




	<u>Date(s) of Evaluation</u> October 26, 2007	<u>Test Report Serial No.</u> 102507OWD-T868b-S90F	<u>Test Report Revision No.</u> Revision 1.0	
	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Certificate No. 2470.01				

SAR TEST REPORT		
RF EXPOSURE EVALUATION		SPECIFIC ABSORPTION RATE
APPLICANT	M/A-COM, INC.	
PRODUCT	PORTABLE 800 MHz FM PTT RADIO TRANSCEIVER	
MODEL(S)	P7100 (P2)	
FCC IDENTIFIER	OWDTR-0023-E	
IC IDENTIFIER	3636B-0023	
APPLICATION TYPE	Permissive Change - Addition of Alkaline Battery Pack	
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)	October 26, 2007	
TEST REPORT SERIAL NO.	102507OWD-T868b-S90F	
TEST REPORT REVISION NO.	Revision 1.0 (Initial Release)	
TEST REPORT ISSUE DATE	January 08, 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)	 Certificate No. 2470.01	

Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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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		
Standard(s) Applied	FCC	47 CFR §2.1093		
	IC	Health Canada Safety Code 6		
Procedure(s) Applied	FCC	OET Bulletin 65, Supplement C (Edition 01-01)		
	IC	RSS-102 Issue 2		
Device Classification	FCC	Licensed Non-Broadcast Transmitter Held to Face (Part 90)		
	IC	Land Mobile Radio Transceiver (RSS-119)		
RF Exposure Category	Occupational / Controlled Environment			
Application Type	Permissive Change - Addition of Alkaline Battery Pack (P/N: BT-013259-001)			
	Original FCC Grant Date: July 16, 2004		Original IC Certification Date: January 30, 2006	
Device Description	Portable 800 MHz FM PTT Radio Transceiver			
Device Model(s)	P7100 (P2)			
FCC IDENTIFIER	OWDTR-0023-E			
IC IDENTIFIER	3636B-0023			
Serial No. Tested	T1-PP27			
Frequency Range(s)	378 - 430 MHz			
Antenna Types Tested	Face-held - Quarter-wave Whip (P/N: KRE1011223/01)			
	Body-worn - Quarter-wave Whip (P/N: KRE1011506/2)			
Battery Type(s) Tested	Alkaline - 1.5V, 2850mAh Duracell Procell (x6 AA)			
Body-worn Accessories Tested	Metal Belt-Clip (P/N: CC23894)			
Audio Accessories Tested	Speaker-Microphone Non-Antenna Version (P/N: KRY1011617/183)			
Max. SAR Level(s) Evaluated	Face-held	1.42 W/kg	averaged over 1g	50% Duty Cycle
	Body-worn	7.55 W/kg	averaged over 1g	50% Duty Cycle
FCC/IC Spatial Peak SAR Limit(s)	Head/Body	8.0 W/kg	averaged over 1g	Occupational / Controlled Exposure

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 evaluated 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.



Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
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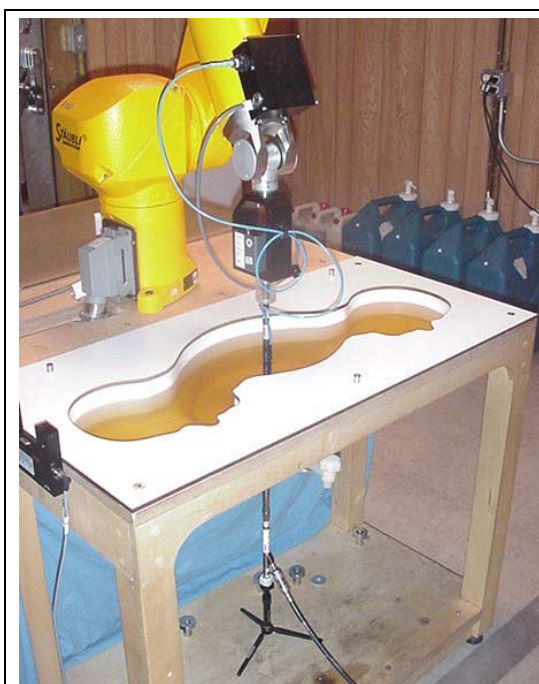
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1.0 INTRODUCTION

This measurement report demonstrates that the M/A-COM Model(s): P7100 P2 Portable 800 MHz FM PTT Radio Transceiver, with the Permissive Change(s) described in this report, continues to comply 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 measurement 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 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**


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Certificate No. 2470.01

3.0 SAR MEASUREMENT SUMMARY

SAR EVALUATION RESULTS														
Test Type	Freq.	Chan.	Test Mode	Antenna Type	Accessories		DUT Position to Planar Phantom	Cond. Power Before Test	Measured SAR 1g (W/kg)		SAR Drift During Test	Scaled SAR 1g (W/kg)		
	MHz				Body-worn	Spacing		Watts	Duty Cycle			Duty Cycle		
					Audio				100%	50%			100%	50%
Face-held	815.0000	Mid	CW	¼-wave Whip	na	2.5 cm	Front Side	3.23	2.23	1.12	-1.04	2.83	1.42	
		Low band		KRE1011223/01	na									
Body-worn	815.0000	Mid	CW	¼-wave Whip	Belt-Clip	1.1 cm	Back Side	3.23	10.3	5.15	-1.66	15.1	7.55	
		Low band		KRE1011506/2	Speaker-Mic									
SAR SAFETY LIMIT(S)				BRAIN		BODY		SPATIAL PEAK		RF EXPOSURE CATEGORY				
FCC 47 CFR 2.1093		Health Canada Safety Code 6		8.0 W/kg		8.0 W/kg		averaged over 1 gram		Occupational / Controlled				
Test Date		October 26, 2007			October 26, 2007			Test Date		Brain	Body	Unit		
Fluid Type		815 MHz Brain			815 MHz Body			Ambient Temperature		23.5	23.5	°C		
Dielectric Constant ϵ_r		IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.	Fluid Temperature		23.1	23.0	°C
		41.6	±5%	42.6	+2.4%	55.3		±5%	57.1	+3.3%	Relative Humidity		32	32
Conductivity σ (mho/m)		IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.	Atmospheric Pressure		100.4	100.4	kPa
		0.90	±5%	0.88	-2.2%	0.97		±5%	0.95	-2.1%	ρ (Kg/m ³)		1000	
Note(s)		1.	The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.											
		2.	The test configuration(s) utilized for this Permissive Change evaluation as reported above were determined based on the following previous measurement results: a. maximum face-held SAR level configuration - measured during the original certification evaluations (please refer to Celltech Test Report Serial No.: 043004-503OWD). b. maximum body-worn SAR level configuration - measured during the original certification evaluations (please refer to Celltech Test Report Serial No.: 043004-503OWD).											
		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 fully charged batteries. After the area scan evaluation was completed the batteries were replaced with fully charged batteries prior to the zoom scan evaluation.											
		Battery Type(s) Evaluated:			1.5V, 2850mAh Duracell Procell Alkaline (x6 AA)									
		5.	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.											
		6.	The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluations using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).											
		7.	The SAR evaluations were performed within 24 hours of the system performance check.											

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4.0 DETAILS OF SAR EVALUATION

The M/A-COM Model(s): P7100 P2 Portable 800 MHz FM PTT Radio Transceiver described in this report 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 & Body-worn Configurations

1. The DUT 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 DUT was tested in a body-worn configuration with the back side placed parallel to the outer surface of the planar phantom. The attached belt-clip was touching the planar phantom and provided a 1.1 cm spacing between the back of the radio and the planar phantom. The body-worn evaluation was performed with the speaker-microphone audio accessory connected to the radio.

Power Level(s) & Test Mode(s)


3. The conducted power levels were measured prior to the SAR evaluations at the antenna connector of the DUT using a Gigatronics 8652A Universal Power Meter according to the procedures described in FCC 47 CFR §2.1046 and IC RSS-Gen.
4. The area scan evaluation was performed with fully charged batteries. After the area scan evaluation was completed the batteries were replaced with fully charged batteries prior to the zoom scan evaluation.
5. The power drift of the DUT during the SAR evaluations was measured by the DASY4 system.
6. The DUT was tested in unmodulated 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

7. 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.
8. The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluations using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).

