Accredited testing laboratory

DAR registration number: TTI-P-G 166/98

Federal Motor Transport Authority (KBA)
DAR registration number: KBA-P 00070-97

Test report no. : 4-0977-01-03/03-B
Type identification : PE2030 A
Test specification : Draft IEEE Std 1528-200X
FCC-ID : BEJPDAPE2030A

Table of Contents

1 General Information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM ICT Services GmbH.

1.1.1 Statement of Compliance

The SAR values found for the PE2030 A Portable Bluetooth WLAN PDA are below the maximum recommended levels of 1.6 W/Kg as averaged over any 1 g tissue according to the FCC rule §2.1093, the ANSI/IEEE C 95.1:1992 and the NCRP Report Number 86 for uncontrolled environment.

Test laboratory manager:

Date	Name	Signature
May 13, 2003	**Oliver Kneip**	

Technical responsibility for area of testing:

Date	Name	Signature
May 13, 2003	**Bernd Rebmann**	

1.2 Testing laboratory

CETECOM ICT Services GmbH
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e-mail: info@ict.cetecom.de
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State of accreditation: The Test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025. DAR registration number: TTI-P-G-166/98

Test location, if different from CETECOM ICT Services GmbH

Name: ---
Street: ---
Town: ---
Country: ---
Phone: ---
Fax: ---

1.3 Details of applicant

Name: Hewlett-Packard Company

Street: MS 060607 20555 SH 249
Town: Houston, TX 77070-2698
Country: USA

Contact: Mr. Walter Overcash
Telephone: +1-281-514-2756

1.4 Application details

Date of receipt of application:	April 17, 2003
Date of receipt of test item:	April 28, 2003
Start/Date of test:	May 9, 2003
End of test:	May 10, 2003
Person(s) present during the test:	MMr. Kyung-Su Han Mr. Yong-Ho Lim

1.5 Test item

Description of the test item:	Portable Bluetooth WLAN PDA
Type identification:	PE2030 A
Type designation:	SKU B
FCC-ID:	BEJPDAPE2030A
Serial number:	KRD31040X2
Manufacturer:	
Name:	LG Electronics Inc.
Street:	19-1 Cheongho-Ri Jinwuy-Myeon Pyungtaik-Shi Kyunggi-Do
Town:	
Country:	Korea
additional information on the DUT:	
device type :	Portable Bluetooth WLAN PDA
device category :	portable device
test device production information :	production unit
exposure category:	uncontrolled environment / general population
device operating configurations :	
operating frequency range:	BT: 2402 MHz – 2480 MHz WLAN: 2412 MHz – 2462 MHz
number of channels:	BT: 79 and WLAN: 11
measured peak output power (conducted):	BT: 1.20 mW WLAN: 51.52 mW
antenna type :	fixed integral antenna
battery options:	Samsung Battery: PE2032B Dianomics battery: PE2032A
accessories / body-worn configurations :	Jacket with Compact flash slot Headphone Y-Cable

1.6 Test specification(s)

Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01)

Draft IEEE Std 1528-200X: Version 6.4:July 2001

1.6.1 RF exposure limits

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR* (Brain)	**1.60 mW/g**	8.00 mW/g
Spatial Average SAR** (Whole Body)	0.08 mW/g	0.40 mW/g
Spatial Peak SAR*** (Hands/Feet/Ankle/Wrist)	4.00 mW/g	20.00 mW/g

Table 1: RF exposure limits

The limit applied in this test report is shown in **bold** letters

Notes:

* The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time

** The Spatial Average value of the SAR averaged over the whole body.

*** The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.	☒
The deviations as specified in 2.5 were ascertained in the course of the tests performed.	☐

2.2 Test environment

General Environment conditions in the test area are as follows :

Ambient temperature: 20°C – 24°C
Tissue simulating liquid: 20°C – 24°C
Humidity: 40% – 50%

Exact temperature values for each test are shown in the table(s) under 2.5. and/or on the measurement plots.

2.3 Measurement and test set-up

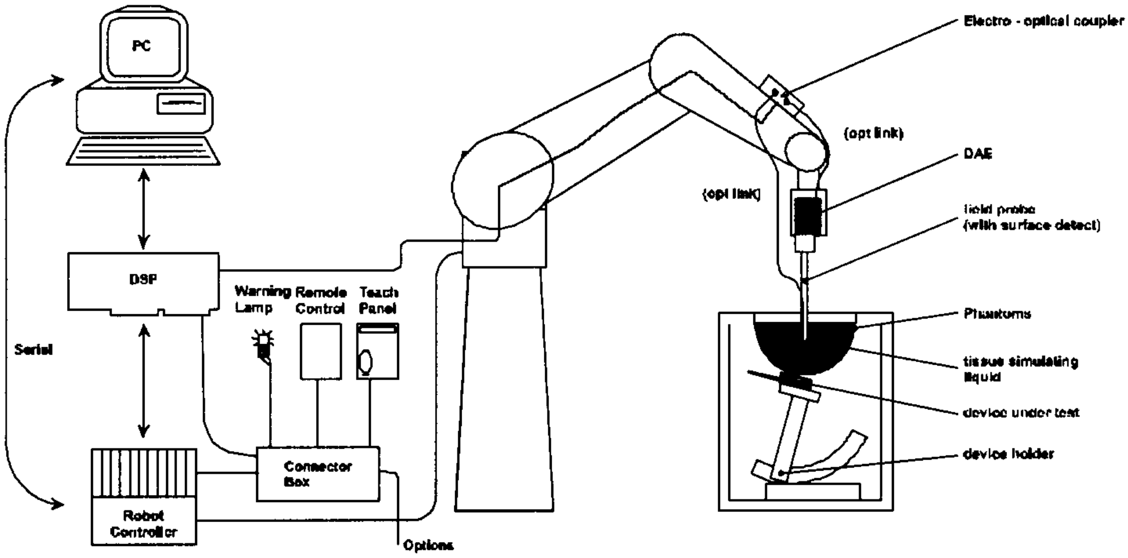
The measurement system is described in chapter 2.4.

The test setup for the system validation can be found in chapter 2.4.14.

A description of positioning and test signal control can be found in chapter 2.5 together with the test results.

2.4 Measurement system

2.4.1 System Description



The DASY3 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).

- A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

- A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

- A unit to operate the optical surface detector which is connected to the EOC.
- The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the PC plug-in card.
- The function of the PC plug-in card based on a DSP is to perform the time critical task such as signal filtering, surveillance of the robot operation fast movement interrupts.
- A computer operating Windows 95 or higher
- DASY3 software
- Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- System validation dipoles allowing to validate the proper functioning of the system.

2.4.2 Test environment

The DASY3 measurement system is placed at the head end of a room with dimensions : 5 x 2.5 x 3 m³, the SAM phantom is placed in a distance of 75 cm from the side walls and 1.1m from the rear wall. Above the test system a 1.5 x 1.5 m² array of pyramid absorbers is installed to reduce reflections from the ceiling.
Picture 1 of the photo documentation shows a complete view of the the test environment.
The system allows the measurement of SAR values larger than 0.005 mW/g.

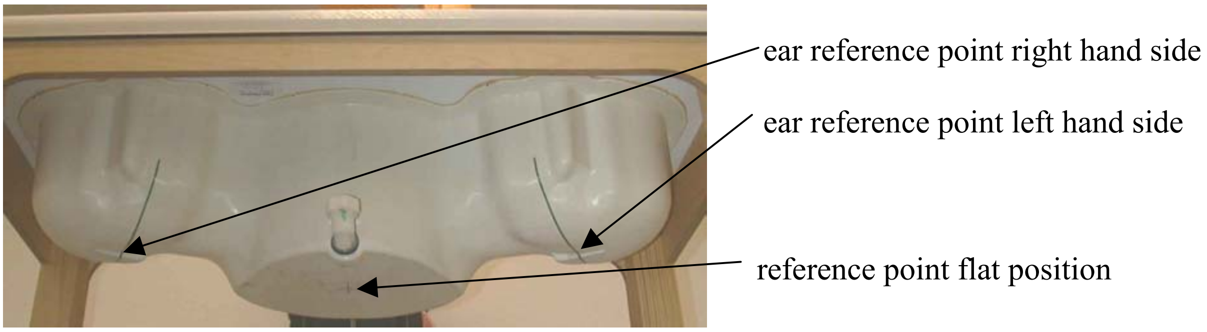
2.4.3 Probe description

Isotropic E-Field Probe ET3DV6 for Dosimetric Measurements

Technical data according to manufacturer information	
Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycolether)
Calibration	In air from 10 MHz to 2.5 GHz In head tissue simulating liquid (HSL) at 900 (800-1000) MHz and 1.8 GHz (1700-1910 MHz) (accuracy ± 9.5%; k=2) Calibration for other liquids and frequencies upon request
Frequency	10 MHz to 3 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.4 dB in HSL (rotation normal to probe axis)
Dynamic range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Optical Surface Detection	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces (ET3DV6 only)
Dimensions	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application	General dosimetry up to 3 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms (ET3DV6)

2.4.4 Phantom description

The used SAM Phantom meets the requirements specified in Edition 01-01 of Supplement C to OET Bulletin 65 for Specific Absorption Rate (SAR) measurements.
The phantom consists of a fibreglass shell integrated in a wooden table. It allows left-hand and right-hand head as well as body-worn measurements with a maximum liquid depth of 18 mm in head position and 22 mm in planar position (body measurements). The thickness of the Phantom shell is 2 mm +/- 0.1 mm.



2.4.5 Device holder description

The DASY3 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. This device holder is used for standard mobile phones or PDA's only. If necessary an additional support of polystyrene material is used.

Larger DUT's (e.g. notebooks) cannot be tested using this device holder. Instead a support of bigger polystyrene cubes and thin polystyrene plates is used to position the DUT in all relevant positions to find and measure spots with maximum SAR values .
Therefore those devices are normally only tested at the flat part of the SAM.

2.4.6 Scanning procedure

The DASY3 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

- The „reference“ and „drift“ measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max. +/- 5 %.

- The „surface check“ measurement tests the optical surface detection system of the DASY3 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

  The „coarse scan“ measures the SAR above the DUT or verification dipole on a parallel plane to the surface. It is used to locate the approximate location of the peak SAR with 2D spline interpolation. The robot performs a stepped movement along one grid axis while the local electrical field strenth is measured by the probe. The probe is touching the surface of the SAM during acquisition of measurement values. The standard scan uses large grid spacing for faster measurement. Standard grid spacing for head measurements is 15 mm in x- and y- dimension. If a finer graphic is needed, the grid spacing can be reduced. Grid spacing and orientation have no influence on the SAR result. For special applications where the standard scan method does not find the peak SAR within the grid, e.g. mobile phones with flip cover, the grid can be adapted in orientation.
  Results of this coarse scan are shown in annex 2.

- A „cube 7x7x7 scan” measures the field in a volume around the 2D peak SAR value acquired in the previous „coarse“ scan. This is a fine 7x7 grid where the robot additionally moves the probe in 7 steps along the z-axis away from the bottom of the Phantom. Grid spacing for the cube measurement is 8 mm in x and y-direction and 5 mm in z-direction. In this document, the evaluated peak 1g and 10g averaged SAR values are shown in the 2D-graphics in annex 2. Test results relevant for the specified standard (see chapter 1.6.) are shown in table form in chapter 2.5.

- A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 7x7x7 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 2mm steps. This measurement shows the continuity of the liquid and can - depending in the field strength – also show the liquid depth. A z-axis scan of the measurement with maximum SAR value is shown in annex 2.

2.4.7 Spatial Peak SAR Evaluation

The spatial peak SAR - value for 1 and 10 g is evaluated after the Cube measurements have been done. The basis of the evaluation are the SAR values measured at the points of the fine cube grid consisting of 7 x 7 x 7 points. If any parameter is changed afterwards with ‘File Modify’ (for example crest factor or medium factors) a re-evaluation of the measurement is needed. This evaluation can be repeated by selecting ‘Job Evaluation’ on the selected scans. The algorithm that finds the maximal averaged volume is separated into three different stages.

- The data between the dipole center of the probe and the surface of the phantom are extrapolated. This data cannot be measured since the center of the dipole is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is about 1 mm (see probe calibration sheet). The extrapolated data from a cube measurement can be visualized by selecting ‘Graph Evaluated’.

- The maximum interpolated value is searched with a straight-forward algorithm. Around this maximum the SAR - values averaged over the spatial volumes (1g or 10 g) are computed using the 3d-spline interpolation algorithm. If the volume cannot be evaluated (i.e., if a part of the grid was cut off by the boundary of the measurement area) the evaluation will be started on the corners of the bottom plane of the cube.

- All neighboring volumes are evaluated until no neighboring volume with a higher average value is found.

Extrapolation

The extrapolation is based on a least square algorithm [W. Gander, Computermathematik, p.168-180]. Through the points in the first 3 cm along the z-axis, polynomials of order four are calculated. These polynomials are then used to evaluate the points between the surface and the probe tip. The points, calculated from the surface, have a distance of 1 mm from each other.

Interpolation

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a knot"-condition [W. Gander, Computermathematik, p.141-150] (x, y and z -direction) [Numerical Recipes in C, Second Edition, p.123ff].

Volume Averaging

At First the size of the cube is calculated. Then the volume is integrated with the trapezoidal algorithm. 8000 points (20x20x20) are interpolated to calculate the average.

Advanced Extrapolation

The BIOEMC group of the ETH Zurich is currently investigating the boundary effects on E-field probes. As soon as the research is finished DASY3 will allow to compensate for these boundary effects. But until then we do not encourage to use the ‘Advanced Extrapolation’ option.

2.4.8 Data Storage and Evaluation

Data Storage

The DASY3 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DA3". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated. To avoid unintentional parameter changes or data manipulations, the parameters in measured files are locked. In the administrator access mode of the software, the parameters can be unlocked by selecting the "modify"-switch in the "file"-pull down menu. After changing the parameters, the measured scans must be re-evaluated by selecting them and using the "evaluate"-option in the "scan"-pull down menu.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

Data Evaluation

The DASY3 software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	Dcpi
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY3 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot cf/dcp_i$$

with	V_i	= compensated signal of channel i	(i = x, y, z)
	U_i	= input signal of channel i	(i = x, y, z)
	cf	= crest factor of exciting field	(DASY parameter)
	dcp_i	= diode compression point	(DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes: $$E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$$

H-field probes: $$H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1}f + a_{i2}f^2)/f$$

with	V_i	= compensated signal of channel i	(i = x, y, z)
	$Norm_i$	= sensor sensitivity of channel i [mV/(V/m)^2] for E-field Probes	(i = x, y, z)
	ConvF	= sensitivity enhancement in solution	
	a_{ij}	= sensor sensitivity factors for H-field probes	
	f	= carrier frequency [GHz]	
	E_i	= electric field strength of channel i in V/m	
	H_i	= magnetic field strength of channel i in A/m	

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}$$

The primary field data are used to calculate the derived field units.

$$SAR = (E_{tot}^2 \cdot \sigma) / (\rho \cdot 1000)$$

with	SAR	= local specific absorption rate in mW/g
	E_{tot}	= total field strength in V/m
	σ	= conductivity in [mho/m] or [Siemens/m]
	ρ	= equivalent tissue density in g/cm^3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 / 3770 \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with	P_{pwe}	= equivalent power density of a plane wave in mW/cm^2
	E_{tot}	= total electric field strength in V/m
	H_{tot}	= total magnetic field strength in A/m

2.4.9 Test equipment utilized

This table gives a complete overview of the SAR measurement equipment

Devices used during the test described in chapter 2.5. are marked ☒

	Manufacturer	Device	Type	Serial number	Date of last calibration)*
☐	Schmid & Partner Engineering AG	Dosimetric E-Field Probe	ET3DV6	1558	March 22, 2002
☒	Schmid & Partner Engineering AG	Dosimetric E-Field Probe	ET3DV6	1559	April 16, 2003
☐	Schmid & Partner Engineering AG	900 MHz System Validation Dipole	D900V2	102	February 7, 2003
☐	Schmid & Partner Engineering AG	1800 MHz System Validation Dipole	D1800V2	287	February 7, 2003
☐	Schmid & Partner Engineering AG	1900 MHz System Validation Dipole	D1900V2	5d009	June 13, 2002
☒	Schmid & Partner Engineering AG	2450 MHz System Validation Dipole	D2450V2	710	July 15, 2002
☒	Schmid & Partner Engineering AG	Data acquisition electronics	DAE3V1	413	February 3, 2003
☒	Schmid & Partner Engineering AG	Software	DASY 3 V3.1d	---	N/A
☒	Schmid & Partner Engineering AG	Phantom	SAM	---	N/A
☐	Rohde & Schwarz	Universal Radio Communication Tester	CMU 200	U-972406/000	August 30, 2002
☐	Agilent	Network Analyser 300 kHz to 3 GHz	8753C	2936A00872	February 11, 2003
☐	Agilent	Dielectric Probe Kit	85070C	US99360146	N/A
☐	Agilent	Peak Power Analyzer	8990A	3128A00169	August 6, 2002
☐	Agilent	Peak Power Sensor	84813A	3125A00111	September 18, 2002
☒	Rohde & Schwarz	Signal Generator	SMPD	882.362/009	December 15, 2002
☒	Amplifier Reasearch	Amplifier	25S1G4 (25 Watt)	20452	N/A
☒	Agilent	Power Meter	438A	2804U01006	April 12,2002
☒	Agilent	Power Meter Sensor	8482A	2703A03025	April 22, 2002

)* : Measurement devices are in a 1-year calibration cycle, validation dipoles are in a 2-year calibration cycle

2.4.10 Tissue simulating liquids : dielectric properties

The following materials are used for producing the tissue-equivalent materials

(liquids used for tests described in chapter 2.5. are marked with ☒) :

Ingredients (% of weight)	Frequency (MHz)					
frequency band	☐ 450	☐ 835	☐ 900	☐ 1800	☐ 1900	☒ 2450
Tissue Type	Head	Head	Head	Head	Head	Head
Water	38.56	41.45	41.05	52.64	52.64	62.7
Salt (NaCl)	3.95	1.45	1.35	0.36	0.36	0.5
Sugar	56.32	56.0	56.5	0.0	0.0	0.0
HEC	0.98	1.0	1.0	0.0	0.0	0.0
Bactericide	0.19	0.1	0.1	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	36.8
DGBE	0.0	0.0	0.0	47.0	47.0	0.0

Table 2: Head tissue dielectric properties

Ingredients (% of weight)	Frequency (MHz)					
frequency band	☐ 450	☐ 835	☐ 900	☐ 1800	☐ 1900	☒ 2450
Tissue Type	Body	Body	Body	Body	Body	Body
Water	51.16	52.4	56.0	69.91	69.91	73.2
Salt (NaCl)	1.49	1.40	0.76	0.13	0.13	0.04
Sugar	46.78	45.0	41.76	0.0	0.0	0.0
HEC	0.52	1.0	1.21	0.0	0.0	0.0
Bactericide	0.05	0.1	0.27	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0
DGBE	0.0	0.0	0.0	29.96	29.96	26.7

Table 3: Body tissue dielectric properties

Salt: 99+% Pure Sodium Chloride
Sugar: 98+% Pure Sucrose
Water: De-ionized, 16MΩ+ resistivity
HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100(ultra pure): Polyethylene glycol mono [4-(1,1,3,3-tetramethylbutyl)phenyl]ether

2.4.11 Tissue simulating liquids : parameters

Used Target Frequency	**Target Head Tissue**		**Measured Head Tissue**		**Measured Date**
[MHz]	Permittivity	Conductivity [S/m]	Permittivity	Conductivity [S/m]	
2450	39.2	1.80	41.2	1.88	2003-05-03

Table 4: Parameter of the head tissue simulating liquid

Used Target Frequency	**Target Body Tissue**		**Measured Body Tissue**		**Measured Date**
[MHz]	Permittivity	Conductivity [S/m]	Permittivity	Conductivity [S/m]	
2450	52.7	1.95	51.5	1.94	2003-05-02

Table 5: Parameter of the body tissue simulating liquid

Note: The dielectric properties have been measured using the contact probe method at 22°C.

