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APREL Laboratories

Exhibit 10

Nurit 3010/CDPD

Point of Sale Device

Lipman USA

FCC ID: O2SNURIT3010C

SAR Report
(With Test Set-up Photographs)

Certification Report on

Specific Absorption Rate (SAR)
Experimental Analysis on Hand

Lipman USA Incorporated
NURIT 3010 CDPD
Wireless Point of Sale Device

Test Date: 8 Aug 2000

LPMB-NURIT 3010 CDPD-3507U

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CERTIFICATION REPORT

Subject: **Specific Absorption Rate (SAR) Experimental Analysis for the User**

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

Model: Nurit 3010, CDPD

Client: Lipman USA Inc.

Address: 50 Gordon Dr.
Syosset, NY 11791 USA

Project #: LPMB-Nurit 3010 CDPD-3507U

Telecommunications Approval Board - Spectrum Sciences Institute
SAR Certified
APREL Laboratories
A082 - Nurit 3010C

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

Tested by ______________ Date: 21 Aug 2000
Ken O'Donnell
Engineering Technical Staff

Submitted by ______________ Date: 21 Aug 2000
Dr. Paul G. Cardinal
Director, Laboratories

Approved by ______________ Date: Aug 21/2000
Dr. Jacek J. Wojcik, P. Eng.

REGISTERED PROFESSIONAL ENGINEER
J. J. Wojcik
PROVINCE OF ONTARIO

FCC ID:	O2SNURIT3010C
Applicant:	Lipman USA Inc.
Equipment:	Wireless Point of Sale Terminal with a Novatel NRM-6832 Expedite Wireless IP 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 Lipman Nurit 3010 wireless point of sale terminal (POS) which incorporates a Novatel NRM-6832 Expedite wireless IP modem. This report is supplementary to the engineering evaluation for bystander exposure, report LPMB-Nurit 3010 CDPD-3507B. The measurements were carried out in accordance with FCC 96-326. The POS was evaluated at its nominal maximum power level (power level 2) with 100% duty factor.

For the SAR Analysis for the User, the Lipman Nurit 3010 wireless point of sale terminal (POS) was tested at low, middle and high channels with the antenna oriented in one position (at the antenna side of the terminal, 0^o, where it is most likely to come in contact with the user's hand). The maximum SAR (3.64 W/kg) was found to coincide with the peak performance RF output power of channel 400 (middle, 837 MHz), with the antenna side of the DUI facing up against the bottom of the phantom. Test data and graphs are presented in this report.

Based on the test results and on how the device will be used, with the duty factor of the POS intrinsically limited to less than 3% (see Appendix G), it is certified that the product meets the requirements as set forth in the above specifications, for an uncontrolled RF exposure environment for extremities (hand).

(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 Lipman Nurit 3010 wireless point of sale terminal (POS) which incorporates a Novatel NRM-6832 Expedite wireless IP 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 C95.1-1992, 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. EQUIPMENT UNDER INVESTIGATION

- Lipman Nurit 3010 wireless point of sale terminal (POS), s/n 86U04 5907107, received on 24 July 2000.

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

The DUI is intended to be used in the hand and may be carried in a case that hooks onto a belt. The antenna is a 5in centre-fed half-wavelengh dipole with a gain of 1 dB. A photograph of the DUI can be found in Appendix B. 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-1, flat manikin, s/n 001
- Tissue Recipe and Calibration Requirements, APREL procedure SSI/DRB-TP-D01-033
- HP 438A power meter, s/n 2502A01684, Asset # 301417
- HP 8482A power sensor, s/n 2652A1512B, Asset # 301418
- Toshiba Laptop computer Satellite ProTM 400S (to setup device via RS232 port)

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

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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 when 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, with 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 radiated RF power sampled before and after each of the eight sets of data used for the worst case SAR in this report.

Table 1. Sampled Radiated RF Power

Scan		Relative Power Reading (dB)	Battery #
Type	Height (mm)		
Area	2.5	-0.50	12
Area	12.5	-0.34	2
Zoom	2.5	-	-
Zoom	7.5	-	-
Zoom	12.5	-	-
Zoom	17.5	-	-
Zoom	22.5	-0.80	-
Depth	2.5 –22.5	0.00	-

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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 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 operating power (nominally power level 2).

3) Figure 3 in Appendix A shows a contour plot of the SAR measurements for the DUI (channel 400, middle, 837 MHz, antenna side, antenna stowed, power level 2). The presented values were taken 2.5mm into the simulated tissue from the flat phantom's solid inner surface. Figures 1 and 2 show the flat phantom used in the measurements. A grid is shown inside the phantom indicating the orientation of the x-y grid used, with the co-ordinates (0,0) on the top left (orange dot). The x-axis is positive towards the bottom and the y-axis is positive towards the right. For this side of the DUI, the bottom was aligned with y = 1, and the antenna, with x = 3.

   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.

   Similar data was obtained 12.5 mm into the simulated tissue. These measurements are presented as a contour plot in Appendix A Figure 5 and surface plot in Figure 6.

   Figure 12 in Appendix A shows an overlay of the DUI's outlines, superimposed onto the contour plot previously shown as Figure 3.

   Figures 3 through 6 in Appendix A show that there is a dominant peak, in the contour plots, that diminishes in magnitude with depth into the tissue simulation.

