UltraTech
Group of Labs

July 06, 2001

Intel Corporation
2800 Center Drive
DuPont, WA 98327-9728, USA

Attn.: **Mr. Brian M. Slowik**

Subject: **Verification Testing in accordance with SAR (Specific Absorption Rate) requirements using guidelines established in:**

IEEE C95.1-1991,
FCC OET Bulletin 65 (Supplement C)
Industry Canada RSS-102 (Issue 1)
ACA Radiocommunications (Electromagnetic Radiation – Human Exposure) Amendment Standard 2000 (No. 1)

Product: **AnyPoint Wireless II Network PC Card**
Model: **AP311**

Dear Mr. Slowik

The product sample has been tested in accordance with **SAR (Specific Absorption Rate) requirements using guidelines established in IEEE C95.1-1991, FCC OET Bulletin 65 (Supplement C), Industry Canada RSS-102(Issue 1) and ACA Radiocommunications (Electromagnetic Radiation – Human Exposure) Amendment Standard 2000 (No. 1),** and the results and observation were recorded in the engineering report, Our File No.: INT-001-SAR

Enclosed you will find a copy of the engineering report. If you have any queries, please do not hesitate to contact us.

Yours truly,

Tri Minh Luu, P.Eng
Vice President - Engineering

Encl.

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CERTIFICATE OF COMPLIANCE

July 06, 2001 File No.: INT-001-SAR

Intel Corporation
2800 Center Drive
DuPont, WA 98327-9728, USA

NOT TRANSFERABLE

This Verification Certificate is hereby issued to the named GRANTEE and is VALID ONLY for the equipment identified hereon for use under the rules and regulations listed below:

GRANTEE'S NAME:	**Intel Corporation**
PRODUCT UNDER TEST:	**AnyPoint Wireless II Network PC Card**
MODEL NO.:	**AP311**
FCC ID:	**EJM-AP311**
OPERATING FREQUENCY RANGE:	**2412 - 2467 MHz**
NOMINAL RF OUTPUT POWER:	**0.026 W**
PEAK SPATIAL-AVERAGE SAR:	**0.420 W/Kg**

APPLICABLE STANDARDS: **SAR (Specific Absorption Rate) requirements using guidelines established in IEEE C95.1-1991, FCC OET Bulletin 65 (Supplement C), Industry Canada RSS-102 (Issue 1) and ACA Radiocommunications (Electromagnetic Radiation – Human Exposure) Amendment Standard 2000 (No. 1)**

- Assessed by ITI (UK) Competent Body, NVLAP (USA) Accreditation Body & ACA/AUSTEL (Australia), VCCI (Japan)
- Accredited by Industry Canada (Canada) under ACC-LAB (Europe/Canada MRA and APEC/Canada MRA)
- Recognized/Listed by FCC (USA)
- *All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST Technology (NIST)*

Approved by: Tri M. Luu, P.Eng.
V.P. – Engineering

UltraTech

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ENGINEERING TEST REPORT

AnyPoint Wireless II Network PC Card
Model No.: AP311

Tested For

Intel Corporation
2800 Center Drive
DuPont, WA 98327-9728, USA

In Accordance With

SAR (Specific Absorption Rate) Requirements
using guidelines established in IEEE C95.1-1991,
FCC OET Bulletin 65 (Supplement C),
Industry Canada RSS-102 (Issue 1) and
ACA Radiocommunications (Electromagnetic Radiation – Human Exposure)
Amendment Standard 2000 (No. 1)

UltraTech's File No.: INT-001-SAR

This Test report is Issued under the Authority of Tri M. Luu, Professional Engineer, Vice President of Engineering UltraTech Group of Labs Date: July 06, 2001	
Report Prepared by: JaeWook Choi Issued Date: July 06, 2001	Tested by: JaeWook Choi Test Dates: July 03, 2001

The results in this Test Report apply only to the sample(s) tested, which has been randomly selected.

UltraTech

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	SAR (Specific Absorption Rate) Requirements IEEE C95.1-1991, FCC OET Bulletin 65 (Supplement C) Industry Canada RSS-102 (Issue 1). ACA Radiocommunications (Electromagnetic Radiation – Human Exposure) Amendment Standard 2000 (No. 1)
Title	Safety Levels with respect to human exposure to Radio Frequency Electromagnetic Fields Guideline for Evaluating the Environmental Effects of Radio Frequency Radiation
Purpose of Test:	To show compliance with Federal regulated SAR requirements in Canada and the US.
Method of Measurements:	IEEE C95.1-1991, FCC OET Bulletin 65 (Supplement C) and Industry Canada RSS-102(Issue 1)
Exposure Category	**[X] General population, uncontrolled exposure** [ ] Occupational, controlled exposure

1.2. REFERENCES

The methods and procedures used for the measurements contained in this report are details in the following reference standards:

Publications	Year	Title
Industry Canada RSS102	1999	"Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields"
ACA	2000	ACA Radiocommunications (Electromagnetic Radiation – Human Exposure) Amendment Standard 2000 (No. 1)
NCRP Report No.86	1986	"Biological Effects and Exposure Criteria for radio Frequency Electromagnetic Fields"
FCC OET Bulletin 65	1997	"Evaluating Compliance with FCC Guidelines for Human Exposure to radio Frequency Fields"
ANSI/IEEE C95.3	1992	"Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave"
ANSI/IEEE C95.1	1992	"Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300GHz"
AS/NZS 2722.1	1998	Interim Australian/New Zealand Standard. "Radiofrequency fields, Part 1:Maximum exposure levels – 3kHz to 300GHz "

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT AND MANUFACTURER INFORMATION

APPLICANT:	
Name:	INTEL Corporation
Address:	2800 Center Drive DuPont, WA 98327-9728, USA
Contact Person:	Mr. Brian M. Slowik Phone #: +1-253-371-9108 Fax #: +1-253-371-9104 Email Address: brian.m.slowik@intel.com

MANUFACTURER:	
Name:	Gemtek Technology Co., Ltd.
Address:	No.1, Jen-Ai Road, HsinChu Industrial Park, Hukuo Hukuo HsinChu Hsien, Tawain, R.O.C.
Contact Person:	Mr. Mike Chen Phone #: +886-3-598-5535 Fax #: +886-598-5585 Email Address: mikechen@mail.gemtek.com.tw

2.2. DEVICE UNDER TEST (EUT) DESCRIPTION

The following information are supplied by the applicant.

Trade Name	Intel Corporation
Type/Model Number	AP311
Serial Number	00904B00DA41
Type of Equipment	Direct Sequence Spread Spectrum Transmitter
Frequency of Operation	2412 – 2462 MHz
Rated RF Power	0.026 W
Duty Cycle	100 %
Modulation Employed	DSSS
Antenna Type	Printed Monopole Pair
External Power Supply	External DC Sources from the hosting laptop computer
Primary User Functions of EUT:	Wireless network communication

2.3. LIST OF EUT'S ACCESSORIES:

None

2.4. SPECIAL CHANGES ON THE EUT'S HARDWARE/SOFTWARE FOR TESTING PURPOSES

None

2.5. ANCILLARY EQUIPMENT

Toshiba 1605CDS/43 Laptop computer (S/N : 1027387CU)

2.6. GENERAL TEST CONFIGURATIONS

2.6.1. Equipment Configuration

Power and signal distribution, grounding, interconnecting cabling and physical placement of equipment of a test system shall simulate the typical application and usage in so far as is practicable, and shall be in accordance with the relevant product specifications of the manufacturer.

The configuration that tends to maximize the EUT's emission or minimize its immunity is not usually intuitively obvious and in most instances selection will involve some trial and error testing. For example, interface cables June be moved or equipment re-orientated during initial stages of testing and the effects on the results observed.

Only configurations within the range of positions likely to occur in normal use need to be considered.

The configuration selected shall be fully detailed and documented in the test report, together with the justification for selecting that particular configuration.

2.6.2. Exercising Equipment

The exercising equipment and other auxiliary equipment shall be sufficiently decoupled from the EUT so that the performance of such equipment does not significantly influence the test results.

2.7. SPECIFIC OPERATING CONDITIONS

Not specified.

2.8. BLOCK DIAGRAM OF TEST SETUP

The EUT was configured as normal intended use. The following block diagram shows the equipment arrangement during tests:

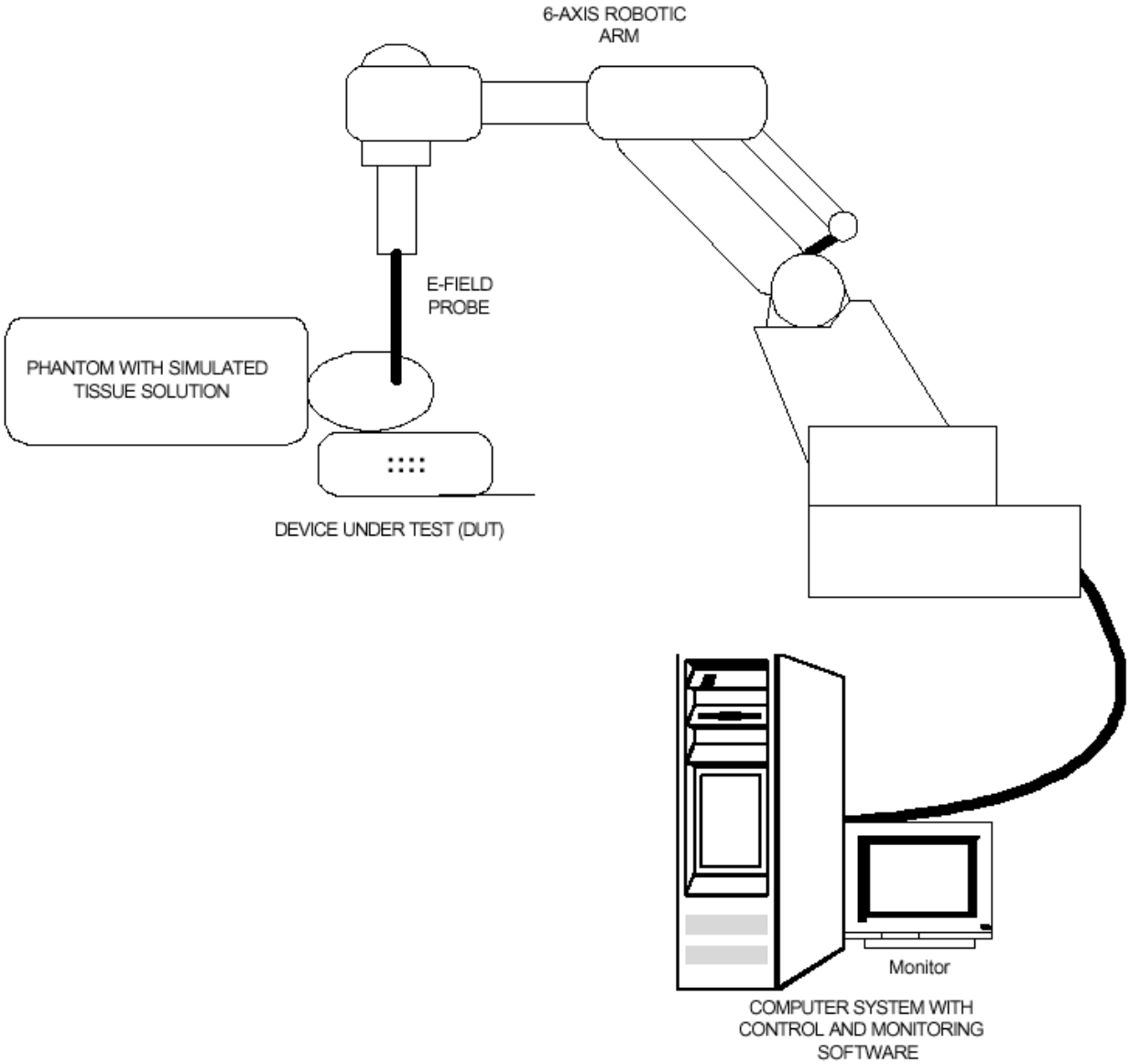


EXHIBIT 3. SUMMARY OF TEST RESULTS

3.1. LOCATION OF TESTS

All of the measurements described in this report were performed at UltraTech Group of Labs located in:

3000 Bristol Circle, Oakville, Ontario, Canada.

3.2. APPLICABILITY & SUMMARY OF SAR RESULTS

The peak spatial - average SAR measured was found to be **0.420 W/Kg**

SAR Limits	Test Requirements	Compliance (Yes/No)
General population/Uncontrolled exposure 0.08W/kg whole body average and spatial peak SAR of 1.6W/kg, averaged over 1gram of tissue Hands, wrist, feet and ankles have a peak SAR not to exceed 4 W/kg, averaged over 10 grams of tissue.	Requirements using guidelines established in IEEE C95.1-1991 FCC OET Bulletin 65 (Supplement C) Industry Canada RSS-102 (Issue 1). ACA Radiocommunications (Electromagnetic Radiation – Human Exposure) Amendment Standard 2000 (No. 1)	Yes
Occupational/Controlled Exposure 0.4W/kg whole body average and spatial peak SAR of 8W/kg, averaged over 1gram of tissue Hands, wrist, feet and ankles have a peak SAR not to exceed 20 W/kg, averaged over 10 grams of tissue.	Requirements using guidelines established in IEEE C95.1-1991 FCC OET Bulletin 65 (Supplement C), Industry Canada RSS-102 (Issue 1) ACA Radiocommunications (Electromagnetic Radiation – Human Exposure) Amendment Standard 2000 (No. 1)	N/A

EXHIBIT 4. MEASUREMENTS, EXAMINATIONS & TEST DATA

4.1. TEST SETUP

EUT Information		Condition	
Radio Type	PCMCIA Wireless LAN Card	Robot Type	6 Axis
Model Number	AP311	Scan Type	SAR
Serial Number	00904B00DA41	Measured Field	E
Frequency Band (MHz)	2412 – 2462	Phantom Type	Open back full body
Frequency Tested (MHz)	2412, 2437, 2462	Phantom Position	Waist
Nominal Output Power (W)	0.026	Room Temperature	22 ± 1 °C
Antenna Type	Printed Monopole Pair		
Signal Type	DSSS		
Duty Cycle	100%		

Type of Tissue	Muscle	
Target Frequency (MHz)	2450	
Target Dielectric Constant	47.00	
Target Conductivity (S/m)	2.17	
Composition (by weight)	DI Water (54.28%) Sugar (44.40%) Salt (0.99%) HEC (0.18%) Bactericide (0.15%)	
Measured Dielectric Constant	49.36	
Measured Conductivity (S/m)	2.23	
Probe Name	UT-ETR-0200-1	
Probe Orientation	Isotropic	
Probe Offset (mm)	2.25	
Sensor Factor	10.8	
Conversion Factor	3.467	
Calibration Date (MM/DD/YY)	06/29/01	

4.2. PHOTOGRAPH OF EUT

< Front View >

11Mbps Wireless LAN Card
-IEEE 802.11b Compliant
-DSSS at 2.4 GHz ISM band
Certified for FCC Part 15 Class B
FCC ID : 2C
MXF-WL211F
CE 0499
-Canada RSS-139
Made in Taiwan
MAC : 00904B00DA41

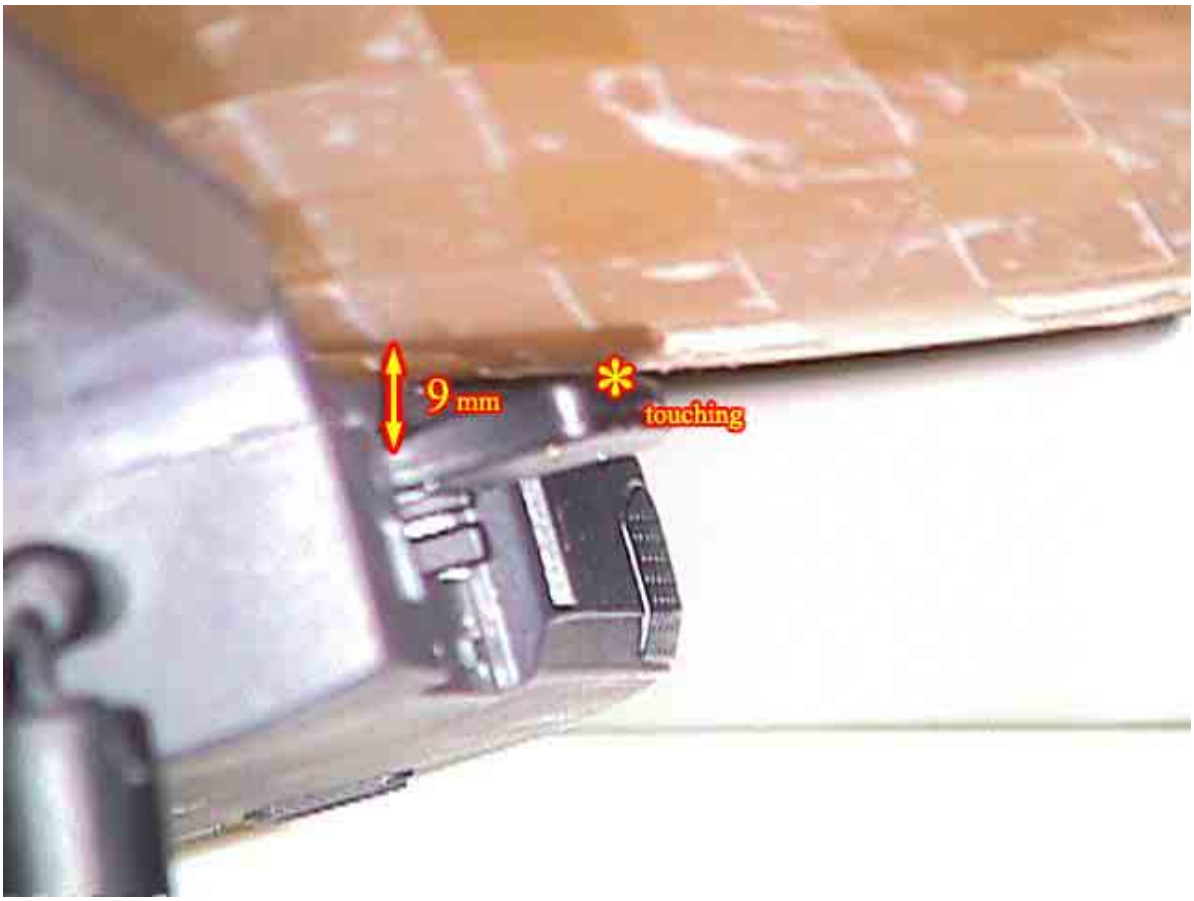
< Rear View >

4.3. PHOTOGRAPHS OF EUT POSITION

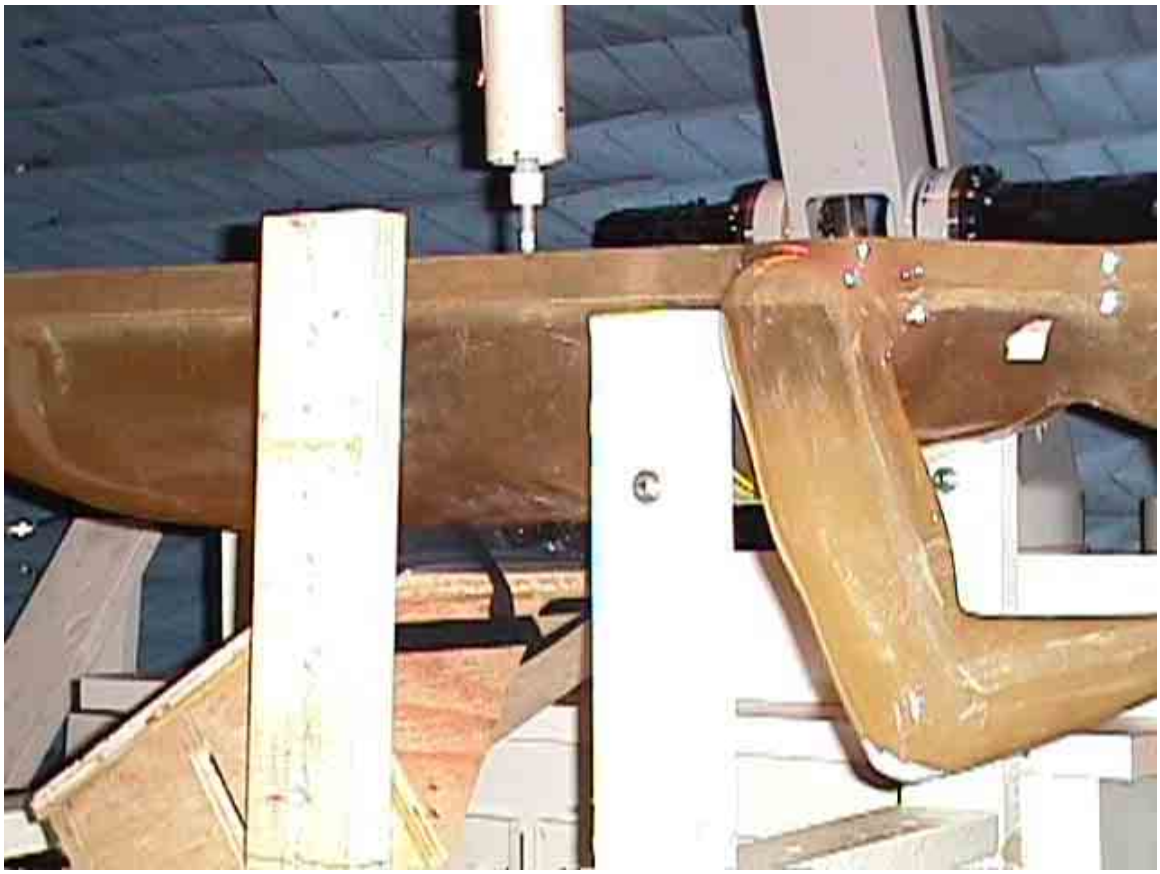
< Overview – Waist with the tip of EUT in contact with the phantom and EUT normal to the phantom >

< Close-up view – Waist with the tip of EUT in contact with the phantom and EUT normal to the phantom >

< Overview – Waist with the tip of EUT in contact with the phantom and the front of EUT faced inward to the phantom >



< Close-up view – Waist with the tip of EUT in contact with the phantom and the front of EUT faced inward to the phantom >



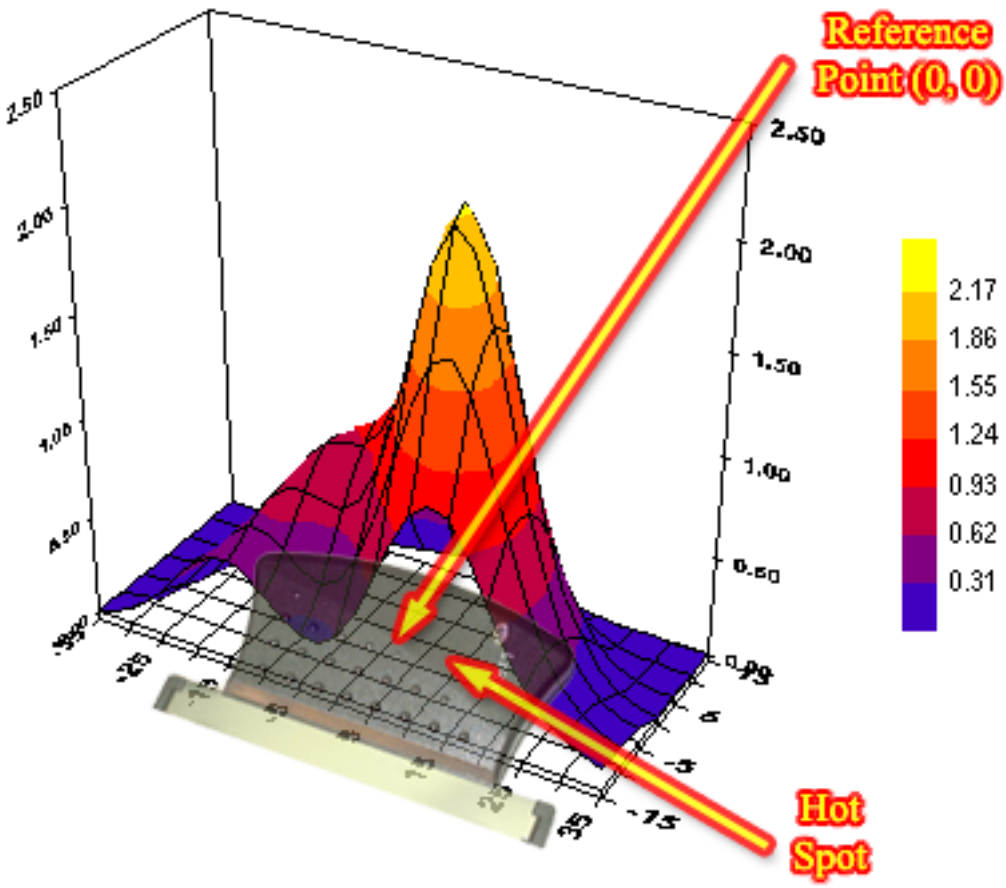
< Overview – Waist with the tip of EUT in contact with the phantom and the frotn of EUT faced outward from the phantom >

< Close-up view – Waist with the tip of EUT in contact with the phantom and the front of EUT faced outward from the phantom >

4.4. MAXIMUM FIELD LOCATION (REFER TO 4.5)

The maximum field was found to be located at (8, -1) with the test configuration as described below.

- Waist position
- The tip of EUT in contact with the phantom
- The front of EUT faced inward to the phantom



4.5. PEAK SPATIAL-AVERAGE SAR MEASURED

Peak Spatial-Average SAR at (8, -1)				
EUT Positioning	Frequency (MHz)	Average EIRP (dBm)	SAR (W/Kg)	EUT Configuration
Waist	2,412	18.1	0.420	**the tip of EUT in contact with the phantom** **the front of EUT faced inward to the phantom**

4.6. SAR MEASUREMENT DATA

EUT Positioning	Frequency (MHz)	Average EIRP (dBm)	SAR (W/Kg)	EUT Configuration
Waist	2,412	18.1	0.077	**the tip of EUT in contact with the phantom** **EUT normal to the phantom**
	2,437	18.6	0.074	
	2,462	14.2	0.038	
	2,412	18.1	0.420	**the tip of EUT in contact with the phantom** **the front of EUT faced inward to the phantom**
	2,437	18.6	0.252	
	2,462	14.2	0.179	
	2,412	18.1	0.235	**the tip of EUT in contact with the phantom** **the front of EUT faced outward from the phantom**
	2,437	18.6	0.205	
	2,462	14.2	0.191	

EXHIBIT 5. SAR SYSTEM CONFIGURATION & TEST METHODOLOGY

5.1. MEASUREMENT SYSTEM SPECIFICATIONS

Positioning Equipment	Probe
Type : 3D Near Field Scanner Location Repeatability : 0.1mm Speed 180 ^{o}/sec AC motors	Sensor : E-Field Spatial Resolution : 0.1 cm^3 Isotropic Response : ± 0.25 dB Dynamic Range : 2 µW/g to 100 mW/g
Computer	**Phantom**
Type : 166 MHz Pentium Memory : 32 Meg. RAM Operating System : Windows NT Monitor : 17" SVGA	Tissue : Simulated Tissue with electrical characteristics similar to those of the human at normal body temperature. Shell : Fiberglass human shell shaped (1.5 mm thick)

5.2. TEST PROCEDURES

In the SAR measurement, the positioning of the probes must be performed with sufficient accuracy to obtain repeatable measurements in the presence of rapid spatial attenuation phenomena. The accurate positioning of the E-field probe is accomplished by using a high precision robot. The robot can be taught to position the probe sensor following a specific pattern of points. In a first sweep, the sensor is positioned as close as possible to the interface, with the sensor enclosure touching the inside of the fiberglass shell. The SAR is measured on a grid of points, which covers the curved surface of the phantom in an area larger than the size of the EUT. After the initial scan, a high- resolution grid is used to locate the absolute maximum measured energy point. At this location, attenuation versus depth scan will be accomplished by the measurement system to calculate the SAR value.

5.3. PHANTOM

The phantom used in the evaluation of the RF exposure of the user of the wireless device is a clear fiberglass enclosure 1.5 mm thick, shaped like a human head or body and filled with a mixture simulating the dielectric characteristics of the brain, muscle or other types of human tissue. The maximum width of the cranial model is 17 cm, the cephalic index is 0.7 and the crown circumference of the cranial model is 61 cm. The ear is 6 mm above the outer surface of the shell.

5.4. SIMULATED TISSUE

Simulated Tissue: Suggested in a paper by George Hartsgrove and colleagues in University of Ottawa Ref.: Bioelectromagnetics 8:29-36 (1987)

Ingredient	Quantity
Water	40.4 %
Sugar	56.0 %
Salt	2.5 %
HEC	1.0 %
Bactericide	0.1 %

Table. Example of composition of simulated tissue.

This simulated tissue is mainly composed of water, sugar and salt. At higher frequencies, in order to achieve the proper conductivity, the solution does not contain salt. Also, at these frequencies, D.I. water and alcohol is preferred.

Tissue Density : Approximately 1.25 g/cm^3

5.4.1. Preparation

We determine the volume needs and carefully measure all components. A clean container is used were the ingredients will be mixed. A stirring paddle and a hand drill is used to stir the mixture. First we heat the DI water to about 40 ^{o}C to help the ingredients to dissolve and then we pour the salt and the bactericide. We stir until all the ingredients are completely dissolved. We continue stirring slowly while adding the sugar. We avoid high RPM from the mixing device to prevent air bubbles in the mixture. Later on, we add the HEC to maintain the solution homogeneous. Mixing time is approximately 30 to 40 min.

5.5. MEASUREMENT OF ELECTRICAL CHARACTERISTICS OF SIMULATED TISSUE

1) Network Analyzer HP8753C or others

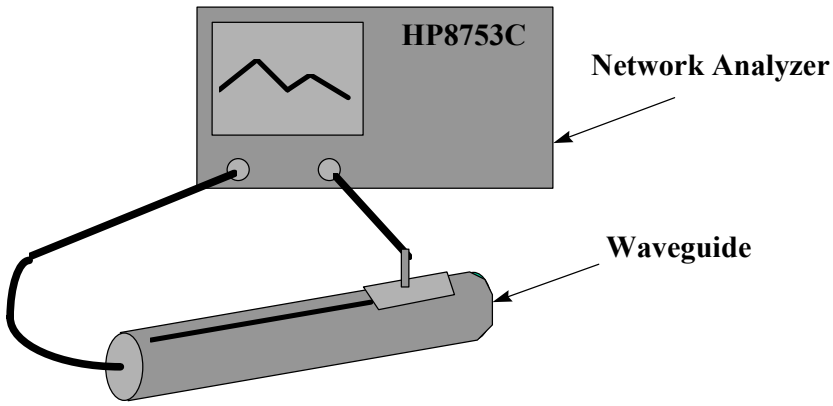
2) Slotted Coaxial Waveguide

5.5.1. Description of the slotted coaxial waveguide

The cylindrical waveguide is constructed with copper tube of about 30 to 40 cm of length, generally 12.5 mm diameter, with connectors at both ends. Inside of this tube, a conductive rod about 6.3 mm is coaxial supported by the two ends connectors (radiator). A slot 3 mm wide start at the beginning of the tube to almost the two third of the tube length. The outer edge of the slotted tube is marked in centimeters (10 to 12) every 1 centimeter, 0.5 if higher frequencies. A saddle piece containing the sampling probe is inserted in the slot so the tip of the probe is close but not in contact with the inner conductor (radiator).

To measure the electrical characteristics of the liquid simulated tissue, we fill the coaxial waveguide, select CW frequency and measure amplitude and phase with the Network Analyzer for every point in the slot (typically 11). An effort is made to keep the results dielectric constant and conductivity within 5 % of published data.

Electrical Characteristics Measurement Setup



$$c = 3 \cdot 10^8 \text{ m/s}$$

$$A = \frac{\Delta A}{20} \ln_{10} \frac{1}{m}$$

$$\theta = \frac{\Delta\theta \cdot 2\pi}{360}$$

$$\lambda = \frac{c}{f} \cdot \frac{100}{2.54} \text{inches}$$

$$\varepsilon_{re} = \frac{(A^2 + \theta^2) \cdot \lambda^2}{4\pi^2}$$

$$\theta' = \left| \frac{|A| \cdot \lambda}{4\pi\sqrt{\varepsilon_{re}}} \right|$$

$$S = \tan(2\theta')$$

$$\varepsilon_r = \frac{\varepsilon_{re}}{\sqrt{(1 + S^2)}}$$

$$\sigma = S \cdot 2\pi \cdot f \cdot 8.854 \cdot 10^{12} \cdot \varepsilon_r \text{ (S/m)}$$

where;

ΔA is the amplitude attenuation in dB

$\Delta\theta$ is the phase change in degrees for 5 cm of wave propagation in the slotted line

f is the frequency of interest in Hz

5.6. SYSTEM DESCRIPTION

The measurement system consists of an E-field probe, instrumentation amplifiers, RF transparent cable connecting the amplifiers to the computer, the robotics arm with its extension and proximity sensors, a phantom with simulated tissue and a radio holder to support the device under test. The E-field probe is a three channel device used to measure RF electric fields in the near vicinity of the source. The three sensors are mutually orthogonal positioned dipoles, and are constructed over a quartz substrate. Located in the center of the dipole is a Schottky diode. High impedance lines are connecting the sensor to the amplifier and then optically linked to the computer. The probe has an isotropic response and is transparent to the RF fields.

Calibration is performed by two steps:

1) Determination of free space E-field from amplified probe outputs in a test RF field. This calibration is performed in a TEM cell when the frequency is below 1 GHz and in a waveguide or some other methodologies above 1 GHz. For the free space calibration, we place the probe in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees until the three channels show the maximum reading. This reading equate to 1mW/cm^2 if that power density is available in the correspondent cavity.

