

**TA Technology (Shanghai) Co., Ltd.**  
**Test Report**

Report No.: RZA2009-1087FCC

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**GSM 1900 SIM1 Towards Phantom Middle**

Date/Time: 8/25/2009 11:48:01 AM

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 52.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.6, 4.6, 4.6); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Phantom Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.150 mW/g

**Towards Phantom Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.67 V/m; Power Drift = -0.030 dB

Peak SAR (extrapolated) = 0.253 W/kg

**SAR(1 g) = 0.140 mW/g; SAR(10 g) = 0.080 mW/g**

Maximum value of SAR (measured) = 0.151 mW/g

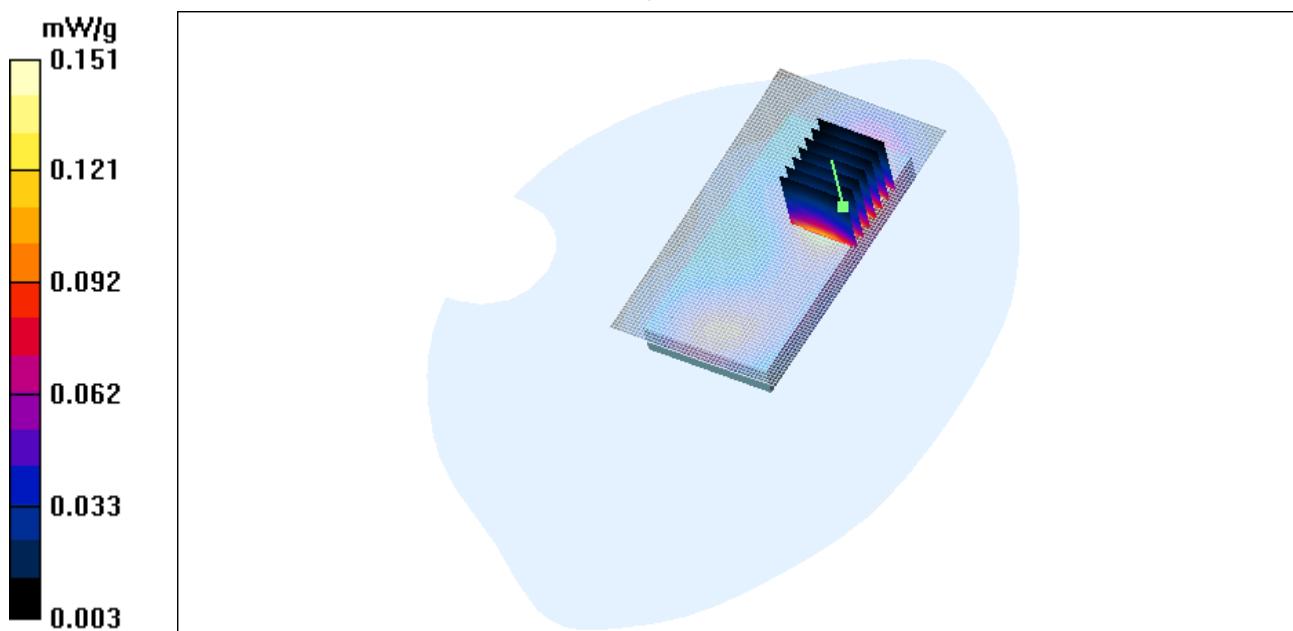


Figure 65 Body, Towards Phantom, GSM 1900 SIM1 Channel190

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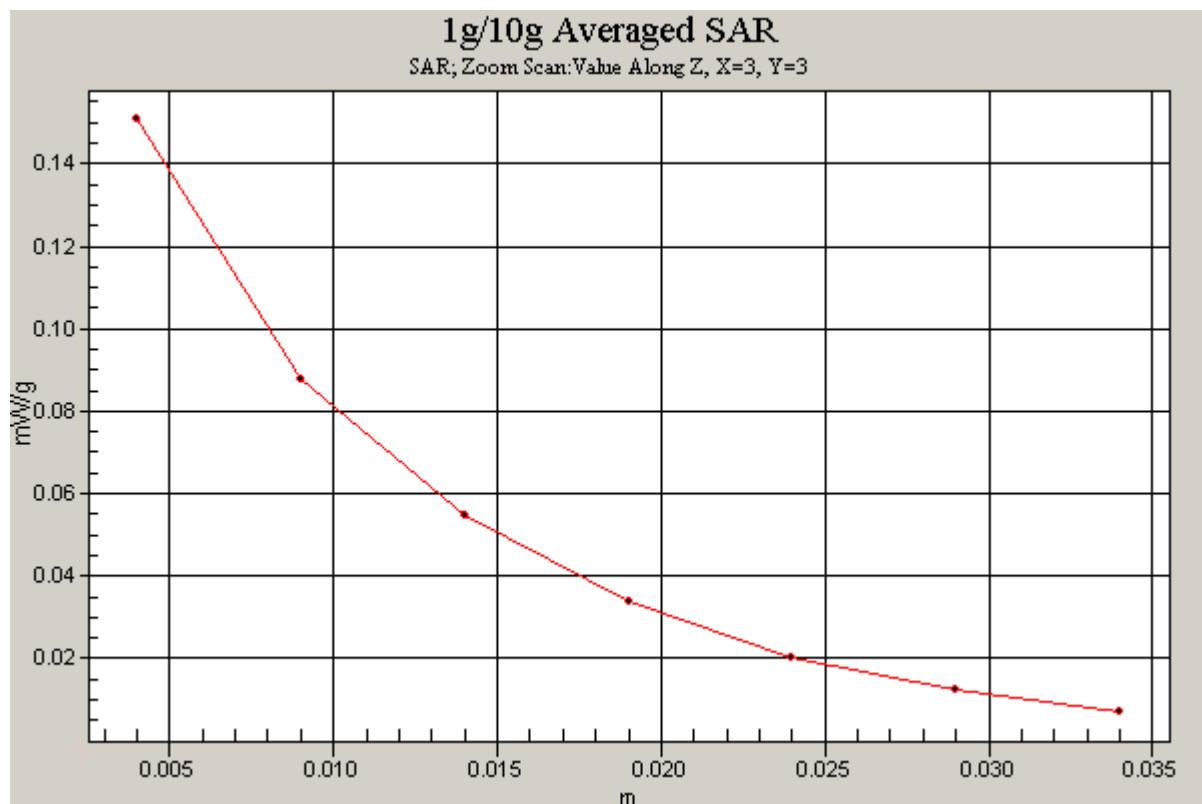


Figure 66 Z-Scan at power reference point (Body, Towards Phantom, GSM 1900 SIM1 Channel190)

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### **GSM 1900 SIM2 Towards Ground Low**

Date/Time: 8/25/2009 12:42:09 PM

Communication System: PCS 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.51$  mho/m;  $\epsilon_r = 52.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.6, 4.6, 4.6); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Low/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.160 mW/g

