CERTIFICATE OF COMPLIANCE
SAR EVALUATION

Test Lab:	**Applicant Information:**
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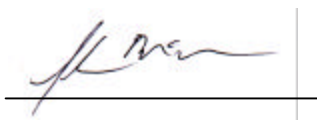
FCC Rule Part(s):	**2.1093; ET Docket 96.326**
FCC ID:	**P5680-5196-00**
Model(s):	**A700**
Equipment Type:	**Single-Mode PCS GSM Phone**
FCC Classification:	**Part 24 Licensed Portable Transmitter Held to Ear (PCE)**
Application Type:	**Class II Permissive Change**
Original Grant Date:	**March 12, 2002**
Tx Frequency Range:	**1850.2 - 1909.8 MHz**
Max. RF Output Power:	**1.32 Watts (EIRP)**
Antenna Type(s):	**Fixed Stubby (1/4λ)**
Battery Type(s):	**Li-Ion (4.2V 540mAh & 700mAh)**
Body-Worn Accessories:	**Belt-Holster, Ear-Microphone**
Class II Change(s):	**Alternate Belt-Holster (P/N: 80-5237)**

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), and Industry Canada RSS-102 Issue 1 (General Population/Uncontrolled Exposure), and was tested in accordance with the appropriate measurement standards, guidelines, and recommended practices specified in American National Standards Institute C95.1-1992.

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



Shawn McMillen
General Manager
Celltech Research Inc.

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1.0 INTRODUCTION

This measurement report shows that the VTECH Model: A700 Single-Mode PCS GSM Phone FCC ID: P5680-5196-00, with the Class II Permissive Change(s) described in this report, 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]), FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [2]), and Industry Canada RSS-102 Issue 1 (see reference [3]) 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	**FCC ID**	P5680-5196-00
Equipment Class	Licensed Portable Transmitter Held to Ear (PCE)	**Model No.(s)**	A700
FCC Rule Part(s)	§ 2.1093, Docket 96-326	**Serial No.**	Pre-production Unit
Application Type	FCC Part 24 Class II Permissive Change	**Class II Change(s)**	Alternate Belt-Holster (P/N: 80-5237)
Tx Frequency Range	1850.2 - 1909.8 MHz	**Antenna Type**	Fixed Stubby (1/4λ)
Modulation	PCS GSM	**Antenna Length**	30 mm
Max. RF Output Power (EIRP)	1.32 Watts	**Battery Type(s)**	Lithium-Ion Battery Standard-life: 4.2V 540mAh Extended-life: 4.2V 700mAh

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.

BODY SAR MEASUREMENT RESULTS

Freq. (MHz)	Channel	Modulation	Cond. Power Before (dBm)	Cond. Power After (dBm)	Battery Type	Antenna Position	Phantom Section	Belt Holster Separation Distance (cm)	SAR 1g (w/kg)
1880.0	661	PCS GSM	29.30	29.24	Extended	Fixed	Planar	1.6	0.416
1880.0	661	PCS GSM	29.30	29.18	Standard	Fixed	Planar	1.6	0.418
1850.2	512	PCS GSM	29.17	29.15	Standard	Fixed	Planar	1.6	0.342
1909.8	810	PCS GSM	29.56	29.49	Standard	Fixed	Planar	1.6	0.425

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

Measured Mixture Type	**Body**	**Relative Humidity**	**36.3 %**
Dielectric Constant	**52.3**	**Atmospheric Pressure**	**102.43 kPa**
Conductivity	**1.52**	**Liquid Temperature**	**≈ 23.0 °C**
Ambient Temperature	**23.9 °C**	**Liquid Depth**	**≥ 15 cm**

Notes:

1. The body SAR values measured were below the maximum limit of 1.6 w/kg (averaged over 1 gram).
2. The highest body SAR value measured was 0.425 w/kg (high channel, standard battery).
3. The EUT was tested for body SAR with ear-microphone and belt-holster. The belt-holster provided a 1.6cm separation distance between the front of the phone and the outer surface of the planar phantom.
4. During the entire test the conducted power was maintained to within 5% of the initial conducted power.
5. Standard Battery: 4.2V 540mAh
   Extended Battery: 4.2V 700mAh

5.0 DETAILS OF SAR EVALUATION

The VTECH Model: A700 Single-Mode PCS GSM Phone FCC ID: P5680-5196-00, with the Class II Permissive Change(s) described in this report, was found to be compliant for localized Specific Absorption Rate (SAR) based on the following test provisions and conditions:

1) The EUT was tested in a body-worn configuration with an ear-microphone and placed inside the horizontal belt-holster with the front of the phone facing the planar phantom. The back of the belt-holster was placed parallel to, and touching, the outer surface of the planar phantom. The belt-holster provided a 1.6 cm separation distance between the front of the EUT and the outer surface of the planar phantom. The belt-holster is designed so that the phone is placed in the holster with the front of the phone facing the user's body.
2) SAR measurements were evaluated at maximum power and the unit was operated for an appropriate period prior to the evaluation in order to minimize drift. The conducted power levels were checked before and after each test. If the conducted power level deviated more than 5% of the initial power level, then the EUT was retested. Any unusual anomalies over the course of the test also warranted a re-evaluation.
3) The conducted power was measured according to the procedures described in FCC Part 2.1046.
4) The EUT was placed into test mode using a Rohde & Schwarz CMU200 base station simulator at a full rated power.
5) The location of the maximum spatial SAR distribution (Hot Spot) was determined relative to the handset and its antenna.
6) The EUT was tested with a fully charged battery.

Body-worn SAR Test Setup

6.0 EVALUATION PROCEDURES

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

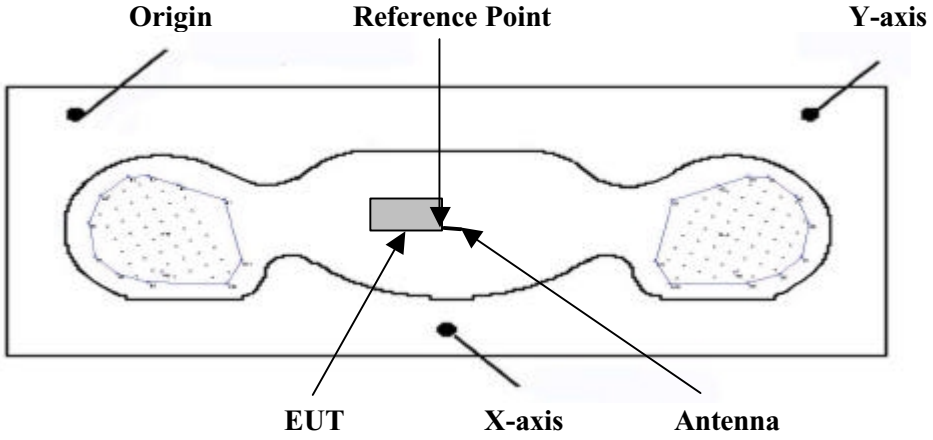
a. (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation both the left and right ear positions were first evaluated at the middle frequency of the band at maximum power with all available battery options and antenna positions as applicable. The worst-case battery configuration was further evaluated at the low and high frequencies of the band 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.

