

	<u>Date(s) of Evaluation</u> September 06, 2006	<u>Test Report Serial No.</u> 090106AL8-T771-S15B	<u>Report Revision No.</u> Revision 1.0	  Certificate No. 2470.01
	<u>Report Issue Date</u> September 13, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

RF EXPOSURE EVALUATION
SPECIFIC ABSORPTION RATE

SAR TEST REPORT

FOR

PLANTRONICS INC.

WIRELESS HEADSET ADAPTOR (Base Unit)

MODEL: CA12CD (Base)

FCC ID: AL8CA12CDXXXX

TEST STANDARD(S) & PROCEDURE(S) APPLIED
FCC OET Bulletin 65, Supplement C (01-01)
Industry Canada RSS-102 Issue 2
IEEE 1528-2003

Test Report Serial No.

090106AL8-T771-S15B

Test Report Revision No.

Revision 1.0 (Initial Release)


Test Location



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



Certificate No. 2470.01

<u>Test Report Prepared By:</u> Cheri Frangiadakis Test Report Writer Celltech Labs Inc.	<u>Test Report Reviewed By:</u> Jonathan Hughes General Manager Celltech Labs Inc.
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Company:	Plantronics Inc.	FCC ID:	AL8CA12CDXXXX	1921.536 - 1928.448 MHz	
Model(s):	CA12CD (Base)	Device:	Wireless Headset Adaptor (Base Unit)		
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DECLARATION OF COMPLIANCE SAR RF EXPOSURE EVALUATION

<u>Test Lab and Location</u> CELLTECH LABS INCORPORATED 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		<u>Company Information</u> PLANTRONICS INC. 345 Encinal Street Santa Cruz, CA 95060 United States	
FCC ID:	AL8CA12CDXXXX		
Model(s):	CA12CD (Base)		
Test Standard(s):	FCC 47 CFR §2.1093; Health Canada Safety Code 6		
Test Procedure(s):	FCC OET Bulletin 65, Supplement C (01-01)		
	Industry Canada RSS-102 Issue 2		
	IEEE 1528-2003		
FCC Device Classification:	Part 15 Unlicensed PCS Base Station (PUB)		
IC Device Classification:	2 GHz Licence-exempt Personal Communications Service Device (LE-PCS)		
Device Description:	Wireless Headset Adaptor (Base Unit)		
Mode of Operation:	TDMA/TDD		
Transmit Frequency Range:	1921.536 - 1928.448 MHz		
RF Output Power Tested:	2.7 dBm (1.86 mW) Conducted - Antenna 0 (Right Side of DUT)		
	0.9 dBm (1.23 mW) Conducted - Antenna 1 (Left Side of DUT)		
Max. Duty Cycle Tested:	8.3 % Source-Based Time-Averaged (Crest Factor: 1:12.05)		
Antenna Type(s) Tested:	Internal Diversity (Antenna 0 / Antenna 1)		
Power Source(s) Tested:	7.5 W Plantronics AC Adapter (P/N: 45561-02)		
Max. SAR Level(s) Evaluated:	Body: 0.006 W/kg (Peak SAR measured from Area Scan)		

Celltech Labs Inc. declares under its sole responsibility that this wireless 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.

Test Report Approved By:
Sean Johnston
 SAR Lab Manager
 Celltech Labs Inc.






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1.0 INTRODUCTION

This measurement report demonstrates that the PLANTRONICS Model: CA12CD Wireless Headset Adaptor (Base Unit) complies with the SAR (Specific Absorption Rate) RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) and Health Canada's Safety Code 6 (see reference [2]) for the General Population / Uncontrolled Exposure environment. The test procedures described in FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]), IC RSS-102 Issue 2 (see reference [4]), and IEEE Standard 1528-2003 (see reference [5]) were employed. A description of the product, operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the various provisions of the rules are included within this test report.

