Prepared (also subject responsible if other)		No.		
LD/ECS/GUF/KG Hamid Kami Shirazi		GTX/FG 02:005		
Approved	Checked	Date	Rev	File
GUF/KG Hamid Kami	ECSHKAM	2002-09-03	B	\\SELDNT01\ECSRAPL$\T200\T200_FCC_rapport_edit_020903_HEAD.doc

EN

SAR Test Report: T200 (PY71130501)

Date of test: April 04, 2002

Laboratory:
Electromagnetic Near Field and Radio Frequency Dosimetry Laboratory
Sony Ericsson Mobile Communications AB
Nya Vattentornet,
SE-221 83 LUND, Sweden

Test Responsible:
Hamid Kami Shirazi
R & D Engineer, Terminal Antennas
hamid.kami.shirazi@ecs.ericsson.se
+ 46 46 232644

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

Ericsson Type 1130501 (T200); FCC ID: PY 71130501

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 test report.

Prepared (also subject responsible if other)		No.		
LD/ECS/GUF/KG Hamid Kami Shirazi		GTX/FG 02:005		
Approved	Checked	Date	Rev	File
GUF/KG Hamid Kami	ECSHKAM	2002-09-03	B	\\SELDNT01\ECSRAPL$\T200\T200_FCC_rapport_edit_020903_HEAD.doc

EN

Table of Contents

Prepared (also subject responsible if other)		No.		
LD/ECS/GUF/KG Hamid Kami Shirazi		GTX/FG 02:005		
Approved	Checked	Date	Rev	File
GUF/KG Hamid Kami	ECSHKAM	2002-09-03	B	\\SELDNT01\ECSRAPL$\T200\T200_FCC_rapport_edit_020903_HEAD.doc

EN

1. Introduction

In this test report, compliance of the Ericsson T200 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 Specification of Wireless Handsets* [1].

2. Device Under Test

2.1 Antenna description

Type	Internal antenna	
Location	Inside the back cover, near the top	
Dimensions	Max length	25mm
	Max width	40mm
Configuration	PIFA	

2.2 Device description

Device model	T200
Serial number	TV4KYW201A
Mode	1900 TDMA
Multiple Access Scheme	TDMA
Maximum Output Power Setting [1]	29.5 dBm
Factory Tolerance in Power Setting	± 0.5dB
Maximum Peak Output Power [2]	30 dBm
Duty Cycle	1 / 8
Transmitting Frequency Range	1850.2 – 1909.8 MHz
Prototype or Production Unit	Preproduction
Device Category	Portable
RF exposure environment [2]	General population / uncontrolled

3. Test equipment

3.1 Dosimetric system

SAR measurements were made using the DASY3 professional system (software version 3.1c) with a 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	4/2003
E-field probe ETDV6	1582	5/2002
Dipole Validation Kit, D1900V2	5d002	2/2003

[1] This is the conducted power measured at the antenna port when the device is set to its highest power setting. It is measured at the middle of the transmit frequency band. Note that the output power may be different at other frequencies.

[2] This equals the maximum output power setting plus the factory tolerance.

3.2 Additional equipment

Description	Serial Number	Due Date
Signal Generator ESG-D4000A	INV 462935	9/2003
Terminator 65N50-0-11	NIV 2903	1/2003
Directional coupler 778D	NIV39656	9/2003
Thermocouple probe2290-4	NIV2393	2/2003
Thermocouple probe 51	NIV2071	9/2003
Dielectric probe kit HP 85070D	INV 20000053	2/2004
S-parameter test set	INV 421670	8/2002
Network analyzer HP 8753C	INV 421671	8/2002
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
Wavetek STABILOCK4031D	INV 421578	7/2002

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 values are shown in the table below. The mass density, ρ, entered into the DASY3 program is also given. Recommended limits for maximum permittivity, minimum conductivity and maximum mass density are also shown.

