CERTIFICATE OF COMPLIANCE
SAR EVALUATION

Test Lab:	**Applicant Information:**
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FCC ID:	**POQWPE-2100**
Model(s):	**WPE-2100**
Equipment Type:	**Dual-Band PCS/Cellular CDMA Phone**
Classification:	**Part 24 Licensed Portable Transmitter Held to Ear (PCE)**
Tx Frequency Range:	**1851.25 - 1908.75 MHz (PCS CDMA)** **824.70 - 848.31 MHz (Cellular CDMA)**
Rx Frequency Range:	**1931.25 - 1988.75 MHz (PCS CDMA)** **869.70 - 893.31 MHz (Cellular CDMA)**
Max. RF Output Power:	**0.340 Watts EIRP (PCS CDMA)** **0.234 Watts ERP (Cellular CDMA)**
Max. Conducted Power:	**24.5 dBm**
FCC Rule Part(s):	**2.1093; ET Docket 96.326**

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 OET Bulletin 65, Supplement C, Edition 01-01 (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 MODOTTEL CO., LTD. Model: WPE-2100 Dual-Band PCS/Cellular CDMA Phone FCC ID: POQWPE-2100 complies with FCC Part 2.1093, ET Docket 96-326 Rules for mobile and portable devices. The test procedures, as described in American National Standards Institute C95.1-1992 (see reference [1]), and FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [2]) were employed. A description of the product and operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the various provisions of the rules are included within this test report.

2.0 DESCRIPTION of Equipment Under Test (EUT)

EUT Type	Dual-Band PCS/Cellular CDMA Phone	**FCC ID**	POQWPE-2100
Equipment Class	Part 24 Licensed Portable Transmitter Held to Ear (PCE)	**Model No.(s)**	WPE-2100
FCC Rule Part(s)	§ 2.1093, Docket 96-326	**Application Type**	FCC Part 24 Certification
Tx Frequency Range (MHz)	1851.25-1908.75 (PCS CDMA) 824.70-848.31 (Cellular CDMA)	**Serial No.**	Pre-production Unit
Rx Frequency Range (MHz)	1931.25-1988.75 (PCS CDMA) 869.70-893.31 (Cellular CDMA)	**Battery Type(s)**	1. 3.7V 550mA/h Lithium-Ion 2. 3.7V 950mA/h Lithium-Ion
Max. RF Output Power	0.340 W EIRP (PCS CDMA) 0.234 W ERP (Cellular CDMA)	**Antenna Type**	Retractable Whip (1/4λ)
Modulation(s)	PCS CDMA Cellular CDMA	**Antenna Length**	101 mm

3.0 SAR MEASUREMENT SYSTEM

Celltech Research SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY system is comprised of the robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for brain or body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card. The DAE3 utilizes a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

DASY3 SAR Measurement System with SAM phantom

4.0 MEASUREMENT SUMMARY

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the EUT are reported in Appendix A.

PCS CDMA HEAD SAR MEASUREMENT RESULTS - Left Head Section

Freq. (MHz)	Channel	Modulation	Cond. Power Before (dBm)	Cond. Power After (dBm)	Battery Type	Antenna Position	Phantom Section	Test Position	SAR 1g (w/kg)
1880.00	600	PCS CDMA	24.54	24.45	Extended	Retracted	Left Ear	Cheek/Touch	0.882
1880.00	600	PCS CDMA	24.55	24.41	Extended	Extended	Left Ear	Cheek/Touch	0.293
1880.00	600	PCS CDMA	24.51	24.47	Standard	Retracted	Left Ear	Cheek/Touch	0.894
1880.00	600	PCS CDMA	24.57	24.48	Standard	Extended	Left Ear	Cheek/Touch	0.302
1851.25	25	PCS CDMA	24.53	24.42	Standard	Retracted	Left Ear	Cheek/Touch	1.01
1851.25	25	PCS CDMA	24.56	24.56	Standard	Extended	Left Ear	Cheek/Touch	0.242
1908.75	1175	PCS CDMA	24.58	24.44	Standard	Retracted	Left Ear	Cheek/Touch	0.804
1908.75	1175	PCS CDMA	24.53	24.38	Standard	Extended	Left Ear	Cheek/Touch	0.325
1880.00	600	PCS CDMA	24.57	24.56	Standard	Retracted	Left Ear	Ear/Tilt	0.189
1880.00	600	PCS CDMA	24.52	24.53	Standard	Extended	Left Ear	Ear/Tilt	0.0826
Mixture Type: Brain (Measured) Dielectric Constant: 39.5 Conductivity: 1.40				**ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak - Uncontrolled Exposure / General Population BRAIN: 1.6 W/kg (averaged over 1 gram)**					

Notes:

1. Test Date(s): January 30, 2002.
2. The SAR values measured were below the maximum limit of 1.6 w/kg (averaged over 1 gram).
3. The highest PCS CDMA head SAR value measured (left head section) was 1.01 w/kg (low channel, cheek/touch position, antenna retracted, standard battery).
4. The EUT was tested with the clamshell open, which is the only ear-held operating configuration for this phone.
5. Ambient TEMPERATURE: 22.2°C
   Relative HUMIDITY: 31.0 %
   Atmospheric PRESSURE: 102.269 kPa
   Fluid TEMPERATURE: ≈ 23 °C
6. During the entire test the conducted power was maintained to within 5% of the initial conducted power.
7. Standard Battery: 550mAh
   Extended Battery: 950mAh

MEASUREMENT SUMMARY (CONT.)

PCS CDMA HEAD SAR MEASUREMENT RESULTS - Right Head Section

Freq. (MHz)	Channel	Modulation	Cond. Power Before (dBm)	Cond. Power After (dBm)	Battery Type	Antenna Position	Phantom Section	Test Position	SAR 1g (w/kg)
1880.00	600	PCS CDMA	24.52	24.39	Extended	Retracted	Right Ear	Cheek/Touch	1.07
1880.00	600	PCS CDMA	24.52	24.41	Extended	Extended	Right Ear	Cheek/Touch	0.114
1880.00	600	PCS CDMA	24.51	24.45	Standard	Retracted	Right Ear	Cheek/Touch	1.09
1880.00	600	PCS CDMA	24.51	24.39	Standard	Extended	Right Ear	Cheek/Touch	0.349
1851.25	25	PCS CDMA	24.50	24.53	Standard	Retracted	Right Ear	Cheek/Touch	1.25
1851.25	25	PCS CDMA	24.52	24.45	Standard	Extended	Right Ear	Cheek/Touch	0.270
1908.75	1175	PCS CDMA	24.51	24.37	Standard	Retracted	Right Ear	Cheek/Touch	0.901
1908.75	1175	PCS CDMA	24.53	24.42	Standard	Extended	Right Ear	Cheek/Touch	0.123
1880.00	600	PCS CDMA	24.54	24.37	Standard	Retracted	Right Ear	Ear/Tilt	0.219
1880.00	600	PCS CDMA	24.55	24.54	Standard	Extended	Right Ear	Ear/Tilt	0.099
Mixture Type: Brain (Measured) Dielectric Constant: 39.5 Conductivity: 1.40				**ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak - Uncontrolled Exposure / General Population BRAIN: 1.6 W/kg (averaged over 1 gram)**					

Notes:

1. Test Date(s): January 30, 2002.
2. The SAR values measured were below the maximum limit of 1.6 w/kg (averaged over 1 gram).
3. The highest PCS CDMA head SAR value measured (right head section) was 1.25 w/kg (low channel, cheek/touch position, antenna retracted, standard battery).
4. The EUT was tested with the clamshell open, which is the only ear-held operating configuration for this phone.
5. Ambient TEMPERATURE: 22.2 °C
   Relative HUMIDITY: 31.0 %
   Atmospheric PRESSURE: 102.269 kPa
   Fluid TEMPERATURE: ≈ 23.0 °C
6. During the entire test the conducted power was maintained to within 5% of the initial conducted power.
7. Standard Battery: 550mAh
   Extended Battery: 950mAh

MEASUREMENT SUMMARY (CONT.)

800MHz CDMA HEAD SAR MEASUREMENT RESULTS - Left Head Section

Freq. (MHz)	Channel	Modulation	Cond. Power Before (dBm)	Cond. Power After (dBm)	Battery Type	Antenna Position	Phantom Section	Test Position	SAR 1g (w/kg)
835.89	363	CDMA	24.54	24.52	Extended	Retracted	Left Ear	Cheek/Touch	1.18
835.89	363	CDMA	24.51	24.42	Extended	Extended	Left Ear	Cheek/Touch	1.23
835.89	363	CDMA	24.51	24.37	Standard	Retracted	Left Ear	Cheek/Touch	1.13
835.89	363	CDMA	24.56	24.48	Standard	Extended	Left Ear	Cheek/Touch	1.40
824.70	1013	CDMA	24.55	24.45	Standard	Retracted	Left Ear	Cheek/Touch	1.11
824.70	1013	CDMA	24.53	24.55	Standard	Extended	Left Ear	Cheek/Touch	1.13
848.31	777	CDMA	24.54	24.38	Standard	Retracted	Left Ear	Cheek/Touch	0.995
848.31	777	CDMA	24.56	24.36	Standard	Extended	Left Ear	Cheek/Touch	1.34
835.89	363	CDMA	24.53	24.43	Standard	Retracted	Left Ear	Ear/Tilt	0.402
835.89	363	CDMA	24.54	24.56	Standard	Extended	Left Ear	Ear/Tilt	0.569
Mixture Type: Brain (Measured) Dielectric Constant: 41.2 Conductivity: 0.91				**ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak - Uncontrolled Exposure / General Population BRAIN: 1.6 W/kg (averaged over 1 gram)**					

Notes:

1. Test Date(s): January 31, 2002.
2. The SAR values measured were below the maximum limit of 1.6 w/kg (averaged over 1 gram).
3. The highest 800MHz CDMA head SAR value measured (left head section) was 1.40 w/kg (mid channel, cheek/touch position, antenna extended, standard battery).
4. The EUT was tested with the clamshell open, which is the only ear-held operating configuration for this phone.
5. Ambient TEMPERATURE: 22.8 °C
   Relative HUMIDITY: 30.0 %
   Atmospheric PRESSURE: 102.269 kPa
   Fluid TEMPERATURE: ≈ 23.0 °C
6. During the entire test the conducted power was maintained to within 5% of the initial conducted power.
7. Standard Battery: 550mAh
   Extended Battery: 950mAh

MEASUREMENT SUMMARY (CONT.)

800MHz CDMA HEAD SAR MEASUREMENT RESULTS - Right Head Section

Freq. (MHz)	Channel	Modulation	Cond. Power Before (dBm)	Cond. Power After (dBm)	Battery Type	Antenna Position	Phantom Section	Test Position	SAR 1g (w/kg)
835.89	363	CDMA	24.53	24.48	Extended	Retracted	Right Ear	Cheek/Touch	1.28
835.89	363	CDMA	24.52	24.47	Extended	Extended	Right Ear	Cheek/Touch	1.35
835.89	363	CDMA	24.51	24.51	Standard	Retracted	Right Ear	Cheek/Touch	1.32
835.89	363	CDMA	24.51	24.51	Standard	Extended	Right Ear	Cheek/Touch	1.37
824.70	1013	CDMA	24.52	24.38	Standard	Retracted	Right Ear	Cheek/Touch	1.14
824.70	1013	CDMA	24.51	24.41	Standard	Extended	Right Ear	Cheek/Touch	1.27
848.31	777	CDMA	24.52	24.39	Standard	Retracted	Right Ear	Cheek/Touch	1.08
848.31	777	CDMA	24.57	24.44	Standard	Extended	Right Ear	Cheek/Touch	1.26
835.89	363	CDMA	24.54	24.50	Standard	Retracted	Right Ear	Ear/Tilt	0.674
835.89	363	CDMA	24.55	24.49	Standard	Extended	Right Ear	Ear/Tilt	0.638
Mixture Type: Brain (Measured) Dielectric Constant: 41.2 Conductivity: 0.91				**ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak - Uncontrolled Exposure / General Population BRAIN: 1.6 W/kg (averaged over 1 gram)**					

Notes:

1. Test Date(s): January 31, 2002.
2. The SAR values measured were below the maximum limit of 1.6 w/kg (averaged over 1 gram).
3. The highest 800MHz CDMA head SAR value measured (right head section) was 1.37 w/kg (mid channel, cheek/touch position, antenna extended, standard battery).
4. The EUT was tested with the clamshell open, which is the only ear-held operating configuration for this phone.
5. Ambient TEMPERATURE: 22.8 °C
   Relative HUMIDITY: 30.0 %
   Atmospheric PRESSURE: 102.269 kPa
   Fluid TEMPERATURE: ≈ 23.0 °C
6. During the entire test the conducted power was maintained to within 5% of the initial conducted power.
7. Standard Battery: 550mAh
   Extended Battery: 950mAh

MEASUREMENT SUMMARY (CONT.)

