

	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

RF EXPOSURE EVALUATION
SPECIFIC ABSORPTION RATE

SAR TEST REPORT

FOR

VOCOLLECT INC.

WIRELESS DATA TERMINAL with 802.11b WLAN

DEVICE IDENTIFIER(S)			
MODEL(S):	TT-601_RA WF		
FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200
APPLICATION TYPE:	New Certification		
TEST STANDARD(S) & PROCEDURE(S) APPLIED			
FCC OET Bulletin 65, Supplement C (01-01)			
FCC OET SAR Measurement Procedures for 802.11a/b/g Transmitters			
Industry Canada RSS-102 Issue 2			

Test Report Serial No.

072007MQO-T842-S15W

Test Report Revision No.

Revision 1.1 (Response to TCB)

Revision 1.0 (Initial Release)

Test Lab and Location

Celltech Compliance Testing & Engineering Lab
(Celltech Labs Inc.)
21-364 Lougheed Road
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Canada



Certificate No. 2470.01

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Celltech Labs Inc.

Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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DECLARATION OF COMPLIANCE SAR RF EXPOSURE EVALUATION

<u>Test Lab and Location</u> CELLTECH LABS INC. Testing and Engineering Services 21-364 Lougheed Road Kelowna, B.C. V1X 7R8 Canada Tel.: 250-765-7650 Fax: 250-765-7645 e-mail: info@celltechlabs.com web site: www.celltechlabs.com		<u>Company Information</u> VOCOLLECT INC. 703 Rodi Road Pittsburgh, PA 15235 United States	
FCC IDENTIFIER: MQOTT601-20000 IC IDENTIFIER: 2570A-TT601200 Device Model(s): TT-601_RA WF			
Standard(s) Applied: FCC 47 CFR §2.1093; Health Canada Safety Code 6 Procedure(s) Applied: FCC OET Bulletin 65, Supplement C (Edition 01-01) FCC OET SAR Measurement Procedures for 802.11a/b/g Transmitters Industry Canada RSS-102 Issue 2			
FCC Device Classification: Digital Transmission System (DTS) - §15C IC Device Classification: Low Power License-Exempt Radiocommunication Device (RSS-210)			
Device Description: Waist-Worn Wireless Data Terminal Internal Transmitter(s): 802.11b WLAN Mode(s) of Operation: DSSS (Direct Sequence Spread Spectrum) Transmit Frequency Range(s): 2412 - 2462 MHz Max. RF Output Power Tested: 14.3 dBm (26.9 mW) Average Conducted (2412 MHz, 1 Mbps) Battery Type(s) Tested: Lithium-ion 7.2V, 1750mAh (Model: 730024) - Standard Battery Lithium-ion 7.2V, 3500mAh (Model: 730025) - Extended Battery			
Antenna Type(s) Tested: Internal Dipole			
Body-worn Accessories Tested: Belt-Strap with Belt-Clip (P/N: BL-601-104) Audio Accessories Connected: Headset-Microphone (P/N: HD 700-1) Other Accessories Connected: Bar Code Scanner (P/N: BC-607-3)			
Max. SAR Level(s) Evaluated:		Body: 0.531 W/kg (1g average)	

Celltech Labs Inc. declares under its sole responsibility that this wireless portable device was compliant 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 General Population / Uncontrolled 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), FCC OET SAR Measurement Procedures for 802.11a/b/g Transmitters and Industry Canada RSS-102 Issue 2. All measurements were performed in accordance with the SAR system manufacturer recommendations.

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

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
Celltech Labs Inc.



Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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1.0 INTRODUCTION

This measurement report demonstrates that the VOCOLLECT INC. Model: TT-601_RA WF Waist-Worn Wireless Data Terminal with internal 802.11b WLAN 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 General Population / Uncontrolled Exposure environment. The test procedures described in FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]), FCC OET SAR Measurement Procedures for 802.11a/b/g Transmitters (see reference [6]) 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)

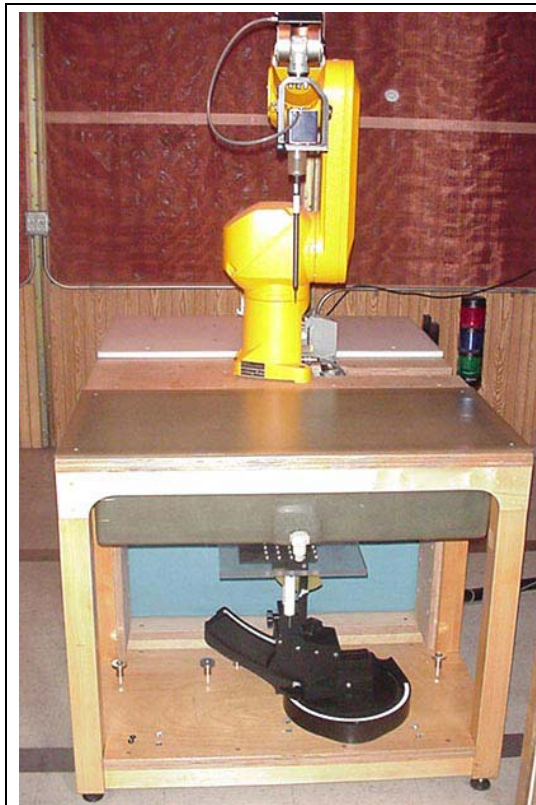
Standard(s) Applied	FCC 47 CFR §2.1093			Health Canada Safety Code 6		
Procedure(s) Applied	FCC OET Bulletin 65, Supplement C (01-01)					
	FCC OET SAR Measurement Procedures for 802.11a/b/g Transmitters					
	Industry Canada RSS-102 Issue 2					
FCC Device Classification	Digital Transmission System (DTS)				Part 15(C)	
IC Device Classification	Low Power License-Exempt Radiocommunication Device: Category I Equipment				RSS-210	
Application Type	New Certification					
RF Exposure Category	Uncontrolled Environment / General Population					
Device Description	Waist-Worn Wireless Data Terminal					
Internal Transmitter(s)	802.11b WLAN					
FCC IDENTIFIER	MQOTT601-20000		IC IDENTIFIER	2570A-TT601200		
Model Name/No.(s)	TT-601_RA WF					
Test Sample Serial No.(s)	097255837			Identical Prototype		
Mode(s) of Operation	Direct Sequence Spread Spectrum					
Data Rates	1 / 2 / 5.5 / 11 Mbps					
Transmit Frequency Range	2412 - 2462 MHz					
Max. RF Output Power Level(s) Measured	Transmit Mode	Frequency	Channel	Data Rate	Average Conducted	
		MHz		Mbps	dBm	mW
	802.11b	2412	1	1	14.3	26.9
	802.11b	2437	6	1	13.9	24.5
	802.11b	2462	11	1	13.6	22.9
	Note: Higher data rates were measured and were not 0.25 dB > power levels at the lowest data rate.					
Antenna Type(s) Tested	Internal Dipole					
Body-worn Accessories Tested	Belt-Strap with Belt-Clip				P/N: BL-601-104	
Audio Accessories Connected	Headset-Microphone				P/N: HD 700-1	
Other Accessories Connected	Bar Code Scanner				P/N: BC-607-3	
Battery Type(s) Tested	Lithium-ion	Standard	7.2V	1750mAh		Model: 730024
	Lithium-ion	Extended	7.2V	3500mAh		Model: 730025

Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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3.0 SAR MEASUREMENT SYSTEM

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



DASY4 SAR Measurement System & planar phantom



DASY4 SAR Measurement System with planar phantom and validation dipole

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Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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4.0 MEASUREMENT SUMMARY

BODY SAR EVALUATION RESULTS

Transmit Mode	Test Mode	Freq.	Chan.	Data Rate	Battery Type	Accessory Type(s)			DUT Position To Planar Phantom	Cond. Power Before Test	SAR Drift During Test	Measured SAR 1g
		MHz		Mbps	mAh	Body-worn	Spacing	Audio		dBm	dB	W/kg
802.11b	DSSS	2412	1	1	1750	Belt-Clip/Strap	Touch	Headset	Front Side	14.3	0.161 ⁴	0.424
802.11b	DSSS	2412	1	1	1750	Belt-Clip/Strap	Touch	Headset	Back Side	14.3	1.19 ⁵	0.0143
802.11b	DSSS	2412	1	1	1750	Belt-Clip/Strap	Touch	Headset	Top Side	14.3	-1.03 ⁵	0.0306
802.11b	DSSS	2412	1	1	1750	Belt-Clip/Strap	Touch	Headset	Bottom Side	14.3	-1.07 ⁵	0.0168
802.11b	DSSS	2412	1	1	3500	Belt-Clip/Strap	Touch	Headset	Front Side	14.3	-0.193 ⁴	0.531

ANSI / IEEE C95.1: 2005 - SAFETY LIMIT

BODY: 1.6 W/kg (averaged over 1 gram)

Spatial Peak: Uncontrolled Exposure / General Population

Test Date(s)	July 23, 2007				Relative Humidity	33	%
Measured Fluid Type	2410 MHz Body				Atmospheric Pressure	101.1	kPa
Dielectric Constant ε	IEEE Target		Measured	Deviation	Ambient Temperature	25.0	°C
	52.8	±5%	51.3	-2.8%	Fluid Temperature	23.8	°C
Conductivity σ (mho/m)	IEEE Target		Measured	Deviation	Fluid Depth	≥ 15	cm
	1.91	±5%	1.91	0.0%	ρ (Kg/m³)	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 SAR levels measured at the maximum output channel were ≥ 3 dB below the SAR limit, SAR evaluation for the remaining selected channels was optional (per FCC OET "SAR Measurement Procedures for 802.11a/b/g Transmitters" - see reference [6]).
- Higher data rates were not evaluated based on the average output power levels were not 0.25 dB > the output power levels measured at the lowest data rate (per FCC OET "SAR Measurement Procedures for 802.11a/b/g Transmitters" - see reference [6]).
- The power drift of the DUT measured by the DASY4 system during the SAR evaluations was <5% from the start power.
- The power drift of the DUT was measured by the DASY4 system during the SAR evaluations at the reference point of the phantom with low SAR. The drift levels are inaccurate due to the SAR value at the reference point is close to the measurement noise floor.
- The DUT battery was fully charged prior to the SAR evaluations.
- The fluid temperature was measured prior to and after the SAR evaluations to ensure the temperature remained within $\pm 2^\circ\text{C}$ of the fluid temperature reported during the dielectric parameter measurements.
- 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:	Voccollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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5.0 DETAILS OF SAR EVALUATION

The VOCOLLECT INC. Model: TT-601_RA WF Waist-Worn Wireless Data Terminal with 802.11b WLAN was compliant for localized Specific Absorption Rate (Uncontrolled Exposure) based on the test provisions and conditions described below. The SAR test setup photographs are shown in Appendix D.

Test Configuration(s)

1. The DUT was tested for body-worn SAR with the front side (battery side, antenna/connector end) placed parallel to, and touching, the outer surface of the planar phantom.
2. The DUT was tested for body-worn SAR with the back side (belt-clip side) placed parallel to, and touching, the outer surface of the planar phantom.
3. The DUT was tested for body-worn SAR with the top side (button side) placed parallel to, and touching, the outer surface of the planar phantom.
4. The DUT was tested for body-worn SAR with the bottom side placed parallel to, and touching, the outer surface of the planar phantom.
5. The belt-strap/clip, headset-microphone and scanner accessories were attached to the DUT during the SAR evaluations.

Test Mode(s) & Power Setting(s)

6. The DUT was placed into test mode using an executable test software program controlled from a PC connected to the DUT via serial cable. The 802.11b WLAN was tested at maximum power in modulated DSSS continuous transmit mode at 100% duty cycle.
7. The average conducted output power levels of the DUT were measured prior to the SAR evaluations by Rhein Tech.
8. The power drift of the DUT during the SAR evaluations was measured by the DASY4 system.
9. The DUT battery was fully charged prior to the SAR evaluations.

6.0 EVALUATION PROCEDURES

- (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation, both the left and right ear positions were evaluated using the SAM phantom.
- (ii) For body-worn and face-held devices a planar phantom was used.
- The SAR was determined by a pre-defined procedure within the DASY4 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 15mm x 15mm.
An area scan was determined as follows:
 - Based on the defined area scan grid, a more detailed grid is created to increase the points by a factor of 10. The interpolation function then evaluates all field values between corresponding measurement points.
 - A linear search is applied to find all the candidate maxima. Subsequently, all maxima are removed that are >2 dB from the global maximum. The remaining maxima are then used to position the cube scans.
A 1g and 10g spatial peak SAR was determined as follows:
 - Extrapolation is used to determine the values between the dipole center of the probe and the surface of the phantom. This data cannot be measured because the center of the dipole sensors is 1.0 mm away from the probe tip and the distance between the probe and the boundary must be larger than 25% of the probe diameter. The probe diameter is 2.4 mm. In the DASY4 software, the distance between the sensor center and phantom surface is set to 2.0 mm. This provides a distance of 1.0 mm between the probe tip and the surface. The extrapolation of the values between the dipole center and the surface of the phantom was based on trivariate quadratics computed from the previously calculated 3D interpolated points nearest the phantom surface.
 - Interpolated data is used to calculate the average SAR over 1g and 10g cubes by spatially discretizing the entire measured cube. The volume used to determine the averaged SAR is a 1 mm grid (42875 interpolated points).
 - A zoom scan volume of 24 mm x 24 mm x 20 mm (7x7x9 points) centered at the peak SAR location determined from the area scan was used and a zoom scan resolution of 4 mm x 4 mm x 2.5 mm was used.

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7.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluations a system check was performed using a planar phantom with a 2450 MHz validation 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 $\pm 10\%$ from the system validation target SAR value (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)
		Sys. Val. Target	Meas.	Dev.	Sys. Val. Target	Meas.	Dev.	Sys. Val. Target	Meas.	Dev.						
Jul 23	Body	13.4 $\pm 10\%$	13.6	+1.5%	50.1 $\pm 5\%$	51.0	+1.8%	1.99 $\pm 5\%$	1.98	-0.5%	1000	25.5	24.0	≥ 15	33	101.1
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.														

