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SEM/CV/PF/P William Stewart		EUS/CV/R-02:0030/REP		
Approved	Checked			
SEM/CV/PF/P Dulce Altabella	DA	2002-1-24	A	U:\FCC Submittals\Fcc_419 HP Nicole\XHIBIT11\Source\T61g_T61zbody.doc

SAR Test Report: T61g and T61z (PXITR-419-A2)
Supplement A: Results for body-worn usage

Date of test: December 6,11, 2001

Laboratory: SAR Testing Laboratory
Sony Ericsson Mobile Communications, Inc.
7001 Development Drive, P.O. Box 13969,
Research Triangle Park, NC, 27709, USA

Tested by: William Stewart
Development Engineer, Antenna Development Group

Test Responsible: Dulce Altabella
Staff Engineer, Antenna Development Group

Accreditation: This laboratory is accredited to ISO/IEC 17025-1999 to perform the following electromagnetic tests: Specific Absorption Rate (SAR), dielectric parameters, and RF power measurement
on the following types of products: Wireless communications devices.

A2LA certificate Number: 1650-01

Statement of Compliance: Sony Ericsson Mobile Communications, Inc. declares under its sole responsibility that the product

T61g and T61z
FCC ID: PXITR-419-A2

to which this declaration relates, is in conformity with the appropriate RF exposure standards, recommendations and guidelines. It also declares that the product was tested using specifications that closely conform to the latest appropriate measurement standards, guidelines and recommended practices. Any deviations from these specifications or from ISO/IEC 17025-1999 are noted below:

None

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This test report shall not be reproduced except in full, without written approval of the laboratory. The results and statements contained herein relate only to the items tested. The names of individuals involved may be mentioned only in connection with the statements or results from this report. All feedback on this report is encouraged, both positive and negative.

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1. Introduction

This report is a supplement to the document EUS/CV/R-02:0029/REP "SAR Test Report: T61g and T61z (PXITR-419-A2)." The main document demonstrates compliance of the T61g and T61z wireless handsets with RF safety guidelines while used against the head. In this report, compliance of the T61g and T61z wireless handsets with RF safety guidelines is demonstrated while the device is used in body-worn configurations. The applicable RF safety guidelines and the SAR measurement specifications used for the test are described in [1].

2. Device Under Test

2.1 Antenna description

Type	Internal antenna	
Location	Inside the back cover, near the top	
Dimensions	Maximum length	38 mm
	Maximum width	51 mm
Configuration	Patch antenna	

2.2 Device description

Device model	T61g and T61z	
FCC ID	PXITR-419-A2	
Serial number	UA2020LXTZ	
Maximum Size	Length	121 mm
	Width	54 mm
	Thickness	24 mm
Modes	800 GSM	1900 GSM
Multiple Access Scheme	TDMA	TDMA
Maximum Output Power Setting	29.0 dBm	30.0 dBm
Factory Tolerance in Power Setting	+1 / -2	+1 / -2
Maximum Peak Output Power	30.0 dBm	31.0 dBm
Duty Cycle	1 / 8	1 / 8
Transmitting Frequency Range	824 – 849 MHz	1850 – 1910 MHz
Prototype or Production Unit	Prototype	
Device Category	Portable	
RF Exposure Environment [2]	General population / uncontrolled	

3. Test equipment

3.1 Dosimetric system

SAR measurements were made using a DASY3 professional system (software version 3.1c) with a SAM phantom, manufactured by Schmid & Partner Engineering AG (SPEAG). The measurement uncertainty of the system is given in [1]. Below is a list of the calibrated equipment.

Description	Serial Number	Due Date
DASY3 DAE V1	431	05 / 2002
E-field probe ET3DV6	1538	06 / 2002
Dipole Validation Kit, D835V2	428	12 / 2002
Dipole Validation Kit, D1900V2	536	05 / 2003

3.2 Additional calibrated equipment

Description	Serial Number	Due Date
Signal Generator HP8648C	3537A01598	9/2002
Dielectric probe kit HP 85070B	US33020390	3/2002
Network analyzer HP 8752C	3410A03105	7/2002
Power meter HP 437B	3125U12026	6/2002
Power sensor HP 8482H	3318A07097	2/2002
Power meter HP 437B	3125U113481	6/2002
Power sensor HP 8482H	MY41090240	6/2002
Power meter HP 437B	3125U13729	1/2002
Power sensor HP 8482H	MY41090239	6/2002
Hygrometer / Thermometer	21242911	10/2002
Thermometer / Probe	350078/99172351	10/2002
Thermometer / Probe	21117674/21117824	11/2002
Spectrum Analyzer MS2623A	M07418	10/2002

4. Electrical parameters of the tissue simulating liquid

Prior to conducting SAR measurements, the relative permittivity, ε_r, and the conductivity, σ, of the tissue simulating liquids were measured with the dielectric probe kit. These are tabulated below. A mass density of ρ = 1.00 g/cm^3 was entered into the DASY3 program in all cases. The temperatures of the tissue simulants during measurements are also given. During the tests, the ambient temperature of the laboratory was in the range 22.6 – 23.6 °C, the relative humidity was 33.0 – 36.6% and the liquid depth above the ear reference points was 160 – 161 mm. It can be seen that the measured parameters are within tolerance of the recommended limits [1].

f (MHz)	Tissue type	Date	Dielectric Parameters		Simulant Temp (°C)
			e_r	s (S/m)	
835	Muscle	06DEC01	55.88	0.97	23.2
1900	Muscle	11DEC01	52.69	1.54	23.3

5. System accuracy verification

A system accuracy verification of the DASY3 was performed using the dipole validation kits listed in Section 3.1. System verification tests were conducted on the same day as the measurement of the DUT. The obtained results are displayed in the table below (SAR values are scaled to 1 Watt power delivered to the antenna). During the tests, the ambient temperature of the laboratory was in the range 23.1 – 23.7 °C, the relative humidity was 32.8 – 36.4% and the liquid depth above the ear reference points was 160 – 161 mm. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values. Reference values are taken from numerical simulations for both the 835MHz and 1900MHz muscle simulant [5]. The SAR distributions are shown in Appendix 1.

