

 <b>Celltech</b> <small>Testing and Engineering Services Ltd.</small>	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 <b>MRC</b> ACCREDITED
	<u>Test Report Issue Date</u> October 11, 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/g WLAN

DEVICE IDENTIFIER(S)							
MODEL NAME(S):		T2x	MODEL NO.(S):	TT-601_RG WF			
FCC ID:	MQOTT601-30000		IC ID:	2570A-TT601300			
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-T842a-S15W

### Test Report Revision No.

Revision 1.1 (Model Correction) - 10/11/07

Revision 1.0 (Initial Release) - 09/06/07

## Test Lab and Location

**Celltech Compliance Testing & Engineering Lab  
(Celltech Labs Inc.)  
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Canada**



**Certificate No. 2470.01**

<b>Test Report Prepared By:</b>  <b>Cheri Frangiadakis</b> <b>Celltech Labs Inc.</b>	<b>Test Report Reviewed By:</b>  <b>Jonathan Hughes</b> <b>Celltech Labs Inc.</b>
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<b>Company:</b>	Vocollect Inc.	<b>FCC ID:</b>	MQOTT601-30000	<b>IC ID:</b>	2570A-TT601300	2412-2462 MHz	
<b>Model(s):</b>	TT-601_RG WF	<b>Device Type:</b>	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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 <b>Celltech</b> <small>Testing and Engineering Services Lab</small>	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 <b>ilac-MRA</b>  <b>ACCREDITED</b>
	<u>Test Report Issue Date</u> October 11, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

## DECLARATION OF COMPLIANCE SAR RF EXPOSURE EVALUATION

<u>Test Lab and Location</u>	<u>Company Information</u>
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<b>FCC IDENTIFIER:</b>	<b>MQOTT601-30000</b>
<b>IC IDENTIFIER:</b>	<b>2570A-TT601300</b>
<b>Model Name(s):</b>	<b>T2x</b>
<b>Model No.(s):</b>	<b>TT-601_RG WF</b>
<b>Standard(s) Applied:</b>	<b>FCC 47 CFR §2.1093; Health Canada Safety Code 6</b>
<b>Procedure(s) Applied:</b>	<b>FCC OET Bulletin 65, Supplement C (Edition 01-01)</b>
	<b>FCC OET SAR Measurement Procedures for 802.11a/b/g Transmitters</b>
	<b>Industry Canada RSS-102 Issue 2</b>
<b>FCC Device Classification:</b>	<b>Digital Transmission System (DTS) - §15C</b>
<b>IC Device Classification:</b>	<b>Low Power License-Exempt Radiocommunication Device (RSS-210)</b>
<b>Device Description:</b>	<b>Waist-Worn Wireless Data Terminal</b>
<b>Internal Transmitter(s):</b>	<b>802.11b/g WLAN (Summit SDC-CF10G CF Card)</b>
<b>Mode(s) of Operation:</b>	<b>802.11b: DSSS (Direct Sequence Spread Spectrum)</b>
	<b>802.11g: OFDM (Orthogonal Frequency Division Multiplexing)</b>
<b>Transmit Frequency Range(s):</b>	<b>2412 - 2462 MHz</b>
<b>Max. RF Output Power Tested:</b>	<b>14.3 dBm (26.9 mW) Average Conducted (2412 MHz, 802.11b, 1 Mbps)</b>
<b>Battery Type(s) Tested:</b>	<b>Lithium-ion 7.2V, 1750mAh (Model: 730024) - Standard Battery</b>
	<b>Lithium-ion 7.2V, 3500mAh (Model: 730025) - Extended Battery</b>
<b>Antenna Type(s) Tested:</b>	<b>Internal Dipole</b>
<b>Body-worn Accessories Tested:</b>	<b>Belt-Strap with Belt-Clip (P/N: BL-601-104)</b>
<b>Audio Accessories Connected:</b>	<b>Headset-Microphone (P/N: HD 700-1)</b>
<b>Other Accessories Connected:</b>	<b>Bar Code Scanner (P/N: BC-607-3)</b>
<b>Max. SAR Level(s) Evaluated:</b>	<b>Body: 0.531 W/kg (1g average)</b>

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.**

<b>Company:</b>	Vocollect Inc.	<b>FCC ID:</b>	MQOTT601-30000	<b>IC ID:</b>	2570A-TT601300	2412-2462 MHz	
<b>Model(s):</b>	TT-601_RG WF	<b>Device Type:</b>	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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 <b>Celltech</b> <small>Testing and Engineering Services Ltd.</small>	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 <b>IAC-MRA</b> <small>ACCREDITED</small>
	<u>Test Report Issue Date</u> October 11, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

Certificate No. 2470.01

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Company:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	 <b>Vocollect</b>
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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	<u>Test Report Issue Date</u> October 11, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

## 1.0 INTRODUCTION

This measurement report demonstrates that the VOCOLLECT INC. Model: TT-601\_RG WF Waist-Worn Wireless Data Terminal with internal 802.11b/g 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)

<b>Standard(s) Applied</b>	FCC 47 CFR §2.1093		Health Canada Safety Code 6							
<b>Procedure(s) Applied</b>	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									
<b>FCC Device Classification</b>	Digital Transmission System (DTS)			Part 15(C)						
<b>IC Device Classification</b>	Low Power License-Exempt Radiocommunication Device: Category I Equipment			RSS-210						
<b>Application Type</b>	New Certification									
<b>RF Exposure Category</b>	Uncontrolled Environment / General Population									
<b>Device Description</b>	Waist-Worn Wireless Data Terminal									
<b>Internal Transmitter Type</b>	802.11b/g WLAN Compact Flash Card		Summit Data Communications, Inc. Model: SDC-CF10G							
<b>FCC IDENTIFIER</b>	MQOTT601-30000		<b>IC IDENTIFIER</b>	2570A-TT601300						
<b>Model Name/No.(s)</b>	TT-601_RG WF									
<b>Test Sample Serial No.(s)</b>	097255837		Identical Prototype							
<b>Mode(s) of Operation</b>	Direct Sequence Spread Spectrum									
<b>Data Rates</b>	1 / 2 / 5.5 / 11 Mbps									
<b>Transmit Frequency Range</b>	2412 - 2462 MHz									
<b>Max. RF Output Power Level(s) Measured</b>	<b>Transmit Mode</b>	<b>Frequency</b>	<b>Channel</b>	<b>Data Rate</b>	<b>Average Conducted</b>					
		MHz		Mbps	dBm					
	802.11b	2412	1	1	14.3					
	802.11b	2437	6	1	13.9					
	802.11b	2462	11	1	13.6					
	Note: Higher data rates and 802.11g mode power levels were not more than 0.25 dB > the average conducted output power levels measured at the lowest data rate in 802.11b mode and therefore were not required to be evaluated for SAR (per FCC OET "SAR Measurement Procedures for 802.11a/b/g Transmitters" - see reference [6]).									
<b>Antenna Type(s) Tested</b>	Internal Dipole									
<b>Body-worn Accessories Tested</b>	Belt-Strap with Belt-Clip			P/N: BL-601-104						
<b>Audio Accessories Connected</b>	Headset-Microphone			P/N: HD 700-1						
<b>Other Accessories Connected</b>	Bar Code Scanner			P/N: BC-607-3						
<b>Battery Type(s) Tested</b>	Lithium-ion	Standard	7.2V	1750mAh	Model: 730024					
	Lithium-ion	Extended	7.2V	3500mAh	Model: 730025					

<b>Company:</b>	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
<b>Model(s):</b>	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 ACCREDITED
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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

Company:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007		<u>Test Report Serial No.</u> 072007MQO-T842a-S15W		<u>Test Report Revision No.</u> Revision 1.1		 IAC-MRA ACCREDITED
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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		Body-worn	Spacing	Audio				
802.11b	DSSS	2412	1	1	1750	Belt-Clip/Strap	Touch	Headset	Front Side	14.3	0.161 <sup>4</sup>	0.424	
802.11b	DSSS	2412	1	1	1750	Belt-Clip/Strap	Touch	Headset	Back Side	14.3	1.19 <sup>5</sup>	0.0143	
802.11b	DSSS	2412	1	1	1750	Belt-Clip/Strap	Touch	Headset	Top Side	14.3	-1.03 <sup>5</sup>	0.0306	
802.11b	DSSS	2412	1	1	1750	Belt-Clip/Strap	Touch	Headset	Bottom Side	14.3	-1.07 <sup>5</sup>	0.0168	
802.11b	DSSS	2412	1	1	3500	Belt-Clip/Strap	Touch	Headset	Front Side	14.3	-0.193 <sup>4</sup>	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 $\epsilon$		IEEE Target		Measured	Deviation	Ambient Temperature			25.0	°C
		52.8	±5%	51.3	-2.8%	Fluid Temperature			23.8	°C
Conductivity $\sigma$ (mho/m)		IEEE Target		Measured	Deviation	Fluid Depth			≥ 15	cm
		1.91	±5%	1.91	0.0%	$\rho$ (Kg/m <sup>3</sup> )			1000	

Note(s)	1.	The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
	2.	If the SAR levels measured at the maximum output channel were $\geq 3$ 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]).
	3.	Higher data rates and 802.11g mode were not evaluated based on the average conducted output power levels were not more than 0.25 dB $>$ the average conducted output power levels measured at the lowest data_(per FCC OET "SAR Measurement Procedures for 802.11a/b/g Transmitters" - see reference [6]).
	4.	The power drift of the DUT measured by the DASY4 system during the SAR evaluations was <5% from the start power.
	5.	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.
	6.	The DUT battery was fully charged prior to the SAR evaluations.
	7.	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.
	8.	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).
	9.	The SAR evaluations were performed within 24 hours of the system performance check.

