

	<u>Date(s) of Evaluation</u> Aug. 31 - Sept. 01, 2006	<u>Test Report Serial No.</u> 082406ALH-T770-S90U	<u>Report Revision No.</u> Revision 1.0	
	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	
Certificate No. 2470.01				

RF EXPOSURE EVALUATION

SPECIFIC ABSORPTION RATE

SAR TEST REPORT

FOR

KENWOOD USA CORPORATION

PORTABLE FM UHF PTT RADIO TRANSCEIVER

MODEL(S): TK-5310-K, TK-5310-K2, TK-5310-K3

IDENTIFIER(S)	FCC ID: ALH39913110
Test Standard(s) and Procedure(s)	FCC OET Bulletin 65, Supplement C (01-01)

Test Report Serial No.

082406ALH-T770-S90U

Test Report Revision No.

Revision 1.0 (Initial Release)

Test Location

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



Certificate No. 2470.01

<u>Test Report Prepared By:</u> Cheri Frangiadakis Test Report Writer Celltech Labs Inc.	<u>Test Report Reviewed By:</u> Jonathan Hughes General Manager Celltech Labs Inc.
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Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	KENWOOD
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	

DECLARATION OF COMPLIANCE SAR RF EXPOSURE EVALUATION

<u>Test Lab and Location</u> CELLTECH LABS INC. Testing and Engineering Services 1955 Moss Court Kelowna, B.C. Canada V1Y 9L3 Phone: 250-448-7047 Fax: 250-448-7046 e-mail: info@celltechlabs.com web site: www.celltechlabs.com		<u>Company Information</u> KENWOOD USA CORPORATION 3975 John Creek Court, Suite 300 Suwanee, GA 30024 United States	
FCC IDENTIFIER: Model(s):		ALH39913110 TK-5310-K, TK-5310-K2, TK-5310-K3	
Test Requirement(s): Test Procedure(s):		FCC 47 CFR §2.1093; Health Canada Safety Code 6 FCC OET Bulletin 65, Supplement C (Edition 01-01) Industry Canada RSS-102 Issue 2	
Device Description: Modulation Type: Transmit Frequency Range(s): Max. RF Output Power Tested: Modulation Type: Antenna Type(s) Tested: Battery Type(s) Tested:		Portable FM UHF PTT Radio Transceiver FM (UHF) 450 - 520 MHz 3.87 Watts (35.88 dBm) Conducted (520 MHz) FM (UHF) Whip 440 - 490 MHz (P/N: KRA-27M) Stubby 440 - 490 MHz (P/N: KRA-23M) Stubby 470 - 520 MHz (P/N: KRA-23M2) Li-ion 7.5 V, 1700 mAh (P/N: KNB-33L) NiCd 7.5 V, 1700 mAh (P/N: KNB-31A) NiMH 7.5 V, 2500 mAh (P/N: KNB-32N) NiMH 7.5 V 2500 mAh Intrinsically Safe (P/N: KNB-41NC) Duracell Procell Alkaline 2850 mAh 1.5 V AA x6 (Battery Case P/N: KBP-6)	
Body-Worn Accessories Tested: Audio Accessories Tested:		Plastic Belt-Clip with Metal Spring (P/N: J29-0710-XX) Speaker-Microphone (P/N: KMC-25)	
Max. SAR Level(s) Evaluated:		Face-Held: 1.86 W/kg (1g) - 50% duty cycle Body-Worn: 3.72 W/kg (1g) - 50% duty cycle	

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. 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 for the Occupational / Controlled Exposure environment. All measurements were performed in accordance with the SAR system manufacturer recommendations.

I attest to the accuracy of data. All measurements were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

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

Test Report Approved By:

Sean Johnston
SAR Lab Manager
Celltech Labs Inc.



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	

1.0 INTRODUCTION

This measurement report demonstrates that the Kenwood USA Corporation Model(s): TK-5310-K, -K2, -K3 Portable FM UHF PTT Radio Transceiver FCC ID: ALH39913110 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 product and operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the provisions of the rules are included within this test report.

2.0 DESCRIPTION OF DEVICE UNDER TEST (DUT)

RF Exposure Test Requirement(s)	FCC Rule Part 47 CFR §2.1093			
	Health Canada Safety Code 6			
Test Procedure(s)	FCC OET Bulletin 65, Supplement C (01-01)			
	Industry Canada RSS-102 Issue 2			
Device Description	Portable FM UHF PTT Radio Transceiver			
RF Exposure Category	Occupational / Controlled Environment			
FCC IDENTIFIER	ALH39913110			
Model(s)	TK-5310-K	TK-5310-K2	TK-5310-K3	
Test Sample Serial No.	None		Identical Prototype	
Modulation Type	FM (UHF)			
Transmit Frequency Range(s)	450 - 520 MHz			
Max. RF Output Power Tested	3.85 Watts	35.85 dBm	Conducted	450 MHz
	3.85 Watts	35.85 dBm	Conducted	485 MHz
	3.87 Watts	35.88 dBm	Conducted	520 MHz
Antenna Type(s) Tested	Whip	440 - 490 MHz	P/N: KRA-27M	Length: 152 cm
	Stubby	440 - 490 MHz	P/N: KRA-23M	Length: 83 cm
	Stubby	470 - 520 MHz	P/N: KRA-23M2	Length: 83 cm
Battery Type(s) Tested	Li-ion	7.5 V	1700 mAh	P/N: KNB-33L
	NiCd	7.5 V	1700 mAh	P/N: KNB-31A
	NiMH	7.5 V	2500 mAh	P/N: KNB-32N
	NiMH Intrinsically Safe	7.5 V	2500 mAh	P/N: KNB-41NC
	Alkaline Duracell Procell	9 V	2850 mAh	P/N: KBP-6 (Battery Case)
Body-Worn Accessories Tested	Plastic Belt-Clip (with Metal Spring)			P/N: J29-0710-XX
Audio Accessories Tested	Speaker-Microphone			P/N: KMC-25

Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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3.0 SAR MEASUREMENT SYSTEM

Celltech Labs Inc. SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 measurement system is comprised of the measurement server, robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for brain and/or body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the DASY4 measurement server. The DAE4 utilizes a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the DASY4 measurement server is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. The sensor systems are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.



DASY4 SAR Measurement System with Plexiglas validation phantom



DASY4 SAR Measurement System with Plexiglas side planar phantom

Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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4.0 MEASUREMENT SUMMARY

FACE-HELD SAR EVALUATION RESULTS

Freq. (MHz)	Chan.	Test Mode	Antenna		Battery		Separation Distance to Planar Phantom	Cond. Power Before Test	Measured SAR 1g (W/kg)		SAR Drift During Test	Scaled SAR with droop 1g (W/kg)	
									Duty Cycle			Duty Cycle	
			Type	P/N	Type	P/N			cm	Watts		100%	50%
485	Mid	CW	Stubby	KRA-23M	NiCd	KNB-31A	2.5	3.85	1.87	0.935	-0.387	2.04	1.02
485	Mid	CW	Stubby	KRA-23M	NiMH	KNB-32N	2.5	3.85	1.90	0.950	-0.259	2.02	1.01
485	Mid	CW	Stubby	KRA-23M	Li-ion	KNB-33L	2.5	3.85	1.89	0.945	-0.273	2.01	1.01
485	Mid	CW	Stubby	KRA-23M	NiMH IS	KNB-41NC	2.5	3.85	1.65	0.825	-0.453	1.83	0.916
485	Mid	CW	Whip	KRA-27M	NiMH	KNB-32N	2.5	3.85	1.74	0.870	-0.200	1.82	0.911
485	Mid	CW	Stubby	KRA-23M2	NiMH	KNB-32N	2.5	3.85	2.37	1.19	-0.321	2.55	1.28
450	Low	CW	Stubby	KRA-23M	NiMH	KNB-32N	2.5	3.85	3.48	1.74	-0.170	3.62	1.81
450	Low	CW	Whip	KRA-27M	NiMH	KNB-32N	2.5	3.85	3.55	1.78	-0.192	3.71	1.86
520	High	CW	Stubby	KRA-23M2	NiMH	KNB-32N	2.5	3.87	2.34	1.17	-0.605	2.69	1.34
ANSI / IEEE C95.1 1999 - SAFETY LIMIT					BRAIN: 8.0 W/kg (averaged over 1 gram)				Spatial Peak Controlled Exposure / Occupational				
Test Date			August 31, 2006				Relative Humidity			32		%	
Measured Fluid Type			450 MHz Brain				Atmospheric Pressure			101.2		kPa	
Dielectric Constant ϵ_r			IEEE Target		Measured	Deviation	Ambient Temperature			22.5		°C	
			43.5	± 5%	44.1	+1.4%	Fluid Temperature			22.2		°C	
Conductivity σ (mho/m)			IEEE Target		Measured	Deviation	Fluid Depth			≥ 15		cm	
			0.87	± 5%	0.85	-2.3%	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.	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]).									
			3.	The area scan evaluation was performed with a fully charged battery. After the area scan was completed the radio was cooled down to room temperature and the battery was replaced with a fully charged battery prior to the zoom scan evaluation.									
			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 ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluations. The temperatures reported were consistent for all measurement periods.									
			6.	The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).									
			7.	The SAR evaluations were performed within 24 hours of the system performance check.									

Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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MEASUREMENT SUMMARY (CONT.)

BODY-WORN SAR EVALUATION RESULTS

Freq. (MHz)	Chan.	Test Mode	Antenna		Battery		Accessories		Separ. Distance to Planar Phantom	Cond. Power Before Test	Measured SAR 1g (W/kg)		SAR Drift During Test	Scaled SAR with droop 1g (W/kg)			
											Duty Cycle			Duty Cycle			
			Type	P/N	Type	P/N	Body-worn	Audio			cm	Watts		100%	50%	dB	100%
485	Mid	CW	Stubby	KRA-23M	NiCd	KNB-31A	Belt-Clip	Spkr-Mic	2.0	3.85	P	3.94	1.97	-0.471	P	4.39	2.20
											S	3.76	1.88		S	4.19	2.10
485	Mid	CW	Stubby	KRA-23M	NiMH	KNB-32N	Belt-Clip	Spkr-Mic	2.0	3.85	P	3.71	1.86	-0.297	P	3.97	1.99
											S	3.64	1.82		S	3.90	1.95
485	Mid	CW	Stubby	KRA-23M	Li-ion	KNB-33L	Belt-Clip	Spkr-Mic	2.0	3.85	P	4.23	2.12	-0.256	P	4.49	2.24
											S	3.59	1.80		S	3.81	1.90
485	Mid	CW	Stubby	KRA-23M	NiMH IS	KNB-41NC	Belt-Clip	Spkr-Mic	2.0	3.85	P	3.47	1.74	-0.694	P	4.07	2.04
											S	3.30	1.65		S	3.87	1.94
485	Mid	CW	Whip	KRA-27M	Li-ion	KNB-33L	Belt-Clip	Spkr-Mic	2.0	3.85	P	4.26	2.13	-0.228	P	4.49	2.24
											S	4.12	2.06		S	4.34	2.17
485	Mid	CW	Stubby	KRA-23M2	Li-ion	KNB-33L	Belt-Clip	Spkr-Mic	2.0	3.85	5.34 2.67		-0.302	5.72 2.86			
450	Low	CW	Stubby	KRA-23M	Li-ion	KNB-33L	Belt-Clip	Spkr-Mic	2.0	3.85	6.86 3.43		-0.282	7.32 3.66			
450	Low	CW	Whip	KRA-27M	Li-ion	KNB-33L	Belt-Clip	Spkr-Mic	2.0	3.85	P	6.58	3.29	-0.536	P	7.44	3.72
											S	5.49	2.75		S	6.21	3.11
520	High	CW	Stubby	KRA-23M2	Li-ion	KNB-33L	Belt-Clip	Spkr-Mic	2.0	3.87	5.27 2.64		-0.592	6.04 3.02			

ANSI / IEEE C95.1 1999 - SAFETY LIMIT

BODY: 8.0 W/kg (averaged over 1 gram)

Spatial Peak
Controlled Exposure / Occupational

Test Date	September 01, 2006				Relative Humidity		33	%
Measured Fluid Type	450 MHz Body				Atmospheric Pressure		101.5	kPa
Dielectric Constant ϵ_r	IEEE Target		Measured	Deviation	Ambient Temperature		24.5	°C
	56.7	± 5%	57.0	+0.5%	Fluid Temperature		23.0	°C
Conductivity σ (mho/m)	IEEE Target		Measured	Deviation	Fluid Depth		≥ 15	cm
	0.94	± 5%	0.93	-1.1%	ρ (Kg/m ³)		1000	

Note(s)

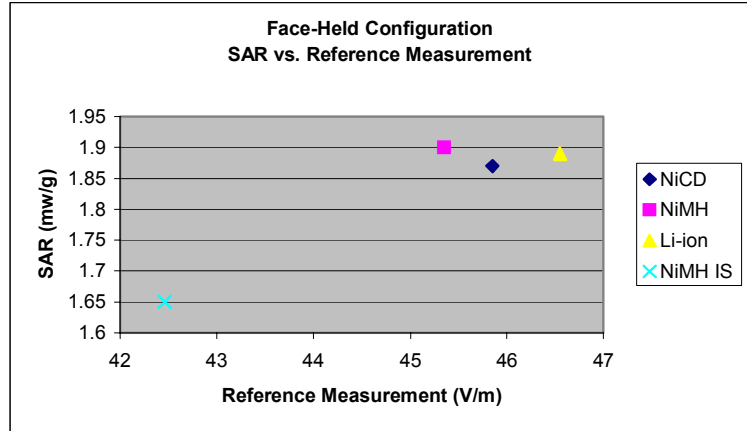
- The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
- If the scaled SAR levels evaluated at the mid channel (50% duty cycle) were ≥ 3 dB below 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]).
- The area scan evaluation was performed with a fully charged battery. After the area scan was completed the radio was cooled down to room temperature and the battery was replaced with a fully charged battery prior to the zoom scan evaluation.
- Secondary peak SAR levels measured within 2 dB of the primary were reported (P = Primary, S = Secondary).
- 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.
- A SAR-versus-Time power droop evaluation was performed in the test configuration that reported the maximum-scaled SAR level. See Appendix A (SAR Test Plots) for SAR-versus-Time power droop evaluation plot.
- The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluations. The temperatures reported were consistent for all measurement periods.
- 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:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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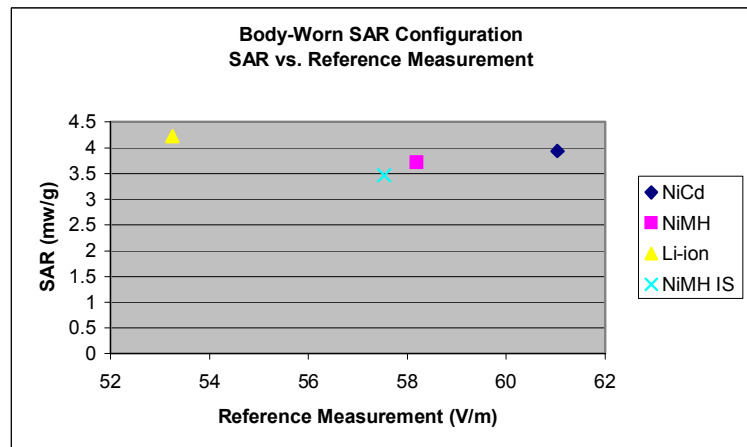
MEASUREMENT SUMMARY (CONT.)

TK-53-10-K3 Alkaline SAR Prediction based on Comparing Reference Values

Face-Held Configuration		
KRA-23M Antenna		
Battery Type	Reference Value V/m	SAR mW/g
NiCd	45.85	1.87
NiMH	45.35	1.90
Li-Ion	46.55	1.89
NiMH IS	42.46	1.65
Alkaline	38.3	



Body-Worn Configuration		
KRA-23M Antenna		
Battery Type	Reference Value V/m	SAR mW/g
NiCd	61.04	3.94
NiMH	58.19	3.71
Li-Ion	53.25	4.23
NiMH IS	57.53	3.47
Alkaline	46.13	



Purpose of Evaluation:

Reference measurements only were performed for the DUT with alkaline battery configuration due to the fact that the radio was not capable of transmitting continuously for the duration of the zoom scan evaluation.

Summary of Evaluation:

A reference measurement was taken at the beginning of each SAR evaluation. Based on the above results the trend shows that the higher the reference value the higher the SAR value. Therefore the conclusion was drawn that since the alkaline battery has a lower reference level than the other battery configurations, the SAR with alkaline battery would be lower than the SAR levels measured for the other battery configurations.

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				Certificate No. 2470.01

5.0 DETAILS OF SAR EVALUATION

The Kenwood USA Corporation Model(s): TK-5310-K, TK-5310-K2, TK-5310-K3 Portable FM UHF PTT Radio Transceiver FCC ID: ALH39913110 was compliant for localized Specific Absorption Rate (Occupational / Controlled Exposure) based on the test provisions and conditions described below. The detailed test setup photographs are shown in Appendix D.

1. The DUT was evaluated in a face-held configuration with the front of the radio placed parallel to the outer surface of the planar phantom. A 2.5 cm separation distance was maintained between the front of the DUT and the outer surface of the planar phantom.
2. The DUT was tested in a body-worn configuration with the back of the radio placed parallel to the outer surface of the planar phantom. The attached belt-clip accessory was touching the planar phantom and provided a 2.0 cm separation distance from the back of the DUT to the outer surface of the planar phantom. The DUT was evaluated for body-worn SAR with the speaker-microphone audio accessory connected to the audio port.
3. The conducted power levels were measured prior to the SAR evaluations using a Gigatronics 8652A Universal Power Meter according to the procedures described in FCC 47 CFR §2.1046.
4. The area scan evaluation was performed with a fully charged battery. After the area scan was completed the radio was cooled down and the battery was replaced with a fully charged battery 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.
7. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluations. The temperatures reported were consistent for all measurement periods.
8. The dielectric parameters of the simulated tissue 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).
9. The SAR evaluations were performed within 24 hours of the system performance check.

6.0 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 1g and 10g 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 1g and 10g cubes by spatially discretizing the entire measured cube. The volume used to determine the averaged SAR is a 1mm grid (42875 interpolated points).
- 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. Zoom scans for frequencies ≥ 800 MHz are 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.

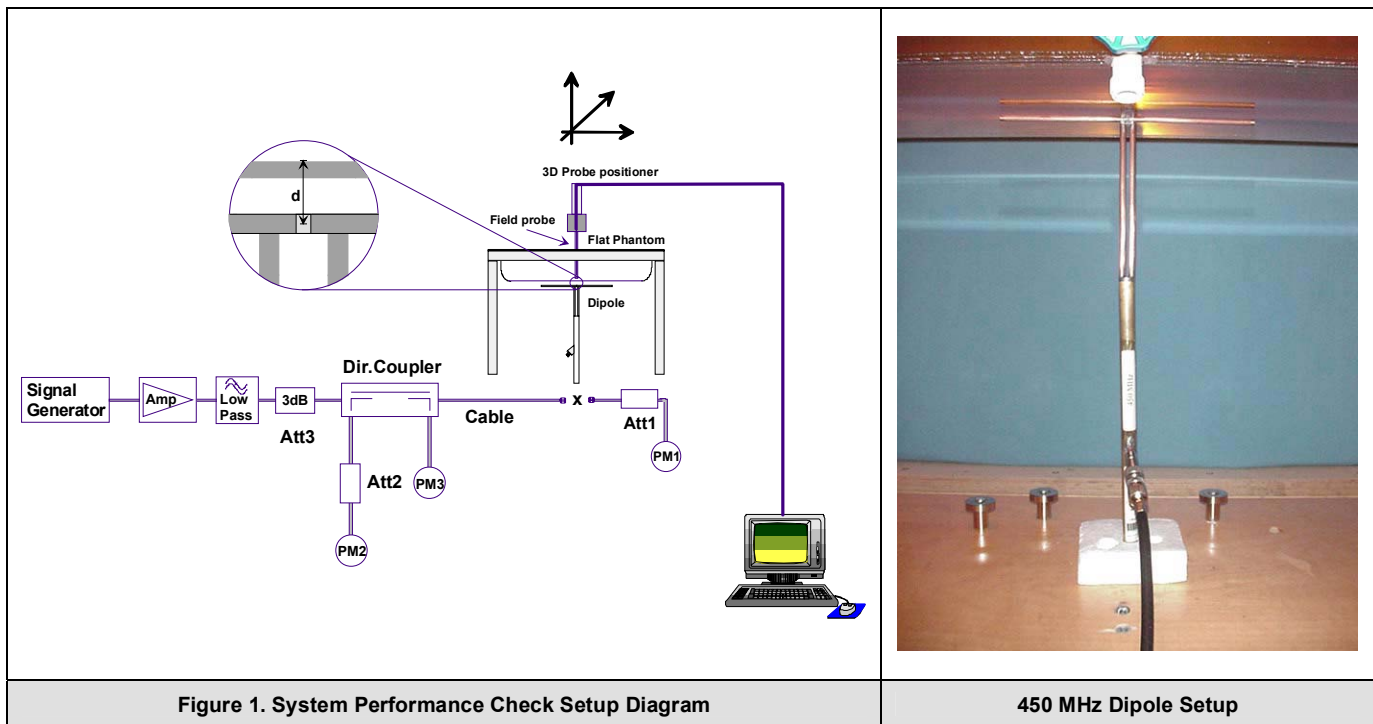
Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	
Certificate No. 2470.01				

7.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluations a system check was performed using a Plexiglas planar phantom and 450MHz dipole (see Appendix E for system validation procedures). The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using an ALS-PR-DIEL Dielectric Probe Kit and HP 8753ET Network Analyzer (see Appendix C). A forward power of 250 mW was applied to the dipole and the system was verified to a tolerance of $\pm 10\%$ (see Appendix B for system performance check test plots).