Daily, prior to conducting tests, measurements were made with RF sources powered off to determine system noise. The highest system noise value was 0.00 W/kg, which is below the recommended limit [2].

f MHz	Tissue type	Measured / Reference	SAR (W/kg) 1 g/10 g	Dielectric Parameters		Simulant Temp. (°C)
				e_r	s (S/m)	
835	Body	Measured, 12/06/01	9.92 / 6.50	55.88	0.97	23.1
		Reference (Simulation)	9.90 / 6.46	55.2	0.97	+/-2.0 of value in §4
1900	Body	Measured, 12/07/01	42.62 / 22.26	52.69	1.54	22.8
		Reference (Simulation)	40.50 / 20.89	53.3	1.52	+/-2.0 of value in §4

6. Test results

The measured 1- and 10-gram averaged SAR values of the device are provided in Tables 1 and 2. Also shown are the measured conducted output powers and the temperature of the tissue simulant during the test. The depth of the tissue simulating liquid was at least 15 cm for all the cases. The humidity and ambient temperature of the test facility were in the ranges 32.6% - 37.8% and 23.1 – 24.5°C respectively. Test commands were used to control the device during the SAR measurements.

SAR measured against the body, using battery BKB-193-1052 (900mAh) is presented in Table 1and 2. For body worn measurements, the device was tested against a flat phantom, representing the user's body, using carry accessory SXK 109 4705 and hands free accessory RLF-501-25/03. For 800 and 1900 GSM modes, the device was tested at the lowest, middle, and highest frequencies of the transmit band.

Mode	*f* (MHz)	Output Power (dBm)	SXK 109 4705		
			Simulant Temp. (°C)	SAR, 1g /10g (W/kg)	
				measured	Calculated to max. power
800 GSM Back of phone facing the body	824	29.41	23.0	0.30/0.22	**0.32/0.23**
	837	29.78	23.0	0.28/0.20	0.30/0.21
	849	29.74	23.0	0.22/0.16	0.24/0.17
800 GSM Front of phone facing the body	824	29.41	23.1	0.20/0.14	0.21/0.15
	837	29.78	23.0	0.15/0.11	0.16/0.11
	849	29.74	23.0	0.11/0.08	0.12/0.09

Table 1: 800 GSM mode. SAR measurement results for the T61g telephone at highest possible output power. Measured against the body using carry accessory SXK 109 4705 with hands free accessory RLF 501 25/03.

Mode	*f* (MHz)	Output Power (dBm)	SXK 109 4705		
			Simulant Temp. (°C)	SAR, 1g /10g (W/kg)	
				measured	Calculated to max. power
1900 GSM Back of phone facing the body	1850	30.86	22.6	0.54/0.31	**0.56/0.31**
	1880	30.85	22.6	0.42/0.24	0.44/0.25
	1910	30.73	22.5	0.48/0.27	0.49/0.28
1900 GSM Front of phone facing the body	1850	30.86	22.6	0.11/0.07	0.12/0.07
	1880	30.85	22.5	0.07/0.04	0.07/0.45
	1910	30.73	22.5	0.05/0.03	0.05/0.03

Table 2: 1900 GSM mode. SAR measurement results for the T61g and T61z telephone at highest possible output power. Measured against the body using carry accessory SXK 109 4705 with hands free accessory RLF 501 25/03.

References

[1] M. Douglas, "SAR Measurement Specification of Mobile Phones," Sony Ericsson internal document EUS/CV/R-01:1061/REP, November 2001.

