RE051-15-101375-1-A Ed. 0

SAR TEST REPORT

According to the standard:
EN 62209-1: 2006

Equipment under test:
Horizontal case for Smartphone
Duthilleul Process

Tested with a SAMSUNG Galaxy S4 (GT-I9505)

Company:
Mr. DUTHILLEUL

DISTRIBUTION: Mr. DUTHILLEUL **Company: -**

Number of pages: 36

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0	May 11, 2015	Creation	Emmanuel TOUTAIN 	Olivier ROY 

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EQUIPMENT UNDER TEST:

Reference 1:	Horizontal case for Smartphone - Duthilleul Process (protective device)
Serial number:	-
Reference 2:	SAMSUNG Galaxy S4 (GT-I9505) (mobile phone)
Serial number:	R21D49GZXNE (IMEI 356843055848140)

MANUFACTURER: -

APPLICANT:

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Person(s) present(s) during the test:	-

DATE(S) OF TEST(S): April 27, 28, 29 and 30, 2015

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SUMMARY

1. INTRODUCTION

In this test report, Specific Absorption Rate (SAR) measurements for the mobile phone SAMSUNG Galaxy S4 (GT-I9505) used with the protective device Horizontal case for Smartphone - Duthilleul Process are presented.

The measurements were made according to the EN 62209-1 standard for evaluating the SAR level attenuation provided by the protective device.
Full SAR testing according to the EN 62209-1 standard is not required by the applicant; the testing program 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 S4 (GT-I9505) and the protective device Horizontal case for Smartphone - Duthilleul Process 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 2100MHz frequency band, the antenna is integrated.

Front and rear sides of the protective device

Mobile phone into the protective device

Front and rear sides of the protective device with the mobile phone for the testing

Front and rear sides of the mobile phone

Markings of the mobile phone

Fig. 1: Photographs of equipment under test

4. TESTS RESULTS SUMMARY

Configuration	SAR level attenuation								
	GSM900			GSM1800			WCDMA2100		
	Channel			Channel			Channel		
	975	038	124	512	699	885	9612	9750	9888
SAMSUNG Galaxy S4 (GT-I9505) + Horizontal case for Smartphone - Duthilleul Process	81.4%	78.7%	91.7%	81.0%	78.7%	78.6%	85.9%	84.9%	81.4%

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 and §14*
Ambient Temperature	*See Graphical Representations and §14*

6. EQUIPMENT USED FOR THE TESTING

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	7197	
	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 Check	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	
	RK100	Coupler	MEB	7210	
	3877	Coupler	Suhner	7208	
	33-3-34	Attenuator	Weinschel Engineering	7213	
	R411810124 R411806124	Attenuator	Radiall	7315	
	R404563000	50 ohms load	Radiall	7313	
	253023-01	Coaxial cable	Hytem	7419	

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 left side of the phantom at the low, centre and high frequencies of GSM 900-1800 and WCDMA 2100 operating bands with and without the protective device.

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

Configuration	Phantom	Position	SAR 10g (W/kg)		
			Channel 975 880.2 MHz	Channel 038 897.6 MHz	Channel 124 914.8 MHz
Mobile phone	Left side	Cheek	0.138	0.166	0.258
Mobile phone + protective device	Left side	Cheek	0.0257	0.0353	0.0214

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

Configuration	Phantom	Position	SAR 10g (W/kg)		
			Channel 512 1710.2 MHz	Channel 699 1747.6 MHz	Channel 885 1784.8 MHz
Mobile phone	Left side	Cheek	0.229	0.182	0.179
Mobile phone + protective device	Left side	Cheek	0.0435	0.0387	0.0382

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

Configuration	Phantom	Position	SAR 10g (W/kg)		
			Channel 9612 1922.4 MHz	Channel 9750 1950.0 MHz	Channel 9888 1977.6 MHz
Mobile phone	Left side	Cheek	0.255	0.306	0.305
Mobile phone + protective device	Left side	Cheek	0.036	0.0463	0.0568

8. GRAPHICAL REPRESENTATIONS

The graphical representations are shown in Fig. 2 to Fig. 19.

DUT: SAMSUNG GT-I9505

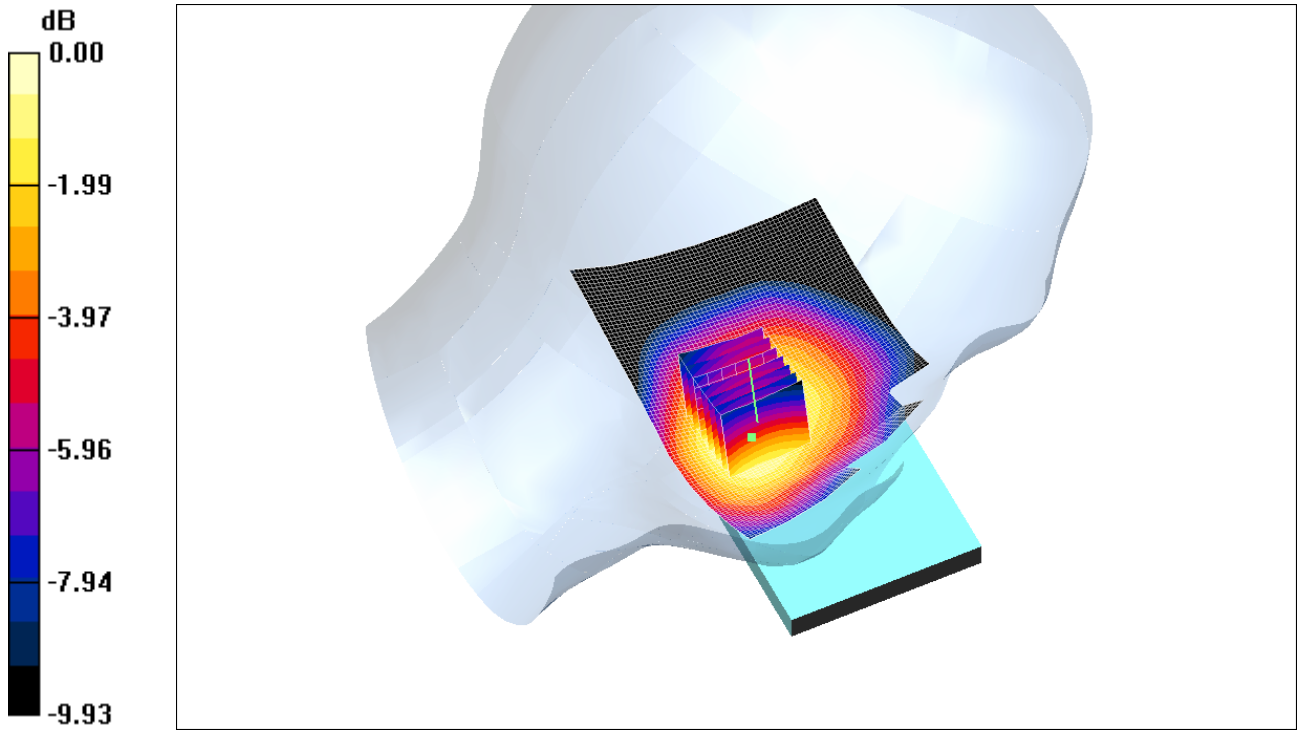
Communication System: E-GSM 900; Frequency: 880.2 MHz; Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0.93$ mho/m, $\varepsilon_r = 41.4$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.5°C, Liquid temperature: 21.6°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(6.15, 6.15, 6.15); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - Low/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.214 mW/g

Cheek Position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.5 V/m; Power Drift = -0.159 dB
Peak SAR (extrapolated) = 0.239 W/kg
SAR(1 g) = 0.186 mW/g; SAR(10 g) = 0.138 mW/g
Maximum value of SAR (measured) = 0.208 mW/g



0 dB = 0.208mW/g

Fig. 2: SAR distribution for GSM900 of the mobile phone:
channel 975 (880.2 MHz), cheek position, left side

DUT: SAMSUNG GT-I9505 + Horizontal case for Smartphone

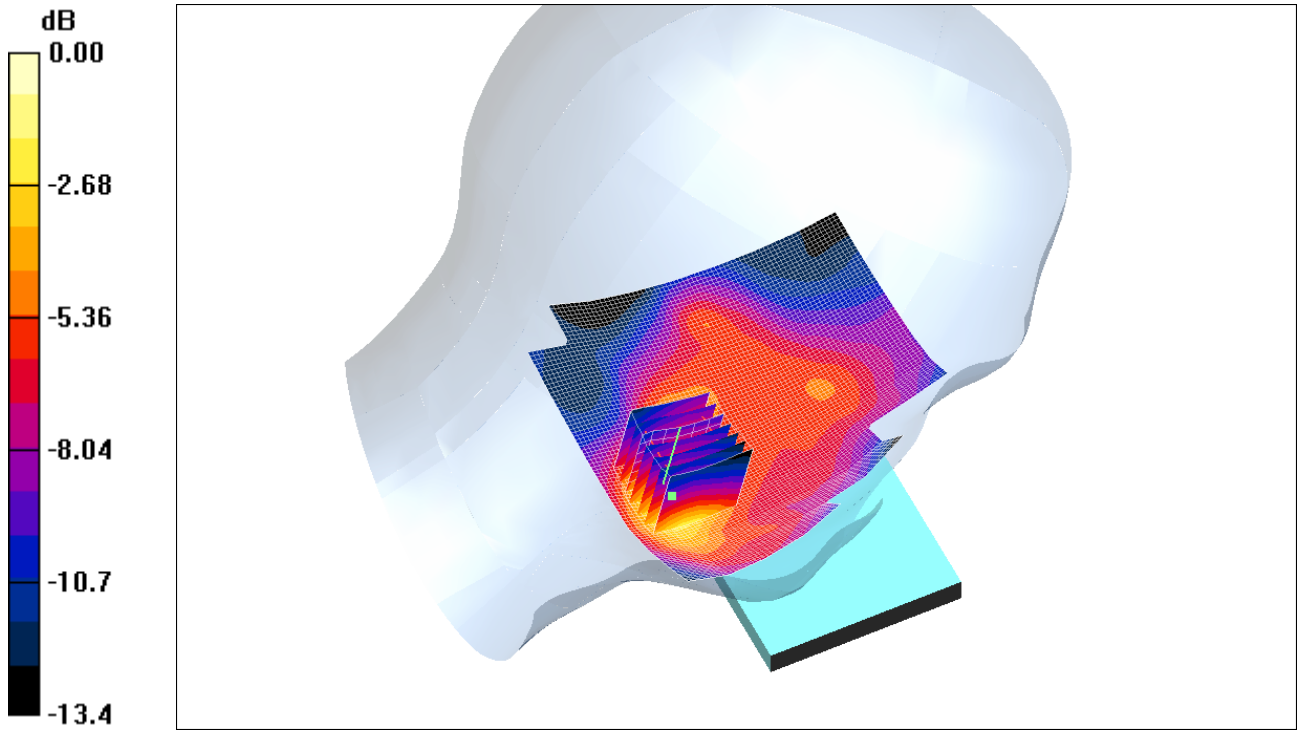
Communication System: E-GSM 900; Frequency: 880.2 MHz; Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0.93$ mho/m, $\varepsilon_r = 41.4$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.8°C, Liquid temperature: 21.6°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(6.15, 6.15, 6.15); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - Low/Area Scan (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.042 mW/g

Cheek Position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.10 V/m; Power Drift = -0.154 dB
Peak SAR (extrapolated) = 0.081 W/kg
SAR(1 g) = 0.045 mW/g; SAR(10 g) = 0.026 mW/g
Maximum value of SAR (measured) = 0.054 mW/g



