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Prepared (also subject responsible if other)		No.		
Hamid Kami Shirazi		**GTX/FG 02:009**		
Approved	Checked	Date	Rev	Reference
Hamid Kami Shirazi	HKAM	020606	A	File

SAR Test Report: T600 (PY71130402)

Date of test: Juni 3 and 4, 2002

Laboratory: Electromagnetic Near Field and Radio Frequency Dosimetry Lab
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Statement of Compliance
Sonyericsson Mobile Communications AB declares under its sole responsibility that the product

Sonyericsson Type 1130402-BV/CN (T600); FCC ID: PY71130402

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)

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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.

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

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2 Introduction

In this test report, compliance of the Sonyericsson T600 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 the back cover, near the top	
Dimensions	Max length	38mm
	Max width	17mm
Configuration	PIFA	

3.2 Device description

Device model	T600
Serial number	KYR0338419
Mode	GSM 1900
Multiple Access Scheme	TDMA
Maximum Output Power Setting	29.4dBm
Factory Tolerance in Power Setting	± 0.5dB
Maximum Peak Output Power	29.9dBm
Crest Factor	8
Transmitting Frequency Range	1850 – 1910 MHz
Prototype or Production Unit	Prototype
Device Category	Portable
RF exposure environment	General population / uncontrolled

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	433	4/2003
E-field probe ETDV6	1596	4/2003
Dipole Validation Kit, D1900 V2	5d002	2/2004

4.2 Additional equipment

Description	***Inventory Number***	***Due Date***
Signal generator ESG-D4000A	INV 462934	9/2003
Directional coupler HP778D	INV 39656	1/2003
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 1625	1/2003
Network analyzer HP8753C	INV421671	8/2002
S-parameter test set HP85047A	INV 421670	8/2002
Dielectric probe kit HP8507D	INV 20000053	2/2004
Wavetek STABILOK 4031D	INV 421578	7/2002
Fluke Thermometer 51	INV 2071	3/2003

5 Electrical parameters on the tissue simulating liquid

Prior to conducting SAR measurements, the relative permittivity, e_r, and the conductivity, s, of the tissue simulating liquids were measured with the dielectric probe kit. These values are shown in the table below. The mass density, ?, entered into the DASY3 software is also given. Recommended limits for permittivity e_r, conductivity s and mass density ? are also shown.

f (MHz)	**Tissue type**	**Limits / Measured**	**Dielectric Parameters**		
			e_r	s (S/m)	? (g/cm³)
1900	**Head**	**Measured, 05/22/02**	37.5	1.46	1.0
		Recommended	40.0	1.4	1.0
	Muscle	**Measured, 05/23/02**	49.2	1.57	1.0
		Recommended	53.3	1.52	1.0

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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 23.4 °C and humanity 40.6%. 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 0.00 mW/g in 1g mass.

f (MHz)	Tissue type	Measured / Reference	SAR (W/kg) 1g mass	Dielectric Parameters			t (°C)
				e_r	s (S/m)	? (g/cm³)	
1900	Head	Measured, 04/06/02	44.2	37.5	1.46	1.0	23.4
		Reference	45.2	39.1	1.47	1.0	??
	Muscle	Measured, 05/06/02	45.5	49.2	1.57	1.0	22.9
		Reference	44.0	51.9	1.58	1.0	??

