



CONFORMANCE TEST REPORT FOR HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

Report No. : SRTC2010-H024-E0037

Product Name: GSM Dual-band Digital Mobile Phone

Product Model: ZTE-G S512

Applicant: ZTE Corporation

Manufacture: ZTE Corporation

Specification: FCC OET Bulletin 65 (Edition 97-01)

Supplement C (Edition 01-01)

47CFR 2.1093

FCC ID: Q78-ZTEGS512

The State Radio_monitoring_center Testing Center (SRTC)

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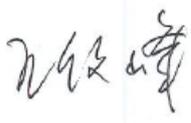
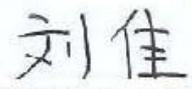
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Executive summary

Test report no.:	SRTC2010-H024-E0037
Product Model:	ZTE-G S512
Date of test:	2010.12.10
Date of report:	2010.12.13
Laboratory:	The State Radio_monitoring_center Testing Center (SRTC)
Test has been Carried out in accordance with:	<p>47CFR §2.1093</p> <p>Radiofrequency Radiation Exposure Evaluation: Portable Devices</p> <p>FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01)</p> <p>Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields</p> <p>RSS-102</p> <p>Evaluation Procedure for Mobile and Portable Radio Transmitters with Respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields</p> <p>IEEE 1528 - 2003</p> <p>IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Technique</p>
Documentation:	The documentation of the testing performed on the tested devices is archived for 5 years at SRTC

Result summary:

Mode	CH/f(MHz)	Power	Position	Sar Limit (1g avg) (mW/g)	Measured value (1g avg)(mW/g)	Result
GSM850	251/848.8	32.3dBm	Towards ground	1.6	0.788	PASS

<p>This Test Report Is Issued by: Mr. Song Qizhu Director of the test lab</p> 	<p>Checked by: Mr. Wang Junfeng Deputy director of the test lab</p> 
<p>Tested by: Ms. Liu Jia Test engineer</p> 	<p>Issued date: 2011.01.10</p>

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1. GENERAL INFORMATION

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).

The test results relate only to individual items of the samples which have been tested.

1.2 Information about the testing laboratory

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1.3 Applicant's details

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1.4 Manufacturer's details

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Country or Region: P.R.China
Contacted person: Min Zhang
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Fax: +86-021-50801070
Email: zhang.min13@zte.com.cn

1.5 Test Details

Period of test	2010.12.10
Batteries used in testing	Li-Lon/Li3706T42P3h383857/ZTE Corporation
State of sample	production unit
H/W Version	g9xA
S/W Version	P118A14(U)B01-En-01\ng9xA
IMEI	355828040001104

1.6 Maximum Results

The maximum measured SAR values for Head configuration and Body Worn configuration are given in section 1.6.1 and 1.6.2 respectively. The device conforms to the requirements of the standard(s) when the maximum measured SAR value is less than or equal to the limit.

1.6.1 Head Configuration

Mode	CH/f(MHz)	Power	Position	Sar Limit (1g avg) (mW/g)	Measured value (1g avg)(mW/g)	Result
GSM850	189/836.4	32.3dBm	Left cheek	1.6	0.489	PASS
GSM1900	661/1880.0	29.6 dBm	Left cheek	1.6	0.215	PASS

1.6.2 Body Worn Configuration

Mode	CH/f(MHz)	Power	Position	Sar Limit (1g avg) (mW/g)	Measured value (1g avg)(mW/g)	Result
GSM850	251/848.8	32.3dBm	Towards ground	1.6	0.788	PASS
GSM1900	661/1880.0	29.6dBm	Towards ground	1.6	0.150	PASS

2. DESCRIPTION OF THE DEVICE UNDER TEST

Device category	production unit
Exposure enviroment	General population/uncontrolled

Mode and bands of operation	GSM 850/1900
Modulation Mode	GMSK
Duty Cycle	1/8
Transmitter Frequency Range(MHz)	824-849 1850-1910

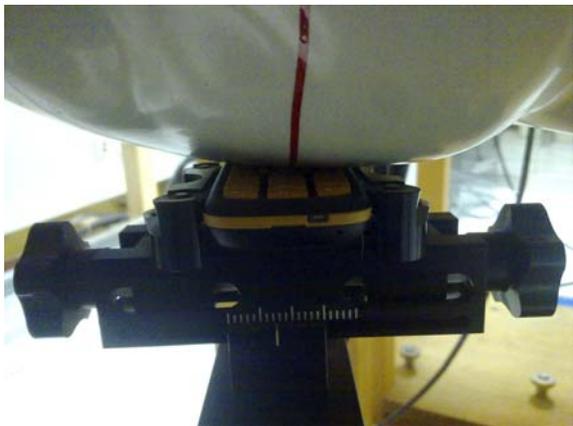
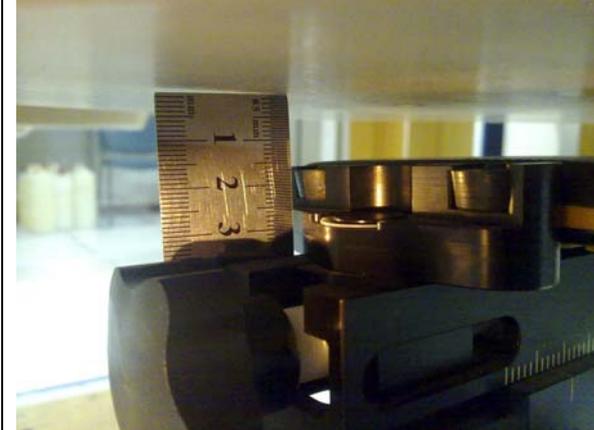
2.1 Description of the Antenna

The device has an internal antenna.

2.2 Picture of the EUT



2.3 Test Positions for the Device under test

	
<p>Cheek position, left side</p>	<p>Tilt position, left side</p>
	
<p>Cheek position, Right side</p>	<p>Tilt position, Right side</p>
	
<p>FLAT position (towards ground)</p>	<p>FLAT position (towards phantom)</p>

2.4 Picture to demonstrate the required liquid depth

the liquid depth in the used SAM phantoms



Liquid depth for SAR Measurement

3. TEST CONDITIONS

3.1 Temperature and Humidity

Ambient temperature (°C)	21.0 to 23.0
Ambient humidity (RH %)	30 to 45

3.2 Test Signal, Frequencies and Output Power

The device was put into operation by using a call tester. Communication between the device and the call tester was established by air link.

The device output power was set to maximum power level for all tests; a fully charged battery was used for every test sequence.

In all operating bands the measurements were performed on lowest, middle and highest channels.

4. DESCRIPTION OF THE TEST EQUIPMENT

4.1 Measurement System and Components

The measurements were performed using an automated near-field scanning system, DASY4, manufactured by Schmid & Partner Engineering AG (SPEAG) in Switzerland. The SAR extrapolation algorithm used in all measurements was the 'advanced extrapolation' algorithm.

The following table lists calibration dates of SPEAG components:

Test Equipment	Serial Number	Calibration interval	Calibration expiry
DAE4	720	1year	2011.01
Dosimetric E-field Probe ES3DV3	3128	1year	2011.06
Dipole Validation Kit, D835V2	473	2 years	2012.06
Dipole Validation Kit, D1900V2	5d024	2 years	2012.06
DASY4 software Version	4.7	N/A	N/A

Note: the Dipole Calibration interval is 24 months

Additional test equipment used in testing:

Test Equipment	Model	Serial Number	Calibration interval	Calibration expiry
Signal Generator	E4428C	MY45280865	1year	2011.08
Amplifier	5S1G4	0323472	N/A	N/A
Power meter	E4417A	MY45101182	1year	2011.08
Power Sensor	E4412A	MY41502214	1year	2011.08
Power Sensor	E4412A	MY41502130	1year	2011.08
Call Tester	8960	GB43194054	1year	2011.08
Network Analyzer	8714ET	US40372083	1year	2011.08
Dielectric Probe Kit	85070D	US33030365	N/A	N/A

4.1.1 Isotropic E-field Probe Type ES3DV3

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Calibration certificate in Appendix C
Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Optical Surface Detection	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces

Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm
Dynamic Range	5 μ W/g to > 100 mW/g; Linearity: \pm 0.2 dB
Application	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones

4.2 Phantoms

The phantom used for all tests i.e. for both system checks and device testing, was the twinheaded "SAM Phantom", manufactured by SPEAG. The phantom conforms to the requirements of IEEE 1528 - 2003.

System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.

The SPEAG device holder (see Section 5.1) was used to position the device in all tests whilst a tripod was used to position the validation dipoles against the flat section of phantom.

4.3 Tissue Simulants

Recommended values for the dielectric parameters of the tissue simulants are given in IEEE 1528 - 2003 and FCC Supplement C to OET Bulletin 65. All tests were carried out using simulants whose dielectric parameters were within \pm 5% of the recommended values. All tests were carried out within 24 hours of measuring the dielectric parameters.

The depth of the tissue simulant was 15.0 \pm 0.5 cm measured from the ear reference point during system checking and device measurements.

