



**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.: 4-0520-01-02-b/02**  
**Type identification : Globetrotter**  
**FCC id: NCMOGL1**

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## 1 General Information

### 1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.6. 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.

### 1.2 Statement of Compliance

The SAR values found for the Option Globetrotter PCS PCMCIA GPRS card are below the maximum recommended levels of 1.6 W/Kg as averaged over any 1 g tissue according the FCC rule §2.1093, the ANSI/IEEE C 95.1:1992 and the NCRP Report Number 86 for uncontrolled environment.

#### Tester operator:



2002-02-19      Fabien Coulet

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Date	Name	Signature
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#### Technical responsibility for area of testing:



20021-02-19      Bernd Rebmann

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Date	Name	Signature
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### 1.3 Testing laboratory

CETECOM ICT Services GmbH  
Untertürkheimer Straße 6-10, D-66117 Saarbrücken  
Germany  
Telephone: +49 681 598 - 0  
Fax: + 49 681 598 - 8475  
e-mail: info@ict.cetecom.de  
Internet: http://www.cetecom.com

State of accreditation: The Test laboratory SAR is accredited according to DIN EN 45001.  
DAR-No.:TTI-P-G-166/98

Test location, if different from CETECOM ICT Services GmbH

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

### 1.4 Details of applicant

Name: OPTION international nv sa  
Address: Kolonel Begaultlaan 45  
Town: B-3012 Leuven  
Country: Belgium  
Phone: +32 16 317 411  
Fax: +32 16 207 164

Contact: Dr Xiao-Hai Shen  
Phone: +32 16 317 411

### 1.5 Application details

Date of receipt of application: 2002-01-09  
Date of receipt of test item: 2002-01-15  
Date of test: 2002-01-22

Person who have been present during the test: Dr Xiao-Hai Shen

## 1.6 Test item

Description of test item:      PCS 1900 PCMCIA card GPRS  
 Type designation:              Globetrotter

IMEI No:                            004999010000440  
 Hardware:                        P4BIS  
 Software:                        09-003 (Dec 18 2001 Time 15:52:08)  
 Frequency:                      1850-1910 MHz  
 Serial number:                 Q91CWAP4C03R  
 Type of modulation:         300KF2D  
 Number of channels:         300  
 Antenna:                         external  
 Power supply:                 3.3V/5V DC via PCMCIA port  
 Manufacturer:                 see applicant  
 Output power:                 PCS 1900, power class1, 29.4 dBm conducted

## 1.7 Test specifications

**Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01)**  
**Draft IEEE Std 1528-200X: Version 6.4:July 2001**

### 1.7.1 RF exposure limits

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

Table 1: RF exposure limits

**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 2.4 and 2.5 were ascertained in the course of the tests performed.

### 2.2 Test environment

Ambient temperature: 21°C – 23°C

Tissue simulating liquid: 21°C – 23°C

### 2.3 Test equipment used

Manufacturer	Device	Type	Serial number	Date of last calibration
Schmid & Partner Engineering AG	Dosimetric E-Fiel Probe	ET3DV6	1558	February 20, 2001
Schmid & Partner Engineering AG	Dosimetric E-Fiel Probe	ET3DV6	1559	February 20, 2001
Schmid & Partner Engineering AG	900 MHz System Validation Dipole	D900V2	102	February 13, 2001
Schmid & Partner Engineering AG	1800 MHz System Validation Dipol	D1800V2	287	February 13, 2001
Schmid & Partner Engineering AG	Data acquisition electronics	DAE3V1	413	January 15, 2001
Schmid & Partner Engineering AG	Software	DASY 3 V3.1c	---	Calibration isn't necessary
Schmid & Partner Engineering AG	Phantom	SAM	---	Calibration isn't necessary
Rohde & Schwarz	Universal Radio Communication Tester	CMU 200	U-972406/000	August 30, 2001
Hewlett Packard	Network Analyser S-Param. Test Set	HP 8510C HP 8515 A	2643A03725 2723A01379	January 18, 2001
Agilent	Dielectric Probe Kit	Agilent 85070C	US99360146	March 8, 2001

## 2.4 Test results (Body SAR)

**Pre results:** measured SAR value with an calibrated used conversion factor of 5.4.

Channel (frequency)	Position	Body Worn 1 slot (measured)	Body Worn 2 slots (calculated)	Limit
661 (1880.0 MHz)	top : 1cm distance	0.146 W/kg	0.292 W/kg	1.6 W/kg
661 (1880.0 MHz)	bottom:	0.0935 W/kg	0.187 W/kg	1.6 W/kg
661 (1880.0 MHz)	antenna side 1 cm distance	0.122 W/kg	0.244 W/kg	1.6 W/kg

Table 2: Pre results (Body SAR) 1900 MHz

**Final results:** SAR value with an used calculated conversion factor of 5.21.

Channel (frequency)	Position	Body Worn 1 slot (measured)	Body Worn 2 slots (calculated)	Limit
661 (1880.0 MHz)	top : 1cm distance	0.151 W/kg	0.302 W/kg	1.6 W/kg
661 (1880.0 MHz)	bottom:	0.0969 W/kg	0.194 W/kg	1.6 W/kg
661 (1880.0 MHz)	antenna side 1 cm distance	0.126 W/kg	0.252 W/kg	1.6 W/kg

Table 3: Final results (Body SAR) 1900 MHz

Note: The table contains the measured SAR values averaged over a mass of 1 g. Upper and lower frequencies were not measured because the values at the middle frequency did not exceed 1.27 W/kg (1.60 W/kg reduced of 2dB)

The calibrated conversion factor at 1800 MHz head tissue decreases approximately 1% per 100 MHz frequency increase. Additional the conversion factor in body tissue is approximately 3% lower than for head tissue for the same frequency. That means, the correct conversion factor for 1880 MHz body tissue is approximately 5.21

The measurement was performed with one active time slot. The EUT can also works with max. two time slots. This aspect was considered, as the measured SAR value with one active time slot was doubled.

The described distance from the EUT to the flat phantom defined from the tip of the antenna to the outside of the flat phantom.

