SUPPLEMENTARY TEST REPORT
FROM
RADIO FREQUENCY
INVESTIGATION LTD.

Test of: Danger Inc.
Tina Tri Band Mobile phone

(Body Measurements Only)

To: OET Bulletin 65 Supplement C: (2001-01)

Measurements were performed on the DASY4 System

Supplementary Test Report Serial No:
RFI/SARB1/SUP45320JD07A

Supplementary report to:
RFI/SARB1/45320JD04A

This Test Report Is Issued Under The Authority Of Richard Jacklin, Operations Director: 	**Checked By: Joe Lomako** 
Tested By: Richelieu Quoi 	**Release Version No: PDF01**
Issue Date: 03 February 2004	**Test Dates: 22 December 2003**

It should be noted that the standard, OET Bulletin 65 Supplement C: (2001-01) is not listed on RFI's current UKAS schedule and is therefore "not UKAS accredited".

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This report may be copied in full. The results in this report apply only to the sample(s) tested.

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1. Client Information

1.1. Client Details

Company Name:	Danger Inc.
Address:	124 University Avenue Palo Alto Ca, 94301 United States of America
Contact Name:	Mr Gavin O'Duffy

1.2. Test Laboratory

Company Name:	Radio Frequency Investigation Ltd.
Address:	Ewhurst Park Ramsdell Basingstoke Hampshire RG26 5RQ.
Contact Name:	Mr J Lomako

2. Equipment Under Test (EUT)

The following information (with the exception of the Date of Receipt) has been supplied by the client:

2.1. Identification Of Equipment Under Test (EUT)

Brand Name	Danger Inc.
Model Name or Number	Tina
Unique type Identification:	Sample 2 (PVT C33700147X)
FCC ID Number	P5J-IGKYA
IMEI Number	001028000072100
Battery Serial Number	None Stated
Country Of Manufacture	Malaysia
Date Of Receipt	12 January 2004

2.2. Accessories for Equipment Under Test (EUT)

Description:	Personal Handsfree Kit (PHF)
Brand Name:	Danger Inc.
Model Name or Number:	22-0004-01/SPKR
Unique type Identification:	None Stated
Serial Number (IMEI No):	None Stated
Battery Serial Number:	Not Applicable
Country of Manufacturer:	None Stated
Date of Reciept:	12 January 2004

Description:	Case
Brand Name:	None Stated
Model Name or Number:	36 – 0002
Unique type Identification:	None Stated
Serial Number (IMEI No):	Not Applicable
Battery Serial Number:	Not Applicable
Country of Manufacturer:	None Stated
Date of Reciept:	12 January 2004

2.3. Modifications Incorporated In EUT

The client has stated that the EUT has not been modified from what is described by the model name or unique type identification number stated above.

2.4. Additional Information Related to the EUT

Equipment Class:	Handheld Mobile Telephone
FCC Rule Part(s):	OET Bulletin 65 Supplement C
Device Category:	Portable
Application Type:	Certification
Maximum Power Output:	1900 MHz – 30 dBm (As stated by the client)
Transmit Frequency Allocation Of EUT When Under Test (Channels):	1900 MHz Band: 660 – Middle – 1879.8 MHz 512 – Low – 1850.2 MHz 810 – High – 1909.8 MHz
Modulation(s):	217 MHz
Modulation Scheme (Crest Factor)	GSM (Crest Factor 8.3)
Battery Type(s):	Ni MH
Antenna Length and Type:	Internal
Number Of Antenna Positions	1
Intended Operating Environment:	Commercial
Weight:	204.60g
Dimensions (without Antenna) mm:	120 (L) x 70 (W) x 30 (H) mm
Power Supply Requirement:	
DC Supply (Volts/Amps)	Not Applicable
AC Supply (Volts/Amps)	Not Applicable
Internal Battery (Volts/Amps)	4.2V
Port(s):	PHF

2.5. Support Equipment

Description	GSM MS Test Set
Brand Name:	Hewlett Packard
Model Name or Number:	8922M
Serial Number:	3933U04329 – RFI Asset Number M1101
Cable Length And Type:	Not Applicable
Connected to Port:	Antenna (Air Link)

Description	DCS / PCS RF Interface
Brand Name:	Hewlett Packard
Model Name or Number:	83220E
Serial Number:	3842U05665 – RFI Asset Number M1102
Cable Length And Type:	Not Applicable
Connected to Port:	Antenna (Air Link)

3. Test Specification, Methods And Procedures

3.1. Test Specification

Reference:	OET Bulletin 65 Supplement C: (2001-01)
Title:	Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification.

3.2. Methods And Procedures

The methods and procedures used were as detailed in:

EN 50361: 2001
Title: Basic standard for the measurement of specific absorption rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz).

ANSI/IEEE C95.1: 1999
IEEE standard for safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz.

Federal Communications Commission, “Evaluating compliance with FCC Guidelines for human exposure to radio frequency electromagnetic fields”, OET Bulletin 65 Supplement C, FCC, Washington, D.C, 20554, 2001.

Thomas Schmid, Oliver Egger and Neils Kuster, “Automated E-field scanning system for dosimetric assessments”, IEEE Transaction on microwave theory and techniques, Vol. 44, pp. 105-113, January 1996.

Neils Kuster, Ralph Kastle and Thomas Schmid, “Dosimetric evaluation of mobile communications equipment with know precision”, IEICE Transactions of communications, Vol. E80-B, No.5, pp. 645-652, May 1997.

3.3. Definition Of Measurement Equipment

The measurement equipment used complied with the requirements as detailed in OET Bulletin 65 Supplement C, Appendix D.

4. Deviations From The Test Specification

This is a supplementary report and only contains measurements performed with the EUT in a body worn configuration.

5. Operation Of The EUT During Testing

5.1. Operating Modes

The EUT was tested in the following operating mode:
1900 Call Allocated Mode.

6. Summary Of Test Results

6.1. Summary Of Tests

Test Name	Specification Reference	Compliancy Status
Specific Absorption Rate (SAR)	OET Bulletin 65 Supplement C	Complied

6.2. Test Results For Specific Absorption Rate – 1900 MHz

Environmental Conditions – Body Sample 2

Temperature Variation in Lab (°C):	24.0 to 24.0
Temperature Variation in Liquid (°C):	23.3 to 23.0

EIRP after Test:	Refer to section 6.3

Position	Section	Frequency Channel No	Distance from antenna to phantom (mm)	SAR Level (W/kg) 1g	SAR Limit (W/kg) 1g	Margin (W/kg) 1g	Result
Body Position with PHF, rear facing phantom	Flat	660	25	0.373	1.6	1.227	Complied
Body Position with PHF and Case, rear facing phantom	Flat	660	25	0.448	1.6	1.152	Complied
Body Position with PHF and Case, rear facing phantom	Flat	512	25	0.498	1.6	1.102	Complied
Body Position with PHF and Case, rear facing phantom	Flat	810	25	0.636	1.6	0.964	Complied
Body Position with PHF, rear facing phantom	Flat	660	25	0.373	1.6	1.227	Complied

6.3. EIRP Measurement

EIRP Measurement – Body Sample 2

The EIRP of the EUT is as follow: -

Frequency Channel	Tx Power After test / dBm
660	26.3
512	26.5
810	26.2

Note: The EIRP measurements were performed post testing.

