

## 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	46.4 ± 6 %	6.28 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 <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.73 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>76.9 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.15 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>21.3 W/kg ± 19.5 % (k=2)</b>

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	49.8 $\Omega$ - 8.3 j $\Omega$
Return Loss	- 21.6 dB

### Antenna Parameters with Head TSL at 5300 MHz

Impedance, transformed to feed point	48.3 $\Omega$ - 3.5 j $\Omega$
Return Loss	- 28.0 dB

### Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	50.4 $\Omega$ - 7.0 j $\Omega$
Return Loss	- 23.2 dB

### Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	56.6 $\Omega$ - 3.3 j $\Omega$
Return Loss	- 23.3 dB

### Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	54.2 $\Omega$ - 1.8 j $\Omega$
Return Loss	- 27.1 dB

### Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	49.1 $\Omega$ - 6.9 j $\Omega$
Return Loss	- 23.0 dB

### Antenna Parameters with Body TSL at 5300 MHz

Impedance, transformed to feed point	48.6 $\Omega$ - 1.6 j $\Omega$
Return Loss	- 33.1 dB

### Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	51.2 $\Omega$ - 4.7 j $\Omega$
Return Loss	- 26.3 dB

### Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	57.5 $\Omega$ - 2.0 j $\Omega$
Return Loss	- 22.8 dB

### Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	55.6 $\Omega$ - 1.4 j $\Omega$
Return Loss	- 25.3 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.203 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 30, 2005

## DASY5 Validation Report for Head TSL

Date: 13.07.2017

Test Laboratory: SPEAG, Zurich, Switzerland

### DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1040

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 4.51$  S/m;  $\epsilon_r = 36.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5300$  MHz;  $\sigma = 4.61$  S/m;  $\epsilon_r = 36.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5500$  MHz;  $\sigma = 4.81$  S/m;  $\epsilon_r = 35.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5600$  MHz;  $\sigma = 4.92$  S/m;  $\epsilon_r = 35.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5800$  MHz;  $\sigma = 5.14$  S/m;  $\epsilon_r = 35.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

### DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.76, 5.76, 5.76); Calibrated: 31.12.2016, ConvF(5.35, 5.35, 5.35); Calibrated: 31.12.2016, ConvF(5.2, 5.2, 5.2); Calibrated: 31.12.2016, ConvF(5.09, 5.09, 5.09); Calibrated: 31.12.2016, ConvF(5.01, 5.01, 5.01); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

### Dipole Calibration for Head Tissue/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 = 68.84 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 29.0 W/kg

**SAR(1 g) = 7.95 W/kg; SAR(10 g) = 2.28 W/kg**

Maximum value of SAR (measured) = 18.2 W/kg

### Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 71.51 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 29.9 W/kg

**SAR(1 g) = 8.3 W/kg; SAR(10 g) = 2.37 W/kg**

Maximum value of SAR (measured) = 19.1 W/kg

### Dipole Calibration for Head Tissue/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 = 69.97 V/m; Power Drift = -0.08 dB

