

RF EXPOSURE EVALUATION

SPECIFIC ABSORPTION RATE

SAR TEST REPORT

FOR

PLANTRONICS INC.

WIRELESS HEADSET SYSTEM (UPCS)

MODEL(S)		DESCRIPTION
CS70	Headset	Voice Tube
CS70N	Headset	Noise Canceling

FCC ID: AL8CS7YYYY

Test Report Serial Number

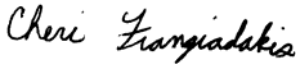

122205AL8-T710-S15T

Test Report Issue Number

S710-011006-R1

Test Lab

**Celltech Compliance Testing & Engineering Lab
 (Celltech Labs Inc.)
 1955 Moss Court
 Kelowna, BC
 Canada
 V1Y 9L3**

<p>Test Report Prepared By:  <hr/> Cheri Frangiadakis Test Report Writer Celltech Labs Inc.</p>	<p>Test Report Approved By:  <hr/> Jonathan Hughes General Manager Celltech Labs Inc.</p>
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------



Test Report Serial No.:	122205AL8-T710-S15T	Report Issue Date:	January 10, 2006
Date(s) of Evaluation:	January 03, 2006	Report Issue No.:	S710-011006-R1
Description of Test(s):	RF Exposure SAR	FCC 47 CFR §2.1093	IC RSS-102 Issue 2



DECLARATION OF COMPLIANCE SAR RF EXPOSURE EVALUATION

<p><u>Test Lab</u></p> <p>CELLTECH LABS INC. Testing and Engineering Services 1955 Moss Court Kelowna, B.C. Canada V1Y 9L3 Phone: 250-448-7047 Fax: 250-448-7046 e-mail: info@celltechlabs.com web site: www.celltechlabs.com</p>	<p><u>Applicant Information</u></p> <p>PLANTRONICS INC. 345 Encinal Street Santa Cruz, CA 95060 United States</p>
<p>FCC ID: AL8CS7YYYY Model(s): CS70 (Voice Tube) CS70N (Noise Canceling)</p>	
<p>Rule Part(s): FCC 47 CFR §2.1093; IC RSS-102 Issue 2 Test Procedure(s): FCC OET Bulletin 65, Supplement C (01-01) IEEE 1525-2003 Device Classification: Part 15 Unlicensed PCS portable Tx held to ear (PUE) Device Description: Wireless Office Headset System (UPCS) Mode of Operation: TDMA (Time Division Multiple Access)</p>	
<p>Tx Frequency Range(s): 1921.536 - 1928.448 MHz RF Output Power Tested: 6.44 dBm (4.41 mW) Peak Conducted (CS70) 6.44 dBm (4.41 mW) Peak Conducted (CS70N) Max. Duty Cycle Tested: 8.3% Source-Based Time-Averaged (Crest Factor: 1:12.05) Antenna Type(s) Tested: Internal Battery Type(s) Tested: Lithium-ion Polymer 3.7 V</p>	
<p>Max. SAR Level(s) Evaluated: Head: 0.005 W/kg (Peak SAR measured from Area Scan)</p>	

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.

This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Labs Inc. The results and statements contained in this report pertain only to the device(s) evaluated.

<p>Tested By:</p>  <p>Sean Johnston Compliance Technologist Celltech Labs Inc.</p>	<p>Reviewed By:</p>  <p>Spencer Watson Senior Compliance Technologist Celltech Labs Inc.</p>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------



Applicant: Plantronics Inc.	FCC ID: AL8CS7YYYY	Freq.: 1921.536 - 1928.448 MHz	
Model(s): CS70, CS70N	DUT Type: Wireless Office Headset System (UPCS Headset)		
2006 Celltech Labs Inc.	This document is not to be reproduced in whole or in part without the prior written permission of Celltech Labs Inc.		Page 2 of 41

TABLE OF CONTENTS

1.0 INTRODUCTION	4
2.0 DESCRIPTION OF DEVICE UNDER TEST (DUT)	4
3.0 SAR MEASUREMENT SYSTEM	5
4.0 MEASUREMENT SUMMARY	6
5.0 DETAILS OF SAR EVALUATION	7
6.0 EVALUATION PROCEDURES	8
7.0 SYSTEM PERFORMANCE CHECK	10
8.0 SIMULATED EQUIVALENT TISSUES	11
9.0 SAR SAFETY LIMITS	11
10.0 ROBOT SYSTEM SPECIFICATIONS	12
11.0 PROBE SPECIFICATION (ET3DV6)	13
12.0 SAM PHANTOM V4.0C	13
13.0 DEVICE HOLDER	13
14.0 TEST EQUIPMENT LIST	14
15.0 MEASUREMENT UNCERTAINTIES	15
16.0 REFERENCES	17
APPENDIX A - SAR MEASUREMENT DATA	18
APPENDIX B - SYSTEM PERFORMANCE CHECK DATA	24
APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS	27
APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS	29
APPENDIX E - SYSTEM VALIDATION	39
APPENDIX F - PROBE CALIBRATION	40
APPENDIX G - SAM PHANTOM CERTIFICATE OF CONFORMITY	41



Test Report Serial No.:	122205AL8-T710-S15T	Report Issue Date:	January 10, 2006
Date(s) of Evaluation:	January 03, 2006	Report Issue No.:	S710-011006-R1
Description of Test(s):	RF Exposure SAR	FCC 47 CFR §2.1093	IC RSS-102 Issue 2

1.0 INTRODUCTION

This measurement report demonstrates compliance of the PLANTRONICS Model(s): CS70 (Voice Tube), CS70N (Noise Canceling) Wireless Office Headset System (UPCS) FCC ID: AL8CS7YYYY 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)

FCC Rule Part(s)	47 CFR §2.1093		
IC Rule Part(s)	Health Canada Safety Code 6		
FCC Device Classification	Part 15 Unlicensed PCS portable Tx held to ear (PUE)	15(D)	
FCC RF Exposure Category	General Population / Uncontrolled Environment		
Test Procedure(s)	FCC OET Bulletin 65, Supplement C (01-01)		
	RSS-102 Issue 2		
	IEEE Standard 1528-2003		
Device Description	Wireless Office Headset System (UPCS)		
FCC ID	AL8CS7YYYY		
Model(s) Tested	CS70	Voice Tube Headset	
	CS70N	Noise Canceling Headset	
Test Device Serial No.(s)	Not available	Production Sample(s)	
Transmitter Frequency Range(s)	1921.536 - 1928.448 MHz	UPCS Band	
Mode(s) of Operation	TDMA	Time Division Multiple Access	
Maximum Duty Cycle Tested	8.3%	Source-Based Time-Averaged	Crest Factor: 1:12.05
Max. RF Output Power Tested	6.44 dBm	4.41 mW	Peak Conducted CS70 Headset
	6.44 dBm	4.41 mW	Peak Conducted CS70N Headset
Battery Type(s) Tested	Lithium-ion Polymer 3.7 V		
Antenna Type(s) Tested	Internal		

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



Test Report Serial No.:	122205AL8-T710-S15T	Report Issue Date:	January 10, 2006
Date(s) of Evaluation:	January 03, 2006	Report Issue No.:	S710-011006-R1
Description of Test(s):	RF Exposure SAR	FCC 47 CFR §2.1093	IC RSS-102 Issue 2

4.0 MEASUREMENT SUMMARY

HEAD SAR EVALUATION RESULTS										
Freq. (MHz)	Chan.	Test Mode	Antenna Position	Headset Model	Microphone Option	Phantom Section	Test Position	Cond. Power Before Test (dBm)	SAR Drift During Test (dB)	Peak SAR Measured from Area Scan (W/kg)
1924.992	3	TDMA	Internal	CS70	Voice Tube	Right Ear	Cheek/Touch	6.44	7.88	0.002
1924.992	3	TDMA	Internal	CS70N	Noise Canceling	Right Ear	Cheek/Touch	6.44	-1.53	0.004
1924.992	3	TDMA	Internal	CS70	Voice Tube	Left Ear	Cheek/Touch	6.44	5.39	0.002
1924.992	3	TDMA	Internal	CS70N	Noise Canceling	Left Ear	Cheek/Touch	6.44	0.467	0.005
ANSI / IEEE C95.1 1999 - SAFETY LIMIT				BRAIN: 1.6 W/kg (averaged over 1 gram)			Spatial Peak Uncontrolled Exposure / General Population			
Test Date(s)		January 03, 2006				Relative Humidity		30	%	
Measured Fluid Type		1920 MHz Brain				Atmospheric Pressure		101.8	kPa	
Dielectric Constant ϵ_r		IEEE Target		Measured	Deviation	Ambient Temperature		23.2	°C	
		40.0	± 5%	38.5	-3.8%	Fluid Temperature		23.5	°C	
Conductivity σ (mho/m)		IEEE Target		Measured	Deviation	Fluid Depth		≥ 15	cm	
		1.40	± 5%	1.39	-0.7%	ρ (Kg/m³)		1000		

Note(s):

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 1g averaged SAR was not measured because the peak SAR value from the area scan evaluations for each test configuration was less than 1% of the 1g average limit. The peak SAR values measured during the area scan evaluations for each test configuration are reported. The mathematical formula used to extrapolate the SAR value at the surface from the Zoom Scan SAR values measured at 5 mm steps leading away from the surface assumes a curving slope (i.e. the SAR values gradually decrease as the probe moves away from the surface). When the peak SAR of a device is so low that the RF noise level is competing with the level of the SAR, the Zoom Scan measurements leading away from the surface are no longer a curving slope and the extrapolation formula cannot accurately estimate the 1g average SAR. In this manner, we have reported the peak values from the Area Scan in place of the 1g averaged SAR values whenever the peak values are less than 1% of the average limit. This avoids gross uncertainties in the 1g average SAR calculation while maintaining a conservative estimation of the SAR level. It is the engineering judgment of Celltech Labs Inc. that no device operating in this frequency band could have a peak SAR value (measured on an Area Scan) less than 0.016 mW/g and simultaneously have a 1g average value greater than 1.6 mW/g (1g average limit).
3. The power drifts were measured by the DASY4 system for the duration of the SAR evaluations. The power drifts are reflective of the very low SAR levels relative to the noise floor.
4. 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]).
5. The DUT battery was fully charged prior to each SAR evaluation.
6. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluations. The temperatures reported were consistent for all measurement periods.
7. The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).
8. The SAR measurements were performed within 24 hours of the system performance check.

Applicant:	Plantronics Inc.	FCC ID:	AL8CS7YYYY	Freq.:	1921.536 - 1928.448 MHz	
Model(s):	CS70, CS70N	DUT Type:	Wireless Office Headset System (UPCS Headset)			
2006 Celltech Labs Inc.		This document is not to be reproduced in whole or in part without the prior written permission of Celltech Labs Inc.				Page 6 of 41

5.0 DETAILS OF SAR EVALUATION

The PLANTRONICS Model(s): CS70 (Voice Tube), CS70N (Noise Canceling) Wireless Office Headset System (UPCS) FCC ID: AL8CS7YYYY was compliant for localized Specific Absorption Rate (SAR) based on the test provisions and conditions described below. The detailed test setup photographs are shown in Appendix D.