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			ε_r	σ (S/m)	ρ (g/cm^3)
1900	Head	**Measured, 04/04/02**	39.3	1.4	1.00
		Recommended	40.0	1.4	1.00

5. 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 °C, liquids temperature 23.3 °C and humidity 15 %. The obtained results are displayed in the table below. Forward power was 100mW for validation measurement and 250mW for reference measurement. At 1900 MHz, the manufacturer provides reference values. The distributions of SAR compare well with those of the reference measurements (see Appendix 1). RF noise value is 0.003mw/g (1g-mass) , when phone is off.

f (MHz)	Tissue type	Measured / Reference	SAR (W/kg), 1 gram	Dielectric Parameters			Temp. (°C)
				ε_r	σ (S/m)	ρ (g/cm^3)	
1900	Head	**Measured, 04/04/02**	42,3	39.3	1.4	1.00	22.7
		Reference	45.2	39.1	1.47	1.00	?

Prepared (also subject responsible if other)		No.		
LD/ECS/GUF/KG Hamid Kami Shirazi		GTX/FG 02:005		
Approved	Checked	Date	Rev	File
GUF/KG Hamid Kami	ECSHKAM	2002-09-03	B	\\SELDNT01\ECSRAPL$\T200\T200_FCC_rapport_edit_020903_HEAD.doc

EN

6. Test results

The measured 1-gram averaged SAR values of the device are provided in Tables 1 and 2. Also shown are the measured output powers and the temperature of the test facility during the test. The humidity and ambient temperature of test facility were 12%-15% and 23°C – 25.5 °C respectively. The depth of the tissue simulating liquid was 15.0 cm. A base station simulator was used to control the device during the SAR measurements. The phone was supplied with a fully charged battery for the tests.

SAR measured against the head is presented in Table 1. The device was tested on the right-hand phantom (corresponding to the right side of the head) and the left-hand phantom in two different phone position, cheek (touch) and tilt (cheek+15deg). For 1900 TDMA modes, the device was tested at the lowest, middle and highest frequencies of the transmit band.

Mode	Chanal	Output power (dBm)	Phone Positions	Liquid Temp (°C)	SAR, 1g (W/kg)	
					Left hand	Right hand
1900 TDMA	512	30.0	Cheek	23.3/23.8	0.28	**0.37**
			Tilt	23.3/23.8	0.20	**0.26**
	661	30.0	Cheek	23.3/23.8	0.22	0.26
			Tilt	23.3/23.8	0.14	0.18
	810	30.0	Cheek	23.3/23.8	0.16	0.17
			Tilt	23.3/23.8	0.11	0.13

Table 1: SAR measurement results for the Sony Ericsson T200 telephone at highest possible output power. Measured against the head.

Prepared (also subject responsible if other)		No.		
LD/ECS/GUF/KG Hamid Kami Shirazi		GTX/FG 02:005		
Approved	Checked	Date	Rev	File
GUF/KG Hamid Kami	ECSHKAM	2002-09-03	B	\\SELDNT01\ECSRAPL$\T200\T200_FCC_rapport_edit_020903_HEAD.doc

EN

References

[1] M. Douglas, "SAR Measurement Specification of Wireless Handsets", Sony Ericsson internal document EUS/CV/R-o1: 1061/REP

