

Fig.56 Z-Scan at power reference point (PCS 1900-EGPRS CH661 Test Position 3)

1900 EGPRS Test Position 4 with HP Laptop

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Test Position 4/Area Scan (71x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.182 mW/g

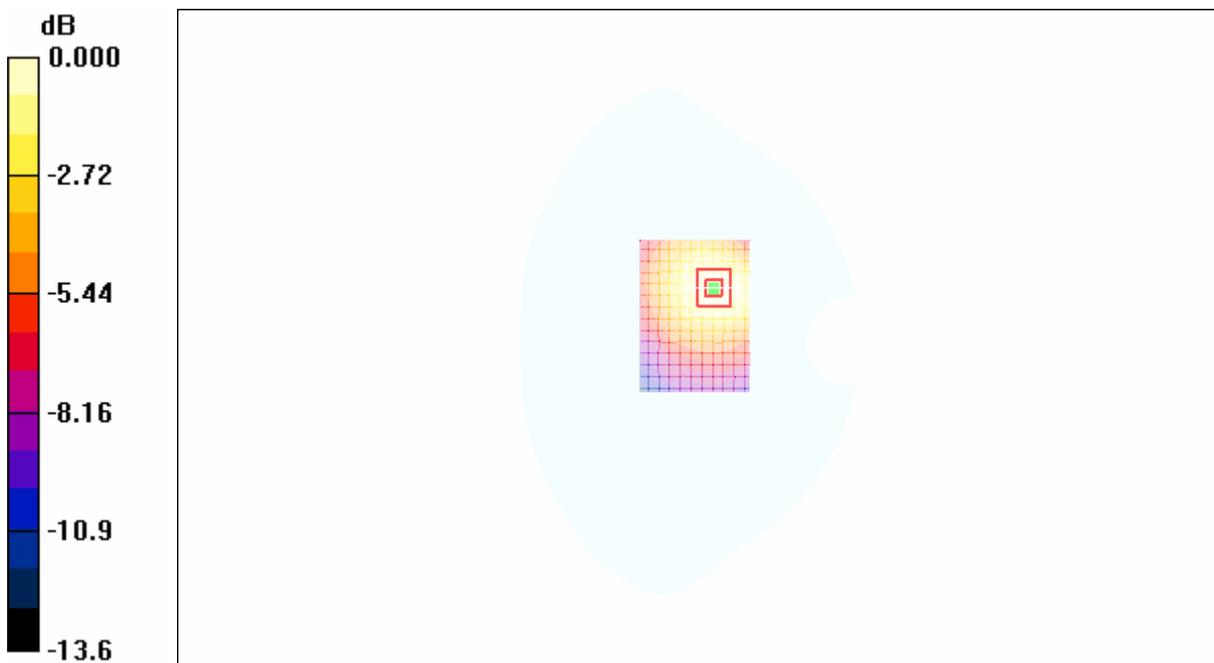
Test Position 4/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.24 V/m; Power Drift = 0.109 dB

Peak SAR (extrapolated) = 0.262 W/kg

SAR(1 g) = 0.163 mW/g; SAR(10 g) = 0.104 mW/g

Maximum value of SAR (measured) = 0.176 mW/g



0 dB = 0.176mW/g

Fig. 57 PCS 1900-EGPRS CH661 Test Position 4

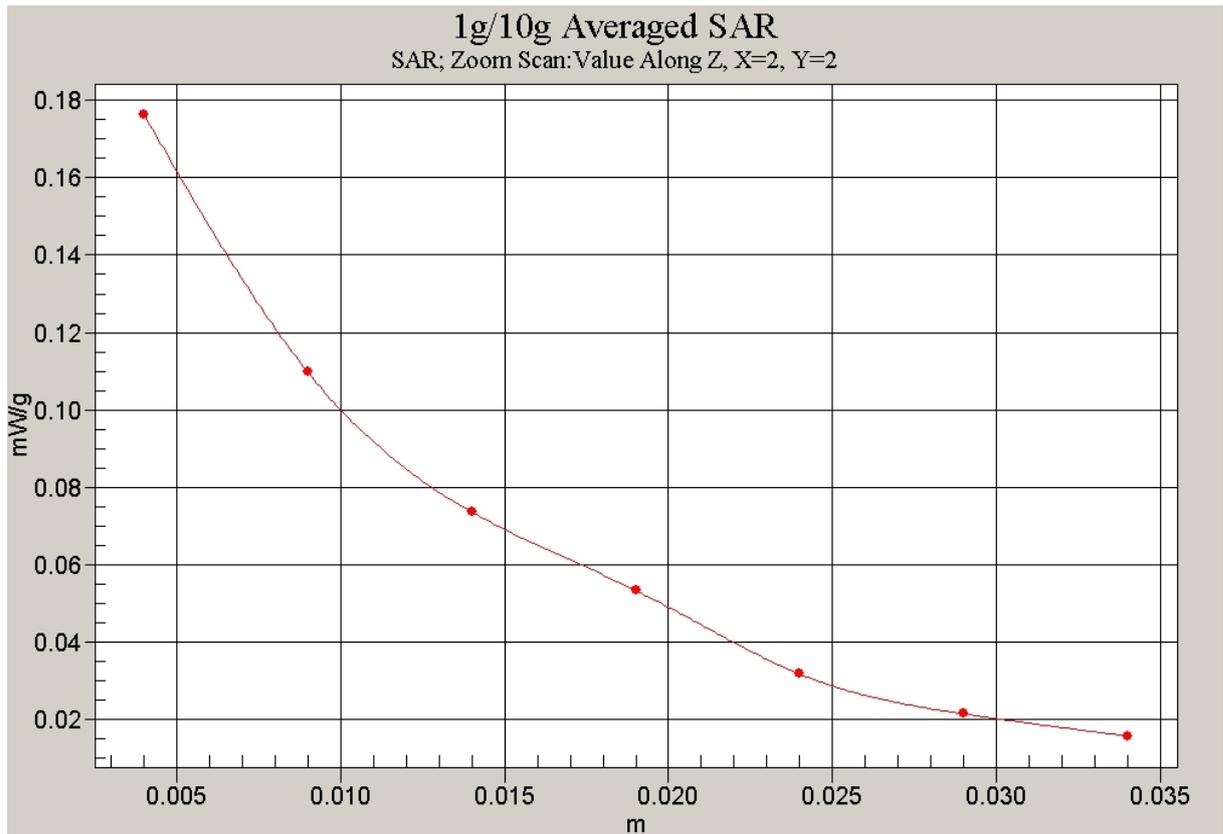


Fig.58 Z-Scan at power reference point (PCS 1900-EGPRS CH661 Test Position 4)

1900 EGPRS Test Position 5 with HP Laptop

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Test Position 5/Area Scan (71x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.062 mW/g

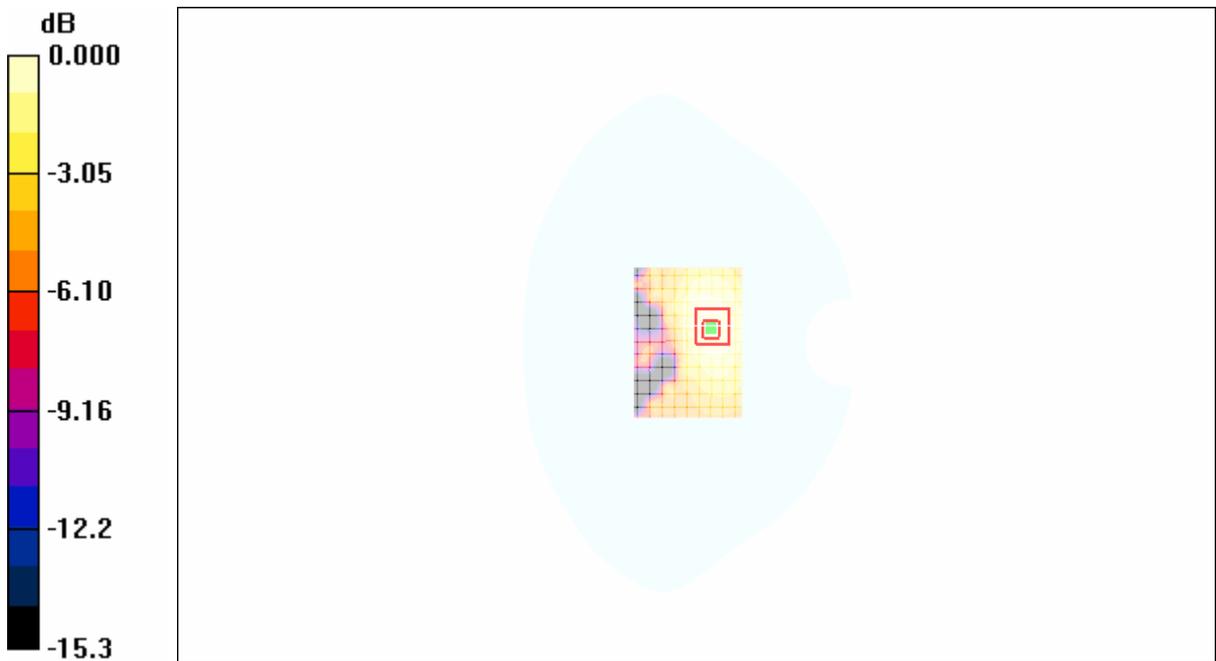
Test Position 5/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.92 V/m; Power Drift = -0.138 dB

Peak SAR (extrapolated) = 0.086 W/kg

SAR(1 g) = 0.057 mW/g; SAR(10 g) = 0.037 mW/g

Maximum value of SAR (measured) = 0.061 mW/g



0 dB = 0.061mW/g

Fig. 59 PCS 1900-EGPRS CH661 Test Position 5

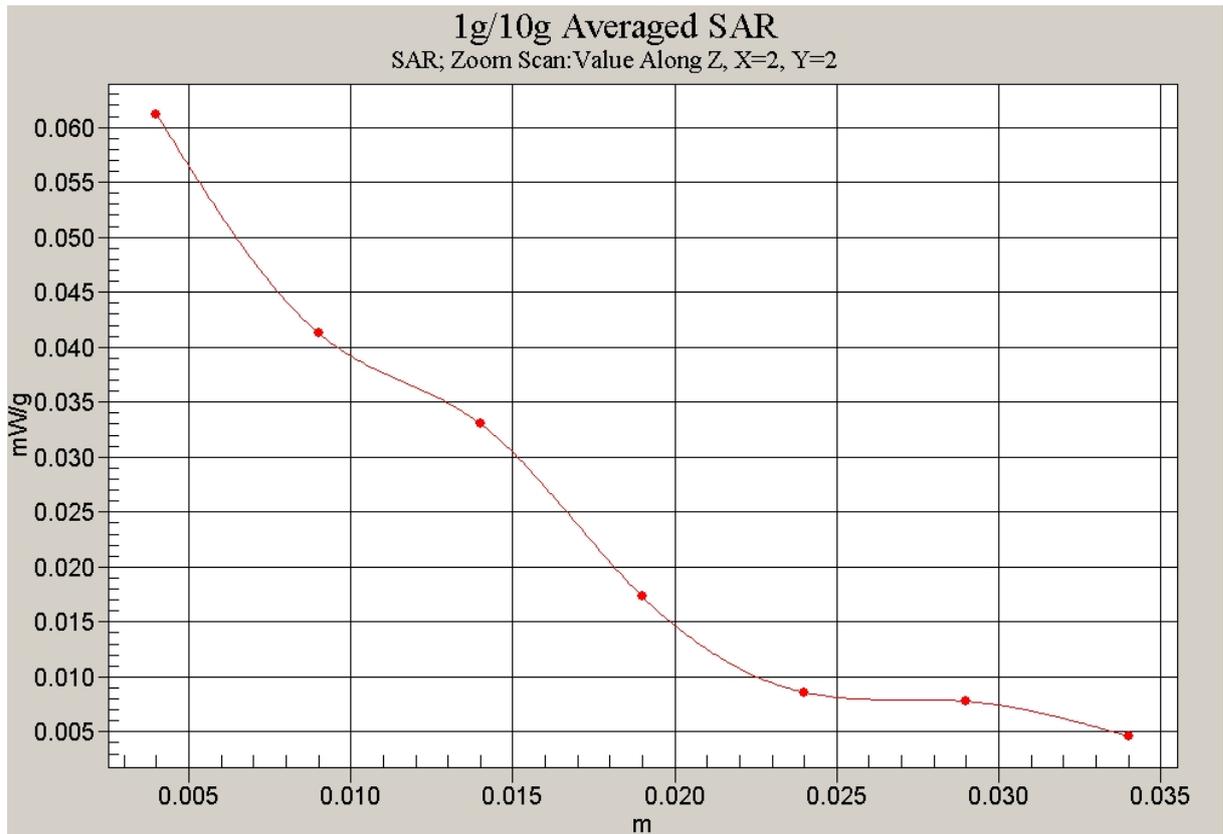


Fig.60 Z-Scan at power reference point (PCS 1900-EGPRS CH661 Test Position 5)