2.4.12 Measurement uncertainties

The overall combined measurement uncertainty of the measurement system is ± 13,6% (K=1). The breakdown of the individual uncertainties is as follows:

Error Sources	Uncertainty Value	Probability Distribution	Divisor	c_i	Standard Uncertainty	v_i^2 or v_{eff}
Measurement System						
Probe calibration	± 4.4%	Normal	1	1	± 4.4%	∞
Axial isotropy	± 4.7%	Rectangular	√3	$(1\text{-}cp)^{1/2}$	± 1.9%	∞
Spherical isotropy	± 9.6%	Rectangular	√3	$(cp)^{1/2}$	± 3.9%	∞
Spatial resolution	± 0.0%	Rectangular	√3	1	± 0.0%	∞
Boundary effects	± 5.5%	Rectangular	√3	1	± 3.2%	∞
Probe linearity	± 4.7%	Rectangular	√3	1	± 2.7%	∞
Detection limit	± 1.0%	Rectangular	√3	1	± 0.6%	∞
Readout electronics	± 1.0%	Normal	1	1	± 1.0%	∞
Response time	± 0.8%	Rectangular	√3	1	± 0.5%	∞
Integration time	± 1.4%	Rectangular	√3	1	± 0.8%	∞
RF ambient conditions	± 3.0%	Rectangular	√3	1	± 1.7%	∞
Mech. robot constructions	± 0.4%	Rectangular	√3	1	± 0.2%	∞
Probe positioning	± 2.9%	Rectangular	√3	1	± 1.7%	∞
Extrapolation & integration	± 3.9%	Rectangular	√3	1	± 2.3%	∞
Test Sample Related						
Device holder	± 6.0%	Normal	0.89	1	± 6.7%	12
Device holder uncertainty	± 5.0%	Normal	0.84	1	± 5.9%	8
Power drift	± 5.0%	Rectangular	√3	1	± 2.9%	∞
Phantom and Set-up						
Phantom uncertainty	± 4.0%	Rectangular	√3	1	± 2.3%	∞
Liquid conductivity (target)	± 5.0%	Rectangular	√3	0.6	± 1.7%	∞
Liquid conductivity (meas.)	± 10.0%	Rectangular	√3	0.6	± 3.5%	∞
Liquid permittivity (target)	± 5.0%	Rectangular	√3	0.6	± 1.7%	∞
Liquid permittivity (meas.)	± 5.0%	Rectangular	√3	0.6	± 1.7%	∞
Combined Uncertainty					± 13.6%	

Table 6: Measurement uncertainties

The measurement uncertainty budget suggested by IEEE Std 1528-200X and determined by Schmid & Partner Engineering AG. The expanded uncertainty (k=2) is assessed to be ± 27.2%

2.4.13 System validation

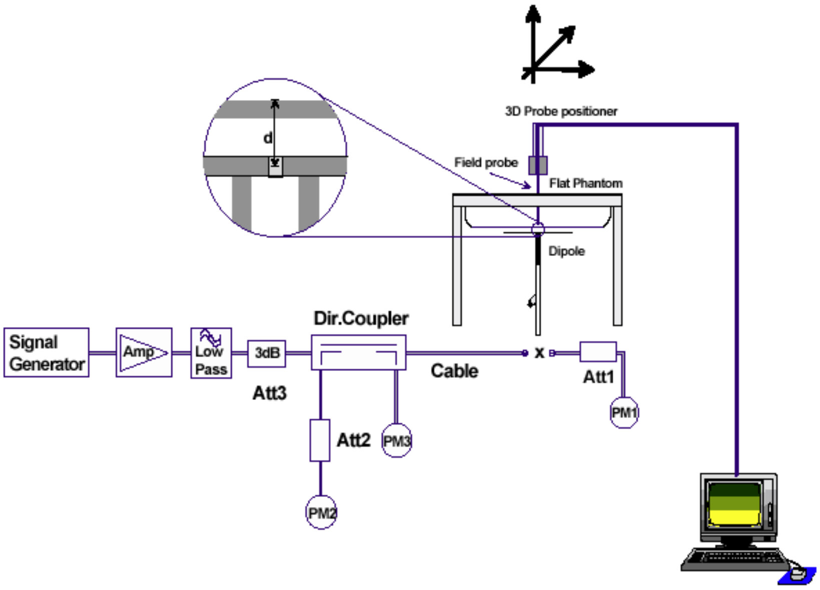
The system validation is performed for verifying the accuracy of the complete measurement system and performance of the software. The system validation is performed with tissue equivalent material according to IEEE Std 1528-200X: 2001 (described above). The following table shows validation results for all frequency bands and tissue liquids used during the tests of the test item described in chapter 1.5. (graphic plot(s) see annex 1).

Validation Kit	Frequency	Target Peak SAR (1000 mW) (+/- 10%)	Target SAR_{1g} (1000 mW) (+/- 10%)	Measured Peak SAR	Measured SAR_{1g}	Measured date
D2450V2 S/N: 710	**2450 MHz head**	**117.2 mW/g**	**57.2 mW/g**	**118 mW/g**	**57.1 mW/g**	**2003-05-03**
D2450V2 S/N: 710	**2450 MHz body**	**112.8 mW/g**	**56.0 mW/g**	**113 mW/g**	**57.1 mW/g**	**2003-05-02**

Table 7: Results system validation

2.4.14 Validation procedure

The validation is performed by using a validation dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a plexiglass spacer. The dipole is connected to the the signal source consisting of signal generator and amplifier via an directional coupler , N-connector cable and adaption to SMA. It is fed with a power of 1000 mW. To adjust this power a power meter is used . The power sensor is connected to the cable before the validation to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the validation to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).
Validation results have to be equal or near the values determined during dipole calibration (target SAR in table above) with the relevant liquids and test system.



2.5 Test results (Head SAR)

The table contains the measured SAR values averaged over a mass of 1 g				
Channel / frequency	Position	SAR value	Limit	Liquid temperature
6 / 2437 GHz	touch left 2nd cube	0.608 W/kg 0.296 W/kg	1.6 W/kg	21.0 °C
6 / 2437 GHz	tilted left	0.617 W/kg	1.6 W/kg	21.0 °C
6 / 2437 GHz	touch right	1.060 W/kg	1.6 W/kg	22.0 °C
6 / 2437 GHz	tilted right	1.040 W/kg	1.6 W/kg	22.0 °C
1 / 2412 GHz	touch right	0.830 W/kg	1.6 W/kg	22.0 °C
11 / 2462 GHz	touch right	1.090 W/kg	1.6 W/kg	23.0 °C
1 / 2412 GHz	tilted right	0.815 W/kg	1.6 W/kg	23.0 °C
11 / 2462 GHz	tilted right	1.030 W/kg	1.6 W/kg	23.0 °C

Table 8: Test results (Head SAR)

Note : The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8 W/kg) , testing at the high and low channels is optional.

2.6 Test results (Body SAR - Diamonics battery)

The table contains the measured SAR values averaged over a mass of 1 g				
Channel / frequency	Position	SAR value	Limit	Liquid temperature
6 / 2437 GHz	front	0.190 W/kg	1.6 W/kg	21.2 °C
6 / 2437 GHz	rear	0.142 W/kg	1.6 W/kg	21.2 °C

Table 9: Test results (Body SAR – Diamonics battery)

Note : The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8 W/kg) , testing at the high and low channels is optional.

2.7 Test results (Body SAR - Samsung battery)

The table contains the measured SAR values averaged over a mass of 1 g				
Channel / frequency	Position	SAR value	Limit	Liquid temperature
6 / 2437 GHz	front	0.178 W/kg	1.6 W/kg	21.0 °C
6 / 2437 GHz	rear 2nd cube	0.137 W/kg 0.0889 W/kg	1.6 W/kg	21.9 °C

Table 10: Test results (Body SAR – Samsung battery)

Note : The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8 W/kg) , testing at the high and low channels is optional.

2.8 Test results (Body SAR – Diamonics battery and Auxilliary equipment installed)

The table contains the measured SAR values averaged over a mass of 1 g				
Channel / frequency	Position	SAR value	Limit	Liquid temperature
6 / 2437 GHz	front	0.131 W/kg	1.6 W/kg	21.0 °C
6 / 2437 GHz	rear 2nd cube	0.0402 W/kg 0.0680 W/kg	1.6 W/kg	21.0 °C

Table 11: Test results (Body SAR – Diamonics battery and Auxilliary eqipment installed)

Note : The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8 W/kg) , testing at the high and low channels is optional.

2.8.1 Description of test positions during SAR evaluation

To evaluate the maximum SAR exposure the EUT was tested with both batteries in body worn position. The test configuration showing the highest SAR values was assumed as worst case configuration. All other tests were performed using this configuration. Additionally the EUT was tested in body worn position with Jacket, SD-Memory card, Y-Cable and Headphone installed.
The EUT was controlled by internal test software during testing. The SAR measurements were performed with both the WLAN and Bluetooth module transmitting at the same time. During the tests both modules were set to their maximum output power. The liquid properties for WLAN frequencies were used during testing, since WLAN hat the highest output power.

touch	The front side of the EUT was touching the phantoms head with the WLAN antenna located near the Ear Reference Point.

tilted	Same position as described under touch but with the lower end of the EUT tilted for 15 degrees away from the phantom.
front	The front side of the EUT was in parallel to the body part of the phantom with a distance of 15 mm between phantom and EUT.
rear	The rear side of the EUT was in parallel to the body part of the phantom with a distance of 15 mm between phantom and EUT.

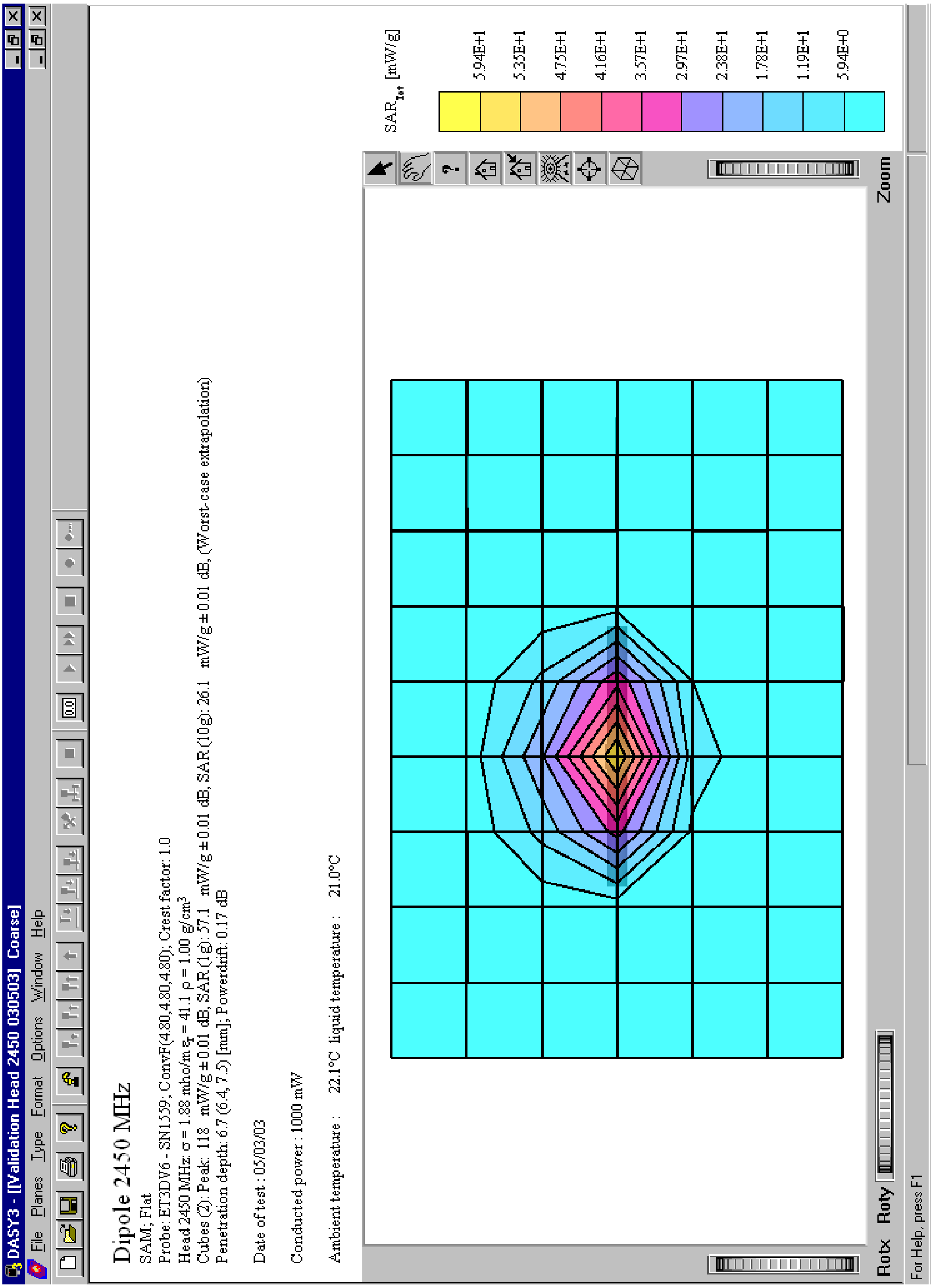
2.9 Test results (conducted power measurement)

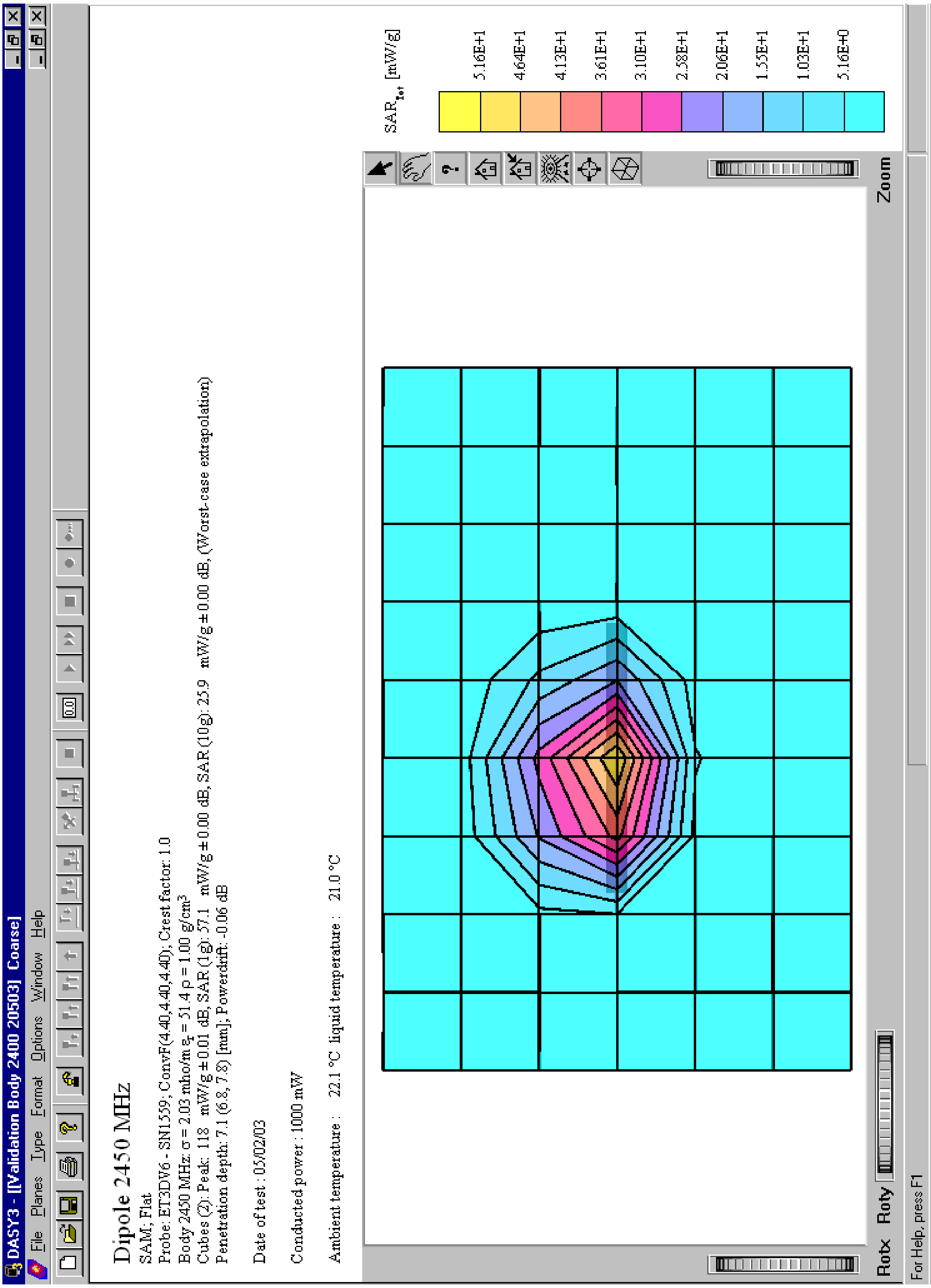
For the measurements an Rhode & Schwarz Radio Communication Tester CMU 200 was used. The output power was measured using an integrated RF connector and attached RF cable.
The conducted output power was measured before and after each SAR measurement. The resulting power values were within a 0.2 dB tolerance of the values shown below.

