

Test Laboratory: HUAWEI SAR/HAC Lab

### CHC-U23 UMTS Band II 9400CH Right hand touch check with battery 2#

**DUT: HUAWEI CHC-U23; Type: Smart Phone; Serial: SAR4**

Communication System: UID 0, HW-UMTS-FDD(WCDMA) (0); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.383$  S/m;  $\epsilon_r = 39.068$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY Configuration:

- Probe: EX3DV4 - SN3744; ConvF(7.6, 7.6, 7.6); Calibrated: 2014-7-24;
- Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn851; Calibrated: 2014-7-24
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (8x13x1):** Measurement grid:  $dx=15$ mm,  $dy=15$ mm

Maximum value of SAR (measured) = 0.161 W/kg

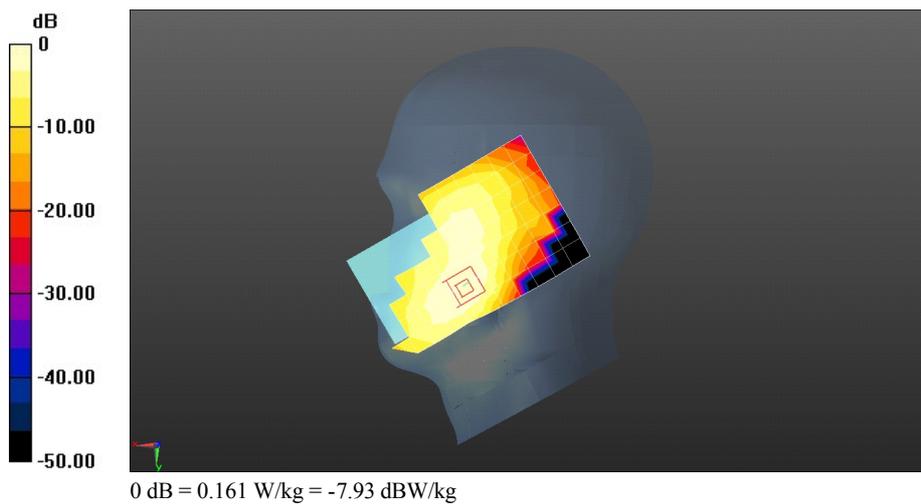
**Configuration/Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 2.752 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 0.219 W/kg

**SAR(1 g) = 0.141 W/kg; SAR(10 g) = 0.086 W/kg**

Maximum value of SAR (measured) = 0.166 W/kg



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## CHC-U23 UMTS Band II 9400CH Back Side 15mm-SIM 2

**DUT: HUAWEI CHC-U23; Type: Smart Phone; Serial: SAR3**

Communication System: UID 0, HW-UMTS-FDD(WCDMA) (0); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.556$  S/m;  $\epsilon_r = 52.517$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3744; ConvF(7.17, 7.17, 7.17); Calibrated: 2014-7-24;
- Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn851; Calibrated: 2014-7-24
- Phantom: SAM2; Type: SAM; Serial: TP:1474
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (7x13x1):** Measurement grid:  $dx=15$ mm,  $dy=15$ mm

Maximum value of SAR (measured) = 0.441 W/kg

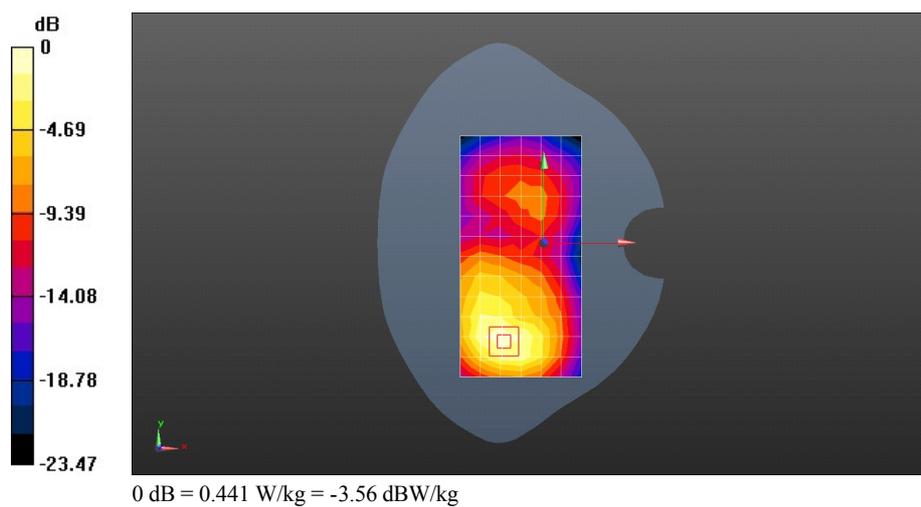
**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 4.058 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.611 W/kg