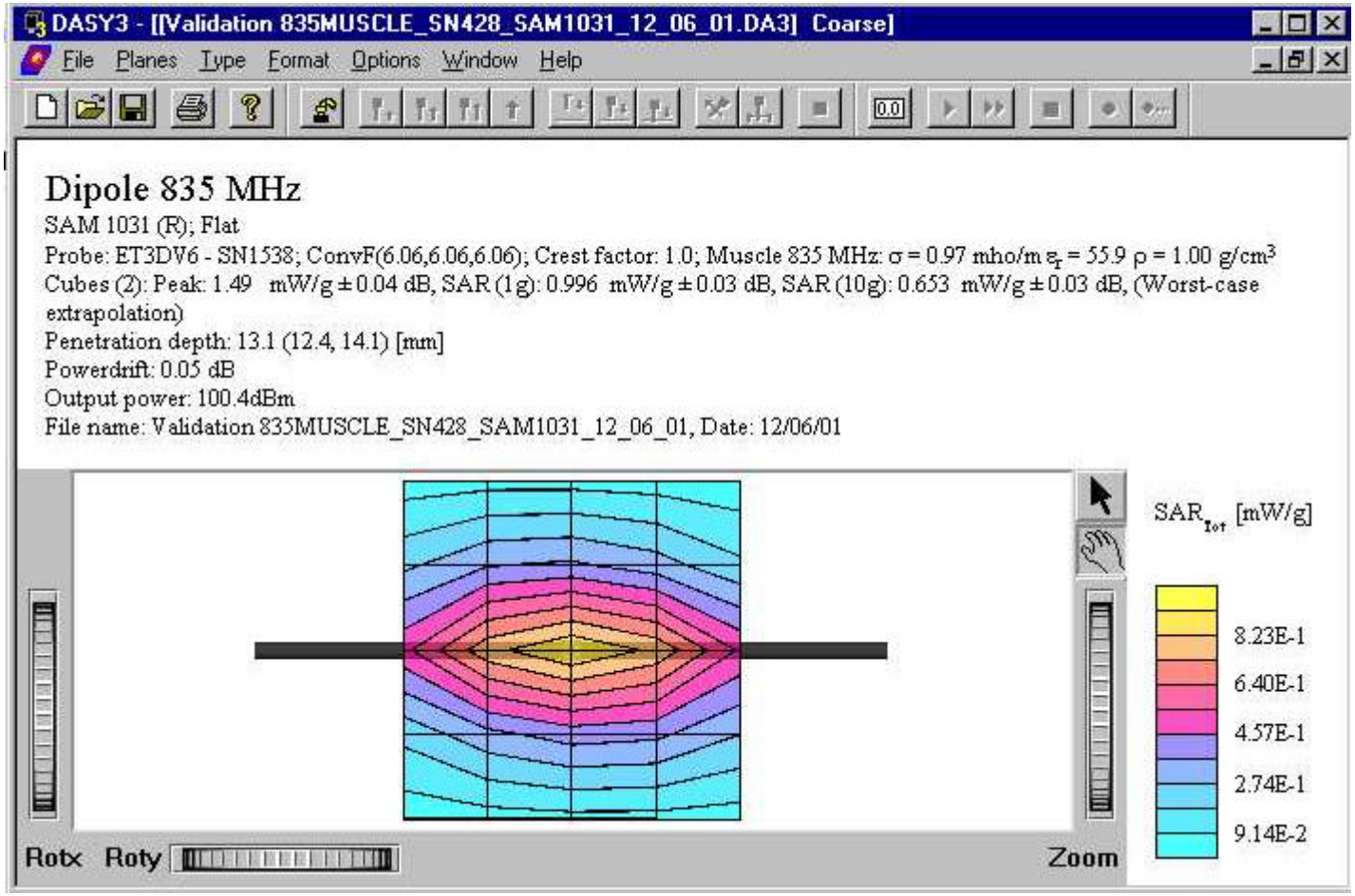
[2] FCC, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields: Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions," Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01).

[3] IEEE, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques," Std 1528-200X, Draft 6.5 – August 20, 2001.

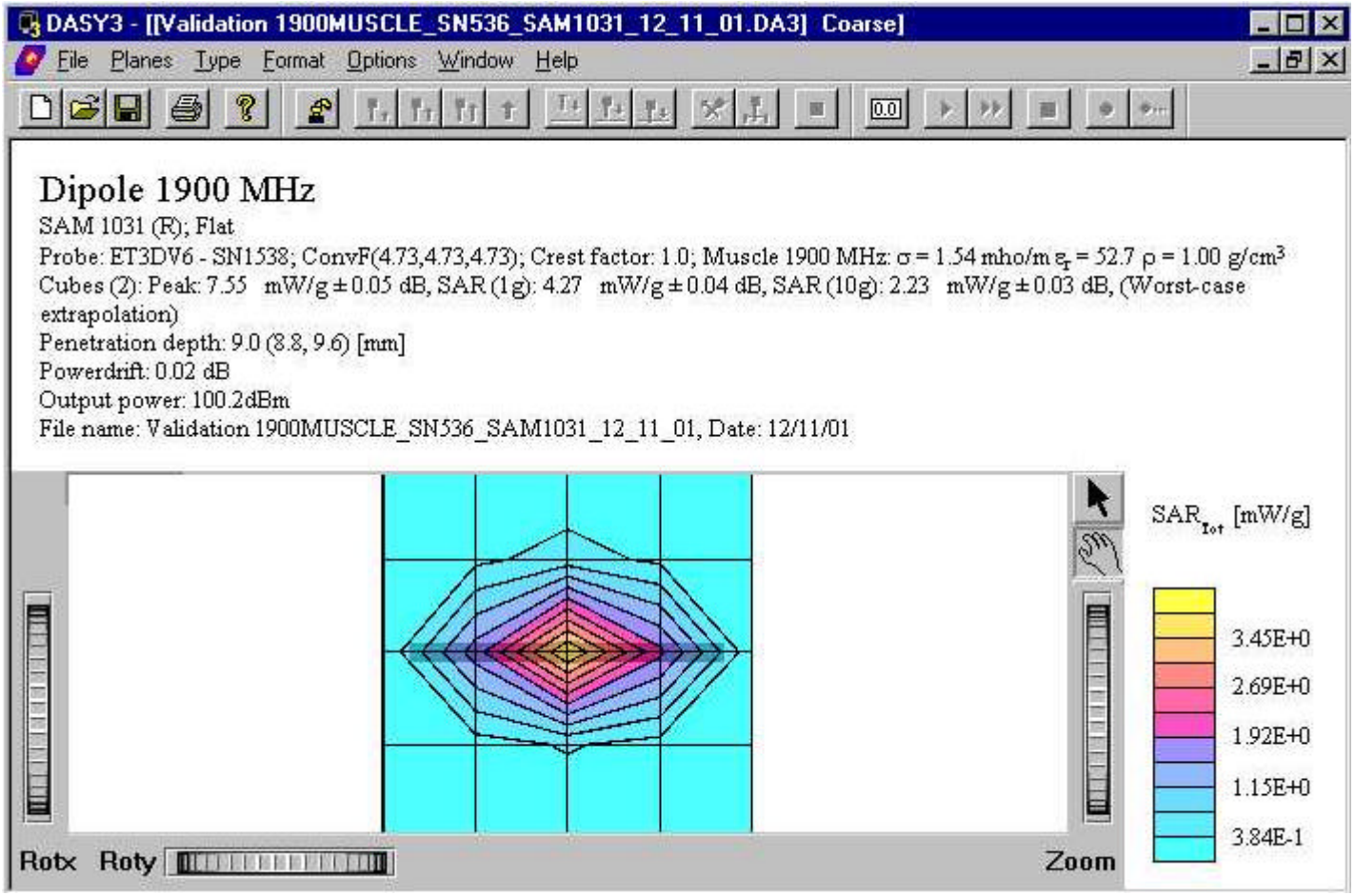
[4] CENELEC, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz – 3 GHz)", European Standard EN 50361, July 2001.