2) Correlation of the measured free space E-field, to temperature rise in a dielectric medium. E-field temperature correlation calibration is performed in a planar phantom filled with the appropriate simulated tissue.

For temperature correlation calibration, a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe. First, the location of the maximum E-field close to the phantom's inner surface is determined as a function of power into the RF source; in this case, a dipole. Then, the E-field probe is moved sideways so that the temperature probe, while affixed to the E-field probe is placed at the previous location of the E-field probe. Finally, temperature changes for 30 seconds exposure at the same RF power levels used for the E-field measurement are recorded. The following equation relates SAR to initial temperature slope:

$$SAR = C\frac{\Delta T}{\Delta t}$$

where:
Δt = exposure time (30 seconds),
C = heat capacity of tissue (brain or muscle),
ΔT = temperature increase due to RF exposure.

The heat capacity used for brain simulated tissue is 2.7 joules/^{0}C/g and 3.0 joules/^{0}C/g for muscle.

SAR is proportional to T / t, the initial rate of tissue heating, before thermal diffusion takes place. Now, it's possible to quantify the electric field in the simulated tissue by equating the thermally derived SAR to the E-field;

$$SAR = \frac{|E|^2 \cdot \sigma}{\rho}$$

where:

σ = Simulated tissue conductivity,

ρ = Tissue density (1.25 g/cm^3 for simulated tissue)

5.7. DATA EXTRAPOLATION (CURVE FITTING)

There is a distance from the center of the sensor (diode) to the end of the protective tube called 'probe offset'. To compensate we use an exponential curve fitting method to obtain the peak surface value from the voltages measured at the distance from the inner surface of the phantom. At the point where the highest voltage was recorded, the field is measured as close as possible to the phantom's surface and every 1mm along the ` Z ` axis for a distance of 50 mm. The appropriate exponential curve is obtained from all the points measured and used to define an exponential decay of the energy density versus depth.

$$E(z) = E_0 \cdot e^{-z/\delta} \text{ (mV)}$$

5.8. INTERPOLATION AND GRAM AVERAGING

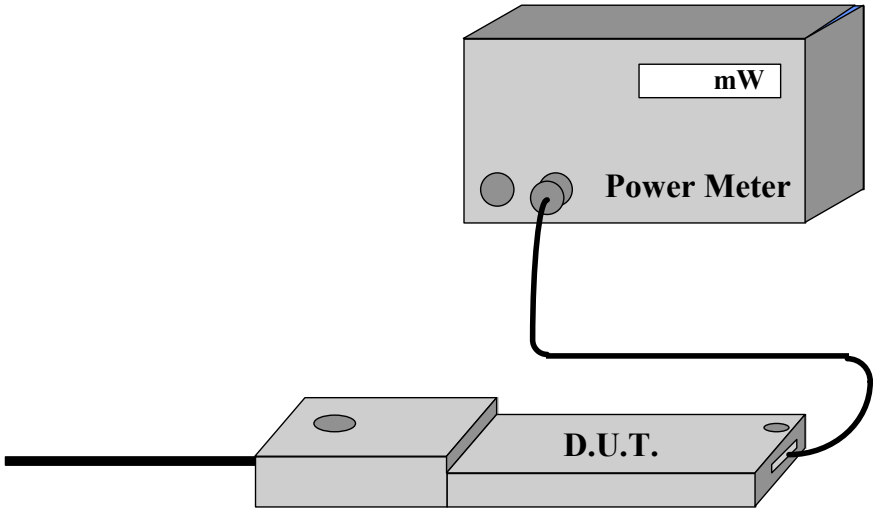
The voltage, (1 cm) above the phantoms surface (E_{tot} 1 cm), is needed to calculate the exposure over one gram of tissue. This SAR value that estimates the average over 1 gram of tissue, is obtained by taking the integral over 1 cm^2 surface of the measured field along the exponential decay curve of the energy density with depth.

$$SAR(mW/g) = \int_{v=1g} SAR(\bullet)dv = \int_{s=1cm^2} \int_0^{1cm} E(z) \cdot \frac{CF}{SensorFactor} dzds$$

5.9. POWER MEASUREMENT

When ever possible, a conducted power measurement is performed. To accomplish this, we utilize a fully charged battery, a calibrated power meter and a cable adapter provided by the manufacturer. The data of the cable and related circuit losses are also provided by the manufacturer. The power measurement is then performed across the operational band and the channel with the highest output power is recorded.

Power measurement is performed before and after the SAR to verify if the battery was delivering full power for the time of test. A difference in output power would determinate a need for battery replacement and repetition the SAR test.



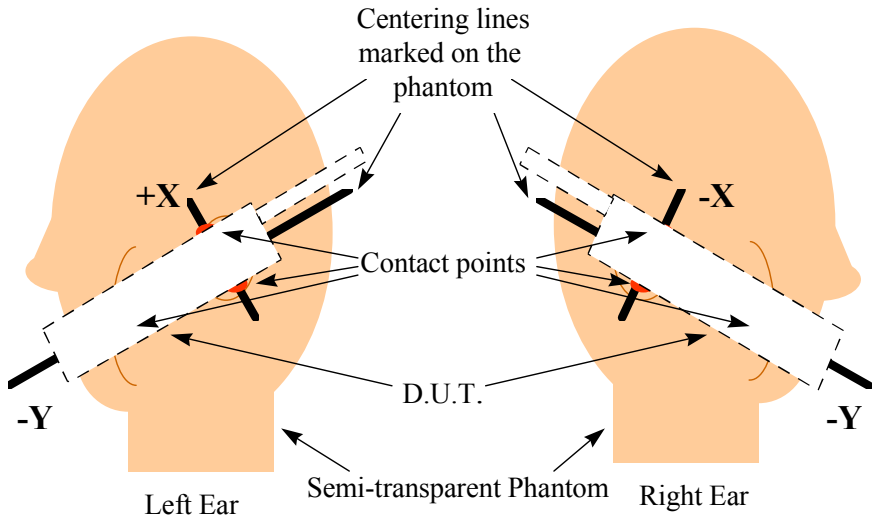
Measured Power Measured Power + Cable and Switching Mechanism Loss

5.10. POSITIONING OF E.U.T.

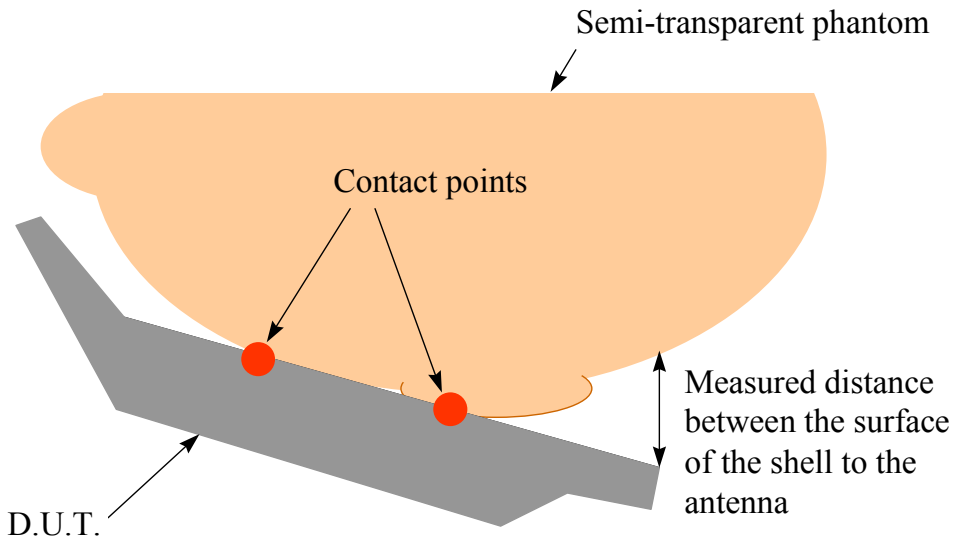
The clear fiberglass phantom shell have been previously marked with a highly visible line, so can easily be seen through the liquid simulated tissue. In the case of testing a cellular phone, this line is connecting the ear channel with the corner of the lips. The E.U.T. is then placed by centering the speaker with the ear channel and the center of the radio width with the corner of the mouth. At the same time the surface of the E.U.T. is always in contact with the phantoms shell. Three points contact; two in the ear region and one on the chin in addition to the previously describe alignment will assure repeatability of the test.

For HAND HELD devices (push-to-talk), or any other type of wireless transmitters, the E.U.T. will be positioned as suggested by manufacturer operational manuals.

Positioning of the D.U.T.



Side View



5.11. SAR MEASUREMENT UNCERTAINTY

This uncertainty analysis covers the 3D-EMC Laboratory test procedure for Specific Absorption Rate (SAR) associated with wireless telephones and similar devices.

Standards Covered Are:

WGMTE 96/4 - Secretary SC211/B

FCC 96-326, ET Docket No. 93-62

Industry Canada RSS 102

ACA Radiocommunications (Electromagnetic Radiation – Human Exposure) Amendment Standard 2000 (No. 1)

The laboratory test procedure, and this uncertainty analysis, June be used to cover all standards above. It is based on test equipment and procedures specified by 3D-EMC Laboratories, Inc. located in Ft. Lauderdale, Florida.

Measurement Uncertainty:

Table I. Estimated SAR Measurement Uncertainty

Contribution	Error (±dB)	Probability Distribution	Type Evaluation	Standard Uncertainty (±dB)
A. Field Measurement Errors:		Rectangular	Type B	
Isotropy in Phantom BTS Liquid	0.8			0.46
Frequency Response	0.2			0.12
Linearity	0.2			0.12
Probe Calibration Error (rss)	0.7			0.40
Duty Factor Variability	0.2			0.12
B. Spatial Peak SAR Errors:		Normal	Type A	
Extrapolation & Interpolation, and Position	0.2			0.20
Integration & Search Routine	0.1			0.10
Cube Shape	0.2			0.20
C. Additional Errors:		Rectangular	Type B	
Solution Variability (Worst-Case SAR)	0.21			0.12
D. Combined Standard Uncertainty, u_c:		Normal	-	0.52
E. Expanded Uncertainty, U:		Normal (k=2)	-	1.04
		95% Confidence	-	27.14%

Appendix I: Waist SAR Measurements

AI.1 THE TIP OF EUT IN CONTACT WITH THE PHANTOM AND EUT NORMAL TO THE PHANTOM

EUT Positioning	Frequency (MHz)	Average EIRP (dBm)	SAR (W/Kg)	EUT Configuration
Waist	2,412	18.1	0.077	**the tip of EUT in contact with the phantom** **EUT normal to the phantom**
	2,437	18.6	0.074	
	2,462	14.2	0.038	

Test Information

Date : 05/07/2001
Time : 10:57:38 AM

Product	: PCMCIA Wireless LAN Card	**Test**	: SAR
Manufacturer	: Gemtek Technology Co., Ltd.	**Frequency (MHz)**	: 2412
Model Number	: AP311	**Nominal Output Power (W)**	: 0.026
Serial Number	: 00904B00DA41	**Antenna Type**	: Printed Monopole F
FCC ID Number	: EJM-AP311	**Signal**	: Spread Spectrum

Phantom	: Waist	**Dielectric Constant**	: 49.36
Simulated Tissue	: Muscle	**Conductivity**	: 2.23

Probe	: UT-ETR-0200-1	**Antenna Position**	: Integral
Probe Offset (mm)	: 2.250		
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 3.467		
Calibrated Date	: 29/06/2001		

Amplifier Setting :

Channel 1 : 0.0038 Channel 2 : 0.0037 Channel 3 : 0.0045

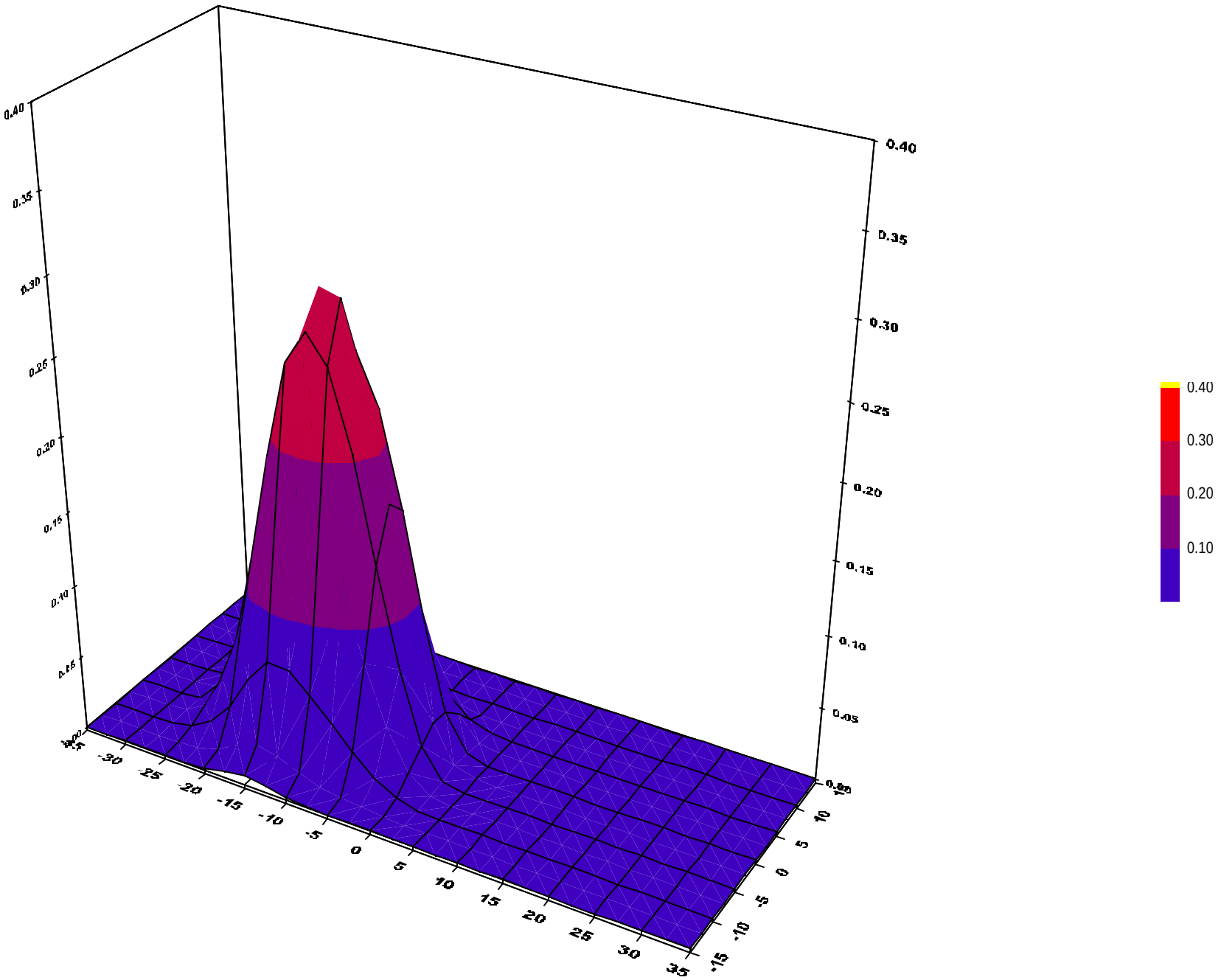
Location of Maximum Field :

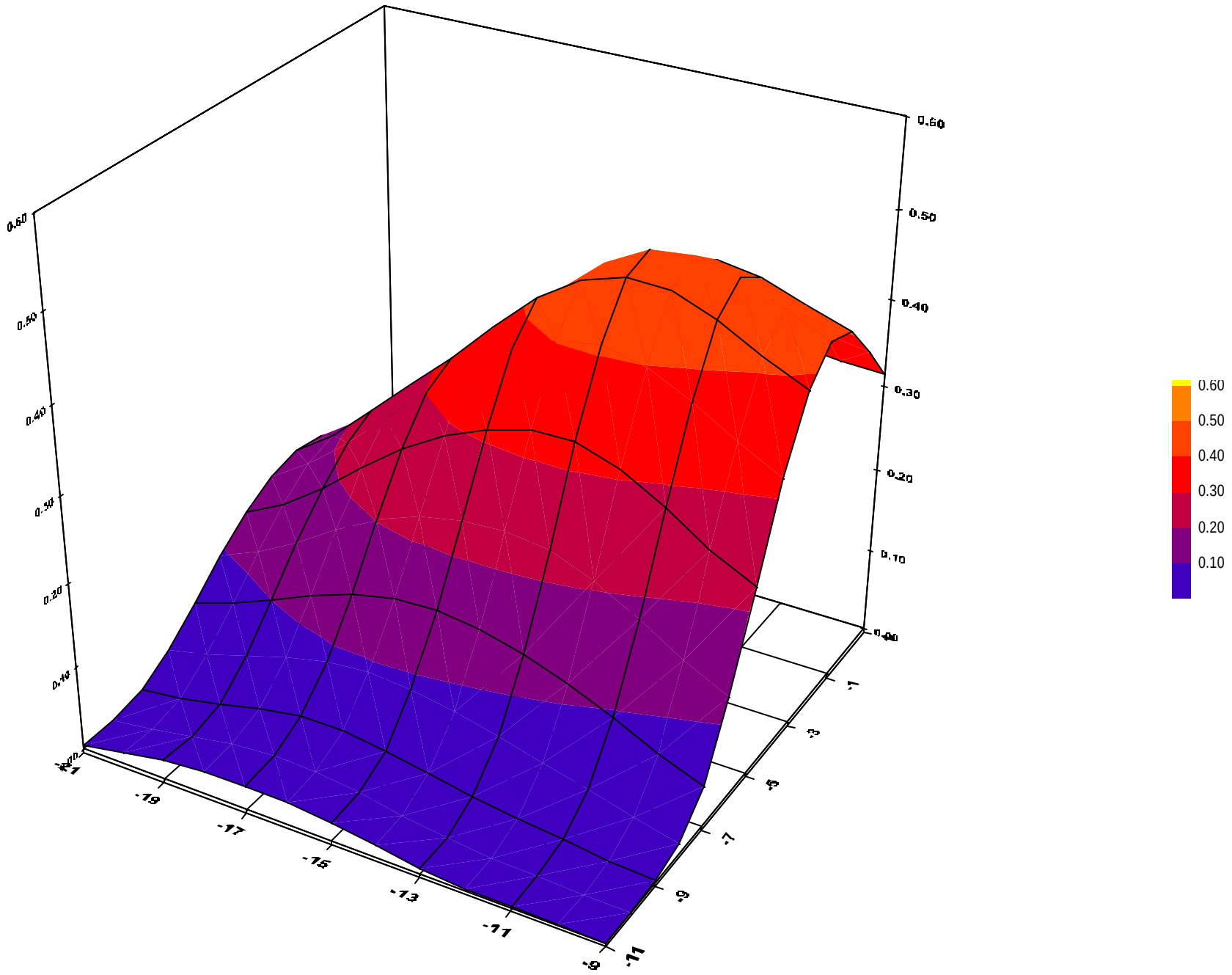
X = -13 Y = -3

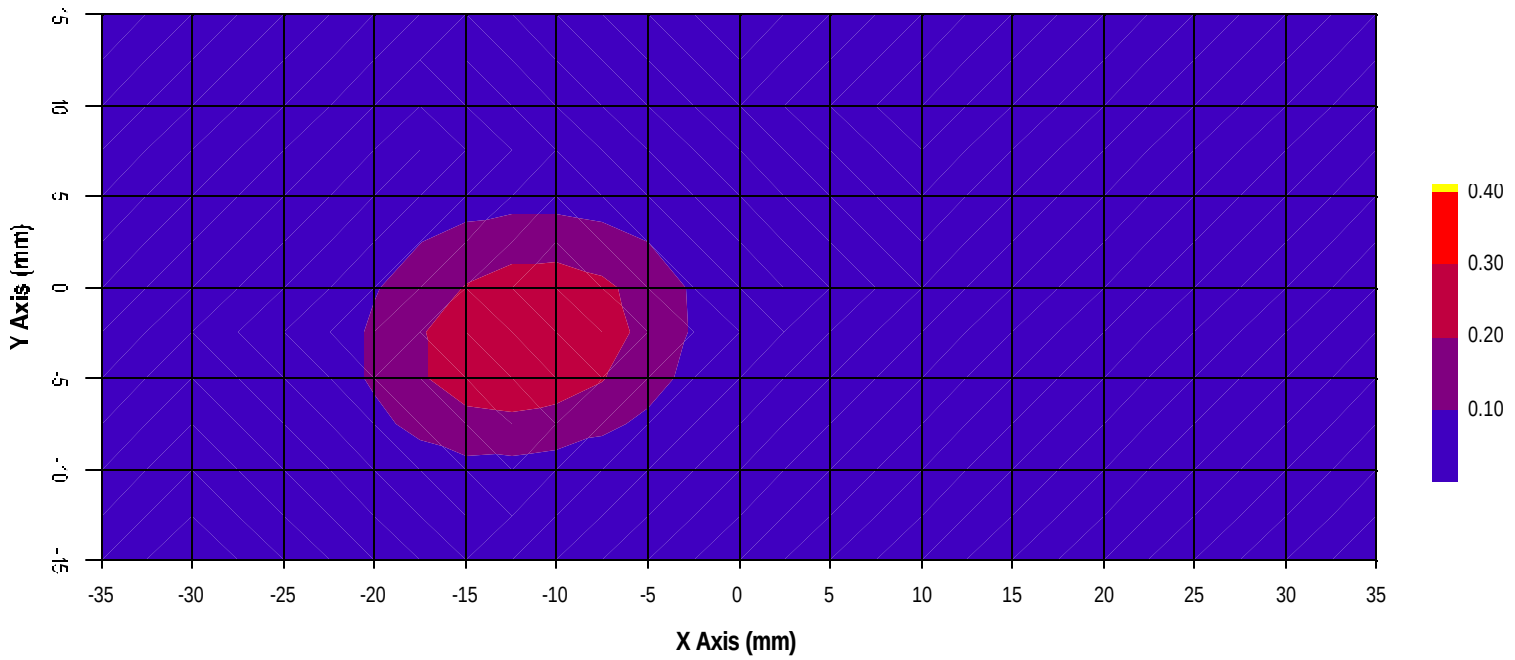
Measured Values (mV) :

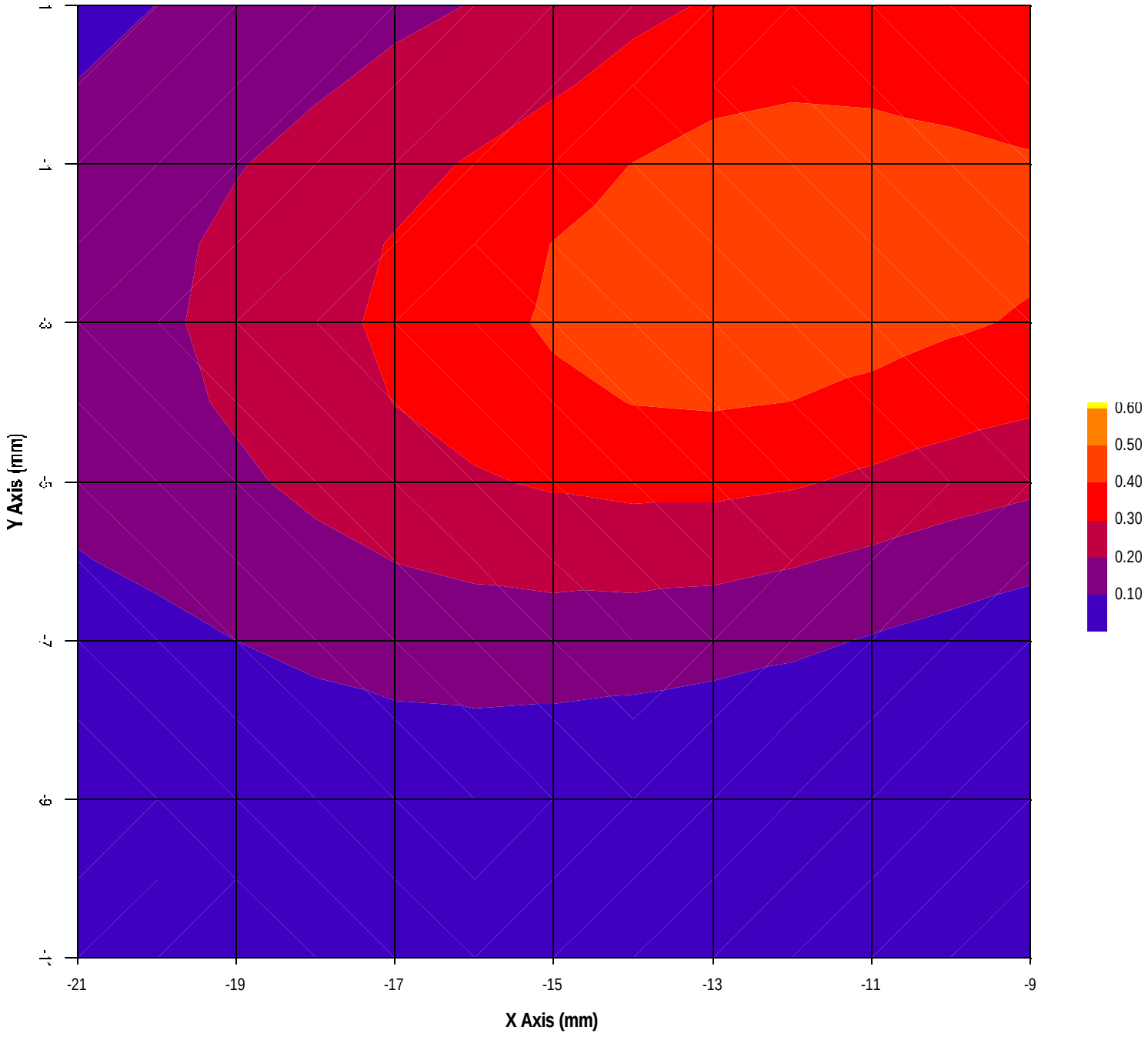
0.500	0.321	0.183	0.078	0.014	0.000
0.000	0.000	0.000	0.000	0.000	

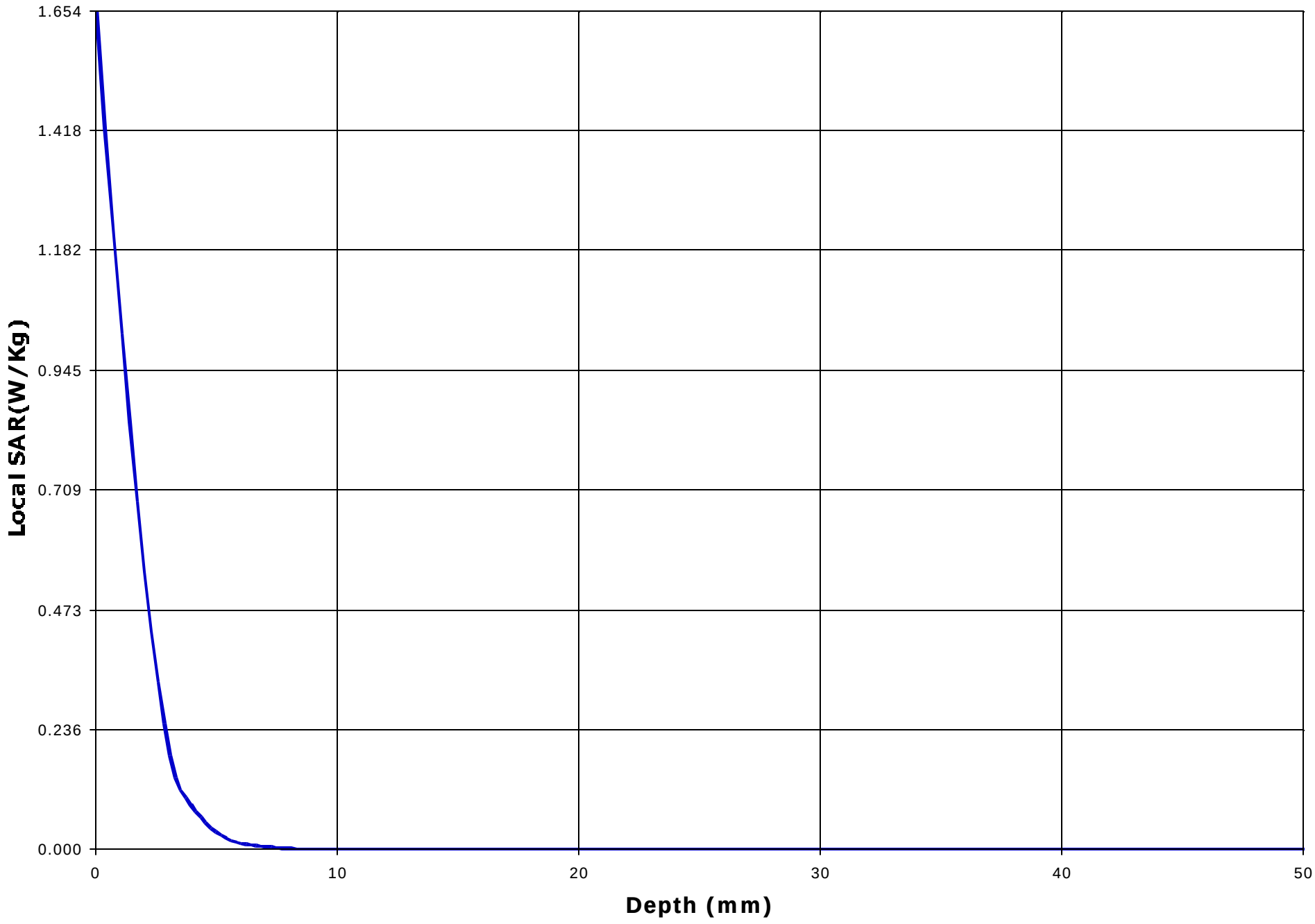
Peak Voltage (mV) : 5.153 **1 Cm Voltage (mV)** : 0.001 **SAR (W/Kg)** : 0.077

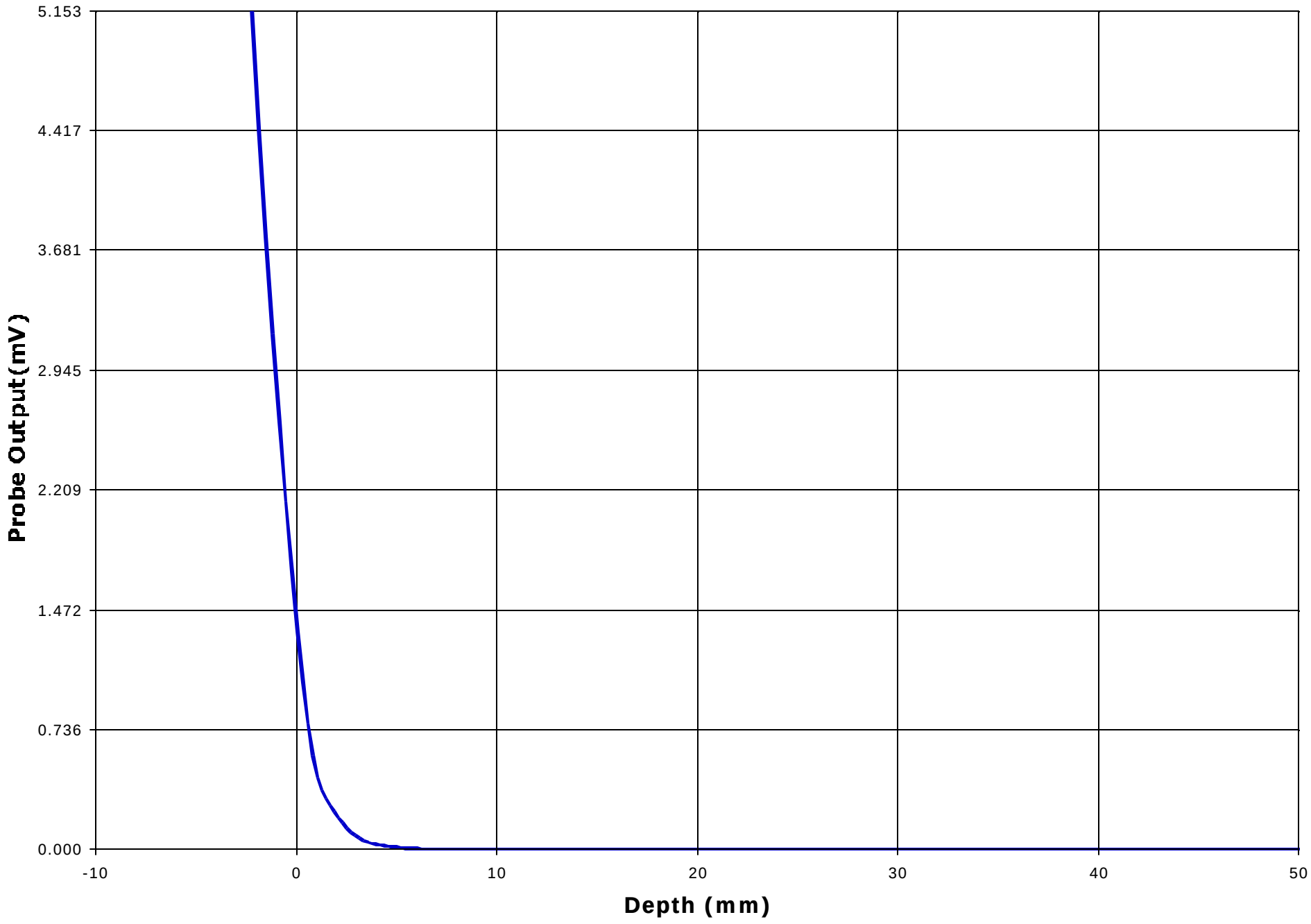

0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
-35
-30
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
-15
-10
-5
0
5
10
0.40
0.30
0.20
0.10


