

 Celltech Testing and Engineering Services Ltd.	Date(s) of Evaluation May 01-02, 2008	Test Report Serial No. 032608O78-T894-S90U	Test Report Revision No. Rev. 1.0 (Initial Release)	 IAC-MRA ACCREDITED
	Test Report Issue Date May 16, 2008	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational / Controlled	

SAR TEST REPORT (FCC)							
RF EXPOSURE EVALUATION		SPECIFIC ABSORPTION RATE					
APPLICANT	SMART COMMUNICATIONS LTD.						
DEVICE UNDER TEST (DUT)	PORTABLE FM UHF PTT RADIO TRANSCEIVER (400-430 MHz)						
DEVICE MODEL(S)	SC-580A						
IDENTIFIER(S)	FCC ID: O78SC580A						
APPLICATION TYPE	Certification						
STANDARD(S) APPLIED	FCC 47 CFR §2.1093 Health Canada Safety Code 6						
PROCEDURE(S) APPLIED	FCC OET Bulletin 65, Supplement C (01-01) Industry Canada RSS-102 Issue 2 IEEE 1528-2003						
FCC DEVICE CLASSIFICATION	Licensed Non-Broadcast Transmitter Held to Face (TNF)						
IC DEVICE CLASSIFICATION	Land Mobile Radio Transmitter/Receiver (27.41-960 MHz)						
RF EXPOSURE CATEGORY	Occupational / Controlled						
RF EXPOSURE EVALUATION(S)	Face-held & Body-worn						
DATE(S) OF EVALUATION(S)	May 01-02, 2008						
TEST REPORT SERIAL NO.	032608O78-T894-S90U						
TEST REPORT REVISION NO.	Revision 1.0		Initial Release	May 16, 2008			
TEST REPORT SIGNATORIES	Testing Performed By		Test Report Prepared By				
	Sean Johnston Celltech Labs Inc.		Jonathan Hughes Celltech Labs Inc.				
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TEST LAB CONTACT INFO.	Tel.: 250-765-7650		Fax: 250-765-7645				
	info@celltechlabs.com		www.celltechlabs.com				
TEST LAB ACCREDITATION(S)	 IAC-MRA ACCREDITED Test Lab Certificate No. 2470.01						

Applicant:	Smart Communications Ltd.	Model:	SC-580A	FCC ID:	O78SC580A	.ii SMARTCOMM USA INC. <sup>TM</sup>
DUT Type:	Portable FM UHF PTT Radio Transceiver	Transmit Frequency Range:	400 - 430 MHz			
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	Test Report Issue Date May 16, 2008	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational / Controlled	

Test Lab Certificate No. 2470.01

## DECLARATION OF COMPLIANCE SAR RF EXPOSURE EVALUATION

<b>Test Lab Information</b>		<b>Name</b>	CELLTECH LABS INC.			
		<b>Address</b>	21-364 Lougheed Road, Kelowna, B.C. V1X 7R8 Canada			
<b>Applicant Information</b>		<b>Name</b>	SMART COMMUNICATIONS LTD.			
		<b>Address</b>	Unit B, 21/F, Nathan Commercial Building, No. 430 ~ 436, Nathan Road, Kowloon, Hong Kong			
<b>Standard(s) Applied</b>		<b>FCC</b>	47 CFR §2.1093			
		<b>IC</b>	Health Canada Safety Code 6			
		<b>FCC</b>	OET Bulletin 65, Supplement C (Edition 01-01)			
<b>Procedure(s) Applied</b>		<b>IC</b>	RSS-102 Issue 2			
		<b>IEEE</b>	1528-2003			
<b>Application Type</b>		<b>FCC/IC</b>	Certification			
<b>Device Classification(s)</b>		<b>FCC</b>	Licensed Non-Broadcast Transmitter Held to Face (TNF)			
		<b>IC</b>	Land Mobile Radio Transmitter/Receiver (27.41-960 MHz)			
<b>Device RF Exposure Category</b>		<b>Portable</b>	Occupational / Controlled Environment			
<b>Device Identifier(s)</b>		<b>FCC ID:</b>	O78SC580A			
		<b>Model(s)</b>	SC-580A			
		<b>Serial No.</b>	U0203080228 (Identical Prototype)			
<b>Device Description</b>		Portable FM UHF Push-to-Talk (PTT) Radio Transceiver				
<b>Transmit Frequency Range(s)</b>		400 - 430 MHz				
<b>Max. RF Output Power Tested</b>		4.4 Watts	36.4 dBm	Conducted	400 MHz	Low Channel
		4.2 Watts	36.2 dBm	Conducted	415 MHz	Mid Channel
		4.2 Watts	36.2 dBm	Conducted	430 MHz	High Channel
<b>Antenna Type(s) Tested</b>		External Detachable Whip (Length: 149 mm)				
<b>Battery Type(s) Tested</b>		Ni-MH	7.2 V	2200 mAh	P/N: SCB-2200M	
		Lithium-ion	7.4 V	4000 mAh	P/N: SCB-4000I	
<b>Body-worn Accessories Tested</b>		Plastic Belt-Clip with Metal Spring		1.5 cm Spacing from Back of DUT		P/N: SBC-15
<b>Audio Accessories Tested</b>		Speaker-Microphone (P/N: SMC-15)				
<b>Max. SAR Level(s) Evaluated</b>		Face-held	2.93 W/kg	1g	50% duty cycle	Occupational / Controlled Exposure
		Body-worn	3.60 W/kg	1g	50% duty cycle	Occupational / Controlled Exposure
<b>FCC/IC Spatial Peak SAR Limit</b>		Head / Body	8.0 W/kg	1g	50% duty cycle	Occupational / Controlled Exposure
<p>Celltech Labs Inc. declares under its sole responsibility that this wireless portable device has demonstrated compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 and Health Canada's Safety Code 6 for the Occupational / Controlled Exposure environment. The device was tested in accordance with the measurement standards and procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01), Industry Canada RSS-102 Issue 2 and IEEE 1528-2003. All measurements were performed in accordance with the SAR system manufacturer recommendations.</p> <p>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.</p> <p>The results and statements contained in this report pertain only to the device(s) evaluated.</p> <p>This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Labs Inc.</p>						
<b>Test Report Approved By</b>			Sean Johnston	Celltech Labs Inc.		

<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A	
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz			
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	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

Test Lab Certificate No. 2470.01

## 1.0 INTRODUCTION

This measurement report demonstrates that the Smart Communications Ltd. Model(s): SC-580A Portable FM UHF PTT Radio Transceiver complies with the SAR (Specific Absorption Rate) RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) and Health Canada's Safety Code 6 (see reference [2]) for the Occupational / Controlled Exposure environment. The measurement procedures described in FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]), Industry Canada RSS-102 Issue 2 (see reference [4]) and IEEE 1528-2003 (see reference [5]) were employed. A description of the device, operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used and the various provisions of the rules are included within this test report.

## 2.0 SAR MEASUREMENT SYSTEM

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



DASY4 SAR System with Plexiglas validation phantom



DASY4 SAR System with Plexiglas side planar phantom

<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A	 <b>SMARTCOMM USA INC.</b>
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver		Transmit Frequency Range:	400 - 430 MHz		
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Specific Absorption RateRF Exposure Category  
Occupational / Controlled

Test Lab Certificate No. 2470.01

### 3.0 MEASUREMENT SUMMARY

## SAR EVALUATION RESULTS

Test Type	Freq.	Ch.	Test Mode	Battery Type	Accessories and Spacing			DUT Position to Planar Phantom	Cond. Power Before Test	Measured SAR 1g (W/kg)		Power Drift During Test	Scaled SAR with droop 1g (W/kg)	
										Duty Cycle			Duty Cycle	
					Body-worn	Spacing	Audio			Watts	100%	50%	dB	100%
Face	400	Low	CW	Ni-MH	n/a	2.5 cm	n/a	Front Side	4.4	2.51	1.26	-0.228	2.65	1.32
Face	415	Mid	CW	Ni-MH	n/a	2.5 cm	n/a	Front Side	4.2	3.96	1.98	-0.193	4.14	2.07
Face	430	High	CW	Ni-MH	n/a	2.5 cm	n/a	Front Side	4.2	5.23	2.62	-0.500	5.87	2.93
Body	400	Low	CW	Ni-MH	Belt-Clip	1.5 cm	Speaker Mic	Back Side	4.4	2.96	1.48	-0.261	3.14	1.57
Body	415	Mid	CW	Ni-MH	Belt-Clip	1.5 cm	Speaker Mic	Back Side	4.2	5.02	2.51	-0.238	5.30	2.65
Body	430	High	CW	Ni-MH	Belt-Clip	1.5 cm	Speaker Mic	Back Side	4.2	6.31	3.16	-0.574	7.20	3.60
Body	430	High	CW	Li-ion	Belt-Clip	1.5 cm	Speaker Mic	Back Side	4.2	3.83	1.92	-0.343	4.14	2.07
SAR LIMIT(S)					BRAIN		BODY		SPATIAL PEAK		RF EXPOSURE CATEGORY			
FCC 47 CFR 2.1093	Health Canada Safety Code 6				8.0 W/kg		8.0 W/kg		averaged over 1 gram		Occupational / Controlled			
Test Date(s)		May 01, 2008			May 02, 2008			Measured Fluid Type		Brain	Body	Unit		
Dielectric Constant $\epsilon_r$		420 MHz Brain			420 MHz Body			Atmospheric Pressure		101.1	101.1	kPa		
		IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.	Relative Humidity		35	35	%		
		43.9	$\pm 5\%$	44.5	+1.4%	57.0	$\pm 5\%$	59.3	+4.0%	Ambient Temperature	22.5	22.5	°C	
Conductivity $\sigma$ (mho/m)		420 MHz Brain			420 MHz Body			Fluid Temperature		21.5	21.5	°C		
		IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.	Fluid Depth		$\geq 15$	$\geq 15$	cm		
		0.87	$\pm 5\%$	0.85	-2.2%	0.94	$\pm 5\%$	0.91	-3.2%	$\rho$ (Kg/m <sup>3</sup> )	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.
- The maximum SAR configuration evaluated with the Ni-MH battery was repeated with the Li-ion battery to report a comparison between the two battery types. The Li-ion battery has a greater thickness than the Ni-MH battery and provides additional spacing between the antenna and the planar phantom.
- The area scan evaluation was performed with a fully charged battery installed in the DUT. After the area scan was completed the radio was cooled down and the battery was replaced with a fully charged battery prior to the zoom scan evaluation.
- The power drift of the DUT was measured by the DASY4 system for the duration of the SAR evaluations. Power drops 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 maximum scaled SAR configuration. See Appendix A (SAR Test Plots) for SAR-versus-Time power droop evaluation plot.
- The fluid temperature was measured prior to and after the SAR evaluations to ensure the temperature remained within +/-2°C of the fluid temperature reported during the dielectric parameter measurements.
- The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluations using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).
- The SAR evaluations were performed within 24 hours of the system performance check.

Applicant:	Smart Communications Ltd.	Model:	SC-580A	FCC ID:	O78SC580A	II SMARTCOMM USA INC.
DUT Type:	Portable FM UHF PTT Radio Transceiver		Transmit Frequency Range:	400 - 430 MHz		
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## 4.0 DETAILS OF SAR EVALUATION

The Smart Communications Ltd. Model(s): SC-580A Portable FM UHF PTT Radio Transceiver described in this report was compliant for localized Specific Absorption Rate (Occupational / Controlled Exposure) based on the test provisions and conditions described below. Detailed photographs of the test setup are shown in Appendix D.

### 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 spacing 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 was touching the planar phantom and provided a 1.5 cm spacing from the back of the DUT to the outer surface of the planar phantom. The DUT was evaluated for body-worn SAR with the customer-supplied speaker-microphone audio accessory connected to the audio port.
3. The DUT was evaluated for body-worn SAR with Ni-MH and Li-ion battery types to report a comparison.

### Test Mode(s) & Power Level(s)

4. 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.
5. The conducted power levels were measured prior to the SAR evaluations at the antenna connector of the DUT using a Gigatronics 8652A Universal Power Meter according to the procedures described in FCC 47 CFR §2.1046 and IC RSS-Gen.

### Test Conditions

6. The fluid temperature was measured prior to and after the SAR evaluations to ensure the temperature remained within +/-2°C of the fluid temperature reported during the dielectric parameter measurements.
7. The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluations using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).

## 5.0 EVALUATION PROCEDURES

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

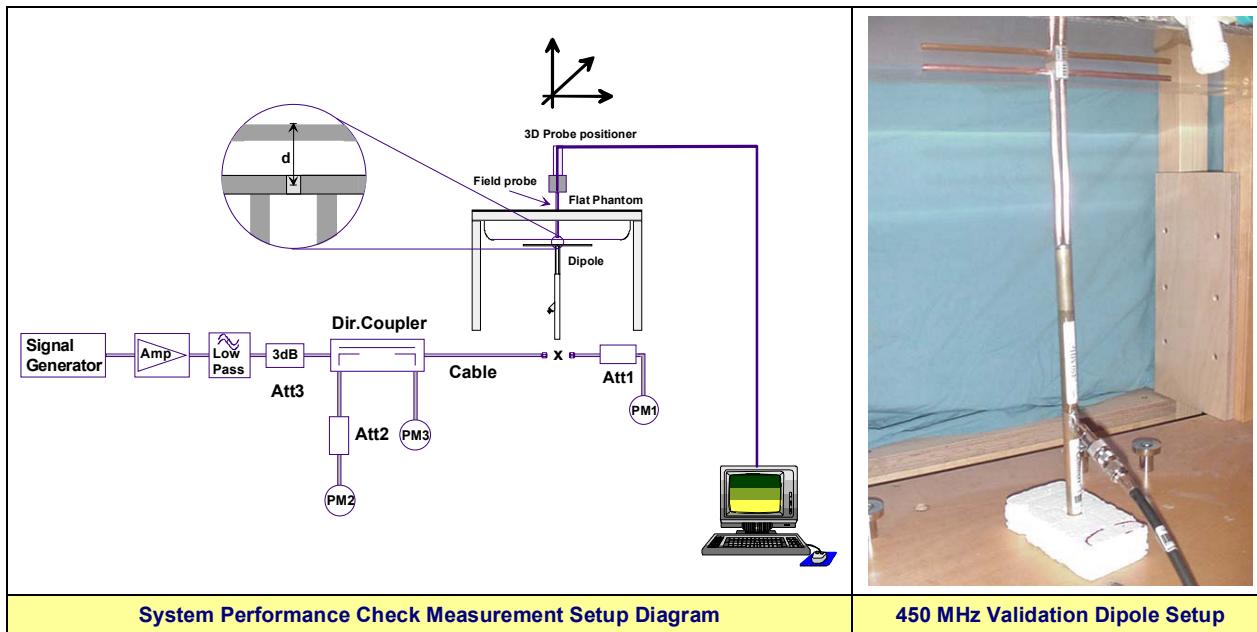
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<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz			
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## 6.0 SYSTEM PERFORMANCE CHECK

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

### SYSTEM PERFORMANCE CHECK EVALUATION

Test Date	Equiv. Tissue	SAR 1g (W/kg)			Dielectric Constant $\epsilon_r$			Conductivity $\sigma$ (mho/m)			$\rho$ (Kg/m <sup>3</sup> )	Amb. Temp. (°C)	Fluid Temp. (°C)	Fluid Depth (cm)	Humid. (%)	Barom. Press. (kPa)
		Freq. (MHz)	Sys. Val Target	Meas.	Dev.	Sys. Val Target	Meas.	Dev.	Sys. Val Target	Meas.	Dev.					
May 01	Brain	1.19 $\pm 10\%$	1.19	0.0%	43.6 $\pm 5\%$	43.6	0.0%	0.86 $\pm 5\%$	0.86	0.0%	1000	22.5	21.5	$\geq 15$	35	101.1
450																
Note(s)		1. The target SAR value is referenced from the System Validation procedure performed by Celltech Labs Inc. (see Appendix E). 2. The target dielectric parameters are referenced from the System Validation procedure performed by Celltech Labs Inc. (see Appendix E). 3. The fluid temperature was measured prior to and after the system performance check to ensure the temperature remained within $\pm 2^\circ\text{C}$ of the fluid temperature reported during the dielectric parameter measurements. 4. The SAR evaluations were performed within 24 hours of the system performance check.														



