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# 9. System Validation from Original equipment supplier

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





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

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SGS-TW (Auden)

Accreditation No.: SCS 108

Certificate No: D835V2-4d063\_May10

### CALIBRATION CERTIFICATE

Object

D835V2 - SN: 4d063

Calibration procedure(s)

QA CAL-05.v7

Calibration procedure for dipole validation kits

May 21, 2010

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)

| ID#                | Cal Date (Certificate No.)  | Scheduled Calibration  |
|--------------------|---|--|
| GB37480704         | 06-Oct-09 (No. 217-01086)   | Oct-10   |
| US37292783         | 06-Oct-09 (No. 217-01086)   | Oct-10   |
| SN: 5086 (20g)     | 30-Mar-10 (No. 217-01158)   | Mar-11   |
| SN: 5047.2 / 06327 | 30-Mar-10 (No. 217-01162)   | Mar-11   |
| SN: 3205           | 30-Apr-10 (No. ES3-3205_Apr10)  | Apr-11   |
| SN: 601            | 02-Mar-10 (No. DAE4-601_Mar10)  | Mar-11   |
| ID#                | Check Date (in house)   | Scheduled Check  |
| MY41092317         | 18-Oct-02 (in house check Oct-09)   | In house check: Oct-11   |
| 100005             | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11   |
| US37390585 S4206   | 18-Oct-01 (in house check Oct-09)   | In house check: Oct-10   |
| Name               | Function  | Signature  |
| Jeton Kastrati     | Laboratory Technician   | 1-Pc   |
| Katja Pokovic      | Technical Manager   | 120 m  |
|                    | GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 3205 SN: 601  ID #  MY41092317 100005 US37390585 S4206  Name Jeton Kastrati | GB37480704 06-Oct-09 (No. 217-01086) US37292783 06-Oct-09 (No. 217-01086) SN: 5086 (20g) 30-Mar-10 (No. 217-01158) SN: 5047.2 / 06327 30-Mar-10 (No. 217-01162) SN: 3205 30-Apr-10 (No. DAE3-3205_Apr10) SN: 601 02-Mar-10 (No. DAE4-601_Mar10)  ID # Check Date (in house)  MY41092317 18-Oct-02 (in house check Oct-09) US37390585 S4206 18-Oct-01 (in house check Oct-09)  Name Function Jeton Kastrati Laboratory Technician |

Certificate No: D835V2-4d063\_May10

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Accreditation No.: SCS 108

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### Glossary:

TSL ConvF N/A

tissue simulating liquid

sensitivity in TSL / NORM x,y,z 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.

Certificate No: D835V2-4d063 May10

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### **Measurement Conditions**

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

| DASY Version                 | DASY5                     | V5.2        |
|------------------------------|---------------------------|-------------|
| 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 ± 1 MHz           |             |

### **Head TSL parameters**

re 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 ± 0.2) °C | 41.7 ± 6 %   | 0.91 mho/m ± 6 % |
| Head TSL temperature during test | (22.5 ± 0.2) °C |              | Section 1        |

#### 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 | 2.42 mW / g               |
| SAR normalized  | normalized to 1W   | 9.68 mW / g               |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 9.62 mW /g ± 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                           |
|---|--------------------|---------------------------|
| SAR measured  | 250 mW input power | 1.58 mW / g               |
| SAR normalized  | normalized to 1W   | 6.32 mW / g               |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 6.29 mW /g ± 16.5 % (k=2) |

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### **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 | 54.2 ± 6 %   | 0.98 mho/m ± 6 % |
| Body TSL temperature during test | (22.0 ± 0.2) °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 | 2.53 mW / g                |
| SAR normalized  | normalized to 1W   | 10.1 mW / g                |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 10.0 mW / g ± 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                            |
|---|--------------------|----------------------------|
| SAR measured  | 250 mW input power | 1.66 mW / g                |
| SAR normalized  | normalized to 1W   | 6.64 mW / g                |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 6.59 mW / g ± 16.5 % (k=2) |

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#### **Appendix**

#### Antenna Parameters with Head TSL

| Impedance, transformed to feed point | 52.6 Ω - $0.6$ jΩ |  |
|--------------------------------------|-------------------|--|
| Return Loss                          | - 31.7 dB         |  |

