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LD/SEMC/BGUG/NMC Mats Hansson	030922	030622	B	File

SAR Test Report: PY7A1021012

Date of test: Sep. 15 to 16, 2003

Laboratory:
Electromagnetic Near Field and Radio Frequency Dosimetry Lab
Sonyericsson Mobile Communications AB
Nya Vatentornet
SE-221 82 LUND, Sweden

Test Responsible:
Hamid Kami Shirazi
Test Engineer, EMF & Safety
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+ 46 46 23 26 44

Statement of Compliance

Sony Ericsson Mobile Communications AB declares under its sole responsibility that the product

Sony Ericsson Type AAB-1021012-BV ; FCC ID: PY7A1021012

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 in accordance with the appropriate measurement standards, guidelines and recommended practices. Any deviations from these standards, guidelines and recommended practices are noted below:

(None)

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.

Sony Ericsson encourages all feedback, both positive and negative, on this report.

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2 Introduction

In this test report, compliance of the Sony Ericsson PY7A1021012 portable telephone with RF safety guidelines is demonstrated. The applicable RF safety guidelines and the SAR measurement specifications used for the test are described in the *SAR Measurement Specifications of Wireless Handsets* [1].

3 Device Under Test

3.1 Antenna Description

Type	Internal antenna	
Location	Inside back, near the top	
Dimensions	Max length	38mm
	Max width	14mm
Configuration	PIFA	

3.2 Device description

Device model	T620
Serial number	CB500LP146
Mode	GSM 1900
Multiple Access Scheme	TDMA
Maximum Output Power Setting	29.0dBm
Factory Tolerance in Power Setting	± 0.3dB
Maximum Peak Output Power	29.3dBm
Crest Factor	8
Transmitting Frequency Range	1850.2 – 1909.8 MHz
Prototype or Production Unit	Preproduction
Device Category	Portable
RF exposure environment	General population / uncontrolled

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4 Test equipment

4.1 Dosimetric system

SAR measurements were made using the DASY3 professional system (software version 3.1c) with SAM twin phantom, manufactured by Schmid & Partner Engineering AG (SPEAG). The list of calibrated equipment is given below.

Description	***Serial Number***	***Due Date***
DASY3 DAE V1	428	4/2004
E-field probe ETDV6	1585	4/2004
E-field probe ETDV6	1582	4/2004
Dipole Validation Kit, D1900 V2	5d002	2/2006

4.2 Additional equipment

Description	***Inventory Number***	***Due Date***
Signal generator ESG-D4000A	INV 462935	9/2004
Directional coupler HP778D	INV 2903	1/2004
Power meter R&S NRVD	INV 483920	1/2004
Power sensor R&S NRV-Z5	INV 2333	1/2004
Power sensor R&S NRV-Z5	INV 2334	1/2004
Termination 65N50-0-11	INV 2903	1/2004
Network analyzer HP8753C	INV421671	8/2004
S-parameter test set HP85047A	INV 421670	9/2004
Dielectric probe kit HP8507D	INV 20000053	2/2004

5 Electrical parameters on 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 values are shown in the table below. The mass density, ρ, entered into the DASY3 software is also given. Recommended limits for permittivity ε_r, conductivity σ and mass density ρ are also shown.

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Application Note: The head and body tissue dielectric parameter recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table is prepared according to the following receipts. **For 1900MHz Head: Water 54.9%, Salt 0.18% and DGBE 44.92%, For 1900MHz Body: Water 56.1%, DGBE 33.4%, Salt 0.5%,**

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			ε_r	σ (S/m)	ρ (g/cm³)
1900	Head	Measured, 15/09/03	38.0	1.47	1.0
		Recommended	40.0	1.4	1.0
	Muscle	Measured, 17/09/03	48.7	1.50	1.0
		Recommended	53.3	1.52	1.0

6 System accuracy verification

A system accuracy verification of the DASY3 was performed using the dipole validation kit listed in section 3.1. The system verification test was conducted on the same day as the measurement of the DUT. Measurement made in ambient temperature 22.5 °C and humanity 50.2%. The obtained results are displayed in the table below.

RF noise had been measured in liquid when all RF equipment in lab was set off. Measured value was 0.0009mW/g in 1g mass.

f (MHz)	Tissue type	Measured / Reference	SAR (W/kg) 1g mass	Dielectric Parameters			t (°C)
				ε_r	σ (S/m)	ρ (g/cm³)	
1900	Head	Measured, 15/09/03	41.6	38.0	1.47	1.0	22.5
		Reference	41.6	38.8	1.44	1.0	-
	Muscle	Measured, 16/09/03	43.5	48.7	1.50	1.0	22.5
		Reference	43.2	51.2	1.59	1.0	-

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7 SAR measurement uncertainty

