FCC ID: ESD-SA806866R8

Exhibit 11

RF Exposure Information
Sar Report

Certification Report on

Specific Absorption Rate (SAR)
Experimental Analysis

Melard Technologies, Inc.

Sidearm with an incorporated Research In Motion R802M-2-0 radio modem (DataTAC/Ardis Network) Wireless Handheld Computer

Test Date: 16 November, 2000

MELB-Ardis Sidearm-3585

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CERTIFICATION REPORT

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

Product: Wireless Handheld Computer

Model: Sidearm with an incorporated Research In Motion R802D-2-0 radio modem (DataTAC/Ardis Network)

Client: Melard Technologies, Inc.

Address: 28 Kaysal Court
Armonk, NY 10504
U.S.A.

Project #: MELB-Ardis Sidearm-3585

Telecommunications Approval Board · Spectrum Sciences Institute · SAR Certified APREL Laboratories A0B5-Sidearm D

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

Approved by ____________ Date: 31/01/2001
Stuart Nicol
Director Product Development, Dosimetric R&D

Submitted by ____________ Date: Jan 31, 2001
Jay Sarkar
Technical Director of Standards & Certification

Released by ____________ Date: Jan 31/01.
Dr. Jacek J. Wojcik, P. Eng.

REGISTERED PROFESSIONAL ENGINEER J. J. Wojcik PROVINCE OF ONTARIO

FCC ID: ESD-SA806866R8
Applicant: Melard Technologies, Inc.
Equipment: Wireless Handheld Computer
Model: Sidearm with an incorporated Research In Motion R802D-2-0 radio modem (DataTAC/Ardis Network)
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 Melard Sidearm wireless handheld computer with an R802D-2-0 radio modem. The measurements were carried out in accordance with FCC 96-326. The Sidearm with an R802D radio modem was evaluated for its maximum power level (0.661W ERP). The duty factor of the radio modem is intrinsically restricted to 25% (See Appendix E).

The Sidearm with an R802D radio modem was tested at low, middle and high channels for the keyboard up, keyboard down and right sides. The maximum 10g SAR (0.90 W/kg) was found to coincide with the peak performance RF output power of channel 22D0 (middle, 815 MHz) for the right side of the device. (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 0.17 W/kg. The manual will have a warning expressing that bystanders, and parts of the user's body other than extremities, be 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 uncontrolled RF exposure environment.

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

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1. INTRODUCTION

Tests were conducted to determine the Specific Absorption Rate (SAR) of a sample of a Melard Sidearm wireless handheld computer with an R802D-2-0 radio modem. 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

- Melard Sidearm wireless handheld computer with an R802D-2-0 radio modem, s/n 1001019, received on 16 October, 2000.

The Melard Sidearm wireless handheld computer with an R802D-2-0 radio modem will be called DUI (Device Under Investigation) in the following.

The DUI is intended to be used with the antenna vertically upright. The antenna of the DUI is an 8.5' half-wavelength dipole antenna. The DUI nominally transmitted at 25% duty factor in the band of 806 MHz - 821 MHz. 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
- APREL F-2, flat manikin, s/n 002
- Tissue Recipe and Calibration Requirements, APREL procedure SSI/DRB-TP-D01-033
- R&S Power Reflexion Meter NRT (Tektronix) s/n 836939/001
- HP 83201A Dual Mode Cellular Adapter, Asset # 301290
- HP 8920A 0.4 – 1000 MHz RF Communications Test Set , Asset # 301290
- Dipole antenna model D-835S S/N 101
- Wireless Test Tool software supplied by the modem manufacturer, Research In Motion Ltd.
- Radio transmission card, supplied by the modem manufacturer, Research In Motion Ltd.

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).

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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.

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.