0.60
0.50
0.40
0.30
0.20
0.10
-21
-19
-17
-15
-13
-11
-9
-11
-9
-7
-5
-3
-1


Y Axis (mm)
X Axis (mm)
-35
-30
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
0.40
0.30
0.20
0.10


Y Axis (mm)
1
-1
-3
-5
-7
-9
-11
X Axis (mm)
-21
-19
-17
-15
-13
-11
-9
0.60
0.50
0.40
0.30
0.20
0.10


1.654
1.418
1.182
0.945
0.709
0.473
0.236
0.000
Local SAR(W/Kg)
0
10
20
30
40
50
Depth (mm)


5.153
4.417
3.681
2.945
2.209
1.472
0.736
0.000
Probe Output (mV)
-10
0
10
20
30
40
50
Depth (mm)

Test Information

Date : 05/07/2001
Time : 11:28:12 AM

Product	: PCMCIA Wireless LAN Card	**Test**	: SAR
Manufacturer	: Gemtek Technology Co., Ltd.	**Frequency (MHz)**	: 2437
Model Number	: AP311	**Nominal Output Power (W)**	: 0.026
Serial Number	: 00904B00DA41	**Antenna Type**	: Printed Monopole F
FCC ID Number	: EJM-AP311	**Signal**	: Spread Spectrum

Phantom	: Waist	**Dielectric Constant**	: 49.36
Simulated Tissue	: Muscle	**Conductivity**	: 2.23

Probe	: UT-ETR-0200-1	**Antenna Position**	: Integral
Probe Offset (mm)	: 2.250		
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 3.467		
Calibrated Date	: 29/06/2001		

Amplifier Setting :

Channel 1 : 0.0038 Channel 2 : 0.0037 Channel 3 : 0.0045

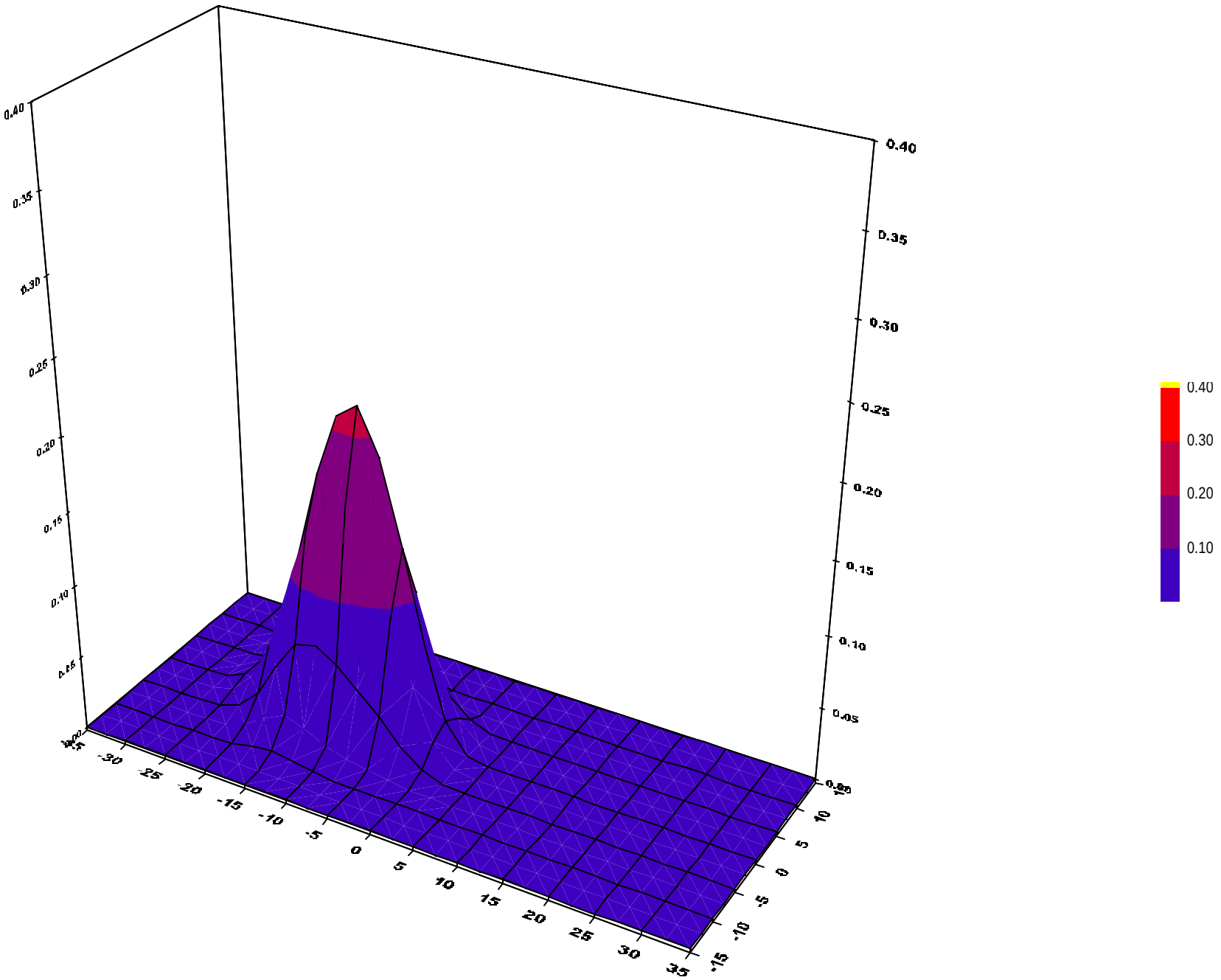
Location of Maximum Field :

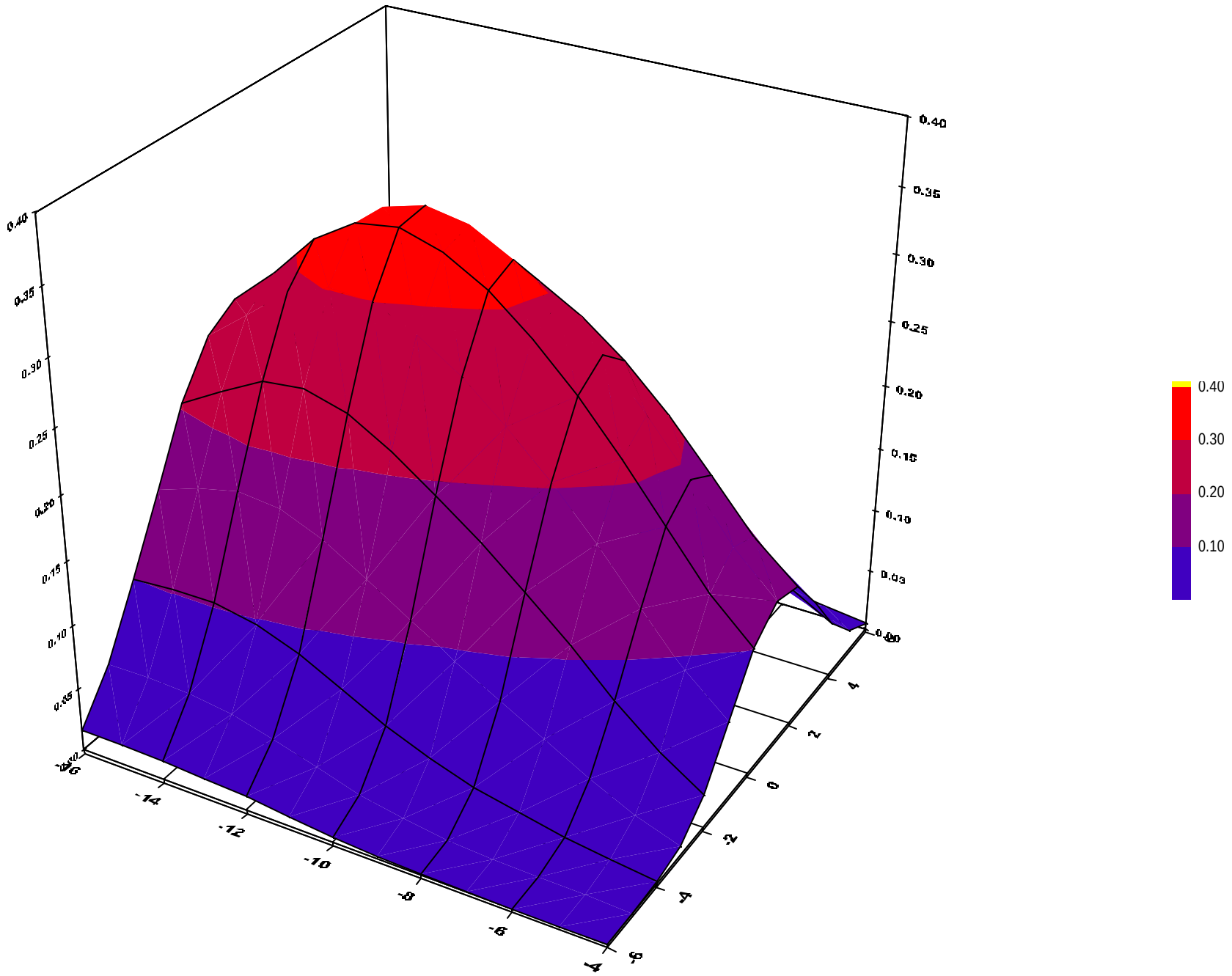
X = -12 Y = 0

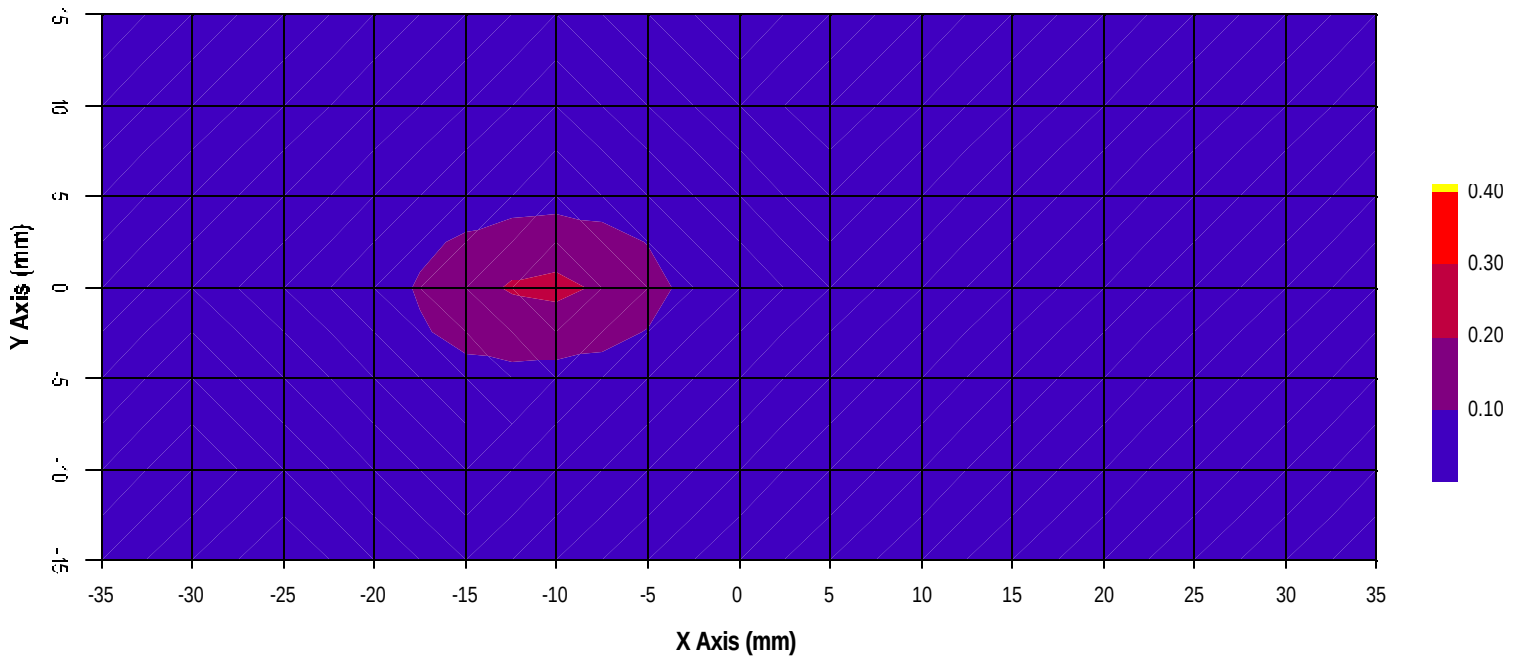
Measured Values (mV) :

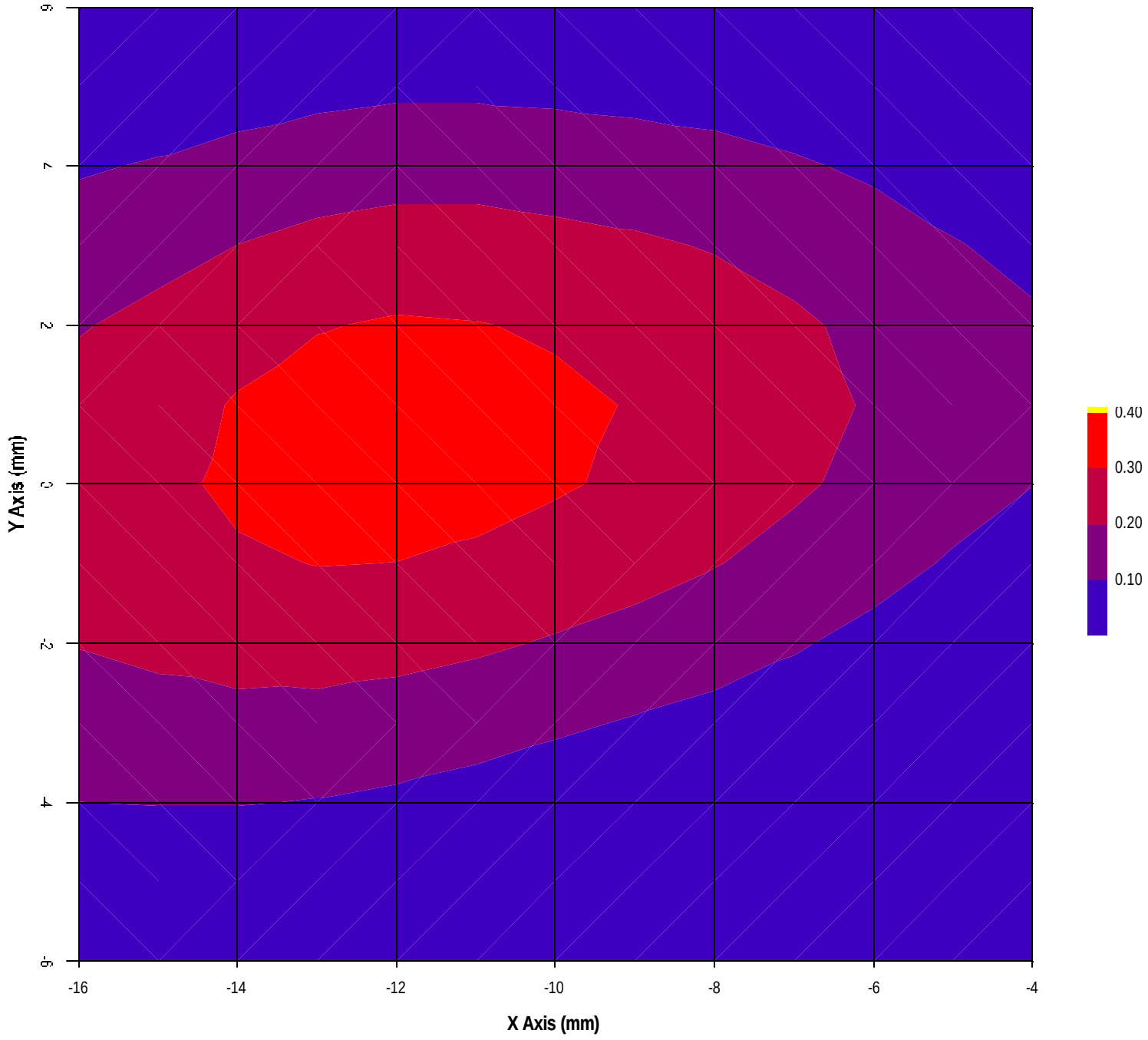
0.367	0.234	0.096	0.014	0.000	0.000
0.000	0.000	0.000	0.000	0.000	

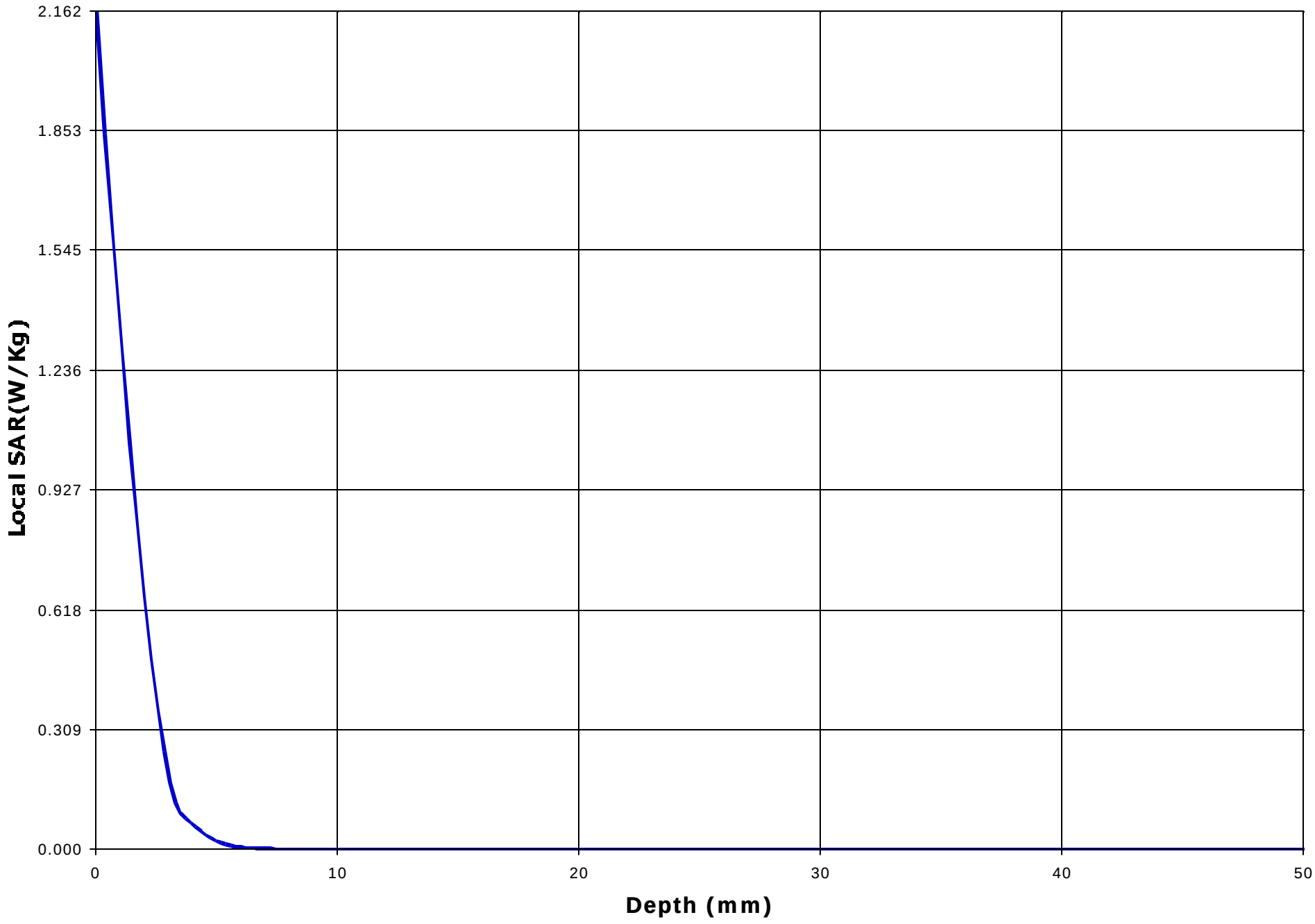
Peak Voltage (mV) : 6.737 **1 Cm Voltage (mV)** : 0.000 **SAR (W/Kg)** : 0.074

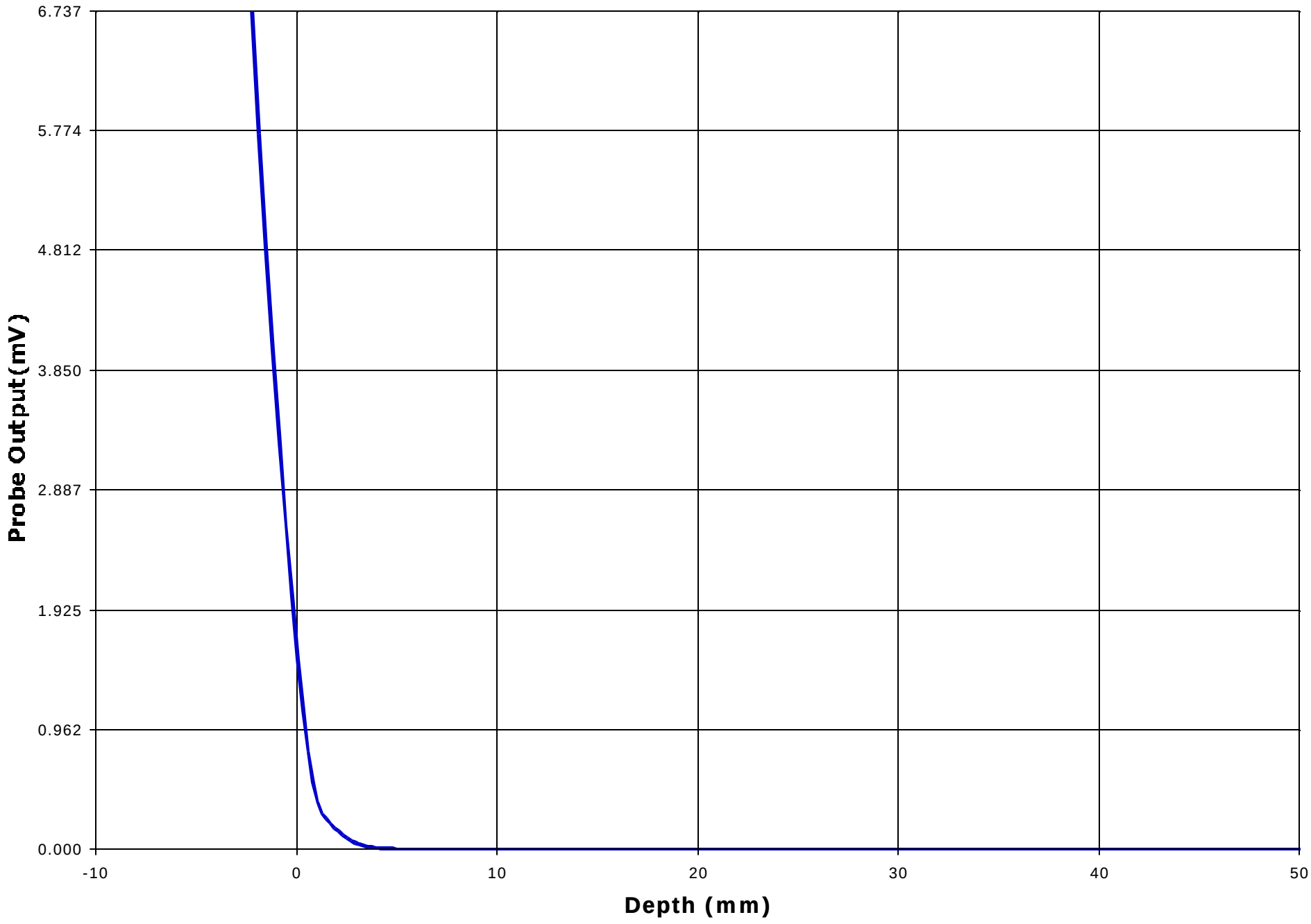

0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
-35
-30
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
-15
-10
-5
0
5
10
0.40
0.30
0.20
0.10


0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
-16
-14
-12
-10
-8
-6
-4
-6
-4
-2
0
2
4
6
0.40
0.30
0.20
0.10


Y Axis (mm)
X Axis (mm)
-35
-30
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
0.40
0.30
0.20
0.10


Y Axis (mm)
6
7
2
0
-2
4
-6
-16
-14
-12
-10
-8
-6
-4
X Axis (mm)
0.40
0.30
0.20
0.10


2.162
1.853
1.545
1.236
0.927
0.618
0.309
0.000
Local SAR(W/Kg)
0
10
20
30
40
50
Depth (mm)


6.737
5.774
4.812
3.850
2.887
1.925
0.962
0.000
Probe Output (mV)
-10
0
10
20
30
40
50
Depth (mm)

Test Information

Date : 05/07/2001
Time : 12:14:32 PM

Product	: PCMCIA Wireless LAN Card	**Test**	: SAR
Manufacturer	: Gemtek Technology Co., Ltd.	**Frequency (MHz)**	: 2462
Model Number	: AP311	**Nominal Output Power (W)**	: 0.026
Serial Number	: 00904B00DA41	**Antenna Type**	: Printed Monopole F
FCC ID Number	: EJM-AP311	**Signal**	: Spread Spectrum

Phantom	: Waist	**Dielectric Constant**	: 49.36
Simulated Tissue	: Muscle	**Conductivity**	: 2.23

Probe	: UT-ETR-0200-1	**Antenna Position**	: Integral
Probe Offset (mm)	: 2.250		
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 3.467		
Calibrated Date	: 29/06/2001		

Amplifier Setting :

Channel 1 : 0.0038 Channel 2 : 0.0037 Channel 3 : 0.0045

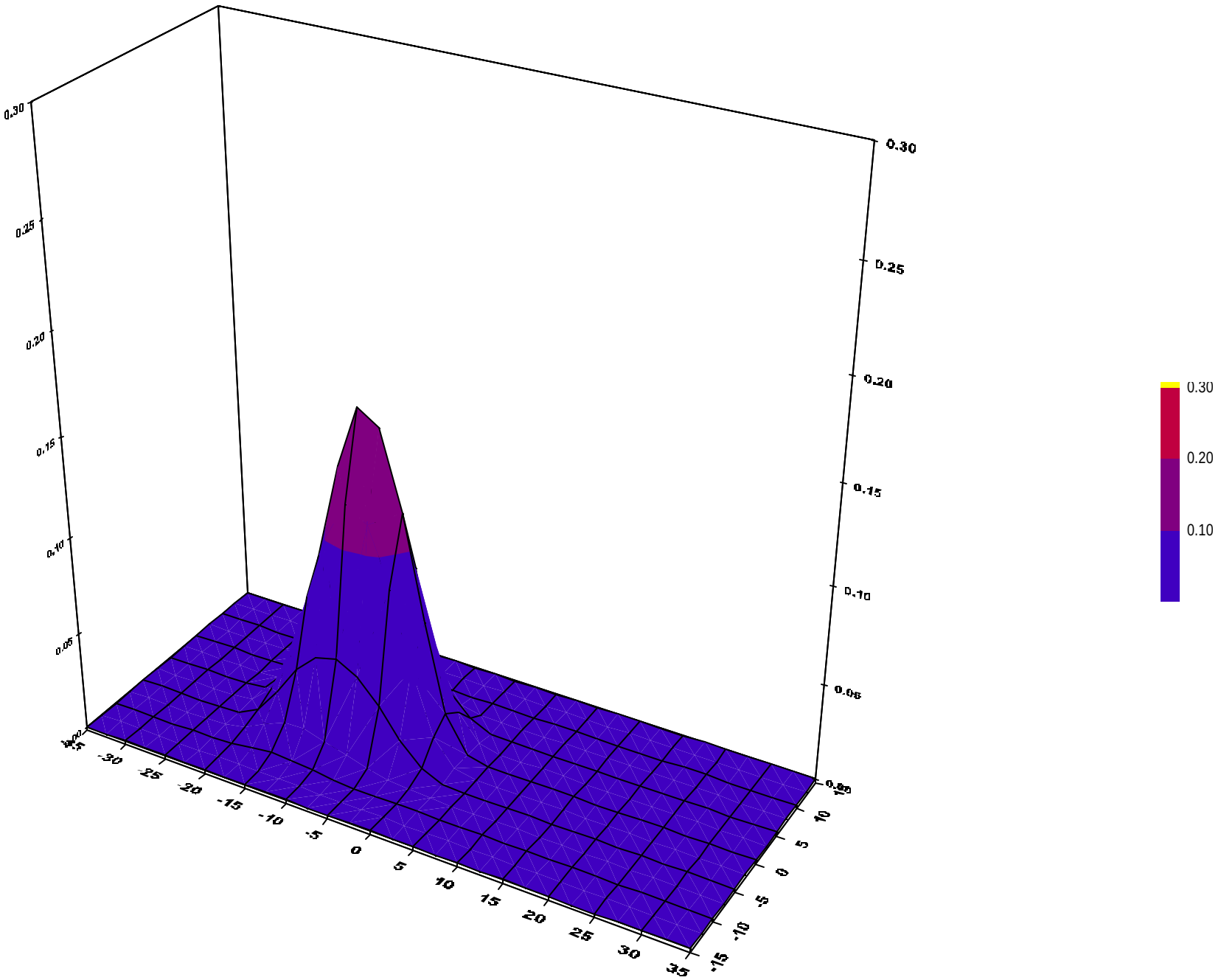
Location of Maximum Field :

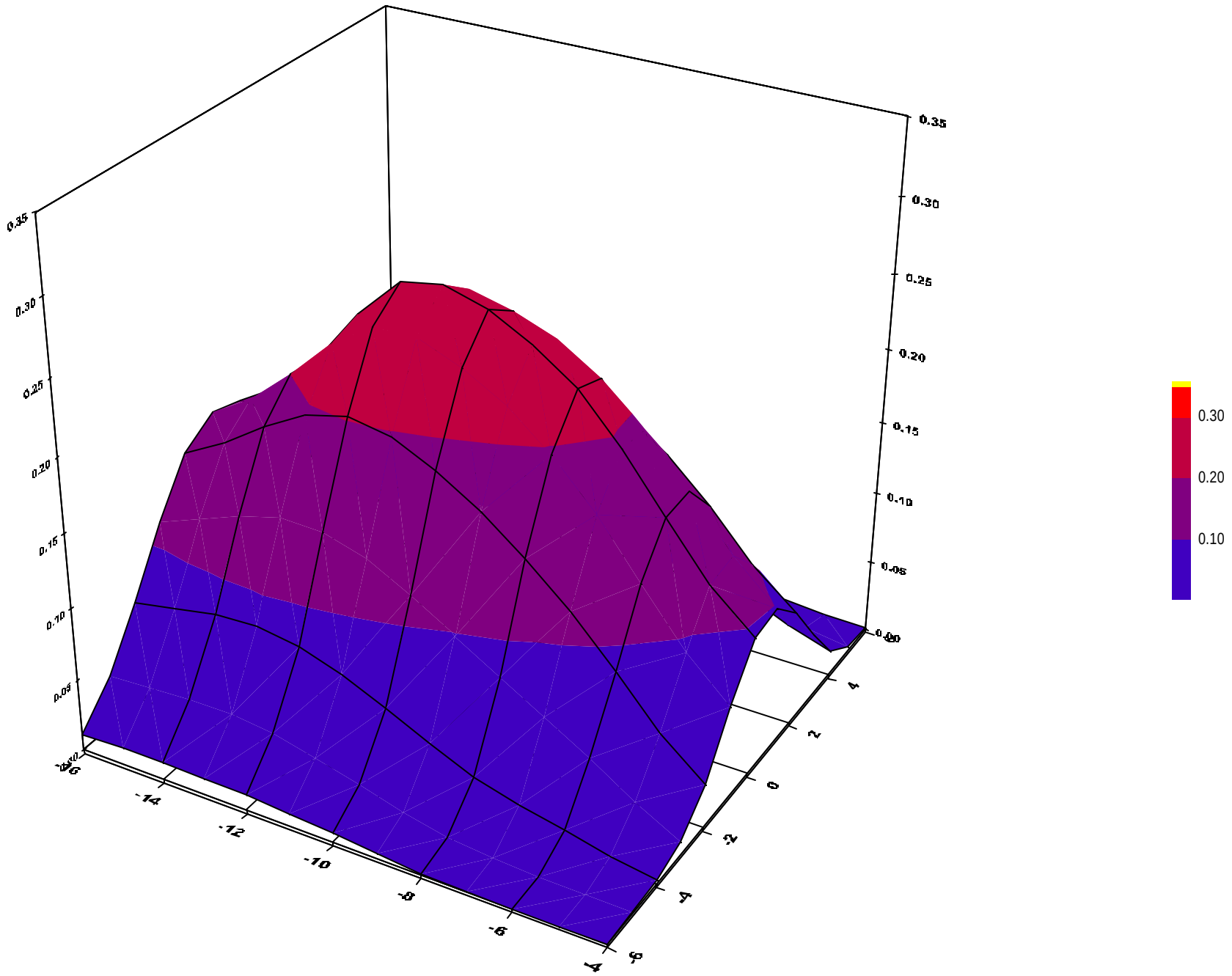
X = -12 Y = 0

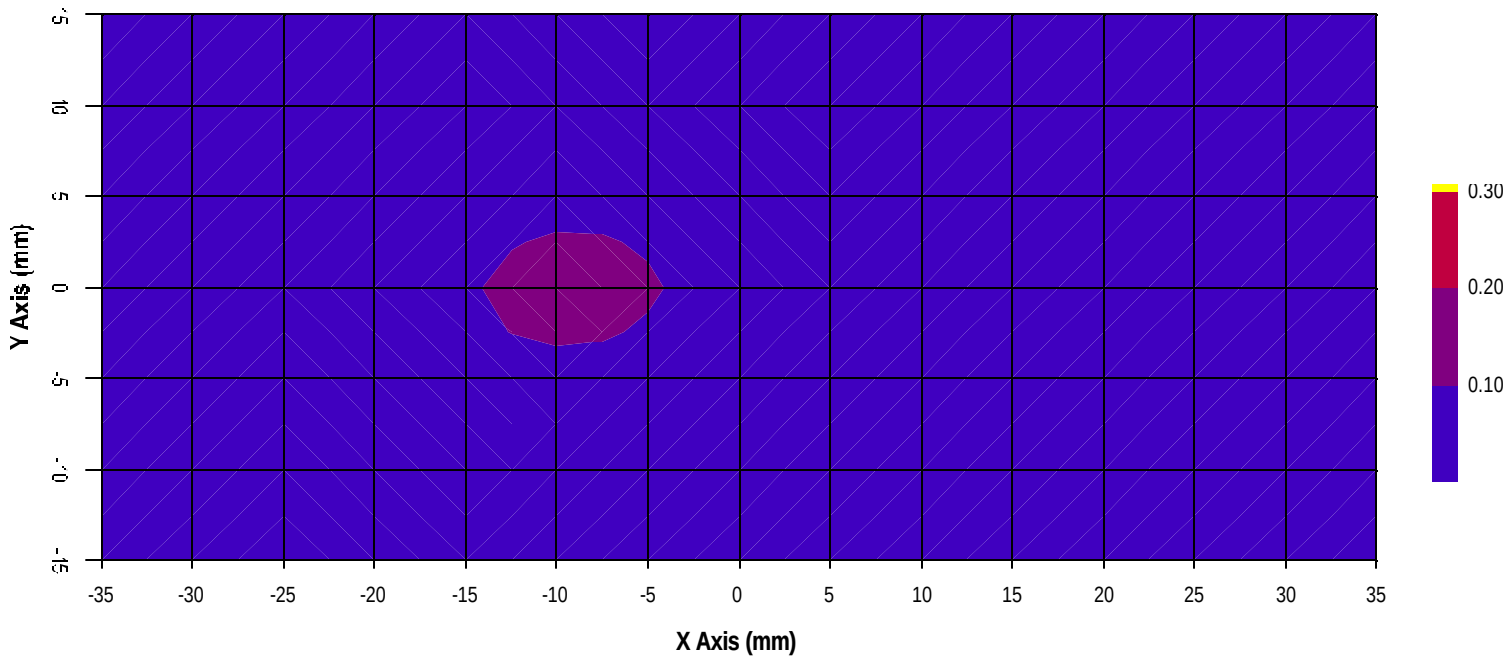
Measured Values (mV) :

