DECLARATION OF COMPLIANCE - SAR RF EXPOSURE EVALUATION (FCC/IC)

Test Lab Information	**Name**	**CELLTECH LABS INC.**				
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Test Lab Accreditation(s)	**A2LA**	ISO/IEC 17025:2005 (A2LA Test Lab Certificate No. 2470.01)				
Applicant Information	**Name**	**KENWOOD USA CORPORATION**				
	Address	3970 Johns Creek Court, Suite 100, Suwanee, GA 30024 United States				
Standard(s) Applied	**FCC**	47 CFR §2.1093		**IC**	Health Canada Safety Code 6	
Procedure(s) Applied	**FCC**	OET Bulletin 65, Supplement C		**FCC**	KDB 447498 D01v04	
	FCC	Occupational PTT Test Reduction *Draft* Considerations (v 07 15 10 Jul 29 2010)				
	IC	RSS-102 Issue 4	**IEEE**	1528-2003	**IEC**	62209-1:2005
Device Classification(s)	**FCC**	Licensed Non-Broadcast Transmitter Held to Face (TNF) - FCC Part 90				
	IC	Land Mobile Radio Transmitter/Receiver (27.41-960 MHz) - RSS-119 Issue 10				
Device Identifier(s)	**FCC ID:**	ALH409000		**Application Type**	FCC TCB Certification	
	IC	282D-409000		**Application Type**	IC CB Certification	
Date of Sample Receipt	September 24, 2010					
Date(s) of Evaluation	October 05, 2010					
Device Description	Portable 800-Band Digital Push-To-Talk (PTT) Radio Transceiver					
Device Model(s)	NX-410-K					
Test Sample Serial No.	TA No10 (Identical Prototype)					
Test Sample Revision No.s	**Hardware**	Revision 0		**Firmware**	Revision 0	
DUT Transmit Frequency Range(s)	**FCC/IC**	806-824 MHz		851-869 MHz		
Manufacturer's Rated Output Power	3 Watts (Maximum Conducted)			**Manuf. Tolerance Spec.**	+/- 0 dB	
RF Output Power Levels Measured	34.77 dBm	3.0 Watts		806.0 MHz	Average Conducted	
	34.76 dBm	3.0 Watts		824.0 MHz	Average Conducted	
	34.76 dBm	3.0 Watts		851.0 MHz	Average Conducted	
	34.77 dBm	3.0 Watts		869.0 MHz	Average Conducted	
Antenna Type(s) Tested	Whip Antenna (A)	P/N: KRA-32		806 - 869 MHz	Length: 182 mm	
	Whip Antenna (B)	P/N: KRA-24M		806 - 869 MHz	Length: 167 mm	
Battery Type(s) Tested	Li-Ion	7.4V		1700 mAh	P/N: KNB-33L	
	Ni-MH	7.2V		2500 mAh	P/N: KNB-32N	
	Alkaline Battery Case	9 V		6x AA	P/N: KBP-6	
Body-worn Accessories Tested	Belt-Clip (contains metal)				P/N: KBH-11	
Audio Accessories Tested	None (Body-worn accessory SAR level ≤ 4.0 W/kg; therefore audio acc. testing not required)					
Max. SAR Level(s) Evaluated	Face-held	**1.52 W/kg**	1g	50% PTT duty cycle	Occupational / Controlled Exp.	
	Body-worn	**3.91 W/kg**	1g	50% PTT duty cycle	Occupational / Controlled Exp.	
FCC/IC Spatial Peak SAR Limit	Head/Body	8.0 W/kg	1g	50% PTT duty cycle	Occupational / Controlled Exp.	

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 Safety Code 6 for the Occupational / Controlled Exposure environment. The device was tested in accordance with the measurement procedures specified in FCC Occupational PTT Test Reduction *Draft* Considerations, FCC OET Bulletin 65, Supplement C (Edition 01-01), Industry Canada RSS-102 Issue 4, IEEE Standard 1528-2003 and IEC International Standard 62209-1:2005. 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**	**Lab Manager**	**Celltech Labs Inc.**

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REVISION HISTORY			
REVISION NO.	**DESCRIPTION**	**IMPLEMENTED BY**	**RELEASE DATE**
1.0	Initial Release	Jon Hughes	October 14, 2010

TEST REPORT SIGN-OFF			
DEVICE TESTED BY	**REPORT PREPARED BY**	**QA REVIEW BY**	**REPORT APPROVED BY**
Scott Kulifaj	Scott Kulifaj	Jon Hughes	Sean Johnston

1.0 INTRODUCTION

This measurement report demonstrates that the Kenwood USA Corporation Model: NX-410-K Portable 800-Band PTT Radio Transceiver complies with the SAR (Specific Absorption Rate) RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) and Health Canada's Safety Code 6 (see reference [2]) for the Occupational / Controlled Exposure environment. The measurement procedures described in FCC OET Bulletin 65, Supplement C 01-01 (see reference [3]), IC RSS-102 Issue 4 (see reference [4]), IEEE Standard 1528-2003 (see reference [5]) and IEC Standard 62209-1:2005 (see reference [6]) were employed. A description of the device, operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used and the various provisions of the rules are included within this test report.

2.0 SAR MEASUREMENT SYSTEM

Celltech Labs Inc. SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 measurement system is comprised of the measurement server, robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for head 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 a controller with a built in VME-bus computer.

3.0 RF CONDUCTED OUTPUT POWER MEASUREMENTS

MEASURED RF CONDUCTED OUTPUT POWER LEVELS

Test Freq. (MHz)	Band	Mode	dBm	Watts	Method
806.0	806-824 MHz	CW	34.77	3.0	Average Conducted
824.0	806-824 MHz	CW	34.76	3.0	Average Conducted
861.0	851-869 MHz	CW	34.76	3.0	Average Conducted
869.0	851-869 MHz	CW	34.77	3.0	Average Conducted

Notes

1. The test channels were selected in accordance with the procedures specified in FCC KDB 447498 Section 6) c) (see reference [7]).

2. The RF conducted output power levels of the DUT were measured by Celltech prior to the SAR evaluations using a Gigatronics 8652A Universal Power Meter at the external antenna connector of the radio in accordance with FCC 47 CFR §2.1046 (see reference [13]) and IC RSS-Gen (see reference [14]).

4.0 FCC POWER THRESHOLDS FOR PTT DEVICES ($f \leq 0.5$ GHz)

FCC SAR Evaluation Power Thresholds for PTT Devices, $f \leq 0.5$ GHz*		
Exposure Conditions	***P* mW (General Population)**	***P* mW (Occupational)**
Held to face, $d \geq 2.5$ cm	250	1250
Body-worn, $d \geq 1.5$ cm	200	1000
Body-worn, $d \geq 1.0$ cm	150	750
1. The time-averaged output power, corresponding to the required PTT duty factor, is compared with these thresholds. 2. The closest distance between the user and the device or its antenna is used to determine the power thresholds. * Per FCC KDB 447498 D01v04 Section 5)b)i) (see reference [7]).		

Note: The thresholds specified in the above table do not apply to this 800 MHz band radio ($f \geq 0.5$ GHz). The output power threshold of $\geq 60/f_{(GHz)}$ mW specified in FCC KDB 447498 was applied (see reference [7]).

5.0 SAR PROBE CALIBRATION & MEASUREMENT FREQUENCIES

The following procedures are recommended for measurements at 150 MHz - 3 GHz to minimize probe calibration and tissue dielectric parameter discrepancies. In general, SAR measurements below 300 MHz should be within ±50 MHz of the probe calibration frequency. At 300 MHz to 3 GHz, measurements should be within ±100 MHz of the probe calibration frequency. Measurements exceeding 50% of these intervals, ±25 MHz < 300 MHz and ±50 MHz ≥300 MHz, require additional steps (per FCC KDB 450824 D01 v01r01, SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz - 3 GHz - see reference [9]).

Probe Calibration Freq.	Device Measurement Freq.	Frequency Interval	±50 MHz ≥ 300 MHz
835 MHz	806.0 MHz	29 MHz	< 50 MHz
	824.0 MHz	11 MHz	< 50 MHz
	851.0 MHz	16 MHz	< 50 MHz
	869.0 MHz	34 MHz	< 50 MHz
Note: The probe calibration and measurement frequency interval is < 25 MHz; therefore the additional steps were not required.			

6.0 NO. OF TEST CHANNELS (N_c)

Antenna Part No.	Antenna Freq. Range	Test Freq. Range	Band	N_c	Test Frequencies (MHz)
KRA-32	806.0 - 869.0 MHz	806.0 - 869.0 MHz	FCC/IC	4	806.0, 824.0, 851.0, 869.0
KRA-24M	806.0 - 869.0 MHz	806.0 - 869.0 MHz	FCC/IC	4	806.0, 824.0, 851.0, 869.0
Note: The number of test channels (*Nc*) were calculated in accordance with the procedures specified in FCC KDB 447498 Section 6) c) (see reference [7]).					

7.0 MANUFACTURER'S DISCLOSED ACCESSORY LISTING

Part No.	Description		Accessory Type
KRA-32	800 MHz Band Whip Antenna		Antenna
KRA-24M	800 MHz Band Whip Antenna		
KNB-33L	Li-Ion, 7.4 V, 1700 mAh		Battery
KNB-32N	Ni-MH, 7.2 V, 2500 mAh		
KBP-6	Alkaline Battery Case, 9 V, 6x AA		
KBH-11	Plastic Belt Clip (Contains Metal)		Body-worn
KMC-25	Noise Cancelling Speaker Microphone	Speaker-Microphone (Audio Accessory Category 1)	Audio
KMC-41	Heavy Duty Speaker Microphone		
KMC-42W	Heavy Duty / IP67 Speaker Microphone		
KMC-47GPS	Heavy Duty GPS Speaker Microphone		

Notes:

1. Manufacturer's disclosed accessory listing information provided by Kenwood USA Corporation
2. The audio accessories listed above were not required to be evaluated for SAR based on the following provision specified in "FCC Occupational PTT Test Reduction *Draft* Considerations" (see reference [8]):
   Body SAR Test Considerations for Audio Accessories without Built-in Antenna
   B) Based on the SAR measured in the body-worn test sequence, without audio accessory, if the SAR for the antenna, body-worn accessory and battery combination(s) applicable to an audio accessory are all $\leq$ 4.0 W/kg, SAR tests for that audio accessory is not necessary.
3. The audio accessory options listed in the above table do not contain an integral antenna.

8.0 SAR MEASUREMENT SUMMARY

SAR EVALUATION RESULTS (800 MHz Band)

Test Config.	Test Date	Test Freq.	Antenna Part No.	Battery		Accessories		Device Distance to Planar Phantom		Cond. Power Before Test	Measured SAR 1g (W/kg)		SAR Drift During Test	Scaled SAR with droop 1g (W/kg)	
											PTT Duty Cycle			PTT Duty Cycle	
		MHz		Type	mAh	Body	Audio	DUT	ANT.	Watts	100%	50%	dB	100%	50%
FACE	Oct 5	806.0	KRA-32 (Ant. A)	Ni-MH (Batt "b")	2500	n/a	n/a	2.5 cm	4.4 cm	3.0	2.48	1.24	-0.864	3.03	**1.52**
		869.0				n/a	n/a	2.5 cm	4.4 cm	3.0	2.25	1.13	-1.16	2.94	1.47
		806.0	KRA-24M (Ant. B)			n/a	n/a	2.5 cm	4.4 cm	3.0	2.27	1.14	-0.165	2.36	1.18
		869.0				n/a	n/a	2.5 cm	4.4 cm	3.0	2.66	1.33	-0.477	2.97	1.49
		806.0	KRA-32 (Ant. A)	Li-Ion (Batt "a")	1700	n/a	n/a	2.5 cm	4.4 cm	3.0	2.49	1.25	-0.337	2.69	1.35
		806.0		Alkaline (Batt "c")	-	n/a	n/a	2.5 cm	4.4 cm	3.0	1.74	0.870	-0.580	1.99	0.995
BODY	Oct 5	806.0	KRA-32 (Ant. A)	Li-Ion (Batt "a")	1700	BC	none	2.5 cm	2.9 cm	3.0	5.54	2.77	-1.49	7.81	**3.91**
		824.0				BC	none	2.5 cm	2.9 cm	3.0	2.79	1.40	-0.763	3.33	1.67
		869.0				BC	none	2.5 cm	2.9 cm	3.0	4.39	2.20	-0.179	4.57	2.29
		806.0	KRA-24M (Ant. B)			BC	none	2.5 cm	2.9 cm	3.0	5.29	2.65	-0.272	5.63	2.82
		869.0				BC	none	2.5 cm	2.9 cm	3.0	4.50	2.25	-0.854	5.48	2.74
		806.0	KRA-32 (Ant. A)	Ni-MH (Batt "b")	2500	BC	none	2.5 cm	2.9 cm	3.0	4.65	2.33	-1.83	7.09	3.55
		806.0		Alkaline (Batt "c")	-	BC	none	2.5 cm	2.9 cm	3.0	3.26	1.63	-1.01	4.11	2.06

SAR LIMIT(S)		HEAD & BODY	SPATIAL PEAK	RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	averaged over 1 gram	Occupational / Controlled

Notes

1. Device Test Mode = CW (Continuous Wave)
2. Phantom Type = Barski Fiberglas Planar
3. ANT. = Antenna
4. BC = Belt-Clip
5. n/a = not applicable
6. 806 MHz = Highest Output Power Channel (806-824 MHz Band) | 869 MHz = Highest Output Power Channel (851-869 MHz Band)
7. The DUT to Planar Phantom separation distances listed in the above table were measured from the back side of the radio to the phantom.
8. For the face-held SAR evaluations the maximum capacity battery is selected as the default battery. For the body-worn SAR evaluations the thinnest standard battery is selected as the default battery. (per "FCC Occupational PTT Test Reduction *Draft* Considerations" (see reference [8])
9. Body-worn accessory SAR levels were $\leq$ 4.0 W/kg; therefore SAR evaluations with audio accessory options connected were not required (per "FCC Occupational PTT Test Reduction *Draft* Considerations" (see reference [8]).
10. See Page 9 (Details of SAR Evaluation) for complete description of test procedures applied.

9.0 SAR SCALING (TUNE-UP TOLERANCE)

SAR scaling is not applicable based on the manufacturer's rated power & tolerance specification is 3 Watts +/- 0 dB.

10.0 FLUID DIELECTRIC PARAMETERS

806 MHz Head – October 5				835 MHz Head – October 5				869 MHz Head – October 5				806 MHz Body – October 5			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
835 Target		Inter.	Dev.	835 Target		Meas.	Dev.	835 Target		Inter.	Dev.	835 Target		Inter.	Dev.
41.5	± 5%	43.5	+4.8%	41.5	± 5%	43.5	+4.8%	41.5	± 5%	43.0	+3.6%	55.2	± 5%	52.9	-4.2%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
835 Target		Inter.	Dev.	835 Target		Meas.	Dev.	835 Target		Inter.	Dev.	835 Target		Inter.	Dev.
0.90	± 5%	0.88	-2.2%	0.90	± 5%	0.92	+2.2%	0.90	± 5%	0.94	+4.3%	0.97	± 5%	0.99	+2.1%

824 MHz Body – October 5				869 MHz Body – October 5			
Dielectric Constant ε_r				Dielectric Constant ε_r			
835 Target		Inter.	Dev.	835 Target		Inter.	Dev.
55.2	± 5%	52.6	-4.7%	55.2	± 5%	52.5	-4.9%
Conductivity σ (mho/m)				Conductivity σ (mho/m)			
835 Target		Inter.	Dev.	150 Target		Inter.	Dev.
0.97	± 5%	1.0	+3.1%	0.97	± 5%	1.01	+4.1%

Inter. = Interpolated
Meas. = Measured

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m^3)
Oct 5	835 Head	23.5°C	24.0 °C	≥ 15 cm	101.1 kPa	35%	1000
Oct 5	835 Body	23.5°C	23.8 °C	≥ 15 cm	101.1 kPa	35%	1000

11.0 DETAILS OF SAR EVALUATION

1. The face-held SAR evaluations were performed with the front of the radio placed parallel to the outer surface of the planar phantom. A 2.5 cm spacing was maintained between the front side of the DUT and the outer surface of the planar phantom.
2. The face-held SAR evaluations were required to be evaluated for the highest output power channel only, due to all SAR levels were ≤ 3.5 W/kg (per "FCC Occupational PTT Test Reduction *Draft* Considerations" (see reference [8])).
3. The body-worn SAR evaluations were performed with the belt-clip body-worn accessory attached to the DUT and touching the outer surface of the planar phantom (battery parallel to phantom).
4. The body-worn SAR evaluations were firstly performed at the highest output power channel (per band split).
5. If the body-worn SAR level(s) measured at the highest output power channel using the default battery and default body-worn accessory were ≤ 3.5 W/kg, testing of all other required channels was not necessary (per "FCC Occupational PTT Test Reduction *Draft* Considerations" (see reference [8])).
6. The adjacent channel(s) were evaluated for body-worn SAR levels > 3.5 W/kg from the highest output power channel.
7. Body-worn SAR evaluations were not required to be evaluated with audio accessory option(s) connected to the DUT based on all body-worn SAR levels without audio accessory were ≤ 4.0 W/kg (per "FCC Occupational PTT Test Reduction *Draft* Considerations" (see reference [8])).
8. 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.
9. The fluid temperature was measured prior to and after the SAR evaluations to ensure the temperature remained within +/-2°C of the fluid temperature reported during the dielectric parameter measurements.
10. The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluations using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).
11. The DUT was tested at the maximum conducted output power level preset by the manufacturer 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.
12. The SAR droop of the DUT was measured by the DASY4 system for the duration of the SAR evaluations. The measured SAR droop was added to the measured SAR levels to report scaled SAR levels as shown in the SAR Measurement Summary table (see Page 7). A SAR-versus-Time power droop evaluation was performed in the test configuration that reported the maximum measured SAR level. See Appendix A (SAR Test Plots) for SAR-versus-Time power droop evaluation plot.

12.0 SAR EVALUATION PROCEDURES

a. (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation, both the left and right ear positions were evaluated using the SAM phantom.

(ii) For body-worn and face-held devices a planar phantom was used.

b. The SAR was determined by a pre-defined procedure within the DASY4 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 15mm x 15mm.

An area scan was determined as follows:

c. Based on the defined area scan grid, a more detailed grid is created to increase the points by a factor of 10. The interpolation function then evaluates all field values between corresponding measurement points.

d. A linear search is applied to find all the candidate maxima. Subsequently, all maxima are removed that are >2 dB from the global maximum. The remaining maxima are then used to position the cube scans.

A 1g and 10g spatial peak SAR was determined as follows:

e. Extrapolation is used to find the points between the dipole center of the probe and the surface of the phantom. This data cannot be measured, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.4 mm (see probe calibration document in Appendix F). The extrapolation was based on trivariate quadratics computed from the previously calculated 3D interpolated points nearest the phantom surface.

f. Interpolated data is used to calculate the average SAR over 1g and 10g cubes by spatially discretizing the entire measured cube. The volume used to determine the averaged SAR is a 1mm grid (42875 interpolated points).

g. A zoom scan volume of 32 mm x 32 mm x 30 mm (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.

13.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluations a daily system check was performed with a planar phantom and 835 MHz SPEAG dipole (see Appendix B for system performance check test plot) in accordance with the procedures described in IEEE Standard 1528-2003 (see reference [5]) and IEC Standard 62209-1:2005 (see reference [6]). The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer (see Appendix C for measured fluid dielectric parameters). A forward power of 250 mW was applied to the dipole and the system was verified to a tolerance of ±10% from the system manufacturer's dipole calibration target SAR value (see Appendix E for system manufacturer's dipole calibration procedures).

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)	SPEAG Target	Meas.	Dev.	SPEAG Target	Meas.	Dev.	SPEAG Target	Meas.	Dev.						
Oct 5	Head 835	2.35 ±10%	2.45	+4.2%	41.5 ±5%	43.5	+4.8%	0.90 ±5%	0.92	+2.2%	1000	23.5	24.0	≥ 15	35	101.1

Notes		
	1.	The target SAR values are the measured values from the dipole calibration performed by SPEAG (see Appendix E).
	2.	The target dielectric parameters are the nominal values from the dipole calibration performed by SPEAG (see Appendix E).
	3.	The fluid temperature was measured prior to and after the system performance check to ensure the temperature remained within +/-2°C of the fluid temperature reported during the dielectric parameter measurements.
	4.	The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).

14.0 SIMULATED EQUIVALENT TISSUES

The simulated equivalent tissue recipes in the table below are derived from the SAR system manufacturer's suggested recipes in the DASY4 manual (see references [10] and [11]) in accordance with the procedures and requirements specified in IEEE Standard 1528-2003 (see reference [5]) and IEC Standard 62209-1:2005 (see reference [6]). The ingredient percentage may have been adjusted minimally in order to achieve the appropriate target dielectric parameters within the specified tolerance.

SIMULATED TISSUE MIXTURES					
INGREDIENT	Water	**835 MHz Head Tissue Mixture**	40.71 %	**835 MHz Body Tissue Mixture**	53.79 %
	Sugar		56.63 %		45.13 %
	Salt		1.48 %		0.98 %
	HEC		0.99 %		--
	Bactericide		0.19 %		0.10 %

15.0 SAR LIMITS

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

16.0 ROBOT SYSTEM SPECIFICATIONS

Specifications	
Positioner	Stäubli Unimation Corp. Robot Model: RX60L
Repeatability	0.02 mm
No. of axis	6
Data Acquisition Electronic (DAE) System	
Cell Controller	
Processor	AMD Athlon XP 2400+
Clock Speed	2.0 GHz
Operating System	Windows XP Professional
Data Converter	
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
DASY4 Measurement Server	
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
E-Field Probe	
Model	ET3DV6
Serial No.	1590
Construction	Triangular core fiber optic detection system
Frequency	10 MHz to 6 GHz
Linearity	±0.2 dB (30 MHz to 3 GHz)
Evaluation Phantom	
Type	Side Planar Phantom
Shell Material	Plexiglas
Bottom Thickness	2.0 mm ± 0.1 mm
Inner Dimensions	72.6 cm (L) x 20.3 cm (W) x 20.3 cm (H)
Validation Phantom	
Type	Barski Planar Phantom
Shell Material	Fiberglas
Thickness	2.0 ±0.1 mm
Volume	Approx. 70 liters

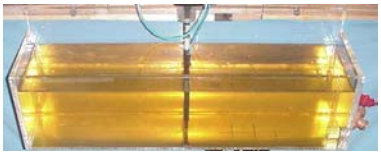
17.0 PROBE SPECIFICATION (ET3DV6)

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 head simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy ± 8%)
Frequency:	10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Directivity:	± 0.2 dB in head tissue (rotation around probe axis) ± 0.4 dB in head tissue (rotation normal to probe axis)
Dynamic Range:	5 μW/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

18.0 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

19.0 BARSKI PLANAR PHANTOM

The Barski Planar Phantom is a fiberglass shell phantom with a 2.0 mm (+/-0.2mm) thick device measurement area at the center of the phantom for SAR evaluations of devices with a larger surface area than the planar section of the SAM phantom. The planar phantom is integrated in a wooden table. The planar phantom is used for DUT SAR evaluations and system performance check evaluations. See Appendix G for dimensions and specifications of the Barski Planar Phantom.

