Appendix 3-10: Calibration certificate: Dipole (D5GHzV2)

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

Client: UL Japan (PTT)

Certificate No: D5GHzV2-1070_Feb12/2

CALIBRATION CERTIFICATE (Replacement of No:D5GHzV2-1070_Feb12)

Object: D5GHzV2 - SN: 1070

Calibration procedure(s): QA CAL-22.v1
Calibration procedure for dipole validation kits between 3-6 GHz

Calibration date: February 16, 2012

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	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe EX3DV4	SN: 3503	30-Dec-11 (No. EX3-3503_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

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-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	Israe ElNaouq
Approved by:	Katja Pokovic	Technical Manager	

Issued: March 2, 2012

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

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

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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.

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%.

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

Measurement Conditions

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

DASY Version	DASY5	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Speag Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5500 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.3 ± 6 %	4.60 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.03 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**80.0 mW /g ±17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.3 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**22.9 mW /g ±16.5 % (k=2)**

Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.9 ± 6 %	4.89 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.57 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**85.3 mW / g ±17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.44 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**24.3 mW / g ± 16.5 % (k=2)**

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Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN
Telephone: +81 463 50 6400 / Facsimile: +81 463 50 6401

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.4 ± 6 %	5.19 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.08 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**80.3 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.30 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**22.8 mW / g ± 16.5 %(k=2)**

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	48.6 ± 6 %	5.48 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.42 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**74.1 mW / g ± 18.1 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.08 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**20.8 mW / g ± 17.6 %(k=2)**

Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.6	5.65 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	48.1 ± 6 %	5.87 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**80.0 mW / g ± 18.1 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.22 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**22.2 mW / g ± 17.6 %(k=2)**

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.5 ± 6 %	6.29 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.55 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**75.4 mW / g ± 18.1 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.09 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**20.9 mW / g ± 17.6 % (k=2)**

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	51.8 Ω - 13.8 jΩ
Return Loss	- 17.3 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	49.5 Ω - 8.0 jΩ
Return Loss	- 21.9 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	53.6 Ω - 3.3 jΩ
Return Loss	- 26.5 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	51.9 Ω - 10.7 jΩ
Return Loss	- 19.5 dB

Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	51.0 Ω - 5.4 jΩ
Return Loss	- 25.2 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	55.4 Ω - 2.4 jΩ
Return Loss	- 25.0 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. 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	September 26, 2008

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

DASY5 Validation Report for Head TSL

Date: 16.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1070

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 4.6 mho/m; ε_r = 35.3; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 4.89 mho/m; ε_r = 34.9; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 5.19 mho/m; ε_r = 34.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

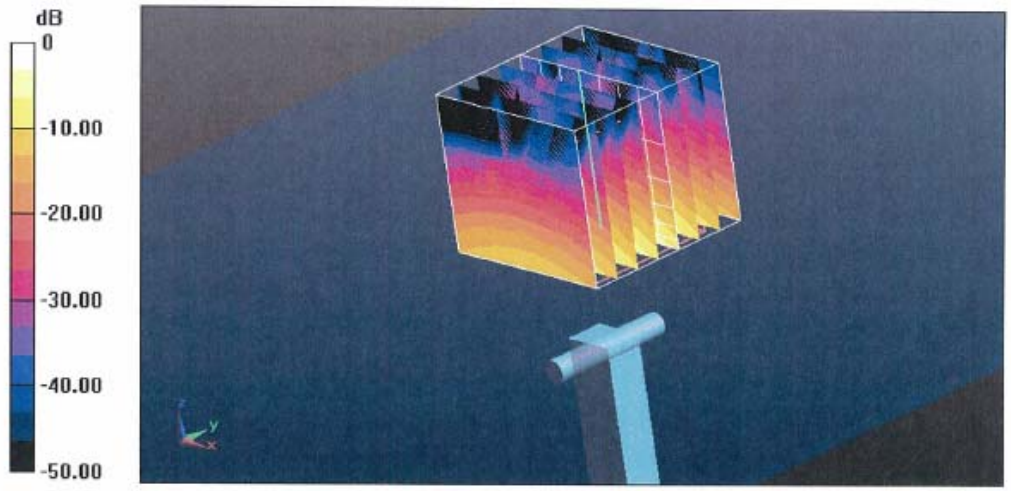
- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41), ConvF(4.91, 4.91, 4.91), ConvF(4.81, 4.81, 4.81); Calibrated: 30.12.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue - Spacer SPEAG/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.235 V/m; Power Drift = -0.0022 dB
Peak SAR (extrapolated) = 30.1280
SAR(1 g) = 8.03 mW/g; SAR(10 g) = 2.3 mW/g
Maximum value of SAR (measured) = 18.715 mW/g

Dipole Calibration for Head Tissue - Spacer SPEAG/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.915 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 34.1720
SAR(1 g) = 8.57 mW/g; SAR(10 g) = 2.44 mW/g
Maximum value of SAR (measured) = 20.497 mW/g

Dipole Calibration for Head Tissue - Spacer SPEAG/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 61.666 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 33.9990
SAR(1 g) = 8.08 mW/g; SAR(10 g) = 2.3 mW/g
Maximum value of SAR (measured) = 19.547 mW/g

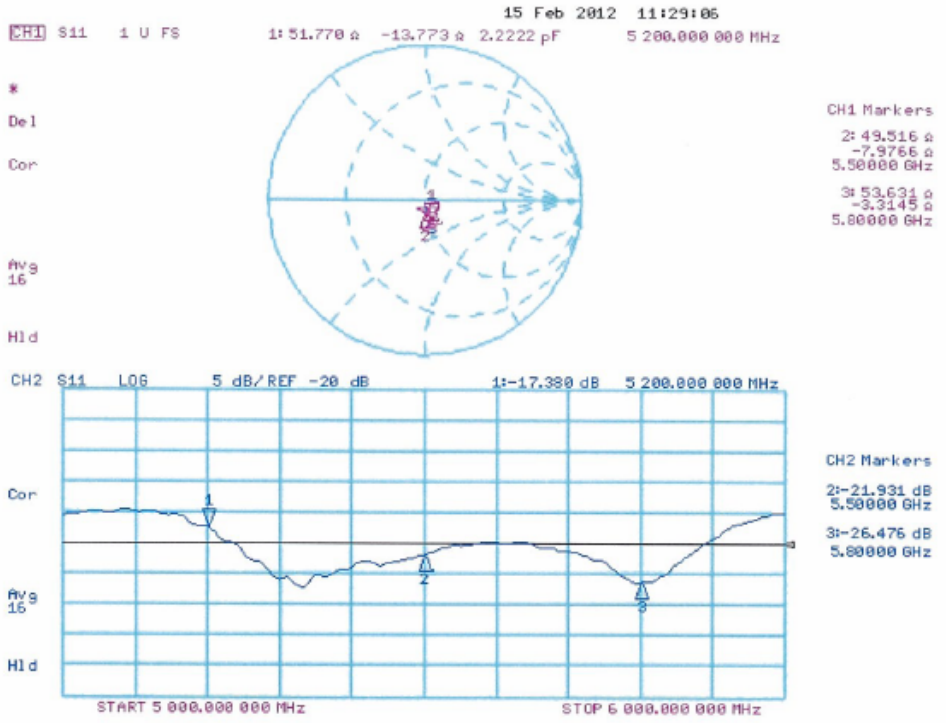
Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)



