FCC ID: PQSWAVENET-DUAL-V

Exhibit 11

RF Exposure Information
SAR Report

Certification Report on

Specific Absorption Rate (SAR)
Experimental Analysis

Wavenet Technologies Pty Ltd.

PDA Wireless Modem
Attachment for Palm V/Vx
Model DWV 100D

Test Date: June 2001

WVTB-Palm V Motient cradle-3731

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EXPERIMENTAL ANALYSIS SAR REPORT

Subject: **Specific Absorption Rate (SAR) Report for FCC Submission**

Product: PDA Wireless Modem Attachment for a Palm V/Vx

Model: DWV 100D

Client: Wavenet Technologies Pty Ltd

Address: 140 Burswood Road
Burswood, Perth, WA 6100
Australia

Project #: WVTB-Palm V Motient cradle-3731

Prepared by APREL Laboratories
51 Spectrum Way
Nepean, Ontario
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Approved by _____ Date: 6th June 2001
Stuart Nicol
Director Product Development, Dosimetric R&D

Submitted by _____ Date: June 6, 2001
Jay Sarkar
Technical Director of Standards & Certification

Released by _____ Date: June 6/01.
Dr. Jacek J. Wojcik, P. Eng.

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FCC ID: PQSWAVENET-DUAL-V
Applicant: Wavenet Technologies Pty Ltd
Equipment: PDA Wireless Modem Attachment for a Palm V/Vx
Model: DWV 100D
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 the DWV 100D Attachment for a Palm V/Vx. The measurements were carried out in accordance with FCC 96-326. The DWV 100D was evaluated for its maximum power level 1.862 (ERP) with a 7 % duty cycle.

The DWV 100D modem is an attachment for a Palm PDA. The device can also be attached to a desktop PC.

The DWV 100D was tested at low, middle and high channels for the keyboard up, keyboard down, and right sides for body, hand, and bystander exposure while attached to the PDA only. The maximum 10g SAR (0.63 W/kg) was found to coincide with the peak performance RF output power of channel 2000 (806 MHz) for the Keyboard Down of the device. (The hot spot is located near the base of the antenna). The maximum 1g SAR (0.89 W/kg) was found to coincide with the peak performance RF output power of channel 2000 (806 MHz) for the Keyboard Down of the device. (The hot spot is located near the base of the antenna). Test data and graphs are presented in this report.

The DWV 100D was tested at low, middle and high channels for the keyboard up, keyboard down, and right sides for bystander exposure while attached to a desktop PC with and without the PDA. The maximum measured value was found to coincide with the peak performance RF output power of channel 2000 (806 MHz) for the Keyboard Down of the device. At a separation distance of 0 cm from the antenna of the device, the maximum 1g SAR is 0.95 W/kg.

Based on the test results and on how the device will be marketed and used, it is certified that the product meets the requirements as set forth in the above specifications, for the RF exposure environment.

(The results presented in this report relate only to the sample tested.)

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TABLES AND FIGURES

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1. INTRODUCTION

Tests were conducted to determine the Specific Absorption Rate (SAR) for a sample DWV 100D. 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 C95.1-1999, IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

3) ANSI/IEEE C95.3-1992, 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. DEVICE UNDER INVESTIGATION

- DWV 100D, s/n 4.05, received on May 29, 2001.

The Wavenet DWV 100D will be called DUI (Device Under Investigation) in the following.

Refer to the submission documentation for drawings and further design details.

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4. TEST EQUIPMENT

- 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 # 301334
- Anritsu Spectrum Analyzer, Asset # 100479
- Tissue Recipe and Calibration Requirements, APREL procedure SSI/DRB-TP-D01-033

5. TEST METHODOLOGY

1. The test methodology utilized in the certification of the DUI 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 measurement).

4. The probe travels in the homogeneous liquid simulating human tissue. Appendix A contains information about the properties of the simulated tissue used for these measurements.

5. The liquid is contained in a manikin simulating a portion of the human body with an overall shell thickness of 3 mm.

6. The DUI is positioned with the surface under investigation against the phantom.

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

   More detailed descriptions of the test method are given in Section 6 where appropriate.

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6. TEST RESULTS

6.1. TRANSMITTER CHARACTERISTICS

The battery-powered DUI will consume energy from its batteries, which may affect the DUI's transmission characteristics. In order to gage this effect the output Tx power of the transmitter is sampled before and after each SAR run. In the case of this DUI, the conducted power was sampled. The following table shows the conducted RF power sampled before and after each of the seven sets of data used for the worst case SAR evaluation in this report.

