CERTIFICATION REPORT (Updated)

Subject: **Specific Absorption Rate (SAR) Experimental Analysis**

Product: Handheld PC

Model: T5200 with a Research in Motion R900M-2-O transmitter

Client: Itronix Corporation

Address: 801 South Stevens Street
Spokane, WA 99204

Project #: ITRB-T5200 R900M2O-3190&3301

Telecommunications Approval Board - Spectrum Sciences Institute - SAR Certified APREL Laboratories A993-T5200M

Prepared by: APREL Laboratories
51 Spectrum Way
Nepean, Ontario
K2R 1E6

Tested by ______________________ Date: ______________
Heike Wünschmann, C.E.T.

Submitted by ______________________ Date: ______________
Dr. Paul G. Cardinal
Director, Laboratories

Approved by ______________________ Date: ______________
Dr. Jacek J. Wojcik, P. Eng.

FCC ID:	KBCT5200RIM
Applicant:	Itronix Corporation
Equipment:	Handheld PC
Model:	T5200 with a Research in Motion R900M-2-O transmitter
Standard:	FCC 96 –326, Guidelines for Evaluating the Environmental Effects of Radio-Frequency Radiation

ENGINEERING SUMMARY

This report contains the results of the engineering evaluation performed on an Itronix T5200 handheld PC operating with a built in Research in Motion R900M-2-O Mobitex radio transmitter. The measurements were carried out in accordance with FCC 96-326. The handheld PC was evaluated for its maximum nominal power level of 2 W(33 dBm).

The Mobitex version of the T5200 was tested at high, middle, and low frequencies, with the maximum SAR coinciding with the peak performance RF output power of channel 720_h (middle, 899 MHz). Test data and graphs are presented in this report.

This unit as tested, and as it will be marketed and used (with a warning in the manual to keep bystanders at least 55 mm from the antenna axis or 44 mm from the edge of the handheld PC), is found to be compliant with the FCC 96-326 requirement, for an uncontrolled RF exposure environment

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1. INTRODUCTION

Tests were conducted to determine the Specific Absorption Rate (SAR) of a sample of an Itronix T5200 handheld PC, which incorporates a Research in Motion R900M-2-O Mobitex radio transmitter. These tests were conducted at APREL Laboratories' facility located at 51 Spectrum Way, Nepean, Ontario, Canada. A view of the SAR measurement setup can be seen in Appendix A Figure 1. This report describes the results obtained.

2. APPLICABLE DOCUMENTS

The following documents are applicable to the work performed:

1) FCC 96-326, Guidelines for Evaluating the Environmental Effects of Radio-Frequency Radiation

2) ANSI/IEEE C95.1-1992, IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

3) ANSI/IEEE 95.3-1992, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave.

4) OET Bulletin 65 (Edition 97-01) Supplement C (Edition 97-01), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields".

3. EQUIPMENT UNDER TEST

- Itronix T5200 with a Research in Motion R900M-2-O Mobitex radio, s/n 905165

The handheld PC's antenna is a ½ wavelength rotateable antenna. The antenna mount is designed to allow the antenna to rotated through 90° in a plane perpendicular to the keyboard. The antenna's intended transmitting position is vertical and its storage position is folded horizontally on top of the folded display (see pictures in Appendix B). The antenna specifications supplied by the manufacturer can be found in Appendix B.

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4. TEST EQUIPMENT

- Narda 8021B miniature E-field probe, s/n 04007, Asset # 301339
- APREL Triangular Dosimetric Probe Model E-009, s/n 115, Asset # 301420
- CRS Robotics A255 articulated robot arm, s/n RA2750, Asset # 301335
- CRS Robotics C500 robotic system controller, s/n RC584, Asset # 201334
- Tektronix-492 spectrum analyser, s/n B054562, Asset # 100949
- APREL F-1, flat manikin, s/n 001
- APREL UH-1, Universal Head-Arm, s/n 001, Asset # 301376
- Tissue Recipe and Calibration Requirements, APREL procedure SSI/DRB-TP-D01-033

5. TEST METHODOLOGY

1. The test methodology utilised in the certification of the handheld PC complies with the requirements of FCC 96-326 and ANSI/IEEE C95.3-1992.
2. The E-field is measured with a small isotropic probe (output voltage proportional to E^2).
3. The probe is moved precisely from one point to the next using the robot (10 mm increments for wide area scanning, 5 mm increments for zoom scanning, and 2.5 mm increments for the final depth profile measurements).
4. The probe travels in the homogeneous liquid simulating human tissue. Appendix D contains information about the recipe and properties of the simulated tissue used for these measurements.
5. The liquid is contained in a manikin simulating a portion of the human body.
6. The handheld PC is positioned in such a way that it touches the bottom of the phantom with either the antenna side, the bottom side or the keyboard.

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7. All tests were performed with the highest power available from the sample handheld PC, under transmit conditions.

More detailed descriptions of the test method is given in Section 6 when appropriate.

6. TEST RESULTS

6.1. TRANSMITTER CHARACTERISTICS

The battery-powered transmitter will consume energy from its batteries, which may affect its transmission characteristics. In order to gage this effect the output of the transmitter is sampled before and after each SAR run. In the case of the handheld PC, which does not have an externally accessible feedpoint the radiated power was sampled. A power meter was connected to an antenna adjacent to a fixture to hold the transmitter in a reproducible position. The following table shows the results for the three sets of data used for this report.

Scan		**Relative Power Reading (dB)**		**Battery #**
Type	Height (mm)	Before	After	
Area	2.5	-13.5	-13.5	1
Area	12.5			
Zoom	2.5			1
Zoom	7.5	-13.5	-13.4	
Zoom	12.5			
Depth	2.5 – 17.5	-13.3	-13.2	2

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6.2. SAR MEASUREMENTS

1) RF exposure is expressed as a Specific Absorption Rate (SAR). SAR is calculated from the E-field, measured in a grid of test points as shown in Appendix A Figure 2. SAR is expressed as RF power per kilogram of mass, averaged in 1 gram of tissue.

2) The Itronix T5200 handheld PC was put into test mode for the SAR measurements using manufacturer supplied keypad or touch screen commands to control the channel (initially 720_h, middle, 899MHz) and maximum operating power (nominally 33 dBm). A duty factor of 45.45 % was used for the initial area scans with the Narda probe and 100% for the later zoom and depth scans with the APREL probe. (The device would only transmit for 5 minutes at a 100 % duty factor with the supplied software.)

3) Figure 3 in Appendix A shows a contour plot of the SAR measurements for the Itronix T5200 handheld PC sample. The presented values were taken 2.5 mm into the simulated tissue from the Flat Phantom's solid inner surface. The device under test's right edge was 0 mm from the Flat Phantom's solid outer surface (11 mm from antenna's axis). Figure 2 in Appendix A shows the Flat Phantom used in the measurements. A grid is shown inside of the Flat Phantom indicating the orientation of the x-y grid used, with the co-ordinates 5,18 at the bottom left corner of the handheld PC. The x-axis is positive towards the right and the y-axis is positive towards the top. The antenna inside the handheld PC is located at the left end of the device (see pictures in Appendix B).

   A different presentation of the same data is shown in Appendix A Figure 4. This is a surface plot, where the measured SAR values provide the vertical dimension, which is useful as a visualisation aid.

   Figure 5 in Appendix A shows the overlay of the Handheld PC's right edge outline, superimposed onto the contour plot previously shown as Figure 3.

   Figures 3 and 4 in Appendix A show that there is a dominant peak.

4) The SAR adjacent to different surfaces of the Handheld PC was investigated on the middle (720_h) channel. The surface being investigated was touching the bottom of the flat phantom.

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Laptop Surface	**Highest Local SAR** (W/kg)
Keyboard	0.30
Bottom	0.09
Right Edge with Antenna	4.06

Subsequent testing was performed with the antenna side of the Handheld PC parallel to the lower surface of the flat phantom.

5) Wide area scans were performed for the low (480_h, 896MHz), middle (720_h, 899MHz) and high (960_h, 901MHz) channels. The peak single point SAR for the scans were:

Channel	**Frequency [MHz]**	**Channel # [hexadecimal]**	**Highest SAR [w/kg]**
Low	896	480	3.41
Middle	899	720	4.06
High	901	960	2.63

Subsequent testing was performed on the middle (720_h, 899 MHz) channel

6) Zoom scans were also performed for the middle (720h, 899MHz) channel vs. separation with a 100 % duty factor. (Wide area scans were not possible with the limited transmit time of 5 minutes.) The peak single point SAR for the scans were:

Channel		**Antenna's Axis to Phantom's Inner Surface Separation**	**Highest Local SAR**
	(MHz)	(mm)	(W/kg)
M	899	43.9	2.30
		50.4	1.54
		53.7	1.37

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Considering the anticipated scaling to the inner surface of the phantom, subsequent testing was performed with an antenna-axis to inner phantom wall (simulated tissue) separation of 53.7 mm.

