

Specific Absorption Rate (SAR) Test Report
for
Shintom Co., Ltd.
on the
Dual Band Phone – GSM 900/1900
Model Number: GDU325

Test Report: 20407301
Date of Report: February 16, 2001

Job #: J20040730
Date of Test: February 14 & 15, 2001

Total No of Pages Contained in this Report: 24 + Data Sheets



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Review Date: <i>02/23/01</i>	

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Shintom Co., Model No: GDU325

Date of Test: February 14 & 15, 2001

1.0 Job description
1.1 Client Information

The Shinton GDU325 has been tested at the request of

Company: Shintom Co., Ltd
1-19-20 Shin-Yakoham, Kohoku-Ku
Yokohama 222-0033
Japan

Name of contact: Mr. Takeo Watanabe
Telephone: +81-45-476-3541
Fax: +81-45-476-3540

1.2 Equipment under test (EUT)**Product Descriptions:**

Equipment	Dual Band Phone GSM 900/1900		
Trade Name	Shintom Co., Ltd	Model No	GDU325
FCC ID	BFYM5016	S/N No.	N/A
Category	Portable	RF Exposure	Uncontrolled Environment
Frequency Band	890- 915 MHz 1860 - 1910 MHz	System	GSM 900 GSM 1900 (PCS)

EUT Antenna Description			
Type	Monopole	Configuration	Fixed
Dimensions	23mm (L)	Gain	0 dBi
Location	Top, Right		

Use of Product : Voice Communication

Manufacturer: SAME as above.

Production is planned: [X] Yes, [] No

EUT receive date: February 14, 2001

EUT received condition: Good working condition prototype

Test end date: February 15, 2001

Shintom Co., Model No: GDU325

Date of Test: February 14 & 15, 2001

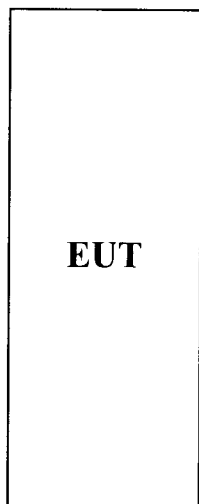
1.3 Test plan reference

FCC rule part 2.1093, FCC Docket 96-326 & Supplement C to OET Bulletin 65

1.4 System test configuration

1.4.1 System block diagram & Support equipment

The diagram shown below details test configuration of the equipment under test.



1.4.2 Test Position

The Shinton GDU325 was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in C95.1 (1992) and Supplement C of OET 65 (1998). The EUT was placed in the intended use position, i.e. CENELEC 80° position. This position is defined by a reference plane and a line. The reference plane of the head is given by three points, the auditory canal opening of both ears and center of the closed mouth. The reference line of the EUT is defined by the line, which connects the center of the ear piece with the center of the bottom of the case and lies on the surface of the case facing the phantom. The reference line of the EUT lies in the reference plane of the head. The center of the ear-piece of the EUT is placed at the entry of the auditory canal. The angle between the reference line of the phone and the line connecting both auditory canal openings is 80°. Please refer to figure 1 below for the position details:

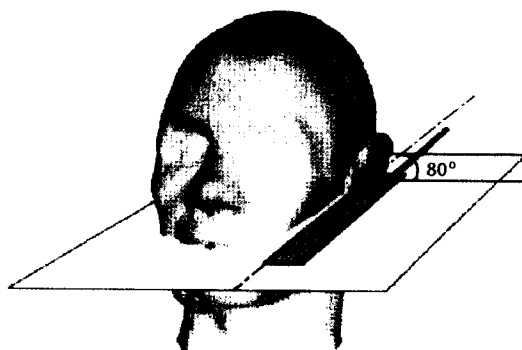


Figure 1: Intended use position

Additionally, the EUT was tested in a second position from the normal 80° angle between the reference line of the phone and the line connecting both auditory canal openings. The center of the ear piece of the EUT is placed at the entry of the auditory canal. The angle between the reference line of the phone and the line connecting both auditory canal openings was adjusted from 80° to the angle where two points of the phone were in contact with the phantom (ear hole and cheek).

Data pages indicate the position of the EUT during testing. The first position of 80° has data pages labeled '1 point touch'. The second position has data pages labeled '2 point touch'.

The left and right hand sections of the phantom were used for measuring the low, middle, and high channels in the 1 point touch and 2 point touch positions.

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1.4.3 Test Condition

During tests, the worst case data (max. RF coupling) was determined with following conditions:

EUT Antenna	Fixed length	Orientation	Two Touch
Usage	Left Hand & Right Hand	Distance between antenna axis at the joint and the liquid surface:	Two-Touch: 20.7mm 80°: 19.2mm
Simulating	Brain & Muscle	EUT Battery	Fully Charged battery
Power output - Maximum power at antenna port	32.4 dBm (890-915 MHz band) 29.5 dBm (1860-1910 MHz band)		

The spatial peak SAR values were accessed for lowest, middle and highest operating channels defined by the manufacturer.

Antenna port power measurement was performed by manufacturer.

1.5 Modifications required for compliance

No modifications were implemented by Intertek Testing Services.

1.6 Additions, deviations and exclusions from standards

No additions, deviations or exclusions have been made from standard.

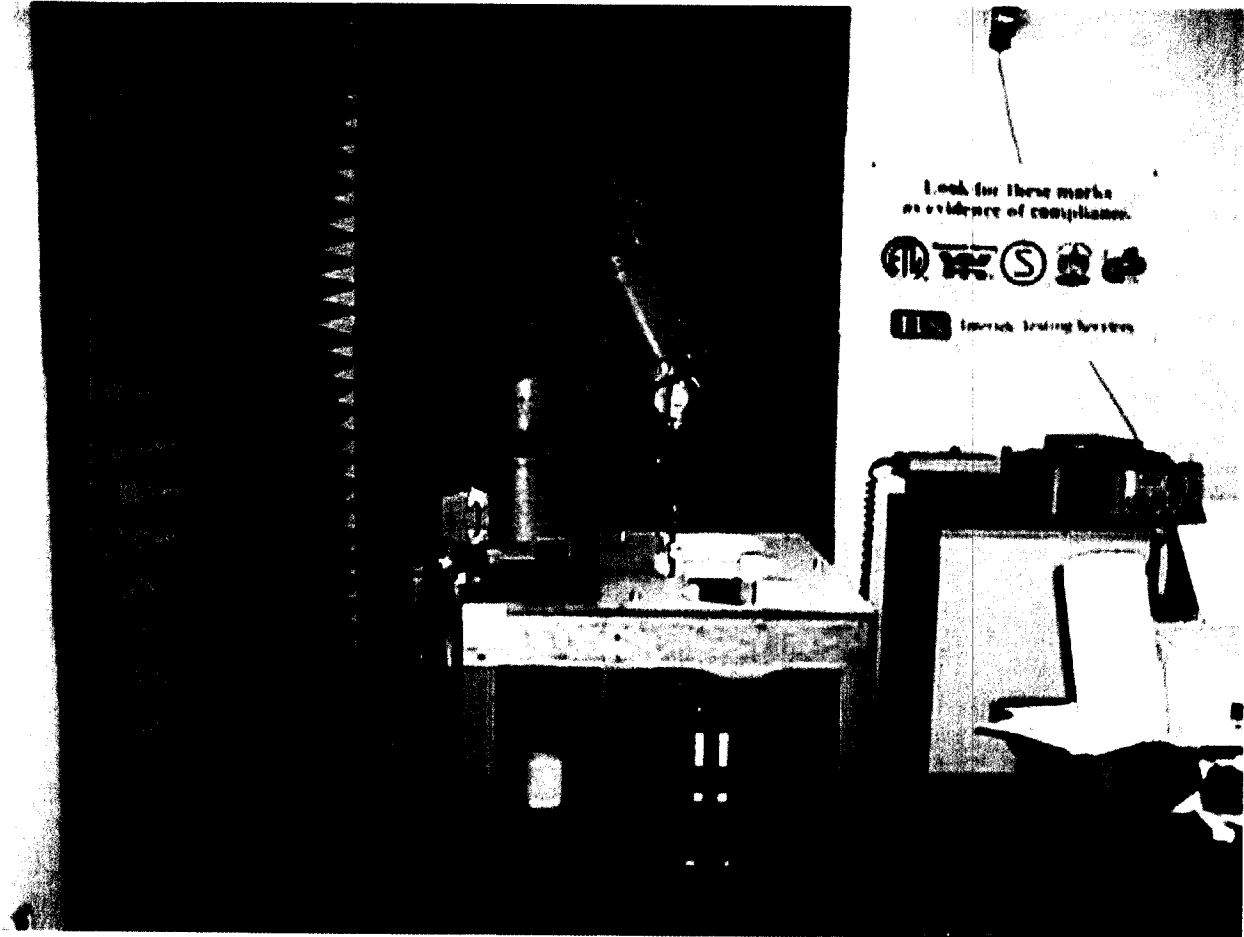
2.0 SAR EVALUATION**2.1 SAR Limits**

The following FCC limits for SAR apply to devices operate in General Population/Uncontrolled Exposure environment:

EXPOSURE (General Population/Uncontrolled Exposure environment)	SAR (W/kg)
Average over the whole body	0.08
Spatial Peak (1g)	1.60
Spatial Peak for hands, wrists, feet and ankles (10g)	4.00