7. SAR Measurement System

7.1. Radio Frequency Investigation SAR measurement facility utilises the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 system is comprised of the robot controller, computer, near-field probe, probe alignment sensor, and the SAM phantom containing brain or muscle equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card. The DAE3 utilises a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching mulitplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

8. SAR Safety Limits

Exposure Limits (General populations/Uncontrolled Exposure Environment)	**SAR** (W/Kg)
Spatial Peak (averaged over any 1 g of tissue)	1.60

Notes:

1. The FCC SAR safety limits specified in the table above apply to devices operated in the General Population / Uncontrolled Exposure Environment.

2. Uncontrolled environments are defined as locations where there is exposure of individuals who have no knowledge or control of their exposure.

9. Details of SAR Evaluation

9.1. The equipment under test was found to be compliant for localised specific absorption rate (SAR) based on the following provisions and conditions:

a) The handset was placed in a normal operating position with the centre of the ear-piece aligned with the ear canal on the phantom.

b) With the ear-piece touching the phantom the centre line of the handset was aligned with an imaginary plane (X and Y axis) consisting of three lines connecting both ears and the mouth.

c) For the cheek position the handset was gradually moved towards the cheek until any point of the mouth-piece or keypad touched the cheek.

d) For the tilted position the EUT was positioned as for the cheek position, then the horizontal angle was increased by fifteen degrees (the phone keypad was moved away from the cheek by fifteen degrees).

e) SAR measurements were evaluated at maximum power and the unit was operated for an appropriate period prior to the evaluation in order to minimise the drift.

f) The device was keyed to operate continuously in the transmit mode for the duration of the test.

g) The location of the maximum spatial SAR distribution (Hot Spot) was determined relative to the handset and its antenna.

h) The EUT was tested with a fully charged battery.

10. Evaluation Procedures

10.1. The Specific Absorption Rate (SAR) evaluation was performed in the following manner:

a) (i) The evaluation was performed in an applicable area of the phantom depending on the type of device being tested. For devices worn about the ear during normal operation, both the left and right ear positions were evaluated at the centre frequency of the band at maximum power. The side, which produced the greatest SAR, determined which side of the phantom would be used for the entire evaluation. The positioning of the head worn device relative to the phantom was dictated by FCC OET bulletin 65 Supplement C.

(ii) For body worn devices or devices which can be operated within 20 cm of the body, the flat section of the phantom was used. The type of device being evaluated dictated the distance of the EUT to the outer surface of the phantom flat section.

b) The SAR was determined by a pre-defined procedure within the DASY4 software. The exposed region of the phantom was scanned near the inner surface with a grid spacing of 20mm x 20mm or appropriate resolution.

c) A 7x7x7 matrix was performed around the greatest spatial SAR distribution found during the area scan of the applicable exposed region. SAR values were then calculated using a 3-D spline interpolation algorithm and averaged over spatial volumes of 1 and 10 grams.

d) If the EUT had any appreciable drift over the course of the evaluation, then the EUT was re-evaluated. Any unusual anomalies over the course of the test also warranted a re-evaluation.

11. System Validation

11.1. Prior to the assessment, the system was verified in the flat region of the phantom. An 1800 MHz dipole was used. A forward power of 250 mW was applied to the dipole and system was verified to a tolerance of ±5% for the 1800 MHz dipole. The applicable verification (normalised to 1 Watt) is as follows:

Dipole Validation Kit	Target SAR 1g (w/kg)	Measured SAR 1g (w/kg)
D1800V2 / 2d009 (12/01/04)	36.7	36.8

***Note**: An 1800 MHz dipole was used to perform 1900 MHz Body validation respectively. This was possible as the device centre frequency for each band is within ± 100 MHz of the verification frequencies.*

12. Simulated Tissues

12.1. The body mixture consists of water and glycol. Visual inspection is made to ensure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the tissue.

Ingredient	Frequency
	1900MHz Muscle
Water	70.17%
DGMBE	29.44%
Salt	0.39%

13. Tissue Parameters

13.1. The dielectric parameters of the fluids were verified prior to the SAR evaluation using a 58070C Dielectric Probe Kit and an 8753E Network Analyser. The dielectric parameters of the fluid are as follows:

Frequency (MHz)	Equivalent Tissue	Dielectric Constant ϵ_r	Conductivity σ (mho/m)
1900 (12/01/04)	Muscle	51.05	1.52

14. DASY4 Systems Specifications

Robot System

Positioner:	Stäubli Unimation Corp. Robot Model: RX90L
Repeatability:	0.025 mm
No. of axis:	6
Serial Number:	F00/SD89A1/A/01
Reach:	1185 mm
Payload:	3.5 kg
Control Unit:	CS7
Programming Language:	V+

Data Acquisition Electronic (DAE) System

Cell Controller

PC:	Dell Precision 340
Operating System:	Windows NT
Data Card:	DASY4 Measurement Server
Serial Number:	1080

Data Converter

Features:	Signal Amplifier, multiplexer, A/D converter and control logic.
Software:	DASY4 Software
Connecting Lines:	Optical downlink for data and status info. Optical uplink for commands and clock.

PC Interface Card

Function:	24 bit (64 MHz) DSP for real time processing Link to DAE3 16 nit A/D converter for surface detection system serial link to robot direct emergency stop output for robot.

E-Field Probe

Model:	ET3DV6
Serial No:	1528
Construction:	Triangular core fibre optic detection system
Frequency:	10 MHz to 3 GHz
Linearity:	±0.2 dB (30 MHz to 3 GHz)
Probe Length (mm):	337
Probe Diameter (mm):	12
Tip Length (mm):	10
Tip Diameter (mm):	6.8
Sensor X Offset (mm):	2.7
Sensor Y Offset (mm):	2.7
Sensor Z Offset (mm):	2.7

Phantom

Phantom:	SAM Phantom
Shell Material:	Fibreglass
Thickness:	2.0 ±0.1 mm

15. Validation results

15.1. System Validation – 1900 MHz Body

15.1.1. Validation of the system test configuration was carried out prior to testing.

Validation Dipole Type and Serial No.	Calibrated Value of SAR in 1g volume (W/kg) at 1800 MHz	Measured Value of SAR in 1g volume (W/kg) at 1800 MHz	Percentage Difference (≤5%)
D1800V2 / 2d009	36.7	36.8	Yes

Note: *An 1800 MHz dipole was used to perform 1900 MHz Body validation respectively. This was possible as the device centre frequency for each band is within ± 100 MHz of the verification frequencies.*

15.2. Liquid Properties

15.2.1. Properties of the tissue simulating liquid were measured prior to testing.

Property	Target Value (1900 MHz)	Measured/Calculated Value (1900 MHz)	Percentage Difference (≤5%)
Relative Permittivity	53.3	51.05	Yes
Conductivity	1.52	1.52	Yes

15.3. Temperature Variation

15.3.1. The temperature of the laboratory and within the tissue simulating liquid for this test shall not exceed the range +15ºC to +30ºC.