4) For the SAR analysis for the user (Table 2), wide area scans were performed for the low (991, 824 MHz), middle (400, 837 MHz) and high (799, 849 MHz) channels, with the antenna stowed and the antenna side of the DUI facing up against the bottom of the phantom. The DUI was operating at maximum output

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power (power level 2) and 100% duty factor. The peak single point SAR for the scans were:

DUI side	Antenna position	Channel			Peak SAR (W/kg)
		L/M/H	#	Freq (MHz)	
antenna side	stowed (0^o)	low	991	824	5.47
antenna side	**stowed (0^o)**	**middle**	**400**	**837**	**6.70**
antenna side	stowed (0^o)	high	799	849	5.43

Table 2. SAR Measurements for the User

All subsequent testing for user was performed on channel 400 (middle, 837 MHz), with the antenna stowed (0^o) and the antenna side of the DUI against the phantom.

5) Channel 400 (middle, 837 MHz) was then explored on a refined 5 mm grid in three dimensions. Figures 7, 8, 9, 10 and 11 show the measurements made at 2.5, 7.5, 12.5, 17.5 and 22.5 mm, respectively. 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 2.48 W/kg.

6) To extrapolate the maximum SAR value averaged over 10 grams to the inner surface of the phantom a series of measurements were made at a few (x,y) co-ordinates within the refined grid as a function of depth, with 2.5 mm spacing. Figure 13 in Appendix A shows the data gathered and the exponential curves fit to them. The average exponential coefficient was determined to be (-0.080 ± 0.008) / mm.

7) 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**, 3.64 W/kg.

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7. CONCLUSIONS

The maximum Specific Absorption Rate (SAR) averaged over 10 grams, determined at 837 MHz (channel 400, middle,antenna side, antenna stowed, power level 2) of the Lipman Nurit 3010 wireless point of sale terminal (POS), which incorporates a Novatel NRM-6832 Expedite wireless IP modem operating with a 100% duty factor, is 3.64 W/kg. The overall margin of uncertainty for this measurement is ±25.6 % (Appendix C). The SAR limit given in the FCC 96-326 safety guideline for uncontrolled exposure of extremities (4 W/kg reduced by the measurement uncertainty) is 2.98 W/kg.

Considering the above, this unit as tested, and as it will be marketed, with a POS duty factor of less than 3% (Appendix F), is found to be compliant with this requirement.

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APPENDIX A. Measurement Setup and SAR Graphs

