ENGINEERING TEST REPORT

Mobile Payment Terminal
Model No.: K78-204 or LP9100

Tested For

Keycorp Limited
Level 8, 67 Albert Avenue
Chatswood NSW 2067
Australia

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.: KYC3-SAR

This Test report is Issued under the Authority of Tri M. Luu, Professional Engineer, Vice President of Engineering UltraTech Group of Labs Date: November 27, 2001	
Report Prepared by: Dan Huynh Issued Date: November 27, 2001	Tested by: JaeWook Choi Test Dates: November 08, 2001

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

UltraTech

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TABLE OF CONTENTS

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 verify 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
IEEE Std. 1528-2001 Draft	2001	Draft Recommended practice for determining the Peak Spatial-Average Specific Absorption rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques.
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:	Keycorp Limited
Address:	Level 8, 67 Albert Avenue Chatswood NSW 2067 AUSTRALIA
Contact Person:	Mr. Ken McAnulty Phone #: +61 2 9415 2900 Fax #: +61 2 9415 1363 Email Address: kmcanulty@keycorp.net

MANUFACTURER	
Name:	Keycorp Limited
Address:	Level 8, 67 Albert Avenue Chatswood NSW 2067 AUSTRALIA
Contact Person:	Mr. Ken McAnulty Phone #: +61 2 9415 2900 Fax #: +61 2 9415 1363 Email Address: kmcanulty@keycorp.net

2.2. DEVICE UNDER TEST (DUT) DESCRIPTION

The following is the information provided by the applicant.

Trade Name:	Keycorp Limited
Type/Model Number:	K78-204 or LP9100
Serial Number:	Test Sample
Type of Equipment:	Licensed Non-Broadcast Station Transmitter
Frequency of Operation:	806-821 MHz
Rated RF Power:	2 W (Conducted) 0.95 W (ERP)
Modulation Employed:	FM Data
Emissions Designation:	20K0F1D
Antenna Type:	Extendable with ¼ length helical over ¼ wavelength whip
External Power Supply:	Ault Inc., I.T.E. Power Supply Model No.: PW 107
Primary User Functions of DUT:	Wireless mobile payment terminal.

2.3. LIST OF DUT'S ACCESSORIES

- Ault Inc., I.T.E. Power Supply, Model No.: PW 107

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

None

2.5. ANCILLARY EQUIPMENT

- Toshiba Laptop

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 DUT'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 may 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

1. EUT will not transmit without connecting the RS232C cable at the back of EUT by its nature at the moment. Therefore the evaluation was performed with RS232C cable connected and the other end of cable connected to the laptop for control.
2. EUT will transmit only a few seconds with 100% duty cycle, then shut down itself automatically. So EUT was configured to transmit the signal with 25% duty cycle(64ms : 196ms) since it is limited on the network the radio modem is designed to be used in.

2.8. BLOCK DIAGRAM OF TEST SETUP

The EUT was configured for normal intended use. The following block diagram shows a representative equipment arrangement during tests:

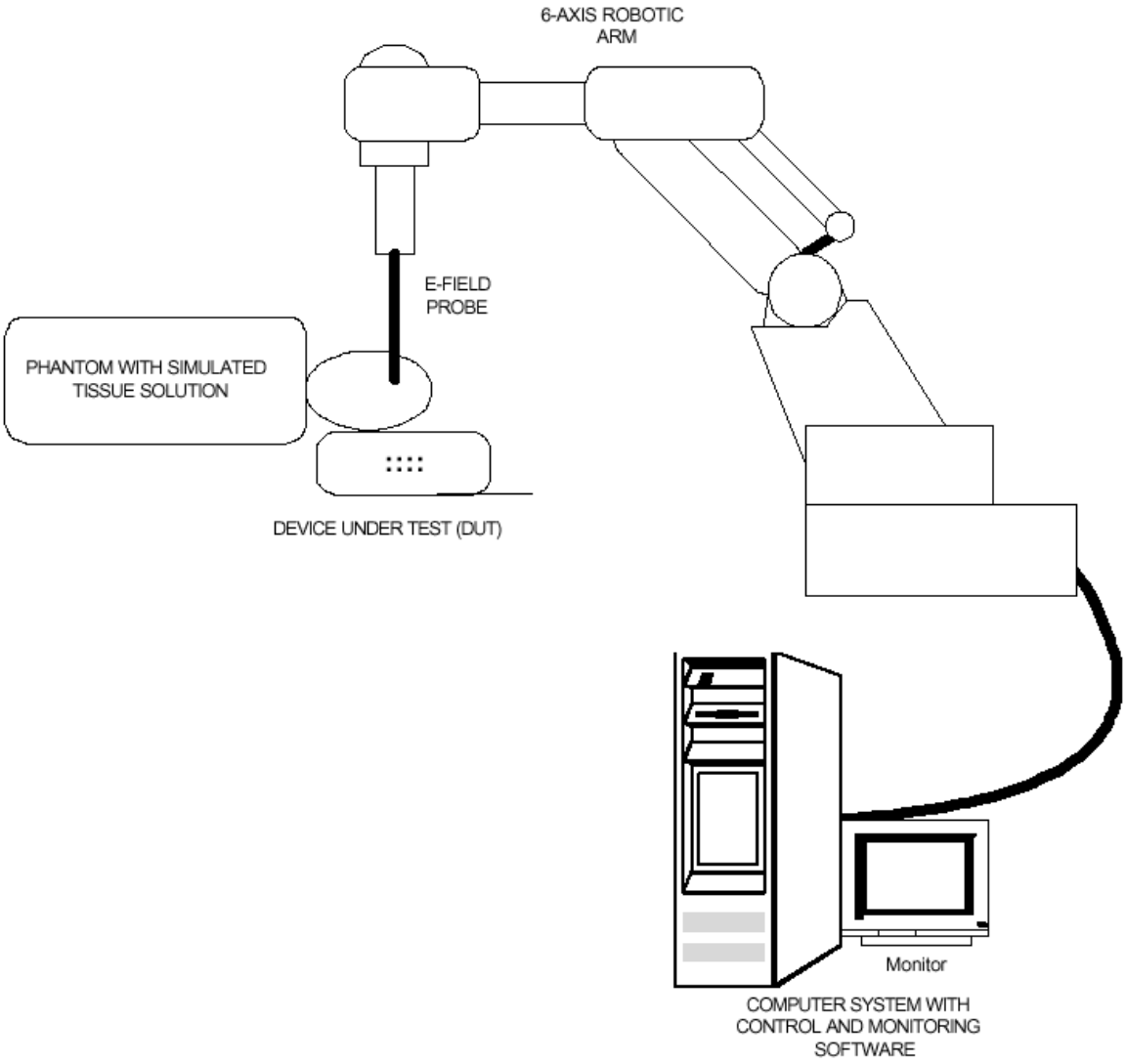


EXHIBIT 3. SUMMARY OF TEST RESULTS

3.1. LOCATION OF TESTS

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

3000 Bristol Circle, in the city of Oakville, Province of Ontario, Canada.

All measurements were performed in UltraTech's shielded chamber, 24' x 16' x 8'.

3.2. APPLICABILITY & SUMMARY OF SAR RESULTS

The maximum peak spatial-average SAR over 1 g measured was found to be **0.817 W/Kg at 4mm separation with 25% duty cycle(64ms : 196ms)**

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	Mobile Payment Terminal	Robot Type	6 Axis
Model Number	K78-204 or LP9100	Scan Type	SAR - Area/Zoom
Serial Number	Test Sample	Measured Field	E
Frequency Band (MHz)	806 – 821 MHz	Phantom Type	Flat phantom (L70×W40×H20, 2mm Base)
Frequency Tested (MHz)	806.0, 813.5, 821.0	Phantom Position	Body worn
Nominal Output Power (W)	2 W, Conducted 0.95 W (ERP)	Room Temperature	23°C
Antenna Type	Retractable	Room Humidity	35%
Signal Type	CW	Tissue Temperature	22°C
Duty Cycle	25% (64ms : 196ms)		

Type of Tissue	Muscle
Target Frequency (MHz)	835
Target Dielectric Constant	55.20
Target Conductivity (S/m)	0.97
Composition (by weight)	Tap Water (53.13 %) Sugar (45.62 %) Salt (0.93 %) HEC (0.23 %) Bactericide (0.10 %)
Measured Dielectric Constant	56.30
Measured Conductivity (S/m)	0.97
Probe Name	E
Probe Orientation	Isotropic
Probe Offset (mm)	2.25
Sensor Factor	10.8
Conversion Factor	0.691
Calibration Date (MM/DD/YY)	10/25/2001

4.2. PHOTOGRAPH OF EUT WITH ALL ACCESORIES

<Front View - Antenna Retracted>

<Rear View - Antenna Retracted >

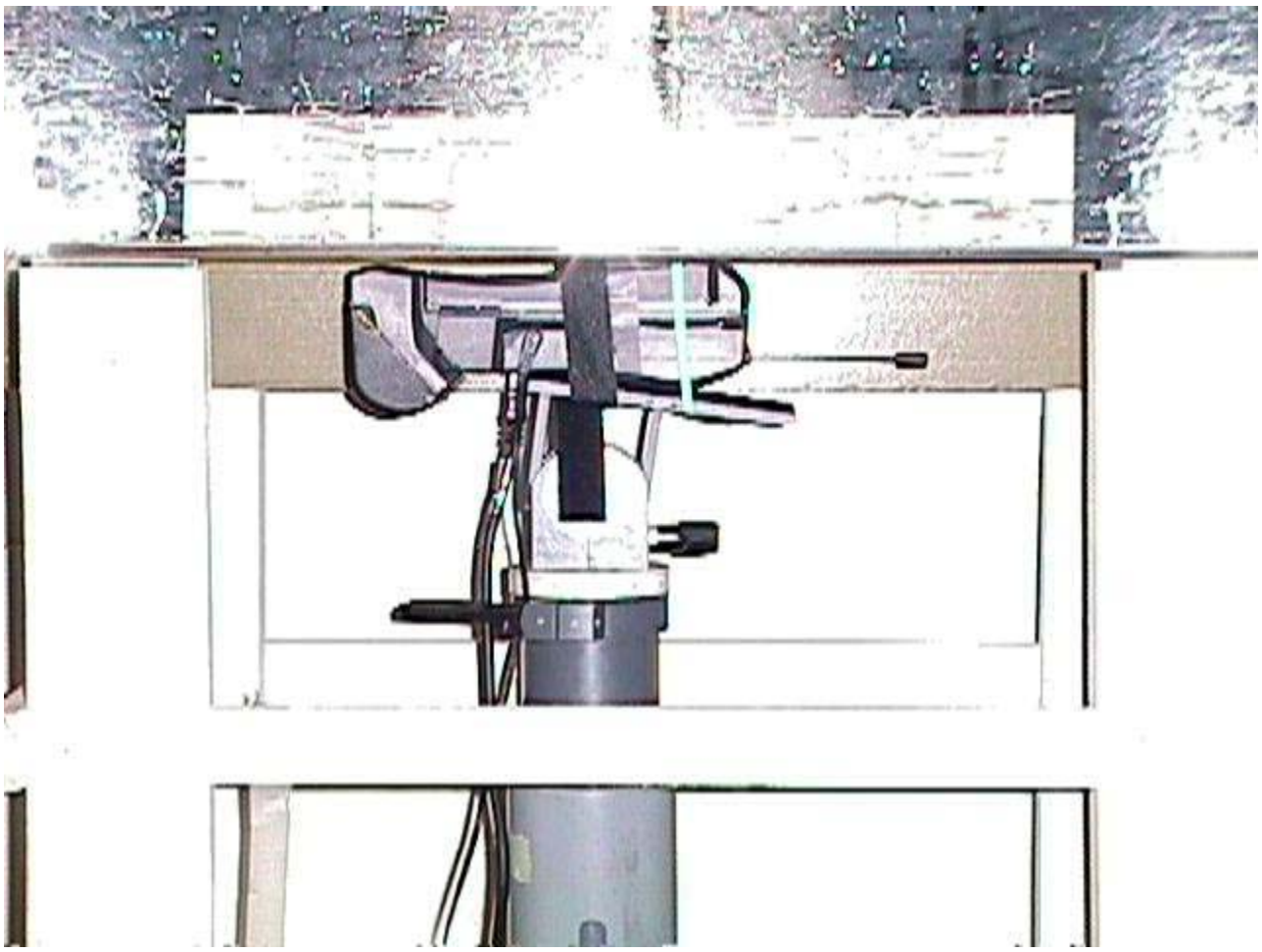
<Front View – Antenna Extended>

<Rear View – Antenna Extended >

<Front View - Ault Inc., I.T.E. Power Supply, Model No.: PW 107>

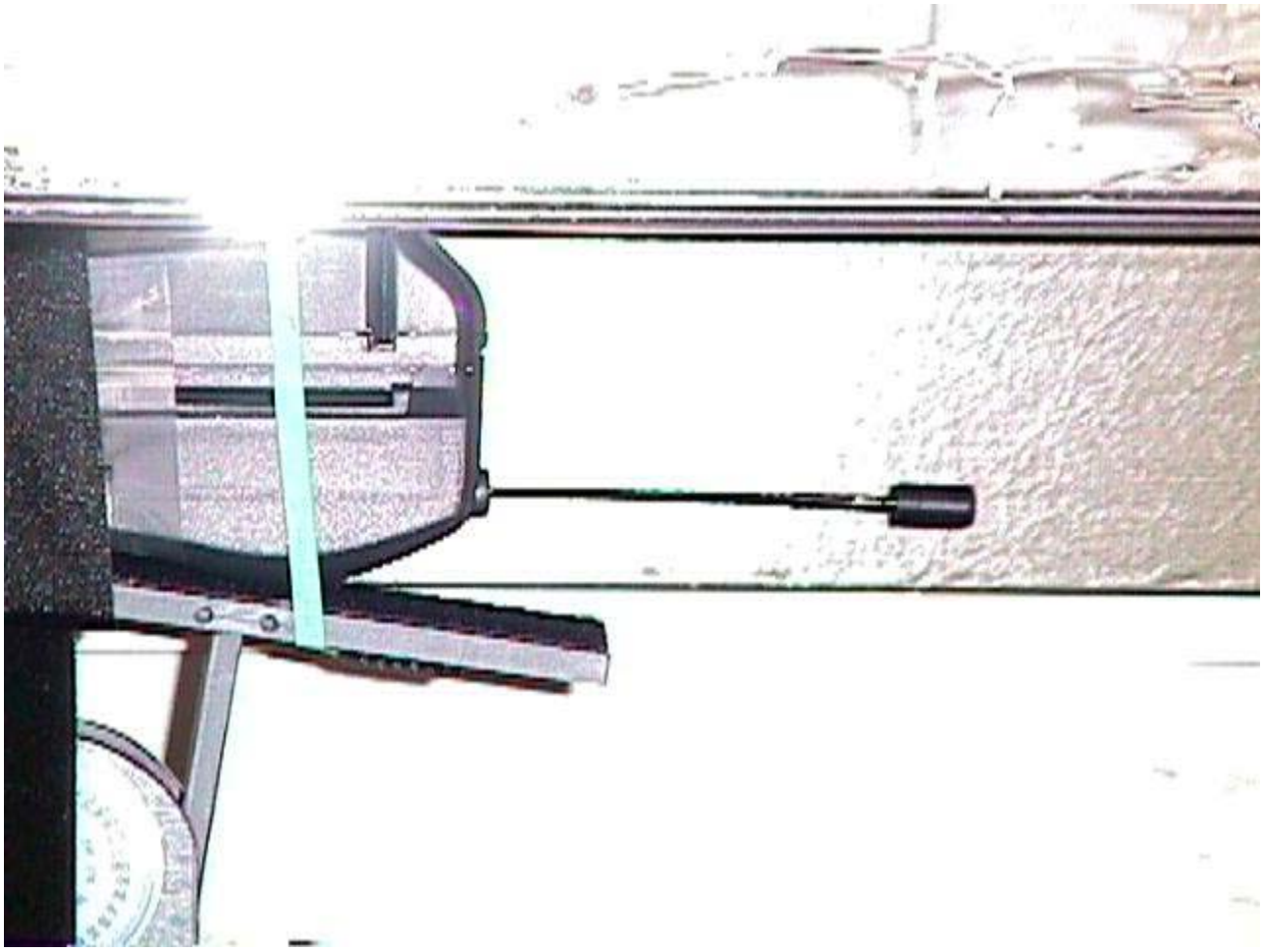
<Rear View - Ault Inc., I.T.E. Power Supply, Model No.: PW 107>

4.3. PHOTOGRAPHS OF EUT POSITION (BODY)



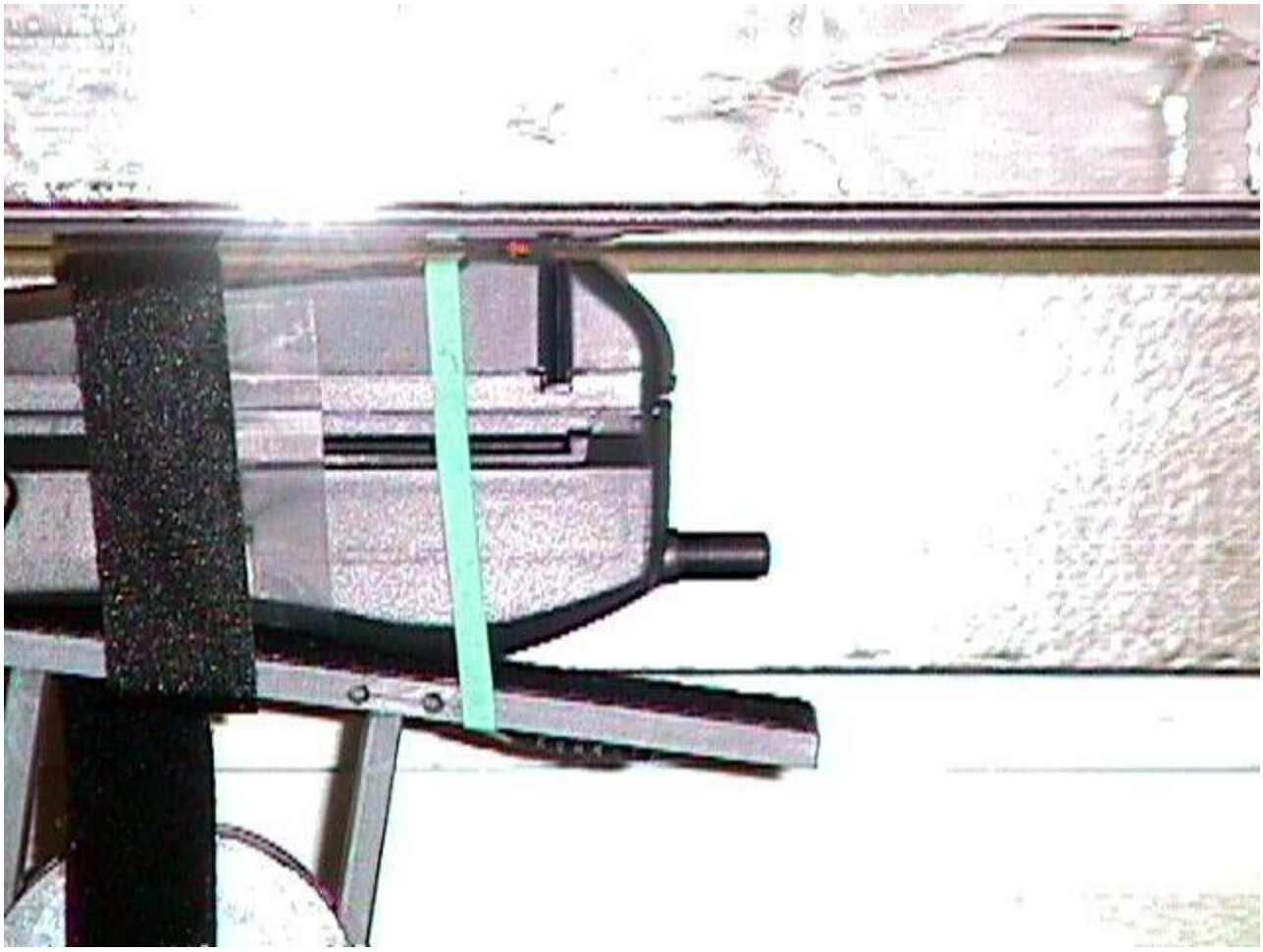
< Front side of EUT faced to the phantom and the antenna fully extended – Overview >

* Power cable was removed for the final evaluation



< Front side of EUT faced to the phantom and the antenna fully extended – Close-up view >

< Front side of EUT faced to the phantom and the antenna fully retracted – Overview >



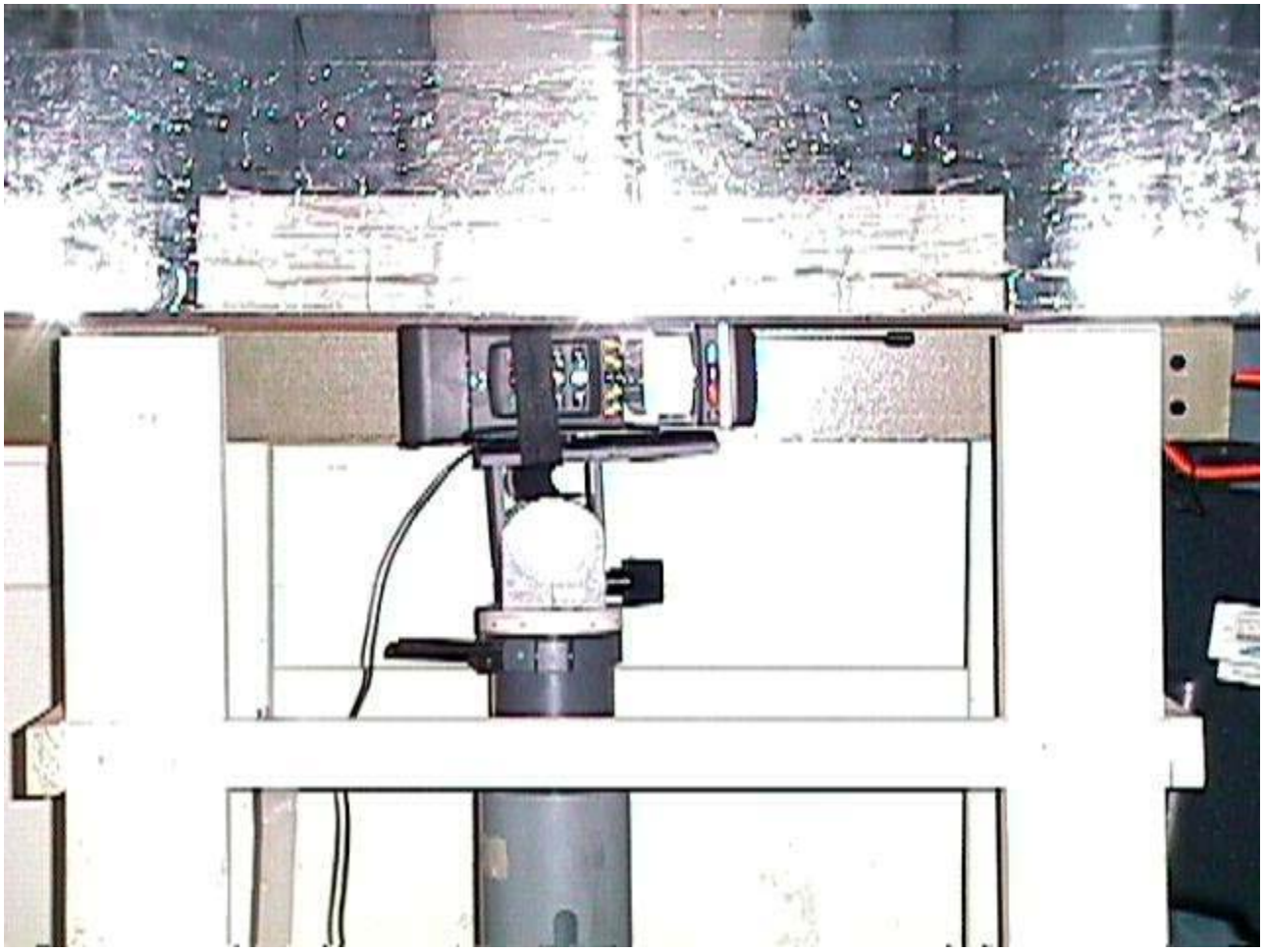
< Front side of EUT faced to the phantom and the antenna fully retracted – Close-up view >

< Back side of EUT faced to the phantom and the antenna fully extended – Overview >

< Back side of EUT faced to the phantom and the antenna fully extended – Close-up Overview >

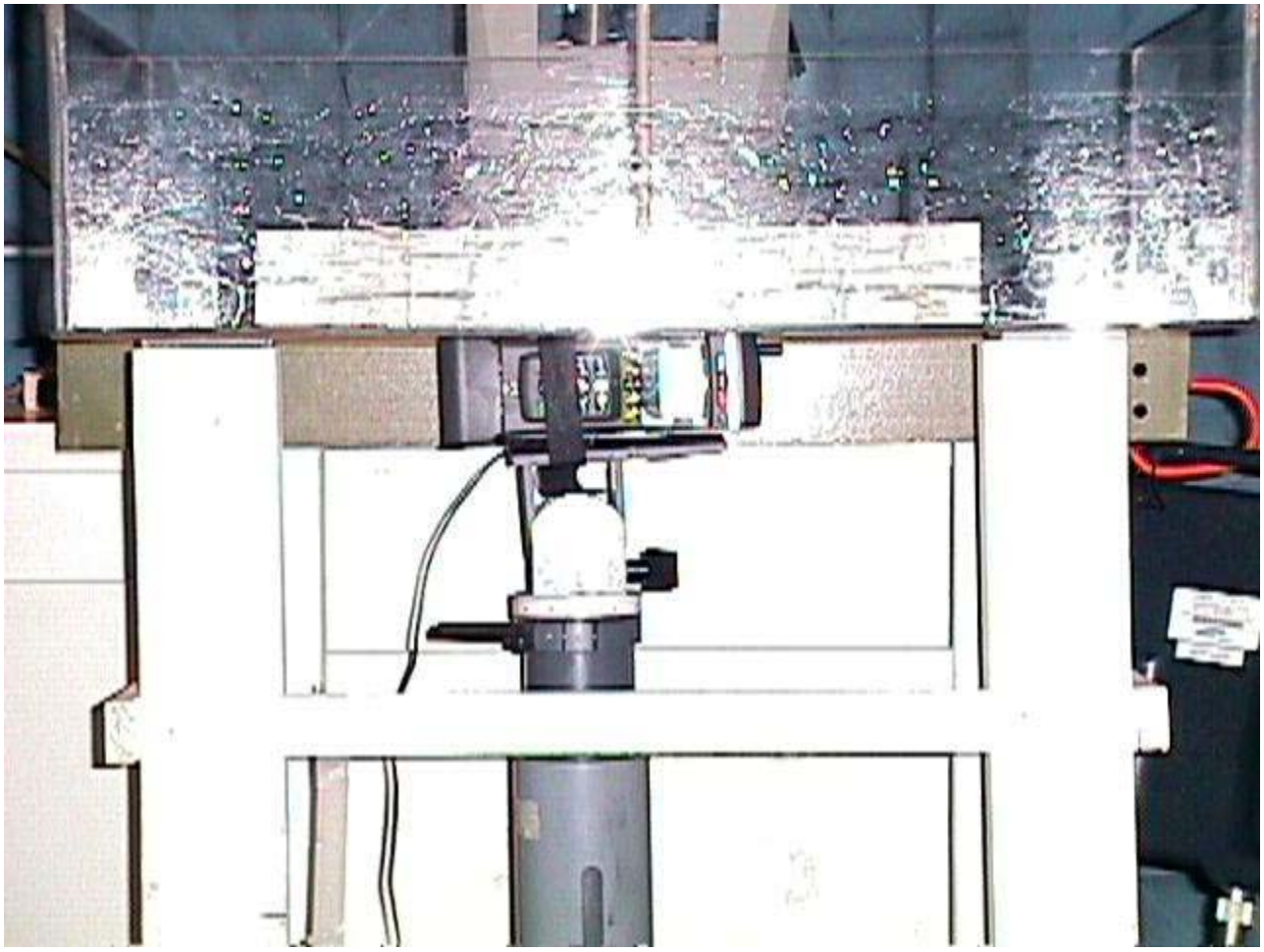
< Back side of EUT faced to the phantom and the antenna fully retracted – Overview >

< Back side of EUT faced to the phantom and the antenna fully retracted – Close-Up view >



< Right side of EUT faced to the phantom and the antenna fully extended – Overview >

< Right side of EUT faced to the phantom and the antenna fully extended - Close-up view >



< Right side of EUT faced to the phantom and the antenna fully retracted - Overview >

< Right side of EUT faced to the phantom and the antenna fully retracted - Close-up view >

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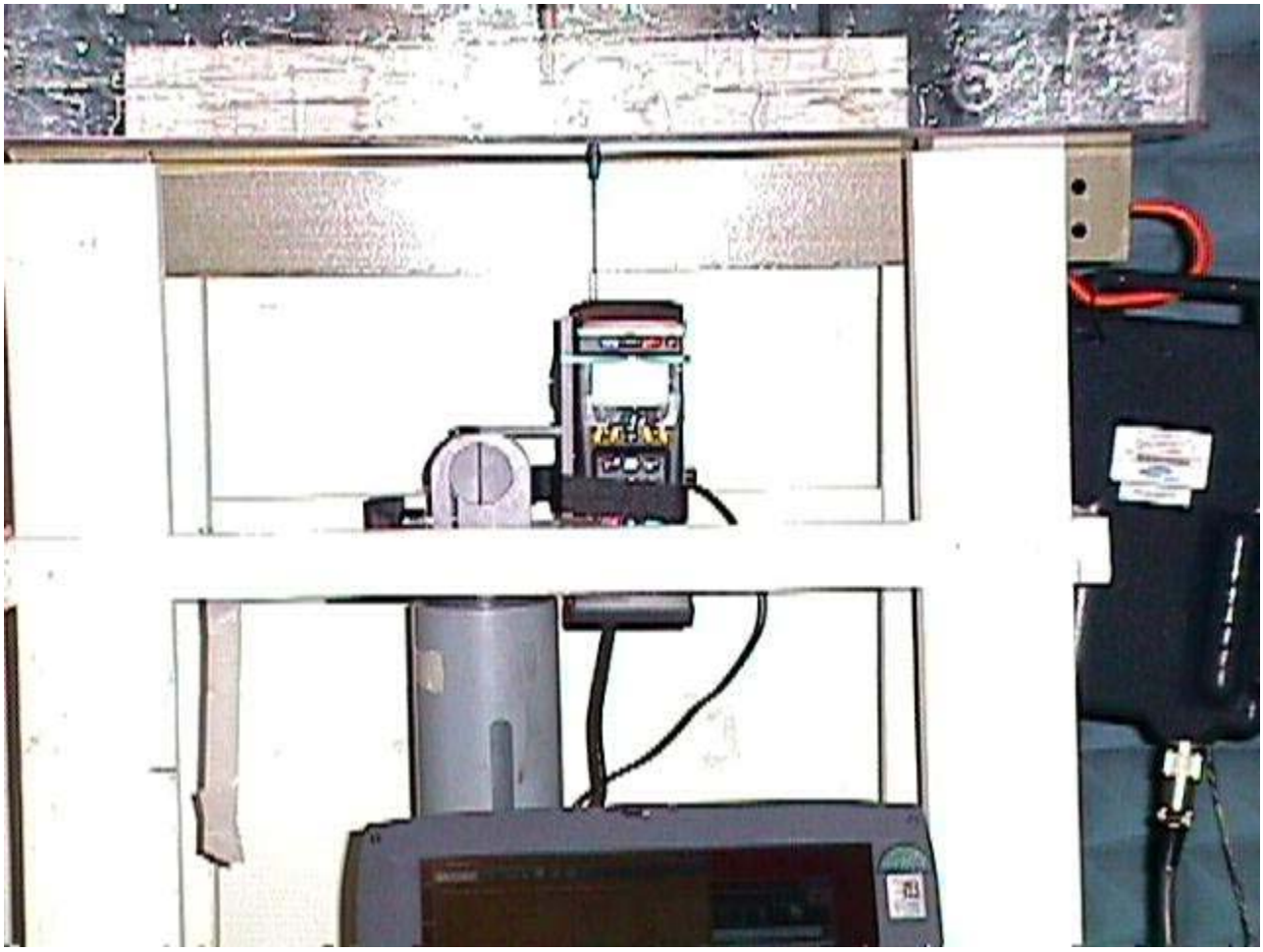
< Left side of EUT faced to the phantom and the antenna fully extended - Overview >

