CERTIFICATE OF COMPLIANCE
SAR EVALUATION

Test Lab:	**Applicant Information:**
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FCC Rule Part(s):	**2.1093; ET Docket 93-62**
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.

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 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 93-62 (see Reference [1]), and Industry Canada RSS-102 Issue 1 (see Reference [2]) for mobile and portable devices. The test procedures described in American National Standards Institute C95.1-1992 (see Reference [3]), and FCC OET Bulletin 65, Supplement C, Edition 01-01 (see Reference [4]) were employed. A description of the product and operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the various provisions of the rules are included within this test report.

2.0 DESCRIPTION of 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

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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	29.33	29.25	Extended	Fixed	Planar	1.6	0.422
1880.0	661	PCS GSM	29.32	29.29	Standard	Fixed	Planar	1.6	0.424
1850.2	512	PCS GSM	29.20	29.23	Standard	Fixed	Planar	1.6	0.347
1909.8	810	PCS GSM	29.58	29.57	Standard	Fixed	Planar	1.6	0.431

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**	**37 %**
Dielectric Constant	**52.3**	**Atmospheric Pressure**	**102.1 kPa**
Conductivity	**1.54**	**Fluid Temperature**	**≈ 23.0 °C**
Ambient Temperature	**23.5 °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 0.431 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 must be 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 measured before and after each test according to the procedures described in FCC Part 2.1046. 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 EUT was placed into test mode using a Rohde & Schwarz CMU200 base station simulator at a full rated power.
4) The location of the maximum spatial SAR distribution (Hot Spot) was determined relative to the handset and its antenna.
5) 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:

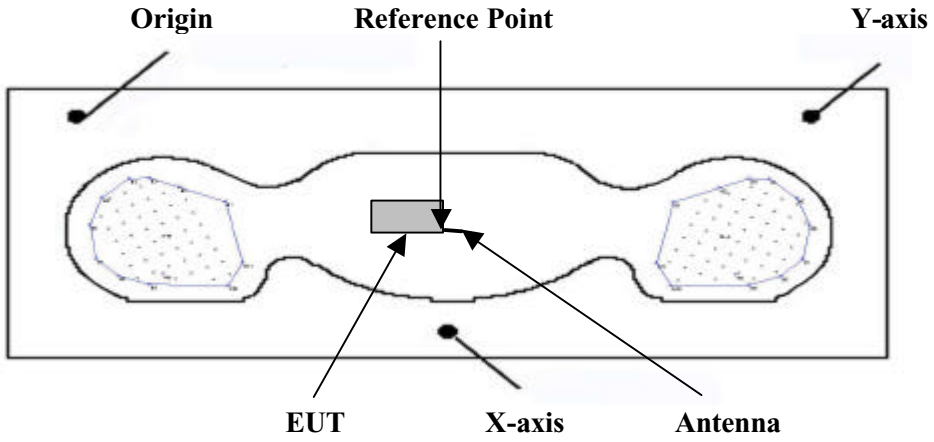
a. (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation both the left and right ear positions were first evaluated at the middle frequency of the band at maximum power with all available 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.

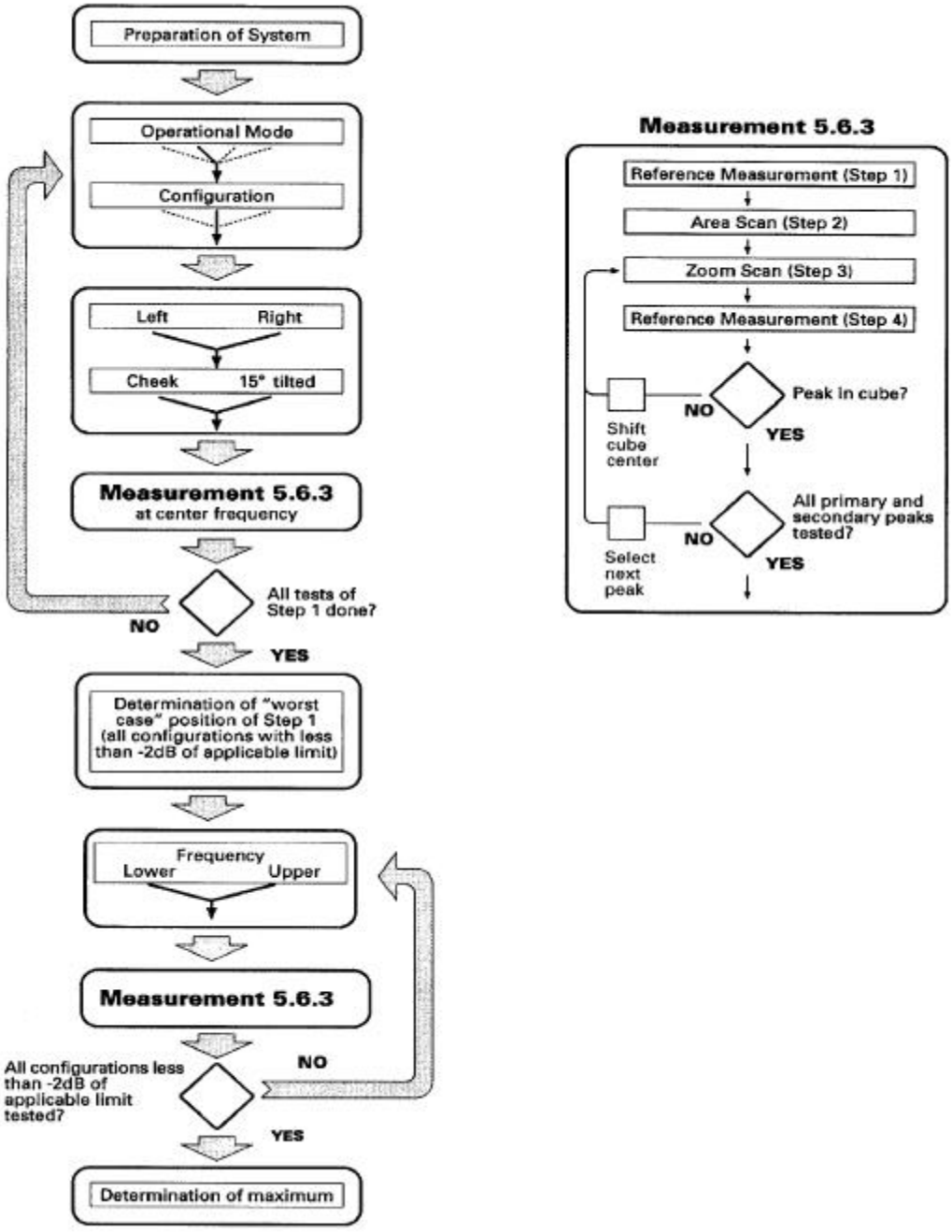
c. A 5x5x7 matrix was performed around the greatest spatial SAR distribution found during the area scan of the applicable exposed region. SAR values were then calculated using a 3-D spline interpolation algorithm and averaged over spatial volumes of 1 and 10 grams.

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 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 verification is listed below (see Appendix B for system validation test plot).

Dipole Validation Kit	Target SAR 1g (w/kg)	Measured SAR 1g (w/kg)	Ambient Temp.	Fluid Temp.	Fluid Depth	Validation Date
D1800V2	9.66	9.81	23.5°C	≈ 23.0°C	≥ 15cm	06/10/02

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 Brain - Target (System Validation)	**40.0 ±5%**	**1.40 ±5%**	**1000**
1800MHz Brain (Measured: 06/10/02)	39.1	1.40	1000
1900MHz Body - Target (EUT Evaluation)	**53.3 ±5%**	**1.52 ±5%**	**1000**
1900MHz Body (Measured: 06/10/02)	52.3	1.54	1000

9.0 SIMULATED TISSUES

The 1800-2000MHz 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 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

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 -Large Planar Phantom	 599396-01 1387 135 136 054 247 150 N/A N/A N/A	 N/A Feb 2002 Oct 2001 Oct 2001 June 2001 June 2001 Oct 2001 N/A 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 [5])

17.0 REFERENCES

[1] Federal Communications Commission, ET Docket 93-62, "Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation", Aug. 1996.

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

[3] 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.

[4] 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.

[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.

[6] 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.