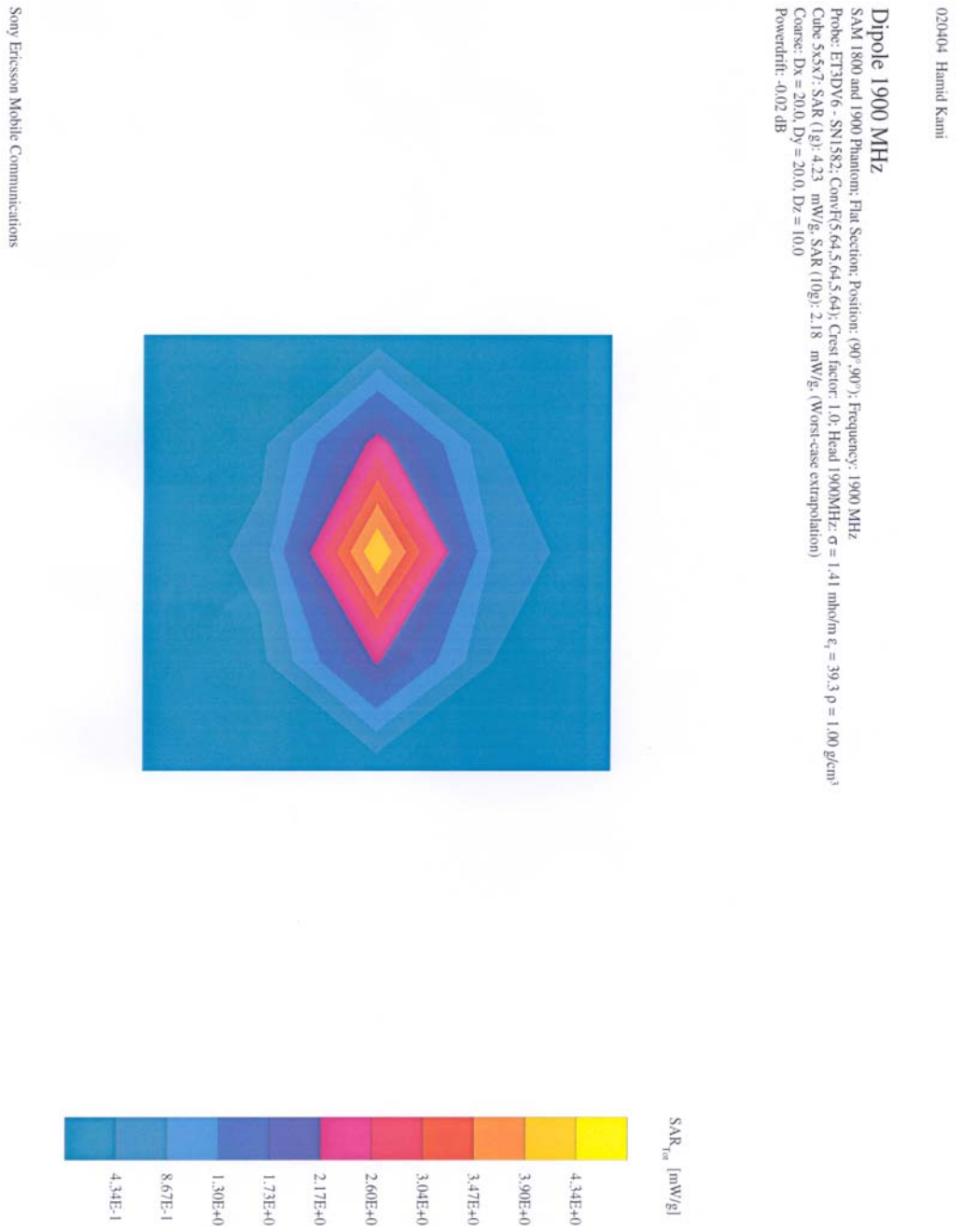
[2] FCC, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields: Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radio frequency Emissions," Supplement C (Edition 01-01) to OET Bulletin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