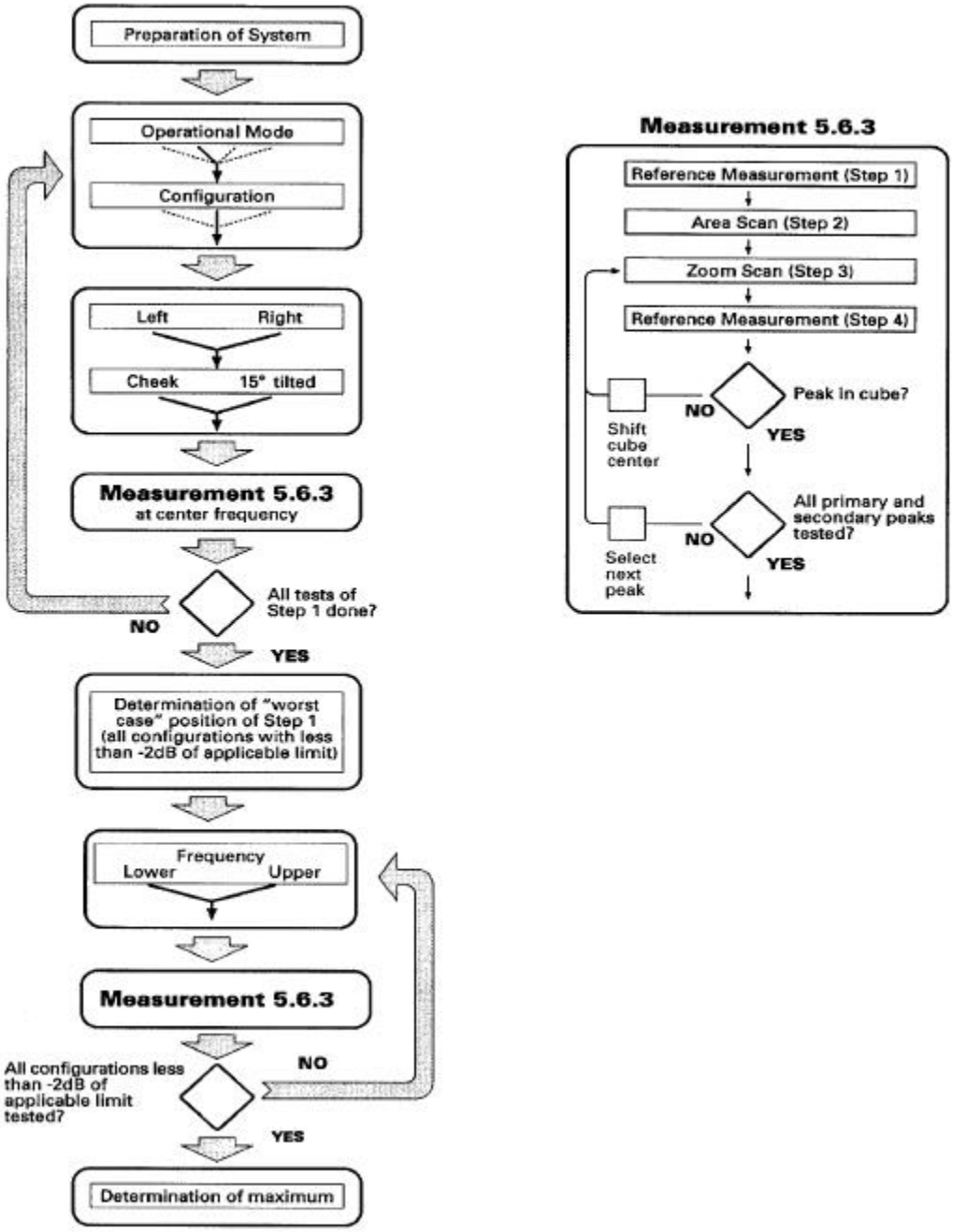
c. A 5x5x7 matrix was performed around the greatest spatial SAR distribution found during the area scan of the applicable exposed region. SAR values were then calculated using a 3-D spline interpolation algorithm and averaged over spatial volumes of 1 and 10 grams.

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



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 a 1800MHz dipole. A forward power of 250mW was applied to the dipole, and the system was verified to a tolerance of ±10%. The applicable verification is listed below (see Appendix B for system 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	9.64	≈23.0 °C	≥ 15cm	04/18/02

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)**
1900MHz Brain (Target)	40.0 ±5%	1.40 ±5%	1000
1900MHz Brain (Measured: 04/18/02)	38.9	1.41	1000
1900MHz Body (Target)	53.3 ±5%	1.52 ±5%	1000
1900MHz Body (Measured: 04/18/02)	52.3	1.52	1000

9.0 SIMULATED TISSUES

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

TISSUE MIXTURES		
INGREDIENT	**1900MHz Brain (System Validation)**	**1900MHz Body (EUT Evaluation)**
Water	54.90 %	69.91 %
Glycol Monobutyl	44.92 %	29.96 %
Salt	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

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)

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.**	**CALIBRATION DATE**
DASY3 System -Robot -ET3DV6 E-Field Probe -300MHz Validation Dipole -450MHz Validation Dipole -900MHz Validation Dipole -1800MHz Validation Dipole -2450MHz Validation Dipole -SAM Phantom V4.0C -Small Planar Phantom	 599396-01 1387 135 136 054 247 150 N/A N/A	 N/A Feb 2002 Oct 2001 Oct 2001 June 2001 June 2001 Oct 2001 N/A 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
Rohde & Schwarz CMU200 Base Station Simulator	100162	Mar 2002
E4408B Spectrum Analyzer	US39240170	Nov 2001
8594E Spectrum Analyzer	3543A02721	Mar 2002
8753E Network Analyzer	US38433013	Nov 2001
8648D Signal Generator	3847A00611	Aug 2001
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	± 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					**± 13.7**	
Expanded Uncertainty (k=2)					**± 27.5**	

Measurement Uncertainty Table in accordance with IEEE Std 1528 (Draft - see reference [6])

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] 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", RSS-102 Issue 1 (Provisional): September 1999.

[4] 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.

[5] 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.

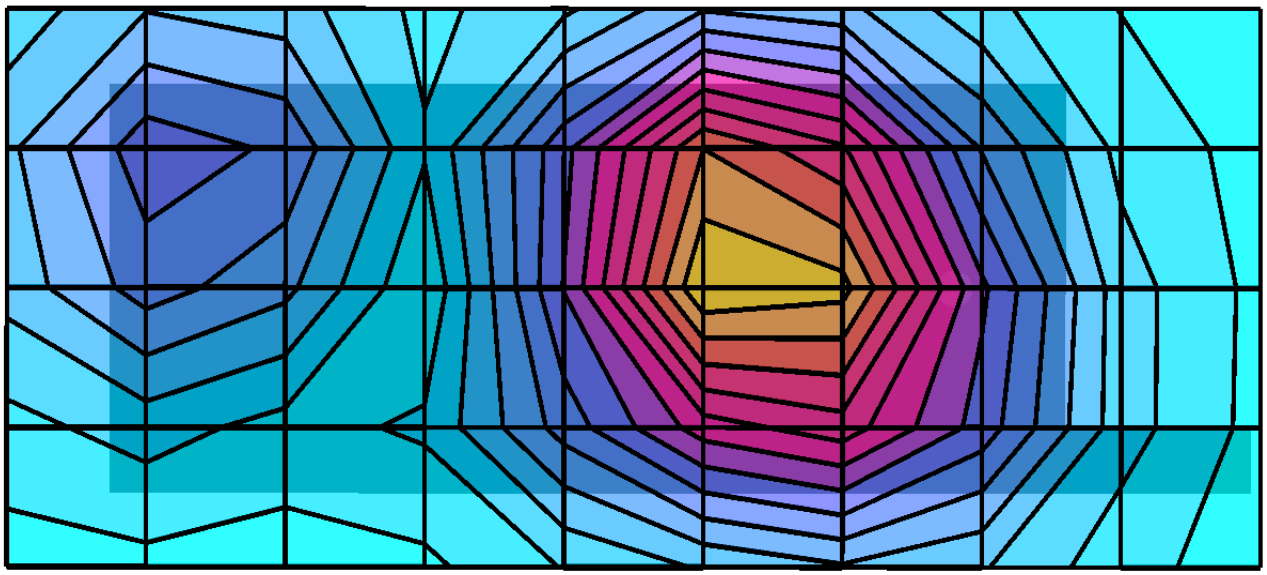
[6] IEEE Standards Coordinating Committee 34, Std. P1528, DRAFT Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques: Draft, December 2001.