Scan		Power Readings (dBm)		D	Battery #
Type	Height (mm)	Before	After	(dB)	
Area	2.5	31.66	31.7	0.04	1
Zoom	2.5	31.7	31.53	0.17	1
Zoom	7.5	31.53	31.53	0.0	2
Zoom	12.5	31.53	31.53	0.0	3
Zoom	17.5	31.53	31.17	0.36	4
Zoom	22.5	31.53	31.17	0.36	1
Depth	2.5 – 22.5	31.17	31.17	0.0	2

Table 1. Sampled RF Power

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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 1. SAR is expressed as RF power per kilogram of mass, averaged in 10 grams of tissue for the extremities and 1 gram of tissue elsewhere.

2) The DUI was put into test mode for the SAR measurements via communications software supplied by the manufacturer running on the DUI to control the channel and operating Tx power.

3) Figure 4 in Appendix A shows a contour plot of the SAR measurements for the DUI (channel 2000, 806 MHz). It also shows an overlay of the DUI's outlines, superimposed onto the contour plot

   A different presentation of the same data is shown in Appendix A Figure 5. This is a surface plot, where the measured SAR values provide the vertical dimension, which is useful as a visualization aid.

4) Wide area scans were performed for the low, middle and high channels on the keyboard up, keyboard down, and right sides of the DUI. The DUI was operating at maximum output power 1.862 W (ERP) and 7 % duty factor. The peak single point SAR for the scans were:

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TYPE OF EXPOSURE	DUI side	With PDA	Antenna distance to phantom (mm)	Channel			Peak Local SAR (W/kg)
				L/M/H	#	Freq (MHz)	
Body/Hand/ Bystander*	Keyboard Up*	N/A	11	Middle	22D0	815	0.47
	Keyboard Up*	N/A	11	Low	2000	806	0.51
	Keyboard Up*	N/A	11	High	24B0	821	0.41
	Keyboard Down*	N/A	3	Middle	22D0	815	0.87
	Keyboard Down*	**N/A**	**3**	**Low**	**2000**	**806**	**1.03**
	Keyboard Down*	N/A	3	High	24B0	821	0.77
	Right side*	N/A	3	Middle	22D0	815	0.75
	Right side*	N/A	3	Low	2000	806	0.94
	Right side*	N/A	3	High	24B0	821	0.69
Bystander Exposure (attached to PC)	Keyboard Up	Yes	11	Middle	22D0	815	0.45
	Keyboard Up	No	6	Middle	22D0	815	0.50
	Right side	Yes	3	Middle	22D0	815	0.91
	Right side	No	3	Middle	22D0	815	0.79
	Keyboard Down	Yes	3	Middle	22D0	815	0.93
	Keyboard Down	No	3	Middle	22D0	815	0.77
	Keyboard Down	**Yes**	**3**	**Low**	**2000**	**806**	**0.97**
	Keyboard Down	Yes	3	High	24B0	821	0.84

Table 2. SAR Measurements

7. USER'S HAND EXPOSURE

All subsequent testing for user's hand exposure was performed on channel 2000 (806 MHz), with the Keyboard Down of the DUI facing up against the bottom of the phantom and the antenna 3 mm away from the bottom of the phantom. This relates to the position and frequency found to provide the maximum measured SAR value.

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1) Channel 2000 (806 MHz) was then explored on a refined 5 mm grid in three dimensions. The SAR value averaged over 10 grams was determined from these measurements by averaging the 125 points (5x5x5) comprising a 2 cm cube. The maximum SAR value measured averaged over 10 grams was determined from these measurements to be 0.43 W/kg.

2) To extrapolate the maximum SAR value averaged over 10 grams to the inner surface of the phantom a series of measurements were made at five (x,y) co-ordinates within the refined grid as a function of depth, with 2.5 mm spacing. The average exponential coefficient was determined to be (-0.077 ± 0.006) mm.

3) The distance from the probe tip to the inner surface of the 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 averaged over 10 grams that was determined previously, we obtain the **maximum SAR value at the surface averaged over 10 grams, 0.63 W/kg.**

8. BODY/BYSTANDER EXPOSURE

All subsequent testing for body/bystander exposure was performed on channel 2000 (806 MHz), with the Keyboard Down of the DUI facing up against the bottom of the phantom and the antenna 3 mm away from the bottom of the phantom. This relates to the position and frequency found to provide the maximum measured SAR value.

1) Channel 2000 (806 MHz) was also explored on a refined 5 mm grid in three dimensions. 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 0.62 W/kg.