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## 7.0 SIMULATED EQUIVALENT TISSUES

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

SIMULATED TISSUE MIXTURES		
INGREDIENT	450 MHz Brain	450 MHz Body
	System Check & 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 %

## 8.0 SAR LIMITS

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

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## 9.0 ROBOT SYSTEM SPECIFICATIONS

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

<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	078SC580A	
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz			
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## 10.0 PROBE SPECIFICATION (ET3DV6)

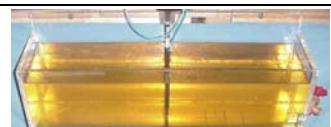
Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, glycol)
Calibration:	In air from 10 MHz to 2.5 GHz In brain simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy $\pm$ 8%)
Frequency:	10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



ET3DV6 E-Field Probe

## 11.0 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

## 12.0 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.



Plexiglas Validation Planar Phantom

## 13.0 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

Applicant:	Smart Communications Ltd.	Model:	SC-580A	FCC ID:	O78SC580A	
DUT Type:	Portable FM UHF PTT Radio Transceiver	Transmit Frequency Range:	400 - 430 MHz			
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	Test Report Issue Date May 16, 2008	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational / Controlled	

Test Lab Certificate No. 2470.01

## 14.0 TEST EQUIPMENT LIST

TEST EQUIPMENT		ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION DUE DATE
USED	DESCRIPTION				
x	Schmid & Partner DASY4 System	-	-	-	-
x	-DASY4 Measurement Server	00158	1078	N/A	N/A
x	-Robot	00046	599396-01	N/A	N/A
x	-DAE4	00019	353	22Apr08	22Apr09
	-EX3DV4 E-Field Probe	00213	3600	19Apr08	19Apr09
x	-ET3DV6 E-Field Probe	00016	1387	22Apr08	22Apr09
	-300 MHz Validation Dipole	00023	135	08Jun07	08Jun08
x	-450 MHz Validation Dipole	00024	136	01May08	01May09
	-835 MHz Validation Dipole	00022	411	Brain	07Jun07
				Body	07Jun07
	-900 MHz Validation Dipole	00020	054	Brain	07Jun07
				Body	07Jun07
	-1800 MHz Validation Dipole	00021	247	Brain	06Jun07
				Body	06Jun07
	-1900 MHz Validation Dipole	00032	151	Brain	06Jun07
				Body	06Jun07
	-2450 MHz Validation Dipole	00025	150	Brain	16Jul07
				Body	08Jun07
	5GHz Validation Dipole	00126	1031	Body	21Apr08
				Body	21Apr08
				Brain	21Apr08
	-5200 MHz	00126	1031	Body	21Apr08
				Body	21Apr08
				Brain	21Apr08
	-SAM Phantom V4.0.C	00154	1033	N/A	N/A
	-Barski Planar Phantom	00155	03-01	N/A	N/A
x	-Plexiglas Side Planar Phantom	00156	161	N/A	N/A
x	-Plexiglas Validation Planar Phantom	00157	137	N/A	N/A
	ALS-PR-DIEL Dielectric Probe Kit	00160	260-00953	N/A	N/A
x	HP 85070C Dielectric Probe Kit	00033	US39240170	N/A	N/A
x	Gigatronics 8652A Power Meter	00007	1835272	23Apr08	23Apr09
x	Gigatronics 80701A Power Sensor	00014	1833699	23Apr08	23Apr09
x	HP 8753ET Network Analyzer	00134	US39170292	28Apr08	28Apr09
x	HP 8648D Signal Generator	00005	3847A00611	NCR	NCR
	Rohde & Schwarz SMR20 Signal Generator	00006	100104	NCR	NCR
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	NCR	NCR
	Amplifier Research 10W 1000C Power Amplifier	00041	27887	NCR	NCR
	Nextec NB00383 Microwave Amplifier	00151	0535	NCR	NCR

Applicant:	Smart Communications Ltd.	Model:	SC-580A	FCC ID:	078SC580A	II SMARTCOMM USA INC. <sup>TM</sup>
DUT Type:	Portable FM UHF PTT Radio Transceiver		Transmit Frequency Range:	400 - 430 MHz		
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	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

Test Lab Certificate No. 2470.01

## 15.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION						
Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	Uncertainty Value ±% (1g)	$V_i$ or $V_{eff}$
<b>Measurement System</b>						
Probe calibration (450 MHz)	6.65	Normal	1	1	6.65	∞
Axial isotropy of the probe	4.7	Rectangular	1.732050808	0.7	1.9	∞
Spherical isotropy of the probe	9.6	Rectangular	1.732050808	0.7	3.9	∞
Spatial resolution	0	Rectangular	1.732050808	1	0.0	∞
Boundary effects	0.9	Rectangular	1.732050808	1	0.5	∞
Probe linearity	4.7	Rectangular	1.732050808	1	2.7	∞
Detection limit	1	Rectangular	1.732050808	1	0.6	∞
Readout electronics	0.3	Normal	1	1	0.3	∞
Response time	0.8	Rectangular	1.732050808	1	0.5	∞
Integration time	2.6	Rectangular	1.732050808	1	1.5	∞
RF ambient conditions	3	Rectangular	1.732050808	1	1.7	∞
Mech. constraints of robot	0.4	Rectangular	1.732050808	1	0.2	∞
Probe positioning	2.9	Rectangular	1.732050808	1	1.7	∞
Extrapolation & integration	1	Rectangular	1.732050808	1	0.6	∞
<b>Test Sample Related</b>						
Device positioning	2.9	Normal	1	1	2.9	12
Device holder uncertainty	3.6	Normal	1	1	3.6	8
Power drift	14.1	Rectangular	1.732050808	1	8.1	∞
<b>Phantom and Setup</b>						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	∞
Liquid conductivity (measured)	3.2	Normal	1	0.64	2.0	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	4	Normal	1	0.6	2.4	∞
<b>Combined Standard Uncertainty</b>						
<b>Expanded Uncertainty (k=2)</b>						
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 (see reference [5])						

<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A	
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver		Transmit Frequency Range:	400 - 430 MHz		
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Test Lab Certificate No. 2470.01

## MEASUREMENT UNCERTAINTIES (CONT.)

UNCERTAINTY BUDGET FOR SYSTEM VALIDATION						
Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	Uncertainty Value ±% (1g)	$V_i$ or $V_{eff}$
<b>Measurement System</b>						
Probe calibration (450 MHz)	6.65	Normal	1	1	6.65	∞
Axial isotropy of the probe	4.7	Rectangular	1.732050808	1	2.7	∞
Spherical isotropy of the probe	0	Rectangular	1.732050808	1	0.0	∞
Spatial resolution	0	Rectangular	1.732050808	1	0.0	∞
Boundary effects	0.9	Rectangular	1.732050808	1	0.5	∞
Probe linearity	4.7	Rectangular	1.732050808	1	2.7	∞
Detection limit	1	Rectangular	1.732050808	1	0.6	∞
Readout electronics	0.3	Normal	1	1	0.3	∞
Response time	0	Rectangular	1.732050808	1	0.0	∞
Integration time	0	Rectangular	1.732050808	1	0.0	∞
RF ambient conditions	3	Rectangular	1.732050808	1	1.7	∞
Mech. constraints of robot	0.4	Rectangular	1.732050808	1	0.2	∞
Probe positioning	2.9	Rectangular	1.732050808	1	1.7	∞
Extrapolation & integration	1	Rectangular	1.732050808	1	0.6	∞
<b>Dipole</b>						
Dipole Positioning	2	Normal	1.732050808	1	1.2	∞
Power & Power Drift	4.7	Normal	1.732050808	1	2.7	∞
<b>Phantom and Setup</b>						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	∞
Liquid conductivity (measured)	0	Normal	1	0.64	0.0	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	0	Normal	1	0.6	0.0	∞
<b>Combined Standard Uncertainty</b>						
<b>Expanded Uncertainty (k=2)</b>						
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 (see reference [5])						

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

Applicant:	Smart Communications Ltd.	Model:	SC-580A	FCC ID:	078SC580A	
DUT Type:	Portable FM UHF PTT Radio Transceiver	Transmit Frequency Range:	400 - 430 MHz			
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	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

Test Lab Certificate No. 2470.01

## 16.0 REFERENCES

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

<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A	 <b>SMARTCOMM USA INC.</b>
<b>DUT Type:</b>	<b>Portable FM UHF PTT Radio Transceiver</b>		<b>Transmit Frequency Range:</b>		400 - 430 MHz	
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Test Lab Certificate No. 2470.01

## APPENDIX A - SAR MEASUREMENT DATA

<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A	 SMARTCOMM USA INC. <sup>TM</sup>
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz			
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	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

Date Tested: 05/01/2008

### Face-held SAR - Low Channel (400 MHz) - Ni-MH Battery

**DUT: Smart Communications Ltd.; Model: SC-580A; Type: Portable UHF PTT Radio Transceiver; Serial: U0203080228**

Ambient Temp: 22.5°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: UHF (CW)

7.2V, 2200mAh Ni-MH Battery Pack

Frequency: 400 MHz; Duty Cycle: 1:1

RF Output Power: 4.4 Watts (Conducted)

Medium: HSL450 Medium parameters used:  $f = 400$  MHz;  $\sigma = 0.85$  mho/m;  $\epsilon_r = 44.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- Probe: ET3DV6 - SN1387; ConvF(7.32, 7.32, 7.32); Calibrated: 22/04/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

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

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

Maximum value of SAR (measured) = 2.47 mW/g

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

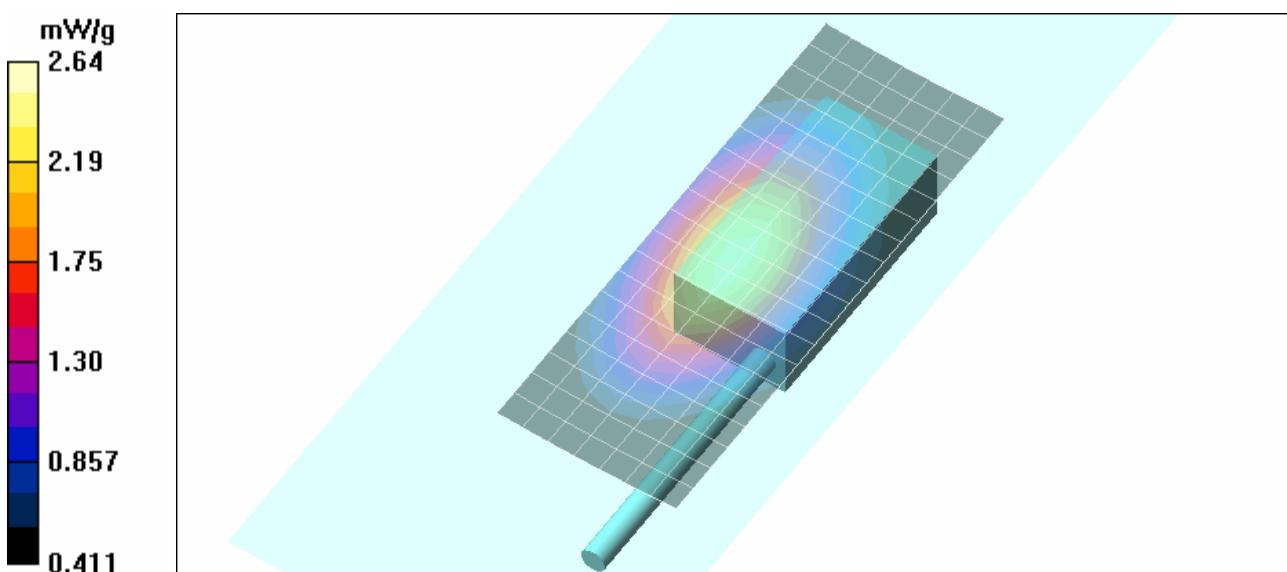
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 56.5 V/m; Power Drift = -0.228 dB

Peak SAR (extrapolated) = 3.53 W/kg

**SAR(1 g) = 2.51 mW/g; SAR(10 g) = 1.84 mW/g**

Maximum value of SAR (measured) = 2.64 mW/g



<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A	
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz			
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	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

Date Tested: 05/01/2008

## Face-held SAR - Mid Channel (415 MHz) - Ni-MH Battery

**DUT: Smart Communications Ltd.; Model: SC-580A; Type: Portable UHF PTT Radio Transceiver; Serial: U0203080228**

Ambient Temp: 22.5°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: UHF (CW)