0 dB = 19.550mW/g = 25.82 dB mW/g

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

Impedance Measurement Plot for Head TSL



Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

DASY5 Validation Report for Body TSL

Date: 15.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1070

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 5.48 mho/m; ε_r = 48.6; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 5.87 mho/m; ε_r = 48.1; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 6.29 mho/m; ε_r = 47.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

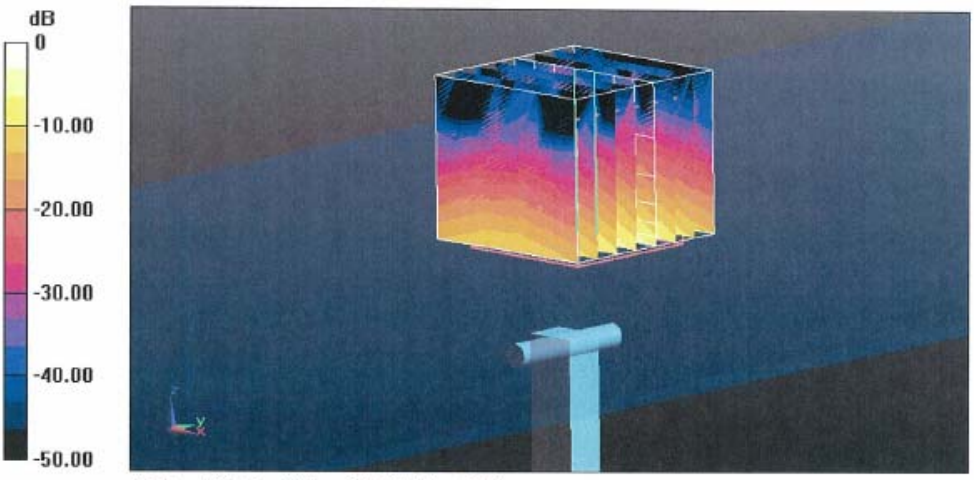
- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91), ConvF(4.43, 4.43, 4.43), ConvF(4.38, 4.38, 4.38); Calibrated: 30.12.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue - Spacer SPEAG/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 58.023 V/m; Power Drift = -0.0003 dB
Peak SAR (extrapolated) = 29.0440
SAR(1 g) = 7.42 mW/g; SAR(10 g) = 2.08 mW/g
Maximum value of SAR (measured) = 17.104 mW/g

Dipole Calibration for Body Tissue - Spacer SPEAG/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 58.498 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 34.2230
SAR(1 g) = 8 mW/g; SAR(10 g) = 2.22 mW/g
Maximum value of SAR (measured) = 18.964 mW/g

Dipole Calibration for Body Tissue - Spacer SPEAG/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 55.286 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 35.0830
SAR(1 g) = 7.55 mW/g; SAR(10 g) = 2.09 mW/g
Maximum value of SAR (measured) = 18.335 mW/g

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

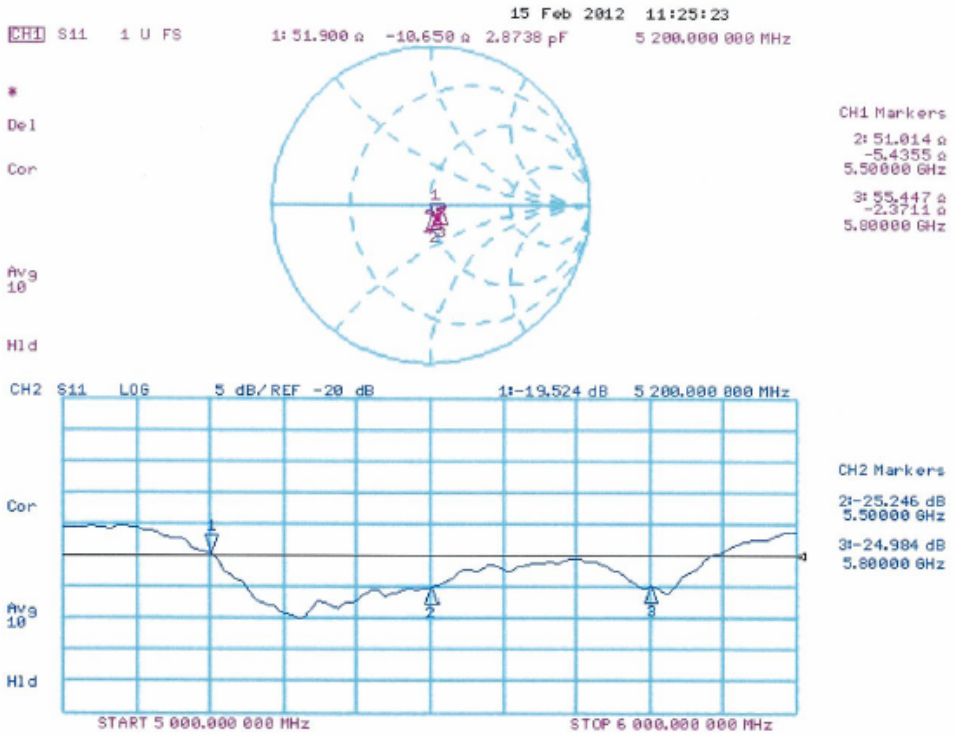


0 dB = 18.340mW/g = 25.27 dB mW/g

Certificate No: D5GHzV2-1070_Feb12/2 Page 12 of 27

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

Impedance Measurement Plot for Body TSL



Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

Appendix B: Additional Measurements

Upon customer request, additional measurements were done using customized Zoom Scan settings and with customer spacer, for Head and Body conditions. Results are summarized on the following pages.

