

	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

Certificate No. 2470.01

RF EXPOSURE EVALUATION

SPECIFIC ABSORPTION RATE

SAR TEST REPORT

FOR

VERTEX STANDARD CO., LTD.

PORTABLE FM UHF PTT RADIO TRANSCEIVER

Model(s)

**VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5
VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5**

IDENTIFIER(S)	FCC ID: K6610584821	IC ID: 511B-10584821
Test Standard(s) and Procedure(s)	FCC OET Bulletin 65, Supplement C (01-01)	
	Industry Canada RSS-102 Issue 2	

Test Report Serial Number

073106K66-T765-S90U

Test Report Revision Number

Revision 1.0 (Initial Release)

Test Location

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



Certificate No. 2470.01

<u>Test Report Prepared By:</u> Cheri Frangiadakis Test Report Writer Celltech Labs Inc.	<u>Test Report Reviewed By:</u> Jonathan Hughes General Manager Celltech Labs Inc.
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Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Lab	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	
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Certificate No. 2470.01				

DECLARATION OF COMPLIANCE SAR RF EXPOSURE EVALUATION

<u>Test Location</u> CELLTECH LABS INC. Testing and Engineering Services 1955 Moss Court Kelowna, B.C. Canada V1Y 9L3 Phone: 250-448-7047 Fax: 250-448-7046 e-mail: info@celltechlabs.com web site: www.celltechlabs.com		<u>Company Information</u> VERTEX STANDARD CO., LTD. 4-8-8 Nakameguro, Meguro-Ku Tokyo 153-8644 Japan	
FCC IDENTIFIER: IC IDENTIFIER: Model(s):		K6610584821 511B-10584821 VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5, VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5	
Test Requirement(s): Test Procedure(s): Device Classification: Device Description: Modulation Type:		FCC 47 CFR §2.1093; Health Canada Safety Code 6 FCC OET Bulletin 65, Supplement C (Edition 01-01) Industry Canada RSS-102 Issue 2 Licensed Non-Broadcast Transmitter Held to Face (TNF) Portable FM UHF PTT Radio Transceiver FM (UHF)	
Transmit Frequency Range: Max. RF Output Power Measured: Antenna Type(s) Tested: Battery Type(s) Tested:		380 - 450 MHz 4.7 Watts (36.7 dBm) Conducted (380 MHz) 5.1 Watts (37.1 dBm) Conducted (415 MHz) 5.4 Watts (37.3 dBm) Conducted (450 MHz) External Whip (P/N: ATU-6A1) Lithium-ion 7.4 V 1150 mAh (P/N: FNB-V86LI) Lithium-ion 7.4 V 2000 mAh (P/N: FNB-V87LI) Lithium-ion 7.4 V 3000 mAh (P/N: FNB-V92LI) Lithium-ion 7.4 V 3000 mAh - Intrinsically Safe (P/N: FNB-V92LIIS) Alkaline 1.5 V 2850 mAh (Duracell Procell AA x6) Alkaline Battery Case (P/N: FBA-34)	
Body-Worn Accessories Tested: Audio Accessories Tested:		Plastic Belt-Clip with Metal Spring (P/N: CLIP-820) Leather Case with Belt-Loop (P/N: LCC-820) Speaker-Microphone (P/N: MH-65B7A)	
Max. SAR Level(s) Evaluated:		Face-held: 3.55 W/kg (1g) - 50% Duty Cycle Body-worn: 7.77 W/kg (1g) - 50% Duty Cycle	

Celltech Labs Inc. declares under its sole responsibility that this wireless portable device has demonstrated compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 and Health Canada's Safety Code 6. The device was tested in accordance with the measurement standards and procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01) and Industry Canada RSS-102 Issue 2 for the Occupational / Controlled Exposure environment. All measurements were performed in accordance with the SAR system manufacturer's recommendations.

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

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

Test Report Approved By:

Sean Johnston
SAR Lab Manager
Celltech Labs Inc.



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

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Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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	Report Issue Date August 30, 2006	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational	

1.0 INTRODUCTION

This measurement report demonstrates compliance of the Vertex Standard Co., Ltd. Models: VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5, VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5 Portable FM UHF PTT Radio Transceiver FCC ID: K6610584821 with the SAR (Specific Absorption Rate) RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) and Health Canada Safety Code 6 (see reference [2]) for the Occupational / Controlled Exposure environment. The test procedures described in FCC OET Bulletin 65, Supplement C (Edition 01-01) (see reference [3]) and IC RSS-102 Issue 2 (see reference [4]) were employed. A description of the product and operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the various provisions of the rules are included within this test report.

2.0 DESCRIPTION OF DEVICE UNDER TEST (DUT)

Test Requirement(s)	FCC Rule Part 47 CFR §2.1093			
	Health Canada Safety Code 6			
Test Procedure(s)	FCC OET Bulletin 65, Supplement C (01-01)			
	Industry Canada RSS-102 Issue 2			
FCC Device Classification	Licensed Non-Broadcast Transmitter Held to Face (TNF)			
IC Device Classification	Land Mobile Radio Transmitter (RSS-119)			
Device Description	Portable FM UHF PTT Radio Transceiver			
RF Exposure Category	Occupational / Controlled Environment			
FCC IDENTIFIER	K6610584821			
IC IDENTIFER	511B-10584821			
Model(s)	VX-P821-G8-5	VX-P824-G8-5	VX-P829-G8-5	
	VX-P871-G8-5	VX-P874-G8-5	VX-P879-G8-5	
Test Sample Serial No.	6I000003		Production Unit	
Modulation Type	FM (UHF)			
Transmit Frequency Range	380 - 450 MHz			
Max. RF Output Power Measured	4.7 Watts	36.7 dBm	380 MHz	Conducted
	5.1 Watts	37.1 dBm	415 MHz	Conducted
	5.4 Watts	37.3 dBm	450 MHz	Conducted
Battery Type(s) Tested	Lithium-ion	7.4 V	1150 mAh	P/N: FNB-V86LI
	Lithium-ion	7.4 V	2000 mAh	P/N: FNB-V87LI
	Lithium-ion	7.4 V	3000 mAh	P/N: FNB-V92LI
	Lithium-ion Intrinsically Safe	7.4 V	3000 mAh	P/N: FNB-V92LIIS
	Alkaline Batteries (6x AA)	9 V	2850 mAh	P/N: FBA-34 (Case)
Antenna Type(s) Tested	External Whip	Length: 166 mm		P/N: ATU-6A1
Body-Worn Accessories Tested	Belt-Clip (Plastic with Metal Spring)			P/N: CLIP-820
	Leather Case with Belt-Loop			P/N: LCC-820
Audio Accessories Tested	Speaker-Microphone			P/N: MH-65B7A
Additional Audio Accessories (Additional Testing Not Required)	Speaker-Microphone			P/N: MH-50D7A
	Submersible Speaker-Microphone			P/N: MH-66A7A
	Submersible Speaker-Microphone			P/N: MH-66B7A

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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Certificate No. 2470.01				

3.0 SAR MEASUREMENT SYSTEM

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



DASY4 SAR Measurement System with Plexiglas validation phantom



DASY4 SAR Measurement System with Plexiglas side planar phantom

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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4.0 MEASUREMENT SUMMARY

FACE-HELD SAR EVALUATION RESULTS

Freq. (MHz)	Chan.	Test Mode	Antenna Type	Battery Type		Separation Distance to Planar Phantom	Cond. Power Before Test	Measured SAR 1g (W/kg)		SAR Drift During Test	Scaled SAR with droop 1g (W/kg)	
								Duty Cycle			Duty Cycle	
				Type	mAh			cm	Watts		100%	50%
415	Mid	CW	Whip	Li-ion	1150	2.5	5.1	5.50	2.75	-0.379	6.00	3.00
415	Mid	CW	Whip	Li-ion	2000	2.5	5.1	5.92	2.96	-0.574	6.76	3.38
415	Mid	CW	Whip	Li-ion	3000	2.5	5.1	6.28	3.14	-0.531	7.10	3.55
415	Mid	CW	Whip	Li-ion IS	3000	2.5	5.1	6.34	3.17	-0.436	7.01	3.50
415	Mid	CW	Whip	Alkaline	2850	2.5	5.1	2.75	1.38	-0.848	3.34	1.67
ANSI / IEEE C95.1 1999 - SAFETY LIMIT				BRAIN: 8.0 W/kg (averaged over 1 gram)				Spatial Peak Controlled Exposure / Occupational				
Test Date		August 21, 2006				Relative Humidity		32		%		
Measured Fluid Type		450 MHz Brain				Atmospheric Pressure		101.1		kPa		
Dielectric Constant ϵ_r		IEEE Target		Measured	Deviation	Ambient Temperature		23.8		°C		
		43.5	± 5%	43.8	+0.7%	Fluid Temperature		23.5		°C		
Conductivity σ (mho/m)		IEEE Target		Measured	Deviation	Fluid Depth		≥ 15		cm		
		0.87	± 5%	0.87	0.0%	ρ (Kg/m ³)		1000				
Note(s)		1.	The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.									
		2.	If the scaled SAR levels evaluated at the mid channel (50% duty cycle) were ≥ 3 dB below the SAR limit, SAR evaluation for the low and high channels was optional per FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]).									
		3.	The area scan evaluation was performed with a fully charged battery. After the area scan was completed the radio was cooled down to room temperature and the battery was replaced with a fully charged battery prior to the zoom scan evaluation.									
		4.	The power droops measured by the DASY4 system for the duration of the SAR evaluations were added to the measured SAR levels to report scaled SAR results as shown in the above test data table.									
		5.	The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluations. The temperatures reported were consistent for all measurement periods.									
		6.	The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).									
		7.	The SAR evaluations were performed within 24 hours of the system performance check.									

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5					Portable FM UHF PTT Radio Transceiver	
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MEASUREMENT SUMMARY (CONT.)

BODY-WORN SAR EVALUATION RESULTS

Freq. (MHz)	Chan.	Test Mode	Antenna Type	Battery Type		Accessories		Separation Distance to Planar Phantom	Cond. Power Before Test	Measured SAR 1g (W/kg)		SAR Drift During Test	Scaled SAR 1g (W/kg) with droop	
										Duty Cycle			Duty Cycle	
				Type	mAh	Body-worn	Audio			cm	Watts		100%	50%
415	Mid	CW	Whip	Li-ion	1150	Belt-Clip	Speaker-Mic	1.1	5.1	8.17	4.09	-0.330	8.81	4.41
415	Mid	CW	Whip	Li-ion	2000	Belt-Clip	Speaker-Mic	1.1	5.1	8.83	4.42	-0.361	9.60	4.80
415	Mid	CW	Whip	Li-ion	3000	Belt-Clip	Speaker-Mic	1.0	5.1	11.0	5.50	-0.304	11.8	5.90
415	Mid	CW	Whip	Li-ion IS	3000	Belt-Clip	Speaker-Mic	1.0	5.1	10.4	5.20	-0.414	11.4	5.72
415	Mid	CW	Whip	Alkaline	2850	Belt-Clip	Speaker-Mic	0.7	5.1	5.38	2.69	-0.861	6.56	3.28
415	Mid	CW	Whip	Li-ion	1150	Leather Case	Speaker-Mic	1.0	5.1	14.4	7.20	-0.330	15.5	7.77
415	Mid	CW	Whip	Li-ion	2000	Leather Case	Speaker-Mic	1.0	5.1	13.4	6.70	-0.421	14.8	7.38
380	Low	CW	Whip	Li-ion	1150	Leather Case	Speaker-Mic	1.0	4.7	12.5	6.25	-0.366	13.6	6.80
450	High	CW	Whip	Li-ion	1150	Leather Case	Speaker-Mic	1.0	5.4	10.6	5.30	-0.386	11.6	5.80

ANSI / IEEE C95.1 1999 - SAFETY LIMIT

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

Spatial Peak
Controlled Exposure / Occupational

Test Date	August 22, 2006			Relative Humidity		33	%
Measured Fluid Type	450 MHz Body			Atmospheric Pressure		101.5	kPa
Dielectric Constant ϵ_r	IEEE Target	Measured	Deviation	Ambient Temperature		23.0	°C
	56.7	± 5%	56.7	0.0%	Fluid Temperature	23.0	°C
Conductivity σ (mho/m)	IEEE Target	Measured	Deviation	Fluid Depth		≥ 15	cm
	0.94	± 5%	0.94	0.0%	ρ (Kg/m ³)	1000	

Note(s)

- The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
- If the scaled SAR levels evaluated at the mid channel (50% duty cycle) were ≥ 3 dB below the SAR limit, SAR evaluation for the low and high channels was optional per FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]).
- The low and high channels were evaluated in the worst-case battery / body-worn accessory configuration measured at the mid channel.
- The area scan evaluation was performed with a fully charged battery. After the area scan was completed the radio was cooled down to room temperature and the battery was replaced with a fully charged battery prior to the zoom scan evaluation.
- The power droops measured by the DASY4 system for the duration of the SAR evaluations were added to the measured SAR levels to report scaled SAR results as shown in the above test data table.
- A SAR-versus-Time power droop evaluation was performed in the test configuration that reported the maximum-scaled SAR level. See Appendix A (SAR Test Plots) for SAR-versus-Time power droop evaluation plot.
- The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluations. The temperatures reported were consistent for all measurement periods.
- The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).
- The SAR evaluations were performed within 24 hours of the system performance check.

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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5.0 DETAILS OF SAR EVALUATION

The Vertex Standard Co., Ltd. Models: VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5, VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5 Portable FM UHF PTT Radio Transceiver FCC ID: K6610584821 was compliant for localized Specific Absorption Rate (Occupational / Controlled Exposure) based on the test provisions and conditions described below. The detailed test setup photographs are shown in Appendix D.

Test Configuration(s)

1. The DUT was evaluated in a face-held configuration with the front of the radio placed parallel to the outer surface of the planar phantom. A 2.5 cm separation distance was maintained between the front side of the DUT and the outer surface of the planar phantom.
2. The DUT was evaluated in a body-worn configuration with the back of the radio placed parallel to the outer surface of the planar phantom. The attached Belt-Clip accessory (P/N: CLIP-820) was touching the planar phantom and provided a separation distance from the back of the DUT and the outer surface of the planar phantom (the actual separation distance varied depending on the thickness of the battery type under test - see test data table on page 7 for measured belt-clip separation distances).
3. The DUT was tested in a body-worn configuration with the radio placed inside the Leather Case with Belt-Loop accessory (P/N: LCC-820). The back of the radio was placed facing parallel to the outer surface of the planar phantom. The back of the Leather Case with Belt-Loop accessory was touching the outer surface of the planar phantom and provided a 1.0 cm separation distance between the back of the DUT and the outer surface of the planar phantom.
4. The DUT was evaluated for body-worn SAR with the speaker-microphone accessory connected to the audio port.

Test Modes & Power Settings

5. The DUT was tested at maximum power 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.
6. The conducted power levels were measured prior to the SAR evaluations using a Gigatronics 8652A Universal Power Meter according to the procedures described in FCC 47 CFR §2.1046.
7. The area scan evaluation was performed with a fully charged battery. After the area scan was completed the radio was cooled down to room temperature and the battery was replaced with a fully charged battery prior to the zoom scan evaluation.
8. The power drift of the DUT during the SAR evaluations was measured by the DASY4 system.

Test Conditions

9. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter checks and the SAR evaluations. The temperatures reported were consistent for all measurement periods.
10. The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluations using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).
11. The SAR evaluations were performed within 24 hours of the system performance check.

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

6.0 EVALUATION PROCEDURES

- a. (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation, both the left and right ear positions were evaluated using the SAM phantom.
(ii) For body-worn and face-held devices a planar phantom was used.
- b. The SAR was determined by a pre-defined procedure within the DASY4 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 15mm x 15mm.

An area scan was determined as follows:

- c. Based on the defined area scan grid, a more detailed grid is created to increase the points by a factor of 10. The interpolation function then evaluates all field values between corresponding measurement points.
- d. A linear search is applied to find all the candidate maxima. Subsequently, all maxima are removed that are >2 dB from the global maximum. The remaining maxima are then used to position the cube scans.

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

- e. Extrapolation is used to find the points between the dipole center of the probe and the surface of the phantom. This data cannot be measured, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.4 mm (see probe calibration document in Appendix F). The extrapolation was based on trivariate quadratics computed from the previously calculated 3D interpolated points nearest the phantom surface.
- f. Interpolated data is used to calculate the average SAR over 1g and 10g cubes by spatially discretizing the entire measured cube. The volume used to determine the averaged SAR is a 1mm grid (42875 interpolated points).
- g. A zoom scan volume of 32 mm x 32 mm x 30 mm (5 x 5 x 7 points) centered at the peak SAR location determined from the area scan is used for all zoom scans for devices with a transmit frequency < 800 MHz. Zoom scans for frequencies ≥ 800 MHz are determined with a scan volume of 30 mm x 30 mm x 30 mm (7 x 7 x 7) to ensure complete capture of the peak spatial-average SAR.

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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7.0 SYSTEM PERFORMANCE CHECK

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

SYSTEM PERFORMANCE CHECK EVALUATION

Test Date	Equiv. Tissue	SAR 1g (W/kg)			Dielectric Constant ϵ_r			Conductivity σ (mho/m)			ρ (Kg/m ³)	Amb. Temp. (°C)	Fluid Temp. (°C)	Fluid Depth (cm)	Humid. (%)	Barom. Press. (kPa)
	Freq. MHz	IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.						
8/21/06	Brain 450	1.23 $\pm 10\%$	1.27	3.3%	43.5 $\pm 5\%$	43.8	+0.7%	0.87 $\pm 5\%$	0.87	0.0%	1000	23.8	23.5	≥ 15	32	101.1
Note(s):		The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the system performance check. The temperatures listed in the table above were consistent for all measurement periods.														