Barski Planar Phantom

20.0 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

21.0 TEST EQUIPMENT LIST

TEST EQUIPMENT		ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION INTERVAL
USED	DESCRIPTION				
x	Schmid & Partner DASY4 System	-	-	-	-
x	-DASY4 Measurement Server	00158	1078	CNR	CNR
x	-Robot	00046	599396-01	CNR	CNR
x	-DAE4	00019	353	27Apr10	Annual
x	-ET3DV6 E-Field Probe	00017	1590	15Jul10	Annual
x	-D835V2 Validation Dipole	00217	4d075	20Apr09	Biennial
x	Side Planar Phantom	00156	161	CNR	CNR
x	Barski Planar Phantom	00155	03-01	CNR	CNR
x	HP 85070C Dielectric Probe Kit	00033	none	CNR	CNR
x	Gigatronics 8652A Power Meter	00007	1835272	04May10	Biennial
x	Gigatronics 80701A Power Sensor	00014	1833699	04May10	Biennial
x	HP 8753ET Network Analyzer	00134	US39170292	04May10	Biennial
x	Rohde & Schwarz SMR20 Signal Generator	00006	100104	CNR	CNR
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	CNR	CNR
Abbr.	CNR = Calibration Not Required				

22.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION

Uncertainty Component	IEEE 1528 Section	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	ci 10g	Uncertainty Value ±% (1g)	Uncertainty Value ±% (10g)	V_i or V_{eff}
Measurement System									
Probe Calibration (835 MHz)	E.2.1	5.5	Normal	1	1	1	5.5	5.5	∞
Axial Isotropy	E.2.2	4.7	Rectangular	1.732050808	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	Rectangular	1.732050808	0.7	0.7	3.9	3.9	∞
Boundary Effect	E.2.3	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	Rectangular	1.732050808	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	Rectangular	1.732050808	1	1	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3	Rectangular	1.732050808	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	Rectangular	1.732050808	1	1	0.2	0.2	∞
Probe Positioning wrt Phantom Shell	E.6.3	2.9	Rectangular	1.732050808	1	1	1.7	1.7	∞
Extrapolation, interpolation & integration algorithms for max. SAR evaluation	E.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	2.9	Normal	1	1	1	2.9	2.9	12
Device Holder Uncertainty	E.4.1	3.6	Normal	1	1	1	3.6	3.6	8
SAR Drift Measurement	6.6.2	5	Rectangular	1.732050808	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4	Rectangular	1.732050808	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5	Rectangular	1.732050808	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measured)	E.3.3	4.3	Normal	1	0.64	0.43	2.8	1.8	∞
Liquid Permittivity (target)	E.3.2	5	Rectangular	1.732050808	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measured)	E.3.3	4.9	Normal	1	0.6	0.49	2.9	2.4	∞
Combined Standard Uncertainty			**RSS**				**11.11**	**10.65**	
Expanded Uncertainty (95% Confidence Interval)			**k=2**				**22.21**	**21.30**	
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003									

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2

23.0 REFERENCES

[1] Federal Communications Commission - "Radiofrequency radiation exposure evaluation: portable devices", Rule Part 47 CFR §2.1093.

[2] Health Canada - "Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz", Safety Code 6: 1999.

[3] Federal Communications Commission - "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.

[4] Industry Canada - "Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)", Radio Standards Specification RSS-102 Issue 4: March 2010.

[5] IEEE Standard 1528-2003 - "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques": December 2003.

[6] IEC International Standard 62209-1:2005 - "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures."

[7] Federal Communications Commission, Office of Engineering and Technology - "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies"; KDB 447498 D01 v04: November 2009.

[8] Federal Communications Commission - "Occupational PTT Test Reduction *Draft* Considerations": Version 07 15 10.

[9] Federal Communications Commission, Office of Engineering and Technology - "Application Note: SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz - 3 GHz"; KDB 450824 D01 v01r01: January 2007.

[10] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 16 Application Note, Head Tissue Recipe: Sept. 2005.

[11] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 17 Application Note, Body Tissue Recipe: Sept. 2005.

[12] ISO/IEC 17025 - "General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005)."

[13] Federal Communications Commission - "Measurements Required: RF Power Output"; Rule Part 47 CFR §2.1046.

[14] Industry Canada - "General Requirements and Information for the Certification of Radiocommunication Equipment", Radio Standards Specification RSS-Gen Issue 2: June 2007.

APPENDIX A - SAR MEASUREMENT DATA

Date Tested: 10/05/2010

Face-held SAR - Ni-MH Battery "b" (KNB-32N) - Whip Antenna A (KRA-32) - 806.0 MHz

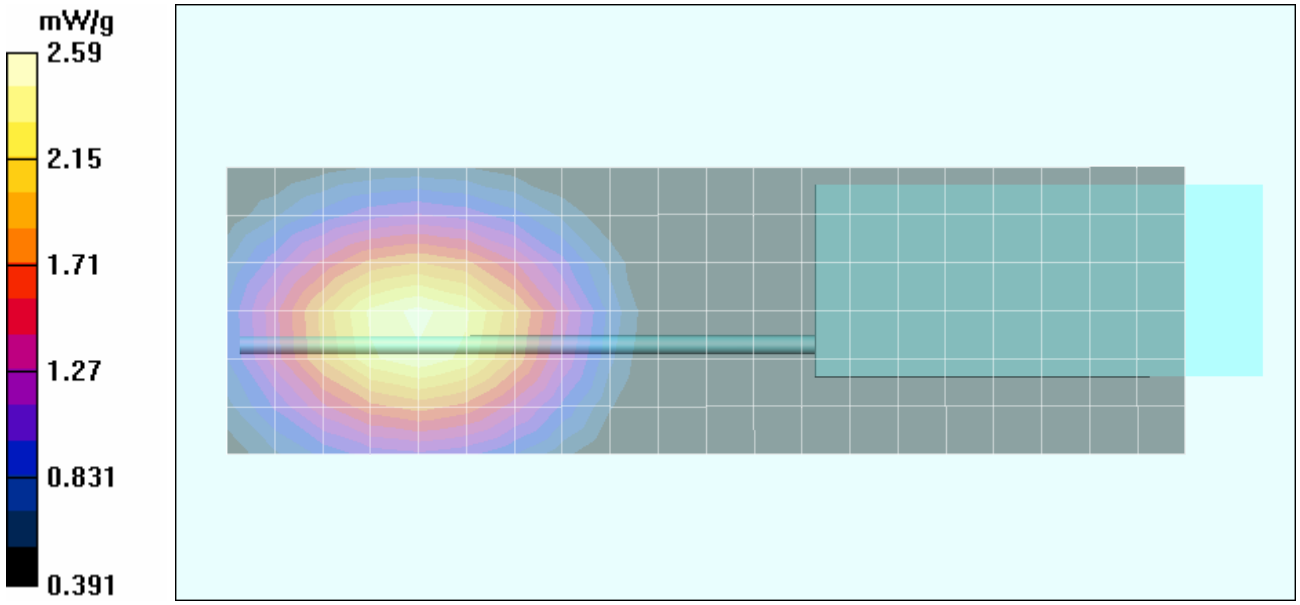
DUT: Kenwood NX-410-K; Type: Portable 800 PTT Radio Transceiver; Serial: TA No10

Ambient Temp: 23.5°C; Fluid Temp: 24.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW
Frequency: 806 MHz; Duty Cycle: 1:1
HSL835 Medium parameters used (interpolated): f = 806 MHz; σ = 0.882 mho/m; ε_r = 43.5; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(6.27, 6.27, 6.27); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Face-held SAR - 2.5 cm Spacing from Front of DUT to Planar Phantom
Area Scan (7x21x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (measured) = 2.50 mW/g
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 12.5 V/m; Power Drift = -0.864 dB
Peak SAR (extrapolated) = 3.17 W/kg
SAR(1 g) = 2.48 mW/g; SAR(10 g) 1.85 mW/g
Maximum value of SAR (measured) = 2.59 mW/g



Date Tested: 10/05/2010

Face-held SAR - Ni-MH Battery "b" (KNB-32N) - Whip Antenna A (KRA-32) - 869.0 MHz

DUT: Kenwood NX-410-K; Type: Portable 800 PTT Radio Transceiver; Serial: TA No10

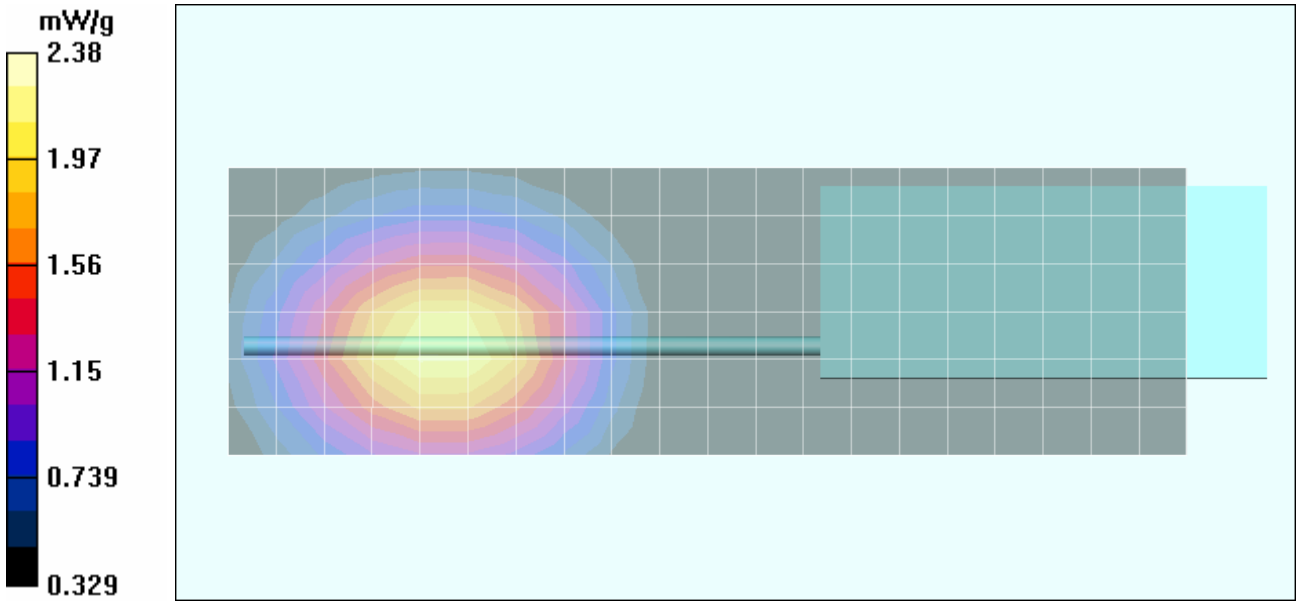
Ambient Temp: 23.5°C; Fluid Temp: 24.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW
Frequency: 869 MHz; Duty Cycle: 1:1
HSL835 Medium parameters used (interpolated): f = 869 MHz; σ = 0.94 mho/m; ε_r = 43; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(6.27, 6.27, 6.27); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Face-held SAR - 2.5 cm Spacing from Front of DUT to Planar Phantom

Area Scan (7x21x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (measured) = 2.13 mW/g
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 10.9 V/m; Power Drift = -1.16 dB
Peak SAR (extrapolated) = 2.92 W/kg
SAR(1 g) = 2.25 mW/g; SAR(10 g) 1.65 mW/g
Maximum value of SAR (measured) = 2.38 mW/g



Date Tested: 10/05/2010

Face-held SAR - Ni-MH Battery "b" (KNB-32N) - Whip Antenna B (KRA-24M) - 806.0 MHz

DUT: Kenwood NX-410-K; Type: Portable 800 PTT Radio Transceiver; Serial: TA No10

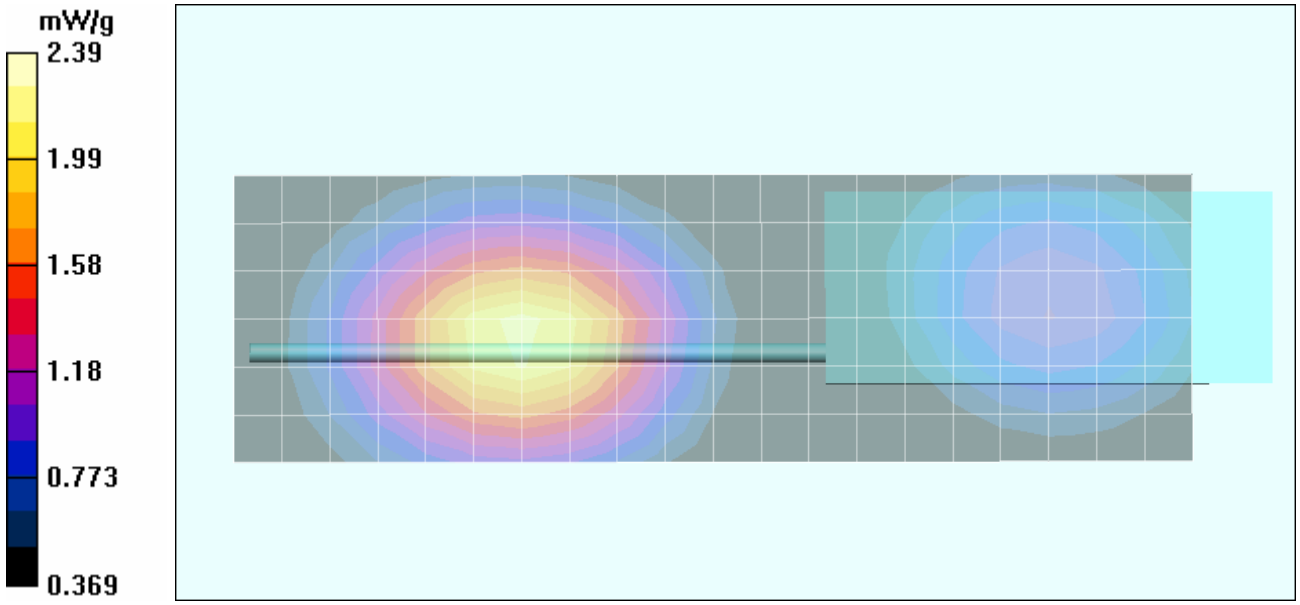
Ambient Temp: 23.5°C; Fluid Temp: 24.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW
Frequency: 806 MHz; Duty Cycle: 1:1
HSL835 Medium parameters used (interpolated): f = 806 MHz; σ = 0.882 mho/m; ε_r = 43.5; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(6.27, 6.27, 6.27); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Face-held SAR - 2.5 cm Spacing from Front of DUT to Planar Phantom

Area Scan (7x21x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (measured) = 2.17 mW/g
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 22.5 V/m; Power Drift = -0.165 dB
Peak SAR (extrapolated) = 2.92 W/kg
SAR(1 g) = 2.27 mW/g; SAR(10 g) 1.68 mW/g
Maximum value of SAR (measured) = 2.39 mW/g



Date Tested: 10/05/2010

Face-held SAR - Ni-MH Battery "b" (KNB-32N) - Whip Antenna B (KRA-24M) - 869.0 MHz

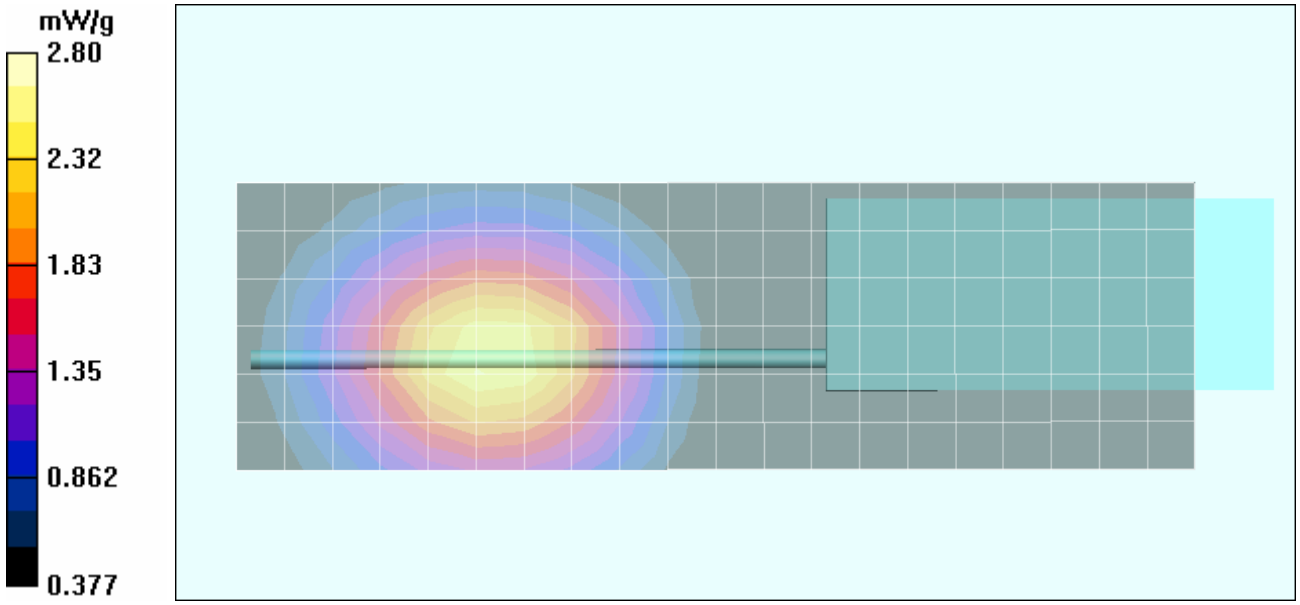
DUT: Kenwood NX-410-K; Type: Portable 800 PTT Radio Transceiver; Serial: TA No10

Ambient Temp: 23.5°C; Fluid Temp: 24.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW
Frequency: 869 MHz; Duty Cycle: 1:1
HSL835 Medium parameters used (interpolated): f = 869 MHz; σ = 0.94 mho/m; ε_r = 43; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(6.27, 6.27, 6.27); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Face-held SAR - 2.5 cm Spacing from Front of DUT to Planar Phantom
Area Scan (7x21x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (measured) = 2.49 mW/g
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 16.3 V/m; Power Drift = -0.477 dB
Peak SAR (extrapolated) = 3.47 W/kg
SAR(1 g) = 2.66 mW/g; SAR(10 g) 1.93 mW/g
Maximum value of SAR (measured) = 2.80 mW/g



Date Tested: 10/05/2010

Face-held SAR - Li-Ion Battery "a" (KNB-33L) - Whip Antenna A (KRA-32) - 806.0 MHz

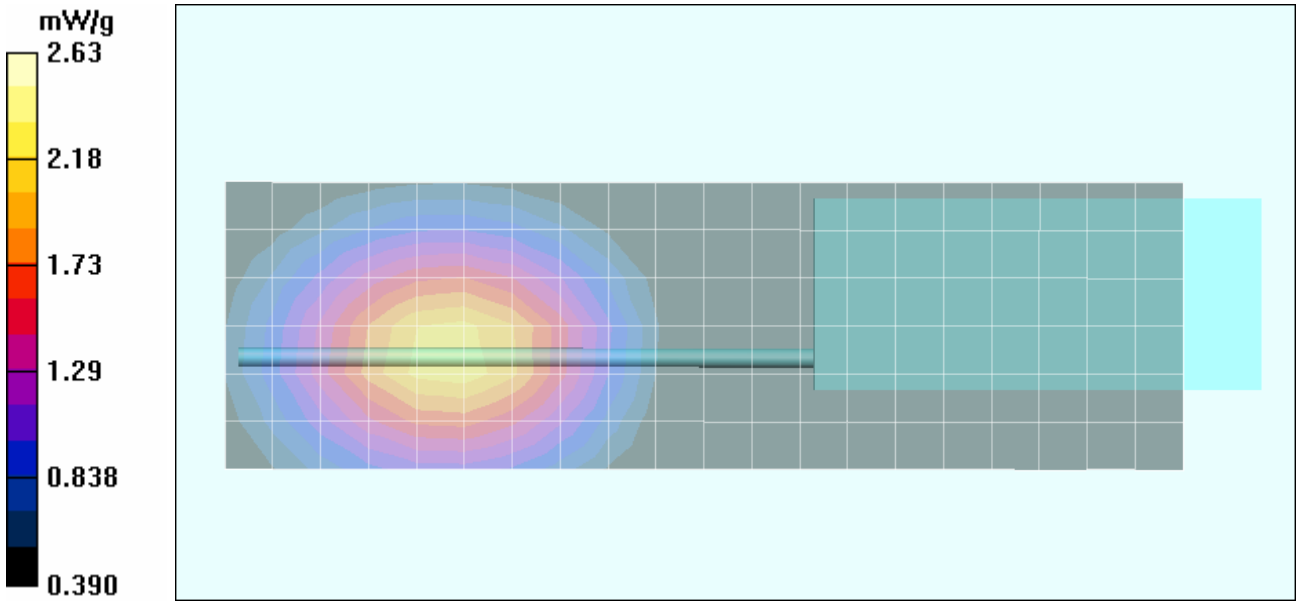
DUT: Kenwood NX-410-K; Type: Portable 800 PTT Radio Transceiver; Serial: TA No10

Ambient Temp: 23.5°C; Fluid Temp: 24.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW
Frequency: 806 MHz; Duty Cycle: 1:1
HSL835 Medium parameters used (interpolated): f = 806 MHz; σ = 0.882 mho/m; ε_r = 43.5; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(6.27, 6.27, 6.27); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Face-held SAR - 2.5 cm Spacing from Front of DUT to Planar Phantom
Area Scan (7x21x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (measured) = 2.14 mW/g
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 14.5 V/m; Power Drift = -0.337 dB
Peak SAR (extrapolated) = 3.20 W/kg
SAR(1 g) = 2.49 mW/g; SAR(10 g) 1.85 mW/g
Maximum value of SAR (measured) = 2.63 mW/g