### Antenna Parameters with Body TSL

| Impedance, transformed to feed point | 47.9 Ω - 2.8 jΩ |
|--------------------------------------|-----------------|
| Return Loss                          | - 28.9 dB       |

#### General Antenna Parameters and Design

| Electrical Delay (one direction) | 1.392 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 | November 27, 2006 |

Certificate No: D835V2-4d063\_May10

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#### **DASY5 Validation Report for Head TSL**

Date/Time: 21.05.2010 11:22:13

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d063

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

Medium: HSL900

Medium parameters used: f = 835 MHz;  $\sigma = 0.91$  mho/m;  $\varepsilon_r = 41.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

#### DASY5 Configuration:

Probe: ES3DV3 - SN3205; ConvF(6.03, 6.03, 6.03); Calibrated: 30.04.2010

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn601; Calibrated: 02.03.2010

Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

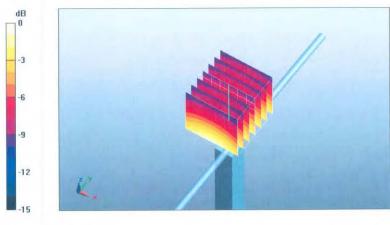
### Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement

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

Reference Value = 57.5 V/m; Power Drift = 0.00219 dB

Peak SAR (extrapolated) = 3.61 W/kg

SAR(1 g) = 2.42 mW/g; SAR(10 g) = 1.58 mW/gMaximum value of SAR (measured) = 2.83 mW/g



0 dB = 2.83 mW/g

Certificate No: D835V2-4d063\_May10

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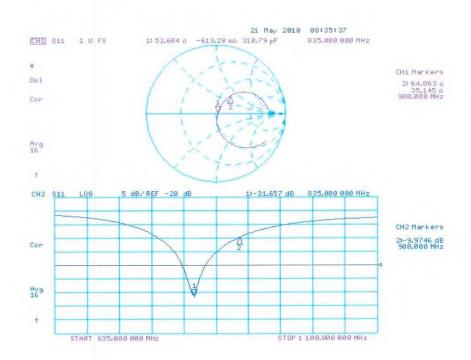
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### Impedance Measurement Plot for Head TSL



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#### **DASY5 Validation Report for Body**

Date/Time: 20.05.2010 10:45:06

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d063

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

Medium: MSL900

Medium parameters used: f = 835 MHz;  $\sigma = 0.98$  mho/m;  $\epsilon_r = 54.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY5 Configuration:

Probe: ES3DV3 - SN3205; ConvF(5.86, 5.86, 5.86); Calibrated: 30.04.2010

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn601; Calibrated: 02.03.2010

Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

### Pin250 mW/d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement

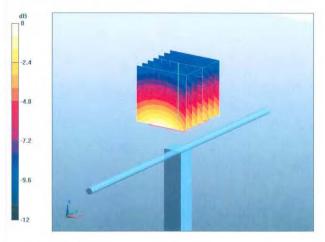
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.5 V/m; Power Drift = 0.013 dB

Peak SAR (extrapolated) = 3.71 W/kg

SAR(1 g) = 2.53 mW/g; SAR(10 g) = 1.66 mW/g

Maximum value of SAR (measured) = 2.94 mW/g



0 dB = 2.94 mW/g

Certificate No: D835V2-4d063\_May10

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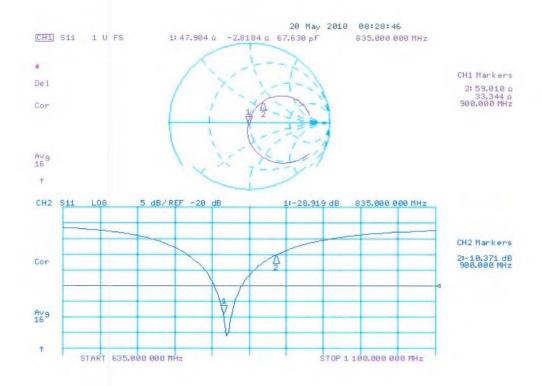
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SGS-TW (Auden)