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 conducted power was sampled. The following table shows the conducted RF power sampled before and after each of the eight 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	25.00	25.00	0	A61
Area	12.5	25.00	25.00	0	B84
Zoom	2.5	25.00	-	0	A61
Zoom	7.5	-	-	0	A61
Zoom	12.5	-	-	0	A61
Zoom	17.5	-	-	0	A61
Zoom	22.5	-	25.00	0	A61
Depth	2.5 – 22.5	25.00	25.00	0	

Table 1. Sampled Conducted 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 radio manufacturer running on a PC to control the channel and maximum operating power (ERP 0.661W).

3) Figure 2 in Appendix A shows a contour plot of the SAR measurements for the DUI (channel 22D0, middle, 815 MHz, right side, 0.661W). It also shows an overlay of the DUI's outlines, superimposed onto the contour plot. The presented values were taken 2.5mm into the simulated tissue from the flat phantom's solid inner surface. Figure 1 shows the flat phantom used in the measurements. For the right side measurements, the botom edge of the DUI was aligned with x=-5, and the antenna, with y=0.

   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 keyboard up, keyboard down and right sides of the DUI. The DUI was operating at maximum output power (0.661W) at 25% duty factor. The peak single point SAR for the scans were:

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TYPE OF EXPOSURE	DUI side	Antenna distance to phantom (mm)	Channel			Peak Local SAR (W/kg)
			L/M/H	#	Freq (MHz)	
Hand Exposure	keyboard up side	13	middle	22D0	815	1.26
	keyboard down side	42	middle	22D0	815	0.07
Hand &Bystander Exposure	**Right side**	**0**	**middle**	**22D0**	**815**	**1.92**
			low	2000	806	1.68
			high	24B0	821	1.79

Table 2. SAR Measurements

All subsequent testing was performed on channel 22D0 (middle, 815 MHz), with the right 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.

7. USER'S HAND EXPOSURE

1) Channel 22D0 (middle, 821 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 0.60 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 (-0.085 ± 0.010) / 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

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value averaged over 10 grams that was determined previously, we obtain the **maximum SAR value at the surface averaged over 10 grams**, 0.90 W/kg.

8. BYSTANDER EXPOSURE

1) Channel 22D0 (middle, 815 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 0.93 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 (-0.085 ± 0.010) / 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, 1.39 W/kg**.

4) Wide area scans were then performed for channel 22D0 (middle, 815 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)
30	0.38
40	0.16
50	0.12

Table 3. SAR versus DUI-Phantom Separation

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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:

$$\text{Peak Local SAR} = 2.227\, e^{-0.0568 * (\text{separation})}$$

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

$$\text{Maximum 1g SAR} = k\, e^{-0.0568 * (\text{separation})}$$

Using this equation with the previous data:

Maximum 1g SAR at the surface = 1.39 W/kg
Tissue to DUI separation = 3 mm,

results in a k = 1.65 W/kg, which corresponds to the maximum 1g SAR when the separation is 0 mm. A conservative maximum 1g SAR of 1.15 W/kg (1.6 W/kg reduced by our measurement uncertainty, 28%) would occur for a separation of 6.4 mm from the antenna of the DUI.

At a standard separation distance of 4 cm, the maximum 1g SAR would be 0.17 W/kg.

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9. CONCLUSIONS

The maximum Specific Absorption Rate (SAR) averaged over 10 grams, determined at 815 MHz (middle channel, 22D0, right side, 0.661W) of the Melard Sidearm wireless handheld computer with an R802D-2-0 radio modem, is 0.90 W/kg. The overall margin of uncertainty for this measurement is ±28 % (Appendix B). The SAR limit given in the FCC 96-326 Safety Guideline is 4 W/kg for uncontrolled 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 0.17 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 - 28% = 1.15 W/kg) is not exceeded is 6.4 mm.

The product under investigation will be used in a general population / uncontrolled exposure environment. The user manual will have a warning informing the user to keep bystanders, and parts of the body other than extremities, at least 4 cm away from the antenna.