SYSTEM PERFORMANCE CHECK EVALUATION																
Test Date	Equiv. Tissue	SAR 1g (W/kg)			Dielectric Constant ϵ_r			Conductivity σ (mho/m)			ρ (Kg/m ³)	Amb. Temp. (°C)	Fluid Temp. (°C)	Fluid Depth (cm)	Humid. (%)	Barom. Press. (kPa)
	Freq. MHz	IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.						
8/31/06	Brain	1.23 ±10%	1.25	+1.6%	43.5 ±5%	44.1	+1.4%	0.87 ±5%	0.85	-2.3%	1000	22.5	22.2	≥ 15	32	101.2
	450															
9/01/06	Brain	1.23 ±10%	1.23	0.0%	43.5 ±5%	42.9	-1.4%	0.87 ±5%	0.85	-2.3%	1000	24.2	23.5	≥ 15	33	101.2
	450															
Note(s):			The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the system performance check. The temperatures listed in the table above were consistent for all measurement periods.													



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	

8.0 SIMULATED EQUIVALENT TISSUES

The 450MHz brain and body simulated tissue mixtures consist of a viscous gel using hydroxethylcellulose (HEC) gelling agent and saline solution. Preservation with a bactericide is added and visual inspection is made to ensure air bubbles are 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	450 MHz Brain	450 MHz Body
	System Check & DUT Evaluation	DUT Evaluation
Water	38.56 %	52.00 %
Sugar	56.32 %	45.65 %
Salt	3.95 %	1.75 %
HEC	0.98 %	0.50 %
Bactericide	0.19 %	0.10 %

9.0 SAR SAFETY LIMITS

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	1.60	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0
Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.		
Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.		

Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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10.0 ROBOT SYSTEM SPECIFICATIONS

<u>Specifications</u>	
Positioner	Stäubli Unimation Corp. Robot Model: RX60L
Repeatability	0.02 mm
No. of axis	6
<u>Data Acquisition Electronic (DAE) System</u>	
<u>Cell Controller</u>	
Processor	AMD Athlon XP 2400+
Clock Speed	2.0 GHz
Operating System	Windows XP Professional
<u>Data Converter</u>	
Features	Signal Amplifier, multiplexer, A/D converter, and control logic
Software	Measurement Software: DASY4, V4.7 Build 44
	Postprocessing Software: SEMCAD, V1.8 Build 171
Connecting Lines	Optical downlink for data and status info.; Optical uplink for commands and clock
<u>DASY4 Measurement Server</u>	
Function	Real-time data evaluation for field measurements and surface detection
Hardware	PC/104 166MHz Pentium CPU; 32 MB chipdisk; 64 MB RAM
Connections	COM1, COM2, DAE, Robot, Ethernet, Service Interface
<u>E-Field Probe</u>	
Model	ET3DV6
Serial No.	1387
Construction	Triangular core fiber optic detection system
Frequency	10 MHz to 6 GHz
Linearity	±0.2 dB (30 MHz to 3 GHz)
<u>Phantom(s)</u>	
<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 (≤ 450MHz)</u>	
Type	Planar Phantom
Shell Material	Plexiglas
Bottom Thickness	6.2 mm ± 0.1 mm
Outer Dimensions	86.0 cm (L) x 39.5 cm (W) x 21.8 cm (H)

Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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Certificate No. 2470.01				

11.0 PROBE SPECIFICATION (ET3DV6)

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

ET3DV6 E-Field Probe

12.0 SIDE PLANAR PHANTOM

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.	
--	--

Plexiglas Side Planar Phantom

13.0 VALIDATION PLANAR PHANTOM

The validation planar phantom is constructed of Plexiglas material with a 6.0 mm shell thickness for system validations at 450MHz and below. The validation planar phantom is mounted to the table of the DASY4 compact system.	
---	---

Validation Planar Phantom

14.0 DEVICE HOLDER

The DASY4 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.	
---	---

Device Holder

Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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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
x	-Robot	00046	599396-01	N/A		N/A
x	-DAE4	00019	353	21Jun06		21Jun07
	-DAE3	00018	370	08Feb06		08Feb07
x	-ET3DV6 E-Field Probe	00016	1387	16Mar06		16Mar07
	-EX3DV4 E-Field Probe	00125	3547	14Feb06		14Feb07
	-300MHz Validation Dipole	00023	135	25Oct05		25Oct06
x	-450MHz Validation Dipole	00024	136	25Oct05		25Oct06
	-835MHz Validation Dipole	00022	411	Brain	28Mar06	28Mar07
				Body	27Mar06	27Mar07
	-900MHz Validation Dipole	00020	054	Brain	06Jun06	06Jun07
				Body	06Jun06	06Jun07
	-1640MHz Validation Dipole	00211	0180	Brain	07Aug06	07Aug07
	-1800MHz Validation Dipole	00021	247	Brain	08Jun06	08Jun07
				Body	09Jun06	09Jun07
	-1900MHz Validation Dipole	00032	151	Brain	09Jun06	09Jun07
				Body	12Jun06	12Jun07
	-2450MHz Validation Dipole	00025	150	Brain	20Sep05	20Sep06
				Body	24Apr06	24Apr07
	-5800MHz Validation Dipole	00126	1031	Brain	15Mar06	15Mar07
	-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
x	-Plexiglas Validation Planar Phantom	00157	137	N/A		N/A
x	ALS-PR-DIEL Dielectric Probe Kit	00160	260-00953	N/A		N/A
	Gigatronics 8652A Power Meter	00110	1835801	12Apr06		12Apr07
x	Gigatronics 8652A Power Meter	00007	1835272	03Feb06		03Feb07
	Gigatronics 80701A Power Sensor	00011	1833542	03Feb06		03Feb07
x	Gigatronics 80701A Power Sensor	00013	1833713	03Feb06		03Feb07
x	Gigatronics 80701A Power Sensor	00014	1833699	07Sep05		07Sep06
x	HP 8753ET Network Analyzer	00134	US39170292	18Apr06		18Apr07
x	HP 8648D Signal Generator	00005	3847A00611	N/A		N/A
	Rohde & Schwarz SMR40 Signal Generator	00006	100104	06Apr06		06Apr07
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	N/A		N/A

Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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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 _{off}
Measurement System						
Probe calibration	4.0	Normal	1	1	4.0	∞
Axial isotropy of the probe	4.7	Rectangular	1.732050808	0.7	1.9	∞
Spherical isotropy of the probe	9.6	Rectangular	1.732050808	0.7	3.9	∞
Spatial resolution	0	Rectangular	1.732050808	1	0.0	∞
Boundary effects	1	Rectangular	1.732050808	1	0.6	∞
Probe linearity	4.7	Rectangular	1.732050808	1	2.7	∞
Detection limit	1	Rectangular	1.732050808	1	0.6	∞
Readout electronics	0.3	Normal	1	1	0.3	∞
Response time	0.8	Rectangular	1.732050808	1	0.5	∞
Integration time	2.6	Rectangular	1.732050808	1	1.5	∞
RF ambient conditions	3	Rectangular	1.732050808	1	1.7	∞
Mech. constraints of robot	0.4	Rectangular	1.732050808	1	0.2	∞
Probe positioning	2.9	Rectangular	1.732050808	1	1.7	∞
Extrapolation & integration	1	Rectangular	1.732050808	1	0.6	∞
Test Sample Related						
Device positioning	2.9	Normal	1	1	2.9	12
Device holder uncertainty	3.6	Normal	1	1	3.6	8
Power drift	5	Rectangular	1.732050808	1	2.9	∞
Phantom and Setup						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	∞
Liquid conductivity (measured)	2.5	Normal	1	0.64	1.6	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	2.5	Normal	1	0.6	1.5	∞
Combined Standard Uncertainty					9.88	
Expanded Uncertainty (k=2)					19.77	

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

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MEASUREMENT UNCERTAINTIES (Cont.)

UNCERTAINTY BUDGET FOR SYSTEM VALIDATION						
Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	Uncertainty Value ±% (1g)	V _i or V _{eff}
Measurement System						
Probe calibration	4.0	Normal	1	1	4.0	∞
Axial isotropy of the probe	4.7	Rectangular	1.732050808	1	2.7	∞
Spherical isotropy of the probe	0	Rectangular	1.732050808	1	0.0	∞
Spatial resolution	0	Rectangular	1.732050808	1	0.0	∞
Boundary effects	1	Rectangular	1.732050808	1	0.6	∞
Probe linearity	4.7	Rectangular	1.732050808	1	2.7	∞
Detection limit	1	Rectangular	1.732050808	1	0.6	∞
Readout electronics	0.3	Normal	1	1	0.3	∞
Response time	0	Rectangular	1.732050808	1	0.0	∞
Integration time	0	Rectangular	1.732050808	1	0.0	∞
RF ambient conditions	3	Rectangular	1.732050808	1	1.7	∞
Mech. constraints of robot	0.4	Rectangular	1.732050808	1	0.2	∞
Probe positioning	2.9	Rectangular	1.732050808	1	1.7	∞
Extrapolation & integration	1	Rectangular	1.732050808	1	0.6	∞
Test Sample Related						
Dipole Positioning	2	Normal	1.732050808	1	1.2	∞
Power & Power Drift	4.7	Normal	1.732050808	1	2.7	∞
Phantom and Setup						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	∞
Liquid conductivity (measured)	2.5	Normal	1	0.64	1.6	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	2.5	Normal	1	0.6	1.5	∞
Combined Standard Uncertainty					7.93	
Expanded Uncertainty (k=2)					15.87	

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

Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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Certificate No. 2470.01				

17.0 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.

Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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Certificate No. 2470.01				

APPENDIX A - SAR MEASUREMENT DATA

Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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Date Tested: 08/31/2006

Face-Held SAR - NiCd Battery - Stubby Antenna (P/N: KRA-23M) - Mid Channel - 485 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Ambient Temp: 22.5°C; Fluid Temp: 22.2°C; Barometric Pressure: 101.2 kPa; Humidity: 32%

Communication System: FM UHF

Frequency: 485 MHz; Duty Cycle: 1:1

RF Output Power: 3.85 Watts (Conducted)

7.5V 1700mAh NiCd Battery Pack (P/N: KNB-31A)

Medium: HSL450 ($\sigma = 0.85$ mho/m; $\epsilon_r = 44.1$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.4, 7.4, 7.4); Calibrated: 16/03/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- 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 Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.98 mW/g

Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel

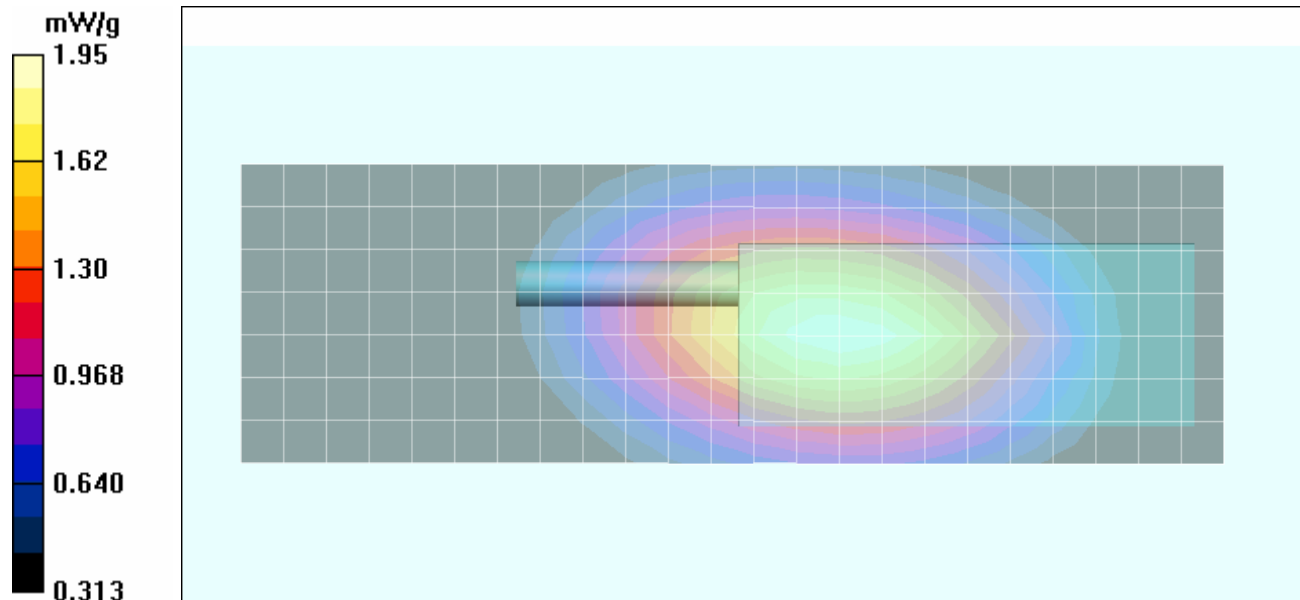
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 45.9 V/m; Power Drift = -0.387 dB

Peak SAR (extrapolated) = 2.85 W/kg

SAR(1 g) = 1.87 mW/g; SAR(10 g) = 1.37 mW/g

Maximum value of SAR (measured) = 1.95 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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Date Tested: 08/31/2006

Face-Held SAR - NiMH Battery - Stubby Antenna (P/N: KRA-23M) - Mid Channel - 485 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Ambient Temp: 22.5°C; Fluid Temp: 22.2°C; Barometric Pressure: 101.2 kPa; Humidity: 32%

Communication System: FM UHF

Frequency: 485 MHz; Duty Cycle: 1:1

RF Output Power: 3.85 Watts (Conducted)

7.5V 2500mAh NiMH Battery Pack (P/N: KNB-32N)

Medium: HSL450 ($\sigma = 0.85$ mho/m; $\epsilon_r = 44.1$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.4, 7.4, 7.4); Calibrated: 16/03/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- 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 Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.85 mW/g

Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel

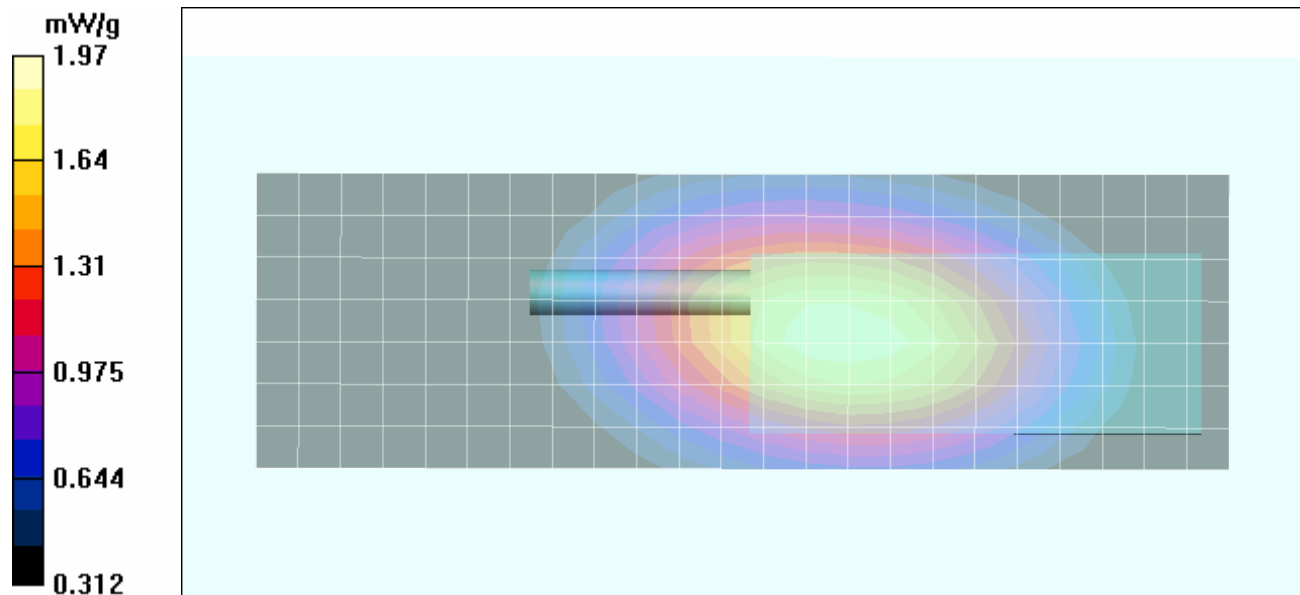
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 45.3 V/m; Power Drift = -0.259 dB

Peak SAR (extrapolated) = 2.91 W/kg

SAR(1 g) = 1.90 mW/g; SAR(10 g) = 1.39 mW/g

Maximum value of SAR (measured) = 1.97 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Ltd	<u>Date(s) of Evaluation</u> Aug. 31 - Sept. 01, 2006	<u>Test Report Serial No.</u> 082406ALH-T770-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	

Date Tested: 08/31/2006

Face-Held SAR - Li-ion Battery - Stubby Antenna (P/N: KRA-23M) - Mid Channel - 485 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Ambient Temp: 22.5°C; Fluid Temp: 22.2°C; Barometric Pressure: 101.2 kPa; Humidity: 32%

Communication System: FM UHF

Frequency: 485 MHz; Duty Cycle: 1:1

RF Output Power: 3.85 Watts (Conducted)

7.5V 1700mAh Li-ion Battery Pack (P/N: KNB-33L)

Medium: HSL450 ($\sigma = 0.85$ mho/m; $\epsilon_r = 44.1$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.4, 7.4, 7.4); Calibrated: 16/03/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- 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 Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.88 mW/g

Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel

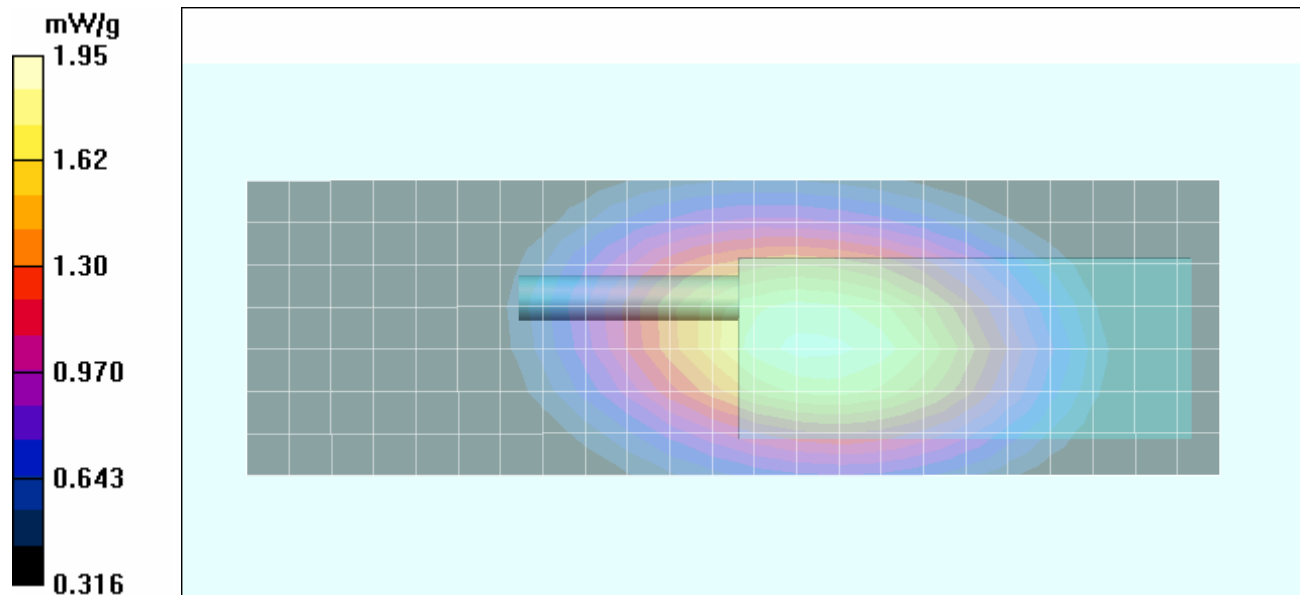
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 46.5 V/m; Power Drift = -0.273 dB