7.2V, 2200mAh Ni-MH Battery Pack

Frequency: 415 MHz; Duty Cycle: 1:1

RF Output Power: 4.2 Watts (Conducted)

Medium: HSL450 Medium parameters used:  $f = 415$  MHz;  $\sigma = 0.85$  mho/m;  $\epsilon_r = 44.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- Probe: ET3DV6 - SN1387; ConvF(7.32, 7.32, 7.32); Calibrated: 22/04/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

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

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

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

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

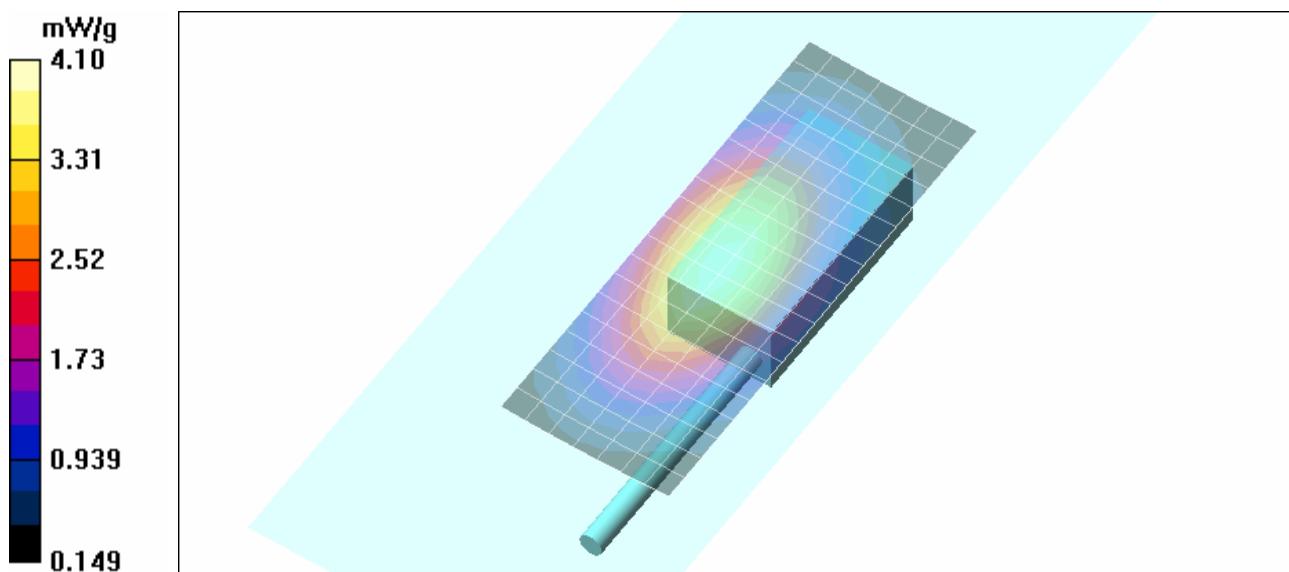
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 71.3 V/m; Power Drift = -0.193 dB

Peak SAR (extrapolated) = 5.56 W/kg

**SAR(1 g) = 3.96 mW/g; SAR(10 g) = 2.89 mW/g**

Maximum value of SAR (measured) = 4.14 mW/g



<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A		
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz				
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	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

Date Tested: 05/01/2008

### Face-held SAR - High Channel (430 MHz) - Ni-MH Battery

**DUT: Smart Communications Ltd.; Model: SC-580A; Type: Portable UHF PTT Radio Transceiver; Serial: U0203080228**

Ambient Temp: 22.5°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: UHF (CW)

7.2V, 2200mAh Ni-MH Battery Pack

Frequency: 430 MHz; Duty Cycle: 1:1

RF Output Power: 4.2 Watts (Conducted)

Medium: HSL450 Medium parameters used:  $f = 430$  MHz;  $\sigma = 0.85$  mho/m;  $\epsilon_r = 44.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- Probe: ET3DV6 - SN1387; ConvF(7.32, 7.32, 7.32); Calibrated: 22/04/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

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

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

Maximum value of SAR (measured) = 5.64 mW/g

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

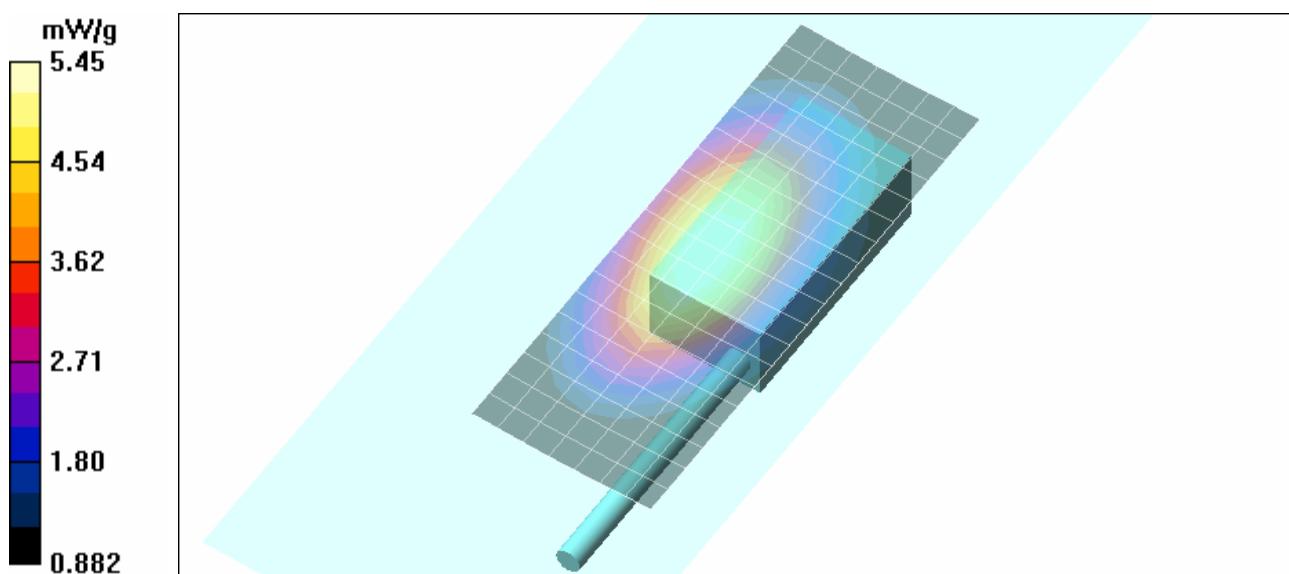
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 84.1 V/m; Power Drift = -0.500 dB

Peak SAR (extrapolated) = 7.25 W/kg

**SAR(1 g) = 5.23 mW/g; SAR(10 g) = 3.86 mW/g**

Maximum value of SAR (measured) = 5.45 mW/g

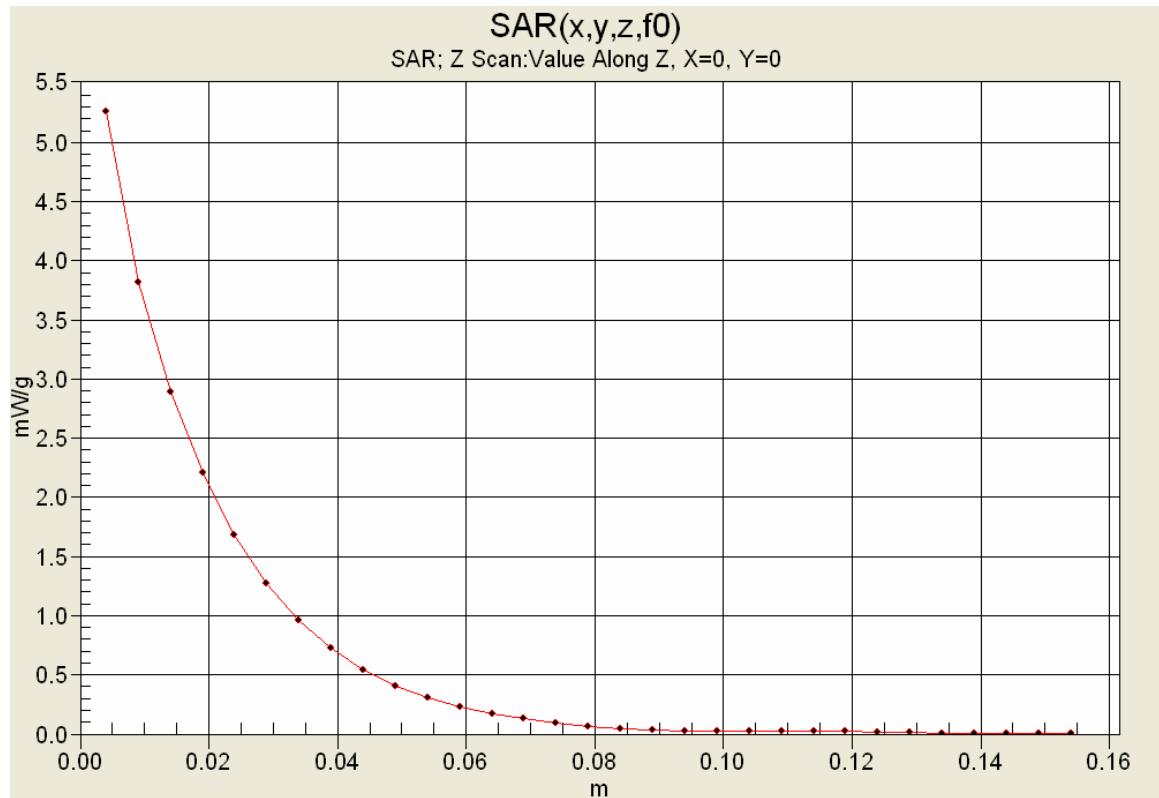


<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A					
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz							
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	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

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## Z-Axis Scan



<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A					
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz							
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 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> May 01-02, 2008	<u>Test Report Serial No.</u> 032608O78-T894-S90U	<u>Test Report Revision No.</u> Rev. 1.0 (Initial Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

Date Tested: 05/02/2008

## Body-worn SAR - Low Channel (400 MHz) - Ni-MH Battery

**DUT:** Smart Communications Ltd.; **Model:** SC-580A; **Type:** Portable UHF PTT Radio Transceiver; **Serial:** U0203080228

**Body-worn Accessory:** Belt-Clip (P/N: SBC-15); **Audio Accessory:** Speaker-Microphone (P/N: SMC-15)

Ambient Temp: 22.5°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: UHF (CW)

7.2V, 2200mAh Ni-MH Battery Pack

Frequency: 400 MHz; Duty Cycle: 1:1

RF Output Power: 4.4 Watts (Conducted)

Medium: M450 Medium parameters used:  $f = 400$  MHz;  $\sigma = 0.91$  mho/m;  $\epsilon_r = 60.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- Probe: ET3DV6 - SN1387; ConvF(7.76, 7.76, 7.76); Calibrated: 22/04/2008

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

- Electronics: DAE4 Sn353; Calibrated: 22/04/2008

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

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

### Body-worn SAR - 1.5 cm Belt-Clip Spacing from Back of DUT to Planar Phantom - Low Channel

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

Maximum value of SAR (measured) = 3.28 mW/g

### Body-worn SAR - 1.5 cm Belt-Clip Spacing from Back of DUT to Planar Phantom - Low Channel

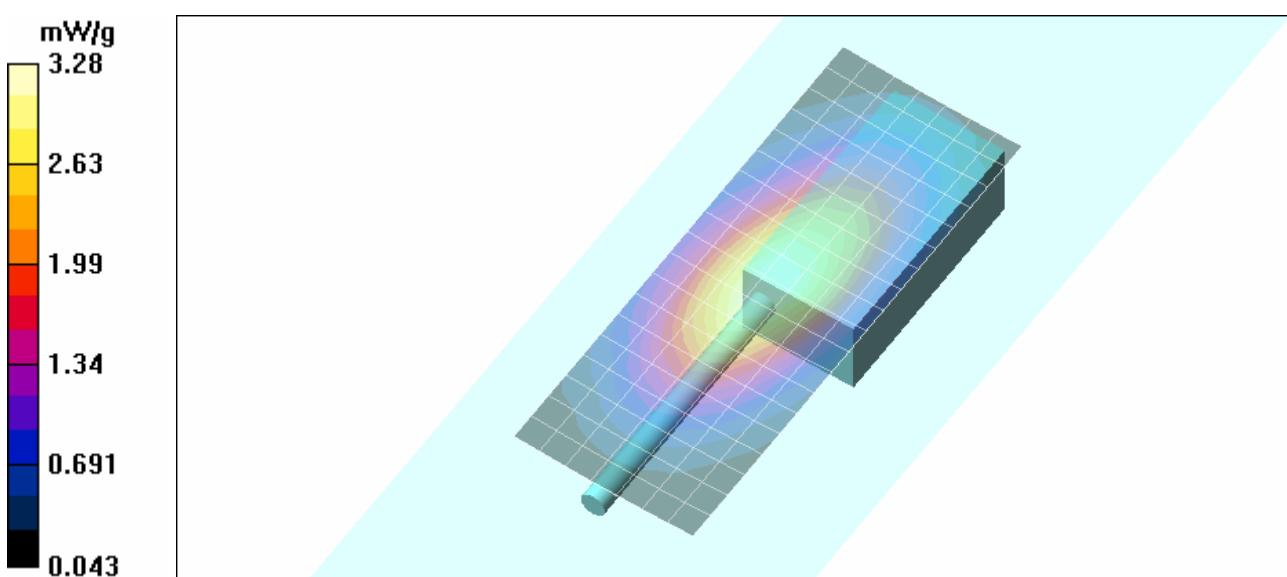
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 56.4 V/m; Power Drift = -0.261 dB

Peak SAR (extrapolated) = 4.16 W/kg

**SAR(1 g) = 2.96 mW/g; SAR(10 g) = 2.19 mW/g**

Maximum value of SAR (measured) = 3.11 mW/g



<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A	
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz			
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 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> May 01-02, 2008	<u>Test Report Serial No.</u> 032608O78-T894-S90U	<u>Test Report Revision No.</u> Rev. 1.0 (Initial Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

Date Tested: 05/02/2008

## Body-worn SAR - Mid Channel (415 MHz) - Ni-MH Battery

**DUT:** Smart Communications Ltd.; **Model:** SC-580A; **Type:** Portable UHF PTT Radio Transceiver; **Serial:** U0203080228