External Antenna 1900 GPRS Test Position 1

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

External Antenna Test Position 1/Area Scan (61x141x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.516 mW/g

External Antenna Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

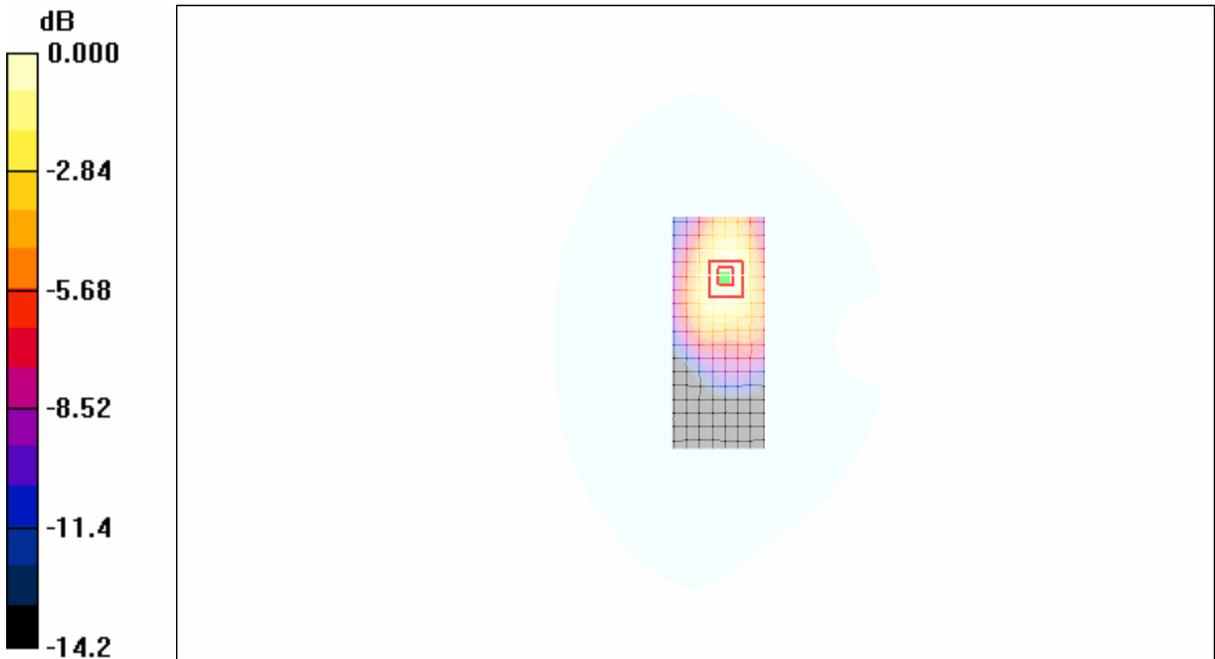
dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.86 V/m; Power Drift = 0.053 dB

Peak SAR (extrapolated) = 0.762 W/kg

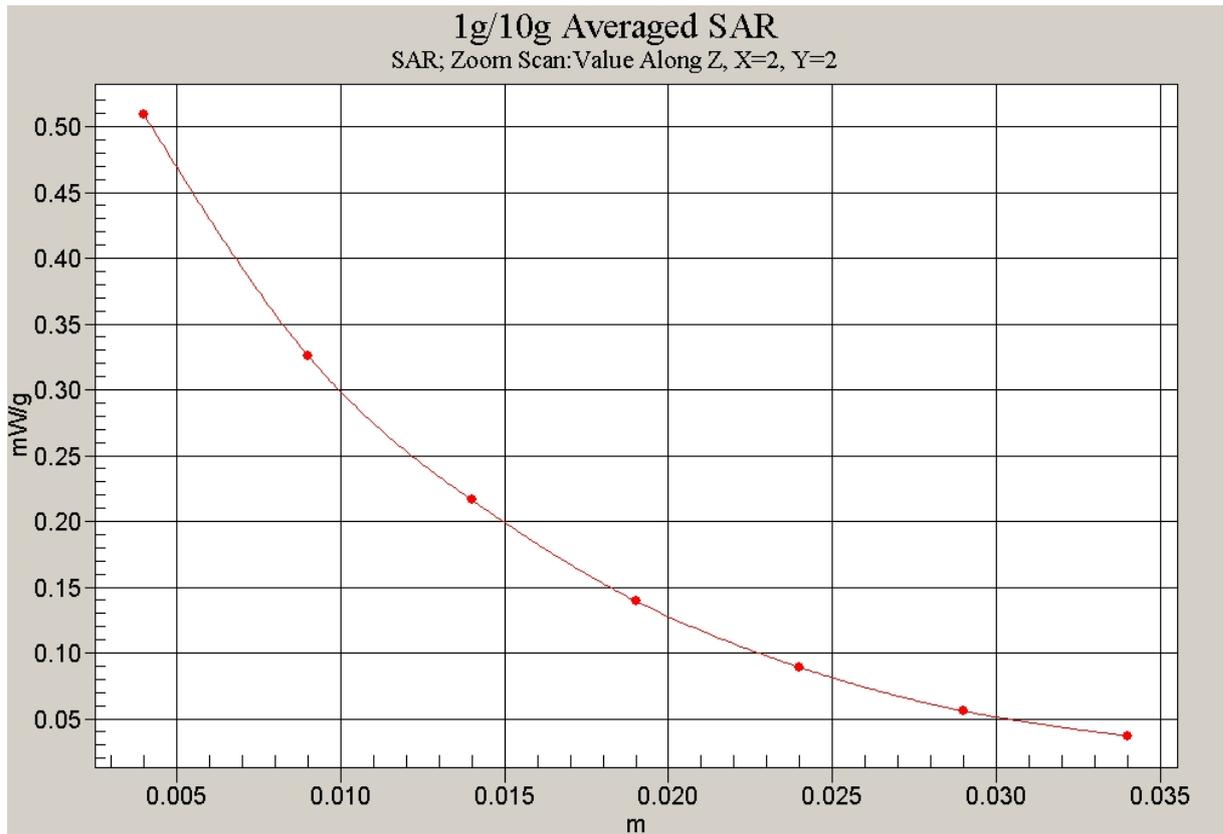
SAR(1 g) = 0.473 mW/g; SAR(10 g) = 0.293 mW/g

Maximum value of SAR (measured) = 0.509 mW/g



0 dB = 0.509mW/g

Fig. 61 External Antenna PCS 1900-GPRS CH661 Test Position 1



**Fig.62 Z-Scan at power reference point
(External Antenna PCS 1900-GPRS CH661 Test Position 1)**

External Antenna 1900 GPRS Test Position 2

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

External Antenna Test Position 2/Area Scan (61x141x1): Measurement grid:
dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.627 mW/g

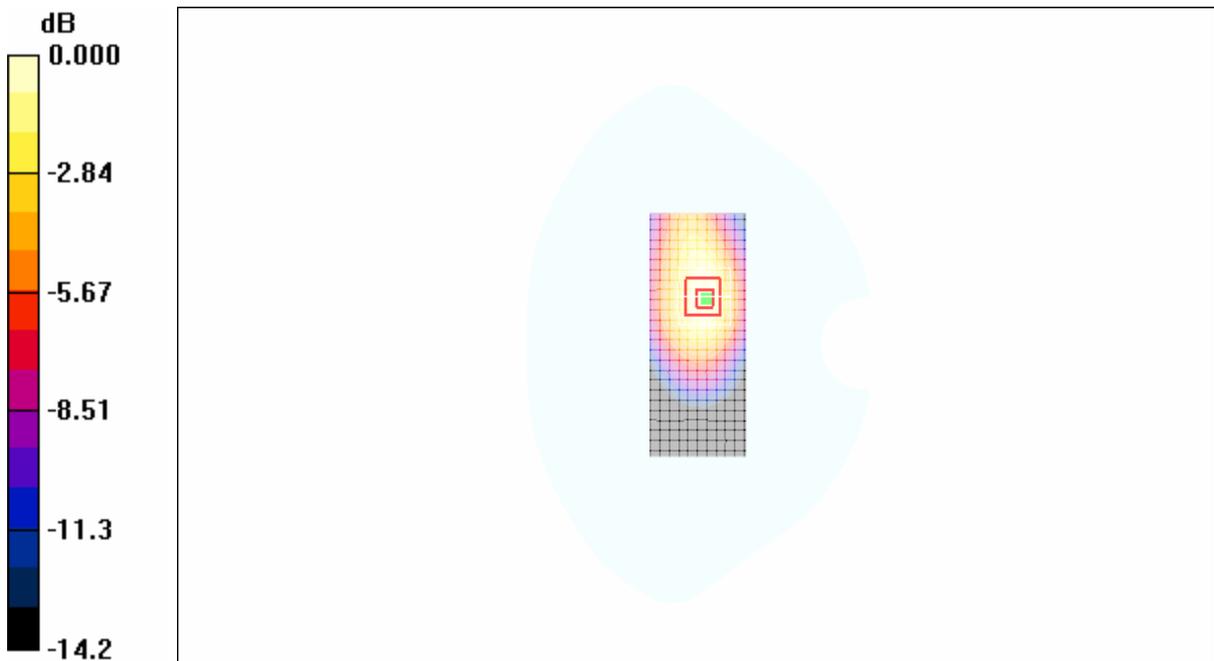
External Antenna Test Position 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid:
dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.9 V/m; Power Drift = -0.006 dB