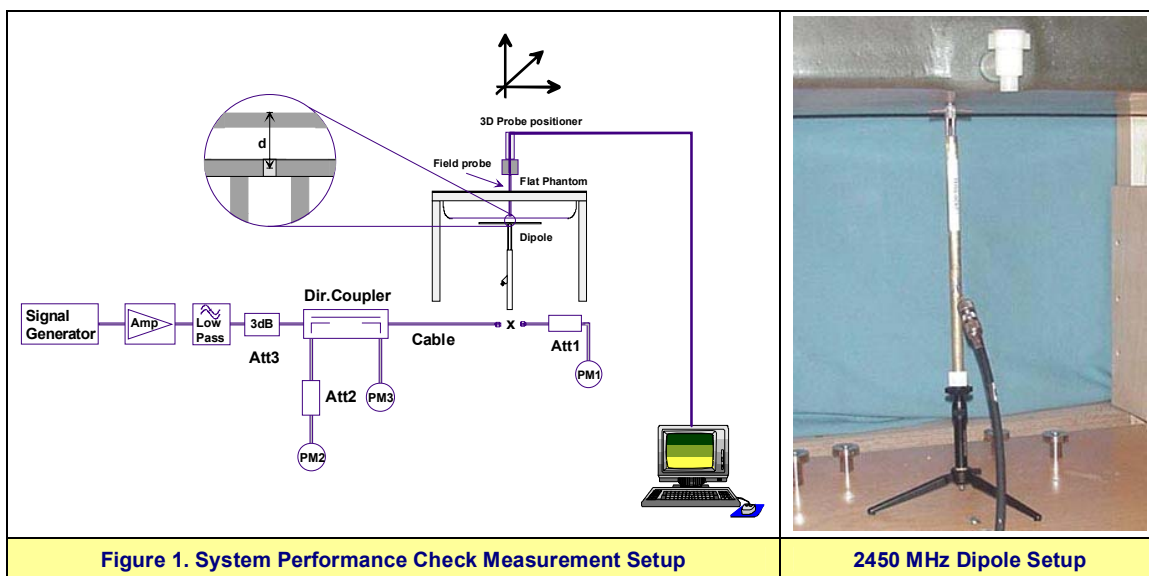


Figure 1. System Performance Check Measurement Setup

2450 MHz Dipole Setup

Company:	Voccollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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8.0 SIMULATED EQUIVALENT TISSUES

The 2450 MHz simulated tissue mixture consisted of Glycol-monobutyl, water, and salt. The fluid was prepared according to standardized procedures and measured for dielectric parameters (permittivity and conductivity).

SIMULATED TISSUE MIXTURES		
INGREDIENT	2450 MHz Body	2410 MHz Body
	System Performance Check	DUT Evaluation
Water	69.98 %	69.98 %
Glycol Monobutyl	30.00 %	30.00 %
Salt	0.02 %	0.02 %

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
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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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	EX3DV4
Serial No.	3600
Construction	Symmetrical design with triangular core
Frequency	10 MHz to 6 GHz
Linearity	±0.2 dB (30 MHz to 3 GHz)
<u>Phantom(s)</u>	
Type	Planar Phantom
Shell Material	Fiberglass
Thickness	2.0 ±0.1 mm
Volume	Approx. 70 liters

Company:	Voccollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

11.0 PROBE SPECIFICATION (EX3DV4)

Construction: Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g. DGBE) Calibration: Basic Broadband Calibration in air: 10-3000 MHz Conversion Factors (CF) for HSL 900 and HSL 1750 Frequency: 10 MHz to >6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz) Directivity: ± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis) Dynamic Range: 10 μW/g to >100 mW/g; Linearity: ± 0.2 dB (noise: typically < 1 μW/g) Dimensions: Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1.0 mm Application: High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better than 30%.	 EX3DV4 E-Field Probe
--	--

12.0 PLANAR PHANTOM

The planar phantom is a fiberglass shell phantom with a 2.0 mm (+/-0.2mm) thick device measurement area at the center of the phantom for SAR evaluations of devices with a larger surface area than the planar section of the SAM phantom. The planar phantom is integrated in a wooden table (see Appendix G for dimensions and specifications of the planar phantom). The planar phantom was also used for the system performance check evaluation.	 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. For evaluations of larger devices a Plexiglas platform is attached to the device holder.	 Device Holder
---	---

Company:	Voccollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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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
	-DAE4		00019	353	10Jul07		10Jul08
x	-DAE3		00018	370	13Mar07		13Mar08
	-ET3DV6 E-Field Probe		00016	1387	16Mar07		16Mar08
x	-EX3DV4 E-Field Probe		00213	3600	24Jan07		24Jan08
	-300 MHz Validation Dipole		00023	135	08Jun07		08Jun08
	-450 MHz Validation Dipole		00024	136	07Jun07		07Jun08
	-835 MHz Validation Dipole		00022	411	Brain	07Jun07	07Jun08
					Body	07Jun07	07Jun08
	-900 MHz Validation Dipole		00020	054	Brain	07Jun07	07Jun08
					Body	07Jun07	07Jun08
	-1800 MHz Validation Dipole		00021	247	Brain	06Jun07	06Jun08
					Body	06Jun07	06Jun08
	-1900 MHz Validation Dipole		00032	151	Brain	06Jun07	06Jun08
					Body	06Jun07	06Jun08
	-2450 MHz Validation Dipole		00025	150	Brain	08Jun07	08Jun08
x					Body	08Jun07	08Jun08
	5GHz Validation Dipole	-5200 MHz	00126	1031	Body	18May07	18May08
		-5500 MHz			Body	22May07	22May08
		-5800 MHz			Brain	09May07	09May08
					Body	10May07	10May08
	-SAM Phantom V4.0C		00154	1033	N/A		N/A
x	-Barski Planar Phantom		00155	03-01	N/A		N/A
	-Plexiglas Side Planar Phantom		00156	161	N/A		N/A
	-Plexiglas Validation Planar Phantom		00157	137	N/A		N/A
x	ALS-PR-DIEL Dielectric Probe Kit		00160	260-00953	N/A		N/A
x	Gigatronics 8652A Power Meter		00007	1835272	26Mar07		26Mar08
	Gigatronics 8652A Power Meter		00008	1835267	22Jan07		22Jan08
	Gigatronics 80701A Power Sensor		00012	1834350	22Jan07		22Jan08
x	Gigatronics 80701A Power Sensor		00014	1833699	22Jan07		22Jan08
x	Gigatronics 80701A Power Sensor		00109	1834366	26Mar07		26Mar08
x	HP 8753ET Network Analyzer		00134	US39170292	20Apr07		20Apr08
x	HP 8648D Signal Generator		00005	3847A00611	NCR		NCR
	Rohde & Schwarz SMR20 Signal Generator		00006	100104	NCR		NCR
x	Amplifier Research 5S1G4 Power Amplifier		00106	26235	NCR		NCR
	Amplifier Research 10W 1000C Power Amplifier		00041	27887	NCR		NCR
	Nextec NB00383 Microwave Amplifier		00151	0535	NCR		NCR
	HP E4408B Spectrum Analyzer		00015	US39240170	05Feb07		05Feb08

Company:	Voccollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

15.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION						
Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	Uncertainty Value ±% (1g)	V _i or V _{eff}
Measurement System						
Probe calibration (2.4 GHz)	5.9	Normal	1	1	5.9	∞
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)	5	Normal	1	0.64	3.2	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	5	Normal	1	0.6	3.0	∞
Combined Standard Uncertainty					11.44	
Expanded Uncertainty (k=2)					22.89	
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 (see reference [5])						

Company:	Voccollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
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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 _{off}
Measurement System						
Probe calibration (2.4 GHz)	5.9	Normal	1	1	5.9	∞
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	∞
Dipole						
Dipole Positioning	2	Normal	1.732050808	1	1.2	∞
Power & Power Drift	4.7	Normal	1.732050808	1	2.7	∞
Phantom and Setup						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	∞
Liquid conductivity (measured)	5	Normal	1	0.64	3.2	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	5	Normal	1	0.6	3.0	∞
Combined Standard Uncertainty					9.81	
Expanded Uncertainty (k=2)					19.61	
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 (see reference [5])						

Company:	Voccollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

16.0 REFERENCES

- [1] Federal Communications Commission - "Radiofrequency radiation exposure evaluation: portable devices", Rule Part 47 CFR §2.1093: 1999.
- [2] Health Canada - "Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz", Safety Code 6: 1999.
- [3] Federal Communications Commission - "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields", OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.
- [4] Industry Canada - "Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)", Radio Standards Specification RSS-102 Issue 2: November 2005.
- [5] IEEE Standard 1528-2003 - "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques": December 2003.
- [6] Federal Communications Commission - "SAR Measurement Procedures for 802.11a/b/g Transmitters": May 2007 (Rev 1.2).

Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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APPENDIX A - SAR MEASUREMENT DATA

Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

Date Tested: 07/23/2007

Body-Worn SAR - 1 Mbps - 1750mAh Battery - Front Side of DUT (Batt./Ant. Side) - 2412 MHz

DUT: Vocollect Model: TT-601_RA WF; Type: Wireless Data Terminal with 802.11b WLAN; Serial: 097255837

Body-Worn Accessory: Belt-Strap with Belt-Clip (P/N: BL-601-104)

Audio Accessory: Headset-Microphone (P/N: HD 700-1)

Ambient Temp: 25.0°C; Fluid Temp: 23.8°C; Barometric Pressure: 101.1 kPa; Humidity: 33%

Communication System: DSSS WLAN

RF Output Power: 14.3 dBm (Conducted)

7.2V, 1750mAh Li-ion Battery (Model: 730024)

Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.91 \text{ mho/m}$; $\epsilon_r = 51.3$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.31, 6.31, 6.31); Calibrated: 24/01/2007
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 13/03/2007
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-Worn SAR - Front Side of DUT (Batt./Ant. Side) Touching Planar Phantom - Low Channel

Area Scan (7x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.494 mW/g

Body-Worn SAR - Front Side of DUT (Batt./Ant. Side) Touching Planar Phantom - Low Channel

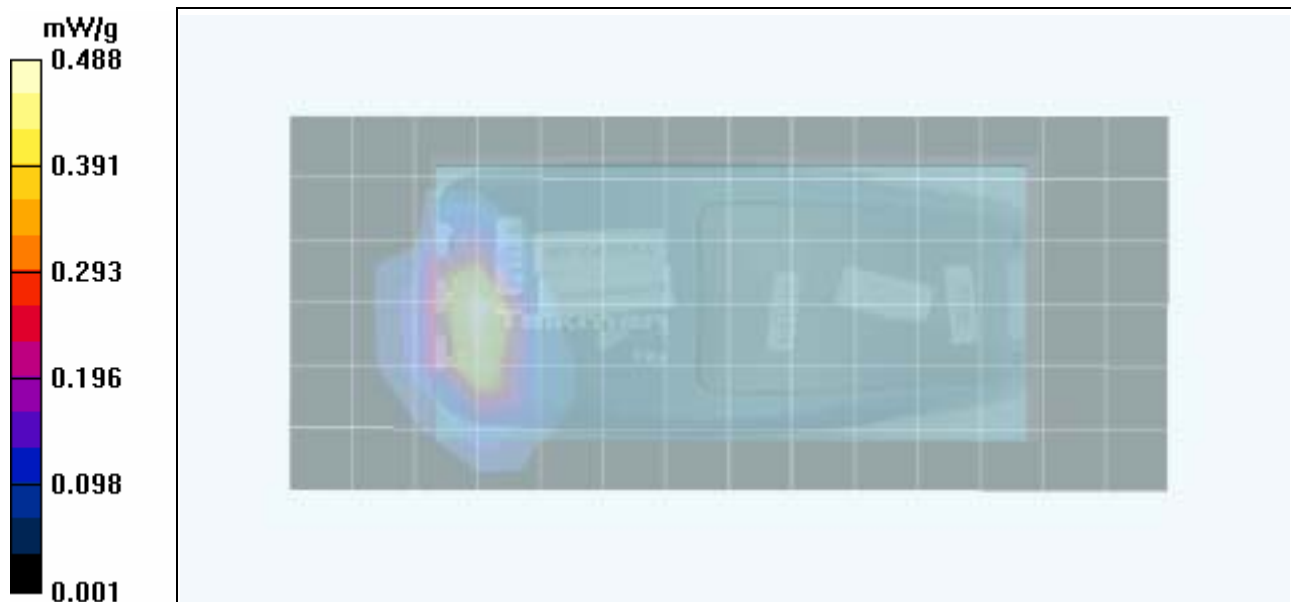
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 1.50 V/m; Power Drift = 0.161 dB

Peak SAR (extrapolated) = 0.877 W/kg

SAR(1 g) = 0.424 mW/g; SAR(10 g) = 0.194 mW/g

Maximum value of SAR (measured) = 0.488 mW/g



Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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Date Tested: 07/23/2007

Body-Worn SAR - 1 Mbps - 1750mAh Battery - Back Side of DUT (Belt-Clip Side) - 2412 MHz

DUT: Vocollect Model: TT-601_RA WF; Type: Wireless Data Terminal with 802.11b WLAN; Serial: 097255837

Body-Worn Accessory: Belt-Strap with Belt-Clip (P/N: BL-601-104)

Audio Accessory: Headset-Microphone (P/N: HD 700-1)

Ambient Temp: 25.0°C; Fluid Temp: 23.8°C; Barometric Pressure: 101.1 kPa; Humidity: 33%

Communication System: DSSS WLAN

RF Output Power: 14.3 dBm (Conducted)

7.2V, 1750mAh Li-ion Battery (Model: 730024)

Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.91 \text{ mho/m}$; $\epsilon_r = 51.3$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.31, 6.31, 6.31); Calibrated: 24/01/2007
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 13/03/2007
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-Worn SAR - Back Side of DUT (Belt-Clip Side) Touching Planar Phantom - Low Channel

Area Scan (7x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.014 mW/g

Body-Worn SAR - Back Side of DUT (Belt-Clip Side) Touching Planar Phantom - Low Channel

Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 0.424 V/m; Power Drift = 1.19 dB

Peak SAR (extrapolated) = 0.027 W/kg

SAR(1 g) = 0.0143 mW/g; SAR(10 g) = 0.00729 mW/g

Maximum value of SAR (measured) = 0.017 mW/g



Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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Date Tested: 07/23/2007

Body-Worn SAR - 1 Mbps - 1750mAh Battery - Top Side of DUT (Button Side) - 2412 MHz

DUT: Vocollect Model: TT-601_RA WF; Type: Wireless Data Terminal with 802.11b WLAN; Serial: 097255837

Body-Worn Accessory: Belt-Strap with Belt-Clip (P/N: BL-601-104)

Audio Accessory: Headset-Microphone (P/N: HD 700-1)

Ambient Temp: 25.0°C; Fluid Temp: 23.8°C; Barometric Pressure: 101.1 kPa; Humidity: 33%

Communication System: DSSS WLAN

RF Output Power: 14.3 dBm (Conducted)

7.2V, 1750mAh Li-ion Battery (Model: 730024)

Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.91 \text{ mho/m}$; $\epsilon_r = 51.3$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.31, 6.31, 6.31); Calibrated: 24/01/2007
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 13/03/2007
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-Worn SAR - Top Side of DUT (Button Side) Touching Planar Phantom - Low Channel

Area Scan (7x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.028 mW/g

Body-Worn SAR - Top Side of DUT (Button Side) Touching Planar Phantom - Low Channel

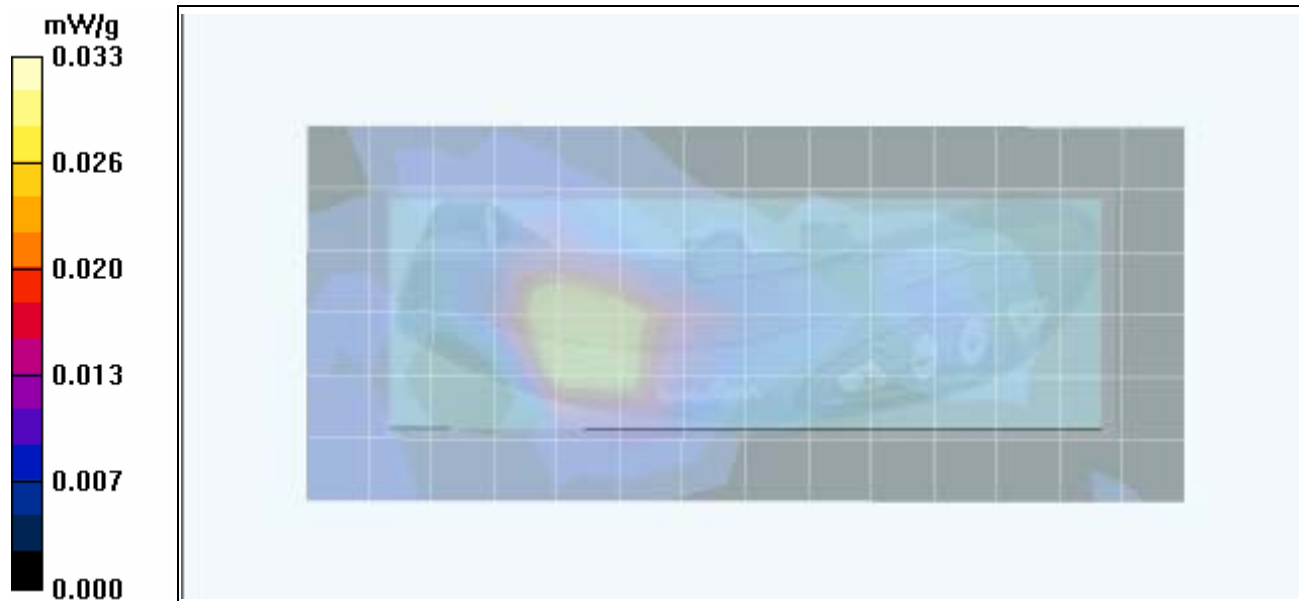
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 2.25 V/m; Power Drift = -1.03 dB

Peak SAR (extrapolated) = 0.059 W/kg

SAR(1 g) = 0.0306 mW/g; SAR(10 g) = 0.016 mW/g

Maximum value of SAR (measured) = 0.033 mW/g



Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

Date Tested: 07/23/2007

Body-Worn SAR - 1 Mbps - 1750mAh Battery - Bottom Side of DUT - 2412 MHz

DUT: Vocollect Model: TT-601_RA WF; Type: Wireless Data Terminal with 802.11b WLAN; Serial: 097255837

Body-Worn Accessory: Belt-Strap with Belt-Clip (P/N: BL-601-104)

Audio Accessory: Headset-Microphone (P/N: HD 700-1)

Ambient Temp: 25.0°C; Fluid Temp: 23.8°C; Barometric Pressure: 101.1 kPa; Humidity: 33%

Communication System: DSSS WLAN

RF Output Power: 14.3 dBm (Conducted)

7.2V, 1750mAh Li-ion Battery (Model: 730024)

Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.91 \text{ mho/m}$; $\epsilon_r = 51.3$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.31, 6.31, 6.31); Calibrated: 24/01/2007
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 13/03/2007
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-Worn SAR - Bottom Side of DUT Touching Planar Phantom - Low Channel

Area Scan (7x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.016 mW/g

Body-Worn SAR - Bottom Side of DUT Touching Planar Phantom - Low Channel

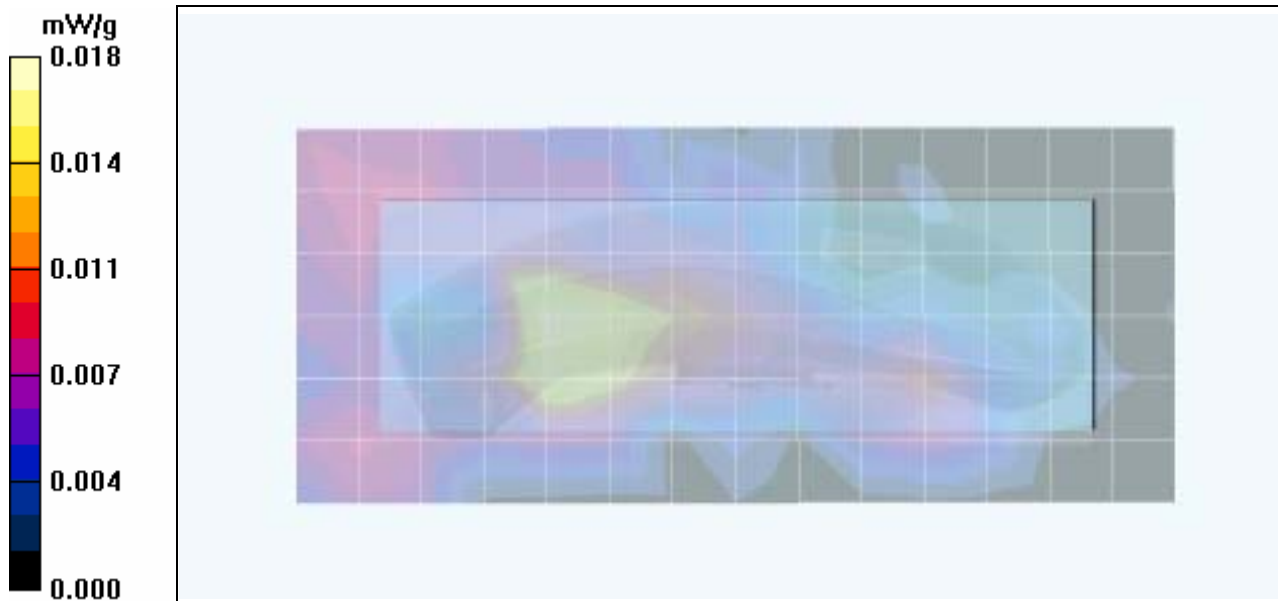
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 2.00 V/m; Power Drift = -1.07 dB

Peak SAR (extrapolated) = 0.043 W/kg

SAR(1 g) = 0.0168 mW/g; SAR(10 g) = 0.00889 mW/g

Maximum value of SAR (measured) = 0.018 mW/g



Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

Date Tested: 07/23/2007

Body-Worn SAR - 1 Mbps - 3500mAh Battery - Front Side of DUT (Batt./Ant. Side) - 2412 MHz

DUT: Vocollect Model: TT-601_RA WF; Type: Wireless Data Terminal with 802.11b WLAN; Serial: 097255837

Body-Worn Accessory: Belt-Strap with Belt-Clip (P/N: BL-601-104)

Audio Accessory: Headset-Microphone (P/N: HD 700-1)

Ambient Temp: 25.0°C; Fluid Temp: 23.8°C; Barometric Pressure: 101.1 kPa; Humidity: 33%

Communication System: DSSS WLAN

RF Output Power: 14.3 dBm (Conducted)

7.2V, 3500mAh Li-ion Battery (Model: 730025)

Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.91 \text{ mho/m}$; $\epsilon_r = 51.3$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.31, 6.31, 6.31); Calibrated: 24/01/2007
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 13/03/2007
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-Worn SAR - Front Side of DUT (Batt./Ant. Side) Touching Planar Phantom - Low Channel

Area Scan (7x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.563 mW/g

Body-Worn SAR - Front Side of DUT (Batt./Ant. Side) Touching Planar Phantom - Low Channel

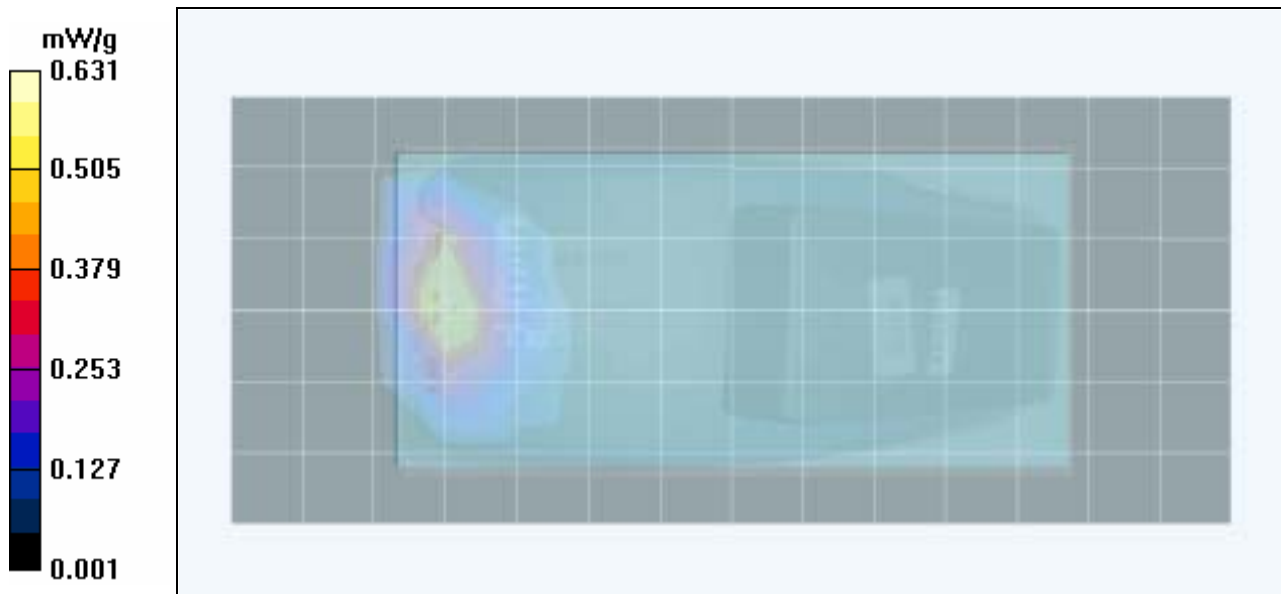
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 1.64 V/m; Power Drift = -0.193 dB

Peak SAR (extrapolated) = 1.20 W/kg

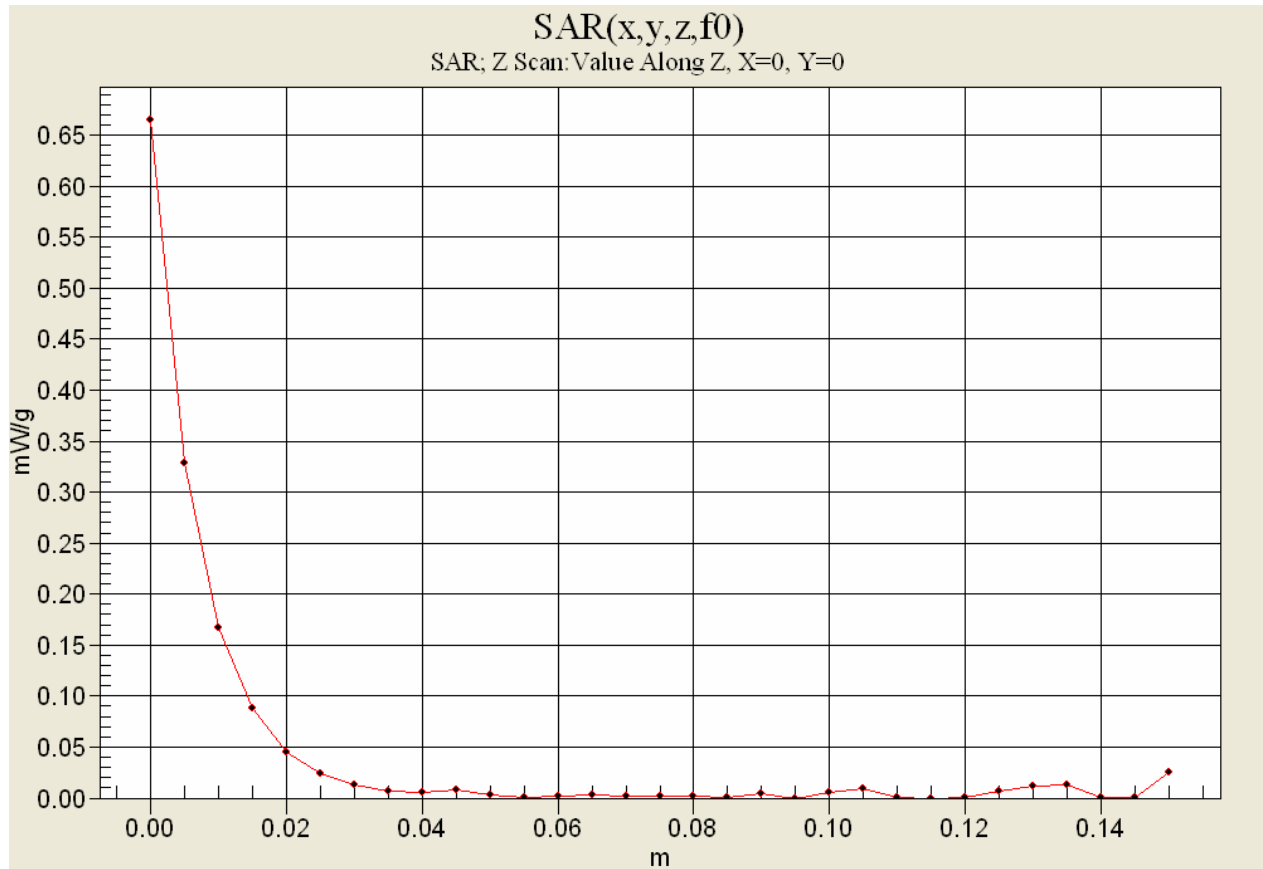
SAR(1 g) = 0.531 mW/g; SAR(10 g) = 0.228 mW/g