7 SAR measurement uncertainty

SAR measurement uncertainty evaluation for Sonyericsson T600 phone

Uncertainty Component	Tol. (± %)	Prob. Dist.	Div.	Measurement on Head	Measurement on Body
Measurement System					
Probe Calibration	2.6	N	1	2.6	2.6
Axial Isotropy	4.7	R	√3	1.9	1.9
Hemispherical Isotropy	9.6	R	√3	3.9	3.9
Boundary Effect	11.0	R	√3	6.4	6.4
Linearity	4.7	R	√3	2.7	2.7
System Detection Limits	1.0	R	√3	0.6	0.6
Readout Electronics	1.0	N	1	1.0	1.0
Response Time	0.8	R	√3	0.5	0.5
Integration Time	1.8	R	√3	1.1	1.1
RF Ambient Conditions	3.0	R	√3	1.7	1.7
Probe Positioned Mechanical Tolerance	0.4	R	√3	0.2	0.2
Probe Positioning respect to Phantom Shell	2.9	R	√3	1.7	1.7
Extrapolation, interpolation and Integration Algorithm for Max. SAR	3.9	R	√3	2.3	2.3
Measurement System Uncertainty				**9.4**	**9.4**
Test Sample Related					
Test Sample Positioning		R	√3	6.7	6.7
Device Holder Uncertainty		R	√3	5.9	5.9
Output Power Variation - Drift	8.9	R	√3	5.1	5.1
Test Sample Related Uncertainty				**10.5**	**10.5**
Phantom and Tissue Parameters					
Phantom Uncertainty(shape and thickness tolerances)	4.0	R	√3	2.3	2.3
Liquid Conductivity-deviation from target values)	4.3/5.3	R	√3	2.5	1.9
Liquid Conductivity-measurement uncertainty	5	R	√3	2.9	2.9
Liquid Permitivity-deviation from target values	6.2/7.7	R	√3	3.6	4.5
Liquid Permitivity-measurement uncertainty	5	R	√3	2.9	2.9
Phantom and Tissue Parameters Uncertainty				**6.4**	**6.8**
Combined Standard Uncertainty		RSS		***15.5***	***15.6***
Expanded Uncertainty (95% CONFIDENCE LEVEL)				***31.0***	***31.2***

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 33.5% - 37.5% and 22.7 °C – 24.1 °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.

Mode	f (MHz)	Peak Output Power(dBm)	Phone Position	Liquid temp(°C)	SAR (W/kg) in 1g mass			
					Right-hand		Left-hand	
					Measured	Calculated	Measured	Calculated
1900 GSM	1850	29.3	**Cheek**	22.7/22.9	0.645	**0,74**	0.628	0,72
			Tilt	22.9/23.1	0.586	**0,67**	0.572	0,66
	1880	29.4	**Cheek**	22.7/22.9	0.519	0,58	0.596	0,67
			Tilt	23.1./23.3	0.511	0,57	0.566	0,65
	1910	29.8	**Cheek**	23.3/23.5	0.333	0,34	0.367	0,42
			Tilt	23.7/23.8	0.328	0,34	0.334	0,37

Table1: SAR measurement result for Sonyericsson T600 telephone at highest possible output power. Measured against the head.

For body-worn measurements, the device was tested against flat phantom representing the user body. Under measurement the phone was hold Under the Flat position Phantom and with 15mm distance and measurement provides for both front and back part the phone.

Mode	f (MHz)	Peak Output Power(dBm)	Phone Position	Liquid temp(°C)	SAR(W/kg) in 1g mass	
					Measured	Calculated
1900 GSM	1850	29.3	**Back +** (15mm-distance)	22.8	0.649	0.75
			Front+ (15mm-distance)	22.5	0.214	0.24
	1880	29.5	**Back +** (15mm-distance)	22.8	0,744	0.85
			Front+ (15mm-distance)	22.5	0.168	0.17
	1910	29.6	**Back +** (15mm-distance)	22.8	0.485	0.54
			Front+ (15mm-distance)	22.5	0.247	0.11

Table 2: SAR measurement result for Sonyericsson T600 telephone at highest possible output power. Measured against the body.

9 References

[1] M. Douglas, “SAR Measurement Specification of Wireless Handsets” Sonyericsson internal document EUS/CV/R-01:1061/REP

[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 Wireless Communications Devices: Experimental Techniques,” Std 1528-200x, Draft 6.5 – August 20, 2001.