Peak SAR (extrapolated) = 0.952 W/kg

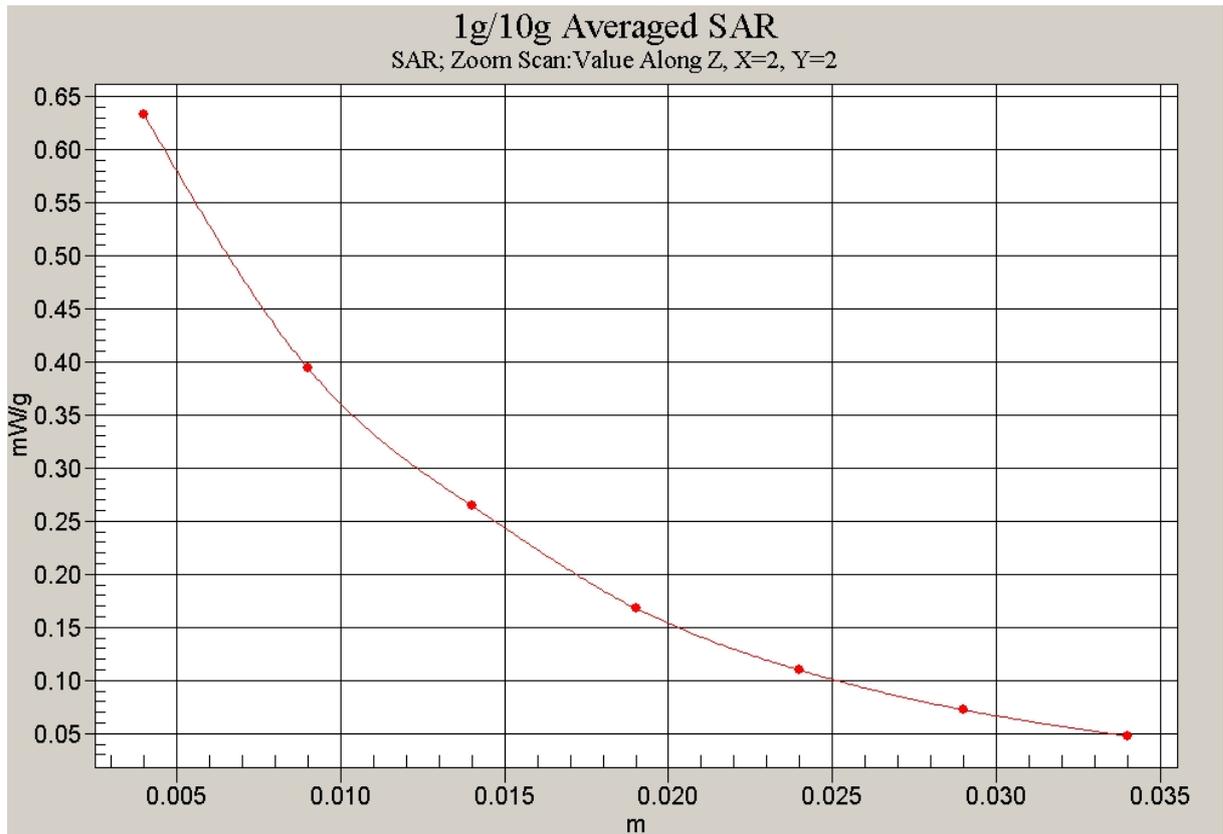
SAR(1 g) = 0.583 mW/g; SAR(10 g) = 0.359 mW/g

Maximum value of SAR (measured) = 0.633 mW/g



0 dB = 0.633mW/g

Fig.63 External Antenna PCS 1900-GPRS CH661 Test Position 2



**Fig.64 Z-Scan at power reference point
(External Antenna PCS 1900-GPRS CH661 Test Position 2)**

External Antenna 1900 GPRS Test Position 3

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

External Antenna Test Position 3/Area Scan (61x141x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.320 mW/g

External Antenna Test Position 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

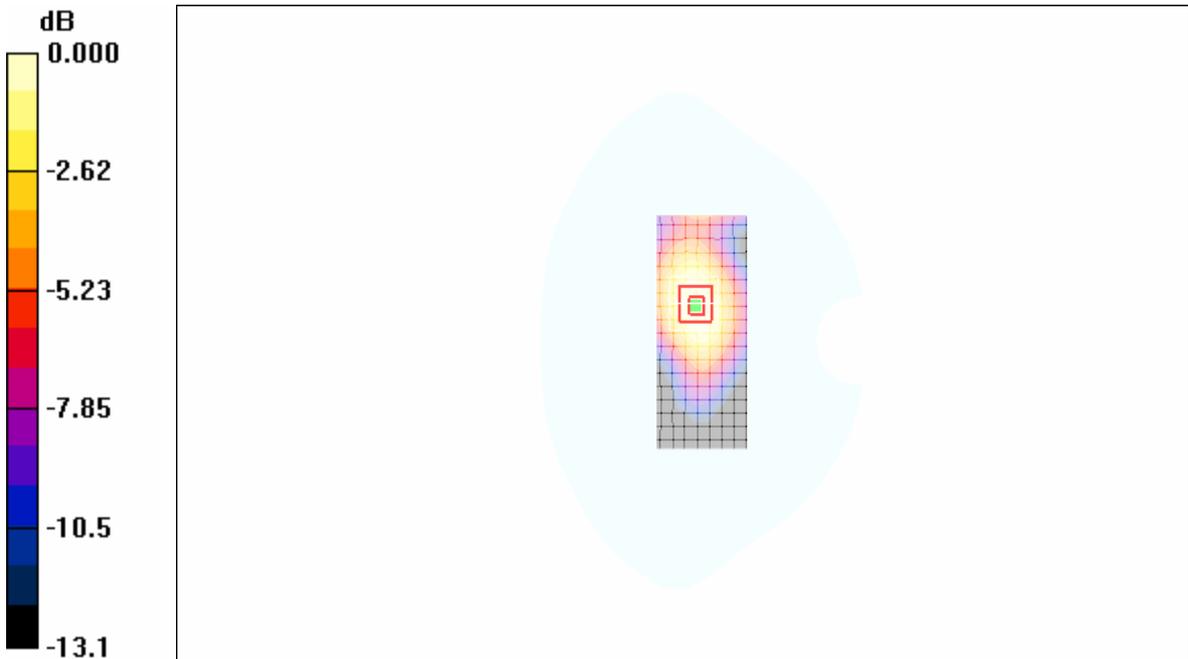
dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.6 V/m; Power Drift = 0.021 dB

Peak SAR (extrapolated) = 0.480 W/kg

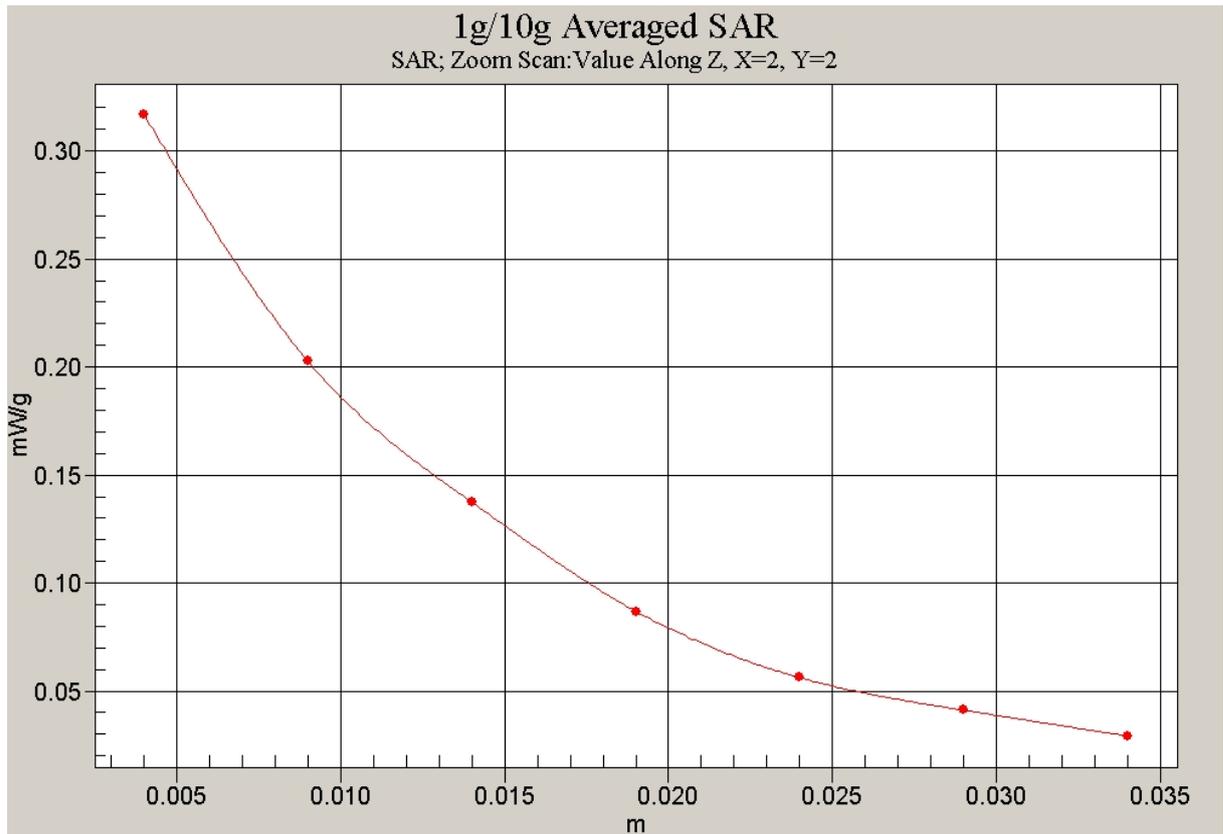
SAR(1 g) = 0.298 mW/g; SAR(10 g) = 0.188 mW/g

Maximum value of SAR (measured) = 0.317 mW/g



0 dB = 0.317mW/g

Fig. 65 External Antenna PCS 1900-GPRS CH661 Test Position 3



**Fig.66 Z-Scan at power reference point
(External Antenna PCS 1900-GPRS CH661 Test Position 3)**

External Antenna 1900 GPRS Test Position 4

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

External Antenna Test Position 4/Area Scan (61x141x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.447 mW/g

External Antenna Test Position 4/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

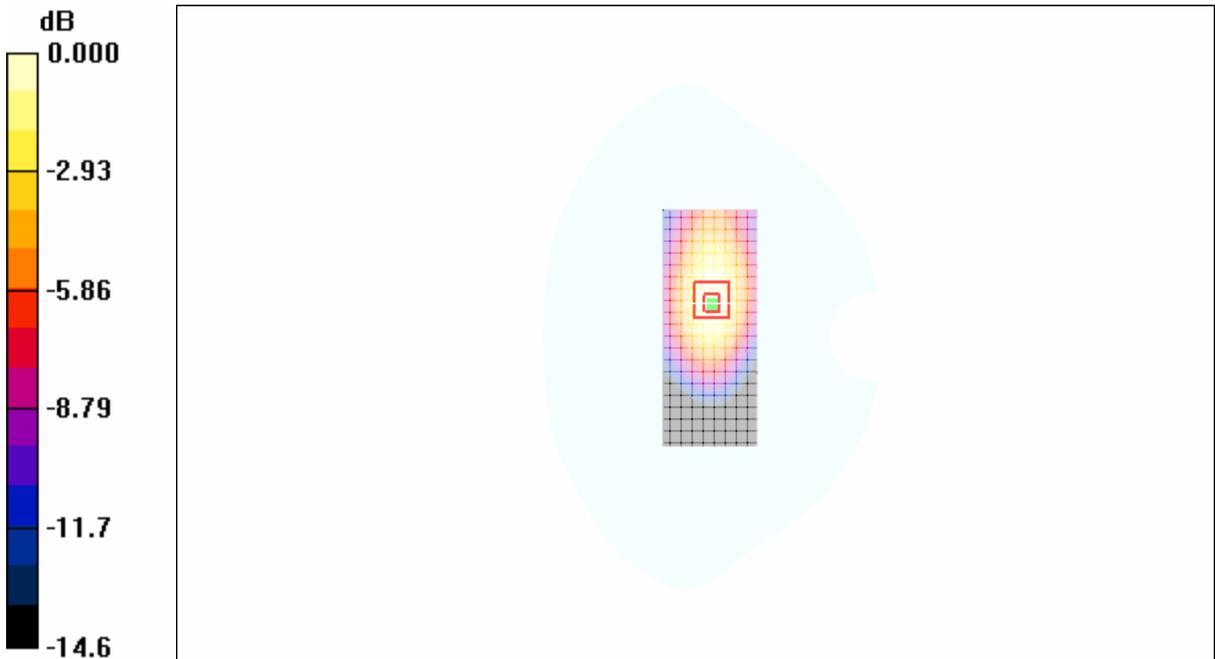
dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.3 V/m; Power Drift = -0.114 dB

