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Accredited testing laboratory

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

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

Appendix to the Report 4-0834-1-1/03 additional calibration and validation information

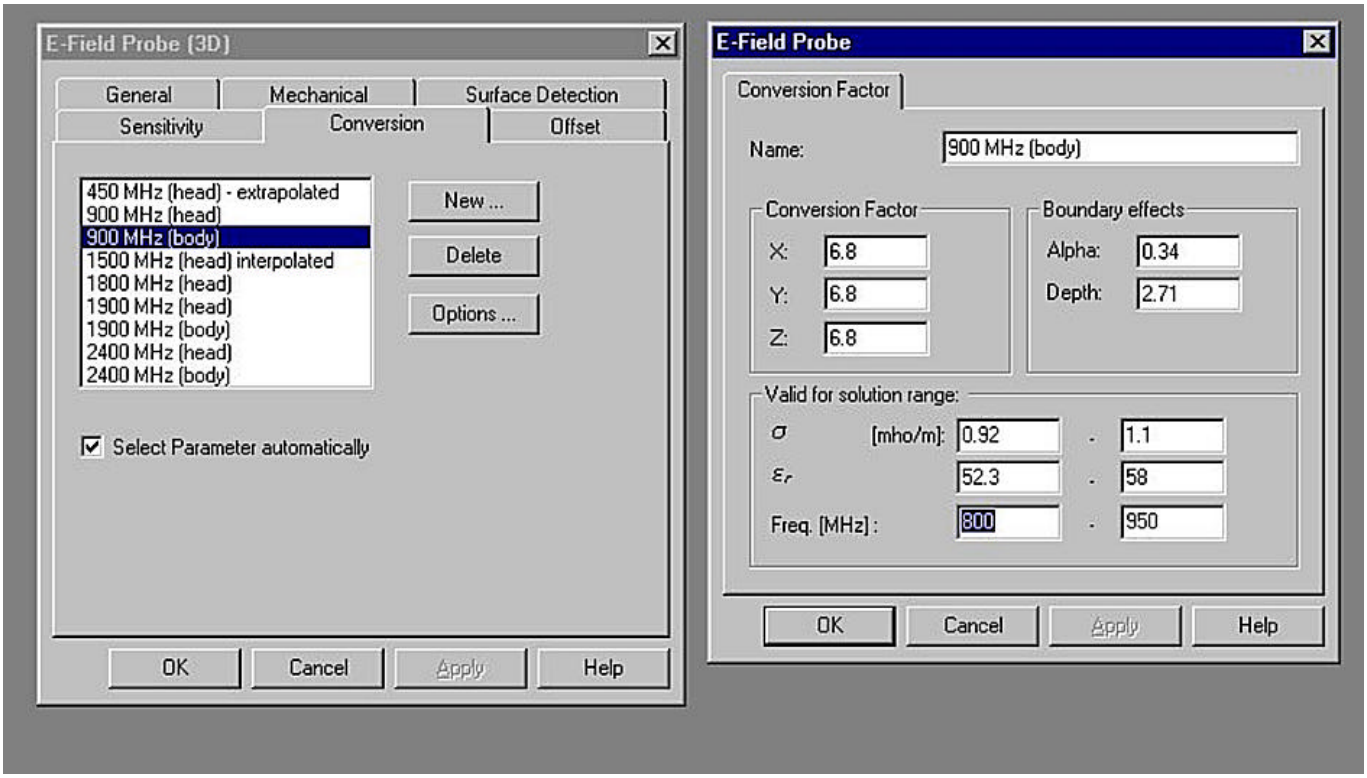
Table of Content

1. Calibration information “Probe ET3DV6”

The document ‚Calibration data and phantom information for test report no. 4-0834-1-1/03‘ contains calibration information to Probe S/N 1558 calibrated on March 22, 2002. It shows calibration factors for 900, 1800, 1900 and 2400MHz frequency bands. The 835 MHz frequency band as used by the Samsung SGH-S307 PCS phone is not explicitly mentioned.

Yet calibration data delivered by probe manufacturer Schmid & Partner include the 835 MHz band.

The following screenshot displaying original calibration file information shows that 900 MHz calibration covers the frequency band from 800 to 950 MHz.



Newer calibration documents issued by Schmid and Partner meanwhile include calibration information for both the 835 and 900 MHz band as shown on the following excerpt from the calibration document of probe no. 1559 dating from February 2003.