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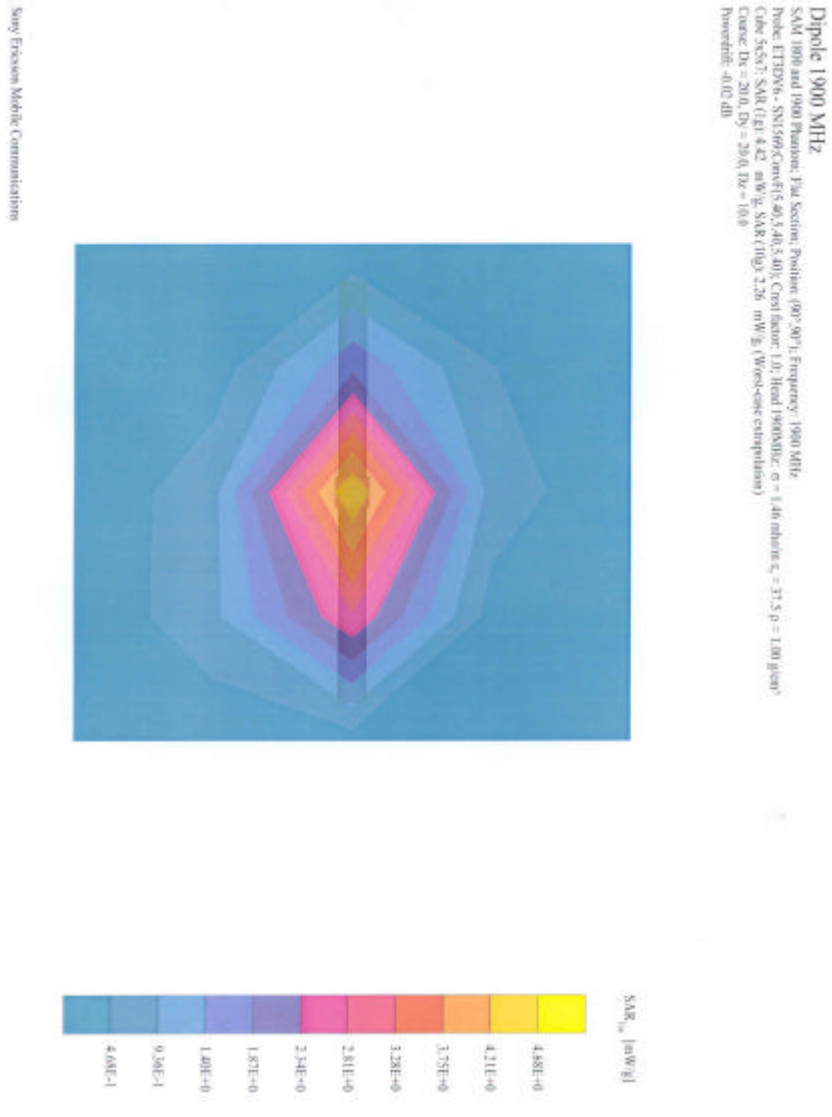
10 Appendix

10.1 SAR distribution comparison for system accuracy verification



Validation Dipole measured with head simulating tissue on 06/06/02

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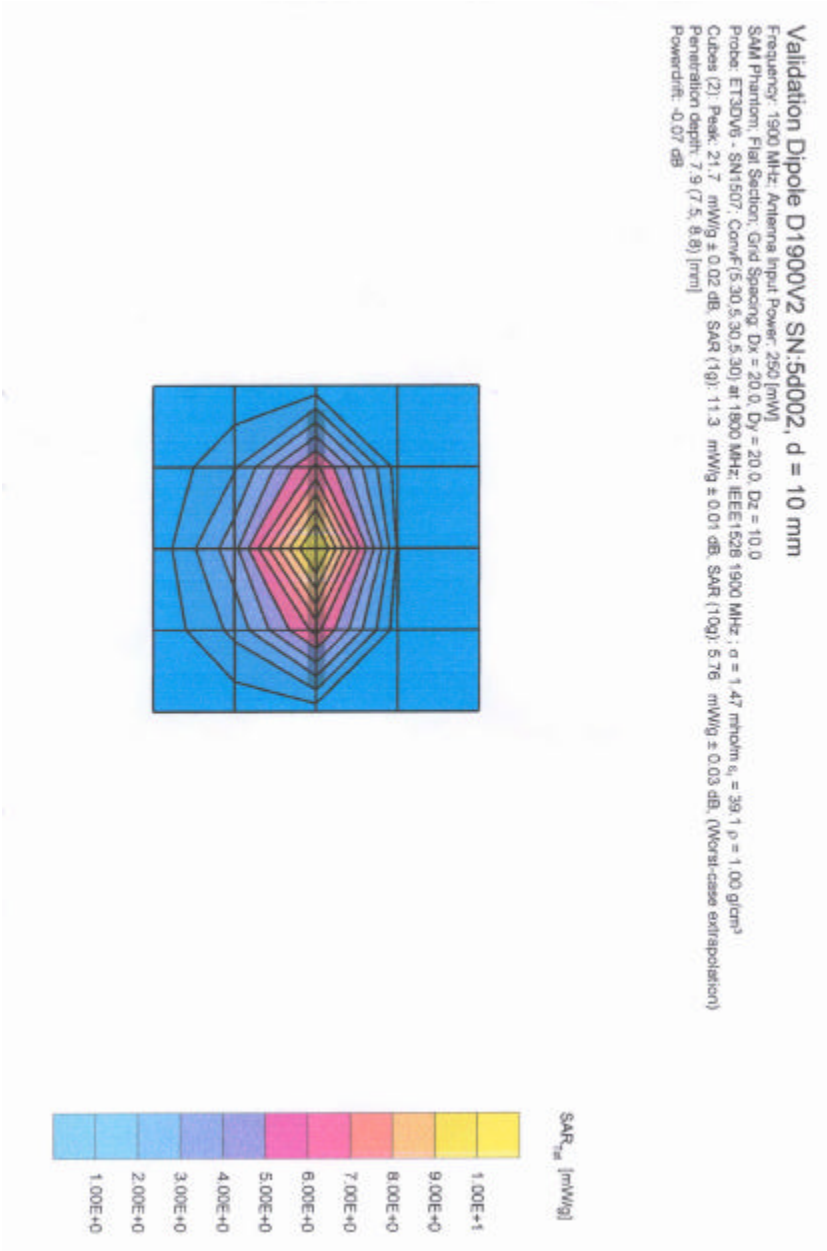