## 2.5 Tissue dielectric properties

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

Ingredients (% by weight)	Frequency (MHz)									
	<input type="checkbox"/> 450		<input type="checkbox"/> 835		<input type="checkbox"/> 900		<input checked="" type="checkbox"/> 1900		<input type="checkbox"/> 2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	52.64	69.91	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.40	1.35	0.76	0.36	0.13	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	0.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	0.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	47.0	29.96	0.0	26.7

Table 4: 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

## 2.6 Tissue parameters

Used Target Frequency [GHz]	Target Head Tissue		Target Body Tissue		Measured Head Tissue		Measured Body Tissue		Measured Date
	Permit- tivity	Conduc- tivity [S/m]	Permit- tivity	Conduc- tivity [S/m]	Permit- tivity	Conduc- tivity [S/m]	Permit- tivity	Conduc- tivity [S/m]	
<input type="checkbox"/> 450	43.5	0.87	56.7	0.94	---	---	---	---	---
<input type="checkbox"/> 835	41.5	0.90	55.2	0.97	---	---	---	---	---
<input type="checkbox"/> 900	41.5	0.97	55.0	1.05	---	---	---	---	---
<input type="checkbox"/> 915	41.5	0.98	55.0	1.06	---	---	---	---	---
<input checked="" type="checkbox"/> 1900	40.0	1.40	53.3	1.52	41.0	1.36	54.6	1.6	14 <sup>th</sup> January 02
<input type="checkbox"/> 2450	39.2	1.80	52.7	1.95	---	---	---	---	---

Table 5: Parameter of the tissue simulating liquid

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



## 2.7 Measurement uncertainties

The overall combined measurement uncertainty of the measurement system is +/-12,1% (K=1). The breakdown of the individual uncertainties is as follows:

<b>Calibration Error:</b>					
	<b>Probability Distribution</b>	<b>Standard Uncertainty</b>			
		<b>900 MHz</b>	<b>1500 MHz</b>	<b>1800 MHz</b>	
Incident power	Rectangular	+/- 1,2 %	+/- 1,2 %	+/- 1,2 %	
Mismatch uncertainty	Rectangular	+/- 0,6 %	+/- 0,6 %	+/- 0,6 %	
Exp. fitting error (95% confidence)	Normal	+/- 0,4 %	+/- 0,2 %	+/- 0,2 %	
Liquid permittivity	Rectangular	+/- 2,3 %	+/- 2,8 %	+/- 2,9 %	
Probe positioning	Normal	+/- 0,5 %	+/- 0,8 %	+/- 1,0 %	
Field homogeneity	Rectangular	+/- 0,6 %	+/- 1,2 %	+/- 1,4 %	
<b>Combined Standard Uncertainty</b>		<b>+/- 2,8 %</b>	<b>+/- 3,4 %</b>	<b>+/- 3,6 %</b>	
<b>E-Field Probe Error:</b>					
<b>Error Description</b>	<b>Error</b>	<b>Probability Distribution</b>	<b>Weight</b>	<b>Standard Uncertainty</b>	
Isotropy around axis	+/- 0,2 dB	U-shape	0,5	+/- 2,4 %	
Spherical Isotropy	+/- 0,4 dB	U-shape	0,5	+/- 4,8 %	
Isotropy from gradient	+/- 0,5 dB	U-shape	0		
Spatial resolution	+/- 0,5 %	normal	1	+/- 0,5 %	
Linearity error	+/- 0,2 dB	rectangular	1	+/- 2,5 %	
Calibration error	+/- 3,6 %	normal	1	+/- 3,6 %	
<b>Combined Standard Uncertainty:</b>				<b>+/- 6,9 %</b>	
<b>Source Uncertainty:</b>					
<b>Error Description</b>	<b>Error</b>	<b>Probability Distribution</b>	<b>Weight</b>	<b>Standard Uncertainty</b>	
Device positioning	+/- 6%	normal	1	+/- 6%	
Laboratory set-up	+/- 3 %	normal	1	+/- 3%	
<b>Combined Standard Uncertainty:</b>				<b>+/- 6,7 %</b>	
<b>SAR Evaluation Error</b>					
<b>Error Description</b>	<b>Error</b>	<b>Probability Distribution</b>	<b>Weight</b>	<b>Standard Uncertainty</b>	<b>Offset</b>
Data acquisition error	+/- 1%	rectangular	1	+/- 0,6 %	
ELF and RF disturbances	+/- 0,25 %	normal	1	+/- 0,25 %	
Conductivity assessment	+/- 10 %	rectangular	1	+/- 5,8 %	
Extrapolation and boundary effects	+/- 3 %	normal	1	+/- 3 %	+ 5 %
Probe positioning	+/- 0,1 mm	normal	1	+/- 1 %	
Integration and cube orientation	+/- 3 %	normal	1	+/- 3 %	
Cube shape inaccuracies	+/- 2 %	rectangular	1	+/- 1,2 %	
<b>Combined Standard Uncertainty:</b>				<b>+/- 7,4 %</b>	

<b>Combined Uncertainties</b>		
<b>Error Description</b>	<b>Standard Uncertainty</b>	<b>Offset</b>
E-field probe errors	+/- 6.9 %	
SAR evaluation error	+/- 7.4 %	+/- 5 %
Source uncertainty	+/- 6,7 %	
<b>Combined Standard Uncertainty:</b>	<b>+/- 12.1 %</b>	
<b>Expanded Uncertainty (k=2):</b>	<b>+/- 24,2 %</b>	

Table 6: Measurement uncertainties

The measurement uncertainties were performed by Schmid & Partner Engineering AG.

