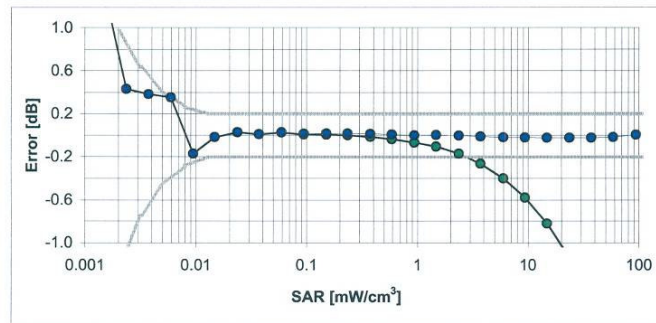
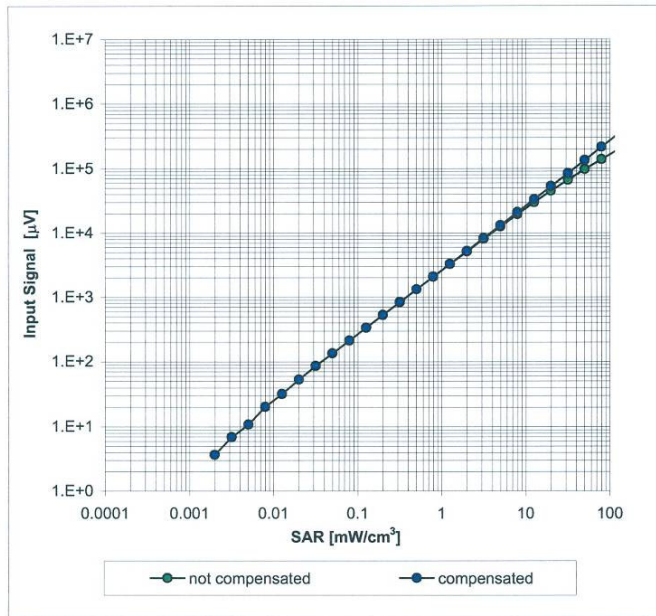


EX3DV4 SN:3578

April 24, 2007

Dynamic Range $f(\text{SAR}_{\text{head}})$ (Waveguide R22, $f = 1800$ MHz)

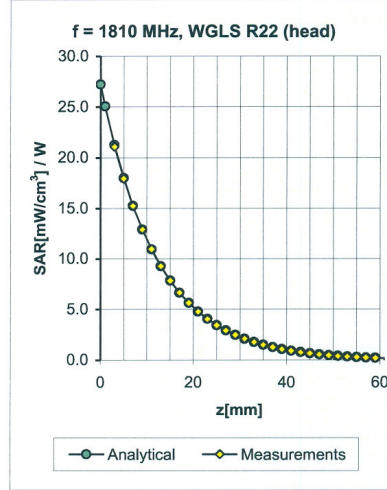
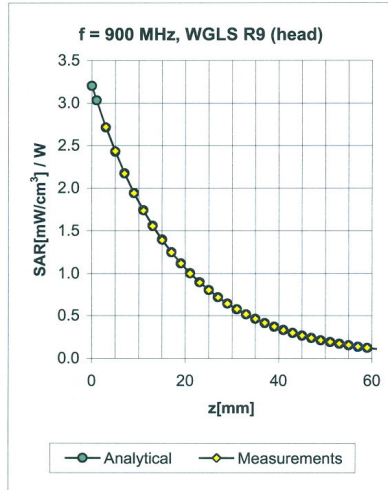