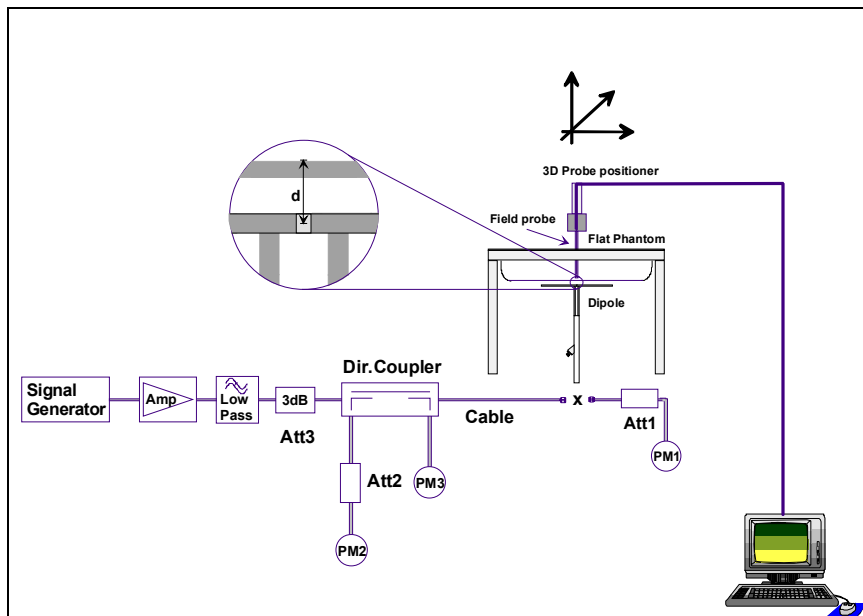


Figure 1. System Performance Check Setup Diagram



450 MHz Dipole Setup

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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8.0 SIMULATED EQUIVALENT TISSUES

The 450MHz brain and body simulated tissue mixtures consist of a viscous gel using hydroxethylcellulose (HEC) gelling agent and saline solution. Preservation with a bactericide is added and visual inspection is made to ensure air bubbles are not trapped during the mixing process. The fluid was prepared according to standardized procedures, and measured for dielectric parameters (permittivity and conductivity).

SIMULATED TISSUE MIXTURES		
INGREDIENT	450 MHz Brain	450 MHz Body
	System Check & DUT Evaluation	DUT Evaluation
Water	38.56 %	52.00 %
Sugar	56.32 %	45.65 %
Salt	3.95 %	1.75 %
HEC	0.98 %	0.50 %
Bactericide	0.19 %	0.10 %

9.0 SAR SAFETY LIMITS

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

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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10.0 ROBOT SYSTEM SPECIFICATIONS

<u>Specifications</u>	
Positioner:	Stäubli Unimation Corp. Robot Model: RX60L
Repeatability:	0.02 mm
No. of axis:	6
<u>Data Acquisition Electronic (DAE) System</u>	
<u>Cell Controller</u>	
Processor:	AMD Athlon XP 2400+
Clock Speed:	2.0 GHz
Operating System:	Windows XP Professional
<u>Data Converter</u>	
Features:	Signal Amplifier, multiplexer, A/D converter, and control logic
Software:	Measurement Software: DASY4, V4.7 Build 44
	Postprocessing Software: SEMCAD, V1.8 Build 171
Connecting Lines:	Optical downlink for data and status info. Optical uplink for commands and clock
<u>DASY4 Measurement Server</u>	
Function:	Real-time data evaluation for field measurements and surface detection
Hardware:	PC/104 166MHz Pentium CPU; 32 MB chipdisk; 64 MB RAM
Connections:	COM1, COM2, DAE, Robot, Ethernet, Service Interface
<u>E-Field Probe</u>	
Model:	ET3DV6
Serial No.:	1387
Construction:	Triangular core fiber optic detection system
Frequency:	10 MHz to 6 GHz
Linearity:	±0.2 dB (30 MHz to 3 GHz)
<u>Phantom(s)</u>	
<u>Evaluation Phantom</u>	
Type:	Side Planar Phantom
Shell Material:	Plexiglas
Bottom Thickness:	2.0 mm ± 0.1 mm
Outer Dimensions:	75.0 cm (L) x 22.5 cm (W) x 20.5 cm (H); Back Plane: 25.7 cm (H)
<u>Validation Phantom (≤ 450MHz)</u>	
Type:	Planar Phantom
Shell Material:	Plexiglas
Bottom Thickness:	6.2 mm ± 0.1 mm
Outer Dimensions:	86.0 cm (L) x 39.5 cm (W) x 21.8 cm (H)

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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11.0 PROBE SPECIFICATION (ET3DV6)

Construction: Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, glycol) Calibration: In air from 10 MHz to 2.5 GHz In brain simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy $\pm 8\%$) Frequency: 10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz) Directivity: ± 0.2 dB in brain tissue (rotation around probe axis) ± 0.4 dB in brain tissue (rotation normal to probe axis) Dynamic Range: $5 \mu\text{W/g}$ to $> 100 \text{ mW/g}$; Linearity: ± 0.2 dB Surface Detect: ± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces Dimensions: Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm Application: General dosimetry up to 3 GHz Compliance tests of mobile phone	
	ET3DV6 E-Field Probe

12.0 SIDE PLANAR PHANTOM

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

13.0 VALIDATION PLANAR PHANTOM

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

14.0 DEVICE HOLDER

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

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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15.0 TEST EQUIPMENT LIST

TEST EQUIPMENT		ASSET NO.	SERIAL NO.	DATE CALIBRATED		CALIBRATION DUE DATE
USED	DESCRIPTION					
x	Schmid & Partner DASY4 System	-	-	-	-	-
x	-DASY4 Measurement Server	00158	1078	N/A	N/A	N/A
x	-Robot	00046	599396-01	N/A	N/A	N/A
x	-DAE4	00019	353	21Jun06	21Jun07	21Jun07
	-DAE3	00018	370	08Feb06	08Feb07	08Feb07
x	-ET3DV6 E-Field Probe	00016	1387	16Mar06	16Mar07	16Mar07
	-EX3DV4 E-Field Probe	00125	3547	14Feb06	14Feb07	14Feb07
	-300MHz Validation Dipole	00023	135	25Oct05	25Oct06	25Oct06
x	-450MHz Validation Dipole	00024	136	25Oct05	25Oct06	25Oct06
	-835MHz Validation Dipole	00022	411	Brain	28Mar06	28Mar07
				Body	27Mar06	27Mar07
	-900MHz Validation Dipole	00020	054	Brain	06Jun06	06Jun07
				Body	06Jun06	06Jun07
	-1800MHz Validation Dipole	00021	247	Brain	08Jun06	08Jun07
				Body	09Jun06	09Jun07
	-1900MHz Validation Dipole	00032	151	Brain	09Jun06	09Jun07
				Body	12Jun06	12Jun07
	-2450MHz Validation Dipole	00025	150	Brain	20Sep05	20Sep06
				Body	24Apr06	24Apr07
	-5800MHz Validation Dipole	00126	1031	Brain	15Mar06	15Mar07
	-SAM Phantom V4.0C	00154	1033	N/A	N/A	N/A
	-Barski Planar Phantom	00155	03-01	N/A	N/A	N/A
x	-Plexiglas Side Planar Phantom	00156	161	N/A	N/A	N/A
x	-Plexiglas Validation Planar Phantom	00157	137	N/A	N/A	N/A
x	ALS-PR-DIEL Dielectric Probe Kit	00160	260-00953	N/A	N/A	N/A
	Gigatronics 8652A Power Meter	00110	1835801	12Apr06	12Apr07	12Apr07
x	Gigatronics 8652A Power Meter	00007	1835272	03Feb06	03Feb07	03Feb07
	Gigatronics 80701A Power Sensor	00011	1833542	03Feb06	03Feb07	03Feb07
	Gigatronics 80701A Power Sensor	00012	1834350	12Sep05	12Sep06	12Sep06
x	Gigatronics 80701A Power Sensor	00013	1833713	03Feb06	03Feb07	03Feb07
x	Gigatronics 80701A Power Sensor	00014	1833699	07Sep05	07Sep06	07Sep06
x	HP 8753ET Network Analyzer	00134	US39170292	18Apr06	18Apr07	18Apr07
	HP 8648D Signal Generator	00005	3847A00611	N/A	N/A	N/A
	Rohde & Schwarz SMR40 Signal Generator	00006	100104	06Apr06	06Apr07	06Apr07
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	N/A	N/A	N/A

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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Certificate No. 2470.01				

16.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION						
Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	Uncertainty Value ±% (1g)	V _i or V _{eff}
Measurement System						
Probe calibration	4.0	Normal	1	1	4.0	∞
Axial isotropy of the probe	4.7	Rectangular	1.732050808	0.7	1.9	∞
Spherical isotropy of the probe	9.6	Rectangular	1.732050808	0.7	3.9	∞
Spatial resolution	0	Rectangular	1.732050808	1	0.0	∞
Boundary effects	1	Rectangular	1.732050808	1	0.6	∞
Probe linearity	4.7	Rectangular	1.732050808	1	2.7	∞
Detection limit	1	Rectangular	1.732050808	1	0.6	∞
Readout electronics	0.3	Normal	1	1	0.3	∞
Response time	0.8	Rectangular	1.732050808	1	0.5	∞
Integration time	2.6	Rectangular	1.732050808	1	1.5	∞
RF ambient conditions	3	Rectangular	1.732050808	1	1.7	∞
Mech. constraints of robot	0.4	Rectangular	1.732050808	1	0.2	∞
Probe positioning	2.9	Rectangular	1.732050808	1	1.7	∞
Extrapolation & integration	1	Rectangular	1.732050808	1	0.6	∞
Test Sample Related						
Device positioning	2.9	Normal	1	1	2.9	12
Device holder uncertainty	3.6	Normal	1	1	3.6	8
Power drift	5	Rectangular	1.732050808	1	2.9	∞
Phantom and Setup						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	∞
Liquid conductivity (measured)	2.5	Normal	1	0.64	1.6	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	2.5	Normal	1	0.6	1.5	∞
Combined Standard Uncertainty					9.88	
Expanded Uncertainty (k=2)					19.77	

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

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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MEASUREMENT UNCERTAINTIES (CONT.)

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

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

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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17.0 REFERENCES

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

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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				Certificate No. 2470.01

APPENDIX A - SAR MEASUREMENT DATA

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Ltd	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

Date Tested: 08/21/2006

Face-Held SAR - Li-ion Battery (1150 mAh) - Mid Channel - 415 MHz

DUT: Vertex Model: VX-829-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6I000003

Ambient Temp: 23.8°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.1 kPa; Humidity: 32%

Communication System: FM UHF

Frequency: 415 MHz; Duty Cycle: 1:1

RF Conducted Power: 5.1 Watts (Conducted)

7.4V 1150mAh Li-ion Battery Pack (P/N: FNB-V86LI)

Medium: HSL450 ($\sigma = 0.87$ mho/m; $\epsilon_r = 43.8$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.4, 7.4, 7.4); Calibrated: 16/03/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

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

Area Scan (8x20x1): Measurement grid: dx=15mm, dy=15mm

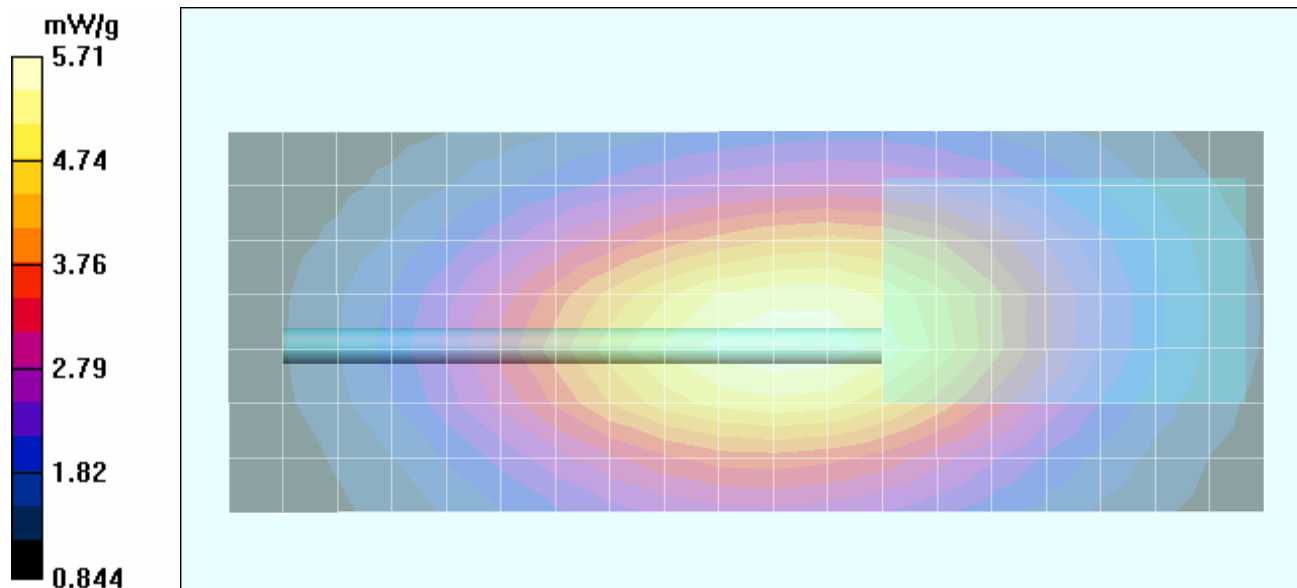
Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 78.3 V/m; Power Drift = -0.379 dB

Peak SAR (extrapolated) = 8.50 W/kg

SAR(1 g) = 5.50 mW/g; SAR(10 g) = 3.96 mW/g



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Lab	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

Date Tested: 08/21/2006

Face-Held SAR - Li-ion Battery (2000 mAh) - Mid Channel - 415 MHz

DUT: Vertex Model: VX-829-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 61000003

Ambient Temp: 23.8°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.1 kPa; Humidity: 32%

Communication System: FM UHF

Frequency: 415 MHz; Duty Cycle: 1:1

RF Conducted Power: 5.1 Watts (Conducted)

7.4V 2000mAh Li-ion Battery Pack (P/N: FNB-V87LI)

Medium: HSL450 ($\sigma = 0.87$ mho/m; $\epsilon_r = 43.8$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.4, 7.4, 7.4); Calibrated: 16/03/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

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

Area Scan (8x20x1): Measurement grid: dx=15mm, dy=15mm

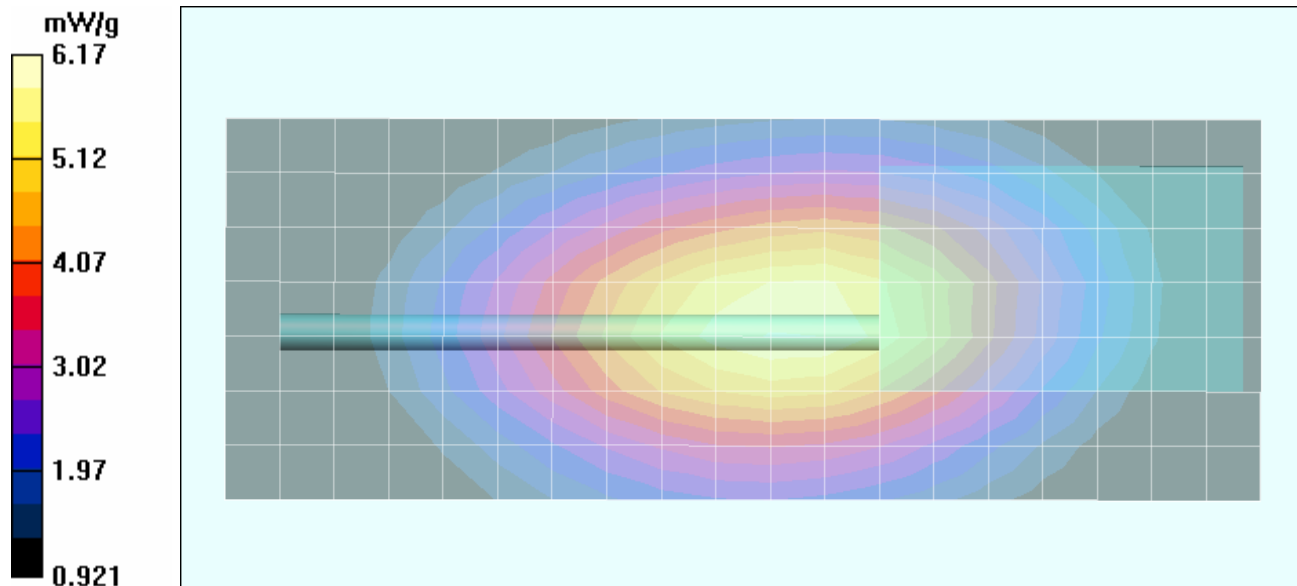
Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 83.2 V/m; Power Drift = -0.574 dB

Peak SAR (extrapolated) = 9.22 W/kg

SAR(1 g) = 5.92 mW/g; SAR(10 g) = 4.24 mW/g



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Ltd	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

Date Tested: 08/21/2006

Face-Held SAR - Li-ion Battery (3000 mAh) - Mid Channel - 415 MHz

DUT: Vertex Model: VX-829-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 61000003

Ambient Temp: 23.8°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.1 kPa; Humidity: 32%

Communication System: FM UHF

Frequency: 415 MHz; Duty Cycle: 1:1

RF Conducted Power: 5.1 Watts (Conducted)

7.4V 3000mAh Li-ion Battery Pack (P/N: FNB-V92LI)

Medium: HSL450 ($\sigma = 0.87$ mho/m; $\epsilon_r = 43.8$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.4, 7.4, 7.4); Calibrated: 16/03/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