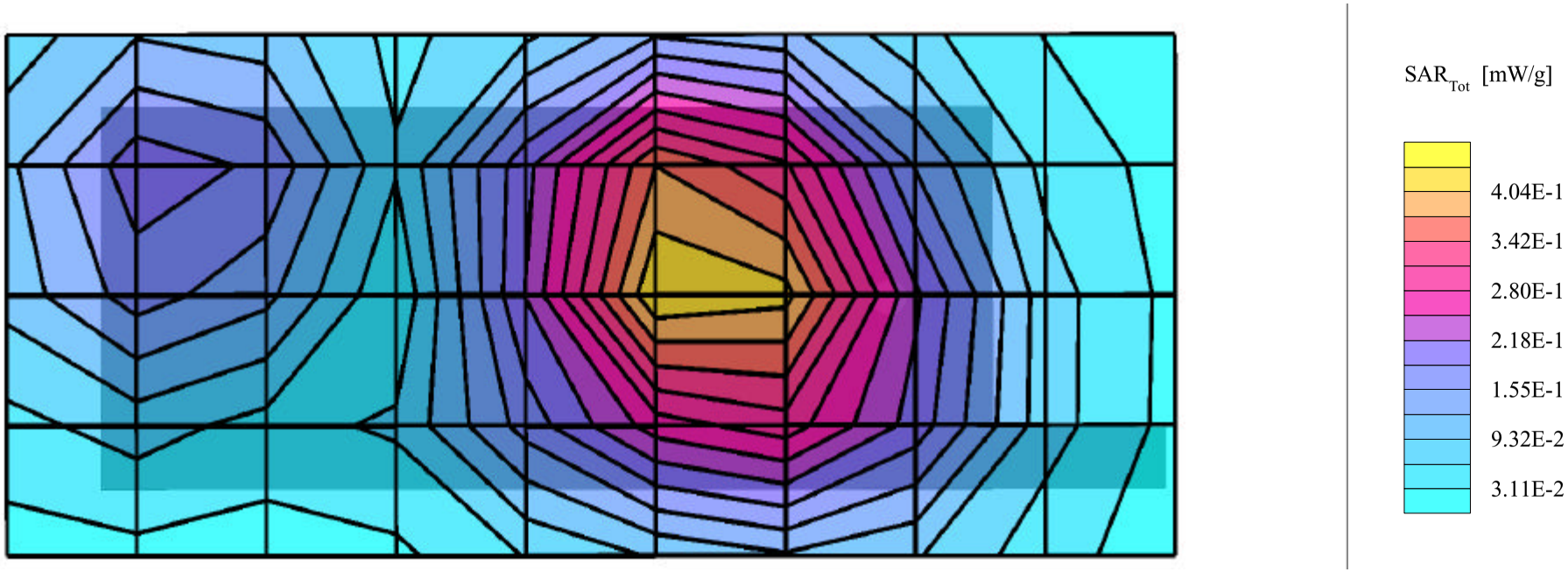
[7] Niels Kuster, Ralph Kastle, and Thomas Schmid, "Dosimetric evaluation of mobile communications equipment with know precision", IEICE Transactions of Communications, vol. E80-B, no. 5, pp. 645-652: May 1997.

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: σ = 1.54 mho/m ε_r = 52.3 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.12 dB
SAR (1g): 0.422 mW/g, SAR (10g): 0.258 mW/g

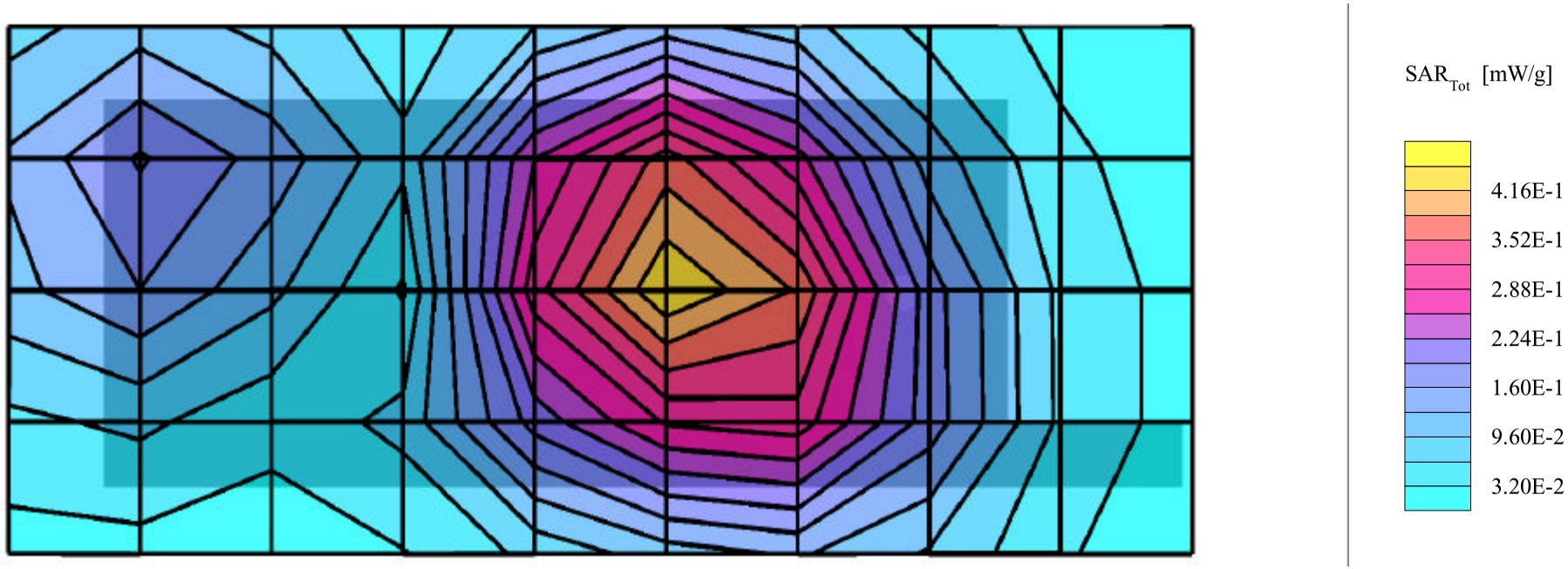
Body SAR with 1.6 cm Belt-Holster
Vtech Model: A700
PCS GSM Mode
Extended Battery
Mid Channel 661 [1880.00 MHz]
Conducted Power: 29.33 dBm
Ambient Temp: 23.5°C; Fluid Temp: 23.0°C
Date Tested: June 10, 2002



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: σ = 1.54 mho/m ε_r = 52.3 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.06 dB
SAR (1g): 0.424 mW/g, SAR (10g): 0.259 mW/g

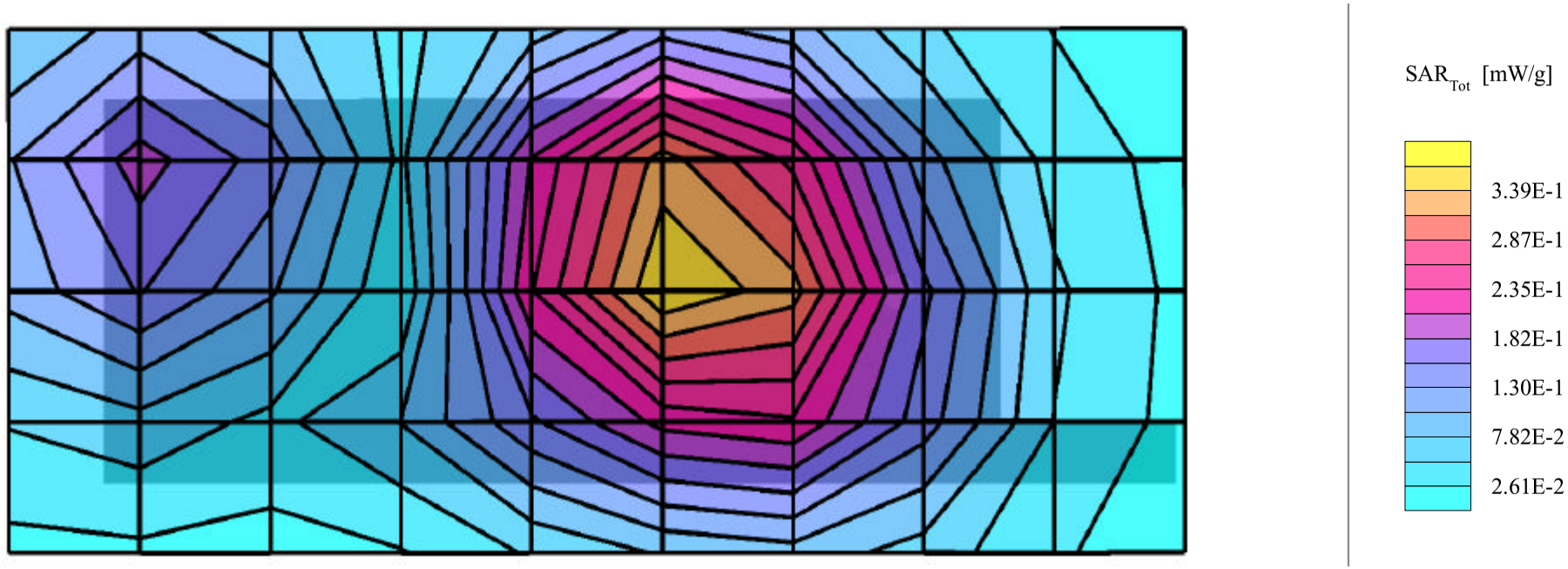
Body SAR with 1.6 cm Belt-Holster
Vtech Model: A700
PCS GSM Mode
Standard Battery
Mid Channel 661 [1880.00 MHz]
Conducted Power: 29.32 dBm
Ambient Temp: 23.5°C; Fluid Temp: 23.0°C
Date Tested: June 10, 2002



