

## Appendix

### Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	$60.8 \Omega + 1.1 j\Omega$
Return Loss	- 20.1 dB

### Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	$55.2 \Omega - 4.7 j\Omega$
Return Loss	- 23.6 dB

### Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	$54.6 \Omega + 2.1 j\Omega$
Return Loss	- 26.3 dB

### Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	$51.8 \Omega - 12.5 j\Omega$
Return Loss	- 18.2 dB

### Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	$47.1 \Omega - 2.7 j\Omega$
Return Loss	- 27.8 dB

### Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	$56.8 \Omega + 6.9 j\Omega$
Return Loss	- 20.9 dB

## General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 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.

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## Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 28, 2003



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**DASY5 Validation Report for Head TSL**

Date: 14.12.2011

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1008**

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz  
 Medium parameters used:  $f = 5200 \text{ MHz}$ ;  $\sigma = 4.65 \text{ mho/m}$ ;  $\epsilon_r = 36.1$ ;  $\rho = 1000 \text{ kg/m}^3$ , Medium parameters used:  $f = 5500 \text{ MHz}$ ;  $\sigma = 4.96 \text{ mho/m}$ ;  $\epsilon_r = 35.6$ ;  $\rho = 1000 \text{ kg/m}^3$ , Medium parameters used:  $f = 5800 \text{ MHz}$ ;  $\sigma = 5.27 \text{ mho/m}$ ;  $\epsilon_r = 35.1$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41), ConvF(4.91, 4.91, 4.91), ConvF(4.81, 4.81, 4.81); Calibrated: 04.03.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:**Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ 

Reference Value = 64.135 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 29.6850

**SAR(1 g) = 8.01 mW/g; SAR(10 g) = 2.28 mW/g**

Maximum value of SAR (measured) = 17.959 mW/g

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:**Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ 

Reference Value = 65.059 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 34.0090

**SAR(1 g) = 8.56 mW/g; SAR(10 g) = 2.41 mW/g**

Maximum value of SAR (measured) = 19.656 mW/g

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:**Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ 

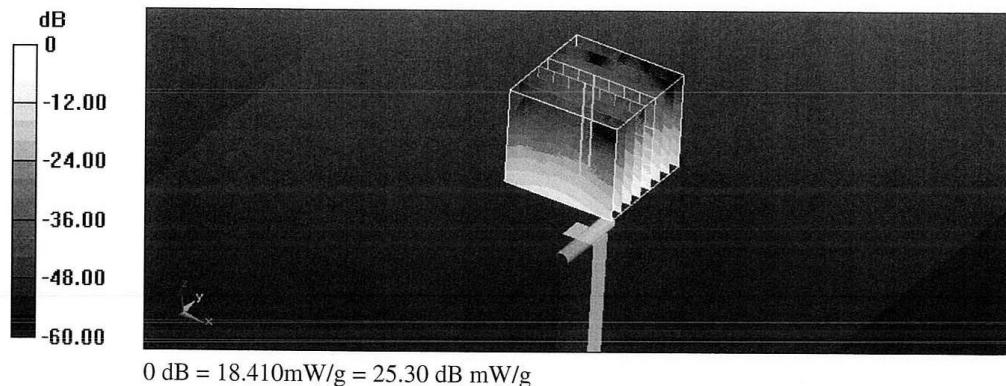
Reference Value = 60.602 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 32.7510