APPENDIX A - SAR MEASUREMENT DATA

VTECH FCC ID: P5680-5196-00

SAM Phantom; Flat Section; Position: (90°,90°)
Probe: ET3DV6 - SN1387; ConvF(5.00,5.00,5.00); Crest factor: 8.0
1900 MHz Muscle: ω = 1.52 mho/m κ_r = 52.3 ψ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.15 dB
SAR (1g): 0.416 mW/g, SAR (10g): 0.255 mW/g

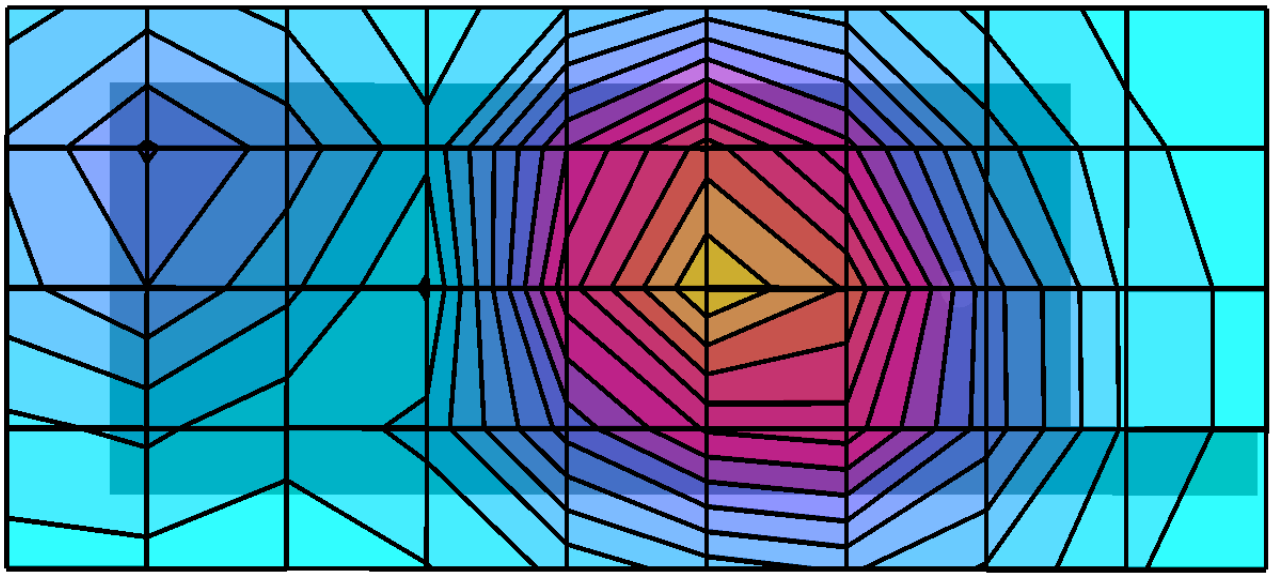
Body SAR with 1.6 cm Belt-Holster
Vtech Model: A700
PCS GSM Mode
Extended Battery
Mid Channel 661 [1880.00 MHz]
Conducted Power 29.30 dBm
Date Tested: April 18, 2002



VTECH FCC ID: P5680-5196-00

SAM Phantom; Flat Section; Position: (90°,90°)
Probe: ET3DV6 - SN1387; ConvF(5.00,5.00,5.00); Crest factor: 8.0
1900 MHz Muscle: ω = 1.52 mho/m κ_r = 52.3 ψ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.09 dB
SAR (1g): 0.418 mW/g, SAR (10g): 0.256 mW/g

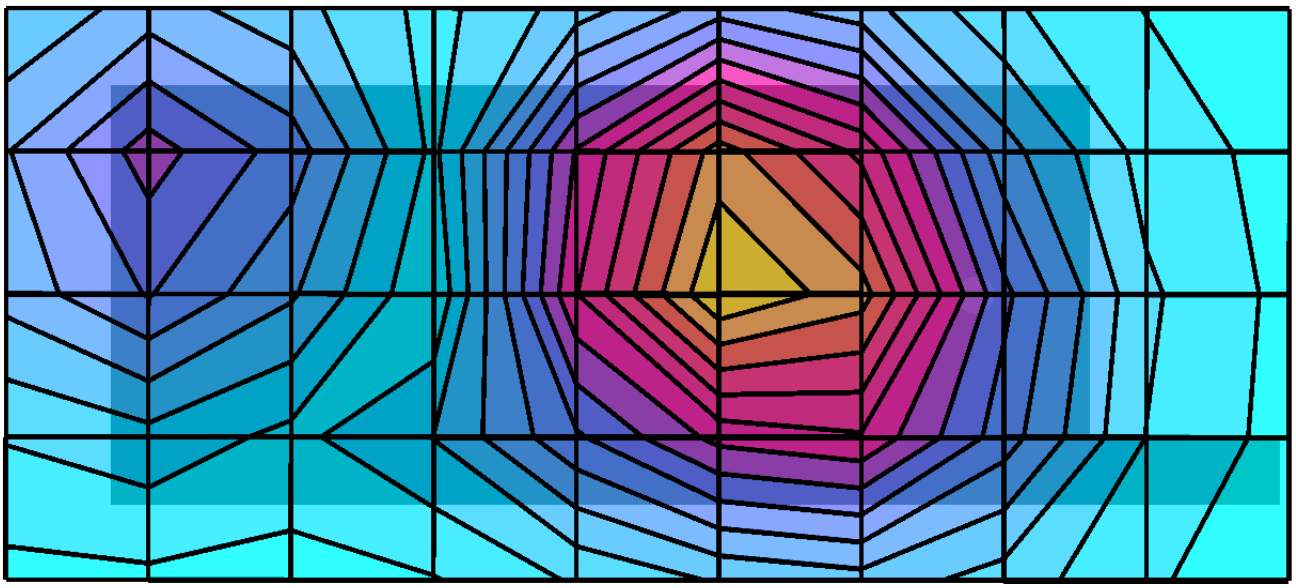
Body SAR with 1.6 cm Belt-Holster
Vtech Model: A700
PCS GSM Mode
Standard Battery
Mid Channel 661 [1880.00 MHz]
Conducted Power 29.30 dBm
Date Tested: April 18, 2002



VTECH FCC ID: P5680-5196-00

SAM Phantom; Flat Section; Position: (90°,90°)
Probe: ET3DV6 - SN1387; ConvF(5.00,5.00,5.00); Crest factor: 8.0
1900 MHz Muscle: ω = 1.52 mho/m κ_r = 52.3 ψ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: 0.02 dB
SAR (1g): 0.342 mW/g, SAR (10g): 0.213 mW/g

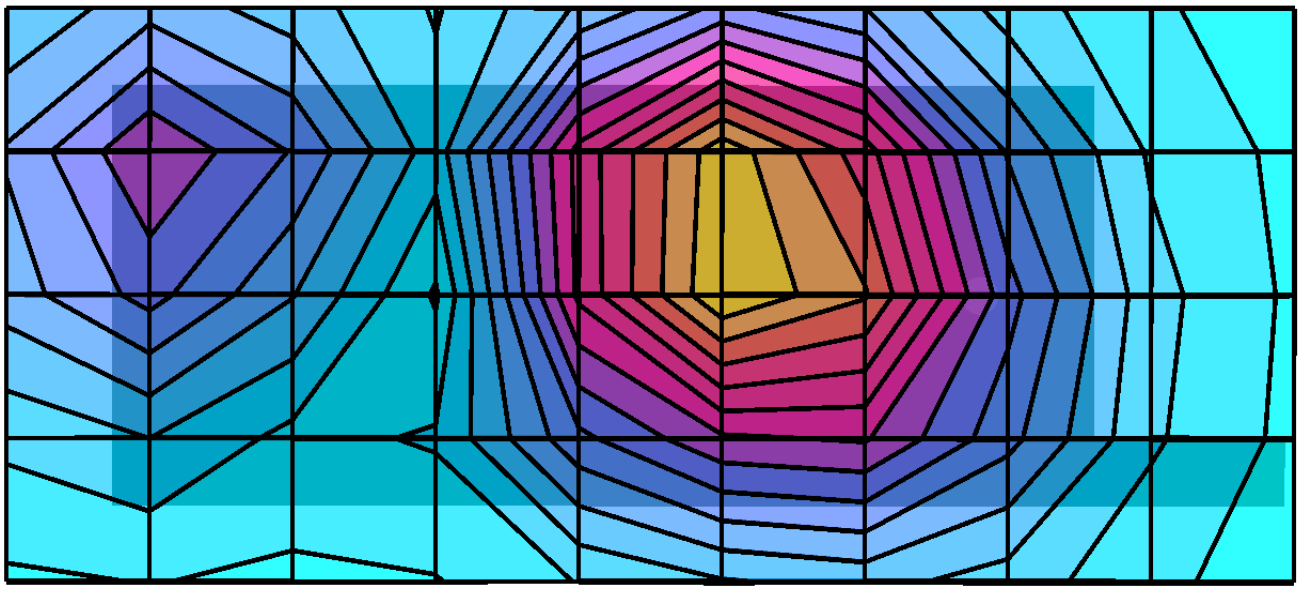
Body SAR with 1.6 cm Belt-Holster
Vtech Model: A700
PCS GSM Mode
Standard Battery
Low Channel 512 [1850.20 MHz]
Conducted Power 29.17 dBm
Date Tested: April 18, 2002