Date Tested: 10/05/2010

Face-held SAR - Alkaline Battery Case "c" (KBP-6) - Whip Antenna A (KRA-32) - 806.0 MHz

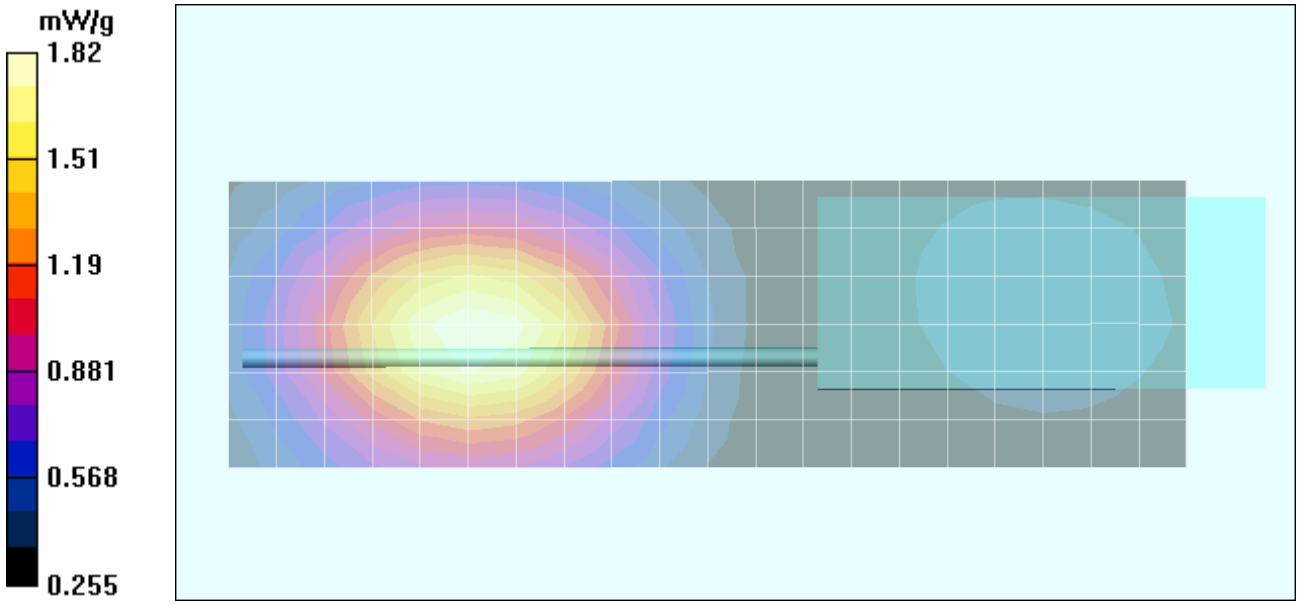
DUT: Kenwood NX-410-K; Type: Portable 800 PTT Radio Transceiver; Serial: TA No10

Ambient Temp: 23.5°C; Fluid Temp: 24.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW
Frequency: 806 MHz; Duty Cycle: 1:1
HSL835 Medium parameters used (interpolated): f = 806 MHz; σ = 0.882 mho/m; ε_r = 43.5; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(6.27, 6.27, 6.27); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Face-held SAR - 2.5 cm Spacing from Front of DUT to Planar Phantom
Area Scan (7x21x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (measured) = 2.09 mW/g
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 12.9 V/m; Power Drift = -0.580 dB
Peak SAR (extrapolated) = 2.22 W/kg
SAR(1 g) = 1.74 mW/g; SAR(10 g) 1.3 mW/g
Maximum value of SAR (measured) = 1.82 mW/g



Date Tested: 10/05/2010

Body-worn SAR - Li-Ion Battery "a" (KNB-33L) - Whip Antenna A (KRA-32) - 806.0 MHz

DUT: Kenwood NX-410-K; Type: Portable 800 PTT Radio Transceiver; Serial: Ta No10

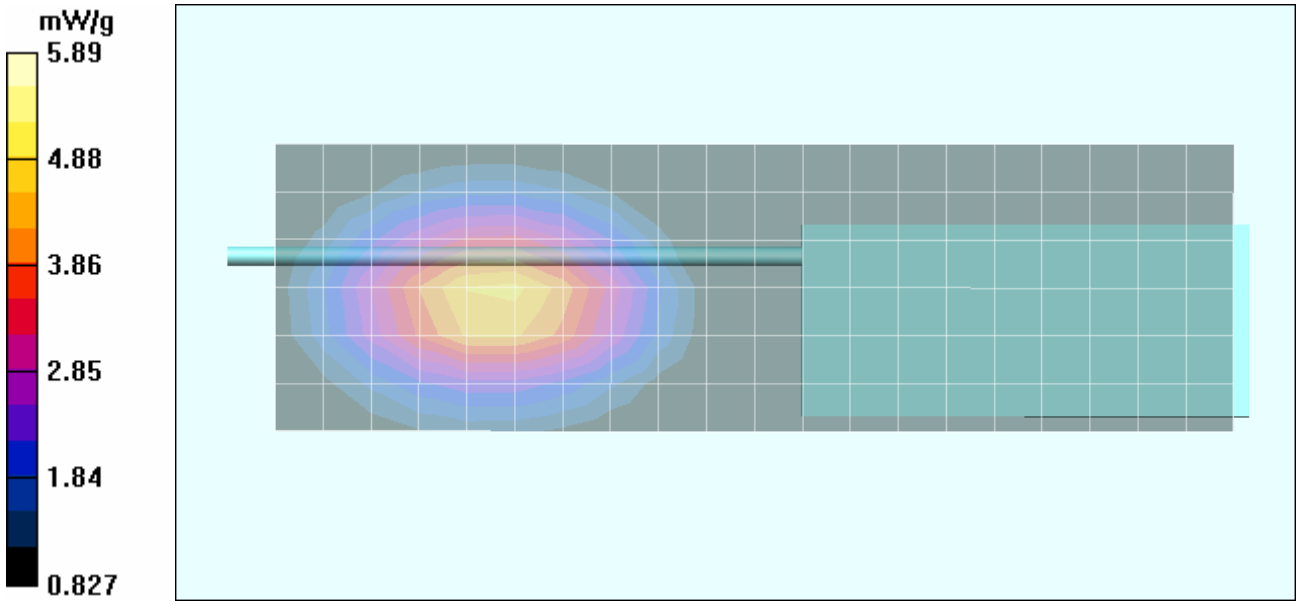
Body-worn Accessory: Belt-Clip P/N: KBH-11; Audio Accessory: None

Ambient Temp: 23.5°C; Fluid Temp: 23.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

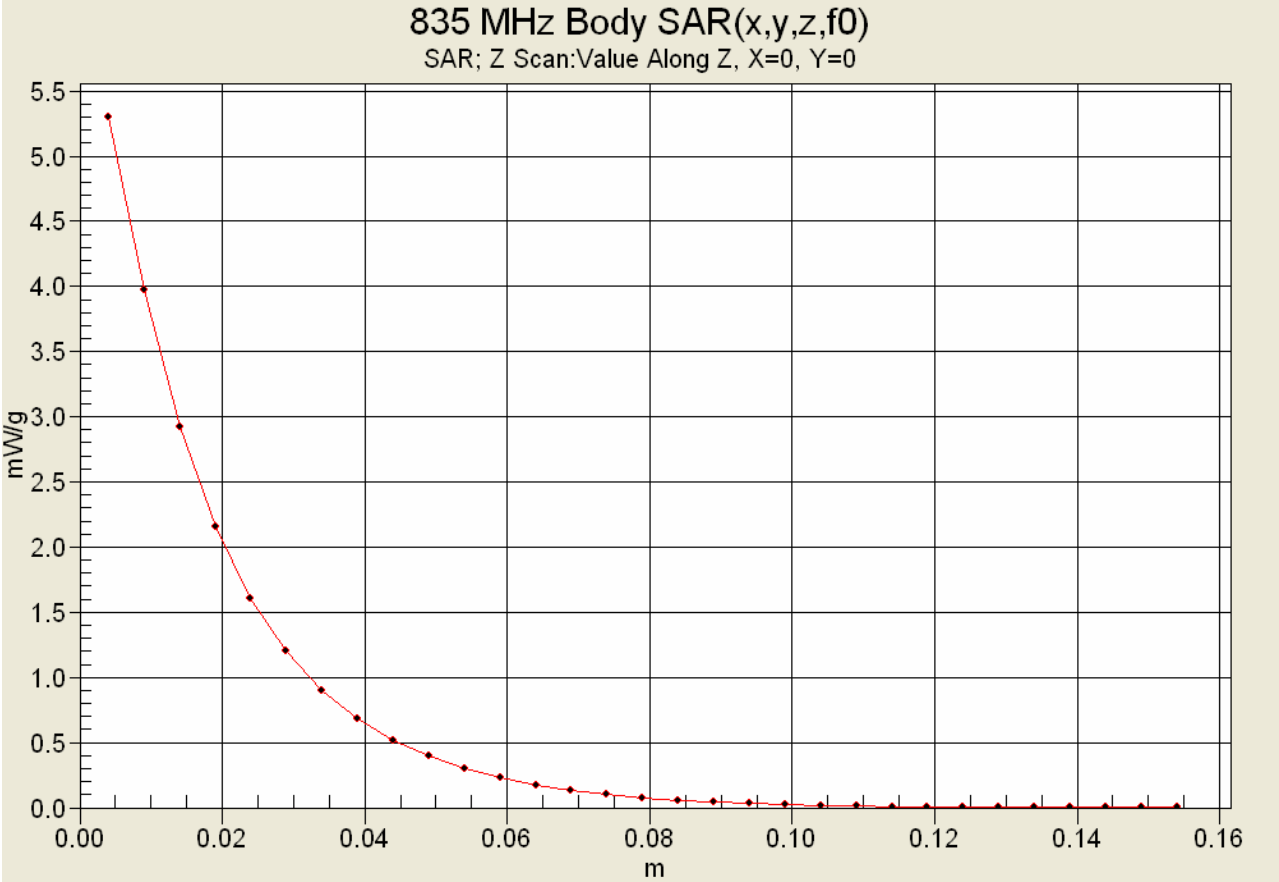
Communication System: CW
Frequency: 806 MHz; Duty Cycle: 1:1
Medium: MSL835 Medium parameters used (interpolated): f = 806 MHz; σ = 0.99 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(6.33, 6.33, 6.33); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

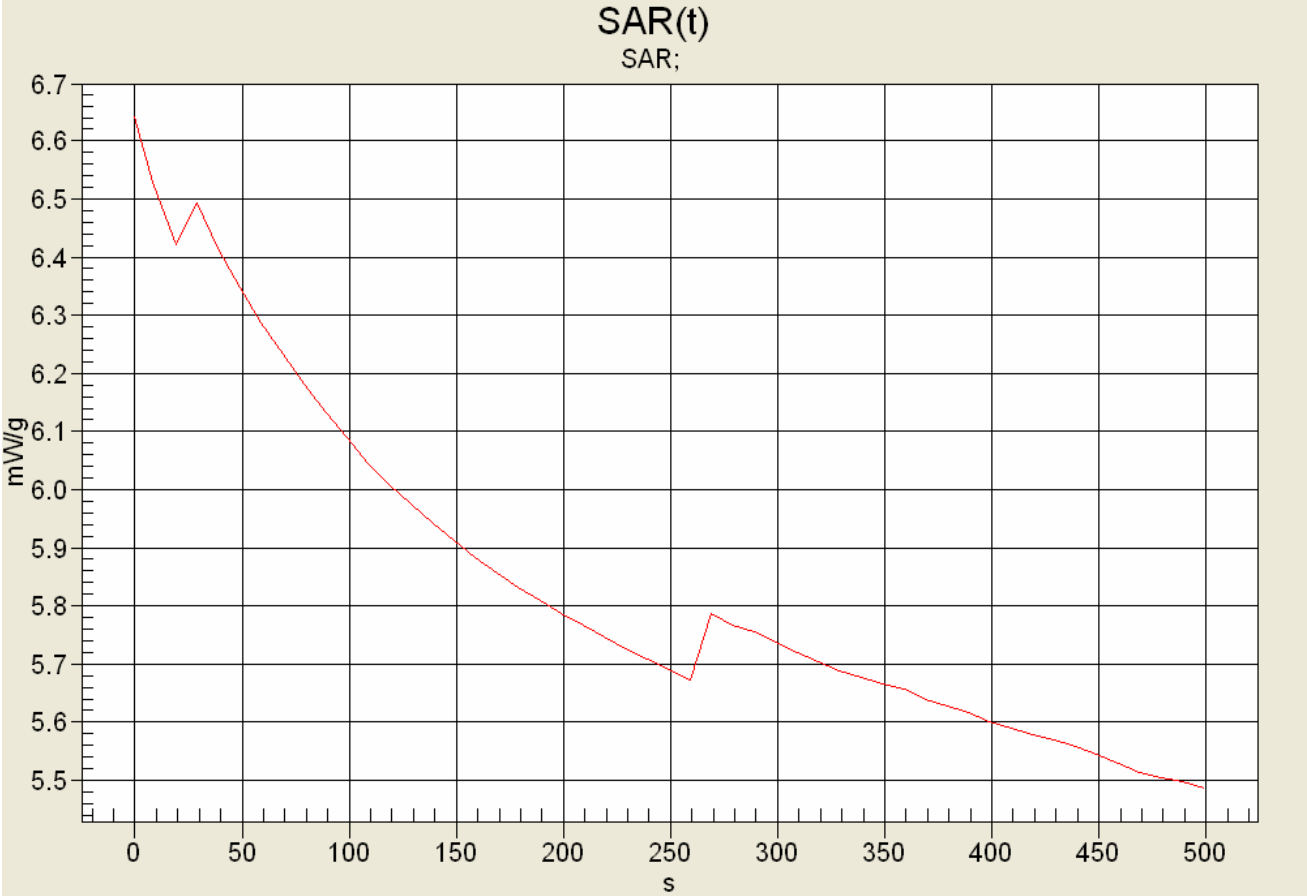
Body-worn SAR - 2.5 cm Belt-Clip Spacing from Back of DUT to Planar Phantom
Area Scan (7x20x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 4.66 mW/g
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 19.6 V/m; Power Drift = -1.49 dB
Peak SAR (extrapolated) = 7.14 W/kg
SAR(1 g) = 5.54 mW/g; SAR(10 g) = 4.01 mW/g
Maximum value of SAR (measured) = 5.89 mW/g



Z-Axis Scan



SAR Droop Evaluation (SAR-versus-Time)



SAR (0s): 6.641 W/kg
SAR (340s): 5.676 W/kg (-0.682 dB)
SAR (500s): 5.487 W/kg (-0.829 dB)
(340s = zoom scan duration)
(500s = area scan duration)

Date Tested: 10/05/2010

Body-worn SAR - Li-Ion Battery "a" (KNB-33L) - Whip Antenna A (KRA-32) - 824.0 MHz

DUT: Kenwood NX-410-K; Type: Portable 800 PTT Radio Transceiver; Serial: Ta No10

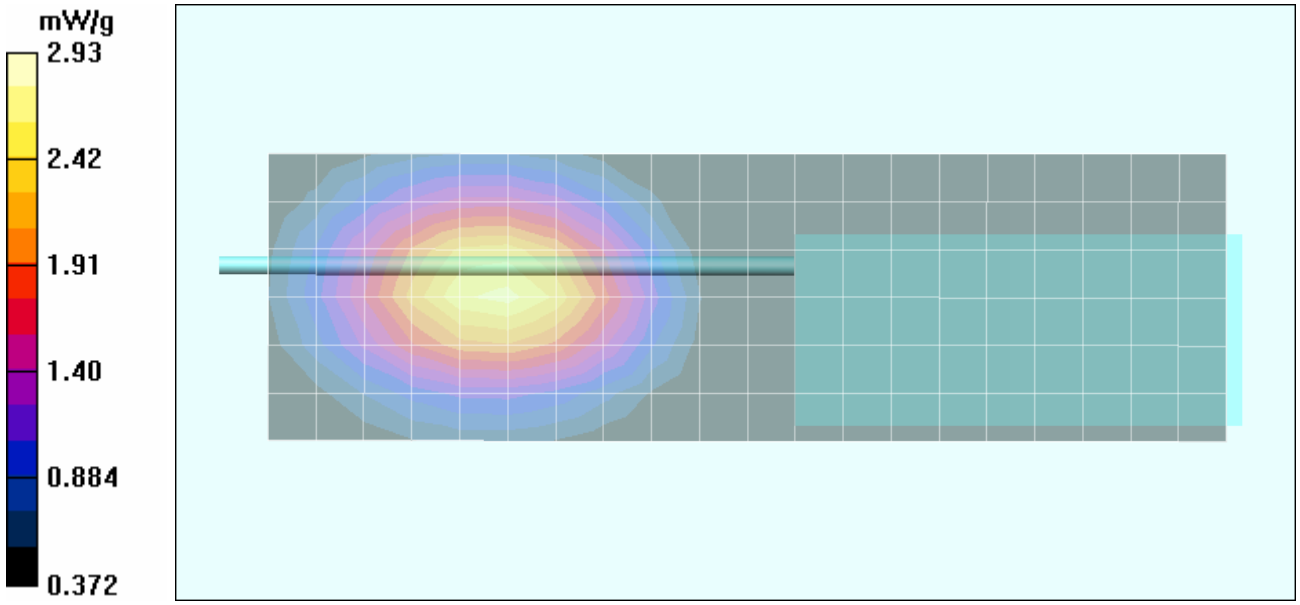
Body-worn Accessory: Belt-Clip P/N: KBH-11; Audio Accessory: None

Ambient Temp: 23.5°C; Fluid Temp: 23.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW
Frequency: 824 MHz; Duty Cycle: 1:1
Medium: MSL835 Medium parameters used (interpolated): f = 824 MHz; σ = 1.0 mho/m; ε_r = 52.62; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(6.33, 6.33, 6.33); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.5 cm Belt-Clip Spacing from Back of DUT to Planar Phantom
Area Scan (7x20x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.66 mW/g
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 11.3 V/m; Power Drift = -0.763 dB
Peak SAR (extrapolated) = 3.57 W/kg
SAR(1 g) = 2.79 mW/g; SAR(10 g) = 2.04 mW/g
Maximum value of SAR (measured) = 2.93 mW/g



Date Tested: 10/05/2010

Body-worn SAR - Li-Ion Battery "a" (KNB-33L) - Whip Antenna A (KRA-32) - 869.0 MHz

DUT: Kenwood NX-410-K; Type: Portable 800 PTT Radio Transceiver; Serial: Ta No10

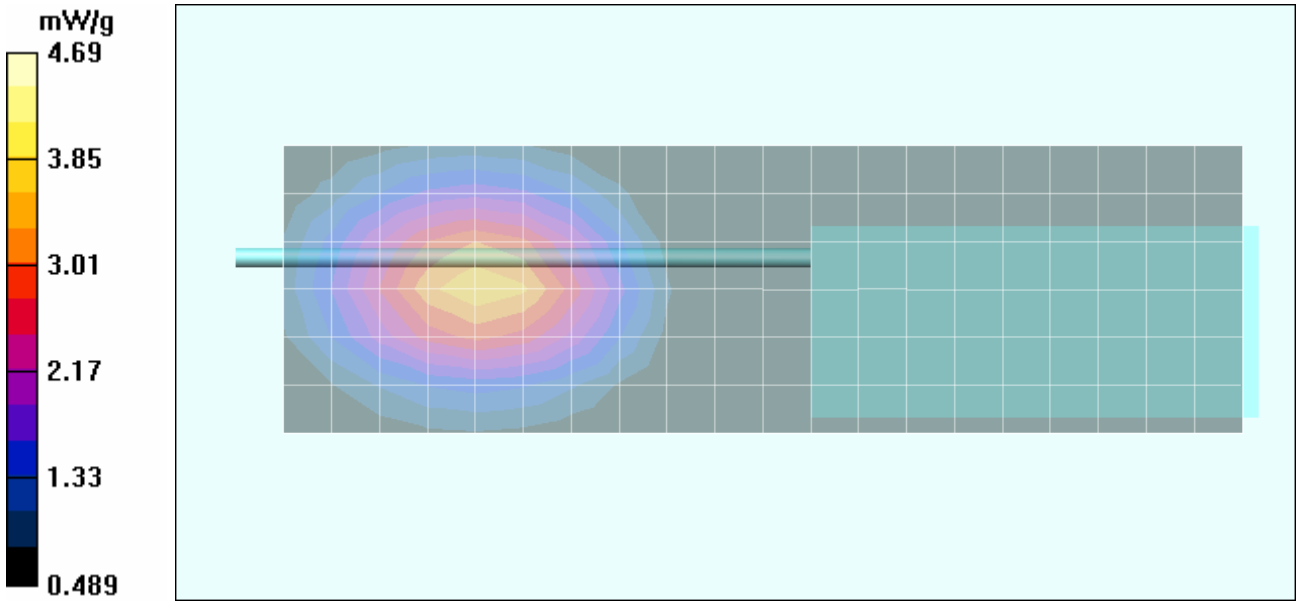
Body-worn Accessory: Belt-Clip P/N: KBH-11; Audio Accessory: None

Ambient Temp: 23.5°C; Fluid Temp: 23.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW
Frequency: 869 MHz; Duty Cycle: 1:1
Medium: MSL835 Medium parameters used (interpolated): f = 869 MHz; σ = 1.01 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(6.33, 6.33, 6.33); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.5 cm Belt-Clip Spacing from Back of DUT to Planar Phantom
Area Scan (7x20x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 3.56mW/g
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 13.0 V/m; Power Drift = -0.179 dB
Peak SAR (extrapolated) = 5.75 W/kg
SAR(1 g) = 4.39 mW/g; SAR(10 g) = 3.1 mW/g
Maximum value of SAR (measured) = 4.69 mW/g



Date Tested: 10/05/2010

Body-worn SAR - Li-Ion Battery "a" (KNB-33L) - Whip Antenna B (KRA-24M) - 806.0 MHz

