RE051-14-102508-2-A Ed. 0

SAR TEST REPORT

According to the standard:

EN 62209-1: 2006

Fast measurements

Equipment under test:

Antenna patch for mobile phone

FAZUP

Tested with a SAMSUNG Galaxy S5 (SM-G900F)

Company:

FAZUP

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This document is the result of testing a specimen or a sample of the product submitted. It does not imply an assessment of the conformity of the whole production of the tested sample.

EQUIPMENT UNDER TEST:	Antenna patch for mobile phone
Reference 1:	FAZUP (antenna patch)
Serial number:	-
Reference 2:	SAMSUNG Galaxy S5 (SM-G900F) (mobile phone)
Serial number:	IMEI 352558061411238
MANUFACTURER:	-
APPLICANT:	
Company:	FAZUP
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SUMMARY

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1. INTRODUCTION

In this test report, Specific Absorption Rate (SAR) measurements for the mobile phone SAMSUNG Galaxy S5 (SM-G900F) used with the antenna patch FAZUP are presented.

The measurements were made according to the EN 62209-1 standard for evaluating the SAR level attenuation provided by the patch.
Full SAR testing according to the EN 62209-1 standard is not required by the applicant; the testing program using a fast measurement method is described in §7. MEASUREMENT RESULTS.

2. REFERENCE DOCUMENTS

The reference documents referred throughout this report are listed below.
These reference documents are applicable to the entire report, although extensions (version, date and amendment) are not repeated.

Reference	Document title	Date
EN 62209-1	Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)	2006

3. PRESENTATION OF EQUIPMENT FOR TESTING PURPOSES

The photographs of the mobile phone SAMSUNG Galaxy S5 (SM-G900F) and the antenna patch FAZUP are shown in Fig. 1.
The standards used by the mobile phone for this test are the GSM in the 900 and 1800MHz frequency bands and the WCDMA in the 900 and 2100MHz frequency bands, the antenna is integrated.

The antenna patch FAZUP was placed on the rear side of the mobile phone by the applicant.

SAMSUNG Galaxy S5 (SM-G900F)

SAMSUNG Galaxy S5 (SM-G900F) and FAZUP

Mobile phone marking

Fig. 1: Photographs of equipment under test

4. TESTS RESULTS SUMMARY

Configuration	SAR level attenuation			
	GSM900 Channel 38 897.6 MHz	GSM1800 Channel 699 1747.6 MHz	WCDMA900 Channel 2788 897.6 MHz	WCDMA2100 Channel 9750 1950.0 MHz
SAMSUNG Galaxy S5 (SM-G900F) + FAZUP	75.2%	67.4%	76.5%	79.4%

This test report only relates to SAR measurements; radiated performances evaluation of the mobile phone with and without the protective device is not part of this report.

5. ENVIRONNEMENTAL CONDITIONS

Condition	Measured Value
Liquid Temperature	*See Graphical Representations*
Ambient Temperature	*See Graphical Representations*

6. EQUIPMENT USED FOR THE TESTING

Platform ID	Platform	Equipment	Type	Manufacturer	Internal Number	Software Version
1	BTS Simulator	CMU200	Radio tester	Rohde-Schwarz	7361	
2	DASY4	DASY4	Software	Speag	7321	V4.5 Build 19
		ES3DV3	E-Field Probe	Speag	9485	
		DAE3	Data acquisition	Speag	7192	
		D900V2	Dipole 900MHz	Speag	7194	
		D1800V2	Dipole 1800MHz	Speag	7193	
		D1950V3	Dipole 1950MHz	Speag	7323	
		SAM	Phantom	Speag	7204	
3	Liquid Measure	HP85070C	Software	Hewlett-Packard	-	C1.01
		HP8753C	Network analyzer	Hewlett-Packard	1402	
		HP85070C	Dielectric probe	Hewlett-Packard	7218	
		922	Thermometer	Testo	6980	
4	System Validation	2024	Signal generator	Marconi	7215	
		ZHL42	Amplifier	Mini-circuits	7209	
		PMC18-2	Power Supply	Kikusui	7214	
		NRVS	Power meter	Rohde-Schwarz	7212	
		NRV-Z31	Probe power meter	Rohde-Schwarz	7211	
		3877	Coupler	Suhner	7208	
		RK100	Coupler	MEB	7210	
		33-3-34	Attenuator	Weinschel Engineering	7213	
		R411810124 R411806124	Attenuator	Radiall	7315	
		17-0193	50 ohms load	Diconex	9161	
		R404563000	50 ohms load	Radiall	7313	

7. MEASUREMENT RESULTS

The output power and frequency are controlled using a base station simulator. The mobile phone is set to transmit at its highest output peak power level.

The mobile phone is measured in the "cheek" position on right side of the phantom at the centre frequency of GSM 900-1800 and WCDMA 900-2100 operating bands with and without FAZUP.

A fast measurement method was applied using a reduced number of measurement points: Zoom Scan with a grid step size in x and y directions of 10mm and 7mm in z direction (cube size: 30mm x 30mm x 28mm).

Measurement results for GSM900 (SAR values averaged over a mass of 10g):

Configuration	Phantom	Position	SAR 10g (W/kg)
			Channel 038 897.6 MHz
Mobile phone without FAZUP	Right Side	Cheek	0.427
Mobile phone with FAZUP	Right Side	Cheek	0.106

Measurement results for GSM1800 (SAR values averaged over a mass of 10g):

Configuration	Phantom	Position	SAR 10g (W/kg)
			Channel 699 1747.6 MHz
Mobile phone without FAZUP	Right Side	Cheek	0.131
Mobile phone with FAZUP	Right Side	Cheek	0.0427

Measurement results for WCDMA900 (SAR values averaged over a mass of 10g):

Configuration	Phantom	Position	SAR 10g (W/kg)
			Channel 2788 897.6 MHz
Mobile phone without FAZUP	Right Side	Cheek	0.391
Mobile phone with FAZUP	Right Side	Cheek	0.092

Measurement results for WCDMA2100 (SAR values averaged over a mass of 10g):

Configuration	Phantom	Position	SAR 10g (W/kg)
			Channel 9750 1950.0 MHz
Mobile phone without FAZUP	Right Side	Cheek	0.114
Mobile phone with FAZUP	Right Side	Cheek	0.0235

8. GRAPHICAL REPRESENTATIONS

The graphical representations are shown in Fig. 2 to Fig. 9.