**Towards Ground Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.58 V/m; Power Drift = 0.021 dB

Peak SAR (extrapolated) = 0.252 W/kg

**SAR(1 g) = 0.148 mW/g; SAR(10 g) = 0.089 mW/g**

Maximum value of SAR (measured) = 0.159 mW/g

**Towards Ground Low/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.58 V/m; Power Drift = 0.021 dB

Peak SAR (extrapolated) = 0.230 W/kg

**SAR(1 g) = 0.113 mW/g; SAR(10 g) = 0.068 mW/g**

Maximum value of SAR (measured) = 0.142 mW/g

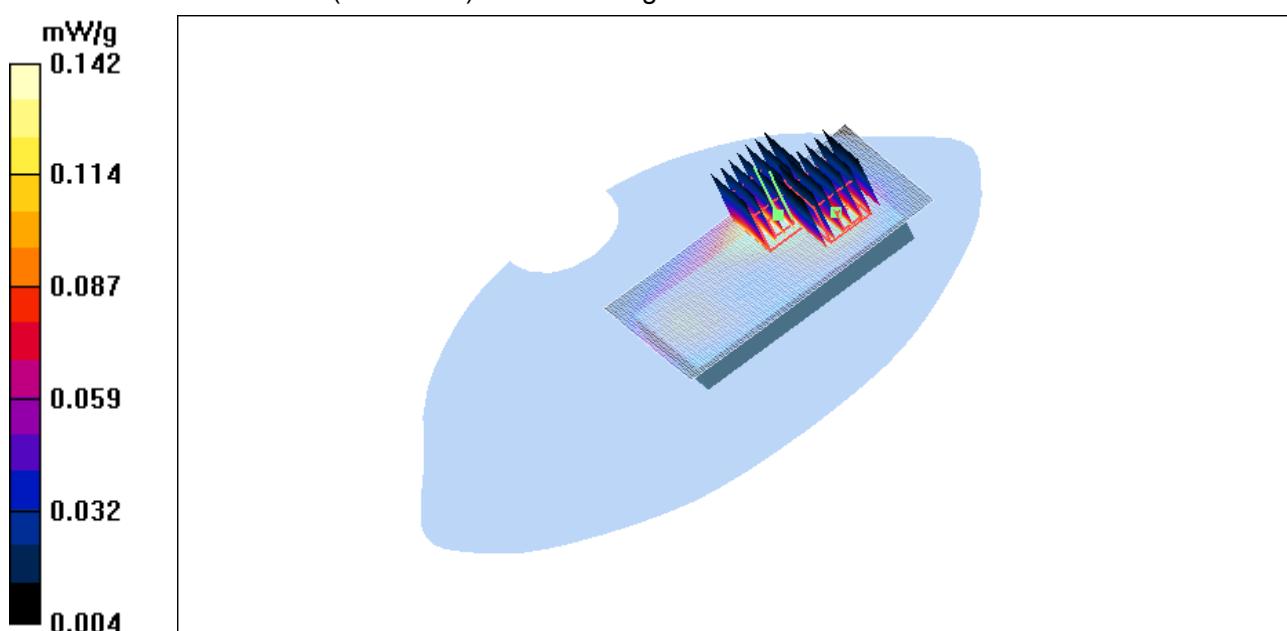


Figure 67 Body, Towards Ground, GSM 1900 SIM2 Channel 512

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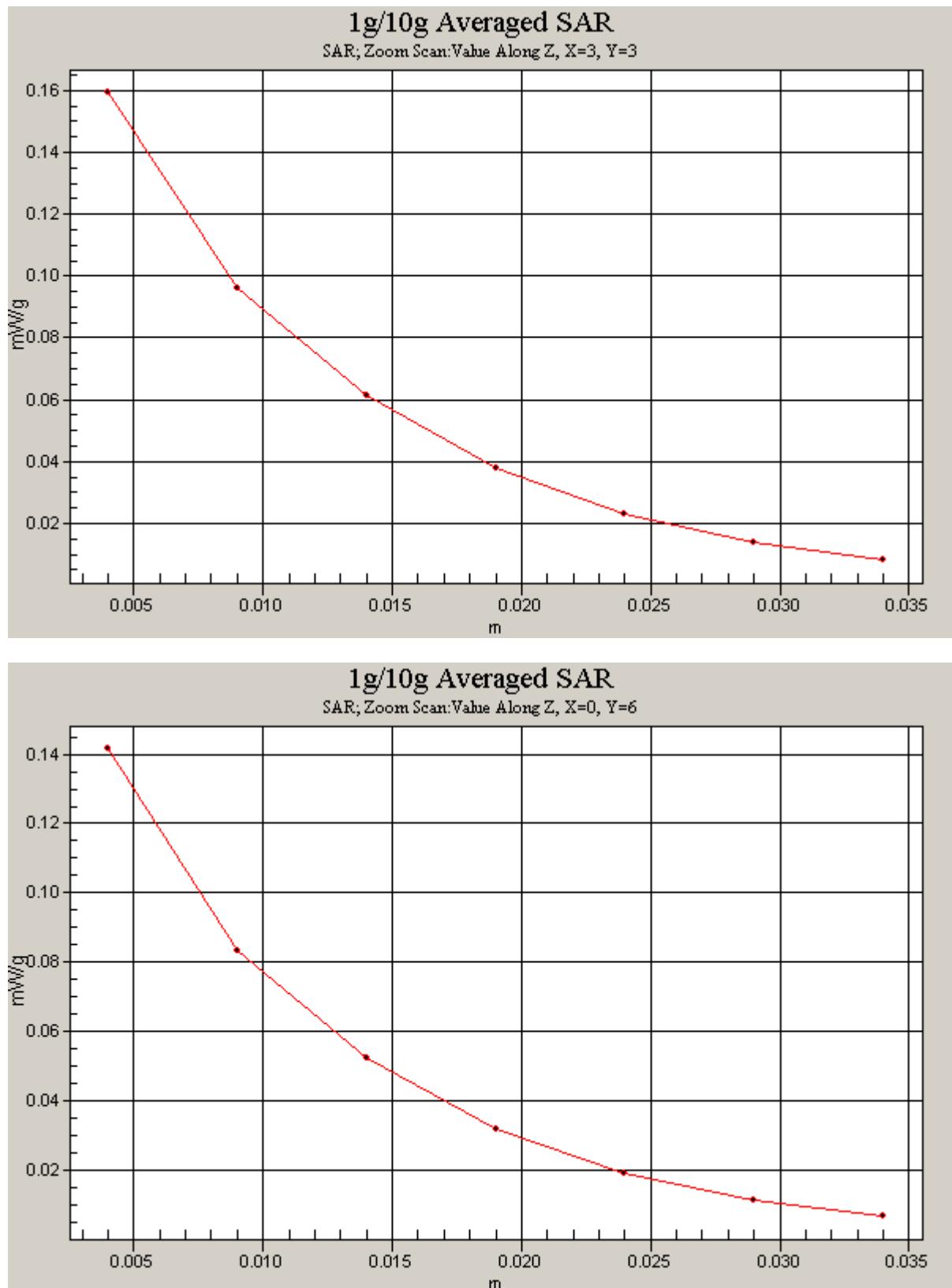


Figure 68 Z-Scan at power reference point (Body, Towards Ground, GSM 1900 SIM2 Channel 512)

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### **GSM 1900 SIM1 Towards Ground with Earphone Low**

Date/Time: 8/25/2009 12:08:00 PM

Communication System: PCS 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.51$  mho/m;  $\epsilon_r = 52.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.6, 4.6, 4.6); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Low/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.170 mW/g

