To whom it may concern:

TMC sincerely apologize for mistakenly using the inappropriate E-field probe calibration information in the SAR test reports during 2009-2012.

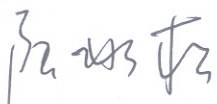
SPEAG has recalibrated all the E-field probes involving in the issue and made uncertainty evaluation and analysis of the probes. A series of comparison tests were also carried out under the instruction of FCC. The recalibration and the comparison tests demonstrated that the TMC's test results in the SAR test reports were within the acceptable range.

This statement together with its two appendix (Appendix A: SPEAG's new calibration certifications and Appendix B: SPEAG's Evaluation report) will replace the original probe calibration certification in the related test reports .

TMC will work closely together with FCC, TCBs and SPEAG to secure probe calibration and verification procedure. Through all the measures, TMC will ensure that the matter will not recur.

I am sincerely sorry about all the confusions and inconvenience caused. For any further questions, you may contact me freely.

Sincerely yours,
Bingsong LU,
(Signature)



Deputy Director of TMC

Appendix:
A: SPEAG's new calibration certifications
B: SPEAG's Evaluation report

Appendix A: SPEAG’s new calibration certifications

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
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 TMC Beijing

Certificate No: ES3-3149_Apr12

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3149

Calibration procedure(s): QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: April 24, 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 E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	10-Jan-12 (No. DAE4-660_Jan12)	Jan-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 24, 2012

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
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS) **Accreditation No.: SCS 108**

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
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * 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*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (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
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z*: *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 $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * 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 ± 50 MHz to ± 100 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.

Probe ES3DV3

SN:3149

Manufactured: June 12, 2007
Calibrated: April 24, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3149

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.21	1.24	1.24	± 10.1 %
DCP (mV)[B]	101.1	100.9	100.5	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
0	CW	0.00	X	0.00	0.00	1.00	112.7	±2.2 %
			Y	0.00	0.00	1.00	114.2	
			Z	0.00	0.00	1.00	118.9	

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%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] 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: ES3DV3 - SN:3149

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.50	6.50	6.50	0.24	2.36	± 12.0 %
850	41.5	0.92	6.26	6.26	6.26	0.25	2.14	± 12.0 %
900	41.5	0.97	6.17	6.17	6.17	0.21	2.55	± 12.0 %
1800	40.0	1.40	5.23	5.23	5.23	0.43	1.64	± 12.0 %
1900	40.0	1.40	5.19	5.19	5.19	0.45	1.64	± 12.0 %
2000	40.0	1.40	5.11	5.11	5.11	0.52	1.46	± 12.0 %
2100	39.8	1.49	5.12	5.12	5.12	0.49	1.52	± 12.0 %
2450	39.2	1.80	4.49	4.49	4.49	0.71	1.37	± 12.0 %
2550	39.1	1.91	4.34	4.34	4.34	0.69	1.26	± 12.0 %
2600	39.0	1.96	4.26	4.26	4.26	0.55	1.29	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) 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 (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