Company:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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## 5.0 DETAILS OF SAR EVALUATION

The VOCOLLECT INC. Model: TT-601\_RG WF Waist-Worn Wireless Data Terminal with 802.11b/g 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/g 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.
- 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 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.  
 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 1 mm grid (42875 interpolated points).  
 g. 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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Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

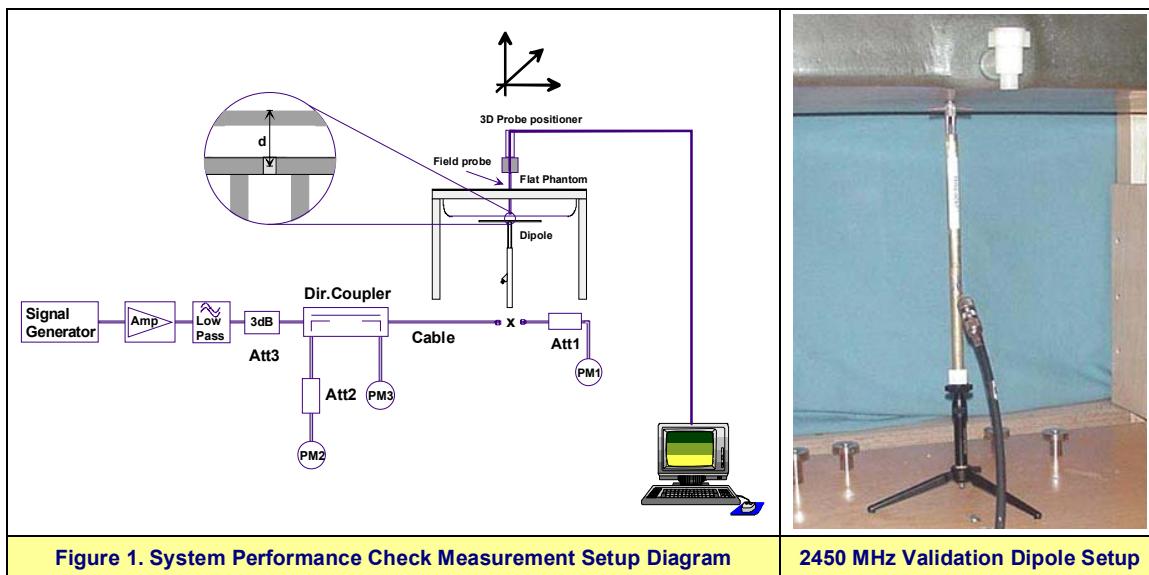
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## 7.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluations a system check was performed using a planar phantom with a 2450 MHz validation dipole (see Appendix B for system performance check test plot). 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 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)
		2450 MHz	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	$\geq 15$	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 +/-2°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.														



Company:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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 <b>Celltech</b> <small>Testing and Engineering Services Ltd</small>	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 Certificate No. 2470.01
	<u>Test Report Issue Date</u> October 11, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

## 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.		

Company:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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## 10.0 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>	
<b>Cell Controller</b>	
<b>Processor</b>	AMD Athlon XP 2400+
<b>Clock Speed</b>	2.0 GHz
<b>Operating System</b>	Windows XP Professional
<b>Data Converter</b>	
<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>	EX3DV4
<b>Serial No.</b>	3600
<b>Construction</b>	Symmetrical design with triangular core
<b>Frequency</b>	10 MHz to 6 GHz
<b>Linearity</b>	$\pm 0.2$ dB (30 MHz to 3 GHz)
<u>Phantom(s)</u>	
<b>Type</b>	Planar Phantom
<b>Shell Material</b>	Fiberglass
<b>Thickness</b>	$2.0 \pm 0.1$ mm
<b>Volume</b>	Approx. 70 liters

Company:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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	<u>Test Report Issue Date</u> October 11, 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: $\pm 0.2$ dB (30 MHz to 3 GHz)	
Directivity:	$\pm 0.3$ dB in HSL (rotation around probe axis) $\pm 0.5$ dB in tissue material (rotation normal to probe axis)	
Dynamic Range:	10 $\mu$ W/g to >100 mW/g; Linearity: $\pm 0.2$ dB (noise: typically < 1 $\mu$ W/g)	
Dimensions:	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm)	
Application:	Typical distance from probe tip to dipole centers: 1.0 mm 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:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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	<u>Test Report Issue Date</u> October 11, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

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
				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	08Jun07
x				Body	08Jun07
	5GHz Validation Dipole	00126	1031	Body	18May07
	-5200 MHz			Body	22May07
	-5500 MHz			Brain	09May07
	-5800 MHz			Body	10May07
	-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 10W1000C Power Amplifier	00041	27887	NCR	NCR
	Nextec NB00383 Microwave Amplifier	00151	0535	NCR	NCR
	HP E4408B Spectrum Analyzer	00015	US39240170	05Feb07	05Feb08

Company:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 IAC-MRA ACCREDITED
	<u>Test Report Issue Date</u> October 11, 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 <sub>i</sub> or V <sub>eff</sub>
<b>Measurement System</b>						
Probe calibration (2450 MHz)	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	∞
<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	5	Rectangular	1.732050808	1	2.9	∞
<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)	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	∞
<b>Combined Standard Uncertainty</b>					11.44	
<b>Expanded Uncertainty (k=2)</b>					22.89	
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 (see reference [5])						

Company:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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Test Report Issue Date	Description of Test(s)	RF Exposure Category		
October 11, 2007	Specific Absorption Rate	General Population		Certificate No. 2470.01

## MEASUREMENT UNCERTAINTIES (Cont.)

UNCERTAINTY BUDGET FOR SYSTEM VALIDATION						
Error Description	Uncertainty Value $\pm\%$	Probability Distribution	Divisor	ci 1g	Uncertainty Value $\pm\%$ (1g)	$V_i$ or $V_{eff}$
<b>Measurement System</b>						
Probe calibration (2450 MHz)	5.9	Normal	1	1	5.9	$\infty$
Axial isotropy of the probe	4.7	Rectangular	1.732050808	1	2.7	$\infty$
Spherical isotropy of the probe	0	Rectangular	1.732050808	1	0.0	$\infty$
Spatial resolution	0	Rectangular	1.732050808	1	0.0	$\infty$
Boundary effects	1	Rectangular	1.732050808	1	0.6	$\infty$
Probe linearity	4.7	Rectangular	1.732050808	1	2.7	$\infty$
Detection limit	1	Rectangular	1.732050808	1	0.6	$\infty$
Readout electronics	0.3	Normal	1	1	0.3	$\infty$
Response time	0	Rectangular	1.732050808	1	0.0	$\infty$
Integration time	0	Rectangular	1.732050808	1	0.0	$\infty$
RF ambient conditions	3	Rectangular	1.732050808	1	1.7	$\infty$
Mech. constraints of robot	0.4	Rectangular	1.732050808	1	0.2	$\infty$
Probe positioning	2.9	Rectangular	1.732050808	1	1.7	$\infty$
Extrapolation & integration	1	Rectangular	1.732050808	1	0.6	$\infty$
<b>Dipole</b>						
Dipole Positioning	2	Normal	1.732050808	1	1.2	$\infty$
Power & Power Drift	4.7	Normal	1.732050808	1	2.7	$\infty$
<b>Phantom and Setup</b>						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	$\infty$
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	$\infty$
Liquid conductivity (measured)	5	Normal	1	0.64	3.2	$\infty$
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	$\infty$
Liquid permittivity (measured)	5	Normal	1	0.6	3.0	$\infty$
<b>Combined Standard Uncertainty</b>					<b>9.81</b>	
<b>Expanded Uncertainty (k=2)</b>					<b>19.61</b>	

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

Company:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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	<u>Test Report Issue Date</u> October 11, 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:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

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	<u>Test Report Issue Date</u> October 11, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

## APPENDIX A - SAR MEASUREMENT DATA

Company:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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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\_RG WF; Type: Wireless Data Terminal with 802.11b/g 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:  $f = 2412$  MHz;  $\sigma = 1.91$  mho/m;  $\epsilon_r = 51.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- 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: Fiberglas 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 - 802.11b

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm

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

### Body-Worn SAR - Front Side of DUT (Batt./Ant. Side) Touching Planar Phantom - Low Channel - 802.11b

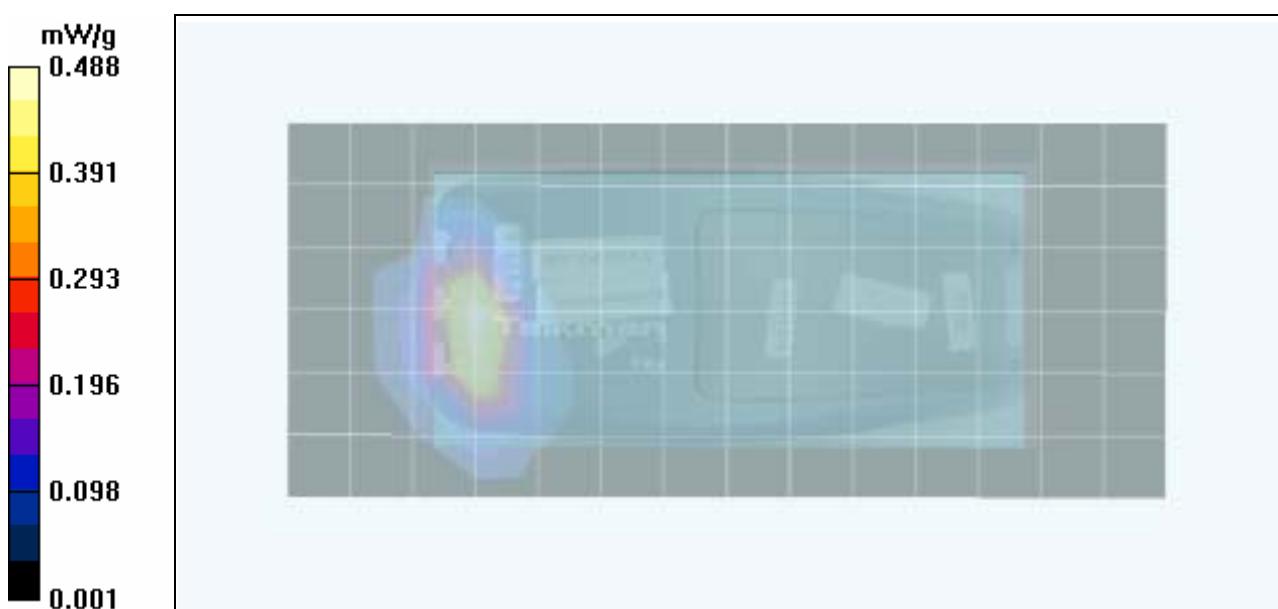
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 IAC-MRA ACCREDITED
	<u>Test Report Issue Date</u> October 11, 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 - Back Side of DUT (Belt-Clip Side) - 2412 MHz