Alternations to Measurement Conditions

DASY system configuration, as far as not given on pages 1 and 3.

Distance Dipole Center - TSL	10 mm	with UL Spacer #1
Zoom Scan Resolution (UL)	dx, dy = 4.0 mm, dz = 2.0 mm	Graded Ratio = 1.5 (Z direction)
Frequency	See page 3	
Head TSL parameters	See pages 3 and 4	
Body TSL parameters	See pages 5 and 6	

SAR result with Head TSL at 5200 MHz

SAR results normalized to 1W input power and for nominal TSL parameters.

SAR averaged over 1 cm^3 (1 g) of Head TSL	**Dipole Spacer**	
SPEAG Zoom Scan setting (page 3)	SPEAG	80.0 mW/g ± 17.0 % (k=2)
SPEAG Zoom Scan setting (page 3)	UL #1	80.1 mW/g ± 17.0 % (k=2)
UL Zoom Scan settings (page 14)	UL #1	80.6 mW/g ± 17.0 % (k=2)

SAR averaged over 10 cm^3 (10 g) of Head TSL	**Dipole Spacer**	
SPEAG Zoom Scan setting (page 3)	SPEAG	22.9 mW/g ± 16.5 % (k=2)
SPEAG Zoom Scan setting (page 3)	UL #1	23.0 mW/g ± 16.5 % (k=2)
UL Zoom Scan settings (page 14)	UL #1	23.1 mW/g ± 16.5 % (k=2)

SAR result with Head TSL at 5500 MHz

SAR results normalized to 1W input power and for nominal TSL parameters.

SAR averaged over 1 cm^3 (1 g) of Head TSL	**Dipole Spacer**	
SPEAG Zoom Scan setting (page 3)	SPEAG	85.3 mW/g ±17.0 % (k=2)
SPEAG Zoom Scan setting (page 3)	UL #1	85.9 mW/g ±17.0 % (k=2)
UL Zoom Scan settings (page 14)	UL #1	86.4 mW/g ±17.0 % (k=2)

SAR averaged over 10 cm^3 (10 g) of Head TSL	**Dipole Spacer**	
SPEAG Zoom Scan setting (page 3)	SPEAG	24.3 mW/g ±16.5 % (k=2)
SPEAG Zoom Scan setting (page 3)	UL #1	24.5 mW/g ±16.5 % (k=2)
UL Zoom Scan settings (page 14)	UL #1	24.6 mW/g ±16.5 % (k=2)

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

SAR result with Head TSL at 5800 MHz

SAR results normalized to 1W input power and for nominal TSL parameters.

SAR averaged over 1 cm^3 (1 g) of Head TSL	Dipole Spacer	
SPEAG Zoom Scan setting (page 3)	SPEAG	80.3 mW/g ±17.0 % (k=2)
SPEAG Zoom Scan setting (page 3)	UL #1	80.9 mW/g ±17.0 % (k=2)
UL Zoom Scan settings (page 14)	UL #1	80.8 mW/g ±17.0 % (k=2)

SAR averaged over 10 cm^3 (10 g) of Head TSL	Dipole Spacer	
SPEAG Zoom Scan setting (page 3)	SPEAG	22.8 mW/g ±16.5 % (k=2)
SPEAG Zoom Scan setting (page 3)	UL #1	22.9 mW/g ±16.5 % (k=2)
UL Zoom Scan settings (page 14)	UL #1	22.9 mW/g ±16.5 % (k=2)

SAR result with Body TSL at 5200 MHz

SAR results normalized to 1W input power and for nominal TSL parameters.

SAR averaged over 1 cm^3 (1 g) of Body TSL	Dipole Spacer	
SPEAG Zoom Scan setting (page 3)	SPEAG	74.1 mW/g ± 18.1 % (k=2)
SPEAG Zoom Scan setting (page 3)	UL #1	74.5 mW/g ± 18.1 % (k=2)
UL Zoom Scan settings (page 14)	UL #1	74.8 mW/g ± 18.1 % (k=2)

SAR averaged over 10 cm^3 (10 g) of Body TSL	Dipole Spacer	
SPEAG Zoom Scan setting (page 3)	SPEAG	20.8 mW/g ± 17.6 % (k=2)
SPEAG Zoom Scan setting (page 3)	UL #1	21.0 mW/g ± 17.6 % (k=2)
UL Zoom Scan settings (page 14)	UL #1	21.0 mW/g ± 17.6 % (k=2)

SAR result with Body TSL at 5500 MHz

SAR results normalized to 1W input power and for nominal TSL parameters.

SAR averaged over 1 cm^3 (1 g) of Body TSL	Dipole Spacer	
SPEAG Zoom Scan setting (page 3)	SPEAG	80.0 mW/g ± 18.1 % (k=2)
SPEAG Zoom Scan setting (page 3)	UL #1	80.8 mW/g ± 18.1 % (k=2)
UL Zoom Scan settings (page 14)	UL #1	81.0 mW/g ± 18.1 % (k=2)

SAR averaged over 10 cm^3 (10 g) of Body TSL	Dipole Spacer	
SPEAG Zoom Scan setting (page 3)	SPEAG	22.2 mW/g ± 17.6 % (k=2)
SPEAG Zoom Scan setting (page 3)	UL #1	22.5 mW/g ± 17.6 % (k=2)
UL Zoom Scan settings (page 14)	UL #1	22.5 mW/g ± 17.6 % (k=2)

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

SAR result with Body TSL at 5800 MHz

SAR results normalized to 1W input power and for nominal TSL parameters.