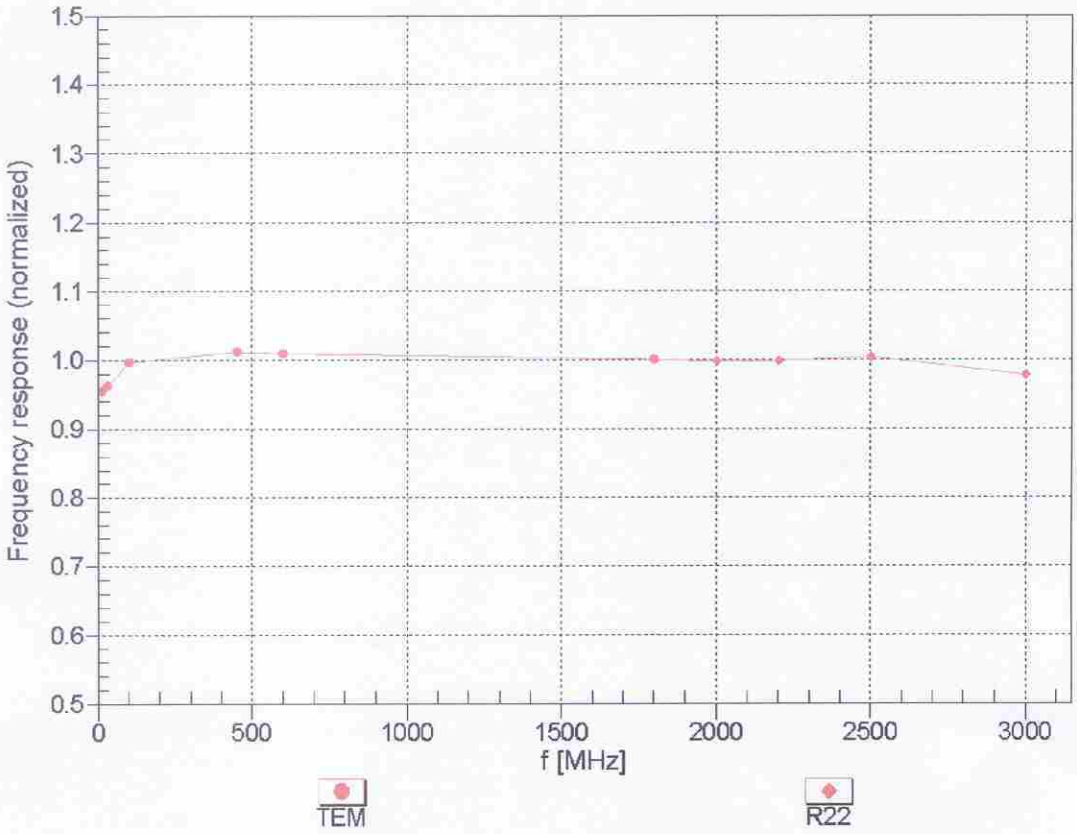
DASY/EASY - Parameters of Probe: ES3DV3 - SN:3149

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.29	6.29	6.29	0.43	1.56	± 12.0 %
850	55.2	0.99	6.14	6.14	6.14	0.41	1.63	± 12.0 %
900	55.0	1.05	6.16	6.16	6.16	0.63	1.30	± 12.0 %
1800	53.3	1.52	4.84	4.84	4.84	0.28	2.97	± 12.0 %
1900	53.3	1.52	4.64	4.64	4.64	0.34	2.25	± 12.0 %
2000	53.3	1.52	4.63	4.63	4.63	0.35	2.21	± 12.0 %
2100	53.2	1.62	4.91	4.91	4.91	0.36	2.20	± 12.0 %
2450	52.7	1.95	4.15	4.15	4.15	0.80	0.61	± 12.0 %
2550	52.6	2.09	4.07	4.07	4.07	0.80	0.50	± 12.0 %
2600	52.5	2.16	3.99	3.99	3.99	0.80	0.51	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) 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 (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

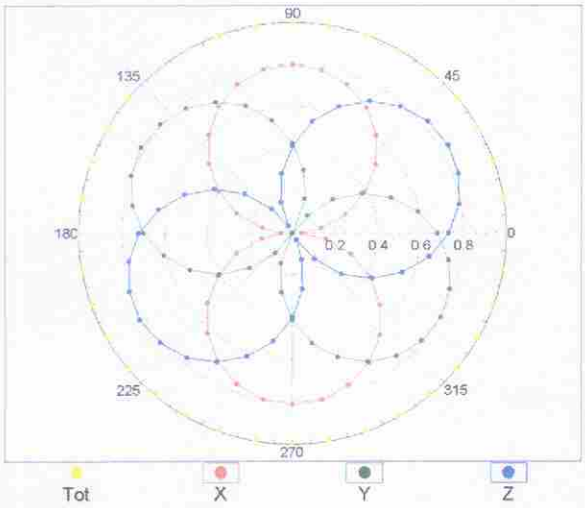
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



