CERTIFICATE OF COMPLIANCE
SAR EVALUATION

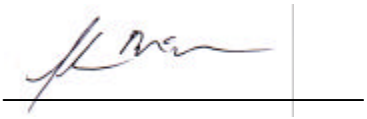
Test Lab:	**Applicant Information:**
CELLTECH RESEARCH INC. Testing and Engineering Lab 1955 Moss Court Kelowna, B.C. Canada V1Y 9L3 Phone: 250 - 860-3130 Fax: 250 - 860-3110 e-mail: info@celltechlabs.com web site: www.celltechlabs.com	**HANDSPRING INC.** 189 Bernardo Avenue Mountain View, CA 94043

FCC Classification:	**Part 24 Licensed Portable Transmitter Held to Ear (PCE)**
FCC Rule Part(s):	**2.1093; ET Docket 96.326**
FCC ID:	**O8FNYNY2**
Model Name(s):	**MANHATTAN, SHEA, ATLANTA**
Equipment Type:	**Single-Mode PCS GSM Phone/PDA**
Tx Frequency Range:	**1850.2 - 1909.8 MHz**
Nominal RF Conducted Pwr:	**30.0 dBm**
Max. RF Output Power:	**1.04 Watts (EIRP)**
Body-Worn Accessories:	**Belt-Clip, Belt-Holster, Ear-Microphone**
Battery Type(s):	**3.7V 850mAh Lithium-Ion**
Antenna Type(s):	**Fixed Stubby**

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 FCC OET Bulletin 65, Supplement C, Edition 01-01 (uncontrolled exposure/general population) 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.

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1.0 INTRODUCTION

This measurement report shows that the HANDSPRING INC. Models: MANHATTAN, SHEA, & ATLANTA PCS GSM Phone/PDA FCC ID: O8FNYNY2 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 PCS GSM Phone/PDA	**FCC ID**	O8FNYNY2
Equipment Class	Licensed Portable Transmitter Held to Ear (PCE)	**Model Name(s)**	MANHATTAN SHEA ATLANTA
FCC Rule Part(s)	§ 2.1093, Docket 96-326	**Application Type(s)**	FCC Part 24 Certification
Tx Frequency Range	1850.2 - 1909.8 MHz	**Battery Type(s)**	3.7V 850mAh Lithium-Ion
Modulation	PCS GSM	**Body-Worn Accessories**	1. Belt-Clip 2. Belt-Holster 3. Ear-Microphone
Nominal RF Conducted Power	30.0 dBm	**Antenna Type**	Fixed Stubby
Serial No.	Pre-production	**Antenna Length**	28 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

Freq. (MHz)	Chan.	Modulation	Unit Model	Power Level (EIRP) (dBm)	Power Drift (dBm)	Antenna Position	Phantom Section	Test Position	SAR 1g (w/kg)
1880.0	661	PCS GSM	MANHATTAN	30.19	-0.13	Fixed	Left Ear	Cheek/Touch	0.306
1880.0	661	PCS GSM	MANHATTAN	30.19	0.00	Fixed	Left Ear	Ear/Tilt	0.108
1880.0	661	PCS GSM	MANHATTAN	30.19	-0.15	Fixed	Right Ear	Cheek/Touch	0.396
1880.0	661	PCS GSM	MANHATTAN	30.19	-0.17	Fixed	Right Ear	Ear/Tilt	0.104
1880.0	661	PCS GSM	SHEA	30.08	-0.16	Fixed	Left Ear	Cheek/Touch	0.333
1880.0	661	PCS GSM	SHEA	30.08	-0.15	Fixed	Left Ear	Ear/Tilt	0.103
1880.0	661	PCS GSM	SHEA	30.08	0.00	Fixed	Right Ear	Cheek/Touch	0.367
1880.0	661	PCS GSM	SHEA	30.08	-0.04	Fixed	Right Ear	Ear/Tilt	0.107
1880.0	661	PCS GSM	ATLANTA	29.52	0.17	Fixed	Left Ear	Cheek/Touch	0.292
1880.0	661	PCS GSM	ATLANTA	29.52	0.12	Fixed	Left Ear	Ear/Tilt	0.110
1880.0	661	PCS GSM	ATLANTA	29.52	-0.10	Fixed	Right Ear	Cheek/Touch	0.323
1880.0	661	PCS GSM	ATLANTA	29.52	0.11	Fixed	Right Ear	Ear/Tilt	0.0781

Mixture Type: Brain (Measured)			
Test Date	**Dielectric Constant**	**Conductivity**	**Frequency Measured**
3/4/02	**40.8**	**1.41**	**1880MHz**
3/5/02	**40.3**	**1.40**	**1880MHz**
3/27/02	**40.4**	**1.42**	**1900MHz**

ANSI / IEEE C95.1 1992 - SAFETY LIMIT
Spatial Peak - Uncontrolled Exposure / General Population
BRAIN: 1.6 W/kg (averaged over 1 gram)

Test Date(s): March 4, 2002 (Manhattan)
March 5, 2002 (Shea)
March 27, 2002 (Atlanta)

Notes:

1. The conducted power level for all three devices could not be measured during the SAR evaluation. The EUTs were tested at the maximum conducted power level set by the manufacturer.
2. The SAR values measured for mid channel were 3.0dB or greater below the SAR limit of 1.6 w/kg, therefore only mid channel data is reported.
3. The SAR values measured were below the maximum limit of 1.6 w/kg (averaged over 1 gram).
4. The highest head SAR value measured for the Manhattan unit was 0.396 w/kg.
5. The highest head SAR value measured for the Shea unit was 0.367 w/kg.
6. The highest head SAR value measured for the Atlanta unit was 0.323 w/kg.
7. Test Conditions:

	March 4,2002	March 5, 2002	March 27, 2002
Ambient TEMPERATURE:	22.8 °C	22.8 °C	23.9 °C
Relative HUMIDITY:	30.6 %	31.5 %	31.0 %
Atmospheric PRESSURE:	102.71 kPa	102.43 kPa	102.27 kPa
Fluid TEMPERATURE:	≈ 23 °C	≈ 23 °C	≈ 23 °C

MEASUREMENT SUMMARY (Cont.)

BODY SAR MEASUREMENT RESULTS

Freq. MHz)	Chan.	Mode	Unit Model	Power Level (EIRP) (dBm)	Power Drift (dBm)	Antenna Position	Phantom Section	Body-Worn Accessory	SAR 1g (w/kg)
1880.0	661	PCS GSM	MANHATTAN	30.19	0.03	Fixed	Planar	Belt-Holster	0.196
1880.0	661	PCS GSM	MANHATTAN	30.19	0.00	Fixed	Planar	Belt-Clip	0.153
1880.0	661	PCS GSM	SHEA	30.08	-0.06	Fixed	Planar	Belt-Holster	0.235
1880.0	661	PCS GSM	SHEA	30.08	-0.11	Fixed	Planar	Belt-Clip	0.162
1880.0	661	PCS GSM	ATLANTA	29.52	-0.02	Fixed	Planar	Belt-Holster	0.155
1880.0	661	PCS GSM	ATLANTA	29.52	0.08	Fixed	Planar	Belt-Clip	0.150

Mixture Type: Body (Measured)				
Test Date	**Dielectric Constant**	**Conductivity**	**Frequency Measured**	**ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak - Uncontrolled Exposure / General Population BODY: 1.6 W/kg (averaged over 1 gram)**
3/4/02	**51.6**	**1.52**	**1880MHz**	
3/5/02	**53.6**	**1.51**	**1880MHz**	
3/27/02	**52.3**	**1.54**	**1900MHz**	

Test Date(s): March 4, 2002 (Manhattan)
March 5, 2002 (Shea)
March 27, 2002 (Atlanta)

Notes:

1. The conducted power level for all three devices could not be measured during the SAR evaluation. The EUTs were tested at the maximum conducted power level set by the manufacturer.
2. The SAR values measured for mid channel were 3.0dB or greater below the SAR limit of 1.6 w/kg, therefore only mid channel data is reported.
3. The body SAR values measured were below the maximum limit of 1.6 w/kg (averaged over 1 gram).
4. The highest body SAR value measured for the Manhattan unit was 0.196 w/kg (with belt-holster).
5. The highest body SAR value measured for the Shea unit was 0.235 w/kg (with belt-holster).
6. The highest body SAR value measured for the Atlanta unit was 0.155 w/kg (with belt-holster).
7. The EUTs were tested for body SAR with the clamshell closed, which is the only intended body-worn operating configuration.
8. The EUTs were tested for body SAR with manufacturer's belt-holster. The belt-holster provided a 1.5cm separation distance between the front of the EUT and the outer surface of the planar phantom. The belt-holster is designed so that the EUT can only be placed in the holster with the front LCD side of the EUT facing the user's body.
9. The EUTs were tested for body SAR with manufacturer's belt-clip. The belt-clip provided a 2.0cm separation distance between the back of the EUT and the outer surface of the planar phantom.
10. The EUTs were tested for body SAR with ear-microphone set connected.
11. Test Conditions:

	March 4,2002	March 5, 2002	March 27, 2002
Ambient TEMPERATURE:	22.8°C	22.2°C	23.9°C
Relative HUMIDITY:	30.6%	31.5%	31.0%
Atmospheric PRESSURE:	102.71 kPa	102.43 kPa	102.27 kPa
Fluid TEMPERATURE:	≈ 23.0 °C	≈ 23.0 °C	≈ 23.0 °C

5.0 DETAILS OF SAR EVALUATION

The HANDSPRING Models: MANHATTAN, SHEA, & ATLANTA Single-Mode PCS GSM Phone/PDAs FCC ID: O8FNYNY2 were found to be compliant for localized Specific Absorption Rate (SAR) based on the following test provisions and conditions:

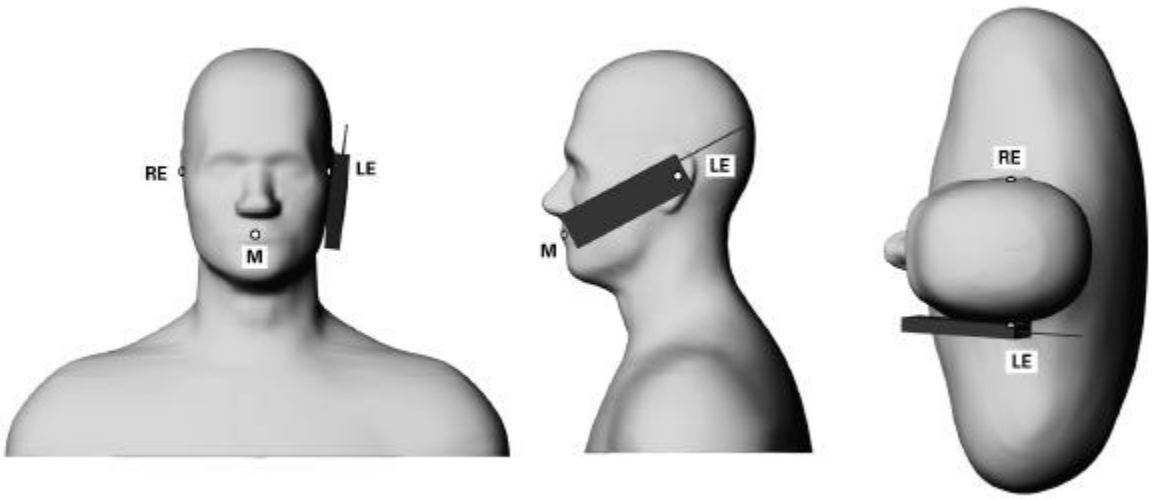
1) The EUT was tested in a ear-held configuration on both the left and right sections of the phantom as follows:

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).