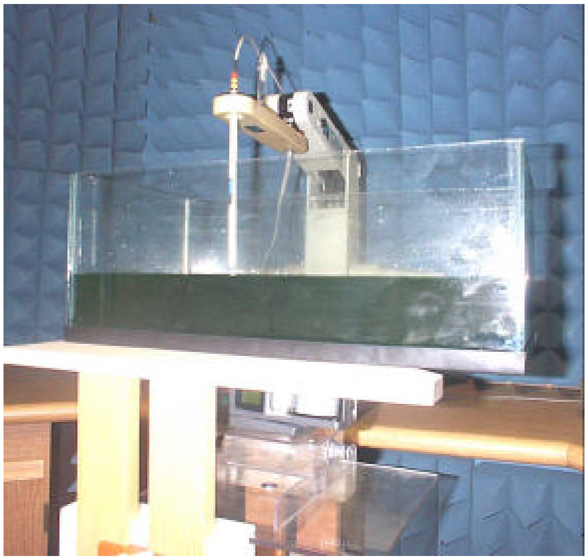

Figure 1. Setup and Setup closeup

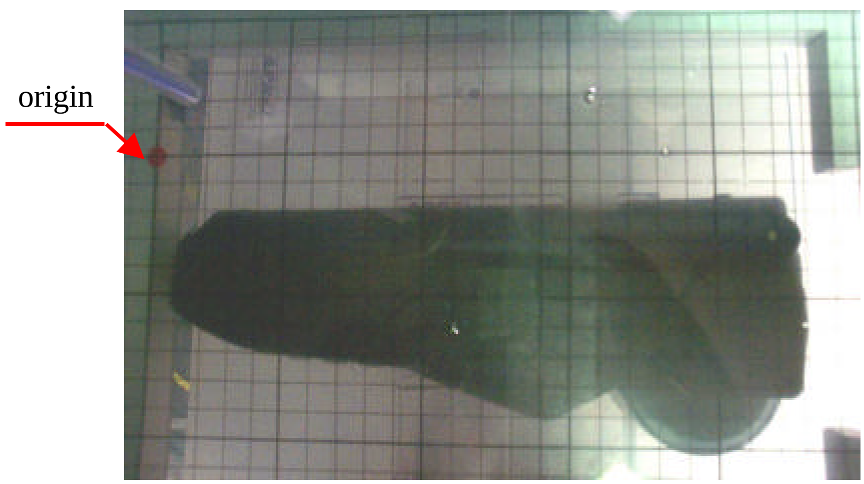

Figure 2. Grid inside the Phantom

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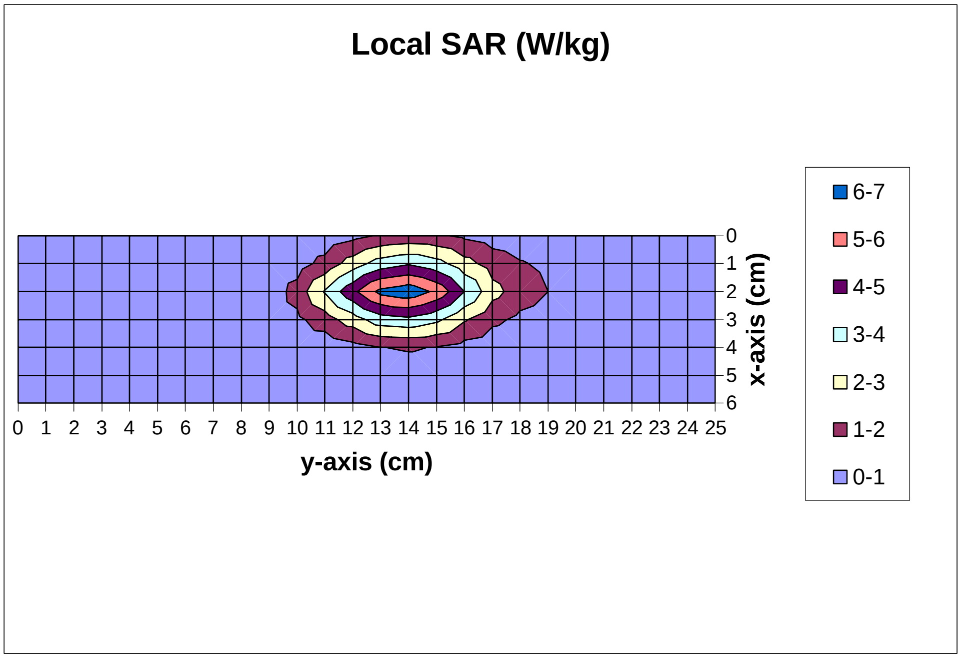

Figure 3. Contour Plot of the Area Scan 2.5mm Above Phantom Surface

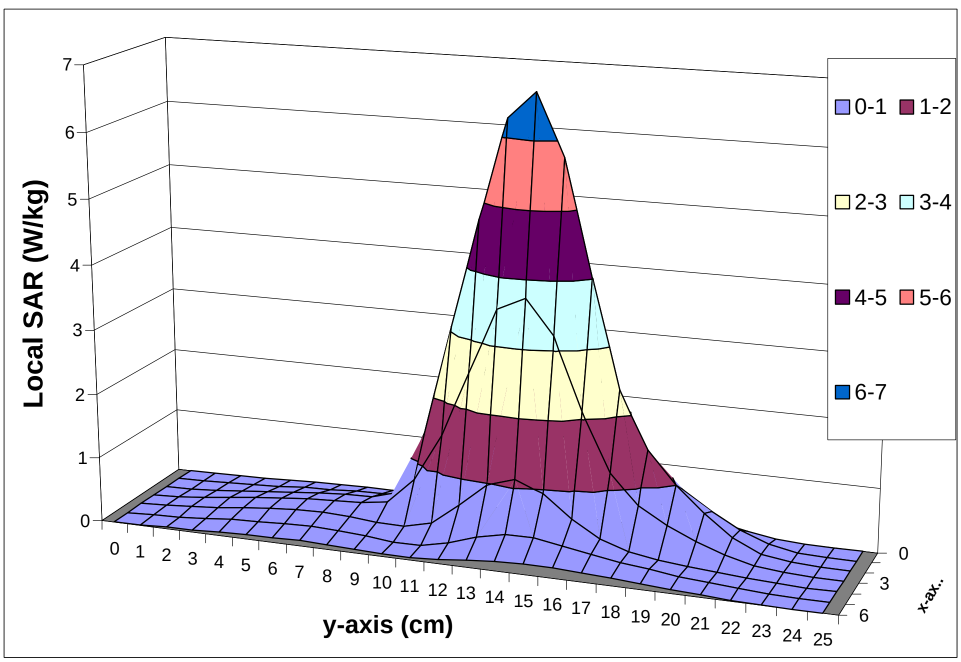

Figure 4. Surface Plot of the Area Scan 2.5mm Above Phantom Surface

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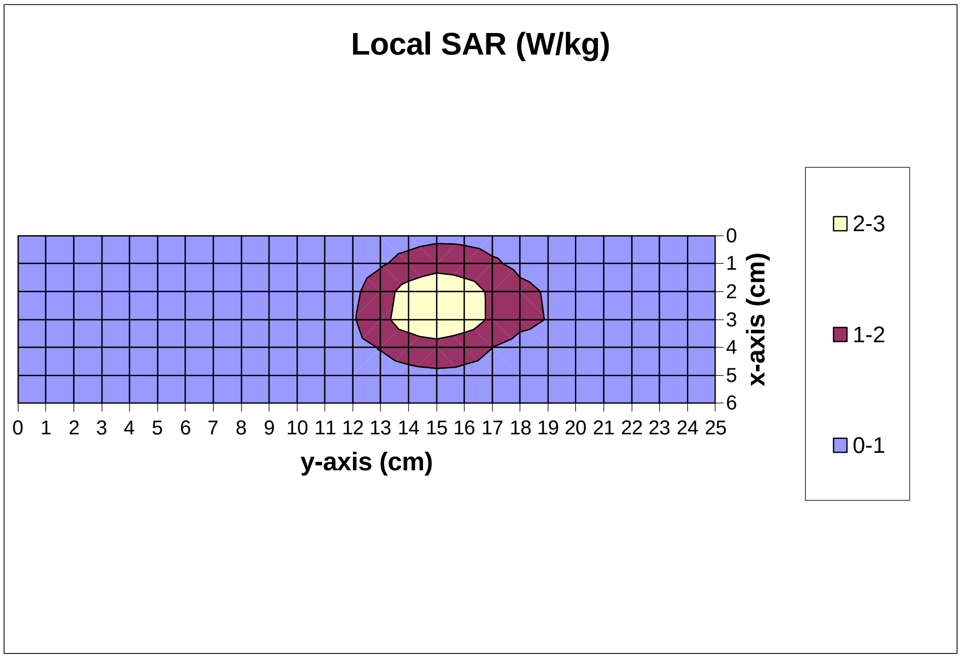