Error description	Uncertainty (%)	Distribution	Divisor	c_i 1g	Standard Uncertainty Head	Standard Uncertainty Body
Measurement system						
Probe calibration	±4.4	Normal	1	1	±4.4	±4.4
Axial isotropy	±4.7	Rectangular	√3	$(1-c_p)^{1/2}$	±1.9	±1.9
Spherical isotropy	±9.6	Rectangular	√3	$(c_p)^{1/2}$	±3.9	±3.9
Spatial resolution	±0.0	Rectangular	√3	1	±0.0	±0.0
Boundary effects	±5.5	Rectangular	√3	1	±3.2	±3.2
Probe linearity	±4.7	Rectangular	√3	1	±2.7	±2.7
Detection limit	±1.0	Rectangular	√3	1	±0.6	±0.6
Readout electronics	±1.0	Normal	1	1	±1.0	±1.0
Response time	±0.8	Rectangular	√3	1	±0.5	±0.5
Integration time	±1.4	Rectangular	√3	1	±0.8	±0.8
RF ambient conditions	±3.0	Rectangular	√3	1	±1.7	±1.7
Mech. Constraints of robot	±0.4	Rectangular	√3	1	±0.2	±0.2
Probe positioning	±2.9	Rectangular	√3	1	±1.7	±1.7
Extrap. and integration	±3.9	Rectangular	√3	1	±2.3	±2.3
					±8.3	**±8.3**
Test sample related						
Device positioning	±6.0	Normal	0.89	1	±6.7	±6.7
Device holder	±5.0	Normal	0.84	1	±5.9	±5.9
Power drift	±1.0/3.2	Rectangular	√3	1	±0.6	±1.8
					±8.9	**±9.1**
Phantom and setup						
Phantom uncertainty	±4.0	Rectangular	√3	1	±2.3	±2.3
Liquid conductivity (target)	±5.0	Rectangular	√3	0.6	±1.7	±1.7
Liquid conductivity (meas)	-5/-5	Rectangular	√3	0.6	±1.7	±1.7
Liquid permittivity (target)	±5.0	Rectangular	√3	0.6	±1.7	±1.7
Liquid permittivity (meas)	-8.7/-1.3	Rectangular	√3	0.6	±5	±07
Phantom and Tissue parameter Uncertainty					**±6.2**	**±3.8**
Combined standard uncertainty					***±13.7***	***±12.9***
Extended standard uncertainty(k=2)					***±27.4***	***±25.8***

8 Test results

The measured 1-gram averaged SAR values of the device against the head and the body are provided in Tables 1 and 2 respectively. The humidity and ambient temperature of test facility were 44.4% - 40.8% and 22.5 °C – 24.4 °C respectively. The depth of the head tissue simulating liquid was 15.1cm and of the muscle tissue simulating liquid was 15.5cm. A base station simulator was used to control the device during the SAR measurement. The phone was supplied with full-charged battery for each measurement.

For head measurement, the device was tested on the right-hand phantom (corresponding to the right side of the head) and the left-hand phantom in two phone position, cheek (touch) and tilt (cheek + 15deg). For GSM 1900 modes, the device was tested at the lowest, middle and highest frequencies in the transmit band. On position and frequency where find max SAR values had been measured SAR with BT ON. Phone had been pared with Sony Ericsson HBH-60 hands free set. Result is provided in table1, row “Tilt + BT ON”.

Mode	Channel	Peak Output Power (dBm)	Phone Position	Liquid temp(°C)	SAR (W/kg) in 1g mass	
					Right-hand	Left-hand
1900 GSM	512	29.3	Cheek	22.6/22.6	0.75	0.44
			Tilt	22.5/22.8	**0.77**	0.62
			Tilt+BT ON	22.8/22.8	**0.83**	-
	661	29.3	Cheek	22.5/22.6	0.51	0.37
			Tilt	22.8/22.9	0.63	0.50
	810	29.3	Cheek	22.5/22.6	0.36	0.27
			Tilt	22.5/23	0.40	0.34

Table1: SAR measurement result for Sony Ericsson PY7A1021012 telephone. Measured against the head.

For body-worn measurements, the device was tested against flat phantom representing the user body. Under measurement phone was put in belt holder KRY 104 157 Sony Ericsson product and measurement provides for both front and back part the phone to the phantom.

Mode	Channel	Peak Output Power(dBm)	Phone Position	Liquid temp(°C)	SAR(W/kg) in 1g mass
1900 GSM	512	29.3	Front to Ph	22.5	0.07
			Back to Ph	22.6	**0.59**
			Back to Ph +BT ON	22.6	**0.63**
	661	29.3	Front to Ph	22.5	0.06
			Back to Ph	22.6	0.35
	810	29.3	Front to Ph	22.5	0.05
			Back to Ph	22.6	0.30

Table 2: SAR measurement result for Sony Ericsson PY7A1021012 telephone. Measured against the body.

9 References

[1] R.Plicanic, “SAR Measurement Specification of Wireless Handsets”, Sony Ericsson internal document LD/SEMC/GUG/N 03:141

[2] FCC, “Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields: Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radio Frequency 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 Wirelles Communications Devices: Experimental Techniques,” Std 1528-200x, Draft 6.5 – August 20, 2001.