DUT: Kenwood NX-410-K; Type: Portable 800 PTT Radio Transceiver; Serial: Ta No10

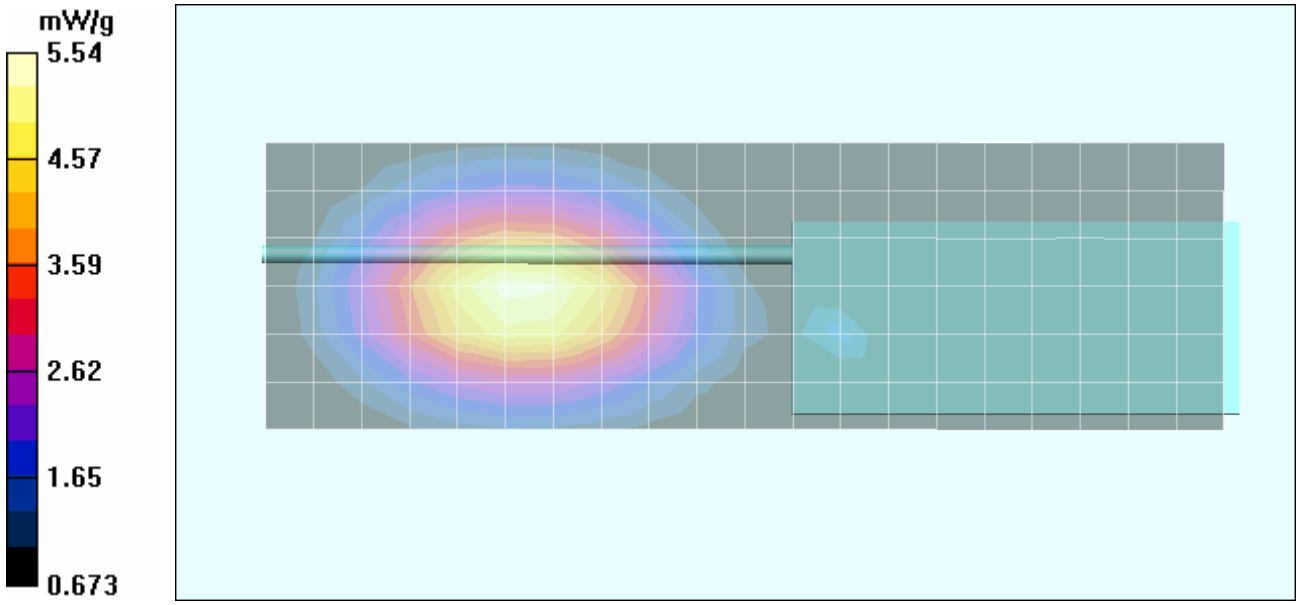
Body-worn Accessory: Belt-Clip P/N: KBH-11; Audio Accessory: None

Ambient Temp: 23.5°C; Fluid Temp: 23.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW
Frequency: 806 MHz; Duty Cycle: 1:1
Medium: MSL835 Medium parameters used (interpolated): f = 806 MHz; σ = 0.99 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(6.33, 6.33, 6.33); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.5 cm Belt-Clip Spacing from Back of DUT to Planar Phantom
Area Scan (7x20x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 5.40 mW/g
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 32.2 V/m; Power Drift = -0.272 dB
Peak SAR (extrapolated) = 6.87 W/kg
SAR(1 g) = 5.29 mW/g; SAR(10 g) = 3.8 mW/g
Maximum value of SAR (measured) = 5.54 mW/g



Date Tested: 10/05/2010

Body-worn SAR - Li-Ion Battery "a" (KNB-33L) - Whip Antenna B (KRA-24M) - 869.0 MHz

DUT: Kenwood NX-410-K; Type: Portable 800 PTT Radio Transceiver; Serial: Ta No10

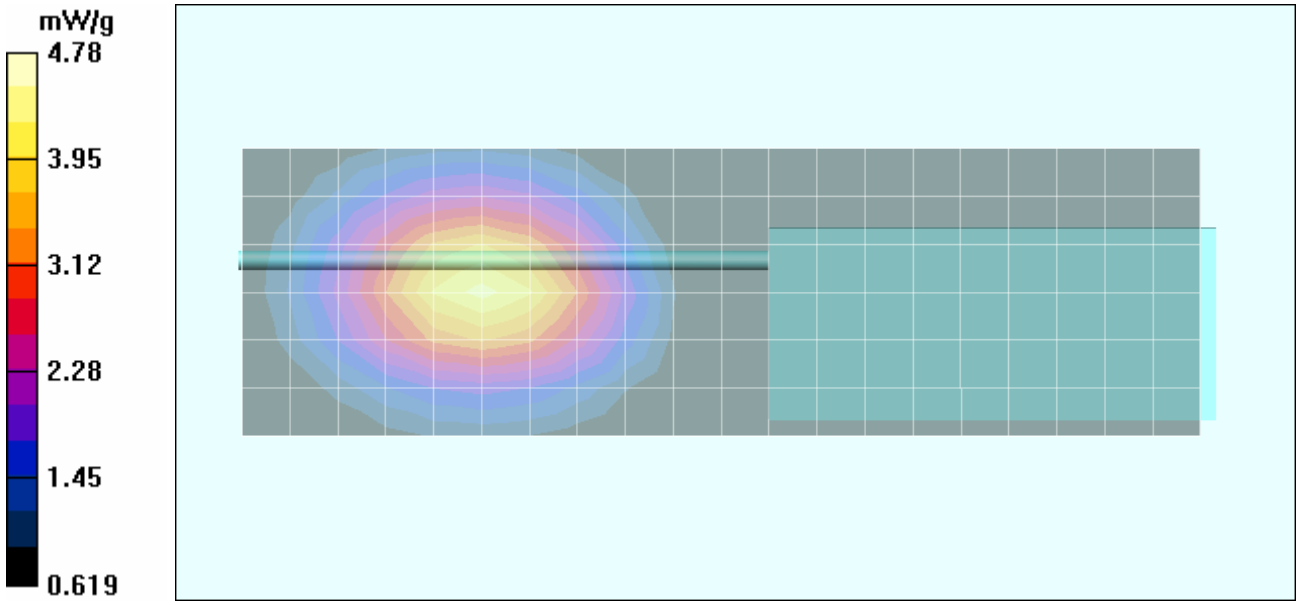
Body-worn Accessory: Belt-Clip P/N: KBH-11; Audio Accessory: None

Ambient Temp: 23.5°C; Fluid Temp: 23.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW
Frequency: 869 MHz; Duty Cycle: 1:1
Medium: MSL835 Medium parameters used (interpolated): f = 869 MHz; σ = 1.01 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(6.33, 6.33, 6.33); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.5 cm Belt-Clip Spacing from Back of DUT to Planar Phantom
Area Scan (7x20x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 4.35 mW/g
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 15.3 V/m; Power Drift = -0.854 dB
Peak SAR (extrapolated) = 5.85 W/kg
SAR(1 g) = 4.5 mW/g; SAR(10 g) = 3.22 mW/g
Maximum value of SAR (measured) = 4.78 mW/g



Date Tested: 10/05/2010

Body-worn SAR - Ni-MH Battery "b" (KNB-32N) - Whip Antenna A (KRA-32) - 806.0 MHz

DUT: Kenwood NX-410-K; Type: Portable 800 PTT Radio Transceiver; Serial: Ta No10

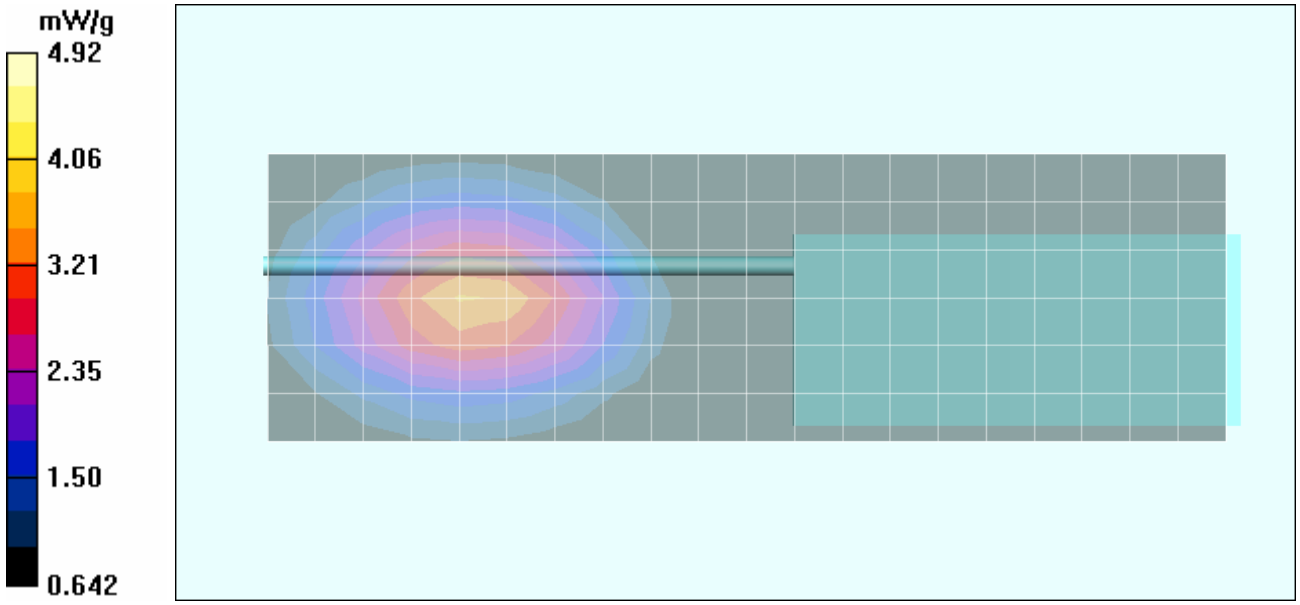
Body-worn Accessory: Belt-Clip P/N: KBH-11; Audio Accessory: None

Ambient Temp: 23.5°C; Fluid Temp: 23.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW
Frequency: 806 MHz; Duty Cycle: 1:1
Medium: MSL835 Medium parameters used (interpolated): f = 806 MHz; σ = 0.99 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(6.33, 6.33, 6.33); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.5 cm Belt-Clip Spacing from Back of DUT to Planar Phantom
Area Scan (7x20x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 3.54 mW/g
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 17.7 V/m; Power Drift = -1.83 dB
Peak SAR (extrapolated) = 5.94 W/kg
SAR(1 g) = 4.65 mW/g; SAR(10 g) = 3.38 mW/g
Maximum value of SAR (measured) = 4.92 mW/g



Date Tested: 10/05/2010

Body-worn SAR - Alkaline Battery Case “c” (KBP-6) - Whip Antenna A (KRA-32) - 806.0 MHz

DUT: Kenwood NX-410-K; Type: Portable 800 PTT Radio Transceiver; Serial: Ta No10

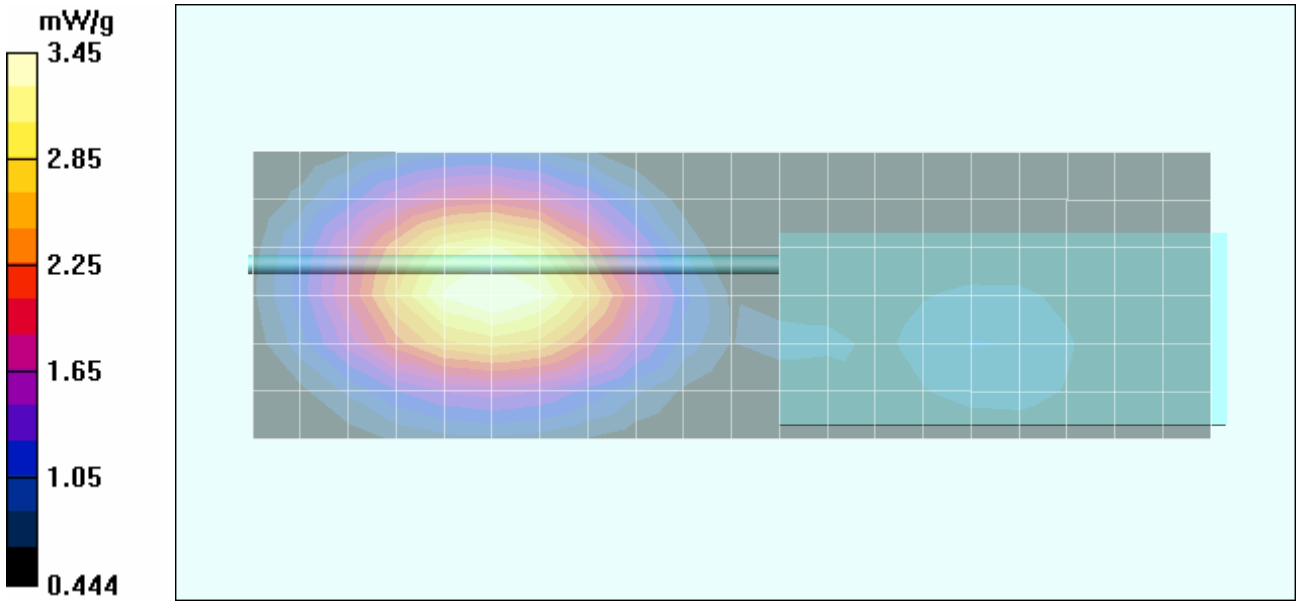
Body-worn Accessory: Belt-Clip P/N: KBH-11; Audio Accessory: None

Ambient Temp: 23.5°C; Fluid Temp: 23.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW
Frequency: 806 MHz; Duty Cycle: 1:1
Medium: MSL835 Medium parameters used (interpolated): f = 806 MHz; σ = 0.99 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(6.33, 6.33, 6.33); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

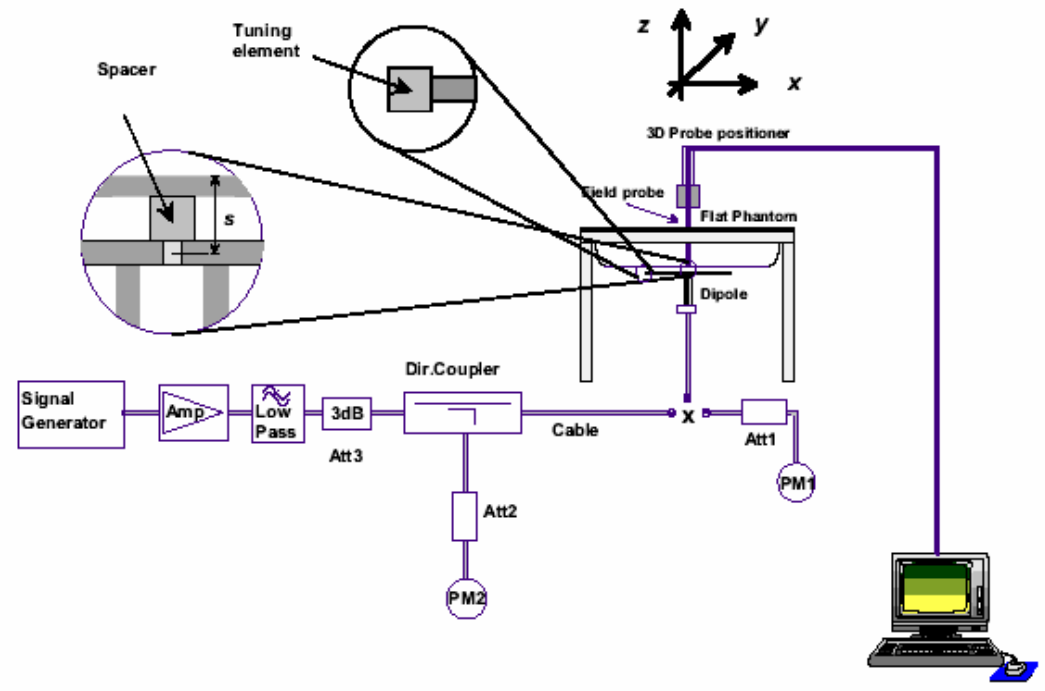
Body-worn SAR - 2.5 cm Belt-Clip Spacing from Back of DUT to Planar Phantom
Area Scan (7x20x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 3.55 mW/g
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 27.5 V/m; Power Drift = -1.01 dB
Peak SAR (extrapolated) = 4.20 W/kg
SAR(1 g) = 3.26 mW/g; SAR(10 g) = 2.36 mW/g
Maximum value of SAR (measured) = 3.45 mW/g



APPENDIX B - SYSTEM PERFORMANCE CHECK

SYSTEM PERFORMANCE CHECK MEASUREMENT SETUP

835 MHz SPEAG Validation Dipole Setup with Barski Planar Phantom



System Performance Check Measurement Setup Diagram (IEEE Standard 1528-2003)

Date Tested: 10/05/2010

System Performance Check - 835 MHz Dipole - Head

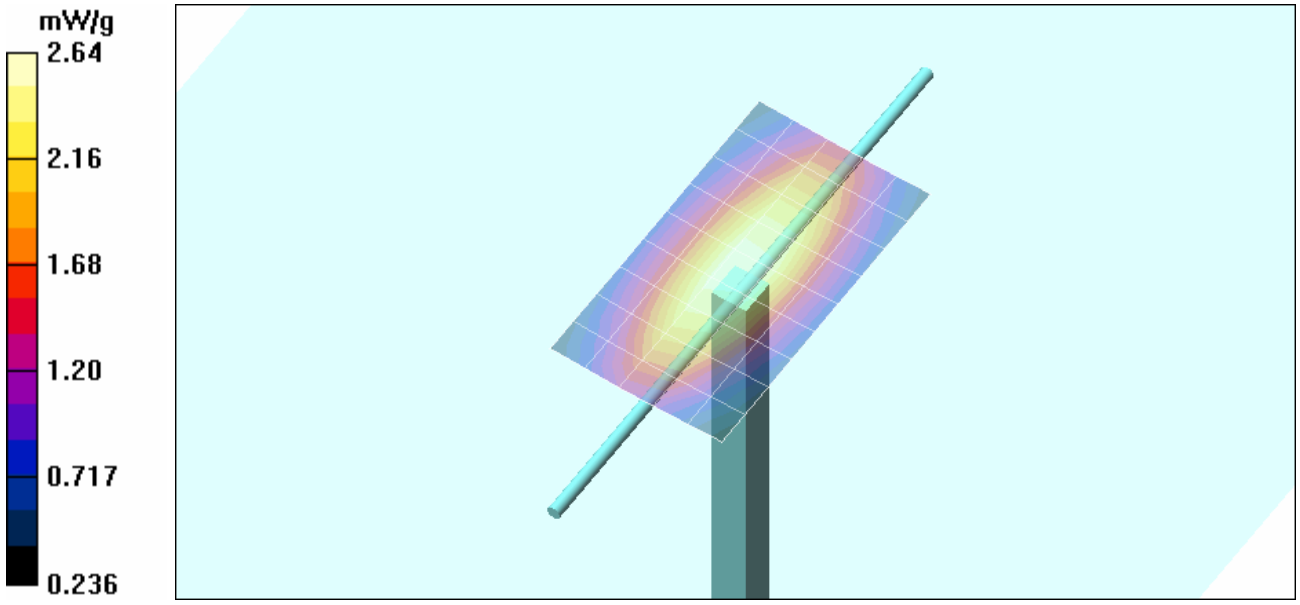
DUT: Dipole D835V2; Asset: 00217; Serial: 411; Calibration: 04/20/2009

Ambient Temp: 23.5°C; Fluid Temp: 24.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

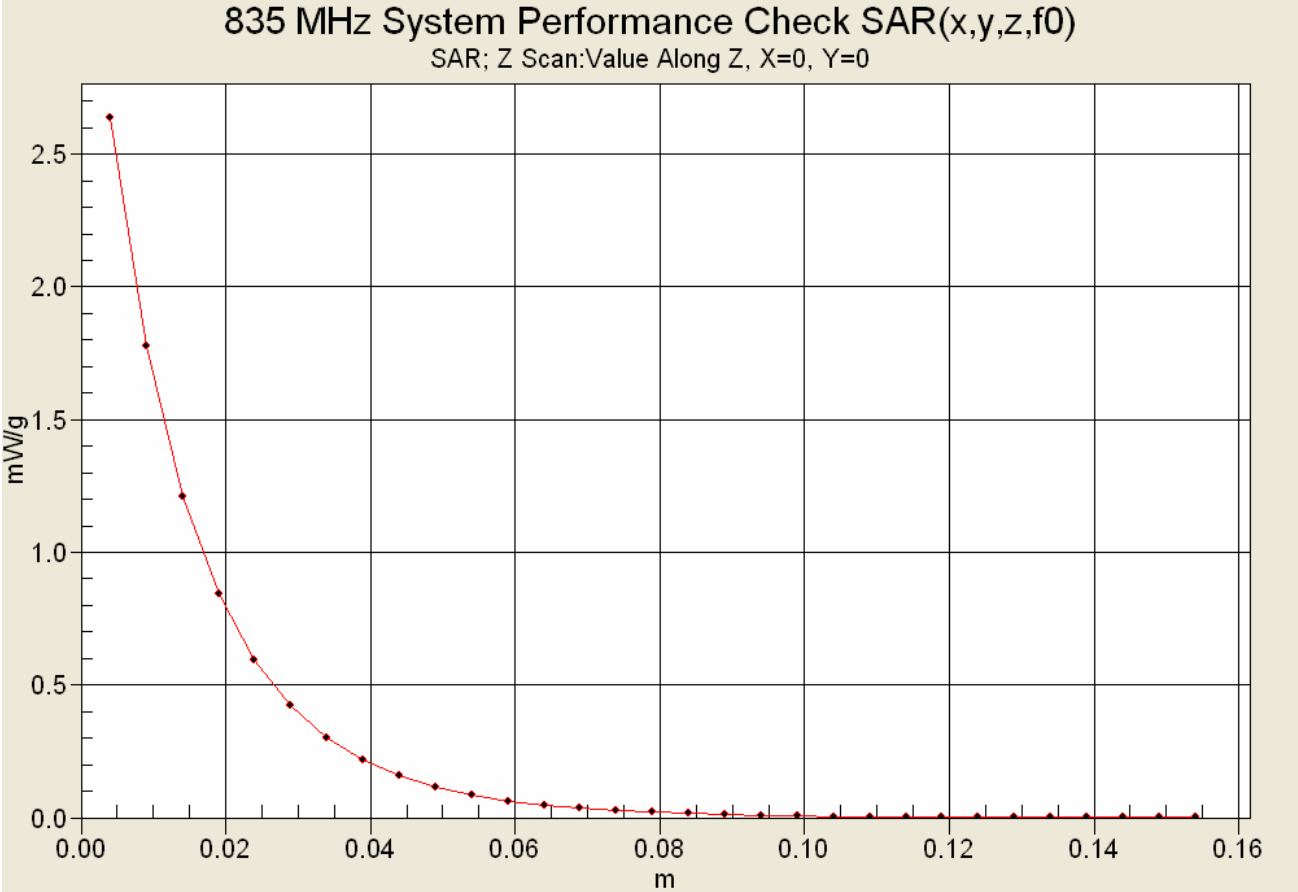
Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL835 Medium parameters used: f = 835 MHz; σ = 0.92 mho/m; ε_r = 43.5; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(6.27, 6.27, 6.27); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