PCS CDMA BODY SAR MEASUREMENT RESULTS

Freq. (MHz)	Channel	Modulation	Cond. Power Before (dBm)	Cond. Power After (dBm)	Battery Type	Antenna Position	Phantom Section	Separation Distance (cm)	SAR 1g (w/kg)
1880.00	600	PCS CDMA	24.51	24.40	Extended	Retracted	Planar	1.5	0.231
1880.00	600	PCS CDMA	24.53	24.36	Extended	Extended	Planar	1.5	0.933
1880.00	600	PCS CDMA	24.52	24.53	Standard	Retracted	Planar	1.5	0.366
1880.00	600	PCS CDMA	24.55	24.38	Standard	Extended	Planar	1.5	1.15
1851.25	25	PCS CDMA	24.54	24.40	Standard	Extended	Planar	1.5	0.982
1908.75	1175	PCS CDMA	24.50	24.32	Standard	Extended	Planar	1.5	0.925
Mixture Type: Body (Measured) Dielectric Constant: 54.9 Conductivity: 1.53				**ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak - Uncontrolled Exposure / General Population BODY: 1.6 W/kg (averaged over 1 gram)**					

Notes:

1. Test Date(s): February 01, 2002.
2. The body SAR values measured were below the maximum limit of 1.6 w/kg (averaged over 1 gram).
3. The highest PCS CDMA body SAR value measured was 1.15 w/kg (mid channel, antenna extended, standard battery).
4. The EUT was tested for body SAR with ear-microphone connected.
5. The EUT was tested for body SAR with the clamshell closed, which is the only intended body-worn operating configuration for this phone. A 1.5cm separation distance was maintained between the back of the phone and the outer surface of the planar phantom.
6. Ambient TEMPERATURE: 24.4 °C
   Relative HUMIDITY: 31.0 %
   Atmospheric PRESSURE: 102.27 kPa
   Fluid TEMPERATURE: ≈ 23.0 °C
7. During the entire test the conducted power was maintained to within 5% of the initial conducted power.
8. Standard Battery: 550mAh
   Extended Battery: 950mAh

MEASUREMENT SUMMARY (CONT.)

800MHz CDMA BODY SAR MEASUREMENT RESULTS

Freq. (MHz)	Channel	Modulation	Cond. Power Before (dBm)	Cond. Power After (dBm)	Battery Type	Antenna Position	Phantom Section	Separation Distance (cm)	SAR 1g (w/kg)
835.89	363	CDMA	24.53	24.52	Extended	Retracted	Planar	1.5	0.599
835.89	363	CDMA	24.55	24.47	Extended	Extended	Planar	1.5	1.00
835.89	363	CDMA	24.52	24.48	Standard	Retracted	Planar	1.5	0.712
835.89	363	CDMA	24.51	24.50	Standard	Extended	Planar	1.5	1.22
824.70	1013	CDMA	24.52	24.47	Standard	Extended	Planar	1.5	1.21
848.31	777	CDMA	24.52	24.39	Standard	Extended	Planar	1.5	1.10
Mixture Type: Body (Measured) Dielectric Constant: 53.4 Conductivity: 0.98				**ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak - Uncontrolled Exposure / General Population BODY: 1.6 W/kg (averaged over 1 gram)**					

Notes:

1. Test Date(s): February 01, 2002.
2. The body SAR values measured were below the maximum limit of 1.6 w/kg (averaged over 1 gram).
3. The highest 800MHz CDMA body SAR value measured was 1.22 w/kg (mid channel, antenna extended, standard battery).
4. The EUT was tested for body SAR with ear-microphone connected.
5. The EUT was tested for body SAR with the clamshell closed, which is the only intended body-worn operating configuration for this phone. A 1.5cm separation distance was maintained between the back of the phone and the outer surface of the planar phantom.
6. Ambient TEMPERATURE: 24.4 °C
   Relative HUMIDITY: 31.0 %
   Atmospheric PRESSURE: 102.27 kPa
   Fluid TEMPERATURE: ≈ 23.0 °C
7. During the entire test the conducted power was maintained to within 5% of the initial conducted power.
8. Standard Battery: 550mAh
   Extended Battery: 950mAh

5.0 DETAILS OF SAR EVALUATION

The MODOTTEL CO., LTD. Model: WPE-2100 Dual-Band PCS/Cellular CDMA Phone FCC ID: POQWPE-2100 was found to be compliant for localized Specific Absorption Rate (SAR) based on the following test provisions and conditions:

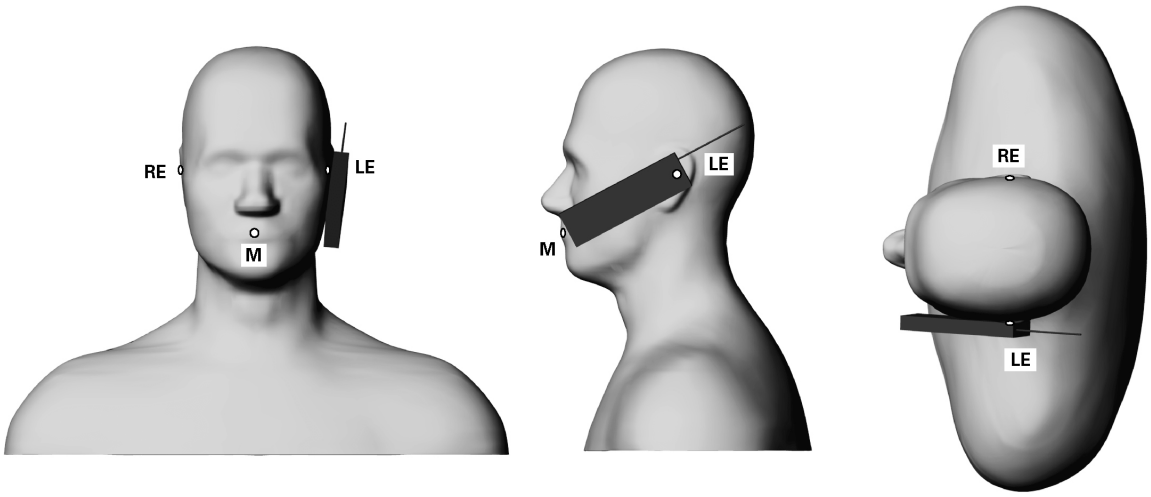
1) The EUT was tested in a ear-held configuration on both the left and right sections of the phantom for mid channel with both standard and extended batteries and in both antenna extended and retracted positions. The battery configuration that measured the higher SAR for mid channel was maintained for the remainder of the tests. The EUT was tested as follows:

a) The handset was placed in the device holder in a normal operating position with the test device reference point located along the vertical centerline on the front of the device aligned to the ear reference point, with the center of the earpiece touching the center of the ear spacer of the SAM phantom.

b) With the handset positioned parallel to the cheek, the test device reference point was aligned to the ear reference point on the head phantom, and the vertical centerline was aligned to the phantom reference plane (initial ear position).

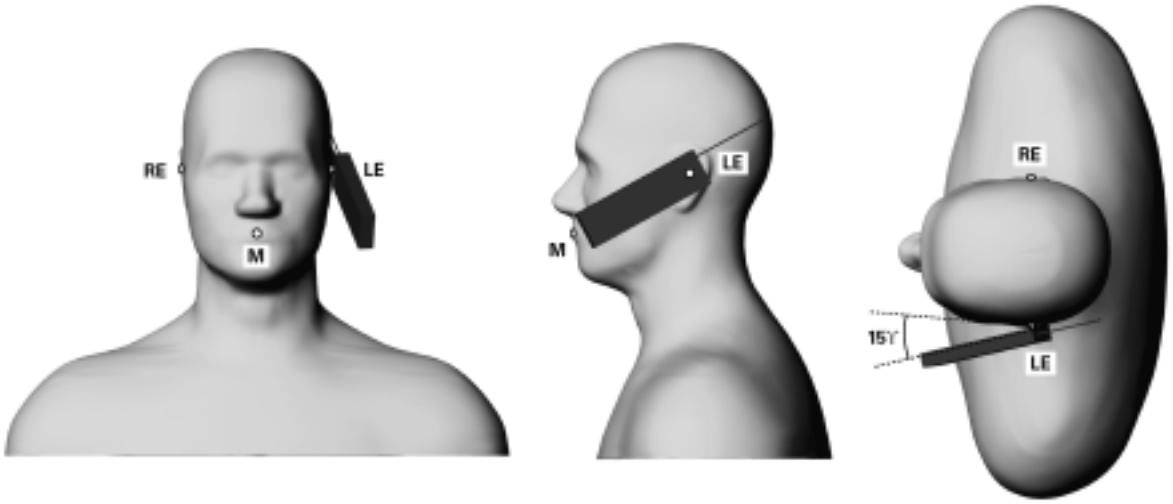
c) While maintaining the three alignments, the body of the handset was gradually adjusted to each of the following test positions:

- Cheek/Touch Position: The handset was brought toward the mouth of the head phantom by pivoting against the ear reference point until any point of the mouthpiece or keypad touched the phantom.



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

- Ear/Tilt Position: With the phone aligned in the Cheek/Touch position, the handset was tilted away from the mouth with respect to the test device reference point by 15 degrees.



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

2) The EUT was tested in a body-worn configuration with the device in the clamshell-closed position and the back of the device placed parallel to the outer surface of the planar phantom at a separation distance of 1.5 cm. The EUT was initially tested for body SAR at mid channel with both standard and extended batteries, and in both antenna extended and retracted positions. The battery configuration that measured the higher SAR for mid channel was maintained for the remainder of the tests. (Note: A body-holster or belt-clip were not available at the time of evaluation)
3) The EUT was tested for body SAR with ear-microphone connected.
4) SAR measurements were evaluated at maximum power and the unit was operated for an appropriate period prior to the evaluation in order to minimize drift. The conducted power levels were checked before and after each test. If the conducted power level deviated more than 5% of the initial power level, then the EUT was retested. Any unusual anomalies over the course of the test also warranted a re-evaluation.
5) The conducted power was measured according to the procedures described in FCC Part 2.1046.
6) The EUT was placed into test mode via keypad access or base station simulator at a full data rate in the "always up" power control mode.
7) The location of the maximum spatial SAR distribution (Hot Spot) was determined relative to the handset and its antenna.
8) The EUT was tested with a fully charged battery.

6.0 EVALUATION PROCEDURES

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

a. (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation both the left and right ear positions were evaluated at the low, middle, and high frequencies of the band at maximum power, and with the device antenna in both the extended and extracted positions as applicable. 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.

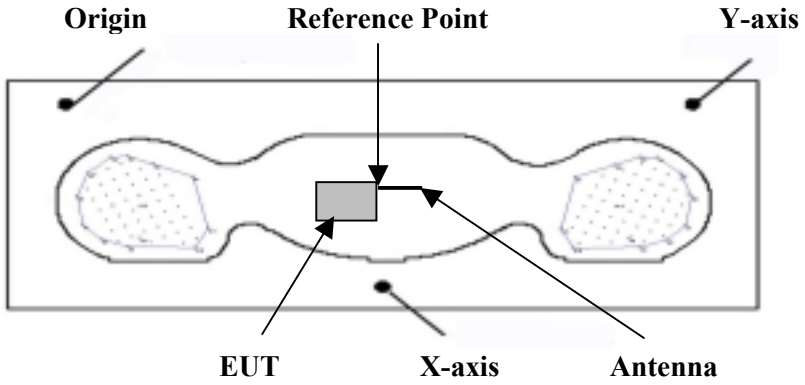
c. A 5x5x7 matrix was performed around the greatest spatial SAR distribution found during the area scan of the applicable exposed region. SAR values were then calculated using a 3-D spline interpolation algorithm and averaged over spatial volumes of 1 and 10 grams.

