





	<u>Date(s) of Evaluation</u> September 03, 2008	<u>Test Report Serial No.</u> 082608AL8-T927-S15D	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> November 19, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

SAR TEST REPORT (FCC/IC)				
RF EXPOSURE EVALUATION		SPECIFIC ABSORPTION RATE		
APPLICANT	PLANTRONICS INC.			
DEVICE UNDER TEST (DUT)	PORTABLE 1.9 GHz UPCS/LE-PCS DECT WIRELESS HEADSET			
DEVICE FREQUENCY RANGE	1921.536 - 1928.448 MHz			
DEVICE MODEL(S)	WH100			
DEVICE IDENTIFIER(S)	FCC ID:	AL8-WH100	IC:	457A-WH100
APPLICATION TYPE	Certification			
STANDARD(S) APPLIED	FCC 47 CFR §2.1093			
PROCEDURE(S) APPLIED	Health Canada Safety Code 6			
	FCC OET Bulletin 65, Supplement C (01-01)			
	Industry Canada RSS-102 Issue 2			
	IEEE 1528-2003			
FCC DEVICE CLASSIFICATION	Part 15 Unlicensed PCS Portable Transmitter held to ear (PUE)		47 CFR §15(D)	
	2 GHz Licence Exempt Personal Communications Service Device (LE-PCS)		RSS-213	
IC DEVICE CLASSIFICATION	2 GHz Licence Exempt Personal Communications Service Device (LE-PCS)		RSS-213	
RF EXPOSURE CATEGORY	General Population / Uncontrolled			
RF EXPOSURE EVALUATION(S)	Ear-held (Head)			
DATE(S) OF EVALUATION(S)	September 03, 2008			
TEST REPORT SERIAL NO.	082608AL8-T927-S15D			
TEST REPORT REVISION NO.	Revision 1.1	2nd Release	November 19, 2008	
	Revision 1.0	Initial Release	September 30, 2008	
TEST REPORT SIGNATORIES	Testing Performed By		Test Report Prepared By	
	Sean Johnston Celltech Labs Inc.		Jonathan Hughes Celltech Labs Inc.	
TEST LAB AND LOCATION	Celltech Compliance Testing and Engineering Lab			
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TEST LAB CONTACT INFO.	Tel.: 250-765-7650		Fax: 250-765-7645	
	info@celltechlabs.com		www.celltechlabs.com	
TEST LAB ACCREDITATION(S)	 Test Lab Certificate No. 2470.01			

Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset		Freq. Range:	1921.536 - 1928.448 MHz				
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DECLARATION OF COMPLIANCE SAR RF EXPOSURE EVALUATION

Test Lab Information	Name	CELLTECH LABS INC.		
	Address	21-364 Lougheed Road, Kelowna, B.C. V1X 7R8 Canada		
Applicant Information	Name	PLANTRONICS INC.		
	Address	345 Encinal Street, Santa Cruz, CA 95060 United States		
Standard(s) Applied	FCC	47 CFR §2.1093		
	IC	Health Canada Safety Code 6		
Procedure(s) Applied	FCC	OET Bulletin 65, Supplement C (01-01)		
	IC	RSS-102 Issue 2		
	IEEE	1528-2003		
	IEC	62209-1:2005		
Device RF Exposure Category	Portable	General Population / Uncontrolled Environment		
Device Classification(s)	FCC	Part 15 Unlicensed PCS portable Tx held to ear (PUE)	47 CFR §15(D)	
	IC	2 GHz Licence Exempt Personal Communications Service Device (LE-PCS)	RSS-213	
Device Identifier(s)	FCC ID:	AL8-WH100		
	IC:	457A-WH100		
	Model(s)	WH100		
	Serial No.	PVB1 34 (Identical Prototype)		
Device Description	Portable 1.9 GHz UPCS/LE-PCS DECT Wireless Headset			
Application Type	Certification			
Transmit Frequency Range(s)	1921.536 - 1928.448 MHz			
Mode(s) of Operation	TDMA/TDD			
Modulation Type(s)	FSK (Frequency Shift Keying)			
Reference RF Output Power	18.2 dBm	66.1 mW	Conducted	1924.992 MHz
Source-Based Time-Averaged	4.22 dBm	2.64 mW	Conducted	1924.992 MHz
Maximum Duty Cycle Tested	4 %	Source-Based Time-Averaged		Crest Factor: 1:25
Antenna Type(s) Tested	Internal			
Battery Type(s) Tested	Lithium Polymer			
Body-worn Accessories Tested	Not applicable			
Max. SAR Level(s) Evaluated	Head	0.012 W/kg	1g average	FCC/IC SAR Limit 1.6 W/kg 1g average
<p>Celltech Labs Inc. declares under its sole responsibility that this wireless portable device was compliant with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 and Health Canada's Safety Code 6 for the General Population / Uncontrolled Exposure environment. The device was tested in accordance with the measurement procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01), Industry Canada RSS-102 Issue 2, IEEE Standard 1528-2003 and IEC International Standard 62209-1:2005. All measurements were performed in accordance with the SAR system manufacturer recommendations.</p> <p>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.</p> <p>The results and statements contained in this report pertain only to the device evaluated.</p> <p>This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Labs Inc.</p>				
Test Report Approved By			Sean Johnston	







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	<u>Test Report Issue Date</u> November 19, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

REVISION HISTORY		
REVISION NO.	DESCRIPTION	RELEASE DATE
1.0	Initial Release	September 30, 2008
1.1	1. Add Revision History (Page 4) 2. Correct Reference Output Power (Page 2, 6) 3. Add Timing Plot (Section 6) 4. Correct Uncertainty Tables (Section 15)	November 19, 2008

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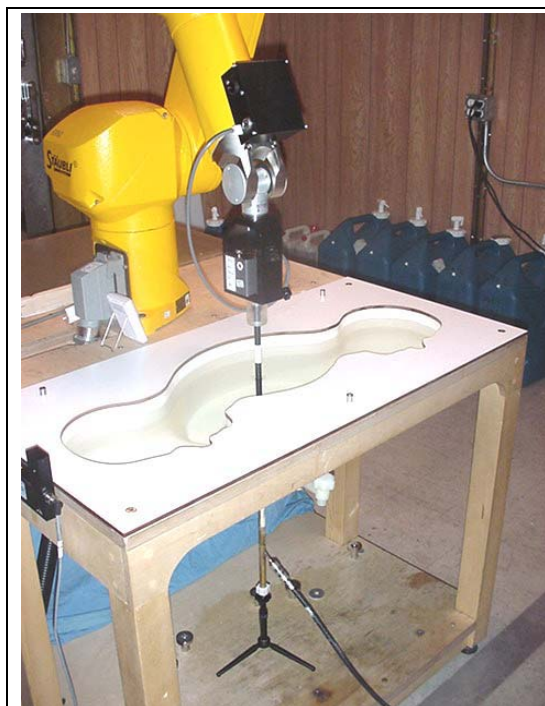
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1.0 INTRODUCTION

This measurement report demonstrates that the Plantronics Inc. Model: WH100 Portable 1.9 GHz UPCS/LE-PCS DECT Wireless Headset complies with the SAR (Specific Absorption Rate) RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) and Health Canada's Safety Code 6 (see reference [2]) for the General Population / Uncontrolled Exposure environment. The test procedures described in FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]), IC RSS-102 Issue 2 (see reference [4]), IEEE Standard 1528-2003 (see reference [5]) and IEC International Standard 62209-1:2005 (see reference [6]) 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 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 System with SAM Twin Phantom V4.0C





DASY4 Measurement Server

Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset			Freq. Range:	1921.536 - 1928.448 MHz			
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3.0 MEASUREMENT SUMMARY

HEAD SAR EVALUATION SUMMARY										
Freq.	Chan.	Test Mode	Duty Cycle	Crest Factor	Battery Type	Phantom Section	Test Position	Reference RF Output Power		Measured SAR (1g)
								Peak Conducted	Source-Based Time-Averaged	W/kg
MHz										
1924.992	2	TDMA/TDD	4%	1:25	Lithium Polymer	Left Ear	Cheek/Touch	66.1 mW	2.64 mW	0.012
1924.992	2	TDMA/TDD	4%	1:25	Lithium Polymer	Right Ear	Cheek/Touch	66.1 mW	2.64 mW	0.010
SAR LIMIT(S)					HEAD	SPATIAL PEAK	RF EXPOSURE CATEGORY			
FCC 47 CFR 2.1093		Health Canada Safety Code 6			1.6 W/kg	1g average	General Population / Uncontrolled			
Date(s) of Evaluation		September 03, 2008				Relative Humidity		30	%	
Measured Fluid Type		1920 MHz Brain				Atmospheric Pressure		101.1	kPa	
Dielectric Constant ϵ_r		IEEE Target		Measured	Deviation	Ambient Temperature		24.0	°C	
		40.0	± 5%	40.9	+2.3%	Fluid Temperature		23.8	°C	
Conductivity σ (mho/m)		IEEE Target		Measured	Deviation	Fluid Depth		≥ 15	cm	
		1.40	± 5%	1.47	+5.0%	ρ (Kg/m ³)		1000		
Notes										
1.	Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.									
2.	The transmission band of the DUT is less than 10 MHz; therefore mid channel data only is reported (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]).									
3.	The power drift of the DUT was measured by the DASY4 system during the SAR evaluations at the reference point of the phantom with low SAR. The drift levels were inaccurate due to the SAR value at the reference point is close to the measurement noise floor and therefore are not reported.									
4.	The fluid temperature was measured prior to and after the SAR evaluations to ensure the temperature remained within +/-2°C of the fluid temperature reported during the dielectric parameter measurements.									
5.	The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).									

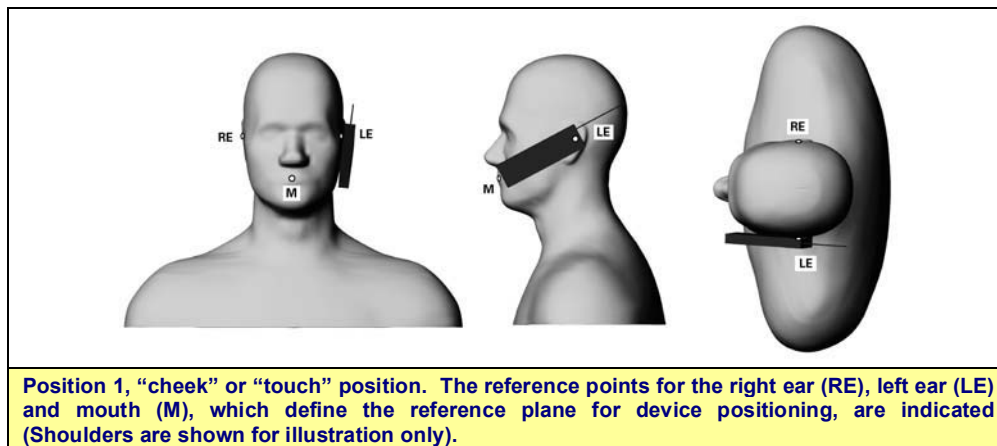
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4.0 DETAILS OF SAR EVALUATION

The Plantronics Inc. Model: WH100 Portable 1.9 GHz UPCS/LE-PCS DECT Wireless Headset was compliant for localized Specific Absorption Rate (Uncontrolled Exposure) based on the test provisions and conditions described below. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A. The detailed test setup photographs are shown in Appendix D.