4.3.1 Tissue Simulant Recipes

The following recipe(s) were used for Head and Body tissue stimulant(s):

800MHz band

Ingredient	Head (% by weight)	Body (% by weight)
Water	40.29	50.75
Sugar	57.90	48.21
Nacl	1.38	0.94
Cellulose	0.24	0
Preventol	0.18	0.10

1900MHz band

Ingredient	Head (% by weight)	Body (% by weight)
Water	44.45	70.17
DGBE	55.24	29.44
Nacl	0.31	0.39

4.3.2 System Checking

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyser. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system checking results (dielectric parameters and SAR values) are given in the table below. Test Date is 2010.8.27

System checking, head tissue simulant

		SAR _{1g} [w/kg]	ϵ_r	σ [S/m]	Temperature	
					Ambient[°C]	Liquid[°C]
900MHz	Target Value	10.8	41.5±2.1	0.97±0.05	15-30	-
	Measured Value	10.9	41.5	0.98	24.0	22.3

All SAR values are normalized to 1W forward power

		SAR _{1g} [w/kg]	ϵ_r	σ [S/m]	Temperature	
					Ambient[°C]	Liquid[°C]
1800MHz	Target Value	38.1	40±1.9	1.40±0.07	15-30	-
	Measured Value	38.8	39.4	1.35	24.0	22.3

All SAR values are normalized to 1W forward power

Plots of the system checking scans are given in Appendix A.

4.3.3 Tissue Simulants used in the Measurements

For the measurement of the following parameters the HP 85070D dielectric probe kit is used, representing the open-ended coaxial probe measurement procedure. Liquid temperature during the test: 22.3° C。 Tested date is 2010.8.27

Head		ϵ_r	σ [S/m]	Temperature	
				Ambient [°C]	Liquid [°C]
850MHz	Recommended Value	41.5±2.1	0.97±0.05	15-30	-
	Measured Value	41.5	0.98	24.0	22.3
1900MHz	Recommended Value	40±1.9	1.40±0.07	15-30	-
	Measured Value	39.0	1.44	24.0	22.3

Body		ϵ_r	σ [S/m]	Temperature	
				Ambient [°C]	Liquid [°C]
850MHz	Recommended Value	55.0±2.8	1.05±0.05	15-30	-
	Measured Value	54.6	1.00	24.0	22.3
1900MHz	Recommended Value	53.3±2.7	1.52±0.08	15-30	-
	Measured Value	54.6	1.49	24.0	22.3

5. DESCRIPTION OF THE TEST PROCEDURE

5.1 Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the Dasy system.



Device holder supplied by SPEAG

5.2 Test positions

5.2.1 Against Phantom Head

Measurements were made in “cheek” and “tilt” positions on both the left hand and right hand sides of the phantom.

The positions used in the measurements were according to IEEE 1528 - 2003 "IEEE

Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques".

5.2.2 Body Worn Configuration

The device was placed in the SPEAG holder below the flat section of the phantom. The distance between the device and the phantom was kept at the separation distance using a separate flat spacer that was removed before the start of the measurements. The device was oriented with its antenna facing the phantom since this orientation gives higher results.

5.3 scan procedure

First, area scans were used for determination of the field distribution. Next, a zoom scan, a minimum of 7 x 7x7 points covering a volume of at least 30x30x30mm, was performed around the highest E-field value to determine the averaged SAR value. Drift was determined by measuring the same point at the start of the area scan and again at the end of the zoom scan.

5.4 SAR Averaging Methods

The maximum SAR value was averaged over a cube of tissue using interpolation and extrapolation.

The interpolation, extrapolation and maximum search routines within Dasy4 are all based on the modified Quadratic Shepard's method (Robert J. Renka, "Multivariate Interpolation Of Large Sets Of Scattered Data", University of North Texas ACM Transactions on Mathematical Software, vol. 14, no. 2, June 1988, pp. 139-148).

The interpolation scheme combines a least-square fitted function method with a weighted average method. A trivariate 3-D / bivariate 2-D quadratic function is computed for each measurement point and fitted to neighbouring points by a least-square method. For the zoom scan, inverse distance weighting is incorporated to fit distant points more accurately. The interpolating function is finally calculated as a weighted average of the quadratics.

In the zoom scan, the interpolation function is used to extrapolate the Peak SAR from the deepest measurement points to the inner surface of the phantom.

6. MEASUREMENT UNCERTAINTY

DASY4 Uncertainty Budget								
Error description	Uncertainty value	Prob. Dist.	Div.	(c_i) 1g	(c_i) 10g	Std.Unc (1g).	Std.Unc. (10g)	(v_i) V_{eff}
Measurement system								
Probe calibration	±5.9%	N	1	1	1	±5.9%	±5.9%	∞
Axial isotropy	±4.7%	R	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical isotropy	±9.6%	R	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	∞
Boundary effects	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
System detection limits	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Readout electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response time	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Integration time	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
RF ambient noise	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
RF ambient reflections	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Probe positioner	±0.4%	R	$\sqrt{3}$	1	1	±0.2%	±0.2%	∞
Probe positioning	±2.9%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Max.SAR Eval.	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Test Sample Related								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power drift	±5.0%	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Phantom and Setup								
Phantom uncertainty	±4.0%	R	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
Liquid conductivity(target)	±5.0%	R	$\sqrt{3}$	0.64	0.43	±1.8%	±1.2%	∞
Liquid conductivity(meas.)	±2.5%	N	1	0.64	0.43	±1.6%	±1.1%	∞
Liquid conductivity(target)	±5.0%	R	$\sqrt{3}$	0.6	0.49	±1.7%	±1.4%	∞
Liquid onductivity(means.)	±2.5%	N	1	0.6	0.49	±1.5%	±1.2%	∞
Combined std. Uncertainty						±10.9%	±10.7%	387
Expanded STD Uncertainty						±21.9%	±21.4%	

Table 6.1 – Measurement uncertainty evaluation

7. RESULTS

7.1 Test result

The measured Head SAR values for the test device are tabulated below:

Mode: GSM 850

f_L (MHz)=824.2MHz

f_M (MHz)=836.4 MHz

f_H (MHz)= 848.8MHz

SAR Values (Head, 850MHz Band)

Limit of SAR (W/kg)	1 g Average
	1.6
Test Case	Measurement Result (mW/g)
	1 g Average
Left hand, Touch cheek, f_H	---
Left hand, Touch cheek, f_M	0.489
Left hand, Touch cheek, f_L	---
Left hand, Tilt 15 Degree, f_M	0.211
Right hand, Touch cheek, f_H	---
Right hand, Touch cheek, f_M	0.454
Right hand, Touch cheek, f_L	---
Right hand, Tilt 15 Degree, f_M	0.176

Mode: GSM1900

f_L (MHz)=1850.2MHz f_M (MHz)=1880.0MHz f_H (MHz)=1909.8MHz

SAR Values (Head, 1900MHz Band)

Limit of SAR (W/kg)	1 g Average
	1.6
Test Case	Measurement Result (mW/g)
	1 g Average
Left hand, Touch cheek , f_H	---
Left hand, Touch cheek, f_M	0.215
Left hand, Touch cheek , f_L	---
Left hand, Tilt 15 Degree, f_M	0.068
Right hand, Touch cheek , f_H	---
Right hand, Touch cheek, f_M	0.162
Right hand, Touch cheek f_L	---
Right hand, Tilt 15 Degree, f_M	0.053

The measured Body SAR values for the test device are tabulated below:

Mode:GSM850

f_L (MHz)=824.2MHz f_M (MHz)=836.4 MHz f_H (MHz)= 848.8MHz

SAR Values (Body, 850MHz Band)

Limit of SAR (W/kg)	1g Average
	1.6
Test Case	Measurement Result (mW/g)
	1g Average
Towards ground with a headset f_L	0.471
Towards ground with a headset f_M	0.598
Towards ground with a headset f_H	0.788
Towards phantom with a headset f_M	0.352

Mode:GSM1900

f_L (MHz)=1850.2MHz f_M (MHz)=1880.0MHz f_H (MHz)=1909.8MHz

SAR Values (Body, 1900MHz Band)

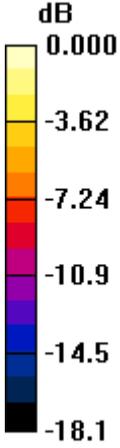
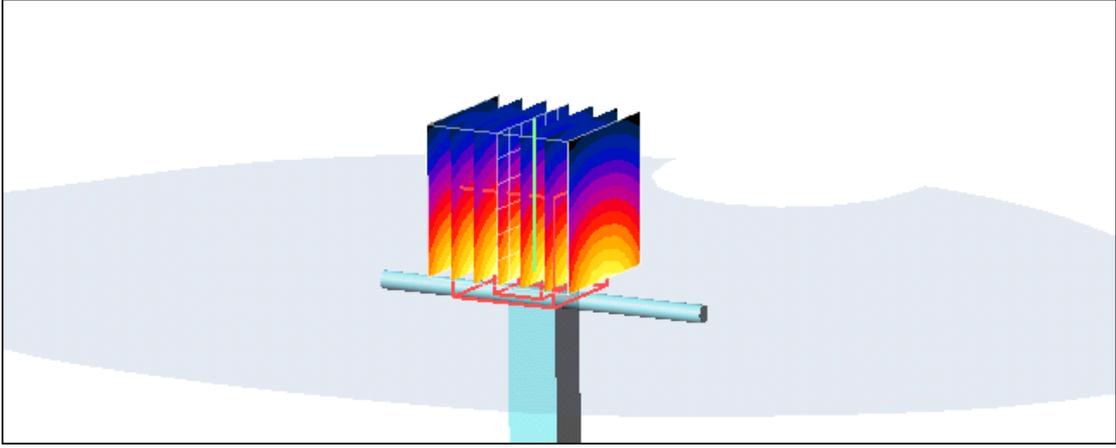
Limit of SAR (W/kg)		1g Average
		1.6
Test Case		Measurement Result (mW/g)
		1g Average
Towards ground with a headset	f_H	---
Towards ground with a headset	f_M	0.150
Towards ground with a headset	f_L	---
Towards phantom with a headset	f_M	0.115