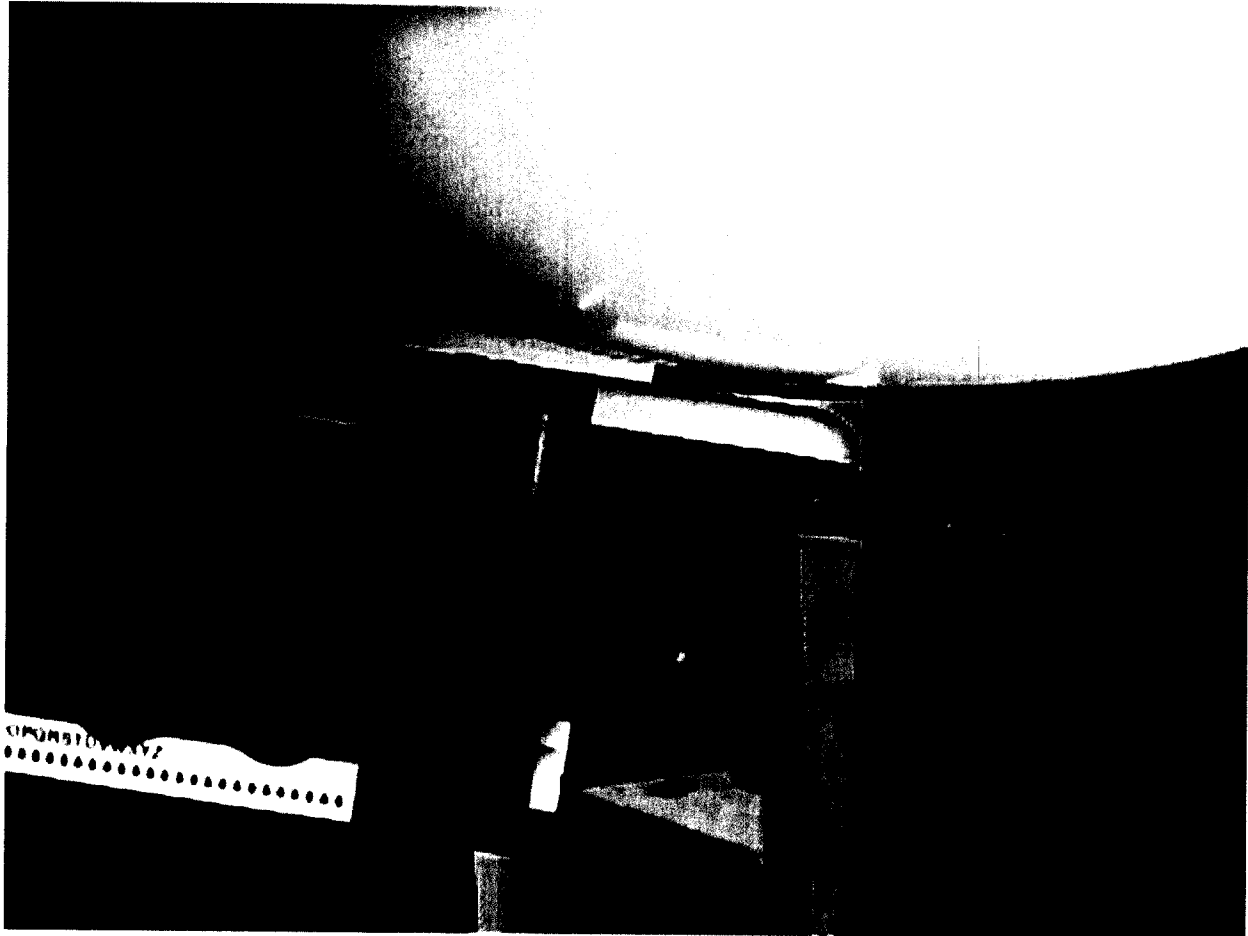
2.2 Configuration Photographs

SAR measurement Test Setup



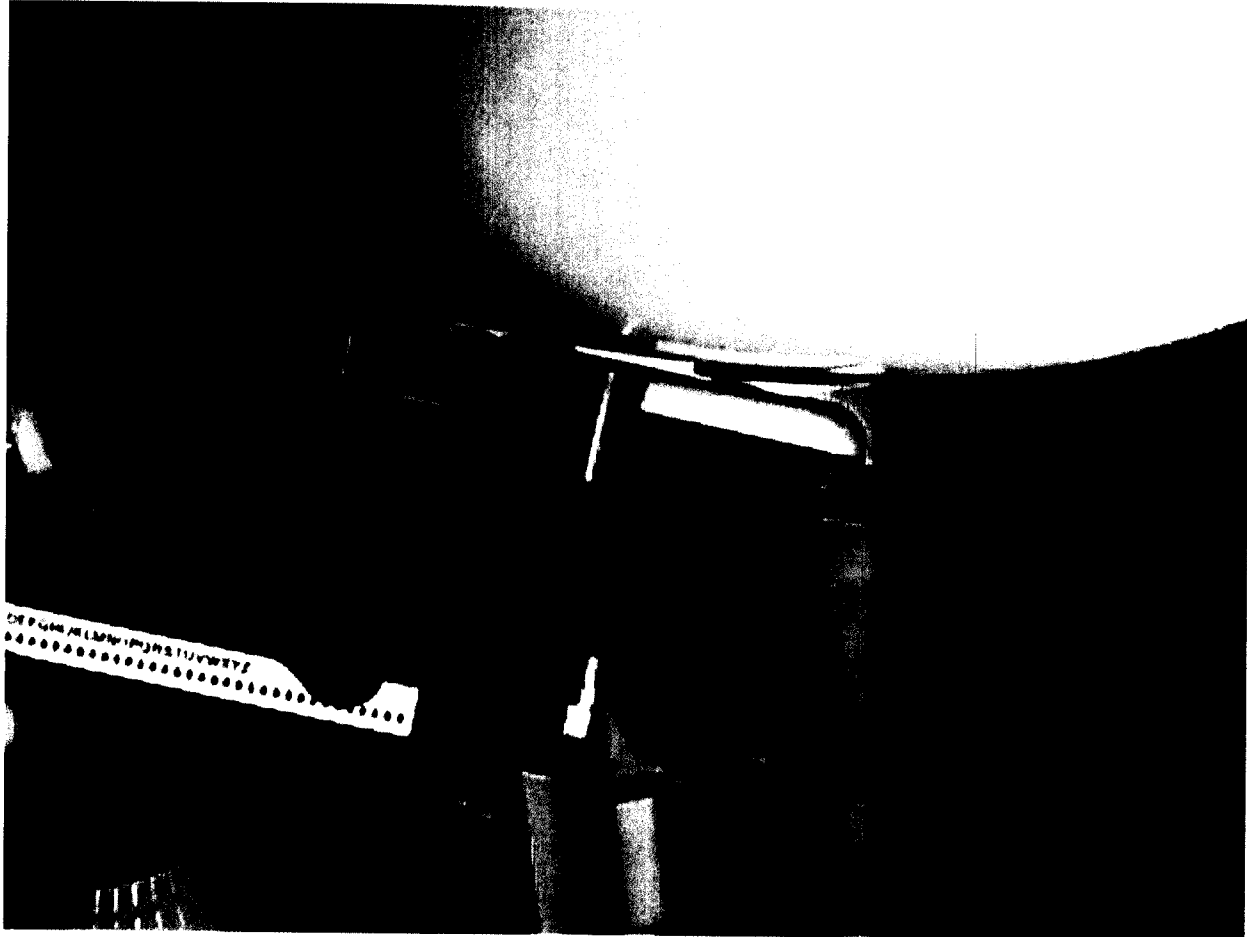
2.2 Configuration Photographs (Continued)

SAR measurement Test Setup



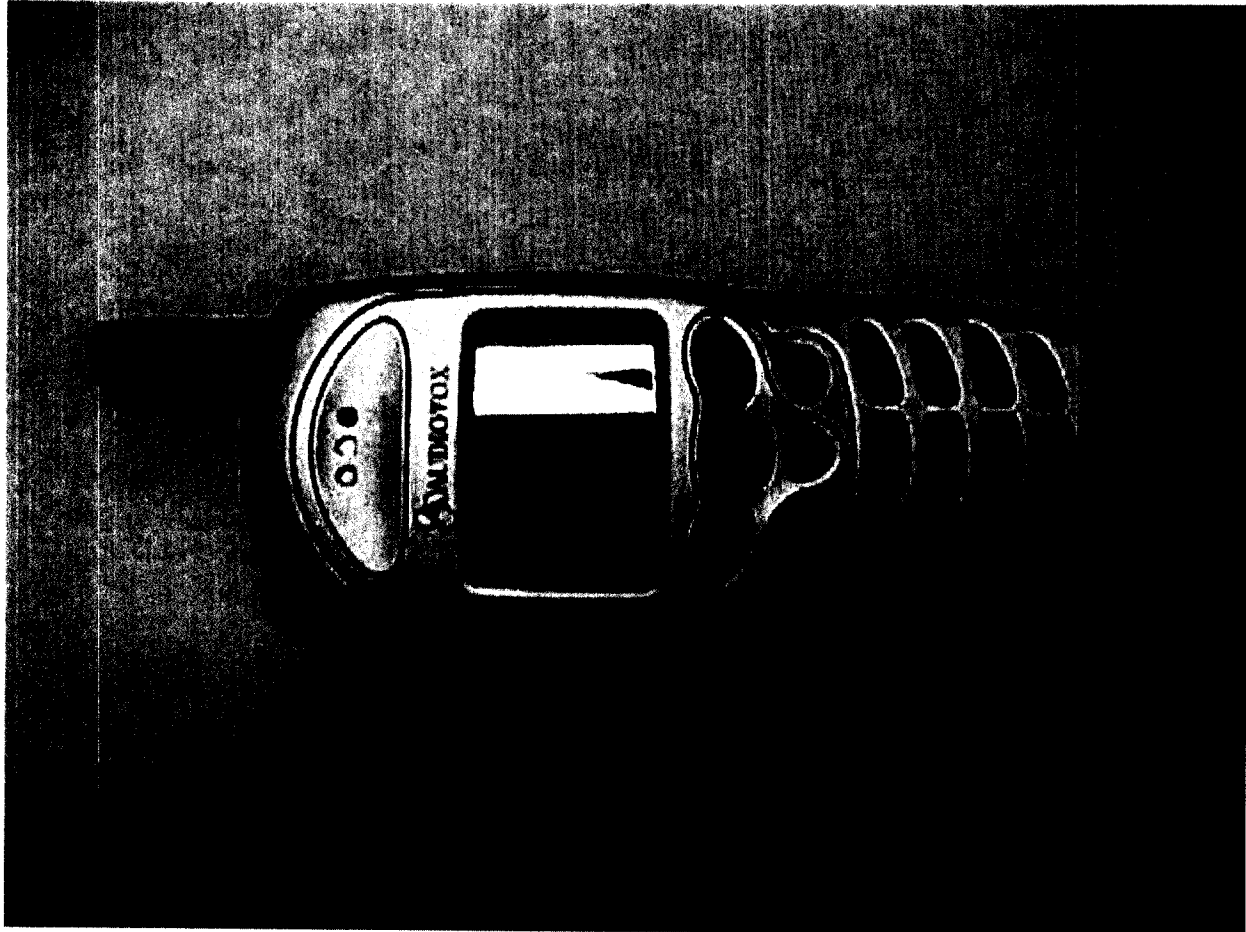
2.2 Configuration Photographs (Continued)

SAR measurement Test Setup



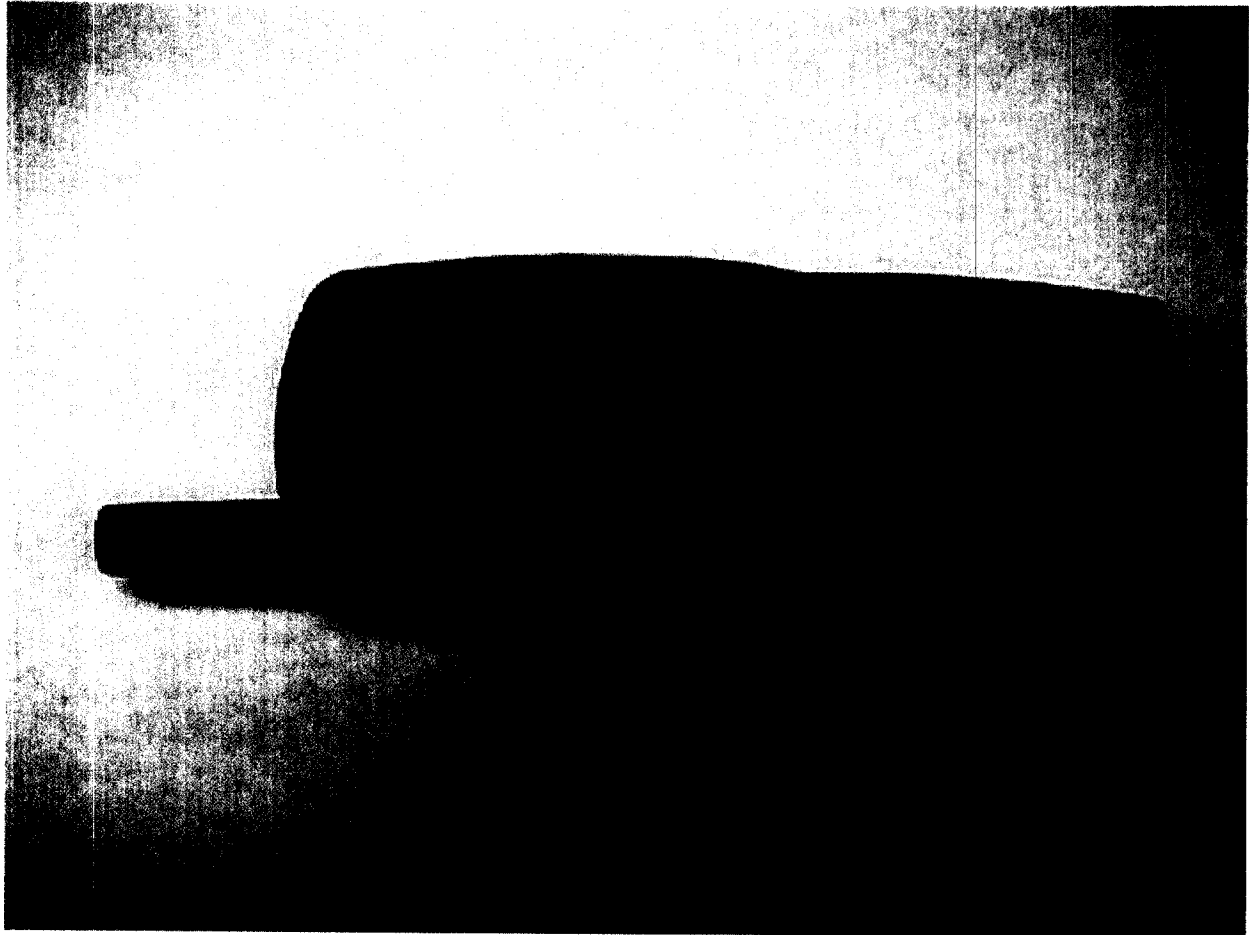
2.2 Configuration Photographs (Continued)