SAR averaged over 1 cm^3 (1 g) of Body TSL	Dipole Spacer	
SPEAG Zoom Scan setting (page 3)	SPEAG	75.4 mW/g ± 18.1 % (k=2)
SPEAG Zoom Scan setting (page 3)	UL #1	76.4 mW/g ± 18.1 % (k=2)
UL Zoom Scan settings (page 14)	UL #1	75.7 mW/g ± 18.1 % (k=2)

SAR averaged over 10 cm^3 (10 g) of Body TSL	Dipole Spacer	
SPEAG Zoom Scan setting (page 3)	SPEAG	20.9 mW/g ± 17.6 % (k=2)
SPEAG Zoom Scan setting (page 3)	UL #1	21.2 mW/g ± 17.6 % (k=2)
UL Zoom Scan settings (page 14)	UL #1	21.0 mW/g ± 17.6 % (k=2)

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

Antenna Parameters with Head TSL at 5200 MHz

SPEAG reference spacer	51.8 Ω - 13.8 jΩ	- 17.3 dB
UL spacer #1	51.7 Ω - 13.9 jΩ	- 17.3 dB
UL spacer #2	51.4 Ω - 14.2 jΩ	- 17.1 dB

Antenna Parameters with Head TSL at 5500 MHz

SPEAG reference spacer	49.5 Ω - 8.0 jΩ	- 21.9 dB
UL spacer #1	49.3 Ω - 8.1 jΩ	- 21.8 dB
UL spacer #2	49.0 Ω - 8.7 jΩ	- 21.1 dB

Antenna Parameters with Head TSL at 5800 MHz

SPEAG reference spacer	53.6 Ω - 3.3 jΩ	- 26.5 dB
UL spacer #1	53.8 Ω - 3.2 jΩ	- 26.5 dB
UL spacer #2	53.4 Ω - 3.7 jΩ	- 26.3 dB

Antenna Parameters with Body TSL at 5200 MHz

SPEAG reference spacer	51.9 Ω - 10.7 jΩ	- 19.5 dB
UL spacer #1	51.8 Ω - 12.4 jΩ	- 18.3 dB
UL spacer #2	52.0 Ω - 12.0 jΩ	- 18.6 dB

Antenna Parameters with Body TSL at 5500 MHz

SPEAG reference spacer	51.0 Ω - 5.4 jΩ	- 25.2 dB
UL spacer #1	49.6 Ω - 6.5 jΩ	- 23.7 dB
UL spacer #2	49.9 Ω - 6.1 jΩ	- 24.3 dB

Antenna Parameters with Body TSL at 5800 MHz

SPEAG reference spacer	55.4 Ω - 2.4 jΩ	- 25.0 dB
UL spacer #1	54.3 Ω - 1.7 jΩ	- 27.1 dB
UL spacer #2	54.6 Ω - 1.2 jΩ	- 27.0 dB

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Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

DASY5 Validation Report for Head TSL

Date: 16.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1070

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 4.6 mho/m; ε_r = 35.3; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 4.89 mho/m; ε_r = 34.9; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 5.19 mho/m; ε_r = 34.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

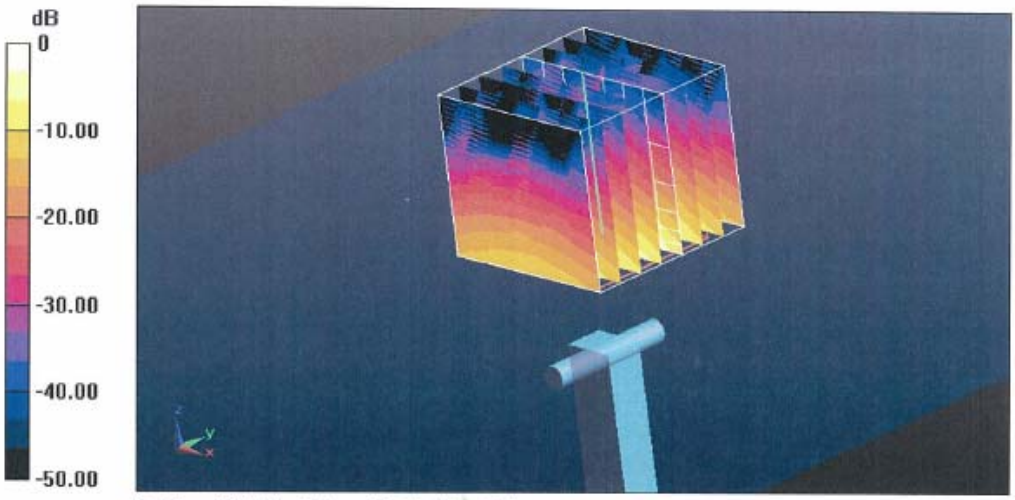
- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41), ConvF(4.91, 4.91, 4.91), ConvF(4.81, 4.81, 4.81); Calibrated: 30.12.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue - Spacer #1/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.699 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 30.0420
SAR(1 g) = 8.04 mW/g; SAR(10 g) = 2.31 mW/g
Maximum value of SAR (measured) = 18.830 mW/g

Dipole Calibration for Head Tissue - Spacer #1/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 23.994 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 34.3130
SAR(1 g) = 8.63 mW/g; SAR(10 g) = 2.46 mW/g
Maximum value of SAR (measured) = 20.553 mW/g

Dipole Calibration for Head Tissue - Spacer #1/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 23.451 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 34.3360
SAR(1 g) = 8.14 mW/g; SAR(10 g) = 2.31 mW/g
Maximum value of SAR (measured) = 19.852 mW/g

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)



0 dB = 19.850mW/g = 25.96 dB mW/g

Certificate No: D5GHzV2-1070_Feb12/2 Page 19 of 27

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

DASY5 Validation Report for Head TSL

Date: 16.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1070

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 4.6 mho/m; ε_r = 35.3; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 4.89 mho/m; ε_r = 34.9; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 5.19 mho/m; ε_r = 34.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