**Towards Ground Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.14 V/m; Power Drift = -0.072 dB

Peak SAR (extrapolated) = 0.256 W/kg

**SAR(1 g) = 0.148 mW/g; SAR(10 g) = 0.086 mW/g**

Maximum value of SAR (measured) = 0.159 mW/g

**Towards Ground Low/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.14 V/m; Power Drift = -0.072 dB

Peak SAR (extrapolated) = 0.263 W/kg

**SAR(1 g) = 0.154 mW/g; SAR(10 g) = 0.092 mW/g**

Maximum value of SAR (measured) = 0.166 mW/g

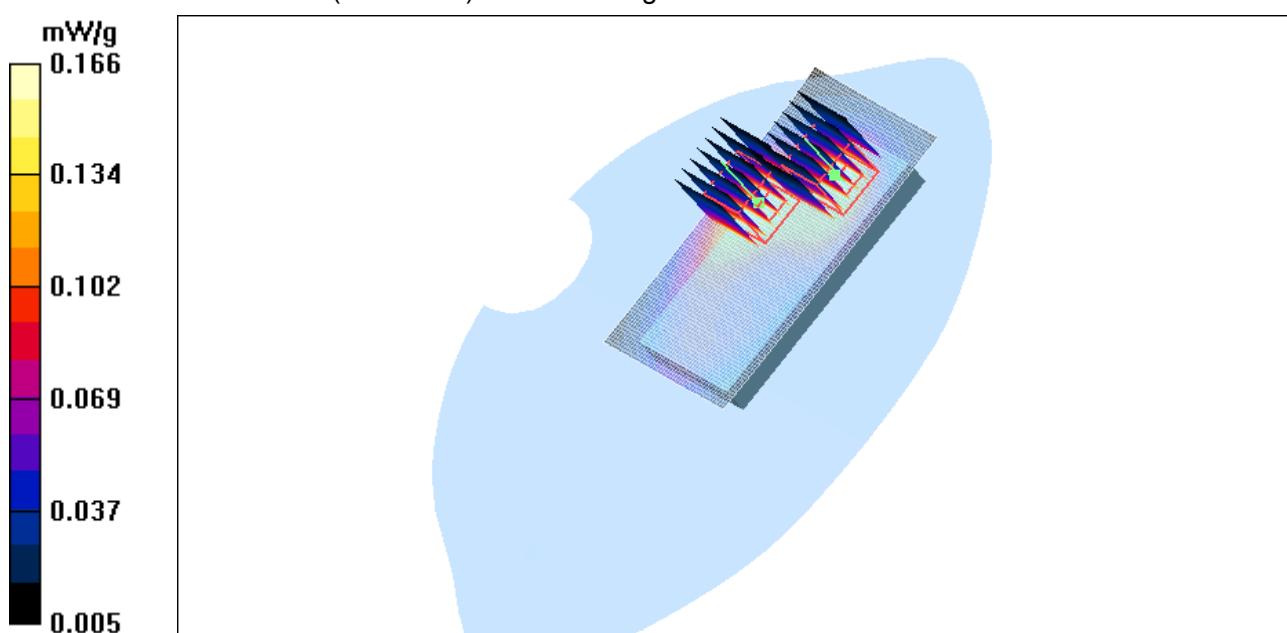


Figure 69 Body with Earphone, Towards Ground, GSM 1900 SIM1 Channel 512

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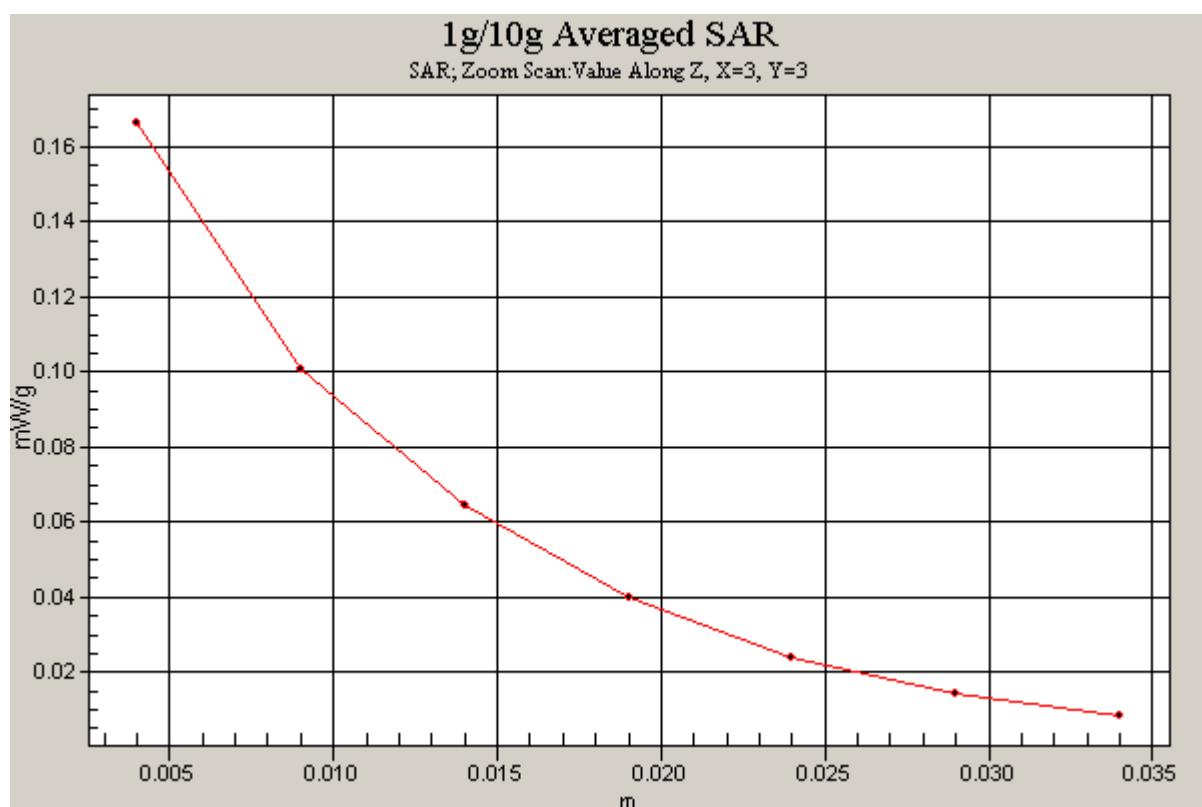
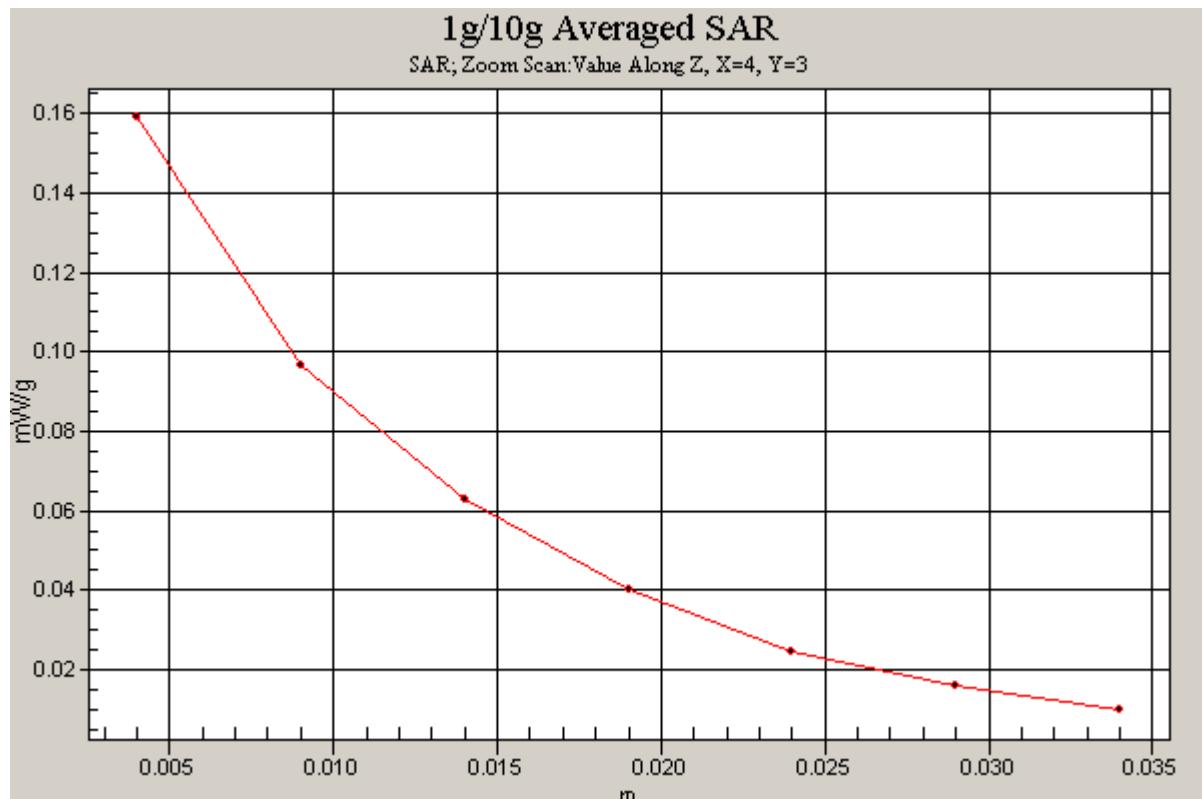


Figure 70 Z-Scan at power reference point (Body with Earphone, Towards Ground, GSM 1900 SIM1  
Channel 512)

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### **GSM 1900 SIM1+GPRS(4Up) Towards Ground Low**

Date/Time: 8/25/2009 1:37:59 PM

Communication System: PCS 1900+GPRS(4Up); Frequency: 1850.2 MHz; Duty Cycle: 1:2

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.51$  mho/m;  $\epsilon_r = 52.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.6, 4.6, 4.6); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Low/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.603 mW/g