Figure 10 in Appendix A shows the data plotted as a function of separation and the exponential curve fit to them.

7) The presented values were taken 2.5 mm into the simulated tissue from the UniHead's solid inner surface. Figure 6 in Appendix A shows the UniHead used in the measurements. A grid is shown inside of the UniHead indicating the orientation of the x-y grid used, with the co-ordinates 0,0 on the antenna rotation point. The x-axis is positive towards the left and the y-axis is positive towards the bottom.

8) The middle channel (720h) SAR peak was then explored on a refined 0.5 mm grid in three dimensions (antenna axis 53.7 mm from inner phantom wall). Figures 7, 8, and 9 show the measurements made at 2.5, 7.5, and 12.5 mm respectively. The SAR value averaged over 1 gram was determined from these measurements by averaging the 27 points (3x3x3) comprising a 1 cm cube. The maximum SAR value measured averaged over 1 gram was determined from these measurements to be 0.99 W/kg.

9) To extrapolate the maximum SAR value averaged over 1 gram to the inner surface of the head phantom a series of measurements were made at a few (x,y) coordinates within the refined grid as a function of depth, with 2.5 mm spacing. Figure 11 in Appendix A shows the data gathered and the exponential curves fit to them. The average exponential coefficient was determined to be (-0.0648± 0.0005) / mm.

The distance from the probe tip to the inner surface of the head phantom for the lowest point is 2.5 mm. The distance from the probe tip to the tip of the measuring dipole within the APREL Triangular Dosimetric Probe Model E-009 is 2.3 mm. The total extrapolation distance is 4.8 mm, the sum of these two.

Applying the exponential coefficient over the 4.8 mm to the maximum SAR value average over 1 gram that was determined previously, we obtain the maximum SAR value at the surface averaged over 1 gram of 1.35 W/kg.

7. ANALYSIS

The preceding measurements were performed for the nominal maximum power of 2 W (33dBm). It was determined by proportional scaling of the maximum power to

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2.4W (FCC grant for R900M-2-O, EAS83666) that the device would produce an estimated 1g SAR of 1.62 W/kg.

The measurements of highest local SAR versus separation of the antenna axis from the inner phantom wall (Section 6.2.4) will enable the peak 1g SAR for a separation of 53.7 mm (previous section) to be extrapolated/interpolated for other separations.

If the data for Figure 10 is fitted to an exponential equation we get:

$$\text{Peak Local SAR} = 24.421e^{-0.0541x\ \text{separation}}$$

A similar equation will exist for the peak 1g SAR versus separation:

$$\text{Peak 1g SAR} = k\ e^{-0.0541x\ \text{separation}}$$

Using this equation with the previous section's data:

Peak 1g SAR for a 100% duty cycle = 1.35W/kg
separation = 53.7 mm

results in a k = 29.55 W/kg, which corresponds to the peak 1g SAR when the separation is zero. A conservative peak 1g SAR of 1.5 W/kg would occur for a separation of 55.1mm (44 mm from the edge of the handheld PC).

8. CONCLUSIONS

The Itronix Corporation T5200 Handheld PC which incorporates a Research in Motion R900M-2-O Mobitex radio transmitter will not expose the user to a maximum Specific Absorption Rate (SAR) exceeding the FCC 96-326 SAR safety guideline limit of 1.6W/kg. However, a bystander in the near proximity of the transmitting antenna may be exposed to such levels.

The maximum SAR averaged over 1g, determined at 899 MHz (middle channel - 720), for a separation between the antenna axis and the inner phantom wall of 53.7 mm, was determined to be 1.35 W/kg. The overall margin of uncertainty for this measurement is ±10.9%. Scaling up to the FCC grant power of 2.4 W for the R900M-2-O transmitter results in an estimated SAR of 1.62 W/kg. The analysis of the previous section shows that a more conservative 1.5W/kg will not be exceeded for a separation exceeding 55 mm from the antenna axis or 44 mm from the edge of the handheld PC.

This unit as tested, and as it will be marketed and used (with a warning in the manual to keep bystanders at least 55 mm from the antenna axis), is found to be compliant with the FCC 96-326 requirement.

