





	Date(s) of Evaluation February 06-14, 2008	Test Report Serial No. 020508OWD-T883-S90F	Test Report Revision No. Rev. 1.0 (Initial Release)	
	Test Report Issue Date March 17, 2008	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational (Controlled)	



SAR TEST REPORT (FCC/IC)

RF EXPOSURE EVALUATION		SPECIFIC ABSORPTION RATE			
APPLICANT	M/A-COM, INC.				
DEVICE UNDER TEST (DUT)	PORTABLE 800 MHz PTT RADIO TRANSCEIVER (ANALOG/DIGITAL)				
MODEL(S)	P5400 (800 MHz)				
IDENTIFIER(S)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
APPLICATION TYPE	Certification				
STANDARD(S) APPLIED	FCC 47 CFR §2.1093				
	Health Canada Safety Code 6				
PROCEDURE(S) APPLIED	FCC OET Bulletin 65, Supplement C (01-01)				
	Industry Canada RSS-102 Issue 2				
FCC DEVICE CLASSIFICATION	Licensed Non-Broadcast Transmitter Held to Face (TNF)				
IC DEVICE CLASSIFICATION	Land Mobile Radio Transmitter/Receiver (27.41-960 MHz)				
RF EXPOSURE CATEGORY	Occupational / Controlled				
RF EXPOSURE EVALUATION(S)	Face-held & Body-worn				
DATE(S) OF EVALUATION(S)	February 06-14, 2008				
TEST REPORT SERIAL NO.	020508OWD-T883-S90F				
TEST REPORT REVISION NO.	Revision 1.0	Initial Release		March 17, 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				
	21-364 Lougheed Road, Kelowna, B.C. V1X 7R8 Canada				
TEST LAB CONTACT INFO.	Tel.: 250-765-7650		Fax: 250-765-7645		
	info@celltechlabs.com		www.celltechlabs.com		
TEST LAB ACCREDITATION(S)	<div></div> <div>Certificate No. 2470.01</div>				


Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
DUT Type:	Portable Analog/Digital 800 MHz PTT Radio Transceiver				Freq.:	806-824 MHz / 851-869 MHz		
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 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> February 06-14, 2008	<u>Test Report Serial No.</u> 020508OWD-T883-S90F	<u>Test Report Revision No.</u> Rev. 1.0 (Initial Release)	 Certificate No. 2470.01
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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							
Company Information	Name		M/A-COM, INC.				Address		221 Jefferson Ridge Parkway Lynchburg, VA 24501 United States							
Device Description	Portable 800 MHz PTT Radio Transceiver						Model(s)		P5400 (800)		Type(s)		Scan		System	
Device Part No.(s) & Serial No.(s) Tested	Scan Radio			P/N: RU-123550-001				S/N: T1-8M-018			Identical Prototype					
	System Radio			P/N: RU-123550-002				S/N: T1-8M-019			Identical Prototype					
Mode(s) & Modulation Type(s)	Analog			(FM)				Digital			(FSK)					
Transmit Frequency Range(s)	806-824 MHz			Low Channel: 806.0125 MHz				Mid Channel: 815.5000 MHz			High Channel: 823.9875 MHz					
	851-869 MHz			Low Channel: 851.0125 MHz				Mid Channel: 860.5000 MHz			High Channel: 868.9875 MHz					
RF Output Power Measured	Scan Radio			Low Channel: 806.0125 MHz		Mid Channel: 815.5000 MHz		High Channel: 823.9875 MHz								
				35.12 dBm		3.25 Watts		35.07 dBm		3.21 Watts		35.04 dBm		3.19 Watts		
				Low Channel: 851.0125 MHz		Mid Channel: 860.5000 MHz		High Channel: 868.9875 MHz								
				34.87 dBm		3.07 Watts		34.86 dBm		3.06 Watts		34.81 dBm		3.03 Watts		
	System Radio			Low Channel: 806.0125 MHz		Mid Channel: 815.5000 MHz		High Channel: 823.9875 MHz								
				35.01 dBm		3.17 Watts		34.98 dBm		3.15 Watts		34.94 dBm		3.12 Watts		
				Low Channel: 851.0125 MHz		Mid Channel: 860.5000 MHz		High Channel: 868.9875 MHz								
				34.87 dBm		3.07 Watts		34.83 dBm		3.04 Watts		34.79 dBm		3.01 Watts		
Antenna Type(s) Tested	High Gain			806 - 870 MHz				Length: 188 mm			P/N: KRE 101 1506/1					
	Quarter-Wave Whip			806 - 870 MHz				Length: 93 mm			P/N: KRE 101 1506/2					
	Quarter-Wave Whip			806 - 870 MHz				Length: 111 mm			P/N: KRE 101 1223/01					
Battery Type(s) Tested	7.5V	Ni-Cd	immersible	non-IS	P/N: BT-023406-001		7.5V	Ni-Cd	immersible	IS	P/N: BT-023406-002					
	7.5V	Ni-MH	immersible	non-IS	P/N: BT-023406-003		7.5V	Ni-MH	immersible	IS	P/N: BT-023406-004					
	7.5V	Li-ion	immersible	non-IS	P/N: BT-023406-005		7.5V	Li-ion	immersible	IS	P/N: BT-023406-006					
Body-worn Accessories Tested	Leather Case Kit 1: Leather Case without D-rings (P/N: CC-023931-001), Swivel Mount (P/N: KRY 101 1608/2), Elastic Strap (P/N: FM-011820) and Belt Loop (P/N: KRY 101 1609/1)											P/N: CC-023931-003				
	Leather Case Kit 2: Leather Case with D-rings (P/N: CC-023931-002), Swivel Mount (P/N: KRY 101 1608/2), Elastic Strap (P/N: FM-011820) and Belt Loop (P/N: KRY 101 1609/1)											P/N: CC-023931-004				
	Leather Case with D-rings, Elastic Strap (P/N: FM-011820) and Shoulder Strap (P/N: CC103333V1)											P/N: CC-023931-002				
	Leather Belt Loop and Metal Swivel Mount (P/N: KRY 101 1608/2)											P/N: KRY 101 1609/1				
	Nylon (black) Case (with metal swivel) and Leather Belt Loop (P/N: KRY 101 1609/1)											P/N: CC-023932-001				
	Metal Belt-Clip											P/N: CC23894				
	Nylon "T" Strap Holder											P/N: KRY 101 1656/1				
Audio Accessories Tested	Speaker-Microphone											P/N: MC-023933-001				
	Speaker-Microphone with Antenna (SMA)											P/N: MC-023933-002				
	Earphone for speaker-mic											P/N: LS103239V1				
Max. SAR Level(s) Evaluated	Face-held		3.20 W/kg		1g average		50% Duty Cycle		FCC/IC SAR Limit		8.0 W/kg		1g average			
	Body-worn		3.52 W/kg		1g average		50% Duty Cycle		FCC/IC SAR Limit		8.0 W/kg		1g average			
Celltech Labs Inc. declares under its sole responsibility that this wireless portable device has demonstrated compliance 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 Occupational/Controlled Exposure environment. The device was tested in accordance with the measurement standards and procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01) and Industry Canada RSS-102 Issue 2. 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.																
The results and statements contained in this report pertain only to the device(s) evaluated.																
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Test Report Approved By					Sean Johnston			Celltech Labs Inc.								



Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
DUT Type:	Portable Analog/Digital 800 MHz PTT Radio Transceiver				Freq.:	806-824 MHz / 851-869 MHz		
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	<u>Test Report Issue Date</u> March 17, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Certificate No. 2470.01				

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Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
DUT Type:	Portable Analog/Digital 800 MHz PTT Radio Transceiver				Freq.:	806-824 MHz / 851-869 MHz		
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1.0 INTRODUCTION

This measurement report demonstrates that the M/A-COM Model: P5400 Portable Analog/Digital 800 MHz PTT Radio Transceiver 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 Occupational / Controlled Exposure environment. The test procedures described in FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]) and IC RSS-102 Issue 2 (see reference [4]) were employed. A description of the device, 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 ADDITIONAL BODY-WORN AND AUDIO ACCESSORIES

Additional Body-worn and Audio Accessories (Testing Not Required *)	Accessory Type	Part No.
	Metal Belt Clip (alternate)	CC-011318
	Nylon Case (Orange) w/ Leather Belt Loop (P/N: KRY 101 1609/1)	CC-023932-002
	Nylon Case (Black) with Swivel	CC-014534-001
	Nylon Case (Black) with Integral Belt-Clip	CC-014534-002
	Leather Case with Swivel	CC-014528-001
	Leather Case with Swivel, D-Rings for Shoulder Strap	CC-014528-002
	Leather Belt Loop	CC-014527
	Shoulder Strap (used with Leather Cases with D-Rings)	CC-014524-001
	Short Leather Retaining Strap (used with Shoulder Strap)	CC-014524-002
	Speaker-Mic (SML), black, no ant.	MC-023933-003
	Speaker/Mic (SML), black, with ant.	MC-023933-004
	Earphone Kit, Black	EA-009580-001
	Earphone Kit, Beige	EA-009580-002
	2-Wire Kit, Palm mic, Black	EA-009580-003
	2-Wire Kit, Palm mic, Beige	EA-009580-004
	3-Wire Kit, Mini-Lapel Mic, Black	EA-009580-005
	3-Wire Kit, Mini-Lapel Mic, Beige	EA-009580-006
	Explorer Headset w/ PTT	EA-009580-007
	Lightweight headset single speaker w/ PTT	EA-009580-008
	Breeze Headset w/ PTT	EA-009580-009
	Headset, heavy duty, N/C behind the head w/ PTT	EA-009580-010
	Ranger Headset w/ PTT	EA-009580-011
	Skull mic w/ body PTT & earcup	EA-009580-012
	Headset, heavy duty, N/C over the head w/ PTT	EA-009580-013
	Throat mic w/ acoustic tube & body PTT	EA-009580-014
	Throat mic w/ acoustic tube, body PTT, & ring PTT	EA-009580-015
	Breeze headset w/ PTT & pigtail jack	EA-009580-016
	Hurricane headset w/ PTT	EA-009580-017
	Hurricane headset w/ PTT & pigtail jack	EA-009580-018
* Additional testing not required for listed body-worn accessories based on identical or similar construction with equal or lesser spacing and similar metallic components. Additional testing not required for listed audio accessories based on no expected affect to SAR levels.		

Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
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Certificate No. 2470.01				

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 SAR Measurement System
with SAM phantom V4.0 (validation)**



**DASY4 SAR Measurement System
with Plexiglas side planar phantom**

Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
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4.0 SAR MEASUREMENT SUMMARY

FACE-HELD SAR EVALUATION RESULTS - Band 1 (806-824 MHz)

Test Date	Freq.	Ch.	Band	DUT Type	Antenna Part No.	Battery Type	DUT Position to Planar Phantom	DUT Spacing to Planar Phantom	Cond. Power Before Test	SAR Drift During Test	Measured SAR 1g (W/kg)		Scaled SAR 1g (W/kg) with Droop	
											Duty Cycle		Duty Cycle	
	MHz							cm	Watts	dB	100%	50%	100%	50%
Feb 12	823.9875	High	1	Scan	KRE1011223/01	NiCd NIS	Front Side	2.5	3.19	0.00585	4.65	2.33		
Feb 12	823.9875	High	1	Scan	KRE1011223/01	NiCd IS	Front Side	2.5	3.19	-0.0227	4.39	2.20	4.41	2.21
Feb 12	823.9875	High	1	Scan	KRE1011223/01	NiMH NIS	Front Side	2.5	3.19	-0.0614	4.88	2.44	4.95	2.47
Feb 12	823.9875	High	1	Scan	KRE1011223/01	NiMH IS	Front Side	2.5	3.19	-0.0680	4.98	2.49	5.06	2.53
Feb 12	823.9875	High	1	Scan	KRE1011223/01	Li-ion NIS	Front Side	2.5	3.19	-0.0525	4.34	2.17	4.39	2.20
Feb 12	823.9875	High	1	Scan	KRE1011223/01	Li-ion IS	Front Side	2.5	3.19	-0.0162	4.45	2.23	4.47	2.23
Feb 12	823.9875	High	1	Scan	KRE1011506/1	NiCd NIS	Front Side	2.5	3.19	0.150	1.81	0.905		
Feb 12	823.9875	High	1	Scan	KRE1011506/1	NiCd IS	Front Side	2.5	3.19	-0.0746	2.27	1.14	2.31	1.15
Feb 12	823.9875	High	1	Scan	KRE1011506/1	NiMH NIS	Front Side	2.5	3.19	-0.0459	1.75	0.875	1.77	0.884
Feb 12	823.9875	High	1	Scan	KRE1011506/1	NiMH IS	Front Side	2.5	3.19	0.294	1.91	0.955		
Feb 12	823.9875	High	1	Scan	KRE1011506/1	Li-ion NIS	Front Side	2.5	3.19	-0.131	1.87	0.935	1.93	0.964
Feb 12	823.9875	High	1	Scan	KRE1011506/1	Li-ion IS	Front Side	2.5	3.19	0.108	1.93	0.965		
Feb 12	823.9875	High	1	Scan	KRE1011506/2	NiCd NIS	Front Side	2.5	3.19	-0.0671	6.24	3.12	6.34	3.17
Feb 12	823.9875	High	1	Scan	KRE1011506/2	NiCd IS	Front Side	2.5	3.19	0.0578	6.40	3.20		
Feb 12	823.9875	High	1	Scan	KRE1011506/2	NiMH NIS	Front Side	2.5	3.19	0.0396	6.24	3.12		
Feb 12	823.9875	High	1	Scan	KRE1011506/2	NiMH IS	Front Side	2.5	3.19	-0.0723	6.19	3.10	6.29	3.15
Feb 12	823.9875	High	1	Scan	KRE1011506/2	Li-ion NIS	Front Side	2.5	3.19	0.0154	5.96	2.98		
Feb 12	823.9875	High	1	Scan	KRE1011506/2	Li-ion IS	Front Side	2.5	3.19	0.0317	6.21	3.11		

SAR SAFETY LIMIT(S)

BRAIN

SPATIAL PEAK

RF EXPOSURE CATEGORY

FCC 47 CFR 2.1093

Health Canada Safety Code 6

8.0 W/kg


averaged over 1 gram




Occupational / Controlled

Test Date(s)	February 12, 2008				Relative Humidity	34%	%
Measured Fluid Type	825 MHz Brain				Atmospheric Pressure	101.1	kPa
Dielectric Constant ϵ_r	IEEE Target		Measured	Deviation	Ambient Temperature	24.1	°C
	41.6	± 5%	43.4	+4.4%	Fluid Temperature	23.0	°C
Conductivity σ (mho/m)	IEEE Target		Measured	Deviation	Fluid Depth	≥ 15	cm
	0.90	± 5%	0.91	+1.1%	ρ (Kg/m ³)	1000	

Note(s)

- The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and distribution plots are shown in Appendix A.
- If the scaled SAR levels evaluated at the mid channel (50% duty cycle) were ≥ 3 dB below the SAR limit, SAR evaluation for the low and high channels was optional (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]). Please note that the high channels were evaluated in place of the mid channels (see attestation letter from applicant submitted with this test report) - maximum SAR configurations were also evaluated at the mid channels and the resulting levels were lower than the maximum high channel results.
- The power droops measured by the DASY4 system for the duration of the SAR evaluations were added to the measured SAR levels to report scaled SAR results as shown in the above test data table.
- The area scan evaluation was performed with a fully charged battery. After the area scan evaluation was completed the battery was replaced with a fully charged battery prior to the zoom scan evaluation.
- 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.
- 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).
- The SAR evaluations were performed within 24 hours of the system performance check.