DUT: SAMSUNG SM-G900F

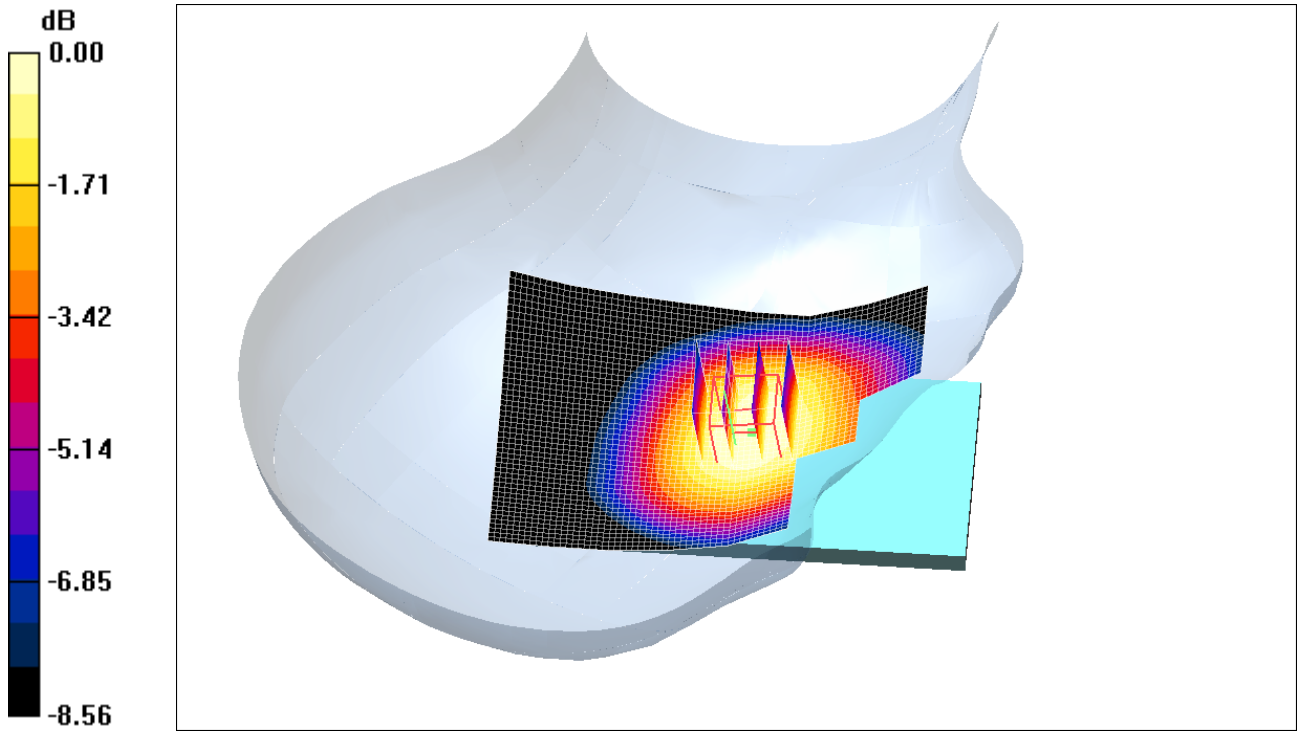
Communication System: E-GSM 900; Frequency: 897.6 MHz; Duty Cycle: 1:8.3
Medium parameters used: σ = 0.94 mho/m, ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section

Program Notes: Ambient temperature: 22.5°C, Liquid temperature: 22.2°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(6.01, 6.01, 6.01); Calibrated: 8/21/2013
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2013
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - Middle/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.641 mW/g

Cheek Position - Middle/Zoom Scan (7x7x7) (4x4x5)/Cube 0: Measurement grid: dx=10mm, dy=10mm, dz=7mm
Reference Value = 23.1 V/m; Power Drift = -0.053 dB
Peak SAR (extrapolated) = 0.702 W/kg
SAR(1 g) = 0.564 mW/g; SAR(10 g) = 0.427 mW/g
Maximum value of SAR (measured) = 0.611 mW/g



0 dB = 0.611mW/g

Fig. 2: SAR distribution for GSM900 of the mobile phone alone:
channel 038 (897.6 MHz), cheek position, right side

DUT: SAMSUNG SM-G900F

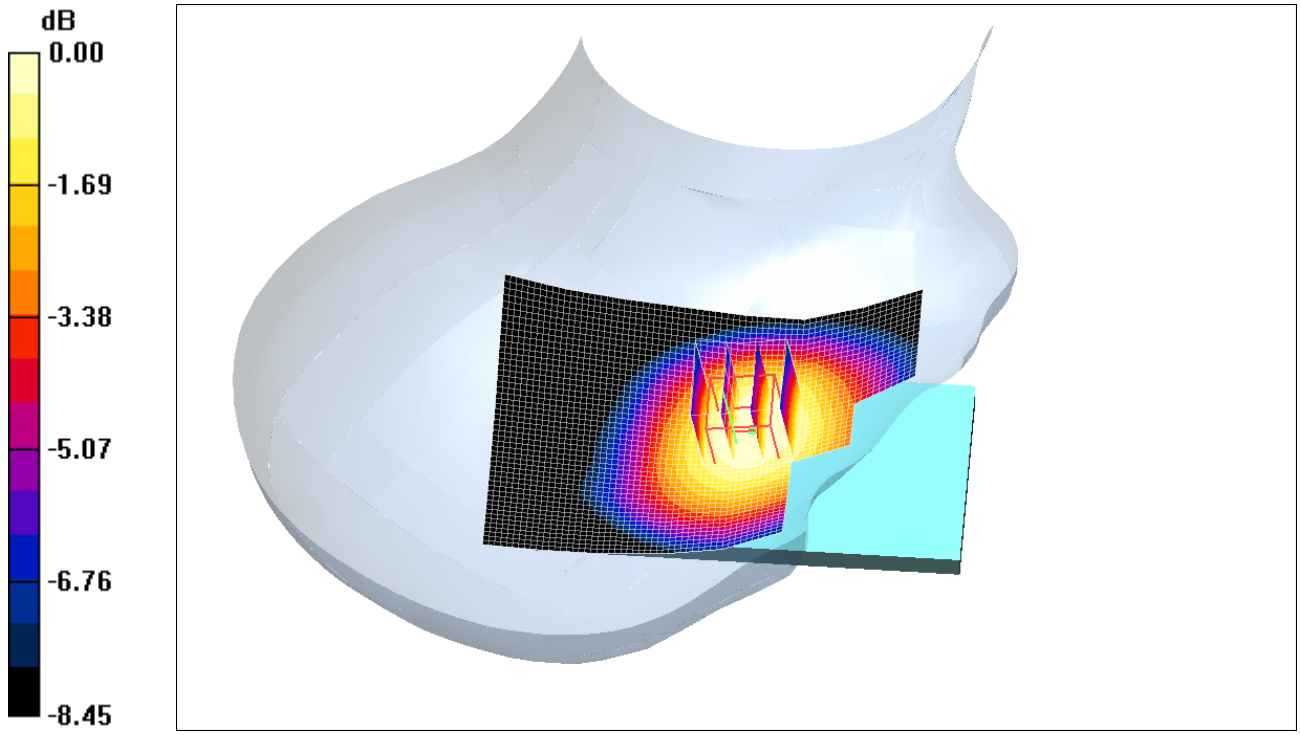
Communication System: E-GSM 900; Frequency: 897.6 MHz; Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0.94$ mho/m, $\varepsilon_r = 41.1$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Program Notes: Ambient temperature: 22.6°C, Liquid temperature: 22.2°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(6.01, 6.01, 6.01); Calibrated: 8/21/2013
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2013
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - Middle/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.158 mW/g

Cheek Position - Middle/Zoom Scan (7x7x7) (4x4x5)/Cube 0: Measurement grid: dx=10mm, dy=10mm, dz=7mm
Reference Value = 11.7 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.177 W/kg
SAR(1 g) = 0.141 mW/g; SAR(10 g) = 0.106 mW/g
Maximum value of SAR (measured) = 0.152 mW/g



0 dB = 0.152mW/g

Fig. 3: SAR distribution for GSM900 of the mobile phone with FAZUP: channel 038 (897.6 MHz), cheek position, right side

