

---

## **Appendix for the Report Dosimetric Assessment of the Portable Device**

### **Integrated Service Information Display (Simatic Mobile Panel) from Siemens (FCC ID: nonexistent)**

### **According to the FCC Requirements**

### **Calibration Data**

November 06, 2007  
**IMST GmbH**  
**Carl-Friedrich-Gauß-Str. 2**  
**D-47475 Kamp-Lintfort**

Customer  
ETS Product Service AG  
Storkower Strasse 38c  
15526 Reichenwalde

This report shall not be reproduced except in full without the written approval of the testing laboratory.



Accredited by the Swiss Federal Office of Metrology and Accreditation  
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 **IMST**

Certificate No: **EX3-3536\_Sep07**

## CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3536**

Calibration procedure(s) **QA CAL-01.v6 and QA CAL-14.v3  
Calibration procedure for dosimetric E-field probes**

Calibration date: **September 18, 2007**

Condition of the calibrated item **In Tolerance**

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 E4419B	GB41293874	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41495277	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41498087	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Reference 3 dB Attenuator	SN: S5054 (3c)	8-Aug-07 (METAS, No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-07 (METAS, No. 217-00671)	Mar-08
Reference 30 dB Attenuator	SN: S5129 (30b)	8-Aug-07 (METAS, No. 217-00720)	Aug-08
Reference Probe ES3DV2	SN: 3013	4-Jan-07 (SPEAG, No. ES3-3013_Jan07)	Jan-08
DAE4	SN: 654	20-Apr-07 (SPEAG, No. DAE4-654_Apr07)	Apr-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

	Name	Function	Signature
Calibrated by:	<b>Katja Pokovic</b>	<b>Technical Manager</b>	
Approved by:	<b>Niels Kuster</b>	<b>Quality Manager</b>	

Issued: September 19, 2007

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



Accredited by the Swiss Federal Office of Metrology and Accreditation  
The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

### Glossary:

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ 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:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 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<sup>2</sup>-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.
- 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 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  $\pm 50$  MHz to  $\pm 100$  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 EX3DV4

## SN:3536

Manufactured:	April 30, 2004
Last calibrated:	September 27, 2006
Recalibrated:	September 18, 2007

Calibrated for DASYS Systems

(Note: non-compatible with DASYS2 system!)

## DASY - Parameters of Probe: EX3DV4 SN:3536

### Sensitivity in Free Space<sup>A</sup>

NormX	<b>0.440</b> ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$
NormY	<b>0.410</b> ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	<b>0.360</b> ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$

### Diode Compression<sup>B</sup>

DCP X	<b>90</b> mV
DCP Y	<b>91</b> mV
DCP Z	<b>90</b> mV

### Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

### Boundary Effect

**TSL**                    **1950 MHz**      **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		<b>2.0 mm</b>	<b>3.0 mm</b>
SAR <sub>be</sub> [%]	Without Correction Algorithm	3.0	1.0
SAR <sub>be</sub> [%]	With Correction Algorithm	0.1	0.1

**TSL**                    **5200 MHz**      **Typical SAR gradient: 25 % per mm**

Sensor Center to Phantom Surface Distance		<b>2.0 mm</b>	<b>3.0 mm</b>
SAR <sub>be</sub> [%]	Without Correction Algorithm	6.0	3.0
SAR <sub>be</sub> [%]	With Correction Algorithm	0.1	0.0