VTECH FCC ID: P5680-5196-00

SAM Phantom; Flat Section; Position: (90°,90°)
Probe: ET3DV6 - SN1387; ConvF(5.00,5.00,5.00); Crest factor: 8.0
1900 MHz Muscle: ω = 1.52 mho/m κ_r = 52.3 ψ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.10 dB
SAR (1g): 0.425 mW/g, SAR (10g): 0.259 mW/g

Body SAR with 1.6 cm Belt-Holster
Vtech Model: A700
PCS GSM Mode
Standard Battery
High Channel 810 [1909.80 MHz]
Conducted Power 29.56 dBm
Date Tested: April 18, 2002

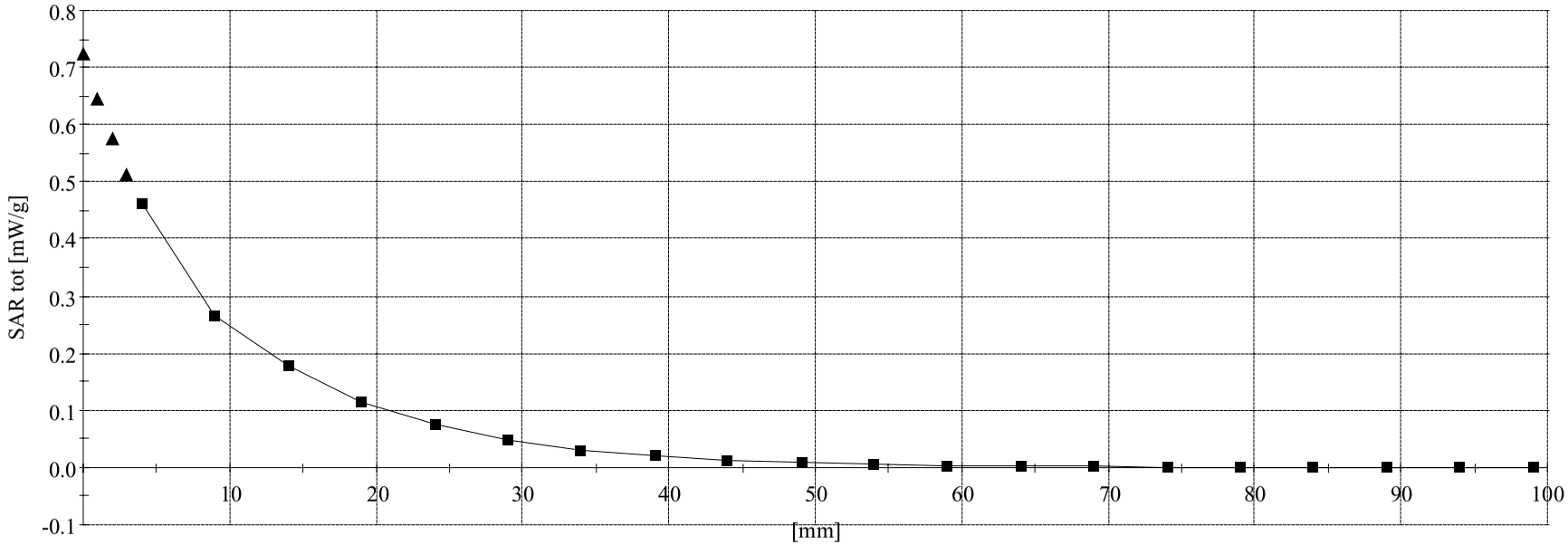


VTECH FCC ID: P5680-5196-00

SAM Phantom; Planar Section
Probe: ET3DV6 - SN1387; ConvF(5.00,5.00,5.00); Crest factor: 8.0;
1900 MHz Muscle: σ = 1.52 mho/m ε_r = 52.3 ρ = 1.00 g/cm^3

Z-Axis Extrapolation at Peak SAR Location

Body SAR with 1.6 cm Belt-Holster
Vtech Model: A700
PCS GSM Mode
Standard Battery
High Channel 810 [1909.8 MHz]
Conducted Power 29.56 dBm
Date Tested: April 18, 2002



APPENDIX B - SYSTEM VALIDATION

1800MHz Dipole

SAM Phantom; Flat Section

Probe: ET3DV6 - SN1387; ConvF(5.40,5.40,5.40); Crest factor: 1.0; 1800 MHz Brain: σ = 1.41 mho/m ε_r = 38.9 ρ = 1.00 g/cm^3

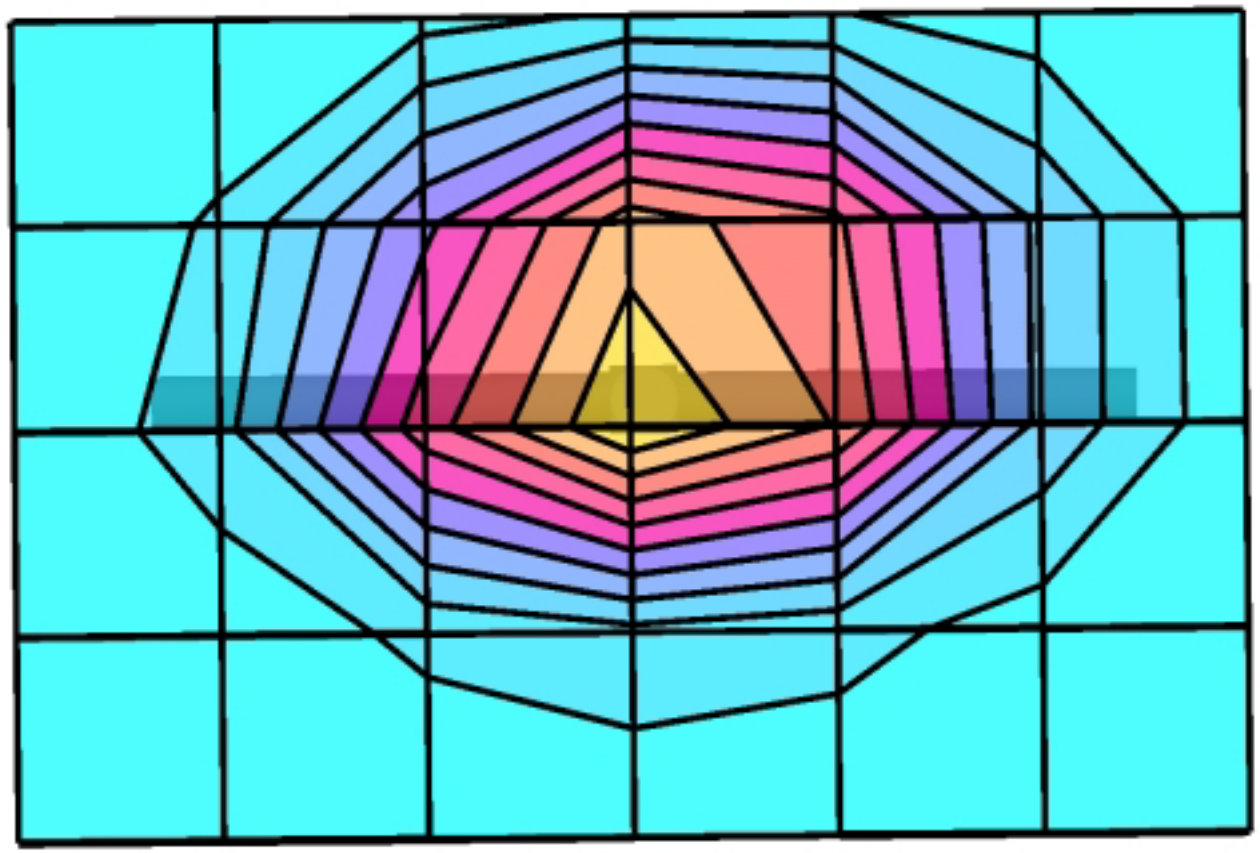
Cube 5x5x7: Peak: 18.7 mW/g, SAR (1g): 9.64 mW/g, SAR (10g): 4.87 mW/g, (Worst-case extrapolation)

Penetration depth: 7.6 (7.2, 8.5) [mm]