0 dB = 0.054mW/g

Fig. 3: SAR distribution for GSM900 of the mobile phone with the protective device: channel 975 (880.2 MHz), cheek position, left side

DUT: SAMSUNG GT-I9505

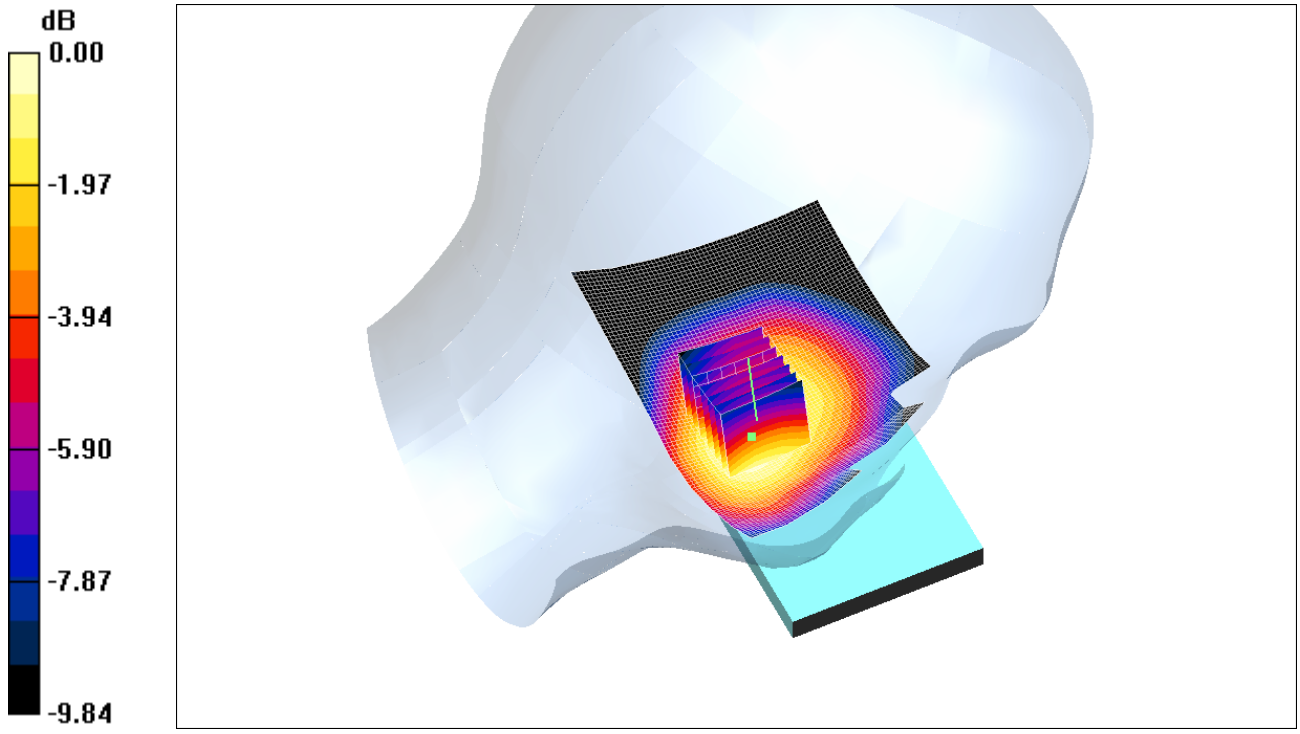
Communication System: E-GSM 900; Frequency: 897.6 MHz; Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0.95$ mho/m, $\varepsilon_r = 41$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.3°C, Liquid temperature: 21.5°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(6.15, 6.15, 6.15); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- 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 (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.262 mW/g

Cheek Position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.4 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.291 W/kg
SAR(1 g) = 0.223 mW/g; SAR(10 g) = 0.166 mW/g
Maximum value of SAR (measured) = 0.246 mW/g



0 dB = 0.246mW/g

Fig. 4: SAR distribution for GSM900 of the mobile phone:
channel 038 (897.6 MHz), cheek position, left side

DUT: SAMSUNG GT-I9505 + Horizontal case for Smartphone

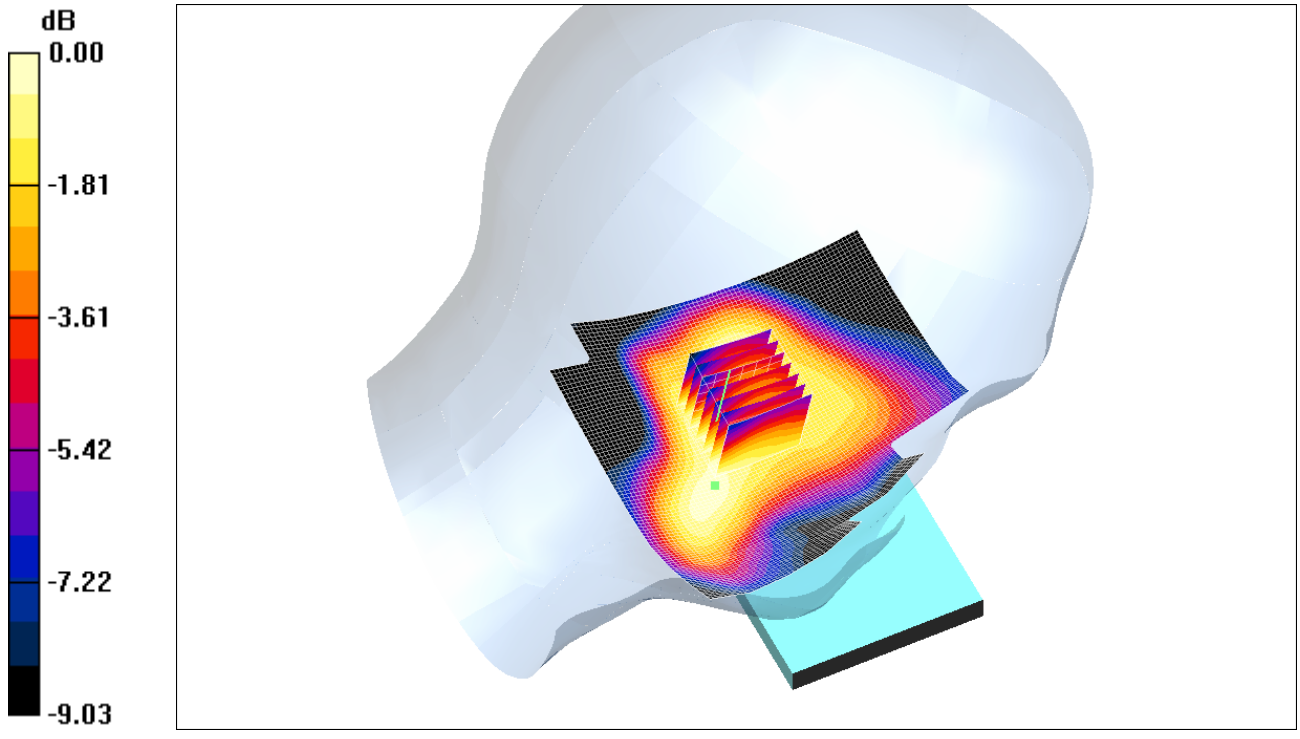
Communication System: E-GSM 900; Frequency: 897.6 MHz; Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0.95$ mho/m, $\varepsilon_r = 41$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.5°C, Liquid temperature: 21.6°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(6.15, 6.15, 6.15); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- 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 (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.044 mW/g

Cheek Position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.28 V/m; Power Drift = 0.207 dB
Peak SAR (extrapolated) = 0.055 W/kg
SAR(1 g) = 0.044 mW/g; SAR(10 g) = 0.035 mW/g
Maximum value of SAR (measured) = 0.047 mW/g



0 dB = 0.047mW/g

Fig. 5: SAR distribution for GSM900 of the mobile phone with the protective device: channel 038 (897.6 MHz), cheek position, left side

DUT: SAMSUNG GT-I9505

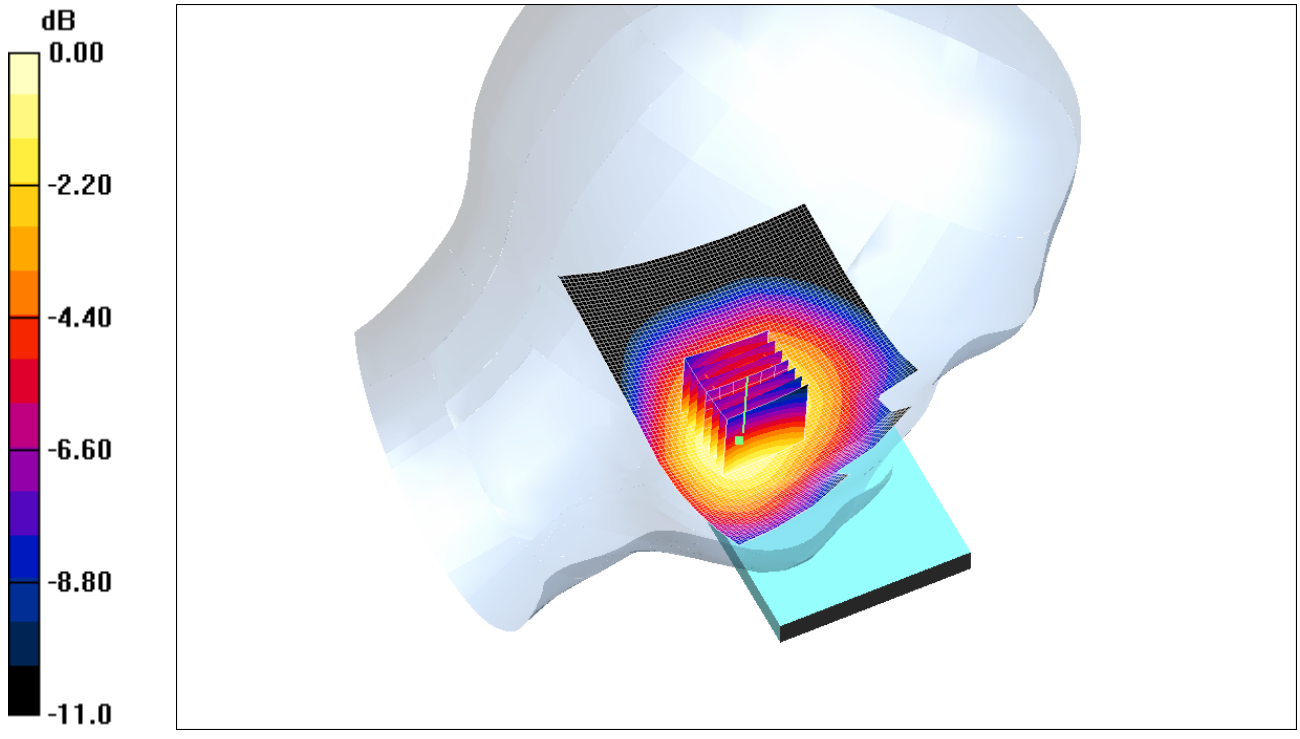
Communication System: E-GSM 900; Frequency: 914.8 MHz; Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0.97$ mho/m, $\varepsilon_r = 40.7$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.7°C, Liquid temperature: 21.6°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(6.15, 6.15, 6.15); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - High/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.377 mW/g

Cheek Position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.3 V/m; Power Drift = 0.190 dB
Peak SAR (extrapolated) = 0.454 W/kg
SAR(1 g) = 0.352 mW/g; SAR(10 g) = 0.258 mW/g
Maximum value of SAR (measured) = 0.390 mW/g