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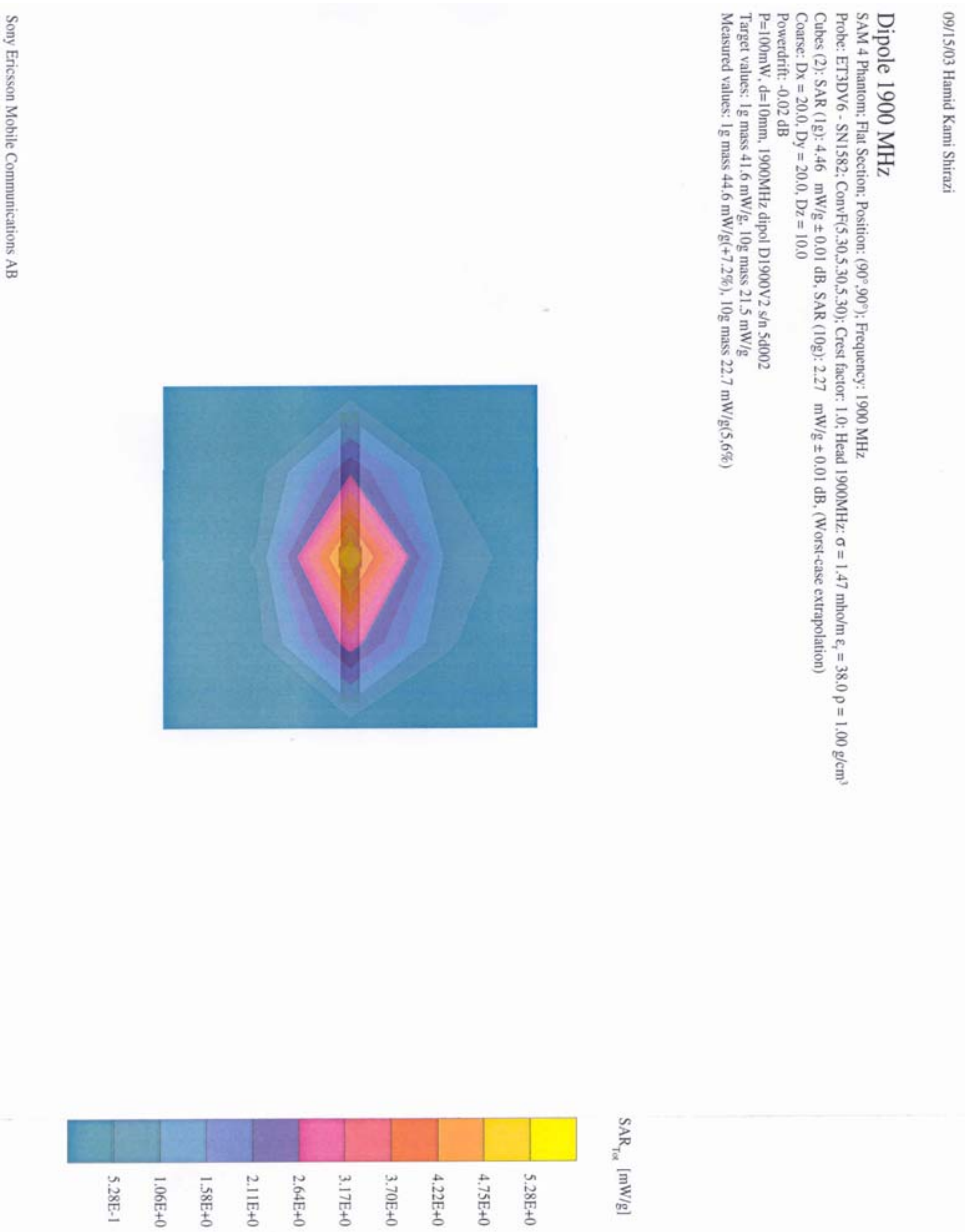
10 Appendix

10.1 SAR distribution comparison for system accuracy verification



Validation Dipole, measured with head simulating tissue on 15/09/03

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Date/Time: 04/09/03 18:49:39

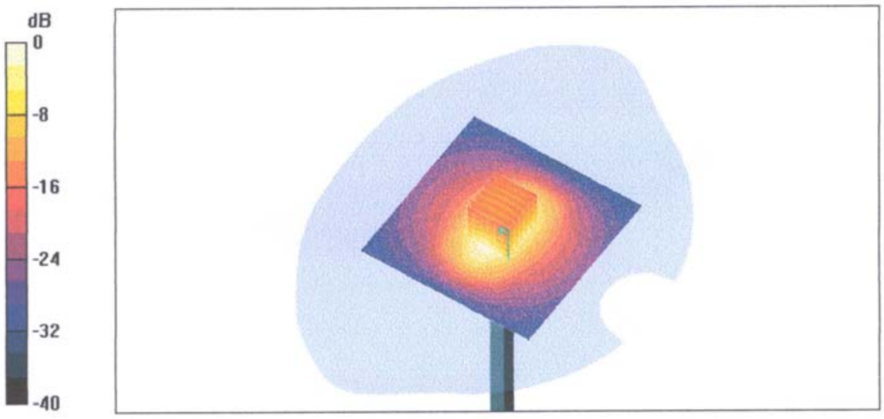
Test Laboratory: SPEAG, Zurich, Switzerland
File Name: SN5d002_SN1507_HSL1900_090403.da4

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN5d002
Program: Dipole Calibration

Communication System: CW-1900; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL 1900 MHz (σ = 1.44 mho/m, ε_r = 38.78, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1507; ConvF(5.2, 5.2, 5.2); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 109

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.2 V/m
Peak SAR = 18.2 W/kg
SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.38 mW/g
Power Drift = 0.01 dB



1900MHz SAR distribution of validation dipole from reference measurement with head simulating tissue