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Certificate No. 2470.01				

SAR MEASUREMENT SUMMARY (Cont.)

FACE-HELD SAR EVALUATION RESULTS - Band 2 (851-869 MHz)

Test Date	Freq. MHz	Ch.	Band	DUT Type	Antenna Part No.	Battery Type	DUT Position to Planar Phantom	DUT Spacing to Planar Phantom cm	Cond. Power Before Test Watts	SAR Drift During Test dB	Measured SAR 1g (W/kg)		Scaled SAR 1g (W/kg) with Droop	
											Duty Cycle		Duty Cycle	
											100%	50%	100%	50%
Feb 13	868.9875	High	2	Scan	KRE1011223/01	NiCd NIS	Front Side	2.5	3.03	0.239	4.76	2.38		
Feb 13	868.9875	High	2	Scan	KRE1011223/01	NiCd IS	Front Side	2.5	3.03	-0.0871	4.55	2.28	4.64	2.32
Feb 13	868.9875	High	2	Scan	KRE1011223/01	NiMH NIS	Front Side	2.5	3.03	0.0334	5.07	2.54		
Feb 13	868.9875	High	2	Scan	KRE1011223/01	NiMH IS	Front Side	2.5	3.03	-0.124	4.73	2.37	4.87	2.43
Feb 13	868.9875	High	2	Scan	KRE1011223/01	Li-ion NIS	Front Side	2.5	3.03	-0.224	4.89	2.45	5.15	2.57
Feb 13	868.9875	High	2	Scan	KRE1011223/01	Li-ion IS	Front Side	2.5	3.03	-0.0610	4.79	2.40	4.86	2.43
Feb 13	868.9875	High	2	Scan	KRE1011506/1	NiCd NIS	Front Side	2.5	3.03	0.0661	1.37	0.685		
Feb 13	868.9875	High	2	Scan	KRE1011506/1	NiCd IS	Front Side	2.5	3.03	-0.633	1.73	0.865	2.00	1.00
Feb 13	868.9875	High	2	Scan	KRE1011506/1	NiMH NIS	Front Side	2.5	3.03	0.140	1.52	0.760		
Feb 13	868.9875	High	2	Scan	KRE1011506/1	NiMH IS	Front Side	2.5	3.03	-0.0669	1.17	0.585	1.19	0.594
Feb 13	868.9875	High	2	Scan	KRE1011506/1	Li-ion NIS	Front Side	2.5	3.03	-0.274	1.31	0.655	1.40	0.698
Feb 13	868.9875	High	2	Scan	KRE1011506/1	Li-ion IS	Front Side	2.5	3.03	0.150	2.06	1.03		
Feb 13	868.9875	High	2	Scan	KRE1011506/2	NiCd NIS	Front Side	2.5	3.03	-0.118	4.51	2.26	4.63	2.32
Feb 13	868.9875	High	2	Scan	KRE1011506/2	NiCd IS	Front Side	2.5	3.03	0.0501	4.66	2.33		
Feb 13	868.9875	High	2	Scan	KRE1011506/2	NiMH NIS	Front Side	2.5	3.03	-0.0392	4.52	2.26	4.56	2.28
Feb 13	868.9875	High	2	Scan	KRE1011506/2	NiMH IS	Front Side	2.5	3.03	-0.0860	4.65	2.33	4.74	2.37
Feb 13	868.9875	High	2	Scan	KRE1011506/2	Li-ion NIS	Front Side	2.5	3.03	-0.113	4.67	2.34	4.79	2.40
Feb 13	868.9875	High	2	Scan	KRE1011506/2	Li-ion IS	Front Side	2.5	3.03	0.0138	4.55	2.28		

SAR SAFETY LIMIT(S)

BRAIN

SPATIAL PEAK

RF EXPOSURE CATEGORY

FCC 47 CFR 2.1093

Health Canada Safety Code 6

8.0 W/kg


averaged over 1 gram



Occupational / Controlled

Test Date(s)	February 13, 2008				Relative Humidity	36	%
Measured Fluid Type	865 MHz Brain				Atmospheric Pressure	101.1	kPa
Dielectric Constant ϵ_r	IEEE Target		Measured	Deviation	Ambient Temperature	21.0	°C
	41.5	$\pm 5\%$	42.8	+3.2%	Fluid Temperature	22.0	°C
Conductivity σ (mho/m)	IEEE Target		Measured	Deviation	Fluid Depth	≥ 15	cm
	0.93	$\pm 5\%$	0.94	+1.1%	ρ (Kg/m ³)	1000	

Notes

1.	The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and distribution plots are shown in Appendix A.
2.	If the scaled SAR levels evaluated at the mid channel (50% duty cycle) were ≥ 3 dB below the SAR limit, SAR evaluation for the low and high channels was optional (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]). Please note that the high channels were evaluated in place of the mid channels (see attestation letter from applicant submitted with this test report) - maximum SAR configurations were also evaluated at the mid channels and the resulting levels were lower than the maximum high channel results.
3.	The power droops measured by the DASY4 system for the duration of the SAR evaluations were added to the measured SAR levels to report scaled SAR results as shown in the above test data table.
4.	The area scan evaluation was performed with a fully charged battery. After the area scan evaluation was completed the battery was replaced with a fully charged battery prior to the zoom scan evaluation.
5.	The fluid temperature was measured prior to and after the SAR evaluations to ensure the temperature remained within $\pm 2^\circ\text{C}$ of the fluid temperature reported during the dielectric parameter measurements.
6.	The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).
7.	The SAR evaluations were performed within 24 hours of the system performance check.

Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
DUT Type:	Portable Analog/Digital 800 MHz PTT Radio Transceiver				Freq.:	806-824 MHz / 851-869 MHz		
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 Testing and Engineering Services Ltd.	Date(s) of Evaluation February 06-14, 2008	Test Report Serial No. 020508OWD-T883-S90F	Test Report Revision No. Rev. 1.0 (Initial Release)	 Certificate No. 2470.01
	Test Report Issue Date March 17, 2008	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational (Controlled)	

SAR MEASUREMENT SUMMARY (Cont.)


FACE-HELD SAR EVALUATION RESULTS - Band 1 (806-824 MHz) & Band 2 (851-869 MHz)



Test Date	Freq. MHz	Ch.	Band	DUT Type	Antenna Part No.	Battery Type	DUT Position to Planar Phantom	DUT Spacing to Planar Phantom cm	Cond. Power Before Test Watts	SAR Drift During Test dB	Measured SAR 1g (W/kg)		Scaled SAR 1g (W/kg) with Droop	
											Duty Cycle		Duty Cycle	
											100%	50%	100%	50%
Feb 13	823.9875	High	1	Speaker-Mic with Antenna	KRE1011223/01	NiMH IS	Front Side	2.5	3.19	-0.0365	1.87	0.935	1.89	0.943
Feb 13	823.9875	High	1	Speaker-Mic with Antenna	KRE1011506/1	NiCd IS	Front Side	2.5	3.19	-0.0982	3.60	1.80	3.68	1.84
Feb 13	823.9875	High	1	Speaker-Mic with Antenna	KRE1011506/2	NiCd IS	Front Side	2.5	3.19	0.0051	2.54	1.27		
Feb 14	868.9875	High	2	Speaker-Mic with Antenna	KRE1011223/01	Li-ion NIS	Front Side	2.5	3.03	-0.0215	2.11	1.06	2.12	1.06
Feb 14	868.9875	High	2	Speaker-Mic with Antenna	KRE1011506/1	Li-ion IS	Front Side	2.5	3.03	0.175	2.56	1.28		
Feb 14	868.9875	High	2	Speaker-Mic with Antenna	KRE1011506/2	Li-ion NIS	Front Side	2.5	3.03	-0.0265	2.23	1.12	2.24	1.12

SAR SAFETY LIMIT(S)				BRAIN		SPATIAL PEAK		RF EXPOSURE CATEGORY		
FCC 47 CFR 2.1093		Health Canada Safety Code 6		8.0 W/kg		averaged over 1 gram		Occupational / Controlled		
Test Date(s)		February 13, 2008		February 14, 2008		Test Date		Feb 13	Feb 14	Unit
Dielectric Constant ϵ_r	Fluid Type	825 MHz Brain		Fluid Type	865 MHz Brain		Relative Humidity	36%	35	%
	IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.	Atmospheric Pressure	101.1	101.1	kPa
	41.6	$\pm 5\%$	43.4	+4.4%	41.5	$\pm 5\%$	Ambient Temperature	21.0	23.8	°C
Conductivity σ (mho/m)	Fluid Type	825 MHz Brain		Fluid Type	865 MHz Brain		Fluid Temperature	22.0	22.6	°C
	IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.	Fluid Depth	≥ 15	≥ 15	cm
	0.90	$\pm 5\%$	0.90	0.0%	0.93	$\pm 5\%$	ρ (Kg/m ³)	1000		

Notes

- The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and distribution plots are shown in Appendix A.
- If the scaled SAR levels evaluated at the mid channel (50% duty cycle) were ≥ 3 dB below the SAR limit, SAR evaluation for the low and high channels was optional (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]). Please note that the high channels were evaluated in place of the mid channels (see attestation letter from applicant submitted with this test report) - maximum SAR configurations were also evaluated at the mid channels and the resulting levels were lower than the maximum high channel results.
- The SAR configurations selected for the Speaker-Microphone Antenna Version evaluations were based on the worst-case face-held results from the Scan Radio with battery type.
- The power droops measured by the DASY4 system for the duration of the SAR evaluations were added to the measured SAR levels to report scaled SAR results as shown in the above test data table.
- The area scan evaluation was performed with a fully charged battery. After the area scan evaluation was completed the battery was replaced with a fully charged battery prior to the zoom scan evaluation.
- The fluid temperature was measured prior to and after the SAR evaluations to ensure the temperature remained within $\pm 2^\circ\text{C}$ of the fluid temperature reported during the dielectric parameter measurements.
- 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).
- The SAR evaluations were performed within 24 hours of the system performance check.

Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
DUT Type:	Portable Analog/Digital 800 MHz PTT Radio Transceiver				Freq.:	806-824 MHz / 851-869 MHz		
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 Testing and Engineering Services Ltd.	Date(s) of Evaluation February 06-14, 2008	Test Report Serial No. 020508OWD-T883-S90F	Test Report Revision No. Rev. 1.0 (Initial Release)	 Certificate No. 2470.01
	Test Report Issue Date March 17, 2008	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational (Controlled)	

SAR MEASUREMENT SUMMARY (Cont.)

BODY-WORN SAR EVALUATION RESULTS - Band 1 (806-824 MHz)

Test Date	Freq.	Ch.	Band	DUT Type	Antenna Part No.	Battery Type	DUT Position to Planar Phantom	DUT Spacing to Planar Phantom	Cond. Power Before Test	SAR Drift During Test	Measured SAR 1g (W/kg)		Scaled SAR 1g (W/kg) with Droop		
	cm							Watts			dB	Duty Cycle		Duty Cycle	
												100%	50%	100%	50%
Radio with Metal Belt-Clip (P/N: CC23894) & Speaker-Microphone (P/N: MC-023933-001) Accessories															
Feb 6	823.9875	High	1	Scan	KRE1011223/01	NiCd NIS	Back Side	1.1	3.19	-0.0142	3.43	1.72	3.44	1.72	
Feb 6	823.9875	High	1	Scan	KRE1011223/01	NiCd IS	Back Side	1.1	3.19	0.0170	3.17	1.59			
Feb 6	823.9875	High	1	Scan	KRE1011223/01	NiMH NIS	Back Side	1.1	3.19	0.0850	P	3.41	1.71		
											S	3.23	1.62		
Feb 6	823.9875	High	1	Scan	KRE1011223/01	NiMH IS	Back Side	1.1	3.19	0.0710	2.79	1.40			
Feb 6	823.9875	High	1	Scan	KRE1011223/01	Li-ion NIS	Back Side	1.1	3.19	-0.0069	3.85	1.93	3.86	1.93	
Feb 6	823.9875	High	1	Scan	KRE1011223/01	Li-ion IS	Back Side	1.1	3.19	-0.0127	4.35	2.18	4.36	2.18	
Feb 7	823.9875	High	1	Scan	KRE1011506/1	NiCd NIS	Back Side	1.1	3.19	-0.0086	4.49	2.25	4.50	2.25	
Feb 7	823.9875	High	1	Scan	KRE1011506/1	NiCd IS	Back Side	1.1	3.19	0.0698	3.99	2.00			
Feb 7	823.9875	High	1	Scan	KRE1011506/1	NiMH NIS	Back Side	1.1	3.19	0.0645	3.60	1.80			
Feb 7	823.9875	High	1	Scan	KRE1011506/1	NiMH IS	Back Side	1.1	3.19	0.292	4.34	2.17			
Feb 7	823.9875	High	1	Scan	KRE1011506/1	Li-ion NIS	Back Side	1.1	3.19	-0.0495	4.75	2.38	4.80	2.40	
Feb 7	823.9875	High	1	Scan	KRE1011506/1	Li-ion IS	Back Side	1.1	3.19	0.0643	4.36	2.18			
Feb 6	823.9875	High	1	Scan	KRE1011506/2	NiCd NIS	Back Side	1.1	3.19	-0.0220	5.57	2.79	5.60	2.80	
Feb 7	823.9875	High	1	Scan	KRE1011506/2	NiCd IS	Back Side	1.1	3.19	-0.111	4.80	2.40	4.92	2.46	
Feb 6	823.9875	High	1	Scan	KRE1011506/2	NiMH NIS	Back Side	1.1	3.19	-0.0647	4.78	2.39	4.85	2.43	
Feb 7	823.9875	High	1	Scan	KRE1011506/2	NiMH IS	Back Side	1.1	3.19	-0.0670	5.29	2.65	5.37	2.69	
Feb 6	823.9875	High	1	Scan	KRE1011506/2	Li-ion NIS	Back Side	1.1	3.19	0.0086	5.52	2.76			
Feb 6	823.9875	High	1	Scan	KRE1011506/2	Li-ion IS	Back Side	1.1	3.19	-0.0709	5.13	2.57	5.21	2.61	