Maximum value of SAR (measured) = 0.631 mW/g



Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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Z-Axis Scan



	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

Date Tested: 07/23/2007

System Performance Check - 2450 MHz Dipole - MSL

DUT: Dipole 2450 MHz; Model: D2450V2; Serial: 150; Validation: 06/08/2007

Ambient Temp: 25.5°C; Fluid Temp: 24.0°C; Barometric Pressure: 101.1 kPa; Humidity: 33%

Communication System: CW

Forward Conducted Power: 250 mW

Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2450 \text{ MHz}$; $\sigma = 1.98 \text{ mho/m}$; $\epsilon_r = 51.0$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.31, 6.31, 6.31); Calibrated: 24/01/2007

- Sensor-Surface: 2 mm (Mechanical Surface Detection)

- Electronics: DAE3 Sn370; Calibrated: 13/03/2007

- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01

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

2450 MHz Dipole - System Performance Check/Area Scan (6x10x1):

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

Maximum value of SAR (measured) = 14.9 mW/g

2450 MHz Dipole - System Performance Check/Zoom Scan (7x7x7)/Cube 0:

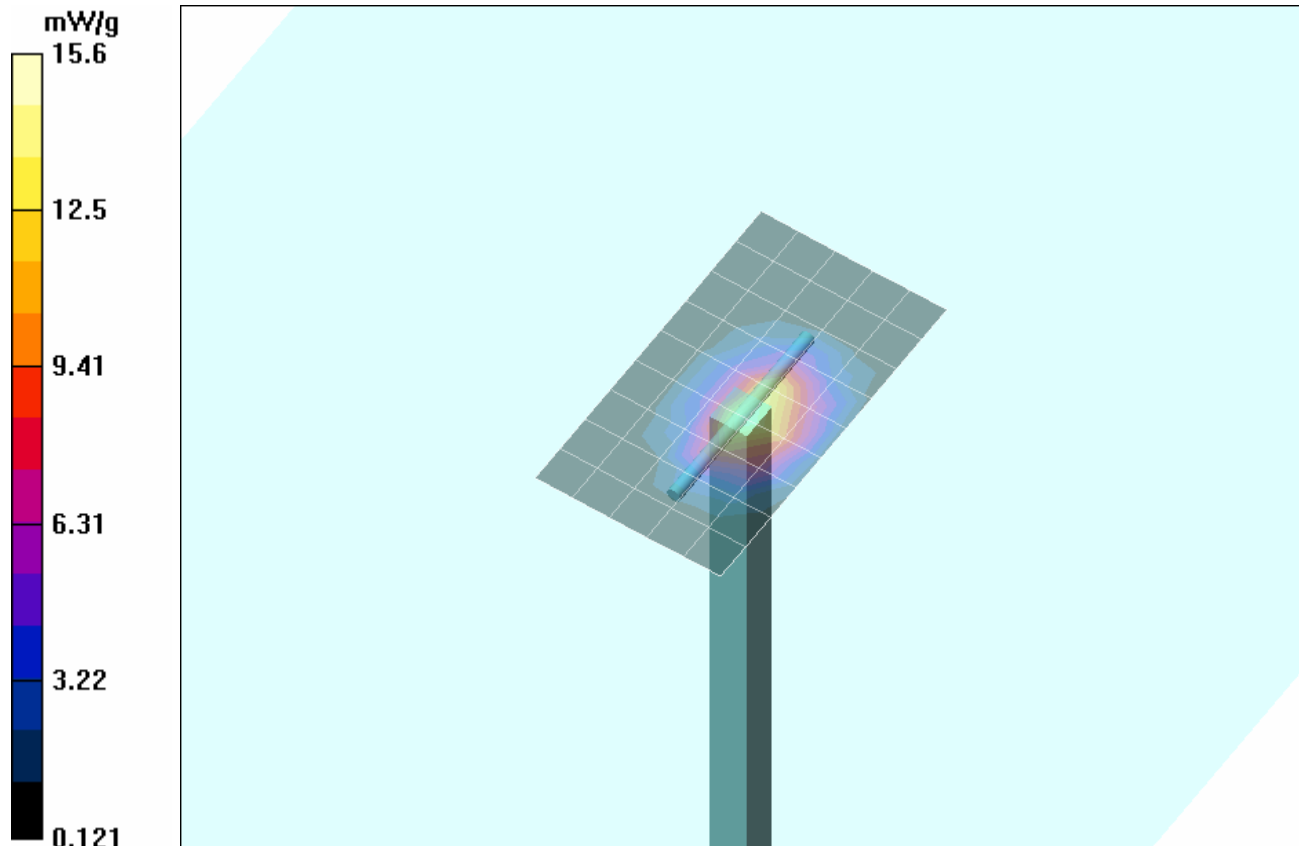
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 71.9 V/m; Power Drift = -0.100 dB

Peak SAR (extrapolated) = 27.5 W/kg

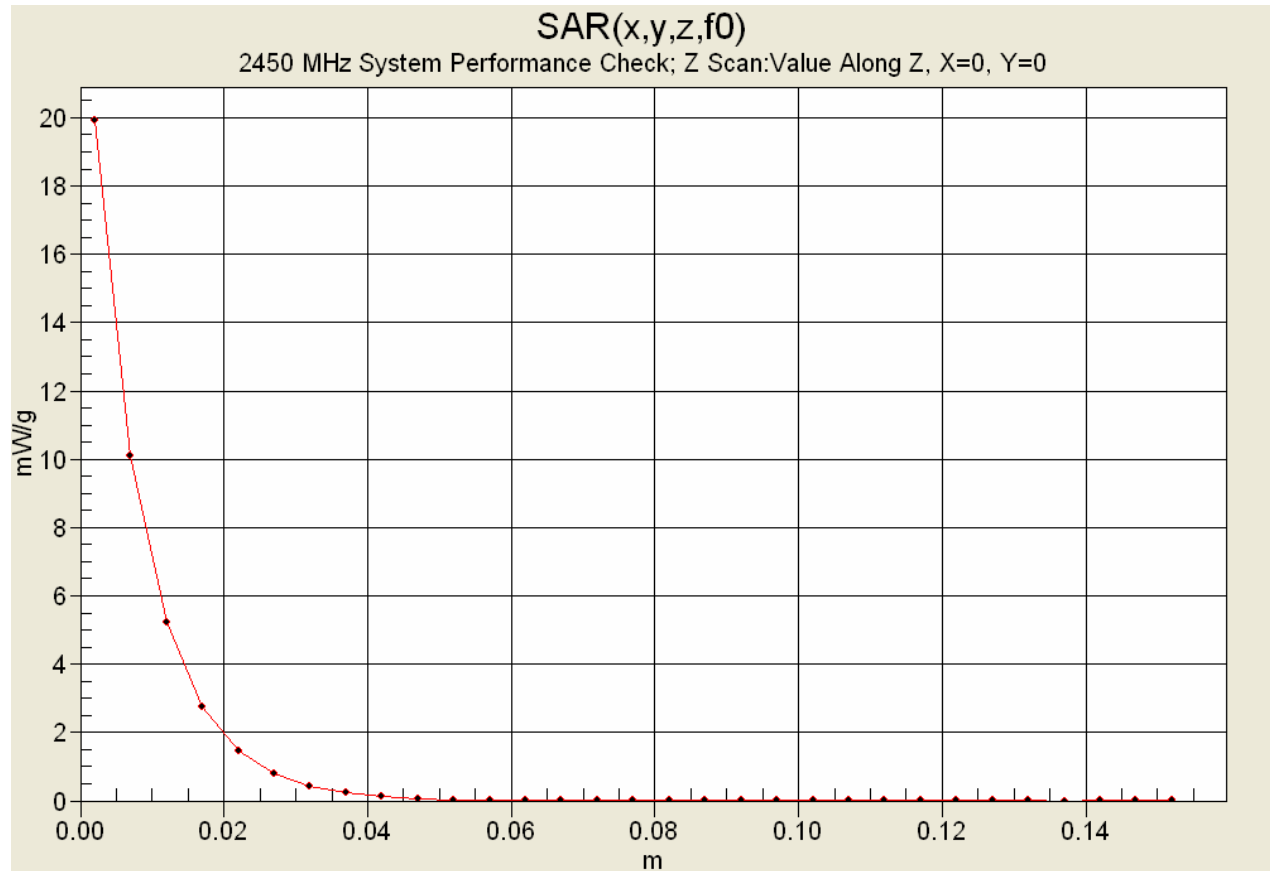
SAR(1 g) = 13.6 mW/g; SAR(10 g) = 6.29 mW/g

Maximum value of SAR (measured) = 15.6 mW/g



Company:	Voccollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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Z-Axis Scan



	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	
				Certificate No. 2470.01

2450 MHz System Performance Check & 2410 MHz DUT Evaluation (Body)

Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

Mon 23/Jul/2007

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
2.3500	52.83	1.85	51.38	1.84
2.3600	52.82	1.86	51.35	1.86
2.3700	52.81	1.87	51.36	1.87
2.3800	52.79	1.88	51.39	1.90
2.3900	52.78	1.89	51.38	1.89
2.4000	52.77	1.90	51.23	1.91
2.4100	52.75	1.91	51.26	1.91
2.4200	52.74	1.92	51.23	1.93
2.4300	52.73	1.93	51.19	1.95
2.4400	52.71	1.94	51.18	1.97
2.4500	52.70	1.95	51.04	1.98
2.4600	52.69	1.96	51.13	1.99
2.4700	52.67	1.98	51.06	2.00
2.4800	52.66	1.99	51.03	2.02
2.4900	52.65	2.01	50.94	2.03
2.5000	52.64	2.02	50.94	2.04
2.5100	52.62	2.04	50.84	2.05
2.5200	52.61	2.05	50.88	2.06
2.5300	52.60	2.06	50.84	2.08
2.5400	52.59	2.08	50.77	2.09
2.5500	52.57	2.09	50.77	2.11

Company:	Voccollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

APPENDIX D - SAR TEST SETUP PHOTOGRAPHS

Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

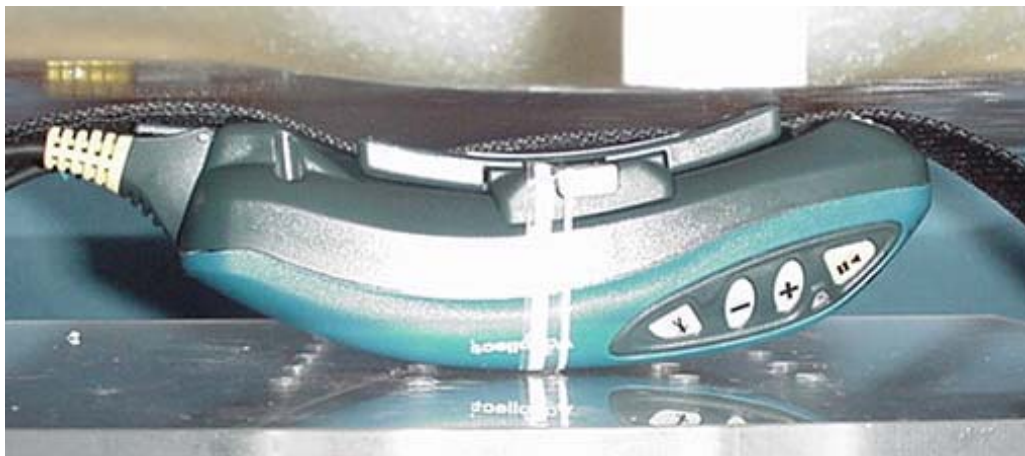
BODY-WORN SAR TEST SETUP PHOTOGRAPHS
Front Side of DUT (Battery/Antenna Side) Touching Planar Phantom
with Belt-Strap/Clip, Headset-Microphone & Scanner Accessories - 1750mAh Battery



Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

BODY-WORN SAR TEST SETUP PHOTOGRAPHS
Back Side of DUT (Belt-Clip Side) Touching Planar Phantom
with Belt-Strap/Clip, Headset-Microphone & Scanner Accessories - 1750mAh Battery



Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

BODY-WORN SAR TEST SETUP PHOTOGRAPHS
Top Side of DUT (Button Side) Touching Planar Phantom
with Belt-Strap/Clip, Headset-Microphone & Scanner Accessories - 1750mAh Battery



Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

BODY-WORN SAR TEST SETUP PHOTOGRAPHS
Bottom Side of DUT Touching Planar Phantom
with Belt-Strap/Clip, Headset-Microphone & Scanner Accessories - 1750mAh Battery



Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

BODY-WORN SAR TEST SETUP PHOTOGRAPHS
Front Side of DUT (Battery Side) Touching Planar Phantom
with Belt-Strap/Clip, Headset-Microphone & Scanner Accessories - 3500mAh Battery



Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

DUT PHOTOGRAPHS



Front Side of DUT (Antenna/Battery Side) with 1750mAh Standard Battery



Front Side of DUT (Antenna/Battery Side) with 3500mAh Extended Battery



Back Side of DUT (Belt-Clip Side)

Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

DUT PHOTOGRAPHS



DUT Battery Compartment



**1750mAh Lithium-ion Standard Battery
(Model: 730024)**

**3500mAh Lithium-ion Extended Battery
(Model: 730025)**

Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

DUT PHOTOGRAPHS



DUT with Belt-Strap/Clip (P/N: BL-601-104), Headset-Microphone (P/N: HD 700-1) & Bar Code Scanner (P/N: BC-607-3)



DUT with Belt-Strap/Clip accessory (P/N: BL-601-104)

Company:	Voccollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

Certificate No. 2470.01

DUT PHOTOGRAPHS



Top Side of DUT (Button Side) with 1750mAh Standard Battery



Bottom Side of DUT with 1750mAh Standard Battery



Battery Latch end of DUT with 1750mAh Standard Battery



Connector end of DUT with 1750mAh Standard Battery

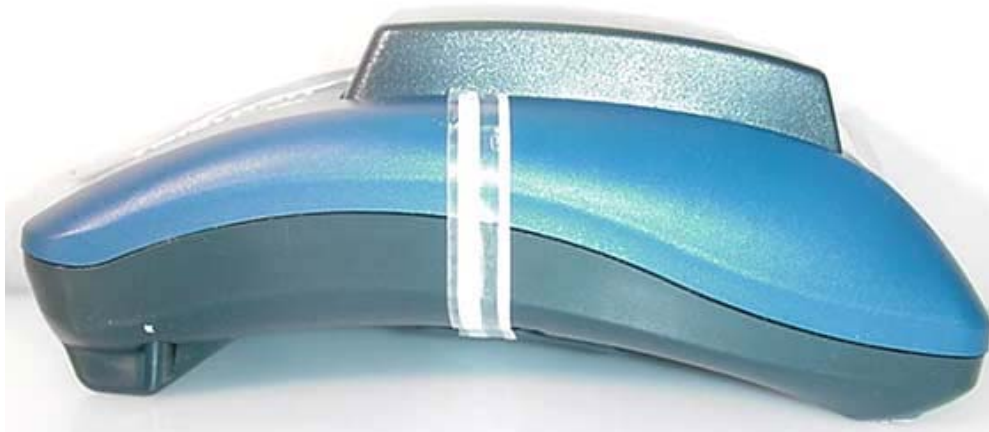
Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

DUT PHOTOGRAPHS



Top Side of DUT (Button Side) with 3500mAh Extended Battery



Bottom Side of DUT with 3500mAh Extended Battery



Battery Latch end of DUT with 3500mAh Ext. Battery



Connector end of DUT with 3500mAh Ext. Battery

Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

APPENDIX E - SYSTEM VALIDATION

Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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	Date of Evaluation:	June 08, 2007	Document Serial No.:	SV2450M-060807-R1.2	
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz	Fluid Type: Body

2450 MHz SYSTEM VALIDATION

Type:

2450 MHz Validation Dipole

Asset Number:

00025

Serial Number:

150

Place of Validation:

Celltech Labs Inc.

Date of Validation:

June 08, 2007

Celltech Labs Inc. certifies that the 2450 MHz System Validation was performed on the date indicated above.

Performed by:

Cheri Frangiadakis

Approved by:

Jon Hughes

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 10.0mm from the simulating fluid using a loss-less dielectric spacer. The measured input impedance is:

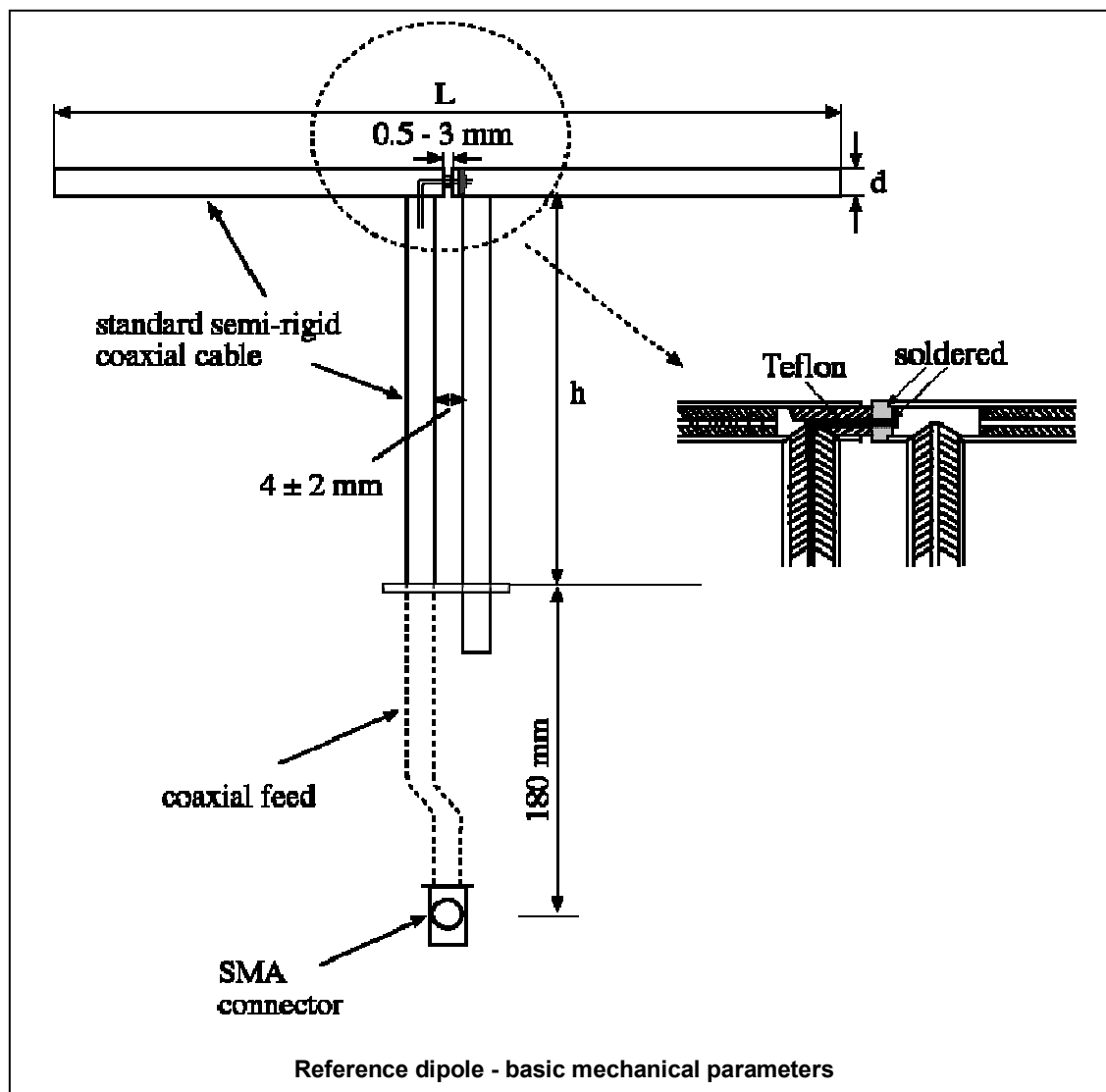
Feed point impedance at 2450 MHz

$$\text{Re}\{Z\} = 45.100\Omega$$

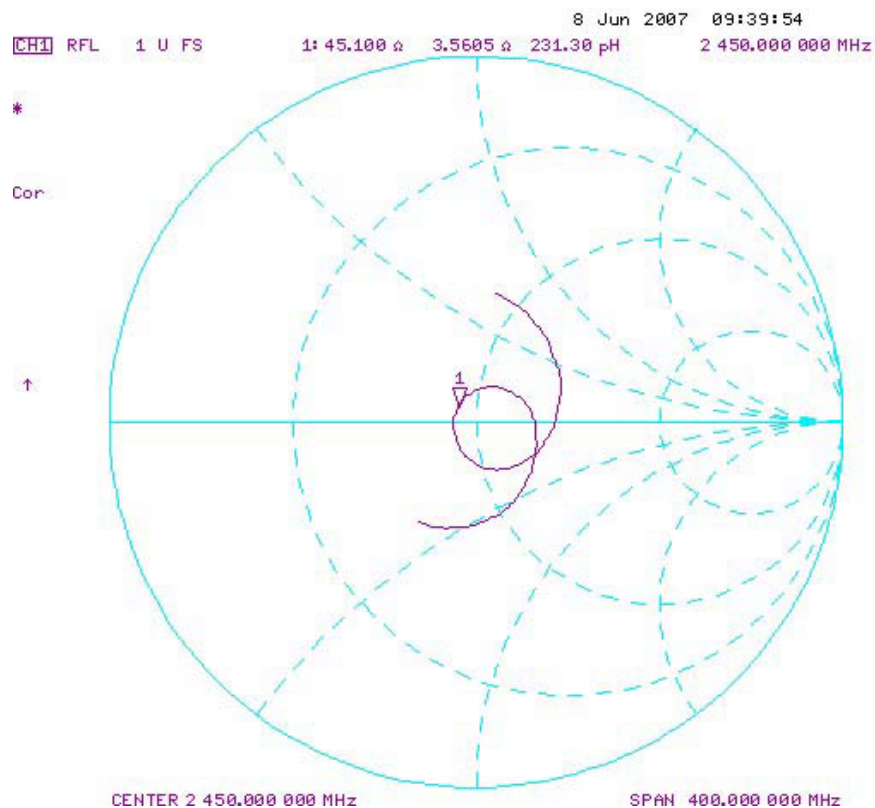
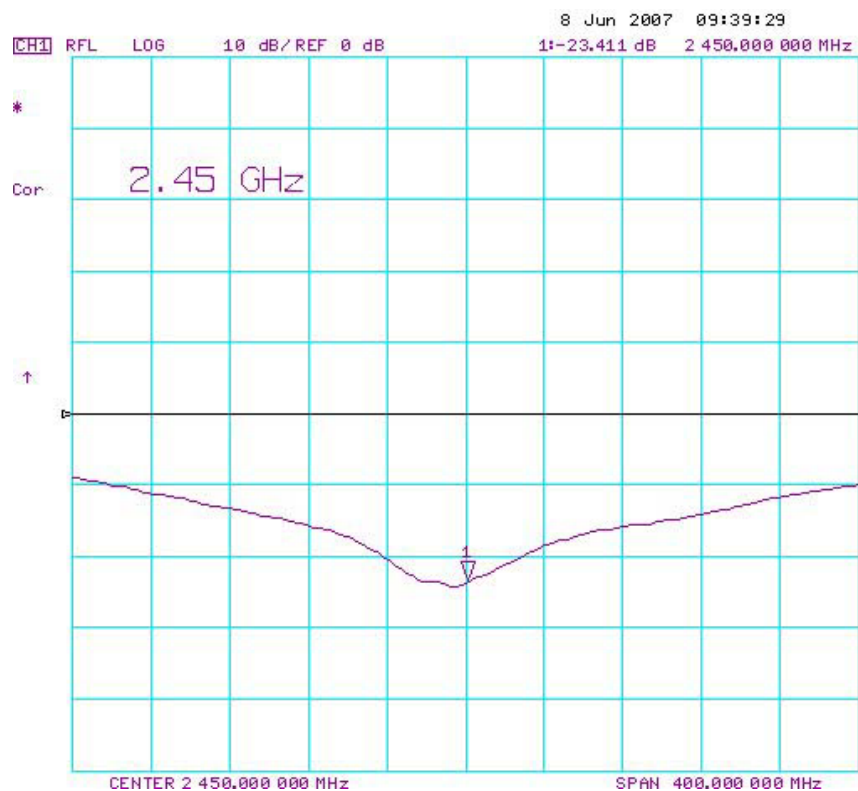
$$\text{Im}\{Z\} = 3.5605\Omega$$

Return Loss at 2450 MHz

$$-23.411\text{dB}$$



2. Validation Dipole VSWR Data



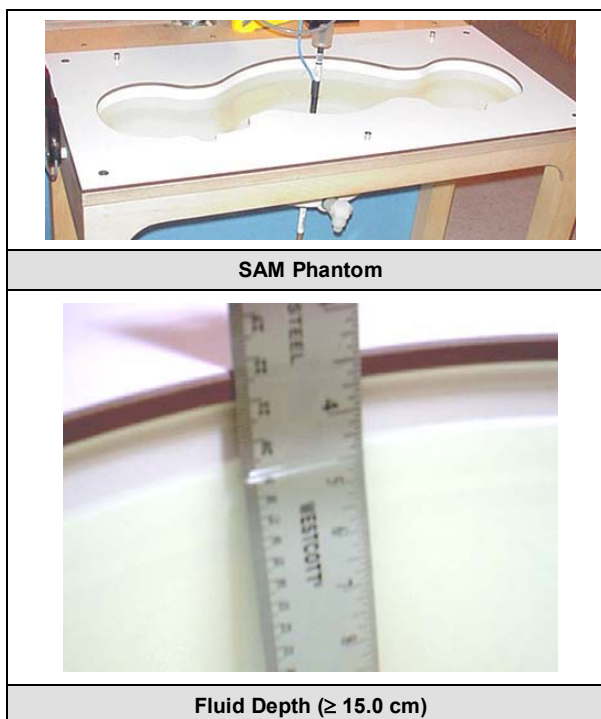
3. Validation Dipole Dimensions

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

4. Validation Phantom

The validation phantom is the SAM (Specific Anthropomorphic Mannequin) phantom manufactured by Schmid & Partner Engineering AG. The SAM phantom is a Fiberglass shell integrated in a wooden table. The shape of the shell corresponds to the phantom defined by SCC34-SC2. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