WLAN 2.4 GHz	
Channel / frequency	peak power
1 / 2412 MHz	17.31 dBm
6 / 2437 MHz	17.81 dBm
11 / 2462 MHz	17.12 dBm
Bluetooth 2.4 GHz	
Channel / frequency	peak power
0 / 2402 MHz	0.48 dBm
39 / 2442 MHz	0.43 dBm
78 / 2480 MHz	0.79 dBm

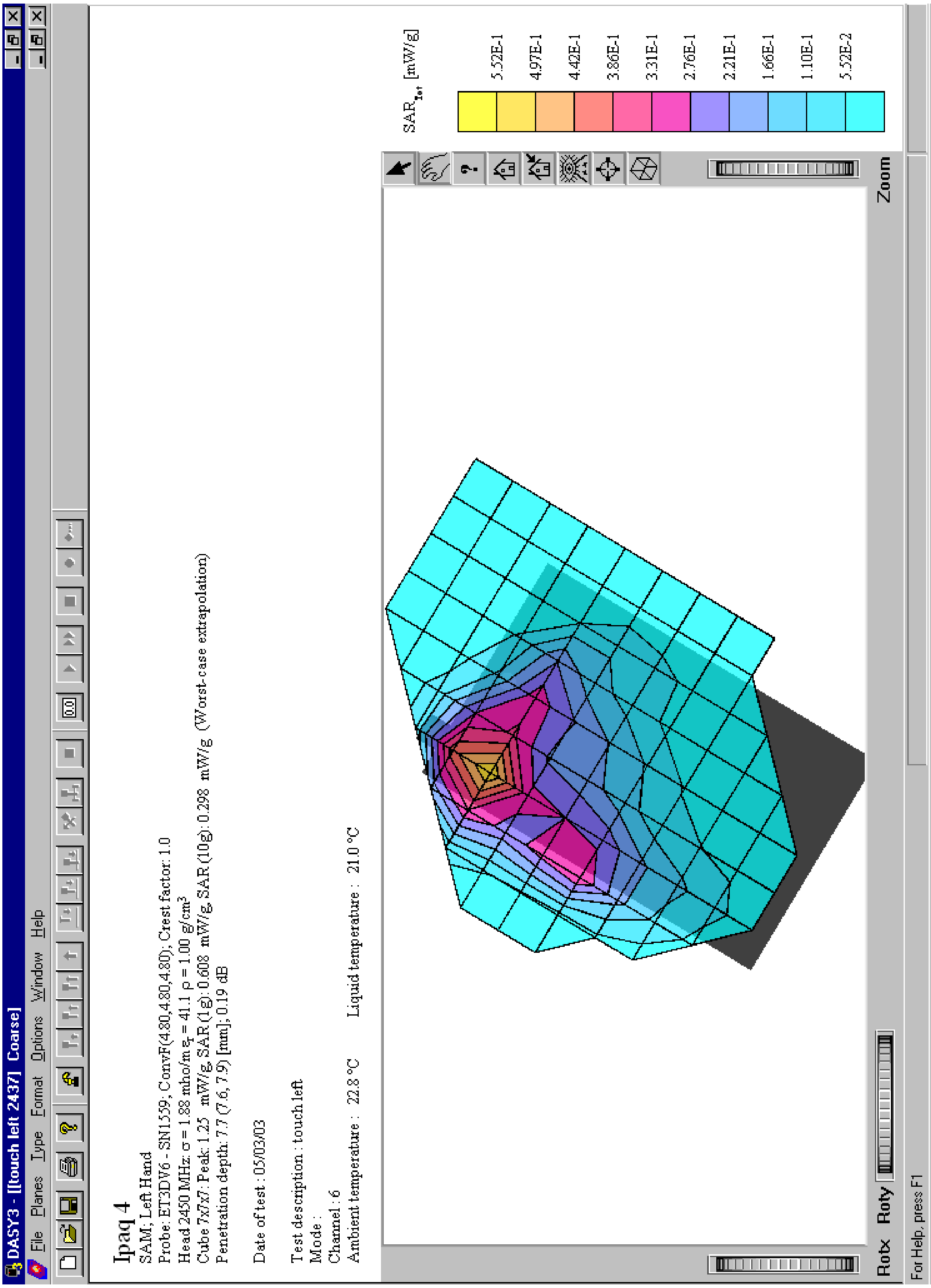
Table 12: Test results conducted peak power measurement

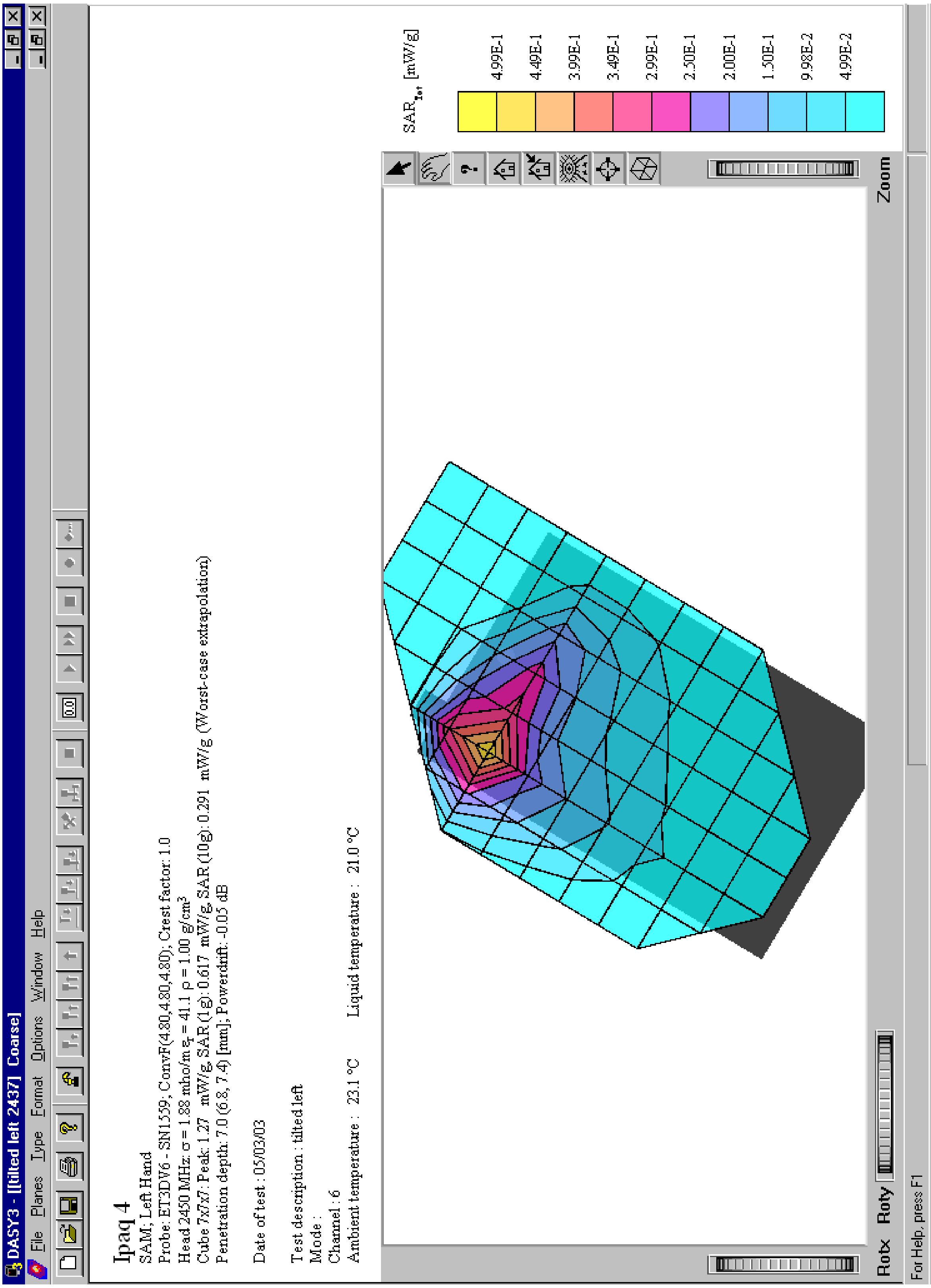
Annex 1 System performance verification

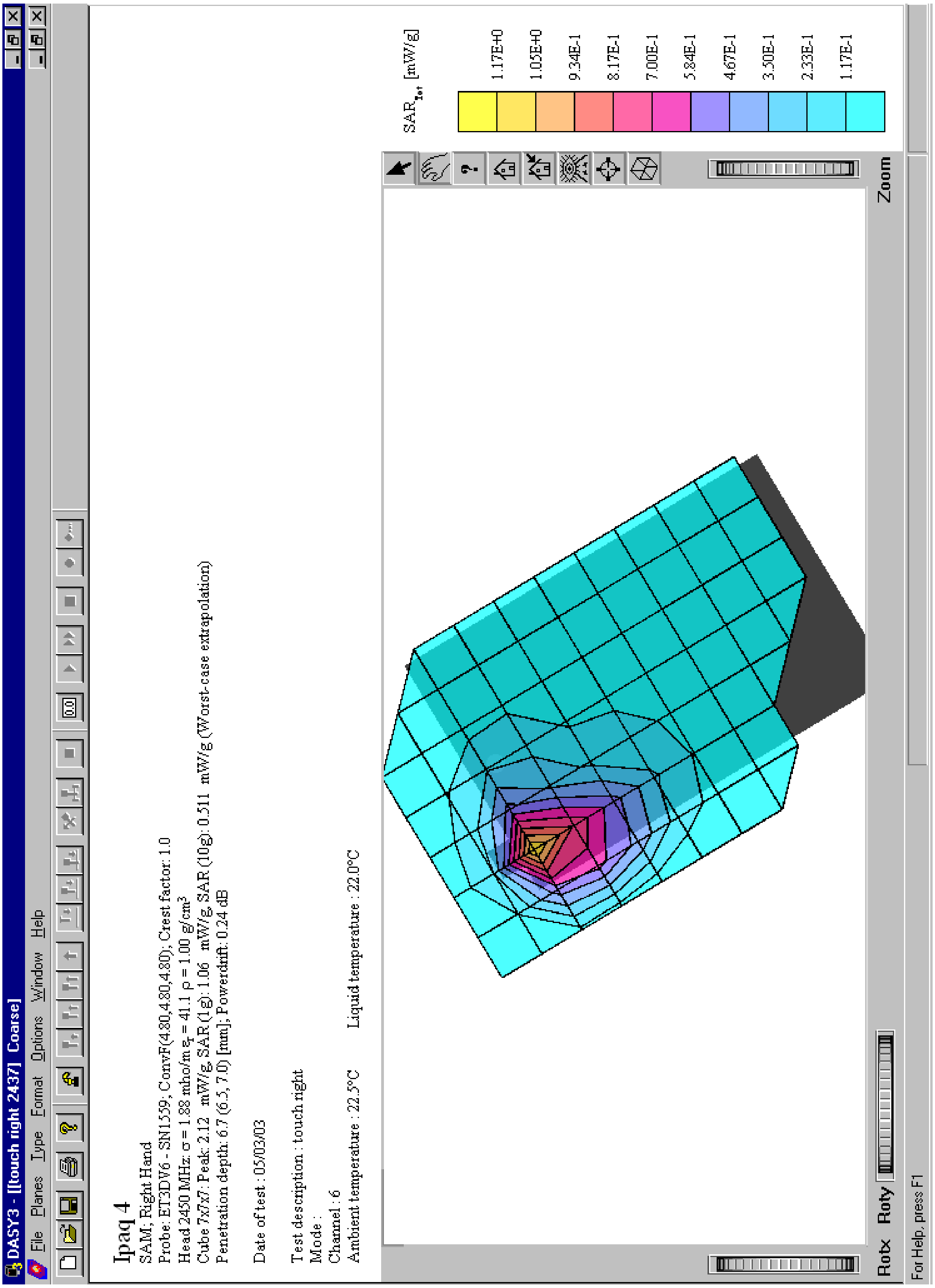


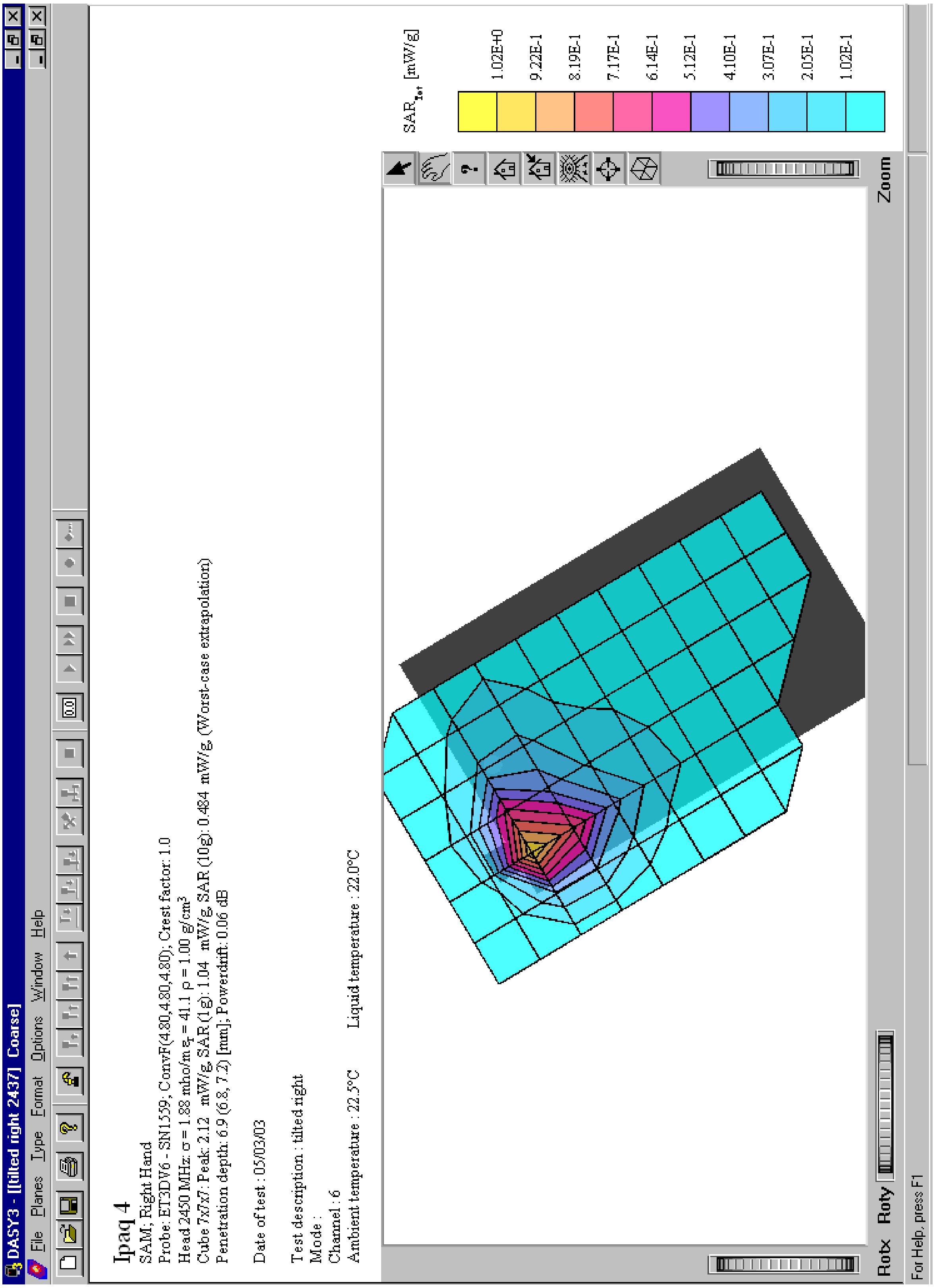

DASY3 - [[Validation Body 2400 20503] Coarse]
File Planes Type Format Options Window Help
Dipole 2450 MHz
SAM; Flat
Probe: ET3DV6 - SN1559; ConvF(4.40,4.40,4.40); Crest factor: 1.0
Body 2450 MHz: σ = 2.03 mho/m εr = 51.4 ρ = 1.00 g/cm3
Cubes (2): Peak: 118 mW/g ± 0.01 dB, SAR (1g): 57.1 mW/g ± 0.00 dB, SAR (10g): 25.9 mW/g ± 0.00 dB, (Worst-case extrapolation)
Penetration depth: 7.1 (6.8, 7.8) [mm]; Powerdrift: -0.06 dB
Date of test : 05/02/03
Conducted power : 1000 mW
Ambient temperature : 22.1 °C liquid temperature : 21.0 °C
SARTot [mW/g]
5.16E+1
4.64E+1
4.13E+1
3.61E+1
3.10E+1
2.58E+1
2.06E+1
1.55E+1
1.03E+1
5.16E+0
Zoom
Rotx Roty
For Help, press F1