Peak SAR (extrapolated) = 2.88 W/kg

SAR(1 g) = 1.89 mW/g; SAR(10 g) = 1.37 mW/g

Maximum value of SAR (measured) = 1.95 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	

Date Tested: 08/31/2006

Face-Held SAR - NiMH IS Battery - Stubby Antenna (P/N: KRA-23M) - Mid Channel - 485 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Ambient Temp: 22.5°C; Fluid Temp: 22.2°C; Barometric Pressure: 101.2 kPa; Humidity: 32%

Communication System: FM UHF

Frequency: 485 MHz; Duty Cycle: 1:1

RF Output Power: 3.85 Watts (Conducted)

7.5V 2500mAh NiMH IS Battery Pack (P/N: KNB-41NC)

Medium: HSL450 ($\sigma = 0.85$ mho/m; $\epsilon_r = 44.1$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.4, 7.4, 7.4); Calibrated: 16/03/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- 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 Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.61 mW/g

Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel

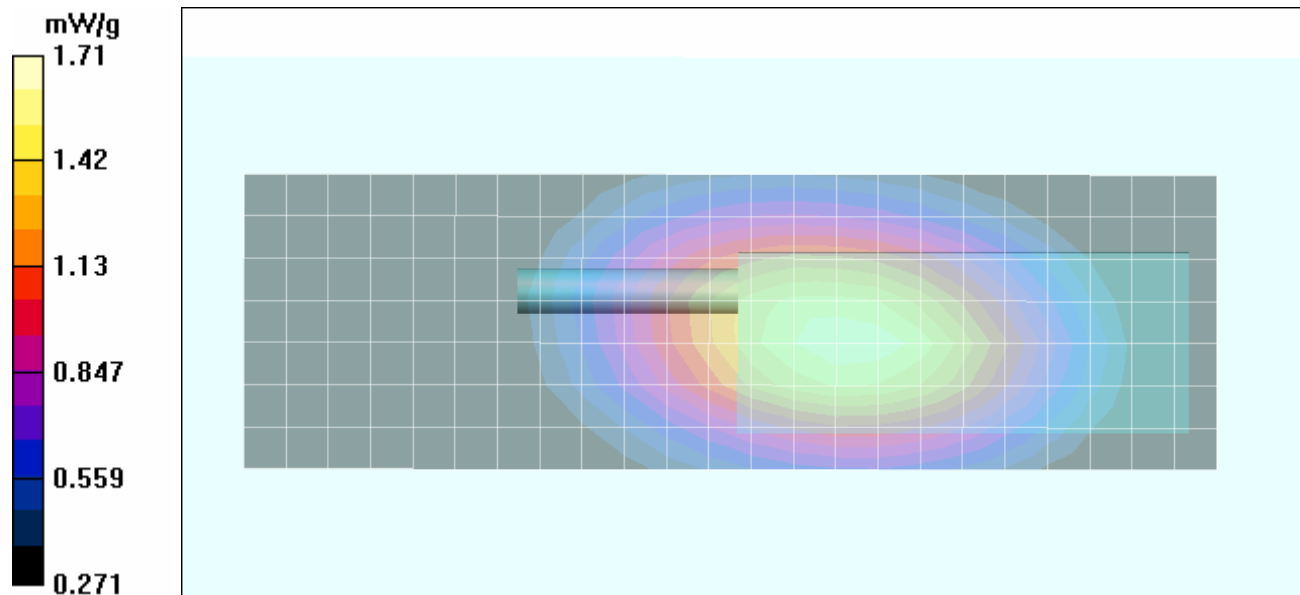
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 42.5 V/m; Power Drift = -0.453 dB

Peak SAR (extrapolated) = 2.51 W/kg

SAR(1 g) = 1.65 mW/g; SAR(10 g) = 1.2 mW/g

Maximum value of SAR (measured) = 1.71 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	
Certificate No. 2470.01				

Date Tested: 08/31/2006

Face-Held SAR - NiMH Battery - Whip Antenna (P/N: KRA-27M) - Mid Channel - 485 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Ambient Temp: 22.5°C; Fluid Temp: 22.2°C; Barometric Pressure: 101.2 kPa; Humidity: 32%

Communication System: FM UHF

Frequency: 485 MHz; Duty Cycle: 1:1

RF Output Power: 3.85 Watts (Conducted)

7.5V 2500mAh NiMH Battery Pack (P/N: KNB-32N)

Medium: HSL450 ($\sigma = 0.85$ mho/m; $\epsilon_r = 44.1$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.4, 7.4, 7.4); Calibrated: 16/03/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- 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 Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.70 mW/g

Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel

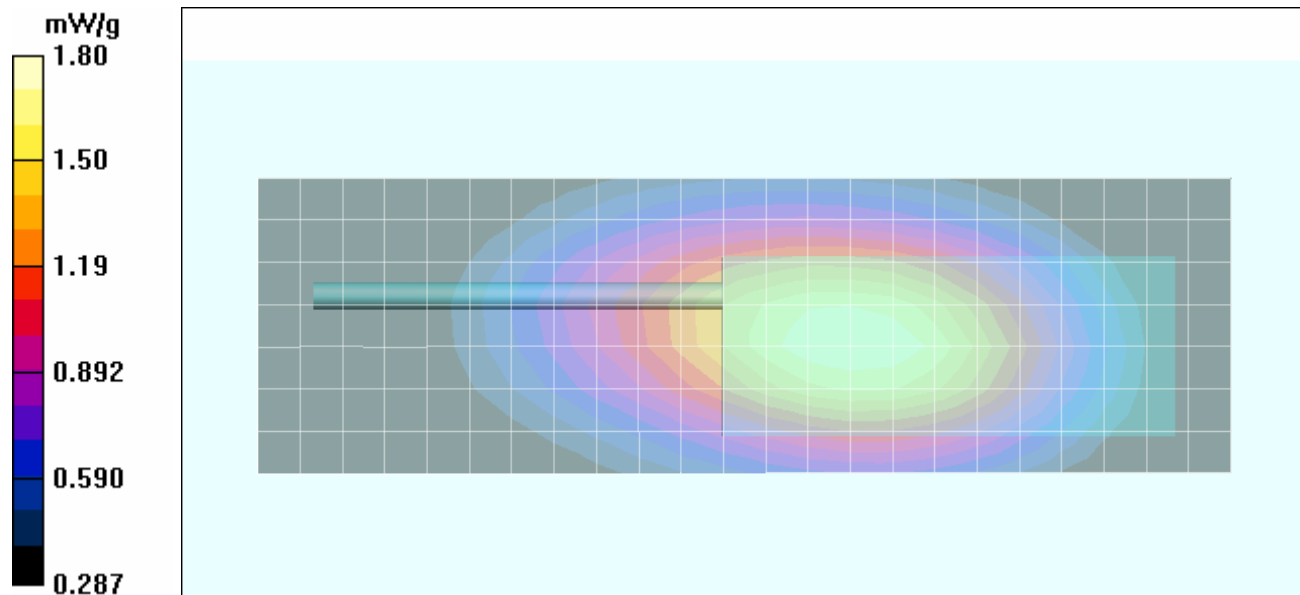
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 42.3 V/m; Power Drift = -0.200 dB

Peak SAR (extrapolated) = 2.65 W/kg

SAR(1 g) = 1.74 mW/g; SAR(10 g) = 1.27 mW/g

Maximum value of SAR (measured) = 1.80 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	

Date Tested: 08/31/2006

Face-Held SAR - NiMH Battery - Stubby Antenna (P/N: KRA-23M2) - Mid Channel - 485 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Ambient Temp: 22.5°C; Fluid Temp: 22.2°C; Barometric Pressure: 101.2 kPa; Humidity: 32%

Communication System: FM UHF

Frequency: 485 MHz; Duty Cycle: 1:1

RF Output Power: 3.85 Watts (Conducted)

7.5V 2500mAh NiMH Battery Pack (P/N: KNB-32N)

Medium: HSL450 ($\sigma = 0.85$ mho/m; $\epsilon_r = 44.1$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.4, 7.4, 7.4); Calibrated: 16/03/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- 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 Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 2.59 mW/g

Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel

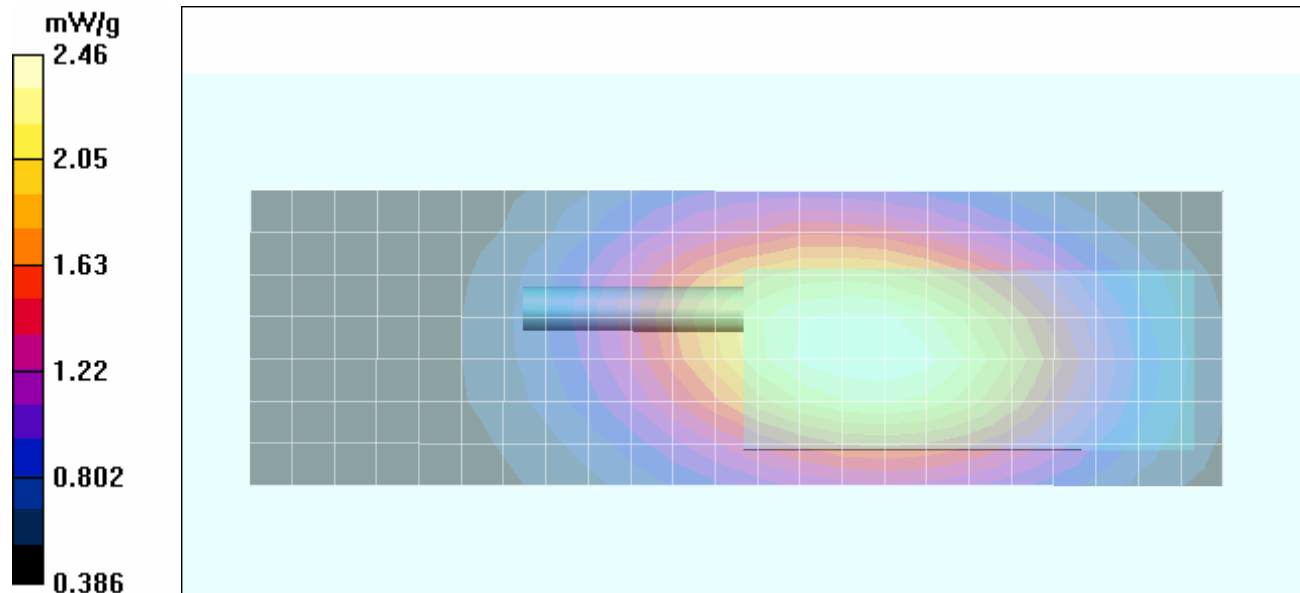
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 50.5 V/m; Power Drift = -0.321 dB

Peak SAR (extrapolated) = 3.61 W/kg

SAR(1 g) = 2.37 mW/g; SAR(10 g) = 1.73 mW/g

Maximum value of SAR (measured) = 2.46 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	
Certificate No. 2470.01				

Date Tested: 08/31/2006

Face-Held SAR - NiMH Battery - Stubby Antenna (P/N: KRA-23M) - Low Channel - 450 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Ambient Temp: 22.5°C; Fluid Temp: 22.2°C; Barometric Pressure: 101.2 kPa; Humidity: 32%

Communication System: FM UHF

Frequency: 450 MHz; Duty Cycle: 1:1

RF Output Power: 3.85 Watts (Conducted)

7.5V 2500mAh NiMH Battery Pack (P/N: KNB-32N)

Medium: HSL450 ($\sigma = 0.85$ mho/m; $\epsilon_r = 44.1$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.4, 7.4, 7.4); Calibrated: 16/03/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- 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 Separation Distance to Planar Phantom - Low Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 3.68 mW/g

Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Low Channel

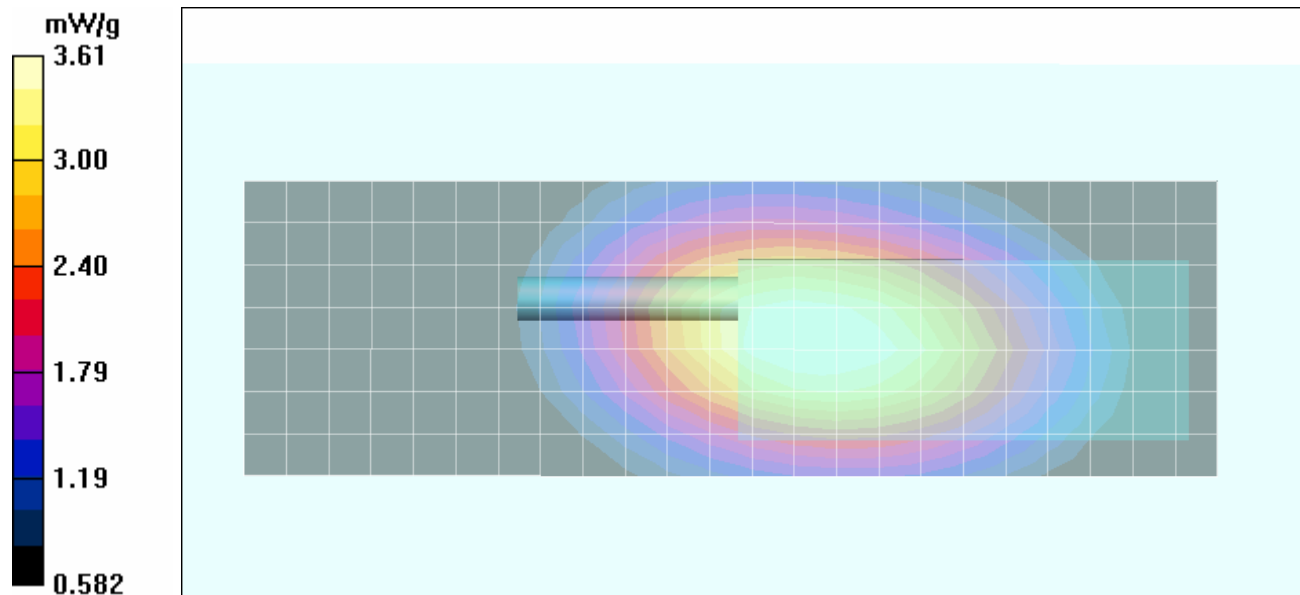
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 61.2 V/m; Power Drift = -0.170 dB

Peak SAR (extrapolated) = 5.22 W/kg

SAR(1 g) = 3.48 mW/g; SAR(10 g) = 2.56 mW/g

Maximum value of SAR (measured) = 3.61 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	
Certificate No. 2470.01				

Date Tested: 08/31/2006

Face-Held SAR - NiMH Battery - Whip Antenna (P/N: KRA-27M) - Low Channel - 450 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Ambient Temp: 22.5°C; Fluid Temp: 22.2°C; Barometric Pressure: 101.2 kPa; Humidity: 32%

Communication System: FM UHF

Frequency: 450 MHz; Duty Cycle: 1:1

RF Output Power: 3.85 Watts (Conducted)

7.5V 2500mAh NiMH Battery Pack (P/N: KNB-32N)

Medium: HSL450 ($\sigma = 0.85$ mho/m; $\epsilon_r = 44.1$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.4, 7.4, 7.4); Calibrated: 16/03/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- 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 Separation Distance to Planar Phantom - Low Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 3.59 mW/g

Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Low Channel

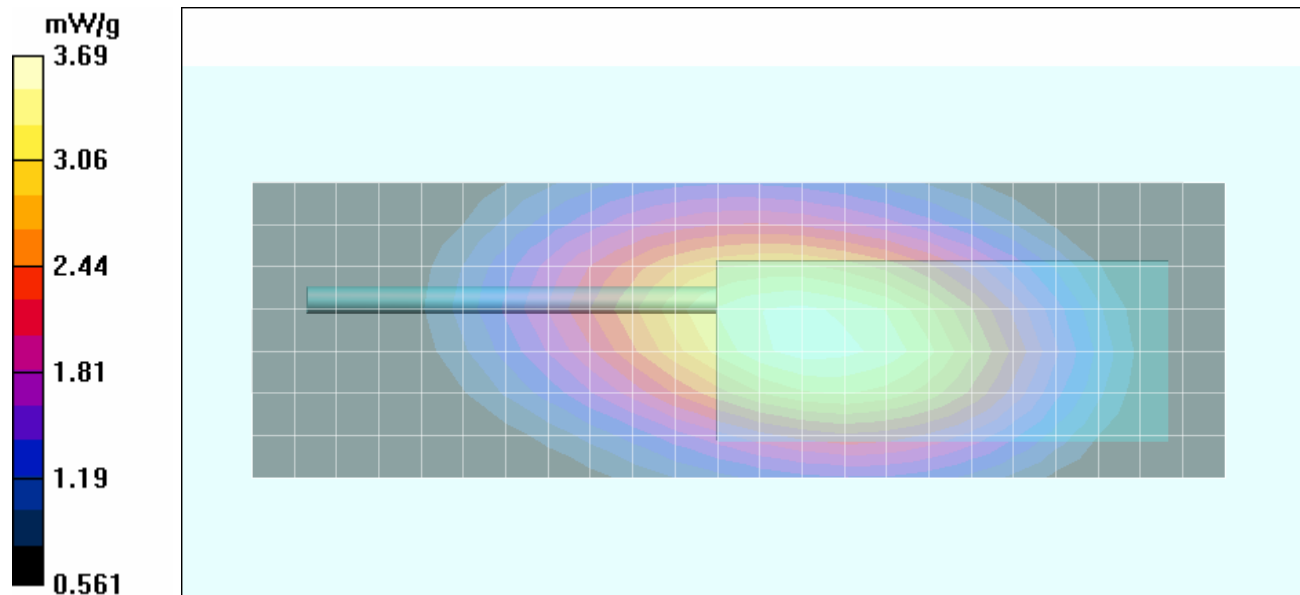
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 63.0 V/m; Power Drift = -0.192 dB

Peak SAR (extrapolated) = 5.30 W/kg

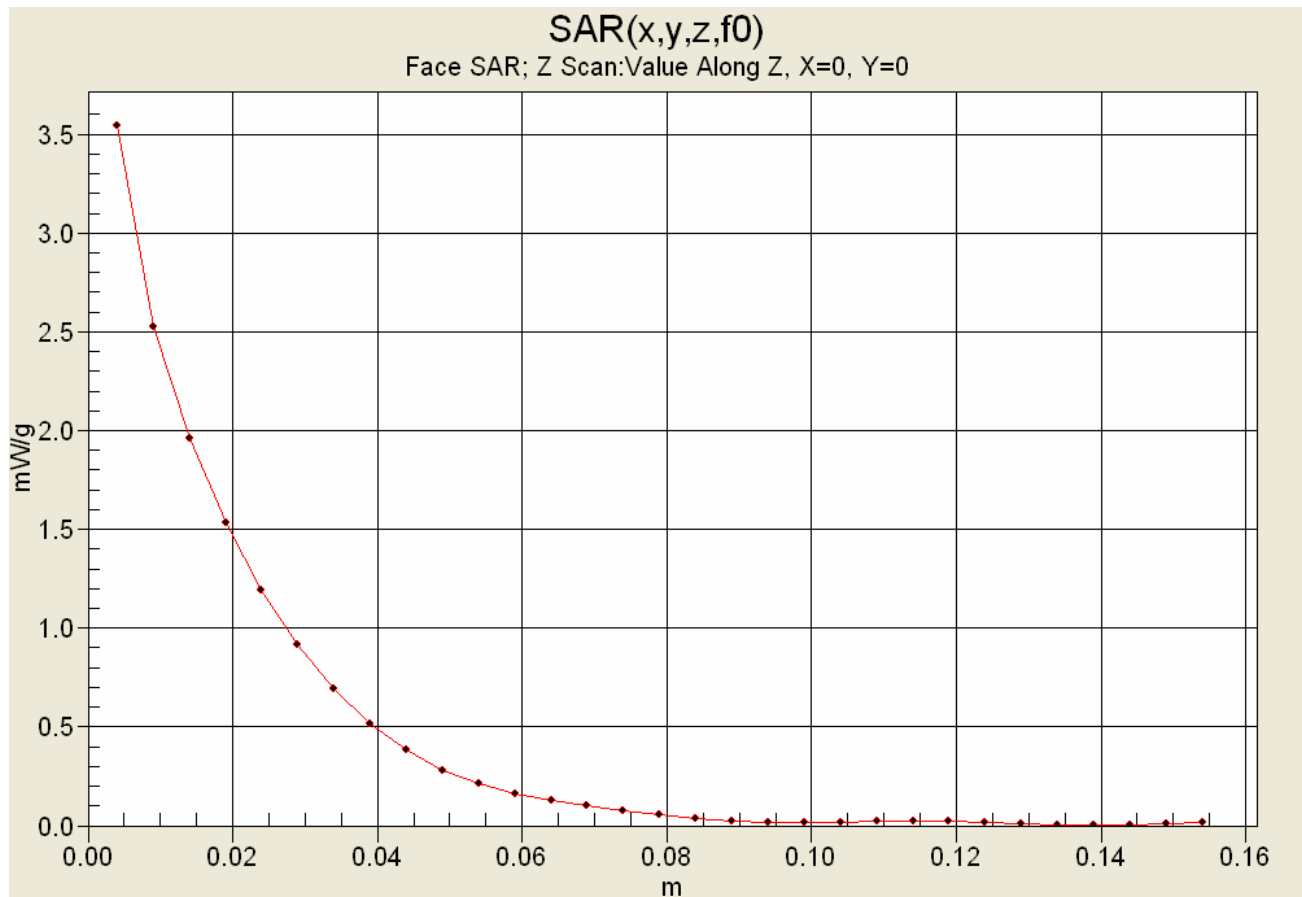
SAR(1 g) = 3.55 mW/g; SAR(10 g) = 2.61 mW/g