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

Area Scan (8x20x1): Measurement grid: dx=15mm, dy=15mm

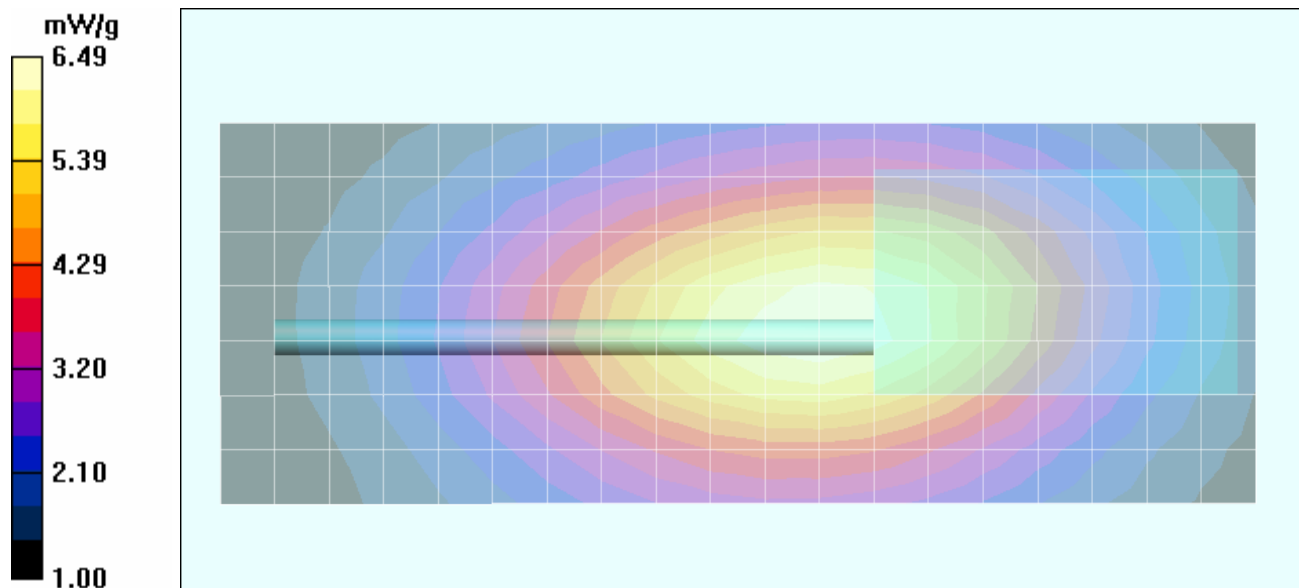
Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 84.8 V/m; Power Drift = -0.531 dB

Peak SAR (extrapolated) = 9.65 W/kg

SAR(1 g) = 6.28 mW/g; SAR(10 g) = 4.52 mW/g



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Ltd	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

Date Tested: 08/21/2006

Face-Held SAR - Li-ion Battery (3000 mAh IS) - Mid Channel - 415 MHz

DUT: Vertex Model: VX-829-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 61000003

Ambient Temp: 23.8°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.1 kPa; Humidity: 32%

Communication System: FM UHF

Frequency: 415 MHz; Duty Cycle: 1:1

RF Conducted Power: 5.1 Watts (Conducted)

7.4V 3000mAh Li-ion Battery Pack (P/N: FNB-V92LIIS)

Medium: HSL450 ($\sigma = 0.87$ mho/m; $\epsilon_r = 43.8$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.4, 7.4, 7.4); Calibrated: 16/03/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

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

Area Scan (8x20x1): Measurement grid: dx=15mm, dy=15mm

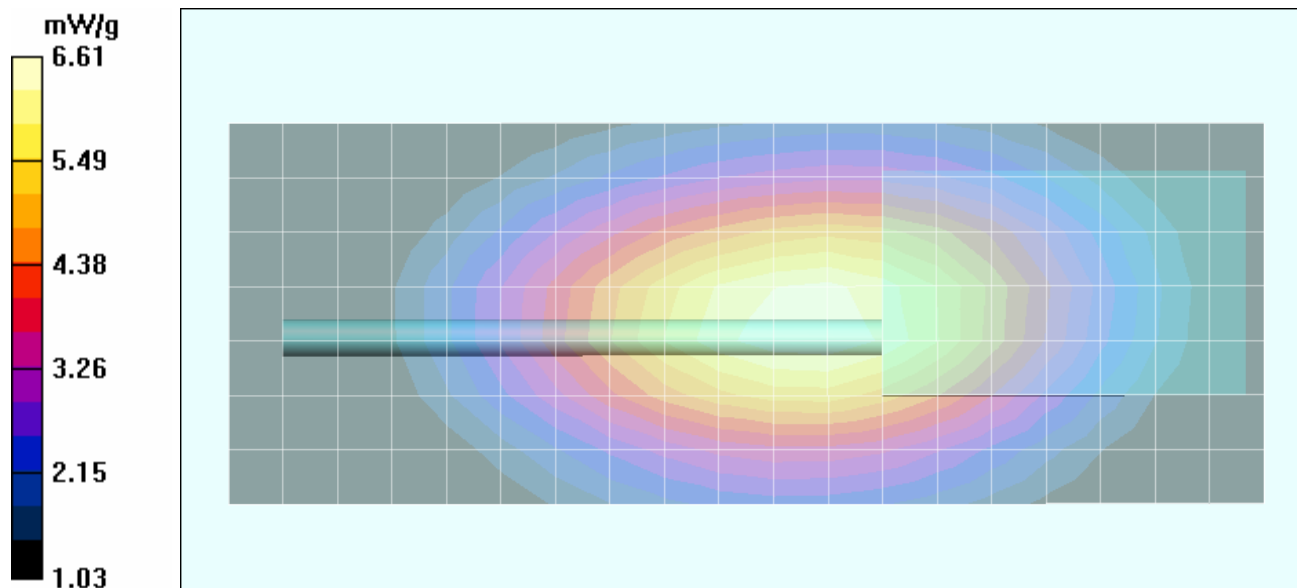
Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 85.5 V/m; Power Drift = -0.436 dB

Peak SAR (extrapolated) = 9.77 W/kg

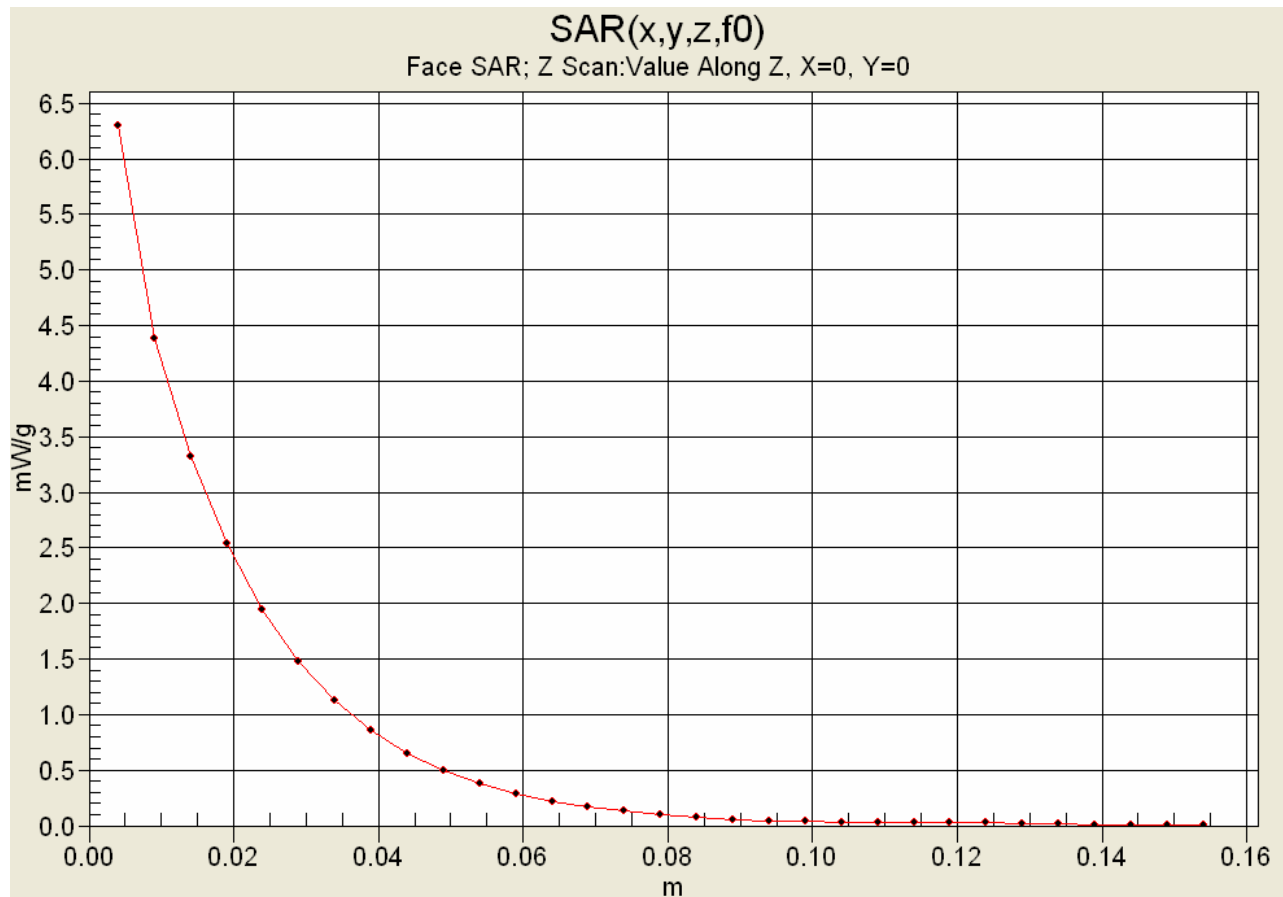
SAR(1 g) = 6.34 mW/g; SAR(10 g) = 4.57 mW/g



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

Z-Axis Scan



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Ltd	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

Date Tested: 08/21/2006

Face-Held SAR - Alkaline Battery (2850 mAh) - Mid Channel - 415 MHz

DUT: Vertex Model: VX-829-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 61000003

Ambient Temp: 23.8°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.1 kPa; Humidity: 32%

Communication System: FM UHF

Frequency: 415 MHz; Duty Cycle: 1:1

RF Conducted Power: 5.1 Watts (Conducted)

9V 2850mAh Alkaline Battery Pack (P/N: FBA-34)

Medium: HSL450 ($\sigma = 0.87$ mho/m; $\epsilon_r = 43.8$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.4, 7.4, 7.4); Calibrated: 16/03/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

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

Area Scan (8x23x1): Measurement grid: dx=15mm, dy=15mm

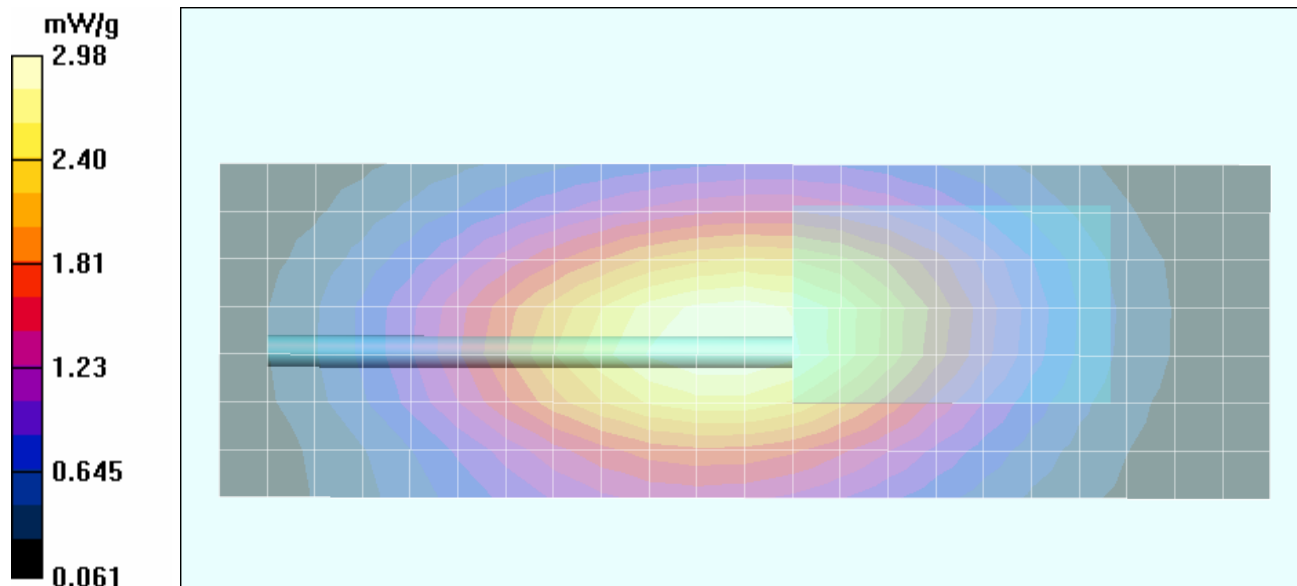
Face-Held SAR - 2.5 cm Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 56.8 V/m; Power Drift = -0.848 dB

Peak SAR (extrapolated) = 4.25 W/kg

SAR(1 g) = 2.75 mW/g; SAR(10 g) = 1.98 mW/g



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	
				Certificate No. 2470.01

Date Tested: 08/22/2006

Body-Worn SAR - Li-ion Battery (1150 mAh) - Mid Channel - 415 MHz

DUT: Vertex Model: VX-829-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6I000003

Body-Worn Accessory: Belt-Clip (P/N: CLIP-820); Audio Accessory: Speaker-Microphone (P/N: MH-65B7A)

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

Communication System: FM UHF

Frequency: 415 MHz; Duty Cycle: 1:1

RF Conducted Power: 5.1 Watts (Conducted)

7.4V 1150mAh Li-ion Battery Pack (P/N: FNB-V86LI)

Medium: ($\sigma = 0.94$ mho/m; $\epsilon_r = 56.7$; $\rho = 1000$ kg/m³)

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

Body-Worn SAR - 1.1 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x20x1): Measurement grid: dx=15mm, dy=15mm

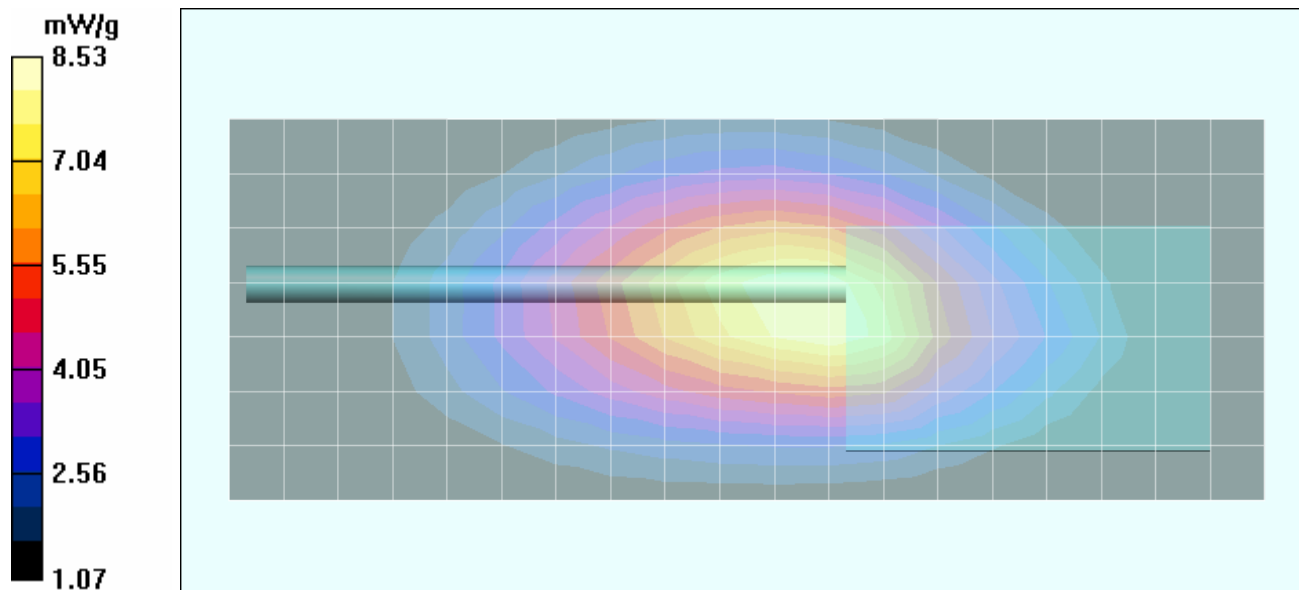
Body-Worn SAR - 1.1 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 90.1 V/m; Power Drift = -0.330 dB

Peak SAR (extrapolated) = 12.7 W/kg

SAR(1 g) = 8.17 mW/g; SAR(10 g) = 5.77 mW/g



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Lab	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

Date Tested: 08/22/2006

Body-Worn SAR - Li-ion Battery (2000 mAh) - Mid Channel - 415 MHz

DUT: Vertex Model: VX-829-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 61000003

Body-Worn Accessory: Belt-Clip (P/N: CLIP-820); Audio Accessory: Speaker-Microphone (P/N: MH-65B7A)

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

Communication System: FM UHF

Frequency: 415 MHz; Duty Cycle: 1:1

RF Conducted Power: 5.1 Watts (Conducted)

7.4V 2000mAh Li-ion Battery Pack (P/N: FNB-V87LI)

Medium: ($\sigma = 0.94$ mho/m; $\epsilon_r = 56.7$; $\rho = 1000$ kg/m³)

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

Body-Worn SAR - 1.1 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x20x1): Measurement grid: dx=15mm, dy=15mm

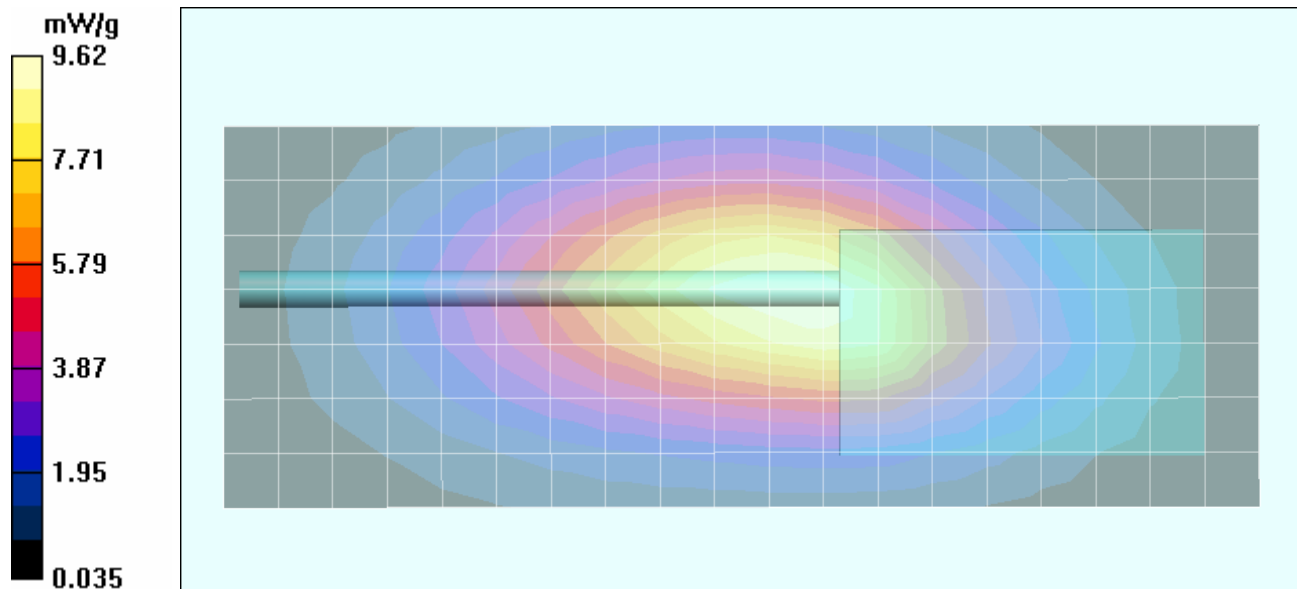
Body-Worn SAR - 1.1 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 95.3 V/m; Power Drift = -0.361 dB