System Performance Check - 835 MHz Dipole
Head d=15mm Pin=250mW 2/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.55 mW/g
Head d=15mm Pin=250mW 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.1 V/m; Power Drift = -0.099 dB
Peak SAR (extrapolated) = 3.59 W/kg
SAR(1 g) = 2.45 mW/g; SAR(10 g) = 1.6 mW/g
Maximum value of SAR (measured) = 2.64 mW/g



Z-Axis Scan



APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

835 MHz Head

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
05/Oct/2010
Frequency (GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
0.7350	42.02	0.89	44.98	0.82
0.7450	41.97	0.89	44.23	0.83
0.7550	41.92	0.89	44.28	0.84
0.7650	41.86	0.89	44.41	0.84
0.7750	41.81	0.90	44.13	0.86
0.7850	41.76	0.90	43.56	0.86
0.7950	41.71	0.90	44.02	0.89
0.8050	41.66	0.90	43.52	0.88
0.8150	41.60	0.90	43.53	0.90
0.8250	41.55	0.90	43.45	0.92
0.8350	41.50	0.90	43.49	0.92
0.8450	41.50	0.91	43.12	0.93
0.8550	41.50	0.92	42.93	0.94
0.8650	41.50	0.93	43.02	0.94
0.8750	41.50	0.94	42.99	0.94
0.8850	41.50	0.95	42.92	0.97
0.8950	41.50	0.96	42.83	1.00
0.9050	41.50	0.97	42.37	0.98
0.9150	41.50	0.98	42.17	1.00
0.9250	41.48	0.98	42.29	1.01
0.9350	41.46	0.99	42.17	1.01

835 MHz Body

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
05/Oct/2010
Frequency (GHz)
FCC_eH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eB	FCC_sB	Test_e	Test_s
0.7350	55.59	0.96	53.35	0.92
0.7450	55.55	0.96	53.32	0.93
0.7550	55.51	0.96	53.22	0.95
0.7650	55.47	0.96	53.21	0.95
0.7750	55.43	0.97	52.95	0.97
0.7850	55.39	0.97	53.21	0.98
0.7950	55.36	0.97	52.88	0.98
0.8050	55.32	0.97	52.95	0.99
0.8150	55.28	0.97	52.67	0.99
0.8250	55.24	0.97	52.61	1.00
0.8350	55.20	0.97	52.65	1.00
0.8450	55.17	0.98	52.40	1.00
0.8550	55.14	0.99	52.49	1.01
0.8650	55.11	1.01	52.52	1.01
0.8750	55.08	1.02	52.50	1.02
0.8850	55.05	1.03	51.87	1.06
0.8950	55.02	1.04	51.94	1.09
0.9050	55.00	1.05	51.98	1.10
0.9150	55.00	1.06	52.01	1.11
0.9250	54.98	1.06	51.69	1.10
0.9350	54.96	1.07	51.74	1.12

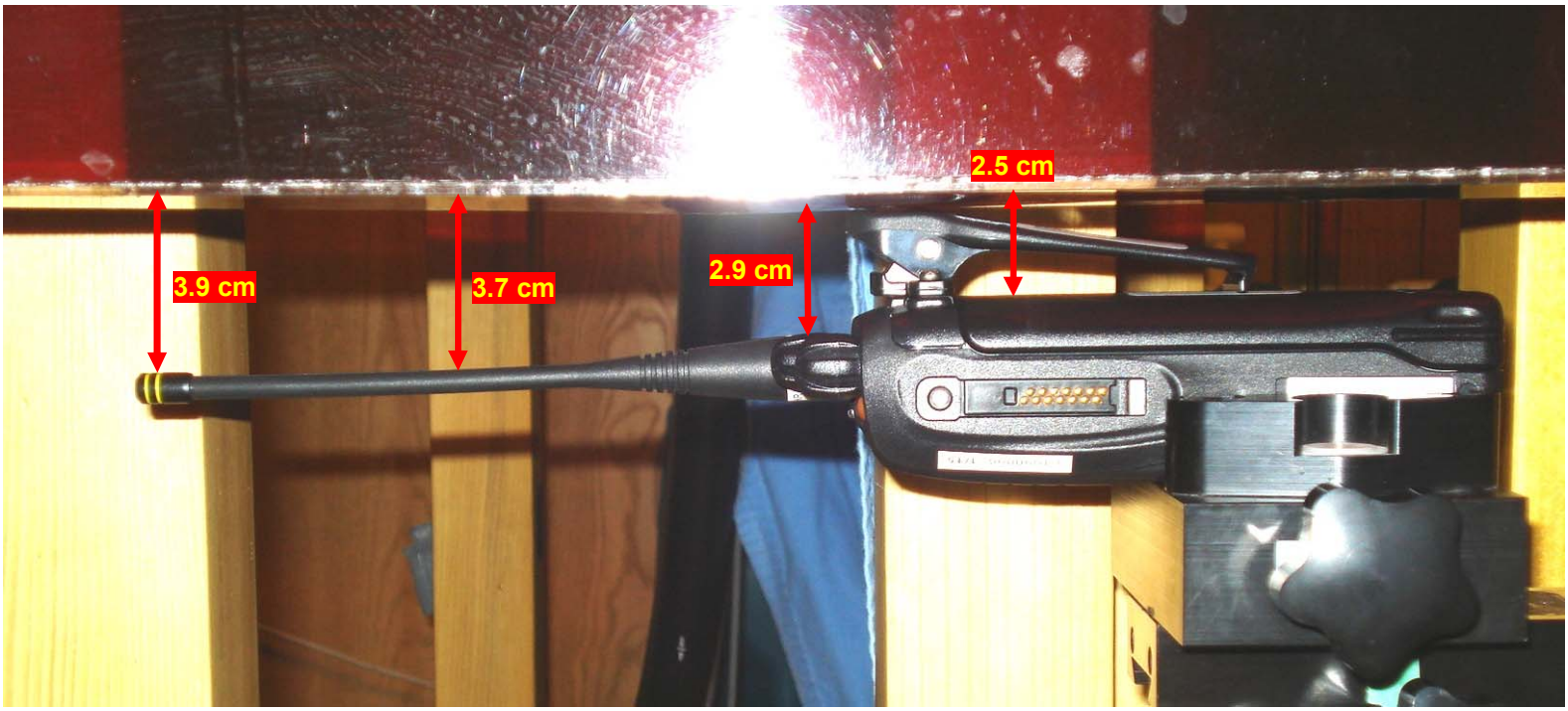
APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS

BODY-WORN SAR TEST SETUP PHOTOGRAPHS

Body-worn Test Setup Configuration

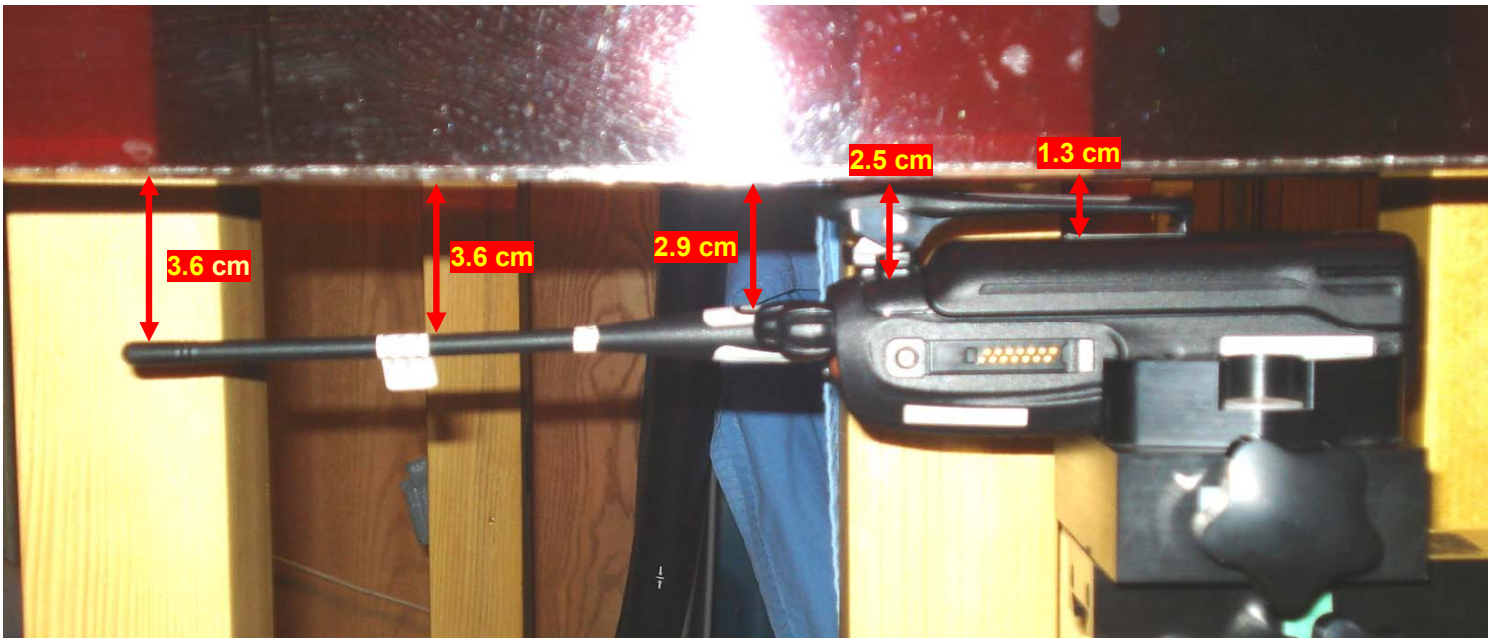
BODY-WORN SAR TEST SETUP PHOTOGRAPHS

ANTENNA A - Body-worn Test Setup with KRA-32 Whip Antenna & Li-Ion Batt "a" – 2.5 cm Belt-Clip Spacing - Battery Housing Parallel to Planar Phantom

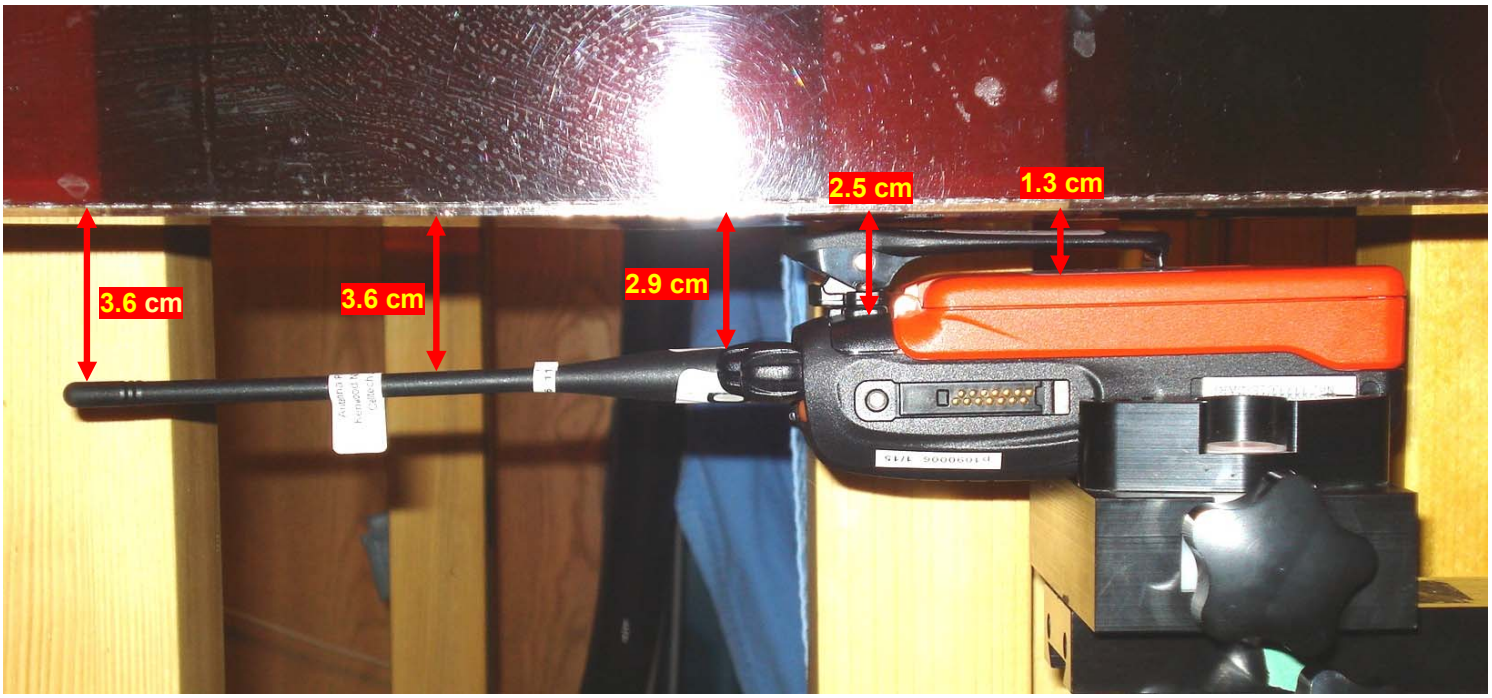


ANTENNA B - Body-worn Test Setup with KRA-24M Whip Antenna & Li-Ion Batt "a" – 2.5 cm Belt-Clip Spacing - Battery Housing Parallel to Planar Phantom

BODY-WORN SAR TEST SETUP PHOTOGRAPHS



ANTENNA A - Body-worn Test Setup with KRA-32 Whip Antenna & Ni-MH Batt "b" – 2.5 cm Belt-Clip Spacing - Battery Housing Parallel to Phantom

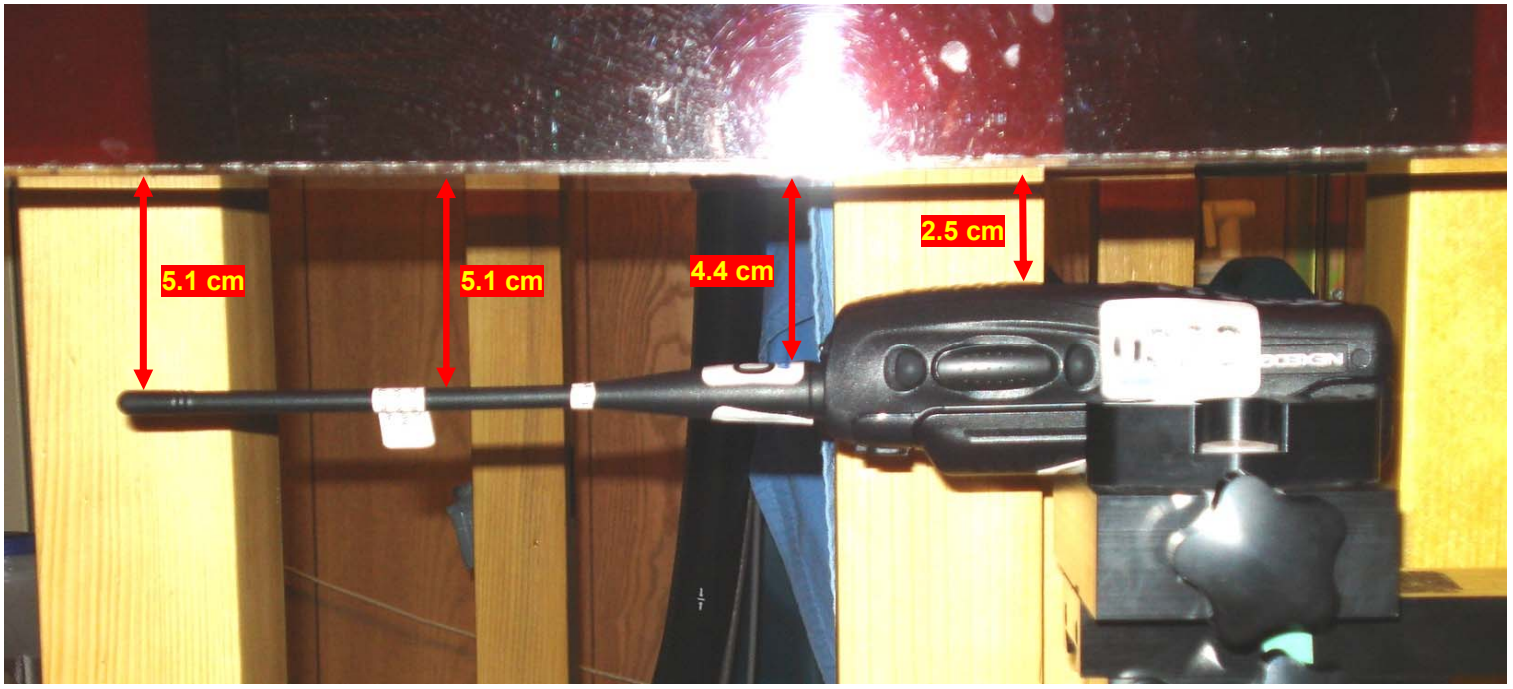


ANTENNA A - Body-worn Test Setup with KRA-32 Whip Antenna & Alkaline Batt Case "c" – 2.5 cm Belt-Clip Spacing - Battery Housing Parallel to Phantom

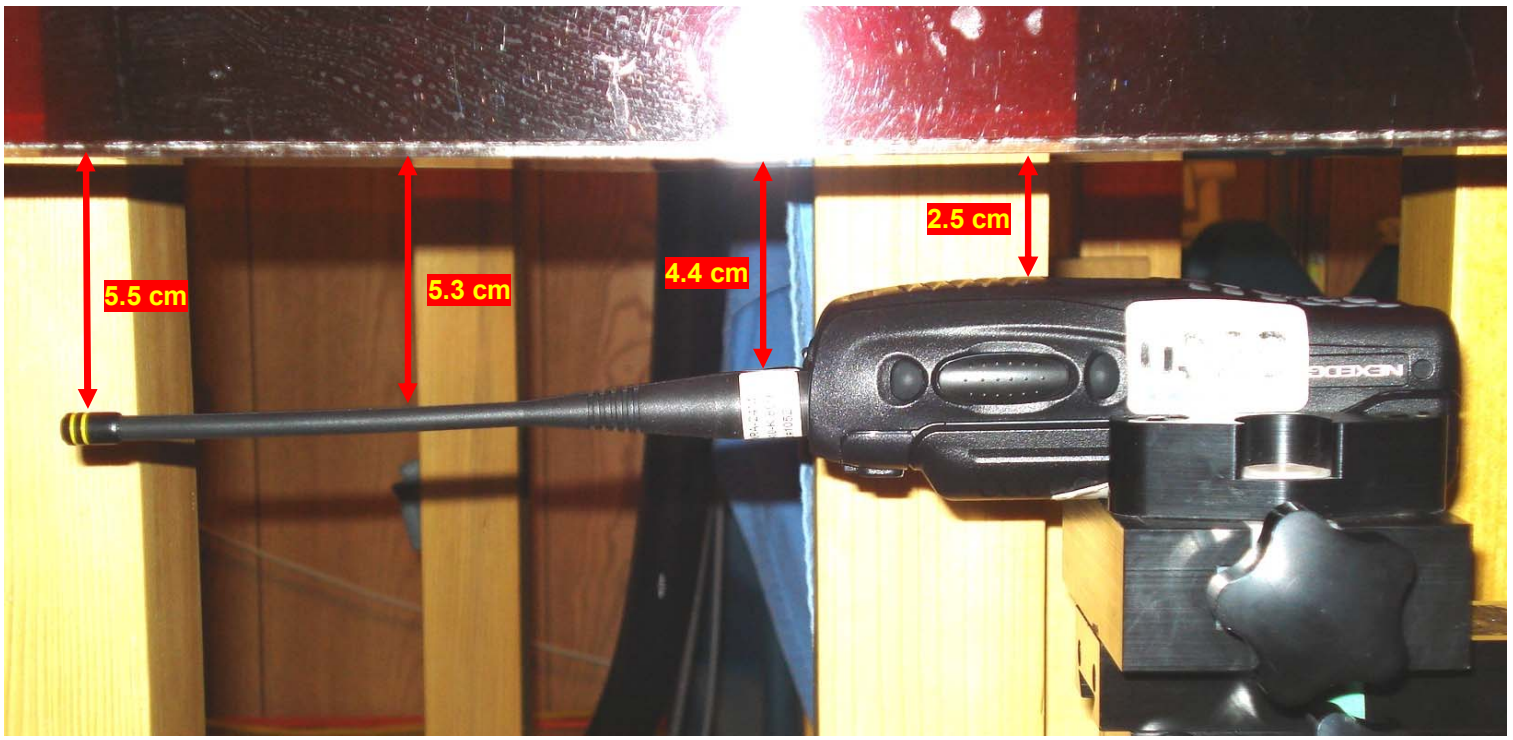
FACE-HELD SAR TEST SETUP PHOTOGRAPHS

Face-held Test Setup Configuration

FACE-HELD SAR TEST SETUP PHOTOGRAPHS

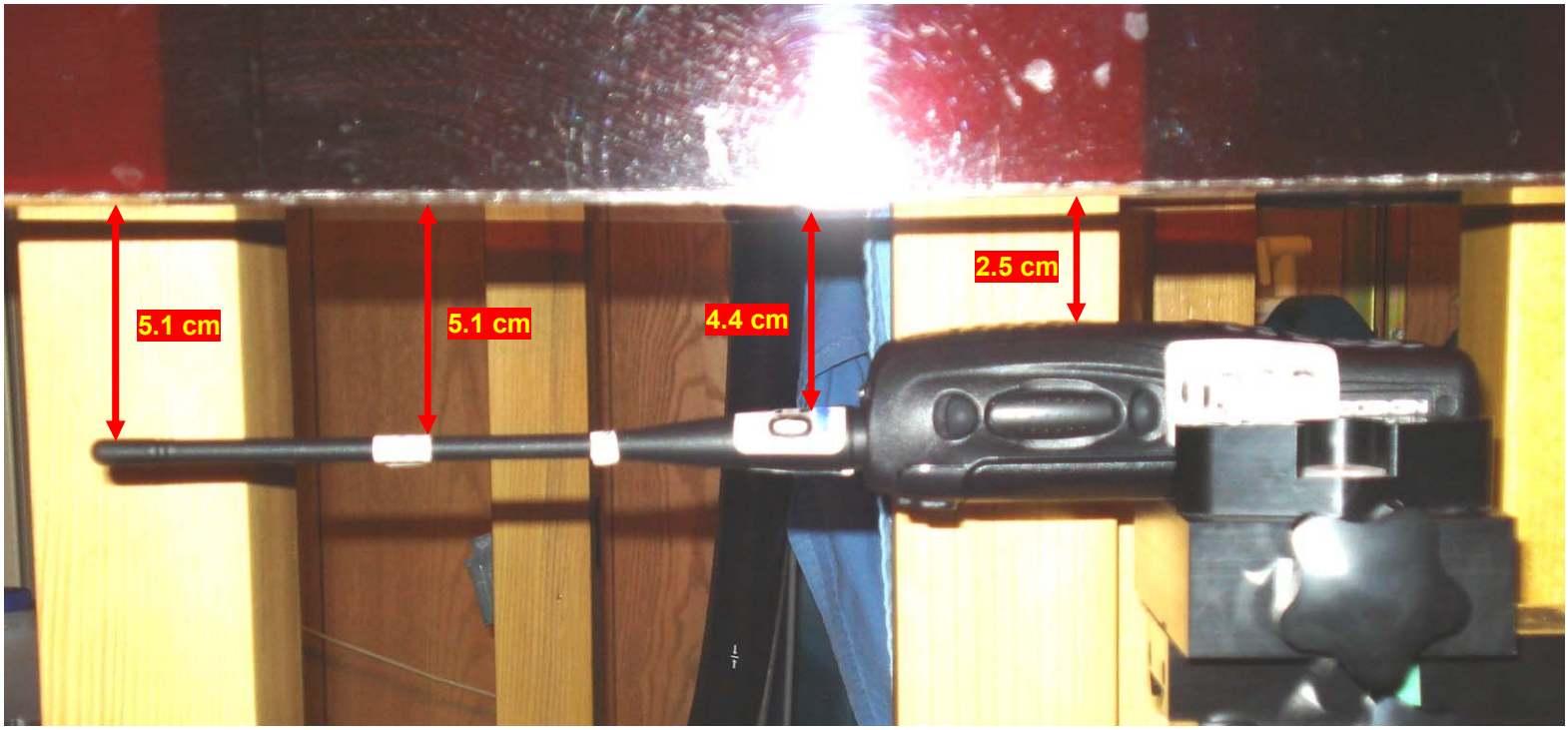


ANTENNA A - Face-held Test Setup with KRA-32 Whip Antenna & Ni-MH Battery "b"