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

e. The E-field probe conversion factors were determined as follows:

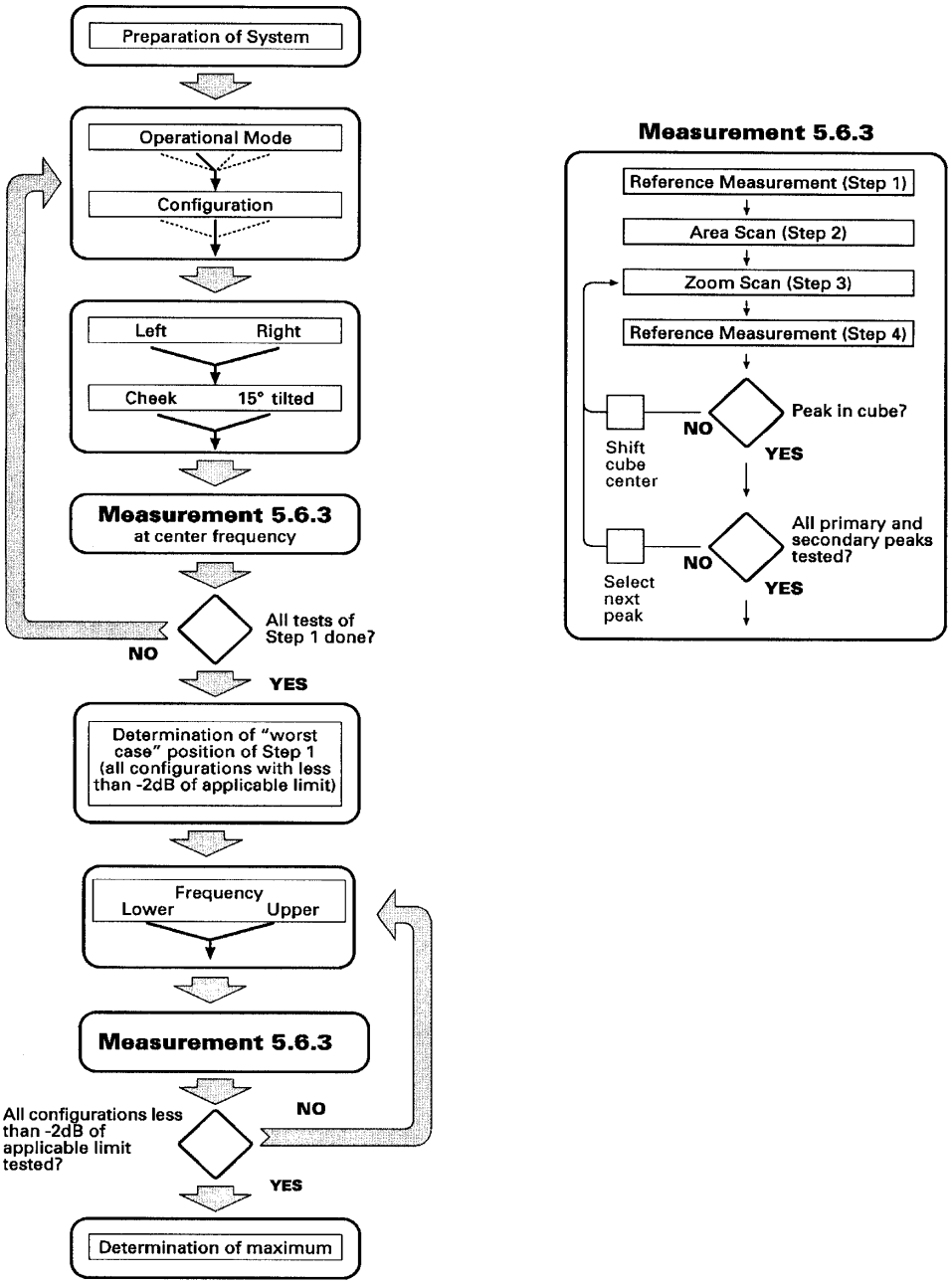
- In brain and muscle tissue between 750MHz and 1GHz, the conversion factor decreases approximately 1.3% per 100MHz frequency increase.
- In brain and muscle tissue between 1.6GHz and 2GHz, the conversion factor decreases approximately 1% per 100MHz frequency increase.

f. The 1800MHz probe conversion factors used for the SAR evaluation were 5.78 for head and 5.36 for body. The manufacturers specified probe conversion factors at 1900MHz are 5.66 and 5.25 for head and body respectively. An evaluation of the highest SAR values for the EUT using 1900MHz probe conversion factors increases the overall SAR for head and body by approximately 2%, which is less than the uncertainty of the probe conversion factors and considerably less then the overall uncertainty of the entire system.



Device Positioning & Reference Point (Body SAR)

EVALUATION PROCEDURES (Cont.)



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

7.0 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.

8.0 SYSTEM VALIDATION

Prior to the assessment, the system was verified in the planar section of the SAM phantom using an 1800MHz and 900MHz 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 as follows (see Appendix B for validation test plots):

Dipole Validation Kit	Target SAR 1g (w/kg)	Measured SAR 1g (w/kg)	Fluid Temperature	Validation Date
D1800V2	9.66	9.51	≈23.0 °C	01/30/02
		9.58	≈23.0 °C	02/01/02
D900V2	2.78	2.77	≈23.0 °C	01/31/02
		2.71	≈23.0 °C	02/01/02

9.0 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 shown in the table below. See Appendix D for printout of measured tissue 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)	40.0 ±5%	1.40 ±5%	1000
1800MHz Brain (Measured: 01/30/02)	39.5	1.40	1000
1800MHz Brain (Measured: 02/01/02)	39.4	1.40	1000
1800MHz Body (Target)	53.3 ±5%	1.52 ±5%	1000
1800MHz Body (Measured: 02/01/02)	54.9	1.53	1000
900MHz Brain (Target)	41.5 ±5%	0.97 ±5%	1000
900MHz Brain (Measured: 01/31/02)	40.4	0.97	1000
900MHz Brain (Measured: 02/01/02)	40.6	0.96	1000
835MHz Brain (Target)	41.5 ±5%	0.90 ±5%	1000
835MHz Brain (Measured: 01/31/02)	41.2	0.91	1000
835MHz Body (Target)	55.2 ±5%	0.97 ±5%	1000
835MHz Body (Measured: 02/01/02)	53.4	0.98	1000

10.0 SIMULATED TISSUES

The 835MHz and 900MHz brain and body mixtures consist of a viscous gel using hydroxethylcellulose (HEC) gelling agent and saline solution. Preservation with a bactericide is added and visual inspection is made to ensure air bubbles are not trapped during the mixing process. The fluid was prepared according to standardized procedures, and measured for dielectric parameters (permitivity and conductivity).

835MHz & 900MHz TISSUE MIXTURE - SYSTEM VALIDATION & EUT EVALUATION			
INGREDIENT	**900MHz Brain Mixture (Validation)**	**835MHz Brain Mixture (EUT Evaluation)**	**835MHz Body Mixture (EUT Evaluation)**
Water	40.71 %	40.71 %	53.70 %
Sugar	56.63 %	56.63 %	45.10 %
Salt	1.48 %	1.48 %	0.97 %
HEC	1.00 %	1.00 %	0.13%
Bactericide	0.18 %	0.18 %	0.10 %

The 1800MHz 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).

1800MHz TISSUE MIXTURE - SYSTEM VALIDATION & EUT EVALUATION		
INGREDIENT	**1800MHz Brain Mixture (System Validation & EUT Evaluation)**	**1800MHz Body Mixture (EUT Evaluation)**
Water	54.90 %	69.91 %
Glycol Monobutyl	44.92 %	29.96 %
Salt	0.18 %	0.13 %

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.:	1590
Construction:	Triangular core fiber optic detection system
Frequency:	10 MHz to 6 GHz
Linearity:	± 0.2 dB (30 MHz to 3 GHz)

Phantom

Type:	SAM V4.0C
Configuration:	Left Head, Right Head, Planar Section
Shell Material:	Fiberglass
Thickness:	2.0 ±0.1 mm
Volume:	Approx. 20 liters

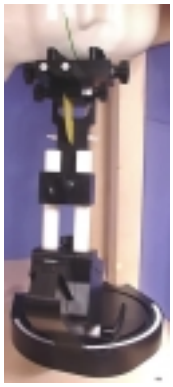
12.0 SAM PHANTOM V4.0C

The SAM phantom V4.0C is a fiberglass shell phantom with a 2.0 mm shell thickness for left and right head and flat planar area integrated in a wooden table. The shape of the fiberglass shell corresponds to the phantom defined by SCC34-SC2. The device holder positions are adjusted to the standard measurement positions in the three sections.

SAM Phantom V4.0C

13.0 DEVICE HOLDER

The DASY3 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.



Device Holder

14.0 PROBE SPECIFICATION (ET3DV6)

Construction: Symmetrical design with triangular core
Built-in shielding against static charges
PEEK enclosure material (resistant to organic solvents, e.g. glycol)

Calibration: In air from 10 MHz to 2.5 GHz
In brain simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy ± 8%)

Frequency: 10 MHz to >6 GHz; Linearity: ±0.2 dB (30 MHz to 3 GHz)

Directivity: ±0.2 dB in brain tissue (rotation around probe axis)
±0.4 dB in brain tissue (rotation normal to probe axis)

Dynam. Rnge: 5 µW/g to >100 mW/g; Linearity: ±0.2 dB

Srfce. Detect. ±0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces

Dimensions: Overall length: 330 mm
Tip length: 16 mm
Body diameter: 12 mm
Tip diameter: 6.8 mm
Distance from probe tip to dipole centers: 2.7 mm

Application: General dosimetry up to 3 GHz
Compliance tests of mobile phone

ET3DV6 E-Field Probe

15.0 TEST EQUIPMENT LIST

SAR MEASUREMENT SYSTEM		
EQUIPMENT	***SERIAL NO.***	***DATE CALIBRATED***
DASY3 System -Robot -ET3DV6 E-Field Probe -300MHz Validation Dipole -450MHz Validation Dipole -900MHz Validation Dipole -1800MHz Validation Dipole -2450MHz Validation Dipole -SAM Phantom V4.0C	 599396-01 1590 135 136 054 247 150 N/A	 N/A Mar 2001 Oct 2001 Oct 2001 June 2001 June 2001 Oct 2001 N/A
85070C Dielectric Probe Kit	N/A	N/A
Gigatronics 8652A Power Meter -Power Sensor 80701A -Power Sensor 80701A	1835272 1833535 1833542	Feb 2002 Feb 2002 Mar 2002
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	± 4.4	Normal	1	1	± 4.4	∞
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	∞
Extrap. & integration	± 3.9	Rectangular	√3	1	± 2.3	∞
Test Sample Related						
Device positioning	± 6.0	Normal	0.89	1	± 6.7	12
Device holder uncertainty	± 5.0	Normal	0.84	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					**± 13.6**	
Expanded Uncertainty (k=2)					**± 27.1**	

The divisor for device positioning uncertainty and holder uncertainty are based on the procedure defined in IEEE Std 1528 (draft) (see reference [5]), or based on the degrees of freedom for each error source.

For estimation of Device Positioning Uncertainty (divisor=0.89) 12 different devices were used (see last column - i.e. degrees of freedom). The corresponding k_p factor for v_{eff}=12 is 2.23, therefore the divisor is 2/2.23=0.89.

For estimation of Device Holder Uncertainty (divisor=0.84) 8 different devices were used (see last column - i.e. degrees of freedom). The corresponding k_p factor for v_{eff}=8 is 2.37, therefore the divisor is 2/2.37=0.84.

17.0 REFERENCES

[1] ANSI, ANSI/IEEE C95.1: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300 Ghz, The Institute of Electrical and Electronics Engineers, Inc., New York, NY: 1992.