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 JAN. 30, 2001

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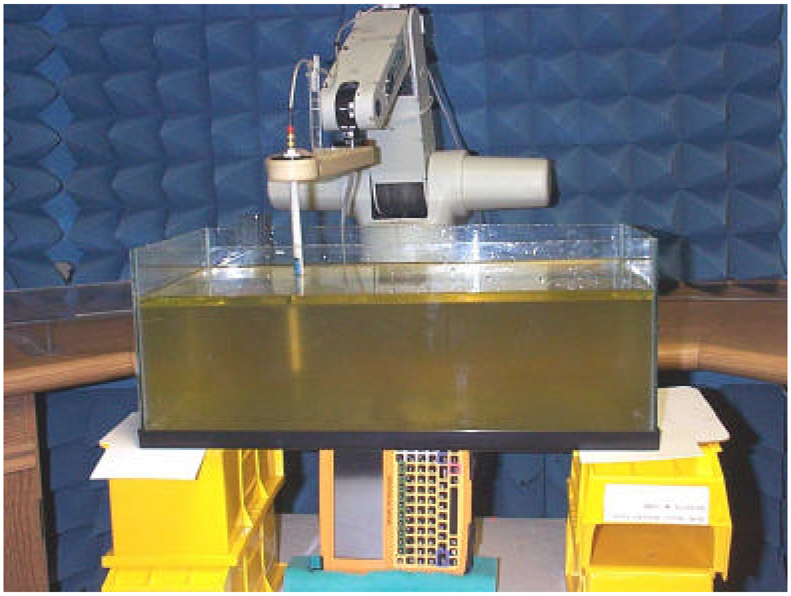
APPENDIX A. Measurement Setup, Tissue Properties and SAR Graphs



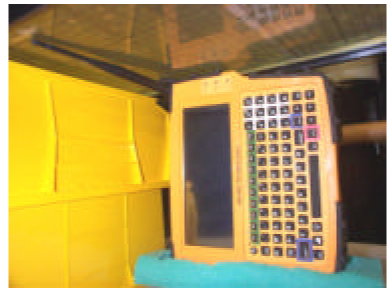


Figure 1. Setup

Simulated Muscle 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	OET 65 Supplement	Δ (%) (OET)
Dielectric constant, ε_r	52.4	56.17	-6.7%
Conductivity, σ [S/m]	11.1	0.94	18.2%
Tissue Conversion Factor, γ	5.2	-	-

Table 4. Dielectric Properties of the Simulated Muscle Tissue at 815 MHz

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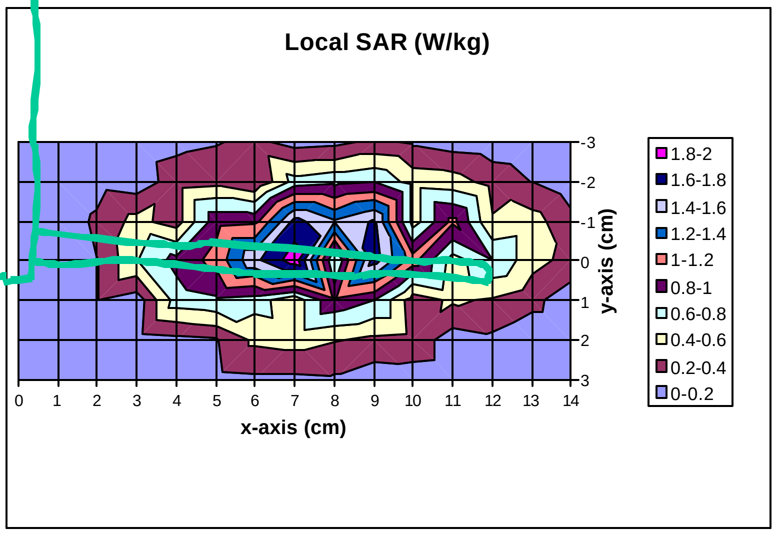