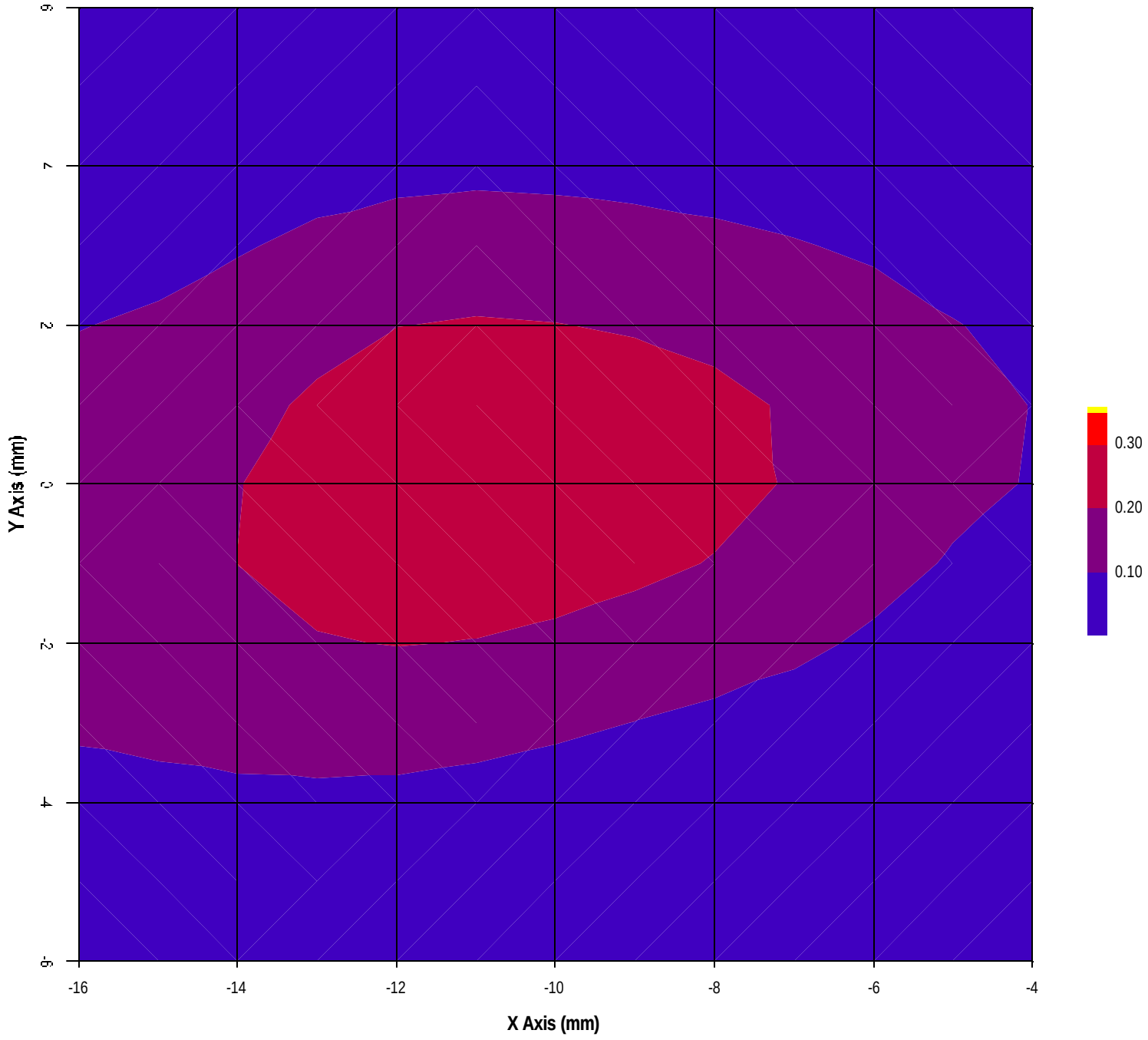
0.303	0.156	0.050	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	

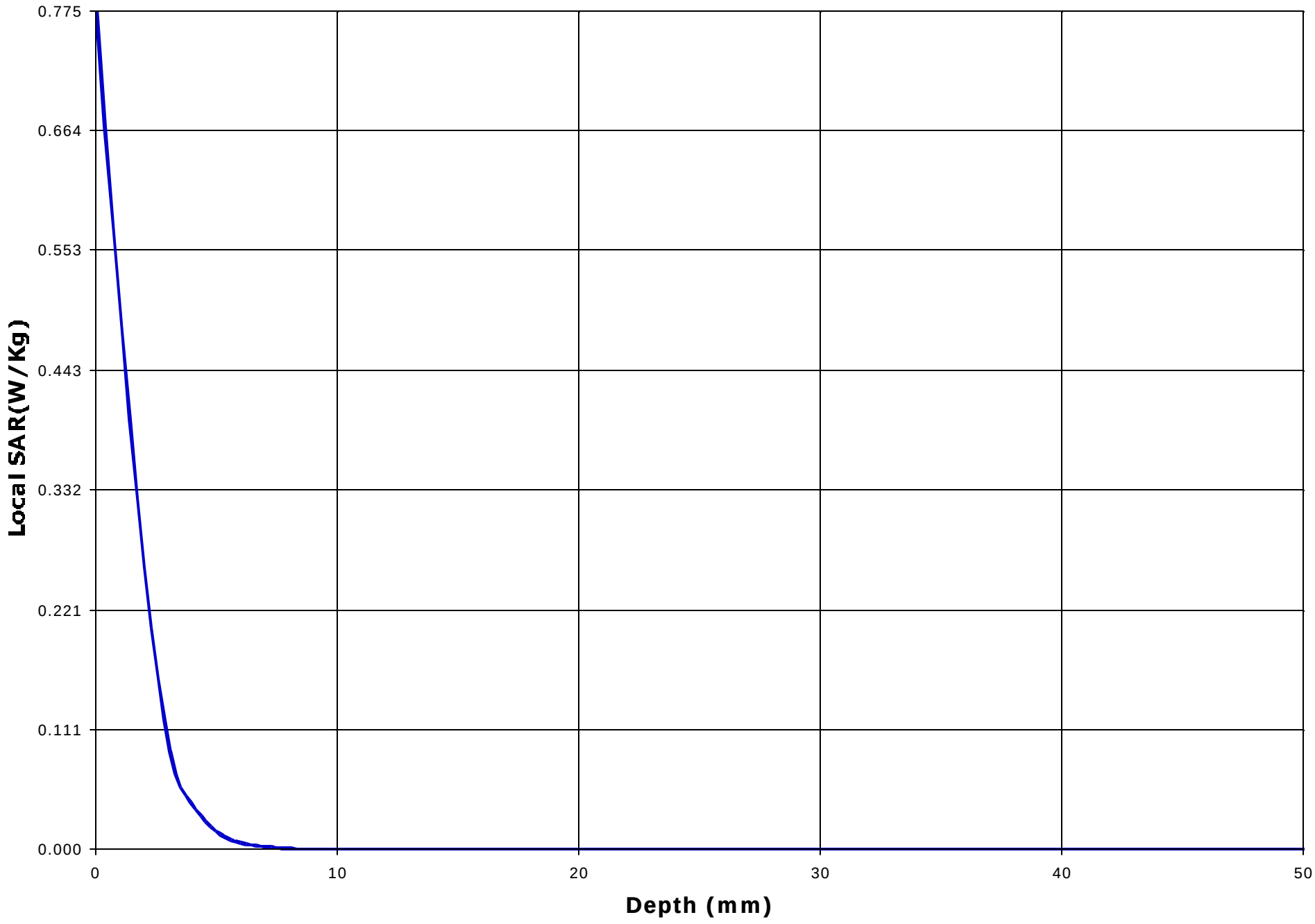
Peak Voltage (mV) : 2.413 **1 Cm Voltage (mV)** : 0.000 **SAR (W/Kg)** : 0.038

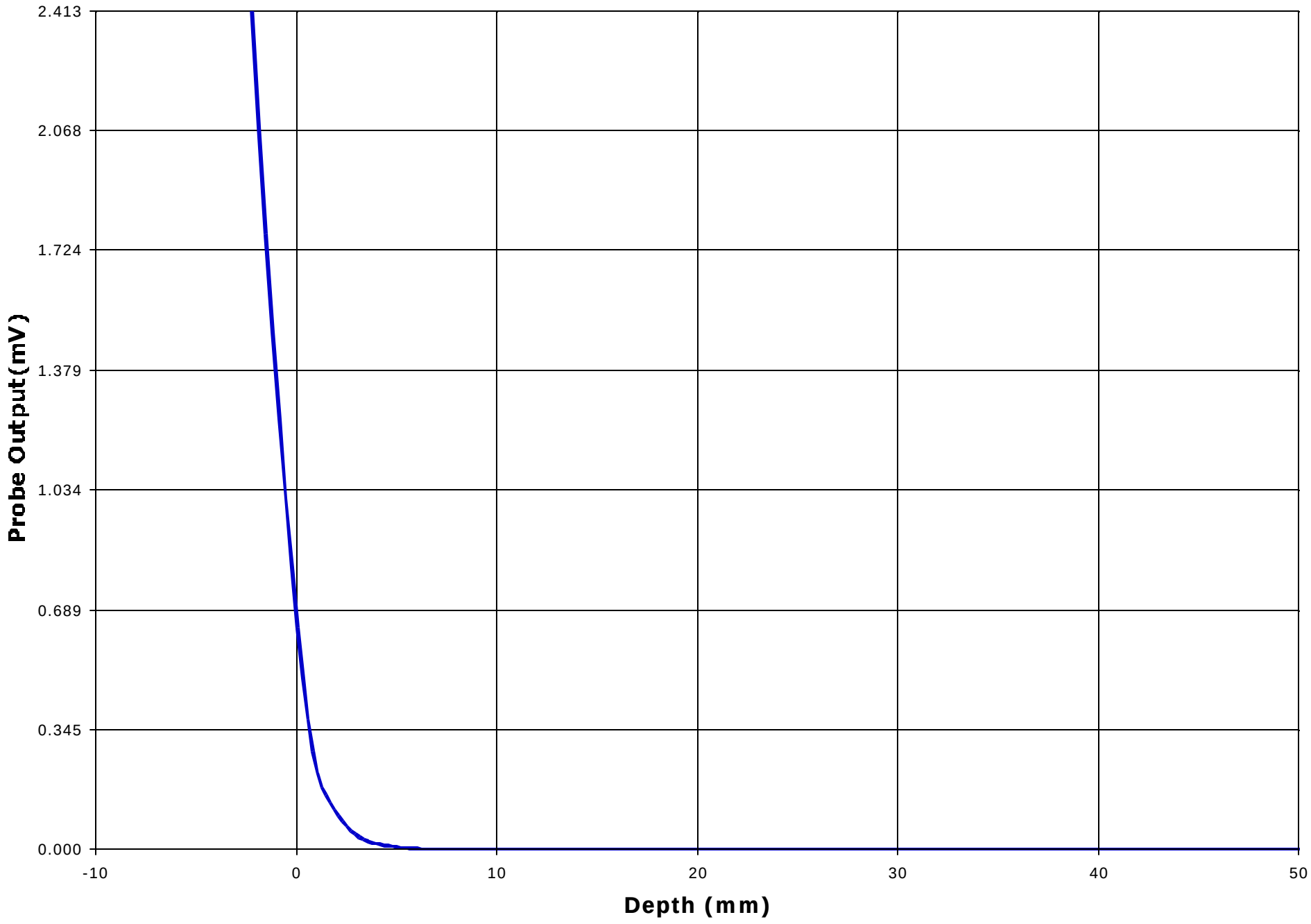

0.30
0.25
0.20
0.15
0.10
0.05
0.00
-35
-30
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
-15
-10
-5
0
5
10
0.30
0.20
0.10


0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
-16
-14
-12
-10
-8
-6
-4
-6
-4
-2
0
2
4
6
0.30
0.20
0.10


Y Axis (mm)
X Axis (mm)
-35
-30
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
0.30
0.20
0.10


Y Axis (mm)
6
7
2
0
-2
4
-6
-16
-14
-12
-10
-8
-6
-4
X Axis (mm)
0.30
0.20
0.10


0.775
0.664
0.553
0.443
0.332
0.221
0.111
0.000
Local SAR(W/Kg)
0
10
20
30
40
50
Depth (mm)


2.413
2.068
1.724
1.379
1.034
0.689
0.345
0.000
Probe Output (mV)
-10
0
10
20
30
40
50
Depth (mm)

AI.2 THE TIP OF EUT IN CONTACT WITH THE PHANTOM AND THE FRONT OF EUT FACED INWARD TO THE PHANTOM

EUT Positioning	Frequency (MHz)	Average EIRP (dBm)	SAR (W/Kg)	EUT Configuration
	2,412	18.1	0.420	**the tip of EUT in contact with the phantom the front of EUT faced inward to the phantom**
	2,437	18.6	0.252	
	2,462	14.2	0.179	

Test Information

Date : 05/07/2001
Time : 4:15:06 PM

Product	: PCMCIA Wireless LAN Card	**Test**	: SAR
Manufacturer	: Gemtek Technology Co., Ltd.	**Frequency (MHz)**	: 2412
Model Number	: AP311	**Nominal Output Power (W)**	: 0.026
Serial Number	: 00904B00DA41	**Antenna Type**	: Printed Monopole F
FCC ID Number	: EJM-AP311	**Signal**	: Spread Spectrum

Phantom	: Waist	**Dielectric Constant**	: 49.36
Simulated Tissue	: Muscle	**Conductivity**	: 2.23

Probe	: UT-ETR-0200-1	**Antenna Position**	: Integral
Probe Offset (mm)	: 2.250		
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 3.467		
Calibrated Date	: 29/06/2001		

Amplifier Setting :

Channel 1 : 0.0038 Channel 2 : 0.0037 Channel 3 : 0.0045

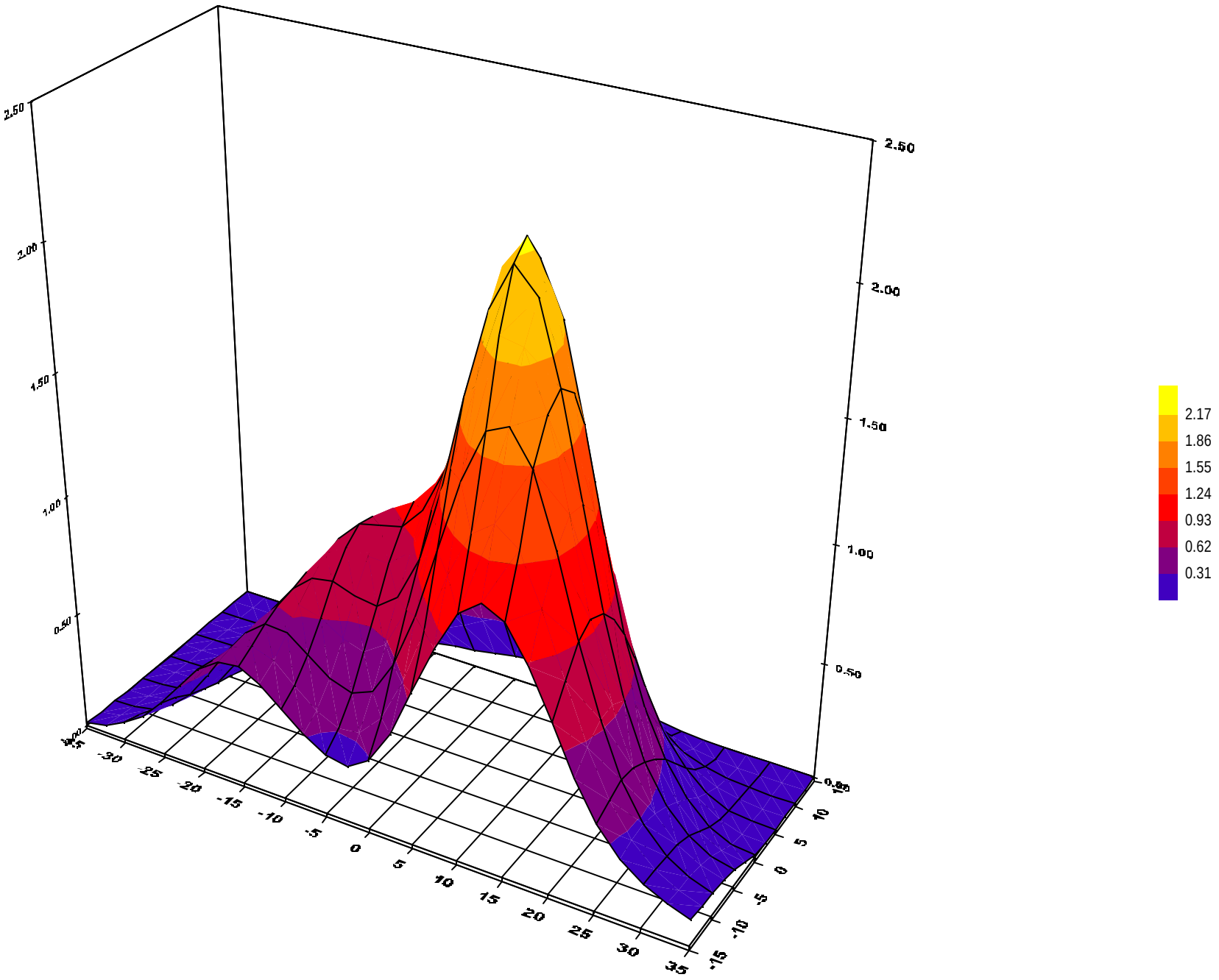
Location of Maximum Field :

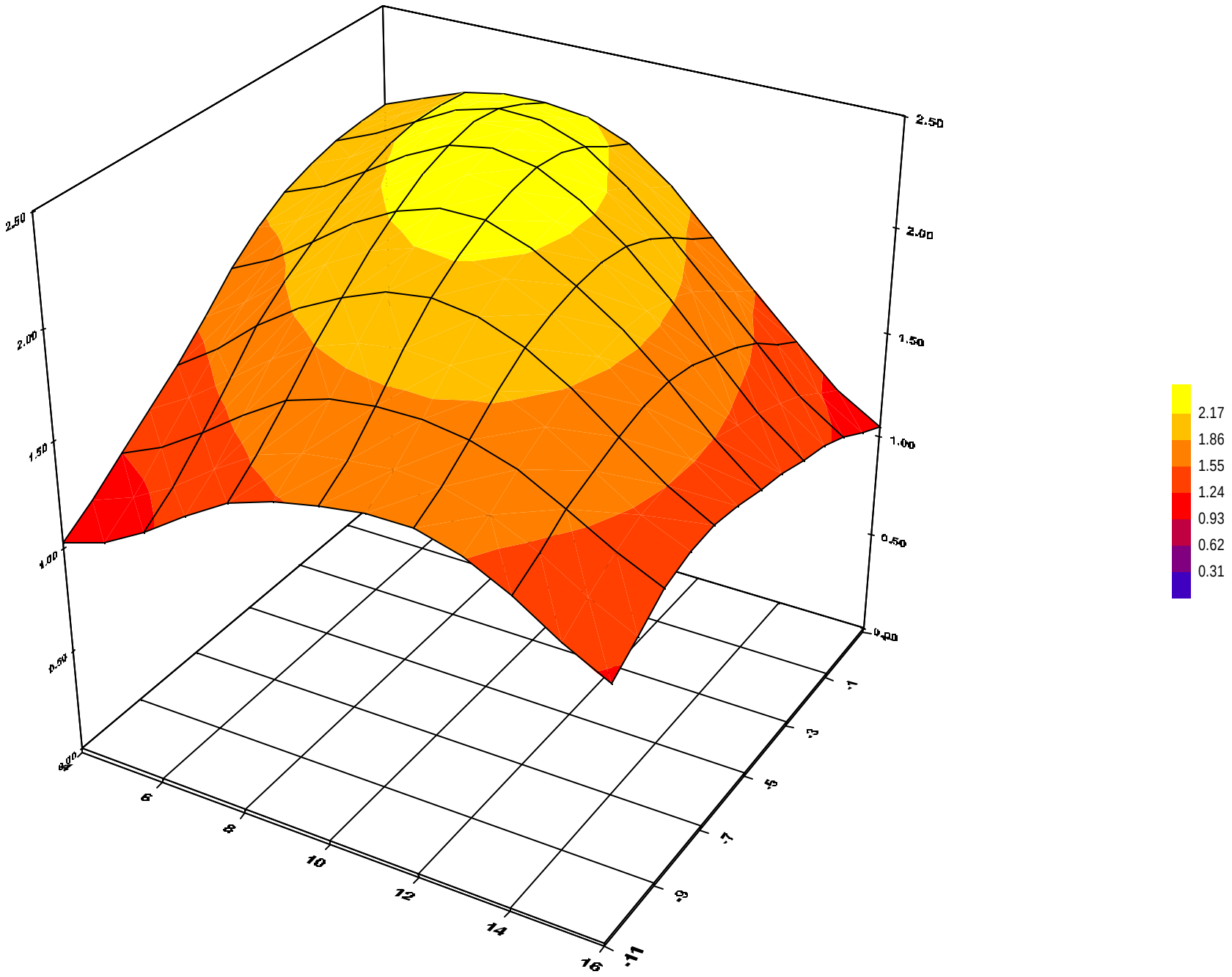
X = 8 Y = -1

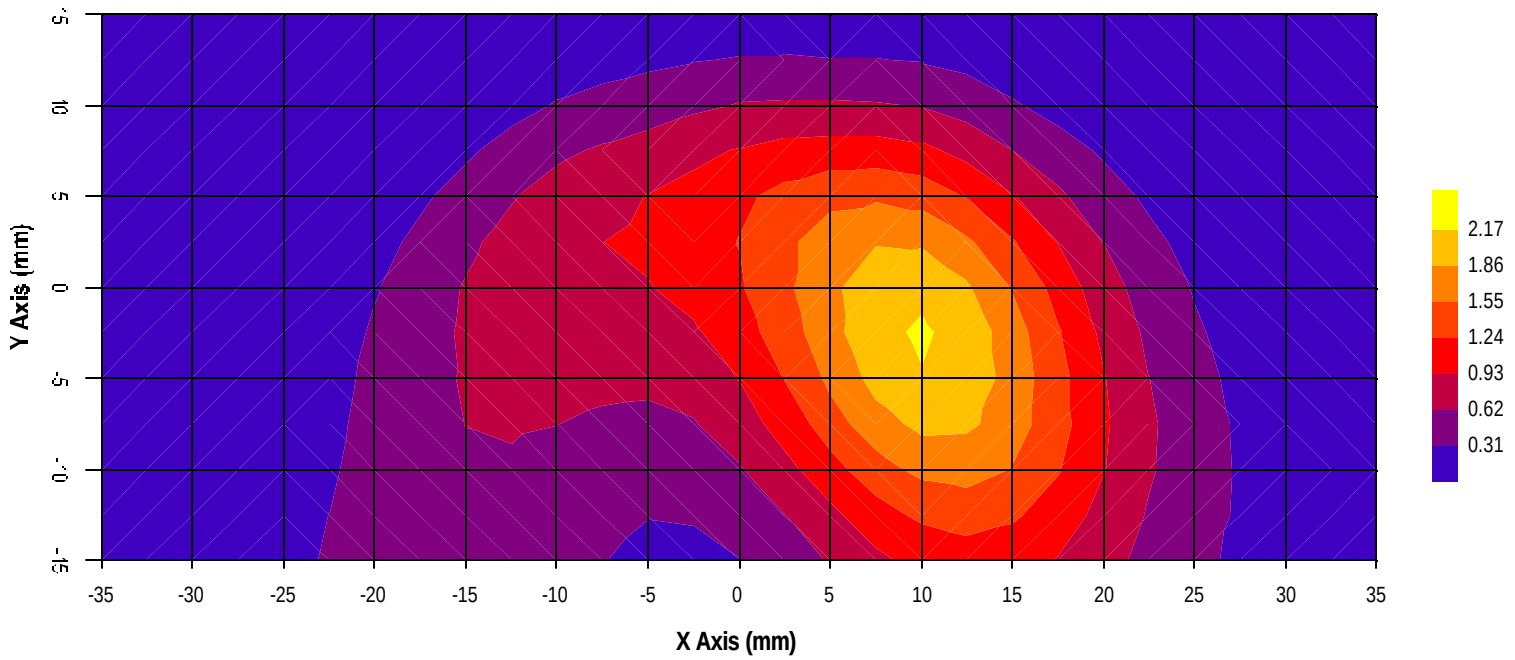
Measured Values (mV) :

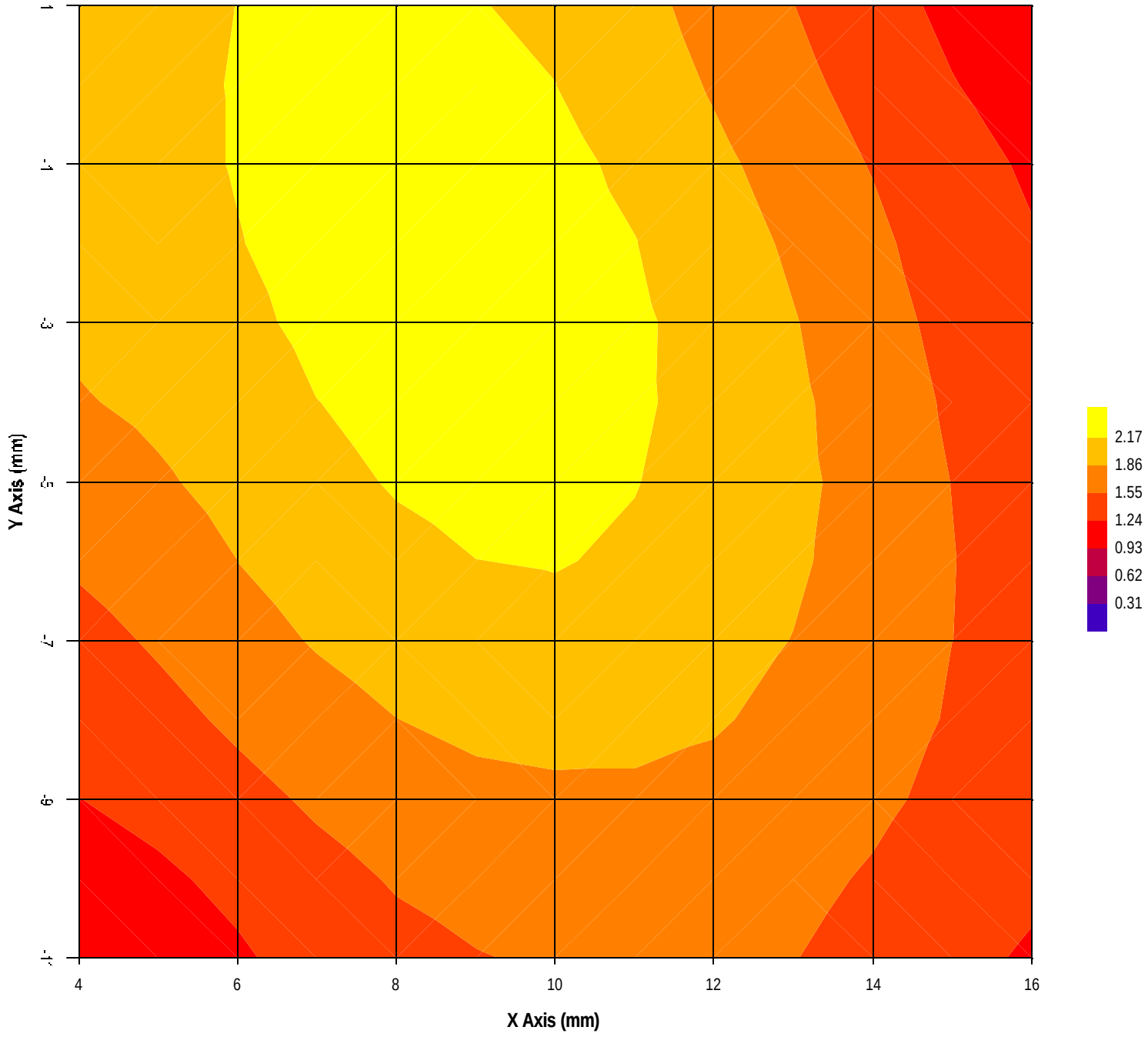
2.335	2.083	1.489	1.252	0.852	0.728
0.462	0.432	0.245	0.272	0.115	

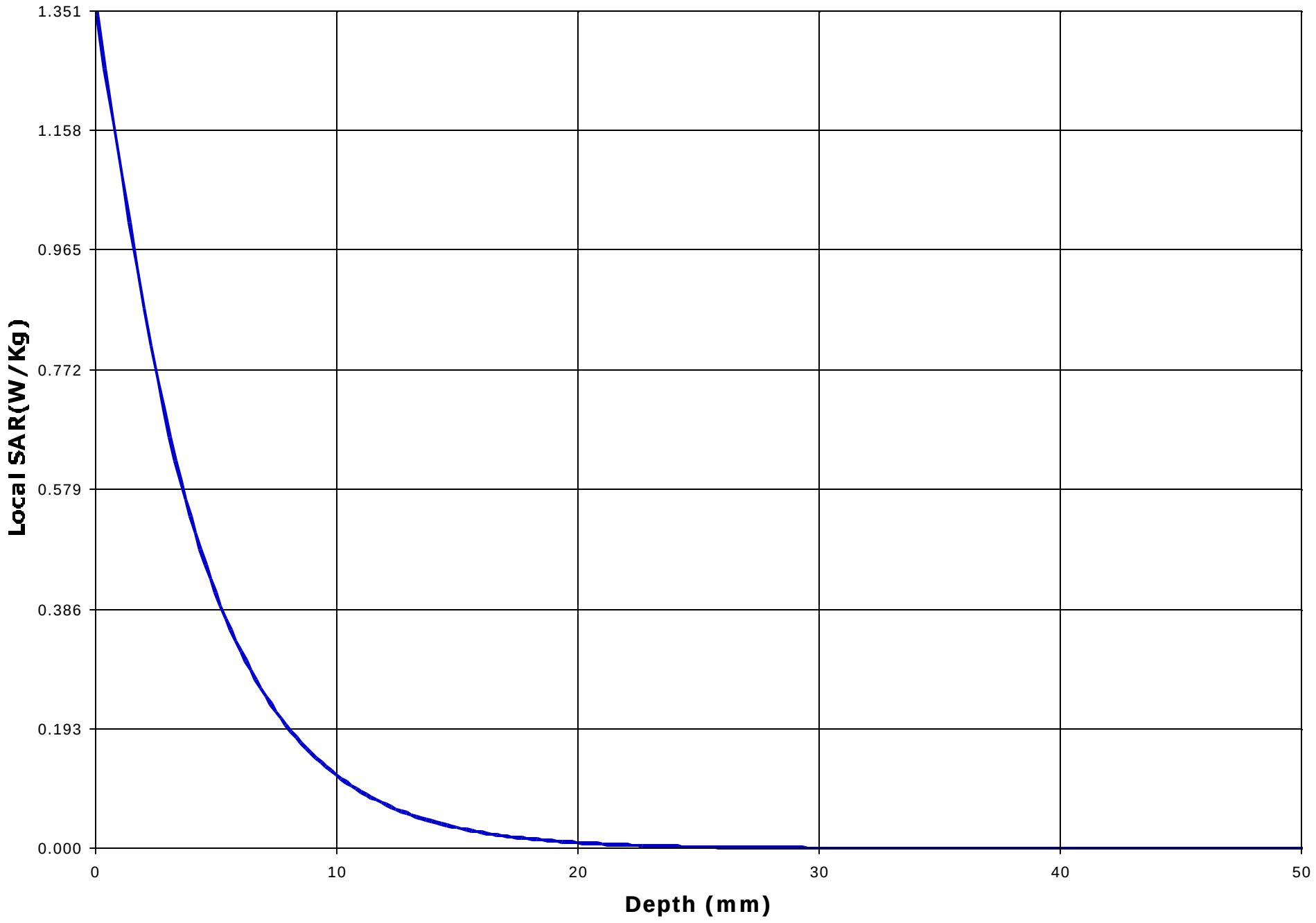
Peak Voltage (mV) : 4.209 **1 Cm Voltage (mV)** : 0.348 **SAR (W/Kg)** : 0.420