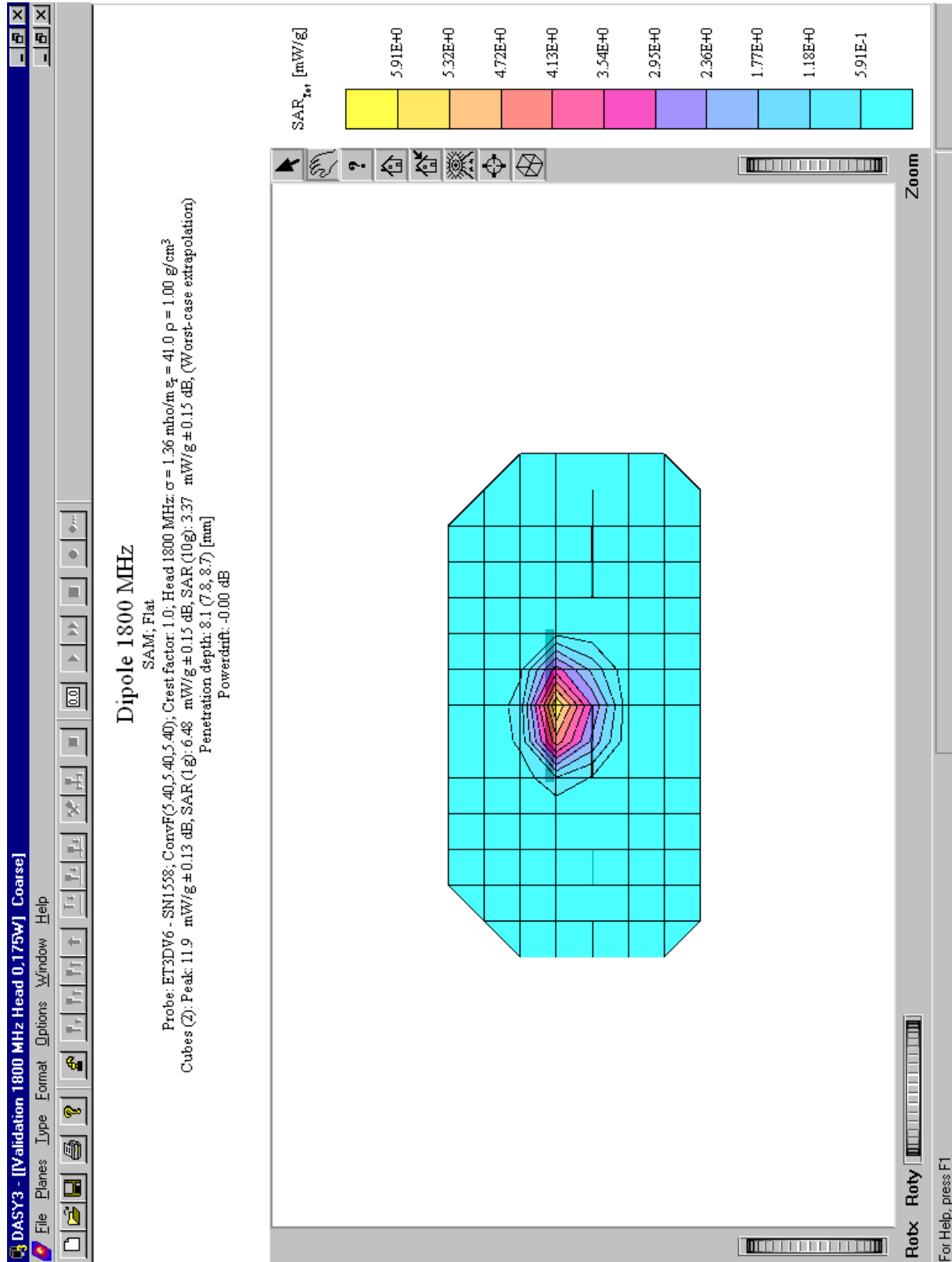
## 2.8 System validation

The system validation is used for verifying the accuracy of the complete measurement system and performance of the software. The system validation is performed with 1800 MHz head tissue equivalent material according IEEE Std 1528-200X: 2001. (graphic plot attached).

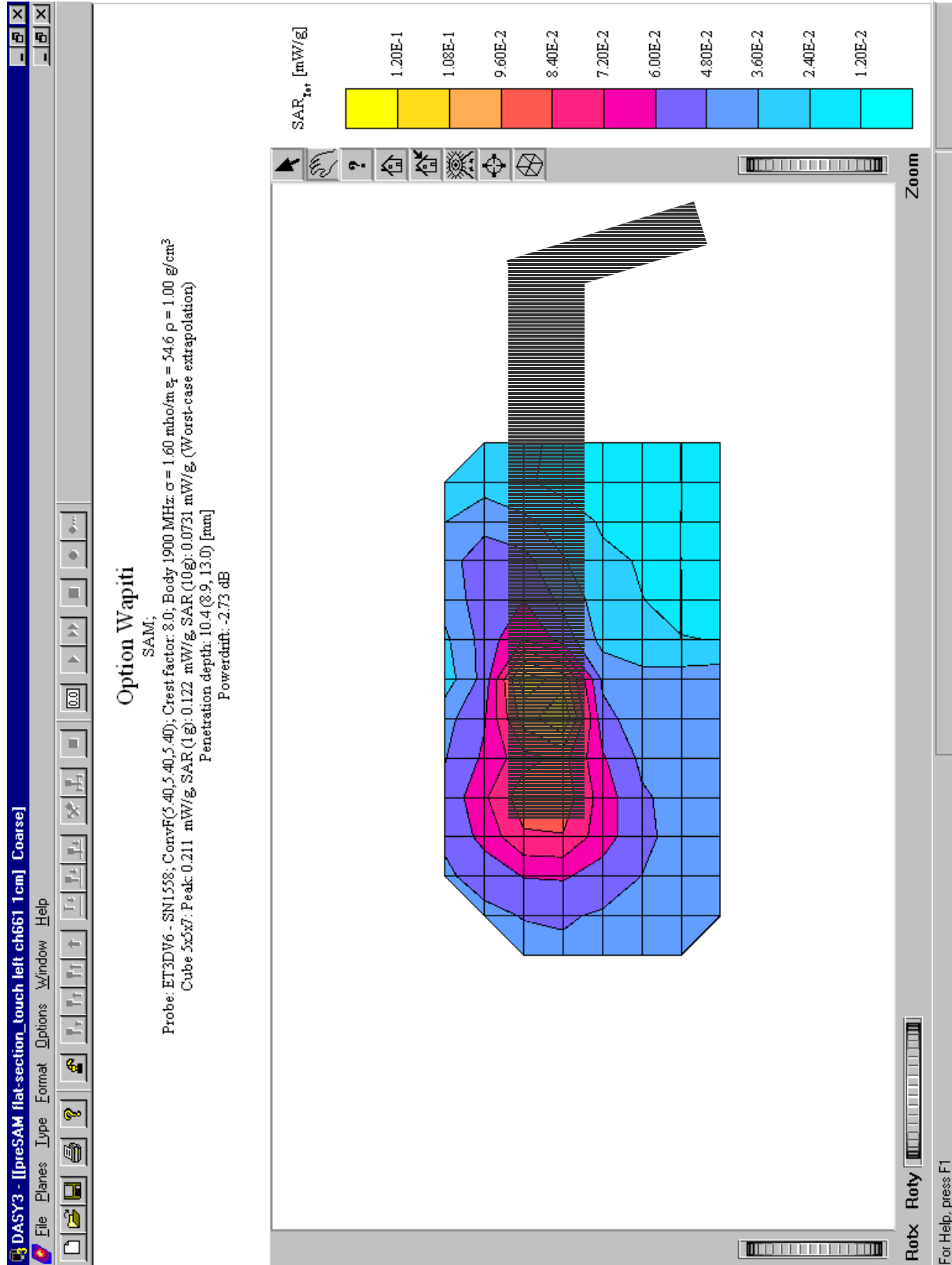
<b>Validation Kit</b>	<b>Frequency</b>	<b>Target SAR<sub>1g</sub> (175mW)</b>	<b>Target SAR<sub>10g</sub> (175mW)</b>	<b>Measured SAR<sub>1g</sub></b>	<b>Measured SAR<sub>10g</sub></b>	<b>Measured date</b>
DV2 1800, S/N:287	1800 MHz	6.67 mW/g	3.46 mW/g	6.48 mW/g	3.37 mW/g	2002.01.21