Figure 2. Contour Plot of the Area Scan 2.5mm Above Phantom Surface

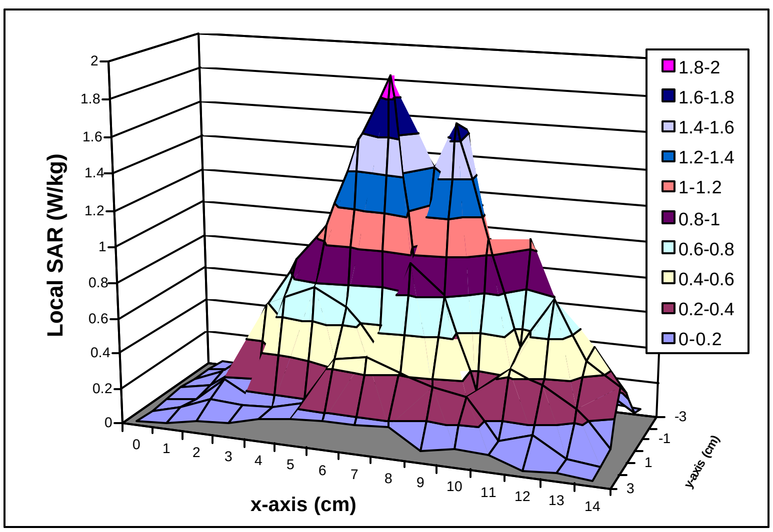

Figure 3. Surface Plot of the Area Scan 2.5mm Above Phantom Surface

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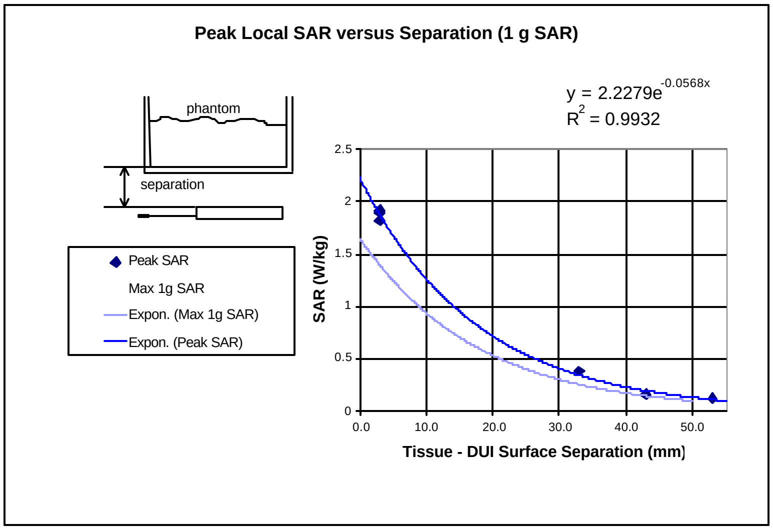

Figure 4. Peak Local SAR versus DUI separation (1g SAR)

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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	0.0%
Extrapolation due to curve fit of SAR vs depth	DUI & setup	23.4%
Extrapolation due to depth measurement	setup	4.2%
Conductivity	setup	6.0%
Density	setup	2.6%
Tissue enhancement factor	setup	7.0%
Voltage measurement	setup	10.8%
Probe sensitivity factor	setup	3.5%
		28.0% RSS

Table 5. Uncertainty Budget

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APPENDIX C. Validation Scan on a Flat Phantom