0 dB = 0.390mW/g

Fig. 6: SAR distribution for GSM900 of the mobile phone:
channel 124 (914.8 MHz), cheek position, left side

DUT: SAMSUNG GT-I9505 + Horizontal case for Smartphone

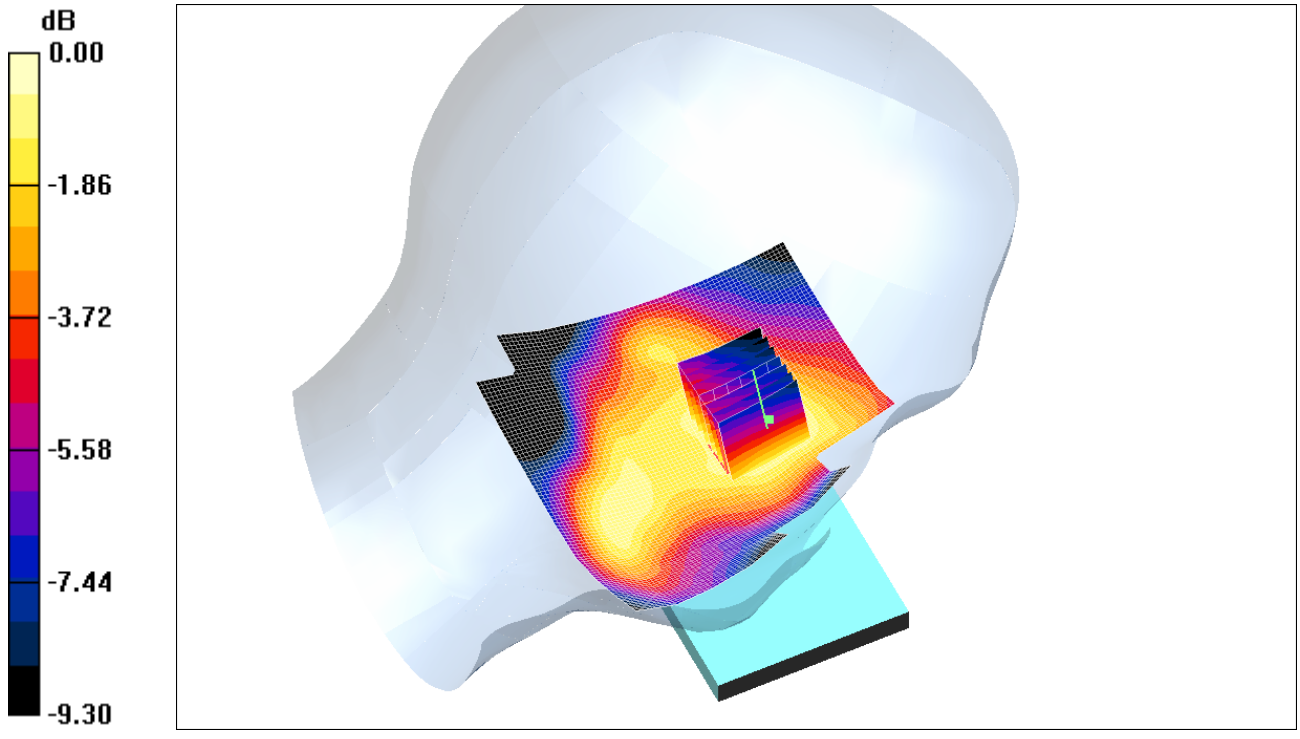
Communication System: E-GSM 900; Frequency: 914.8 MHz; Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0.97$ mho/m, $\varepsilon_r = 40.7$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.3°C, Liquid temperature: 21.5°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(6.15, 6.15, 6.15); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - High/Area Scan (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.034 mW/g

Cheek Position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.04 V/m; Power Drift = -0.090 dB
Peak SAR (extrapolated) = 0.043 W/kg
SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.021 mW/g
Maximum value of SAR (measured) = 0.034 mW/g



0 dB = 0.034mW/g

Fig. 7: SAR distribution for GSM900 of the mobile phone with the protective device: channel 124 (914.8 MHz), cheek position, left side

DUT: SAMSUNG GT-I9505

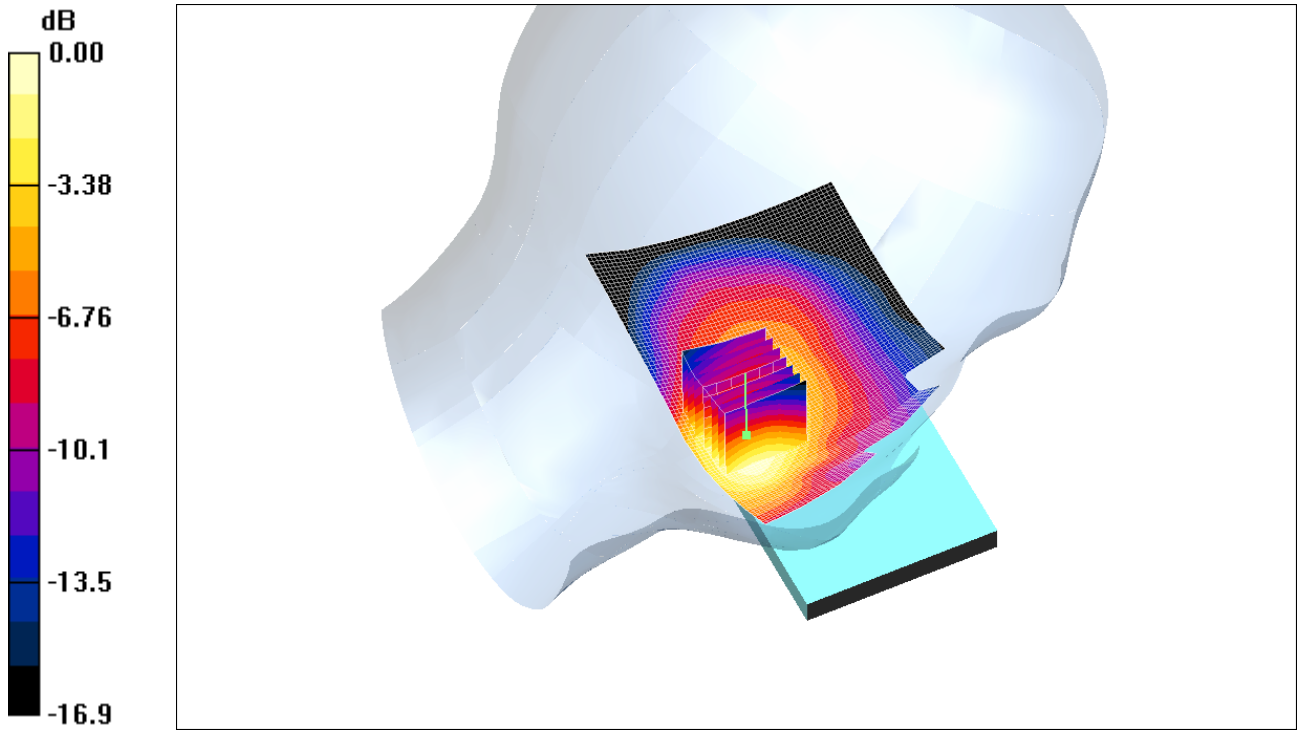
Communication System: GSM 1800; Frequency: 1710.2 MHz; Duty Cycle: 1:8.3
Medium parameters used: σ = 1.38 mho/m, ε_r = 38.5; ρ = 1000 kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.3°C, Liquid temperature: 21.6°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(5.07, 5.07, 5.07); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - Low/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.459 mW/g

Cheek Position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.2 V/m; Power Drift = -0.096 dB
Peak SAR (extrapolated) = 0.536 W/kg
SAR(1 g) = 0.363 mW/g; SAR(10 g) = 0.229 mW/g
Maximum value of SAR (measured) = 0.423 mW/g



0 dB = 0.423mW/g

Fig. 8: SAR distribution for GSM1800 of the mobile phone:
channel 512 (1710.2 MHz), cheek position, left side

DUT: SAMSUNG GT-I9505 + Horizontal case for Smartphone

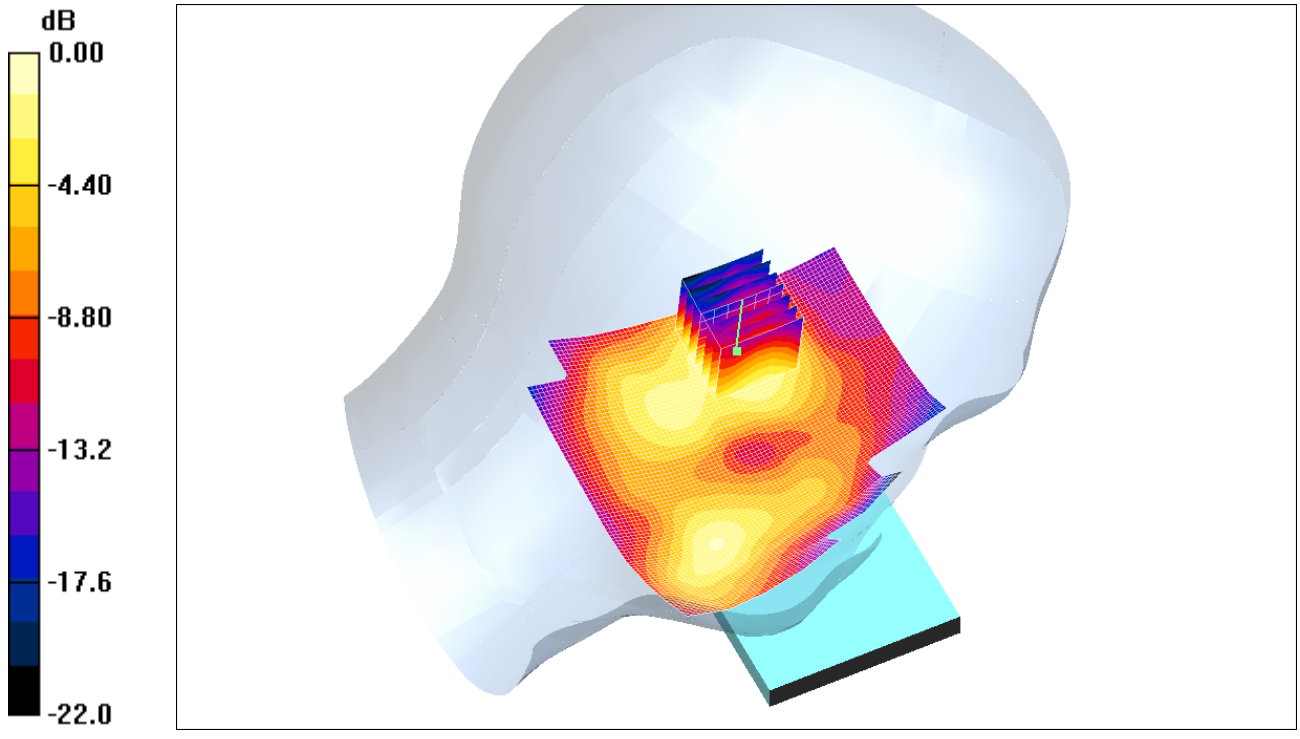
Communication System: GSM 1800; Frequency: 1710.2 MHz; Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 1.38$ mho/m, $\varepsilon_r = 38.5$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.6°C, Liquid temperature: 21.6°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(5.07, 5.07, 5.07); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - Low/Area Scan (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.109 mW/g

Cheek Position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.94 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 0.156 W/kg
SAR(1 g) = 0.081 mW/g; SAR(10 g) = 0.044 mW/g
Maximum value of SAR (measured) = 0.103 mW/g