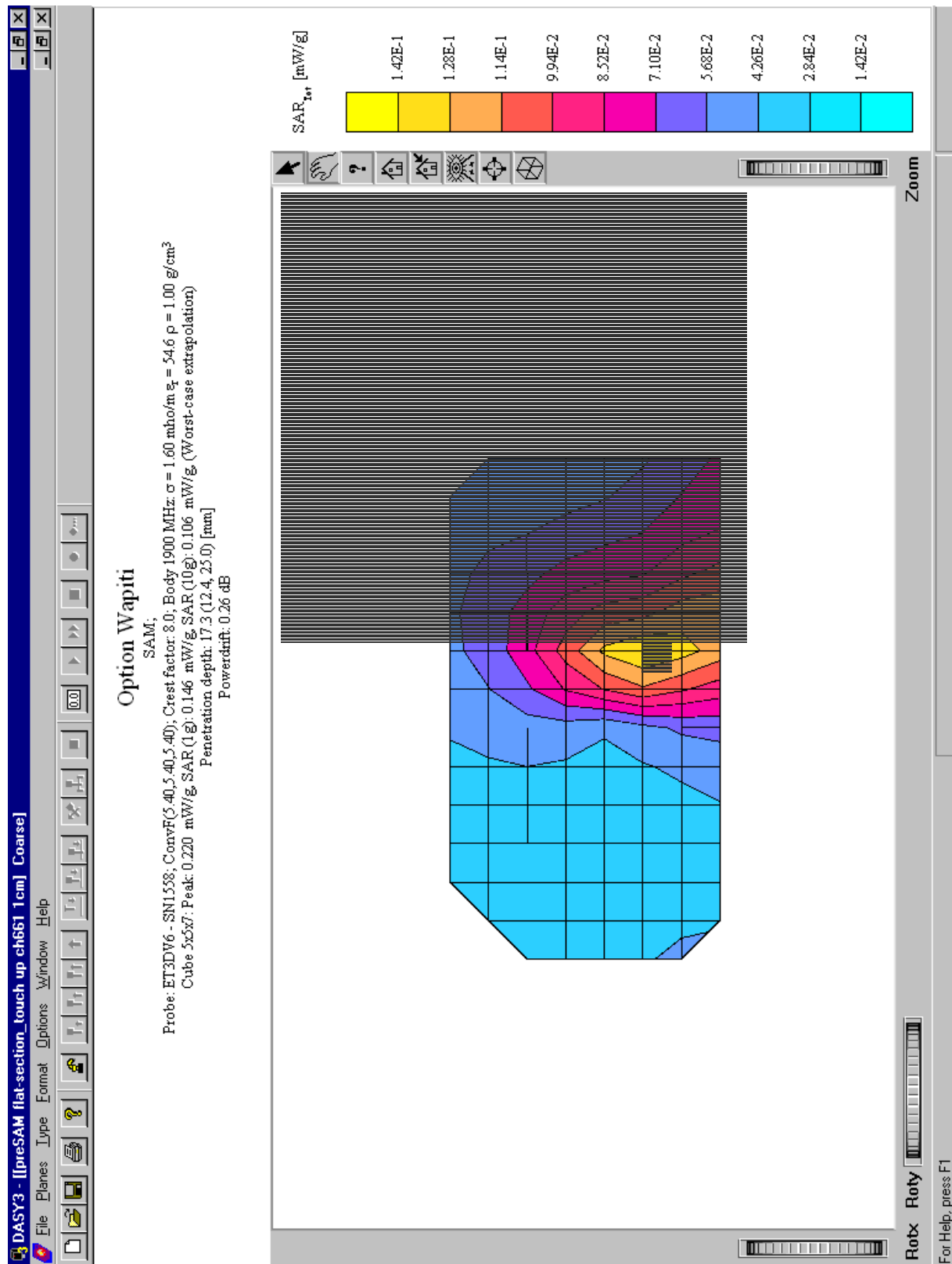
Table 7: Results system validation

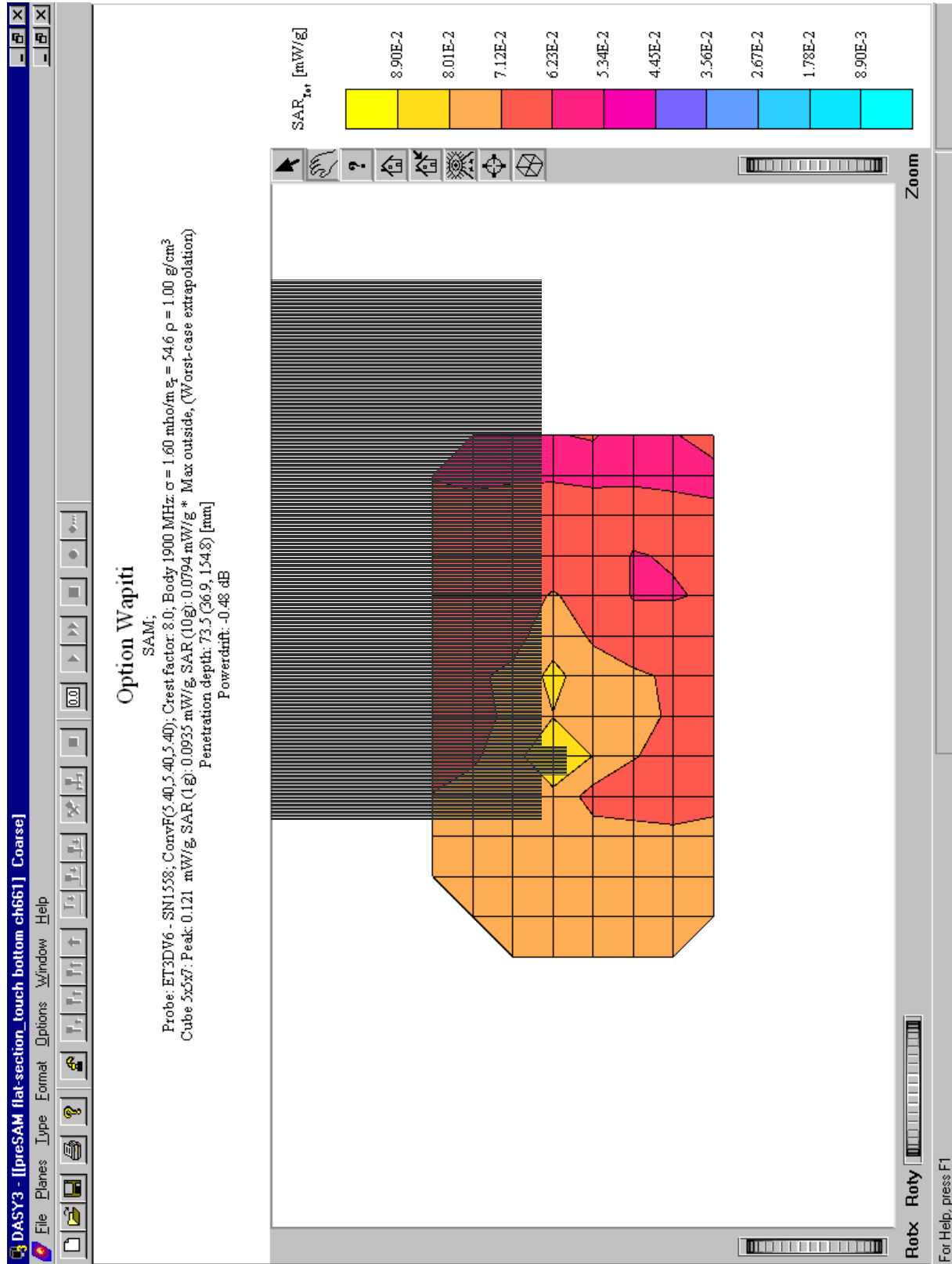
### Appendix 1: System performance verification