SAR SAFETY LIMIT(S)

BODY

SPATIAL PEAK

RF EXPOSURE CATEGORY

FCC 47 CFR 2.1093

Health Canada Safety Code 6

8.0 W/kg


averaged over 1 gram




Occupational / Controlled

Test Date(s)		February 6, 2008		February 7, 2008		Test Date		Feb 6	Feb 7	Unit
Dielectric Constant ϵ_r	Fluid Type	825 MHz Body		825 MHz Body		Relative Humidity		35	35	%
	IEEE Target	Measured	Deviation	Measured	Deviation	Atmospheric Pressure		101.1	101.1	kPa
	55.2 ± 5%	56.6	+2.6%	56.6	+2.6%	Ambient Temperature		24	24	°C
Conductivity σ (mho/m)	Fluid Type	825 MHz Body		825 MHz Body		Fluid Temperature		22.3	22.0	°C
	IEEE Target	Measured	Deviation	Measured	Deviation	Fluid Depth		≥ 15	≥ 15	cm
	0.97 ± 5%	0.94	-3.0%	0.94	-3.0%	ρ (Kg/m ³)		1000		

Notes

- The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and distribution plots are shown in Appendix A.
- If the scaled SAR levels evaluated at the mid channel (50% duty cycle) were ≥ 3 dB below the SAR limit, SAR evaluation for the low and high channels was optional (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]). Please note that the high channels were evaluated in place of the mid channels (see attestation letter from applicant submitted with this test report) - maximum SAR configurations were also evaluated at the mid channels and the resulting levels were lower than the maximum high channel results.
- The power droops measured by the DASY4 system for the duration of the SAR evaluations were added to the measured SAR levels to report scaled SAR results as shown in the above test data table.
- Secondary peak SAR levels measured within 2 dB of the primary were reported (P = Primary, S = Secondary).
- The area scan evaluation was performed with a fully charged battery. After the area scan evaluation was completed the battery was replaced with a fully charged battery prior to the zoom scan evaluation.
- The fluid temperature was measured prior to and after the SAR evaluations to ensure the temperature remained within $\pm 2^\circ\text{C}$ of the fluid temperature reported during the dielectric parameter measurements.
- 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).
- The SAR evaluations were performed within 24 hours of the system performance check.

Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
DUT Type:	Portable Analog/Digital 800 MHz PTT Radio Transceiver				Freq.:	806-824 MHz / 851-869 MHz		
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 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> February 06-14, 2008	<u>Test Report Serial No.</u> 020508OWD-T883-S90F	<u>Test Report Revision No.</u> Rev. 1.0 (Initial Release)	  ACCREDITED
	<u>Test Report Issue Date</u> March 17, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Certificate No. 2470.01				

SAR MEASUREMENT SUMMARY (Cont.)

BODY-WORN SAR EVALUATION RESULTS - Band 2 (851-869 MHz)

Test Date	Freq.	Ch.	Band	DUT Type	Antenna Part No.	Battery Type	DUT Position to Planar Phantom	DUT Spacing to Planar Phantom	Cond. Power Before Test	SAR Drift During Test	Measured SAR 1g (W/kg)		Scaled SAR 1g (W/kg) with Droop		
	cm							Watts			dB	Duty Cycle		Duty Cycle	
												100%	50%	100%	50%
Radio with Metal Belt-Clip (P/N: CC23894) & Speaker-Microphone (P/N: MC-023933-001) Accessories															
Feb 7	868.9875	High	2	Scan	KRE1011223/01	NiCd NIS	Back Side	1.1	3.03	-0.118	P	3.39	1.70	3.48	1.74
											S	3.27	1.64	3.36	1.68
Feb 7	868.9875	High	2	Scan	KRE1011223/01	NiCd IS	Back Side	1.1	3.03	0.068	P	3.31	1.66		
											S	2.59	1.30		
Feb 7	868.9875	High	2	Scan	KRE1011223/01	NiMH NIS	Back Side	1.1	3.03	0.014	P	3.56	1.78		
											S	2.25	1.13		
Feb 7	868.9875	High	2	Scan	KRE1011223/01	NiMH IS	Back Side	1.1	3.03	-0.079	P	3.99	2.00	4.06	2.03
											S	3.09	1.55	3.15	1.57
Feb 7	868.9875	High	2	Scan	KRE1011223/01	Li-ion NIS	Back Side	1.1	3.03	-0.074	P	3.34	1.67	3.40	1.70
											S	2.39	1.20	2.43	1.22
Feb 7	868.9875	High	2	Scan	KRE1011223/01	Li-ion IS	Back Side	1.1	3.03	-0.006	P	3.79	1.90	3.80	1.90
											S	2.88	1.44	2.88	1.44
Feb 7	868.9875	High	2	Scan	KRE1011506/1	NiCd NIS	Back Side	1.1	3.03	-0.004		3.09	1.55	3.09	1.55
Feb 7	868.9875	High	2	Scan	KRE1011506/1	NiCd IS	Back Side	1.1	3.03	-0.038		2.98	1.49	3.01	1.50
Feb 7	868.9875	High	2	Scan	KRE1011506/1	NiMH NIS	Back Side	1.1	3.03	0.164		3.06	1.53		
Feb 7	868.9875	High	2	Scan	KRE1011506/1	NiMH IS	Back Side	1.1	3.03	-0.205		2.64	1.32	2.77	1.38
Feb 7	868.9875	High	2	Scan	KRE1011506/1	Li-ion NIS	Back Side	1.1	3.03	0.074		2.99	1.50		
Feb 7	868.9875	High	2	Scan	KRE1011506/1	Li-ion IS	Back Side	1.1	3.03	0.135		3.01	1.51		
Feb 8	868.9875	High	2	Scan	KRE1011506/2	NiCd NIS	Back Side	1.1	3.03	-0.073	P	3.63	1.82	3.69	1.85
											S	3.29	1.65	3.35	1.67
Feb 8	868.9875	High	2	Scan	KRE1011506/2	NiCd IS	Back Side	1.1	3.03	-0.014	P	3.57	1.79	3.58	1.79
											S	2.92	1.46	2.93	1.46
Feb 8	868.9875	High	2	Scan	KRE1011506/2	NiMH NIS	Back Side	1.1	3.03	-0.075	P	3.46	1.73	3.52	1.76
											S	2.89	1.45	2.94	1.47
Feb 8	868.9875	High	2	Scan	KRE1011506/2	NiMH IS	Back Side	1.1	3.03	-0.024	P	3.47	1.74	3.49	1.74
											S	2.48	1.24	2.49	1.25
Feb 8	868.9875	High	2	Scan	KRE1011506/2	Li-ion NIS	Back Side	1.1	3.03	-0.086	P	3.98	1.99	4.06	2.03
											S	2.75	1.38	2.80	1.40
Feb 8	868.9875	High	2	Scan	KRE1011506/2	Li-ion IS	Back Side	1.1	3.03	-0.043	P	3.47	1.74	3.50	1.75
											S	3.34	1.67	3.37	1.69
											S	2.42	1.21	2.44	1.22

SAR SAFETY LIMIT(S)

BODY

SPATIAL PEAK

RF EXPOSURE CATEGORY

FCC 47 CFR 2.1093

Health Canada Safety Code 6

8.0 W/kg


averaged over 1 gram



Occupational / Controlled

Test Date(s)			February 7, 2008		February 8, 2008		Test Date	Feb 7	Feb 8	Unit
Dielectric Constant ε _r	Fluid Type		865 MHz Body		865 MHz Body		Relative Humidity	35	34	%
	IEEE Target		Measured	Deviation	Measured	Deviation	Atmospheric Pressure	101.1	101.1	kPa
	55.1	± 5%	56.5	+2.6%	57.4	+4.2%	Ambient Temperature	24.1	23	°C
Conductivity σ (mho/m)	Fluid Type		865 MHz Body		865 MHz Body		Fluid Temperature	22.5	21.1	°C
	IEEE Target		Measured	Deviation	Measured	Deviation	Fluid Depth	≥ 15	≥ 15	cm
	1.01	± 5%	0.98	-3.0%	1.01	0.0%	ρ (Kg/m ³)	1000		

Notes

- The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and distribution plots are shown in Appendix A.
- If the scaled SAR levels evaluated at the mid channel (50% duty cycle) were ≥ 3 dB below the SAR limit, SAR evaluation for the low and high channels was optional (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]). Please note that the high channels were evaluated in place of the mid channels (see attestation letter from applicant submitted with this test report) - maximum SAR configurations were also evaluated at the mid channels and the resulting levels were lower than the maximum high channel results.
- The power droops measured by the DASY4 system for the duration of the SAR evaluations were added to the measured SAR levels to report scaled SAR results as shown in the above test data table.
- Secondary peak SAR levels measured within 2 dB of the primary were reported (P = Primary, S = Secondary).
- The area scan evaluation was performed with a fully charged battery. After the area scan evaluation was completed the battery was replaced with a fully charged battery prior to the zoom scan evaluation.

Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
DUT Type:	Portable Analog/Digital 800 MHz PTT Radio Transceiver				Freq.:	806-824 MHz / 851-869 MHz		
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 Testing and Engineering Services Ltd.	Date(s) of Evaluation February 06-14, 2008	Test Report Serial No. 020508OWD-T883-S90F	Test Report Revision No. Rev. 1.0 (Initial Release)	 Certificate No. 2470.01
	Test Report Issue Date March 17, 2008	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational (Controlled)	

SAR MEASUREMENT SUMMARY (Cont.)


BODY-WORN SAR EVALUATION RESULTS - Band 1 (806-824 MHz) & Band 2 (851-869 MHz)



Test Date	Freq.	Ch.	Band	DUT Type	Antenna Part No.	Battery Type	DUT Position to Planar Phantom	DUT Spacing to Planar Phantom	Cond. Power Before Test	SAR Drift During Test	Measured SAR 1g (W/kg)		Scaled SAR 1g (W/kg) with Droop	
	MHz										Duty Cycle		Duty Cycle	
								cm	Watts	dB	100%	50%	100%	50%
Speaker-Microphone Antenna Version with Lapel Clip & Earphone (P/N: LS103239V1) Accessory														
Feb 8	823.9875	High	1	Speaker-Mic with Antenna	KRE1011223/01	Li-Ion IS	Back Side	1.5	3.19	-0.466	0.565	0.283	0.629	0.314
Feb 8	823.9875	High	1	Speaker-Mic with Antenna	KRE1011506/1	Li-Ion NIS	Back Side	1.5	3.19	-0.251	0.951	0.476	1.01	0.504
Feb 8	823.9875	High	1	Speaker-Mic with Antenna	KRE1011506/2	NiCd NIS	Back Side	1.5	3.19	0.144	2.83	1.42		
Feb 8	868.9875	High	2	Speaker-Mic with Antenna	KRE1011223/01	NiMH IS	Back Side	1.5	3.03	-0.0241	2.02	1.01	2.03	1.02
Feb 8	868.9875	High	2	Speaker-Mic with Antenna	KRE1011506/1	NiCd NIS	Back Side	1.5	3.03	0.0279	0.755	0.378		
Feb 8	868.9875	High	2	Speaker-Mic with Antenna	KRE1011506/2	Li-ion NIS	Back Side	1.5	3.03	-0.148	4.42	2.21	4.57	2.29

SAR SAFETY LIMIT(S)					BODY				SPATIAL PEAK		RF EXPOSURE CATEGORY									
FCC 47 CFR 2.1093		Health Canada Safety Code 6			8.0 W/kg				averaged over 1 gram		Occupational / Controlled									
Test Date(s)		February 8, 2008			February 8, 2008				Relative Humidity		34		%							
Tissue Simulant		Fluid Type		825 MHz Body		Fluid Type		865 MHz Body		Atmospheric Pressure		101.1		kPa						
Dielectric Constant ε _r		IEEE Target		Meas.		Dev.		IEEE Target		Meas.		Dev.		Ambient Temperature		23.0		°C		
		55.2		± 5%		57.8		+4.7%		55.1		± 5%		57.4		+4.2%		Fluid Temperature		21.1
Conductivity σ (mho/m)		IEEE Target		Meas.		Dev.		IEEE Target		Meas.		Dev.		Fluid Depth		≥ 15		cm		
		0.97		± 5%		0.97		0.0%		1.01		± 5%		1.01		0.0%		ρ (Kg/m ³)		1000

Notes

1.	The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and distribution plots are shown in Appendix A.
2.	If the scaled SAR levels evaluated at the mid channel (50% duty cycle) were ≥ 3 dB below the SAR limit, SAR evaluation for the low and high channels was optional (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]). Please note that the high channels were evaluated in place of the mid channels (see attestation letter from applicant submitted with this test report) - maximum SAR configurations were also evaluated at the mid channels and the resulting levels were lower than the maximum high channel results.
3.	The SAR configurations selected for the Speaker-Microphone Antenna Version evaluations were based on the worst-case body-worn results from the Scan Radio with belt-clip accessory and battery type.
4.	The power droops measured by the DASY4 system for the duration of the SAR evaluations were added to the measured SAR levels to report scaled SAR results as shown in the above test data table.
5.	The area scan evaluation was performed with a fully charged battery. After the area scan evaluation was completed the battery was replaced with a fully charged battery prior to the zoom scan evaluation.
6.	The fluid temperature was measured prior to and after the SAR evaluations to ensure the temperature remained within $\pm 2^\circ\text{C}$ of the fluid temperature reported during the dielectric parameter measurements.
7.	The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).
8.	The SAR evaluations were performed within 24 hours of the system performance check.

Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
DUT Type:	Portable Analog/Digital 800 MHz PTT Radio Transceiver			Freq.:	806-824 MHz / 851-869 MHz			
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	Test Report Issue Date March 17, 2008	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational (Controlled)	

SAR MEASUREMENT SUMMARY (Cont.)