### Sensor Offset

Probe Tip to Sensor Center                    **1.0 mm**

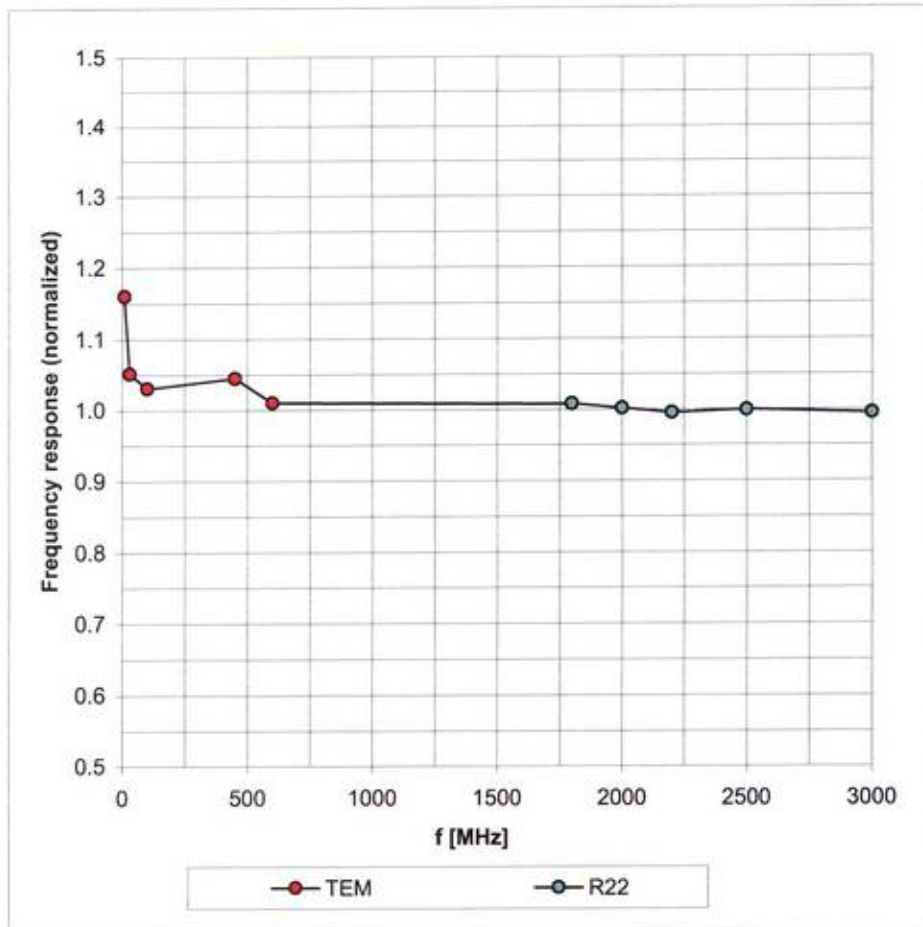
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Page 8).

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

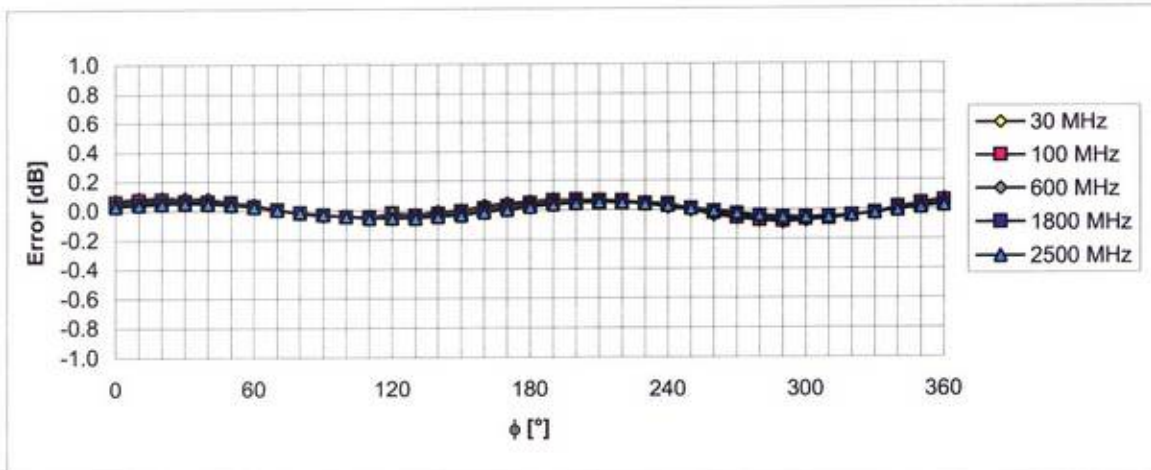
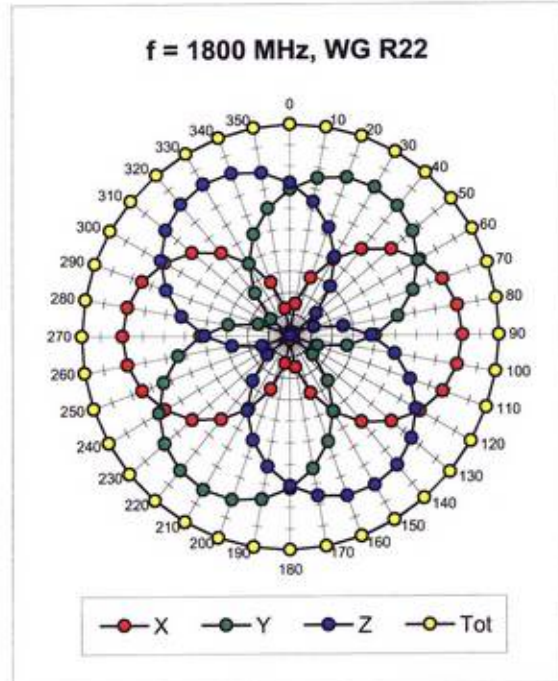
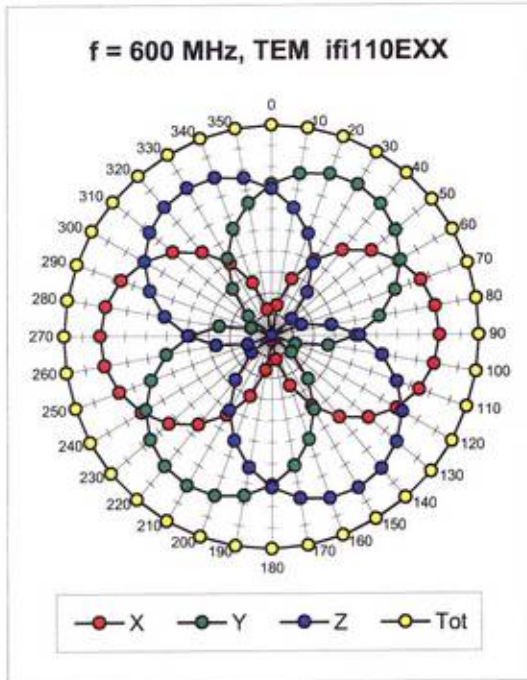
## Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