Peak SAR (extrapolated) = 13.8 W/kg

SAR(1 g) = 8.83 mW/g; SAR(10 g) = 6.27 mW/g



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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	Date(s) of Evaluation August 21-22, 2006	Test Report Serial No. 073106K66-T765-S90U	Report Revision No. Revision 1.0	
	Report Issue Date August 30, 2006	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational	
				Certificate No. 2470.01

Date Tested: 08/22/2006

Body-Worn SAR - Li-ion Battery (3000 mAh) - Mid Channel - 415 MHz

DUT: Vertex Model: VX-829-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 61000003

Body-Worn Accessory: Belt-Clip (P/N: CLIP-820); Audio Accessory: Speaker-Microphone (P/N: MH-65B7A)

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

Communication System: FM UHF

Frequency: 415 MHz; Duty Cycle: 1:1

RF Conducted Power: 5.1 Watts (Conducted)

7.4V 3000mAh Li-ion Battery Pack (P/N: FNB-V92LI)

Medium: ($\sigma = 0.94$ mho/m; $\epsilon_r = 56.7$; $\rho = 1000$ kg/m³)

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

Body-Worn SAR - 1.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x20x1): Measurement grid: dx=15mm, dy=15mm

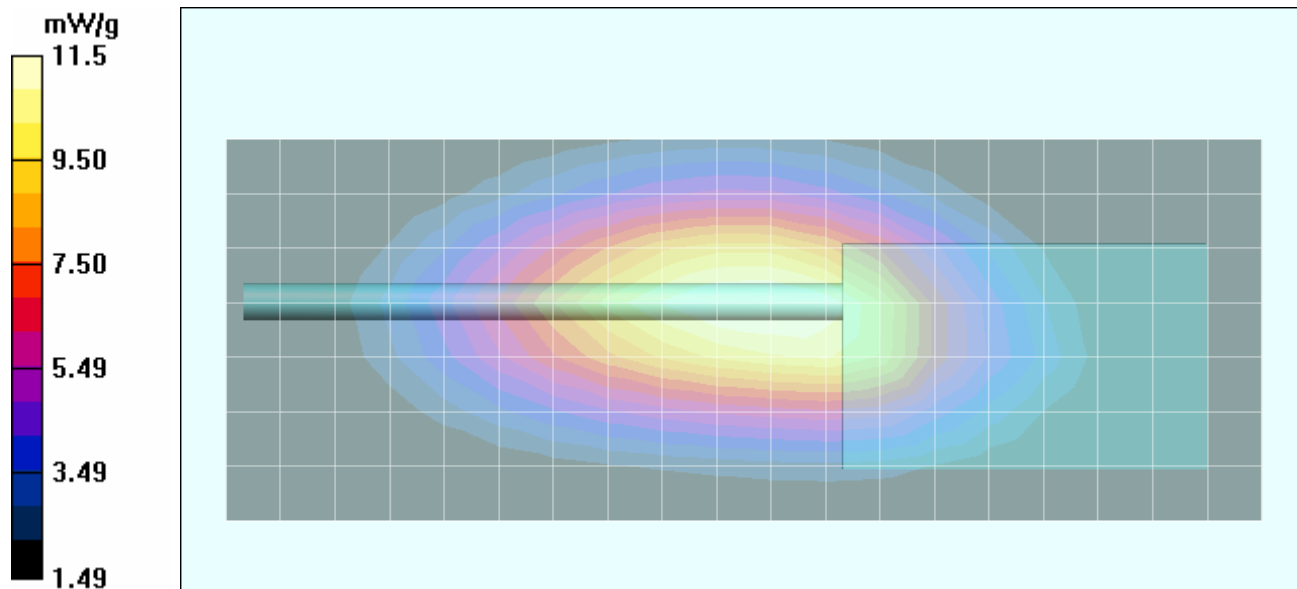
Body-Worn SAR - 1.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 102.7 V/m; Power Drift = -0.304 dB

Peak SAR (extrapolated) = 17.2 W/kg

SAR(1 g) = 11.0 mW/g; SAR(10 g) = 7.77 mW/g



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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	Date(s) of Evaluation August 21-22, 2006	Test Report Serial No. 073106K66-T765-S90U	Report Revision No. Revision 1.0	
	Report Issue Date August 30, 2006	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational	
				Certificate No. 2470.01

Date Tested: 08/22/2006

Body-Worn SAR - Li-Ion Battery (3000 mAh IS) - Mid Channel - 415 MHz

DUT: Vertex Model: VX-829-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6I000003

Body-Worn Accessory: Belt-Clip (P/N: CLIP-820); Audio Accessory: Speaker-Microphone (P/N: MH-65B7A)

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

Communication System: FM UHF

Frequency: 415 MHz; Duty Cycle: 1:1

RF Conducted Power: 5.1 Watts (Conducted)

7.4V 3000mAh IS Li-ion Battery Pack (P/N: FNB-V92LIIS)

Medium: ($\sigma = 0.94$ mho/m; $\epsilon_r = 56.7$; $\rho = 1000$ kg/m³)

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

Body-Worn SAR - 1.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x20x1): Measurement grid: dx=15mm, dy=15mm

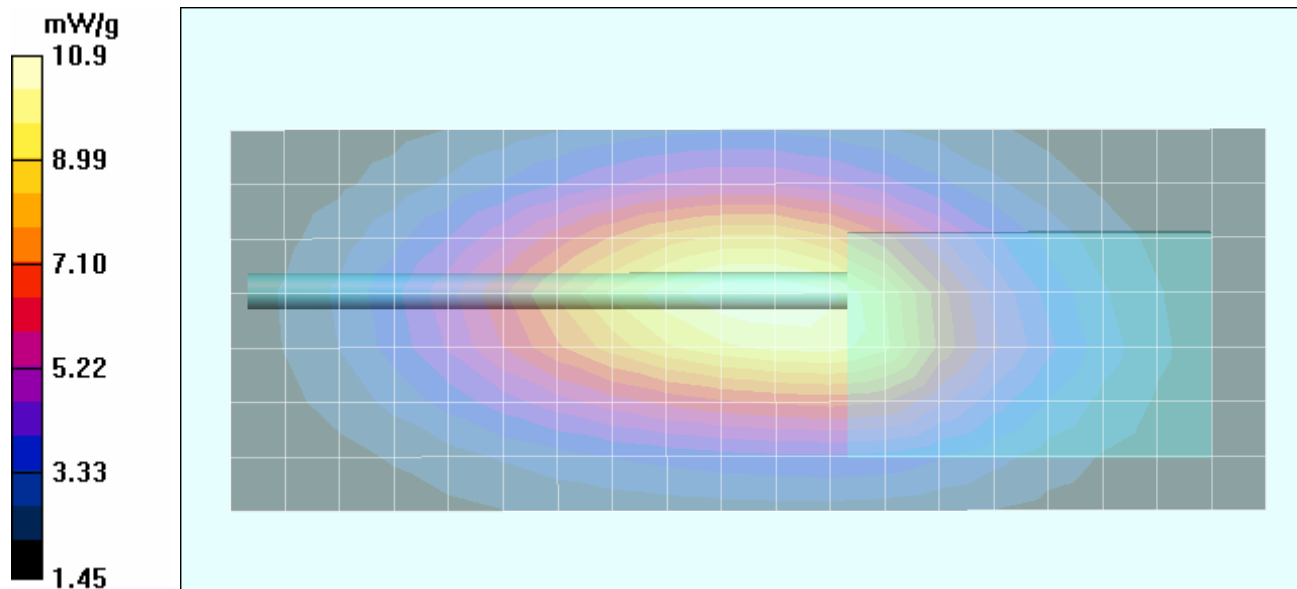
Body-Worn SAR - 1.0 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 102.8 V/m; Power Drift = -0.414 dB

Peak SAR (extrapolated) = 16.4 W/kg

SAR(1 g) = 10.4 mW/g; SAR(10 g) = 7.35 mW/g



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	
				Certificate No. 2470.01

Date Tested: 08/22/2006

Body-Worn SAR - Alkaline Battery (2850 mAh) - Mid Channel - 415 MHz

DUT: Vertex Model: VX-829-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6I000003

Body-Worn Accessory: Belt-Clip (P/N: CLIP-820); Audio Accessory: Speaker-Microphone (P/N: MH-65B7A)

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

Communication System: FM UHF

Frequency: 415 MHz; Duty Cycle: 1:1

RF Conducted Power: 5.1 Watts (Conducted)

9.0V 2850mAh Alkaline Battery Pack (P/N: FBA-34)

Medium: ($\sigma = 0.94$ mho/m; $\epsilon_r = 56.7$; $\rho = 1000$ kg/m³)

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

Body-Worn SAR - 0.7 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x20x1): Measurement grid: dx=15mm, dy=15mm

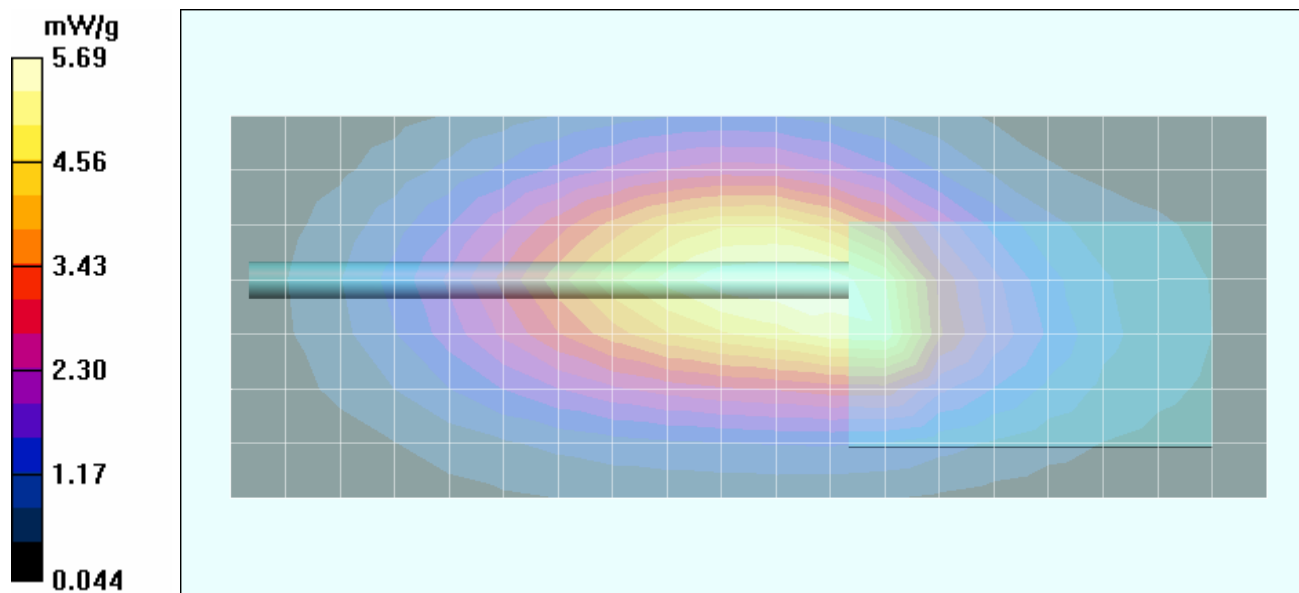
Body-Worn SAR - 0.7 cm Belt-Clip Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 79.0 V/m; Power Drift = -0.861 dB

Peak SAR (extrapolated) = 9.02 W/kg

SAR(1 g) = 5.38 mW/g; SAR(10 g) = 3.68 mW/g



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5		Portable FM UHF PTT Radio Transceiver				
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 Testing and Engineering Services Ltd	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

Date Tested: 08/22/2006

Body-Worn SAR - Li-ion Battery (1150 mAh) - Mid Channel - 415 MHz

DUT: Vertex Model: VX-829-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6I000003

Body-Worn Accessory: Leather Case (P/N: LCC-820); Audio Accessory: Speaker-Microphone (P/N: MH-65B7A)

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

Communication System: FM UHF

Frequency: 415 MHz; Duty Cycle: 1:1

RF Conducted Power: 5.1 Watts (Conducted)

7.4V 1150mAh Li-ion Battery Pack (P/N: FNB-V86LI)

Medium: ($\sigma = 0.94$ mho/m; $\epsilon_r = 56.7$; $\rho = 1000$ kg/m³)

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

Body-Worn SAR - 1.0 cm Leather Case Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x20x1): Measurement grid: dx=15mm, dy=15mm

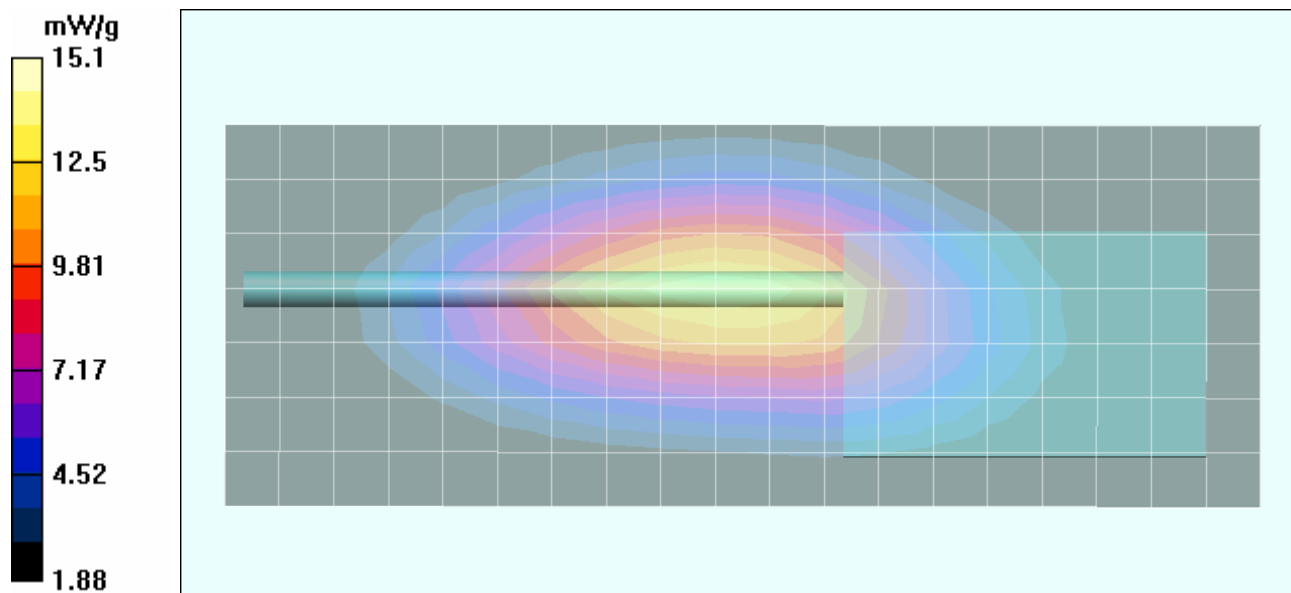
Body-Worn SAR - 1.0 cm Leather Case Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 109.7 V/m; Power Drift = -0.330 dB

Peak SAR (extrapolated) = 23.3 W/kg

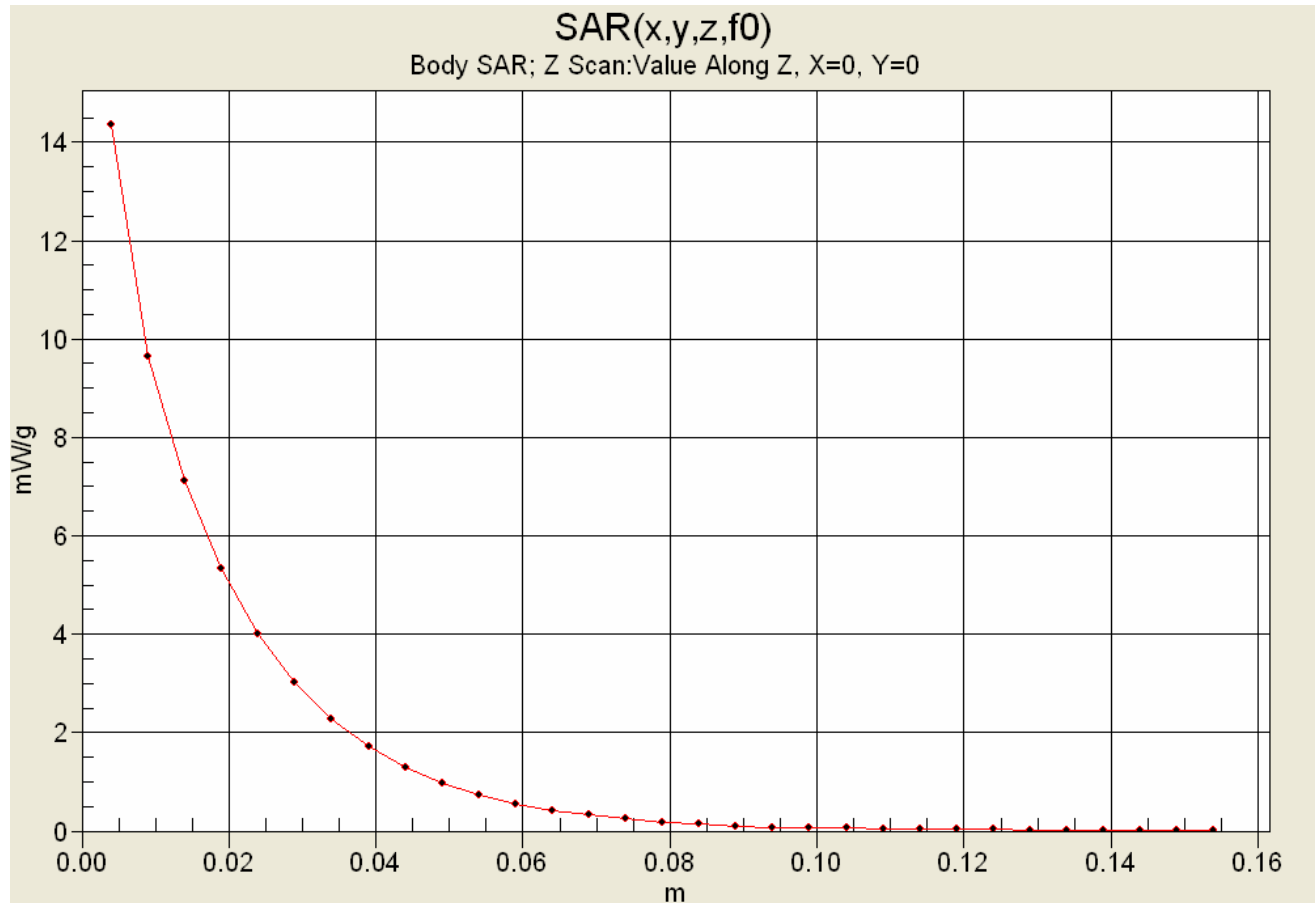
SAR(1 g) = 14.4 mW/g; SAR(10 g) = 9.93 mW/g