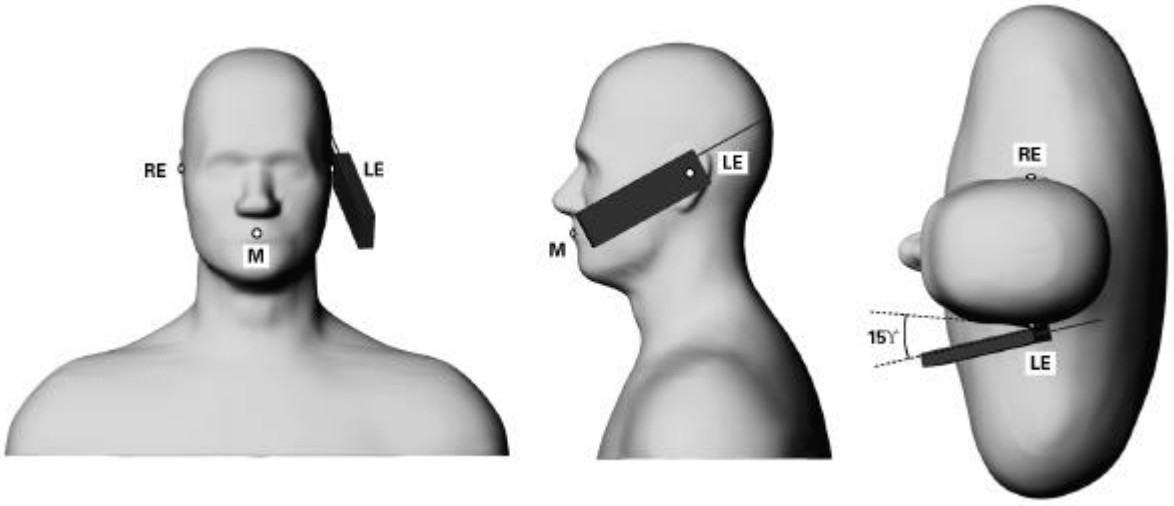
c) While maintaining the three alignments, the body of the handset was gradually adjusted to each of the following test positions:

- 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 manufacturer's belt-holster and ear-microphone. The belt-holster is designed so that the phone can only be placed in the holster with the front LCD side facing the user's body. The front of the phone and belt-holster were placed parallel to, and the belt-holster touching, the outer surface of the planar phantom. The belt-holster provided a 1.5 cm separation distance between the front of the phone and the outer surface of the planar phantom.
3) The EUT was tested in a body-worn configuration with the manufacturer's belt-clip and ear-microphone. The back of the phone and belt-clip were placed parallel to, and the belt-clip touching, the outer surface of the planar phantom. The belt-clip provided a 2.0 cm separation distance between the back of the phone and the outer surface of the planar phantom.
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 level for all three devices could not be measured during the SAR evaluation. The EUT was tested at the maximum conducted power level set by the manufacturer.
5) The EUT was placed into test mode using a Wavetek 4201S base station simulator at a full rated power.
6) The location of the maximum spatial SAR distribution (Hot Spot) was determined relative to the handset and its antenna.
7) 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 maximum power. 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 using a uniform grid spacing.

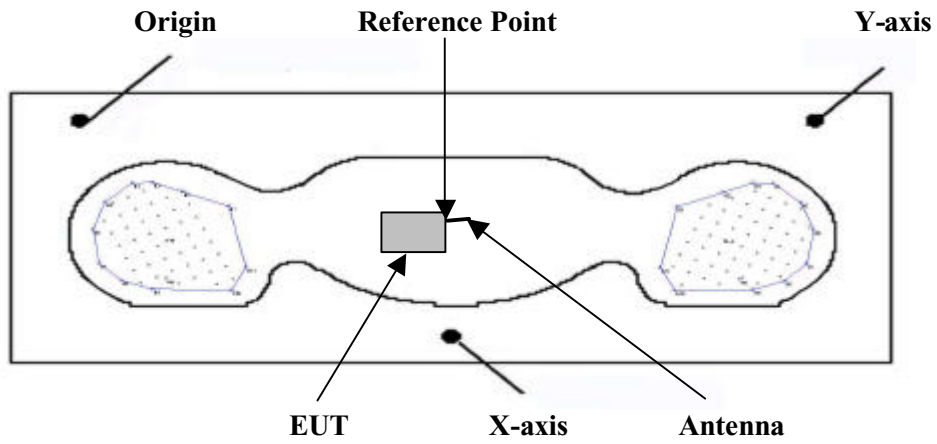
c. A 5x5x7 matrix was performed around the greatest spatial SAR distribution found during the area scan of the applicable exposed region. SAR values were then calculated using a 3-D spline interpolation algorithm and averaged over spatial volumes of 1 and 10 grams.

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

e. During the evaluation, two E-field probes were used (SN: 1590 for Manhattan & Shea units, and SN: 1387 for the Atlanta unit). The probe conversion factors for SN: 1387 are the same for 1800MHz and 1900MHz (See Appendix C for system manufacturer's certified probe conversion factors). The SN: 1590 probe was calibrated for 1800MHz only. The conversion factors can be extrapolated using the following manufacturer's recommended procedures:

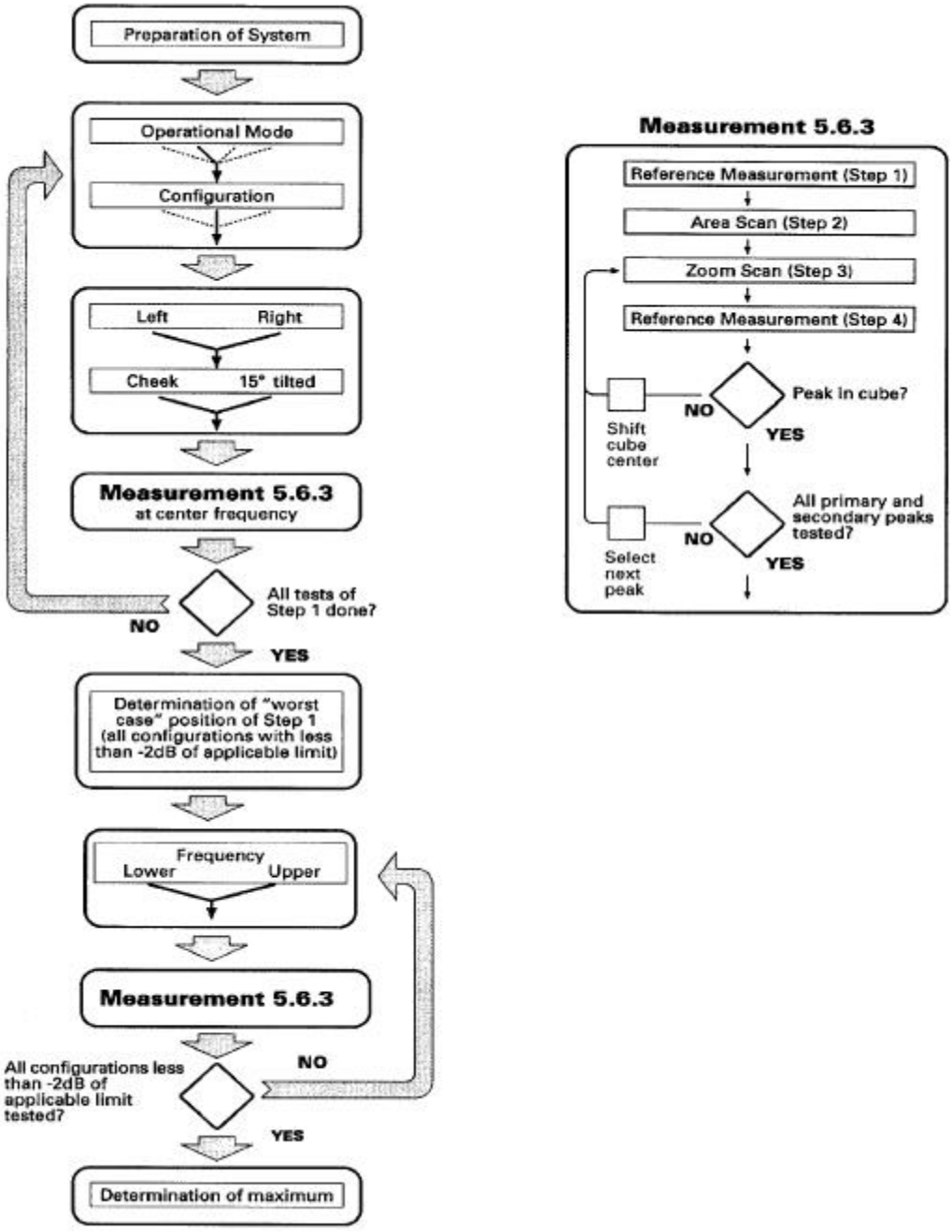
- In brain and muscle tissue between 750MHz and 1GHz, the conversion factor decreases approximately 1.3% per 100MHz frequency increase.
- In brain and muscle tissue between 1.6GHz and 2GHz, the conversion factor decreases approximately 1% per 100MHz frequency increase.

By using the extrapolation method, the change in the conversion factors for the SN: 1590 probe from 1800MHz to 1880MHz yielded an approximate 0.8% increase in the highest SAR reported for both head and body measurements, which is less than the uncertainty of the probe conversion factors and considerably less then the overall uncertainty of the entire system. The uncertainty budget was updated to reflect the greater uncertainty in the probe calibration.



Device Positioning & Reference Point (Body SAR)

EVALUATION PROCEDURES (Cont.)



Flow Chart of the recommended practices and procedures per IEEE Std 1528 (Draft) [see reference 5]

7.0 SYSTEM VALIDATION

Prior to the assessment, the system was verified in the planar section of the SAM phantom using an 1800MHz dipole. A forward power of 250mW was applied to the dipole, and the system was verified to a tolerance of ±10%. The applicable verifications are listed below (see Appendix B for validation test plots):

Dipole Validation Kit	Target SAR 1g (w/kg)	Measured SAR 1g (w/kg)	Fluid Temperature	Fluid Depth	Validation Date
D1800V2	9.66	9.65	≈23.0 °C	≥ 15cm	03/04/02
		9.64	≈23.0 °C	≥ 15cm	03/05/02
		9.67	≈23.0 °C	≥ 15cm	03/27/02

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 listed below. See Appendix D for printout of measured fluid dielectric parameters.

TISSUE PARAMETERS - SYSTEM VALIDATION & EUT EVALUATION			
Equivalent Tissue	**Dielectric Constant ε_r**	**Conductivity σ (mho/m)**	**ρ (Kg/m^3)**
1800MHz Head - Target (System Validation)	**40.0 ±5%**	**1.40 ±5%**	**1000**
1800MHz Head (Measured: 03/04/02)	39.2	1.40	1000
1800MHz Head (Measured: 03/05/02)	39.1	1.40	1000
1800MHz Head (Measured: 03/27/02)	39.6	1.40	1000
1880/1900MHz Head - Target (EUT Evaluation)	**40.0 ±5%**	**1.40 ±5%**	**1000**
1880MHz Head (Measured: 03/04/02)	40.8	1.41	1000
1880MHz Head (Measured: 03/05/02)	40.3	1.40	1000
1900MHz Head (Measured: 03/27/02)	40.4	1.42	1000
1880/1900MHz Body - Target (EUT Evaluation)	**53.3 ±5%**	**1.52 ±5%**	**1000**
1880MHz Body (Measured: 03/04/02)	51.6	1.52	1000
1880MHz Body (Measured: 03/05/02)	53.6	1.51	1000
1900MHz Body (Measured: 03/27/02)	52.3	1.54	1000

9.0 SIMULATED TISSUES

The 1800-1900MHz brain and body fluids consist of Glycol-monobutyl, water, and salt. The fluid was prepared according to standardized procedures, and measured for dielectric parameters (permitivity and conductivity).

TISSUE MIXTURE - SYSTEM VALIDATION & EUT EVALUATION			
INGREDIENT	**1800MHz Brain Fluid (System Validation)**	**1900MHz Brain Fluid (EUT Evaluation)**	**1900MHz Body Fluid (EUT Evaluation)**
Water	54.90 %	55.30 %	70.31 %
Glycol Monobutyl	44.92 %	44.52 %	29.56 %
Salt	0.18 %	0.18 %	0.13 %

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(s)

Model:	ET3DV6
Serial No(s).:	1590, 1387
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 -ET3DV6 E-Field Probe -300MHz Validation Dipole -450MHz Validation Dipole -900MHz Validation Dipole -1800MHz Validation Dipole -2450MHz Validation Dipole -SAM Phantom V4.0C	 599396-01 1590 1387 135 136 054 247 150 N/A	 N/A Mar 2001 Feb 2002 Oct 2001 Oct 2001 June 2001 June 2001 Oct 2001 N/A
85070C Dielectric Probe Kit	N/A	N/A
Gigatronics 8652A Power Meter -Power Sensor 80701A -Power Sensor 80701A	1835272 1833535 1833542	Feb 2002 Feb 2002 Mar 2002
Wavetek 4201S GSM Base Station Simulator	0213286	Oct 2001
E4408B Spectrum Analyzer	US39240170	Nov 2001
8594E Spectrum Analyzer	3543A02721	Feb 2002
8753E Network Analyzer	US38433013	Feb 2002
8648D Signal Generator	3847A00611	Feb 2002
5S1G4 Amplifier Research Power Amplifier	26235	N/A

16.0 MEASUREMENT UNCERTAINTIES

Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	c_i 1g	Standard Uncertainty ±% (1g)	v_i or v_{eff}
Measurement System						
Probe calibration (SN: 1590)	± 4.4	Normal	1	1	± 4.4	∞
Probe calibration (SN: 1387)	± 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)	± 10.0	Rectangular	√3	0.6	± 3.5	∞
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 (1590 Probe)					**± 13.6**	
Expanded Uncertainty (k=2) (1590 Probe)					**± 27.1**	
Combined Standard Uncertainty (1387 Probe)					**± 13.7**	
Expanded Uncertainty (k=2) (1387 Probe)					**± 27.5**	

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

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 Niels 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.

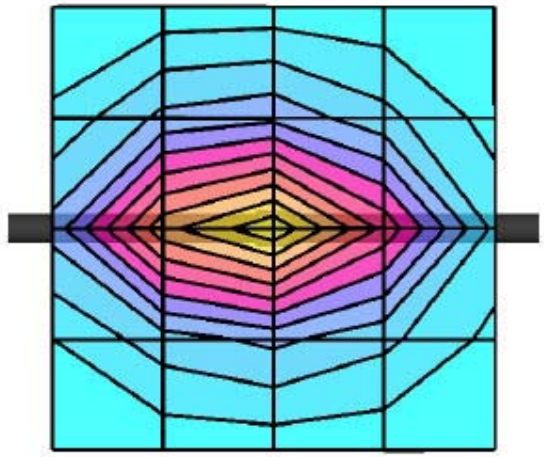
[5] IEEE Standards Coordinating Committee 34, Std. P1528, DRAFT Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques: Draft, December 2001.