15.3.2. The actual temperature measured at the beginning and end of each test was recorded and the maximum range is shown below:

Measurement	Maximum Temperature	Minimum Temperature
Laboratory	24.0	24.0
Tissue Simulating Liquid	23.0	23.3

16. Measurement Uncertainty

16.1. No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

16.2. The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

16.3. The uncertainty of the result may need to be taken into account when interpreting the measurement results.

16.4. The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Range	Confidence Level	Calculated Uncertainty
Specific Absorption Rate	1900 MHz	95%	+17.12%

16.5. The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

16.6. Measurement uncertainties in SAR measurements are difficult to quantify due to several variables including biological, physiological, and environment. However, the estimated measurement uncertainties in SAR are less than 30%.

16.7. According to ANSI/IEEE C95.3, the overall uncertainties are difficult to assess and will vary with the type of meter and usage situation. However, accuracy’s of $\pm$1 to 3 dB can be expected in practice, with greater uncertainties in near-field situations and at higher frequencies (shorter wavelengths), or areas where large reflecting objects are present. Under optimum measurement conditions, SAR measurement uncertainties of at least $\pm$2 dB can be expected.

16.8. According to CENELEC, typical worst-case uncertainty of field measurements is $\pm$5 dB. For well-defined modulation characteristics the uncertainty can be reduced to $\pm$3 dB.

Measurement Uncertainty (Continued)

Specific Absorption Rate Uncertainty at 1900 MHz, GSM Modulation Scheme calculated in accordance with IEEE 1528-200X

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	c_i	Standard Uncertainty		υ_i or υ_{eff}	Note
							+ u (dBµV)	- u (dBµV)		
B	Probe calibration	8.900	8.900	normal (k=2)	2.0000	1.0000	4.450	4.450	∞	
B	Axail Isotropy	0.100	0.100	normal (k=2)	2.0000	1.0000	0.050	0.050	∞	
B	Hemispherical Isotropy	0.100	0.100	normal (k=2)	2.0000	1.0000	0.050	0.050	∞	
B	Spatial Resolution	0.500	0.500	Rectangular	1.7321	1.0000	0.289	0.289	∞	
B	Boundary Effect	0.769	0.769	Rectangular	1.7321	1.0000	0.444	0.444	∞	
B	Linearity	2.330	2.330	Rectangular	1.7321	1.0000	1.345	1.345	∞	
B	Detection Limits	0.200	0.200	Rectangular	1.7321	1.0000	0.115	0.115	∞	
B	Readout Electronics	0.650	0.650	normal (k=2)	2.0000	1.0000	0.325	0.325	∞	
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞	
B	Integration Time	0.005	0.005	Rectangular	1.7321	1.0000	0.003	0.003	∞	
B	RF Ambinet conditions	3.000	3.000	Rectangular	1.7321	1.0000	1.732	1.732	∞	
B	Probe Positioner Mechanical Restrictions	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞	
B	Probe Positioning with regard to Phantom Shell	2.850	2.850	Rectangular	1.7321	1.0000	1.645	1.645	∞	
B	Extrapolation and integration/ Maximum SAR evaluation	5.080	5.080	Rectangular	1.7321	1.0000	2.933	2.933	∞	
A	Test Sample Positioning	0.584	0.584	normal (k=1)	1.0000	1.0000	0.584	0.584	10	
A	Device Holder uncertainty	0.154	0.154	normal (k=1)	1.0000	1.0000	0.154	0.154	10	
B	Phantom Uncertainty	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞	
B	Drit of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞	
B	Liquid Conductivity (target value)	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞	
B	Liquid Conductivity (measured value)	2.440	2.440	Rectangular	1.7321	1.0000	1.409	1.409	∞	
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞	
B	Liquid Permittivity (measured value)	2.440	2.440	Rectangular	1.7321	1.0000	1.409	1.409	∞	
	Combined standard uncertainty			t-distribution			8.74	8.74	>500	
	Expanded uncertainty			k = 1.96			17.12	17.12	>500	

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A034	Narda 20W Termination	Narda	374BNM	8706
A1097	SMA Directional Coupler	MiDISCO	MDC6223-30	None
A1174	Dielectric Probe Kit	Agilent Technologies	85070C	Us99360072
A1185	Probe	Schmid & Partners	ET3 DV6	1528
A1225	Low noise Amplifier	Mini Circuits	ZHL-42	E022601
A1234	Data Acquisition Electronics	Schmid & Partner	DAE3	450
A1236	1800MHz Validation Dipole	Schmid & Partners	D1800V2	2d009
C1052	Cable	Utiflex	FA210A0030 M3030	001
C1053	Cable	Utiflex	FA210A0003 M3030	001
C1054	Cable	Utiflex	FA210A0001 M3050A	001
C1059	Cable	Rosenberger	1	1
C360	Cable	Rosenberger	UFA210A-1-1181-70x70	1927
G046	Signal Generator	Gigatronics	7100/.01-20	749474
G0528	Robot Power Supply	Schmid & Partners	DASY4	None
G088	PSU	Thurlby Thandar	CPX200	100700
M011	NRV-Z1 Power Sensor	Rohde & Schwarz	NRV-Z1	882 321/004
M1015	Network Analyser	Agilent Technologies	8753ES	US39172406
M1047	Robot Arm	Staubli	RX908 L	F00/SD89A1/A/01
M1101	Hewlett Packard	Hewlett Packard	8922M	3933U04329

Test Equipment Used - Continued

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
M1102	Hewlett Packard	Hewlett Packard	83220E	3842U05665
M1130	Rohde & Schwarz	Rohde & Schwarz	URY-Z2	891649/59
M136	Temperature/Humidity/Pressure Meter	RS Components	None	None
M509	Thermometer	Testo	110	40378800433
M514	RF Millivoltmeter	Rohde & Schwarz	URV-5	839330/047
S256	Site 56	RFI	N/A	N/A

NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

Appendix 2. SAR Distribution Scans

This appendix contains SAR Distribution Scans.