Ear-held Configuration

- 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 is reported (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]).
 - a) The headset unit 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 headset unit 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 headset was gradually adjusted to each of the following test positions:
 - Cheek/Touch Position: the headset 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.

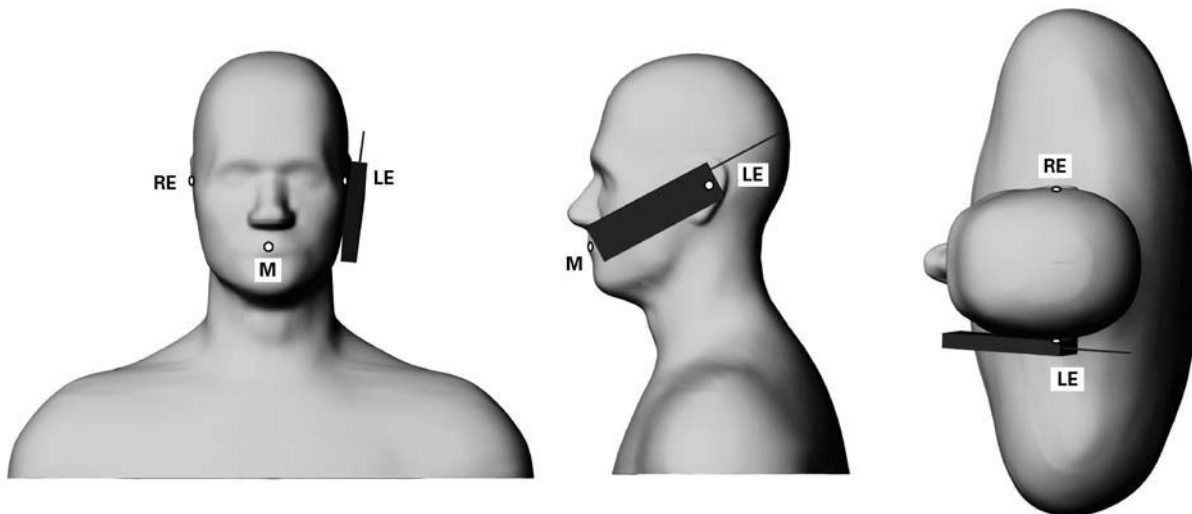


Figure 1. Position 1, “cheek” or “touch” position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for device positioning, are indicated (Shoulders are shown for illustration only).

DETAILS OF SAR EVALUATION (Cont.)

DUT Test Modes & Power Settings

- 2) The base unit was placed 1-meter away from the headset unit. After a 10 second period the link contact switch on the headset unit was depressed. The green LED on the top face of the base unit is illuminated and the base unit clicks as the relays close. The green LED on the headset unit then begins to flash to indicate the device is in test mode.
- 3) The 1g averaged SAR was not measured because the peak SAR value from the area scan evaluations for each test configuration was less than 1% of 1.6 mW/g (1g average limit). The peak SAR values measured during the area scan evaluations for each test configuration are reported (please refer to detailed explanation on page 6, note 2).
- 4) The DUT was tested at the maximum power setting in TDMA mode with a duty cycle of 8.3% (crest factor = 1:12.05).
- 5) The conducted power level(s) of the DUT were measured prior to the SAR evaluations by Plantronics using a Rohde & Schwarz CMD60 digital radiocommunication tester according to the measurement procedures described in FCC 47 CFR §2.1046.
- 6) The DUT was evaluated for SAR with a fully charged battery.
- 7) The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluations. The temperatures reported were consistent for all measurement periods.
- 8) The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).
- 9) 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 from 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.)

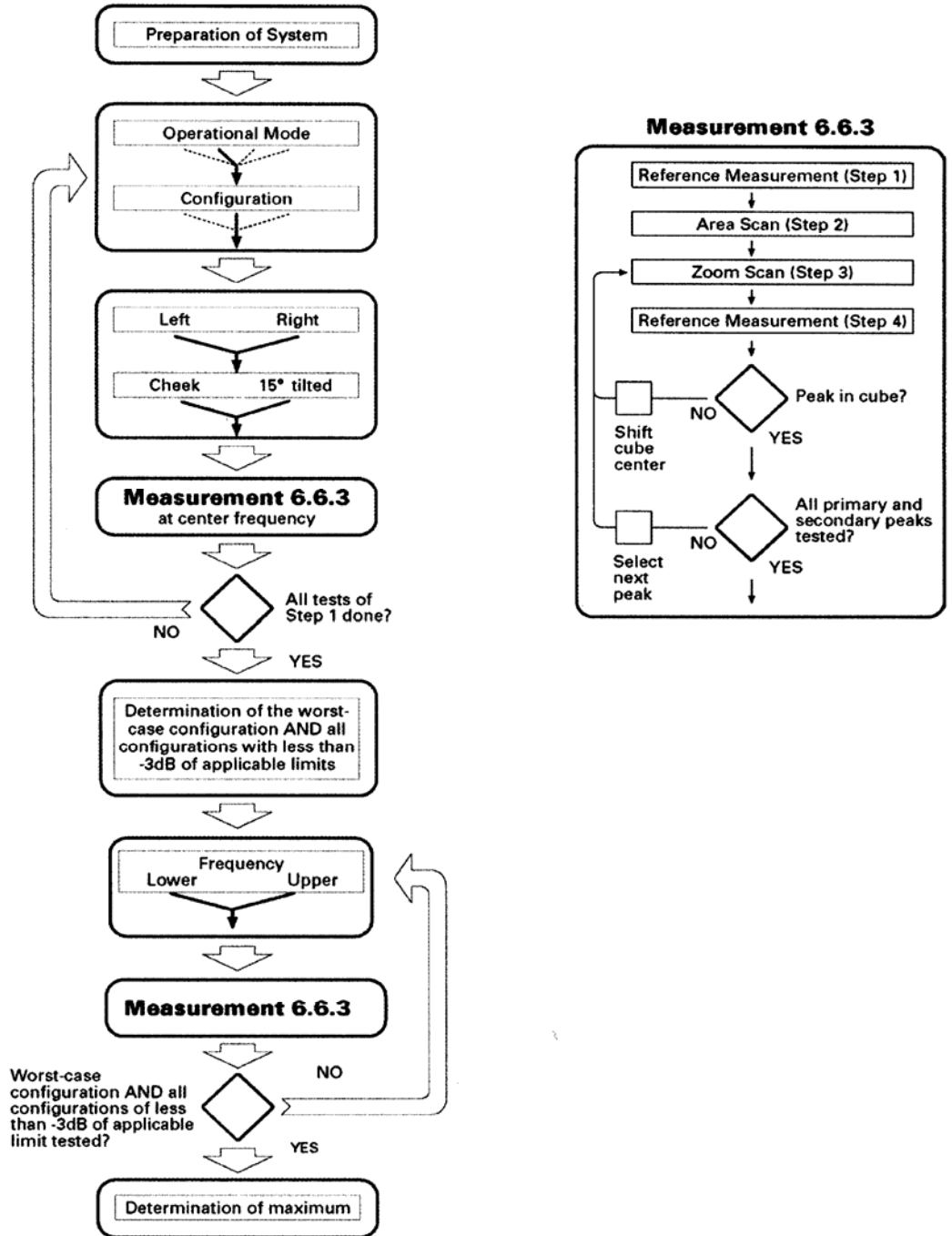


Figure 3. Flow Chart for determining the largest peak spatial-average SAR from all device configurations per IEEE Standard 1528-2003 (see reference [5]).

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 $\pm 10\%$ (see Appendix B for system performance check test plot).

SYSTEM PERFORMANCE CHECK EVALUATION																
Test Date	1900MHz 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)
		IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.						
1/3/06	Brain	9.93 $\pm 10\%$	9.53	-4.0%	40.0 $\pm 5\%$	38.4	-4.0%	1.40 $\pm 5\%$	1.37	-2.1%	1000	22.3	23.5	≥ 15	30	101.8

Note(s):
 1. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the system performance check. The temperatures listed in the table above were consistent for all measurement periods.

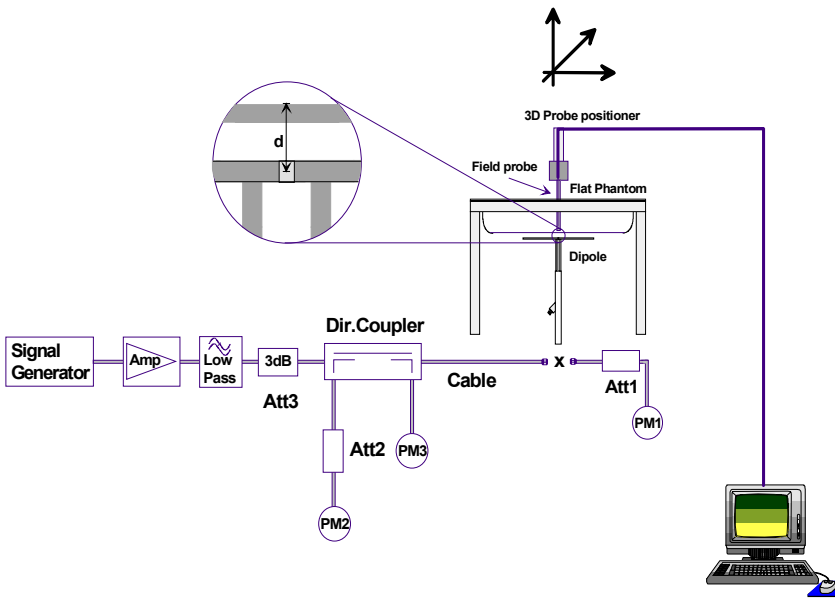


Figure 1. System Performance Check Setup



1900MHz Dipole Setup

8.0 SIMULATED EQUIVALENT TISSUES

The 1900/1920MHz simulated equivalent tissue mixture consists 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 MIXTURE		
INGREDIENT	1900 MHz Brain	1920 MHz Brain
	System Performance Check	DUT Evaluation
Water	55.85 %	55.85 %
Glycol Monobutyl	44.00 %	44.00 %
Salt	0.15 %	0.15 %

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

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.