Schmid & Partner
Engineering AG

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

Probe ET3DV6

SN:1559

Manufactured:	December 1, 2000
Last calibration:	February 20, 2001
Recalibrated:	February 7, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1559 **February 7, 2003**

DASY - Parameters of Probe: ET3DV6 SN:1559

Sensitivity in Free Space

NormX	**1.48**	$\mu V/(V/m)^2$	DCP X	**100**	mV
NormY	**1.48**	$\mu V/(V/m)^2$	DCP Y	**100**	mV
NormZ	**1.46**	$\mu V/(V/m)^2$	DCP Z	**100**	mV

Sensitivity in Tissue Simulating Liquid

Head	**900 MHz**		ε_r **= 41.5 ± 5%**	σ **= 0.97 ± 5% mho/m**	
Head	**835 MHz**		ε_r **= 41.5 ± 5%**	σ **= 0.90 ± 5% mho/m**	
	ConvF X	**6.9**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.9**	± 9.5% (k=2)	Alpha	**0.31**
	ConvF Z	**6.9**	± 9.5% (k=2)	Depth	**2.72**
Head	**1800 MHz**		ε_r **= 40.0 ± 5%**	σ **= 1.40 ± 5% mho/m**	
	ConvF X	**5.5**	± 8.9% (k=2)	Boundary effect:	
	ConvF Y	**5.5**	± 8.9% (k=2)	Alpha	**0.45**
	ConvF Z	**5.5**	± 8.9% (k=2)	Depth	**2.85**

Boundary Effect

Head **900 MHz** **Typical SAR gradient: 5 % per mm**

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	9.1	5.3
SAR_{be} [%]	With Correction Algorithm	0.4	0.6

Head **1800 MHz** **Typical SAR gradient: 10 % per mm**

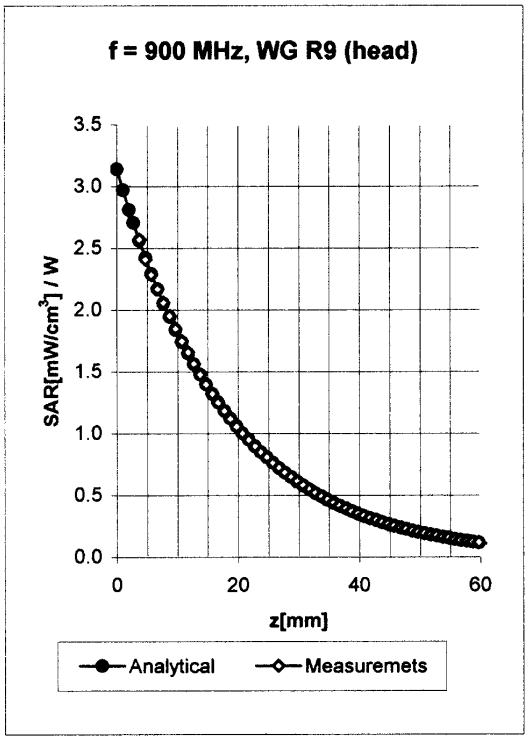
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	13.6	9.7
SAR_{be} [%]	With Correction Algorithm	0.3	0.3

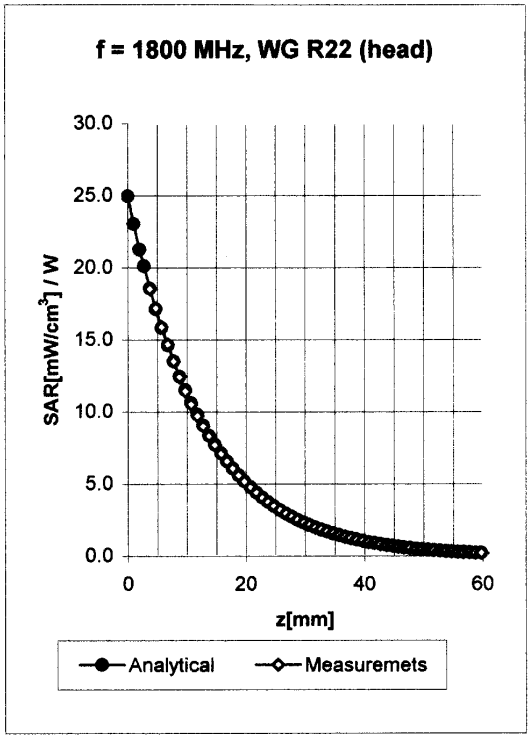
Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.9 ± 0.2**	mm