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: σ = 1.54 mho/m ε_r = 52.3 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: 0.00 dB
SAR (1g): 0.347 mW/g, SAR (10g): 0.216 mW/g

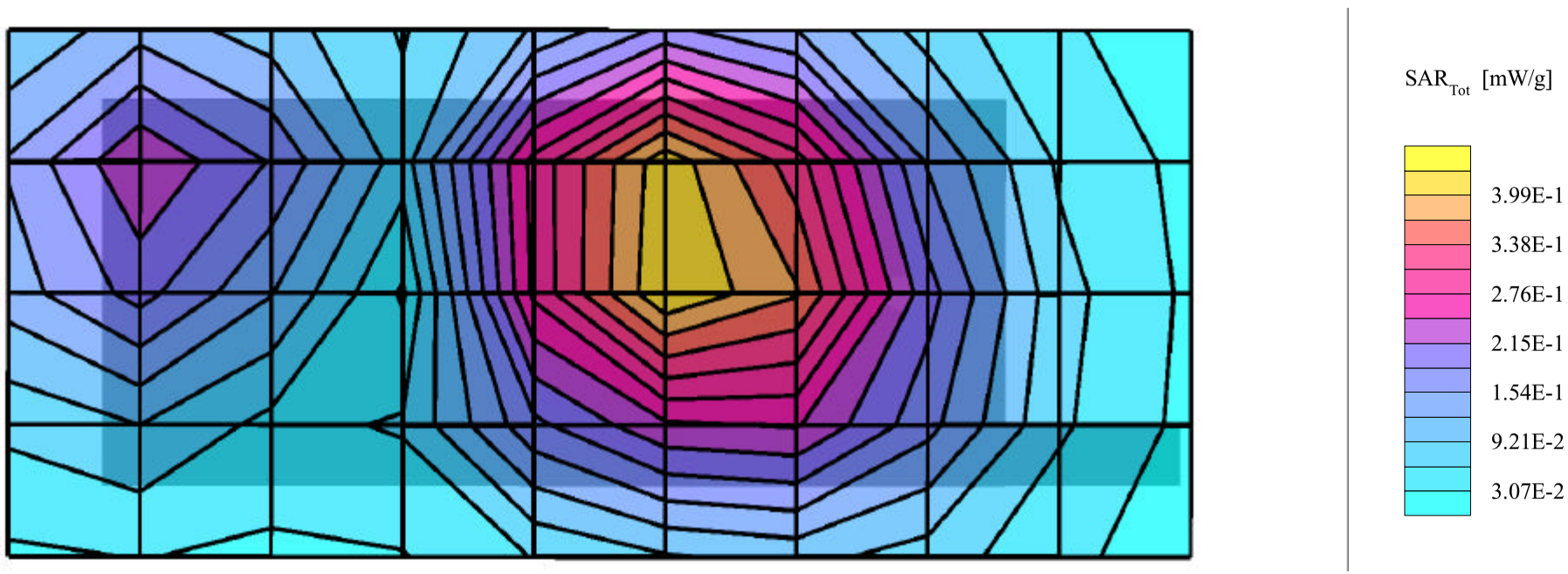
Body SAR with 1.6 cm Belt-Holster
Vtech Model: A700
PCS GSM Mode
Standard Battery
Low Channel 512 [1850.20 MHz]
Conducted Power: 29.20 dBm
Ambient Temp: 23.5°C; Fluid Temp: 23.0°C
Date Tested: June 10, 2002



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: σ = 1.54 mho/m ε_r = 52.3 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: 0.05 dB
SAR (1g): 0.431 mW/g, SAR (10g): 0.262 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: 29.58 dBm
Ambient Temp: 23.5°C; Fluid Temp: 23.0°C
Date Tested: June 10, 2002

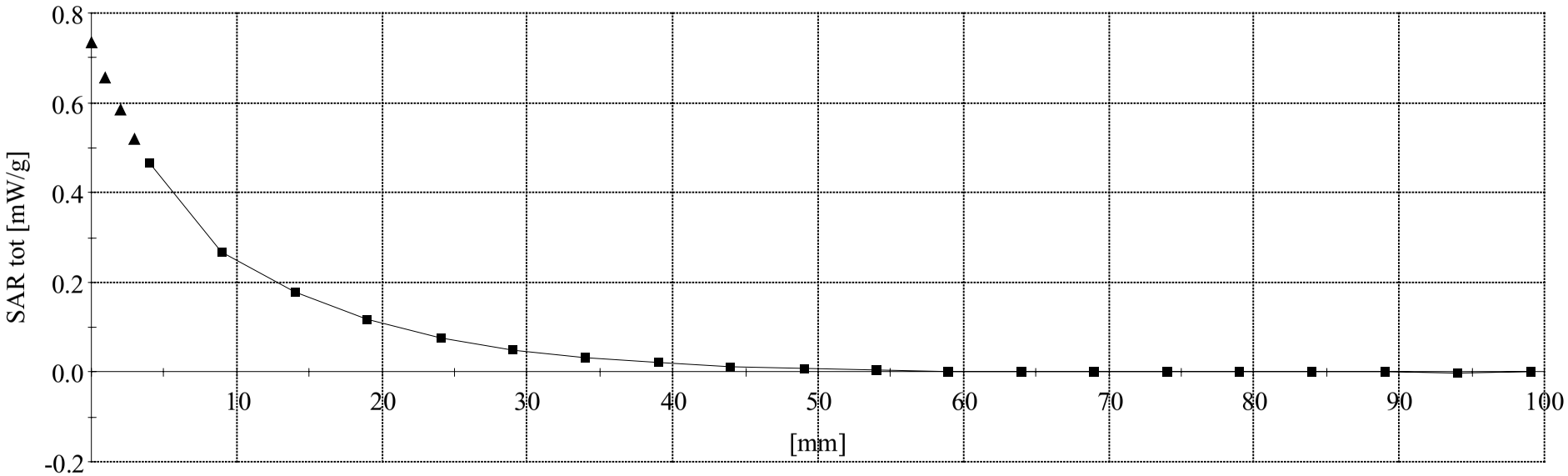


Vtech FCC ID: P5680-5196-00

SAM Phantom; Flat Section
Probe: ET3DV6 - SN1387; ConvF(5.00,5.00,5.00); Crest factor: 8.0
1900 MHz Muscle: σ = 1.54 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 [1909.80 MHz]
Conducted Power 29.58 dBm
Ambient Temp: 23.5°C; Fluid Temp: 23.0°C
Date Tested: June 10, 2002