Peak SAR (extrapolated) = 0.671 W/kg

SAR(1 g) = 0.403 mW/g; SAR(10 g) = 0.242 mW/g

Maximum value of SAR (measured) = 0.436 mW/g



0 dB = 0.436mW/g

Fig. 67 External Antenna PCS 1900-GPRS CH661 Test Position 4

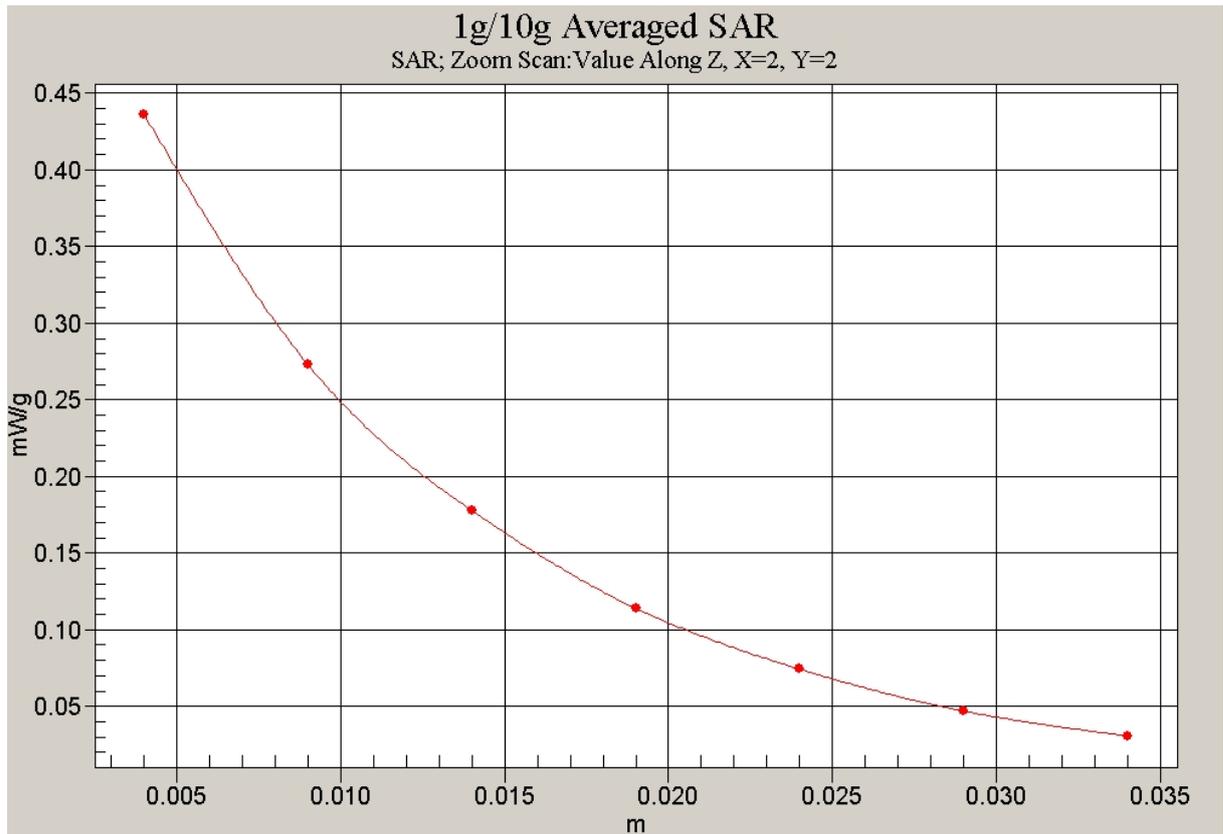


Fig.68 Z-Scan at power reference point
(External Antenna PCS 1900-GPRS CH661 Test Position 4)

External Antenna 1900 GPRS Test Position 5

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

External Antenna Test Position 5/Area Scan (61x141x1): Measurement grid:
dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.038 mW/g

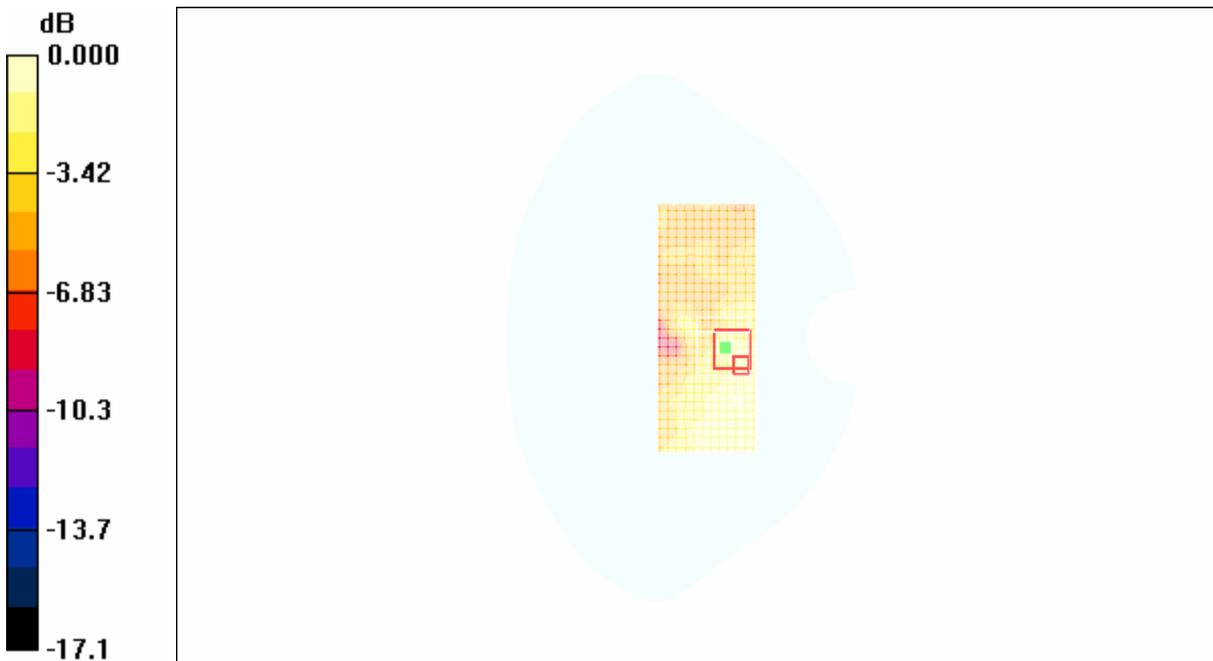
External Antenna Test Position 5/Zoom Scan (7x7x7)/Cube 0: Measurement grid:
dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.15 V/m; Power Drift = 0.200 dB

Peak SAR (extrapolated) = 0.058 W/kg

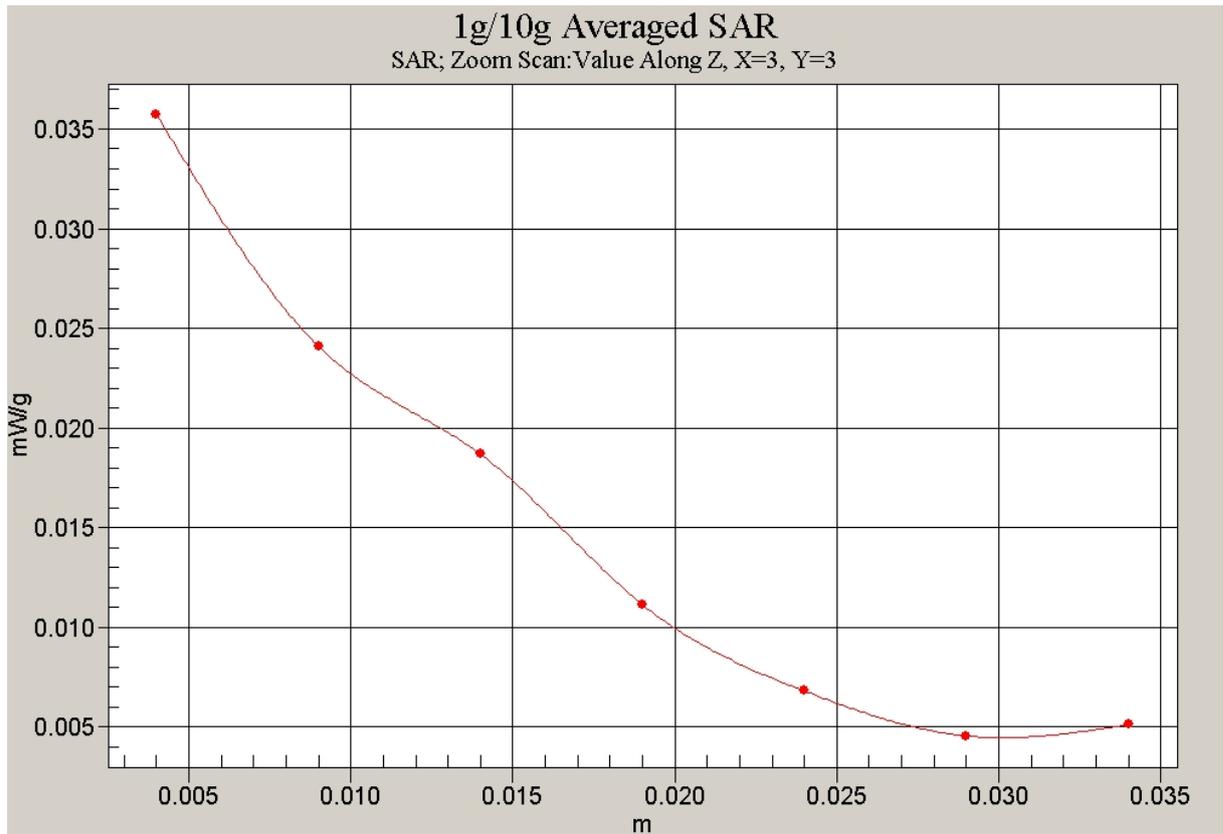
SAR(1 g) = 0.036 mW/g; SAR(10 g) = 0.024 mW/g

Maximum value of SAR (measured) = 0.039 mW/g



0 dB = 0.039mW/g

Fig.69 External Antenna PCS 1900-GPRS CH661 Test Position 5



**Fig.70 Z-Scan at power reference point
(External Antenna PCS 1900-GPRS CH661 Test Position 5)**

External Antenna 1900 EGPRS Test Position 1

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

External Antenna Test Position 1/Area Scan (61x141x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.190 mW/g