Test Report Serial No.:	122205AL8-T710-S15T	Report Issue Date:	January 10, 2006
Date(s) of Evaluation:	January 03, 2006	Report Issue No.:	S710-011006-R1
Description of Test(s):	RF Exposure SAR	FCC 47 CFR §2.1093	IC RSS-102 Issue 2

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: DASY4 software
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: ET3DV6
Serial No.: 1387
Construction: Triangular core fiber optic detection system
Frequency: 10 MHz to 6 GHz
Linearity: ±0.2 dB (30 MHz to 3 GHz)

Phantom(s)

Type: SAM V4.0C
Shell Material: Fiberglass
Thickness: 2.0 ±0.1 mm
Volume: Approx. 25 liters

11.0 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 $\pm 8\%$)
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)
Dynamic Range:	5 μ W/g to >100 mW/g; Linearity: ± 0.2 dB
Surface Detection:	± 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

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



Test Report Serial No.:	122205AL8-T710-S15T	Report Issue Date:	January 10, 2006
Date(s) of Evaluation:	January 03, 2006	Report Issue No.:	S710-011006-R1
Description of Test(s):	RF Exposure SAR	FCC 47 CFR §2.1093	IC RSS-102 Issue 2

14.0 TEST EQUIPMENT LIST

USED	TEST EQUIPMENT DESCRIPTION	ASSET NO.	SERIAL NO.	DATE CALIBRATED		CALIBRATION DUE DATE
x	Schmid & Partner DASY4 System	-	-	-	-	-
x	-DASY4 Measurement Server	00158	1078	N/A	N/A	N/A
x	-Robot	00046	599396-01	N/A	N/A	N/A
x	-DAE4	00019	353	15Jun05		15Jun06
	-DAE3	00018	370	25Jan05		25Jan06
x	-ET3DV6 E-Field Probe	00016	1387	18Mar05		18Mar06
	-ET3DV6 E-Field Probe	00017	1590	20May05		20May06
	-EX3DV4 E-Field Probe	00125	3547	21Jan05		21Jan06
	-300MHz Validation Dipole	00023	135	25Oct05		25Oct06
	-450MHz Validation Dipole	00024	136	25Oct05		25Oct06
	-835MHz Validation Dipole	00022	411	Brain	30Mar05	30Mar06
				Body	12Apr05	12Apr06
	-900MHz Validation Dipole	00020	054	Brain	10Jun05	10Jun06
				Body	10Jun05	10Jun06
	-1800MHz Validation Dipole	00021	247	Brain	14Jun05	14Jun06
				Body	14Jun05	14Jun06
x	-1900MHz Validation Dipole	00032	151	Brain	17Jun05	17Jun06
				Body	22Apr05	22Apr06
	-2450MHz Validation Dipole	00025	150	Brain	20Sep05	20Sep06
				Body	22Apr05	22Apr06
	-5000MHz Validation Dipole	00126	1031	Brain	11Jan05	11Jan06
				Body	11Jan05	11Jan06
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
	HP 85070C Dielectric Probe Kit	00033	N/A	N/A		N/A
x	ALS-PR-DIEL Dielectric Probe Kit	00160	260-00953	N/A		N/A
	Gigatronics 8652A Power Meter	00110	1835801	16Apr05		16Apr06
x	Gigatronics 8652A Power Meter	00008	1835267	29Apr05		29Apr06
x	Gigatronics 80701A Power Sensor	00012	1834350	12Sep05		12Sep06
x	Gigatronics 80701A Power Sensor	00014	1833699	07Sep05		07Sep06
	Gigatronics 80701A Power Sensor	00109	1834366	16Apr05		16Apr06
x	HP 8753ET Network Analyzer	00134	US39170292	04May05		04May06
x	HP 8648D Signal Generator	00005	3847A00611	29Apr05		29Apr06
	Rohde & Schwarz SMR40 Signal Generator	00006	100104	12Apr05		12Apr06
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	N/A		N/A
x	Rohde & Schwarz CMD60 Digital Radio Communication Tester	-	100072/060	26May05		10Jul06

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	3.5	Normal	1	1	3.5	∞
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)	2.5	Normal	1	0.64	1.6	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	2.5	Normal	1	0.6	1.5	∞
Combined Standard Uncertainty					9.69	
Expanded Uncertainty (k=2)					19.39	

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)	2.5	Normal	1	0.64	1.6	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	2.5	Normal	1	0.6	1.5	∞
Combined Standard Uncertainty					8.79	
Expanded Uncertainty (k=2)					17.57	

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



Test Report Serial No.:	122205AL8-T710-S15T	Report Issue Date:	January 10, 2006
Date(s) of Evaluation:	January 03, 2006	Report Issue No.:	S710-011006-R1
Description of Test(s):	RF Exposure SAR	FCC 47 CFR §2.1093	IC RSS-102 Issue 2

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.



Test Report Serial No.:	122205AL8-T710-S15T	Report Issue Date:	January 10, 2006
Date(s) of Evaluation:	January 03, 2006	Report Issue No.:	S710-011006-R1
Description of Test(s):	RF Exposure SAR	FCC 47 CFR §2.1093	IC RSS-102 Issue 2

APPENDIX A - SAR MEASUREMENT DATA

Date Tested: 01/03/2006

Head SAR - Right Ear - Cheek/Touch Position - Voice Tube Headset - Mid Channel

DUT: Plantronics Model: CS70 (Voice Tube); Type: Wireless Office Headset System (UPCS); Serial: None

Ambient Temp: 23.2 °C; Fluid Temp: 23.5 °C; Barometric Pressure: 101.8 kPa; Humidity: 30%

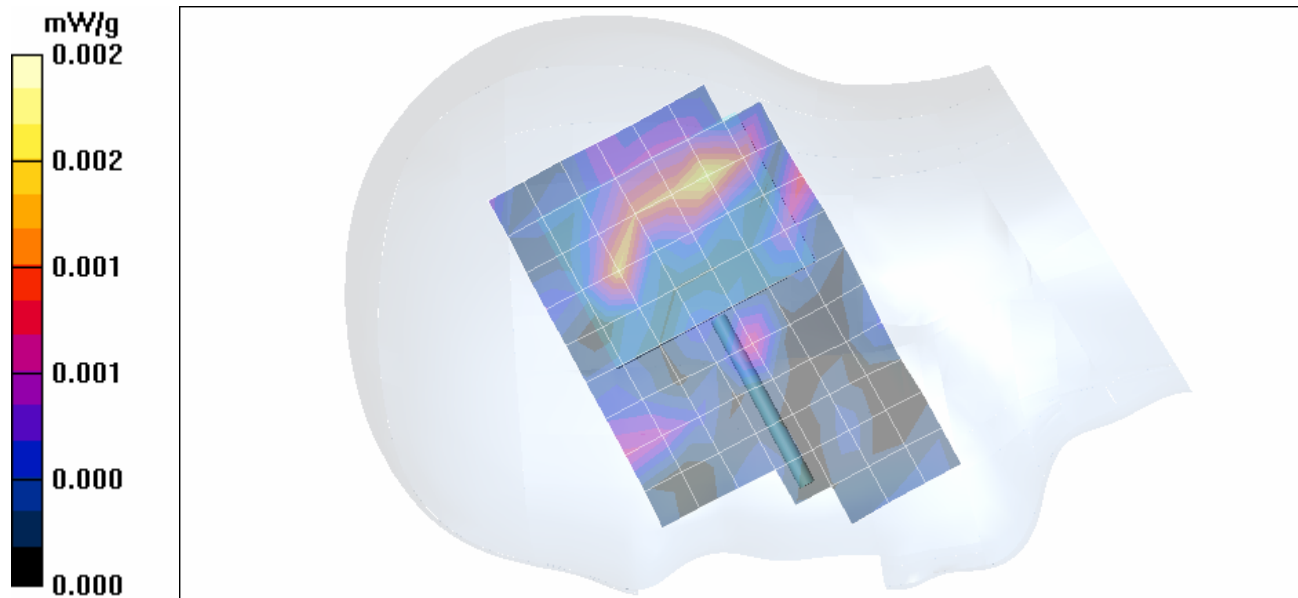
Lithium-ion Polymer Battery
 Communication System: TDMA
 RF Output Power: 6.44 dBm (Peak Conducted)
 Frequency: 1924.992 MHz; Channel 3; Duty Cycle: 1:12.05
 Medium: HSL1920 ($\sigma = 1.39 \text{ mho/m}$; $\epsilon_r = 38.5$; $\rho = 1000 \text{ kg/m}^3$)

- Probe: ET3DV6 - SN1387; ConvF(5, 5, 5); Calibrated: 18/03/2005
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Head SAR - Right Ear - Cheek/Touch Position - Mid Channel/Area Scan (8x12x1):

Measurement grid: dx=15mm, dy=15mm

Maximum Peak Value of SAR (measured) = 0.002 mW/g



Date Tested: 01/03/2006

Head SAR - Right Ear - Cheek/Touch Position - Noise Canceling Headset - Mid Channel

DUT: Plantronics Model: CS70N (Noise Canceling); Type: Wireless Office Headset System (UPCS); Serial: None

Ambient Temp: 23.2 °C; Fluid Temp: 23.5 °C; Barometric Pressure: 101.8 kPa; Humidity: 30%

Lithium-ion Polymer Battery

Communication System: TDMA

RF Output Power: 6.44 dBm (Peak Conducted)

Frequency: 1924.992 MHz; Channel 3; Duty Cycle: 1:12.05

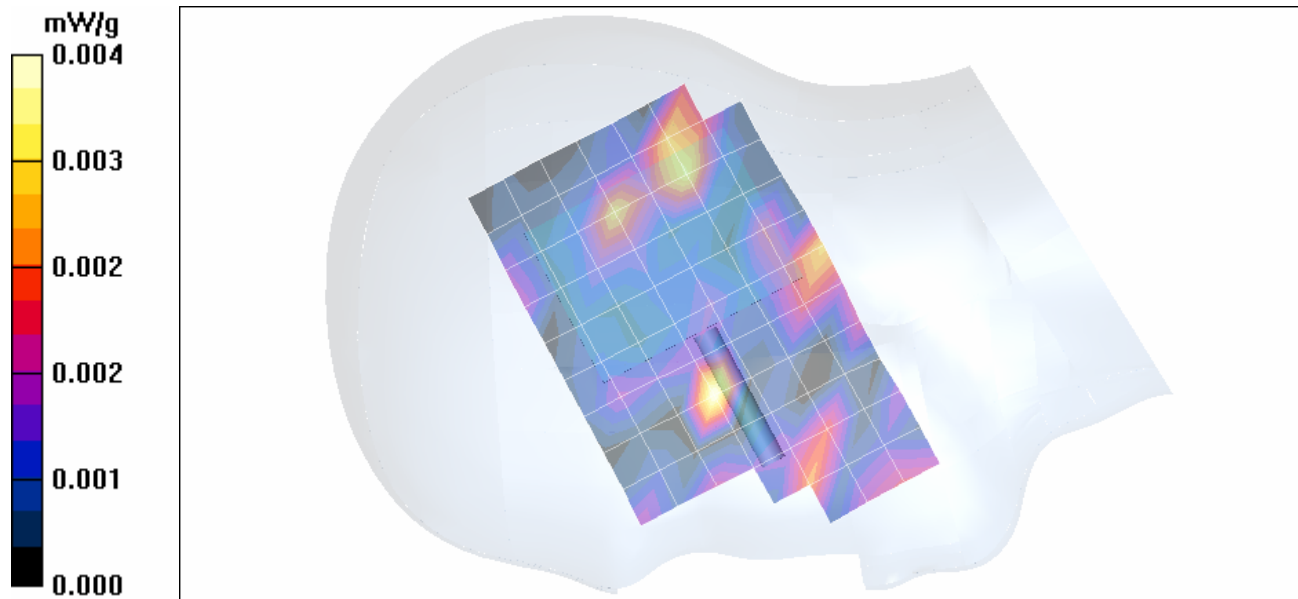
Medium: HSL1920 ($\sigma = 1.39 \text{ mho/m}$; $\epsilon_r = 38.5$; $\rho = 1000 \text{ kg/m}^3$)

- Probe: ET3DV6 - SN1387; ConvF(5, 5, 5); Calibrated: 18/03/2005
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Head SAR - Right Ear - Cheek/Touch Position - Mid Channel/Area Scan (8x12x1):

