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1 General information

This report presents the Specific Absorption Rate (SAR) measurement data for the Jaguar 700P. The measurements were conducted at the Ericsson Corporate EMF Research Laboratory at Ericsson Research in Stockholm Sweden according to the procedures described in the *Ericsson SAR measurement specification*[1].

2 Device Under Test

2.1 Antenna description

Type	$\lambda/4$ antenna	$\lambda/2$ antenna
Type number	KRE 101 1223/01	KRE 101 1216/01
Location	right side	right side
Dimensions (mm)	length=98, \varnothing =5	length=195, \varnothing =10&5
Configuration	Whip	Whip

2.2 Device description

Device model	Jaguar 700P
Type number	KRD 103 161/1
Serial number	3003
Mode	EDACS
Multiple access acheme	FDMA
Maximum output power setting	3 W
Factory Tolerance in power setting	$\pm 5\%$
Maximum peak output power	3.15 W, (2.20 W) ¹
Duty cycle	N/A ²
Transmitter frequency range	806-824, 851-870 MHz

¹ At handsfree speaker/microphone antenna connector. The minimum loss of the interconnecting cable is 1.5 dB.

² Depends on the usage. A realistic maximum duty-cycle is 1/2.

3 Test equipment

3.1 Dosimetric system

Schmid&Partner Engineering AG DASY3 professional (installed September 1997), software version 3.1c.

Description	Asset number	Due date
DASY3 DAE3	S/N 304	2000 08
E-field probe ET3DV6	S/N 1394	2000 10
Dipole validation kit D835V2	S/N 413	2000 08

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3.2 Additional equipment

Description	Asset number	Due date
Signal generator, R&S SMHU58	S/N 843863/034	2000 11
Dielectric probe kit HP85070B	S/N US33020318	2000 02
Network analyzer HP8753D	S/N 3410A08356	2000 11
Power meter R&S NRVS	S/N 848888/052	2000 03
Power sensor R&S NRV-Z32	S/N 825600/030	2000 02

4 Electrical parameters of the tissue simulating liquid

The parameters of the tissue simulating liquid were measured with the dielectric probe kit prior to the SAR measurement and the results are shown in the table below.

Parameter	Value
Frequency, f (MHz)	835
Relative permittivity, ϵ_r	41.1-44.1 ($\pm 5\%$) ¹
Conductivity, σ (S/m)	0.80-0.82 ($\pm 10\%$) ¹

¹ Measurement were conducted during several days and the values were within the stated range.

5 System accuracy verification

A system performance verification for the DASY3 was conducted before the SAR measurements with the D835V2 validation kit and the obtained results are displayed in the table below. The results are within 10% from the reference values obtained from the manufacturer of the system. The temperature of the test facility during the tests was $20 \pm 1^\circ\text{C}$ and the depth of the tissue simulating liquid in the phantom was 12 cm. Appendix 1 shows the measured SAR distribution and the reference distribution for this antenna.

f (MHz)	Measured/Reference	SAR 1g (W/kg)	σ (S/m)	ϵ_r	ρ (kg/m ³)	Date
835	Measured	9.03	0.82	44.1	1.00	991117
	Reference	8.56	0.80	42.6	1.00	991029

6 Test Results

Six different antenna and speaker/microphone configurations were tested for the Jaguar 700P unit. 1) Halfwave and 2) quarterwave antenna on the Jaguar radio without any additional equipment. 3) Halfwave and 4) quarterwave on the radio with the belt clip and a speaker/microphone. 5) Halfwave or 6) quarterwave antenna mounted on the speaker/microphone.

For the configurations 1 and 2 the test position was at a distance of 5 cm from the flat phantom with the key pad facing the phantom. For configurations 3 and 4 the jaguar radio was positioned with the beltclip touching the phantom shell and for configurations 5 and 6 the speaker/microphone with the antenna was positioned with the clip touching the phantom. The radio configurations and the corresponding setups below the DASY3 phantom are shown in Appendix 3 and 4.