Plot Number	Title
45320/JD07/005	Body position with PHF, rear facing phantom. CH 660. Sample 2
45320/JD07/006	Body position with PHF and Case, rear facing phantom. CH 660. Sample 2
45320/JD07/007	Body position with PHF and Case, rear facing phantom. CH 512. Sample 2
45320/JD07/008	Body position with PHF and Case, rear facing phantom. CH 810. Sample 2
45320/JD08/Validation_001	1800MHz Muscle Validation

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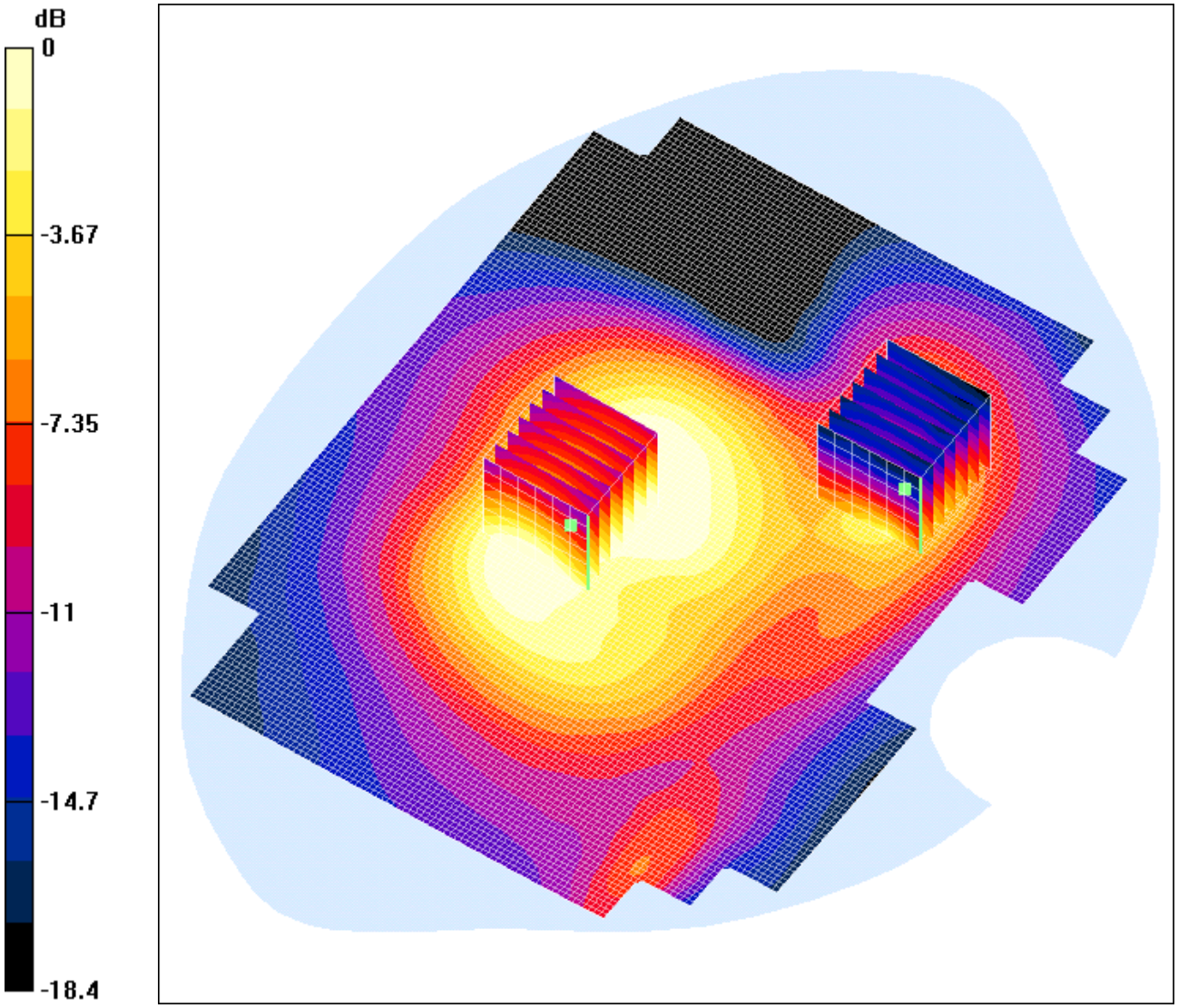
Date: 12/01/04

45320/JD07/005

Test Laboratory: RADIO FREQUENCY INVESTIGATION LTD.

DUT: Danger; Type: Tina; Serial: 001028000072100



0 dB = 0.244mW/g

Communication System: DCS 1900; Frequency: 1879.8 MHz;Duty Cycle: 1:8.3
Medium: 1900 MHz MSL (σ = 1.50045 mho/m, ε_r = 51.1149, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1528; ConvF(4.7, 4.7, 4.7); Calibrated: 29/07/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE3 Sn450; Calibrated: 19/05/2003
- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1197
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

Body position with PHF, rear facing phantom 15mm away from surface- Middle/Area Scan 2 (111x141x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 13.2 V/m
Power Drift = -0.07 dB
Maximum value of SAR = 0.394 mW/g

Body position with PHF, rear facing phantom 15mm away from surface- Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.595 W/kg
SAR(1 g) = 0.373 mW/g; SAR(10 g) = 0.22 mW/g
Reference Value = 13.2 V/m
Power Drift = -0.07 dB
Maximum value of SAR = 0.403 mW/g

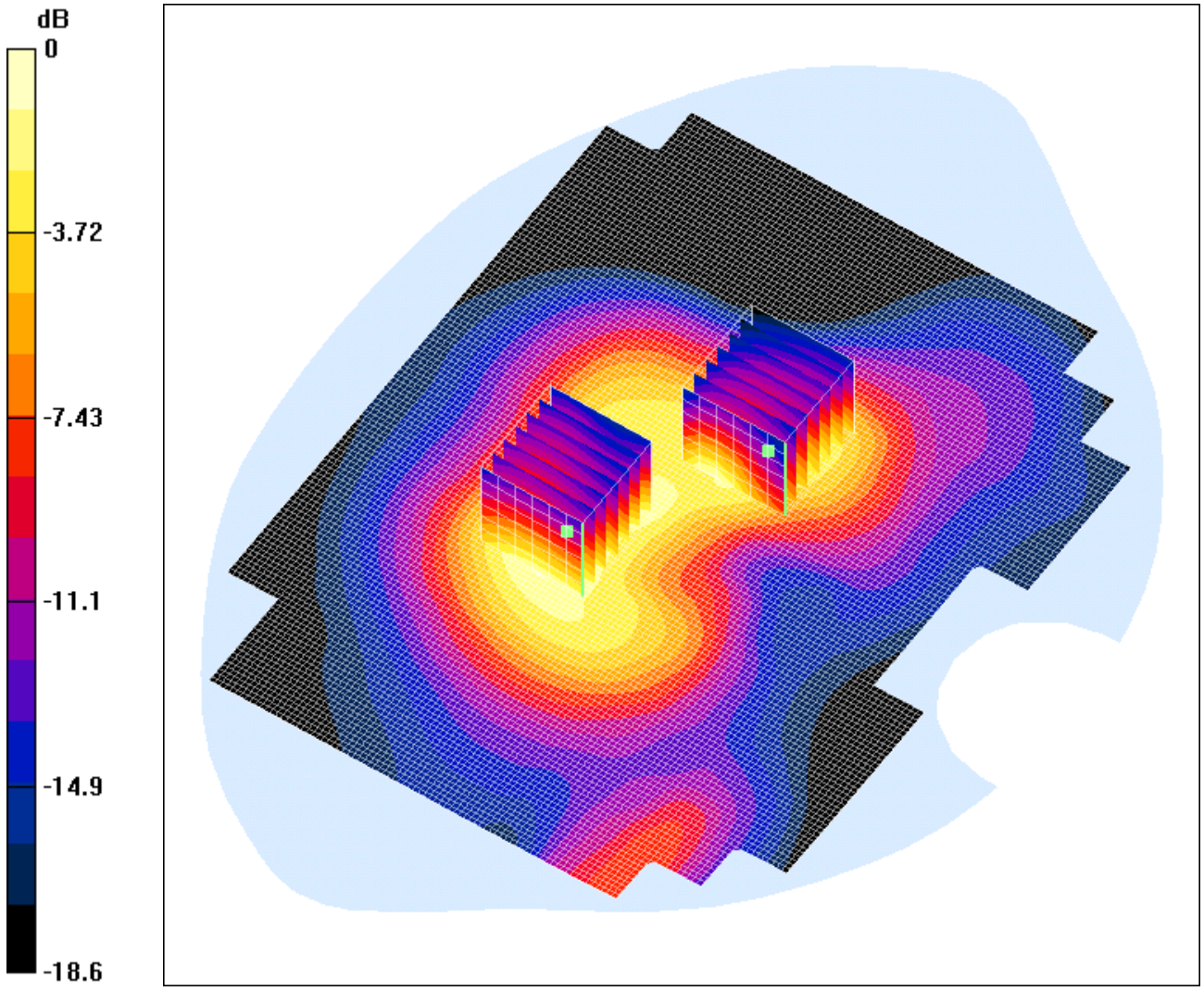
Body position with PHF, rear facing phantom 15mm away from surface- Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.462 W/kg
SAR(1 g) = 0.203 mW/g; SAR(10 g) = 0.0947 mW/g
Reference Value = 13.2 V/m
Power Drift = -0.07 dB
Maximum value of SAR = 0.244 mW/g