Plots of the Measurement scans are given in Appendix B

7.2 Conducted power

Mode	GSM850(Head) Duty cycle: 1:8(12.5%)			GSM1900(Head) Duty cycle: 1:8(12.5%)		
	128	189	251	512	661	810
Channel	128	189	251	512	661	810
Frequency(MHz)	824.2	836.4	848.8	1850.2	1880.0	1909.8
Measured Power(dBm)	32.5	32.4	32.3	29.8	29.6	29.5

APPENDIX A: SYSTEM CHECKING SCANS

SYSTEM CHECKING SCANS	900MHz
<p>DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:171 Medium parameters used (interpolated): $f = 900 \text{ MHz}$; $\sigma = 0.95 \text{ mho/m}$; $\epsilon_r = 40.7$; $\rho = 1000 \text{ kg/m}^3$</p> <p>DASY4 Configuration:</p> <ul style="list-style-type: none"> - Probe: ES3DV3 - SN3128; ConvF(9.03, 9.53, 9.2); Calibrated: 6/22/2010 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 - SN720; Calibrated: 1/18/2010 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 <p>d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 56.3V/m; Power Drift = -0.047 dB Peak SAR (extrapolated) = 4.08 W/kg SAR(1 g) = 2.72 mW/g; SAR(10 g) = 1.62 mW/g Maximum value of SAR (measured) = 2.9 mW/g</p> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;"> <p>dB</p>  <p>0.000 -3.62 -7.24 -10.9 -14.5 -18.1</p> </div> <div>  </div> </div> <p style="margin-top: 10px;">0 dB = 2.9 mW/g</p>	

SYSTEM CHECKING SCANS

1800 MHz

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:2d084
Program Name: System Performance Check at 1800 MHz

Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 1800$ MHz; $\sigma = 1.35$ mho/m; $\epsilon_r = 39.4$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3128; ConvF(6.15, 6.5, 6.27); Calibrated: 6/22/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 - SN720; Calibrated: 1/18/2010
- Phantom: SAM 1559; Type: SAM; Serial: 1559
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

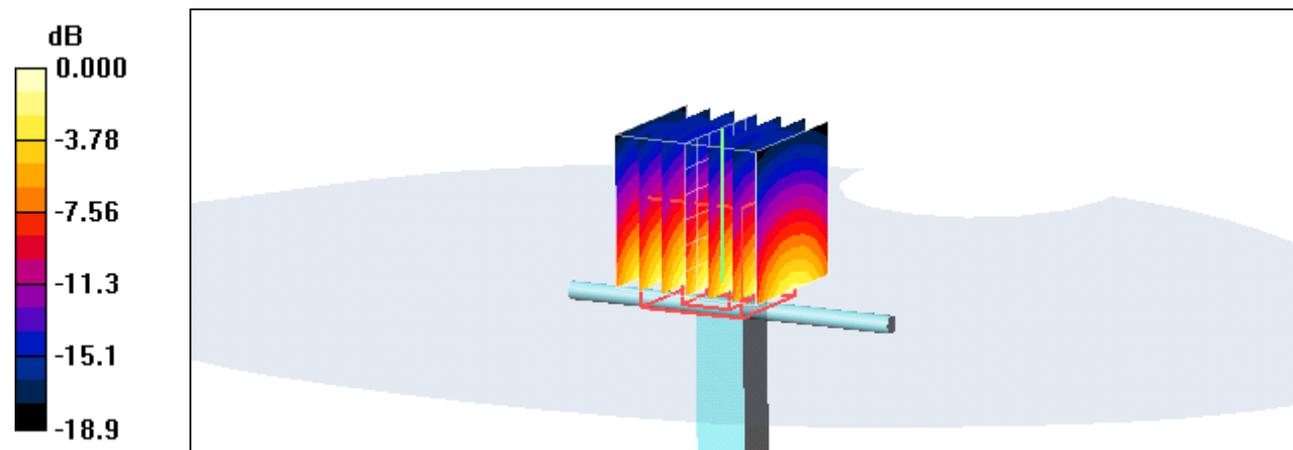
d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.1 V/m; Power Drift = 0.030 dB

Peak SAR (extrapolated) = 17.9 W/kg

SAR(1 g) = 9.71 mW/g; SAR(10 g) = 5.08 mW/g

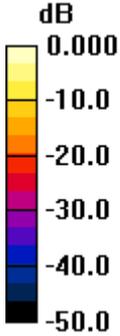
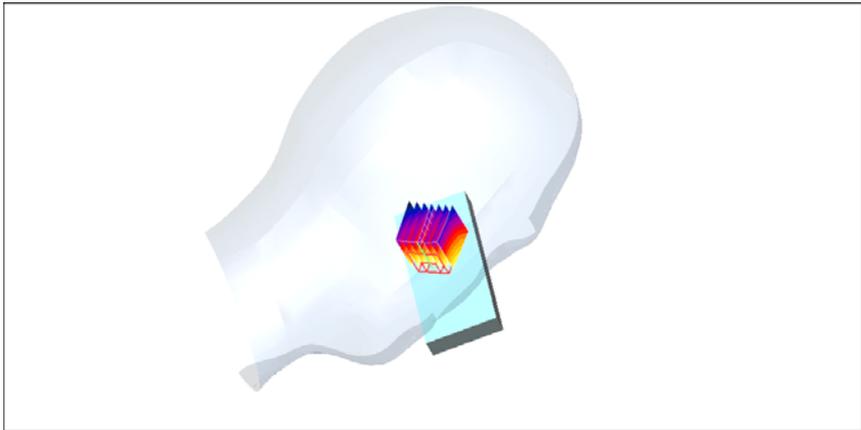
Maximum value of SAR (measured) = 10.9 mW/g

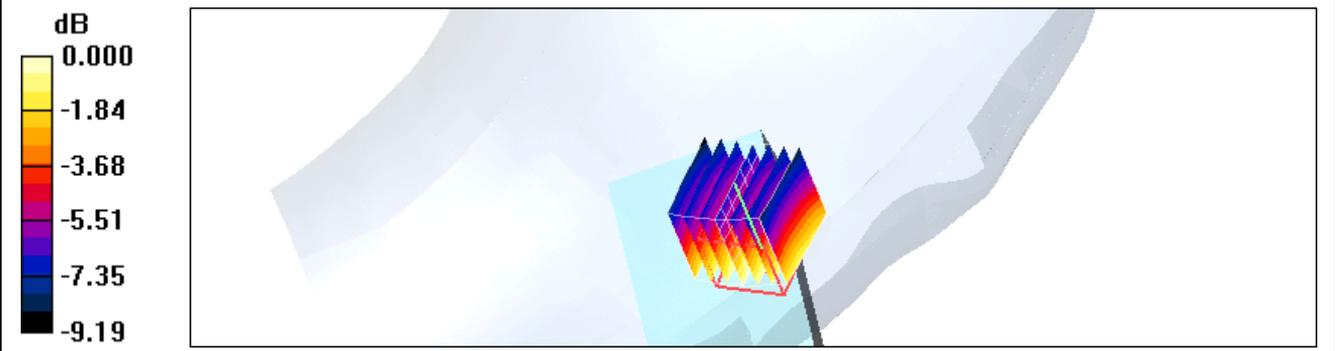


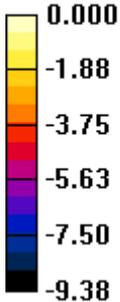
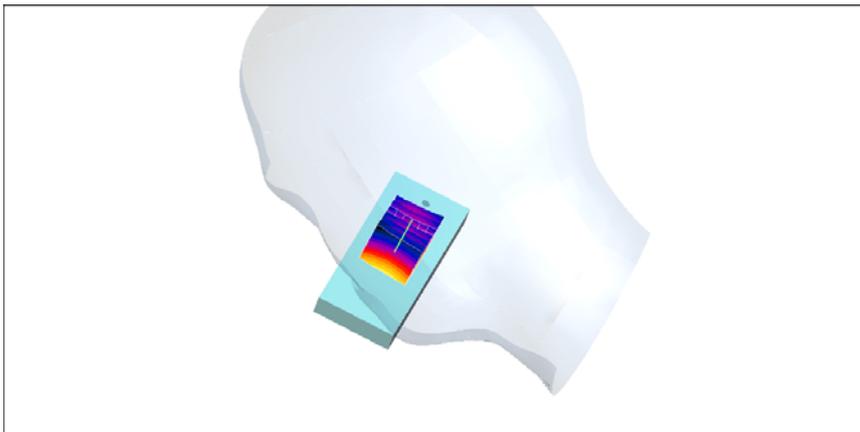
0 dB = 10.9 mW/g

APPENDIX B: MEASUREMENT SCANS

GSM (850MHz/Head)