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2) To extrapolate the maximum SAR value averaged over 1 gram to the inner surface of the phantom a series of measurements were made at a five (x,y) co-ordinates within the refined grid as a function of depth, with 2.5 mm spacing. The average exponential coefficient was determined to be (-0.077 ±0.006) mm.

3) The distance from the probe tip to the inner surface of the 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 averaged over 1 gram that was determined previously, we obtain the **maximum SAR value at the surface averaged over 1 gram, 0.89 W/kg**.

9. BYSTANDER EXPOSURE (ATTACHED TO DESKTOP PC)

All subsequent testing for bystander exposure while the DUI was attached to a Toshiba 440CDX mobile PC via the serial port was performed on channel 2000 (806 MHz), with the Keyboard Down of the DUI facing up against the bottom of the phantom and the antenna 3 mm away from the bottom of the phantom. This relates to the position and frequency found to provide the maximum measured SAR value.

1) Channel 2000 (806 MHz) was also explored on a refined 5 mm grid in three dimensions. 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 0.66 W/kg.

2) To extrapolate the maximum SAR value averaged over 1 gram to the inner surface of the phantom a series of measurements were made at a five (x,y) co-ordinates within the refined grid as a function of depth, with 2.5 mm spacing. The average exponential coefficient was determined to be (-0.076 ±0.005) mm.

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3) The distance from the probe tip to the inner surface of the 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 averaged over 1 gram that was determined previously, we obtain the **maximum SAR value at the surface averaged over 1 gram, 0.95 W/kg**.

Figure 1. PDA With DUI

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Figure 2. DUI With Desktop PC

10. CONCLUSIONS

The maximum Specific Absorption Rate (SAR) averaged over 10 grams, determined at 806 MHz (channel 2000) of the DWV 100D, is 0.63 W/kg. The overall margin of uncertainty for this measurement is ± 22.3 % (Appendix B). The SAR limit given in the FCC 96-326 Safety Guideline is 4 W/kg for hand exposure for the general population.

The maximum Specific Absorption Rate (SAR) averaged over 1 gram, determined at 806 MHz (channel 2000) of the DWV 100D, is 0.89 W/kg. The overall margin of uncertainty for this measurement is ± 22.3 % (Appendix B). The SAR limit given in the FCC 96-326 Safety Guideline is 1.6 W/kg for body and bystander exposure for the general population.

For a bystander or user exposing a part of the body other than the extremities when the DWV 100D is attached to a desktop PC, the maximum Specific Absorption Rate (SAR) averaged over 1 g is 0.95 W/kg. The SAR limit given in the FCC 96-326 Safety Guideline is 1.6 W/kg for uncontrolled partial body exposure of the general population. The overall margin of uncertainty for this measurement is ± 18.3 % (Appendix B).

Considering the above, this unit as tested, and as it will be marketed and used, is found to be compliant with the FCC 96-326 requirement.

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Tested by _____ Date JUNE 26, 2001

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APPENDIX A. Measurement Setup, Tissue Properties and SAR Graphs