Accreditation No.: SCS 108

Certificate No: D1750V2-1008\_May10

## **CALIBRATION CERTIFICATE**

D1750V2 - SN: 1008

Calibration procedure(s)

QA CAL-05.v6 Calibration procedure for dipole validation kits

Calibration date:

May 26, 2010

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         | 06-Oct-09 (No. 217-01086)         | Oct-10                 |
| Power sensor HP 8481A       | US37292783         | 06-Oct-09 (No. 217-01086)         | Oct-10                 |
| Reference 20 dB Attenuator  | SN: 5086 (20g)     | 30-Mar-10 (No. 217-01158)         | Mar-11                 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 30-Mar-10 (No. 217-01162)         | Mar-11                 |
| Reference Probe ES3DV3      | SN: 3205           | 30-Apr-10 (No. ES3-3205_Apr10)    | Apr-11                 |
| DAE4                        | SN: 601            | 02-Mar-10 (No. DAE4-601_Mar10)    | Mar-11                 |
| Secondary Standards         | ID#                | Check Date (in house)             | Scheduled Check        |
| Power sensor HP 8481A       | MY41092317         | 18-Oct-02 (in house check Oct-09) | In house check: Oct-11 |
| RF generator R&S SMT-06     | 100005             | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-09) | In house check: Oct-10 |
|                             | Name               | Function                          | Signature              |
| Calibrated by:              | Dimce Iliev        | Laboratory Technician             | D. Hier                |
| Approved by:                | Katja Pokovic      | Technical Manager                 | 27 100                 |
| A PARTY CONTRACTOR          |                    |                                   | 166-169                |
|                             |                    |                                   | Issued: May 27, 2010   |

Certificate No: D1750V2-1008\_May10

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





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Servizio svizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 108

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

Glossary:

tissue simulating liquid TSL 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
- 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
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

Certificate No: D1750V2-1008 May10

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f (886-2) 2298-0488



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#### **Measurement Conditions**

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

| DASY Version                 | DASY5                     | V5.2        |
|------------------------------|---------------------------|-------------|
| 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                    | 1750 MHz ± 1 MHz          |             |

### **Head TSL parameters**

|                                  | Temperature     | Permittivity | Conductivity     |
|----------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters      | 22.0 °C         | 40.1         | 1.37 mho/m       |
| Measured Head TSL parameters     | (22.0 ± 0.2) °C | 39.8 ± 6 %   | 1.33 mho/m ± 6 % |
| Head TSL temperature during test | (21.5 ± 0.2) °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 | 8.84 mW / g                |
| SAR normalized  | normalized to 1W   | 35.4 mW / g                |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 36.0 mW / g ± 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                            |
|---|--------------------|----------------------------|
| SAR measured  | 250 mW input power | 4.73 mW / g                |
| SAR normalized  | normalized to 1W   | 18.9 mW / g                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 19.1 mW / g ± 16.5 % (k=2) |

Certificate No: D1750V2-1008 May10

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### **Body TSL parameters**

The following parameters and calculations were applied.

|                                  | Temperature     | Permittivity | Conductivity     |
|----------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters      | 22.0 °C         | 53.4         | 1.49 mho/m       |
| Measured Body TSL parameters     | (22.0 ± 0.2) °C | 54.1 ± 6 %   | 1.43 mho/m ± 6 % |
| Body TSL temperature during test | (22.5 ± 0.2) °C |              | (Seese:          |

#### SAR result with Body TSL

| SAR averaged over 1 cm3 (1 g) of Body TSL | condition          |                            |
|---|--------------------|----------------------------|
| SAR measured                              | 250 mW input power | 9.46 mW / g                |
| SAR normalized                            | normalized to 1W   | 37.8 mW / g                |
| SAR for nominal Body TSL parameters       | normalized to 1W   | 38.9 mW / g ± 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                            |
|---|--------------------|----------------------------|
| SAR measured  | 250 mW input power | 5.18 mW / g                |
| SAR normalized  | normalized to 1W   | 20.7 mW / g                |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 21.0 mW / g ± 16.5 % (k=2) |