Maximum value of SAR (measured) = 3.69 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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Z-Axis Scan



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	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	

Date Tested: 08/31/2006

Face-Held SAR - NiMH Battery - Stubby Antenna (P/N: KRA-23M2) - High Channel - 520 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Ambient Temp: 22.5°C; Fluid Temp: 22.2°C; Barometric Pressure: 101.2 kPa; Humidity: 32%

Communication System: FM UHF

Frequency: 520 MHz; Duty Cycle: 1:1

RF Output Power: 3.87 Watts (Conducted)

7.5V 2500mAh NiMH Battery Pack (P/N: KNB-32N)

Medium: HSL450 ($\sigma = 0.85$ mho/m; $\epsilon_r = 44.1$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.4, 7.4, 7.4); Calibrated: 16/03/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- 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 Separation Distance to Planar Phantom - High Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

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

Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - High Channel

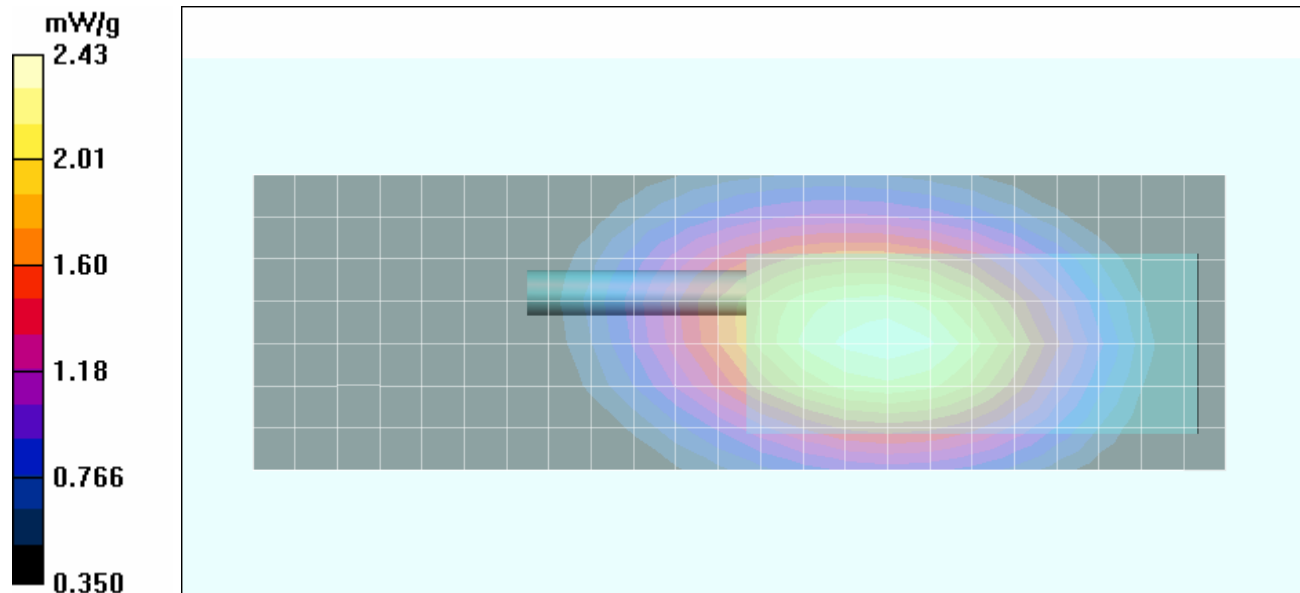
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 49.1 V/m; Power Drift = -0.605 dB

Peak SAR (extrapolated) = 3.56 W/kg

SAR(1 g) = 2.34 mW/g; SAR(10 g) = 1.7 mW/g

Maximum value of SAR (measured) = 2.43 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	

Date Tested: 09/01/2006

Body-Worn SAR - NiCd Battery - Stubby Antenna (P/N: KRA-23M) - Mid Channel - 485 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Body-Worn Accessory: Belt-Clip (P/N: J29-0710-XX); Audio Accessory: Speaker-Microphone (P/N: KMC-25)

Ambient Temp: 24.5°C; Fluid Temp: 23.0°C; Barometric Pressure: 101.5 kPa; Humidity: 33%

Communication System: FM UHF

Frequency: 485 MHz; Duty Cycle: 1:1

RF Output Power: 3.85 Watts (Conducted)

7.5V 1700mAh NiCd Battery Pack (P/N: KNB-31A)

Medium: M450 ($\sigma = 0.93$ mho/m; $\epsilon_r = 57.0$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.3, 7.3, 7.3); Calibrated: 16/03/2006

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn353; Calibrated: 21/06/2006

- Phantom: Side Planar; Type: Plexiglas; Serial: 161

- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 3.91 mW/g

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 61.0 V/m; Power Drift = -0.471 dB

Peak SAR (extrapolated) = 5.96 W/kg

SAR(1 g) = 3.94 mW/g; SAR(10 g) = 2.85 mW/g

Maximum value of SAR (measured) = 4.10 mW/g

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

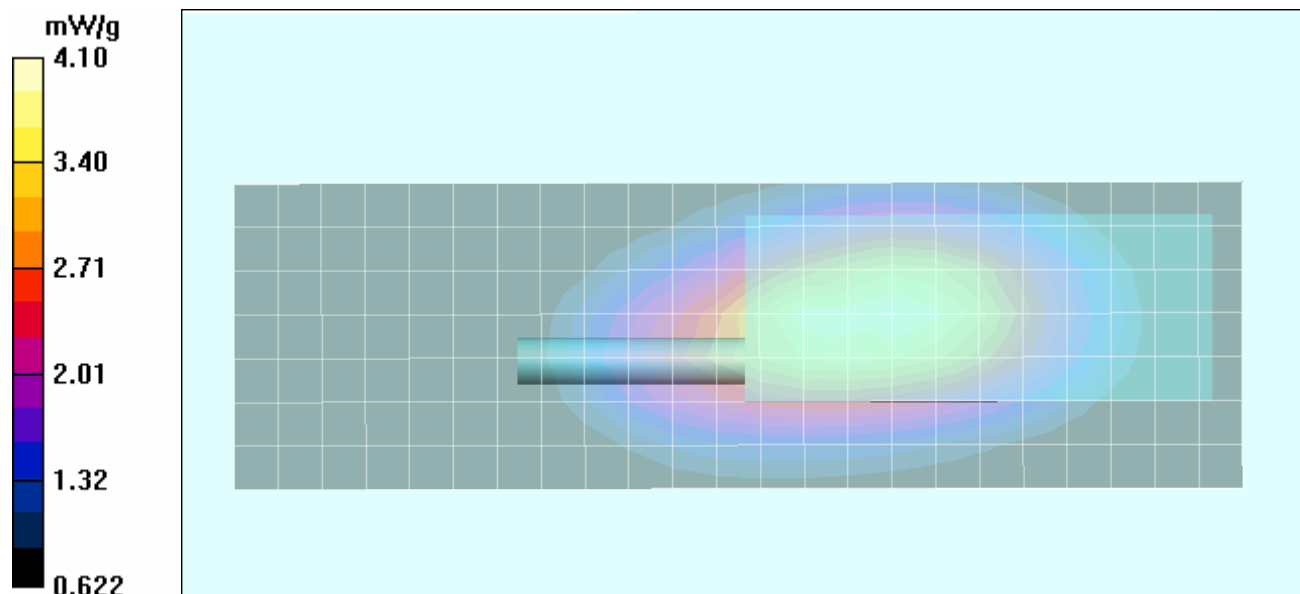
Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 61.0 V/m; Power Drift = -0.471 dB

Peak SAR (extrapolated) = 6.17 W/kg

SAR(1 g) = 3.76 mW/g; SAR(10 g) = 2.69 mW/g

Maximum value of SAR (measured) = 3.96 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	

Date Tested: 09/01/2006

Body-Worn SAR - NiMH Battery - Stubby Antenna (P/N: KRA-23M) - Mid Channel - 485 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Body-Worn Accessory: Belt-Clip (P/N: J29-0710-XX); Audio Accessory: Speaker-Microphone (P/N: KMC-25)

Ambient Temp: 24.5°C; Fluid Temp: 23.0°C; Barometric Pressure: 101.5 kPa; Humidity: 33%

Communication System: FM UHF

Frequency: 485 MHz; Duty Cycle: 1:1

RF Output Power: 3.85 Watts (Conducted)

7.2V 2500mAh NiMH Battery Pack (P/N: KNB-32N)

Medium: M450 ($\sigma = 0.93$ mho/m; $\epsilon_r = 57.0$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.3, 7.3, 7.3); Calibrated: 16/03/2006

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn353; Calibrated: 21/06/2006

- Phantom: Side Planar; Type: Plexiglas; Serial: 161

- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 4.13 mW/g

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 58.2 V/m; Power Drift = -0.297 dB

Peak SAR (extrapolated) = 5.58 W/kg

SAR(1 g) = 3.71 mW/g; SAR(10 g) = 2.69 mW/g

Maximum value of SAR (measured) = 3.87 mW/g

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

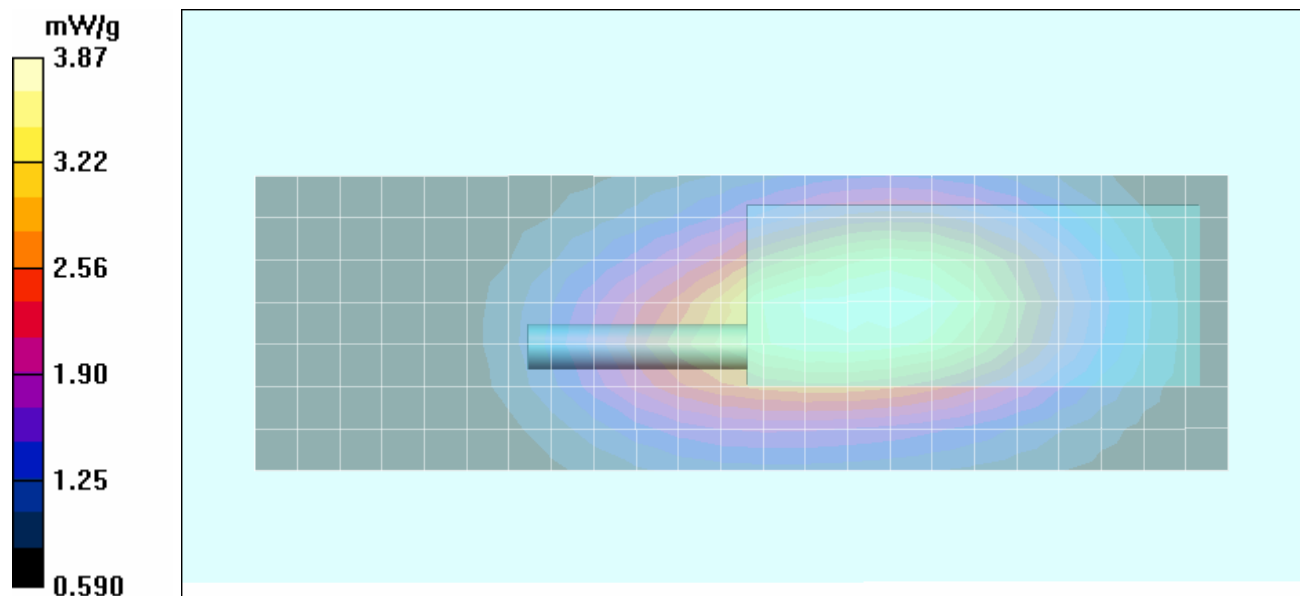
Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 58.2 V/m; Power Drift = -0.297 dB

Peak SAR (extrapolated) = 5.99 W/kg

SAR(1 g) = 3.64 mW/g; SAR(10 g) = 2.59 mW/g

Maximum value of SAR (measured) = 3.85 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Lab	Date(s) of Evaluation Aug. 31 - Sept. 01, 2006	Test Report Serial No. 082406ALH-T770-S90U	Report Revision No. Revision 1.0	 Certificate No. 2470.01
	Report Issue Date September 18, 2006	Description of Test(s) RF Exposure - SAR	RF Exposure Category Occupational/Controlled	

Date Tested: 09/01/2006

Body-Worn SAR - Li-ion Battery - Stubby Antenna (P/N: KRA-23M) - Mid Channel - 485 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Body-Worn Accessory: Belt-Clip (P/N: J29-0710-XX); Audio Accessory: Speaker-Microphone (P/N: KMC-25)

Ambient Temp: 24.5°C; Fluid Temp: 23.0°C; Barometric Pressure: 101.5 kPa; Humidity: 33%

Communication System: FM UHF

Frequency: 485 MHz; Duty Cycle: 1:1

RF Output Power: 3.85 Watts (Conducted)

7.4V 1700mAh Li-ion Battery Pack (P/N: KNB-33L)

Medium: M450 ($\sigma = 0.93 \text{ mho/m}$; $\epsilon_r = 57.0$; $\rho = 1000 \text{ kg/m}^3$)

- Probe: ET3DV6 - SN1387; ConvF(7.3, 7.3, 7.3); Calibrated: 16/03/2006

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn353; Calibrated: 21/06/2006

- Phantom: Side Planar; Type: Plexiglas; Serial: 161

- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 4.52 mW/g

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 53.3 V/m; Power Drift = -0.256 dB

Peak SAR (extrapolated) = 6.44 W/kg

SAR(1 g) = 4.23 mW/g; SAR(10 g) = 3.04 mW/g

Maximum value of SAR (measured) = 4.40 mW/g

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

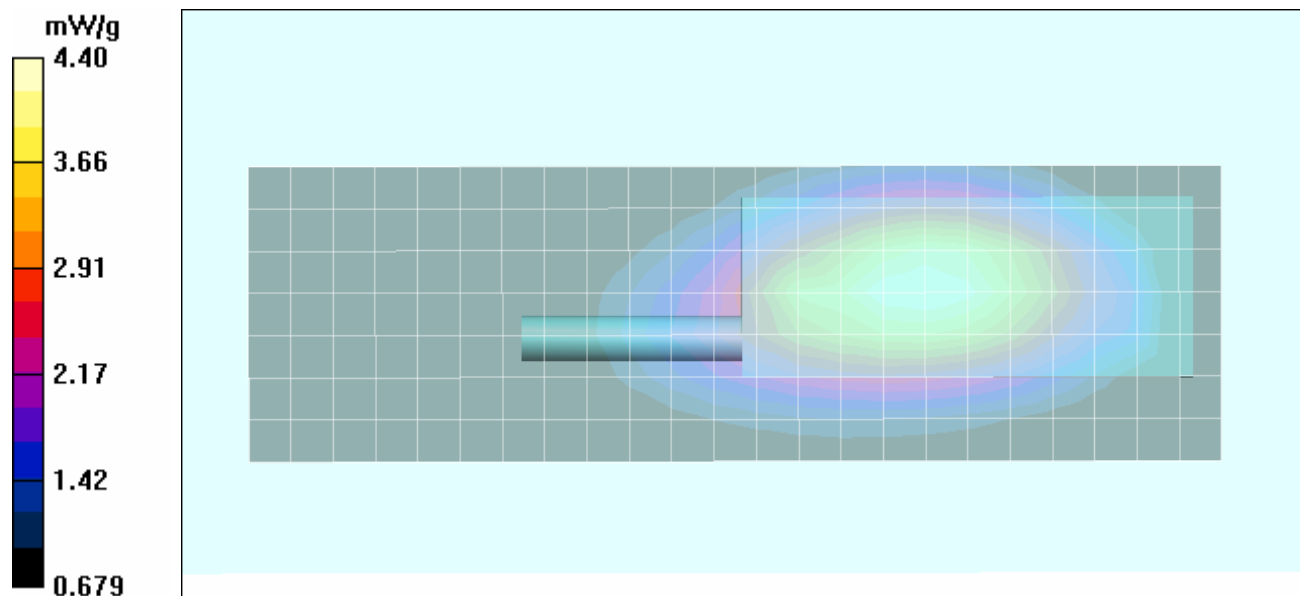
Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 53.3 V/m; Power Drift = -0.256 dB

Peak SAR (extrapolated) = 5.68 W/kg

SAR(1 g) = 3.59 mW/g; SAR(10 g) = 2.53 mW/g

Maximum value of SAR (measured) = 3.87 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	KENWOOD
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Lab	<u>Date(s) of Evaluation</u> Aug. 31 - Sept. 01, 2006	<u>Test Report Serial No.</u> 082406ALH-T770-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	

Date Tested: 09/01/2006

Body-Worn SAR - NiMH IS Battery - Stubby Antenna (P/N: KRA-23M) - Mid Channel - 485 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Body-Worn Accessory: Belt-Clip (P/N: J29-0710-XX); Audio Accessory: Speaker-Microphone (P/N: KMC-25)

Ambient Temp: 24.5°C; Fluid Temp: 23.0°C; Barometric Pressure: 101.5 kPa; Humidity: 33%

Communication System: FM UHF

Frequency: 485 MHz; Duty Cycle: 1:1

RF Output Power: 3.85 Watts (Conducted)

7.5V 2500mAh NiMH IS Battery Pack (P/N:KNB-41NC)

Medium: M450 ($\sigma = 0.93$ mho/m; $\epsilon_r = 57.0$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.3, 7.3, 7.3); Calibrated: 16/03/2006

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn353; Calibrated: 21/06/2006

- Phantom: Side Planar; Type: Plexiglas; Serial: 161

- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 3.34 mW/g

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 57.5 V/m; Power Drift = -0.694 dB

Peak SAR (extrapolated) = 5.75 W/kg

SAR(1 g) = 3.47 mW/g; SAR(10 g) = 2.48 mW/g

Maximum value of SAR (measured) = 3.65 mW/g

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

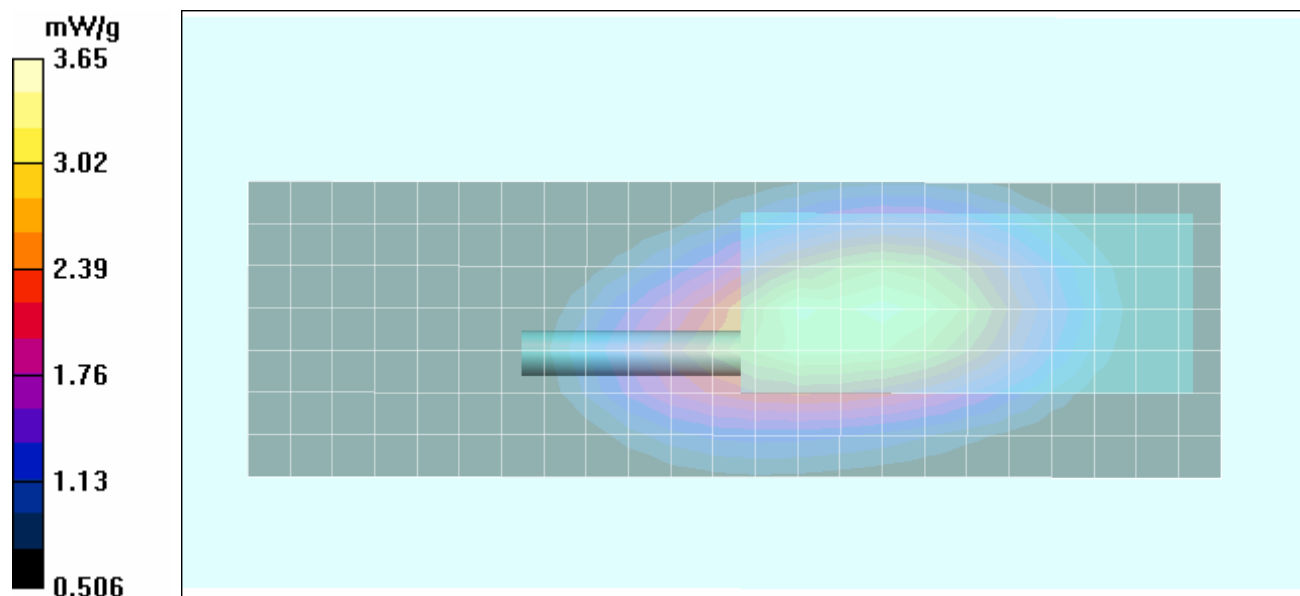
Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 57.5 V/m; Power Drift = -0.694 dB