APPENDIX B - SYSTEM VALIDATION

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 = 39.1 ρ = 1.00 g/cm^3

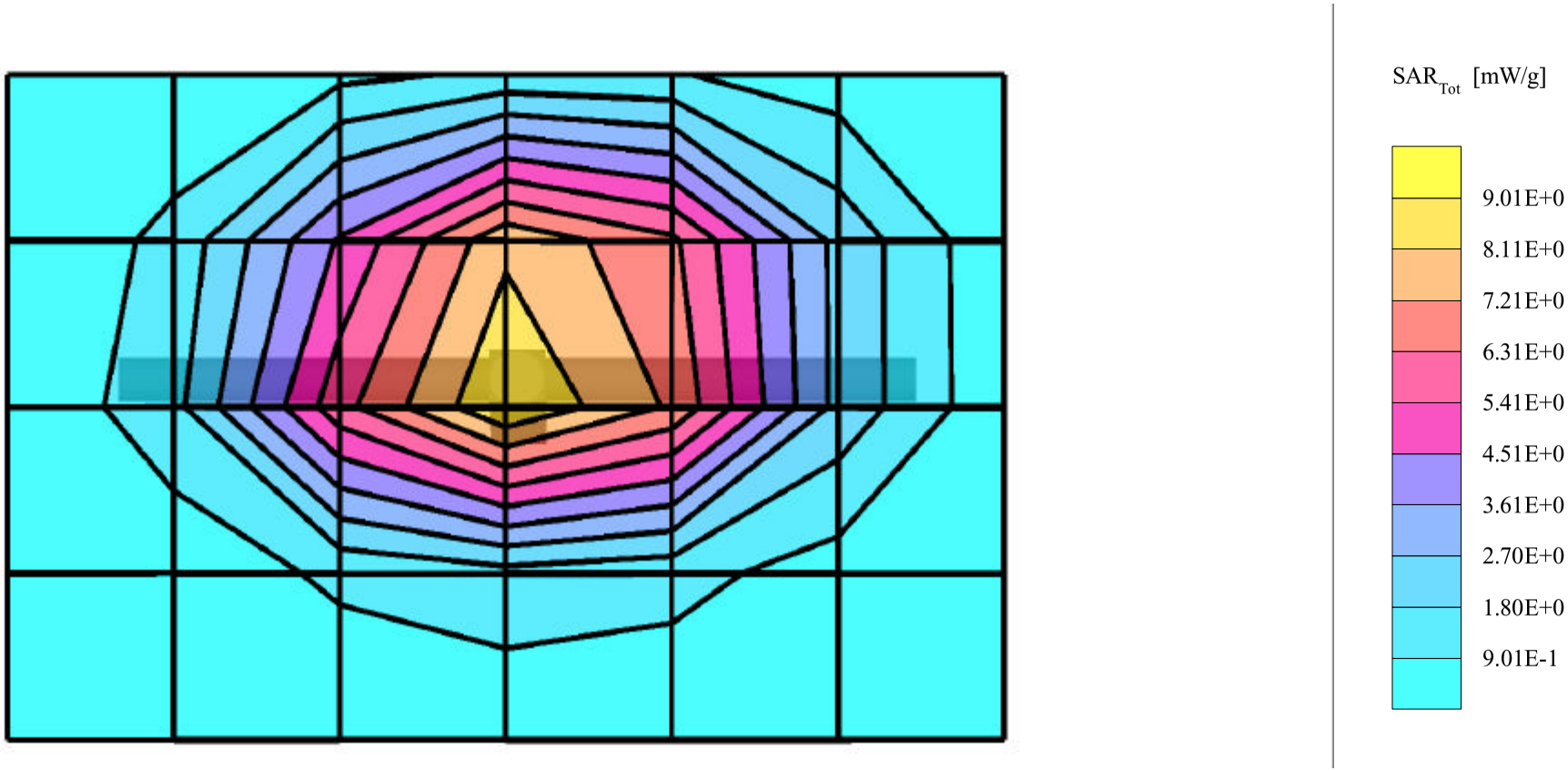
Cube 5x5x7: Peak: 19.2 mW/g, SAR (1g): 9.81 mW/g, SAR (10g): 4.93 mW/g, (Worst-case extrapolation)

Penetration depth: 7.5 (7.1, 8.4) [mm]; Ambient Temp: 23.5°C; Fluid Temp: 23.0°C

Powerdrift: 0.06 dB

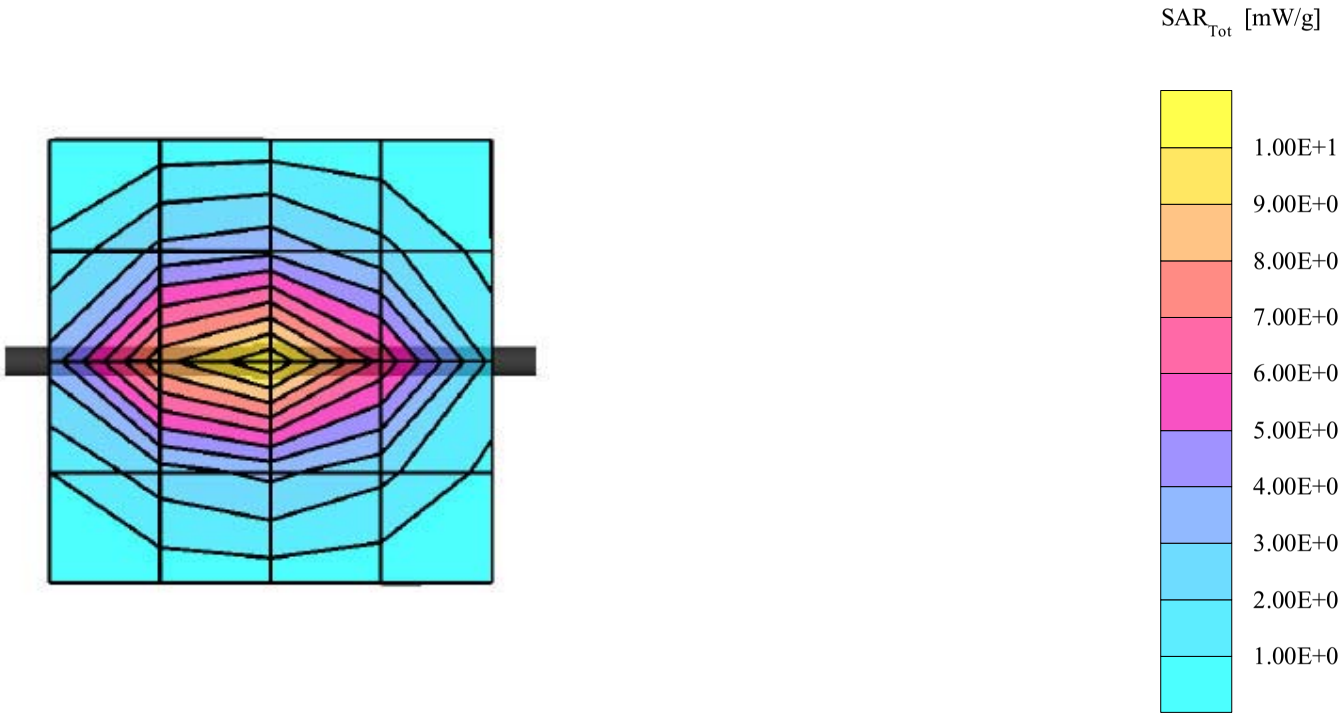
Conducted Power: 250mW

Validation Date: June 10, 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

NormX	**1.58**	$\mu V/(V/m)^2$
NormY	**1.67**	$\mu V/(V/m)^2$
NormZ	**1.67**	$\mu V/(V/m)^2$

Diode Compression

DCP X	**97**	mV
DCP Y	**97**	mV
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

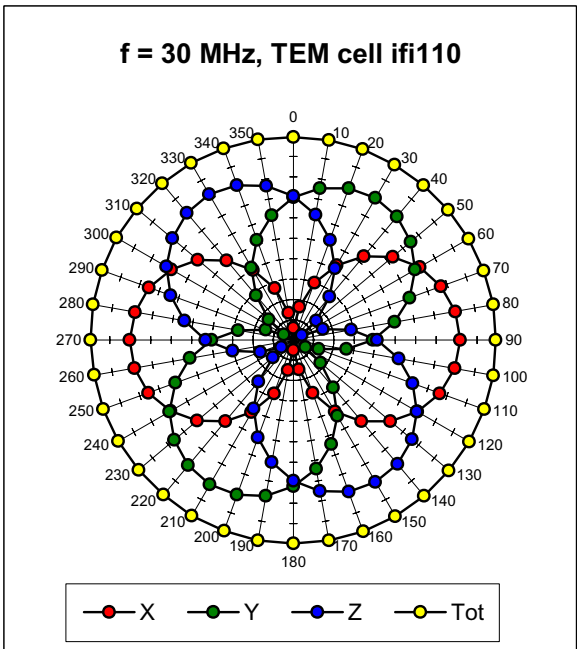
Head **1800 MHz** **Typical SAR gradient: 10 % per mm**