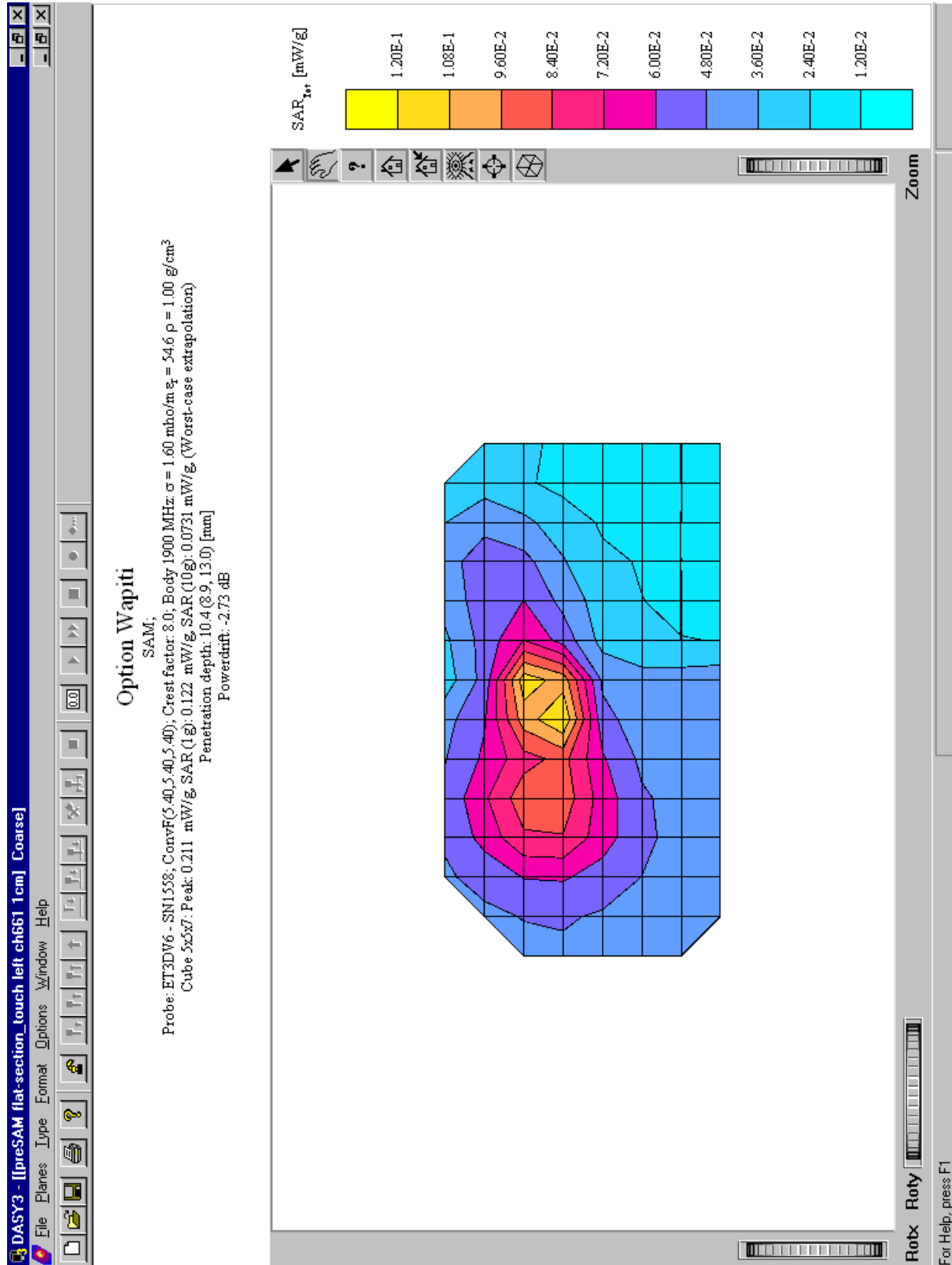
## Appendix 2: Measurement results with superimpose device outline on the SAR plots