< Left side of EUT faced to the phantom and the antenna fully extended - Close-up view >

< Left side of EUT faced to the phantom and the antenna fully retracted - Close-up view >

< Left side of EUT faced to the phantom and the antenna fully retracted - Close-up view >

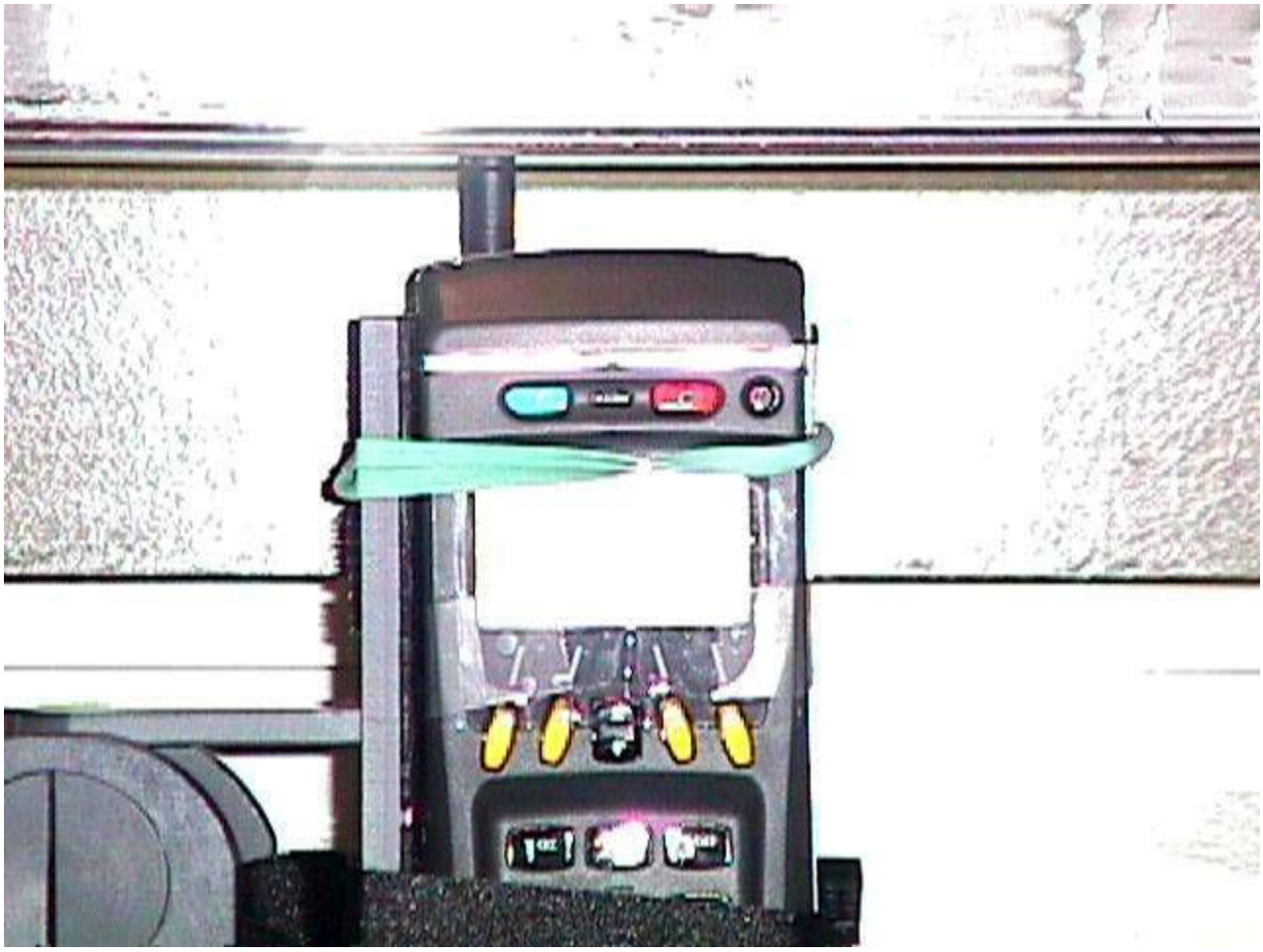


< Top of EUT in contact and the antenna fully extended - Overview >

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vhk.ultratech@sympatico.ca, Website: http://www.ultratech-labs.com

< Top of EUT faced to the phantom and the antenna fully extended – Close-up view >

< Top of EUT faced to the phantom and antenna fully retracted – Overview >



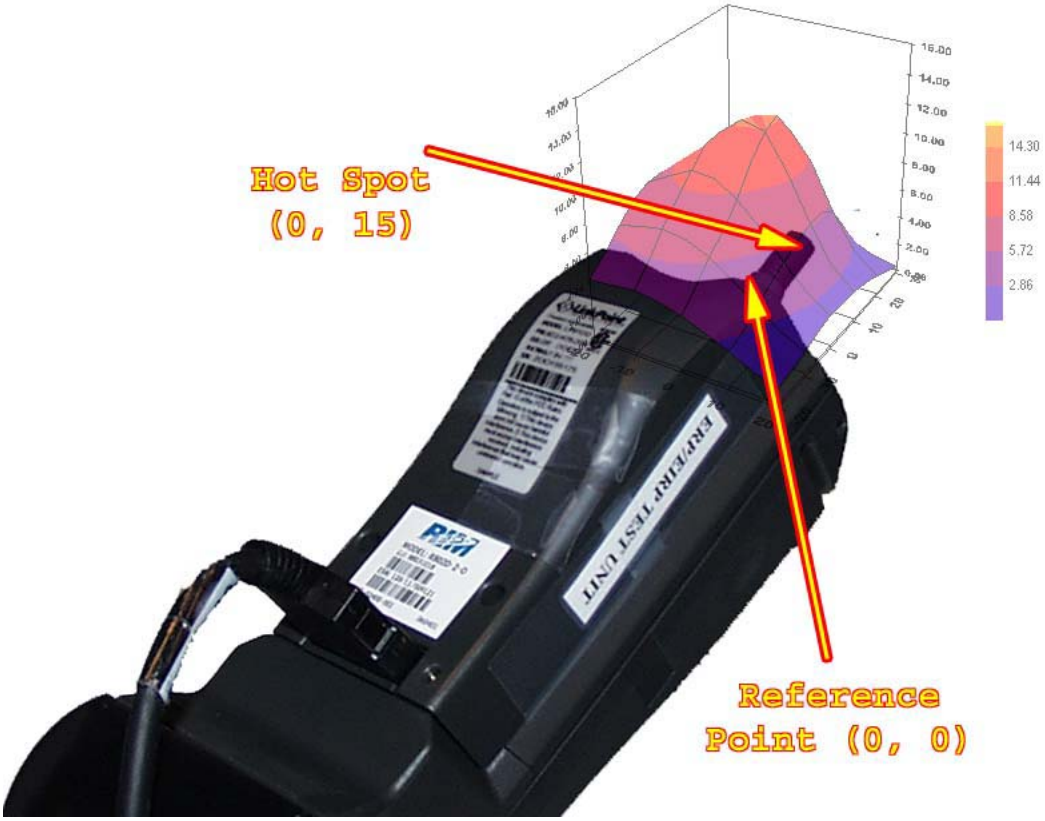
< Top of EUT in contact and the antenna fully retracted – Close-up view >

< Back of EUT faced to the phantom at 4 mm separation and the antenna fully retracted – Close-up view >

4.4. MAXIMUM FIELD LOCATION (BODY)

The maximum field was found to be located at (0, 15) with the test configuration as described below:

- body-worn position
- the back side of EUT faced inward to the flat phantom
- the antenna fully retracted
- at 821.0 MHz
- 25 % duty cycle (64 ms : 196 ms)
- 4 mm separation



Complete area Pre-scans on all faces of the EUT were conducted to determine the location of the highest SAR and the device was repositioned to allow the identified hot-spots to be orientated with as large an area around the hot-spots to come into contact with the phantom surface. This procedure ensured that the maximum SAR readings would be obtained from the hot-spot areas identified.

4.5. MAXIMUM PEAK SPATIAL-AVERAGE SAR MEASURED

Phantom Configurations	Device Test Configuration	Peak spatial-average SAR, Frequency & Output
Body worn	**Back side of EUT at 4 mm separation from the phantom with antenna fully retracted**	**821.0 MHz, 32.8 dBm(conducted), 18.75 dBm(ERP)**
		0.881 W/Kg

4.6. SAR MEASUREMENT DATA

4.6.1. Prescan results to determine the worst case configuration at 813.5 MHz with EUT Face "in contact with phantom surface"

EUT face scanned	Antenna Position	Peak spatial-average SAR over 1g volume (W/Kg)	Relative location of hot spot to the reference point (mm)*
Front	Extended	0.033	(0, 25)
	Retracted	0.000	(-30, -190)
Back	Extended	1.610	(0, 25)
	Retracted	**5.121**	**(0, 15)**
Right	Extended	0.942	(-20, -100)
	Retracted	0.306	(0, -15)
Left	Extended	0.086	(15, 20)
	Retracted	0.025	(-20, -100)
Top	Extended	0.113	(0, 0)
	Retracted	2.657	(-5, -5)

*** The location of the base of the antenna in the projected surface to the phantom surface was set as reference point (0, 0)**

4.6.2. Detailed SAR results with EUT relocated for maximum contact with phantom surface

Complete area Pre-scans on all faces of the EUT were conducted to determine the location of the highest SAR, which indicated that the hot spot is located at the base of antenna. The bottom part of the EUT was therefore not scanned in some of the final evaluation as all scans indicated very low emissions in this area.

EUT Configurations	Antenna Position	Frequency (MHz)	EUT Separation Distance to Phantom (mm)	SAR (W/kg)
Back side of EUT faced inward to the flat phantom	Retracted	813.5	0	5.121
	Retracted	813.5	15	0.042
	Retracted	813.5	2	1.697
	Retracted	813.5	4	0.611

4.6.3. The additional test configuration performed in order to ensure the compliance

EUT Configurations	Antenna Position	Frequency (MHz)	EUT Separation Distance to Phantom (mm)	SAR (W/kg)
Back side of EUT faced inward to the flat phantom	Retracted	806.0	4	0.492
	Retracted	813.5	4	0.611
	Retracted	**821.0**	**4**	**0.817**
Top of EUT faced inward to the flat phantom	Retracted	831.5	4	0.354

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 °/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 DUT. 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 where the ingredients will be mixed. A stirring paddle mounted to a drill press is used to stir the mixture. First we heat the DI water to about 40 ^{o}C to help the ingredients 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

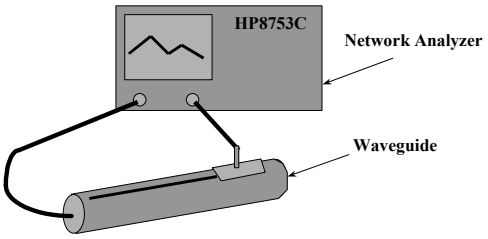
1) Network Analyzer HP8753C or others
2) Slotted Coaxial Waveguide

5.5.1. Description Of The Slotted Coaxial Waveguide

The cylindrical waveguide is constructed with copper tube of about 30 to 40 cm in 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 approximately two thirds of the tube length. The outer edge of the slotted tube is marked in increments of 1 centimeter (10 to 12), and 0.5 centimeter for 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 with the mixture, 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 resultant 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)

The distance from the center of the sensor (diode) to the end of the protective tube is called the '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

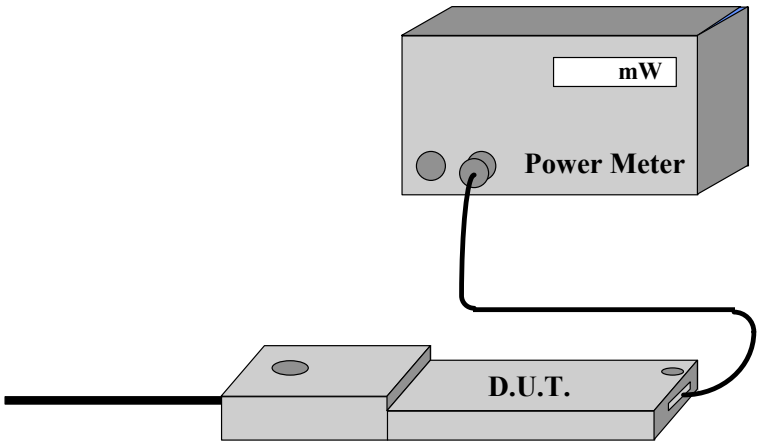
The voltage, (1 cm) above the phantoms surface (E_{tot} 1 cm), is needed to calculate the exposure over one gram of tissue. This SAR value that estimates the average over 1 gram of tissue, is obtained by taking the integral over 1 cm^2 surface of the measured field along the exponential decay curve of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

Whenever 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 at the time of testing. A difference in output power would determine a need for battery replacement and to repeat the SAR test.



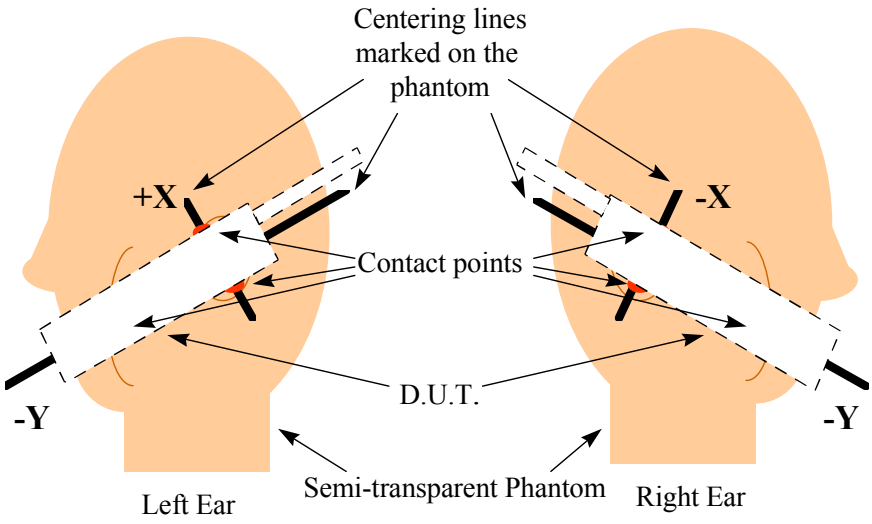
Measured Power + Cable and Switching Mechanism Loss

5.10. POSITIONING OF D.U.T.

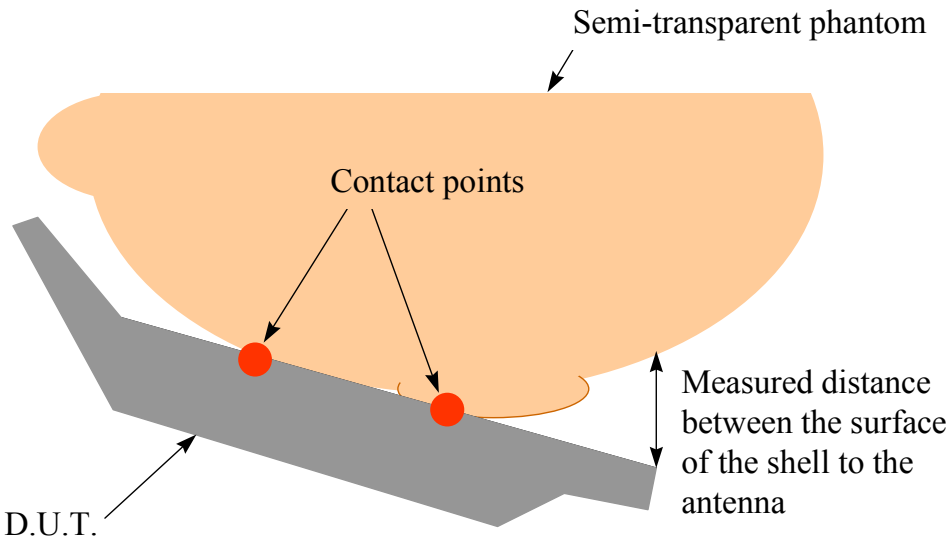
The clear fiberglass phantom shell have been previously marked with a highly visible line, so it can easily be seen through the liquid simulated tissue. In the case of testing a cellular phone, this line is connecting the ear channel with the corner of the lips. The D.U.T. is then placed by centering 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 D.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 D.U.T. will be positioned as suggested by manufacturer operational manuals.

Positioning of the D.U.T.



Side View


Semi-transparent phantom
Contact points
Measured distance between the surface of the shell to the antenna
D.U.T.

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, may 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%

EXHIBIT 6. BODY WORN CONFIGURATION INFORMATION

FCC OET 65 Supplement C Requirements

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. Devices with a headset output should be tested with a headset connected to the device. The EUT was placed against the phantom and tested in its appropriate holster as would normally be used by the end user. If the SAR measured at the middle channel for each test is at least 2.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

If the transmission band of the test device is less than 10 MHz, testing at the high and low frequency channels is optional

When multiple accessories that do not contain metallic components are supplied with the device, the device may be tested with only the accessory that dictates the closest spacing to the body. When multiple accessories that contain metallic components are supplied with the device, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component (e.g., the same metallic belt-clip used with different holsters with no other metallic components), only the accessory that dictates the closest spacing to the body must be tested.

Body-worn accessories may not always be supplied or available as options for some devices that are intended to be authorized for body-worn use. **A separation distance of 1.5 cm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances**. Other separation distances may be used, but they should not exceed 2.5 cm. In these cases, the device may use body-worn accessories that provide a separation distance greater than that tested for the device provided however that the accessory contains no metallic components..

Equipment permutation investigated for each orientation

The manufacturer does not include a body-mounting device for this device and it is not intended to be used as a body worn device. An investigation for bystander SAR effects were carried out using the body worn requirements as a guideline. As such, a preliminary scan on all faces of the EUT were carried out to determine the potential hot spot locations. A more detailed investigation into the peak spatial SAR was carried out on two faces of the EUT that demonstrated the hottest spots and this was determined to be at the base of antenna. The separation distance to the phantom was varied to determine at what separation distance the device would safely meet the 1.6 W/Kg requirements for general population use for body worn devices.

All tests were carried out using 25% duty cycle which the worst case duty cycle as limited on the network the radio modem is designed to be used in.

Comments on non-tested configurations

Head positions were not investigated as this is considered abnormal use. No other configurations considered abnormal use, were investigated.

Recommended Caution Statements to be included in Users Manual

In order for users to be aware of the body-worn operating requirements for meeting RF exposure compliance, operating instructions and caution statements should be included in the manual. The information should allow users to make informed decisions on the type of body-worn accessories and operating configurations that are appropriate for the device. The following are *examples* of typical statements that provide end-users with the necessary information about body-worn accessories:

1. For a product that has the potential to be used in a body worn configuration and has been tested and certified with a specific accessory device(s):

> "For body worn operation, this device has been tested and meets the FCC RF exposure guidelines when used with the (*manufacturer name*) accessories supplied or designated for this product. Use of other accessories may not ensure compliance with FCC RF exposure guidelines. "

2. For a product that has the potential to be used in a body worn configuration and has not been certified with a specific accessory device(s):

> **"For body worn operation, this device has been tested and meets FCC RF exposure guidelines when used with an accessory that contains no metal and that positions the device a minimum of 4 mm from the body. Use of other accessories may not ensure compliance with FCC RF exposure guidelines."**

3. For a product that has the potential to be used in a body worn configuration with future manufacturer designed accessories:

> "For body worn operation, this device has been tested and meets the FCC RF exposure guidelines when used with a (*manufacturer name*) accessory designated for this product or when used with an accessory that contains no metal and that positions the handset a minimum of (specified distance) from the body."

EXHIBIT 7. PRESCAN TO DETERMINE THE WORST CASE TEST CONFIGURATION

The EUT were pre-scanned to determined location of the hot spot locations where the highest SAR would be located. The pre-scans were conducted on the flat phantom and the EUT was operating at 813.0 MHz. Pre-scans were performed in the following configurations:

01. Front side of EUT in contact and faced to the phantom and the antenna fully extracted
02. Front side of EUT in contact and faced to the phantom and the antenna fully retracted
03. Back side of EUT in contact and faced to the phantom and the antenna fully extracted
04. Back side of EUT in contact and faced to the phantom and the antenna fully retracted
05. Right side of EUT in contact and faced to the phantom and the antenna fully extracted
06. Right side of EUT in contact and faced to the phantom and the antenna fully retracted
07. Left side of EUT in contact and faced to the phantom and the antenna fully extracted
08. Left side of EUT in contact and faced to the phantom and the antenna fully retracted
09. Top of EUT in contact and faced to the phantom with and antenna fully extracted
10. Top of EUT in contact and faced to the phantom with and antenna fully retracted

Complete area Pre-scans on all primary faces of the EUT were conducted to determine the location of the highest SAR, which indicated that the hot spot is located at the base of antenna. The bottom part of the EUT was therefore not scanned in some of the final evaluation as all scans indicated very low emissions in this area.

The following test data results in their respective order indicates that test configuration # 04 is the worst-case, complete test will be performed in those configurations.

EUT face scanned	Antenna Position	Peak spatial-average SAR over 1g volume (W/Kg)	Relative location of hot spot to the reference point (mm)*
Front	Extended	0.033	(0, 25)
	Retracted	0.000	(-30, -190)
Back	Extended	1.610	(0, 25)
	Retracted	**5.121**	**(0, 15)**
Right	Extended	0.942	(-20, -100)
	Retracted	0.306	(0, -15)
Left	Extended	0.086	(15, 20)
	Retracted	0.025	(-20, -100)
Top	Extended	0.113	(0, 0)
	Retracted	2.657	(-5, -5)

*** The location of the base of the antenna in the projected surface to the phantom was set as reference point (0, 0)**

EXHIBIT 8. BODY-WORN SAR MEASUREMENTS

Final evaluations for determine the maximum peak spatial-average SAR over 1g volume were performed in the following configurations:

- body-worn position
- the back side of EUT faced inward to the flat phantom
- the antenna fully retracted
- 25 % duty cycle (64 ms : 196 ms)
- at 813.5 MHz

Complete area Pre-scans on all faces of the EUT were conducted to determine the location of the highest SAR, which indicated that the hot spot is located at the base of antenna. The bottom part of the EUT was therefore not scanned in some of the final evaluation as all scans indicated very low emissions in this area.

Detailed SAR results with EUT relocated for maximum contact with phantom surface

EUT Configurations	Antenna Position	Frequency (MHz)	EUT Separation Distance to Phantom (mm)	SAR (W/kg)
Back side of EUT faced inward to the flat phantom	Retracted	813.5	0	5.121
	Retracted	813.5	15	0.042
	Retracted	813.5	2	1.697
	Retracted	813.5	4	0.611

The additional test configuration performed in order to ensure the compliance

EUT Configurations	Antenna Position	Frequency (MHz)	EUT Separation Distance to Phantom (mm)	SAR (W/kg)
Back side of EUT faced inward to the flat phantom	Retracted	806.0	4	0.492
	Retracted	813.5	4	0.611
	Retracted	**821.0**	**4**	**0.817**
Top of EUT faced inward to the flat phantom	Retracted	831.5	4	0.354

Test Information

Date : 08/11/2001
Time : 10:49:13 AM

Product	: Mobile Payment Terminal	**Test**	: SAR
Manufacturer	: KEYCORP LIMITED	**Frequency (MHz)**	: 813.5
Model Number	: K78-204 or LP9100	**Nominal Output Power (W)**	: 2.0
Serial Number	: N/A	**Antenna Type**	: Monopole
FCC ID Number	: P3AK78-2XX	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 56.3
Simulated Tissue	: Muscle	**Conductivity**	: 0.97

Probe	: UT-ETR-0200-1	**Antenna Position**	: Retracted
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 32.9
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.691	**Cable Insertion Loss (dB)**	: 0
Calibrated Date	: 25/10/2001	**Compensated Power (dBm)**	: 32.9

Amplifier Setting :

Channel 1 : 0.0062 Channel 2 : 0.0059 Channel 3 : 0.0072

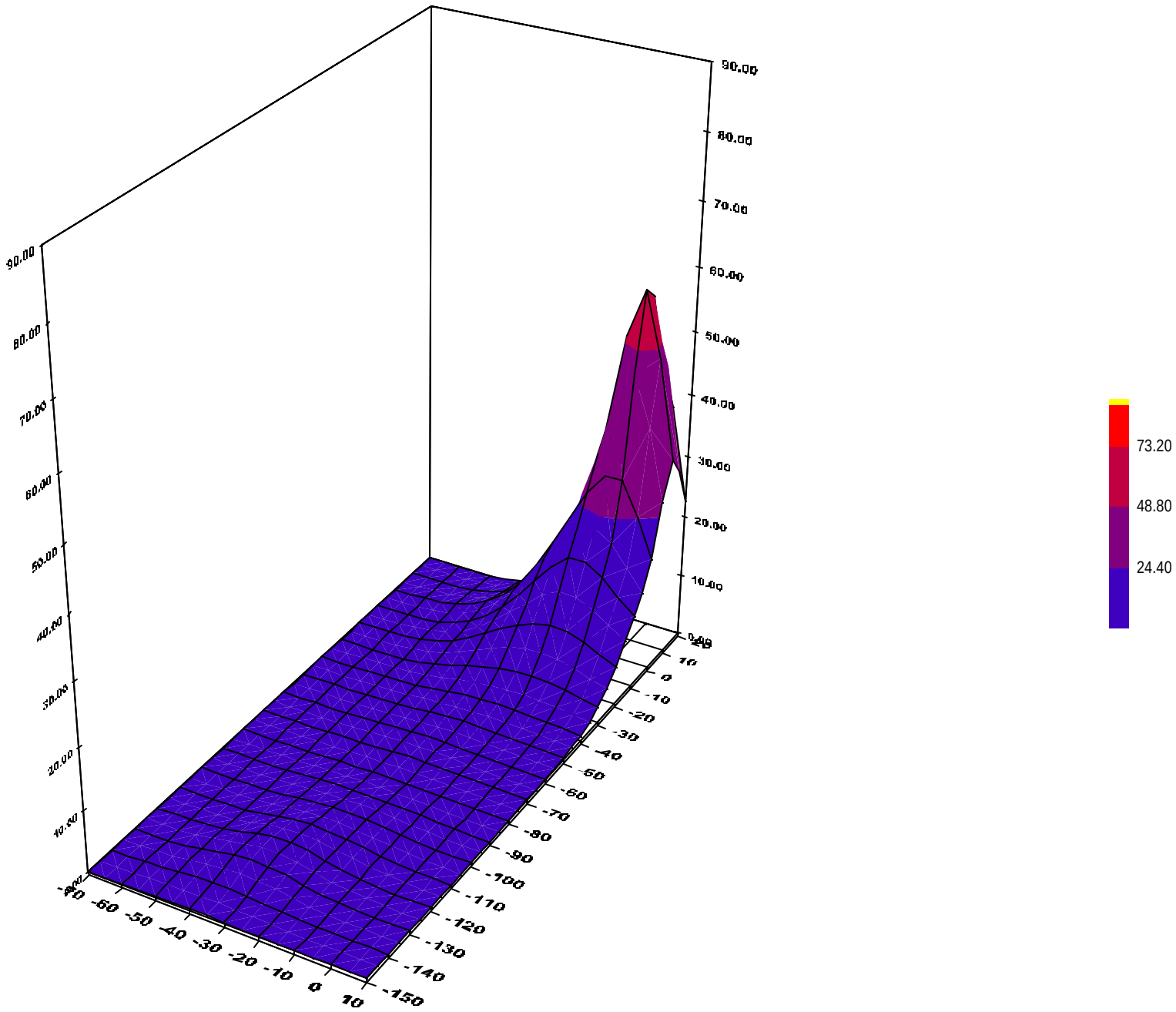
Location of Maximum Field :