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The Jaguar 700P was SAR measured for an output power level of 0.5 W (at the device output connector) and a duty-cycle of 1. SAR measurements were performed for six frequencies for the configurations 1 and 2; the lowest, the center and the highest frequency for both transmitter band. For the configurations 3 to 6 the SARs were measured at the frequency that resulted in the highest SAR values for configurations 1 and 2. Finally, measurements were then conducted at six frequencies for the configuration that was highest in SAR of the configurations 3 to 6. The tables below show the measured 1g and 10g averaged SAR and the corresponding values normalized to 3.15 W output power level and duty-cycle 1/2 which corresponds to a realistic maximum. In appendix 2 the obtained SAR distributions for the different configurations are shown.

Device/Antenna	f (MHz)	Measured output power (W)	SAR 1g/10g (W/kg), Measured	SAR 1g/10g (W/kg), Normalized to 3.15 W and duty-cycle 1/2
			Flat section, 5cm distance	
Jaguar/ $\lambda/2$ antenna (configuration 1)	806	0.502	0.1/0.1	0.4/0.3
	813	0.504	0.1/0.1	0.4/0.3
	824	0.501	0.1/0.1	0.4/0.3
	851	0.502	0.09/0.07	0.3/0.2
	858	0.504	0.08/0.06	0.3/0.2
	870	0.511	0.07/0.05	0.2/0.2
Jaguar/ $\lambda/4$ antenna (configuration 2)	806	0.502	0.09/0.07	0.3/0.2
	813	0.504	0.08/0.06	0.3/0.2
	824	0.501	0.08/0.06	0.3/0.2
	851	0.502	0.07/0.05	0.2/0.2
	858	0.504	0.06/0.05	0.2/0.1
	870	0.511	0.06/0.04	0.2/0.1

Table 1 The measured 1g and 10g SAR for the Jaguar 700P (configurations 1 and 2) positioned 5 cm from the phantom.

Device/Antenna	f (MHz)	Measured output power (W)	SAR 1g/10g (W/kg), Measured	SAR 1g/10g (W/kg), Normalized to 3.15 (2.20) W and duty-cycle 1/2
			Flat section, clip touching	
Jaguar 700P with $\lambda/2$ antenna, belt clip and speaker/mic (configuration 3)	813	0.504	1.8/1.3	5.5/3.9
Jaguar 700P with $\lambda/4$ antenna, belt clip and speaker/mic (configuration 4)	806	0.502	1.4/0.9	4.4/2.8
Jaguar 700P $\lambda/2$ antenna on speaker/microphone (configuration 5)	806	0.176	0.4/0.3	2.6/1.9
Jaguar 700P $\lambda/4$ antenna on speaker/microphone (configuration 6)	806	0.176	0.3/0.2	1.9/1.3

Table 2 The measured 1g and 10g SAR for the Jaguar 700P (configurations 3, 4, 5 and 6) in belt clip and speaker/microphone clip touching position.

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Device/Antenna	f (MHz)	Measured output power (W)	SAR 1g/10g (W/kg), Measured	SAR 1g/10g (W/kg), Normalized to 3.15 W and duty-cycle 1/2
			Flat section, clip touching	
Jaguar 700P with $\lambda/2$ antenna, belt clip and speaker/mic (configuration 3)	806	0.502	1.7/1.2	5.2/3.7
	813	0.504	1.8/1.3	5.6/4.1
	824	0.501	1.5/1.1	4.8/3.4
	851	0.502	1.1/0.8	3.4/2.4
	858	0.504	1.0/0.7	3.0/2.1
	870	0.511	1.0/0.7	2.9/2.07