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

[3] Thomas Schmid, Oliver Egger, and Niels Kuster, "Automated E-field scanning system for dosimetric assessments", IEEE Transaction on Microwave Theory and Techniques, Vol. 44, pp. 105 - 113: January 1996.

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

[5] IEEE Standards Coordinating Committee 34, Std 1528, DRAFT Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques: Draft, December 2001.

APPENDIX A - SAR MEASUREMENT DATA

APPENDIX B - DIPOLE VALIDATION

Dipole 1800 MHz

SAM Phantom; Flat Section

Probe: ET3DV6 - SN1590; ConvF(5.78,5.78,5.78); Crest factor: 1.0; 1800 MHz Brain: σ = 1.40 mho/m ε_r = 39.5 ρ = 1.00 g/cm^3

Cube 5x5x7: Peak: 18.4 mW/g, SAR (1g): 9.51 mW/g, SAR (10g): 4.81 mW/g, (Worst-case extrapolation)

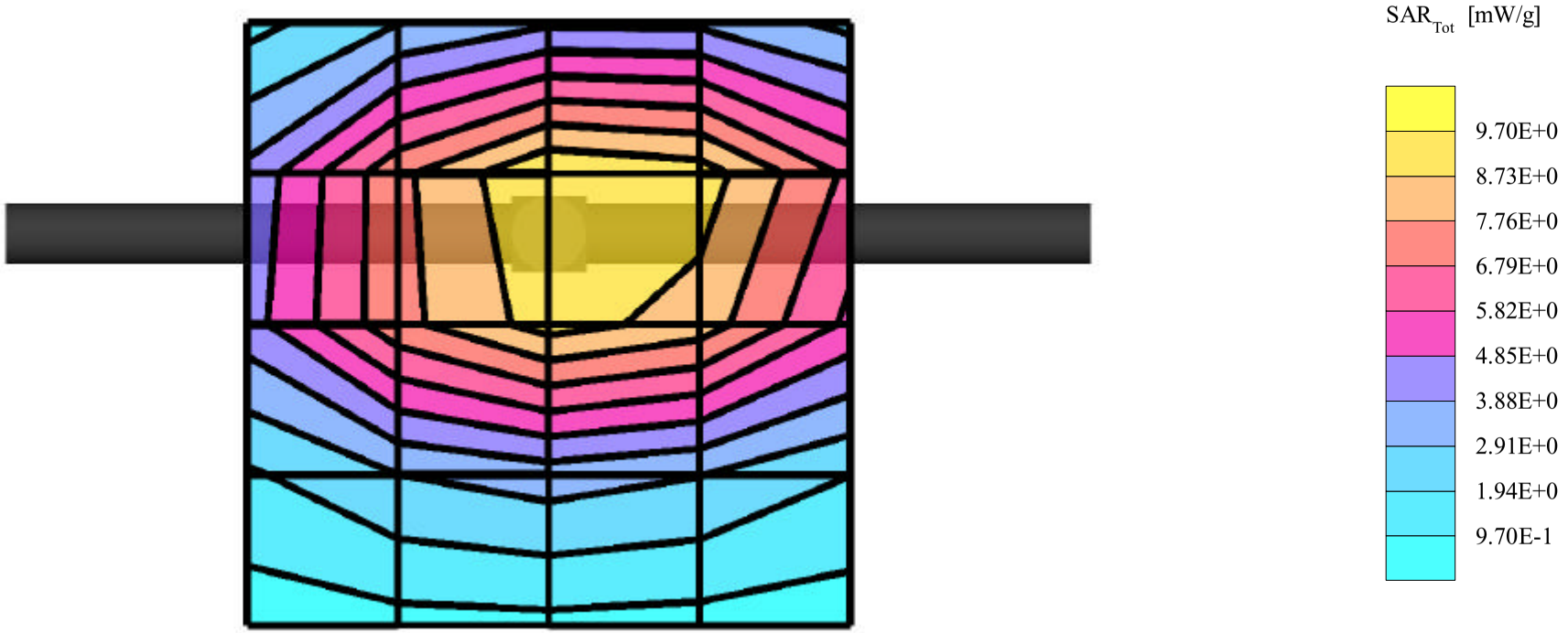
Penetration depth: 7.7 (7.3, 8.6) [mm]

Powerdrift: 0.02 dB

1800MHz Dipole Validation

Conducted Power: 250 mW

Date: January 30, 2002



Dipole 1800 MHz

SAM Phantom; Flat Section

Probe: ET3DV6 - SN1590; ConvF(5.78,5.78,5.78); Crest factor: 1.0; 1800 MHz Brain: σ = 1.40 mho/m ε_r = 39.4 ρ = 1.00 g/cm^3

Cube 5x5x7: Peak: 18.5 mW/g, SAR (1g): 9.58 mW/g, SAR (10g): 4.85 mW/g, (Worst-case extrapolation)

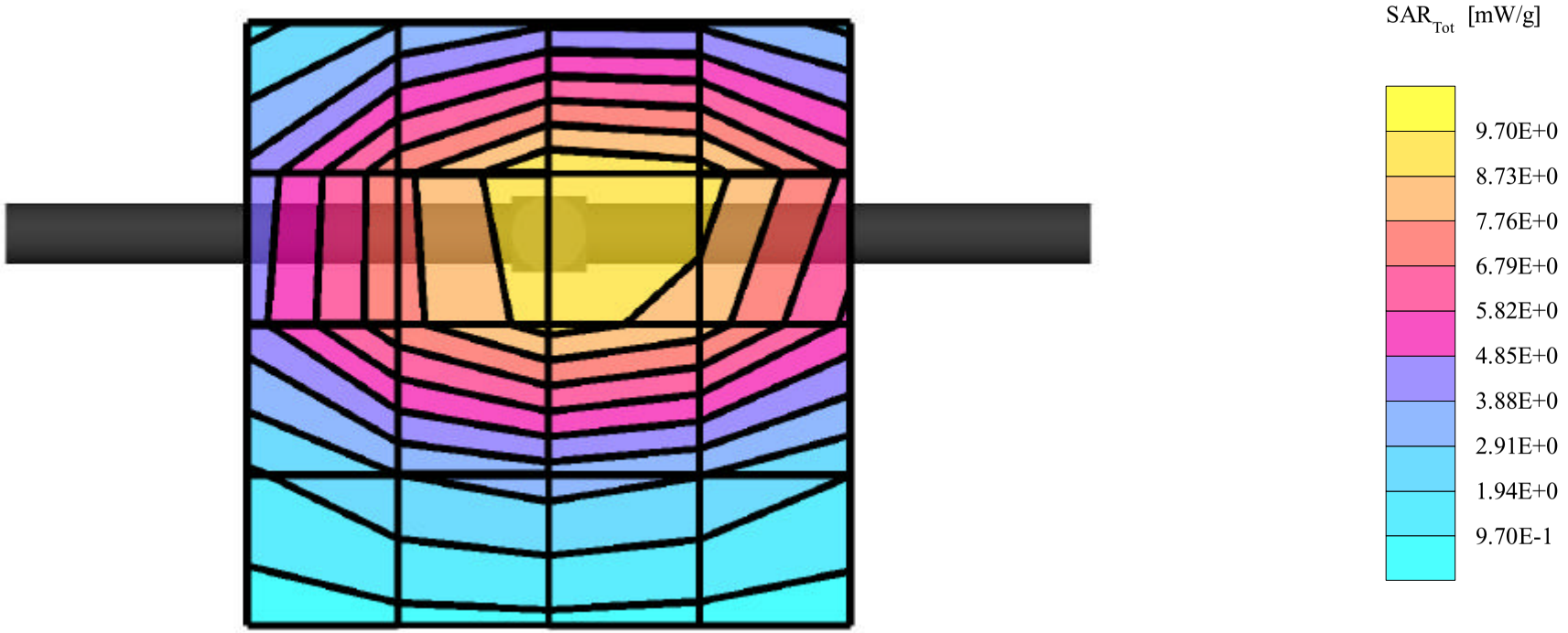
Penetration depth: 7.7 (7.3, 8.6) [mm]

Powerdrift: 0.02 dB

1800MHz Dipole Validation

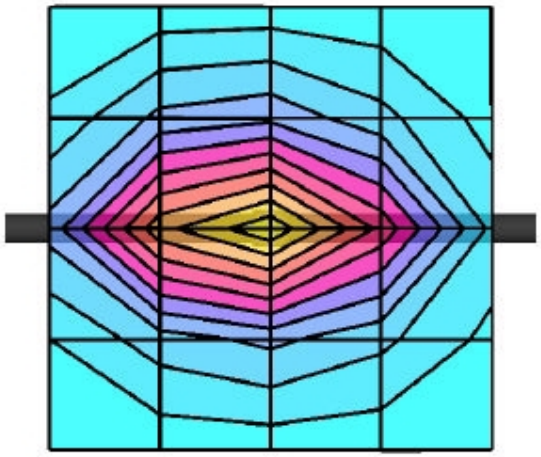
Conducted Power: 250 mW

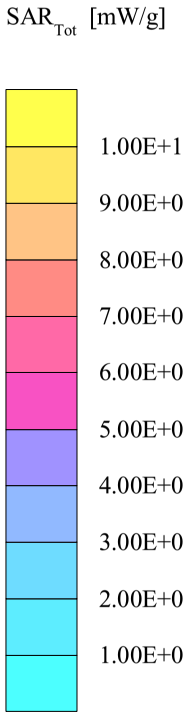
Date: February 01, 2002



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





Dipole 900 MHz

SAM Phantom; Flat Section

Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0; 900 MHz Brain: $\sigma = 0.97$ mho/m $\varepsilon_r = 40.4$ $\rho = 1.00$ g/cm^3

Cube 5x5x7: Peak: 4.47 mW/g, SAR (1g): 2.77 mW/g, SAR (10g): 1.74 mW/g, (Worst-case extrapolation)

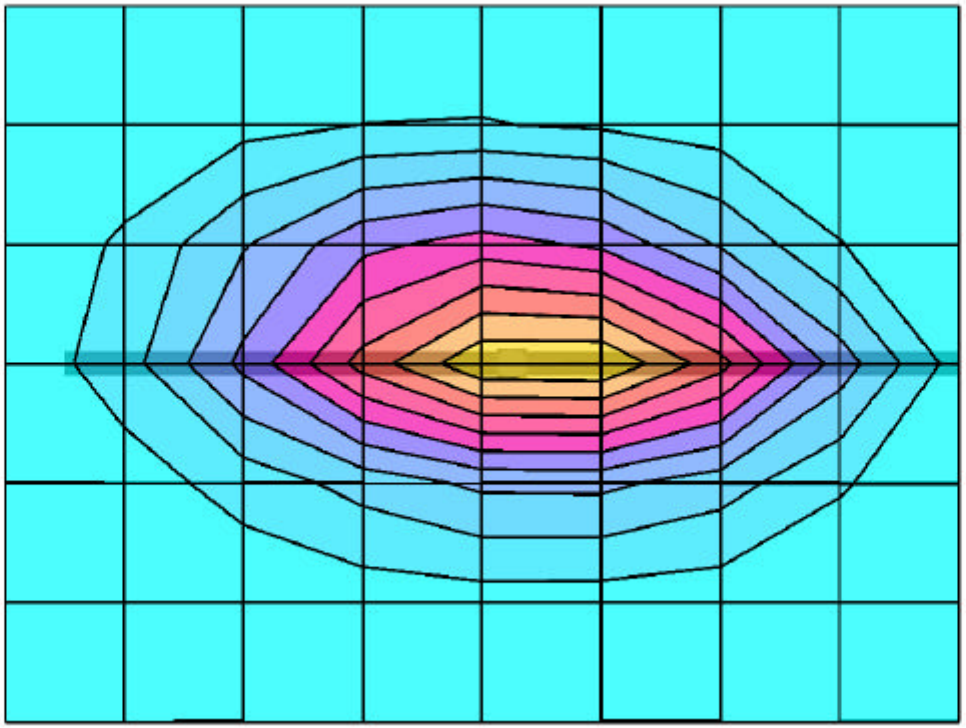
Penetration depth: 11.3 (10.2, 12.7) [mm]