EUT Photo



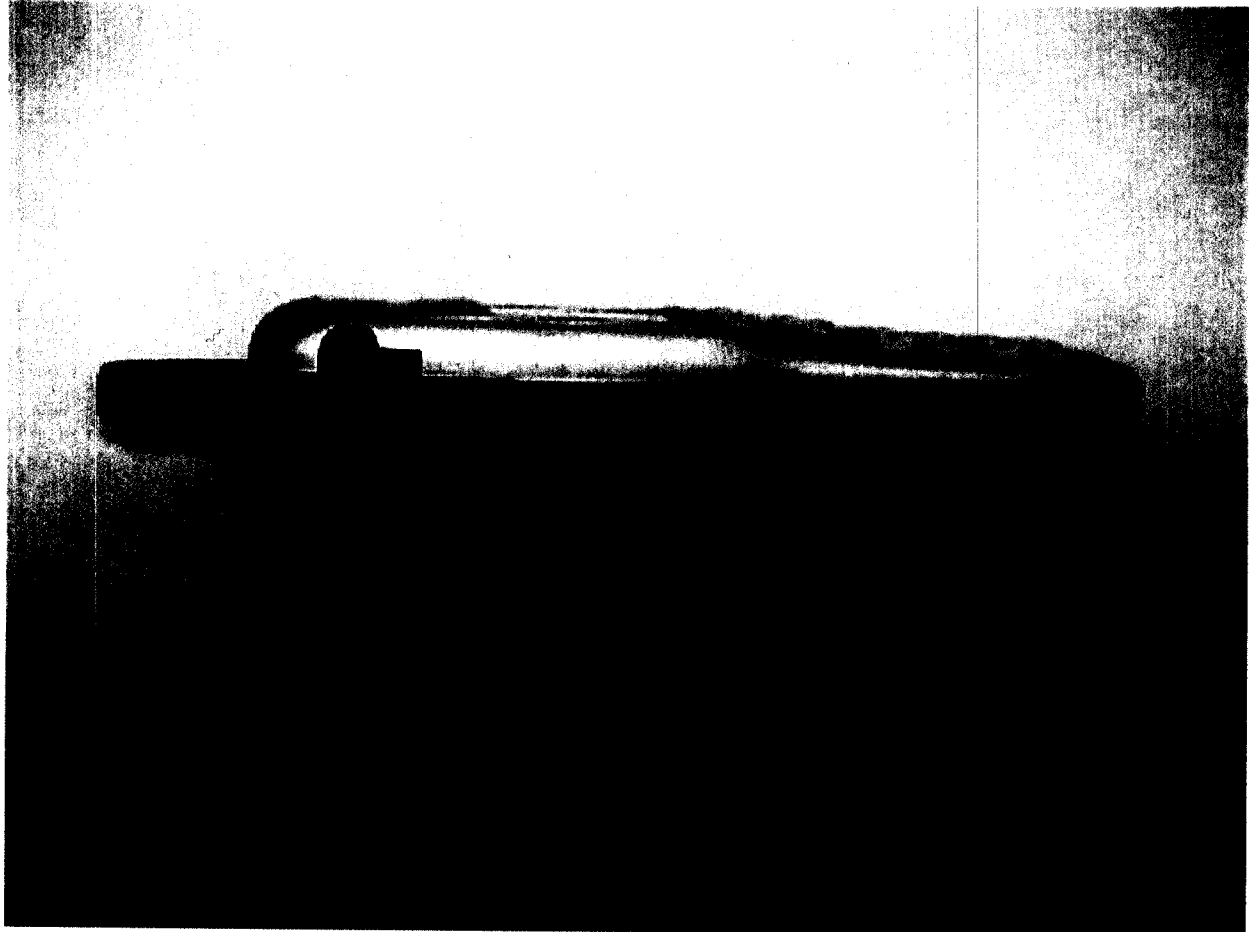
2.2 Configuration Photographs (Continued)

EUT Photo



2.2 Configuration Photographs (Continued)

EUT Photo



2.3 System Verification

Prior to the assessment, the system was verified to the $\pm 5\%$ of the specifications by using the system validation kit. The validation was performed at 900 MHz.

Validation kit	Targeted SAR _{1g} (mW/g)	Measured SAR _{1g} (mW/g)
D900V2, S/N #: 0013	4.03	3.9

2.4 Evaluation Procedures

The SAR evaluation was performed with the following procedures:

- a. SAR was measured at a fixed location above the reference point and used as a reference value for the assessing the power drop.
- b. The SAR distribution at the exposed side of the flat Phantom was measured at a distance of 30 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 20 mm x 20 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.
- c. Around this point, a volume of 32 mm x 32 mm x 34 mm was assessed by measuring 5 x 5 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure:
 - i) The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measurement point is 1.6 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in Z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.
 - ii) The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum, the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3-D spline interpolation algorithm. The 3-D spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y and z directions). The volume was integrated with the trapezoidal algorithm. 1000 points (10 x 10 x 10) were interpolated to calculate the average.
 - iii) All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
- d. Re-measurement of the SAR value at the same location as in step a. above. If the value changed by more than 5 %, the evaluation was repeated.

2.5 Test Results

The results on the following page(s) were obtained when the device was tested in the condition described in this report. Detail measurement data and plots, which reveal information about the location of the maximum SAR with respect to the device, are reported in Appendix A.

Shintom Co., Model No: GDU325

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Measurement Results

Trade Name:	Shinton Co., Ltd.	Model No.:	Shinton GDU325
Serial No.:	Not Labeled	Test Engineer:	Xi-Ming Yang

TEST CONDITIONS

Ambient Temperature	22.1 °C	Relative Humidity	52 %
Test Signal Source	Test Mode	Signal Modulation	GSM
Output Power Before SAR Test	32.4 dBm in 900 MHz band 29.5 dBm in 1800 MHz band	Output Power After SAR Test	The Same
Test Duration	23 Min. each test	Number of Battery Change	Every Scan

EUT Position: Left Hand 80°

Channel MHz	Operating Mode	Duty Cycle ratio	Measured SAR _{1g} (mW/g)	Plot Number
1850	GSM	8	0.731	1
1880	GSM	8	0.684	3
1910	GSM	8	0.670	4
890	GSM	8	0.786	6

EUT Position: Left Hand, 2 Points Touching Phantom 80°

Channel MHz	Operating Mode	Duty Cycle ratio	Measured SAR _{1g} (mW/g)	Plot Number
1850	GSM	8	0.588	2
890	GSM	8	0.937	7
902.4	GSM	8	0.826	8
914.8	GSM	8	0.733	9

EUT Position: Right Hand 80°

Channel MHz	Operating Mode	Duty Cycle ratio	Measured SAR _{1g} (mW/g)	Plot Number
1850	GSM	8	0.731	5

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EUT Position: Right Hand Two Touch				
Channel MHz	Operating Mode	Duty Cycle ratio	Measured SAR_{1g} (mW/g)	Plot Number
890	GSM	8	0.910	10

Note: a) Worst case data were reported
b) Duty cycle factor included in the measured SAR data
c) Uncertainty of the system is not included
d.) Belt Clip – 23.5mm thick
e.) 80° antenna to hand 17.5mm
f.) Two-Touch antenna to hand 20.5mm

3.0 TEST EQUIPMENT**3.1 Equipment List**

The Specific Absorption Rate (SAR) tests were performed with the SPEAG model DASY 3 automated near-field scanning system which is package optimized for dosimetric evaluation of mobile radios [3].

The following major equipment/components were used for the SAR evaluations:

SAR Measurement System			
EQUIPMENT	SPECIFICATIONS	S/N #	CAL. DATE
Robot	Stäubi RX60L Repeatability: ± 0.025 mm Accuracy: 0.806×10^{-3} degree Number of Axes: 6	597412-01	N/A
E-Field Probe	ET3DV5 Frequency Range: 10 MHz to 6 GHz Linearity: ± 0.2 dB Directivity: ± 0.1 dB in brain tissue	1334	4/10/00
Data Acquisition	DAE3 Measurement Range: 1 μ V to >200mV Input offset Voltage: < 1 μ V (with auto zero) Input Resistance: 200 M	317	N/A
Phantom	Generic Twin V3.0 Type: Generic Twin, Homogenous Shell Material: Fiberglass Thickness: 2 ± 0.1 mm Capacity: 20 liter Ear spacer: 4 mm (between EUT ear piece and tissue simulating liquid)	N/A	N/A
Simulated Tissue	Mixture Please see section 6.2 for details	N/A	1/26/01
Power Meter	HP 8900D w/ 84811A sensor Frequency Range: 100kHz to 18 GHz Power Range: 300 μ W to 3W	1312A01255	8/01/00

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3.2 Tissue Simulating Liquid

Brain	
Ingredient	Frequency (900 MHz)
Water	40.47 %
Cellulose	0.25 %
Salt	0.7 %
Preservative	0.1 %
Sugar	58.48 %

The dielectric parameters were verified prior to assessment using the HP 85070A dielectric probe kit and the HP 8753C network Analyzer. The dielectric parameters were:

Frequency (MHz)	ϵ_r^*	σ^* (mho/m)	ρ^{**} (kg/m ³)
900	45.5 ± 5%	0.81 ± 10%	1000

* worst case uncertainty of the HP 85070A dielectric probe kit

** worst case assumption

Brain	
Ingredient	Frequency (1900 MHz)
Water	45.32 %
Cellulose	0.25%
Salt	0 %
Preservative	0.1%
Sugar	54.33 %

The dielectric parameters were verified prior to assessment using the HP 85070A dielectric probe kit and the HP 8753C network Analyzer. The dielectric parameters were:

Frequency (MHz)	ϵ_r^*	σ^* (mho/m)	ρ^{**} (kg/m ³)
1900	42.78 ± 5%	1.77 ± 10%	1000

* worst case uncertainty of the HP 85070A dielectric probe kit

** worst case assumption

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Muscle	
Ingredient	Frequency (900 MHz)
Water	54.05 %
Sugar	45.75 %
Salt	0.1 %
Preservative	0.1 %

The dielectric parameters were verified prior to assessment using the HP 85070A dielectric probe kit and the HP 8753C network Analyzer. The dielectric parameters were:

Frequency (MHz)	ϵ_r^*	σ^* (mho/m)	ρ^{**} (kg/m ³)
835	56.5 ± 5%	0.97 ± 10%	1000

* worst case uncertainty of the HP 85070A dielectric probe kit

** worst case assumption

Muscle	
Ingredient	Frequency (1900 MHz)
Water	54.5 %
Cellulose	0.1 %
Salt	0 %
Preservative	0.1 %
Sugar	45.3 %

The dielectric parameters were verified prior to assessment using the HP 85070A dielectric probe kit and the HP 8753C network Analyzer. The dielectric parameters were:

Frequency (MHz)	ϵ_r^*	σ^* (mho/m)	ρ^{**} (kg/m ³)
1900	52.2 ± 5%	1.65 ± 10%	1000

* worst case uncertainty of the HP 85070A dielectric probe kit

** worst case assumption

Note: The amount of each ingredient specified in the tables are not the exact amounts of the final test solution. The final test solution was adjusted by adding small amounts of either water, sugar, and/or salt to calibrate the solution to meet the proper dielectric parameters.

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3.3 E-Field Probe Calibration

Probes were calibrated by the manufacturer in the TEM cell ifi 110. To ensure consistency, a strict protocol was followed. The conversion factor (ConF) between this calibration and the measurement in the tissue simulation solution was performed by comparison with temperature measurement and computer simulations. Probe calibration factors are included in Appendix C.

3.4 Measurement Uncertainty

The uncertainty budget has been determined for the DASY3 measurement system according to the NIS81 [5] and the NIST 1297 [6] documents and is given in the following table. The extended uncertainty (K=2) was assessed to be 23.5 %

UNCERTAINTY BUDGET				
Uncertainty Description	Error	Distrib.	Weight	Std.Dev.
Probe Uncertainty				
Axial isotropy	±0.2 dB	U-shape	0.5	±2.4 %
Spherical isotropy	±0.4 dB	U-shape	0.5	±4.8 %
Isotropy from gradient	±0.5 dB	U-shape	0	
Spatial resolution	±0.5 %	Normal	1	±0.5 %
Linearity error	±0.2 dB	Rectang.	1	±2.7 %
Calibration error	±3.3 %	Normal	1	±3.3 %
SAR Evaluation Uncertainty				
Data acquisition error	±1 %	Rectang.	1	±0.6 %
ELF and RF disturbances	±0.25 %	Normal	1	±0.25 %
Conductivity assessment	±10 %	Rectang.	1	±5.8 %
Spatial Peak SAR Evaluation Uncertainty				
Extrapol boundary effect	±3 %	Normal	1	±3 %
Probe positioning error	±0.1 mm	Normal	1	±1 %
Integrat. and cube orient	±3 %	Normal	1	±3 %
Cube shape inaccuracies	±2 %	Rectang.	1	±1.2 %
Device positioning	±6 %	Normal	1	±6 %
Combined Uncertainties				±11.7 %

3.5 Measurement Tractability

All measurements described in this report are traceable to National Institute of Standards and Technology (NIST) standards or appropriate national standards.

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4.0 WARNING LABEL INFORMATION - USA

See User Manual.

5.0 REFERENCES

- [1] ANSI, *ANSI/IEEE C95.1-1991: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300 GHz*, The Institute of electrical and Electronics Engineers, Inc., New York, NY 10017, 1992
- [2] Federal Communications Commission, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", OET Bulletin 65, FCC, Washington, D.C. 20554, 1997
- [3] Thomas Schmid, Oliver Egger, and Niels Kuster, "Automated E-field scanning system for dosimetric assessments", *IEEE Transaction on Microwave Theory and Techniques*, vol. 44, pp. 105-113, Jan. 1996.
- [4] Niels Kuster, Ralph Kastle, and Thomas Schmid, "Dosimetric evaluation of mobile communications equipment with know precision", *IEICE Transactions on Communications*, vol. E80-B, no. 5, pp.645-652, May 1997.
- [5] NIS81, NAMAS, "The treatment of uncertainty in EMC measurement", Tech. Rep., NAMAS Executive, National Physical Laboratory, Teddinton, Middlesex, England, 1994.
- [6] Barry N. Taylor and Chris E. Kuyatt, "Guidelines for evaluating and expressing the uncertainty of NIST measurement results", Tech. Rep., National Institute of Standards and Technology, 1994.