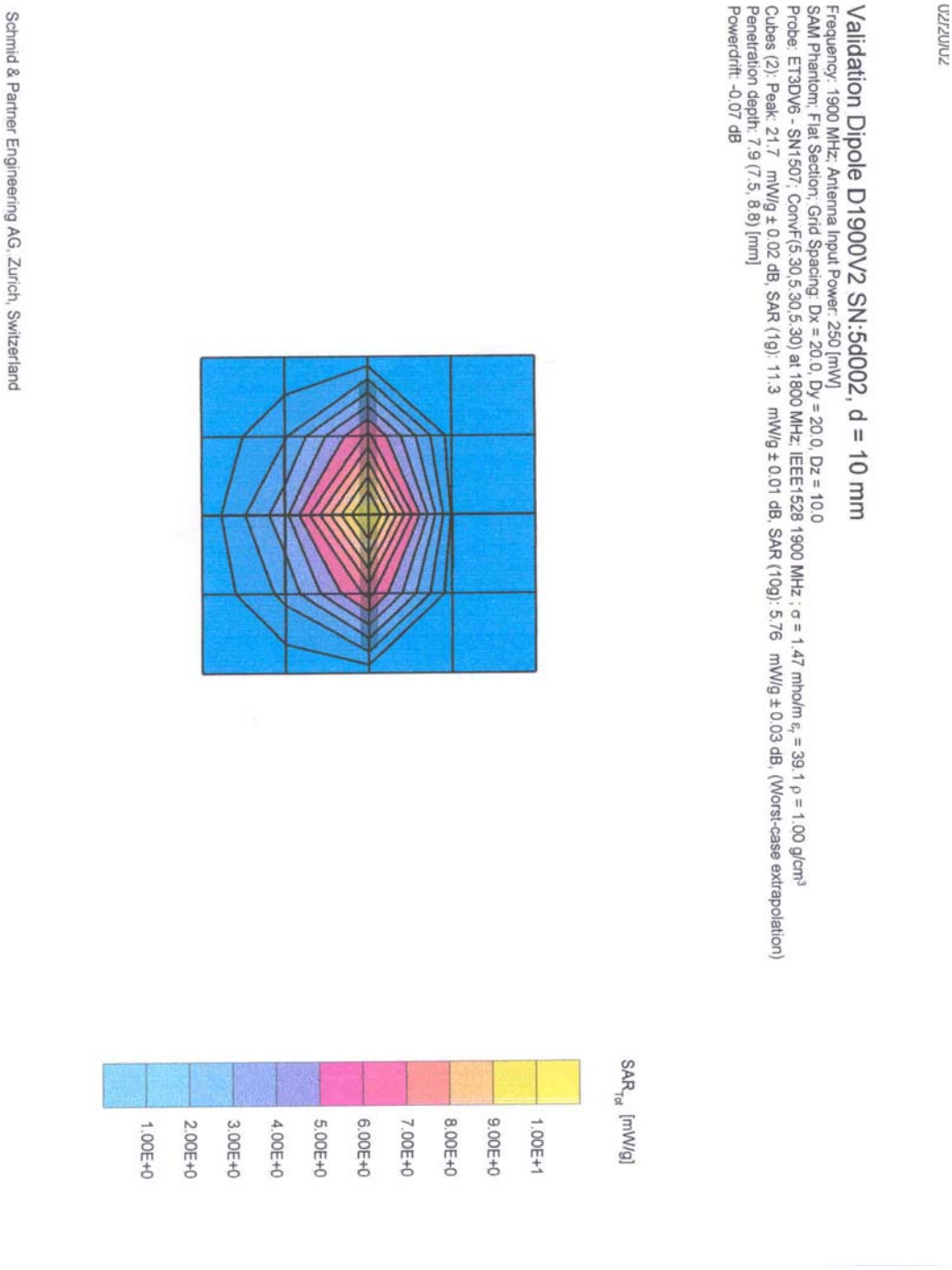
Prepared (also subject responsible if other)		No.		
LD/ECS/GUF/KG Hamid Kami Shirazi		GTX/FG 02:005		
Approved	Checked	Date	Rev	File
GUF/KG Hamid Kami	ECSHKAM	2002-09-03	B	\\SELDNT01\ECSRAPL$\T200\T200_FCC_rapport_edit_020903_HEAD.doc

