

	Date(s) of Evaluation October 04, 2010	Test Report Serial No. 092410MQO-T1053-S15W	Test Report Revision No. Rev. 1.1 (2nd Release)	
	Test Report Issue Date October 21, 2010	Description of Test(s) Specific Absorption Rate	RF Exposure Category Gen. Pop. / Uncontrolled	

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

Test Lab Information	Name	CELLTECH LABS INC.		Address	21-364 Lougheed Road, Kelowna B.C. V1X 7R8 Canada								
Applicant Information	Name	VOCOLLECT INC.		Address	703 Rodi Road, Pittsburgh PA 15235 United States								
Standard(s) Applied	FCC	47 CFR §2.1093			IC	Health Canada Safety Code 6							
Procedure(s) Applied	FCC	KDB 447498 D01v04	KDB 248227 D01v01r02		OET Bulletin 65, Supplement C (Edition 01-01)								
	IC	RSS-102 Issue 4		IEEE	1528-2003		IEC	62209-1:2005					
Device Classification(s)	FCC	DTS - Digital Transmission System (Part 15 Subpart C)											
		NII - Unlicensed National Information Infrastructure Transmitter (Part 15 Subpart E)											
	IC	Low Power License-Exempt Radiocommunication Device (RSS-210)											
Device Identifier(s)	FCC	MQO-TT-800-1-1			IC	2570A-TT80011							
Device Model(s)	Name	A500 Terminal			No.	TT-800-1-1							
Test Sample Serial No.(s)	30100051 (Identical Prototype)		Hardware Rev. No.		Rev B		Firmware Rev. No.	VIPV_14					
Date of SAR Evaluations	October 04, 2010			Date of Sample Receipt		September 24, 2010							
Device Description	Portable Body-worn Voice-Controlled Wireless Data Terminal												
Internal Transmitter(s)	802.11a/b/g WLAN + Bluetooth Combo Module				Transmitter Tested		802.11a/b/g WLAN						
Co-located Bluetooth	Class 2 Bluetooth		3 dBm typical (+1.0/-2.0 dB)		< 60/f _(GHz) mW		Simultaneous transmission with WLAN						
	Ant.-to-Ant. Distance (BT-802.11bg) = 68 mm (approx.)				Ant.-to-Ant. Distance (BT-802.11a) = 53 mm (approx.)								
	SAR evaluation for simultaneous transmission not required per FCC KDB 447498 D01v04 Section 3(b)ii)(1)(a) & (c)												
Modulation Type(s)	802.11a/g	OFDM, 16QAM, 64QAM			802.11b		DSSS, DBPSK, DQPSK, CCK						
Data Rates	802.11b	1, 2, 5.5, 11 Mbps			802.11a/g		6, 9, 12, 24, 36, 48, 54 Mbps						
Transmit Frequency Range(s)	RLAN	2412 - 2462 / 5180 - 5320 / 5500 - 5700 / 5745 - 5825 MHz				Bluetooth	2402 - 2480 MHz						
Manufacturer's Rated Power	15 dBm (+2.0/-2.0 dBm) - 802.11b		13 dBm (+2.0/-2.0 dBm) - 802.11g			12 dBm (+2.5/-2.5 dBm) - 802.11a							
RF Output Power Levels Tested	Transmit Mode		Freq. (MHz)		Channel		Data Rate (Mbps)		Average Conducted Power				
	802.11a			5240		48		6		12.3 dBm		17.0 mW	
				5320		64		6		13.8 dBm		24.0 mW	
				5500		100		6		17.0 dBm		50.1 mW	
				5745		149		6		13.1 dBm		20.4 mW	
	802.11b		2412		1		1		15.5 dBm		35.5 mW		
Maximum Duty Cycle Measured	34 %		802.11a		Source-Based Time-Averaged			Crest Factor:		1:2.94			
	82 %		802.11b		Source-Based Time-Averaged			Crest Factor:		1:1.22			
Antenna Type(s) Tested	Internal (802.11a / 802.11bg)												
Battery Type(s) Tested	Lithium-ion (3.6 V, 4400 mAh)								Model No.: 730022				
Body-worn Accessory Tested	Belt-Clip & Belt-Strap								P/N: BL-700-4				
Audio Accessory Tested	Headset-Microphone								P/N: 070334878				
Max. SAR Level(s) Evaluated	BODY	802.11a	0.148 W/kg	1g average		FCC/IC SAR Limit			1.6 W/kg		1g average		
		802.11b	0.051 W/kg	1g average									

Celltech Labs Inc. declares under its sole responsibility that this wireless device is 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), Industry Canada RSS-102 Issue 4, IEEE 1528-2003 and IEC International Standard 62209-1:2005. All measurements were performed in accordance with the SAR system manufacturer recommendations.

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

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The results and statements contained in this report pertain only to the device(s) evaluated.

Test Report Approved By		Sean Johnston	Lab Manager	Celltech Labs Inc.
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Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Test Lab Certificate No. 2470.01

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Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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REVISION HISTORY			
REVISION NO.	DESCRIPTION	IMPLEMENTED BY	RELEASE DATE
1.0	Initial Release	Jon Hughes	October 20, 2010
1.1	Added manuf. rated power spec. - WLAN (pg. 1)	Jon Hughes	October 21, 2010
	Added Bluetooth Frequency Range (pg. 1)		
	Removed 802.11g measured duty cycle (pg. 1)		
	Corrected frequency typographical error (pg. 5)		

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

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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1.0 INTRODUCTION

This measurement report demonstrates that the VOCOLLECT INC. Model: A500 Terminal TT-800-1-1 Portable Body-worn Voice-Controlled Wireless Data Terminal with 802.11a/b/g WLAN and Bluetooth 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]), Industry Canada RSS-102 Issue 4 (see reference [4]), IEEE 1528-2003 (see reference [5]) and IEC 62209-1:2005 (see reference [6]) 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 SAR MEASUREMENT SYSTEM

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

3.0 SAR PROBE CALIBRATION & MEASUREMENT FREQUENCIES (150MHz-3GHz)

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

Probe Calibration Freq.	Device Measurement Freq.	Frequency Interval	± 50 MHz ≥ 300 MHz
2450 MHz	2412 MHz	38 MHz	< 50 MHz
The probe calibration and measurement frequency interval is < 50 MHz; therefore the additional steps were not required.			

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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4.0 CONDUCTED OUTPUT POWER MEASUREMENTS

MEASURED RF CONDUCTED OUTPUT POWER LEVELS					
Transmit Mode	Test Freq. (MHz)	Channel	Data Rate	dBm	mW
802.11a	5180	36	6 Mbps	11.0	12.6
	5200	40		11.2	13.2
	5220	44		11.8	15.1
	5240	48		12.3	17.0
	5260	52		12.7	18.6
	5280	56		13.2	20.9
	5300	60		13.6	22.9
	5320	64		13.8	24.0
	5500	100		17.0	50.1
	5520	104		16.7	46.8
	5540	108		16.3	42.7
	5560	112		16.0	39.8
	5580	116		15.6	36.3
	5600	120		15.2	33.1
	5620	124		14.8	30.2
	5640	128		14.5	28.2
	5660	132		14.1	25.7
	5680	136		13.7	23.4
	5700	140		13.4	21.9
	5745	149		13.1	20.4
	5765	153		12.0	15.9
	5785	157		11.0	12.6
	5805	161		10.0	10.0
	5825	165		9.0	7.9
802.11b	2412	1	1 Mbps	15.5	35.5
	2437	6		15.4	34.7
	2462	11		15.2	33.1
802.11g	2412	1	6 Mbps	11.3	13.5
	2437	6		11.2	13.2
	2462	11		10.7	11.8

Notes

1. The RF conducted average output power levels of the DUT were measured by Celltech prior to the SAR evaluations using a Gigatronics 8652A Universal Power Meter at the internal antenna connector in accordance with FCC 47 CFR §2.1046 (see reference [12]) and IC RSS-Gen (see reference [13]).
2. The RF conducted output power levels measured in 802.11g mode were < 0.25 dB > 802.11b mode; therefore SAR evaluations were not required for 802.11g mode (per FCC KDB 248227 D01v01r02 - see reference [8]).
3. The RF conducted output power levels were measured for the higher data rates and were < 0.25 dB > the lowest data rate conducted output power levels listed above; therefore SAR evaluations were not required for the higher data rates (per FCC KDB 248227 D01v01r02 - see reference [8]).
4. The default test channels (FCC KDB 248227 D01v01r02 - see reference [8]) evaluated for SAR are highlighted in yellow.

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5.0 SAR MEASUREMENT SUMMARY

BODY SAR EVALUATION RESULTS												
WLAN Mode/Ant.	Test Mode	Test Freq.	Test Chan.	Data Rate	Duty Cycle & Crest Factor	Battery Type	Accessory Type(s)			Cond. Power Before Test	SAR Drift During Test	Measured SAR 1g
		MHz		Mbps			Body-worn	Spacing	Audio	dBm	dB	W/kg
802.11a	OFDM	5240	48	6	34% d/c c/f = 1:2.94	Li-ion	Belt-Clip & Belt-Strap	Touch	Headset	12.3	-0.130	0.038
802.11a	OFDM	5320	64	6	34% d/c c/f = 1:2.94	Li-ion	Belt-Clip & Belt-Strap	Touch	Headset	13.8	-0.127	0.071
802.11a	OFDM	5500	100	6	34% d/c c/f = 1:2.94	Li-ion	Belt-Clip & Belt-Strap	Touch	Headset	17.0	0.121	0.148
802.11a	OFDM	5745	149	6	34% d/c c/f = 1:2.94	Li-ion	Belt-Clip & Belt-Strap	Touch	Headset	13.1	-0.085	0.012
802.11b	DSSS	2412	1	1	82% d/c c/f = 1:1.22	Li-ion	Belt-Clip & Belt-Strap	Touch	Headset	15.5	0.093	0.051
SAR LIMIT(S)						BODY	SPATIAL PEAK		RF EXPOSURE CATEGORY			
FCC 47 CFR 2.1093			Health Canada Safety Code 6			1.6 W/kg	averaged over 1 gram		General Population / Uncontrolled			
Date	Fluid Type		Ambient Temp.		Fluid Temp.	Fluid Depth	Atmospheric Pressure		Relative Humidity		ρ (Kg/m³)	
Oct 4	2450 MHz		BODY		23.0°C	23.5°C	≥ 15 cm		101.1 kPa		35%	
Oct 4	5 GHz		BODY		23.0°C	23.5°C	≥ 15 cm		101.1 kPa		35%	
Notes												
1.	Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.											
2.	The test frequencies/channels in the above table are the default test frequencies in accordance with the procedures described in FCC KDB 248227 D01v01r02 (see reference [8]).											
3.	The default channels and data rates evaluated for SAR were determined based on the maximum conducted output power levels measured prior to the SAR evaluations in accordance with the requirements specified in FCC KDB 248227 D01v01r02 (see reference [8]).											
4.	If the SAR levels measured at the maximum output channel were ≥ 3 dB below the SAR limit, SAR evaluations for the remaining selected channels were not required (per FCC KDB 248227 D01v01r02 - see reference [8]).											
5.	The SAR drift of the DUT measured by the DASY4 system during the SAR evaluations was <5%.											
6.	The DUT battery was fully charged prior to the SAR evaluations.											
7.	The fluid temperature measured after the SAR evaluations were within +/-2°C of the fluid temperature measured prior to the SAR evaluations.											
8.	The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).											

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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6.0 FLUID DIELECTRIC PARAMETERS

FLUID DIELECTRIC PARAMETERS						
Date: 10/04/2010		Frequency: 2450 MHz			Tissue: BODY	
Freq	Test_e	Test_s	450MHz Target	450MHz Target	Deviation Permittivity	Deviation Conductivity
2.35	50.33	1.91	52.7	1.95	-4.50%	-2.05%
2.36	50.3	1.88	52.7	1.95	-4.55%	-3.59%
2.37	50.33	1.9	52.7	1.95	-4.50%	-2.56%
2.38	50.31	1.92	52.7	1.95	-4.54%	-1.54%
2.39	50.33	1.93	52.7	1.95	-4.50%	-1.03%
2.4	50.29	1.95	52.7	1.95	-4.57%	0.00%
2.41	50.17	1.96	52.7	1.95	-4.80%	0.51%
2.412*	50.20	1.96	52.7	1.95	-4.74%	0.51%
2.42	49.96	1.97	52.7	1.95	-5.20%	1.03%
2.43	49.95	1.97	52.7	1.95	-5.22%	1.03%
2.44	50.09	1.98	52.7	1.95	-4.95%	1.54%
2.45	50.21	1.98	52.7	1.95	-4.72%	1.54%
2.46	50.13	2	52.7	1.95	-4.88%	2.56%
2.47	50.24	2.02	52.7	1.95	-4.67%	3.59%
2.48	50.01	2.02	52.7	1.95	-5.10%	3.59%
2.49	49.82	2.03	52.7	1.95	-5.46%	4.10%
2.5	49.74	2.04	52.7	1.95	-5.62%	4.62%
2.51	49.65	2.06	52.7	1.95	-5.79%	5.64%
2.52	49.62	2.09	52.7	1.95	-5.84%	7.18%
2.53	49.66	2.1	52.7	1.95	-5.77%	7.69%
2.54	49.42	2.11	52.7	1.95	-6.22%	8.21%
2.55	49.71	2.12	52.7	1.95	-5.67%	8.72%

*Note: Interpolated values generated from DASY4 software

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FLUID DIELECTRIC PARAMETERS (Cont.)

FLUID DIELECTRIC PARAMETERS						
Date: 10/04/2010		Freq.: 5200/5500/5800 MHz			Tissue: BODY	
Freq	Test_e	Test_s	450MHz Target	450MHz Target	Deviation Permittivity	Deviation Conductivity
5.2	50.57	5.14	49	5.3	3.20%	-3.02%
5.22	50.03	5.14	49	5.3	2.10%	-3.02%
5.24	50.1	5.19	49	5.3	2.24%	-2.08%
5.26	50.12	5.29	48.9	5.42	2.49%	-2.40%
5.28	50.09	5.21	48.9	5.42	2.43%	-3.87%
5.3	50.38	5.2	48.9	5.42	3.03%	-4.06%
5.32	49.98	5.21	48.9	5.42	2.21%	-3.87%
5.34	50	5.23	48.9	5.42	2.25%	-3.51%
5.36	49.74	5.27	48.9	5.42	1.72%	-2.77%
5.38	50	5.29	48.9	5.42	2.25%	-2.40%
5.4	49.8	5.28	48.9	5.42	1.84%	-2.58%
5.42	49.86	5.27	48.9	5.42	1.96%	-2.77%
5.44	49.81	5.32	48.9	5.42	1.86%	-1.85%
5.46	49.92	5.39	48.6	5.65	2.72%	-4.60%
5.48	49.52	5.44	48.6	5.65	1.89%	-3.72%
5.5	49.54	5.44	48.6	5.65	1.93%	-3.72%
5.52	49.69	5.42	48.6	5.65	2.24%	-4.07%
5.54	49.79	5.42	48.6	5.65	2.45%	-4.07%
5.56	49.47	5.48	48.6	5.65	1.79%	-3.01%
5.58	49.32	5.39	48.6	5.65	1.48%	-4.60%
5.6	49.57	5.56	48.6	5.65	2.00%	-1.59%
5.62	49.81	5.56	48.6	5.65	2.49%	-1.59%
5.64	49.43	5.7	48.6	5.65	1.71%	0.88%
5.66	50.02	5.62	48.6	5.65	2.92%	-0.53%
5.68	49.5	5.66	48.6	5.65	1.85%	0.18%
5.7	49.32	5.72	48.6	5.65	1.48%	1.24%
5.72	49.73	5.8	48.2	6	3.17%	-3.33%
5.74	49.47	5.89	48.2	6	2.63%	-1.83%
5.745*	49.5	5.89	48.2	6	2.70%	-1.83%
5.76	49.43	5.95	48.2	6	2.55%	-0.83%
5.78	49.31	5.93	48.2	6	2.30%	-1.17%
5.8	49.17	5.95	48.2	6	2.01%	-0.83%

*Note: Interpolated values generated from DASY4 software

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Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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7.0 DETAILS OF SAR EVALUATION

The VOCOLLECT INC. Model: A500 Terminal TT-800-1-1 Portable Body-worn Voice-Controlled Wireless Data Terminal with 802.11a/b/g WLAN and Bluetooth 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 E.

Test Configuration(s)

- The DUT was evaluated for body-worn SAR with the plastic belt-clip and belt-strap accessory attached to the DUT. The back side (belt-clip side) of the DUT was placed parallel and touching the outer surface of the planar phantom.
- The headset-microphone audio accessory was connected to the DUT for the duration of the body-worn evaluations.

Test Mode(s) & Power Setting(s)

- The DUT was placed into test mode using an executable software program provided by the customer and controlled via PC with serial cable connected to the DUT. The DUT was placed in test mode at maximum RF output power and channel setting and the serial cable was removed from the DUT prior to the SAR evaluations.
- The DUT was tested with a modulated DSSS signal in 802.11b mode and a modulated OFDM signal in 802.11a mode.