Date: 12/01/04

45320/JD07/006

Test Laboratory: RADIO FREQUENCY INVESTIGATION LTD.

DUT: Danger; Type: Tina; Serial: 001028000072100



0 dB = 0.508mW/g

Communication System: DCS 1900; Frequency: 1879.8 MHz;Duty Cycle: 1:8.3
Medium: 1900 MHz MSL (σ = 1.50045 mho/m, ε_r = 51.1149, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1528; ConvF(4.7, 4.7, 4.7); Calibrated: 29/07/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn450; Calibrated: 19/05/2003

- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1197
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

Body position with PHF and case, rear facing phantom 15mm away from surface- Middle 2/Area Scan 2 (111x141x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 15 V/m
Power Drift = -0.08 dB
Maximum value of SAR = 0.481 mW/g

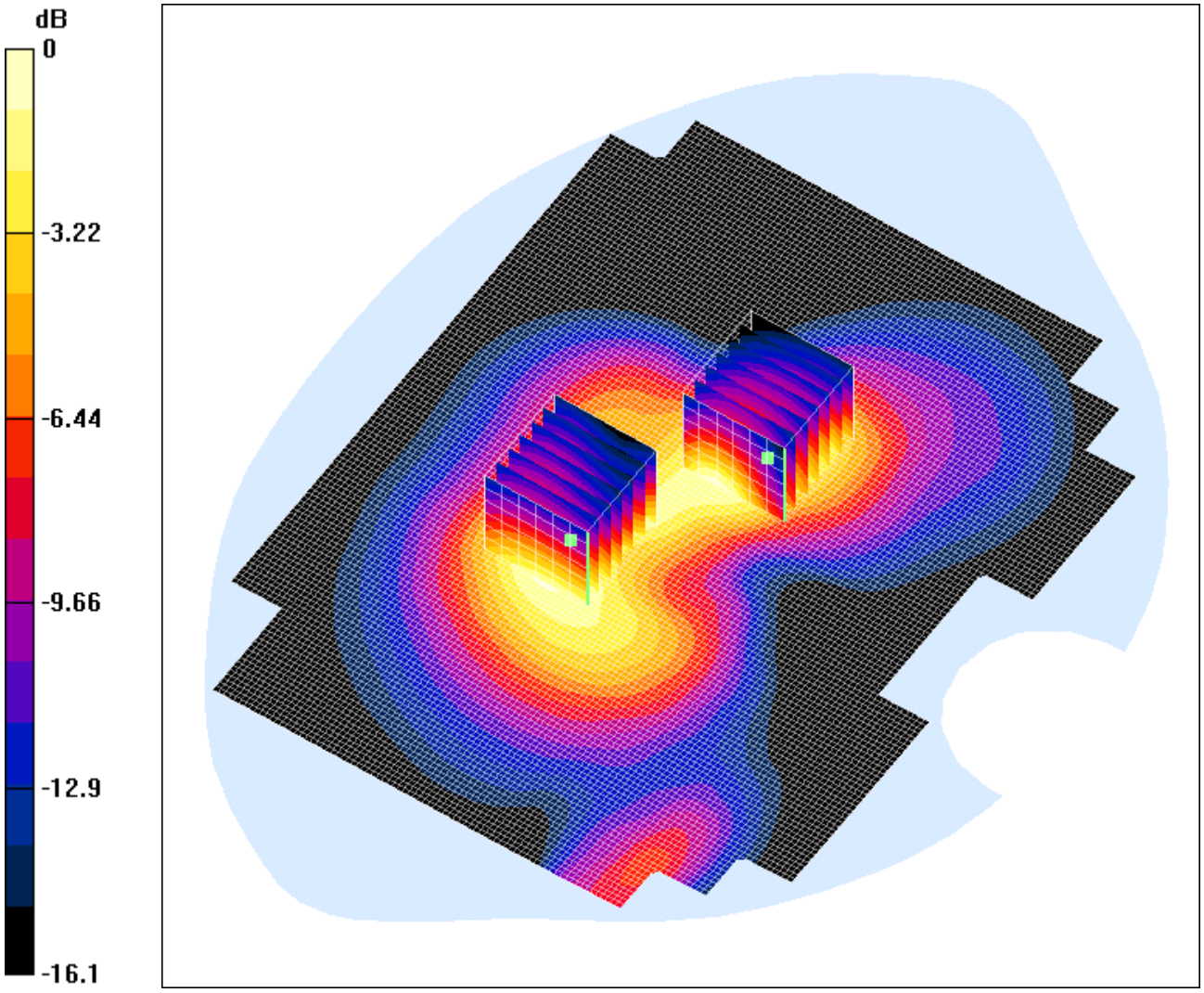
Body position with PHF and case, rear facing phantom 15mm away from surface- Middle 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.734 W/kg
SAR(1 g) = 0.448 mW/g; SAR(10 g) = 0.253 mW/g
Reference Value = 15 V/m
Power Drift = -0.08 dB
Maximum value of SAR = 0.492 mW/g

Body position with PHF and case, rear facing phantom 15mm away from surface- Middle 2/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.732 W/kg
SAR(1 g) = 0.444 mW/g; SAR(10 g) = 0.249 mW/g
Reference Value = 15 V/m
Power Drift = -0.08 dB
Maximum value of SAR = 0.508 mW/g

Date: 12/01/04

Test Laboratory: RADIO FREQUENCY INVESTIGATION LTD.

