RF EXPOSURE EVALUATION

SPECIFIC ABSORPTION RATE

SAR TEST REPORT

FOR

UNIDEN AMERICA CORPORATION

1.9 GHz UPCS/LE-PCS DECT PORTABLE HANDSET

MODEL(S): DECT2080

IDENTIFIERS	FCC ID:	AMWUU644
	IC ID:	513C-UC511
TEST STANDARD(S) & PROCEDURE(S) APPLIED		
FCC OET Bulletin 65, Supplement C (01-01)		
Industry Canada RSS-102 Issue 2		
IEEE 1528-2003		

Test Report Serial No.

031907AMW-T822-S15T

Test Report Revision No.

Revision 1.1 (FCC ID Correction)
Revision 1.0 (Initial Release)

Test Lab and Location

Celltech Compliance Testing & Engineering Lab
(Celltech Labs Incorporated)
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Certificate No. 2470.01

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DECLARATION OF COMPLIANCE
SAR RF EXPOSURE EVALUATION

Test Lab and Location

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FCC IDENTIFIER:	**AMWUU644**
IC IDENTIFIER:	**513C-UC511**
Device Model(s):	**DECT2080**
Rule Part(s) Applied:	**FCC 47 CFR §2.1093; Health Canada Safety Code 6**
Test Procedure(s) Applied:	**FCC OET Bulletin 65, Supplement C (Edition 01-01)** **Industry Canada RSS-102 Issue 2** **IEEE Standard 1525-2003**
Device Classification(s):	**FCC Part 15 Unlicensed PCS portable Tx held to ear (PUE)** **IC 2 GHz Licence Exempt Personal Communications Service Device (LE-PCS)**
Device Description:	**1.9 GHz UPCS/LE-PCS DECT Portable Handset**
Transmit Frequency Range:	**1921.536 - 1928.448 MHz**
Mode of Operation:	**TDD (Time Division Duplexing)**
Modulation Type:	**FSK (Frequency Shift Keying)**
Max. Reference Power Level Measured:	**17.64 dBm (58.1 mW) EIRP (1924.992 MHz)**
Max. Source-Based Time-Av. Duty Cycle:	**4 % (Crest Factor: 1:25)**
Max. Source-Based Time-Av. Power Level:	**3.66 dBm (2.32 mW) EIRP (1924.992 MHz)**
Antenna Type(s) Tested:	**Internal**
Battery Type(s) Tested:	**NiMH 2.4 V, 650 mAh**
Body-worn Accessories Tested:	**Plastic Belt-Clip (7 mm spacing)**
Audio Accessories Tested:	**Headset (Ear-Loop with Boom-Microphone P/N: ZA-133)**
Max. SAR Level(s) Evaluated:	**Head: 0.0204 W/kg (1g average)** **Body: 0.0125 W/kg (1g average)**

Celltech Labs Inc. declares under its sole responsibility that this wireless portable device is compliant with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 and Health Canada's Safety Code 6. The device was tested in accordance with the measurement standards and procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01), Industry Canada RSS-102 Issue 2 and IEEE Standard 1528-2003 for the General Population / Uncontrolled Exposure environment. All measurements were performed in accordance with the SAR system manufacturer recommendations.

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

Test Report Approved By:

Sean Johnston
SAR Lab Manager
Celltech Labs Inc.

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1.0 INTRODUCTION

This measurement report demonstrates that the Uniden America Corporation Model(s): DECT2080 1.9 GHz UPCS/LE-PCS DECT Portable Handset complies with the SAR (Specific Absorption Rate) RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) and Health Canada's Safety Code 6 (see reference [2]) for the General Population / Uncontrolled Exposure environment. The test procedures described in FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]), IC RSS-102 Issue 2 (see reference [4]), and IEEE Standard 1528-2003 (see reference [5]) were employed. A description of the product, operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the various provisions of the rules are included within this test report.

2.0 DESCRIPTION OF DEVICE UNDER TEST (DUT)

Rule Part(s) Applied	FCC Rule Part 47 CFR §2.1093			
	Health Canada Safety Code 6			
Test Procedure(s) Applied	FCC OET Bulletin 65, Supplement C (01-01)			
	Industry Canada RSS-102 Issue 2			
	IEEE Standard 1528-2003			
FCC Device Classification	Part 15 Unlicensed PCS portable Tx held to ear (PUE)			§15(D)
IC Device Classification	2 GHz Licence Exempt Personal Communications Service Device (LE-PCS)			RSS-213 Issue 2
Device Description	1.9 GHz UPCS/LE-PCS DECT Portable Handset			
RF Exposure Category	General Population / Uncontrolled Exposure Environment			
FCC IDENTIFIER	AMWUU644			
IC IDENTIFIER	513C-UC511			
Device Model(s)	DECT2080			
Test Sample Serial No.	#2		Identical Prototype	
Transmit Frequency Range	1921.536 - 1928.448 MHz			
Mode(s) of Operation	TDD		Time Division Duplexing	
Modulation Type(s)	FSK		Frequency Shift Keying	
System Technology	DECT		Digital Enhanced Cordless Telecommunications	
Reference Power Measured	17.64 dBm	58.1 mW	EIRP	1924.992 MHz
Source-Based Time-Averaged	3.66 dBm	2.32 mW	EIRP	1924.992 MHz
Maximum Duty Cycle Tested	4 %	Source-Based Time-Averaged	1 Time Slot	Crest Factor: 1:25
Battery Type(s) Tested	NiMH Battery Pack		2.4 V	650 mAh
Antenna Type(s) Tested	Internal			
Body-Worn Accessories Tested	Plastic Belt-Clip (7 mm spacing)			
Audio Accessories Tested	Headset (Ear-Loop with Boom-Microphone P/N: ZA-133)			

3.0 SAR MEASUREMENT SYSTEM

Celltech Labs Inc. SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 measurement system is comprised of the measurement server, robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for brain and/or body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the DASY4 measurement server. The DAE4 utilizes a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the DASY4 measurement server is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. The sensor systems are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

DASY4 Measurement System with SAM Phantom and device holder

DASY4 Measurement System with SAM Phantom and validation dipole

4.0 MEASUREMENT SUMMARY

HEAD SAR EVALUATION RESULTS

Freq.	Chan.	Test Mode	Time Slots	Duty Cycle	Crest Factor	Battery Type	Phantom Section	Test Position	Reference Power (mW)		Measured SAR 1g
MHz									EIRP	SBTA	W/kg
1924.992	Mid	TDD	1	4%	1:25	NiMH	Left Ear	Cheek/Touch	58.1	2.32	0.0175
1924.992	Mid	TDD	1	4%	1:25	NiMH	Left Ear	Ear/Tilt (15°)	58.1	2.32	0.0173
1924.992	Mid	TDD	1	4%	1:25	NiMH	Right Ear	Cheek/Touch	58.1	2.32	0.0188
1924.992	Mid	TDD	1	4%	1:25	NiMH	Right Ear	Ear/Tilt (15°)	58.1	2.32	**0.0204**

ANSI / IEEE C95.1: 2005 - SAFETY LIMIT	BRAIN: 1.6 W/kg (averaged over 1 gram)	Spatial Peak Uncontrolled Exposure / General Population

Date(s) of Evaluation	March 20, 2007			Relative Humidity	30	%
Measured Fluid Type	1920 MHz Brain			Atmospheric Pressure	101.2	kPa
Dielectric Constant ε_r	IEEE Target	Measured	Deviation	Ambient Temperature	22.5	°C
	40.0 ± 5%	38.3	-4.2%	Fluid Temperature	21.2	°C
Conductivity σ (mho/m)	IEEE Target	Measured	Deviation	Fluid Depth	≥ 15	cm
	1.40 ± 5%	1.47	+5.0%	ρ (Kg/m^3)	1000	

Notes		
	1.	The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
	2.	The transmission band of the DUT is less than 10 MHz; therefore mid channel data only is reported (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]).
	3.	The power drift of the DUT was measured by the DASY4 system during the SAR evaluations at the reference point of the phantom with low SAR. The drift levels were inaccurate due to the SAR value at the reference point is close to the measurement noise floor and are therefore not reported.
	4.	The DUT battery pack was fully charged prior to the SAR evaluations.
	5.	The fluid temperature was measured prior to and after the SAR evaluations to ensure the temperature remained within +/-2°C of the fluid temperature reported during the dielectric parameter measurements.
	6.	The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations (see Appendix C).
	7.	The SAR evaluations were performed within 24 hours of the system performance check.

MEASUREMENT SUMMARY (Cont.)

BODY-WORN SAR EVALUATION RESULTS

Freq.	Chan.	Test Mode	Time Slots	Duty Cycle	Crest Factor	Battery Type	Phantom Section	DUT Position	Accessories			Reference Power (mW)		Measured SAR 1g
MHz									Body-Worn	Spacing	Audio	EIRP	SBTA	W/kg
1924.992	Mid	TDD	1	4%	1:25	NiMH	Planar	Back Side	Belt-Clip	7 mm	Headset	58.1	2.32	0.0125

ANSI / IEEE C95.1:2005 - SAFETY LIMIT	BODY: 1.6 W/kg (averaged over 1 gram)	Spatial Peak Uncontrolled Exposure / General Population

Date(s) of Evaluation	March 20, 2007				Relative Humidity	30	%
Measured Fluid Type	1920 MHz Body				Atmospheric Pressure	101.2	kPa
Dielectric Constant ε_r	IEEE Target		Measured	Deviation	Ambient Temperature	23.3	°C
	53.3	± 5%	50.9	-4.5%	Fluid Temperature	21.6	°C
Conductivity σ (mho/m)	IEEE Target		Measured	Deviation	Fluid Depth	≥ 15	cm
	1.52	± 5%	1.59	+4.6%	ρ (Kg/m^3)	1000	

Notes		
	1.	The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
	2.	The transmission band of the DUT is less than 10 MHz; therefore mid channel data only is reported (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]).
	3.	The power drift of the DUT was measured by the DASY4 system during the SAR evaluation at the reference point of the phantom with low SAR. The drift level was inaccurate due to the SAR value at the reference point is close to the measurement noise floor and therefore is not reported.
	4.	The DUT battery pack was fully charged prior to the SAR evaluation.
	5.	The fluid temperature was measured prior to and after the SAR evaluation to ensure the temperature remained within +/-2°C of the fluid temperature reported during the dielectric parameter measurements.
	6.	The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluation (see Appendix C).
	7.	The SAR evaluation was performed within 24 hours of the system performance check.

5.0 DETAILS OF SAR EVALUATION

The Uniden America Corporation Model(s): DECT2080 1.9 GHz UPCS/LE-PCS DECT Portable Handset was compliant for localized Specific Absorption Rate (Uncontrolled Exposure) based on the test provisions and conditions described below. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A. The detailed test setup photographs are shown in Appendix D.

Ear-held Configuration(s)

1) The DUT was tested in an ear-held configuration on both the left and right sections of the SAM phantom at the mid channel of the operating band. The transmission band of the DUT is less than 10 MHz; therefore mid channel data only was reported (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]).

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.

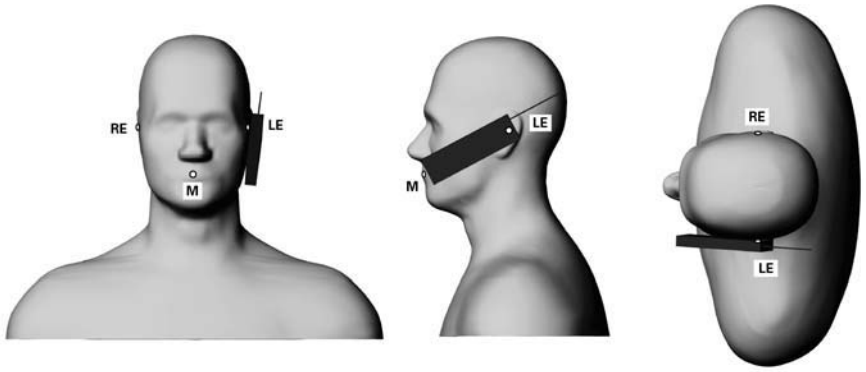


Figure 1. Phone position 1 - "cheek" or "touch" position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning, are indicated (Shoulders are shown for illustration only).

- 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.

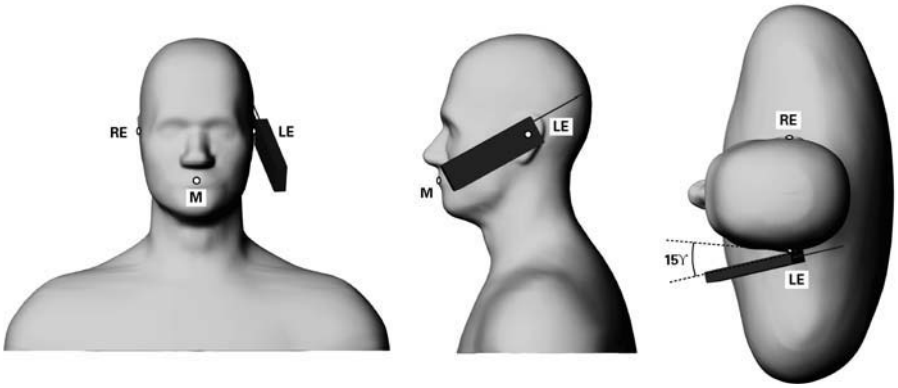


Figure 2. Phone position 2 - "tilted position." The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning, are indicated (Shoulders are shown for illustration only).

DETAILS OF SAR EVALUATION (Cont.)

Body-worn Configuration(s)

2) The DUT was tested in a body-worn configuration with the back side of the device placed parallel to the outer surface of the SAM phantom (planar section). The attached belt-clip accessory was touching the outer surface of the SAM phantom (planar section) and provided a 7 mm spacing from the back of the DUT to the SAM phantom (planar section). The DUT was evaluated for body-worn SAR with the supplied headset audio accessory.

Test Mode(s) & Power Setting(s)

3) The DUT was placed in test mode using handset keypad code.
4) The DUT was tested at maximum power in TDD modulation with a duty cycle of 4% and a crest factor of 1:25.
5) The RF conducted output power of the DUT could not be measured prior to the SAR evaluations due to an internal antenna. The DUT was evaluated for SAR at the maximum RF conducted output power level preset by the manufacturer.
6) The radiated reference output power (EIRP) of the DUT was measured by Timco Engineering.
7) The DUT battery pack was fully charged prior to the SAR evaluations.
8) The power drift of the DUT during the SAR evaluations was measured by the DASY4 system.

Test Conditions

9) The fluid temperature was measured prior to and after the SAR evaluations to ensure the temperature remained within +/-2°C of the fluid temperature reported during the dielectric parameter measurements.
10) The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluations using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).
11) The SAR measurements were performed within 24 hours of the system performance check.

6.0 EVALUATION PROCEDURES

a. (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation, both the left and right ear positions were evaluated using the SAM phantom.
(ii) For body-worn and face-held devices a planar phantom was used.

b. The SAR was determined by a pre-defined procedure within the DASY4 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 15mm x 15mm.

An area scan was determined as follows:

c. Based on the defined area scan grid, a more detailed grid is created to increase the points by a factor of 10. The interpolation function then evaluates all field values between corresponding measurement points.

d. A linear search is applied to find all the candidate maxima. Subsequently, all maxima are removed that are >2 dB from the global maximum. The remaining maxima are then used to position the cube scans.