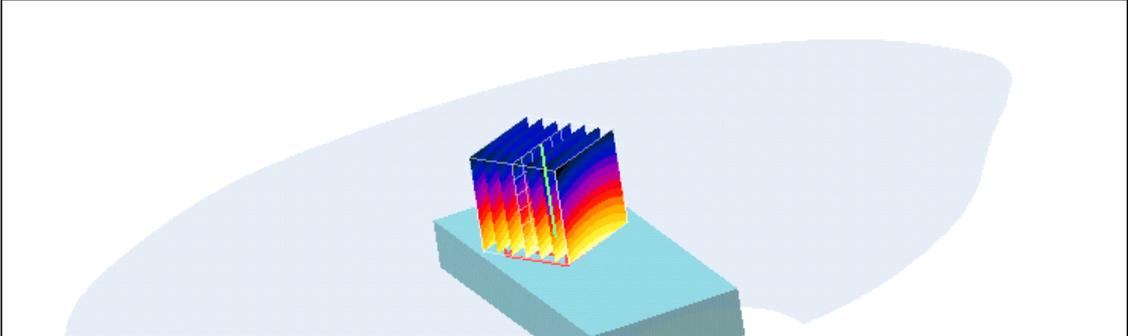
Left Side	Cheek	836.4 MHz
<p>Communication System: GSM 850; Frequency: 836.4 MHz; Duty Cycle: 1:8.3 Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.978$ mho/m; $\epsilon_r = 39.4$; $\rho = 1000$ kg/m³ Phantom section: Left Section</p> <p>DASY4 Configuration: - Probe: ES3DV3 - SN3128; ConvF(7.88, 8.3, 8.05); Calibrated: 6/22/2010 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 - SN720; Calibrated: 1/18/2010 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186</p> <p>Touch position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 5.69 V/m; Power Drift = -0.066 dB Peak SAR (extrapolated) = 0.679 W/kg SAR(1 g) = 0.489 mW/g; SAR(10 g) = 0.328 mW/g Info: Interpolated medium parameters used for SAR evaluation. Maximum value of SAR (measured) = 0.543 mW/g</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>dB</p>  </div> <div style="flex-grow: 1;">  </div> </div> <p style="text-align: center;">0 dB = 0.543 mW/g</p>		

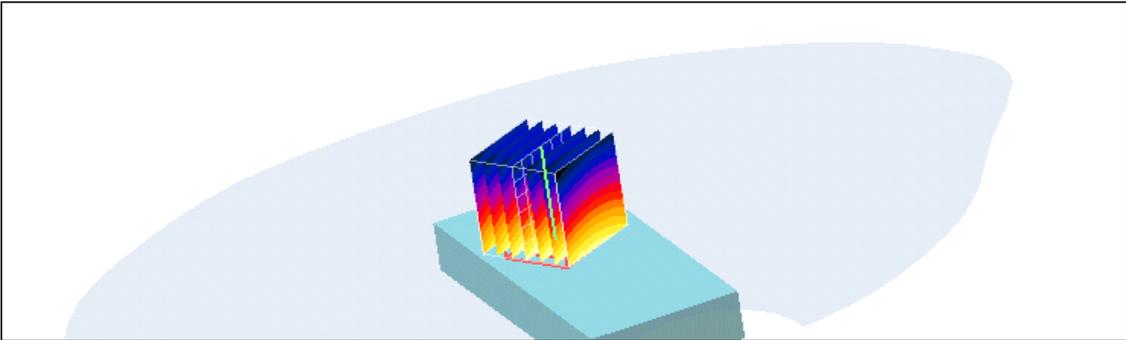
Left Side	Tilt	836.4 MHz
<p>Communication System: GSM 850; Frequency: 836.4 MHz; Duty Cycle: 1:8.3 Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.978$ mho/m; $\epsilon_r = 39.4$; $\rho = 1000$ kg/m³ Phantom section: Left Section</p> <p>DASY4 Configuration: - Probe: ES3DV3 - SN3128; ConvF(7.88, 8.3, 8.05); Calibrated: 6/22/2010 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 - SN720; Calibrated: 1/18/2010 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186</p> <p>Tilt position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 6.78 V/m; Power Drift = -0.008 dB Peak SAR (extrapolated) = 0.274 W/kg SAR(1 g) = 0.211 mW/g; SAR(10 g) = 0.153 mW/g</p> <p>Info: Interpolated medium parameters used for SAR evaluation. Maximum value of SAR (measured) = 0.223 mW/g</p>  <p>0 dB = 0.223mW/g</p>		

Right Side	Cheek	836.4 MHz
<p>Communication System: GSM 850; Frequency: 836.4 MHz; Duty Cycle: 1:8.3 Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.978$ mho/m; $\epsilon_r = 39.4$; $\rho = 1000$ kg/m³ Phantom section: Right Section</p> <p>DASY4 Configuration: - Probe: ES3DV3 - SN3128; ConvF(7.88, 8.3, 8.05); Calibrated: 6/22/2010 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 - SN720; Calibrated: 1/18/2010 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186</p> <p>Touch position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0:</p> <p>Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 4.45 V/m; Power Drift = -0.205 dB Peak SAR (extrapolated) = 0.611 W/kg SAR(1 g) = 0.454 mW/g; SAR(10 g) = 0.318 mW/g Info: Interpolated medium parameters used for SAR evaluation. Maximum value of SAR (measured) = 0.486 mW/g</p>		
<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>dB</p>  <p>0.000 -1.88 -3.75 -5.63 -7.50 -9.38</p> </div> <div style="flex-grow: 1;">  </div> </div> <p style="text-align: center;">0 dB = 0.486mW/g</p>		

Right Side	Tilt	836.4MHz
<p>Communication System: GSM 850; Frequency: 836.4 MHz; Duty Cycle: 1:8.3 Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.978$ mho/m; $\epsilon_r = 39.4$; $\rho = 1000$ kg/m³ Phantom section: Right Section</p> <p>DASY4 Configuration: - Probe: ES3DV3 - SN3128; ConvF(7.88, 8.3, 8.05); Calibrated: 6/22/2010 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 - SN720; Calibrated: 1/18/2010 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186</p> <p>Tilt position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 5.37 V/m; Power Drift = 0.044 dB Peak SAR (extrapolated) = 0.228 W/kg SAR(1 g) = 0.176 mW/g; SAR(10 g) = 0.129 mW/g</p> <p>Info: Interpolated medium parameters used for SAR evaluation. Maximum value of SAR (measured) = 0.187 mW/g</p> <div data-bbox="279 1384 1311 1814"> <p>The figure shows a color scale legend on the left with values: 0.000, -2.28, -4.56, -6.84, -9.12, and -11.4 dB. To the right is a 3D model of a human head with a mobile phone attached to the side. The phone's surface is color-coded to show the SAR distribution, with the highest values (yellow/orange) concentrated on the phone's surface and decreasing (blue/black) as distance from the phone increases.</p> </div> <p>0 dB = 0.187 mW/g</p>		

GSM (850MHz/Flat)

FLAT	Towards ground	836.4 MHz						
<p>Communication System: GSM 850; Frequency: 836.4 MHz; Duty Cycle: 1:8.3 Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.99$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p> <p>DASY4 Configuration: - Probe: ES3DV3 - SN3128; ConvF(6.78, 7.02, 6.8); Calibrated: 6/22/2010 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 - SN720; Calibrated: 1/18/2010 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186</p> <p>Towards ground - Middle/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm Info: Interpolated medium parameters used for SAR evaluation. Maximum value of SAR (measured) = 0.641 mW/g</p> <p>Towards ground - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 19.0 V/m; Power Drift = -0.055 dB Peak SAR (extrapolated) = 0.785 W/kg SAR(1 g) = 0.598 mW/g; SAR(10 g) = 0.428 mW/g Info: Interpolated medium parameters used for SAR evaluation. Maximum value of SAR (measured) = 0.633 mW/g</p>								
<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>dB</p> <table border="1"> <tr><td>0.000</td></tr> <tr><td>-1.98</td></tr> <tr><td>-3.97</td></tr> <tr><td>-5.95</td></tr> <tr><td>-7.94</td></tr> <tr><td>-9.92</td></tr> </table> </div> <div style="flex-grow: 1;">  </div> </div> <p style="text-align: center;">0 dB = 0.633mW/g</p>			0.000	-1.98	-3.97	-5.95	-7.94	-9.92
0.000								
-1.98								
-3.97								
-5.95								
-7.94								
-9.92								

FLAT	Towards ground	824.2 MHz						
<p>Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:8.3 Medium parameters used: $f = 825$ MHz; $\sigma = 0.968$ mho/m; $\epsilon_r = 53.1$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p> <p>DASY4 Configuration: - Probe: ES3DV3 - SN3128; ConvF(6.78, 7.02, 6.8); Calibrated: 6/22/2010 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 - SN720; Calibrated: 1/18/2010 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186</p> <p>Touch position - Low/Area Scan (5x5x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.508 mW/g</p> <p>Touch position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 17.2 V/m; Power Drift = -0.123 dB Peak SAR (extrapolated) = 0.617 W/kg SAR(1 g) = 0.471 mW/g; SAR(10 g) = 0.337 mW/g Maximum value of SAR (measured) = 0.502 mW/g</p>								
<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;"> <p>dB</p> <table border="1"> <tr><td style="background-color: yellow;">0.000</td></tr> <tr><td style="background-color: orange;">-1.98</td></tr> <tr><td style="background-color: red;">-3.97</td></tr> <tr><td style="background-color: purple;">-5.95</td></tr> <tr><td style="background-color: blue;">-7.94</td></tr> <tr><td style="background-color: black;">-9.92</td></tr> </table> </div> <div style="flex-grow: 1;">  <p style="text-align: center;">0 dB = 0.502mW/g</p> </div> </div>			0.000	-1.98	-3.97	-5.95	-7.94	-9.92
0.000								
-1.98								
-3.97								
-5.95								
-7.94								
-9.92								