DUT: Vocollect Model: TT-601\_RG WF; Type: Wireless Data Terminal with 802.11b/g 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:  $f = 2412$  MHz;  $\sigma = 1.91$  mho/m;  $\epsilon_r = 51.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- 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: Fiberglas 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 - 802.11b

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm

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

### Body-Worn SAR - Back Side of DUT (Belt-Clip Side) Touching Planar Phantom - Low Channel - 802.11b

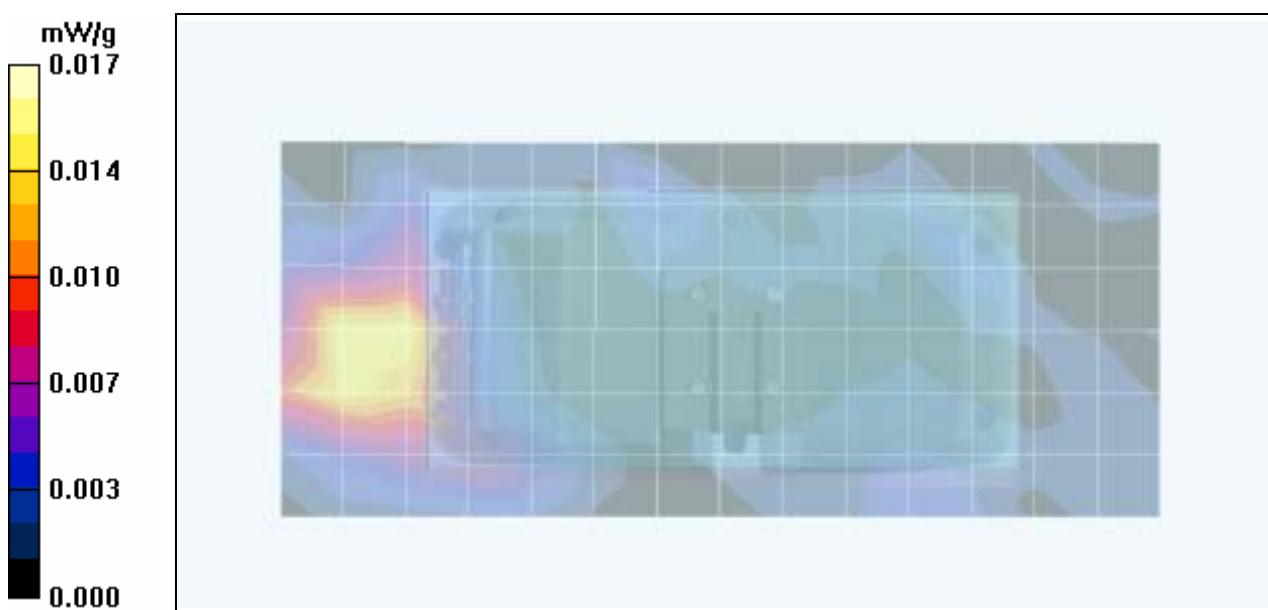
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 IAC-MRA ACCREDITED
	<u>Test Report Issue Date</u> October 11, 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 - Top Side of DUT (Button Side) - 2412 MHz

DUT: Vocollect Model: TT-601\_RG WF; Type: Wireless Data Terminal with 802.11b/g 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:  $f = 2412$  MHz;  $\sigma = 1.91$  mho/m;  $\epsilon_r = 51.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- 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: Fiberglas 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 - 802.11b

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm

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

#### Body-Worn SAR - Top Side of DUT (Button Side) Touching Planar Phantom - Low Channel - 802.11b

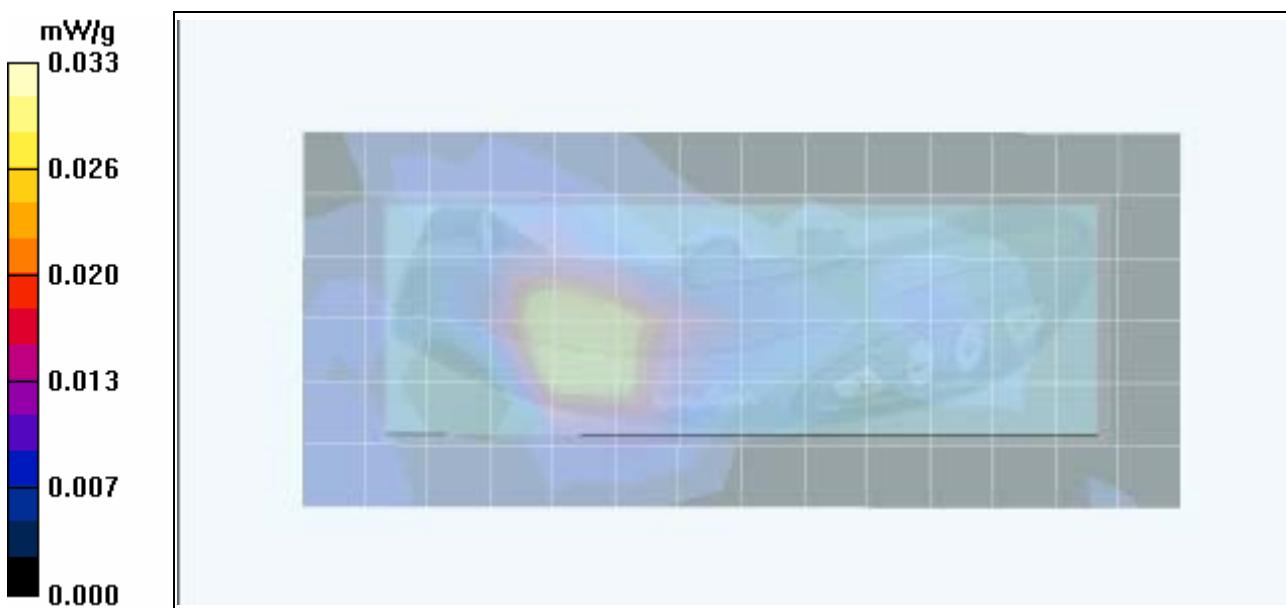
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 IAC-MRA ACCREDITED
	<u>Test Report Issue Date</u> October 11, 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\_RG WF; Type: Wireless Data Terminal with 802.11b/g 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:  $f = 2412$  MHz;  $\sigma = 1.91$  mho/m;  $\epsilon_r = 51.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- 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: Fiberglas 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 - 802.11b

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm

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

### Body-Worn SAR - Bottom Side of DUT Touching Planar Phantom - Low Channel - 802.11b

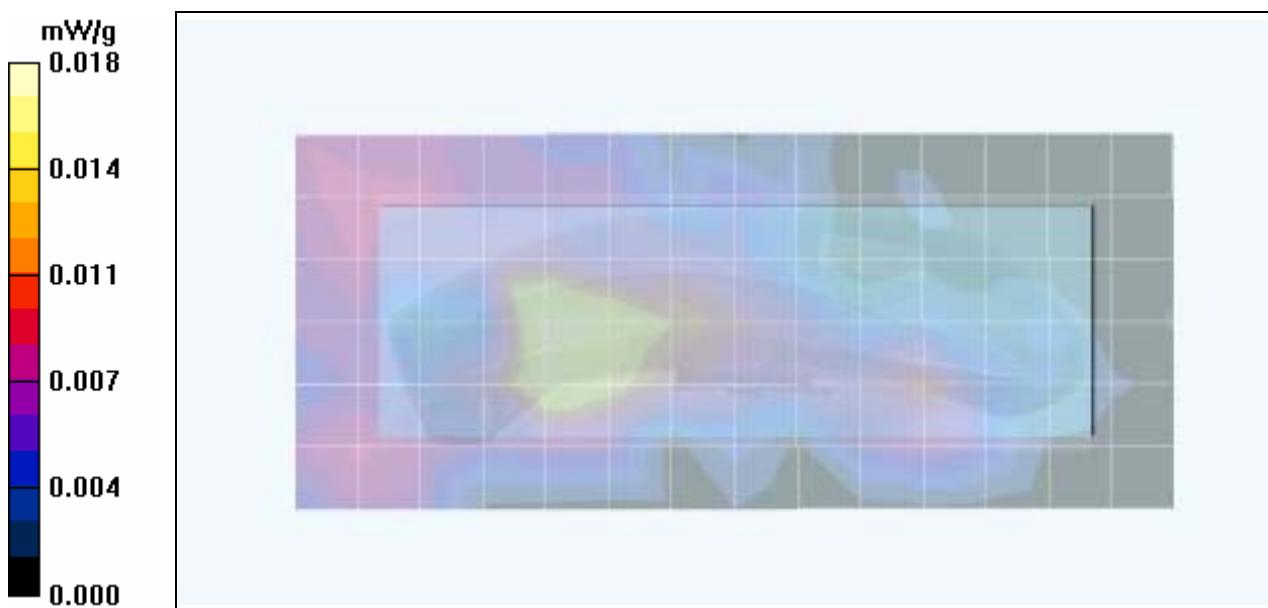
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 IAC-MRA ACCREDITED
	<u>Test Report Issue Date</u> October 11, 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\_RG WF; Type: Wireless Data Terminal with 802.11b/g 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:  $f = 2412$  MHz;  $\sigma = 1.91$  mho/m;  $\epsilon_r = 51.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- 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: Fiberglas 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 - 802.11b