DUT: Danger; Type: Tina; Serial: 001028000072100



0 dB = 0.469mW/g

Communication System: DCS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: 1900 MHz MSL (σ = 1.48032 mho/m, ε_r = 51.1856, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1528; ConvF(4.7, 4.7, 4.7); Calibrated: 29/07/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn450; Calibrated: 19/05/2003
- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1197
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

Body position with PHF and case, rear facing phantom 15mm away from surface- Middle 2 2/Area Scan 2 (111x141x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 14.9 V/m
Power Drift = 0.02 dB
Maximum value of SAR = 0.485 mW/g

Body position with PHF and case, rear facing phantom 15mm away from surface- Middle 2 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.722 W/kg
SAR(1 g) = 0.498 mW/g; SAR(10 g) = 0.276 mW/g
Reference Value = 14.9 V/m
Power Drift = 0.02 dB
Maximum value of SAR = 0.566 mW/g

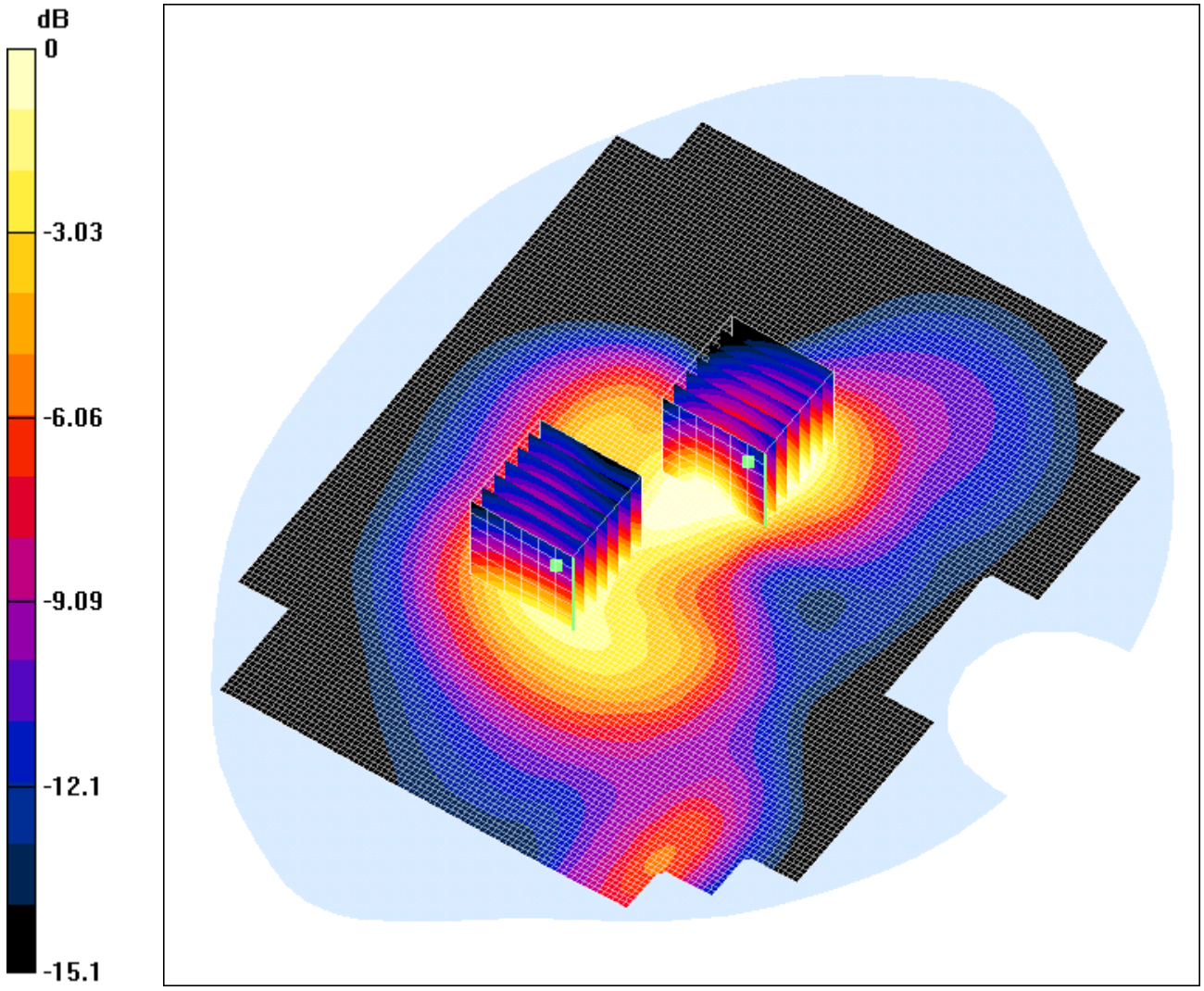
Body position with PHF and case, rear facing phantom 15mm away from surface- Middle 2 2/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.688 W/kg
SAR(1 g) = 0.429 mW/g; SAR(10 g) = 0.245 mW/g
Reference Value = 14.9 V/m
Power Drift = 0.02 dB
Maximum value of SAR = 0.469 mW/g

Date: 12/01/04

45320/JD07/008

Test Laboratory: RADIO FREQUENCY INVESTIGATION LTD.

DUT: Danger; Type: Tina; Serial: 001028000072100



0 dB = 0.428mW/g

Communication System: DCS 1900; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium: 1900 MHz MSL (σ = 1.52139 mho/m, ε_r = 51.0538, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1528; ConvF(4.6, 4.6, 4.6); Calibrated: 29/07/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn450; Calibrated: 19/05/2003

- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1197
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

Body position with PHF and case, rear facing phantom 15mm away from surface- Middle 2 2 2/Area Scan 2 (111x141x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 17.9 V/m
Power Drift = -0.08 dB
Maximum value of SAR = 0.646 mW/g

Body position with PHF and case, rear facing phantom 15mm away from surface- Middle 2 2 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.978 W/kg
SAR(1 g) = 0.636 mW/g; SAR(10 g) = 0.34 mW/g
Reference Value = 17.9 V/m
Power Drift = -0.08 dB
Maximum value of SAR = 0.719 mW/g