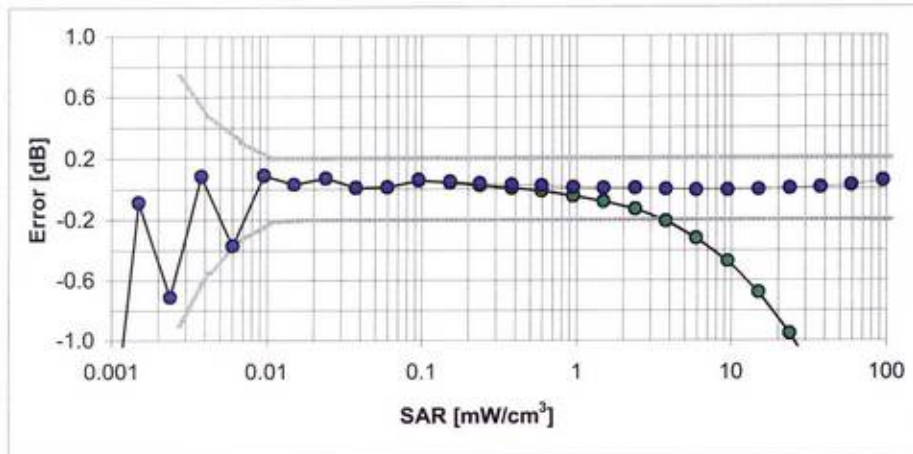
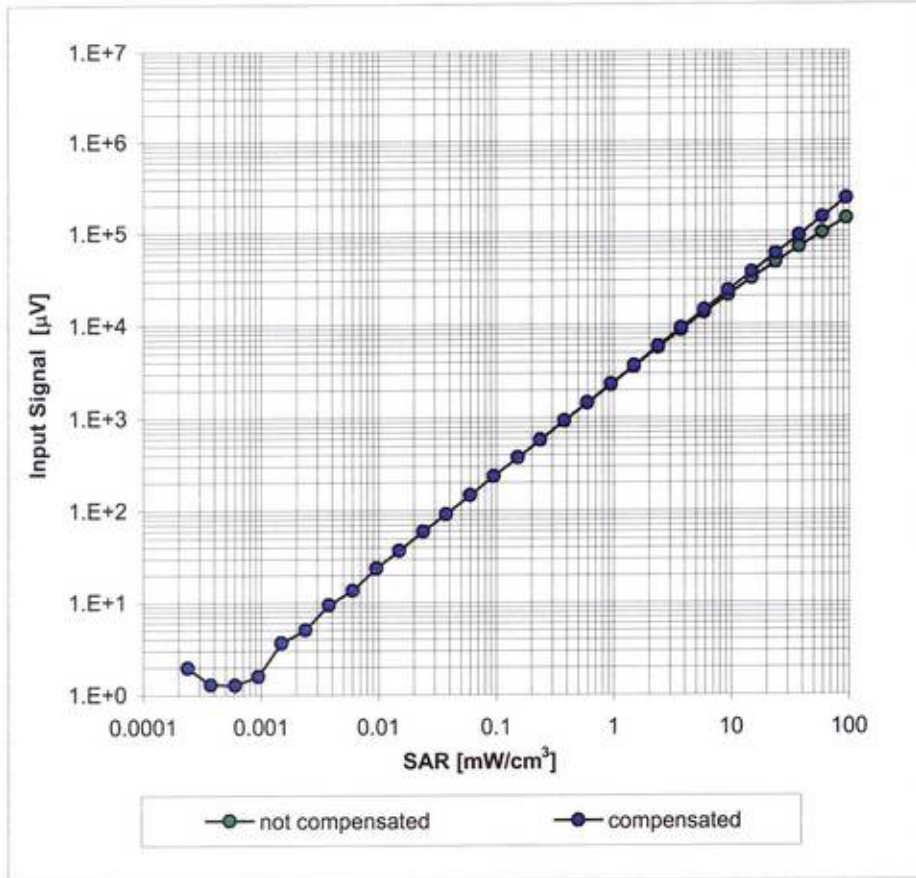
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