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

EX3DV3 SN:3526

August 29, 2007

Conversion Factor Assessment



| f [MHz] | Validity [MHz] ^c | TSL | Permittivity | Conductivity | Alpha | Depth | ConvF Uncertainty |
|---------|-----------------------------|------|--------------|--------------|-------|-------|---------------------|
| 900 | ± 50 / ± 100 | Head | 41.5 ± 5% | 0.97 ± 5% | 0.50 | 0.80 | 11.48 ± 11.0% (k=2) |
| 1810 | ± 50 / ± 100 | Head | 40.0 ± 5% | 1.40 ± 5% | 0.15 | 1.32 | 9.30 ± 11.0% (k=2) |
| 1950 | ± 50 / ± 100 | Head | 40.0 ± 5% | 1.40 ± 5% | 0.22 | 1.01 | 8.91 ± 11.0% (k=2) |
| 2450 | ± 50 / ± 100 | Head | 39.2 ± 5% | 1.80 ± 5% | 0.34 | 1.00 | 8.42 ± 11.8% (k=2) |
| 900 | ± 50 / ± 100 | Body | 55.0 ± 5% | 1.05 ± 5% | 0.50 | 0.80 | 10.93 ± 11.0% (k=2) |
| 1810 | ± 50 / ± 100 | Body | 53.3 ± 5% | 1.52 ± 5% | 0.16 | 1.28 | 9.04 ± 11.0% (k=2) |
| 1950 | ± 50 / ± 100 | Body | 53.3 ± 5% | 1.52 ± 5% | 0.15 | 1.43 | 8.67 ± 11.0% (k=2) |
| 2450 | ± 50 / ± 100 | Body | 52.7 ± 5% | 1.95 ± 5% | 0.38 | 1.00 | 8.08 ± 11.8% (k=2) |

^c 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.

**Calibration Laboratory of
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Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



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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 **SGS KES (Dymstec)**

Certificate No: **ET3-1782_Apr07**

CALIBRATION CERTIFICATE

Object: **ET3DV6 - SN:1782**

Calibration procedure(s): **QA CAL-01.v5 and QA CAL-12.v4
Calibration procedure for dosimetric E-field probes**

Calibration date: **April 23, 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) | 10-Aug-06 (METAS, No. 217-00592) | Aug-07 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 29-Mar-07 (METAS, No. 217-00671) | Mar-08 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 10-Aug-06 (METAS, No. 217-00593) | Aug-07 |
| Reference Probe ES3DV2 | SN: 3013 | 4-Jan-07 (SPEAG, No. ES3-3013_Jan07) | Jan-08 |
| DAE4 | SN: 654 | 21-Jun-06 (SPEAG, No. DAE4-654_Jun06) | Jun-07 |
| 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 |

Calibrated by: **Katja Pokovic** (Name), **Technical Manager** (Function), *[Signature]* (Signature)

Approved by: **Fin Bomholt** (Name), **R&D Director** (Function), *[Signature]* (Signature)

Issued: April 23, 2007

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

**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
NORM_{x,y,z} sensitivity in free space
ConF sensitivity in TSL / NORM_{x,y,z}
DCP diode compression point
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:

- **NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E²-field uncertainty inside TSL (see below *ConvF*).
- **NORM(*f*)_{x,y,z}** = NORM_{x,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*.
- **DCP_{x,y,z}**: 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_{x,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.

ET3DV6 SN:1782

April 23, 2007

Probe ET3DV6

SN:1782

| | |
|------------------|----------------|
| Manufactured: | April 15, 2003 |
| Last calibrated: | May 2, 2006 |
| Recalibrated: | April 23, 2007 |

Calibrated for DASY Systems

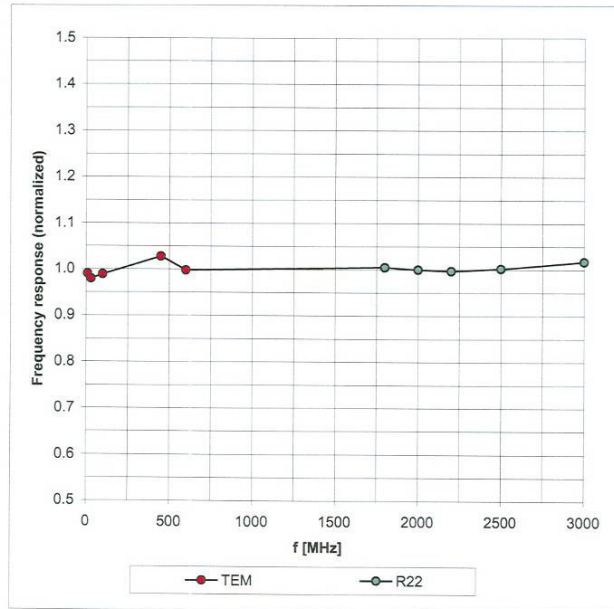
(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1782