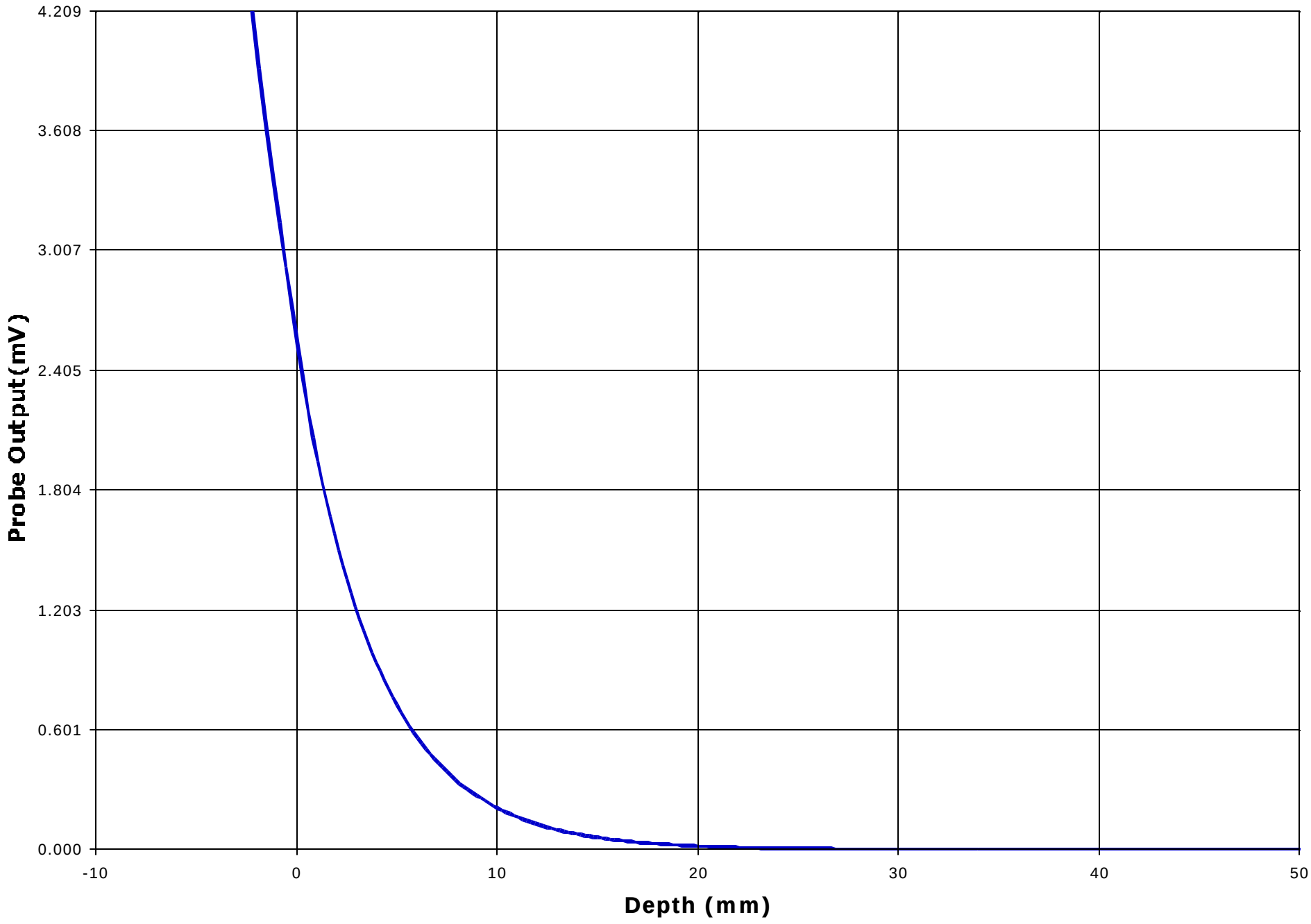

2.50
2.00
1.50
1.00
0.50
0.00
-35
-30
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
-15
-10
-5
0
5
10
2.17
1.86
1.55
1.24
0.93
0.62
0.31


2.50
2.00
1.50
1.00
0.50
0.00
6
8
10
12
14
16
.11
.9
.7
.5
.3
.1
2.17
1.86
1.55
1.24
0.93
0.62
0.31


Y Axis (mm)
X Axis (mm)
-35
-30
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
2.17
1.86
1.55
1.24
0.93
0.62
0.31


Y Axis (mm)
1
-1
-3
-5
-7
-9
-11
4
6
8
10
12
14
16
X Axis (mm)
2.17
1.86
1.55
1.24
0.93
0.62
0.31


1.351
1.158
0.965
0.772
0.579
0.386
0.193
0.000
Local SAR(W/Kg)
0
10
20
30
40
50
Depth (mm)


4.209
3.608
3.007
2.405
1.804
1.203
0.601
0.000
Probe Output (mV)
-10
0
10
20
30
40
50
Depth (mm)

Test Information

Date : 05/07/2001
Time : 4:30:37 PM

Product	: PCMCIA Wireless LAN Card	**Test**	: SAR
Manufacturer	: Gemtek Technology Co., Ltd.	**Frequency (MHz)**	: 2437
Model Number	: AP311	**Nominal Output Power (W)**	: 0.026
Serial Number	: 00904B00DA41	**Antenna Type**	: Printed Monopole F
FCC ID Number	: EJM-AP311	**Signal**	: Spread Spectrum

Phantom	: Waist	**Dielectric Constant**	: 49.36
Simulated Tissue	: Muscle	**Conductivity**	: 2.23

Probe	: UT-ETR-0200-1	**Antenna Position**	: Integral
Probe Offset (mm)	: 2.250		
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 3.467		
Calibrated Date	: 29/06/2001		

Amplifier Setting :

Channel 1 : 0.0038 Channel 2 : 0.0037 Channel 3 : 0.0045

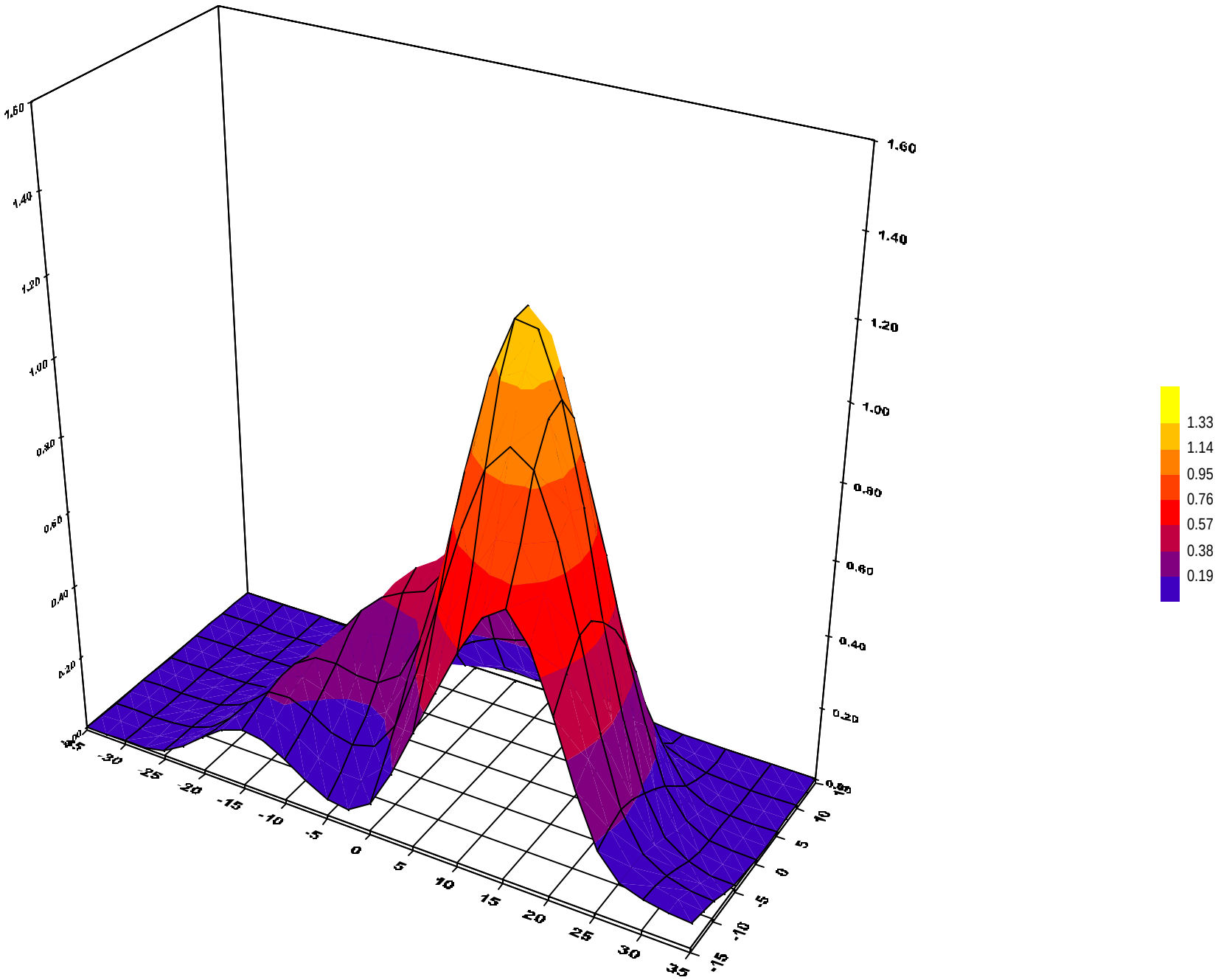
Location of Maximum Field :

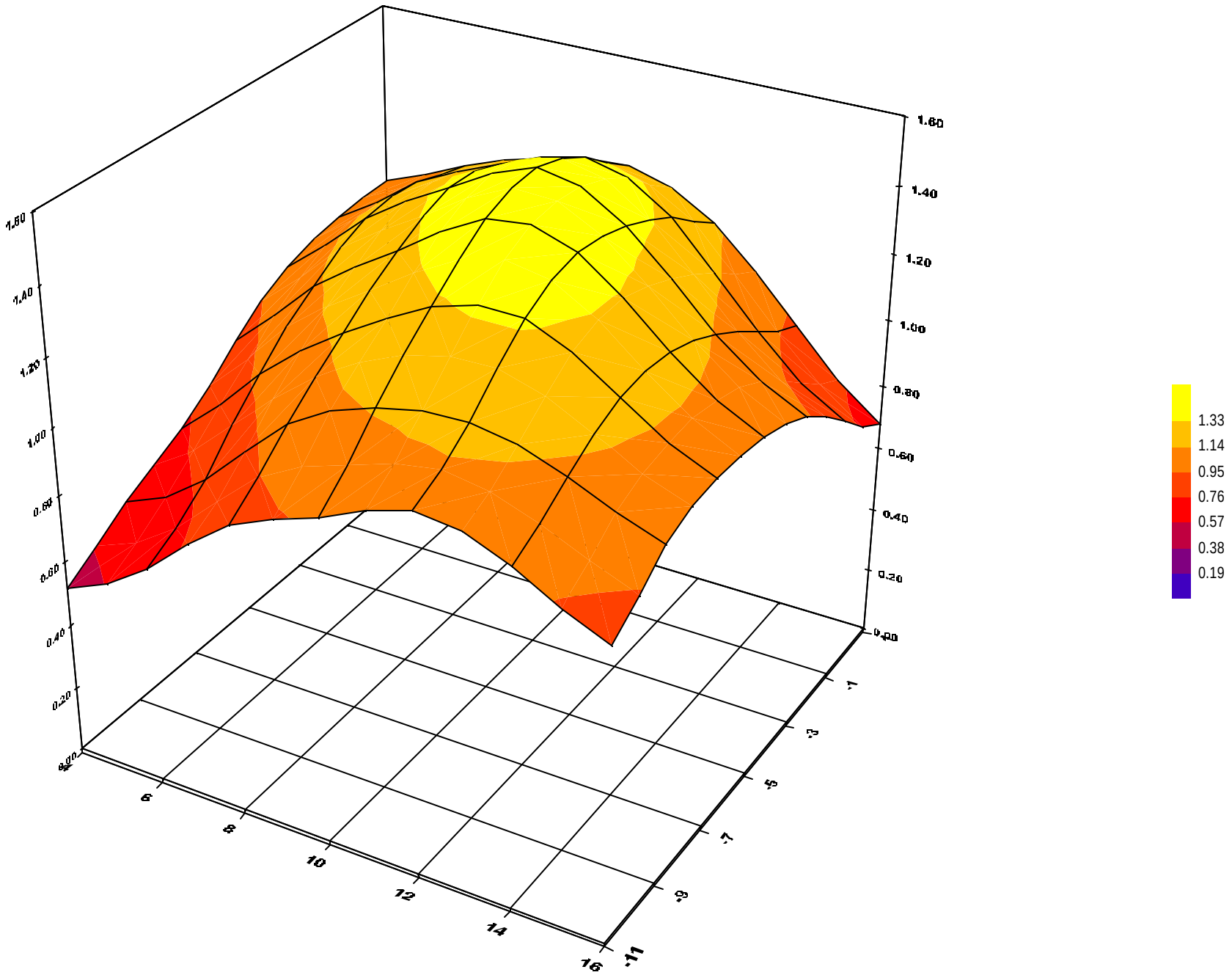
X = 10 Y = -3

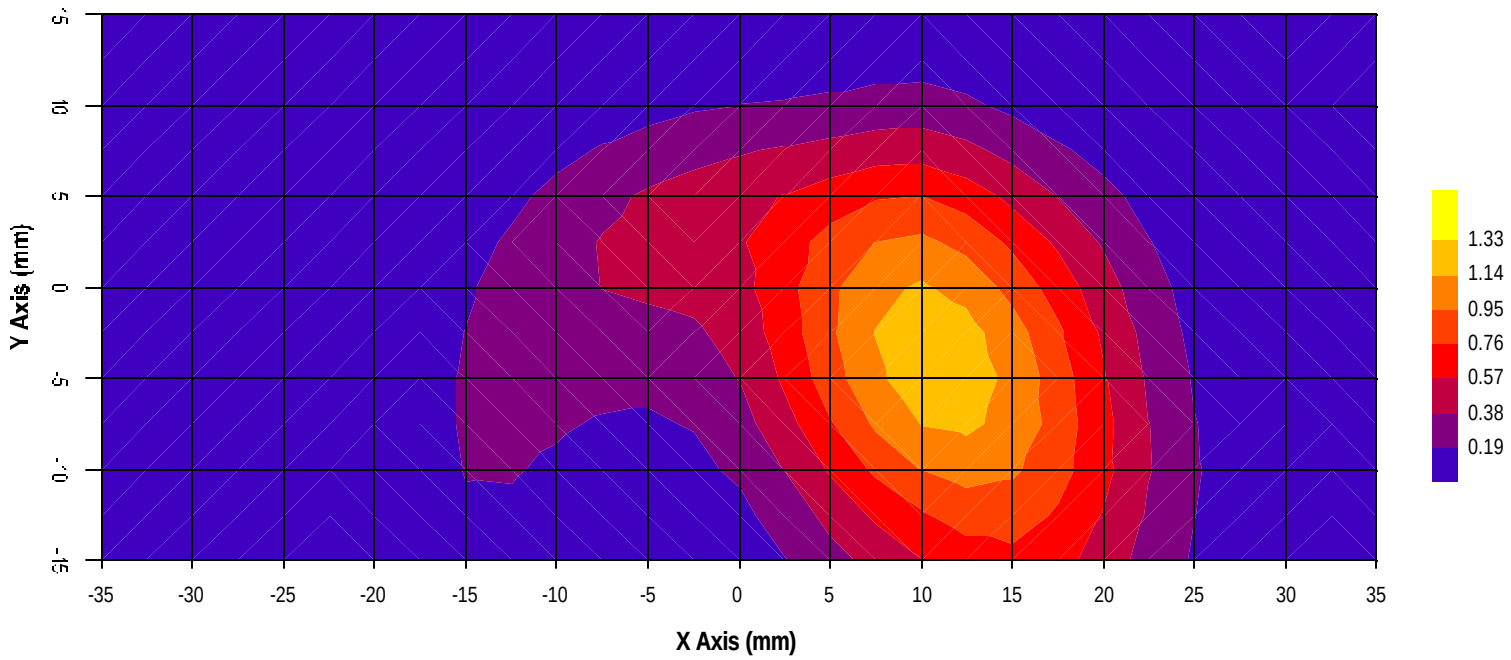
Measured Values (mV) :

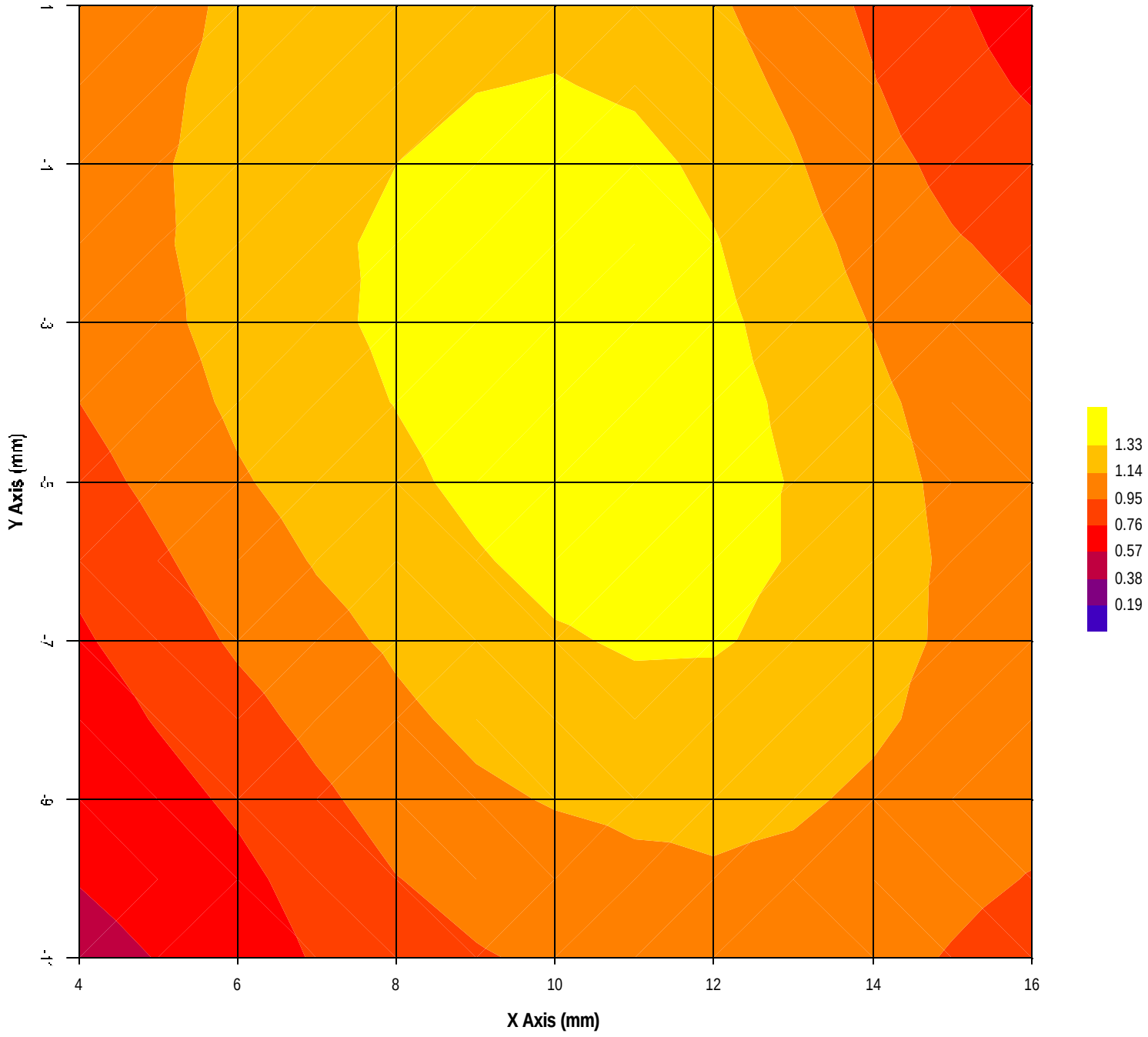
1.538	1.172	1.054	0.617	0.542	0.291
0.318	0.142	0.188	0.027	0.088	

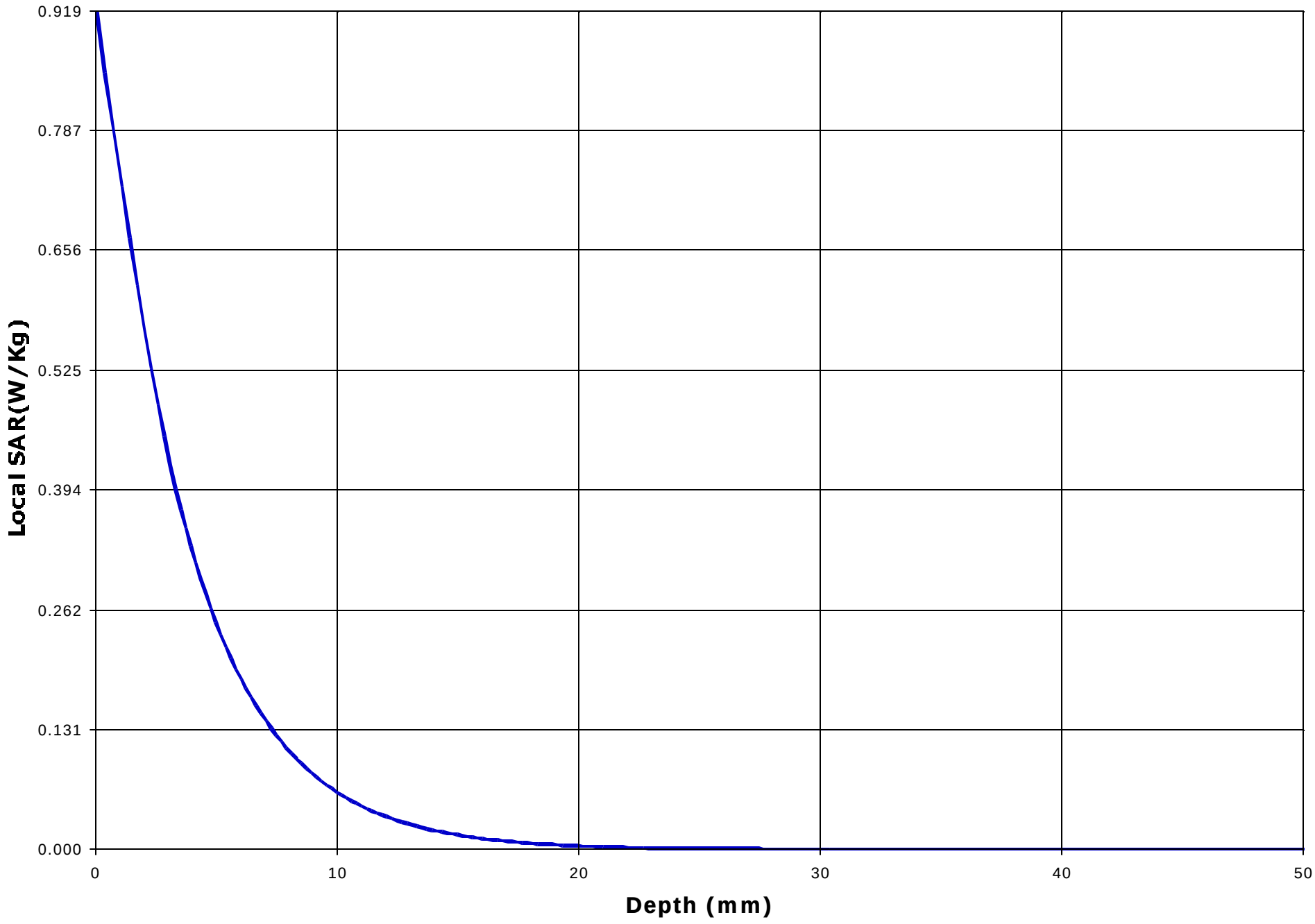
Peak Voltage (mV) : 2.862 **1 Cm Voltage (mV)** : 0.183 **SAR (W/Kg)** : 0.252

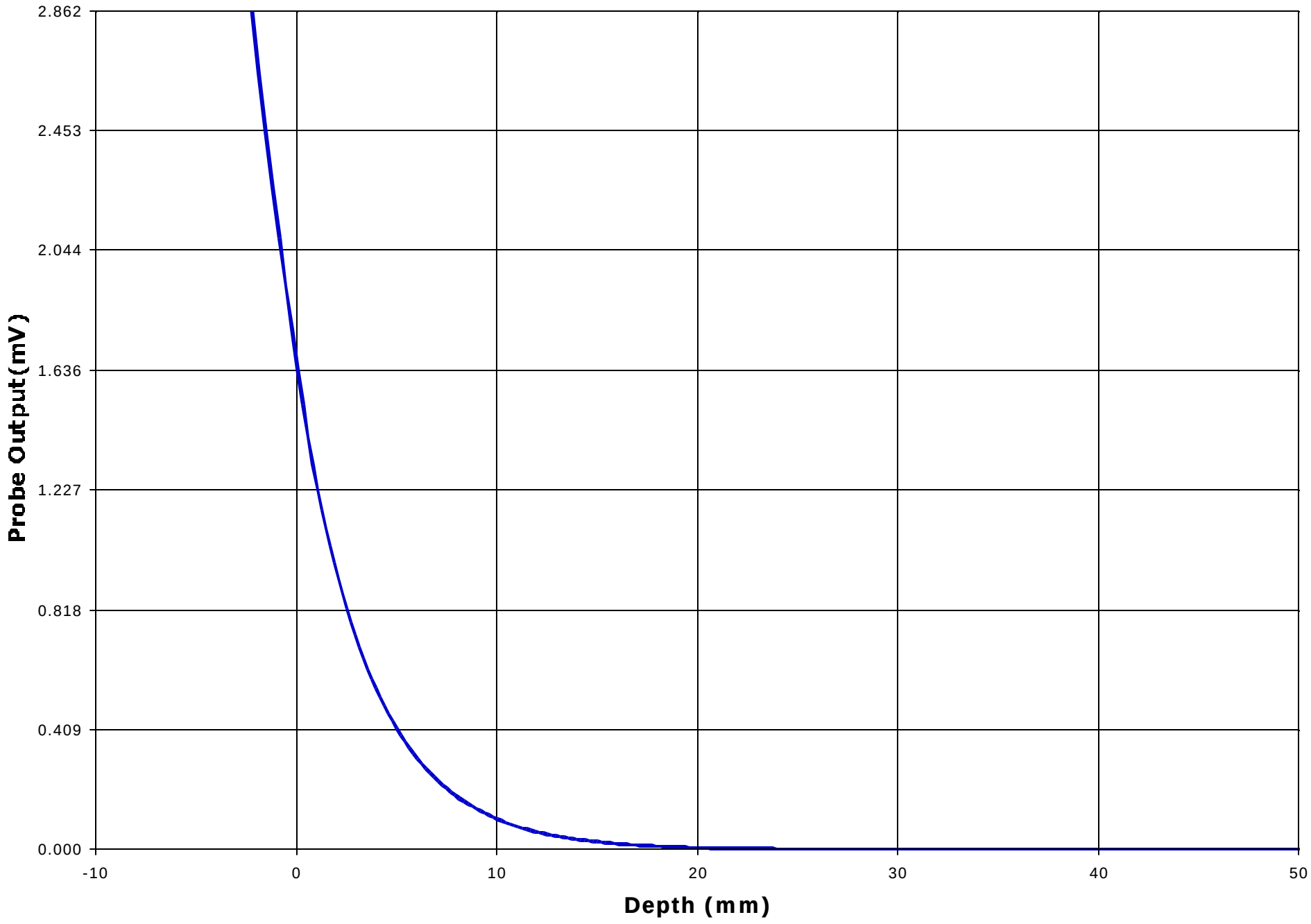

1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
-35
-30
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
-15
-10
-5
0
5
10
1.33
1.14
0.95
0.76
0.57
0.38
0.19


1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
6
8
10
12
14
16
.11
.9
.7
.5
.3
.1
1.33
1.14
0.95
0.76
0.57
0.38
0.19


Y Axis (mm)
X Axis (mm)
-35
-30
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
1.33
1.14
0.95
0.76
0.57
0.38
0.19


1.33
1.14
0.95
0.76
0.57
0.38
0.19
Y Axis (mm)
X Axis (mm)
1
-1
-3
-5
-7
-9
-11
4
6
8
10
12
14
16


0.919
0.787
0.656
0.525
0.394
0.262
0.131
0.000
Local SAR(W/Kg)
0
10
20
30
40
50
Depth (mm)


2.862
2.453
2.044
1.636
1.227
0.818
0.409
0.000
Probe Output (mV)
-10
0
10
20
30
40
50
Depth (mm)

Test Information

Date : 05/07/2001
Time : 4:45:22 PM

Product	: PCMCIA Wireless LAN Card	**Test**	: SAR
Manufacturer	: Gemtek Technology Co., Ltd.	**Frequency (MHz)**	: 2462
Model Number	: AP311	**Nominal Output Power (W)**	: 0.026
Serial Number	: 00904B00DA41	**Antenna Type**	: Printed Monopole F
FCC ID Number	: EJM-AP311	**Signal**	: Spread Spectrum

Phantom	: Waist	**Dielectric Constant**	: 49.36
Simulated Tissue	: Muscle	**Conductivity**	: 2.23

Probe	: UT-ETR-0200-1	**Antenna Position**	: Integral
Probe Offset (mm)	: 2.250		
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 3.467		
Calibrated Date	: 29/06/2001		

Amplifier Setting :

Channel 1 : 0.0038 Channel 2 : 0.0037 Channel 3 : 0.0045

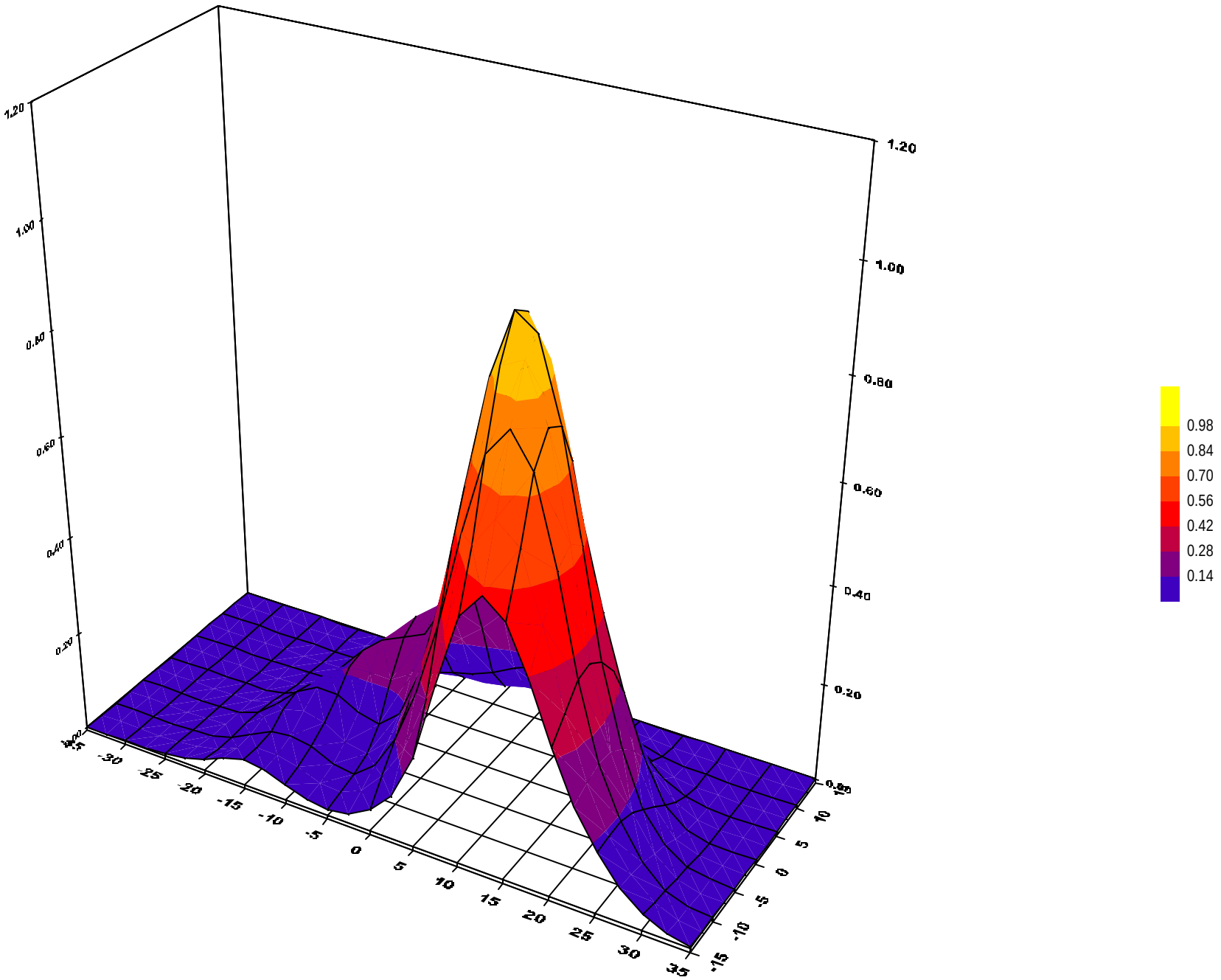
Location of Maximum Field :