Shell Thickness: 2.0 ± 0.1 mm
Filling Volume: Approx. 25 liters
Dimensions: 50 cm (W) x 100 cm (L)



	Date of Evaluation:	June 08, 2007	Document Serial No.:	SV2450M-060807-R1.2
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz
			Fluid Type:	Body

5. 2450 MHz System Validation Setup



	Date of Evaluation:	June 08, 2007	Document Serial No.:	SV2450M-060807-R1.2
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz
			Fluid Type:	Body

6. 2450 MHz Dipole Setup

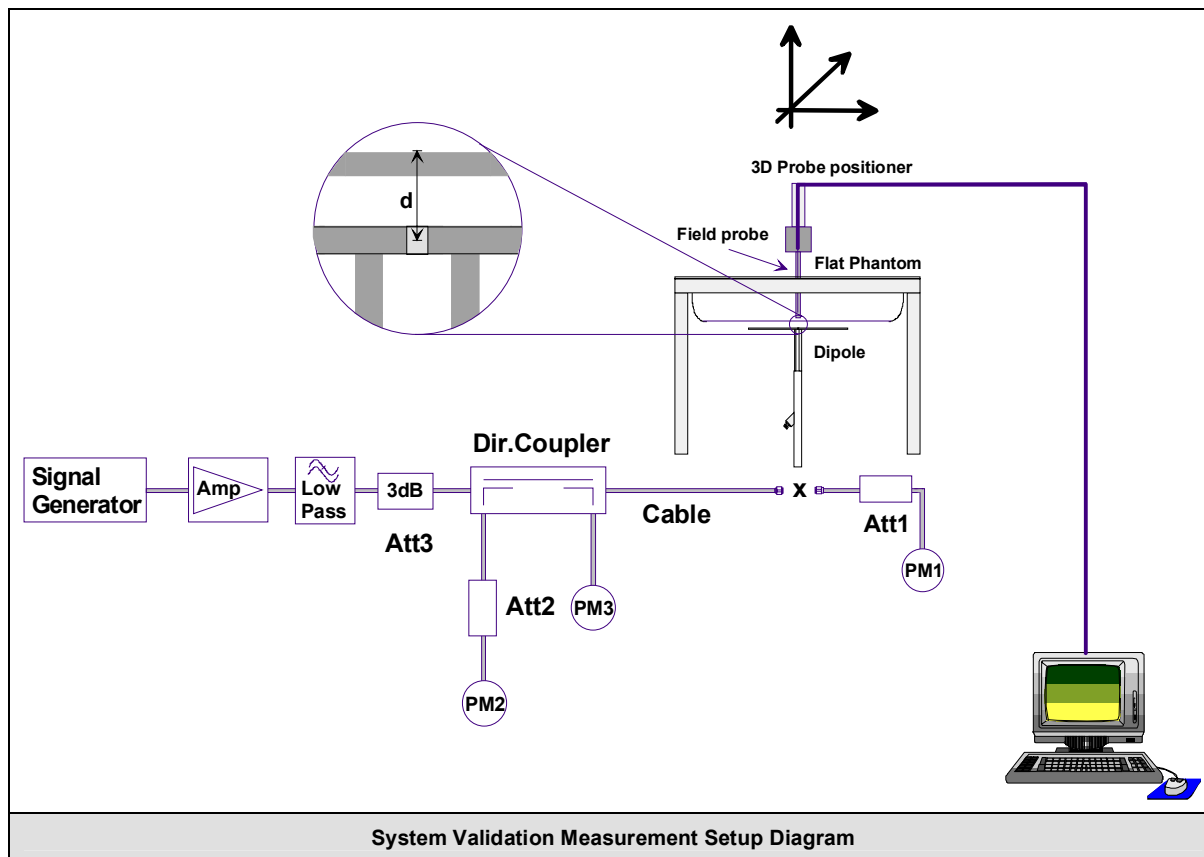


	Date of Evaluation:	June 08, 2007	Document Serial No.:	SV2450M-060807-R1.2	
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz	Fluid Type: Body

7. SAR Measurement

Measurements were made at the planar section of the SAM phantom using a dosimetric E-field probe EX3DV4 (S/N: 3600, conversion factor 6.31). 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.



	Date of Evaluation:	June 08, 2007	Document Serial No.:	SV2450M-060807-R1.2
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz
			Fluid Type:	Body

8. Measurement Conditions

The SAM phantom was filled with 2450 MHz Body tissue simulant.

Relative Permittivity: 50.1 (-4.9% deviation from target)
Conductivity: 1.99 mho/m (+2.1% deviation from target)
Fluid Temperature: 21.5 °C (Start of Test) / 21.2 °C (End of Test)
Fluid Depth: ≥ 15.0 cm

Environmental Conditions:

Ambient Temperature: 22.7 °C
Barometric Pressure: 101.1 kPa
Humidity: 31 %

The 2450 MHz Body tissue simulant consisted of the following ingredients:

Ingredient	Percentage by weight	
Water	69.98%	
Glycol Monobutyl	30.00%	
Salt	0.02%	
IEEE Target Dielectric Parameters:	$\epsilon_r = 52.7$ (+/-5%)	$\sigma = 1.95$ S/m (+/-5%)

9. System Validation SAR Results

SAR @ 0.25W Input averaged over 1g (W/kg)				SAR @ 1W Input averaged over 1g (W/kg)			
SPEAG Target		Measured	Deviation	SPEAG Target		Measured	Deviation
12.8	+/- 10%	13.4	+4.7%	51.2	+/- 10%	53.6	+4.7%
SAR @ 0.25W Input averaged over 10g (W/kg)				SAR @ 1W Input averaged over 10g (W/kg)			
SPEAG Target		Measured	Deviation	SPEAG Target		Measured	Deviation
5.93	+/- 10%	6.03	+1.7%	23.7	+/- 10%	24.1	+1.7%

Dipole Type	Distance [mm]	Frequency [MHz]	SAR (1g) [W/kg]	SAR (10g) [W/kg]	SAR (peak) [W/kg]
D300V2	15	300	3.02	2.06	4.36
D450V2	15	450	5.01	3.36	7.22
D835V2	15	835	9.71	6.38	14.1
D900V2	15	900	11.1	7.17	16.3
D1450V2	10	1450	29.6	16.6	49.8
D1500V2	10	1500	30.8	17.1	52.1
D1640V2	10	1640	34.4	18.7	59.4
D1800V2	10	1800	38.5	20.3	67.5
D1900V2	10	1900	39.8	20.8	69.6
D2000V2	10	2000	40.9	21.2	71.5
D2450V2	10	2450	51.2	23.7	97.6
D3000V2	10	3000	61.9	24.8	136.7

Table 32.1: Numerical reference SAR values for SPEAG dipoles and flat phantom filled with body-tissue simulating liquid. Note: All SAR values normalized to 1 W forward power.

	Date of Evaluation:	June 08, 2007	Document Serial No.:	SV2450M-060807-R1.2
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz
			Fluid Type:	Body

System Validation - 2450 MHz Dipole - June 8, 2007

DUT: Dipole 2450 MHz; Asset: 00025; Serial: 150

Ambient Temp: 22.7°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 31%

Communication System: CW

Forward Conducted Power: 250 mW

Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2450 \text{ MHz}$; $\sigma = 1.99 \text{ mho/m}$; $\epsilon_r = 50.1$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.31, 6.31, 6.31); Calibrated: 24/01/2007
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

2450 MHz System Validation/Area Scan (6x10x1):

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

Maximum value of SAR (measured) = 13.1 mW/g

2450 MHz System Validation/Zoom Scan (7x7x7)/Cube 0:

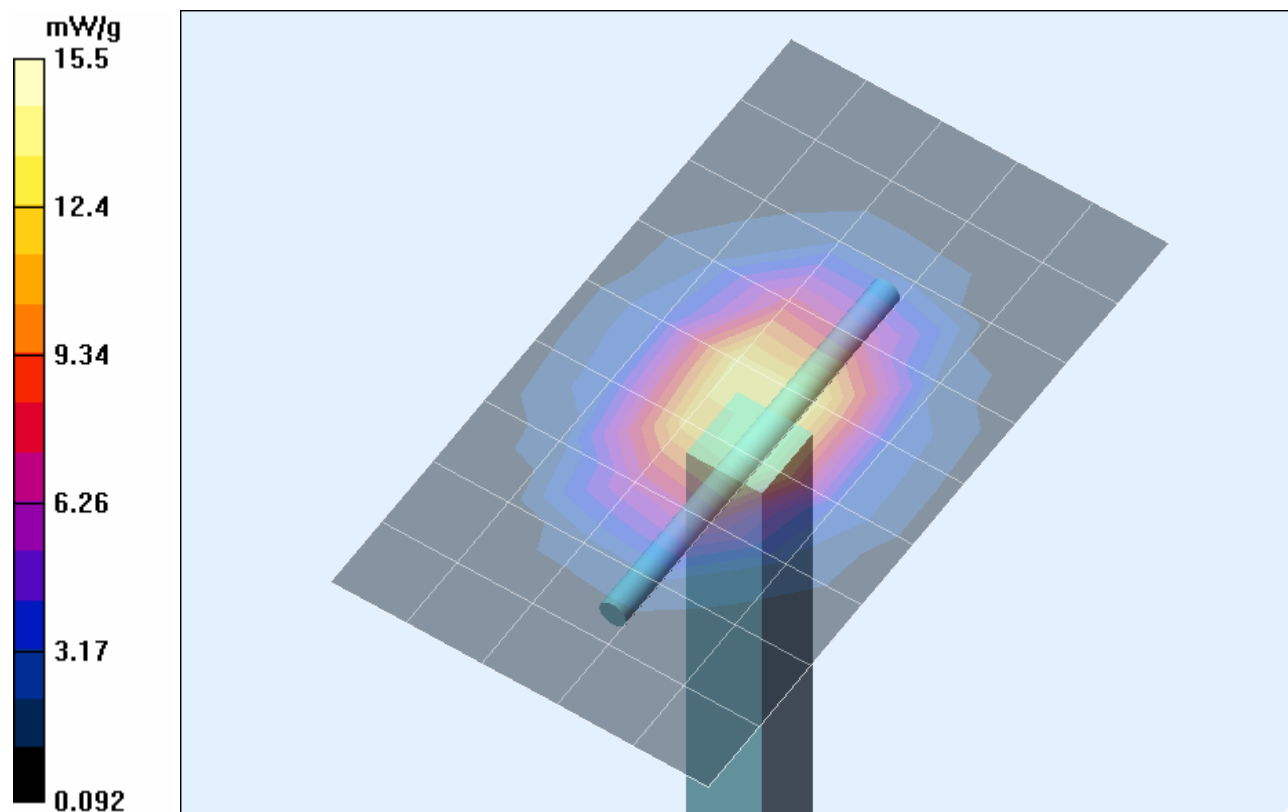
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

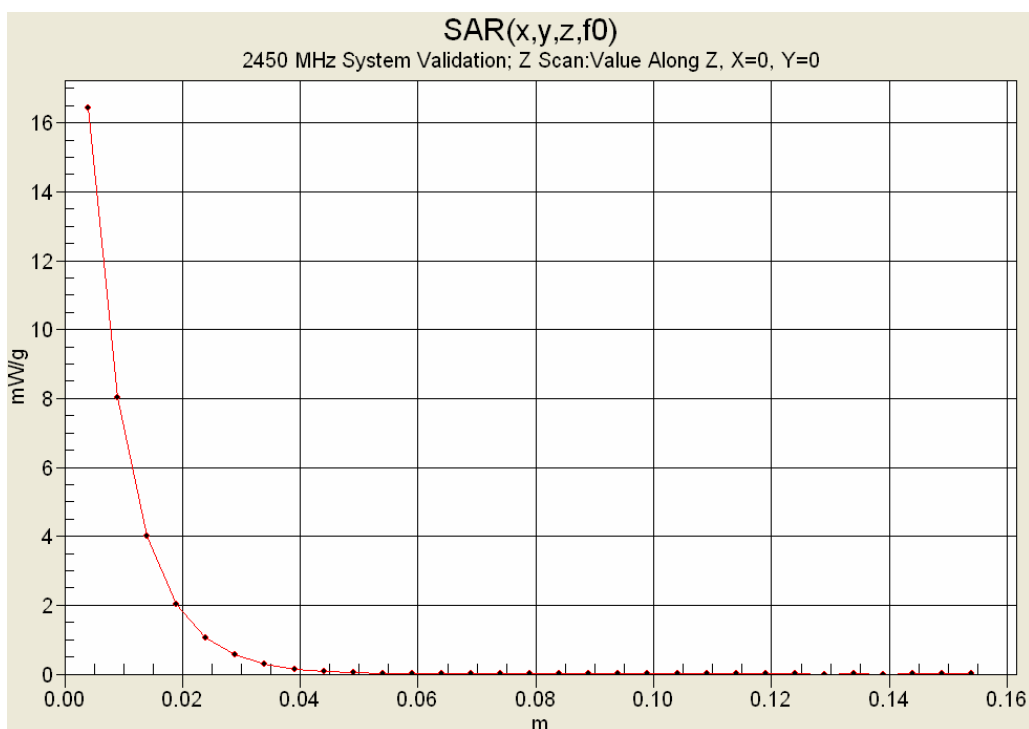
Reference Value = 91.9 V/m; Power Drift = -0.128 dB

Peak SAR (extrapolated) = 28.6 W/kg

SAR(1 g) = 13.4 mW/g; SAR(10 g) = 6.03 mW/g

Maximum value of SAR (measured) = 15.5 mW/g





10. Measured Fluid Dielectric Parameters

System Validation - 2450 MHz (Body)

Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

Fri 08/Jun/2007

Frequency (GHz)