2.0 DESCRIPTION OF DEVICE UNDER TEST (DUT)

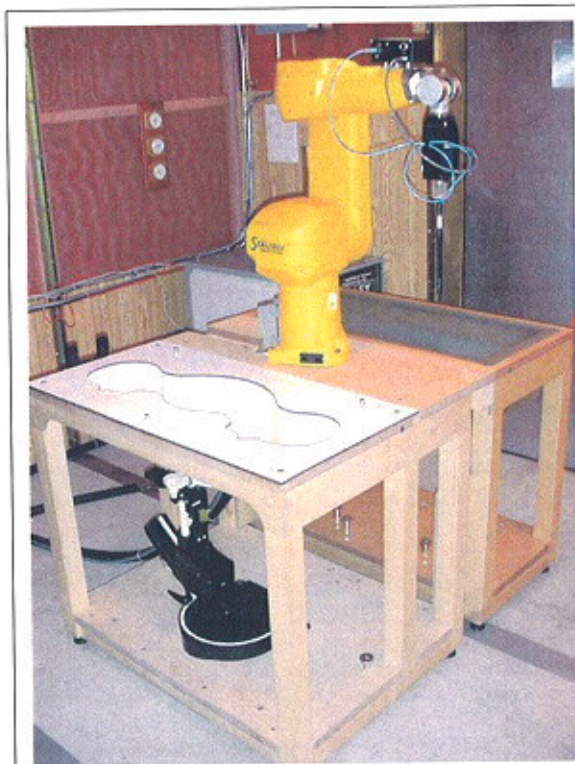
Test Standard(s)	FCC	47 CFR §2.1093		
	IC	Health Canada Safety Code 6		
Device Classification(s)	Part 15 Unlicensed PCS Base Station (PUB)			FCC §15(D)
	2 GHz Licence-exempt Personal Communications Service Device (LE-PCS)			IC RSS-213
Measurement Procedure(s)	FCC OET Bulletin 65, Supplement C (01-01)			
	Industry Canada RSS-102 Issue 2			
	IEEE Standard 1528-2003			
Device Description	Wireless Headset Adaptor (Base Unit)			
RF Exposure Category	General Population / Uncontrolled Environment			
FCC ID	AL8CA12CDXXXX			
Model(s)	CA12CD (Base)			
Serial No.(s) Tested	219		Production Unit	
Transmit Frequency Range	1921.536 - 1928.448 MHz		UPCS Band	
Mode(s) of Operation	TDMA (Time Division Multiple Access)		TDD (Time Division Duplex)	
Maximum Duty Cycle Tested	8.3 %	Source-Based Time-Averaged		Crest Factor: 1:12.05
Max. RF Output Power Tested	2.7 dBm	1.86 mW	Conducted	Antenna 0
	0.9 dBm	1.23 mW	Conducted	Antenna 1
Antenna Type(s) Tested	Internal Diversity	Antenna 0 - Right Side of DUT	Antenna 1 - Left Side of DUT	
Power Source(s) Tested	Plantronics	7.5 W AC Adapter	Part No.: 45561-02	

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Model(s):	CA12CD (Base)	Device:	Wireless Headset Adaptor (Base Unit)		
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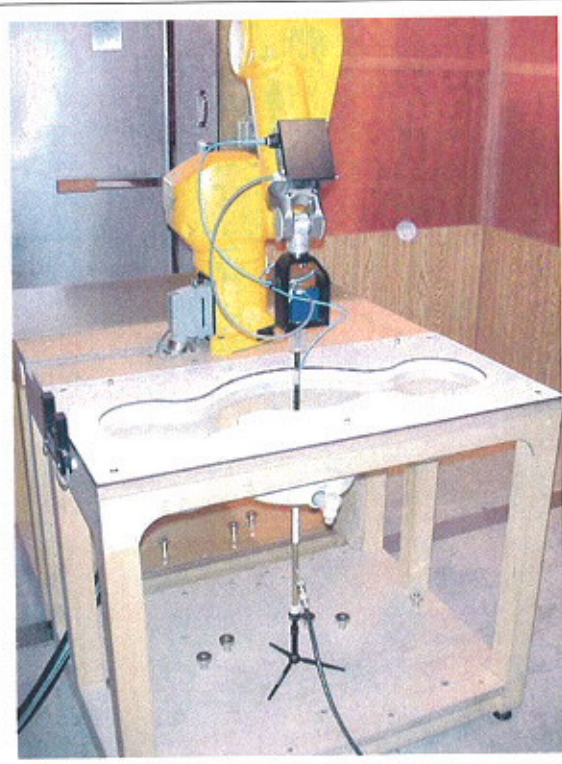
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3.0 SAR MEASUREMENT SYSTEM