**SAR(1 g) = 0.375 W/kg; SAR(10 g) = 0.217 W/kg**

Maximum value of SAR (measured) = 0.456 W/kg



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### CHC-U23 UMTS Band II 9538CH Back Side 10mm-SIM2

**DUT: HUAWEI CHC-U23; Type: Smart Phone; Serial: SAR3**

Communication System: UID 0, HW-UMTS-FDD(WCDMA) (0); Frequency: 1907.6 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1908$  MHz;  $\sigma = 1.59$  S/m;  $\epsilon_r = 52.457$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3744; ConvF(7.17, 7.17, 7.17); Calibrated: 2014-7-24;
- Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn851; Calibrated: 2014-7-24
- Phantom: SAM2; Type: SAM; Serial: TP:1474
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (7x13x1):** Measurement grid:  $dx=15$ mm,  $dy=15$ mm

Maximum value of SAR (measured) = 0.842 W/kg

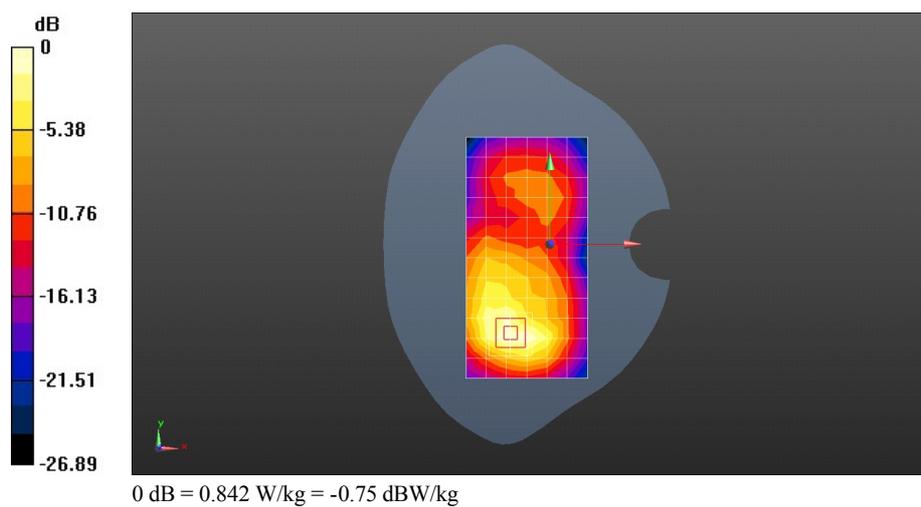
**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 6.005 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 1.37 W/kg

**SAR(1 g) = 0.797 W/kg; SAR(10 g) = 0.430 W/kg**

Maximum value of SAR (measured) = 0.992 W/kg



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### CHC-U23 WIFI 802.11b 11CH Left hand touch cheek with battery 2#

**DUT: HUAWEI CHC-U23; Type: Smart Phone; Serial: SAR5**

Communication System: UID 0, WiFi(802.11a/b/g/n/ac) (0); Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2462$  MHz;  $\sigma = 1.844$  S/m;  $\epsilon_r = 39.401$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY Configuration:

- Probe: EX3DV4 - SN3744; ConvF(7.08, 7.08, 7.08); Calibrated: 2014-7-24;
- Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn851; Calibrated: 2014-7-24
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (9x15x1):** Measurement grid:  $dx=12$ mm,  $dy=12$ mm