0 dB = 0.103mW/g

Fig. 9: SAR distribution for GSM1800 of the mobile phone with the protective device: channel 512 (1710.2 MHz), cheek position, left side

DUT: SAMSUNG GT-I9505

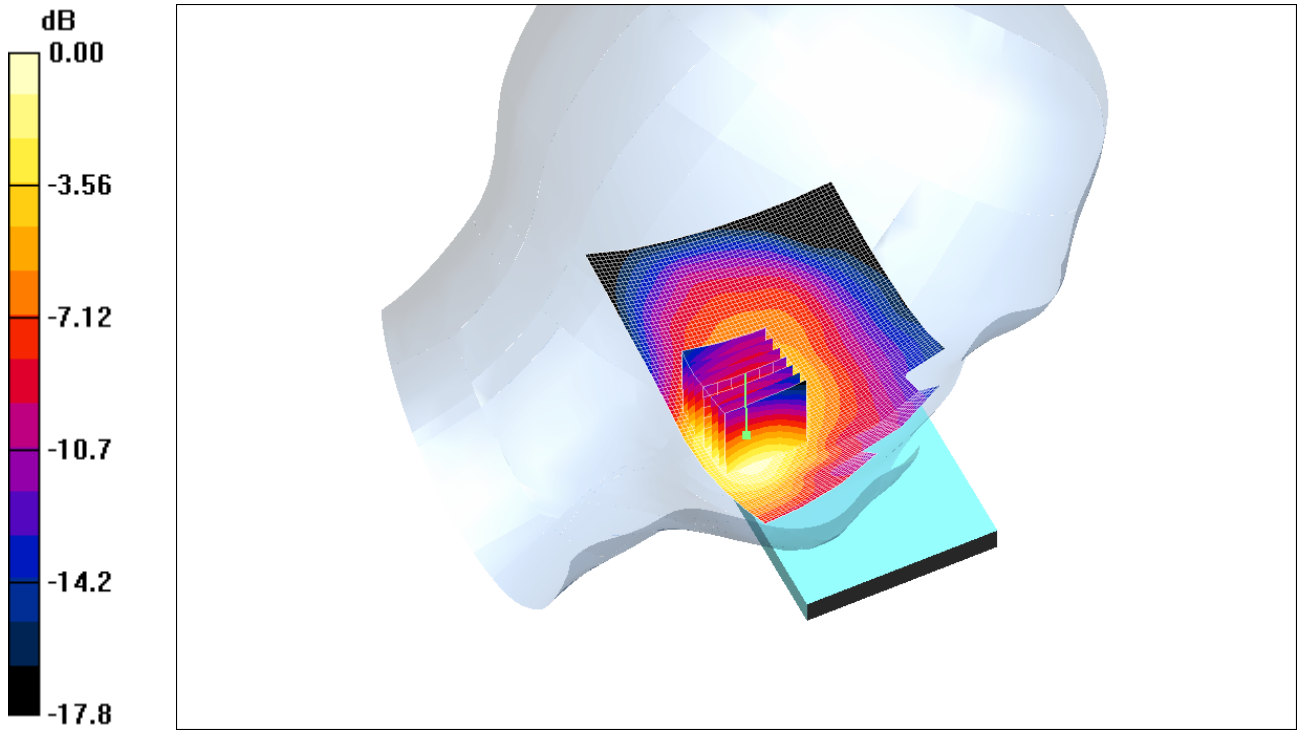
Communication System: GSM 1800; Frequency: 1747.6 MHz; Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 1.42$ mho/m, $\varepsilon_r = 38.4$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.3°C, Liquid temperature: 21.5°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(5.07, 5.07, 5.07); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- 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 (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.362 mW/g

Cheek Position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.79 V/m; Power Drift = -0.111 dB
Peak SAR (extrapolated) = 0.440 W/kg
SAR(1 g) = 0.291 mW/g; SAR(10 g) = 0.182 mW/g
Maximum value of SAR (measured) = 0.341 mW/g



0 dB = 0.341mW/g

Fig. 10: SAR distribution for GSM1800 of the mobile phone:
channel 699 (1747.6 MHz), cheek position, left side

DUT: SAMSUNG GT-I9505 + Horizontal case for Smartphone

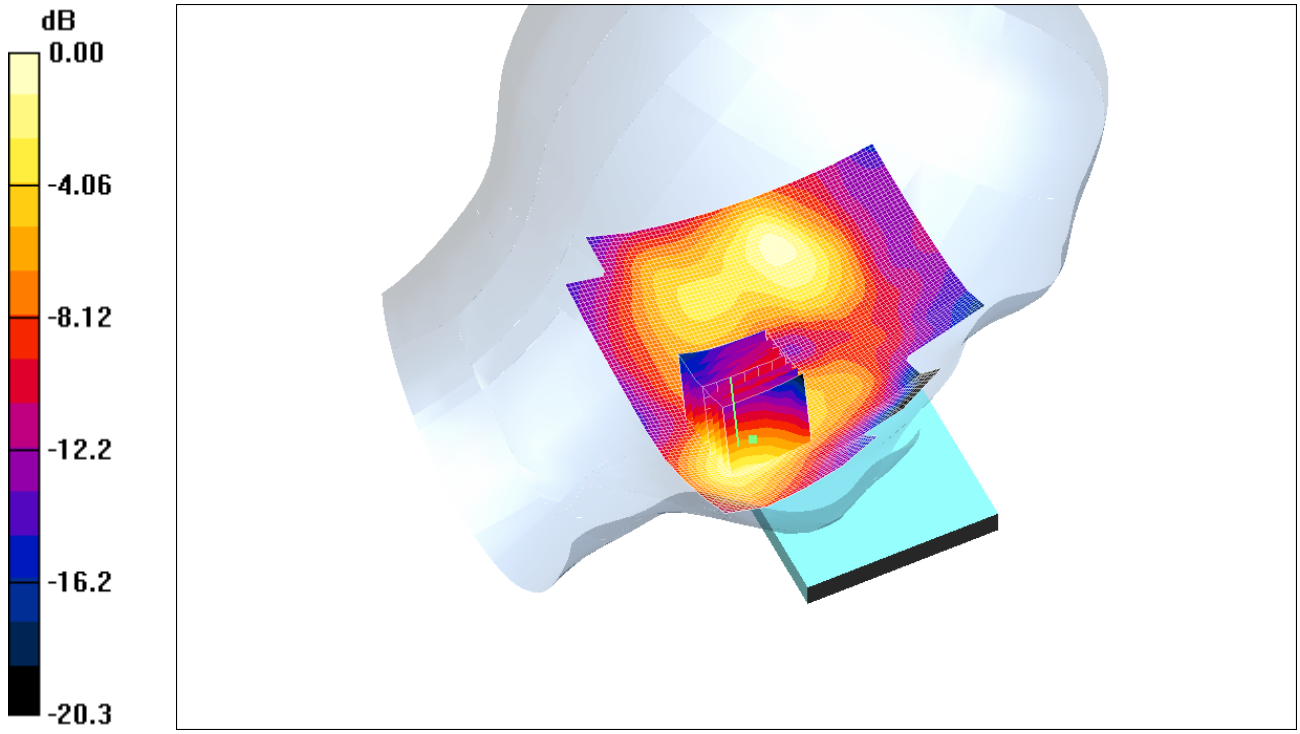
Communication System: GSM 1800; Frequency: 1747.6 MHz; Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 1.42$ mho/m, $\varepsilon_r = 38.4$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.5°C, Liquid temperature: 21.6°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(5.07, 5.07, 5.07); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- 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 (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.081 mW/g

Cheek Position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.69 V/m; Power Drift = -0.093 dB
Peak SAR (extrapolated) = 0.116 W/kg
SAR(1 g) = 0.068 mW/g; SAR(10 g) = 0.039 mW/g
Maximum value of SAR (measured) = 0.084 mW/g



0 dB = 0.084mW/g

Fig. 11: SAR distribution for GSM1800 of the mobile phone with the protective device: channel 699 (1747.6 MHz), cheek position, left side

DUT: SAMSUNG GT-I9505

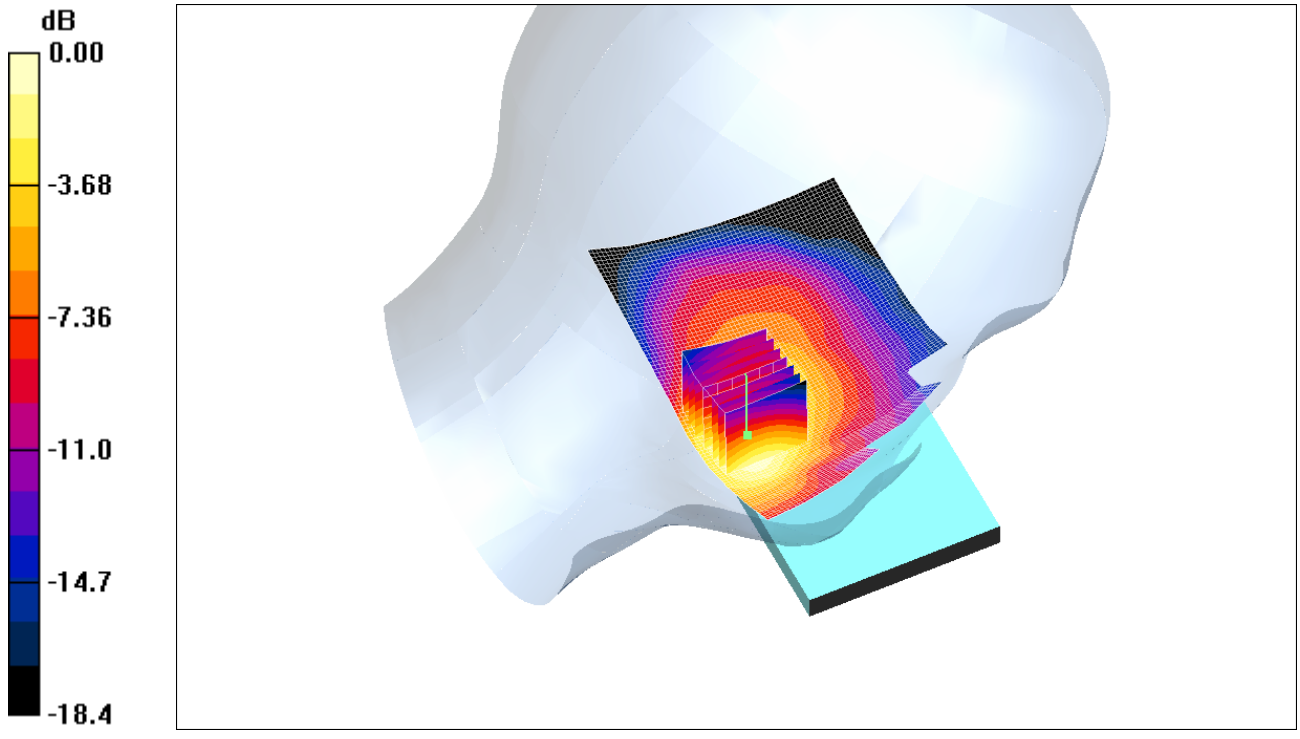
Communication System: GSM 1800; Frequency: 1784.8 MHz; Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 1.45$ mho/m, $\varepsilon_r = 38.2$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.3°C, Liquid temperature: 21.6°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(5.07, 5.07, 5.07); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - High/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.363 mW/g

Cheek Position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.32 V/m; Power Drift = -0.065 dB
Peak SAR (extrapolated) = 0.447 W/kg
SAR(1 g) = 0.291 mW/g; SAR(10 g) = 0.179 mW/g
Maximum value of SAR (measured) = 0.341 mW/g