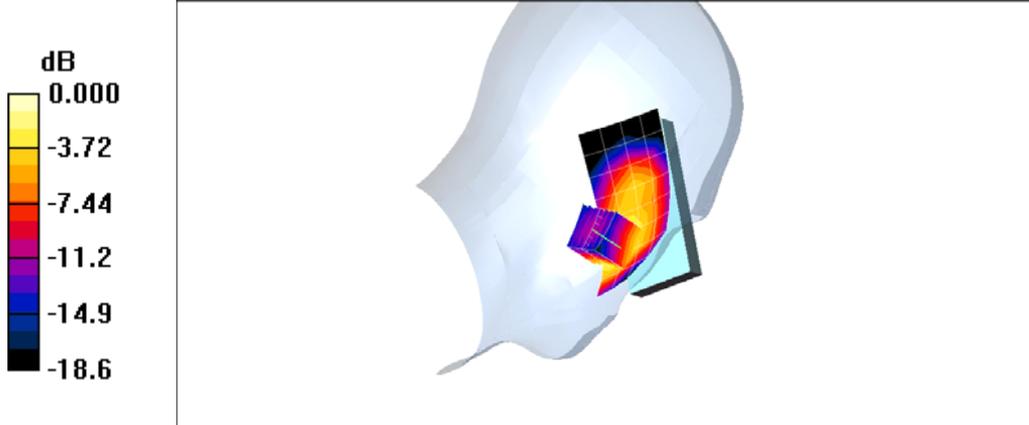
FLAT	Towards ground	848.8 MHz
<p>Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3 Medium parameters used (interpolated): $f = 848.8$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 54.6$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p> <p>DASY4 Configuration: - Probe: ES3DV3 - SN3128; ConvF(6.78, 7.02, 6.8); Calibrated: 6/22/2010 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 - SN720; Calibrated: 1/18/2010 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186</p> <p>towards ground - high/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm Info: Interpolated medium parameters used for SAR evaluation. Maximum value of SAR (measured) = 0.836 mW/g</p> <p>towards ground - high/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 22.0 V/m; Power Drift = -0.039 dB Peak SAR (extrapolated) = 1.03 W/kg SAR(1 g) = 0.788 mW/g; SAR(10 g) = 0.562 mW/g</p> <p>Info: Interpolated medium parameters used for SAR evaluation. Maximum value of SAR (measured) = 0.837 mW/g</p> <div data-bbox="140 1467 1444 1814"> </div> <p>0 dB = 0.837mW/g</p>		

FLAT	Towards phantom	836.4 MHz
<p>Communication System: GSM 850; Frequency: 836.4 MHz; Duty Cycle: 1:8.3 Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.99$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p> <p>DASY4 Configuration: - Probe: ES3DV3 - SN3128; ConvF(6.78, 7.02, 6.8); Calibrated: 6/22/2010 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 - SN720; Calibrated: 1/18/2010 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186</p> <p>Towards ground - Middle/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm Info: Interpolated medium parameters used for SAR evaluation. Maximum value of SAR (measured) = 0.365 mW/g</p> <p>Towards ground - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 15.0 V/m; Power Drift = -0.013 dB Peak SAR (extrapolated) = 0.474 W/kg SAR(1 g) = 0.352 mW/g; SAR(10 g) = 0.245 mW/g</p> <p>Info: Interpolated medium parameters used for SAR evaluation. Maximum value of SAR (measured) = 0.377 mW/g</p> <div data-bbox="140 1467 1444 1814"> </div> <p>0 dB = 0.377mW/g</p>		

GSM (1900MHz/Head)

Right Side	Touch	1880 MHz
<p>Communication System: PCS1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3 Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.44 \text{ mho/m}$; $\epsilon_r = 39$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Right Section</p> <p>DASY4 Configuration: - Probe: ES3DV3 - SN3128; ConvF(4.95, 5.22, 5.06); Calibrated: 6/22/2010 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 - SN720; Calibrated: 1/18/2010 - Phantom: SAM 1559; Type: SAM; Serial: 1559 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186</p> <p>Touch position - Middle/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.163 mW/g</p> <p>Touch position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 2.52 V/m; Power Drift = -0.009 dB Peak SAR (extrapolated) = 0.233 W/kg SAR(1 g) = 0.162 mW/g; SAR(10 g) = 0.103 mW/g Maximum value of SAR (measured) = 0.176 mW/g</p> <div data-bbox="140 1352 1219 1792"> </div> <p>0 dB = 0.176mW/g</p>		

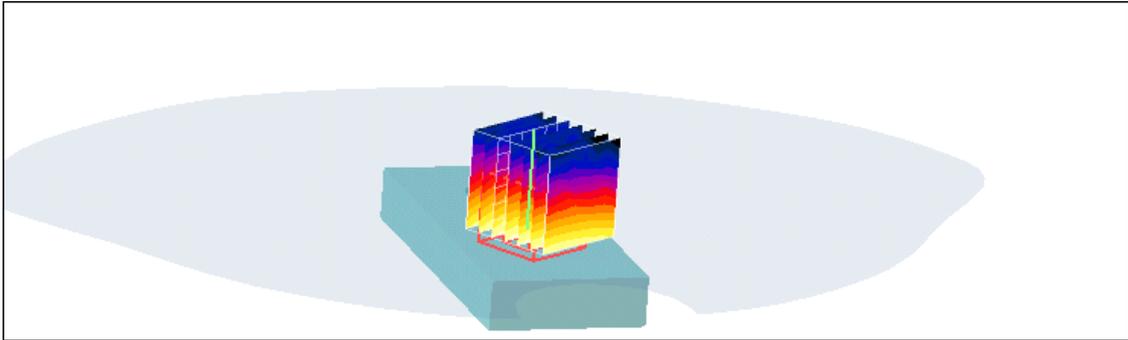
Right Side	Tilt	1880 MHz
<p>Communication System: PCS1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.44$ mho/m; $\epsilon_r = 39$; $\rho = 1000$ kg/m³ Phantom section: Right Section</p> <p>DASY4 Configuration: - Probe: ES3DV3 - SN3128; ConvF(4.95, 5.22, 5.06); Calibrated: 6/22/2010 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 - SN720; Calibrated: 1/18/2010 - Phantom: SAM 1559; Type: SAM; Serial: 1559 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186</p> <p>Tilt position - Middle/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.055 mW/g</p> <p>Tilt position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 4.23 V/m; Power Drift = 0.006 dB Peak SAR (extrapolated) = 0.078 W/kg SAR(1 g) = 0.053 mW/g; SAR(10 g) = 0.035 mW/g Maximum value of SAR (measured) = 0.057 mW/g</p> <div data-bbox="277 1435 1315 1868" style="text-align: center;"> </div> <p style="text-align: center;">0 dB = 0.057mW/g</p>		

Left Side	Cheek	1880 MHz
<p>Communication System: PCS1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.44$ mho/m; $\epsilon_r = 39$; $\rho = 1000$ kg/m³ Phantom section: Left Section</p> <p>DASY4 Configuration: - Probe: ES3DV3 - SN3128; ConvF(4.95, 5.22, 5.06); Calibrated: 6/22/2010 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 - SN720; Calibrated: 1/18/2010 - Phantom: SAM 1559; Type: SAM; Serial: 1559 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186</p> <p>Touch position - Middle/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.199 mW/g</p> <p>Touch position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 1.40 V/m; Power Drift = 0.029 dB Peak SAR (extrapolated) = 0.338 W/kg SAR(1 g) = 0.215 mW/g; SAR(10 g) = 0.123 mW/g Maximum value of SAR (measured) = 0.237 mW/g</p> <div style="text-align: center;">  <p>0 dB = 0.237mW/g</p> </div>		

Left Side	Tilt	1880 MHz
<p>Communication System: PCS1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.44$ mho/m; $\epsilon_r = 39$; $\rho = 1000$ kg/m³ Phantom section: Left Section</p> <p>DASY4 Configuration: - Probe: ES3DV3 - SN3128; ConvF(4.95, 5.22, 5.06); Calibrated: 6/22/2010 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 - SN720; Calibrated: 1/18/2010 - Phantom: SAM 1559; Type: SAM; Serial: 1559 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186</p> <p>Tilt position - Middle/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.072 mW/g</p> <p>Tilt position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 3.24 V/m; Power Drift = -0.069 dB Peak SAR (extrapolated) = 0.094 W/kg SAR(1 g) = 0.068 mW/g; SAR(10 g) = 0.044 mW/g Maximum value of SAR (measured) = 0.074 mW/g</p> <div data-bbox="255 1370 1332 1825"> </div>		

GSM (1900MHz/Flat)

FLAT	Towards ground	1880 MHz
<p>Communication System: PCS1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.57$ mho/m; $\epsilon_r = 53.5$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p> <p>DASY4 Configuration: - Probe: ES3DV3 - SN3128; ConvF(4.53, 4.79, 4.63); Calibrated: 6/22/2010 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 - SN720; Calibrated: 1/18/2010 - Phantom: SAM 1559; Type: SAM; Serial: 1559 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186</p> <p>Towards ground - Middle/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.154 mW/g</p> <p>Towards ground - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 7.97 V/m; Power Drift = 0.011 dB Peak SAR (extrapolated) = 0.231 W/kg SAR(1 g) = 0.150 mW/g; SAR(10 g) = 0.089 mW/g Maximum value of SAR (measured) = 0.164 mW/g</p> <div data-bbox="129 1456 1465 1879"> <p>0 dB = 0.164mW/g</p> </div>		