**Body-worn Accessory:** Belt-Clip (P/N: SBC-15); **Audio Accessory:** Speaker-Microphone (P/N: SMC-15)

Ambient Temp: 22.5°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: UHF (CW)

7.2V, 2200mAh Ni-MH Battery Pack

Frequency: 415 MHz; Duty Cycle: 1:1

RF Output Power: 4.2 Watts (Conducted)

Medium: M450 Medium parameters used:  $f = 415$  MHz;  $\sigma = 0.91$  mho/m;  $\epsilon_r = 60.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- Probe: ET3DV6 - SN1387; ConvF(7.76, 7.76, 7.76); Calibrated: 22/04/2008

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

- Electronics: DAE4 Sn353; Calibrated: 22/04/2008

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

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

### Body-worn SAR - 1.5 cm Belt-Clip Spacing from Back of DUT to Planar Phantom - Mid Channel

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

Maximum value of SAR (measured) = 4.79 mW/g

### Body-worn SAR - 1.5 cm Belt-Clip Spacing from Back of DUT to Planar Phantom - Mid Channel

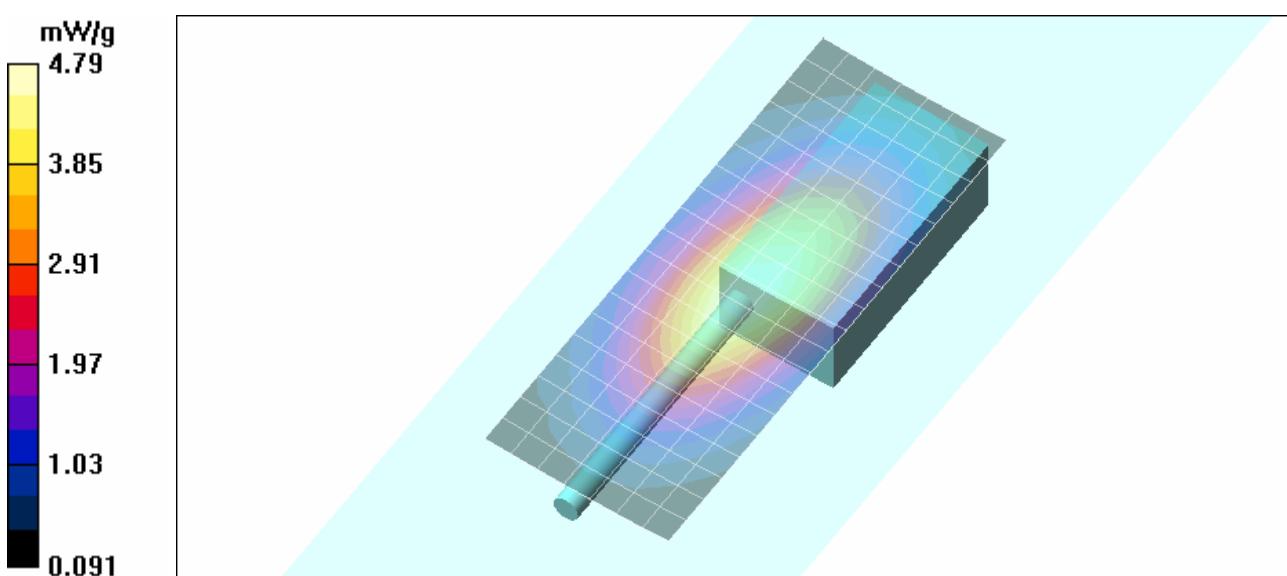
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 74.7 V/m; Power Drift = -0.238 dB

Peak SAR (extrapolated) = 7.06 W/kg

**SAR(1 g) = 5.02 mW/g; SAR(10 g) = 3.71 mW/g**

Maximum value of SAR (measured) = 5.26 mW/g



<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A					
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz							
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	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

Date Tested: 05/02/2008

## Body-worn SAR - High Channel (430 MHz) - Ni-MH Battery

**DUT:** Smart Communications Ltd.; **Model:** SC-580A; **Type:** Portable UHF PTT Radio Transceiver; **Serial:** U0203080228

**Body-worn Accessory:** Belt-Clip (P/N: SBC-15); **Audio Accessory:** Speaker-Microphone (P/N: SMC-15)

Ambient Temp: 22.5°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: UHF (CW)

7.2V, 2200mAh Ni-MH Battery Pack

Frequency: 430 MHz; Duty Cycle: 1:1

RF Output Power: 4.2 Watts (Conducted)

Medium: M450 Medium parameters used:  $f = 430$  MHz;  $\sigma = 0.91$  mho/m;  $\epsilon_r = 60.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- Probe: ET3DV6 - SN1387; ConvF(7.76, 7.76, 7.76); Calibrated: 22/04/2008

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

- Electronics: DAE4 Sn353; Calibrated: 22/04/2008

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

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

### Body-worn SAR - 1.5 cm Belt-Clip Spacing from Back of DUT to Planar Phantom - High Channel

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

Maximum value of SAR (measured) = 7.33 mW/g

### Body-worn SAR - 1.5 cm Belt-Clip Spacing from Back of DUT to Planar Phantom - High Channel

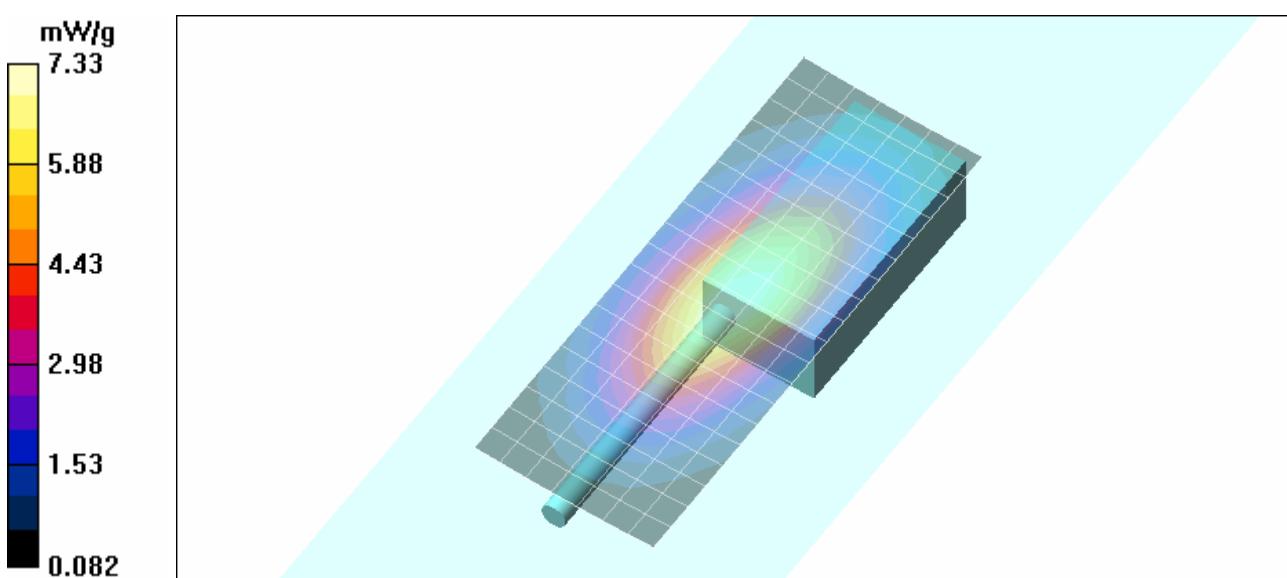
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 83.6 V/m; Power Drift = -0.574 dB

Peak SAR (extrapolated) = 8.89 W/kg

**SAR(1 g) = 6.31 mW/g; SAR(10 g) = 4.62 mW/g**

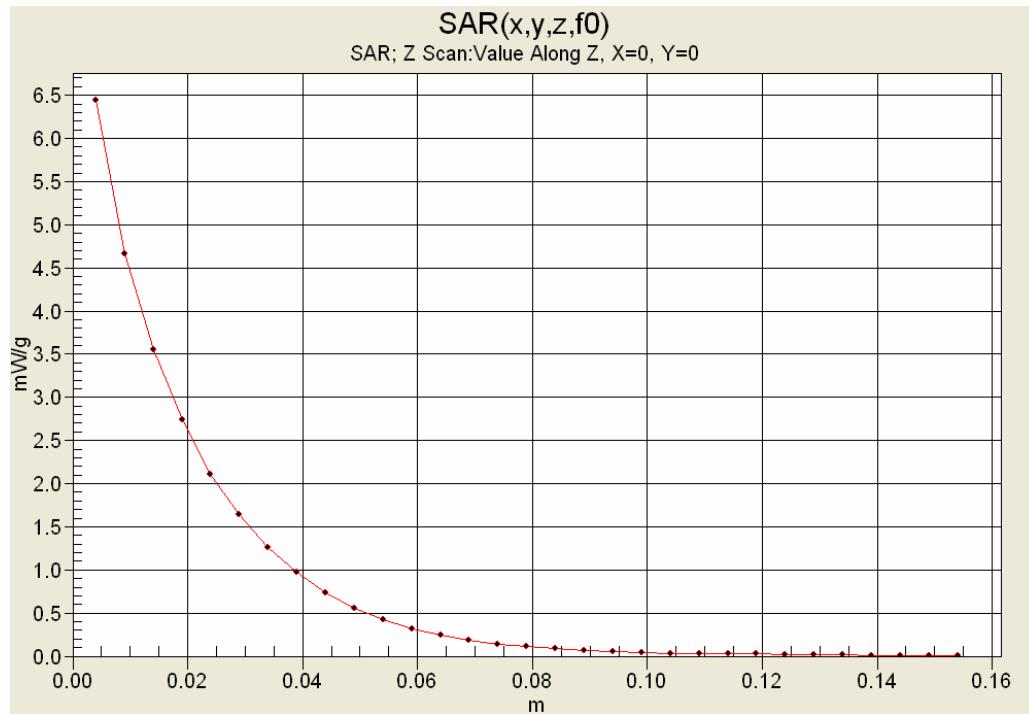
Maximum value of SAR (measured) = 6.63 mW/g



<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A	
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz			
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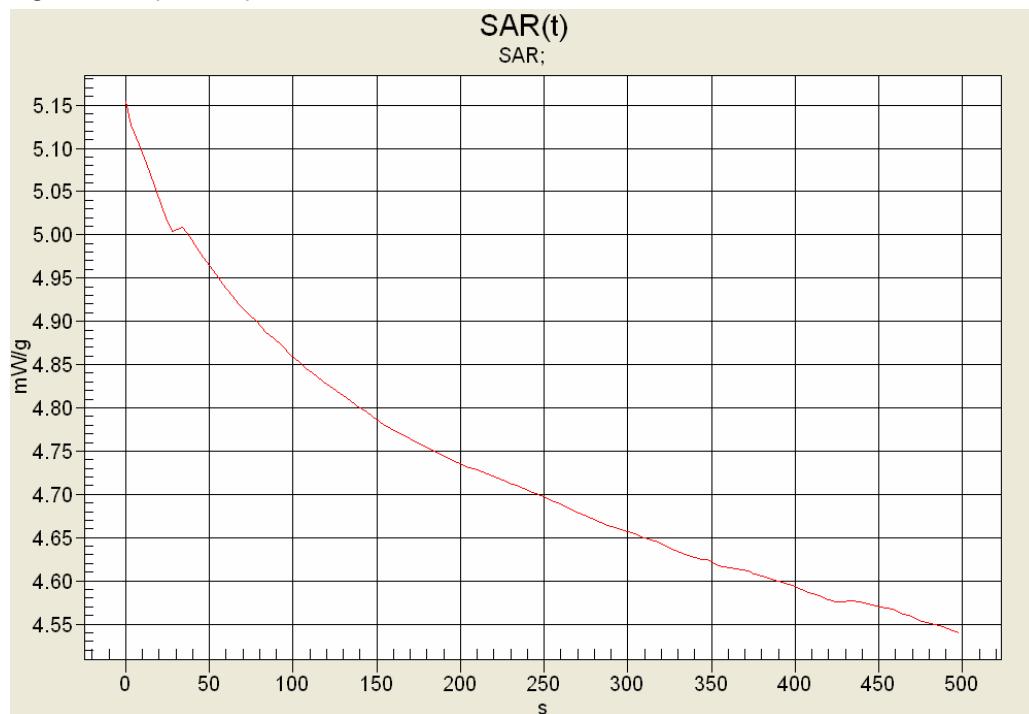
 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> May 01-02, 2008	<u>Test Report Serial No.</u> 032608O78-T894-S90U	<u>Test Report Revision No.</u> Rev. 1.0 (Initial Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

## Z-Axis Scan



## SAR-versus-Time Power Drift Evaluation

Body-worn Configuration  
High Channel (430 MHz)



Max SAR: 5.15 mW/g

Low SAR: 4.54 mW/g (-0.548 dB)

SAR after 340s: 4.63 mW/g (-0.462 dB)

(340s = Zoom Scan Duration)

<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	078SC580A		
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz				
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	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

Date Tested: 05/02/2008

## Body-worn SAR - High Channel (430 MHz) - Li-ion Battery

**DUT:** Smart Communications Ltd.; **Model:** SC-580A; **Type:** Portable UHF PTT Radio Transceiver; **Serial:** U0203080228

**Body-worn Accessory:** Belt-Clip (P/N: SBC-15); **Audio Accessory:** Speaker-Microphone (P/N: SMC-15)

Ambient Temp: 22.5°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: UHF (CW)

7.4V, 4000mAh Li-ion Battery Pack

Frequency: 430 MHz; Duty Cycle: 1:1

RF Output Power: 4.2 Watts (Conducted)

Medium: M450 Medium parameters used:  $f = 430$  MHz;  $\sigma = 0.91$  mho/m;  $\epsilon_r = 60.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- Probe: ET3DV6 - SN1387; ConvF(7.76, 7.76, 7.76); Calibrated: 22/04/2008