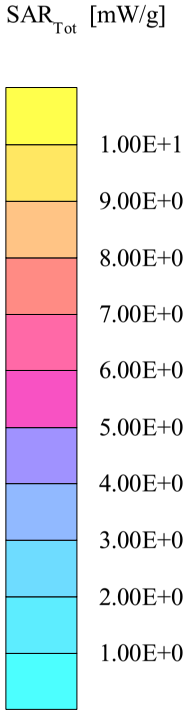
APPENDIX A - SAR MEASUREMENT DATA

APPENDIX B - SYSTEM VALIDATION

Validation Dipole D1800V2 SN:247, d = 10 mm

Frequency: 1800 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(5.57,5.57,5.57); Crest factor: 1.0; IEEE1528 1800 MHz : σ = 1.36 mho/m ε_r = 40.0 ρ = 1.00 g/cm^3
Cubes (2): Peak: 18.2 mW/g ± 0.04 dB, SAR (1g): 9.66 mW/g ± 0.03 dB, SAR (10g): 5.02 mW/g ± 0.03 dB, (Worst-case extrapolation)
Penetration depth: 8.2 (7.6, 9.4) [mm]
Powerdrift: -0.01 dB





Dipole 1800 MHz

SAM Phantom; Flat Section

Probe: ET3DV6 - SN1590; ConvF(5.78,5.78,5.78); Crest factor: 1.0; 1800 MHz Brain: σ = 1.40 mho/m ε_r = 39.2 ρ = 1.00 g/cm^3

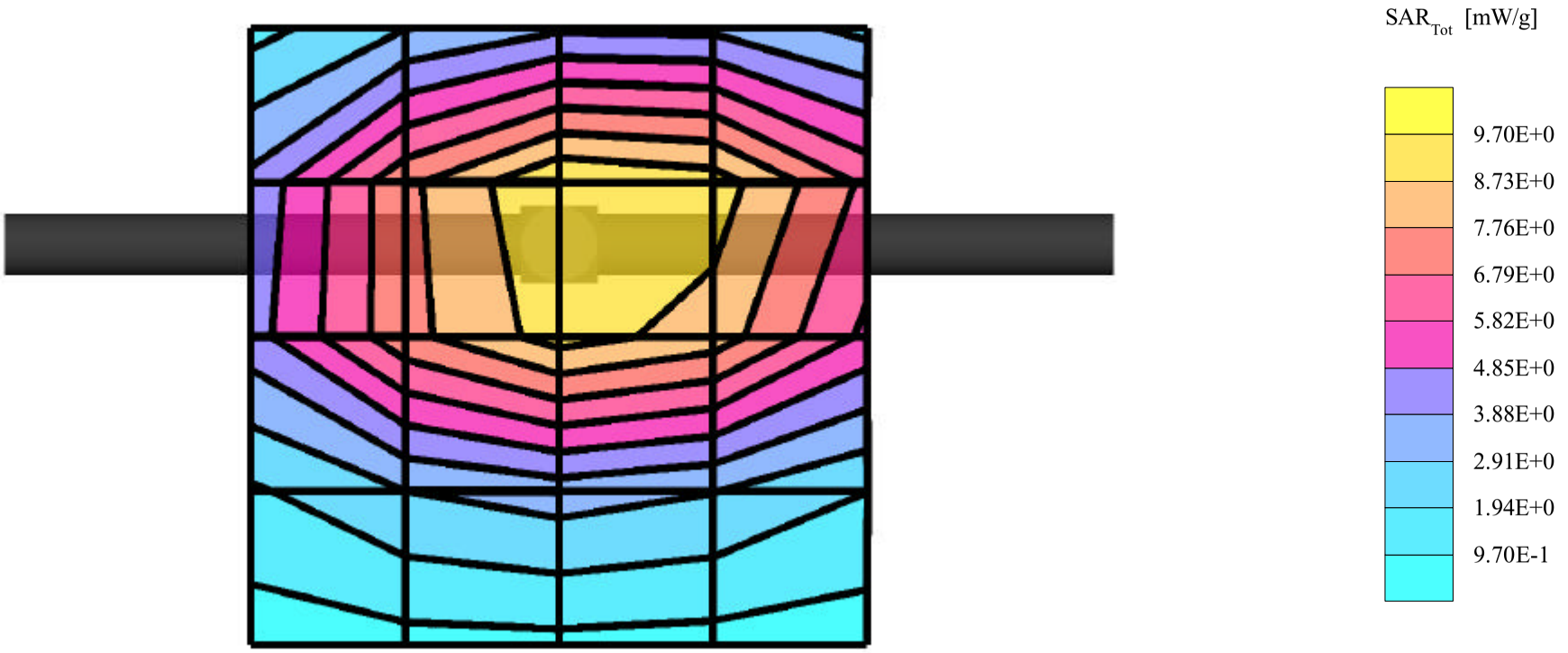
Cube 5x5x7: Peak: 18.6 mW/g, SAR (1g): 9.65 mW/g, SAR (10g): 4.88 mW/g, (Worst-case extrapolation)

Penetration depth: 7.7 (7.3, 8.6) [mm]

Powerdrift: 0.02 dB

Conducted Power: 250 mW

Validation Date: March 04, 2002



Dipole 1800 MHz

SAM Phantom; Flat Section

Probe: ET3DV6 - SN1590; ConvF(5.78,5.78,5.78); Crest factor: 1.0; 1800 MHz Brain: σ = 1.40 mho/m ε_r = 39.1 ρ = 1.00 g/cm^3

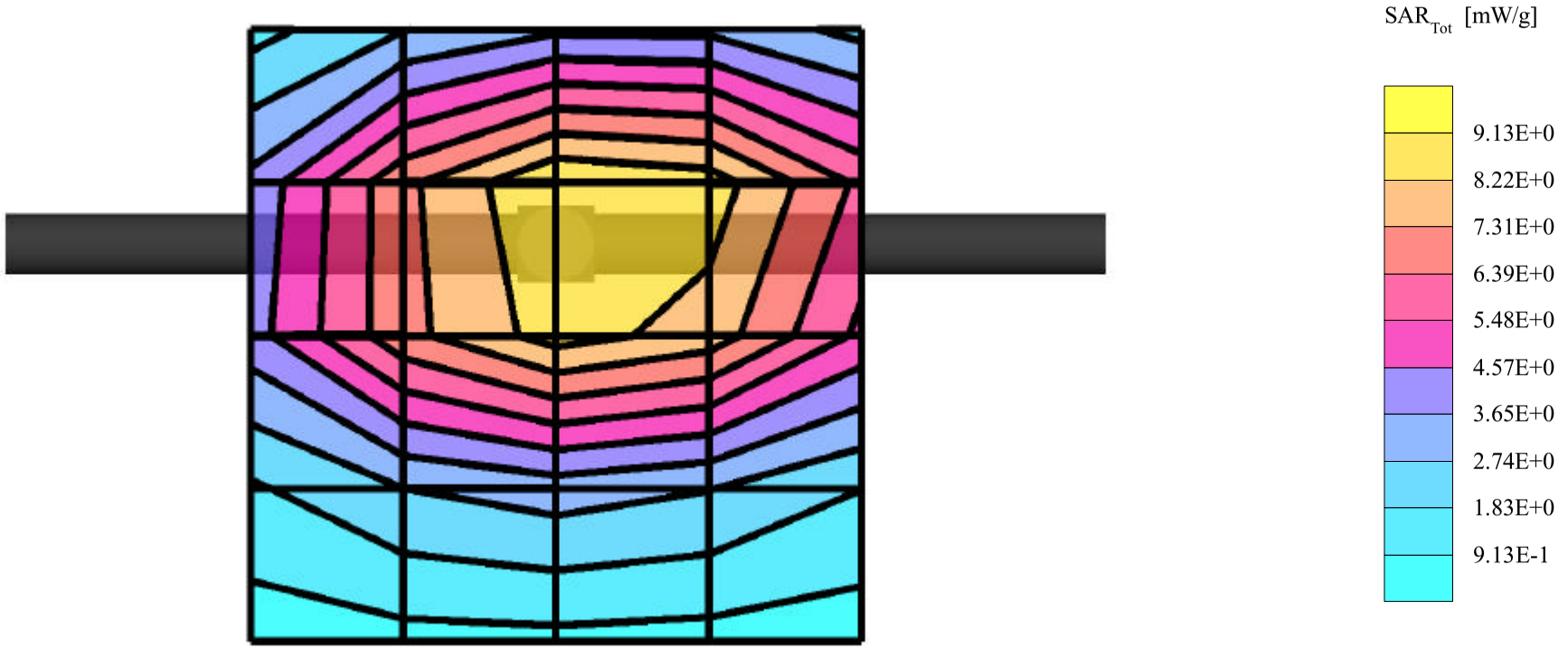
Cube 5x5x7: Peak: 18.7 mW/g, SAR (1g): 9.64 mW/g, SAR (10g): 4.87 mW/g, (Worst-case extrapolation)

Penetration depth: 7.7 (7.3, 8.6) [mm]

Powerdrift: 0.02 dB

Conducted Power: 250 mW

Date Tested: March 05, 2002



Dipole 1800MHz

SAM Phantom; Flat Section

Probe: ET3DV6 - SN1387; ConvF(5.40,5.40,5.40); Crest factor: 1.0; 1800 MHz Brain: σ = 1.40 mho/m ε_r = 39.6 ρ = 1.00 g/cm^3

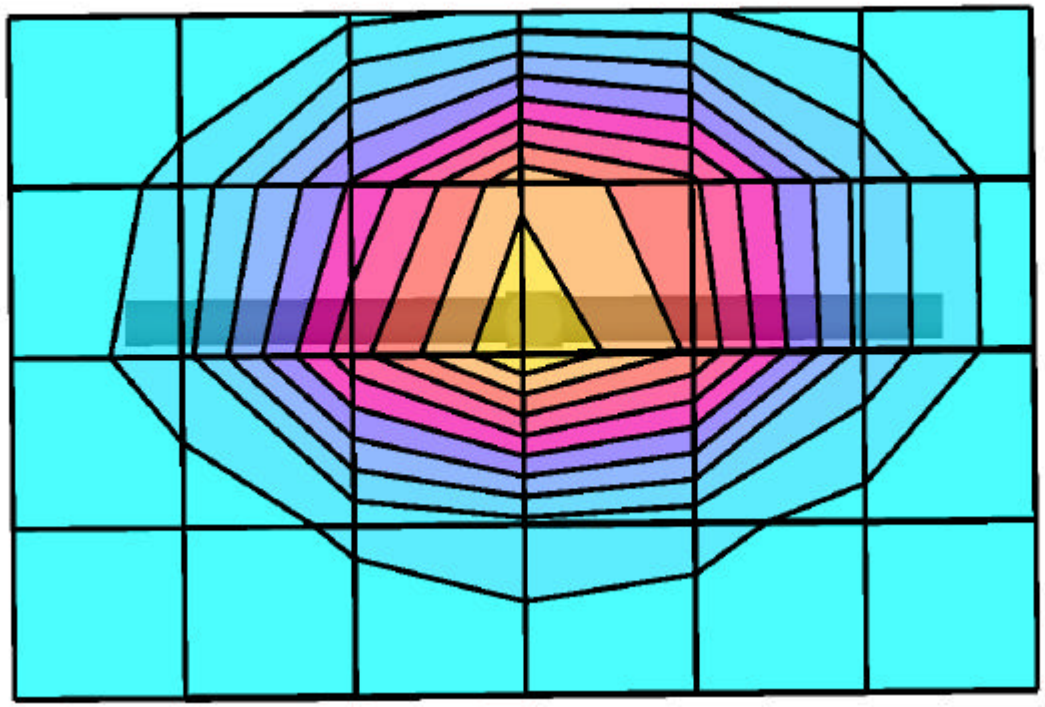
Cube 5x5x7: Peak: 18.9 mW/g, SAR (1g): 9.67 mW/g, SAR (10g): 4.88 mW/g, (Worst-case extrapolation)

Penetration depth: 7.5 (7.1, 8.4) [mm]

Powerdrift: 0.06 dB

Conducted Power: 250mW

Date Tested: March 27, 2002



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** ε_r **= 43.5 ± 5%** σ **= 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** ε_r **= 42 ± 5%** σ **= 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** ε_r **= 40.4 ± 5%** σ **= 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** ε_r **= 40 ± 5%** σ **= 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
ConvF Y	**7.23**	extrapolated
ConvF Z	**7.23**	extrapolated

Body **900 MHz** **ε_r = 55.0 ± 5%** **σ = 1.05 ± 10% mho/m**

ConvF X	**6.61**	± 7% (k=2)
ConvF Y	**6.61**	± 7% (k=2)
ConvF Z	**6.61**	± 7% (k=2)