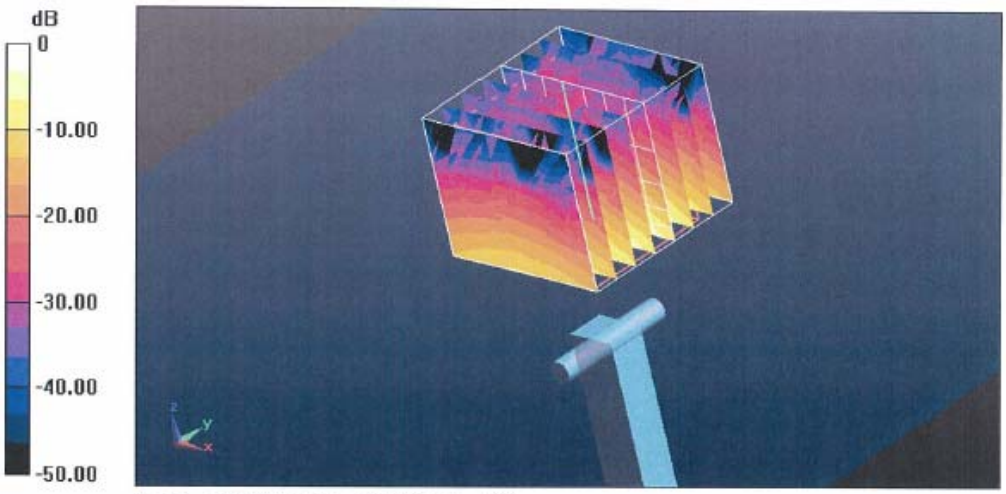
- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41), ConvF(4.91, 4.91, 4.91), ConvF(4.81, 4.81, 4.81); Calibrated: 30.12.2011
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue - Spacer #1/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=2mm custom (8x8x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 63.699 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 30.6260
SAR(1 g) = 8.1 mW/g; SAR(10 g) = 2.32 mW/g
Maximum value of SAR (measured) = 15.779 mW/g

Dipole Calibration for Head Tissue - Spacer #1/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=2mm custom (8x8x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 23.994 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 34.7080
SAR(1 g) = 8.68 mW/g; SAR(10 g) = 2.47 mW/g
Maximum value of SAR (measured) = 17.013 mW/g

Dipole Calibration for Head Tissue - Spacer #1/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=2mm custom (8x8x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 23.451 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 34.4850
SAR(1 g) = 8.13 mW/g; SAR(10 g) = 2.31 mW/g
Maximum value of SAR (measured) = 16.326 mW/g

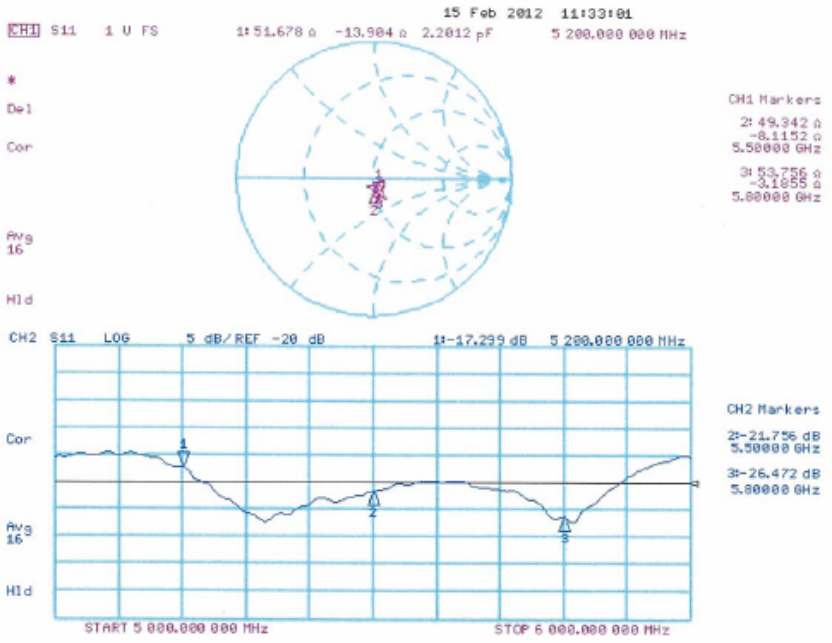
Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)



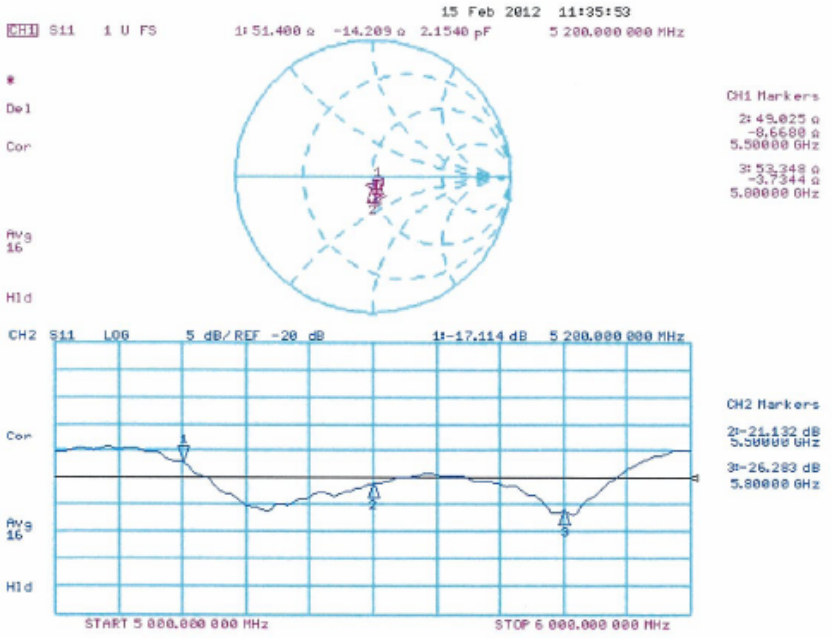
0 dB = 16.330mW/g = 24.26 dB mW/g

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

Impedance Measurement Plot for Head TSL (UL Spacer #1)



Impedance Measurement Plot for Head TSL (UL Spacer #2)



Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

DASY5 Validation Report for Body TSL

Date: 15.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1070

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 5.48 mho/m; ε_r = 48.6; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 5.87 mho/m; ε_r = 48.1; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 6.29 mho/m; ε_r = 47.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