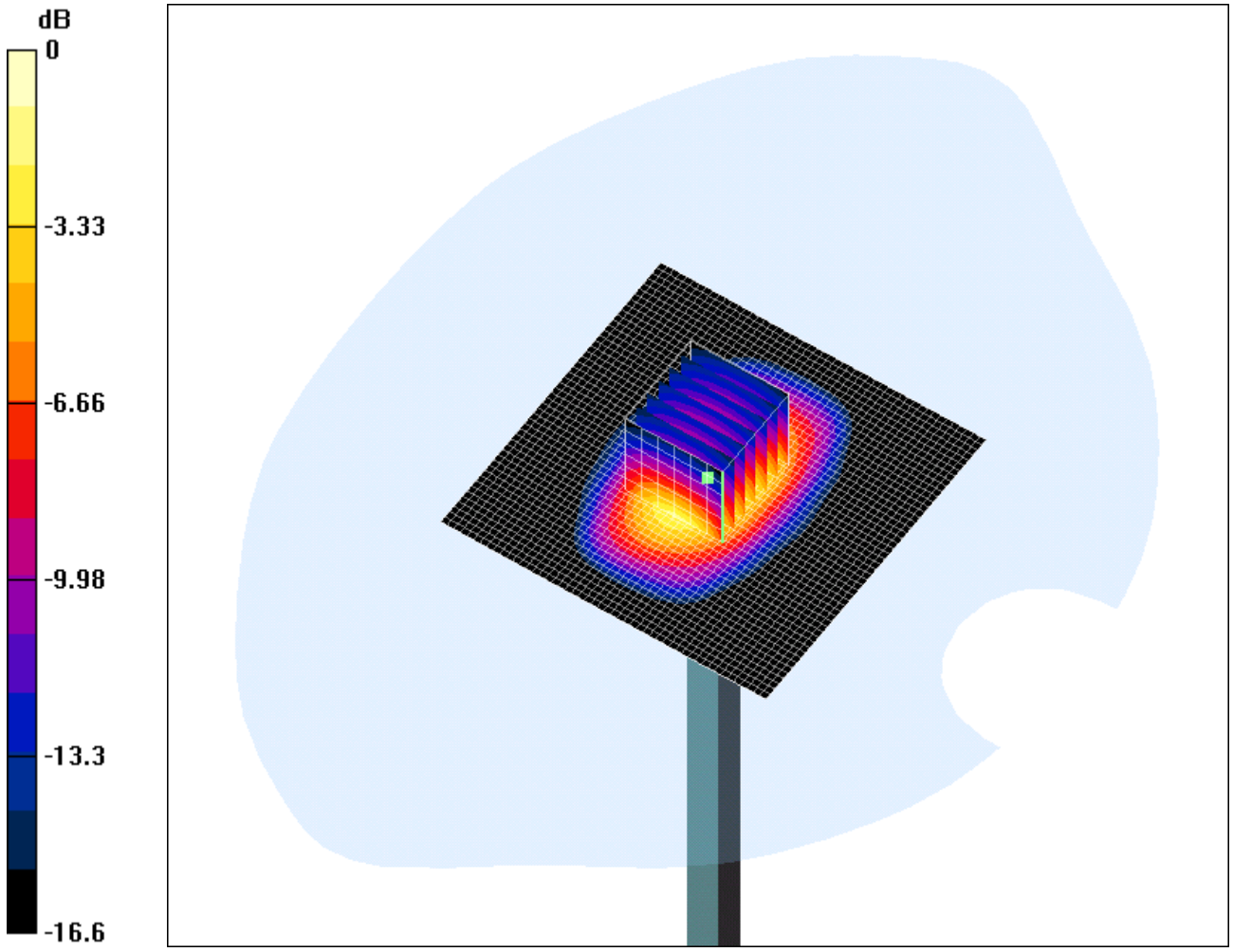
Body position with PHF and case, rear facing phantom 15mm away from surface- Middle 2 2 2/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.645 W/kg
SAR(1 g) = 0.396 mW/g; SAR(10 g) = 0.228 mW/g
Reference Value = 17.9 V/m
Power Drift = -0.08 dB
Maximum value of SAR = 0.428 mW/g

Date: 12/01/04

Validation_001

Test Laboratory: RADIO FREQUENCY INVESTIGATION LTD.

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: SN2d009



0 dB = 10.3mW/g

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 MHz MSL (σ = 1.52139 mho/m, ε_r = 51.0538, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1528; ConvF(4.6, 4.6, 4.6); Calibrated: 29/07/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn450; Calibrated: 19/05/2003
- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1197

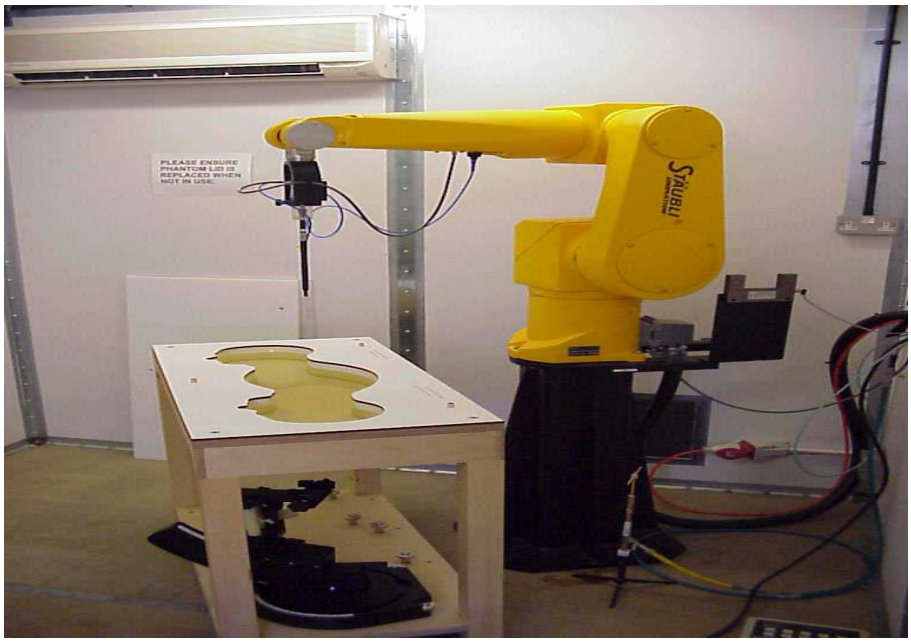
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

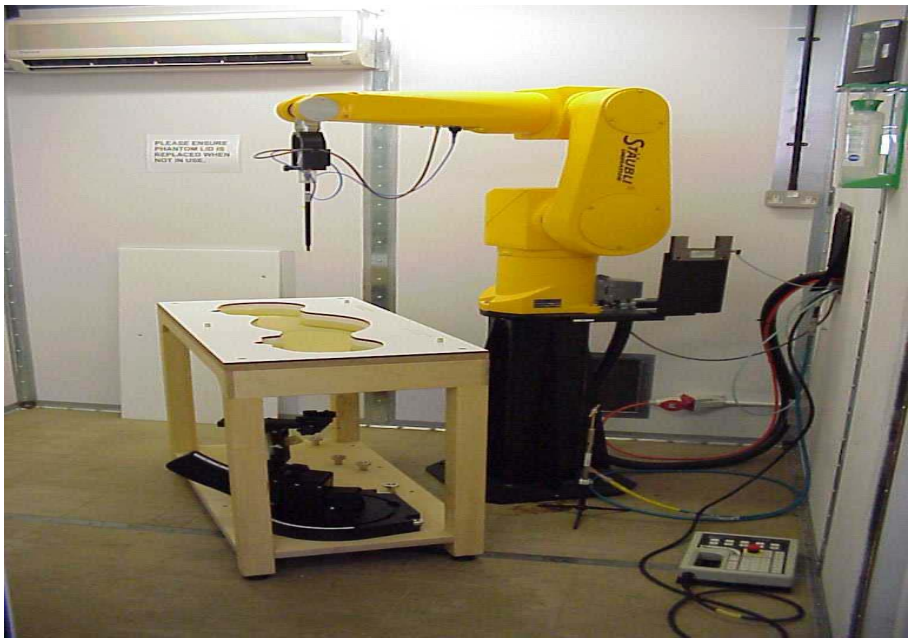
d=10mm, Pin=250mW/Area Scan (51x51x1): Measurement grid: dx=20mm, dy=20mm
Reference Value = 87 V/m
Power Drift = 0.2 dB
Maximum value of SAR = 10.8 mW/g

d=10mm, Pin=250mW/Zoom Scan 7x7x7 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 15.7 W/kg
SAR(1 g) = 9.2 mW/g; SAR(10 g) = 4.84 mW/g
Reference Value = 87 V/m
Power Drift = 0.2 dB
Maximum value of SAR = 10.3 mW/g

Appendix 3. Test Configuration Photographs

This appendix contains photographs showing the test configuration for the measurement of Specific Absorption Rate (SAR)





Test Configuration Photographs (Continued)

Appendix 4. Calibration Data

This appendix contains the calibration data and certificates.