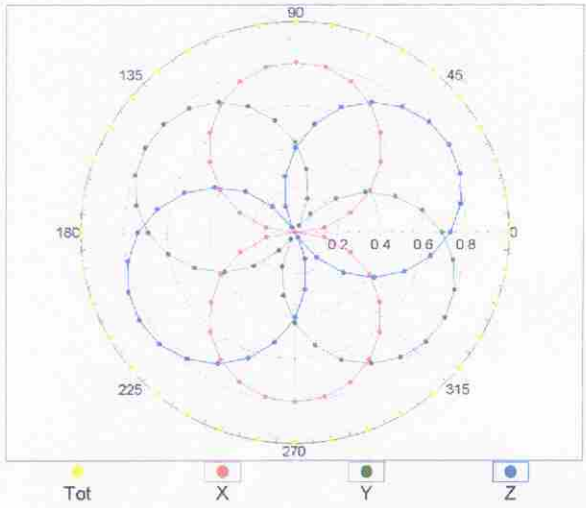
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

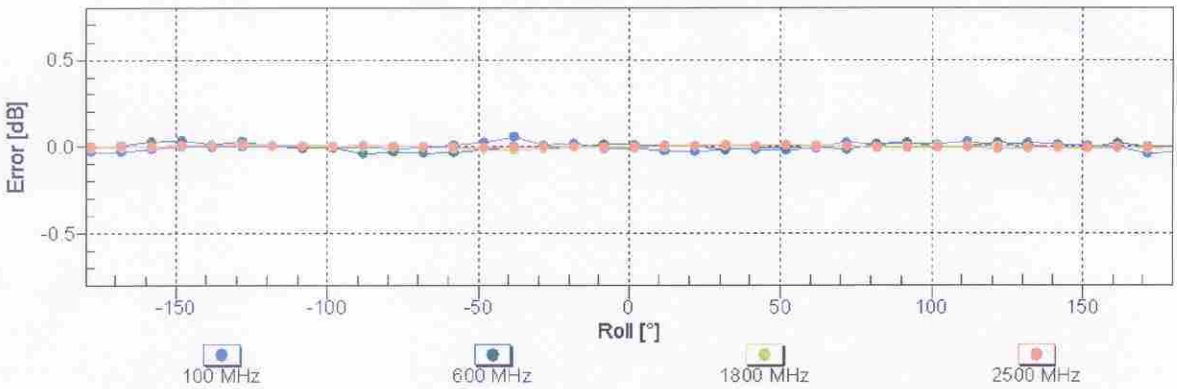
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