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm

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

### Body-Worn SAR - Front Side of DUT (Batt./Ant. Side) Touching Planar Phantom - Low Channel - 802.11b

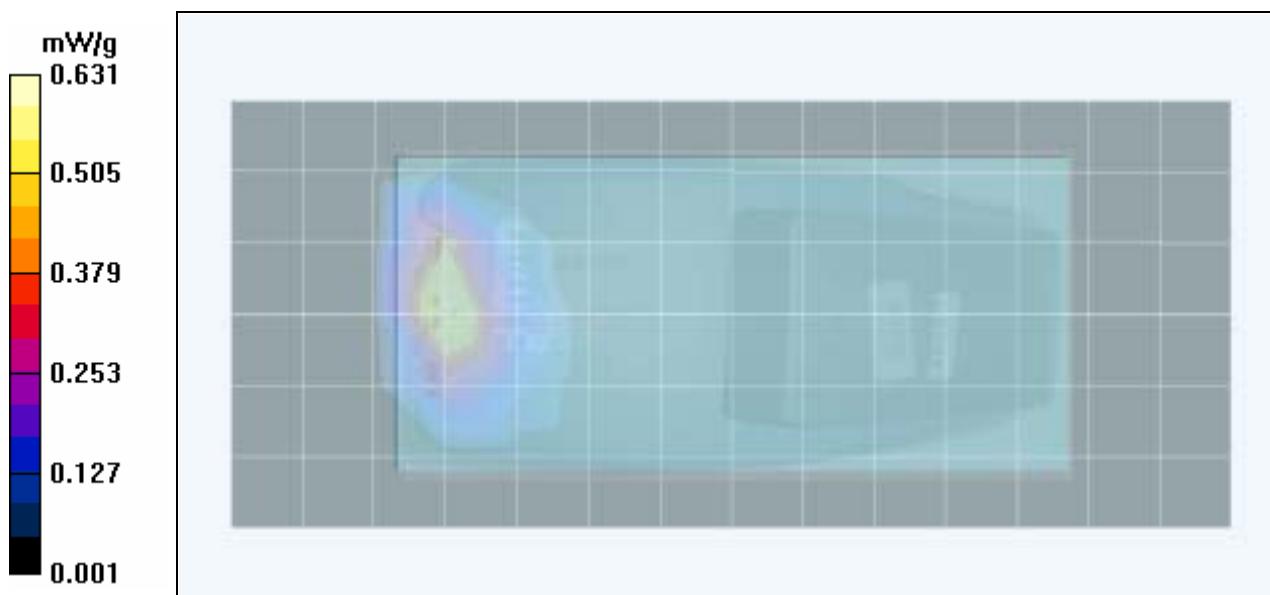
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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**

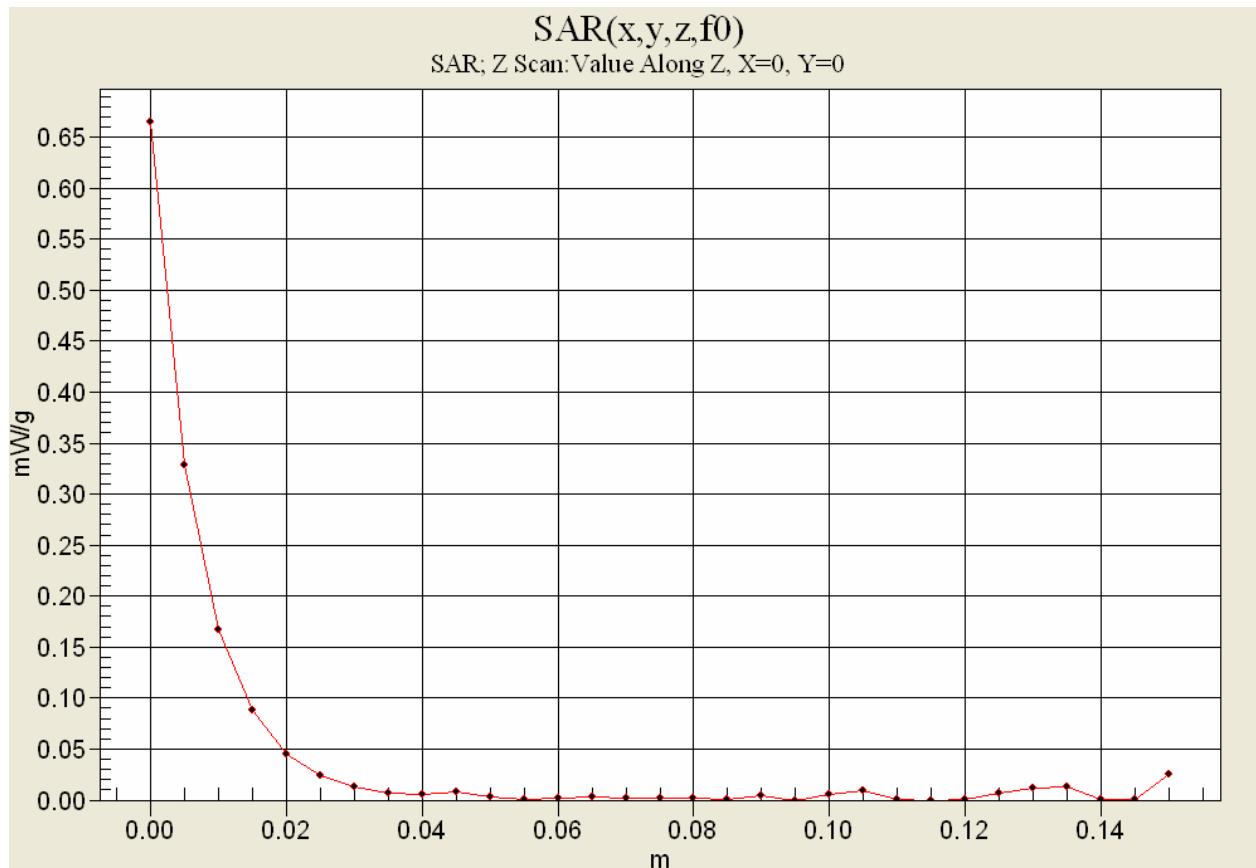
Maximum value of SAR (measured) = 0.631 mW/g



Company:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

 Celltech Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 IAC-MRA ACCREDITED
	<u>Test Report Issue Date</u> October 11, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

## Z-Axis Scan



Company:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

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	<u>Test Report Issue Date</u> October 11, 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:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g 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-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 ACCREDITED
	<u>Test Report Issue Date</u> October 11, 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; Asset: 00025; 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:  $f = 2450$  MHz;  $\sigma = 1.98$  mho/m;  $\epsilon_r = 51.0$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- 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: Fiberglas 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=10mm, dy=10mm

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

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

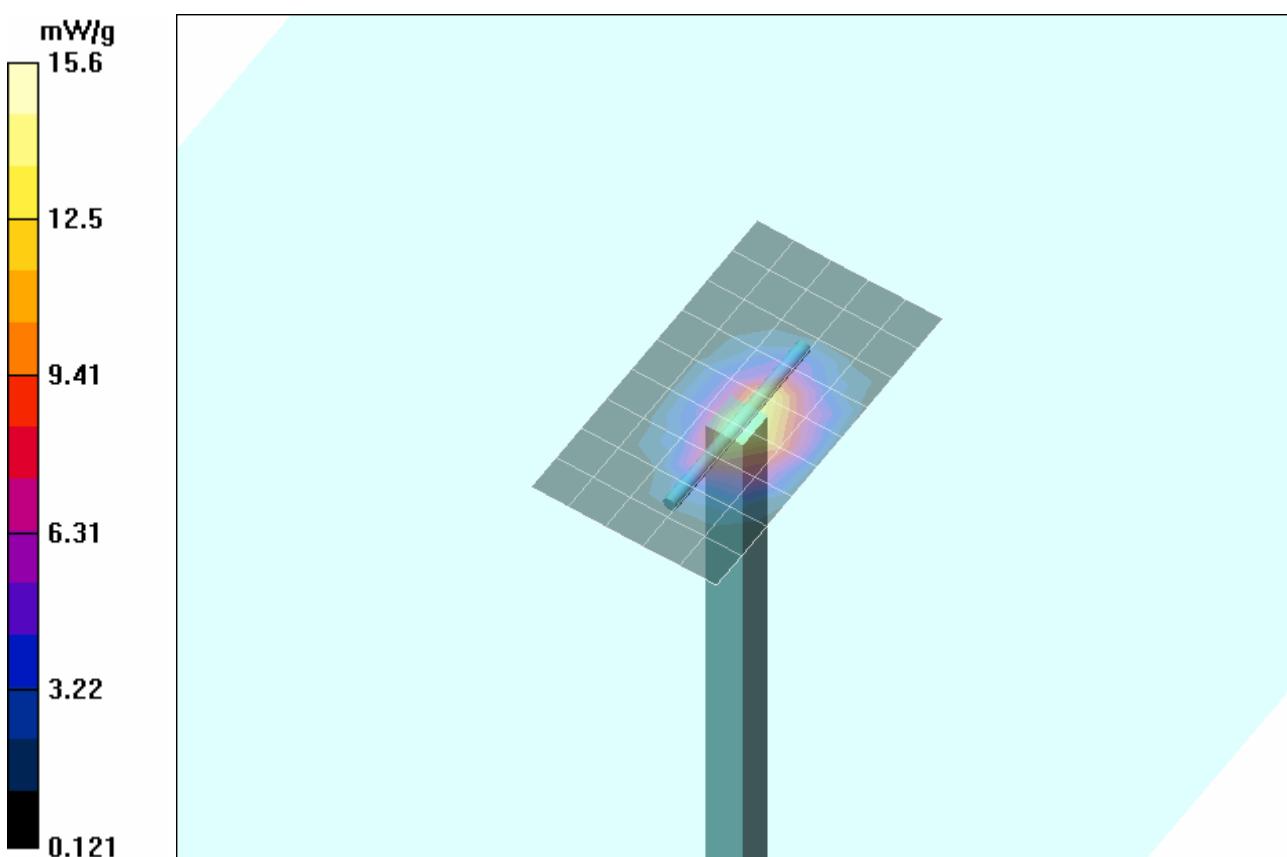
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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**