0 dB = 0.341mW/g

Fig. 12: SAR distribution for GSM1800 of the mobile phone:
channel 885 (1784.8 MHz), cheek position, left side

DUT: SAMSUNG GT-I9505 + Horizontal case for Smartphone

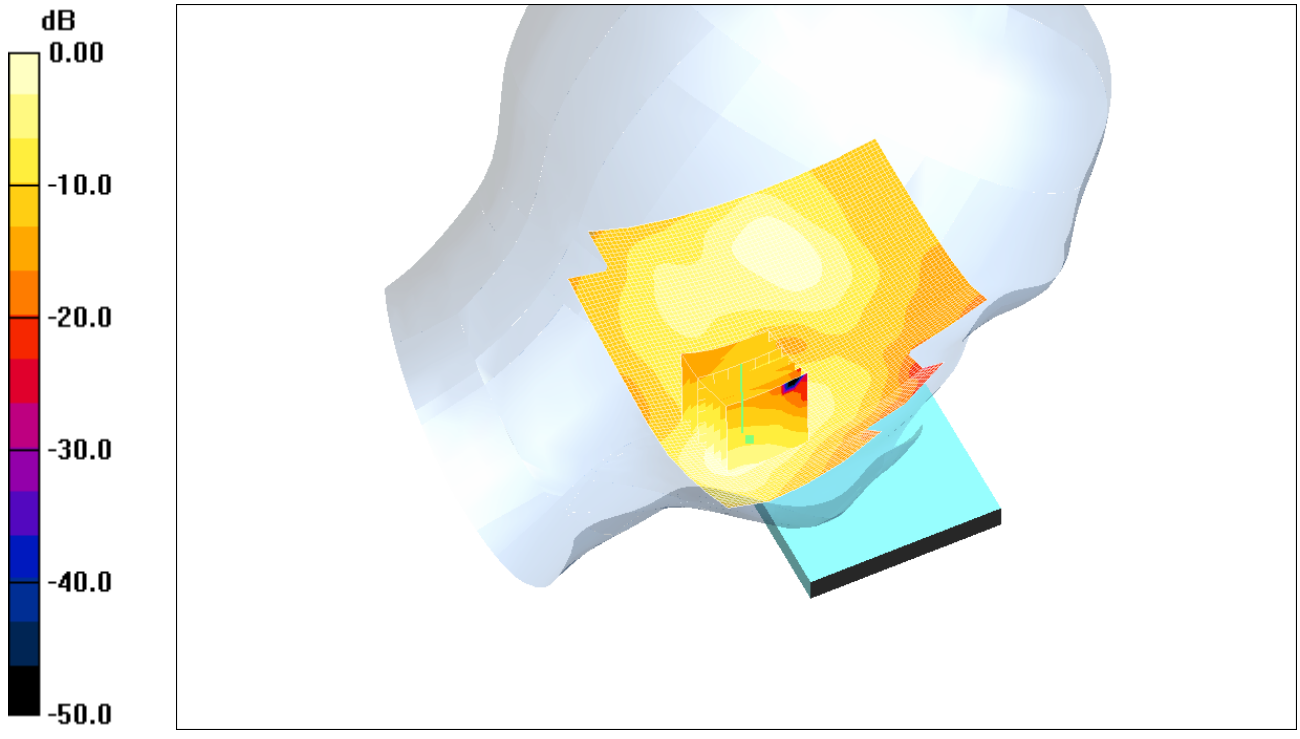
Communication System: GSM 1800; Frequency: 1784.8 MHz; Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 1.45$ mho/m, $\varepsilon_r = 38.2$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.7°C, Liquid temperature: 21.6°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(5.07, 5.07, 5.07); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - High/Area Scan (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.080 mW/g

Cheek Position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.26 V/m; Power Drift = -0.116 dB
Peak SAR (extrapolated) = 0.113 W/kg
SAR(1 g) = 0.067 mW/g; SAR(10 g) = 0.038 mW/g
Maximum value of SAR (measured) = 0.081 mW/g



0 dB = 0.081mW/g

Fig. 13: SAR distribution for GSM1800 of the mobile phone with the protective device: channel 885 (1784.8 MHz), cheek position, left side

DUT: SAMSUNG GT-I9505

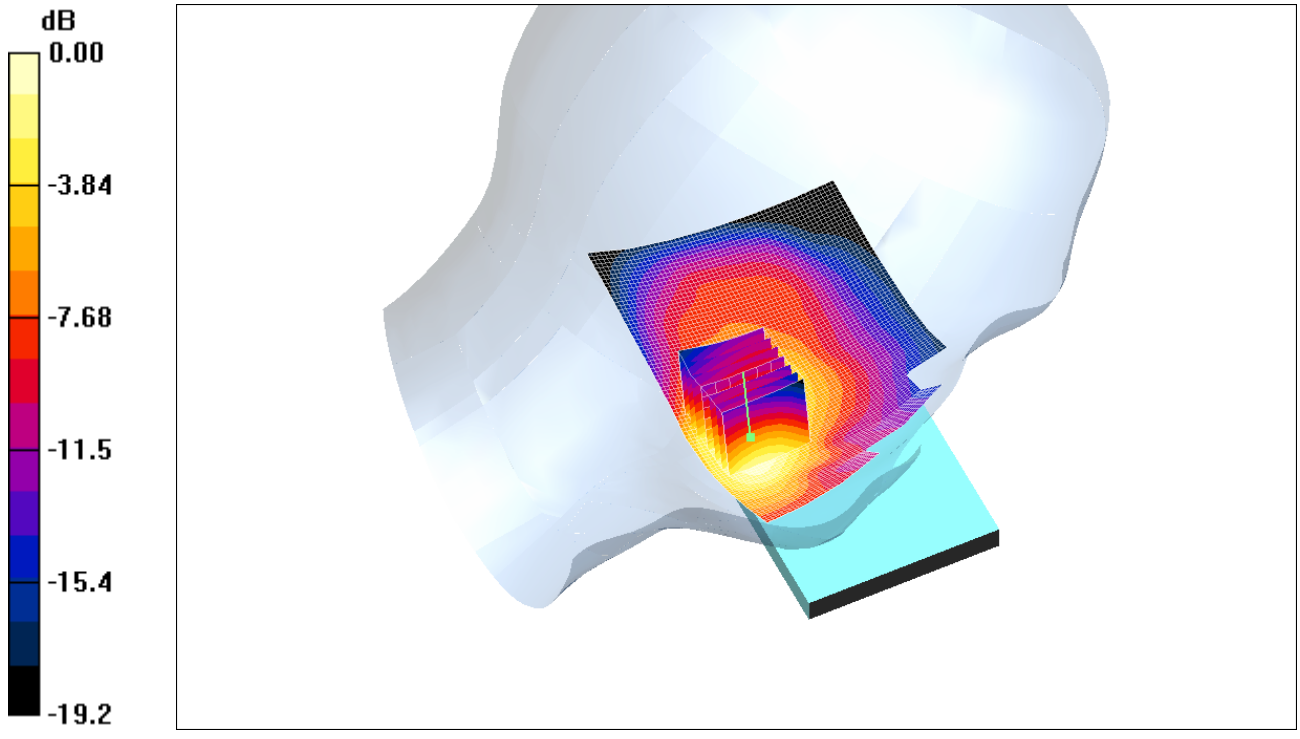
Communication System: WCDMA 2100; Frequency: 1922.4 MHz; Duty Cycle: 1:1
Medium parameters used: $\sigma = 1.39$ mho/m, $\varepsilon_r = 38.3$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.3°C, Liquid temperature: 21.9°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(4.91, 4.91, 4.91); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - Low/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.540 mW/g

Cheek Position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.8 V/m; Power Drift = -0.138 dB
Peak SAR (extrapolated) = 0.666 W/kg
SAR(1 g) = 0.423 mW/g; SAR(10 g) = 0.255 mW/g
Maximum value of SAR (measured) = 0.498 mW/g



0 dB = 0.498mW/g

Fig. 14: SAR distribution for WCDMA2100 of the mobile phone:
channel 9612 (1922.4 MHz), cheek position, left side

DUT: SAMSUNG GT-I9505 + Horizontal case for Smartphone

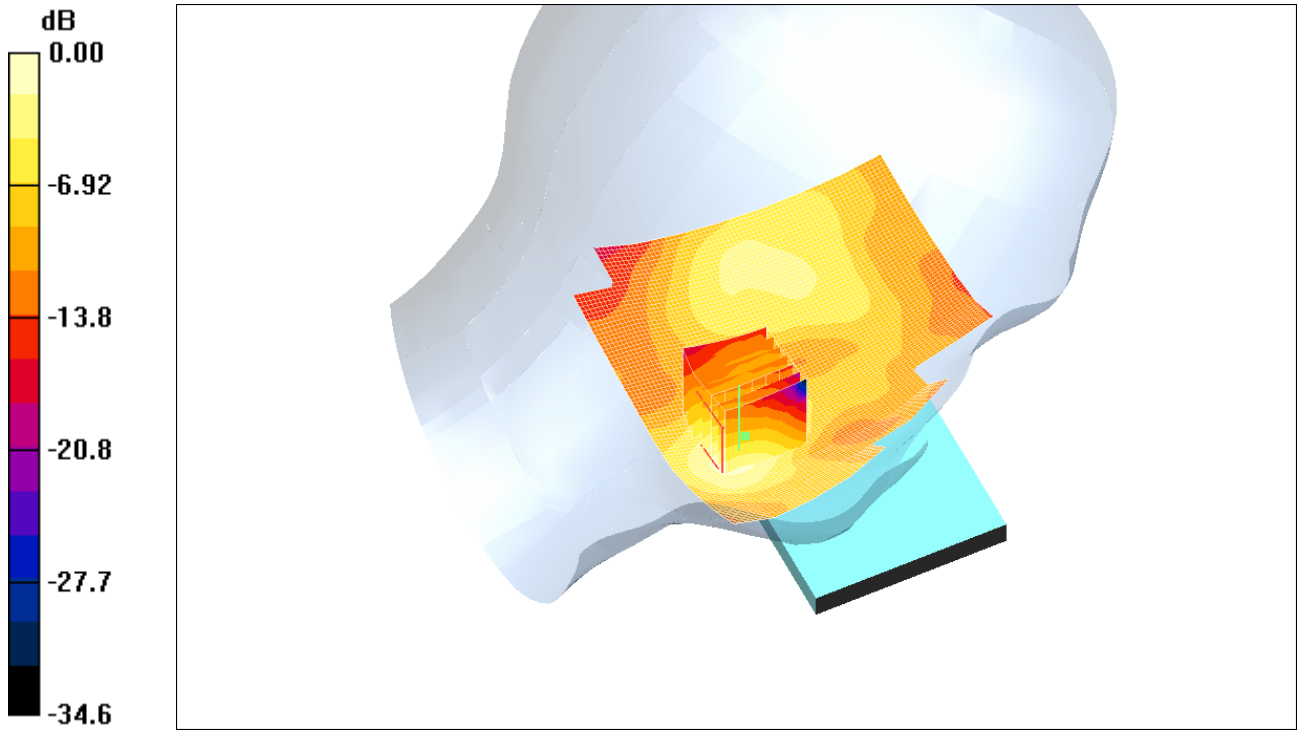
Communication System: WCDMA 2100; Frequency: 1922.4 MHz; Duty Cycle: 1:1
Medium parameters used: $\sigma = 1.39$ mho/m, $\varepsilon_r = 38.3$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.8°C, Liquid temperature: 22.2°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(4.91, 4.91, 4.91); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - Low/Area Scan (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.077 mW/g