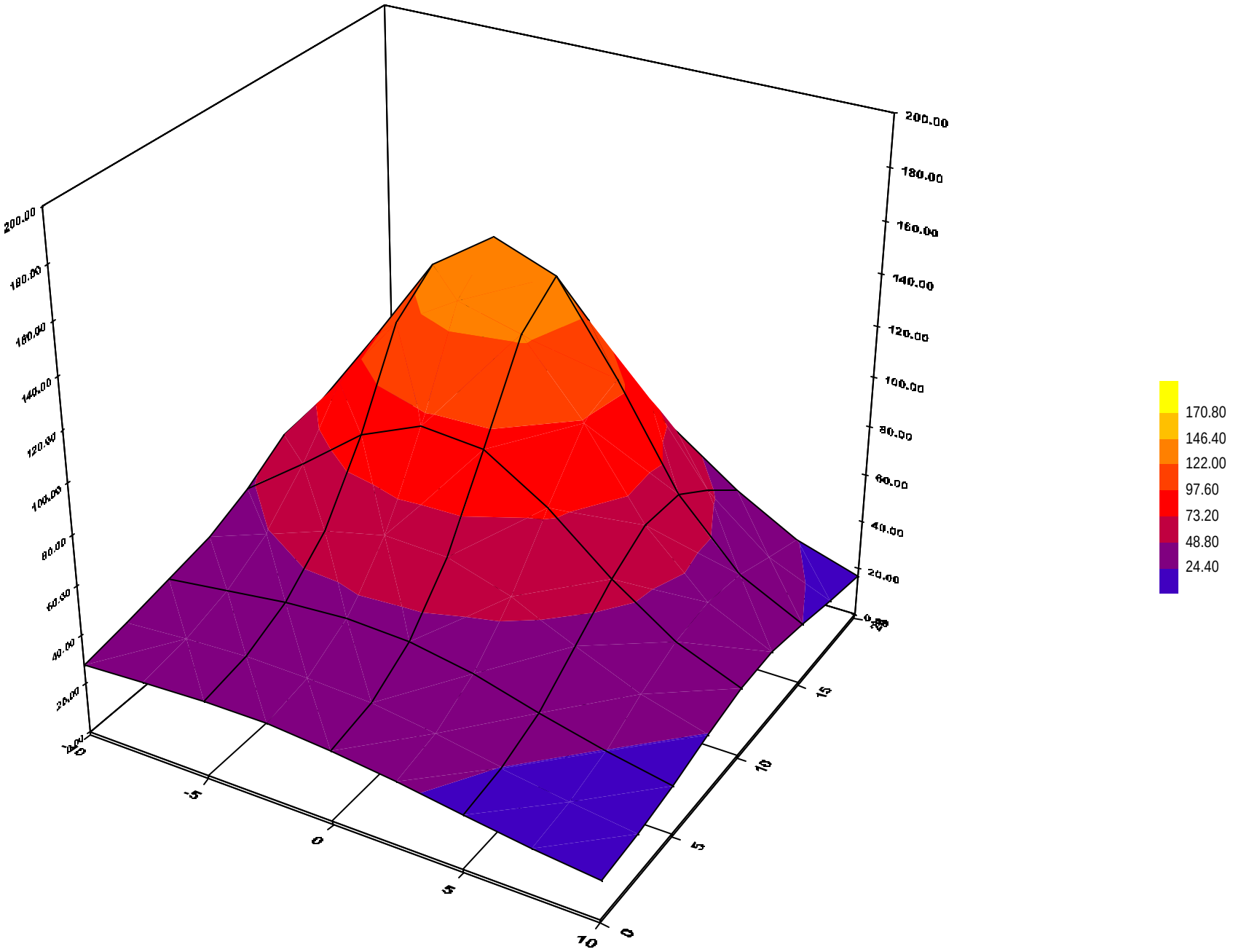
X = 0 Y = 15

Measured Values (mV) :

210.635	207.507	181.709	149.118	121.735	93.654
80.005	63.851	54.413	43.112	36.367	

Peak Voltage (mV) : 295.174 **1 Cm Voltage (mV)** : 65.079 **SAR (W/Kg)** : 5.121


90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
-60
-50
-40
-30
-20
-10
0
10
-150
73.20
48.80
24.40


200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
-10
-5
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0
5
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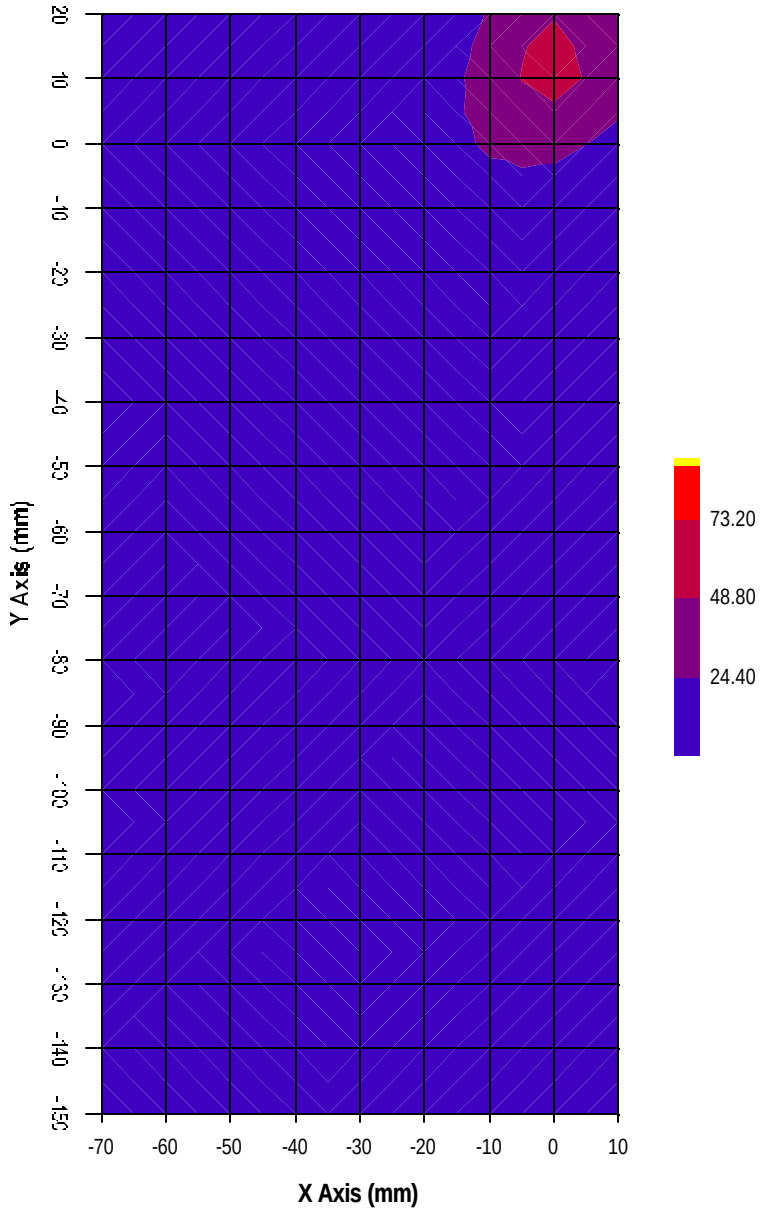
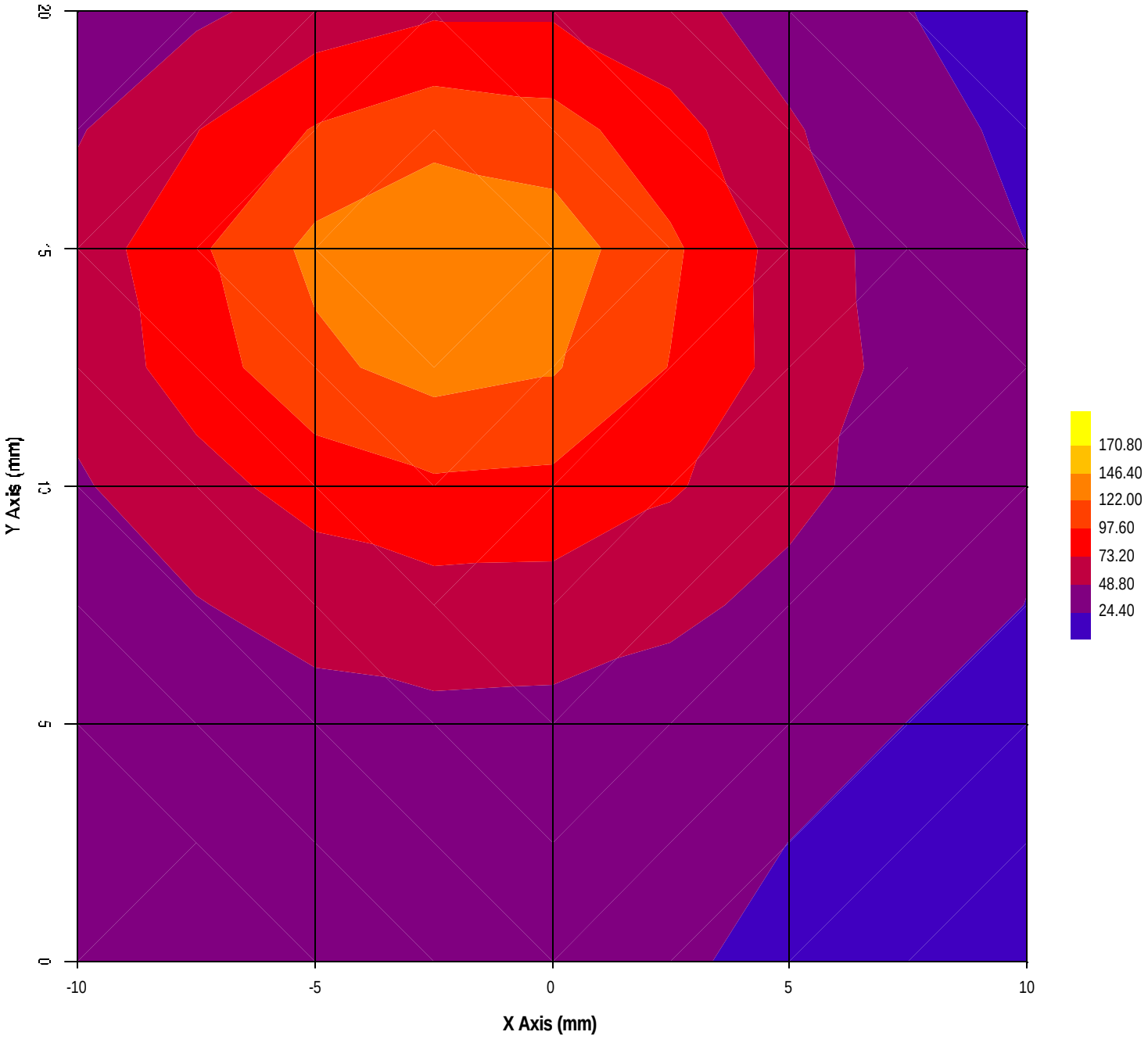
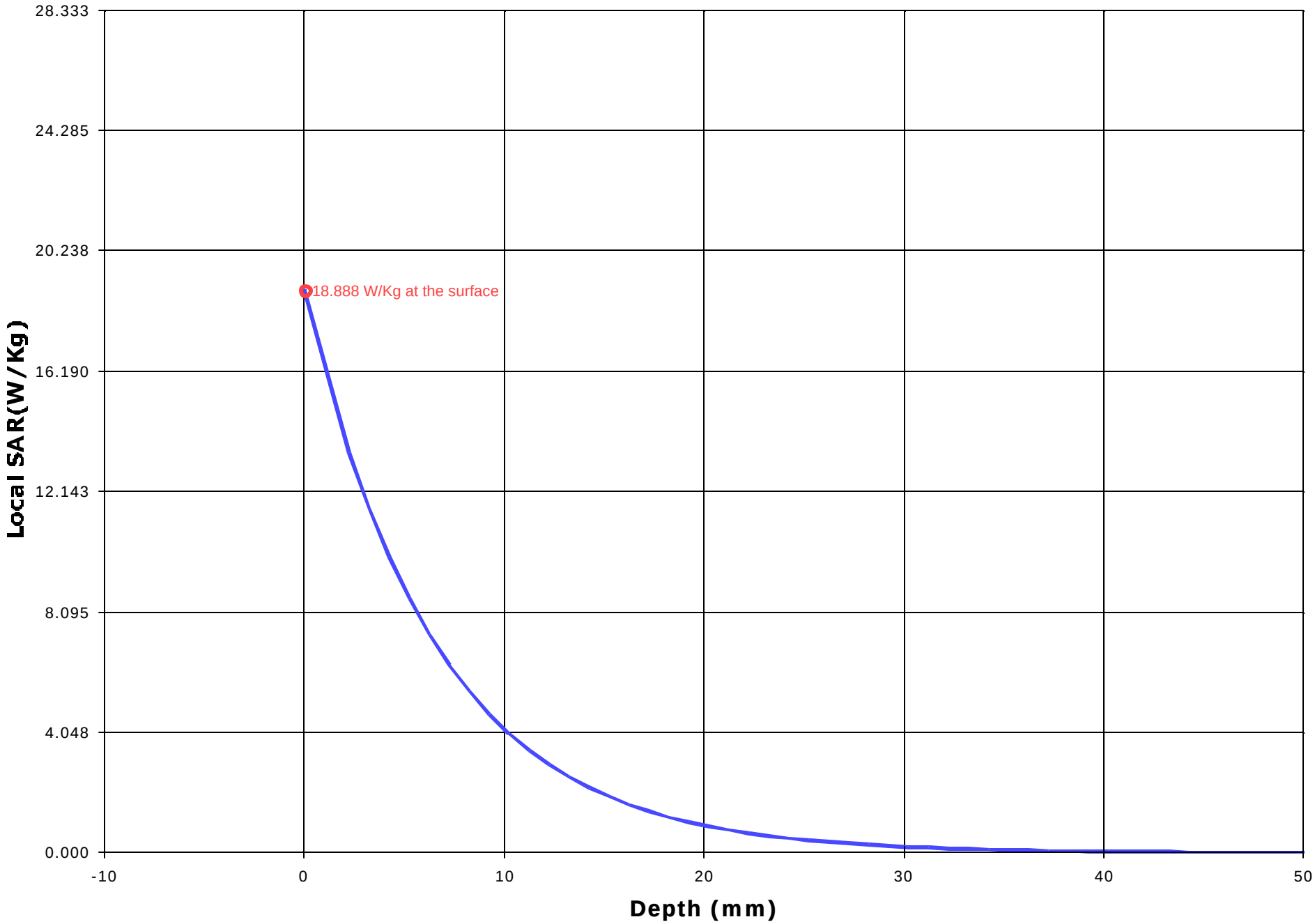
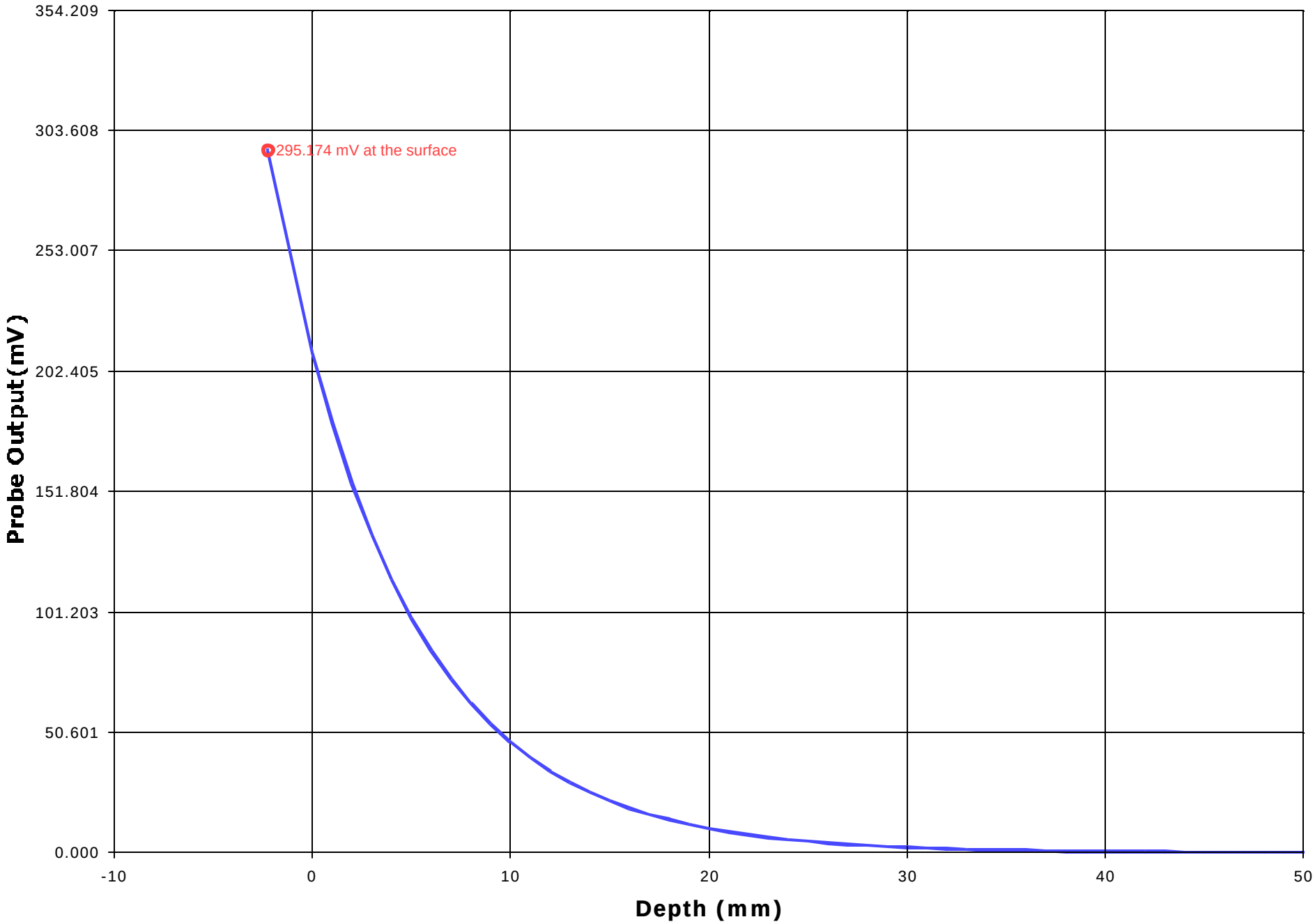
146.40
122.00
97.60
73.20
48.80
24.40


Y Axis (mm)
20
10
0
-10
-23
-30
-40
-53
-60
-70
-83
-90
-100
-113
-120
-133
-140
-150
-70
-60
-50
-40
-30
-20
-10
0
10
X Axis (mm)
73.20
48.80
24.40


20
15
10
5
0
Y Axis (mm)
-10
-5
0
5
10
X Axis (mm)
170.80
146.40
122.00
97.60
73.20
48.80
24.40


28.333
24.285
20.238
16.190
12.143
8.095
4.048
0.000
Local SAR(W/Kg)
18.888 W/Kg at the surface
-10
0
10
20
30
40
50
Depth (mm)


354.209
303.608
253.007
202.405
151.804
101.203
50.601
0.000
Probe Output (mV)
295.174 mV at the surface
-10
0
10
20
30
40
50
Depth (mm)

Test Information

Date : 08/11/2001
Time : 11:10:39 AM

Product	: Mobile Payment Terminal	**Test**	: SAR
Manufacturer	: KEYCORP LIMITED	**Frequency (MHz)**	: 813.5
Model Number	: K78-204 or LP9100	**Nominal Output Power (W)**	: 2.0
Serial Number	: N/A	**Antenna Type**	: Monopole
FCC ID Number	: P3AK78-2XX	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 56.3
Simulated Tissue	: Muscle	**Conductivity**	: 0.97

Probe	: UT-ETR-0200-1	**Antenna Position**	: Retracted
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 32.9
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.691	**Cable Insertion Loss (dB)**	: 0
Calibrated Date	: 25/10/2001	**Compensated Power (dBm)**	: 32.9

Amplifier Setting :

Channel 1 : 0.0062 Channel 2 : 0.0059 Channel 3 : 0.0072

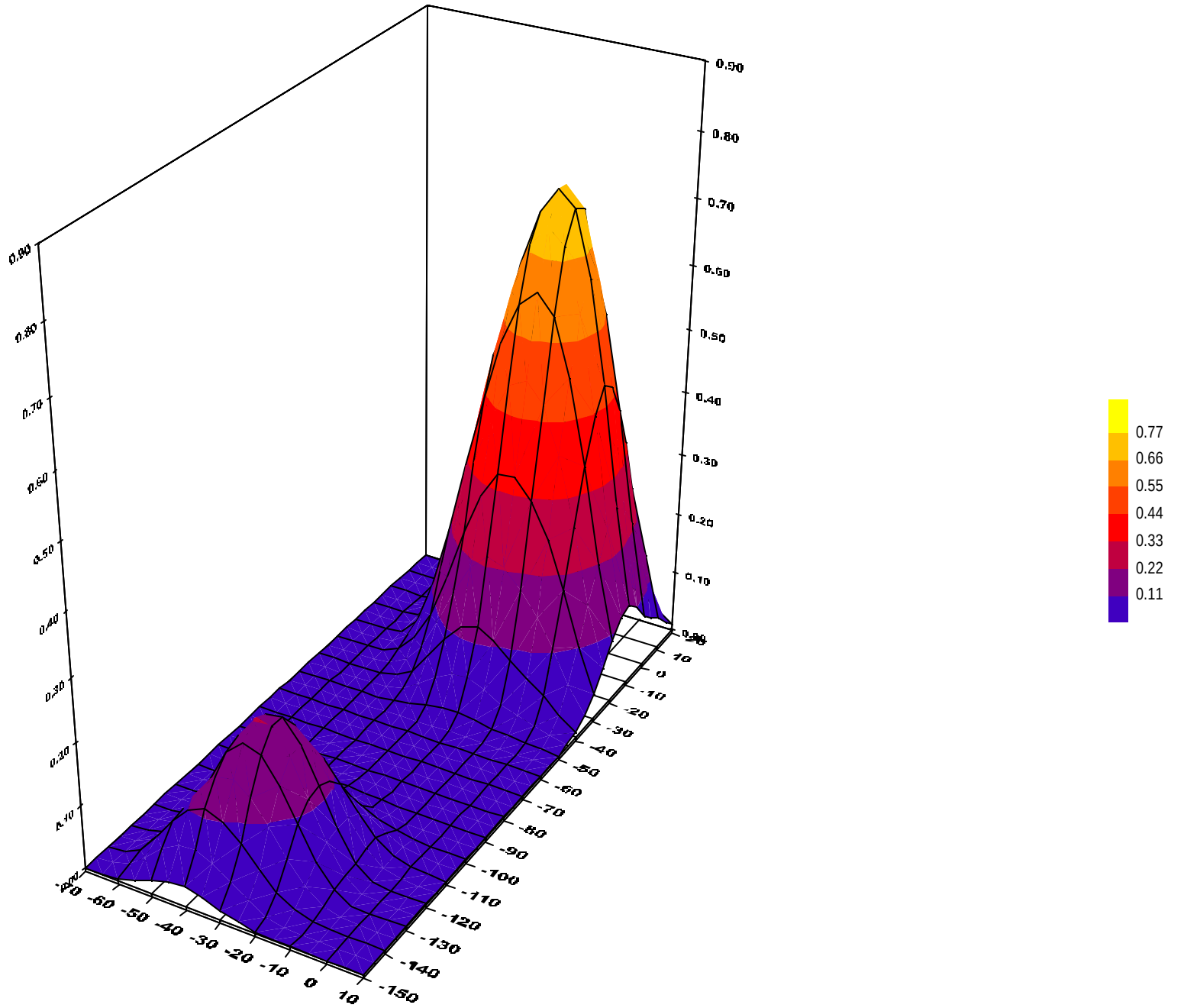
Location of Maximum Field :

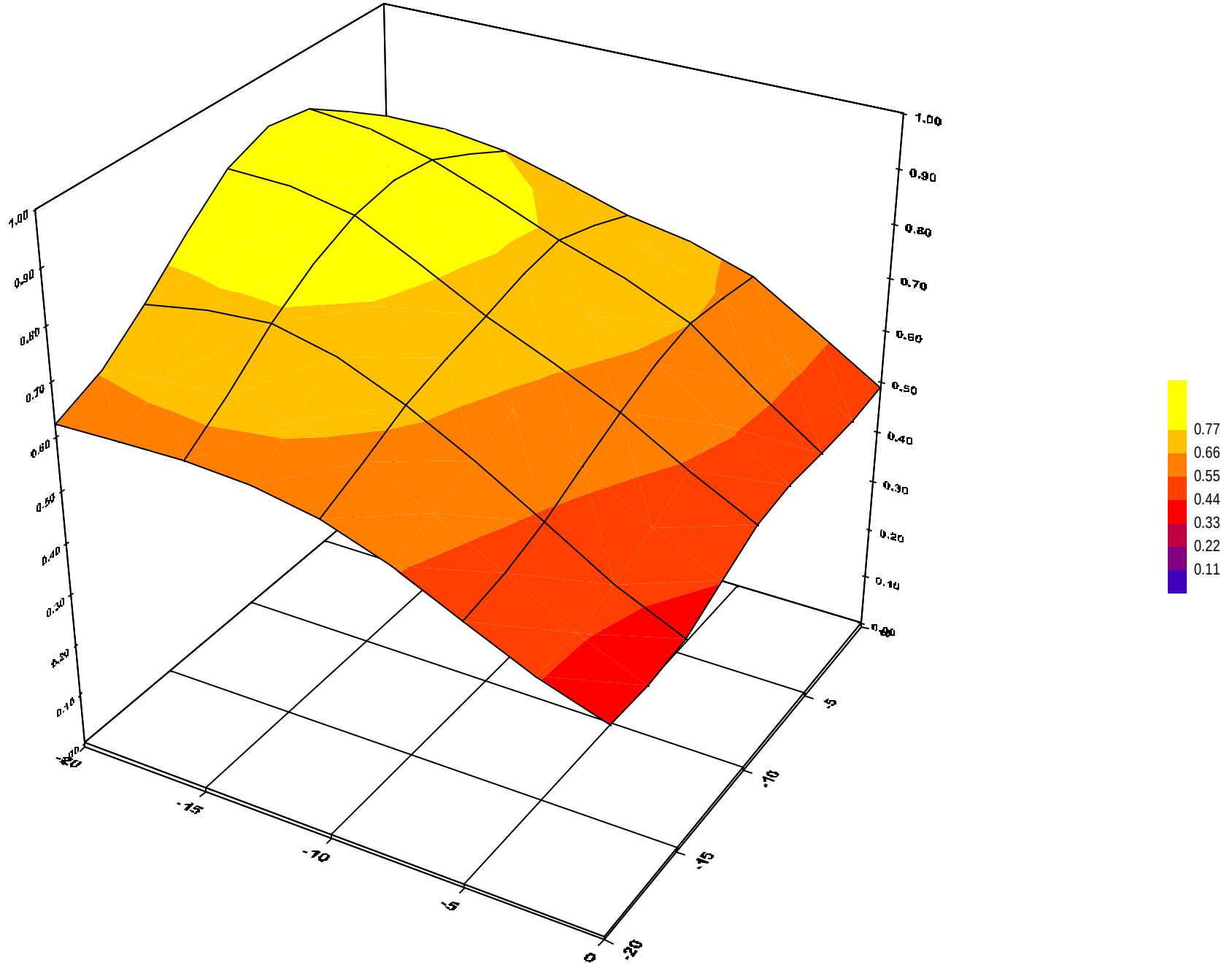
X = -20 Y = -5

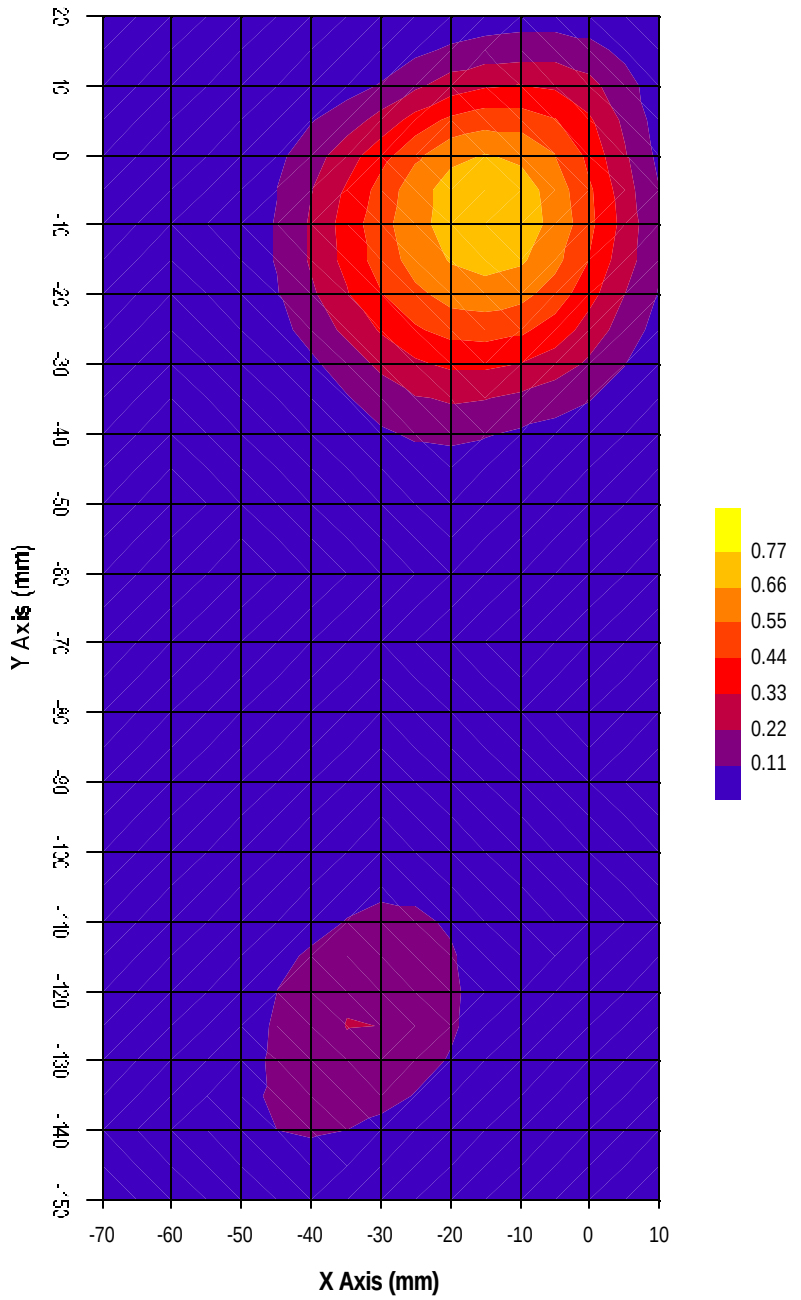
Measured Values (mV) :