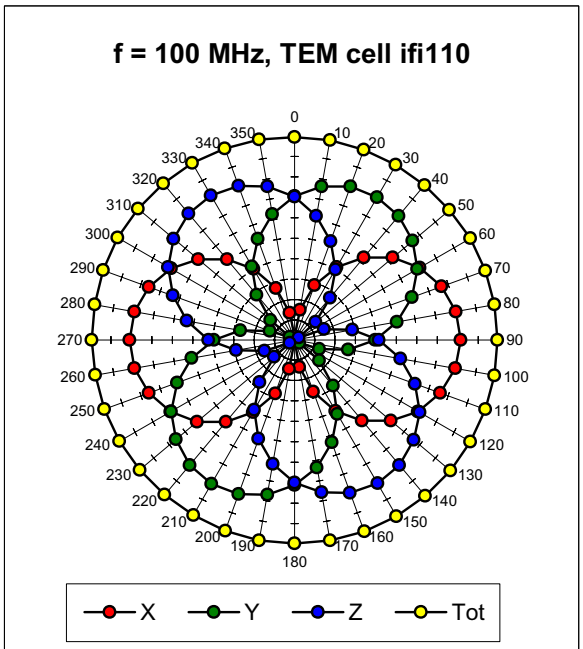
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	11.5	7.3
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

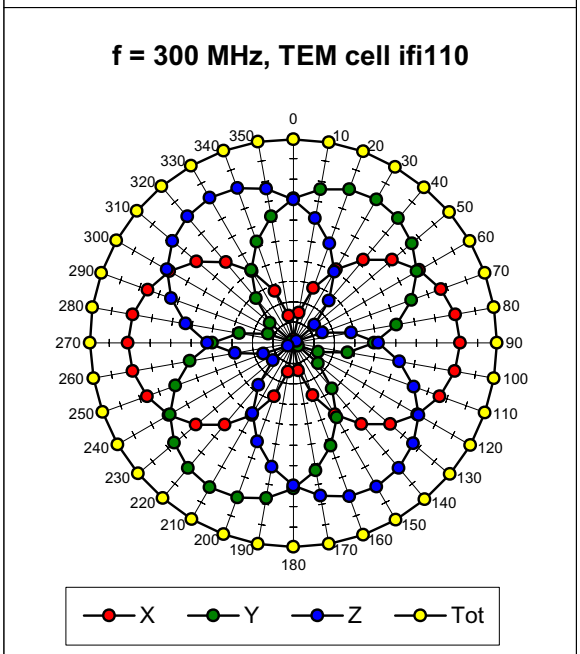
Sensor Offset

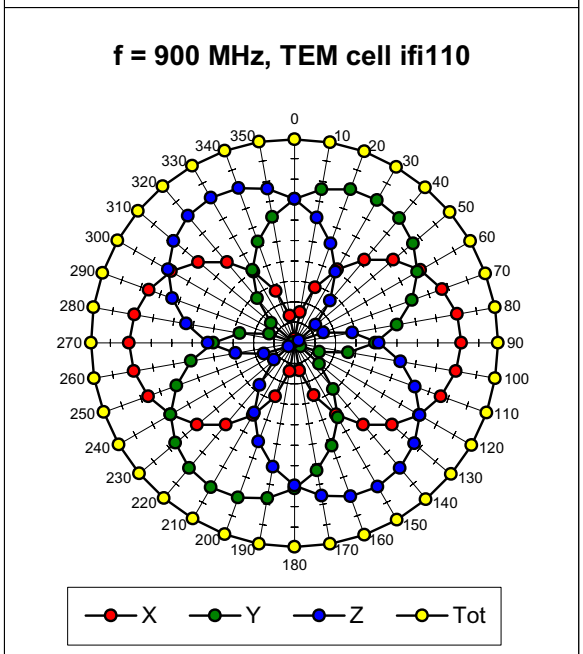
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.3 ± 0.2**	mm