Powerdrift: 0.02 dB

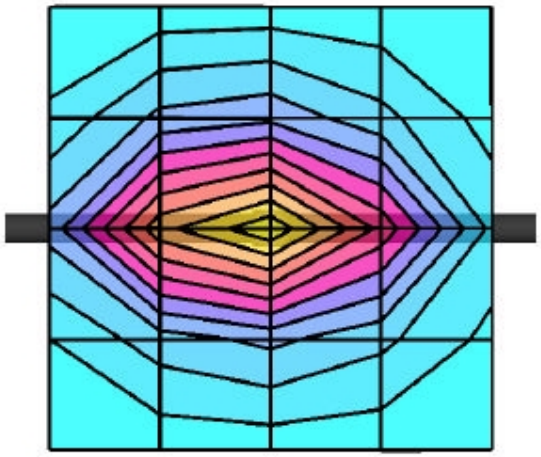
Conducted Power: 250mW

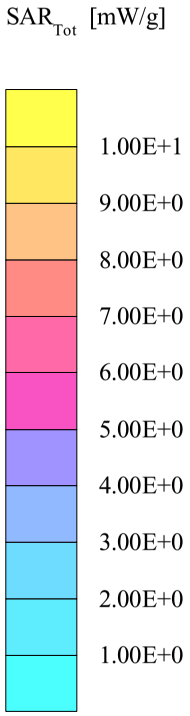
Validation Date: April 18, 2002



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





APPENDIX C - PROBE CALIBRATION

Schmid & Partner
Engineering AG

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

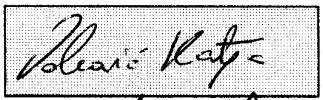
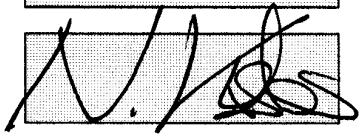
Calibration Certificate

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**

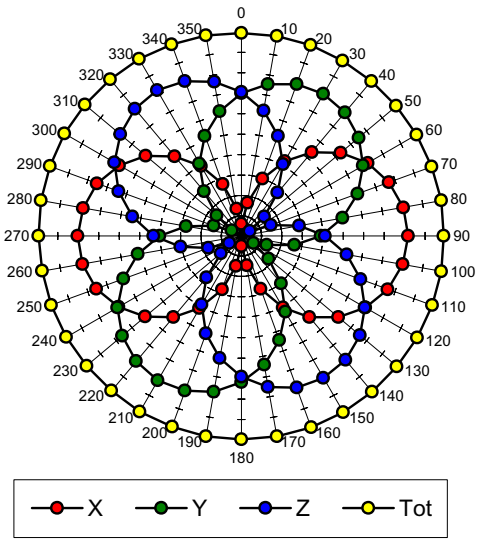
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	11.5	7.3
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

Sensor Offset

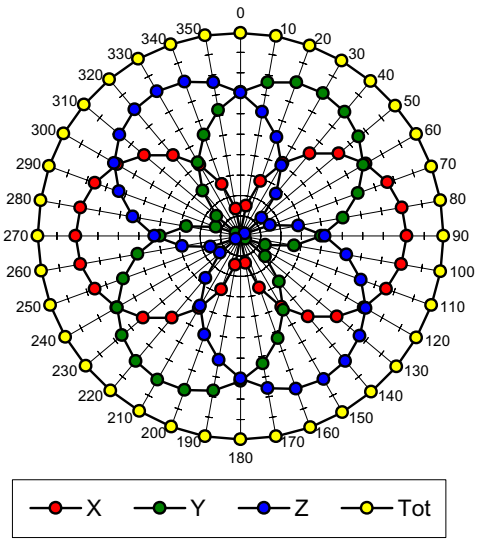
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.3 ± 0.2**	mm