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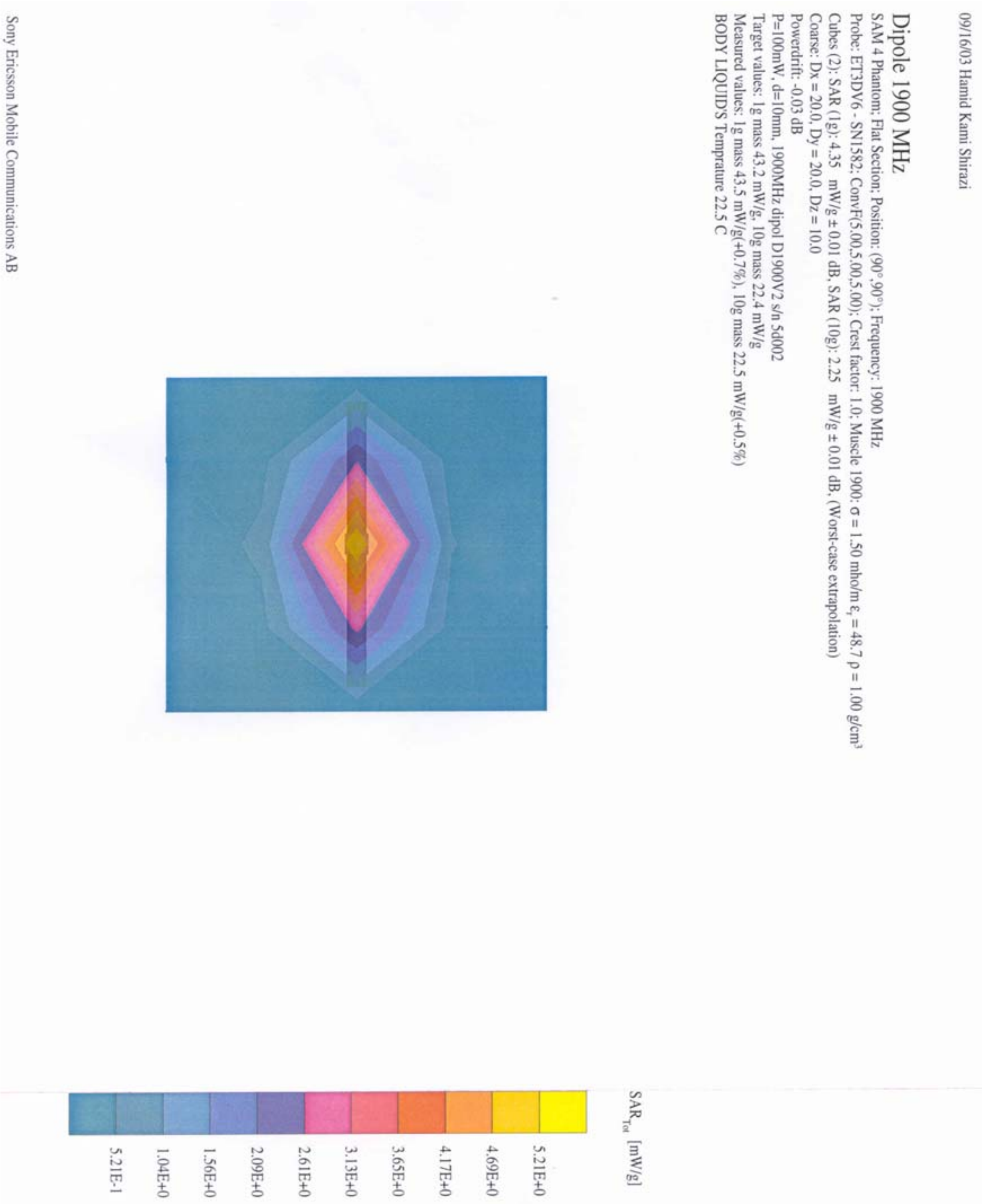


Validation Dipole, measured with muscle simulating tissue on 16/09/03

Date/Time: 04/08/03 12:31:50

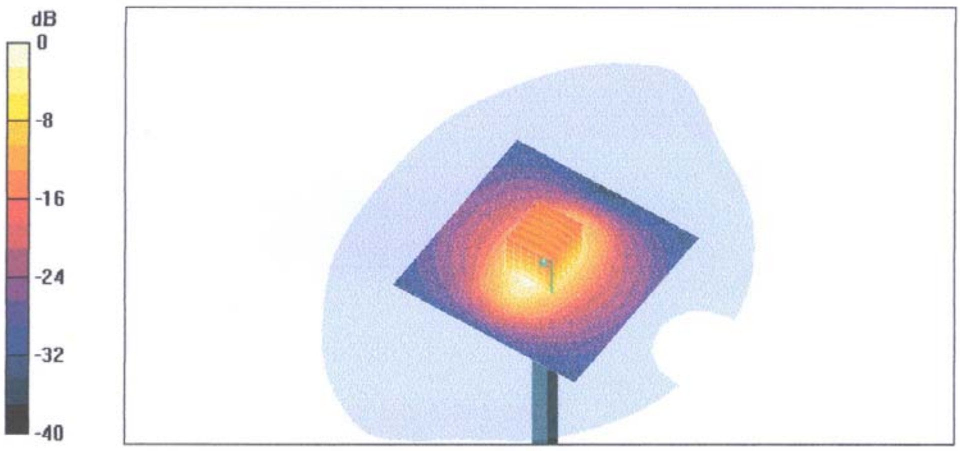
Test Laboratory: SPEAG, Zurich, Switzerland
File Name: SN5d002_SN1507_M1900_080403.da4