FLAT	Towards phantom	1880 MHz						
<p>Communication System: PCS1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.57$ mho/m; $\epsilon_r = 53.5$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p>								
<p>DASY4 Configuration: - Probe: ES3DV3 - SN3128; ConvF(4.53, 4.79, 4.63); Calibrated: 6/22/2010 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 - SN720; Calibrated: 1/18/2010 - Phantom: SAM 1559; Type: SAM; Serial: 1559 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186</p>								
<p>Towards ground - Middle/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.123 mW/g</p>								
<p>Towards ground - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 4.90 V/m; Power Drift = 0.027 dB Peak SAR (extrapolated) = 0.183 W/kg SAR(1 g) = 0.115 mW/g; SAR(10 g) = 0.068 mW/g Maximum value of SAR (measured) = 0.125 mW/g</p>								
<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>dB</p> <table border="1"> <tr><td>0.000</td></tr> <tr><td>-2.96</td></tr> <tr><td>-5.92</td></tr> <tr><td>-8.88</td></tr> <tr><td>-11.8</td></tr> <tr><td>-14.8</td></tr> </table> </div> <div style="flex-grow: 1;">  </div> </div>			0.000	-2.96	-5.92	-8.88	-11.8	-14.8
0.000								
-2.96								
-5.92								
-8.88								
-11.8								
-14.8								

APPENDIX C: RELEVANT PAGES FROM PROBE CALIBRATION REPORT(S)

The State Radio_monitoring_center Testing Center

Calibration Certificate



Dosimetric E-field Probe

Instrument	
Type/Model	ES3DV3
Manufacturer	Schmid & Partner Engineering AG
Serial No	SN:3128
Name of Client	The State Radio_monitoring_center Testing Center
Address of Client	No.98 Bei Lishi Road XiCheng District
Calibration Date	2010.6.22

All calibrations have been conducted in the closed laboratory facility: environment temperature (22±3) °C and humidity<70%

Approved by  

Tel: +86-10-68009202 68009203 Fax: +86-10-68009205 68009195
Add: No.80 Bei Lishi Road, Xi Cheng District Beijing 100037, P.R.China

Page 1 of 6 Certificate No.SRTC2010-CAL002-004

The State Radio_monitoring_center Testing Center

Reference documents of the measurement(Code, Name) SRTC3003-V1.0.0 Working procedure for calibration——SAR testing system
Place and environmental condition of the measurement Temperature 22.1℃ Humidity 24.8% Location SRTC226 room

Primary Calibration Equipment used	Model/Type	ID#	Cal Date	Scheduled Calibration
Power meter	E4417A	SN: MY45101004	2009.8	2010.8
Power sensor	E9300B	SN: MY41496001	2009.8	2010.8
Power sensor	E9300B	SN: MY41496003	2009.8	2010.8
Reference DAE	DAE4	SN: 720	2010.1	2011.1
Signal generator	SML03	SN:103514	2009.8	2010.8
Network analyzer	8714ET	SN:US40372083	2009.8	2010.8
Secondary Calibration Equipment used	Model/Type	ID#		
Waveguide	WGLS R9	SN:1006		
Waveguide	WGLS R14	SN:1003		
Waveguide	WGLS R22	SN:1006		

The State Radio_monitoring_center Testing Center

Note:

1. This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.
2. This calibration certificate is not permitted to be reproduced except in full without written the approval of the only laboratory
3. SRTC is responsible for the whole of certificate only with stamp of SRTC.
4. The calibration results would be valid only for the items calibration.
5. The certification is written by Chinese and English. Exact meaning should be explained only on Chinese version.

The State Radio_monitoring_center Testing Center

Glossary

TSL	Tissue Simulating Liquid
NORM _{x, y, z}	The sensitivity in free space
ConvF	The sensitivity of the TSL/The sensitivity in free space
DCP	Diode Compression Point
Angle ϕ	ϕ rotation around probe axis
Angle θ	θ rotation around an axis that is in the plane normal to probe axis i.e. $\theta=0$, means that is normal to probe axis

Calibration is preformed according to the Following Standards

IEEE Std 1528-2003
IEC 62209-1-2005
Federal Communication Commission Office of Engineering & Technology (FCC OET)

Methods Applied and Interpretation of Parameters

- NORM_{x, y, z}: Assessed for E-field polarization $\theta=0$ for XY sensors and $\theta=90$ for Z sensor
- NORM(f)_{x, y, z}= NORM_{x, y, z} * frequency_response. And this linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the states uncertainty of ConvF.
- DCP_{x,y,z}: DCP are numerical linearization parameters assessed based on the data of power sweep(no uncertainty required). DCP does not depend on frequency and medium.
- ConvF and boundary effect: Assessed in flat phantom using E-field and inside waveguide using analytical field distributions based on power measurements for $f > 800\text{MHz}$.The same setups are used for assessment of the parameters applied for boundary compensation(alpha,depth)of which typical uncertainty values are given. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from $\pm 50\text{MHz}$ to $\pm 100\text{MHz}$.
- Spherical isotropy: in a locally homogeneous field realized using an open waveguide setup.

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Page 4 of 6 Certificate No.SRTC2010-CAL002-004

The State Radio_monitoring_center Testing Center

Measurement Conditions

DASY versions	DSAY 5	V5.0 Build 126
Model	Flat phantom	——

Probe Sensitivity Parameters

	Value	Unit
Axis X	1.00	$\mu V / (V / m)^2$
Axis Y	1.00	$\mu V / (V / m)^2$
Axis Z	1.00	$\mu V / (V / m)^2$

1. Diode Compression Point

	Value	Unit	Uncertainty (k=2)
Axis X	97.4	mV	10.82%
Axis Y	101.4	mV	10.82%
Axis Z	100.7	mV	10.82%

2. Probe Conversion Factors: Head Tissue Liquid

Frequency (MHz)	Validity (MHz)	Permittivity	Conductivity (mho/m)	Alpha	Depth (mm)	ConvFx / ConvFy / ConvFz $\mu V / (V / m)^2$	Uncertainty (k = 2)
835	±100	41.93	0.916	0.448	1.499	7.880 8.301 8.050	13.02%
900	±100	42.72	0.968	0.607	1.271	9.029 9.525 9.201	13.02%
1800	±100	39.61	1.354	0.312	2.126	6.154 6.495 6.273	13.02%
1900	±100	39.11	1.463	0.381	1.832	4.947 5.220 5.055	13.02%

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Page 5 of 6 Certificate No.SRTC2010-CAL002-004

The State Radio_monitoring_center Testing Center

3. Probe Conversion Factors: Body Tissue Liquid

Frequency (MHz)	Validity (MHz)	Permittivity	Conductivity (mho/m)	Alpha	Depth (mm)	ConvFx/ ConvFy/ConvFz			Uncertainty (k = 2)
						$\mu V / (V / m)^2$			
835	±100	54.05	0.983	0.508	1.412	6.776	7.019	6.804	13.02%
900	±100	54.48	1.055	0.672	1.244	8.755	9.243	8.919	13.02%
1800	±100	53.74	1.567	0.316	2.446	5.702	6.018	5.816	13.02%
1900	±100	54.42	1.465	0.330	2.414	4.532	4.785	4.632	13.02%

4. Probe Isotropy

	Value	Unit	Uncertainty(k=2)
Axial Isotropy	-0.071	dB	10.18%
Spherical Isotropy	-0.171	dB	10.18%

Calibrated by 张明远

Checked by 刘 梅

**APPENDIX D: RELEVANT PAGES FROM DIPOLE VALIDATION KIT
REPORT(S)**

The State Radio_monitoring_center Testing Center

Calibration Certificate



Instrument Dipole

Type/Model D900V2

Manufacturer Schmid & Partner Engineering AG

Serial No SN:171

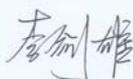
Name of Client The State Radio_monitoring_center Testing Center

Address of Client No.98 Bei Lishi Road XiCheng District

Calibration Date 2010.6.11

All calibrations have been conducted in the closed laboratory facility: environment temperature (22±3) °C and humidity<70%

Approved by



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Page 1 of 8 Certificate No.SRTC2010-CAL003-003

The State Radio_monitoring_center Testing Center

Reference documents of the measurement(Code, Name)
SRTC3003-V1.0.0 Working procedure for calibration of SAR Testing system
Place and environmental condition of the measurement
Temperature 21.6℃ Humidity 30.7%
Location SRTC Room226

Primary Calibration Equipment used	Model/Type	ID#	Cal Date	Scheduled Calibration
Power meter	E4417A	SN: MY45101004	2009.8	2010.8
Power sensor	E9300B	SN: MY41496001	2009.8	2010.8
Power sensor	E9300B	SN: MY41496003	2009.8	2010.8
Reference DAE	DAE4	SN: 720	2010.1	2011.1
Reference probe	ES3DV3	SN: 3128	2009.6	2010.6
Secondary Calibration Equipment used	Model/Type	ID#	Cal Date	Scheduled Calibration
Signal generator	SML03	SN:103514	2009.8	2010.8
Network analyzer	8714ET	SN:US40372083	2009.8	2010.8

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Page 2 of 8 Certificate No.SRTC2010-CAL003-003

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The State Radio_monitoring_center Testing Center

Glossary

TSL	Tissue Simulating Liquid
ConvF	The sensitivity of the TSL / sensitivity in TSL/NORM x, y, z
N/A	not applicable or not measured

Calibration is preformed according to the Following Standards

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in Human Head from Wireless Communication Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz) ", February 2005
- c) Federal Communication Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- e) DASY System Handbook

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Page 4 of 8 Certificate No.SRTC2010-CAL003-003

The State Radio_monitoring_center Testing Center

Methods Applied and Interpretation of Parameters

- Measurement Conditions: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- SAR measured: SAR measured at the stated antenna input power
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY Version	DSAY 5	V5.0 Build 126
Extrapolation	Advanced Extrapolation	——
Phantom	ELI4	——
Distance Dipole Center-TSL	15mm	With spacer (See note)
Area Scan Resolution	dx,dy=15mm	——
Zoom Scan Resolution	dx,dy,dz=5mm	——
Frequency	900MHz	——

Note: As client can not provide a spacer for their dipole, we used a alternate method to define the distance from dipole center to TSL. Pictures in Annex 3 show the details.