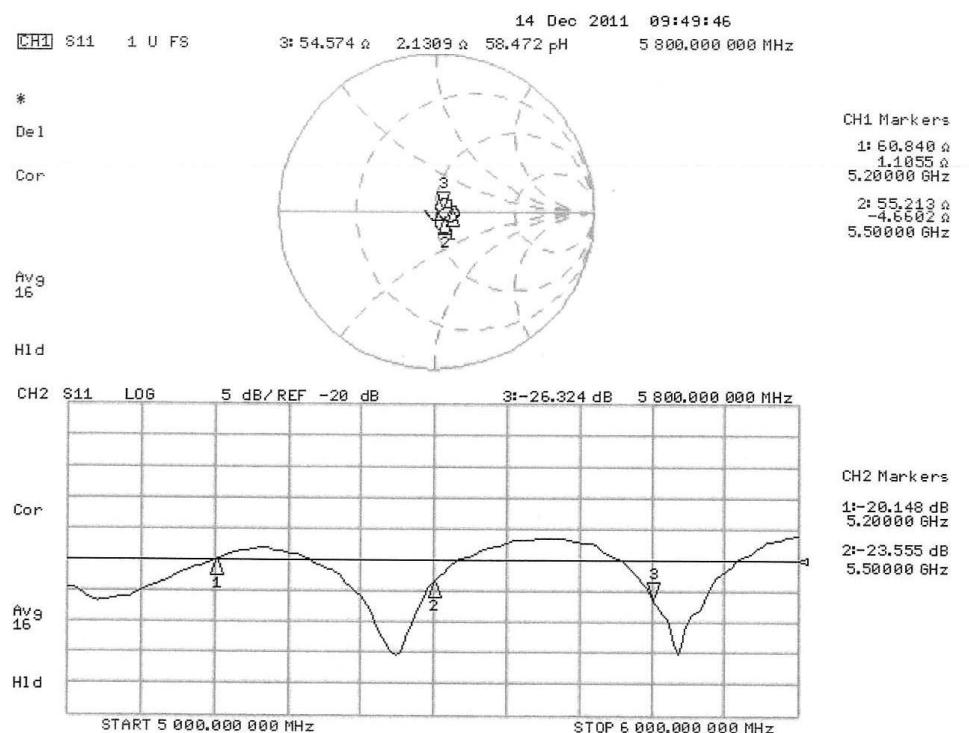
**SAR(1 g) = 7.79 mW/g; SAR(10 g) = 2.2 mW/g**

Maximum value of SAR (measured) = 18.411 mW/g





## Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body TSL**

Date: 13.12.2011

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1008**

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz  
 Medium parameters used:  $f = 5200 \text{ MHz}$ ;  $\sigma = 5.44 \text{ mho/m}$ ;  $\epsilon_r = 49.6$ ;  $\rho = 1000 \text{ kg/m}^3$ , Medium parameters used:  $f = 5500 \text{ MHz}$ ;  $\sigma = 5.86 \text{ mho/m}$ ;  $\epsilon_r = 49$ ;  $\rho = 1000 \text{ kg/m}^3$ , Medium parameters used:  $f = 5800 \text{ MHz}$ ;  $\sigma = 6.28 \text{ mho/m}$ ;  $\epsilon_r = 48.4$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91), ConvF(4.43, 4.43, 4.43), ConvF(4.38, 4.38, 4.38); Calibrated: 04.03.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:**Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ 

Reference Value = 58.776 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 29.4610

**SAR(1 g) = 7.54 mW/g; SAR(10 g) = 2.1 mW/g**

Maximum value of SAR (measured) = 17.191 mW/g

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:**Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ 

Reference Value = 59.224 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 35.0790

**SAR(1 g) = 8.2 mW/g; SAR(10 g) = 2.26 mW/g**

Maximum value of SAR (measured) = 19.300 mW/g

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:**Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ 

Reference Value = 55.474 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 35.6620