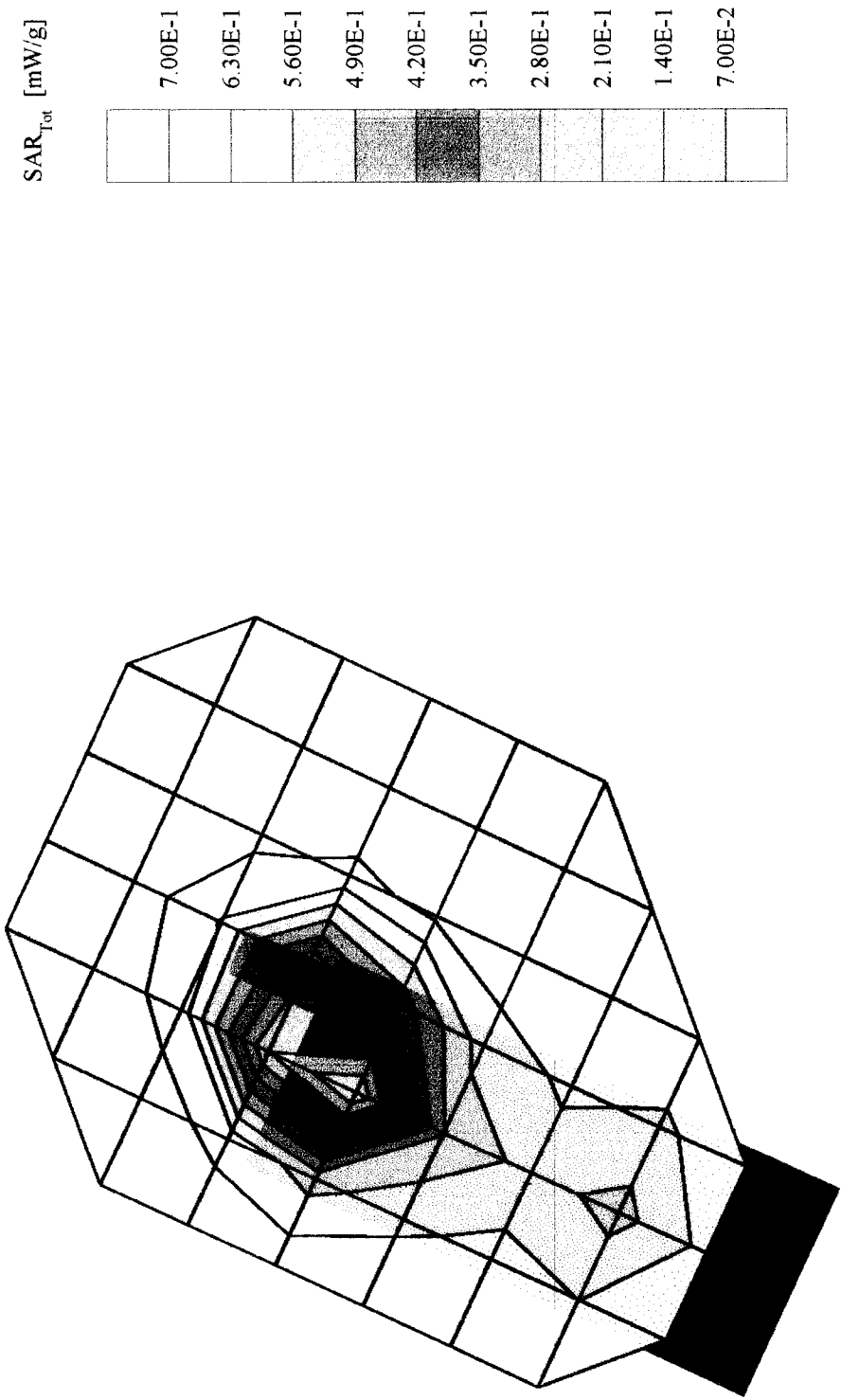
APPENDIX A - SAR Evaluation Data

Please note that the graphical visualization of the phone position onto the SAR distribution gives only limited information on the current distribution of the device, since the curvature of the head results in graphical distortion. Full information can only be obtained either by H-field scans in free space or SAR evaluation with a flat phantom.

Powerdrift is the measurement of power drift of the device over one complete SAR scan.

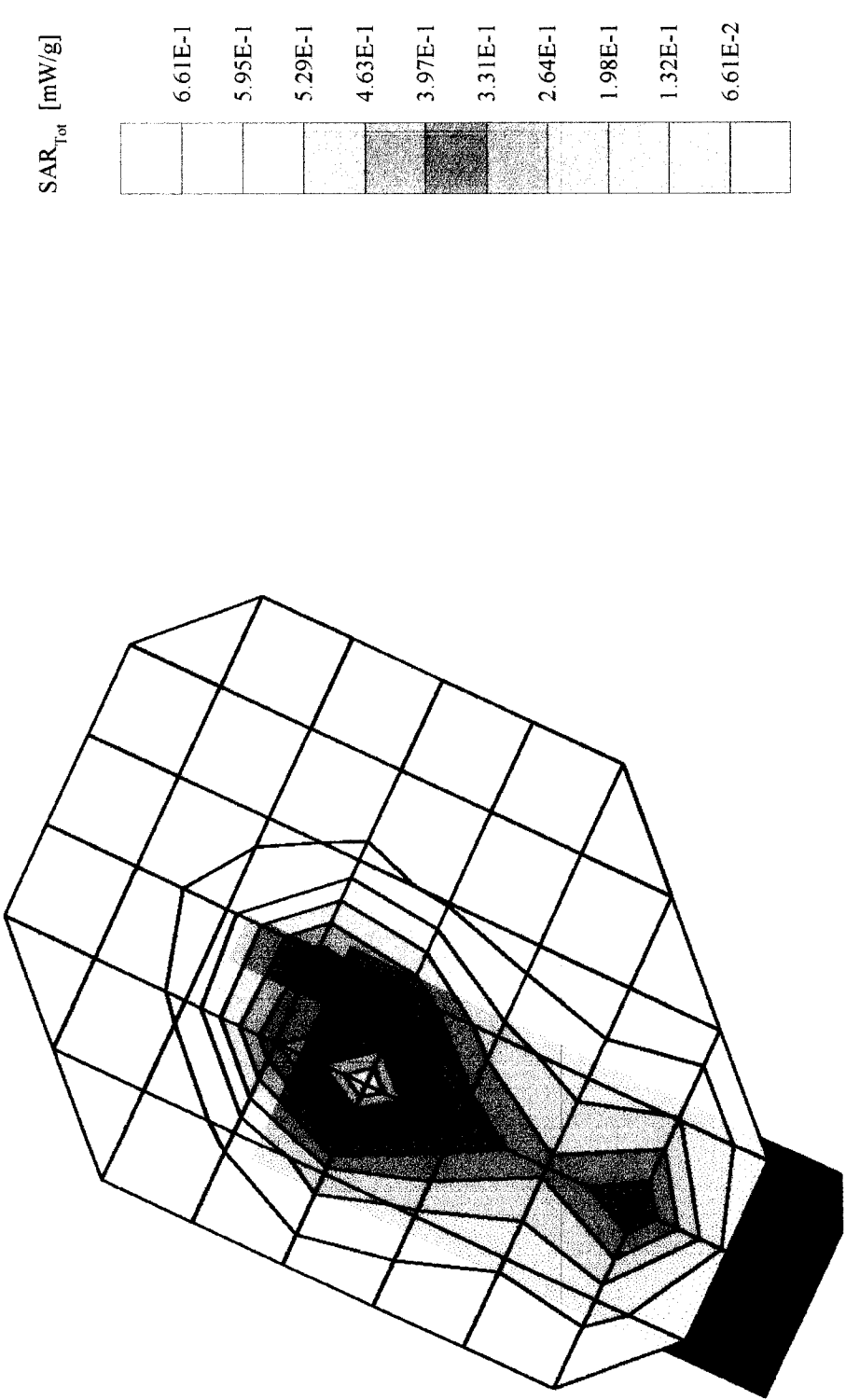
Shintom GDU325 # /

Generic Twin Phantom, Left Hand _X Section; Position: (80°, 65°); Frequency: 1850 MHz
Probe: ET3DV5 - SN1333; ConvF(5.03, 5.03); Crest factor: 8.0; Brain 1900 MHz: $\sigma = 1.77$ mho/m $\epsilon_r = 42.8$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.732 mW/g, SAR (10g): 0.393 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: 0.00 dB



Shintom GDU325 # 2

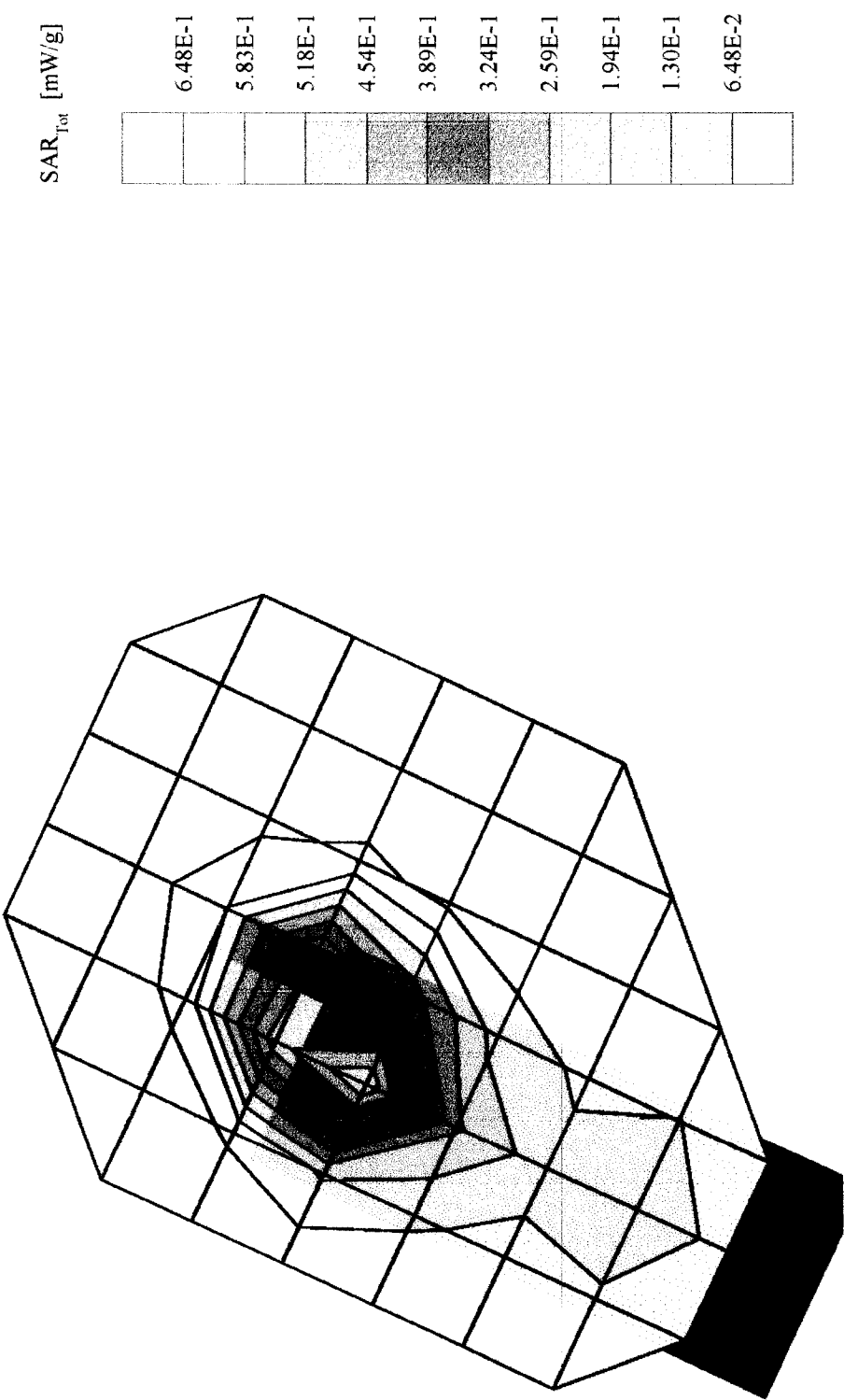
Generic Twin Phantom, Left Hand_X Section; Position: (80°, 65°); Frequency: 1850 MHz
Probe: ET3DV5 - SN1333; ConvF(5.03, 5.03, 5.03); Crest factor: 8.0; Brain 1900 MHz: $\sigma = 1.77$ mho/m $\epsilon_r = 42.8$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.588 mW/g, SAR (10g): 0.328 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.05 dB