### Receiving Pattern ( $\phi$ ), $\vartheta = 0^\circ$



Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

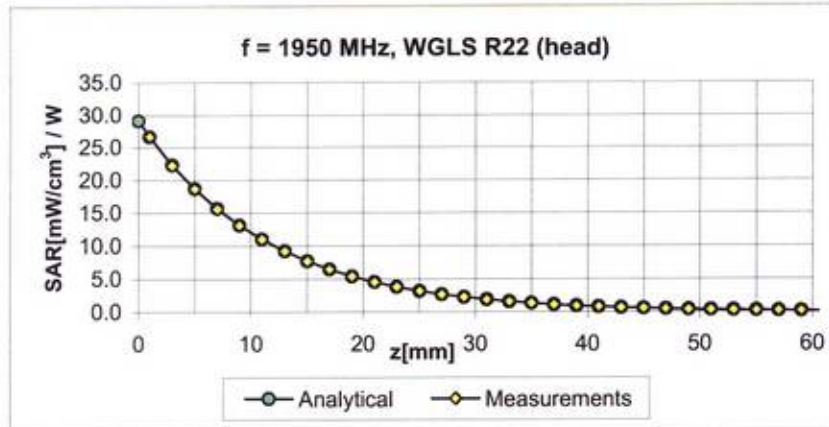
### Dynamic Range f(SAR<sub>head</sub>) (Waveguide R22, f = 1800 MHz)