ANTENNA B - Face-held Test Setup with KRA-24M Whip Antenna & Ni-MH Battery "b"

FACE-HELD SAR TEST SETUP PHOTOGRAPHS



ANTENNA A - Face-held Test Setup with KRA-32 Whip Antenna & Li-Ion Battery "a"

ANTENNA A - Face-held Test Setup with KRA-32 Whip Antenna & Alkaline Battery Case "c"

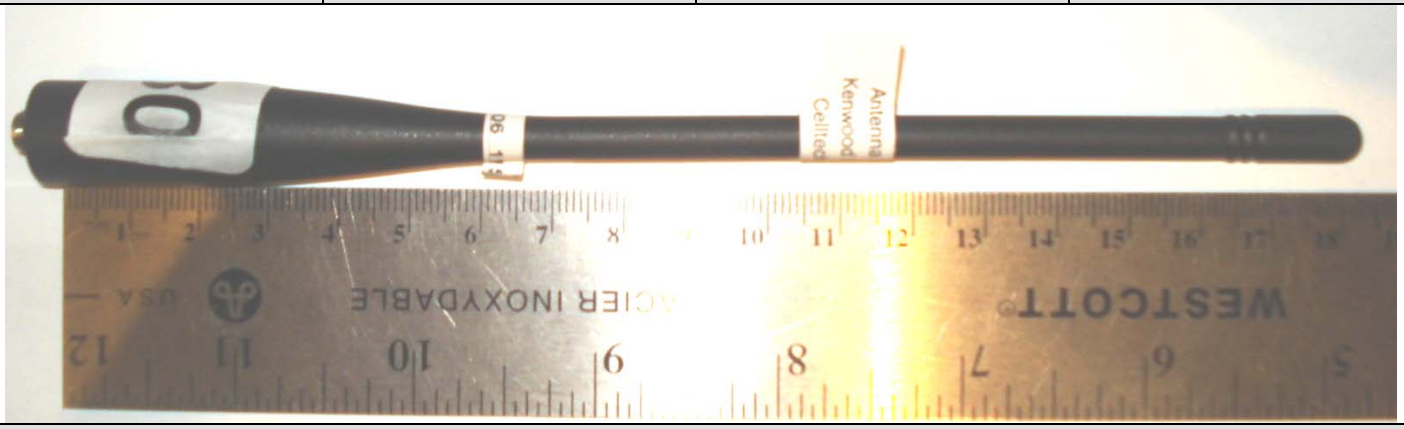
DUT PHOTOGRAPHS

Front of Radio w/ KRA-32 Antenna A

Back of Radio w/ Li-ion Batt "a"

Back of Radio w/ Ni-MH Batt "b"

Back of Radio w/ Alkaline Batt Case "c"



ANTENNA A - Whip Antenna P/N: KRA-32 (Length = 182 mm)

Front of Radio w/ KRA-24M Antenna B

Back of Radio w/ Li-ion Batt "a"

Back of Radio w/ Ni-MH Batt "b"

Back of Radio w/ Alkaline Batt Case "c"

ANTENNA B - Whip Antenna P/N: KRA-24M (Length = 167 mm)

Left Side of Radio with Belt-Clip & Li-ion Battery "a"

Right Side of Radio with Belt-Clip & Li-ion Battery "a"

Bottom end of Radio w/ Belt-Clip & Li-ion Battery "a"

Top end of Radio with Belt-Clip & Li-ion Battery "a"

Left Side of Radio with Belt-Clip & Ni-MH Battery "b"

Right Side of Radio with Belt-Clip & Ni-MH Battery "b"

Bottom end of Radio w/ Belt-Clip & Ni-MH Battery "b"

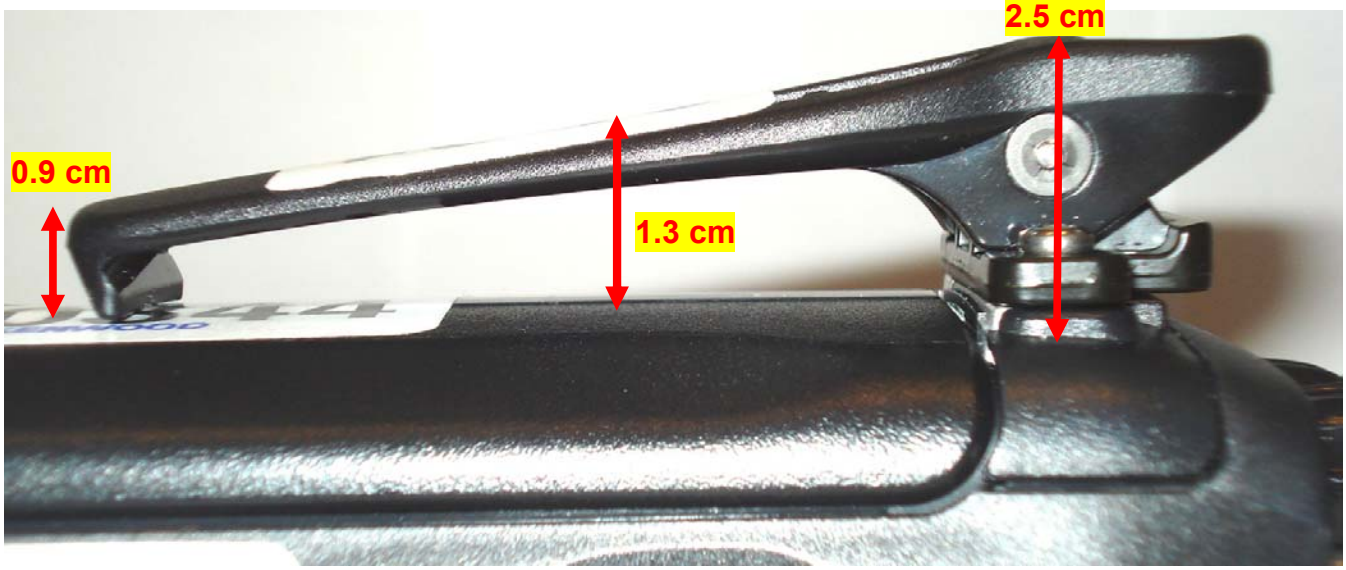
Top end of Radio w/ Belt-Clip & Ni-MH Battery "b"

Left Side of Radio with Belt-Clip & Alkaline Battery Case "c"

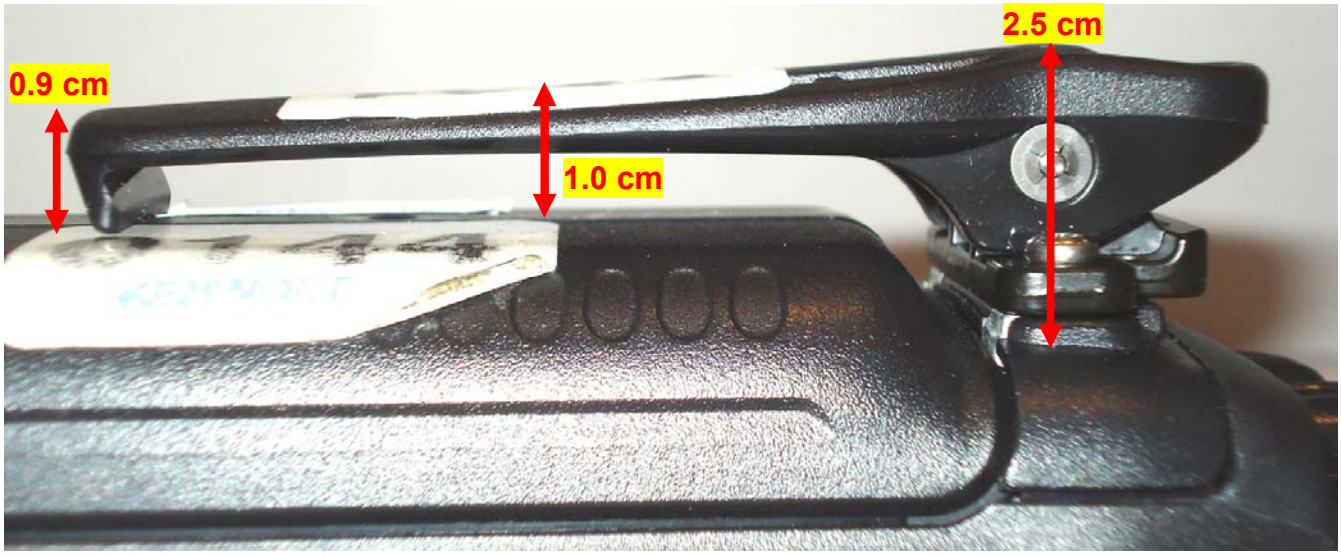
Right Side of Radio with Belt-Clip & Alkaline Battery Case "c"

Bottom end of Radio w/ Belt-Clip & Alkaline Battery Case "c"

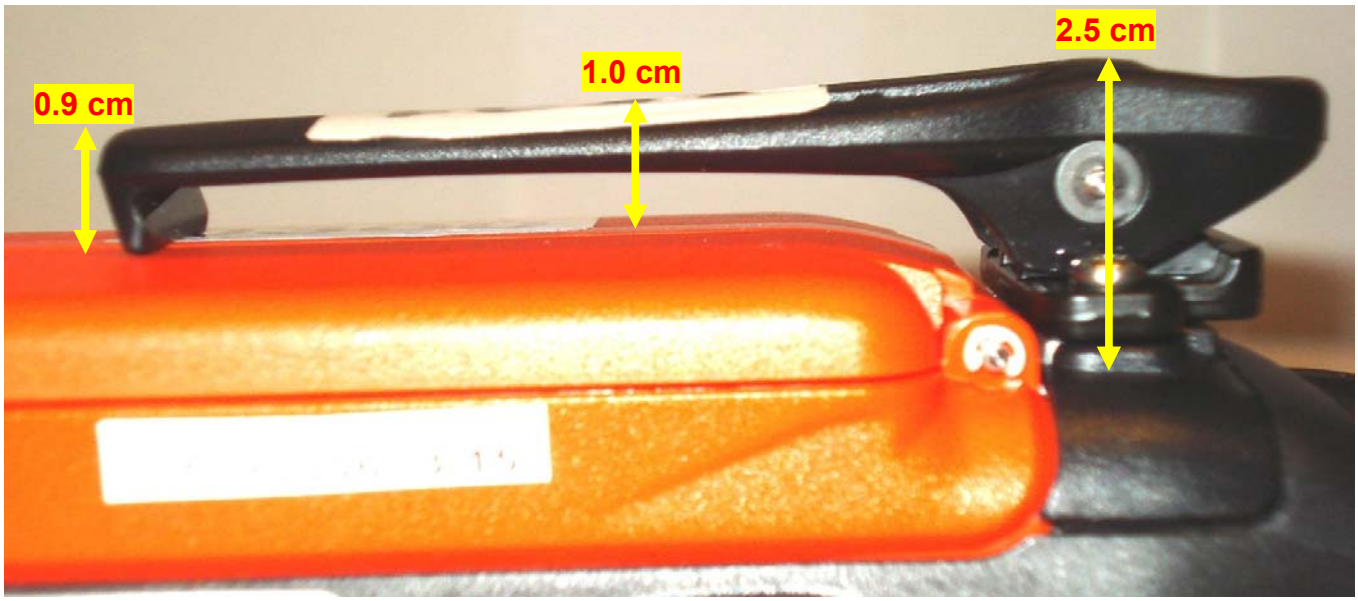
Top end of Radio w/ Belt-Clip & Alkaline Battery Case "c"



Belt-Clip Thickness Measurement Distance – Radio with Li-ion Battery "a"



Belt-Clip Thickness Measurement Distance – Radio with Ni-MH Battery "b"



Belt-Clip Thickness Measurement Distance – Radio with Alkaline Battery Case "c"

Li-Ion Battery "a"

Ni-MH Battery "b"

Alkaline Battery Case "c"

Li-Ion Battery "a"

Ni-MH Battery "b"

Alkaline Battery Case "c"

Front of Radio

Back of Radio with Belt Clip (Battery Removed)

Back of Radio without Belt-Clip (Battery Removed)

Belt-Clip Body-worn accessory P/N: KBH-11 (contains metal)

SPEAKER-MICROPHONE #1 - AUDIO ACCESSORY CATEGORY #1 (NOT TESTED)

Noise-Canceling Speaker-Microphone (P/N: KMC-25)

SPEAKER-MICROPHONE #2 - AUDIO ACCESSORY CATEGORY #1 (NOT TESTED)

Heavy-Duty Speaker-Microphone (P/N: KMC-41)

SPEAKER-MICROPHONE #3 - AUDIO ACCESSORY CATEGORY #1 (NOT TESTED)

Heavy-Duty Speaker-Microphone (P/N: KMC-42W)

SPEAKER-MICROPHONE #4 - AUDIO ACCESSORY CATEGORY #1 (NOT TESTED)

Heavy-Duty GPS Speaker-Microphone (P/N: KMC-47GPS)

APPENDIX E - DIPOLE CALIBRATION

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client Celltech

Certificate No: D835V2-4d075_Apr09

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d075
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	April 20, 2009
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV2	SN: 3025	28-Apr-08 (No. ES3-3025_Apr08)	Apr-09
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 22, 2009

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V5.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.1 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature during test	(22.1 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.35 mW / g
SAR normalized	normalized to 1W	9.40 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**9.46 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.54 mW / g
SAR normalized	normalized to 1W	6.16 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**6.19 mW /g ± 16.5 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.9 ± 6 %	1.01 mho/m ± 6 %
Body TSL temperature during test	(22.1 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.49 mW / g
SAR normalized	normalized to 1W	9.96 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**9.61 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.64 mW / g
SAR normalized	normalized to 1W	6.56 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**6.39 mW / g ± 16.5 % (k=2)**

[2] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.8 Ω - 3.1 jΩ
Return Loss	- 29.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.0 Ω - 4.1 jΩ
Return Loss	- 26.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.401 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 09, 2007

DASY5 Validation Report for Head TSL

Date/Time: 14.04.2009 11:20:38

Test Laboratory: SPEAG, Zurich, Switzerland

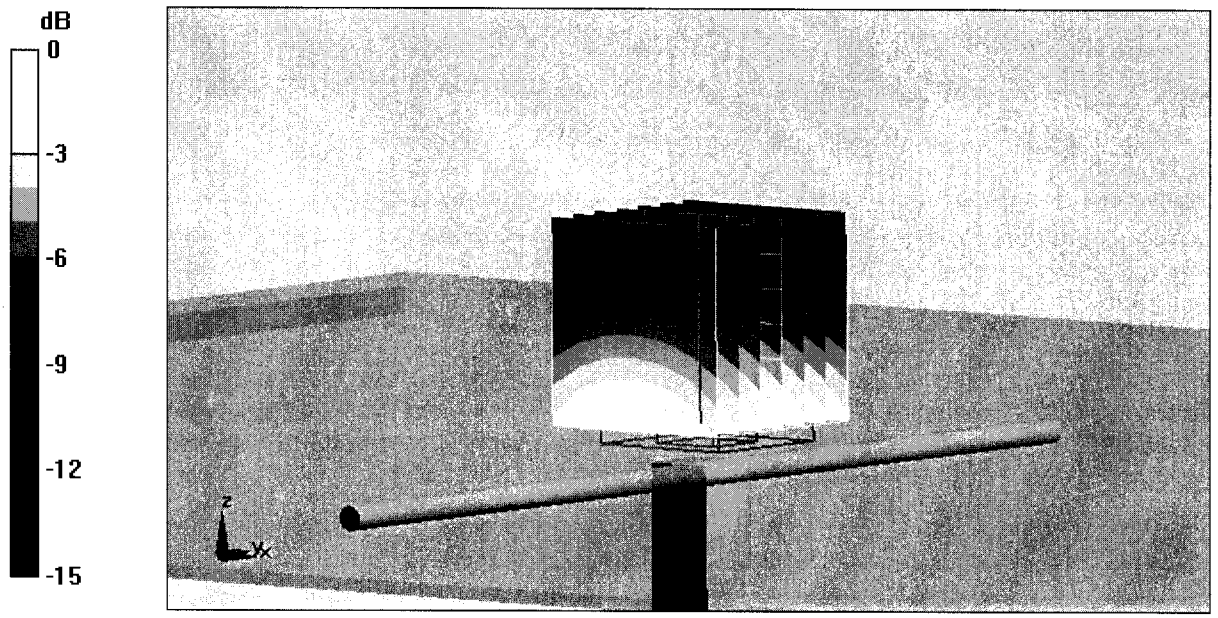
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d075

Communication System: CW-835; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL 900 MHz
Medium parameters used: f = 835 MHz; σ = 0.89 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

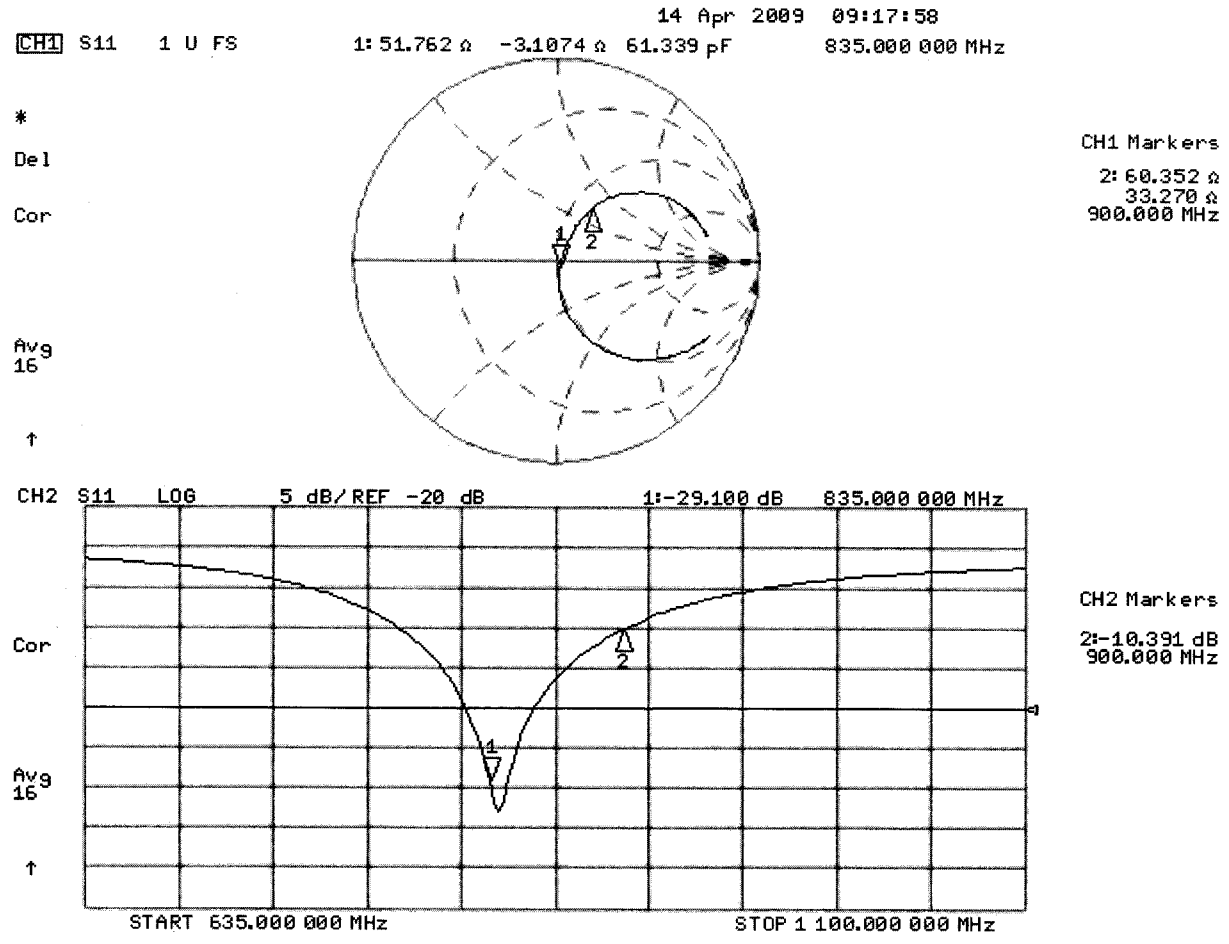
- Probe: ES3DV2 - SN3025; ConvF(5.97, 5.97, 5.97); Calibrated: 28.04.2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