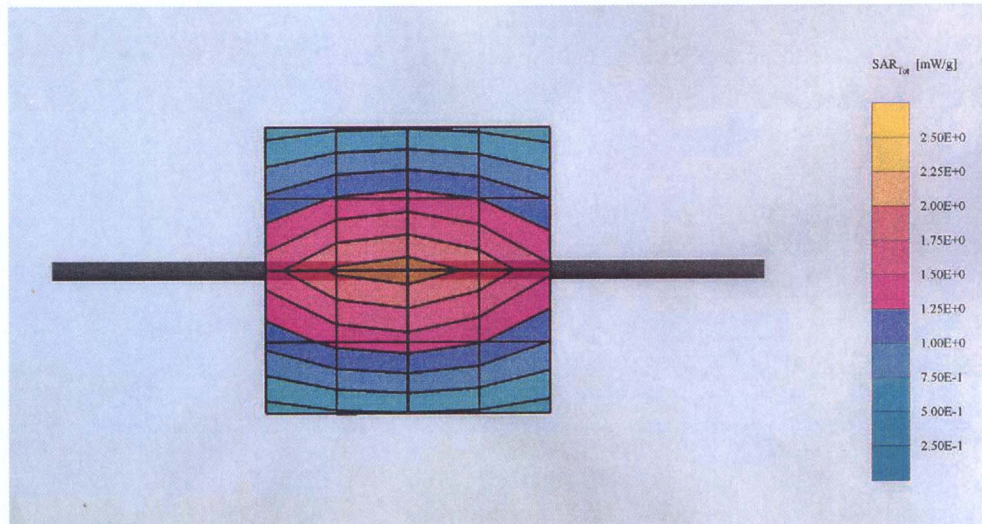
Table 3 The measured 1g and 10g SAR for the Jaguar 700P (configuration 3) in belt clip touching position.

7 References

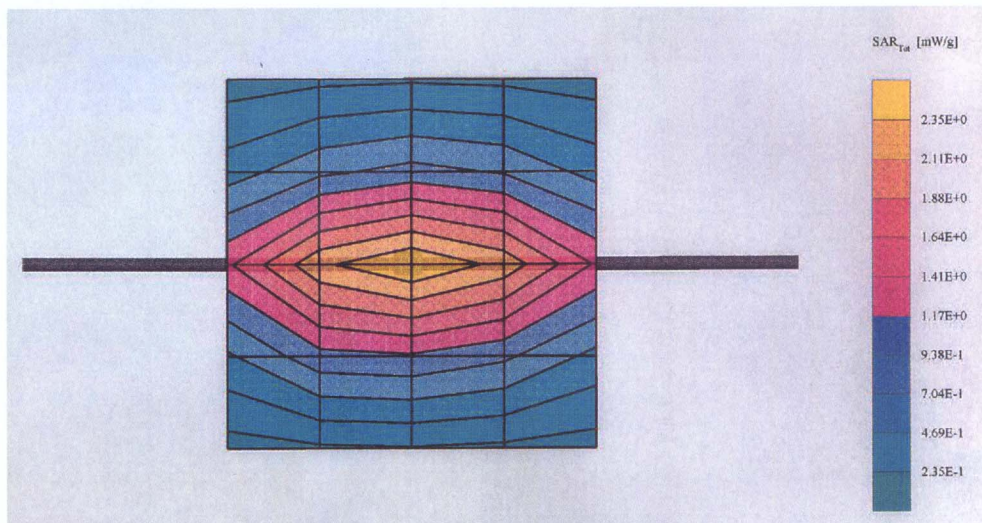
- [1] C. Törnevik, M. Siegbahn, T. Persson, M. Douglas and R. Plicanic, "Ericsson SAR Measurement Specification", Ericsson Internal Document, November 1999.