Ear-held Configuration(s)

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




Body-worn Configuration(s)

- 2) Not applicable

Test Mode(s) & Power Level(s)

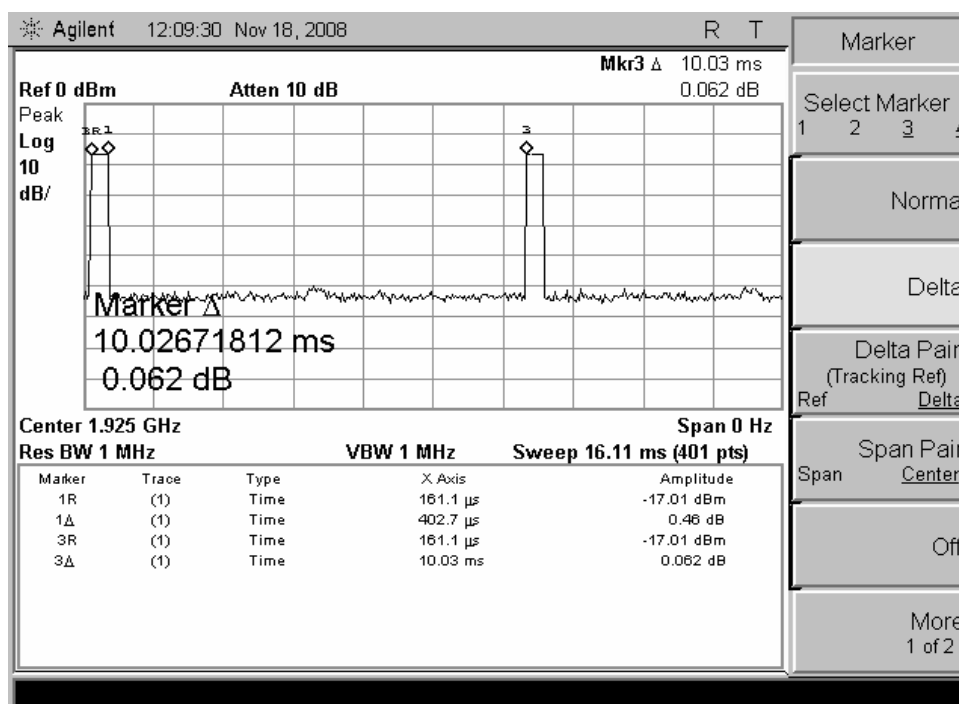
- 3) An active link was established between the headset unit and the base unit by following the procedures prescribed by Plantronics.
- 4) The DUT was transmitting with a modulated TDMA/TDD signal and a source-based time-averaged duty cycle of 4% (crest factor = 1:25).
- 5) The RF conducted output power of the DUT could not be measured due to an internal antenna. The DUT was evaluated for SAR at the maximum RF conducted output power level preset by the manufacturer.
- 6) The peak conducted RF output power level of the DUT referenced in this report was provided by Plantronics.
- 7) The DUT battery was fully charged prior to the SAR evaluations.

Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset			Freq. Range:	1921.536 - 1928.448 MHz			
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5.0 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 determine the values between the dipole center of the probe and the surface of the phantom. This data cannot be measured because the center of the dipole sensors is 1.0 mm away from the probe tip and the distance between the probe and the boundary must be larger than 25% of the probe diameter. The probe diameter is 2.4 mm. In the DASY4 software, the distance between the sensor center and phantom surface is set to 2.0 mm. This provides a distance of 1.0 mm between the probe tip and the surface. The extrapolation of the values between the dipole center and the surface of the phantom 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.

6.0 TIMING PLOT

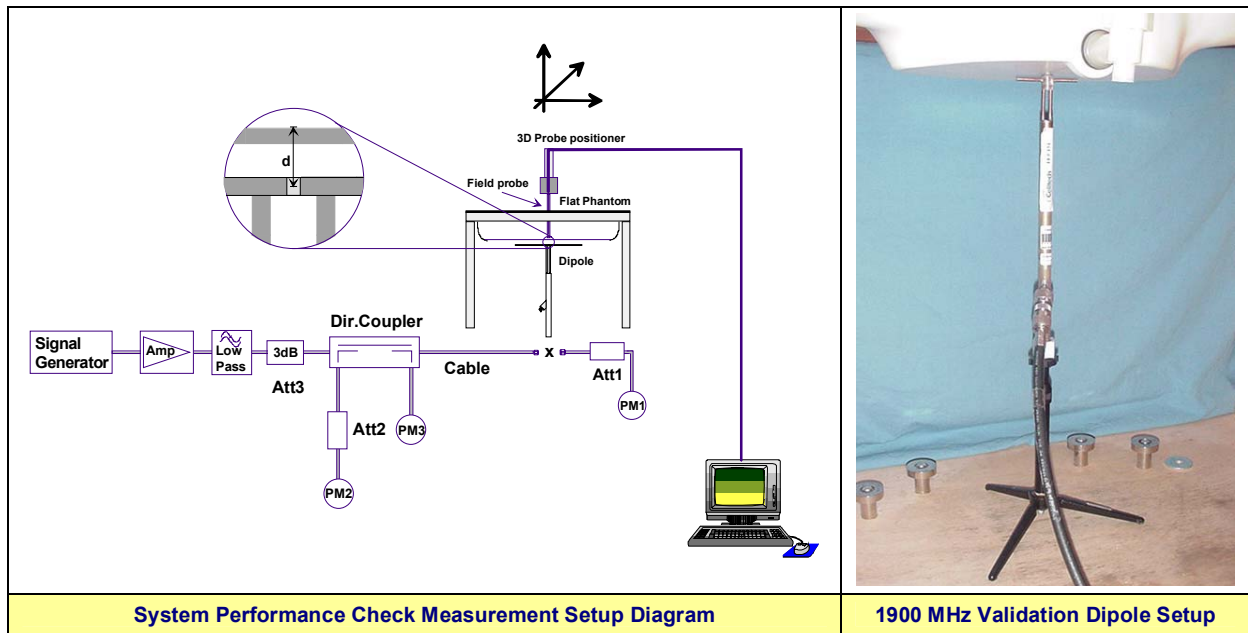




0.4027 ms / 10.03 ms
= 4 % Duty Cycle

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 B for system performance check test plot). The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a 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 $\pm 10\%$ from the system validation target SAR value (see Appendix E for system validation procedures).

SYSTEM PERFORMANCE CHECK EVALUATION SUMMARY																
Test Date	Equiv. Tissue	SAR 1g (W/kg)			Dielectric Constant ϵ_r			Conductivity σ (mho/m)			ρ (Kg/m ³)	Amb. Temp. (°C)	Fluid Temp. (°C)	Fluid Depth (cm)	Humid. (%)	Barom. Press. (kPa)
		Freq. (MHz)	Sys. Val. Target	Meas.	Dev.	Sys. Val. Target	Meas.	Dev.	Sys. Val. Target	Meas.						
Sep 03	Brain 1900	10.8 $\pm 10\%$	10.8	0.0%	40.9 $\pm 5\%$	40.9	0.0%	1.45 $\pm 5\%$	1.45	0.0%	1000	24.0	23.8	≥ 15	30	101.1
Note(s)		1. The target SAR value is referenced from the System Validation procedure performed by Celltech Labs Inc. (see Appendix E).														
		2. The target dielectric parameters are referenced from the System Validation procedure performed by Celltech Labs Inc. (see Appendix E).														
		3. The fluid temperature was measured prior to and after the system performance check to ensure the temperature remained within $\pm 2^\circ\text{C}$ of the fluid temperature reported during the dielectric parameter measurements.														



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8.0 SIMULATED EQUIVALENT TISSUES



The 1900/1920MHz simulated equivalent tissue mixture consisted of Glycol-monobutyl, water and salt. The fluid was 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 LIMITS


SAR RF EXPOSURE LIMITS			
FCC 47 CFR 2.1093	Health Canada Safety Code 6	(General Population / Uncontrolled Exposure)	(Occupational / Controlled Exposure)
Spatial Average (averaged over the whole body)		0.08 W/kg	0.4 W/kg
Spatial Peak (averaged over any 1 g of tissue)		1.6 W/kg	8.0 W/kg
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)		4.0 W/kg	20.0 W/kg
The Spatial Average value of the SAR averaged over the whole body.			
The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.			
The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.			
Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.			
Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.			



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10.0 ROBOT SYSTEM SPECIFICATIONS

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

Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
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11.0 PROBE SPECIFICATION (EX3DV4)

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

Calibration: Basic Broadband Calibration in air: 10-3000 MHz
 Conversion Factors (CF) for HSL 900 and HSL 1750

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

Directivity: ± 0.3 dB in HSL (rotation around probe axis)
 ± 0.5 dB in tissue material (rotation normal to probe axis)

Dynamic Range: 10 μ W/g to >100 mW/g; Linearity: ± 0.2 dB
 (noise: typically $< 1 \mu$ W/g)

Dimensions: Overall length: 330 mm (Tip: 20 mm)
 Tip diameter: 2.5 mm (Body: 12 mm)
 Typical distance from probe tip to dipole centers: 1.0 mm

Application: High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better than 30%.



EX3DV4 E-Field Probe

12.0 SAM PHANTOM V4.0C

The SAM phantom V4.0C is a fiberglass shell phantom with a 2.0 mm (+/-0.2 mm) shell thickness for left and right head and flat planar area integrated in a wooden table. The shape of the fiberglass shell corresponds to the phantom defined by SCC34-SC2. The device holder positions are adjusted to the standard measurement positions in the three sections (see Appendix G for specifications of the SAM phantom V4.0C).




SAM Twin 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

Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset			Freq. Range:	1921.536 - 1928.448 MHz			
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	<u>Test Report Issue Date</u> November 19, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	


14.0 TEST EQUIPMENT LIST




TEST EQUIPMENT		ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION DUE DATE
USED	DESCRIPTION				
x	Schmid & Partner DASY4 System	-	-	-	-
x	-DASY4 Measurement Server	00158	1078	CNR	CNR
x	-Robot	00046	599396-01	CNR	CNR
x	-DAE4	00019	353	22Apr08	22Apr09
x	-EX3DV4 E-Field Probe	00213	3600	19Apr08	19Apr09
x	-1900 MHz Validation Dipole	00032	151	03Sep08	03Sep09
x	-SAM Phantom V4.0C	00154	1033	CNR	CNR
	-Barski Planar Phantom	00155	03-01	CNR	CNR
	-Plexiglas Side Planar Phantom	00156	161	CNR	CNR
	-Plexiglas Validation Planar Phantom	00157	137	CNR	CNR
	ALS-PR-DIEL Dielectric Probe Kit	00160	260-00953	CNR	CNR
x	HP 85070C Dielectric Probe Kit	00033	US39240170	CNR	CNR
x	Gigatronics 8652A Power Meter	00007	1835272	23Apr08	23Apr09
x	Gigatronics 80701A Power Sensor	00014	1833699	23Apr08	23Apr09
x	HP 8753ET Network Analyzer	00134	US39170292	28Apr08	28Apr09
x	Rohde & Schwarz SMR20 Signal Generator	00006	100104	23Apr08	23Apr09
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	CNR	CNR
	Amplifier Research 10W1000C Power Amplifier	00041	27887	CNR	CNR
	Nextec NB00383 Microwave Amplifier	00151	0535	CNR	CNR
Abbr.	CNR = Calibration Not Required				