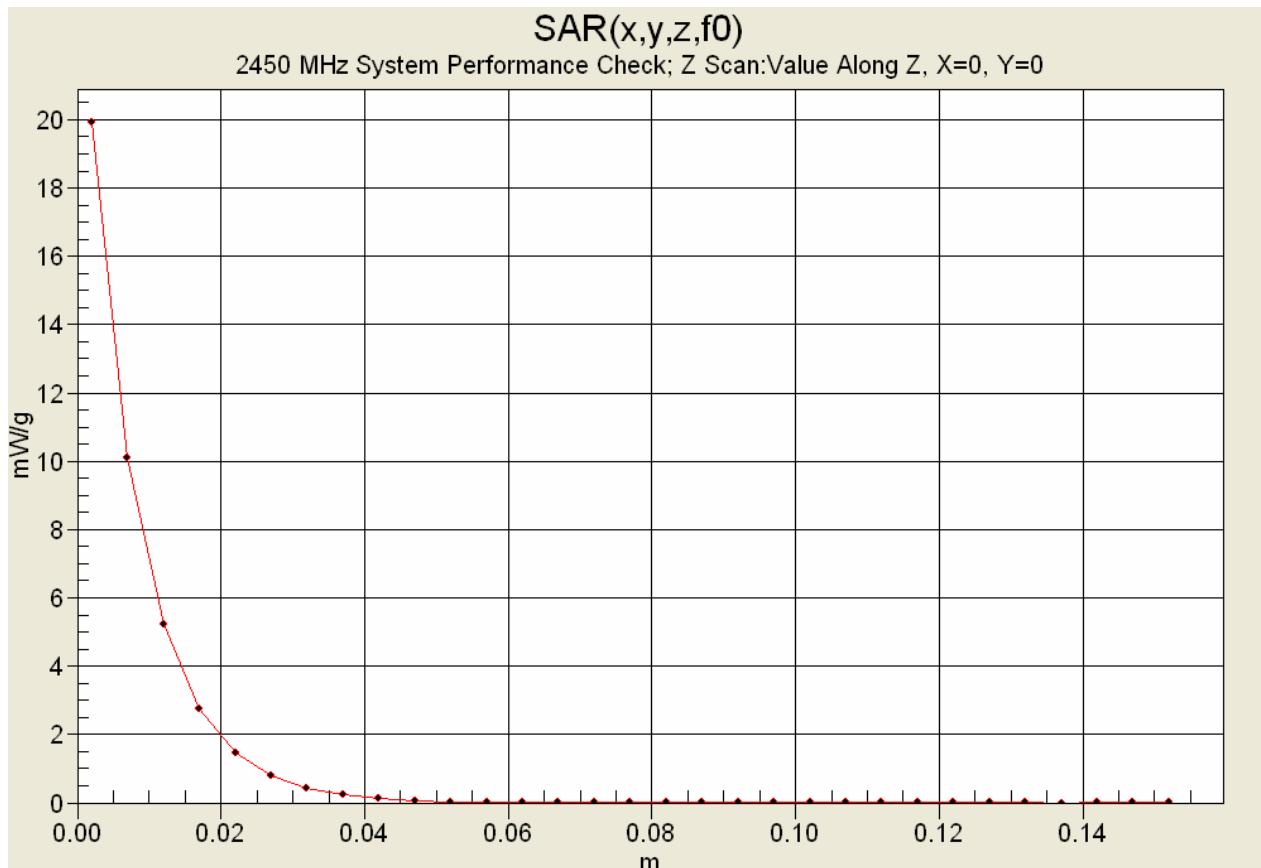
Maximum value of SAR (measured) = 15.6 mW/g



Company:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

 Celltech Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 IAC-MRA ACCREDITED
	<u>Test Report Issue Date</u> October 11, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

## Z-Axis Scan



Company:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

 Celltech Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 IAC-MRA ACCREDITED Certificate No. 2470.01
	<u>Test Report Issue Date</u> October 11, 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:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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 Celltech Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 IAC-MRA ACCREDITED
	<u>Test Report Issue Date</u> October 11, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

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

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Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

Mon 23/Jul/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	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:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

 Celltech Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 IAC-MRA ACCREDITED Certificate No. 2470.01
	<u>Test Report Issue Date</u> October 11, 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:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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 Celltech Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 ILAC-MRA ACCREDITED
	<u>Test Report Issue Date</u> October 11, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

Certificate No. 2470.01

## 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



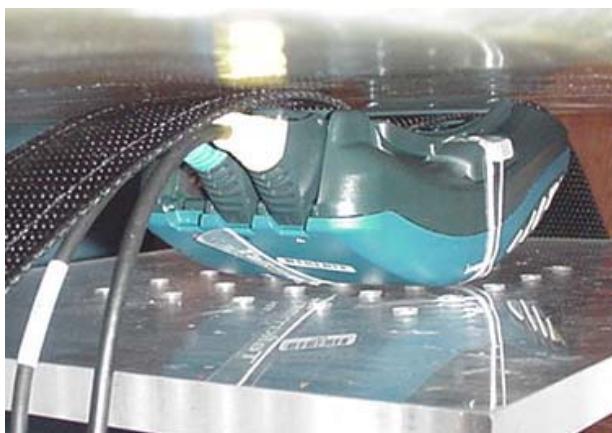
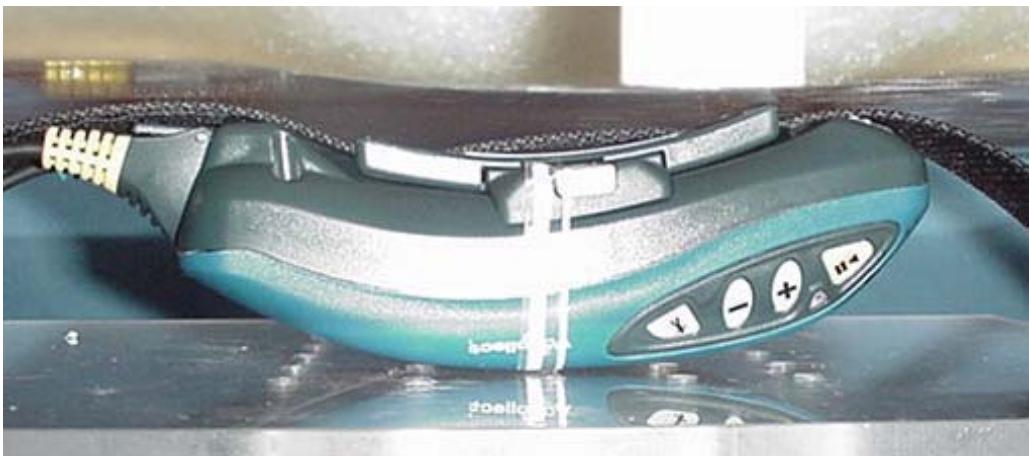
Company:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 ACCREDITED
	<u>Test Report Issue Date</u> October 11, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

Certificate No. 2470.01

## 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



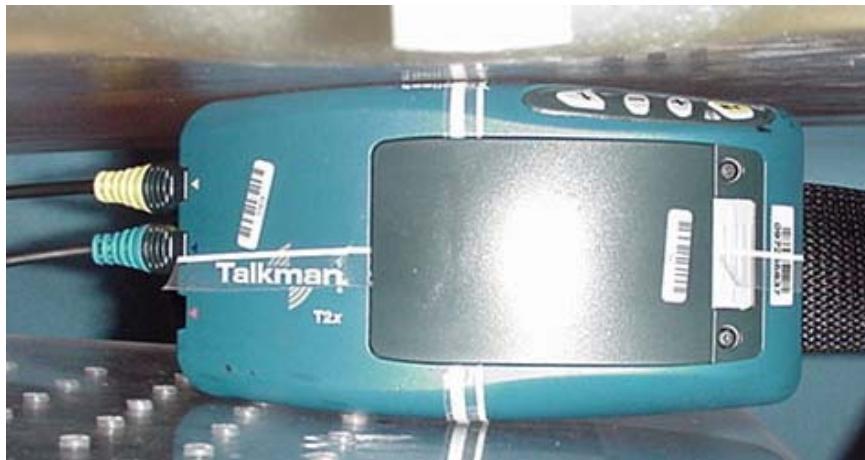
Company:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

 Celltech Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 IAC-MRA ACCREDITED
	<u>Test Report Issue Date</u> October 11, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

Certificate No. 2470.01

## 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:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				



Date(s) of Evaluation

July 23, 2007

Test Report Serial No.

072007MQO-T842a-S15W

Test Report Revision No.

Revision 1.1

Test Report Issue Date

October 11, 2007

Description of Test(s)

Specific Absorption Rate

RF Exposure Category

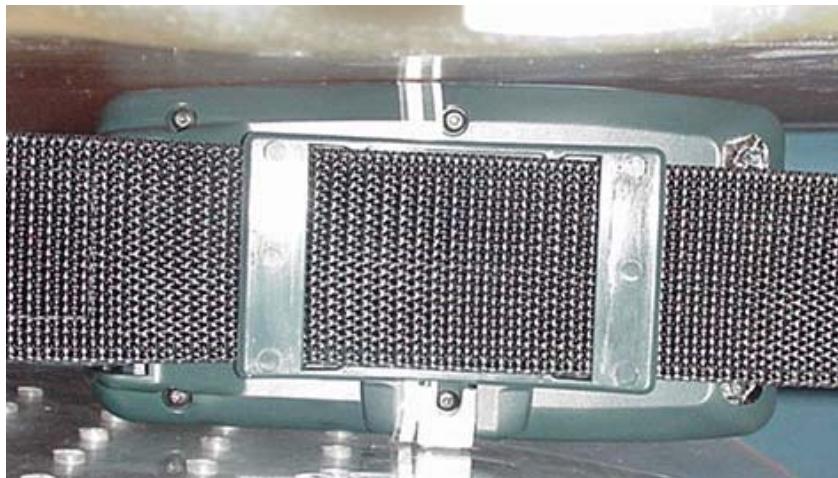
General Population



Certificate No. 2470.01

## 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:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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 <b>Celltech</b> <small>Testing and Engineering Services Ltd</small>	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 <b>IAC-MRA</b> <small>ACCREDITED</small>
	<u>Test Report Issue Date</u> October 11, 2007	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> General Population	

Certificate No. 2470.01

## 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:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

 <b>Celltech</b> <small>Testing and Engineering Services Ltd</small>	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 <b>IAC-MRA</b> <small>ACCREDITED</small>
	<u>Test Report Issue Date</u> October 11, 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:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	 <b>Vocollect</b>
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g 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-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 IAC-MRA ACCREDITED
	<u>Test Report Issue Date</u> October 11, 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:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

 <b>Celltech</b> <small>Testing and Engineering Services Ltd</small>	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 <b>IAC-MRA</b> <small>ACCREDITED</small>
	<u>Test Report Issue Date</u> October 11, 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:	Vocollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				

 Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 IAC-MRA ACCREDITED
	<u>Test Report Issue Date</u> October 11, 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 1750mAh Standard Battery