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

e. Extrapolation is used to find the points between the dipole center of the probe and the surface of the phantom. This data cannot be measured, since the center of the dipoles is 2.7 mm away form the tip of the probe and the distance between the surface and the lowest measuring point is 1.4 mm (see probe calibration document in Appendix F). The extrapolation was based on trivariate quadratics computed from the previously calculated 3D interpolated points nearest the phantom surface.

f. Interpolated data is used to calculate the average SAR over 1g and 10g cubes by spatially discretizing the entire measured cube. The volume used to determine the averaged SAR is a 1mm grid (42875 interpolated points).

g. A zoom scan volume of 32 mm x 32 mm x 30 mm (5x5x7 points) centered at the peak SAR location determined from the area scan is used for all zoom scans for devices with a transmit frequency < 800 MHz. Zoom scans for frequencies ≥ 800 MHz are determined with a scan volume of 30 mm x 30 mm x 30 mm (7x7x7 points) to ensure complete capture of the peak spatial-average SAR.

EVALUATION PROCEDURES (Cont.)

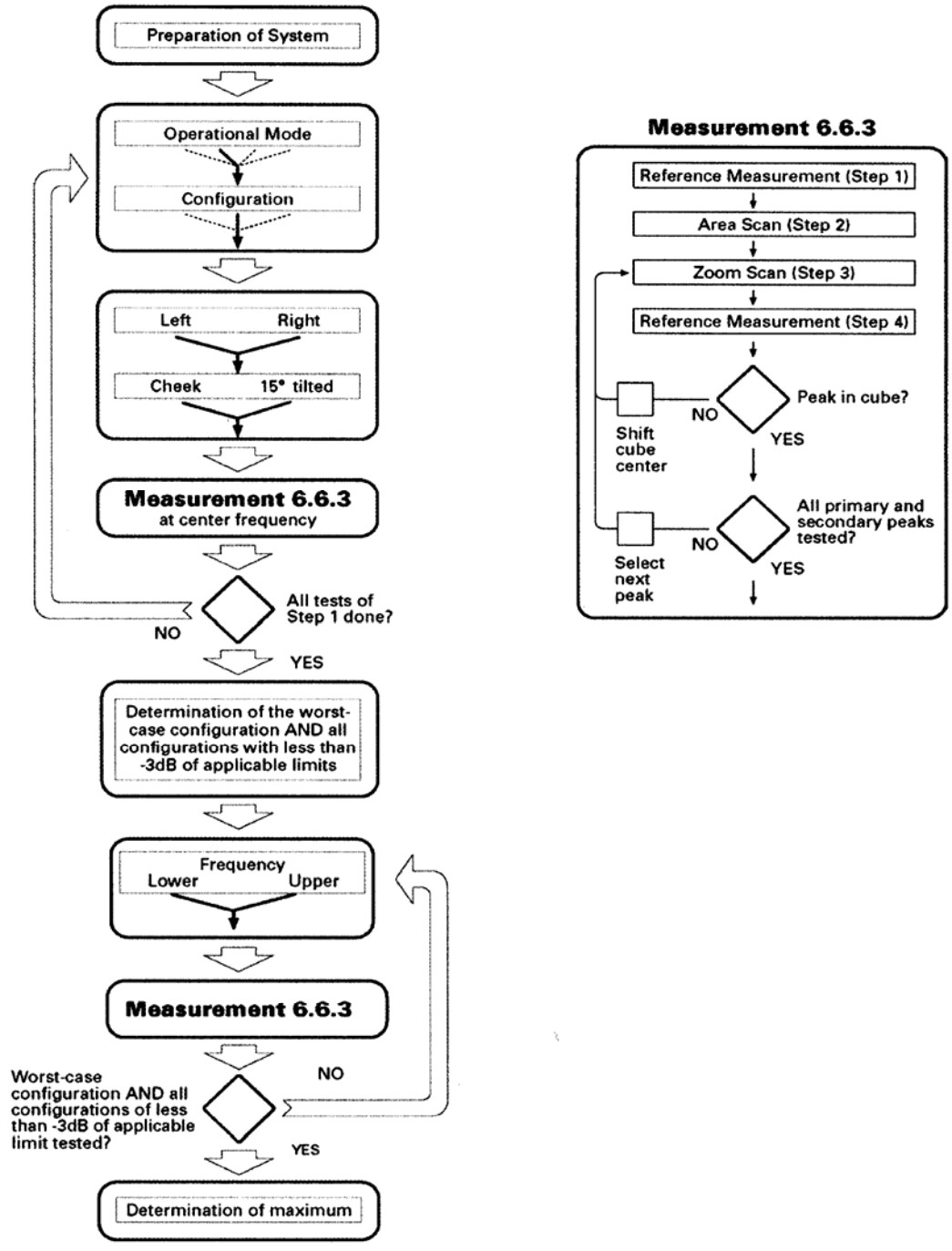


Figure 3. Flow Chart for determining the largest peak spatial-average SAR from all device configurations per IEEE Standard 1528-2003 (see reference [5]).

7.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluations a system check was performed at the planar section of the SAM phantom with a 1900MHz dipole (see Appendix E for system validation procedures). The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C). A forward power of 250 mW was applied to the dipole and the system was verified to a tolerance of ±10% (see Appendix B for system performance check test plot).

SYSTEM PERFORMANCE CHECK EVALUATION

Test Date	Equiv. Tissue	SAR 1g (W/kg)			Dielectric Constant ε_r			Conductivity σ (mho/m)			ρ (Kg/m^3)	Amb. Temp. (°C)	Fluid Temp. (°C)	Fluid Depth (cm)	Humid. (%)	Barom. Press. (kPa)
	MHz	IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.						
Mar 20	Brain 1900	9.93 ±10%	10.5	+5.8%	40.0±5%	38.3	-4.2%	1.40±5%	1.45	+3.6%	1000	22.5	21.2	≥ 15	30	101.2
Note(s)		1. The fluid temperature was measured prior to and after the system performance check to ensure the temperature remained within +/-2°C of the fluid temperature reported during the dielectric parameter measurements.														
		2. The SAR evaluations were performed within 24 hours of the system performance check.														

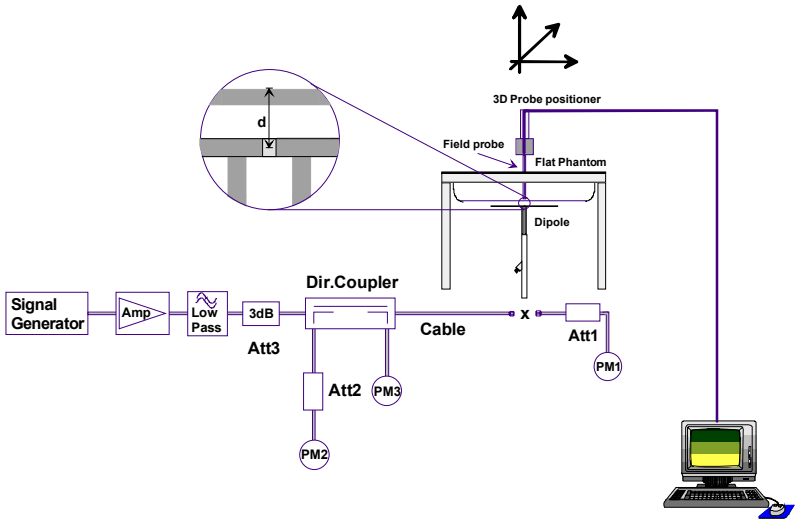


Figure 4. System Performance Check Measurement Setup

1900 MHz Dipole Setup

8.0 SIMULATED EQUIVALENT TISSUES

The 1900/1920MHz simulated equivalent tissue mixtures consisted of Glycol-monobutyl, water and salt. The fluids were prepared according to standardized procedures and measured for dielectric parameters (permittivity and conductivity).

1900/1920 MHz SIMULATED TISSUE MIXTURES			
INGREDIENT	1900 MHz Brain	1920 MHz Brain	1920 MHz Body
	System Performance Check	DUT Evaluation	DUT Evaluation
Water	55.85 %	55.85 %	69.85 %
Glycol Monobutyl	44.00 %	44.00 %	29.89 %
Salt	0.15 %	0.15 %	0.26 %

9.0 SAR SAFETY LIMITS

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	1.60	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0
The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.		
The Spatial Average value of the SAR averaged over the whole body.		
The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.		
Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.		
Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.		

10.0 ROBOT SYSTEM SPECIFICATIONS

Specifications	
Positioner	Stäubli Unimation Corp. Robot Model: RX60L
Repeatability	0.02 mm
No. of axis	6
Data Acquisition Electronic (DAE) System	
Cell Controller	
Processor	AMD Athlon XP 2400+
Clock Speed	2.0 GHz
Operating System	Windows XP Professional
Data Converter	
Features	Signal Amplifier, multiplexer, A/D converter, and control logic
Software	Measurement Software: DASY4, V4.7 Build 44
	Postprocessing Software: SEMCAD, V1.8 Build 171
Connecting Lines	Optical downlink for data and status info.; Optical uplink for commands and clock
DASY4 Measurement Server	
Function	Real-time data evaluation for field measurements and surface detection
Hardware	PC/104 166MHz Pentium CPU; 32 MB chipdisk; 64 MB RAM
Connections	COM1, COM2, DAE, Robot, Ethernet, Service Interface
E-Field Probe	
Model	EX3DV4
Serial No.	3600
Construction	Symmetrical design with triangular core
Frequency	10 MHz to 6 GHz
Linearity	±0.2 dB (30 MHz to 3 GHz)
Phantom(s)	
Type	SAM V4.0C
Shell Material	Fiberglass
Thickness	2.0 ±0.1 mm
Volume	Approx. 25 liters

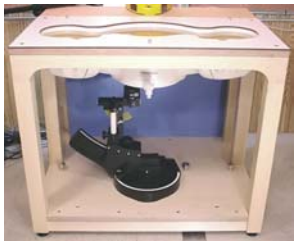
11.0 PROBE SPECIFICATION (EX3DV4)

Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g. DGBE)
Calibration:	Basic Broadband Calibration in air: 10-3000 MHz Conversion Factors (CF) for HSL 900 and HSL 1750
Frequency:	10 MHz to >6 GHz; Linearity: ±0.2 dB (30 MHz to 3 GHz)
Directivity:	±0.3 dB in HSL (rotation around probe axis) ±0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range:	10 μW/g to >100 mW/g; Linearity: ±0.2 dB (noise: typically < 1 μW/g)
Dimensions:	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1.0 mm
Application:	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better than 30%.

EX3DV4 E-Field Probe

12.0 SAM PHANTOM V4.0C

The SAM phantom V4.0C is a fiberglass shell phantom with a 2.0 mm (+/-0.2 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 (see Appendix G for specifications of the SAM phantom V4.0C).



SAM Phantom V4.0C

13.0 DEVICE HOLDER

The DASY4 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.

Device Holder

14.0 TEST EQUIPMENT LIST

TEST EQUIPMENT		ASSET NO.	SERIAL NO.	DATE CALIBRATED		CALIBRATION DUE DATE
USED	DESCRIPTION					
x	Schmid & Partner DASY4 System	-	-	-		-
x	-DASY4 Measurement Server	00158	1078	N/A		N/A
x	-Robot	00046	599396-01	N/A		N/A
x	-DAE4	00019	353	21Jun06		21Jun07
x	-EX3DV4 E-Field Probe	00213	3600	24Jan07		24Jan08
	-300MHz Validation Dipole	00023	135	23Oct06		23Oct07
	-450MHz Validation Dipole	00024	136	07Dec06		07Dec07
	-835MHz Validation Dipole	00022	411	**Brain**	28Mar06	28Mar07
				Body	18Jan07	18Jan08
	-900MHz Validation Dipole	00020	054	**Brain**	06Jun06	06Jun07
				Body	06Jun06	06Jun07
	-1640MHz Validation Dipole	00212	0175	**Brain**	14Aug06	14Aug07
	-1800MHz Validation Dipole	00021	247	**Brain**	08Jun06	08Jun07
				Body	09Jun06	09Jun07
x	-1900MHz Validation Dipole	00032	151	**Brain**	20Mar07	20Mar08
				Body	02Feb07	02Feb08
	-2450MHz Validation Dipole	00025	150	**Body**	15Mar07	15Mar08
	5GHz Validation Dipole -5200MHz	00126	1031	**Body**	18Jul06	18Jul07
	5GHz Validation Dipole -5500MHz			**Body**	14Nov06	14Nov07
	5GHz Validation Dipole -5800MHz			**Brain**	27Feb07	27Feb08
				Body	18Jul06	18Jul07
x	-SAM Phantom V4.0C	00154	1033	N/A		N/A
	-Barski Planar Phantom	00155	03-01	N/A		N/A
	-Plexiglas Side Planar Phantom	00156	161	N/A		N/A
	-Plexiglas Validation Planar Phantom	00157	137	N/A		N/A
x	ALS-PR-DIEL Dielectric Probe Kit	00160	260-00953	N/A		N/A
x	Gigatronics 8652A Power Meter	00110	1835801	12Apr06		12Apr07
	Gigatronics 8652A Power Meter	00008	1835267	22Jan07		22Jan08
x	Gigatronics 80701A Power Sensor	00012	1834350	22Jan07		22Jan08
	Gigatronics 80701A Power Sensor	00014	1833699	22Jan07		22Jan08
x	HP 8753ET Network Analyzer	00134	US39170292	18Apr06		18Apr07
x	HP 8648D Signal Generator	00005	3847A00611	N/A		N/A
	Rohde & Schwarz SMR40 Signal Generator	00006	100104	06Apr06		06Apr07
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	N/A		N/A
	HP E4408B Spectrum Analyzer	00015	US39240170	05Feb07		05Feb08
	Anritsu Radio Communication Analyzer	00208	6200241241	06Jun06		06Jun07

15.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION						
Error Description	**Uncertainty Value ±%**	**Probability Distribution**	**Divisor**	**ci 1g**	**Uncertainty Value ±% (1g)**	**V_i or V_{eff}**
Measurement System						
Probe calibration	5.5	Normal	1	1	5.5	∞
Axial isotropy of the probe	4.7	Rectangular	1.732050808	0.7	1.9	∞
Spherical isotropy of the probe	9.6	Rectangular	1.732050808	0.7	3.9	∞
Spatial resolution	0	Rectangular	1.732050808	1	0.0	∞
Boundary effects	1	Rectangular	1.732050808	1	0.6	∞
Probe linearity	4.7	Rectangular	1.732050808	1	2.7	∞
Detection limit	1	Rectangular	1.732050808	1	0.6	∞
Readout electronics	0.3	Normal	1	1	0.3	∞
Response time	0.8	Rectangular	1.732050808	1	0.5	∞
Integration time	2.6	Rectangular	1.732050808	1	1.5	∞
RF ambient conditions	3	Rectangular	1.732050808	1	1.7	∞
Mech. constraints of robot	0.4	Rectangular	1.732050808	1	0.2	∞
Probe positioning	2.9	Rectangular	1.732050808	1	1.7	∞
Extrapolation & integration	1	Rectangular	1.732050808	1	0.6	∞
Test Sample Related						
Device positioning	2.9	Normal	1	1	2.9	12
Device holder uncertainty	3.6	Normal	1	1	3.6	8
Power drift	5	Rectangular	1.732050808	1	2.9	∞
Phantom and Setup						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	∞
Liquid conductivity (measured)	5	Normal	1	0.64	3.2	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	5	Normal	1	0.6	3.0	∞
Combined Standard Uncertainty					**11.24**	
Expanded Uncertainty (k=2)					**22.48**	

Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 (see reference [5])

MEASUREMENT UNCERTAINTIES (Cont.)