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

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

FCC_eB FCC Limits for Body Epsilon

FCC_sB FCC Limits for Body Sigma

Test_e Epsilon of UIM

Test_s Sigma of UIM

Freq	FCC_eB	FCC_sB	Test_e	Test_s
2.3500	52.83	1.85	50.39	1.89
2.3600	52.82	1.86	50.32	1.90
2.3700	52.81	1.87	50.28	1.91
2.3800	52.79	1.88	50.28	1.93
2.3900	52.78	1.89	50.31	1.94
2.4000	52.77	1.90	50.26	1.95
2.4100	52.75	1.91	50.24	1.96
2.4200	52.74	1.92	50.21	1.96
2.4300	52.73	1.93	50.21	1.98
2.4400	52.71	1.94	50.13	1.99
2.4500	52.70	1.95	50.09	1.99
2.4600	52.69	1.96	50.01	2.03
2.4700	52.67	1.98	50.10	2.03
2.4800	52.66	1.99	50.12	2.05
2.4900	52.65	2.01	50.09	2.07
2.5000	52.64	2.02	50.08	2.07
2.5100	52.62	2.04	50.03	2.08
2.5200	52.61	2.05	50.02	2.09
2.5300	52.60	2.06	49.93	2.10
2.5400	52.59	2.08	49.87	2.11
2.5500	52.57	2.09	49.78	2.13

	Date of Evaluation:	June 08, 2007	Document Serial No.:	SV2450M-060807-R1.2
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz
			Fluid Type:	Body

11. Measurement Uncertainties

UNCERTAINTY BUDGET FOR SYSTEM VALIDATION						
Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	Uncertainty Value ±% (1g)	V _i or V _{eff}
Measurement System						
Probe calibration (2450 MHz)	5.9	Normal	1	1.0	5.9	∞
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	0.0	Rectangular	1.732050808	1	0.0	∞
Boundary effects	1.0	Rectangular	1.732050808	1	0.6	∞
Probe linearity	4.7	Rectangular	1.732050808	1	2.7	∞
Detection limit	1.0	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	3.0	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	1.0	Rectangular	1.732050808	1	0.6	∞
Test Sample Related						
Device positioning	2.0	Normal	1.732050808	1	1.2	∞
Power drift	5.0	Rectangular	1.732050808	1	2.9	∞
Phantom and Setup						
Phantom uncertainty	4.0	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5.0	Rectangular	1.732050808	0.7	2.0	∞
Liquid conductivity (measured)	5.0	Rectangular	1.732050808	0.7	2.0	∞
Liquid permittivity (target)	5.0	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	5.0	Rectangular	1.732050808	0.6	1.7	∞
Combined Standard Uncertainty					9.97	
Expanded Uncertainty (k=2)					19.94	
Note(s)	1. Measurement Uncertainty Table in accordance with IEC 62209-1:2005.					

	Date of Evaluation:	June 08, 2007	Document Serial No.:	SV2450M-060807-R1.2
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz
			Fluid Type:	Body

UNCERTAINTY BUDGET FOR SYSTEM VALIDATION						
Error Description	Uncertainty Value $\pm\%$	Probability Distribution	Divisor	ci 1g	Uncertainty Value $\pm\%$ (1g)	V_i or V_{eff}
Measurement System						
Probe calibration (2450 MHz)	5.9	Normal	1	1	5.9	∞
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	∞
Dipole						
Dipole Positioning	2	Normal	1.732050808	1	1.2	∞
Power & Power Drift	4.7	Normal	1.732050808	1	2.7	∞
Phantom and Setup						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	∞
Liquid conductivity (measured)	5	Normal	1	0.64	3.2	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	5	Normal	1	0.6	3.0	∞
Combined Standard Uncertainty					9.81	
Expanded Uncertainty (k=2)					19.61	
Note(s)	1. Measurement Uncertainty Table in accordance with IEEE 1528-2003.					

12. Test Equipment List

TEST EQUIPMENT	ASSET NO.	SERIAL NO.	DATE OF CAL.	CAL. DUE DATE
SPEAG DASY4 Measurement Server	00158	1078	N/A	N/A
SPEAG Robot	00046	599396-01	N/A	N/A
SPEAG DAE4	00019	353	21Jun06	21Jun07
SPEAG EX3DV4 E-Field Probe	00213	3600	24Jan07	24Jan08
2450 MHz Validation Dipole	00025	150	08Jun07	08Jun08
SPEAG SAM Phantom V4.0C	00154	1033	N/A	N/A
ALS-PR-DIEL Dielectric Probe Kit	00160	260-00953	N/A	N/A
Gigatronics 8652A Power Meter	00007	1835272	26Mar07	26Mar08
Gigatronics 80701A Power Sensor	00014	1833699	22Jan07	22Jan08
Gigatronics 80701A Power Sensor	00109	1834366	26Mar07	26Mar08
HP 8753ET Network Analyzer	00134	US39170292	20Apr07	20Apr08
HP 8648D Signal Generator	00005	3847A00611	NCR	NCR
Amplifier Research 5S1G4 Power Amplifier	00106	26235	NCR	NCR

	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

APPENDIX F - PROBE CALIBRATION

Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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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**

Certificate No: **EX3-3600_Jan07**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3600**

Calibration procedure(s) **QA CAL-01.v5 and QA CAL-14.v3**
Calibration procedure for dosimetric E-field probes

Calibration date: **January 24, 2007**

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 $(22 \pm 3)^{\circ}\text{C}$ 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	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-06 (METAS, No. 217-00592)	Aug-07
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-06 (METAS, No. 217-00593)	Aug-07
Reference Probe ES3DV2	SN: 3013	4-Jan-07 (SPEAG, No. ES3-3013_Jan07)	Jan-08
DAE4	SN: 654	21-Jun-06 (SPEAG, No. DAE4-654_Jun06)	Jun-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 Oct-06)	In house check: Oct-07

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

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

Signature

Issued: January 24, 2007

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 E²-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 EX3DV4

SN:3600

Manufactured:	January 10, 2007
Calibrated:	January 24, 2007

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: EX3DV4 SN:3600

Sensitivity in Free Space^A

Diode Compression^B

NormX	0.460 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	90 mV
NormY	0.470 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	88 mV
NormZ	0.380 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	89 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL **1810 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		2.0 mm	3.0 mm
SAR _{be} [%]	Without Correction Algorithm	4.5	3.5
SAR _{be} [%]	With Correction Algorithm	0.2	0.4

TSL **5800 MHz** **Typical SAR gradient: 30 % per mm**

Sensor Center to Phantom Surface Distance		2.0 mm	3.0 mm
SAR _{be} [%]	Without Correction Algorithm	3.5	2.0
SAR _{be} [%]	With Correction Algorithm	0.1	0.3

Sensor Offset

Probe Tip to Sensor Center **1.0 mm**

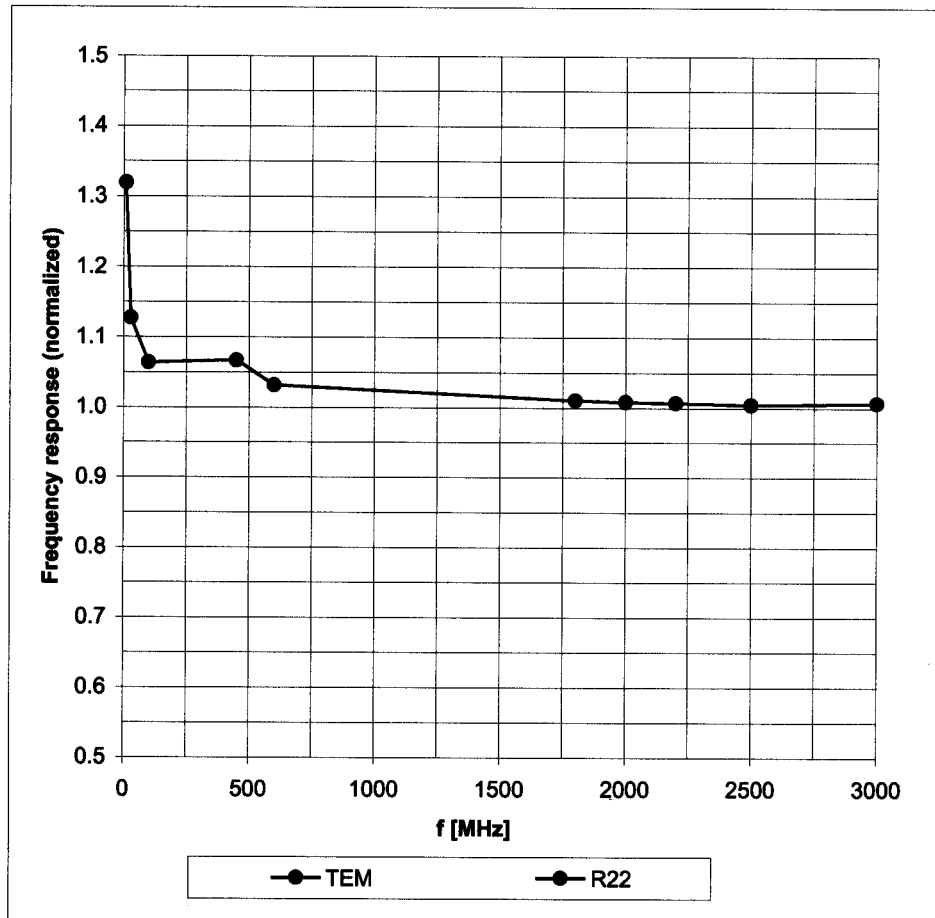
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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

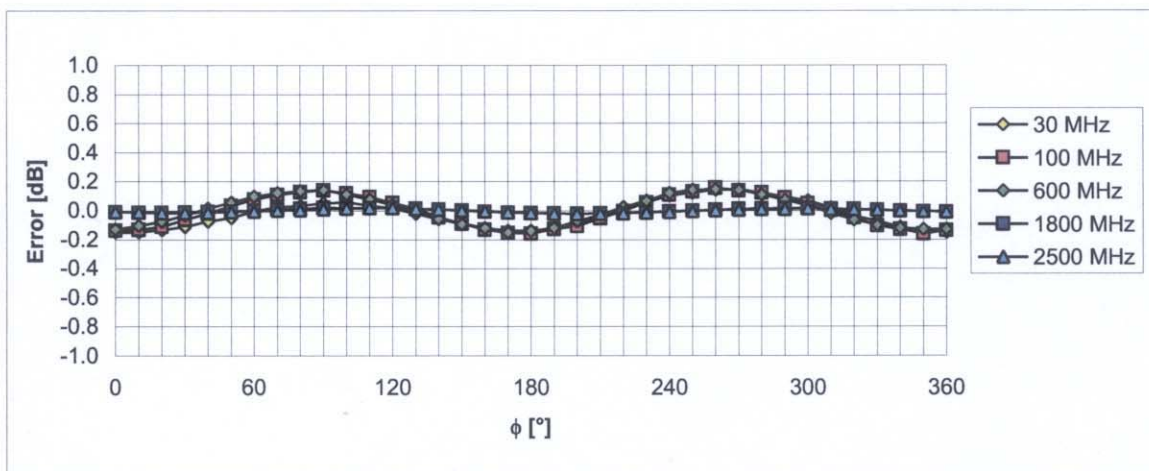
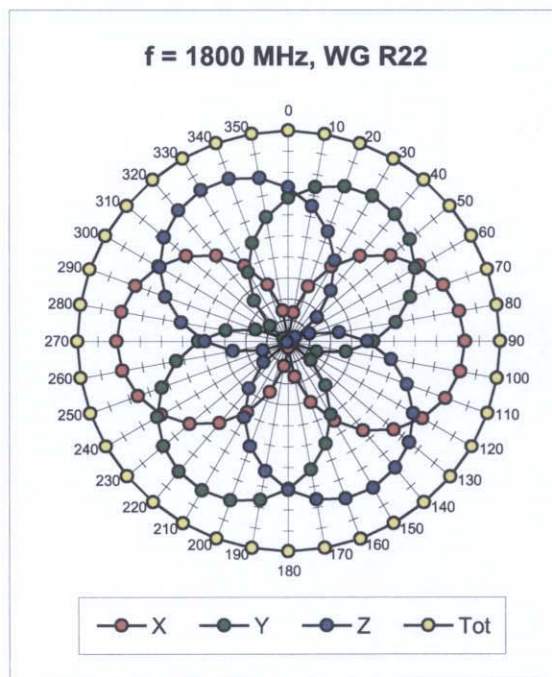
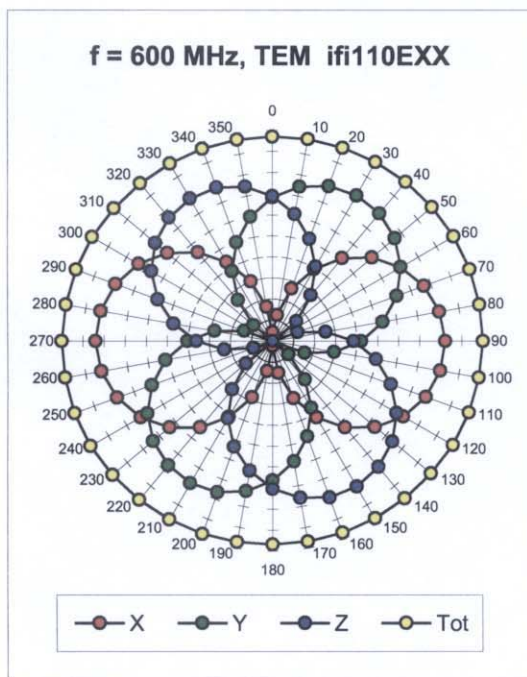
^B Numerical linearization parameter: uncertainty not required.