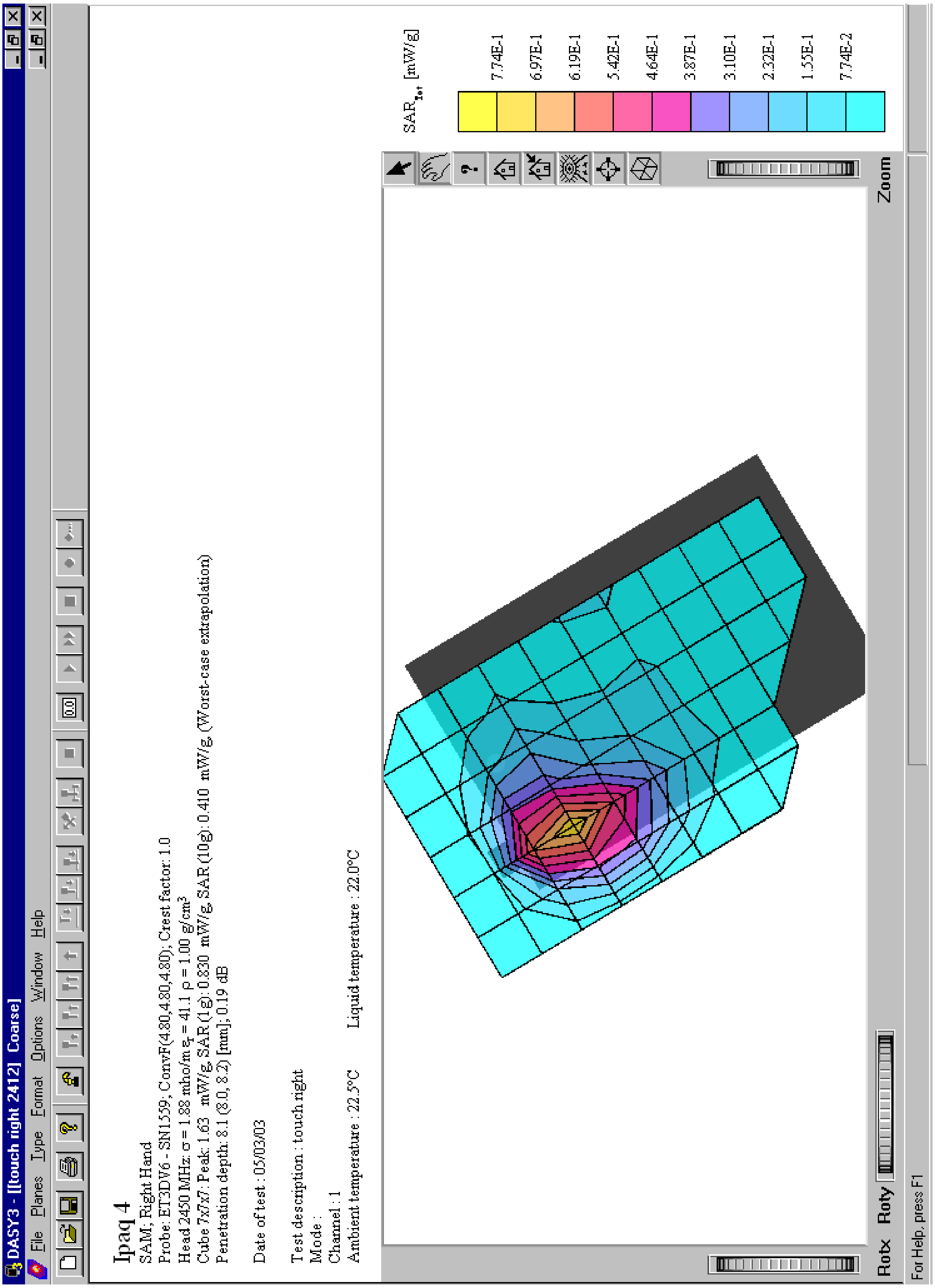
Annex 2 Measurement results (printout from DASY ™)

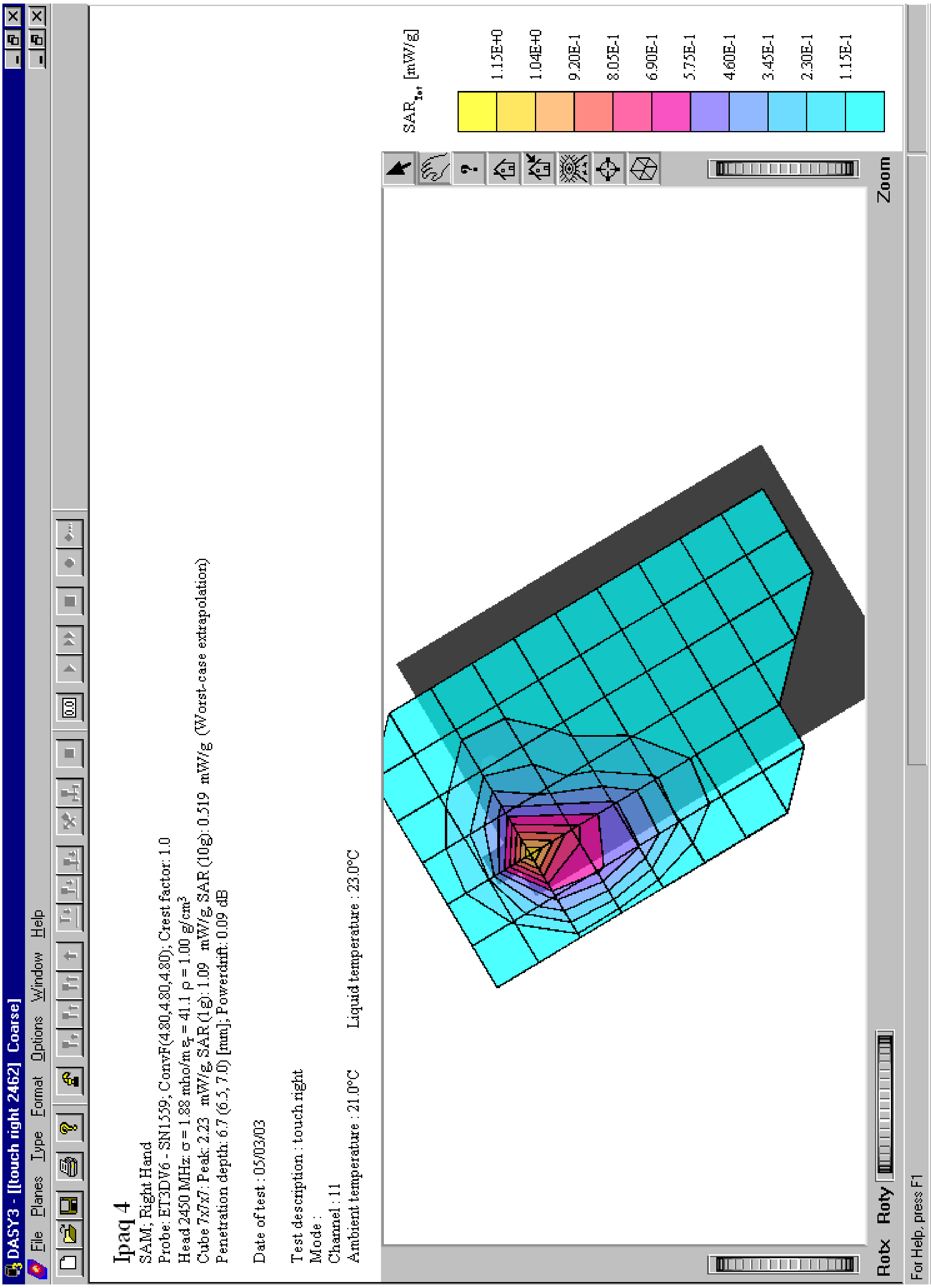


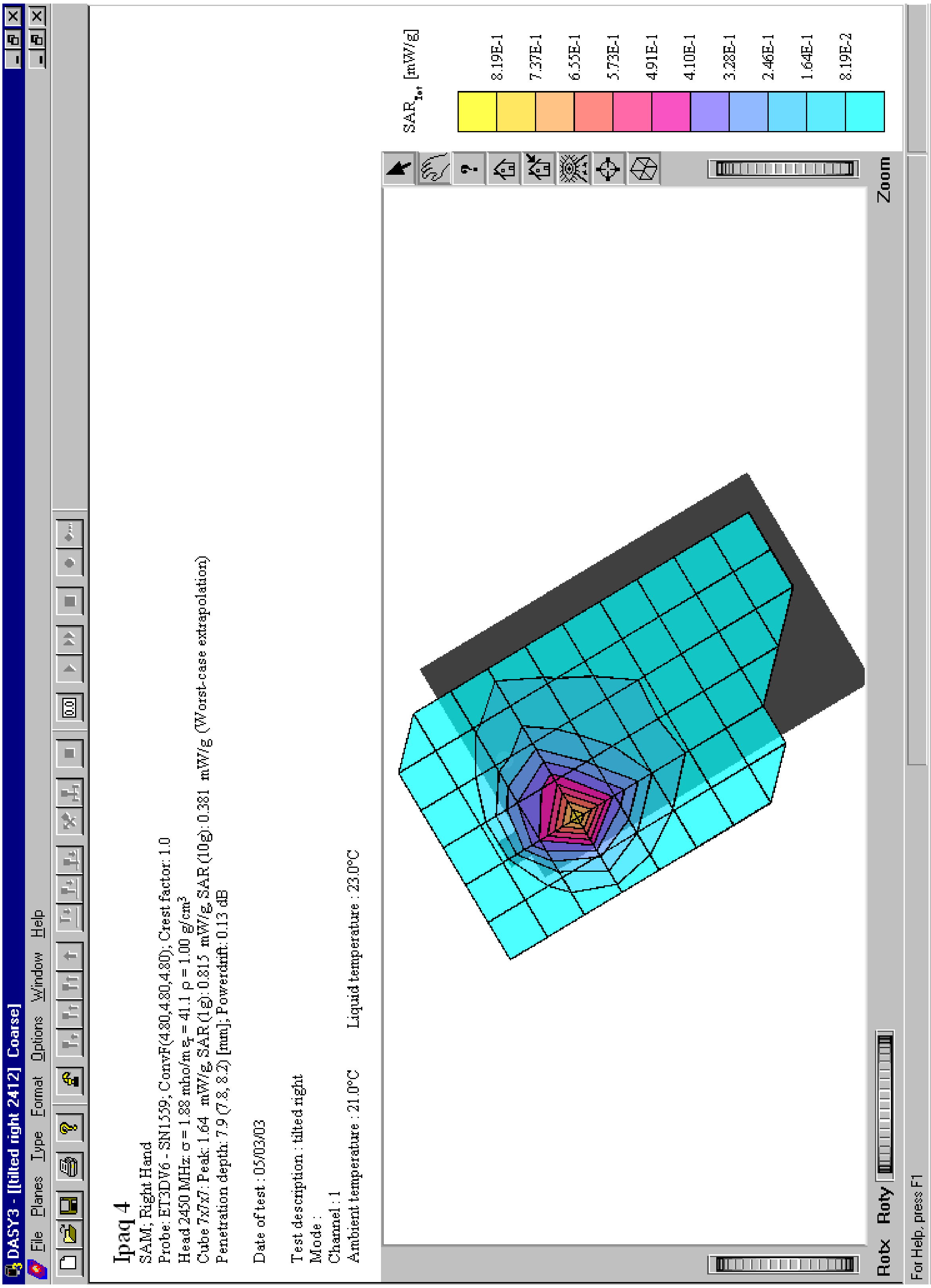

DASY3 - [[tilted left 2437] Coarse]
File Planes Type Format Options Window Help
Ipaq 4
SAM; Left Hand
Probe: ET3DV6 - SN1559; ConvF(4.80,4.80,4.80); Crest factor: 1.0
Head 2450 MHz: σ = 1.88 mho/m εr = 41.1 ρ = 1.00 g/cm3
Cube 7x7x7: Peak: 1.27 mW/g, SAR (1g): 0.617 mW/g, SAR (10g): 0.291 mW/g (Worst-case extrapolation)
Penetration depth: 7.0 (6.8, 7.4) [mm]; Powerdrift: -0.05 dB
Date of test: 05/03/03
Test description: tilted left
Mode:
Channel: 6
Ambient temperature: 23.1 °C
Liquid temperature: 21.0 °C
SARTot [mW/g]
4.99E-1
4.49E-1
3.99E-1
3.49E-1
2.99E-1
2.50E-1
2.00E-1
1.50E-1
9.98E-2
4.99E-2
Zoom
Rotx
Roty
For Help, press F1

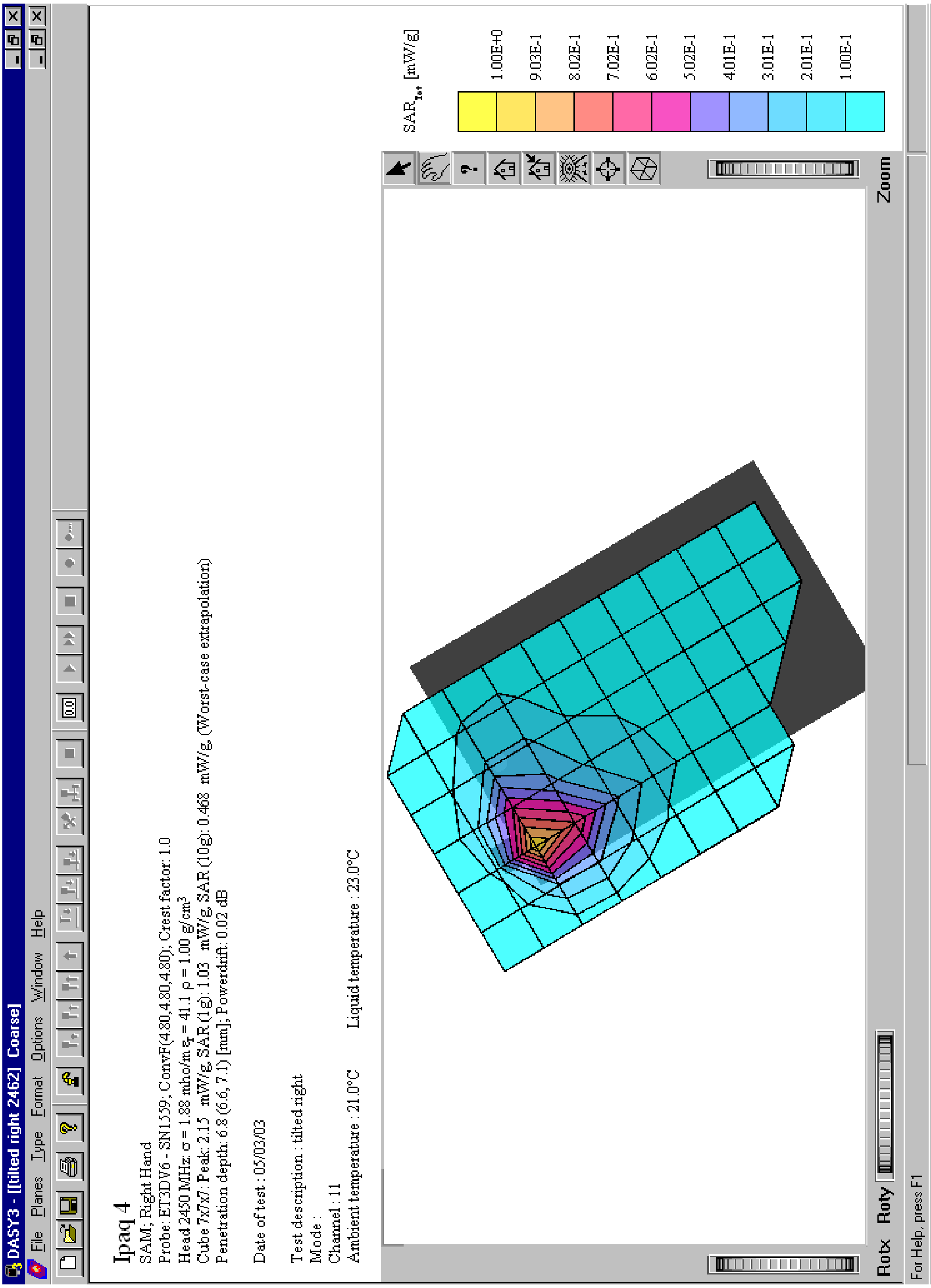

DASY3 - [[touch right 2437] Coarse]
File Planes Type Format Options Window Help
Ipaq 4
SAM; Right Hand
Probe: ET3DV6 - SN1559; ConvF(4.80,4.80,4.80); Crest factor: 1.0
Head 2450 MHz: σ = 1.88 mho/m εr = 41.1 ρ = 1.00 g/cm3
Cube 7x7x7: Peak: 2.12 mW/g, SAR (1g): 1.06 mW/g, SAR (10g): 0.511 mW/g (Worst-case extrapolation)
Penetration depth: 6.7 (6.5, 7.0) [mm]; Powerdrift: 0.24 dB
Date of test : 05/03/03
Test description : touch right
Mode :
Channel : 6
Ambient temperature : 22.5°C
Liquid temperature : 22.0°C
SAR Tot [mW/g]
1.17E+0
1.05E+0
9.34E-1
8.17E-1
7.00E-1
5.84E-1
4.67E-1
3.50E-1
2.33E-1
1.17E-1
Zoom
Rotx
Roty
For Help, press F1

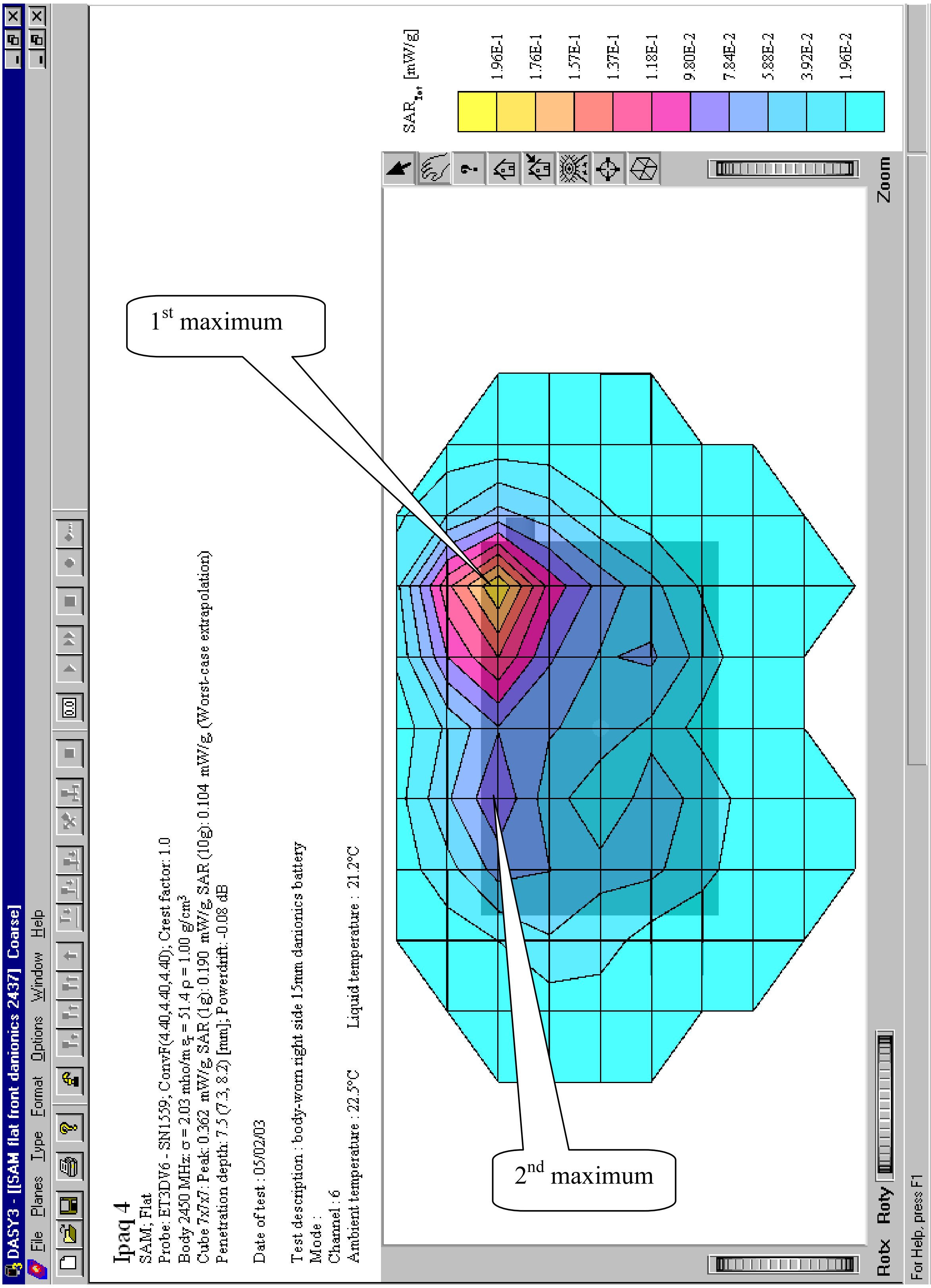

DASY3 - [[tilted right 2437] Coarse]
File Planes Type Format Options Window Help
Ipaq 4
SAM; Right Hand
Probe: ET3DV6 - SN1559; ConvF(4.80,4.80,4.80); Crest factor: 1.0
Head 2450 MHz: σ = 1.88 mho/m εr = 41.1 ρ = 1.00 g/cm3
Cube 7x7x7: Peak: 2.12 mW/g, SAR (1g): 1.04 mW/g, SAR (10g): 0.484 mW/g, (Worst-case extrapolation)
Penetration depth: 6.9 (6.8, 7.2) [mm]; Powerdrift: 0.06 dB
Date of test : 05/03/03
Test description : tilted right
Mode :
Channel : 6
Ambient temperature : 22.5°C
Liquid temperature : 22.0°C
SARTot [mW/g]
1.02E+0
9.22E-1
8.19E-1
7.17E-1
6.14E-1
5.12E-1
4.10E-1
3.07E-1
2.05E-1
1.02E-1
Zoom
Rotx Roty
For Help, press F1