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

Z-Axis Scan

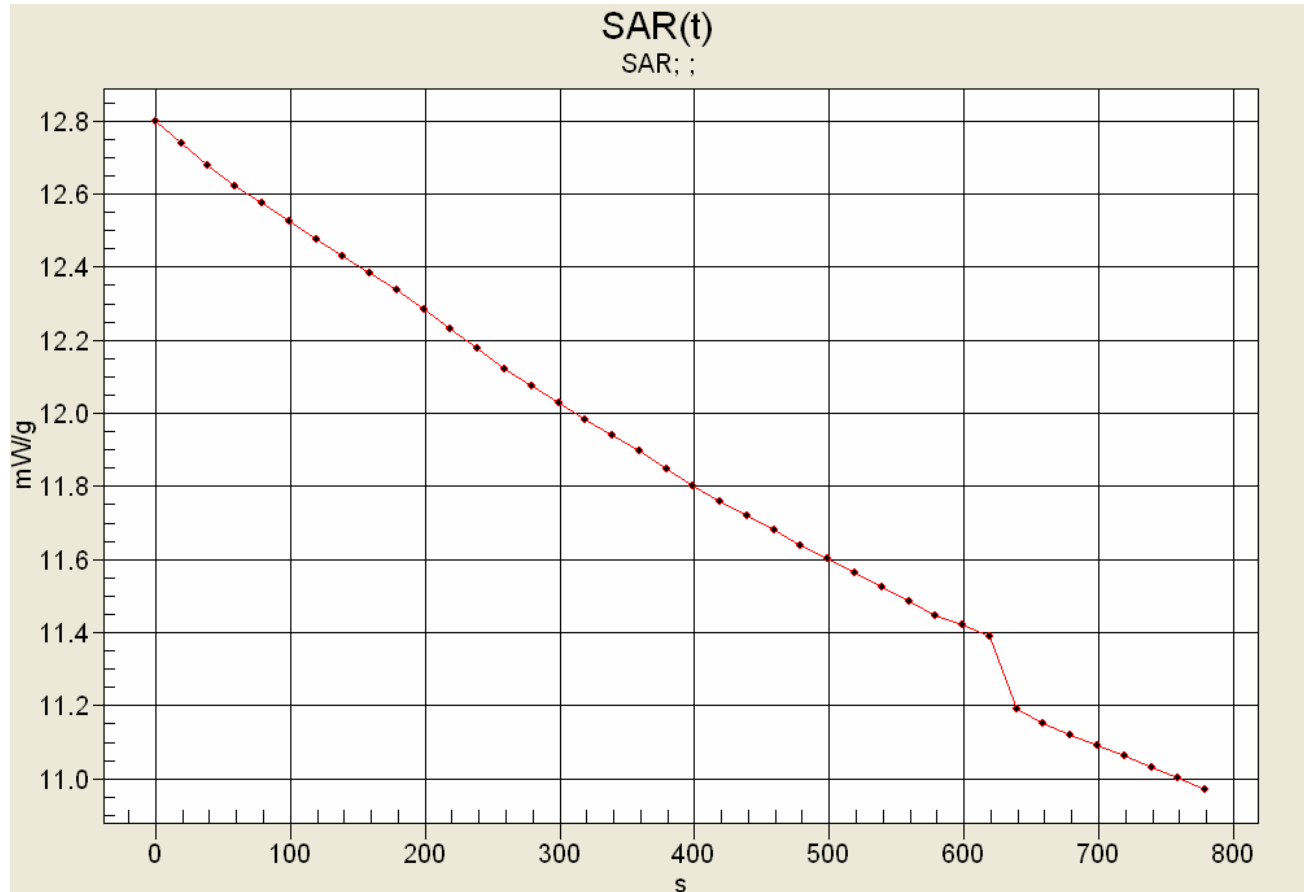


Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Ltd	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

SAR-versus-Time Power Droop Evaluation

Body-Worn Configuration with Leather Case Accessory
1150 mAh Li-ion Battery Pack (P/N: FNB-V86LI)
Mid Channel - 415 MHz



Max. SAR: 12.7979 mW/g
Min. SAR: 10.9715 mW/g (-0.669 dB)
SAR after 340s: 11.939 mW/g (-0.302 dB)
(340s = Zoom Scan Duration)
(780s = Area Scan Duration)

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Ltd	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

Date Tested: 08/22/2006

Body-Worn SAR - Li-ion Battery (2000 mAh) - Mid Channel - 415 MHz

DUT: Vertex Model: VX-829-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 61000003

Body-Worn Accessory: Leather Case (P/N: LCC-820); Audio Accessory: Speaker-Microphone (P/N: MH-65B7A)

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

Communication System: FM UHF

Frequency: 415 MHz; Duty Cycle: 1:1

RF Output Power: 5.1 Watts (Conducted)

7.4V 2000mAh Li-ion Battery Pack (P/N: FNB-V87LI)

Medium: M450 ($\sigma = 0.94$ mho/m; $\epsilon_r = 56.7$; $\rho = 1000$ kg/m³)

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

Body-Worn SAR - 1.0 cm Leather Case Separation Distance to Planar Phantom - Mid Channel

Area Scan (8x20x1): Measurement grid: dx=15mm, dy=15mm

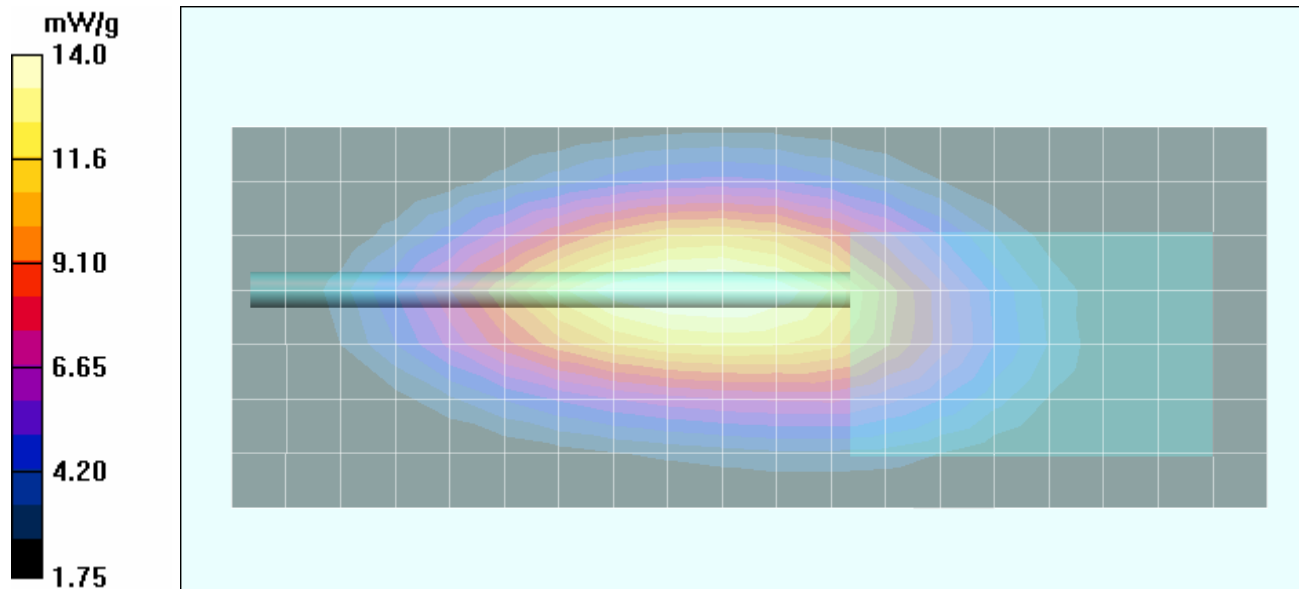
Body-Worn SAR - 1.0 cm Leather Case Separation Distance to Planar Phantom - Mid Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 106.7 V/m; Power Drift = -0.421 dB

Peak SAR (extrapolated) = 21.7 W/kg

SAR(1 g) = 13.4 mW/g; SAR(10 g) = 9.28 mW/g



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Lab	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

Date Tested: 08/22/2006

Body-Worn SAR - Li-ion Battery (1150 mAh) - Low Channel - 380 MHz

DUT: Vertex Model: VX-829-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 61000003

Body-Worn Accessory: Leather Case (P/N: LCC-820); Audio Accessory: Speaker-Microphone (P/N: MH-65B7A)

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

Communication System: FM UHF

Frequency: 380 MHz; Duty Cycle: 1:1

RF Conducted Power: 4.7 Watts (Conducted)

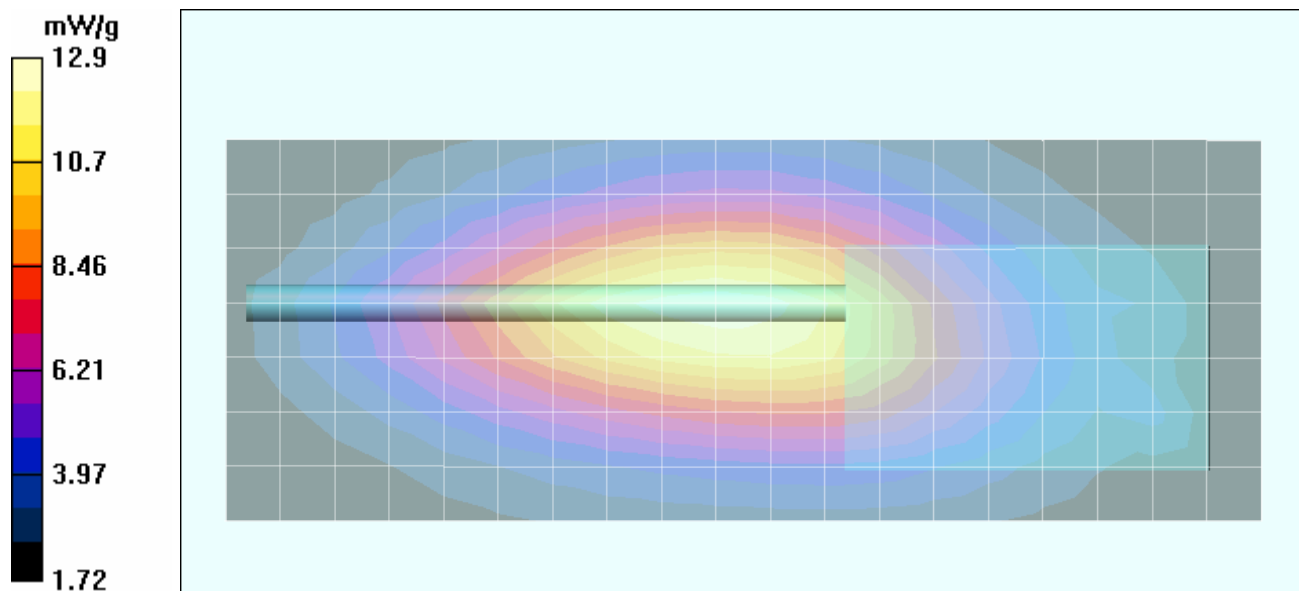
7.4V 1150mAh Li-ion Battery Pack (P/N: FNB-V86LJ)

Medium: ($\sigma = 0.94$ mho/m; $\epsilon_r = 56.7$; $\rho = 1000$ kg/m³)

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

Body-Worn SAR - 1.0 cm Leather Case Separation Distance to Planar Phantom - Low Channel
Area Scan (8x20x1): Measurement grid: dx=15mm, dy=15mm

Body-Worn SAR - 1.0 cm Leather Case Separation Distance to Planar Phantom - Low Channel
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 110.5 V/m; Power Drift = -0.366 dB
Peak SAR (extrapolated) = 19.6 W/kg
SAR(1 g) = 12.5 mW/g; SAR(10 g) = 8.91 mW/g



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Lab	Date(s) of Evaluation August 21-22, 2006	Test Report Serial No. 073106K66-T765-S90U	Report Revision No. Revision 1.0	 Certificate No. 2470.01
	Report Issue Date August 30, 2006	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational	

Date Tested: 08/22/2006

Body-Worn SAR - Li-ion Battery (1150 mAh) - High Channel - 450 MHz

DUT: Vertex Model: VX-829-G8-5; Type: Portable FM UHF PTT Radio Transceiver; Serial: 6I000003

Body-Worn Accessory: Leather Case (P/N: LCC-820); Audio Accessory: Speaker-Microphone (P/N: MH-65B7A)

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

Communication System: FM UHF

Frequency: 450 MHz; Duty Cycle: 1:1

RF Conducted Power: 5.4 Watts (Conducted)

7.4V 1150mAh Li-ion Battery Pack (P/N: FNB-V86LI)

Medium: ($\sigma = 0.94$ mho/m; $\epsilon_r = 56.7$; $\rho = 1000$ kg/m³)

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

Body-Worn SAR - 1.0 cm Leather Case Separation Distance to Planar Phantom - High Channel

Area Scan (8x20x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 10.4 mW/g

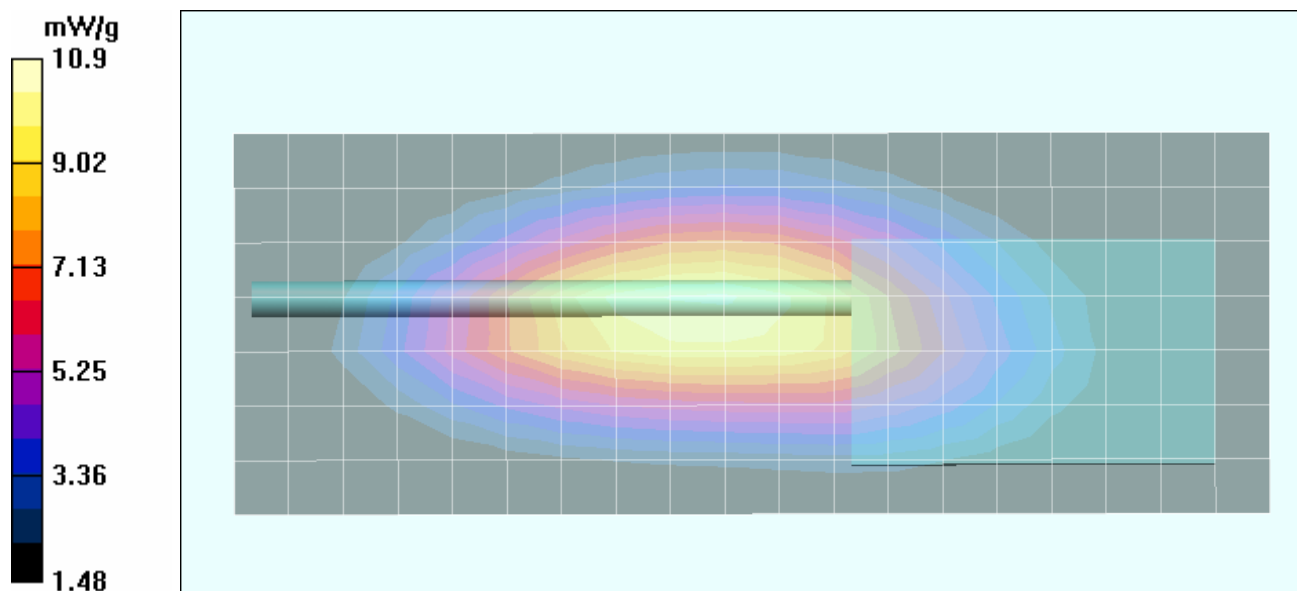
Body-Worn SAR - 1.0 cm Leather Case Separation Distance to Planar Phantom - High Channel

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 99.2 V/m; Power Drift = -0.386 dB

Peak SAR (extrapolated) = 16.9 W/kg

SAR(1 g) = 10.6 mW/g; SAR(10 g) = 7.4 mW/g



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Lab	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Ltd	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

Date Tested: 08/21/2006

System Performance Check (Brain) - 450 MHz Dipole

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

Ambient Temp: 23.8°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.1 kPa; Humidity: 32%

Communication System: CW

Forward Conducted Power: 250 mW

Frequency: 450 MHz; Duty Cycle: 1:1

Medium: HSL450 ($\sigma = 0.87$ mho/m; $\epsilon_r = 43.8$; $\rho = 1000$ kg/m³)