5.0 EVALUATION PROCEDURES

- (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.
- 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:
- 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.
- 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:
- 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.
- 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).
- 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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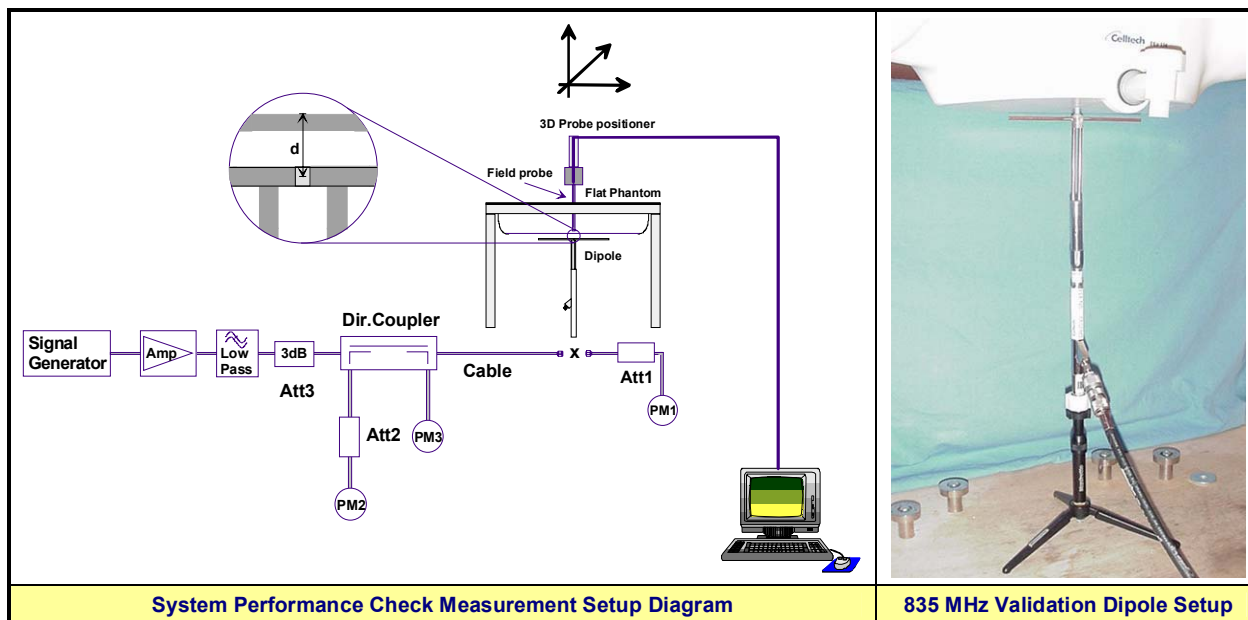
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6.0 SYSTEM PERFORMANCE CHECK




Prior to the SAR evaluations a system check was performed using the SAM twin phantom (planar section) and an 835 MHz dipole (see Appendix B for system performance check test plot). The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer (see Appendix C 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 $\pm 10\%$ from the system validation target SAR value (see Appendix E for system validation procedures).

SYSTEM PERFORMANCE CHECK EVALUATION

Test Date	Tissue Freq.	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)
	Brain MHz	Sys. Val. Target	Meas.	Dev.	Sys. Val. Target	Meas.	Dev.	Sys. Val. Target	Meas.	Dev.						
Oct 26	835	2.21 $\pm 10\%$	2.32	+5.0%	43.3 $\pm 5\%$	42.4	-2.1%	0.90 $\pm 5\%$	0.90	0.0%	1000	23.5	23.1	≥ 15	32	100.4
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.														



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7.0 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 %

8.0 SAR LIMITS


SAR RF EXPOSURE LIMITS (W/kg)			
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	0.4
Spatial Peak (averaged over any 1 g of tissue)		1.60	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)		4.0	20.0
The Spatial Average value of the SAR averaged over the whole body.			
The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.			
The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.			
Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.			
Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.			



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9.0 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

Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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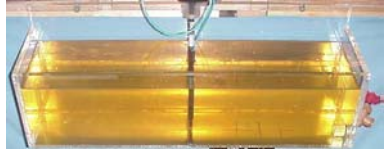
	<u>Date(s) of Evaluation</u> October 26, 2007	<u>Test Report Serial No.</u> 102507OWD-T868b-S90F	<u>Test Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

10.0 PROBE SPECIFICATION (ET3DV6)

Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, glycol)	
Calibration:	In air from 10 MHz to 2.5 GHz In brain simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy $\pm 8\%$)	
Frequency:	10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)	
Directivity:	± 0.2 dB in brain tissue (rotation around probe axis) ± 0.4 dB in brain tissue (rotation normal to probe axis)	
Dynamic Range:	5 μ W/g to > 100 mW/g; Linearity: ± 0.2 dB	
Surface Detect:	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces	
Dimensions:	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm	
Application:	General dosimetry up to 3 GHz Compliance tests of mobile phone	


ET3DV6 E-Field Probe

11.0 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

12.0 SAM TWIN PHANTOM V4.0C


<p>The SAM twin 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 twin phantom V4.0C).</p>	
---	---




SAM Twin Phantom V4.0C

13.0 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




Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Certificate No. 2470.01				

14.0 TEST EQUIPMENT LIST


TEST EQUIPMENT			ASSET NO.	SERIAL NO.	DATE CALIBRATED		CALIBRATION DUE DATE
USED	DESCRIPTION						
x	Schmid & Partner DASY4 System		-	-	-		-
x	-DASY4 Measurement Server		00158	1078	N/A		N/A
x	-Robot		00046	599396-01	N/A		N/A
x	-DAE4		00019	353	10Jul07		10Jul08
	-DAE3		00018	370	13Mar07		13Mar08
x	-ET3DV6 E-Field Probe		00016	1387	16Mar07		16Mar08
	-EX3DV4 E-Field Probe		00213	3600	24Jan07		24Jan08
	-300 MHz Validation Dipole		00023	135	08Jun07		08Jun08
	-450 MHz Validation Dipole		00024	136	30Jul07		30Jul08
x	-835 MHz Validation Dipole		00022	411	Brain	07Jun07	07Jun08
					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	-5200 MHz	00126	1031	Body	18May07	18May08
		-5500 MHz			Body	22May07	22May08
		-5800 MHz			Brain	09May07	09May08
					Body	10May07	10May08
x	-SAM Phantom V4.0C		00154	1033	N/A		N/A
	-Barski Planar Phantom		00155	03-01	N/A		N/A
x	-Plexiglas Side Planar Phantom		00156	161	N/A		N/A
	-Plexiglas Validation Planar Phantom		00157	137	N/A		N/A
	ALS-PR-DIEL Dielectric Probe Kit		00160	260-00953	N/A		N/A
x	HP 85070C Dielectric Probe Kit		00033	US39240170	N/A		N/A
x	Gigatronics 8652A Power Meter		00007	1835272	26Mar07		26Mar08
	Gigatronics 8652A Power Meter		00008	1835267	22Jan07		22Jan08
x	Gigatronics 80701A Power Sensor		00012	1834350	22Jan07		22Jan08
x	Gigatronics 80701A Power Sensor		00014	1833699	22Jan07		22Jan08
	Gigatronics 80701A Power Sensor		00109	1834366	26Mar07		26Mar08
x	HP 8753ET Network Analyzer		00134	US39170292	20Apr07		20Apr08
x	HP 8648D Signal Generator		00005	3847A00611	NCR		NCR
	Rohde & Schwarz SMR20 Signal Generator		00006	100104	NCR		NCR
x	Amplifier Research 5S1G4 Power Amplifier		00106	26235	NCR		NCR
	Amplifier Research 10W1000C Power Amplifier		00041	27887	NCR		NCR
	Nextec NB00383 Microwave Amplifier		00151	0535	NCR		NCR
	HP E4408B Spectrum Analyzer		00015	US39240170	05Feb07		05Feb08




Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Certificate No. 2470.01				

15.0 MEASUREMENT UNCERTAINTIES


UNCERTAINTY BUDGET FOR DEVICE EVALUATION						
Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	Uncertainty Value ±% (1g)	V _i or V _{eff}
Measurement System						
Probe calibration (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	5	Rectangular	1.732050808	1	2.9	∞
Phantom and Setup						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	∞
Liquid conductivity (measured)	2.2	Normal	1	0.64	1.4	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	3.3	Normal	1	0.6	2.0	∞
Combined Standard Uncertainty					10.63	
Expanded Uncertainty (k=2)					21.25	
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 (see reference [5])						



Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Certificate No. 2470.01				

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)	0	Normal	1	0.64	0.0	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	2.1	Normal	1	0.6	1.3	∞
Combined Standard Uncertainty					8.59	
Expanded Uncertainty (k=2)					17.19	
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 (see reference [5])						



Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	


16.0 REFERENCES




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

Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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APPENDIX A - SAR MEASUREMENT DATA

Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Certificate No. 2470.01				

Date Tested: 10/26/2007

Face-Held SAR - P7100 (P2) Radio - ¼-Wave Whip Antenna (P/N: KRE1011223/01) - 815 MHz

DUT: M/A-COM Model: P7100 (P2); Type: Portable FM PTT Radio Transceiver; Serial: T1-PP27

Ambient Temp: 23.5°C; Fluid Temp: 23.1°C; Barometric Pressure: 100.4 kPa; Humidity: 32%

Communication System: FM (CW)

Frequency: 815 MHz; Duty Cycle: 1:1

RF Output Power: 3.23 Watts (Conducted)

9V AA Alkaline Battery Pack (Battery Case P/N: BT-013259-001)

Medium: HSL835 Medium parameters used: $f = 815 \text{ MHz}$; $\sigma = 0.88 \text{ mho/m}$; $\epsilon_r = 42.6$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1387; ConvF(6.25, 6.25, 6.25); Calibrated: 16/03/2007
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 10/07/2007
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Face-Held SAR - 2.5 cm Spacing from Front of DUT to Planar Phantom - Low Band Mid Channel - 815 MHz

Area Scan (8x25x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 3.16 mW/g

Face-Held SAR - 2.5 cm Spacing from Front of DUT to Planar Phantom - Low Band Mid Channel - 815 MHz

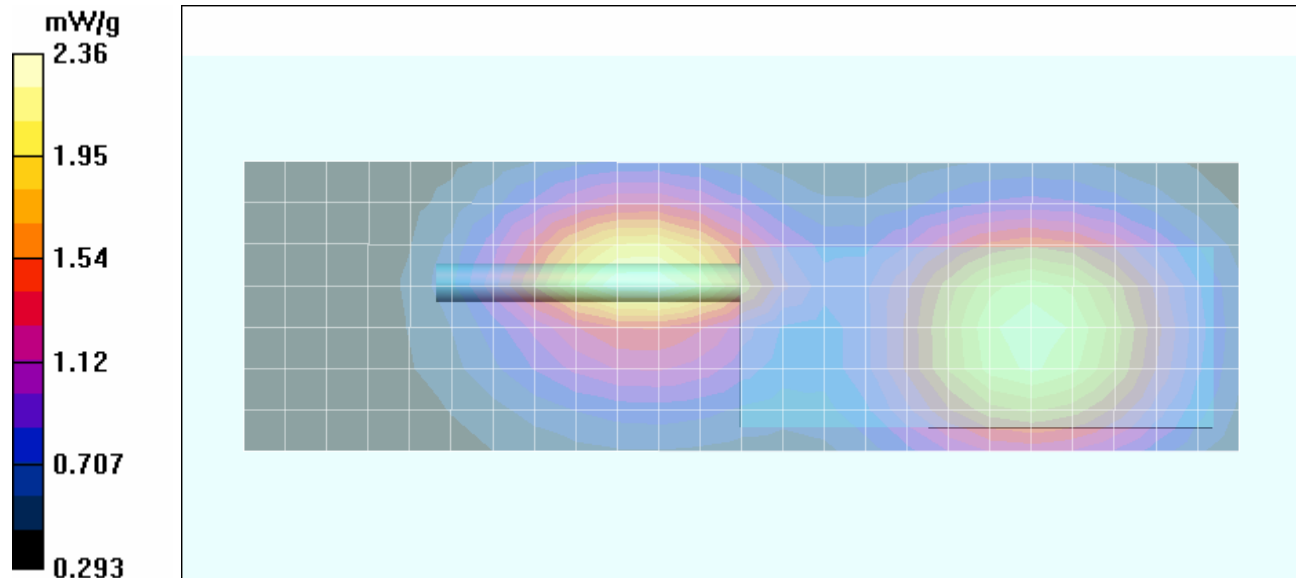
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$


Reference Value = 46.3 V/m; Power Drift = -1.04 dB



Peak SAR (extrapolated) = 2.95 W/kg

SAR(1 g) = 2.23 mW/g; SAR(10 g) = 1.62 mW/g

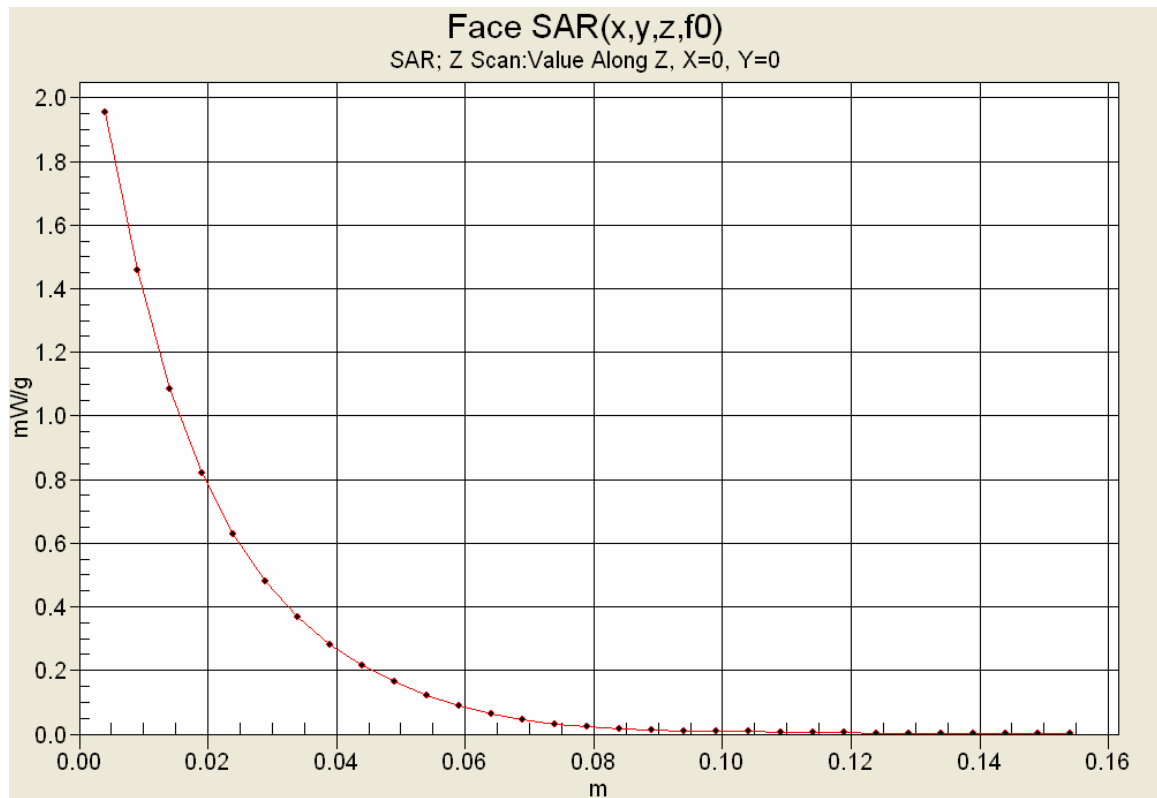
Maximum value of SAR (measured) = 2.36 mW/g






Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Z-Axis Scan



Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 10/26/2007

Body-Worn SAR - P7100 (P2) Radio - ¼-Wave Whip Antenna (P/N: KRE1011506/2) - 815 MHz

DUT: M/A-COM Model: P7100 (P2); Type: Portable FM PTT Radio Transceiver; Serial: T1-PP27

Body-Worn Accessory: Metal Belt-Clip (P/N: CC23894)

Audio Accessory: Speaker-Microphone (P/N: KRY1011617/183)

Ambient Temp: 23.5°C; Fluid Temp: 23.0°C; Barometric Pressure: 100.4 kPa; Humidity: 32%

Communication System: FM (CW)

Frequency: 815 MHz; Duty Cycle: 1:1

RF Output Power: 3.23 Watts (Conducted)

9V AA Alkaline Battery Pack (Battery Case P/N: BT-013259-001)