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

- Electronics: DAE4 Sn353; Calibrated: 22/04/2008

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

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

### Body-worn SAR - 1.5 cm Belt-Clip Spacing from Back of DUT to Planar Phantom - High Channel

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

Maximum value of SAR (measured) = 4.36 mW/g

### Body-worn SAR - 1.5 cm Belt-Clip Spacing from Back of DUT to Planar Phantom - High Channel

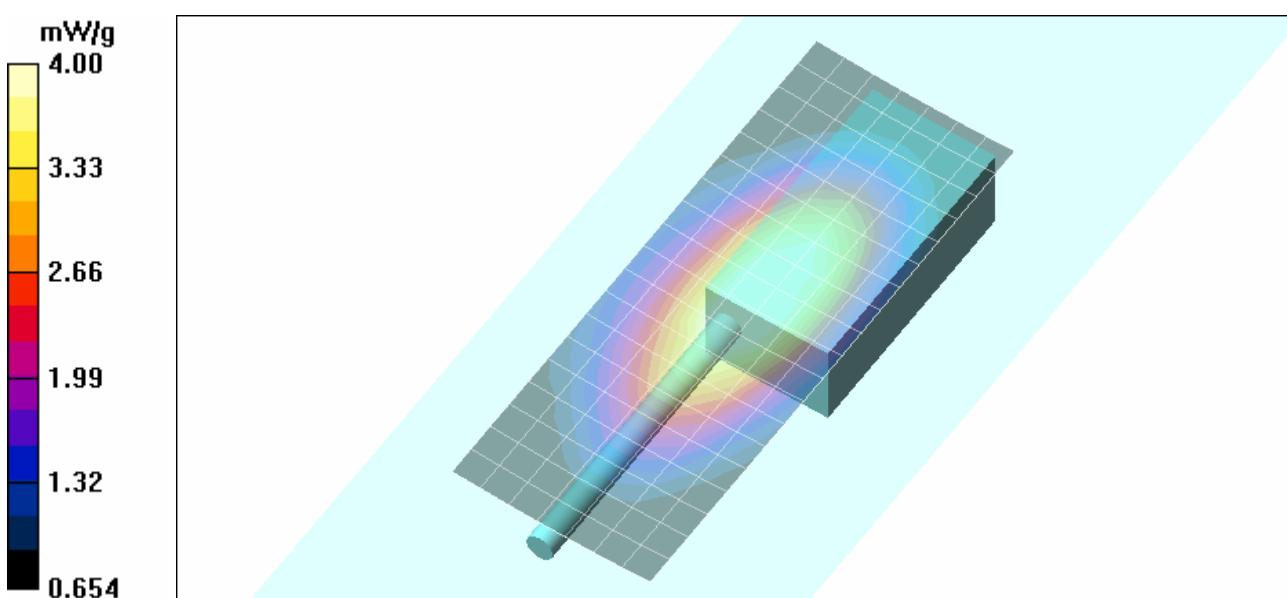
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 68.3 V/m; Power Drift = -0.343 dB

Peak SAR (extrapolated) = 5.24 W/kg

**SAR(1 g) = 3.83 mW/g; SAR(10 g) = 2.88 mW/g**

Maximum value of SAR (measured) = 4.00 mW/g



<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A	
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz			
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	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

Test Lab Certificate No. 2470.01

## APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A	 III SMARTCOMM USA INC. <sup>TM</sup>
<b>DUT Type:</b>	<b>Portable FM UHF PTT Radio Transceiver</b>		<b>Transmit Frequency Range:</b>		400 - 430 MHz	
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 <b>Celltech</b> <small>Testing and Engineering Services Ltd</small>	<u>Date(s) of Evaluation</u> May 01-02, 2008	<u>Test Report Serial No.</u> 032608O78-T894-S90U	<u>Test Report Revision No.</u> Rev. 1.0 (Initial Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

Date Tested: 05/01/2008

## System Performance Check - 450 MHz Dipole - HSL

**DUT: Dipole 450 MHz; Asset: 00024; Serial: 136; Validation: 04/28/2008**

Ambient Temp: 22.5°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Forward Conducted Power: 250 mW

Frequency: 450 MHz; Duty Cycle: 1:1

Medium: HSL450 Medium parameters used:  $f = 450$  MHz;  $\sigma = 0.86$  mho/m;  $\epsilon_r = 43.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- Probe: ET3DV6 - SN1387; ConvF(7.32, 7.32, 7.32); Calibrated: 22/04/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Validation Planar; Type: Plexiglas; Serial: TE#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

Maximum value of SAR (measured) = 1.21 mW/g

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

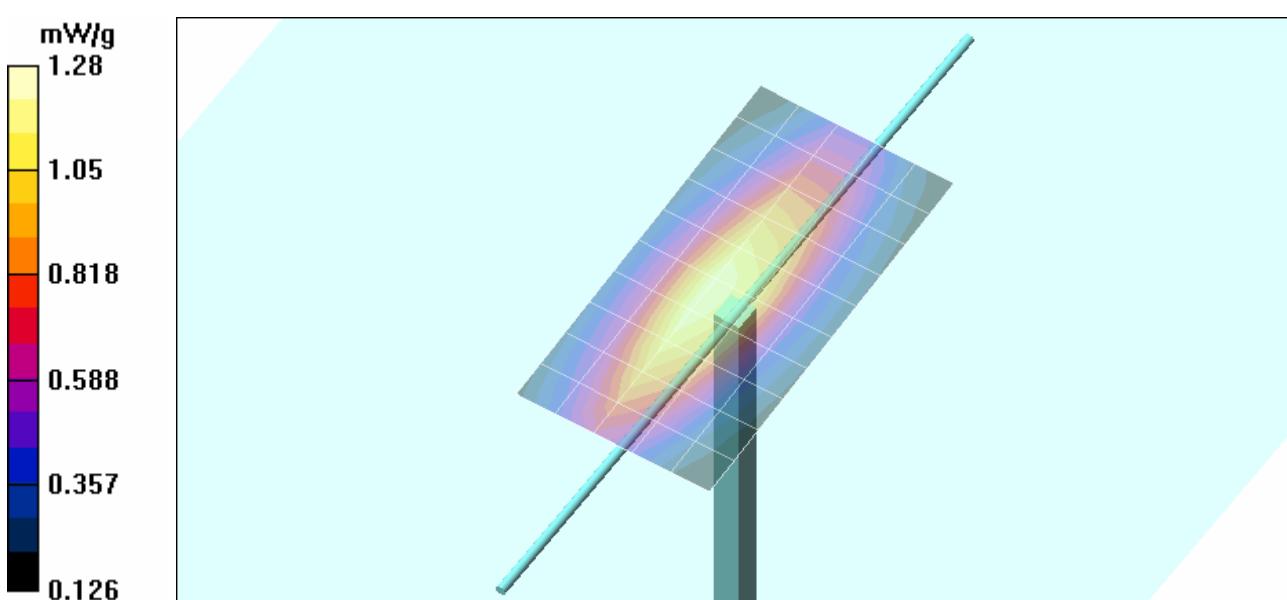
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 38.9 V/m; Power Drift = 0.008 dB

Peak SAR (extrapolated) = 1.90 W/kg

**SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.776 mW/g**

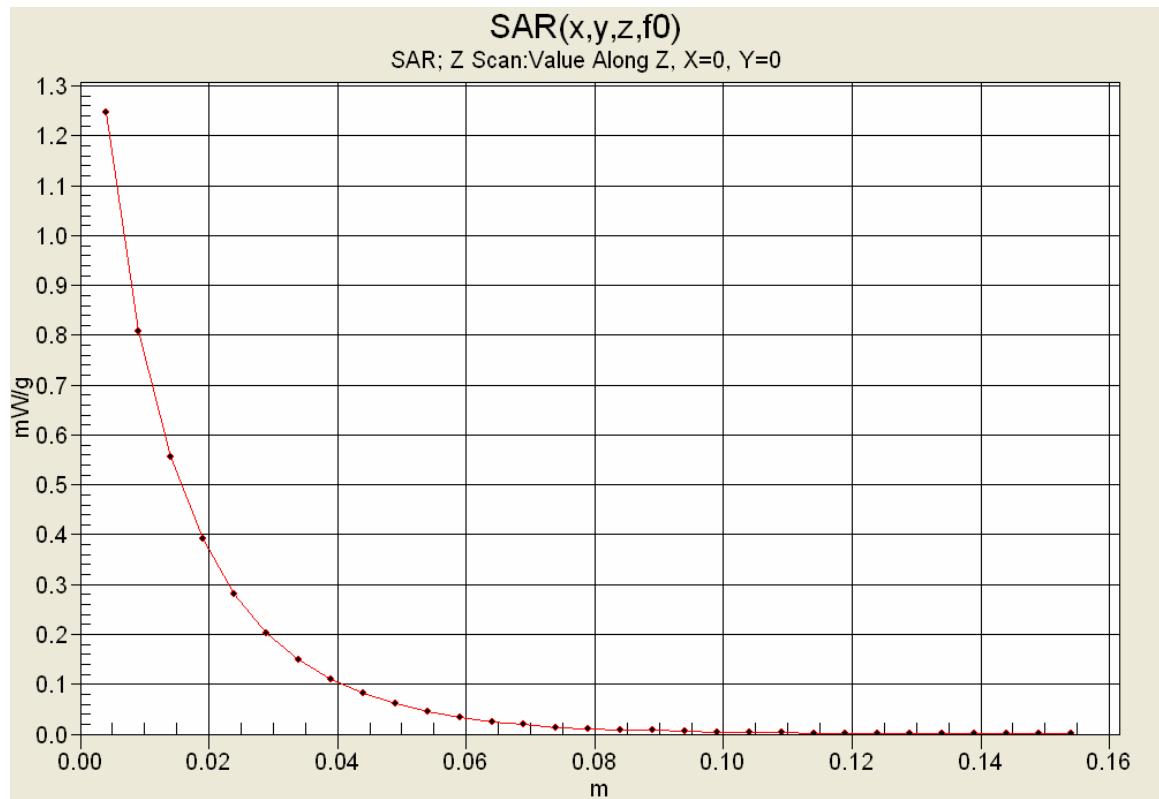
Maximum value of SAR (measured) = 1.28 mW/g



<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A		
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz				
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	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

## Z-Axis Scan



<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A		
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz				
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	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

Test Lab Certificate No. 2470.01

## APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A	 SMARTCOMM USA INC. <sup>TM</sup>
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz			
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 <b>Celltech</b> <small>Testing and Engineering Services Ltd</small>	<u>Date(s) of Evaluation</u> May 01-02, 2008	<u>Test Report Serial No.</u> 032608O78-T894-S90U	<u>Test Report Revision No.</u> Rev. 1.0 (Initial Release)	 <b>IAC-MRA</b>  <b>ACCREDITED</b>
	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

## 450 MHz System Performance Check & 420 MHz DUT Evaluation (Brain)

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Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

Thu 01/May/2008

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	45.98	0.79
0.3600	44.58	0.87	46.26	0.79
0.3700	44.46	0.87	45.44	0.79
0.3800	44.34	0.87	45.32	0.80
0.3900	44.22	0.87	45.29	0.82
0.4000	44.10	0.87	44.75	0.83
0.4100	43.98	0.87	44.32	0.83
<b>0.4200</b>	<b>43.86</b>	<b>0.87</b>	<b>44.49</b>	<b>0.85</b>
0.4300	43.74	0.87	43.85	0.86
0.4400	43.62	0.87	44.09	0.85
<b>0.4500</b>	<b>43.50</b>	<b>0.87</b>	<b>43.63</b>	<b>0.86</b>
0.4600	43.45	0.87	42.89	0.87
0.4700	43.40	0.87	43.20	0.89
0.4800	43.34	0.87	43.31	0.90
0.4900	43.29	0.87	42.86	0.91
0.5000	43.24	0.87	42.42	0.91
0.5100	43.19	0.87	42.44	0.92
0.5200	43.14	0.88	42.03	0.92
0.5300	43.08	0.88	41.88	0.92
0.5400	43.03	0.88	41.95	0.94
0.5500	42.98	0.88	41.64	0.93

<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	078SC580A	
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz			
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	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

## 420 MHz DUT Evaluation (Body)

Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

Fri 02/May/2008

Frequency (GHz)

FCC\_eH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon  
 FCC\_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma

FCC\_eB FCC Limits for Body Epsilon

FCC\_sB FCC Limits for Body Sigma

Test\_e Epsilon of UIM

Test\_s Sigma of UIM

Freq	FCC_eB	FCC_sB	Test_e	Test_s
0.3500	57.70	0.93	60.27	0.87
0.3600	57.60	0.93	59.32	0.87
0.3700	57.50	0.93	59.34	0.90
0.3800	57.40	0.93	59.30	0.90
0.3900	57.30	0.93	59.14	0.91
0.4000	57.20	0.93	59.12	0.90
0.4100	57.10	0.93	59.30	0.92
0.4200	57.00	0.94	59.31	0.91
0.4300	56.90	0.94	58.60	0.92
0.4400	56.80	0.94	59.06	0.94
0.4500	56.70	0.94	58.66	0.95
0.4600	56.66	0.94	58.58	0.95
0.4700	56.62	0.94	58.35	0.97
0.4800	56.58	0.94	57.78	0.97
0.4900	56.54	0.94	58.25	0.97
0.5000	56.51	0.94	57.65	0.98
0.5100	56.47	0.94	58.08	0.98
0.5200	56.43	0.95	57.63	0.99
0.5300	56.39	0.95	57.23	1.00
0.5400	56.35	0.95	57.42	1.02
0.5500	56.31	0.95	56.94	1.03

<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	078SC580A	
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz			
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 Celltech Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> May 01-02, 2008	<u>Test Report Serial No.</u> 032608O78-T894-S90U	<u>Test Report Revision No.</u> Rev. 1.0 (Initial Release)	 IAC-MRA ACCREDITED
	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