**Towards Ground Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.7 V/m; Power Drift = -0.142 dB

Peak SAR (extrapolated) = 0.964 W/kg

**SAR(1 g) = 0.561 mW/g; SAR(10 g) = 0.333 mW/g**

Maximum value of SAR (measured) = 0.603 mW/g

**Towards Ground Low/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.7 V/m; Power Drift = -0.142 dB

Peak SAR (extrapolated) = 0.852 W/kg

**SAR(1 g) = 0.408 mW/g; SAR(10 g) = 0.243 mW/g**

Maximum value of SAR (measured) = 0.519 mW/g

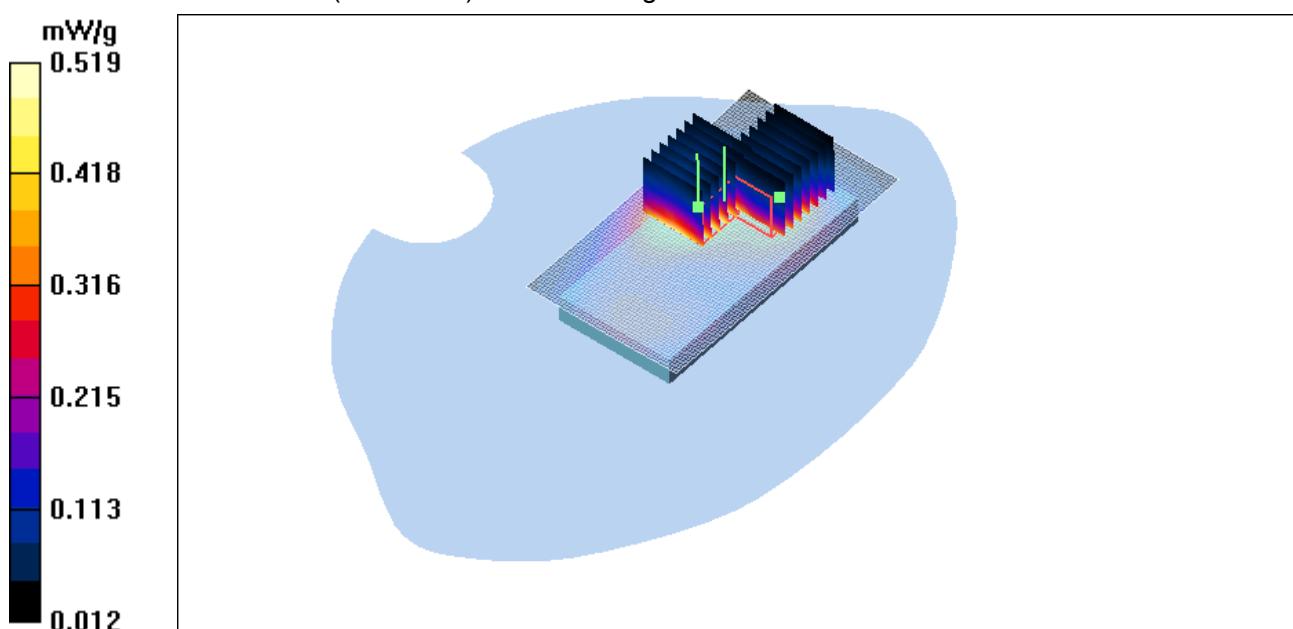


Figure 71 Body, Towards Ground, GSM 1900 SIM1 GPRS(4up) Channel 512

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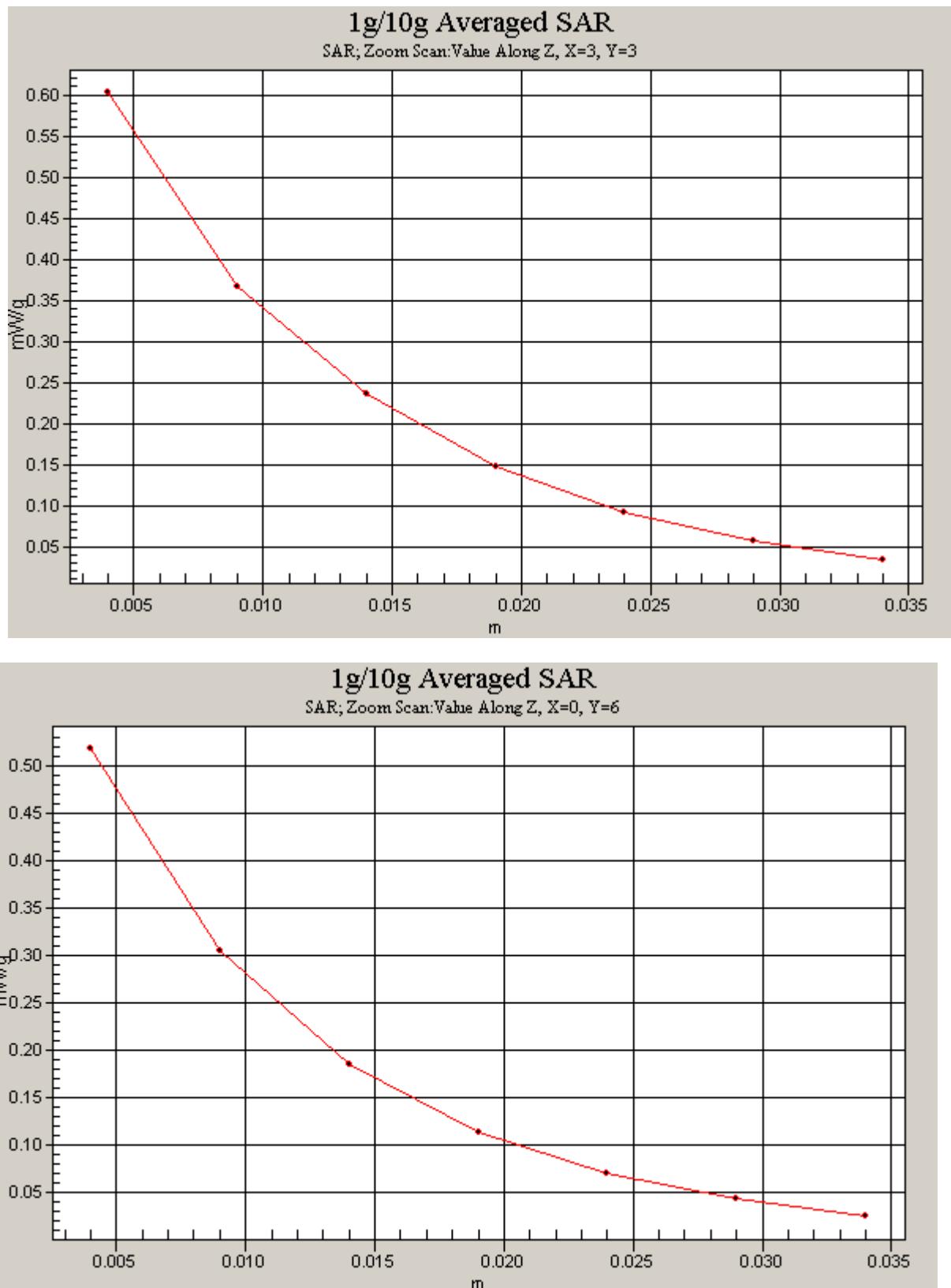


Figure 72 Z-Scan at power reference point (Body, Towards Ground, GSM 1900 SIM1 GPRS(4up)  
Channel 512)

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### **GSM 1900 SIM1+EGPRS(4Up) Towards Ground Low**

Date/Time: 8/25/2009 1:16:39 PM

Communication System: PCS 1900+EGPRS(4Up); Frequency: 1850.2 MHz; Duty Cycle: 1:2

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.51$  mho/m;  $\epsilon_r = 52.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.6, 4.6, 4.6); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Low/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.524 mW/g