Body **1500 MHz** **ε_r = 54.0 ± 5%** **σ = 1.30 ± 10% mho/m**

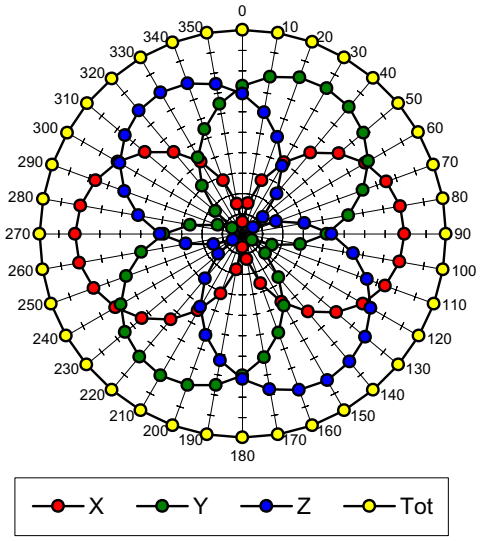
ConvF X	**5.78**	interpolated
ConvF Y	**5.78**	interpolated
ConvF Z	**5.78**	interpolated

Body **1800 MHz** **ε_r = 53.3 ± 5%** **σ = 1.52 ± 10% mho/m**

ConvF X	**5.36**	± 7% (k=2)
ConvF Y	**5.36**	± 7% (k=2)
ConvF Z	**5.36**	± 7% (k=2)

Receiving Pattern (ϕ , θ = 0°

f = 30 MHz, TEM cell ifi110



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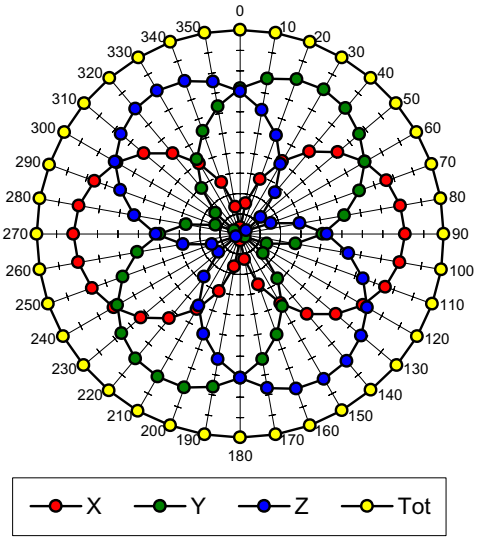

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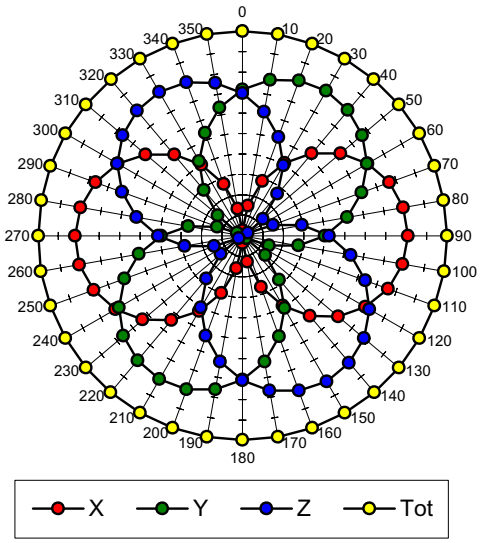
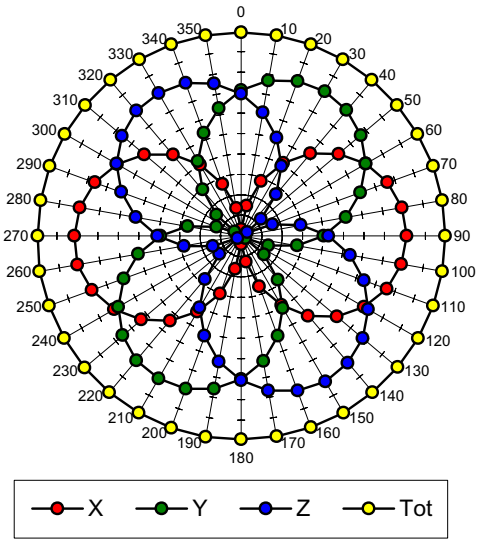
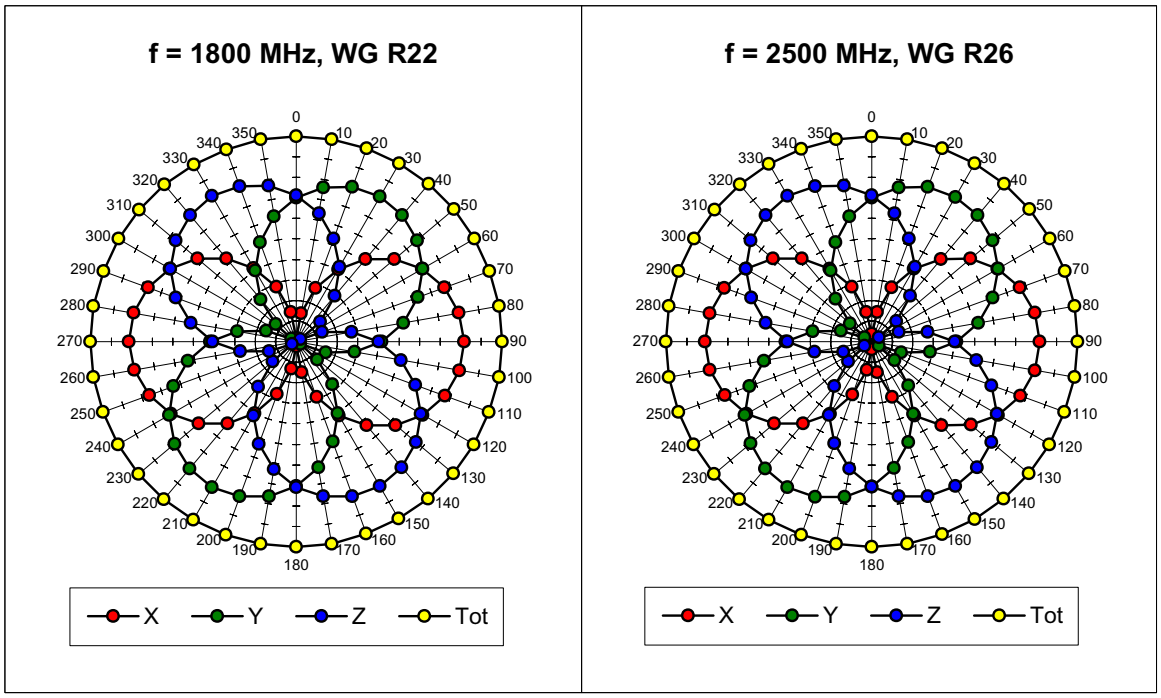
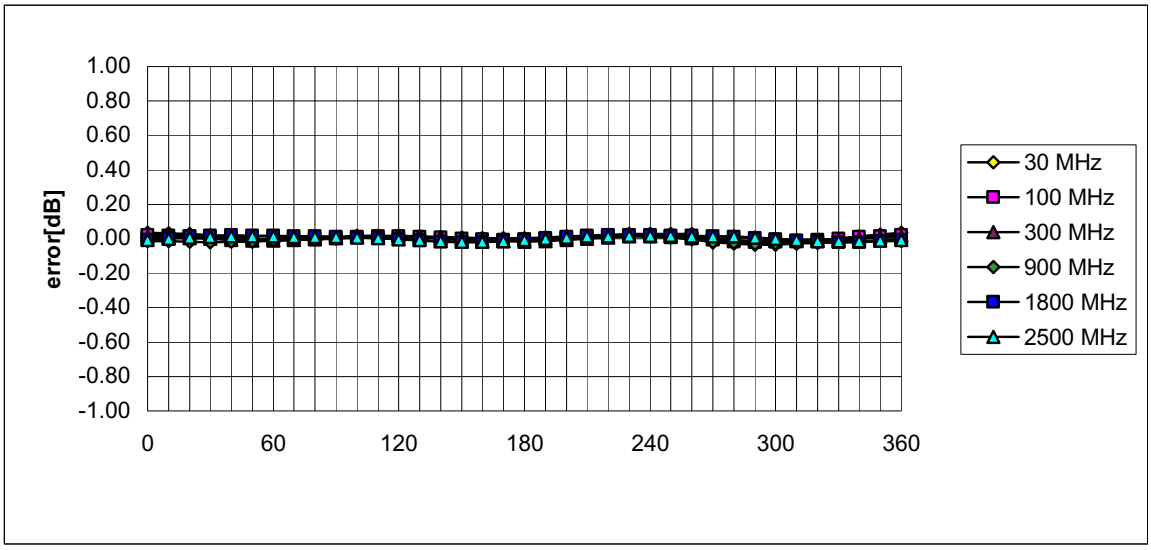