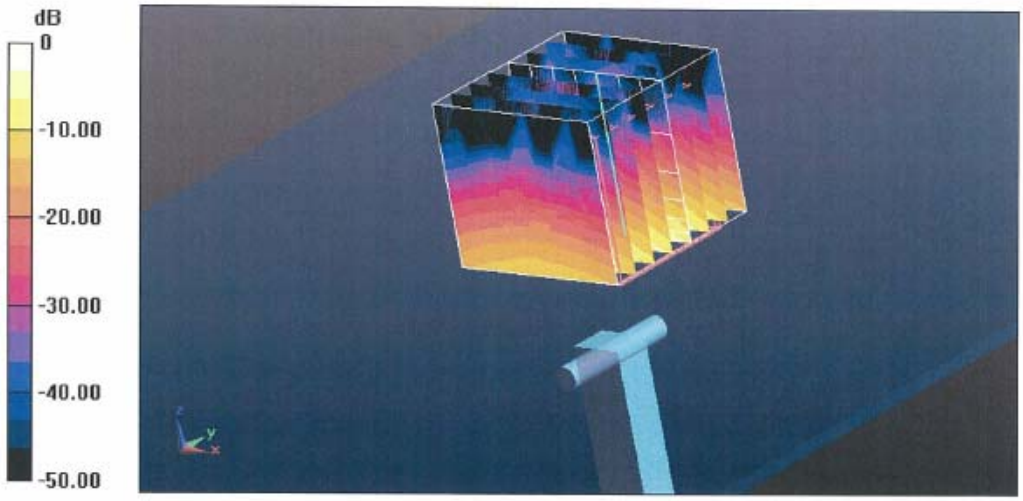
- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91), ConvF(4.43, 4.43, 4.43), ConvF(4.38, 4.38, 4.38); Calibrated: 30.12.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue - Spacer #1/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 57.949 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 29.4580
SAR(1 g) = 7.46 mW/g; SAR(10 g) = 2.1 mW/g
Maximum value of SAR (measured) = 17.691 mW/g

Dipole Calibration for Body Tissue - Spacer #1/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 58.644 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 34.9420
SAR(1 g) = 8.08 mW/g; SAR(10 g) = 2.25 mW/g
Maximum value of SAR (measured) = 19.688 mW/g

Dipole Calibration for Body Tissue - Spacer #1/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 55.296 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 35.9150
SAR(1 g) = 7.65 mW/g; SAR(10 g) = 2.12 mW/g
Maximum value of SAR (measured) = 19.112 mW/g

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)



0 dB = 19.110mW/g = 25.63 dB mW/g

Certificate No: D5GHzV2-1070_Feb12/2 Page 24 of 27

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

DASY5 Validation Report for Body TSL

Date: 15.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1070

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 5.48 mho/m; ε_r = 48.6; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 5.87 mho/m; ε_r = 48.1; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 6.29 mho/m; ε_r = 47.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

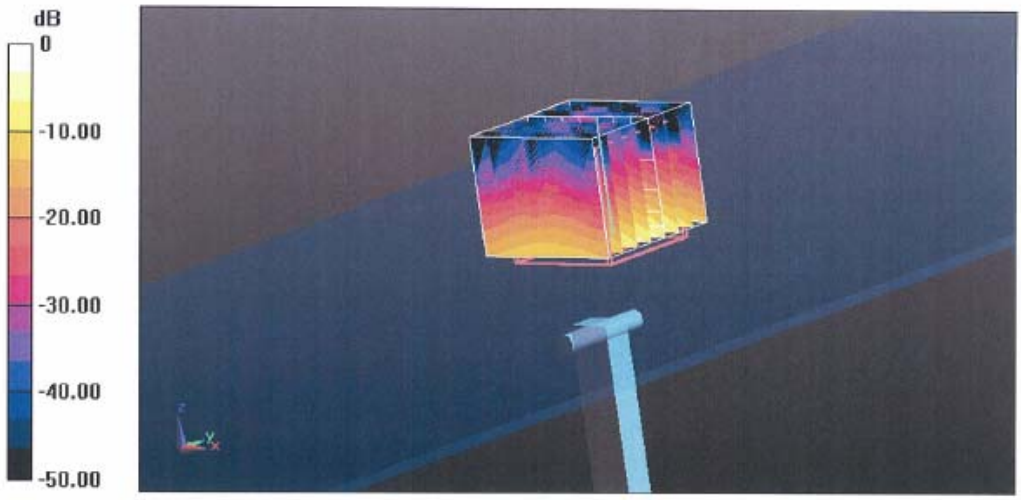
- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91), ConvF(4.43, 4.43, 4.43), ConvF(4.38, 4.38, 4.38); Calibrated: 30.12.2011
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue - Spacer #1/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=2mm custom (8x8x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 57.949 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 29.6900
SAR(1 g) = 7.49 mW/g; SAR(10 g) = 2.1 mW/g
Maximum value of SAR (measured) = 14.830 mW/g

Dipole Calibration for Body Tissue - Spacer #1/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=2mm custom (8x8x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 58.644 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 34.4440
SAR(1 g) = 8.1 mW/g; SAR(10 g) = 2.25 mW/g
Maximum value of SAR (measured) = 16.373 mW/g

Dipole Calibration for Body Tissue - Spacer #1/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=2mm custom (8x8x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 55.296 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 34.0500
SAR(1 g) = 7.58 mW/g; SAR(10 g) = 2.1 mW/g
Maximum value of SAR (measured) = 15.404 mW/g

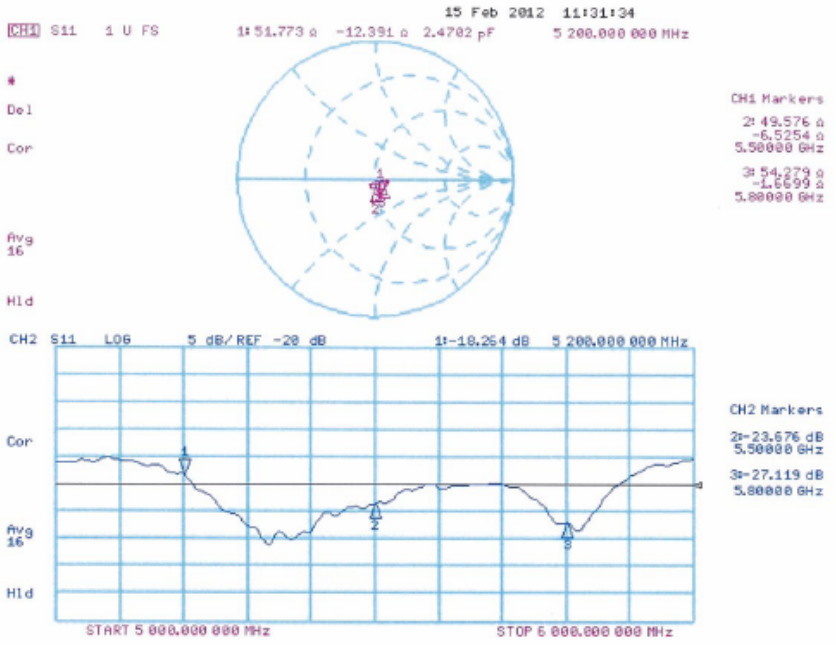
Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)