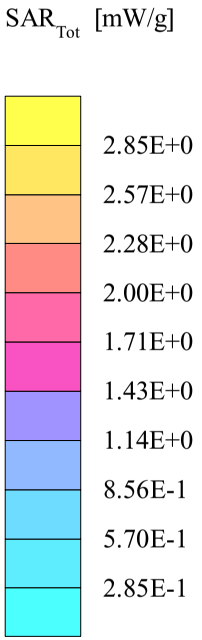
Powerdrift: 0.03 dB

900MHz Dipole Validation

Conducted Power: 250.0 mW

Date: January 31, 2002





Dipole 900 MHz

SAM Phantom; Flat Section

Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0; 900 MHz Brain: $\sigma = 0.96$ mho/m $\varepsilon_r = 40.6$ $\rho = 1.00$ g/cm^3

Cube 5x5x7: Peak: 4.38 mW/g, SAR (1g): 2.71 mW/g, SAR (10g): 1.70 mW/g, (Worst-case extrapolation)

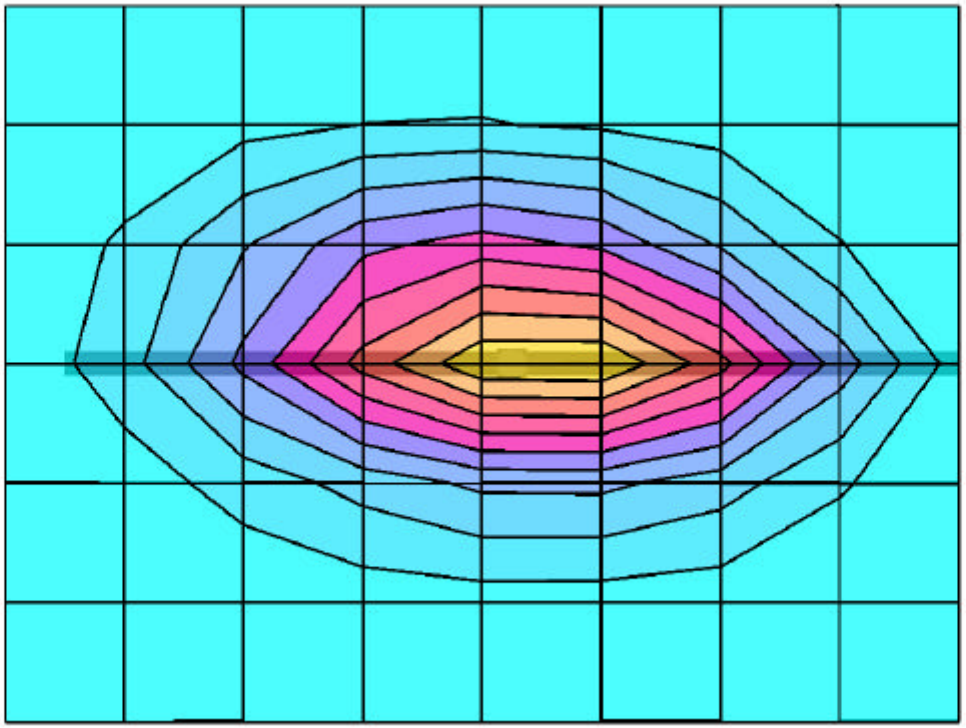
Penetration depth: 11.3 (10.2, 12.7) [mm]

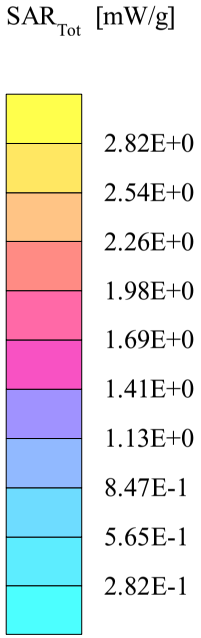
Powerdrift: 0.03 dB

900MHz Dipole Validation

Conducted Power: 250.0 mW

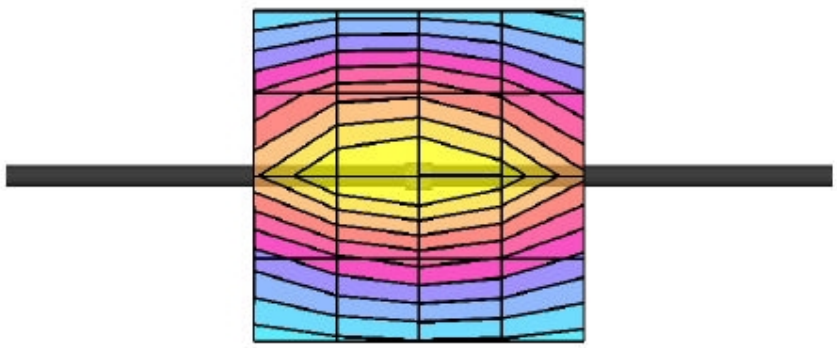
Date: February 01, 2002

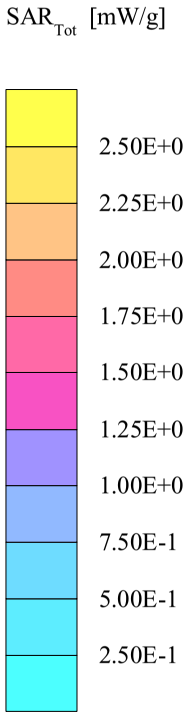




Validation Dipole D900V2 SN:054, d = 15 mm

Frequency: 900 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(6.27,6.27,6.27); Crest factor: 1.0; IEEE1528 900 MHz: σ = 0.97 mho/m ε_r = 42.4 ρ = 1.00 g/cm^3
Cubes (2): Peak: 4.47 mW/g ± 0.05 dB, SAR (1g): 2.78 mW/g ± 0.04 dB, SAR (10g): 1.76 mW/g ± 0.02 dB, (Worst-case extrapolation)
Penetration depth: 11.5 (10.3, 13.2) [mm]
Powerdrift: -0.00 dB





APPENDIX C - PROBE CALIBRATION

Probe ET3DV6

SN:1590

Manufactured: March 19, 2001
Calibrated: March 26, 2001

Calibrated for System DASY3

DASY3 - Parameters of Probe: ET3DV6 SN:1590

Sensitivity in Free Space

NormX	**1.77**	$\mu V/(V/m)^2$
NormY	**1.91**	$\mu V/(V/m)^2$
NormZ	**1.67**	$\mu V/(V/m)^2$

Diode Compression

DCP X	**100**	mV
DCP Y	**100**	mV
DCP Z	**100**	mV

Sensitivity in Tissue Simulating Liquid

Head **450 MHz** ε_r **= 43.5 ± 5%** σ **= 0.87 ± 10% mho/m**

ConvF X	**7.36**	extrapolated	Boundary effect:	
ConvF Y	**7.36**	extrapolated	Alpha	**0.29**
ConvF Z	**7.36**	extrapolated	Depth	**2.72**

Head **900 MHz** ε_r **= 42 ± 5%** σ **= 0.97 ± 10% mho/m**

ConvF X	**6.83**	± 7% (k=2)	Boundary effect:	
ConvF Y	**6.83**	± 7% (k=2)	Alpha	**0.37**
ConvF Z	**6.83**	± 7% (k=2)	Depth	**2.48**

Head **1500 MHz** ε_r **= 40.4 ± 5%** σ **= 1.23 ± 10% mho/m**

ConvF X	**6.13**	interpolated	Boundary effect:	
ConvF Y	**6.13**	interpolated	Alpha	**0.47**
ConvF Z	**6.13**	interpolated	Depth	**2.17**

Head **1800 MHz** ε_r **= 40 ± 5%** σ **= 1.40 ± 10% mho/m**

ConvF X	**5.78**	± 7% (k=2)	Boundary effect:	
ConvF Y	**5.78**	± 7% (k=2)	Alpha	**0.53**
ConvF Z	**5.78**	± 7% (k=2)	Depth	**2.01**

Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.2 ± 0.2**	mm

DASY3 - Parameters of Probe: ET3DV6 SN: 1590

Body **450 MHz** **ε_r = 56.7 ± 5%** **σ = 0.94 ± 10% mho/m**

ConvF X	**7.23**	extrapolated
ConvF Y	**7.23**	extrapolated
ConvF Z	**7.23**	extrapolated

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

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

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

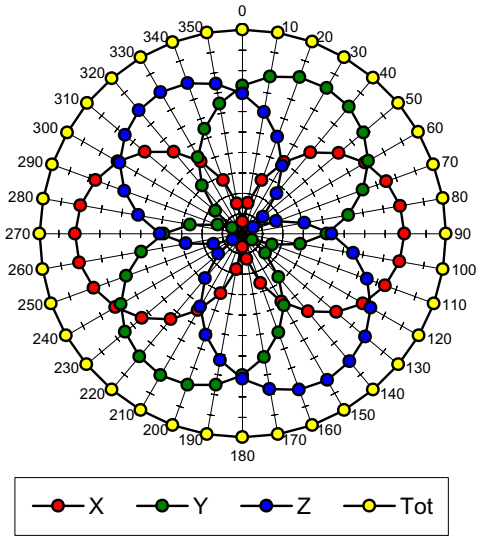
ConvF X	**5.78**	interpolated
ConvF Y	**5.78**	interpolated
ConvF Z	**5.78**	interpolated

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

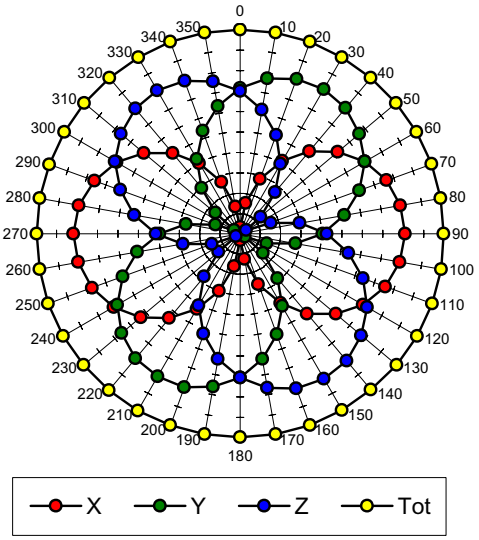
ConvF X	**5.36**	± 7% (k=2)
ConvF Y	**5.36**	± 7% (k=2)
ConvF Z	**5.36**	± 7% (k=2)