- Probe: ET3DV6 - SN1387; ConvF(7.4, 7.4, 7.4); Calibrated: 16/03/2006

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

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

- Phantom: Validation Planar; Type: Plexiglas; Serial: 137

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

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

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

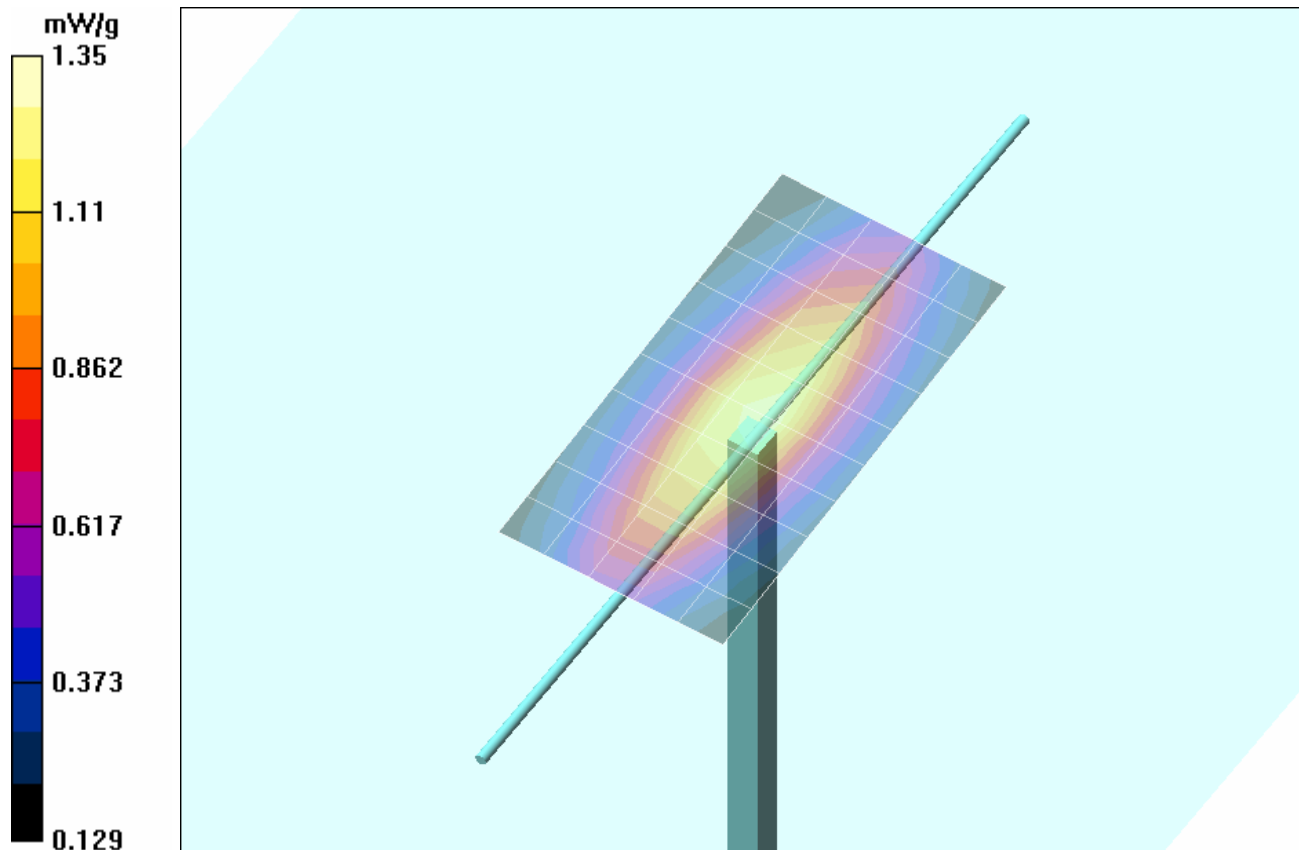
450 MHz Dipole - System Performance Check/Zoom Scan (5x5x7)/Cube 0:

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

Reference Value = 39.3 V/m; Power Drift = -0.039 dB

Peak SAR (extrapolated) = 2.25 W/kg

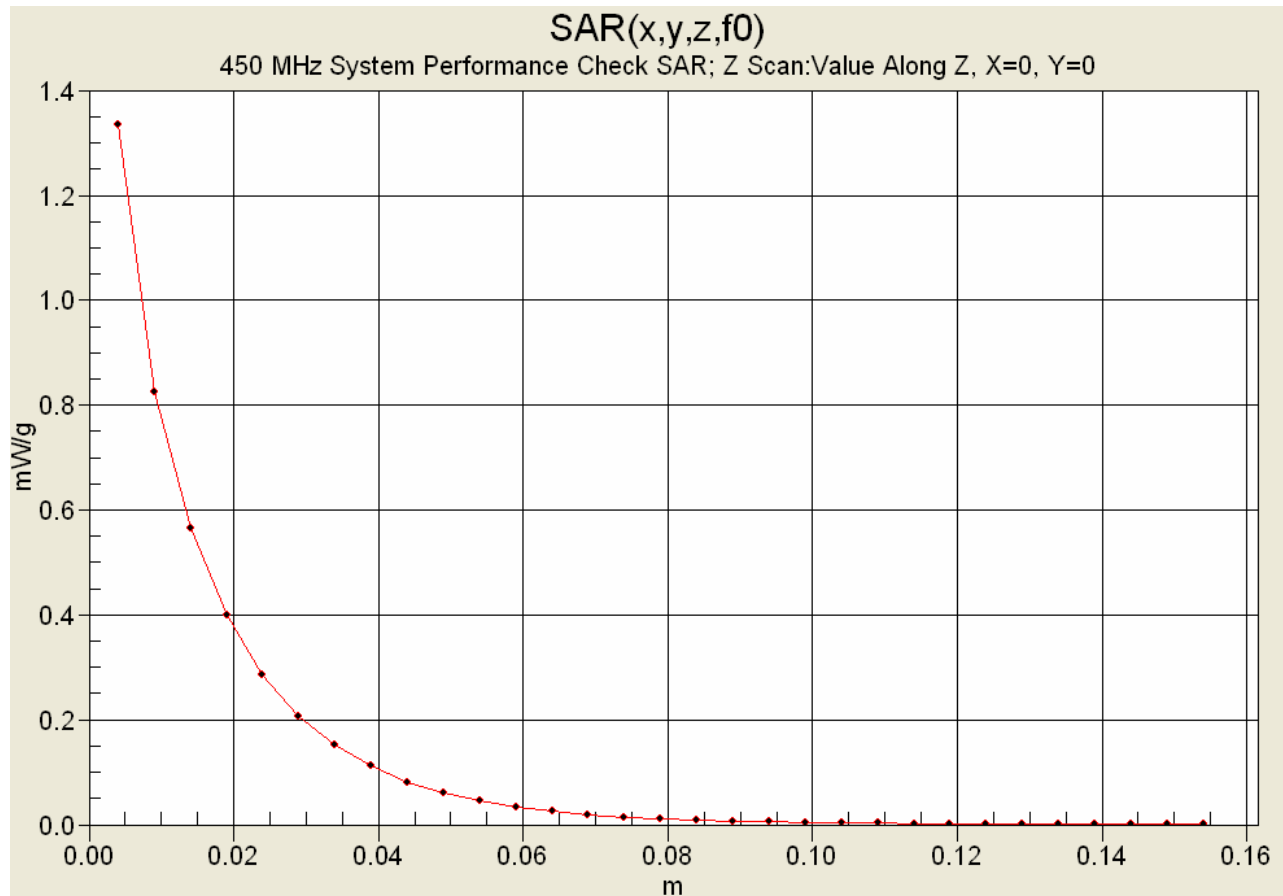
SAR(1 g) = 1.27 mW/g; SAR(10 g) = 0.814 mW/g



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Ltd.	Date(s) of Evaluation August 21-22, 2006	Test Report Serial No. 073106K66-T765-S90U	Report Revision No. Revision 1.0	 Certificate No. 2470.01
	Report Issue Date August 30, 2006	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational	

Z-Axis Scan



Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	
Certificate No. 2470.01				

APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Ltd	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

450 MHz System Performance Check & DUT Evaluation (Brain)

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
Mon 21/Aug/2006
Frequency (GHz)
FCC_eHFCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sHFCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

Freq	FCC_eHFCC	sH	Test_e	Test_s
0.3500	44.70	0.87	46.34	0.78
0.3600	44.58	0.87	45.95	0.79
0.3700	44.46	0.87	45.70	0.80
0.3800	44.34	0.87	45.55	0.80
0.3900	44.22	0.87	44.99	0.82
0.4000	44.10	0.87	45.12	0.83
0.4100	43.98	0.87	45.05	0.84
0.4200	43.86	0.87	44.78	0.84
0.4300	43.74	0.87	44.38	0.86
0.4400	43.62	0.87	44.33	0.86
0.4500	43.50	0.87	43.75	0.87
0.4600	43.45	0.87	43.76	0.88
0.4700	43.40	0.87	43.76	0.89
0.4800	43.34	0.87	43.22	0.90
0.4900	43.29	0.87	43.47	0.90
0.5000	43.24	0.87	42.87	0.92
0.5100	43.19	0.87	43.00	0.92
0.5200	43.14	0.88	42.48	0.94
0.5300	43.08	0.88	42.69	0.95
0.5400	43.03	0.88	42.52	0.95
0.5500	42.98	0.88	42.12	0.96

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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 Testing and Engineering Services Lab	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

450 MHz DUT Evaluation (Body)

Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

Tue 22/Aug/2006

Frequency (GHz)

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

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

FCC_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
0.3500	57.70	0.93	58.69	0.86
0.3600	57.60	0.93	58.70	0.87
0.3700	57.50	0.93	58.21	0.88
0.3800	57.40	0.93	58.01	0.89
0.3900	57.30	0.93	57.80	0.90
0.4000	57.20	0.93	57.88	0.90
0.4100	57.10	0.93	57.91	0.91
0.4200	57.00	0.94	57.43	0.92
0.4300	56.90	0.94	57.26	0.93
0.4400	56.80	0.94	57.18	0.93
0.4500	56.70	0.94	56.73	0.94
0.4600	56.66	0.94	56.97	0.95
0.4700	56.62	0.94	56.83	0.95
0.4800	56.58	0.94	56.35	0.97
0.4900	56.54	0.94	56.48	0.96
0.5000	56.51	0.94	56.10	0.98
0.5100	56.47	0.94	56.00	0.99
0.5200	56.43	0.95	55.98	1.00
0.5300	56.39	0.95	55.70	1.00
0.5400	56.35	0.95	55.83	1.01
0.5500	56.31	0.95	55.72	1.01

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	
				Certificate No. 2470.01

APPENDIX E - SYSTEM VALIDATION

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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	Date of Evaluation:	October 25, 2005	Document Issue No.:	SV450B-102505-R1.1
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz

450 MHz SYSTEM VALIDATION DIPOLE

Type:

450 MHz Validation Dipole

Asset Number:

00024

Serial Number:

136

Place of Validation:

Celltech Labs Inc.

Date of Validation:

October 25, 2005

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

Validated by:



Approved by:



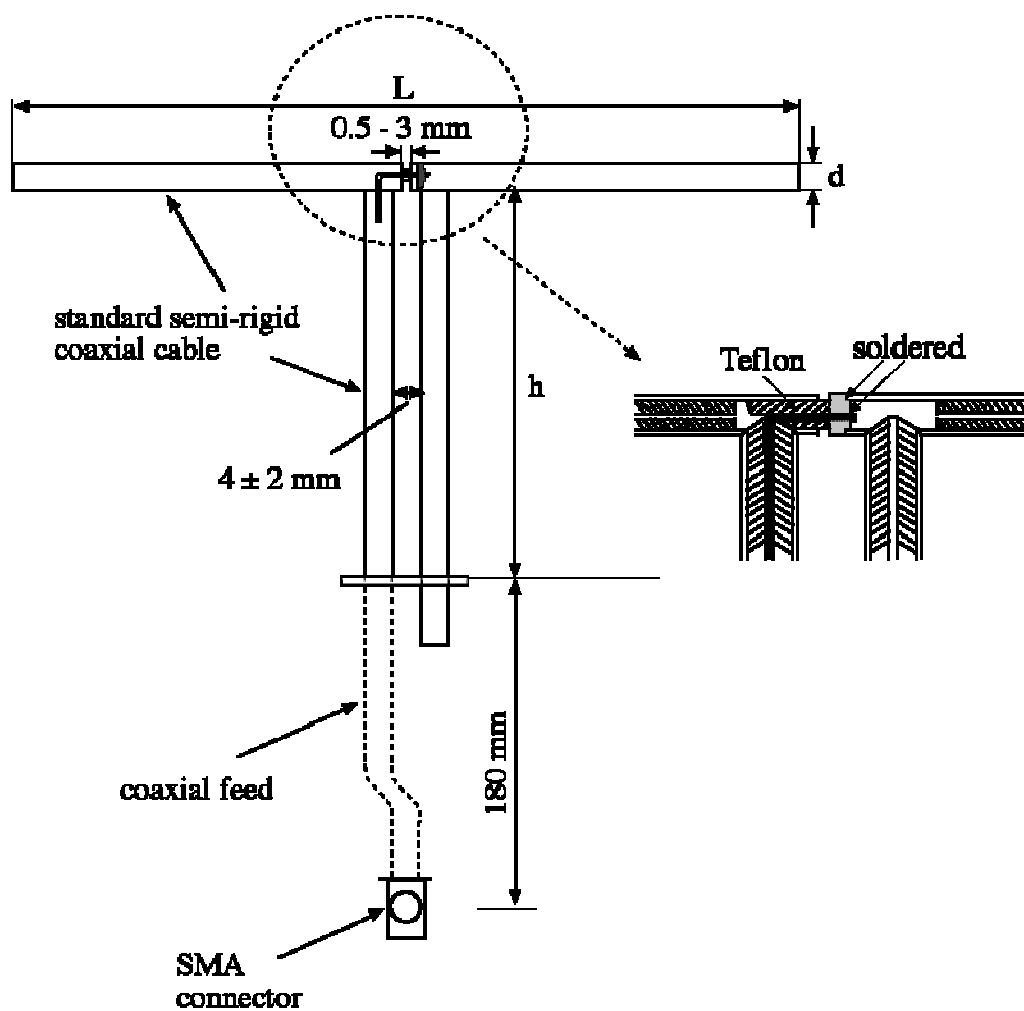
	Date of Evaluation:	October 25, 2005	Document Issue No.:	SV450B-102505-R1.1
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz

1. Dipole Construction & Electrical Characteristics

The validation dipole was constructed in accordance with the IEEE Std "Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques". The electrical properties were measured using an HP 8753E Network Analyzer. The network analyzer was calibrated to the validation dipole N-type connector feed point using an HP85032E Type N calibration kit. The dipole was placed parallel to a planar phantom at a separation distance of 15.0mm from the simulating fluid using a loss-less dielectric spacer. The measured input impedance is:

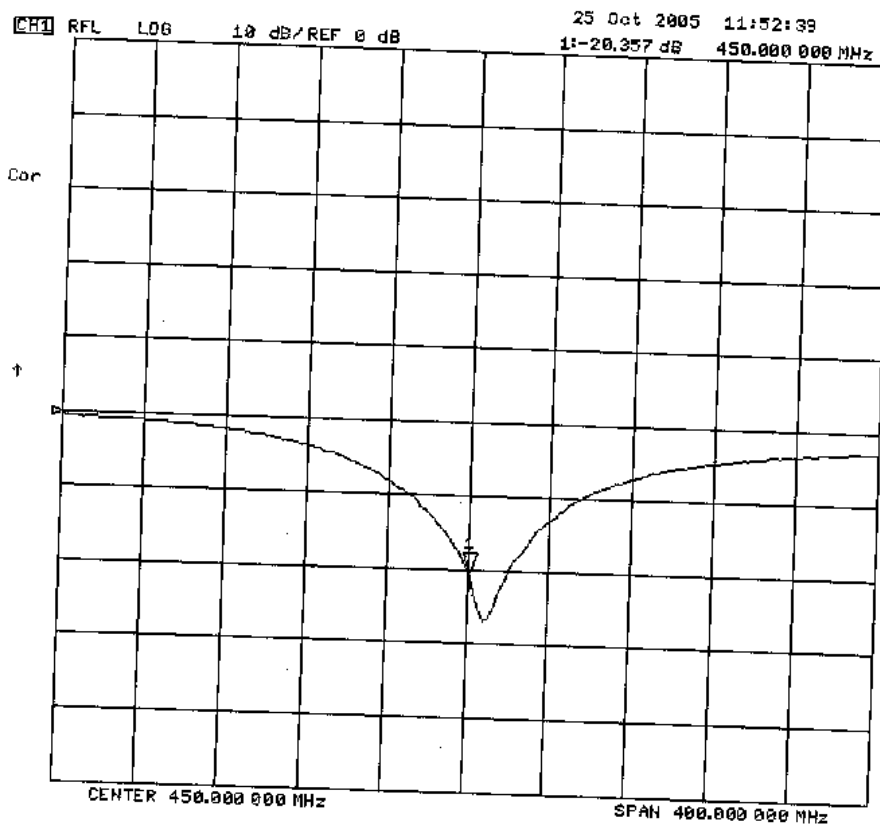
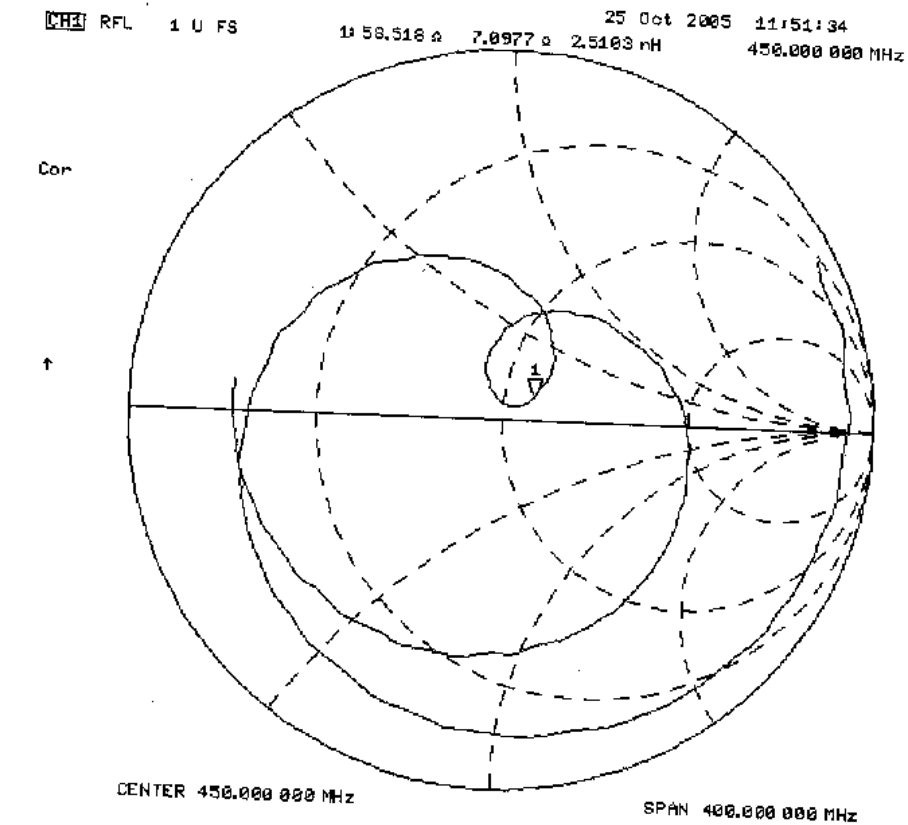
Feed point impedance at 450MHz $\text{Re}\{Z\} = 58.518\Omega$
 $\text{Im}\{Z\} = 7.0977\Omega$