Medium: M815 Medium parameters used: $f = 815 \text{ MHz}$; $\sigma = 0.95 \text{ mho/m}$; $\epsilon_r = 57.1$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1387; ConvF(6.18, 6.18, 6.18); Calibrated: 16/03/2007
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 10/07/2007
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-Worn SAR - 1.1 cm Belt-Clip Spacing from Back of DUT to Planar Phantom - Low Band Mid Channel - 815 MHz

Area Scan (8x26x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 11.0 mW/g

Body-Worn SAR - 1.1 cm Belt-Clip Spacing from Back of DUT to Planar Phantom - Low Band Mid Channel - 815 MHz

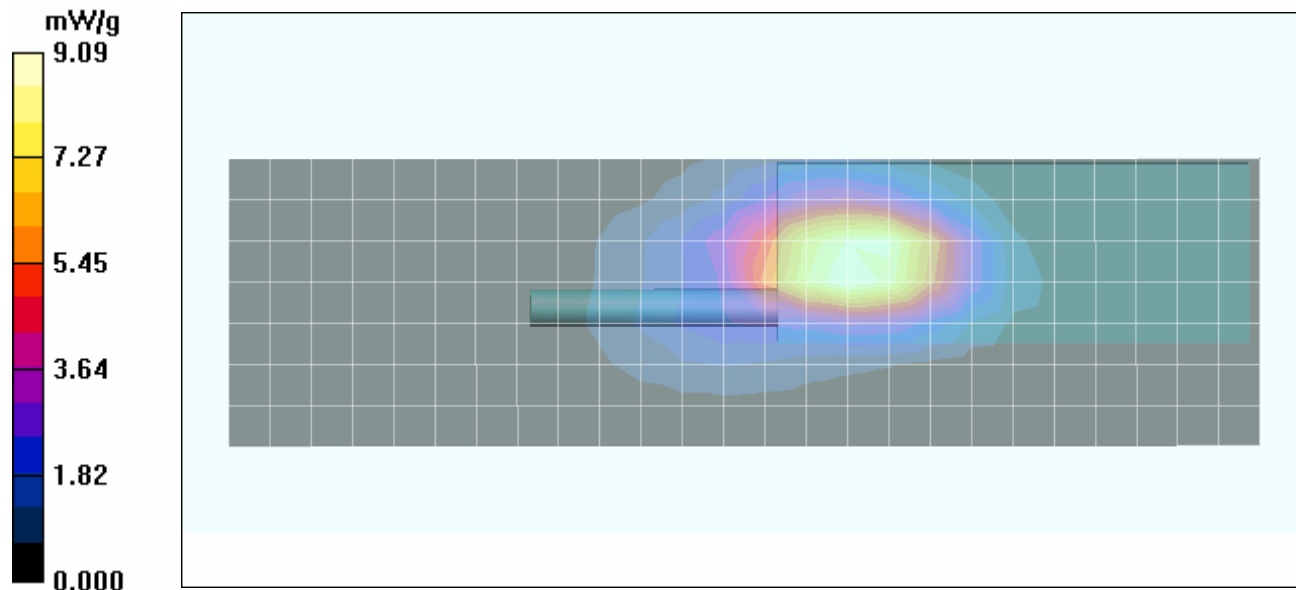
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$


Reference Value = 89.4 V/m; Power Drift = -1.66 dB



Peak SAR (extrapolated) = 22.1 W/kg

SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.12 mW/g

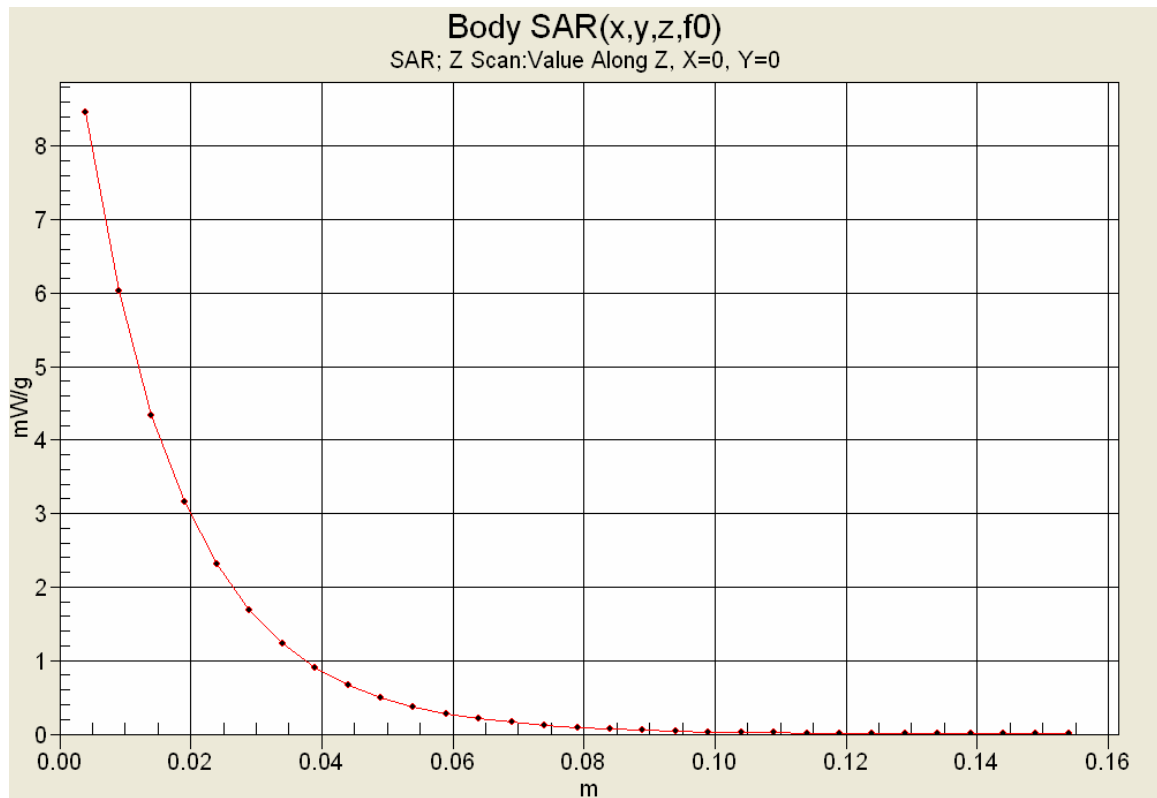
Maximum value of SAR (measured) = 9.09 mW/g






Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	


Z-Axis Scan





Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 10/26/2007

System Performance Check - 835 MHz Dipole - HSL

DUT: Dipole 835 MHz; Asset: 00022; Serial: 411; Validation: 06/07/2007

Ambient Temp: 23.5°C; Fluid Temp: 23.1°C; Barometric Pressure: 100.4 kPa; Humidity: 32%

Communication System: CW

Forward Conducted Power: 250 mW

Frequency: 835 MHz; Duty Cycle: 1:1

Medium: HSL835 Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.90 \text{ mho/m}$; $\epsilon_r = 42.4$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1387; ConvF(6.25, 6.25, 6.25); Calibrated: 16/03/2007
- Sensor-Surface: 4 mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 10/07/2007
- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