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APPENDIX 1: SAR distribution comparison for system accuracy verification



Reference data

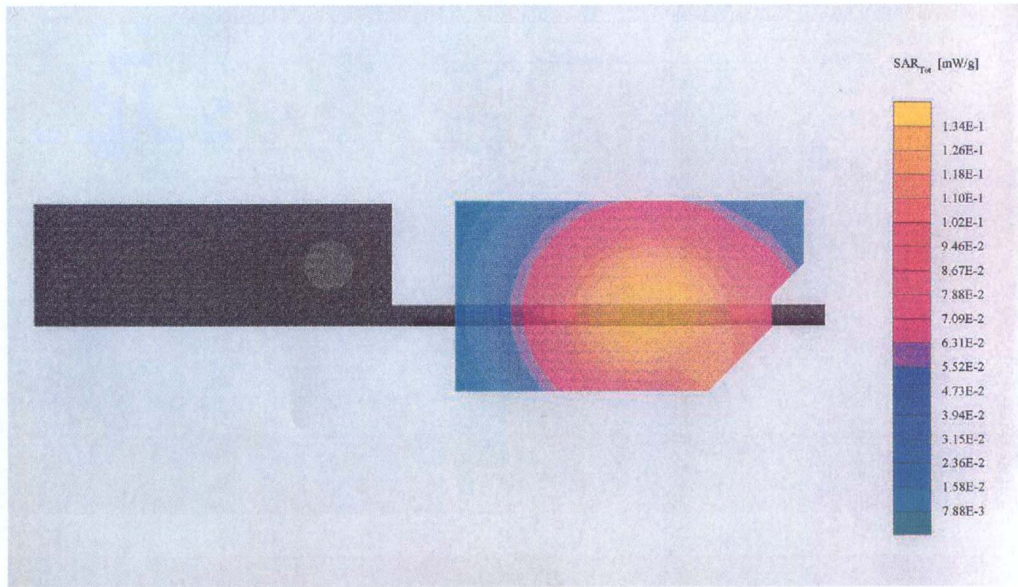


Measurement data

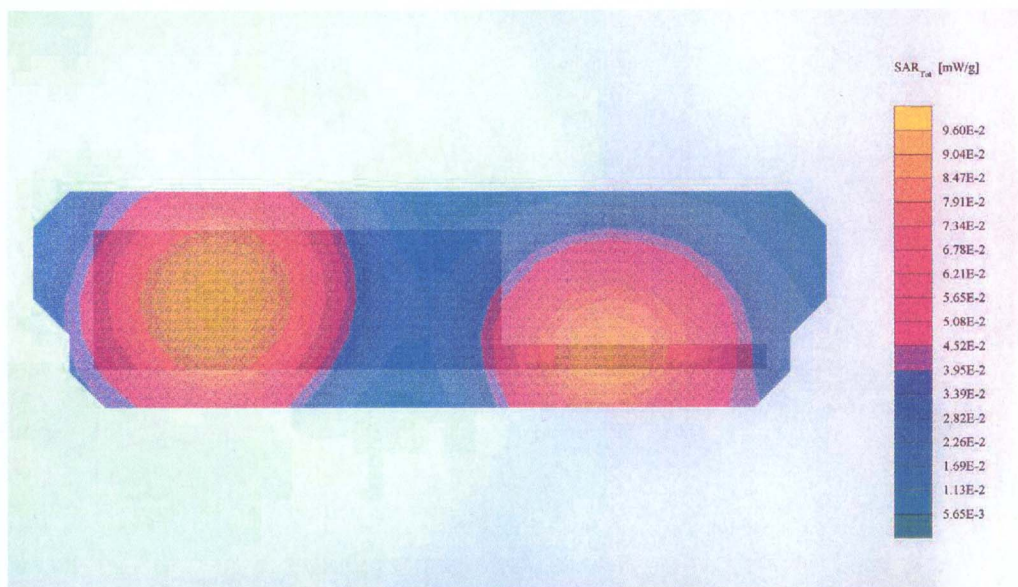
SAR distribution plots for the 835 MHz validation dipole antenna. The upper plot shows the reference data obtained from the DASY3 manufacturer and the lower plot the measurement data obtained prior to the SAR testing.