BODY-WORN SAR EVALUATION RESULTS - Band 1 (806-824 MHz) & Band 2 (851-869 MHz)




Test Date	Freq.	Ch.	Band	DUT Type	Antenna Part No.	Battery Type	DUT Position to Planar Phantom	DUT Spacing to Planar Phantom	Cond. Power Before Test	SAR Drift During Test	Measured SAR 1g (W/kg)		Scaled SAR 1g (W/kg) with Droop	
	MHz										Duty Cycle		Duty Cycle	
								cm	Watts	dB	100%	50%	100%	50%
Radio with Leather Case Kit 1 (P/N: CC-023931-003) & Speaker-Microphone (P/N: MC-023933-001) Accessories														
Feb 11	823.9875	High	1	Scan	KRE1011223/01	Li-Ion IS	Back Side	4.0	3.19	-0.0854	1.98	0.990	2.02	1.01
Feb 11	868.9875	High	2	Scan	KRE1011223/01	NiMH IS	Back Side	4.0	3.03	0.0963	1.55	0.775		
Radio with Leather Case Kit 2 (P/N: CC-023931-004) & Speaker-Microphone (P/N: MC-023933-001) Accessories														
Feb 11	823.9875	High	1	Scan	KRE1011223/01	Li-Ion IS	Back Side	4.0	3.19	-0.163	2.14	1.07	2.22	1.11
Feb 11	868.9875	High	2	Scan	KRE1011223/01	NiMH IS	Back Side	4.0	3.03	0.188	1.59	0.795		
Radio with Leather Case (P/N: CC-023931-002), Shoulder Strap (P/N: P/N: CC103333V1) & Speaker-Microphone (P/N: MC-023933-001) Accessories														
Feb 11	823.9875	High	1	Scan	KRE1011223/01	Li-Ion IS	Back Side	2.5	3.19	-0.0988	5.34	2.67	5.46	2.73
Feb 11	868.9875	High	2	Scan	KRE1011223/01	NiMH IS	Back Side	2.5	3.03	-0.0078	4.28	2.14	4.29	2.14
Radio with Leather Belt Loop (P/N: KRY 101 1609/1), Swivel Mount (P/N: KRY 101 1608/2) & Speaker-Microphone (P/N: MC-023933-001) Accessories														
Feb 11	823.9875	High	1	Scan	KRE1011223/01	Li-Ion IS	Back Side	3.0	3.19	-0.0847	2.25	1.13	2.29	1.15
Feb 11	868.9875	High	2	Scan	KRE1011223/01	NiMH IS	Back Side	3.0	3.03	-0.114	2.52	1.26	2.59	1.29
Radio with Nylon Case (P/N: CC-023932-001), Belt Loop (KRY 101 1609/1) & Speaker-Microphone (P/N: MC-023933-001) Accessories														
Feb 11	823.9875	High	1	Scan	KRE1011223/01	Li-Ion IS	Back Side	3.5	3.19	-0.0352	2.10	1.05	2.12	1.06
Feb 11	868.9875	High	2	Scan	KRE1011223/01	NiMH IS	Back Side	3.5	3.03	0.285	1.72	0.860		
Radio with Nylon "T" Strap Holder (P/N: KRY 101 1656/1) & Speaker-Microphone (P/N: MC-023933-001) Accessories														
Feb 11	823.9875	High	1	Scan	KRE1011506/1	Li-Ion NIS	Back Side	2.0	3.19	-0.303	6.57	3.29	7.04	3.52
Feb 11	823.9875	High	1	Scan	KRE1011506/2	NiCd NIS	Back Side	2.0	3.19	0.164	5.01	2.51		
Feb 11	806.0125	Low	1	Scan	KRE1011506/1	Li-Ion NIS	Back Side	2.0	3.25	-0.394	5.86	2.93	6.42	3.21
Feb 11	815.5000	Mid	1	Scan	KRE1011506/1	Li-Ion NIS	Back Side	2.0	3.21	-0.0955	4.88	2.44	4.99	2.49
Feb 11	823.9875	High	1	Scan	KRE1011223/01	Li-Ion IS	Back Side	2.0	3.19	0.0282	4.46	2.23		
Feb 11	868.9875	High	2	Scan	KRE1011506/1	Li-Ion NIS	Back Side	2.0	3.03	0.0374	4.86	2.43		
Feb 11	851.0125	Low	2	Scan	KRE1011506/1	Li-Ion NIS	Back Side	2.0	3.07	0.151	4.34	2.17		
Feb 11	860.5000	Mid	2	Scan	KRE1011506/1	Li-Ion NIS	Back Side	2.0	3.06	-0.136	2.68	1.34	2.77	1.38
Feb 11	823.9875	High	1	System	KRE1011506/1	Li-Ion NIS	Back Side	2.0	3.12	-0.187	6.32	3.16	6.60	3.30

SAR SAFETY LIMIT(S)				BODY			SPATIAL PEAK			RF EXPOSURE CATEGORY	
FCC 47 CFR 2.1093				Health Canada Safety Code 6			8.0 W/kg			averaged over 1 gram	
Occupational / Controlled											
Test Date(s)				February 11, 2008			February 11, 2008			Relative Humidity	
Tissue Simulant				Fluid Type			825 MHz Body			Atmospheric Pressure	
Dielectric Constant				IEEE Target			Meas.			Ambient Temperature	
ϵ_r				55.2			± 5%			24.2	
Conductivity				IEEE Target			Meas.			Fluid Temperature	
σ (mho/m)				0.97			± 5%			21.8	
				0.95			-2.0%			Fluid Depth	
				1.01			± 5%			≥ 15	
				0.99			-2.0%			ρ (Kg/m ³)	
										1000	

Notes

- The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and distribution plots are shown in Appendix A.
- If the scaled SAR levels evaluated at the mid channel (50% duty cycle) were ≥ 3 dB below the SAR limit, SAR evaluation for the low and high channels was optional (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]). Please note that the high channels were evaluated in place of the mid channels (see attestation letter from applicant submitted with this test report) - maximum SAR configurations were also evaluated at the mid channels and the resulting levels were lower than the maximum high channel results.
- The SAR configurations selected for the evaluations reported in the above table were based on the worst-case body-worn results from the Scan Radio with belt-clip accessory and battery type. Additional evaluations were performed with the Nylon "T" Strap Holder accessory based on the maximum body-worn SAR level was measured with this accessory.
- The power droops measured by the DASY4 system for the duration of the SAR evaluations were added to the measured SAR levels to report scaled SAR results as shown in the above test data table.
- The area scan evaluation was performed with a fully charged battery. After the area scan evaluation was completed the battery was replaced with a fully charged battery prior to the zoom scan evaluation.

Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
DUT Type:	Portable Analog/Digital 800 MHz PTT Radio Transceiver				Freq.:	806-824 MHz / 851-869 MHz		
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	Test Report Issue Date March 17, 2008	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational (Controlled)	

5.0 DETAILS OF SAR EVALUATION


The M/A-COM Model: P5400 Portable Analog/Digital 800 MHz PTT Radio Transceiver was compliant for localized Specific Absorption Rate (Occupational / Controlled Exposure) based on the test provisions and conditions described below. Detailed photographs of the test setup are shown in Appendix D.



Face-Held Configuration

1. The Radio was tested in a face-held configuration with the front side placed parallel to the outer surface of the planar phantom. A spacing of 2.5 cm was maintained between the front side of the Radio and the outer surface of the planar phantom.
2. The Speaker-Microphone Antenna Version (P/N: MC-023933-002) was connected to the Scan Radio and tested in a face-held configuration with the front of the speaker-microphone placed parallel to the outer surface of the planar phantom at a spacing of 2.5 cm.

Body-Worn Configuration

3. The Speaker-Microphone Antenna Version (P/N: MC-023933-002) was connected to the Scan Radio and tested in a body-worn configuration with the back of the speaker-microphone placed parallel to the outer surface of the planar phantom. The Speaker-Microphone Lapel Clip was touching the outer surface of the planar phantom and provided a 1.5 cm spacing between the back of the Speaker-Microphone and the outer surface of the planar phantom. The evaluation was performed with the Earphone audio accessory (P/N: LS103239V1) connected to the Speaker-Mic.
4. The Radio was tested in a body-worn configuration with the back side placed parallel to the outer surface of the planar phantom. The attached Metal Belt-Clip (P/N: CC23894) was touching the planar phantom and provided a 1.1 cm spacing between the back of the Radio and the planar phantom. The evaluation was performed with the Speaker-Microphone (non-antenna version) audio accessory (P/N: MC-023933-001) connected to the Radio.
5. The Radio was tested in a body-worn configuration with the Leather Case Kit 1 (P/N: CC-023931-003). The Radio was placed inside the Leather Case (P/N: CC-023931-001) with the Belt Loop (P/N: KRY 101 1609/1) attached to the Swivel Mount (P/N: KRY 101 1608/2) and the back of the Radio facing parallel to the outer surface of the planar phantom. The back side of the Belt Loop (P/N: KRY 101 1609/1) was touching the planar phantom and provided a 4.0 cm spacing between the back of the Radio and the planar phantom. The evaluation was performed with the Speaker-Microphone (non-antenna version) audio accessory (P/N: MC-023933-001) connected to the Radio.
6. The Radio was tested in a body-worn configuration with the Leather Case Kit 2 (P/N: CC-023931-004). The Radio was placed inside the Leather Case (P/N: CC-023931-002) with the Belt Loop (P/N: KRY 101 1609/1) attached to the Swivel Mount (P/N: KRY 101 1608/2) and the back of the Radio facing parallel to the outer surface of the planar phantom. The back side of the Belt Loop (P/N: KRY 101 1609/1) was touching the planar phantom and provided a 4.0 cm spacing between the back of the Radio and the planar phantom. The evaluation was performed with the Speaker-Microphone (non-antenna version) audio accessory (P/N: MC-023933-001) connected to the Radio.
7. The Radio was tested in a body-worn configuration placed inside the Leather Case (P/N: CC-023931-002), which provided a 2.5 cm spacing between the back of the Radio and the outer surface of the planar phantom. The Shoulder Strap (P/N: CC103333V1) accessory was attached to the Leather Case and the evaluation was performed with the Speaker-Microphone (non-antenna version) audio accessory (P/N: MC-023933-001) connected to the Radio.
8. The Radio was tested in a body-worn configuration with the Belt Loop (P/N: KRY 101 1609/1) attached to the Swivel Mount (P/N: KRY 101 1608/2) on the back of the Radio. The back side of the Belt Loop was touching the outer surface of the planar phantom and provided a 3.0 cm spacing between the back of the Radio and the planar phantom. The evaluation was performed with the Speaker-Microphone (non-antenna version) audio accessory (P/N: MC-023933-001) connected to the Radio.
9. The Radio was tested in a body-worn configuration placed inside the Nylon Case (P/N: CC-023932-001) with the Belt Loop (P/N: KRY 101 1609/1) attached to the Nylon Case. The back side of the Belt Loop (P/N: KRY 101 1609/1) was touching the outer surface of the planar phantom and provided a 3.5 cm spacing between the back of the Radio and the planar phantom. The evaluation was performed with the Speaker-Microphone (non-antenna version) audio accessory (P/N: MC-023933-001) connected to the Radio.
10. The Radio was tested in a body-worn configuration with the Nylon "T" Strap Holder (P/N: KRY 101 1656/1) attached to the Radio facing parallel to and touching the outer surface of the planar phantom. The Nylon "T" Strap Holder provided a 2.0 cm spacing between the back of the Radio and the planar phantom. The evaluation was performed with the Speaker-Microphone (non-antenna version) audio accessory (P/N: MC-023933-001) connected to the Radio.
11. The body-worn SAR evaluations were performed with the Scan Radio. A worst-case SAR evaluation was performed with the System Radio to report a comparison between the two radios.

Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
DUT Type:	Portable Analog/Digital 800 MHz PTT Radio Transceiver				Freq.:	806-824 MHz / 851-869 MHz		
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DETAILS OF SAR EVALUATION (Cont.)

Power Setting(s)

12. The DUT was configured to maximum power setting prior to the SAR evaluations by the manufacturer.
13. The conducted power levels were measured at the radio antenna connector prior to the SAR evaluations using a Gigatronics 8652A Universal Power Meter according to the procedures described in FCC 47 CFR §2.1046 and IC RSS-Gen.
14. The area scan evaluation was performed with a fully charged battery. After the area scan evaluation was completed the battery was replaced with a fully charged battery prior to the zoom scan evaluation.
15. The power drift of the DUT during the SAR evaluations was measured by the DASY4 system.

Test Mode(s)


16. The DUT was tested in continuous transmit operation (Continuous Wave mode at 100% duty cycle) with the transmit key constantly depressed. For a push-to-talk device the 50% duty cycle compensation reported assumes a transmit/receive cycle of equal time base.



Test Conditions

17. The fluid temperature was measured prior to and after the SAR evaluations to ensure the temperature remained within $\pm 2^{\circ}\text{C}$ of the fluid temperature reported during the dielectric parameter measurements.
18. The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluations using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).
19. The SAR evaluations 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 1 g and 10 g 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 1 g and 10 g 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 (5 x 5 x 7 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. Depending on the device type under evaluation, zoom scans for frequencies ≥ 800 MHz are typically determined with a scan volume of 30 mm x 30 mm x 30 mm (7 x 7 x 7) to ensure complete capture of the peak spatial-average SAR.

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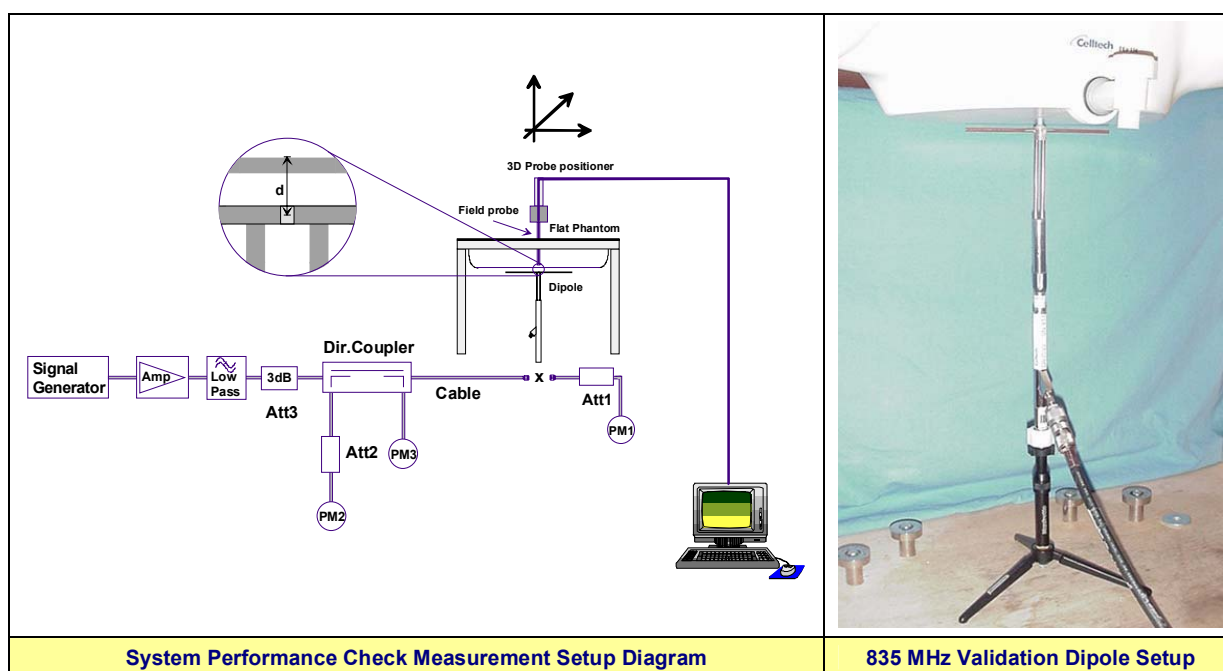
Certificate No. 2470.01


7.0 SYSTEM PERFORMANCE CHECK



Prior to the SAR evaluations, system checks were performed at the planar section of the SAM phantom with an 835MHz dipole (see Appendix B for system performance check test plots). Prior to the system performance checks the dielectric parameters of the simulated tissue mixtures were measured 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 E for system validation procedures).