Peak SAR (extrapolated) = 5.01 W/kg

SAR(1 g) = 3.30 mW/g; SAR(10 g) = 2.38 mW/g

Maximum value of SAR (measured) = 3.44 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	

Date Tested: 09/01/2006

Body-Worn SAR - Li-ion Battery - Whip Antenna (P/N: KRA-27M) - Mid Channel - 485 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Body-Worn Accessory: Belt-Clip (P/N: J29-0710-XX); Audio Accessory: Speaker-Microphone (P/N: KMC-25)

Ambient Temp: 24.5°C; Fluid Temp: 23.0°C; Barometric Pressure: 101.5 kPa; Humidity: 33%

Communication System: FM UHF

Frequency: 485 MHz; Duty Cycle: 1:1

RF Output Power: 3.85 Watts (Conducted)

7.4V 1700mAh Li-ion Battery Pack (P/N: KNB-33L)

Medium: M450 ($\sigma = 0.93$ mho/m; $\epsilon_r = 57.0$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.3, 7.3, 7.3); Calibrated: 16/03/2006

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn353; Calibrated: 21/06/2006

- Phantom: Side Planar; Type: Plexiglas; Serial: 161

- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 4.29 mW/g

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 61.3 V/m; Power Drift = -0.228 dB

Peak SAR (extrapolated) = 6.42 W/kg

SAR(1 g) = 4.26 mW/g; SAR(10 g) = 3.09 mW/g

Maximum value of SAR (measured) = 4.41 mW/g

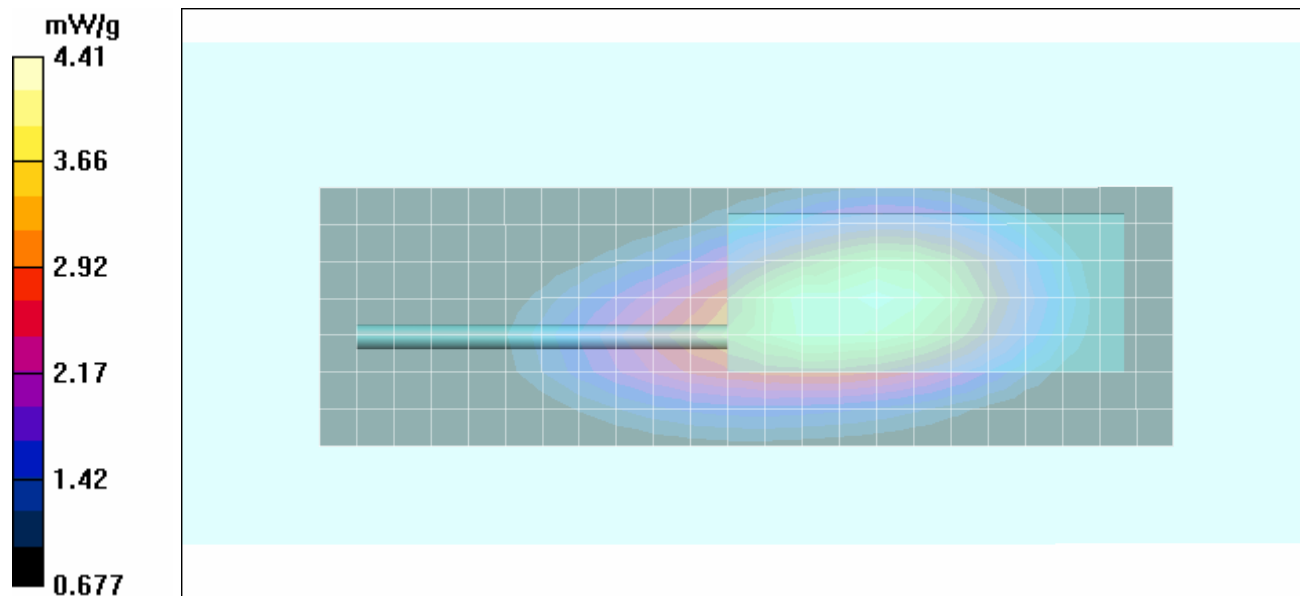
Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 61.3 V/m; Power Drift = -0.228 dB

Peak SAR (extrapolated) = 6.79 W/kg

SAR(1 g) = 4.12 mW/g; SAR(10 g) = 2.93 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	

Date Tested: 09/01/2006

Body-Worn SAR - Li-ion Battery - Stubby Antenna (P/N: KRA-23M2) - Mid Channel - 485 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Body-Worn Accessory: Belt-Clip (P/N: J29-0710-XX); Audio Accessory: Speaker-Microphone (P/N: KMC-25)

Ambient Temp: 24.5°C; Fluid Temp: 23.0°C; Barometric Pressure: 101.5 kPa; Humidity: 33%

Communication System: FM UHF

Frequency: 485 MHz; Duty Cycle: 1:1

RF Output Power: 3.85 Watts (Conducted)

7.4V 1700mAh Li-ion Battery Pack (P/N: KNB-33L)

Medium: M450 ($\sigma = 0.93$ mho/m; $\epsilon_r = 57.0$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.3, 7.3, 7.3); Calibrated: 16/03/2006

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn353; Calibrated: 21/06/2006

- Phantom: Side Planar; Type: Plexiglas; Serial: 161

- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 5.38 mW/g

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

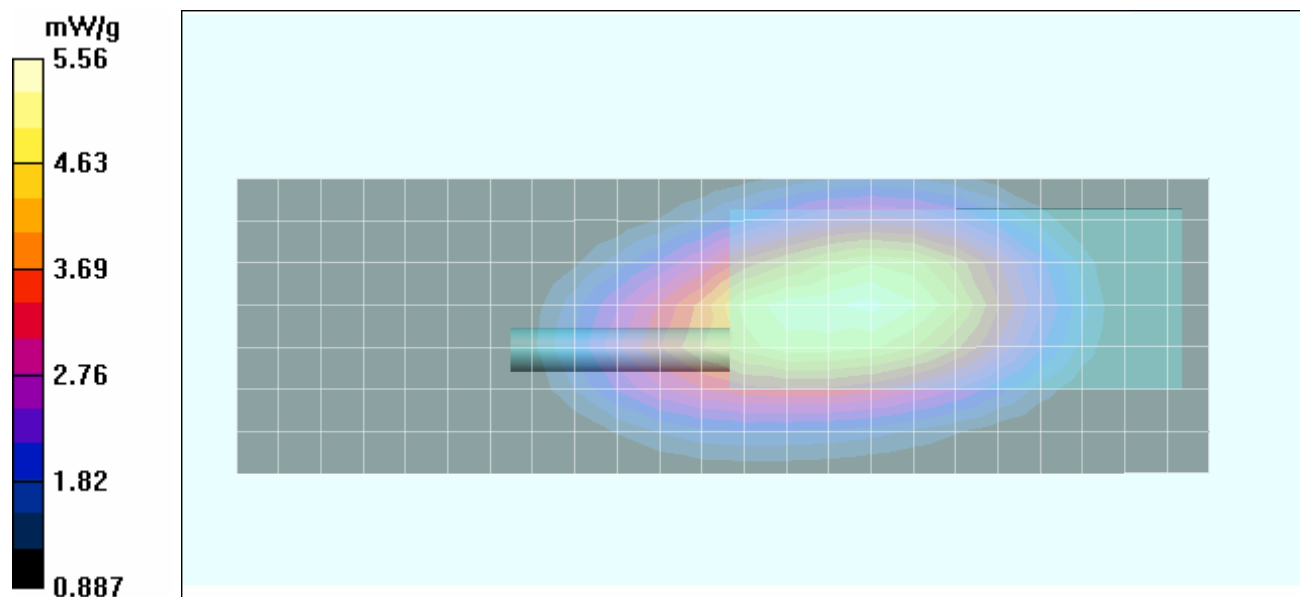
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 69.0 V/m; Power Drift = -0.302 dB

Peak SAR (extrapolated) = 8.06 W/kg

SAR(1 g) = 5.34 mW/g; SAR(10 g) = 3.88 mW/g

Maximum value of SAR (measured) = 5.56 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	<u>Date(s) of Evaluation</u> Aug. 31 - Sept. 01, 2006	<u>Test Report Serial No.</u> 082406ALH-T770-S90U	<u>Report Revision No.</u> Revision 1.0	
	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	
				Certificate No. 2470.01

Date Tested: 09/01/2006

Body-Worn SAR - Li-ion Battery - Stubby Antenna (P/N: KRA-23M) - Low Channel - 450 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Body-Worn Accessory: Belt-Clip (P/N: J29-0710-XX); Audio Accessory: Speaker-Microphone (P/N: KMC-25)

Ambient Temp: 24.5°C; Fluid Temp: 23.0°C; Barometric Pressure: 101.5 kPa; Humidity: 33%

Communication System: FM UHF

Frequency: 450 MHz; Duty Cycle: 1:1

RF Output Power: 3.85 Watts (Conducted)

7.4V 1700mAh Li-ion Battery Pack (P/N: KNB-33L)

Medium: M450 ($\sigma = 0.93 \text{ mho/m}$; $\epsilon_r = 57.0$; $\rho = 1000 \text{ kg/m}^3$)

- Probe: ET3DV6 - SN1387; ConvF(7.3, 7.3, 7.3); Calibrated: 16/03/2006

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn353; Calibrated: 21/06/2006

- Phantom: Side Planar; Type: Plexiglas; Serial: 161

- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Low Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 5.98 mW/g

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Low Channel

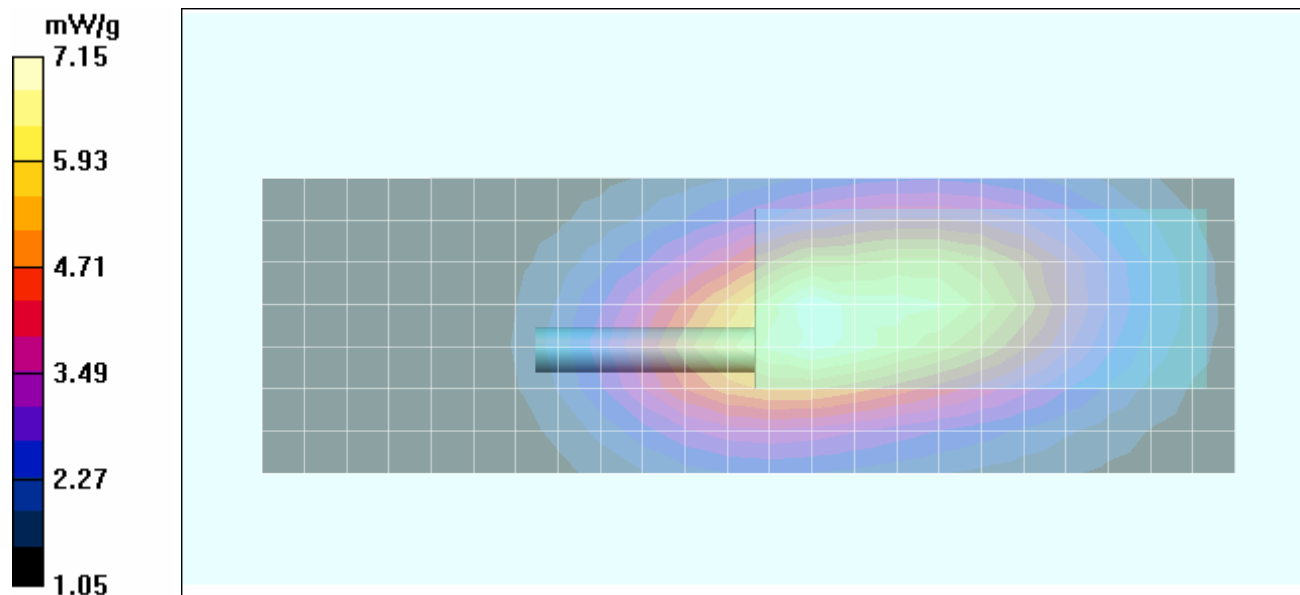
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 81.6 V/m; Power Drift = -0.282 dB

Peak SAR (extrapolated) = 11.2 W/kg

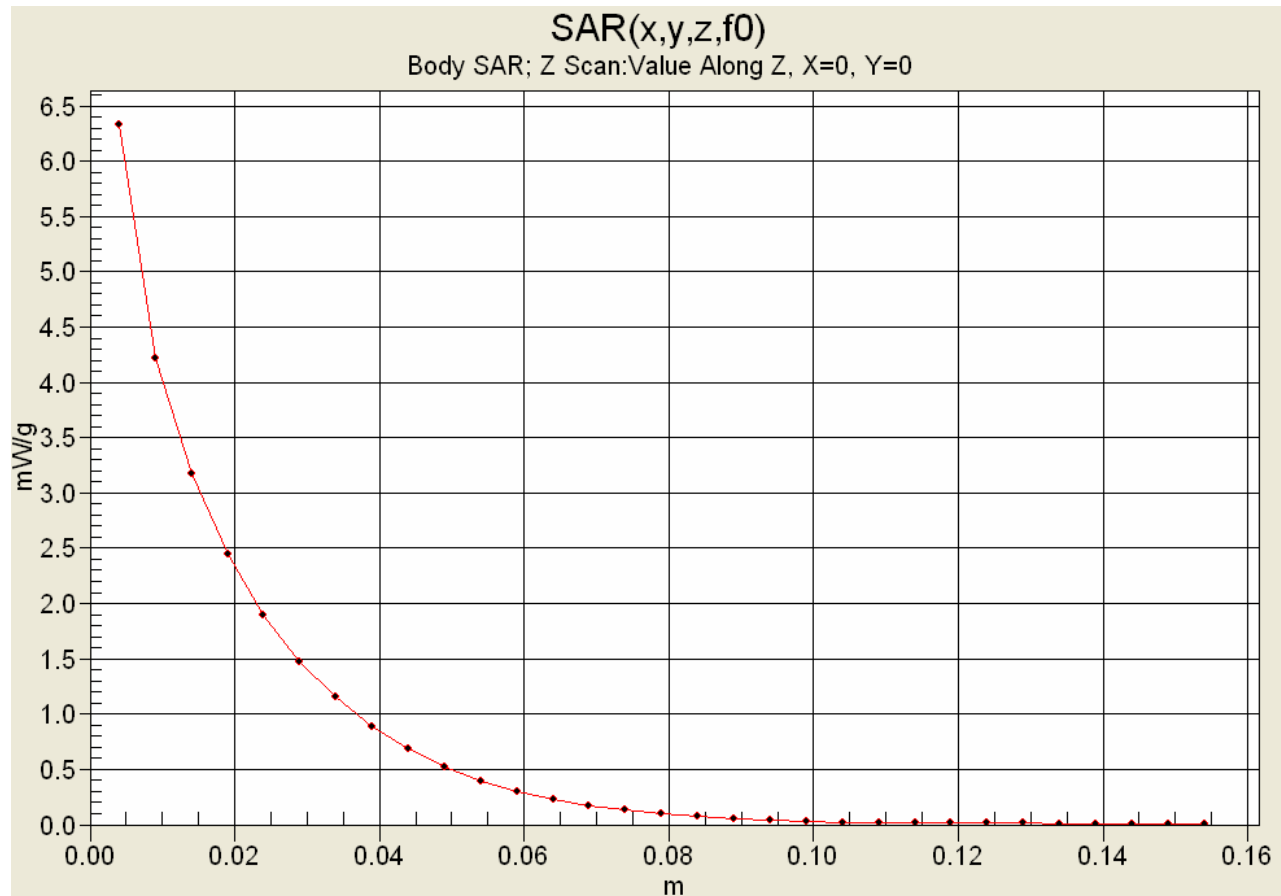
SAR(1 g) = 6.86 mW/g; SAR(10 g) = 4.78 mW/g

Maximum value of SAR (measured) = 7.15 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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Z-Axis Scan



	<u>Date(s) of Evaluation</u> Aug. 31 - Sept. 01, 2006	<u>Test Report Serial No.</u> 082406ALH-T770-S90U	<u>Report Revision No.</u> Revision 1.0	
	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	
Certificate No. 2470.01				

Date Tested: 09/01/2006

Body-Worn SAR - Li-ion Battery - Whip Antenna (P/N: KRA-27M) - Low Channel - 450 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Body-Worn Accessory: Belt-Clip (P/N: J29-0710-XX); Audio Accessory: Speaker-Microphone (P/N: KMC-25)

Ambient Temp: 24.5°C; Fluid Temp: 23.0°C; Barometric Pressure: 101.5 kPa; Humidity: 33%

Communication System: FM UHF

Frequency: 450 MHz; Duty Cycle: 1:1

RF Output Power: 3.85 Watts (Conducted)

7.4V 1700mAh Li-ion Battery Pack (P/N: KNB-33L)

Medium: M450 ($\sigma = 0.93$ mho/m; $\epsilon_r = 57.0$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.3, 7.3, 7.3); Calibrated: 16/03/2006

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn353; Calibrated: 21/06/2006

- Phantom: Side Planar; Type: Plexiglas; Serial: 161

- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Low Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 5.63 mW/g

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Low Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 82.1 V/m; Power Drift = -0.536 dB

Peak SAR (extrapolated) = 10.8 W/kg

SAR(1 g) = 6.58 mW/g; SAR(10 g) = 4.58 mW/g

Maximum value of SAR (measured) = 6.92 mW/g

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - Low Channel

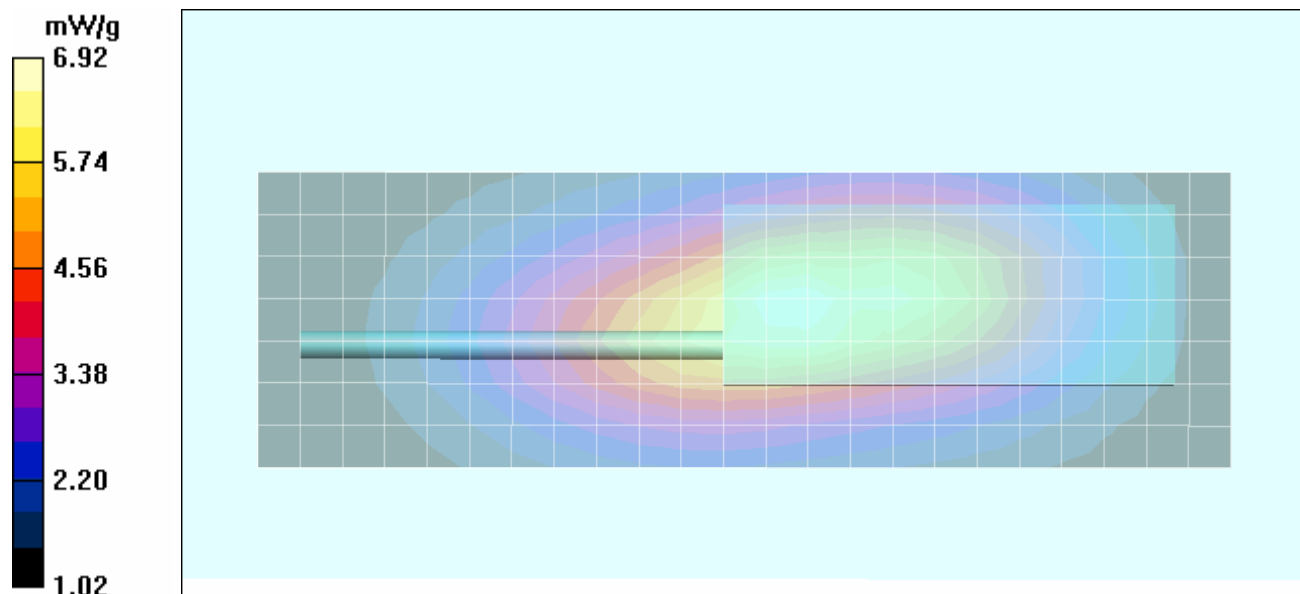
Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 82.1 V/m; Power Drift = -0.536 dB