1900MHz SAR distribution of validation dipole from reference measurement

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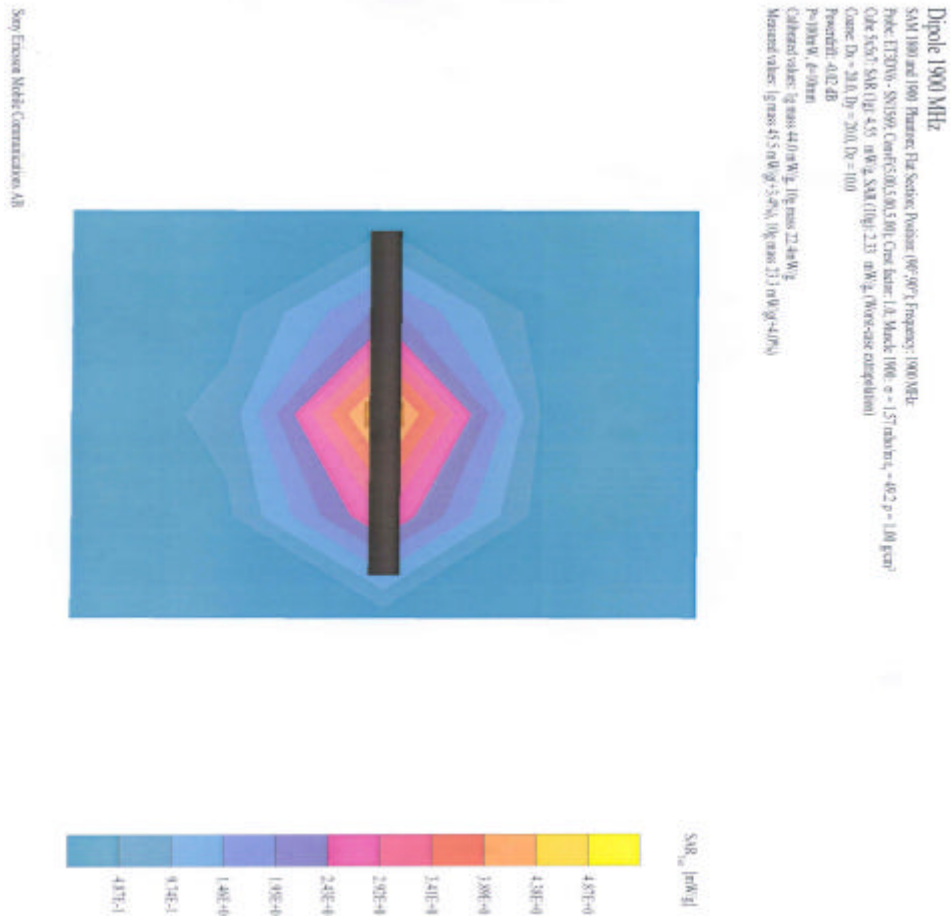