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15.0 MEASUREMENT UNCERTAINTIES


UNCERTAINTY BUDGET FOR DEVICE EVALUATION									
Uncertainty Component	IEEE 1528 Section	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	ci 10g	Uncertainty Value ±% (1g)	Uncertainty Value ±% (10g)	V _i or V _{eff}
Measurement System									
Probe Calibration (1950 MHz)	E.2.1	5.5	Normal	1	1	1	5.5	5.5	∞
Axial Isotropy	E.2.2	4.7	Rectangular	1.732050808	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	Rectangular	1.732050808	0.7	0.7	3.9	3.9	∞
Boundary Effect	E.2.3	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	Rectangular	1.732050808	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	Rectangular	1.732050808	1	1	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3	Rectangular	1.732050808	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	Rectangular	1.732050808	1	1	0.2	0.2	∞
Probe Positioning wrt Phantom Shell	E.6.3	2.9	Rectangular	1.732050808	1	1	1.7	1.7	∞
Extrapolation, interpolation & integration algorithms for max. SAR evaluation	E.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	2.9	Normal	1	1	1	2.9	2.9	12
Device Holder Uncertainty	E.4.1	3.6	Normal	1	1	1	3.6	3.6	8
SAR Drift Measurement	6.6.2	5	Rectangular	1.732050808	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4	Rectangular	1.732050808	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5	Rectangular	1.732050808	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measured)	E.3.3	5	Normal	1	0.64	0.43	3.2	2.2	∞
Liquid Permittivity (target)	E.3.2	5	Rectangular	1.732050808	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measured)	E.3.3	2.3	Normal	1	0.6	0.49	1.4	1.1	∞
Combined Standard Uncertainty			RSS				10.92	10.50	
Expanded Uncertainty (95% Confidence Interval)			k=2				21.84	20.99	
Measurement Uncertainty Table in accordance with IEEE 1528-2003 and IEC 62209-1:2005									



Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset			Freq. Range:	1921.536 - 1928.448 MHz			
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	<u>Test Report Issue Date</u> November 19, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

MEASUREMENT UNCERTAINTIES (CONT.)


UNCERTAINTY BUDGET FOR SYSTEM VALIDATION									
Uncertainty Component	IEEE 1528 Section	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	ci 10g	Uncertainty Value ±% (1g)	Uncertainty Value ±% (10g)	V _i or V _{eff}
Measurement System									
Probe Calibration (1950 MHz)	E.2.1	6	Normal	1	1	1	6	5.5	∞
Axial Isotropy	E.2.2	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
Hemispherical Isotropy	E.2.2	0	Rectangular	1.732050808	1	1	0.0	0.0	∞
Boundary Effect	E.2.3	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0	Rectangular	1.732050808	1	1	0.0	0.0	∞
Integration Time	E.2.8	0	Rectangular	1.732050808	1	1	0.0	0.0	∞
RF Ambient Conditions	E.6.1	3	Rectangular	1.732050808	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	Rectangular	1.732050808	1	1	0.2	0.2	∞
Probe Positioning wrt Phantom Shell	E.6.3	2.9	Rectangular	1.732050808	1	1	1.7	1.7	∞
Extrapolation, interpolation & integration algorithms for max. SAR evaluation	E.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Dipole									
Dipole Positioning	E.4.2	2	Normal	1.732050808	1	1	1.2	1.2	∞
SAR Drift Measurement	6.6.2	4.7	Normal	1.732050808	1	1	2.7	1.2	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4	Rectangular	1.732050808	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5	Rectangular	1.732050808	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measured)	E.3.3	0	Normal	1	0.64	0.43	0.0	0.0	∞
Liquid Permittivity (target)	E.3.2	5	Rectangular	1.732050808	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measured)	E.3.3	0	Normal	1	0.6	0.49	0.0	0.0	∞
Combined Standard Uncertainty			RSS				8.51	7.98	
Expanded Uncertainty (95% Confidence Interval)			k=2				17.01	15.96	
Measurement Uncertainty Table in accordance with IEEE 1528-2003 and IEC 62209-1:2005									



Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset			Freq. Range:	1921.536 - 1928.448 MHz			
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	<u>Test Report Issue Date</u> November 19, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	


16.0 REFERENCES



- [1] Federal Communications Commission - "Radiofrequency radiation exposure evaluation: portable devices", Rule Part 47 CFR §2.1093.
- [2] Health Canada - "Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz", Safety Code 6: 1999.
- [3] Federal Communications Commission - "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.
- [4] Industry Canada - "Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)", Radio Standards Specification RSS-102 Issue 2: November 2005.
- [5] IEEE Standard 1528-2003 - "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques": December 2003.
- [6] IEC International Standard 62209-1:2005 - "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)".

Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset			Freq. Range:	1921.536 - 1928.448 MHz			
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	<u>Test Report Issue Date</u> November 19, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

APPENDIX A - SAR MEASUREMENT DATA

Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset			Freq. Range:	1921.536 - 1928.448 MHz			
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	<u>Test Report Issue Date</u> November 19, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

Date Tested: 09/03/2008

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

DUT: Plantronics Model: WH100; Type: Portable UPCS DECT Wireless Headset; Serial: PVB1 34

Ambient Temp: 24°C; Fluid Temp: 23.8°C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: TDMA/TDD

Frequency: 1924.99 MHz; Crest Factor: 1:25

Medium: HSL1900 Medium parameters used: $f = 1924.99 \text{ MHz}$; $\sigma = 1.47 \text{ mho/m}$; $\epsilon_r = 40.9$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.99, 6.99, 6.99); Calibrated: 19/04/2008
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Ear-held SAR - Left Head Section - Cheek/Touch Position - Mid Channel

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.018 mW/g

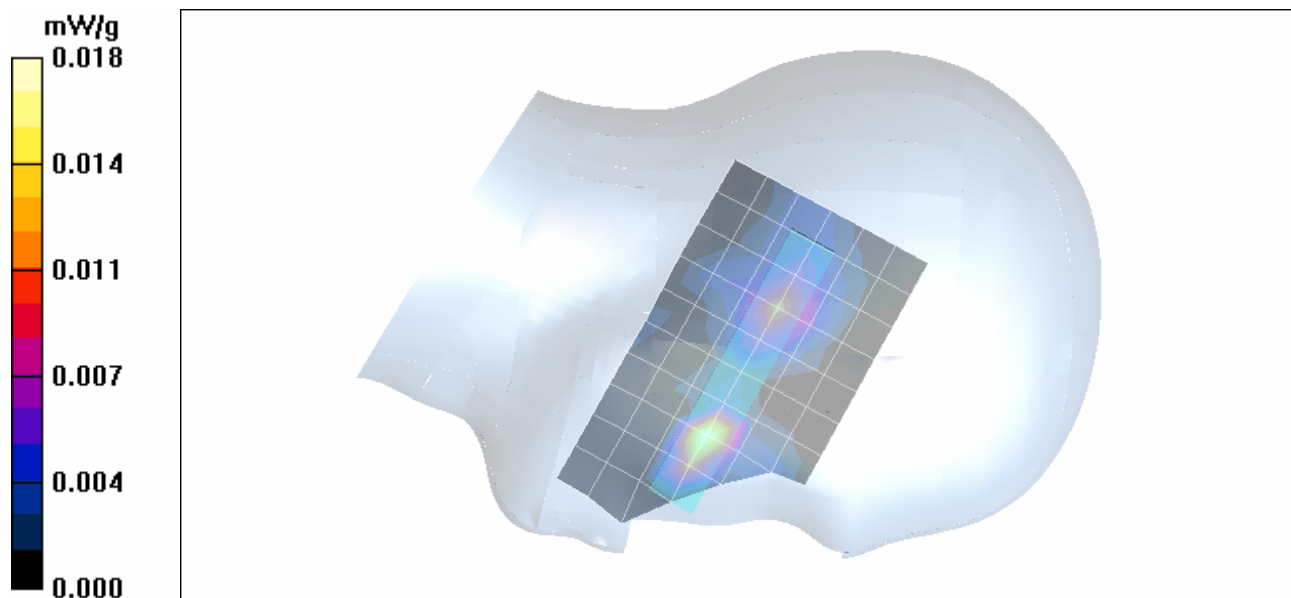
Ear-held SAR - Left Head Section - Cheek/Touch Position - Mid Channel


Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.41 V/m

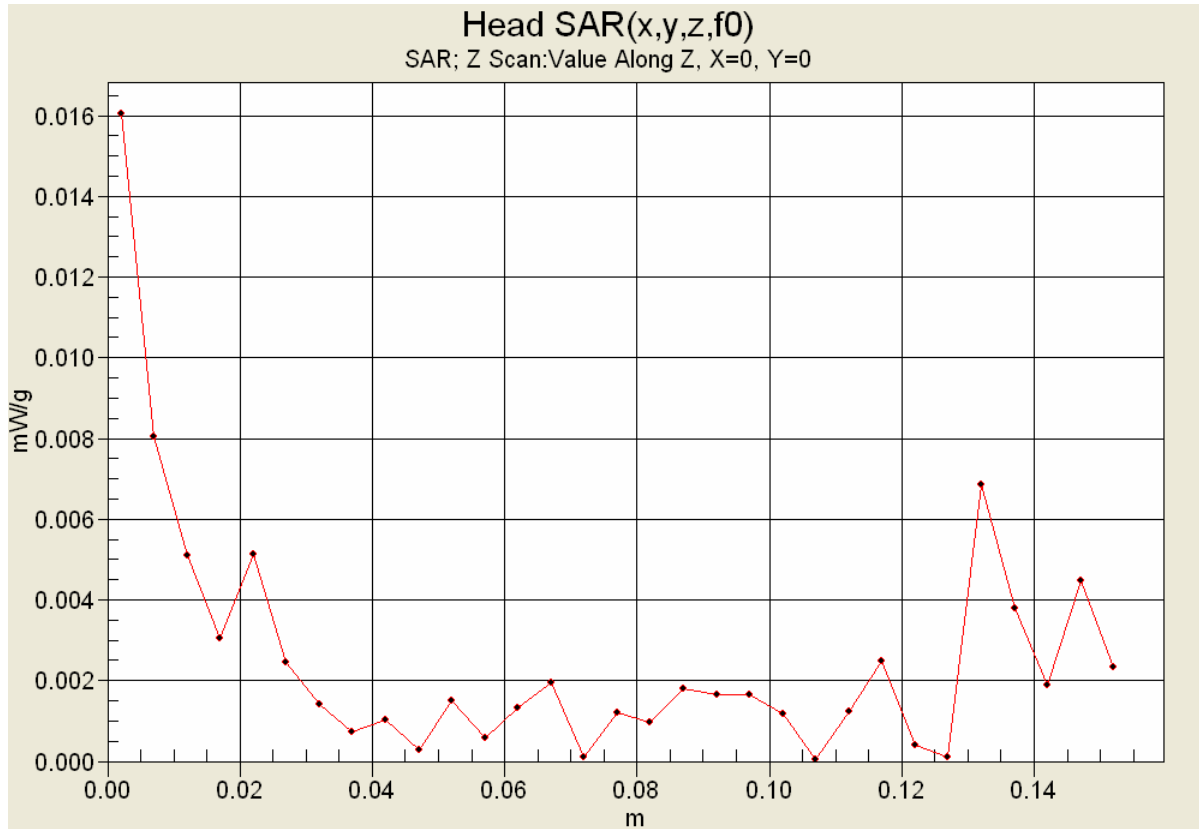
Peak SAR (extrapolated) = 0.024 W/kg

SAR(1 g) = 0.012 mW/g; SAR(10 g) = 0.00467 mW/g





Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset			Freq. Range:	1921.536 - 1928.448 MHz			
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Z-Axis Scan



Due to the very low SAR level measured, the Z-axis scan is only reporting noise. The DASY4 software adjusts the scale according to the measured SAR level, which for this evaluation is close to the measurement noise floor.