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### **Appendix**

### Antenna Parameters with Head TSL

| Impedance, transformed to feed point | $50.1 \Omega + 0.9 j\Omega$ |  |
|--------------------------------------|-----------------------------|--|
| Return Loss                          | - 40.5 dB                   |  |

### Antenna Parameters with Body TSL

| Impedance, transformed to feed point | $46.9 \Omega + 1.0 J\Omega$ |  |
|--------------------------------------|-----------------------------|--|
| Return Loss                          | - 29.4 dB                   |  |

### General Antenna Parameters and Design

| Electrical Delay (one direction)   | 1.220 ns  |
|--|-----------|
| The state of the s | 71223 713 |

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 | February 11, 2009 |  |

Certificate No: D1750V2-1008\_May10

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### **DASY5 Validation Report for Head TSL**

Date/Time: 17.05.2010 11:55:07

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1008

Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: HSL U11 BB

Medium parameters used: f = 1750 MHz;  $\sigma = 1.33 \text{ mho/m}$ ;  $\varepsilon_r = 39.9$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

#### DASY5 Configuration:

Probe: ES3DV3 - SN3205; ConvF(5.25, 5.25, 5.25); Calibrated: 30.04.2010

• Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn601; Calibrated: 02.03.2010

Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

#### Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement

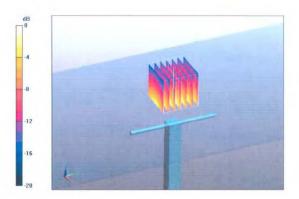
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.5 V/m; Power Drift = 0.012 dB

Peak SAR (extrapolated) = 15.7 W/kg

SAR(1 g) = 8.84 mW/g; SAR(10 g) = 4.73 mW/g

Maximum value of SAR (measured) = 11.1 mW/g



0 dB = 11.1 mW/g

Certificate No: D1750V2-1008\_May10

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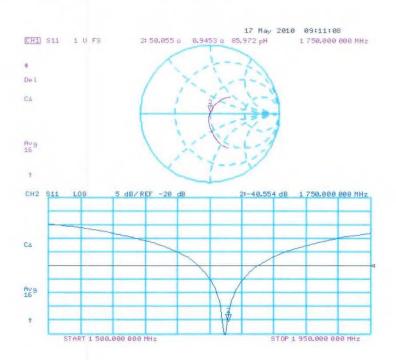
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#### Impedance Measurement Plot for Head TSL



Certificate No: D1750V2-1008 May10

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### **DASY5 Validation Report for Body TSL**

Date/Time: 26.05.2010 10:38:16

Test Laboratory: SPEAG, Zurich, Switzerland

DOX DIPOR TIDO MILLO TIPO DE DE DOTA, DETMIN DE 100 1 ... DIMEDOU

Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: MSL U11 BB

Medium parameters used: f = 1750 MHz;  $\sigma = 1.43$  mho/m;  $\varepsilon_r = 54$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY5 Configuration:

Probe: ES3DV3 - SN3205; ConvF(4.8, 4.8, 4.8); Calibrated: 30.04.2010

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn601; Calibrated: 02.03.2010

Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

### Pin250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement

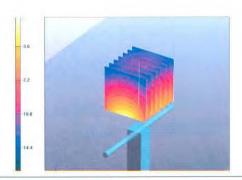
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.1 V/m; Power Drift = -0.012 dB

Peak SAR (extrapolated) = 15.9 W/kg

SAR(1 g) = 9.46 mW/g; SAR(10 g) = 5.18 mW/g

Maximum value of SAR (measured) = 11.9 mW/g



Certificate No: D1750V2-1008\_May10

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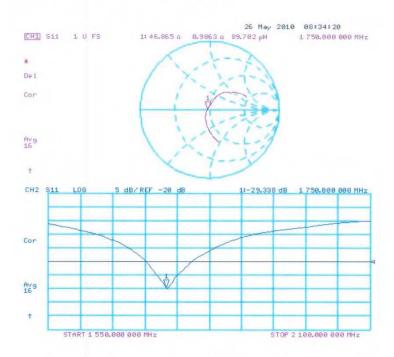
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### Impedance Measurement Plot for Body TSL