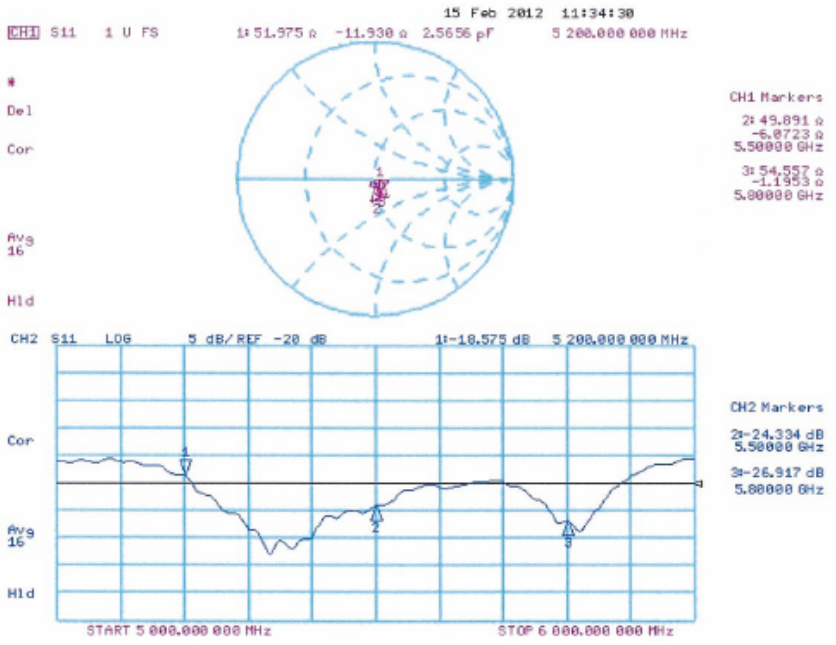
0 dB = 15.400mW/g = 23.75 dB mW/g

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

Impedance Measurement Plot for Body TSL (UL Spacer #1)



Impedance Measurement Plot for Body TSL (UL Spacer #2)



Certificate No: D5GHzV2-1070_Feb12/2 Page 27 of 27

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

Appendix C: Additional Measurements

Upon customer request, additional measurements were done to compare the influence of the dipole spacer on the SAR results. Summary of these tests are outlined below.

Same measurement conditions including the extended standard uncertainty (K=2) were used as given in the D5GHzV2 1070_Feb12/2 calibration certificate.

SAR result with Head TSL at 5200 MHz

SAR results normalized to 1W input power and for nominal TSL parameters.

SAR averaged over 1 cm^3 (1 g) of Head TSL	Dipole Spacer	
UL Zoom Scan setting (page 14)	Spacer #1	80.6 mW/g
UL Zoom Scan setting (page 14)	No spacer	79.5 mW/g

SAR averaged over 10 cm^3 (10 g) of Head TSL	Dipole Spacer	
UL Zoom Scan setting (page 14)	Spacer #1	23.1 mW/g
UL Zoom Scan setting (page 14)	No spacer	23.2 mW/g

SAR result with Head TSL at 5500 MHz

SAR results normalized to 1W input power and for nominal TSL parameters.

SAR averaged over 1 cm^3 (1 g) of Head TSL	Dipole Spacer	
UL Zoom Scan setting (page 14)	Spacer #1	86.4 mW/g
UL Zoom Scan setting (page 14)	No spacer	87.0 mW/g

SAR averaged over 10 cm^3 (10 g) of Head TSL	Dipole Spacer	
UL Zoom Scan setting (page 14)	Spacer #1	24.6 mW/g
UL Zoom Scan setting (page 14)	No spacer	25.2 mW/g

SAR result with Head TSL at 5800 MHz

SAR results normalized to 1W input power and for nominal TSL parameters.

SAR averaged over 1 cm^3 (1 g) of Head TSL	Dipole Spacer	
UL Zoom Scan setting (page 14)	Spacer #1	80.8 mW/g
UL Zoom Scan setting (page 14)	No spacer	80.6 mW/g

SAR averaged over 10 cm^3 (10 g) of Head TSL	Dipole Spacer	
UL Zoom Scan setting (page 14)	Spacer #1	22.9 mW/g
UL Zoom Scan setting (page 14)	No spacer	23.3 mW/g

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

SAR result with Body TSL at 5200 MHz

SAR results normalized to 1W input power and for nominal TSL parameters.

SAR averaged over 1 cm^3 (1 g) of Body TSL	Dipole Spacer	
UL Zoom Scan setting (page 14)	Spacer #1	74.8 mW/g
UL Zoom Scan setting (page 14)	No spacer	72.7 mW/g

SAR averaged over 10 cm^3 (10 g) of Body TSL	Dipole Spacer	
UL Zoom Scan setting (page 14)	Spacer #1	21.0 mW/g
UL Zoom Scan setting (page 14)	No spacer	20.7 mW/g

SAR result with Body TSL at 5500 MHz

SAR results normalized to 1W input power and for nominal TSL parameters.

SAR averaged over 1 cm^3 (1 g) of Body TSL	Dipole Spacer	
UL Zoom Scan setting (page 14)	Spacer #1	81.0 mW/g
UL Zoom Scan setting (page 14)	No spacer	81.1 mW/g

SAR averaged over 10 cm^3 (10 g) of Body TSL	Dipole Spacer	
UL Zoom Scan setting (page 14)	Spacer #1	22.5 mW/g
UL Zoom Scan setting (page 14)	No spacer	22.8 mW/g

SAR result with Body TSL at 5800 MHz

SAR results normalized to 1W input power and for nominal TSL parameters.