Peak SAR (extrapolated) = 8.22 W/kg

SAR(1 g) = 5.49 mW/g; SAR(10 g) = 4.01 mW/g

Maximum value of SAR (measured) = 5.71 mW/g

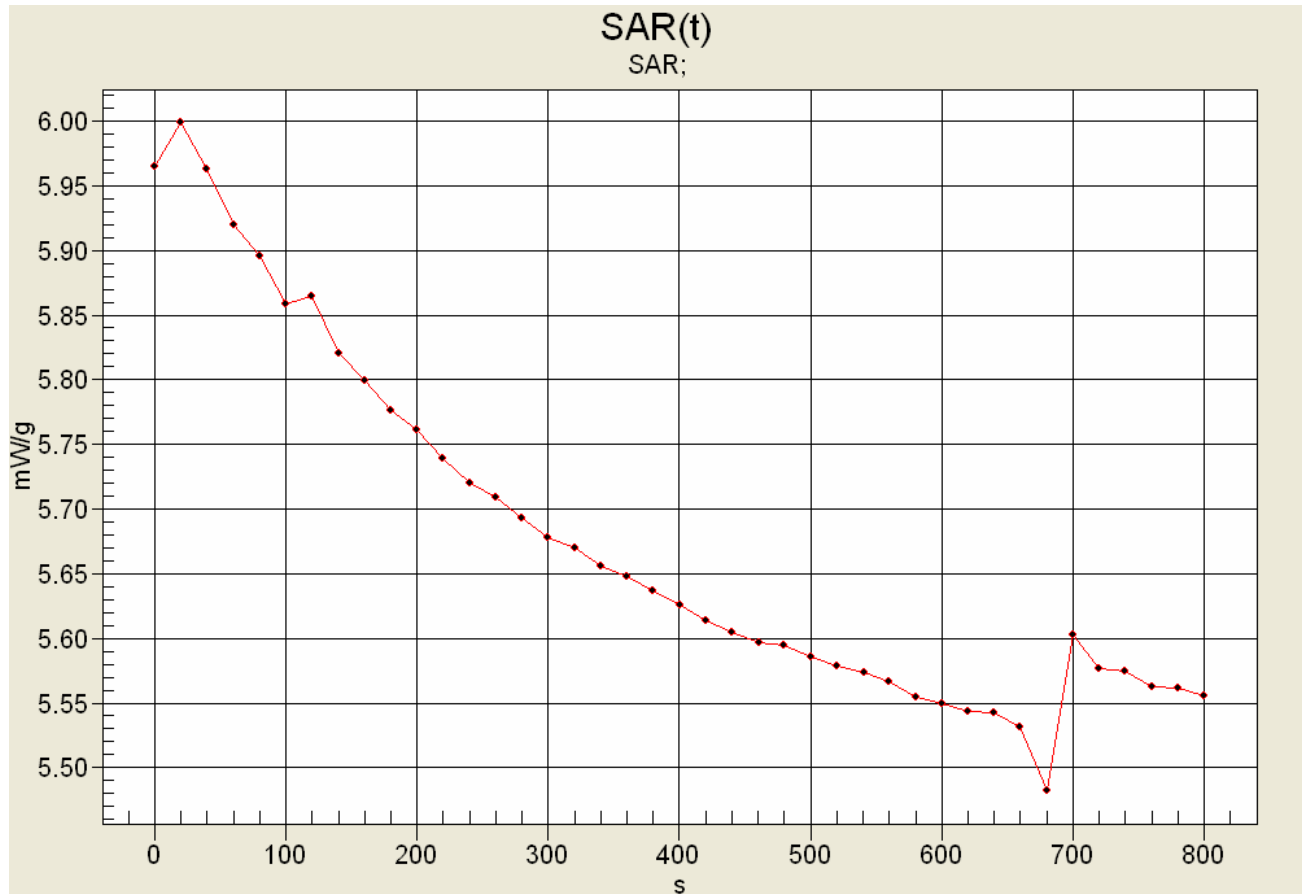


Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Ltd	<u>Date(s) of Evaluation</u> Aug. 31 - Sept. 01, 2006	<u>Test Report Serial No.</u> 082406ALH-T770-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	

SAR-Versus-Time Power Droop Evaluation

Body-Worn SAR
Li-ion Battery (P/N: KNB-33L)
KRA-27M Whip Antenna
Low Channel (450 MHz)



Max SAR: 5.96526 mW/g
Min. SAR: 5.48253 mW/g (-0.366 dB)
SAR after 340s: 5.65602 mW/g (-0.231 dB)
(340s = Zoom Scan Duration)
(800s = Area Scan Duration)

Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Ltd	<u>Date(s) of Evaluation</u> Aug. 31 - Sept. 01, 2006	<u>Test Report Serial No.</u> 082406ALH-T770-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	

Date Tested: 09/01/2006

Body-Worn SAR - Li-ion Battery - Stubby Antenna (P/N: KRA-23M2) - High Channel - 520 MHz

DUT: Kenwood Model: TK-5310-K3; Type: Portable FM UHF PTT Radio Transceiver; Serial: None

Body-Worn Accessory: Belt-Clip (P/N: J29-0710-XX); Audio Accessory: Speaker-Microphone (P/N: KMC-25)

Ambient Temp: 24.5°C; Fluid Temp: 23.0°C; Barometric Pressure: 101.5 kPa; Humidity: 33%

Communication System: FM UHF

Frequency: 520 MHz; Duty Cycle: 1:1

RF Output Power: 3.87 Watts (Conducted)

7.4V 1700mAh Li-ion Battery Pack (P/N: KNB-33L)

Medium: M450 ($\sigma = 0.93$ mho/m; $\epsilon_r = 57.0$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.3, 7.3, 7.3); Calibrated: 16/03/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - High Channel

Area Scan (8x24x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 4.99 mW/g

Body-Worn SAR - 2.0 cm Belt-Clip Separation Distance to Planar Phantom - High Channel

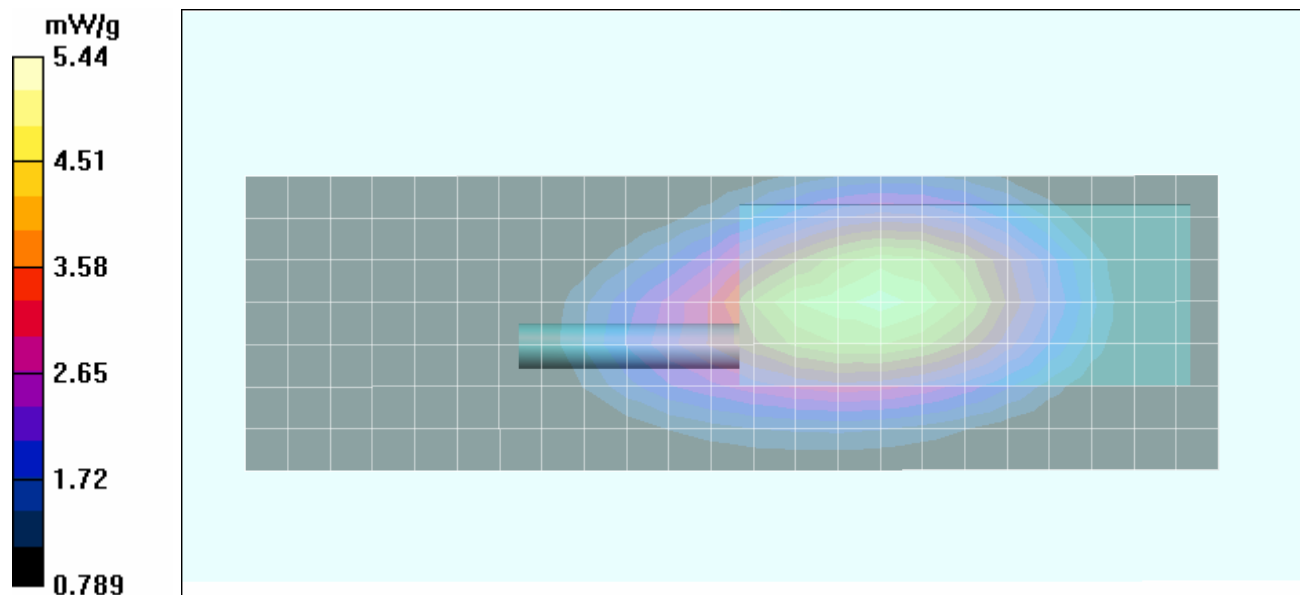
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 65.2 V/m; Power Drift = -0.592 dB

Peak SAR (extrapolated) = 7.96 W/kg

SAR(1 g) = 5.27 mW/g; SAR(10 g) = 3.8 mW/g

Maximum value of SAR (measured) = 5.44 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	<u>Date(s) of Evaluation</u> Aug. 31 - Sept. 01, 2006	<u>Test Report Serial No.</u> 082406ALH-T770-S90U	<u>Report Revision No.</u> Revision 1.0	
	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	
Certificate No. 2470.01				

APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	Date(s) of Evaluation Aug. 31 - Sept. 01, 2006	Test Report Serial No. 082406ALH-T770-S90U	Report Revision No. Revision 1.0	 Certificate No. 2470.01
	Report Issue Date September 18, 2006	Description of Test(s) RF Exposure - SAR	RF Exposure Category Occupational/Controlled	

Date Tested: 08/31/2006

System Performance Check (Brain) - 450 MHz Dipole

DUT: Dipole 450 MHz; Model: D450V2; Serial: 136; Validation: 10/25/2005

Ambient Temp: 22.5°C; Fluid Temp: 22.2°C; Barometric Pressure: 101.2 kPa; Humidity: 32%

Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: HSL450 ($\sigma = 0.85$ mho/m; $\epsilon_r = 44.1$; $\rho = 1000$ kg/m³)

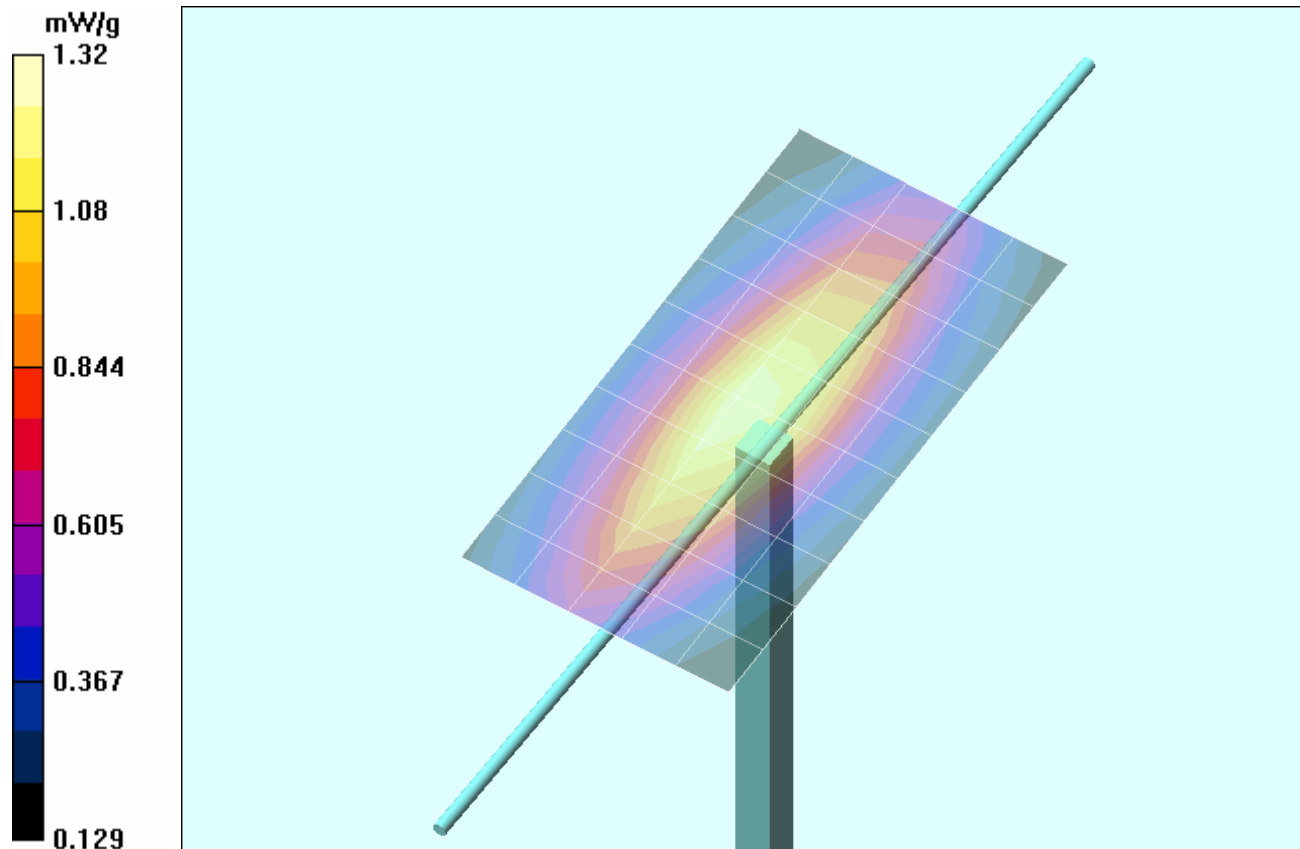
- Probe: ET3DV6 - SN1387; ConvF(7.4, 7.4, 7.4); Calibrated: 16/03/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: Validation Planar; Type: Plexiglas; Serial: 137
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

450 MHz Dipole - System Performance Check/Area Scan (6x11x1):

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

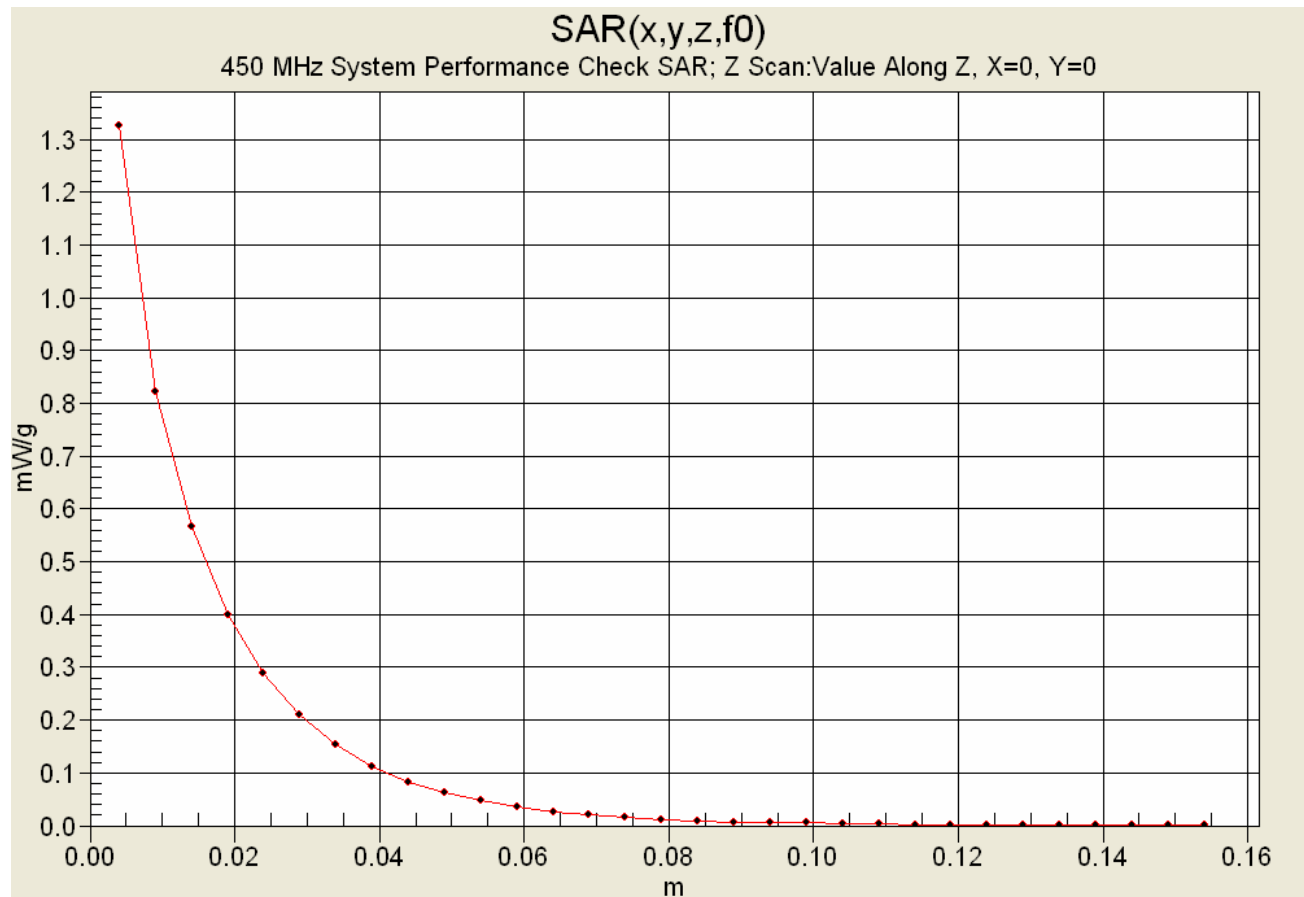
450 MHz Dipole - System Performance Check/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 39.4 V/m; Power Drift = 0.034 dB
Peak SAR (extrapolated) = 2.18 W/kg
SAR(1 g) = 1.25 mW/g; SAR(10 g) = 0.805 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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Z-Axis Scan



	Date(s) of Evaluation Aug. 31 - Sept. 01, 2006	Test Report Serial No. 082406ALH-T770-S90U	Report Revision No. Revision 1.0	 Certificate No. 2470.01
	Report Issue Date September 18, 2006	Description of Test(s) RF Exposure - SAR	RF Exposure Category Occupational/Controlled	

Date Tested: 09/01/2006

System Performance Check (Brain) - 450 MHz Dipole

DUT: Dipole 450 MHz; Model: D450V2; Serial: 136; Validation: 10/25/2005

Ambient Temp: 24.2°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.2 kPa; Humidity: 33%

Communication System: CW

Forward Conducted Power: 250 mW

Frequency: 450 MHz; Duty Cycle: 1:1

Medium: HSL450 ($\sigma = 0.85$ mho/m; $\epsilon_r = 42.9$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.4, 7.4, 7.4); Calibrated: 16/03/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: Validation Planar; Type: Plexiglas; Serial: 137
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

450 MHz Dipole - System Performance Check/Area Scan (6x11x1):

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

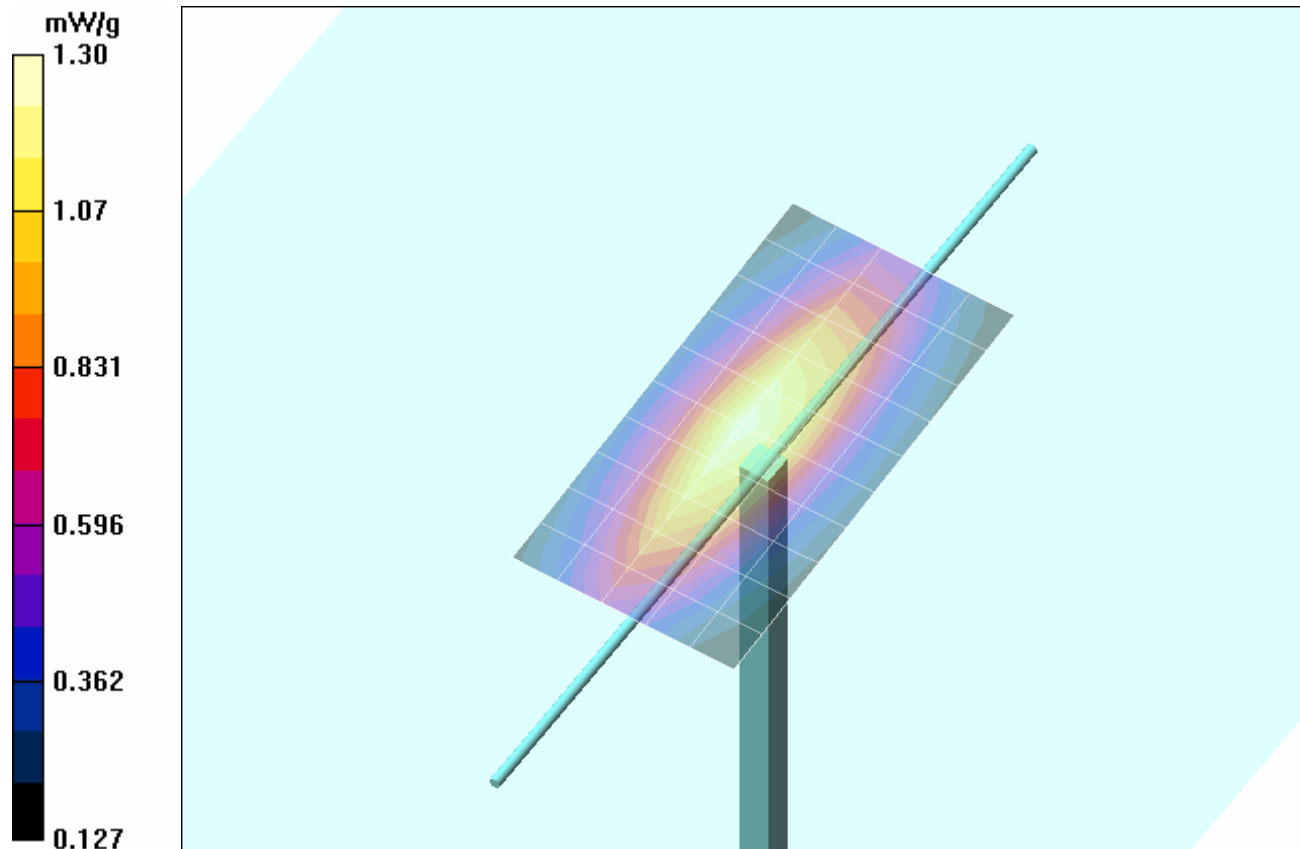
450 MHz Dipole - System Performance Check/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 39.0 V/m; Power Drift = -0.032 dB