f = 900 MHz, TEM cell ifi110



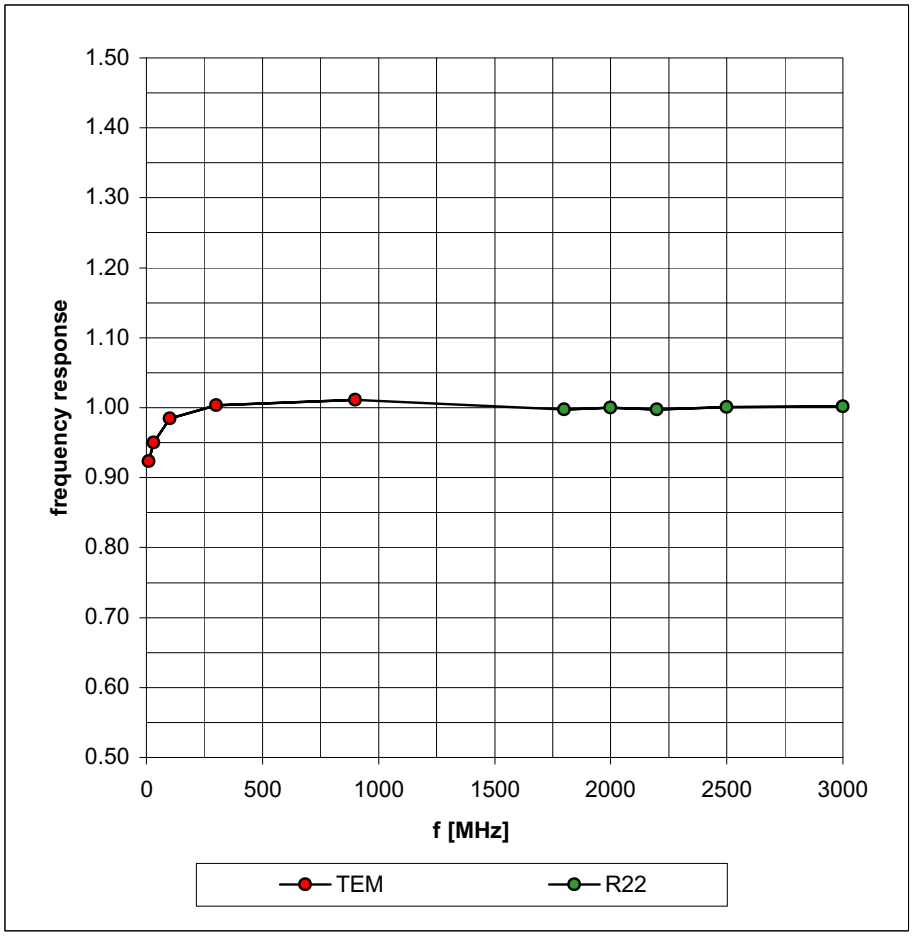


Isotropy Error (ϕ), θ = 0°



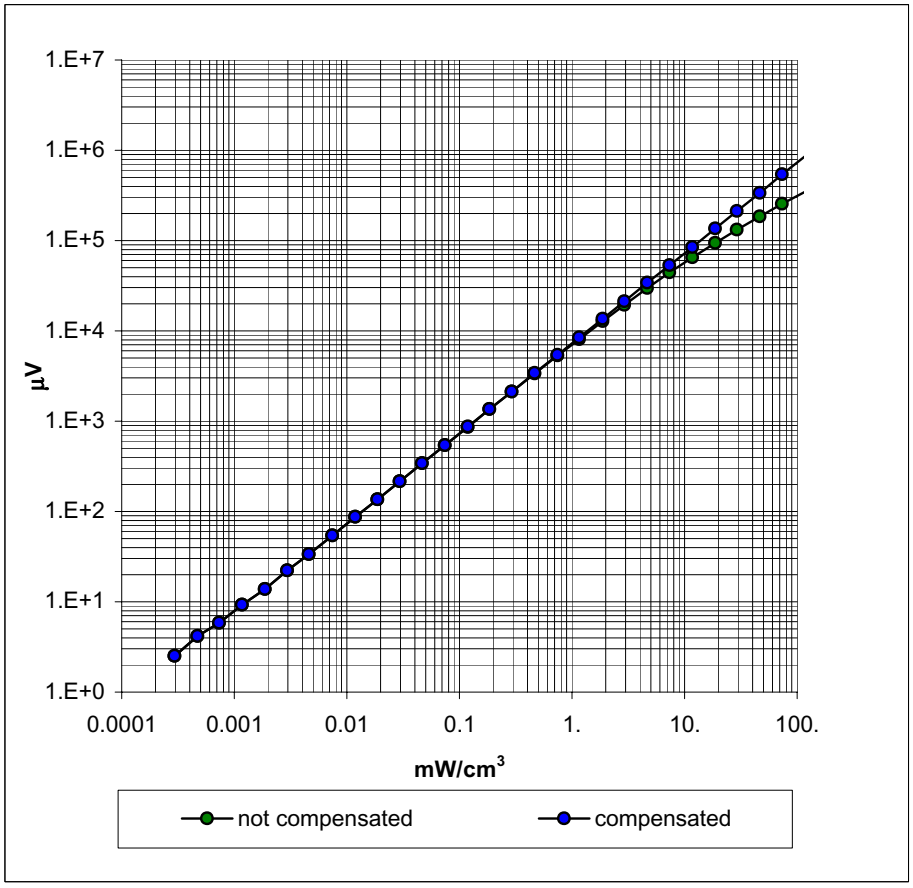
Frequency Response of E-Field

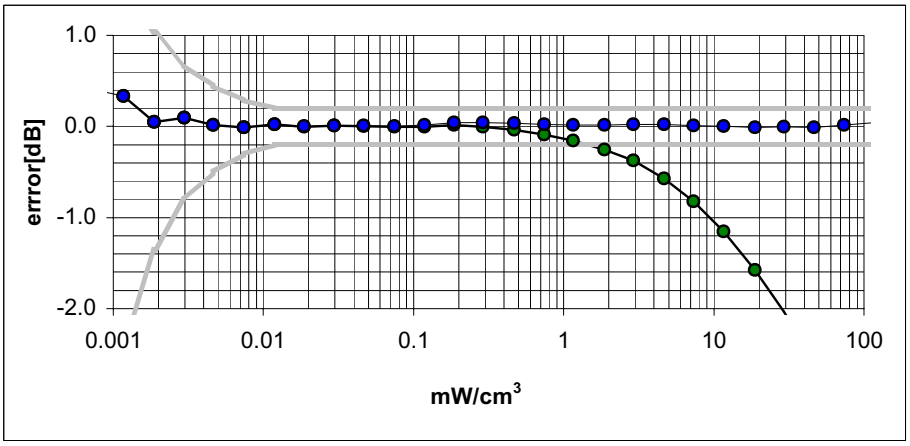
(TEM-Cell:ifi110, Waveguide R22)



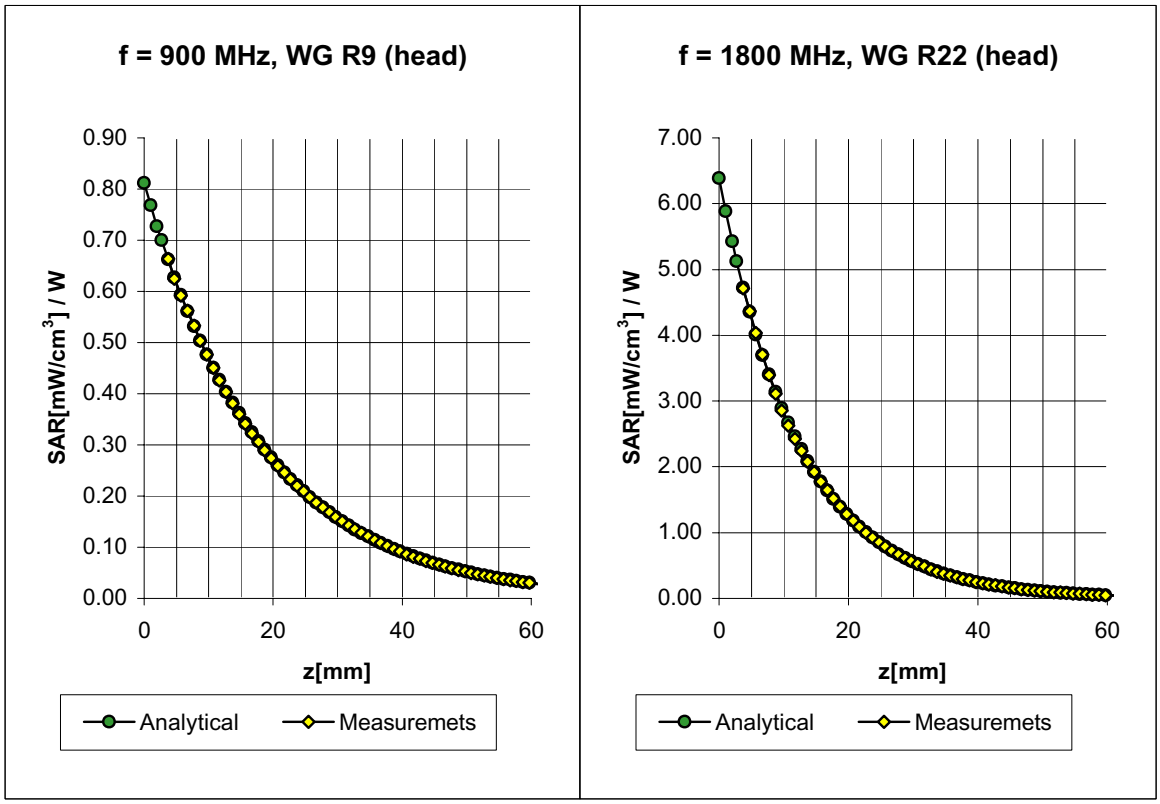
Dynamic Range f(SAR_{brain})

(TEM-Cell:ifi110)





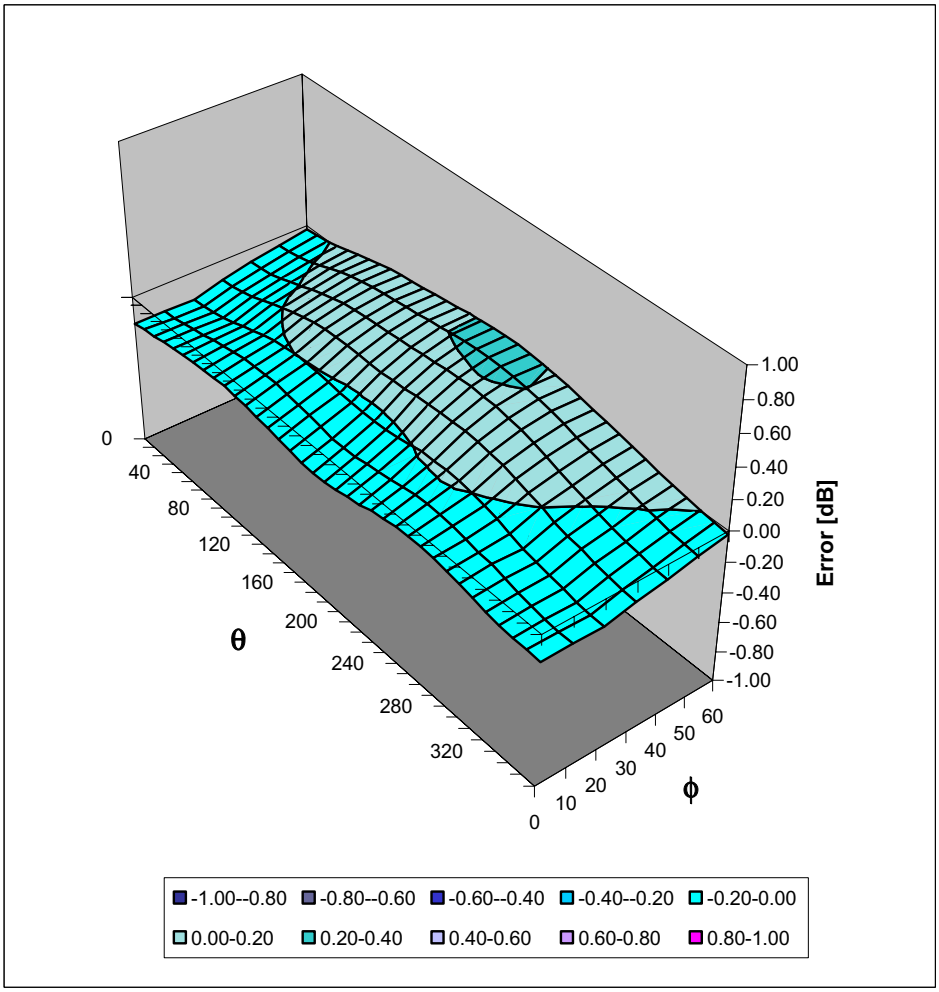
Conversion Factor Assessment



ET3DV6 SN:1590

Deviation from Isotropy in HSL

Error (θϕ), f = 900 MHz



Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

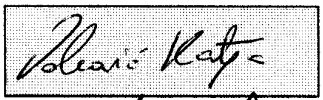
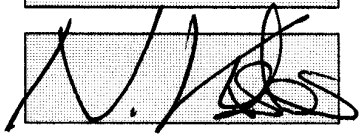
Calibration Certificate

Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1387**
Place of Calibration:	**Zurich**
Date of Calibration:	**February 22, 2002**
Calibration Interval:	**12 months**

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:	
Approved by:	

Probe ET3DV6

SN:1387

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

Calibrated for System DASY3

DASY3 - Parameters of Probe: ET3DV6 SN:1387

Sensitivity in Free Space

Diode Compression

NormX	**1.58** $\mu V/(V/m)^2$		DCP X	**97**	mV
NormY	**1.67** $\mu V/(V/m)^2$		DCP Y	**97**	mV
NormZ	**1.67** $\mu V/(V/m)^2$		DCP Z	**97**	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	**0.40**
ConvF Z	**6.6** ± 9.5% (k=2)		Depth	**2.38**

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	**5.4** ± 9.5% (k=2)		Boundary effect:	
ConvF Y	**5.4** ± 9.5% (k=2)		Alpha	**0.57**
ConvF Z	**5.4** ± 9.5% (k=2)		Depth	**2.18**

Boundary Effect

Head **900 MHz** **Typical SAR gradient: 5 % per mm**

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	9.7	5.4
SAR_{be} [%]	With Correction Algorithm	0.3	0.6

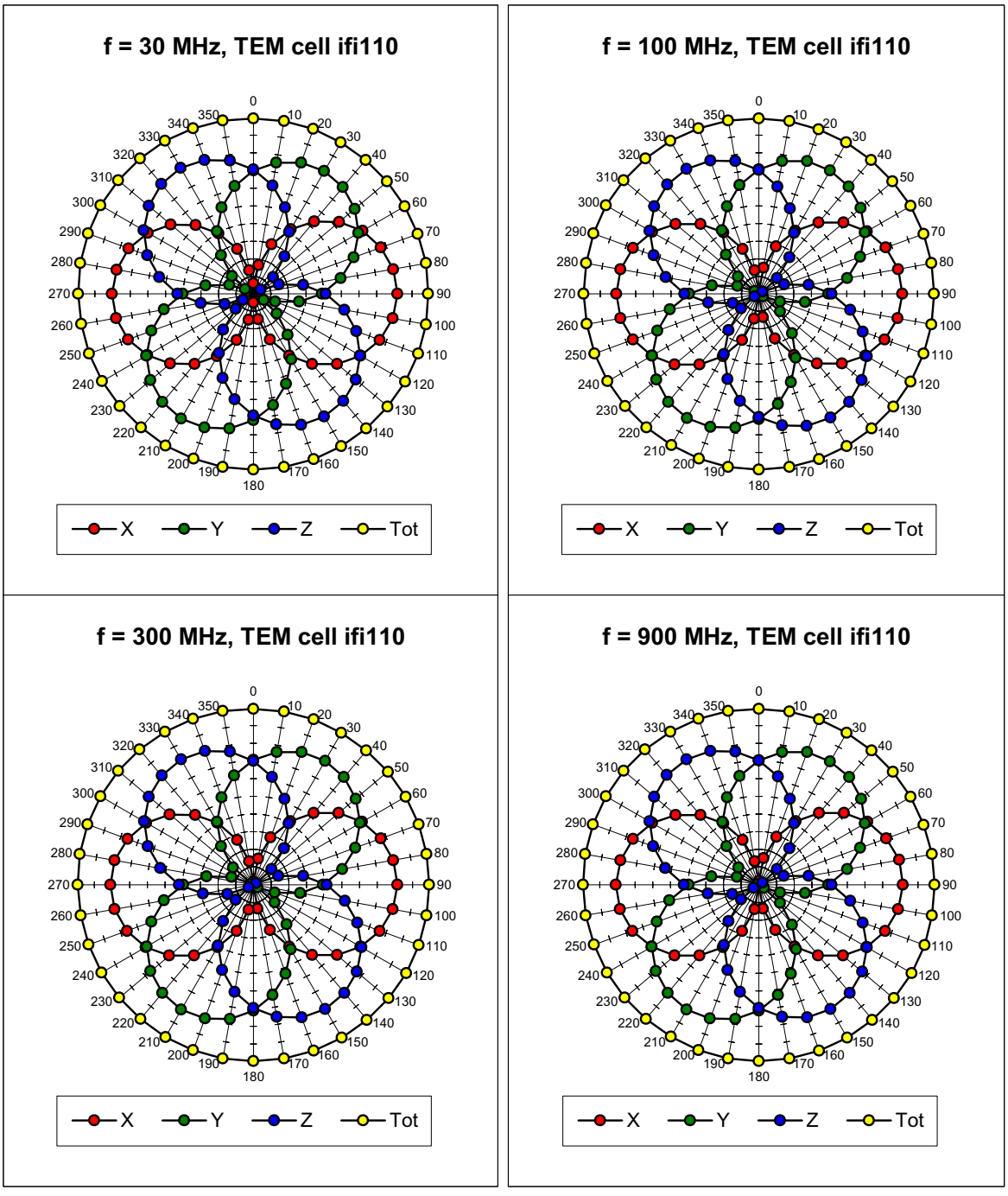
Head **1800 MHz** **Typical SAR gradient: 10 % per mm**