DUT: Dipole 1900 MHz; Serial: D1900V2 - SN5d002
Program: Dipole Calibration

Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: Muscle 1900 MHz; ($\sigma = 1.59$ mho/m, $\varepsilon_r = 51.2$, $\rho = 1000$ kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1507; ConvF(4.8, 4.8, 4.8); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 109

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.8 V/m
Peak SAR = 18.9 W/kg
SAR(1 g) = 10.8 mW/g; SAR(10 g) = 5.6 mW/g
Power Drift = 0.02 dB



1900MHz SAR distribution of validation dipole from reference measurement with muscle simulating tissue

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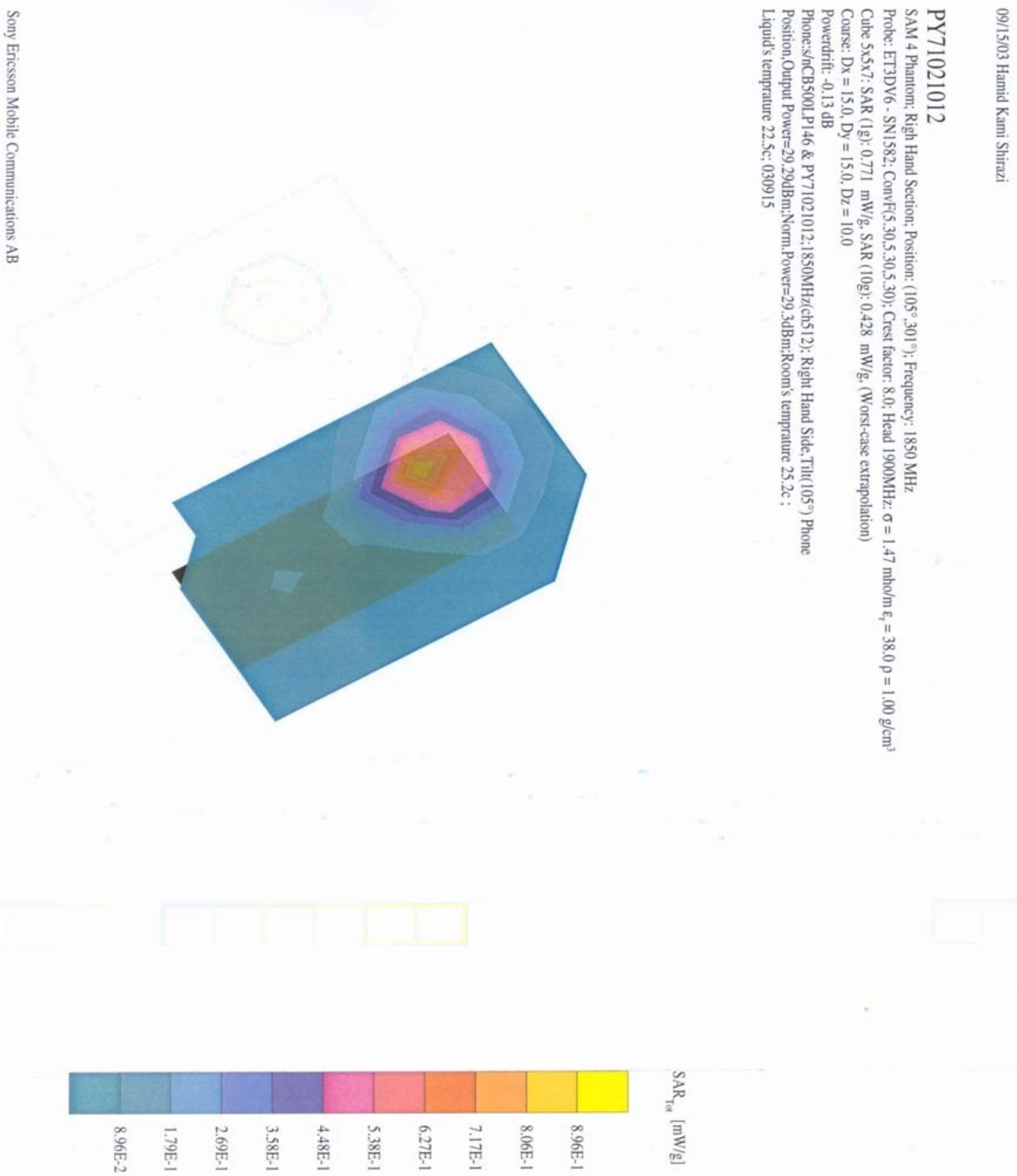
10.2 SAR distribution plot



Distribution of max SAR in GSM 1900 mode at ch512. Measured against the head for tilt phone position