EN

Appendix 1: SAR distribution comparison for system accuracy verification

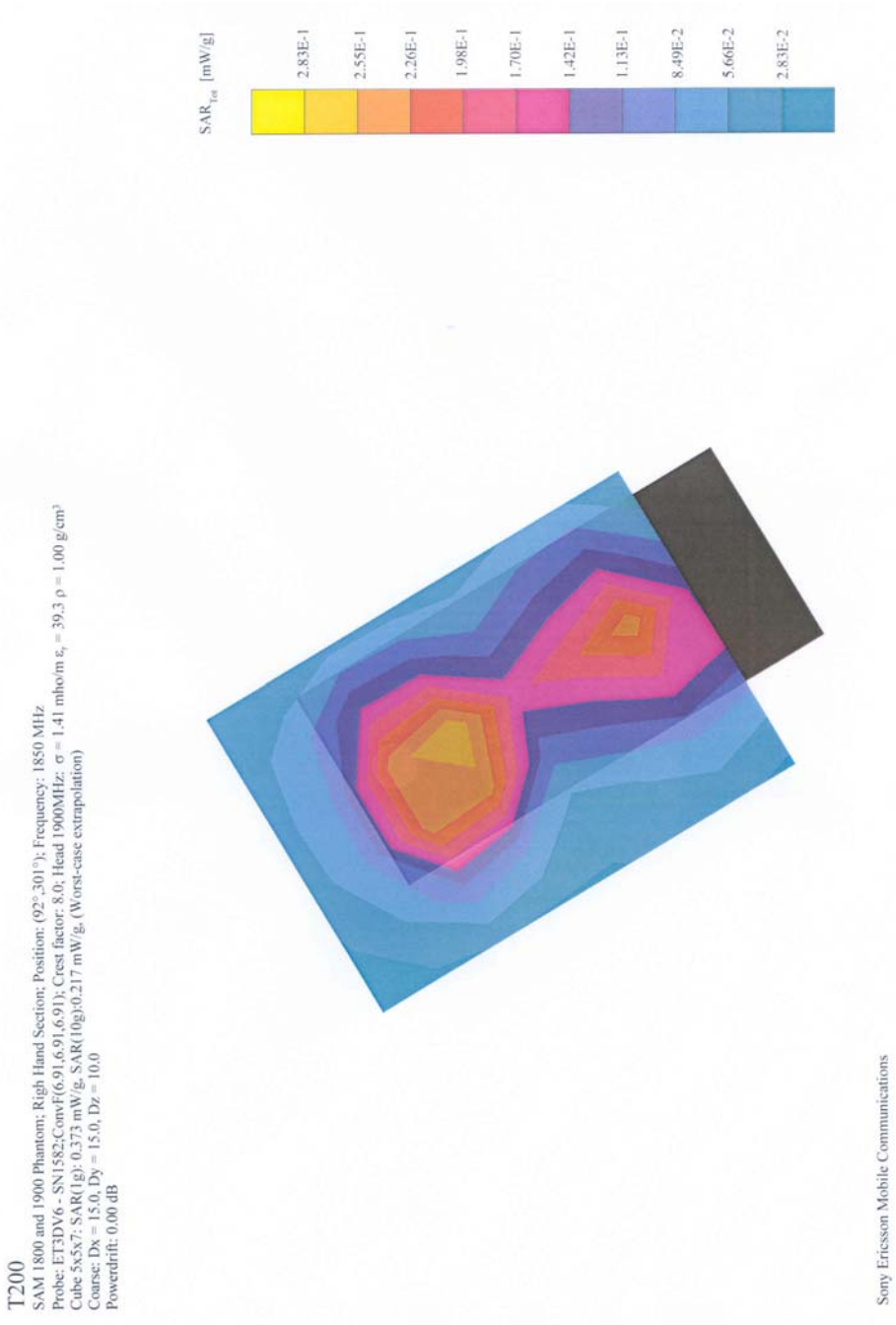


Validation Dipole D1900V2 SN: 5d002, d=10mm. Measured with head simulating tissue on 04/04/02.