ET3DV6 SN:1559 **February 7, 2003**

Conversion Factor Assessment



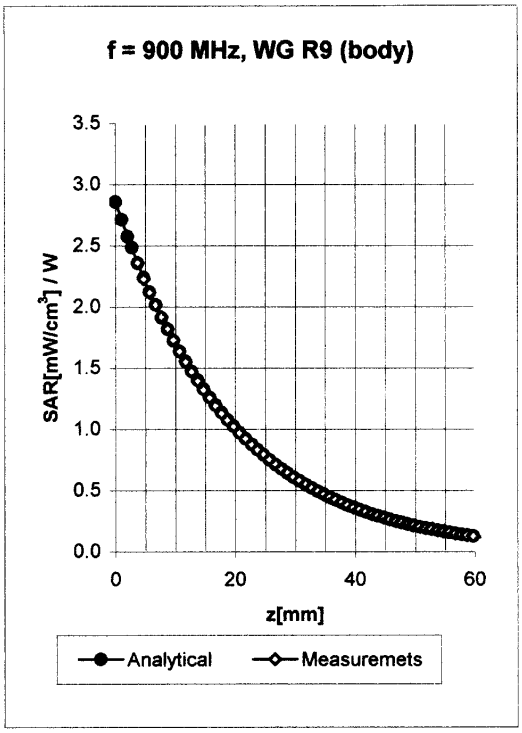


Head	**900 MHz**	ε_r **= 41.5 ± 5%**	σ **= 0.97 ± 5% mho/m**	
Head	**835 MHz**	ε_r **= 41.5 ± 5%**	σ **= 0.90 ± 5% mho/m**	
	ConvF X	**6.9** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.9** ± 9.5% (k=2)	Alpha	**0.31**
	ConvF Z	**6.9** ± 9.5% (k=2)	Depth	**2.72**

Head	**1800 MHz**	ε_r **= 40.0 ± 5%**	σ **= 1.40 ± 5% mho/m**	
	ConvF X	**5.5** ± 8.9% (k=2)	Boundary effect:	
	ConvF Y	**5.5** ± 8.9% (k=2)	Alpha	**0.45**
	ConvF Z	**5.5** ± 8.9% (k=2)	Depth	**2.85**

ET3DV6 SN:1559 **February 7, 2003**

Conversion Factor Assessment



Body	**900 MHz**		ε_r = **55.0 ± 5%**	σ = **1.05 ± 5% mho/m**
Body	**835 MHz**		ε_r = **55.2 ± 5%**	σ = **0.97 ± 5% mho/m**
	ConvF X	**6.8** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.8** ± 9.5% (k=2)	Alpha	**0.34**
	ConvF Z	**6.8** ± 9.5% (k=2)	Depth	**2.71**

2. Comparitive validation with a 900 MHz System validation dipole

For system validation it is generally recommended to use a validation dipole matched to the frequency band which is used by the device under test. At the date of test a special dipole for 835 MHz was not available so a standard dipole for 900 MHz was used. As this dipole has a poor return loss behaviour at 835 MHz (8 dB only) validation was performed at 900 MHz.

At the time of test the validation was performed using 835 MHz liquid parameters although calibration information of the dipole only gives reference data with 900 MHz liquids.
Though liquid parameters are similar and frequency difference is not too big an additional validation has been performed to allow a comparison between different set-ups.
The following pages contain validation results both with 835 MHz and with 900 MHz head and body liquids in order to show that similar reasults can be reached.