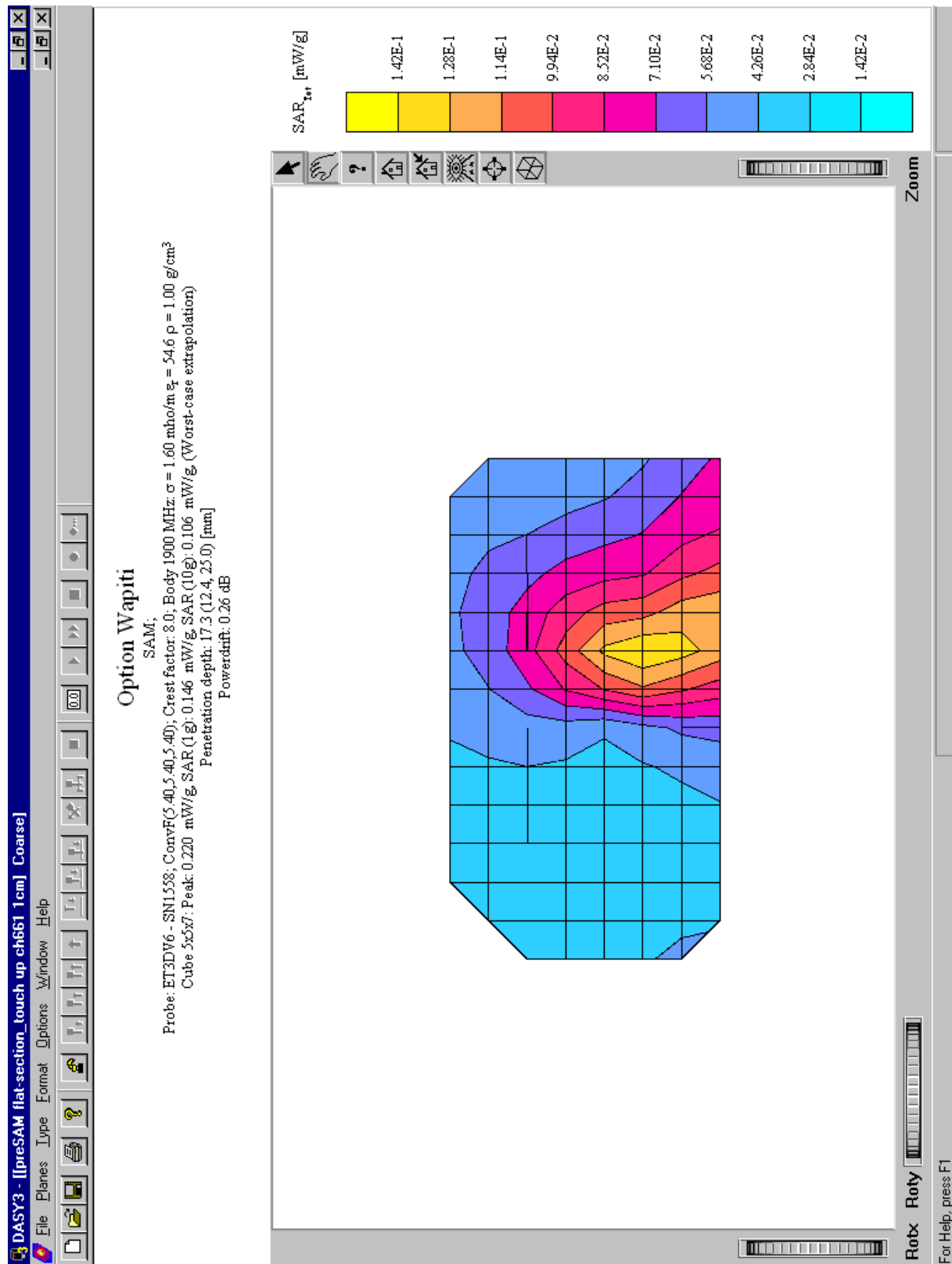




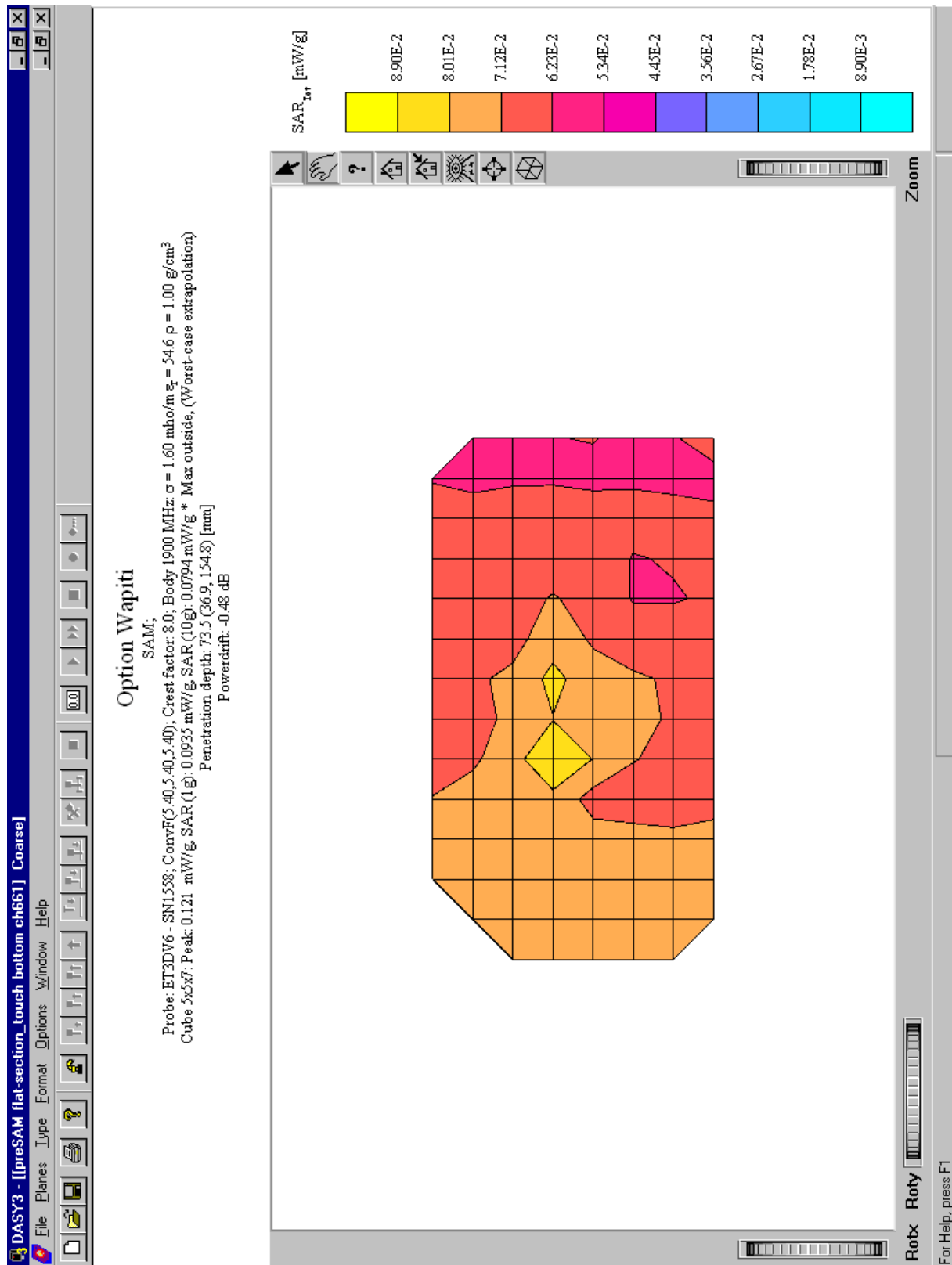


**Appendix 3: Measurement results (printout from DASYS™)**









## Appendix 4: Photo documentation



Photo 1: Measurement System DASY 3

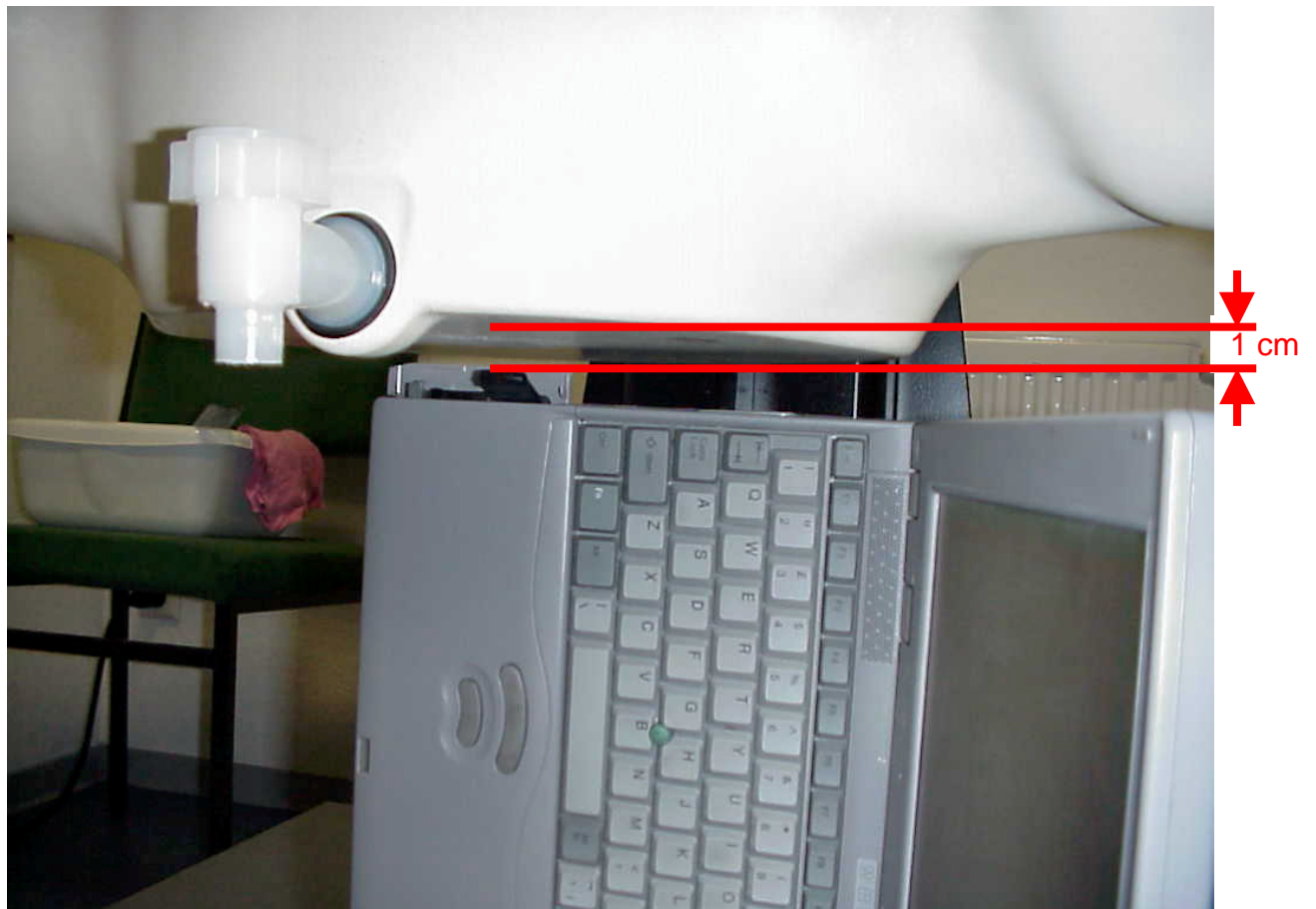