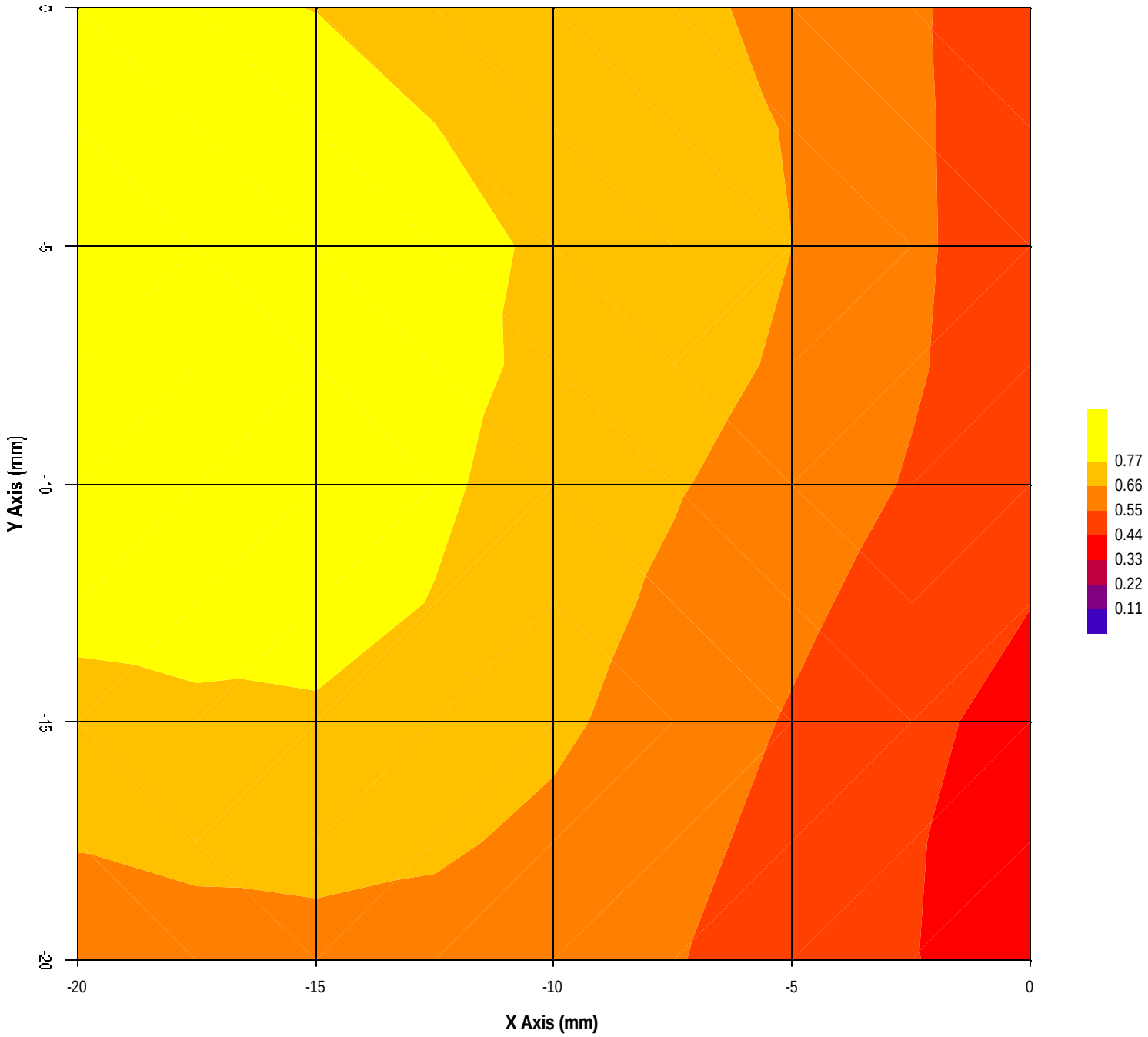
0.775	0.779	0.746	0.673	0.596	0.579
0.466	0.431	0.407	0.384	0.289	

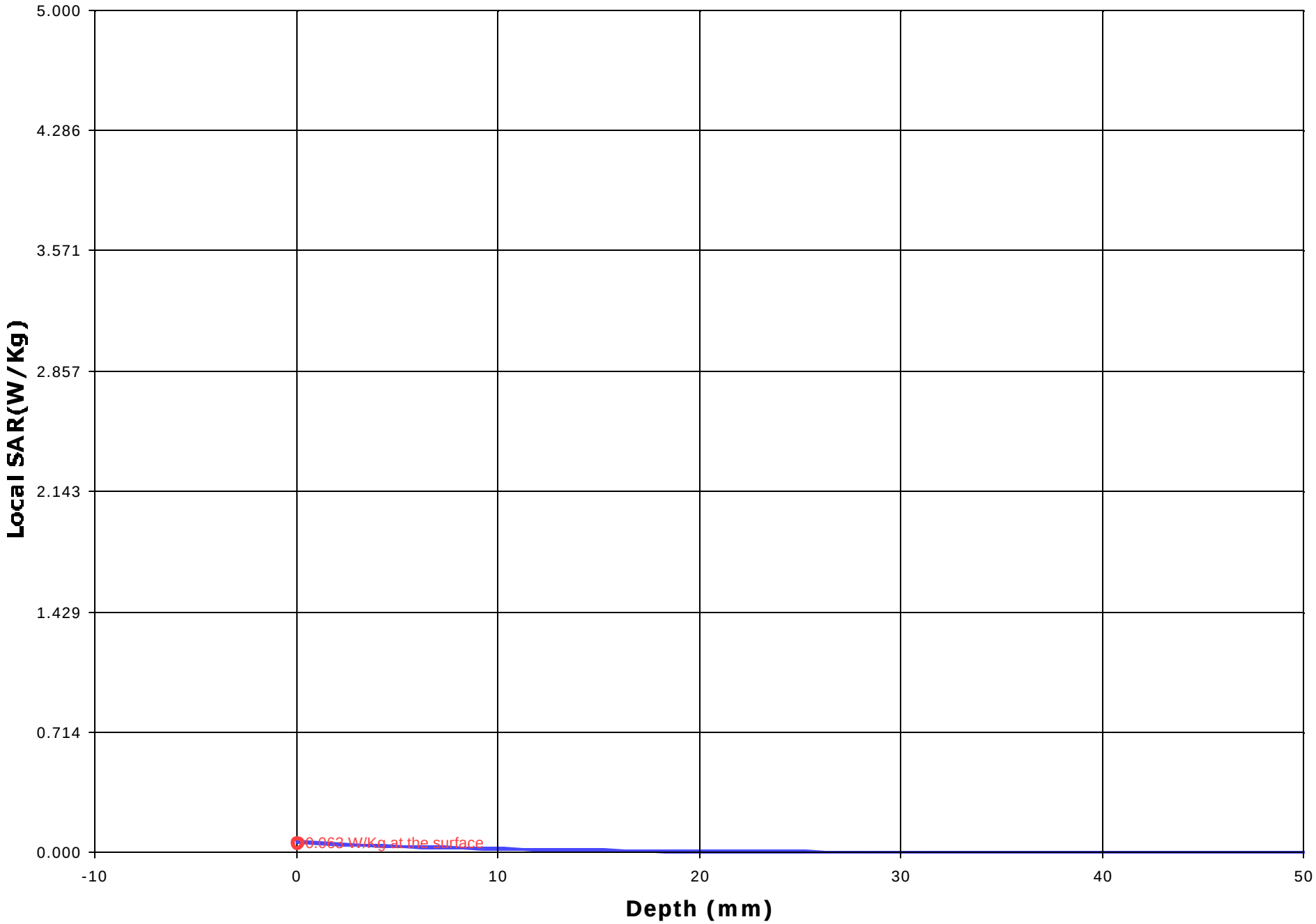
Peak Voltage (mV) : 0.977 **1 Cm Voltage (mV)** : 0.347 **SAR (W/Kg)** : 0.042

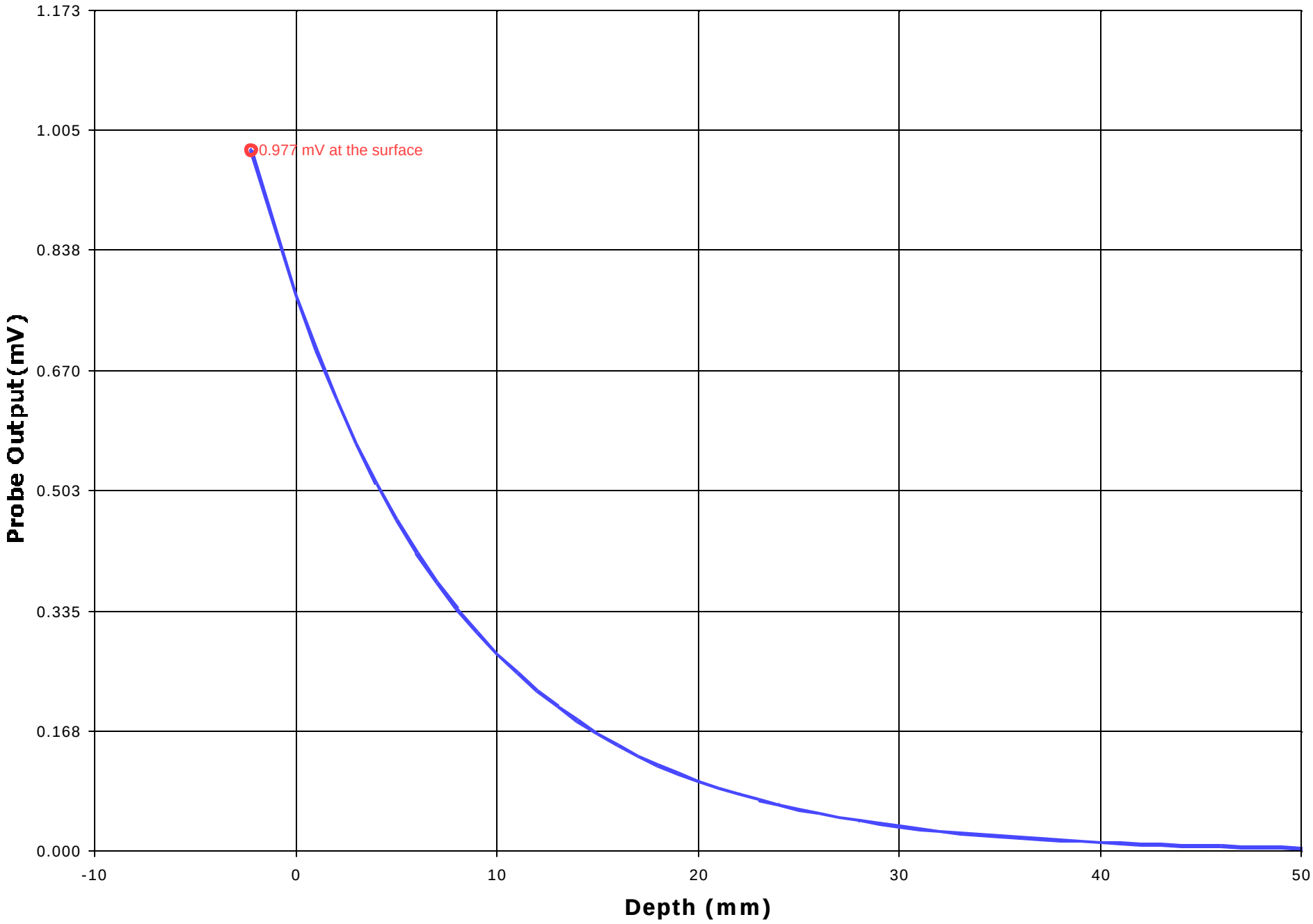

0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
-70 -60 -50 -40 -30 -20 -10 0 10
0.50
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150
0.77
0.66
0.55
0.44
0.33
0.22
0.11


1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-20
-15
-10
-5
0
5
10
15
20
0.77
0.66
0.55
0.44
0.33
0.22
0.11


Y Axis (mm)
X Axis (mm)
-70
-60
-50
-40
-30
-20
-10
0
10
0.77
0.66
0.55
0.44
0.33
0.22
0.11


Y Axis (mm)
-20
-15
-10
-5
0
X Axis (mm)
0.77
0.66
0.55
0.44
0.33
0.22
0.11


5.000
4.286
3.571
2.857
2.143
1.429
0.714
0.000
Local SAR(W/Kg)
-10
0
10
20
30
40
50
Depth (mm)
0.063 W/Kg at the surface


1.173
1.005
0.838
0.670
0.503
0.335
0.168
0.000
Probe Output (mV)
0.977 mV at the surface
-10
0
10
20
30
40
50
Depth (mm)

Test Information

Date : 08/11/2001
Time : 11:20:09 AM

Product	: Mobile Payment Terminal	**Test**	: SAR
Manufacturer	: KEYCORP LIMITED	**Frequency (MHz)**	: 813.5
Model Number	: K78-204 or LP9100	**Nominal Output Power (W)**	: 2.0
Serial Number	: N/A	**Antenna Type**	: Monopole
FCC ID Number	: P3AK78-2XX	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 56.3
Simulated Tissue	: Muscle	**Conductivity**	: 0.97

Probe	: UT-ETR-0200-1	**Antenna Position**	: Retracted
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 32.9
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.691	**Cable Insertion Loss (dB)**	: 0
Calibrated Date	: 25/10/2001	**Compensated Power (dBm)**	: 323.9

Amplifier Setting :

Channel 1 : 0.0062 Channel 2 : 0.0059 Channel 3 : 0.0072

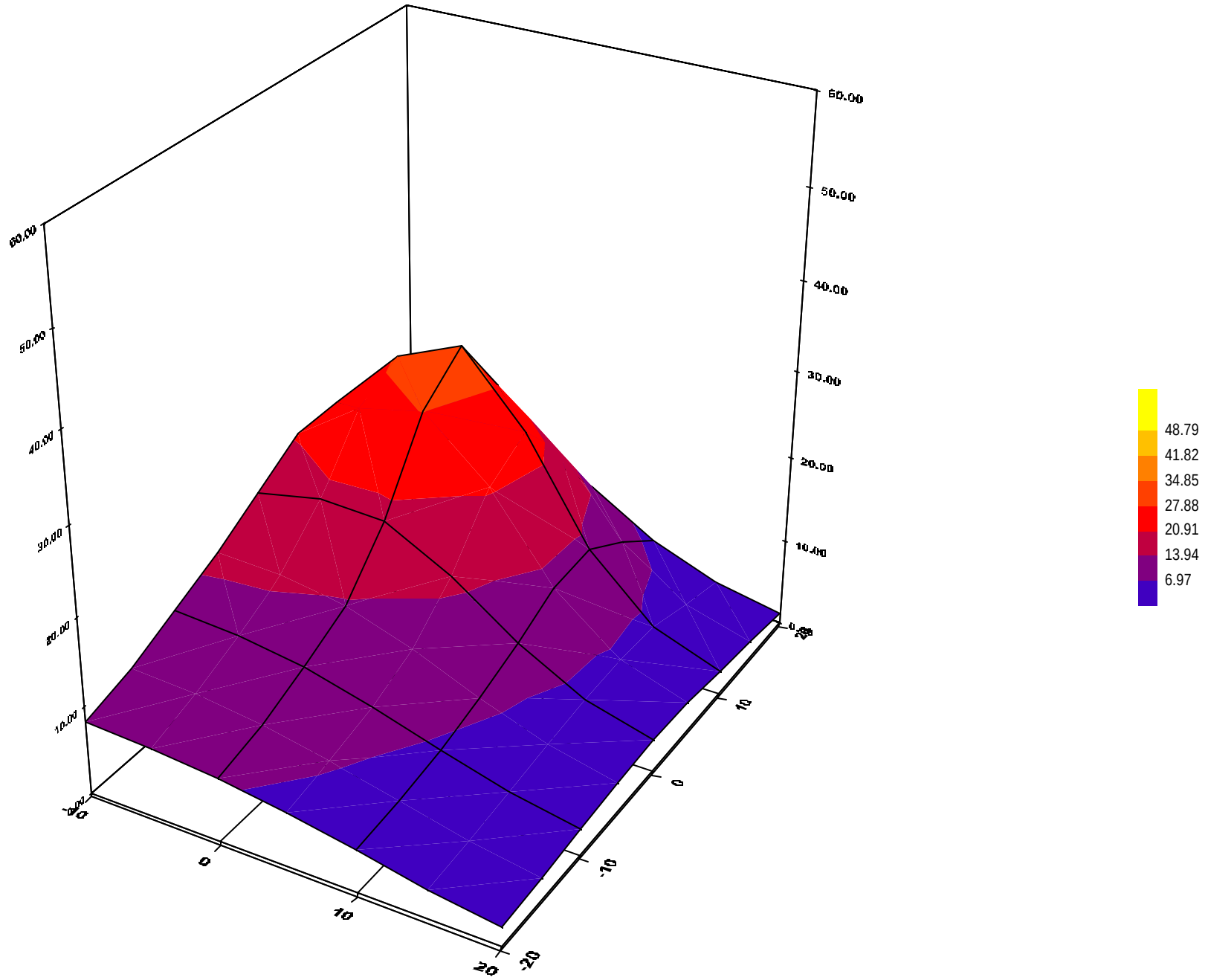
Location of Maximum Field :

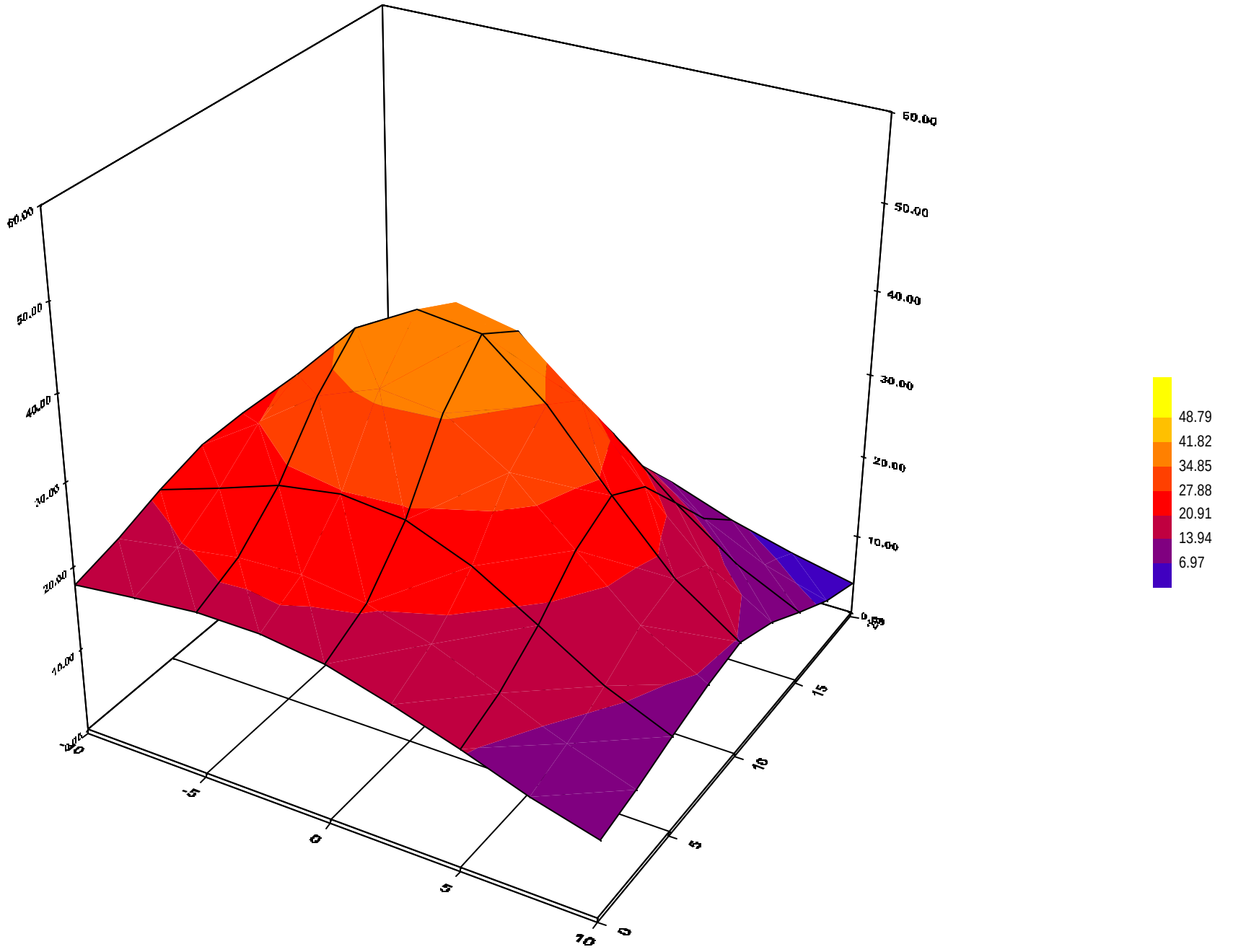
X = 0 Y = 10

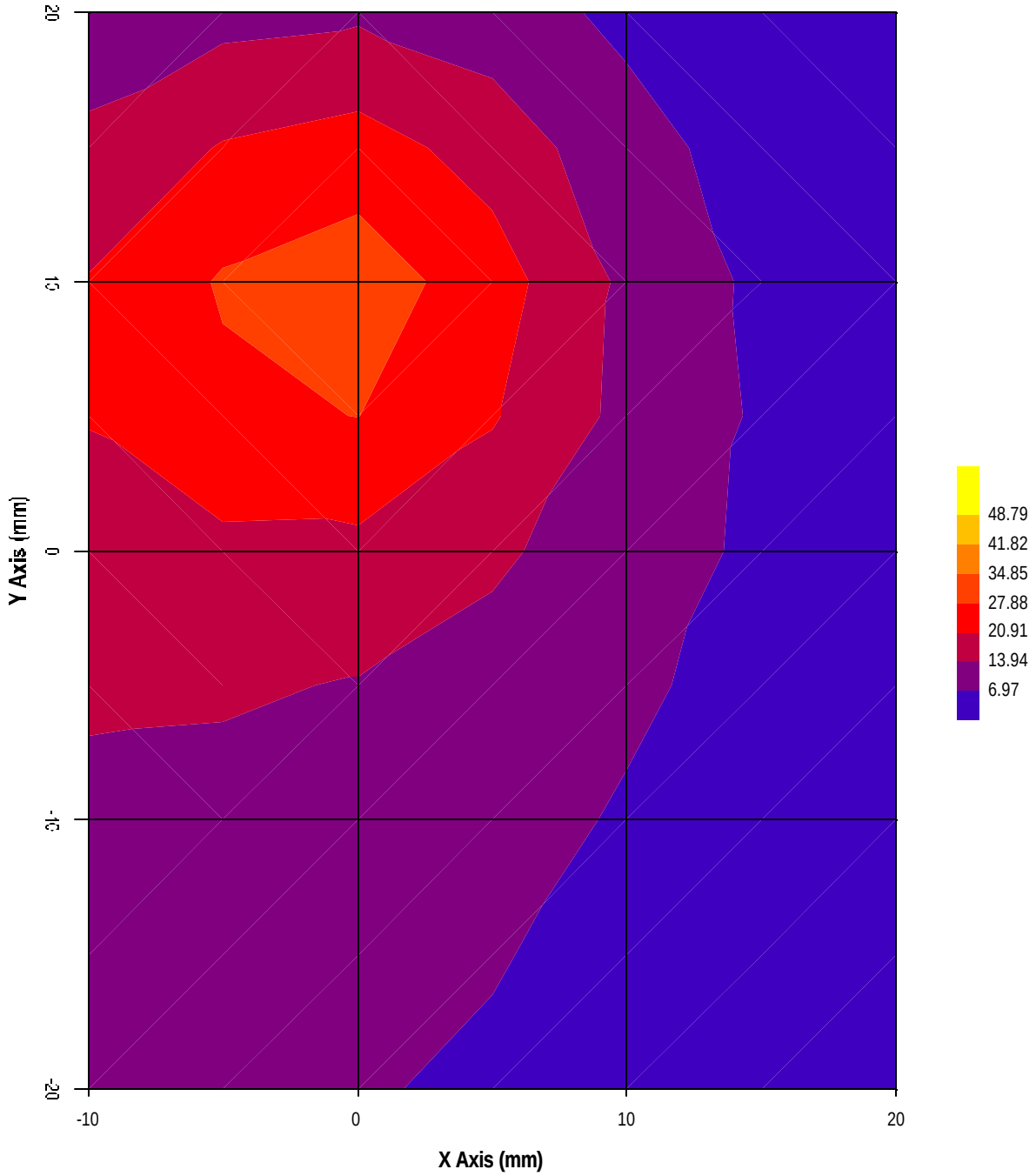
Measured Values (mV) :

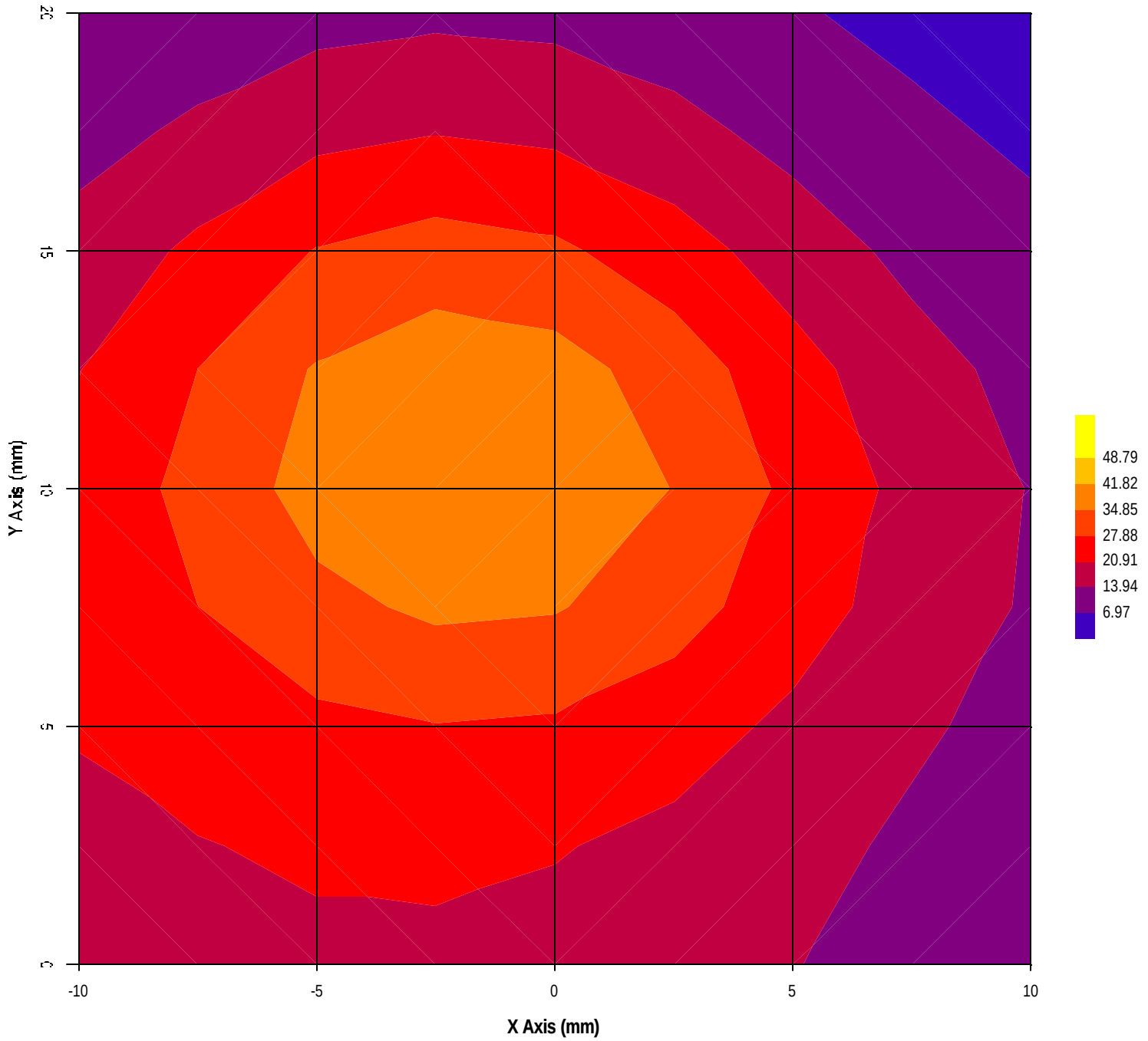
48.855	48.418	41.802	36.924	30.226	25.767
22.146	17.870	14.993	12.221	10.890	

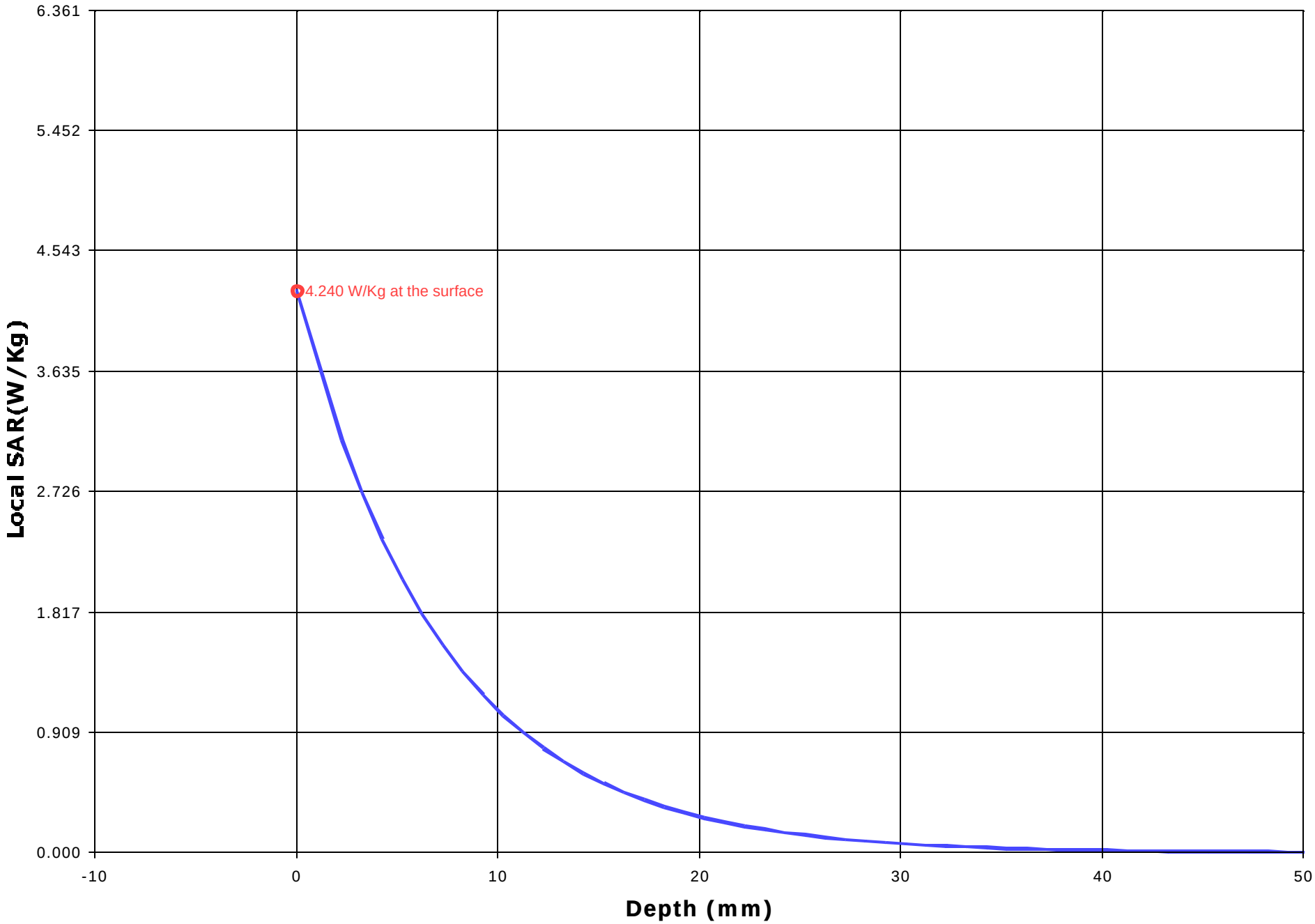
Peak Voltage (mV) : 66.266 **1 Cm Voltage (mV)** : 16.782 **SAR (W/Kg)** : 1.697