External Antenna Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

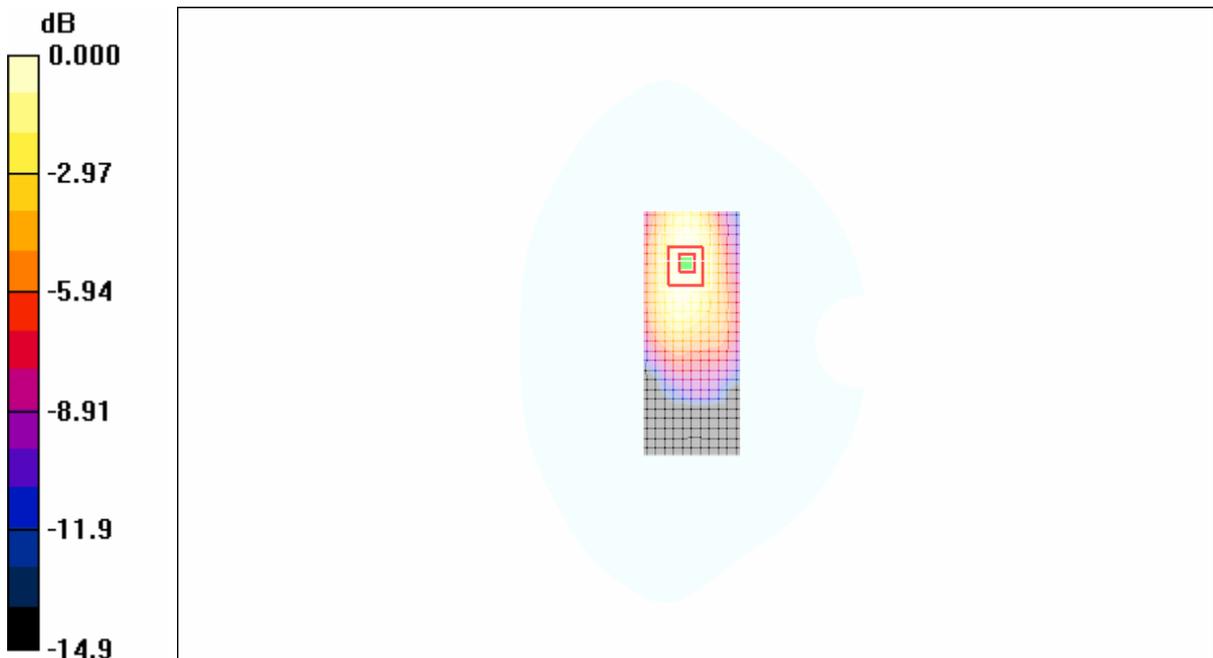
dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.77 V/m; Power Drift = -0.121 dB

Peak SAR (extrapolated) = 0.291 W/kg

SAR(1 g) = 0.176 mW/g; SAR(10 g) = 0.108 mW/g

Maximum value of SAR (measured) = 0.190 mW/g



0 dB = 0.190mW/g

Fig. 71 External Antenna PCS 1900-EGPRS CH661 Test Position 1

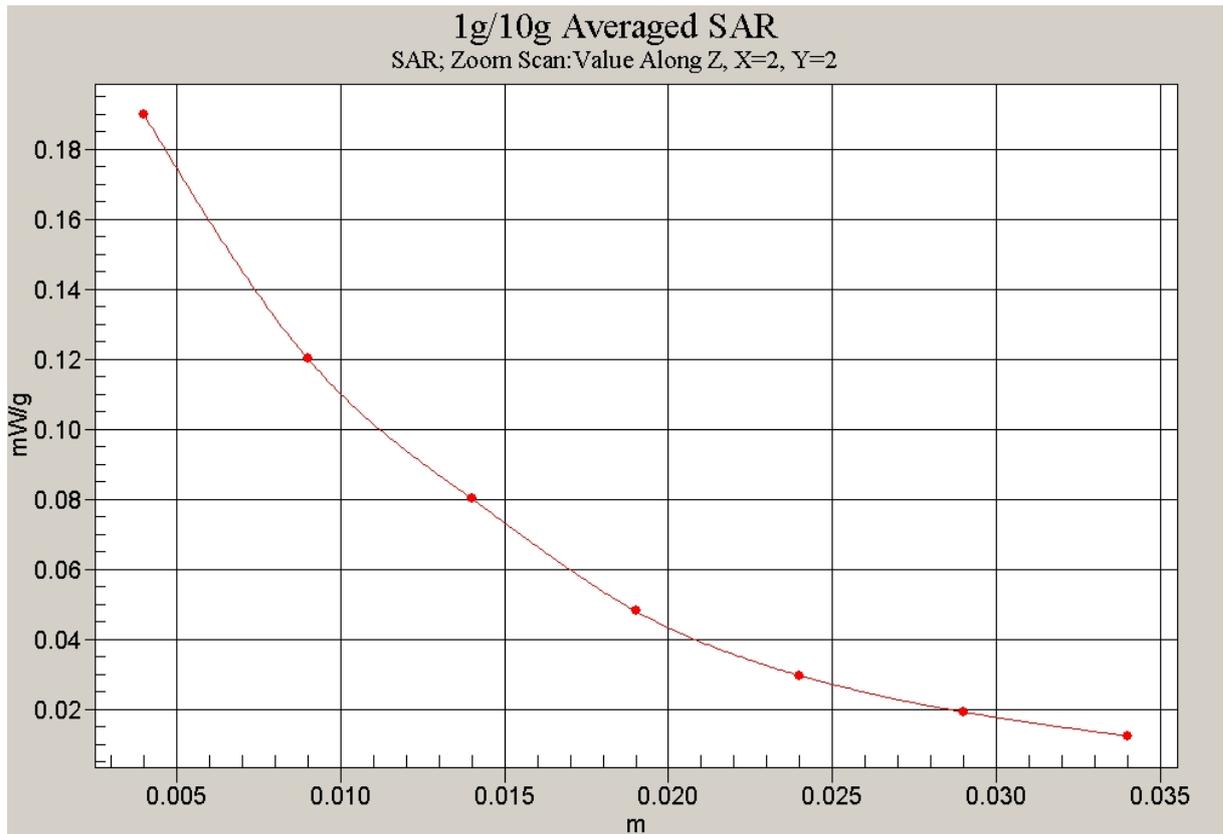


Fig.72 Z-Scan at power reference point
(External Antenna PCS 1900-EGPRS CH661 Test Position 1)

External Antenna 1900 EGPRS Test Position 2

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

External Antenna Test Position 2/Area Scan (61x141x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.245 mW/g

External Antenna Test Position 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

dx=5mm, dy=5mm, dz=5mm

Reference Value = 10.5 V/m; Power Drift = 0.028 dB

Peak SAR (extrapolated) = 0.352 W/kg

SAR(1 g) = 0.219 mW/g; SAR(10 g) = 0.134 mW/g

Maximum value of SAR (measured) = 0.236 mW/g

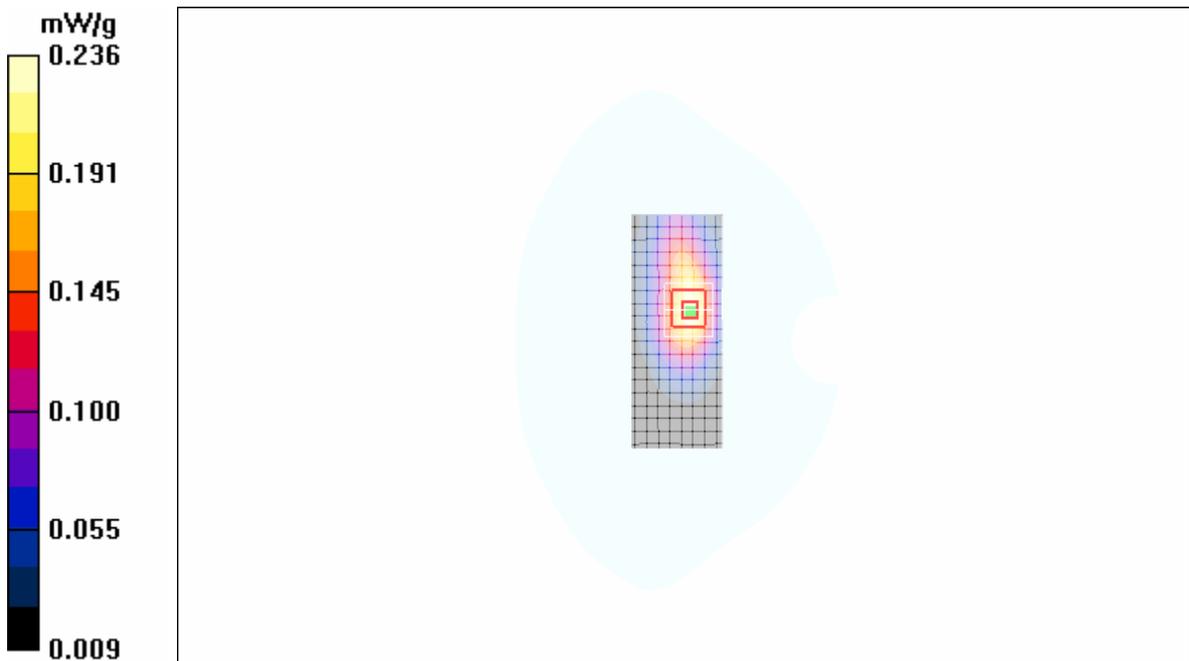


Fig.73 External Antenna PCS 1900-EGPRS CH661 Test Position 2

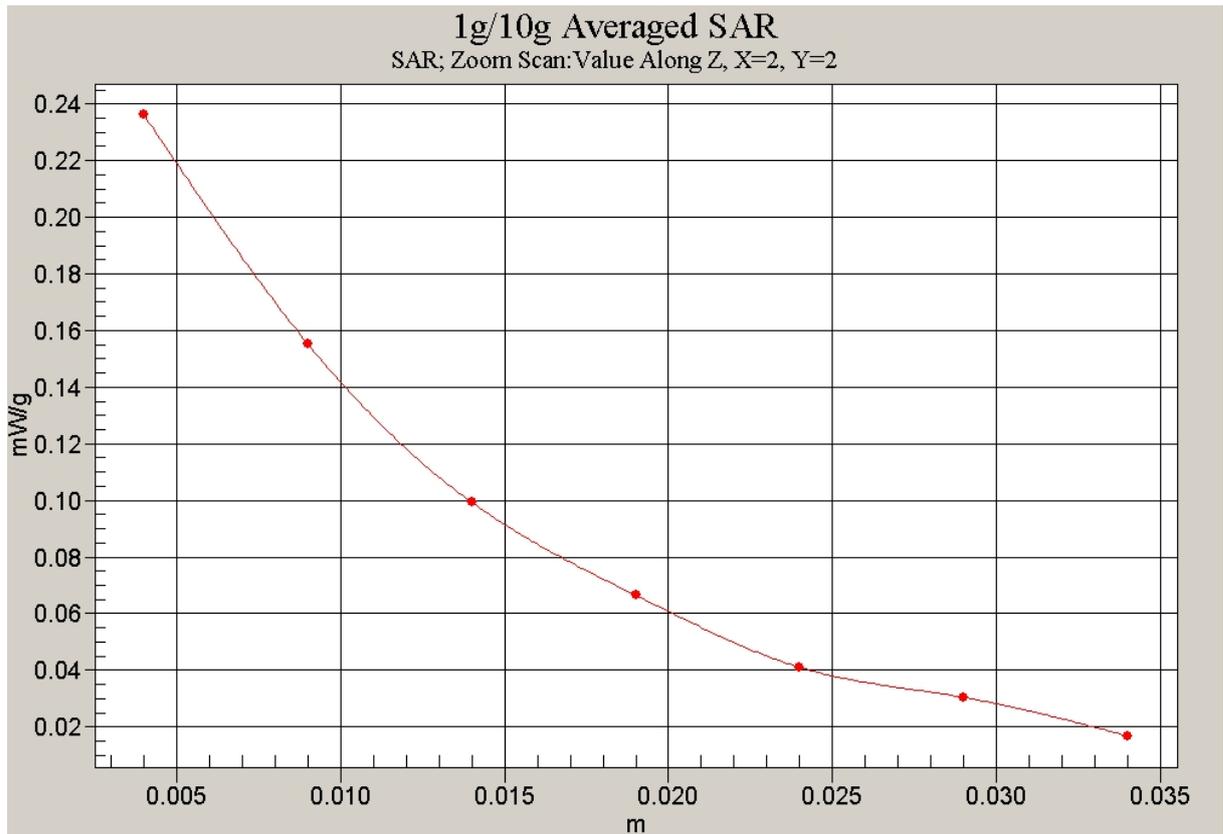


Fig.74 Z-Scan at power reference point
(External Antenna PCS 1900-EGPRS CH661 Test Position 2)