Photo 2: Position left side on the flat phantom (body SAR measurement)

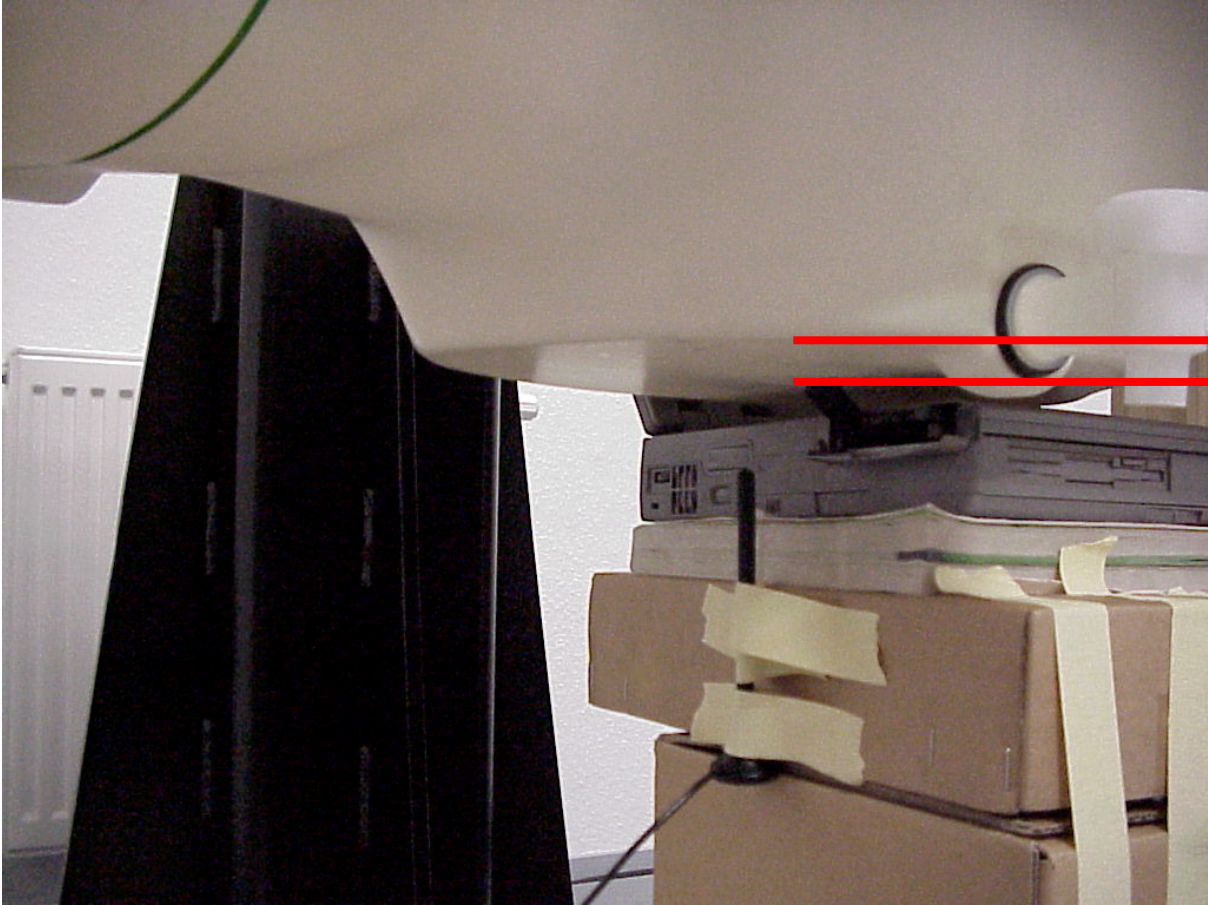


Photo 3: Position up side on the flat phantom (Body SAR measurement)





Photo 4: Position bottom on the flat phantom (Body SAR measurement)