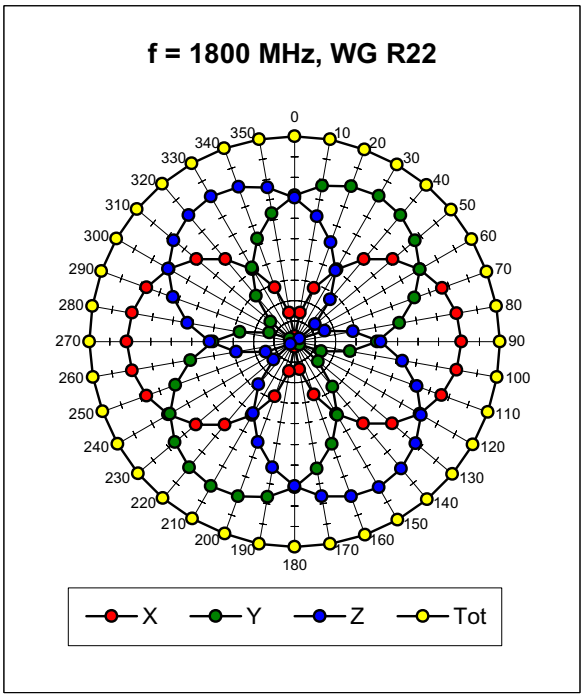
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	11.5	7.3
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

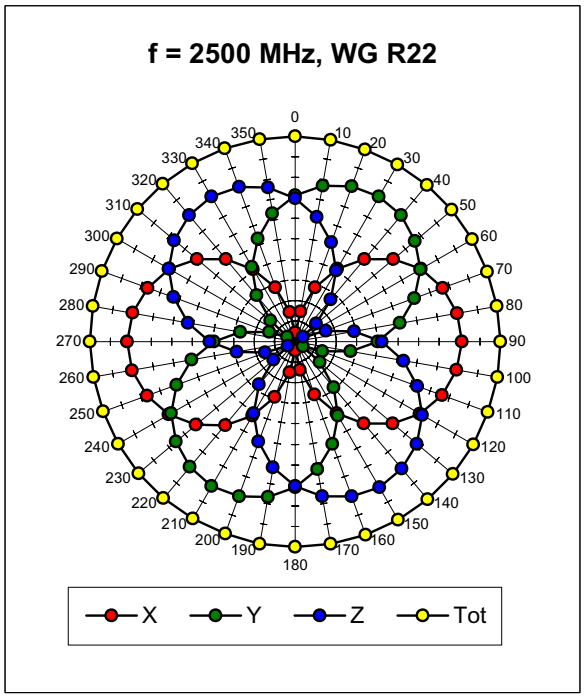
Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.3 ± 0.2**	mm

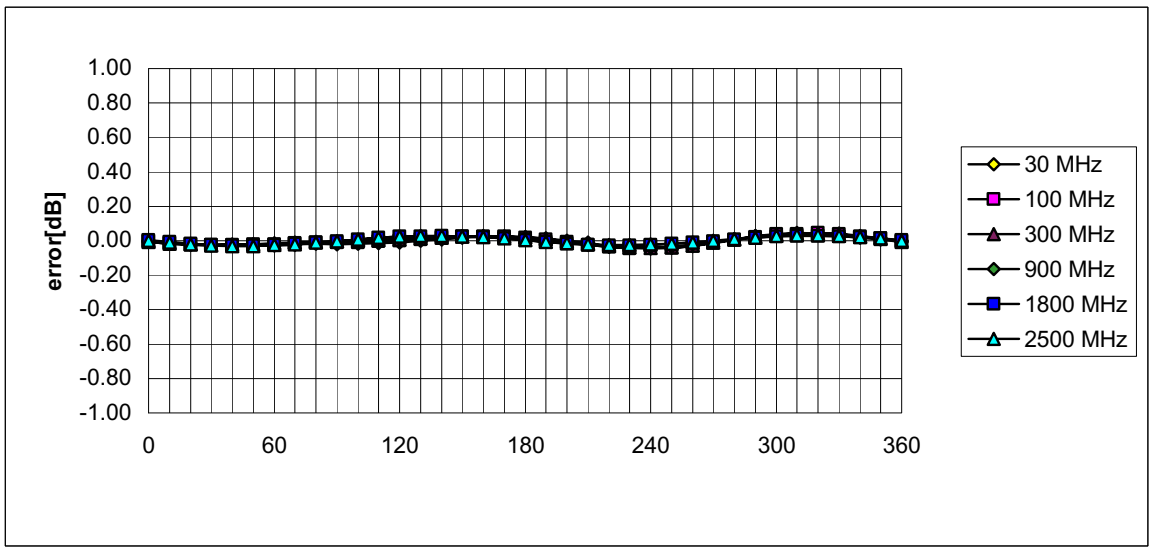
Receiving Pattern (ϕ , θ = 0°





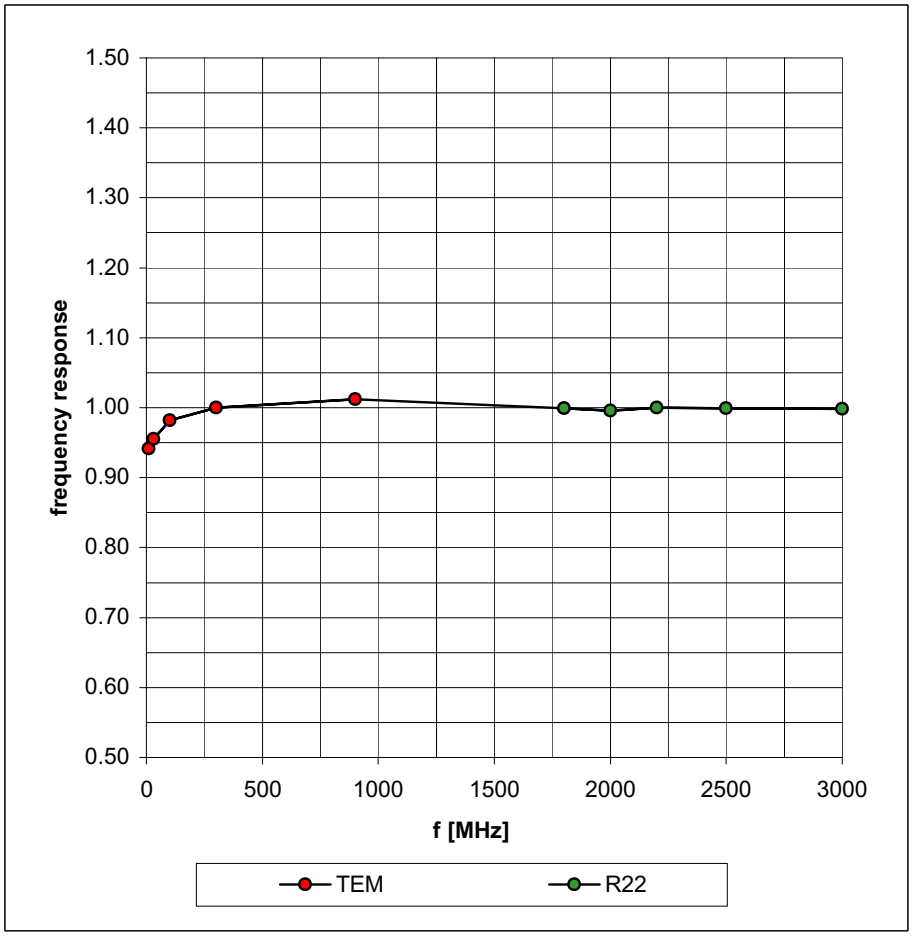


Isotropy Error (ϕ), θ = 0°



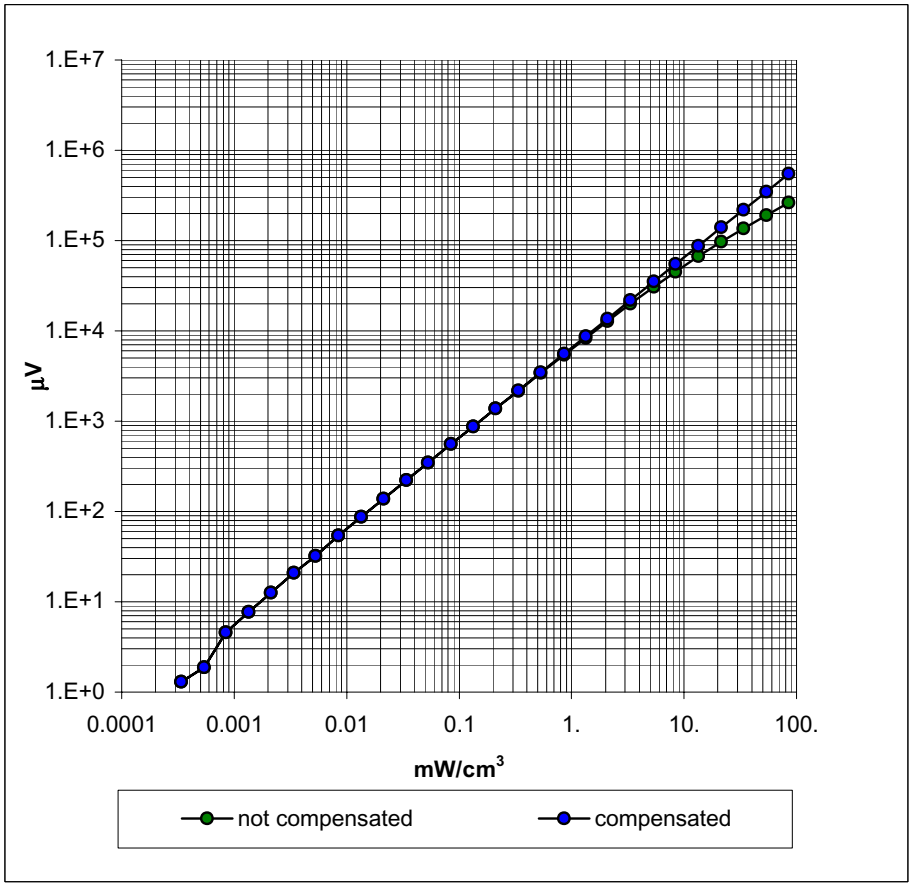
Frequency Response of E-Field

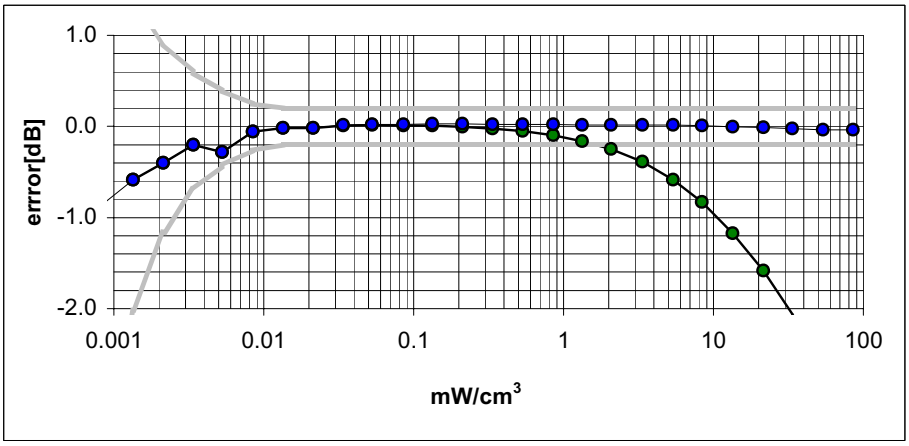
(TEM-Cell:ifi110, Waveguide R22)