DUT: SAMSUNG SM-G900F

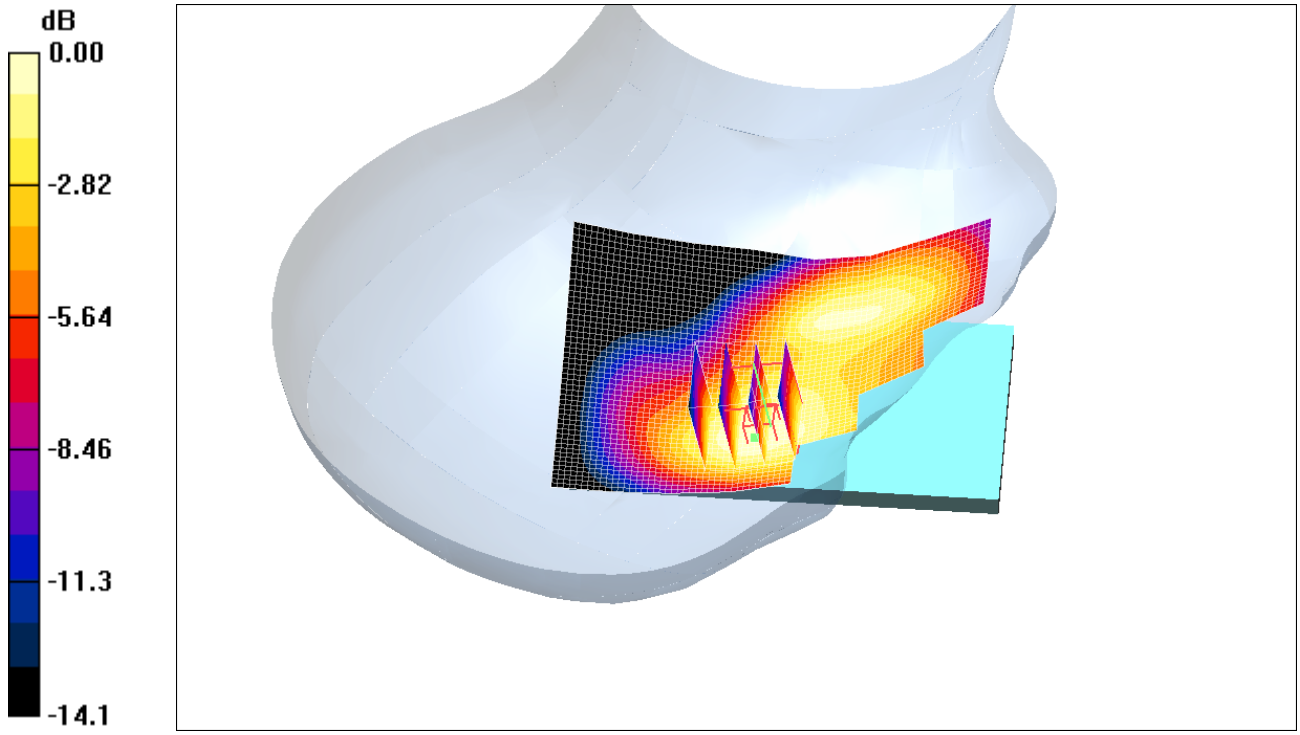
Communication System: GSM 1800; Frequency: 1747.6 MHz; Duty Cycle: 1:8.3
Medium parameters used: σ = 1.4 mho/m, ε_r = 38.3; ρ = 1000 kg/m^3
Phantom section: Right Section

Program Notes: Ambient temperature: 23.2°C, Liquid temperature: 20.6°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(5.09, 5.09, 5.09); Calibrated: 8/21/2013
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2013
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - Middle/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.232 mW/g

Cheek Position - Middle/Zoom Scan (7x7x7) (4x4x5)/Cube 0: Measurement grid: dx=10mm, dy=10mm, dz=7mm
Reference Value = 8.82 V/m; Power Drift = -0.096 dB
Peak SAR (extrapolated) = 0.304 W/kg
SAR(1 g) = 0.204 mW/g; SAR(10 g) = 0.131 mW/g
Maximum value of SAR (measured) = 0.231 mW/g



0 dB = 0.231mW/g

Fig. 4: SAR distribution for GSM1800 of the mobile phone alone:
channel 699 (1747.6 MHz), cheek position, right side

DUT: SAMSUNG SM-G900F

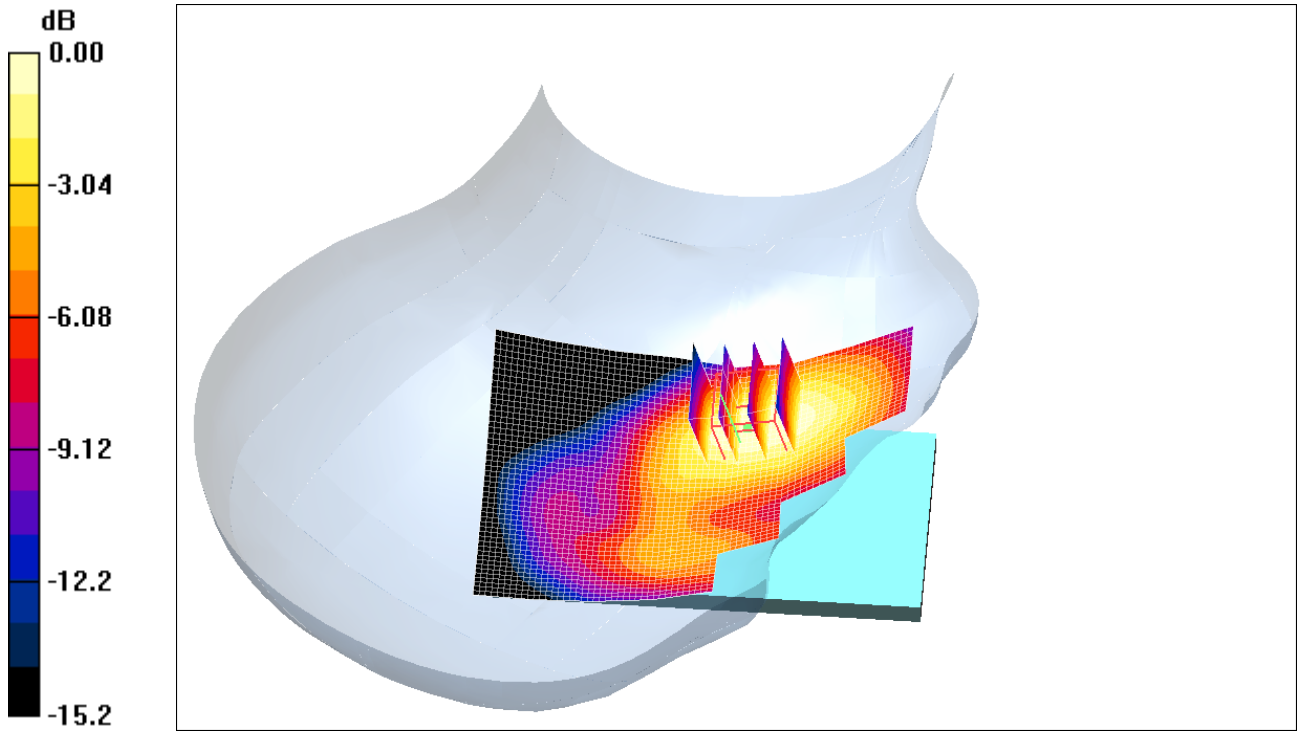
Communication System: GSM 1800; Frequency: 1747.6 MHz; Duty Cycle: 1:8.3
Medium parameters used: σ = 1.4 mho/m, ε_r = 38.3; ρ = 1000 kg/m^3
Phantom section: Right Section

Program Notes: Ambient temperature: 23.5°C, Liquid temperature: 20.6°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(5.09, 5.09, 5.09); Calibrated: 8/21/2013
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2013
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - Middle/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.085 mW/g