#3

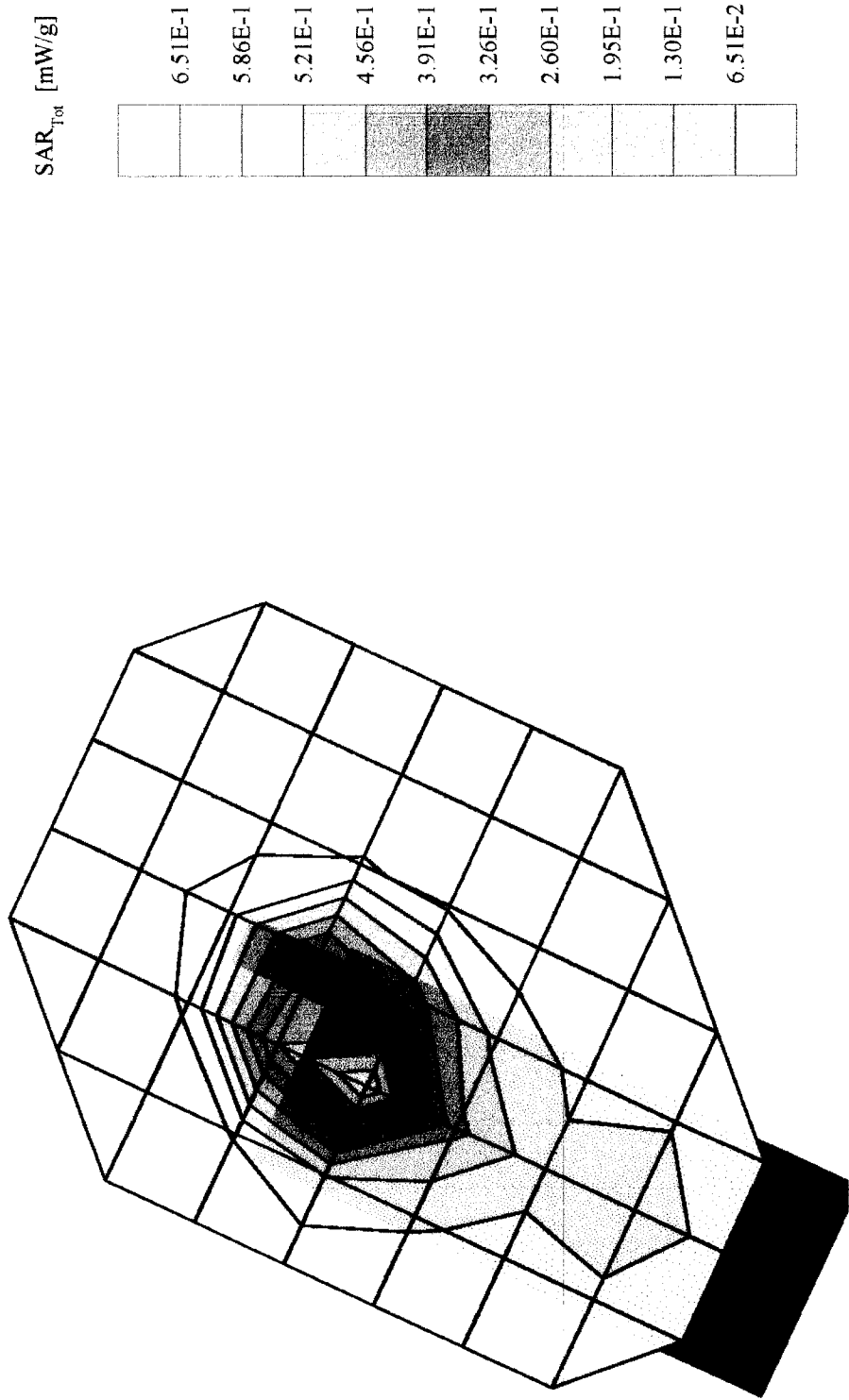
Shintom GDU325

Generic Twin Phantom; Left Hand_X Section; Position: (80°, 65°); Frequency: 1880 MHz
Probe: ET3DV5 - SN1333; ConvF(5.03, 5.03, 5.03); Crest factor: 8.0; Brain1900 MHz: $\sigma = 1.77$ mho/m $\epsilon_r = 42.8$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.684 mW/g, SAR (10g): 0.363 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.06 dB



Shintom GDU325 #4

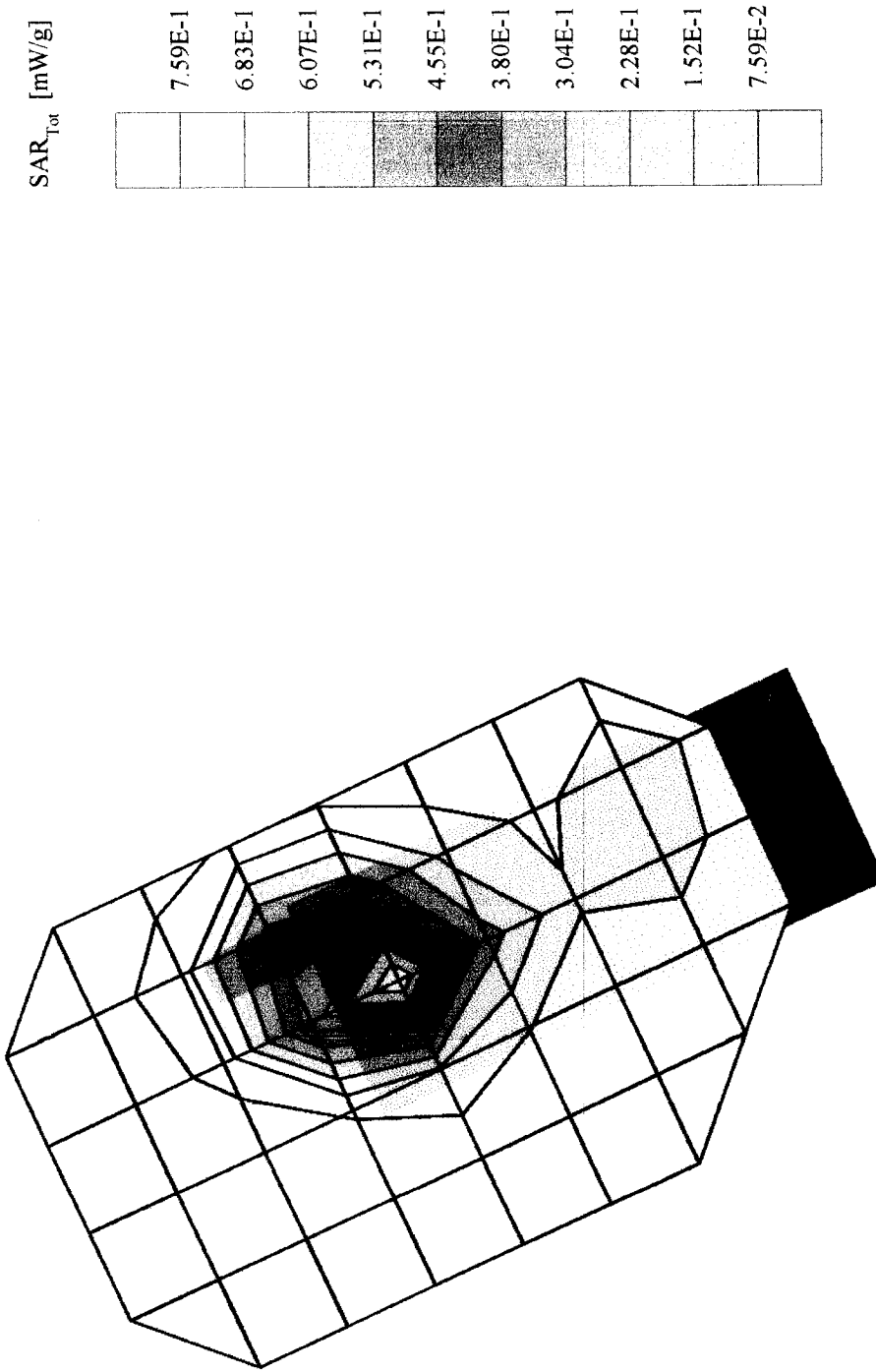
Generic Twin Phantom; Left Hand_X Section; Position: (80°, 65°); Frequency: 1910 MHz
Probe: ET3DV5 - SN1333; ConvF(5.03, 5.03, 5.03); Crest factor: 8.0; Brain 1900 MHz: $\sigma = 1.77$ mho/m $\epsilon_r = 42.8$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.670 mW/g; SAR (10g): 0.354 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: 0.08 dB



Shintom GDU325

5

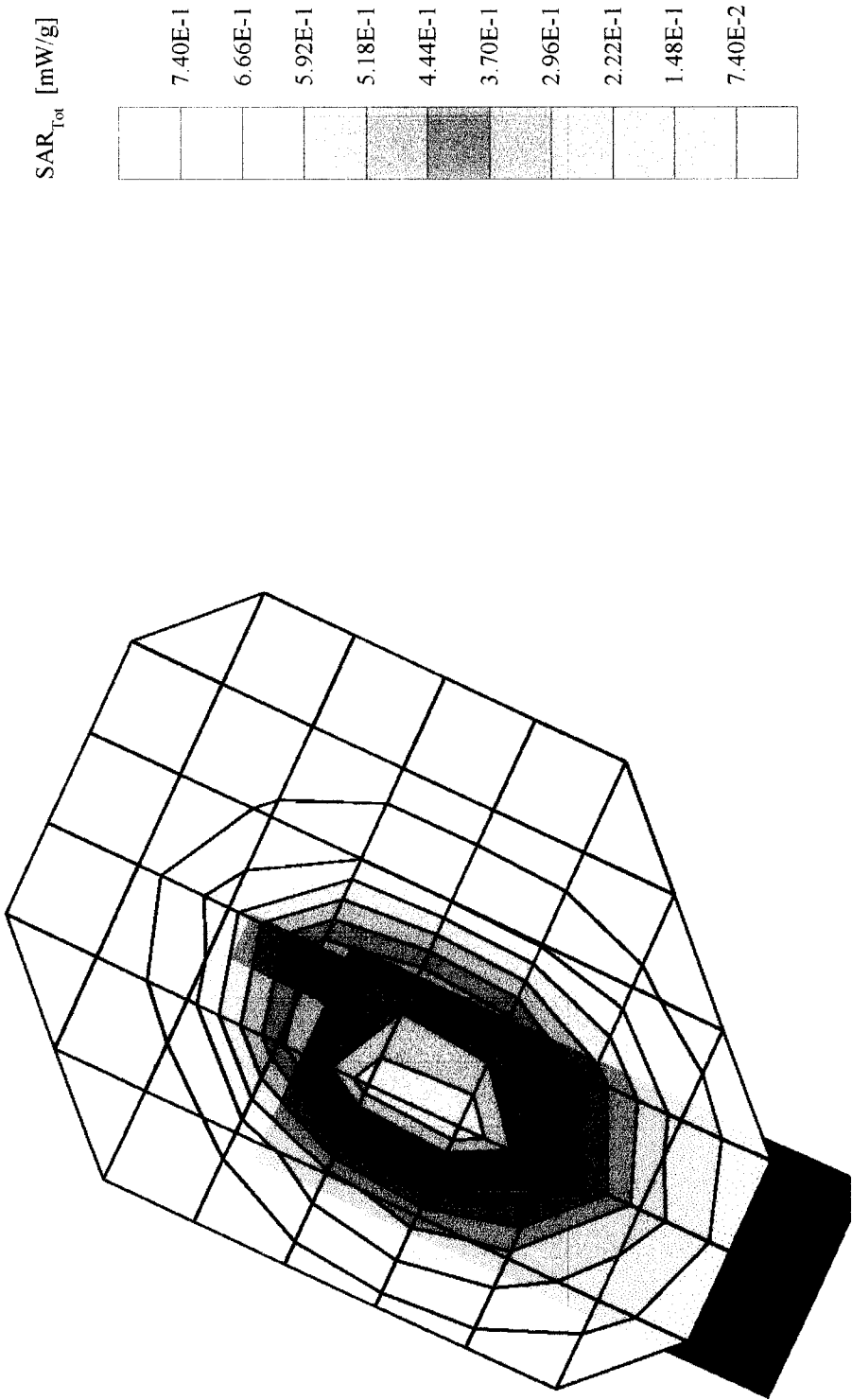
Generic Twin Phantom; Right Hand Section; Position: (80°,65°); Frequency: 1850 MHz
Probe: ET3DV5 - SN1333; ConvF(5.03,5.03,5.03); Crest factor: 8.0; Brain1900 MHz: $\sigma = 1.77$ mho/m $\epsilon_r = 42.8$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.731 mW/g, SAR (10g): 0.392 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.11 dB