Figure 5. Contour Plot of the Area Scan 12.5mm Above Phantom Surface

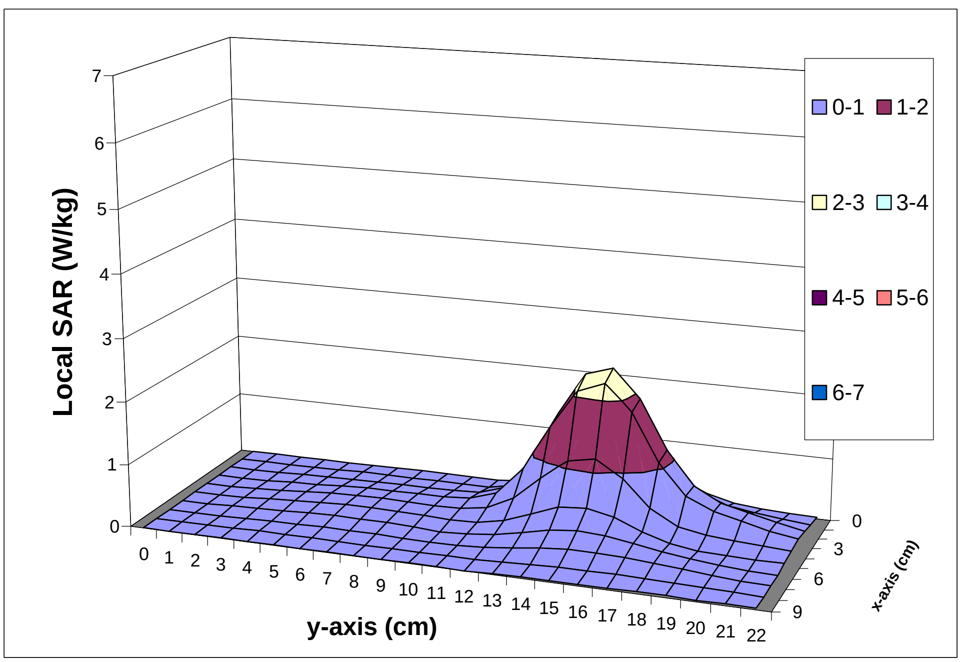

Figure 6. Surface Plot of the Area Scan 12.5mm Above Phantom Surface

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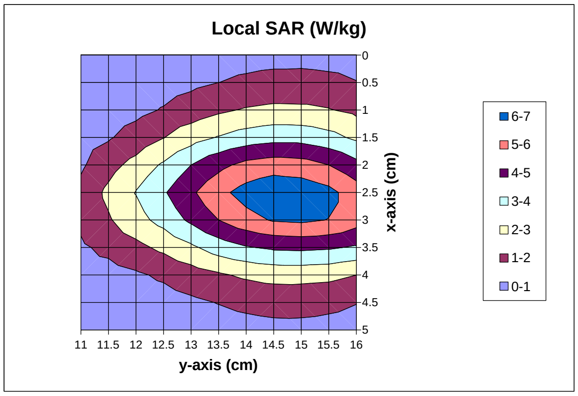

Figure 7. Zoom Scan 2.5mm Above Phantom Surface

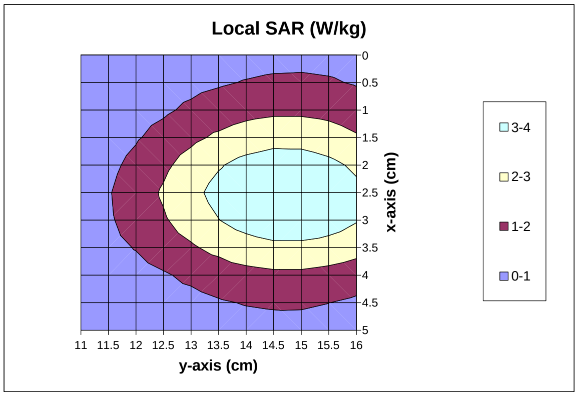

Figure 8. Zoom Scan 7.5mm Above Phantom Surface

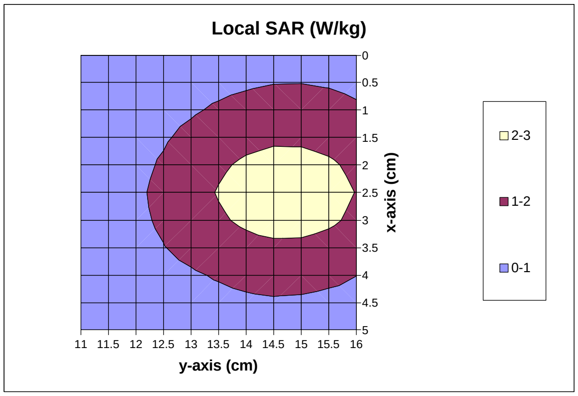

Figure 9. Zoom Scan 12.5mm Above Phantom Surface

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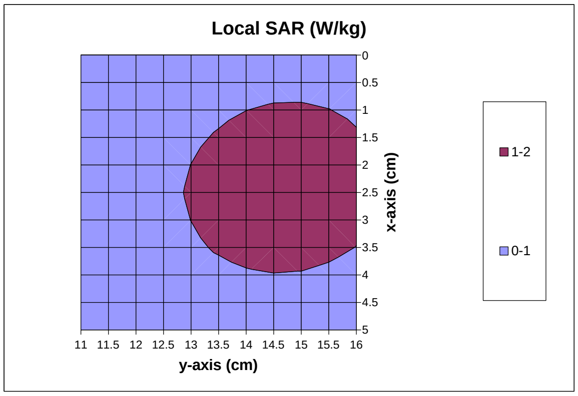