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


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4.0 MEASUREMENT SUMMARY

BODY SAR EVALUATION RESULTS

Freq. (MHz)	Chan.	Test Mode	Power Source	Antenna Tested	Device Position to Planar Phantom	Separation Distance to Planar Phantom	Conducted Power Before Test	Peak SAR Measured from Area Scan	
1924.992	Mid	TDMA/TDD	AC Adapter	Antenna 1	Left Side	0.0 cm (Touch)	0.9 dBm	0.003 W/kg	
1924.992	Mid	TDMA/TDD	AC Adapter	Antenna 0	Right Side	0.0 cm (Touch)	2.7 dBm	0.004 W/kg	
1924.992	Mid	TDMA/TDD	AC Adapter	Antenna 0	Front Side	0.0 cm (Touch)	2.7 dBm	0.006 W/kg	
ANSI / IEEE C95.1 1999 - SAFETY LIMIT			BODY: 1.6 W/kg (averaged over 1 gram)			Spatial Peak Uncontrolled Exposure / General Population			
Test Date(s)	September 06, 2006				Relative Humidity	33	%		
Measured Fluid Type	1920 MHz Body				Atmospheric Pressure	101.2	kPa		
Dielectric Constant ϵ_r	IEEE Target		Measured	Deviation	Ambient Temperature		24.2	°C	
	53.3	± 5%	51.6	-3.2%	Fluid Temperature		23.8	°C	
Conductivity σ (mho/m)	IEEE Target		Measured	Deviation	Fluid Depth		≥ 15	cm	
	1.52	± 5%	1.50	-1.3%	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 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 SAR levels measured were the Peak SAR level measured from the area scan. The 1g-averaged SAR was not measured because the peak SAR values from the area scan evaluations were less than 1% of the 1g average limit. The peak SAR value measured during the area scan evaluation is 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 SAR level, 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.							
	4.	The power drifts were 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.							
	5.	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.							
	6.	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 for measured fluid dielectric parameters).							
	7.	The SAR measurements were performed within 24 hours of the system performance check.							

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5.0 DETAILS OF SAR EVALUATION



The PLANTRONICS Model: CA12CD Wireless Headset Adaptor (Base Unit) 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.

- 1) The DUT was tested for body SAR with the left side (Antenna 1) facing parallel to, and touching, the outer surface of the SAM phantom (planar section).
- 2) The DUT was tested for body SAR with the right side (Antenna 0) facing parallel to, and touching, the outer surface of the SAM phantom (planar section).
- 3) The DUT was tested for body SAR with the front side (Antenna 0) facing parallel to, and touching, the outer surface of the SAM phantom (planar section).
- 4) The DUT was evaluated for SAR with the Plantronics 7.5 W AC power adapter.
- 5) The DUT was evaluated for SAR at maximum power in TDMA/TDD mode with a source-based time-averaged duty cycle of 8.3% (crest factor = 1:12.05).
- 6) 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 (Unit No. 5212J, calibrated February 24, 2006).
- 7) A stack of low-density, low-loss dielectric foamed polystyrene was used in place of the device holder.
- 8) 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.
- 9) 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 for measured fluid dielectric parameters).
- 10) 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.

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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 for measured fluid dielectric parameters). 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). See Table 1 below for the SAR system manufacturer's reference body SAR values from the DASY4 Operation Manual (see reference [6]).

SYSTEM PERFORMANCE CHECK EVALUATION

Test Date	Equip. 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)
		1900MHz	IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.	IEEE Target	Meas.						
9/6/06	Body	9.95 $\pm 10\%$	10.9	+9.5%	53.3 $\pm 5\%$	51.5	-3.4%	1.52 $\pm 5\%$	1.49	-2.0%	1000	24.2	23.8	≥ 15	33	101.2
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.														