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



## Conversion Factor Assessment

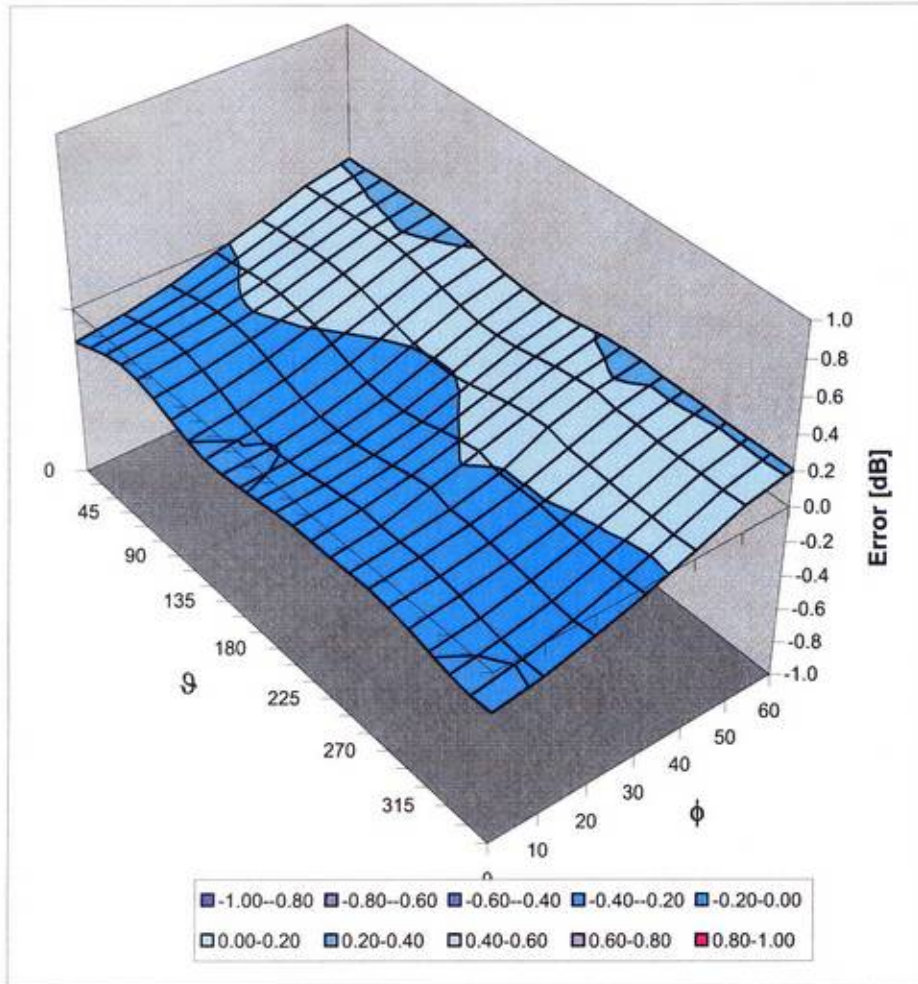


f [MHz]	Validity [MHz] <sup>c</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.29	0.86	7.85	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.87	0.57	7.57	± 11.8% (k=2)
2600	± 50 / ± 100	Head	39.0 ± 5%	1.96 ± 5%	0.92	0.55	7.32	± 11.8% (k=2)
3500	± 50 / ± 100	Head	37.9 ± 5%	2.91 ± 5%	0.30	1.15	7.25	± 13.1% (k=2)
5200	± 50 / ± 100	Head	36.0 ± 5%	4.66 ± 5%	0.43	1.60	5.28	± 13.1% (k=2)
5300	± 50 / ± 101	Head	35.9 ± 5%	4.76 ± 5%	0.42	1.60	5.18	± 13.1% (k=2)
5600	± 50 / ± 101	Head	35.5 ± 5%	5.07 ± 5%	0.42	1.60	5.01	± 13.1% (k=2)
5800	± 50 / ± 100	Head	35.3 ± 5%	5.27 ± 5%	0.44	1.60	4.83	± 13.1% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.21	1.11	7.67	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.90	0.58	7.46	± 11.8% (k=2)
2600	± 50 / ± 100	Body	52.5 ± 5%	2.16 ± 5%	0.98	0.55	7.12	± 11.8% (k=2)
3500	± 50 / ± 100	Body	51.3 ± 5%	3.31 ± 5%	0.36	1.08	6.72	± 13.1% (k=2)
5200	± 50 / ± 100	Body	49.0 ± 5%	5.30 ± 5%	0.36	1.65	4.89	± 13.1% (k=2)
5300	± 50 / ± 101	Body	48.5 ± 5%	5.42 ± 5%	0.38	1.65	4.79	± 13.1% (k=2)
5600	± 50 / ± 101	Body	48.5 ± 5%	5.77 ± 5%	0.28	1.65	4.71	± 13.1% (k=2)
5800	± 50 / ± 100	Body	48.2 ± 5%	6.00 ± 5%	0.28	1.65	4.76	± 13.1% (k=2)

<sup>c</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

### Deviation from Isotropy in HSL

Error ( $\phi, \vartheta$ ),  $f = 900$  MHz



Uncertainty of Spherical Isotropy Assessment:  $\pm 2.6\%$  ( $k=2$ )



Accredited by the Swiss Federal Office of Metrology and Accreditation  
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 IMST

Certificate No: D5GHzV2-1028\_Dec06

## CALIBRATION CERTIFICATE

Object: D5GHzV2 - SN: 1028

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

Calibration date: December 08, 2006

Condition of the calibrated item: In Tolerance

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 E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference Probe EX3DV4	SN: 3503	19-Mar-05 (SPEAG, No. EX3-3503_Mar06)	Mar-07
DAE4	SN: 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Nov-07

Calibrated by:	Name	Function	Signature
	Marcel Fehr	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: December 14, 2006

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



Accredited by the Swiss Federal Office of Metrology and Accreditation  
The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

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) IEC Std 62209 Part 2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", Draft Version 0.9, December 2004
- b) 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:**

- c) DASY4 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.