[5] M. Douglas, "Reference values for system validation using body material," internal Sony Ericsson document EUS/CV/R-01:1118 /REP.

Appendix 1: SAR distribution comparison for system accuracy verification



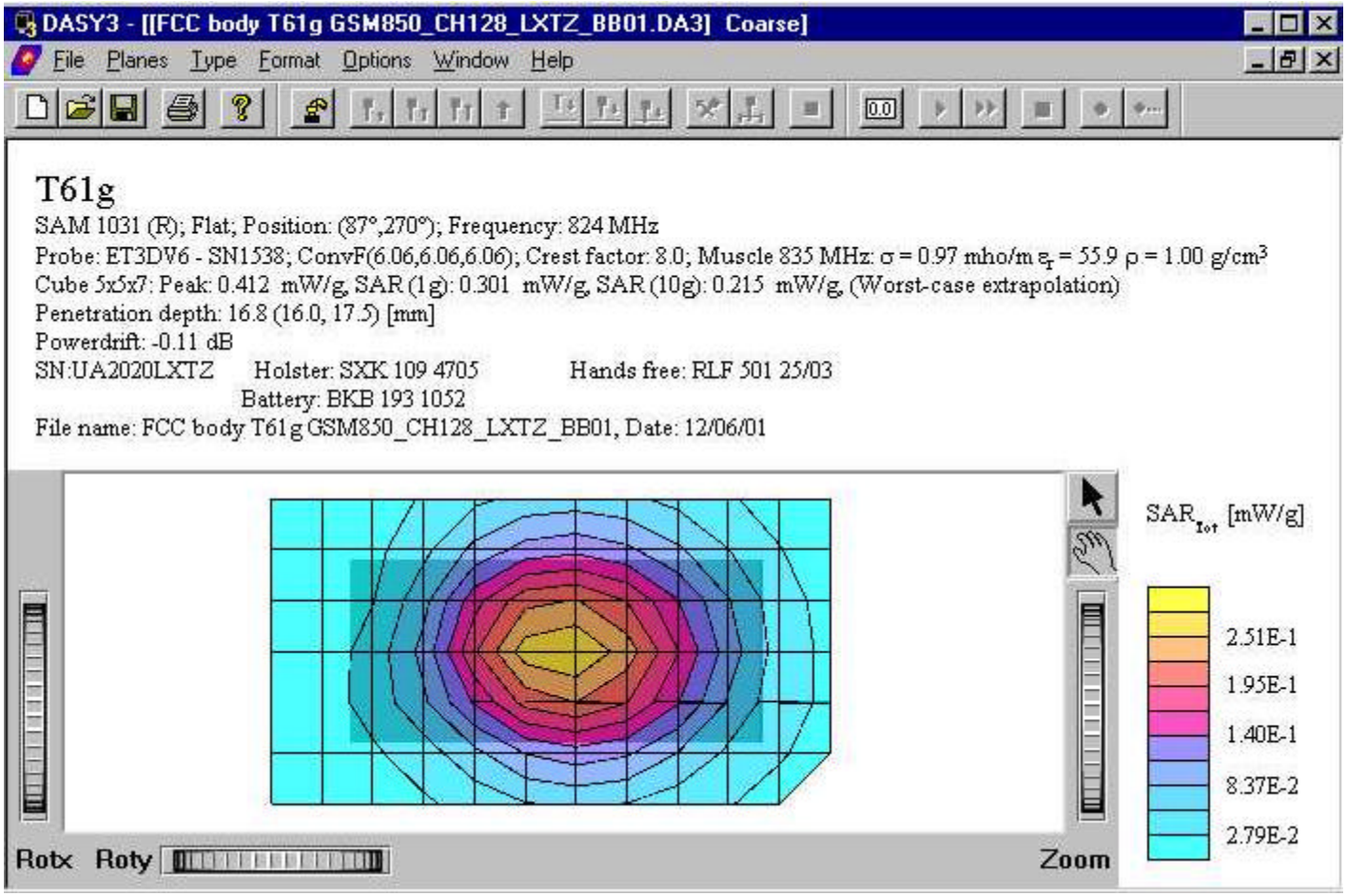
835 MHz SAR distribution of validation dipole antenna from system accuracy verification test on December 6, 2001. Using muscle tissue.