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APPENDIX A

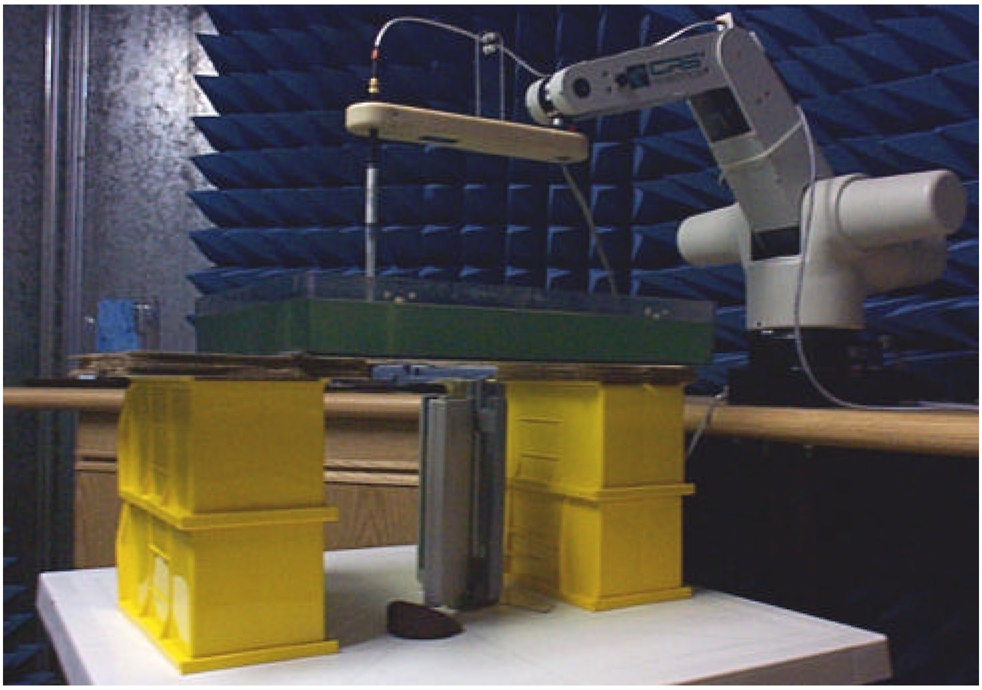

Figure 1

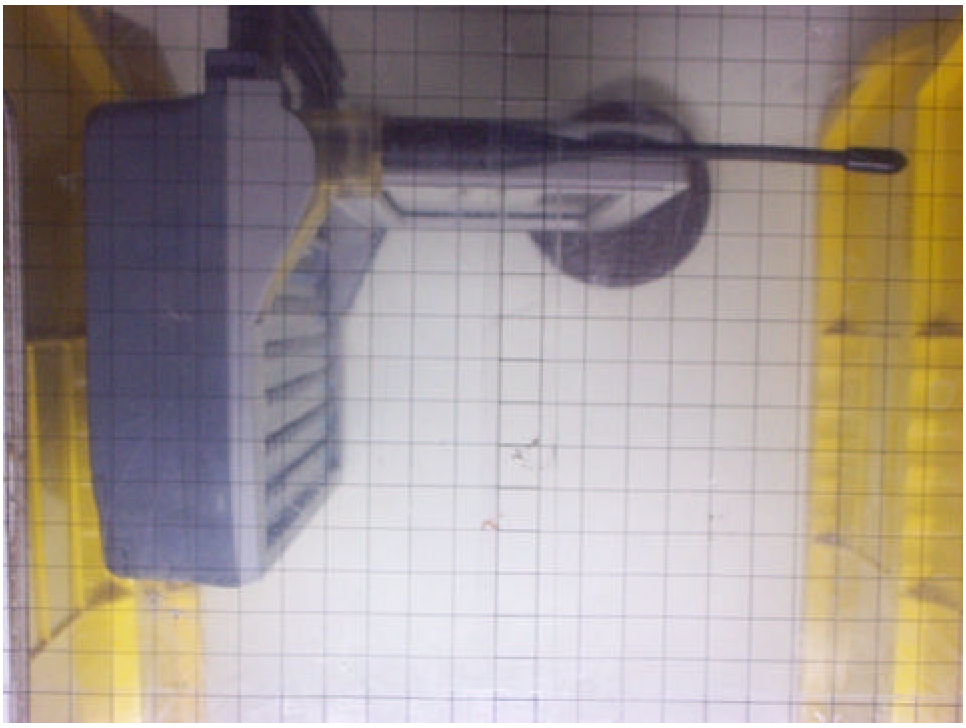

Figure 2

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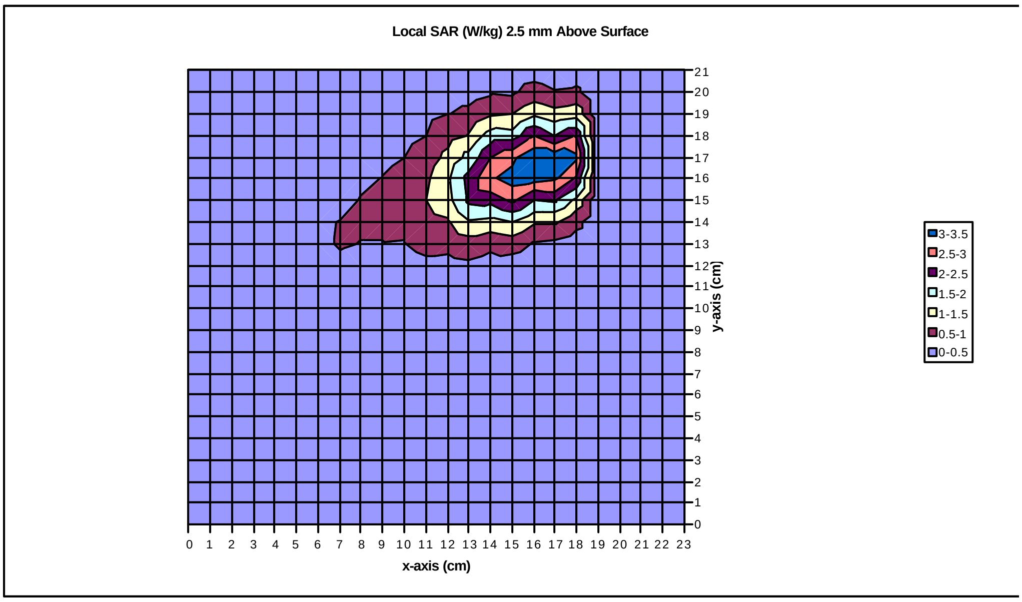

Figure 3

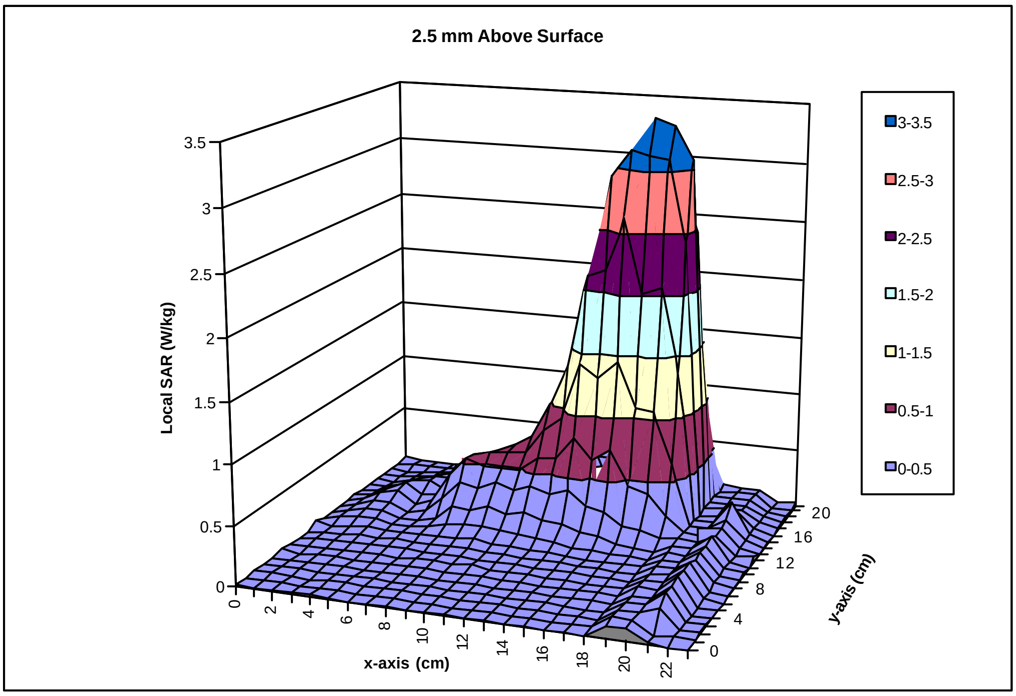

Figure 4

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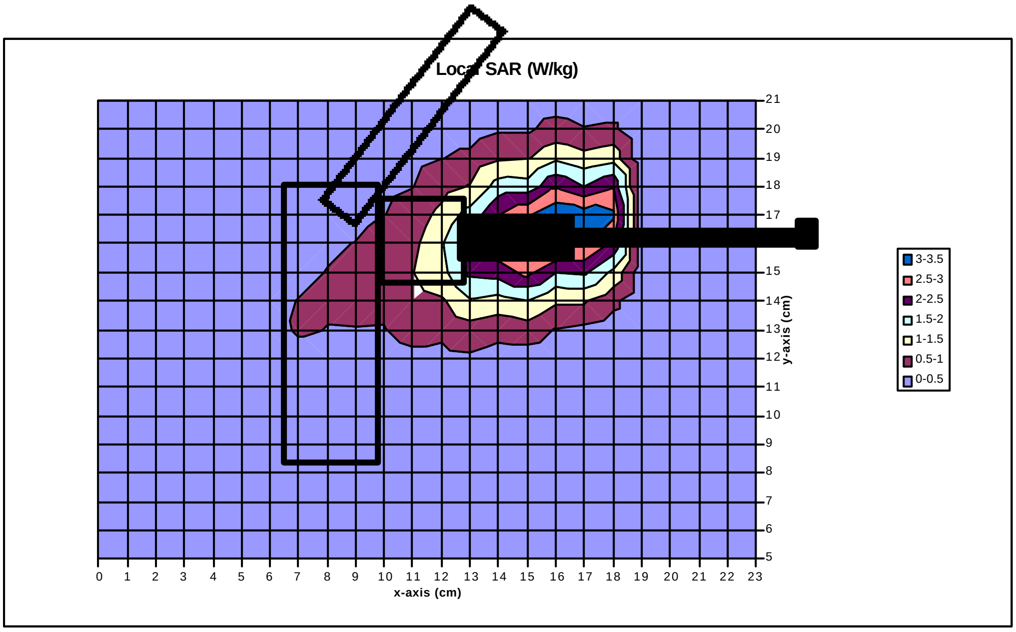

Figure 5

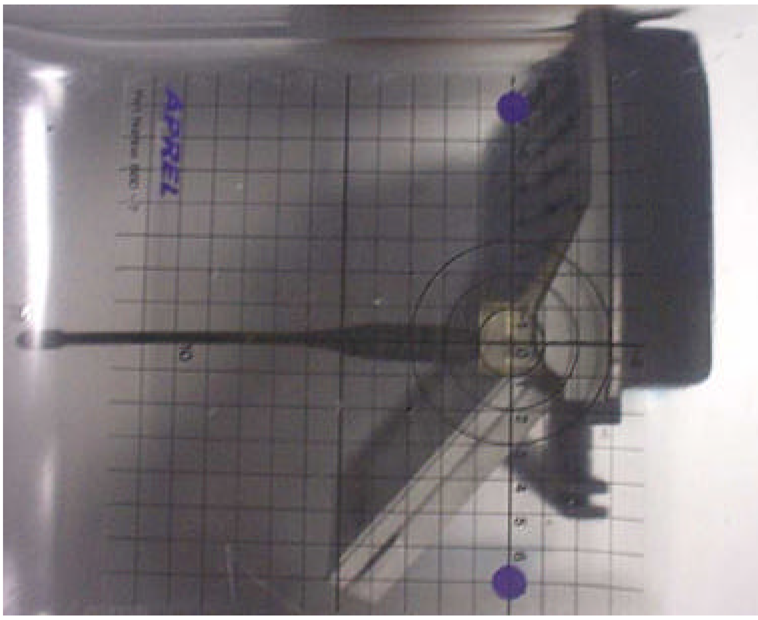

Figure 6

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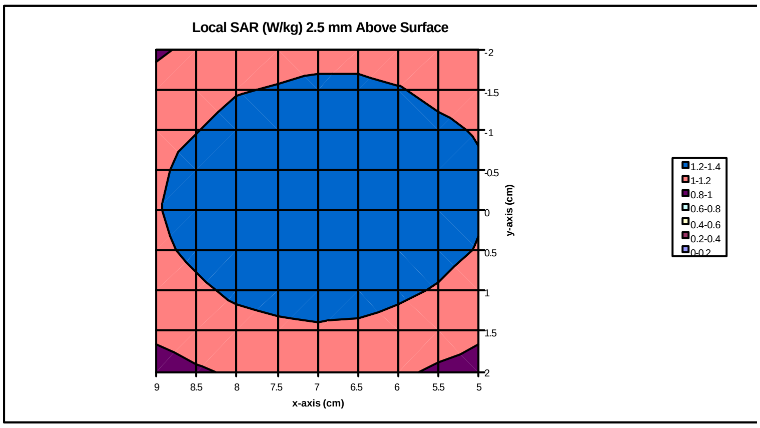