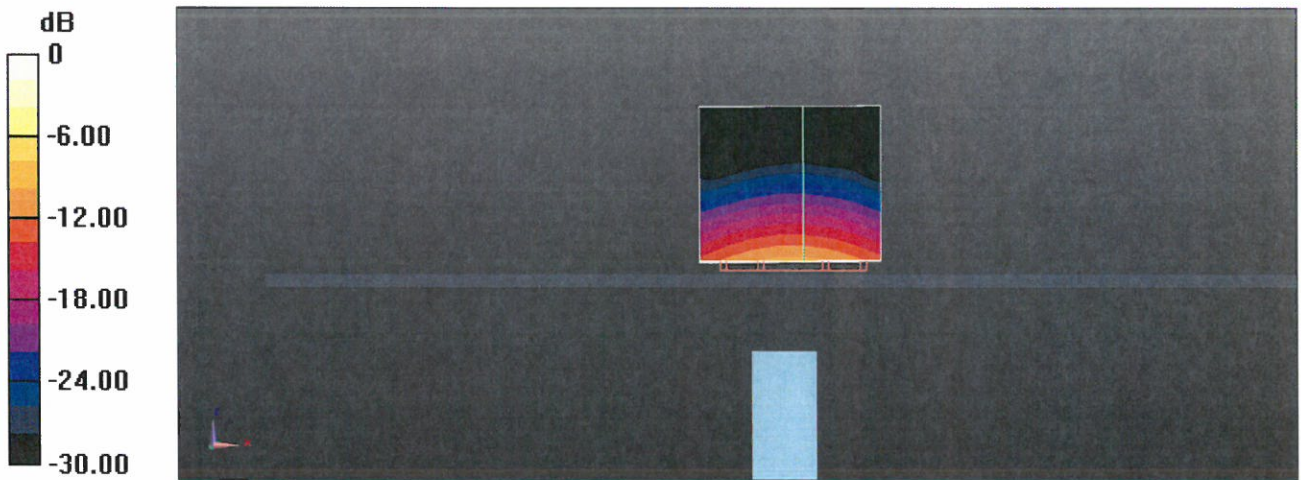
Peak SAR (extrapolated) = 32.8 W/kg

**SAR(1 g) = 8.37 W/kg; SAR(10 g) = 2.37 W/kg**

Maximum value of SAR (measured) = 19.7 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 70.63 V/m; Power Drift = -0.07 dB  
Peak SAR (extrapolated) = 33.4 W/kg  
**SAR(1 g) = 8.54 W/kg; SAR(10 g) = 2.43 W/kg**  
Maximum value of SAR (measured) = 20.1 W/kg

**Dipole Calibration for Head Tissue/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 = 67.92 V/m; Power Drift = -0.07 dB  
Peak SAR (extrapolated) = 33.4 W/kg  
**SAR(1 g) = 8.2 W/kg; SAR(10 g) = 2.32 W/kg**  
Maximum value of SAR (measured) = 18.7 W/kg



0 dB = 19.7 W/kg = 12.94 dBW/kg

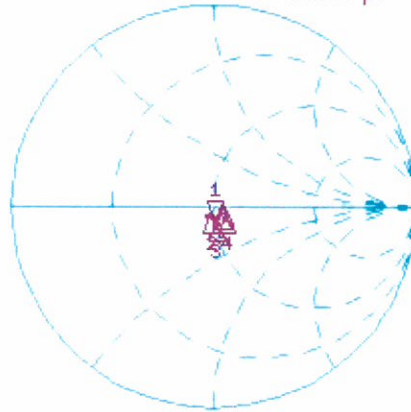


# Impedance Measurement Plot for Head TSL

13 Jul 2017 11:01:29

CH1 S11 1 U FS 1: 49.768  $\Omega$  -8.3398  $\Omega$  3.6699 pF 5 200.000 000 MHz

\*  
Del  
Cor  
Avg  
16  
H1d

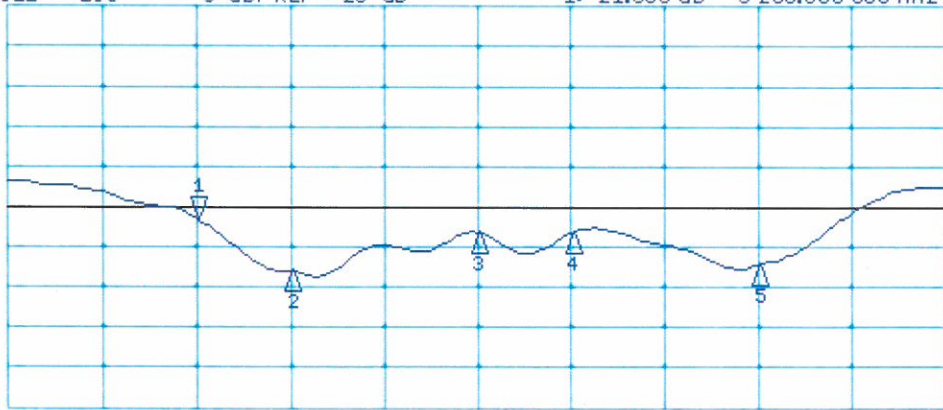


CH1 Markers

- 2: 48.289  $\Omega$   
-3.5156  $\Omega$   
5.30000 GHz
- 3: 50.396  $\Omega$   
-6.9766  $\Omega$   
5.50000 GHz
- 4: 56.555  $\Omega$   
-3.2754  $\Omega$   
5.60000 GHz
- 5: 54.215  $\Omega$   
-1.8242  $\Omega$   
5.80000 GHz

CH2 S11 LOG 5 dB/REF -20 dB 1:-21.583 dB 5 200.000 000 MHz

Cor  
Avg  
16  
H1d



CH2 Markers

- 2: -28.017 dB  
5.30000 GHz
- 3: -23.166 dB  
5.50000 GHz
- 4: -23.250 dB  
5.60000 GHz
- 5: -27.110 dB  
5.80000 GHz