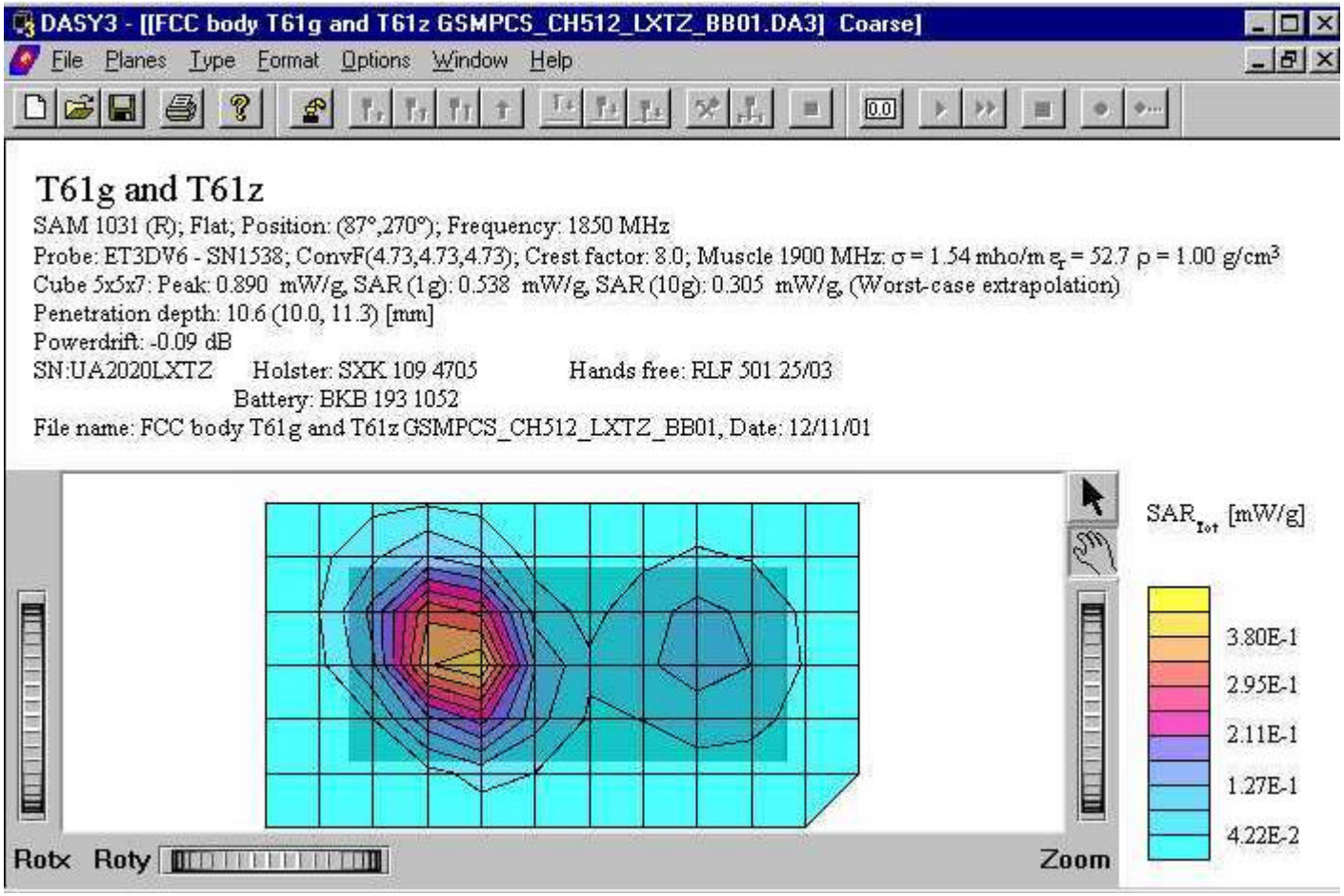
1900 MHz SAR distribution of validation dipole antenna from system accuracy verification test on December 11, 2001.

Using muscle tissue.