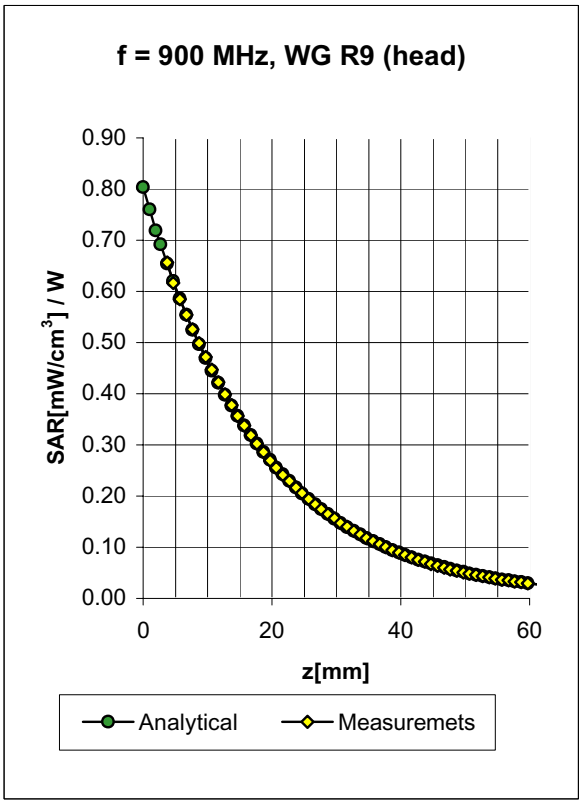
Dynamic Range f(SAR_{brain})

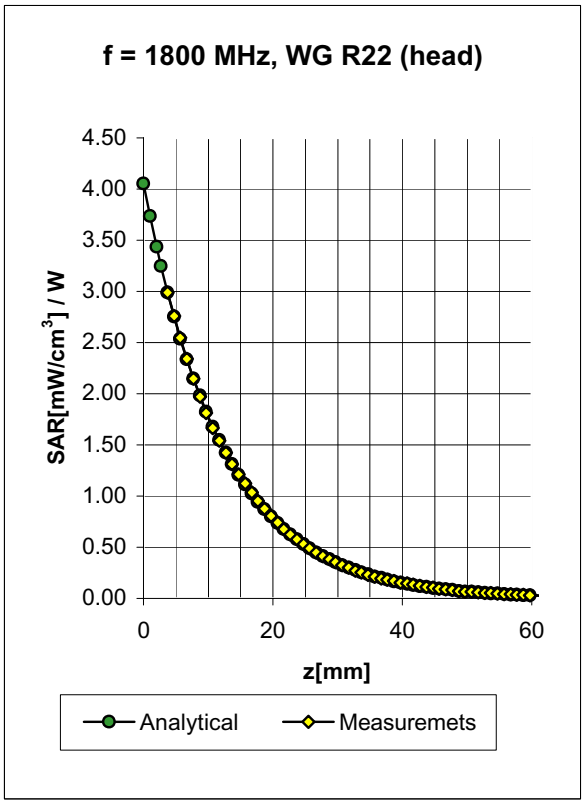
(Waveguide R22)





Conversion Factor Assessment



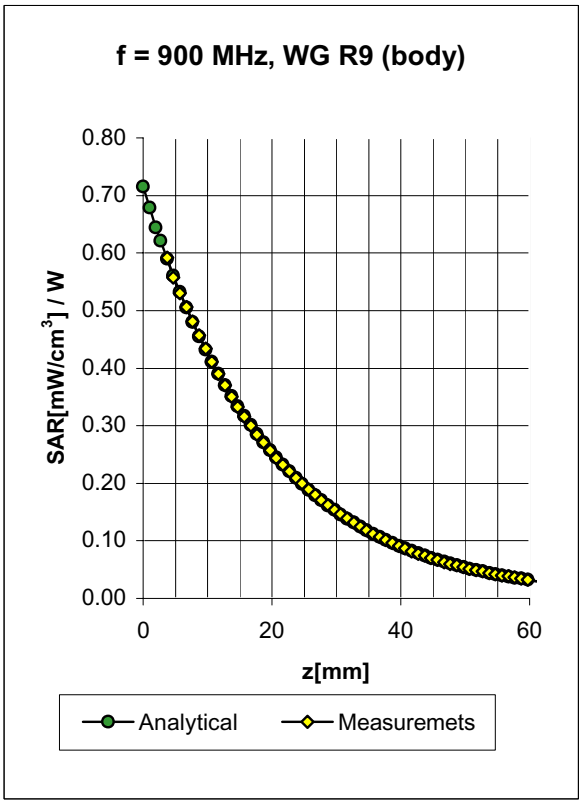


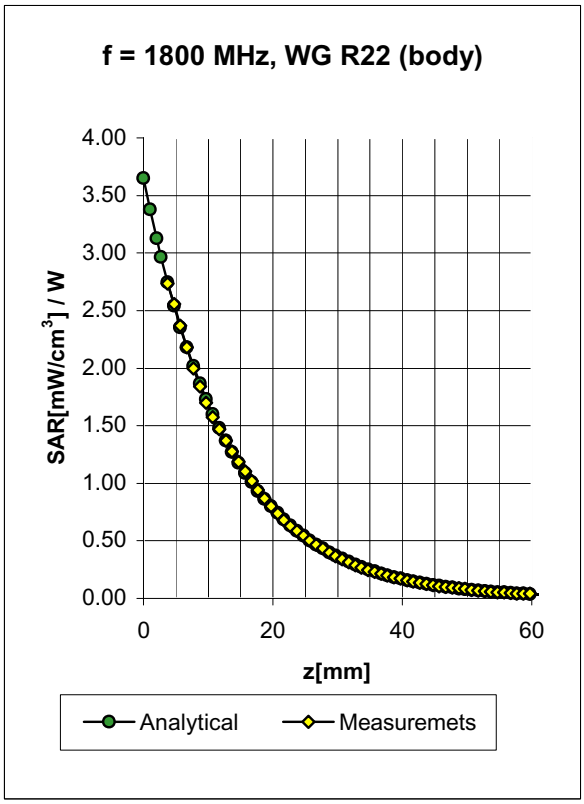
Head	**900 MHz**		**ε_r = 41.5 ± 5%**	**σ = 0.97 ± 5% mho/m**	
Head	**835 MHz**		**ε_r = 41.5 ± 5%**	**σ = 0.90 ± 5% mho/m**	
	ConvF X	**6.6** ± 9.5% (k=2)		Boundary effect:	
	ConvF Y	**6.6** ± 9.5% (k=2)		Alpha	**0.40**
	ConvF Z	**6.6** ± 9.5% (k=2)		Depth	**2.38**

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	**5.4** ± 9.5% (k=2)		Boundary effect:	
	ConvF Y	**5.4** ± 9.5% (k=2)		Alpha	**0.57**
	ConvF Z	**5.4** ± 9.5% (k=2)		Depth	**2.18**

ET3DV6 SN:1387 **February 22, 2002**

Conversion Factor Assessment





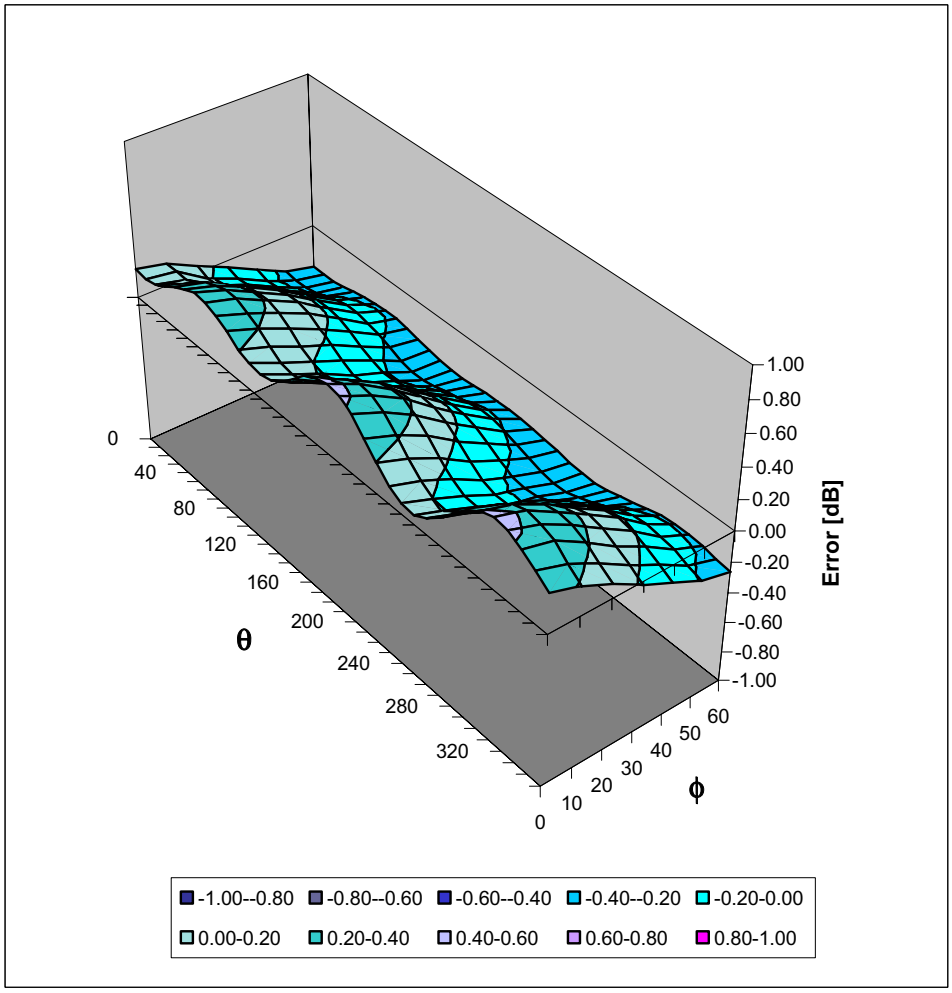
Body	**900 MHz**	ε_r **= 55.0 ± 5%**	**σ = 1.05 ± 5% mho/m**	
Body	**835 MHz**	ε_r **= 55.2 ± 5%**	**σ = 0.97 ± 5% mho/m**	
	ConvF X	**6.3** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.3** ± 9.5% (k=2)	Alpha	**0.42**
	ConvF Z	**6.3** ± 9.5% (k=2)	Depth	**2.44**

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	**5.0** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**5.0** ± 9.5% (k=2)	Alpha	**0.76**
	ConvF Z	**5.0** ± 9.5% (k=2)	Depth	**2.01**

ET3DV6 SN:1387 **February 22, 2002**

Deviation from Isotropy in HSL

Error ($\theta\phi$), f = 900 MHz



Schmid & Partner
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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 25, 2002**
Probe Calibration Date:	**February 22, 2002**

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	**9.2 ± 8%**	**ε_r = 52.3** **σ = 0.76 mho/m** (head tissue)
300 MHz	ConvF	**8.0 ± 8%**	**ε_r = 45.3** **σ = 0.87 mho/m** (head tissue)
450 MHz	ConvF	**7.3 ± 8%**	**ε_r = 43.5** **σ = 0.87 mho/m** (head tissue)
2450 MHz	ConvF	**4.7 ± 8%**	**ε_r = 39.2** **σ = 1.80 mho/m** (head tissue)
150 MHz	ConvF	**8.8 ± 8%**	**ε_r = 61.9** **σ = 0.80 mho/m** (body tissue)
450 MHz	ConvF	**7.7 ± 8%**	**ε_r = 56.7** **σ = 0.94 mho/m** (body tissue)
2450 MHz	ConvF	**4.3 ± 8%**	**ε_r = 52.7** **σ = 1.95 mho/m** (body tissue)

APPENDIX D - MEASURED FLUID DIELECTRIC PARAMETERS

1800MHz System Validation

Measured Fluid Dielectric Parameters (Brain)

March 4, 2002

Frequency	e'	e"
1.750000000 GHz	39.3311	13.9853
1.760000000 GHz	39.2881	13.9932
1.770000000 GHz	39.2368	13.9949
1.780000000 GHz	39.2291	13.9969
1.790000000 GHz	39.2235	13.9987
1.800000000 GHz	39.2159	14.0189
1.810000000 GHz	39.1886	14.0357
1.820000000 GHz	39.1528	14.0493
1.830000000 GHz	39.0799	14.0682
1.840000000 GHz	39.0462	14.1327
1.850000000 GHz	38.9829	14.1586
1.860000000 GHz	38.9557	14.1813
1.870000000 GHz	38.8796	14.2159
1.880000000 GHz	38.8499	14.2597
1.890000000 GHz	38.8321	14.2956
1.900000000 GHz	38.7928	14.3497
1.910000000 GHz	38.7690	14.3763
1.920000000 GHz	38.7294	14.3946
1.930000000 GHz	38.6913	14.4194
1.940000000 GHz	38.6783	14.4329
1.950000000 GHz	38.6457	14.4595

1880MHz EUT Evaluation (Head)

Measured Fluid Dielectric Parameters (Brain)