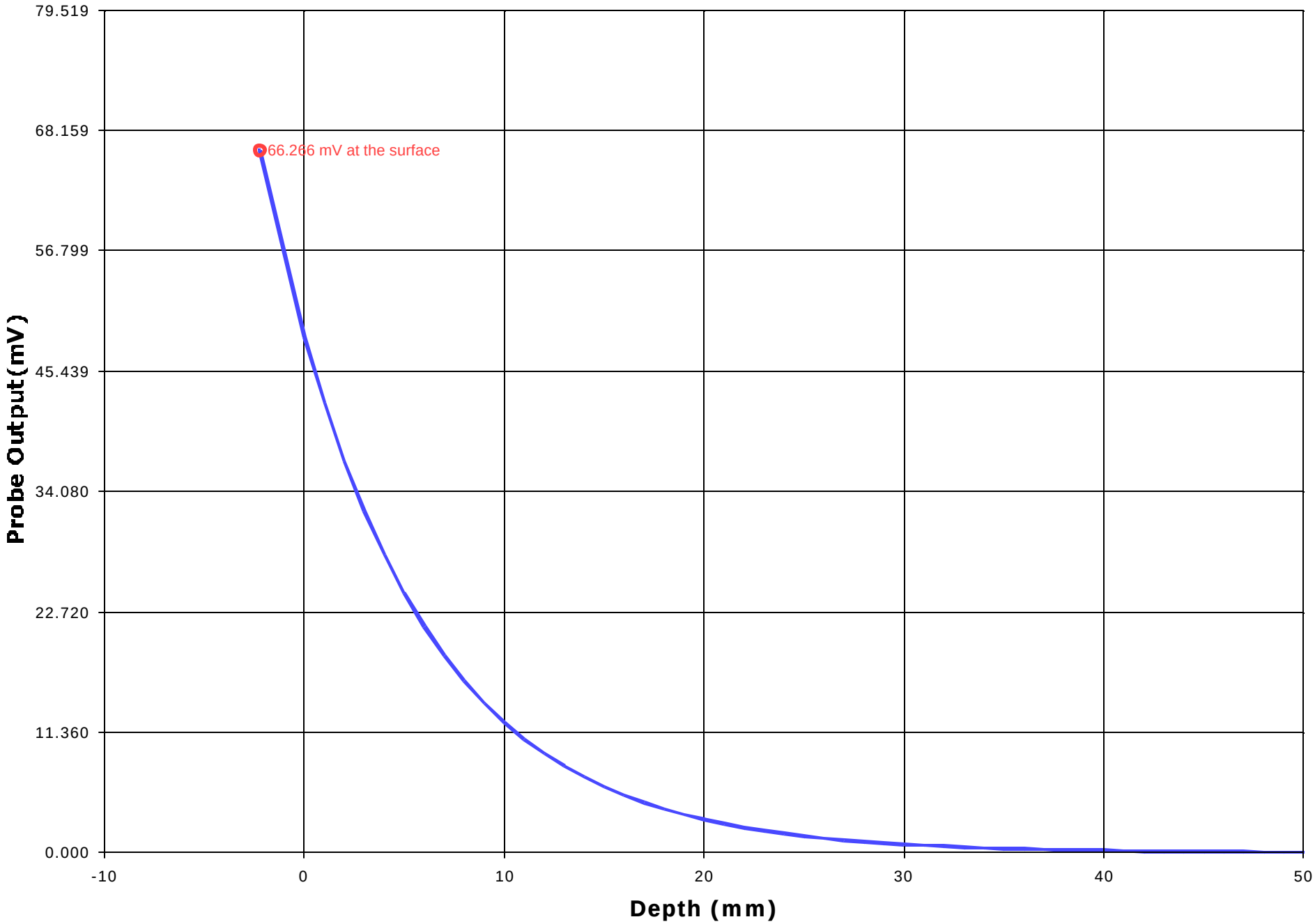

60.00
50.00
40.00
30.00
20.00
10.00
48.79
41.82
34.85
27.88
20.91
13.94
6.97


60.00
50.00
40.00
30.00
20.00
10.00
0.00
50.00
40.00
30.00
20.00
10.00
0.00
-10
-5
0
5
10
0
5
10
15
48.79
41.82
34.85
27.88
20.91
13.94
6.97


Y Axis (mm)
20
10
0
-10
-20
-10
0
10
20
X Axis (mm)
48.79
41.82
34.85
27.88
20.91
13.94
6.97


Y Axis (mm)
X Axis (mm)
-10
-5
0
5
10
48.79
41.82
34.85
27.88
20.91
13.94
6.97


6.361
5.452
4.543
3.635
2.726
1.817
0.909
0.000
Local SAR(W/Kg)
4.240 W/Kg at the surface
-10
0
10
20
30
40
50
Depth (mm)


79.519
68.159
56.799
45.439
34.080
22.720
11.360
0.000
Probe Output (mV)
66.266 mV at the surface
-10
0
10
20
30
40
50
Depth (mm)

Test Information

Date : 08/11/2001
Time : 11:50:03 AM

Product	: Mobile Payment Terminal	**Test**	: SAR
Manufacturer	: KEYCORP LIMITED	**Frequency (MHz)**	: 813.5
Model Number	: K78-204 or LP9100	**Nominal Output Power (W)**	: 2.0
Serial Number	: N/A	**Antenna Type**	: Monopole
FCC ID Number	: P3AK78-2XX	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 56.3
Simulated Tissue	: Muscle	**Conductivity**	: 0.97

Probe	: UT-ETR-0200-1	**Antenna Position**	: Retracted
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 32.9
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.691	**Cable Insertion Loss (dB)**	: 0
Calibrated Date	: 25/10/2001	**Compensated Power (dBm)**	: 32.9

Amplifier Setting :

Channel 1 : 0.0062 Channel 2 : 0.0059 Channel 3 : 0.0072

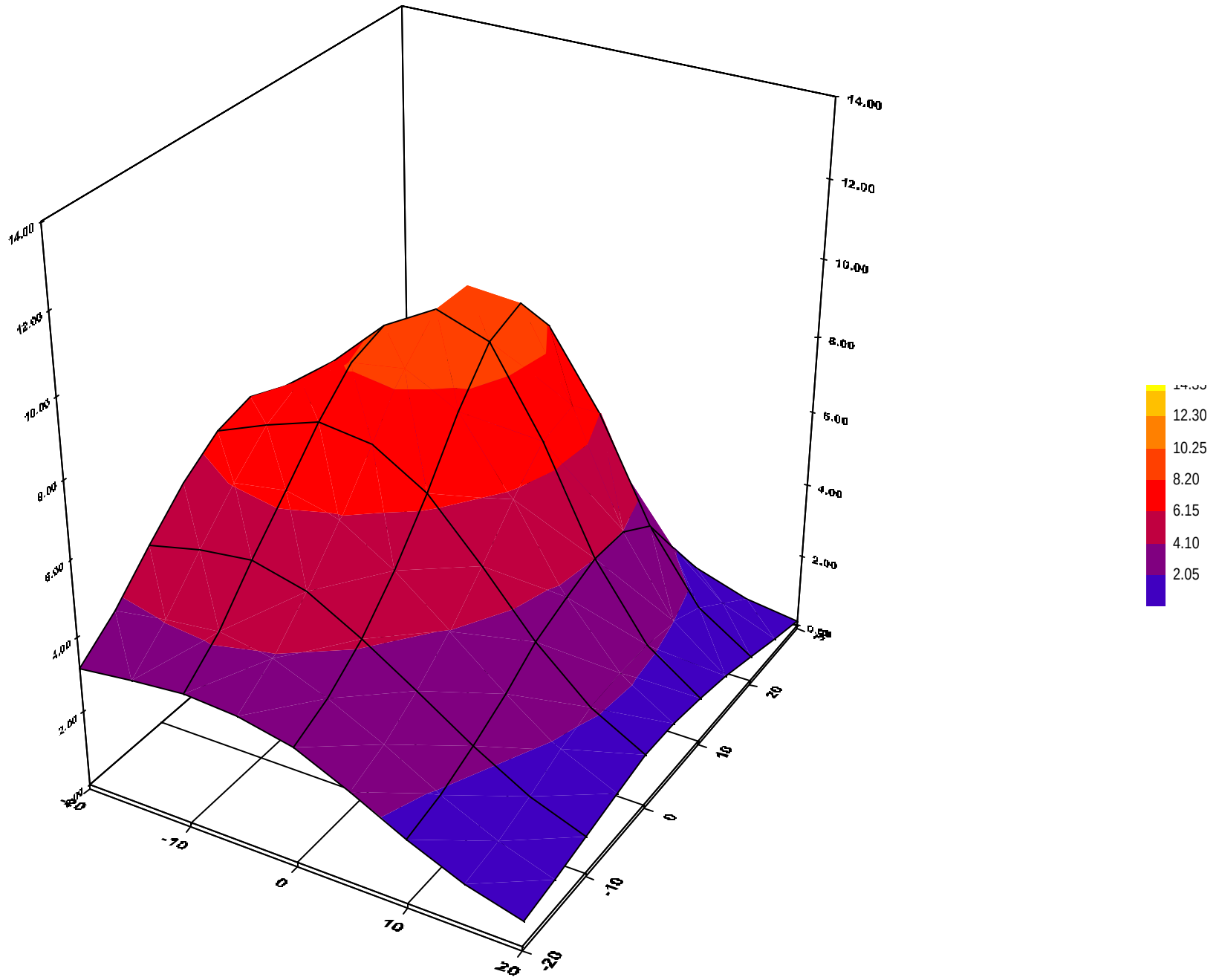
Location of Maximum Field :

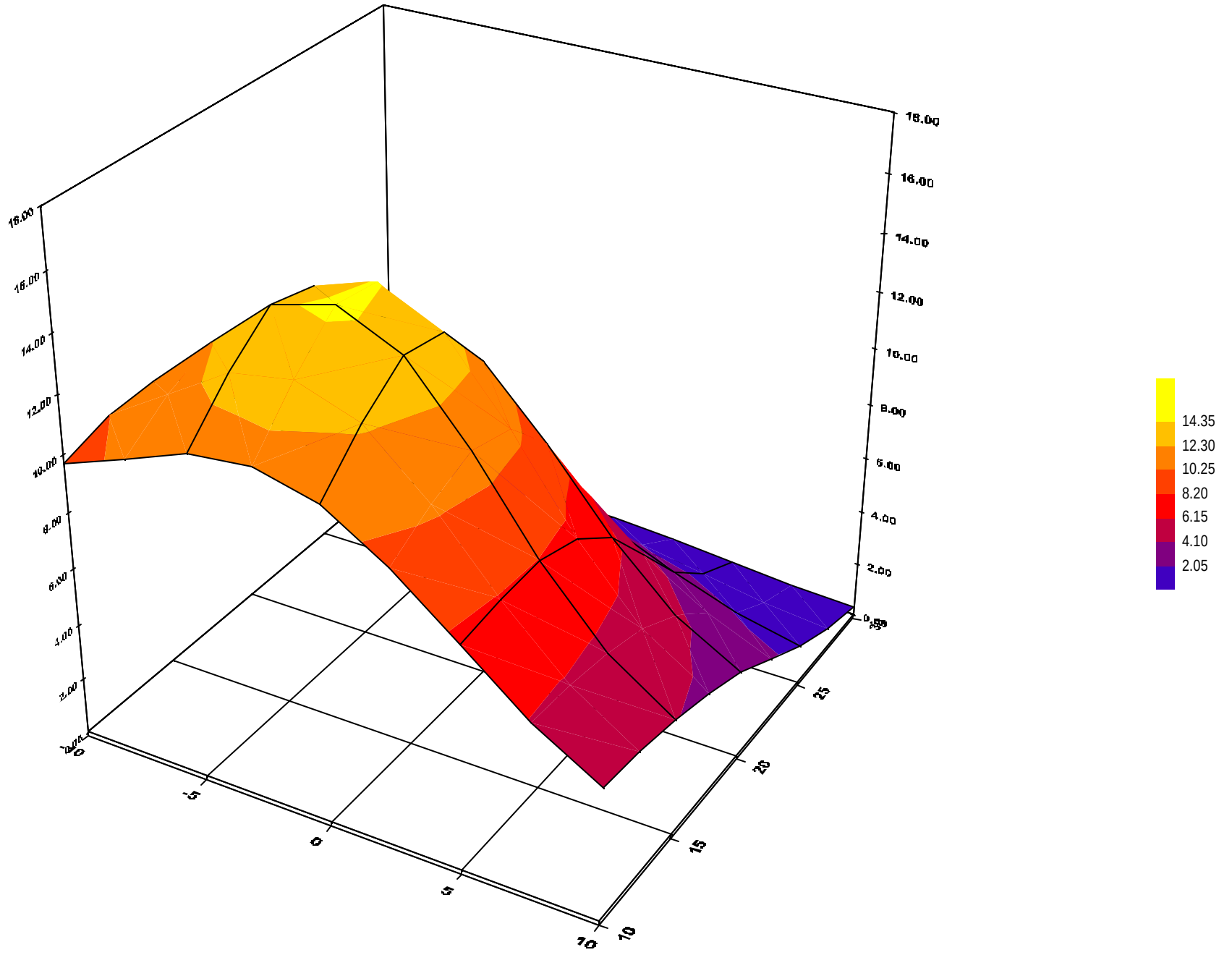
X = -5 Y = 15

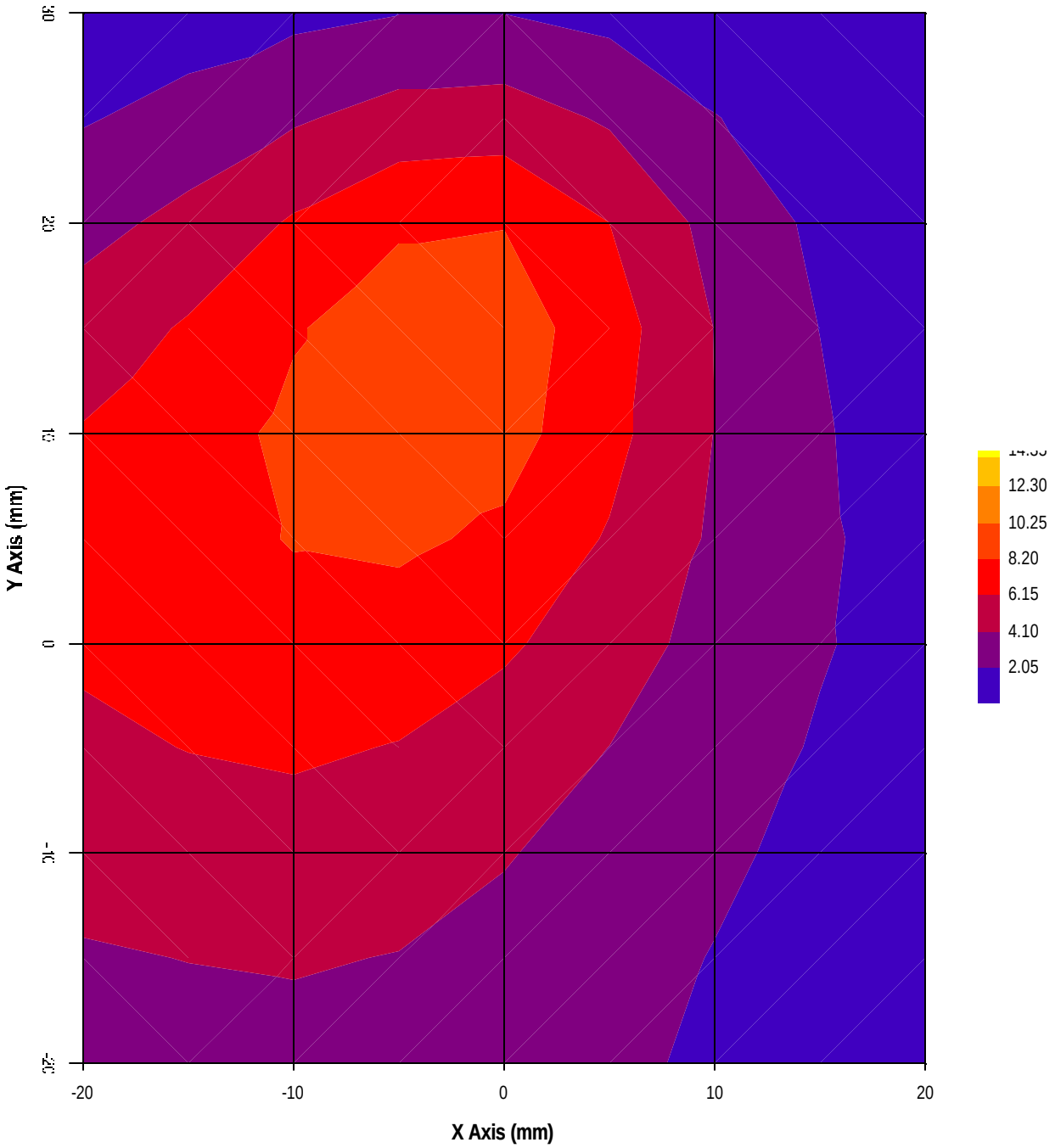
Measured Values (mV) :

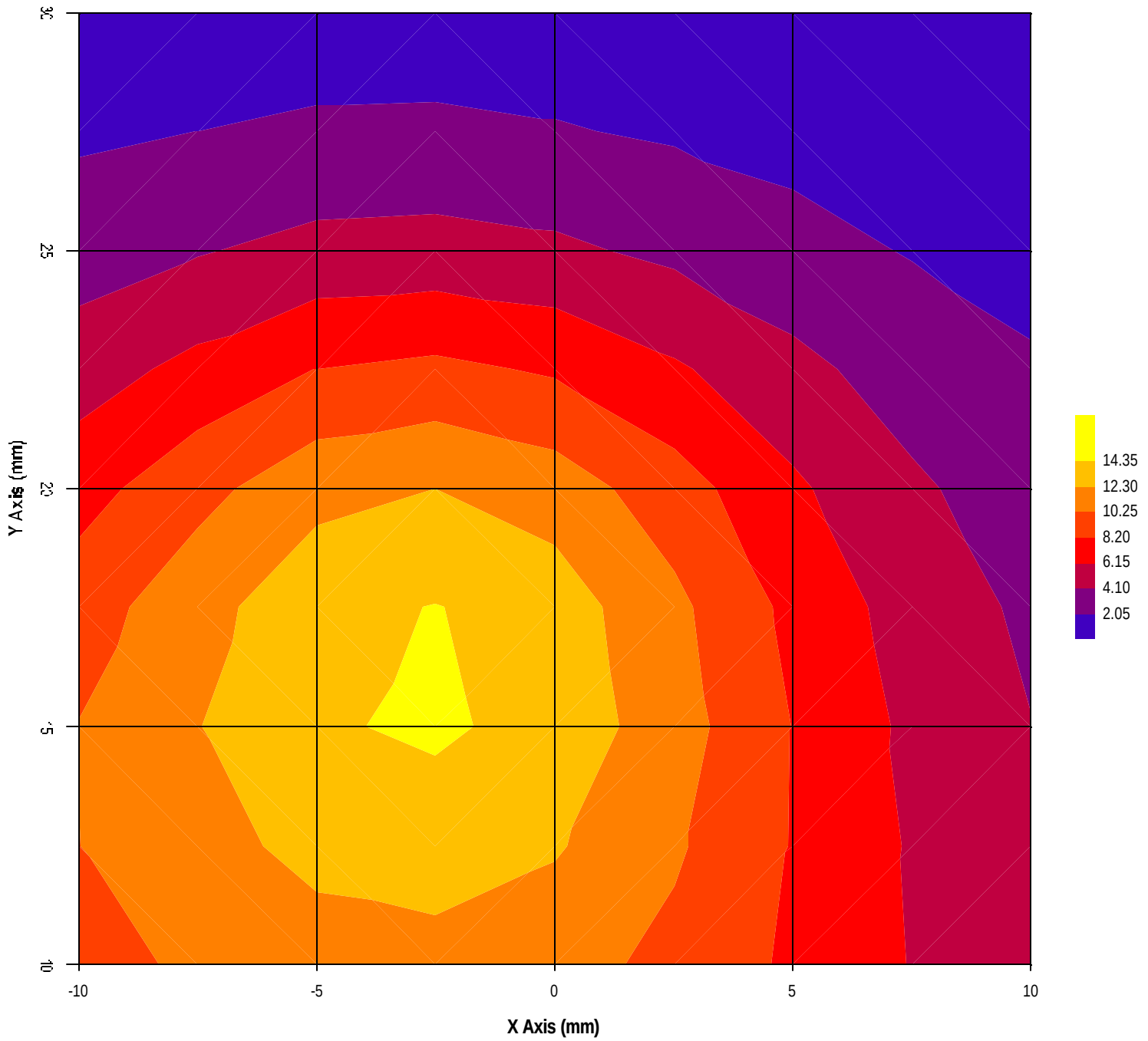
18.393	16.610	14.929	12.386	11.276	9.432
8.216	6.896	6.011	4.738	4.189	

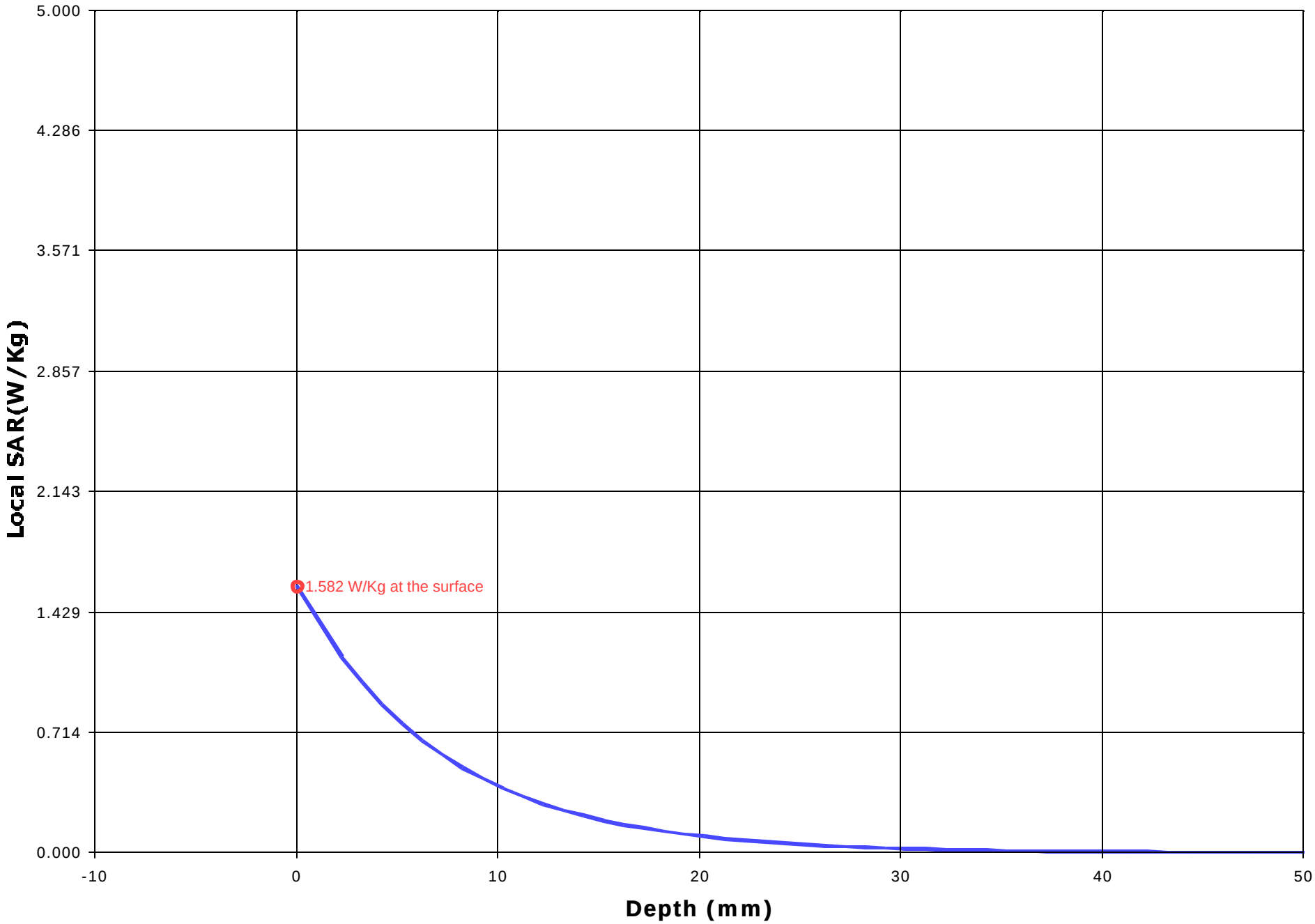
Peak Voltage (mV) : 24.728 **1 Cm Voltage (mV)** : 6.185 **SAR (W/Kg)** : 0.611

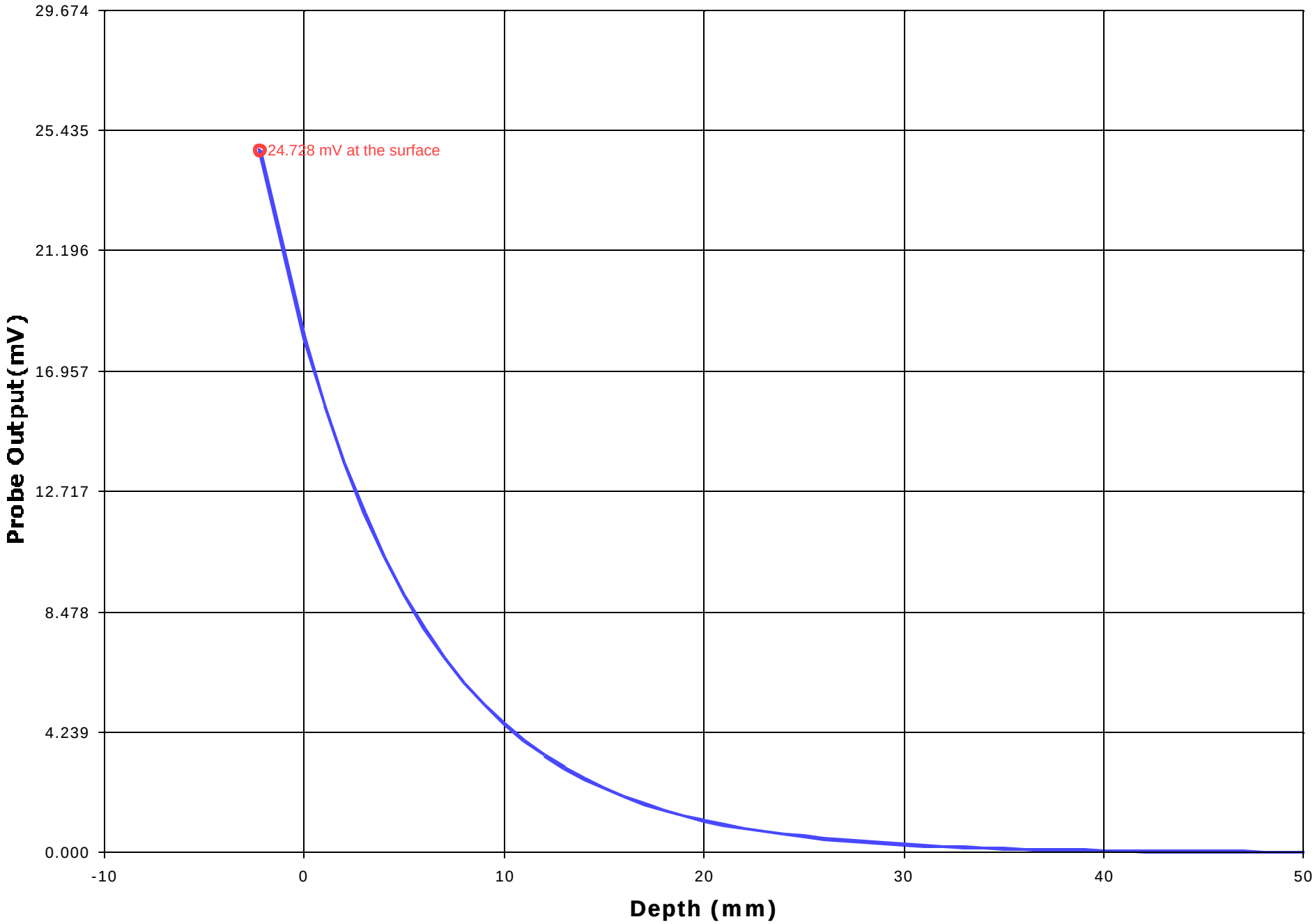

14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-20
-10
0
10
20
12.30
10.25
8.20
6.15
4.10
2.05


16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-5
0
5
10
15
20
25
14.35
12.30
10.25
8.20
6.15
4.10
2.05


Y Axis (mm)
30
20
10
0
-10
-20
-20
-10
0
10
20
X Axis (mm)
12.30
10.25
8.20
6.15
4.10
2.05


30
25
20
15
10
Y Axis (mm)
-10
-5
0
5
10
X Axis (mm)
14.35
12.30
10.25
8.20
6.15
4.10
2.05


5.000
4.286
3.571
2.857
2.143
1.429
0.714
0.000
Local SAR(W/Kg)
1.582 W/Kg at the surface
-10
0
10
20
30
40
50
Depth (mm)


29.674
25.435
21.196
16.957
12.717
8.478
4.239
0.000
Probe Output (mV)
24.728 mV at the surface
-10
0
10
20
30
40
50
Depth (mm)

Test Information

Date : 08/11/2001
Time : 11:58:19 AM

Product	: Mobile Payment Terminal	**Test**	: SAR
Manufacturer	: KEYCORP LIMITED	**Frequency (MHz)**	: 806.0
Model Number	: K78-204 or LP9100	**Nominal Output Power (W)**	: 2.0
Serial Number	: N/A	**Antenna Type**	: Monopole
FCC ID Number	: P3AK78-2XX	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 56.3
Simulated Tissue	: Muscle	**Conductivity**	: 0.97

Probe	: UT-ETR-0200-1	**Antenna Position**	: Retracted
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 33.0
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.691	**Cable Insertion Loss (dB)**	: 0
Calibrated Date	: 25/10/2001	**Compensated Power (dBm)**	: 33.0

Amplifier Setting :