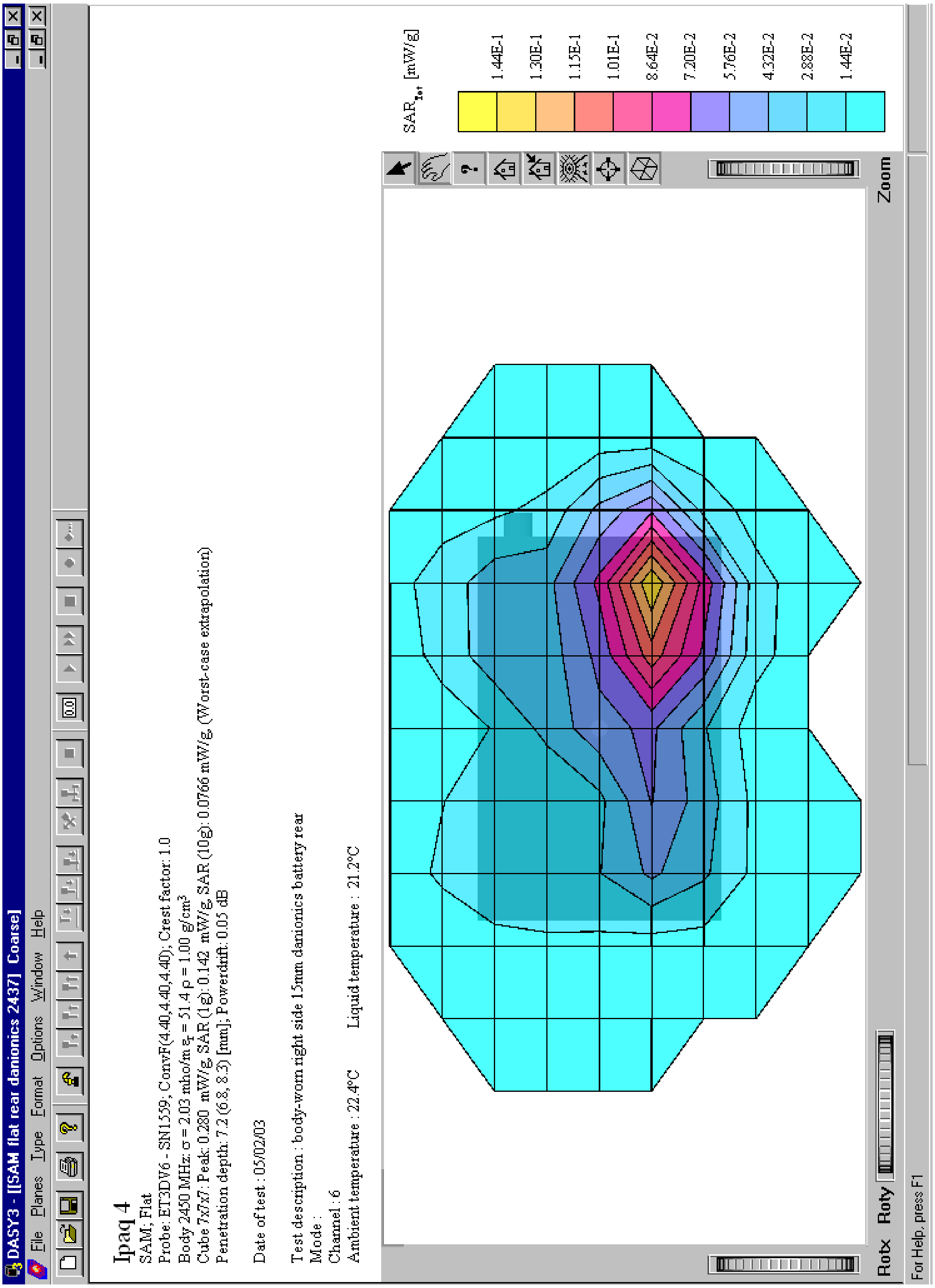

DASY3 - [[touch right 2412] Coarse]
File Planes Type Format Options Window Help
Ipaq 4
SAM; Right Hand
Probe: ET3DV6 - SN1559; ConvF(4.80,4.80,4.80); Crest factor: 1.0
Head 2450 MHz: σ = 1.88 mho/m εr = 41.1 ρ = 1.00 g/cm3
Cube 7x7x7: Peak: 1.63 mW/g, SAR (1g): 0.830 mW/g, SAR (10g): 0.410 mW/g, (Worst-case extrapolation)
Penetration depth: 8.1 (8.0, 8.2) [mm]; 0.19 dB
Date of test : 05/03/03
Test description : touch right
Mode :
Channel : 1
Ambient temperature : 22.5°C
Liquid temperature : 22.0°C
SAR_Tot [mW/g]
7.74E-1
6.97E-1
6.19E-1
5.42E-1
4.64E-1
3.87E-1
3.10E-1
2.32E-1
1.55E-1
7.74E-2
Zoom
Rotx
Roty
For Help, press F1

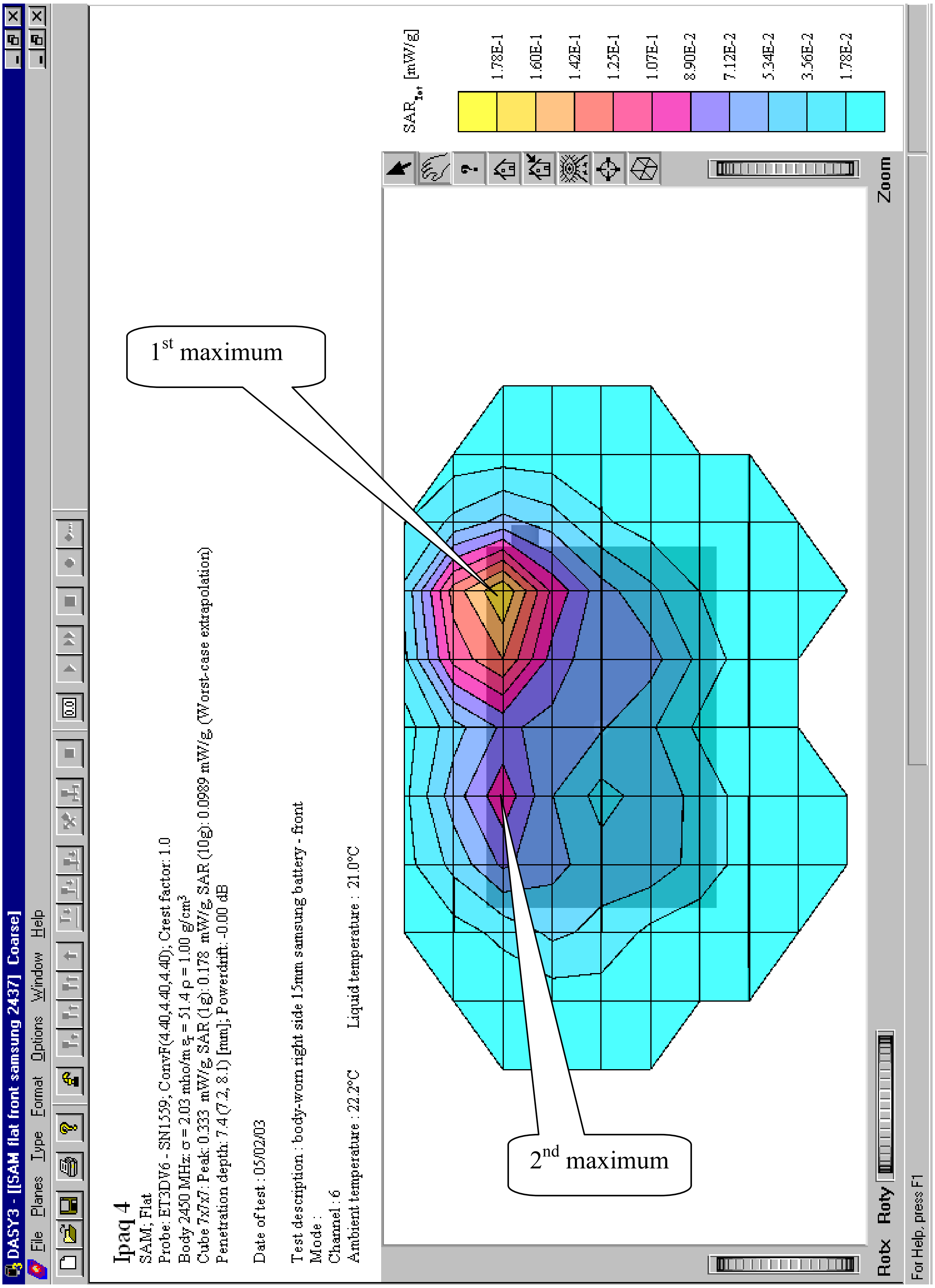

DASY3 - [[touch right 2462] Coarse]
File Planes Type Format Options Window Help
Ipaq 4
SAM; Right Hand
Probe: ET3DV6 - SN1559; ConvF(4.80,4.80,4.80); Crest factor: 1.0
Head 2450 MHz: σ = 1.88 mho/m εr = 41.1 ρ = 1.00 g/cm3
Cube 7x7x7: Peak: 2.23 mW/g, SAR (1g): 1.09 mW/g, SAR (10g): 0.519 mW/g (Worst-case extrapolation)
Penetration depth: 6.7 (6.5, 7.0) [mm]; Powerdrift: 0.09 dB
Date of test : 05/03/03
Test description : touch right
Mode :
Channel : 11
Ambient temperature : 21.0°C
Liquid temperature : 23.0°C
SAR Tot [mW/g]
1.15E+0
1.04E+0
9.20E-1
8.05E-1
6.90E-1
5.75E-1
4.60E-1
3.45E-1
2.30E-1
1.15E-1
Zoom
Rotx
Roty
For Help, press F1

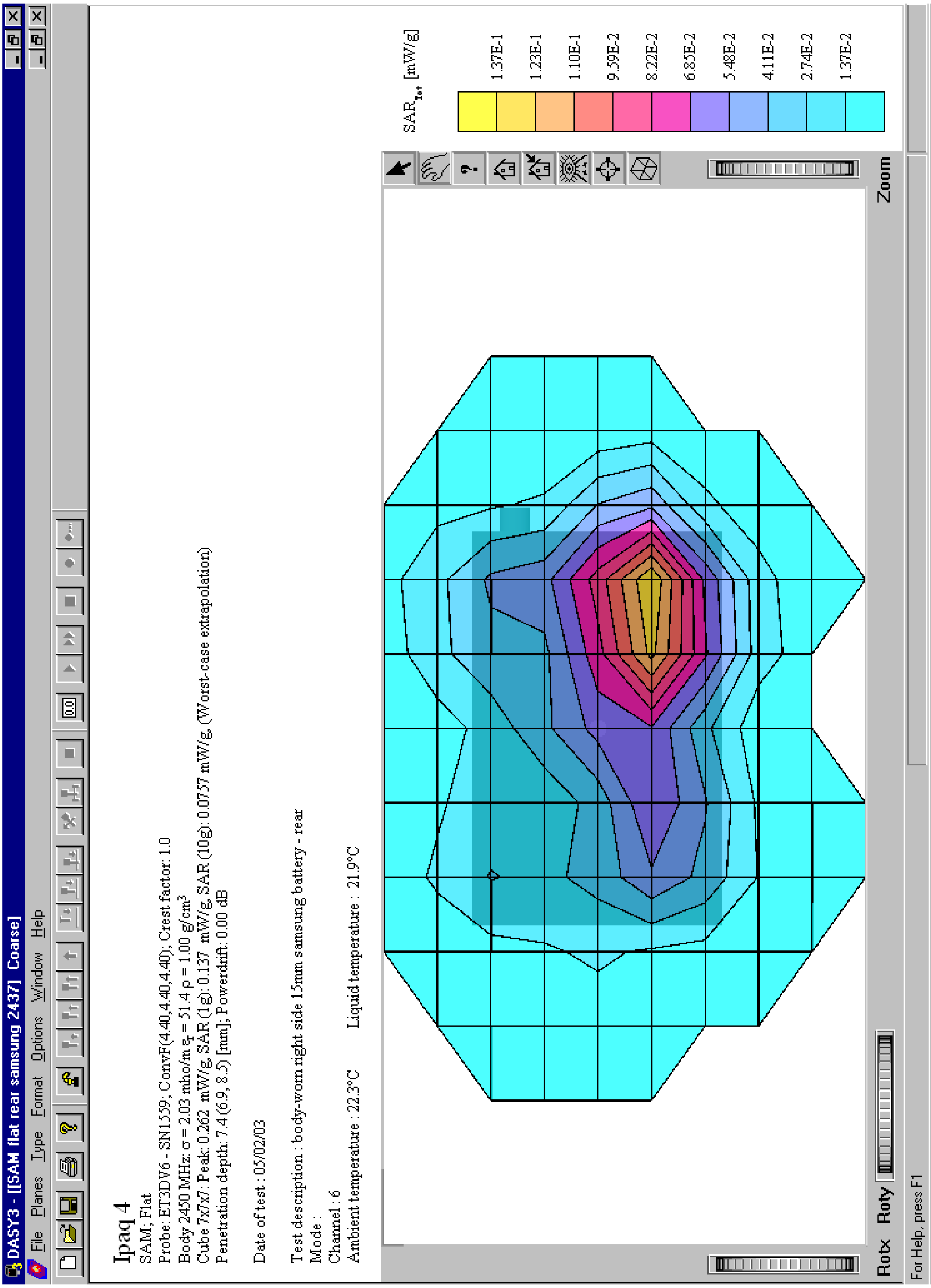

DASY3 - [[tilted right 2412] Coarse]
File Planes Type Format Options Window Help
Ipaq 4
SAM; Right Hand
Probe: ET3DV6 - SN1559; ConvF(4.80,4.80,4.80); Crest factor: 1.0
Head 2450 MHz: σ = 1.88 mho/m εr = 41.1 ρ = 1.00 g/cm3
Cube 7x7x7: Peak: 1.64 mW/g, SAR (1g): 0.815 mW/g, SAR (10g): 0.381 mW/g (Worst-case extrapolation)
Penetration depth: 7.9 (7.8, 8.2) [mm]; Powerdrift: 0.13 dB
Date of test : 05/03/03
Test description : tilted right
Mode :
Channel : 1
Ambient temperature : 21.0°C
Liquid temperature : 23.0°C
SAR Tot [mW/g]
8.19E-1
7.37E-1
6.55E-1
5.73E-1
4.91E-1
4.10E-1
3.28E-1
2.46E-1
1.64E-1
8.19E-2
Zoom
Rotx
Roty
For Help, press F1