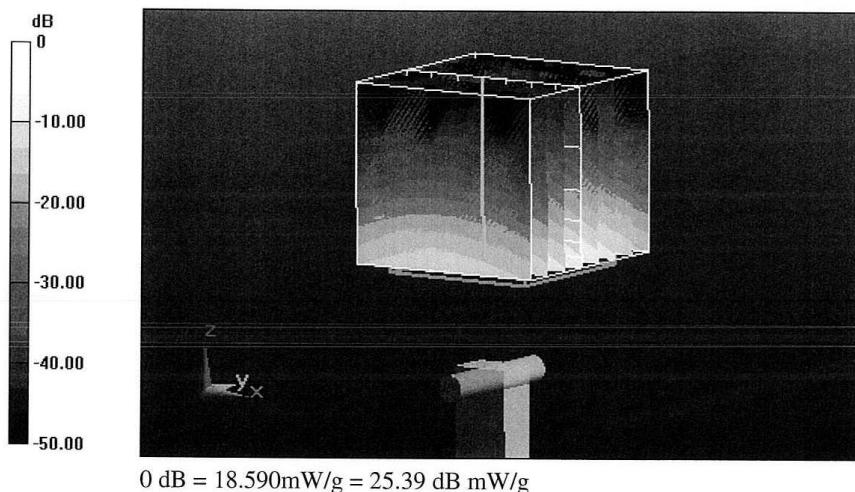
**SAR(1 g) = 7.65 mW/g; SAR(10 g) = 2.1 mW/g**

Maximum value of SAR (measured) = 18.593 mW/g

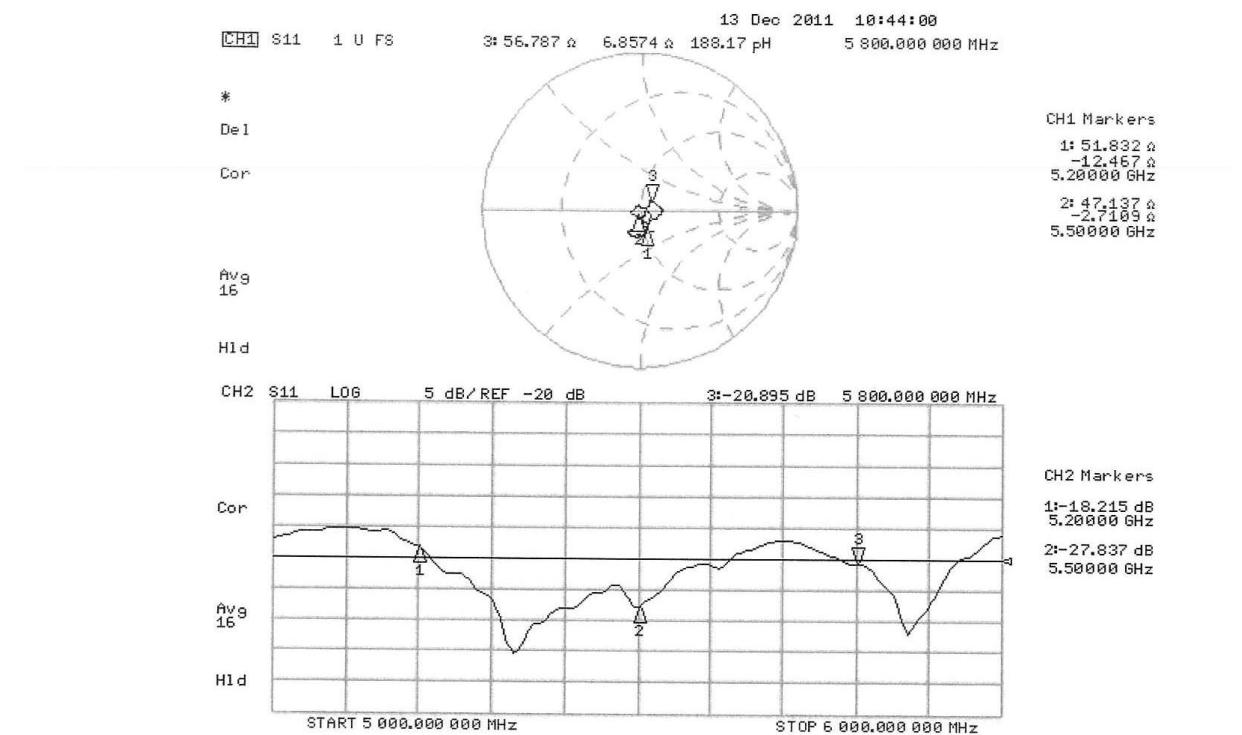


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## Impedance Measurement Plot for Body TSL



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