Validation Dipole, measured with muscle simulating tissue on 05/23/02

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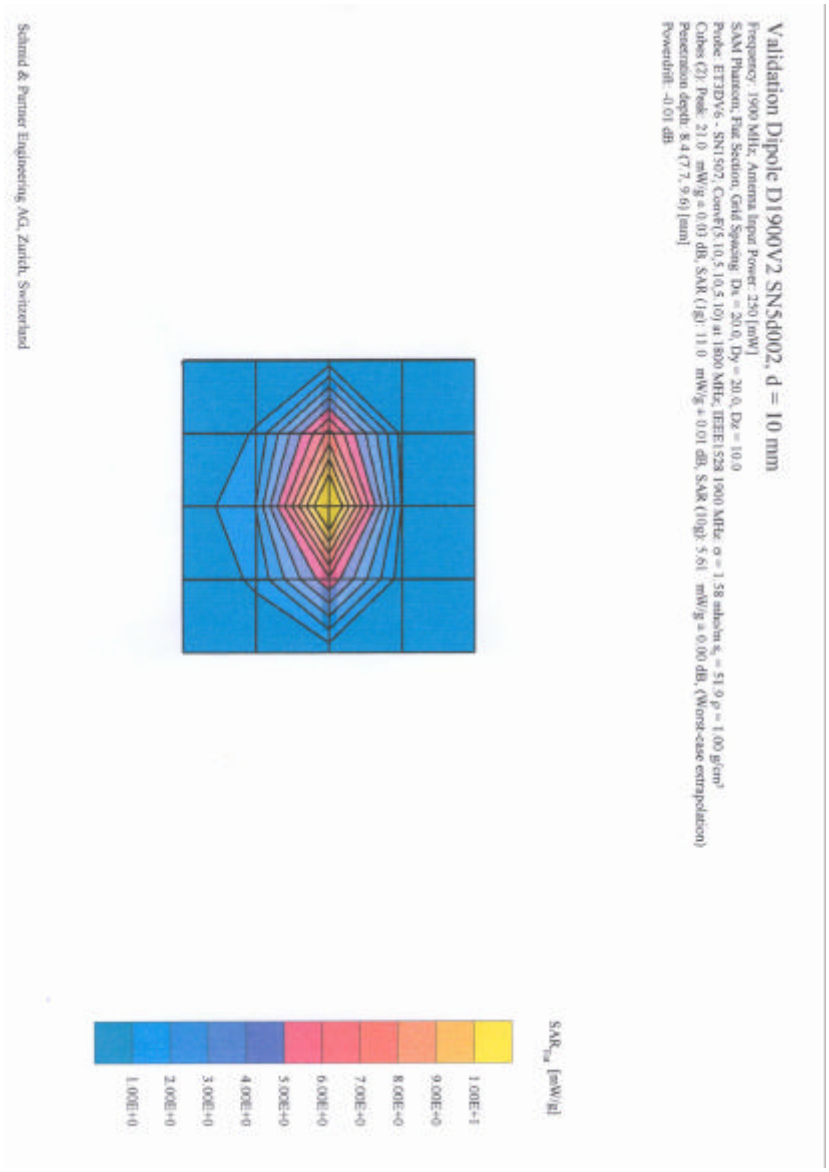

1900MHz SAR distribution of validation dipole from reference measurement with muscle simulating tissue