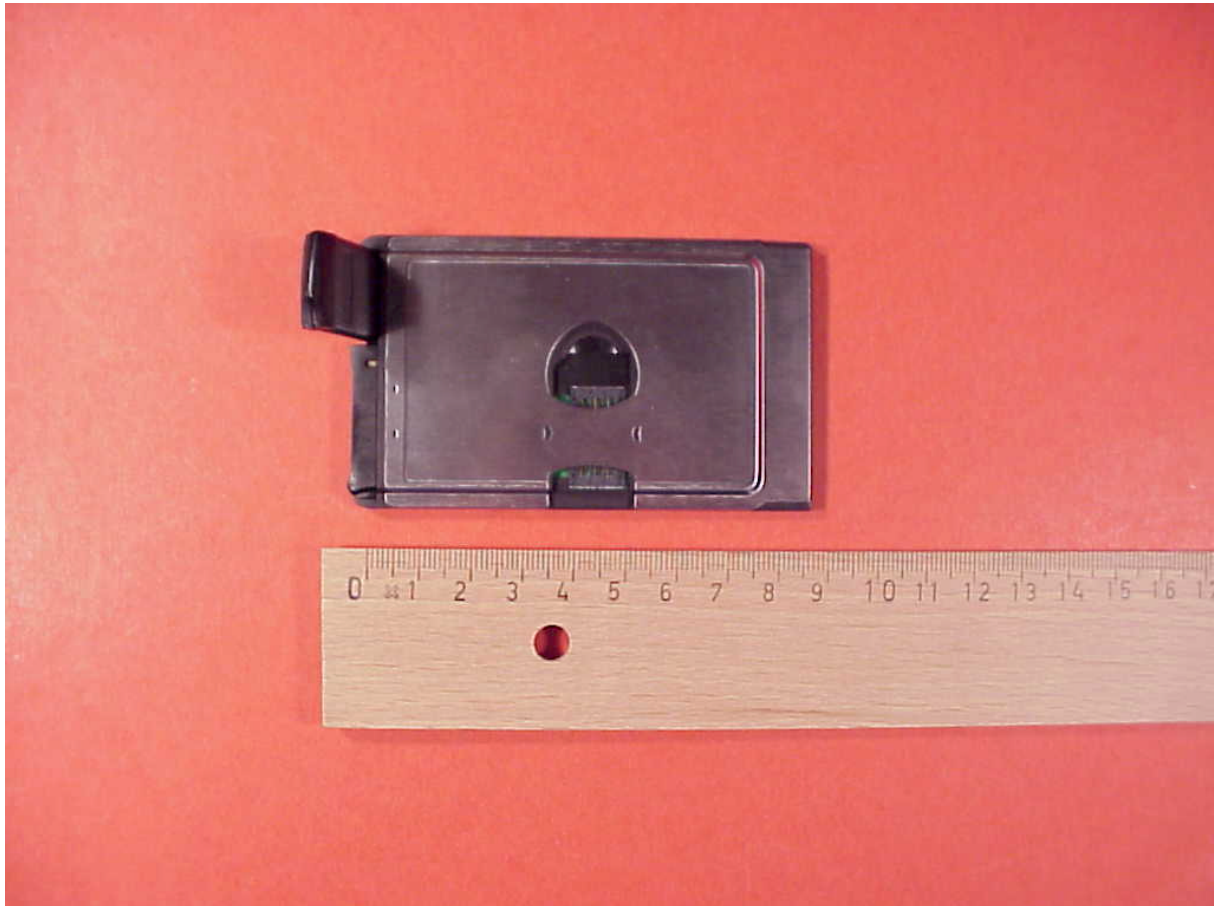


Photo 5: EUT front side



**Appendix 5: Calibration parameters of E-field probe**

**Schmid & Partner  
Engineering AG**

**Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79**

**Calibration Certificate**

**Dosimetric E-Field Probe**

Type:

**ET3DV6**

Serial Number:

**1558**

Place of Calibration:

**Zurich**

Date of Calibration:

**Feb. 20, 2001**

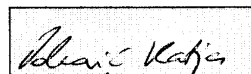
Calibration Interval:

**12 months**

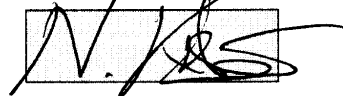
Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:



Approved by:





**ET3DV6 SN:1558**

**DASY3 - Parameters of Probe: ET3DV6 SN:1558**

**Sensitivity in Free Space**

NormX	<b>1.48</b> $\mu\text{V}/(\text{V}/\text{m})^2$
NormY	<b>1.35</b> $\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	<b>1.40</b> $\mu\text{V}/(\text{V}/\text{m})^2$

**Diode Compression**

DCP X	<b>100</b> mV
DCP Y	<b>100</b> mV
DCP Z	<b>100</b> mV

**Sensitivity in Tissue Simulating Liquid**

<b>Head</b>	<b>450 MHz</b>	$\epsilon_r = 43.5 \pm 5\%$	$\sigma = 0.87 \pm 10\% \text{ mho}/\text{m}$
ConvF X	<b>7.12</b> extrapolated		Boundary effect:
ConvF Y	<b>7.12</b> extrapolated		Alpha <b>0.18</b>
ConvF Z	<b>7.12</b> extrapolated		Depth <b>3.71</b>
<b>Head</b>	<b>900 MHz</b>	$\epsilon_r = 42 \pm 5\%$	$\sigma = 0.97 \pm 10\% \text{ mho}/\text{m}$
ConvF X	<b>6.55</b> $\pm 7\%$ (k=2)		Boundary effect:
ConvF Y	<b>6.55</b> $\pm 7\%$ (k=2)		Alpha <b>0.27</b>
ConvF Z	<b>6.55</b> $\pm 7\%$ (k=2)		Depth <b>3.26</b>
<b>Head</b>	<b>1500 MHz</b>	$\epsilon_r = 40.4 \pm 5\%$	$\sigma = 1.23 \pm 10\% \text{ mho}/\text{m}$
ConvF X	<b>5.78</b> interpolated		Boundary effect:
ConvF Y	<b>5.78</b> interpolated		Alpha <b>0.39</b>
ConvF Z	<b>5.78</b> interpolated		Depth <b>2.65</b>
<b>Head</b>	<b>1800 MHz</b>	$\epsilon_r = 40 \pm 5\%$	$\sigma = 1.40 \pm 10\% \text{ mho}/\text{m}$
ConvF X	<b>5.40</b> $\pm 7\%$ (k=2)		Boundary effect:
ConvF Y	<b>5.40</b> $\pm 7\%$ (k=2)		Alpha <b>0.45</b>
ConvF Z	<b>5.40</b> $\pm 7\%$ (k=2)		Depth <b>2.35</b>

**Sensor Offset**

Probe Tip to Sensor Center	<b>2.7</b>	mm
Optical Surface Detection	<b>1.9 <math>\pm</math> 0.2</b>	mm