2.1. Tissue simulating liquids : parameters

Used Target Frequency	**Target Head Tissue**		**Measured Head Tissue**		**Measured Date**
[MHz]	Permittivity	Conductivity [S/m]	Permittivity	Conductivity [S/m]	
835	41.5	0.90	43.0	0.93	2003-03-21
900	41.5	0.97	42.1	0.97	2003-03-21

Table 1: Parameter of the head tissue simulating liquid

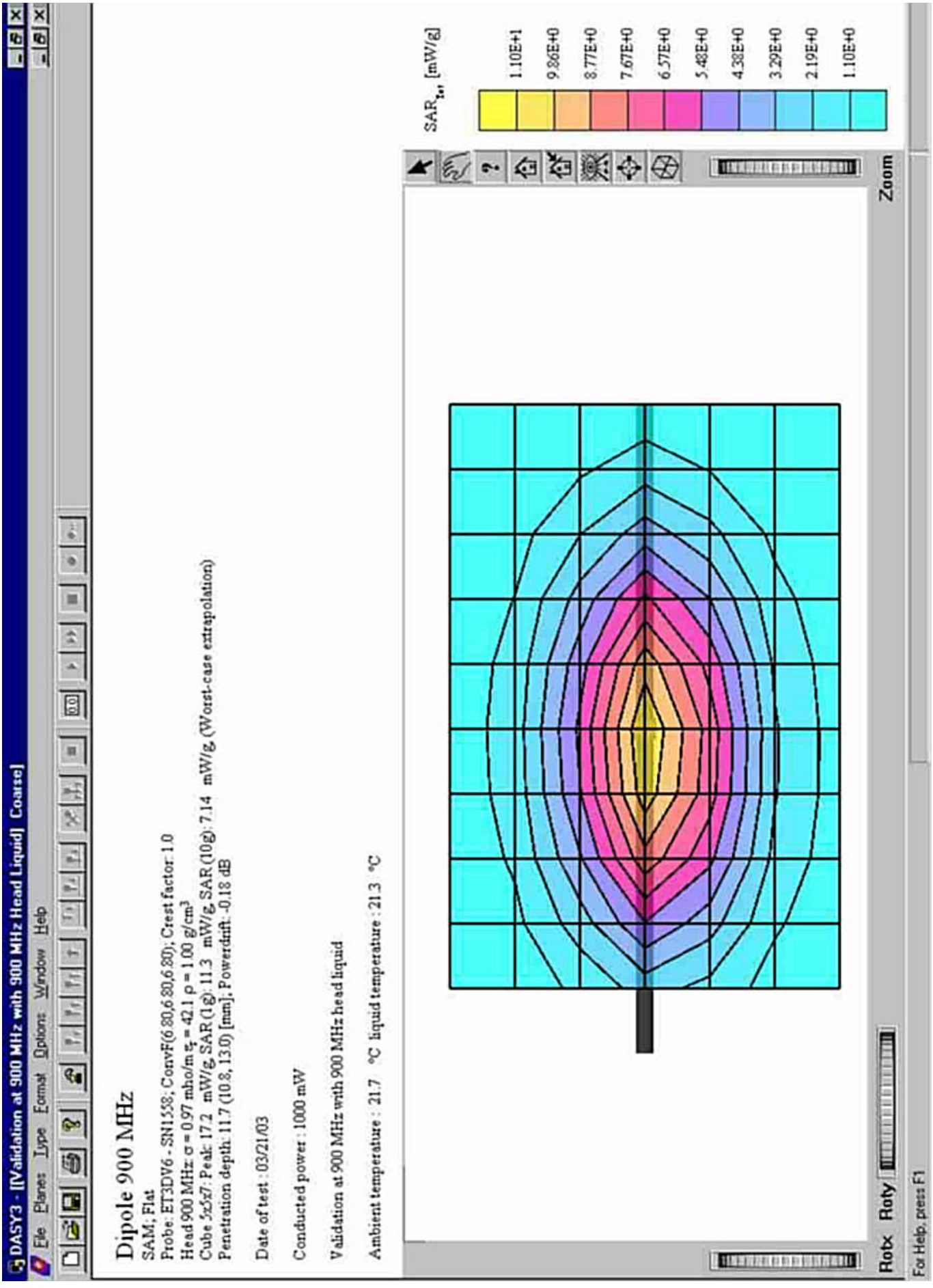
Used Target Frequency	**Target Body Tissue**		**Measured Body Tissue**		**Measured Date**
[MHz]	Permittivity	Conductivity [S/m]	Permittivity	Conductivity [S/m]	
835	55.2	0.97	57.7	1.01	2003-03-21
900	55.0	1.05	57.6	1.02	2003-03-21