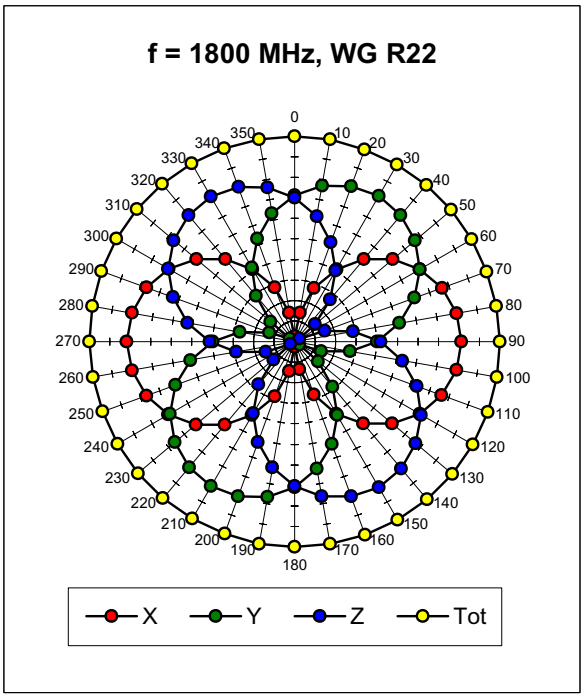
Receiving Pattern (ϕ , θ = 0°

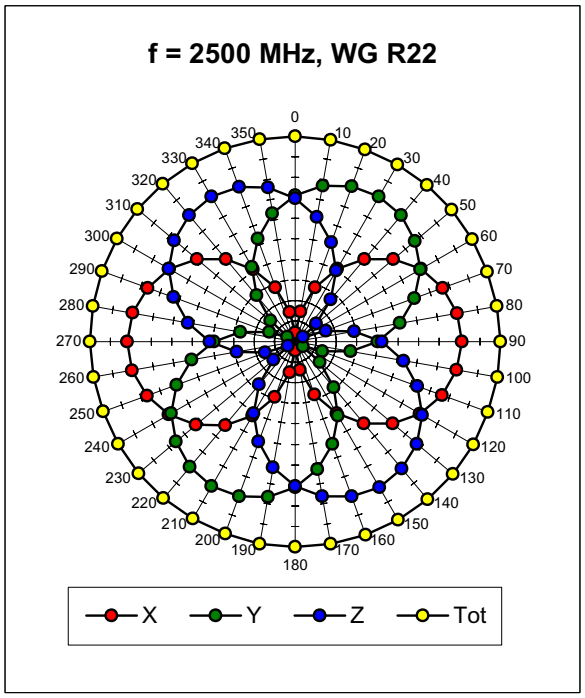




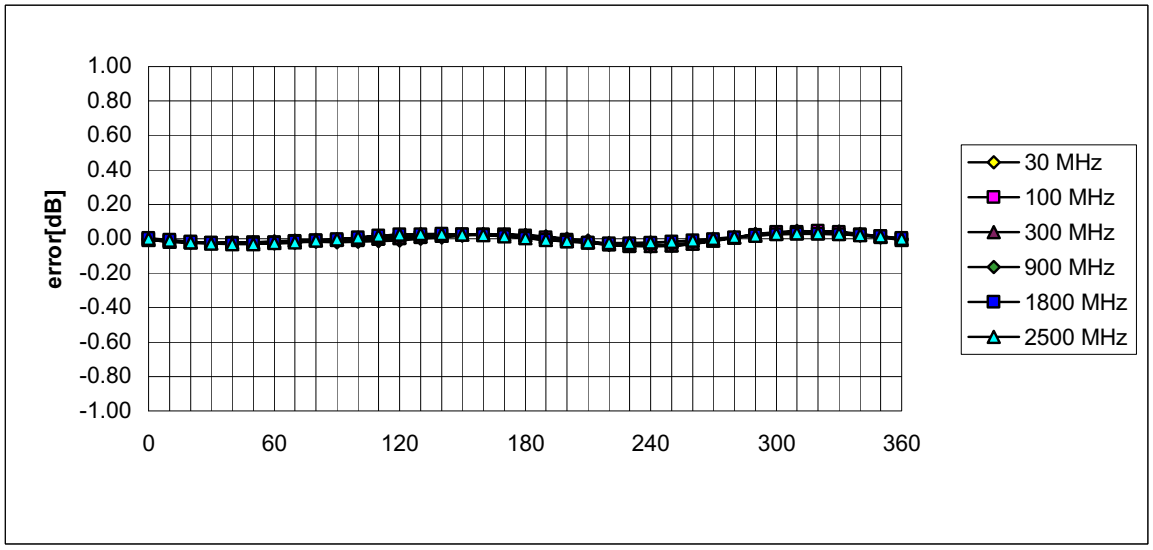






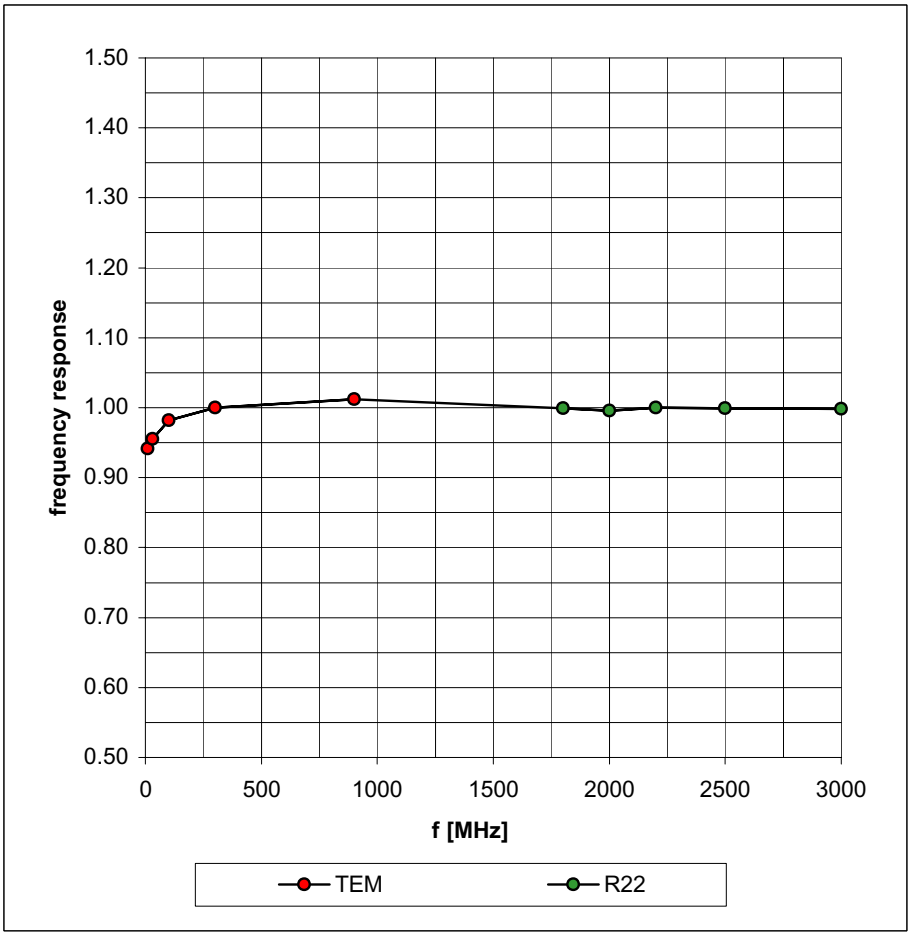


Isotropy Error (ϕ), θ = 0°



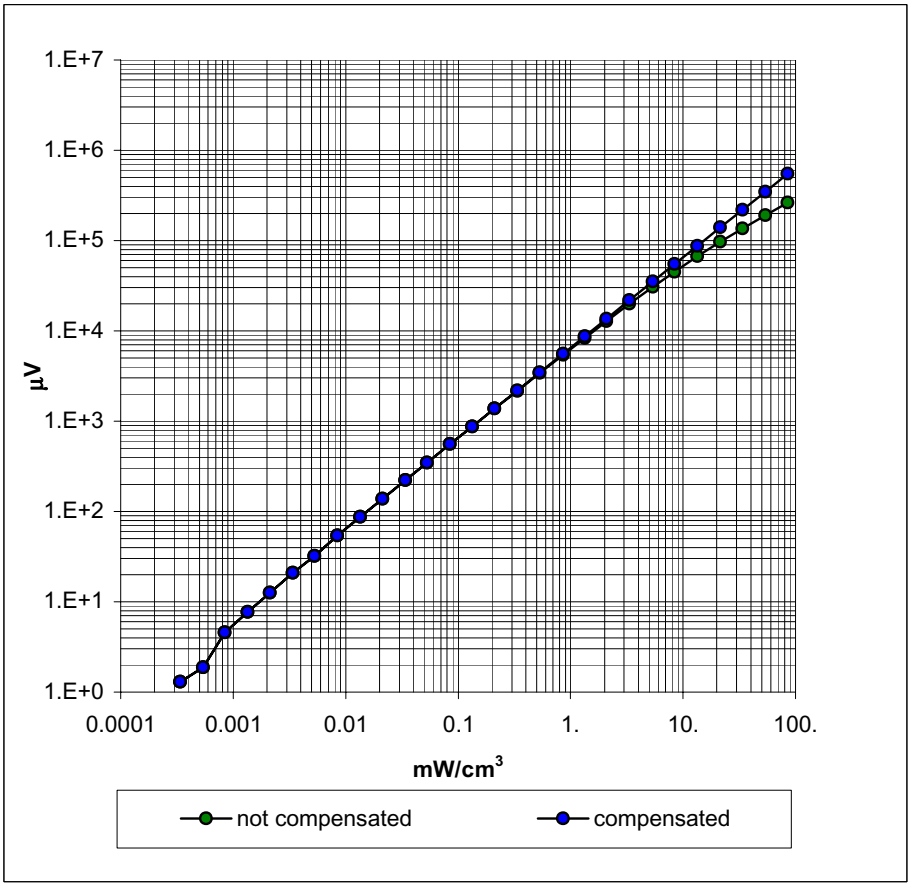
Frequency Response of E-Field

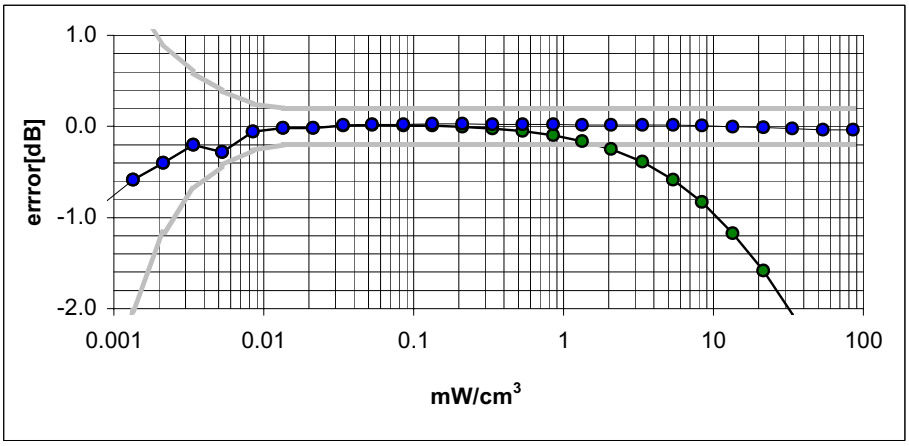
(TEM-Cell:ifi110, Waveguide R22)



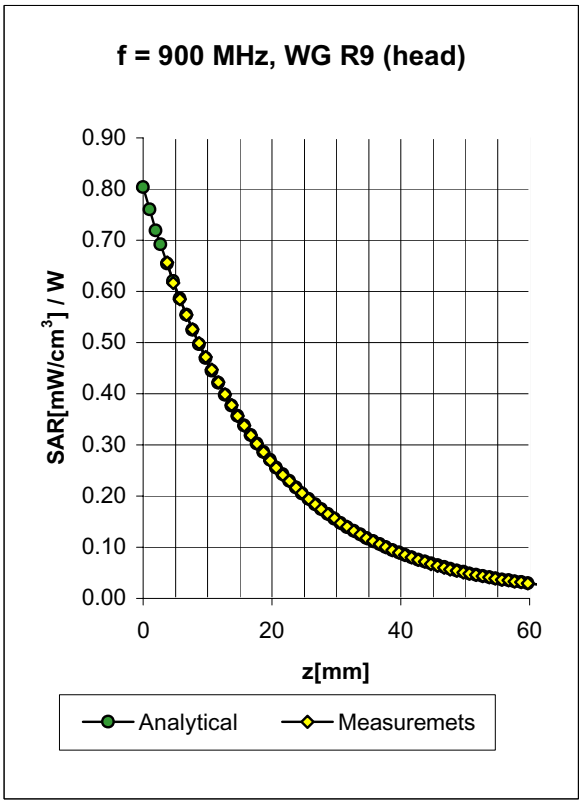
Dynamic Range f(SAR_{brain})