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APPENDIX 2: SAR distribution plots



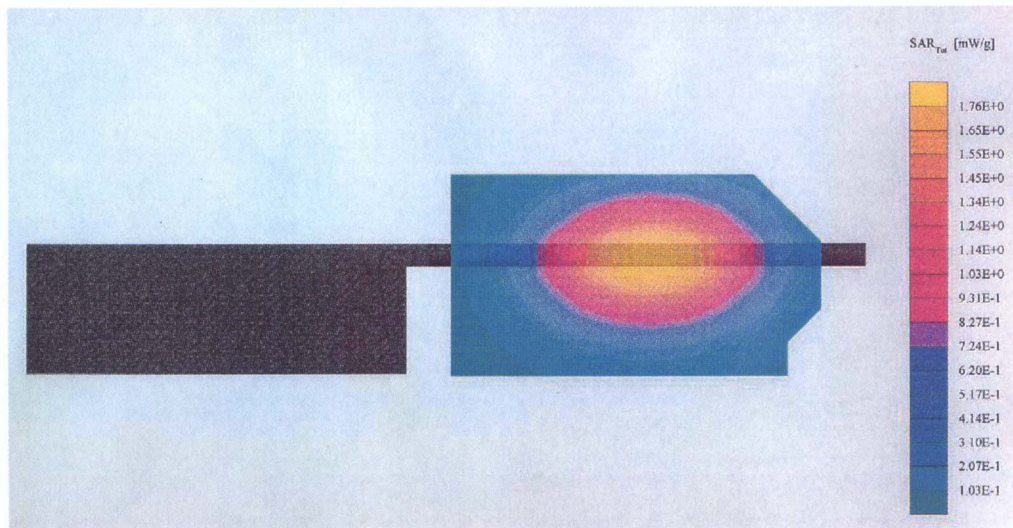
Configuration 1, 5 cm distance



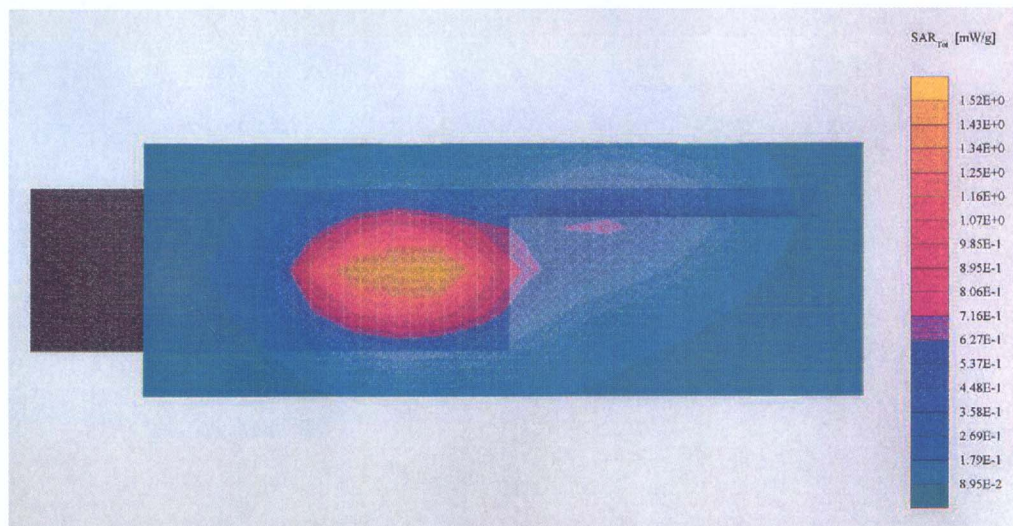
Configuration 2, 5 cm distance

SAR distribution plots for the Jaguar 700P with the halfwave and the quarterwave antenna (configurations 1 and 2) positioned 5 cm from the flat phantom. The plots shows the measurement data for the maximum area at the tested power level of 0.5 W and duty-cycle 1.