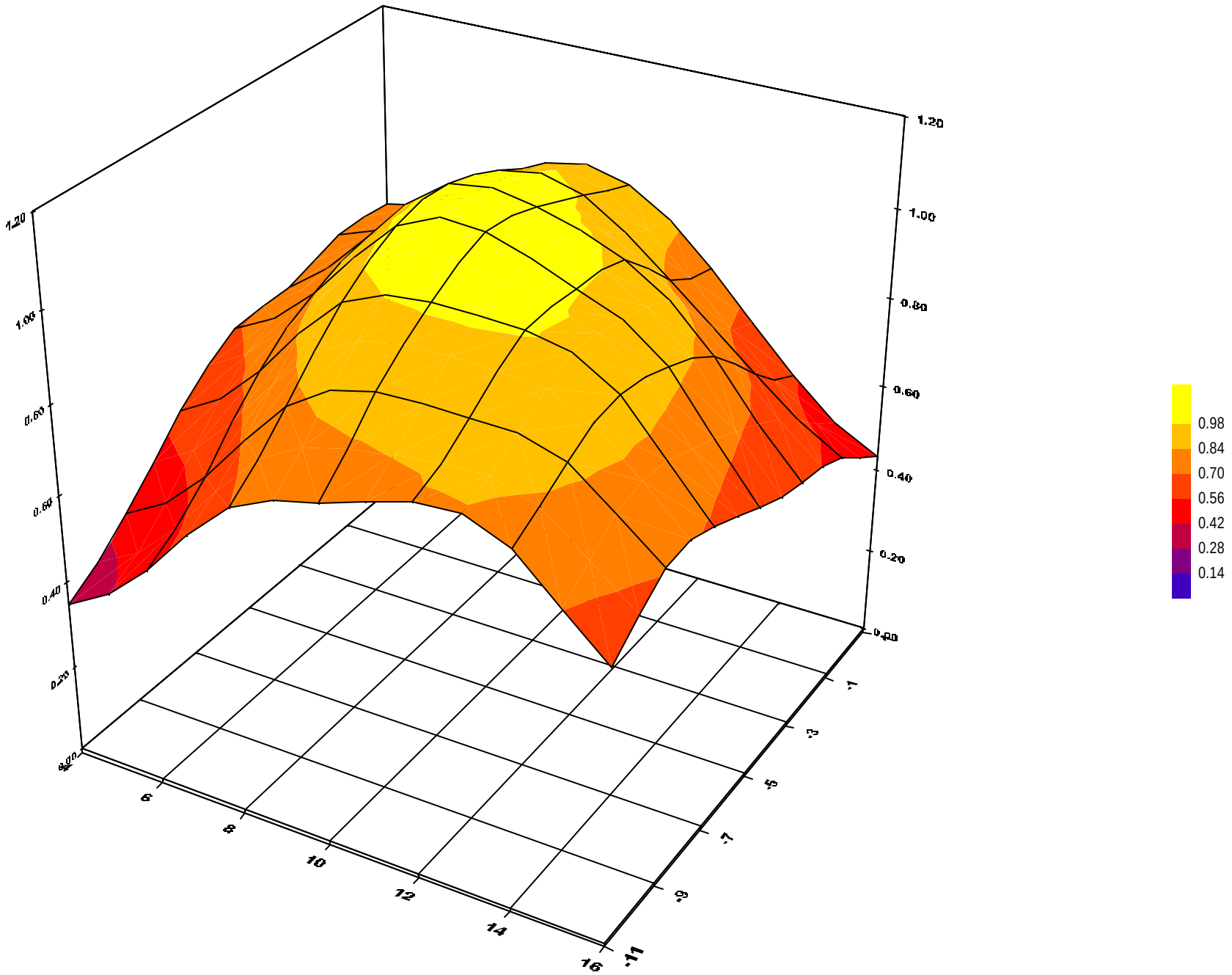
X = 10 Y = -5

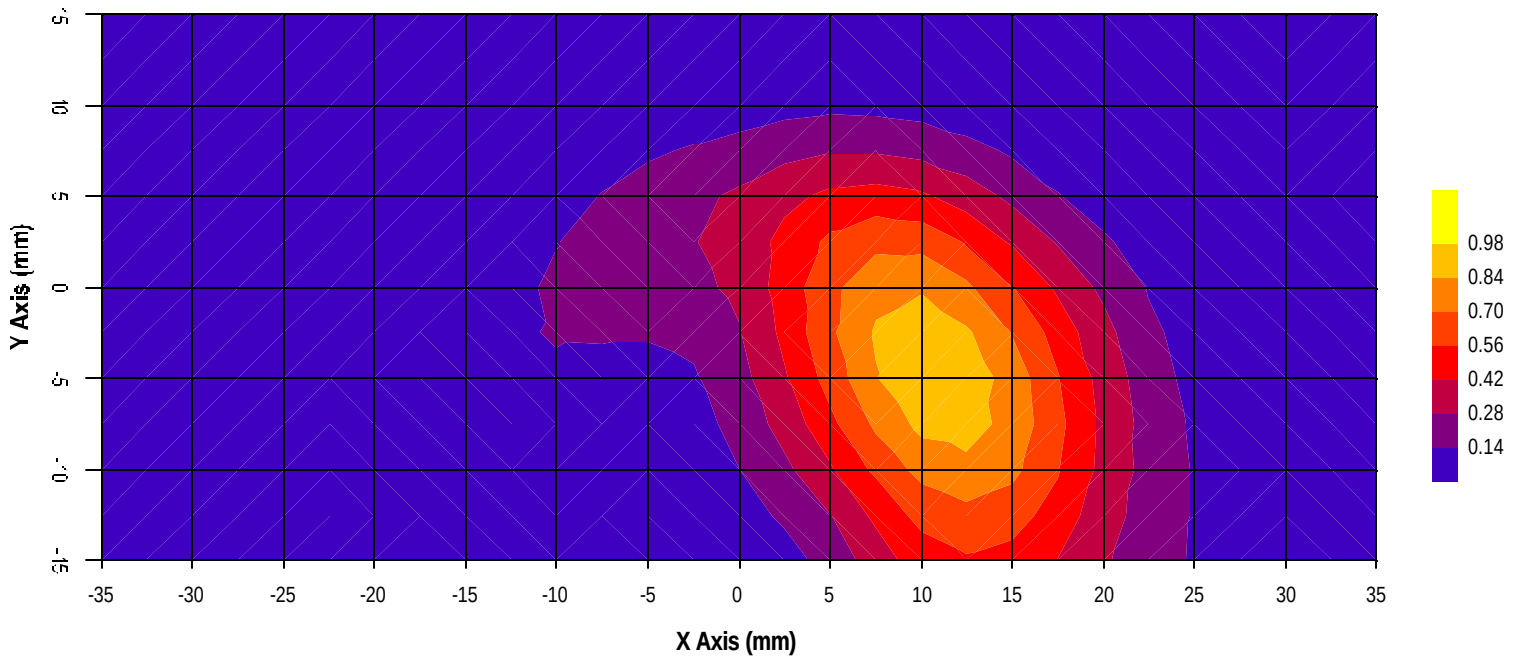
Measured Values (mV) :

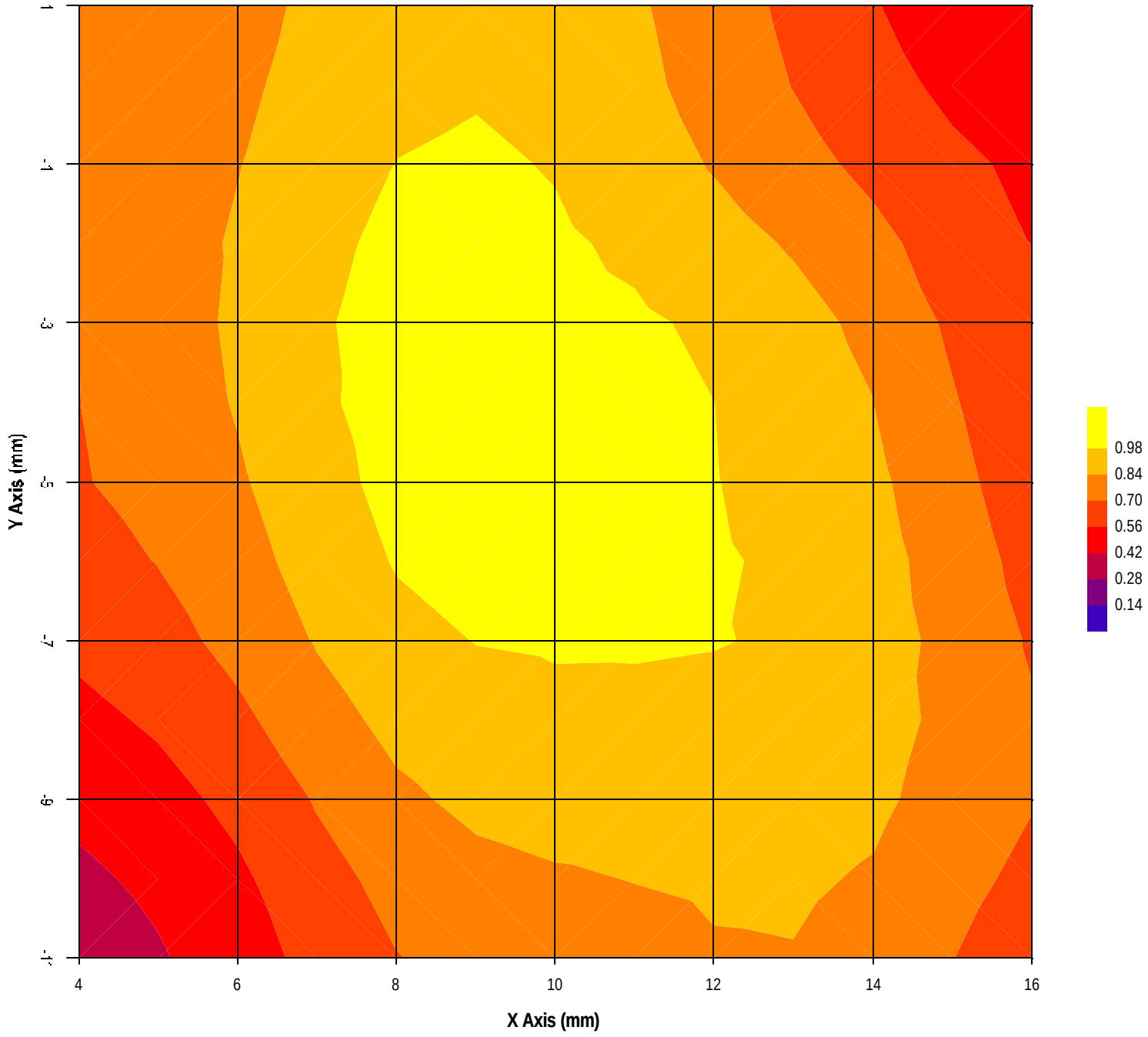
1.063	0.963	0.640	0.482	0.272	0.268
0.165	0.138	0.100	0.015	0.023	

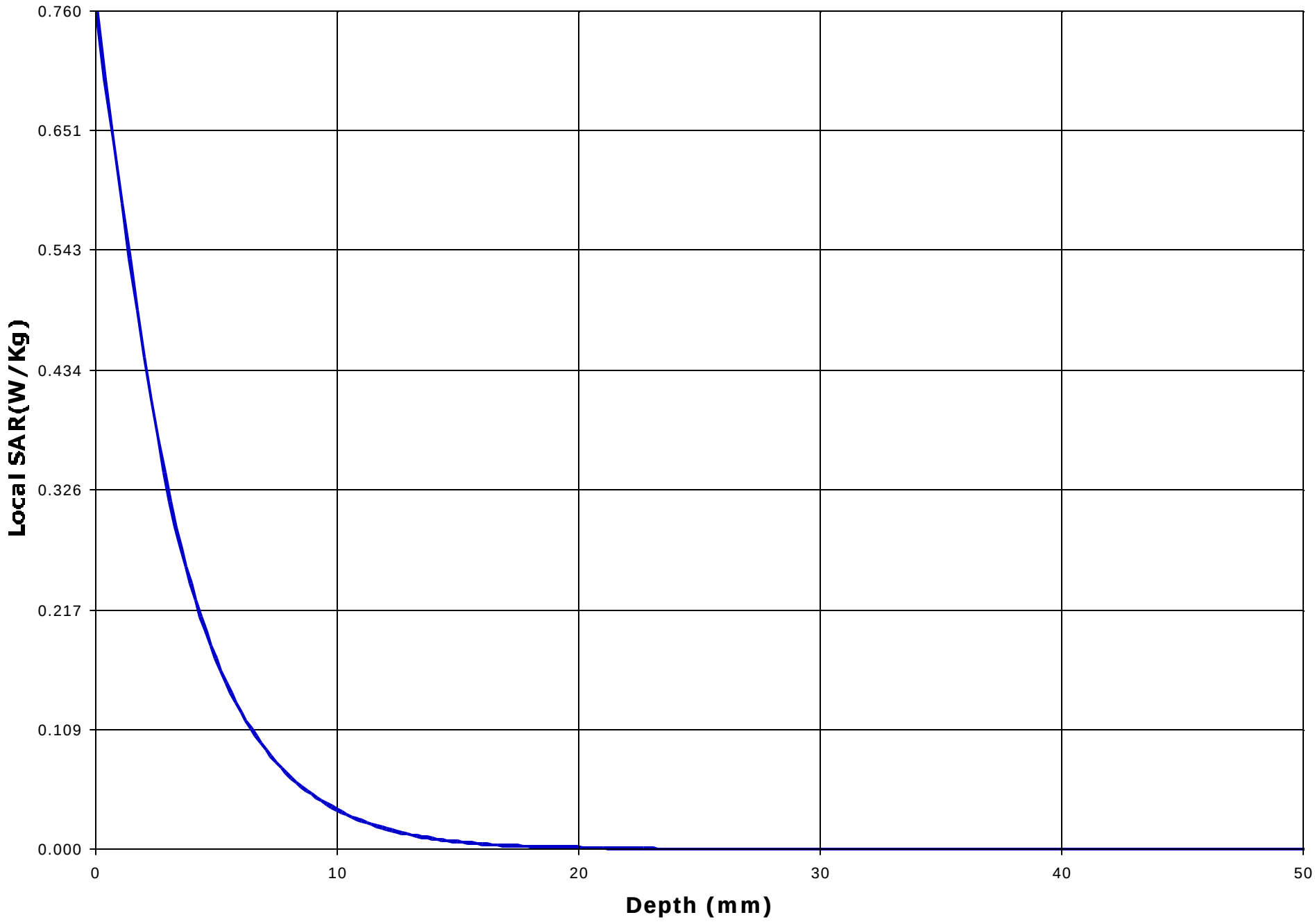
Peak Voltage (mV) : 2.367 **1 Cm Voltage (mV)** : 0.102 **SAR (W/Kg)** : 0.179

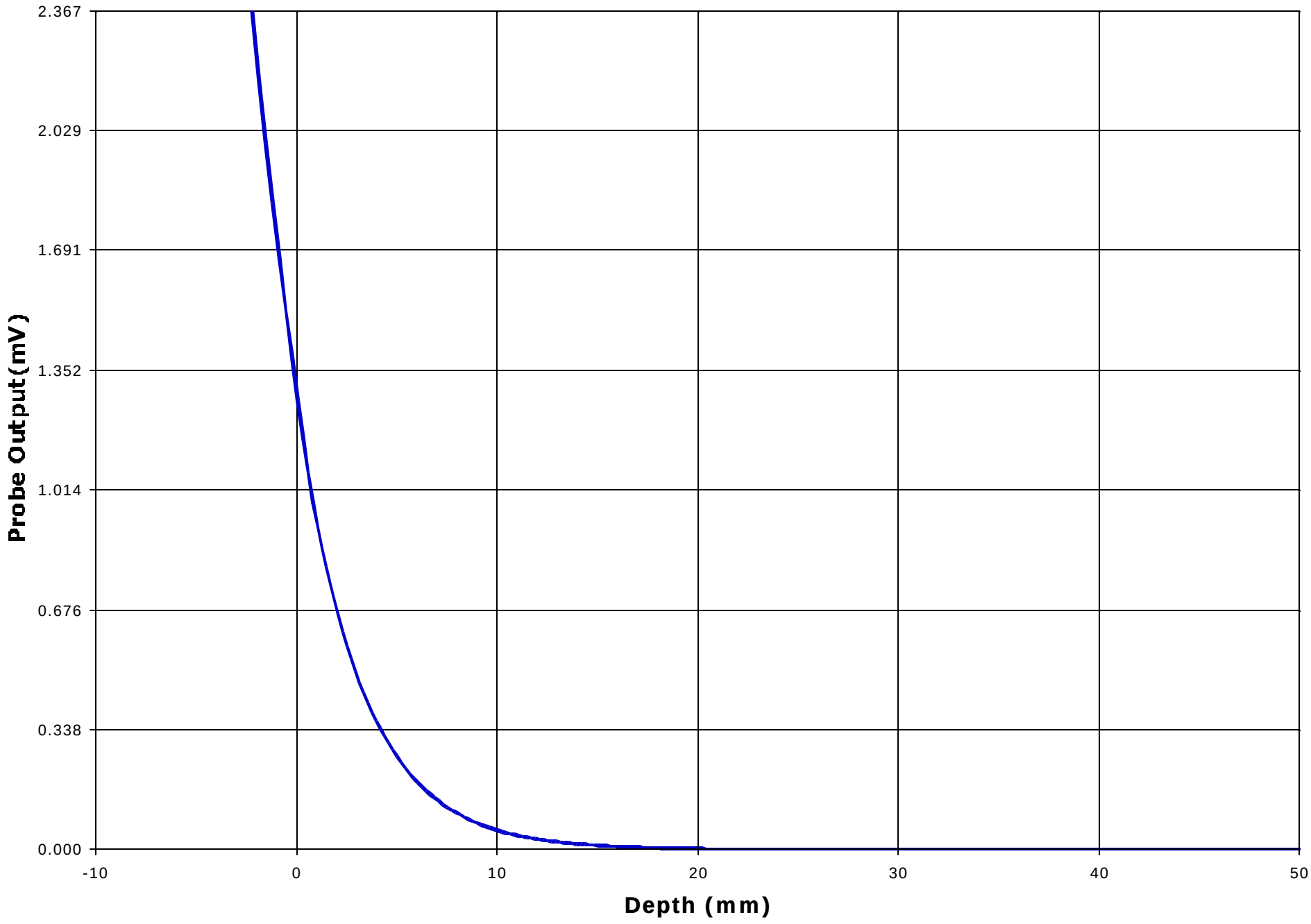

1.20
1.00
0.80
0.60
0.40
0.20
0.00
-35
-30
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
-15
-10
-5
0
5
10
0.98
0.84
0.70
0.56
0.42
0.28
0.14


1.20
1.00
0.80
0.60
0.40
0.20
0.00
6
8
10
12
14
16
.11
.9
.7
.5
.3
.1
0.98
0.84
0.70
0.56
0.42
0.28
0.14


Y Axis (mm)
X Axis (mm)
-35
-30
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
0.98
0.84
0.70
0.56
0.42
0.28
0.14


Y Axis (mm)
1
-1
-3
-5
-7
-9
-11
X Axis (mm)
4
6
8
10
12
14
16
0.98
0.84
0.70
0.56
0.42
0.28
0.14


0.760
0.651
0.543
0.434
0.326
0.217
0.109
0.000
Local SAR(W/Kg)
0
10
20
30
40
50
Depth (mm)


2.367
2.029
1.691
1.352
1.014
0.676
0.338
0.000
Probe Output (mV)
-10
0
10
20
30
40
50
Depth (mm)

AI.3 THE TIP OF EUT IN CONTACT WITH THE PHANTOM AND THE FRONT OF EUT FACED OUTWARD FROM THE PHANTOM

EUT Positioning	Frequency (MHz)	Average EIRP (dBm)	SAR (W/Kg)	EUT Configuration
	2,412	18.1	0.235	**the tip of EUT in contact with the phantom the front of EUT faced outward from the phantom**
	2,437	18.6	0.205	
	2,462	14.2	0.191	

Test Information

Date : 06/07/2001
Time : 11:28:25 AM

Product	: PCMCIA Wireless LAN Card	**Test**	: SAR
Manufacturer	: Gemtek Technology Co., Ltd.	**Frequency (MHz)**	: 2412
Model Number	: AP311	**Nominal Output Power (W)**	: 0.026
Serial Number	: 00904B00DA41	**Antenna Type**	: Printed Monopole F
FCC ID Number	: EJM-AP311	**Signal**	: Spread Spectrum

Phantom	: Waist	**Dielectric Constant**	: 49.36
Simulated Tissue	: Muscle	**Conductivity**	: 2.23

Probe	: UT-ETR-0200-1	**Antenna Position**	: Integral
Probe Offset (mm)	: 2.250		
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 3.467		
Calibrated Date	: 29/06/2001		

Amplifier Setting :

Channel 1 : 0.0038 Channel 2 : 0.0037 Channel 3 : 0.0045

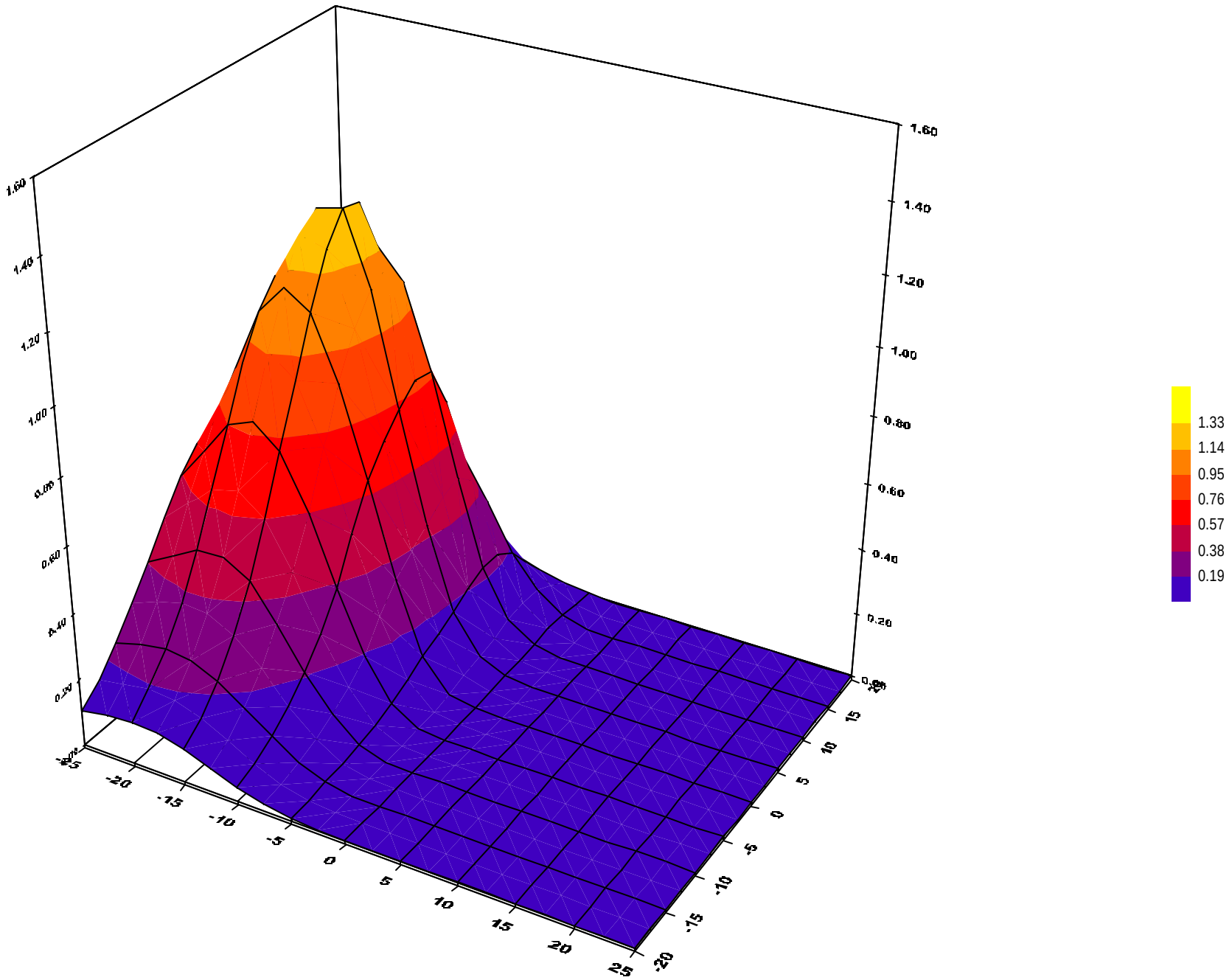
Location of Maximum Field :

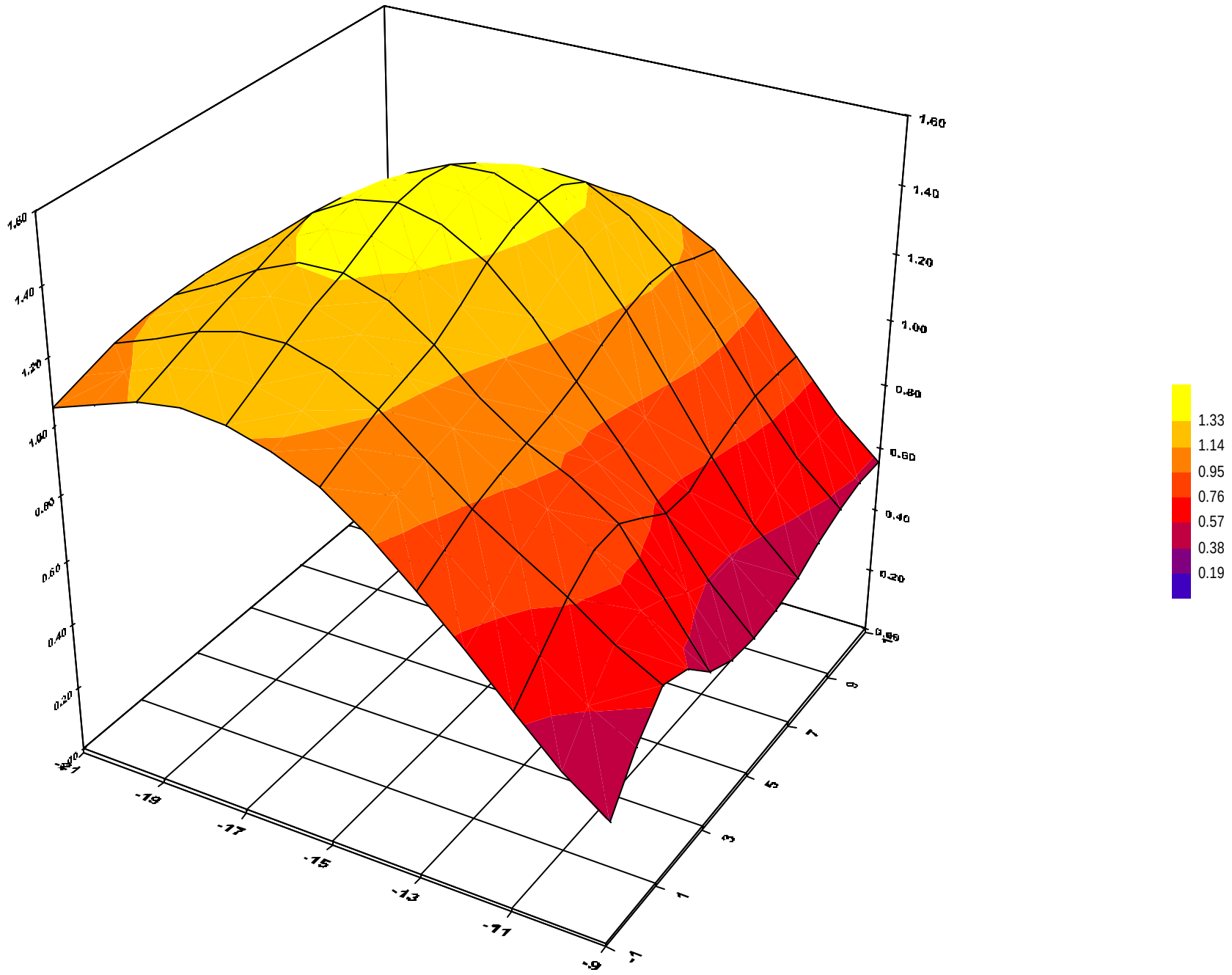
X = -17 Y = 7

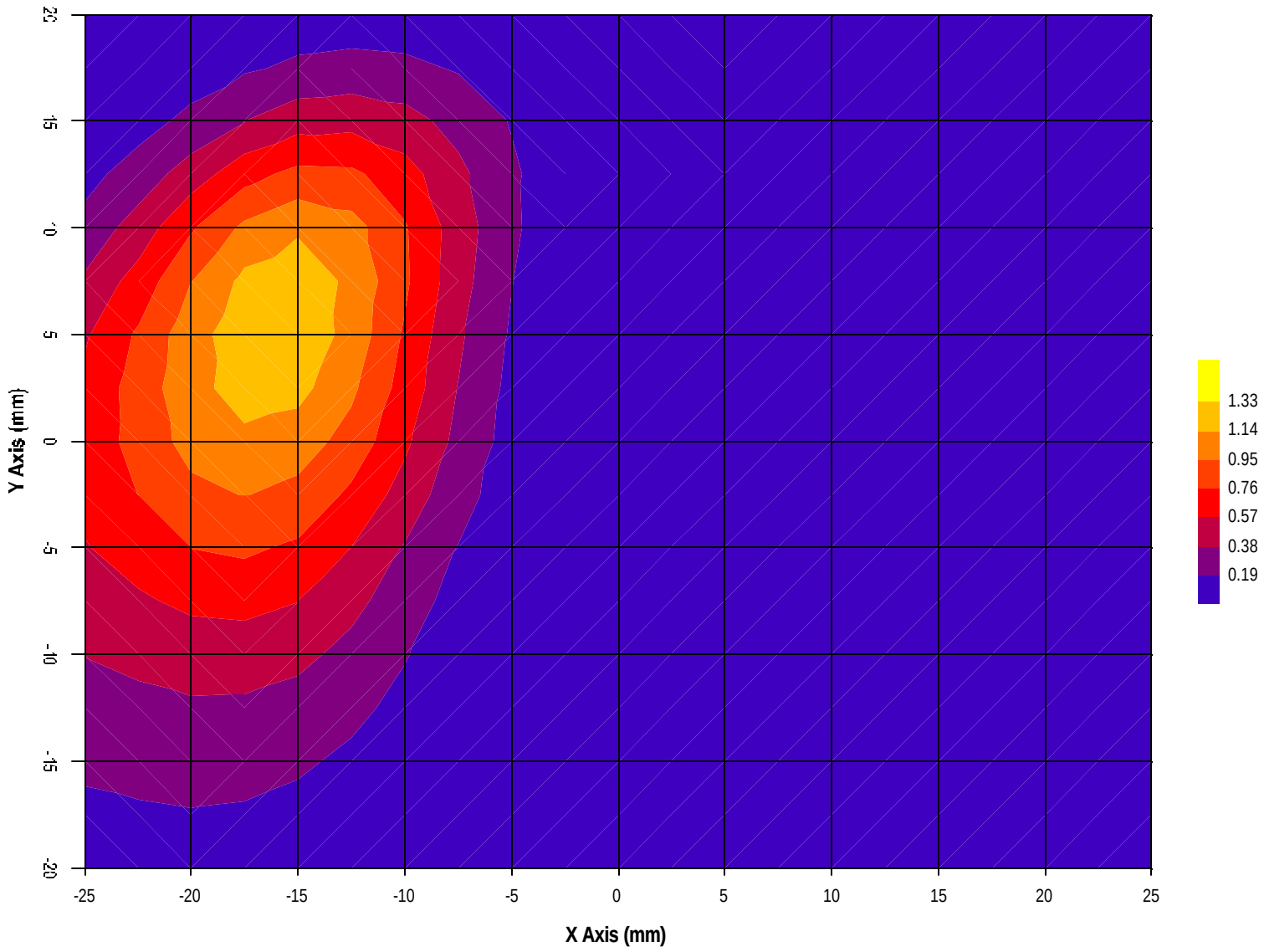
Measured Values (mV) :