Certificate No: D1750V2-1008 May10

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### Calibration Laboratory of

Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





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SGS-TW (Auden)

Accreditation No.: SCS 108

C

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Certificate No: D1900V2-5d027\_Apr10

### **CALIBRATION CERTIFICATE**

Object

D1900V2 - SN: 5d027

Calibration procedure(s)

QA CAL-05.v7

Calibration procedure for dipole validation kits

Calibration date

April 28, 2010

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         | 06-Oct-09 (No. 217-01086)         | Oct-10                 |
| Power sensor HP 8481A       | US37292783         | 06-Oct-09 (No. 217-01086)         | Oct-10                 |
| Reference 20 dB Attenuator  | SN: 5086 (20g)     | 30-Mar-10 (No. 217-01158)         | Mar-11                 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 30-Mar-10 (No. 217-01162)         | Mar-11                 |
| Reference Probe ES3DV3      | SN: 3205           | 26-Jun-09 (No. ES3-3205_Jun09)    | Jun-10                 |
| DAE4                        | SN: 601            | 02-Mar-10 (No. DAE4-601_Mar10)    | Mar-11                 |
| Secondary Standards         | ID#                | Check Date (in house)             | Scheduled Check        |
| Power sensor HP 8481A       | MY41092317         | 18-Oct-02 (in house check Oct-09) | In house check: Oct-11 |
| RF generator R&S SMT-06     | 100005             | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-09) | In house check: Oct-10 |
|                             | Name               | Function                          | Signature              |
| Calibrated by:              | Dimce Iliev        | Laboratory Technician             | D. Hier                |
| Approved by:                | Katja Pokovic      | Technical Manager                 | 20 111                 |

Certificate No: D1900V2-5d027\_Apr10

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Issued: April 29, 2010



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#### **DASY5 Validation Report for Head TSL**

Date/Time: 22.04.2010 15:17:55

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d027

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

Medium: HSL U11 BB

Medium parameters used: f = 1900 MHz;  $\sigma = 1.41 \text{ mho/m}$ ;  $\varepsilon_r = 40.6$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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: 02.03.2010

Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001

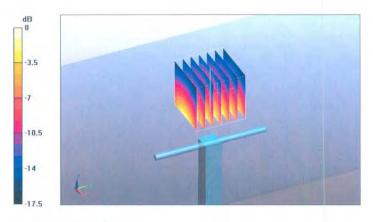
Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 57

### Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement

grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 96.9 V/m; Power Drift = 0.047 dB Peak SAR (extrapolated) = 18.1 W/kg

SAR(1 g) = 9.91 mW/g; SAR(10 g) = 5.17 mW/g

Maximum value of SAR (measured) = 12.4 mW/g



0 dB = 12.4 mW/g

Certificate No: D1900V2-5d027\_Apr10

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#### Calibration Laboratory of

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





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Swiss Calibration Service

Accreditation No.: SCS 108

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

#### Glossary:

TSL ConvF N/A

tissue simulating liquid

sensitivity in TSL / NORM x,y,z 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
- 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:**

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.

Certificate No: D1900V2-5d027\_Apr10

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#### **Measurement Conditions**

| DASY Version                 | DASY5                     | V5.2        |
|------------------------------|---------------------------|-------------|
| 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 | 40.5 ± 6 %   | 1.41 mho/m ± 6 % |
| Head TSL temperature during test | (21.5 ± 0.2) °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 | 9.91 mW / g               |
| SAR normalized  | normalized to 1W   | 39.6 mW / g               |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 39.6 mW /g ± 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                           |
|---|--------------------|---------------------------|
| SAR measured  | 250 mW input power | 5.17 mW / g               |
| SAR normalized  | normalized to 1W   | 20.7 mW / g               |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 20.7 mW /g ± 16.5 % (k=2) |

Certificate No: D1900V2-5d027\_Apr10

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### **Body TSL parameters**

The following parameters and calculations were applied.

|                                  | Temperature     | Permittivity | Conductivity     |
|----------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters      | 22.0 °C         | 53.3         | 1.52 mho/m       |
| Measured Body TSL parameters     | (22.0 ± 0.2) °C | 54.8 ± 6 %   | 1.53 mho/m ± 6 % |
| Body TSL temperature during test | (21.5 ± 0.2) °C | (222)        |                  |