**Towards Ground Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.6 V/m; Power Drift = -0.040 dB

Peak SAR (extrapolated) = 0.796 W/kg

**SAR(1 g) = 0.467 mW/g; SAR(10 g) = 0.280 mW/g**

Maximum value of SAR (measured) = 0.502 mW/g

**Towards Ground Low/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.6 V/m; Power Drift = -0.408 dB

Peak SAR (extrapolated) = 0.654 W/kg

**SAR(1 g) = 0.341 mW/g; SAR(10 g) = 0.205 mW/g**

Maximum value of SAR (measured) = 0.399 mW/g

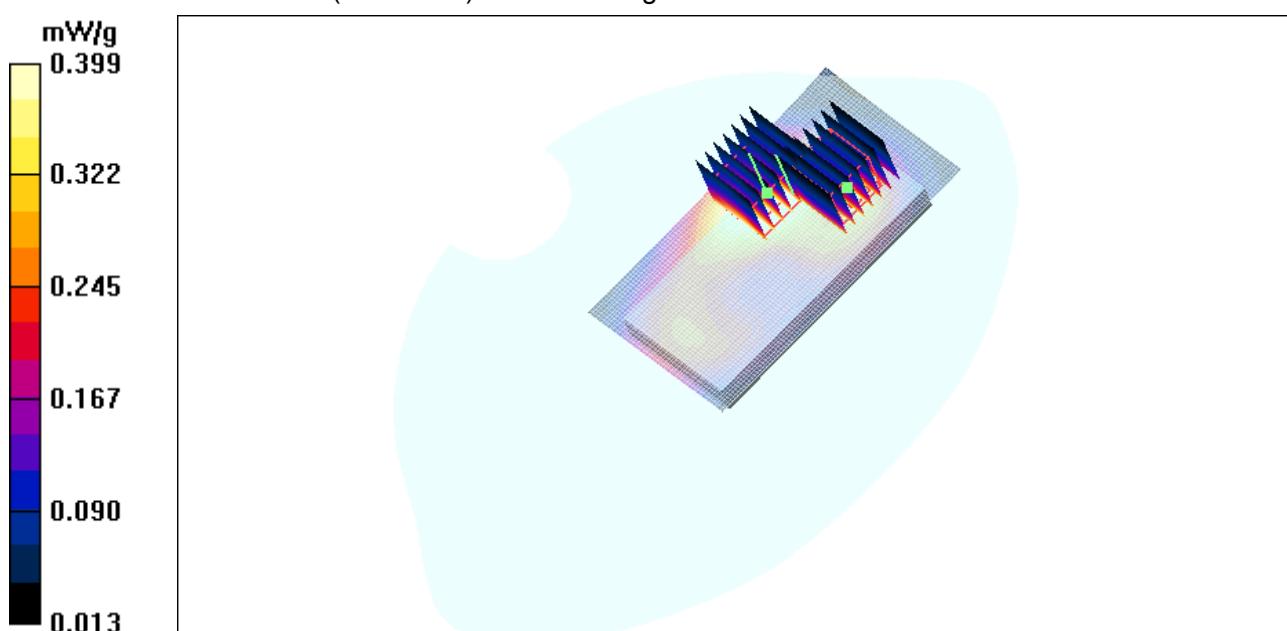


Figure 73 Body, Towards Ground, GSM 1900 SIM1 EGPRS(4up) Channel 512

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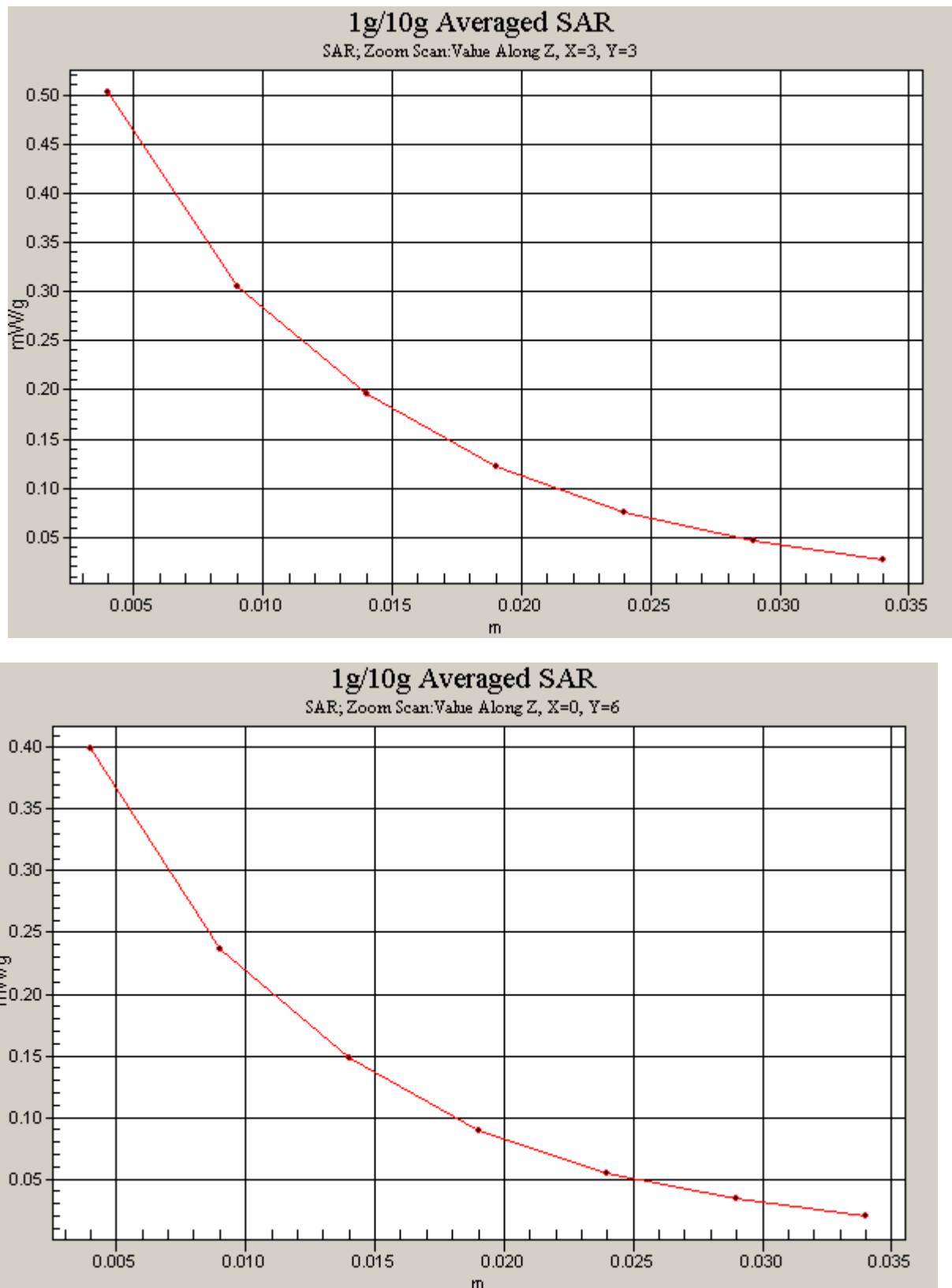


Figure 74 Z-Scan at power reference point (Body, Towards Ground, GSM 1900 SIM1 EGPRS(4up)  
Channel 512)

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### ANNEX D: 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 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 TA Shanghai (Auden)

Certificate No: ET3-1737\_Nov08

#### CALIBRATION CERTIFICATE

Object ET3DV6 - SN:1737

Calibration procedure(s)  
QA CAL-01.v6, QA CAL-12.v5 and QA CAL-23.v3  
Calibration procedure for dosimetric E-field probes

Calibration date: November 25, 2008

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  $(22 \pm 3)^\circ\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	1-Jul-08 (No. 217-00865)	Jul-09
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	1-Jul-08 (No. 217-00866)	Jul-09
Reference Probe ES3DV2	SN: 3013	2-Jan-08 (No. ES3-3013_Jan08)	Jan-09
DAE4	SN: 660	9-Sep-08 (No. DAE4-660_Sep08)	Sep-09

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

Calibrated by:	Name	Function	Signature
	Katja Pokovic	Technical Manager	

Approved by:	Name	Function	Signature
	Niels Kuster	Quality Manager	

Issued: November 25, 2008

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

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**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 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

### Glossary:

TS	tissue simulating liquid
NORM $x,y,z$	sensitivity in free space
ConvF	sensitivity in TSL / NORM $x,y,z$
DCP	diode compression point
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\theta$	$\theta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ 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:

- $NORMx,y,z$ : Assessed for E-field polarization  $\theta = 0$  ( $f \leq 900$  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 effect 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 (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  $NORMx,y,z * ConvF$  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  $\pm 50$  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.

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**ET3DV6 SN:1737**

**November 25, 2008**

# **Probe ET3DV6**

## **SN:1737**

Manufactured:	September 27, 2002
Last calibrated:	February 19, 2007
Repaired:	November 18, 2008
Recalibrated:	November 25, 2008

**Calibrated for DASY Systems**

(Note: non-compatible with DASY2 system!)

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ET3DV6 SN:1737

November 25, 2008

**DASY - Parameters of Probe: ET3DV6 SN:1737**

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

NormX	<b>1.42</b> $\pm$ 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$
NormY	<b>1.68</b> $\pm$ 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	<b>1.63</b> $\pm$ 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$

**Diode Compression<sup>B</sup>**

DCP X	<b>93</b> mV
DCP Y	<b>94</b> mV
DCP Z	<b>85</b> mV

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

Please see Page 8.

**Boundary Effect**

**TSL                    900 MHz                    Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance	<b>3.7</b> mm	<b>4.7</b> mm
SAR <sub>be</sub> [%]      Without Correction Algorithm	10.7	6.9
SAR <sub>be</sub> [%]      With Correction Algorithm	0.3	0.4

**TSL                    1750 MHz                    Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance	<b>3.7</b> mm	<b>4.7</b> mm
SAR <sub>be</sub> [%]      Without Correction Algorithm	12.5	8.4
SAR <sub>be</sub> [%]      With Correction Algorithm	0.8	0.5

**Sensor Offset**

Probe Tip to Sensor Center                    **2.7** 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.

