FCC ID: O2SNURIT3010CT

Exhibit 11

RF Exposure Information
Sar Report

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

Product: Point of Sale Device with a
Novatel NRM-6832 Wireless IP Modem

Model: Nurit 3010, CDPD

Client: Lipman U.S.A Inc.

Address: 50 Gordon Drive
Syosset, NY
11791

Project #: LPMB-Nurit 3010 POS EDC Terminal w. Novatel CDPD-3684

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

Approved by _____ Date: April 6 2001
Stuart Nicol
Director Product Development, Dosimetric R&D

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

Released by _____ Date: April 6/2001
Dr. Jacek J. Wojcik, P. Eng.

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FCC ID: O2SNURIT3010CT
Applicant: Lipman
Equipment: Point of Sale Device with a Novatel NRM-6832 Wireless Modem
Model: Nurit 3010, CDPD
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 a Nurit 3010 POS EDC Terminal which incorporates a Novatel NRM-6832 CDPD modem and has a detachable Carant 3664 antenna. The measurements were carried out in accordance with FCC 96-326. The Nurit 3010 was evaluated for its maximum power level 0.141W(ERP). The duty factor of the radio modem is 100 %.

The Nurit 3010 was tested at low, middle, and high channels for the keyboard up, keyboard down, left, and right sides with the antenna in the 0, 90, and 180 degree positions. The maximum 10g SAR (2.65 W/kg) was found to coincide with the peak performance RF output power of channel 383 (836.49 MHz) for the left side of the device with the antenna in the 90 degree position. (The hot spot is located on the antenna). Test data and graphs are presented in this report.

At a separation distance of 4 cm from the antenna of the device, the maximum 1g SAR is 0.10 W/kg. The manual will have a warning to keep bystanders, and parts of the user's body other than extremities, at least 4 cm away from the antenna.

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 RF exposure environment.

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

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TABLE OF CONTENTS

TABLES AND FIGURES

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1. INTRODUCTION

Tests were conducted to determine the Specific Absorption Rate (SAR) of a sample Nurit 3010 POS EDC Terminal. 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

- Nurit 3010 POS EDC Terminal, s/n 3010-US-11-GRY-B11, received on Mar 9, 2001.

The Nurit 3010 POS will be called DUI (Device Under Investigation) in the following report.

For further technical details see the manufacturer's submission documentation for drawings and more 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
- Rohde & Schwarz power meter, Asset # 100851
- Rohde & Schwarz power sensor, Asset # 301461
- 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 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 is 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 of the transmitter is sampled before and after each SAR run. In the case of this DUI, the radiated power was sampled. The following table shows the radiated RF power sampled before and after each of the seven sets of data used for the worst case SAR in this report.

Scan		Power Readings (dBm)		D	Battery #
Type	Height (mm)	Before	After	(dB)	
Area	2.5	6.40	6.05	0.35	5
Zoom	2.5	6.30	6.05	0.25	7
Zoom	7.5	6.30	6.05	0.25	3
Zoom	12.5	6.30	6.02	0.28	7
Zoom	17.5	6.30	6.02	0.28	3
Zoom	22.5	6.30	6.06	0.24	4
Depth	2.5 – 22.5	6.30	6.01	0.29	5

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 a PC to control the channel and operating power.

3) Figure 3 in Appendix A shows a contour plot of the SAR measurements for the DUI (channel 383, middle, 836.49 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 3. This is a surface plot, where the measured SAR values provide the vertical dimension, which is useful as a visualisation aid.

4) Wide area scans were performed for the low, middle and high channels on the left side of the DUI. The DUI was operating at maximum output power 0.141 W(ERP) and 100% duty factor. The peak single point SAR for the scans were:

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TYPE OF EXPOSURE	DUI side	Antenna Poition (Degrees)	Channel			Peak Local SAR (W/kg)
			L/M/H	#	Freq (MHz)	
Hand &Bystander Exposure	Left side	0	middle	383	836.49	3.20
	Left side	0	low	991	824.04	2.87
	Left side	0	high	799	848.97	2.66
	Left side	90	middle	383	836.49	4.02
	Left side	90	low	991	824.04	3.28
	Left side	90	high	799	848.97	3.85
	Left side	180	middle	383	836.49	3.14
	Left side	180	low	991	824.04	3.32
	Left side	180	high	799	848.97	3.04
	Keyboard up	180	middle	383	836.49	0.09
	Keyboard down	180	middle	383	836.49	0.33
	Right side	180	middle	383	836.49	0.26

Table 2. SAR Measurements

7. USER'S HAND EXPOSURE

All subsequent testing for user's hand exposure was performed on channel 383 (836.49 MHz), with the left side of the DUI facing up against the bottom of the phantom and the antenna touching the phantom. This relates to the positition and frequency found to provide the maximum measured SAR value.