Co-located Bluetooth

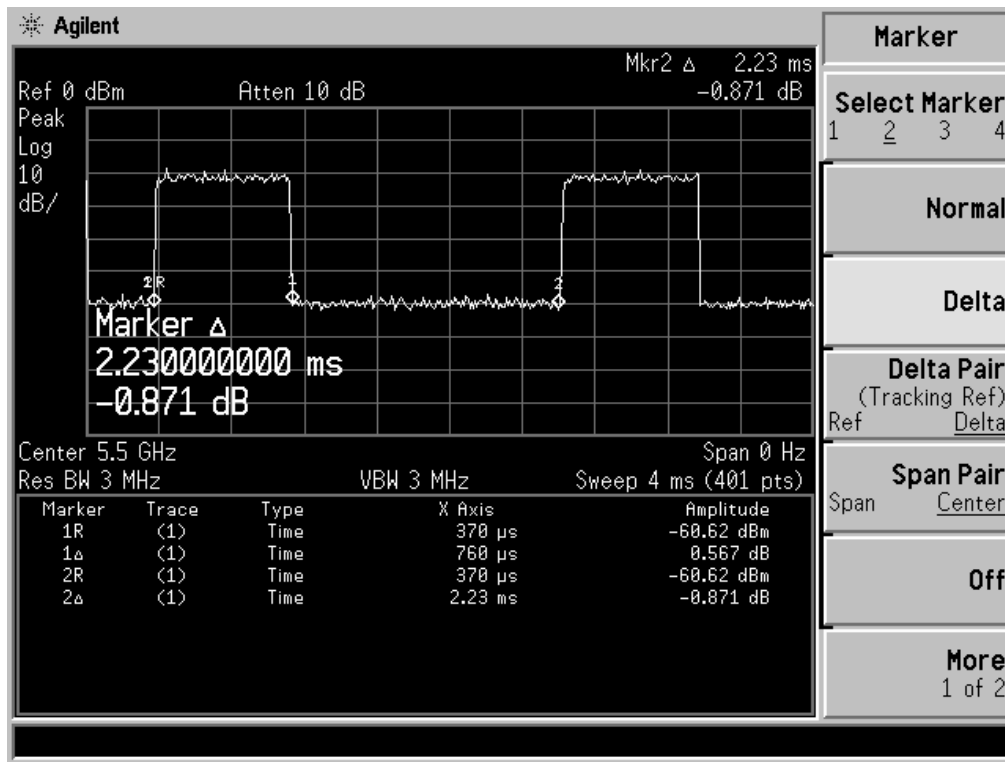
Class 2 Bluetooth	3 dBm typical (+1.0/-2.0 dB)	< 60/f _(GHz) mW	Simultaneous transmission with WLAN
Antenna-to-Antenna Distance (BT-802.11bg) = 68 mm		Antenna-to-Antenna Distance (BT-802.11a) = 53 mm	
SAR evaluation for simultaneous transmission not required per FCC KDB 447498 D01v04 Section 3)b)ii)(1)(a) & (c)			

8.0 SAR EVALUATION PROCEDURES

- 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.
 - 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.

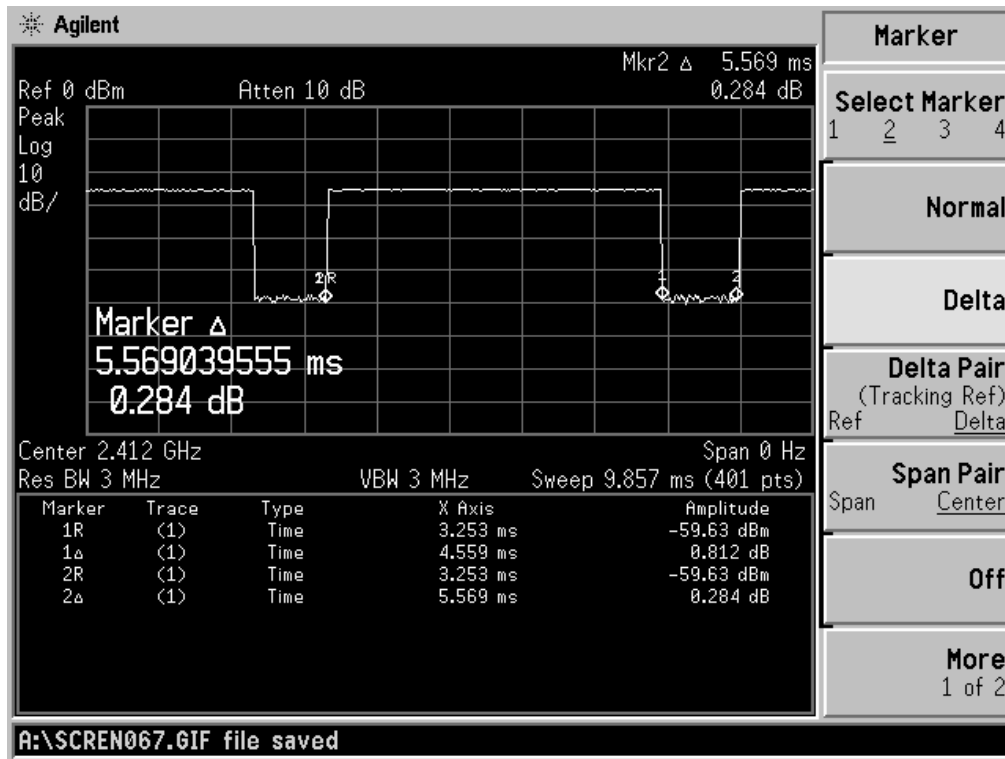
Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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9.0 TIMING PLOTS



Transmit Mode: 802.11a

0.760 ms / 2.230 ms
= 34 % Duty Cycle



Transmit Mode: 802.11b

4.559 ms / 5.569 ms
= 82 % Duty Cycle

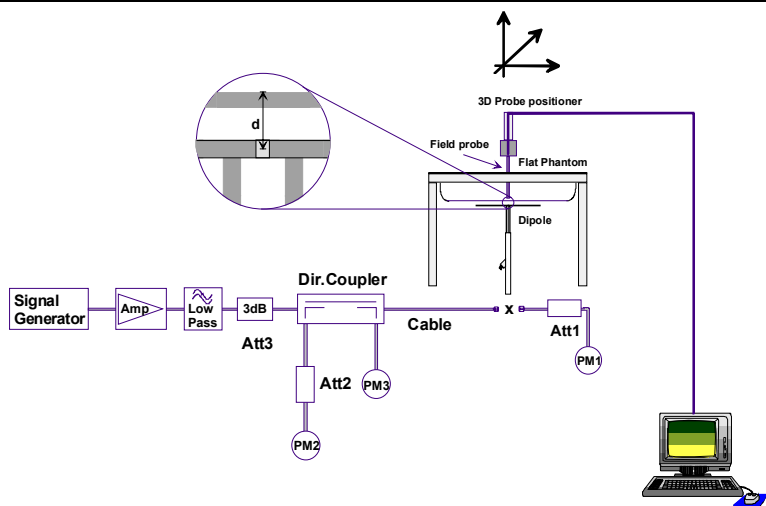
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10.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluations, daily system checks were performed using the Barski Planar Phantom with a 2450MHz SPEAG dipole and 5GHz SPEAG dipole (see Appendix B for system performance check evaluation plots) in accordance with the procedures described in IEEE Standard 1528-2003 (see reference [5]). The dielectric parameters of the simulated tissue mixtures were measured prior to the system performance checks using an HP 85070C Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C). The DASY4 measurement system was verified to a tolerance of $\pm 10\%$ from the system manufacturer's dipole calibration target SAR values (see Appendix F for system manufacturer's dipole calibration procedures).

SYSTEM PERFORMANCE CHECK EVALUATIONS

Test Date	Fluid Freq.	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)
	Body (MHz)	SPEAG Target (1W)	Meas.	Norm (1W)	Dev.	SPEAG Target	Meas.	Dev.	SPEAG Target	Meas.	Dev.						
Oct 4	2450	51.6 ±10%	14.1	56.4	+9.3%	52.7 ±5%	50.2	-4.7%	1.95 ±5%	1.98	+1.5%	1000	23.0	23.5	≥ 15	35	101.1
Oct 4	5200	76.3 ±10%	3.53	70.6	-7.5%	49.0 ±5%	50.6	+3.3%	5.30 ±5%	5.14	-3.0%	1000	23.0	23.5	≥ 15	35	101.1
Oct 4	5500	80.1 ±10%	7.98	79.8	-0.4%	48.6 ±5%	49.5	+1.9%	5.65 ±5%	5.44	-3.7%	1000	23.0	23.5	≥ 15	35	101.1
Oct 4	5800	68.2 ±10%	6.71	67.1	-1.6%	48.2 ±5%	49.2	+2.1%	6.00 ±5%	5.95	-0.8%	1000	23.0	23.5	≥ 15	35	101.1
Notes	1. Forward Conducted Power: 250 mW (2.45 GHz), 50 mW (5.2 GHz), 100 mW (5.5, 5.8 GHz)																
	2. The target SAR values are the measured values from the dipole calibration performed by SPEAG (see Appendix E).																
	3. The target dielectric parameters are the nominal values from the dipole calibration performed by SPEAG (see Appendix E).																
	4. 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.																
	5. The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).																



System Performance Check Measurement Setup Diagram



2.4 GHz Validation Dipole Setup



5 GHz Validation Dipole Setup

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11.0 SIMULATED EQUIVALENT TISSUES

The 2450 MHz simulated equivalent tissue recipe in the table below is derived from the SAR system manufacturer's suggested recipe in the DASY4 manual (see reference [10]) in accordance with the procedures and requirements specified in IEEE Standard 1528-2003 (see reference [5]) and IEC Standard 62209-1:2005 (see reference [6]). The ingredient percentage may have been adjusted marginally in order to achieve the appropriate target dielectric parameters within the specified tolerance. The 5 GHz simulated tissue mixture was provided by SPEAG and is listed below. The dielectric parameters of the fluid (permittivity and conductivity) were measured prior to the SAR evaluations. See Appendix D for the system manufacturer's 5GHz fluid data sheet.

SIMULATED TISSUE MIXTURE (2 GHz)		
INGREDIENT	2450 MHz BODY	2450 MHz BODY
	System Performance Check	DUT Evaluation
Water	69.98 %	69.98 %
Glycol Monobutyl	30.00 %	30.00 %
Salt	0.02 %	0.02 %

SIMULATED TISSUE MIXTURE (5 GHz)		
INGREDIENT	5 GHz BODY	5 GHz BODY
	System Performance Check	DUT Evaluation
Water	64-78%	64-78%
Mineral Oil	11-18%	11-18%
Emulsifiers	9-15%	9-15%
Additives and Salt	2-3%	2-3%

12.0 SAR SAFETY LIMITS

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

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13.0 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	Barski Planar Phantom
Shell Material	Fiberglass
Thickness	2.0 ±0.1 mm
Volume	Approx. 70 liters

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14.0 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
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15.0 BARSKI PLANAR PHANTOM

The Barski Planar Phantom is a fiberglass shell phantom with a 2.0 mm (+/-0.2mm) thick device measurement area at the center of the phantom for SAR evaluations of devices with a larger surface area than the planar section of the SAM phantom. The planar phantom is integrated in a wooden table. The planar phantom was used for the DUT SAR evaluations and the system performance check evaluations. See Appendix H for dimensions and specifications of the Barski Planar Phantom.	 Barski Planar Phantom
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16.0 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 evaluation of devices with a larger footprint (e.g. Laptop PC, Tablet PC), or to avoid perturbation due to device holder clamps for devices with a smaller footprint, a Plexiglas platform is attached to the device holder.	 Device Holder
---	---

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17.0 TEST EQUIPMENT LIST

TEST EQUIPMENT		ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION INTERVAL
USED	DESCRIPTION				
x	Schmid & Partner DASY4 System	-	-	-	-
x	-DASY4 Measurement Server	00158	1078	CNR	CNR
x	-Robot	00046	599396-01	CNR	CNR
x	-DAE4	00019	353	27Apr10	Annual
x	-EX3DV4 E-Field Probe	00213	3600	29Apr10	Annual
x	-D2450V2 Validation Dipole	00219	825	17Apr09	Biennial
x	-D5GHzV2 Validation Dipole	00126	1031	29Apr09	Biennial
x	-Barski Planar Phantom	00155	03-01	CNR	CNR
x	HP 85070C Dielectric Probe Kit	00033	none	CNR	CNR
x	Gigatronics 8652A Power Meter	00007	1835272	04May10	Biennial
x	Gigatronics 80701A Power Sensor	00014	1833699	04May10	Biennial
x	HP 8753ET Network Analyzer	00134	US39170292	04May10	Biennial
x	Rohde & Schwarz SMR20 Signal Generator	00006	100104	CNR	CNR
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	CNR	CNR
Abbr.	CNR = Calibration Not Required; N/A = Not Applicable				

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18.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION									
Uncertainty Component	IEEE 1528 Section	Uncertainty Value $\pm\%$	Probability Distribution	Divisor	ci 1g	ci 10g	Uncertainty Value $\pm\%$ (1g)	Uncertainty Value $\pm\%$ (10g)	V_i or V_{eff}
Measurement System									
Probe Calibration (2450 MHz)	E.2.1	5.5	Normal	1	1	1	5.5	5.5	∞
Axial Isotropy	E.2.2	4.7	Rectangular	1.732050808	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	Rectangular	1.732050808	0.7	0.7	3.9	3.9	∞
Boundary Effect	E.2.3	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	Rectangular	1.732050808	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	Rectangular	1.732050808	1	1	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3	Rectangular	1.732050808	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	Rectangular	1.732050808	1	1	0.2	0.2	∞
Probe Positioning wrt Phantom Shell	E.6.3	2.9	Rectangular	1.732050808	1	1	1.7	1.7	∞
Extrapolation, interpolation & integration algorithms for max. SAR evaluation	E.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	2.9	Normal	1	1	1	2.9	2.9	12
Device Holder Uncertainty	E.4.1	3.6	Normal	1	1	1	3.6	3.6	8
SAR Drift Measurement	6.6.2	5	Rectangular	1.732050808	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4	Rectangular	1.732050808	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5	Rectangular	1.732050808	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measured)	E.3.3	0.5	Normal	1	0.64	0.43	0.3	0.2	∞
Liquid Permittivity (target)	E.3.2	5	Rectangular	1.732050808	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measured)	E.3.3	4.7	Normal	1	0.6	0.49	2.8	2.3	∞
Combined Standard Uncertainty			RSS				10.73	10.47	
Expanded Uncertainty (95% Confidence Interval)			k=2				21.47	20.94	
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003									

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

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MEASUREMENT UNCERTAINTIES (Cont.)

UNCERTAINTY BUDGET FOR DEVICE EVALUATION

Error Description	IEC 62209-1 Section	Uncertainty Value $\pm\%$	Probability Distribution	Divisor	ci 1g	ci 10g	Uncertainty Value $\pm\%$ (1g)	Uncertainty Value $\pm\%$ (10g)	V_i or V_{eff}
Measurement System									
Probe Calibration (5 GHz)	7.2.1	6.55	Normal	1	1	1	6.55	6.55	∞
Axial Isotropy	7.2.1.2	4.7	Rectangular	1.732050808	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy	7.2.1.2	9.6	Rectangular	1.732050808	0.7	0.7	3.9	3.9	∞
Boundary Effect	7.2.1.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Linearity	7.2.1.3	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
System Detection Limits	7.2.1.4	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Readout Electronics	7.2.1.6	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	7.2.1.7	0.8	Rectangular	1.732050808	1	1	0.5	0.5	∞
Integration Time	7.2.1.8	2.6	Rectangular	1.732050808	1	1	1.5	1.5	∞
RF Ambient Conditions	7.2.3.6	3	Rectangular	1.732050808	1	1	1.7	1.7	∞
Probe Positioner Mechanical Restrictions	7.2.2.1	0.8	Rectangular	1.732050808	1	1	0.5	0.5	∞
Probe Positioning wrt Phantom Shell	7.2.2.3	5.7	Rectangular	1.732050808	1	1	3.3	3.3	∞
Post-processing	7.2.4	4	Rectangular	1.732050808	1	1	2.3	2.3	∞
Test Sample Related									
Device positioning	7.2.2.4	2.9	Normal	1	1	1	2.9	2.9	12
Device holder uncertainty	7.2.2.4.2	3.6	Normal	1	1	1	3.6	3.6	8
Power drift	7.2.3.5	5	Rectangular	1.732050808	1	1	2.9	2.9	∞
Phantom and Setup									
Phantom uncertainty	7.2.2.2	4	Rectangular	1.732050808	1	1	2.3	2.3	∞
Liquid conductivity (target)	7.2.3.3	5	Rectangular	1.732050808	0.64	0.43	1.8	1.2	∞
Liquid conductivity (measured)	7.2.3.3	3.9	Normal	1	0.64	0.43	2.5	1.7	∞
Liquid permittivity (target)	7.2.3.4	10	Rectangular	1.732050808	0.6	0.49	3.5	2.8	∞
Liquid permittivity (measured)	7.2.3.4	2.7	Normal	1	0.6	0.49	1.6	1.3	∞
Combined Standard Uncertainty			RSS				12.28	11.86	
Expanded Uncertainty (95% Confidence Interval)			k=2				24.56	23.72	

Measurement Uncertainty Table in accordance with IEC International Standard 62209-1:2005

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

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	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

19.0 REFERENCES

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- [7] Federal Communications Commission, Office of Engineering and Technology - "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies"; KDB 447498 D01v04: November 2009.
- [8] Federal Communications Commission, Office of Engineering and Technology - "SAR Measurement Procedures for 802.11a/b/g Transmitters"; KDB 248227 D01v01r02: May 2007.
- [9] Federal Communications Commission, Office of Engineering and Technology - "Application Note: SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz - 3 GHz"; KDB 450824 D01 v01r01: January 2007.
- [10] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 17 Application Note, Body Tissue Recipe: Sept. 2005.
- [11] ISO/IEC 17025 - "General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005)."
- [12] Federal Communications Commission - "Measurements Required: RF Power Output"; Rule Part 47 CFR §2.1046.
- [13] Industry Canada - "General Requirements and Information for the Certification of Radiocommunication Equipment", Radio Standards Specification RSS-Gen Issue 2: June 2007.