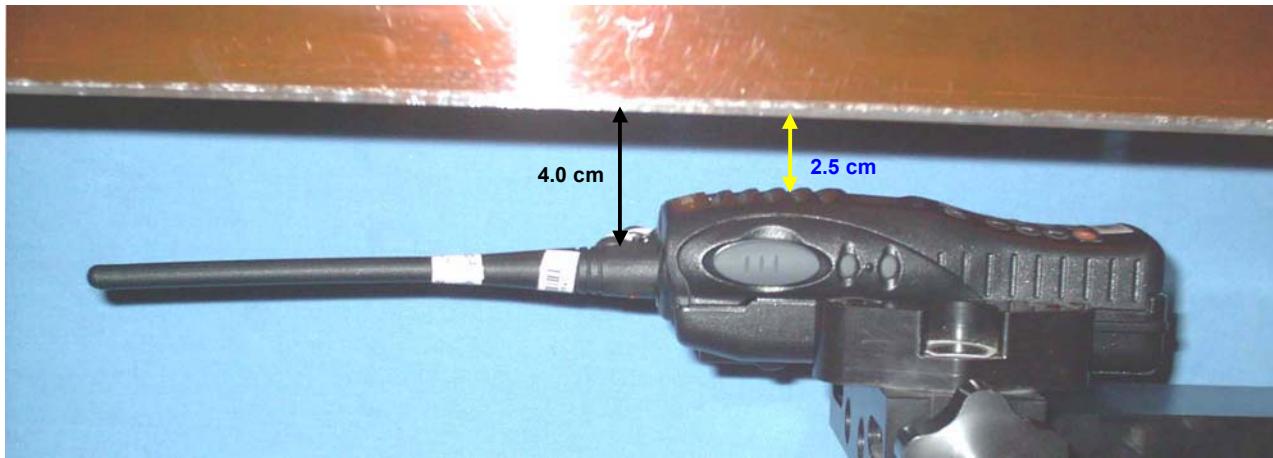
Test Lab Certificate No. 2470.01

## APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS

<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A	 SMARTCOMM USA INC. <sup>TM</sup>
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz			
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## FACE-HELD SAR TEST SETUP PHOTOGRAPHS

2.5 cm Spacing from Front of DUT to Planar Phantom



Applicant:	Smart Communications Ltd.	Model:	SC-580A	FCC ID:	O78SC580A	
DUT Type:	Portable FM UHF PTT Radio Transceiver		Transmit Frequency Range:	400 - 430 MHz		
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## BODY-WORN SAR TEST SETUP PHOTOGRAPHS

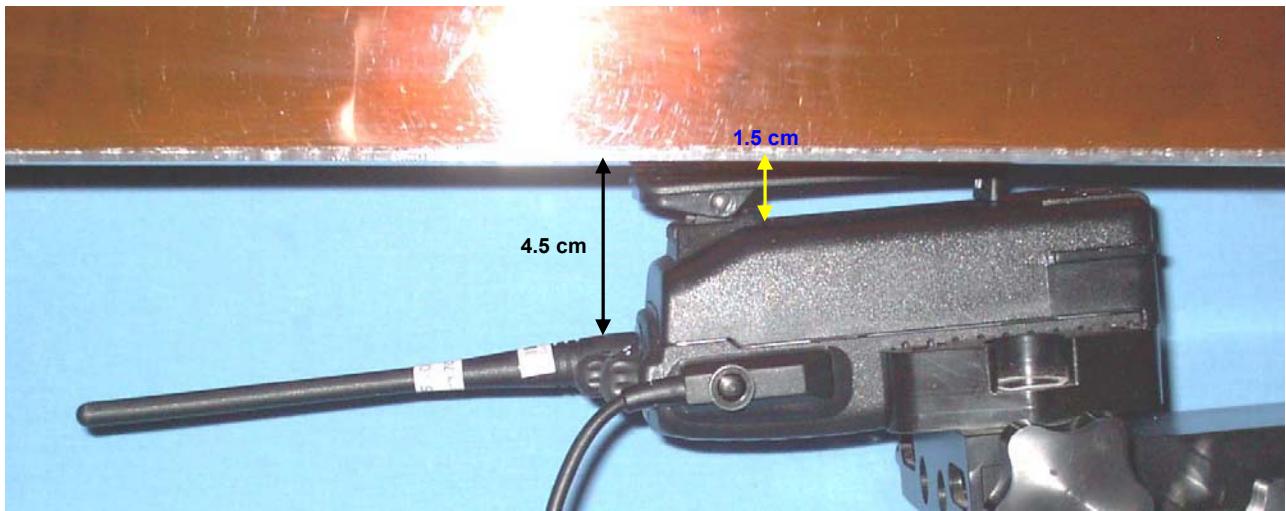
1.5 cm Belt-Clip Spacing from Back of DUT to Planar Phantom  
With Ni-MH Battery & Speaker-Microphone Audio Accessory



Applicant:	Smart Communications Ltd.	Model:	SC-580A	FCC ID:	O78SC580A	
DUT Type:	Portable FM UHF PTT Radio Transceiver		Transmit Frequency Range:	400 - 430 MHz		
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## BODY-WORN SAR TEST SETUP PHOTOGRAPHS

1.5 cm Belt-Clip Spacing from Back of DUT to Planar Phantom  
With Li-ion Battery & Speaker-Microphone Audio Accessory



Applicant:	Smart Communications Ltd.	Model:	SC-580A	FCC ID:	O78SC580A	
DUT Type:	Portable FM UHF PTT Radio Transceiver		Transmit Frequency Range:	400 - 430 MHz		
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Date(s) of Evaluation  
May 01-02, 2008

Test Report Serial No.  
032608O78-T894-S90U

Test Report Revision No.  
Rev. 1.0 (Initial Release)

Test Report Issue Date  
May 16, 2008

Description of Test(s)  
Specific Absorption Rate

RF Exposure Category  
Occupational / Controlled



Test Lab Certificate No. 2470.01

## DUT PHOTOGRAPHS



Front Side of DUT



Back Side of DUT with Ni-MH Battery



Back Side of DUT with Li-ion Battery



Whip Antenna

Applicant:	Smart Communications Ltd.	Model:	SC-580A	FCC ID:	O78SC580A	
DUT Type:	Portable FM UHF PTT Radio Transceiver	Transmit Frequency Range:	400 - 430 MHz			
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Date(s) of Evaluation  
May 01-02, 2008

Test Report Serial No.  
032608O78-T894-S90U

Test Report Revision No.  
Rev. 1.0 (Initial Release)

Test Report Issue Date  
May 16, 2008

Description of Test(s)  
Specific Absorption Rate



Test Lab Certificate No. 2470.01

## DUT PHOTOGRAPHS



Left Side of DUT with Ni-MH Battery



Right Side of DUT with Ni-MH Battery



Left Side of DUT with Li-ion Battery



Right Side of DUT with Li-ion Battery



Top end of DUT - Ni-MH Battery



Bottom end of DUT - Ni-MH Battery



Bottom end of DUT - Li-ion Battery

Applicant:

Smart Communications Ltd.

Model:

SC-580A

FCC ID:

078SC580A

SMARTCOMM USA INC.<sup>TM</sup>

DUT Type:

Portable FM UHF PTT Radio Transceiver

Transmit Frequency Range:

400 - 430 MHz



Date(s) of Evaluation  
May 01-02, 2008

Test Report Serial No.  
032608078-T894-S90U

Test Report Revision No.  
Rev. 1.0 (Initial Release)

Test Report Issue Date  
May 16, 2008

Description of Test(s)  
Specific Absorption Rate

RF Exposure Category  
Occupational / Controlled



Test Lab Certificate No. 2470.01

## DUT PHOTOGRAPHS



Back of DUT with Belt-Clip



Plastic Belt-Clip with Metal Spring (P/N: SBC-15)



DUT w/ Speaker-Microphone Accessory (P/N: SMC-15)



DUT Audio Connector

Applicant:	Smart Communications Ltd.	Model:	SC-580A	FCC ID:	078SC580A	.ii SMARTCOMM USA INC. <sup>TM</sup>
DUT Type:	Portable FM UHF PTT Radio Transceiver		Transmit Frequency Range:	400 - 430 MHz		
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	Page 37 of 40					

## DUT PHOTOGRAPHS



DUT Battery Enclosure



7.2 V 2200 mAh Ni-MH Battery Pack (P/N: SCB-2200M)



7.4 V 4000 mAh Lithium-ion Battery Pack (P/N: SCB-4000I)

Applicant:	Smart Communications Ltd.	Model:	SC-580A	FCC ID:	O78SC580A	
DUT Type:	Portable FM UHF PTT Radio Transceiver		Transmit Frequency Range:	400 - 430 MHz		
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 Celltech Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> May 01-02, 2008	<u>Test Report Serial No.</u> 032608O78-T894-S90U	<u>Test Report Revision No.</u> Rev. 1.0 (Initial Release)	 IAC-MRA ACCREDITED
	<u>Test Report Issue Date</u> May 16, 2008	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational / Controlled	

Test Lab Certificate No. 2470.01

## APPENDIX E - SYSTEM VALIDATION

<b>Applicant:</b>	Smart Communications Ltd.	<b>Model:</b>	SC-580A	<b>FCC ID:</b>	O78SC580A	 SMARTCOMM USA INC. <sup>TM</sup>
<b>DUT Type:</b>	Portable FM UHF PTT Radio Transceiver	<b>Transmit Frequency Range:</b>	400 - 430 MHz			
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 Celltech Testing and Engineering Services Ltd.	Date of Evaluation:	May 01, 2008	Document Serial No.:	SV450B-050108-R1.0
Evaluation Type:	System Validation	Validation Dipole:	450 MHz	Fluid Type: Brain

## 450 MHz SYSTEM VALIDATION

Type:

**450 MHz Validation Dipole**

Asset Number:

**00024**

Serial Number:

**136**

Place of Validation:

**Celltech Labs Inc.**

Date of Validation:

**May 01, 2008**

Celltech Labs Inc. certifies that the 450 MHz System Validation was performed on the date indicated above.

Validated by:

**Sean Johnston**

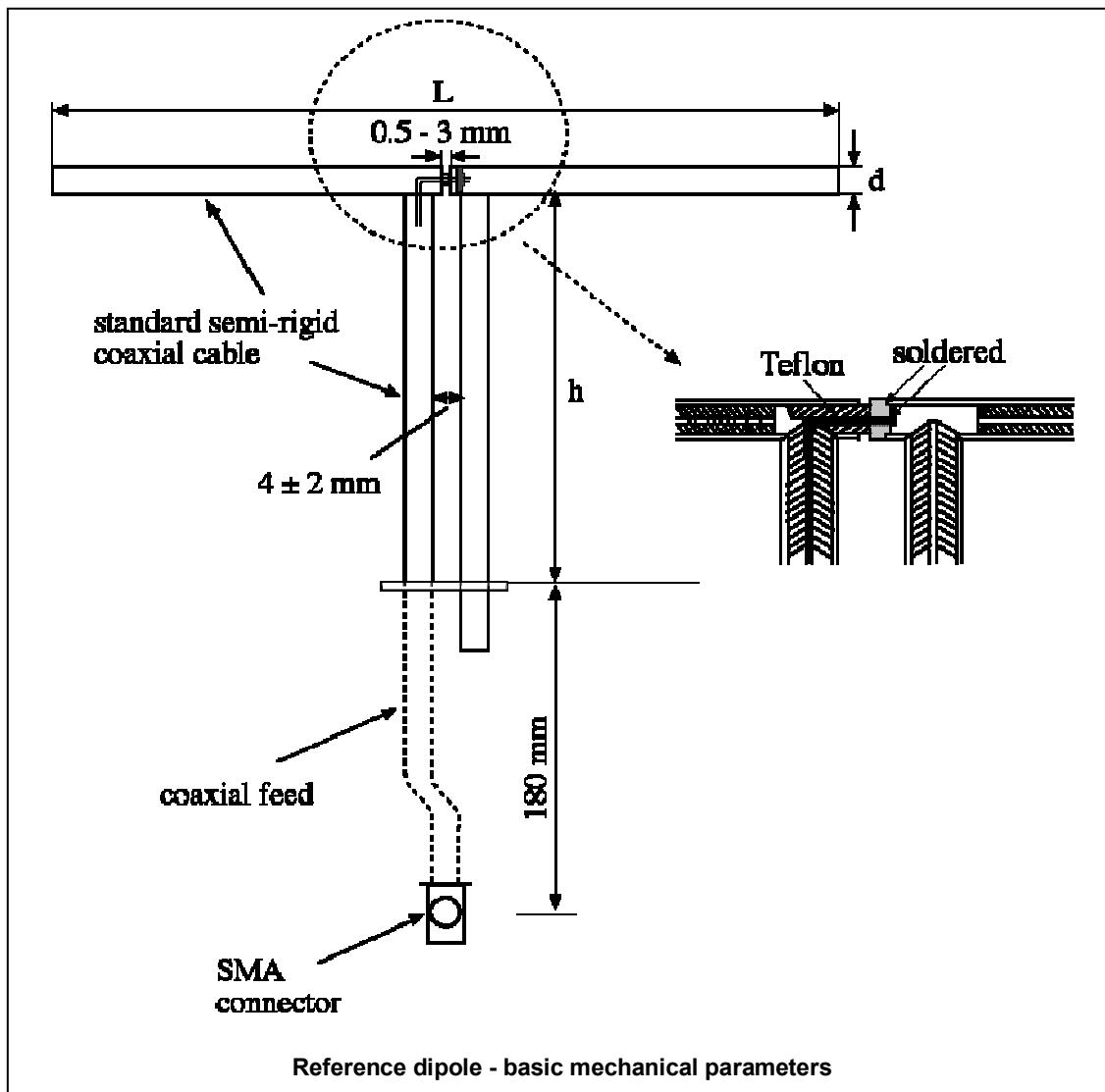
 Celltech <small>Testing and Engineering Services Ltd.</small>	Date of Evaluation:	May 01, 2008	Document Serial No.:	SV450B-042808-R1.0
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz
			Fluid Type:	Brain