1) Channel 383 (836.49 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 1.85 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 (-0.075 ±0.002) / 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 10 grams that was determined previously, we obtain the **maximum SAR value at the surface averaged over 10 grams**, 2.65 W/kg.

8. BYSTANDER EXPOSURE

All subsequent testing for bystander exposure was performed on channel 383 (836.49 MHz), with the left side of the DUI facing up against the bottom of the phantom and the antenna touching the phantom. This relates to the positition and frequency found to provide the maximum measured SAR value.

1) Channel 383 (836.49 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 2.72 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 (-0.075 ±0.002) / 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, 3.89 W/kg**.

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4) Wide area scans were then performed for channel 383 (836.49 MHz) versus DUI separation from the bottom of the phantom. The peak single point SAR for the scans were:

DUI to phantom separation (mm)	Highest Local SAR (W/kg)
10	0.99
20	0.39
30	0.26

Table 3. SAR versus DUI-Phantom Separation

The measurements of highest local SAR versus separation of the DUI from the bottom of the phantom can be used to determine the SAR exposure of the bystander during operation of the DUI.

If the data for Figure 4 is fitted to an exponential equation we get:

$$\text{Peak Local SAR} = 4.942\, e^{-0.0982^* (\text{separation})}$$

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

$$\text{Maximum 1g SAR} = k\, e^{-0.0982^* (\text{separation})}$$

Using this equation with the previous data:

Maximum 1g SAR at the surface = 3.89 W/kg
Tissue to DUI separation = 3 mm,

results in a k = 5.22 W/kg, which corresponds to the maximum 1g SAR when the separation is 0 mm. A conservative maximum 1g SAR of 1.40W/kg (1.6 W/kg reduced by our measurement uncertainty,12.8 %) would occur for a separation of 13.4 mm from the antenna of the DUI.

At a standard separation distance of 4 cm, the maximum 1g SAR would be 0.10 W/kg.

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9. CONCLUSIONS

The maximum Specific Absorption Rate (SAR) averaged over 10 grams, determined at 836.49 MHz (channel 383) of the Nurit 3010 POS, is 2.65 W/kg. The overall margin of uncertainty for this measurement is 12.8± % (Appendix B). The SAR limit given in the FCC 96-326 Safety Guideline is 4 W/kg for hand exposure for the general population.

For a bystander or user exposing a part of the body other than the extremities, at a separation distance of 4 cm from the device, the maximum Specific Absorption Rate (SAR) averaged over 1 g is 0.10 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 minimum separation distance that will ensure that the limit minus the measurement uncertainty (1.6 - 12.8% = 1.40 W/kg) is not exceeded, is 13.4 mm.

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.

Tested by _____ Date APR. 5, 2001

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APPENDIX A. Measurement Setup, Tissue Properties and SAR Graphs

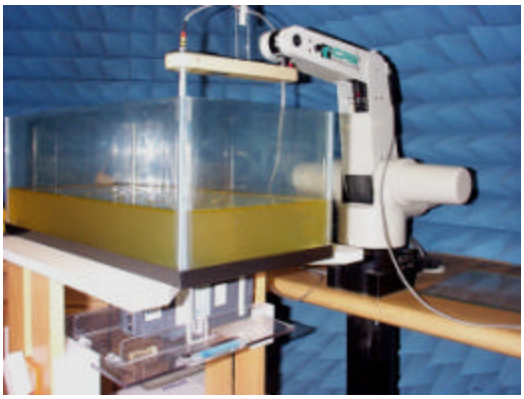

Figure 1. Setup

Figure 2. Setup Closeup

Figure 3. Antenna in 0 Degree Position

Figure 4. Antenna in 90 Degree Position

Figure 5. Antenna in 180 Degree Position

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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 Analyser, a Hewlett Packard 809B Slotted Line Carriage, and an APREL SLP-001 Slotted Line Probe.