Figure 7

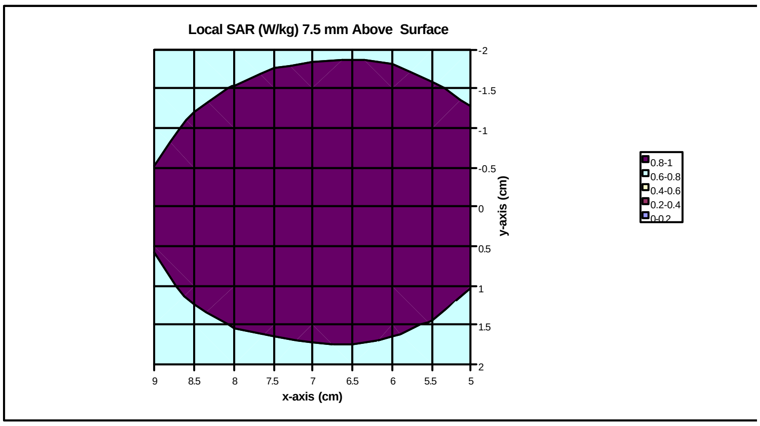

Figure 8

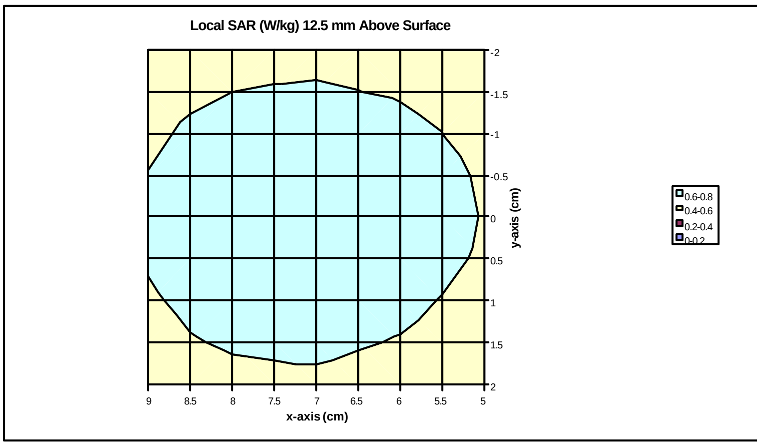

Figure 9

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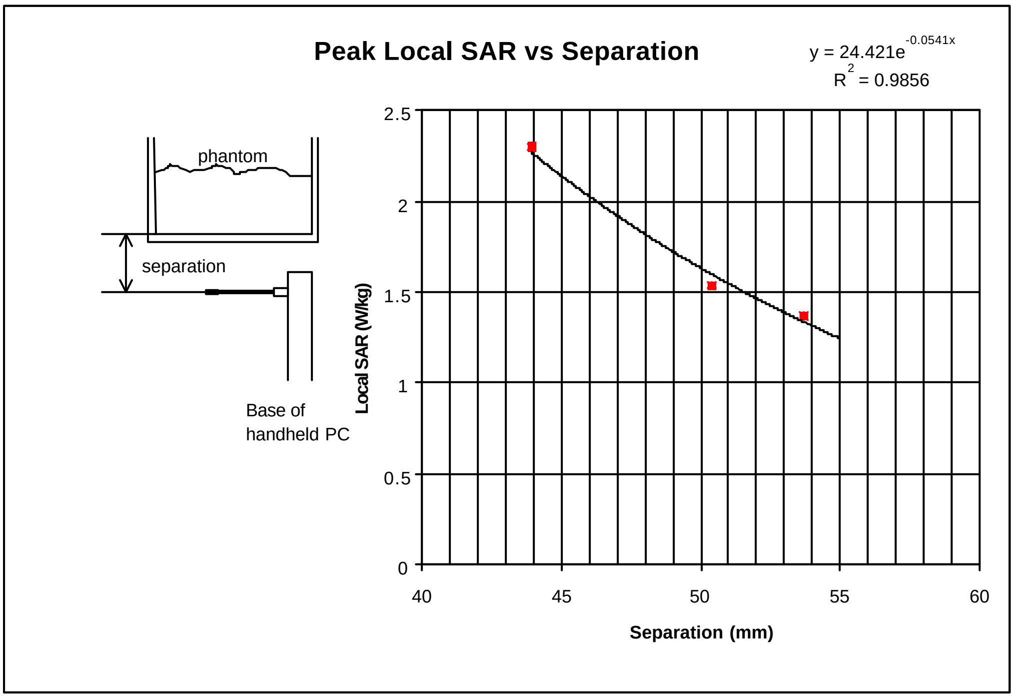