Bottom Side of DUT with 1750mAh Standard Battery



Battery Latch end of DUT with 1750mAh Standard Battery



Headset Port      Scanner Port      Serial Port

Connector end of DUT with 1750mAh Standard Battery

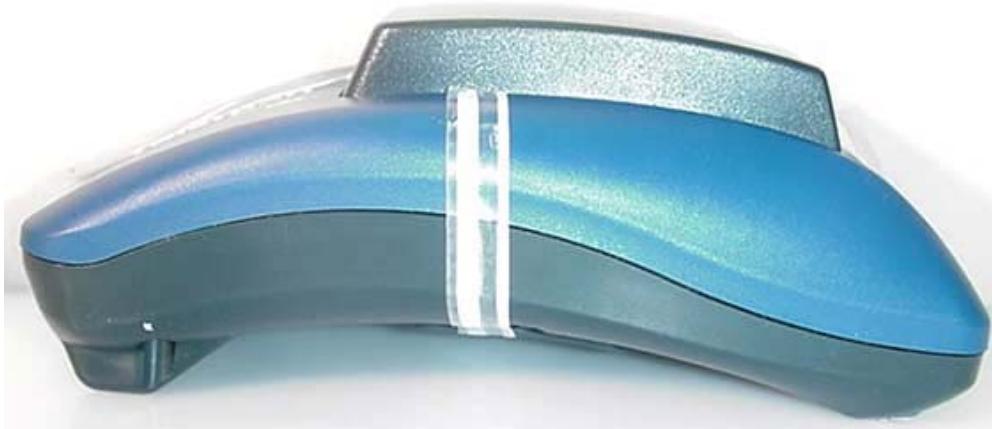
Company:	Volollect Inc.	FCC ID:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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 <b>Celltech</b> <small>Testing and Engineering Services Ltd</small>	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 <b>IAC-MRA</b>  <b>ACCREDITED</b>
	<u>Test Report Issue Date</u> October 11, 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:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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 Celltech Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 IAC-MRA ACCREDITED Certificate No. 2470.01
	<u>Test Report Issue Date</u> October 11, 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:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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 Celltech <small>Testing and Engineering Services Ltd.</small>	Date of Evaluation:	June 08, 2007	Document Serial No.:	SV2450M-060807-R1.3
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz

## 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:

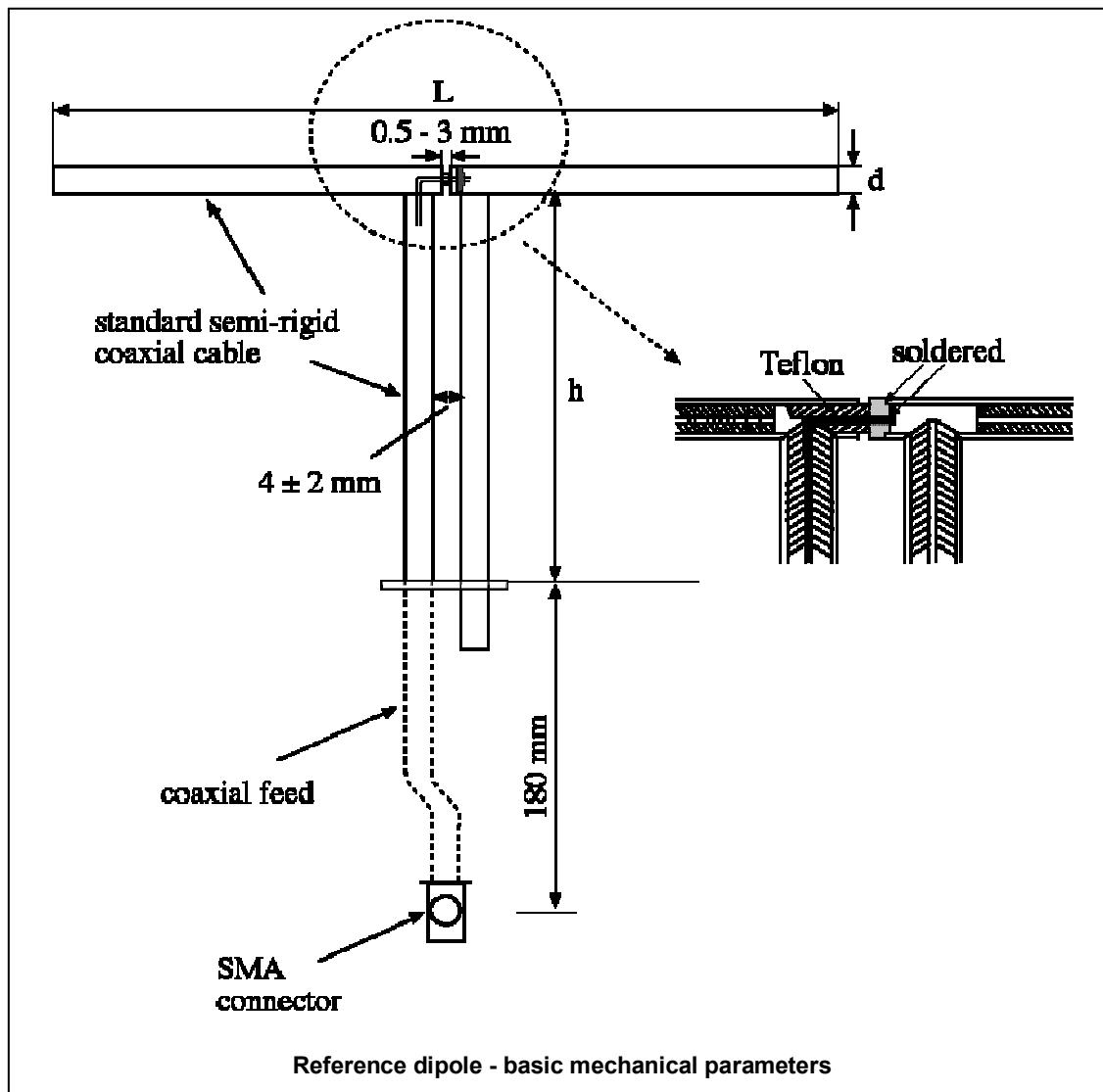
Feed point impedance at 2450 MHz

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

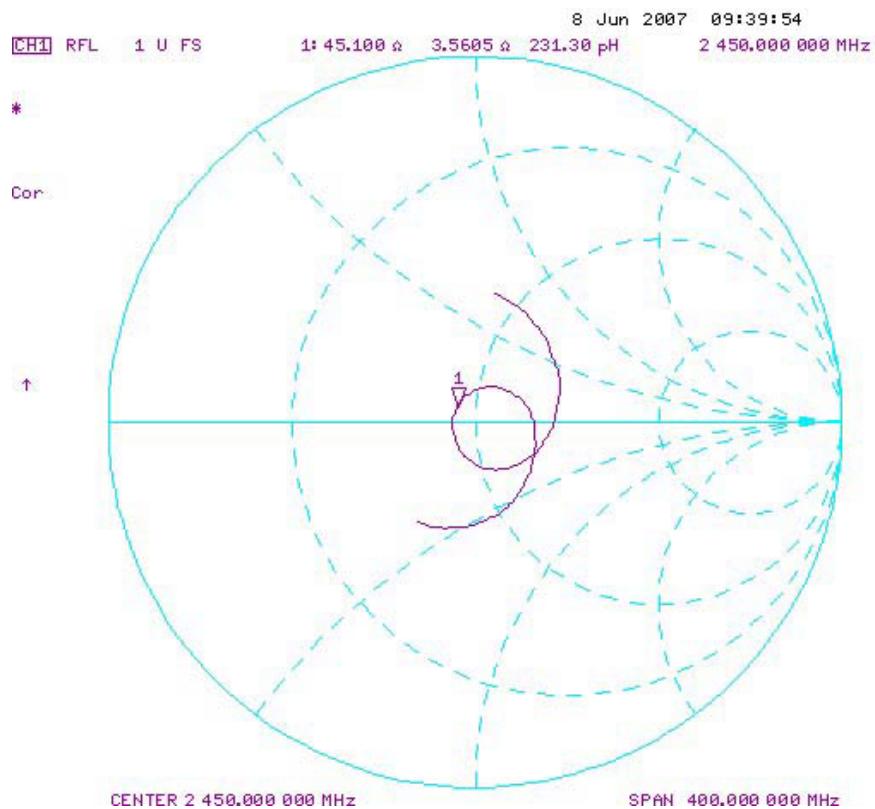
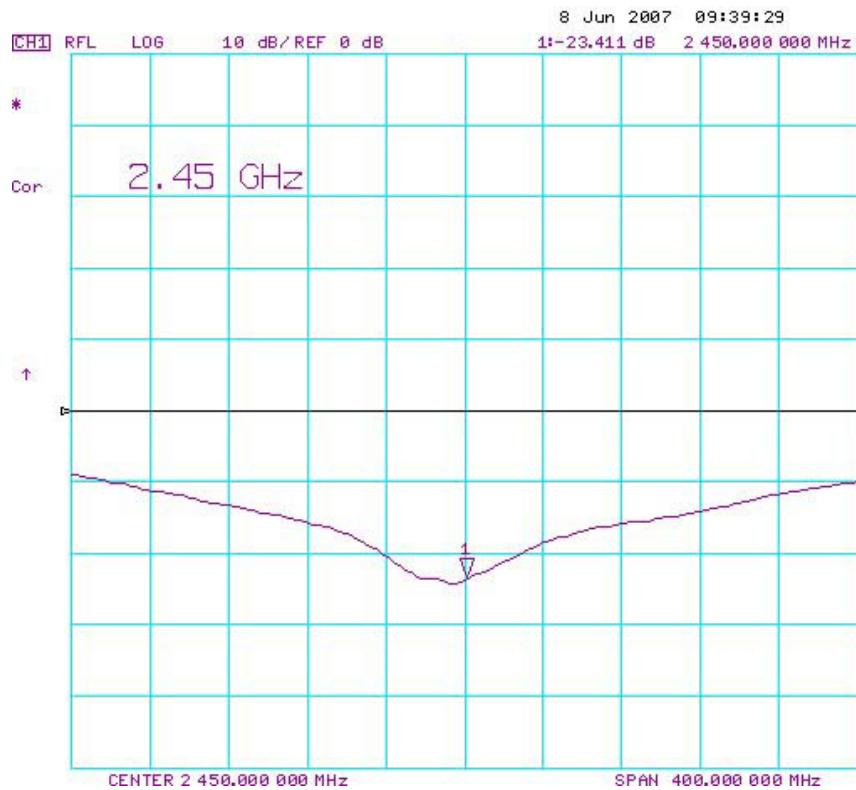
$$\text{Im}\{Z\} = 3.5605\Omega$$