Receiving Pattern (ϕ) , θ = 0°

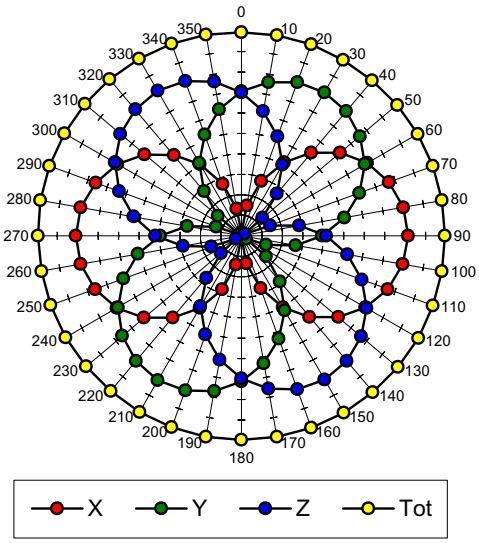
f = 30 MHz, TEM cell ifi110



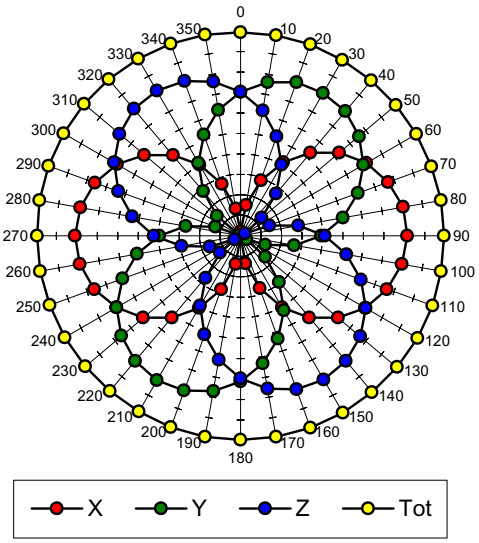
f = 100 MHz, TEM cell ifi110

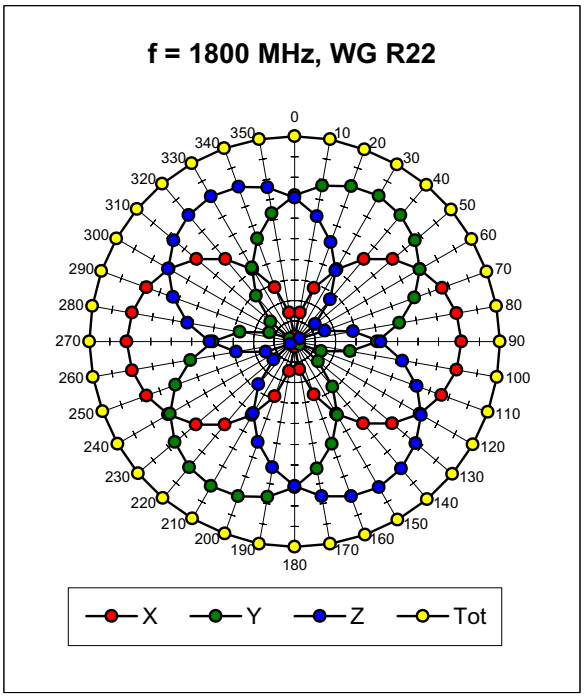


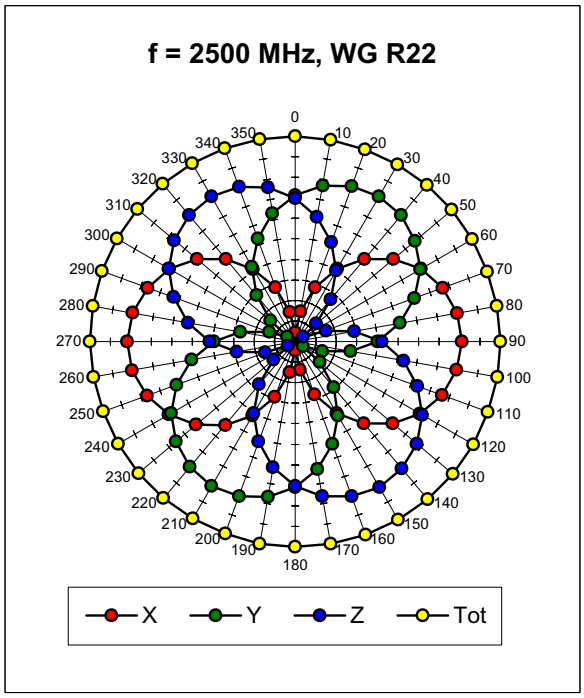
f = 300 MHz, TEM cell ifi110



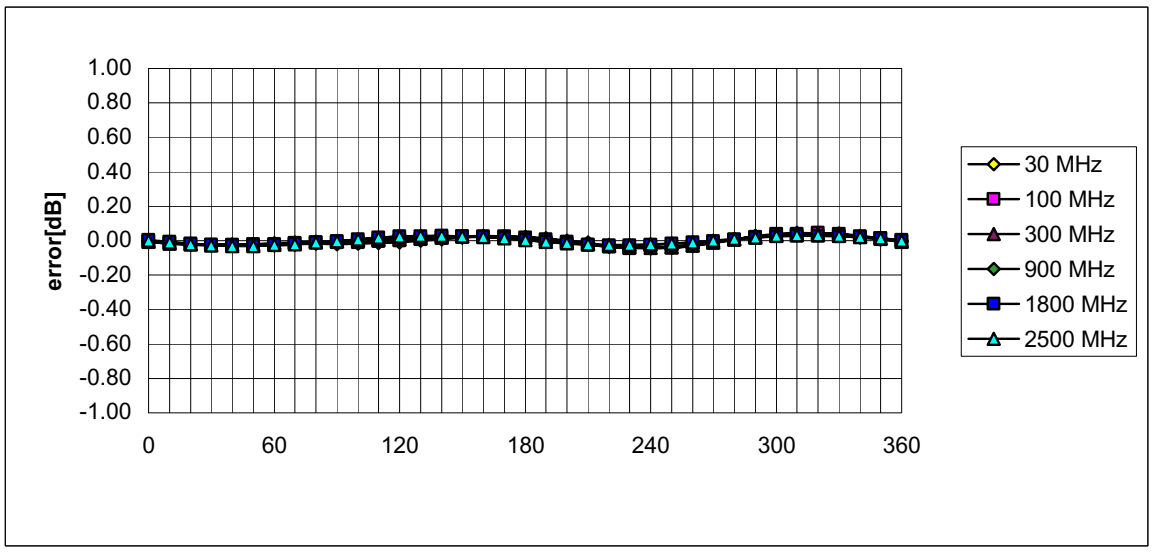
f = 900 MHz, TEM cell ifi110





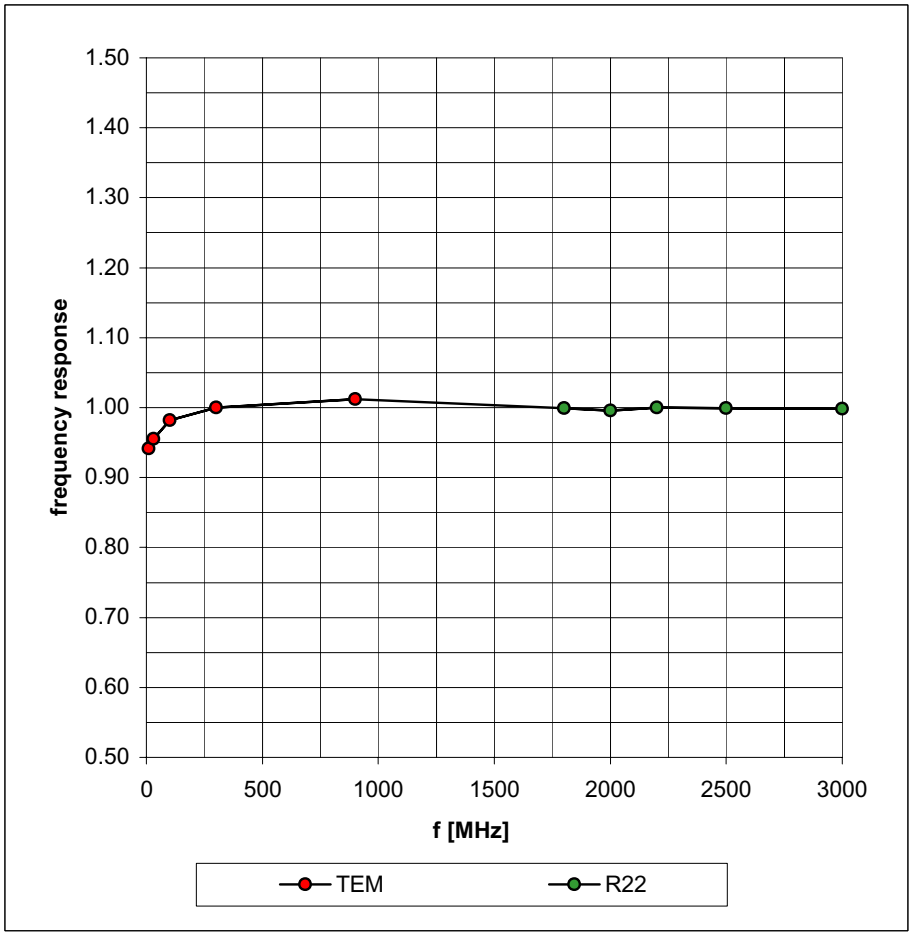


Isotropy Error (ϕ), θ = 0°



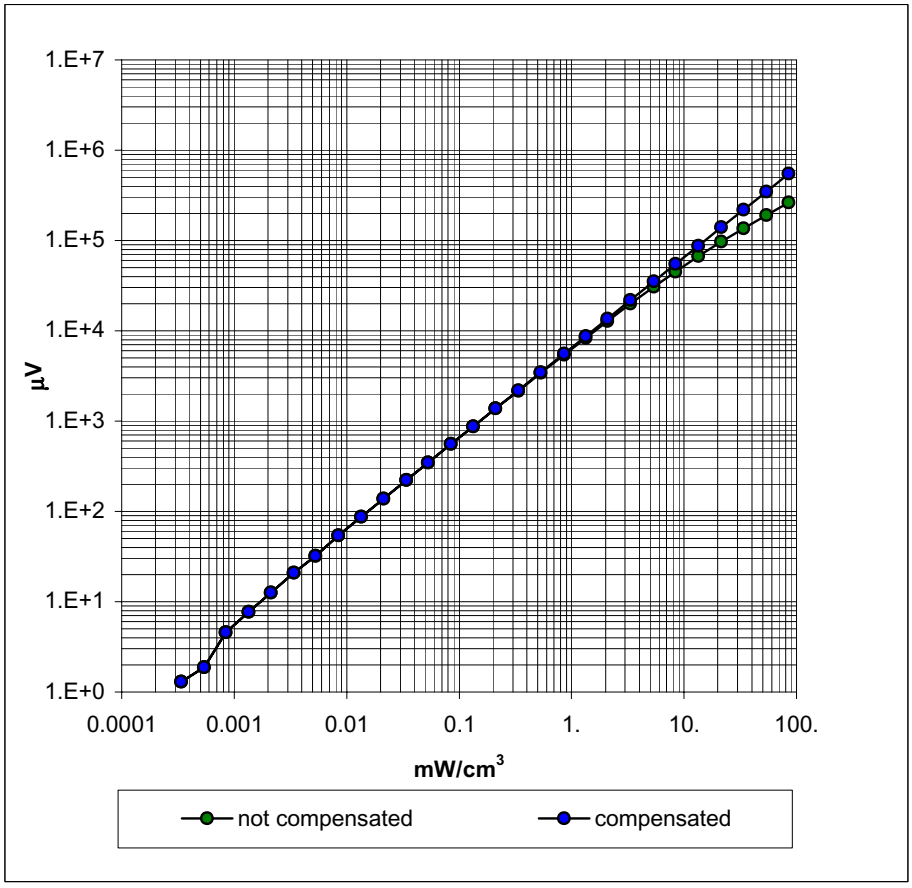
Frequency Response of E-Field

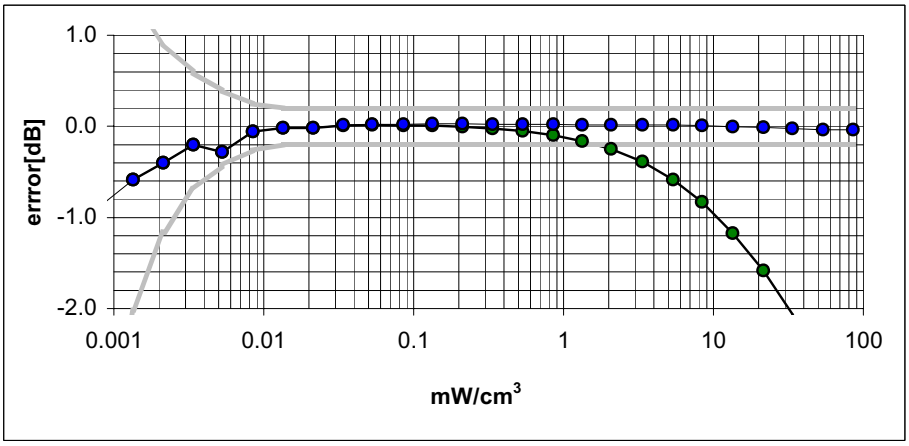
(TEM-Cell:ifi110, Waveguide R22)