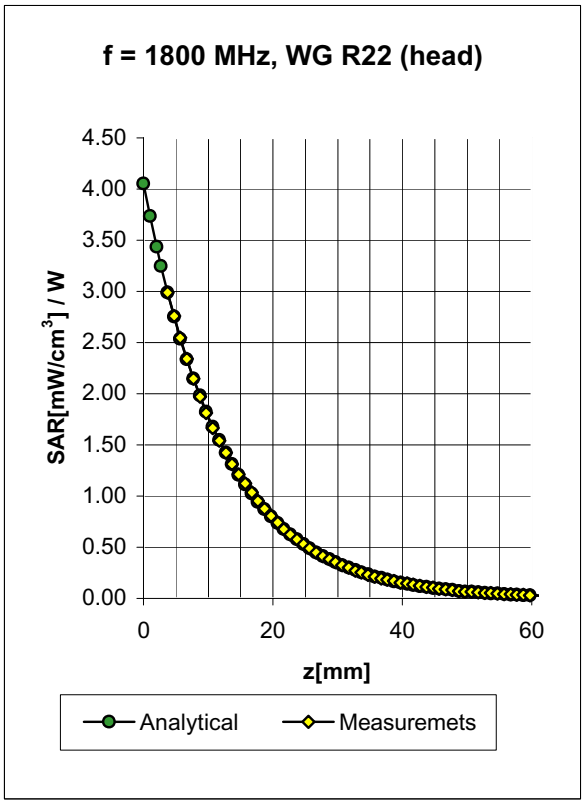
(Waveguide R22)





Conversion Factor Assessment



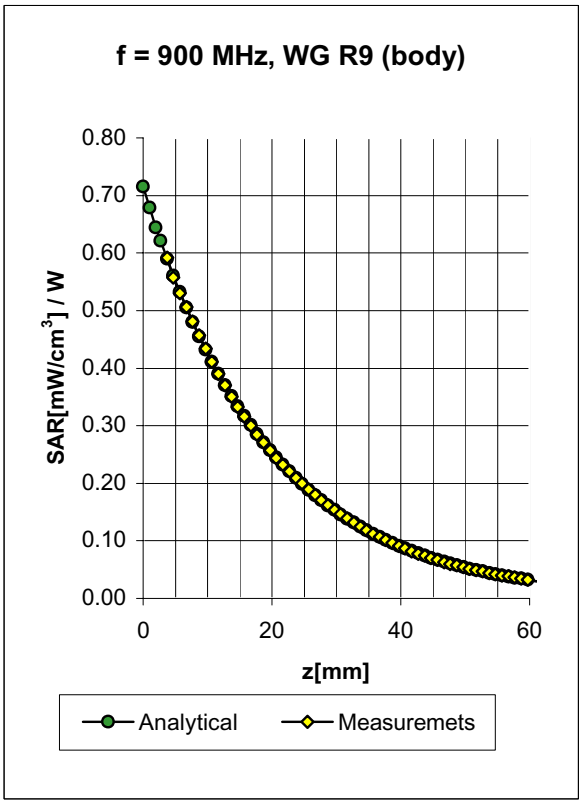


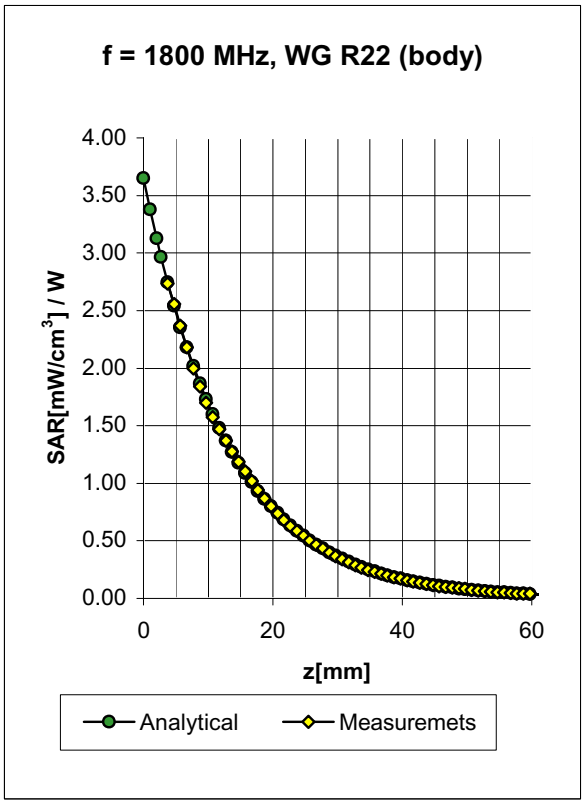
Head	**900 MHz**		**ε_r = 41.5 ± 5%**	**σ = 0.97 ± 5% mho/m**	
Head	**835 MHz**		**ε_r = 41.5 ± 5%**	**σ = 0.90 ± 5% mho/m**	
	ConvF X	**6.6**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.6**	± 9.5% (k=2)	Alpha	**0.40**
	ConvF Z	**6.6**	± 9.5% (k=2)	Depth	**2.38**

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





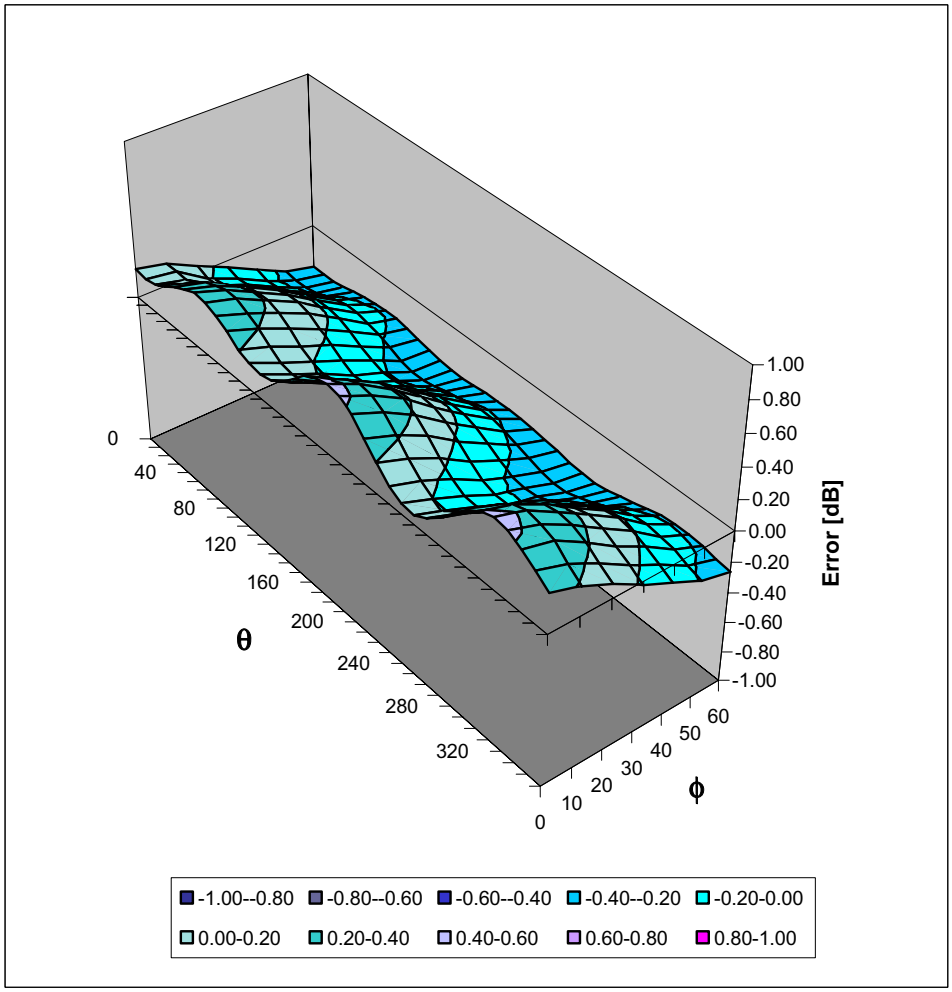
Body	**900 MHz**		**ε_r = 55.0 ± 5%**	**σ = 1.05 ± 5% mho/m**	
Body	**835 MHz**		**ε_r = 55.2 ± 5%**	**σ = 0.97 ± 5% mho/m**	
	ConvF X	**6.3**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.3**	± 9.5% (k=2)	Alpha	**0.42**
	ConvF Z	**6.3**	± 9.5% (k=2)	Depth	**2.44**

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 (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

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: Jelusić Katja

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)