UNCERTAINTY BUDGET FOR SYSTEM VALIDATION						
Error Description	**Uncertainty Value ±%**	**Probability Distribution**	**Divisor**	**ci 1g**	**Uncertainty Value ±% (1g)**	**V_i or V_{eff}**
Measurement System						
Probe calibration	5.5	Normal	1	1	5.5	∞
Axial isotropy of the probe	4.7	Rectangular	1.732050808	1	2.7	∞
Spherical isotropy of the probe	0	Rectangular	1.732050808	1	0.0	∞
Spatial resolution	0	Rectangular	1.732050808	1	0.0	∞
Boundary effects	1	Rectangular	1.732050808	1	0.6	∞
Probe linearity	4.7	Rectangular	1.732050808	1	2.7	∞
Detection limit	1	Rectangular	1.732050808	1	0.6	∞
Readout electronics	0.3	Normal	1	1	0.3	∞
Response time	0	Rectangular	1.732050808	1	0.0	∞
Integration time	0	Rectangular	1.732050808	1	0.0	∞
RF ambient conditions	3	Rectangular	1.732050808	1	1.7	∞
Mech. constraints of robot	0.4	Rectangular	1.732050808	1	0.2	∞
Probe positioning	2.9	Rectangular	1.732050808	1	1.7	∞
Extrapolation & integration	1	Rectangular	1.732050808	1	0.6	∞
Test Sample Related						
Dipole Positioning	2	Normal	1.732050808	1	1.2	∞
Power & Power Drift	4.7	Normal	1.732050808	1	2.7	∞
Phantom and Setup						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	∞
Liquid conductivity (measured)	5	Normal	1	0.64	3.2	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	5	Normal	1	0.6	3.0	∞
Combined Standard Uncertainty					**9.57**	
Expanded Uncertainty (k=2)					**19.14**	

Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 (see reference [5])

16.0 REFERENCES

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

[2] Health Canada - “Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz”, Safety Code 6: 1999.

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

[4] Industry Canada - “Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)”, Radio Standards Specification RSS-102 Issue 2: November 2005.

[5] IEEE Standard 1528-2003 - “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”: December 2003.

[6] ANSI/IEEE C95.1:2005 - “American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz”, New York: IEEE, April 2006.

APPENDIX A - SAR MEASUREMENT DATA

Date Tested: 03/20/2007

Head SAR - Left Ear - Cheek/Touch Position - Mid Channel - 1924.992 MHz

DUT: Uniden Model: DECT2080; Type: 1.9GHz UPCS/LE-PCS DECT Portable Handset; Serial: #2

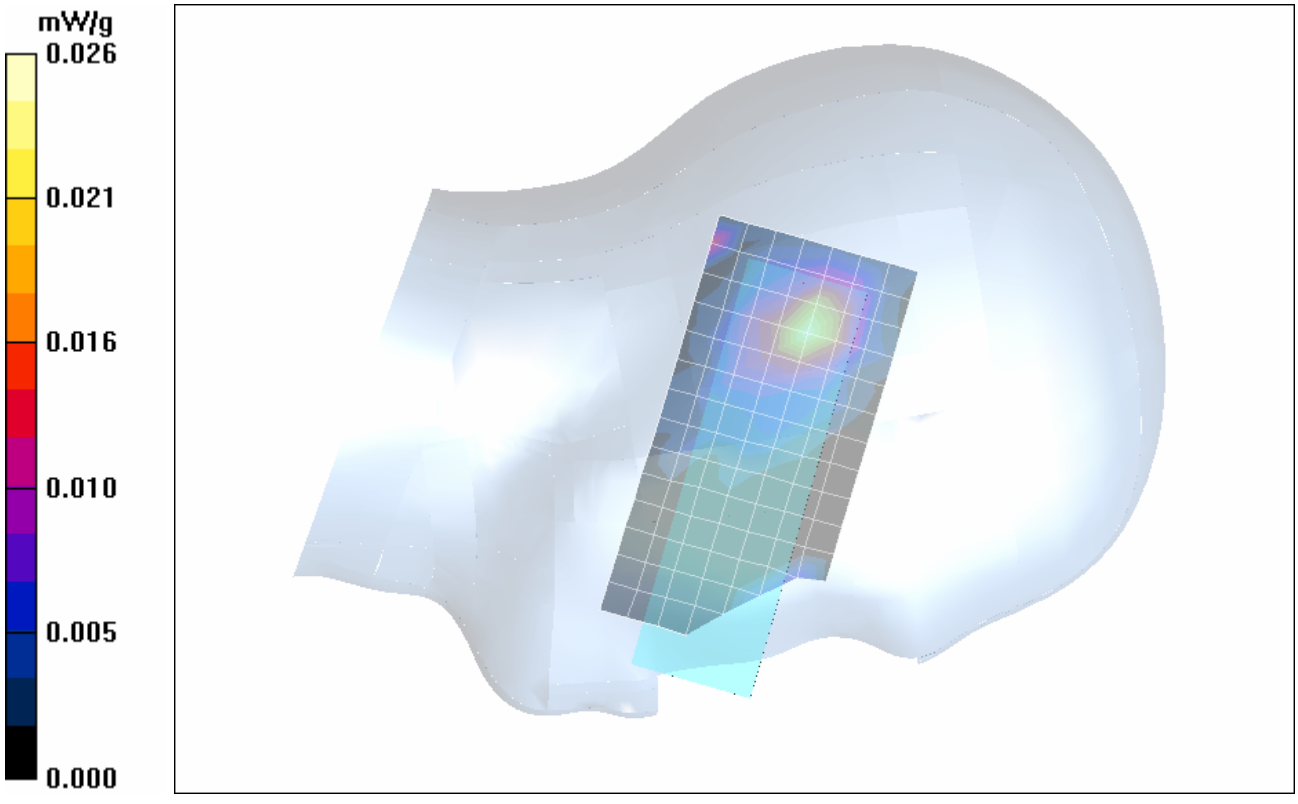
Ambient Temp: 22.5ºC; Fluid Temp: 21.2ºC; Barometric Pressure: 101.2 kPa; Humidity: 30%

Communication System: TDD
Reference Power: 58.1 mW EIRP
2.4V, 650mAh NiMH Battery Pack
Frequency: 1924.99 MHz; Duty Cycle: 1:25
Medium: HSL1900 Medium parameters used: f = 1924.99 MHz; σ = 1.47 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3

- Probe: EX3DV4 - SN3600; ConvF(6.59, 6.59, 6.59); Calibrated: 24/01/2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Head SAR - Left Ear - Cheek/Touch Position - Mid Channel - 1924.992 MHz
Area Scan (8x15x1): Measurement grid: dx=10mm, dy=10mm

Head SAR - Left Ear - Cheek/Touch Position - Mid Channel - 1924.992 MHz
Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 3.64 V/m; Power Drift = 0.435 dB
Peak SAR (extrapolated) = 0.029 W/kg
SAR(1 g) = 0.0175 mW/g; SAR(10 g) = 0.00888 mW/g
Maximum value of SAR (measured) = 0.026 mW/g



Date Tested: 03/20/2007

Head SAR - Left Ear - Tilt Position (15º) - Mid Channel - 1924.992 MHz

DUT: Uniden Model: DECT2080; Type: 1.9GHz UPCS/LE-PCS DECT Portable Handset; Serial: #2

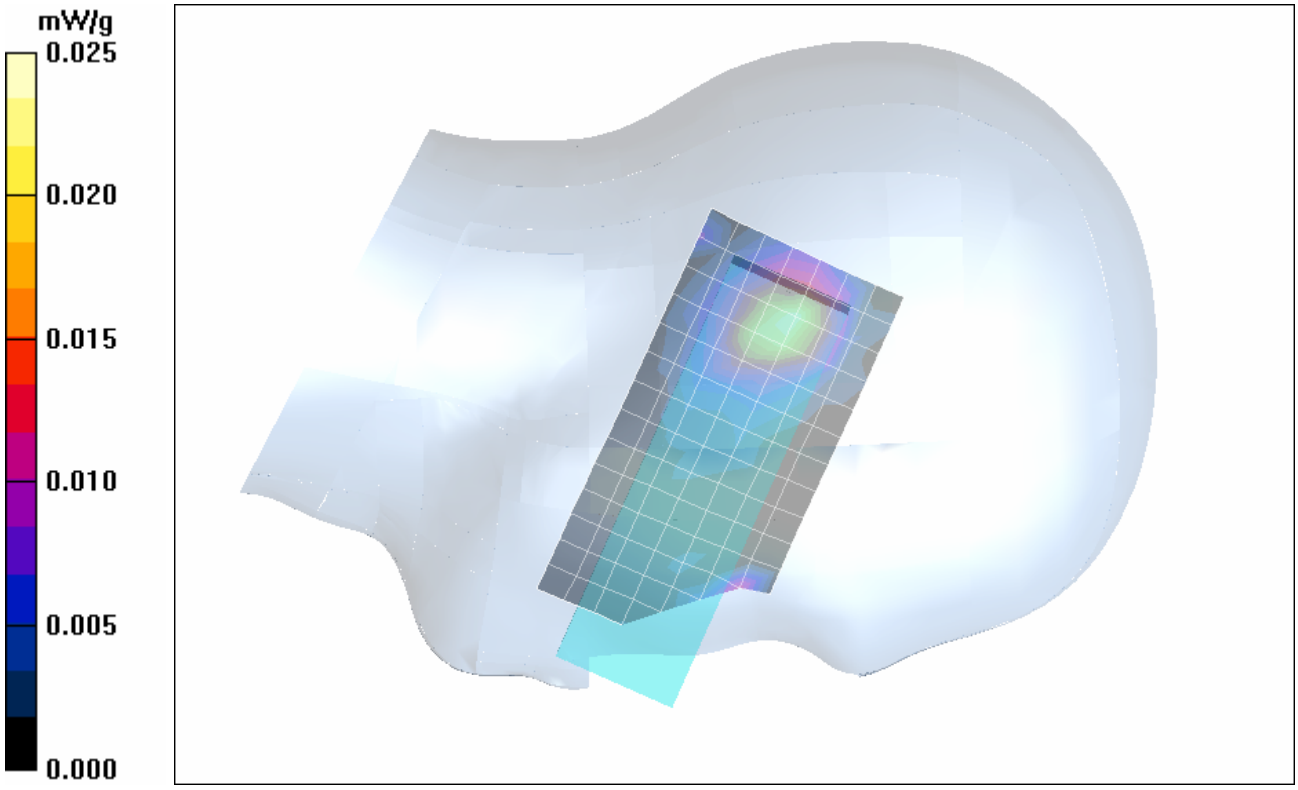
Ambient Temp: 22.5ºC; Fluid Temp: 21.2ºC; Barometric Pressure: 101.2 kPa; Humidity: 30%

Communication System: TDD
Reference Power: 58.1 mW EIRP
2.4V, 650mAh NiMH Battery Pack
Frequency: 1924.99 MHz; Duty Cycle: 1:25
Medium: HSL1900 Medium parameters used: f = 1924.99 MHz; σ = 1.47 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3

- Probe: EX3DV4 - SN3600; ConvF(6.59, 6.59, 6.59); Calibrated: 24/01/2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Head SAR - Left Ear - Tilt Position (15º) - Mid Channel - 1924.992 MHz
Area Scan (8x15x1): Measurement grid: dx=10mm, dy=10mm

Head SAR - Left Ear - Tilt Position (15º) - Mid Channel - 1924.992 MHz
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 3.70 V/m; Power Drift = 0.315 dB
Peak SAR (extrapolated) = 0.033 W/kg
SAR(1 g) = 0.0173 mW/g; SAR(10 g) = 0.00918 mW/g
Maximum value of SAR (measured) = 0.025 mW/g



Date Tested: 03/20/2007

Head SAR - Right Ear - Cheek/Touch Position - Mid Channel - 1924.992 MHz

DUT: Uniden Model: DECT2080; Type: 1.9GHz UPCS/LE-PCS DECT Portable Handset; Serial: #2

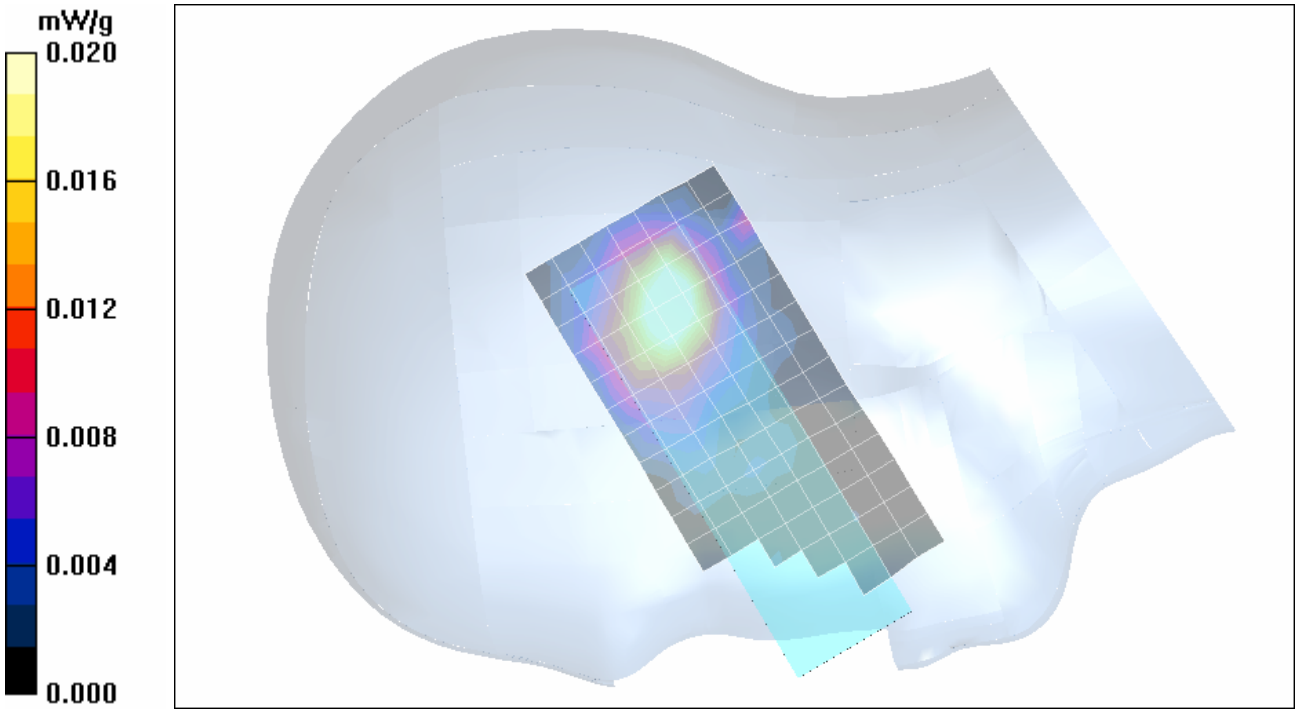
Ambient Temp: 22.5ºC; Fluid Temp: 21.2ºC; Barometric Pressure: 101.2 kPa; Humidity: 30%