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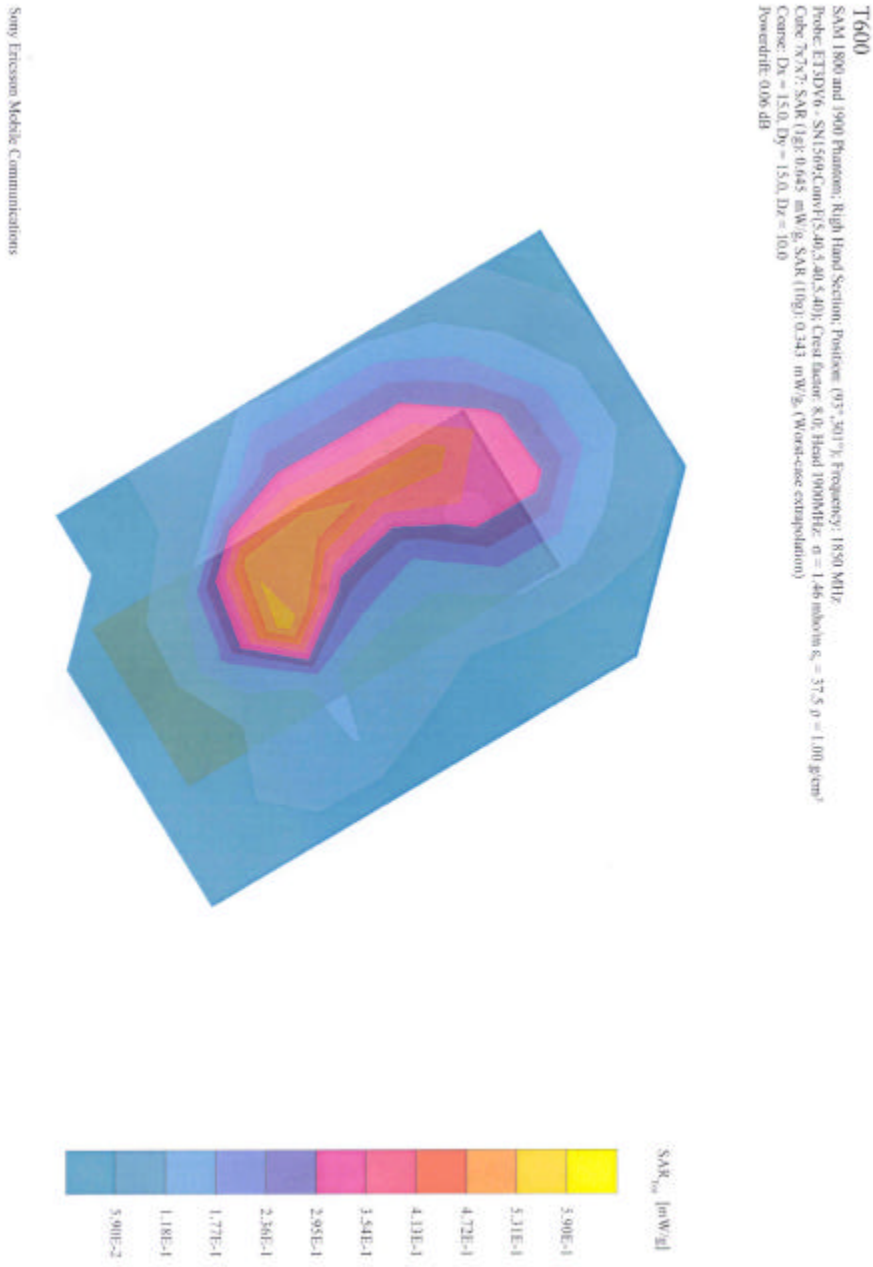
10.2 SAR distribution plot



Distribution of max SAR in GSM1900 mode at 1850MHz. Measured against the head for cheek phone position

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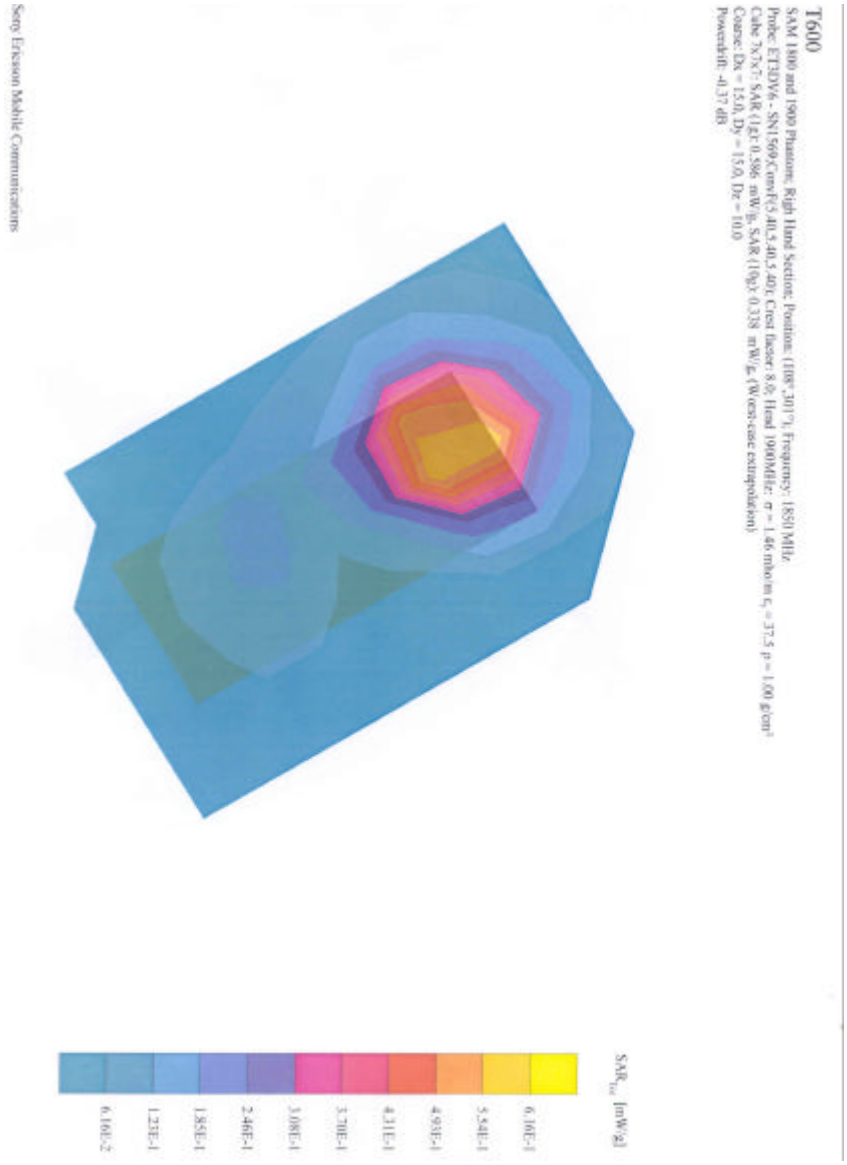