Return Loss at 450MHz -20.357dB



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

2. Validation Dipole VSWR Data



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

3. Validation Dipole Dimensions

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

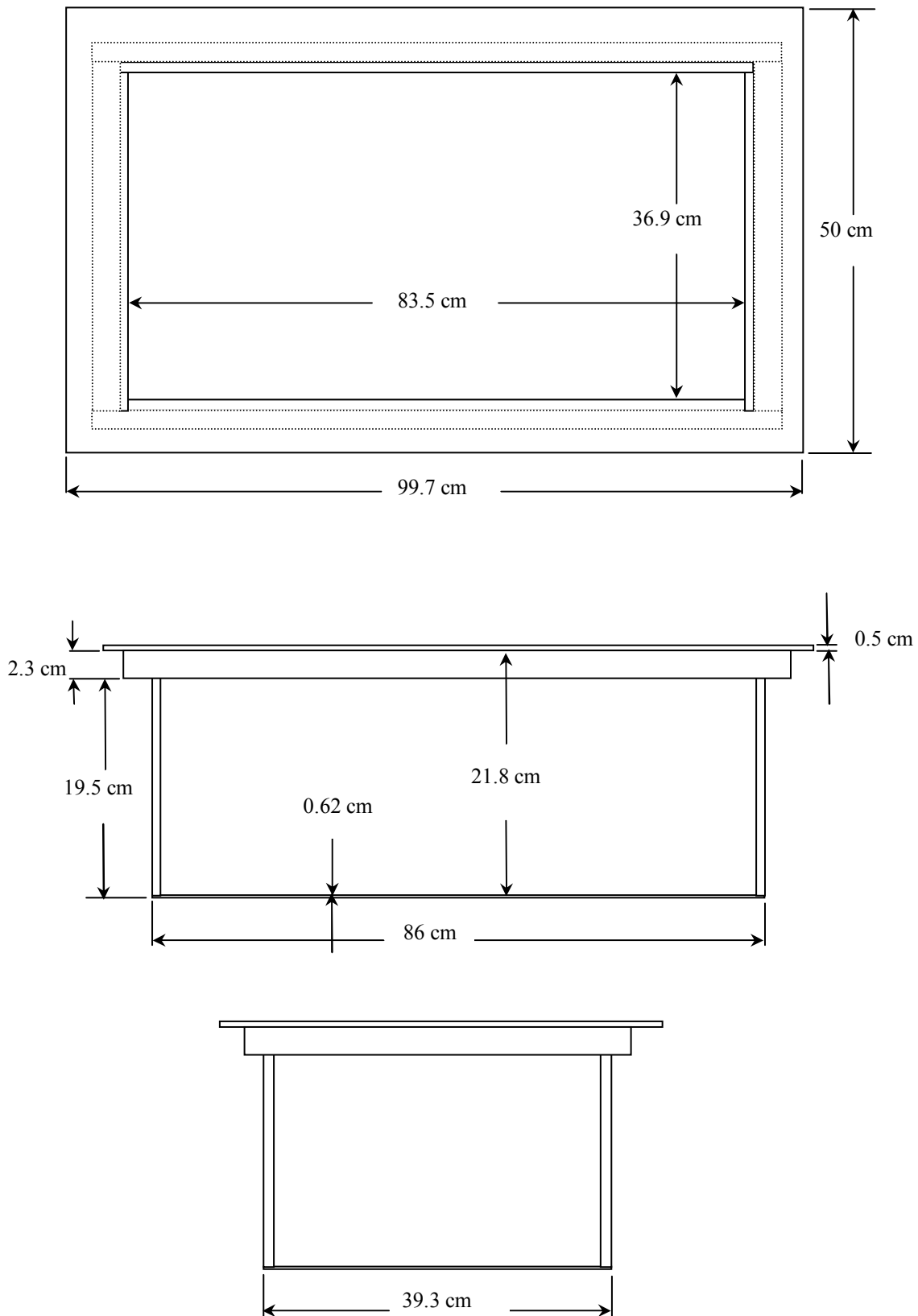
4. Validation Phantom

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

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

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

5. Dimensions of Plexiglas Planar Phantom



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

6. 450 MHz System Validation Setup



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

7. 450 MHz Validation Dipole Setup



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

8. Measurement Conditions

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

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

Environmental Conditions:

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

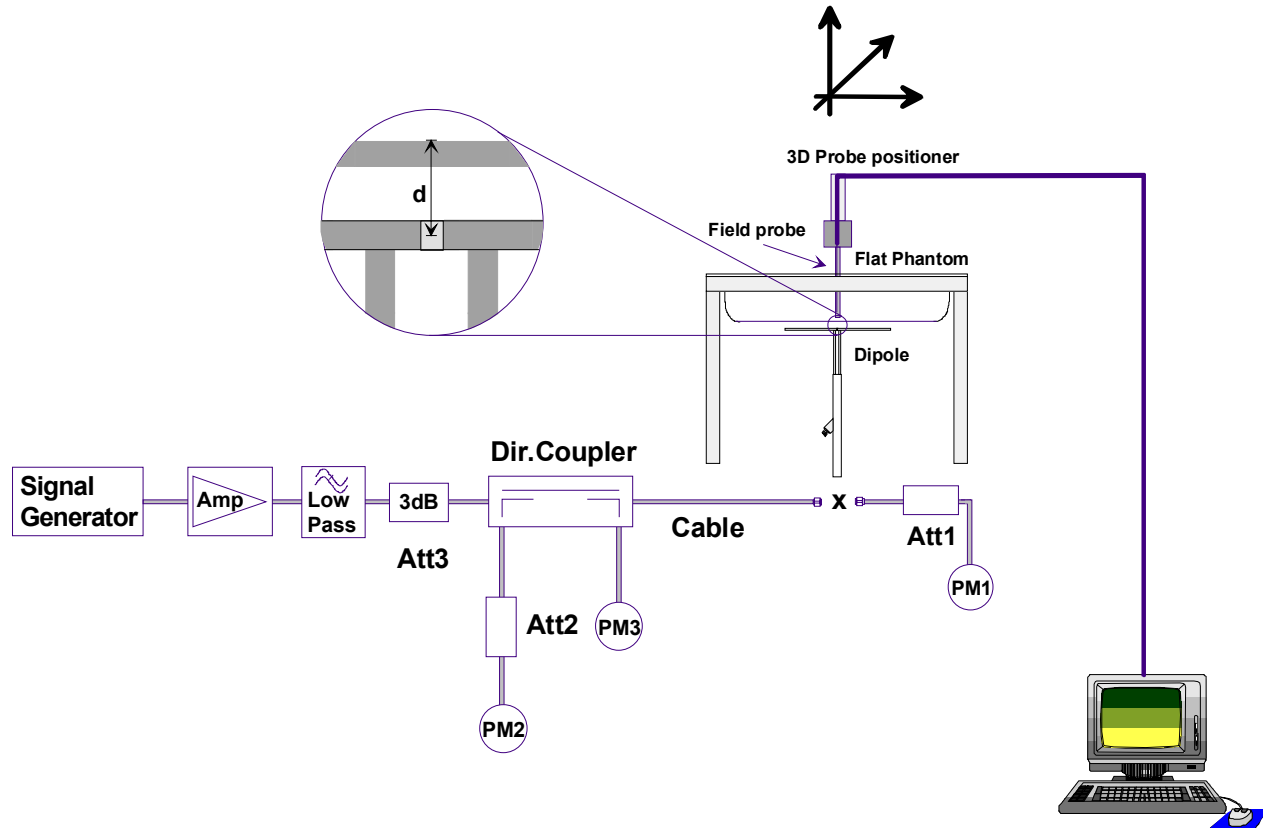
The 450 MHz brain tissue simulant consisted of the following ingredients:

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

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

9. SAR Measurement

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



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

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

10. Validation Dipole SAR Test Results

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

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

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

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

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

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

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

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

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

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

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

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

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

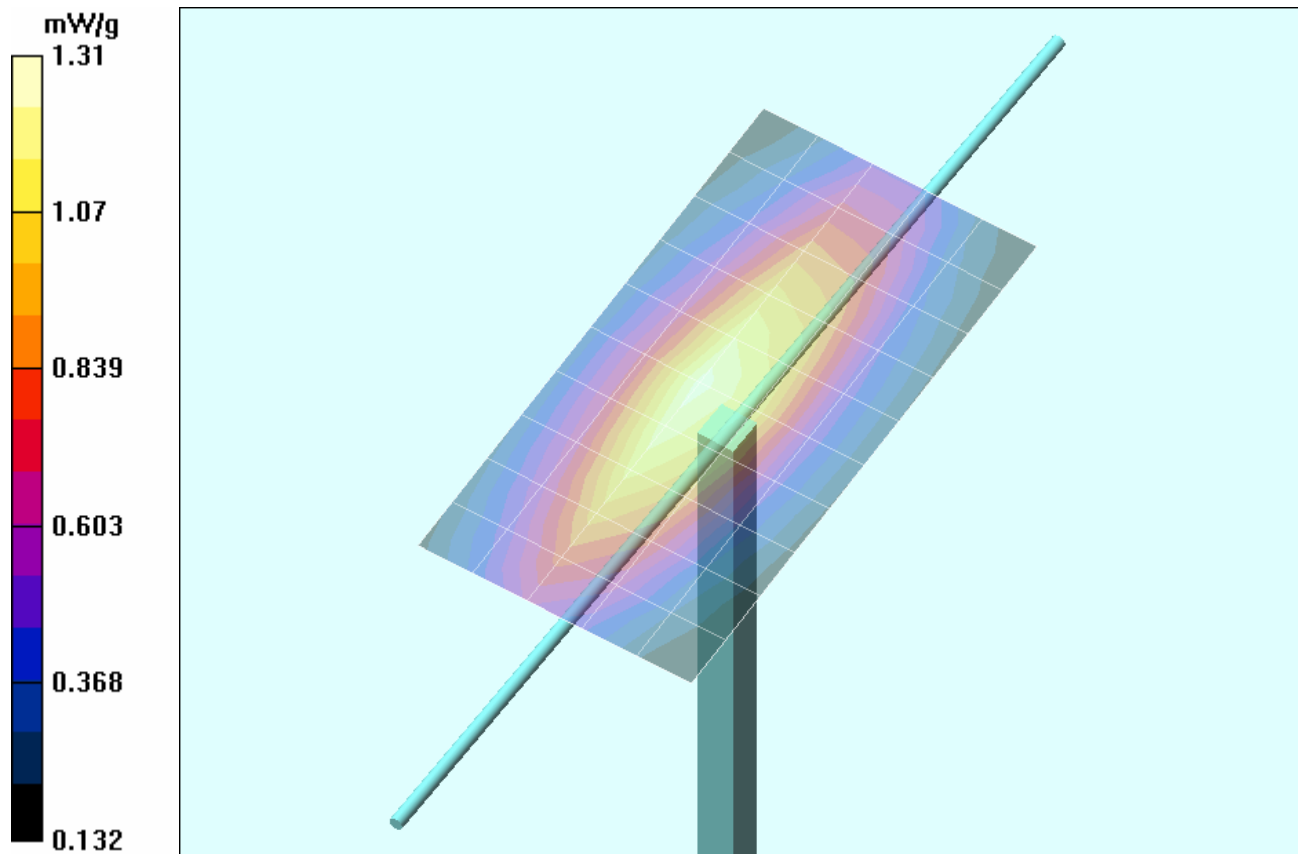
450 MHz System Validation/Zoom Scan 6 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 39.1 V/m; Power Drift = 0.016 dB
SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.799 mW/g
 Maximum value of SAR (measured) = 1.31 mW/g

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

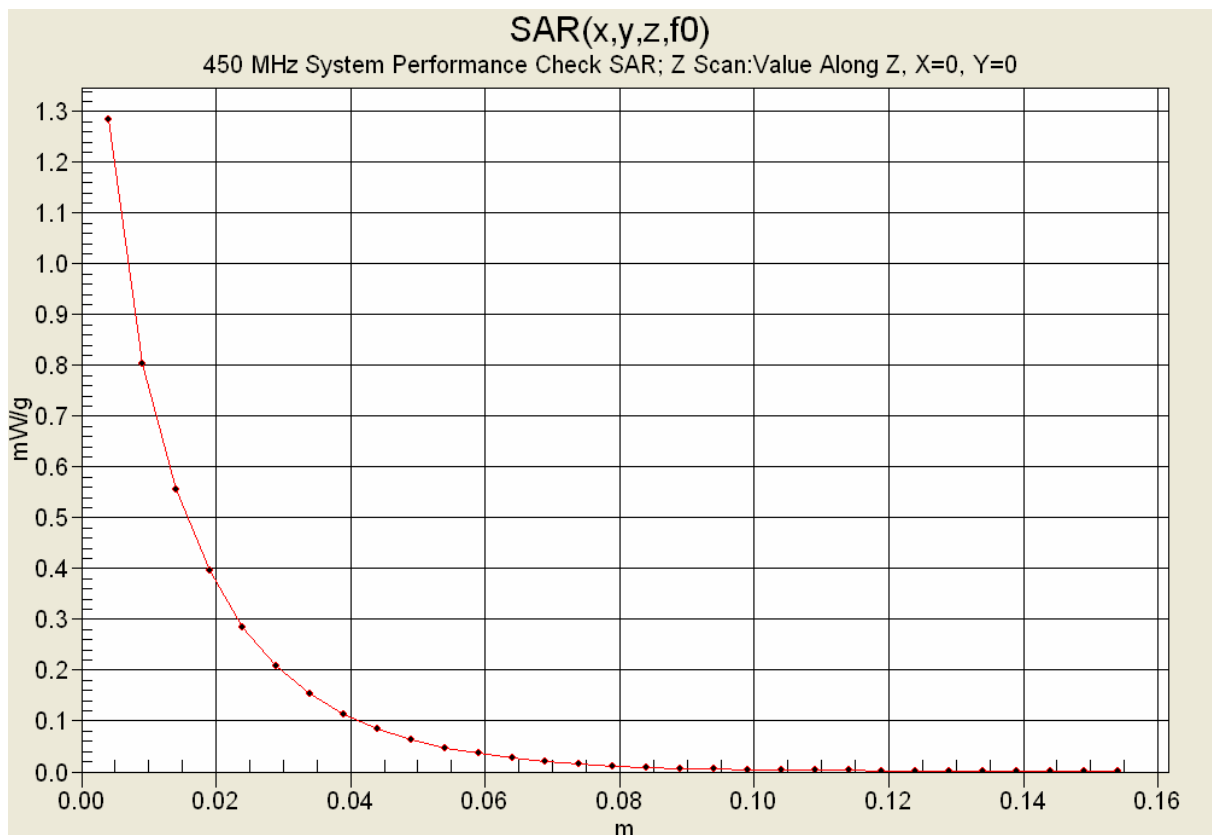
450 MHz System Validation/Zoom Scan 8 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 39.6 V/m; Power Drift = -0.031 dB
SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.802 mW/g
 Maximum value of SAR (measured) = 1.31 mW/g

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

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



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



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

11. Measured Fluid Dielectric Parameters

System Validation (Brain) - 450 MHz Dipole

Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

Tue 25/Oct/2005 12:07:39

Freq Frequency (GHz)

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

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

Test_e Epsilon of UIM

Test_s Sigma of UIM

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

 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> August 21-22, 2006	<u>Test Report Serial No.</u> 073106K66-T765-S90U	<u>Report Revision No.</u> Revision 1.0	 Certificate No. 2470.01
	<u>Report Issue Date</u> August 30, 2006	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational	

APPENDIX F - PROBE CALIBRATION

Company:	Vertex Standard Co., Ltd.	FCC ID:	K6610584821	IC ID:	511B-10584821	Freq.:	380 - 450 MHz
Model(s):	VX-P821-G8-5, VX-P824-G8-5, VX-P829-G8-5 VX-P871-G8-5, VX-P874-G8-5, VX-P879-G8-5			Portable FM UHF PTT Radio Transceiver			
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Accredited by the Swiss Federal Office of Metrology and Accreditation
 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 Labs**

Certificate No: **ET3-1387_Mar06**

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN:1387**

Calibration procedure(s) **QA CAL-01.v5**
Calibration procedure for dosimetric E-field probes

Calibration date: **March 16, 2006**

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 (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41495277	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41498087	3-May-05 (METAS, No. 251-00466)	May-06
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-05 (METAS, No. 251-00467)	May-06
Reference 30 dB Attenuator	SN: S5129 (30b)	11-Aug-05 (METAS, No. 251-00500)	Aug-06
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	2-Feb-06 (SPEAG, No. DAE4-654_Feb06)	Feb-07
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov 06

Calibrated by: **Katja Pokovic** **Technical Manager**

Approved by: **Niels Kuster** **Quality Manager**

Signature

Issued: March 16, 2006

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Federal Office of Metrology and Accreditation
 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
NORM _{x,y,z}	sensitivity in free space
ConF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
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:

- 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
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}:** Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E^2 -field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z} = NORM_{x,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*.
- DCP_{x,y,z}:** DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters:** Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ 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 NORM_{x,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:1387

Manufactured:	September 21, 1999
Last calibrated:	March 18, 2005
Recalibrated:	March 16, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1387**Sensitivity in Free Space^A****Diode Compression^B**

NormX	1.62 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	92 mV
NormY	1.72 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	92 mV
NormZ	1.72 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	92 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL 900 MHz Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{be} [%]	Without Correction Algorithm	9.3	5.0
SAR _{be} [%]	With Correction Algorithm	0.1	0.2

Sensor Offset

Probe Tip to Sensor Center **2.7 mm**

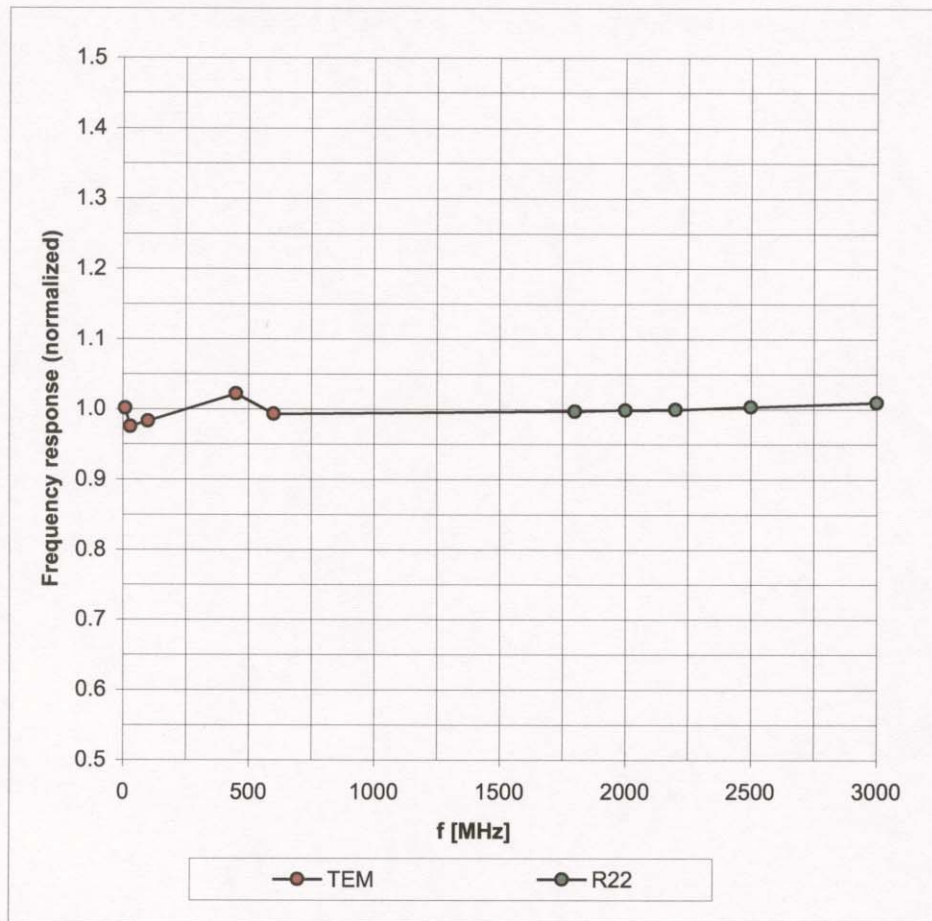
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Page 8).