### 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 | 10.1 mW / g                |
| SAR normalized  | normalized to 1W   | 40.4 mW / g                |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 40.5 mW / g ± 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                            |
|---|--------------------|----------------------------|
| SAR measured  | 250 mW input power | 5.36 mW / g                |
| SAR normalized  | normalized to 1W   | 21.4 mW / g                |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 21.5 mW / g ± 16.5 % (k=2) |

Certificate No: D1900V2-5d027 Apr10

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### **Appendix**

#### Antenna Parameters with Head TSL

| Impedance, transformed to feed point | $50.5 \Omega + 5.0 j\Omega$ |  |
|--------------------------------------|-----------------------------|--|
| Return Loss                          | - 26.0 dB                   |  |

### Antenna Parameters with Body TSL

| Impedance, transformed to feed point | $46.8 \Omega + 6.7 j\Omega$ |  |
|--------------------------------------|-----------------------------|--|
| Return Loss                          | - 22.3 dB                   |  |

### General Antenna Parameters and Design

| Electrical Delay (one direction) | 1.196 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 | December 17, 2002 |  |  |

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### **DASY5 Validation Report for Head TSL**

Date/Time: 22.04.2010 15:17:55

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d027

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

Medium: HSL U11 BB

Medium parameters used: f = 1900 MHz;  $\sigma = 1.41 \text{ mho/m}$ ;  $\varepsilon_r = 40.6$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

#### 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: 02.03.2010

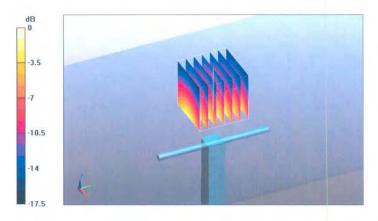
Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 57

### Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement

grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 96.9 V/m; Power Drift = 0.047 dB Peak SAR (extrapolated) = 18.1 W/kg SAR(1 g) = 9.91 mW/g; SAR(10 g) = 5.17 mW/g

Maximum value of SAR (measured) = 12.4 mW/g



0 dB = 12.4 mW/g

Certificate No: D1900V2-5d027\_Apr10

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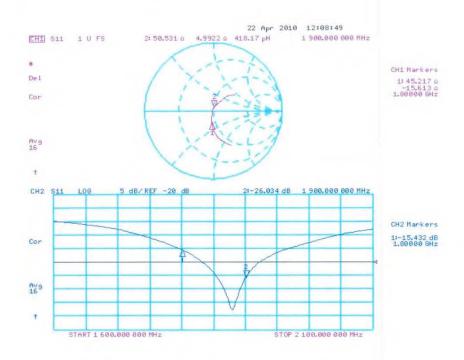
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### Impedance Measurement Plot for Head TSL



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#### **DASY5 Validation Report for Body**

Date/Time: 28.04.2010 15:11:22

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d027

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

Medium: MSL U11 BB

Medium parameters used: f = 1900 MHz;  $\sigma = 1.53 \text{ mho/m}$ ;  $\varepsilon_r = 54.9$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

#### DASY5 Configuration:

Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 26.06.2009

• Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn601; Calibrated: 02.03.2010

Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 57

#### Pin250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement

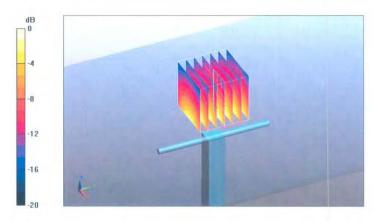
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.2 V/m; Power Drift = -0.014 dB

Peak SAR (extrapolated) = 17.1 W/kg

SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.36 mW/g

Maximum value of SAR (measured) = 12.7 mW/g



0 dB = 12.7 mW/g

Certificate No: D1900V2-5d027\_Apr10

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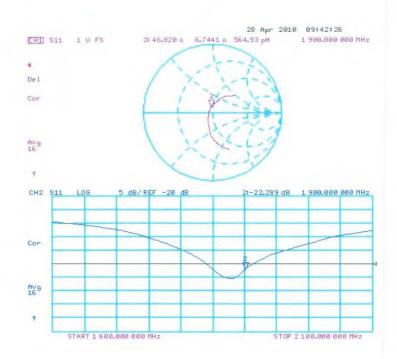
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### Impedance Measurement Plot for Body TSL