Receiving Pattern (ϕ , θ = 0°

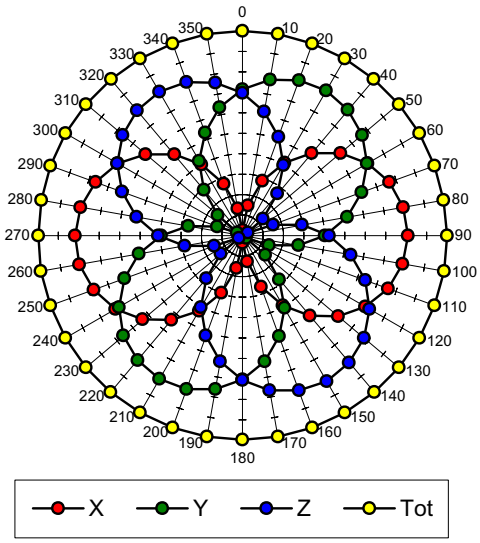
f = 30 MHz, TEM cell ifi110



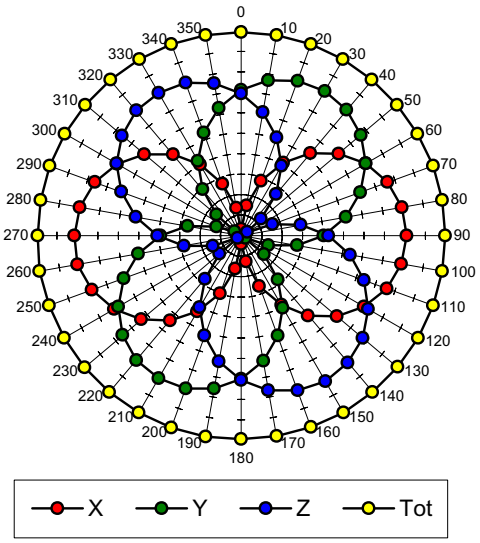
f = 100 MHz, TEM cell ifi110

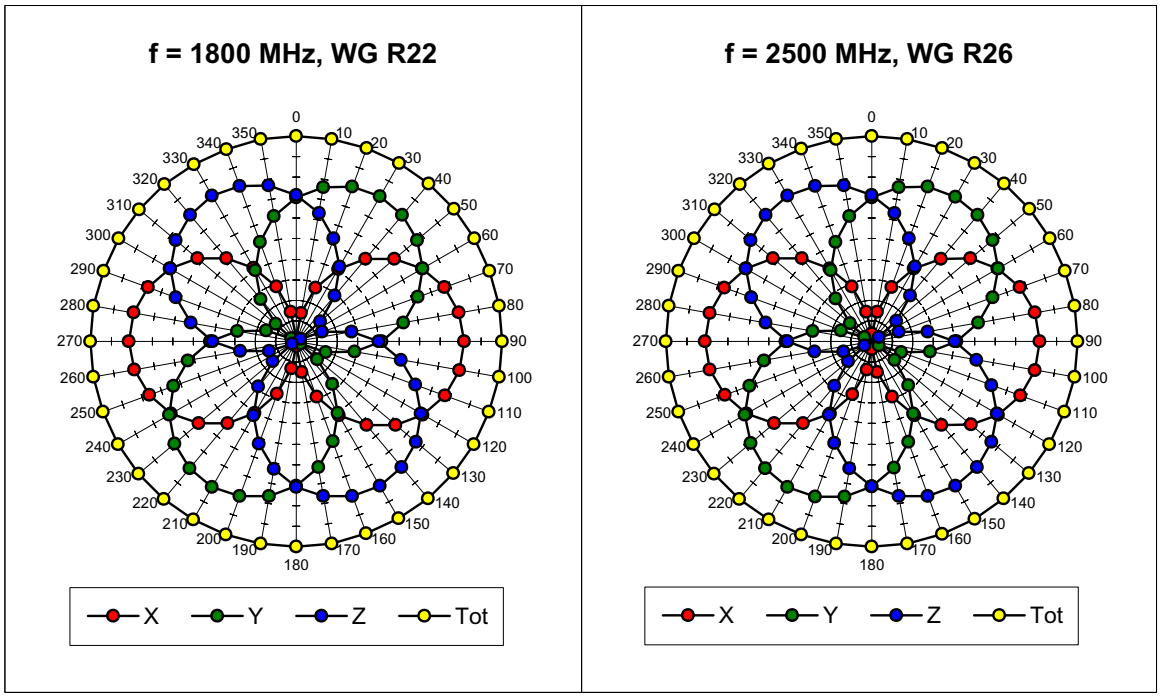


f = 300 MHz, TEM cell ifi110

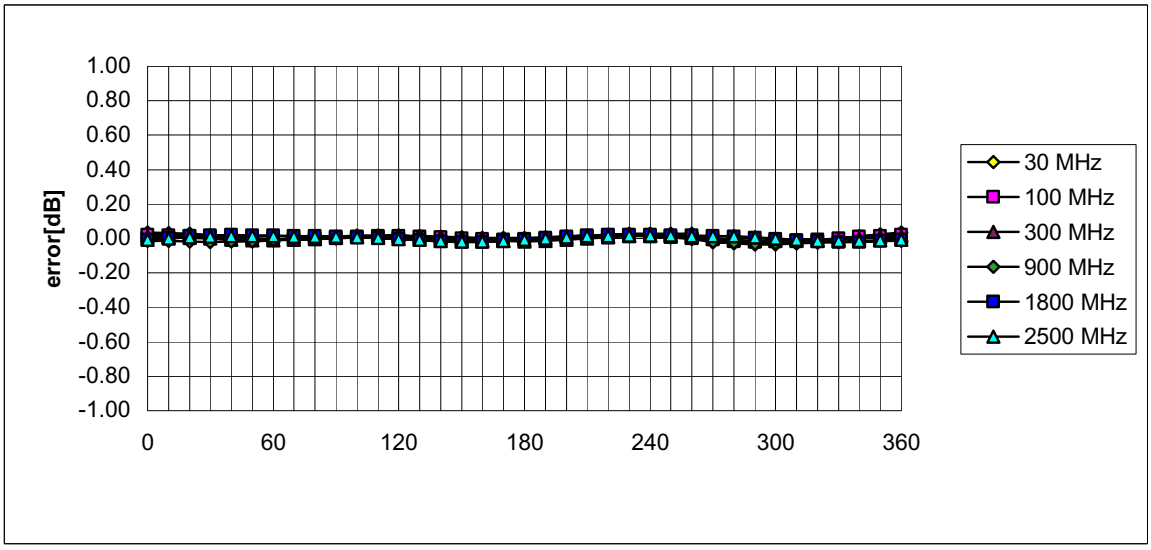


f = 900 MHz, TEM cell ifi110



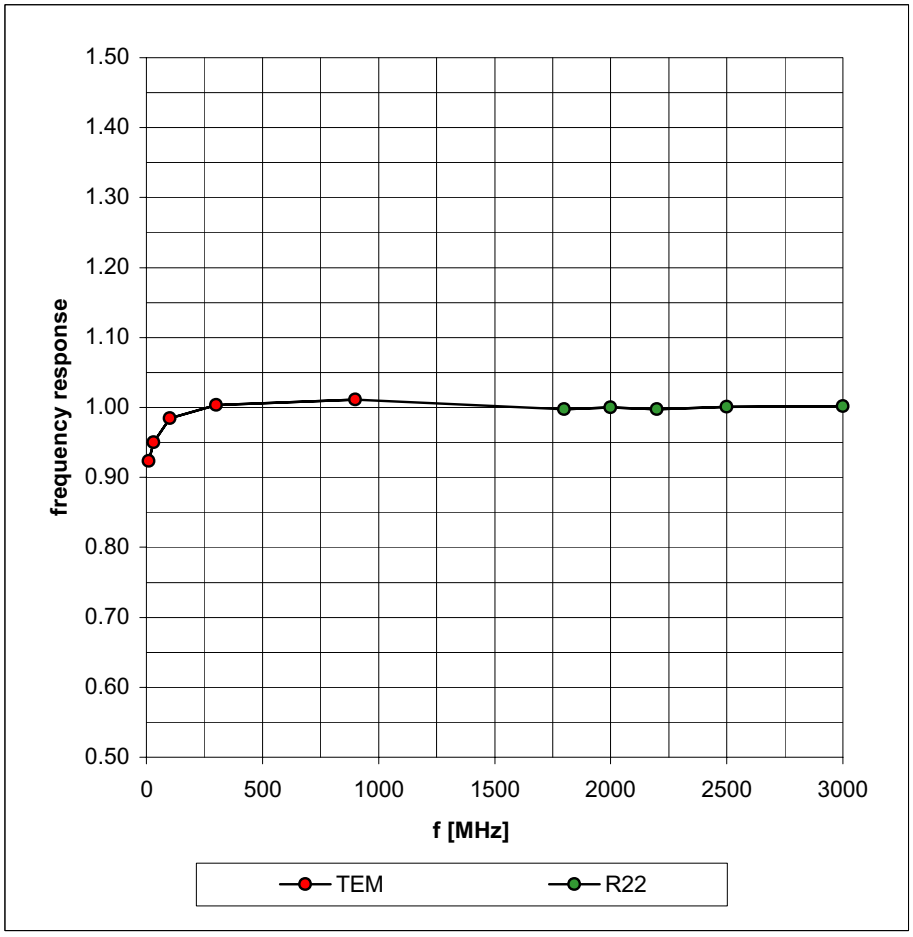


Isotropy Error (ϕ), θ = 0°



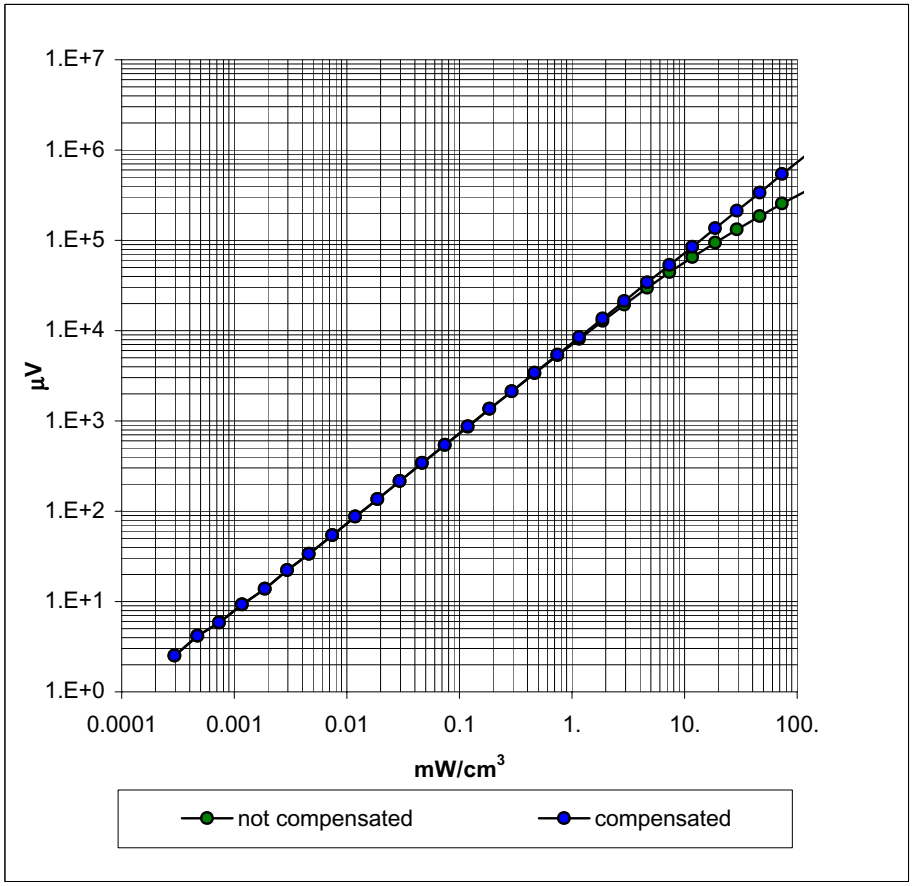
Frequency Response of E-Field

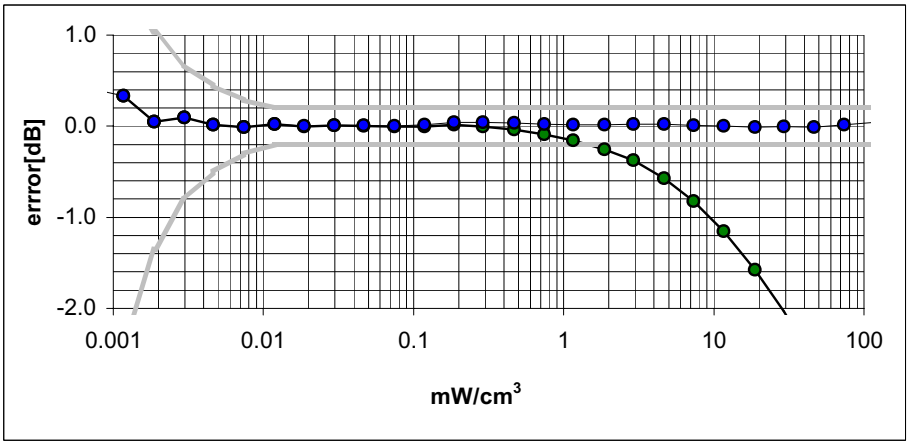
(TEM-Cell:ifi110, Waveguide R22)