Figure 10. Zoom Scan 17.5mm Above Phantom Surface

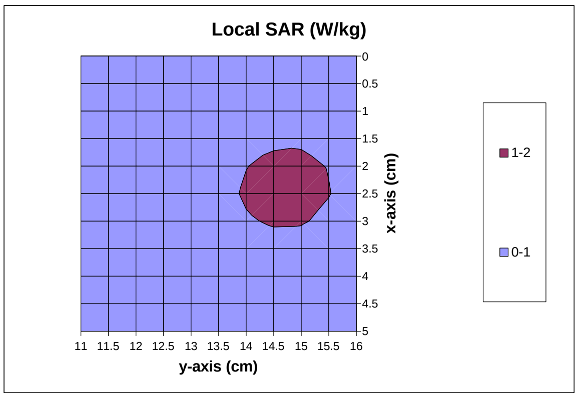

Figure 11. Zoom Scan 22.5mm Above Phantom Surface

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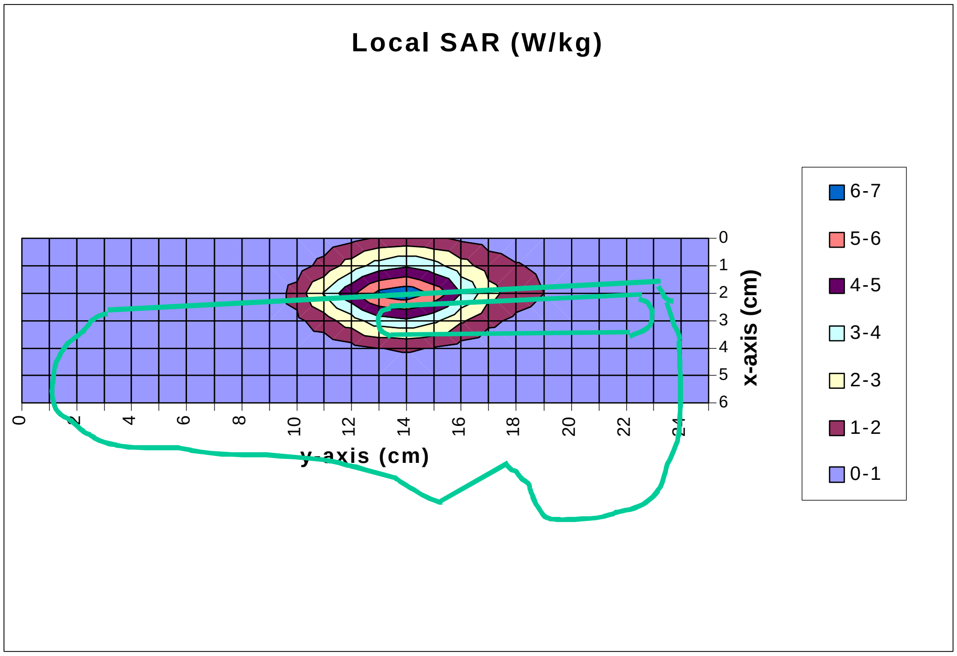

Figure 12. Overlay of the DUI's Outlines Superimposed onto the Area Scan

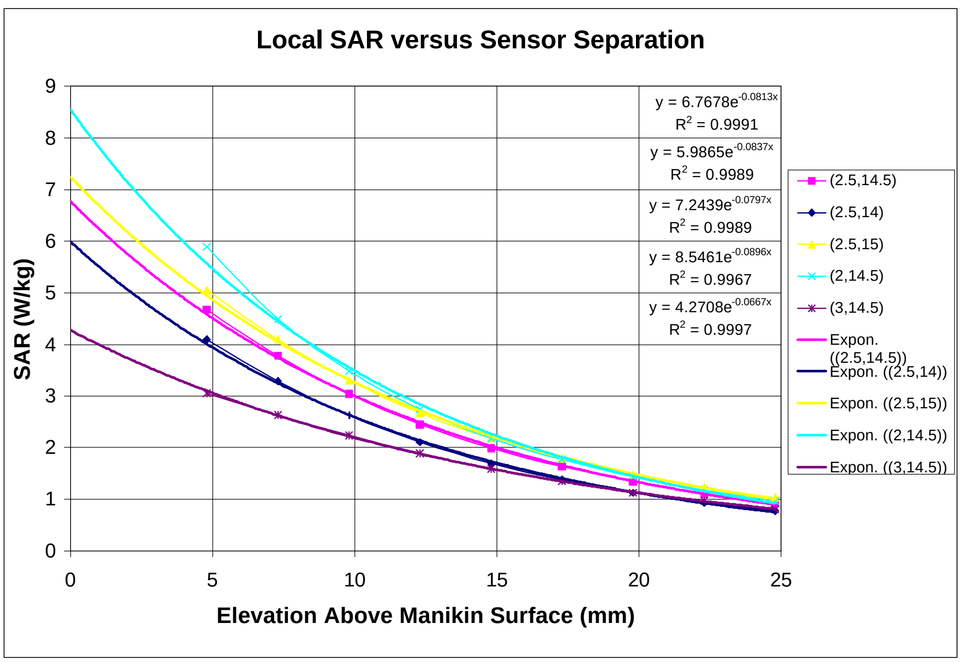

Figure 13. Local SAR versus Sensor Separation

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APPENDIX B. Manufacturer's Specifications