Peak SAR (extrapolated) = 2.15 W/kg

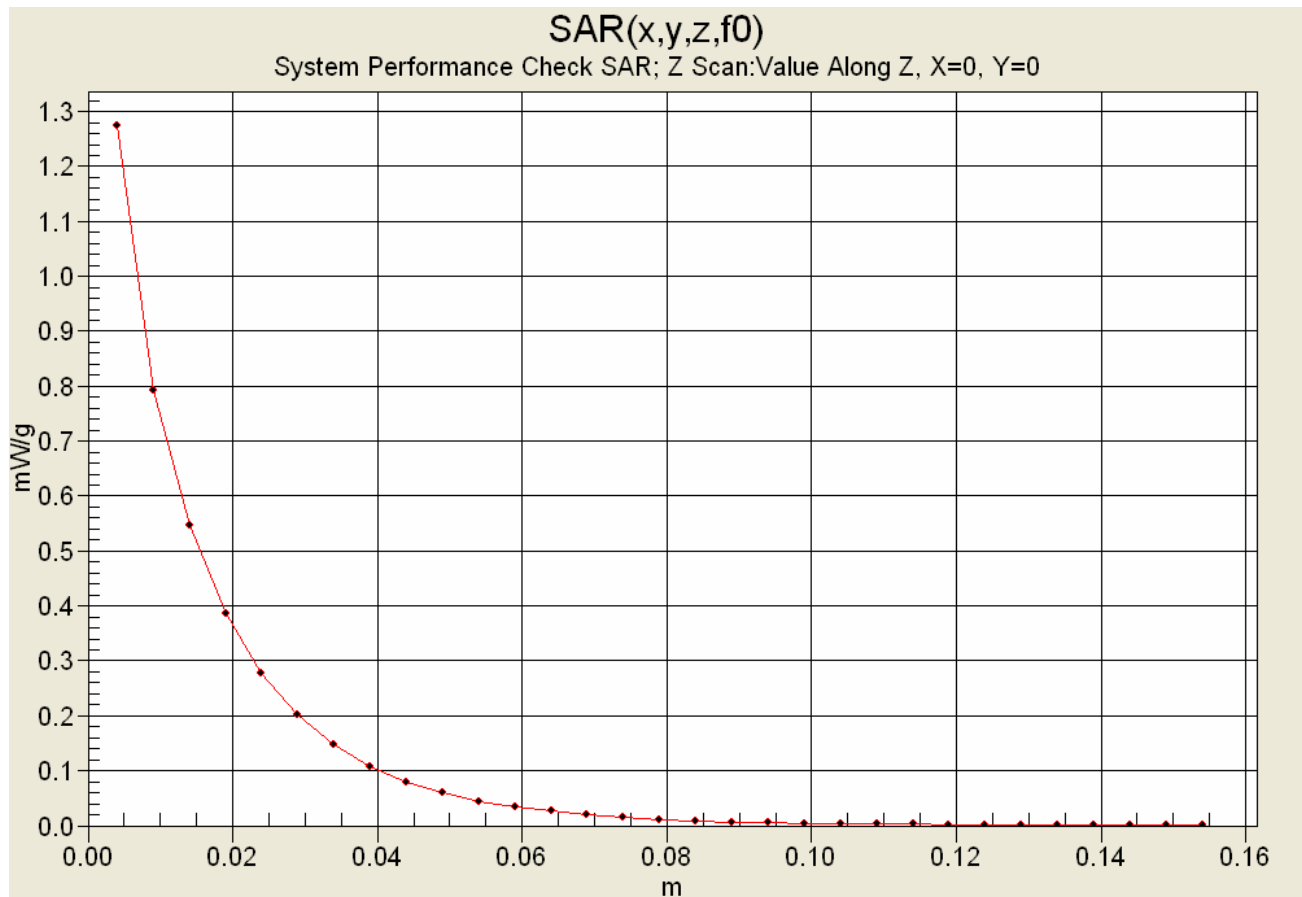
SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.791 mW/g



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	Date(s) of Evaluation Aug. 31 - Sept. 01, 2006	Test Report Serial No. 082406ALH-T770-S90U	Report Revision No. Revision 1.0	 Certificate No. 2470.01
	Report Issue Date September 18, 2006	Description of Test(s) RF Exposure - SAR	RF Exposure Category Occupational/Controlled	

Z-Axis Scan



Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	<u>Date(s) of Evaluation</u> Aug. 31 - Sept. 01, 2006	<u>Test Report Serial No.</u> 082406ALH-T770-S90U	<u>Report Revision No.</u> Revision 1.0	
	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	
Certificate No. 2470.01				

APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Lab	<u>Date(s) of Evaluation</u> Aug. 31 - Sept. 01, 2006	<u>Test Report Serial No.</u> 082406ALH-T770-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	

450MHz System Performance Check and Device Evaluation (Brain)

Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

Thu 31/Aug/2006

Frequency (GHz)

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

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

Test_e Epsilon of UIM

Test_s Sigma of UIM

Freq	FCC_eHFCC	sHFCC	Test_e	Test_s
0.3500	44.70	0.87	46.74	0.76
0.3600	44.58	0.87	46.22	0.77
0.3700	44.46	0.87	45.94	0.78
0.3800	44.34	0.87	45.65	0.79
0.3900	44.22	0.87	45.40	0.80
0.4000	44.10	0.87	45.24	0.81
0.4100	43.98	0.87	45.20	0.81
0.4200	43.86	0.87	44.76	0.82
0.4300	43.74	0.87	44.75	0.83
0.4400	43.62	0.87	44.31	0.83
0.4500	43.50	0.87	44.06	0.85
0.4600	43.45	0.87	43.91	0.86
0.4700	43.40	0.87	43.70	0.87
0.4800	43.34	0.87	43.47	0.88
0.4900	43.29	0.87	43.38	0.89
0.5000	43.24	0.87	43.04	0.89
0.5100	43.19	0.87	42.93	0.91
0.5200	43.14	0.88	42.63	0.91
0.5300	43.08	0.88	42.64	0.91
0.5400	43.03	0.88	42.33	0.92
0.5500	42.98	0.88	42.19	0.93

Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Lab	<u>Date(s) of Evaluation</u> Aug. 31 - Sept. 01, 2006	<u>Test Report Serial No.</u> 082406ALH-T770-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	

450 MHz Device Evaluation (Body)

Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

Fri 01/Sep/2006

Frequency (GHz)

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

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

FCC_eBFCC Limits for Body Epsilon

FCC_sBFCC Limits for Body Sigma

Test_e Epsilon of UIM

Test_s Sigma of UIM

Freq	FCC_eB	FCC_sB	Test_e	Test_s
0.3500	57.70	0.93	58.69	0.86
0.3600	57.60	0.93	58.37	0.86
0.3700	57.50	0.93	58.39	0.87
0.3800	57.40	0.93	58.00	0.88
0.3900	57.30	0.93	57.83	0.88
0.4000	57.20	0.93	57.64	0.89
0.4100	57.10	0.93	57.68	0.90
0.4200	57.00	0.94	57.43	0.91
0.4300	56.90	0.94	57.49	0.92
0.4400	56.80	0.94	56.96	0.92
0.4500	56.70	0.94	57.01	0.93
0.4600	56.66	0.94	57.01	0.94
0.4700	56.62	0.94	56.76	0.95
0.4800	56.58	0.94	56.49	0.96
0.4900	56.54	0.94	56.50	0.97
0.5000	56.51	0.94	56.28	0.97
0.5100	56.47	0.94	56.42	0.98
0.5200	56.43	0.95	56.01	0.99
0.5300	56.39	0.95	56.01	1.00
0.5400	56.35	0.95	55.86	1.00
0.5500	56.31	0.95	55.65	1.01

Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Lab	<u>Date(s) of Evaluation</u> Aug. 31 - Sept. 01, 2006	<u>Test Report Serial No.</u> 082406ALH-T770-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	

450 MHz System Performance Check (Brain)

Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

Fri 01/Sep/2006

Frequency (GHz)

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

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

Test_e Epsilon of UIM

Test_s Sigma of UIM

Freq	FCC_eHFCC	sHFCC	Test_e	Test_s
0.3500	44.70	0.87	45.26	0.76
0.3600	44.58	0.87	44.73	0.77
0.3700	44.46	0.87	44.81	0.78
0.3800	44.34	0.87	44.40	0.79
0.3900	44.22	0.87	44.04	0.80
0.4000	44.10	0.87	44.06	0.81
0.4100	43.98	0.87	43.98	0.82
0.4200	43.86	0.87	43.50	0.82
0.4300	43.74	0.87	43.31	0.83
0.4400	43.62	0.87	42.91	0.84
0.4500	43.50	0.87	42.91	0.85
0.4600	43.45	0.87	42.64	0.86
0.4700	43.40	0.87	42.61	0.86
0.4800	43.34	0.87	42.17	0.88
0.4900	43.29	0.87	42.05	0.89
0.5000	43.24	0.87	41.83	0.90
0.5100	43.19	0.87	41.81	0.90
0.5200	43.14	0.88	41.22	0.91
0.5300	43.08	0.88	41.41	0.91
0.5400	43.03	0.88	41.13	0.92
0.5500	42.98	0.88	40.85	0.93

Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	<u>Date(s) of Evaluation</u> Aug. 31 - Sept. 01, 2006	<u>Test Report Serial No.</u> 082406ALH-T770-S90U	<u>Report Revision No.</u> Revision 1.0	
	<u>Report Issue Date</u> September 18, 2006	<u>Description of Test(s)</u> RF Exposure - SAR	<u>RF Exposure Category</u> Occupational/Controlled	
Certificate No. 2470.01				

APPENDIX E - SYSTEM VALIDATION

Company:	Kenwood USA Corporation	FCC ID:	ALH39913110	Freq.	450 - 520 MHz	
Model(s):	TK-5310-K, -K2, -K3	Type:	Portable FM UHF PTT Radio Transceiver			
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	Date of Evaluation:	October 25, 2005	Document Issue No.:	SV450B-102505-R1.1
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz
			Fluid Type:	Brain

450 MHz SYSTEM VALIDATION DIPOLE

Type:

450 MHz Validation Dipole

Asset Number:

00024

Serial Number:

136

Place of Validation:

Celltech Labs Inc.

Date of Validation:

October 25, 2005

Celltech Labs Inc. hereby certifies that the system validation was performed on the date indicated above.

Validated by:



Approved by:



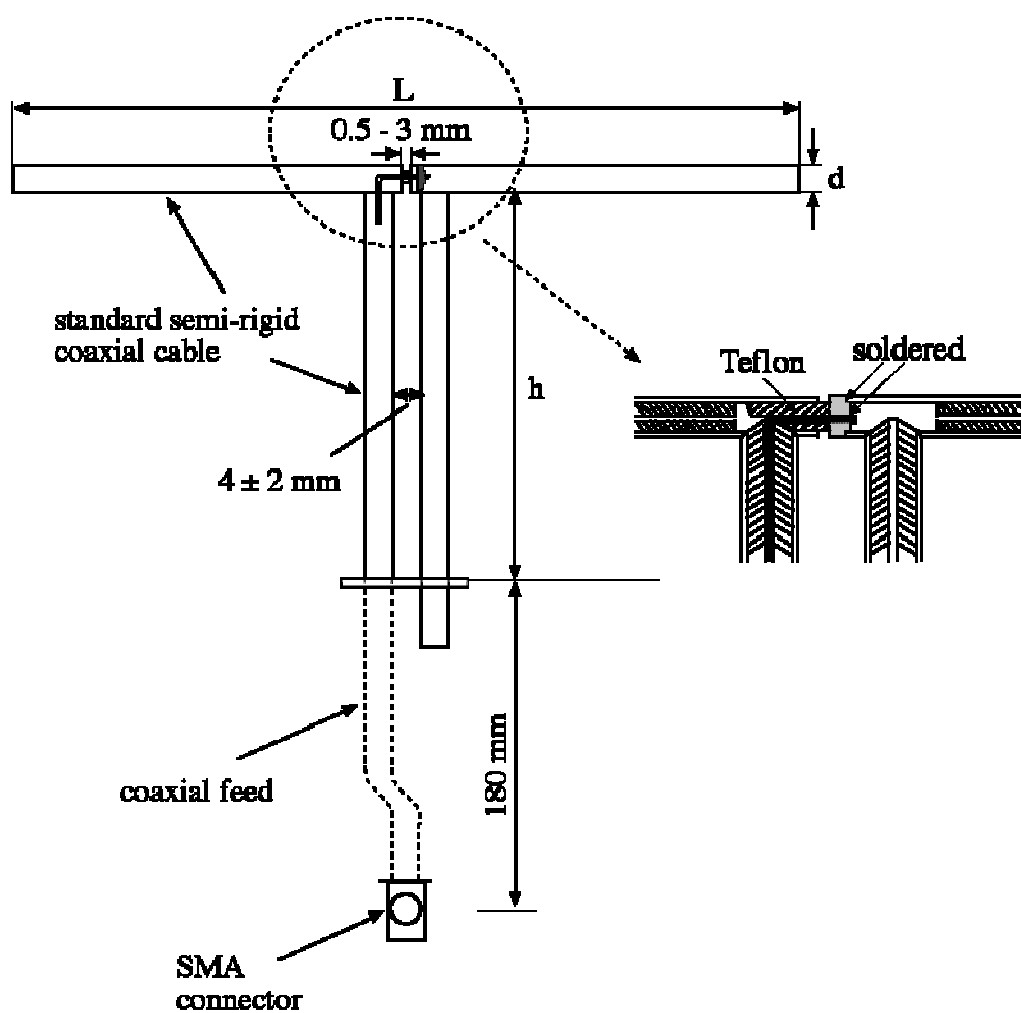
	Date of Evaluation:	October 25, 2005	Document Issue No.:	SV450B-102505-R1.1
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz

1. Dipole Construction & Electrical Characteristics

The validation dipole was constructed in accordance with the IEEE Std "Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques". The electrical properties were measured using an HP 8753E 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:

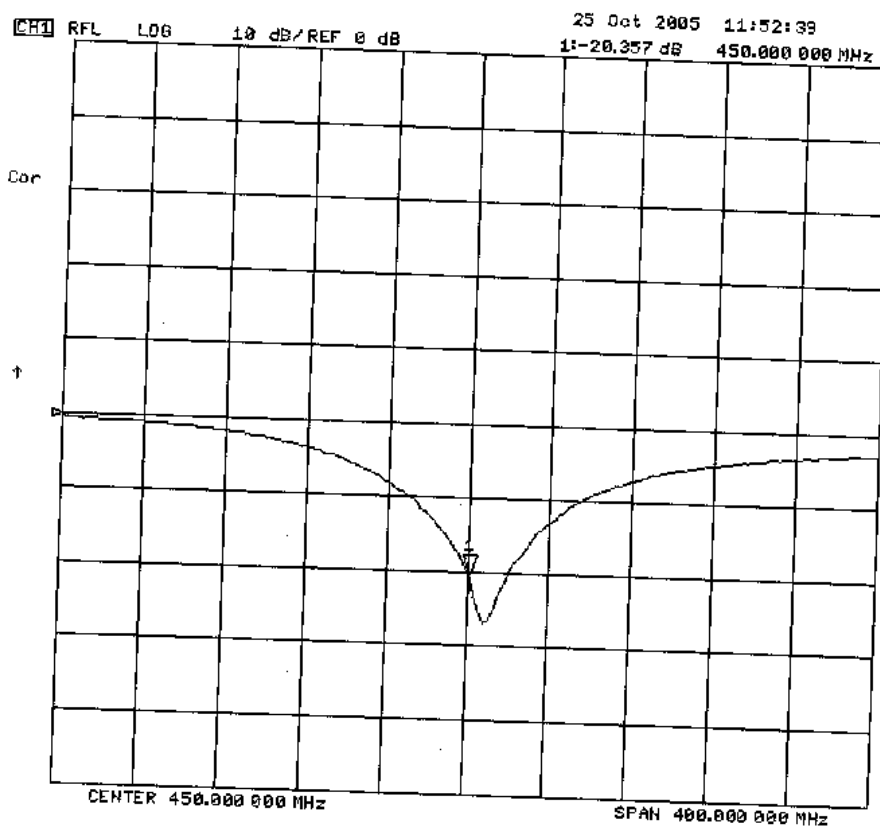
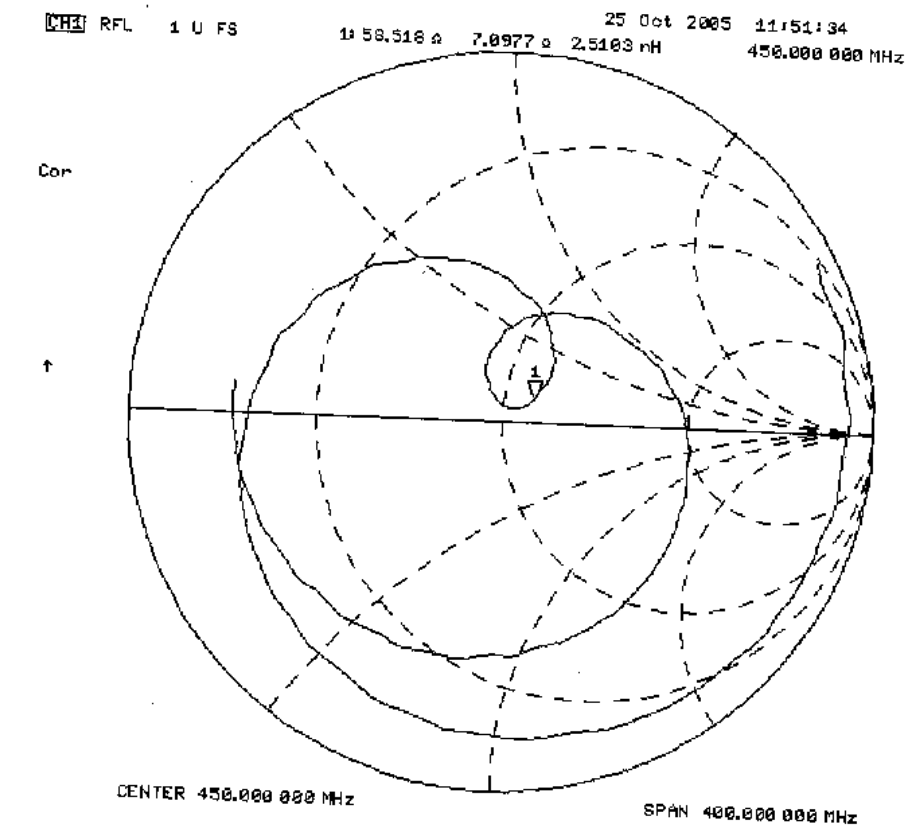
Feed point impedance at 450MHz $\text{Re}\{Z\} = 58.518\Omega$
 $\text{Im}\{Z\} = 7.0977\Omega$

Return Loss at 450MHz -20.357dB



	Date of Evaluation:	October 25, 2005	Document Issue No.:	SV450B-102505-R1.1
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz

2. Validation Dipole VSWR Data



	Date of Evaluation:	October 25, 2005	Document Issue No.:	SV450B-102505-R1.1
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz

3. Validation Dipole Dimensions

Frequency (MHz)	L (mm)	h (mm)	d (mm)
300	420.0	250.0	6.2
450	288.0	167.0	6.2
835	161.0	89.8	3.6
900	149.0	83.3	3.6
1450	89.1	51.7	3.6
1800	72.0	41.7	3.6
1900	68.0	39.5	3.6
2000	64.5	37.5	3.6
2450	51.8	30.6	3.6
3000	41.5	25.0	3.6