Figure 10

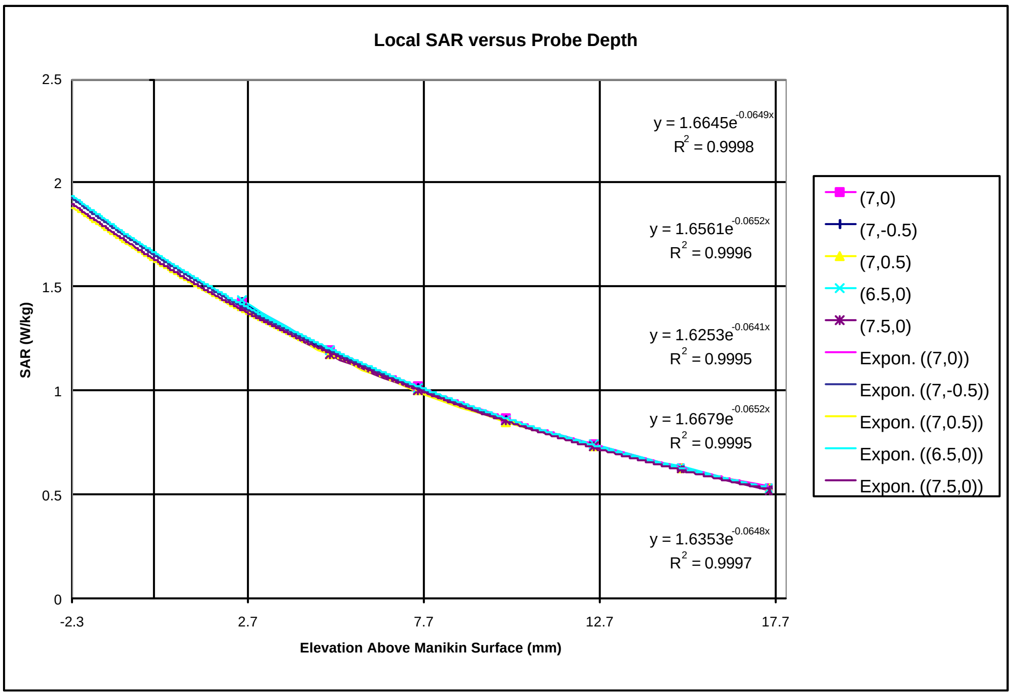

Figure 11

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APPENDIX B

Manufacturer's Antenna Specifications

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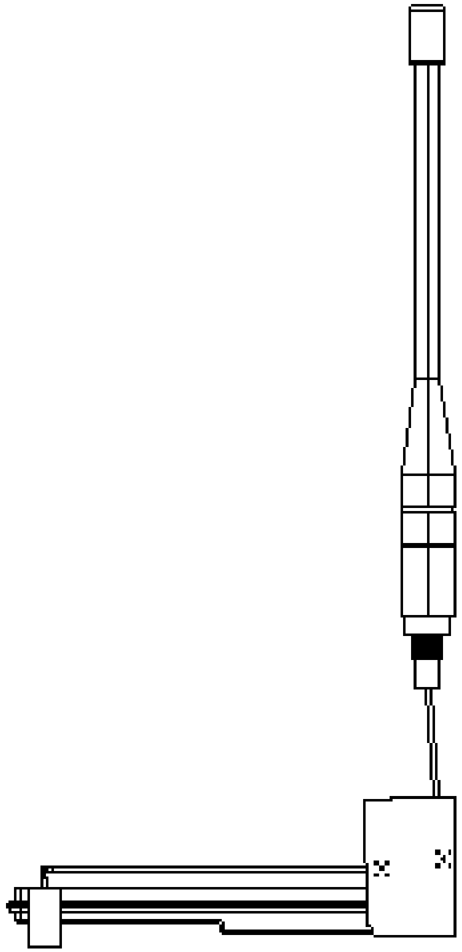
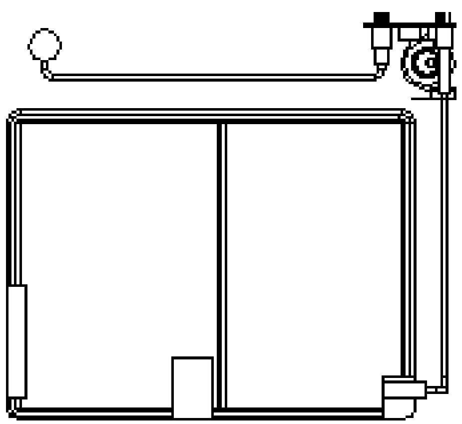
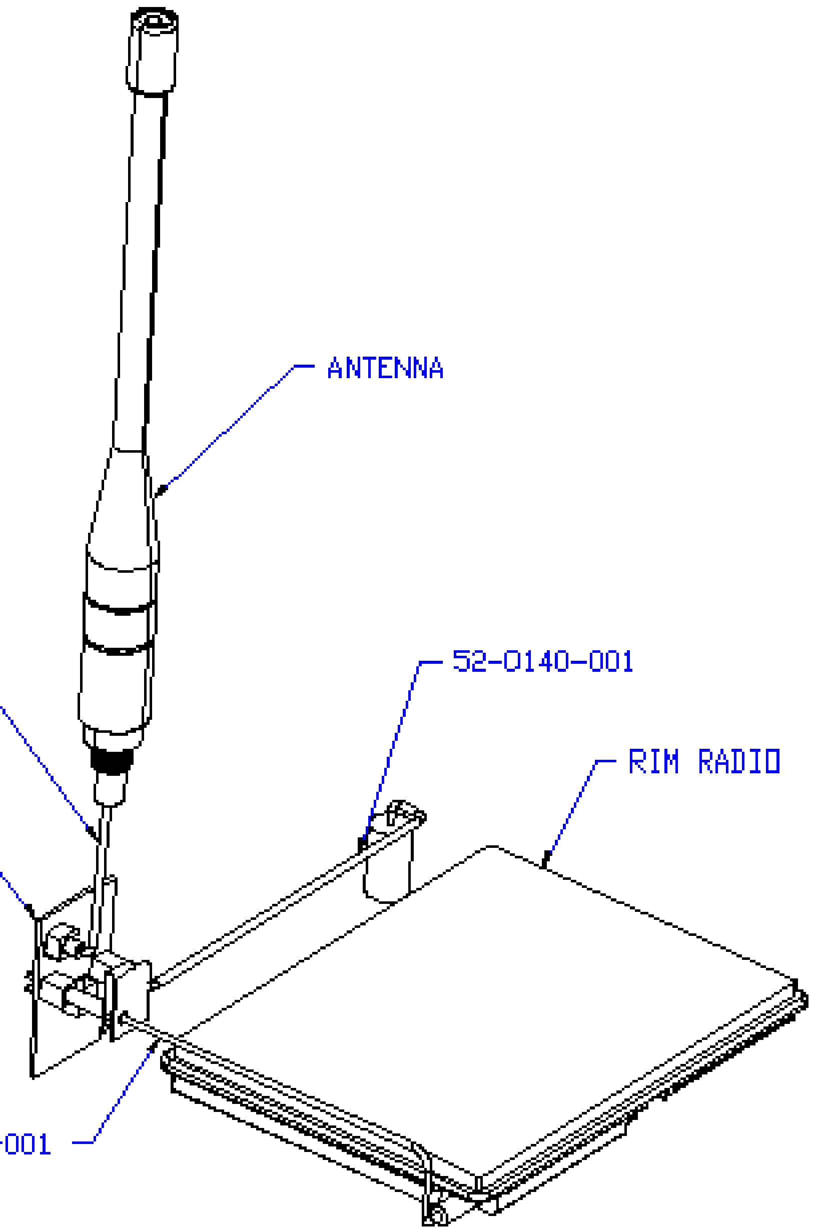


REAR VIEW



BOTTOM VIEW



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TOL. EXCEPT AS NOTED
.XX ± .01 INCH
.XXX ± .005 INCH
ANG. = 1°
.XXX DIMENSIONS NOT TO SCALE

THIRD ANGLE PROJECTION

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SPOKANE, WA 99210

ZONE	REV.	ECO	BY	DESCRIPTION	APP.	DATE

DRAFTER B. BRITZ	DATE 5-6-99	TITLE RADIO SKETCH FOR FCC	
CHECKER	DATE		
ELEC. ENG	DATE	SIZE B	DWG. NO
MECH. ENG B. BRITZ	DATE 5-6-99	PROJECT	SUPERSEDES
MFG. ENG	DATE	SCALE .75X	SHEET 1 OF 1 / REV

APPENDIX C

Uncertainty Budget

Uncertainties Contributing to the Overall Uncertainty

Type of Uncertainty	Specific to	Uncertainty
Power variation due to battery condition	DUT	1.2%
Extrapolation due to curve fit of SAR vs depth	DUT	1.4%
Extrapolation due to depth measurement	setup	3.2%
Conductivity	setup	6.0%
Density	setup	2.6%
Tissue enhancement factor	setup	7.0%
Voltage measurement	setup	0.4%
Probe sensitivity factor	setup	3.5%
		10.9% RSS

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APPENDIX D

Simulated Tissue Material and Calibration Technique

The tissue mixture used was based on that presented SSI/DRB-TP-D01-033, "Tissue Recipe and Calibration Requirements".

De-ionised water	52.8 %
Sugar	45.3 %
Salt	1.5 %
HEC	0.3 %
Bactericide	0.1 %
Mass density, ρ	1.30 g/ml (The density used to determine SAR from the measurements was the recommended 1040 kg/m^3 found in Appendix E of Supplement C to OET Bulletin 65, Edition 97-01)

Dielectric parameters of the simulated tissue material were determined using a Hewlett Packard 8510 Network Analyser, a Hewlett Packard 809B Slotted Line Carriage, and an APREL SLP-001 Slotted Line Probe. The dielectric properties are:

Date: 7 May 99 Probe: Narda 8021B	APREL	OET 65 Supplement	Δ/%
Dielectric constant, ε_r	51.3	55.96	-8.3
Conductivity, σ [S/m]	1.14	0.97	+17.5
Tissue Conversion Factor, γ	6.3	-	-

Date: 29 Sep 99 Probe: APREL E-009	APREL	OET 65 Supplement	Δ/%
Dielectric constant, ε_r	52.8	55.9	-5.6
Conductivity, σ [S/m]	1.18	0.97	+21.6
Tissue Conversion Factor, γ	6.3	-	-

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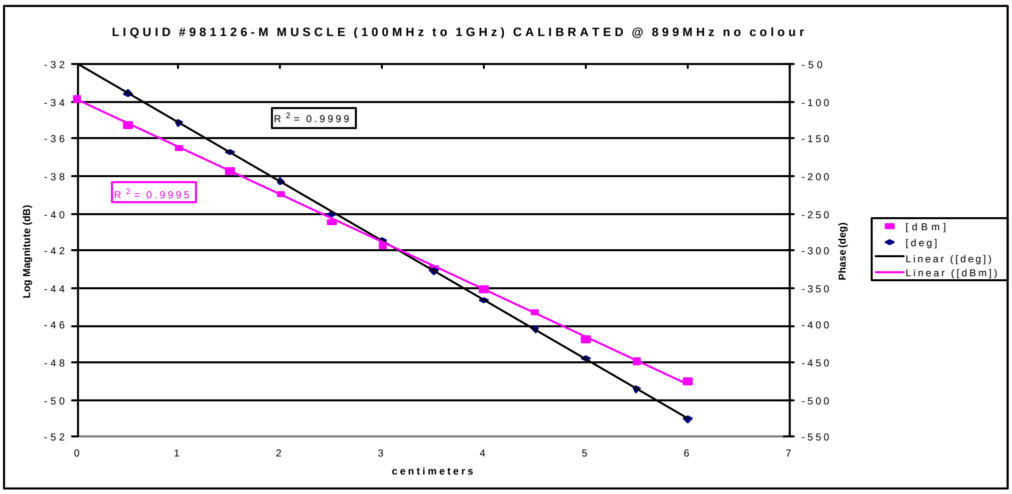
SIMULATION FLUID #	**981126-M no colour**
CALIBRATION DATE	**7-May-99**
CALIBRATED BY	**Antonio**
Frequency Range	**100MHz-1GHz**
Frequency Calibrated	**899 MHz**
Tissue Type	**Muscle**