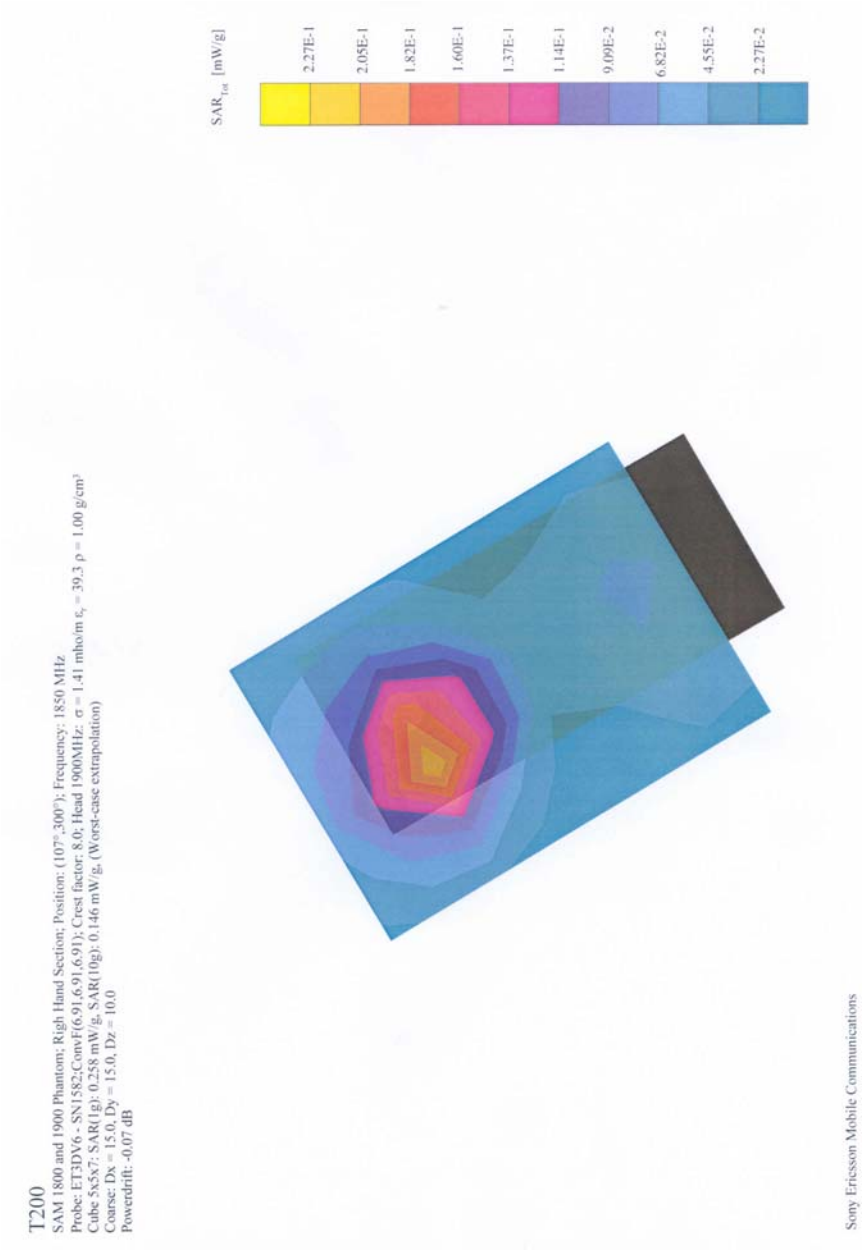


1900 MHz SAR distribution of validation dipole antenna from reference measurement.

Appendix 2: SAR distribution plots



Distribution of maximum SAR in 1900 TDMA mode at 1850.2 MHz. Measured against the head for cheek phone position.