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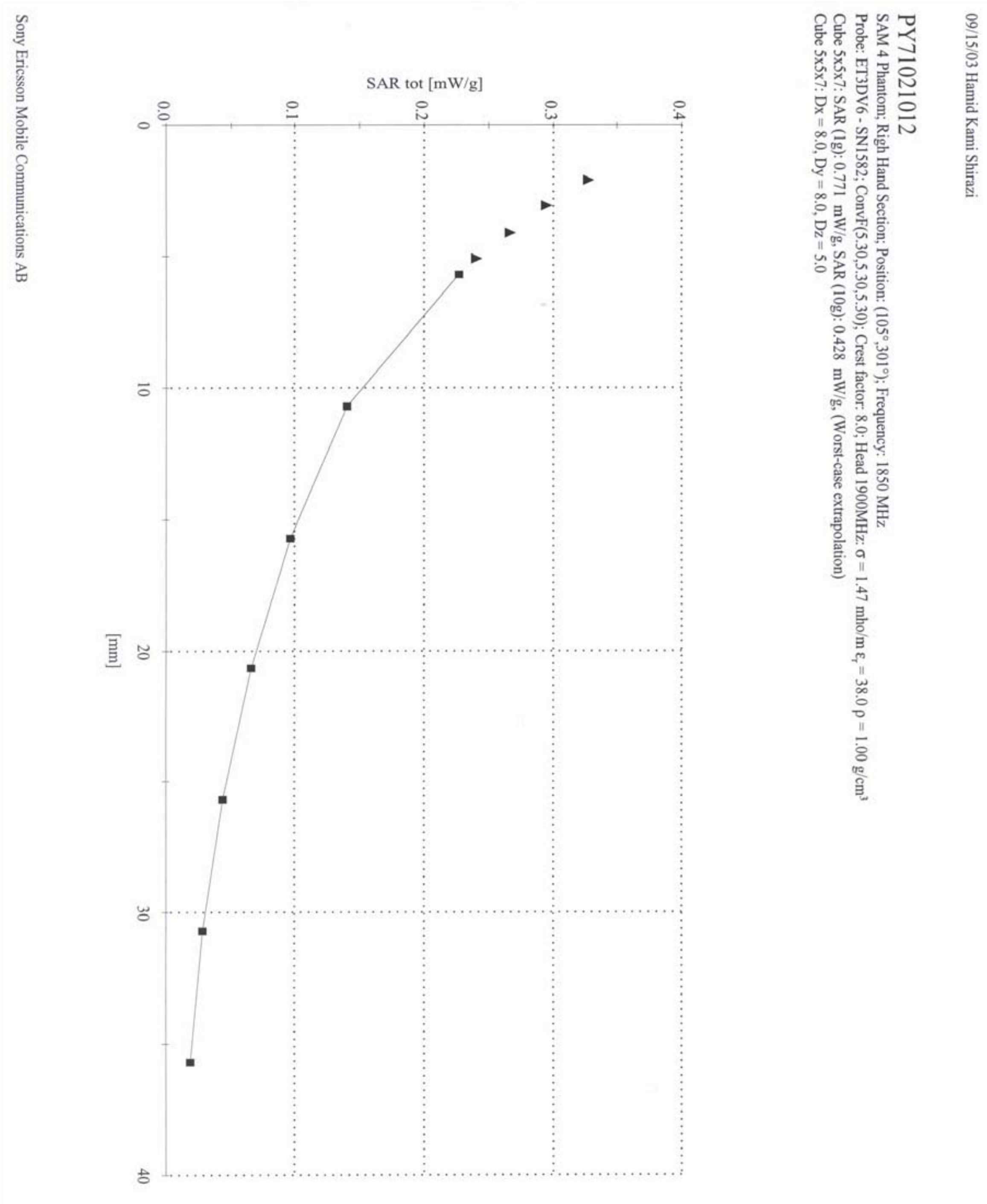

Z(x) distribution of max SAR in GSM1900 mode at ch512. Measured against the head for tilt phone position

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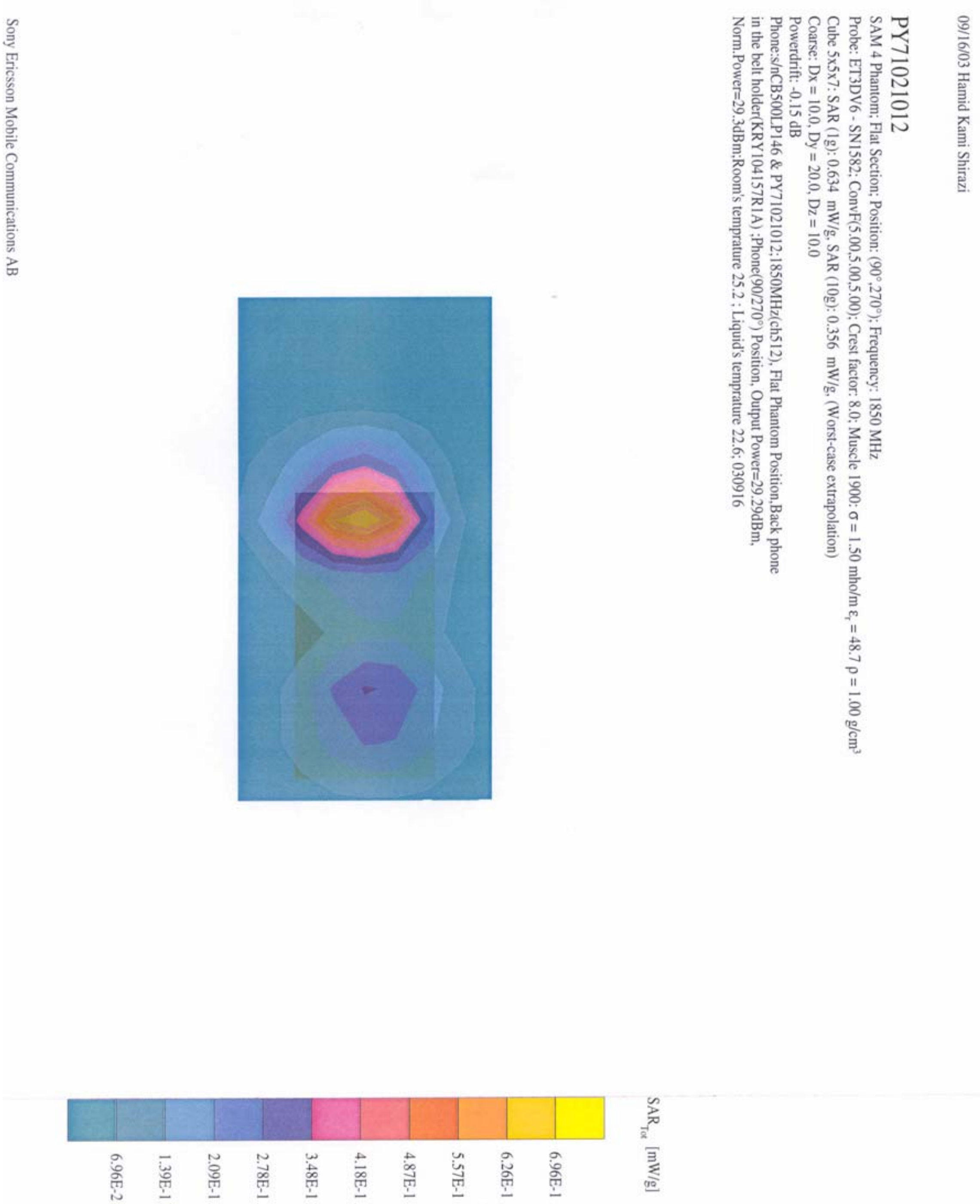