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	<u>Test Report Issue Date</u> November 19, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

Date Tested: 09/03/2008

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

DUT: Plantronics Model: WH100; Type: Portable UPCS DECT Wireless Headset; Serial: PVB1 34

Ambient Temp: 24°C; Fluid Temp: 23.8°C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: TDMA/TDD

Frequency: 1924.99 MHz; Crest Factor: 1:25

Medium: HSL1900 Medium parameters used: $f = 1924.99 \text{ MHz}$; $\sigma = 1.47 \text{ mho/m}$; $\epsilon_r = 40.9$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.99, 6.99, 6.99); Calibrated: 19/04/2008
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Ear-held SAR - Right Head Section - Cheek/Touch Position - Mid Channel

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.013 mW/g

Ear-held SAR - Right Head Section - Cheek/Touch Position - Mid Channel

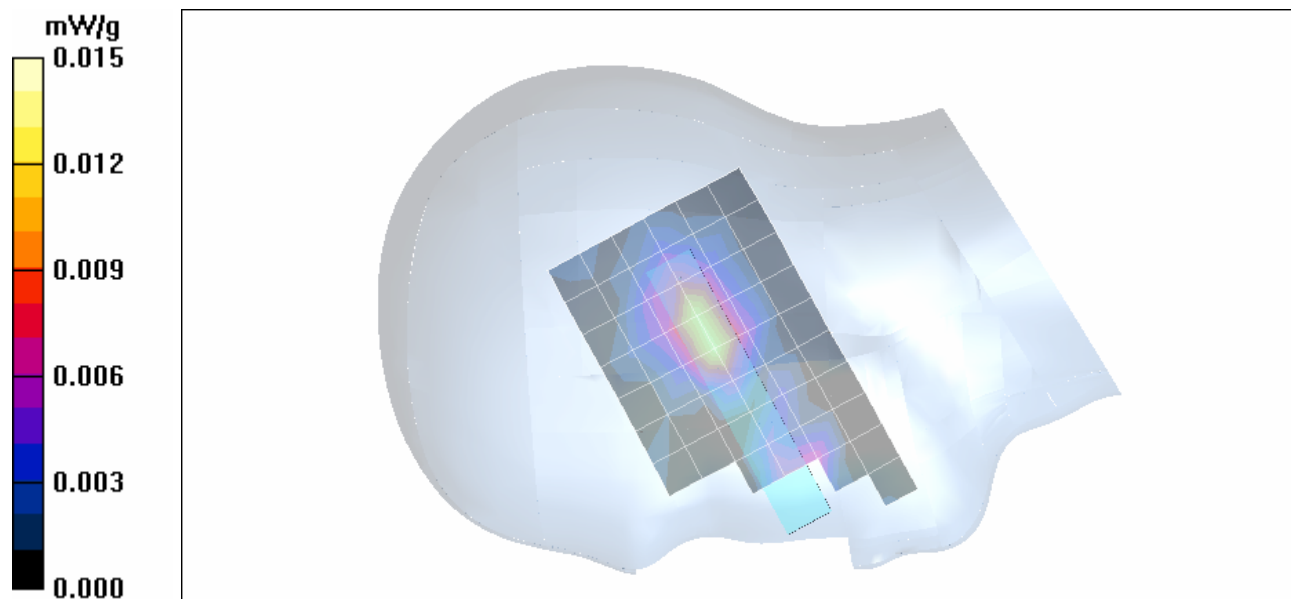
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm


Reference Value = 2.90 V/m



Peak SAR (extrapolated) = 0.018 W/kg

SAR(1 g) = 0.010 mW/g; SAR(10 g) = 0.00597 mW/g

Maximum value of SAR (measured) = 0.015 mW/g



Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset			Freq. Range:	1921.536 - 1928.448 MHz			
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Fluid Depth (>15cm)





Left Head Section






Right Head Section

Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset			Freq. Range:	1921.536 - 1928.448 MHz			
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APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset			Freq. Range:	1921.536 - 1928.448 MHz			
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Date Tested: 09/03/2008

System Performance Check - 1900 MHz Dipole - HSL

DUT: Dipole 1900 MHz; Asset: 00032; Serial: 151; Validation: 09/03/2008

Ambient Temp: 24°C; Fluid Temp: 23.8°C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Forward Conducted Power: 250 mW

Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL1900 Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.45 \text{ mho/m}$; $\epsilon_r = 40.9$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.99, 6.99, 6.99); Calibrated: 19/04/2008
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: SAM 4.0; Type: Fibreglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

System Performance Check - 1900 MHz Dipole

Area Scan (5x8x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 15.1 mW/g

System Performance Check - 1900 MHz Dipole

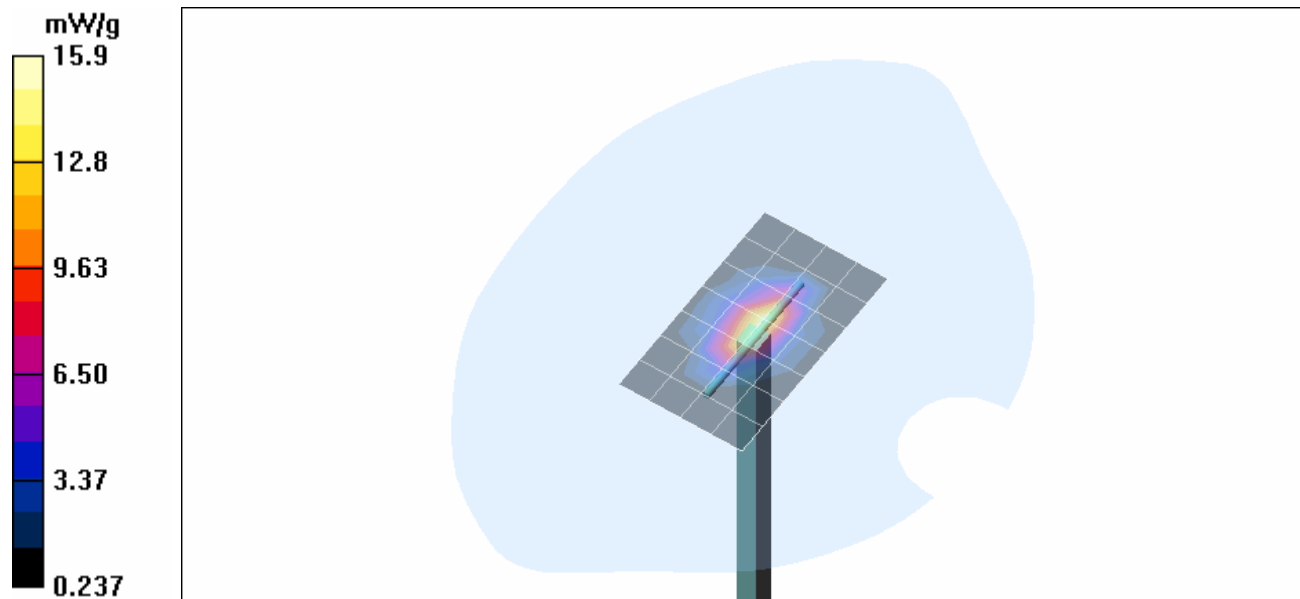
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$


Reference Value = 106.0 V/m; Power Drift = 0.067 dB

Peak SAR (extrapolated) = 20.9 W/kg

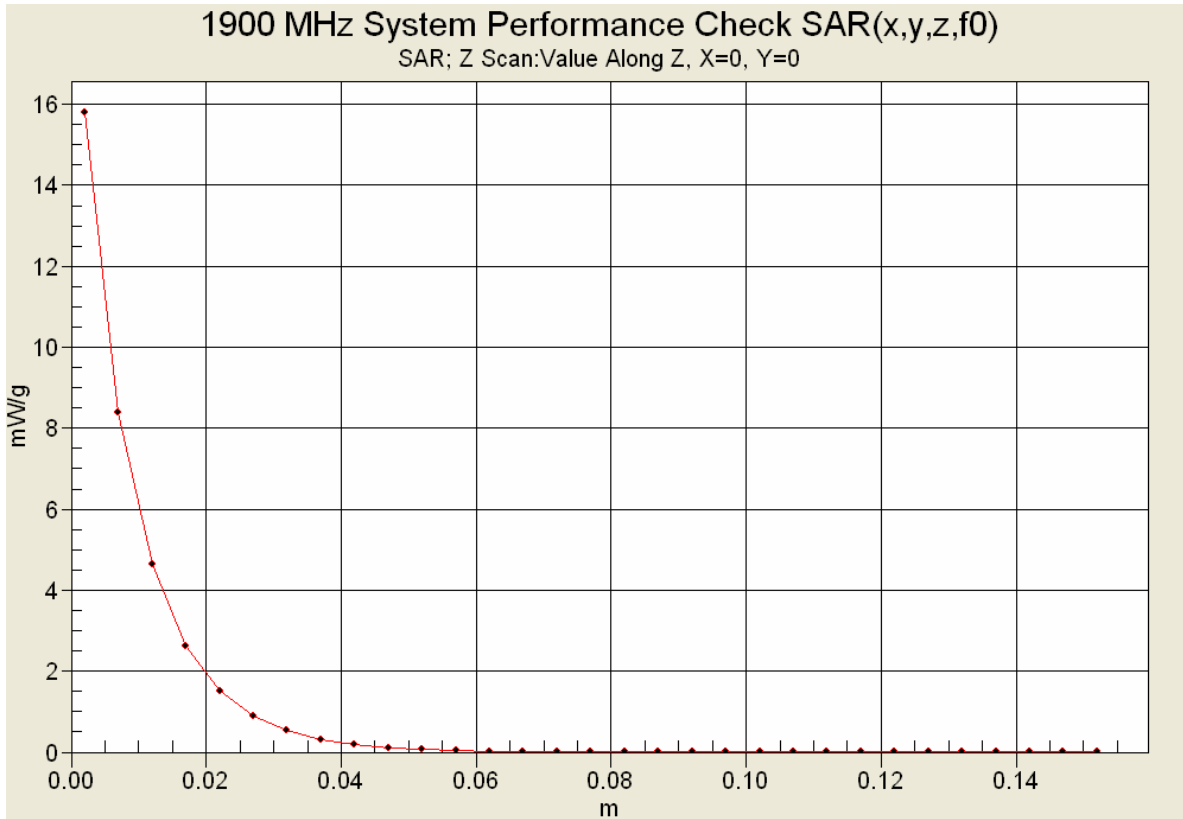
SAR(1 g) = 10.8 mW/g; SAR(10 g) = 5.47 mW/g



Maximum value of SAR (measured) = 15.9 mW/g




Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset			Freq. Range:	1921.536 - 1928.448 MHz			
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Z-Axis Scan



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APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS


Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset			Freq. Range:	1921.536 - 1928.448 MHz			
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1900 MHz System Performance Check & 1920 MHz DUT Evaluation (Brain)