START 5 000.000 000 MHz

STOP 6 000.000 000 MHz

Test Laboratory: SPEAG, Zurich, Switzerland

## DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1040

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 5.45$  S/m;  $\epsilon_r = 47.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5300$  MHz;  $\sigma = 5.58$  S/m;  $\epsilon_r = 47.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5500$  MHz;  $\sigma = 5.85$  S/m;  $\epsilon_r = 46.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.99$  S/m;  $\epsilon_r = 46.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5800$  MHz;  $\sigma = 6.28$  S/m;  $\epsilon_r = 46.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

### DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.29, 5.29, 5.29); Calibrated: 31.12.2016, ConvF(5.04, 5.04, 5.04); Calibrated: 31.12.2016, ConvF(4.62, 4.62, 4.62); Calibrated: 31.12.2016, ConvF(4.57, 4.57, 4.57); Calibrated: 31.12.2016, ConvF(4.48, 4.48, 4.48); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

### Dipole Calibration for Body Tissue/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 = 64.58 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 28.8 W/kg

**SAR(1 g) = 7.47 W/kg; SAR(10 g) = 2.09 W/kg**

Maximum value of SAR (measured) = 17.7 W/kg

### Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 64.69 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 30.5 W/kg

**SAR(1 g) = 7.73 W/kg; SAR(10 g) = 2.17 W/kg**

Maximum value of SAR (measured) = 18.4 W/kg

### Dipole Calibration for Body Tissue/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 = 65.64 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 34.0 W/kg

**SAR(1 g) = 8.13 W/kg; SAR(10 g) = 2.25 W/kg**

Maximum value of SAR (measured) = 19.8 W/kg

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 64.99 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 33.9 W/kg

**SAR(1 g) = 8.05 W/kg; SAR(10 g) = 2.25 W/kg**

Maximum value of SAR (measured) = 19.5 W/kg

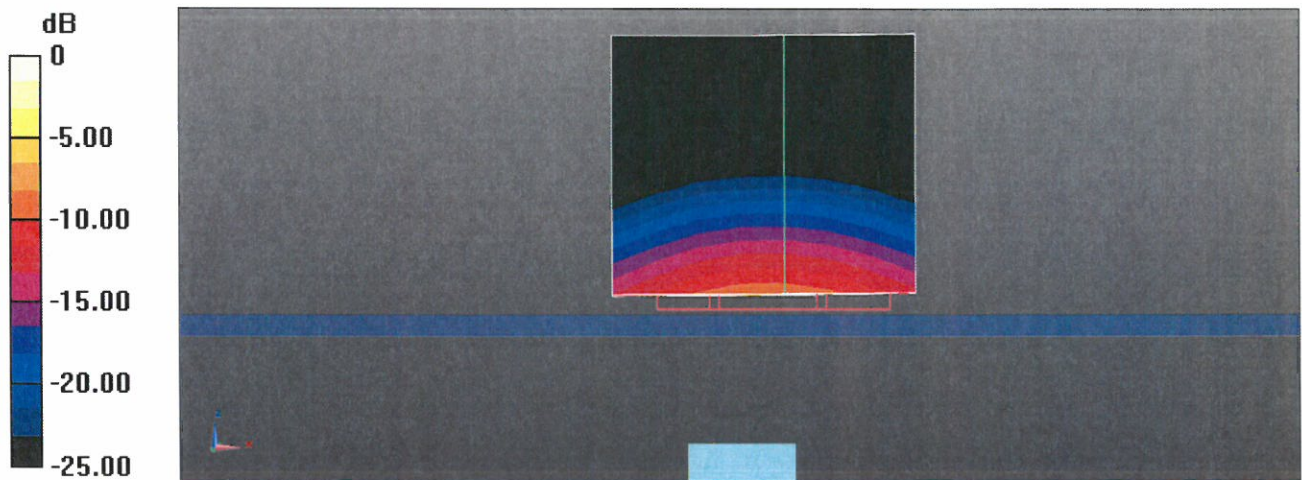
**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 63.02 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 34.5 W/kg