Distribution of max SAR in GSM1900 mode at ch512. Measured against the body for back phone part to the phantom

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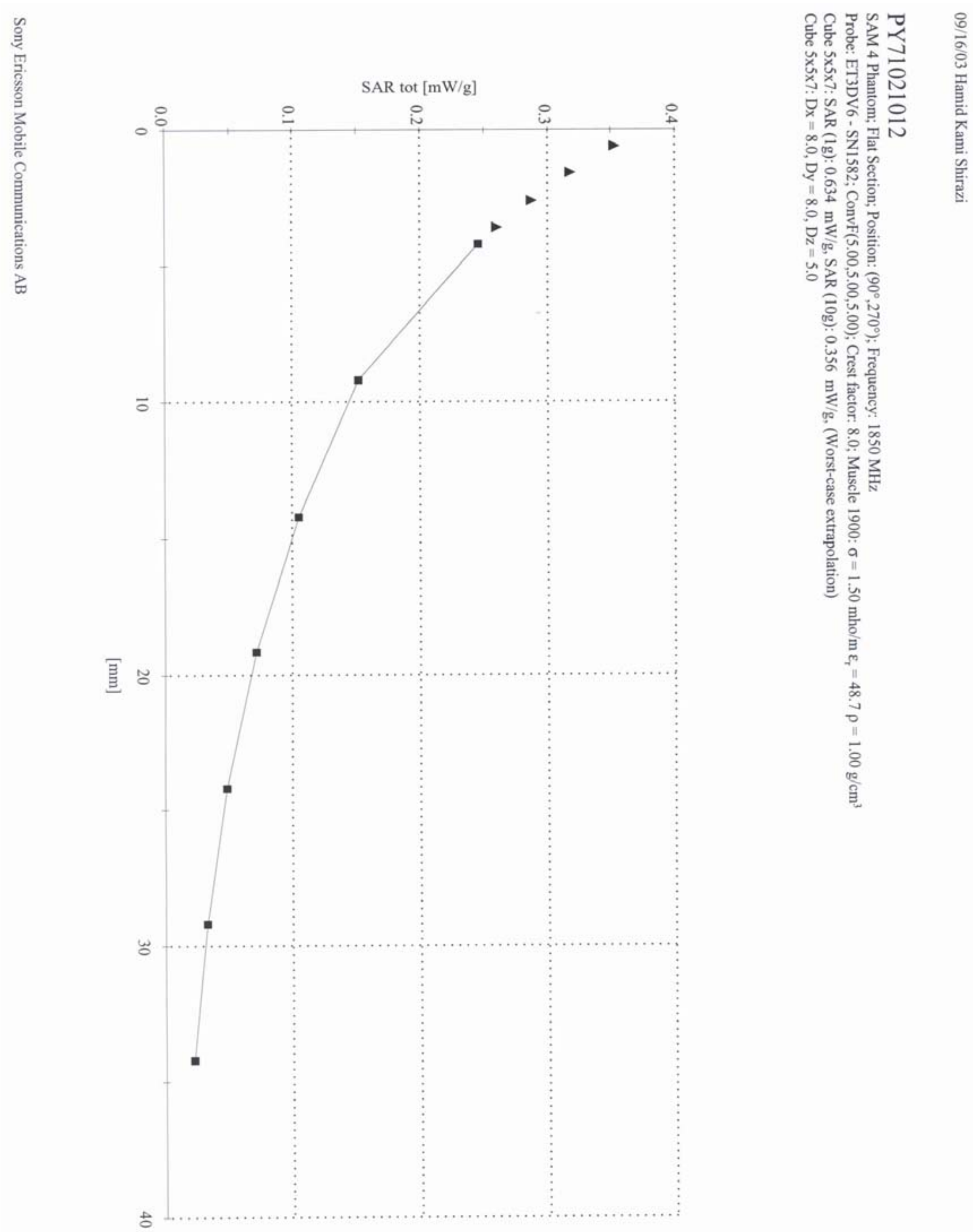