	APREL	Targeted Vaue	Δ (%) (OET)
Dielectric constant, ε_r	50.3	52	3.27 %
Conductivity, σ [S/m]	1.11	1.1	0.9 %
Tissue Conversion Factor, γ	9.0	-	-

Table 4. Dielectric Properties of the Simulated Muscle Tissue at 835 MHz

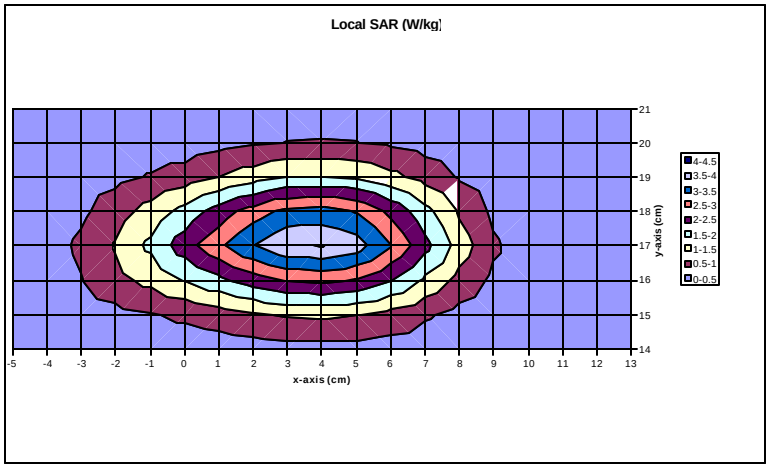

Figure 6. Contour Plot of the Area Scan 2.5mm Above Phantom Surface

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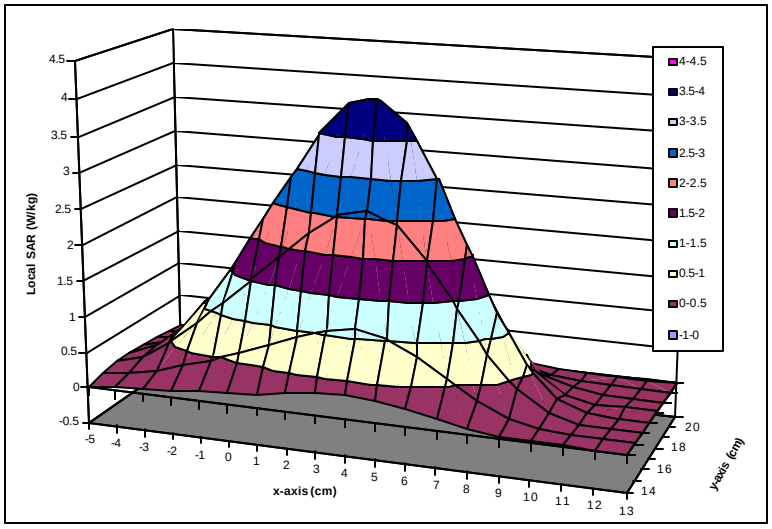

Figure 7. Surface Plot of the Area Scan 2.5mm Above Phantom Surface

APPENDIX B. Uncertainty Budget

Uncertainties Contributing to the Overall Uncertainty

Type of Uncertainty	Specific to	Uncertainty	
Power variation due to battery condition	DUI	4.1%	
Extrapolation due to curve fit of SAR vs depth	DUI & Setup	5.4%	
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	0.3%	
Probe sensitivity factor	setup	3.5%	
		12.8%	**RSS**

Table 5. Uncertainty Budget

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APPENDIX C. Validation Scan on a Flat Phantom