SAR averaged over 1 cm^3 (1 g) of Body TSL	Dipole Spacer	
UL Zoom Scan setting (page 14)	Spacer #1	75.7 mW/g
UL Zoom Scan setting (page 14)	No spacer	74.7 mW/g

SAR averaged over 10 cm^3 (10 g) of Body TSL	Dipole Spacer	
UL Zoom Scan setting (page 14)	Spacer #1	21.0 mW/g
UL Zoom Scan setting (page 14)	No spacer	21.0 mW/g

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

DASY5 Validation Report for Head TSL "No Spacer"

Date: 16.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1070

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 4.6 mho/m; ε_r = 35.3; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 4.89 mho/m; ε_r = 34.9; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 5.19 mho/m; ε_r = 34.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

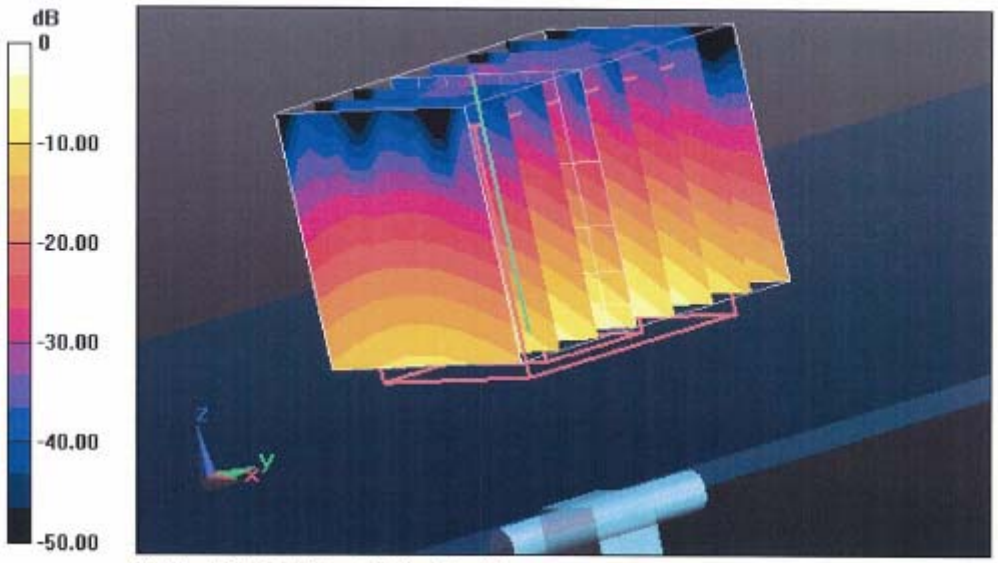
- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41), ConvF(4.91, 4.91, 4.91), ConvF(4.81, 4.81, 4.81); Calibrated: 30.12.2011
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue - No Spacer/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=2mm custom (8x8x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 62.152 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 29.7210
SAR(1 g) = 7.98 mW/g; SAR(10 g) = 2.33 mW/g
Maximum value of SAR (measured) = 15.399 mW/g

Dipole Calibration for Head Tissue - No Spacer/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=2mm custom (8x8x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 63.595 V/m; Power Drift = -0.0084 dB
Peak SAR (extrapolated) = 34.6390
SAR(1 g) = 8.74 mW/g; SAR(10 g) = 2.53 mW/g
Maximum value of SAR (measured) = 17.135 mW/g

Dipole Calibration for Head Tissue - No Spacer/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=2mm custom (8x8x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 59.759 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 33.3780
SAR(1 g) = 8.11 mW/g; SAR(10 g) = 2.35 mW/g
Maximum value of SAR (measured) = 15.874 mW/g

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)



0 dB = 15.870mW/g = 24.01 dB mW/g

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)

DASY5 Validation Report for Body TSL "No Spacer"

Date: 15.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1070

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 5.48 mho/m; ε_r = 48.6; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 5.87 mho/m; ε_r = 48.1; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 6.29 mho/m; ε_r = 47.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

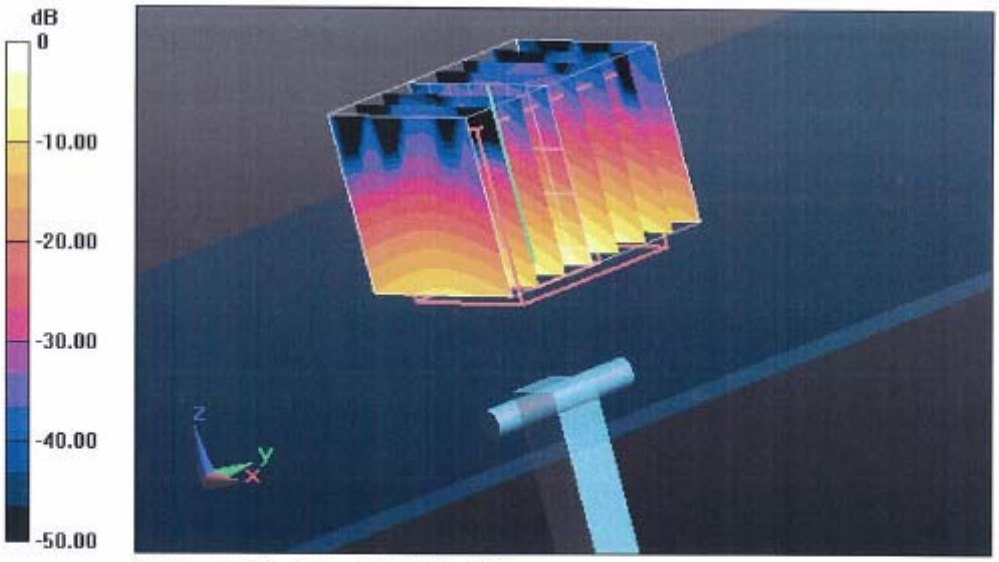
- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91), ConvF(4.43, 4.43, 4.43), ConvF(4.38, 4.38, 4.38); Calibrated: 30.12.2011
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue - No Spacer/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=2mm custom (8x8x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 56.822 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 28.5420
SAR(1 g) = 7.28 mW/g; SAR(10 g) = 2.07 mW/g
Maximum value of SAR (measured) = 13.985 mW/g

Dipole Calibration for Body Tissue - No Spacer/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=2mm custom (8x8x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 58.019 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 33.9610
SAR(1 g) = 8.11 mW/g; SAR(10 g) = 2.28 mW/g
Maximum value of SAR (measured) = 15.846 mW/g

Dipole Calibration for Body Tissue - No Spacer/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=2mm custom (8x8x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 54.561 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 33.3380
SAR(1 g) = 7.48 mW/g; SAR(10 g) = 2.1 mW/g
Maximum value of SAR (measured) = 14.827 mW/g

Appendix 3-10: Calibration certificate: Dipole (D5GHzV2) (cont'd)



0 dB = 14.830mW/g = 23.42 dB mW/g