Pin=250mW; dip=15mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57 V/m; Power Drift = 0.011 dB
Peak SAR (extrapolated) = 3.47 W/kg
SAR(1 g) = 2.35 mW/g; SAR(10 g) = 1.54 mW/g
Maximum value of SAR (measured) = 2.74 mW/g



0 dB = 2.74mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date/Time: 20.04.2009 09:57:39

Test Laboratory: SPEAG, Zurich, Switzerland

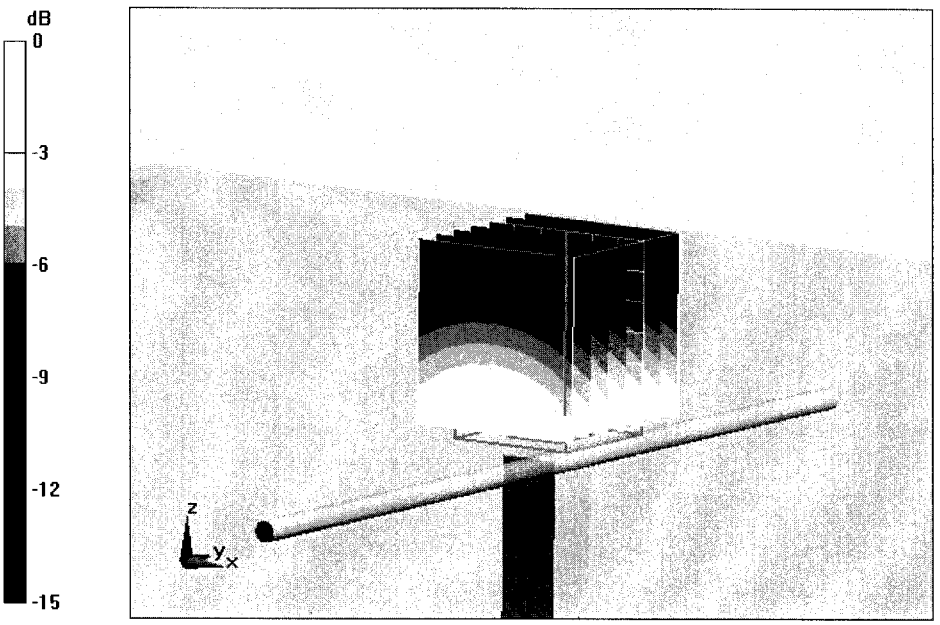
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d075

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900
Medium parameters used: f = 835 MHz; σ = 1.01 mho/m; ε_r = 53.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

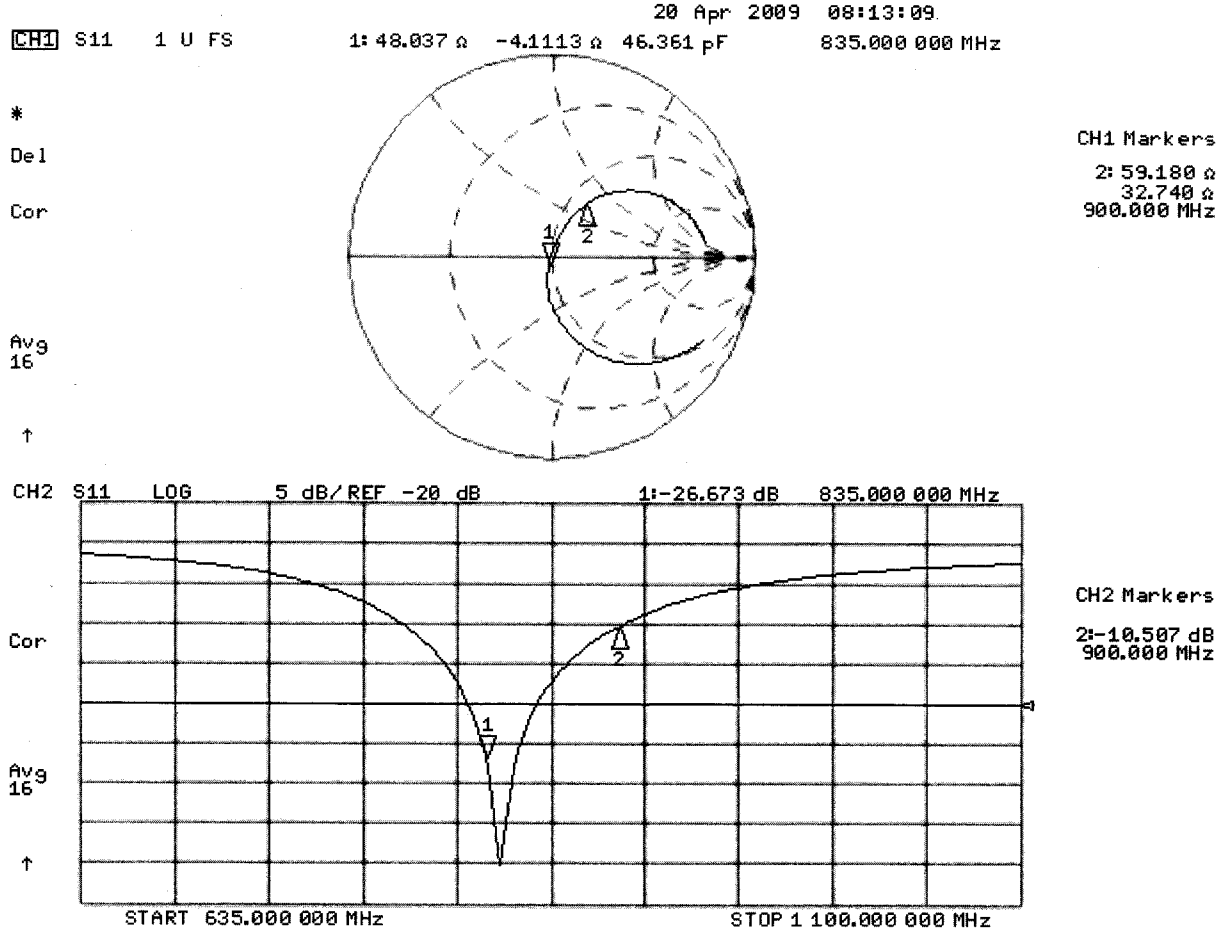
- Probe: ES3DV2 - SN3025; ConvF(5.9, 5.9, 5.9); Calibrated: 28.04.2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

Pin = 250mW, d = 15mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.4 V/m; Power Drift = -0.00173 dB
Peak SAR (extrapolated) = 3.61 W/kg
SAR(1 g) = 2.49 mW/g; SAR(10 g) = 1.64 mW/g
Maximum value of SAR (measured) = 2.9 mW/g



0 dB = 2.9mW/g

Impedance Measurement Plot for Body TSL



APPENDIX F - PROBE CALIBRATION

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 108

Client **Celltech**

Certificate No: ET3-1590_Jul10

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN:1590**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-12.v6, QA CAL-23.v3 and QA CAL-25.v2**
Calibration procedure for dosimetric E-field probes

Calibration date: **July 15, 2010**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

	Name	Function	Signature
Calibrated by	**Jeton Kastrati**	**Laboratory Technician**	
Approved by:	**Katja Pokovic**	**Technical Manager**	

Issued: July 15, 2010

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accredited by the Swiss Accreditation Service (SAS)
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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \le 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *Ax,y,z; Bx,y,z; Cx,y,z; VRx,y,z: A, B, C* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \le 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy):* in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ET3DV6

SN:1590

Manufactured:	March 19, 2001
Last calibrated:	July 16, 2009
Recalibrated:	July 15, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ET3DV6 SN:1590

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.86	2.06	1.77	± 10.1%
DCP (mV)[B]	91.4	92.4	83.5	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300.0	± 1.5%
			Y	0.00	0.00	1.00	300.0	
			Z	0.00	0.00	1.00	300.0	

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6)

[B] Numerical linearization parameter: uncertainty not required.

[E] Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ET3DV6 SN:1590

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
450	± 50 / ± 100	43.5 ± 5%	0.87 ± 5%	7.25	7.25	7.25	0.20	2.19 ± 13.3%
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	6.27	6.27	6.27	0.32	2.49 ± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	6.12	6.12	6.12	0.27	2.86 ± 11.0%

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

DASY/EASY - Parameters of Probe: ET3DV6 SN:1590

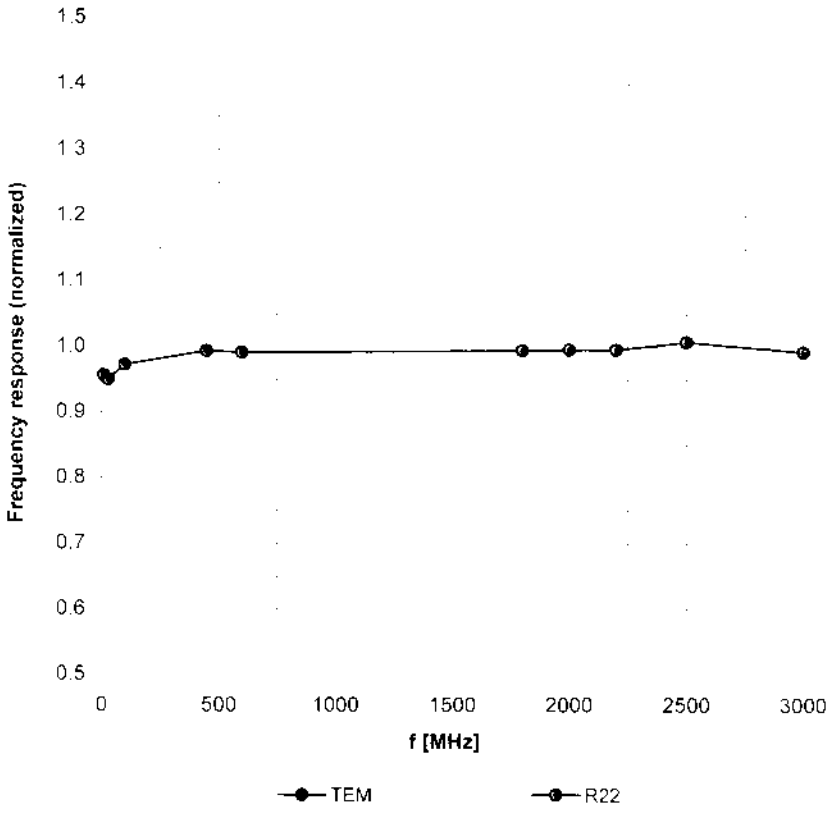
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
450	± 50 / ± 100	56.7 ± 5%	0.94 ± 5%	7.73	7.73	7.73	0.13	2.06 ± 13.3%
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	6.33	6.33	6.33	0.22	3.60 ± 11.0%
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	6.15	6.15	6.15	0.28	2.94 ± 11.0%

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

Frequency Response of E-Field

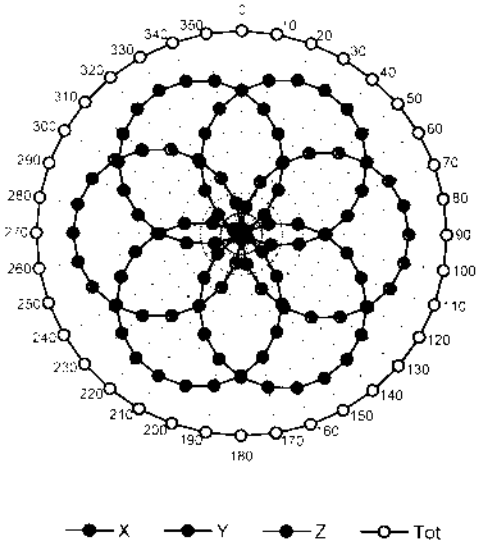
(TEM-Cell:ifi110 EXX, Waveguide: R22)



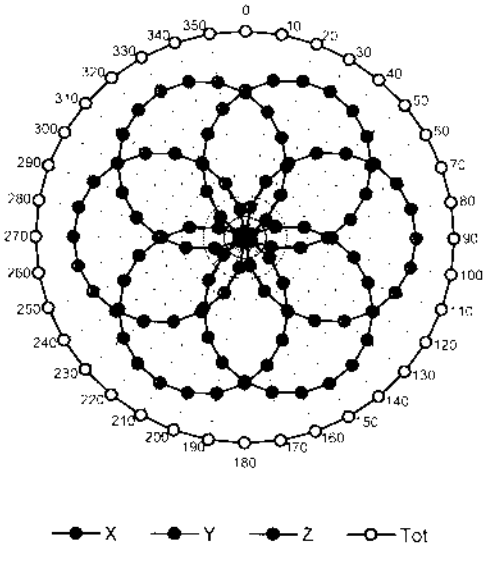
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

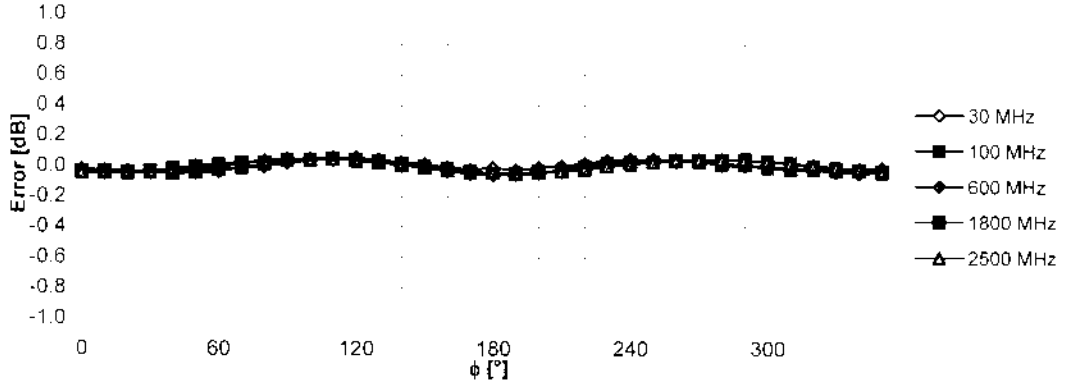
Receiving Pattern (ϕ), ϑ = 0°

f = 600 MHz, TEM ifi110EXX



f = 1800 MHz, WG R22

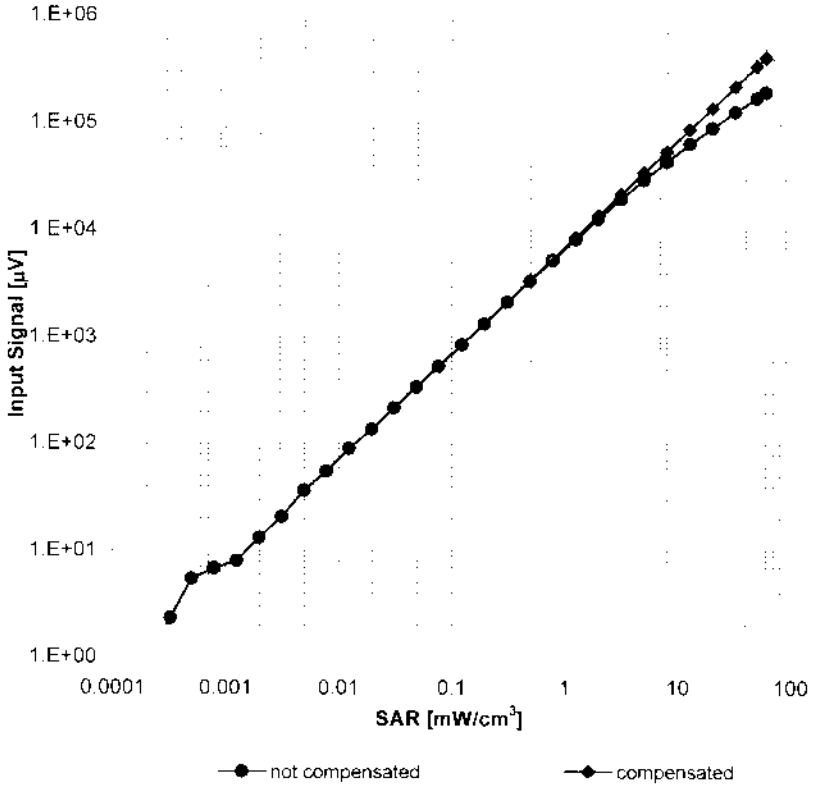


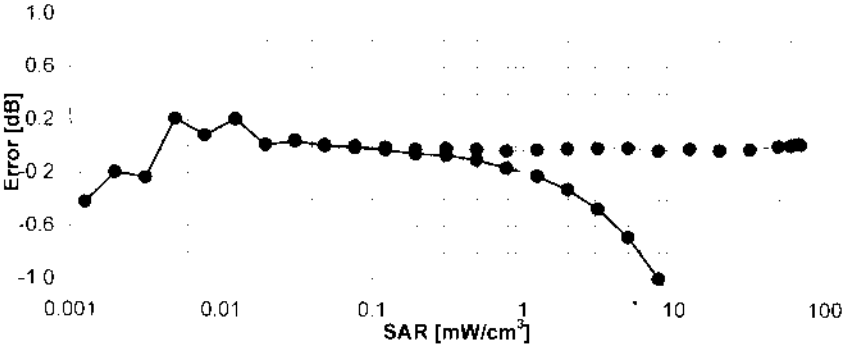


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

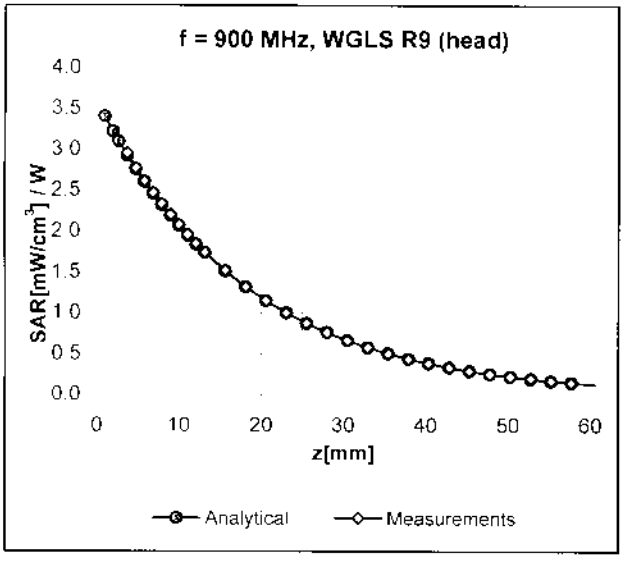
(Waveguide R22, f = 1800 MHz)

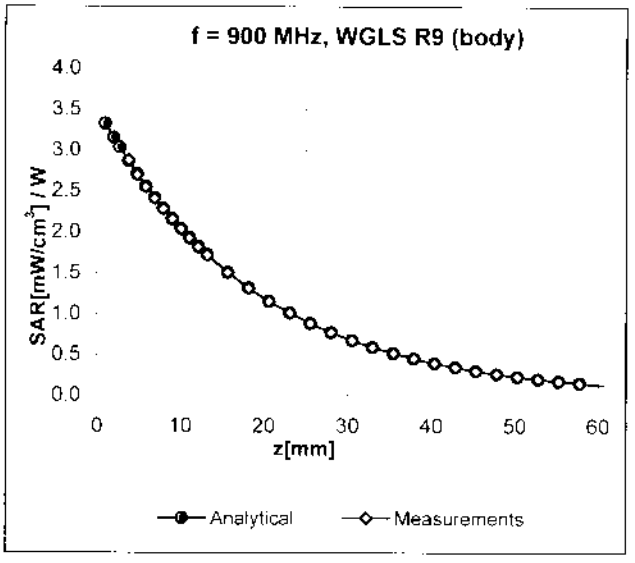




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

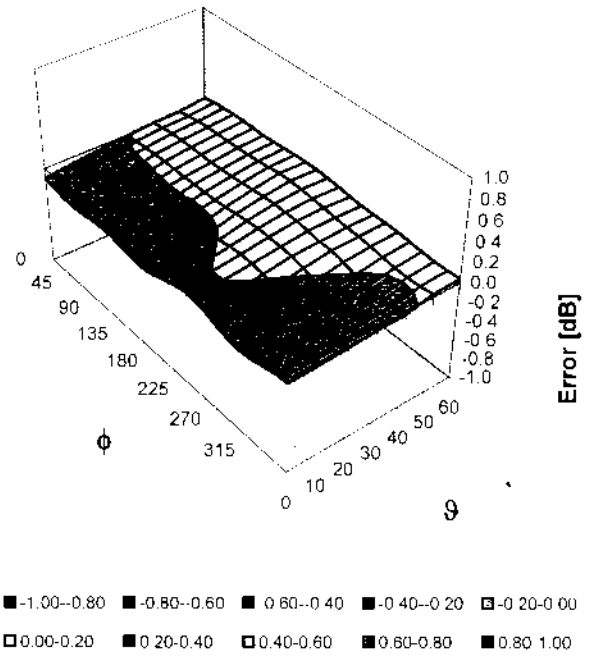
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	enabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

APPENDIX G - BARSKI PHANTOM CERTIFICATE OF CONFORMITY

2378 Westlake Road
Kelowna, B.C. Canada
V1Z-2V2

BARSKI INDUSTRIES (1985) LTD.

Ph. # 250-769-6848
Fax # 250-769-6334
E-mail: barskiind@shaw.ca
Web: www.bcfiberglass.com

FIBERGLASS FABRICATORS

Certificate of Conformity

Item : Flat Planar Phantom Unit # 03-01
Date: June 16, 2003
Manufacturer: Barski Industries (1985 Ltd)

Test	Requirement	Details
Shape	Compliance to geometry according to drawing	Supplied CAD drawing
Material Thickness	Compliant with the requirements	2mm +/- 0.2mm in measurement area
Material Parameters	Dielectric parameters for required frequencies Based on Dow Chemical technical data	100 MHz-5 GHz Relative permittivity<5 Loss Tangent<0.05

Conformity

Based on the above information, we certify this product to be compliant to the requirements specified.