Cheek Position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.18 V/m; Power Drift = 0.017 dB
Peak SAR (extrapolated) = 0.114 W/kg
SAR(1 g) = 0.065 mW/g; SAR(10 g) = 0.036 mW/g
Maximum value of SAR (measured) = 0.080 mW/g



0 dB = 0.080mW/g

Fig. 15: SAR distribution for WCDMA2100 of the mobile phone with the protective device: channel 9612 (1922.4 MHz), cheek position, left side

DUT: SAMSUNG GT-I9505

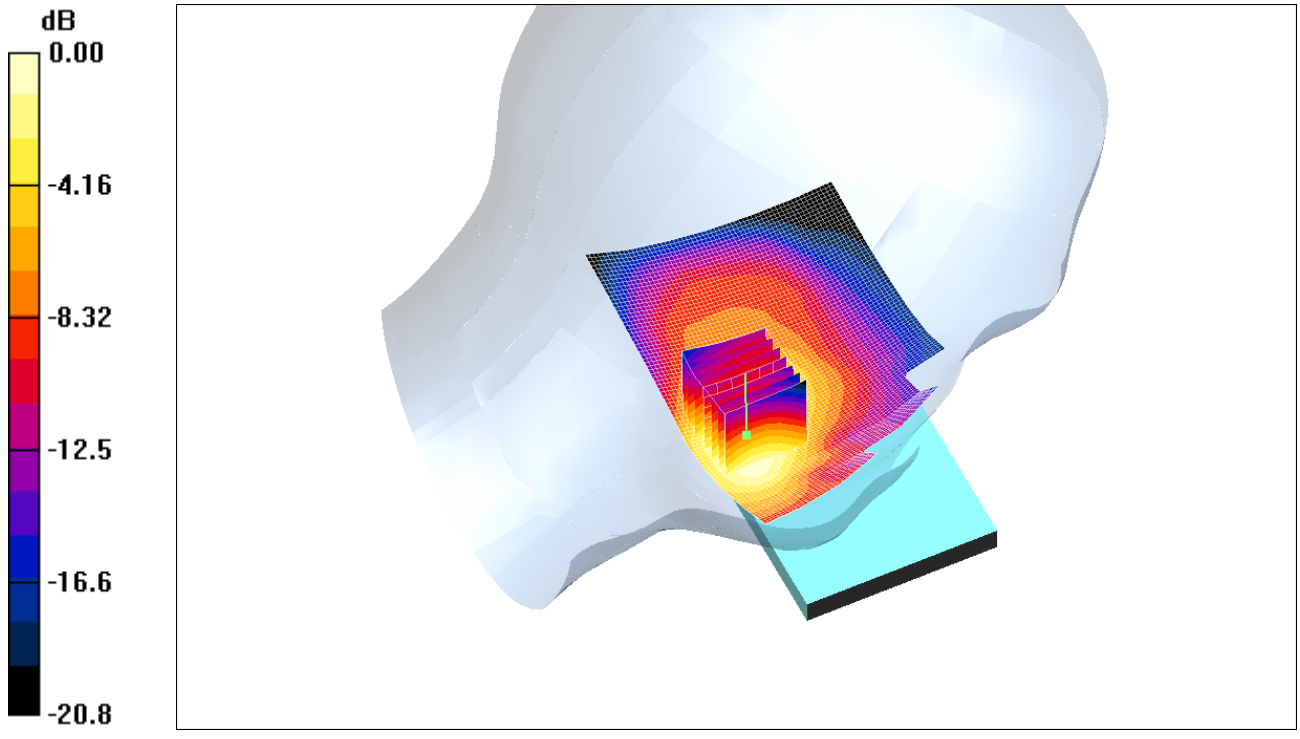
Communication System: WCDMA 2100; Frequency: 1950 MHz; Duty Cycle: 1:1
Medium parameters used: $\sigma = 1.43$ mho/m, $\varepsilon_r = 38.2$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.5°C, Liquid temperature: 21.9°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(4.91, 4.91, 4.91); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- 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 (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.659 mW/g

Cheek Position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.9 V/m; Power Drift = 0.079 dB
Peak SAR (extrapolated) = 0.804 W/kg
SAR(1 g) = 0.512 mW/g; SAR(10 g) = 0.306 mW/g
Maximum value of SAR (measured) = 0.603 mW/g



0 dB = 0.603mW/g

Fig. 16: SAR distribution for WCDMA2100 of the mobile phone:
channel 9750 (1950.0 MHz), cheek position, left side

DUT: SAMSUNG GT-I9505 + Horizontal case for Smartphone

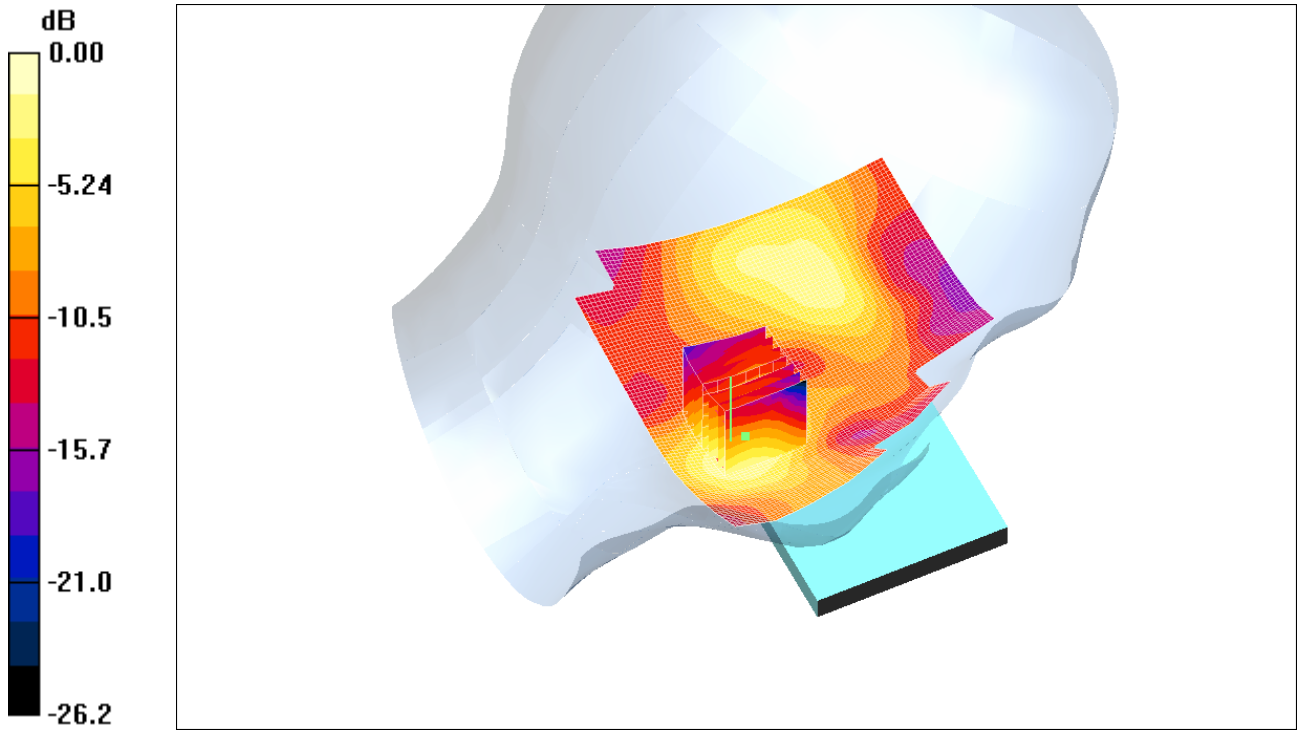
Communication System: WCDMA 2100; Frequency: 1950 MHz; Duty Cycle: 1:1
Medium parameters used: σ = 1.43 mho/m, ε_r = 38.2; ρ = 1000 kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.7°C, Liquid temperature: 22.1°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(4.91, 4.91, 4.91); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- 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 (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.102 mW/g

Cheek Position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.49 V/m; Power Drift = -0.079 dB
Peak SAR (extrapolated) = 0.153 W/kg
SAR(1 g) = 0.085 mW/g; SAR(10 g) = 0.046 mW/g
Maximum value of SAR (measured) = 0.106 mW/g



0 dB = 0.106mW/g

Fig. 17: SAR distribution for WCDMA2100 of the mobile phone with the protective device: channel 9750 (1950.0 MHz), cheek position, left side

DUT: SAMSUNG GT-I9505

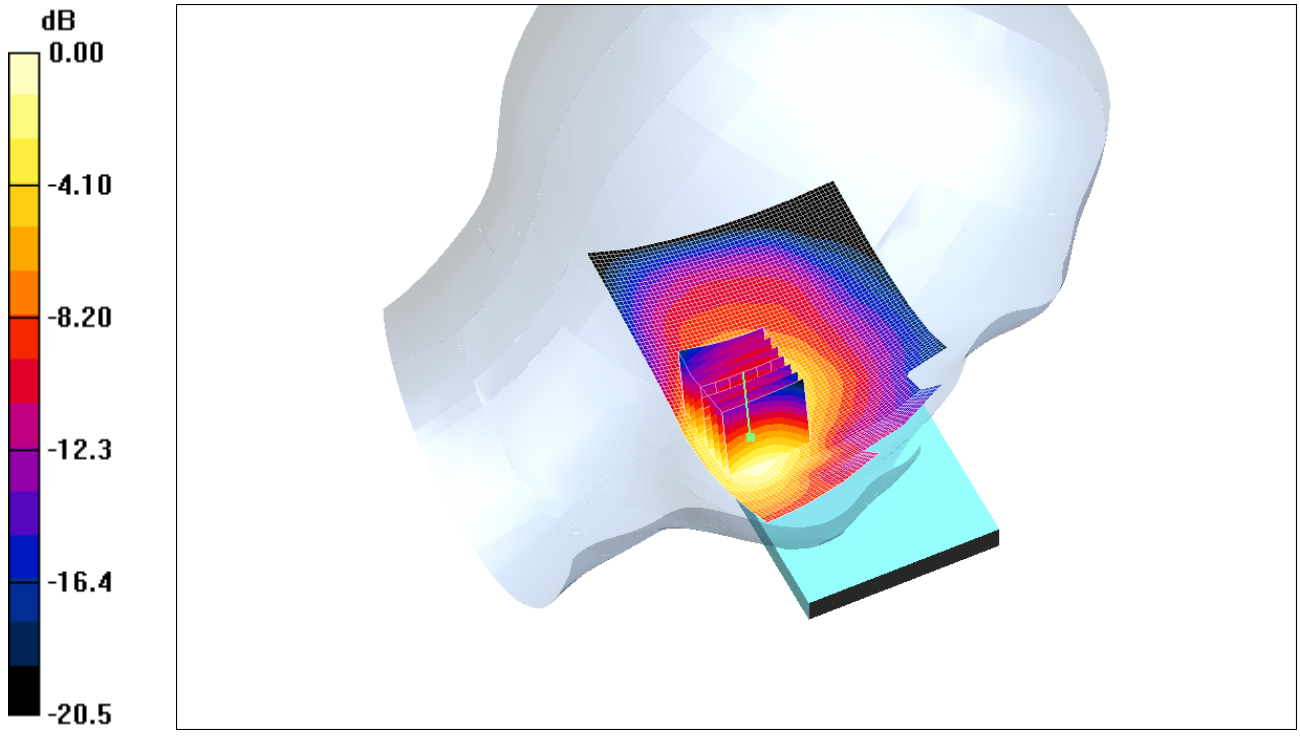
Communication System: WCDMA 2100; Frequency: 1977.6 MHz; Duty Cycle: 1:1
Medium parameters used: $\sigma = 1.46$ mho/m, $\varepsilon_r = 38.1$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.6°C, Liquid temperature: 22.0°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(4.91, 4.91, 4.91); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - High/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.644 mW/g