^B Numerical linearization parameter: uncertainty not required.

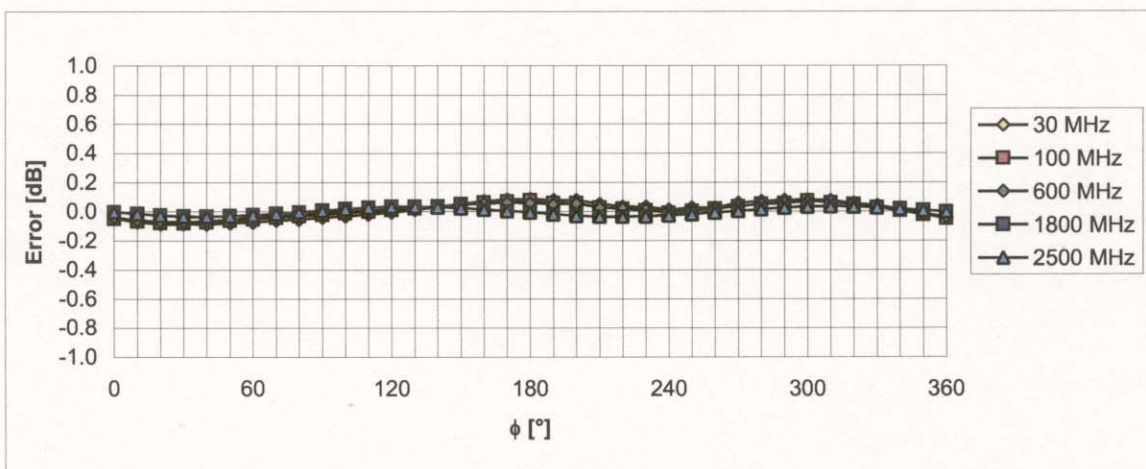
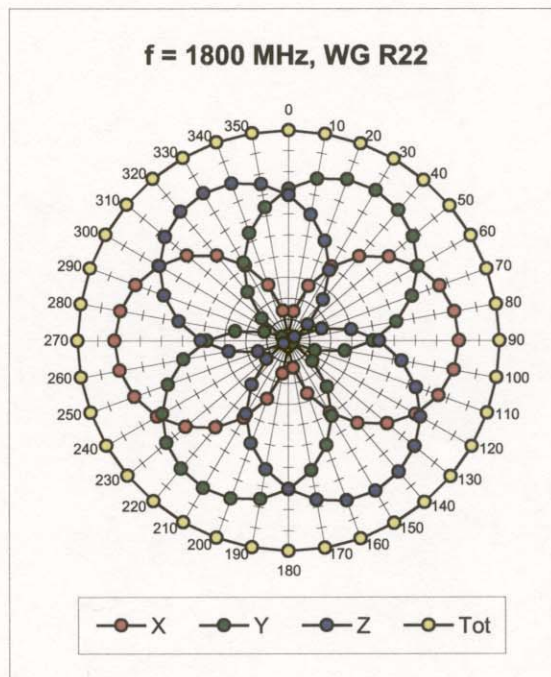
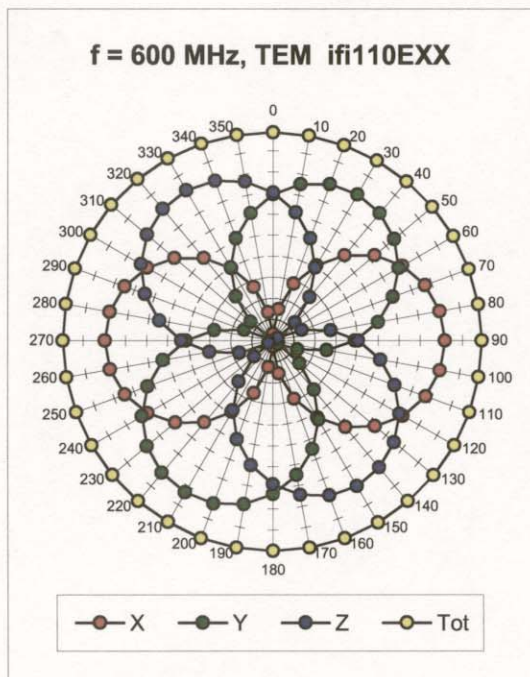
Frequency Response of E-Field

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



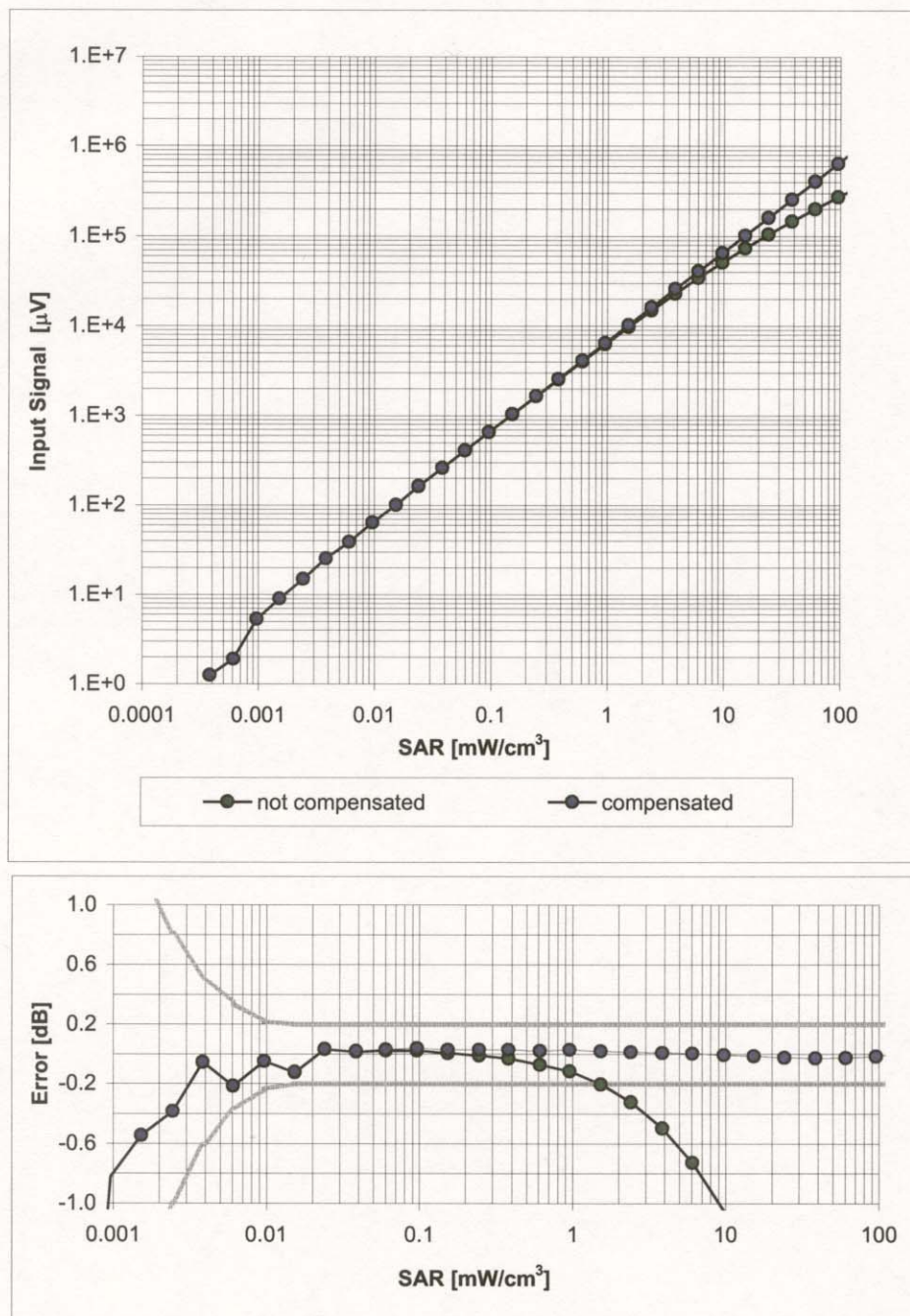
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\vartheta = 0^\circ$



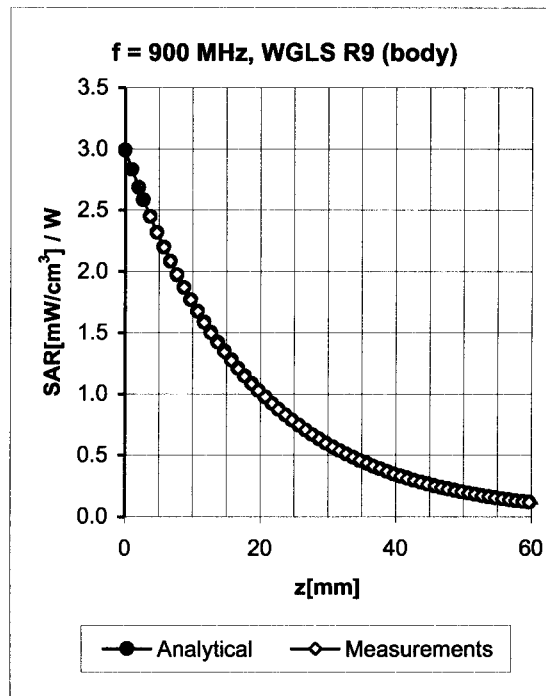
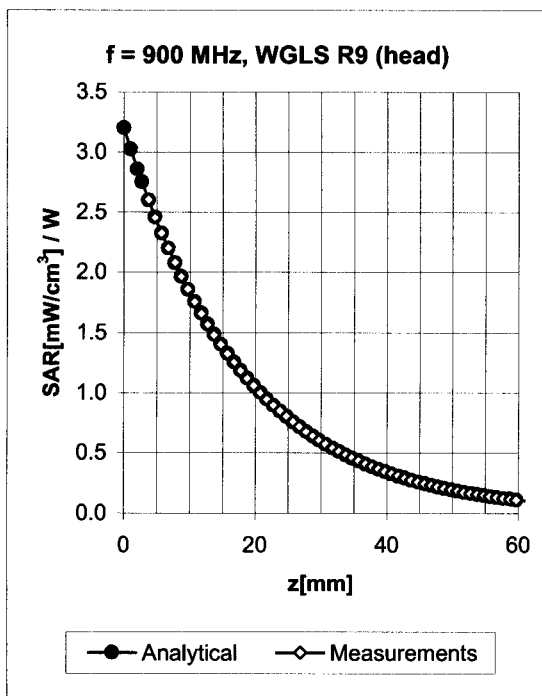
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (Waveguide R22, $f = 1800 \text{ MHz}$)



Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment

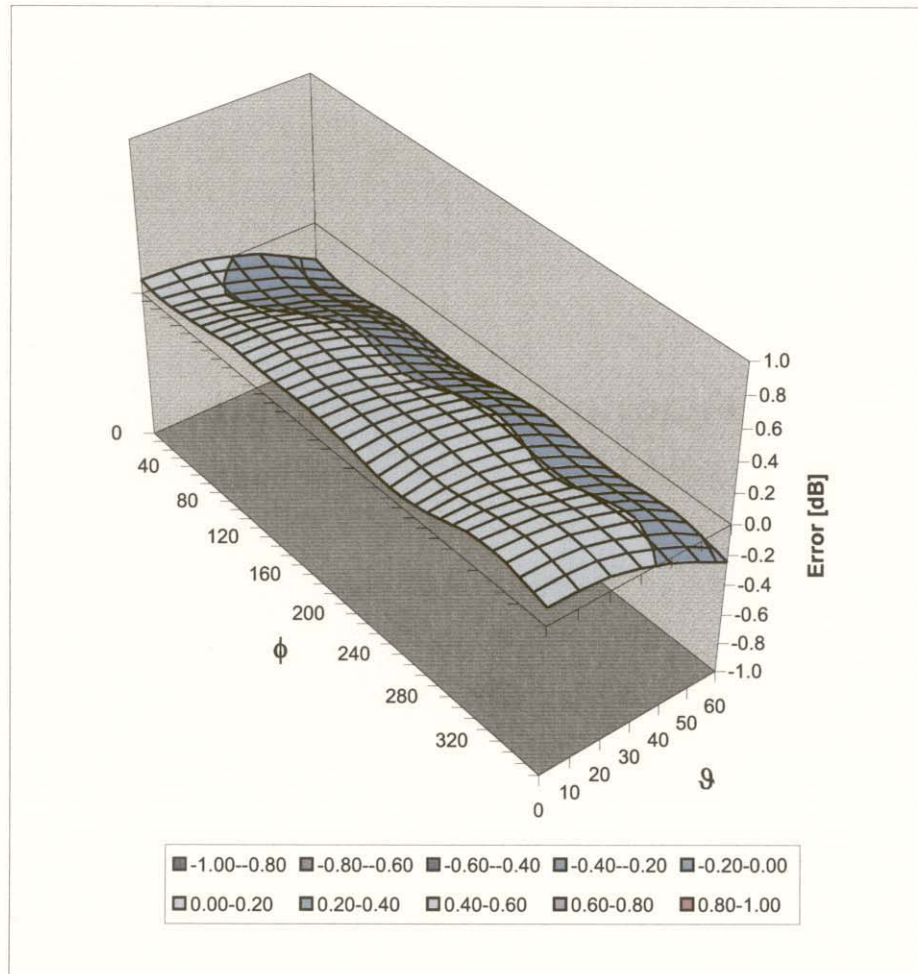


f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.62	1.86	6.35 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.59	1.97	6.04 ± 11.0% (k=2)

^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.

Deviation from Isotropy in HSL

Error (ϕ , θ), $f = 900$ MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1387

Place of Assessment:

Zurich

Date of Assessment:

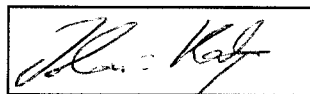
March 18, 2006

Probe Calibration Date:

March 16, 2006

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1800 MHz.

Assessed by:



Dosimetric E-Field Probe ET3DV6 SN:1387

Conversion factor ($\pm$ standard deviation)

150 $\pm$ 50 MHz	ConvF	8.6 $\pm$ 10%	$\epsilon_r = 52.3 \pm 5\%$ $\sigma = 0.76 \pm 5\%$ mho/m (head tissue)
150 $\pm$ 50 MHz	ConvF	8.2 $\pm$ 10%	$\epsilon_r = 61.9 \pm 5\%$ $\sigma = 0.80 \pm 5\%$ mho/m (body tissue)
300 $\pm$ 50 MHz	ConvF	7.8 $\pm$ 9%	$\epsilon_r = 45.3 \pm 5\%$ $\sigma = 0.87 \pm 5\%$ mho/m (head tissue)
450 $\pm$ 50 MHz	ConvF	7.4 $\pm$ 8%	$\epsilon_r = 43.5 \pm 5\%$ $\sigma = 0.87 \pm 5\%$ mho/m (head tissue)
450 $\pm$ 50 MHz	ConvF	7.3 $\pm$ 8%	$\epsilon_r = 56.7 \pm 5\%$ $\sigma = 0.94 \pm 5\%$ mho/m (body tissue)
750 $\pm$ 50 MHz	ConvF	6.6 $\pm$ 7%	$\epsilon_r = 41.8 \pm 5\%$ $\sigma = 0.89 \pm 5\%$ mho/m (head tissue)
750 $\pm$ 50 MHz	ConvF	6.4 $\pm$ 7%	$\epsilon_r = 55.4 \pm 5\%$ $\sigma = 0.96 \pm 5\%$ mho/m (body tissue)
1925 $\pm$ 50 MHz	ConvF	5.0 $\pm$ 7%	$\epsilon_r = 39.8 \pm 5\%$ $\sigma = 1.48 \pm 5\%$ mho/m (head tissue)
1925 $\pm$ 50 MHz	ConvF	4.7 $\pm$ 7%	$\epsilon_r = 53.2 \pm 5\%$ $\sigma = 1.60 \pm 5\%$ mho/m (body tissue)

Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.
 Please see also Section 4.7 of the DASY4 Manual.