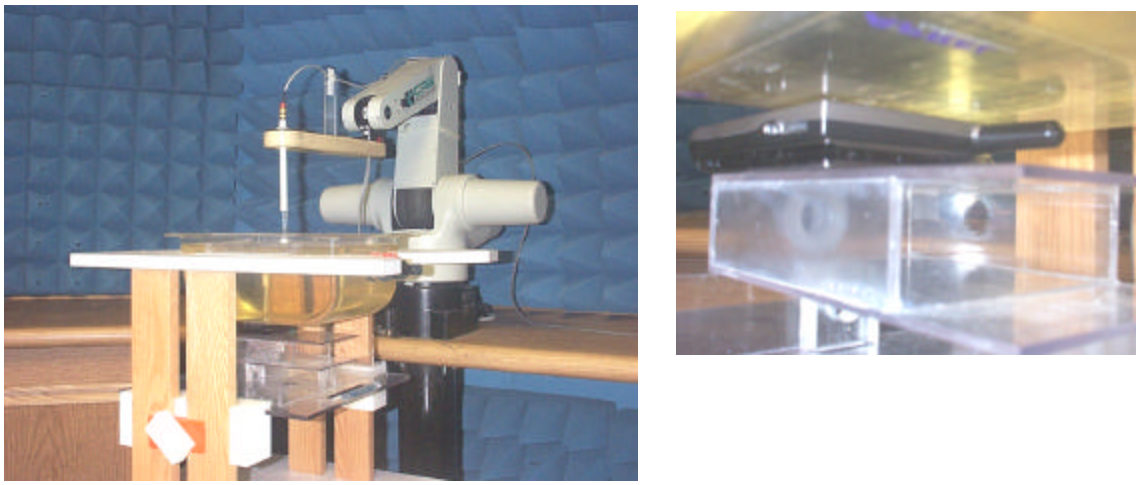

Figure 3. Setup

Simulated Tissue Material and Calibration Technique

The mixture used was based on that presented SSI/DRB-TP-D01-033, "Tissue Recipe and Calibration Requirements". The density used to determine SAR from the measurements was the recommended 1040 kg/m^3 found in Appendix C 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 Analyzer, a Hewlett Packard 809B Slotted Line Carriage, and an APREL SLP-001 Slotted Line Probe.

	APREL	Target	Δ (%)
Dielectric constant, ε_r	55.6	52	6.9 %
Conductivity, σ [S/m]	1.06	1.1	-4 %
Tissue Conversion Factor, γ	9.0	-	-

Table 3. Dielectric Properties of the Simulated Muscle Tissue at 815 MHz

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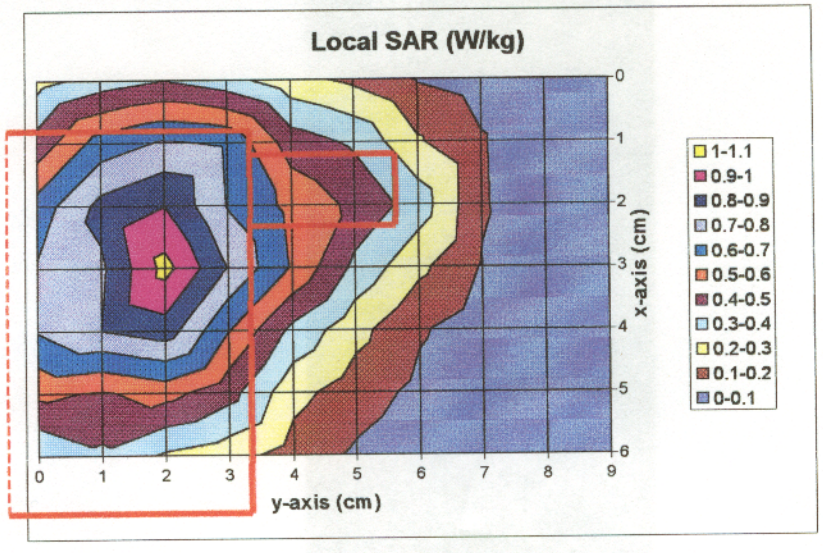

Figure 4. Contour Plot of the Area Scan 2.5mm Above Phantom Surface

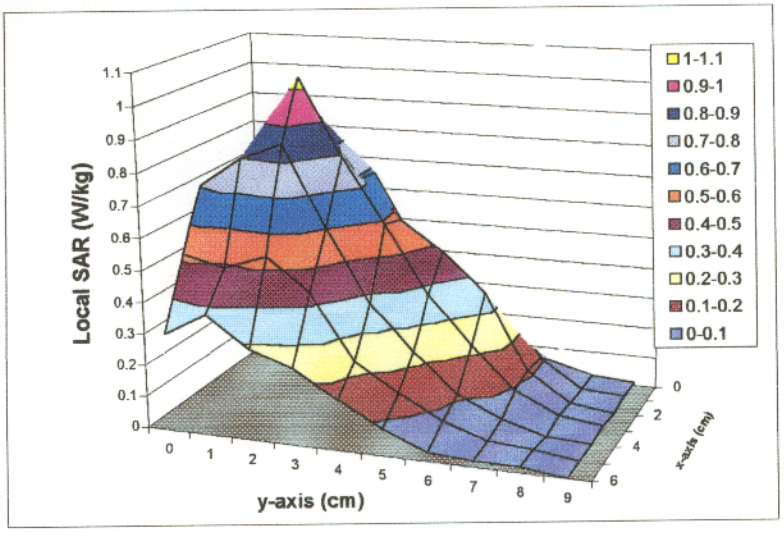

Figure 5. Surface Plot of the Area Scan 2.5mm Above Phantom Surface

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APPENDIX B. Uncertainty Budget