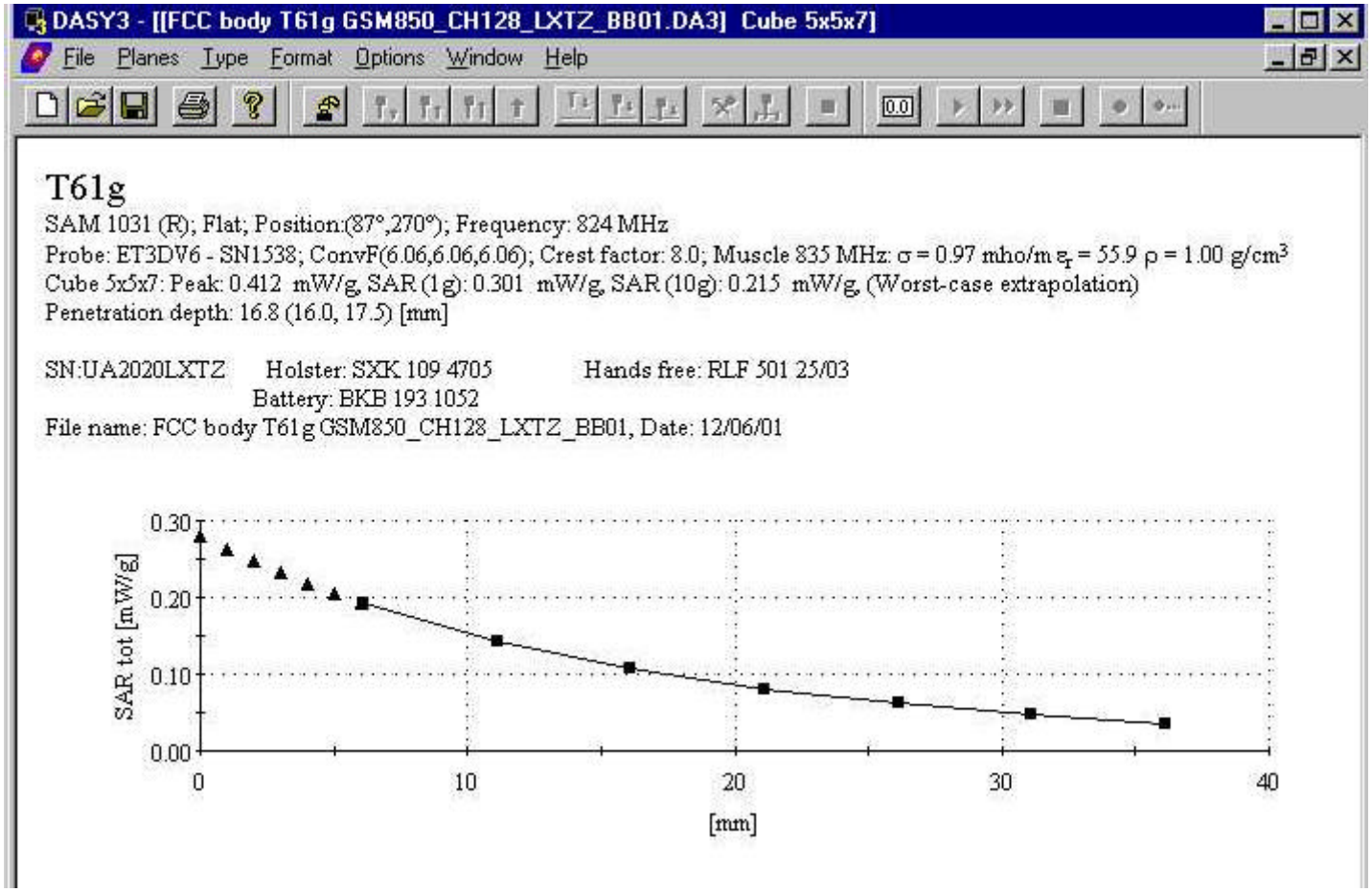
Appendix 2: SAR distribution plots



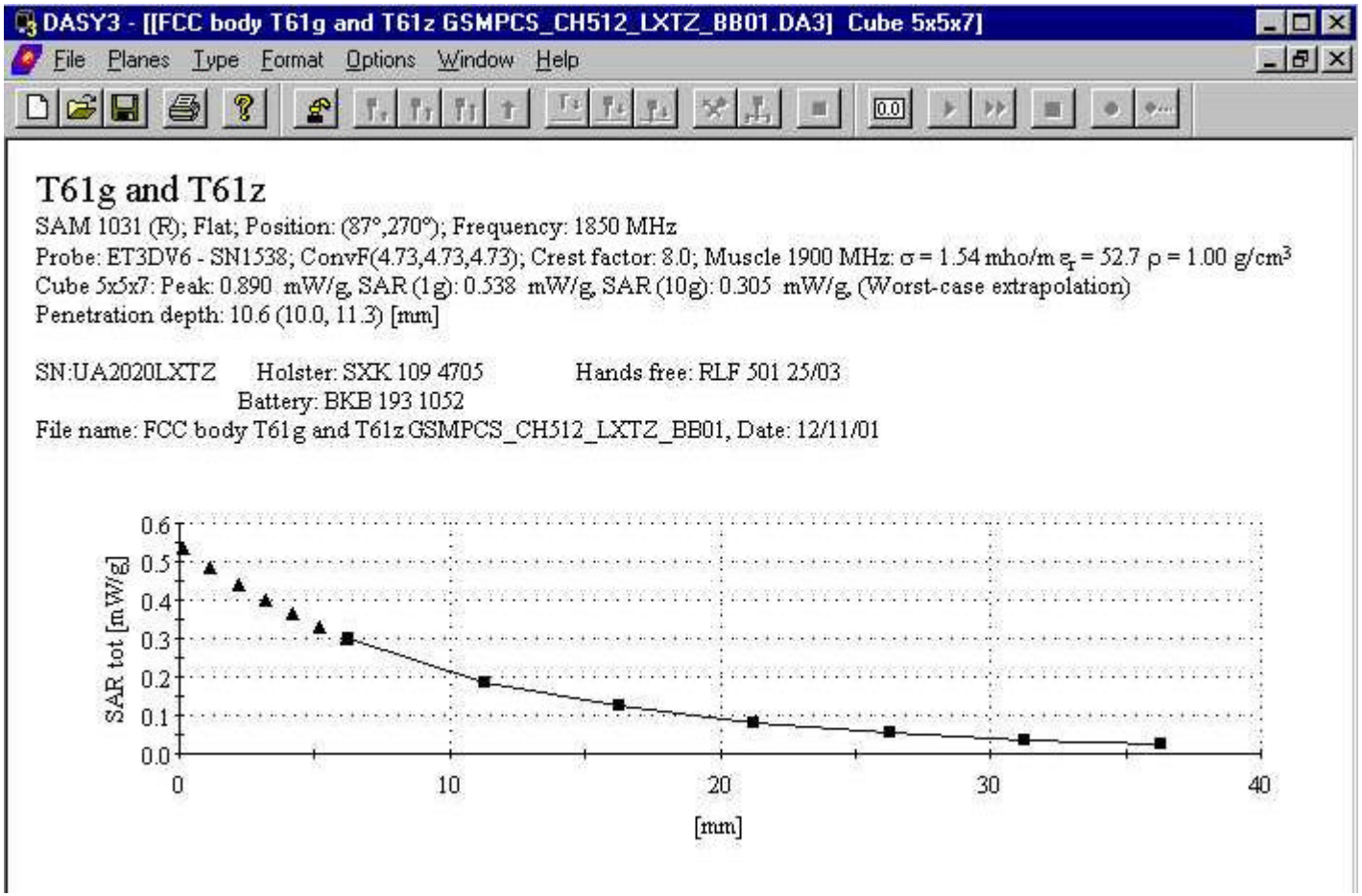
Distribution of maximum SAR in 800 GSM band. Measured with back of device facing the body using carry accessory SXK 109 4705 and hands free accessory RLF 501 25/03.