## Measurement Conditions

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

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Area Scan resolution	dx, dy = 10 mm	
Zoom Scan Resolution	dx, dy = 4.3 mm, dz = 3 mm	
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	35.4 ± 6 %	4.49 mho/m ± 6 %
Head TSL temperature during test	(22.4 ± 0.2) °C	----	----

## SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	condition	
SAR measured	250 mW input power	20.3 mW / g
SAR normalized	normalized to 1W	81.2 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>80.8 mW / g ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.76 mW / g
SAR normalized	normalized to 1W	23.0 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>22.8 mW / g ± 19.5 % (k=2)</b>

<sup>1</sup> Correction to nominal TSL parameters according to c), chapter "SAR Sensitivities"

### 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	34.8 ± 6 %	4.77 mho/m ± 6 %
Head TSL temperature during test	(22.2 ± 0.2) °C	----	----

### SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	condition	
SAR measured	250 mW input power	20.5 mW / g
SAR normalized	normalized to 1W	82.0 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>81.3 mW / g ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.79 mW / g
SAR normalized	normalized to 1W	23.2 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>22.9 mW / g ± 19.5 % (k=2)</b>

### 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	34.2 ± 6 %	5.05 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

### SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	condition	
SAR measured	250 mW input power	19.3 mW / g
SAR normalized	normalized to 1W	77.2 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>76.3 mW / g ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.46 mW / g
SAR normalized	normalized to 1W	21.8 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>21.6 mW / g ± 19.5 % (k=2)</b>

<sup>1</sup> Correction to nominal TSL parameters according to c), chapter "SAR Sensitivities"

### 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	47.4 ± 6 %	5.27 mho/m ± 6 %
Body TSL temperature during test	(21.9 ± 0.2) °C	----	----

### SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	condition	
SAR measured	250 mW input power	19.4 mW / g
SAR normalized	normalized to 1W	77.6 mW / g
SAR for nominal Body TSL parameters <sup>1</sup>	normalized to 1W	<b>76.8 mW / g ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.46 mW / g
SAR normalized	normalized to 1W	21.8 mW / g
SAR for nominal Body TSL parameters <sup>1</sup>	normalized to 1W	<b>21.6 mW / g ± 19.5 % (k=2)</b>

### 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	5.56 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.8 ± 6 %	5.66 mho/m ± 6 %
Body TSL temperature during test	(21.8 ± 0.2) °C	----	----

### SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	condition	
SAR measured	250 mW input power	19.7 mW / g
SAR normalized	normalized to 1W	78.8 mW / g
SAR for nominal Body TSL parameters <sup>1</sup>	normalized to 1W	<b>77.8 mW / g ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.51 mW / g
SAR normalized	normalized to 1W	22.0 mW / g
SAR for nominal Body TSL parameters <sup>1</sup>	normalized to 1W	<b>21.8 mW / g ± 19.5 % (k=2)</b>

<sup>1</sup> Correction to nominal TSL parameters according to c), chapter "SAR Sensitivities"

### 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	46.1 ± 6 %	6.04 mho/m ± 6 %
Body TSL temperature during test	(21.7 ± 0.2) °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	250 mW input power	17.9 mW / g
SAR normalized	normalized to 1W	71.6 mW / g
SAR for nominal Body TSL parameters <sup>1</sup>	normalized to 1W	<b>70.6 mW / g ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.03 mW / g
SAR normalized	normalized to 1W	20.1 mW / g
SAR for nominal Body TSL parameters <sup>1</sup>	normalized to 1W	<b>19.9 mW / g ± 19.5 % (k=2)</b>

<sup>1</sup> Correction to nominal TSL parameters according to c), chapter "SAR Sensitivities"