835 MHz Dipole - System Performance Check/Area Scan (6x10x1):

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

Maximum value of SAR (measured) = 2.39 mW/g

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

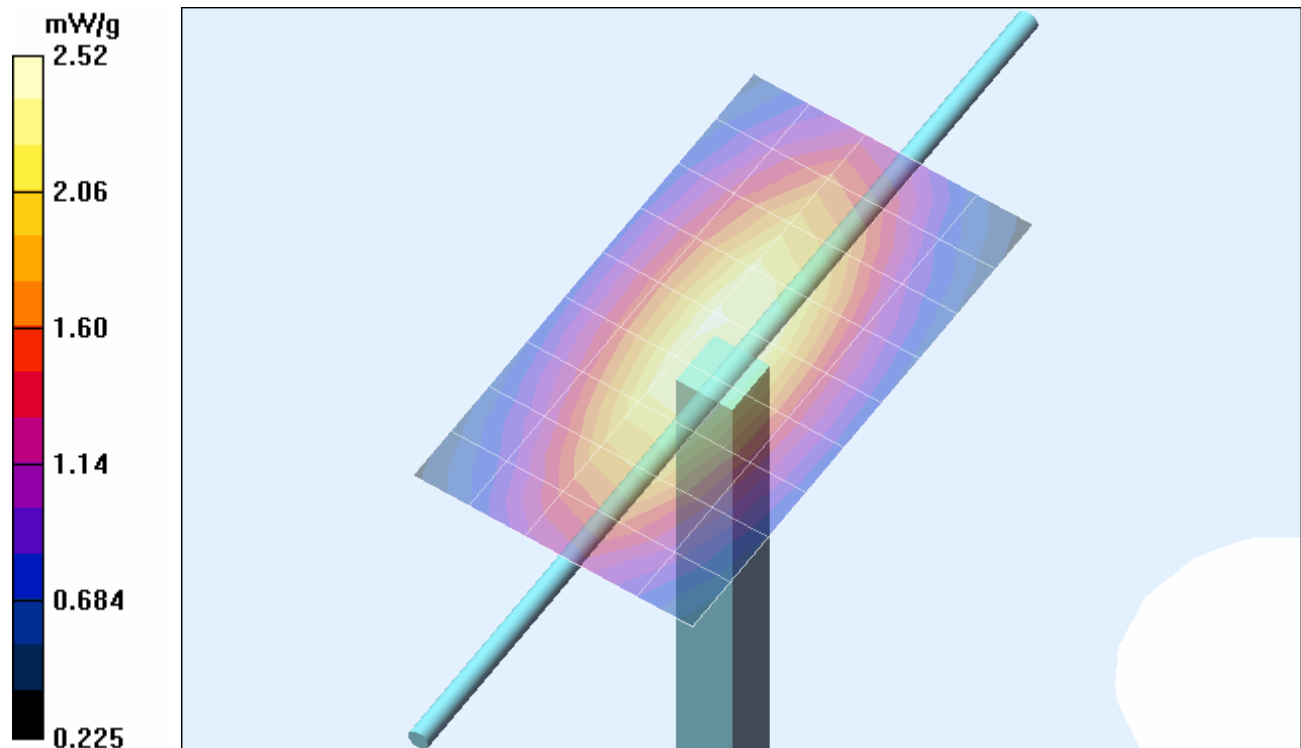
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$


Reference Value = 55.4 V/m; Power Drift = -0.008 dB



Peak SAR (extrapolated) = 3.37 W/kg

SAR(1 g) = 2.32 mW/g; SAR(10 g) = 1.52 mW/g

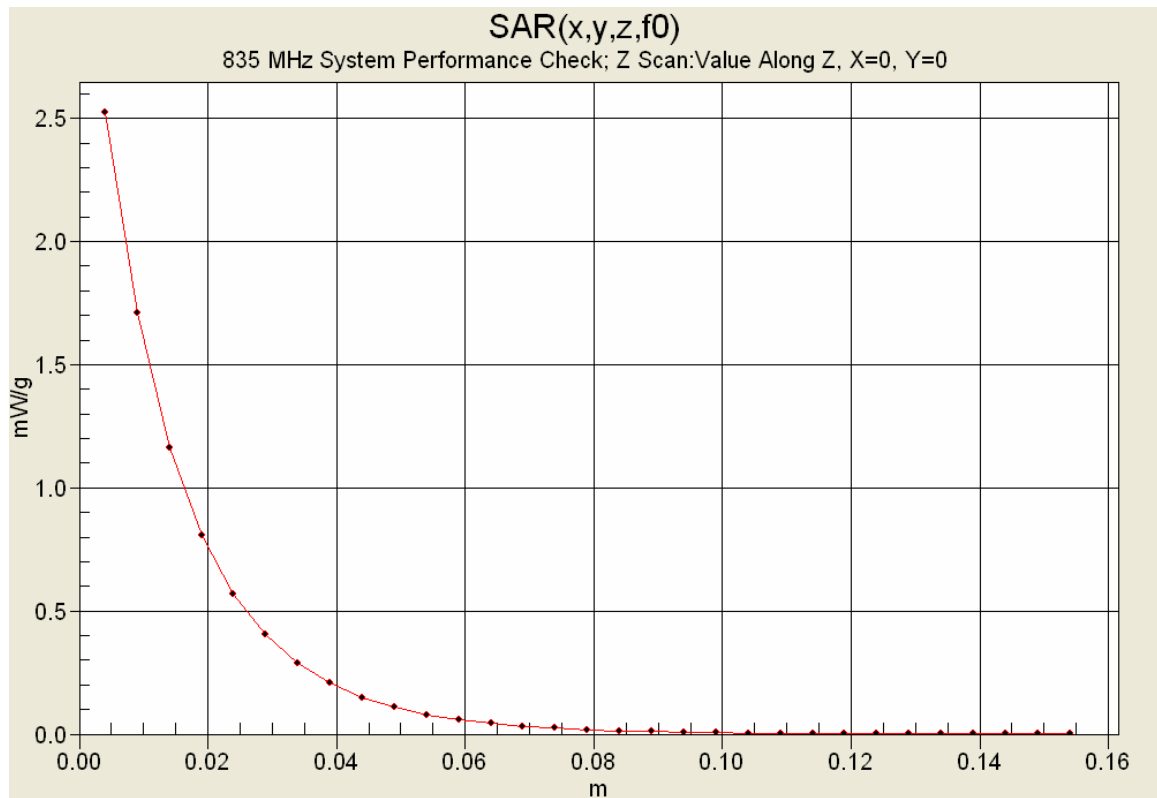
Maximum value of SAR (measured) = 2.52 mW/g






Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Date(s) of Evaluation</u> October 26, 2007	<u>Test Report Serial No.</u> 102507OWD-T868b-S90F	<u>Test Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	


Z-Axis Scan





Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Date(s) of Evaluation</u> October 26, 2007	<u>Test Report Serial No.</u> 102507OWD-T868b-S90F	<u>Test Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS


Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Date(s) of Evaluation</u> October 26, 2007	<u>Test Report Serial No.</u> 102507OWD-T868b-S90F	<u>Test Report Revision No.</u> Revision 1.0	
	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
Certificate No. 2470.01				

835 MHz System Performance Check & 815 MHz DUT Evaluation (Brain)

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
Fri 26/Oct/2007
Frequency (GHz)
FCC_eHFCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sHFCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

Freq	FCC_eHFCC_sH	Test_e	Test_s
0.7350	42.02 0.89	43.56	0.80
0.7450	41.97 0.89	43.52	0.81
0.7550	41.92 0.89	43.34	0.82
0.7650	41.86 0.89	43.26	0.83
0.7750	41.81 0.90	43.06	0.84
0.7850	41.76 0.90	43.07	0.85
0.7950	41.71 0.90	42.87	0.86
0.8050	41.66 0.90	42.79	0.87
0.8150	41.60 0.90	42.64	0.88
0.8250	41.55 0.90	42.60	0.89
0.8350	41.50 0.90	42.39	0.90
0.8450	41.50 0.91	42.24	0.91
0.8550	41.50 0.92	42.24	0.93
0.8650	41.50 0.93	42.05	0.93
0.8750	41.50 0.94	42.05	0.94
0.8850	41.50 0.95	41.92	0.95
0.8950	41.50 0.96	41.73	0.96
0.9050	41.50 0.97	41.61	0.97
0.9150	41.50 0.98	41.55	0.98
0.9250	41.48 0.98	41.48	0.99
0.9350	41.46 0.99	41.50	1.00

Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Date(s) of Evaluation</u> October 26, 2007	<u>Test Report Serial No.</u> 102507OWD-T868b-S90F	<u>Test Report Revision No.</u> Revision 1.0	 
	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	
				Certificate No. 2470.01

815 MHz DUT Evaluation (Body)

Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

Fri 26/Oct/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	57.76	0.89
0.7450	55.55	0.96	57.62	0.90
0.7550	55.51	0.96	57.47	0.91
0.7650	55.47	0.96	57.47	0.92
0.7750	55.43	0.97	57.57	0.92
0.7850	55.39	0.97	57.49	0.93
0.7950	55.36	0.97	57.34	0.94
0.8050	55.32	0.97	57.26	0.95
0.8150	55.28	0.97	57.13	0.95
0.8250	55.24	0.97	57.01	0.96
0.8350	55.20	0.97	56.97	0.97
0.8450	55.17	0.98	56.93	0.99
0.8550	55.14	0.99	56.88	1.00
0.8650	55.11	1.01	56.81	1.00
0.8750	55.08	1.02	56.79	1.01
0.8850	55.05	1.03	56.72	1.02
0.8950	55.02	1.04	56.70	1.02
0.9050	55.00	1.05	56.58	1.04
0.9150	55.00	1.06	56.49	1.05
0.9250	54.98	1.06	56.41	1.05
0.9350	54.96	1.07	56.31	1.06

Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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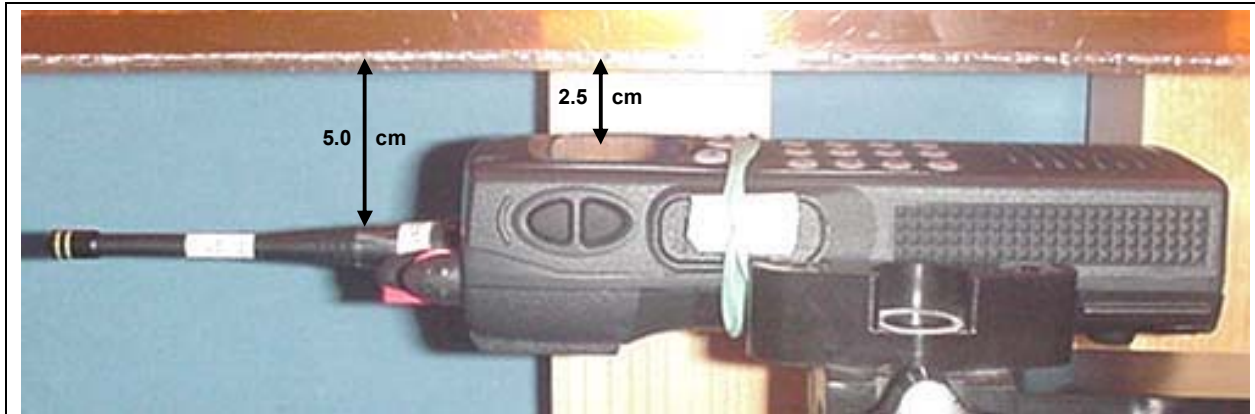
	<u>Date(s) of Evaluation</u> October 26, 2007	<u>Test Report Serial No.</u> 102507OWD-T868b-S90F	<u>Test Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS

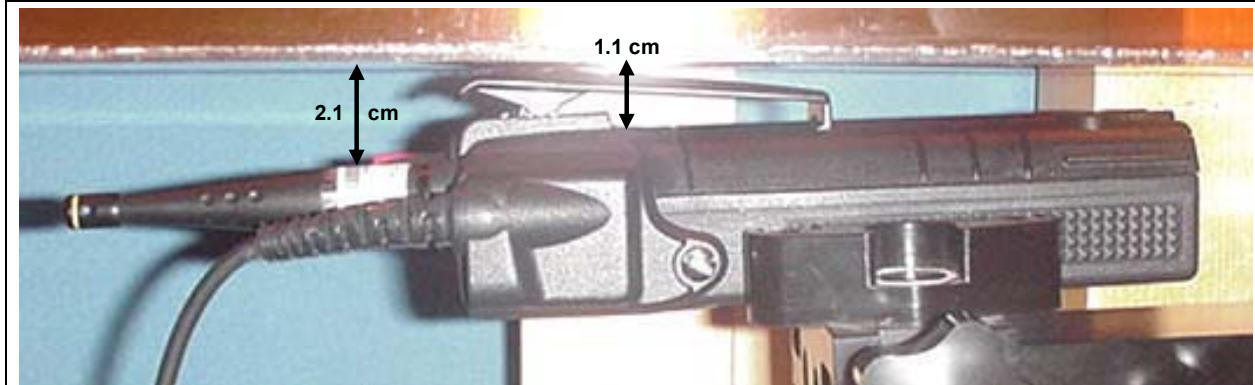
Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Date(s) of Evaluation</u> October 26, 2007	<u>Test Report Serial No.</u> 102507OWD-T868b-S90F	<u>Test Report Revision No.</u> Revision 1.0	  Certificate No. 2470.01
	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	


SAR TEST SETUP PHOTOGRAPHS






DUT with 1/4-Wave Whip Antenna (P/N: KRE1011223/01) - 2.5 cm Spacing from Front of DUT to Planar Phantom




DUT with 1/4-Wave Whip Antenna (P/N: KRE1011506/2) - 1.1 cm Belt-Clip Spacing from Back of DUT to Planar Phantom



Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Date(s) of Evaluation</u> October 26, 2007	<u>Test Report Serial No.</u> 102507OWD-T868b-S90F	<u>Test Report Revision No.</u> Revision 1.0	  Certificate No. 2470.01
	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

DUT PHOTOGRAPHS

		
Front of DUT	Back of DUT with Alkaline Battery Pack	DUT Battery Compartment

Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Date(s) of Evaluation</u> October 26, 2007	<u>Test Report Serial No.</u> 102507OWD-T868b-S90F	<u>Test Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

DUT PHOTOGRAPHS




Left Side of DUT with Alkaline Battery Pack






Right Side of DUT with Alkaline Battery Pack




Bottom end of DUT with Alkaline Battery Pack




Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Date(s) of Evaluation</u> October 26, 2007	<u>Test Report Serial No.</u> 102507OWD-T868b-S90F	<u>Test Report Revision No.</u> Revision 1.0	  Certificate No. 2470.01
	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	




DUT PHOTOGRAPHS


		
DUT with Alkaline Battery Pack & Metal Belt-Clip (P/N: CC23894)	Front of Metal Belt-Clip (P/N: CC23894)	Back of Metal Belt-Clip (P/N: CC23894)



Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Date(s) of Evaluation</u> October 26, 2007	<u>Test Report Serial No.</u> 102507OWD-T868b-S90F	<u>Test Report Revision No.</u> Revision 1.0	  Certificate No. 2470.01
	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	


DUT PHOTOGRAPHS


	
Alkaline Battery Pack	Duracell Procell AA Alkaline Batteries (x6)
	
Alkaline Battery Case (P/N: BT-013259-001)	

Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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	<u>Date(s) of Evaluation</u> October 26, 2007	<u>Test Report Serial No.</u> 102507OWD-T868b-S90F	<u>Test Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

APPENDIX E - SYSTEM VALIDATION

Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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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

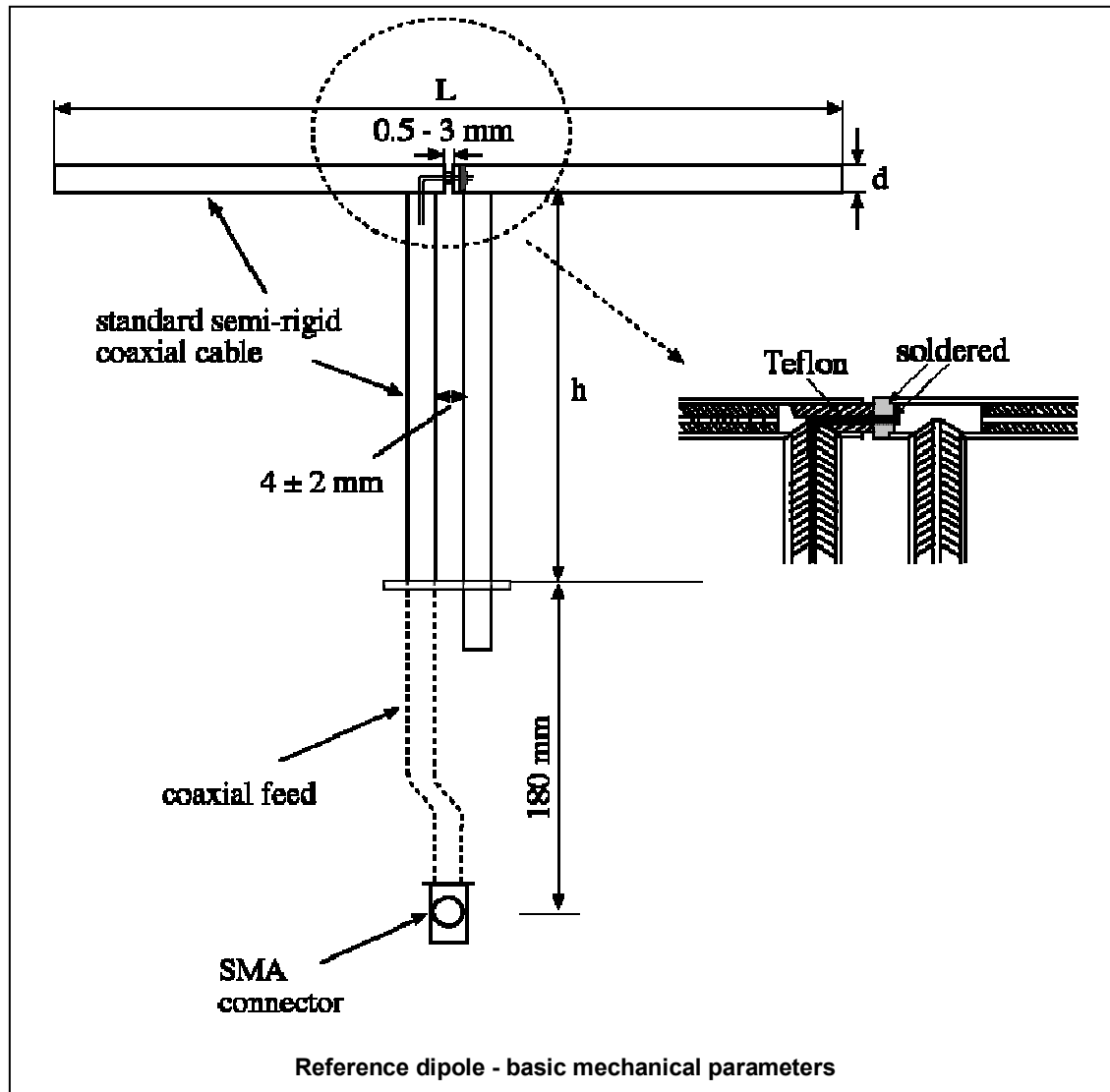
	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835B-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Brain