Cheek Position - Middle/Zoom Scan (7x7x7) (4x4x5)/Cube 0: Measurement grid: dx=10mm, dy=10mm, dz=7mm
Reference Value = 4.25 V/m; Power Drift = 0.114 dB
Peak SAR (extrapolated) = 0.110 W/kg
SAR(1 g) = 0.070 mW/g; SAR(10 g) = 0.043 mW/g
Maximum value of SAR (measured) = 0.076 mW/g



0 dB = 0.076mW/g

Fig. 5: SAR distribution for GSM1800 of the mobile phone with FAZUP: channel 699 (1747.6 MHz), cheek position, right side

DUT: SAMSUNG SM-G900F

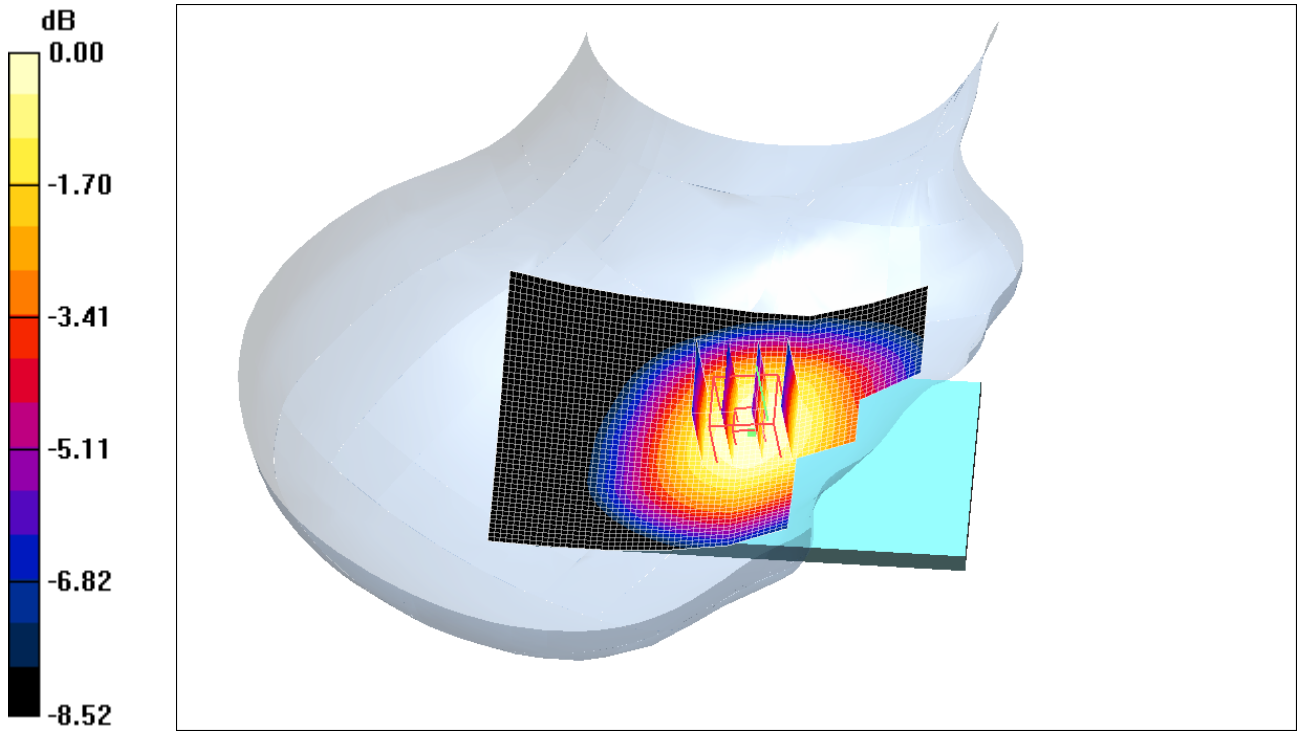
Communication System: WCDMA 900; Frequency: 897.6 MHz; Duty Cycle: 1:1
Medium parameters used: σ = 0.94 mho/m, ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section

Program Notes: Ambient temperature: 23.5°C, Liquid temperature: 22.5°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(6.01, 6.01, 6.01); Calibrated: 8/21/2013
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2013
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - Middle/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.582 mW/g

Cheek Position - Middle/Zoom Scan (7x7x7) (4x4x5)/Cube 0: Measurement grid: dx=10mm, dy=10mm, dz=7mm
Reference Value = 22.0 V/m; Power Drift = -0.012 dB
Peak SAR (extrapolated) = 0.647 W/kg
SAR(1 g) = 0.517 mW/g; SAR(10 g) = 0.391 mW/g
Maximum value of SAR (measured) = 0.554 mW/g



0 dB = 0.554mW/g

Fig. 6: SAR distribution for WCDMA900 of the mobile phone alone:
channel 2788 (897.6 MHz), cheek position, right side

DUT: SAMSUNG SM-G900F

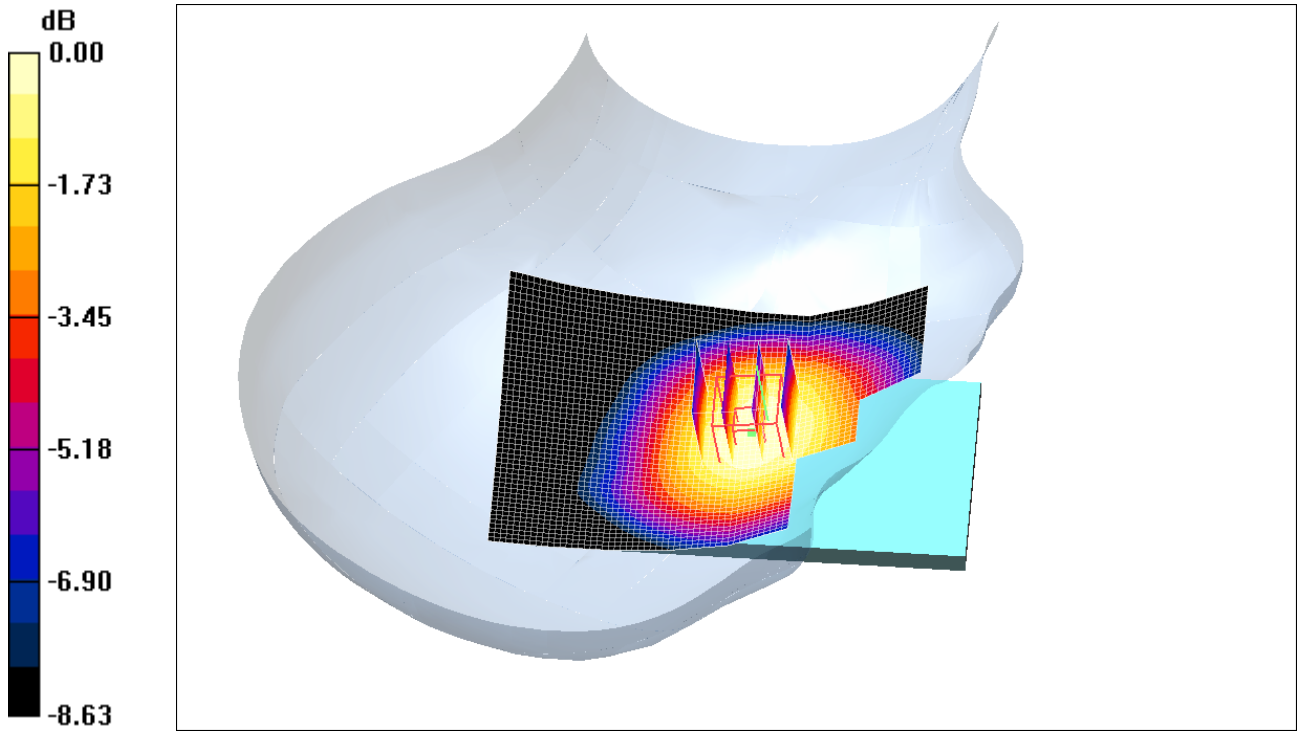
Communication System: WCDMA 900; Frequency: 897.6 MHz; Duty Cycle: 1:1
Medium parameters used: σ = 0.94 mho/m, ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section