#6

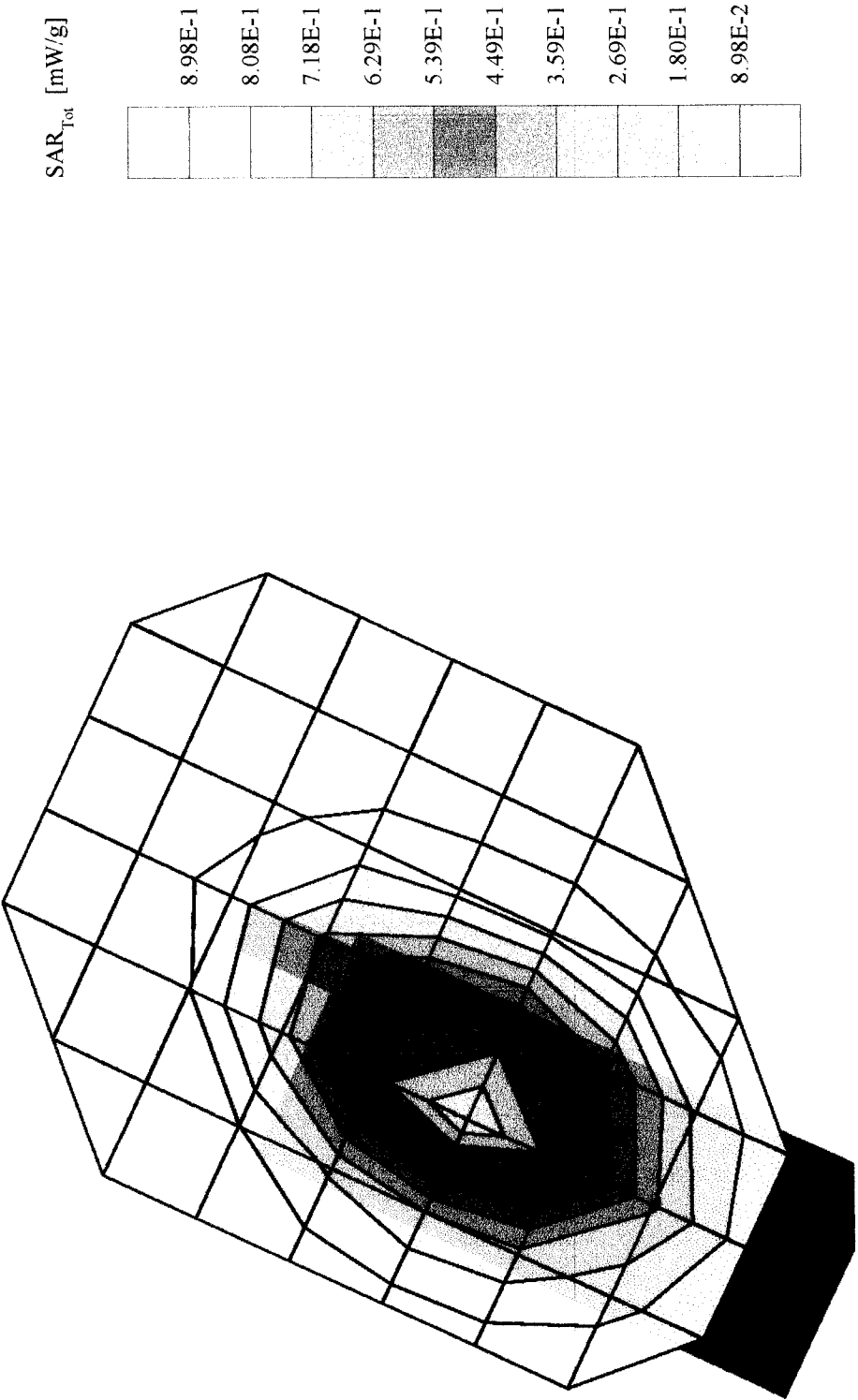
Shintom GDU325

Generic Twin Phantom; Left Hand X Section; Position: (80°, 65°); Frequency: 890 MHz
Probe: ET3DV5 - SN1333; ConvF(5.70, 5.70, 5.70); Crest factor: 8.0; Brain 900MHz: $\sigma = 0.81$ mho/m $\epsilon_r = 45.5$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.786 mW/g, SAR (10g): 0.548 mW/g. (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: 0.02 dB



Shintom GDU325 #7

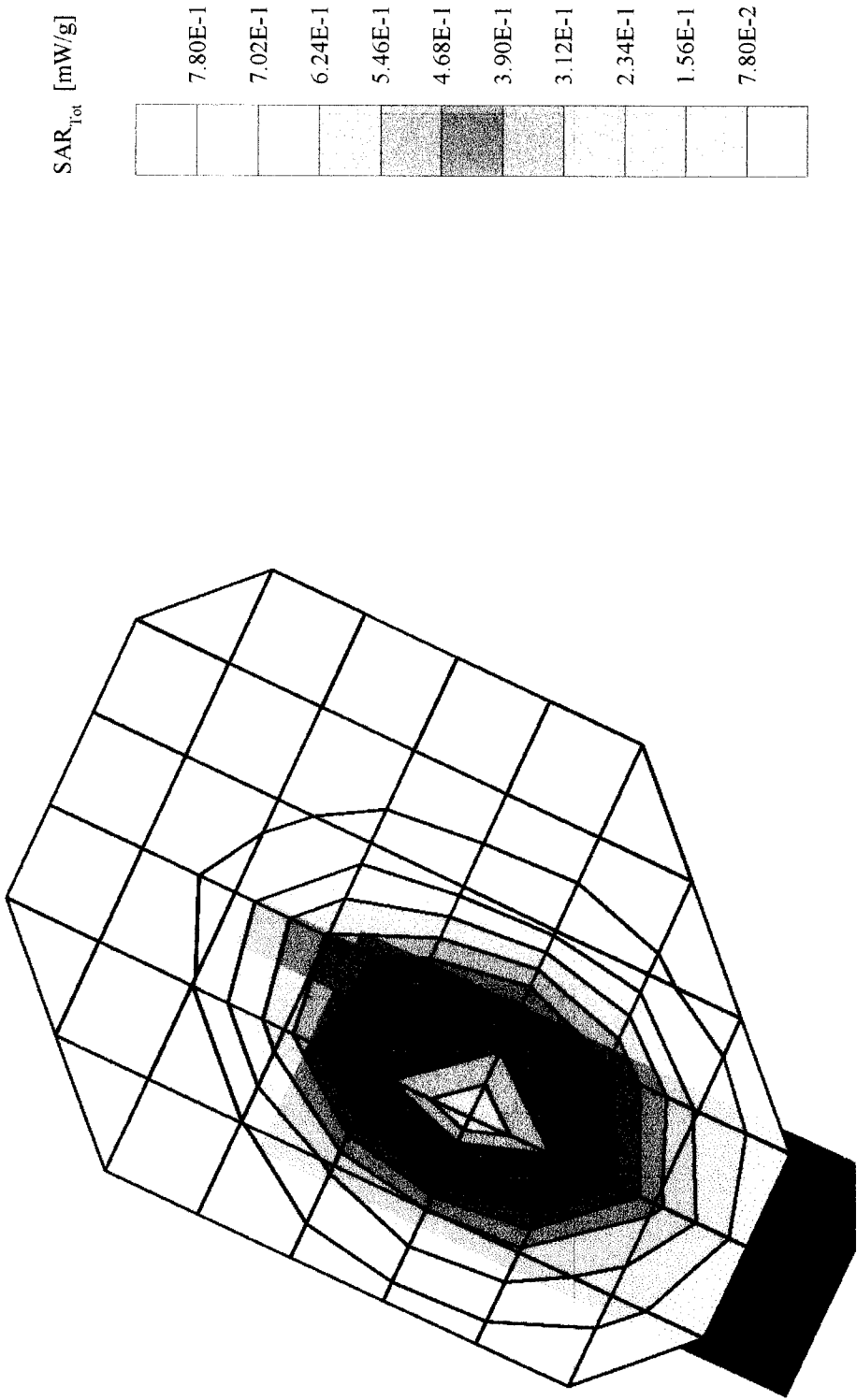
Generic Twin Phantom; Left Hand X Section; Position: (80°,65°); Frequency: 890 MHz
Probe: ET3DV5 - SN1333; ConvF(5.70,5.70,5.70); Crest factor: 8.0; Brain 900MHz: $\sigma = 0.81$ mho/m $\epsilon_r = 45.5$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.937 mW/g, SAR (10g): 0.635 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.03 dB





Shintom GDU325

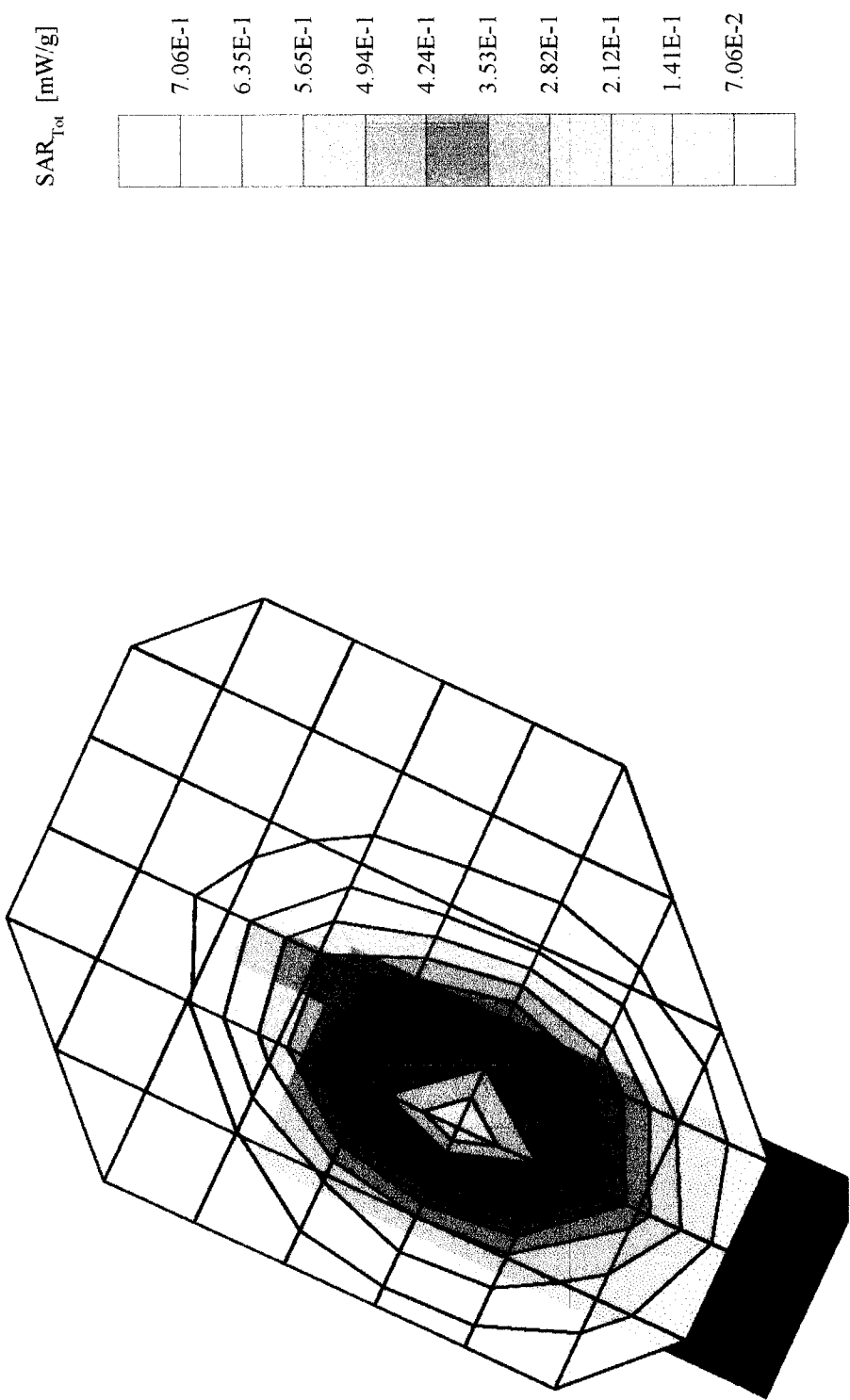
Generic Twin Phantom; Left Hand_X Section; Position: (80°,65°); Frequency: 902 MHz
Probe: ET3DDV5 - SN1333; ConvF(5.70,5.70,5.70); Crest factor: 8.0; Brain 900MHz: $\sigma = 0.81$ mho/m $\epsilon_r = 45.5$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.826 mW/g; SAR (10g): 0.556 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.01 dB



#3

Shintom GDU325

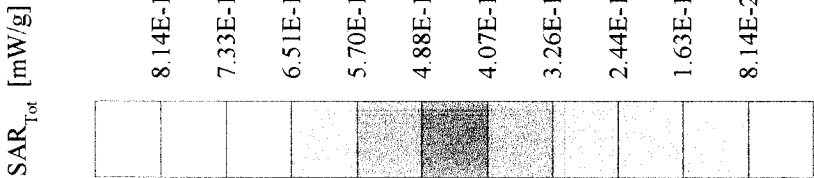
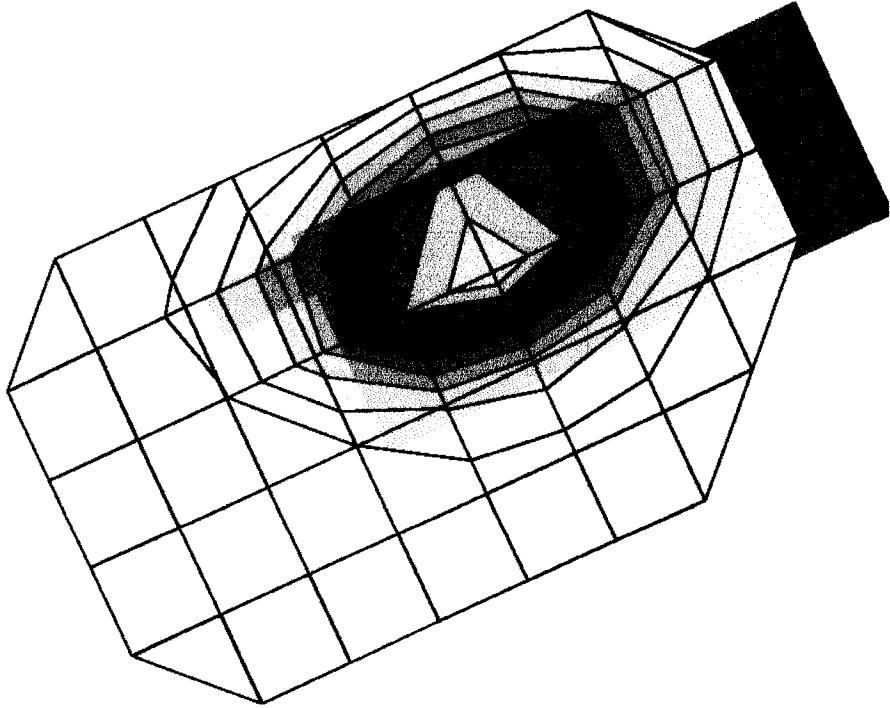
Generic Twin Phantom; Left Hand _X Section; Position: (80°,65°); Frequency: 915 MHz
Probe: ET3DV5 - SN1333; ConvF(5.70,5.70,5.70); Crest factor: 8.0; Brain 900MHz: $\sigma = 0.81$ mho/m $\epsilon_r = 45.5$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.733 mW/g, SAR (10g): 0.496 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.01 dB