SYSTEM PERFORMANCE CHECK EVALUATION RESULTS

Test Date	Fluid Type	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)
		Sys. Val. Target	Meas.	Dev.	Sys. Val. Target	Meas.	Dev.	Sys. Val. Target	Meas.	Dev.						
Feb 06	Body	221 $\pm 10\%$	2.30	+4.1%	55.1 $\pm 5\%$	57.8	+4.9%	0.94 $\pm 5\%$	0.96	+2.2%	1000	24.1	22.4	≥ 15	35	101.1
Feb 07	Body	221 $\pm 10\%$	2.35	+6.3%	55.1 $\pm 5\%$	57.2	+3.9%	0.94 $\pm 5\%$	0.97	+3.2%	1000	24.1	22.1	≥ 15	35	101.1
Feb 08	Body	221 $\pm 10\%$	2.23	+1.0%	55.1 $\pm 5\%$	56.3	+2.2%	0.94 $\pm 5\%$	0.94	0.0%	1000	23.0	21.0	≥ 15	34	101.1
Feb 11	Brain	221 $\pm 10\%$	2.38	+7.7%	43.3 $\pm 5\%$	42.9	-0.9%	0.90 $\pm 5\%$	0.92	+2.3%	1000	24.0	21.5	≥ 15	35	101.1
Feb 12	Brain	221 $\pm 10\%$	2.39	+8.2%	43.3 $\pm 5\%$	42.4	-2.0%	0.90 $\pm 5\%$	0.92	+2.3%	1000	24.0	23.0	≥ 15	34	101.1
Feb 13	Brain	221 $\pm 10\%$	2.27	+2.8%	43.3 $\pm 5\%$	42.6	-1.6%	0.90 $\pm 5\%$	0.92	+2.3%	1000	21.0	22.0	≥ 15	36	101.1
Feb 14	Brain	221 $\pm 10\%$	2.36	+6.8%	43.3 $\pm 5\%$	43.0	-0.6%	0.90 $\pm 5\%$	0.93	+3.4%	1000	23.6	22.5	≥ 15	35	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.														
		4. The SAR evaluations were performed within 24 hours of the system performance check.														



Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
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8.0 SIMULATED EQUIVALENT TISSUES




The simulated tissue mixtures consisted of a viscous gel using hydroxethylcellulose (HEC) gelling agent (except body) and saline solution. Preservation with a bactericide was added and visual inspection made to ensure air bubbles were not trapped during the mixing process. The fluid was prepared according to standardized procedures and measured for dielectric parameters (permittivity and conductivity).

SIMULATED TISSUE MIXTURES		
INGREDIENT	835 MHz Brain	835 MHz Body
	System Check & DUT Evaluation	DUT Evaluation
Water	40.71 %	53.79 %
Sugar	56.63 %	45.13 %
Salt	1.48 %	0.98 %
HEC	0.99 %	-
Bactericide	0.19 %	0.10 %

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)		1.60 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.			



Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
DUT Type:	Portable Analog/Digital 800 MHz PTT Radio Transceiver			Freq.:	806-824 MHz / 851-869 MHz			
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	<u>Date(s) of Evaluation</u> February 06-14, 2008	<u>Test Report Serial No.</u> 020508OWD-T883-S90F	<u>Test Report Revision No.</u> Rev. 1.0 (Initial Release)	  Certificate No. 2470.01
	<u>Test Report Issue Date</u> March 17, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	


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>	
<u>Evaluation Phantom</u>	
Type	Side Planar Phantom
Shell Material	Plexiglas
Bottom Thickness	2.0 mm ± 0.1 mm
Outer Dimensions	75.0 cm (L) x 22.5 cm (W) x 20.5 cm (H); Back Plane: 25.7 cm (H)
<u>Validation Phantom</u>	
Type	SAM Twin V4.0C (Planar Section)
Shell Material	Fiberglass
Thickness	2.0 ±0.1 mm
Volume	Approx. 25 liters

Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
DUT Type:	Portable Analog/Digital 800 MHz PTT Radio Transceiver				Freq.:	806-824 MHz / 851-869 MHz		
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 Testing and Engineering Services Lab	<u>Date(s) of Evaluation</u> February 06-14, 2008	<u>Test Report Serial No.</u> 020508OWD-T883-S90F	<u>Test Report Revision No.</u> Rev. 1.0 (Initial Release)	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> March 17, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

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 835 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	

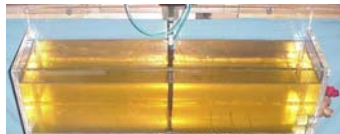
ET3DV6 E-Field Probe

12.0 SAM TWIN PHANTOM V4.0C

<p>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).</p>	
---	--


SAM Twin Phantom V4.0C

13.0 SIDE PLANAR PHANTOM


<p>The side planar phantom is constructed of Plexiglas material with a 2.0 mm shell thickness for face-held and body-worn SAR evaluations of portable radio transceivers. The side planar phantom is mounted on the side of the DASY4 compact system table.</p>	
---	---



Plexiglas Side Planar Phantom

14.0 DEVICE HOLDER

<p>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.</p>	
--	---


Device Holder



Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
DUT Type:	Portable Analog/Digital 800 MHz PTT Radio Transceiver			Freq.:	806-824 MHz / 851-869 MHz			
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15.0 TEST EQUIPMENT LIST


TEST EQUIPMENT		ASSET NO.	SERIAL NO.	DATE CALIBRATED		CALIBRATION DUE DATE
USED	DESCRIPTION					
x	Schmid & Partner DASY4 System	-	-	-	-	-
x	-DASY4 Measurement Server	00158	1078	N/A	N/A	N/A
x	-Robot	00046	599396-01	N/A	N/A	N/A
x	-DAE4	00019	353	10Jul07	10Jul08	10Jul08
x	-ET3DV6 E-Field Probe	00016	1387	16Mar07	16Mar08	16Mar08
	-300 MHz Validation Dipole	00023	135	08Jun07	08Jun08	08Jun08
	-450 MHz Validation Dipole	00024	136	30Jul07	30Jul08	30Jul08
x	-835 MHz Validation Dipole	00022	411	Brain	07Jun07	07Jun08
x				Body	07Jun07	07Jun08
	-900 MHz Validation Dipole	00020	054	Brain	07Jun07	07Jun08
				Body	07Jun07	07Jun08
	-1800 MHz Validation Dipole	00021	247	Brain	06Jun07	06Jun08
				Body	06Jun07	06Jun08
	-1900 MHz Validation Dipole	00032	151	Brain	06Jun07	06Jun08
				Body	06Jun07	06Jun08
	-2450 MHz Validation Dipole	00025	150	Brain	16Jul07	16Jul08
				Body	08Jun07	08Jun08
	5GHz Validation Dipole	00126	1031	Body	18May07	18May08
				Body	22May07	22May08
				Brain	09May07	09May08
				Body	10May07	10May08
x	-SAM Phantom V4.0C	00154	1033	N/A	N/A	N/A
	-Barski Planar Phantom	00155	03-01	N/A	N/A	N/A
x	-Plexiglas Side Planar Phantom	00156	161	N/A	N/A	N/A
	-Plexiglas Validation Planar Phantom	00157	137	N/A	N/A	N/A
	ALS-PR-DIEL Dielectric Probe Kit	00160	260-00953	N/A	N/A	N/A
x	HP 85070C Dielectric Probe Kit	00033	US39240170	N/A	N/A	N/A
x	Gigatronics 8652A Power Meter	00007	1835272	26Mar07	26Mar08	26Mar08
x	Gigatronics 80701A Power Sensor	00109	1834366	26Mar07	26Mar08	26Mar08
x	HP 8753ET Network Analyzer	00134	US39170292	20Apr07	20Apr08	20Apr08
x	HP 8648D Signal Generator	00005	3847A00611	NCR	NCR	NCR
	Rohde & Schwarz SMR20 Signal Generator	00006	100104	NCR	NCR	NCR
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	NCR	NCR	NCR
	Amplifier Research 10W1000C Power Amplifier	00041	27887	NCR	NCR	NCR
	Nextec NB00383 Microwave Amplifier	00151	0535	NCR	NCR	NCR




Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
DUT Type:	Portable Analog/Digital 800 MHz PTT Radio Transceiver			Freq.:	806-824 MHz / 851-869 MHz			
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 Celltech Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> February 06-14, 2008	<u>Test Report Serial No.</u> 020508OWD-T883-S90F	<u>Test Report Revision No.</u> Rev. 1.0 (Initial Release)	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> March 17, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

16.0 MEASUREMENT UNCERTAINTIES


UNCERTAINTY BUDGET FOR DEVICE EVALUATION						
Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	Uncertainty Value ±% (1g)	V _i or V _{eff}
Measurement System						
Probe calibration (835 MHz)	5.5	Normal	1	1	5.5	∞
Axial isotropy of the probe	4.7	Rectangular	1.732050808	0.7	1.9	∞
Spherical isotropy of the probe	9.6	Rectangular	1.732050808	0.7	3.9	∞
Spatial resolution	0	Rectangular	1.732050808	1	0.0	∞
Boundary effects	0.8	Rectangular	1.732050808	1	0.5	∞
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	15.6	Rectangular	1.732050808	1	9.0	∞
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	Normal	1	0.64	1.9	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	4.7	Normal	1	0.6	2.8	∞
Combined Standard Uncertainty					13.84	
Expanded Uncertainty (k=2)					27.67	
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 (see reference [5])						



Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
DUT Type:	Portable Analog/Digital 800 MHz PTT Radio Transceiver			Freq.:	806-824 MHz / 851-869 MHz			
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 Testing and Engineering Services Ltd	<u>Date(s) of Evaluation</u> February 06-14, 2008	<u>Test Report Serial No.</u> 020508OWD-T883-S90F	<u>Test Report Revision No.</u> Rev. 1.0 (Initial Release)	  Certificate No. 2470.01
	<u>Test Report Issue Date</u> March 17, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

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 (835 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	0.8	Rectangular	1.732050808	1	0.5	∞
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)	3.4	Normal	1	0.64	2.2	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	4.9	Normal	1	0.6	2.9	∞
Combined Standard Uncertainty					9.25	
Expanded Uncertainty (k=2)					18.51	
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 (see reference [5])						


Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
DUT Type:	Portable Analog/Digital 800 MHz PTT Radio Transceiver				Freq.:	806-824 MHz / 851-869 MHz		
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	<u>Test Report Issue Date</u> March 17, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Certificate No. 2470.01				

17.0 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.

Company:	M/A-COM, Inc.	Model:	P5400 (800)	FCC ID:	OWDTR-0043-E	IC:	3636B-0043	
DUT Type:	Portable Analog/Digital 800 MHz PTT Radio Transceiver				Freq.:	806-824 MHz / 851-869 MHz		
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	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835B-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Brain

835 MHz SYSTEM VALIDATION

Type:

835 MHz Validation Dipole

Asset Number:

00022

Serial Number:

411

Place of Validation:

Celltech Labs Inc.

Date of Validation:

June 07, 2007

Celltech Labs Inc. certifies that the 835 MHz System Validation was performed on the date indicated above.

Performed by:

Cheri Frangiadakis

Approved by:

Sean Johnston

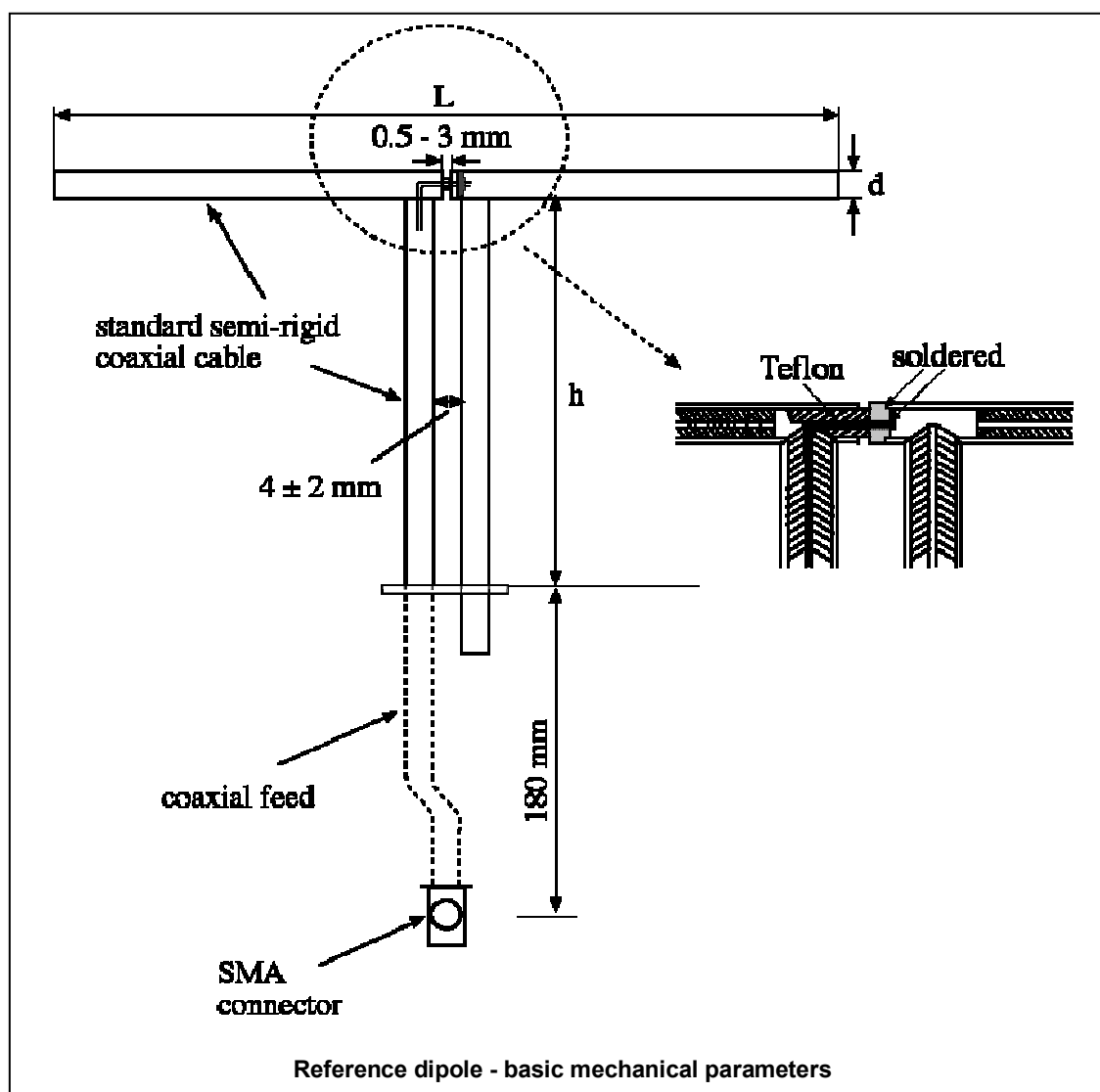
	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835B-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Brain