**SAR(1 g) = 7.73 W/kg; SAR(10 g) = 2.15 W/kg**

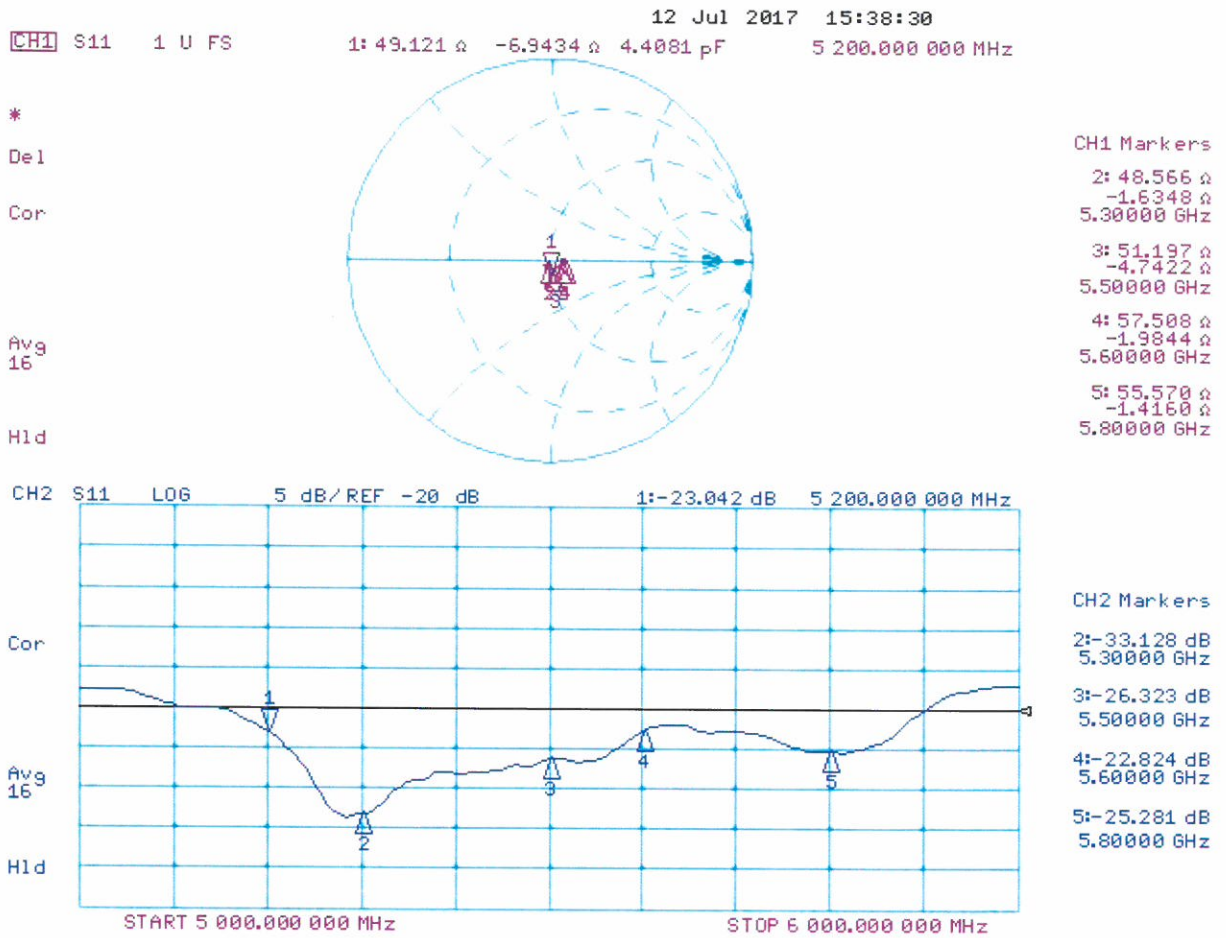
Maximum value of SAR (measured) = 19.2 W/kg



0 dB = 19.2 W/kg = 12.83 dBW/kg



# Impedance Measurement Plot for Body TSL





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Client **Emtek(Shenzhen)**

Certificate No: **Z17-97195**

## CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3970**

Calibration Procedure(s) **FF-Z11-004-01**  
**Calibration Procedures for Dosimetric E-field Probes**

Calibration date: **November 02, 2017**

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(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	27-Jun-17 (CTTL, No.J17X05857)	Jun-18
Power sensor NRP-Z91	101547	27-Jun-17 (CTTL, No.J17X05857)	Jun-18
Power sensor NRP-Z91	101548	27-Jun-17 (CTTL, No.J17X05857)	Jun-18
Reference10dBAttenuator	18N50W-10dB	13-Mar-16(CTTL,No.J16X01547)	Mar-18
Reference20dBAttenuator	18N50W-20dB	13-Mar-16(CTTL, No.J16X01548)	Mar-18
Reference Probe EX3DV4	SN 3617	23-Jan-17(SPEAG,No.EX3-3617_Jan17)	Jan-18
DAE4	SN 549	13-Dec-16(SPEAG, No.DAE4-549_Dec16)	Dec -17
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGeneratorMG3700A	6201052605	27-Jun-17 (CTTL, No.J17X05858)	Jun-18
Network Analyzer E5071C	MY46110673	13-Jan-17 (CTTL, No.J17X00285)	Jan -18

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: November 03, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.