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Certificate No: D2450V2-727\_Apr10

### **CALIBRATION CERTIFICATE**

Object

D2450V2 - SN: 727

Calibration procedure(s)

QA CAL-05.v7

Calibration procedure for dipole validation kits

Calibration date:

April 29, 2010

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)

| ID#                | Cal Date (Certificate No.)   | Scheduled Calibration   |
|--------------------|--|---|
| GB37480704         | 06-Oct-09 (No. 217-01086)  | Oct-10  |
| US37292783         | 06-Oct-09 (No. 217-01086)  | Oct-10  |
| SN: 5086 (20g)     | 30-Mar-10 (No. 217-01158)  | Mar-11  |
| SN: 5047.2 / 06327 | 30-Mar-10 (No. 217-01162)  | Mar-11  |
| SN: 3205           | 26-Jun-09 (No. ES3-3205_Jun09)   | Jun-10  |
| SN: 601            | 02-Mar-10 (No. DAE4-601_Mar10)   | Mar-11  |
| ID#                | Check Date (in house)  | Scheduled Check   |
| MY41092317         | 18-Oct-02 (in house check Oct-09)  | In house check: Oct-11  |
| 100005             | 4-Aug-99 (in house check Oct-09)   | In house check: Oct-11  |
| US37390585 S4206   | 18-Oct-01 (in house check Oct-09)  | In house check: Oct-10  |
| Name               | Function   | Signature   |
| Jeton Kastrati     | Laboratory Technician  | I W   |
| Katja Pokovic      | Technical Manager  | DE 113  |
|                    | GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 3205 SN: 601  ID # MY41092317 100005 US37390585 S4206  Name Jeton Kastrati | GB37480704 06-Oct-09 (No. 217-01086) US37292783 06-Oct-09 (No. 217-01086) SN: 5086 (20g) 30-Mar-10 (No. 217-01158) SN: 5047.2 / 06327 30-Mar-10 (No. 217-01162) SN: 3205 26-Jun-09 (No. ES3-3205_Jun09) SN: 601 02-Mar-10 (No. DAE4-601_Mar10)  ID # Check Date (in house) MY41092317 18-Oct-02 (in house check Oct-09) US37390585 S4206 18-Oct-01 (in house check Oct-09) Name Function Jeton Kastrati Laboratory Technician |

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





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Swiss Calibration Service

Accreditation No.: SCS 108

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

### Glossary:

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

### 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)",
- 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
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

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#### **Measurement Conditions**

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

| DASY Version                 | DASY5                     | V5.2        |
|------------------------------|---------------------------|-------------|
| Extrapolation                | Advanced Extrapolation    |             |
| Phantom                      | Modular Flat Phantom V4.9 |             |
| Distance Dipole Center - TSL | 10 mm                     | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm         |             |
| Frequency                    | 2450 MHz ± 1 MHz          |             |

#### **Head TSL parameters**

The following parameters and calculations were applied.

|                                  | Temperature     | Permittivity | Conductivity     |
|----------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters      | 22.0 °C         | 39.2         | 1.80 mho/m       |
| Measured Head TSL parameters     | (22.0 ± 0.2) °C | 39.8 ± 6 %   | 1.78 mho/m ± 6 % |
| Head TSL temperature during test | (21.5 ± 0.2) °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 | 13.2 mW / g               |
| SAR normalized  | normalized to 1W   | 52.8 mW / g               |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 53.2 mW /g ± 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                           |
|---|--------------------|---------------------------|
| SAR measured  | 250 mW input power | 6.22 mW / g               |
| SAR normalized  | normalized to 1W   | 24.9 mW / g               |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 25.0 mW /g ± 16.5 % (k=2) |

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#### **Body TSL parameters**

The following parameters and calculations were applied.