Maximum value of SAR (measured) = 0.563 W/kg

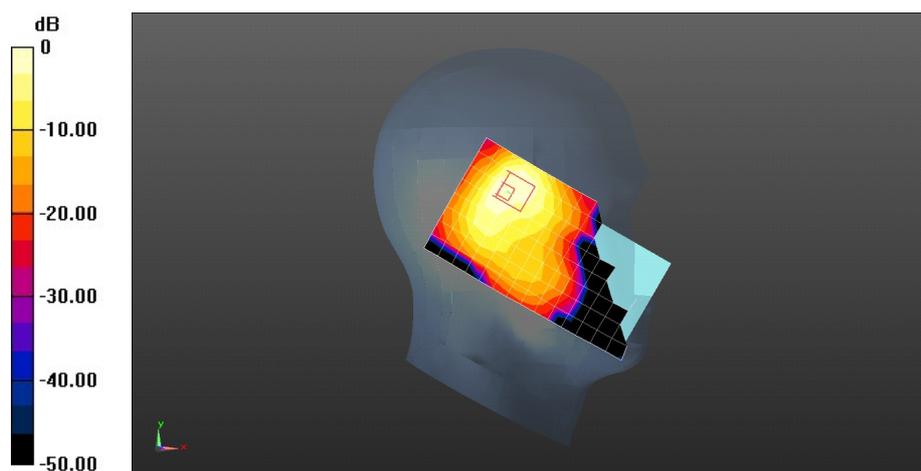
**Configuration/Head/Zoom Scan (8x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 12.86 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 1.20 W/kg

**SAR(1 g) = 0.489 W/kg; SAR(10 g) = 0.237 W/kg**

Maximum value of SAR (measured) = 0.644 W/kg



0 dB = 0.563 W/kg = -2.49 dBW/kg

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### CHC-U23 WiFi 802.11b 11CH Back Side 15mm with battery 2#

**DUT: HUAWEI CHC-U23; Type: Smart Phone; Serial: SAR5**

Communication System: UID 0, WiFi(802.11a/b/g/n/ac) (0); Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2462$  MHz;  $\sigma = 1.993$  S/m;  $\epsilon_r = 52.176$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3744; ConvF(6.69, 6.69, 6.69); Calibrated: 2014-7-24;
- Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn851; Calibrated: 2014-7-24
- Phantom: SAM2; Type: SAM; Serial: TP:1474
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (9x15x1):** Measurement grid:  $dx=12$ mm,  $dy=12$ mm

Maximum value of SAR (measured) = 0.0734 W/kg

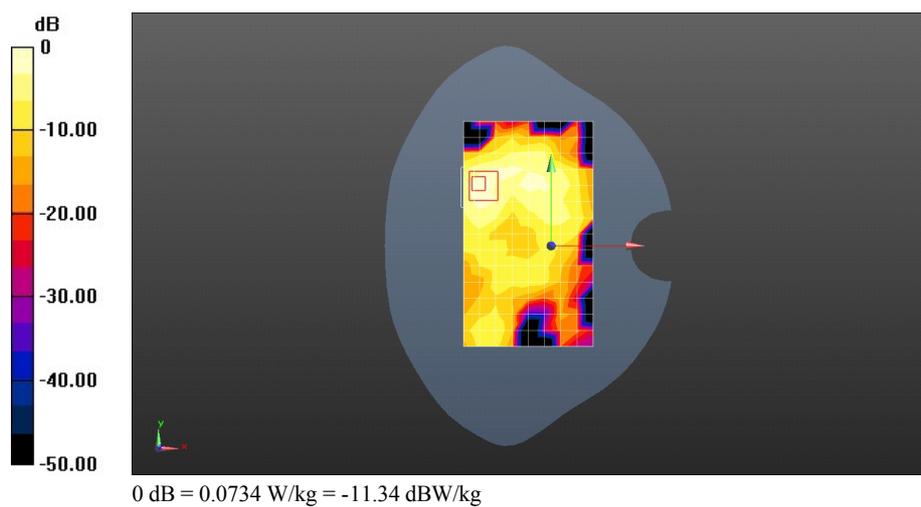
**Configuration/Body/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 1.630 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.145 W/kg