Position	Amplitude	Phase	
[cm]	[dBm]	[deg]	[deg]
0	-33.85	-48.77	-48.77
0.5	-35.27	-88.95	-88.95
1	-36.47	-128.64	-128.64
1.5	-37.72	-167.95	-167.95
2	-38.96	153.44	-206.56
2.5	-40.49	109.23	-250.77
3	-41.71	73.53	-286.47
3.5	-42.94	33.09	-326.91
4	-44.08	-6.8	-366.8
4.5	-45.31	-44.92	-404.92
5	-46.76	-84.28	-444.28
5.5	-47.95	-125.24	-485.24
6	-48.99	-165.46	-525.46

ΔdB_1	-7.86	Δdeg_1	-237.7
ΔdB_2	-7.67	Δdeg_2	-237.96
ΔdB_3	-7.61	Δdeg_3	-238.16
ΔdB_4	-7.59	Δdeg_4	-236.97
ΔdB_5	-7.8	Δdeg_5	-237.72
ΔdB_6	-7.46	Δdeg_6	-234.47
ΔdB_7	-7.28	Δdeg_7	-238.99
ΔdB_{AVG} [dB]	-7.61	$Ddeg_{AVG}$ [deg]	-237.4242857
dB_{AVG} (α_{AVG}) [dB/cm]	-2.54	deg_{AVG} (β_{AVG}) [deg/cm]	-79.14142857
(α_{AVG}) [NP/cm]	-0.292044543	(β_{AVG}) [rad/cm]	-1.381278503

f [Hz]	8.99E+08
μ [H/cm]	1.25664E-08
ε_o [F/cm]	8.854E-14

ε_r	**51.3**	
$\sigma_{effective}$	**1.14**	S/m



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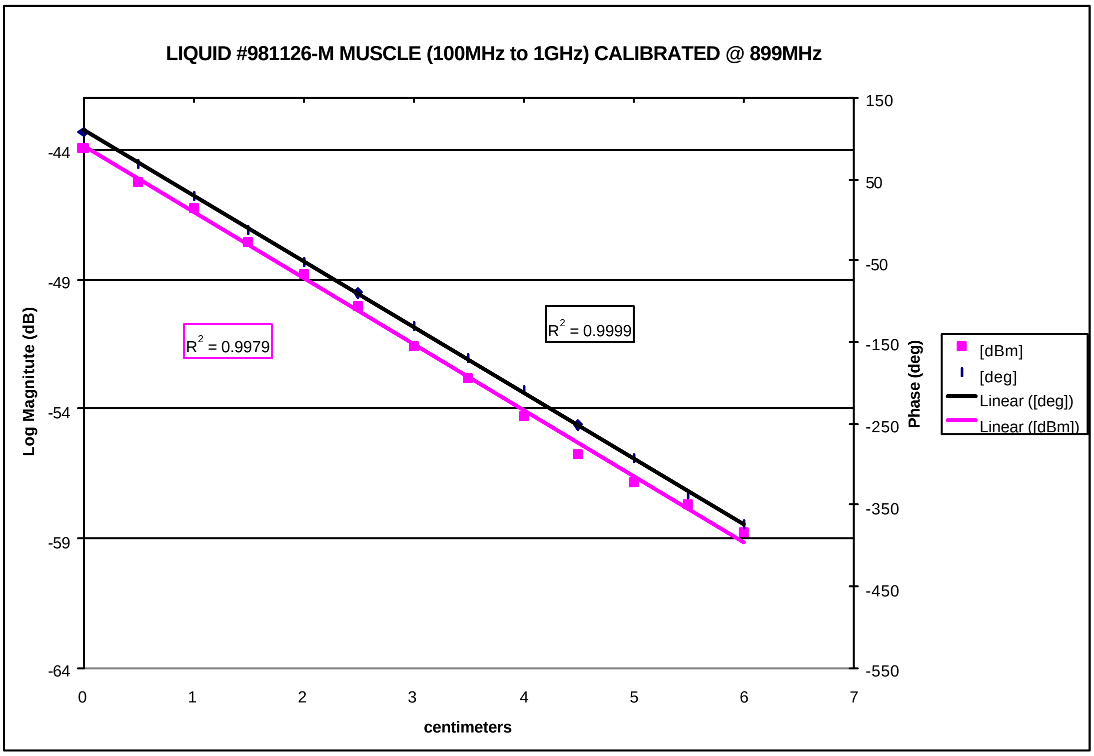
SIMULATION FLUID #	**981126-M**
CALIBRATION DATE	**29-Sep-99**
CALIBRATED BY	**Heike**
Frequency Range	**100MHz-1GHz**
Frequency Calibrated	**899 MHz**
Tissue Type	**Muscle**

Position [cm]	Amplitude [dBm]	Phase [deg]	[deg]
0	-43.94	108.4	108.4
0.5	-45.26	68.07	68.07
1	-46.29	28.6	28.6
1.5	-47.55	-11.28	-11.28
2	-48.77	-51.99	-51.99
2.5	-50.02	-89.73	-89.73
3	-51.59	-129.43	-129.43
3.5	-52.83	-169.68	-169.68
4	-54.28	150.28	-209.72
4.5	-55.76	108.16	-251.84
5	-56.85	67.5	-292.5
5.5	-57.7	24.44	-335.56
6	-58.77	-13.77	-373.77

ΔdB_1	-7.65	Δdeg_1	-237.83
ΔdB_2	-7.57	Δdeg_2	-237.75
ΔdB_3	-7.99	Δdeg_3	-238.32
ΔdB_4	-8.21	Δdeg_4	-240.56
ΔdB_5	-8.08	Δdeg_5	-240.51
ΔdB_6	-7.68	Δdeg_6	-245.83
ΔdB_7	-7.18	Δdeg_7	-244.34
ΔdB_{AVG} [dB]	-7.77	$Ddeg_{AVG}$ [deg]	-240.7342857
dB_{AVG} (α_{AVG}) [dB/cm]	-2.59	deg_{AVG} (β_{AVG}) [deg/cm]	-80.2447619
(α_{AVG}) [NP/cm]	-0.298020299	(β_{AVG}) [rad/cm]	-1.400535303

f [Hz]	8.99E+08
μ [H/cm]	1.25664E-08
ε_o [F/cm]	8.854E-14

ε_r	**52.8**	
$\sigma_{effective}$	**1.18**	**S/m**



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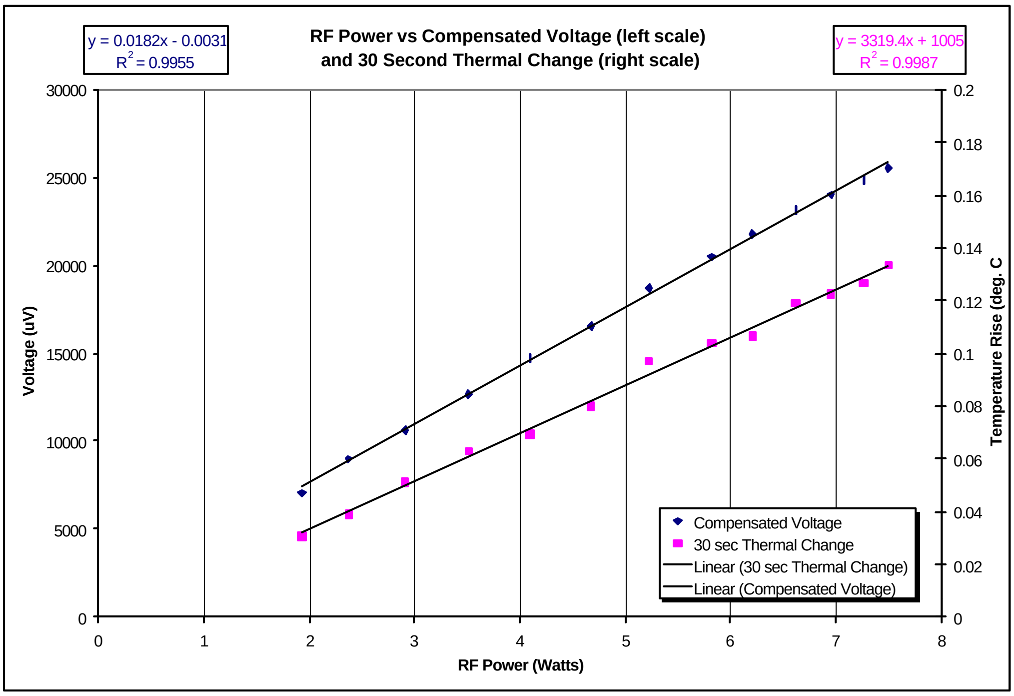
RF Power			Ch0	Ch1	Ch2	(30 sec)	Vi/Ei		SAR
W	dBm	R&S	uV	uV	uV	deg. C			W/kg
1.936422	32.87	-12.48	208	3328	4153	0.0307	7042.46		2.84
2.37684	33.76	-11.59	226	4453	5137	0.0388	8981.27		3.59
2.910717	34.64	-10.71	244	5249	6104	0.0512	10610.6		4.74
3.515604	35.46	-9.89	269	6333	7261	0.0628	12680.9		5.81
4.092607	36.12	-9.23	293	7427	8408	0.0695	14749.8		6.43
4.677351	36.7	-8.65	391	8325	9375	0.08	16547.1		7.40
5.223962	37.18	-8.17	439	9424	10571	0.0971	18689.3		8.98
5.821032	37.65	-7.7	439	10425	11548	0.104	20493.6		9.62
6.20869	37.93	-7.42	439	11230	12183	0.1064	21804.1		9.84
6.622165	38.21	-7.14	464	11963	12931	0.119	23179.7		11.01
6.950243	38.42	-6.93	464	12549	13257	0.1224	24006.7		11.32
7.26106	38.61	-6.74	439	13159	13599	0.1266	24845.9		11.71
7.498942	38.75	-6.6	464	13550	13916	0.1336	25514.5		12.36