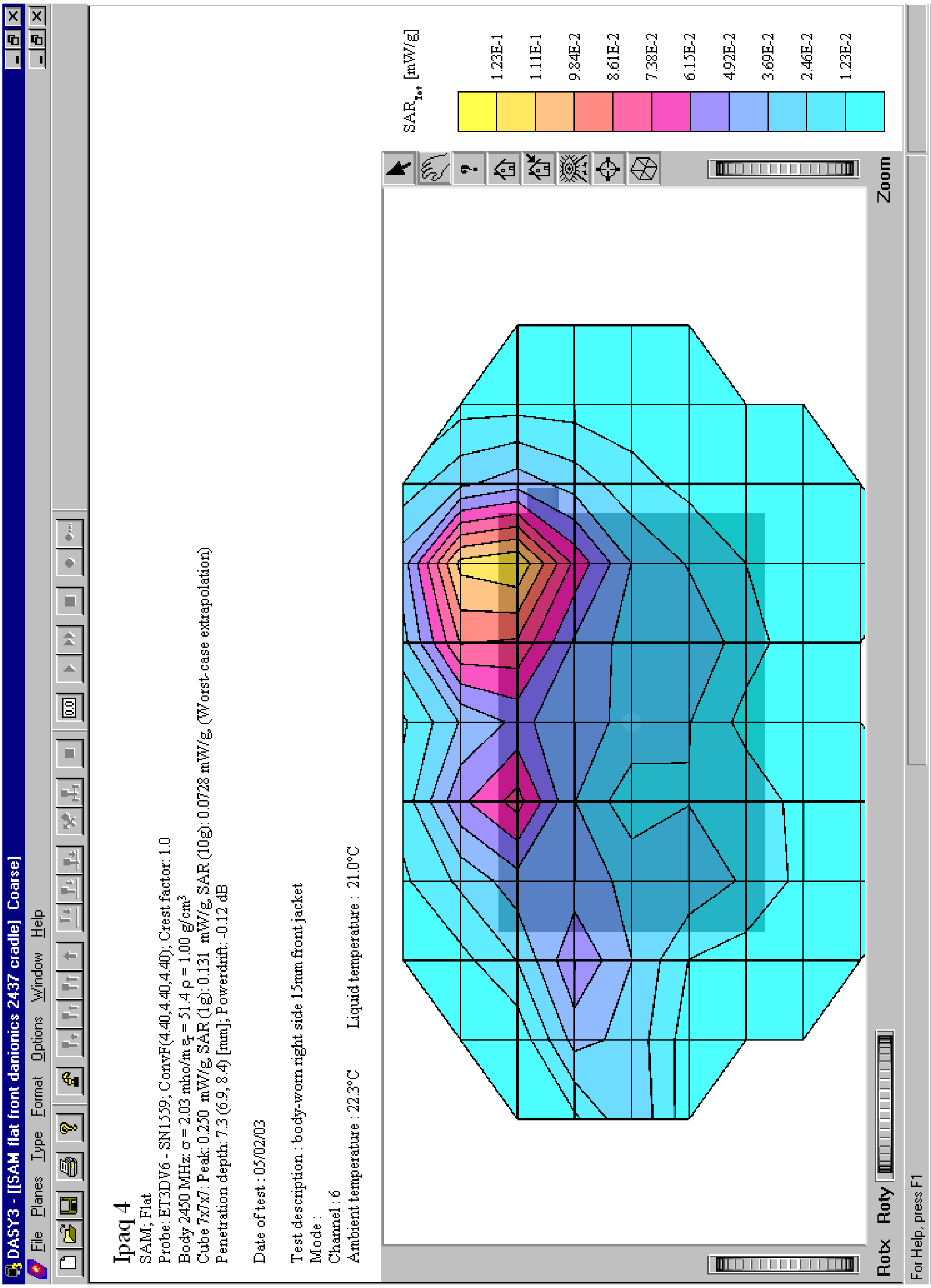

DASY3 - [[tilted right 2462] Coarse]
File Planes Type Format Options Window Help
Ipaq 4
SAM; Right Hand
Probe: ET3DV6 - SN1559; ConvF(4.80,4.80,4.80); Crest factor: 1.0
Head 2450 MHz: σ = 1.88 mho/m εr = 41.1 ρ = 1.00 g/cm3
Cube 7x7x7: Peak: 2.15 mW/g, SAR (1g): 1.03 mW/g, SAR (10g): 0.468 mW/g, (Worst-case extrapolation)
Penetration depth: 6.8 (6.6, 7.1) [mm]; Powerdrift: 0.02 dB
Date of test: 05/03/03
Test description: tilted right
Mode:
Channel: 11
Ambient temperature: 21.0°C
Liquid temperature: 23.0°C
SAR Tot [mW/g]
1.00E+0
9.03E-1
8.02E-1
7.02E-1
6.02E-1
5.02E-1
4.01E-1
3.01E-1
2.01E-1
1.00E-1
Zoom
Rotx
Roty
For Help, press F1

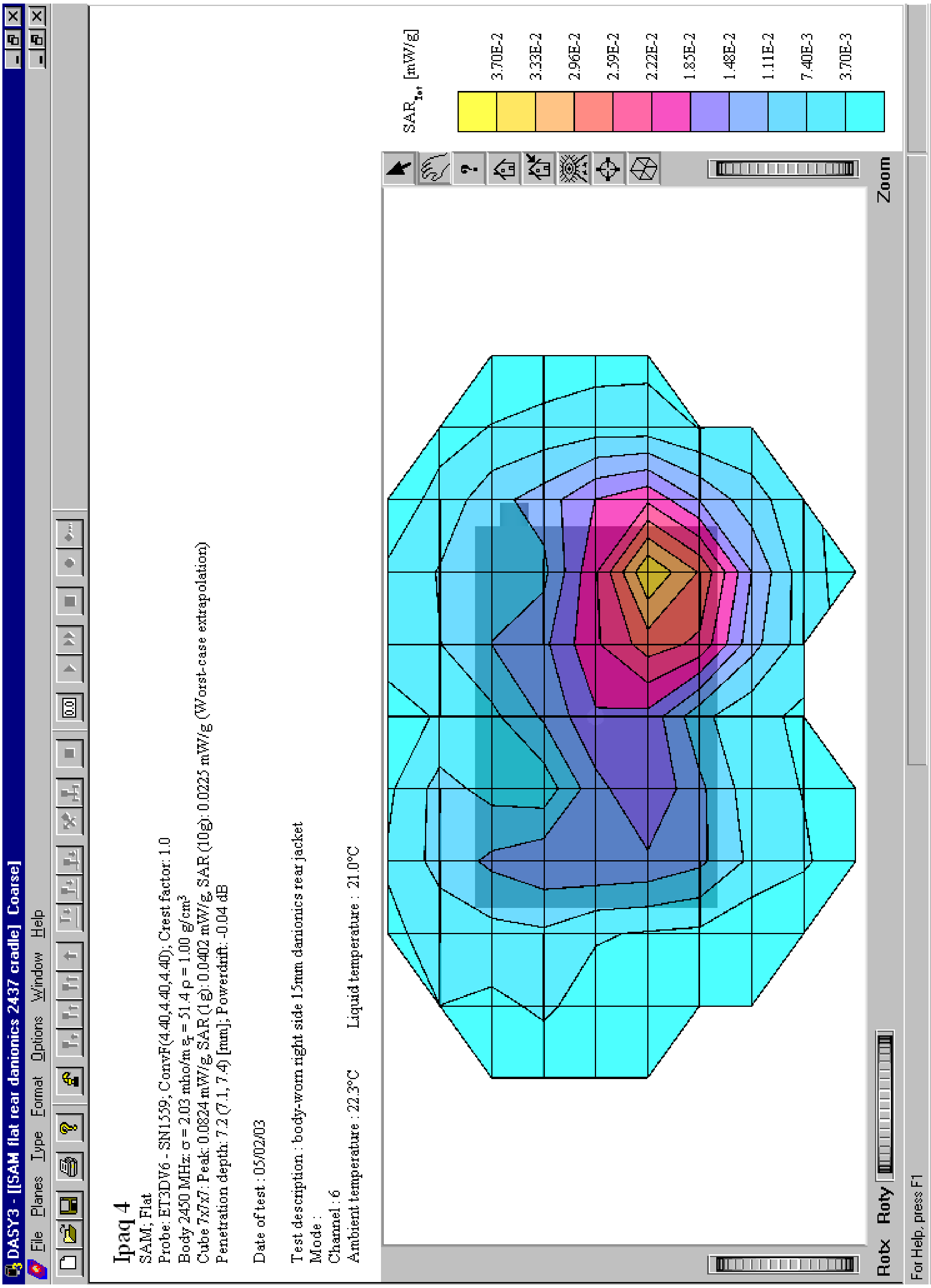

DASY3 - [[SAM flat front danionics 2437] Coarse]
File Planes Type Format Options Window Help
Ipaq 4
SAM; Flat
Probe: ET3DV6 - SN1559; ConvF(4.40,4.40,4.40); Crest factor: 1.0
Body 2450 MHz: σ = 2.03 mho/m εr = 51.4 ρ = 1.00 g/cm3
Cube 7x7x7: Peak: 0.362 mW/g, SAR (1g): 0.190 mW/g, SAR (10g): 0.104 mW/g, (Worst-case extrapolation)
Penetration depth: 7.5 (7.3, 8.2) [mm]; Powerdrift: -0.08 dB
Date of test: 05/02/03
Test description: body-worn right side 15mm danionics battery
Mode:
Channel: 6
Ambient temperature: 22.5°C
Liquid temperature: 21.2°C
1st maximum
2nd maximum
SAR Tot [mW/g]
1.96E-1
1.76E-1
1.57E-1
1.37E-1
1.18E-1
9.80E-2
7.84E-2
5.88E-2
3.92E-2
1.96E-2
Zoom
Rotx
Roty
For Help, press F1

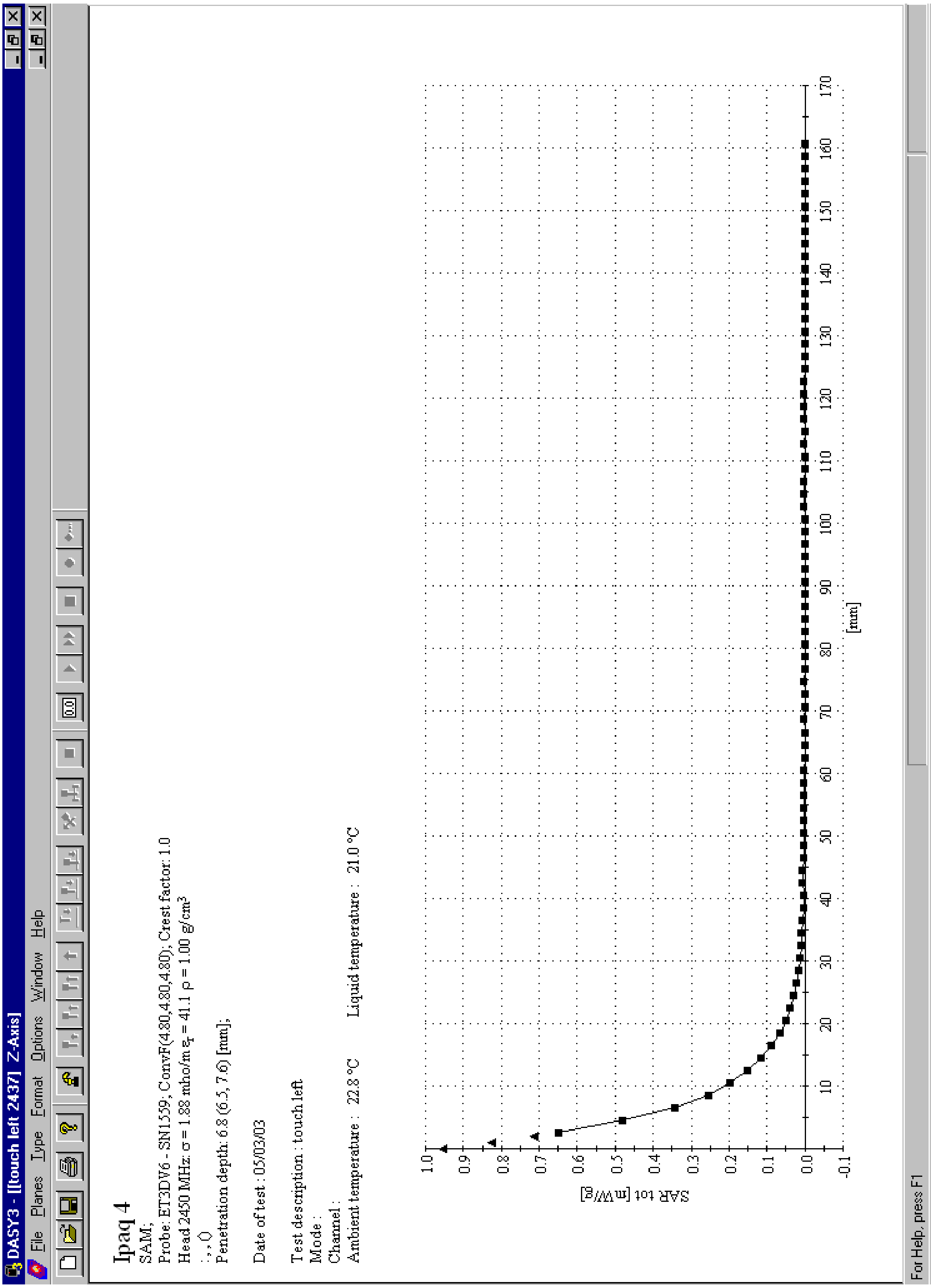

DASY3 - [[SAM flat rear danionics 2437] Coarse]
File Planes Type Format Options Window Help
Ipaq 4
SAM; Flat
Probe: ET3DV6 - SN1559; ConvF(4.40,4.40,4.40); Crest factor: 1.0
Body 2450 MHz: σ = 2.03 mho/m εr = 51.4 ρ = 1.00 g/cm3
Cube 7x7x7: Peak: 0.280 mW/g, SAR (1g): 0.142 mW/g, SAR (10g): 0.0766 mW/g, (Worst-case extrapolation)
Penetration depth: 7.2 (6.8, 8.3) [mm]; Powerdrift: 0.05 dB
Date of test : 05/02/03
Test description : body-worn right side 15mm danionics battery rear
Mode :
Channel : 6
Ambient temperature : 22.4°C
Liquid temperature : 21.2°C
SARTot [mW/g]
1.44E-1
1.30E-1
1.15E-1
1.01E-1
8.64E-2
7.20E-2
5.76E-2
4.32E-2
2.88E-2
1.44E-2
Rotx
Roty
Zoom
For Help, press F1

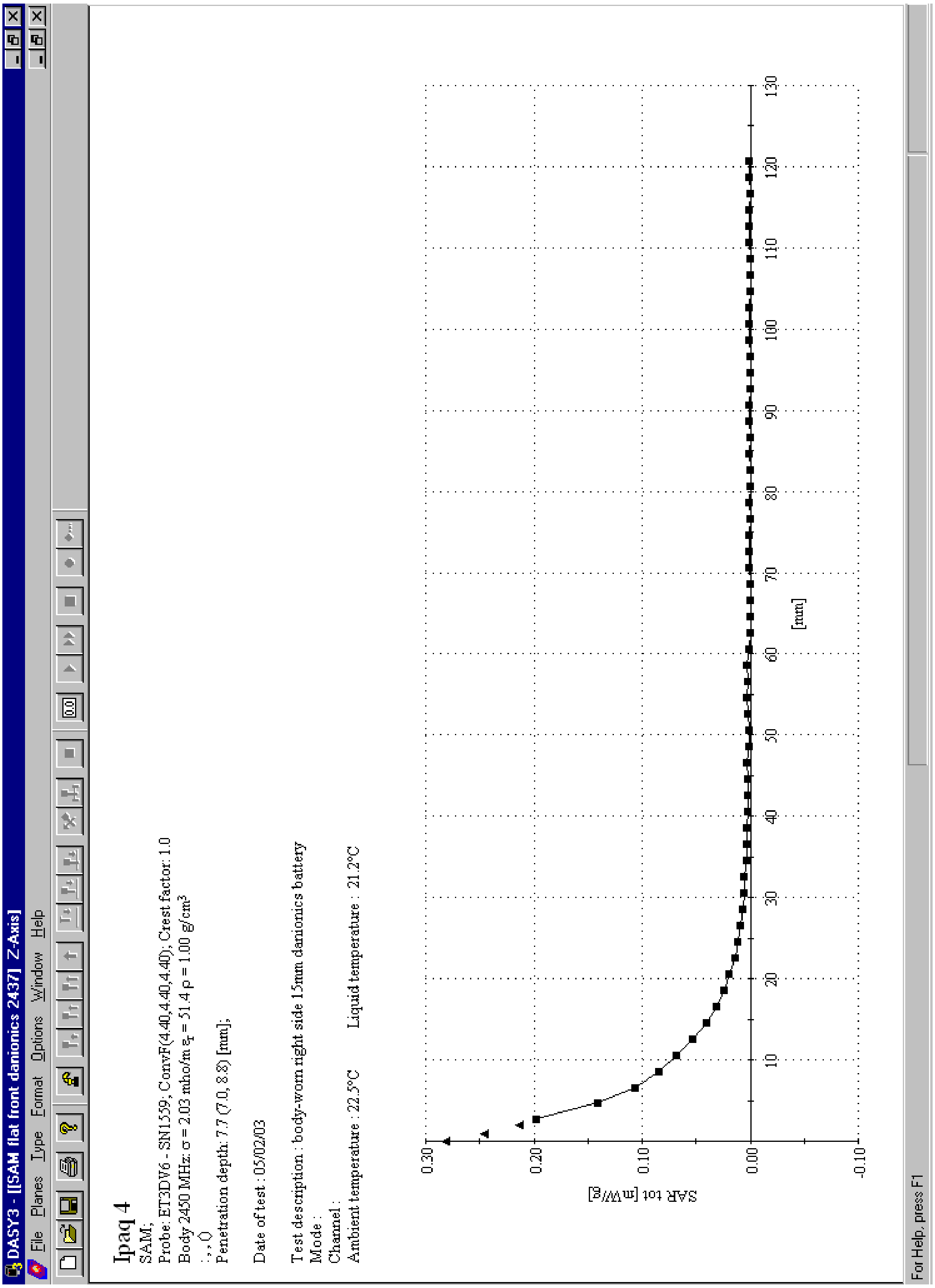

DASY3 - [[SAM flat front samsung 2437] Coarse]
File Planes Type Format Options Window Help
Ipaq 4
SAM; Flat
Probe: ET3DV6 - SN1559; ConvF(4.40,4.40,4.40); Crest factor: 1.0
Body 2450 MHz: σ = 2.03 mho/m εr = 51.4 ρ = 1.00 g/cm3
Cube 7x7x7: Peak: 0.333 mW/g, SAR (1g): 0.178 mW/g, SAR (10g): 0.0989 mW/g, (Worst-case extrapolation)
Penetration depth: 7.4 (7.2, 8.1) [mm]; Powerdrift: -0.00 dB
Date of test: 05/02/03
Test description: body-worn right side 15mm samsung battery - front
Mode:
Channel: 6
Ambient temperature: 22.2°C
Liquid temperature: 21.0°C
SARTot [mW/g]
1.78E-1
1.60E-1
1.42E-1
1.25E-1
1.07E-1
8.90E-2
7.12E-2
5.34E-2
3.56E-2
1.78E-2
1st maximum
2nd maximum
Zoom
Rotx Roty
For Help, press F1