June 10, 2002

Frequency	e'	e''
1.750000000 GHz	39.2607	13.8969
1.752000000 GHz	39.2554	13.9070
1.754000000 GHz	39.2574	13.9189
1.756000000 GHz	39.2480	13.9005
1.758000000 GHz	39.2447	13.9032
1.760000000 GHz	39.2388	13.9013
1.762000000 GHz	39.2350	13.9135
1.764000000 GHz	39.2354	13.9171
1.766000000 GHz	39.2382	13.9193
1.768000000 GHz	39.2196	13.9217
1.770000000 GHz	39.2251	13.9284
1.772000000 GHz	39.2216	13.9251
1.774000000 GHz	39.2300	13.9209
1.776000000 GHz	39.2166	13.9265
1.778000000 GHz	39.2064	13.9271
1.780000000 GHz	39.2084	13.9327
1.782000000 GHz	39.1910	13.9314
1.784000000 GHz	39.1844	13.9483
1.786000000 GHz	39.1799	13.9272
1.788000000 GHz	39.1770	13.9449
1.790000000 GHz	39.1769	13.9518
1.792000000 GHz	39.1557	13.9437
1.794000000 GHz	39.1512	13.9532
1.796000000 GHz	39.1453	13.9604
1.798000000 GHz	39.1318	13.9752
1.800000000 GHz	39.1327	13.9937
1.802000000 GHz	39.1207	13.9954
1.804000000 GHz	39.1177	13.9918
1.806000000 GHz	39.1129	14.0106
1.808000000 GHz	39.0961	14.0091
1.810000000 GHz	39.0967	14.0216
1.812000000 GHz	39.0908	14.0228
1.814000000 GHz	39.0906	14.0388
1.816000000 GHz	39.0807	14.0332
1.818000000 GHz	39.0672	14.0420

1900MHz EUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

June 10, 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

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

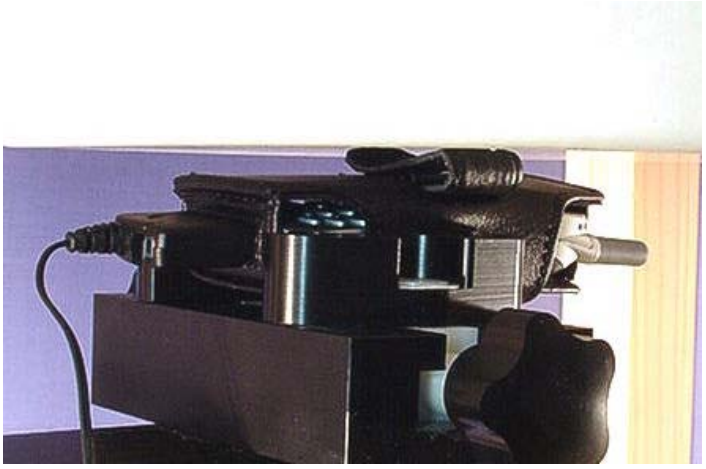
Signature / Stamp

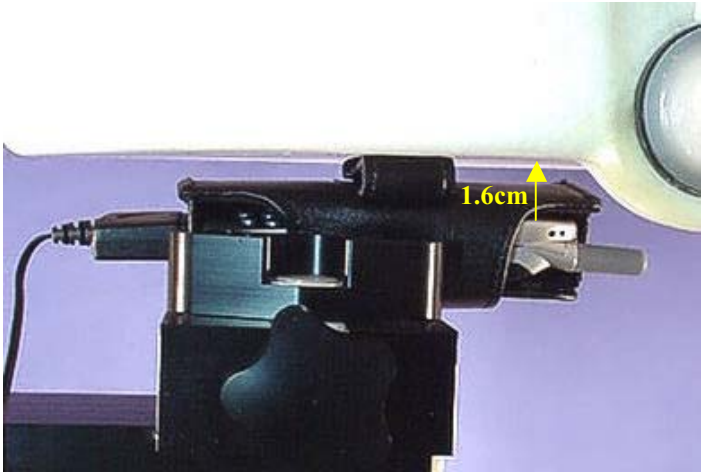
Schmid & Partner Engineering AG
Zeughausstrasse 43, CH-8004 Zurich
Tel. +41 1 245 97 00, Fax +41 1 245 97 79

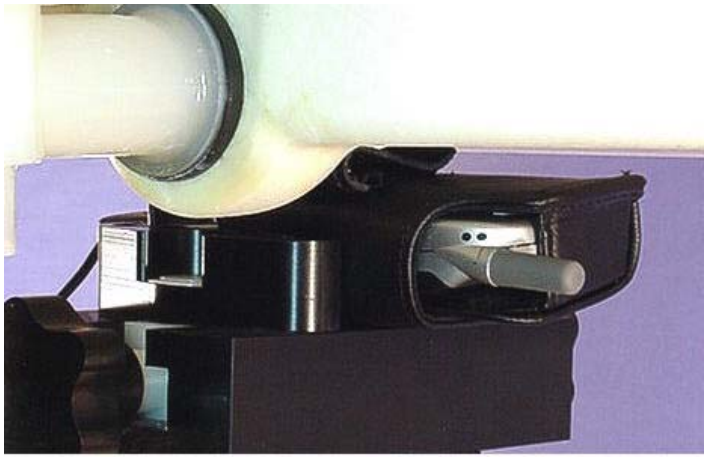
APPENDIX F - SAR TEST SETUP & BELT-HOLSTER PHOTOGRAPHS

SAR TEST SETUP PHOTOGRAPHS

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







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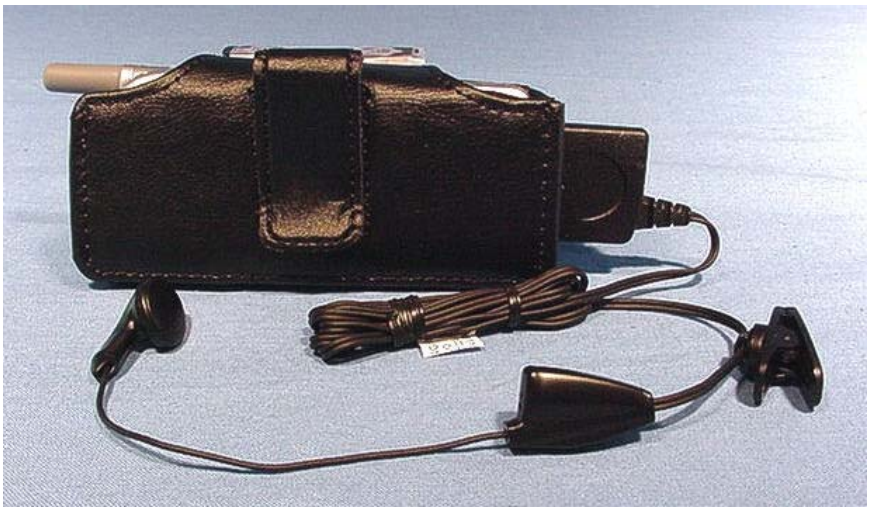
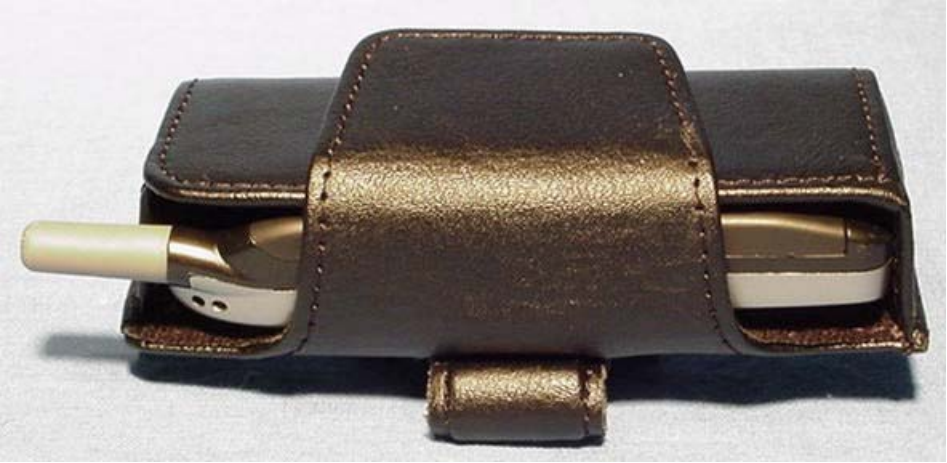
BELT-HOLSTER PHOTOGRAPHS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