## Appendix

### Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	50.8 $\Omega$ - 10.4 j $\Omega$
Return Loss	-19.7 dB

### Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	54.5 $\Omega$ - 4.6 j $\Omega$
Return Loss	-24.3 dB

### Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	58.7 $\Omega$ - 6.3 j $\Omega$
Return Loss	-20.1 dB

### Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	50.2 $\Omega$ - 8.7 j $\Omega$
Return Loss	-21.2 dB

### Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	55.1 $\Omega$ - 3.2 j $\Omega$
Return Loss	-24.9 dB

### Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	60.3 $\Omega$ - 4.5 j $\Omega$
Return Loss	-19.9 dB

## General Antenna Parameters and Design

Electrical Delay (one direction)	1.197 ns
----------------------------------	----------

After long term use with 40 W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

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

## Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 09, 2004

## DASY4 Validation Report for Head TSL

Date/Time: 08.12.2006 12:41:46

Test Laboratory: SPEAG, Zurich, Switzerland

### DUT: Dipole 5GHz; Type: D5GHz; Serial: D5GHzV2 - SN:1028

Communication System: CW-5GHz; Frequency: 5200 MHzFrequency: 5500 MHzFrequency: 5800 MHz;Duty Cycle: 1:1  
Medium: HSL 5800 MHz;  
Medium parameters used:  $f = 5200$  MHz;  $\sigma = 4.49$  mho/m;  $\epsilon_r = 35.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Medium parameters used:  $f = 5500$  MHz;  $\sigma = 4.77$  mho/m;  $\epsilon_r = 34.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Medium parameters used:  $f = 5800$  MHz;  $\sigma = 5.05$  mho/m;  $\epsilon_r = 34.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY4 (High Precision Assessment)

### DASY4 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.52, 5.52, 5.52)ConvF(5.18, 5.18, 5.18)ConvF(5.02, 5.02, 5.02); Calibrated: 18.03.2006
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

### **d=10mm, Pin=250mW, f=5200 MHz/Area Scan (61x61x1):**

Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (interpolated) = 46.1 mW/g

### **d=10mm, Pin=250mW, f=5200 MHz/Zoom Scan (8x8x8), dist=2mm (8x8x8)/Cube 0:**

Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm  
Reference Value = 76.5 V/m; Power Drift = 0.240 dB  
Peak SAR (extrapolated) = 73.2 W/kg  
**SAR(1 g) = 20.3 mW/g; SAR(10 g) = 5.76 mW/g**  
Maximum value of SAR (measured) = 38.7 mW/g

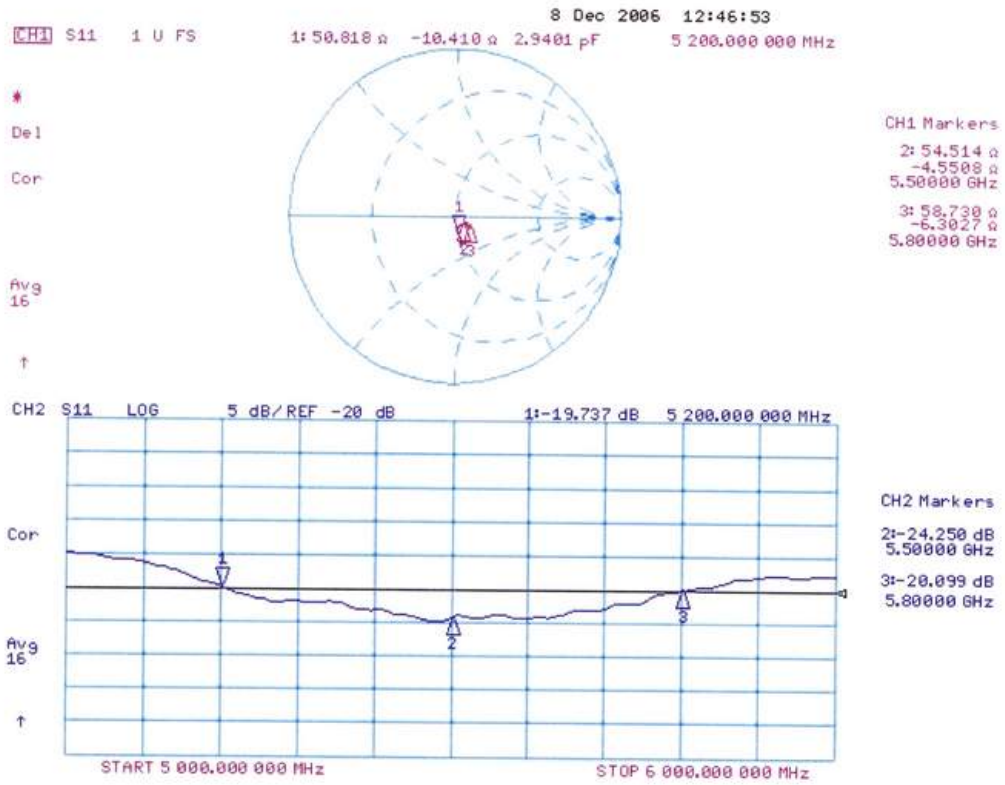
### **d=10mm, Pin=250mW, f=5500 MHz/Zoom Scan (8x8x8), dist=2mm 2 (8x8x8)/Cube 0:**

Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm  
Reference Value = 74.8 V/m; Power Drift = 0.106 dB  
Peak SAR (extrapolated) = 79.1 W/kg  
**SAR(1 g) = 20.5 mW/g; SAR(10 g) = 5.79 mW/g**  
Maximum value of SAR (measured) = 39.8 mW/g

### **d=10mm, Pin=250mW, f=5800 MHz/Zoom Scan (8x8x8), dist=2mm (8x8x8)/Cube 0:**

Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm  
Reference Value = 70.9 V/m; Power Drift = 0.041 dB  
Peak SAR (extrapolated) = 77.8 W/kg  
**SAR(1 g) = 19.3 mW/g; SAR(10 g) = 5.46 mW/g**  
Maximum value of SAR (measured) = 38.3 mW/g

# Impedance Measurement Plot for Head TSL



## DASY4 Validation Report for Body TSL

Date/Time: 08.12.2006 13:55:00

Test Laboratory: SPEAG, Zurich, Switzerland

### DUT: Dipole 5GHz; Type: D5GHz; Serial: D5GHzV2 - SN:1028

Communication System: CW-5GHz; Frequency: 5200 MHz; Frequency: 5500 MHz; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: MSL 5800 MHz;

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 5.28$  mho/m;  $\epsilon_r = 47.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Medium parameters used:  $f = 5500$  MHz;  $\sigma = 5.68$  mho/m;  $\epsilon_r = 46.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Medium parameters used:  $f = 5800$  MHz;  $\sigma = 6.07$  mho/m;  $\epsilon_r = 46.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

#### DASY4 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.98, 4.98, 4.98)ConvF(4.67, 4.67, 4.67)ConvF(4.72, 4.72, 4.72); Calibrated: 18.03.2006
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

#### **d=10mm, Pin=250mW, f=5200 MHz/Area Scan 2 (91x91x1):** Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 42.0 mW/g

#### **d=10mm, Pin=250mW, f=5200 MHz/Zoom Scan (8x8x8), dist=2mm (8x8x8)/Cube 0:**

Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm

Reference Value = 77.9 V/m; Power Drift = 0.175 dB

Peak SAR (extrapolated) = 70.3 W/kg

**SAR(1 g) = 19.4 mW/g; SAR(10 g) = 5.46 mW/g**

Maximum value of SAR (measured) = 39.3 mW/g

#### **d=10mm, Pin=250mW, f=5500 MHz/Zoom Scan (8x8x8), dist=2mm (8x8x8)/Cube 0:**

Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm

Reference Value = 76.1 V/m; Power Drift = 0.027 dB

Peak SAR (extrapolated) = 77.7 W/kg

**SAR(1 g) = 19.7 mW/g; SAR(10 g) = 5.51 mW/g**

Maximum value of SAR (measured) = 40.3 mW/g

#### **d=10mm, Pin=250mW, f=5800 MHz/Zoom Scan (8x8x8), dist=2mm (8x8x8)/Cube 0:**

Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm

Reference Value = 70.9 V/m; Power Drift = 0.029 dB

Peak SAR (extrapolated) = 72.9 W/kg

**SAR(1 g) = 17.9 mW/g; SAR(10 g) = 5.03 mW/g**

Maximum value of SAR (measured) = 36.4 mW/g

# Impedance Measurement Plot for Body TSL