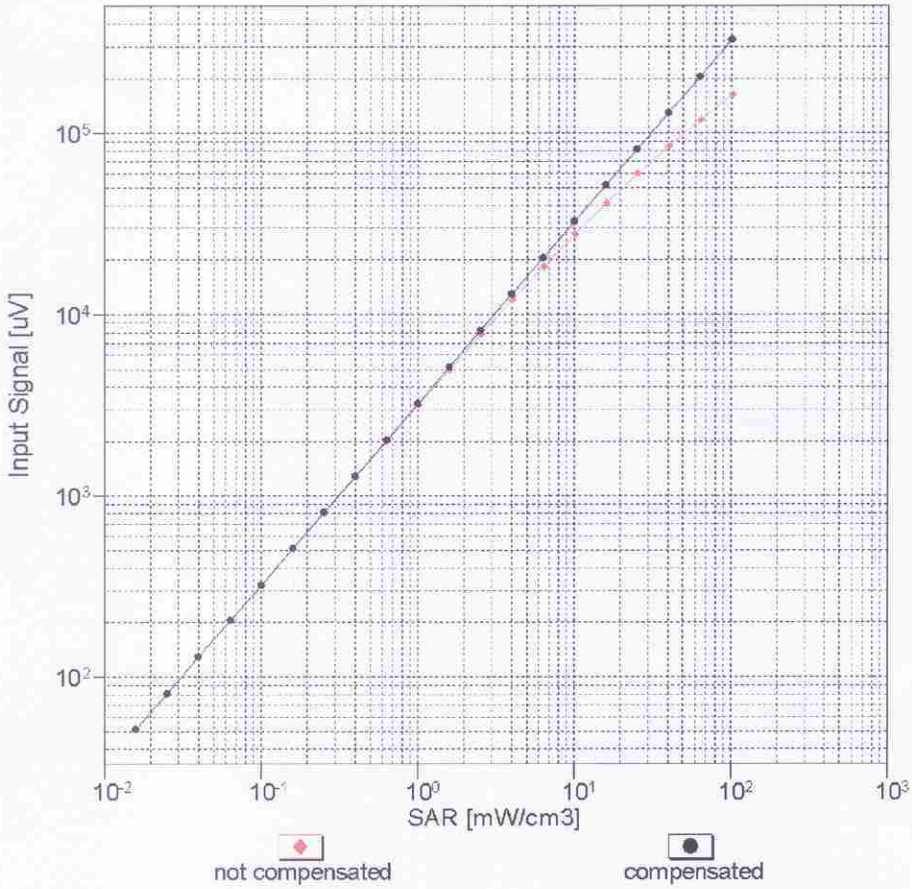
f=1800 MHz,R22

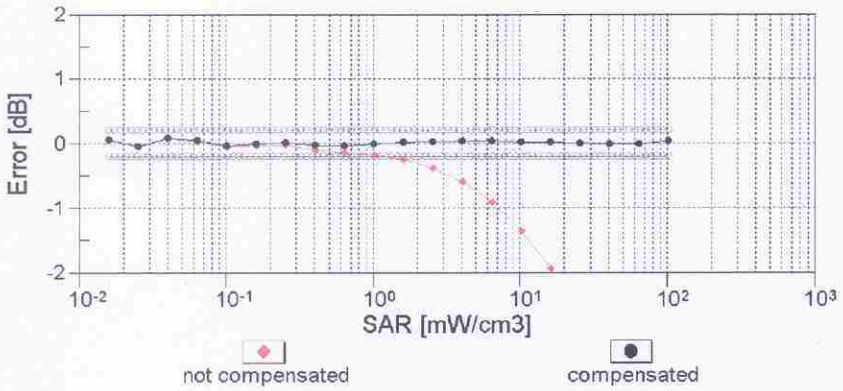




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

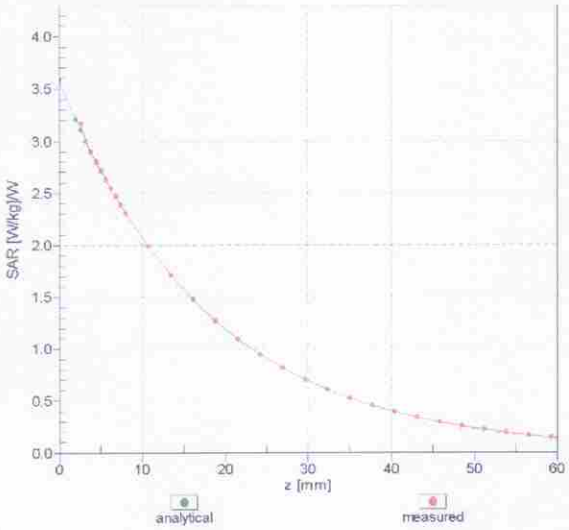




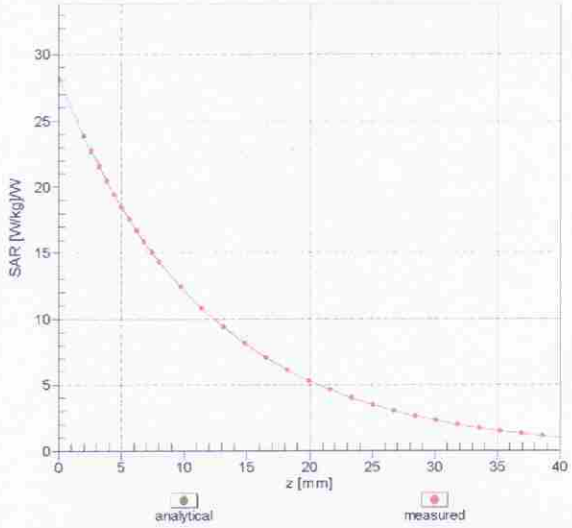
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