**SAR(1 g) = 0.054 W/kg; SAR(10 g) = 0.021 W/kg**

Maximum value of SAR (measured) = 0.104 W/kg



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### CHC-U23 WiFi 802.11b 11CH Back Side 10mm

**DUT: HUAWEI CHC-U23; Type: Smart Phone; Serial: SAR4**

Communication System: UID 0, WiFi(802.11a/b/g/n/ac) (0); Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2462$  MHz;  $\sigma = 1.993$  S/m;  $\epsilon_r = 52.176$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3744; ConvF(6.69, 6.69, 6.69); Calibrated: 2014-7-24;
- Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn851; Calibrated: 2014-7-24
- Phantom: SAM2; Type: SAM; Serial: TP:1474
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (10x15x1):** Measurement grid:  $dx=12$ mm,  $dy=12$ mm

Maximum value of SAR (measured) = 0.110 W/kg

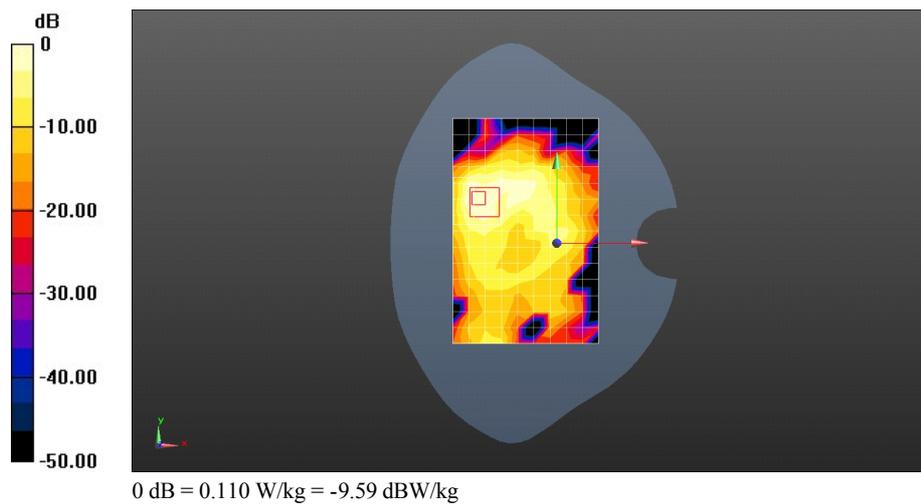
**Configuration/Body/Zoom Scan (8x8x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 1.654 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.621 W/kg

**SAR(1 g) = 0.130 W/kg; SAR(10 g) = 0.054 W/kg**

Maximum value of SAR (measured) = 0.198 W/kg





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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Huawei-SZ (Auden)**

Certificate No: **D835V2-4d059\_May13**

## CALIBRATION CERTIFICATE

Object: **D835V2 - SN: 4d059**

Calibration procedure(s): **QA CAL-05.v9  
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **May 02, 2013**

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.

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

Calibrated by: **Claudio Leubler** (Name), **Laboratory Technician** (Function),  (Signature)

Approved by: **Katja Pokovic** (Name), **Technical Manager** (Function),  (Signature)

Issued: May 2, 2013

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**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
- 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
- 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.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

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

DASY Version	DASY5	V52.8.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
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	40.8 $\pm$ 6 %	0.94 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

## SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.46 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>9.49 W/kg <math>\pm</math> 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.59 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>6.18 W/kg <math>\pm</math> 16.5 % (k=2)</b>

## 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 $\pm$ 0.2) °C	54.0 $\pm$ 6 %	1.01 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

## SAR result with Body TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.44 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>9.42 W/kg <math>\pm</math> 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.59 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>6.19 W/kg <math>\pm</math> 16.5 % (k=2)</b>

## Appendix

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.7 $\Omega$ - 2.7 j $\Omega$
Return Loss	- 30.2 dB

### Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.1 $\Omega$ - 4.7 j $\Omega$
Return Loss	- 24.9 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.391 ns
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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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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	November 27, 2006