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Test Lab Certificate No. 2470.01

APPENDIX A - SAR MEASUREMENT DATA

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 10/04/2010

Body-worn SAR - 802.11a - 6 Mbps - 5240 MHz - Channel 48 - Belt-Clip Touch Position

DUT: Vocollect TT-800-1-1; Type: A500 Data Terminal with 802.11a/b/g WLAN & Bluetooth; Serial: 30100051

Body-worn Accessory: Belt-Clip/Strap (P/N: BL-700-4); Audio Accessory: Headset-Microphone (P/N: 070334878)

Ambient Temp: 23.0°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: OFDM WLAN

Frequency: 5240 MHz; Duty Cycle: 1:2.94

Medium: M5200-5800 Medium parameters used: $f = 5240 \text{ MHz}$; $\sigma = 5.19 \text{ mho/m}$; $\epsilon_r = 50.1$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(3.73, 3.73, 3.73); Calibrated: 29/04/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - Belt-Clip Touching Planar Phantom

Area Scan (10x19x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.041 mW/g

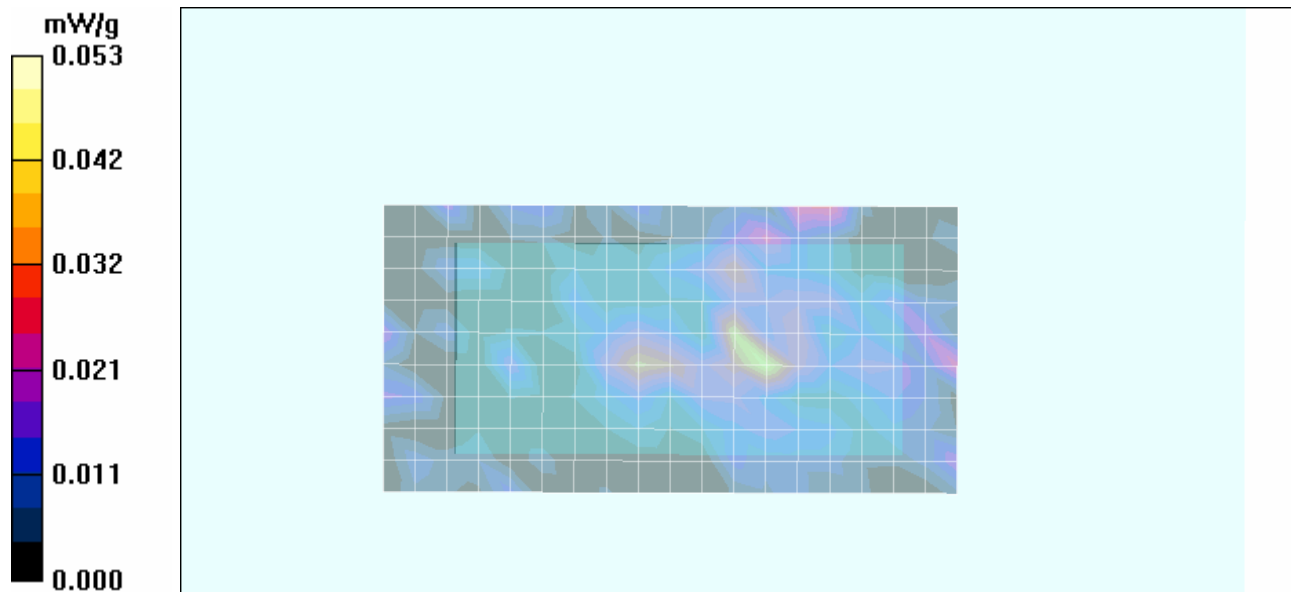
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 1.84 V/m; Power Drift = -0.130 dB

Peak SAR (extrapolated) = 0.216 W/kg

SAR(1 g) = 0.038 mW/g; SAR(10 g) = 0.011 mW/g

Maximum value of SAR (measured) = 0.053 mW/g



DUT orientation under planar phantom

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 10/04/2010

Body-worn SAR - 802.11a - 6 Mbps - 5320 MHz - Channel 64 - Belt-Clip Touch Position

DUT: Vocollect TT-800-1-1; Type: A500 Data Terminal with 802.11a/b/g WLAN & Bluetooth; Serial: 30100051

Body-worn Accessory: Belt-Clip/Strap (P/N: BL-700-4); Audio Accessory: Headset-Microphone (P/N: 070334878)

Ambient Temp: 23.0°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: OFDM WLAN

Frequency: 5320 MHz; Duty Cycle: 1:2.94

Medium: M5200-5800 Medium parameters used: $f = 5320 \text{ MHz}$; $\sigma = 5.21 \text{ mho/m}$; $\epsilon_r = 50$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(3.73, 3.73, 3.73); Calibrated: 29/04/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- 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 - Belt-Clip Touching Planar Phantom

Area Scan (10x19x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.073 mW/g

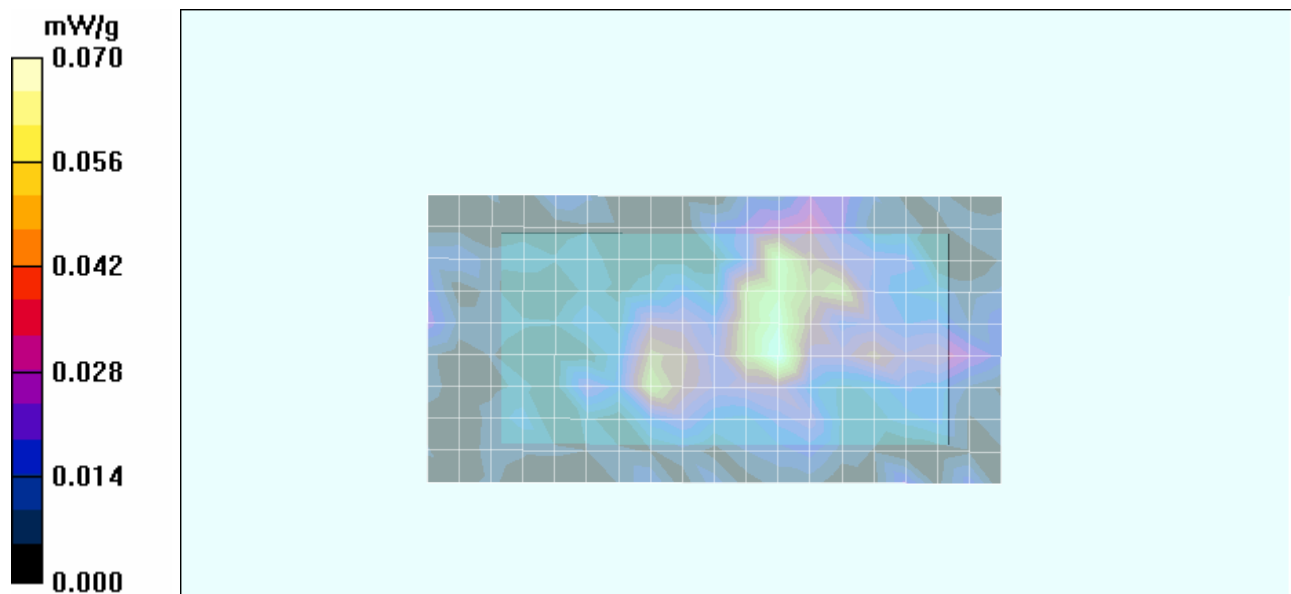
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 3.32 V/m; Power Drift = -0.127 dB

Peak SAR (extrapolated) = 0.335 W/kg

SAR(1 g) = 0.071 mW/g; SAR(10 g) = 0.028 mW/g

Maximum value of SAR (measured) = 0.070 mW/g



DUT orientation under planar phantom

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 10/04/2010

Body-worn SAR - 802.11a - 6 Mbps - 5500 MHz - Channel 100 - Belt-Clip Touch Position

DUT: Vocollect TT-800-1-1; Type: A500 Data Terminal with 802.11a/b/g WLAN & Bluetooth; Serial: 30100051

Body-worn Accessory: Belt-Clip/Strap (P/N: BL-700-4); Audio Accessory: Headset-Microphone (P/N: 070334878)

Ambient Temp: 23.0°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: OFDM WLAN

Frequency: 5500 MHz; Duty Cycle: 1:2.94

Medium: M5200-5800 Medium parameters used: $f = 5500$ MHz; $\sigma = 5.44$ mho/m; $\epsilon_r = 49.5$; $\rho = 1000$ kg/m³

- Probe: EX3DV4 - SN3600; ConvF(3.3, 3.3, 3.3); Calibrated: 29/04/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - Belt-Clip Touching Planar Phantom

Area Scan (10x19x1): Measurement grid: $dx=10$ mm, $dy=10$ mm

Maximum value of SAR (measured) = 0.188 mW/g

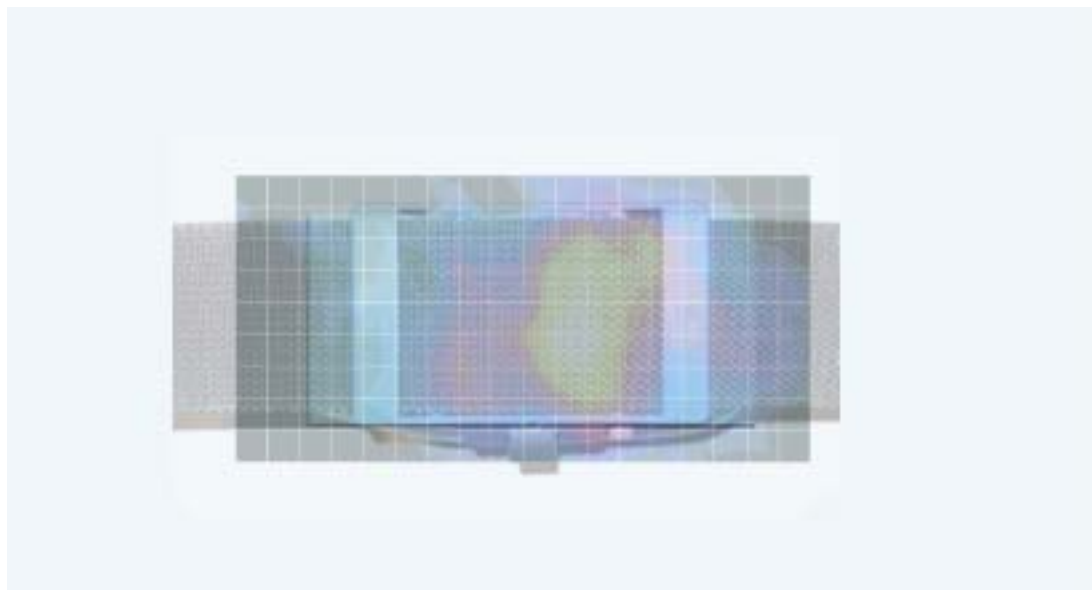
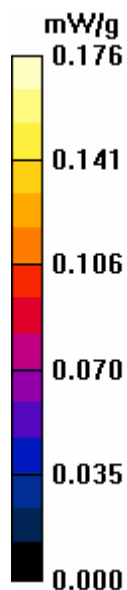
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 5.51 V/m; Power Drift = 0.121 dB

Peak SAR (extrapolated) = 0.375 W/kg

SAR(1 g) = 0.148 mW/g; SAR(10 g) = 0.062 mW/g

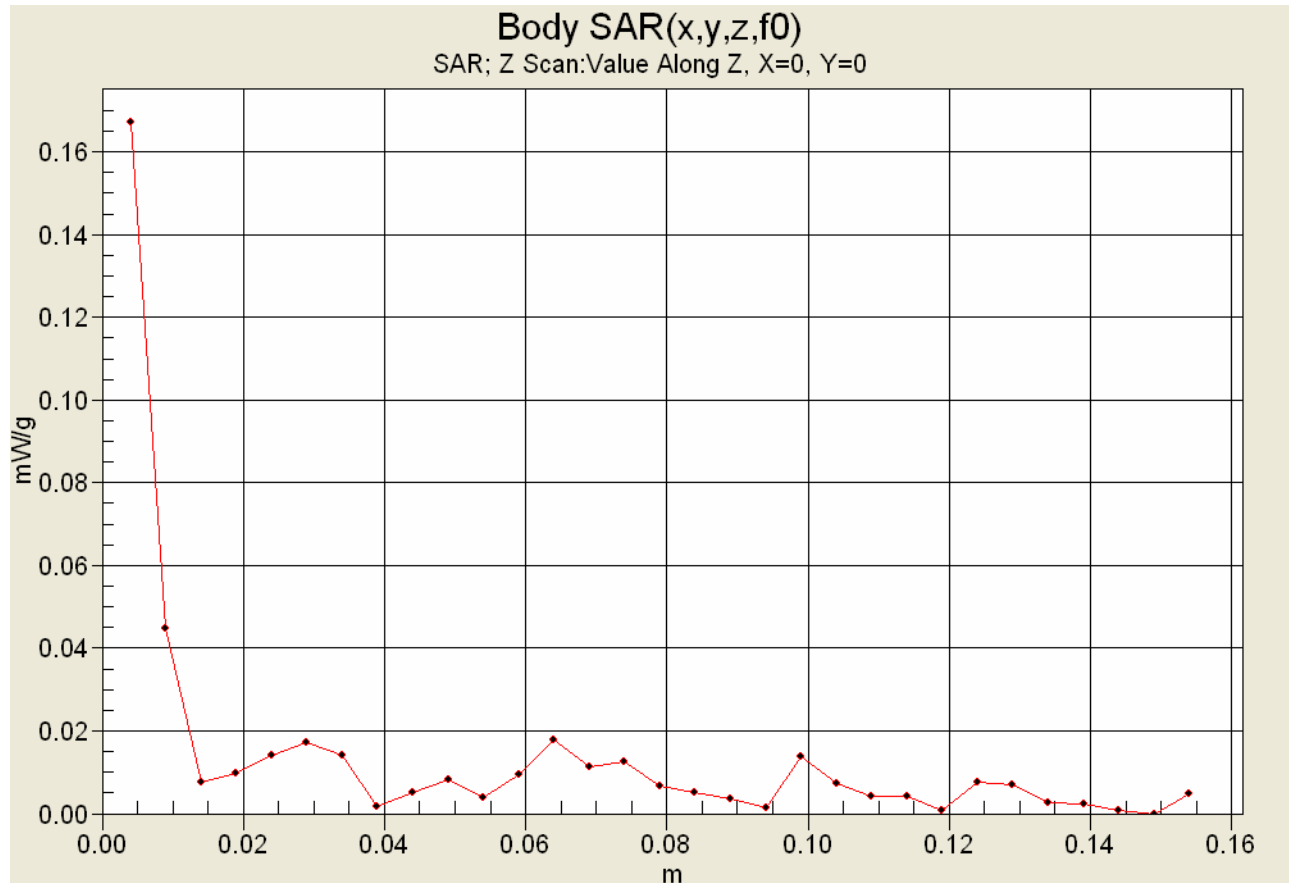
Maximum value of SAR (measured) = 0.176 mW/g



DUT orientation under planar phantom

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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Z-Axis Scan



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	Test Report Issue Date October 21, 2010	Description of Test(s) Specific Absorption Rate	RF Exposure Category Gen. Pop. / Uncontrolled	

Date Tested: 10/04/2010

Body-worn SAR - 802.11a - 6 Mbps - 5745 MHz - Channel 149 - Belt-Clip Touch Position

DUT: Vocollect TT-800-1-1; Type: A500 Data Terminal with 802.11a/b/g WLAN & Bluetooth; Serial: 30100051

Body-worn Accessory: Belt-Clip/Strap (P/N: BL-700-4); Audio Accessory: Headset-Microphone (P/N: 070334878)

Ambient Temp: 23.0°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: OFDM WLAN

Frequency: 5745 MHz; Duty Cycle: 1:2.94

Medium: M5200-5800 Medium parameters used (interpolated): $f = 5745$ MHz; $\sigma = 5.89$ mho/m; $\epsilon_r = 49.5$; $\rho = 1000$ kg/m³

- Probe: EX3DV4 - SN3600; ConvF(3.44, 3.44, 3.44); Calibrated: 29/04/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- 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 - Belt-Clip Touching Planar Phantom

Area Scan (10x19x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.050 mW/g

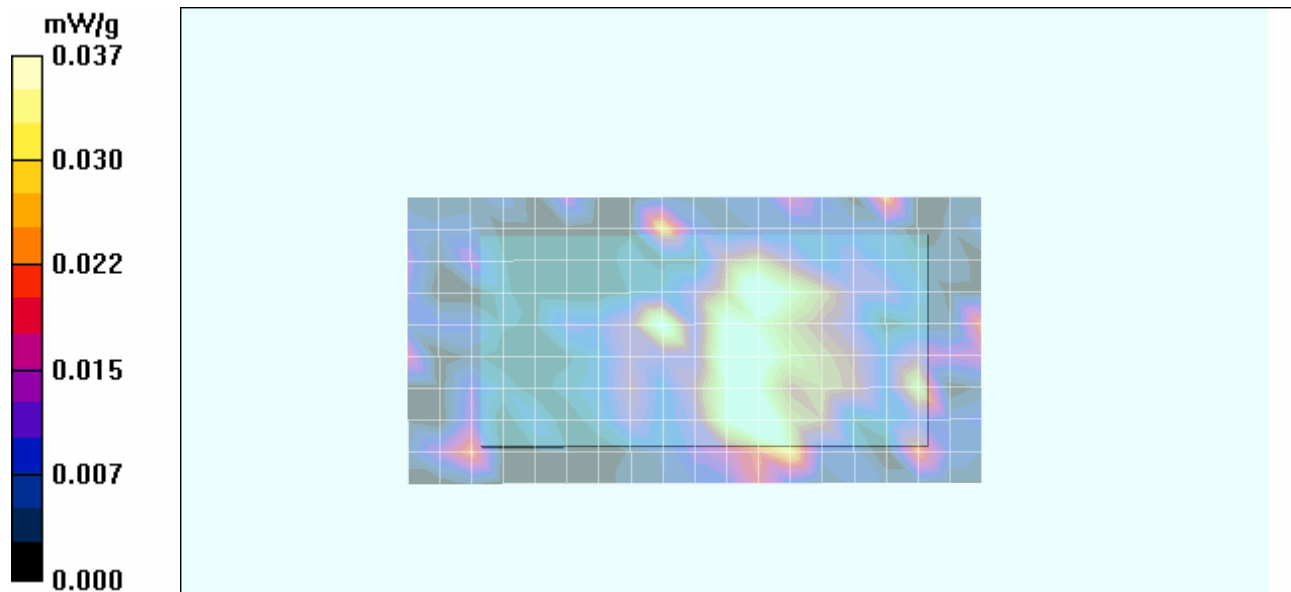
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.95 V/m; Power Drift = -0.085 dB