Communication System: TDD
Reference Power: 58.1 mW EIRP
2.4V, 650mAh NiMH Battery Pack
Frequency: 1924.99 MHz; Duty Cycle: 1:25
Medium: HSL1900 Medium parameters used: f = 1924.99 MHz; σ = 1.47 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3

- Probe: EX3DV4 - SN3600; ConvF(6.59, 6.59, 6.59); Calibrated: 24/01/2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Head SAR - Right Ear - Cheek/Touch Position - Mid Channel - 1924.992 MHz
Area Scan (8x15x1): Measurement grid: dx=10mm, dy=10mm

Head SAR - Right Ear - Cheek/Touch Position - Mid Channel - 1924.992 MHz
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 3.49 V/m; Power Drift = -0.0176 dB
Peak SAR (extrapolated) = 0.045 W/kg
SAR(1 g) = 0.0188 mW/g; SAR(10 g) = 0.00925 mW/g
Maximum value of SAR (measured) = 0.020 mW/g



Date Tested: 03/20/2007

Head SAR - Right Ear - Tilt Position (15º) - Mid Channel - 1924.992 MHz

DUT: Uniden Model: DECT2080; Type: 1.9GHz UPCS/LE-PCS DECT Portable Handset; Serial: #2

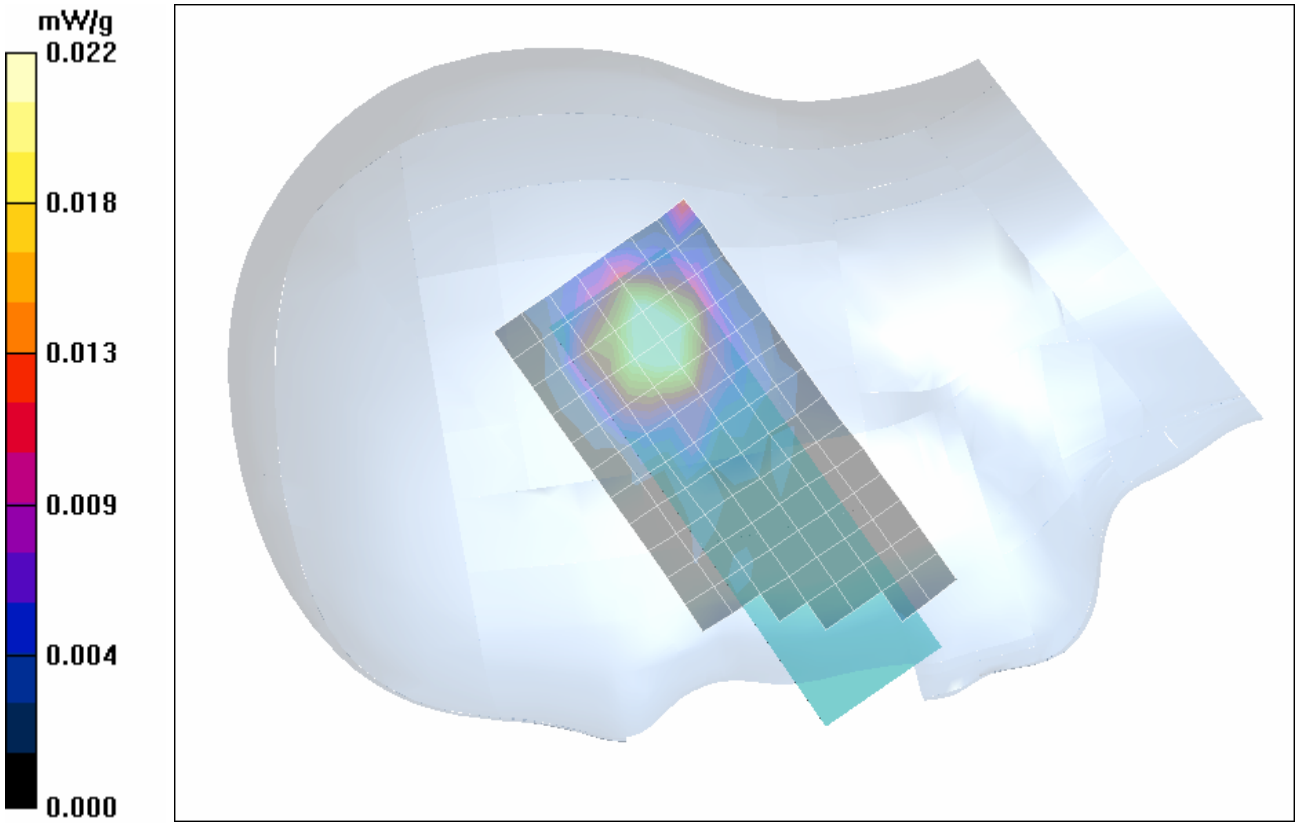
Ambient Temp: 22.5ºC; Fluid Temp: 21.2ºC; Barometric Pressure: 101.2 kPa; Humidity: 30%

Communication System: TDD
Reference Power: 58.1 mW EIRP
2.4V, 650mAh NiMH Battery Pack
Frequency: 1924.99 MHz; Duty Cycle: 1:25
Medium: HSL1900 Medium parameters used: f = 1924.99 MHz; σ = 1.47 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3

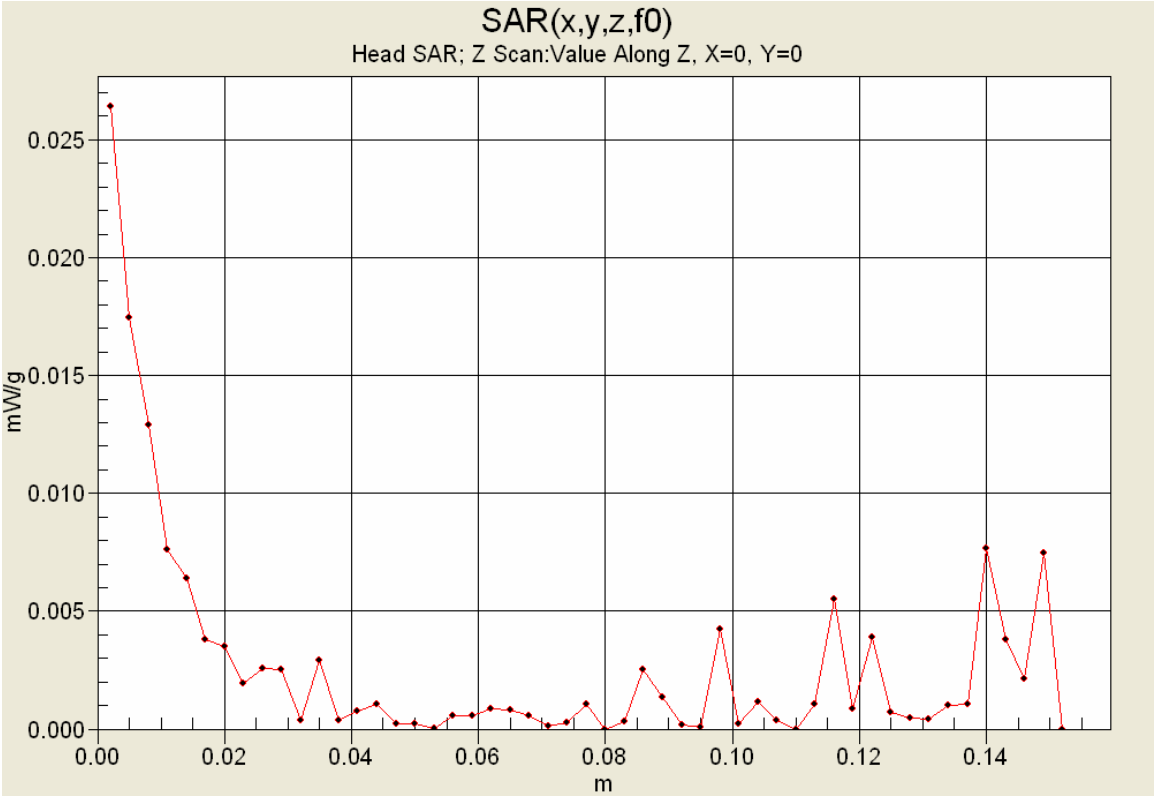
- Probe: EX3DV4 - SN3600; ConvF(6.59, 6.59, 6.59); Calibrated: 24/01/2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Head SAR - Right Ear - Tilt Position (15º) - Mid Channel - 1924.992 MHz
Area Scan (8x15x1): Measurement grid: dx=10mm, dy=10mm

Head SAR - Right Ear - Tilt Position (15º) - Mid Channel - 1924.992 MHz
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 4.00 V/m; Power Drift = -0.626 dB
Peak SAR (extrapolated) = 0.035 W/kg
SAR(1 g) = 0.0204 mW/g; SAR(10 g) = 0.011 mW/g
Maximum value of SAR (measured) = 0.022 mW/g



Z-Axis Scan



Fluid Depth (>15cm)

Left Head Section

Right Head Section

Date Tested: 03/20/2007

Body-Worn SAR - Back Side of DUT - Mid Channel - 1924.992 MHz

DUT: Uniden Model: DECT2080; Type: 1.9GHz UPCS/LE-PCS DECT Portable Handset; Serial: #2

Body-Worn Accessory: Plastic Belt-Clip; Audio Accessory: Headset (Ear-Loop with Boom-Microphone)

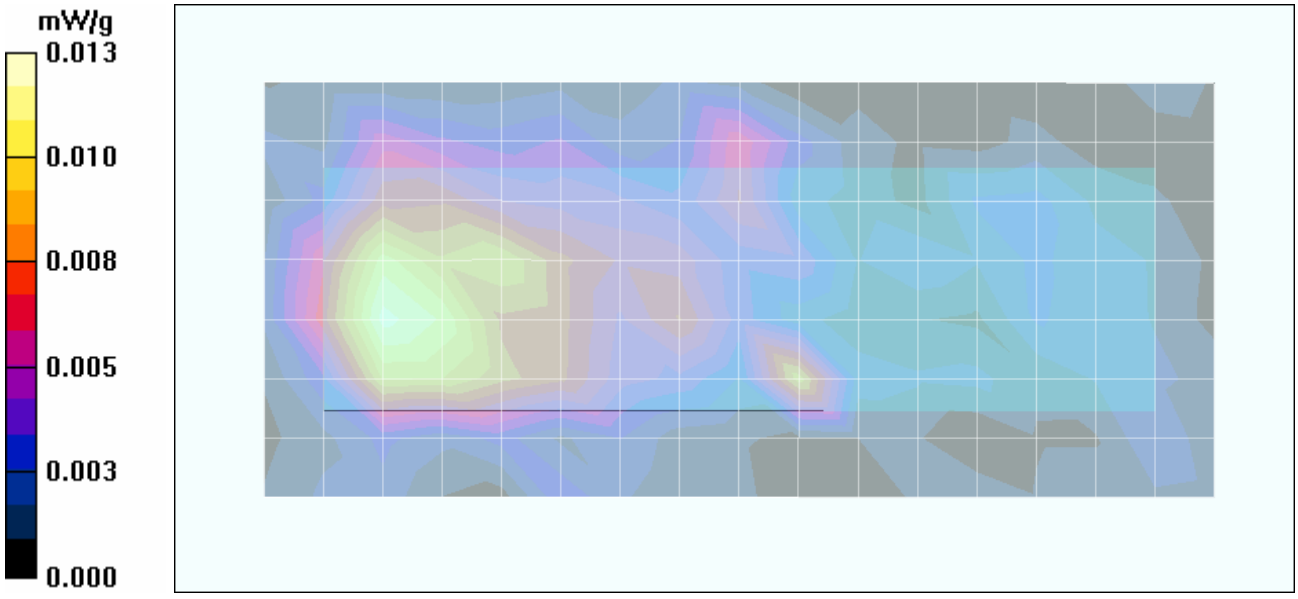
Ambient Temp: 23.3ºC; Fluid Temp: 21.6ºC; Barometric Pressure: 101.2 kPa; Humidity: 30%

Communication System: TDD
Reference Power: 58.1 mW EIRP
2.4V, 650mAh NiMH Battery Pack
Frequency: 1924.99 MHz; Duty Cycle: 1:25
Medium: M1900 Medium parameters used: f = 1924.99 MHz; σ = 1.59 mho/m; ε_r = 50.9; ρ = 1000 kg/m^3

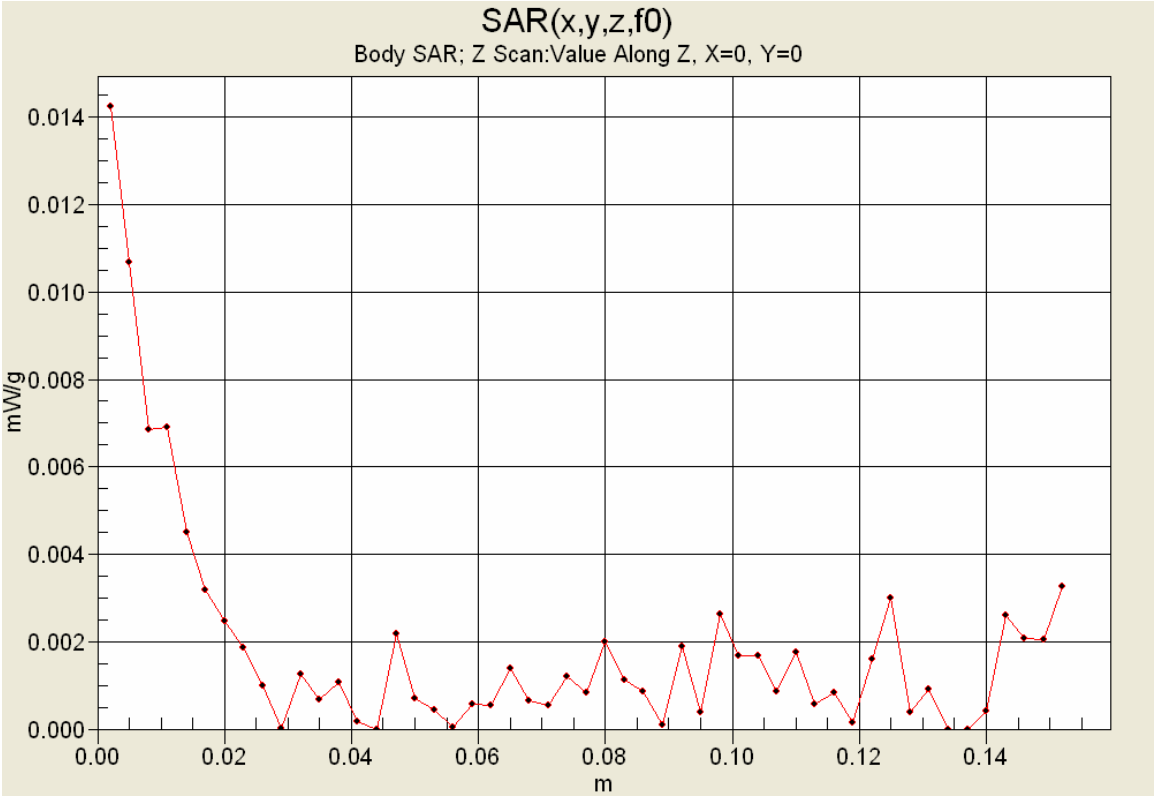
- Probe: EX3DV4 - SN3600; ConvF(6.54, 6.54, 6.54); Calibrated: 24/01/2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-Worn SAR - 7 mm Belt-Clip Spacing from Back of DUT to Phantom - Mid Channel - 1924.992 MHz
Area Scan (8x17x1): Measurement grid: dx=10mm, dy=10mm