Channel 1 : 0.0062 Channel 2 : 0.0059 Channel 3 : 0.0072

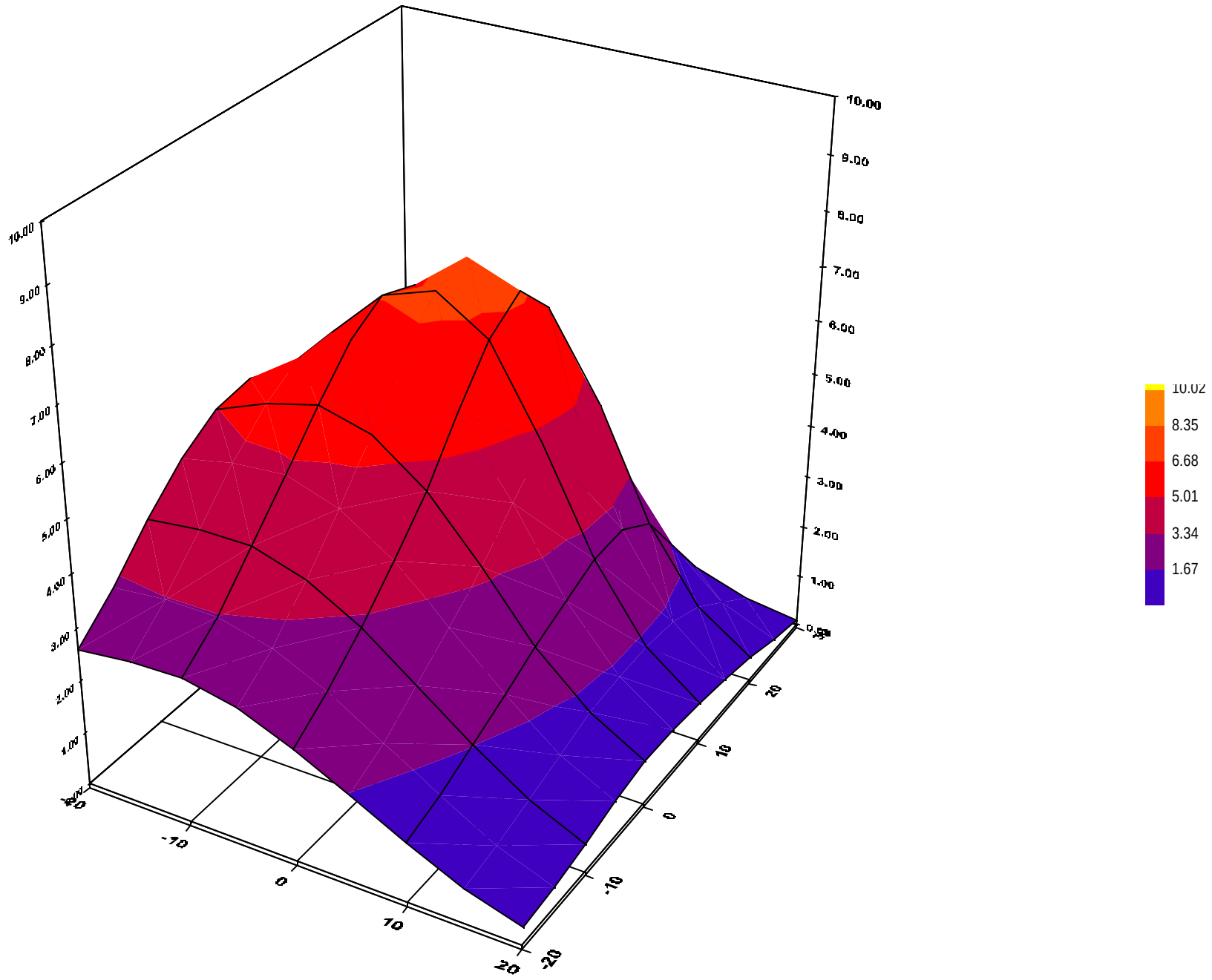
Location of Maximum Field :

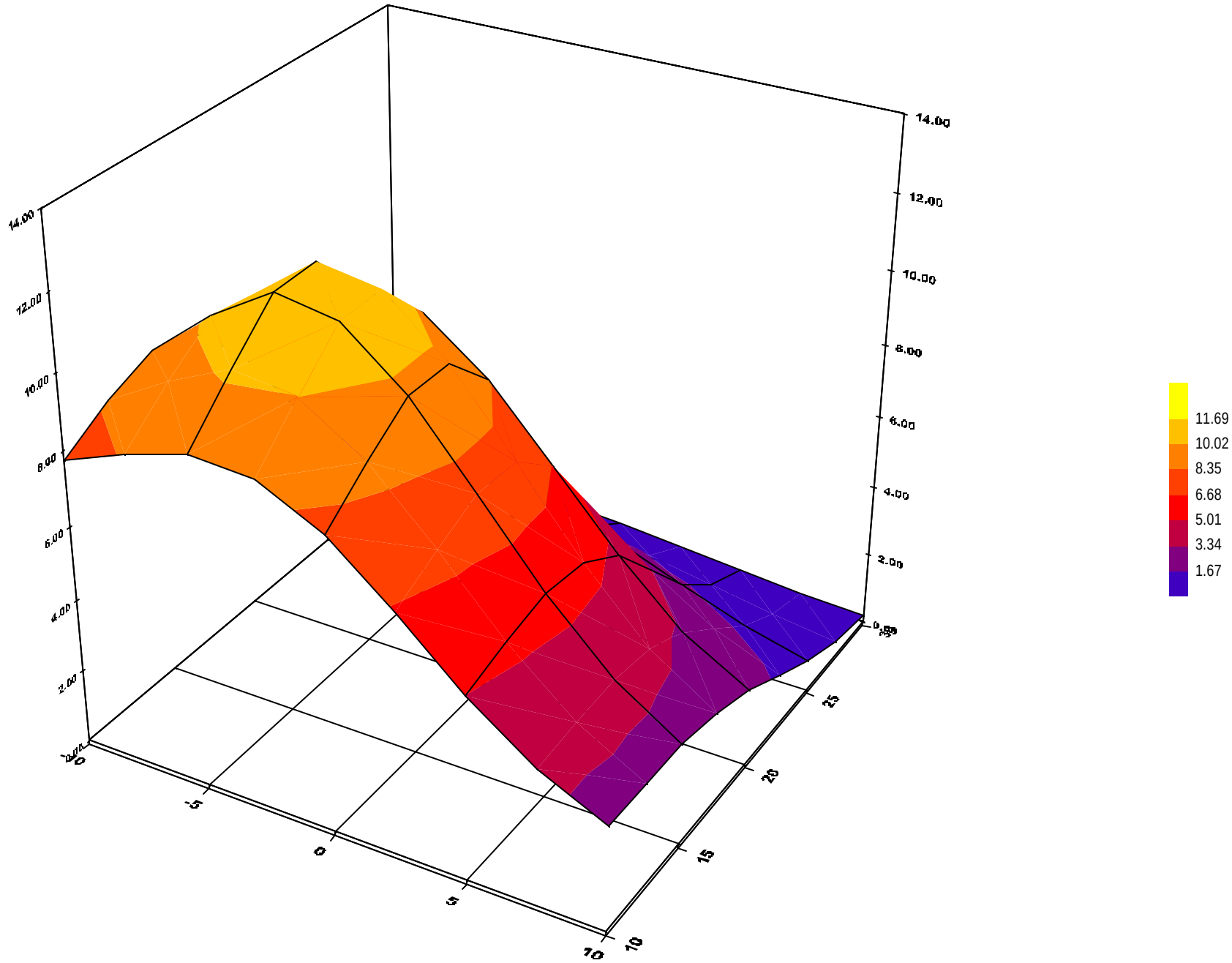
X = -5 Y = 15

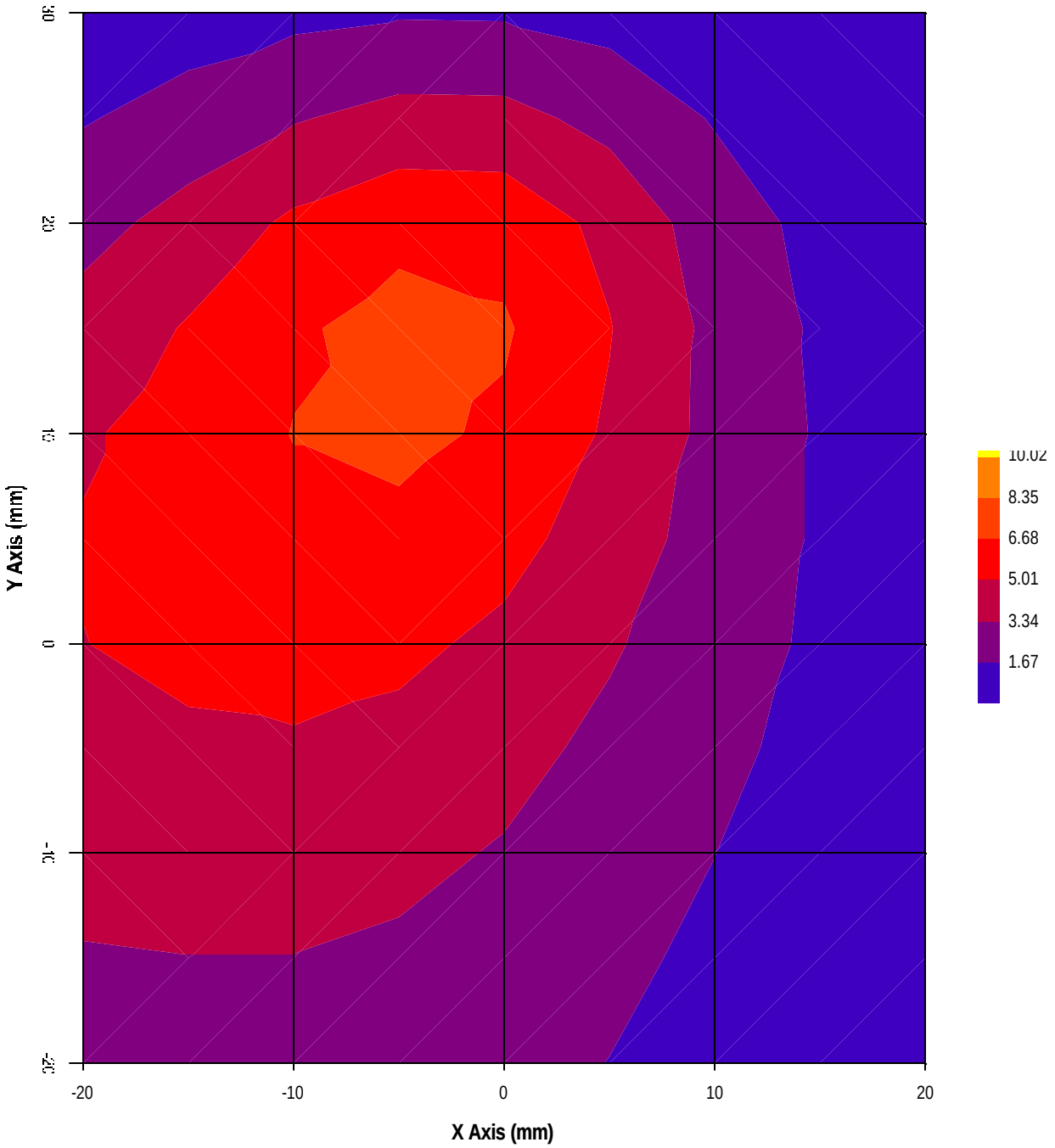
Measured Values (mV) :

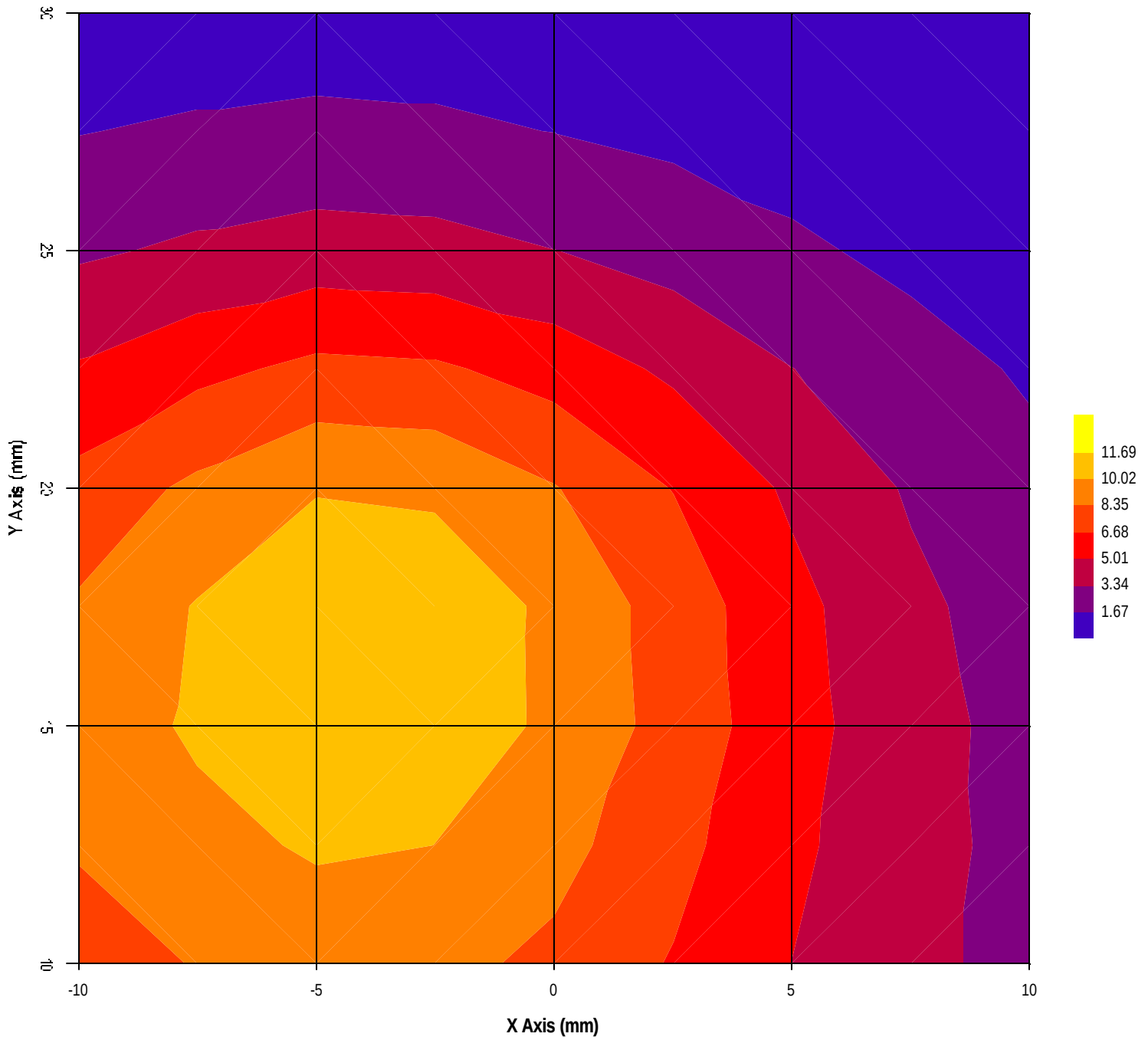
14.284	13.056	12.185	10.019	8.887	7.364
6.330	5.373	4.439	3.927	3.090	

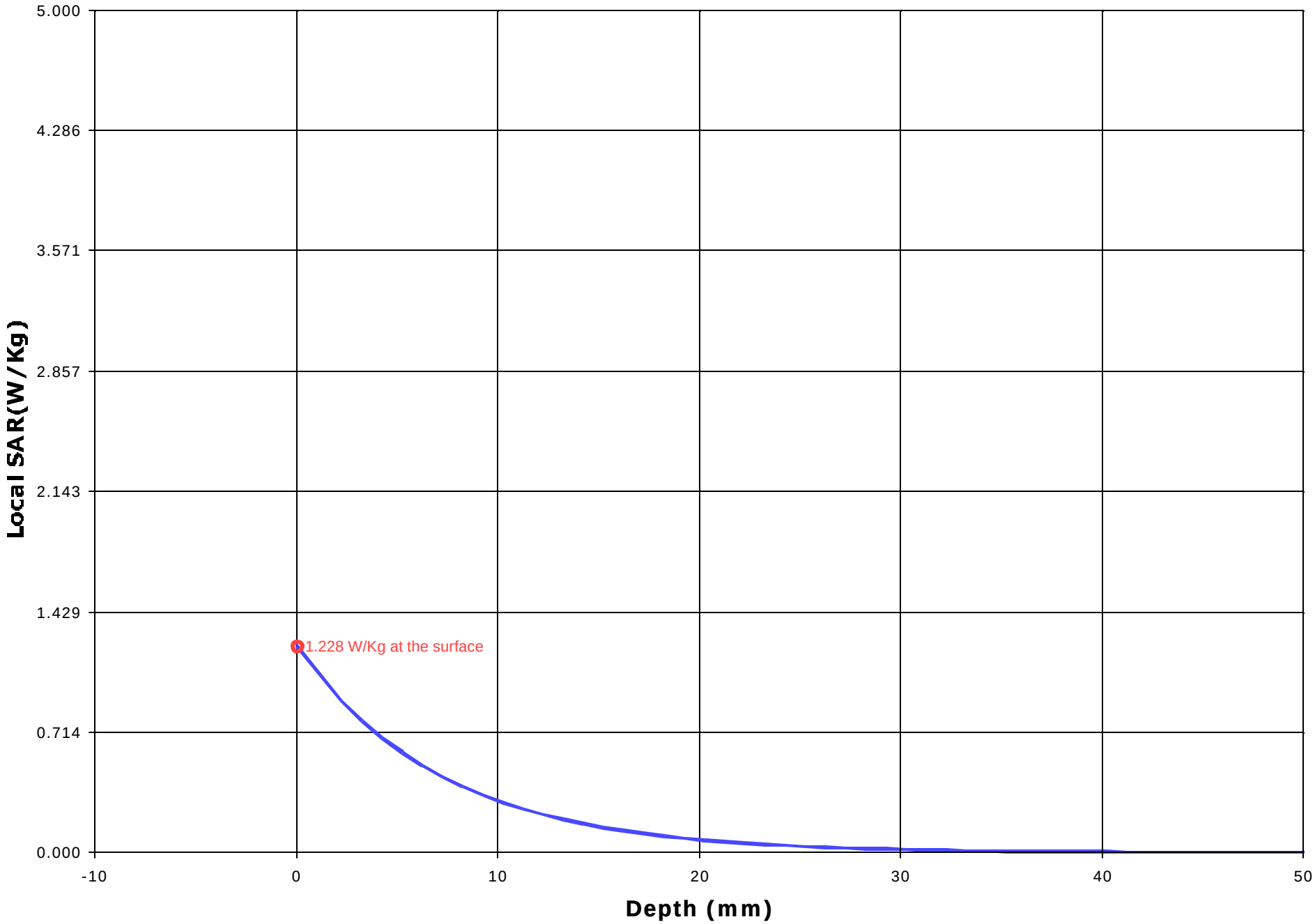
Peak Voltage (mV) : 19.191 **1 Cm Voltage (mV)** : 4.814 **SAR (W/Kg)** : 0.492

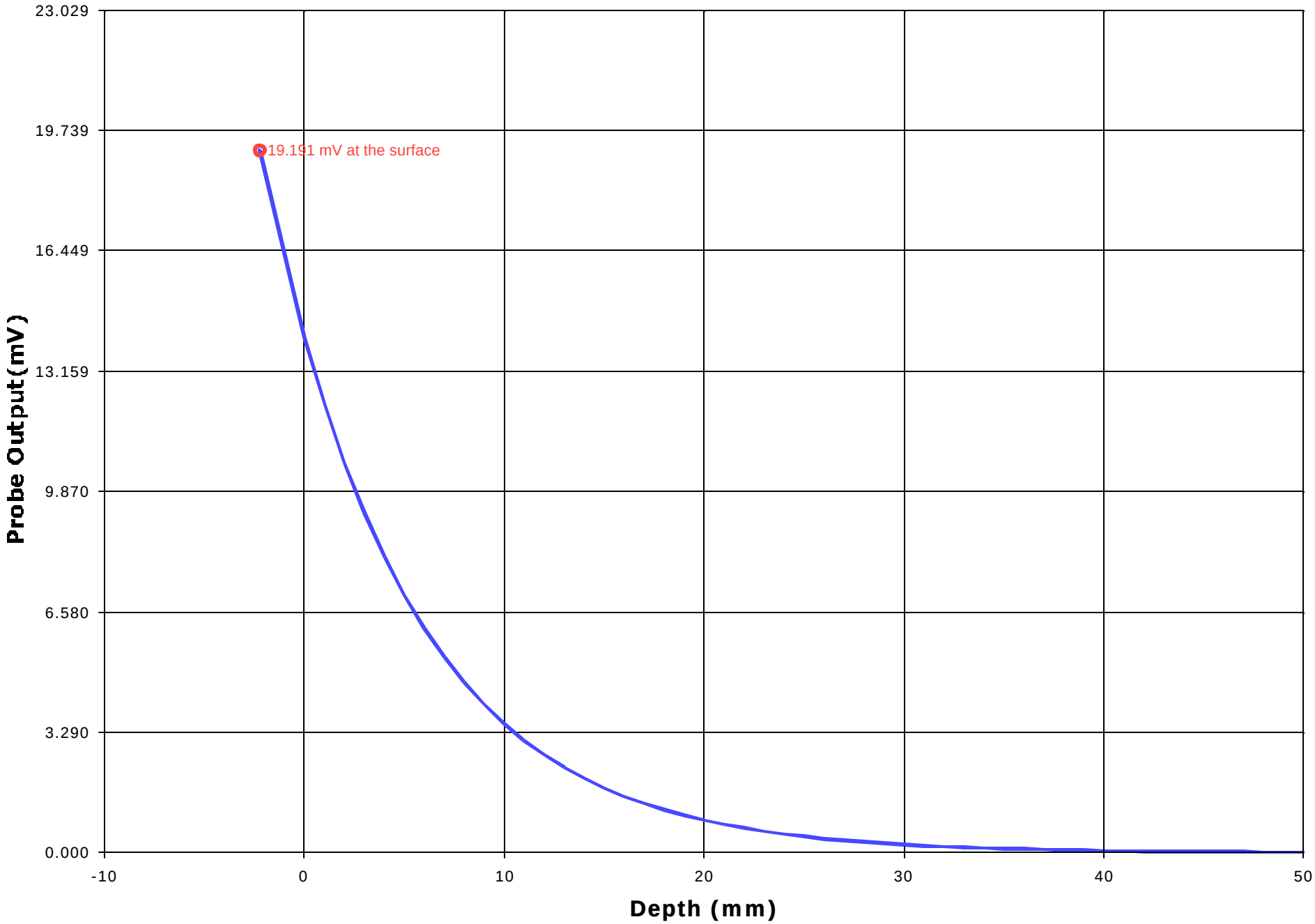

10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
-20
-10
0
10
20
10.02
8.35
6.68
5.01
3.34
1.67


14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-5
0
5
10
15
20
25
11.69
10.02
8.35
6.68
5.01
3.34
1.67


30
20
10
0
-10
-20
Y Axis (mm)
-20
-10
0
10
20
X Axis (mm)
10.02
8.35
6.68
5.01
3.34
1.67


30
25
20
15
10
Y Axis (mm)
-10
-5
0
5
10
X Axis (mm)
11.69
10.02
8.35
6.68
5.01
3.34
1.67


5.000
4.286
3.571
2.857
2.143
1.429
0.714
0.000
Local SAR(W/Kg)
1.228 W/Kg at the surface
-10
0
10
20
30
40
50
Depth (mm)


23.029
19.739
16.449
13.159
9.870
6.580
3.290
0.000
Probe Output (mV)
19.191 mV at the surface
-10
0
10
20
30
40
50
Depth (mm)

Test Information

Date : 08/11/2001
Time : 11:42:41 AM

Product	: Mobile Payment Terminal	**Test**	: SAR
Manufacturer	: KEYCORP LIMITED	**Frequency (MHz)**	: 821.0
Model Number	: K78-204 or LP9100	**Nominal Output Power (W)**	: 2.0
Serial Number	: N/A	**Antenna Type**	: Monopole
FCC ID Number	: P3AK78-2XX	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 56.3
Simulated Tissue	: Muscle	**Conductivity**	: 0.97

Probe	: UT-ETR-0200-1	**Antenna Position**	: Retracted
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 32.8
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.691	**Cable Insertion Loss (dB)**	: 0
Calibrated Date	: 25/10/2001	**Compensated Power (dBm)**	: 32.8

Amplifier Setting :

Channel 1 : 0.0062 Channel 2 : 0.0059 Channel 3 : 0.0072

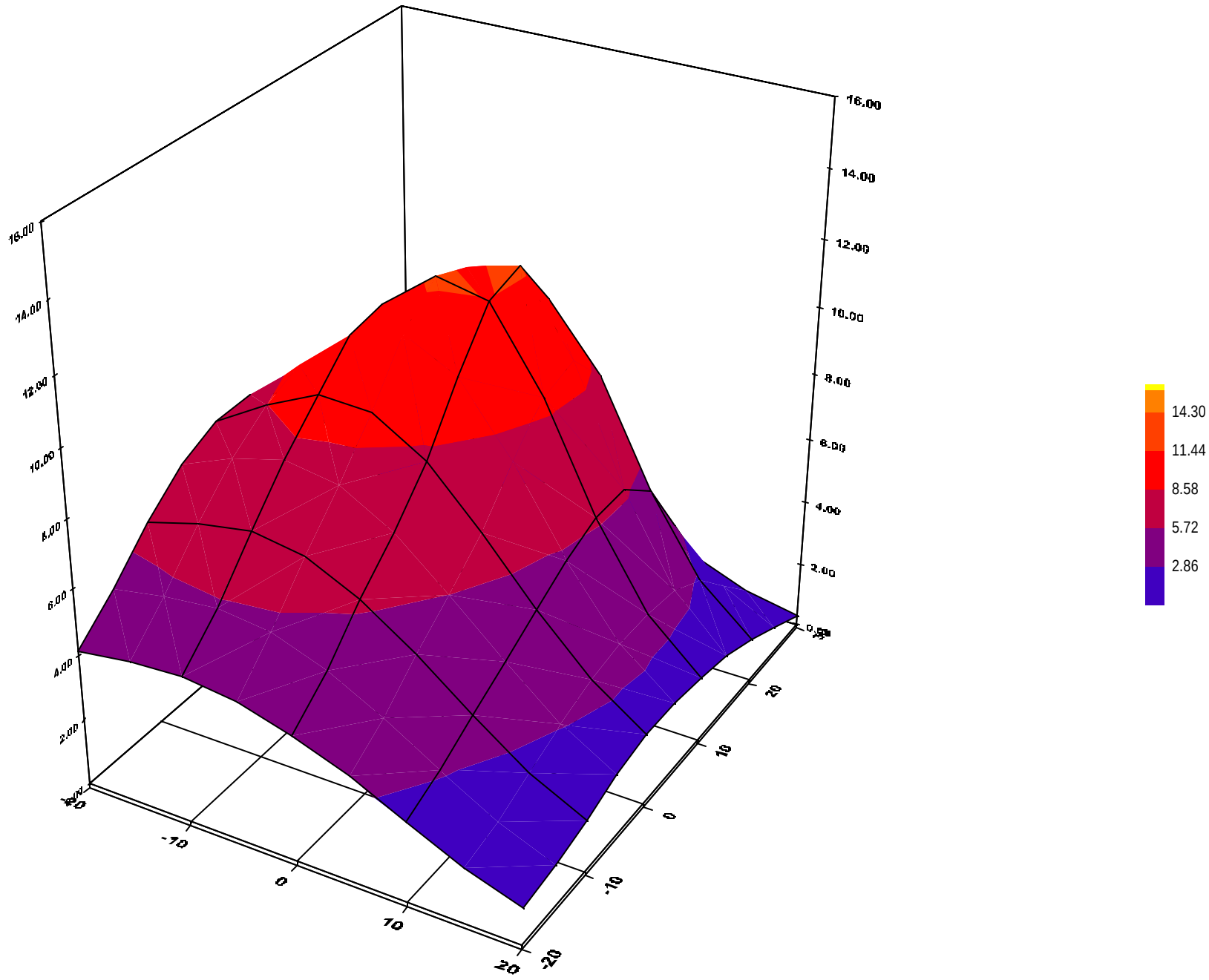
Location of Maximum Field :