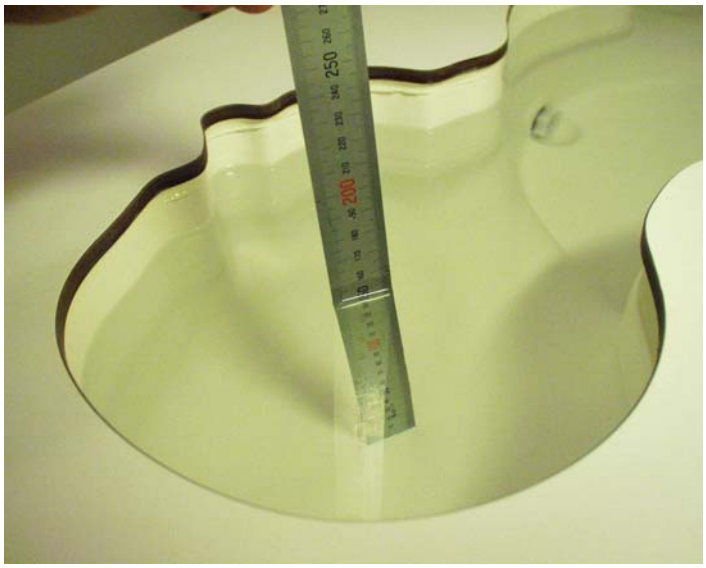
Distribution of maximum SAR in 1900 TDMA mode at 1850.2 MHz. Measured against the head for tilt phone position.