Body-Worn SAR - 7 mm Belt-Clip Spacing from Back of DUT to Phantom - Mid Channel - 1924.992 MHz
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 2.78 V/m; Power Drift = 0.0275 dB
Peak SAR (extrapolated) = 0.040 W/kg
SAR(1 g) = 0.0125 mW/g; SAR(10 g) = 0.00598 mW/g
Maximum value of SAR (measured) = 0.013 mW/g



Z-Axis Scan



Fluid Depth (>15cm)

Planar Section

APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Date Tested: 03/20/2007

System Performance Check - 1900 MHz Dipole

DUT: Dipole 1900 MHz; Asset: 00032; Serial: 151; Validation: 03/20/2007

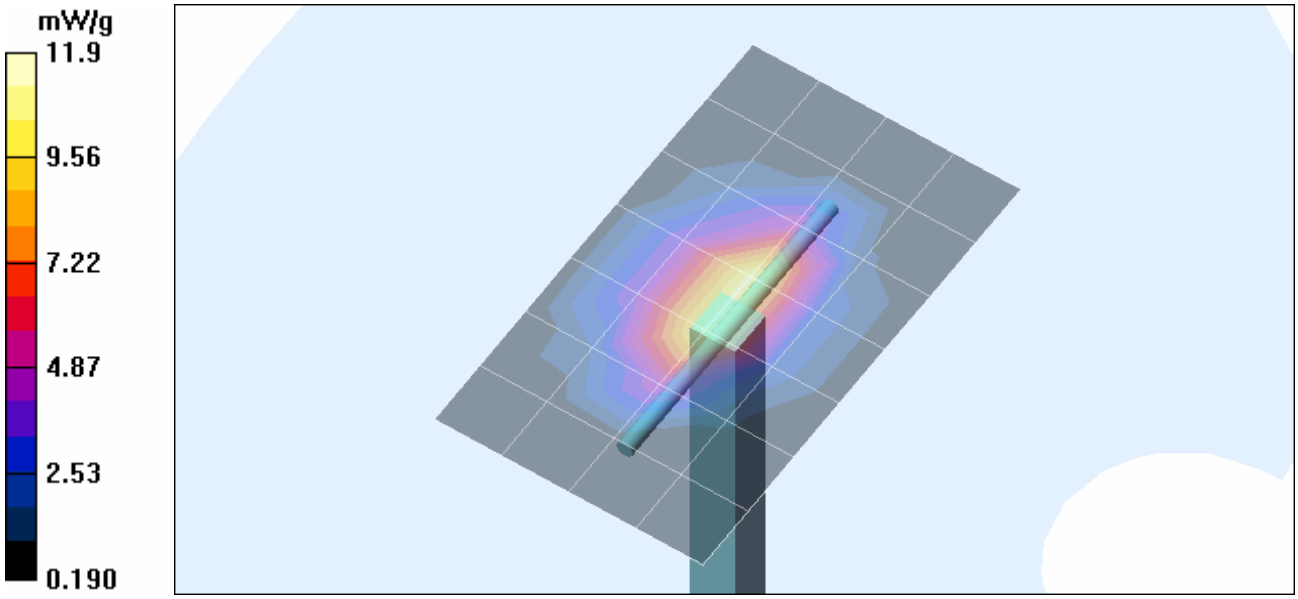
Ambient Temp: 22.5ºC; Fluid Temp: 21.2ºC; Barometric Pressure: 101.2 kPa; Humidity: 30%

Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL1900 Medium parameters used: f = 1900 MHz; σ = 1.45 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3

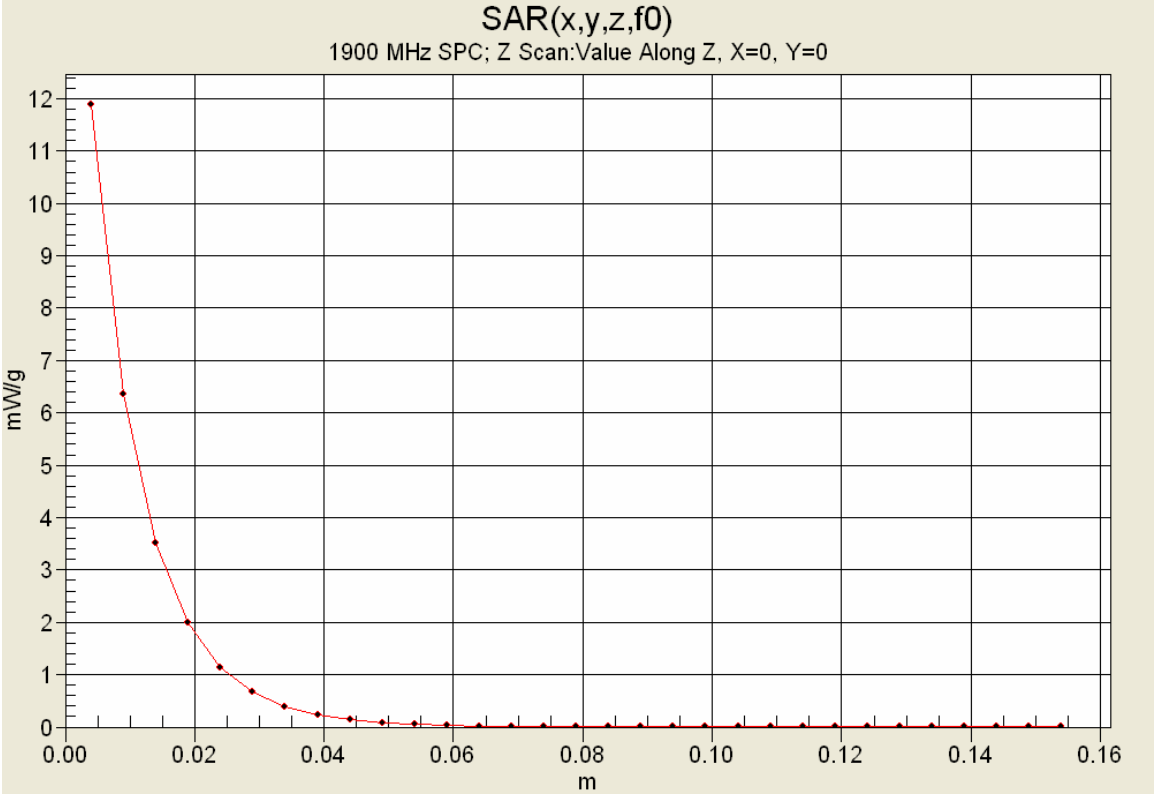
- Probe: EX3DV4 - SN3600; ConvF(6.59, 6.59, 6.59); Calibrated: 24/01/2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

1900 MHz Dipole - System Performance Check
Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

1900 MHz Dipole - System Performance Check
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.0 V/m; Power Drift = -0.014 dB
Peak SAR (extrapolated) = 20.3 W/kg
SAR(1 g) = 10.5 mW/g; SAR(10 g) = 5.33 mW/g
Maximum value of SAR (measured) = 11.9 mW/g



Z-Axis Scan



APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

1900 MHz System Performance Check & 1920 MHz DUT Evaluation (Brain)

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
Tue 20/Mar/2007
Frequency (GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
1.8000	40.00	1.40	38.82	1.34
1.8100	40.00	1.40	38.82	1.36
1.8200	40.00	1.40	38.73	1.36
1.8300	40.00	1.40	38.64	1.39
1.8400	40.00	1.40	38.58	1.39
1.8500	40.00	1.40	38.56	1.39
1.8600	40.00	1.40	38.53	1.40
1.8700	40.00	1.40	38.52	1.42
1.8800	40.00	1.40	38.42	1.42
1.8900	40.00	1.40	38.41	1.44
1.9000	40.00	1.40	38.27	1.45
1.9100	40.00	1.40	38.35	1.46
1.9200	40.00	1.40	38.30	1.47
1.9300	40.00	1.40	38.27	1.47
1.9400	40.00	1.40	38.21	1.49
1.9500	40.00	1.40	38.15	1.49
1.9600	40.00	1.40	37.99	1.51
1.9700	40.00	1.40	38.04	1.51
1.9800	40.00	1.40	37.98	1.53
1.9900	40.00	1.40	38.00	1.54
2.0000	40.00	1.40	37.88	1.56

1920 MHz DUT Evaluation (Body)

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
Tue 20/Mar/2007 13:00:33
Frequency (GHz)
FCC_eH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eB	FCC_sB	Test_e	Test_s
1.8000	53.30	1.52	51.47	1.45
1.8100	53.30	1.52	51.51	1.47
1.8200	53.30	1.52	51.39	1.48
1.8300	53.30	1.52	51.26	1.50
1.8400	53.30	1.52	51.32	1.49
1.8500	53.30	1.52	51.23	1.51
1.8600	53.30	1.52	51.25	1.52
1.8700	53.30	1.52	51.13	1.53
1.8800	53.30	1.52	51.08	1.54
1.8900	53.30	1.52	51.03	1.56
1.9000	53.30	1.52	50.97	1.57
1.9100	53.30	1.52	50.86	1.58
1.9200	53.30	1.52	50.86	1.59
1.9300	53.30	1.52	50.90	1.59
1.9400	53.30	1.52	50.85	1.61
1.9500	53.30	1.52	50.80	1.62
1.9600	53.30	1.52	50.77	1.63
1.9700	53.30	1.52	50.64	1.65
1.9800	53.30	1.52	50.70	1.66
1.9900	53.30	1.52	50.62	1.67
2.0000	53.30	1.52	50.62	1.68

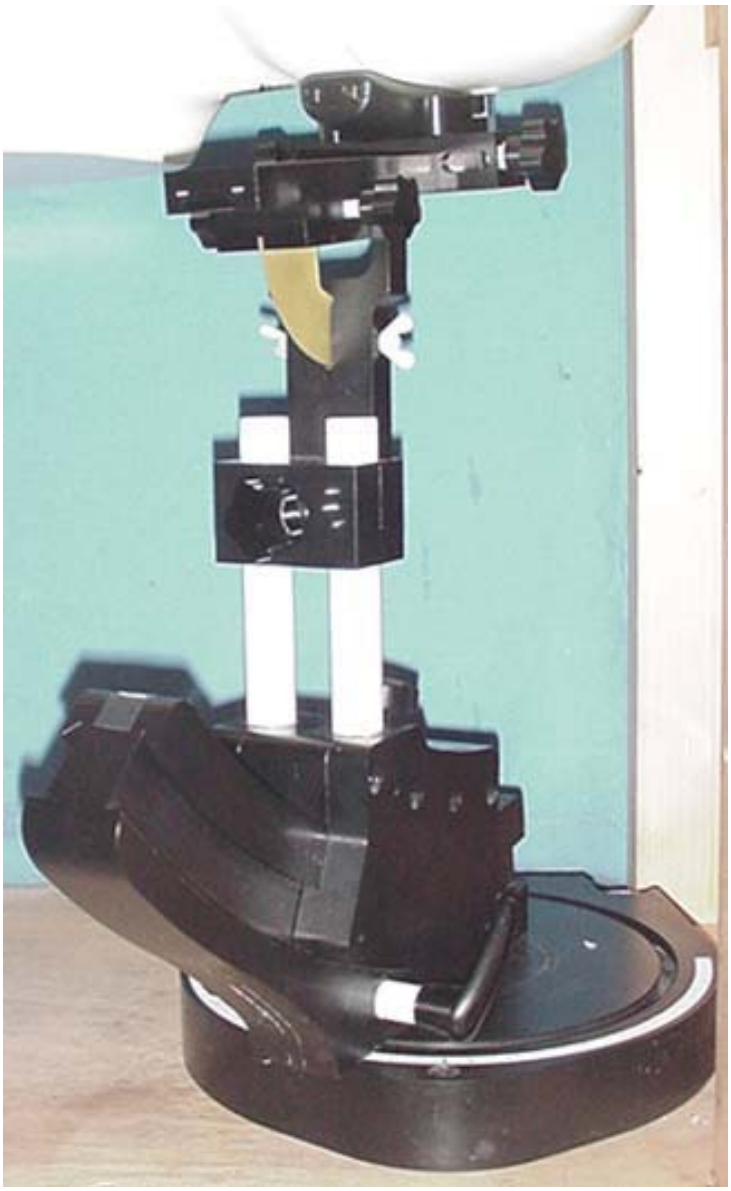
APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS

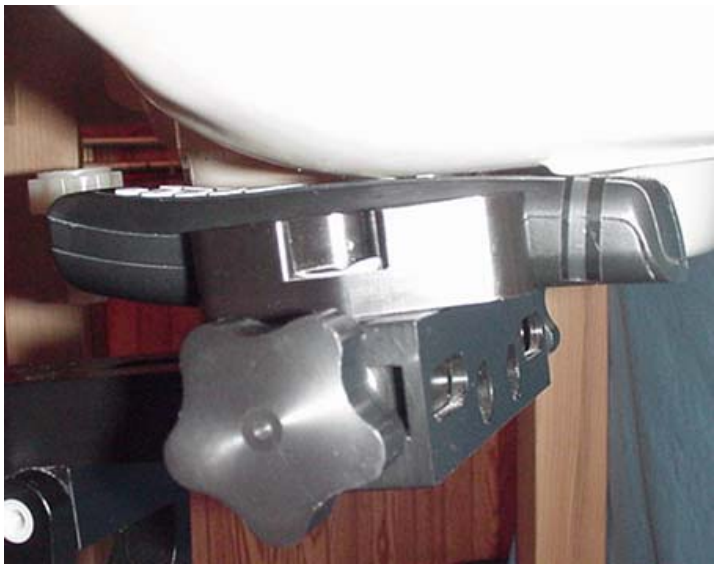
HEAD SAR TEST SETUP PHOTOGRAPHS

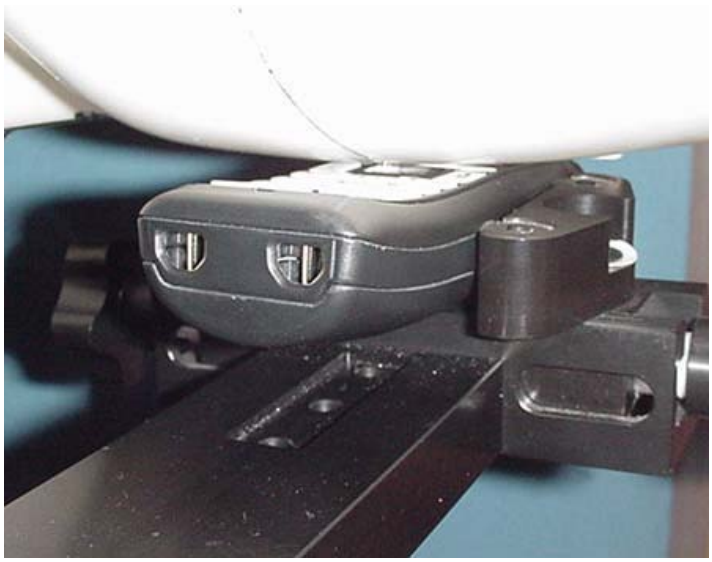
Left Head Section / Ear-Tilt Position (15°)