Peak SAR (extrapolated) = 0.083 W/kg

SAR(1 g) = 0.012 mW/g; SAR(10 g) = 0.00253 mW/g

Maximum value of SAR (measured) = 0.037 mW/g



DUT orientation under planar phantom

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 10/04/2010

Body-worn SAR - 802.11b - 1 Mbps - 2412 MHz - Channel 1 - Belt-Clip Touch Position

DUT: Vocollect TT-800-1-1; Type: A500 Data Terminal with 802.11a/b/g WLAN & Bluetooth; Serial: 30100051

Body-worn Accessory: Belt-Clip/Strap (P/N: BL-700-4); Audio Accessory: Headset-Microphone (P/N: 070334878)

Ambient Temp: 23.0°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: DSSS WLAN

Frequency: 2412 MHz; Duty Cycle: 1:1.22

Medium: M2450 Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.96$ mho/m; $\epsilon_r = 50.2$; $\rho = 1000$ kg/m³

- Probe: EX3DV4 - SN3600; ConvF(6.24, 6.24, 6.24); Calibrated: 29/04/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fibreglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - Belt-Clip Touching Planar Phantom

Area Scan (10x19x1): Measurement grid: $dx=10$ mm, $dy=10$ mm

Maximum value of SAR (measured) = 0.060 mW/g

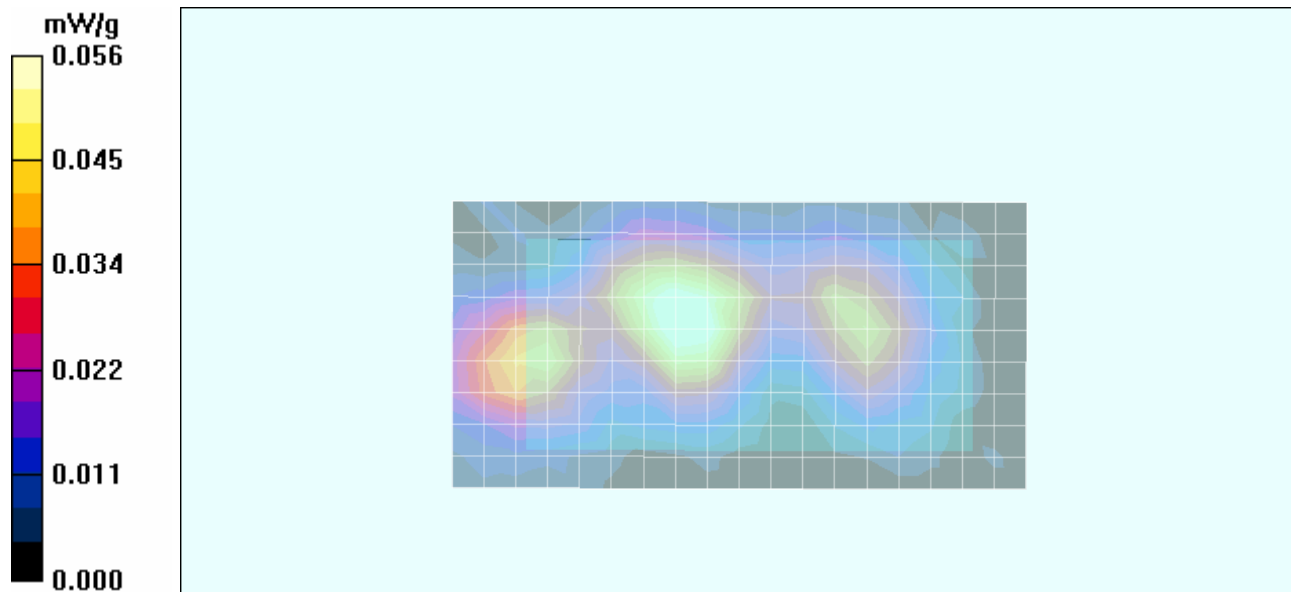
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 5.22 V/m; Power Drift = 0.093 dB

Peak SAR (extrapolated) = 0.084 W/kg

SAR(1 g) = 0.051 mW/g; SAR(10 g) = 0.030 mW/g

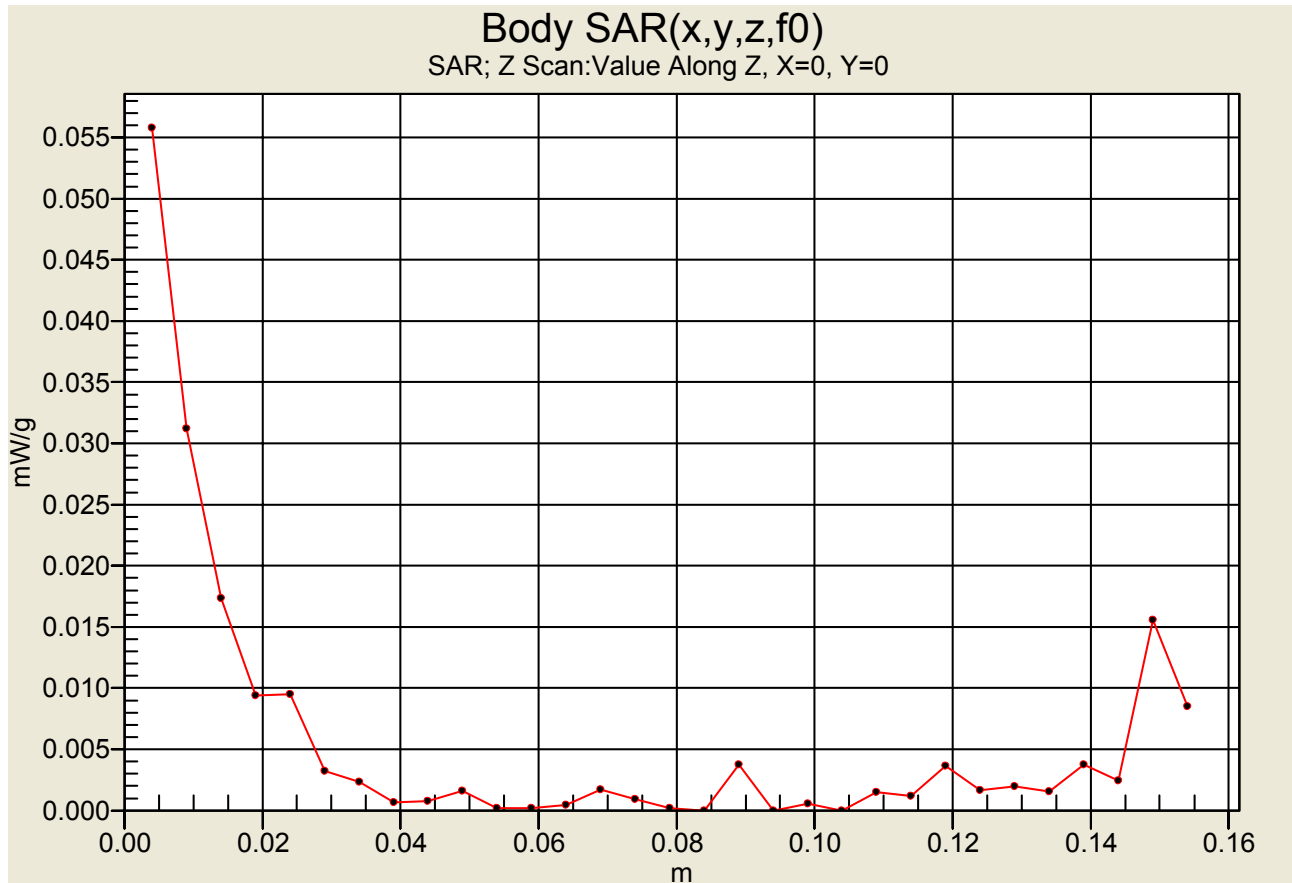
Maximum value of SAR (measured) = 0.056 mW/g



DUT orientation under planar phantom

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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Z-Axis Scan



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	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Test Lab Certificate No. 2470.01

APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 10/04/2010

System Performance Check - 2450 MHz Dipole - Body

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 825; Calibrated: 17/04/2009

Ambient Temp: 23.0°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Forward Conducted Power: 250 mW

Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used: $f = 2450 \text{ MHz}$; $\sigma = 1.98 \text{ mho/m}$; $\epsilon_r = 50.2$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(6.24, 6.24, 6.24); Calibrated: 29/04/2010
- Sensor-Surface: 3 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- 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 System Performance Check

Area Scan (6x10x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 18.3 mW/g

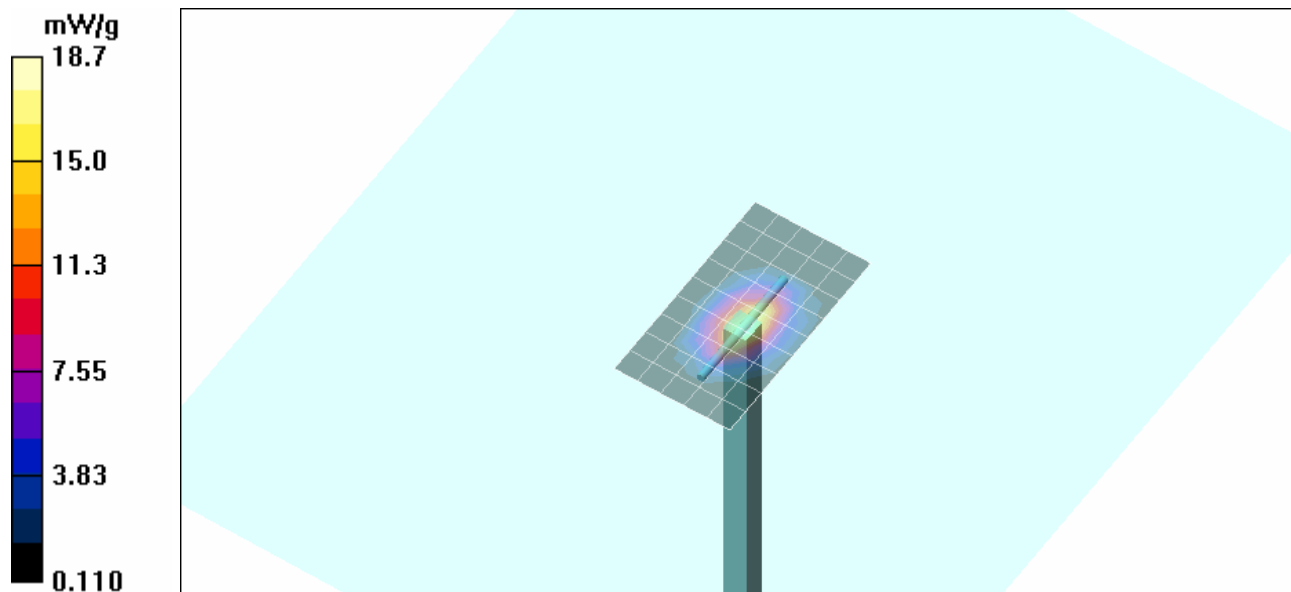
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 91.8 V/m; Power Drift = -0.076 dB

Peak SAR (extrapolated) = 30.0 W/kg

SAR(1 g) = 14.1 mW/g; SAR(10 g) = 6.47 mW/g

Maximum value of SAR (measured) = 18.7 mW/g

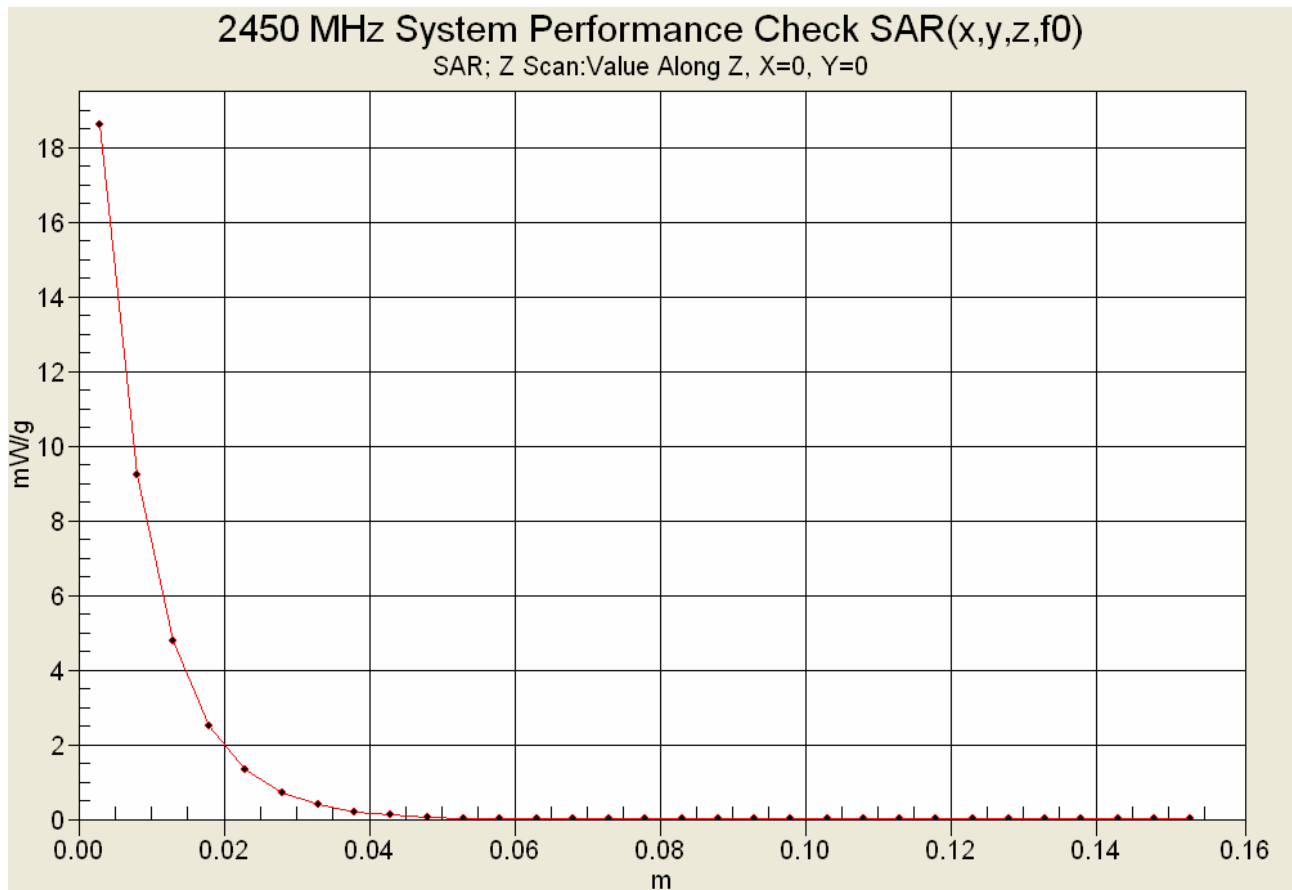


Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Test Lab Certificate No. 2470.01

Z-Axis Scan



Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 10/04/2010

System Performance Check - 5 GHz Dipole - 5.2 GHz Body

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1031; Calibrated: 29/04/2009

Ambient Temp: 23.0°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Forward Conducted Power: 50 mW

Frequency: 5200 MHz; Duty Cycle: 1:1

Medium: M5200-5800 Medium parameters used: $f = 5200$ MHz; $\sigma = 5.14$ mho/m; $\epsilon_r = 50.6$; $\rho = 1000$ kg/m³

- Probe: EX3DV4 - SN3600; ConvF(3.73, 3.73, 3.73); Calibrated: 29/04/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