Distribution of maximum SAR in 1900 GSM band. Measured with back of device facing the body using carry accessory SXK 109 4705 and hands free accessory RLF 501 25/03.



SAR Extrapolation to the phantom inner surface. Measured for maximum SAR in 800 GSM band, while phone is against the body using carry accessory SXK 109 4705 and hands free accessory RLF 501 25/03



SAR Extrapolation to the phantom inner surface. Measured for maximum SAR in 1900 GSM band, while phone is against the body using carry accessory SXK 109 4705 and hands free accessory RLF 501 25/03

Appendix 3: Photographs of Device Under Test

Front view of device

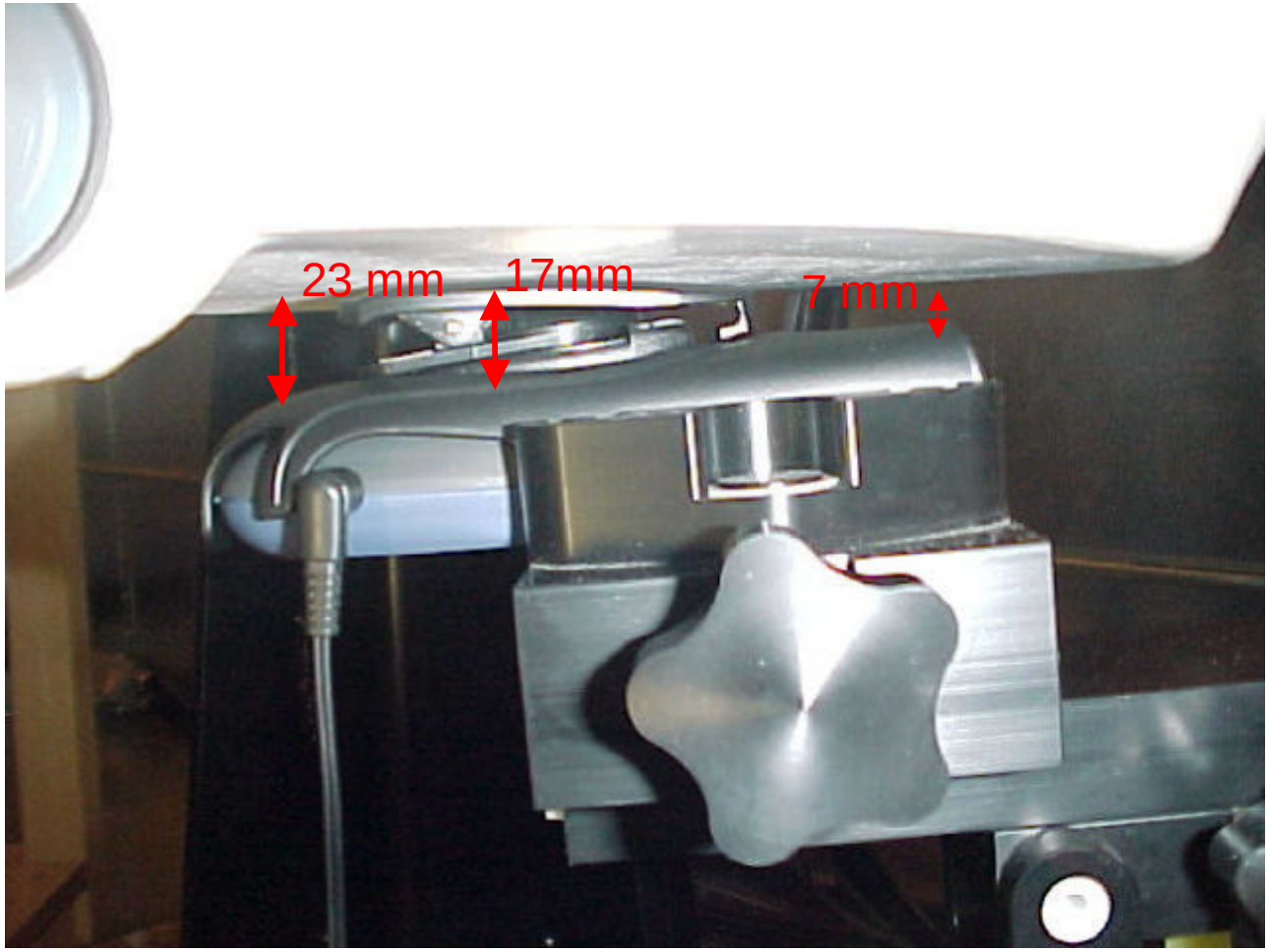
Back view of device

Side view of device.

Prepared (also subject responsible if other)		No.		
SEM/CV/PF/P William Stewart		EUS/CV/R-02:0030/REP		
Approved	Checked			
SEM/CV/PF/P Dulce Altabella	DA	2002-1-24	A	U:\FCC Submittals\Fcc_419 HP Nicole\XHIBIT11\Source\T61g_T61zbody.doc

Front, back, and side views of product number SXK-109-4705. This accessory contains plastic and metal.