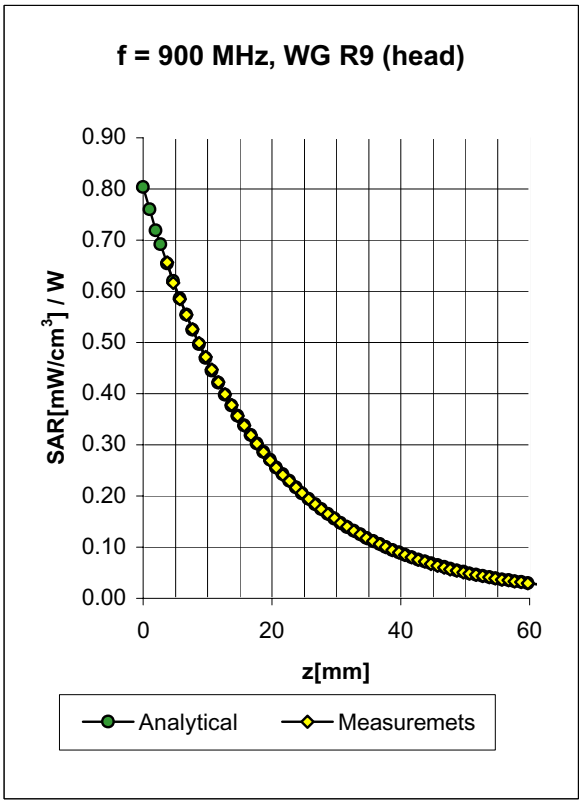
Dynamic Range f(SAR_{brain})

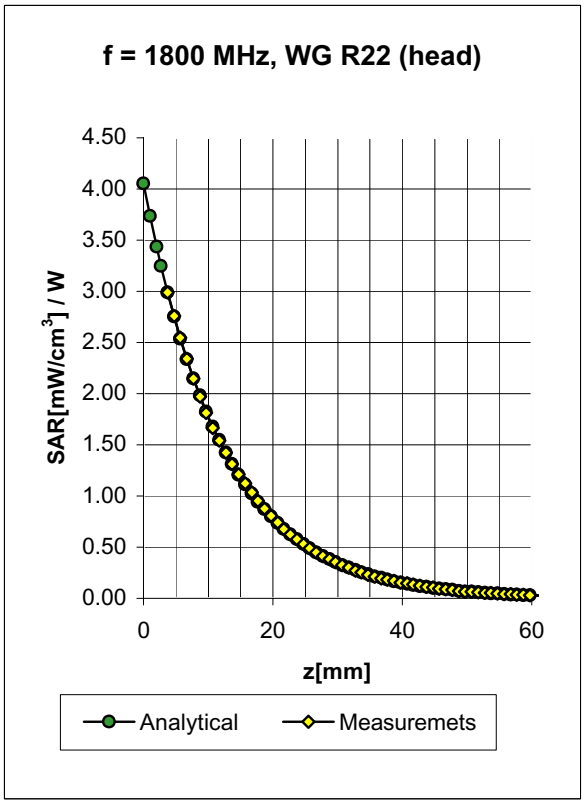
(Waveguide R22)





Conversion Factor Assessment



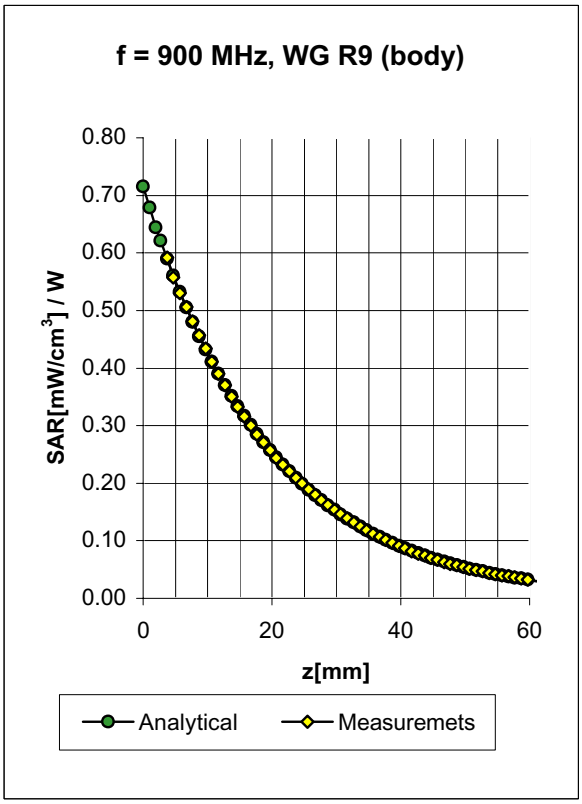


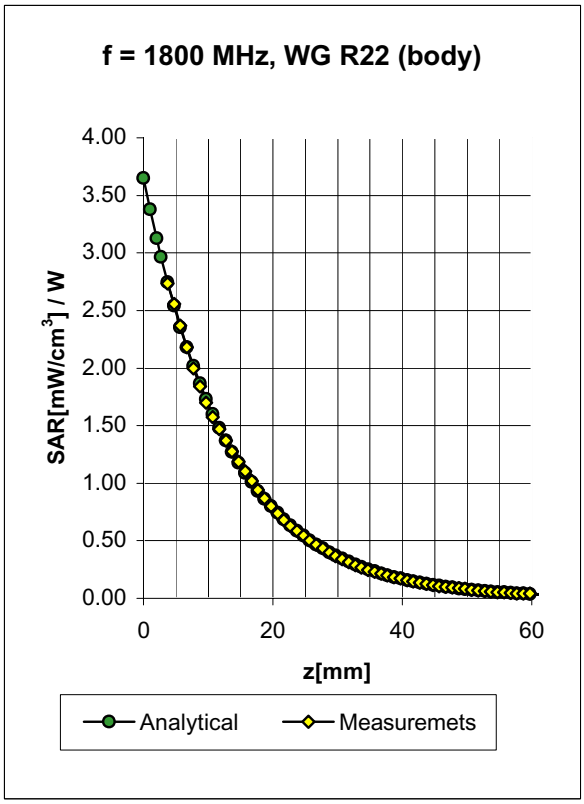
Head	**900 MHz**		**ε_r = 41.5 ± 5%**	**σ = 0.97 ± 5% mho/m**	
Head	**835 MHz**		**ε_r = 41.5 ± 5%**	**σ = 0.90 ± 5% mho/m**	
	ConvF X	**6.6** ± 9.5% (k=2)		Boundary effect:	
	ConvF Y	**6.6** ± 9.5% (k=2)		Alpha	**0.40**
	ConvF Z	**6.6** ± 9.5% (k=2)		Depth	**2.38**

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





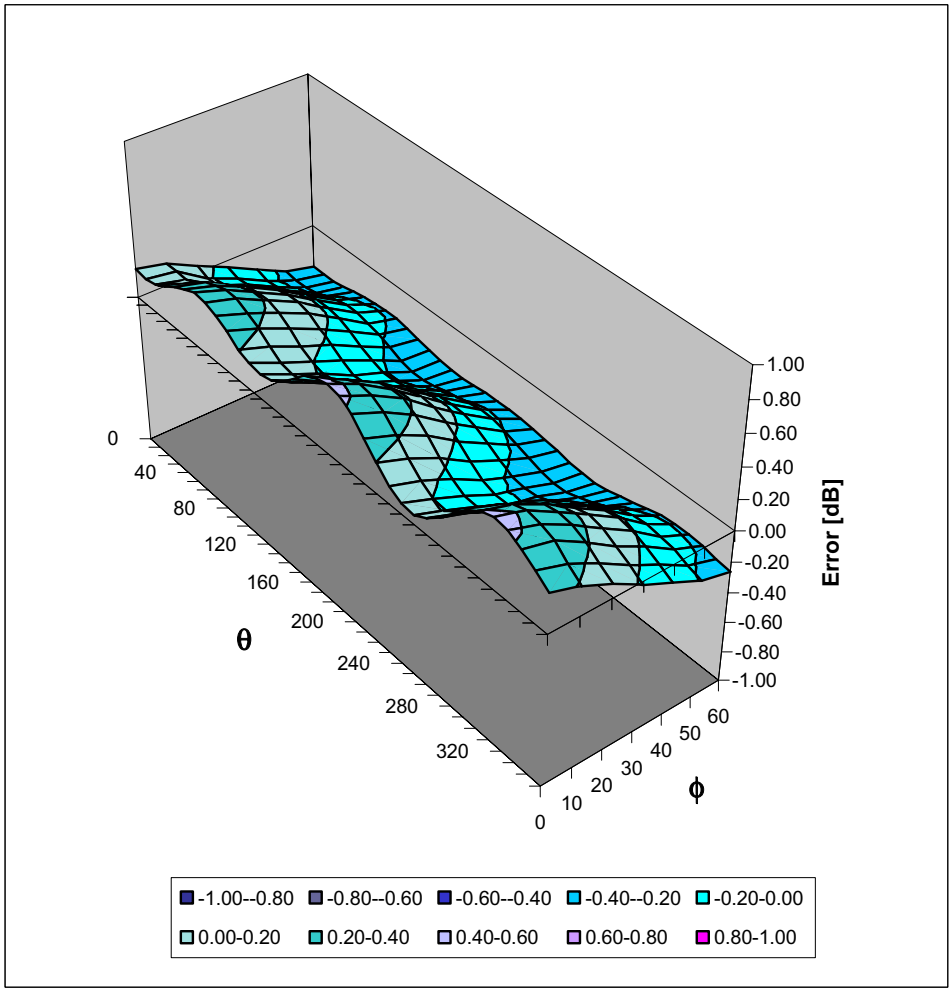
Body	**900 MHz**	ε_r **= 55.0 ± 5%**	**σ = 1.05 ± 5% mho/m**	
Body	**835 MHz**	ε_r **= 55.2 ± 5%**	**σ = 0.97 ± 5% mho/m**	
	ConvF X	**6.3** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.3** ± 9.5% (k=2)	Alpha	**0.42**
	ConvF Z	**6.3** ± 9.5% (k=2)	Depth	**2.44**