Cheek Position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.3 V/m; Power Drift = -0.166 dB
Peak SAR (extrapolated) = 0.824 W/kg
SAR(1 g) = 0.514 mW/g; SAR(10 g) = 0.305 mW/g
Maximum value of SAR (measured) = 0.607 mW/g



0 dB = 0.607mW/g

Fig. 18: SAR distribution for WCDMA2100 of the mobile phone:
channel 9888 (1977.6 MHz), cheek position, left side

DUT: SAMSUNG GT-I9505 + Horizontal case for Smartphone

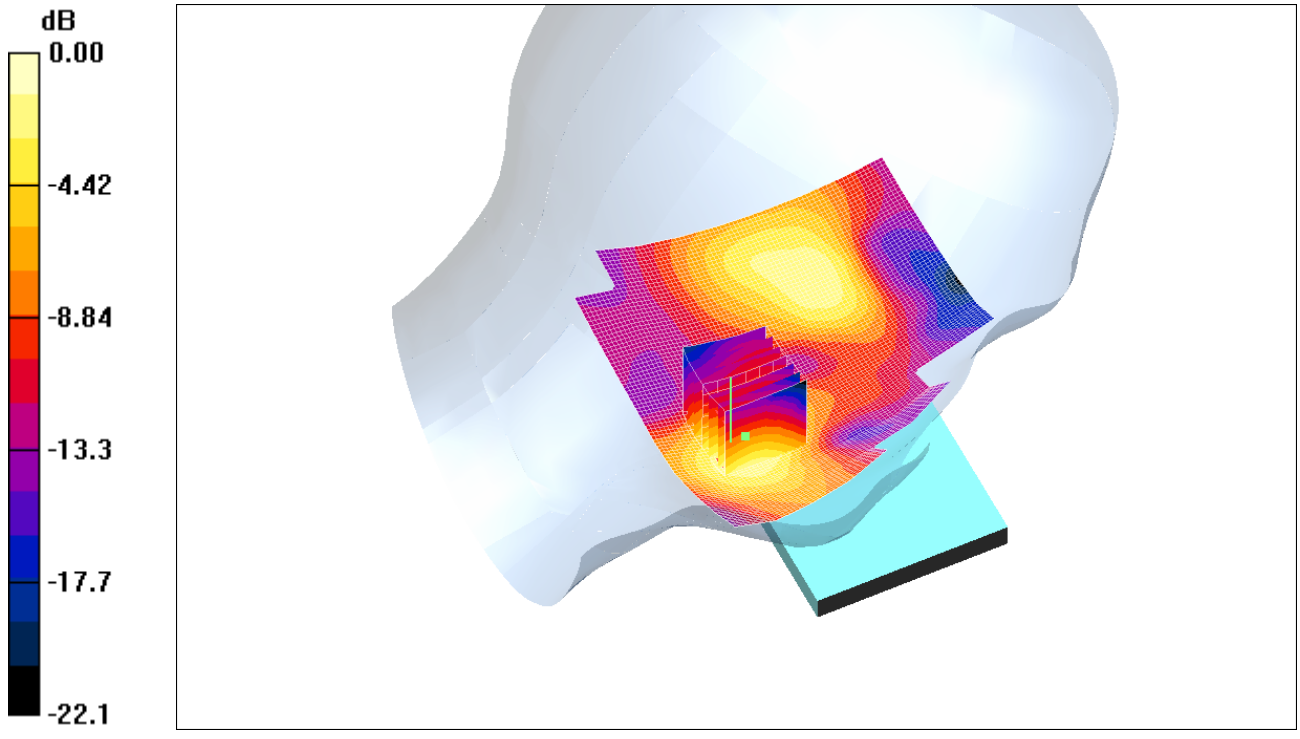
Communication System: WCDMA 2100; Frequency: 1977.6 MHz; Duty Cycle: 1:1
Medium parameters used: $\sigma = 1.46$ mho/m, $\varepsilon_r = 38.1$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Program Notes: Ambient temperature: 23.9°C, Liquid temperature: 22.2°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(4.91, 4.91, 4.91); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- Phantom: SAM 12; Type: QD; Serial: TP-1111
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

Cheek Position - High/Area Scan (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.126 mW/g

Cheek Position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.68 V/m; Power Drift = 0.015 dB
Peak SAR (extrapolated) = 0.189 W/kg
SAR(1 g) = 0.104 mW/g; SAR(10 g) = 0.057 mW/g
Maximum value of SAR (measured) = 0.131 mW/g



0 dB = 0.131mW/g

Fig. 19: SAR distribution for WCDMA2100 of the mobile phone with the protective device: channel 9888 (1977.6 MHz), cheek position, left side

9. PHOTOGRAPHS OF THE MOBILE PHONE UNDER TEST

The photographs of the mobile phone under test are shown in Fig. 20 and Fig. 21.

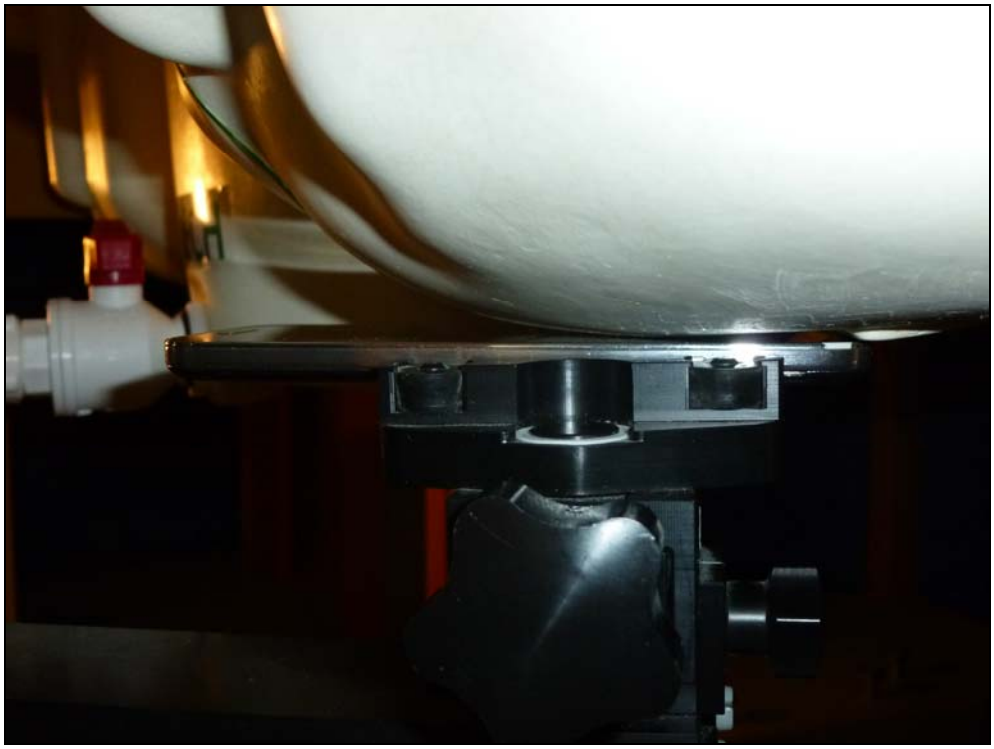


Fig. 20: Mobile phone in cheek position on left side

Fig. 21: Mobile phone into the protective device in cheek position on left 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. The expanded uncertainty is ± 24.0%.

Source of uncertainty	Tolerance/ uncertainty (%)	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	± 2.0	Rectangular	√3	1	± 1.2
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					± 12.0
Expanded uncertainty (confidence interval of 95%)					± 24.0

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
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 (2100 MHz)
Crest factor:	1
Modulation:	QPSK
Maximum output power:	Class 3 = 24 dBm (+1dB,-3dB)
Configuration:	Mode RMC 12.2kbps with all TPC bits = “1”

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. 22 shows the system.

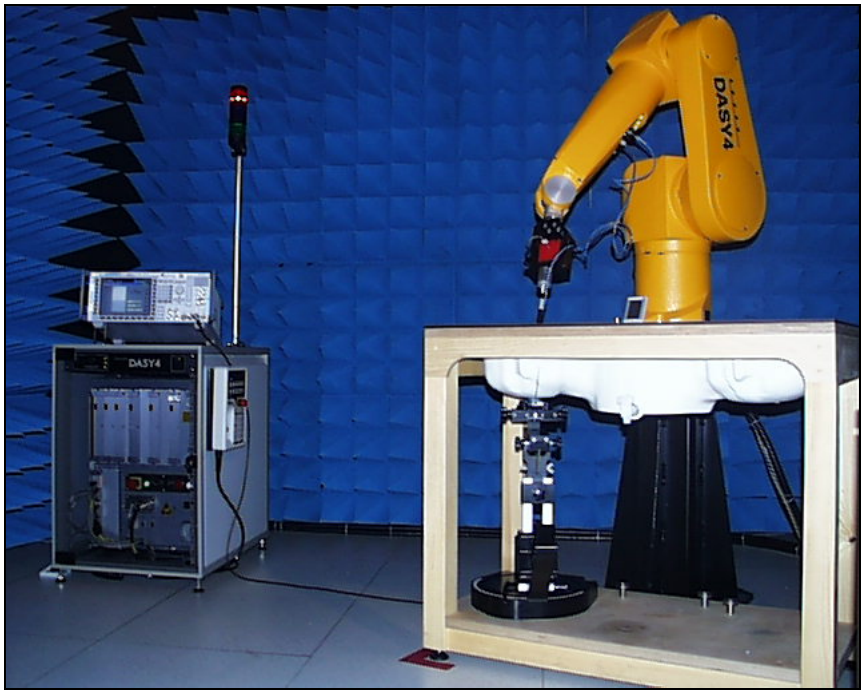


Fig. 22: The measurement setup with equipment under test

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 (F/m) Targeted value	ε_r (F/m) Measured value	σ (S/m) Targeted value	σ (S/m) Measured value	Liquid temperature (°C)	Ambient temperature (°C)
880	41.5 ± 5 %	41.4	0.95 ± 5 %	0.93	21.3	22.5
895	41.5 ± 5 %	41.1	0.96 ± 5 %	0.94		
900	41.5 ± 5 %	41.0	0.97 ± 5 %	0.95		
915	41.5 ± 5 %	40.7	0.97 ± 5 %	0.97		
1710	40.1 ± 5 %	38.5	1.34 ± 5 %	1.38	21.4	22.3
1750	40.1 ± 5 %	38.4	1.37 ± 5 %	1.42		
1785	40.0 ± 5 %	38.2	1.39 ± 5 %	1.45		
1800	40.0 ± 5 %	38.2	1.40 ± 5 %	1.46		
1920	40.0 ± 5 %	38.3	1.40 ± 5 %	1.39	21.9	23.0
1950	40.0 ± 5 %	38.2	1.40 ± 5 %	1.43		
1980	40.0 ± 5 %	38.1	1.40 ± 5 %	1.46		

14. SYSTEM CHECK: 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 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. 23 to Fig. 25.