Appendix 4: Position of Device on Phantom



Position of device against flat phantom using carry accessory SXK 109 4705 with hands free accessory RLF 501 25/03

Appendix 5: Probe calibration parameters

ET3DV6 SN:1538

DASY3 - Parameters of Probe: ET3DV6 SN:1538

Sensitivity in Free Space

NormX	**1.32** $\mu V/(V/m)^2$
NormY	**1.13** $\mu V/(V/m)^2$
NormZ	**1.39** $\mu V/(V/m)^2$

Diode Compression

DCP X	**101** mV
DCP Y	**101** mV
DCP Z	**101** mV

Sensitivity in Tissue Simulating Liquid

Head **450 MHz** ε_r **= 43.5 ± 5%** σ **= 0.87 ± 10% mho/m**

ConvF X	**6.81**	extrapolated	Boundary effect:	
ConvF Y	**6.81**	extrapolated	Alpha	**1.00**
ConvF Z	**6.81**	extrapolated	Depth	**1.06**

Head **900 MHz** ε_r **= 42 ± 5%** σ **= 0.97 ± 10% mho/m**

ConvF X	**6.35**	± 7% (k=2)	Boundary effect:	
ConvF Y	**6.35**	± 7% (k=2)	Alpha	**1.00**
ConvF Z	**6.35**	± 7% (k=2)	Depth	**1.45**

Head **1500 MHz** ε_r **= 40.4 ± 5%** σ **= 1.23 ± 10% mho/m**

ConvF X	**5.74**	interpolated	Boundary effect:	
ConvF Y	**5.74**	interpolated	Alpha	**0.71**
ConvF Z	**5.74**	interpolated	Depth	**1.97**

Head **1800 MHz** ε_r **= 40 ± 5%** σ **= 1.40 ± 10% mho/m**

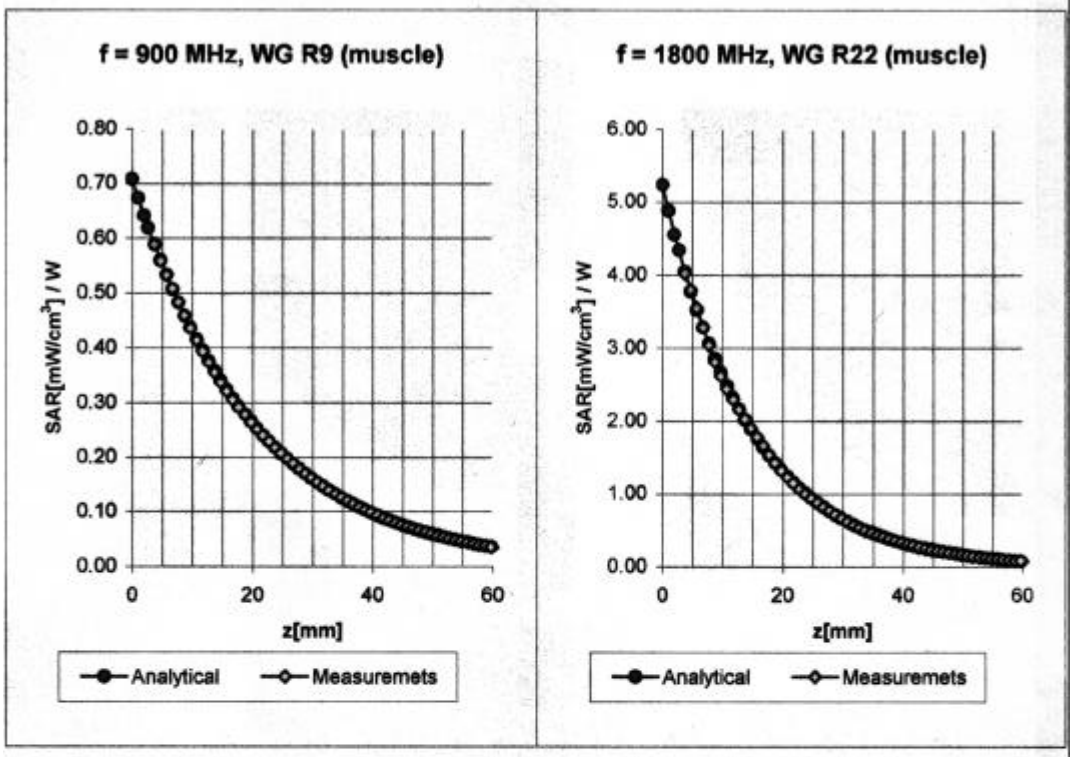
ConvF X	**5.44**	± 7% (k=2)	Boundary effect:	
ConvF Y	**5.44**	± 7% (k=2)	Alpha	**0.56**
ConvF Z	**5.44**	± 7% (k=2)	Depth	**2.23**

Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.5 ± 0.2**	mm

ET3DV6 SN:1538

Conversion Factor Assessment



Muscle **900 MHz** ε_r **= 56 ± 5%** σ **= 0.99 ± 10% mho/m**

ConvF X	**6.06** ± 7% (k=2)	Boundary effect:	
ConvF Y	**6.06** ± 7% (k=2)	Alpha	**0.63**
ConvF Z	**6.06** ± 7% (k=2)	Depth	**1.90**

Muscle **1800 MHz** ε_r **= 54 ± 5%** σ **= 1.4 ± 10% mho/m**

ConvF X	**4.73** ± 7% (k=2)	Boundary effect:	
ConvF Y	**4.73** ± 7% (k=2)	Alpha	**0.68**
ConvF Z	**4.73** ± 7% (k=2)	Depth	**2.19**