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:

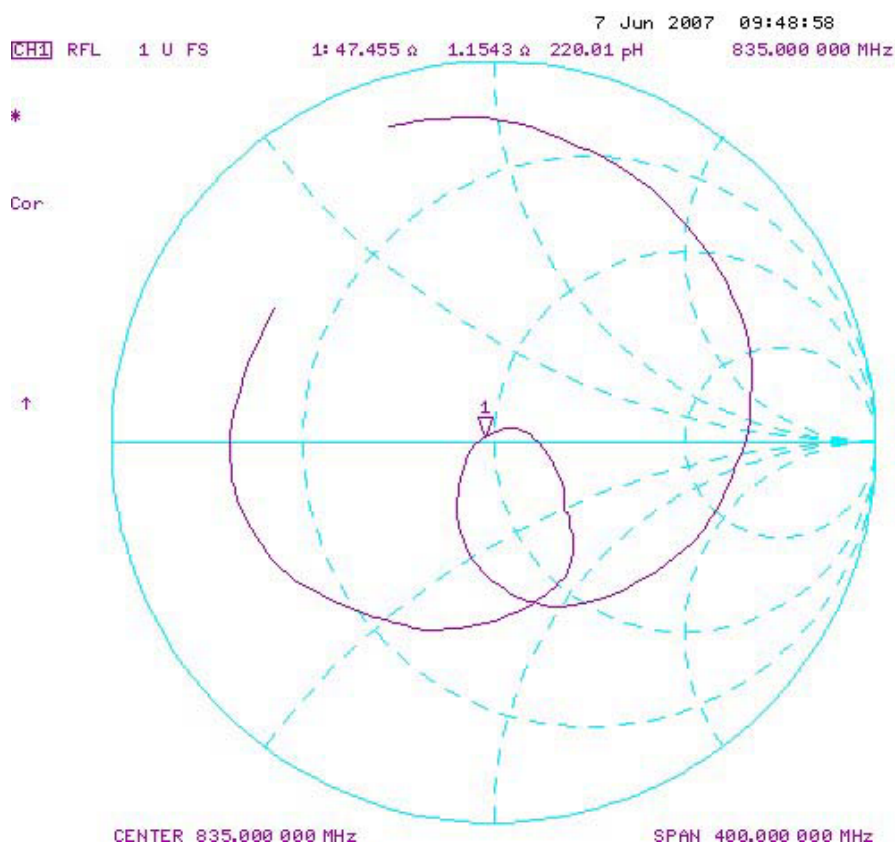
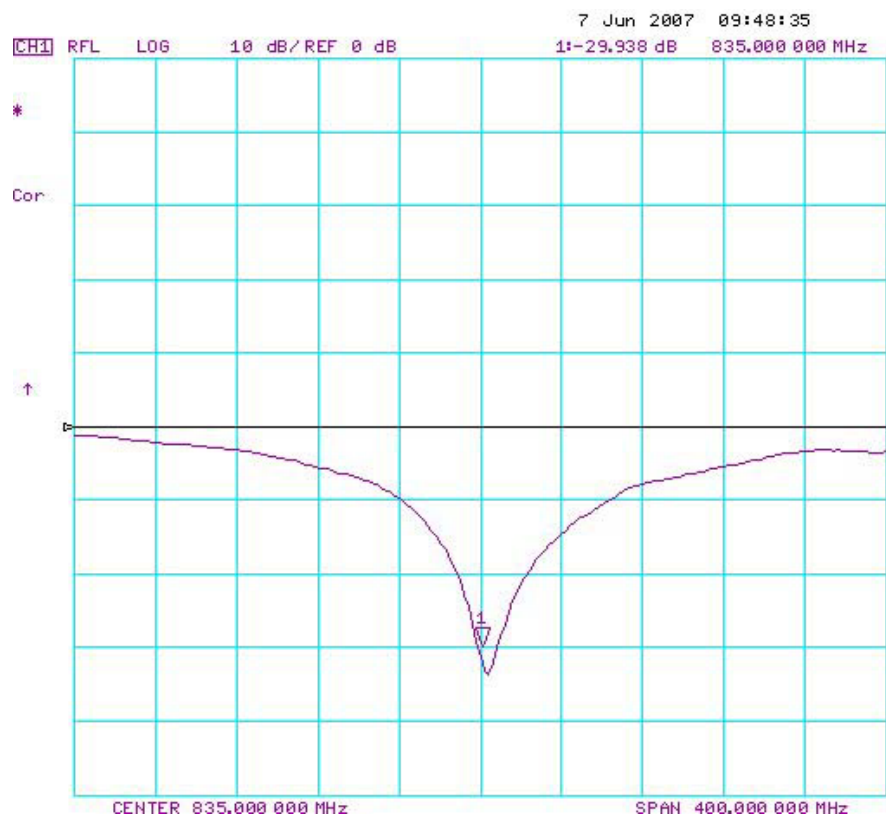
Feed point impedance at 835 MHz $\text{Re}\{Z\} = 47.455\Omega$
 $\text{Im}\{Z\} = 1.1543\Omega$