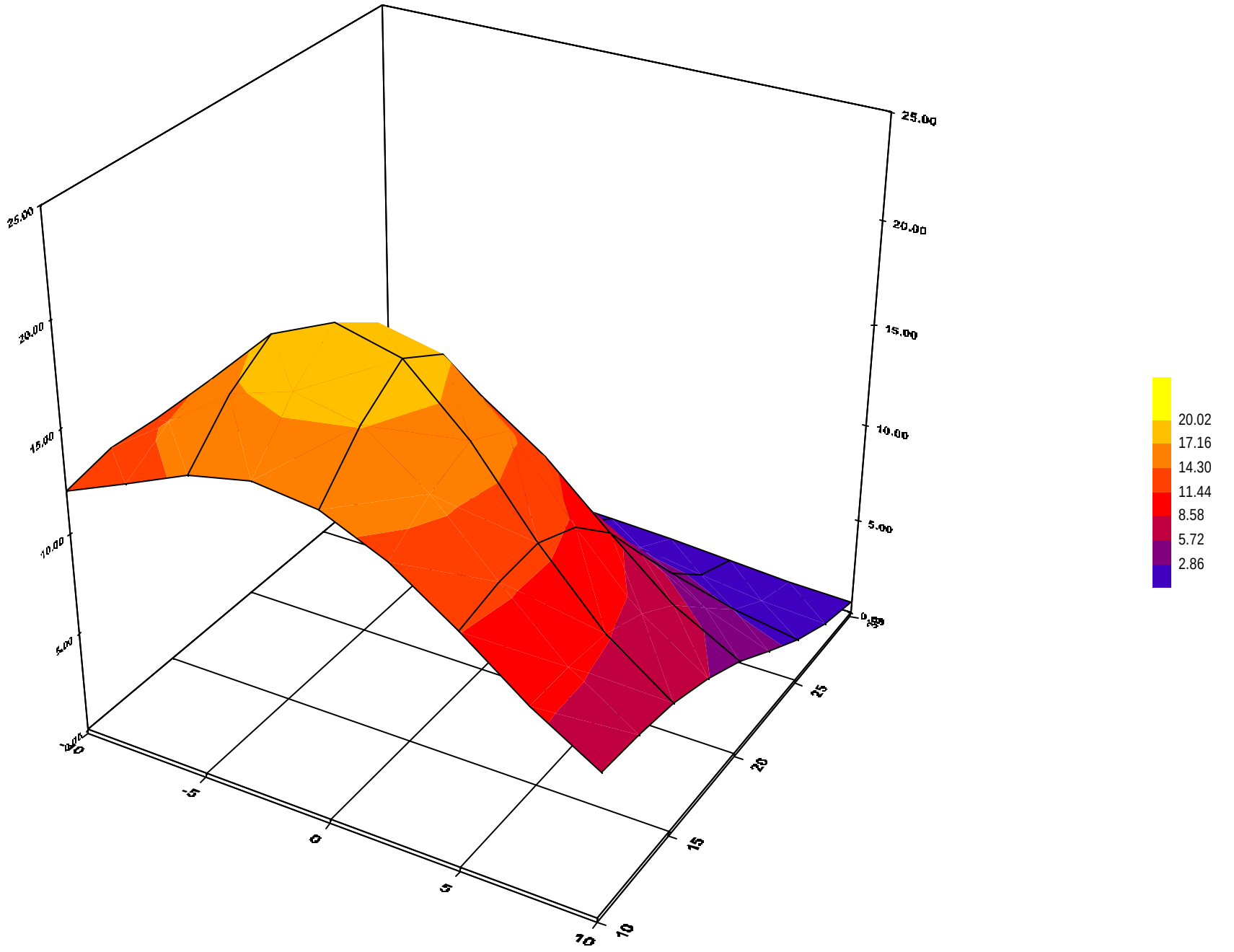
X = 0 Y = 15

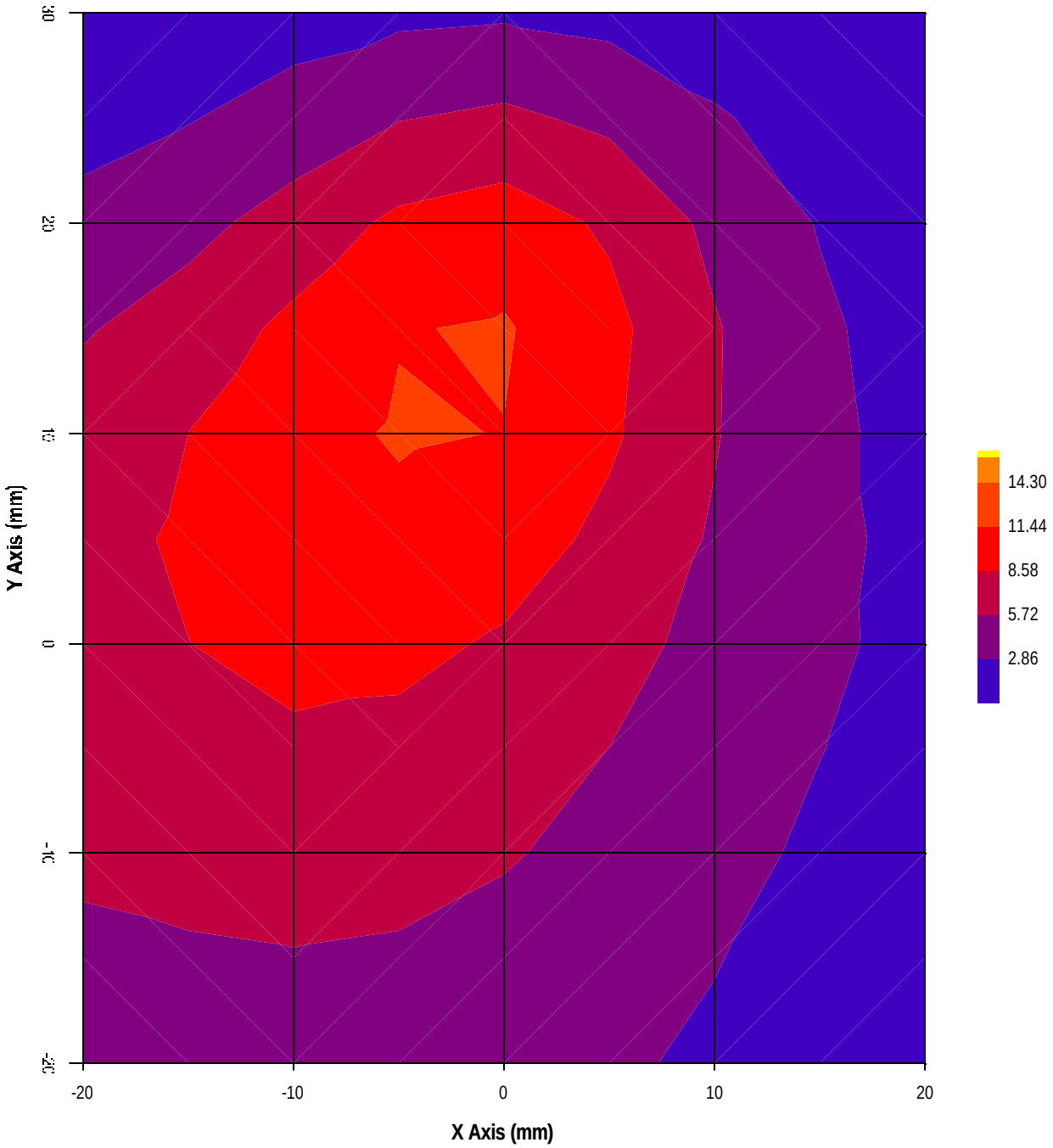
Measured Values (mV) :

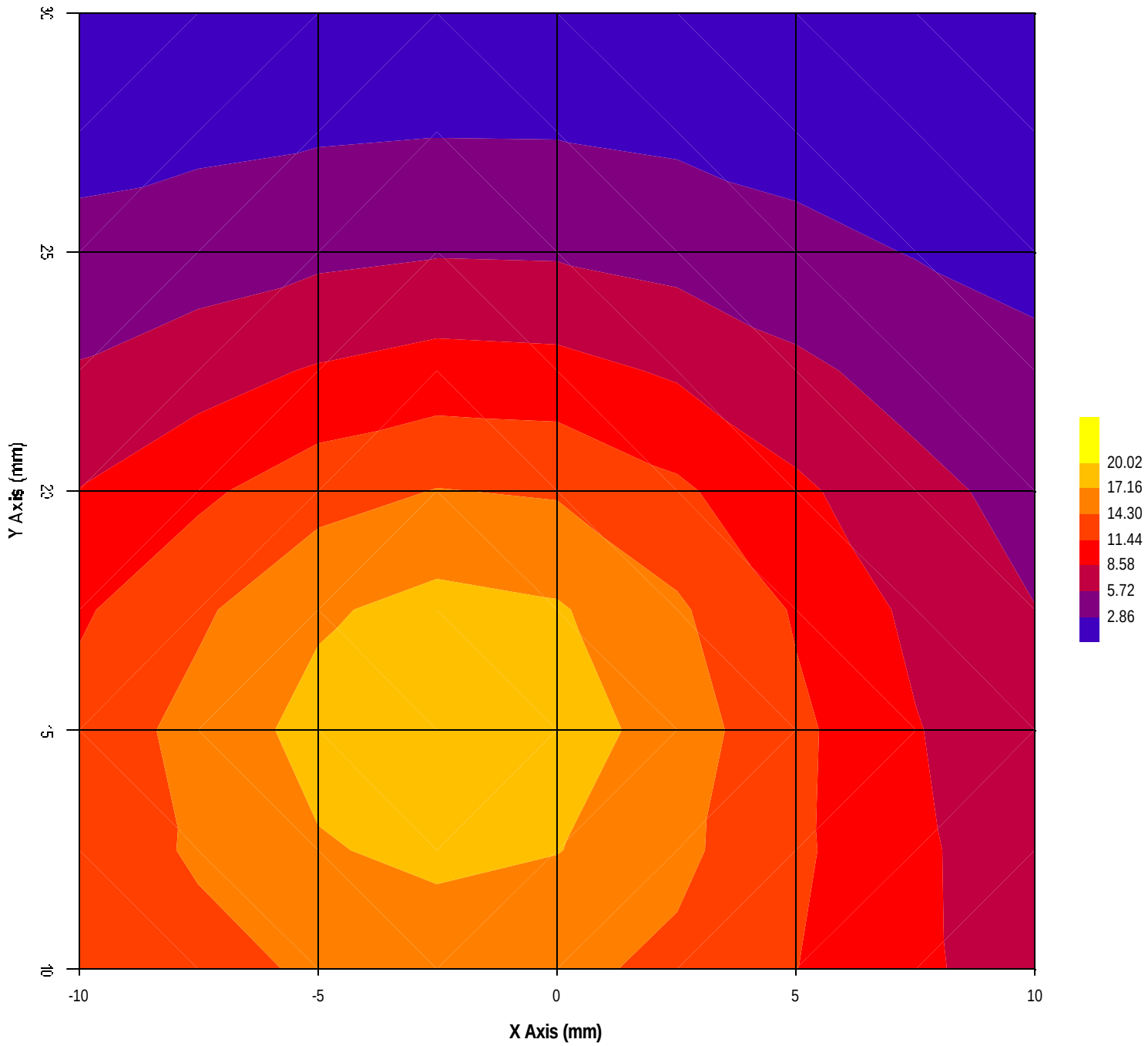
22.053	20.715	18.691	15.755	14.366	11.738
10.005	8.441	6.991	6.310	5.235	

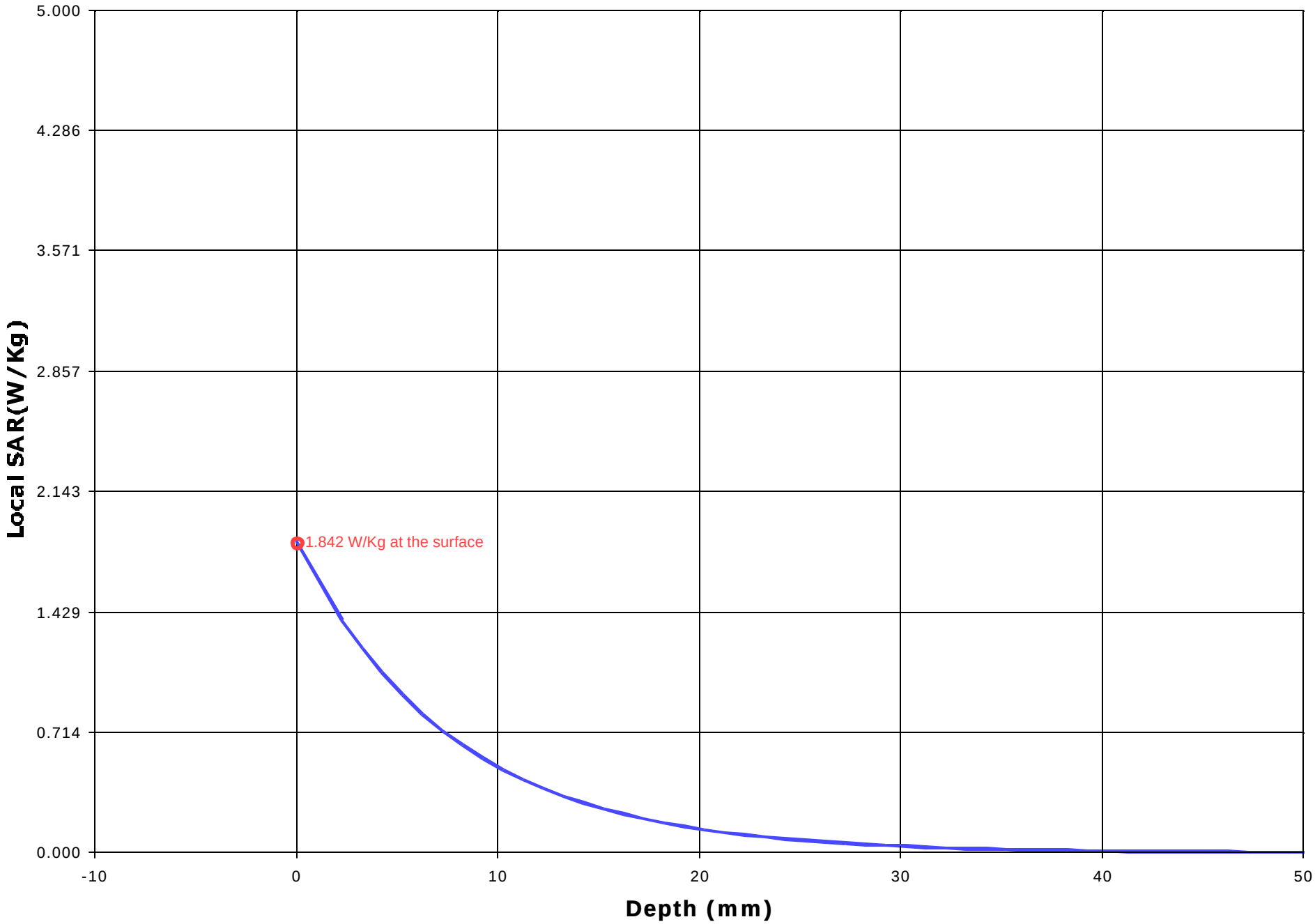
Peak Voltage (mV) : 28.789 **1 Cm Voltage (mV)** : 7.961 **SAR (W/Kg)** : 0.817

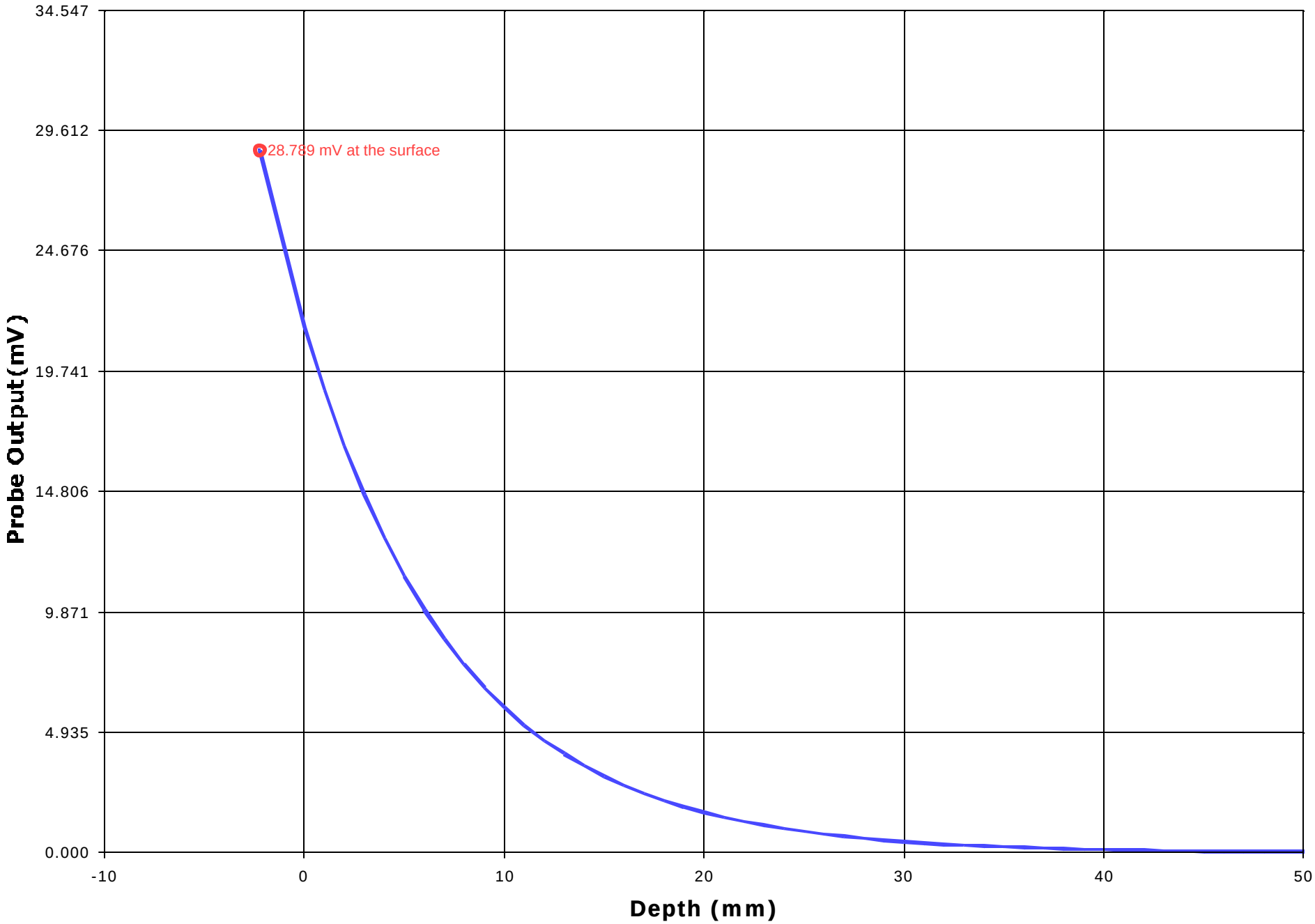

16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-20
-10
0
10
20
14.30
11.44
8.58
5.72
2.86


25.00
20.00
15.00
10.00
5.00
0.00
-10
-5
0
5
10
10
15
20
25
20.02
17.16
14.30
11.44
8.58
5.72
2.86


Y Axis (mm)
30
20
10
0
-10
-20
-20
-10
0
10
20
X Axis (mm)
14.30
11.44
8.58
5.72
2.86


30
25
20
15
10
Y Axis (mm)
-10
-5
0
5
10
X Axis (mm)
20.02
17.16
14.30
11.44
8.58
5.72
2.86


5.000
4.286
3.571
2.857
2.143
1.429
0.714
0.000
Local SAR(W/Kg)
1.842 W/Kg at the surface
-10
0
10
20
30
40
50
Depth (mm)


34.547
29.612
24.676
19.741
14.806
9.871
4.935
0.000
Probe Output (mV)
28.789 mV at the surface
-10
0
10
20
30
40
50
Depth (mm)

Test Information

Date : 08/11/2001
Time : 2:01:24 PM

Product	: Mobile Payment Terminal	**Test**	: SAR
Manufacturer	: KEYCORP LIMITED	**Frequency (MHz)**	: 813.5
Model Number	: K78-204 or LP9100	**Nominal Output Power (W)**	: 2.0
Serial Number	: N/A	**Antenna Type**	: Monopole
FCC ID Number	: P3AK78-2XX	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 56.3
Simulated Tissue	: Muscle	**Conductivity**	: 0.97

Probe	: UT-ETR-0200-1	**Antenna Position**	: Retracted
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 32.9
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.691	**Cable Insertion Loss (dB)**	: 0
Calibrated Date	: 25/10/2001	**Compensated Power (dBm)**	: 32.9

Amplifier Setting :

Channel 1 : 0.0062 Channel 2 : 0.0059 Channel 3 : 0.0072

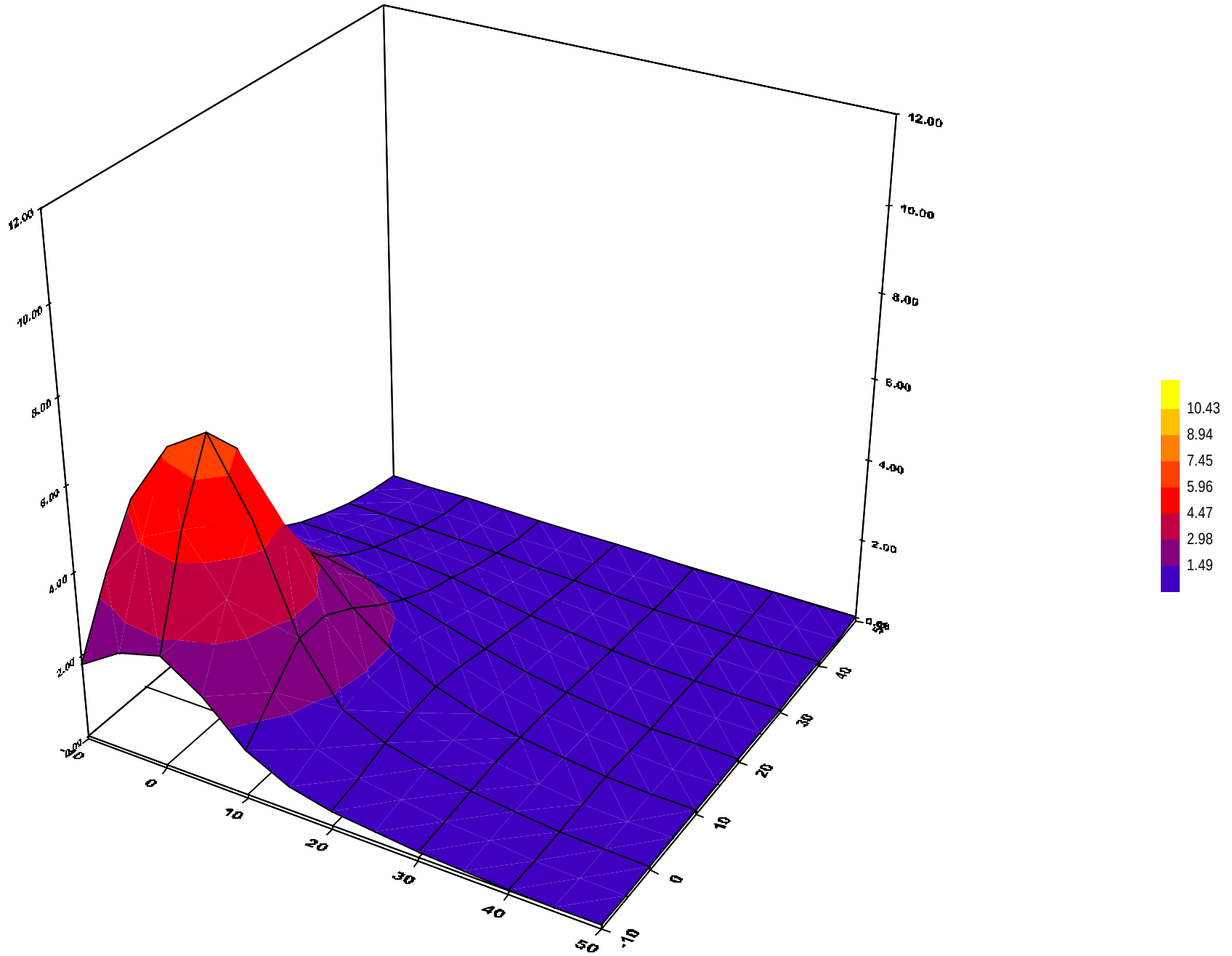
Location of Maximum Field :

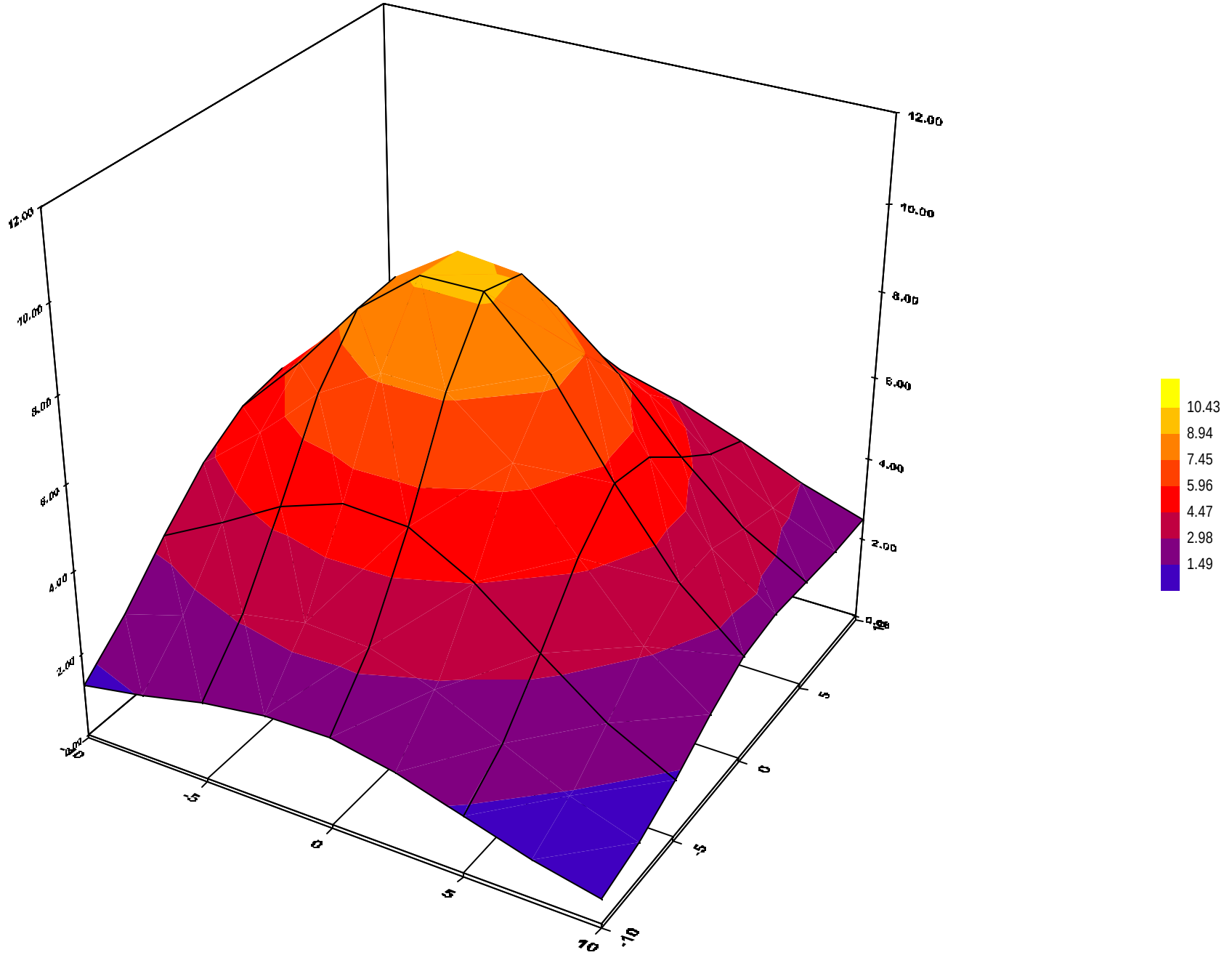
X = 0 Y = 0

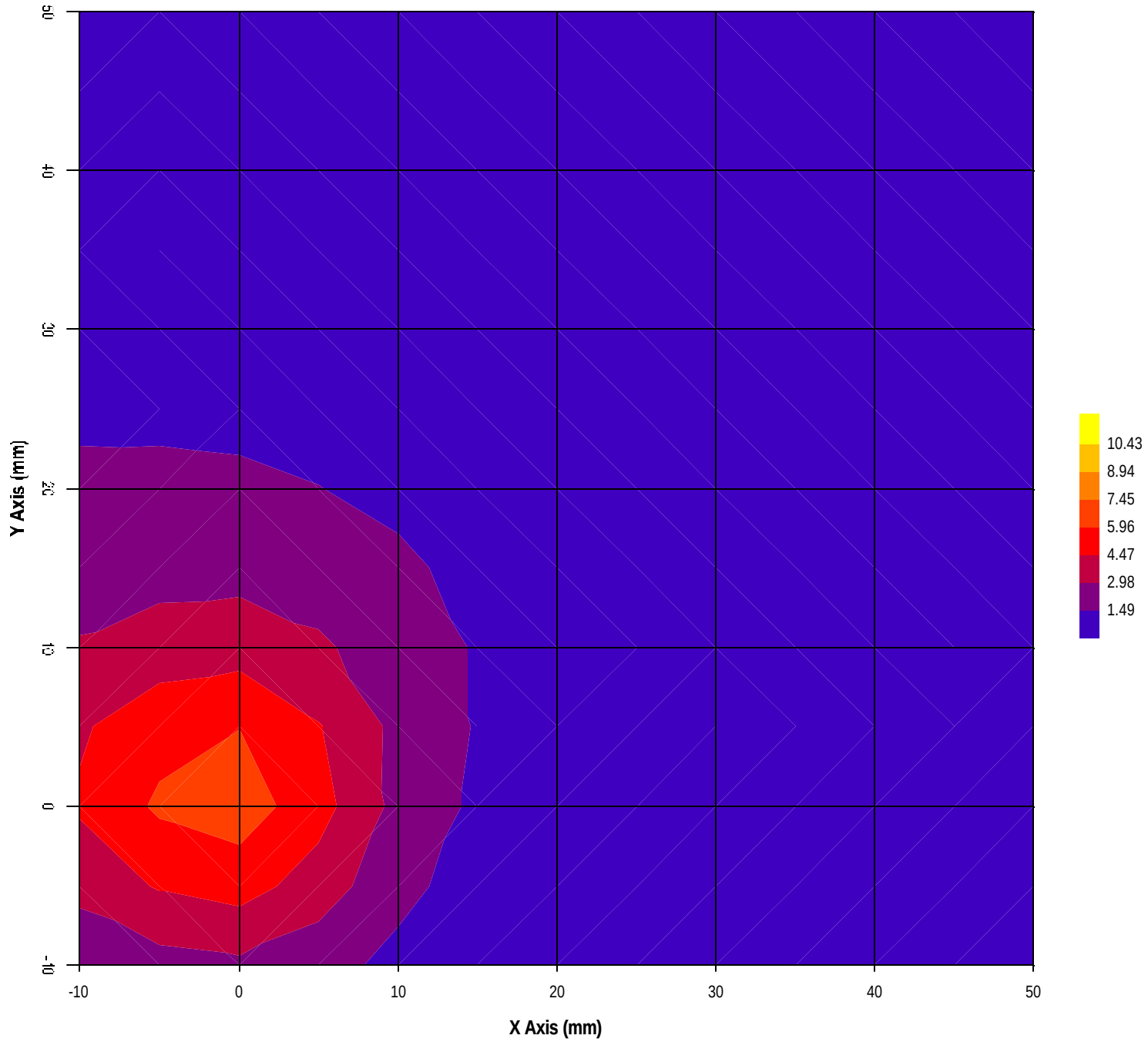
Measured Values (mV) :