Distribution of max SAR in GSM1900 mode at 1910MHz. Measured against the head for tilt phone position

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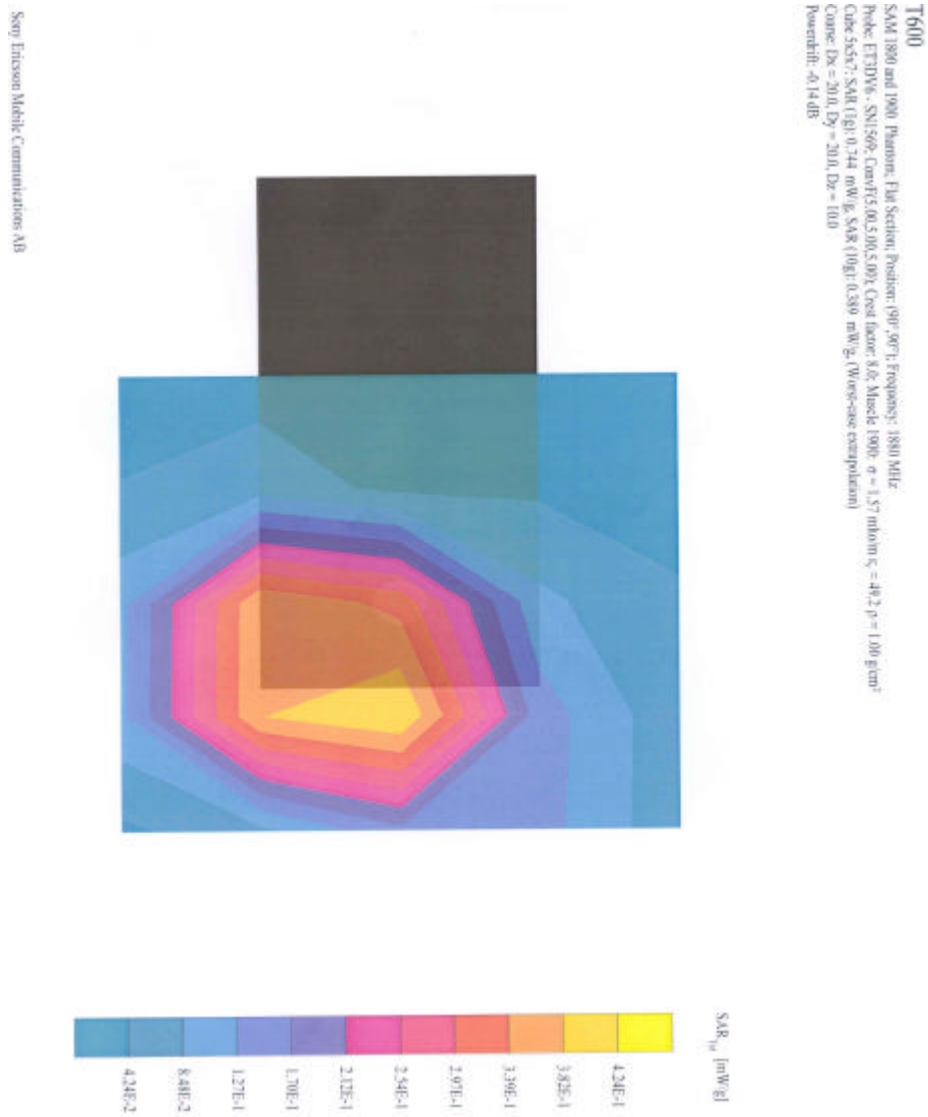