HEAD SAR TEST SETUP PHOTOGRAPHS

Left Head Section / Cheek-Touch Position

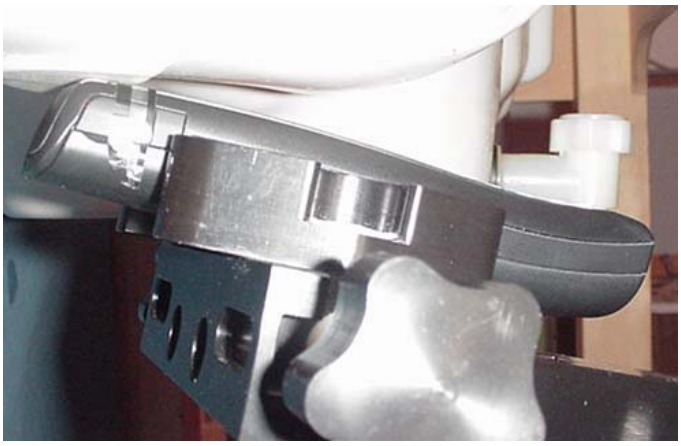






HEAD SAR TEST SETUP PHOTOGRAPHS

Right Head Section / Ear-Tilt Position (15°)

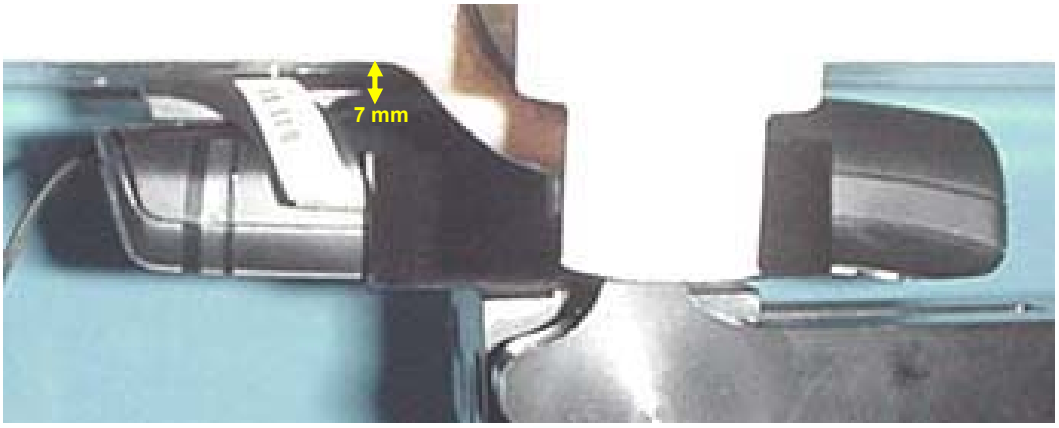


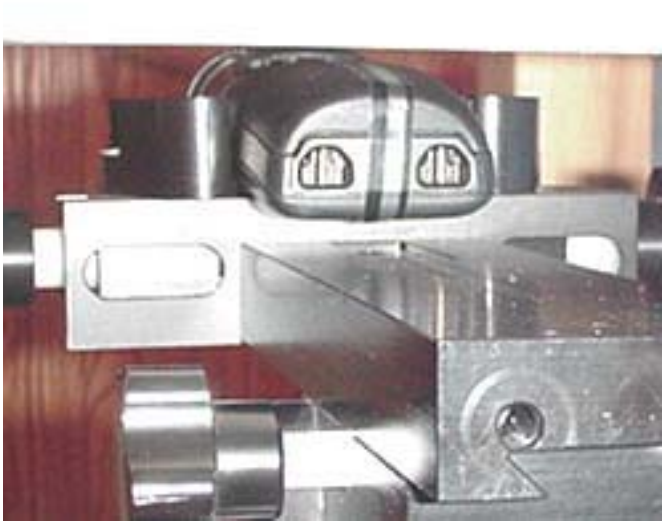
HEAD SAR TEST SETUP PHOTOGRAPHS

Right Head Section / Cheek-Touch Position

BODY-WORN SAR TEST SETUP PHOTOGRAPHS

7 mm Belt-Clip Spacing from Back of DUT to Planar Section
With Headset (Ear-Loop/Boom-Microphone) Audio Accessory





DUT PHOTOGRAPHS

Front of DUT

Back of DUT with Plastic Belt-Clip

DUT PHOTOGRAPHS

Left Side of DUT with Plastic Belt-Clip

Right Side of DUT with Plastic Belt-Clip

Top end of DUT

Bottom end of DUT

DUT PHOTOGRAPHS

DUT Battery Compartment

NiMH Battery Pack

DUT with Headset Audio Accessory (Ear-Loop with Boom-Microphone P/N: ZA-133)

APPENDIX E - SYSTEM VALIDATION

1900 MHz SYSTEM VALIDATION

Type:	**1900 MHz Validation Dipole**
Asset Number:	**00032**
Serial Number:	**151**
Place of Validation:	**Celltech Labs Inc.**
Date of Validation:	**March 20, 2007**

Celltech Labs Inc. certifies that the 1900 MHz System Validation (Brain) was performed on the date indicated above.

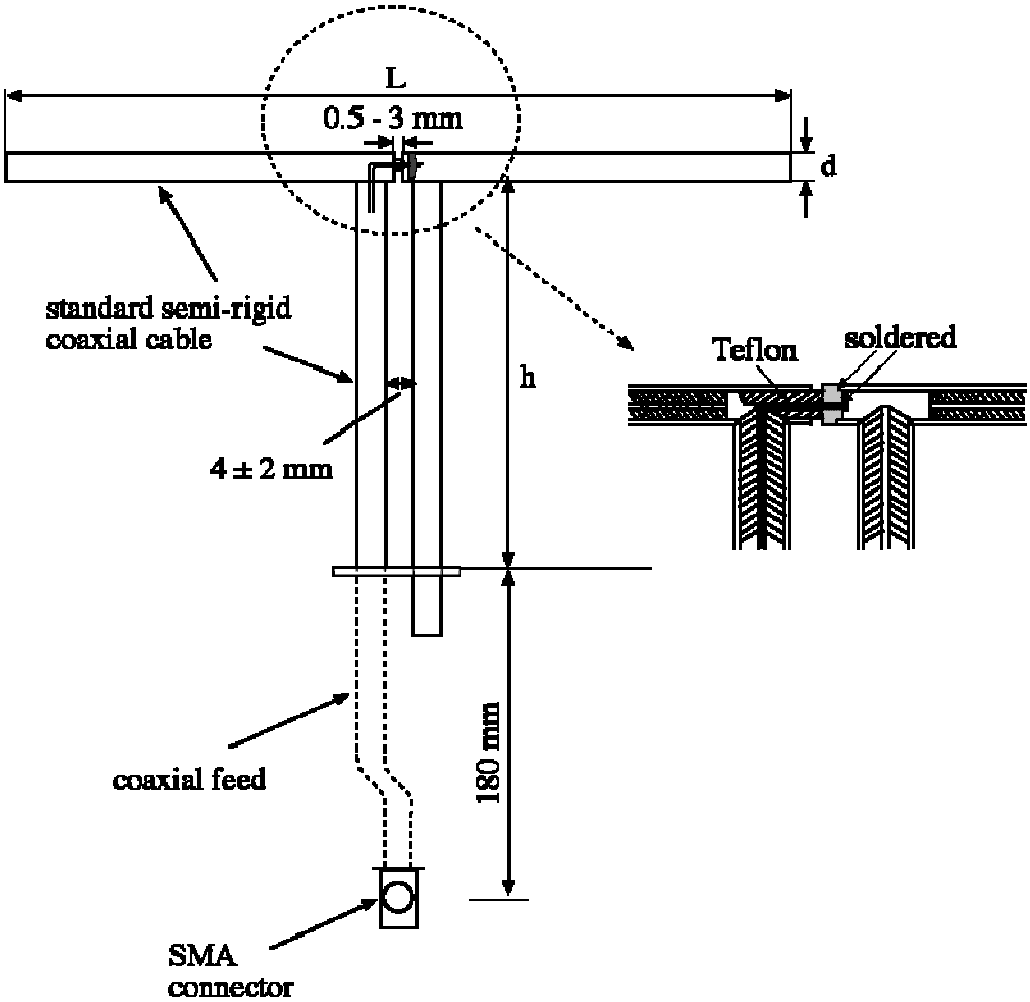
Performed by:	**Sean Johnston**
Approved by:	**Spencer Watson**

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

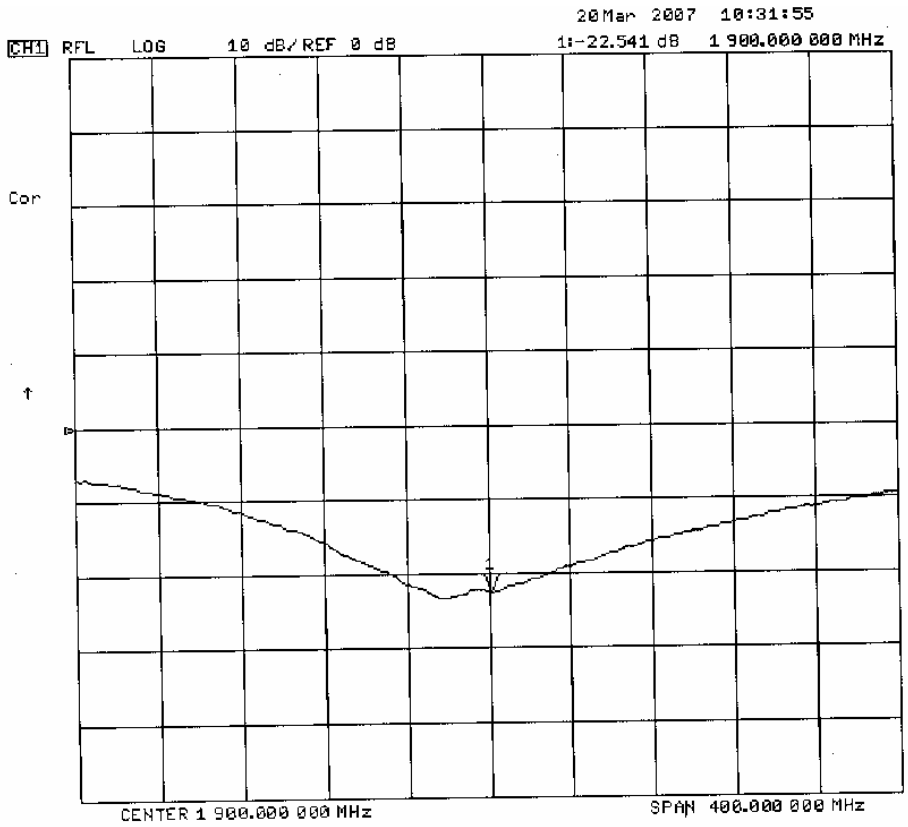
1. Dipole Construction & Electrical Characteristics

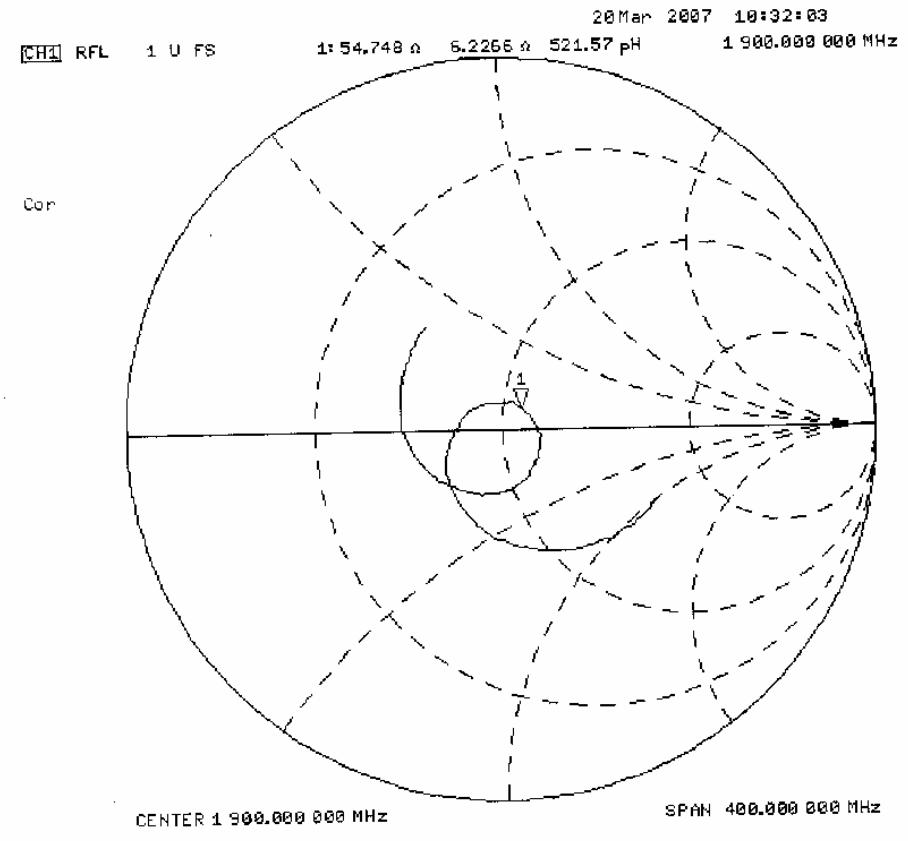
The validation dipole was constructed in accordance with the IEEE Standard "Annex G (informative) Reference dipoles for use in system validation". The electrical properties were measured using an HP 8753ET Network Analyzer. The network analyzer was calibrated to the validation dipole N-type connector feed point using an HP85032E Type N calibration kit. The dipole was placed parallel to a planar phantom at a separation distance of 10.0mm from the simulating fluid using a loss-less dielectric spacer. The measured input impedance is:

Feed point impedance at 1900 MHz	Re{Z} = 54.748Ω
	Im{Z} = 6.2266Ω
Return Loss at 1900 MHz	-22.541dB



2. Validation Dipole VSWR Data





3. Validation Dipole Dimensions

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

4. Validation Phantom

The validation phantom is the SAM (Specific Anthropomorphic Mannequin) phantom manufactured by Schmid & Partner Engineering AG. The SAM phantom is a Fiberglass shell integrated in a wooden table. The shape of the shell corresponds to the phantom defined by SCC34-SC2. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