Measurement grid: dx=15mm, dy=15mm

Maximum Peak Value of SAR (measured) = 0.004 mW/g



Date Tested: 01/03/2006

Head SAR - Left Ear - Cheek/Touch Position - Voice Tube Headset - Mid Channel

DUT: Plantronics Model: CS70 (Voice Tube); Type: Wireless Office Headset System (UPCS); Serial: None

Ambient Temp: 23.2 °C; Fluid Temp: 23.5 °C; Barometric Pressure: 101.8 kPa; Humidity: 30%

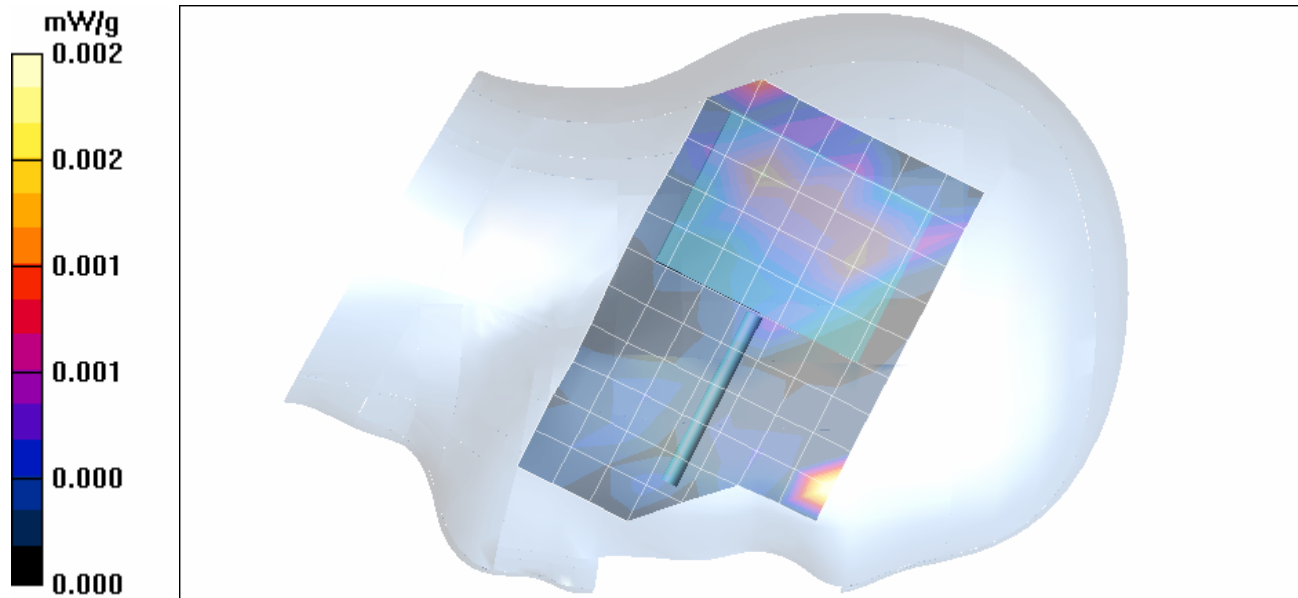
Lithium-ion Polymer Battery
 Communication System: TDMA
 RF Output Power: 6.44 dBm (Peak Conducted)
 Frequency: 1924.992 MHz; Channel 3; Duty Cycle: 1:12.05
 Medium: HSL1920 ($\sigma = 1.39 \text{ mho/m}$; $\epsilon_r = 38.5$; $\rho = 1000 \text{ kg/m}^3$)

- Probe: ET3DV6 - SN1387; ConvF(5, 5, 5); Calibrated: 18/03/2005
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: SAM 4.0; Type: Fibreglas; Serial: 1033
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Head SAR - Left Ear - Cheek/Touch Position - Mid Channel/Area Scan (8x12x1):

Measurement grid: dx=15mm, dy=15mm

Maximum Peak Value of SAR (measured) = 0.002 mW/g



Date Tested: 01/03/2006

Head SAR - Left Ear - Cheek/Touch Position - Noise Canceling Headset - Mid Channel

DUT: Plantronics Model: CS70N (Noise Canceling); Type: Wireless Office Headset System (UPCS); Serial: None

Ambient Temp: 23.2 °C; Fluid Temp: 23.5 °C; Barometric Pressure: 101.8 kPa; Humidity: 30%

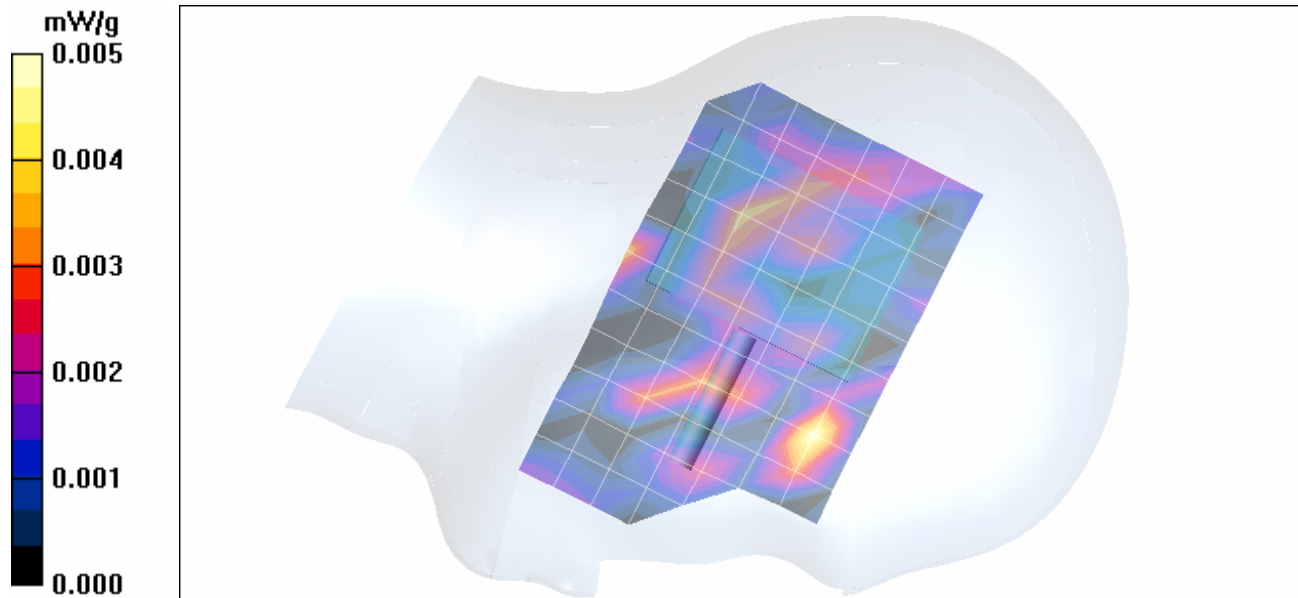
Lithium-ion Polymer Battery
 Communication System: TDMA
 RF Output Power: 6.44 dBm (Peak Conducted)
 Frequency: 1924.992 MHz; Channel 3; Duty Cycle: 1:12.05
 Medium: HSL1920 ($\sigma = 1.39$ mho/m; $\epsilon_r = 38.5$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(5, 5, 5); Calibrated: 18/03/2005
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Head SAR - Left Ear - Cheek/Touch Position - Mid Channel/Area Scan (8x12x1):

Measurement grid: dx=15mm, dy=15mm

Maximum Peak Value of SAR (measured) = 0.005 mW/g



Fluid Depth (>15cm)



Right Head Section



Left Head Section



Test Report Serial No.:	122205AL8-T710-S15T	Report Issue Date:	January 10, 2006
Date(s) of Evaluation:	January 03, 2006	Report Issue No.:	S710-011006-R1
Description of Test(s):	RF Exposure SAR	FCC 47 CFR §2.1093	IC RSS-102 Issue 2

APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Applicant:	Plantronics Inc.	FCC ID:	AL8CS7YYYY	Freq.:	1921.536 - 1928.448 MHz	
Model(s):	CS70, CS70N	DUT Type:	Wireless Office Headset System (UPCS Headset)			
2006 Celltech Labs Inc.	This document is not to be reproduced in whole or in part without the prior written permission of Celltech Labs Inc.					Page 24 of 41

Date Tested: 01/03/2006

System Performance Check (Brain) - 1900 MHz Dipole

DUT: Dipole 1900 MHz; Model: D1900V2; Type: System Performance Check; Serial: 151; Calibrated: 06/17/2005

Ambient Temp: 22.3 °C; Fluid Temp: 23.5 °C; Barometric Pressure: 101.8 kPa; Humidity: 30%

Communication System: CW
 Forward Conducted Power: 250 mW
 Frequency: 1900 MHz; Duty Cycle: 1:1
 Medium: HSL1900 ($\sigma = 1.37 \text{ mho/m}$; $\epsilon_r = 38.4$; $\rho = 1000 \text{ kg/m}^3$)

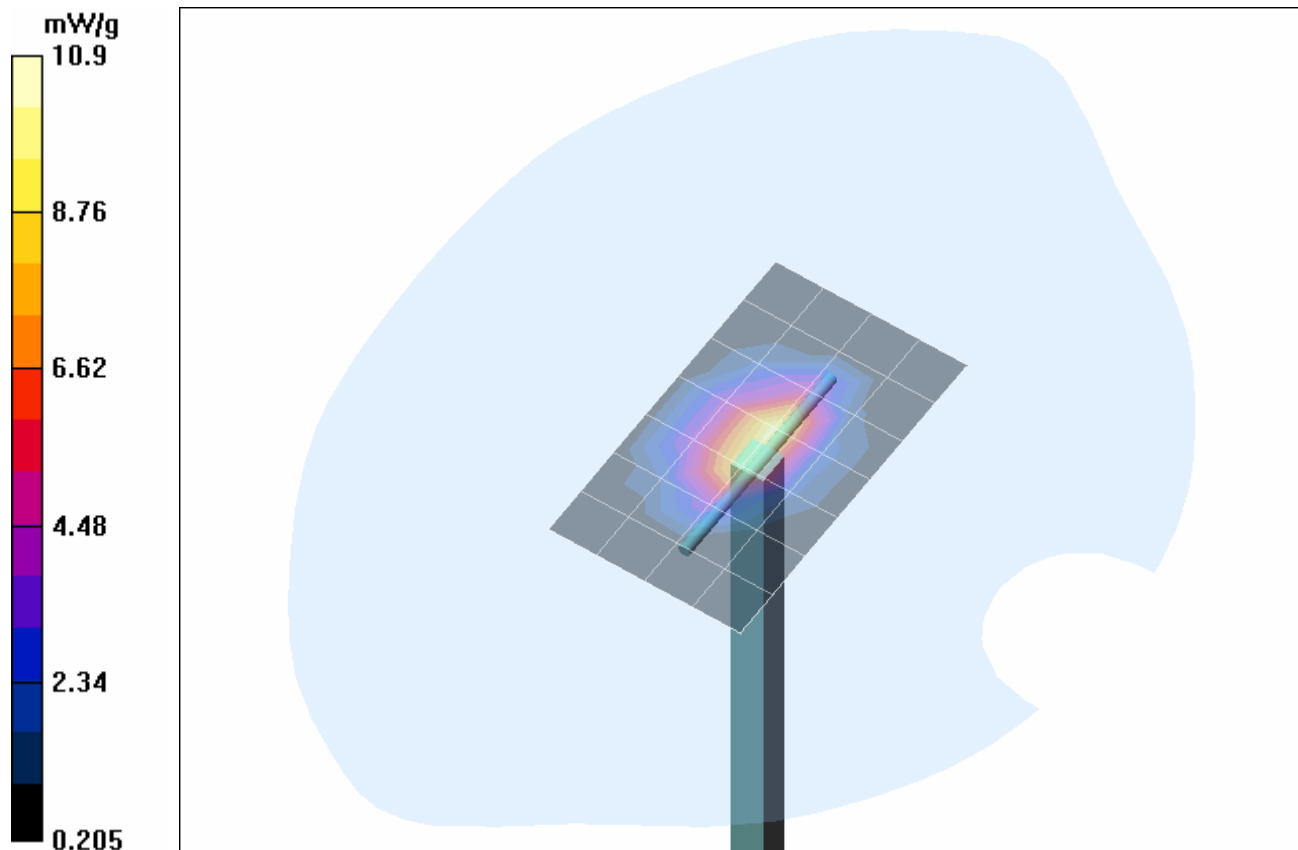
- Probe: ET3DV6 - SN1387; ConvF(5.18, 5.18, 5.18); Calibrated: 18/03/2005
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