Program Notes: Ambient temperature: 23.7°C, Liquid temperature: 22.6°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(6.01, 6.01, 6.01); Calibrated: 8/21/2013
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2013
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - Middle/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.136 mW/g

Cheek Position - Middle/Zoom Scan (7x7x7) (4x4x5)/Cube 0: Measurement grid: dx=10mm, dy=10mm, dz=7mm
Reference Value = 10.8 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.154 W/kg
SAR(1 g) = 0.122 mW/g; SAR(10 g) = 0.092 mW/g
Maximum value of SAR (measured) = 0.132 mW/g



0 dB = 0.132mW/g

Fig. 7: SAR distribution for WCDMA 900 of the mobile phone with FAZUP: channel 2788 (897.6 MHz), cheek position, right side

DUT: SAMSUNG SM-G900F

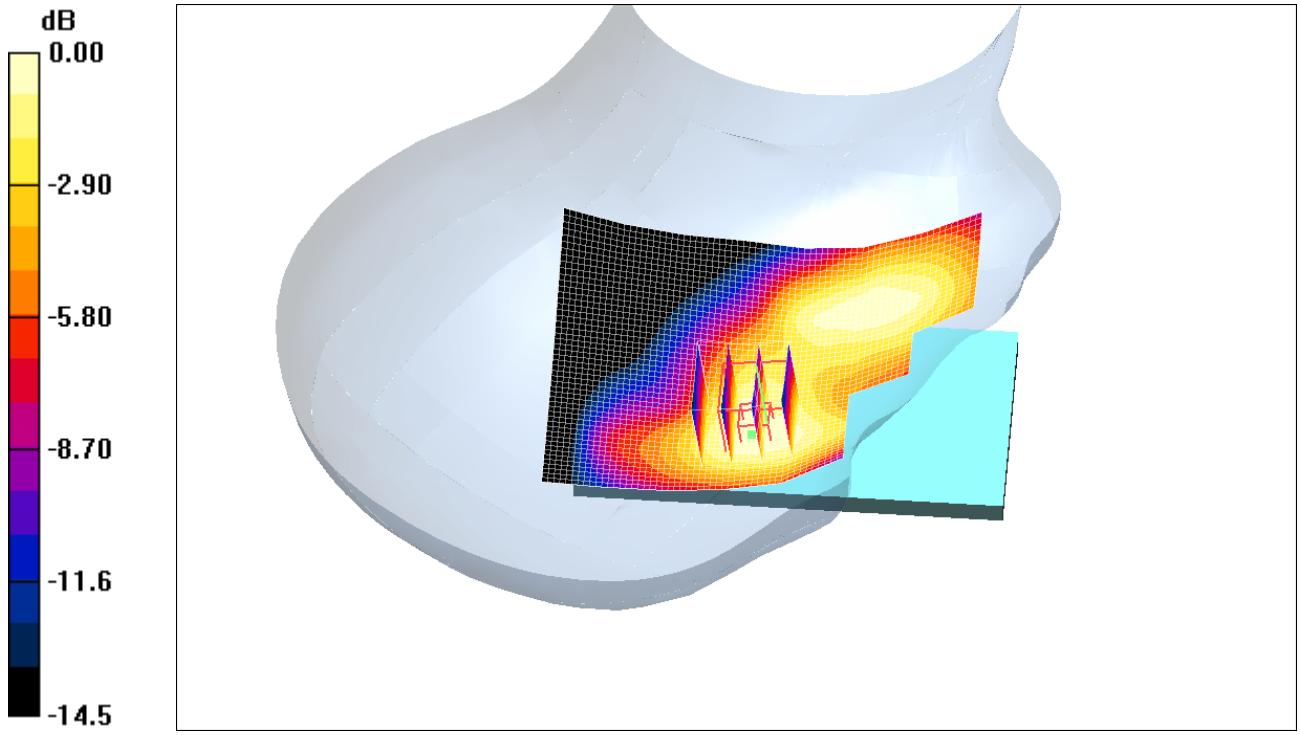
Communication System: WCDMA 2100; Frequency: 1950 MHz; Duty Cycle: 1:1
Medium parameters used: σ = 1.41 mho/m, ε_r = 38.3; ρ = 1000 kg/m^3
Phantom section: Right Section

Program Notes: Ambient temperature: 23.2°C, Liquid temperature: 20.4°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(4.99, 4.99, 4.99); Calibrated: 8/21/2013
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2013
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - Middle/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.204 mW/g

Cheek Position - Middle/Zoom Scan (7x7x7) (4x4x5)/Cube 0: Measurement grid: dx=10mm, dy=10mm, dz=7mm
Reference Value = 2.07 V/m; Power Drift = -0.044 dB
Peak SAR (extrapolated) = 0.267 W/kg
SAR(1 g) = 0.179 mW/g; SAR(10 g) = 0.114 mW/g
Maximum value of SAR (measured) = 0.199 mW/g



0 dB = 0.199mW/g

Fig. 8: SAR distribution for WCDMA2100 of the mobile phone alone: channel 9750 (1950.0 MHz), cheek position, right side

DUT: SAMSUNG SM-G900F

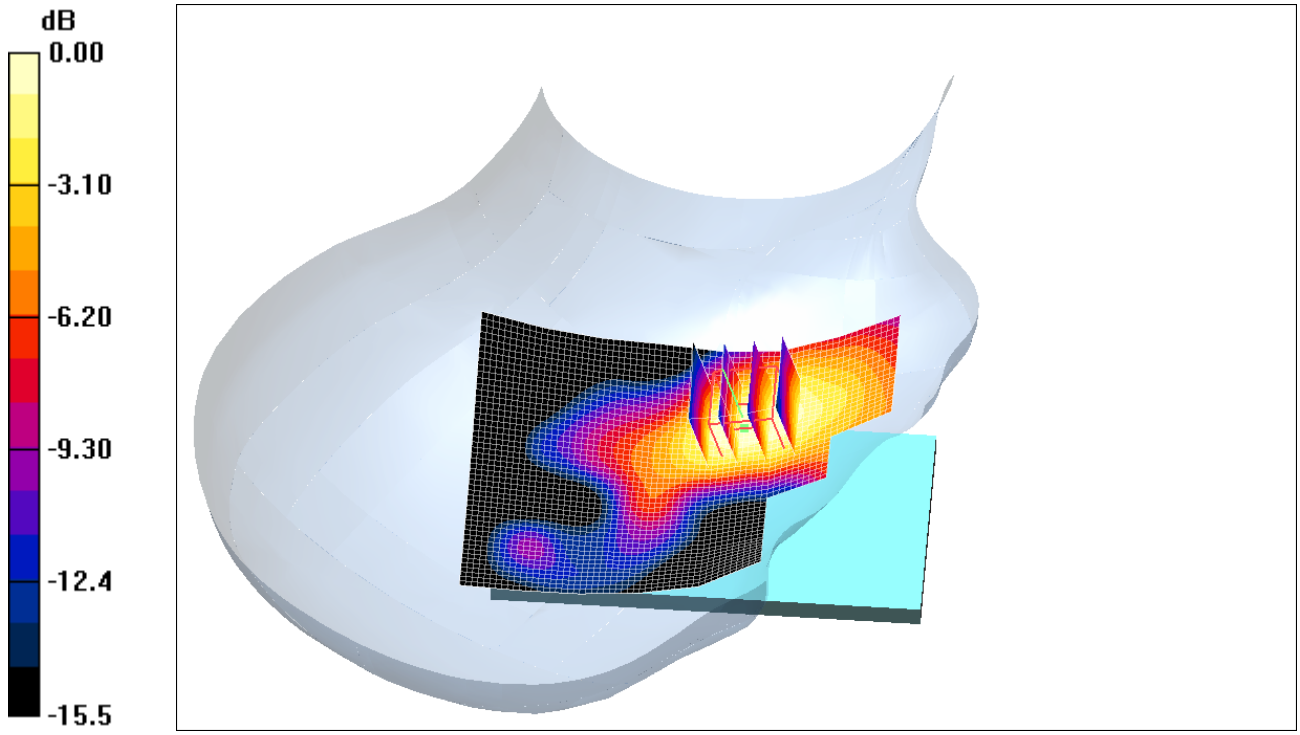
Communication System: WCDMA 2100; Frequency: 1950 MHz; Duty Cycle: 1:1
Medium parameters used: σ = 1.41 mho/m, ε_r = 38.3; ρ = 1000 kg/m^3
Phantom section: Right Section