10

Shintom GDU325

Generic Twin Phantom, Right Hand Section; Position: (80°, 65°); Frequency: 890 MHz
Probe: ET3DV5 - SN1333; ConvF(5.70, 5.70, 5.70); Crest factor: 8.0; Brain 900MHz: $\sigma = 0.81$ mho/m $\epsilon_r = 45.5$ $\rho = 1.00$ g/cm³
Cube 5x5x7; SAR (1g): 0.910 mW/g, SAR (10g): 0.618 mW/g (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.28 dB



Shintom Co., Model No: GDU325

Date of Test: February 14 & 15, 2001

APPENDIX B - E-Field Probe Calibration Data

See attached.

Calibration Certificate

Dosimetric E-Field Probe

Type:

ET3DV5

Serial Number:

1333

Place of Calibration:

Zurich

Date of Calibration:

April 10, 2000

Calibration Interval:

12 months

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:

Oliver Käfer

Approved by:

C. Eyr

Probe ET3DV5

SN:1333

Manufactured:	December 20, 1997
Last calibration:	March 18, 1999
Recalibrated:	April 10, 2000

Calibrated for System DASY3

DASY3 - Parameters of Probe: ET3DV5 SN:1333**Sensitivity in Free Space****Diode Compression**

NormX	2.39 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	100 mV
NormY	2.36 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	100 mV
NormZ	2.34 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	100 mV

Sensitivity in Tissue Simulating Liquid

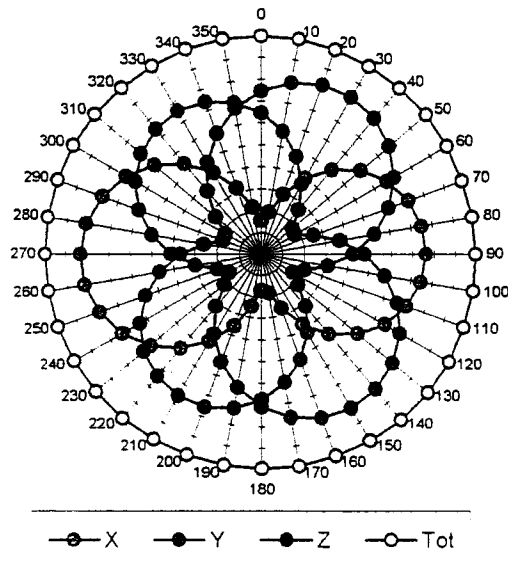
Brain	450 MHz	$\epsilon_r = 48 \pm 5\%$	$\sigma = 0.50 \pm 10\% \text{ mho/m}$
ConvF X	6.03 extrapolated	Boundary effect:	
ConvF Y	6.03 extrapolated	Alpha	0.13
ConvF Z	6.03 extrapolated	Depth	3.57
Brain	900 MHz	$\epsilon_r = 42.5 \pm 5\%$	$\sigma = 0.86 \pm 10\% \text{ mho/m}$
ConvF X	5.70 $\pm 7\%$ (k=2)	Boundary effect:	
ConvF Y	5.70 $\pm 7\%$ (k=2)	Alpha	0.34
ConvF Z	5.70 $\pm 7\%$ (k=2)	Depth	3.00
Brain	1500 MHz	$\epsilon_r = 41 \pm 5\%$	$\sigma = 1.32 \pm 10\% \text{ mho/m}$
ConvF X	5.25 interpolated	Boundary effect:	
ConvF Y	5.25 interpolated	Alpha	0.61
ConvF Z	5.25 interpolated	Depth	2.23
Brain	1800 MHz	$\epsilon_r = 41 \pm 5\%$	$\sigma = 1.69 \pm 10\% \text{ mho/m}$
ConvF X	5.03 $\pm 7\%$ (k=2)	Boundary effect:	
ConvF Y	5.03 $\pm 7\%$ (k=2)	Alpha	0.74
ConvF Z	5.03 $\pm 7\%$ (k=2)	Depth	1.85

Sensor Offset

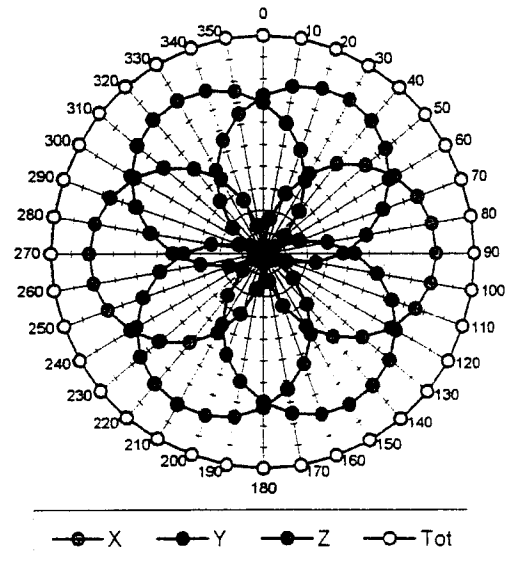
Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.9 $\pm$ 0.2	mm