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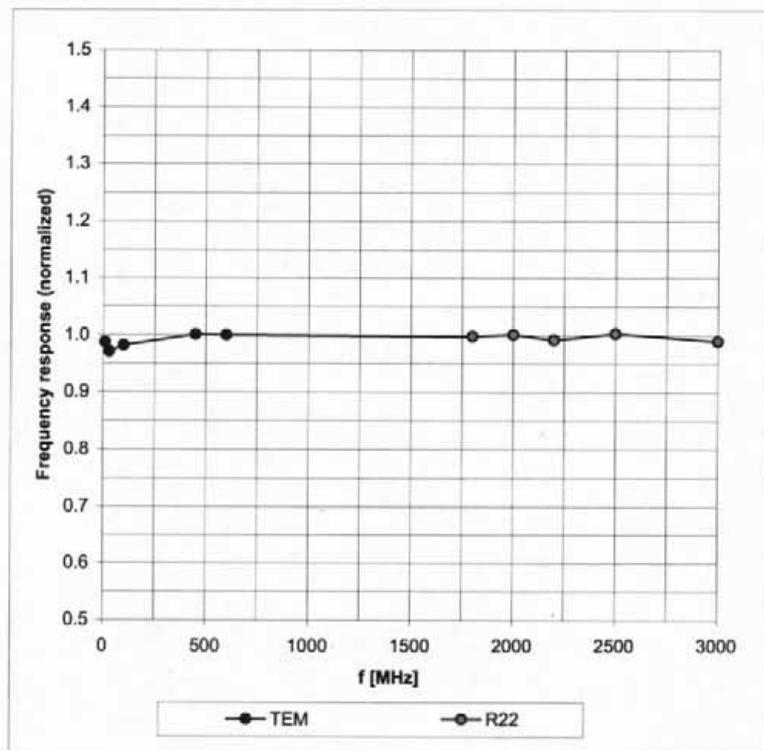
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ET3DV6 SN:1737

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**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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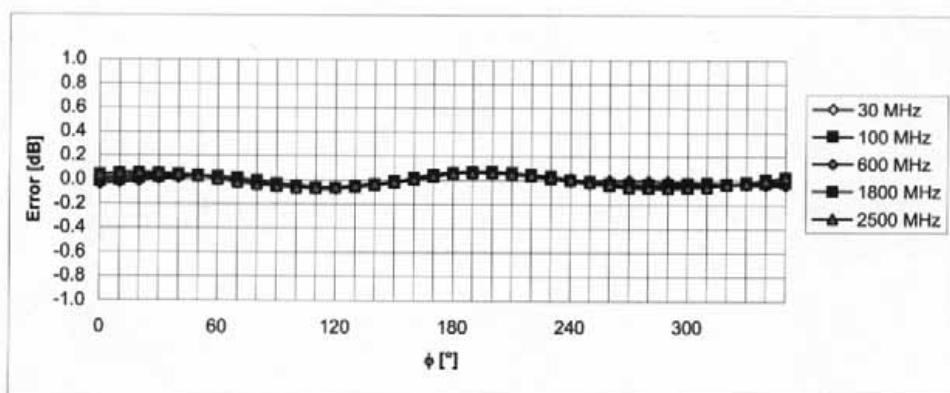
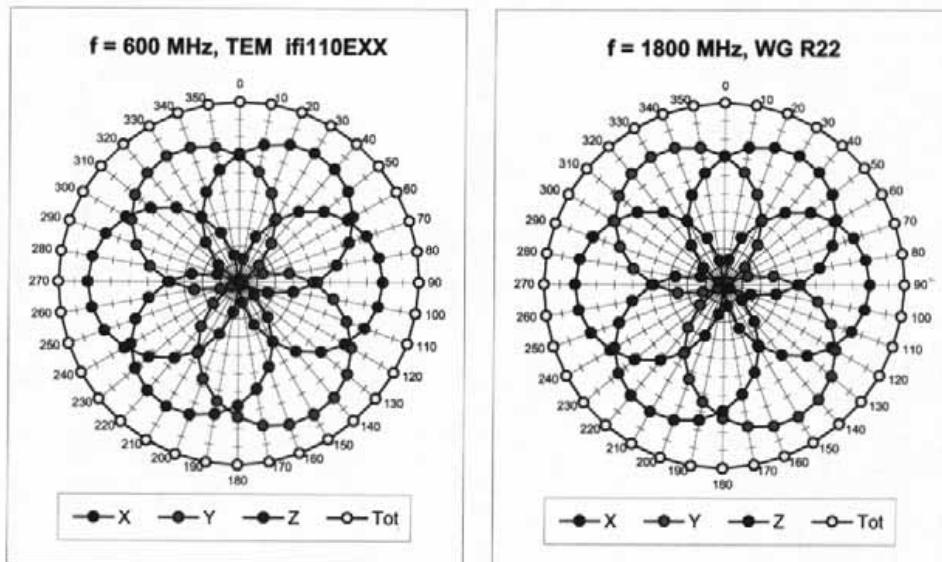
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Receiving Pattern ( $\phi$ ),  $\theta = 0^\circ$



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

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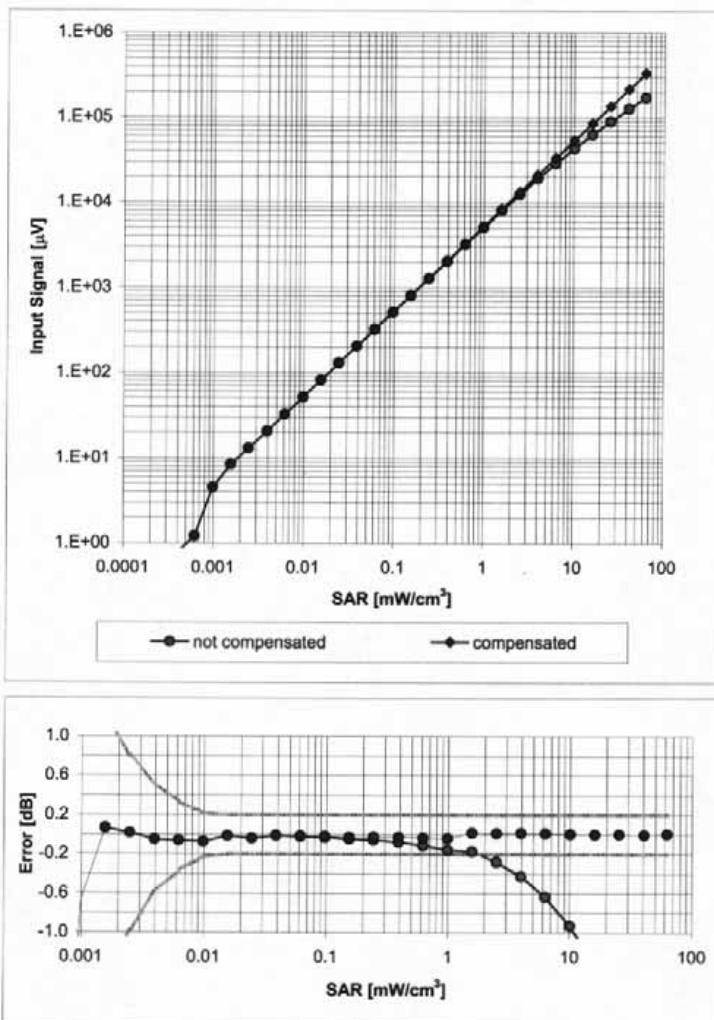
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ET3DV6 SN:1737

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



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

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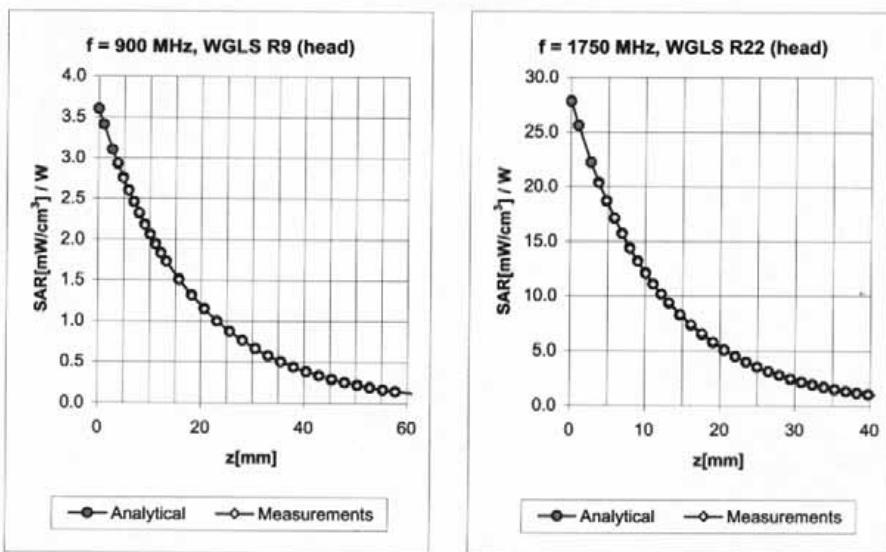
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ET3DV6 SN:1737

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**Conversion Factor Assessment**



f [MHz]	Validity [MHz] <sup>c</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.36	1.84	7.20	± 13.3% (k=2)
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.25	3.53	6.33	± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.27	3.53	6.14	± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.56	2.77	5.35	± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.57	2.72	4.89	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.51	1.60	4.39	± 11.0% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.27	1.80	7.52	± 13.3% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.36	2.75	6.14	± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.43	2.51	5.98	± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.99	1.74	4.84	± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.99	1.50	4.60	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.98	1.42	3.91	± 11.0% (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.