1. Dipole Construction & Electrical Characteristics

The validation dipole was constructed in accordance with the requirements specified in IEEE Standard 1528-2003 and International Standard IEC 62209-1:2005. The electrical properties were measured using an HP 8753ET Network Analyzer. The network analyzer was calibrated to the validation dipole N-type connector feed point using an HP85032E Type N calibration kit. The dipole was placed parallel to a planar phantom at a separation distance of 15.0mm from the simulating fluid using a loss-less dielectric spacer. The measured input impedance is:

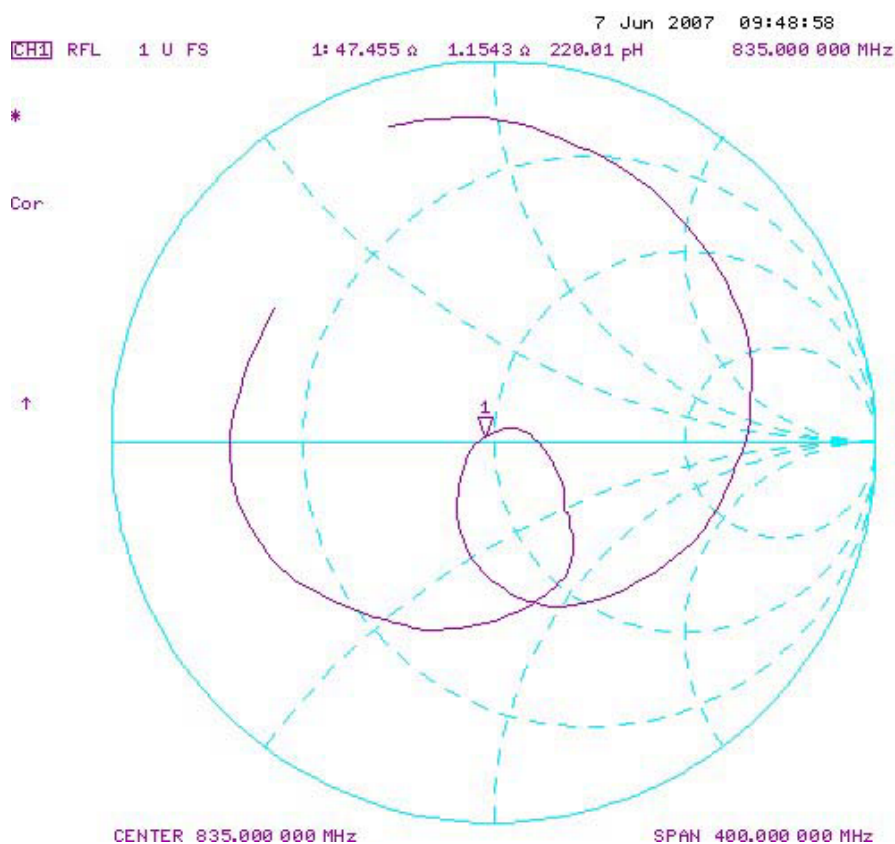
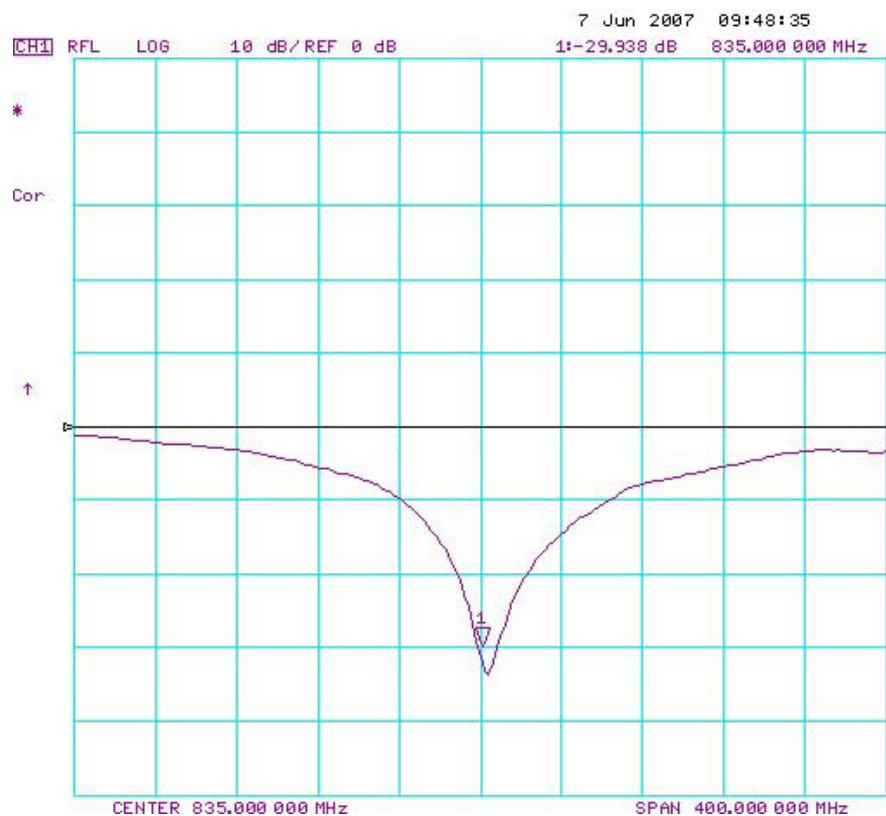
Feed point impedance at 835 MHz $\text{Re}\{Z\} = 47.455\Omega$
 $\text{Im}\{Z\} = 1.1543\Omega$


Return Loss at 835 MHz -29.938dB



	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835B-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Brain

2. Validation Dipole VSWR Data



	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835B-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Brain

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

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


5. Test Equipment List

TEST EQUIPMENT	ASSET NO.	SERIAL NO.	DATE OF CAL.	CAL. DUE DATE
SPEAG DASY4 Measurement Server	00158	1078	N/A	N/A
SPEAG Robot	00046	599396-01	N/A	N/A
SPEAG DAE4	00019	353	21Jun06	21Jun07
SPEAG ET3DV6 E-Field Probe	00016	1387	16Mar07	16Mar08
835 MHz Validation Dipole	00022	411	07Jun07	07Jun08
SPEAG SAM Phantom V4.0C	00154	1033	N/A	N/A
ALS-PR-DIEL Dielectric Probe Kit	00160	260-00953	N/A	N/A
Gigatronics 8652A Power Meter	00007	1835272	26Mar07	26Mar08
Gigatronics 80701A Power Sensor	00014	1833699	22Jan07	22Jan08
Gigatronics 80701A Power Sensor	00109	1834366	26Mar07	26Mar08
HP 8753ET Network Analyzer	00134	US39170292	20Apr07	20Apr08
HP 8648D Signal Generator	00005	3847A00611	NCR	NCR
Amplifier Research 5S1G4 Power Amplifier	00106	26235	NCR	NCR

	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835B-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Brain

6. 835 MHz System Validation Setup



	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835B-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Brain

7. 835 MHz Validation Dipole Setup

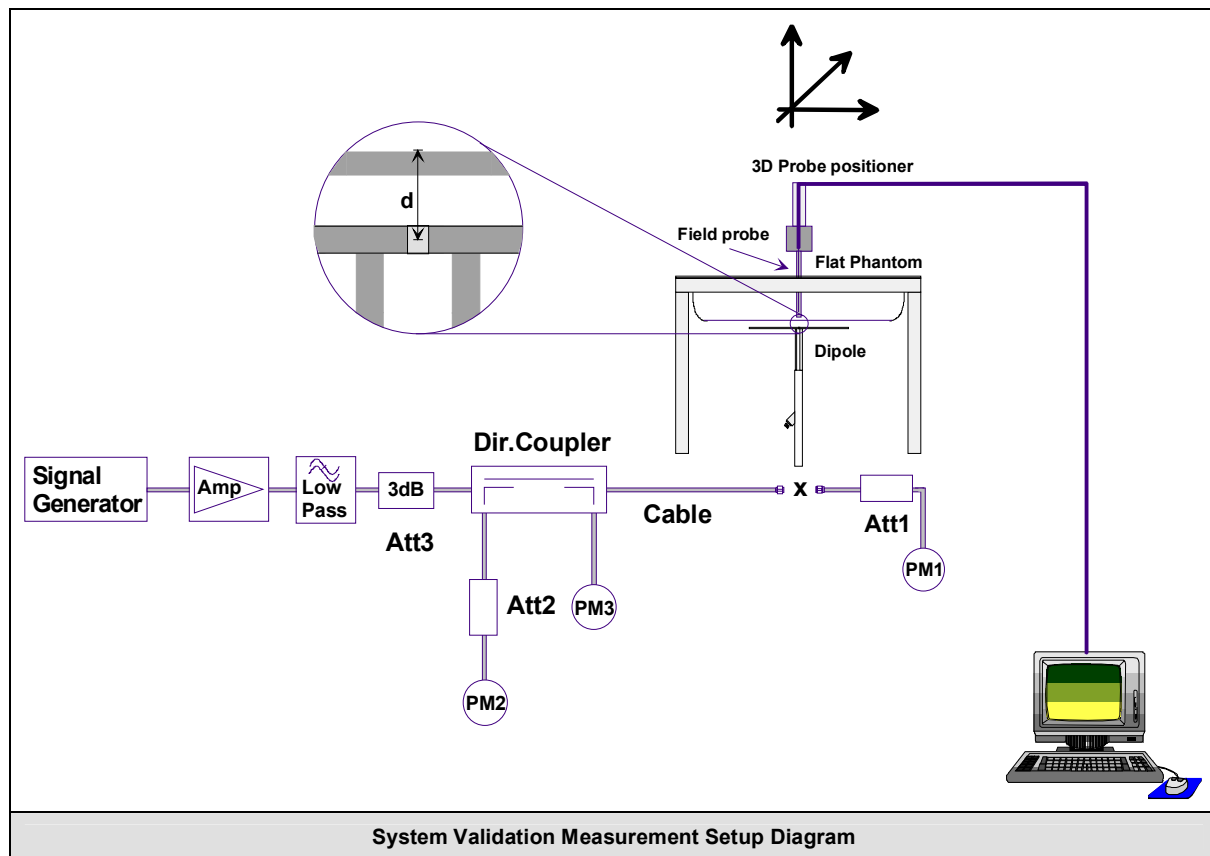



	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835B-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Brain

8. SAR Measurement

Measurements were made using a dosimetric E-field probe ET3DV6 (S/N: 1387, Conversion Factor 6.25). The SAR measurement was performed with the E-field probe in mechanical and optical surface detection mode. 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 20dB below the forward power.



	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835B-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Brain

9. Measurement Conditions

The SAM phantom was filled with 835 MHz Brain tissue simulant.

Relative Permittivity: 43.3 (+4.4% deviation from target)
Conductivity: 0.90 mho/m (0.0% deviation from target)
Fluid Temperature: 21.4 °C (Start of Test) / 21.6 °C (End of Test)
Fluid Depth: ≥ 15.0 cm

Environmental Conditions:

Ambient Temperature: 24.2°C
Barometric Pressure: 96.9 kPa
Humidity: 31%

The 835 MHz Brain tissue simulant consisted of the following ingredients:


Ingredient	Percentage by weight
Water	40.71%
Sugar	56.63%
Salt	1.48%
Dowicil 75	0.19%
HEC	0.99%
IEEE Target Dielectric Parameters:	$\epsilon_r = 41.5$ (+/- 5%) $\sigma = 0.90$ S/m (+/- 5%)

10. 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
2.38	+/- 10%	2.21	-7.1%	9.5	+/- 10%	8.84	-6.9%
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
1.55	+/- 10%	1.44	-7.1%	6.2	+/- 10%	5.76	-7.1%

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:	June 07, 2007	Document Serial No.:	SV835B-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Brain

System Validation - 835 MHz Dipole - June 07, 2007

DUT: Dipole 835 MHz; Asset: 00022; Serial: 411

Ambient Temp: 24.2°C; Fluid Temp: 21.4°C; Barometric Pressure: 96.9 kPa; Humidity: 31%

Communication System: CW

Forward Conducted Power: 250 mW

Frequency: 835 MHz; Duty Cycle: 1:1

Medium: HSL835 Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.90 \text{ mho/m}$; $\epsilon_r = 43.3$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1387; ConvF(6.25, 6.25, 6.25); Calibrated: 16/03/2007
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