Signature: _____

Daniel Chailler

Fiberglass Planar Phantom - Top View

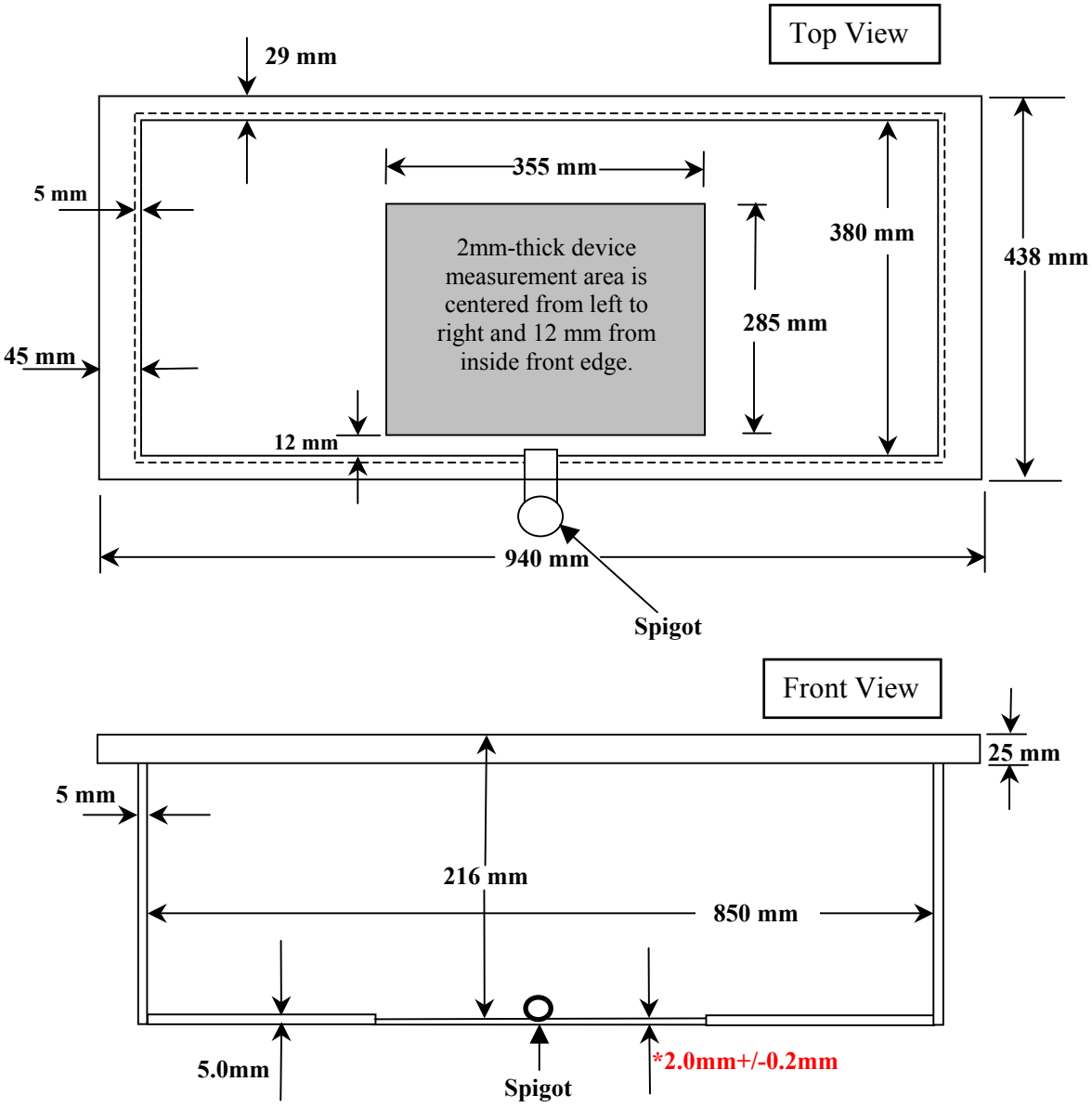
Fiberglass Planar Phantom - Front View

Fiberglass Planar Phantom - Back View

Fiberglass Planar Phantom - Bottom View

Dimensions of Fiberglass Planar Phantom

(Manufactured by Barski Industries Ltd. - Unit# 03-01)



Note: Measurements that aren't repeated for the opposite sides are the same as the side measured. This drawing is not to scale.

APPENDIX H - OCCUPATIONAL PTT TEST REDUCTION *DRAFT* CONSIDERATIONS

Occupational PTT Test Reduction *Draft* Considerations

Head SAR Test Considerations

Passive body-worn and audio accessories generally do not apply to the head SAR of PTT devices. Head SAR is measured with the front of the device at 2.5 cm parallel to a flat phantom. When the front of the device has a contour or non-uniform surface with > 1.0 cm variation, the average distance of such variations is used to establish the 2.5 cm test separation from the phantom.

A) Start with a standard battery supplied with the device by default to measure the head SAR of each antenna on the highest output power channel, according to the test channels required by KDB 447498 (6)(c) and in the frequency range covered by the antenna within each device operating frequency band.[1]
   1) When multiple standard batteries are supplied with a device, the battery with the highest capacity is considered the default battery for making head SAR measurements.

B) When the head SAR of an antenna tested on the highest output power channel using the default battery is ≤ 4.0 W/kg, testing of the required immediately adjacent channel(s) is not necessary. When the head SAR of an antenna tested on the highest output power channel using the default battery is ≤ 3.5 W/kg, testing of all other required channels is not necessary. For the remaining channels that require testing, the exclusion of 4.0 W/kg for the required immediately adjacent channels and 3.5 W/kg for subsequent remaining channels may be applied recursively with respect to the highest output power channel among the remaining channels. When the head SAR of an antenna tested on the highest output power channel using the default battery is > 4.0 W/kg, head SAR should be measured for that antenna on the required immediately adjacent channels and on all required channels if the highest SAR channel or an adjacent channel is > 6.0 W/kg.

C) For antennas of the same type and construction, with similar SAR distributions, operating within the same device operating frequency band, if the frequency range of an antenna (A) is fully within the frequency range of another antenna (B) and the highest SAR for antenna (A) is ≤ 4.0 W/kg or ≤ 6.0 W/kg and at least 25% lower than the highest SAR measured for antenna (B) within the device operating frequency band, further head SAR tests are not necessary for antenna (A).[2]

D) When the highest SAR for <u>all antennas</u> tested using the default battery is ≤ 4.0 W/kg, according to the above test sequences, test additional batteries using the antenna and channel configuration that resulted in the highest SAR among all antennas tested with the default battery. Testing of additional batteries for other antennas is unnecessary.
   1) When the SAR tested with an additional battery using the antenna and channel configuration that resulted in the highest SAR from the default battery is > 6.0 W/kg, test that battery on the highest SAR channel of each antenna.
      a) If the SAR measured on the highest SAR channel of an antenna using an additional battery is > 6.0 W/kg, test that additional battery and antenna combination on the required immediately adjacent channels and on all required channels if the highest SAR channel or an adjacent channel is > 7.0 W/kg.

E) When the highest SAR of an antenna tested using the default battery is > 4.0 W/kg,[3] test additional batteries on the channel that resulted in the highest SAR for that antenna when tested with the standard default battery.
   1) If the SAR of an antenna tested with the default battery or an additional battery using the highest SAR channel is > 6.0 W/kg, test that battery and antenna combination on the required immediately adjacent channels and on all required channels if the highest SAR channel or an adjacent channel is > 7.0 W/kg.
   2) An antenna tested using the default battery with highest SAR ≤ 4.0 W/kg[4] does not need to be tested using additional batteries.

F) Report the measured head SAR in formats similar to the following:

[1] The test channel selection criteria in IEEE 1528-2003 may be considered when the number of channels required is greater than or equal to that required by KDB 447498 and the measured maximum output power for the closest channels between the channel selection schemes are within ½ dB.

[2] The highest SAR is determined according to the SAR measured on the highest output power channel and all required adjacent and remaining channels. Also note that the procedures must be applied in sequence, from A) – F).

[3] D) and E) are mutually exclusive. For item D), all SAR must be ≤ 4.0 W/kg. For Item E), the SAR for some antennas could be ≤ 4.0 W/kg when others are > 4.0 W/kg.

[4] See footnote 3.

Example for Illustration Only					
Head SAR – in front of the face					
Antenna (MHz)	Measured	Ch. Freq. (MHz)	Battery		
			Default	I: *Model #*	II: *Model #*
A (470 – 490)	Power (W)	470.5			
		480.0			
		489.5			
	SAR (W/kg)	470.5			
		480.0			
		489.5			
B (420 – 450)	Power (W)	420.5			
		430.0			
		440.0			
		449.5			
	SAR (W/kg)	420.5			
		430.0			
		440.0			
		449.5			
C (450 – 465)	Power (W)	450.5			
		464.5			
	SAR (W/kg)	450.5			
		464.5			
D (465 – 470)	Power (W)	467.5			
	SAR (W/kg)	467.5			
Reported SAR values have already been scaled by the applicable duty factor Antenna, battery and accessory specifications are explained in the product descriptions section When test reduction applies, the slots for such configurations are left blank *(Need to confirm this table layout works)*					

Body SAR Test Considerations for Body-worn Accessories

Body SAR is measured with the device placed in a body-worn accessory, positioned against a flat phantom, representative of the normal operating conditions expected by users, without any audio accessory. Since audio accessories, including any default audio accessories supplied with the device, may be designed to operate with a subset of the combination of antennas, batteries and body-worn accessories, to simplify the test selection sequences for audio accessories, body-worn accessories are tested without audio accessory. All sides of the device that may be positioned using a body-worn accessory facing the user must be considered for SAR compliance.

A) Start with a standard battery supplied with the device by default and a standard body-worn accessory, also supplied with the device by default, to measure the body SAR of each antenna on the highest output power channel, according to the test channels required by KDB 447498 (6)(c) and in the frequency range covered within each device operating frequency band.[5]
   1) When multiple default batteries and/or default body-worn accessories are supplied with a device, for testing purposes, the thinnest standard battery with the highest capacity and the standard body-worn accessory expected to result in the highest SAR based on its construction and exposure conditions are considered the default battery and default body-worn accessory for body SAR measurements.

B) When the body SAR of an antenna tested on the highest output power channel using the default battery and default body-worn accessory is ≤ 4.0 W/kg, testing of the required immediately adjacent channel(s) is not necessary. When the body SAR of an antenna tested on the highest output power channel using the default battery and default body-worn accessory is ≤ 3.5 W/kg, testing of all other required channels is not necessary. For the remaining channels that require testing, the exclusion of 4.0 W/kg for the required immediately adjacent channels and 3.5 W/kg for subsequent remaining channels may be applied recursively with respect to the highest output power channel among the remaining channels. When the body SAR of an antenna tested on the highest output power channel using the default battery and default body-worn accessory is > 4.0 W/kg, body SAR should be measured for that antenna on the required immediately adjacent channels and on all required channels if the highest SAR channel or an adjacent channel is > 6.0 W/kg using the default battery and default body-worn accessory.

C) For antennas of the same type and construction, with similar SAR distributions, operating within the same device operating frequency band, if the frequency range of an antenna (A) is fully within the frequency range of another antenna (B) and the highest SAR for antenna (A) is ≤ 4.0 W/kg or ≤ 6.0 W/kg and at least 25% lower than the highest SAR measured for antenna (B) within the device operating frequency band, further body SAR tests are not necessary for antenna (A).[6]

D) When the highest SAR for <u>all antennas</u> tested using the default battery and default body-worn accessory is ≤ 4.0 W/kg, according to the above test sequences, test additional batteries using the antenna and channel configuration that resulted in the highest SAR among all antennas tested with the default battery and default body-worn accessory. Testing of additional batteries with the default body-worn accessory for other antennas is unnecessary.
   1) For batteries with similar construction, test only the battery that is expected to result in the highest SAR. This is generally determined by the smallest antenna separation distance provided by the body-worn accessory, between the device and the user, with the applicable side(s) of the device facing the user.
   2) When the SAR tested with an additional battery using the antenna, default body-worn accessory and channel configuration that resulted in the highest SAR is > 6.0 W/kg, test that battery with the default body-worn accessory on the highest SAR channel of each applicable antenna.
      a) If the SAR measured on the highest SAR channel of an antenna tested using an additional battery and the default body-worn accessory is > 6.0 W/kg, test that additional battery, antenna and default body-worn accessory combination on the required immediately adjacent channels and on all required channels if the highest SAR channel or an adjacent channel is > 7.0 W/kg.

E) When the highest SAR of an antenna tested using the default battery and default body-worn accessory is > 4.0 W/kg,[7] test additional batteries on the channel that resulted in the highest SAR for that antenna when tested using the default battery and default body-worn accessory.
   1) For batteries with similar construction, test only the battery that is expected to result in the highest SAR. This is generally determined by the smallest antenna separation distance provided by the body-worn accessory, between the device and the user, with the applicable side(s) of the device facing the user.

[5] See footnote 1.
[6] See footnote 2.
[7] See footnote 3.

2) If the SAR of an antenna tested with the default battery or an additional battery and the default body-worn accessory using the highest SAR channel is > 6.0 W/kg, test that battery, antenna and default body-worn accessory on the required immediately adjacent channels and on all required channels if the highest SAR channel or an adjacent channel is > 7.0 W/kg.
3) An antenna tested using the default battery and default body-worn accessory with highest SAR ≤ 4.0 W/kg[8] does not need to be tested using additional batteries when such batteries provide a minimum separation distance, between the device and the user, greater than or equal to that established by the default battery.

F) Report the measured body SAR in formats similar to the following for the default body-worn accessory:

Example for Illustration Only					
Body-worn Accessory 1: *Model Number* Default Audio Accessory I: *Model Number*					
Antenna (MHz)	Measured	Ch. Freq. (MHz)	Battery		
			Standard	I	II
A (470 – 490)	Power (W)	470.5			
		480.0			
		489.5			
	SAR (W/kg)	470.5			
		480.0			
		489.5			
B (420 – 450)	Power (W)	420.5			
		430.0			
		440.0			
		449.5			
	SAR (W/kg)	420.5			
		430.0			
		440.0			
		449.5			
C (450 – 465)	Power (W)	450.5			
		464.5			
	SAR (W/kg)	450.5			
		464.5			
D (465 – 470)	Power (W)	467.5			
	SAR (W/kg)	467.5			
Reported SAR values have already been scaled by the applicable duty factor Antenna, battery and accessory specifications are explained in the product descriptions section When test reduction applies, the slots for such configurations are left blank *(Need to confirm this table layout works)*					

G) Repeat the above test sequence for the additional body-worn accessories by replacing the "default body-worn" accessory with each "additional body-worn accessory".
1) For body-worn accessories with similar construction and operating configurations, test only the body-worn accessory within the group that is expected to result in the highest SAR. This is typically determined by the smallest antenna separation distance provided by the body-worn accessory, between the device and the user, with the applicable side(s) of the device facing the user. Similarities in construction and operating configurations for batteries and body-worn accessories must be clearly explained in the SAR report.

[8] See footnote 3.

Body SAR Test Considerations for Audio Accessories with Integral Antenna

Audio accessories with an integral radiating element (antenna) must be tested separately from those without any primary radiating element. An audio accessory with a built-in antenna that enables the (main) antenna on the (PTT) device to be disconnected from its output while the audio accessory is in use should be tested using the highest capacity default battery. When transmission from the (main) antenna on the (PTT) device is disabled while the audio accessory is transmitting using its integral antenna, body-worn accessories for the device are not expected to influence the SAR of the audio accessory. In addition, different body-worn accessories or attachments are generally used for audio accessories with an integral antenna, which must be tested according to the way these are attached to the user during normal operation. Body SAR is measured with the audio accessory positioned against a flat phantom representative of the normal operating and exposure conditions expected by users. All sides of the device that may be positioned against the user must be considered for SAR compliance.

A) The audio accessory is tested on the highest output power channel, according to the test channels required by KDB 447498 (6)(c) and in the frequency range covered by the antenna on the audio accessory within each device operating frequency band to measure body SAR.[9]
B) When the body SAR of an audio accessory tested on the highest output power channel is ≤ 4.0 W/kg, testing of the required immediately adjacent channel(s) is not necessary. When the body SAR of an audio accessory tested on the highest output power channel using the default battery is ≤ 3.5 W/kg, testing of all other required channels is not necessary. For the remaining channels that require testing, the exclusion of 4.0 W/kg for the required immediately adjacent channels and 3.5 W/kg for subsequent remaining channels may be applied recursively with respect to the highest output power channel among the remaining channels. When the body SAR of an audio accessory tested on the highest output power channel is > 4.0 W/kg, body SAR should be measured on the required immediately adjacent channels and on all required channels if the highest SAR channel or an adjacent channel is > 7.0 W/kg.
C) For audio accessories of the same type and construction, including the antenna, with similar SAR distributions, operating within the same device operating frequency band, if the (antenna) frequency range of an audio accessory (A) is fully within the (antenna) frequency range of another audio accessory (B) and the highest SAR for accessory (A) is ≤ 4.0 W/kg or ≤ 6.0 W/kg and at least 25% lower than the highest SAR measured for accessory (B) within the device operating frequency band, further body SAR tests are not necessary for audio accessory (A)
D) Report the measured body SAR in formats similar to the following for the audio accessory:

Example for Illustration Only			
Body SAR – audio accessories with integral antenna			
Audio Accessory (MHz)	Measured	Ch. Freq. (MHz)	SAR (W/kg)
A: *Model #* (470 – 490)	Power (W)	470.5	
		480.0	
		489.5	
	SAR (W/kg)	470.5	
		480.0	
		489.5	
B: *Model #* (450 – 465)	Power (W)	450.5	
		464.5	
	SAR (W/kg)	450.5	
		464.5	
Reported SAR values have already been scaled by the applicable duty factor Antenna, battery and accessory specifications are explained in the product descriptions section When test reduction applies, the slots for such configurations are left blank *(Need to confirm this table layout works)*			

[9] See footnote 1.

Body SAR Test Considerations for Audio Accessories without Built-in Antenna

For audio accessories that do not have any built-in radiating element, the antenna, battery and body-worn accessory combinations that are applicable to each audio accessory must be clearly identified in a format similar to the following, with the applicable combinations requiring testing highlighted to facilitate reviewing the results.

Example for Illustration Only												
Antenna (1 – 5)	Battery											
	a				b				c			
	Body-worn				Body-worn				Body-worn			
Audio Accessory	A	B	C	D	A	B	C	D	A	B	C	D
I	1, 2, 3, 4, 5	N/A	1, 3, 4, 5	N/A	3, 4, 5	1, 2, 3, 4, 5	2, 3	N/A	N/A	2, 4	1, 2, 3, 4, 5	1, 4
II	1, 2, 3, 4	1, 2, 3, 4, 5	N/A	1, 2, 3, 4, 5	N/A	N/A	1, 2, 3, 4, 5	2, 5	3, 5	1, 2, 3, 4, 5	N/A	N/A
III	2, 3, 4, 5	N/A	2, 3, 4, 5	2, 5	1, 3, 4, 5	1, 3, 5	N/A	1, 2, 3, 4, 5	1, 2, 3, 4, 5	N/A	2, 3, 4	1, 2, 3, 4, 5

In this example, audio accessories only work with the subset of antenna, battery and body-worn accessory combinations identified in the table, where N/A indicates the audio accessory (I, II or III) and/or the battery (a, b, or c) is not supported or applicable for the body-worn accessory. The antenna numbers listed for each body-worn accessory and battery combination identify the antennas supported or applicable for that body-worn accessory.

The possible combinations are highly dependent on the design and implementation of an individual device and the applicable antenna and accessory combinations. The above table must be adapted accordingly for the specific product and accessory combinations in use. The combinations require testing should be highlighted.

(Need to confirm this table layout works)

A) For audio accessories with similar construction and operating requirements, test only the audio accessory within the group that is expected to result in the highest SAR, with respect to changes in RF characteristics and exposure conditions for the combination. If it is unclear which audio accessory within a group of similar accessories is expected to result in the highest SAR, good engineering judgment or preliminary testing should be applied to select the accessory that is expected to result in the highest SAR. Similarities in construction and operating configurations must be clearly explained in the SAR report.

B) Based on the SAR measured in the body-worn test sequence, without audio accessory, if the SAR for the antenna, body-worn accessory and battery combination(s) applicable to an audio accessory are all ≤ 4.0 W/kg, SAR tests for that audio accessory is not necessary.

C) Based on the SAR measured in the body-worn test sequence, without audio accessory, if the SAR for the antenna, body-worn accessory and battery combination(s) applicable to an audio accessory is/are > 4.0 W/kg, test that audio accessory using the highest body-worn SAR combination and channel configuration applicable to the audio accessory.

D) If the SAR measured for an audio accessory combination is > 6.0 W/kg, test that audio accessory on the required immediately adjacent channels and on all required channels if the highest SAR channel or an adjacent channel is > 7.0 W/kg, using the highest body-worn SAR combination applicable to that audio accessory.

E) If the SAR measured for an audio accessory is > 7.0 W/kg and it is one of the accessories within a group of similar audio accessories, test all other audio accessories within that group of similar audio accessories using the 7.0 W/kg audio accessory test combination.

   1) If the highest SAR for a similar audio accessory is > 7.0 W/kg, test that audio accessory on all required channels using that combination of antenna, battery and body-worn accessory.

F) Report the measured body SAR for audio accessories in formats similar to the following

Example for Illustration Only							
Audio Accessory I: *Model Number*							
Antenna (MHz)	Measured	Ch. Freq. (MHz)	Battery (a – c) & Body-Worn (1 – 5) Combinations				
			c/1	c/2	c/3	b/4	b/5
A (470 – 490)	Power (W)	470.5					
		480.0					
		489.5					
	SAR (W/kg)	470.5					
		480.0					
		489.5					
B (420 – 450)	Power (W)	420.5					
		430.0					
		440.0					
		449.5					
	SAR (W/kg)	420.5					
		430.0					
		440.0					
		449.5					
C (450 – 465)	Power (W)	450.5					
		464.5					
	SAR (W/kg)	450.5					
		464.5					
D (465 – 470)	Power (W)	467.5					
	SAR (W/kg)	467.5					
Reported SAR values have already been scaled by the applicable duty factor Antenna, battery and accessory specifications are explained in the product descriptions section When test reduction applies, the slots for such configurations are left blank *(Need to confirm this table layout works)*							

General Reporting Procedures

All SAR values should be reported as measured, with the applicable duty factor taken into consideration. Adjustments made to account for tune-up tolerances should be considered separately, apart from the reported SAR summary results. SAR adjustments for tune-up tolerances are only needed for the highest reported SAR and SAR results that are within the tune-up tolerance range from the SAR limit, with respect to the power applied during testing for the individual channels, to determine compliance.