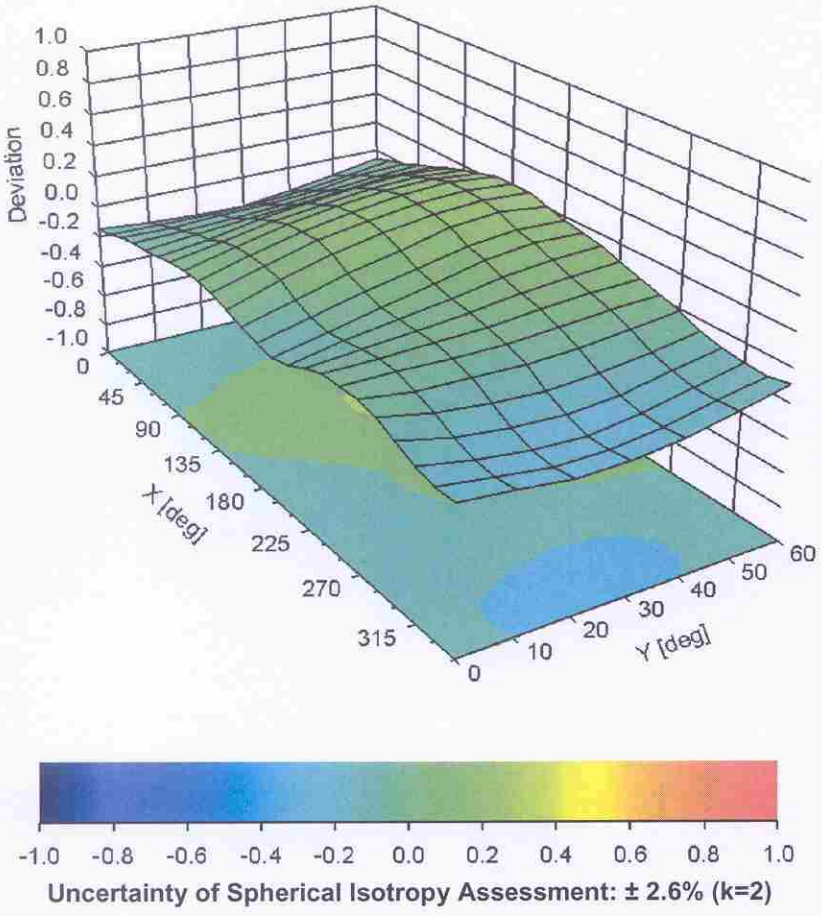


f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3149

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	51.8
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Appendix B: SPEAG’s Evaluation report

Evaluation Report of Dosimetric Probe ES3DV3 - SN3149

History of Probe

The probe was delivered to TMC in December 2007 with the SPEAG calibration certificate ES_3149_Dec07. The calibration values are summarized in Table A-1. During 2008 and 2011, TMC has applied the calibration parameters as summarized in Table A-2, A-2a, A-2b and A-2c for **head** tissue and B-2, B-2a, B-2b and B-2c for **body** tissue media. In April 2012, TMC has asked SPEAG to evaluate the maximum probe uncertainty of the probe since its first use.

Objective of this Evaluation

As the validity of the calibration parameters used had been questioned, SPEAG was mandated to determine the uncertainty retrospectively. The objective was as follow:

- Estimation of the uncertainty of the calibration parameters for the probe ES3149 applied during the time frame 2007 – 2012.

Methodology

The evaluation is based on the following steps:

- Functional inspections after probe had been received.
- Recalibration of the probe for all frequencies used since 2007. Very small shifts in calibration frequencies, e.g., 1800 and 1810 MHz, have been considered identical.
- For conservative reasons, the calibration uncertainty of the parameters determined by TMC has been assumed undefined[1] and only determined when the corresponding frequency/media appeared.
- Comparing the ES/3149 calibration data with SPEAG statistics of the long-term stability statistics of ES3D type of SPEAG probes.
- Estimation of the uncertainty of the calibration parameters applied by TMC since 2007 based on the above four-step evaluations.

Results

The functional inspection revealed that the probe is fully in tolerance. The recalibration results are summarized in Table A-3 for **head** tissue and B-3 for **body** tissue media. The changes of parameters determined between the first and second calibration are well within the expected long-term drifts for highly stable probes of less than 3% per year (k=1)[2]. In Table 4 and Table 5 we have combined the calibration uncertainty and the cumulated[3] drift uncertainty of 6% per year (k=2) since closest calibration. All calibration parameters applied by TMC were always well within the combined calibration uncertainty (See Table 4 and Table 5).