Return Loss at 2450 MHz

$$-23.411\text{dB}$$



## 2. Validation Dipole VSWR Data



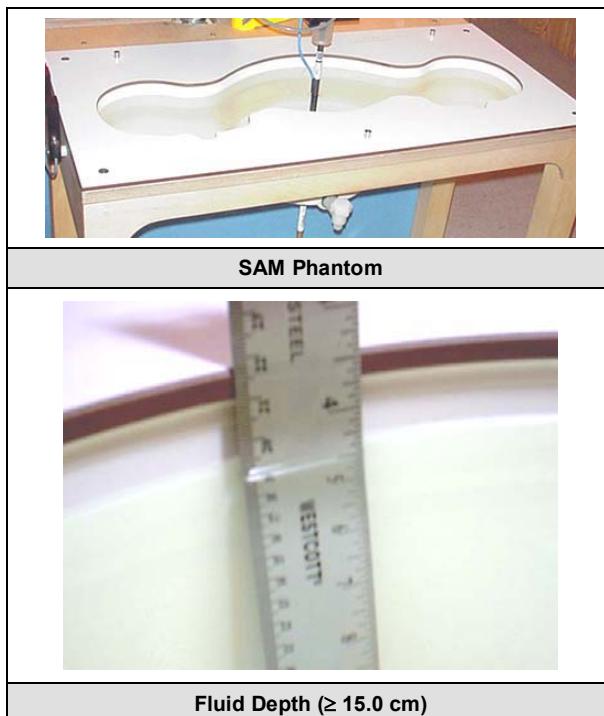
### 3. Validation Dipole Dimensions

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
<b>2450</b>	<b>51.5</b>	<b>30.4</b>	<b>3.6</b>
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:**  $2.0 \pm 0.1$  mm  
**Filling Volume:** Approx. 25 liters  
**Dimensions:** 50 cm (W) x 100 cm (L)



<b>Celltech</b> Testing and Engineering Services LLC	Date of Evaluation:	June 08, 2007	Document Serial No.:	SV2450M-060807-R1.3
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz

## 5. 2450 MHz System Validation Setup



<b>Celltech</b> Testing and Engineering Services LLC	Date of Evaluation:	June 08, 2007	Document Serial No.:	SV2450M-060807-R1.3
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz

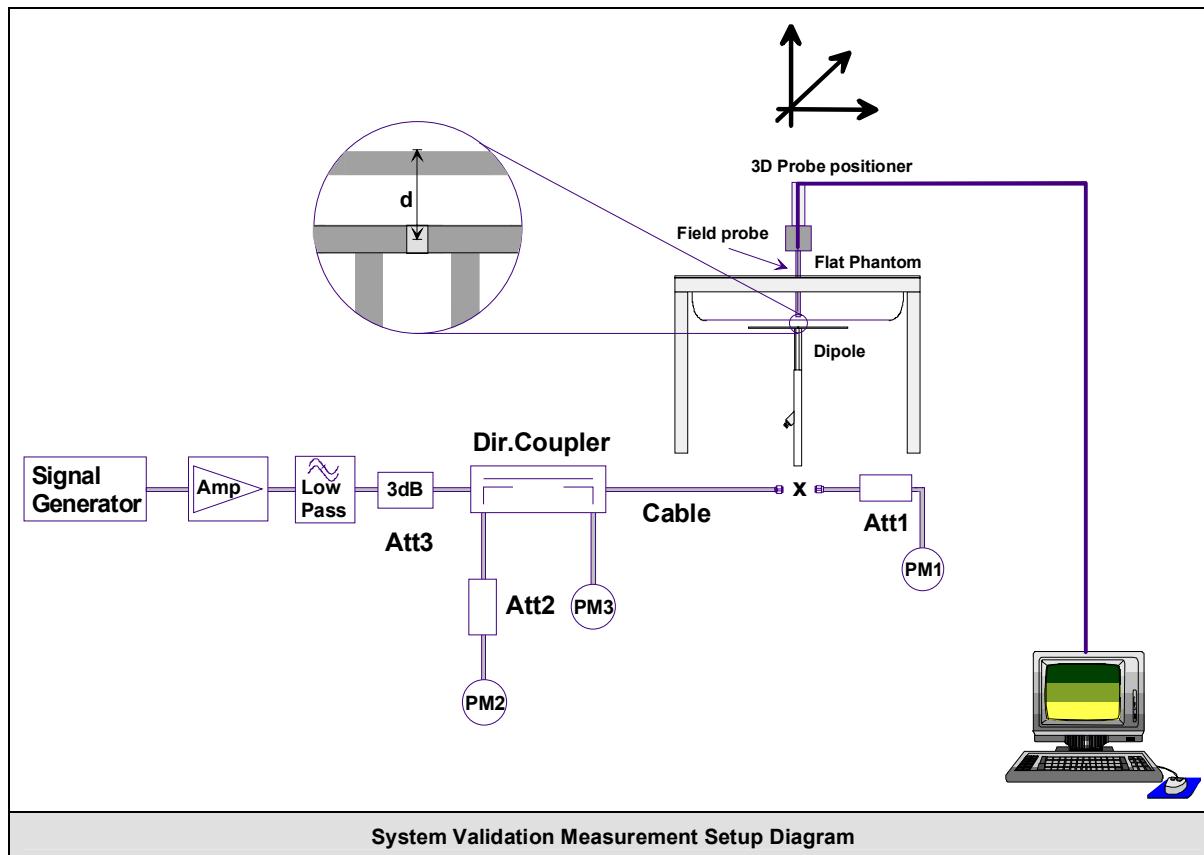
## 6. 2450 MHz Validation Dipole Setup



## 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.



 Testing and Engineering Services LLC	Date of Evaluation:	June 08, 2007		Document Serial No.:	SV2450M-060807-R1.3	
	Evaluation Type:	System Validation		Validation Dipole:	2450 MHz	Fluid Type:

## 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%	
<b>IEEE Target Dielectric Parameters:</b>	$\epsilon_r = 52.7$ (+/-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%																																																																														
<table border="1"> <thead> <tr> <th>Dipole Type</th> <th>Distance [mm]</th> <th>Frequency [MHz]</th> <th>SAR (1g) [W/kg]</th> <th>SAR (10g) [W/kg]</th> <th>SAR (peak) [W/kg]</th> </tr> </thead> <tbody> <tr><td>D300V2</td><td>15</td><td>300</td><td>3.02</td><td>2.06</td><td>4.36</td></tr> <tr><td>D450V2</td><td>15</td><td>450</td><td>5.01</td><td>3.36</td><td>7.22</td></tr> <tr><td>D835V2</td><td>15</td><td>835</td><td>9.71</td><td>6.38</td><td>14.1</td></tr> <tr><td>D900V2</td><td>15</td><td>900</td><td>11.1</td><td>7.17</td><td>16.3</td></tr> <tr><td>D1450V2</td><td>10</td><td>1450</td><td>29.6</td><td>16.6</td><td>49.8</td></tr> <tr><td>D1500V2</td><td>10</td><td>1500</td><td>30.8</td><td>17.1</td><td>52.1</td></tr> <tr><td>D1640V2</td><td>10</td><td>1640</td><td>34.4</td><td>18.7</td><td>59.4</td></tr> <tr><td>D1800V2</td><td>10</td><td>1800</td><td>38.5</td><td>20.3</td><td>67.5</td></tr> <tr><td>D1900V2</td><td>10</td><td>1900</td><td>39.8</td><td>20.8</td><td>69.6</td></tr> <tr><td>D2000V2</td><td>10</td><td>2000</td><td>40.9</td><td>21.2</td><td>71.5</td></tr> <tr><td>D2450V2</td><td>10</td><td>2450</td><td>51.2</td><td>23.7</td><td>97.6</td></tr> <tr><td>D3000V2</td><td>10</td><td>3000</td><td>61.9</td><td>24.8</td><td>136.7</td></tr> </tbody> </table>								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
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																																																																																
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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.																																																																																					

 Testing and Engineering Services Ltd.	Date of Evaluation:	June 08, 2007	Document Serial No.:	SV2450M-060807-R1.3
	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:  $f = 2450$  MHz;  $\sigma = 1.99$  mho/m;  $\epsilon_r = 50.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- Probe: EX3DV4 - SN3600; ConvF(6.31, 6.31, 6.31); Calibrated: 24/01/2007
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 21/06/2006
- Phantom: SAM 4.0; Type: Fiberglas; 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:  $dx=10$ mm,  $dy=10$ mm