Z(x) distribution of max SAR in GSM1900 mode at ch512. Measured against the body

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10.3 Photographs of the device under test

Front and Back side

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Left and Right side

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**Battery and
Back side**

10.4 Device position on SAM Twins Phantom

Device position against the head: Cheek (touch) phone position

Device position against the head: Tilt (cheek+15deg) phone position

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Device position against the body: Phone with belt holder under phantom

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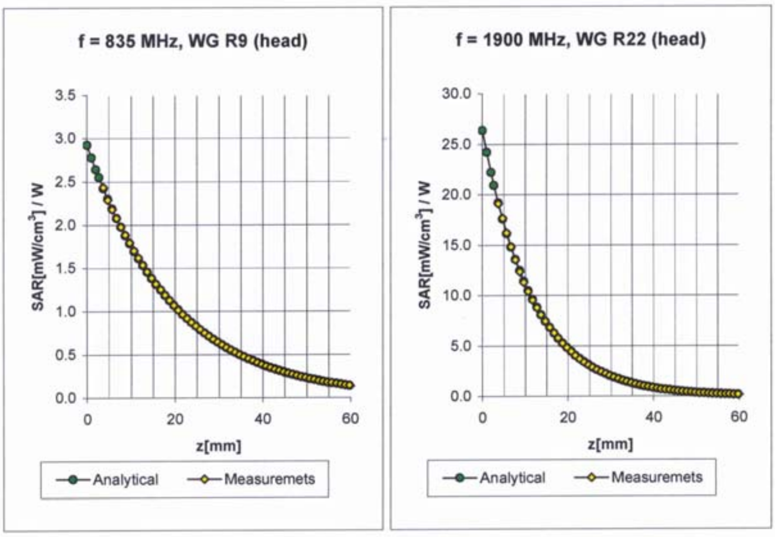
10.5 Probe calibration parameters

ET3DV6 SN:1582 April 16, 2003

Conversion Factor Assessment



Head **835 MHz** ε_r **= 41.5 ± 5%** σ **= 0.90 ± 5% mho/m**

ConvF X	**7.4** ± 8.9% (k=2)		Boundary effect:	
ConvF Y	**7.4** ± 8.9% (k=2)		Alpha	**0.28**
ConvF Z	**7.4** ± 8.9% (k=2)		Depth	**2.79**

Head **1900 MHz** ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**

ConvF X	**5.3** ± 8.9% (k=2)		Boundary effect:	
ConvF Y	**5.3** ± 8.9% (k=2)		Alpha	**0.49**
ConvF Z	**5.3** ± 8.9% (k=2)		Depth	**2.57**

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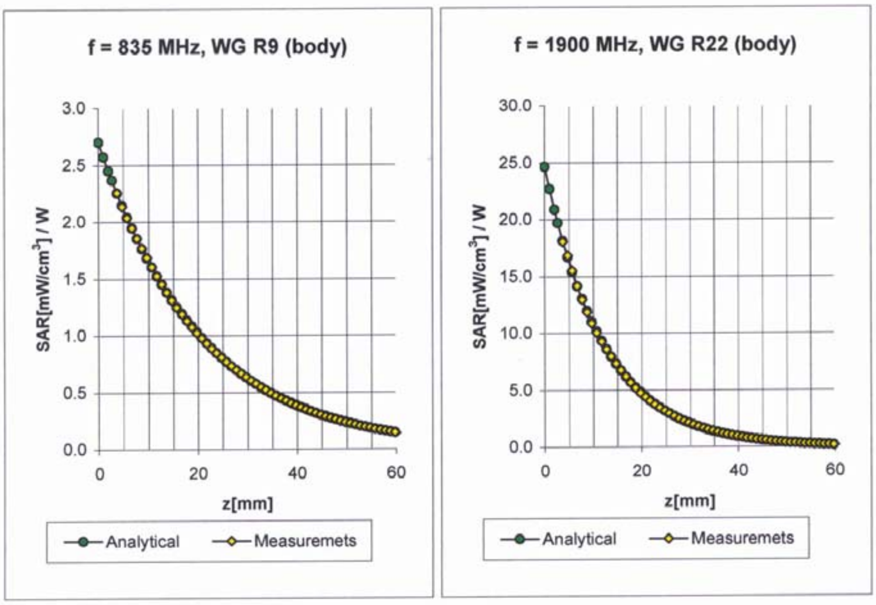
ET3DV6 SN:1585 April 16, 2003

Conversion Factor Assessment



Body **835 MHz** ε_r **= 55.2 ± 5%** σ **= 0.97 ± 5% mho/m**

Valid for f=800-1000 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	**6.7** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.7** ± 9.5% (k=2)	Alpha	**0.34**
ConvF Z	**6.7** ± 9.5% (k=2)	Depth	**2.48**

Body **1900 MHz** ε_r **= 53.3 ± 5%** σ **= 1.52 ± 5% mho/m**

Valid for f=1710-1910 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	**4.8** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.8** ± 9.5% (k=2)	Alpha	**0.59**
ConvF Z	**4.8** ± 9.5% (k=2)	Depth	**2.55**