External Antenna 1900 EGPRS Test Position 3

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

External Antenna Test Position 3/Area Scan (61x141x1): Measurement grid:
dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.094 mW/g

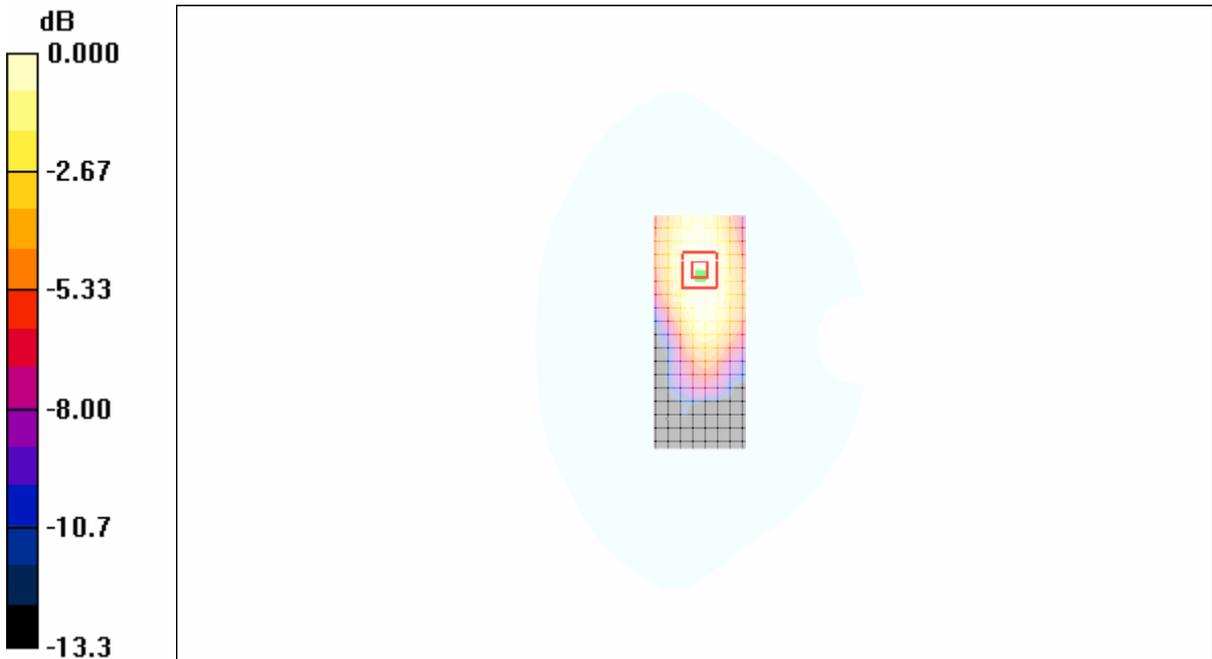
External Antenna Test Position 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid:
dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.01 V/m; Power Drift = -0.073 dB

Peak SAR (extrapolated) = 0.138 W/kg

SAR(1 g) = 0.087 mW/g; SAR(10 g) = 0.056 mW/g

Maximum value of SAR (measured) = 0.092 mW/g



0 dB = 0.092mW/g

Fig.75 External Antenna PCS 1900-EGPRS CH661 Test Position 3

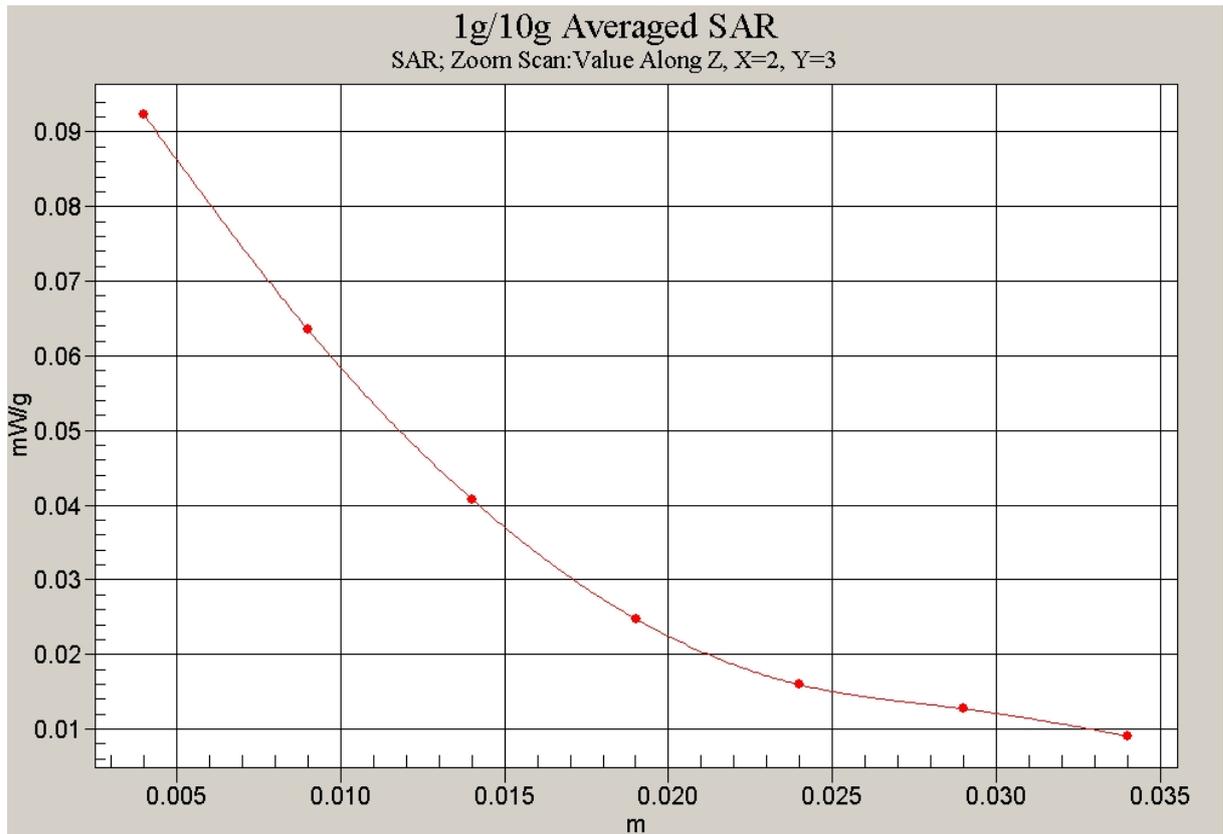


Fig.76 Z-Scan at power reference point
(External Antenna PCS 1900-EGPRS CH661 Test Position 3)

External Antenna 1900 EGPRS Test Position 4

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

External Antenna Test Position 4/Area Scan (61x141x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.129 mW/g

External Antenna Test Position 4/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

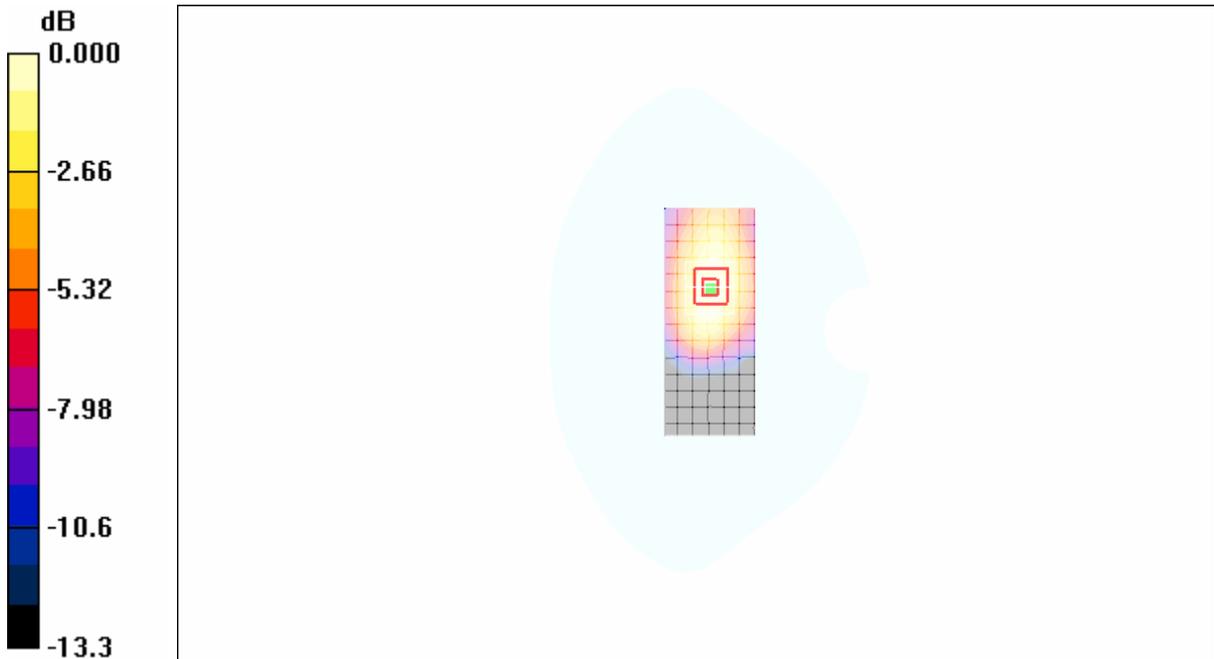
dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.11 V/m; Power Drift = -0.200 dB

Peak SAR (extrapolated) = 0.178 W/kg

SAR(1 g) = 0.115 mW/g; SAR(10 g) = 0.073 mW/g

Maximum value of SAR (measured) = 0.125 mW/g



0 dB = 0.125mW/g

Fig. 77 External Antenna PCS 1900-EGPRS CH661 Test Position 4

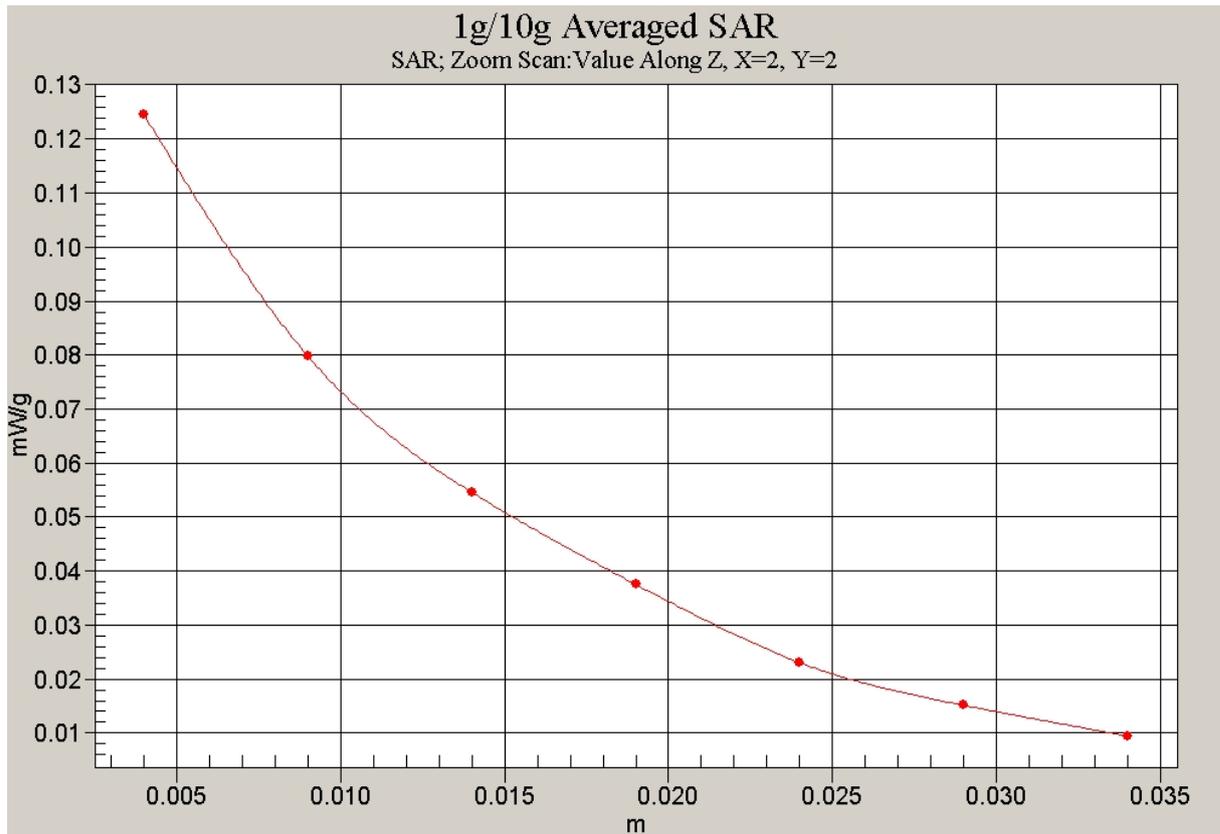


Fig.78 Z-Scan at power reference point
(External Antenna PCS 1900-EGPRS CH661 Test Position 4)