## 1. Dipole Construction & Electrical Characteristics

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

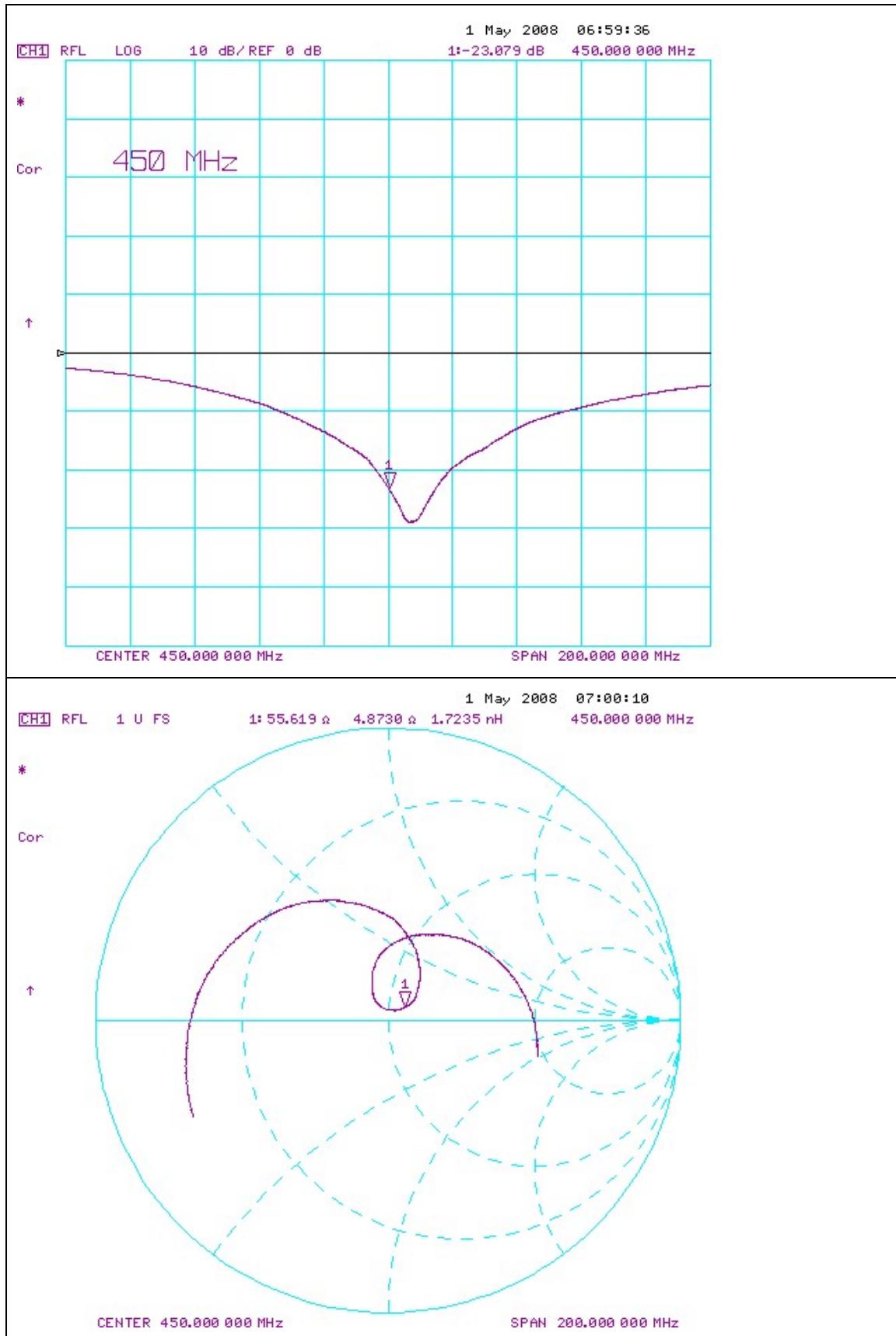
Feed point impedance at 450 MHz       $\text{Re}\{Z\} = 55.619 \Omega$   
 $\text{Im}\{Z\} = 4.8730 \Omega$

Return Loss at 450 MHz      -23.079 dB



 Celltech <small>Testing and Engineering Services Ltd.</small>	Date of Evaluation:	May 01, 2008	Document Serial No.:	SV450B-042808-R1.0
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz
	Fluid Type:	Brain		

## 2. Validation Dipole VSWR Data



	Date of Evaluation:	May 01, 2008	Document Serial No.:	SV450B-042808-R1.0
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz
	Fluid Type:	Brain		

### 3. Validation Dipole Dimensions

Frequency (MHz)	L (mm)	h (mm)	d (mm)
300	396.0	250.0	6.0
<b>450</b>	<b>270.0</b>	<b>167.0</b>	<b>6.0</b>
835	161.0	89.8	3.6
900	149.0	83.3	3.6
1450	89.1	51.7	3.6
1800	72.0	41.7	3.6
1900	68.0	39.5	3.6
2000	64.5	37.5	3.6
2450	51.5	30.4	3.6
3000	41.5	25.0	3.6

### 4. Validation Phantom

The validation phantom (planar) was constructed using relatively low-loss tangent Plexiglas material.

The inner dimensions of the validation phantom are as follows:

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

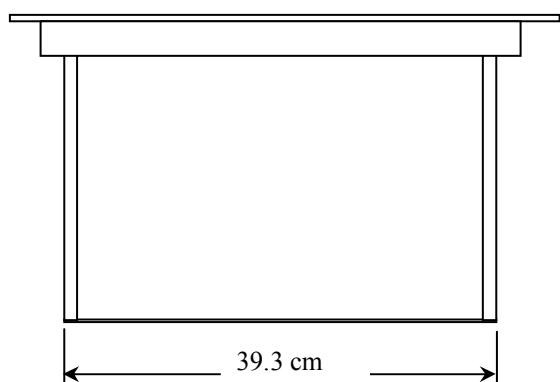
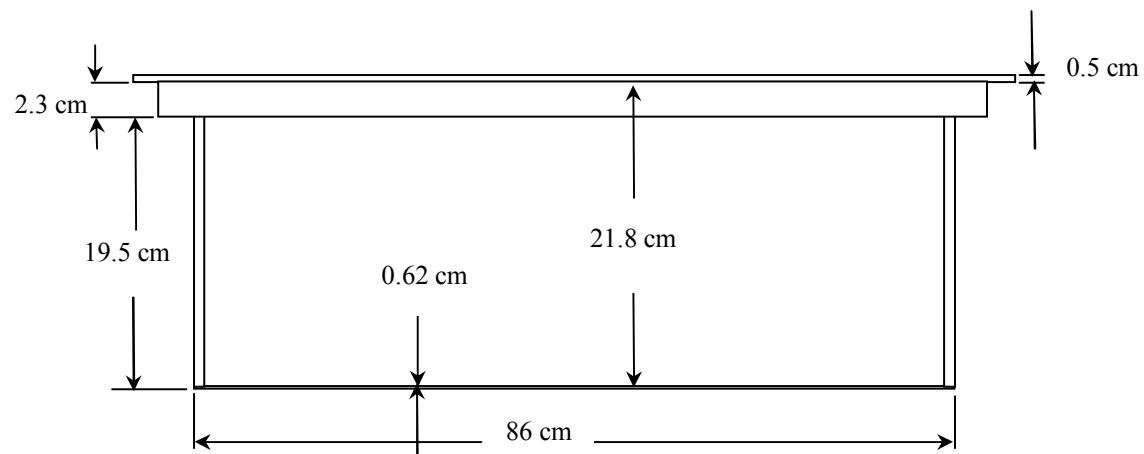
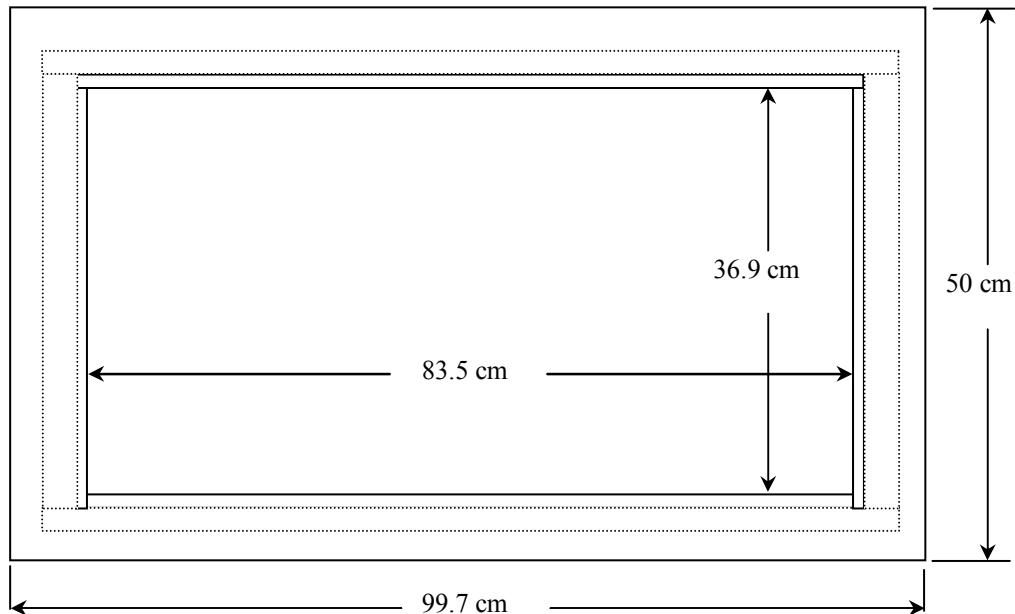
The bottom section of the validation phantom is constructed of  $6.2 \pm 0.1$ mm Plexiglas.

### 5. Test Equipment List

TEST EQUIPMENT	ASSET NO.	SERIAL NO.	DATE OF CAL.	CAL. DUE DATE
SPEAG DASY4 Measurement Server	00158	1078	N/A	N/A
SPEAG Robot	00046	599396-01	N/A	N/A
SPEAG DAE4	00019	353	22Apr08	22Apr09
SPEAG ET3DV6 E-Field Probe	00016	1387	22Apr08	22Apr09
450 MHz Validation Dipole	00024	136	01May08	01May09
Plexiglas Validation Planar Phantom	00157	137	N/A	N/A
HP 85070C Dielectric Probe Kit	00033	US39240170	N/A	N/A
Gigatronics 8652A Power Meter	00007	1835272	23Apr08	23Apr09
Gigatronics 80701A Power Sensor	00014	1833699	23Apr08	23Apr09
HP 8753ET Network Analyzer	00134	US39170292	28Apr08	28Apr09
HP 8648D Signal Generator	00005	3847A00611	NCR	NCR
Amplifier Research 5S1G4 Power Amplifier	00106	26235	NCR	NCR

 Celltech <small>Testing and Engineering Services Ltd.</small>	Date of Evaluation:	May 01, 2008	Document Serial No.:	SV450B-042808-R1.0
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz
	Fluid Type:	Brain		

## 6. Dimensions of Plexiglas Planar Phantom



<b>Celltech</b> Testing and Engineering Services Ltd.	Date of Evaluation:	May 01, 2008	Document Serial No.:	SV450B-042808-R1.0
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz

## 7. 450 MHz System Validation Setup



 Celltech Testing and Engineering Services Ltd.	Date of Evaluation:	May 01, 2008	Document Serial No.:	SV450B-042808-R1.0
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz
	Fluid Type:	Brain		

## 8. 450 MHz Validation Dipole Setup

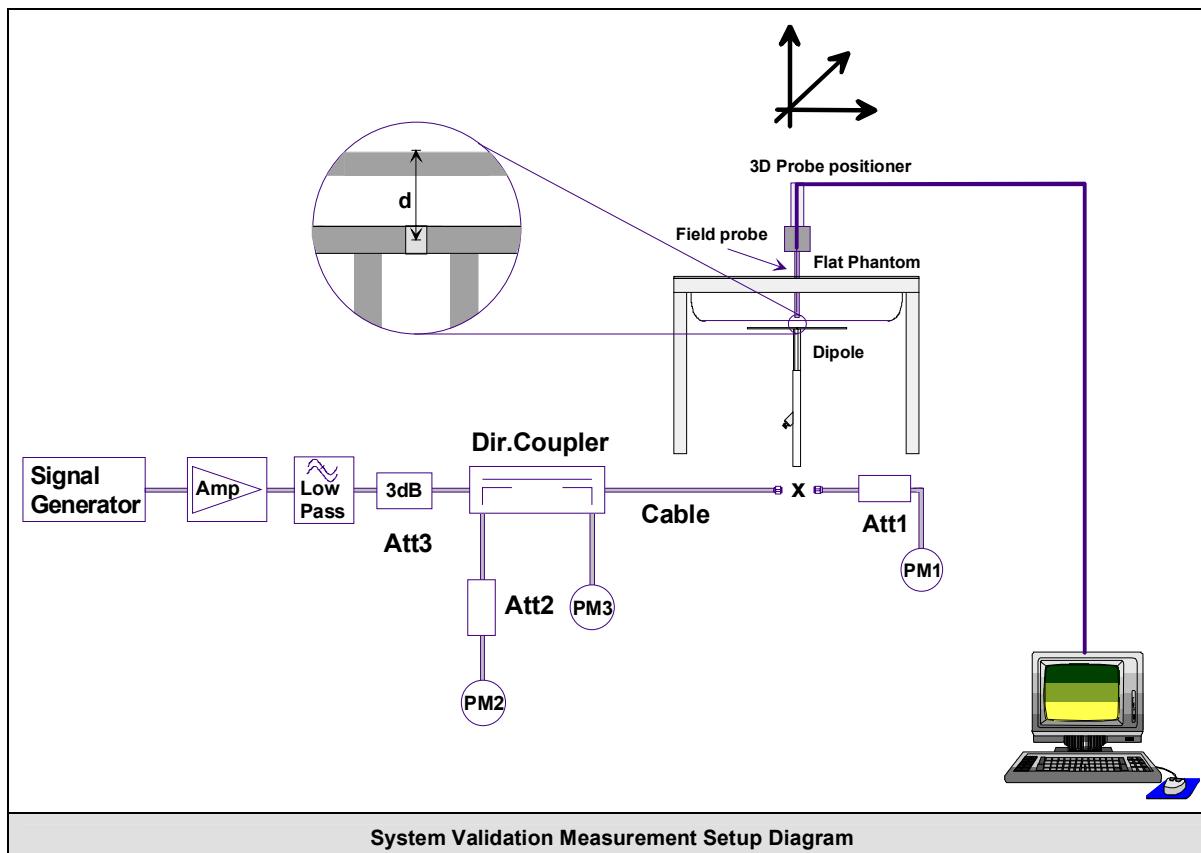


 Celltech <small>Testing and Engineering Services Ltd.</small>	Date of Evaluation:	May 01, 2008	Document Serial No.:	SV450B-042808-R1.0
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz
			Fluid Type:	Brain

## 9. SAR Measurement

Measurements were made using a dosimetric E-field probe ET3DV6 (S/N: 1387, Conversion Factor 7.32). 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 procedures described below.

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



 Testing and Engineering Services LLC	Date of Evaluation:	May 01, 2008		Document Serial No.:	SV450B-042808-R1.0	
	Evaluation Type:	System Validation		Validation Dipole:	450 MHz	Fluid Type:

## 10. Measurement Conditions

The validation phantom was filled with 450 MHz Brain tissue simulant.