5200 MHz System Performance Check

Area Scan (9x13x1): Measurement grid: dx=5mm, dy=5mm

Maximum value of SAR (measured) = 6.94 mW/g

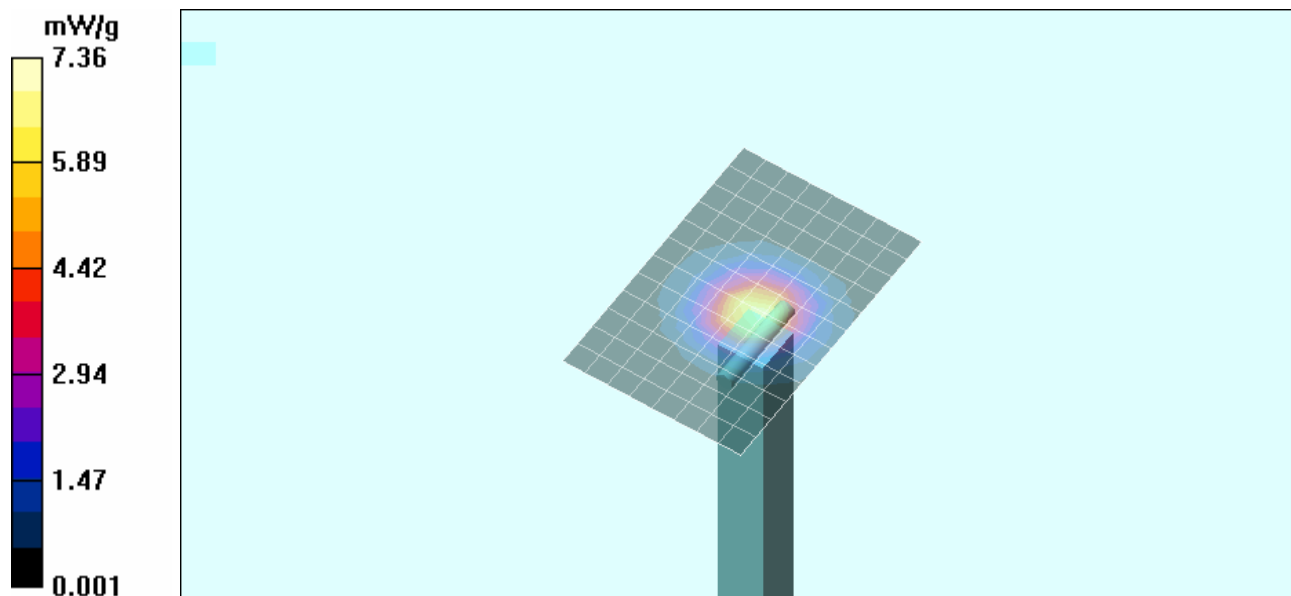
Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 39.3 V/m; Power Drift = 0.037 dB

Peak SAR (extrapolated) = 13.1 W/kg

SAR(1 g) = 3.53 mW/g; SAR(10 g) = 1.00 mW/g

Maximum value of SAR (measured) = 7.36 mW/g

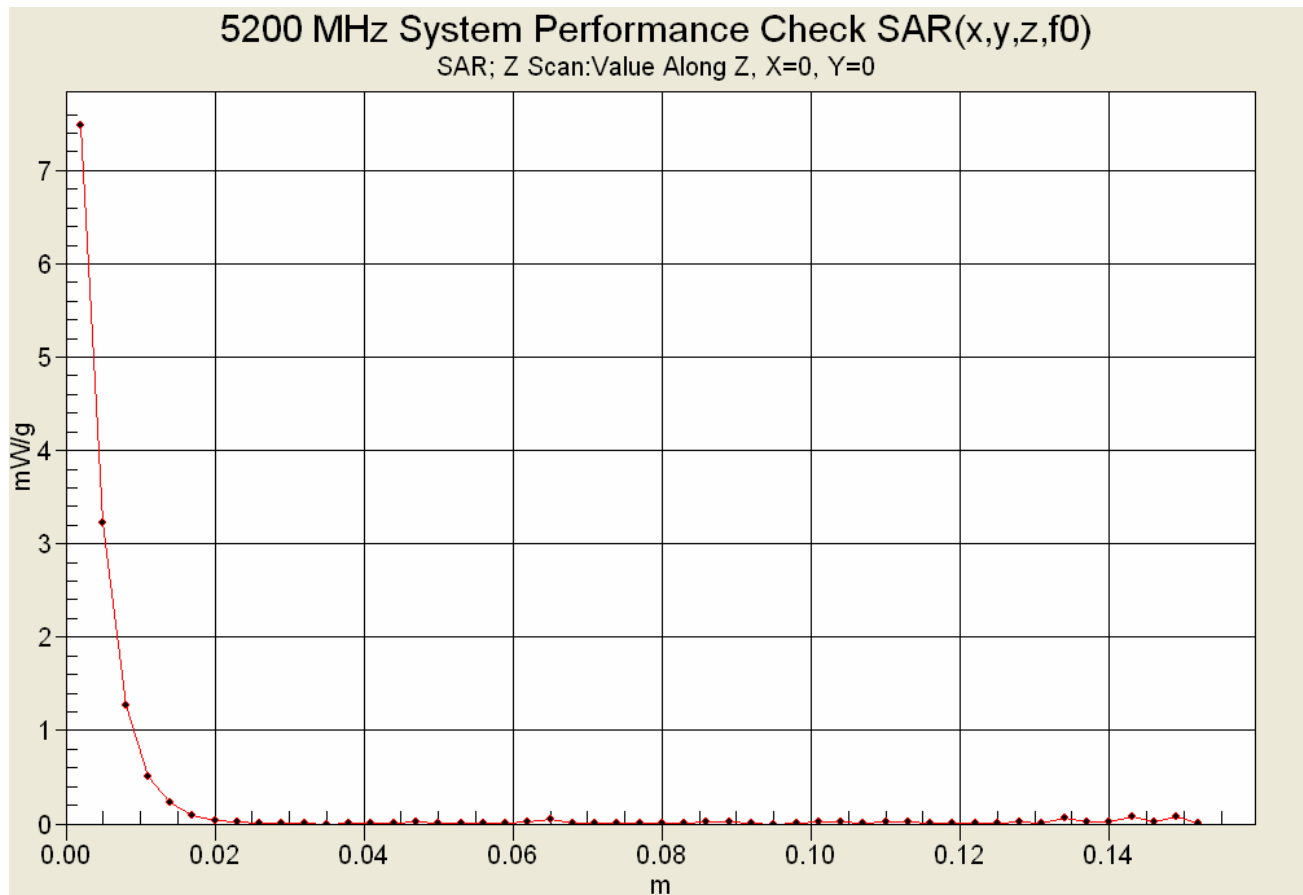


Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	<u>Date(s) of Evaluation</u> October 04, 2010	<u>Test Report Serial No.</u> 092410MQO-T1053-S15W	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Test Lab Certificate No. 2470.01

Z-Axis Scan



Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	<u>Date(s) of Evaluation</u> October 04, 2010	<u>Test Report Serial No.</u> 092410MQO-T1053-S15W	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 10/04/2010

System Performance Check - 5 GHz Dipole - 5.5 GHz Body

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1031; Calibrated: 29/04/2009

Ambient Temp: 23.0°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Forward Conducted Power: 100 mW

Frequency: 5500 MHz; Duty Cycle: 1:1

Medium: M5200-5800 Medium parameters used: $f = 5500 \text{ MHz}$; $\sigma = 5.44 \text{ mho/m}$; $\epsilon_r = 49.5$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(3.3, 3.3, 3.3); Calibrated: 29/04/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

5500 MHz System Performance Check

Area Scan (9x13x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 11.9 mW/g

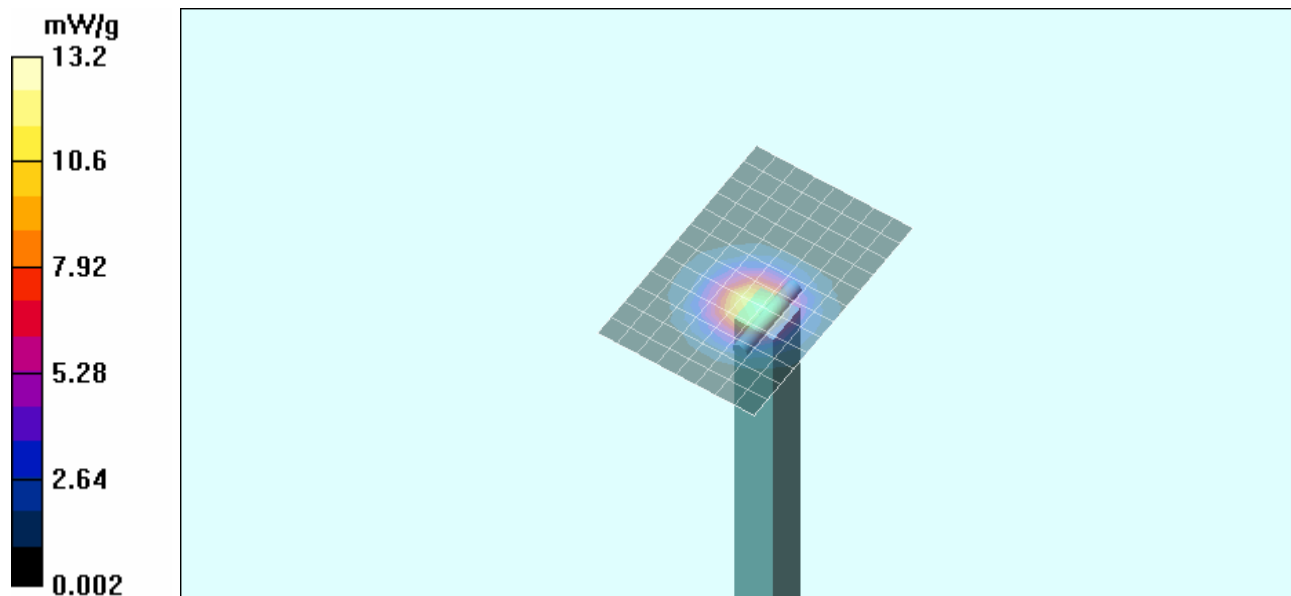
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 50.1 V/m; Power Drift = -0.051 dB

Peak SAR (extrapolated) = 24.9 W/kg

SAR(1 g) = 7.98 mW/g; SAR(10 g) = 2.31 mW/g

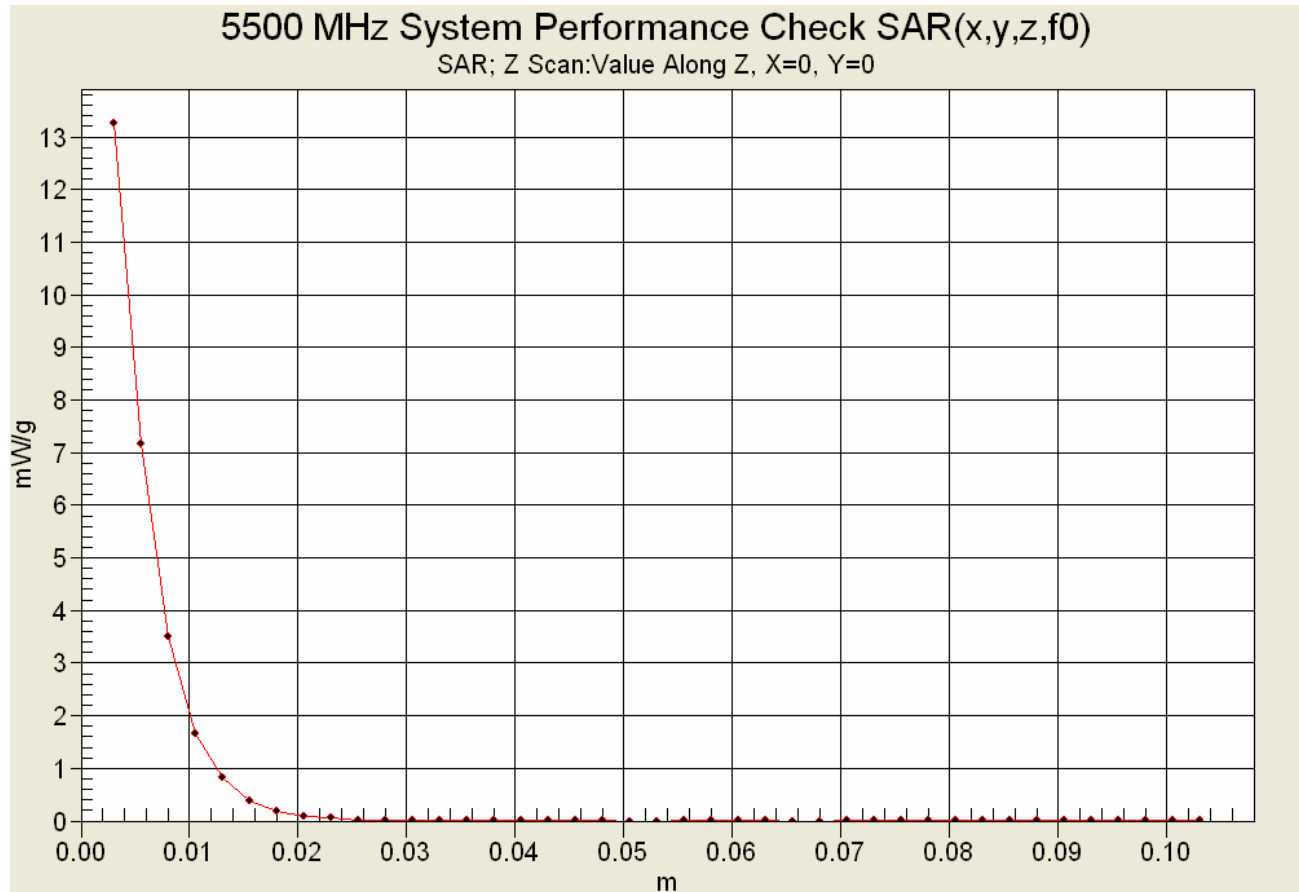
Maximum value of SAR (measured) = 13.2 mW/g



Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Z-Axis Scan



Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	<u>Date(s) of Evaluation</u> October 04, 2010	<u>Test Report Serial No.</u> 092410MQO-T1053-S15W	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 10/04/2010

System Performance Check - 5 GHz Dipole - 5.8 GHz Body

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1031; Calibrated: 29/04/2009

Ambient Temp: 23.0°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Forward Conducted Power: 100 mW

Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: M5200-5800 Medium parameters used: $f = 5800 \text{ MHz}$; $\sigma = 5.95 \text{ mho/m}$; $\epsilon_r = 49.2$; $\rho = 1000 \text{ kg/m}^3$

- Probe: EX3DV4 - SN3600; ConvF(3.44, 3.44, 3.44); Calibrated: 29/04/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

5800 MHz System Performance Check

Area Scan (9x13x1): Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$

Maximum value of SAR (measured) = 14.2 mW/g

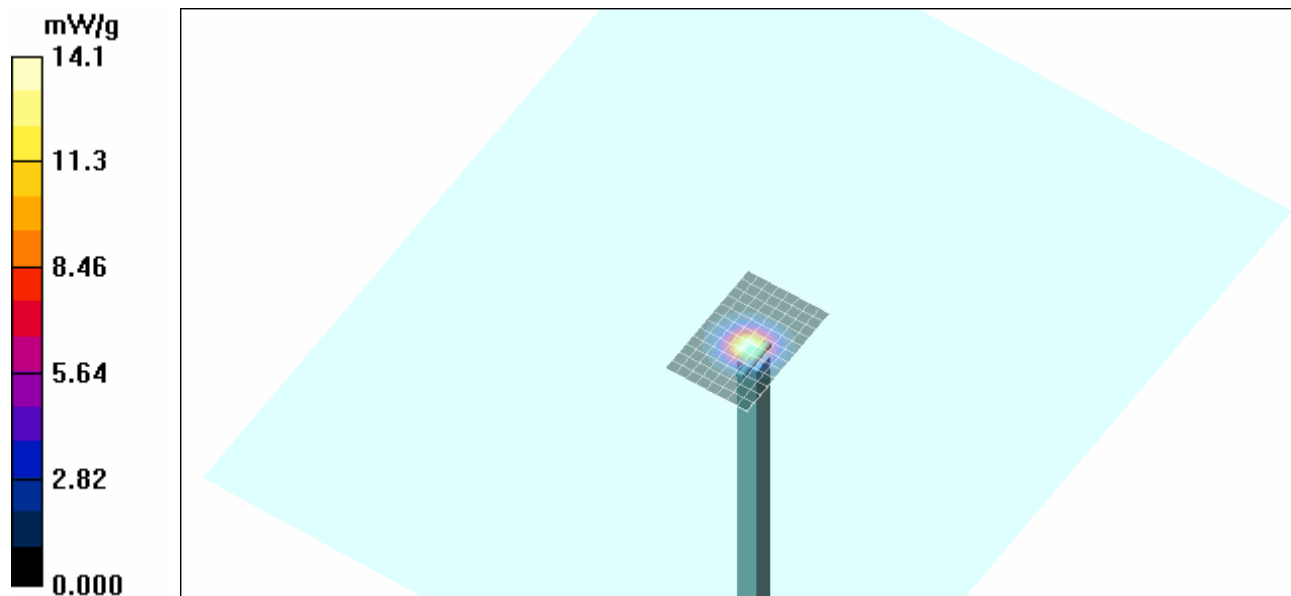
Zoom Scan (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 54.8 V/m; Power Drift = -0.055 dB