**TA Technology (Shanghai) Co., Ltd.**  
**Test Report**

Report No.: RZA2009-1087FCC

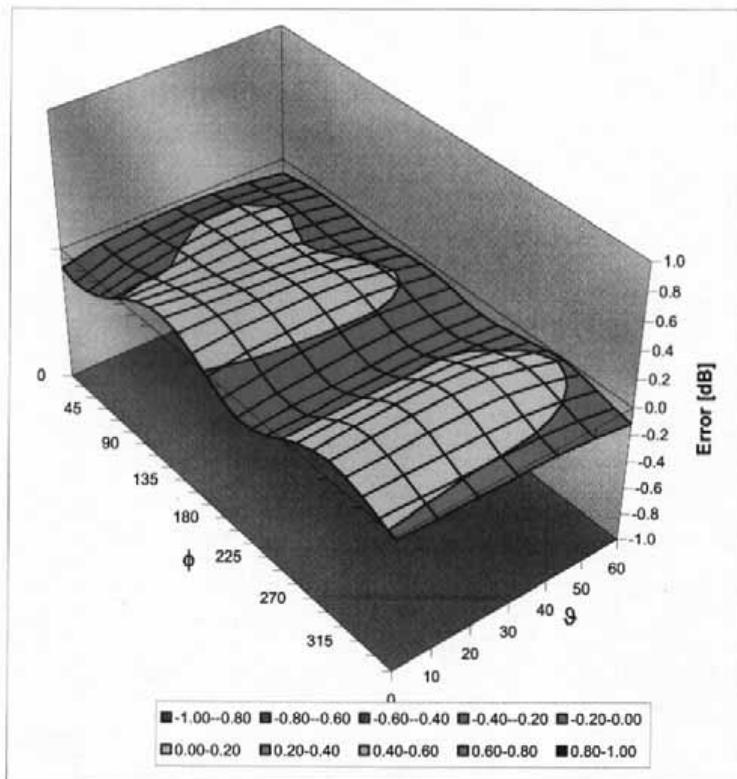
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ET3DV6 SN:1737

November 25, 2008

**Deviation from Isotropy in HSL**

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



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

**TA Technology (Shanghai) Co., Ltd.**  
**Test Report**

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**ANNEX E: D835V2 Dipole Calibration Certificate**

信息产业部通信计量中心  
Telecommunication Metrology Center of MIIT



检 测

CNAS L0442

Client

TA

Certificate No: D835V2-4d020\_Jul09

**CALIBRATION CERTIFICATE**

Object D835V2 - SN: 4d020

Calibration Procedure(s) TMC-XZ-01-027  
Calibration procedure for dipole validation kits

Calibration date: July 15, 2009

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( $22 \pm 3$ )°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 NRVD	101253	19-Jun-09 (TMC, No.JZ09-248)	Jun-10
Power sensor NRV-Z5	100333	19-Jun-09 (TMC, No. JZ09-248)	Jun-10
Reference Probe ES3DV3	SN 3149	08-Dec-08(SPEAG, No.ES3-3149_Dec08)	Dec-09
DAE4	SN 771	21-Nov-08(SPEAG, No.DAE4-771_Nov08)	Nov-09
RF generator E4438C	MY45092879	18-Jun-09(TMC, No.JZ09-302)	Jun-10
Network Analyzer 8753E	US38433212	03-Aug-08(TMC, No.JZ08-056)	Aug-09

Calibrated by:	Name	Function	Signature
	Lin Hao	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: July 15, 2009

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

Certificate No: D835V2-4d020\_Jul09

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# TA Technology (Shanghai) Co., Ltd.

## Test Report

Report No.: RZA2009-1087FCC

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### Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,y,z
N/A	not applicable or not measured

### 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 300MHz to 3GHz)", February 2005
- c) 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:

- d) DASY 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.

# TA Technology (Shanghai) Co., Ltd.

## Test Report

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### Measurement Conditions

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

<b>DASY Version</b>	DASY5	V5.0
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	2mm Oval Phantom ELI4	
<b>Distance Dipole Center - TSL</b>	15 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	835 MHz ± 1 MHz	

### Head TSL parameters

The following parameters and calculations were applied.

	<b>Temperature</b>	<b>Permittivity</b>	<b>Conductivity</b>
<b>Nominal Head TSL parameters</b>	22.0 °C	41.5	0.90 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	41.2 ± 6 %	0.91 mho/m ± 6 %
<b>Head TSL temperature during test</b>	(21.7 ± 0.2) °C	---	---

### SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	<b>Condition</b>	
SAR measured	250 mW input power	2.40 mW / g
SAR normalized	normalized to 1W	9.60 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>9.2 mW /g ± 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	<b>Condition</b>	
SAR measured	250 mW input power	1.55 mW / g
SAR normalized	normalized to 1W	6.20 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>6.07 mW /g ± 16.5 % (k=2)</b>

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

# TA Technology (Shanghai) Co., Ltd.

## Test Report

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### Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	55.2	0.97 mho/m
<b>Measured Body TSL parameters</b>	(22.0 ± 0.2) °C	54.6 ± 6%	0.99 mho/m ± 6 %
<b>Body TSL temperature during test</b>	(21.9 ± 0.2) °C	---	---

### SAR result with Body TSL

SAR averaged over 1 $cm^3$ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.41 mW / g
SAR normalized	normalized to 1W	9.64 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>9.28 mW / g ± 17.0 % (k=2)</b>

SAR averaged over 10 $cm^3$ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.58 mW / g
SAR normalized	normalized to 1W	6.32 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>6.19 mW / g ± 16.5 % (k=2)</b>

<sup>2</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

# TA Technology (Shanghai) Co., Ltd.

## Test Report

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### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.7Ω -3.7 jΩ
Return Loss	- 25.9dB

#### Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.4Ω - 5.1 jΩ
Return Loss	-25.6dB

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.387 ns
----------------------------------	----------

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.  
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	April 22, 2004

#### DASY5 Validation Report for Head TSL

Certificate No: D835V2-4d020\_Jul09

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**TA Technology (Shanghai) Co., Ltd.**  
**Test Report**

Report No.: RZA2009-1087FCC

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Date/Time: 2009-7-15 14:54:13

**Test Laboratory: TMC, Beijing, China**

**DUT: Dipole 835 MHz; Type: D835V2; Serial: SN: 4d020**

Communication System: CW Frequency: 835 MHz Duty Cycle: 1:1

Medium: Head 835MHz

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.91$  mho/m;  $\epsilon_r = 41.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(6.34, 6.34, 6.34); Calibrated: 08.12.08
- Electronics: DAE4 Sn771; Calibration: 21.11.08
- Phantom: 2mm Oval Phantom ELI4; Type: QDOVA001BB
- Measurement SW: DASY5, V5.0 Build 119.9; Postprocessing SW: SEMCAD, V13.2 Build 87

**Pin=250mW; d=15mm/Zoom Scan (7x7x7)/Cube 0:**

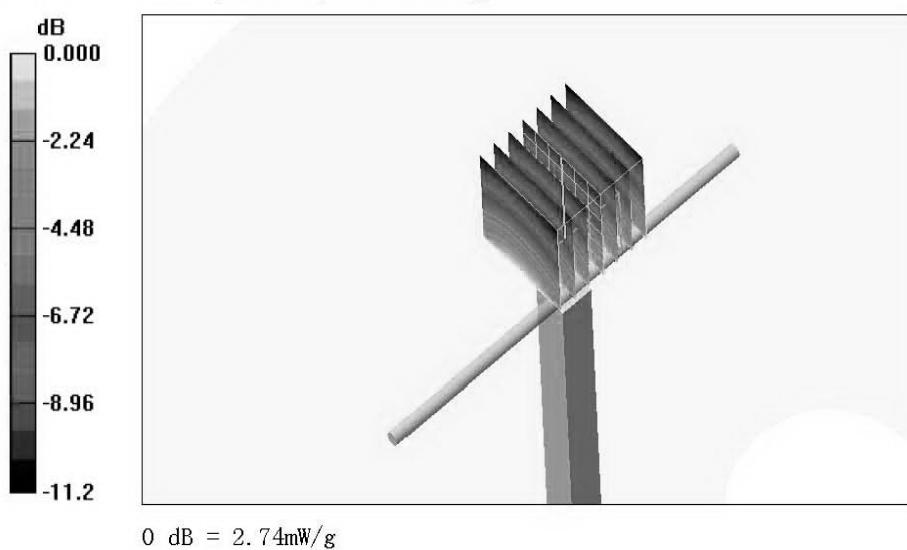
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.2 V/m; Power Drift = -0.019 dB