Frequency (MHz)	SAR 1g (W/kg) Targeted value	SAR 1g (W/kg) Measured value
900	1.725 ± 10 %	1.68
1800	4.95 ± 10 %	5.10
1950	5.225 ± 10 %	5.34

DUT: Dipole 900 MHz

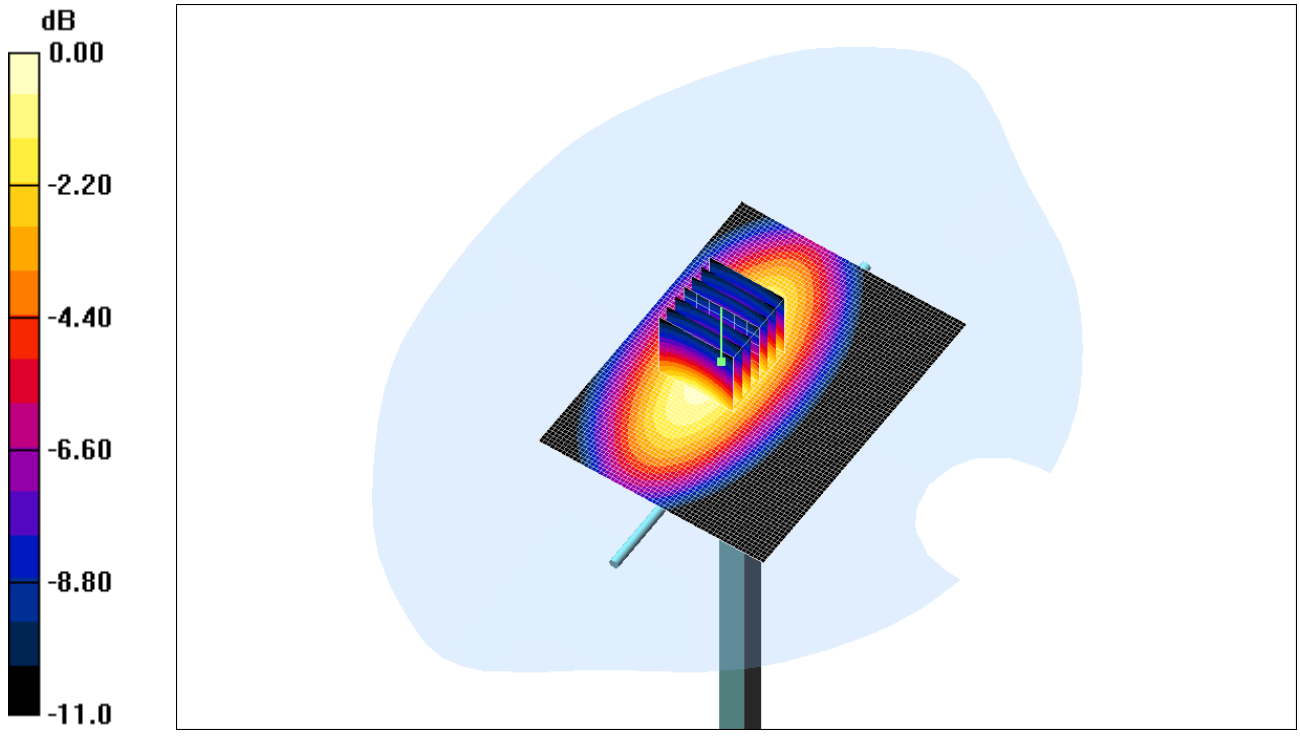
Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium parameters used: $\sigma = 0.95$ mho/m, $\varepsilon_r = 41$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

Program Notes: Ambient temperature: 23.7°C, Liquid temperature: 21.6°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(6.15, 6.15, 6.15); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- 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) = 3.05 mW/g

d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.2 V/m; Power Drift = -0.053 dB
Peak SAR (extrapolated) = 3.95 W/kg
SAR(1 g) = 2.61 mW/g; SAR(10 g) = 1.68 mW/g
Maximum value of SAR (measured) = 3.08 mW/g



0 dB = 3.08mW/g

Fig. 23: 900 MHz system check result

DUT: Dipole 1800 MHz

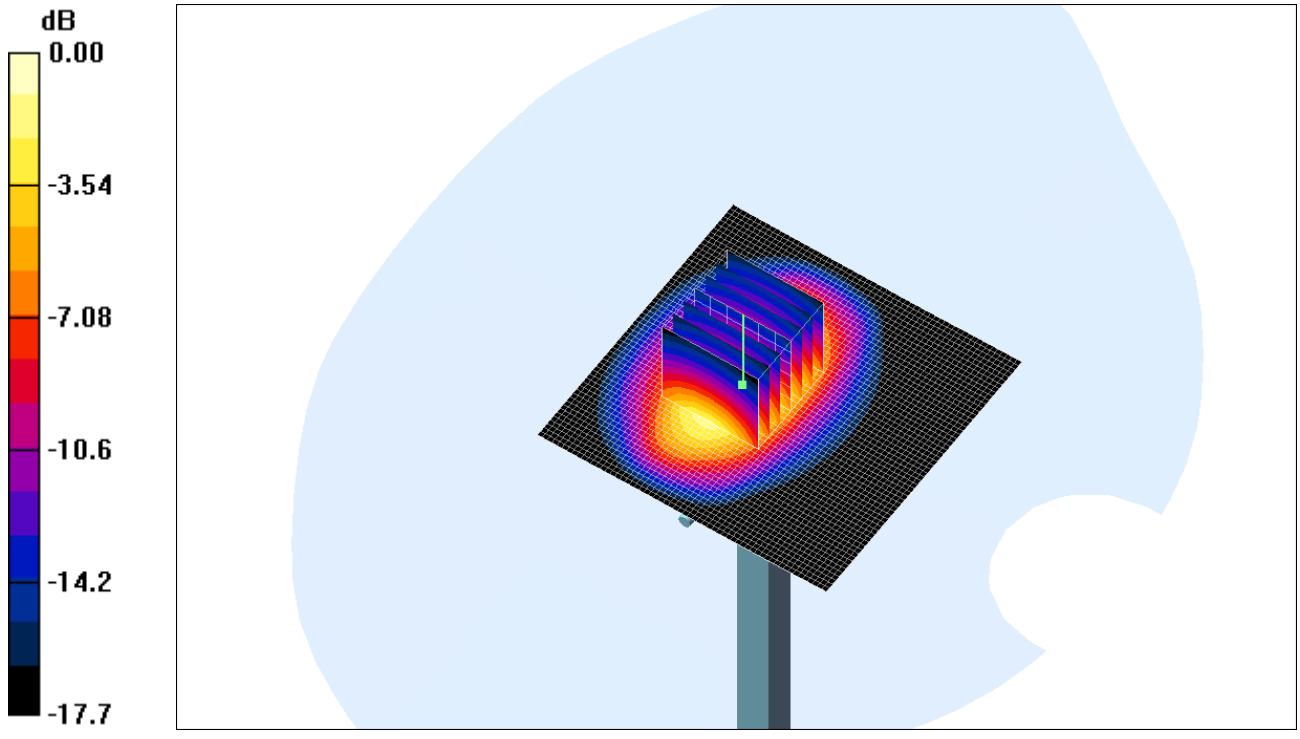
Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1
Medium parameters used: $\sigma = 1.46$ mho/m, $\varepsilon_r = 38.2$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

Program Notes: Ambient temperature: 22.5°C, Liquid temperature: 21.5°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(5.07, 5.07, 5.07); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- 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) = 12.9 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 83.8 V/m; Power Drift = -0.016 dB
Peak SAR (extrapolated) = 18.6 W/kg
SAR(1 g) = 9.88 mW/g; SAR(10 g) = 5.1 mW/g
Maximum value of SAR (measured) = 12.6 mW/g



0 dB = 12.6mW/g

Fig. 24: 1800 MHz system check result

DUT: Dipole 1950 MHz

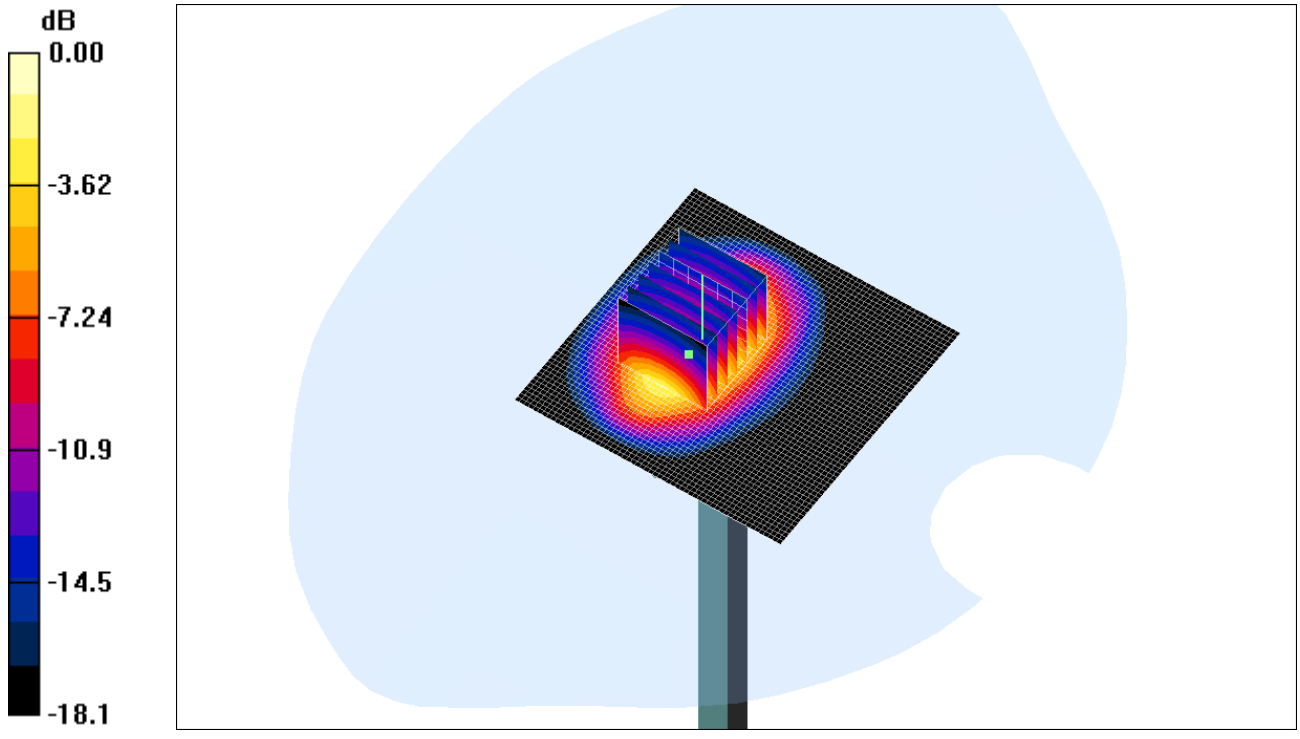
Communication System: CW; Frequency: 1950 MHz; Duty Cycle: 1:1
Medium parameters used: $\sigma = 1.43$ mho/m, $\varepsilon_r = 38.2$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

Program Notes: Ambient temperature: 23.2°C, Liquid temperature: 22.0°C

DASY4 Configuration:
- Probe: ES3DV3 - SN3303; ConvF(4.91, 4.91, 4.91); Calibrated: 8/22/2014
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn402; Calibrated: 8/14/2014
- 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) = 13.3 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 79.6 V/m; Power Drift = -0.058 dB
Peak SAR (extrapolated) = 19.5 W/kg
SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.34 mW/g
Maximum value of SAR (measured) = 13.2 mW/g



0 dB = 13.2mW/g

Fig. 25: 1950 MHz system check result

□□□ End of report □□□