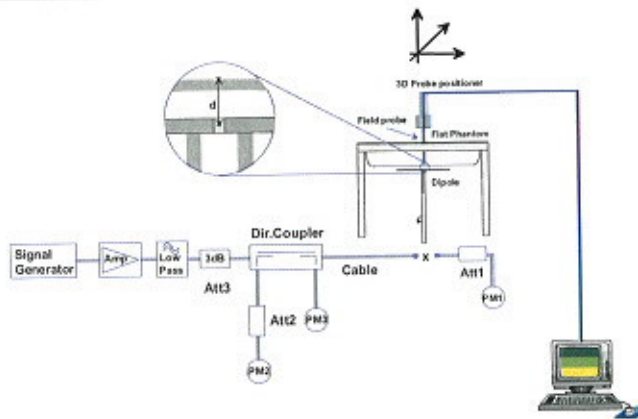
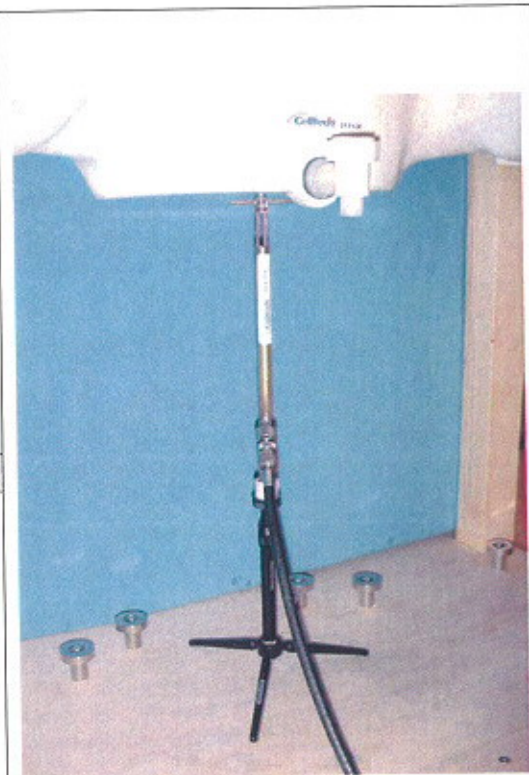


Figure 1. System Performance Check Measurement Setup


Dipole Type	Distance (mm)	Frequency [MHz]	SAR (1g) [W/kg]	SAR (10g) [W/kg]	SAR (peak) [W/kg]
D800V2	15	800	3.02	2.06	1.36
D150V2	15	150	5.91	3.36	7.22
D835V2	15	835	9.71	6.38	11.1
D900V2	15	900	11.1	7.17	16.3
D1150V2	10	1150	29.6	16.6	49.8
D1500V2	10	1500	30.8	17.1	52.1
D1640V2	10	1640	31.1	18.7	59.4
D1800V2	10	1800	38.5	24.3	67.5
D1900V2	10	1900	39.8	24.8	69.6
D2000V2	10	2000	40.9	21.2	71.5
D2150V2	10	2150	51.2	23.7	97.6
D3000V2	10	3000	61.9	21.8	136.7



Table 32.1: Numerical reference SAR values for SPEAG dipoles and flat phantom filled with body-tissue simulating liquid. Note: All SAR values normalized to 1 W forward power.

Table 1. SAR System Manufacturer's Reference Body SAR Values



1900MHz Dipole Setup

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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 MIXTURES		
INGREDIENT	1900 MHz Body	1920 MHz Body
	System Performance Check	DUT Evaluation
Water	69.85 %	69.85 %
Glycol Monobutyl	29.89 %	29.89 %
Salt	0.26 %	0.26 %



9.0 SAR SAFETY LIMITS

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	1.60	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

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	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)
<u>Phantom(s)</u>	
Type	SAM V4.0C
Shell Material	Fiberglass
Thickness	2.0 ±0.1 mm
Volume	Approx. 25 liters

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	<u>Report Issue Date</u> September 13, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

11.0 PROBE SPECIFICATION (ET3DV6)

Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, 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 Detect:	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Dimensions:	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application:	General dosimetry up to 3 GHz Compliance tests of mobile phone