Peak SAR (extrapolated) = 3.16 W/kg

**SAR(1 g) = 2.4 mW/g; SAR(10 g) = 1.55 mW/g**

Maximum value of SAR (measured) = 2.74 mW/g

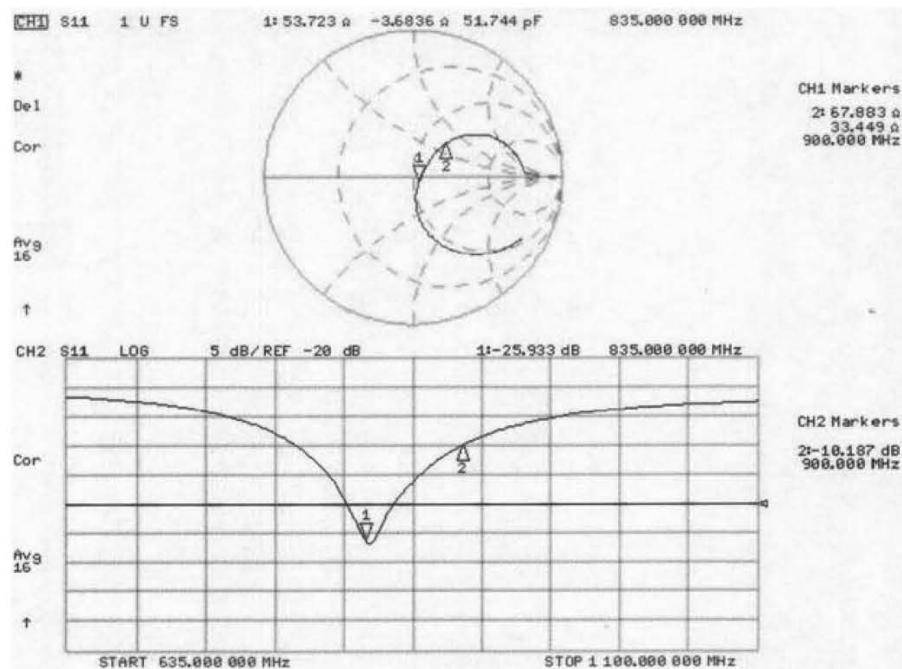


**TA Technology (Shanghai) Co., Ltd.**  
**Test Report**

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**Impedance Measurement Plot for Head TSL**



**TA Technology (Shanghai) Co., Ltd.**  
**Test Report**

Report No.: RZA2009-1087FCC

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**DASY5 Validation Report for Body TSL**

Date/Time: 2009-7-15 11:27:23

**Test Laboratory: TMC, Beijing, China**

**DUT: Dipole 835 MHz; Type: D835V2; Serial: SN: 4d020**

Communication System: CW Frequency: 835 MHz Duty Cycle: 1:1

Medium: Body 835MHz

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.99 \text{ mho/m}$ ;  $\epsilon_r = 54.6$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

**DASY5 Configuration:**

- Probe: ES3DV3 - SN3149; ConvF(6.02, 6.02, 6.02); Calibrated: 08.12.08
- Electronics: DAE4 Sn771; Calibration: 21.11.08
- Phantom: 2mm Oval Phantom ELI4; Type: QDOVA001BB
- Measurement SW: DASY5, V5.0 Build 119.9; Postprocessing SW: SEMCAD, V13.2 Build 87

**Pin=250mW; d=15mm/Zoom Scan (7x7x7)/Cube 0:**

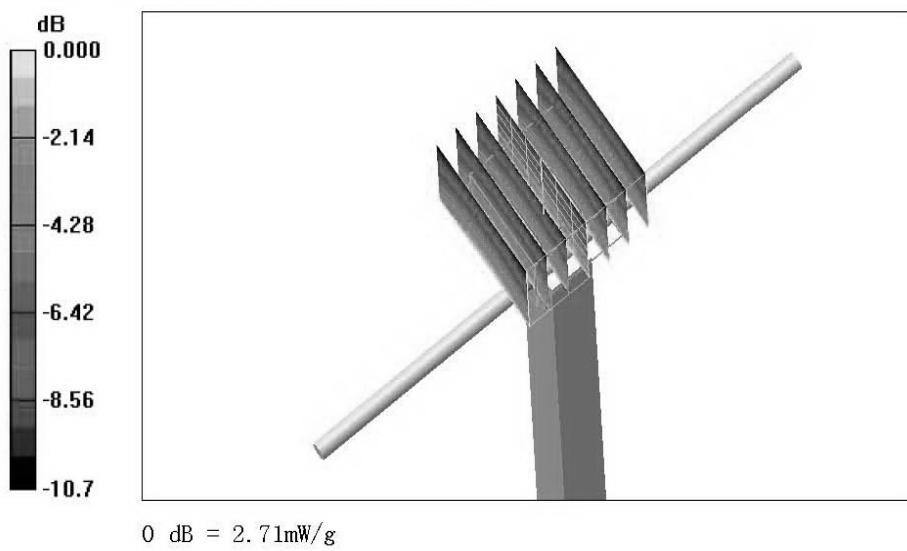
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 54.1 V/m; Power Drift = -0.004 dB

Peak SAR (extrapolated) = 3.81 W/kg

**SAR(1 g) = 2.41 mW/g; SAR(10 g) = 1.58 mW/g**

Maximum value of SAR (measured) = 2.71 mW/g

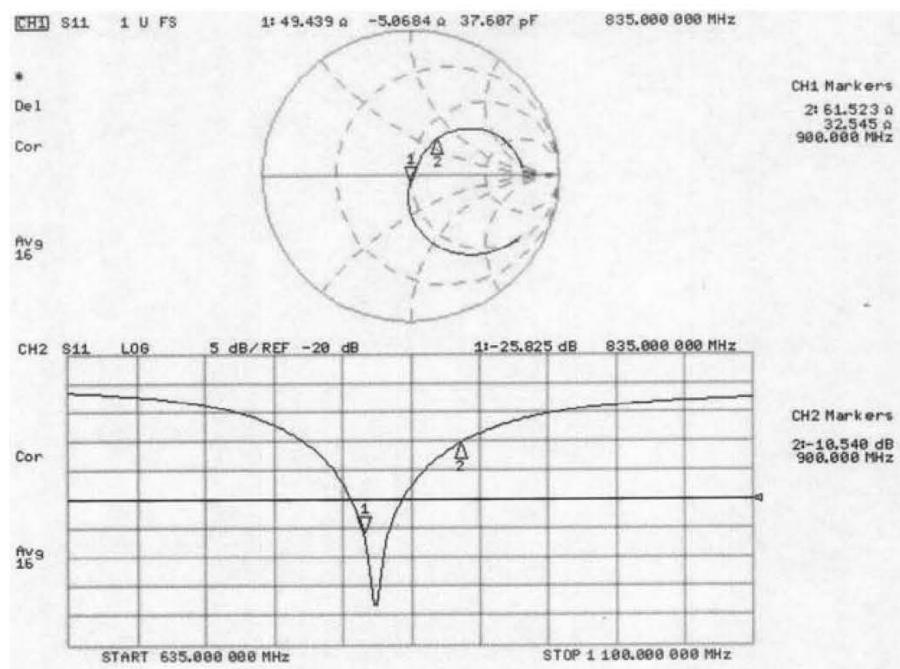


**TA Technology (Shanghai) Co., Ltd.**  
**Test Report**

Report No.: RZA2009-1087FCC

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**Impedance Measurement Plot for Body TSL**



# TA Technology (Shanghai) Co., Ltd.

## Test Report

Report No.: RZA2009-1087FCC

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### ANNEX F: D1900V2 Dipole Calibration Certificate

信息产业部通信计量中心  
Telecommunication Metrology Center of MIIT



Client

TA

Certificate No: D1900V2-5d060\_Jul09

#### CALIBRATION CERTIFICATE

Object D1900V2 - SN: 5d060

Calibration Procedure(s) TMC-XZ-01-027  
Calibration procedure for dipole validation kits

Calibration date: July 15, 2009

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( $22 \pm 3$ )°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 NRVD	101253	19-Jun-09 (TMC, No. JZ09-248)	Jun-10
Power sensor NRV-Z5	100333	19-Jun-09 (TMC, No. JZ09-248)	Jun-10
Reference Probe ES3DV3	SN 3149	08-Dec-08(SPEAG, No.ES3-3149_Dec08)	Dec-09
DAE4	SN 771	21-Nov-08(SPEAG, No.DAE4-771_Nov08)	Nov-09
RF generator E4438C	MY45092879	18-Jun-09(TMC, No.JZ09-302)	Jun-10
Network Analyzer 8753E	US38433212	03-Aug-08(TMC, No.JZ08-056)	Aug-09

	Name	Function	Signature
Calibrated by:	Lin Hao	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: July 15, 2009

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

# TA Technology (Shanghai) Co., Ltd.

## Test Report

Report No.: RZA2009-1087FCC

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### Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,y,z
N/A	not applicable or not measured

### 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 300MHz to 3GHz)", February 2005
- c) 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:

- d) DASY 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.