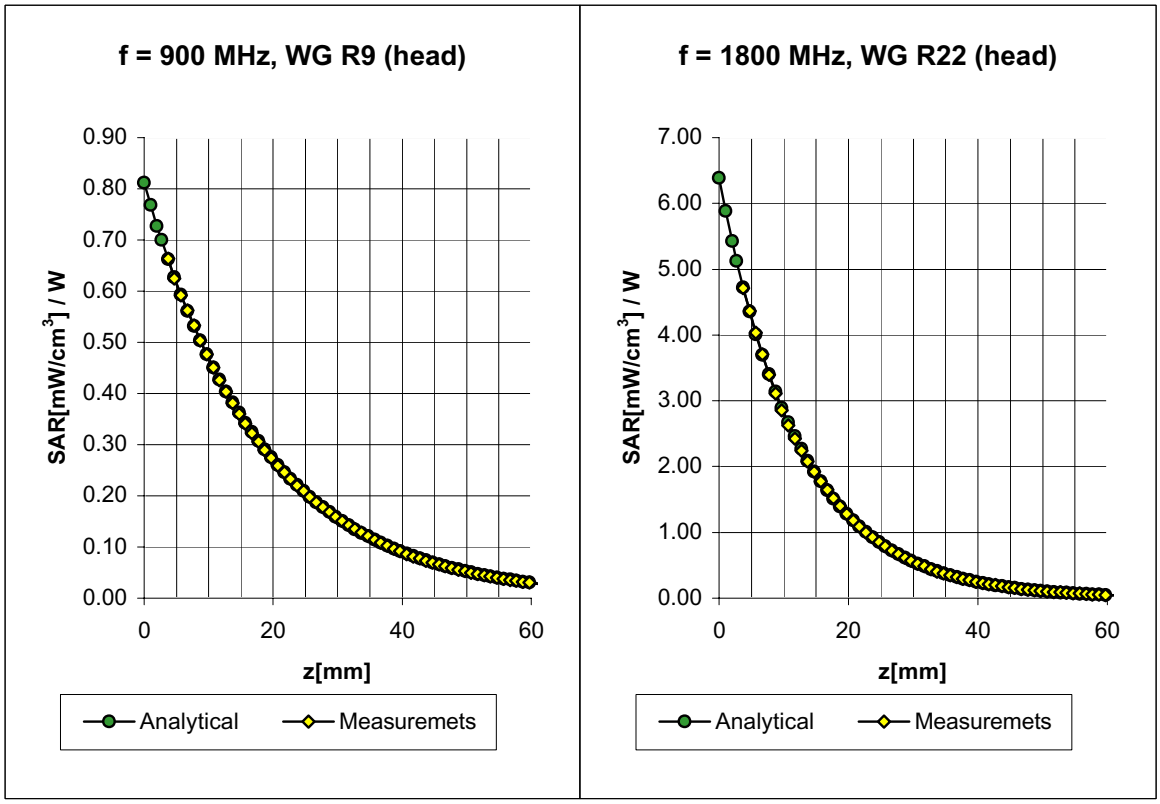
Dynamic Range f(SAR_{brain})

(TEM-Cell:ifi110)





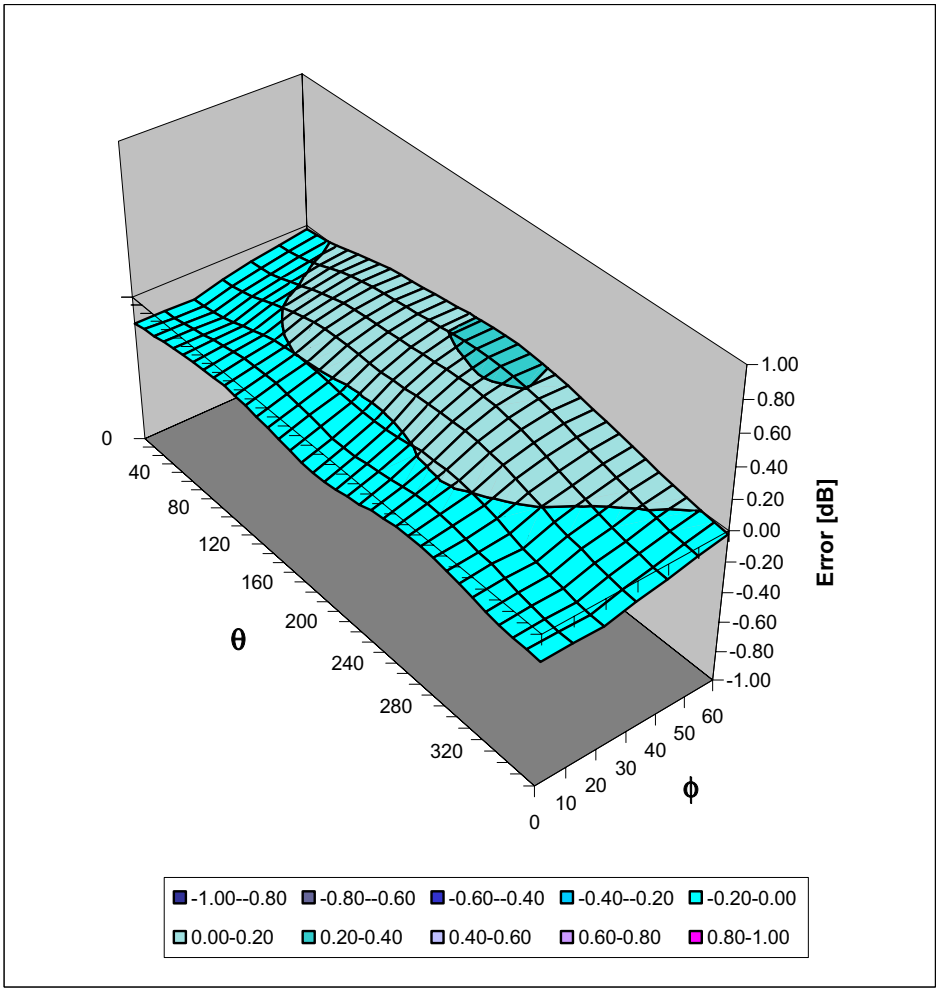
Conversion Factor Assessment



ET3DV6 SN:1590

Deviation from Isotropy in HSL

Error (θϕ), f = 900 MHz



APPENDIX D - MEASURED LIQUID DIELECTRIC PARAMETERS

1800MHz System Validation & EUT Evaluation

Measured Liquid Dielectric Parameters (Head)

January 30, 2002

Frequency	e'	e"
1.750000000 GHz	39.6566	13.9084
1.755000000 GHz	39.6373	13.9238
1.760000000 GHz	39.6155	13.9344
1.765000000 GHz	39.5931	13.9485
1.770000000 GHz	39.5788	13.9394
1.775000000 GHz	39.5646	13.9457
1.780000000 GHz	39.5429	13.9595
1.785000000 GHz	39.5219	13.9636
1.790000000 GHz	39.5229	13.9732
1.795000000 GHz	39.4861	13.9808
1.800000000 GHz	39.4667	13.9810
1.805000000 GHz	39.4597	13.9862
1.810000000 GHz	39.4268	13.9885
1.815000000 GHz	39.4171	13.9984
1.820000000 GHz	39.3884	14.0167
1.825000000 GHz	39.3533	14.0388
1.830000000 GHz	39.3464	14.0470
1.835000000 GHz	39.3319	14.0719
1.840000000 GHz	39.3369	14.0787
1.845000000 GHz	39.3131	14.0972
1.850000000 GHz	39.2928	14.1014
1.855000000 GHz	39.2720	14.1090
1.860000000 GHz	39.2501	14.1144
1.865000000 GHz	39.2402	14.1243
1.870000000 GHz	39.2111	14.1462
1.875000000 GHz	39.1941	14.1486
1.880000000 GHz	39.1752	14.1762
1.885000000 GHz	39.1463	14.1921
1.890000000 GHz	39.1219	14.2052
1.895000000 GHz	39.1097	14.2227
1.900000000 GHz	39.0799	14.2452
1.905000000 GHz	39.0550	14.2558
1.910000000 GHz	39.0450	14.2660
1.915000000 GHz	39.0224	14.2842
1.920000000 GHz	38.9996	14.2966

1800MHz System Validation

Measured Liquid Dielectric Parameters (Head)

February 01, 2002

Frequency	e'	e"
1.750000000 GHz	39.5957	13.9314
1.755000000 GHz	39.5812	13.9442
1.760000000 GHz	39.5523	13.9529
1.765000000 GHz	39.5336	13.9680
1.770000000 GHz	39.5121	13.9725
1.775000000 GHz	39.4995	13.9656
1.780000000 GHz	39.4780	13.9794
1.785000000 GHz	39.4549	13.9850
1.790000000 GHz	39.4379	13.9900
1.795000000 GHz	39.4130	13.9967
1.800000000 GHz	39.3974	14.0133
1.805000000 GHz	39.3735	14.0103
1.810000000 GHz	39.3534	14.0235
1.815000000 GHz	39.3344	14.0329
1.820000000 GHz	39.3219	14.0476
1.825000000 GHz	39.2891	14.0533
1.830000000 GHz	39.2718	14.0740
1.835000000 GHz	39.2751	14.0881
1.840000000 GHz	39.2590	14.0899
1.845000000 GHz	39.2451	14.1145
1.850000000 GHz	39.2157	14.1184
1.855000000 GHz	39.2008	14.1256
1.860000000 GHz	39.1808	14.1389
1.865000000 GHz	39.1649	14.1436
1.870000000 GHz	39.1346	14.1634
1.875000000 GHz	39.1166	14.1785
1.880000000 GHz	39.0995	14.1992
1.885000000 GHz	39.0713	14.2208
1.890000000 GHz	39.0562	14.2341
1.895000000 GHz	39.0406	14.2509
1.900000000 GHz	39.0190	14.2624
1.905000000 GHz	39.0020	14.2712
1.910000000 GHz	38.9691	14.2780
1.915000000 GHz	38.9424	14.2989
1.920000000 GHz	38.9213	14.3044

1800MHz EUT Evaluation

Measured Liquid Dielectric Parameters (Body)

February 01, 2002

Frequency	e'	e"
1.700000000 GHz	55.1068	15.1095
1.705000000 GHz	55.1076	15.1234
1.710000000 GHz	55.0786	15.1509
1.715000000 GHz	55.0624	15.1792
1.720000000 GHz	55.0205	15.1989
1.725000000 GHz	54.9978	15.2137
1.730000000 GHz	54.9622	15.2170
1.735000000 GHz	54.9026	15.1918
1.740000000 GHz	54.9126	15.2207
1.745000000 GHz	54.8973	15.2108
1.750000000 GHz	54.8942	15.2056
1.755000000 GHz	54.8875	15.1959
1.760000000 GHz	54.8843	15.1984
1.765000000 GHz	54.8901	15.2194
1.770000000 GHz	54.8780	15.2107
1.775000000 GHz	54.8898	15.2114
1.780000000 GHz	54.8817	15.2105
1.785000000 GHz	54.8748	15.2276
1.790000000 GHz	54.8799	15.2490
1.795000000 GHz	54.8759	15.2597
1.800000000 GHz	54.8589	15.2933
1.805000000 GHz	54.8482	15.3289
1.810000000 GHz	54.8586	15.3494
1.815000000 GHz	54.8371	15.3758
1.820000000 GHz	54.8282	15.3947
1.825000000 GHz	54.8109	15.4328
1.830000000 GHz	54.8025	15.4551
1.835000000 GHz	54.8100	15.4857
1.840000000 GHz	54.7951	15.4914
1.845000000 GHz	54.7922	15.5013
1.850000000 GHz	54.8108	15.5216
1.855000000 GHz	54.8103	15.5330
1.860000000 GHz	54.8017	15.5596
1.865000000 GHz	54.7797	15.5873
1.870000000 GHz	54.7655	15.6229

900MHz System Validation & 835MHz EUT Evaluation

Measured Liquid Dielectric Parameters (Head)