Appendix 3: Photographs of the device under test

Front view

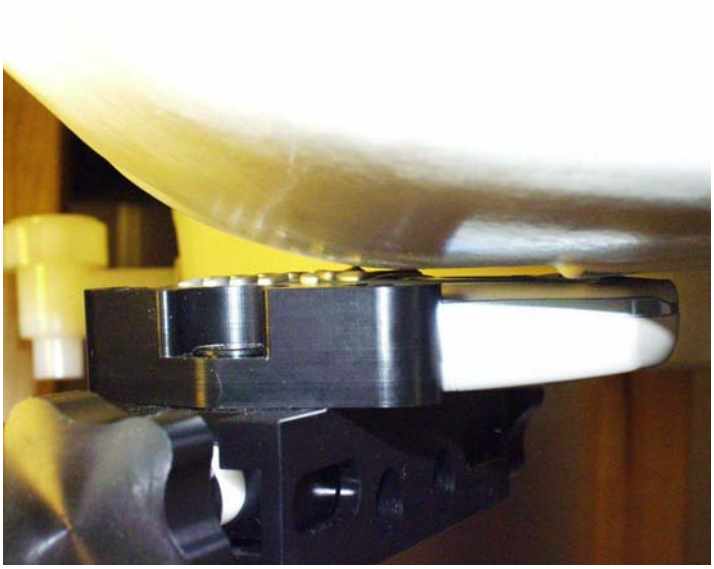
Side view

Back view

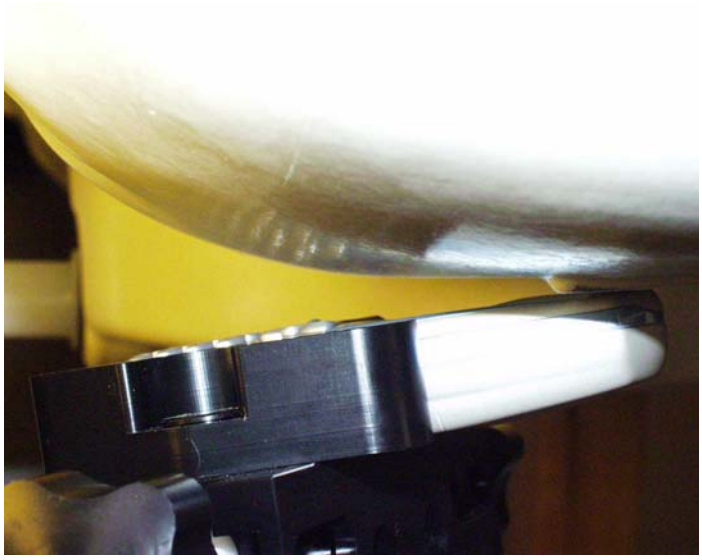


Liquid Level

Appendix 4: Position of device on SAM Twin Phantom



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



Device position against the head: Tilt (106deg) phone position

Appendix 5: Probe calibration parameters for ET3DV4 SN: 1582

ET3DV6 SN:1582

DASY3 - Parameters of Probe: ET3DV6 SN:1582

Sensitivity in Free Space

NormX	**1.99** $\mu V/(V/m)^2$
NormY	**1.85** $\mu V/(V/m)^2$
NormZ	**2.03** $\mu V/(V/m)^2$

Diode Compression

DCP X	**100** mV
DCP Y	**100** mV
DCP Z	**100** mV

Sensitivity in Tissue Simulating Liquid

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

ConvF X	**7.55** extrapolated	Boundary effect:	
ConvF Y	**7.55** extrapolated	Alpha	**0.33**
ConvF Z	**7.55** extrapolated	Depth	**2.53**

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

ConvF X	**6.91** ± 7% (k=2)	Boundary effect:	
ConvF Y	**6.91** ± 7% (k=2)	Alpha	**0.39**
ConvF Z	**6.91** ± 7% (k=2)	Depth	**2.39**

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

ConvF X	**6.07** interpolated	Boundary effect:	
ConvF Y	**6.07** interpolated	Alpha	**0.47**
ConvF Z	**6.07** interpolated	Depth	**2.19**

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

ConvF X	**5.64** ± 7% (k=2)	Boundary effect:	
ConvF Y	**5.64** ± 7% (k=2)	Alpha	**0.51**
ConvF Z	**5.64** ± 7% (k=2)	Depth	**2.09**

Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.1 ± 0.2**	mm

Appendix 6:SAR measurement uncertainty

SAR measurement uncertainty evaluation for Sonyericsson T200 phone

Uncertainty Component	Tol. (± %)	Prob. Dist.	Div.	Measurement on Head
Measurement System				
Probe Calibration	2.6	N	1	2.6
Axial Isotropy	4.7	R	√3	1.9
Hemispherical Isotropy	9.6	R	√3	3.9
Boundary Effect	11.0	R	√3	6.4
Linearity	4.7	R	√3	2.7
System Detection Limits	1.0	R	√3	0.6
Readout Electronics	1.0	N	1	1.0
Response Time	0.8	R	√3	0.5
Integration Time	1.8	R	√3	1.1
RF Ambient Conditions	3.0	R	√3	1.7
Probe Positioned Mechanical Tolerance	0.4	R	√3	0.2
Probe Positioning respect to Phantom Shell	2.9	R	√3	1.7
Extrapolation, interpolation and Integration Algorithm for Max. SAR	3.9	R	√3	2.3
Measurement System Uncertainty				**9.4**
Test Sample Related				
Test Sample Positioning		R	√3	6.7
Device Holder Uncertainty		R	√3	5.9
Output Power Variation - Drift	1.04	R	√3	0.6
Test Sample Related Uncertainty				**8.9**
Phantom and Tissue Parameters				
Phantom Uncertainty(shape and thickness tolerances)	4.0	R	√3	2.3
Liquid Conductivity-deviation from target values)	0.7	R	√3	0.4
Liquid Conductivity-measurement uncertainty	5	R	√3	2.9
Liquid Permitivity-deviation from target values	1.75	R	√3	1.01
Liquid Permitivity-measurement uncertainty	5	R	√3	2.9
Phantom and Tissue Parameters Uncertainty				**4.8**
Combined Standard Uncertainty		RSS		***13.8***
Expanded Uncertainty (95% CONFIDENCE LEVEL)				***27.6***