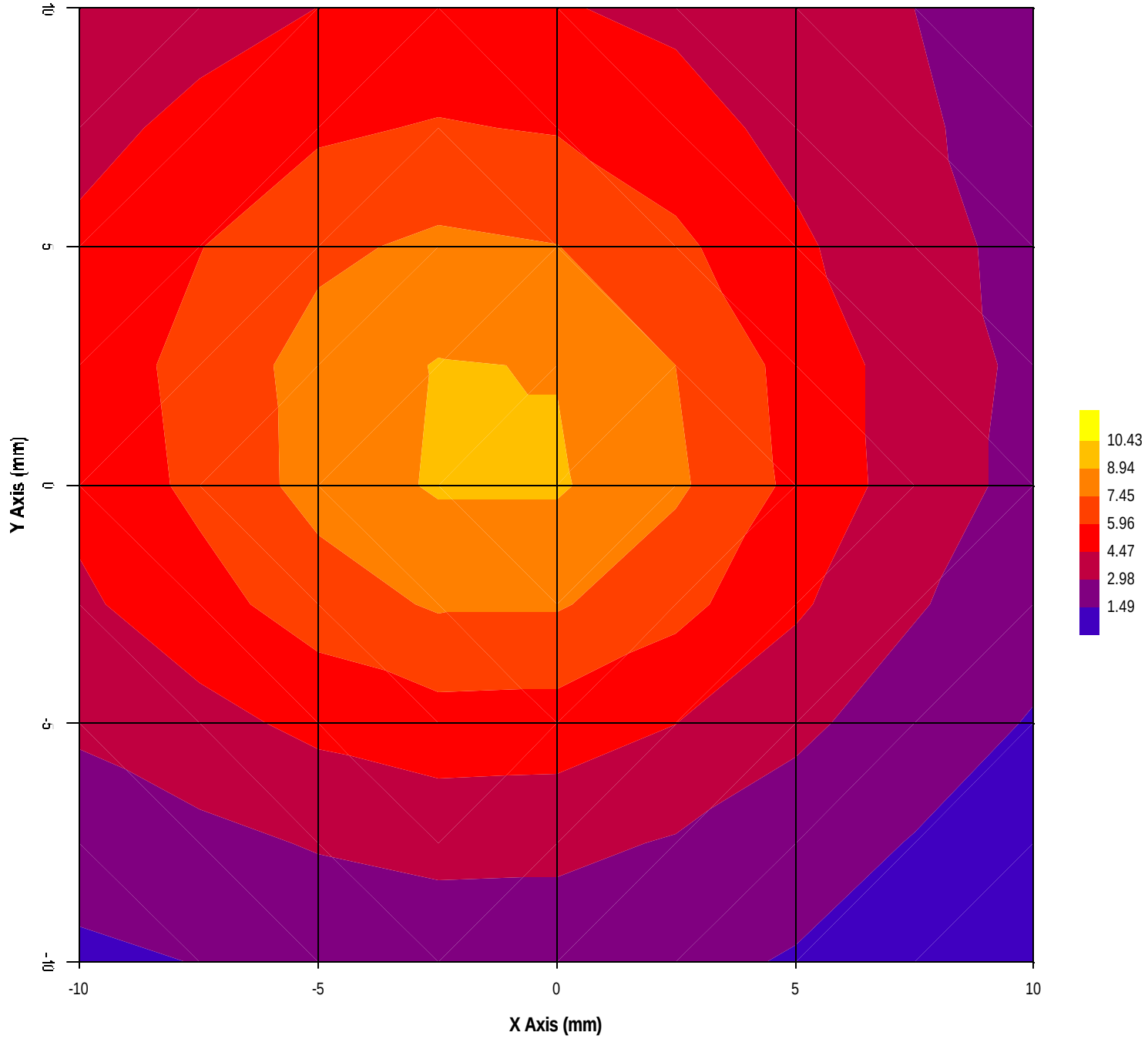
11.025	10.688	8.671	6.999	5.605	4.304
3.497	2.744	2.037	1.555	1.079	

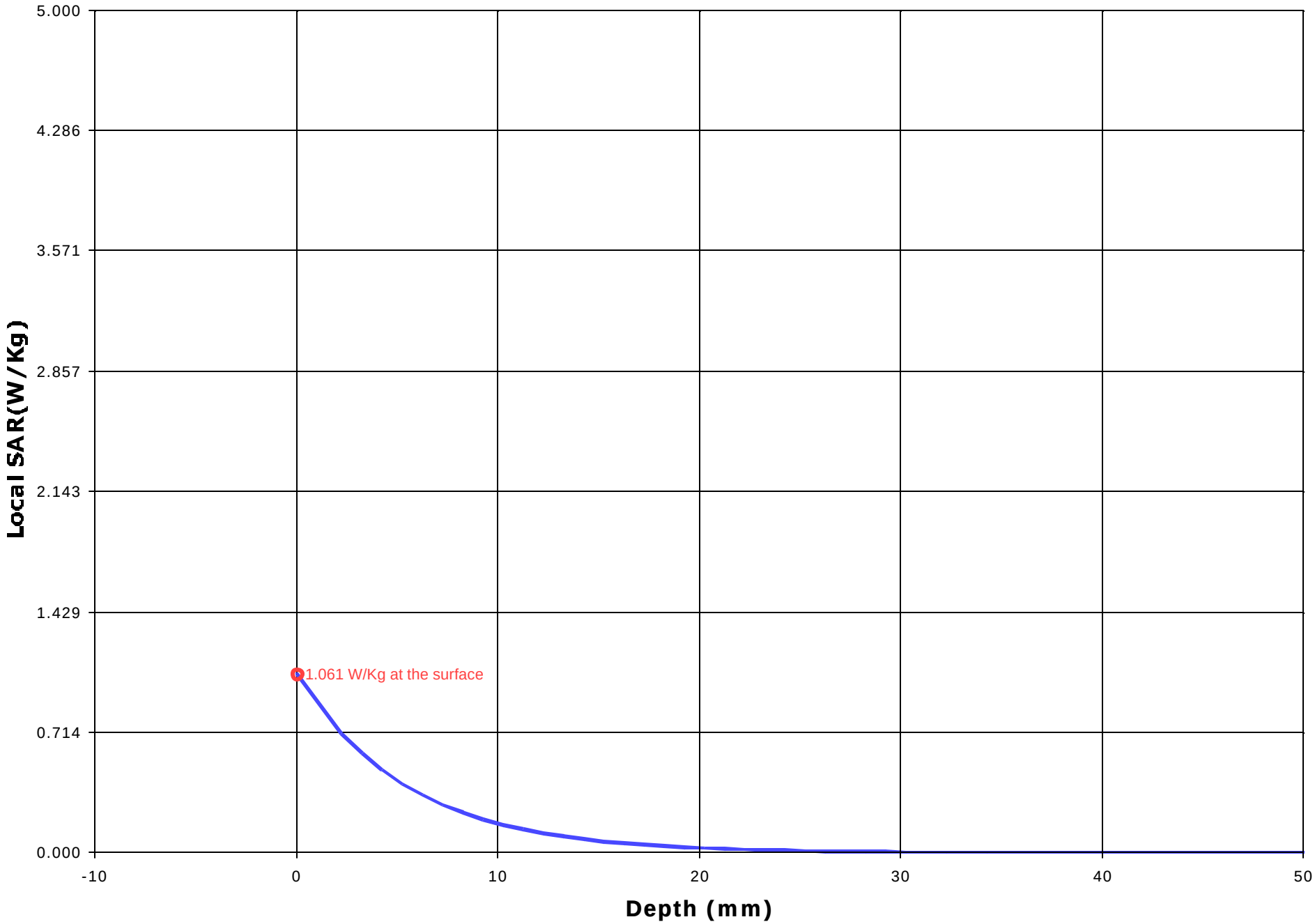
Peak Voltage (mV) : 16.584 **1 Cm Voltage (mV)** : 2.697 **SAR (W/Kg)** : 0.354


12.00
10.00
8.00
6.00
4.00
2.00
0.00
-10
0
10
20
30
40
50
10.43
8.94
7.45
5.96
4.47
2.98
1.49


12.00
10.00
8.00
6.00
4.00
2.00
0.00
-10
-5
0
5
10
10.43
8.94
7.45
5.96
4.47
2.98
1.49


Y Axis (mm)
50
40
30
20
10
0
-10
-10
0
10
20
30
40
50
X Axis (mm)
10.43
8.94
7.45
5.96
4.47
2.98
1.49


Y Axis (mm)
10
5
0
-5
-10
-10
-5
0
5
10
X Axis (mm)
10.43
8.94
7.45
5.96
4.47
2.98
1.49


5.000
4.286
3.571
2.857
2.143
1.429
0.714
0.000
Local SAR(W/Kg)
1.061 W/Kg at the surface
-10
0
10
20
30
40
50
Depth (mm)

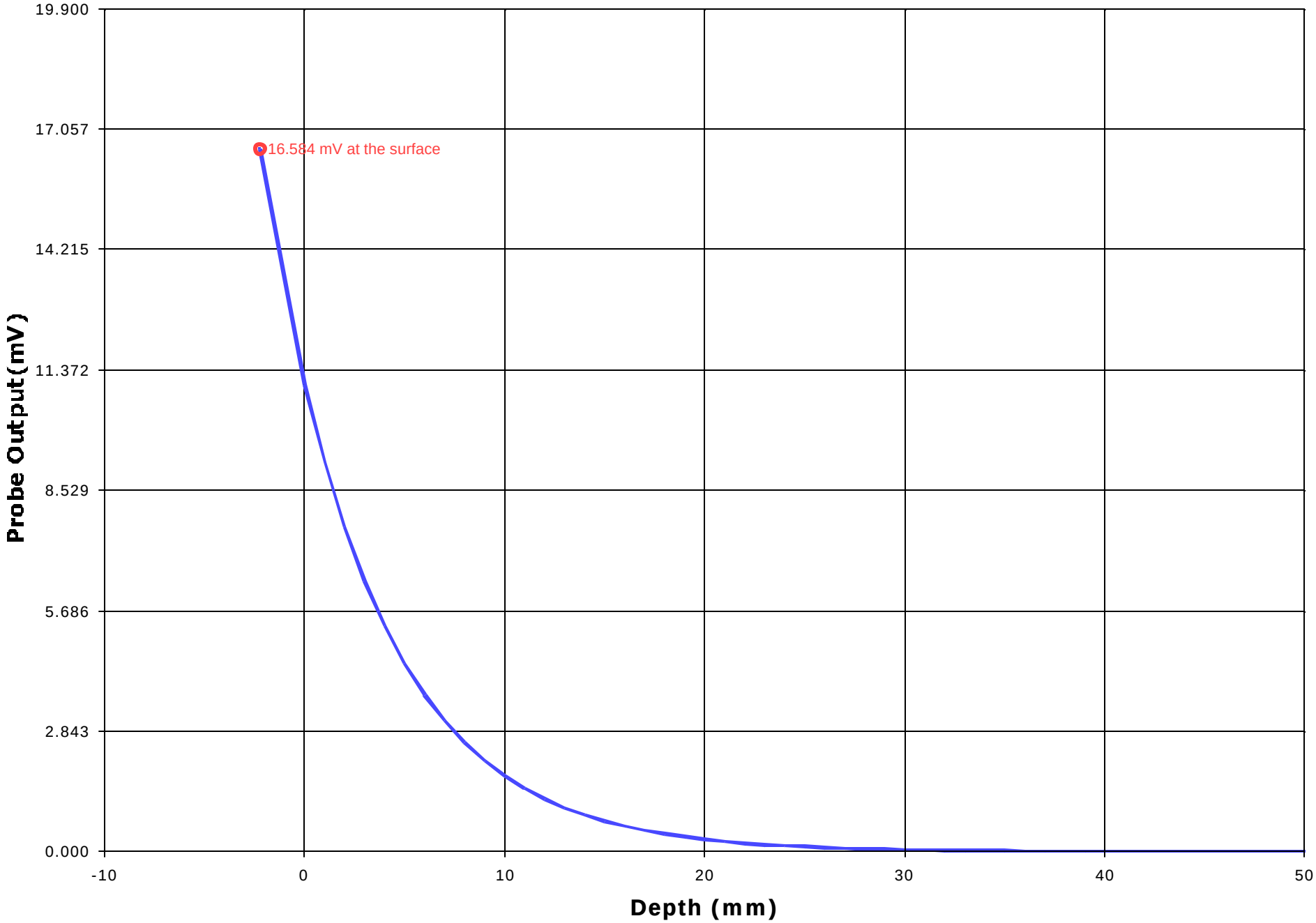
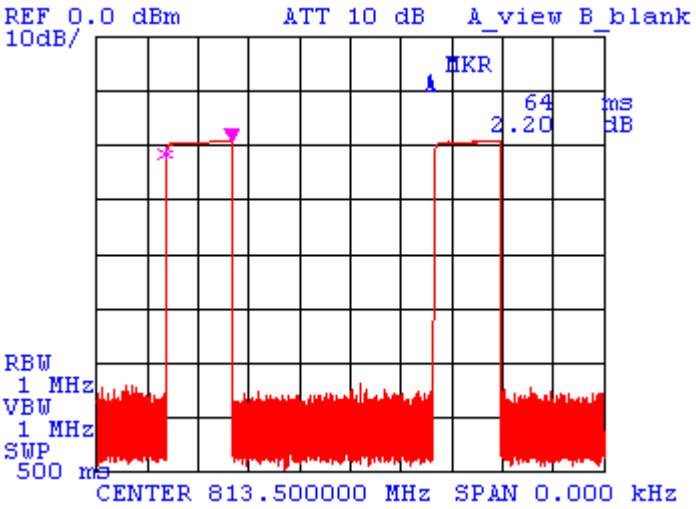
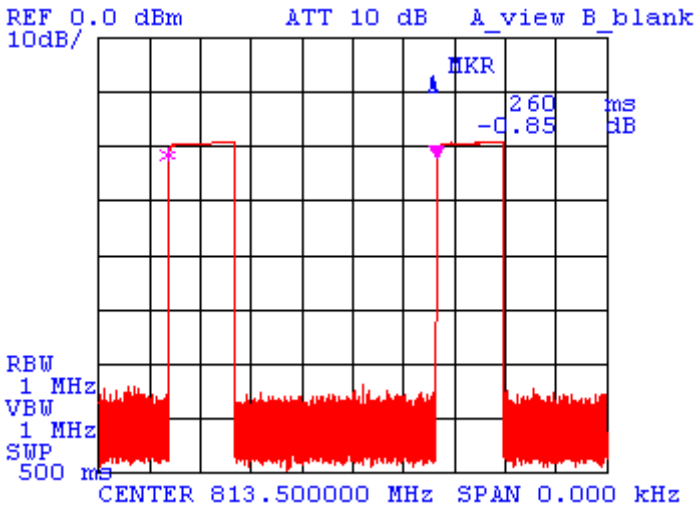

19.900
17.057
14.215
11.372
8.529
5.686
2.843
0.000
Probe Output (mV)
16.584 mV at the surface
-10
0
10
20
30
40
50
Depth (mm)

EXHIBIT 9. DUTY CYCLE INFORMATION





Duty Cycle = 64 ms / 260 ms × 100 ≅ 25%

EXHIBIT 10. TISSUE CALIBRATION

The tissue conductivity was calibrated in accordance with IEEE Std 1528-200X, Draft 6.1 November 14, 2000, Sponsor IEEE SCC 34.

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: Wayne **Date:** 10/23/2001

Frequency: 835 MHz **Mixture:** Muscle **Room Temp.:** 22.5 ±1°C

# of Points: 11 **Point Dist:** 1.0 cm

Point	Amplitude	Phase
1	-27.14	-89.90
2	-29.45	-167.97
3	-31.22	117.68
4	-33.28	40.98
5	-35.31	-34.80
6	-37.34	-110.57
7	-39.46	171.28
8	-41.65	96.30
9	-43.71	18.85
10	-45.88	-59.68
11	-47.96	-134.80

Composition

	weight	% by weight
DI Water	35,178.0 g	53.13 %
Sucrose (98 %) ← Sugar	30,208.2 g	45.62 %
2-(2-ButoxyEthoxy) Ethanol ← Alcohol	0.0 g	0.00 %
Sodium Chloride (99+ %) ← Salt	613.8 g	0.93 %
Hydroxyethyl Cellulose ← HEC	150.0 g	0.23 %
Bactericide	66.0 g	0.10 %
1,2-propanedio	0.0 g	0.00 %
	0.0 g	0.00 %
	0.0 g	0.00 %
Total	66,216.0 g	100.00 %

Results:		Target	Low Limit	High Limit	% Off Target
D. Const:	56.30	55.20	52.440	57.960	1.98
Conductivity:	0.97	0.97	0.922	1.019	-0.32

ω(rad/sec)	5.246E+09
ε_0(F/m)	8.854E-14
μ(H/m)	1.257E-08
α_{avg}(Np/cm)	-0.23882
β_{avg}(rad/cm)	-1.33456

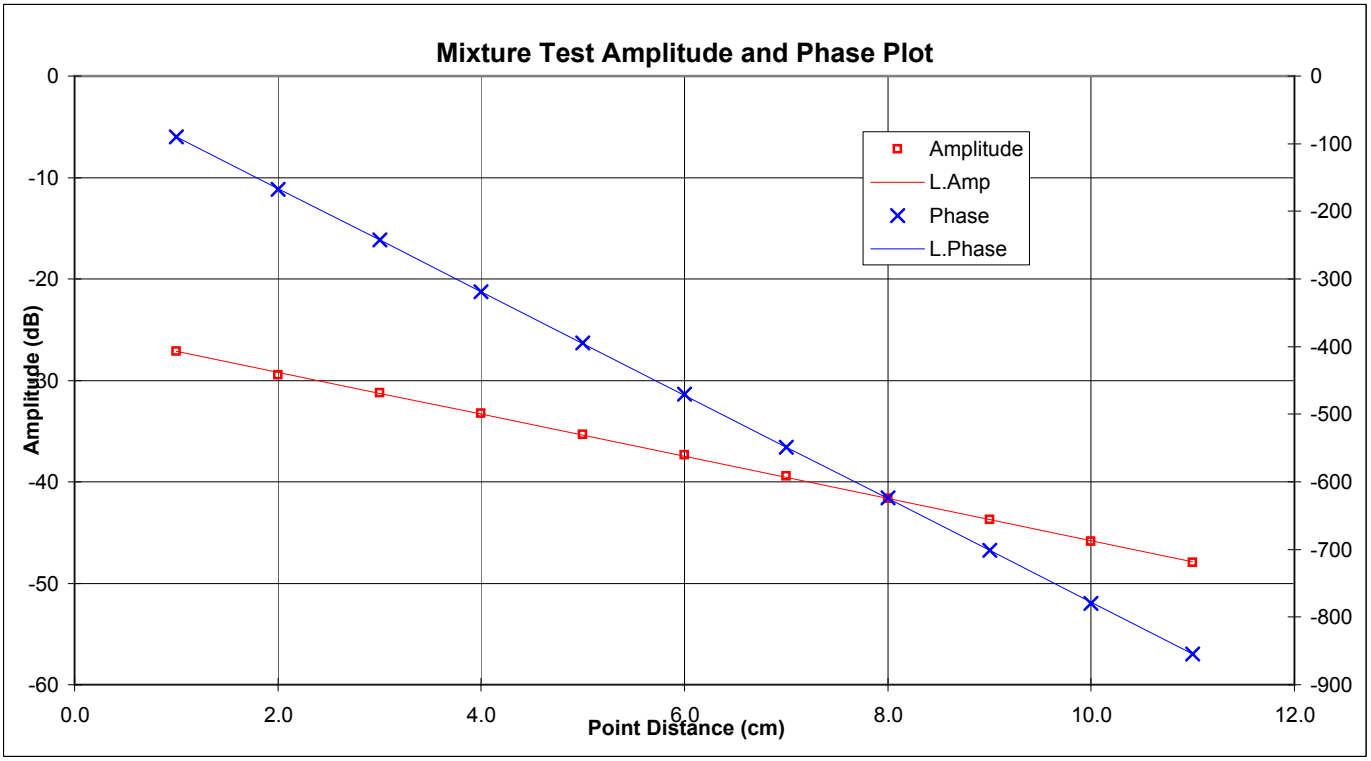
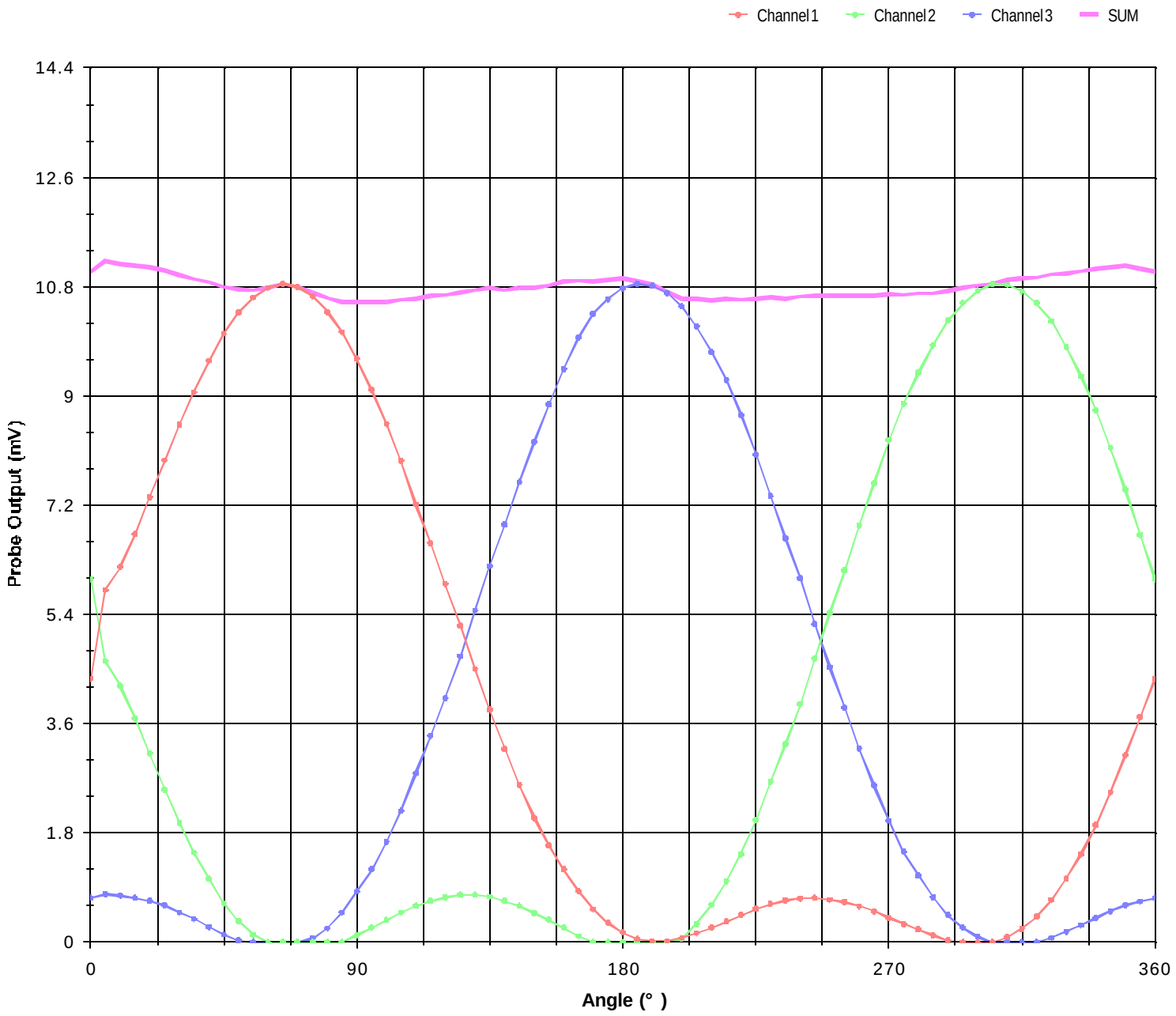


EXHIBIT 11. PROBE CALIBRATION FREE SPACE

Probe Name : UT-ETR-0200-1
Type : E-field (Triangular beam), Offset(mm) : 2.25
Frequency(MHz) : 815
Amplifier Setting : 0.00622002, 0.00590371, 0.00720910
Calibrated Date : 07/11/2001 11:17:44 AM



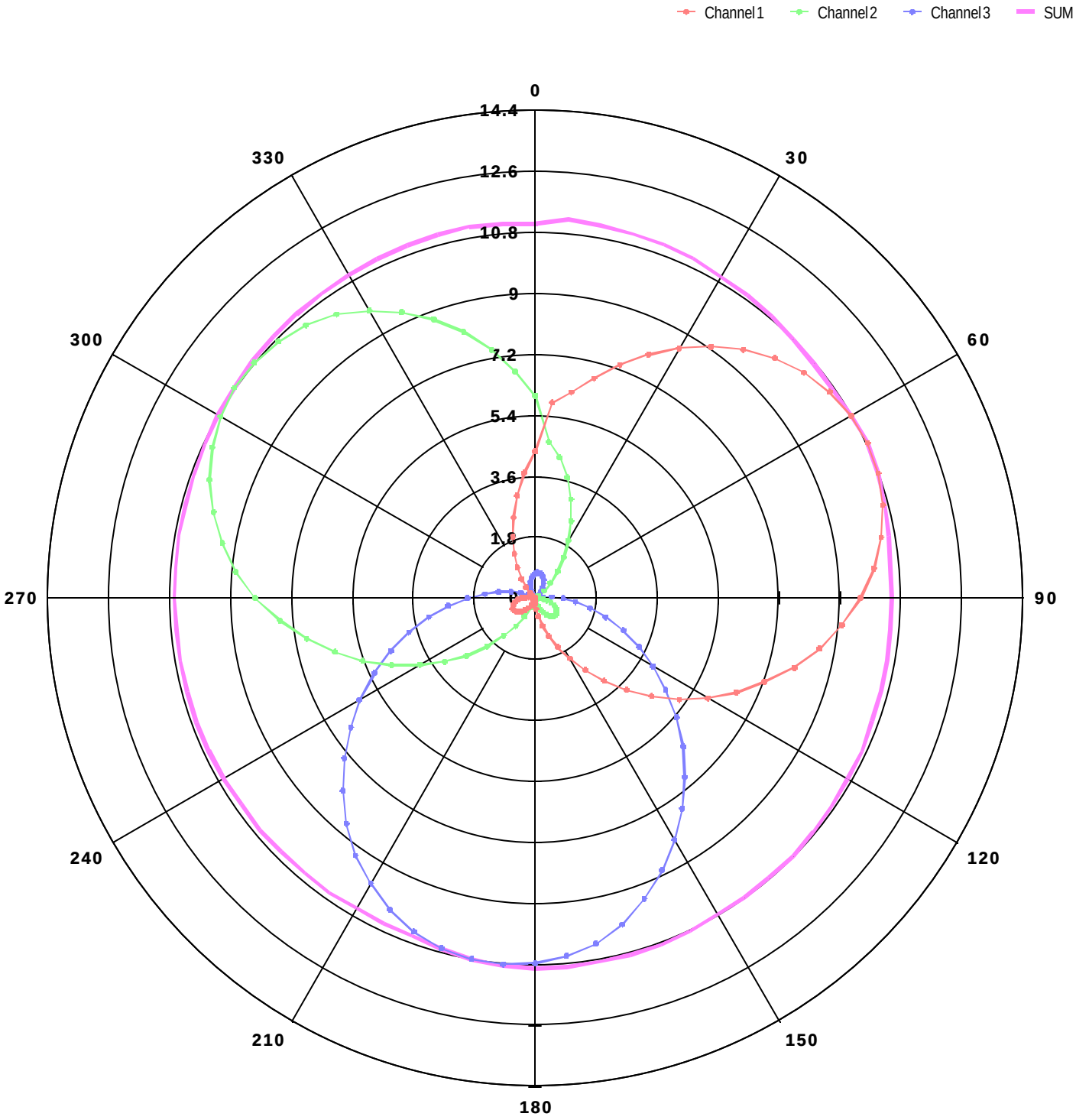
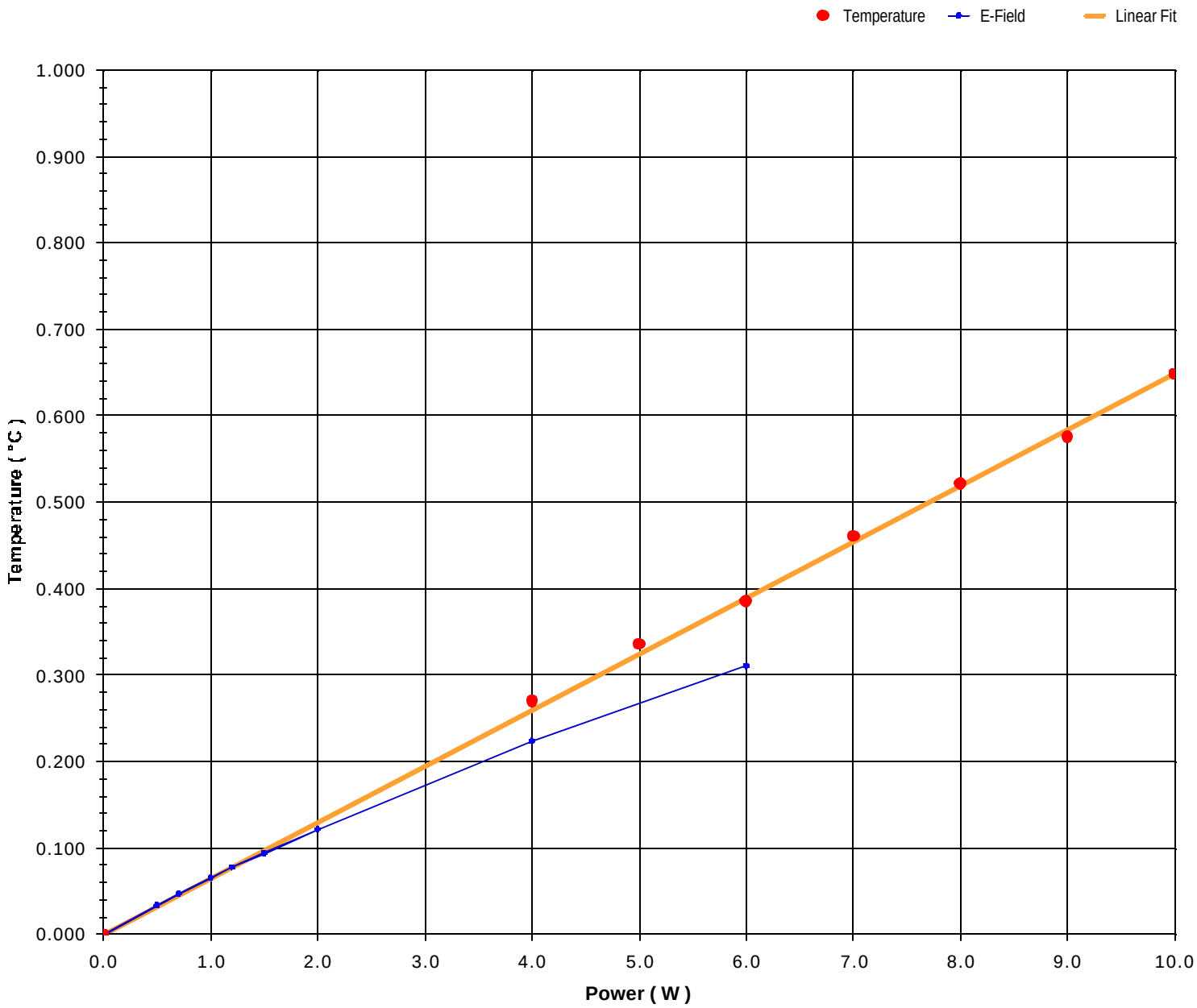

Channel 1
Channel 2
Channel 3
SUM
0
30
60
90
120
150
180
210
240
270
300
330
14.4
12.6
10.8
9
7.2
5.4
3.6
1.8
0

EXHIBIT 12. PROBE TEMPERATURE TRANSFER CALIBRATION

Probe Name : UT-ETR-0200-1
Type : E-field (Triangular beam), Offset(mm) : 2.25
Frequency(MHz) : 835, Conversion Factor : 0.6911
Simulated Tissue Type : Brain
Dielectrical Const. : 56.3, Conductivity : 0.97
Temperature - Simulated Tissue : 20.2°C, Room : 22.0°C
Calibrated Date : 25/10/2001 1:35:40 PM



E-Field & Diode Compensation