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 (θϕ), 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 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 Liquid Dielectric Parameters (Brain)

April 18, 2002

Frequency	e'	e"
1.750000000 GHz	38.9619	14.0313
1.752000000 GHz	38.9582	14.0222
1.754000000 GHz	38.9585	14.0415
1.756000000 GHz	38.9528	14.0396
1.758000000 GHz	38.9333	14.0457
1.760000000 GHz	38.9370	14.0385
1.762000000 GHz	38.9394	14.0504
1.764000000 GHz	38.9283	14.0547
1.766000000 GHz	38.9329	14.0438
1.768000000 GHz	38.9255	14.0491
1.770000000 GHz	38.9227	14.0517
1.772000000 GHz	38.9282	14.0526
1.774000000 GHz	38.9228	14.0506
1.776000000 GHz	38.9142	14.0535
1.778000000 GHz	38.8993	14.0509
1.780000000 GHz	38.9067	14.0445
1.782000000 GHz	38.8990	14.0592
1.784000000 GHz	38.8996	14.0567
1.786000000 GHz	38.8902	14.0631
1.788000000 GHz	38.9010	14.0517
1.790000000 GHz	38.8922	14.0487
1.792000000 GHz	38.8757	14.0532
1.794000000 GHz	38.8808	14.0633
1.796000000 GHz	38.8762	14.0670
1.798000000 GHz	38.8813	14.0770
1.800000000 GHz	38.8822	14.0744
1.802000000 GHz	38.8758	14.0700
1.804000000 GHz	38.8611	14.0614
1.806000000 GHz	38.8430	14.0729
1.808000000 GHz	38.8446	14.0972
1.810000000 GHz	38.8477	14.1084
1.812000000 GHz	38.8577	14.1004
1.814000000 GHz	38.8369	14.0863
1.816000000 GHz	38.8303	14.0911
1.818000000 GHz	38.8170	14.0999

1800MHz EUT Evaluation

Measured Liquid Dielectric Parameters (Body)

April 18, 2002

Frequency	e'	e"
1.750000000 GHz	52.4769	15.1617
1.752500000 GHz	52.4793	15.1634
1.755000000 GHz	52.4527	15.1742
1.757500000 GHz	52.4438	15.1706
1.760000000 GHz	52.4377	15.1792
1.762500000 GHz	52.4488	15.1775
1.765000000 GHz	52.4367	15.1875
1.767500000 GHz	52.4219	15.1851
1.770000000 GHz	52.4078	15.1968
1.772500000 GHz	52.4018	15.1871
1.775000000 GHz	52.3934	15.1833
1.777500000 GHz	52.3817	15.1930
1.780000000 GHz	52.3770	15.1933
1.782500000 GHz	52.3709	15.1875
1.785000000 GHz	52.3566	15.1849
1.787500000 GHz	52.3567	15.1995
1.790000000 GHz	52.3462	15.2011
1.792500000 GHz	52.3432	15.2073
1.795000000 GHz	52.3268	15.2103
1.797500000 GHz	52.3211	15.2042
1.800000000 GHz	52.3083	15.2114
1.802500000 GHz	52.3157	15.2162
1.805000000 GHz	52.2992	15.2230
1.807500000 GHz	52.3009	15.2253
1.810000000 GHz	52.2789	15.2295
1.812500000 GHz	52.2904	15.2344
1.815000000 GHz	52.2635	15.2283
1.817500000 GHz	52.2510	15.2390
1.820000000 GHz	52.2551	15.2393
1.822500000 GHz	52.2497	15.2623
1.825000000 GHz	52.2413	15.2732
1.827500000 GHz	52.2301	15.2720
1.830000000 GHz	52.2423	15.2726
1.832500000 GHz	52.2265	15.2828
1.835000000 GHz	52.2262	15.2940

APPENDIX E - SAM PHANTOM CERTIFICATE OF CONFORMITY

Schmid & Partner
Engineering AG

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

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].

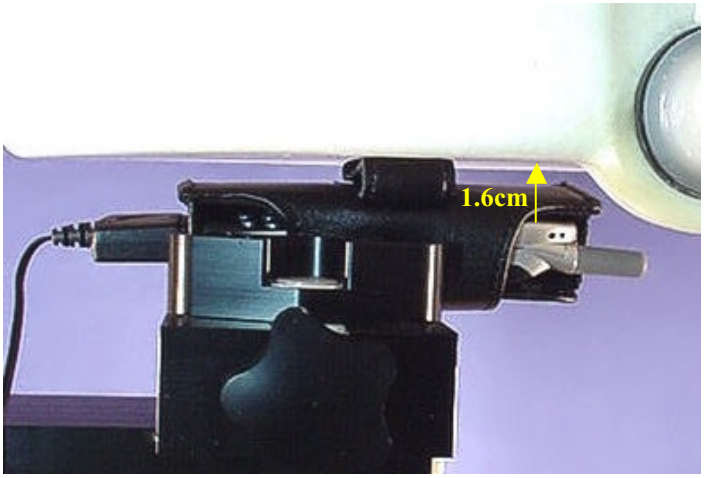
Date 18.11.2001

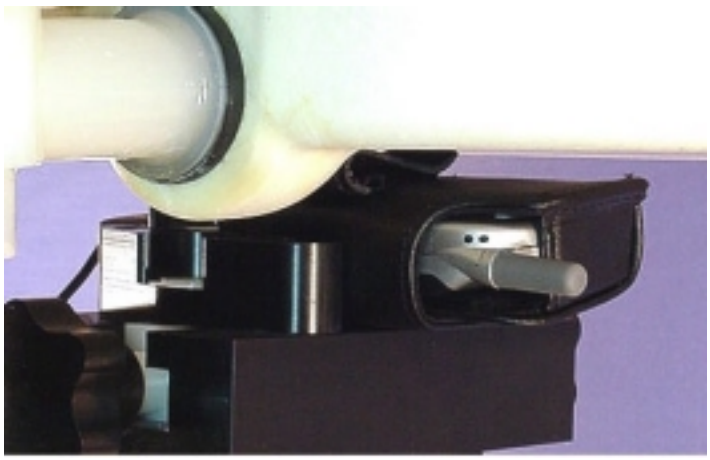
Signature / Stamp Schmid & Partner Engineering AG
Zeughausstrasse 43, CH-8004 Zurich
Tel. +41 1 245 97 00, Fax +41 1 245 97 79

APPENDIX F - SAR TEST SETUP & BELT-HOLSTER PHOTOGRAPHS

SAR TEST SETUP PHOTOGRAPHS

Body-Worn with Belt-Holster & Ear-Microphone
(1.6cm Separation Distance between Front of Handset & Planar Phantom)





BELT-HOLSTER PHOTOGRAPHS

BELT-HOLSTER PHOTOGRAPHS