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

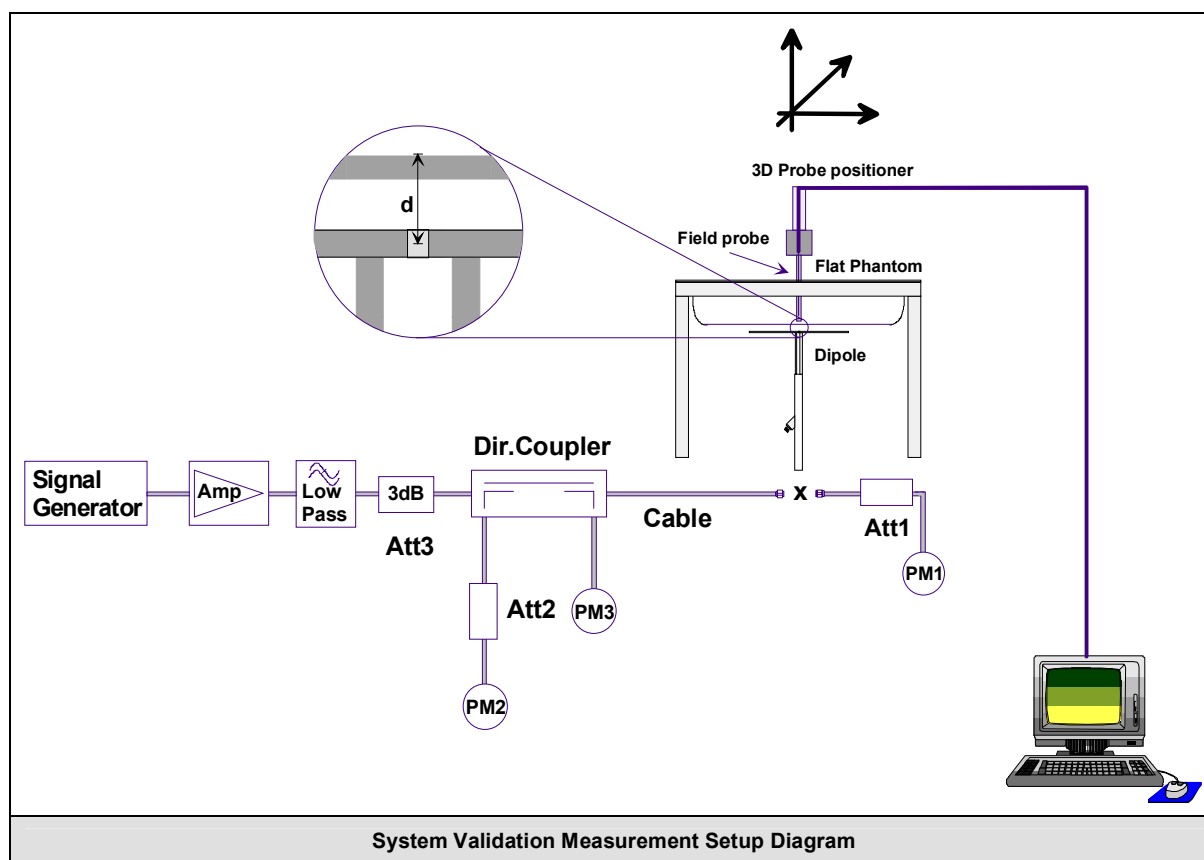



	Date of Evaluation:	June 07, 2007	Document Serial No.:	SV835B-060707-R1.1		
	Evaluation Type:	System Validation	Validation Dipole:	835 MHz	Fluid Type:	Brain

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:

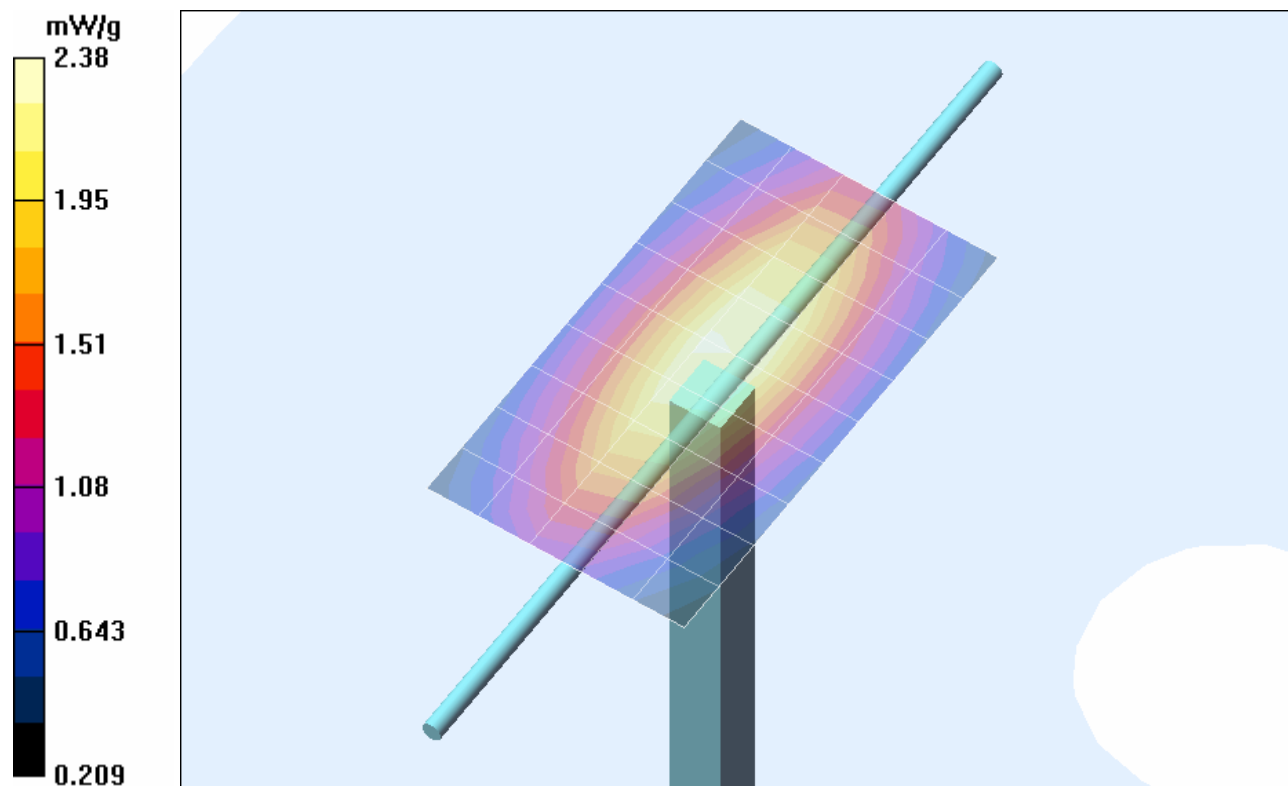
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

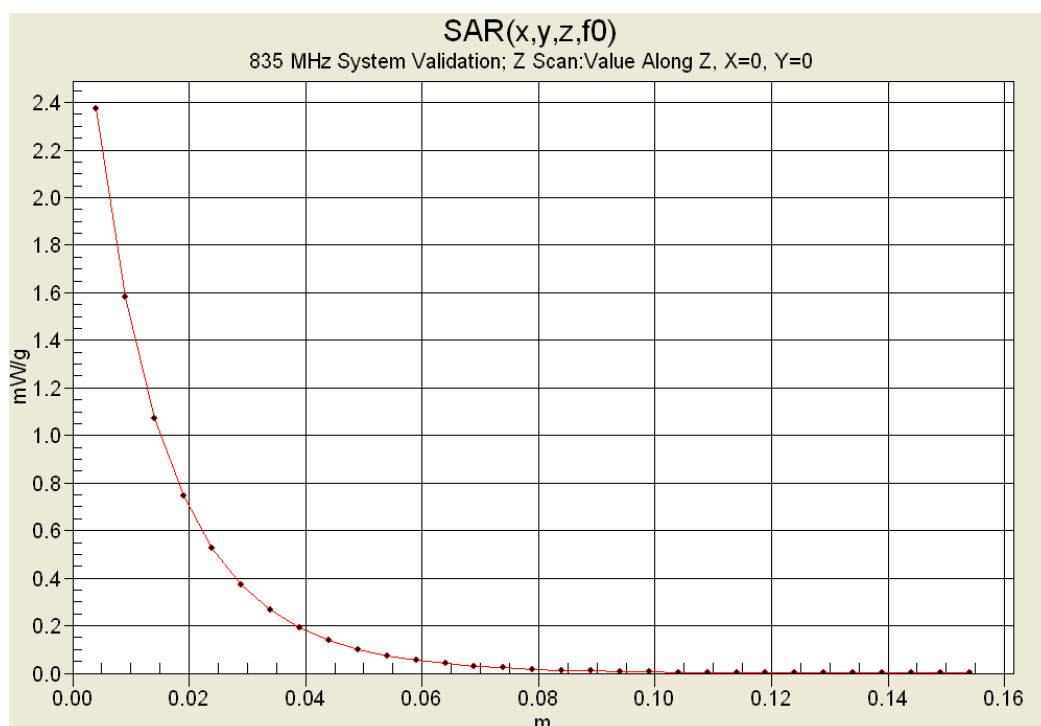
Reference Value = 53.2 V/m; Power Drift = 0.008 dB

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						

	<u>Date(s) of Evaluation</u> October 26, 2007	<u>Test Report Serial No.</u> 102507OWD-T868b-S90F	<u>Test Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> January 08, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

APPENDIX G - SAM PHANTOM CERTIFICATE OF CONFORMITY

Applicant:	M/A-COM, Inc.	FCC ID:	OWDTR-0023-E	IC:	3636B-0023	Freq.: 806-824/851-869 MHz	
Model(s):	P7100 (P2)	DUT:	Portable 800 MHz PTT Radio Transceiver with Alkaline Battery Pack				
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Schmid & Partner Engineering AG

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

Certificate of conformity / First Article Inspection

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

Tests

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

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

Standards

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

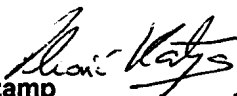
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

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

Date 18.11.2001

Signature / Stamp



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