1900 MHz Dipole - System Performance Check/Area Scan (5x8x1):

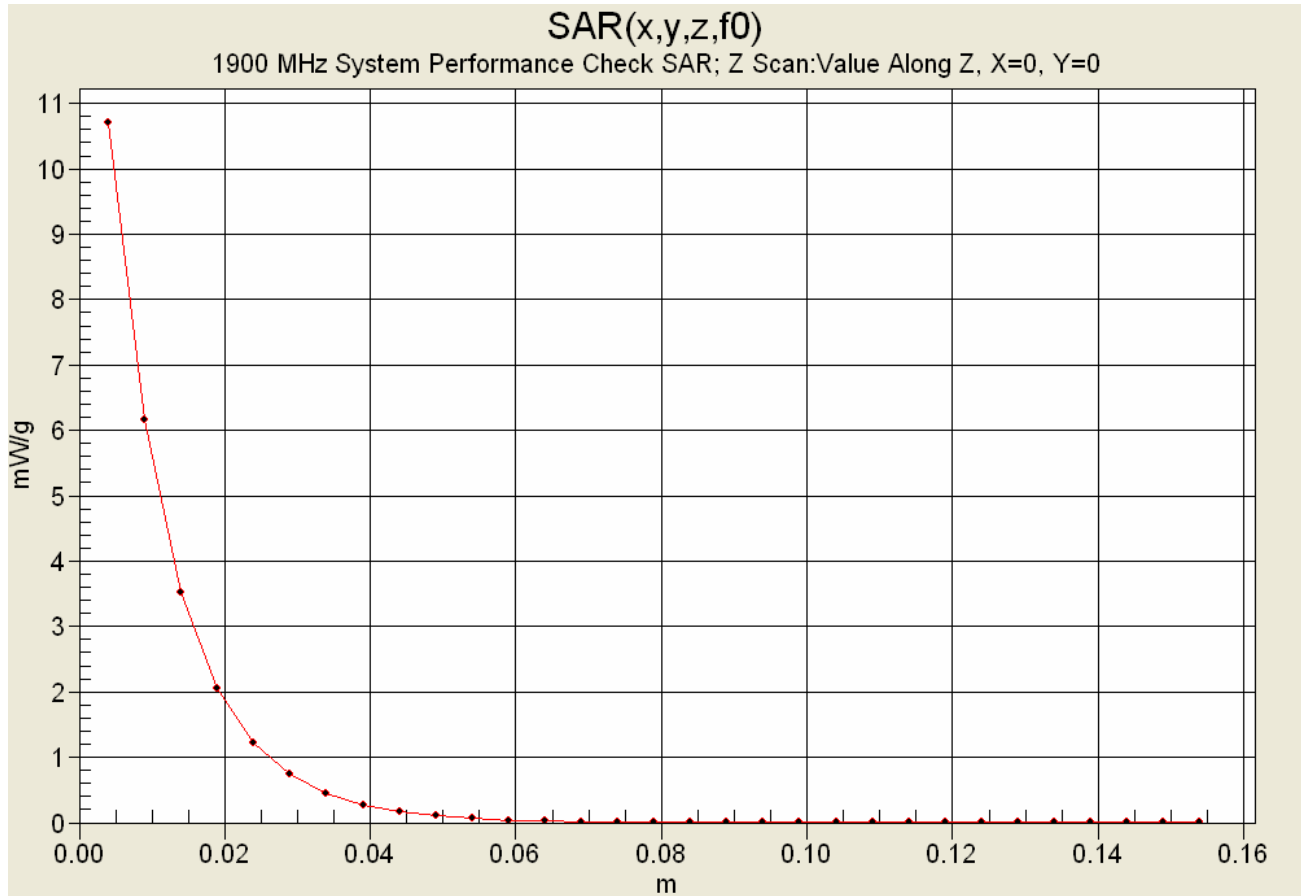
Measurement grid: dx=15mm, dy=15mm

1900 MHz Dipole - System Performance Check/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 92.9 V/m; Power Drift = -0.021 dB
 Peak SAR (extrapolated) = 16.7 W/kg
SAR(1 g) = 9.53 mW/g; SAR(10 g) = 4.98 mW/g



Z-Axis Scan





Test Report Serial No.:	122205AL8-T710-S15T	Report Issue Date:	January 10, 2006
Date(s) of Evaluation:	January 03, 2006	Report Issue No.:	S710-011006-R1
Description of Test(s):	RF Exposure SAR	FCC 47 CFR §2.1093	IC RSS-102 Issue 2

APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS



Test Report Serial No.:	122205AL8-T710-S15T	Report Issue Date:	January 10, 2006
Date(s) of Evaluation:	January 03, 2006	Report Issue No.:	S710-011006-R1
Description of Test(s):	RF Exposure SAR	FCC 47 CFR §2.1093	IC RSS-102 Issue 2

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

Celltech Labs Inc.
 Test Result for UIM Dielectric Parameter
 Tue 03/Jan/2006
 Frequency(GHz)
 FCC_eHFCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
 FCC_sHFCC 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	39.05	1.29
1.8100	40.00	1.40	39.02	1.30
1.8200	40.00	1.40	38.92	1.32
1.8300	40.00	1.40	38.93	1.33
1.8400	40.00	1.40	38.85	1.34
1.8500	40.00	1.40	38.79	1.34
1.8600	40.00	1.40	38.77	1.34
1.8700	40.00	1.40	38.65	1.35
1.8800	40.00	1.40	38.62	1.35
1.8900	40.00	1.40	38.58	1.36
1.9000	40.00	1.40	38.39	1.37
1.9100	40.00	1.40	38.40	1.38
1.9200	40.00	1.40	38.47	1.39
1.9300	40.00	1.40	38.38	1.40
1.9400	40.00	1.40	38.36	1.40
1.9500	40.00	1.40	38.31	1.42
1.9600	40.00	1.40	38.31	1.42
1.9700	40.00	1.40	38.19	1.43
1.9800	40.00	1.40	38.09	1.43
1.9900	40.00	1.40	37.98	1.44
2.0000	40.00	1.40	37.99	1.45

Applicant:	Plantronics Inc.	FCC ID:	AL8CS7YYYY	Freq.:	1921.536 - 1928.448 MHz	
Model(s):	CS70, CS70N	DUT Type:	Wireless Office Headset System (UPCS Headset)			
2006 Celltech Labs Inc.		This document is not to be reproduced in whole or in part without the prior written permission of Celltech Labs Inc.				Page 28 of 41



Test Report Serial No.:	122205AL8-T710-S15T	Report Issue Date:	January 10, 2006
Date(s) of Evaluation:	January 03, 2006	Report Issue No.:	S710-011006-R1
Description of Test(s):	RF Exposure SAR	FCC 47 CFR §2.1093	IC RSS-102 Issue 2

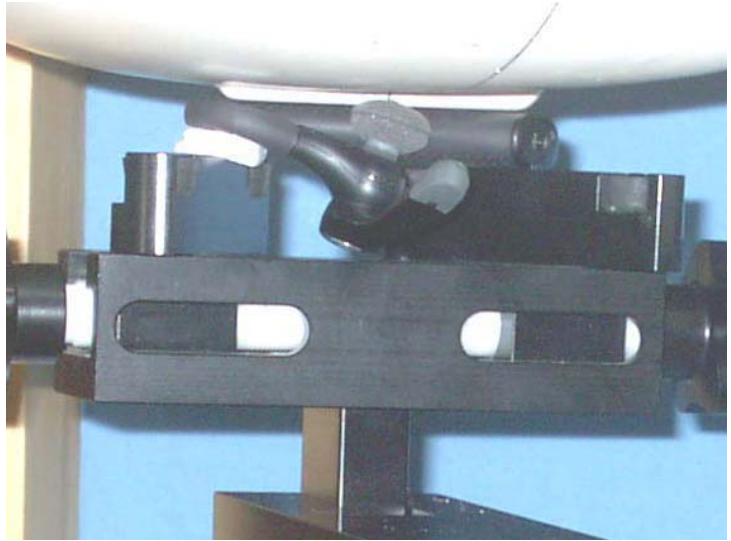
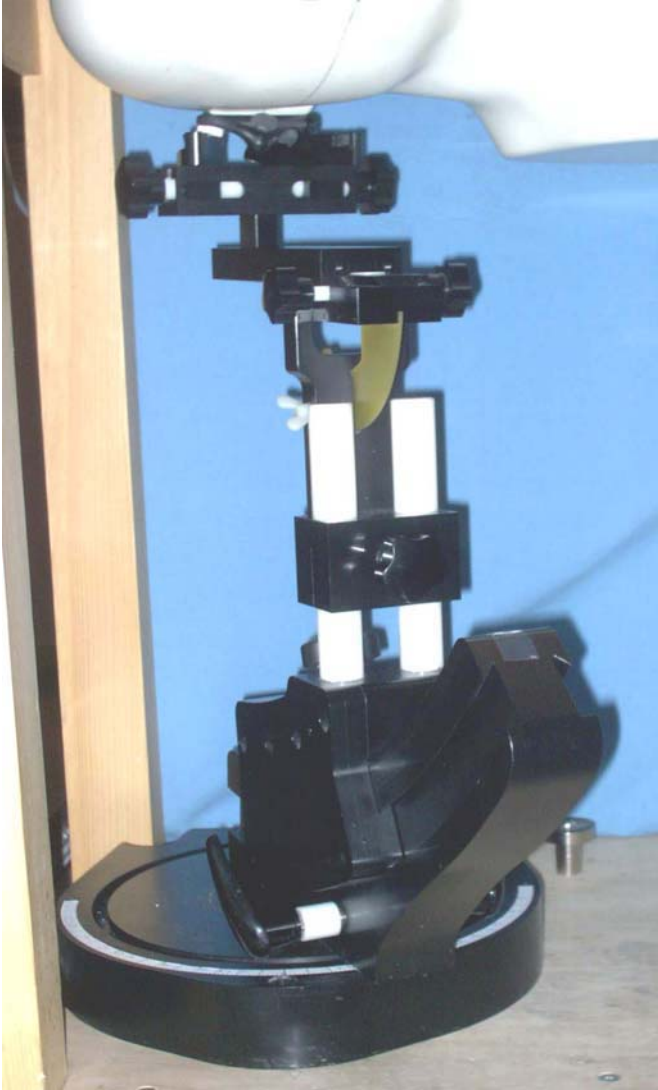
APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS

Applicant:	Plantronics Inc.	FCC ID:	AL8CS7YYYY	Freq.:	1921.536 - 1928.448 MHz	
Model(s):	CS70, CS70N	DUT Type:	Wireless Office Headset System (UPCS Headset)			
2006 Celltech Labs Inc.	This document is not to be reproduced in whole or in part without the prior written permission of Celltech Labs Inc.					Page 29 of 41

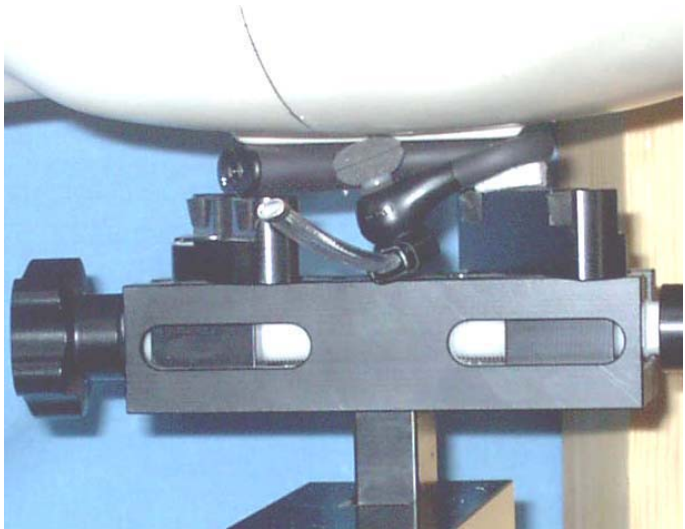
HEAD SAR TEST SETUP PHOTOGRAPHS
 Right Head Section / Cheek-Touch Position
 CS70 Headset (Voice Tube)



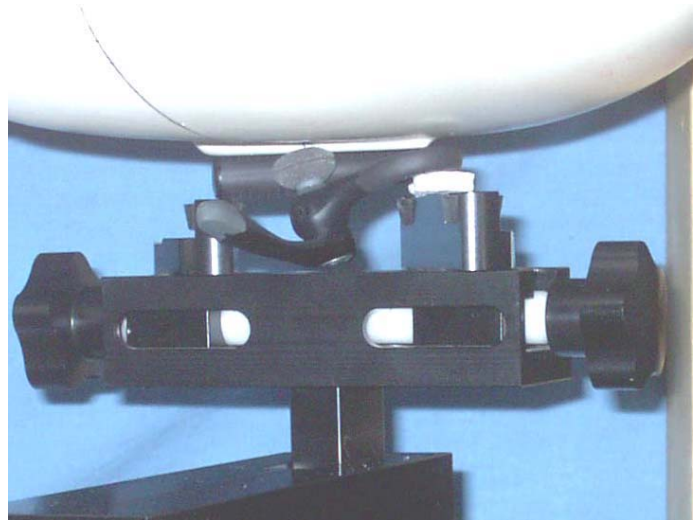
HEAD SAR TEST SETUP PHOTOGRAPHS
 Right Head Section / Cheek-Touch Position
 CS70N Headset (Noise Canceling)



HEAD SAR TEST SETUP PHOTOGRAPHS
 Left Head Section / Cheek-Touch Position
 CS70 Headset (Voice Tube)



HEAD SAR TEST SETUP PHOTOGRAPHS
 Left Head Section / Cheek-Touch Position
 CS70N Headset (Noise Canceling)



DUT PHOTOGRAPHS



CS70 (Voice Tube) Wireless Headset and Base System



CS70N (Noise Canceling) Wireless Headset and Base System

DUT PHOTOGRAPHS



CS70 (Voice Tube) Outer Side



CS70 (Voice Tube) Inner Side

DUT PHOTOGRAPHS

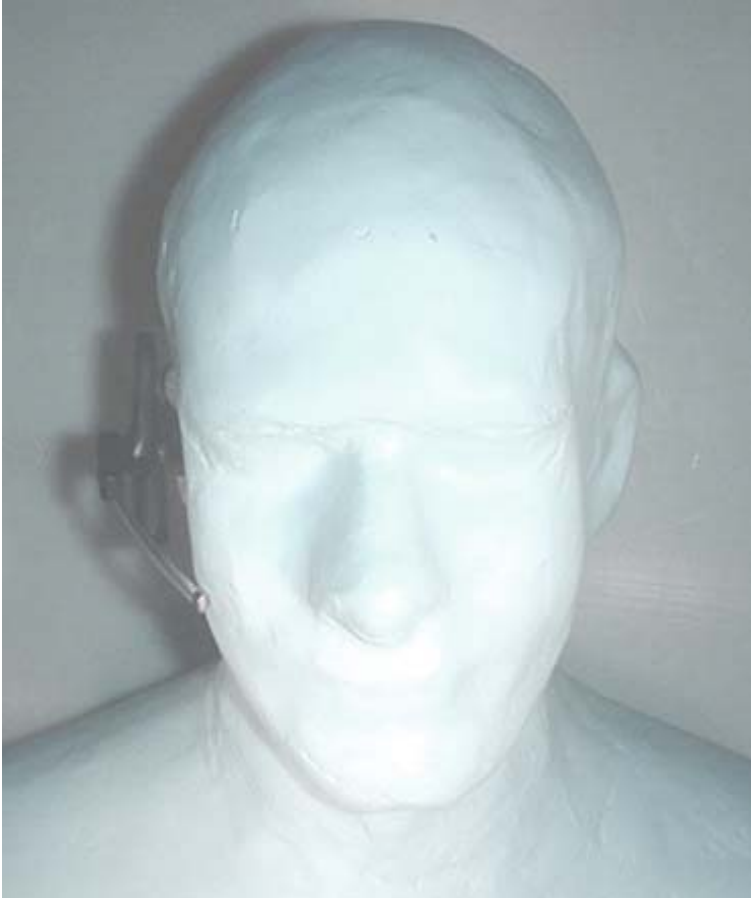


CS70N (Noise Canceling) Outer Side

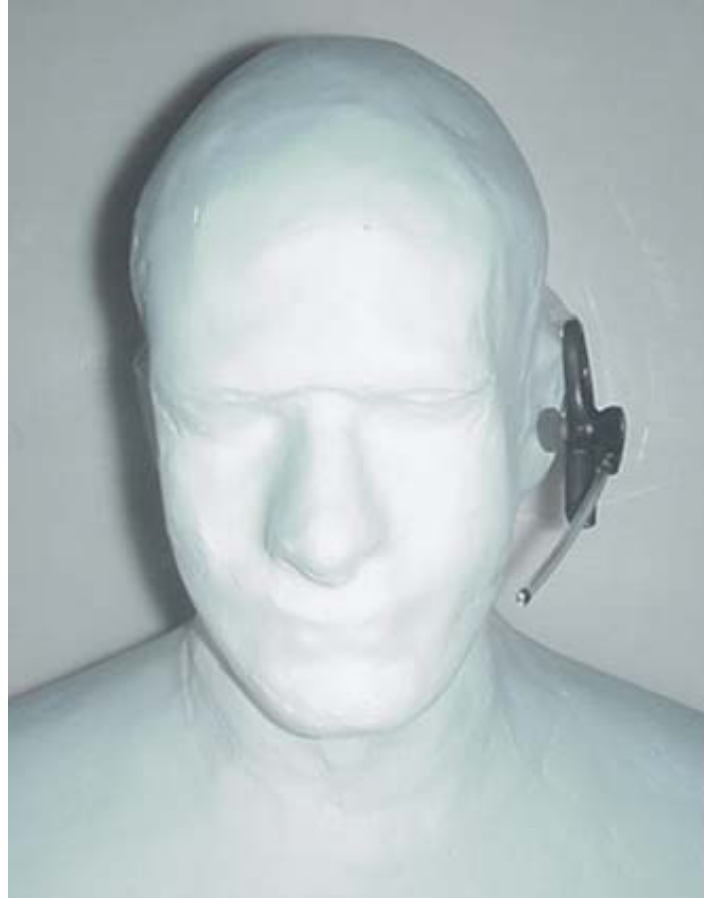


CS70N (Noise Canceling) Inner Side

DUT PHOTOGRAPHS

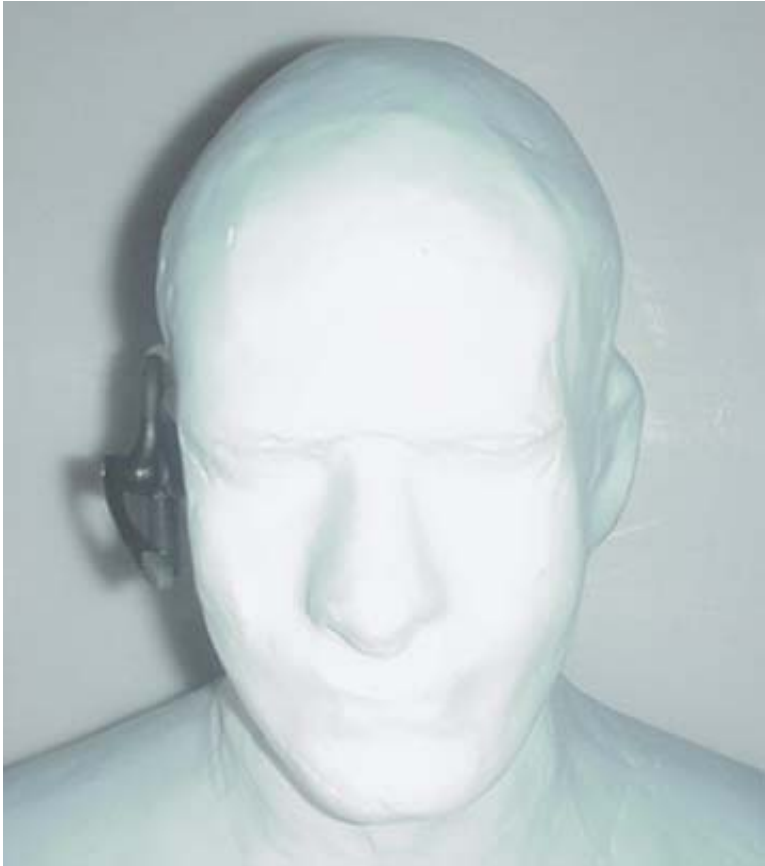


Right Ear - CS70 (Voice Tube)



Left Ear - CS70 (Voice Tube)

DUT PHOTOGRAPHS



Right Ear - CS70N (Noise Canceling)



Left Ear - CS70N (Noise Canceling)



Test Report Serial No.:	122205AL8-T710-S15T	Report Issue Date:	January 10, 2006
Date(s) of Evaluation:	January 03, 2006	Report Issue No.:	S710-011006-R1
Description of Test(s):	RF Exposure SAR	FCC 47 CFR §2.1093	IC RSS-102 Issue 2

APPENDIX E - SYSTEM VALIDATION

1900 MHz SYSTEM VALIDATION DIPOLE

Type:

1900 MHz Validation Dipole

Asset Number:

00032

Serial Number:

151

Place of Calibration:

Celltech Labs Inc.