External Antenna 1900 EGPRS Test Position 5

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

External Antenna Test Position 5/Area Scan (71x141x1): Measurement grid:
dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.019 mW/g

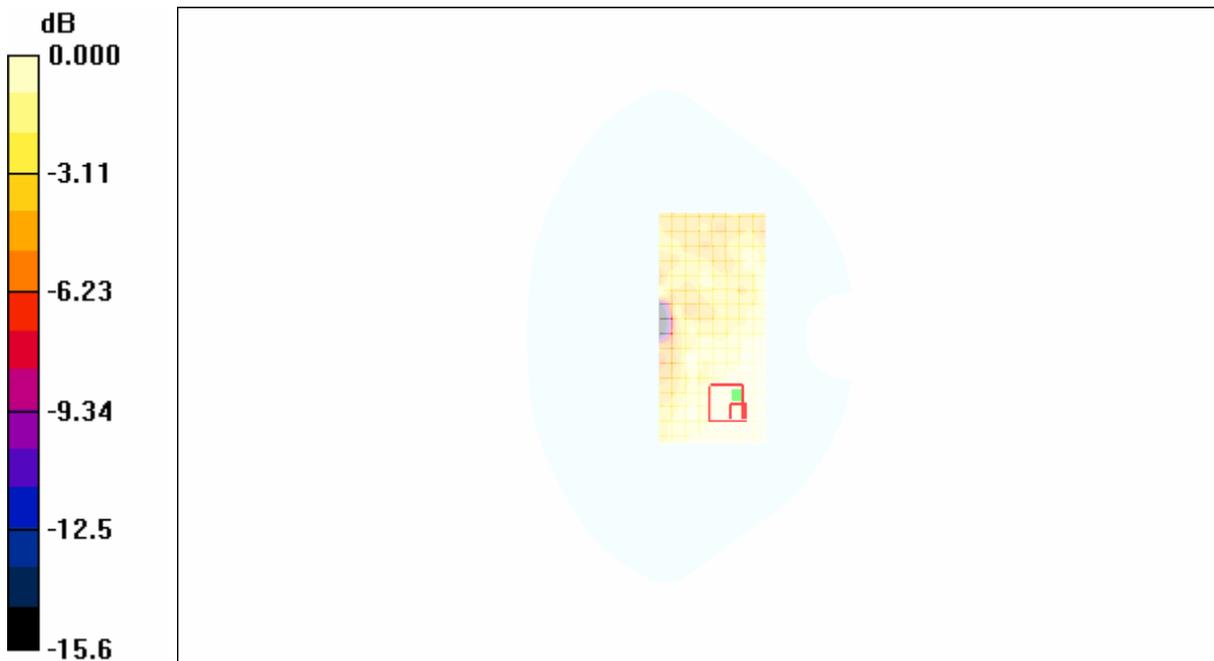
External Antenna Test Position 5/Zoom Scan (7x7x7)/Cube 0: Measurement grid:
dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.14 V/m; Power Drift = 0.200 dB

Peak SAR (extrapolated) = 0.026 W/kg

SAR(1 g) = 0.014 mW/g; SAR(10 g) = 0.00961 mW/g

Maximum value of SAR (measured) = 0.015 mW/g



0 dB = 0.015mW/g

Fig.79 External Antenna PCS 1900-EGPRS CH661 Test Position 5

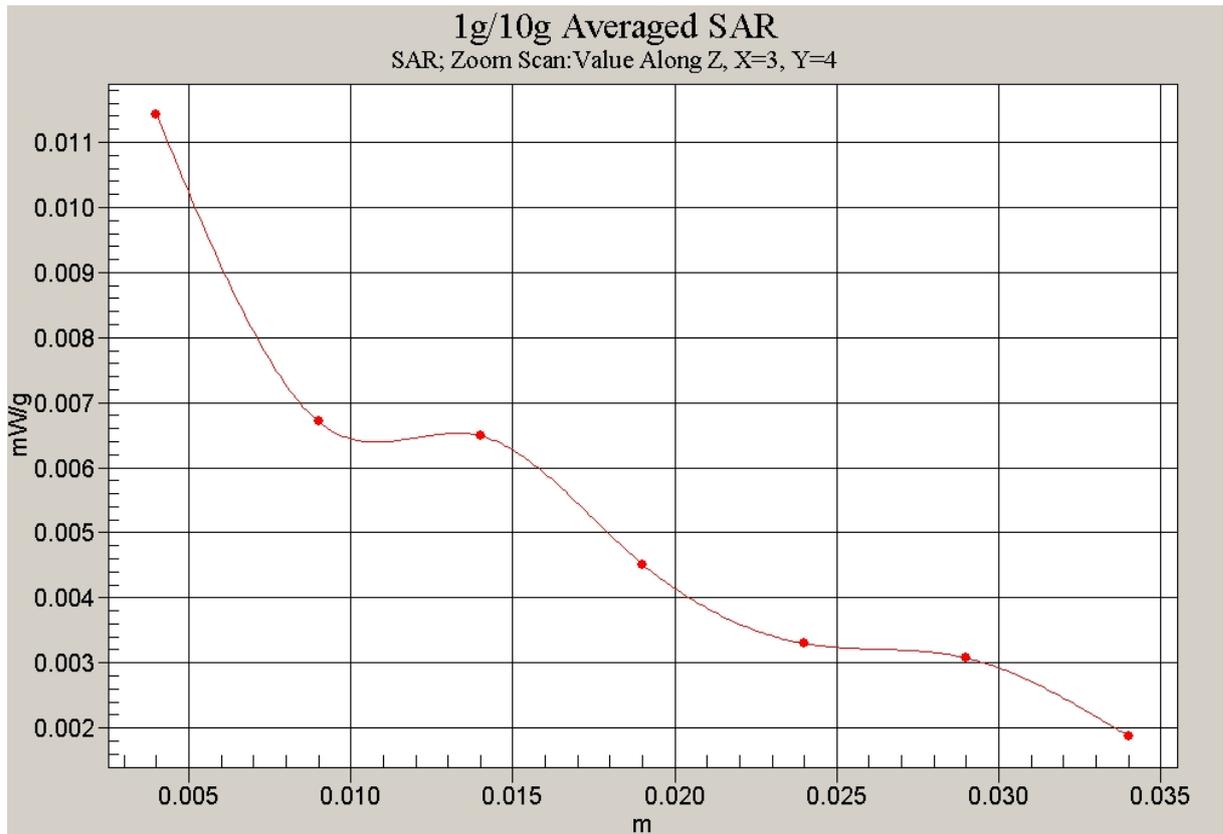


Fig.80 Z-Scan at power reference point
(External Antenna PCS 1900-EGPRS CH661 Test Position 5)

ANNEX D: SYSTEM VALIDATION RESULTS

1900MHzDAE536Probe1736

Electronics: DAE3 Sn536

Communication System: CW Frequency: 1900 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1736 ConvF(5.4, 5.4, 5.4)

System Validation/Area Scan (101x101x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 92.1 V/m; Power Drift = 0.1 dB

Maximum value of SAR (interpolated) = 11.2 mW/g

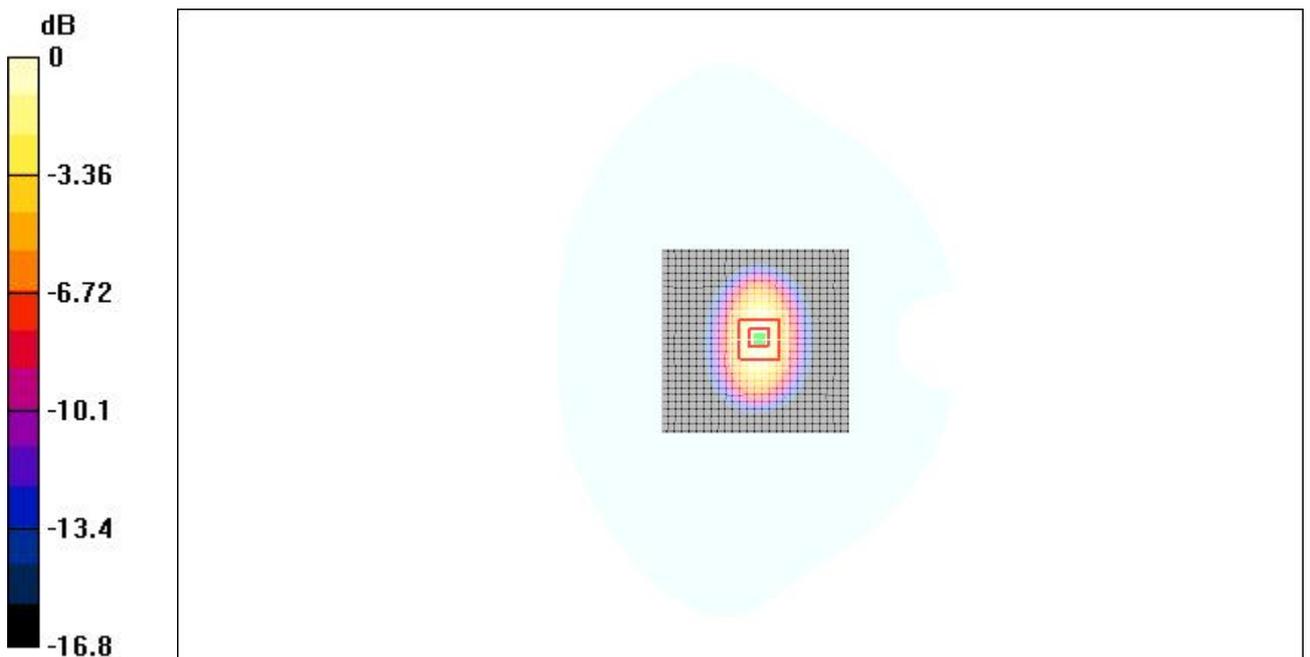
System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 92.1 V/m; Power Drift = 0.1 dB