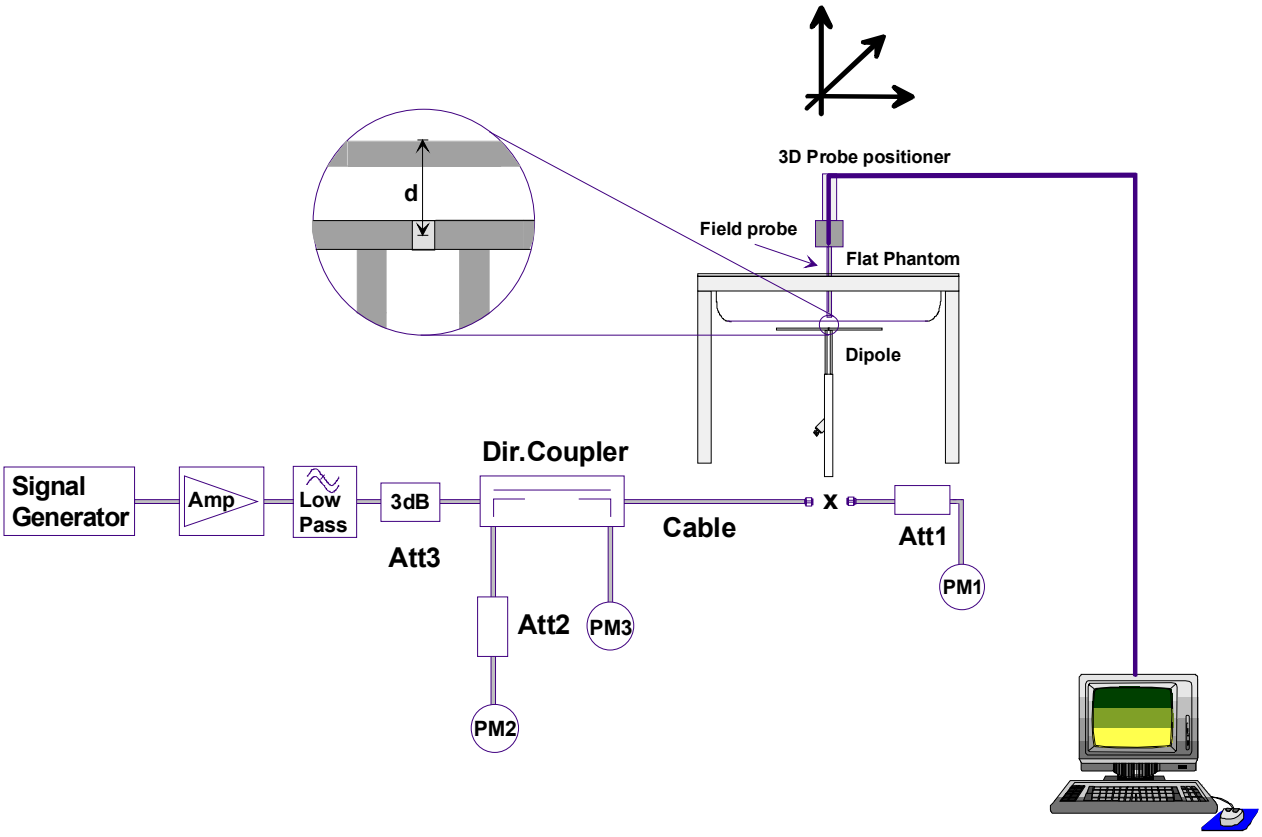
Shell Thickness: 2.0 ± 0.1 mm
Filling Volume: Approx. 25 liters
Dimensions: 50 cm (W) x 100 cm (L)

5. 1900 MHz System Validation Setup

6. 1900 MHz Dipole Setup

7. SAR Measurement

Measurements were made using a dosimetric E-field probe EX3DV4 (S/N: 3600, Conversion Factor 6.59). The SAR measurement was performed with the E-field probe in mechanical detection mode only. The setup and determination of the forward power into the dipole was performed using the procedures described below.



First the power meter PM1 (including attenuator Att1) is connected to the cable to measure the forward power at the location of the dipole connector (X). The signal generator is adjusted for the desired forward power at the dipole connector (taking into account the attenuation of Att1) as read by power meter PM2. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter PM2. If the signal generator does not allow adjustment in 0.01dB steps, the remaining difference at PM2 must be taken into consideration. PM3 records the reflected power from the dipole to ensure that the value is not changed from the previous value. The reflected power should be 50dB below the forward power.

8. Measurement Conditions

The SAM phantom was filled with 1900 MHz Brain tissue simulant.

Relative Permittivity: 38.3 (-4.2% deviation from target)
Conductivity: 1.45 mho/m (+3.6% deviation from target)
Fluid Temperature: 21.2 °C
Fluid Depth: ≥ 15.0 cm

Environmental Conditions:
Ambient Temperature: 22.5 °C
Barometric Pressure: 101.2 kPa
Humidity: 30%

The 1900 MHz Brain tissue simulant consisted of the following ingredients:

Ingredient	Percentage by weight
Water	55.85%
Glycol	44.00%
Salt	0.15%
Target Dielectric Parameters at 25 °C	ε_r = 40.0 σ = 1.40 S/m

9. System Validation SAR Results

SAR @ 0.25W Input averaged over 1g (W/kg)				SAR @ 1W Input averaged over 1g (W/kg)			
IEEE Target		Measured	Deviation	IEEE Target		Measured	Deviation
9.93	**+/- 10%**	10.5	+5.8%	**39.72**	**+/- 10%**	42.02	+5.8%
SAR @ 0.25W Input averaged over 10g (W/kg)				**SAR @ 1W Input averaged over 10g (W/kg)**			
IEEE Target		Measured	Deviation	IEEE Target		Measured	Deviation
5.13	**+/- 10%**	5.33	+3.9%	**20.52**	**+/- 10%**	21.32	+3.9%
The results have been normalized to 1W (forward power) into the dipole.							

Date Tested: 03/20/2007

System Validation - 1900 MHz Dipole

DUT: Dipole 1900 MHz; Asset: 00032; Serial: 151

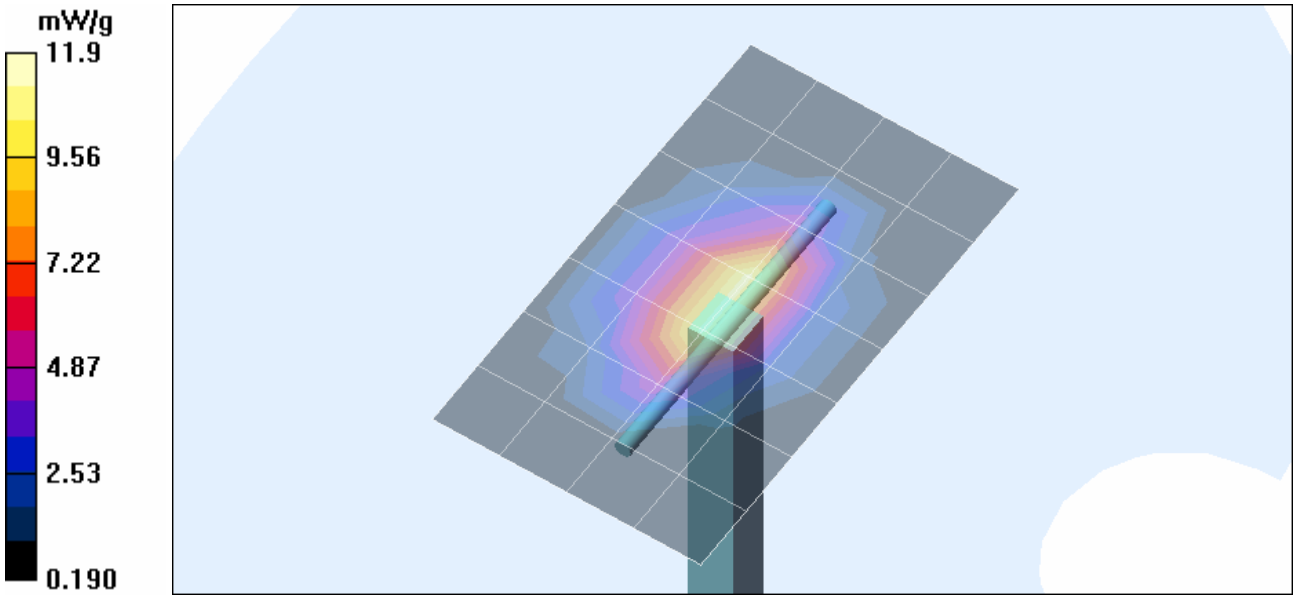
Ambient Temp: 22.5ºC; Fluid Temp: 21.2ºC; Barometric Pressure: 101.2 kPa; Humidity: 30%

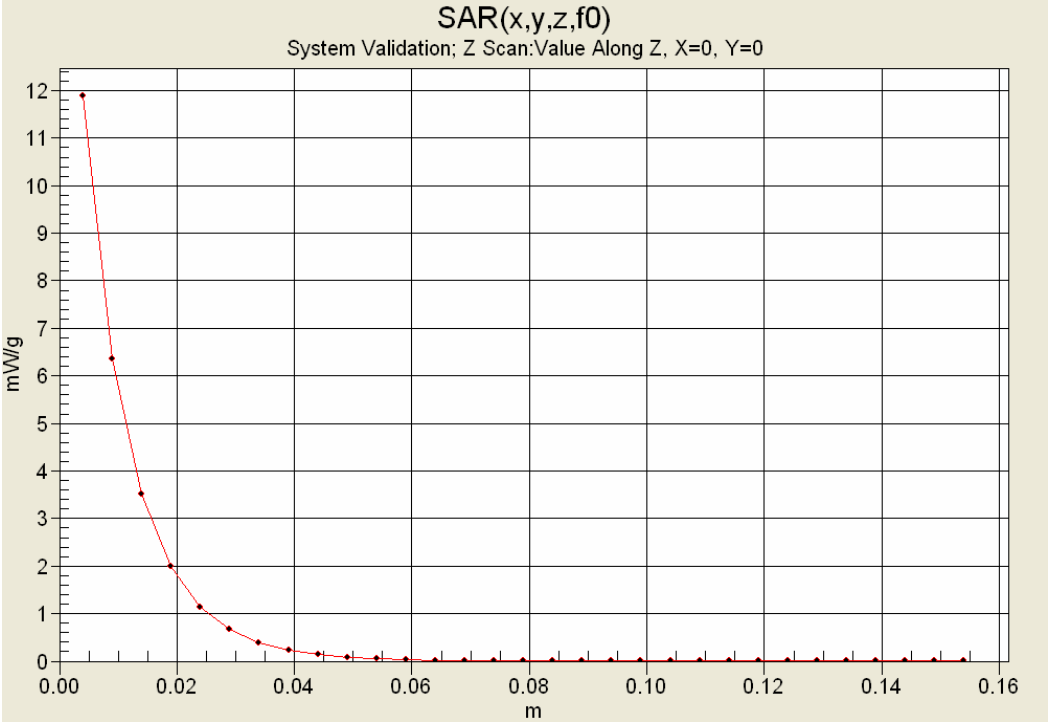
Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL1900 Medium parameters used: f = 1900 MHz; σ = 1.45 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3

- Probe: EX3DV4 - SN3600; ConvF(6.59, 6.59, 6.59); Calibrated: 24/01/2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

1900 MHz Dipole - System Validation
Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

1900 MHz Dipole - System Validation
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.0 V/m; Power Drift = -0.014 dB
Peak SAR (extrapolated) = 20.3 W/kg
SAR(1 g) = 10.5 mW/g; SAR(10 g) = 5.33 mW/g
Maximum value of SAR (measured) = 11.9 mW/g





10. Measured Fluid Dielectric Parameters

1900 MHz System Validation (Brain)

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
Tue 20/Mar/2007
Frequency (GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
1.8000	40.00	1.40	38.82	1.34
1.8100	40.00	1.40	38.82	1.36
1.8200	40.00	1.40	38.73	1.36
1.8300	40.00	1.40	38.64	1.39
1.8400	40.00	1.40	38.58	1.39
1.8500	40.00	1.40	38.56	1.39
1.8600	40.00	1.40	38.53	1.40
1.8700	40.00	1.40	38.52	1.42
1.8800	40.00	1.40	38.42	1.42
1.8900	40.00	1.40	38.41	1.44
1.9000	40.00	1.40	38.27	1.45
1.9100	40.00	1.40	38.35	1.46
1.9200	40.00	1.40	38.30	1.47
1.9300	40.00	1.40	38.27	1.47
1.9400	40.00	1.40	38.21	1.49
1.9500	40.00	1.40	38.15	1.49
1.9600	40.00	1.40	37.99	1.51
1.9700	40.00	1.40	38.04	1.51
1.9800	40.00	1.40	37.98	1.53
1.9900	40.00	1.40	38.00	1.54
2.0000	40.00	1.40	37.88	1.56

APPENDIX F - PROBE CALIBRATION

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Federal Office of Metrology and Accreditation
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client Celitech

Certificate No: EX3-3600_Jan07

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3600
Calibration procedure(s)	QA CAL-01.v5 and QA CAL-14.v3 Calibration procedure for dosimetric E-field probes
Calibration date:	January 24, 2007
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-06 (METAS, No. 217-00592)	Aug-07
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-06 (METAS, No. 217-00593)	Aug-07
Reference Probe ES3DV2	SN: 3013	4-Jan-07 (SPEAG, No. ES3-3013_Jan07)	Jan-08
DAE4	SN: 654	21-Jun-06 (SPEAG, No. DAE4-654_Jun06)	Jun-07

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: January 24, 2007

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Federal Office of Metrology and Accreditation
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe EX3DV4

SN:3600

Manufactured: January 10, 2007
Calibrated: January 24, 2007

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: EX3DV4 SN:3600

Sensitivity in Free Space[A] Diode Compression[B]

NormX	**0.460** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**90** mV
NormY	**0.470** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**88** mV
NormZ	**0.380** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**89** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL **1810 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	4.5	3.5
SAR_{be} [%]	With Correction Algorithm	0.2	0.4

TSL **5800 MHz** **Typical SAR gradient: 30 % per mm**

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	3.5	2.0
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

Sensor Offset

Probe Tip to Sensor Center	**1.0** mm

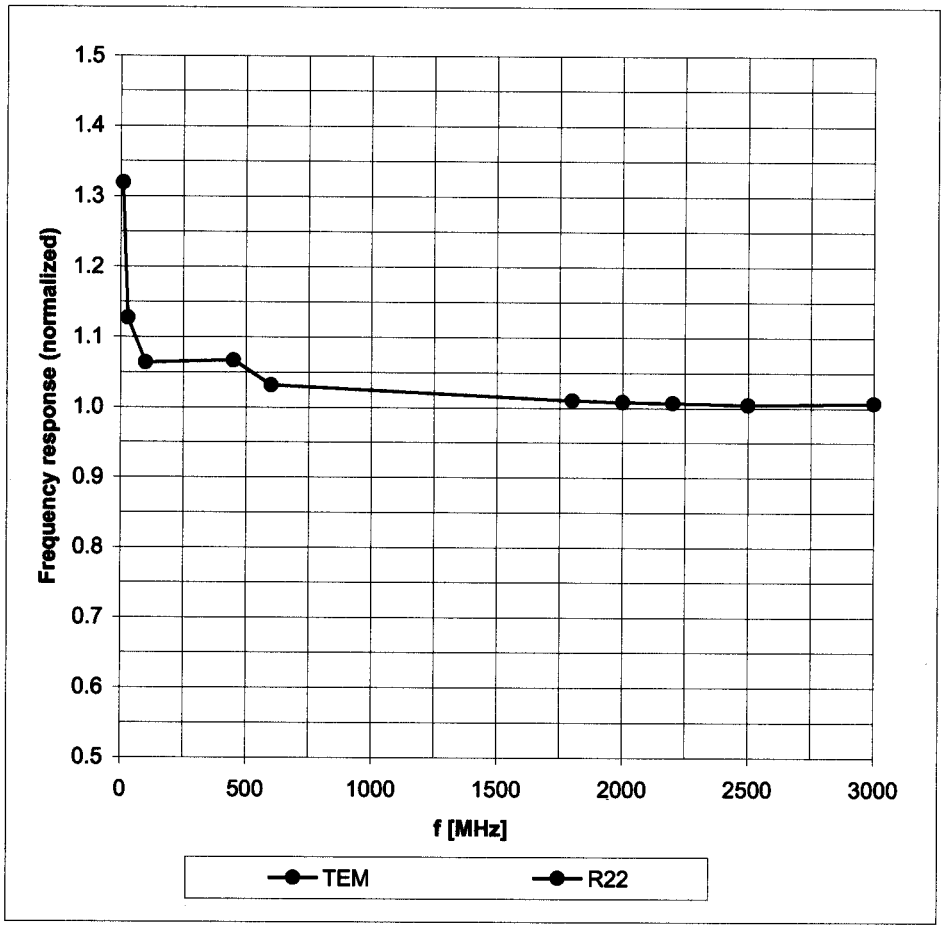
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