Directional Coupler factor 25.35 dB (Asset 100251 cal file data (Janusz, 21 Jul 96))
Additional inline attenuation 20 dB

	Ch0	Ch1	Ch2	
Sensitivity (e)	0.693	0.747	0.715	- Sensor Sensitivity in mV/ (mW/cm^2): 899 MHz cal (AU + HW, 1 Sep 98)
η = 1.50 e	1.0395	1.1205	1.0725	

Density	1.3	g/cm^3	1300	kg/m^3	- Marcin, summer 97
Conductivity	11.8	mS/cm	1.18	S/m	- Heike 19-Apr-99
Heat Capacity (c)	2.775	J/C/g	2775	J/C/kg	- average of Balzano (2.7) and Kuster (2.85) values
Exposure Time	30	seconds	30	seconds	
Slope of Measure Voltage (m_V)	3319.43	uV/W	0.00332	V/W	
- standard error or m_V	34.6847	uV/W	3.5E-05	V/W	1.0%
Slope of Measure Temp Change (m_T)	0.01831	C/W	0.01831	C/W	
- standard error or m_T	0.00066	C/W	0.00066	C/W	3.6%

Tissue Conversion Factor (γ)	6.3



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899 MHz Data (Tony & Heike) MUSCLE with E-115

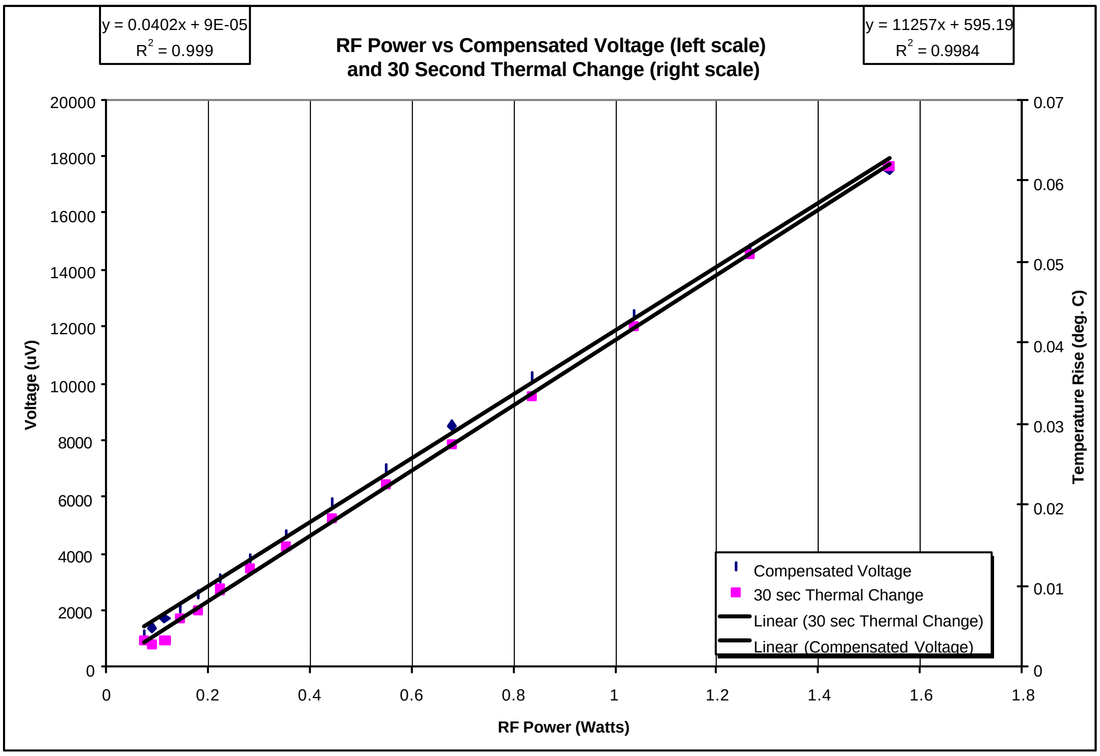
						delta T	Sum		Thermal
RF Power			Ch0	Ch1	Ch2	(30 sec)	Vi/Ei		SAR
W	dBm	R&S	uV	uV	uV	deg. C			W/kg
0.072611	18.61	-26.74	317	708	1831	0.0033	1173.54		0.31
0.090991	19.59	-25.76	342	830	2246	0.0028	1404.52		0.26
0.115345	20.62	-24.73	391	1001	2808	0.0034	1725.93		0.31
0.143549	21.57	-23.78	439	1221	3418	0.006	2086.69		0.56
0.179887	22.55	-22.8	513	1465	4224	0.0071	2548.67		0.66
0.224905	23.52	-21.83	610	1807	5225	0.0096	3140.42		0.89
0.283792	24.53	-20.82	732	2222	6421	0.0122	3852.56		1.13
0.353183	25.48	-19.87	854	2710	7861	0.015	4694.98		1.39
0.442588	26.46	-18.89	1025	3345	9717	0.0184	5788.89		1.70
0.548277	27.39	-17.96	1221	4077	11719	0.0225	6992.81		2.08
0.677642	28.31	-17.04	1489	5005	14233	0.0275	8517.23		2.54
0.837529	29.23	-16.12	1782	6079	17114	0.0334	10262.7		3.09
1.037528	30.16	-15.19	2173	7422	20605	0.042	12409.5		3.89
1.264736	31.02	-14.33	2612	8936	24390	0.0509	14766.9		4.71
1.538155	31.87	-13.48	3149	10693	28711	0.0617	17484.6		5.71

Directional Coupler factor 25.35 dB (Asset 100251 cal file data (Janusz, 21 Jul 96))
Additional inline attenuation 20 dB

Sensitivity (e)	1.619	1.633	1.619	- Sensor Sensitivity in mV/ (mW/cm^2): 899 MHz cal (HW, 2 Jul 99)
η = 1.50 e	2.4285	2.4495	2.4285	

Density	1.3	g/cm^3	1300	kg/m^3	- Marcin, summer 97
Conductivity	11.7	mS/cm	1.17	S/m	- Heike 19-Apr-99
Heat Capacity (c)	2.775	J/C/g	2775	J/C/kg	- average of Balzano (2.7) and Kuster (2.85) values
Exposure Time	30	seconds	30	seconds	
Slope of Measure Voltage (m_V)	11256.6	uV/W	0.01126	V/W	
- standard error or m_V	126.203	uV/W	0.00013	V/W	1.1%
Slope of Measure Temp Change (m_T)	0.04025	C/W	0.04025	C/W	
- standard error or m_T	0.00035	C/W	0.00035	C/W	0.9%