March 4, 2002

Frequency	e'	e"
1.750000000 GHz	41.3087	13.2680
1.755000000 GHz	41.3145	13.2588
1.760000000 GHz	41.3079	13.2696
1.765000000 GHz	41.3014	13.2803
1.770000000 GHz	41.2845	13.2787
1.775000000 GHz	41.2785	13.2890
1.780000000 GHz	41.2509	13.2942
1.785000000 GHz	41.2211	13.3102
1.790000000 GHz	41.2051	13.3081
1.795000000 GHz	41.1897	13.3213
1.800000000 GHz	41.1604	13.3463
1.805000000 GHz	41.1253	13.3565
1.810000000 GHz	41.0934	13.3956
1.815000000 GHz	41.0527	13.4249
1.820000000 GHz	41.0163	13.4361
1.825000000 GHz	40.9937	13.4540
1.830000000 GHz	40.9713	13.4811
1.835000000 GHz	40.9581	13.4837
1.840000000 GHz	40.9508	13.4950
1.845000000 GHz	40.9408	13.5018
1.850000000 GHz	40.9477	13.4916
1.855000000 GHz	40.9466	13.5018
1.860000000 GHz	40.9478	13.5104
1.865000000 GHz	40.9449	13.5217
1.870000000 GHz	40.9266	13.5277
1.875000000 GHz	40.9156	13.5350
1.880000000 GHz	40.8885	13.5499
1.885000000 GHz	40.8702	13.5591
1.890000000 GHz	40.8500	13.5696
1.895000000 GHz	40.8293	13.5834
1.900000000 GHz	40.7991	13.6097
1.905000000 GHz	40.7775	13.6394
1.910000000 GHz	40.7422	13.6570
1.915000000 GHz	40.7072	13.6655
1.920000000 GHz	40.6419	13.6913

1880MHz EUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

March 4, 2002

Frequency	e'	e''
1.750000000 GHz	51.9980	14.1424
1.755000000 GHz	51.9899	14.1511
1.760000000 GHz	51.9726	14.1743
1.765000000 GHz	51.9628	14.1843
1.770000000 GHz	51.9587	14.2004
1.775000000 GHz	51.9438	14.2073
1.780000000 GHz	51.9183	14.2268
1.785000000 GHz	51.8977	14.2386
1.790000000 GHz	51.8816	14.2467
1.795000000 GHz	51.8786	14.2655
1.800000000 GHz	51.8613	14.2711
1.805000000 GHz	51.8276	14.2906
1.810000000 GHz	51.8009	14.3221
1.815000000 GHz	51.7777	14.3402
1.820000000 GHz	51.7548	14.3580
1.825000000 GHz	51.7335	14.3853
1.830000000 GHz	51.7402	14.4031
1.835000000 GHz	51.7201	14.4224
1.840000000 GHz	51.7210	14.4237
1.845000000 GHz	51.7056	14.4390
1.850000000 GHz	51.7031	14.4397
1.855000000 GHz	51.6971	14.4648
1.860000000 GHz	51.6790	14.4754
1.865000000 GHz	51.6648	14.4898
1.870000000 GHz	51.6450	14.5056
1.875000000 GHz	51.6354	14.5161
1.880000000 GHz	51.6039	14.5458
1.885000000 GHz	51.5848	14.5648
1.890000000 GHz	51.5670	14.5684
1.895000000 GHz	51.5474	14.6058
1.900000000 GHz	51.5251	14.6315
1.905000000 GHz	51.4973	14.6585
1.910000000 GHz	51.4840	14.6691
1.915000000 GHz	51.4508	14.6728
1.920000000 GHz	51.4126	14.7024

1800MHz System Validation

Measured Fluid Dielectric Parameters (Brain)

March 5, 2002

Frequency	e'	e"
1.750000000 GHz	39.2106	13.9813
1.760000000 GHz	39.1872	13.9927
1.770000000 GHz	39.1682	13.9945
1.780000000 GHz	39.1452	13.9973
1.790000000 GHz	39.1435	13.9989
1.800000000 GHz	39.1311	14.0220
1.810000000 GHz	39.0881	14.0479
1.820000000 GHz	39.0368	14.0578
1.830000000 GHz	39.0291	14.0931
1.840000000 GHz	39.0031	14.1361
1.850000000 GHz	38.9559	14.1620
1.860000000 GHz	39.9314	14.1982
1.870000000 GHz	38.8896	14.2238
1.880000000 GHz	38.8530	14.2704
1.890000000 GHz	38.8299	14.3151
1.900000000 GHz	38.7892	14.3714
1.910000000 GHz	38.7509	14.3931
1.920000000 GHz	38.7313	14.4028
1.930000000 GHz	38.6864	14.4328
1.940000000 GHz	38.6790	14.4558
1.950000000 GHz	38.6294	14.4581

1880MHz EUT Evaluation (Head)

Measured Fluid Dielectric Parameters (Brain)

March 5, 2002

Frequency	e'	e"
1.750000000 GHz	40.7818	13.1094
1.755000000 GHz	40.7703	13.1123
1.760000000 GHz	40.7617	13.1196
1.765000000 GHz	40.7657	13.1316
1.770000000 GHz	40.7547	13.1341
1.775000000 GHz	40.7423	13.1437
1.780000000 GHz	40.7187	13.1447
1.785000000 GHz	40.6888	13.1651
1.790000000 GHz	40.6810	13.1657
1.795000000 GHz	40.6664	13.1798
1.800000000 GHz	40.6409	13.2005
1.805000000 GHz	40.6014	13.2178
1.810000000 GHz	40.5812	13.2507
1.815000000 GHz	40.5415	13.2713
1.820000000 GHz	40.5022	13.2918
1.825000000 GHz	40.4703	13.3138
1.830000000 GHz	40.4545	13.3317
1.835000000 GHz	40.4406	13.3424
1.840000000 GHz	40.4328	13.3431
1.845000000 GHz	40.4252	13.3438
1.850000000 GHz	40.4199	13.3429
1.855000000 GHz	40.4266	13.3556
1.860000000 GHz	40.4236	13.3623
1.865000000 GHz	40.4265	13.3590
1.870000000 GHz	40.4068	13.3765
1.875000000 GHz	40.3910	13.3762
1.880000000 GHz	40.3667	13.3996
1.885000000 GHz	40.3450	13.4033
1.890000000 GHz	40.3311	13.4231
1.895000000 GHz	40.3070	13.4314
1.900000000 GHz	40.2844	13.4508
1.905000000 GHz	40.2509	13.4804
1.910000000 GHz	40.2073	13.5077
1.915000000 GHz	40.1613	13.5217
1.920000000 GHz	40.1204	13.5563

1880MHz EUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

March 5, 2002

Frequency	e'	e"
1.750000000 GHz	54.0188	14.1141
1.755000000 GHz	54.0015	14.1391
1.760000000 GHz	53.9852	14.1559
1.765000000 GHz	53.9814	14.1694
1.770000000 GHz	53.9694	14.1899
1.775000000 GHz	53.9561	14.2042
1.780000000 GHz	53.9299	14.2113
1.785000000 GHz	53.9199	14.2449
1.790000000 GHz	53.9042	14.2503
1.795000000 GHz	53.8902	14.2654
1.800000000 GHz	53.8846	14.2769
1.805000000 GHz	53.8657	14.2853
1.810000000 GHz	53.8359	14.3183
1.815000000 GHz	53.8089	14.3413
1.820000000 GHz	53.7908	14.3530
1.825000000 GHz	53.7870	14.3594
1.830000000 GHz	53.7825	14.3811
1.835000000 GHz	53.7707	14.4021
1.840000000 GHz	53.7603	14.3996
1.845000000 GHz	53.7340	14.4117
1.850000000 GHz	53.7218	14.4184
1.855000000 GHz	53.7060	14.4247
1.860000000 GHz	53.6807	14.4362
1.865000000 GHz	53.6765	14.4542
1.870000000 GHz	53.6553	14.4731
1.875000000 GHz	53.6310	14.4802
1.880000000 GHz	53.6135	14.5179
1.885000000 GHz	53.5836	14.5416
1.890000000 GHz	53.5635	14.5635
1.895000000 GHz	53.5402	14.5812
1.900000000 GHz	53.5359	14.6108
1.905000000 GHz	53.5188	14.6302
1.910000000 GHz	53.5020	14.6532
1.915000000 GHz	53.4807	14.6474
1.920000000 GHz	53.4437	14.6712

1800MHz System Validation

Measured Fluid Dielectric Parameters (Brain)

March 27, 2002

Frequency	e'	e"
1.750000000 GHz	39.7180	13.8984
1.760000000 GHz	39.6765	13.9187
1.770000000 GHz	39.6604	13.9360
1.780000000 GHz	39.6294	13.9552
1.790000000 GHz	39.6228	14.0134
1.800000000 GHz	39.5978	14.0351
1.810000000 GHz	39.5737	14.0598
1.820000000 GHz	39.5656	14.0969
1.830000000 GHz	39.5505	14.0998
1.840000000 GHz	39.5374	14.1761
1.850000000 GHz	39.5216	14.1912
1.860000000 GHz	39.4985	14.2405
1.870000000 GHz	39.4906	14.2698
1.880000000 GHz	39.4583	14.3106
1.890000000 GHz	39.4194	14.3539
1.900000000 GHz	39.3892	14.4043
1.910000000 GHz	39.3509	14.4516
1.920000000 GHz	39.3313	14.4928
1.930000000 GHz	39.2864	14.5286
1.940000000 GHz	39.2790	14.5589
1.950000000 GHz	39.2294	14.5816

1900MHz EUT Evaluation (Head)

Measured Fluid Dielectric Parameters (Brain)

March 27, 2002

Frequency	e'	e"
1.750000000 GHz	40.9900	13.1757
1.755000000 GHz	40.9810	13.1828
1.760000000 GHz	40.9784	13.1796
1.765000000 GHz	40.9615	13.1883
1.770000000 GHz	40.9539	13.1912
1.775000000 GHz	40.9506	13.2008
1.780000000 GHz	40.9200	13.2057
1.785000000 GHz	40.8907	13.2221
1.790000000 GHz	40.8772	13.2287
1.795000000 GHz	40.8642	13.2504
1.800000000 GHz	40.8415	13.2659
1.805000000 GHz	40.8009	13.2865
1.810000000 GHz	40.7752	13.3254
1.815000000 GHz	40.7361	13.3422
1.820000000 GHz	40.6958	13.3566
1.825000000 GHz	40.6650	13.3805
1.830000000 GHz	40.6621	13.3898
1.835000000 GHz	40.6407	13.3986
1.840000000 GHz	40.6271	13.3903
1.845000000 GHz	40.6275	13.4035
1.850000000 GHz	40.6197	13.4036
1.855000000 GHz	40.6234	13.4117
1.860000000 GHz	40.6158	13.4208
1.865000000 GHz	40.6148	13.4256
1.870000000 GHz	40.5956	13.4392
1.875000000 GHz	40.5823	13.4428
1.880000000 GHz	40.5557	13.4582
1.885000000 GHz	40.5371	13.4714
1.890000000 GHz	40.5188	13.4845
1.895000000 GHz	40.5014	13.4940
1.900000000 GHz	40.4744	13.5158
1.905000000 GHz	40.4421	13.5382
1.910000000 GHz	40.3968	13.5632
1.915000000 GHz	40.3499	13.5714
1.920000000 GHz	40.2962	13.6142

1900MHz EUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

March 27, 2002

Frequency	e'	e"
1.750000000 GHz	52.7728	14.1604
1.755000000 GHz	52.7741	14.1807
1.760000000 GHz	52.7563	14.1950
1.765000000 GHz	52.7491	14.2040
1.770000000 GHz	52.7259	14.2192
1.775000000 GHz	52.7137	14.2253
1.780000000 GHz	52.6950	14.2405
1.785000000 GHz	52.6628	14.2562
1.790000000 GHz	52.6448	14.2710
1.795000000 GHz	52.6448	14.2850
1.800000000 GHz	52.6299	14.2936
1.805000000 GHz	52.6000	14.3223
1.810000000 GHz	52.5820	14.3517
1.815000000 GHz	52.5523	14.3624
1.820000000 GHz	52.5228	14.3729
1.825000000 GHz	52.5081	14.3998
1.830000000 GHz	52.5055	14.4234
1.835000000 GHz	52.4919	14.4421
1.840000000 GHz	52.4761	14.4411
1.845000000 GHz	52.4632	14.4594
1.850000000 GHz	52.4738	14.4751
1.855000000 GHz	52.4522	14.4866
1.860000000 GHz	52.4381	14.5060
1.865000000 GHz	52.4360	14.5220
1.870000000 GHz	52.4039	14.5322
1.875000000 GHz	52.3932	14.5415
1.880000000 GHz	52.3783	14.5618
1.885000000 GHz	52.3595	14.5893
1.890000000 GHz	52.3323	14.6028
1.895000000 GHz	52.3068	14.6257
1.900000000 GHz	52.2840	14.6390
1.905000000 GHz	52.2584	14.6766
1.910000000 GHz	52.2343	14.6914
1.915000000 GHz	52.2073	14.6945
1.920000000 GHz	52.1832	14.7239

APPENDIX E - SAM PHANTOM CERTIFICATE OF CONFORMITY

Schmid & Partner Engineering AG

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Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 BA
Series No	TP-1002 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

Tests

The series production process used allows the limitation to test of first articles.
Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards	Liquid type HSL 1800 and others according to the standard.	Pre-series, First article

Standards

[1] CENELEC EN 50361
[2] IEEE P1528-200x draft 6.5
[3] IEC PT 62209 draft 0.9
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 18.11.2001

Signature / Stamp Schmid & Partner Engineering AG
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