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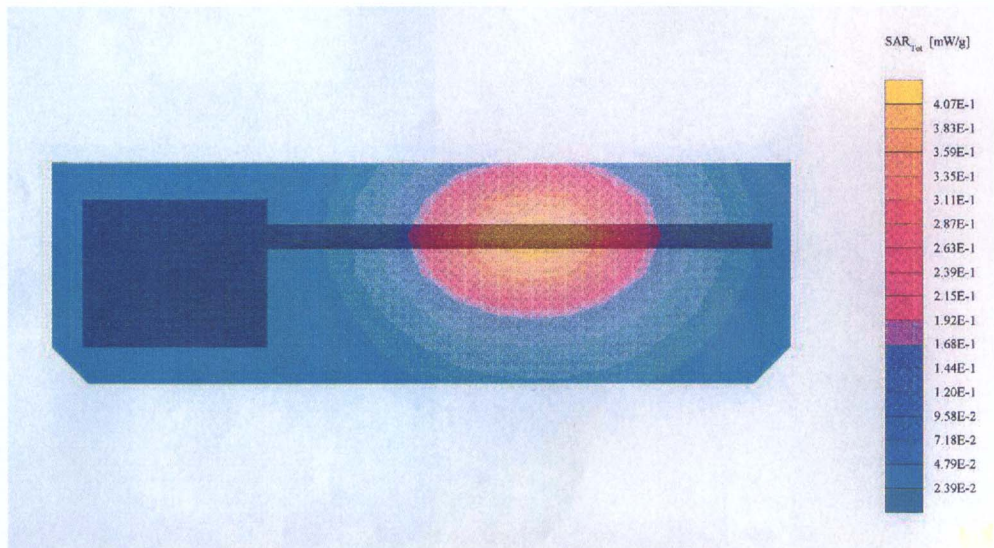
Configuration 3, beltclip touching



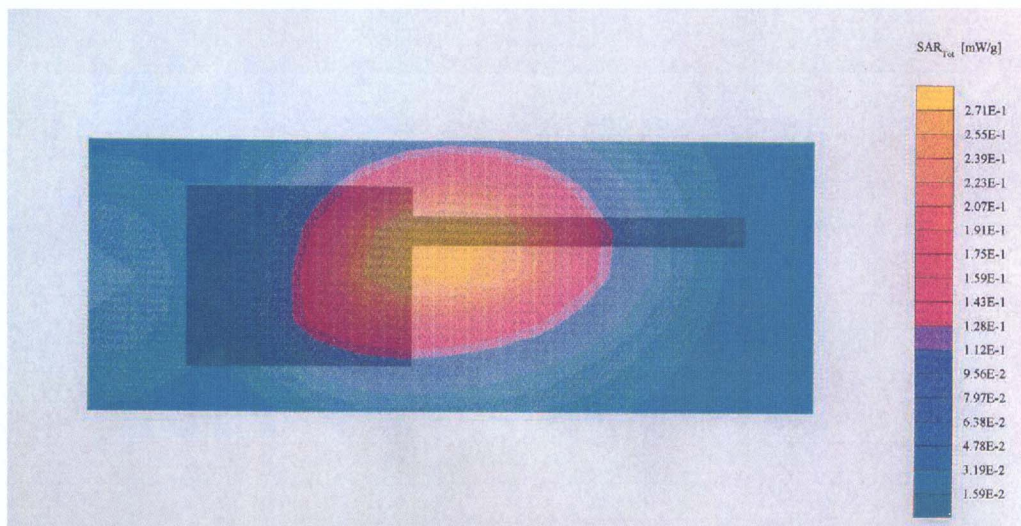
Configuration 4, beltclip touching

SAR distribution plots for the Jaguar 700P with halfwave and quarterwave antenna, beltclip plus speaker/microphone (configurations 3 and 4). The plots show the measurement data for the maximum area at the tested power level of 0.5 W and duty-cycle 1.

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Configuration 5, clip touching



Configuration 6, clip touching

SAR distribution plots for the Jaguar 700P with halfwave and quarterwave mounted on the speaker/microphone (configurations 5 and 6). The plots show the measurement data at the tested output power level of 0.5 W and duty-cycle 1.