ET3DV6 E-Field Probe

12.0 SAM PHANTOM V4.0C

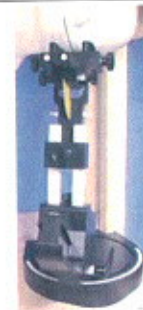
The SAM phantom V4.0C is a fiberglass shell phantom with a 2.0 mm (± 0.2 mm) shell thickness for left and right head and flat planar area integrated in a wooden table. The shape of the fiberglass shell corresponds to the phantom defined by SCC34-SC2. The device holder positions are adjusted to the standard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



Company:	Plantronics Inc.	FCC ID:	AL8CA12CDXXXX	1921.536 - 1928.448 MHz	
Model(s):	CA12CD (Base)	Device:	Wireless Headset Adaptor (Base Unit)		
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14.0 TEST EQUIPMENT LIST

USED	TEST EQUIPMENT	ASSET NO.	SERIAL NO.	DATE CALIBRATED		CALIBRATION DUE DATE
	DESCRIPTION					
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	21Jun06		21Jun07
	-DAE3	00018	370	08Feb06		08Feb07
x	-ET3DV6 E-Field Probe	00016	1387	16Mar06		16Mar07
	-EX3DV4 E-Field Probe	00125	3547	14Feb06		14Feb07
	-300MHz Validation Dipole	00023	135	25Oct05		25Oct06
	-450MHz Validation Dipole	00024	136	25Oct05		25Oct06
	-835MHz Validation Dipole	00022	411	Brain	28Mar06	28Mar07
				Body	27Mar06	27Mar07
	-900MHz Validation Dipole	00020	054	Brain	06Jun06	06Jun07
				Body	06Jun06	06Jun07
	-1640MHz Validation Dipole	00212	0175	Brain	07Aug06	07Aug07
	-1800MHz Validation Dipole	00021	247	Brain	08Jun06	08Jun07
				Body	09Jun06	09Jun07
	-1900MHz Validation Dipole	00032	151	Brain	09Jun06	09Jun07
x				Body	12Jun06	12Jun07
	-2450MHz Validation Dipole	00025	150	Brain	20Sep05	20Sep06
				Body	24Apr06	24Apr07
	-5800MHz Validation Dipole	00126	1031	Brain	15Mar06	15Mar07
x	-SAM Phantom V4.0C	00154	1033	N/A		N/A
	-Barski Planar Phantom	00155	03-01	N/A		N/A
	-Plexiglas Side Planar Phantom	00156	161	N/A		N/A
	-Plexiglas Validation Planar Phantom	00157	137	N/A		N/A
x	ALS-PR-DIEL Dielectric Probe Kit	00160	260-00953	N/A		N/A
	Gigatronics 8652A Power Meter	00110	1835801	12Apr06		12Apr07
x	Gigatronics 8652A Power Meter	00007	1835272	03Feb06		03Feb07
	Gigatronics 80701A Power Sensor	00011	1833542	03Feb06		03Feb07
x	Gigatronics 80701A Power Sensor	00012	1834350	12Sep05		12Sep06
x	Gigatronics 80701A Power Sensor	00013	1833713	03Feb06		03Feb07
x	HP 8753ET Network Analyzer	00134	US39170292	18Apr06		18Apr07
x	HP 8648D Signal Generator	00005	3847A00611	N/A		N/A
	Rohde & Schwarz SMR40 Signal Generator	00006	100104	06Apr06		06Apr07
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	N/A		N/A


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15.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION						
Error Description	Uncertainty Value $\pm\%$	Probability Distribution	Divisor	cl 1g	Uncertainty Value $\pm\%$ (1g)	V_1 or V_{eff}
Measurement System						
Probe calibration (1920 MHz)	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])


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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	3.5	Normal	1	1	3.5	∞
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	∞
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)	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					7.69	
Expanded Uncertainty (k=2)					15.39	


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

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16.0 REFERENCES

- [1] Federal Communications Commission - "Radiofrequency radiation exposure evaluation: portable devices", Rule Part 47 CFR §2.1093: 1999.
- [2] Health Canada - "Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz", Safety Code 6:1999.
- [3] Federal Communications Commission - "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.
- [4] Industry Canada - "Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)", Radio Standards Specification RSS-102 Issue 2: November 2005.
- [5] IEEE Standard 1528-2003 - "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques": December 2003.
- [6] Schmid & Partner Engineering AG - "DASY4 Manual", V4.5: March 2005.

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