DASY3 - [[SAM flat rear samsung 2437] Coarse]
File Planes Type Format Options Window Help
Ipaq 4
SAM; Flat
Probe: ET3DV6 - SN1559; ConvF(4.40,4.40,4.40); Crest factor: 1.0
Body 2450 MHz: σ = 2.03 mho/m εr = 51.4 ρ = 1.00 g/cm3
Cube 7x7x7: Peak: 0.262 mW/g, SAR (1g): 0.137 mW/g, SAR (10g): 0.0757 mW/g, (Worst-case extrapolation)
Penetration depth: 7.4 (6.9, 8.5) [mm]; Powerdrift: 0.00 dB
Date of test: 05/02/03
Test description: body-worn right side 15mm samsung battery - rear
Mode:
Channel: 6
Ambient temperature: 22.3°C
Liquid temperature: 21.9°C
SARTot [mW/g]
1.37E-1
1.23E-1
1.10E-1
9.59E-2
8.22E-2
6.85E-2
5.48E-2
4.11E-2
2.74E-2
1.37E-2
Zoom
Rotx Roty
For Help, press F1


DASY3 - [[SAM flat front danionics 2437 cradle] Coarse]
File Planes Type Format Options Window Help
Ipaq 4
SAM; Flat
Probe: ET3DV6 - SN1559; ConvF(4.40,4.40,4.40); Crest factor: 1.0
Body 2450 MHz: σ = 2.03 mho/m εr = 51.4 ρ = 1.00 g/cm³
Cube 7x7x7: Peak: 0.250 mW/g, SAR (1g): 0.131 mW/g, SAR (10g): 0.0728 mW/g, (Worst-case extrapolation)
Penetration depth: 7.3 (6.9, 8.4) [mm]; Powerdrift: -0.12 dB
Date of test : 05/02/03
Test description : body-worn right side 15mm front jacket
Mode :
Channel : 6
Ambient temperature : 22.3°C
Liquid temperature : 21.0°C
SAR_Tot [mW/g]
1.23E-1
1.11E-1
9.84E-2
8.61E-2
7.38E-2
6.15E-2
4.92E-2
3.69E-2
2.46E-2
1.23E-2
Zoom
Rotx Roty
For Help, press F1


DASY3 - [[SAM flat rear danionics 2437 cradle] Coarse]
File Planes Type Format Options Window Help
Ipaq 4
SAM; Flat
Probe: ET3DV6 - SN1559; ConvF(4.40,4.40,4.40); Crest factor: 1.0
Body 2450 MHz: σ = 2.03 mho/m εr = 51.4 ρ = 1.00 g/cm³
Cube 7x7x7: Peak: 0.0824 mW/g, SAR (1g): 0.0402 mW/g, SAR (10g): 0.0225 mW/g (Worst-case extrapolation)
Penetration depth: 7.2 (7.1, 7.4) [mm]; Powerdrift: -0.04 dB
Date of test : 05/02/03
Test description : body-worn right side 15mm danionics rear jacket
Mode :
Channel : 6
Ambient temperature : 22.3°C
Liquid temperature : 21.0°C
SAR Tot [mW/g]
3.70E-2
3.33E-2
2.96E-2
2.59E-2
2.22E-2
1.85E-2
1.48E-2
1.11E-2
7.40E-3
3.70E-3
Rotx
Roty
Zoom
For Help, press F1


DASY3 - [[touch left 2437] Z-Axis]
File Planes Type Format Options Window Help
Ipaq 4
SAM;
Probe: ET3DV6 - SN1559; ConvF(4.80,4.80,4.80); Crest factor: 1.0
Head 2450 MHz: σ = 1.88 mho/m εr = 41.1 ρ = 1.00 g/cm³
: , , 0
Penetration depth: 6.8 (6.5, 7.6) [mm];
Date of test : 05/03/03
Test description : touch left
Mode :
Channel :
Ambient temperature : 22.8 °C
Liquid temperature : 21.0 °C
SAR tot [mW/g]
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
[mm]
For Help, press F1



DASY3 - [[SAM flat front danionics 2437] Z-Axis]
File Planes Type Format Options Window Help
Ipaq 4
SAM;
Probe: ET3DV6 - SN1559; ConvF(4.40,4.40,4.40); Crest factor: 1.0
Body 2450 MHz: σ = 2.03 mho/m εr = 51.4 ρ = 1.00 g/cm3
: , , 0
Penetration depth: 7.7 (7.0, 8.8) [mm];
Date of test : 05/02/03
Test description : body-worn right side 15mm danionics battery
Mode :
Channel :
Ambient temperature : 22.5°C
Liquid temperature : 21.2°C
SAR tot [mW/g]
0.30
0.20
0.10
0.00
-0.10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
[mm]
For Help, press F1

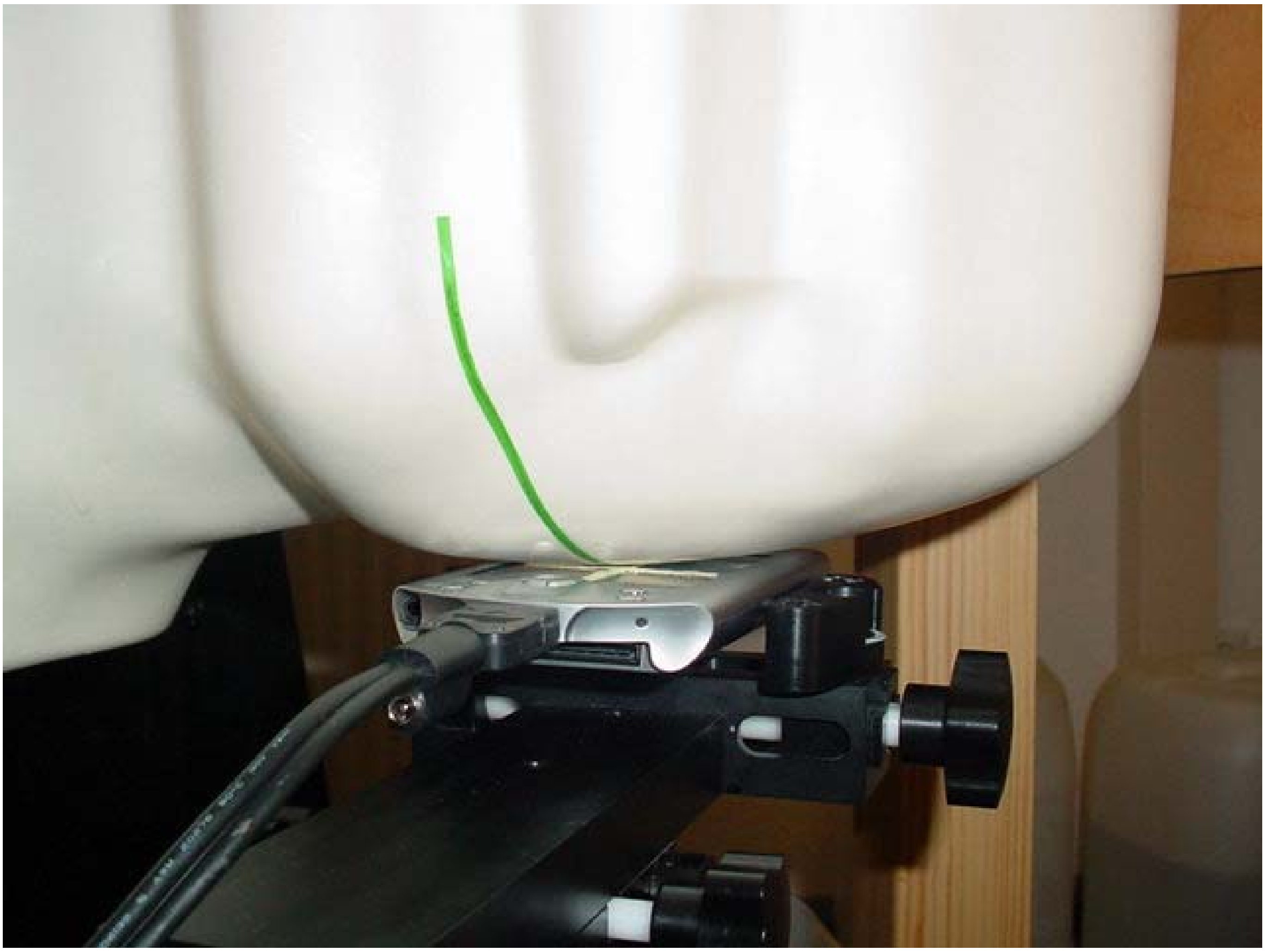
Annex 3 Photo documentation

Picture no. 1

Measurement System DASY 3

Picture no. 2

Touch left hand front view



Picture no. 3

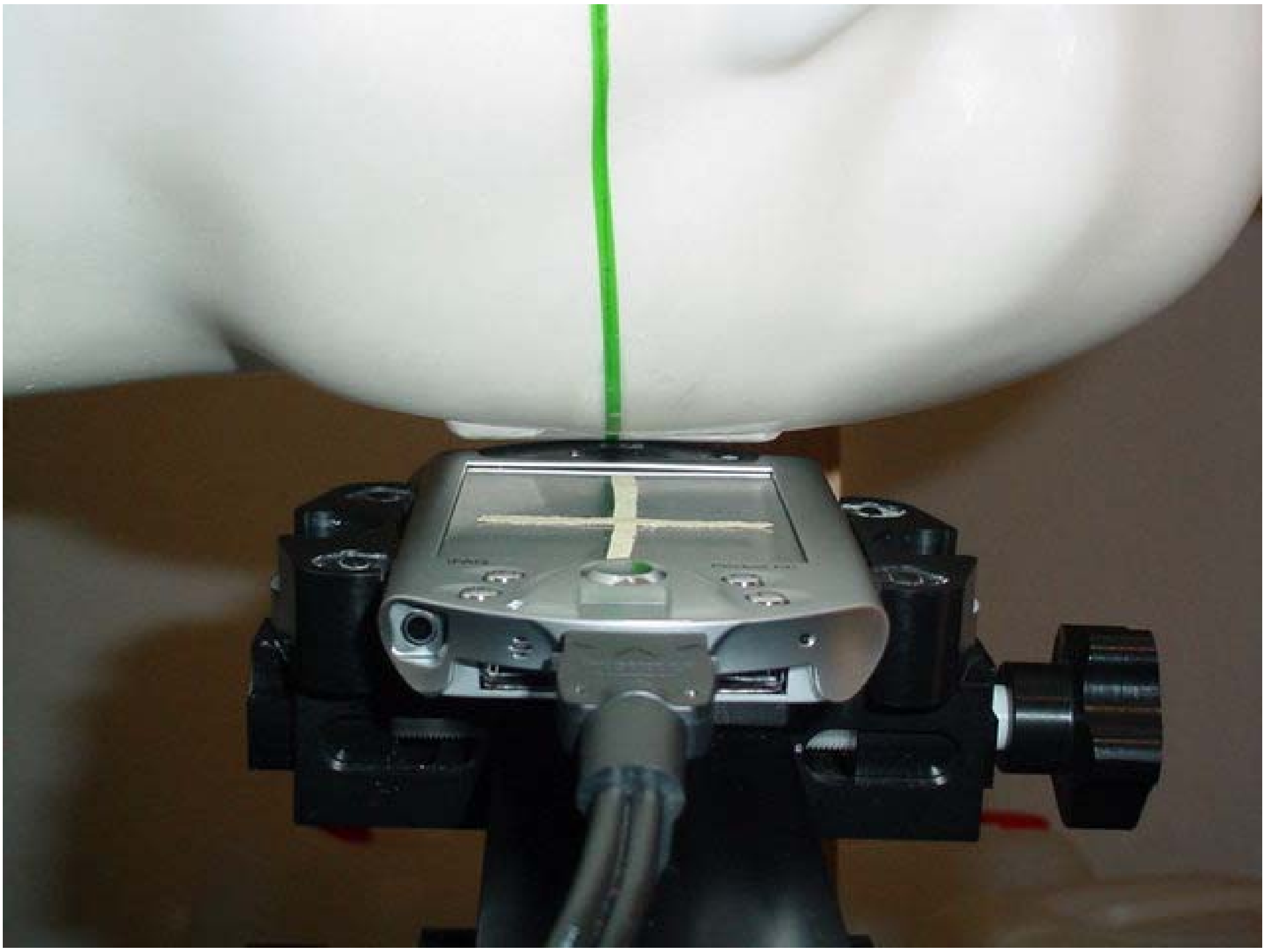
Touch left hand side view

Picture no. 4

Touch left hand rear view

Picture no. 5

Tilted left hand front view



Picture no. 6

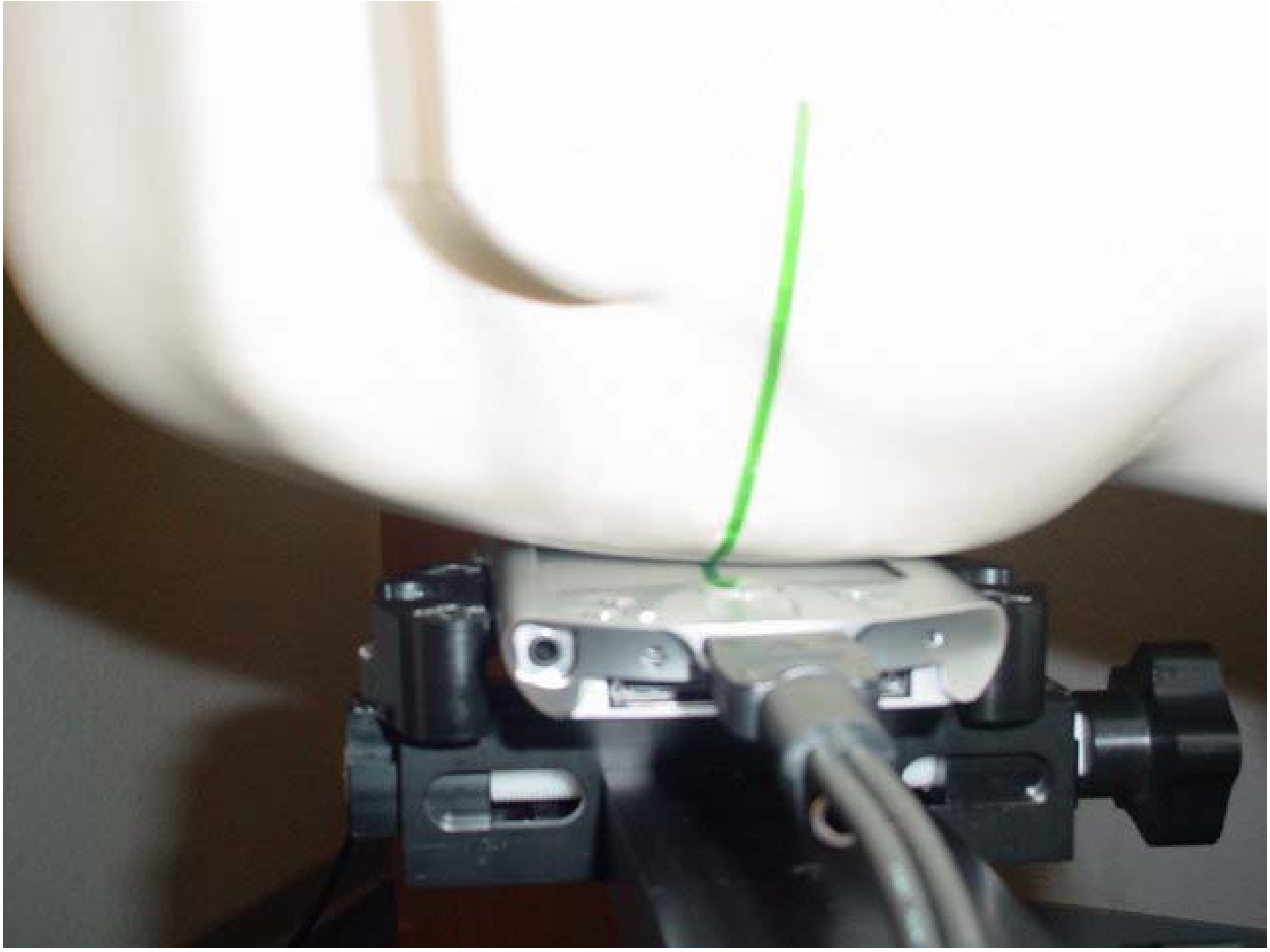
Tilted left hand side view

Picture no. 7

Tilted left hand rear view

Picture no. 8

Touch right hand front view



Picture no. 9

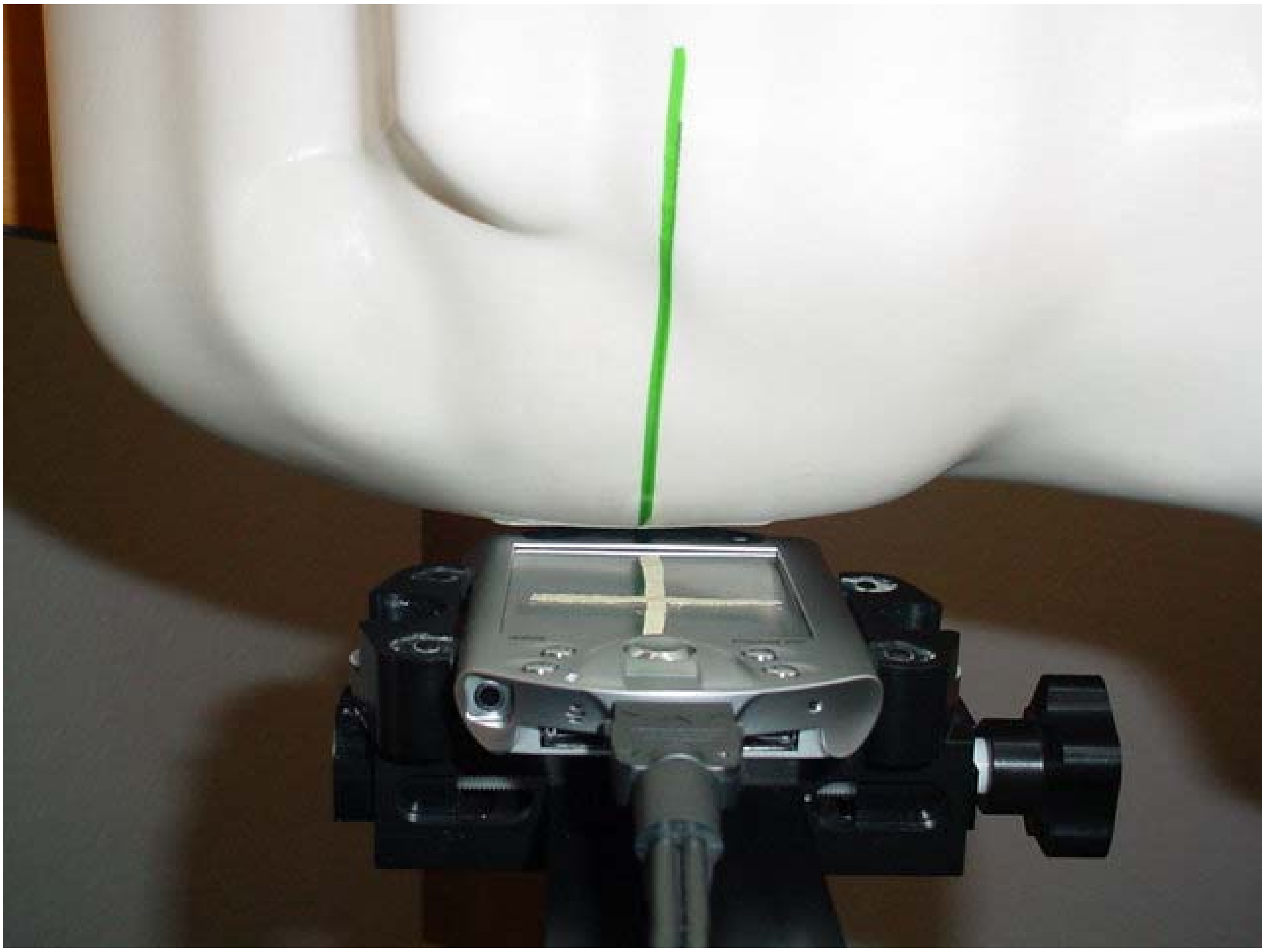
Touch right hand side view

Picture no. 10

Touch right hand rear view

Picture no. 11

Tilted right hand front view



Picture no. 12

Tilted right hand side view

Picture no. 13

Tilted right hand rear view

Picture no. 14

PDA screen to phantom - body position (distance 5mm)