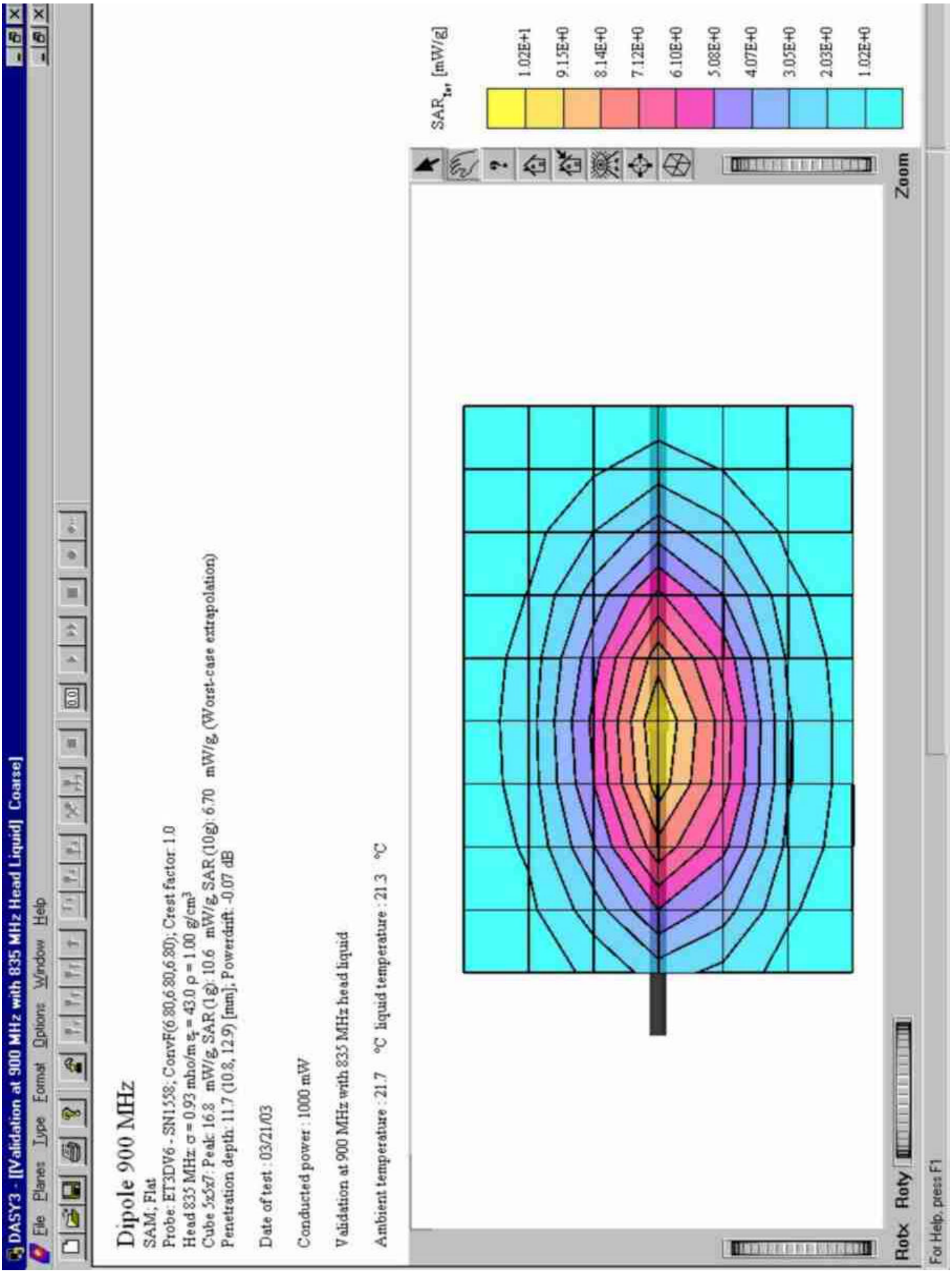
Table 2: Parameter of the body tissue simulating liquid