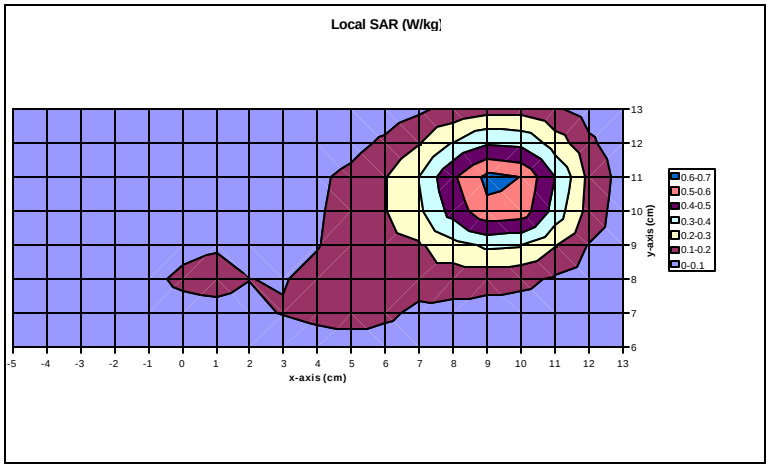

Figure 8. Contour Plot of the Reference Area Scan 2.5mm Above Phantom

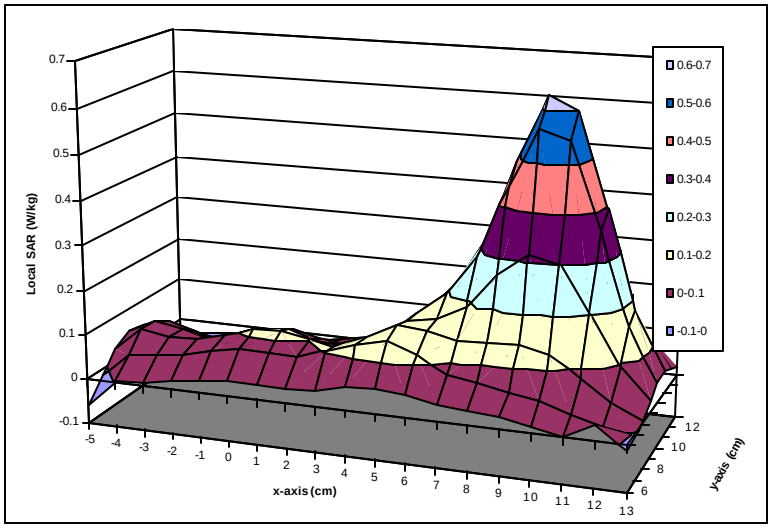

Figure 9. Surface Plot of the Reference Area Scan 2.5mm Above Phantom

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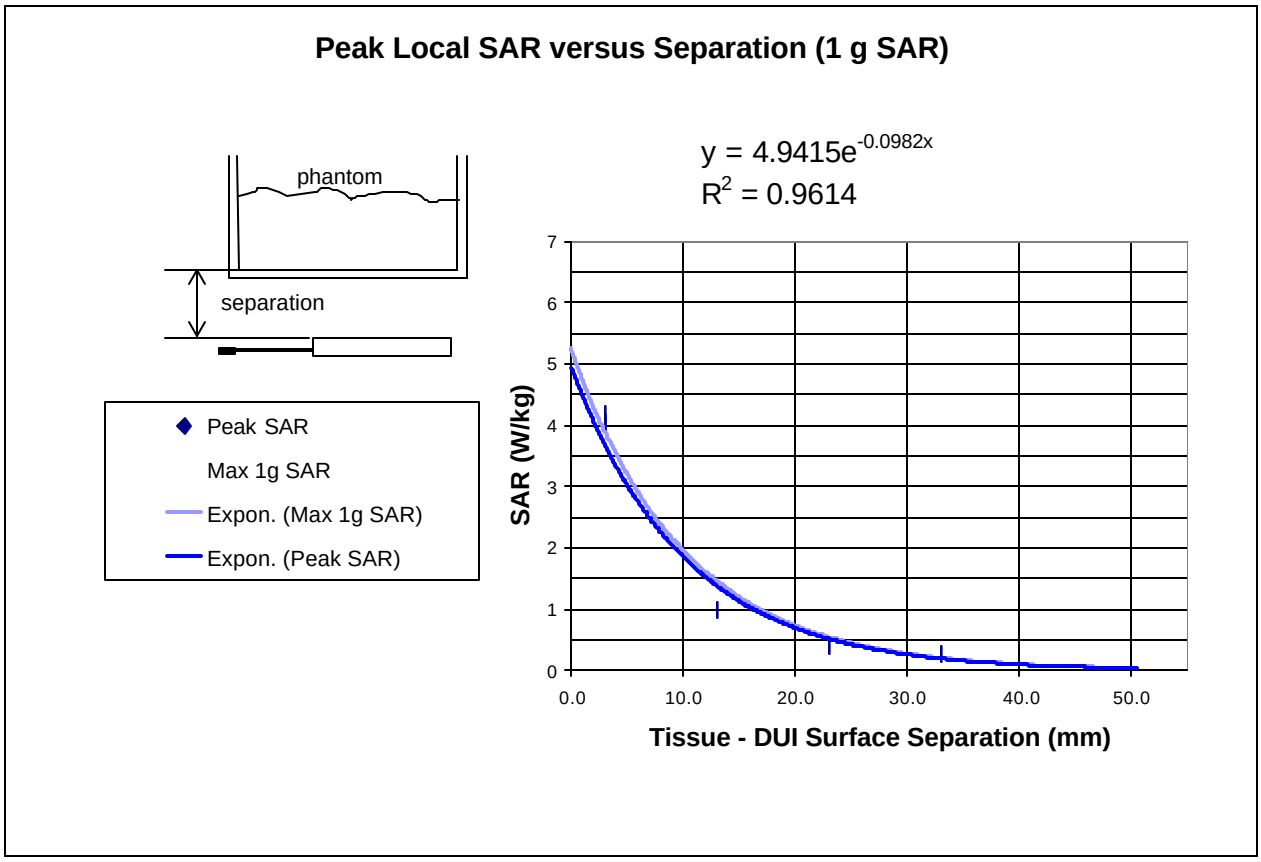

Figure 10. Peak Local SAR versus Separation (1 gram SAR)

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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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