835 MHz System Validation/Area Scan (6x10x1):

Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 2.26 mW/g

835 MHz System Validation/Zoom Scan (7x7x7)/Cube 0:

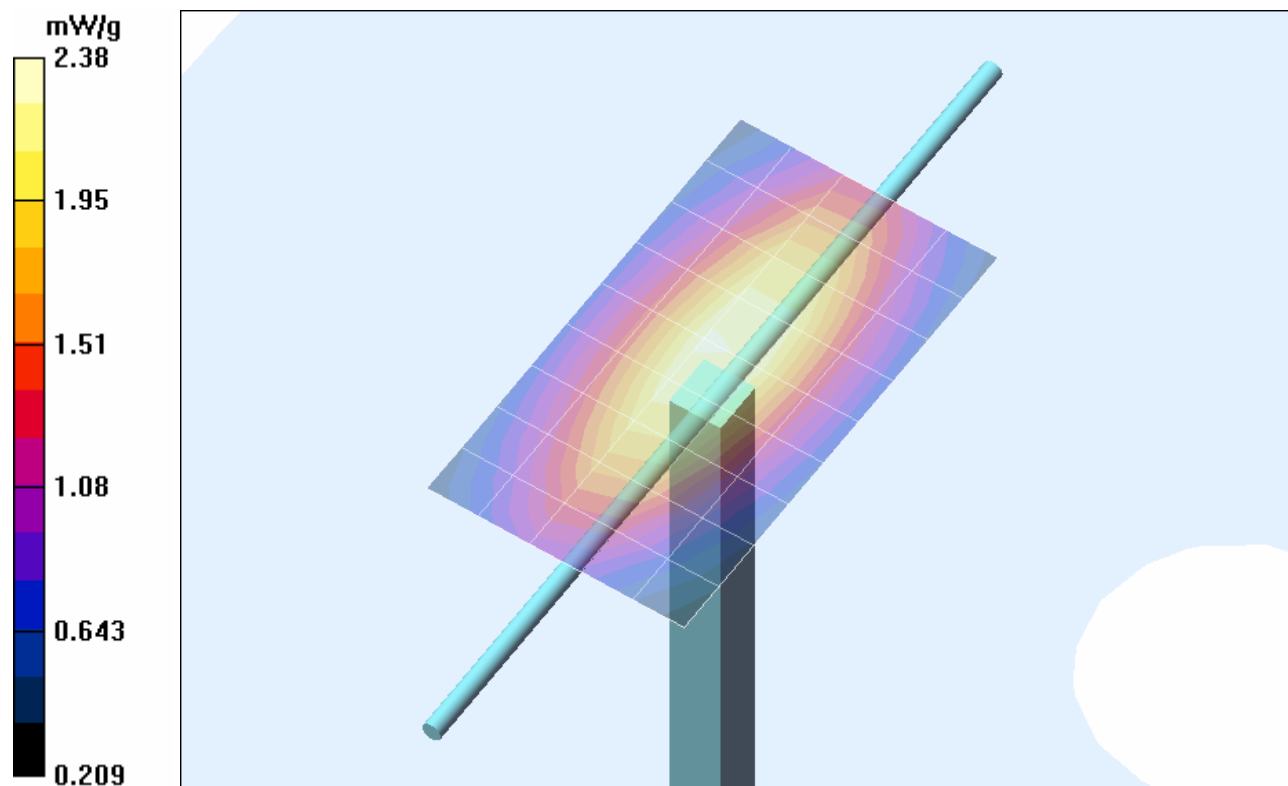
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

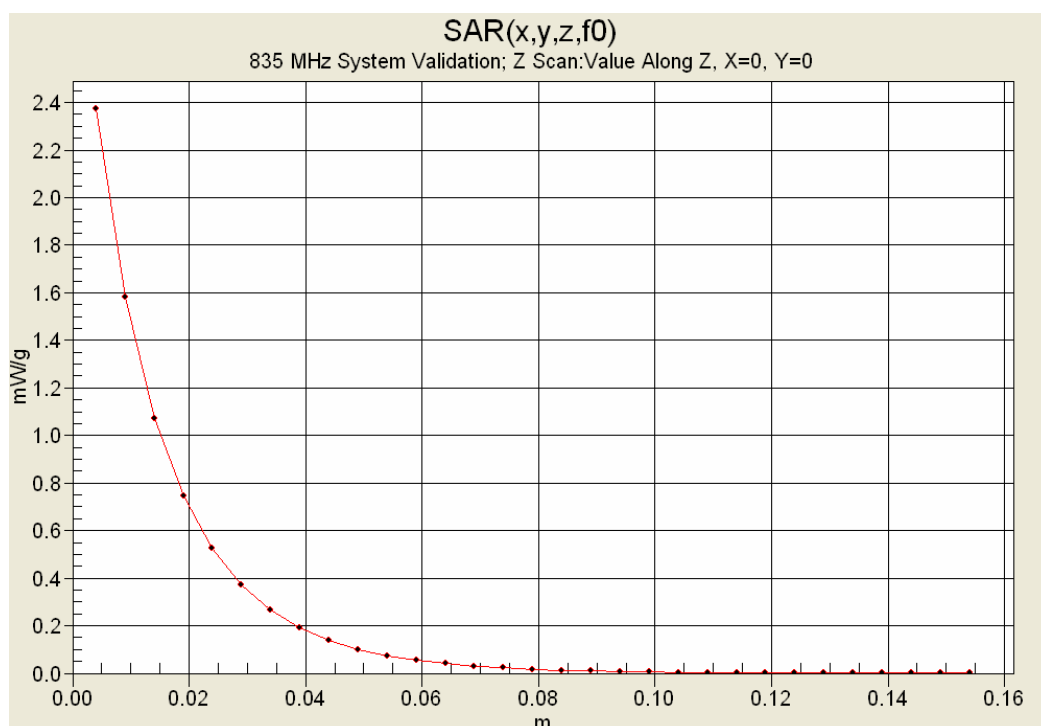
Reference Value = 53.2 V/m; Power Drift = 0.008 dB

Peak SAR (extrapolated) = 3.29 W/kg

SAR(1 g) = 2.21 mW/g; SAR(10 g) = 1.44 mW/g

Maximum value of SAR (measured) = 2.38 mW/g





11. Measured Fluid Dielectric Parameters

System Validation - 835 MHz (Brain)

Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

Thu 07/Jun/2007

Frequency (GHz)


FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon

FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma

Test_e Epsilon of UIM


Test_s Sigma of UIM

Freq	FCC_eH	FCC_sH	Test_e	Test_s
0.7350	42.02	0.89	44.47	0.82
0.7450	41.97	0.89	44.37	0.82
0.7550	41.92	0.89	44.26	0.83
0.7650	41.86	0.89	44.24	0.84
0.7750	41.81	0.90	43.98	0.85
0.7850	41.76	0.90	43.90	0.86
0.7950	41.71	0.90	43.86	0.87
0.8050	41.66	0.90	43.70	0.88
0.8150	41.60	0.90	43.56	0.89
0.8250	41.55	0.90	43.46	0.90
0.8350	41.50	0.90	43.33	0.90
0.8450	41.50	0.91	43.15	0.92
0.8550	41.50	0.92	43.17	0.93
0.8650	41.50	0.93	42.95	0.94
0.8750	41.50	0.94	42.79	0.95
0.8850	41.50	0.95	42.79	0.96
0.8950	41.50	0.96	42.64	0.97
0.9050	41.50	0.97	42.57	0.97
0.9150	41.50	0.98	42.51	0.98
0.9250	41.48	0.98	42.33	0.99
0.9350	41.46	0.99	42.23	1.00

	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835B-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Brain

12. Measurement Uncertainties

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 (835 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	0.8	Rectangular	1.732050808	1	0.5	∞
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)	0	Normal	1	0.64	0.0	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	4.4	Normal	1	0.6	2.6	∞
Combined Standard Uncertainty					8.90	
Expanded Uncertainty (k=2)					17.80	
Measurement Uncertainty Table in accordance with IEEE 1528-2003 and IEC 62209-1:2005						

	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835M-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Body

835 MHz SYSTEM VALIDATION

Type:

835 MHz Validation Dipole

Asset Number:

00022

Serial Number:

411

Place of Validation:

Celltech Labs Inc.

Date of Validation:

June 07, 2007


Celltech Labs Inc. certifies that the 835 MHz System Validation was performed on the date indicated above.

Performed by:

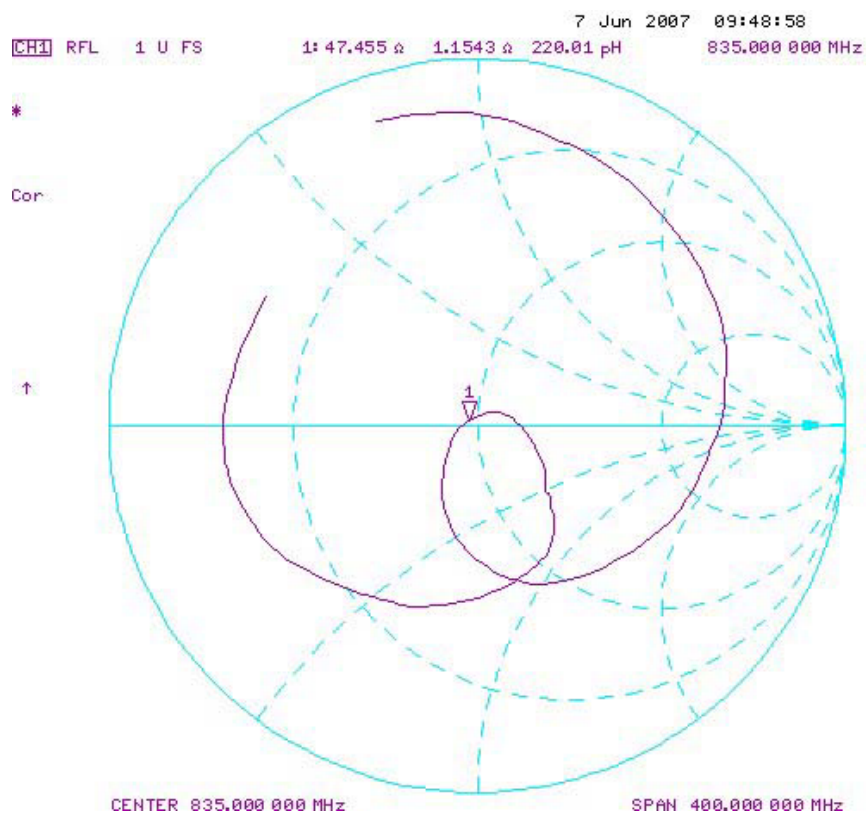
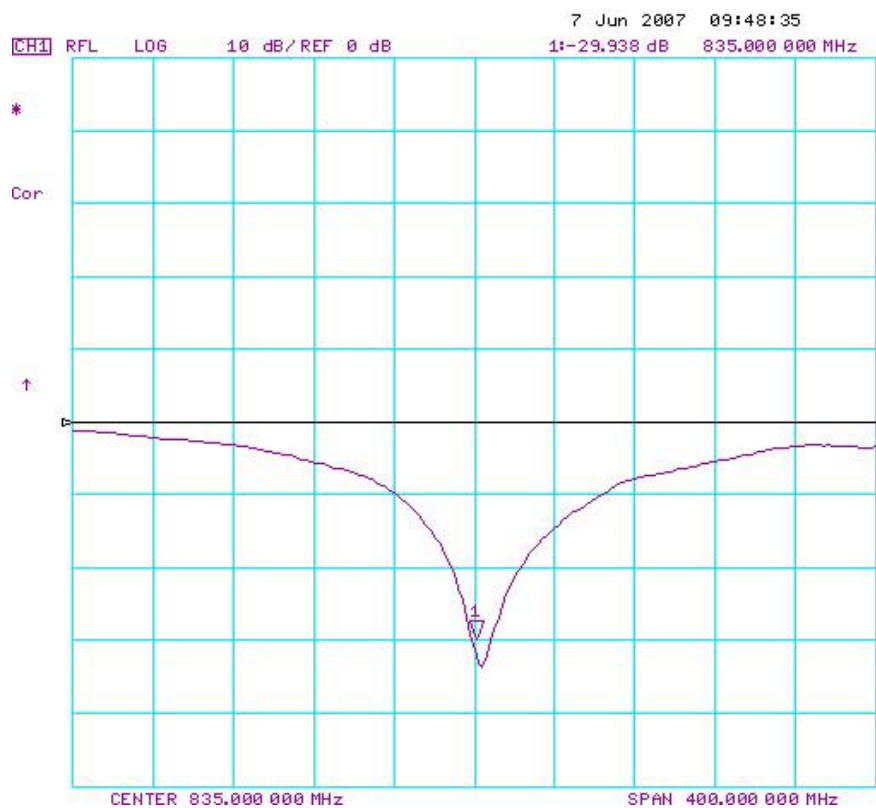
Cheri Frangiadakis


Approved by:

Jon Hughes

	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835M-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Body

2. Validation Dipole VSWR Data



	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835M-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Body

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

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


5. Test Equipment List

TEST EQUIPMENT	ASSET NO.	SERIAL NO.	DATE OF CAL.	CAL. DUE DATE
SPEAG DASY4 Measurement Server	00158	1078	N/A	N/A
SPEAG Robot	00046	599396-01	N/A	N/A
SPEAG DAE4	00019	353	21Jun06	21Jun07
SPEAG ET3DV6 E-Field Probe	00016	1387	16Mar07	16Mar08
835 MHz Validation Dipole	00022	411	07Jun07	07Jun08
SPEAG SAM Phantom V4.0C	00154	1033	N/A	N/A
ALS-PR-DIEL Dielectric Probe Kit	00160	260-00953	N/A	N/A
Gigatronics 8652A Power Meter	00007	1835272	26Mar07	26Mar08
Gigatronics 80701A Power Sensor	00014	1833699	22Jan07	22Jan08
Gigatronics 80701A Power Sensor	00109	1834366	26Mar07	26Mar08
HP 8753ET Network Analyzer	00134	US39170292	20Apr07	20Apr08
HP 8648D Signal Generator	00005	3847A00611	NCR	NCR
Amplifier Research 5S1G4 Power Amplifier	00106	26235	NCR	NCR

	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835M-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Body

6. 835 MHz System Validation Setup



	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835M-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Body