---

[1] The inter-laboratory probe calibration comparison between SPEAG and TMC demonstrated comparable uncertainties in the range of 12 -15% (k=2).

[2] The experience has shown that our probes can be divided into two categories. Highly stable probes that show minimal drifts over a long period and probes with larger drifts. The cause of the later could not be clearly identified.

[3] RSS summation has been applied for assessing the cumulated drift since nearest of SPEAG's calibration date. RSS is justified that the drifts have not shown to be linear additive for stable probes (also supported by the data here).

Uncertainty of Calibration Parameter Determined in Head Tissue Simulating Media

Date	14-Dec-07		1-Oct-08		25-Sep-09		25-Sep-10		24-Sep-11		24-Apr-12	
Lab	SPEAG		TMC		TMC		TMC		TMC		SPEAG	
Frequency (MHz)	Calibration (Norm*CF)	Unc (k=2)	Calibration (Norm*CF)	Unc (k=2)	Calibration (Norm*CF)	Unc (k=2)	Calibration (Norm*CF)	Unc (k=2)	Calibration (Norm*CF)	Unc (k=2)	Calibration (Norm*CF)	Unc (k=2)
850			8.00	20	8.00	20	8.00	20	8.00	20	7.70	12.0
900	7.66	11.0	7.73	13	7.73	15	7.73	15	7.73	13	7.59	12.0
1800			6.32	13	6.32	15	6.32	15	6.32	13	6.43	12.0
1810	6.20	11.0										
1900			6.14	20	6.14	20	6.14	20	6.14	20	6.38	12.0
2100					5.59	17	5.59	17	5.59	17	6.30	12.0
2450									5.31	13	5.52	12.0

Table 4: Uncertainty of calibration parameters based on SPEAG's retrospective evaluation (head tissue).

Uncertainty of Calibration Parameter Determined in Body Tissue Simulating Media

Date	14-Dec-07		1-Oct-08		25-Sep-09		25-Sep-10		24-Sep-11		24-Apr-12	
Lab	SPEAG		TMC		TMC		TMC		TMC		SPEAG	
Frequency (MHz)	Calibration (Norm*CF)	Unc (k=2)	Calibration (Norm*CF)	Unc (k=2)	Calibration (Norm*CF)	Unc (k=2)	Calibration (Norm*CF)	Unc (k=2)	Calibration (Norm*CF)	Unc (k=2)	Calibration (Norm*CF)	Unc (k=2)
850			7.59	20	7.59	20	7.59	20	7.59	20	7.55	12.0
900			7.34	20	7.34	20	7.34	20	7.34	20	7.58	12.0
1800			6.06	20	6.06	20	6.06	20	6.06	20	5.95	12.0
1810												
1900			5.71	20	5.71	20	5.71	20	5.71	20	5.71	12.0
2100					5.31	17	5.31	17	5.31	17	6.04	12.0
2450									5.04	13	5.10	12.0

Table 5: Uncertainty of calibration parameters based on SPEAG's retrospective evaluation (body tissue).

Conclusions

The evaluation was performed in a conservative approach by relying only on SPEAG's calibrations and considering the vase experience of SPEAG regarding the long-term stability of the probes. Therefore, SPEAG is confident that the calibration parameters used during the tests between 2007 and 2012 are covering the confidence interval of 95% when the uncertainty parameters of Tables 4 and 5 are considered.

Appendix

(A) Calibration Parameter Determined in Head Tissue Simulating Media
(B) Calibration Parameter Determined in Body Tissue Simulating Media

s p e a g
Schmid & Partner Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Calibration Parameter Determined in Head Tissue Simulating Media

			X	Y	Z	Norm-Avg
Lab	SPEAG					
Date	14-Dec-07	Norm	1.14	1.23	1.29	1.22
		DCP	94.0	95.0	91.0	

f (MHz)	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
900	41.5	0.97	6.28	6.28	6.28	0.89	1.24	± 11.0 %
1810	40.0	1.40	5.08	5.08	5.08	0.66	1.44	± 11.0 %