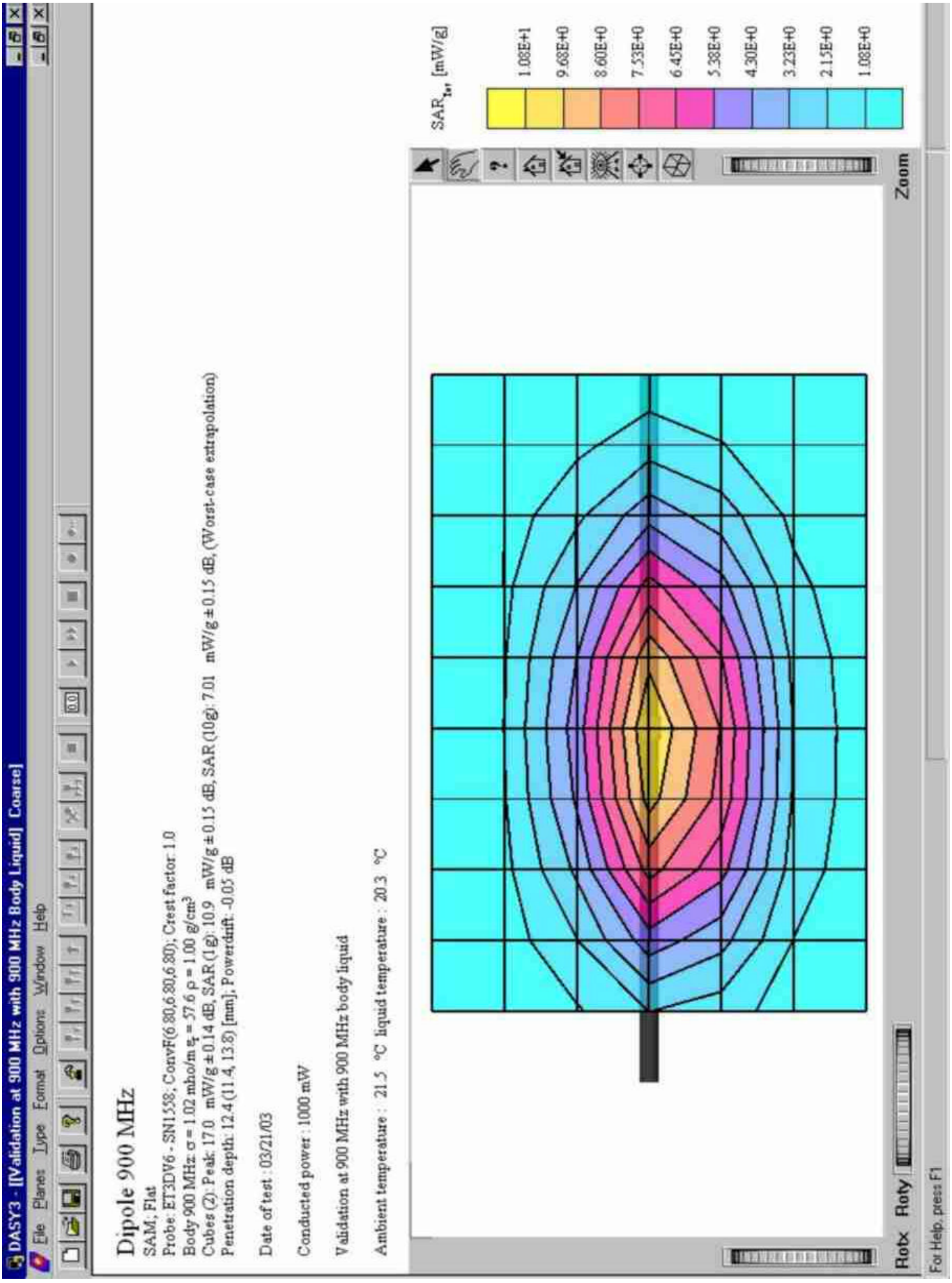
The dielectric properties have been measured using the contact probe method at 20.8°C.