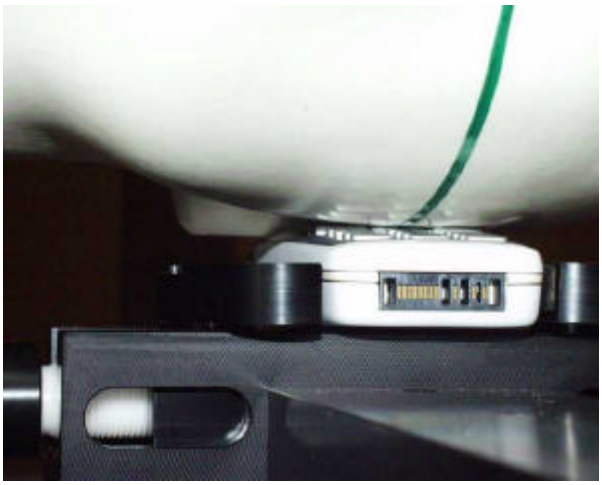
Distribution of max SAR in GSM1900 mode at 1850MHz.Measured against the body for back phone position to the phantom

10.3 Photographs of the device under test

Front side

Backside with battery

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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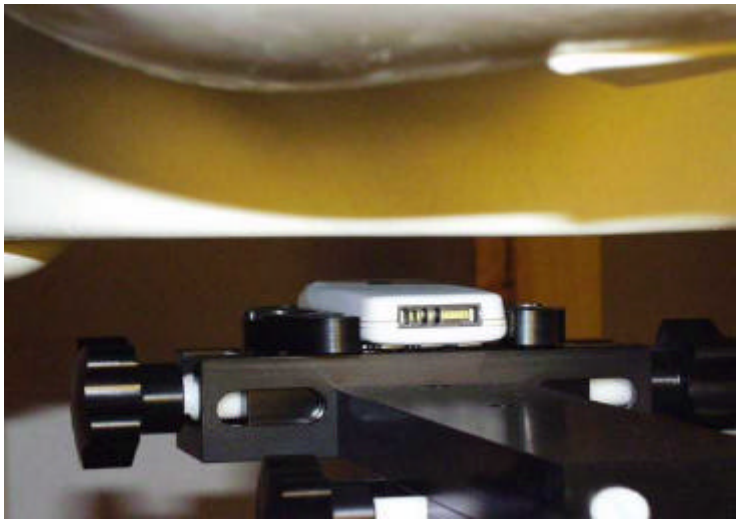

Device position against the body: 15 mm gap between Phone

And phantom

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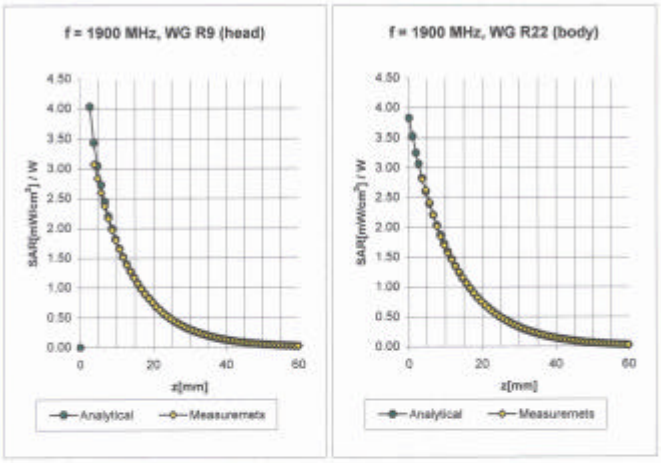
10.5 Probe calibration parameters

ET3DV6 SN:1569 April 25, 2002

Conversion Factor Assessment



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

ConvF X	5.4 ± 8.9% (k=2)	Boundary effect:	
ConvF Y	5.4 ± 8.9% (k=2)	Alpha	0.47
ConvF Z	5.4 ± 8.9% (k=2)	Depth	2.44

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

ConvF X	5.0 ± 8.9% (k=2)	Boundary effect:	
ConvF Y	5.0 ± 8.9% (k=2)	Alpha	0.65
ConvF Z	5.0 ± 8.9% (k=2)	Depth	2.16

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