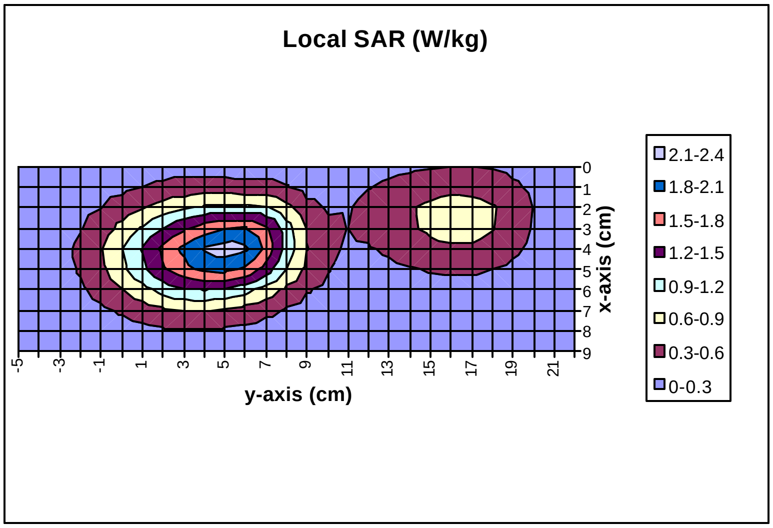

Figure 5. Contour Plot of the Reference Area Scan 2.5mm Above Phantom

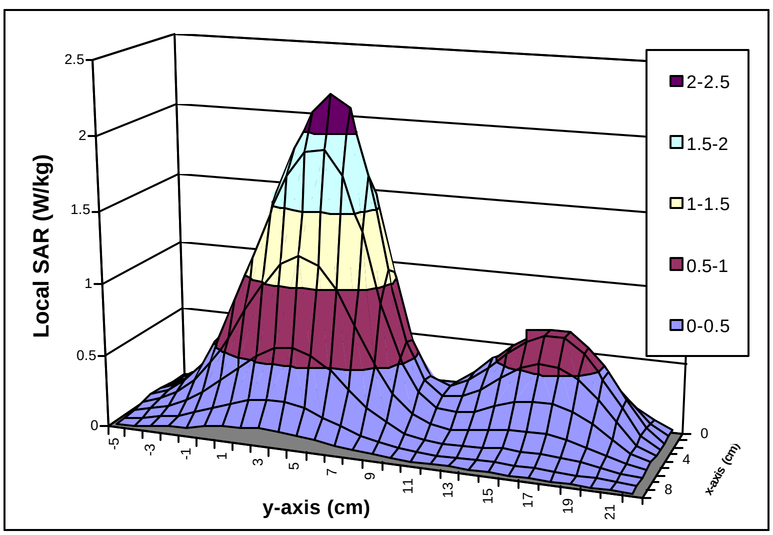

Figure 6. Surface Plot of the Reference Area Scan 2.5mm Above Phantom

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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: ______________________

NCL CALIBRATION LABORATORIES

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SAR Certified

APPENDIX E. Duty Factor Limiting Algorithm for the OEM Radio Module R802D-2-O

The duty factor limiting algorithm for the OEM radio module R802D-2-O is a firmware algorithm that directly inhibits the radio firmware that generates transmit pulses. This algorithm will be permanently integrated with the radio firmware and installed at time of manufacture in the production facility. The algorithm cannot be modified or disabled by the user.

The radio module operates on a packet data network. The network controls the timing of most aspects of the radio signalling protocol. The shortest transmit event over which the mobile device has timing control is an entire uplink (transmit) transaction which is a series of transmit pulses. From the perspective of the mobile device this in an "atomic" event, i.e. the network controls the timing of the signalling within the transaction and the transaction can not be broken into smaller independent sub-parts.

Research in Motion Ltd. has implemented and tested a duty factor limiting algorithm for the radio module to comply with the requirement for limiting the duty factor at all times. To limit the duty factor at all times the algorithm controls the timing of when uplink (transmit) transactions are initiated. When an uplink (transmit) transaction occurs the algorithm accrues the actual transmit time. The algorithm ensures that the idle (transmitter off) time is sufficient to ensure the duty factor is less than the limit (25%) before the next uplink (transmit) transaction is initiated. This ensures that the duty factor is limited to the maximum allowable over all times.

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