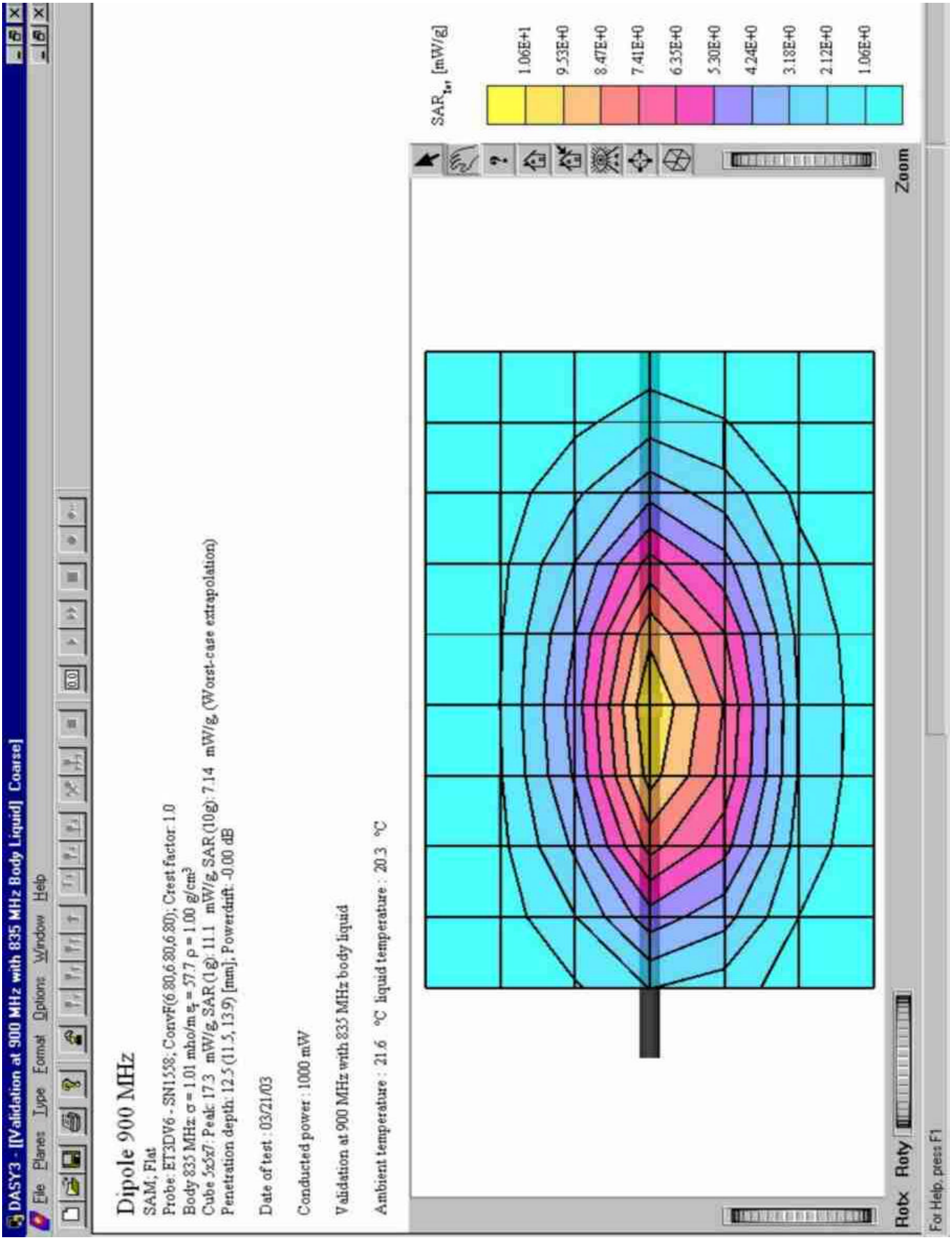
2.2. System validation results

Validation Kit	Liquid	Target Peak SAR (1000 mW) (+/- 10%)	Target SAR_{1g} (1000 mW) (+/- 10%)	Measured Peak SAR	Measured SAR_{1g}	Measured date
D900V2 S/N: 102	**900 MHz head**	**15.8 mW/g**	**10.6 mW/g**	**17.2 mW/g**	**11.1 mW/g**	**2003-03-21**
D900V2 S/N: 102	**835 MHz head**	**not defined**	**not defined**	**16.8 mW/g**	**10.6 mW/g**	**2003-03-21**
D900V2 S/N: 102	**900 MHz body**	**16.2 mW/g**	**11.1 mW/g**	**17.0 mW/g**	**10.9 mW/g**	**2003-03-21**
D900V2 S/N: 102	**835 MHz body**	**not defined**	**not defined**	**17.3 mW/g**	**11.1 mW/g**	**2003-03-21**