The antenna is a 5in centre-fed half-wavelengh dipole with a gain of 1 dB
Antenna stowed (0^o position)

(See manufacturer's submission documentation for drawings and more design details)

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APPENDIX C. Uncertainty Budget

Uncertainties Contributing to the Overall Uncertainty

Type of Uncertainty	**Specific to**	**Uncertainty**	
Power variation due to battery condition	DUI	9.6%	
Extrapolation due to curve fit of SAR vs depth	DUI & setup	21.0%	
Extrapolation due to depth measurement	setup	3.9%	
Conductivity	setup	6.0%	
Density	setup	2.6%	
Tissue enhancement factor	setup	7.0%	
Voltage measurement	setup	1.9%	
Probe sensitivity factor	setup	3.5%	
		25.6%	**RSS**

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APPENDIX D. 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".

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 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.

The dielectric properties at 835 MHz are:

	APREL	OET 65 Supplement	Δ (%) (OET)
Dielectric constant, ε_r	58.6	56.11	4.4%
Conductivity, σ [S/m]	1.09	0.946	15.3%
Tissue Conversion Factor, γ	7.8	-	-

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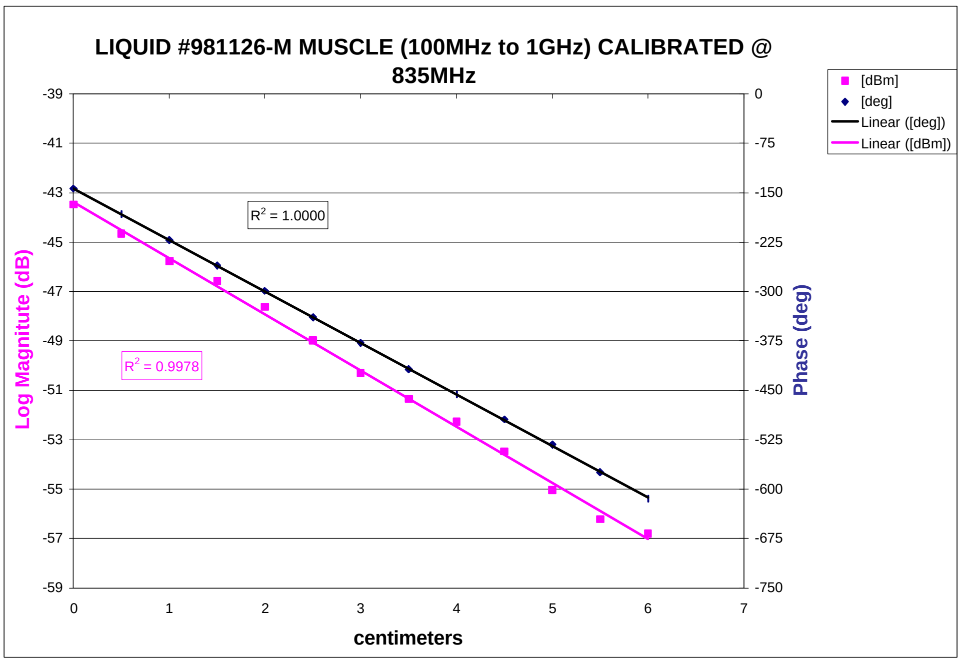
SIMULATION FLUID #	**981126-M**
CALIBRATION DATE	**31-Jul-00**
CALIBRATED BY	**Ken O'Donnell**
Frequency Range	**100MHz-1GHz**
Frequency Calibrated	**835 MHz**
Tissue Type	**Muscle**

Position [cm]	Amplitude [dBm]	Phase [deg]	Phase [deg]
0	-43.48	-143.7	-143.7
0.5	-44.66	177.8	-182.2
1	-45.77	138.3	-221.7
1.5	-46.58	99.6	-260.4
2	-47.61	61.03	-298.97
2.5	-48.99	21.06	-338.94
3	-50.3	-18.14	-378.14
3.5	-51.34	-58.06	-418.06
4	-52.27	-96.03	-456.03
4.5	-53.47	-134.13	-494.13
5	-55.04	-171.99	-531.99
5.5	-56.22	145.77	-574.23
6	-56.8	105.82	-614.18
ΔdB_1	-6.82	Δdeg_1	-234.44
ΔdB_2	-6.68	Δdeg_2	-235.86
ΔdB_3	-6.5	Δdeg_3	-234.33
ΔdB_4	-6.89	Δdeg_4	-233.73
ΔdB_5	-7.43	Δdeg_5	-233.02
ΔdB_6	-7.23	Δdeg_6	-235.29
ΔdB_7	-6.5	Δdeg_7	-236.04
ΔdB_{AVG} [dB]	-6.86	Δdeg_{AVG} [deg]	-234.6728571
dB_{AVG} (α_{AVG}) [dB/cm]	-2.29	deg_{AVG} (β_{AVG}) [deg/cm]	-78.22428571
(α_{AVG}) [NP/cm]	-0.263426699	(β_{AVG}) [rad/cm]	-1.365271341
f [Hz]	8.35E+08		
μ [H/cm]	1.25664E-08		
ε_o [F/cm]	8.854E-14		
ε_r	**58.6**		
$\sigma_{effective}$	**1.09**		