April 23, 2007

Frequency Response of E-Field

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

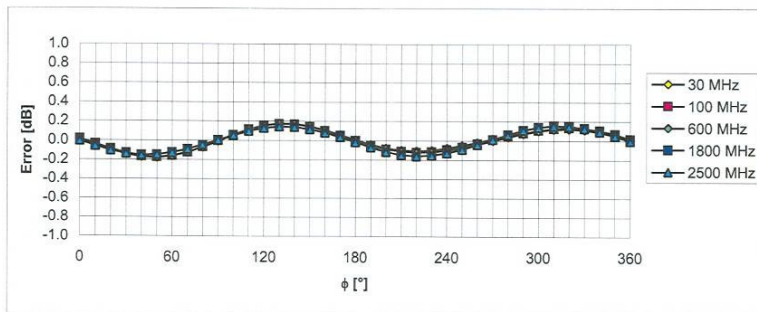
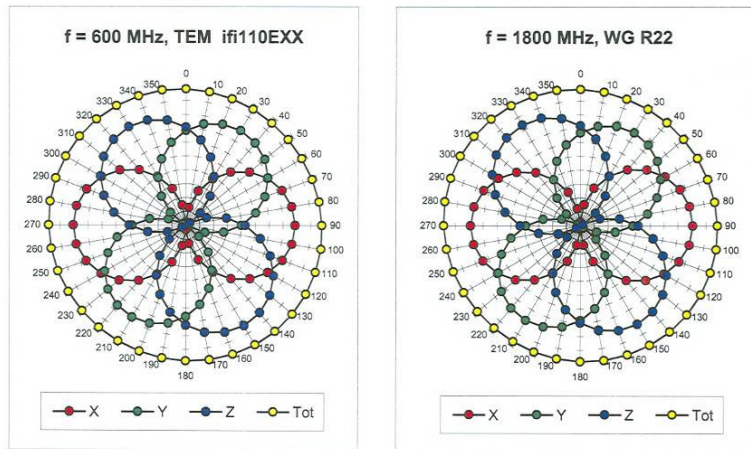


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

ET3DV6 SN:1782

April 23, 2007

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

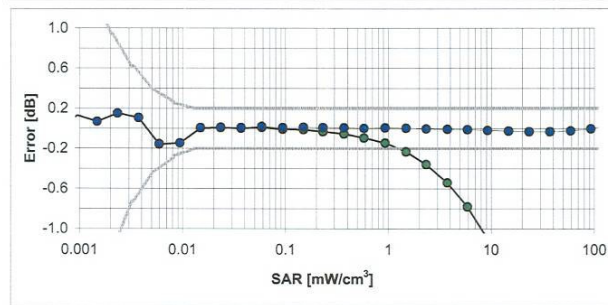
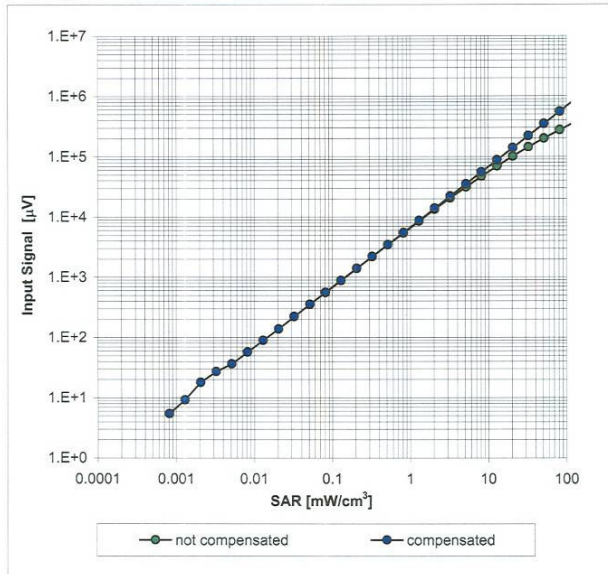