Celltech Labs Inc.
 Test Result for UIM Dielectric Parameter
 03/Sep/2008
 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_eHFCC_sH	Test_e	Test_s
1.8000	40.00	1.40	41.24
1.8100	40.00	1.40	41.23
1.8200	40.00	1.40	41.01
1.8300	40.00	1.40	41.07
1.8400	40.00	1.40	41.13
1.8500	40.00	1.40	41.07
1.8600	40.00	1.40	41.02
1.8700	40.00	1.40	40.77
1.8800	40.00	1.40	40.92
1.8900	40.00	1.40	40.86
1.9000	40.00	1.40	40.85
1.9100	40.00	1.40	40.85
1.9200	40.00	1.40	40.89
1.9300	40.00	1.40	40.65
1.9400	40.00	1.40	40.91
1.9500	40.00	1.40	40.64
1.9600	40.00	1.40	40.66
1.9700	40.00	1.40	40.41
1.9800	40.00	1.40	40.58
1.9900	40.00	1.40	40.64
2.0000	40.00	1.40	40.55

Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset			Freq. Range:	1921.536 - 1928.448 MHz			
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	<u>Date(s) of Evaluation</u> September 03, 2008	<u>Test Report Serial No.</u> 082608AL8-T927-S15D	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> November 19, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS

Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset			Freq. Range:	1921.536 - 1928.448 MHz			
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	<u>Date(s) of Evaluation</u> September 03, 2008	<u>Test Report Serial No.</u> 082608AL8-T927-S15D	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> November 19, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

APPENDIX E - SYSTEM VALIDATION

Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset			Freq. Range:	1921.536 - 1928.448 MHz			
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Date of Evaluation:	September 03, 2008	Validation Document Serial No.:	SV1900B-090308-R1.0		
Evaluation Type:	System Validation	Validation Dipole:	1900 MHz	Fluid Type:	Brain

1900 MHz SYSTEM VALIDATION

Type:

1900 MHz Validation Dipole

Asset Number:

00032

Serial Number:

151

Place of Validation:

Celltech Labs Inc.

Date of Validation:

September 03, 2008

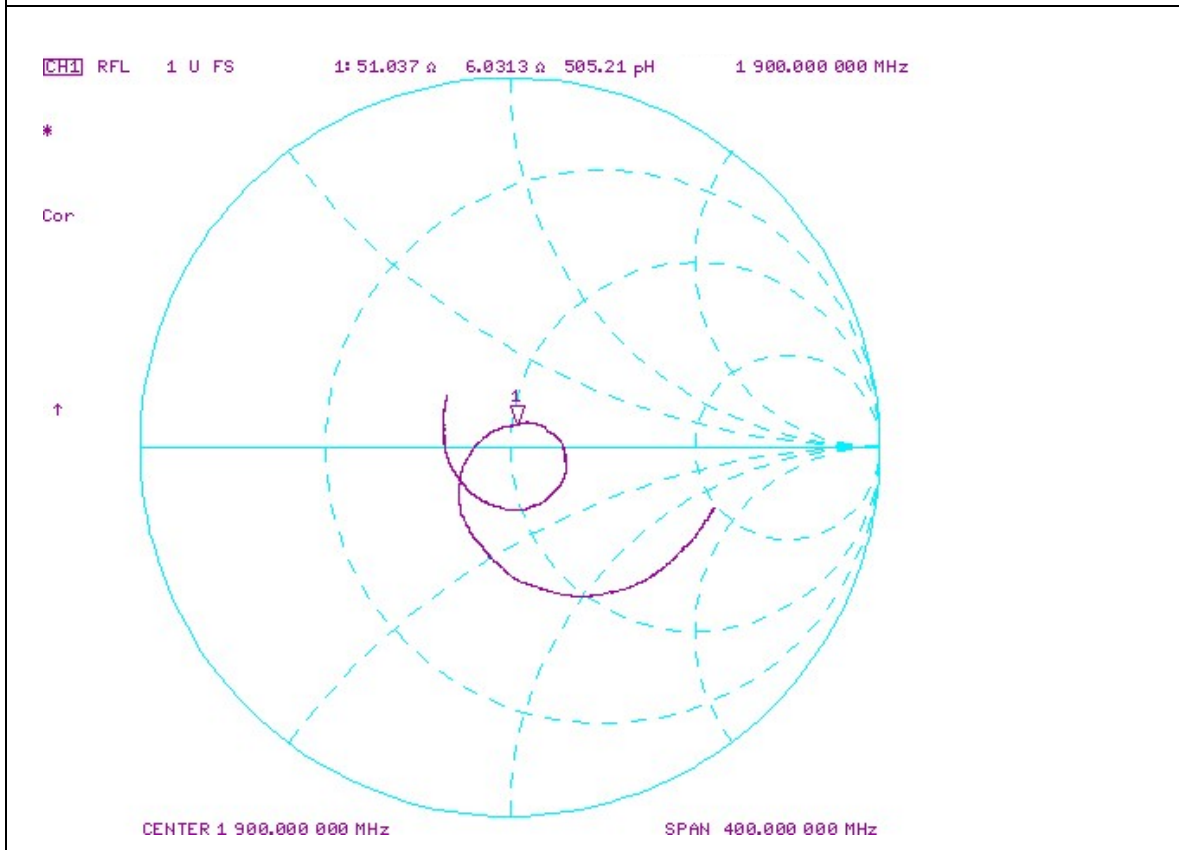
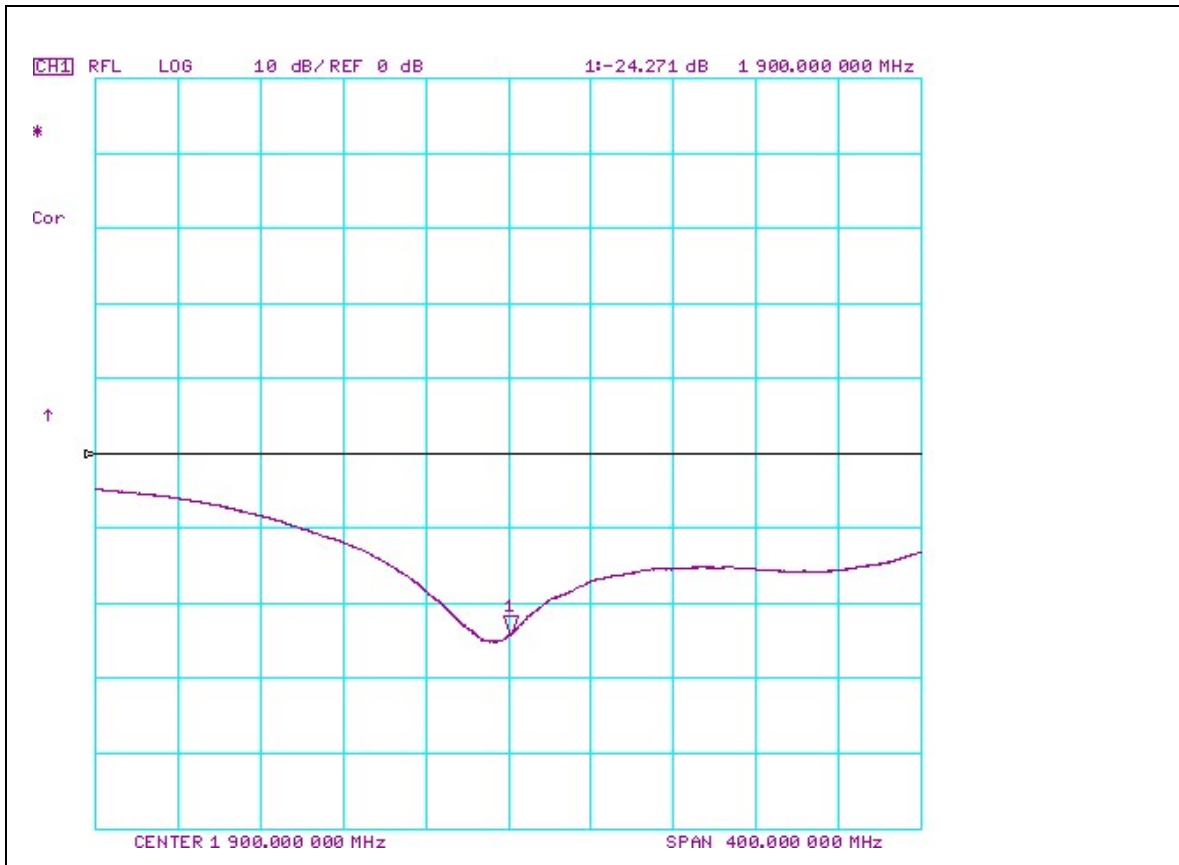
Celltech Labs Inc. hereby certifies that the 1900 MHz System Validation was performed on the date indicated above.

Performed by:

Sean Johnston

Signature:

2. Validation Dipole VSWR Data



3. Validation Dipole Dimensions

Frequency (MHz)	L (mm)	h (mm)	d (mm)
300	396.0	250.0	6.0
450	270.0	167.0	6.0
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	51.5	30.4	3.6
3000	41.5	25.0	3.6

4. Validation Phantom

The validation phantom is the SAM (Specific Anthropomorphic Mannequin) twin 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)



SAM Twin Phantom V4.0C



Fluid Depth (≥ 15.0 cm)

	Date of Evaluation:	September 03, 2008	Validation Document Serial No.:	SV1900B-090308-R1.0	
	Evaluation Type:	System Validation	Validation Dipole:	1900 MHz	Fluid Type:

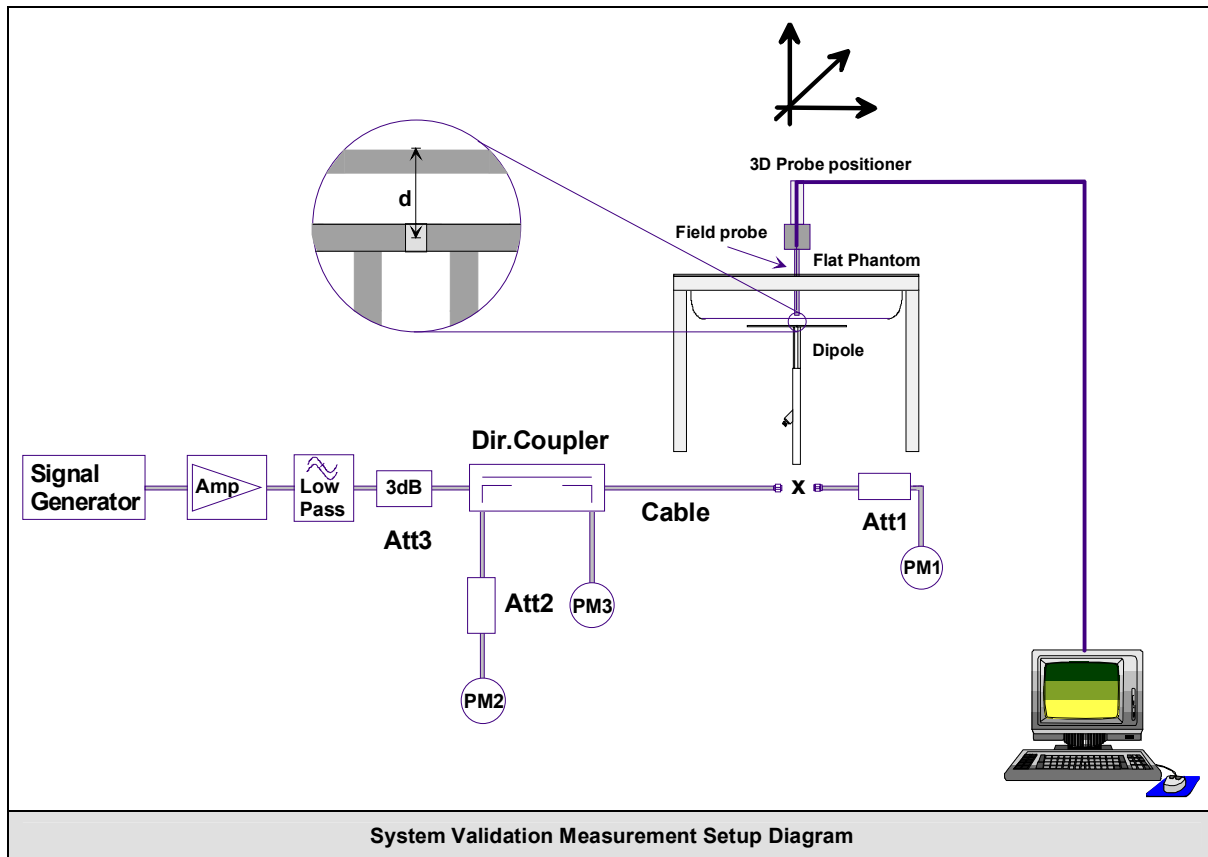
5. 1900 MHz System Validation Setup



6. SAR Measurement

Measurements were made using a dosimetric E-field probe EX3DV4 (S/N: 3600, Conversion Factor 6.99). The SAR measurement was performed with the E-field probe in mechanical detection mode only. The setup and determination of the forward power into the dipole was performed using the procedures described below.

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



7. Measurement Conditions

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

Relative Permittivity: 40.9 (+2.2% deviation from target)
 Conductivity: 1.45 mho/m (+3.5% deviation from target)
 Fluid Temperature: 23.8 °C (Start of Test) / 23.7 °C (End of Test)
 Fluid Depth: ≥ 15.0 cm
 Environmental Conditions:
 Ambient Temperature: 24.0 °C
 Barometric Pressure: 101.1 kPa
 Humidity: 30%

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

Ingredient	Percentage by weight	
Water	55.85%	
Glycol	44.00%	
Salt	0.15%	
IEEE/IEC Target Dielectric Parameters (1900 MHz):	$\epsilon_r = 40.0 (+/-5\%)$	$\sigma = 1.40 \text{ S/m (+/-5\%)}$

8. System Validation SAR Results

SAR @ 0.25W Input averaged over 1g (W/kg)				SAR @ 1W Input averaged over 1g (W/kg)			
IEEE/IEC Target		Measured	Deviation	IEEE/IEC Target		Measured	Deviation
9.93	+/- 10%	10.8	+8.8%	39.7	+/- 10%	43.2	+8.8%
SAR @ 0.25W Input averaged over 10g (W/kg)				SAR @ 1W Input averaged over 10g (W/kg)			
IEEE/IEC Target		Measured	Deviation	IEEE/IEC Target		Measured	Deviation
5.13	+/- 10%	5.47	+6.7%	20.5	+/- 10%	21.9	+6.7%

Frequency (MHz)	1 g SAR	10 g SAR	Local SAR at surface (above feed-point)	Local SAR at surface (y – 2 cm offset from feed-point) ^a
300	3.0	2.0	4.4	2.1
450	4.9	3.3	7.2	3.2
835	9.5	6.2	4.1	4.9
900	10.8	6.9	16.4	5.4
1450	29.0	16.0	50.2	6.5
1800	38.1	19.8	69.5	6.8
1900	39.7	20.5	72.1	6.6
2000	41.1	21.1	74.6	6.5
2450	52.4	24.0	104.2	7.7
3000	63.8	25.7	140.2	9.5

Numerical reference SAR values for reference dipole and flat phantom normalized to 1 W (IEEE 1528-2003; IEC 62209-1:2005)

	Date of Evaluation:	September 03, 2008	Validation Document Serial No.:	SV1900B-090308-R1.0	
	Evaluation Type:	System Validation	Validation Dipole:	1900 MHz	Fluid Type:

Date Tested: 09/03/2008

System Validation - 1900 MHz Dipole - HSL

DUT: Dipole 1900 MHz; Asset: 00032; Serial: 151; Validation: 09/03/2008

Ambient Temp: 24°C; Fluid Temp: 23.8°C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Forward Conducted Power: 250 mW

Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL1900 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.45$ mho/m; $\epsilon_r = 40.9$; $\rho = 1000$ kg/m³

- Probe: EX3DV4 - SN3600; ConvF(6.99, 6.99, 6.99); Calibrated: 19/04/2008
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

System Validation - 1900 MHz Dipole

Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 15.1 mW/g

System Validation - 1900 MHz Dipole

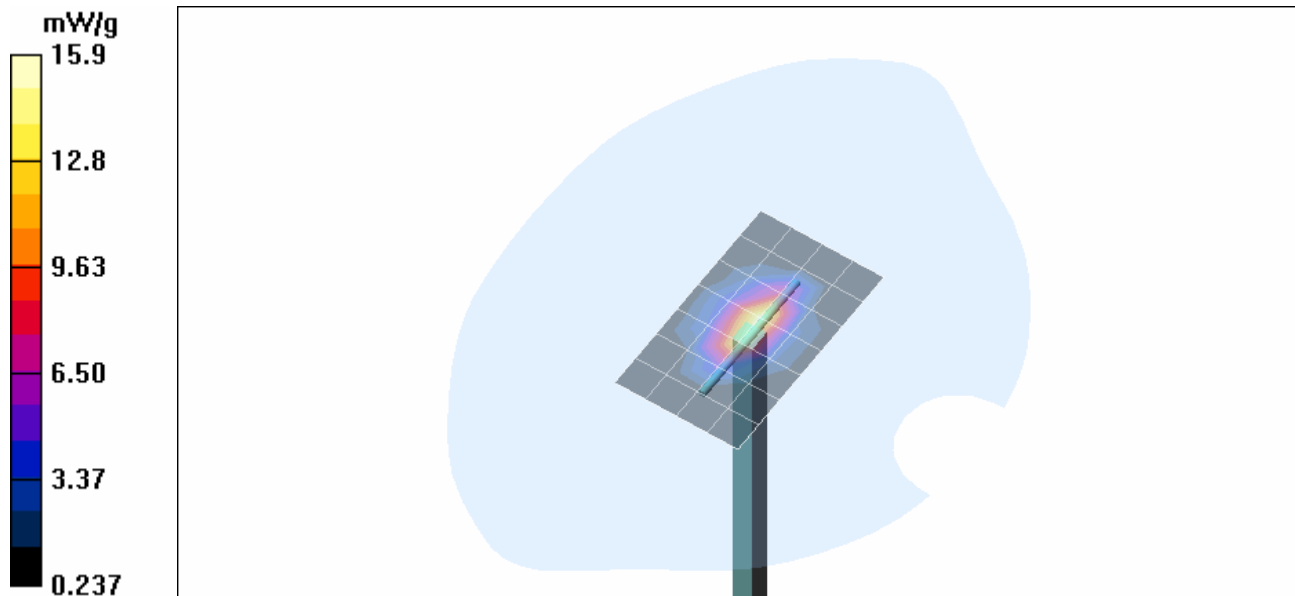
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 106.0 V/m; Power Drift = 0.067 dB

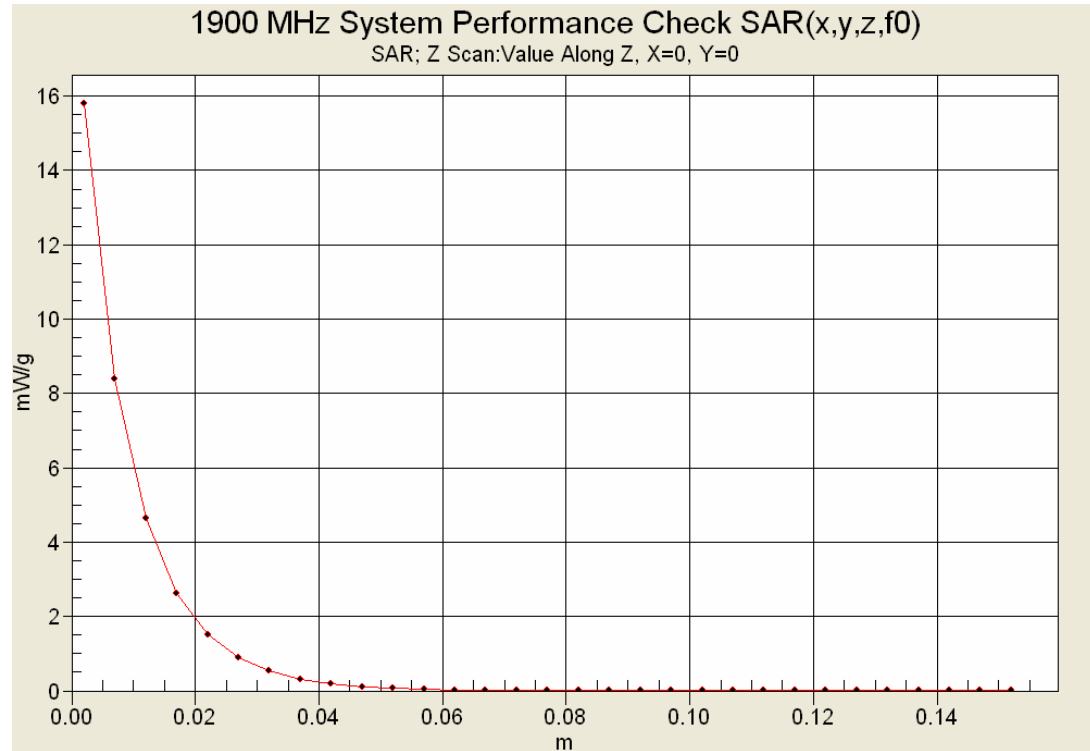
Peak SAR (extrapolated) = 20.9 W/kg

SAR(1 g) = 10.8 mW/g; SAR(10 g) = 5.47 mW/g

Maximum value of SAR (measured) = 15.9 mW/g



Z-Axis Scan



9. Measured Fluid Dielectric Parameters

System Validation - 1900 MHz (Brain)

 Celltech Labs Inc.
 Test Result for UIM Dielectric Parameter
 03/Sep/2008
 Frequency (GHz)
 IEEE_eH 1528-2003 Limits for Head Epsilon
 IEEE_sH 1528-2003 Limits for Head Sigma
 Test_e Epsilon of UIM
 Test_s Sigma of UIM