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

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

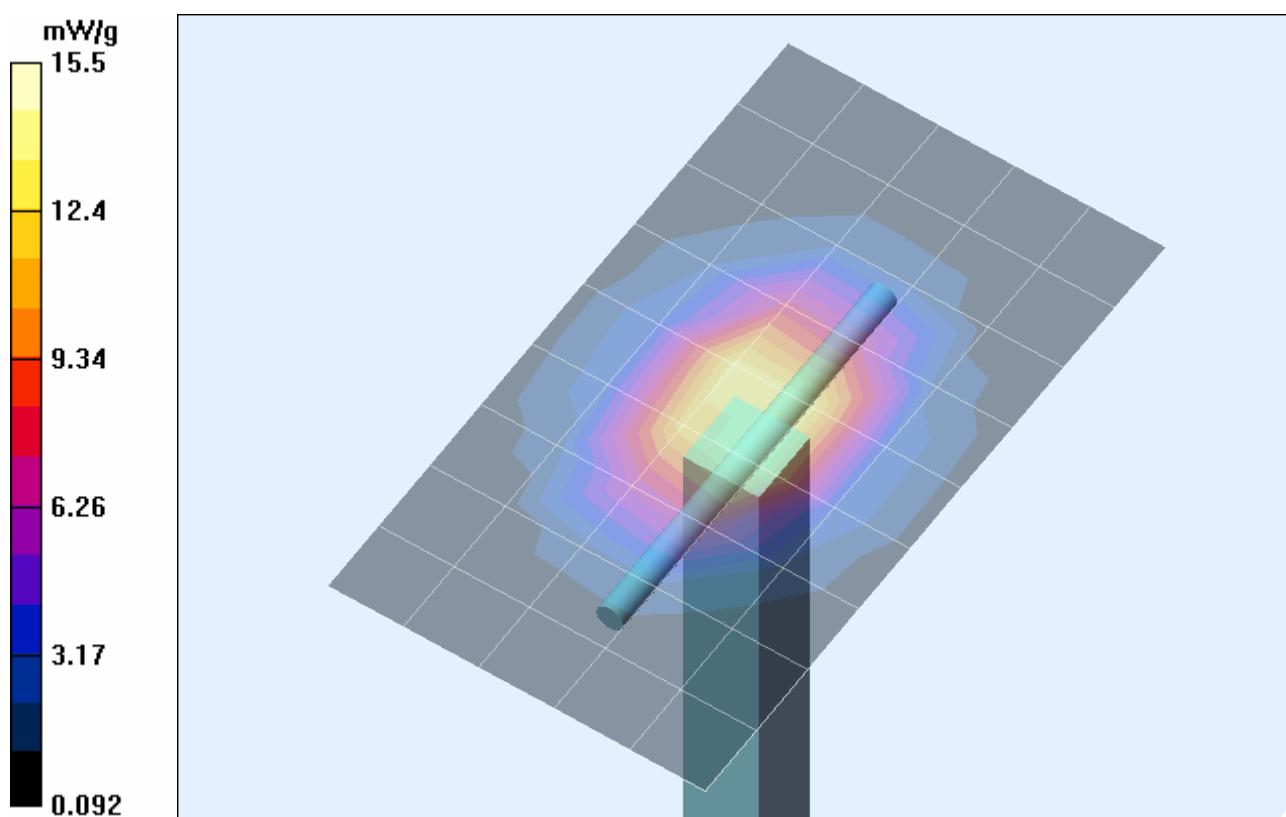
Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

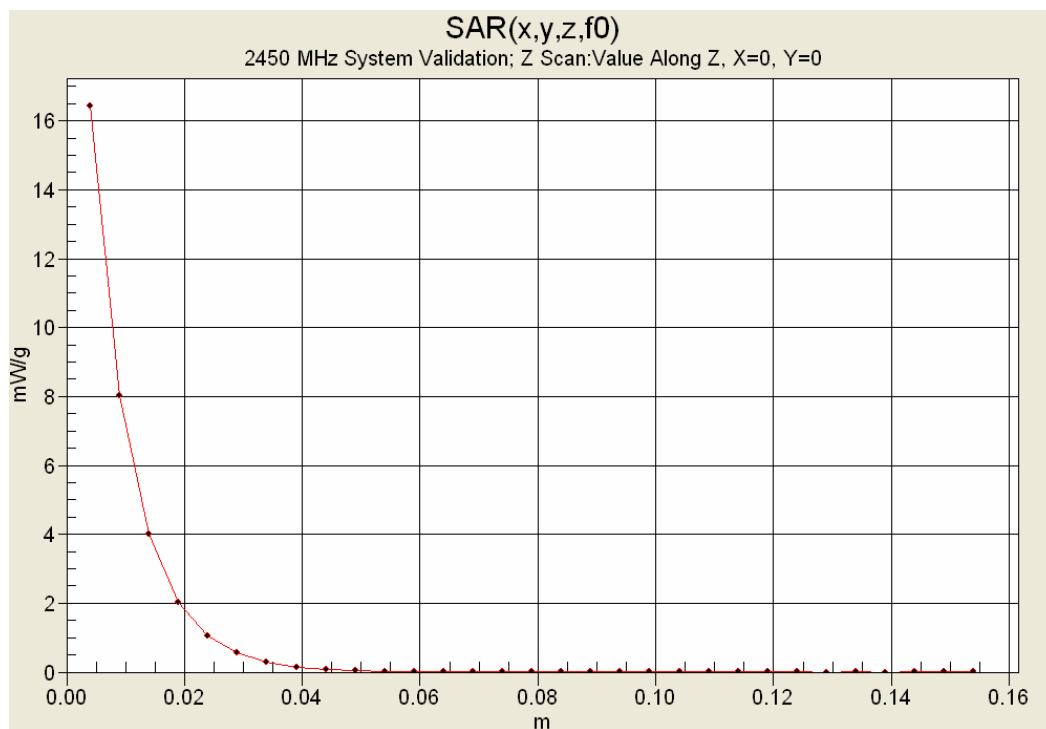
Reference Value = 91.9 V/m; Power Drift = -0.128 dB

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
<b>2.4500</b>	<b>52.70</b>	<b>1.95</b>	<b>50.09</b>	<b>1.99</b>
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-R1.3	
	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 $V_{eff}$
<b>Measurement System</b>						
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	∞
<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)	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	∞
<b>Combined Standard Uncertainty</b>					9.81	
<b>Expanded Uncertainty (k=2)</b>					19.61	
Note(s)	1. Measurement Uncertainty Table in accordance with IEEE 1528-2003 and IEC 62209-1:2005.					

## 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

 Celltech Testing and Engineering Services Ltd.	<u>Date(s) of Evaluation</u> July 23, 2007	<u>Test Report Serial No.</u> 072007MQO-T842a-S15W	<u>Test Report Revision No.</u> Revision 1.1	 IAC-MRA ACCREDITED Certificate No. 2470.01
	<u>Test Report Issue Date</u> October 11, 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:	MQOTT601-30000	IC ID:	2570A-TT601300	2412-2462 MHz	
Model(s):	TT-601_RG WF	Device Type:	Waist-Worn Wireless Data Terminal with 802.11b/g WLAN				
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2378 Westlake Road  
Kelowna, B.C. Canada  
V1Z-2V2



Ph. # 250-769-6848  
Fax # 250-769-6334  
E-mail: [barskiind@shaw.ca](mailto:barskiind@shaw.ca)  
Web: [www.bcfiberglass.com](http://www.bcfiberglass.com)

## FIBERGLASS FABRICATORS

### Certificate of Conformity

Item : Flat Planar Phantom Unit # 03-01

Date: June 16, 2003

Manufacturer: Barski Industries (1985 Ltd)

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

### Conformity

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

Signature: 

Daniel Chailler



**Fiberglass Planar Phantom - Top View**



**Fiberglass Planar Phantom - Front View**



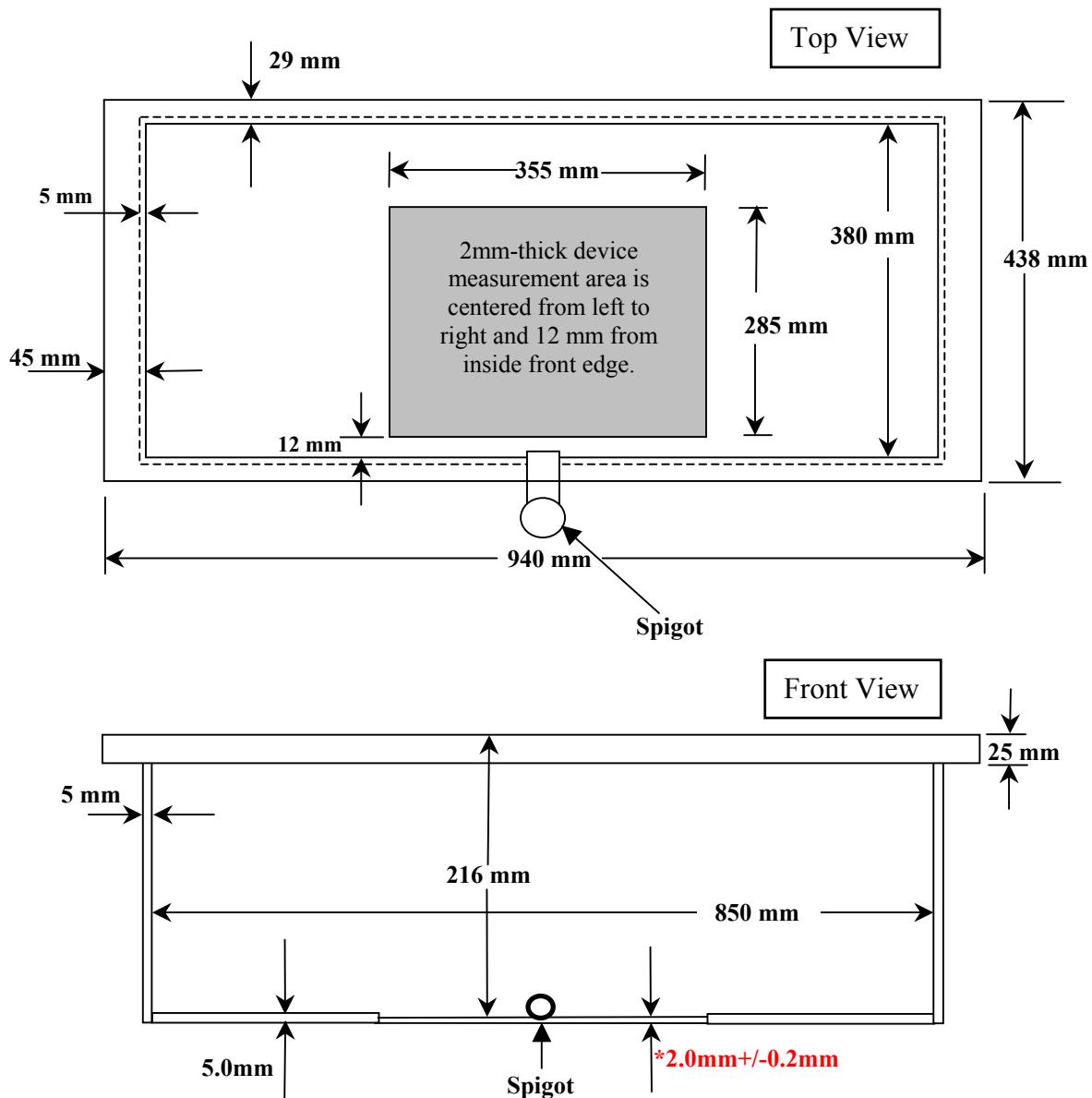
**Fiberglass Planar Phantom - Back View**



**Fiberglass Planar Phantom - Bottom View**

## Dimensions of Fiberglass Planar Phantom

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



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