7. 835 MHz Validation Dipole Setup

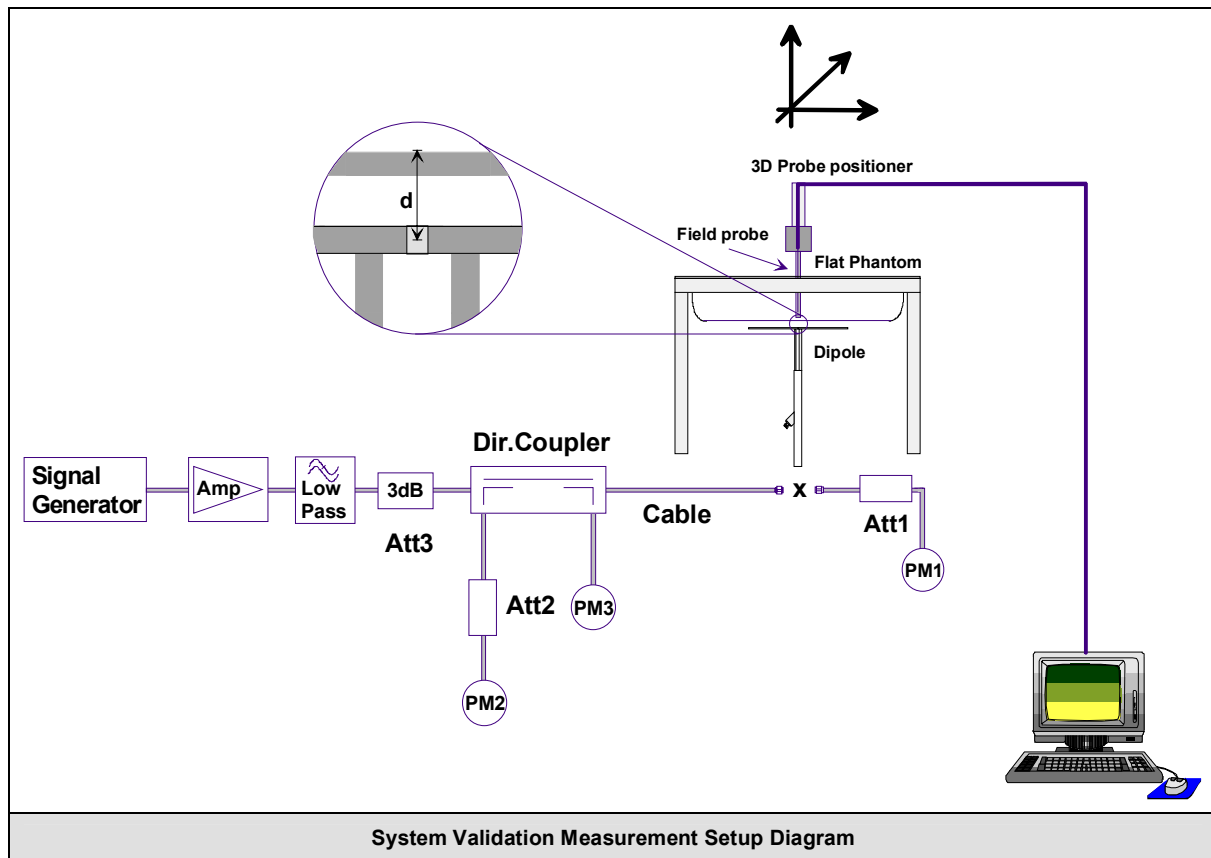


	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835M-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Body

8. SAR Measurement

Measurements were made using a dosimetric E-field probe ET3DV6 (S/N: 1387, Conversion Factor 6.18). The SAR measurement was performed with the E-field probe in mechanical and optical surface detection mode. The setup and determination of the forward power into the dipole was performed using the following procedures.

First the power meter PM1 (including attenuator Att1) is connected to the cable to measure the forward power at the location of the dipole connector (X). The signal generator is adjusted for the desired forward power at the dipole connector (taking into account the attenuation of Att1) as read by power meter PM2. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter PM2. If the signal generator does not allow adjustment in 0.01dB steps, the remaining difference at PM2 must be taken into consideration. PM3 records the reflected power from the dipole to ensure that the value is not changed from the previous value. The reflected power should be 20dB below the forward power.



9. Measurement Conditions

The SAM phantom was filled with 835 MHz Body tissue simulant.

Relative Permittivity: 55.1 (-0.1% deviation from target)
 Conductivity: 0.94 mho/m (-3.0% deviation from target)
 Fluid Temperature: 21.6 °C (Start of Test) / 21.9 °C (End of Test)
 Fluid Depth: ≥ 15.0 cm

Environmental Conditions:

Ambient Temperature: 24.2°C
 Barometric Pressure: 96.9 kPa
 Humidity: 31%

The 835 MHz Body tissue simulant consisted of the following ingredients:


Ingredient	Percentage by weight
Water	53.79%
Sugar	45.13%
Salt	0.98%
Dowicil 75	0.10%
IEEE Target Dielectric Parameters:	$\epsilon_r = 55.2 (+/- 5\%)$ $\sigma = 0.97 \text{ S/m } (+/- 5\%)$

10. System Validation SAR Results

SAR @ 0.25W Input averaged over 1g (W/kg)				SAR @ 1W Input averaged over 1g (W/kg)			
SPEAG Target		Measured	Deviation	SPEAG Target		Measured	Deviation
2.43	+/- 10%	2.21	-9.0%	9.71	+/- 10%	8.84	-9.0%
SAR @ 0.25W Input averaged over 10g (W/kg)				SAR @ 1W Input averaged over 10g (W/kg)			
SPEAG Target		Measured	Deviation	SPEAG Target		Measured	Deviation
1.60	+/- 10%	1.45	-9.4%	6.38	+/- 10%	5.80	-9.1%

Dipole Type	Distance [mm]	Frequency [MHz]	SAR (1g) [W/kg]	SAR (10g) [W/kg]	SAR (peak) [W/kg]
D300V2	15	300	3.02	2.06	4.36
D450V2	15	450	5.01	3.36	7.22
D835V2	15	835	9.71	6.38	14.1
D900V2	15	900	11.1	7.17	16.3
D1450V2	10	1450	29.6	16.6	49.8
D1500V2	10	1500	30.8	17.1	52.1
D1640V2	10	1640	34.4	18.7	59.4
D1800V2	10	1800	38.5	20.3	67.5
D1900V2	10	1900	39.8	20.8	69.6
D2000V2	10	2000	40.9	21.2	71.5
D2450V2	10	2450	51.2	23.7	97.6
D3000V2	10	3000	61.9	24.8	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.

	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835M-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Body

System Validation - 835 MHz Dipole - June 7, 2007

DUT: Dipole 835 MHz; Asset: 00022; Serial: 411

Ambient Temp: 24.2°C; Fluid Temp: 21.6°C; Barometric Pressure: 96.9 kPa; Humidity: 31%

Communication System: CW

Forward Conducted Power: 250 mW

Frequency: 835 MHz; Duty Cycle: 1:1

Medium: M835 Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.94 \text{ mho/m}$; $\epsilon_r = 55.1$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1387; ConvF(6.18, 6.18, 6.18); Calibrated: 16/03/2007
- Sensor-Surface: 4 mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

835 MHz System Validation/Area Scan (6x10x1):

Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 2.28 mW/g

835 MHz System Validation/Zoom Scan (7x7x7)/Cube 0:

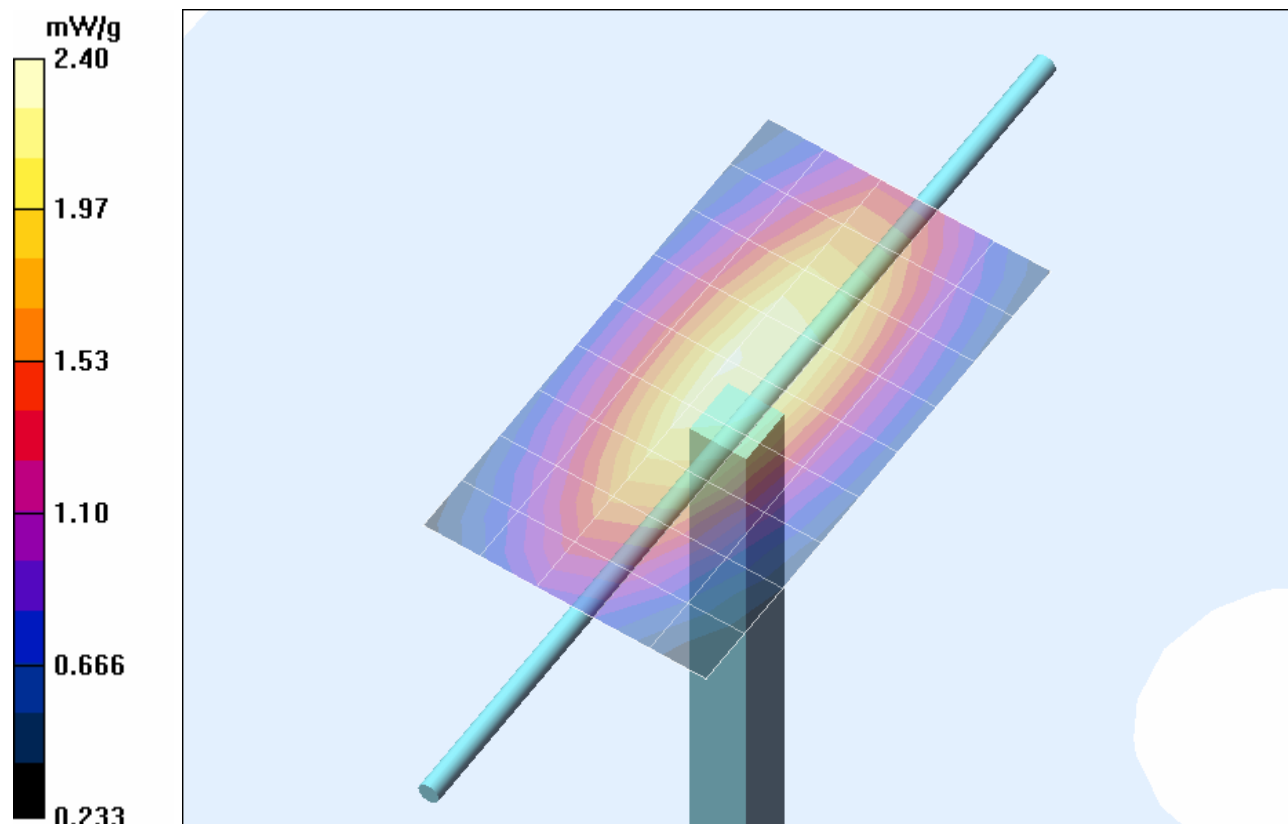
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

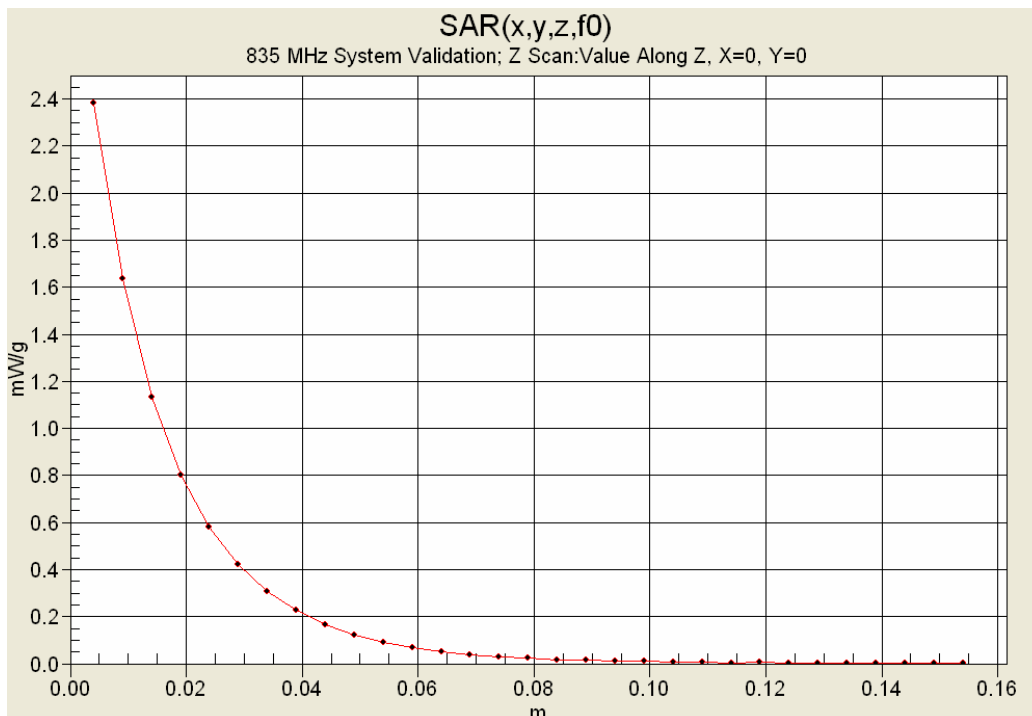
Reference Value = 51.7 V/m; Power Drift = -0.028 dB

Peak SAR (extrapolated) = 3.21 W/kg

SAR(1 g) = 2.21 mW/g; SAR(10 g) = 1.45 mW/g

Maximum value of SAR (measured) = 2.40 mW/g





11. Measured Fluid Dielectric Parameters

System Validation - 835 MHz (Body)

Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

Tue 07/Jun/2007

Frequency (GHz)

FCC_eH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon

FCC_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma


FCC_eB FCC Limits for Body Epsilon

FCC_sB FCC Limits for Body Sigma

Test_e Epsilon of UIM

Test_s Sigma of UIM

Freq	FCC_eB	FCC_sB	Test_e	Test_s
0.7350	55.59	0.96	58.23	0.86
0.7450	55.55	0.96	57.76	0.87
0.7550	55.51	0.96	57.57	0.88
0.7650	55.47	0.96	57.26	0.89
0.7750	55.43	0.97	57.05	0.90
0.7850	55.39	0.97	56.69	0.90
0.7950	55.36	0.97	56.32	0.91
0.8050	55.32	0.97	55.97	0.92
0.8150	55.28	0.97	55.74	0.93
0.8250	55.24	0.97	55.44	0.94
0.8350	55.20	0.97	55.1	0.94
0.8450	55.17	0.98	54.75	0.96
0.8550	55.14	0.99	54.47	0.96
0.8650	55.11	1.01	54.00	0.97
0.8750	55.08	1.02	53.63	0.98
0.8850	55.05	1.03	53.24	0.98
0.8950	55.02	1.04	52.84	0.99
0.9050	55.00	1.05	52.48	1.00
0.9150	55.00	1.06	52.04	1.00
0.9250	54.98	1.06	51.61	1.01
0.9350	54.96	1.07	51.18	1.02

	Date of Evaluation:	June 07, 2007	Document Serial No.:		SV835M-060707-R1.1	
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Body

12. Measurement Uncertainties

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 (835 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	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)	5	Normal	1	0.64	3.2	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	5	Normal	1	0.6	3.0	∞
Combined Standard Uncertainty					9.57	
Expanded Uncertainty (k=2)					19.14	
Note(s)	1. Measurement Uncertainty Table in accordance with IEEE 1528-2003 and IEC 62209-1:2005.					

Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 BA
Series No	TP-1002 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

Tests

The series production process used allows the limitation to test of first articles.
Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards	Liquid type HSL 1800 and others according to the standard.	Pre-series, First article

Standards

- [1] CENELEC EN 50361
- [2] IEEE P1528-200x draft 6.5
- [3] IEC PT 62209 draft 0.9

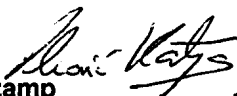
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 18.11.2001

Signature / Stamp



**Schmid & Partner
Engineering AG**



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