DASY3 - [Validation at 900 MHz with 900 MHz Head Liquid] Coarse]
File Plane Type Format Options Window Help
Dipole 900 MHz
SAM; Flat
Probe: ET3DV6 - SN1558; ConvF(6.80,6.80,6.80); Crest factor: 1.0
Head 900 MHz: σ = 0.97 mho/m, ε = 42.1 ρ = 1.00 g/cm³
Cube 5x5x7: Peak: 17.2 mW/g, SAR (1g): 11.3 mW/g, SAR (10g): 7.14 mW/g (Worst-case extrapolation)
Penetration depth: 11.7 (10.8, 13.0) [mm], Powerdrift: -0.18 dB
Date of test: 03/21/03
Conducted power: 1000 mW
Validation at 900 MHz with 900 MHz head liquid
Ambient temperature: 21.7 °C liquid temperature: 21.3 °C
SAR1g [mW/g]
1.10E+1
9.86E+0
8.77E+0
7.67E+0
6.57E+0
5.48E+0
4.38E+0
3.29E+0
2.19E+0
1.10E+0
Zoom
Rotx
Roty
For Help, press F1


DASY3 - [Validation at 900 MHz with 835 MHz Head Liquid] Coarse]
File Planes Type Format Options Window Help
Dipole 900 MHz
SAM; Flat
Probe: ET3DV6 - SN1558; ConvF(6.80,6.80,6.80); Crest factor: 1.0
Head 835 MHz: σ = 0.93 mho/m ε = 43.0 ρ = 1.00 g/cm³
Cube 5x5x7: Peak: 16.8 mW/g, SAR (1g): 10.6 mW/g, SAR (10g): 6.70 mW/g, (Worst-case extrapolation)
Penetration depth: 11.7 (10.8, 12.9) [mm], Powerdrift: -0.07 dB
Date of test: 03/21/03
Conducted power : 1000 mW
Validation at 900 MHz with 835 MHz head liquid
Ambient temperature : 21.7 °C liquid temperature : 21.3 °C
SAR1g [mW/g]
1.02E+1
9.15E+0
8.14E+0
7.12E+0
6.10E+0
5.08E+0
4.07E+0
3.05E+0
2.03E+0
1.02E+0
Zoom
Rotx
Roty
For Help, press F1


DASY3 - [Validation at 900 MHz with 900 MHz Body Liquid] Coarse]
File Planes Type Format Options Window Help
Dipole 900 MHz
SAM; Flat
Probe: ET3DV6 - SN1538; ConvF(6.80,6.80,6.80); Crest factor: 1.0
Body 900 MHz: σ = 1.02 mho/m ε_r = 57.6 ρ = 1.00 g/cm³
Cubes (2): Peak: 17.0 mW/g ± 0.14 dB, SAR (1g): 10.9 mW/g ± 0.15 dB, SAR (10g): 7.01 mW/g ± 0.15 dB, (Worst-case extrapolation)
Penetration depth: 12.4 (11.4, 13.8) [mm]; Powerdrift: -0.05 dB
Date of test: 03/21/03
Conducted power : 1000 mW
Validation at 900 MHz with 900 MHz body liquid
Ambient temperature : 21.5 °C liquid temperature : 20.3 °C
SAR_1g [mW/g]
1.08E+1
9.68E+0
8.60E+0
7.53E+0
6.45E+0
5.38E+0
4.30E+0
3.23E+0
2.15E+0
1.08E+0
Zoom
Rotx Roty
For Help, press F1


DASY3 - [Validation at 900 MHz with 835 MHz Body Liquid] Coarse]
File Plane Type Format Options Window Help
Dipole 900 MHz
SAM; Flat
Probe: ET3DV6 - SN1558; ConvF(6.80,6.80,6.80); Crest factor: 1.0
Body 835 MHz: σ = 1.01 mho/m ε = 57.7 ρ = 1.00 g/cm³
Cube 5x5x7: Peak: 17.3 mW/g, SAR (1g): 11.1 mW/g, SAR (10g): 7.14 mW/g, (Worst-case extrapolation)
Penetration depth: 12.5 (11.5, 13.9) [mm], Powerdrift: -0.00 dB
Date of test: 03/21/03
Conducted power: 1000 mW
Validation at 900 MHz with 835 MHz body liquid
Ambient temperature : 21.6 °C liquid temperature : 20.3 °C
SAR$_{1g}$ [mW/g]
1.06E+1
9.53E+0
8.47E+0
7.41E+0
6.35E+0
5.30E+0
4.24E+0
3.18E+0
2.12E+0
1.06E+0
Zoom
Rotx
Roty
For Help, press F1