Peak SAR (extrapolated) = 24.8 W/kg

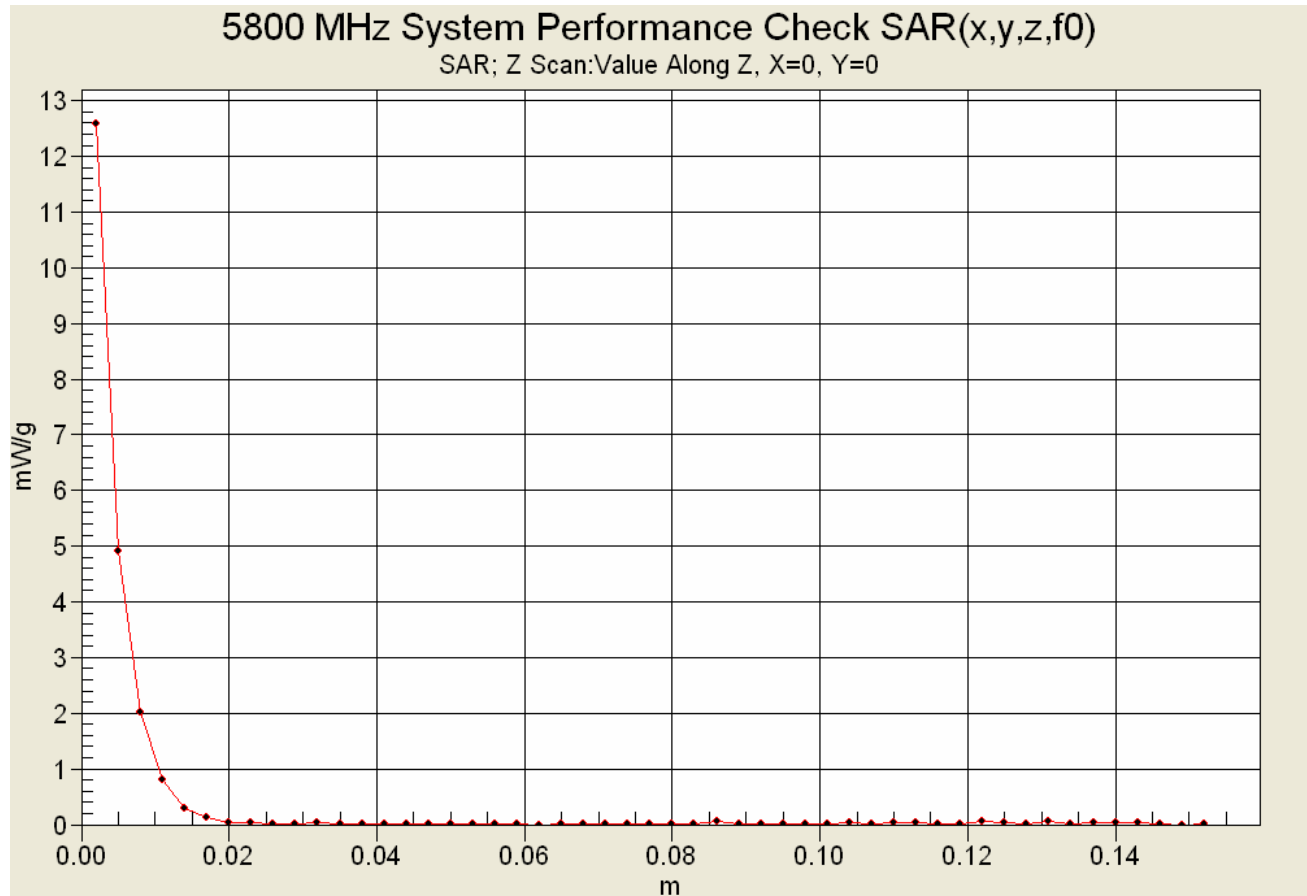
SAR(1 g) = 6.71 mW/g; SAR(10 g) = 1.92 mW/g

Maximum value of SAR (measured) = 14.1 mW/g



Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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Z-Axis Scan



	<u>Date(s) of Evaluation</u> October 04, 2010	<u>Test Report Serial No.</u> 092410MQO-T1053-S15W	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
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Test Lab Certificate No. 2470.01

APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	<u>Date(s) of Evaluation</u> October 04, 2010	<u>Test Report Serial No.</u> 092410MQO-T1053-S15W	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Test Lab Certificate No. 2470.01

2450 MHz Body

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
04/Oct/2010
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	50.33	1.91
2.3600	52.82	1.86	50.30	1.88
2.3700	52.81	1.87	50.33	1.90
2.3800	52.79	1.88	50.31	1.92
2.3900	52.78	1.89	50.33	1.93
2.4000	52.77	1.90	50.29	1.95
2.4100	52.75	1.91	50.17	1.96
2.4200	52.74	1.92	49.96	1.97
2.4300	52.73	1.93	49.95	1.97
2.4400	52.71	1.94	50.09	1.98
2.4500	52.70	1.95	50.21	1.98
2.4600	52.69	1.96	50.13	2.00
2.4700	52.67	1.98	50.24	2.02
2.4800	52.66	1.99	50.01	2.02
2.4900	52.65	2.01	49.82	2.03
2.5000	52.64	2.02	49.74	2.04
2.5100	52.62	2.04	49.65	2.06
2.5200	52.61	2.05	49.62	2.09
2.5300	52.60	2.06	49.66	2.10
2.5400	52.59	2.08	49.42	2.11
2.5500	52.57	2.09	49.71	2.12

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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Test Lab Certificate No. 2470.01

5200-5800 MHz Body

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
04/Oct/2010
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
5.2000	49.01	5.30	50.57	5.14
5.2200	48.99	5.32	50.03	5.14
5.2400	48.96	5.35	50.10	5.19
5.2600	48.93	5.37	50.12	5.29
5.2800	48.91	5.39	50.09	5.21
5.3000	48.88	5.42	50.38	5.20
5.3200	48.85	5.44	49.98	5.21
5.3400	48.82	5.46	50.00	5.23
5.3600	48.80	5.49	49.74	5.27
5.3800	48.77	5.51	50.00	5.29
5.4000	48.74	5.53	49.80	5.28
5.4200	48.72	5.56	49.86	5.27
5.4400	48.69	5.58	49.81	5.32
5.4600	48.66	5.60	49.92	5.39
5.4800	48.63	5.63	49.52	5.44
5.5000	48.61	5.65	49.54	5.44
5.5200	48.58	5.67	49.69	5.42
5.5400	48.55	5.70	49.79	5.42
5.5600	48.53	5.72	49.47	5.48
5.5800	48.50	5.74	49.32	5.39
5.6000	48.47	5.77	49.57	5.56
5.6200	48.44	5.79	49.81	5.56
5.6400	48.42	5.81	49.43	5.70
5.6600	48.39	5.84	50.02	5.62
5.6800	48.36	5.86	49.50	5.66
5.7000	48.34	5.88	49.32	5.72
5.7200	48.31	5.91	49.73	5.80
5.7400	48.28	5.93	49.47	5.89
5.7600	48.25	5.95	49.43	5.95
5.7800	48.23	5.98	49.31	5.93
5.8000	48.20	6.00	49.17	5.95

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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Test Lab Certificate No. 2470.01

APPENDIX D - MANUFACTURER'S TISSUE SIMULANT DATA SHEET (5 GHz)

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Material Safety Data Sheet

1 Identification of the substance and of the manufacturer / origin

Item	Head Tissue Simulation Liquid HSL5800 Muscle Tissue Simulation Liquid MSL 5800
Type No	SL AAH 580, SL AAM 580
Series No	N/A
Manufacturer / Origin	Schmid & Partner Engineering AG Zeughausstrasse 43 8004 Zürich Switzerland Phone +41 1 245 9700, Fax +41 1 245 9779, support@speag.com

Use of the substance:

Liquid simulating physical parameters of Head or Muscle Tissue in the RF range to 6GHz.

2 Composition / Information on ingredients

The Item is composed of the following ingredients:

Water	64 - 78%
Mineral Oil	11 - 18%
Emulsifiers	9 - 15%
Additives and Salt	2 - 3%

Safety relevant ingredients according to EU directives:

CAS-No 107-41-5	< 4%	2-Methyl-2,4-pentandiol (Hexylene Glycol): Xi irritant, R36/38 irritant for eyes and skin
CAS-No 770-35-4	< 2%	1-Phenoxy-2-propanol (Propylene Glycol Phenyl Ether): Xi irritant, R36 irritant for eyes
CAS-No 93-83-4	< 2%	N,N-bis(2-Hydroxyethyl)oleamide: Xi irritant, R36/38 irritant for eyes and skin
CAS-No 9004-95-9	< 0.5%	Polyethylene glycol cetyl ether: Xi irritant, R22 harmful if swallowed, R36/38 irritant for eyes and skin R50 Very toxic to aquatic organisms

According to EU guidelines and Swiss rules, the product is not a dangerous mixture and therefore not required to be marked by symbols.

3 Hazards identification

Identification not required.

4 First aid measures

The product reacts slightly alkaline.

After skin contact:	Wash with fresh water and mild sope
After eye contact:	Rinse out with plenty of water for several minutes with the eyelid held open. Consult an ophthalmologist if necessary.
After ingestion:	Do not induce vomiting. Get medical attention.

5 Fire-fighting measures

Firefighting media	CO2, foam, dry chemical
Combustion products	Carbon oxides, nitrogen and traces of oxides of chlorine and sulfur, HCl
Due to the high water content, the liquid is self-extinguishing.	

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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Test Lab Certificate No. 2470.01

6 Accidental release measures

Person-related precaution measures: wash with water and mild soap.

Environmental-protection measures: do not allow to enter sewerage system.

Procedures for cleaning / absorption: Use oil-binding agents., forward for disposal. Spills may cause slippery conditions.

7 Handling and storage

Handling: Keep in open container only for minimum required time in order to avoid water evaporation.

Storage: tightly closed, between >0 to 40°C. Avoid direct solar irradiation of the storage containers.

8 Exposure controls / personal protection

Protection measures are not generally required. For eye protection, industrial safety glasses are recommended.

Personal hygiene and clean working practices are sufficient.

9 Physical and chemical properties

Form:	liquid
Colour:	medium to dark brown, transparent to opaque
Odour:	almost odourless / slightly oily
pH-Value:	slightly alcalic
Boiling point:	100°C
Density:	1g/cm ³

10 Stability and reactivity

Conditions to be avoided: heating above 40°C

The product contains water and is not compatible with strong oxidizers or magnesium.

11 Toxicological information

LD50 > 40 g/kg

Further data: the product should be handled with the care usual when dealing with chemicals

12 Ecological information

Contains mineral oil. Do not allow to enter waters, waste water, or soil!

13 Disposal considerations

Disposal is possible by splitting the mineral oil from the emulsion with absorbing agents, with salt or ultra-filtration. Dispose as other mineral oil containing products according to local regulations.

Product packing must be disposed of in compliance with respect national regulations.

14 Transport information

Not subject to transport regulations.

15 Regulatory information

No special labelling required.

16 Other information

Release date: 6.1.2005

Responsible: FB

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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Test Lab Certificate No. 2470.01

APPENDIX E - SAR TEST SETUP & DUT PHOTOGRAPHS

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Test Lab Certificate No. 2470.01

BODY SAR TEST SETUP PHOTOGRAPHS

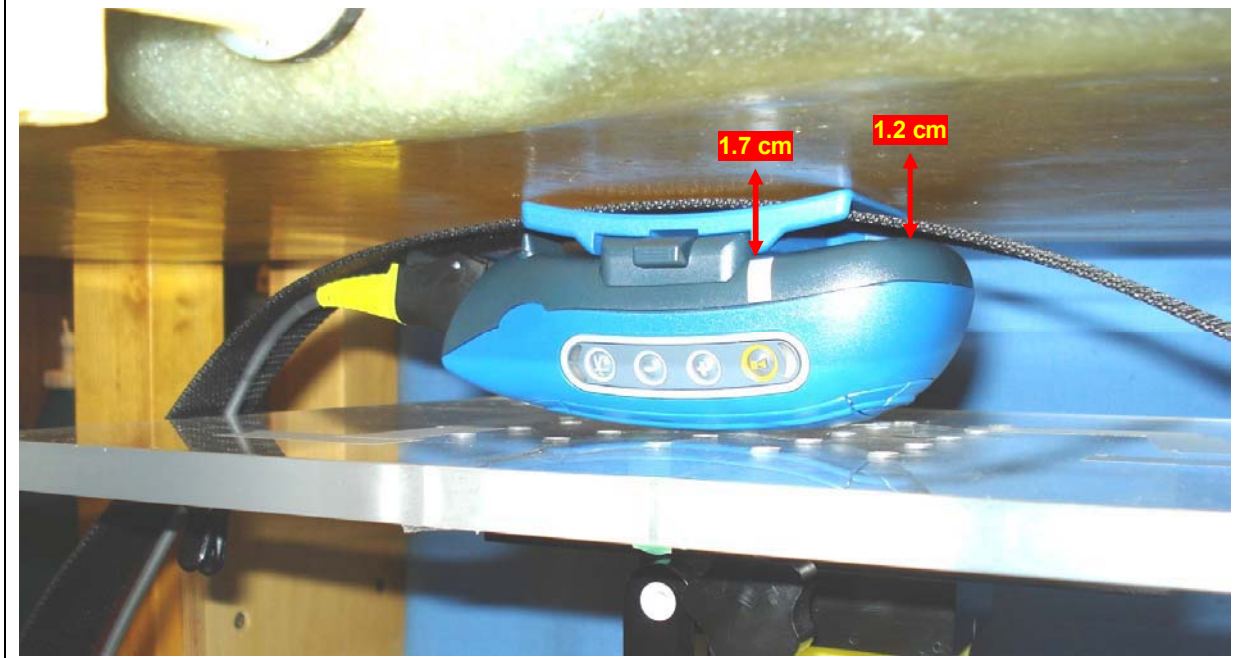
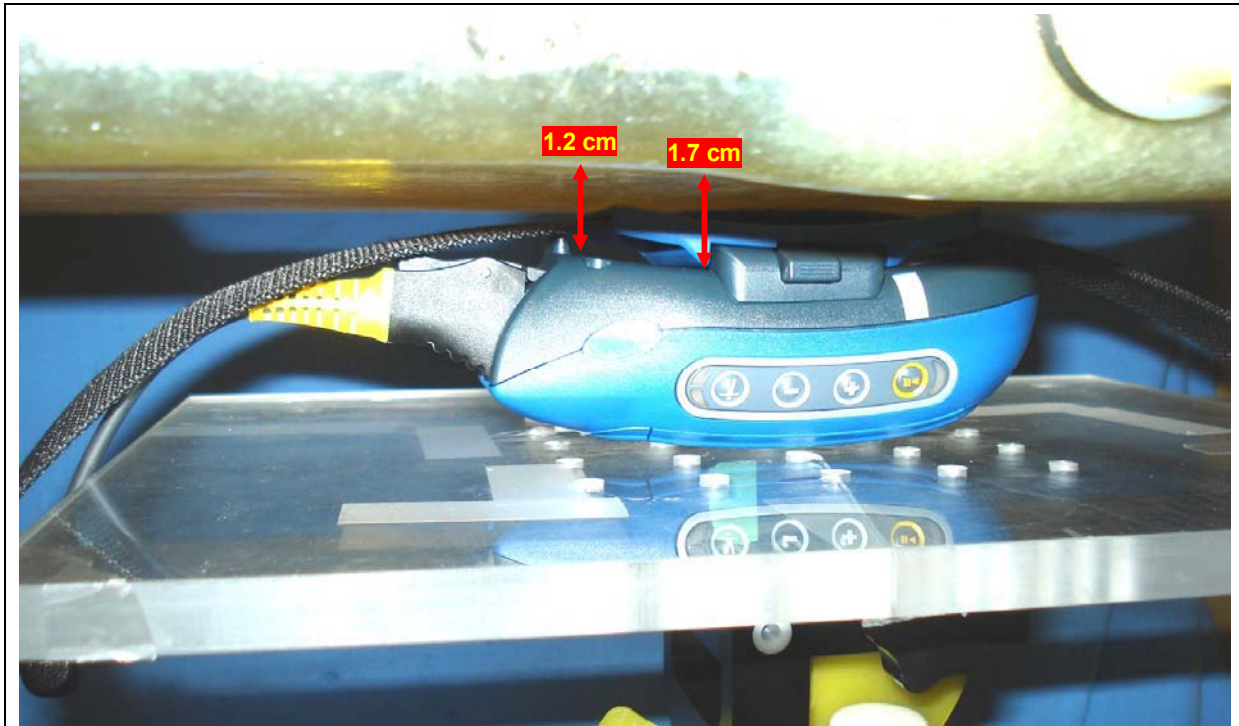


DUT with Belt-Clip/Belt-Strap Body-worn Accessory and Headset-Microphone Audio Accessory

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	Date(s) of Evaluation October 04, 2010	Test Report Serial No. 092410MQO-T1053-S15W	Test Report Revision No. Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	Test Report Issue Date October 21, 2010	Description of Test(s) Specific Absorption Rate	RF Exposure Category Gen. Pop. / Uncontrolled	

BODY SAR TEST SETUP PHOTOGRAPHS



Belt-Clip Accessory Touching Planar Phantom

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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DUT PHOTOGRAPHS

	
Button Side of DUT	Opposite Side of DUT
	
Battery Side of DUT (Front Side)	Belt-Clip Side of DUT (Back Side)
	
Audio Connector end of DUT	Opposite end of DUT

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	Test Report Issue Date October 21, 2010	Description of Test(s) Specific Absorption Rate	RF Exposure Category Gen. Pop. / Uncontrolled	

DUT PHOTOGRAPHS



DUT with Headset-Microphone audio accessory



DUT with Headset-Microphone audio accessory & Belt-Clip/Belt-Strap body-worn accessory

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	Test Report Issue Date October 21, 2010	Description of Test(s) Specific Absorption Rate	RF Exposure Category Gen. Pop. / Uncontrolled	

DUT PHOTOGRAPHS



Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	<u>Date(s) of Evaluation</u> October 04, 2010	<u>Test Report Serial No.</u> 092410MQO-T1053-S15W	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Test Lab Certificate No. 2470.01

DUT PHOTOGRAPHS



DUT with Belt-Clip and Belt-Strap (P/N: BL-700-4)



Belt-Clip Front Side



Belt-Clip Back Side

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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	<u>Date(s) of Evaluation</u> October 04, 2010	<u>Test Report Serial No.</u> 092410MQO-T1053-S15W	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	
	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Test Lab Certificate No. 2470.01

APPENDIX F - DIPOLE CALIBRATION

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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Accreditation No.: **SCS 108**

Client **Celltech**

Certificate No: **D2450V2-825_Apr09**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 825**

Calibration procedure(s) **QA CAL-05.v7**
Calibration procedure for dipole validation kits

Calibration date: **April 17, 2009**

Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

Calibrated by: **Claudio Leubler** **Laboratory Technician**

Signature

Approved by: **Katja Pokovic** **Technical Manager**

Issued: April 22, 2009

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

- d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V5.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	38.0 $\pm$ 6 %	1.82 mho/m $\pm$ 6 %
Head TSL temperature during test	(22.0 $\pm$ 0.2) °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.6 mW / g
SAR normalized	normalized to 1W	54.4 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	53.7 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.29 mW / g
SAR normalized	normalized to 1W	25.2 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	25.0 mW / g $\pm$ 16.5 % (k=2)