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835 MHz Data (Heike & Tony) Muscle with E-115

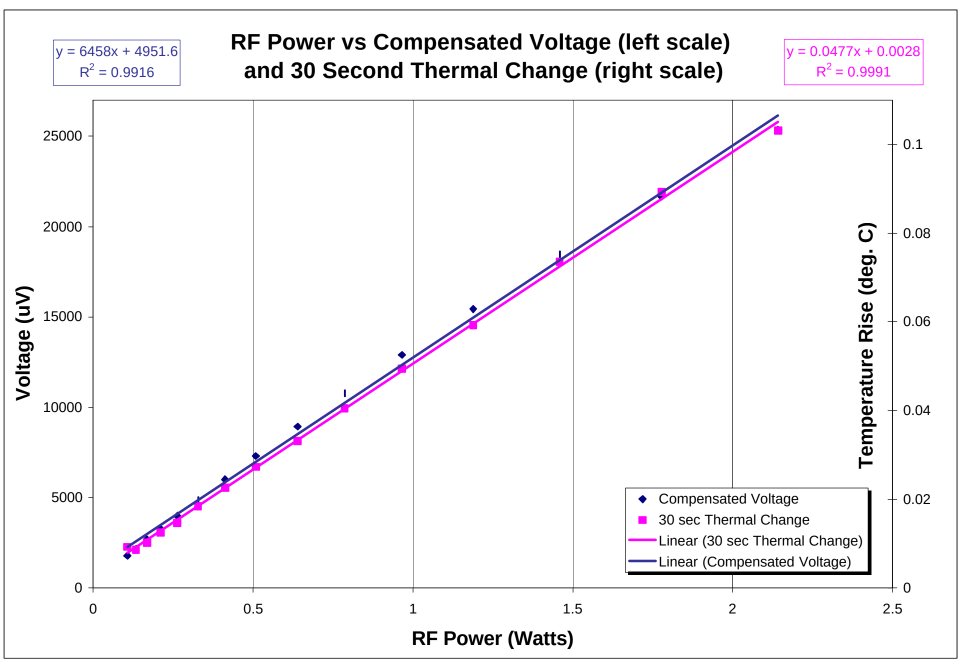
						delta T	Sum		Thermal
RF Power			Ch0	Ch1	Ch2	(30 sec)	Vi/Ei		SAR
W	dBm	R&S	uV	uV	uV	deg. C			W/kg
0.10666	20.28	-25.61	391	1196	2954	0.0093	1792.736		0.86
0.133352	21.25	-24.64	439	1440	3638	0.0086	2177.984		0.80
0.169044	22.28	-23.61	513	1782	4517	0.0102	2689.029		0.94
0.210863	23.24	-22.65	586	2173	5542	0.0125	3276.59		1.16
0.263027	24.2	-21.69	684	2661	6787	0.0147	3999.08		1.36
0.328095	25.16	-20.73	830	3247	8276	0.0185	4875.658		1.71
0.412098	26.15	-19.74	1001	4028	10205	0.0227	6012.429		2.10
0.509331	27.07	-18.82	1196	4932	12402	0.0273	7312.846		2.53
0.639735	28.06	-17.83	1440	6079	15137	0.0331	8940.589		3.06
0.787046	28.96	-16.93	1733	7397	18188	0.0405	10779.67		3.75
0.966051	29.85	-16.04	2100	8960	21680	0.0495	12918.42		4.58
1.188502	30.75	-15.14	2515	10815	25806	0.0592	15441.16		5.48
1.458814	31.64	-14.25	3052	13086	30640	0.0736	18455.06		6.81
1.778279	32.5	-13.39	3662	15503	35718	0.0893	21651.69		8.26
2.142891	33.31	-12.58	4395	18335	41528	0.1031	25349.01		9.54

Directional Coupler factor 25.89 dB (Asset 100251 cal file data)
Additional inline attenuation 20 dB

Sensitivity (e)	1.658	1.721	1.68	- Sensor Sensitivity in mV/ (mW/cm^2): 835 MHz cal
η = 1.50 e	2.487	2.5815	2.52	

Density	1.3	g/cm^3	1300	kg/m^3	
Conductivity	10.8	mS/cm	1.08	S/m	
Heat Capacity (c)	2.775	J/C/g	2775	J/C/kg	
Exposure Time	30	seconds	30	seconds	
Slope of Measure Voltage (m_V)	11722.36	uV/W	0.011722	V/W	
- standard error or m_V	182.1283	uV/W	0.000182	V/W	1.6%
Slope of Measure Temp Change (m_T)	0.047724	C/W	0.047724	C/W	
- standard error or m_T	0.000398	C/W	0.000398	C/W	0.8%