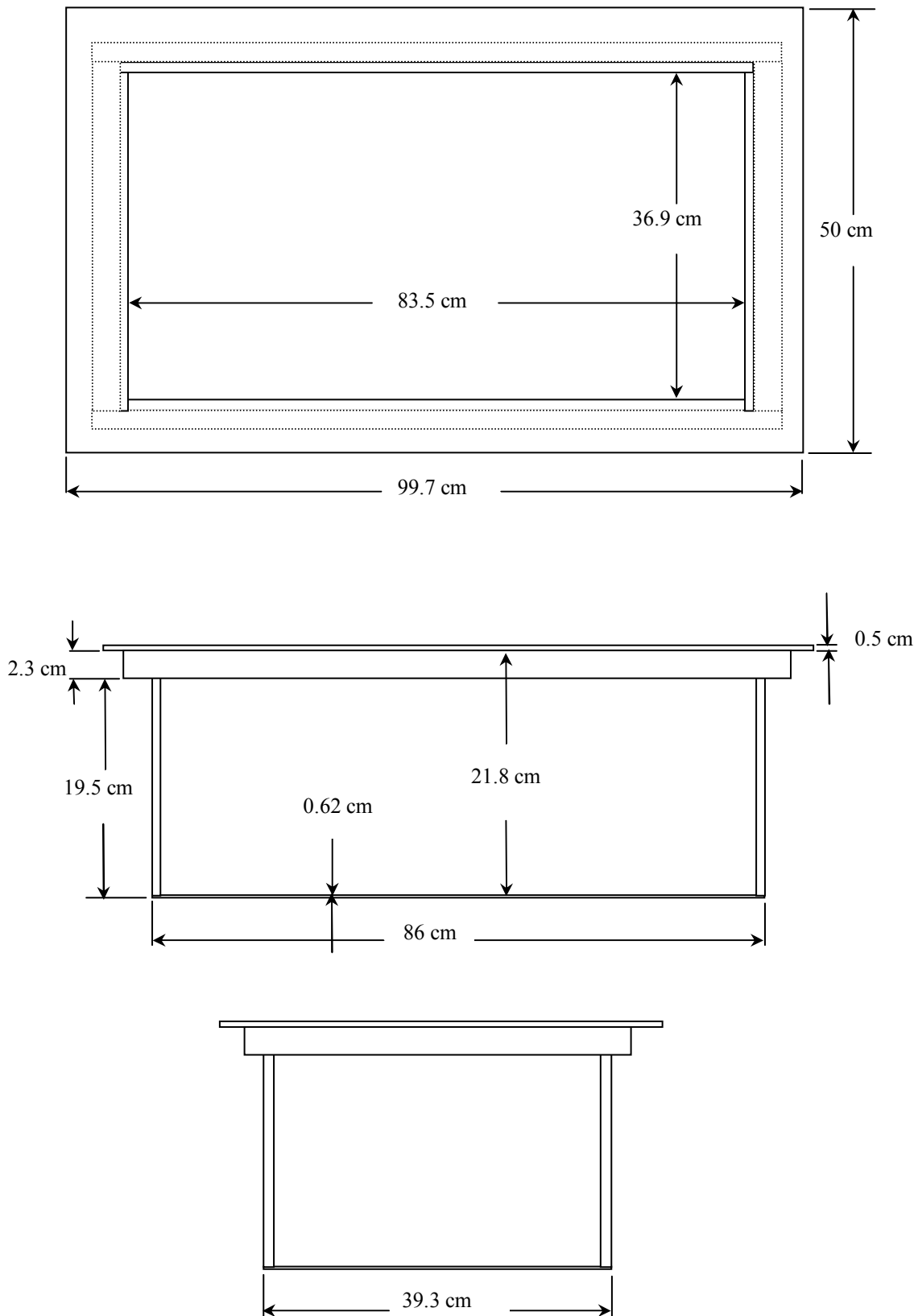
4. Validation Phantom

The validation phantom was constructed using relatively low-loss tangent Plexiglas material. The inner dimensions of the phantom are as follows:

Length: 83.5 cm
Width: 36.9 cm
Height: 21.8 cm

The bottom section of the validation phantom is constructed of 6.2 ± 0.1 mm Plexiglas.

5. Dimensions of Plexiglas Planar Phantom



	Date of Evaluation:	October 25, 2005	Document Issue No.:	SV450B-102505-R1.1
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz

6. 450 MHz System Validation Setup



	Date of Evaluation:	October 25, 2005	Document Issue No.:	SV450B-102505-R1.1
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz

7. 450 MHz Validation Dipole Setup



	Date of Evaluation:	October 25, 2005	Document Issue No.:	SV450B-102505-R1.1
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz

8. Measurement Conditions

The planar phantom was filled with 450 MHz brain tissue simulant:

Relative Permittivity: 43.2 (-0.7% deviation from target)
 Conductivity: 0.84 mho/m (-3.4% deviation from target)
 Fluid Temperature: 22.5 °C
 Fluid Depth: ≥ 15.0 cm

Environmental Conditions:

Ambient Temperature: 23.5 °C
 Humidity: 34 %
 Barometric Pressure: 101.4 kPa

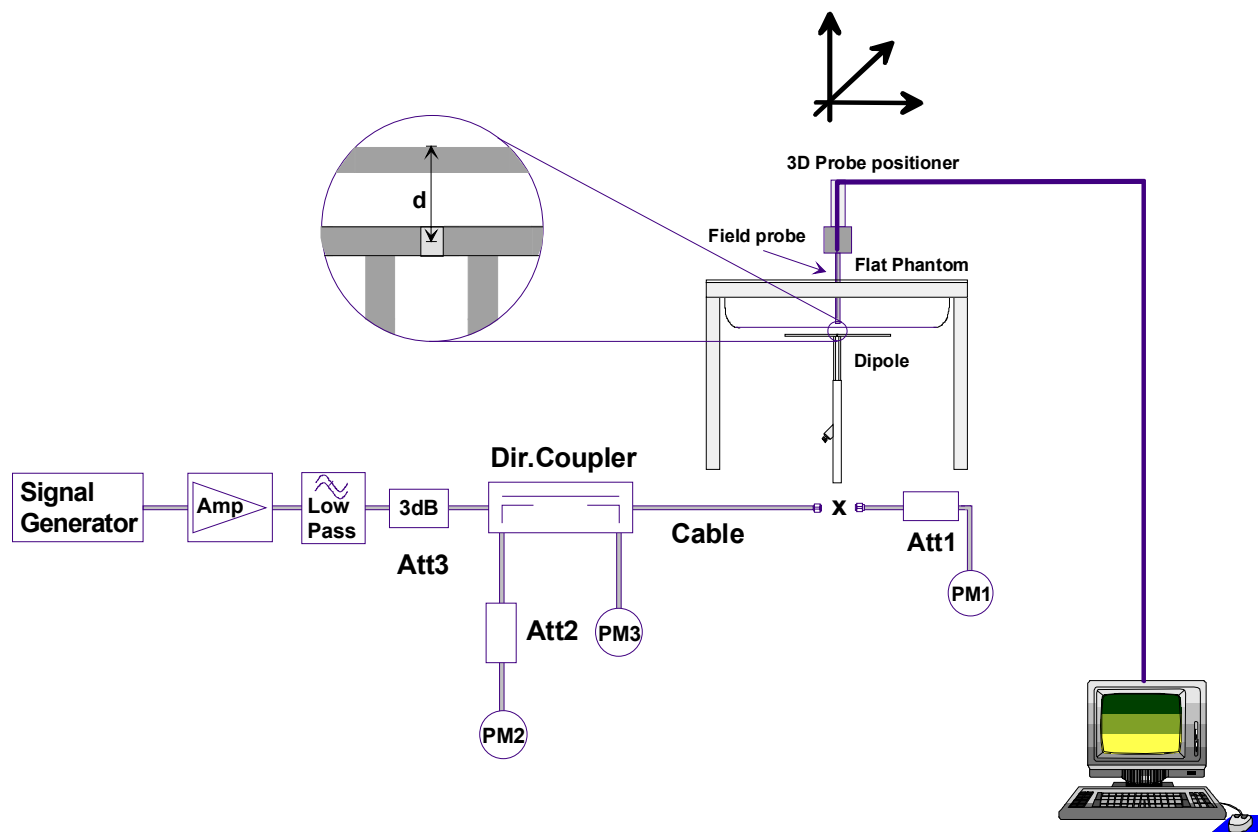
The 450 MHz brain tissue simulant consisted of the following ingredients:

Ingredient	Percentage by weight
Water	38.56%
Sugar	56.32%
Salt	3.95%
HEC	0.98%
Dowicil 75	0.19%
450 MHz Target Dielectric Parameters at 22 °C	$\epsilon_r = 43.5$ (+/- 5%) $\sigma = 0.87$ S/m (+/- 5%)

	Date of Evaluation:	October 25, 2005	Document Issue No.:	SV450B-102505-R1.1
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz

9. SAR Measurement

The SAR measurement was performed with the E-field probe in mechanical detection mode only. The setup and determination of the forward power into the dipole was performed using the following procedures.



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

	Date of Evaluation:	October 25, 2005	Document Issue No.:	SV450B-102505-R1.1
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz

10. Validation Dipole SAR Test Results

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

Validation Measurement	SAR @ 0.25W Input averaged over 1g	SAR @ 1W Input averaged over 1g	SAR @ 0.25W Input averaged over 10g	SAR @ 1W Input averaged over 10g	Peak SAR @ 0.25W Input
Test 1	1.24	4.96	0.800	3.200	1.31
Test 2	1.24	4.96	0.798	3.192	1.31
Test 3	1.24	4.96	0.798	3.192	1.31
Test 4	1.24	4.96	0.799	3.196	1.31
Test 5	1.24	4.96	0.799	3.196	1.31
Test 6	1.24	4.96	0.799	3.196	1.31
Test 7	1.24	4.96	0.801	3.204	1.31
Test 8	1.24	4.96	0.802	3.208	1.31
Test 9	1.25	5.00	0.807	3.228	1.31
Test 10	1.25	5.00	0.806	3.224	1.31
Average	1.24	4.97	0.801	3.204	1.31

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

Target SAR @ 1 Watt Input averaged over 1 gram (W/kg)		Measured SAR @ 1 Watt Input averaged over 1 gram (W/kg)	Deviation from Target (%)	Target SAR @ 1 Watt Input averaged over 10 grams (W/kg)		Measured SAR @ 1 Watt Input averaged over 10 grams (W/kg)	Deviation from Target (%)
4.90	+/- 10%	4.97	+1.4%	3.30	+/- 10%	3.204	-2.9%

	Date of Evaluation:	October 25, 2005	Document Issue No.:	SV450B-102505-R1.1
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz

450 MHz System Validation (Brain) - October 25, 2005

Dipole: 450 MHz; Model: D450V2; Serial: 136
Ambient Temp: 23.5 °C; Fluid Temp: 22.5 °C; Barometric Pressure: 101.4 kPa; Humidity: 34%
Communication System: CW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: HSL450 ($\sigma = 0.84$ mho/m; $\epsilon_r = 43.2$; $\rho = 1000$ kg/m³)
- Probe: ET3DV6 - SN1387; ConvF(7.5, 7.5, 7.5); Calibrated: 18/03/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Validation Planar; Type: Plexiglas; Serial: 137
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

450 MHz System Validation/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.27 mW/g

450 MHz System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 39.3 V/m; Power Drift = -0.025 dB
SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.800 mW/g
Maximum value of SAR (measured) = 1.31 mW/g

450 MHz System Validation/Zoom Scan 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 39.1 V/m; Power Drift = 0.004 dB
SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.798 mW/g
Maximum value of SAR (measured) = 1.31 mW/g

450 MHz System Validation/Zoom Scan 3 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 39.0 V/m; Power Drift = 0.014 dB
SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.798 mW/g
Maximum value of SAR (measured) = 1.31 mW/g

450 MHz System Validation/Zoom Scan 4 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 39.0 V/m; Power Drift = 0.040 dB
SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.799 mW/g
Maximum value of SAR (measured) = 1.31 mW/g

450 MHz System Validation/Zoom Scan 5 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 39.0 V/m; Power Drift = 0.014 dB
SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.799 mW/g
Maximum value of SAR (measured) = 1.31 mW/g

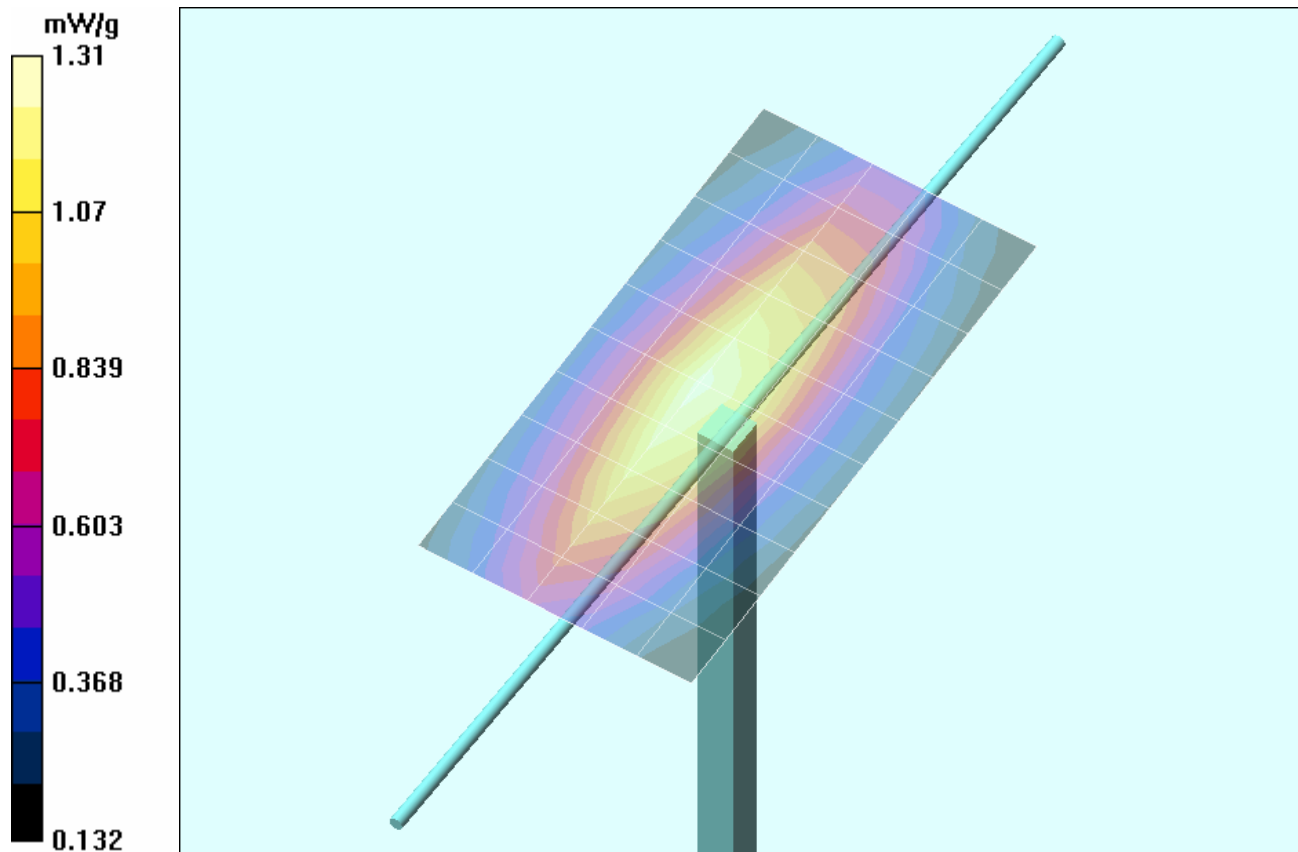
450 MHz System Validation/Zoom Scan 6 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 39.1 V/m; Power Drift = 0.016 dB
SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.799 mW/g
Maximum value of SAR (measured) = 1.31 mW/g

450 MHz System Validation/Zoom Scan 7 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 39.1 V/m; Power Drift = 0.008 dB
SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.801 mW/g
Maximum value of SAR (measured) = 1.31 mW/g

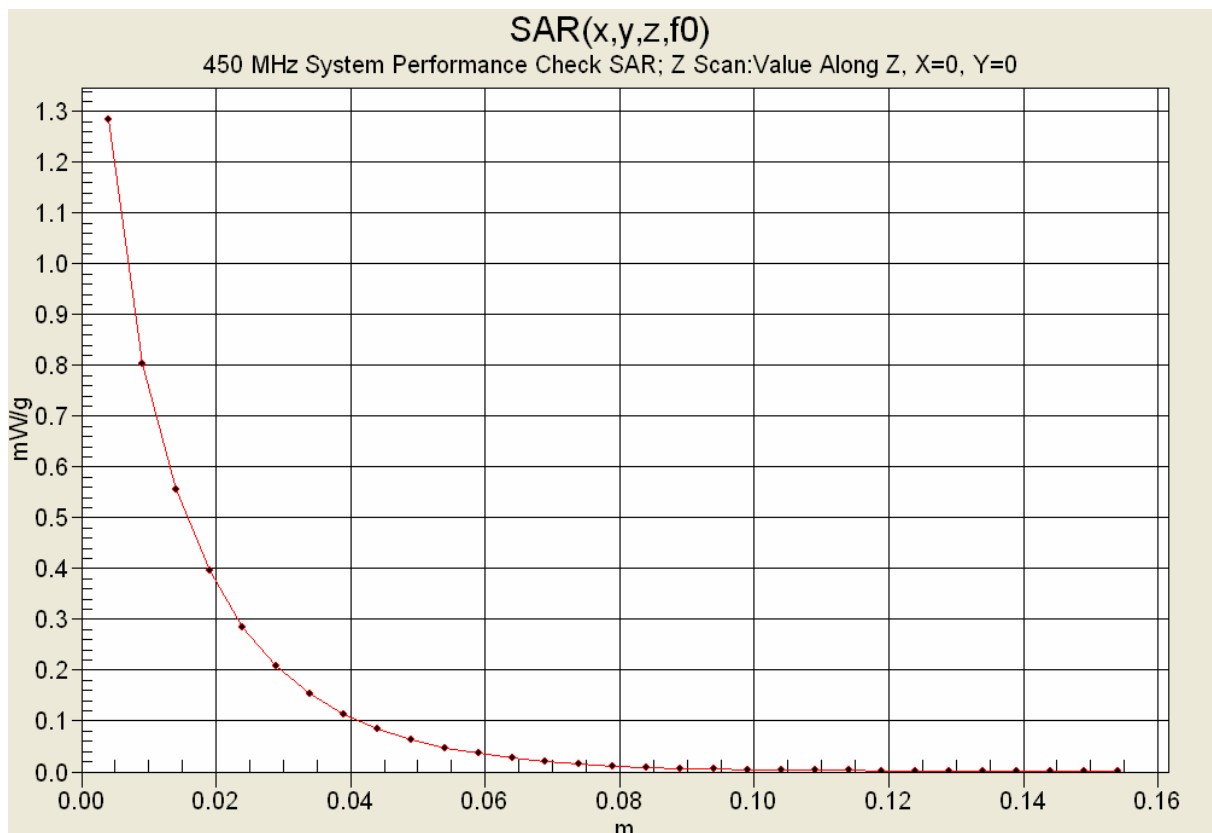
450 MHz System Validation/Zoom Scan 8 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 39.6 V/m; Power Drift = -0.031 dB
SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.802 mW/g
Maximum value of SAR (measured) = 1.31 mW/g

450 MHz System Validation/Zoom Scan 9 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 39.2 V/m; Power Drift = 0.016 dB
SAR(1 g) = 1.25 mW/g; SAR(10 g) = 0.807 mW/g
Maximum value of SAR (measured) = 1.31 mW/g

450 MHz System Validation/Zoom Scan 10 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 39.2 V/m; Power Drift = -0.010 dB
SAR(1 g) = 1.25 mW/g; SAR(10 g) = 0.806 mW/g
Maximum value of SAR (measured) = 1.31 mW/g



1 g average of 10 measurements: 1.24 mW/g
10 g average of 10 measurements: 0.801 mW/g



	Date of Evaluation:	October 25, 2005	Document Issue No.:	SV450B-102505-R1.1
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz

11. Measured Fluid Dielectric Parameters

System Validation (Brain) - 450 MHz Dipole

Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

Tue 25/Oct/2005 12:07:39

Freq Frequency (GHz)

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

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

Test_e Epsilon of UIM

Test_s Sigma of UIM

Freq	FCC_eH	FCC_sH	Test_e	Test_s
0.3500	44.70	0.87	46.08	0.7567
0.3600	44.58	0.87	45.12	0.7628
0.3700	44.46	0.87	45.10	0.7809
0.3800	44.34	0.87	45.43	0.7839
0.3900	44.22	0.87	43.97	0.7737
0.4000	44.10	0.87	43.78	0.7898
0.4100	43.98	0.87	43.52	0.8094
0.4200	43.86	0.87	43.40	0.8252
0.4300	43.74	0.87	43.32	0.8299
0.4400	43.62	0.87	43.32	0.8412
0.4500	43.50	0.87	43.20	0.8371
0.4600	43.45	0.87	42.91	0.8381
0.4700	43.40	0.87	42.76	0.8474
0.4800	43.34	0.87	42.33	0.8578
0.4900	43.29	0.87	42.63	0.8839
0.5000	43.24	0.87	42.19	0.8784
0.5100	43.19	0.87	41.77	0.8958
0.5200	43.14	0.88	41.64	0.8896
0.5300	43.08	0.88	41.13	0.9037
0.5400	43.03	0.88	40.85	0.9328
0.5500	42.98	0.88	40.94	0.9272