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

ET3DV6 SN:1782

April 23, 2007

Dynamic Range f(SAR_{head}) (Waveguide R22, f = 1800 MHz)

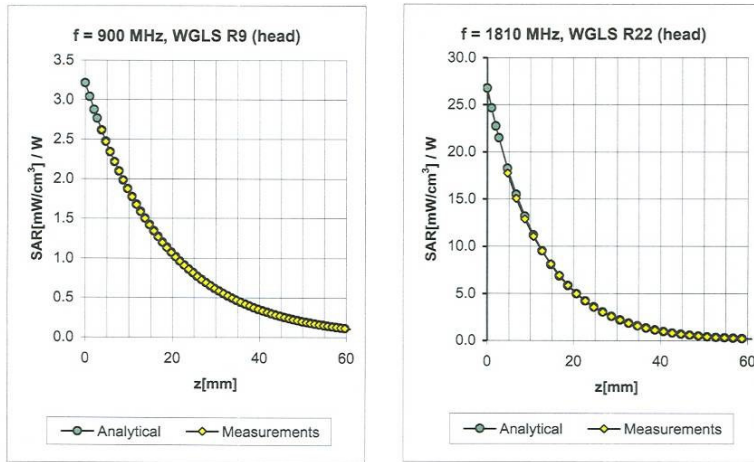


Uncertainty of Linearity Assessment: $\pm 0.6\%$ (k=2)

ET3DV6 SN:1782

April 23, 2007

Conversion Factor Assessment



| f [MHz] | Validity [MHz] ^c | TSL | Permittivity | Conductivity | Alpha | Depth | ConvF | Uncertainty |
|---------|-----------------------------|------|--------------|--------------|-------|-------|-------|---------------|
| 450 | ± 50 / ± 100 | Head | 43.5 ± 5% | 0.87 ± 5% | 0.40 | 1.93 | 7.08 | ± 13.3% (k=2) |
| 900 | ± 50 / ± 100 | Head | 41.5 ± 5% | 0.97 ± 5% | 0.36 | 2.79 | 6.18 | ± 11.0% (k=2) |
| 1810 | ± 50 / ± 100 | Head | 40.0 ± 5% | 1.40 ± 5% | 0.44 | 2.87 | 5.16 | ± 11.0% (k=2) |
| 2000 | ± 50 / ± 100 | Head | 40.0 ± 5% | 1.40 ± 5% | 0.51 | 2.77 | 4.82 | ± 11.0% (k=2) |
| 2450 | ± 50 / ± 100 | Head | 39.2 ± 5% | 1.80 ± 5% | 0.59 | 2.36 | 4.62 | ± 11.8% (k=2) |
| 450 | ± 50 / ± 100 | Body | 56.7 ± 5% | 0.94 ± 5% | 0.33 | 1.93 | 7.86 | ± 13.3% (k=2) |
| 900 | ± 50 / ± 100 | Body | 55.0 ± 5% | 1.05 ± 5% | 0.59 | 2.23 | 5.96 | ± 11.0% (k=2) |
| 1810 | ± 50 / ± 100 | Body | 53.3 ± 5% | 1.52 ± 5% | 0.57 | 2.78 | 4.84 | ± 11.0% (k=2) |
| 2000 | ± 50 / ± 100 | Body | 53.3 ± 5% | 1.52 ± 5% | 0.58 | 2.61 | 4.51 | ± 11.0% (k=2) |
| 2450 | ± 50 / ± 100 | Body | 52.7 ± 5% | 1.95 ± 5% | 0.66 | 2.22 | 4.14 | ± 11.8% (k=2) |

^c 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.