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

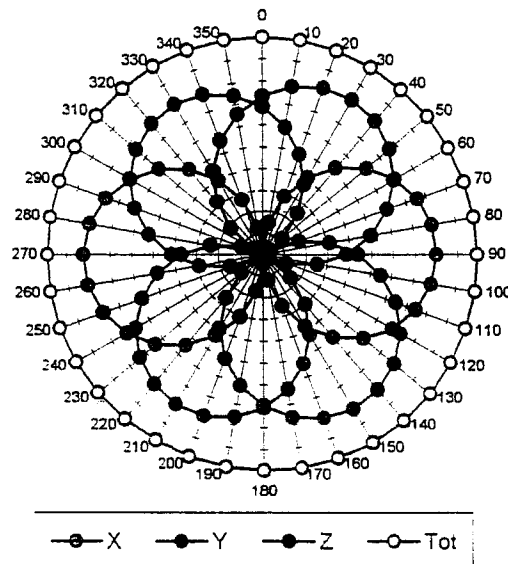
$f = 30 \text{ MHz}$, TEM cell ifi110



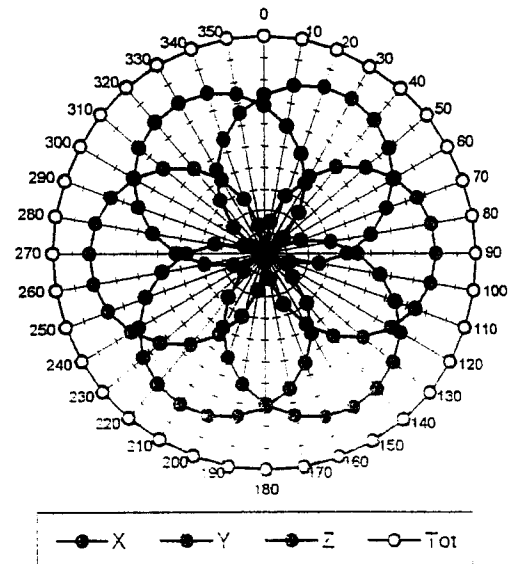
$f = 100 \text{ MHz}$, TEM cell ifi110

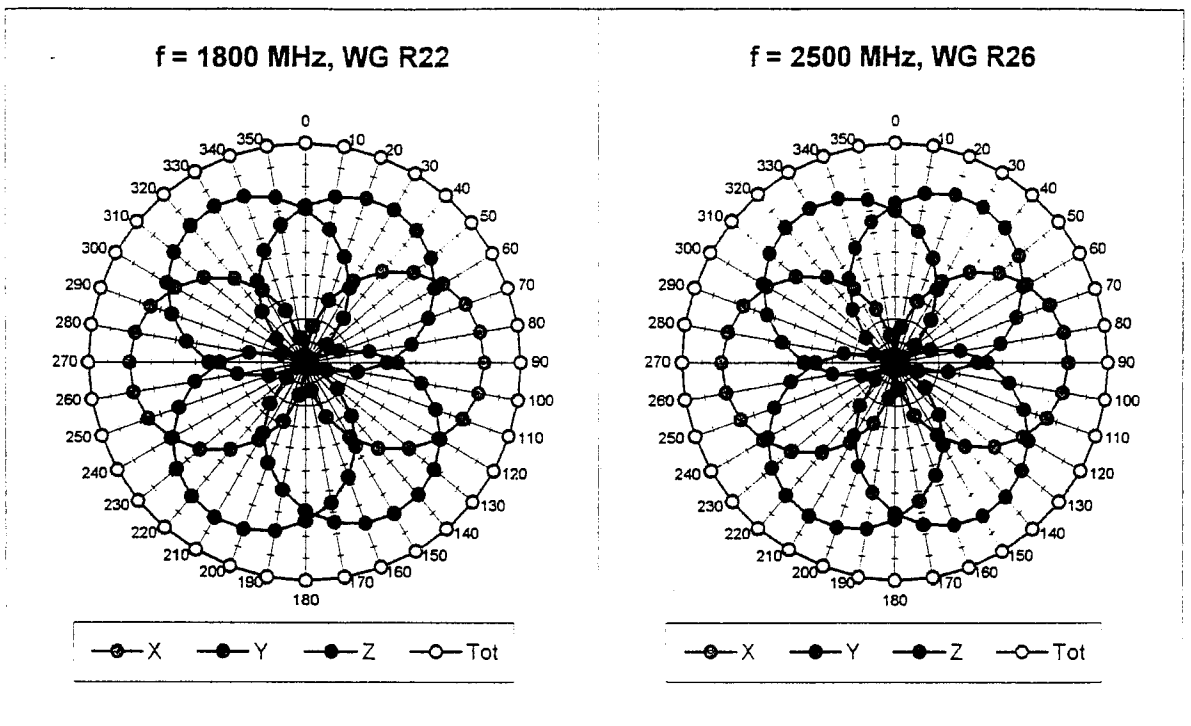


$f = 300 \text{ MHz}$, TEM cell ifi110

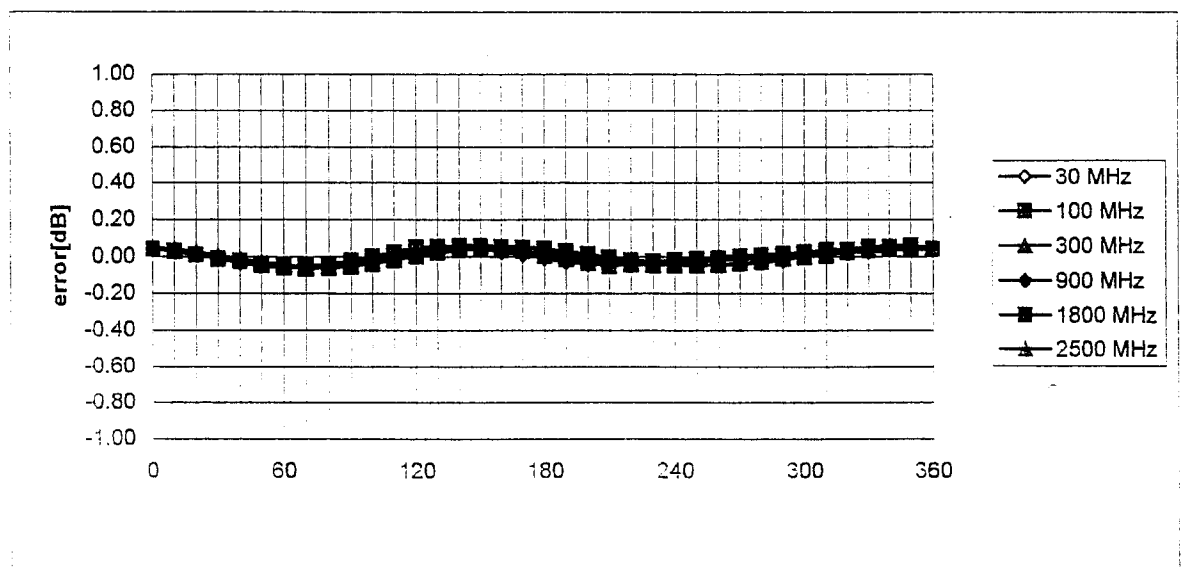


$f = 900 \text{ MHz}$, TEM cell ifi110



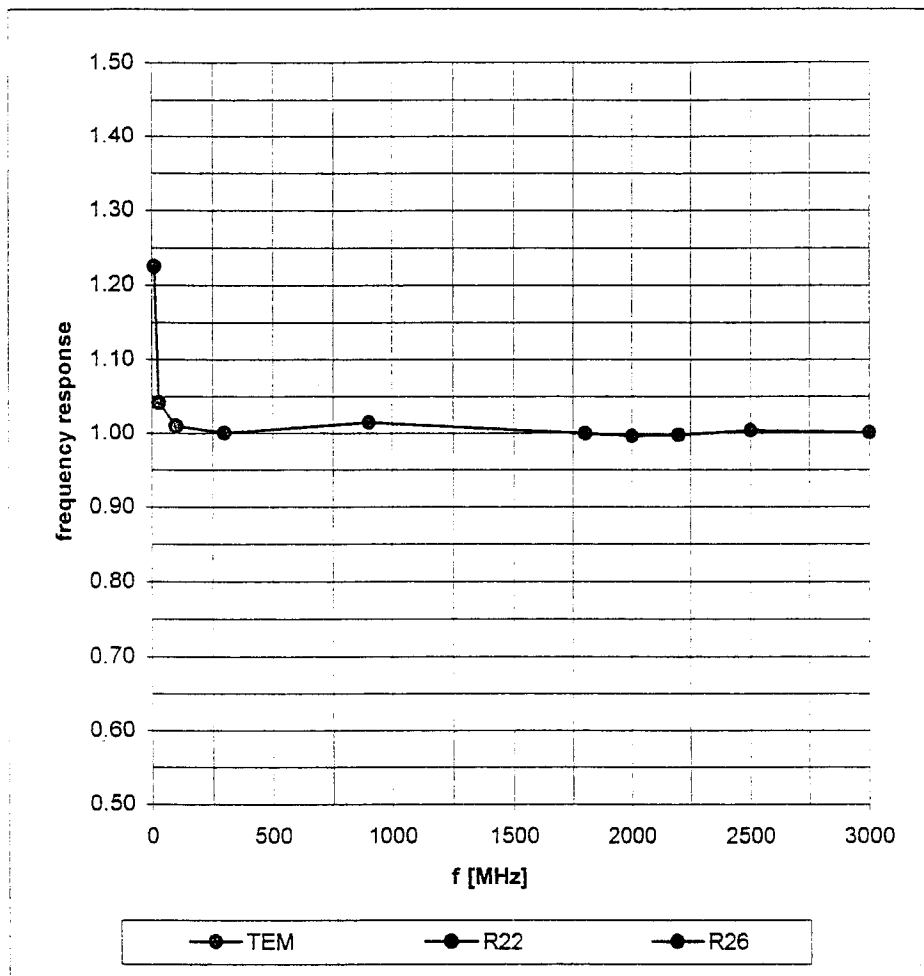


Isotropy Error (ϕ), $\theta = 0^\circ$

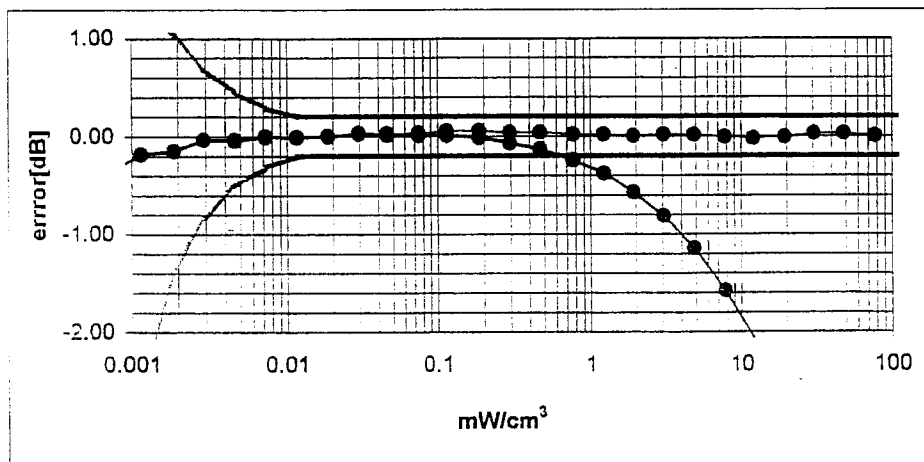
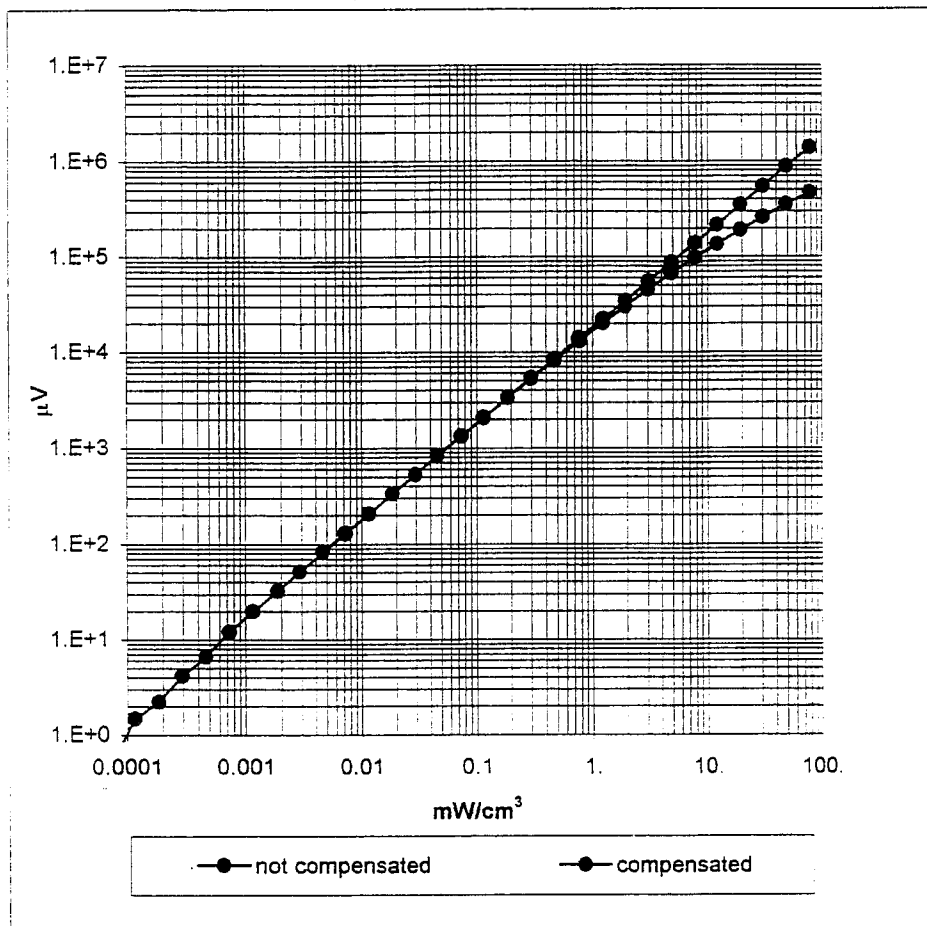


Frequency Response of E-Field

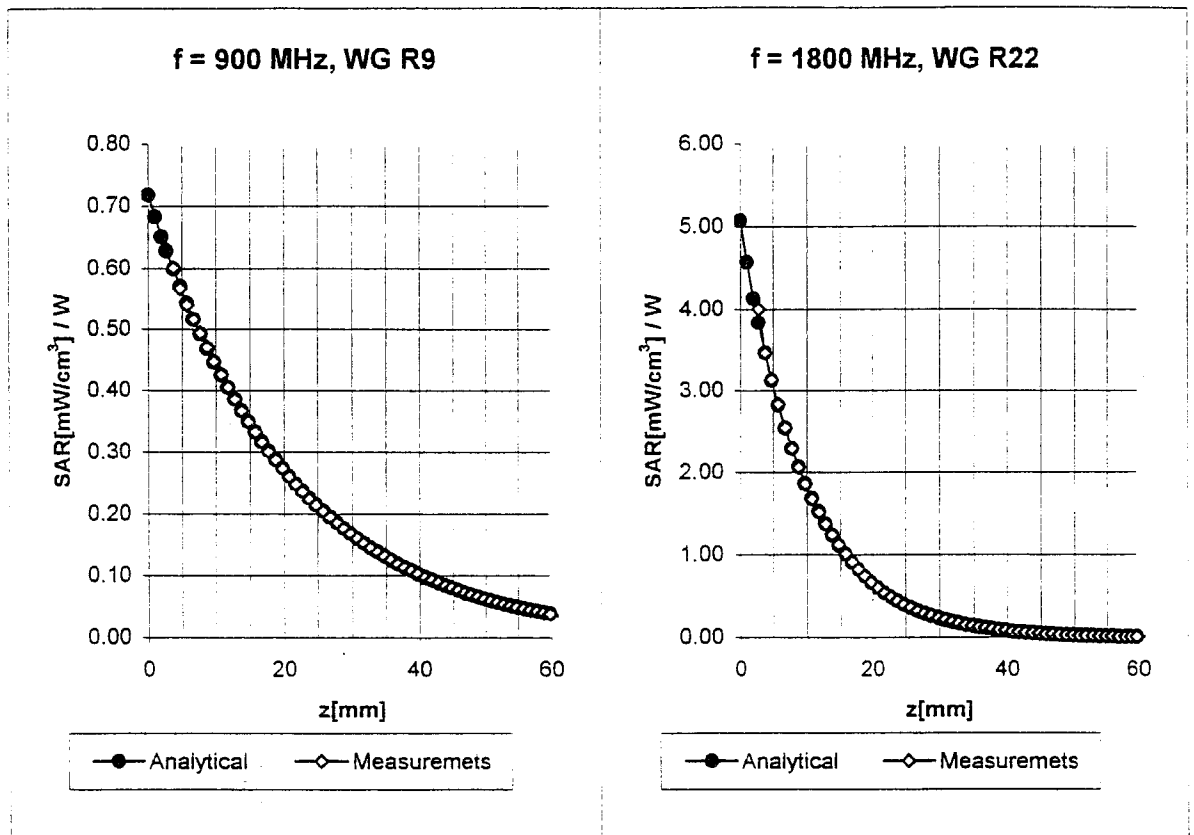
(TEM-Cell:ifi110, Waveguide R22, R26)



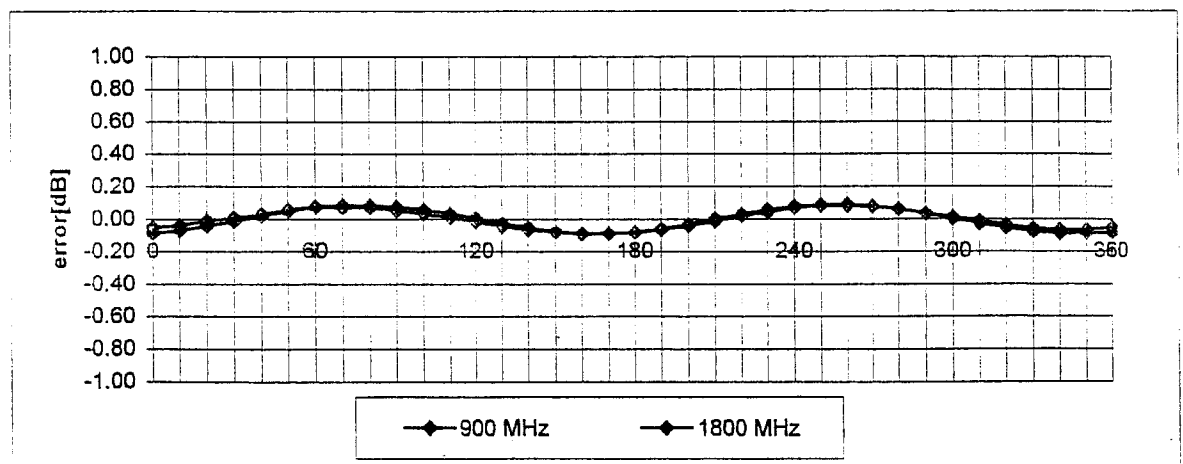
Dynamic Range f(SAR_{brain}) (TEM-Cell:ifi110)



Conversion Factor Assessment



Receiving Pattern (ϕ) (in brain tissue, z = 5 mm)



Shintom Co., Model No: GDU325

Date of Test: February 14 & 15, 2001

6.0 DOCUMENT HISTORY

Revision/ Job Number	Writer Initials	Date	Change
1.0 /J	SS	February 16, 2001	Original document