Freq	IEEE_eH	IEEE_sH	Test_e	Test_s
1.8000	40.00	1.40	41.24	1.35
1.8100	40.00	1.40	41.23	1.37
1.8200	40.00	1.40	41.01	1.39
1.8300	40.00	1.40	41.07	1.39
1.8400	40.00	1.40	41.13	1.40
1.8500	40.00	1.40	41.07	1.40
1.8600	40.00	1.40	41.02	1.41
1.8700	40.00	1.40	40.77	1.41
1.8800	40.00	1.40	40.92	1.44
1.8900	40.00	1.40	40.86	1.44
1.9000	40.00	1.40	40.85	1.45
1.9100	40.00	1.40	40.85	1.46
1.9200	40.00	1.40	40.89	1.47
1.9300	40.00	1.40	40.65	1.49
1.9400	40.00	1.40	40.91	1.49
1.9500	40.00	1.40	40.64	1.50
1.9600	40.00	1.40	40.66	1.51
1.9700	40.00	1.40	40.41	1.52
1.9800	40.00	1.40	40.58	1.53
1.9900	40.00	1.40	40.64	1.54
2.0000	40.00	1.40	40.55	1.56

	Date of Evaluation:	September 03, 2008	Validation Document Serial No.:	SV1900B-090308-R1.0	
	Evaluation Type:	System Validation	Validation Dipole:	1900 MHz	Fluid Type:



10. Measurement Uncertainties

UNCERTAINTY BUDGET FOR SYSTEM VALIDATION						
Error Description	Uncertainty Value $\pm\%$	Probability Distribution	Divisor	ci 1g	Uncertainty Value $\pm\%$ (1g)	V_i or V_{eff}
Measurement System						
Probe calibration (1950 MHz)	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	0.2	Rectangular	1.732050808	1	0.1	∞
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	∞
Dipole						
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)	3.5	Normal	1	0.64	2.2	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	2.2	Normal	1	0.6	1.3	∞
Combined Standard Uncertainty					8.88	
Expanded Uncertainty (k=2)					17.75	


Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 and IEC Standard 62209-1:2005

11. Test Equipment List

TEST EQUIPMENT	ASSET NO.	SERIAL NO.	DATE OF CAL.	CAL. DUE DATE
SPEAG DASY4 Measurement Server	00158	1078	NA	NA
SPEAG Robot	00046	599396-01	NA	NA
SPEAG DAE4	00019	353	22Apr08	22Apr09
EX3DV4 E-Field Probe	00213	3600	19Apr08	19Apr09
1900 MHz Validation Dipole	00032	151	03Sep08	03Sep09
SPEAG SAM Twin Phantom V4.0C	00154	1033	NA	NA
HP 85070C Dielectric Probe Kit	00033	US39240170	NA	NA
Gigatronics 8652A Power Meter	00007	1835272	23Apr08	23Apr09
Gigatronics 80701A Power Sensor	00014	1833699	23Apr08	23Apr09
HP 8753ET Network Analyzer	00134	US39170292	28Apr08	28Apr09
HP 8648D Signal Generator	00005	3847A00611	NR	NR
Amplifier Research 5S1G4 Power Amplifier	00106	26235	NR	NR
Abbreviations	NA = Not Applicable		NR = Not Required	

	<u>Date(s) of Evaluation</u> September 03, 2008	<u>Test Report Serial No.</u> 082608AL8-T927-S15D	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> November 19, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

APPENDIX F - PROBE CALIBRATION

Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset			Freq. Range:	1921.536 - 1928.448 MHz			
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Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Celltech**

Certificate No: **EX3-3600_Apr08**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3600**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-14.v3 and QA CAL-23.v3
Calibration procedure for dosimetric E-field probes**

Calibration date: **April 19, 2008**

Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	8-Aug-07 (No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	8-Aug-07 (No. 217-00720)	Aug-08
Reference Probe ES3DV2	SN: 3013	2-Jan-08 (No. ES3-3013_Jan08)	Jan-09
DAE4	SN: 660	3-Sep-07 (No. DAE4-660_Sep07)	Sep-08
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-07)	In house check: Oct-08

Calibrated by: **Katja Pokovic** **Technical Manager**

Approved by: **Niels Kuster** **Quality Manager**

Signature

Issued: April 22, 2008

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E²-field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * *frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * *ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe EX3DV4

SN:3600

Manufactured:	January 10, 2007
Last calibrated:	January 24, 2007
Recalibrated:	April 19, 2008

Calibrated for DASYS Systems

(Note: non-compatible with DASYS2 system!)

DASY - Parameters of Probe: EX3DV4 SN:3600**Sensitivity in Free Space^A****Diode Compression^B**

NormX	0.480 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	86 mV
NormY	0.500 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	88 mV
NormZ	0.380 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	92 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL 1810 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		2.0 mm	3.0 mm
SAR _{be} [%]	Without Correction Algorithm	7.7	3.3
SAR _{be} [%]	With Correction Algorithm	0.2	0.5

Sensor Offset

Probe Tip to Sensor Center **1.0 mm**

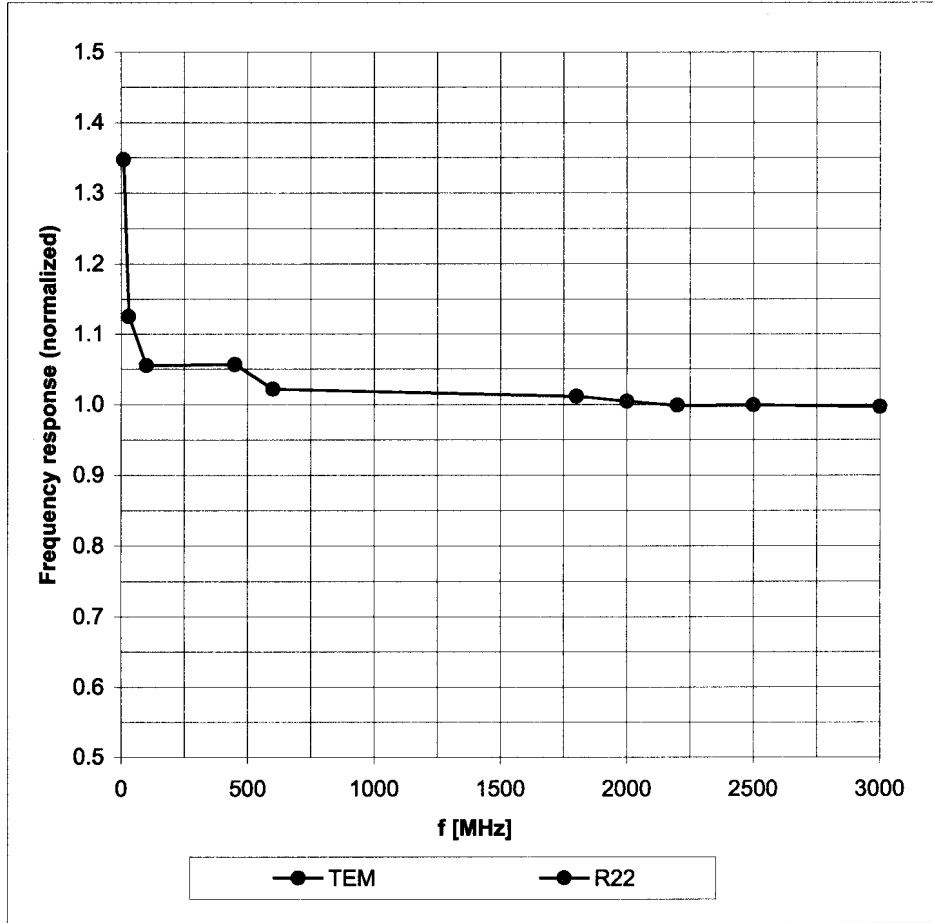
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Page 8).

^B Numerical linearization parameter: uncertainty not required.

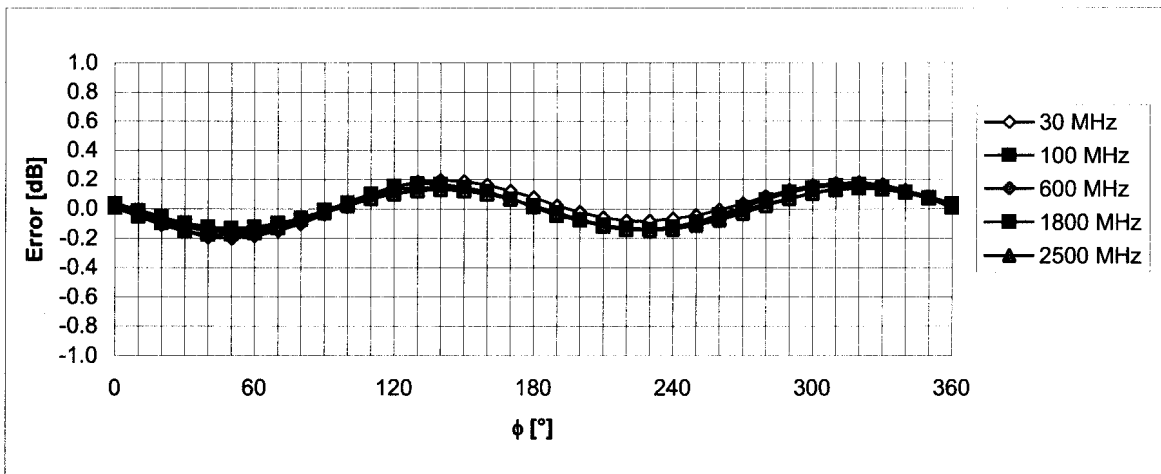
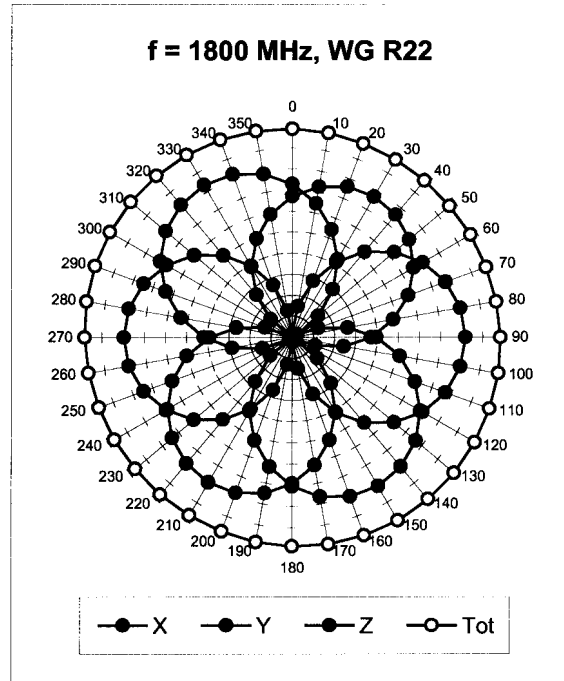
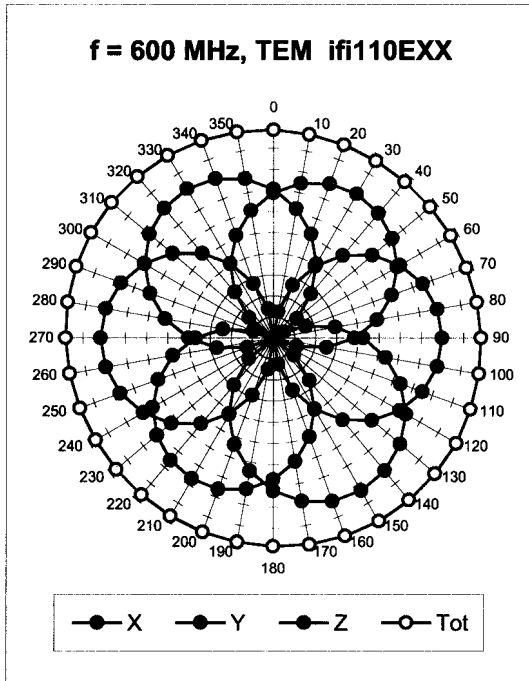
Frequency Response of E-Field