Picture no. 15

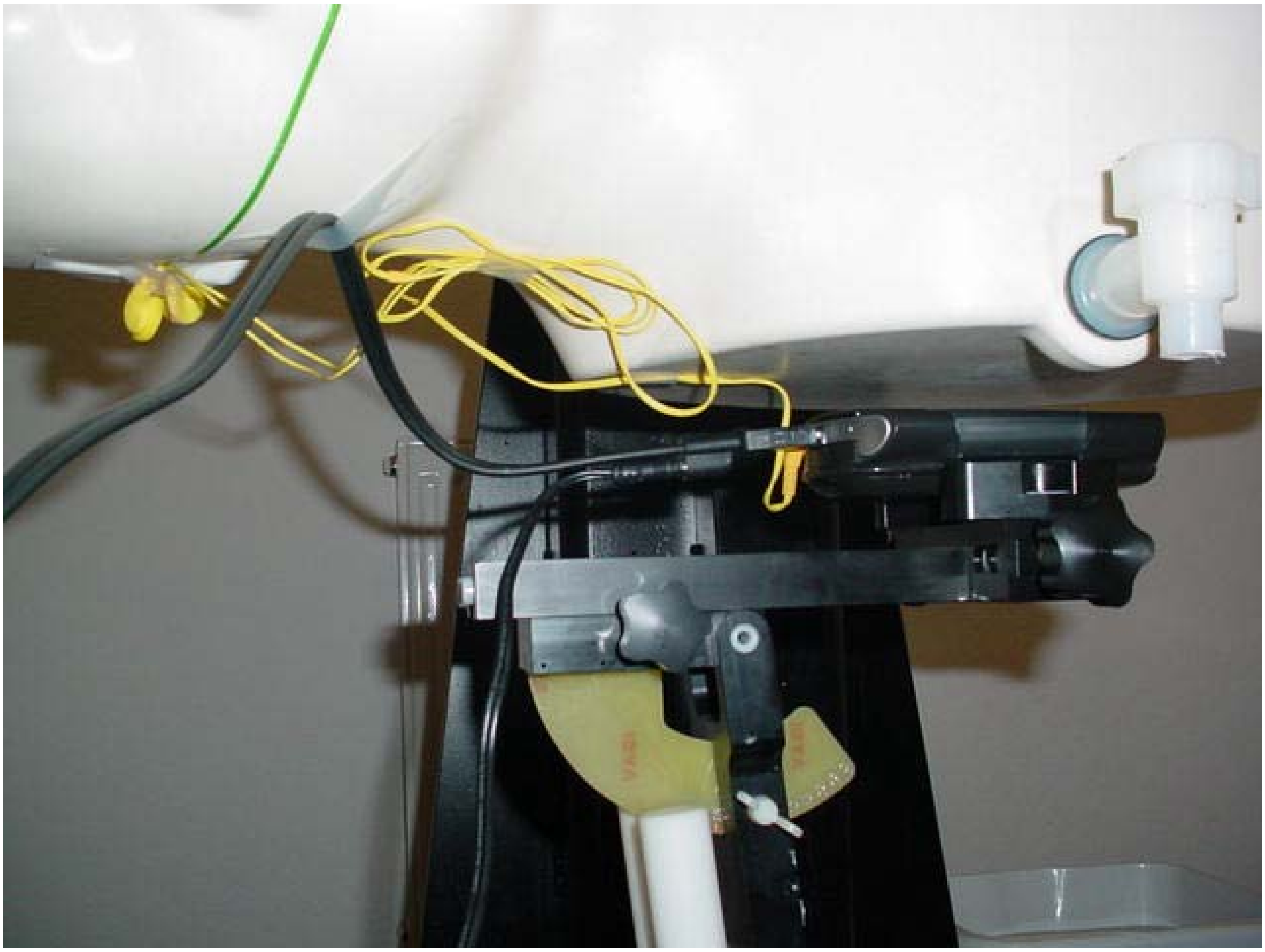
PDA screen away from phantom - body position (distance 5mm)

Picture no. 16

PDA screen away from phantom - body position (distance 5mm)

Picture no. 17

PDA with Jacket, Compact flash card and Headphone - body position - screen to phantom (distance 5 mm)

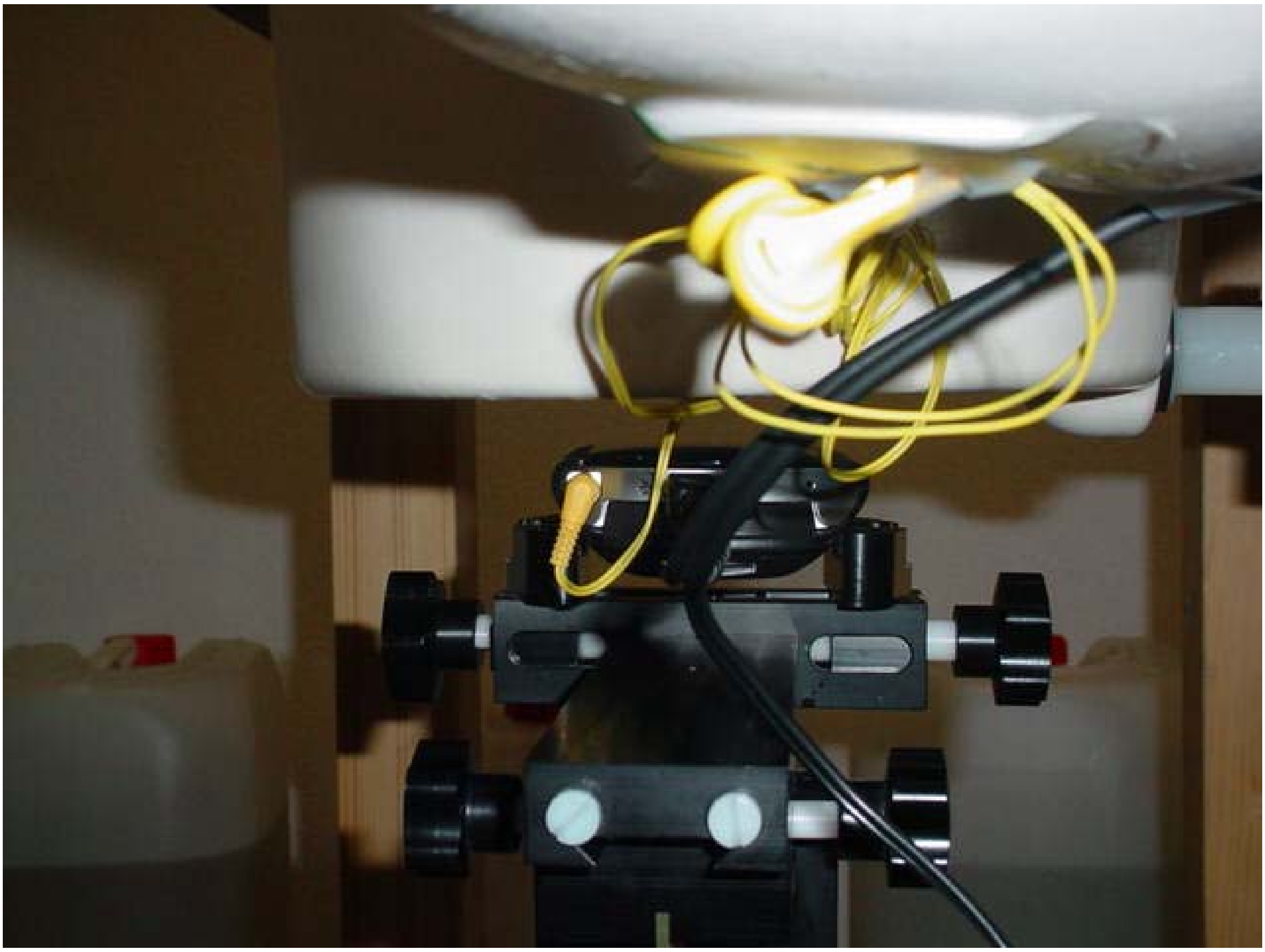


Picture no. 18

PDA with Jacket, Compact flash card and Headphone - body position - screen to phantom (distance 5 mm)

Picture no. 19

PDA with Jacket, Compact flash card and Headphone - body position - screen to phantom (distance 5 mm)

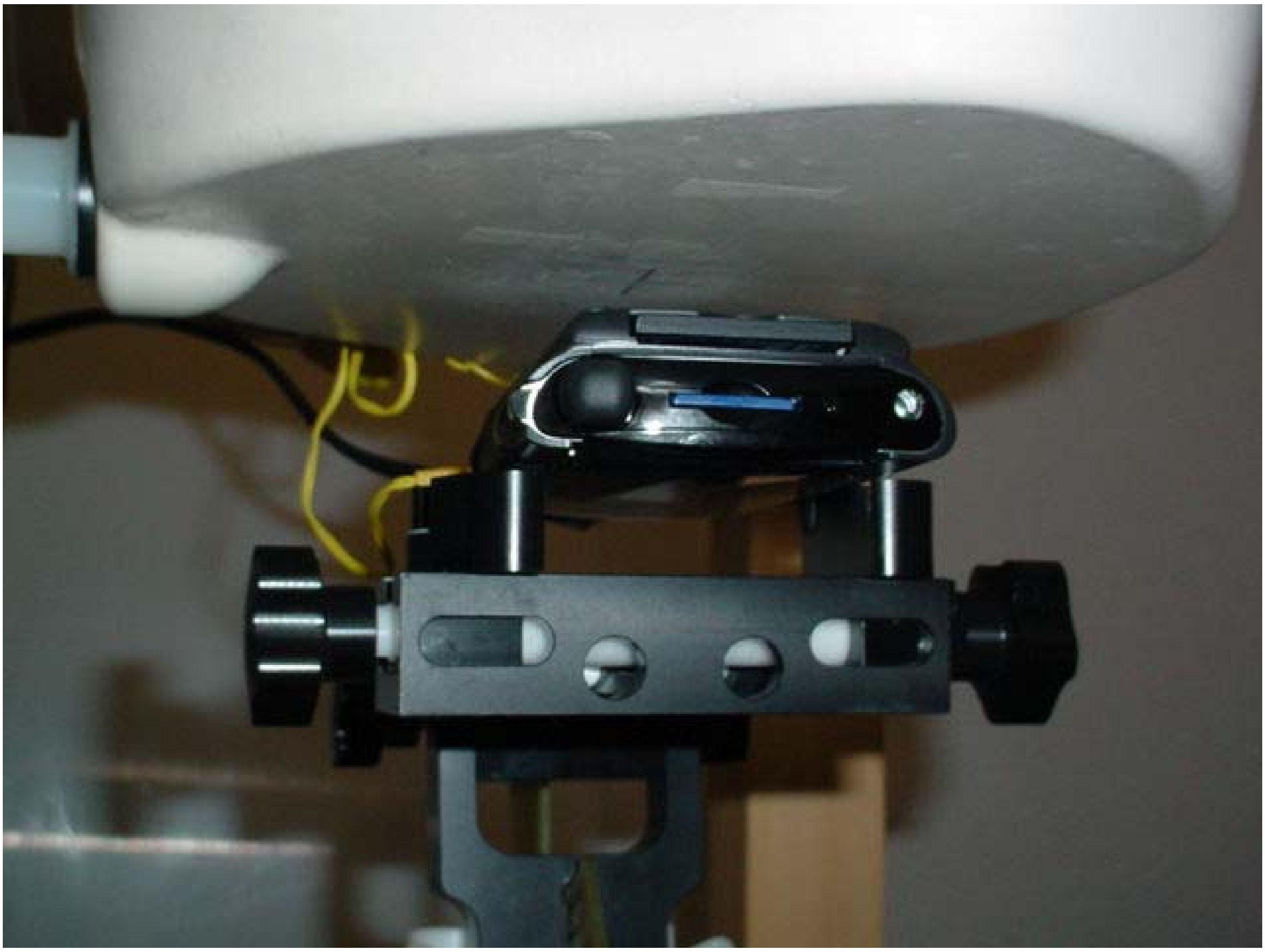


Picture no. 20

PDA with Jacket, Compact flash card and Headphone - body position - screen away from phantom (distance 5 mm)

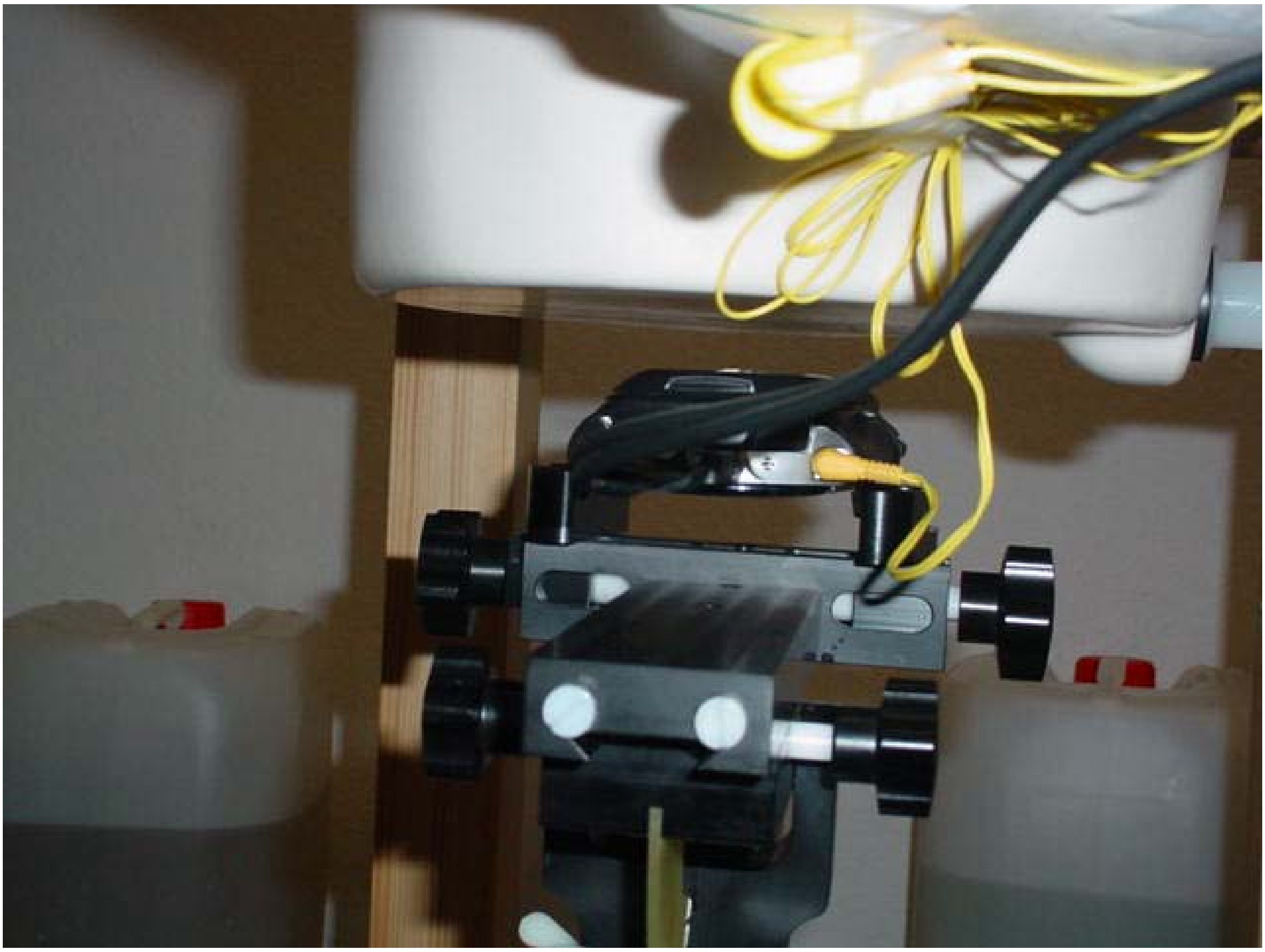
Picture no. 21

PDA with Jacket, Compact flash card and Headphone - body position - screen away from phantom (distance 5 mm)



Picture no. 22

PDA with Jacket, Compact flash card and Headphone - body position - screen away from phantom (distance 5 mm)



Picture no. 23

Liquid level Head Tissue 2400 MHz

Picture no. 24

Liquid level Body Tissue 2400 MHz

Picture no. 25

DUT - front view

Picture no. 26

DUT - rear view

Picture no. 27

DUT - rear view without battery

Picture no. 28

PE2032A Battery - rear view

Picture no. 29

PE2032A Battery - front view

Picture no. 30

PE2032B Battery - rear view

Picture no. 31

PE2032B Battery - front view

Picture no. 32

Jacket - front view

Picture no. 33

Jacket - rear view

Picture no. 34

DUT with Jacket - front view

Picture no. 35

DUT with Jacket - rear view

Picture no. 36

Cradle

Picture no. 37

Headphones

Annex 4 Calibration parameters of E-field probe

Calibration parameters are described in the additional document

‘ Calibration data and Phantom information for test report no. 4-0977-01-03/03-B‘,

provided together with this document.