The State Radio_monitoring_center Testing Center

Head TSL Parameters

The following parameters and calculation were applied

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0°C	41.5	0.97mho/m
Measured Head TSL parameters	(22±0.5)°C	41.2	0.95m±5%
Head TSL temperature during test	(21.6±0.6)°C	—	—

1. SAR-Head TSL

SAR -1g SAR averaged over 1cm ³ (1g) of Head TSL	Condition	—
SAR measured	250mW input power	2.70mW/g
SAR normalized	normalized to 1W	10.80mW/g
SAR for nominal Head TSL parameters	normalized to 1W	10.71 mW/g±15.20%(k=2)

SAR-10g SAR averaged over 10cm ³ (10g) of Head TSL	Condition	—
SAR measured	250mW input power	1.72mW/g
SAR normalized	normalized to 1W	6.88mW/g
SAR for nominal Head TSL parameters	normalized to 1W	6.80mW/g±14.38%(k=2)

The State Radio_monitoring_center Testing Center

2. Annex

Annex 1

Date/Time: 6/11/2010 8:30:47 AM

Test Laboratory: SRTC, Beijing, China

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:171

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 900$ MHz; $\sigma = 0.949$ mho/m; $\epsilon_r = 41.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: ES3DV3 - SN3128; ConvF(5.52, 5.52, 5.52); Calibrated: 6/22/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn720; Calibrated: 1/18/2010
- Phantom: ELI 4.0; Type: QDOVA001BA
- Measurement SW: DASYS, V5.0 Build 126; SEMCAD X Version 13.4 Build 125

Pin=250mW;d=15mm /Zoom Scan (7x7x7) (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.3 V/m; Power Drift = -0.025 dB

Peak SAR (extrapolated) = 4.18 W/kg

SAR(1 g) = 2.7 mW/g; SAR(10 g) = 1.72 mW/g

Maximum value of SAR (measured) = 2.93 mW/g



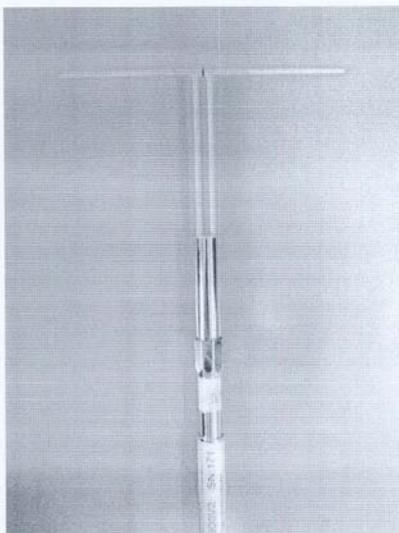
0 dB = 2.93mW/g

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The State Radio_monitoring_center Testing Center

Annex 2



Calibrated by 张明远

Checked by 刘翔

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**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zoughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL tissue simulating liquid
ConvF sensitivity in TSL / NORM x,y,z
N/A not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result..

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz \pm 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 \pm 0.2) °C	40.4 \pm 6 %	0.88 mho/m \pm 6 %
Head TSL temperature during test	(22.0 \pm 0.2) °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.37 mW / g
SAR normalized	normalized to 1W	9.48 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	9.46 mW / g \pm 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.56 mW / g
SAR normalized	normalized to 1W	6.24 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	6.21 mW / g \pm 16.5 % (k=2)

¹ Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.4 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.42 mW / g
SAR normalized	normalized to 1W	9.68 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	9.36 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.60 mW / g
SAR normalized	normalized to 1W	6.40 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	6.24 mW / g ± 16.5 % (k=2)

² Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.9 Ω - 2.6 j Ω
Return Loss	-25.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.3 Ω - 4.5 j Ω
Return Loss	- 27.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.390 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 04, 2005

DASY4 Validation Report for Head TSL

Date/Time: 16.06.2008 10:59:00

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d023

Communication System: CW-835; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: HSL 900 MHz;

Medium parameters used: $f = 835$ MHz; $\sigma = 0.88$ mho/m; $\epsilon_r = 40.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(5.97, 5.97, 5.97); Calibrated: 28.04.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

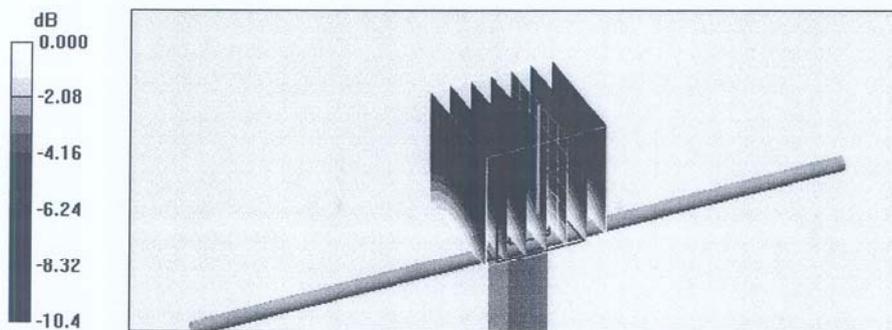
Pin=250mW; dip=15mm; dist=3.4mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.5 V/m; Power Drift = -0.056 dB

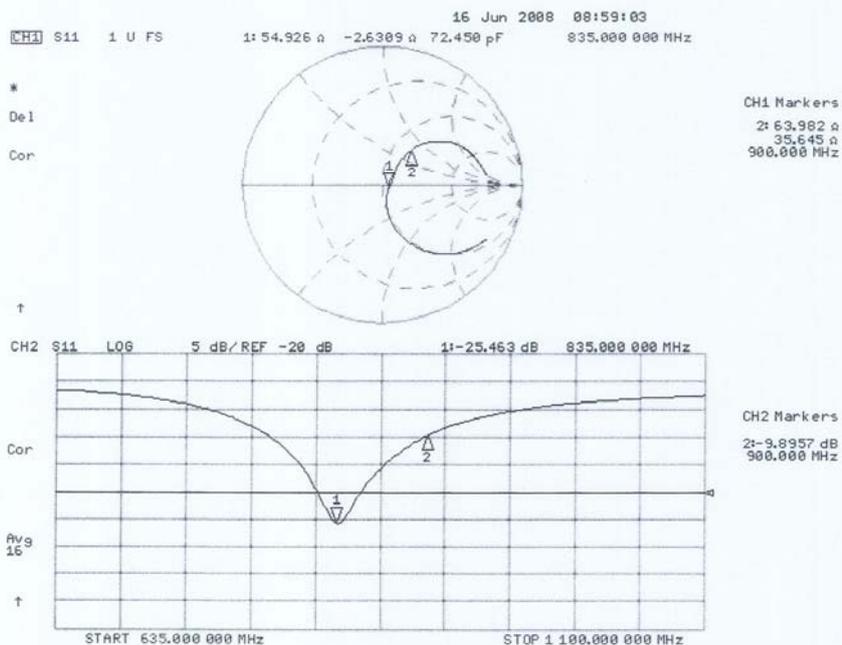
Peak SAR (extrapolated) = 3.48 W/kg

SAR(1 g) = 2.37 mW/g; SAR(10 g) = 1.56 mW/g

Maximum value of SAR (measured) = 2.68 mW/g



Impedance Measurement Plot for Head TSL



DASY4 Validation Report for Body TSL

Date/Time: 06.06.2008 12:44:11

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d023

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: MSL900;

Medium parameters used: $f = 835$ MHz; $\sigma = 0.99$ mho/m; $\epsilon_r = 53.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(5.9, 5.9, 5.9); Calibrated: 28.04.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

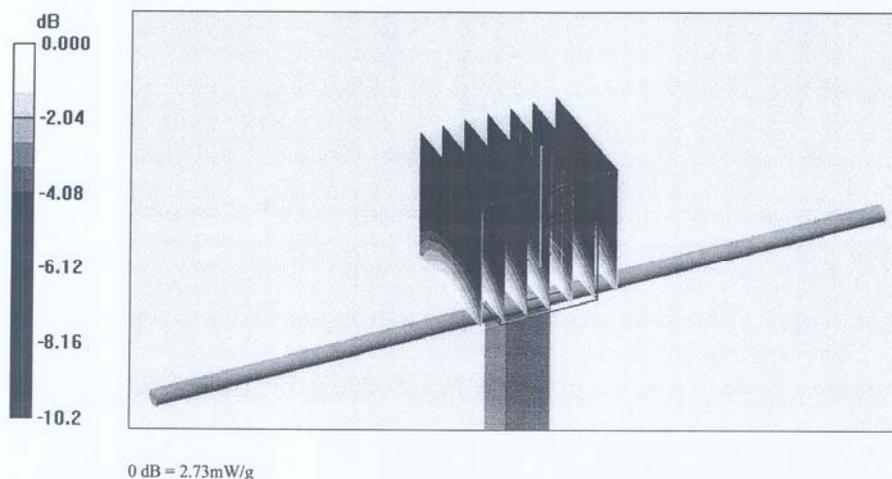
Pin = 250mW, d = 15mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.7 V/m; Power Drift = 0.008 dB