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



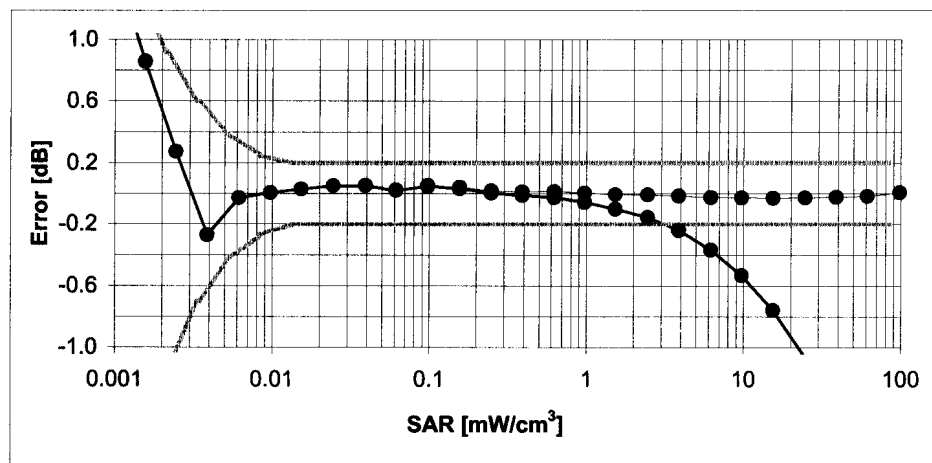
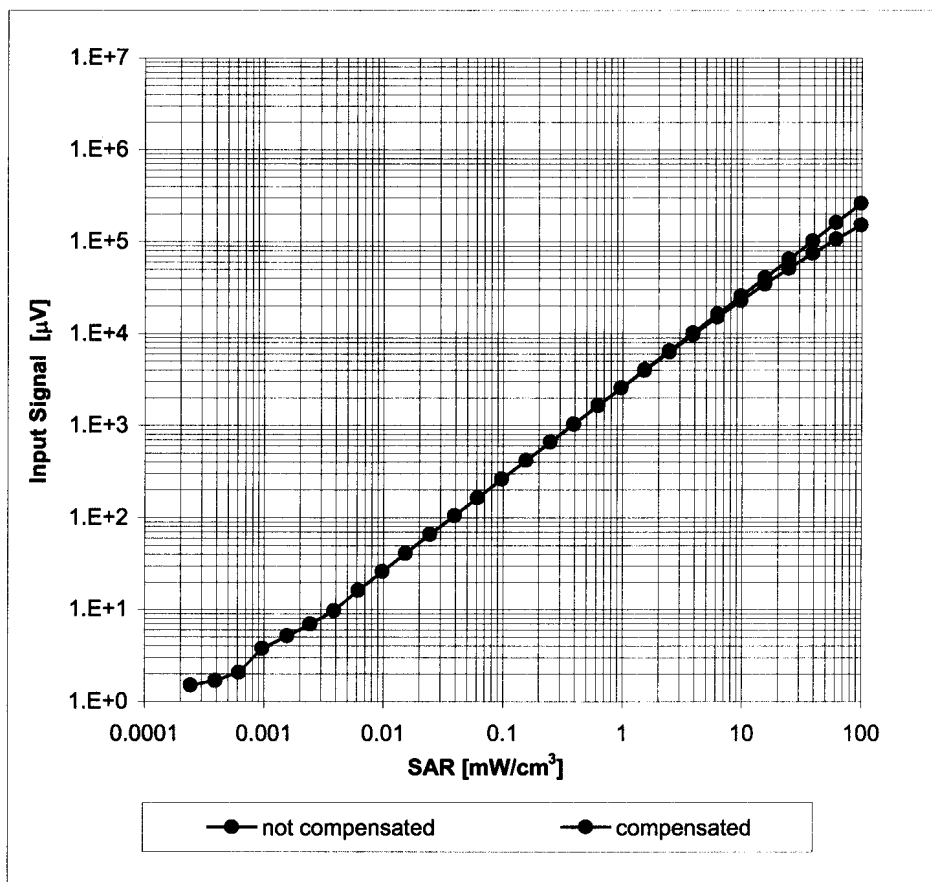
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\vartheta = 0^\circ$



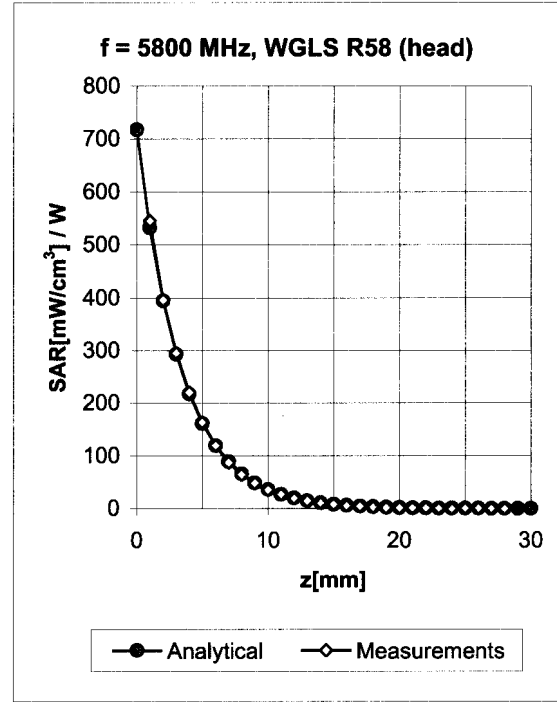
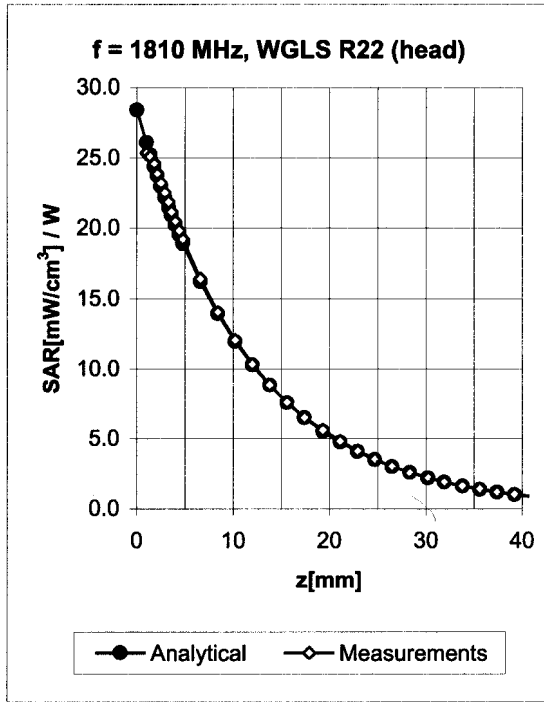
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(SAR_{head})$ (Waveguide R22, $f = 1800$ MHz)



Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment

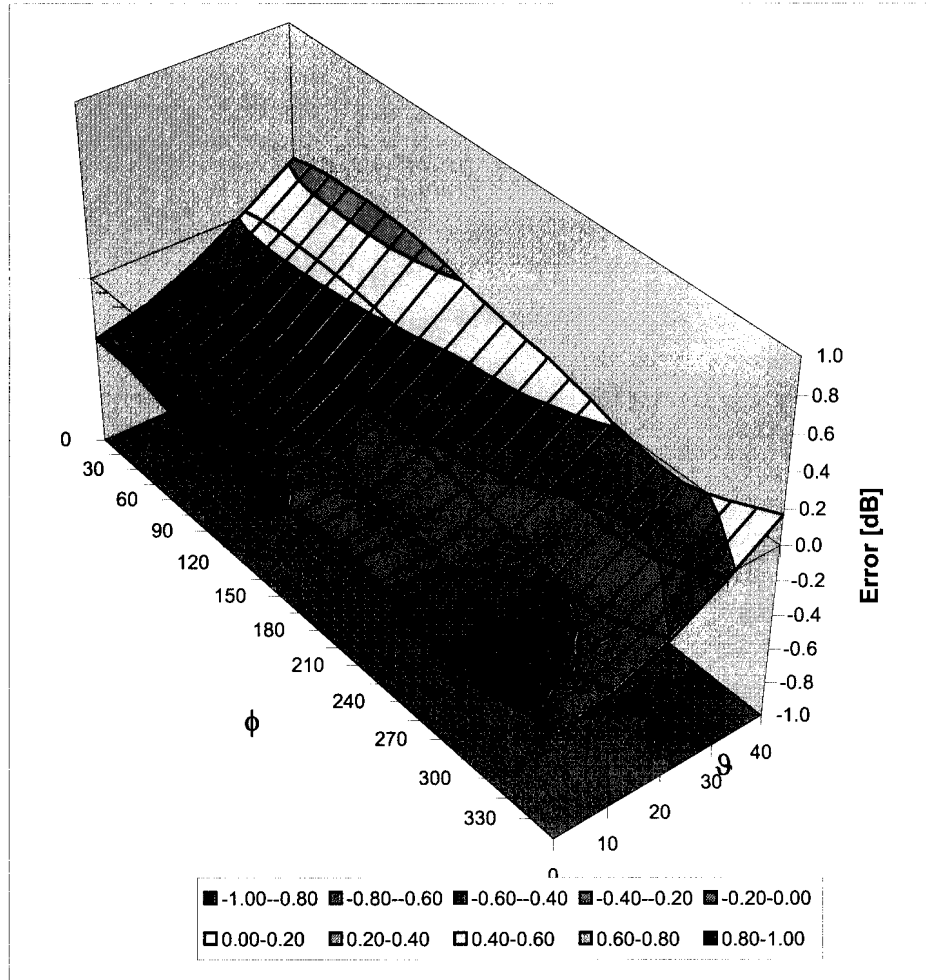


f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.82	0.58	7.32 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.85	0.57	6.99 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.79	0.58	6.75 ± 11.0% (k=2)
5800	± 50 / ± 100	Head	35.3 ± 5%	5.27 ± 5%	0.50	1.70	4.11 ± 13.1% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.93	0.56	7.45 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.92	0.55	7.07 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.59	0.73	6.32 ± 11.0% (k=2)
5200	± 50 / ± 100	Body	49.0 ± 5%	5.30 ± 5%	0.50	1.70	3.84 ± 13.1% (k=2)
5500	± 50 / ± 100	Body	48.6 ± 5%	5.65 ± 5%	0.48	1.70	3.86 ± 13.1% (k=2)
5800	± 50 / ± 100	Body	48.2 ± 5%	6.00 ± 5%	0.47	1.70	3.93 ± 13.1% (k=2)



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

Deviation from Isotropy in HSL


Error (ϕ , ϑ), $f = 900$ MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)

	<u>Date(s) of Evaluation</u> September 03, 2008	<u>Test Report Serial No.</u> 082608AL8-T927-S15D	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> November 19, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

APPENDIX G - SAM PHANTOM CERTIFICATE OF CONFORMITY

Applicant:	Plantronics Inc.	Model:	WH100	FCC ID:	AL8-WH100	IC:	457A-WH100	
DUT Type:	Portable UPCS/LE-PCS DECT Wireless Headset		Freq. Range:	1921.536 - 1928.448 MHz				
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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

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