Tissue Conversion Factor (γ)	7.8



51 Spectrum Way
Nepean, Ontario, K2R 1E6
Tel. (613) 820-2730
Fax (613) 820 4161
e-mail: info@aprel.com

APPENDIX E. Validation Scans on a Flat Phantom

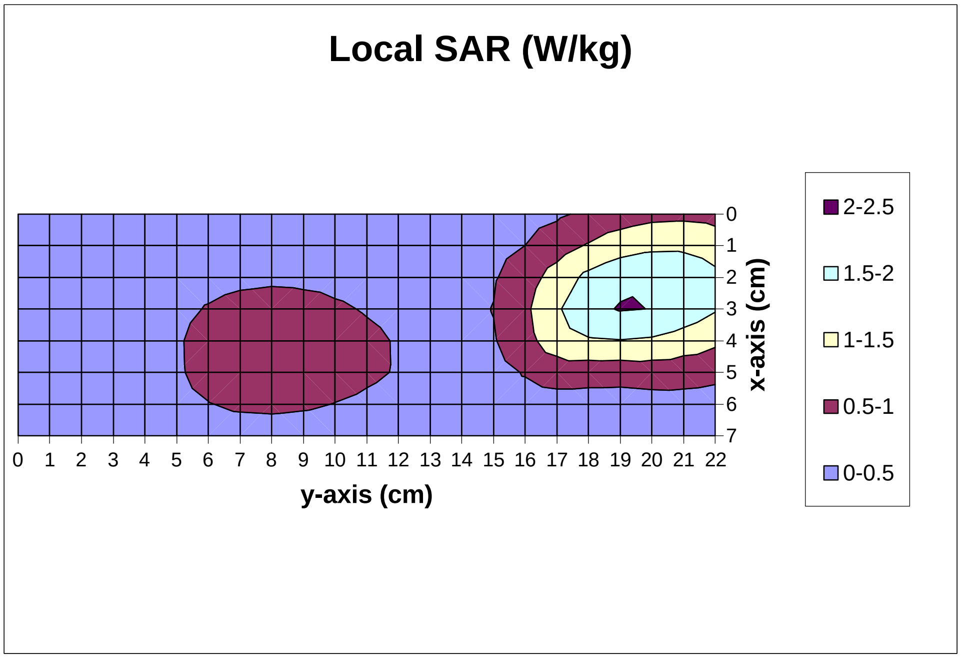


Figure 14. Contour Plot of the Reference Area Scan 2.5mm Above Phantom

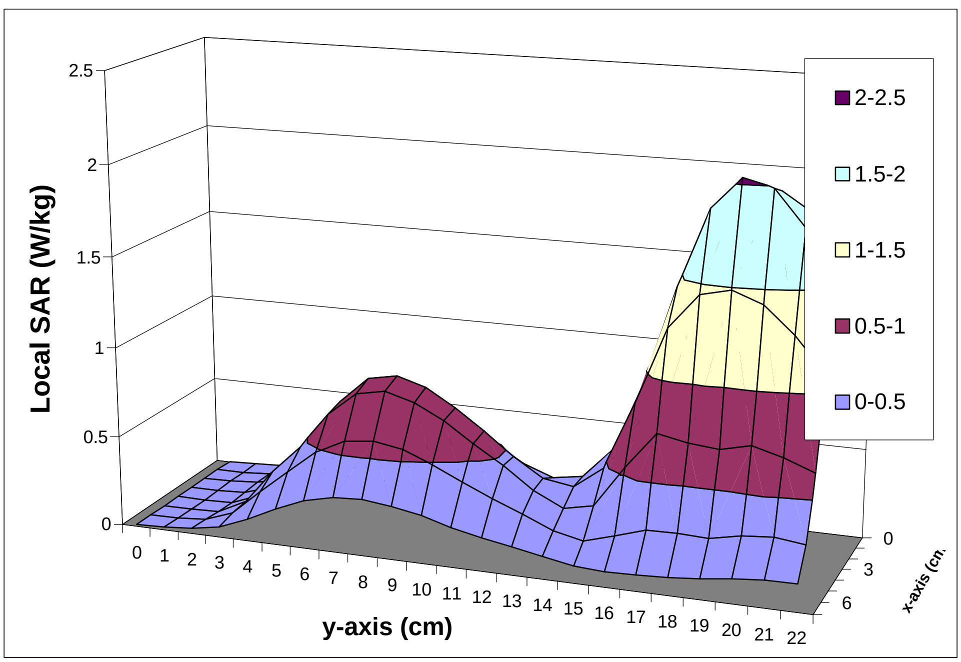


Figure 15. Surface Plot of the Reference Area Scan 2.5mm Above Phantom

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APPENDIX F. Duty Factor Limitation of Lipman Nurit 3010 POS

Lip LIPMAN U.S.A. Inc. *The Ideal Solution®*

50 Gordon Drive
Syosset, New York 11791

August 23, 2000

Federal Communications Commision
Equipment Authorization Branch
7435 Oakland Mills Road
Columbia, MD 21406

To Whom It May Concern:
A typical authorization financial transaction in the POS industry consists of approximately 100 bytes of request that is transmitted by the POS device and 50 bytes of response received by the POS device. The fastest transaction time that has been achieved on the Mobitex network was 3 seconds. A regular transaction time is about 6 seconds and it takes another 10 seconds before the next transaction can be run after swiping the next card and entering the amount.

To be conservative, we will still assume that we can transmit one transaction per 3 sec continuously. According to RIM, Mobitex transmits at a maximum of 8000 bytes per second which would be 24000 bytes in 3 seconds. The maximum duty factor is therefore 100 / 24000 = 0.00416 or 0.42%.

Some of the financial institutions may require the terminal to submit all transactions as a batch at the end of each day. During this batch upload terminal uploads all necessary transactions to the host computer.

The current maximum byte stream transmitted for a transaction in a batch upload is 250.

Assuming the worst condition situation, the terminal will submit one transaction (500 byte stream, double the size of current numbers) per 3 seconds. According to RIM, Mobitex transmits at a maximum of 8000 bytes per second which would be 24000 bytes in 3 seconds. The maximum duty factor is therefore 500 (bytes per trans) / 24000 = 0.0208 or 2.1%.

Sincerely,
Bulent Ozayaz
Chief Engineer

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