Program Notes: Ambient temperature: 23.4°C, Liquid temperature: 20.4°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(4.99, 4.99, 4.99); Calibrated: 8/21/2013
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2013
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - Middle/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.048 mW/g

Cheek Position - Middle/Zoom Scan (7x7x7) (4x4x5)/Cube 0: Measurement grid: dx=10mm, dy=10mm, dz=7mm
Reference Value = 0.441 V/m; Power Drift = 0.141 dB
Peak SAR (extrapolated) = 0.066 W/kg
SAR(1 g) = 0.040 mW/g; SAR(10 g) = 0.023 mW/g
Maximum value of SAR (measured) = 0.044 mW/g



0 dB = 0.044mW/g

Fig. 9: SAR distribution for WCDMA2100 of the mobile phone with FAZUP: channel 9750 (1950.0 MHz), cheek position, right side

9. PHOTOGRAPH OF THE MOBILE PHONE UNDER TEST

The photograph of the mobile phone under test is shown in Fig. 10.

Fig. 10: Mobile phone in cheek position on right side

10. MEASUREMENT UNCERTAINTY

The expanded uncertainty with a confidence interval of 95% shall not exceed 30% for averaged SAR values in the range from 0.4 to 10W/kg.

The uncertainty of the measurements was evaluated according to the EN 62209-1, including fast measurement method. The expanded uncertainty is ± 25.0%.

ERROR SOURCES	Uncertainty Value (%)	Probability Distribution	Divisor	Ci	Standard Uncertainty (%)
Measurement System					
Probe Calibration	± 6.7	Normal	1	1	± 6.7
Axial Isotropy	± 4.7	Rectangular	√3	1	± 2.7
Hemispherical Isotropy	± 9.6	Rectangular	√3	1	± 5.5
Boundary Effect	± 1.0	Rectangular	√3	1	± 0.6
Linearity	± 4.7	Rectangular	√3	1	± 2.7
Detection Limits	± 1.0	Rectangular	√3	1	± 0.6
Readout Electronics	± 0.3	Normal	1	1	± 0.3
Response Time	± 0.8	Rectangular	√3	1	± 0.5
Integration Time	± 2.6	Rectangular	√3	1	± 1.5
RF Ambient Conditions-Noise	± 3.0	Rectangular	√3	1	± 1.7
RF Ambient Conditions-Reflections	± 3.0	Rectangular	√3	1	± 1.7
Probe Positioner Mechanical Restrictions	± 0.4	Rectangular	√3	1	± 0.2
Probe Positioning with respect to Phantom Shell	± 2.9	Rectangular	√3	1	± 1.7
Post-Processing Fast SAR	± 6.0	Rectangular	√3	1	± 3.5
Test Sample Related					
Test Sample Positioning	± 2.9	Normal	1	1	± 2.9
Device Holder Uncertainty	± 3.6	Normal	1	1	± 3.6
Drift of Output Power	± 5.0	Rectangular	√3	1	± 2.9
Phantom and Set-Up					
Phantom Uncertainty (shape and thickness tolerances)	± 4.0	Rectangular	√3	1	± 2.3
Liquid Conductivity (Target)	± 5.0	Rectangular	√3	0.43	± 1.2
Liquid Conductivity (Measurement)	± 2.5	Normal	1	0.43	± 1.1
Liquid Permittivity (Target)	± 5.0	Rectangular	√3	0.49	± 1.4
Liquid Permittivity (Measurement)	± 2.5	Normal	1	0.49	± 1.2
Combined standard uncertainty					± 12.5
Expanded uncertainty (confidence interval of 95%)					± 25.0

11. TEST CONDITIONS

The equipment is controlled during test using platform n° 1 (BTS simulator) referenced in paragraph 6 of this test report. The following test conditions are given for information; the maximum output powers were not measured.

Standard:	GSM (900 & 1800 MHz)
Crest factor:	8
Modulation:	GMSK
Traffic Channel:	GSM 900: middle channel = 38
	GSM 1800: middle channel = 699
Maximum output power:	GSM 900 Class 4: Tx level 5 = 33 dBm (± 2dB)
	GSM 1800 Class 1: Tx level 0 = 30 dBm (± 2dB)

Standard:	WCDMA (900 & 2100 MHz)
Crest factor:	1
Modulation:	QPSK
Traffic Channel:	WCDMA 900: middle = 2788
	WCDMA 2100: middle = 9750
Maximum output power:	Class 3 = 24 dBm (+1dB,-3dB)
Configuration:	Mode RMC 12.2kbps with all TPC bits = “1”

Note: The tested EUT could contain an antenna diversity technology, as MIMO or MISO. The control of the antenna’s scheme has not been provided by the applicant. Thus, the radiated performances of the EUT are dependent on the test set-up; an antenna diversity control could lead to different results from those reported in this test report.

12. MEASUREMENT SYSTEM DESCRIPTION

The automated near-field scanning system Dosimetric Assessment System DASY4 from Schmid & Partner Engineering AG was used. The measurement is performed using platform n° 2 referenced in paragraph 6 (“Equipment used for the testing”) of this report. The system consists of a computer controlled, high precision robotics system, robot controller, extreme near-field probes and the phantom containing the liquid. The six axis robot precisely positions the probe at the points of maximum electromagnetic field. A device holder made of low-loss dielectric material is used to maintain the test position of the equipment under test against the phantom. The measurements were conducted in an RF controlled environment (i.e. semi anechoic room). Fig. 11 shows the system.