Frequency Response of E-Field

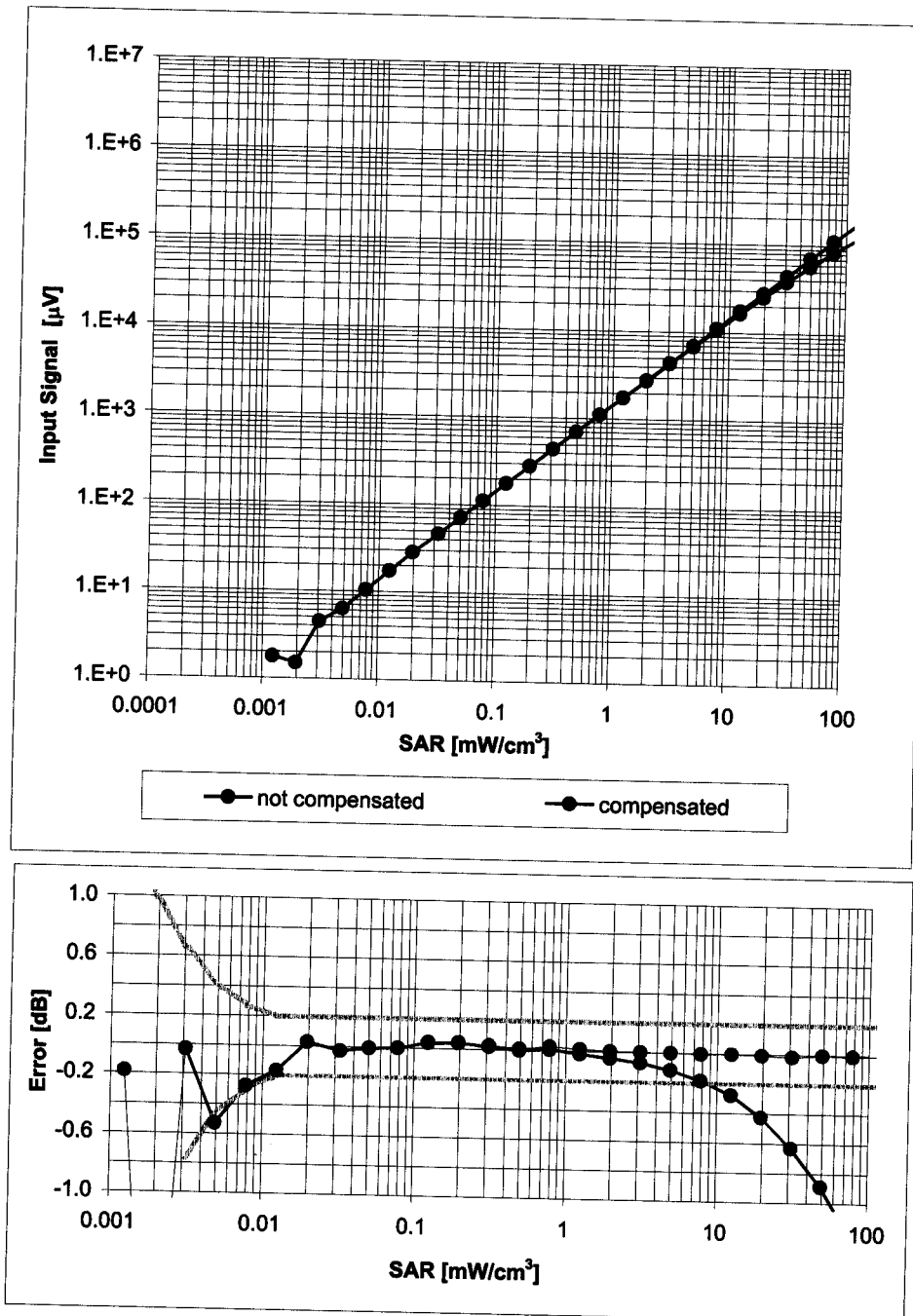
(TEM-Cell: ifi110 EXX, Waveguide: R22)



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

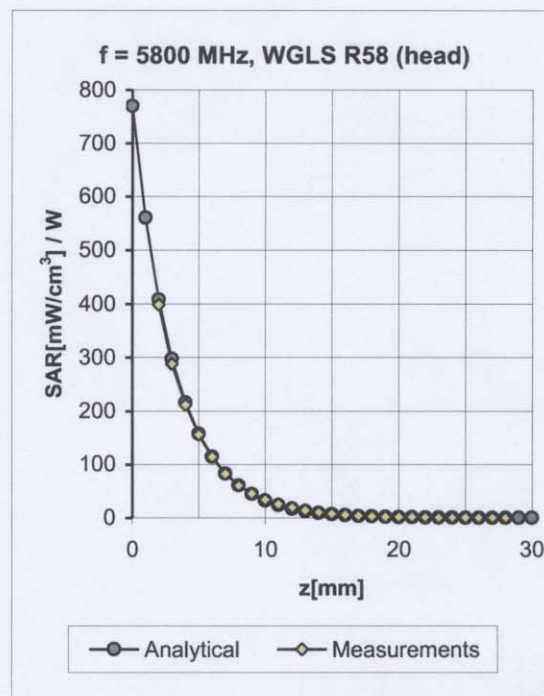
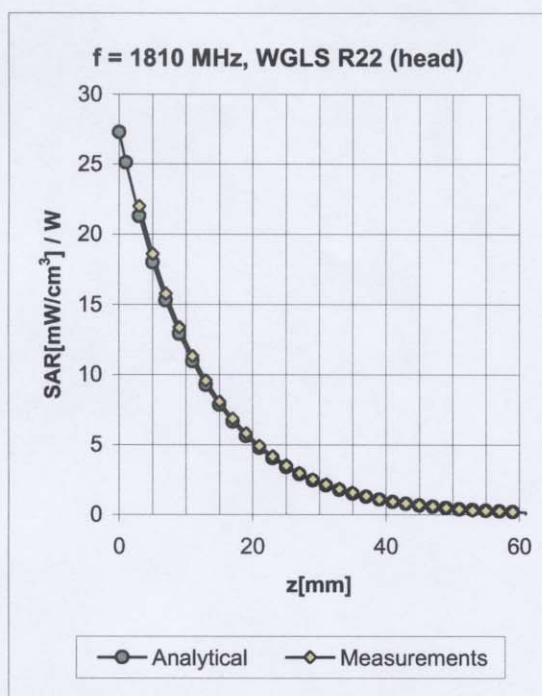
Receiving Pattern (ϕ), $\vartheta = 0^\circ$ Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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

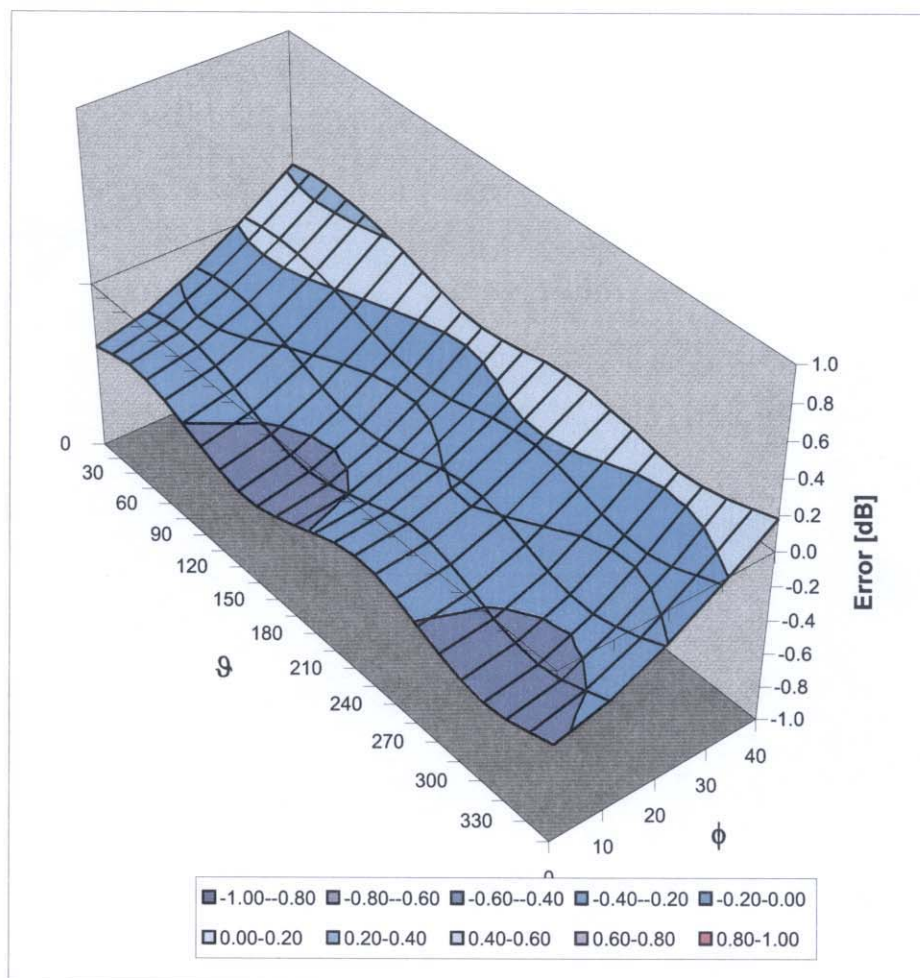


f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.20	1.01	7.02 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.26	1.05	6.59 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.44	1.00	6.37 ± 11.8% (k=2)
5800	± 50 / ± 100	Head	35.3 ± 5%	5.27 ± 5%	0.37	1.65	4.34 ± 13.1% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.24	1.06	6.85 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.16	1.35	6.54 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.42	1.00	6.31 ± 11.8% (k=2)
5200	± 50 / ± 100	Body	49.0 ± 5%	5.30 ± 5%	0.35	1.70	4.10 ± 13.1% (k=2)
5500	± 50 / ± 100	Body	48.6 ± 5%	5.65 ± 5%	0.32	1.70	3.95 ± 13.1% (k=2)
5800	± 50 / ± 100	Body	48.2 ± 5%	6.00 ± 5%	0.33	1.70	4.14 ± 13.1% (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: $\pm 2.6\%$ ($k=2$)

	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> August 01, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

APPENDIX G - PLANAR PHANTOM CERTIFICATE OF CONFORMITY

Company:	Vocollect Inc.	FCC ID:	MQOTT601-20000	IC ID:	2570A-TT601200	2412-2462 MHz	
Model(s):	TT-601_RA WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b WLAN				
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FIBERGLASS FABRICATORS

Certificate of Conformity

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

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

Conformity

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

Signature: _____

A handwritten signature in black ink, appearing to read 'Daniel Chailier', is written over a horizontal line.

Daniel Chailier



Fiberglass Planar Phantom - Top View



Fiberglass Planar Phantom - Front View



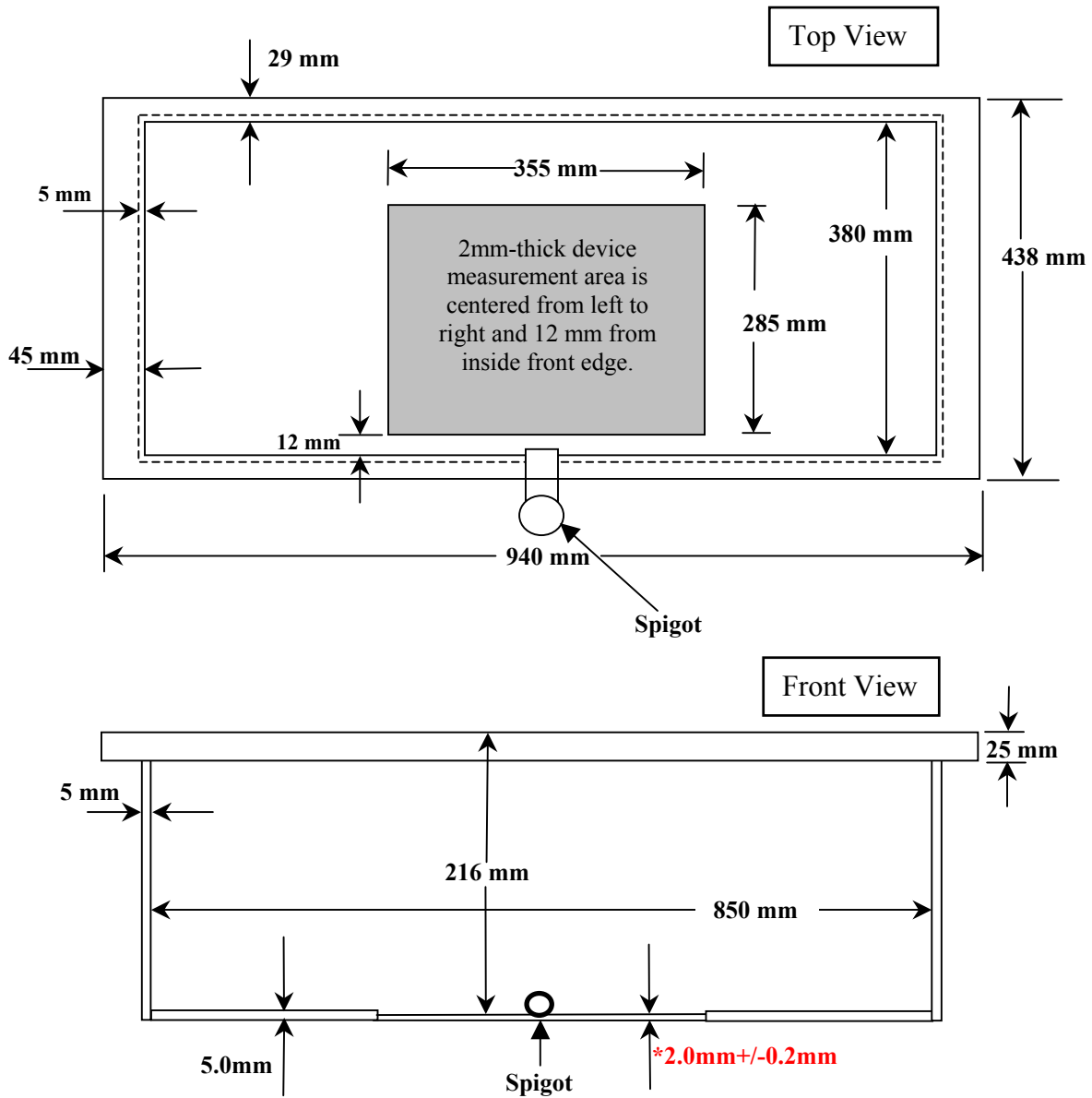
Fiberglass Planar Phantom - Back View



Fiberglass Planar Phantom - Bottom View

Dimensions of Fiberglass Planar Phantom

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



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