Date of Calibration:

June 17, 2005

Celltech Labs Inc. hereby certifies that this device has been calibrated on the date indicated above.

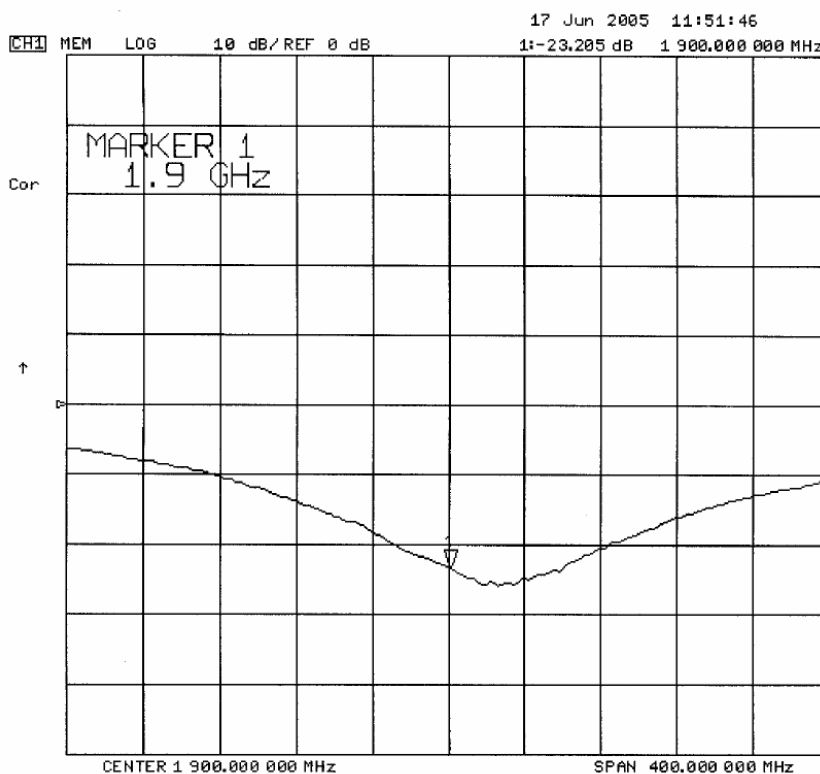
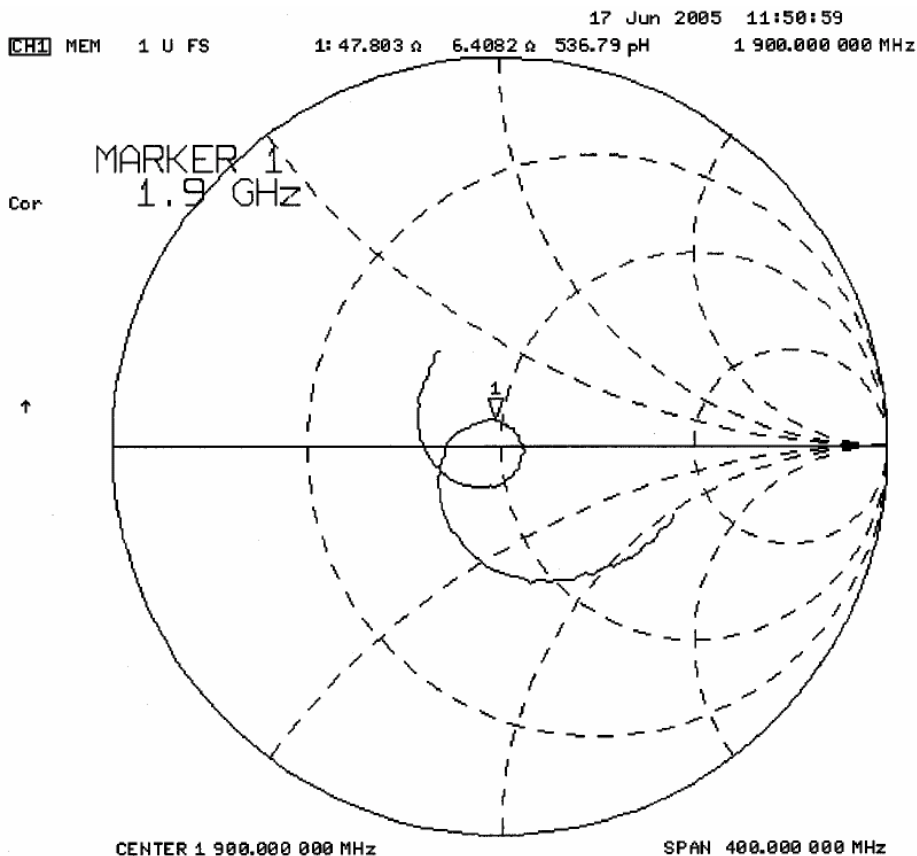
Calibrated by:



Approved by:



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



1900 MHz System Validation Setup



6. Measurement Conditions

The SAM phantom was filled with 1900 MHz brain simulating tissue.

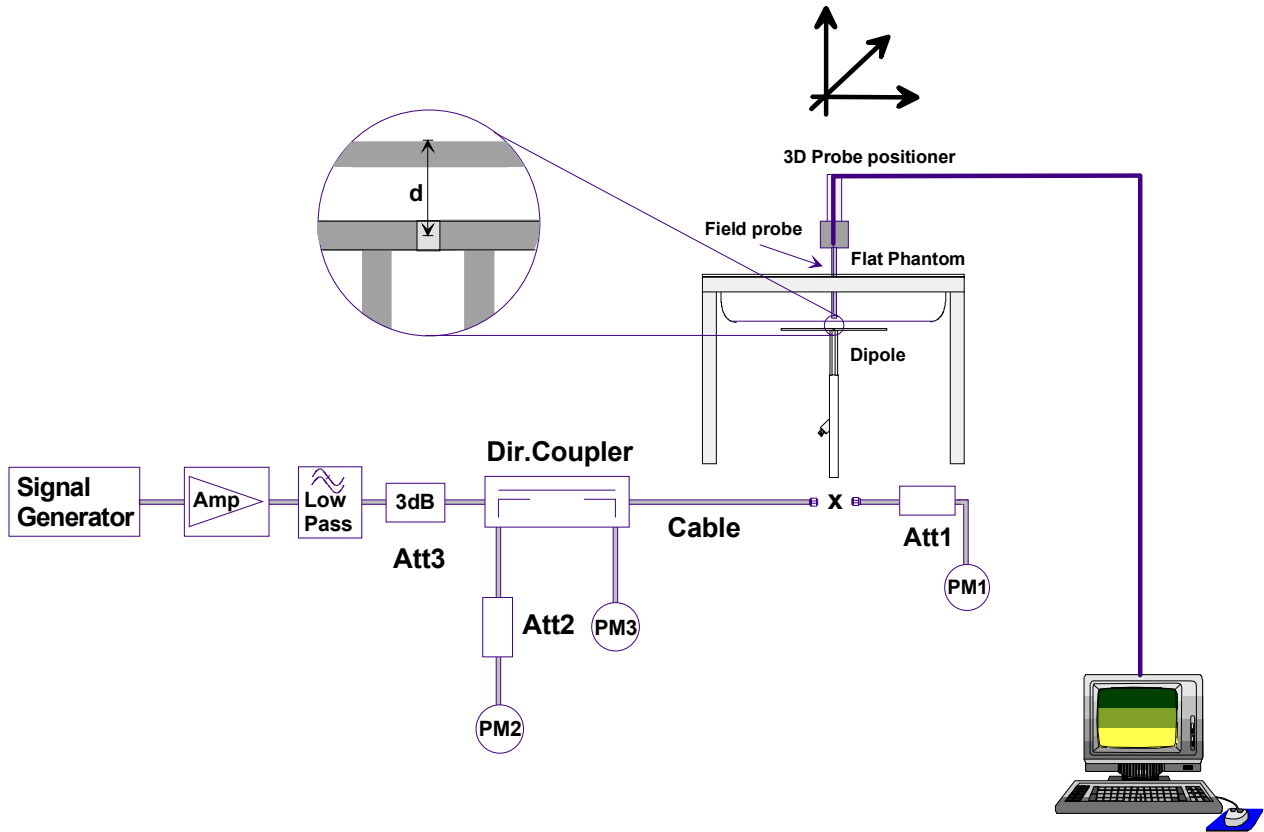
Relative Permittivity:	38.4
Conductivity:	1.40 mho/m
Ambient Temperature:	23.4 °C
Fluid Temperature:	22.7 °C
Fluid Depth:	≥ 15.0 cm
Barometric Pressure:	100.6 kPa
Humidity:	35%

The 1900 MHz tissue simulant consists of the following ingredients:

Ingredient	Percentage by weight
Water	55.85%
Glycol	44.00%
Salt	0.15%
Target Dielectric Parameters at 22 °C	$\epsilon_r = 40.0$ $\sigma = 1.40 \text{ S/m}$

7. SAR Measurement

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 following procedures.



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. Validation Dipole SAR Test Results

Ten SAR measurements were performed in order to achieve repeatability and to establish an average target value.

Validation Measurement	SAR @ 0.25W Input averaged over 1g	SAR @ 1W Input averaged over 1g	SAR @ 0.25W Input averaged over 10g	SAR @ 1W Input averaged over 10g	Peak SAR @ 0.25W Input
Test 1	9.97	39.88	5.20	20.80	17.7
Test 2	10.0	40.00	5.19	20.76	17.9
Test 3	10.1	40.40	5.21	20.84	18.1
Test 4	9.98	39.92	5.20	20.80	17.8
Test 5	9.96	39.84	5.19	20.76	17.7
Test 6	9.99	39.96	5.18	20.72	17.9
Test 7	9.89	39.56	5.16	20.64	17.5
Test 8	9.95	39.80	5.19	20.76	17.6
Test 9	9.96	39.84	5.20	20.80	17.6
Test 10	9.92	39.68	5.19	20.76	17.5
Average	9.972	39.888	5.191	20.764	17.73

The results have been normalized to 1W (forward power) into the dipole.