## Glossary:

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A,B,C,D	modulation dependent linearization parameters
Polarization $\Phi$	$\Phi$ rotation around probe axis
Polarization $\theta$	$\theta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), $i$ $\theta=0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

## Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\theta=0$  ( $f \leq 900\text{MHz}$  in TEM-cell;  $f > 1800\text{MHz}$ : waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not effect the  $E^2$ -field uncertainty inside TSL (see below ConvF).
- NORM(f)<sub>x,y,z</sub>** = NORM<sub>x,y,z</sub> \* frequency\_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP<sub>x,y,z</sub>**: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; VR<sub>x,y,z</sub>; A,B,C** are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800\text{MHz}$ ) and inside waveguide using analytical field distributions based on power measurements for  $f > 800\text{MHz}$ . The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50\text{MHz}$  to  $\pm 100\text{MHz}$ .
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).



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# Probe EX3DV4

## SN: 3970

Calibrated: November 02, 2017

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)



## DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3970

### Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	0.49	0.64	0.26	±10.0%
DCP(mV) <sup>B</sup>	102.2	105.1	96.2	

### Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc <sup>E</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	176.2	±2.3%
		Y	0.0	0.0	1.0		211.5	
		Z	0.0	0.0	1.0		115.6	

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%.

<sup>A</sup> The uncertainties of Norm X, Y, Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Page 5 and Page 6).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.



## DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3970

### Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz] <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unct. (k=2)
750	41.9	0.89	10.41	10.41	10.41	0.30	0.80	± 12.1%
835	41.5	0.90	10.03	10.03	10.03	0.16	1.26	± 12.1%
900	41.5	0.97	10.05	10.05	10.05	0.14	1.46	± 12.1%
1750	40.1	1.37	8.68	8.68	8.68	0.21	1.11	± 12.1%
1900	40.0	1.40	8.25	8.25	8.25	0.24	1.00	± 12.1%
2300	39.5	1.67	8.08	8.08	8.08	0.56	0.70	± 12.1%
2450	39.2	1.80	7.91	7.91	7.91	0.55	0.73	± 12.1%
2600	39.0	1.96	7.59	7.59	7.59	0.51	0.79	± 12.1%
5200	36.0	4.66	5.92	5.92	5.92	0.35	1.50	± 13.3%
5300	35.9	4.76	5.67	5.67	5.67	0.35	1.40	± 13.3%
5500	35.6	4.96	5.22	5.22	5.22	0.35	1.45	± 13.3%
5600	35.5	5.07	5.12	5.12	5.12	0.35	1.65	± 13.3%
5800	35.3	5.27	5.21	5.21	5.21	0.40	1.35	± 13.3%

<sup>C</sup> Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<sup>F</sup> At frequency below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



## DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3970

### Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz] <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unct. (k=2)
750	55.5	0.96	10.35	10.35	10.35	0.40	0.85	± 12.1%
835	55.2	0.97	10.16	10.16	10.16	0.19	1.33	± 12.1%
900	55.0	1.05	10.12	10.12	10.12	0.23	1.21	± 12.1%
1750	53.4	1.49	8.32	8.32	8.32	0.25	1.04	± 12.1%
1900	53.3	1.52	8.10	8.10	8.10	0.20	1.15	± 12.1%
2300	52.9	1.81	7.80	7.80	7.80	0.54	0.79	± 12.1%
2450	52.7	1.95	7.83	7.83	7.83	0.66	0.70	± 12.1%
2600	52.5	2.16	7.49	7.49	7.49	0.54	0.78	± 12.1%
5200	49.0	5.30	5.19	5.19	5.19	0.50	1.30	± 13.3%
5300	48.9	5.42	4.73	4.73	4.73	0.50	1.36	± 13.3%
5500	48.6	5.65	4.42	4.42	4.42	0.50	1.40	± 13.3%
5600	48.5	5.77	4.31	4.31	4.31	0.50	1.60	± 13.3%
5800	48.2	6.00	4.40	4.40	4.40	0.50	1.72	± 13.3%

<sup>C</sup> Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<sup>F</sup> At frequency below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.