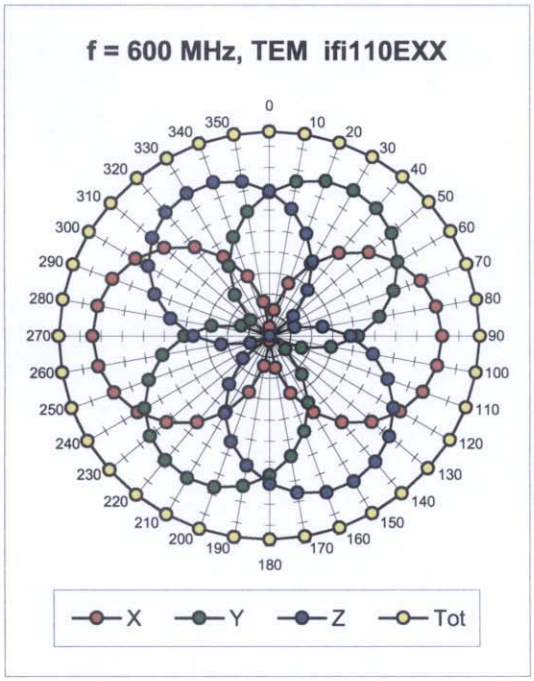
Frequency Response of E-Field

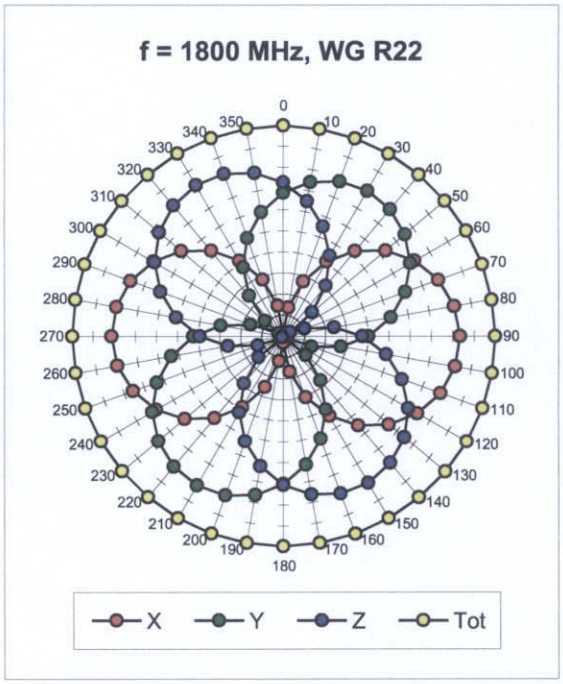
(TEM-Cell:ifi110 EXX, Waveguide: R22)

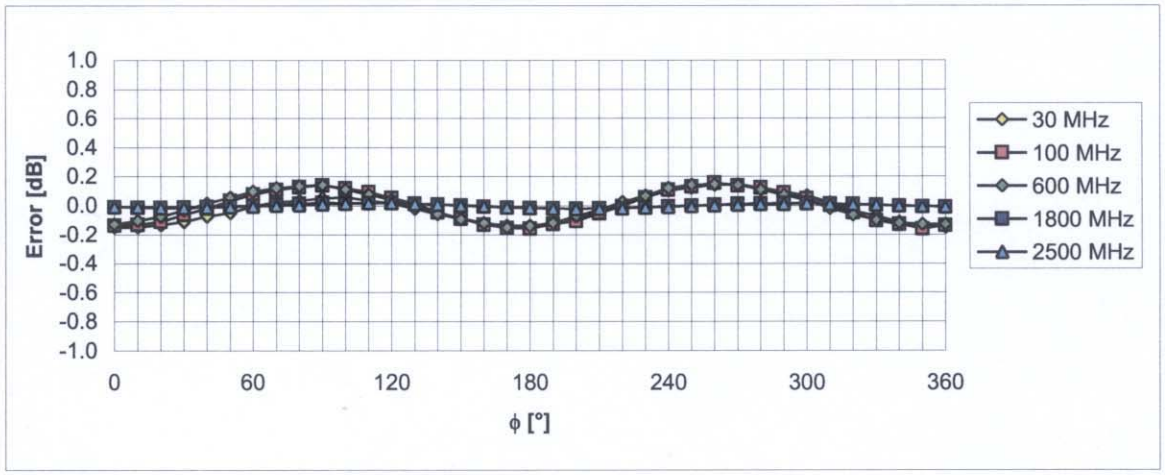


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



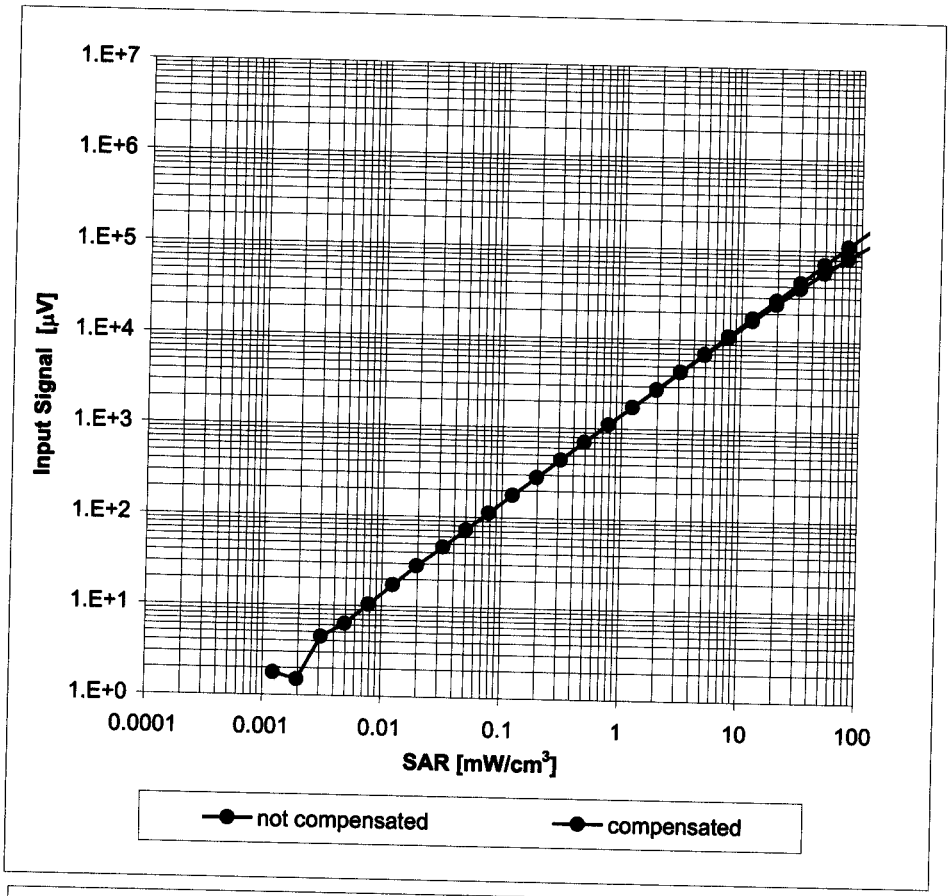


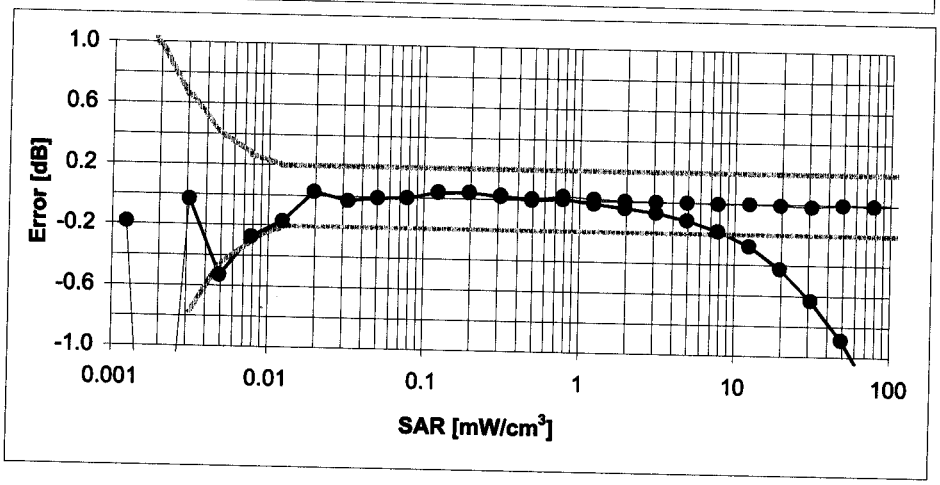


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

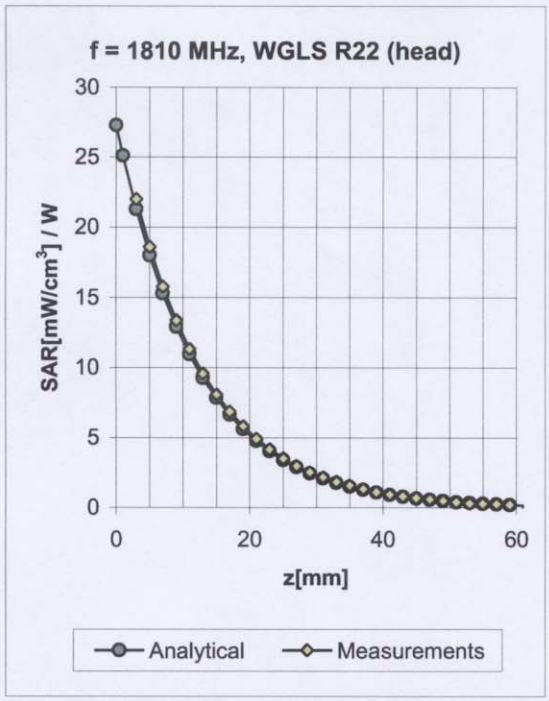
(Waveguide R22, f = 1800 MHz)

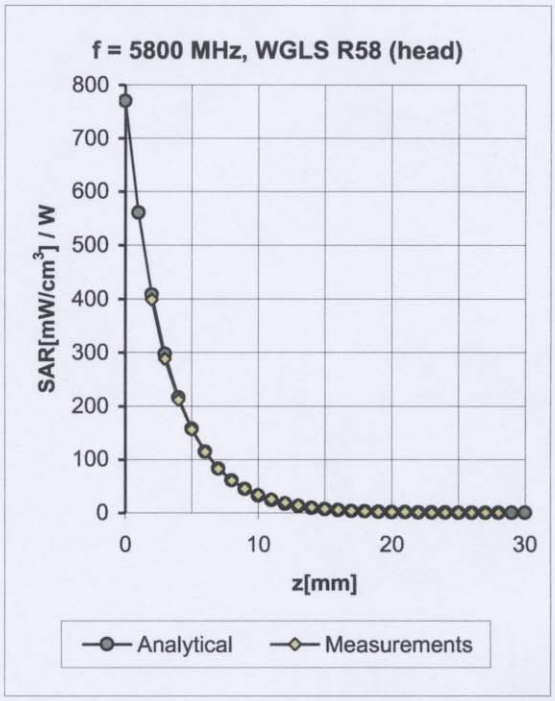




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



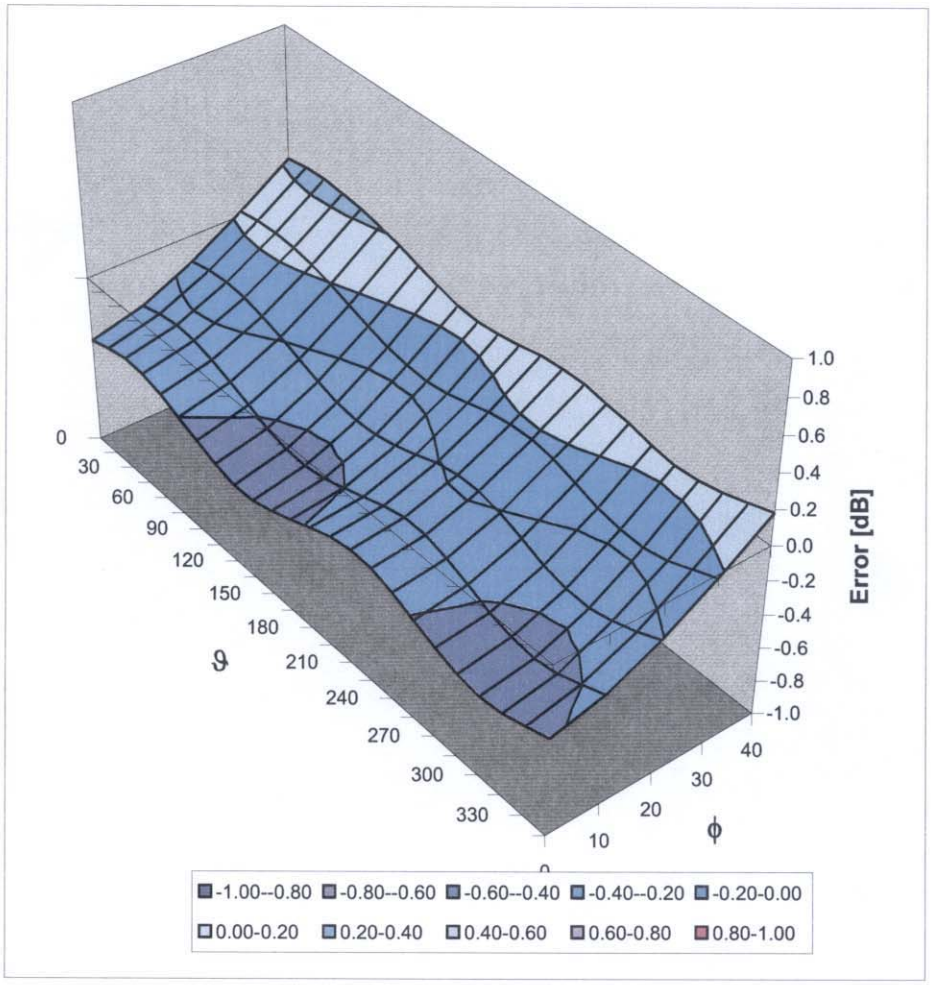


f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.20	1.01	7.02 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.26	1.05	6.59 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.44	1.00	6.37 ± 11.8% (k=2)
5800	± 50 / ± 100	Head	35.3 ± 5%	5.27 ± 5%	0.37	1.65	4.34 ± 13.1% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.24	1.06	6.85 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.16	1.35	6.54 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.42	1.00	6.31 ± 11.8% (k=2)
5200	± 50 / ± 100	Body	49.0 ± 5%	5.30 ± 5%	0.35	1.70	4.10 ± 13.1% (k=2)
5500	± 50 / ± 100	Body	48.6 ± 5%	5.65 ± 5%	0.32	1.70	3.95 ± 13.1% (k=2)
5800	± 50 / ± 100	Body	48.2 ± 5%	6.00 ± 5%	0.33	1.70	4.14 ± 13.1% (k=2)

[C] **The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.**

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

APPENDIX G - 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

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