Table A-1: Calibration parameters (SPEAG, 14. December 2007)

			X	Y	Z	Norm-Avg
Lab	TMC					
Date	1-Oct-08	Norm	1.14	1.23	1.29	1.22
		DCP	94.0	95.0	91.0	

f (MHz)	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
850	41.5	0.90	6.56	6.56	6.56	0.91	1.13	± 11.0 %
900	41.5	0.97	6.34	6.34	6.34	0.83	1.26	± 11.0 %
1800	40.0	1.40	5.18	5.18	5.18	0.69	1.47	± 11.0 %
1900	40.0	1.40	5.03	5.03	5.03	0.72	1.38	± 11.0 %

Table A-2: Calibration parameters (TMC, 1. October 2008)

			X	Y	Z	Norm-Avg
Lab	TMC					
Date	25-Sep-09	Norm	1.14	1.23	1.29	1.22
		DCP	94.0	95.0	91.0	

f (MHz)	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
850	41.5	0.90	6.56	6.56	6.56	0.91	1.13	± 11.0 %
900	41.5	0.97	6.34	6.34	6.34	0.83	1.26	± 11.0 %
1800	40.0	1.40	5.18	5.18	5.18	0.69	1.47	± 11.0 %
1900	40.0	1.40	5.03	5.03	5.03	0.72	1.38	± 11.0 %
2100	39.8	1.49	4.58	4.58	4.58	0.66	1.34	± 11.0 %

Table A-2a: Calibration parameters (TMC, 25. September 2009)

			X	Y	Z	Norm-Avg
Lab	TMC					
Date	25-Sep-10	Norm	1.14	1.23	1.29	1.22
		DCP	94.0	95.0	91.0	

f (MHz)	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
850	41.5	0.90	6.56	6.56	6.56	0.91	1.13	± 11.0 %
900	41.5	0.97	6.34	6.34	6.34	0.83	1.26	± 11.0 %
1800	40.0	1.40	5.18	5.18	5.18	0.69	1.47	± 11.0 %
1900	40.0	1.40	5.03	5.03	5.03	0.72	1.38	± 11.0 %
2100	39.8	1.49	4.58	4.58	4.58	0.66	1.34	± 11.0 %

Table A-2b: Calibration parameters (TMC, 25. Septemebr 2010)

			X	Y	Z	Norm-Avg
Lab	TMC					
Date	24-Sep-11	Norm	1.14	1.23	1.29	1.22
		DCP	94.0	95.0	91.0	

f (MHz)	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
850	41.5	0.90	6.56	6.56	6.56	0.91	1.13	± 12.0 %
900	41.5	0.97	6.34	6.34	6.34	0.83	1.26	± 12.0 %
1800	40.0	1.40	5.18	5.18	5.18	0.69	1.47	± 12.0 %
1900	40.0	1.40	5.03	5.03	5.03	0.72	1.38	± 12.0 %
2100	39.8	1.49	4.58	4.58	4.58	0.66	1.34	± 12.0 %
2450	39.2	1.80	4.35	4.35	4.35	0.67	1.36	± 12.0 %

Table A-2c: Calibration parameters (TMC, 24. September 2011)

			X	Y	Z	Norm-Avg
Lab	SPEAG					
Date	24-Apr-12	Norm	1.21	1.24	1.24	1.23
		DCP	101.1	100.9	100.5	

f (MHz)	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
850	41.5	0.92	6.26	6.26	6.26	0.25	2.14	± 12.0 %
900	41.5	0.97	6.17	6.17	6.17	0.21	2.56	± 12.0 %
1800	40.0	1.40	5.23	5.23	5.23	0.43	1.64	± 12.0 %
1900	40.0	1.40	5.19	5.19	5.19	0.45	1.64	± 12.0 %
2100	39.8	1.49	5.12	5.12	5.12	0.49	1.52	± 12.0 %
2450	39.2	1.80	4.49	4.49	4.49	0.71	1.37	± 12.0 %

Table A-3: Calibration parameters (SPEAG, 24. April 2012)