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

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.4 ± 6 %	1.98 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	—	—

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.9 mW / g
SAR normalized	normalized to 1W	51.6 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	51.6 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.05 mW / g
SAR normalized	normalized to 1W	24.2 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	24.2 mW / g ± 16.5 % (k=2)

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

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$54.5 \Omega + 4.7 j\Omega$
Return Loss	- 24.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$49.2 \Omega + 5.6 j\Omega$
Return Loss	- 24.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.160 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 11, 2008

DASY5 Validation Report for Head TSL

Date/Time: 17.04.2009 12:17:23

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN825

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: HSL U10 BB

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.82$ mho/m; $\epsilon_r = 38$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.4, 4.4, 4.4); Calibrated: 28.04.2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:

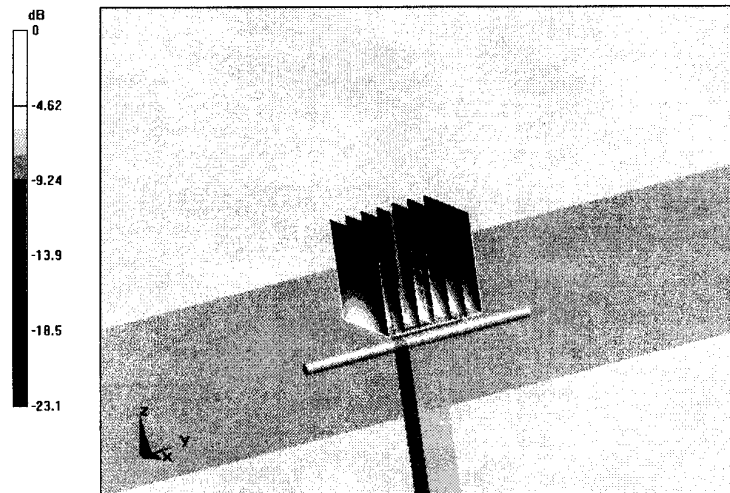
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.1 V/m; Power Drift = 0.026 dB

Peak SAR (extrapolated) = 28.4 W/kg

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

Maximum value of SAR (measured) = 17.7 mW/g



0 dB = 17.7mW/g

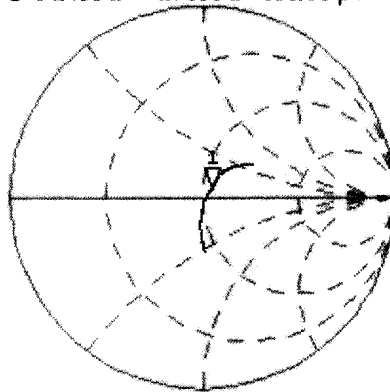
Impedance Measurement Plot for Head TSL

17 Apr 2009 09:36:50
CH1 S11 1 U FS 1: 54.469 Ω 4.7090 Ω 305.90 pH 2 450.000 000 MHz

*
 Del
 Cor

Avg
 16

↑

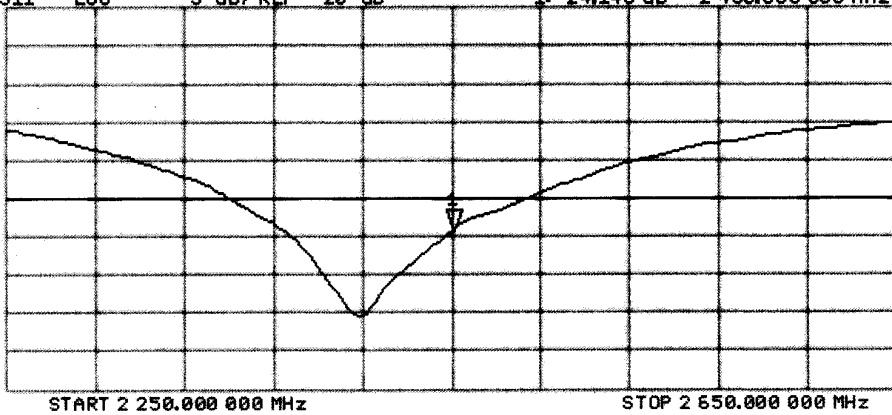


CH2 S11 L06 5 dB/REF -20 dB 1:-24.145 dB 2 450.000 000 MHz

Cor

Avg
 16

↑



DASY5 Validation Report for Body TSL

Date/Time: 17.04.2009 14:54:34

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:825

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: MSL U10 BB

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.98$ mho/m; $\epsilon_r = 54.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.07, 4.07, 4.07); Calibrated: 28.04.2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:

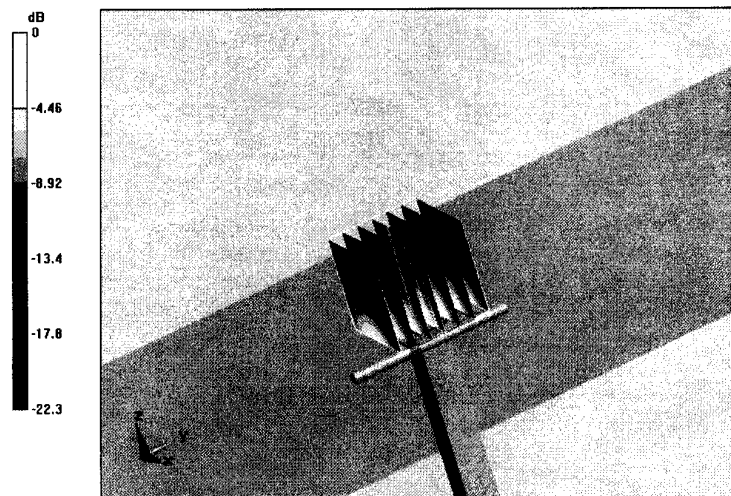
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 91.6 V/m; Power Drift = 0.046 dB

Peak SAR (extrapolated) = 26.1 W/kg

SAR(1 g) = 12.9 mW/g; SAR(10 g) = 6.05 mW/g

Maximum value of SAR (measured) = 16.6 mW/g



0 dB = 16.6mW/g

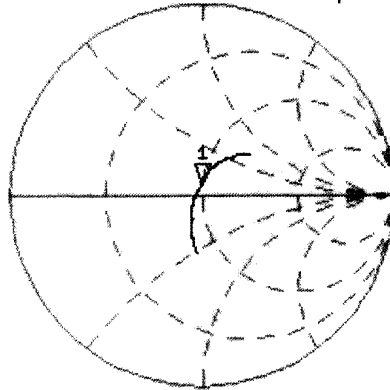
Impedance Measurement Plot for Body TSL

17 Apr 2009 09:37:35
CH1 S11 1 U FS 1: 49.158 Ω 5.6484 Ω 365.93 pH 2 450.000 000 MHz

*
De1
Cor

Avg
16

↑

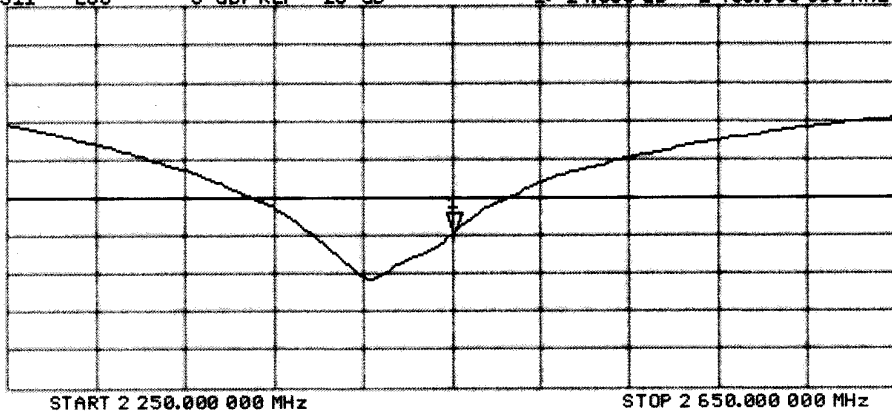


CH2 S11 L06 5 dB/REF -20 dB 1: -24.800 dB 2 450.000 000 MHz

Cor

Avg
16

↑





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Accreditation No.: **SCS 108**

Client **Colttech**

Certificate No: **D5GHzV2-1031_Apr09**

CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN: 1031**

Calibration procedure(s) **QA CAL-22.v1**
Calibration procedure for dipole validation kits between 3-6 GHz

Calibration date: **April 29, 2009**

Condition of the calibrated item **In Tolerance**

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

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^\circ\text{C}$ and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe EX3DV4	SN: 3503	11-Mar-09 (No. EX3-3503_Mar09)	Mar-10
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

Calibrated by: **Claudio Leubler** Function: **Laboratory Technician**

Approved by: **Katja Pokovic** Technical Manager

Signature

[Handwritten signatures]

Issued: April 29, 2009

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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- a) IEC Std 62209 Part 2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", Draft Version 0.9, December 2004
- b) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- c) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V5.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Area Scan resolution	dx, dy = 10 mm	
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 2.5 mm	
Frequency	5200 MHz $\pm$ 1 MHz 5500 MHz $\pm$ 1 MHz 5800 MHz $\pm$ 1 MHz	

Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	47.5 $\pm$ 6 %	5.37 mho/m $\pm$ 6 %
Body TSL temperature during test	(22.0 $\pm$ 0.2) °C	---	---

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	condition	
SAR measured	100 mW input power	7.63 mW / g
SAR normalized	normalized to 1W	76.3 mW / g
SAR for nominal Body TSL parameters ¹	normalized to 1W	75.8 mW / g $\pm$ 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.13 mW / g
SAR normalized	normalized to 1W	21.3 mW / g
SAR for nominal Body TSL parameters ¹	normalized to 1W	21.2 mW / g $\pm$ 19.5 % (k=2)

¹ Correction to nominal TSL parameters according to c), chapter "SAR Sensitivities"

Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.6	5.65 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.8 ± 6 %	5.74 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	---	---

SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	condition	
SAR measured	100 mW input power	8.01 mW / g
SAR normalized	normalized to 1W	80.1 mW / g
SAR for nominal Body TSL parameters ¹	normalized to 1W	79.5 mW / g ± 19.9 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.22 mW / g
SAR normalized	normalized to 1W	22.2 mW / g
SAR for nominal Body TSL parameters ¹	normalized to 1W	22.0 mW / g ± 19.5 % (k=2)

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.1 ± 6 %	6.13 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	---	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	condition	
SAR measured	100 mW input power	6.82 mW / g
SAR normalized	normalized to 1W	68.2 mW / g
SAR for nominal Body TSL parameters ¹	normalized to 1W	67.7 mW / g ± 19.9 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	1.89 mW / g
SAR normalized	normalized to 1W	18.9 mW / g
SAR for nominal Body TSL parameters ¹	normalized to 1W	18.7 mW / g ± 19.5 % (k=2)

¹ Correction to nominal TSL parameters according to c), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	50.1 Ω - 6.7 $\mu\Omega$
Return Loss	-23.5 dB

Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	51.6 Ω - 3.3 $\mu\Omega$
Return Loss	-29.0 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	59.4 Ω - 3.5 $\mu\Omega$
Return Loss	-20.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.197 ns
----------------------------------	----------

After long term use with 40 W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 09, 2004

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHz; Serial: D5GHzV2 - SN:1031

Communication System: CW-5GHz; Frequency: 5200 MHzFrequency: 5500 MHzFrequency: 5800 MHz;
Duty Cycle: 1:1

Medium: MSL 5800 MHz

Medium parameters used: $f = 5200$ MHz; $\sigma = 5.37$ mho/m; $\epsilon_r = 47.5$; $\rho = 1000$ kg/m³

Medium parameters used: $f = 5500$ MHz; $\sigma = 5.74$ mho/m; $\epsilon_r = 46.8$; $\rho = 1000$ kg/m³

Medium parameters used: $f = 5800$ MHz; $\sigma = 6.13$ mho/m; $\epsilon_r = 46.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.88, 4.88, 4.88)ConvF(4.37, 4.37, 4.37)ConvF(4.57, 4.57, 4.57); Calibrated: 11.03.2009
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

d=10mm, Pin=100mW, f=5200 MHz/Zoom Scan (8x8x10), dist=2mm (8x8x10)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 49.6 V/m; Power Drift = 0.00494 dB

Peak SAR (extrapolated) = 28.5 W/kg

SAR(1 g) = 7.63 mW/g; SAR(10 g) = 2.13 mW/g

Maximum value of SAR (measured) = 15.7 mW/g

d=10mm, Pin=100mW, f=5500 MHz/Zoom Scan (8x8x10), dist=2mm (8x8x10)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 49 V/m; Power Drift = -0.016 dB

Peak SAR (extrapolated) = 32 W/kg

SAR(1 g) = 8.01 mW/g; SAR(10 g) = 2.22 mW/g

Maximum value of SAR (measured) = 16.8 mW/g

d=10mm, Pin=100mW, f=5800 MHz/Zoom Scan (8x8x10), dist=2mm (8x8x10)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

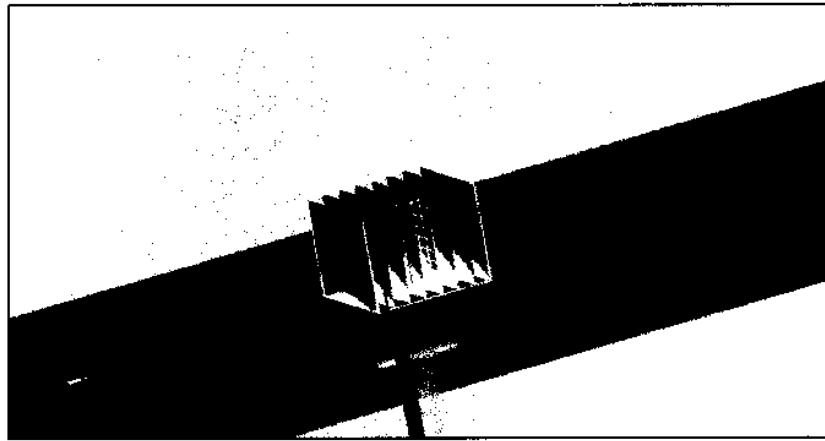
Reference Value = 43.7 V/m; Power Drift = -0.029 dB

Peak SAR (extrapolated) = 28.9 W/kg

SAR(1 g) = 6.82 mW/g; SAR(10 g) = 1.89 mW/g

Maximum value of SAR (measured) = 14.4 mW/g

dB
0
-10
-20
-30
-40
-50

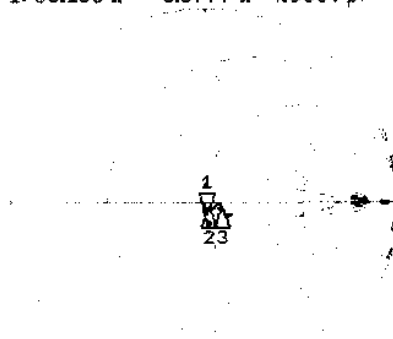


0 dB = 14.4mW/g

Impedance Measurement Plot for Body TSL

28 Apr 2009 10:39:01
 CH1 S11 1 U FS 1: 50.135 Ω -6.5777 Ω 4.5834 pF 5 200.000 000 MHz

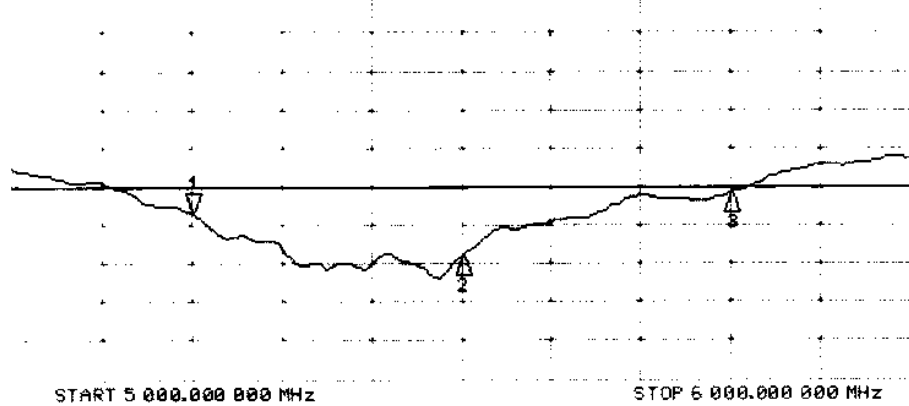
*
 Del
 Cor
 Avg
 16



CH1 Markers
 2: 51.553 Ω
 -3.2539 Ω
 5.50000 GHz
 3: 59.363 Ω
 -3.5331 Ω
 5.00000 GHz

CH2 S11 L06 5 dB/REF -20 dB 1: -23.533 dB 5 200.000 000 MHz

Cor
 Avg
 16



CH2 Markers
 2: -23.001 dB
 5.50000 GHz
 3: -20.776 dB
 5.00000 GHz

	<u>Date(s) of Evaluation</u> October 04, 2010	<u>Test Report Serial No.</u> 092410MQO-T1053-S15W	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX G - PROBE CALIBRATION

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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Accredited by the Swiss Accreditation Service (SAS)
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Celltech**

Certificate No: **EX3-3600_Apr10**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3600**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-14.v3, QA CAL-23.v3 and QA CAL-25.v2**
Calibration procedure for dosimetric E-field probes

Calibration date: **April 29, 2010**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	29-Sep-09 (No. DAE4-660_Sep09)	Sep-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct-10