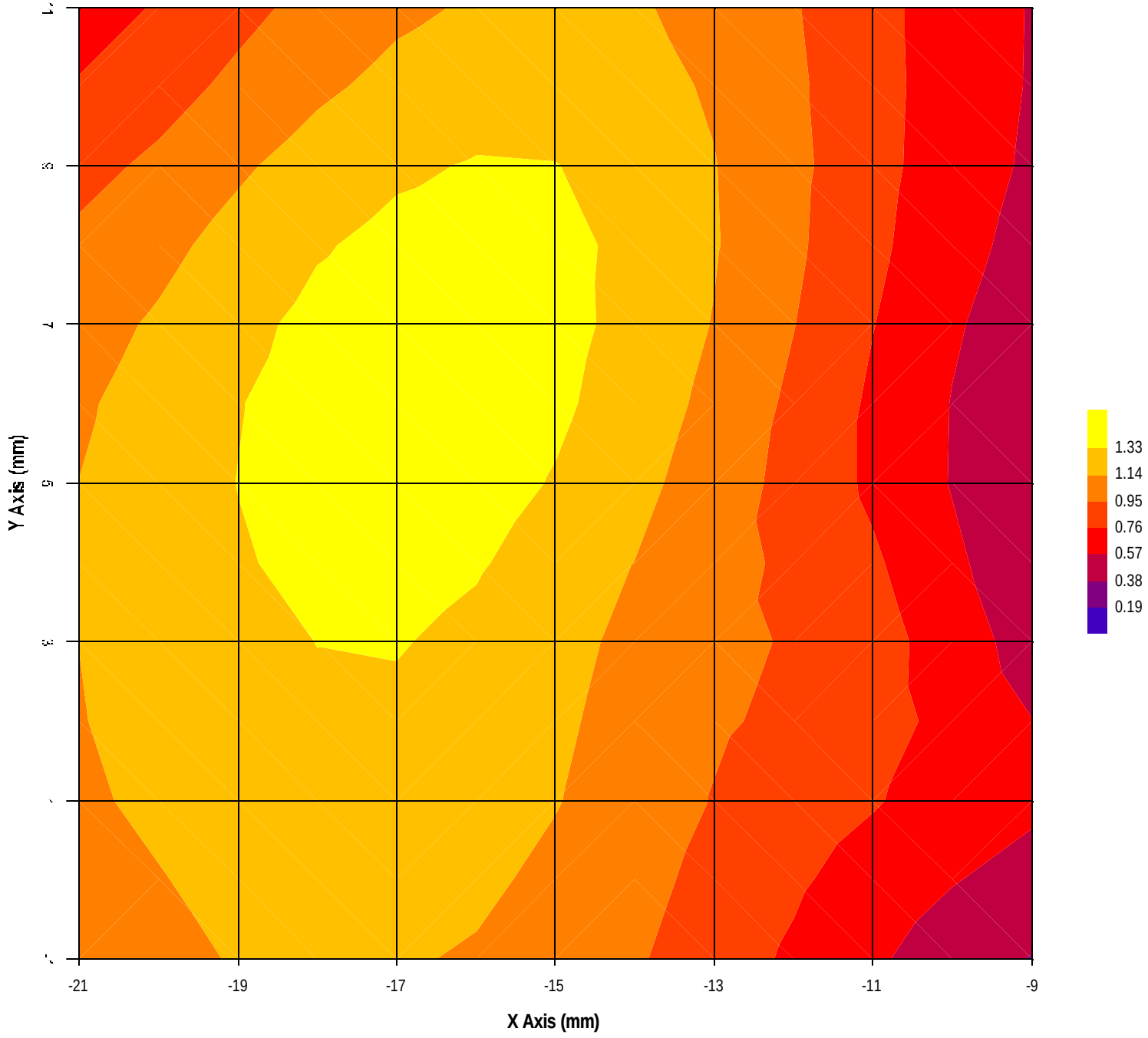
1.497	1.201	0.903	0.579	0.394	0.226
0.148	0.078	0.004	0.000	0.000	

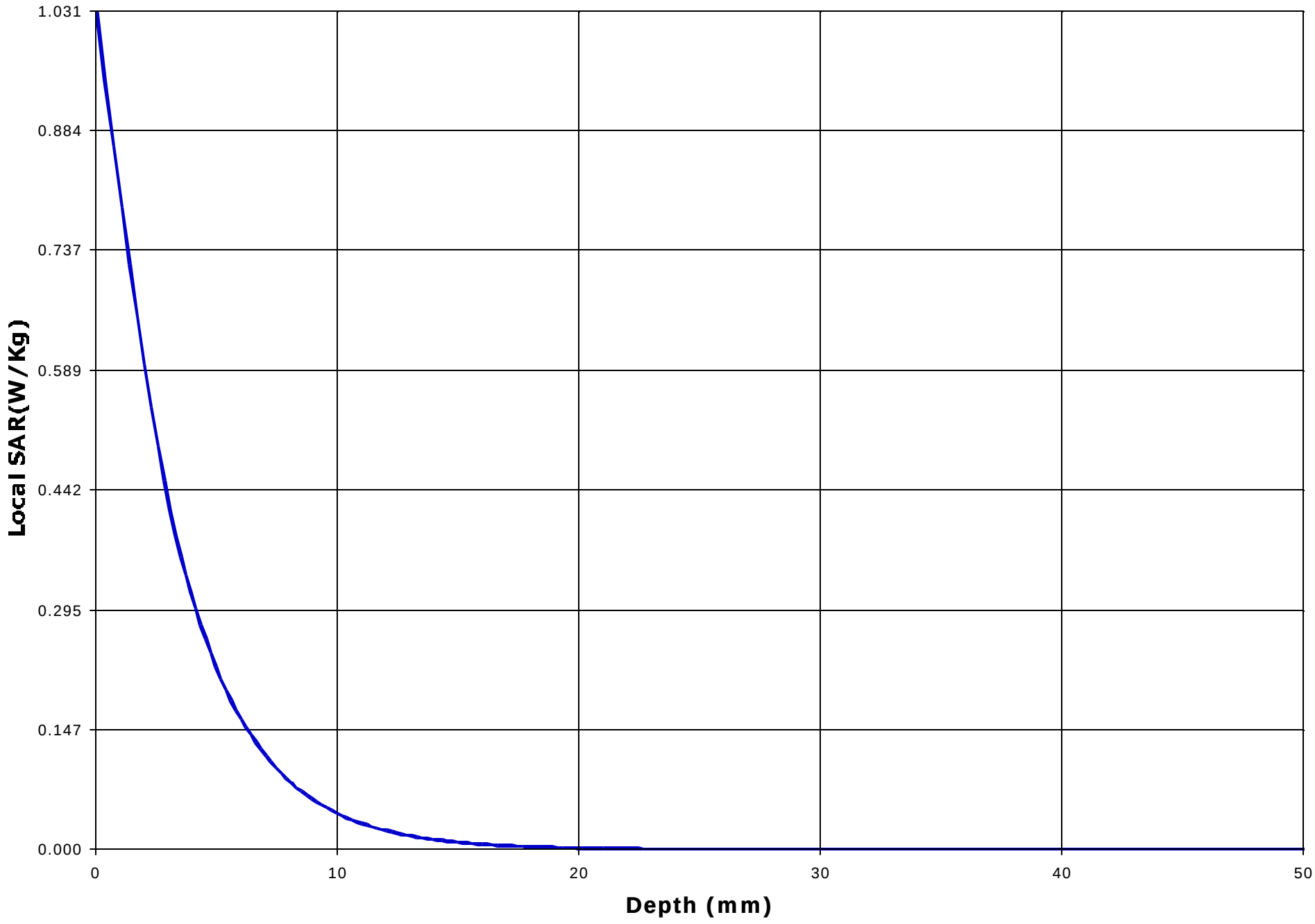
Peak Voltage (mV) : 3.213 **1 Cm Voltage (mV)** : 0.127 **SAR (W/Kg)** : 0.235

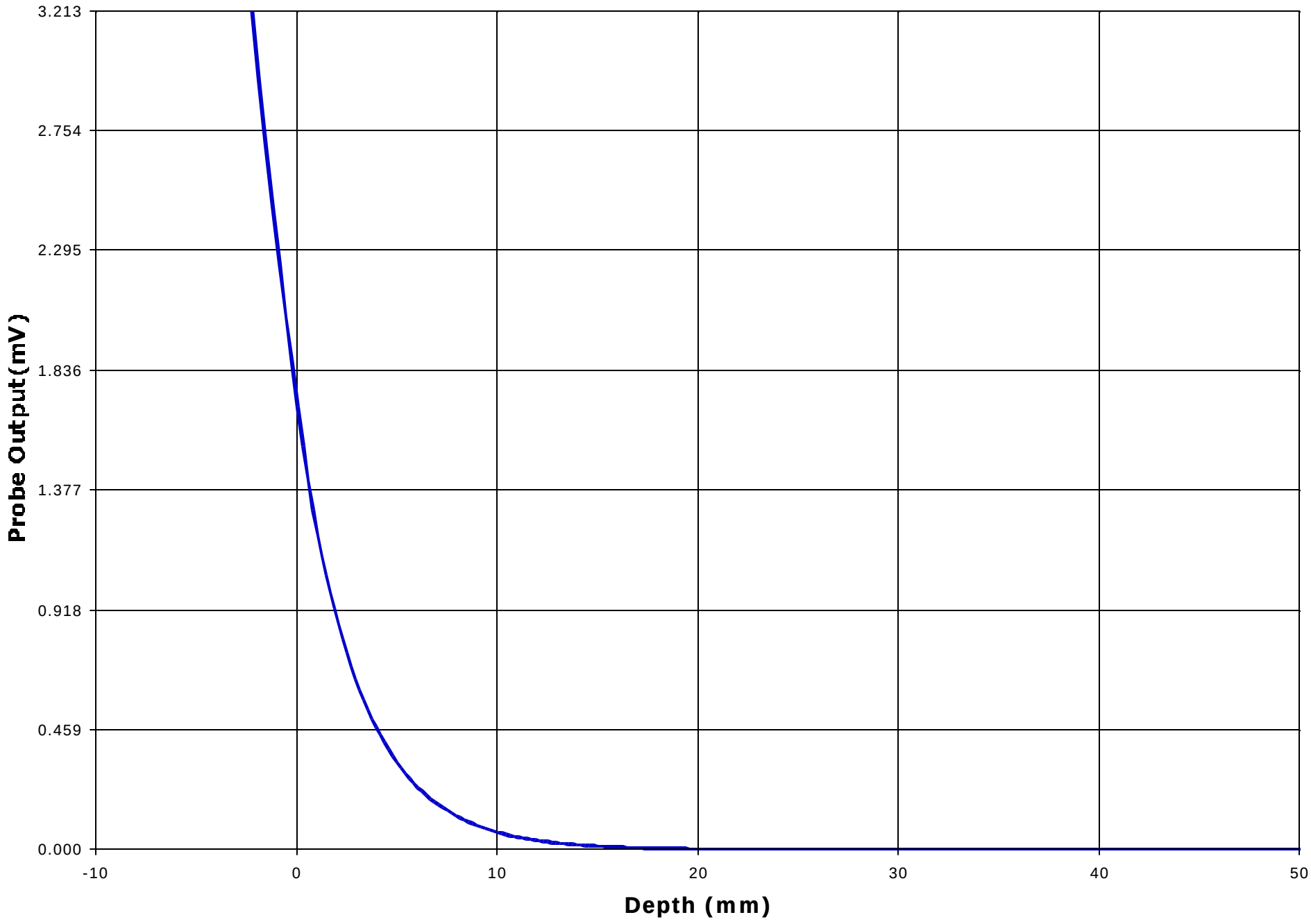

1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
-25
-20
-15
-10
-5
0
5
10
15
20
25
1.33
1.14
0.95
0.76
0.57
0.38
0.19


1.33
1.14
0.95
0.76
0.57
0.38
0.19
-19
-17
-15
-13
-11
-9
-7
-5
-3
-1
1
3
5
7
9
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60


Y Axis (mm)
X Axis (mm)
-25
-20
-15
-10
-5
0
5
10
15
20
25
1.33
1.14
0.95
0.76
0.57
0.38
0.19


Y Axis (mm)
X Axis (mm)
-21
-19
-17
-15
-13
-11
-9
1.33
1.14
0.95
0.76
0.57
0.38
0.19


1.031
0.884
0.737
0.589
0.442
0.295
0.147
0.000
Local SAR(W/Kg)
0
10
20
30
40
50
Depth (mm)


3.213
2.754
2.295
1.836
1.377
0.918
0.459
0.000
Probe Output (mV)
-10
0
10
20
30
40
50
Depth (mm)

Test Information

Date : 06/07/2001
Time : 11:10:32 AM

Product	: PCMCIA Wireless LAN Card	**Test**	: SAR
Manufacturer	: Gemtek Technology Co., Ltd.	**Frequency (MHz)**	: 2437
Model Number	: AP311	**Nominal Output Power (W)**	: 0.026
Serial Number	: 00904B00DA41	**Antenna Type**	: Printed Monopole F
FCC ID Number	: EJM-AP311	**Signal**	: Spread Spectrum

Phantom	: Waist	**Dielectric Constant**	: 49.36
Simulated Tissue	: Muscle	**Conductivity**	: 2.23

Probe	: UT-ETR-0200-1	**Antenna Position**	: Integral
Probe Offset (mm)	: 2.250		
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 3.467		
Calibrated Date	: 29/06/2001		

Amplifier Setting :

Channel 1 : 0.0038 Channel 2 : 0.0037 Channel 3 : 0.0045

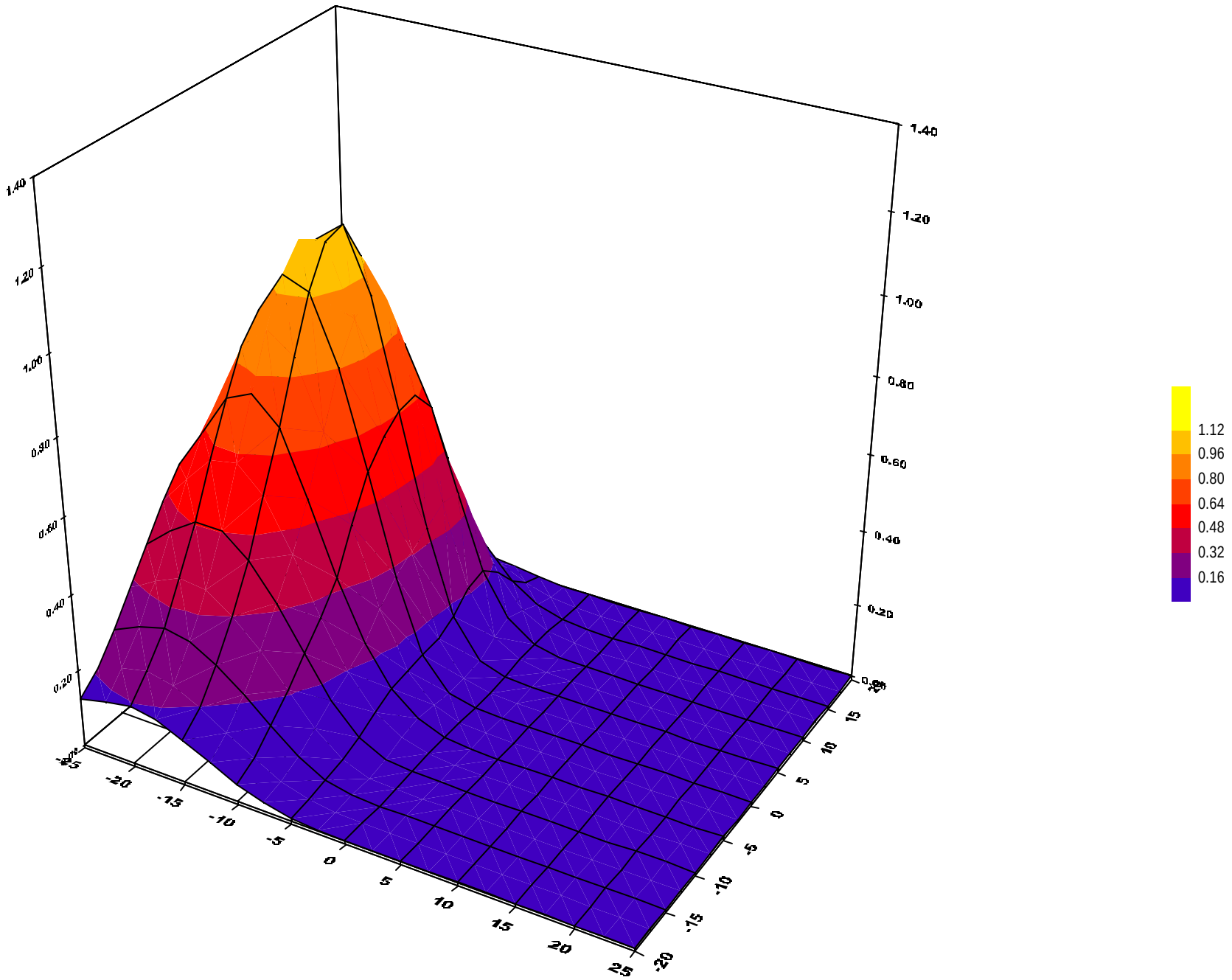
Location of Maximum Field :

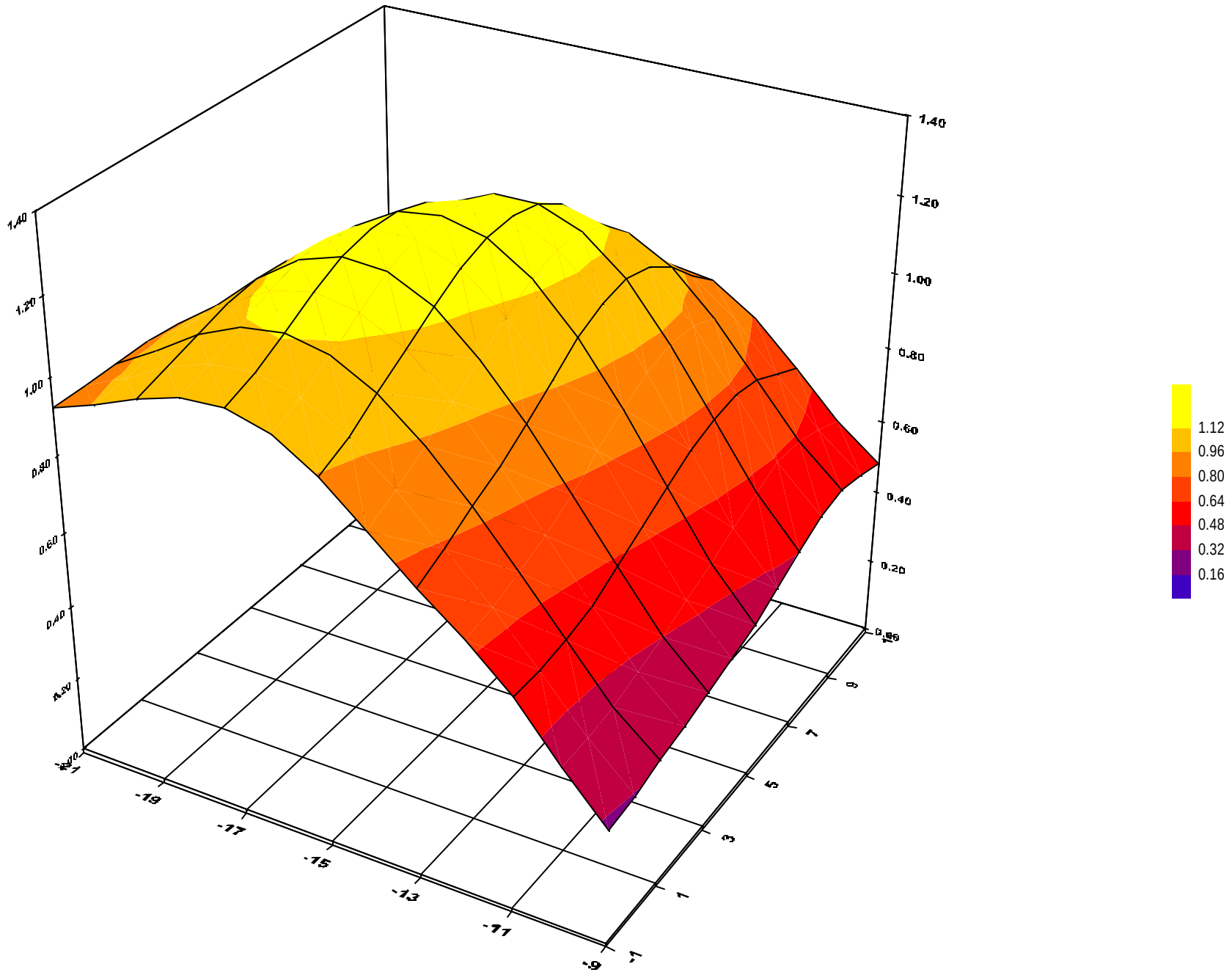
X = -17 Y = 3

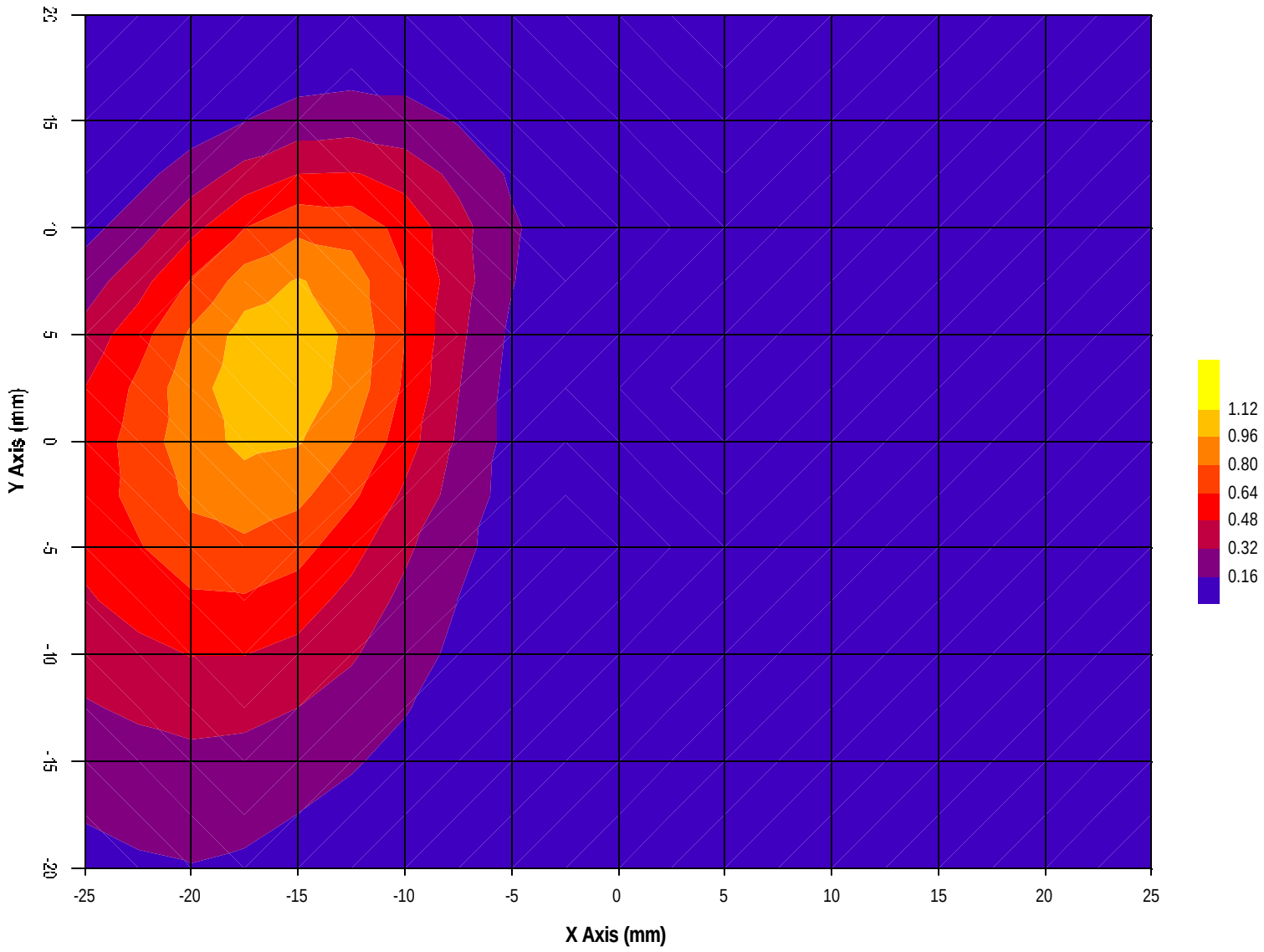
Measured Values (mV) :

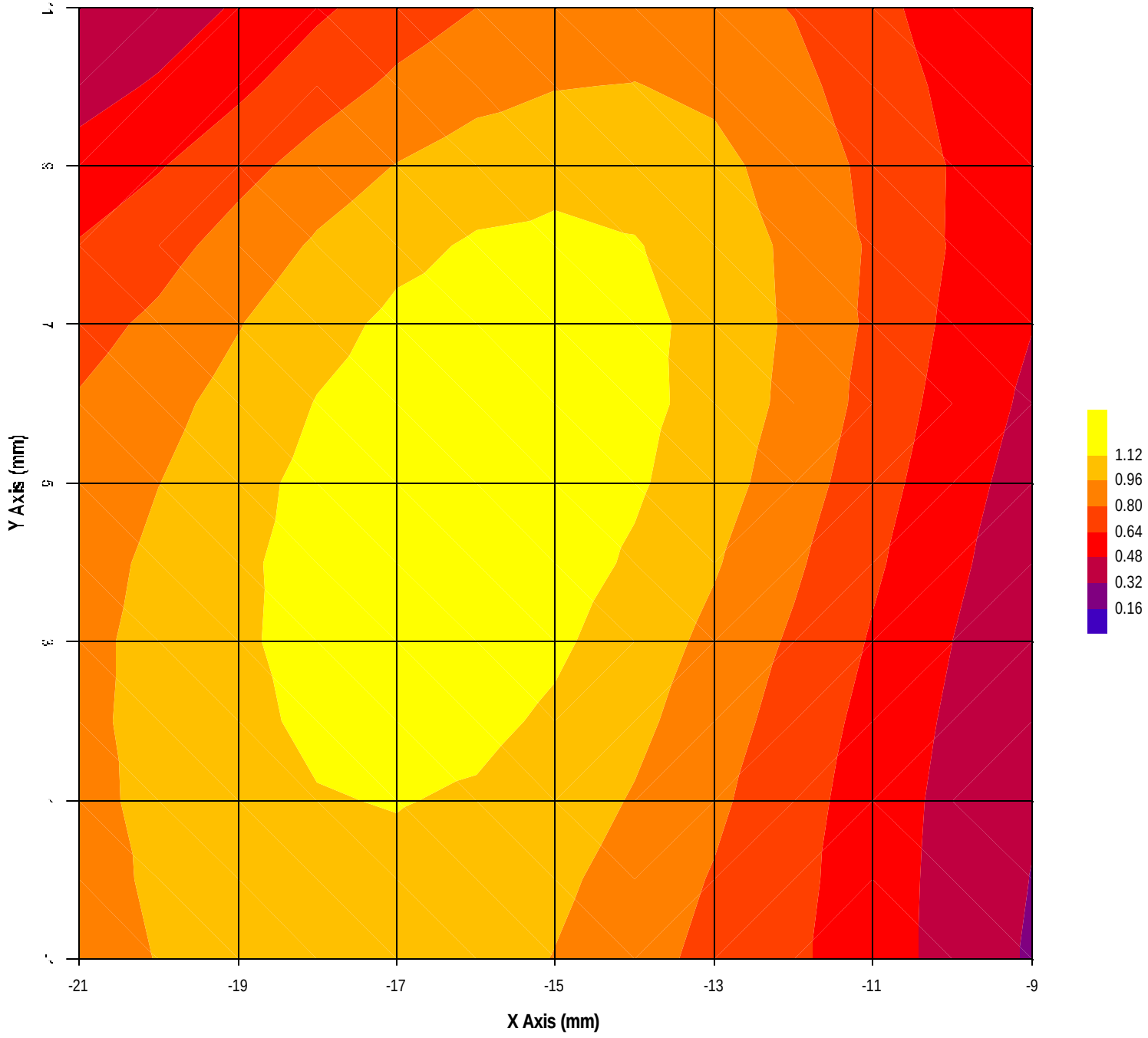
1.229	0.988	0.756	0.526	0.393	0.256
0.141	0.085	0.015	0.000	0.000	

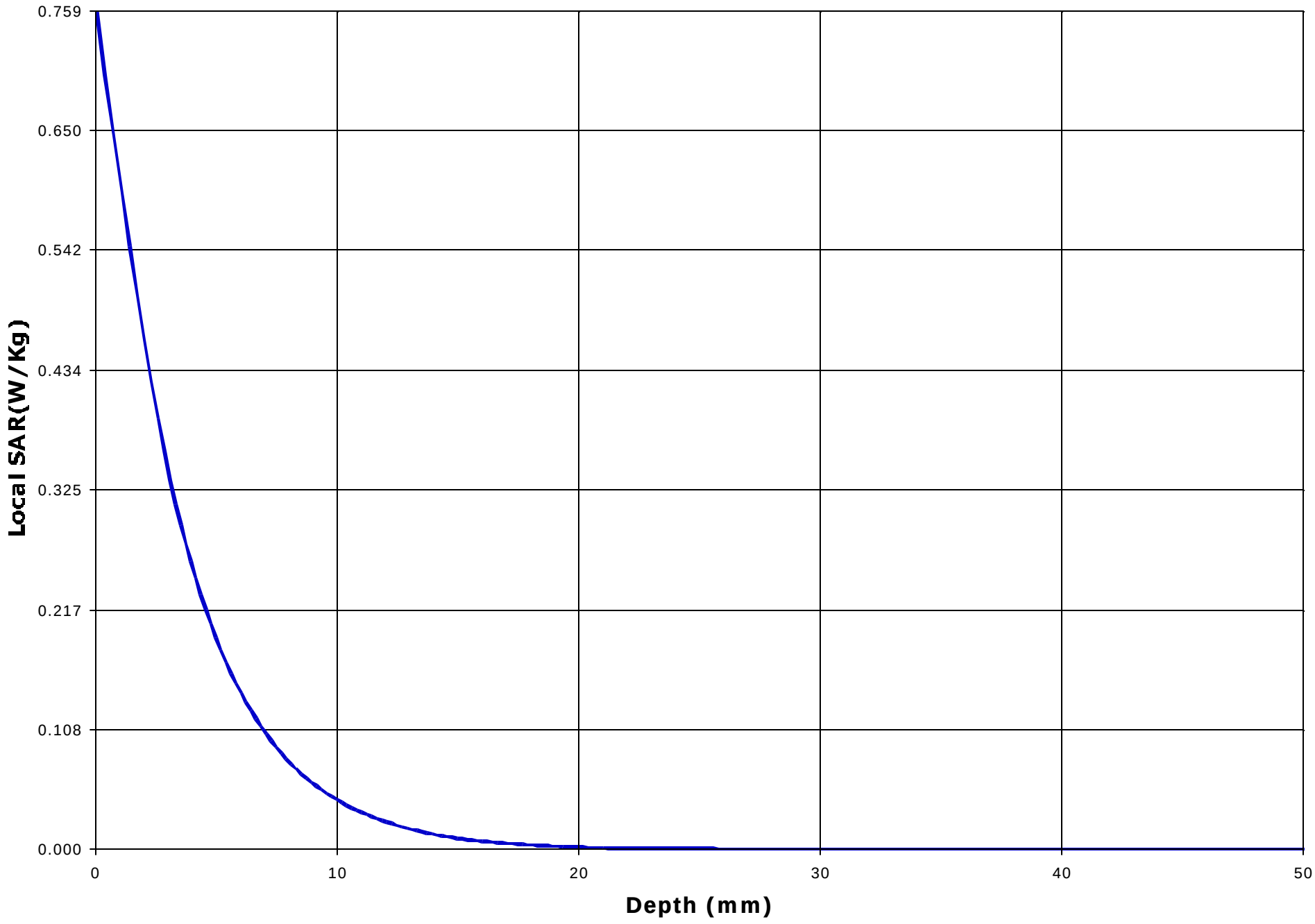
Peak Voltage (mV) : 2.364 **1 Cm Voltage (mV)** : 0.130 **SAR (W/Kg)** : 0.205