Relative Permittivity: 43.6 (+0.3% deviation from target)

Conductivity: 0.86 mho/m (-1.0% deviation from target)

Fluid Temperature: 21.5°C (Start of Test) / 21.5°C (End of Test)

Fluid Depth: ≥ 15.0 cm

Environmental Conditions:

Ambient Temperature: 22.5°C

Barometric Pressure: 101.1 kPa

Humidity: 35%

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%
IEEE/IEC Target Dielectric Parameters (450 MHz):	$\epsilon_r = 43.5 (+/- 5\%)$
	$\sigma = 0.87 \text{ S/m} (+/- 5\%)$

## 11. System Validation SAR Results

SAR @ 0.25W Input averaged over 1g (W/kg)			SAR @ 1W Input averaged over 1g (W/kg)																																																								
IEEE/IEC Target	Measured	Deviation	IEEE/IEC Target	Measured	Deviation																																																						
1.23	+/- 10%	1.19	-3.2%	4.9	+/- 10%																																																						
SAR @ 0.25W Input averaged over 10g (W/kg)			SAR @ 1W Input averaged over 10g (W/kg)																																																								
IEEE/IEC Target	Measured	Deviation	IEEE/IEC Target	Measured	Deviation																																																						
0.825	+/- 10%	0.776	-6.0%	3.3	+/- 10%																																																						
<table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>1 g SAR</th> <th>10 g SAR</th> <th>Local SAR at surface (above feed-point)</th> <th>Local SAR at surface (y = 2 cm offset from feed-point)<sup>a</sup></th> </tr> </thead> <tbody> <tr> <td>300</td><td>3.0</td><td>2.0</td><td>4.4</td><td>2.1</td></tr> <tr> <td>450</td><td>4.9</td><td>3.3</td><td>7.2</td><td>3.2</td></tr> <tr> <td>835</td><td>9.5</td><td>6.2</td><td>4.1</td><td>4.9</td></tr> <tr> <td>900</td><td>10.8</td><td>6.9</td><td>16.4</td><td>5.4</td></tr> <tr> <td>1450</td><td>29.0</td><td>16.0</td><td>50.2</td><td>6.5</td></tr> <tr> <td>1800</td><td>38.1</td><td>19.8</td><td>69.5</td><td>6.8</td></tr> <tr> <td>1900</td><td>39.7</td><td>20.5</td><td>72.1</td><td>6.6</td></tr> <tr> <td>2000</td><td>41.1</td><td>21.1</td><td>74.6</td><td>6.5</td></tr> <tr> <td>2450</td><td>52.4</td><td>24.0</td><td>104.2</td><td>7.7</td></tr> <tr> <td>3000</td><td>63.8</td><td>25.7</td><td>140.2</td><td>9.5</td></tr> </tbody> </table>					Frequency (MHz)	1 g SAR	10 g SAR	Local SAR at surface (above feed-point)	Local SAR at surface (y = 2 cm offset from feed-point) <sup>a</sup>	300	3.0	2.0	4.4	2.1	450	4.9	3.3	7.2	3.2	835	9.5	6.2	4.1	4.9	900	10.8	6.9	16.4	5.4	1450	29.0	16.0	50.2	6.5	1800	38.1	19.8	69.5	6.8	1900	39.7	20.5	72.1	6.6	2000	41.1	21.1	74.6	6.5	2450	52.4	24.0	104.2	7.7	3000	63.8	25.7	140.2	9.5
Frequency (MHz)	1 g SAR	10 g SAR	Local SAR at surface (above feed-point)	Local SAR at surface (y = 2 cm offset from feed-point) <sup>a</sup>																																																							
300	3.0	2.0	4.4	2.1																																																							
450	4.9	3.3	7.2	3.2																																																							
835	9.5	6.2	4.1	4.9																																																							
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2000	41.1	21.1	74.6	6.5																																																							
2450	52.4	24.0	104.2	7.7																																																							
3000	63.8	25.7	140.2	9.5																																																							
Numerical reference SAR values for reference dipole and flat phantom normalized to 1 W (IEEE 1528-2003; IEC 62209-1:2005)																																																											

 Celltech <small>Testing and Engineering Services Ltd</small>	Date of Evaluation:	May 01, 2008	Document Serial No.:	SV450B-042808-R1.0
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz
	Fluid Type:	Brain		

Date Tested: 05/01/2008

## System Validation - 450 MHz Dipole - HSL

**DUT: Dipole 450 MHz; Asset: 00024; Serial: 136; Validation: 05/01/2008**

Ambient Temp: 22.5°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Forward Conducted Power: 250 mW

Frequency: 450 MHz; Duty Cycle: 1:1

Medium: HSL450 Medium parameters used:  $f = 450$  MHz;  $\sigma = 0.86$  mho/m;  $\epsilon_r = 43.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- Probe: ET3DV6 - SN1387; ConvF(7.32, 7.32, 7.32); Calibrated: 22/04/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Validation Planar; Type: Plexiglas; Serial: TE#137
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

### 450 MHz Dipole - System Validation/Area Scan (6x11x1):

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

Maximum value of SAR (measured) = 1.21 mW/g

### 450 MHz Dipole - System Validation/Zoom Scan (5x5x7)/Cube 0:

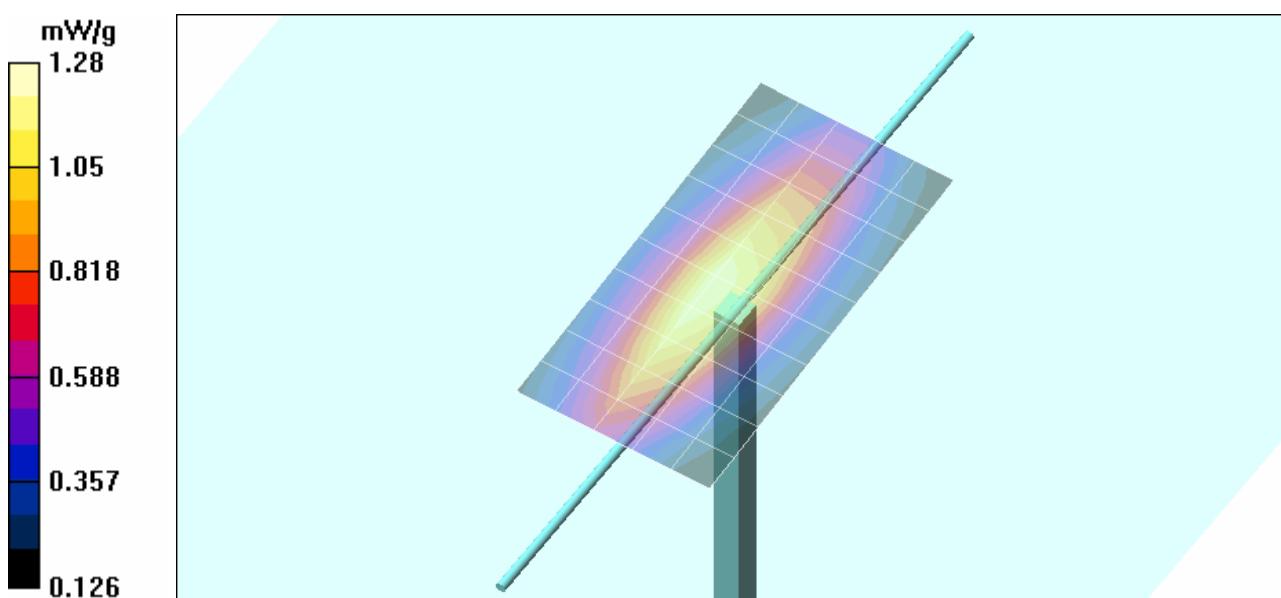
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 38.9 V/m; Power Drift = 0.008 dB

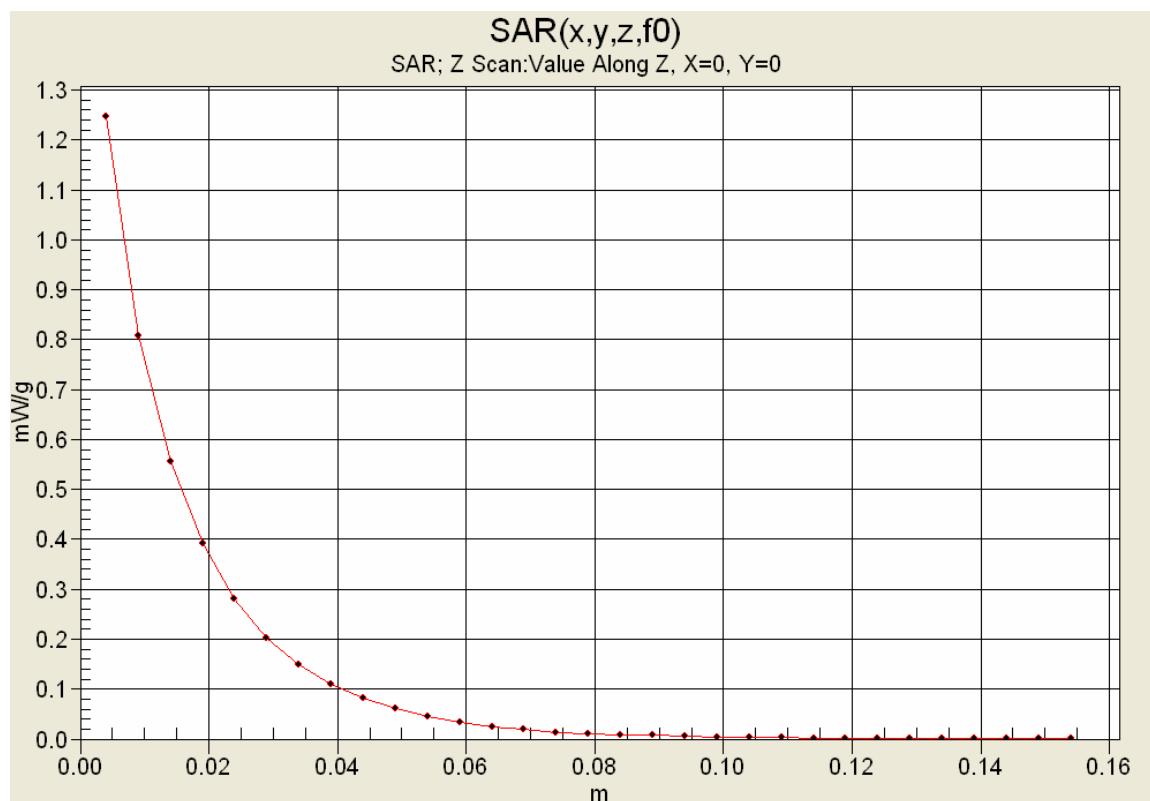
Peak SAR (extrapolated) = 1.90 W/kg

**SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.776 mW/g**

Maximum value of SAR (measured) = 1.28 mW/g



 Celltech Testing and Engineering Services LLC	Date of Evaluation:	May 01, 2008	Document Serial No.:	SV450B-042808-R1.0
	Evaluation Type:	System Validation	Validation Dipole:	450 MHz
	Fluid Type:	Brain		



## 12. Measured Fluid Dielectric Parameters

### System Validation - 450 MHz (Brain)

\*\*\*\*\*

Celltech Labs Inc.  
Test Result for UIM Dielectric Parameter

Thu 01/May/2008

Frequency (GHz)

IEEE\_eH IEEE 1528-2003 Limits for Head Epsilon

IEEE\_sH IEEE 1528-2003 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	45.98	0.79
0.3600	44.58	0.87	46.26	0.79
0.3700	44.46	0.87	45.44	0.79
0.3800	44.34	0.87	45.32	0.80
0.3900	44.22	0.87	45.29	0.82
0.4000	44.10	0.87	44.75	0.83
0.4100	43.98	0.87	44.32	0.83
0.4200	43.86	0.87	44.49	0.85
0.4300	43.74	0.87	43.85	0.86
0.4400	43.62	0.87	44.09	0.85
<b>0.4500</b>	<b>43.50</b>	<b>0.87</b>	<b>43.63</b>	<b>0.86</b>
0.4600	43.45	0.87	42.89	0.87
0.4700	43.40	0.87	43.20	0.89
0.4800	43.34	0.87	43.31	0.90
0.4900	43.29	0.87	42.86	0.91
0.5000	43.24	0.87	42.42	0.91
0.5100	43.19	0.87	42.44	0.92
0.5200	43.14	0.88	42.03	0.92
0.5300	43.08	0.88	41.88	0.92
0.5400	43.03	0.88	41.95	0.94
0.5500	42.98	0.88	41.64	0.93

 Celltech <small>Testing and Engineering Services Ltd.</small>	Date of Evaluation:	May 01, 2008		Document Serial No.:	SV450B-042808-R1.0	
	Evaluation Type:	System Validation		Validation Dipole:	450 MHz	Fluid Type: Brain

### 13. Measurement Uncertainties

UNCERTAINTY BUDGET FOR SYSTEM VALIDATION						
Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	Uncertainty Value ±% (1g)	$V_i$ or $V_{eff}$
<b>Measurement System</b>						
Probe calibration (450 MHz)	6.65	Normal	1	1	6.65	∞
Axial isotropy of the probe	4.7	Rectangular	1.732050808	1	2.7	∞
Spherical isotropy of the probe	0	Rectangular	1.732050808	1	0.0	∞
Spatial resolution	0	Rectangular	1.732050808	1	0.0	∞
Boundary effects	0.9	Rectangular	1.732050808	1	0.5	∞
Probe linearity	4.7	Rectangular	1.732050808	1	2.7	∞
Detection limit	1	Rectangular	1.732050808	1	0.6	∞
Readout electronics	0.3	Normal	1	1	0.3	∞
Response time	0	Rectangular	1.732050808	1	0.0	∞
Integration time	0	Rectangular	1.732050808	1	0.0	∞
RF ambient conditions	3	Rectangular	1.732050808	1	1.7	∞
Mech. constraints of robot	0.4	Rectangular	1.732050808	1	0.2	∞
Probe positioning	2.9	Rectangular	1.732050808	1	1.7	∞
Extrapolation & integration	1	Rectangular	1.732050808	1	0.6	∞
<b>Dipole</b>						
Dipole Positioning	2	Normal	1.732050808	1	1.2	∞
Power & Power Drift	4.7	Normal	1.732050808	1	2.7	∞
<b>Phantom and Setup</b>						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	∞
Liquid conductivity (measured)	1	Normal	1	0.64	0.6	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	0.3	Normal	1	0.6	0.2	∞
<b>Combined Standard Uncertainty</b>						
<b>Expanded Uncertainty (k=2)</b>						
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 and IEC Standard 62209-1:2005						