Tissue Conversion Factor (γ) 9.6



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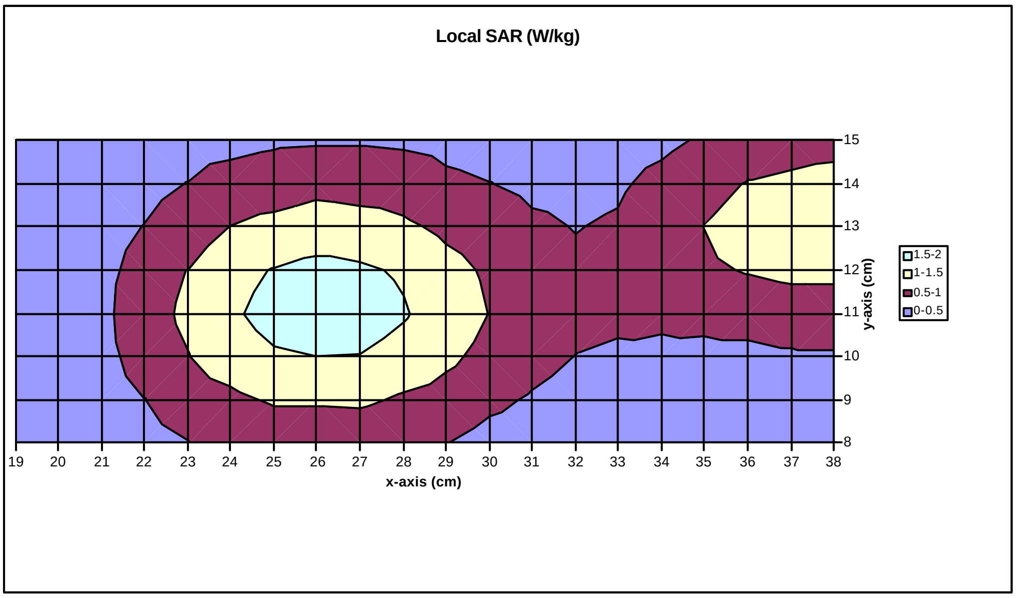
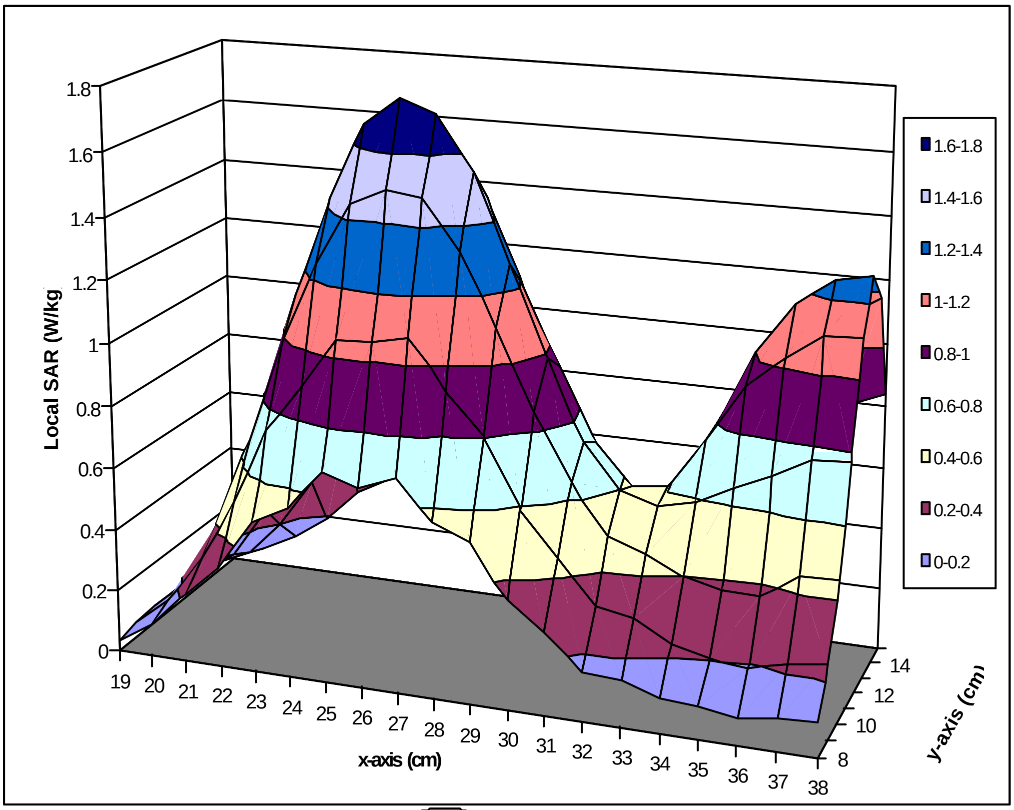
APPENDIX E

Validation Scans with Narda Probe





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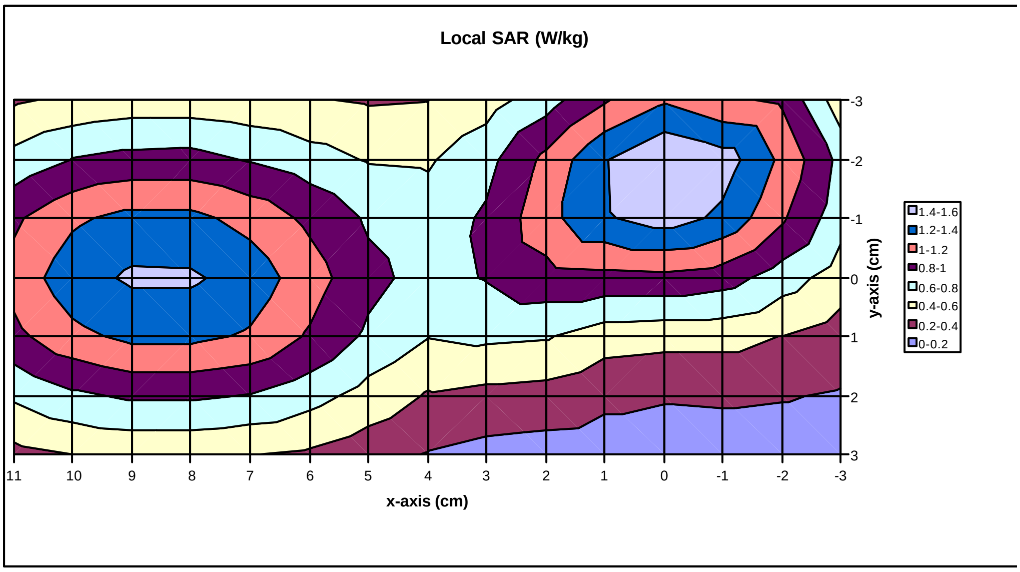
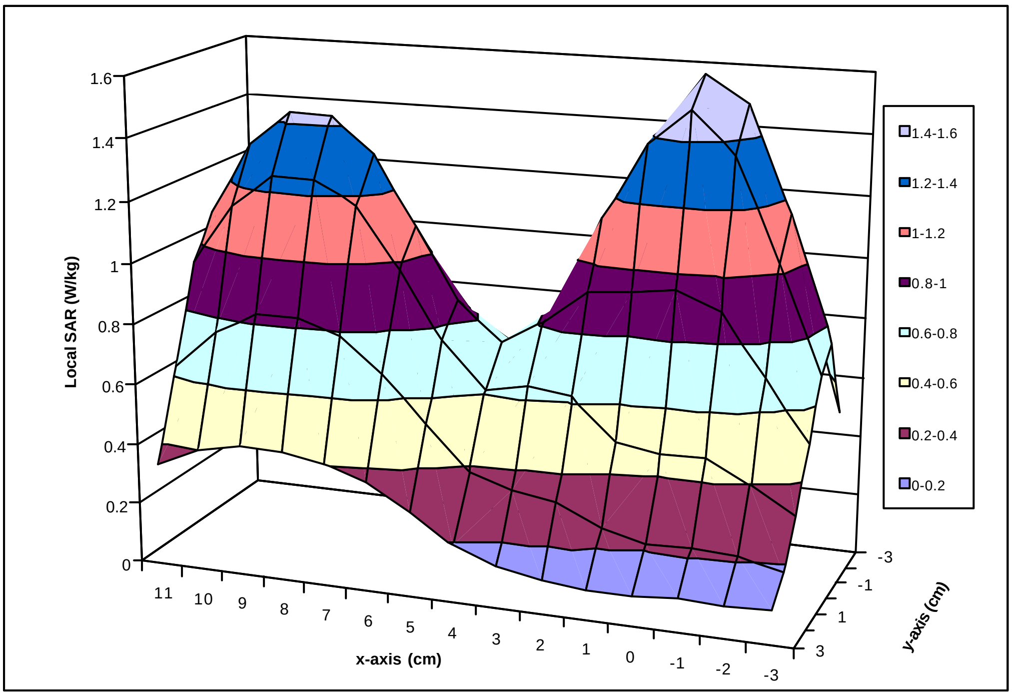
Validation Scans with APREL Probe





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