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APPENDIX 3: Photographs of the DUT.



(a) The Ericsson Jaguar 700P with $\lambda/2$ antenna (configuration 1).



(b) The Ericsson Jaguar 700P with $\lambda/4$ antenna (configuration 2).

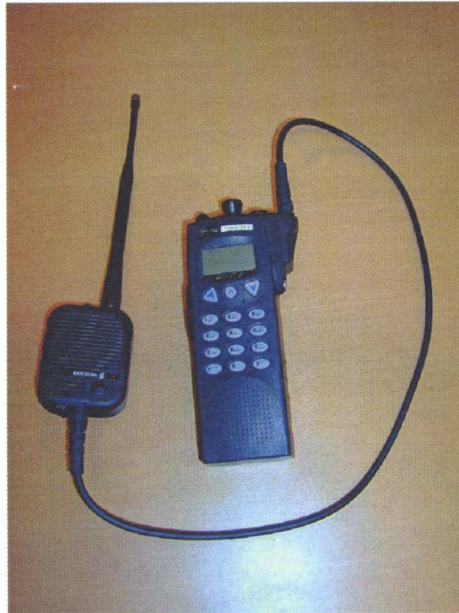


(c) The Ericsson Jaguar 700P with $\lambda/2$, beltclip and speaker/microphone (configuration 3).



(d) The Ericsson Jaguar 700P with $\lambda/4$, beltclip and speaker/microphone (configuration 4).

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(e) The Ericsson Jaguar 700P with beltclip and $\lambda/2$ antenna mounted on the speaker/microphone (configuration 5).



(f) The Ericsson Jaguar 700P with beltclip and $\lambda/4$ antenna mounted on the speaker/microphone (configuration 6).



(g) The beltclip for the Jaguar 700P



(h) The clip for the speaker/microphone

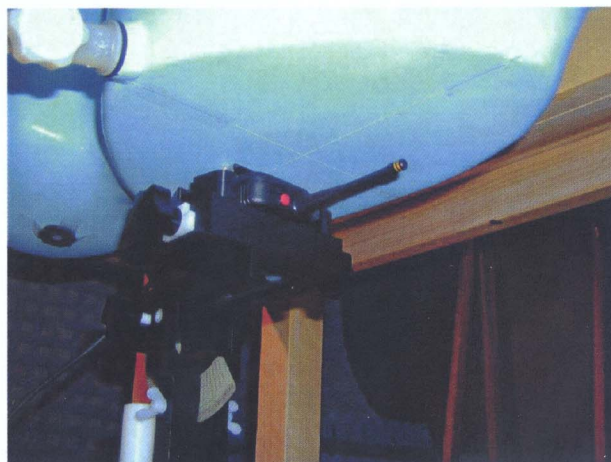
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APPENDIX 4: Photographs of the DUT when positioned for SAR measurements.

(a) The setup for configuration 1 and 2; 5 cm distance to flat section of phantom



(b) The setup for configuration 3 and 4; beltclip touching phantom shell



(c) The setup for configuration 5 and 6; clip touching phantom shell

The setups of the different Jaguar configurations below the flat section of the DASY3 phantom.

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APPENDIX 5: Probe calibration parameters for ET3DV6 SN:1394**Diode compression**

Parameter	Value in mV
DCP X	98
DCP Y	98
DCP Z	98

Sensitivity in free space:

Parameter	Value in $\mu\text{V}/(\text{V}/\text{m})^2$
Norm X	1.87
Norm Y	1.92
Norm Z	1.66

Conversion factors for tissue simulating liquid

Liquid for 900 MHz; $\epsilon_r=42.5 \pm 5\%$, $\sigma=0.86 \pm 10\%$.

Boundary effect: $\alpha=0.55$, $\text{Depth}=2.17$

Parameter	Value
ConvF X	6.87
ConvF Y	6.87
ConvF Z	6.87

Optical Surface Detection:

1.42 ± 0.2 mm