January 31, 2002

Frequency	e'	e"
800.000000 MHz	41.6114	19.6929
805.000000 MHz	41.5679	19.6855
810.000000 MHz	41.5024	19.6735
815.000000 MHz	41.4303	19.6527
820.000000 MHz	41.3841	19.6253
825.000000 MHz	41.2817	19.6031
830.000000 MHz	41.2260	19.6109
835.000000 MHz	41.1604	19.5794
840.000000 MHz	41.0915	19.5703
845.000000 MHz	41.0322	19.5171
850.000000 MHz	40.9749	19.5055
855.000000 MHz	40.9063	19.4870
860.000000 MHz	40.8414	19.4781
865.000000 MHz	40.7681	19.4719
870.000000 MHz	40.7120	19.4509
875.000000 MHz	40.6648	19.4581
880.000000 MHz	40.6130	19.4465
885.000000 MHz	40.5490	19.4588
890.000000 MHz	40.4990	19.4470
895.000000 MHz	40.4758	19.3879
900.000000 MHz	40.4246	19.3673
905.000000 MHz	40.3619	19.3552
910.000000 MHz	40.3046	19.3419
915.000000 MHz	40.2567	19.3407
920.000000 MHz	40.1908	19.3255
925.000000 MHz	40.1285	19.3193
930.000000 MHz	40.0618	19.2954
935.000000 MHz	39.9695	19.2796
940.000000 MHz	39.9187	19.2709
945.000000 MHz	39.8653	19.2822
950.000000 MHz	39.7908	19.2526
955.000000 MHz	39.7112	19.2344
960.000000 MHz	39.6697	19.2145
965.000000 MHz	39.5945	19.2052
970.000000 MHz	39.5374	19.1906

900MHz System Validation

Measured Liquid Dielectric Parameters (Head)

February 01, 2002

Frequency	e'	e"
800.000000 MHz	41.8327	19.5026
805.000000 MHz	41.7878	19.4960
810.000000 MHz	41.6981	19.4801
815.000000 MHz	41.6519	19.4420
820.000000 MHz	41.6102	19.4565
825.000000 MHz	41.5298	19.4233
830.000000 MHz	41.4674	19.3750
835.000000 MHz	41.3932	19.3570
840.000000 MHz	41.3380	19.3655
845.000000 MHz	41.2439	19.3432
850.000000 MHz	41.2115	19.3145
855.000000 MHz	41.1265	19.2804
860.000000 MHz	41.0793	19.2669
865.000000 MHz	41.0073	19.2710
870.000000 MHz	40.9430	19.2628
875.000000 MHz	40.8945	19.2706
880.000000 MHz	40.8441	19.2690
885.000000 MHz	40.7761	19.2726
890.000000 MHz	40.7394	19.2772
895.000000 MHz	40.6949	19.1847
900.000000 MHz	40.6418	19.1797
905.000000 MHz	40.5856	19.1612
910.000000 MHz	40.5276	19.1336
915.000000 MHz	40.4833	19.1170
920.000000 MHz	40.4072	19.1054
925.000000 MHz	40.3845	19.1070
930.000000 MHz	40.3137	19.0750
935.000000 MHz	40.2316	19.0662
940.000000 MHz	40.1820	19.0668
945.000000 MHz	40.1166	19.0440
950.000000 MHz	40.0694	19.0159
955.000000 MHz	40.0109	19.0105
960.000000 MHz	39.9337	18.9877
965.000000 MHz	39.8766	18.9965
970.000000 MHz	39.8546	18.9805

835MHz EUT Evaluation

Measured Liquid Dielectric Parameters (Body)

February 01, 2002

Frequency	e'	e"
800.000000 MHz	53.8113	22.1624
805.000000 MHz	53.7596	22.1288
810.000000 MHz	53.7024	22.1087
815.000000 MHz	53.6609	21.8665
820.000000 MHz	53.6302	21.6209
825.000000 MHz	53.5648	21.5158
830.000000 MHz	53.5291	21.4670
835.000000 MHz	53.4349	21.0561
840.000000 MHz	53.4153	20.8971
845.000000 MHz	53.3776	20.9103
850.000000 MHz	53.3196	20.8657
855.000000 MHz	53.2888	20.8332
860.000000 MHz	53.2338	20.8206
865.000000 MHz	53.1869	20.8267
870.000000 MHz	53.1398	20.8009
875.000000 MHz	53.1112	20.8215
880.000000 MHz	53.0544	20.8209
885.000000 MHz	52.9952	20.8107
890.000000 MHz	52.9518	20.7843
895.000000 MHz	52.9289	20.7136
900.000000 MHz	52.8996	20.6928
905.000000 MHz	52.8288	20.6830
910.000000 MHz	52.7707	20.6635
915.000000 MHz	52.7207	20.6616
920.000000 MHz	52.6769	20.6472
925.000000 MHz	52.6394	20.6203
930.000000 MHz	52.5762	20.6039
935.000000 MHz	52.5263	20.5925
940.000000 MHz	52.5138	20.5967
945.000000 MHz	52.4412	20.5747
950.000000 MHz	52.3939	20.5629
955.000000 MHz	52.3198	20.5322
960.000000 MHz	52.2871	20.5150
965.000000 MHz	52.2296	20.5081
970.000000 MHz	52.1857	20.4959

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

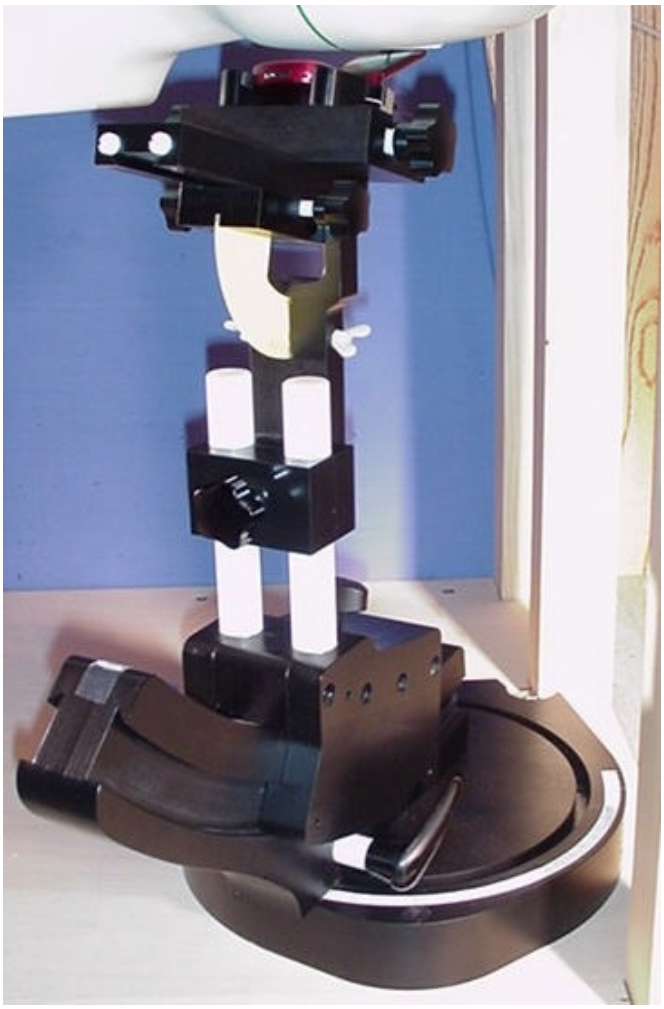
APPENDIX F - SAR TEST SETUP PHOTOGRAPHS

SAR TEST SETUP PHOTOGRAPHS

Left Head Section – Cheek/Touch Position

SAR TEST SETUP PHOTOGRAPHS

Left Head Section – Ear/Tilt Position



SAR TEST SETUP PHOTOGRAPHS

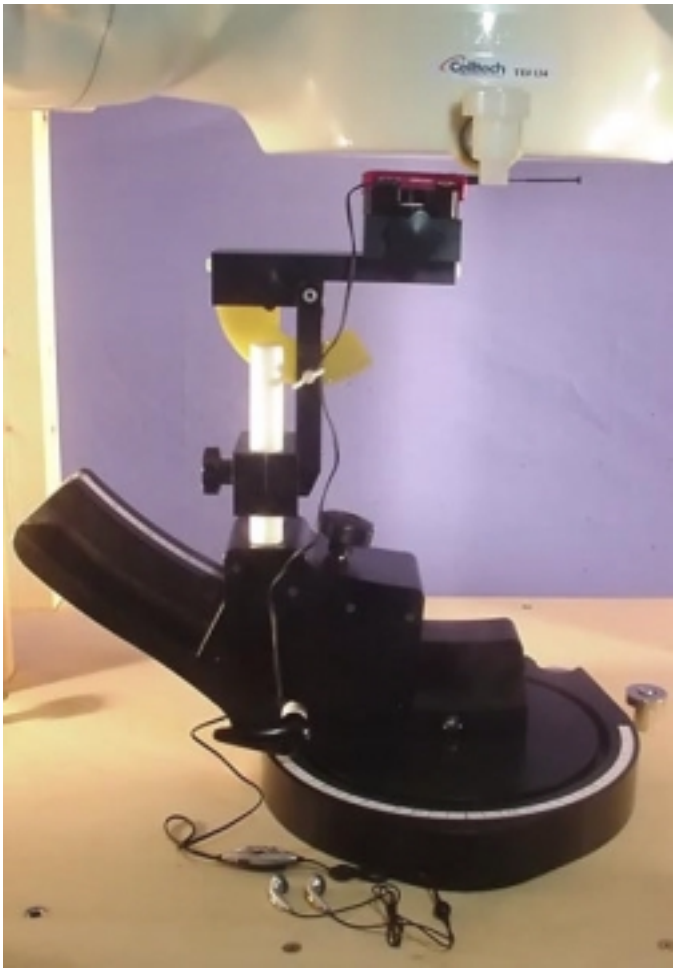
Right Head Section – Cheek/Touch Position

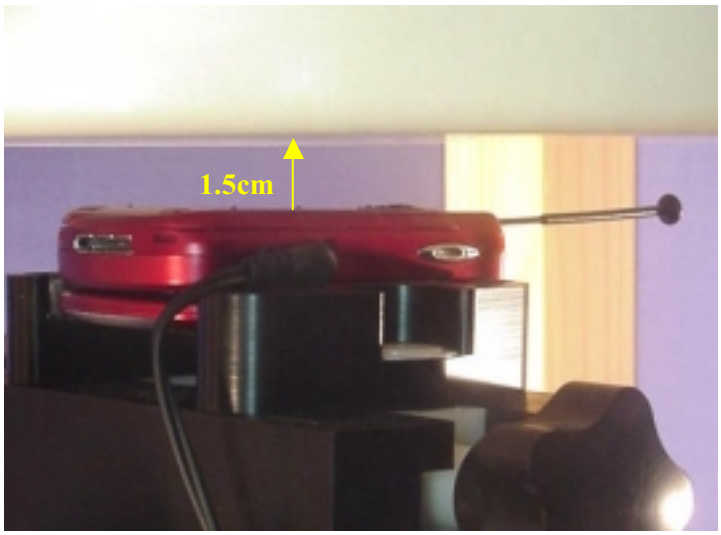
SAR TEST SETUP PHOTOGRAPHS

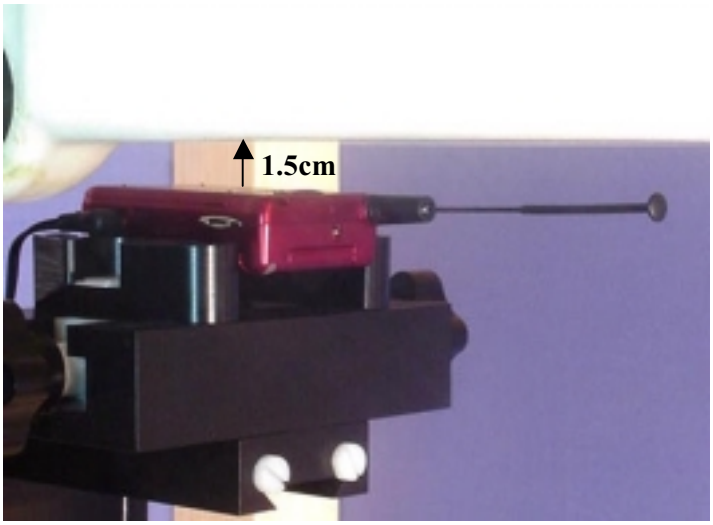
Right Head Section – Ear/Tilt Position

SAR TEST SETUP PHOTOGRAPHS

Planar Section - Body-Worn Configuration
1.5 cm Separation Distance - with Standard Battery







SAR TEST SETUP PHOTOGRAPHS

Planar Section – Body-Worn Configuration

1.5 cm Separation Distance - with Extended Battery