Maximum value of SAR (measured) = 11.3 mW/g

Peak SAR (extrapolated) = 16.9 W/kg

SAR(1 g) = 9.91 mW/g; SAR(10 g) = 5.27 mW/g



0 dB = 11.3mW/g

Fig.81 validation 1900MHz 250mW

**Telecommunication Metrology Center
of Ministry of Information Industry**

No. 2006E00876

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ANNEX E: PROBE CALIBRATION CERTIFICATE

**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 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 **TMC-Auden**

Certificate No: **ET3-1736_Nov05**

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN:1736**

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

Calibration date: **November 25, 2005**

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	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41495277	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41498087	3-May-05 (METAS, No. 251-00466)	May-06
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-05 (METAS, No. 251-00467)	May-06
Reference Probe ES3DV2	SN: S5086 (20b)	3-May-05 (METAS, No. 251-00467)	May-06
DAE4	SN: 3013	7-Jan-05 (SPEAG, No. ES3-3013_Jan05)	Jan-06
Reference Probe ES3DV2	SN: 907	21-Jun-05 (SPEAG, No. DAE4-907_Jun05)	Jun-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Dec-03)	In house check: Dec-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-04)	In house check: Nov 05

Calibrated by:	Name	Function	Signature
	Nico Vetterli	Laboratory Technician	

Approved by:	Name	Function	Signature
	Katja Pokovic	Technical Manager	

Issued: November 25, 2005

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



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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 _{x,y,z}	sensitivity in free space
ConvF	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:

- 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
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

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 E^2 -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:1736

November 25, 2005

Probe ET3DV6

SN:1736

Manufactured:	September 27, 2002
Last calibrated:	July 14, 2005
Recalibrated:	November 25, 2005

Calibrated for DASY Systems

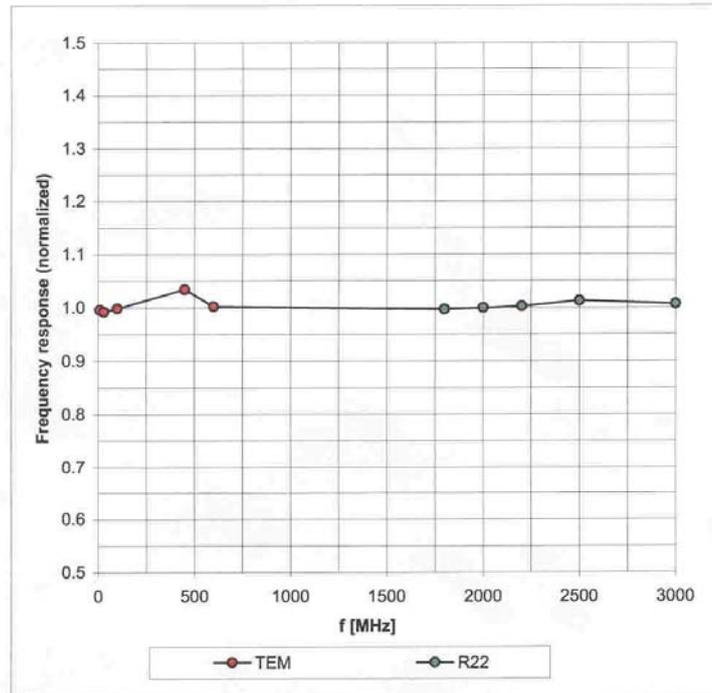
(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1736

November 25, 2005

Frequency Response of E-Field

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

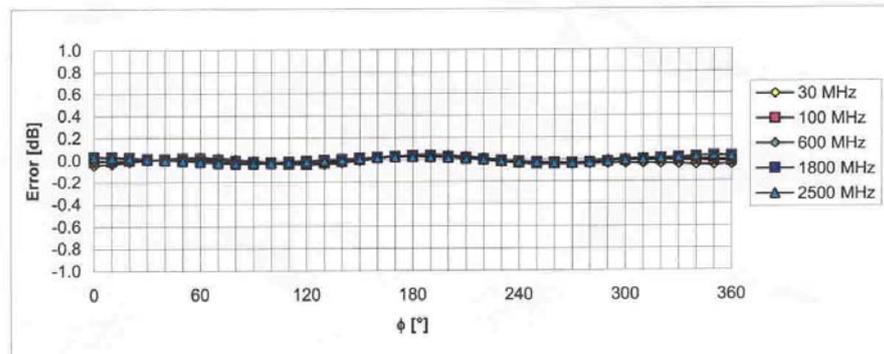
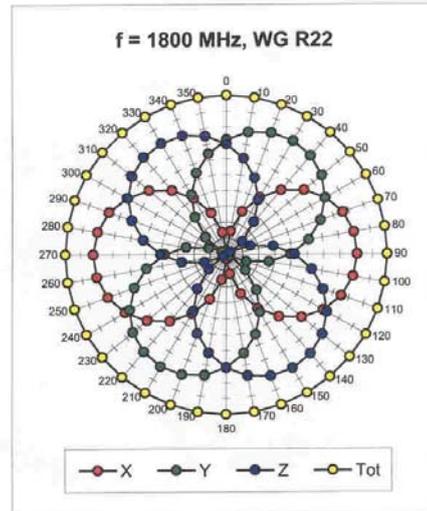
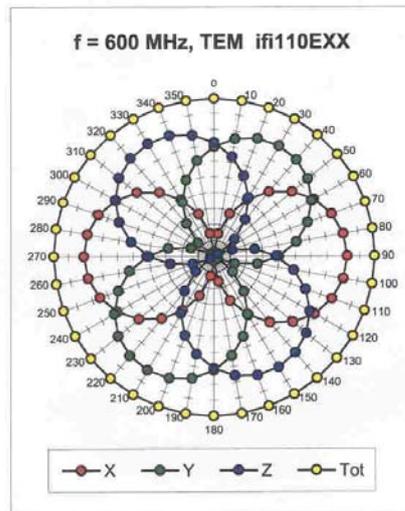


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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

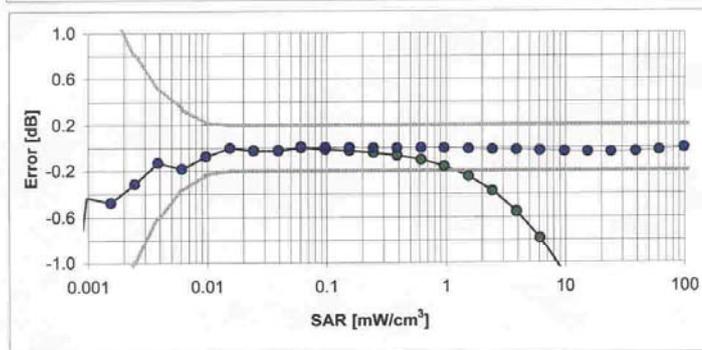
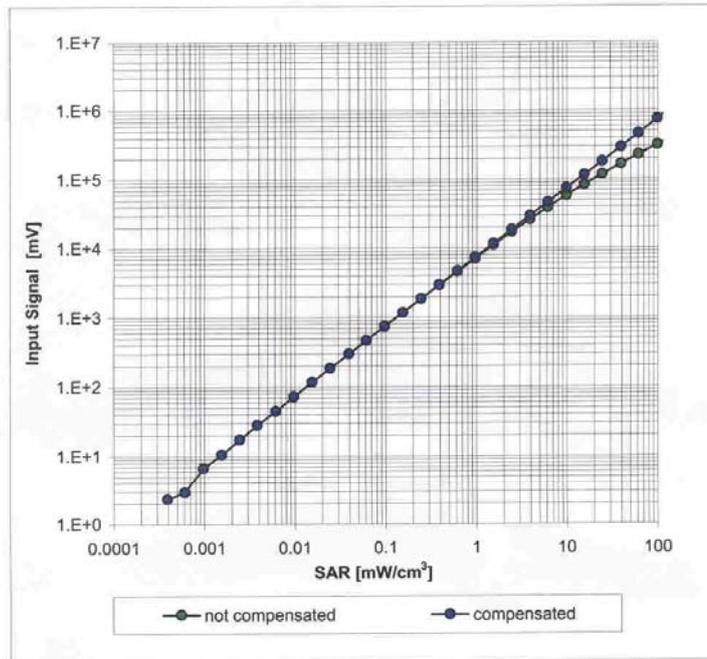


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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

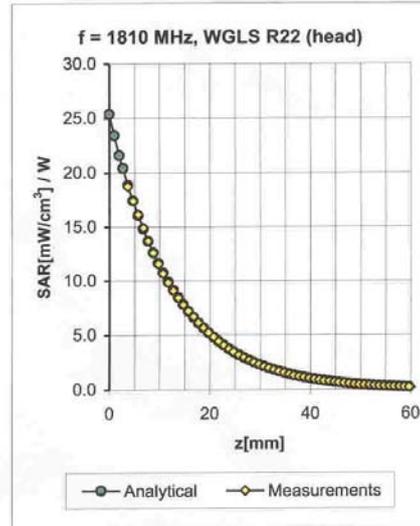
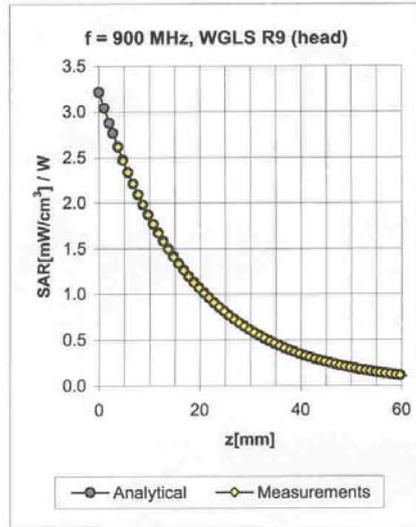


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

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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%	0.56	1.85	6.51 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.57	2.47	5.40 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.62	2.29	4.67 ± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.12	1.61	7.74 ± 13.3% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.47	2.15	6.45 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.53	2.78	4.88 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.65	2.11	4.35 ± 11.8% (k=2)

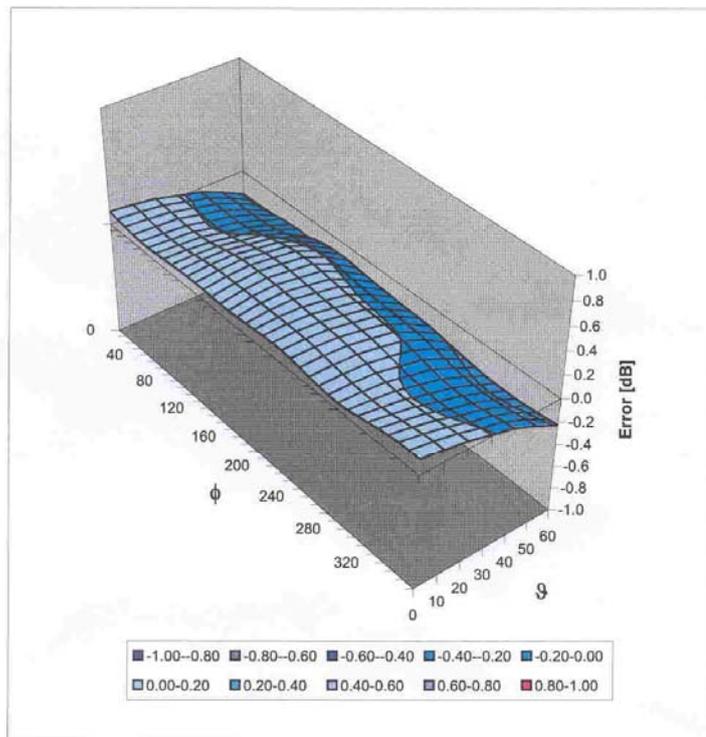
^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the Indicated frequency band.

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Deviation from Isotropy in HSL

Error (ϕ, ϑ), $f = 900$ MHz



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