1g/10g Averaged	Average Measured SAR @ 1W Input	IEEE Target SAR @ 1W Input	Deviation (%)
1 gram	39.888	39.7	+ 0.474
10 gram	20.764	20.5	+ 1.29

1900 MHz System Validation - June 17, 2005

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 151
Ambient Temp: 23.4 °C; Fluid Temp: 22.7 °C; Barometric Pressure: 100.6 kPa; Humidity: 35%
Communication System: CW
Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL1900 ($\sigma = 1.40$ mho/m; $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1590; ConvF(5.44, 5.44, 5.44); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 25/01/2005
- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

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

1900 MHz System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.6 V/m; Power Drift = -0.018 dB
Peak SAR (extrapolated) = 17.7 W/kg
SAR(1 g) = 9.97 mW/g; SAR(10 g) = 5.20 mW/g

1900 MHz System Validation/Zoom Scan 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.6 V/m; Power Drift = -0.025 dB
Peak SAR (extrapolated) = 17.9 W/kg
SAR(1 g) = 10.0 mW/g; SAR(10 g) = 5.19 mW/g

1900 MHz System Validation/Zoom Scan 3 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.1 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 18.1 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.21 mW/g

1900 MHz System Validation/Zoom Scan 4 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.8 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 17.8 W/kg
SAR(1 g) = 9.98 mW/g; SAR(10 g) = 5.20 mW/g

1900 MHz System Validation/Zoom Scan 5 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.8 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 17.7 W/kg
SAR(1 g) = 9.96 mW/g; SAR(10 g) = 5.19 mW/g

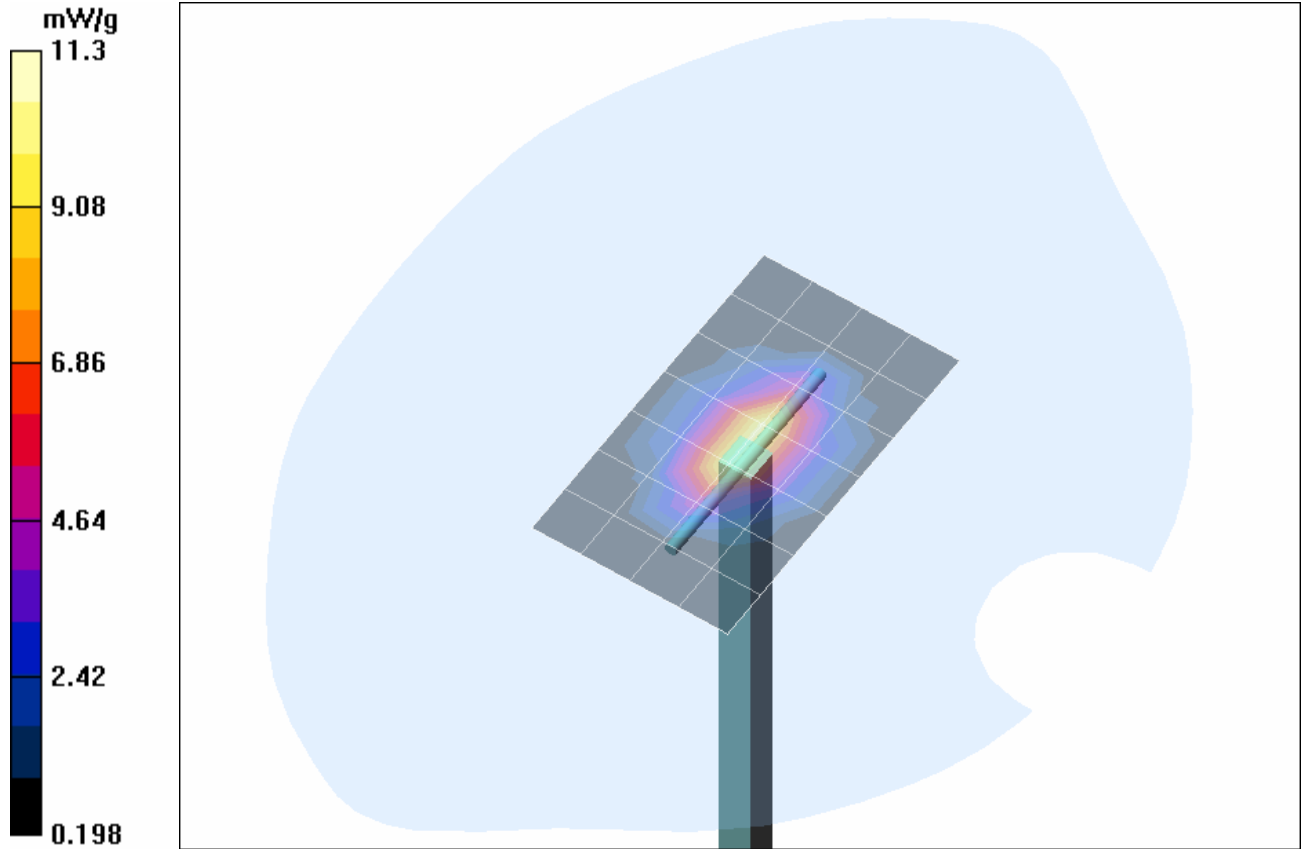
1900 MHz System Validation/Zoom Scan 6 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.6 V/m; Power Drift = -0.081 dB
Peak SAR (extrapolated) = 17.9 W/kg
SAR(1 g) = 9.99 mW/g; SAR(10 g) = 5.18 mW/g

1900 MHz System Validation/Zoom Scan 7 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.6 V/m; Power Drift = -0.019 dB
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 9.89 mW/g; SAR(10 g) = 5.16 mW/g

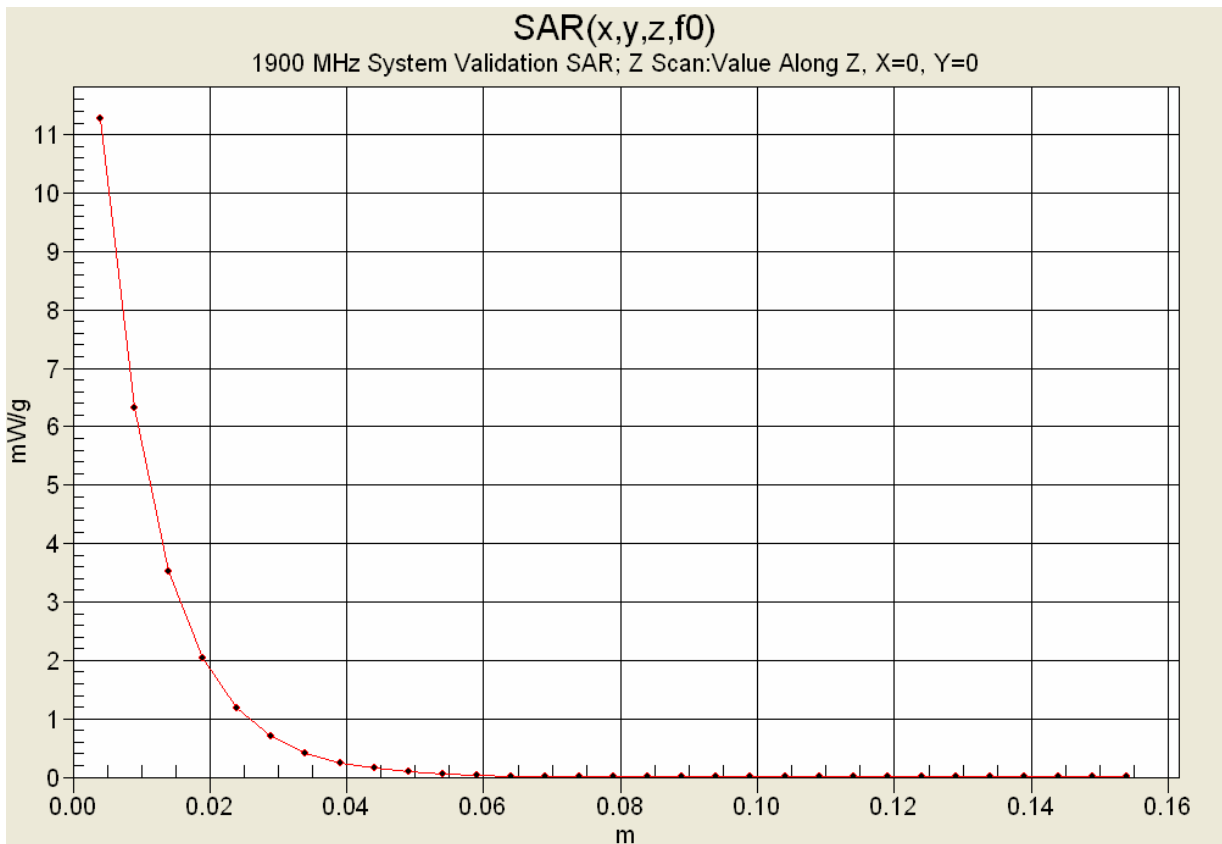
1900 MHz System Validation/Zoom Scan 8 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.0 V/m; Power Drift = -0.016 dB
Peak SAR (extrapolated) = 17.6 W/kg
SAR(1 g) = 9.95 mW/g; SAR(10 g) = 5.19 mW/g

1900 MHz System Validation/Zoom Scan 9 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.0 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 17.6 W/kg
SAR(1 g) = 9.96 mW/g; SAR(10 g) = 5.20 mW/g

1900 MHz System Validation/Zoom Scan 10 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.7 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 9.92 mW/g; SAR(10 g) = 5.19 mW/g



1 g average of 10 measurements: 9.972 mW/g
10 g average of 10 measurements: 5.191 mW/g



System Validation - 1900 MHz Dipole (Brain)

Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

Fri 17/Jun/2005

Freq 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	1.30
1.8100	40.00	1.40	38.66	1.32
1.8200	40.00	1.40	38.64	1.33
1.8300	40.00	1.40	38.60	1.33
1.8400	40.00	1.40	38.57	1.34
1.8500	40.00	1.40	38.47	1.34
1.8600	40.00	1.40	38.40	1.36
1.8700	40.00	1.40	38.44	1.37
1.8800	40.00	1.40	38.34	1.38
1.8900	40.00	1.40	38.39	1.38
1.9000	40.00	1.40	38.37	1.40
1.9100	40.00	1.40	38.32	1.41
1.9200	40.00	1.40	38.34	1.42
1.9300	40.00	1.40	38.30	1.42
1.9400	40.00	1.40	38.31	1.44
1.9500	40.00	1.40	38.27	1.44
1.9600	40.00	1.40	38.20	1.46
1.9700	40.00	1.40	38.23	1.47
1.9800	40.00	1.40	38.11	1.49
1.9900	40.00	1.40	38.02	1.50
2.0000	40.00	1.40	38.11	1.52



Test Report Serial No.:	122205AL8-T710-S15T	Report Issue Date:	January 10, 2006
Date(s) of Evaluation:	January 03, 2006	Report Issue No.:	S710-011006-R1
Description of Test(s):	RF Exposure SAR	FCC 47 CFR §2.1093	IC RSS-102 Issue 2

APPENDIX G - SAM PHANTOM CERTIFICATE OF CONFORMITY

Applicant:	Plantronics Inc.	FCC ID:	AL8CS7YYYY	Freq.:	1921.536 - 1928.448 MHz	
Model(s):	CS70, CS70N	DUT Type:	Wireless Office Headset System (UPCS Headset)			
2006 Celltech Labs Inc.	This document is not to be reproduced in whole or in part without the prior written permission of Celltech Labs Inc.					Page 41 of 41

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

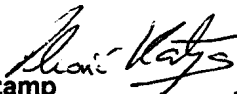
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

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