Calibration Parameter Determined in Body Tissue Simulating Media

Lab	SPEAG		X	Y	Z	Norm-Avg
Date	14-Dec-07	Norm	1.14	1.23	1.29	1.22
		DCP	94.0	95.0	91.0	

f (MHz)	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
900	55.0	1.05						
1810	53.3	1.52						

Table B-1: Calibration parameters (SPEAG, 14. December 2007)

Lab	TMC		X	Y	Z	Norm-Avg
Date	1-Oct-08	Norm	1.14	1.23	1.29	1.22
		DCP	94.0	95.0	91.0	

f (MHz)	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
850	55.2	0.97	6.22	6.22	6.22	0.76	1.26	± 11.0 %
900	55.0	1.05	6.02	6.02	6.02	0.99	1.06	± 11.0 %
1800	53.3	1.52	4.97	4.97	4.97	0.75	1.34	± 11.0 %
1900	53.3	1.52	4.68	4.68	4.68	0.62	1.33	± 11.0 %

Table B-2: Calibration parameters (TMC, 1. October 2008)

Lab	TMC		X	Y	Z	Norm-Avg
Date	25-Sep-09	Norm	1.14	1.23	1.29	1.22
		DCP	94.0	95.0	91.0	

f (MHz)	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
850	55.2	0.97	6.22	6.22	6.22	0.76	1.26	± 11.0 %
900	55.0	1.05	6.02	6.02	6.02	0.99	1.06	± 11.0 %
1800	53.3	1.52	4.97	4.97	4.97	0.75	1.34	± 11.0 %
1900	53.3	1.52	4.68	4.68	4.68	0.62	1.33	± 11.0 %
2100	53.5	1.57	4.35	4.35	4.35	0.68	1.34	± 11.0 %

Table B-2a: Calibration parameters (TMC, 25. September 2009)

Lab	TMC		X	Y	Z	Norm-Avg
Date	25-Sep-10	Norm	1.14	1.23	1.29	1.22
		DCP	94.0	95.0	91.0	

f (MHz)	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
850	55.2	0.97	6.22	6.22	6.22	0.76	1.26	± 11.0 %
900	55.0	1.05	6.02	6.02	6.02	0.99	1.06	± 11.0 %
1800	53.3	1.52	4.97	4.97	4.97	0.75	1.34	± 11.0 %
1900	53.3	1.52	4.68	4.68	4.68	0.62	1.33	± 11.0 %
2100	53.5	1.57	4.35	4.35	4.35	0.68	1.34	± 11.0 %

Table B-2b: Calibration parameters (TMC, 25. Septemebr 2010)

Lab	TMC		X	Y	Z	Norm-Avg
Date	24-Sep-11	Norm	1.14	1.23	1.29	1.22
		DCP	94.0	95.0	91.0	

f (MHz)	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
850	55.2	0.97	6.22	6.22	6.22	0.76	1.26	± 12.0 %
900	55.0	1.05	6.02	6.02	6.02	0.99	1.06	± 12.0 %
1800	53.3	1.52	4.97	4.97	4.97	0.75	1.34	± 12.0 %
1900	53.3	1.52	4.68	4.68	4.68	0.62	1.33	± 12.0 %
2100	53.5	1.57	4.35	4.35	4.35	0.68	1.34	± 12.0 %
2450	52.7	1.95	4.13	4.13	4.13	0.71	1.35	± 12.0 %

Table B-2c: Calibration parameters (TMC, 24. September 2011)

Lab	SPEAG		X	Y	Z	Norm-Avg
Date	24-Apr-12	Norm	1.21	1.24	1.24	1.23
		DCP	101.1	100.9	100.5	

f (MHz)	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
850	55.2	0.99	6.14	6.14	6.14	0.41	1.63	± 12.0 %
900	55.0	1.05	6.16	6.16	6.16	0.62	1.30	± 12.0 %
1800	53.3	1.52	4.84	4.84	4.84	0.28	2.97	± 12.0 %
1900	53.3	1.52	4.64	4.64	4.64	0.34	2.25	± 12.0 %
2100	53.2	1.62	4.91	4.91	4.91	0.36	2.20	± 12.0 %
2450	52.7	1.95	4.15	4.15	4.15	0.80	0.61	± 12.0 %

Table B-3: Calibration parameters (SPEAG, 24. April 2012)