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

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

Signature

Issued: April 29, 2010

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



Accredited by the Swiss Accreditation Service (SAS)
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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
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- 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
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- 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 with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}:** A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters:** Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ 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
Last calibrated:	April 28, 2009
Recalibrated:	April 29, 2010

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: EX3DV4 SN:3600**Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.51	0.51	0.40	± 10.1%
DCP (mV) ^B	90.5	88.5	85.2	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300	± 1.5%
			Y	0.00	0.00	1.00	300	
			Z	0.00	0.00	1.00	300	

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 Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

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

DASY - Parameters of Probe: EX3DV4 SN:3600

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	7.79	7.79	7.79	0.74	0.61 ± 11.0%
1810	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	6.79	6.79	6.79	0.59	0.70 ± 11.0%
1950	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	6.46	6.46	6.46	0.57	0.72 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	6.15	6.15	6.15	0.34	0.89 ± 11.0%

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

DASY - Parameters of Probe: EX3DV4 SN:3600

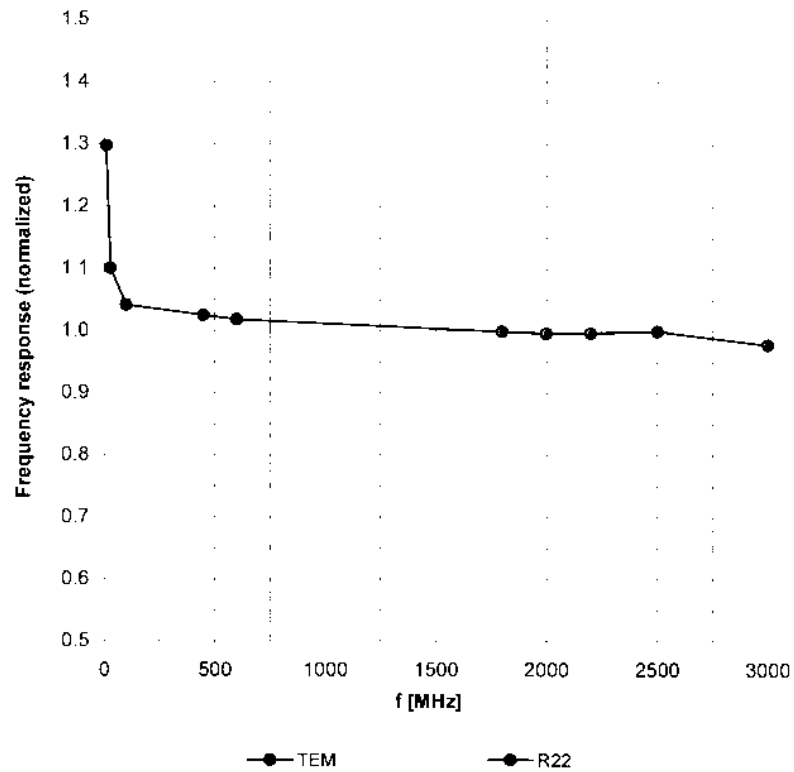
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	7.92	7.92	7.92	0.50	0.77 ± 11.0%
1810	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	6.47	6.47	6.47	0.70	0.64 ± 11.0%
1950	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	6.53	6.53	6.53	0.64	0.67 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	6.24	6.24	6.24	0.43	0.87 ± 11.0%
5200	± 50 / ± 100	49.0 ± 5%	5.30 ± 5%	3.73	3.73	3.73	0.52	1.95 ± 13.1%
5500	± 50 / ± 100	48.6 ± 5%	5.65 ± 5%	3.30	3.30	3.30	0.58	1.95 ± 13.1%
5800	± 50 / ± 100	48.2 ± 5%	6.00 ± 5%	3.44	3.44	3.44	0.63	1.95 ± 13.1%

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

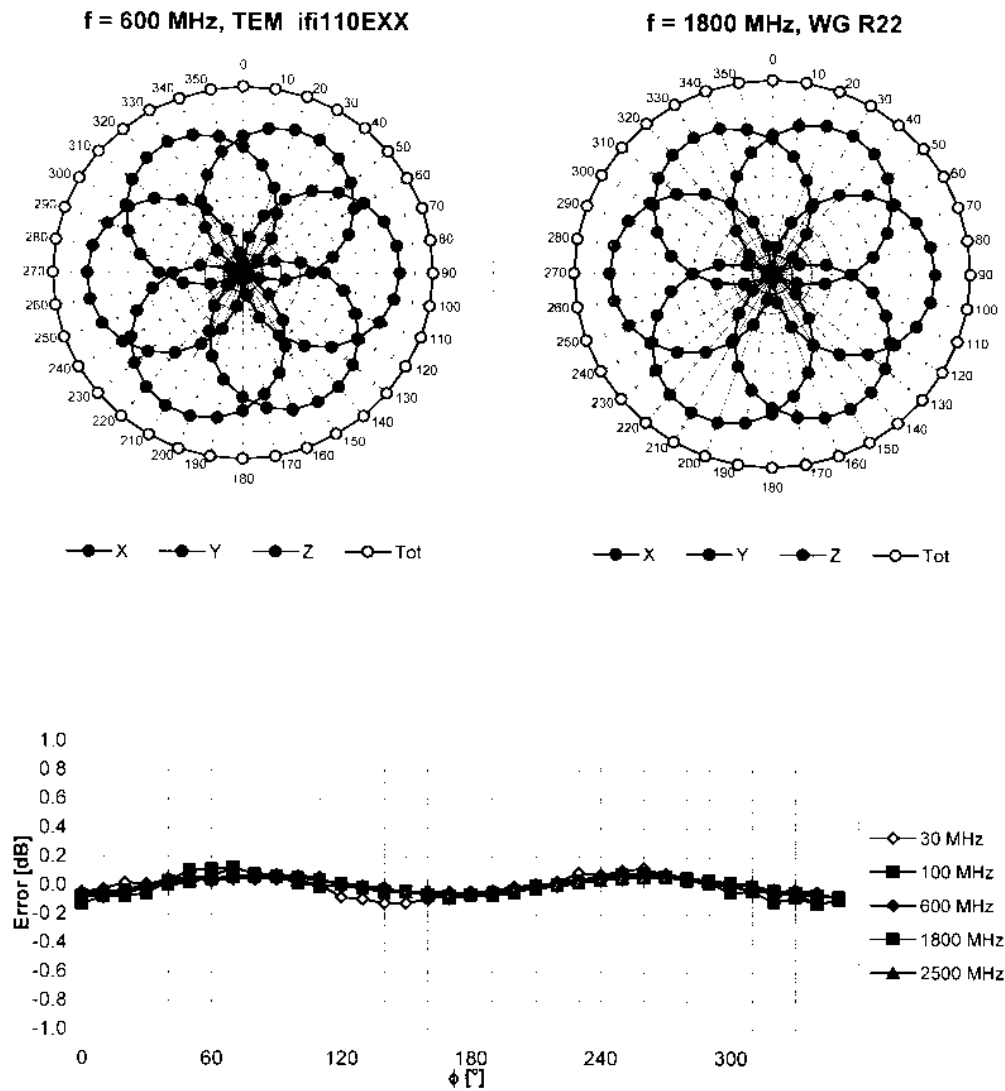
Frequency Response of E-Field

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



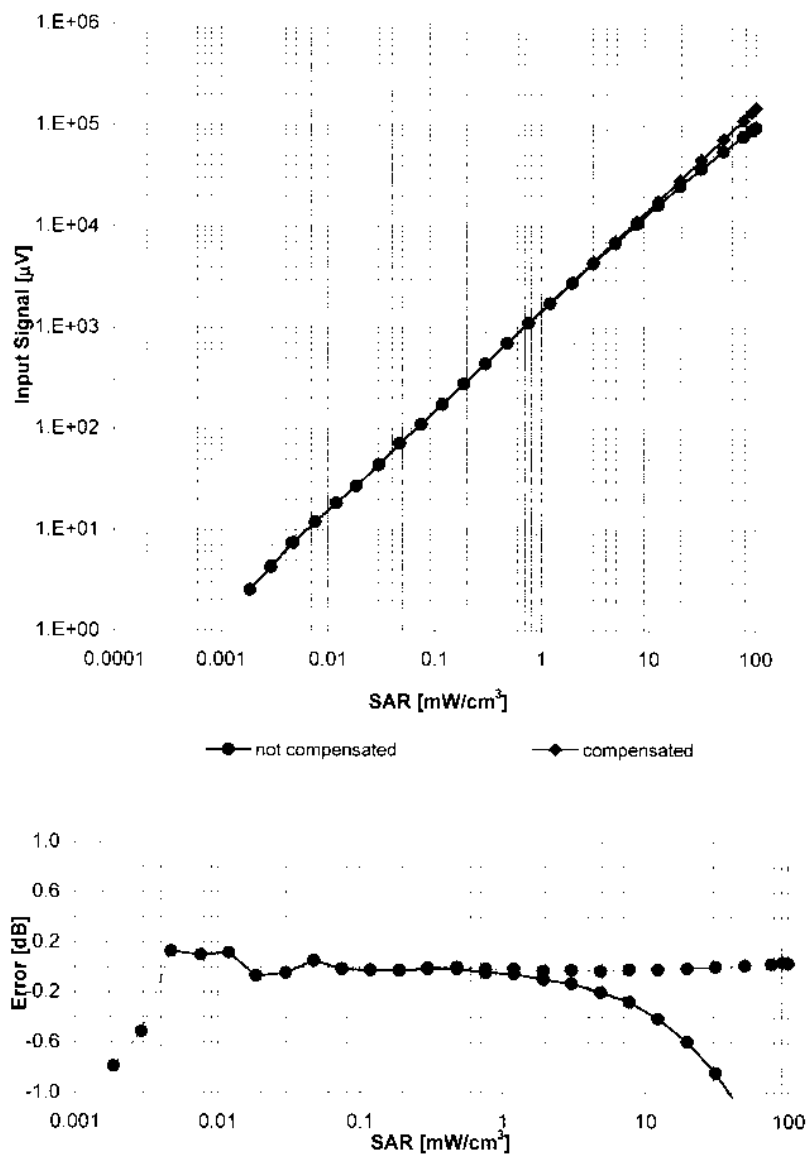
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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



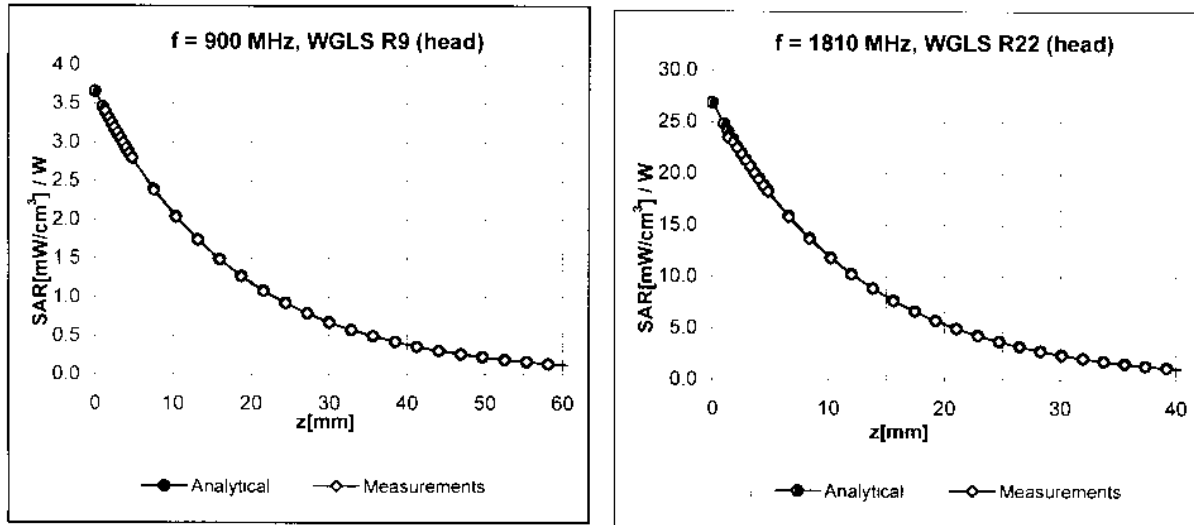
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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



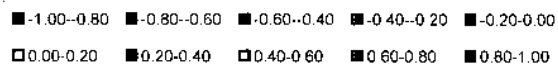
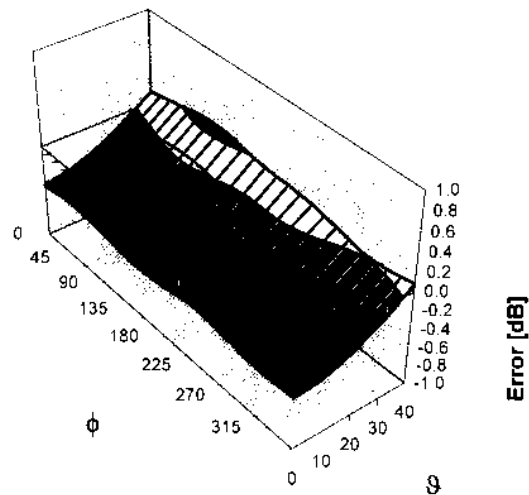
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in HSL

Error (ϕ , θ), f = 900 MHz



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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

	<u>Date(s) of Evaluation</u> October 04, 2010	<u>Test Report Serial No.</u> 092410MQO-T1053-S15W	<u>Test Report Revision No.</u> Rev. 1.1 (2nd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> October 21, 2010	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX H - BARSKI PLANAR PHANTOM CERTIFICATE OF CONFORMITY

Company Name:	VOCOLLECT, INC.	FCC ID:	MQO-TT-800-1-1	IC:	2570A-TT80011	
Model Name/No.:	A500 Terminal TT-800-1-1	DUT:	Portable Data Terminal w/ 802.11a/b/g & Bluetooth			
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V1Z-2V2



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

FIBERGLASS FABRICATORS

Certificate of Conformity

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

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

Conformity

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

Signature: _____

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



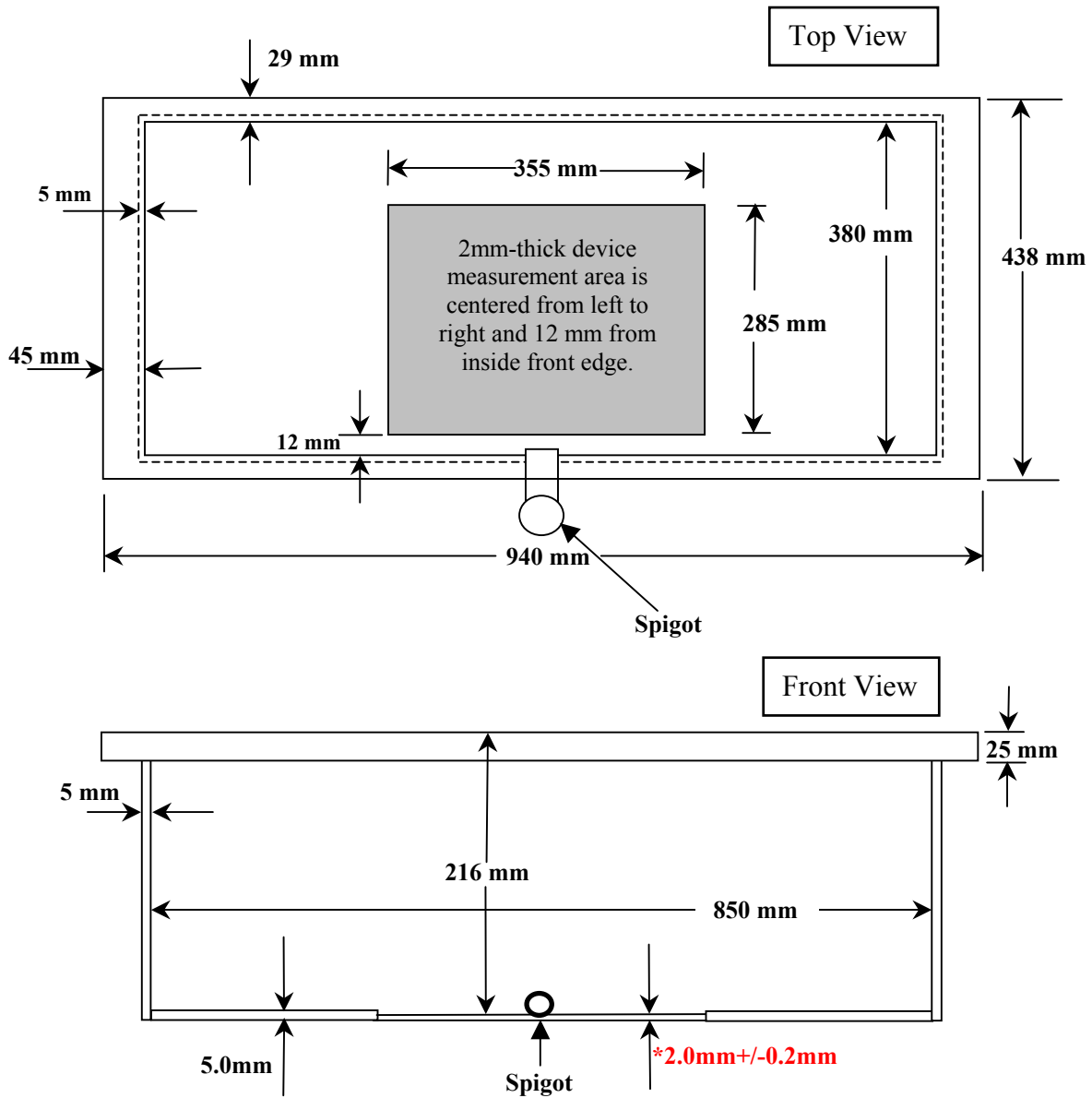
Fiberglass Planar Phantom - Back View



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.**