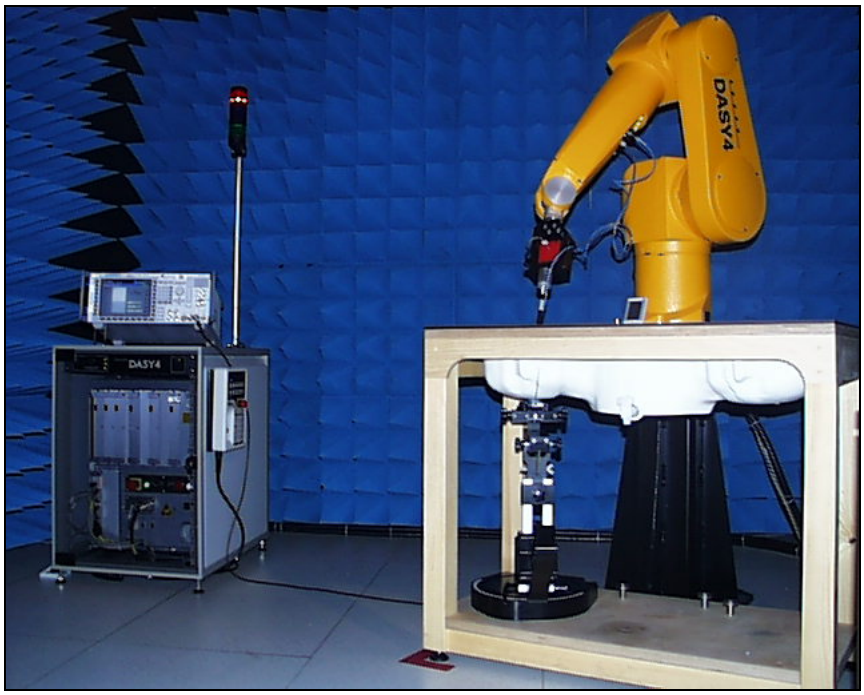


Fig. 11: The measurement setup with equipment under test

13. LIQUID MEASUREMENT: TEST CONDITIONS & RESULTS

The measurement is performed using platform n° 3 referenced in paragraph 6 ("Equipment used for the testing") of this report. The following ingredients (in % by weight) are theoretical and given for information.

900 MHz liquid: Sucrose 56.50 %
De-ionised water 40.92 %
NaCl salt 1.48 % - HEC 1.00 % - Bactericide 0.10 %

1800 MHz liquid: Diethylenglykol-monobutylether 44.92 %
De-ionised water 54.90 %
NaCl salt 0.18 %

1950 MHz liquid: Diethylenglykol-monobutylether 45.00 %
De-ionised water 55.00 %

The dielectric parameters of the head simulating liquid were controlled prior to assessment (contact probe method). Dielectric properties measured:

Frequency (MHz)	ε_r Targeted value	ε_r Measured value	σ (S/m) Targeted value	σ (S/m) Measured value	Liquid temperature (°C)	Ambient temperature (°C)
900	41.5 ± 5 %	41.1	0.97 ± 5 %	0.94	22.2	22.0
1750	40.1 ± 5 %	38.3	1.37 ± 5 %	1.40	20.1	22.0
1800	40.0 ± 5 %	38.1	1.40 ± 5 %	1.44		
1950	40.0 ± 5 %	38.3	1.40 ± 5 %	1.41	20.3	22.5

14. SYSTEM VALIDATION: TEST CONDITIONS & RESULTS

The measurement is performed using platform n° 4 referenced in paragraph 6 ("Equipment used for the testing") of this report.

Measurement conditions: The measurements were performed in the flat section of the SAM phantom filled with liquids simulating tissue. The validation dipole input power was 250mW.
Prior to the assessment, the validation dipole were used to check whether the system was operating within its specification of ± 10 %.

Measurement results: The results are hereafter below and shown in Fig. 12 to Fig. 14.

Frequency (MHz)	SAR 1g (W/kg) Targeted value	SAR 1g (W/kg) Measured value
900	1.725 ± 10 %	1.70
1800	4.95 ± 10 %	4.95
1950	5.225 ± 10 %	5.15

DUT: Dipole 900 MHz

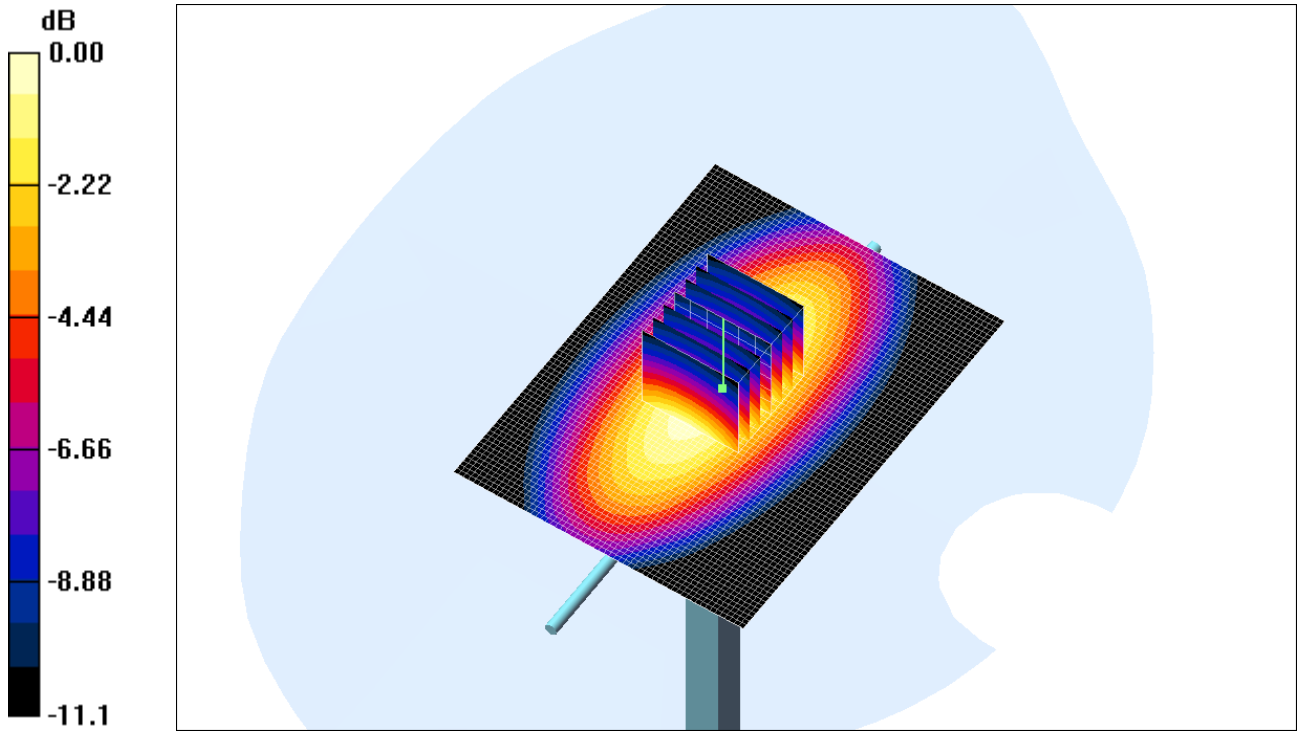
Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium parameters used: $\sigma = 0.94$ mho/m, $\varepsilon_r = 41.1$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

Program Notes: Ambient temperature: 22.3°C, Liquid temperature: 22.2°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(6.01, 6.01, 6.01); Calibrated: 8/21/2013
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2013
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

d=15mm, Pin=250mW/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 3.12 mW/g

d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.7 V/m; Power Drift = -0.027 dB
Peak SAR (extrapolated) = 4.01 W/kg
SAR(1 g) = 2.64 mW/g; SAR(10 g) = 1.7 mW/g
Maximum value of SAR (measured) = 3.12 mW/g