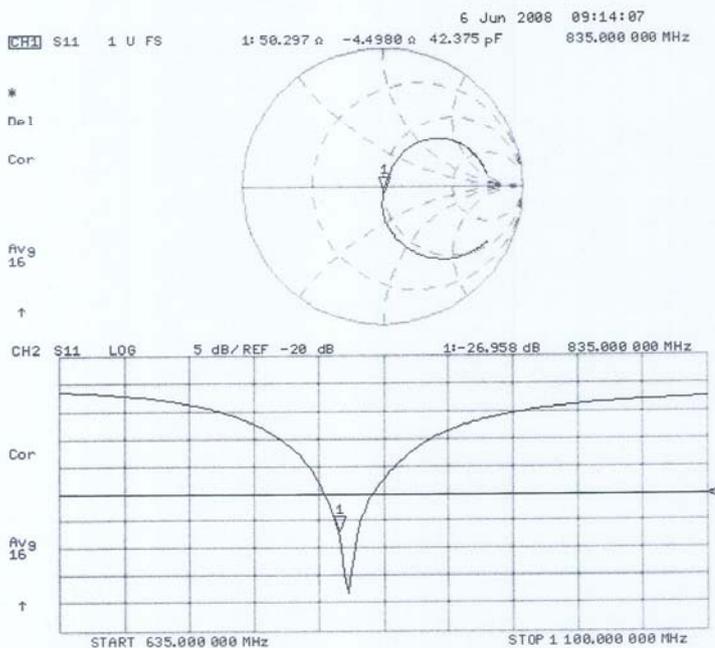
Peak SAR (extrapolated) = 3.49 W/kg

SAR(1 g) = 2.42 mW/g; SAR(10 g) = 1.6 mW/g

Maximum value of SAR (measured) = 2.73 mW/g



Impedance Measurement Plot for Body TSL



The State Radio_monitoring_center Testing Center

Calibration Certificate



Instrument Dipole

Type/Model D1800V2

Manufacturer Schmid & Partner Engineering AG

Serial No SN:2d084

Name of Client The State Radio_monitoring_center Testing Center

Address of Client No.98 Bei Lishi Road XiCheng District

Calibration Date 2010.6.11

All calibrations have been conducted in the closed laboratory facility: environment temperature (22±3) °C and humidity<70%

Approved by

A handwritten signature in black ink, appearing to be '李刚' (Li Gang).



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The State Radio_monitoring_center Testing Center

Reference documents of the measurement(Code, Name)	
SRMC3003-V1.0.0 Working procedure for calibration of SAR Testing system	
Place and environmental condition of the measurement	
Temperature 21.6℃	Humidity 30.7%
Location SRTC Room226	

Primary Calibration Equipment used	Model/Type	ID#	Cal Date	Scheduled Calibration
Power meter	E4417A	SN: MY45101004	2009.8	2010.8
Power sensor	E9300B	SN: MY41496001	2009.8	2010.8
Power sensor	E9300B	SN: MY41496003	2009.8	2010.8
Reference DAE	DAE4	SN: 720	2010.1	2011.1
Reference probe	ES3DV3	SN: 3128	2009.6	2010.6
Secondary Calibration Equipment used	Model/Type	ID#	Cal Date	Scheduled Calibration
Signal generator	SML03	SN:103514	2009.8	2010.8
Network analyzer	8714ET	SN:US40372083	2009.8	2010.8

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The State Radio_monitoring_center Testing Center

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Page 3 of 8 Certificate No.SRTC2010-CAL003-004

The State Radio_monitoring_center Testing Center

Glossary

TSL	Tissue Simulating Liquid
ConvF	The sensitivity of the TSL / sensitivity in TSL/NORM x, y, z
N/A	not applicable or not measured

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- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- c) Federal Communication Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- e) DASY System Handbook

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Add: No.80 Bei Lishi Road, Xi Cheng District Beijing 100037, P.R.China

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The State Radio_monitoring_center Testing Center

Methods Applied and Interpretation of Parameters

- Measurement Conditions: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- SAR measured: SAR measured at the stated antenna input power
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY Version	DSAY 5	V5.0 Build 126
Extrapolation	Advanced Extrapolation	——
Phantom	ELI4	——
Distance Dipole Center-TSL	10mm	With spacer (See note)
Area Scan Resolution	dx,dy=10mm	——
Zoom Scan Resolution	dx,dy,dz=5mm	——
Frequency	1800MHz	——

Note: As client can not provide a spacer for their dipole, we used a alternate method to define the distance from dipole center to TSL. Pictures in Annex 3 show the details.

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Head TSL Parameters

The following parameters and calculation were applied

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0°C	40.0	1.40mho/m
Measured Head TSL parameters	(22±0.5)°C	39.2	1.35m±5%
Head TSL temperature during test	(21.6±0.6)°C	——	——

1. SAR-Head TSL

SAR -1g SAR averaged over 1cm ³ (1g) of Head TSL	Condition	——
SAR measured	250mW input power	9.55mW/g
SAR normalized	normalized to 1W	38.20mW/g
SAR for nominal Head TSL parameters	normalized to 1W	37.62 mW/g±15.20%(k=2)

SAR-10g SAR averaged over 10cm ³ (10g) of Head TSL	Condition	——
SAR measured	250mW input power	5.09mW/g
SAR normalized	normalized to 1W	20.36mW/g
SAR for nominal Head TSL parameters	normalized to 1W	20.13mW/g±14.38%(k=2)

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2. Annex

Annex 1

Date/Time: 6/11/2010 8:30:47 AM

Test Laboratory: SRTC, Beijing, China

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 2d084

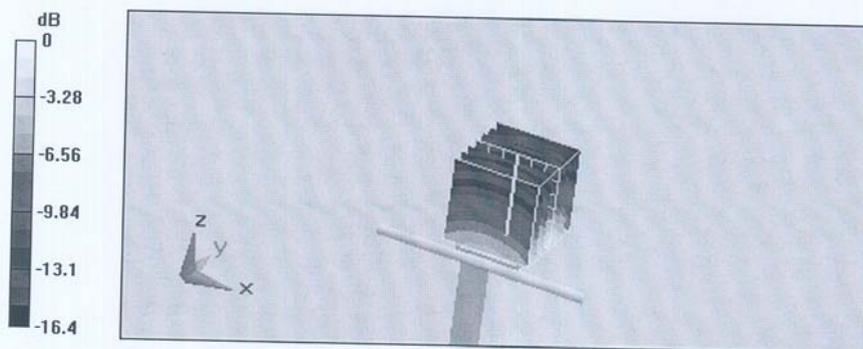
Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1800$ MHz; $\sigma = 1.35$ mho/m; $\epsilon_r = 39.2$; $\rho = 1000$ kg/m³
Phantom section: Flat Section
Measurement Standard: DASYS (IEEE/IEC)

DASY4 Configuration:

- Probe: ES3DV3 - SN3128; ConvF(4.93, 4.93, 4.93); Calibrated: 6/22/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn720; Calibrated: 1/18/2010
- Phantom: ELI 4.0; Type: QDOVA001BA
- Measurement SW: DASYS, V5.0 Build 126; SEMCAD X Version 13.4 Build 125

Pin=250mW;d=10mm/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89 V/m; Power Drift = -0.119 dB
Peak SAR (extrapolated) = 17.2 W/kg
SAR(1 g) = 9.55 mW/g; SAR(10 g) = 5.09 mW/g
Maximum value of SAR (measured) = 10.7 mW/g



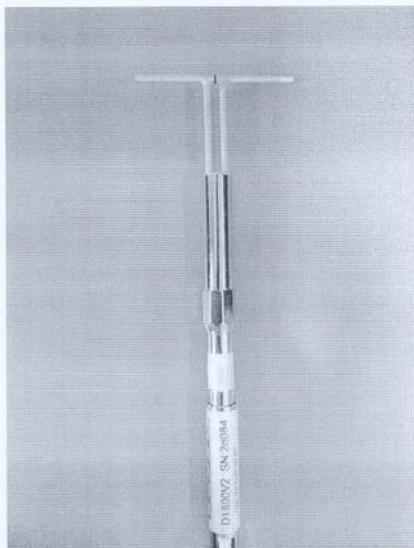
0 dB = 10.7mW/g

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Annex 2



Calibrated by 张明远

Checked by 孙海

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**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V5.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.8 ± 6 %	1.45 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	condition	
SAR measured	250 mW input power	10.2 mW / g
SAR normalized	normalized to 1W	40.8 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	40.1 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.32 mW / g
SAR normalized	normalized to 1W	21.3 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	21.1 mW / g ± 16.5 % (k=2)

¹ Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.5 Ω + 5.5 j Ω
Return Loss	- 25.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.202 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 24, 2009

DASY5 Validation Report for Head TSL

Date/Time: 05.08.2009 14:47:20

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d113

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL U11 BB

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.45$ mho/m; $\epsilon_r = 40.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

Pin = 250 mW; dip = 10 mm, scan at 3.0 mm/Zoom Scan (dist=3.0 mm, probe 0deg)

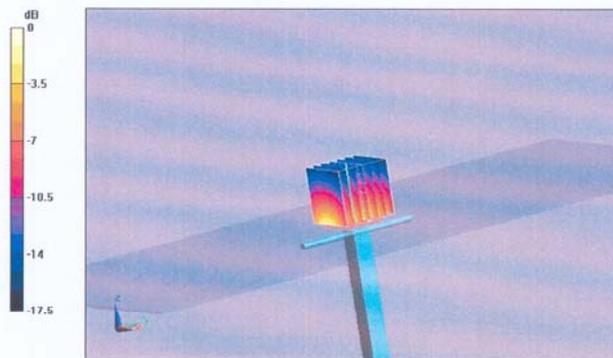
(7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.4 V/m; Power Drift = 0.017 dB

Peak SAR (extrapolated) = 18.6 W/kg

SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.32 mW/g

Maximum value of SAR (measured) = 12.5 mW/g



0 dB = 12.5mW/g

Impedance Measurement Plot for Head TSL