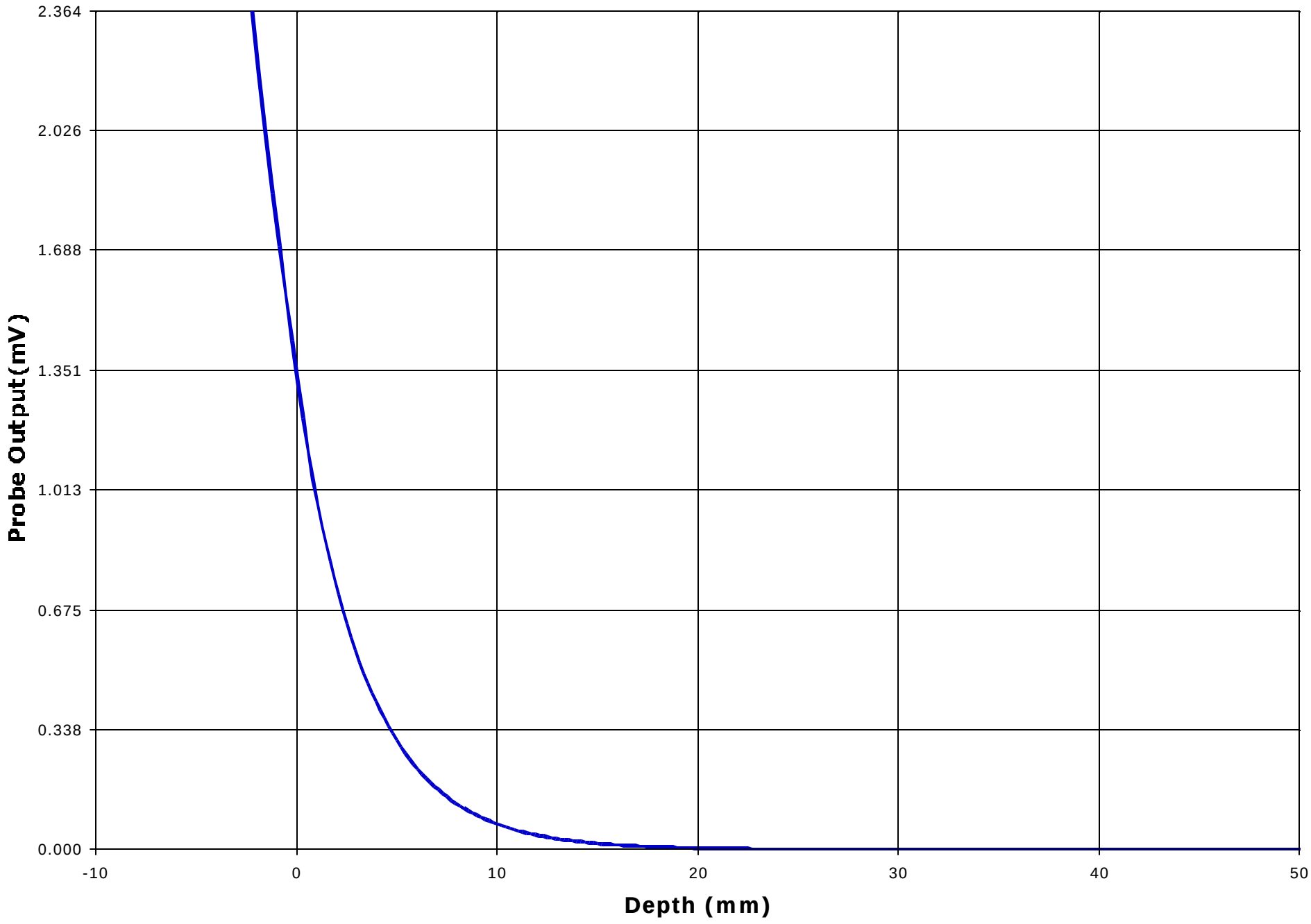

1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
-25
-20
-15
-10
-5
0
5
10
15
20
25
1.12
0.96
0.80
0.64
0.48
0.32
0.16


1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
-19
-17
-15
-13
-11
-9
-1
1
3
5
7
9
1.12
0.96
0.80
0.64
0.48
0.32
0.16


Y Axis (mm)
X Axis (mm)
-25
-20
-15
-10
-5
0
5
10
15
20
25
1.12
0.96
0.80
0.64
0.48
0.32
0.16


Y Axis (mm)
X Axis (mm)
-21
-19
-17
-15
-13
-11
-9
1.12
0.96
0.80
0.64
0.48
0.32
0.16


0.759
0.650
0.542
0.434
0.325
0.217
0.108
0.000
Local SAR(W/Kg)
0
10
20
30
40
50
Depth (mm)


2.364
2.026
1.688
1.351
1.013
0.675
0.338
0.000
Probe Output (mV)
-10
0
10
20
30
40
50
Depth (mm)

Test Information

Date : 06/07/2001
Time : 11:45:32 AM

Product	: PCMCIA Wireless LAN Card	**Test**	: SAR
Manufacturer	: Gemtek Technology Co., Ltd.	**Frequency (MHz)**	: 2462
Model Number	: AP311	**Nominal Output Power (W)**	: 0.026
Serial Number	: 00904B00DA41	**Antenna Type**	: Printed Monopole F
FCC ID Number	: EJM-AP311	**Signal**	: Spread Spectrum

Phantom	: Waist	**Dielectric Constant**	: 49.36
Simulated Tissue	: Muscle	**Conductivity**	: 2.23

Probe	: UT-ETR-0200-1	**Antenna Position**	: Integral
Probe Offset (mm)	: 2.250		
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 3.467		
Calibrated Date	: 29/06/2001		

Amplifier Setting :

Channel 1 : 0.0038 Channel 2 : 0.0037 Channel 3 : 0.0045

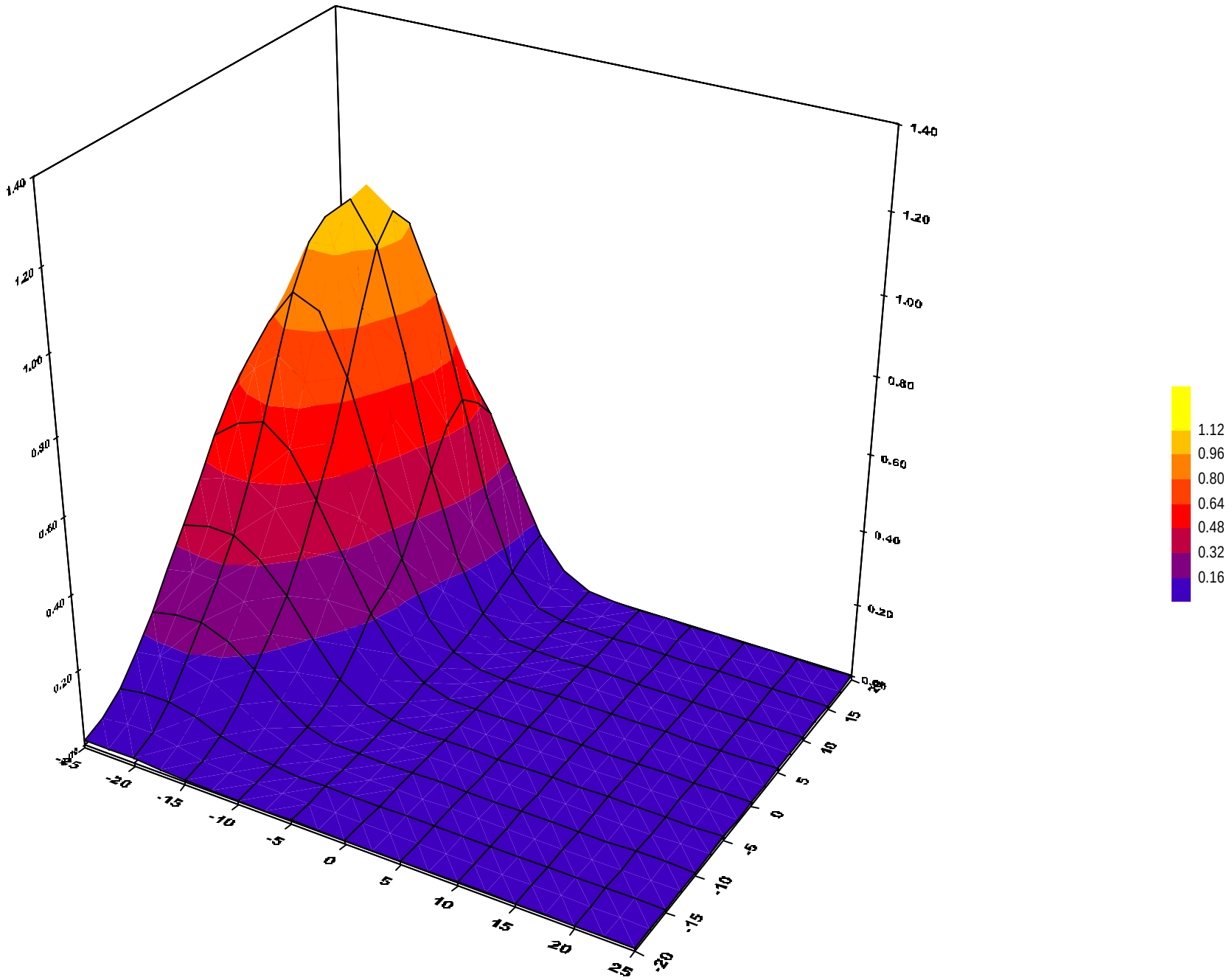
Location of Maximum Field :

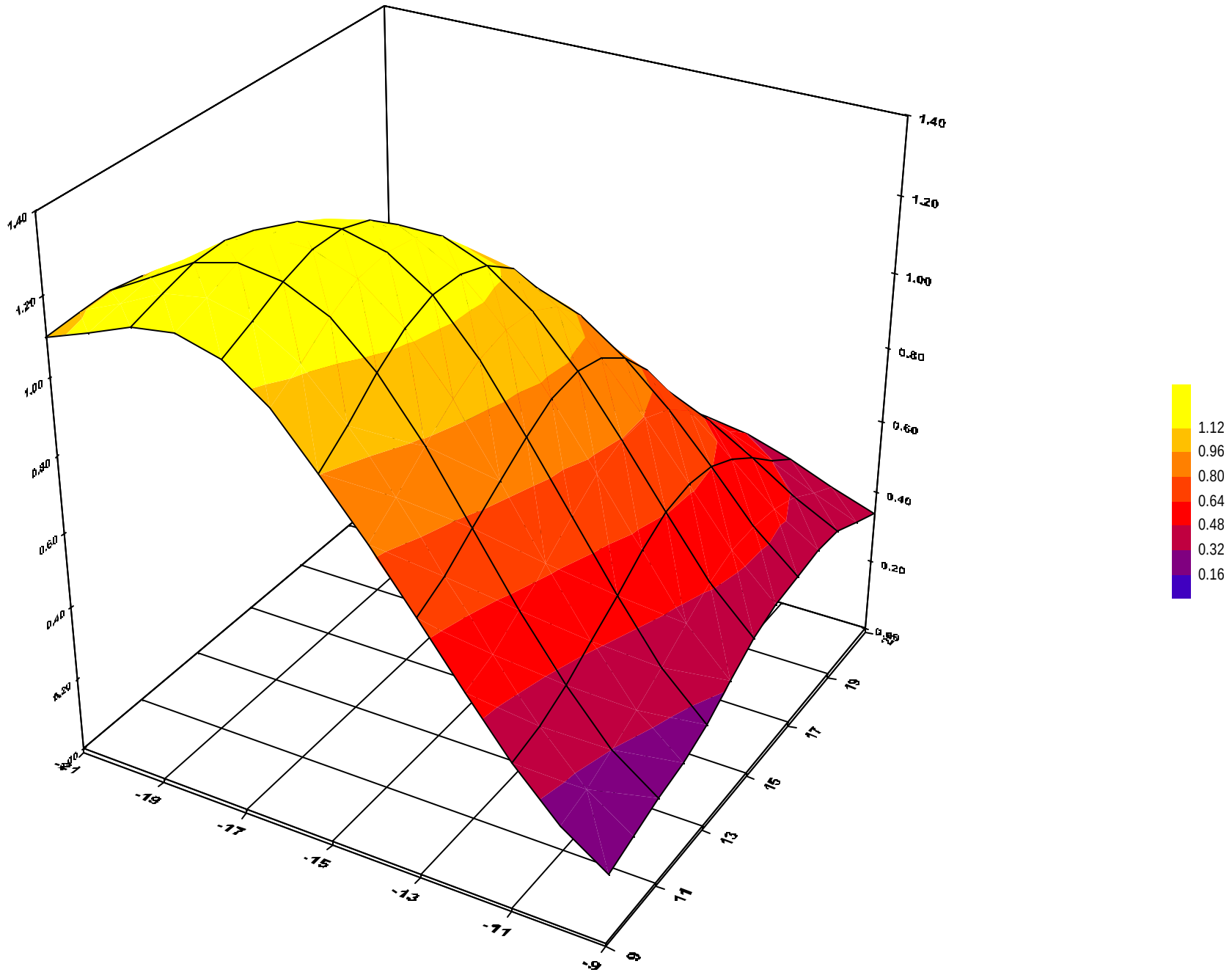
X = -17 Y = 13

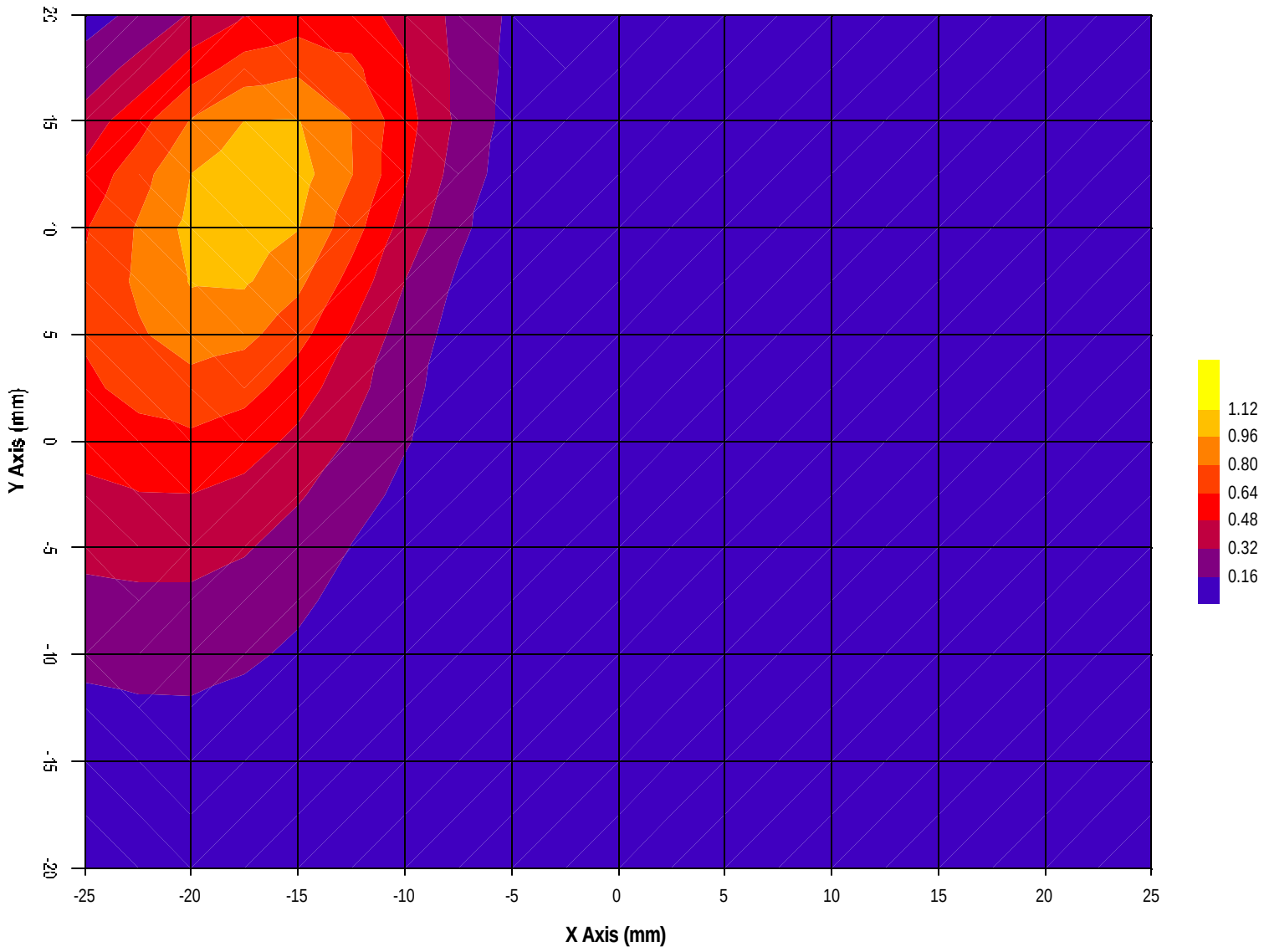
Measured Values (mV) :

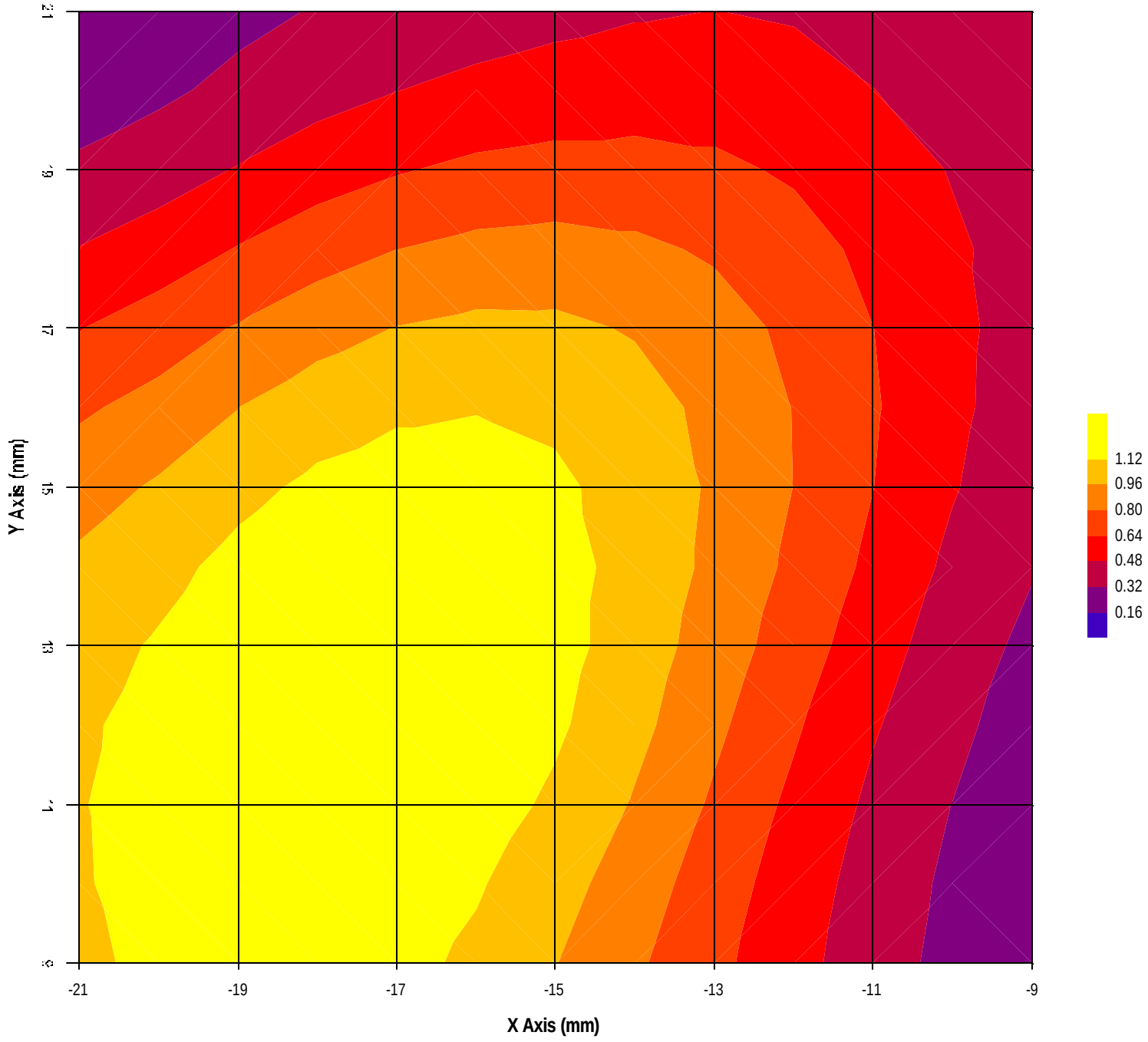
1.317	1.025	0.699	0.454	0.282	0.200
0.089	0.030	0.000	0.000	0.000	

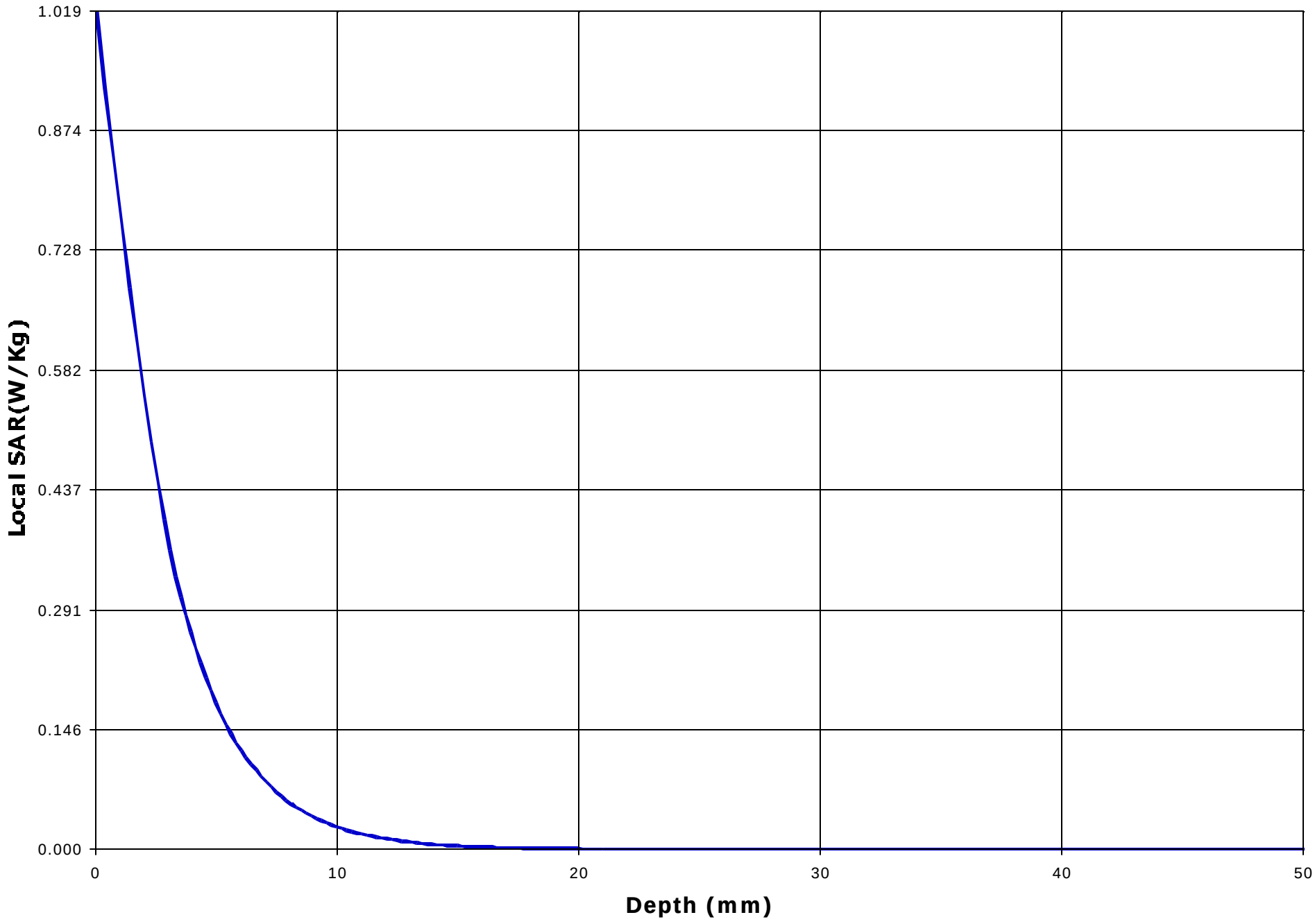
Peak Voltage (mV) : 3.175 **1 Cm Voltage (mV)** : 0.076 **SAR (W/Kg)** : 0.191

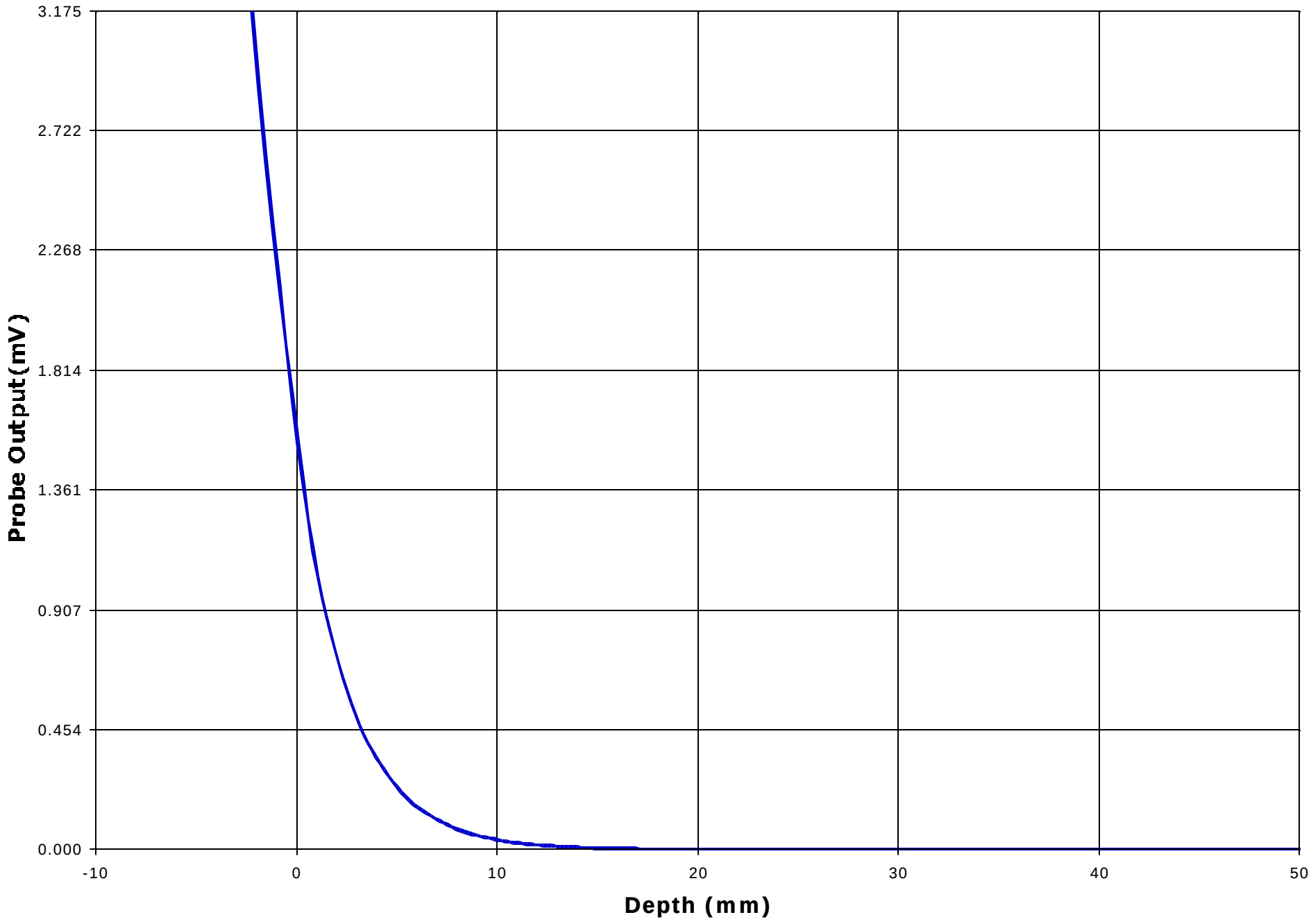

1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
-25
-20
-15
-10
-5
0
5
10
15
20
25
1.12
0.96
0.80
0.64
0.48
0.32
0.16


1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
-19
-17
-15
-13
-11
-9
9
11
13
15
17
19
1.12
0.96
0.80
0.64
0.48
0.32
0.16


Y Axis (mm)
X Axis (mm)
-25
-20
-15
-10
-5
0
5
10
15
20
25
1.12
0.96
0.80
0.64
0.48
0.32
0.16


Y Axis (mm)
X Axis (mm)
-21
-19
-17
-15
-13
-11
-9
1.12
0.96
0.80
0.64
0.48
0.32
0.16


1.019
0.874
0.728
0.582
0.437
0.291
0.146
0.000
Local SAR(W/Kg)
0
10
20
30
40
50
Depth (mm)


3.175
2.722
2.268
1.814
1.361
0.907
0.454
0.000
Probe Output (mV)
-10
0
10
20
30
40
50
Depth (mm)

Appendix II: Tissue Calibration

Ultratech Group of Labs.
3000 Bristol Circle Road
Oakville, Ontario
Canada L6H 6G4

Phone (905) 829-1570
FAX (905) 829-8050
Email vhk.ultratech@sympatico.ca

Name: Jae

Date: 19/06/2001

Frequency: 2,450 MHz

Mixture: Muscle

Room Temp.: 22.5 ±1°C

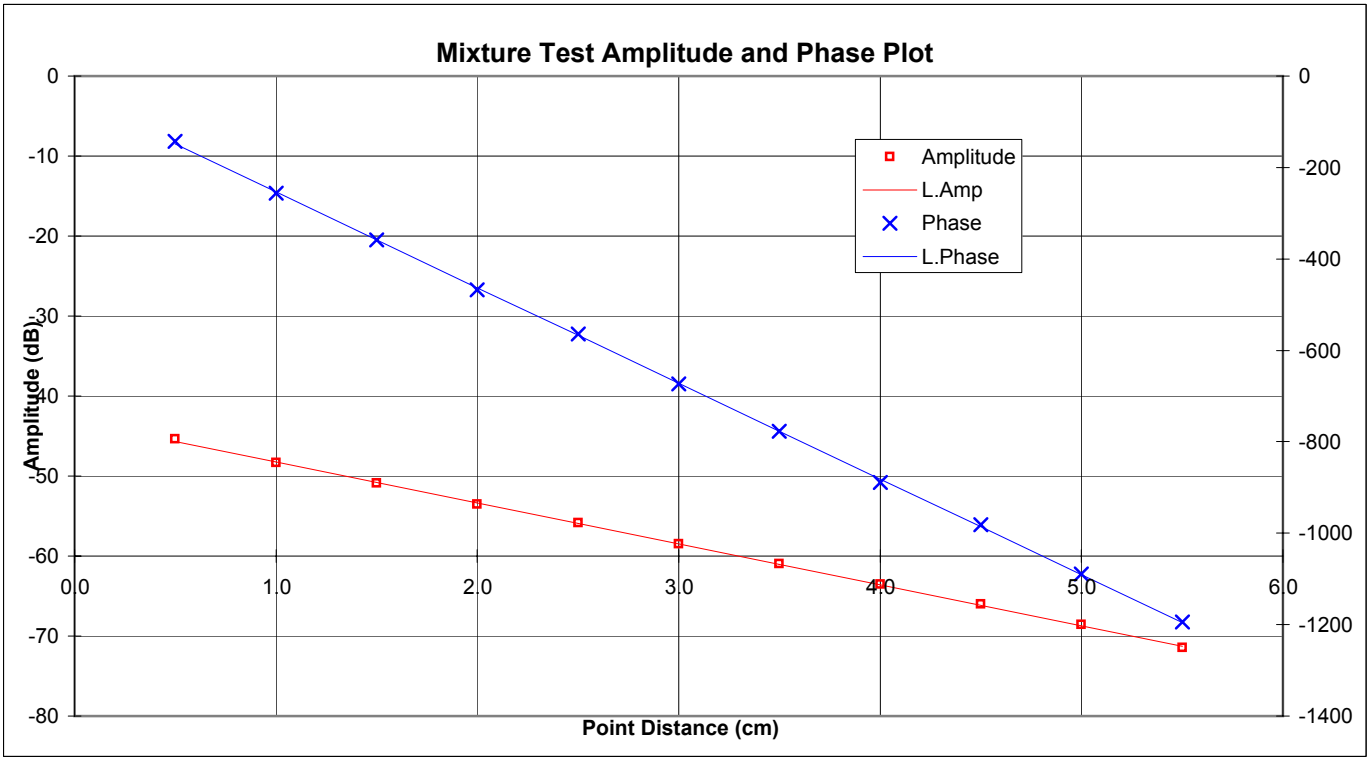
# of Points: 11

Point Dist: 0.5 cm

Point	Amplitude	Phase
1	-45.38	-142.30
2	-48.35	104.43
3	-50.88	1.56
4	-53.56	-108.25
5	-55.85	155.23
6	-58.50	46.84
7	-61.00	-56.89
8	-63.51	-168.47
9	-66.01	98.51
10	-68.56	-9.89
11	-71.42	-114.21

Composition

		weight	% by weight
	DI Water	35,943.6 g	54.28 %
Sucrose (98 %) ←	Sugar	29,403.0 g	44.40 %
2-(2-ButoxyEthoxy) Ethanol ←	Alcohol	0.0 g	0.00 %
Sodium Chloride (99+ %) ←	Salt	653.4 g	0.99 %
Hydroxyethyl Cellulose ←	HEC	120.0 g	0.18 %
	Bactericide	100.0 g	0.15 %
	1,2-propanedio	0.0 g	0.00 %
		0.0 g	0.00 %
		0.0 g	0.00 %
	Total	66,220.0 g	100.00 %

ω(rad/sec)	1.539E+10
ε_0(F/m)	8.854E-14
μ(H/m)	1.257E-08
α_{avg}(Np/cm)	-0.58914
β_{avg}(rad/cm)	-3.65522

Results:		Target	Low Limit	High Limit	% Off Target
D. Const:	49.36	47.00	44.650	49.350	5.02
Conductivity:	2.23	2.17	2.062	2.279	2.60