0 dB = 3.12mW/g

Fig. 12: 900 MHz validation result

DUT: Dipole 1800 MHz

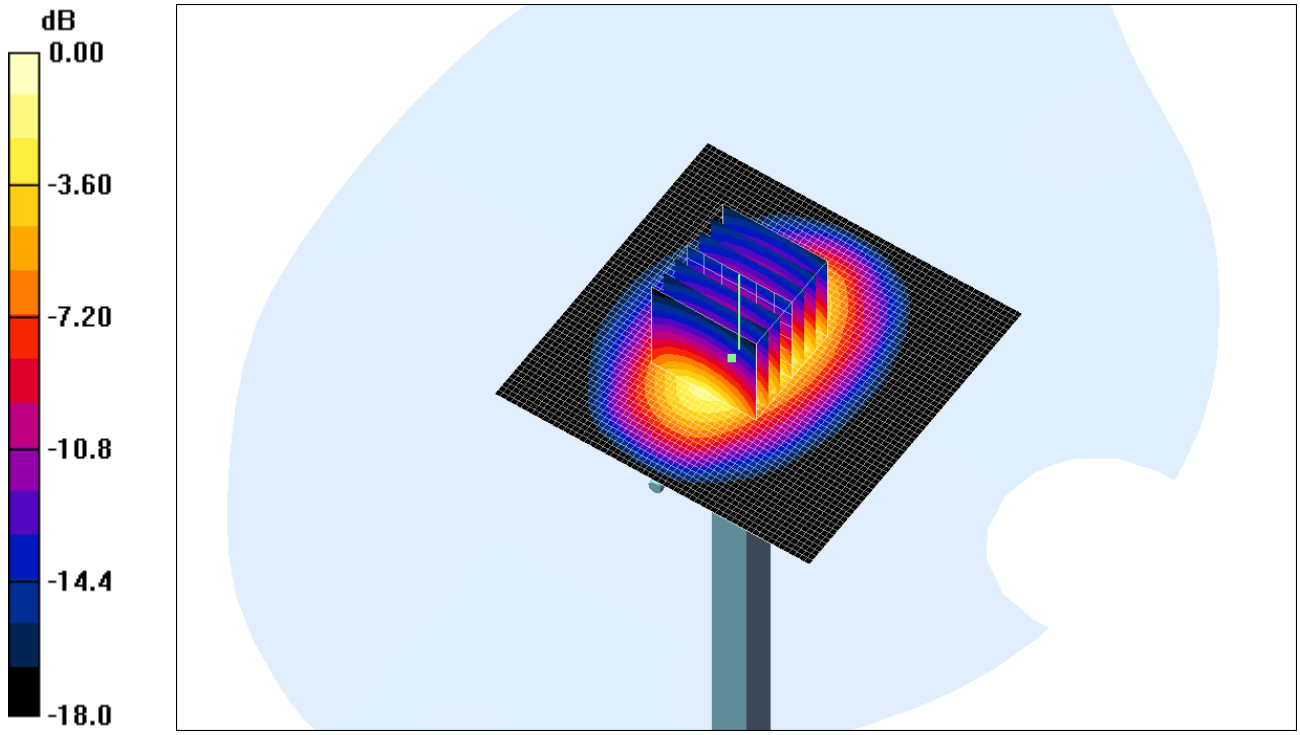
Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1
Medium parameters used: σ = 1.44 mho/m, ε_r = 38.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

Program Notes: Ambient temperature: 23.0°C, Liquid temperature: 20.4°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(5.09, 5.09, 5.09); Calibrated: 8/21/2013
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2013
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

d=10mm, Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 12.5 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.1 V/m; Power Drift = 0.055 dB
Peak SAR (extrapolated) = 17.7 W/kg
SAR(1 g) = 9.55 mW/g; SAR(10 g) = 4.95 mW/g
Maximum value of SAR (measured) = 12.0 mW/g



0 dB = 12.0mW/g

Fig. 13: 1800 MHz validation result

DUT: Dipole 1950 MHz

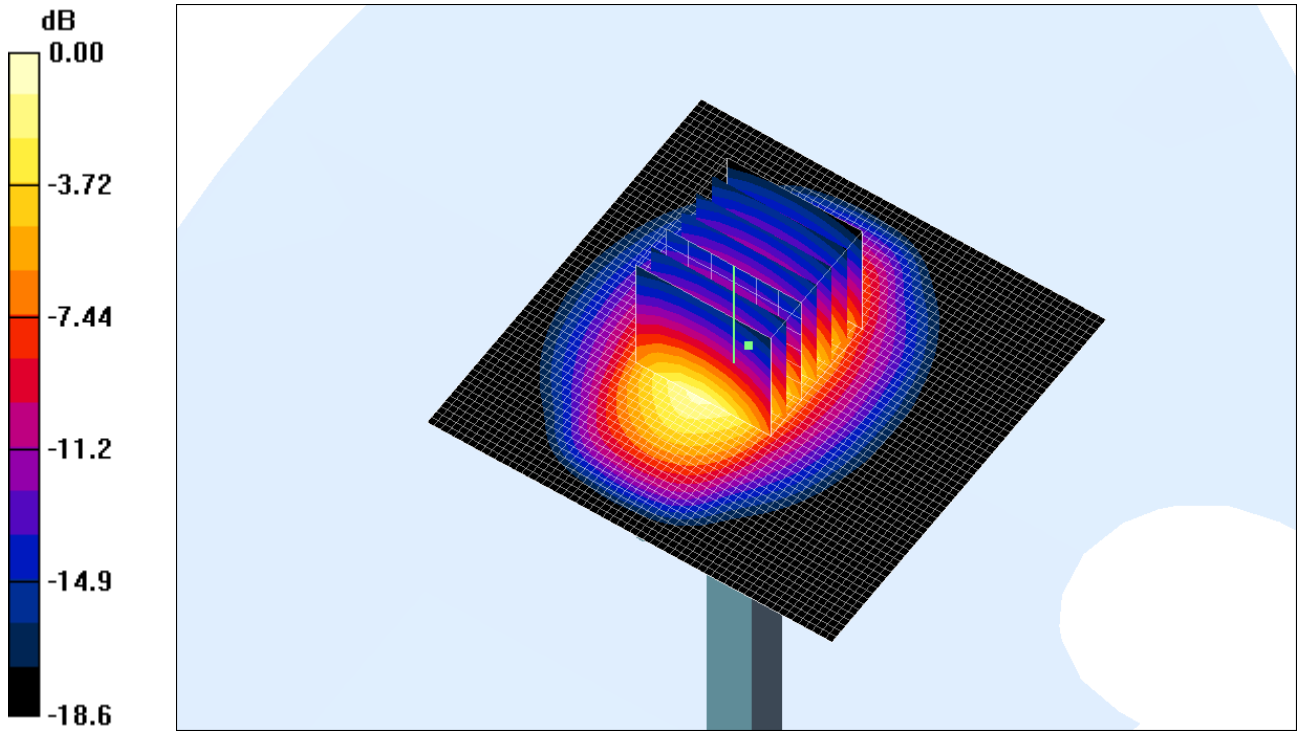
Communication System: CW; Frequency: 1950 MHz; Duty Cycle: 1:1
Medium parameters used: σ = 1.41 mho/m, ε_r = 38.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

Program Notes: Ambient temperature: 23.0°C, Liquid temperature: 20.4°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(4.99, 4.99, 4.99); Calibrated: 8/21/2013
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2013
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

d=10mm, Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 13.7 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.0 V/m; Power Drift = -0.012 dB
Peak SAR (extrapolated) = 18.8 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.15 mW/g
Maximum value of SAR (measured) = 13.0 mW/g



0 dB = 13.0mW/g

Fig. 14: 1950 MHz validation result

□□□ End of report □□□