|                                  | Temperature     | Permittivity | Conductivity     |
|----------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters      | 22.0 °C         | 52.7         | 1.95 mho/m       |
| Measured Body TSL parameters     | (22.0 ± 0.2) °C | 54.2 ± 6 %   | 2.01 mho/m ± 6 % |
| Body TSL temperature during test | (22.5 ± 0.2) °C | CHARL.       |                  |

### 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 | 13.4 mW / g                |
| SAR normalized  | normalized to 1W   | 53.6 mW / g                |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 53.2 mW / g ± 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                            |
|---|--------------------|----------------------------|
| SAR measured  | 250 mW input power | 6.23 mW / g                |
| SAR normalized  | normalized to 1W   | 24.9 mW / g                |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 24.9 mW / g ± 16.5 % (k=2) |

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#### **Appendix**

### Antenna Parameters with Head TSL

| Impedance, transformed to feed point | $53.3 \Omega + 1.7 j\Omega$ |  |
|--------------------------------------|-----------------------------|--|
| Return Loss                          | - 28.9 dB                   |  |

#### Antenna Parameters with Body TSL

| Impedance, transformed to feed point | $50.3 \Omega + 3.6 j\Omega$ |  |
|--------------------------------------|-----------------------------|--|
| Return Loss                          | - 29.0 dB                   |  |

#### General Antenna Parameters and Design

| Electrical Delay (one direction) | 1.150 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 | January 09, 2003 |

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#### **DASY5 Validation Report for Head TSL**

Date/Time: 22.04.2010 16:30:51

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:727

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: HSL U11 BB

Medium parameters used: f = 2450 MHz;  $\sigma = 1.78 \text{ mho/m}$ ;  $\varepsilon_r = 39.8$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

#### DASY5 Configuration:

Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 26.06.2009

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn601; Calibrated: 02.03.2010

Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 57

#### Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement

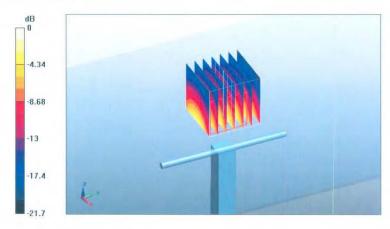
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.0 V/m; Power Drift = 0.064 dB

Peak SAR (extrapolated) = 26.8 W/kg

SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.22 mW/g

Maximum value of SAR (measured) = 16.9 mW/g



0 dB = 16.9 mW/g

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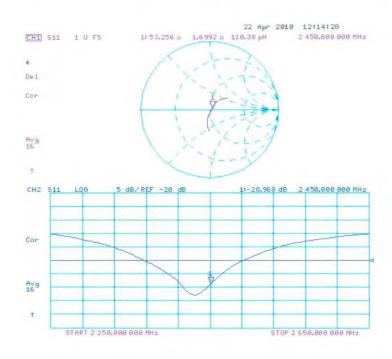
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### Impedance Measurement Plot for Head TSL



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### **DASY5 Validation Report for Body**

Date/Time: 29.04.2010 14:57:43

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:727

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: MSL U11 BB

Medium parameters used: f = 2450 MHz;  $\sigma = 2 \text{ mho/m}$ ;  $\varepsilon_r = 54.1$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY5 Configuration:

Probe: ES3DV3 - SN3205; ConvF(4.31, 4.31, 4.31); Calibrated: 26.06.2009

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn601; Calibrated: 02.03.2010

Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 57

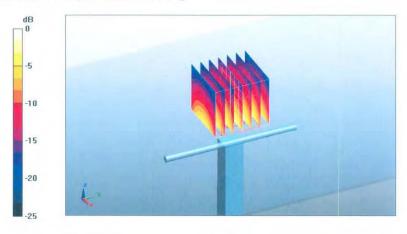
### Pin250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement

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

Reference Value = 96.1 V/m; Power Drift = 0.00929 dB

Peak SAR (extrapolated) = 27.7 W/kg

SAR(1 g) = 13.4 mW/g; SAR(10 g) = 6.23 mW/gMaximum value of SAR (measured) = 17.6 mW/g



0 dB = 17.6 mW/g

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# End of 1st part of report

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