Uncertainties Contributing to the Overall Uncertainty			
Type of Uncertainty	**Specific to**	**Uncertainty**	
Power variation due to battery condition	DUI	2.0%	
Extrapolation due to curve fit of SAR vs depth	DUI & Setup	14.8%	
Extrapolation due to depth measurement	setup	3.8%	
Conductivity	setup	6.0%	
Density	setup	2.6%	
Tissue enhancement fact or	setup	7.0%	
Voltage measurement	setup	12.6%	
Probe sensitivity factor	setup	3.5%	
		22.3%	**RSS**

Table 4. Uncertainty Budget Hand and Body

Uncertainties Contributing to the Overall Uncertainty			
Type of Uncertainty	**Specific to**	**Uncertainty**	
Power variation due to battery condition	DUI	0.2%	
Extrapolation due to curve fit of SAR vs depth	DUI & Setup	12.2%	
Extrapolation due to depth measurement	setup	3.7%	
Conductivity	setup	6.0%	
Density	setup	2.6%	
Tissue enhancement factor	setup	7.0%	
Voltage measurement	setup	8.3%	
Probe sensitivity factor	setup	3.5%	
		18.3%	**RSS**

Table 5. Uncertainty Budget (Bystander exposure when DUI attached to desktop PC)

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APPENDIX C. Validation Scan on a Flat Phantom

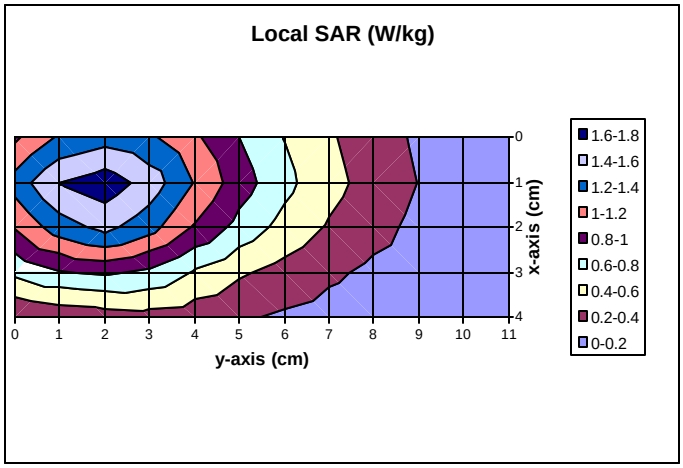

Figure 6. Contour Plot of the Reference Area Scan 2.5mm Above Phantom

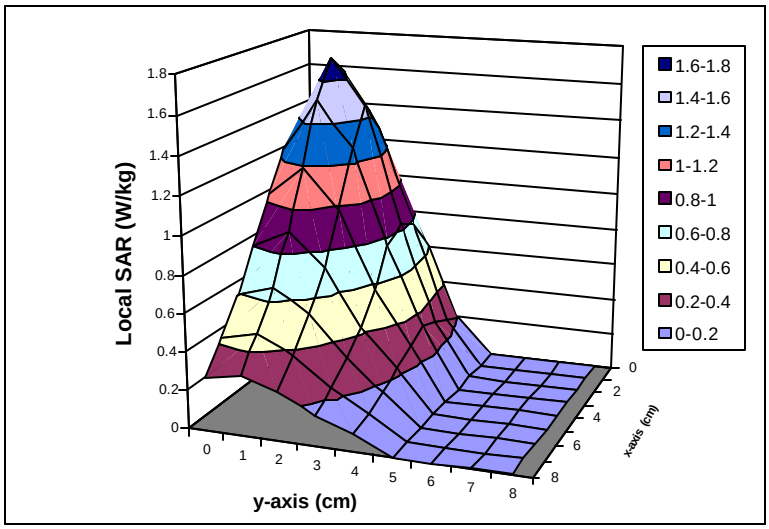

Figure 7. Surface Plot of the Reference Area Scan 2.5mm Above Phantom

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APPENDIX D. Probe Calibration

NCL CALIBRATION LABORATORIES

Calibration File No.: 301420

CERTIFICATE OF CALIBRATION

It is certified that the equipment identified below has been calibrated in the **NCL CALIBRATION LABORATORIES** by qualified personnel following recognized procedures and using transfer standards traceable to NRC/NIST.

Equipment: Miniature Isotropic RF Probe

Manufacturer: APREL Laboratories/IDX Robotics Inc
Model No.: E-009
Serial No.: 115

Customer: APREL
Asset No.:301420

Calibration Procedure: SSI/DRB-TP-D01-032

Cal. Date: 9 November, 2000 Cal. Due Date: 8 November, 2001
Remarks: None

Calibrated By: _____

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