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A1185.

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

CHECKED 06/08/03

Client RFI

CALIBRATION CERTIFICATE

Object(s) ET3DV6 - SN:1528

Calibration procedure(s) QA CAL-01.v2
Calibration procedure for dosimetric E-field probes

Calibration date: July 29, 2003

Condition of the calibrated item In Tolerance (according to the specific calibration document)

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Power sensor E4412A	MY41495277	2-Apr-03 (METAS, No 252-0250)	Apr-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (Agilent, No. 20020918)	Sep-03
Power meter EPM E4419B	GB41293874	2-Apr-03 (METAS, No 252-0250)	Apr-04
Network Analyzer HP 8753E	US37390585	18-Oct-01 (Agilent, No. 24BR1033101)	In house check: Oct 03
Fluke Process Calibrator Type 702	SN: 6295803	3-Sep-01 (ELCAL, No.2360)	Sep-03

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: July 29, 2003

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Probe ET3DV6

SN:1528

Manufactured:	March 21, 2000
Last calibration:	February 6, 2003
Recalibrated:	July 29, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1528

Sensitivity in Free Space

Diode Compression

NormX	**1.51**	$\mu V/(V/m)^2$	DCP X	**99**	mV
NormY	**1.28**	$\mu V/(V/m)^2$	DCP Y	**99**	mV
NormZ	**1.34**	$\mu V/(V/m)^2$	DCP Z	**99**	mV

Sensitivity in Tissue Simulating Liquid

Head **900 MHz** ε_r **= 41.5 ± 5%** σ **= 0.97 ± 5% mho/m**

Valid for f=855-945 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**6.3**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.3**	± 9.5% (k=2)	Alpha	**0.41**
ConvF Z	**6.3**	± 9.5% (k=2)	Depth	**2.46**

Head **1800 MHz** ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**

Valid for f=1710-1890 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**5.0**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.0**	± 9.5% (k=2)	Alpha	**0.51**
ConvF Z	**5.0**	± 9.5% (k=2)	Depth	**2.62**

Boundary Effect

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

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	10.2	6.0
SAR_{be} [%]	With Correction Algorithm	0.3	0.3

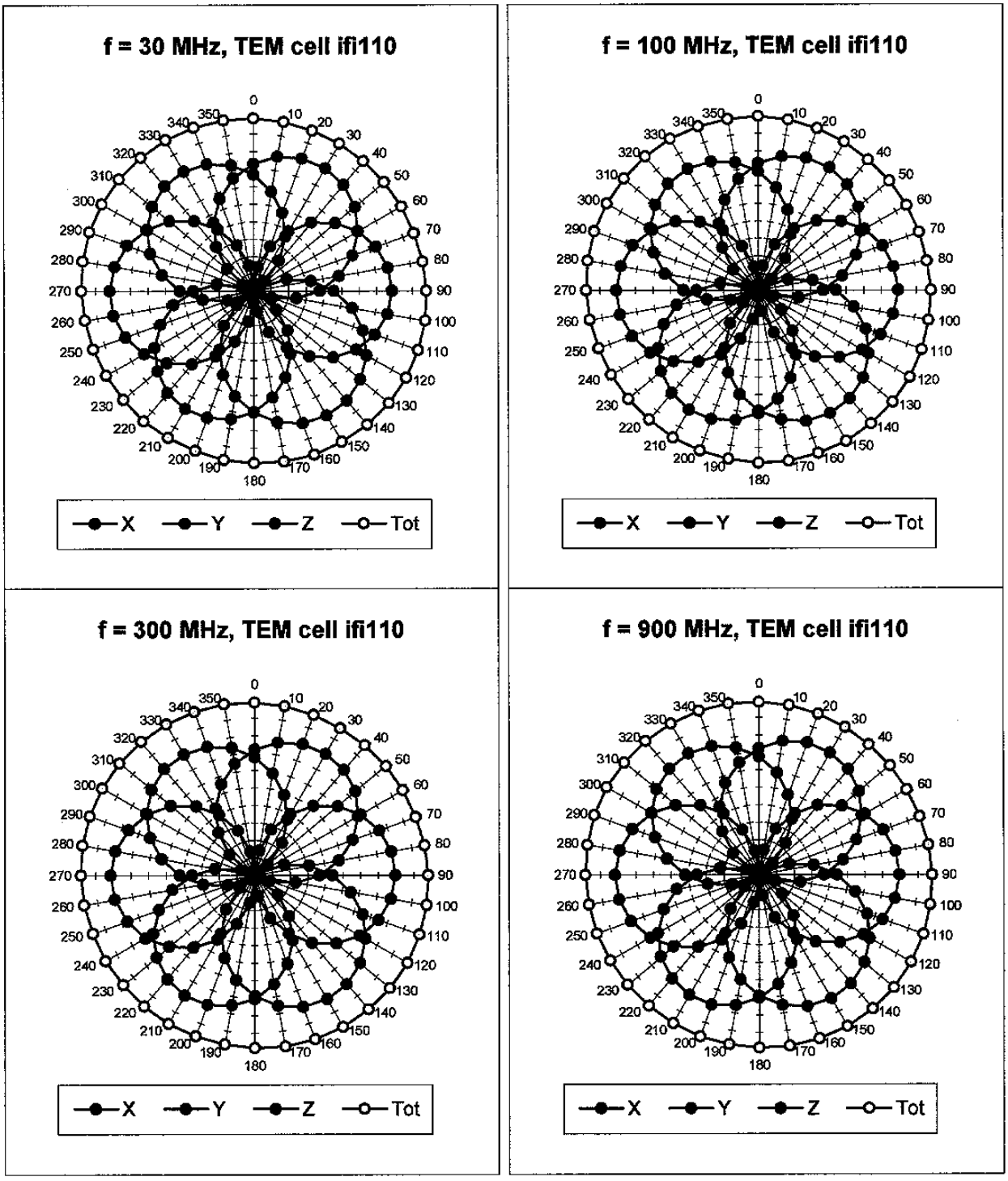
Head **1800 MHz** **Typical SAR gradient: 10 % per mm**

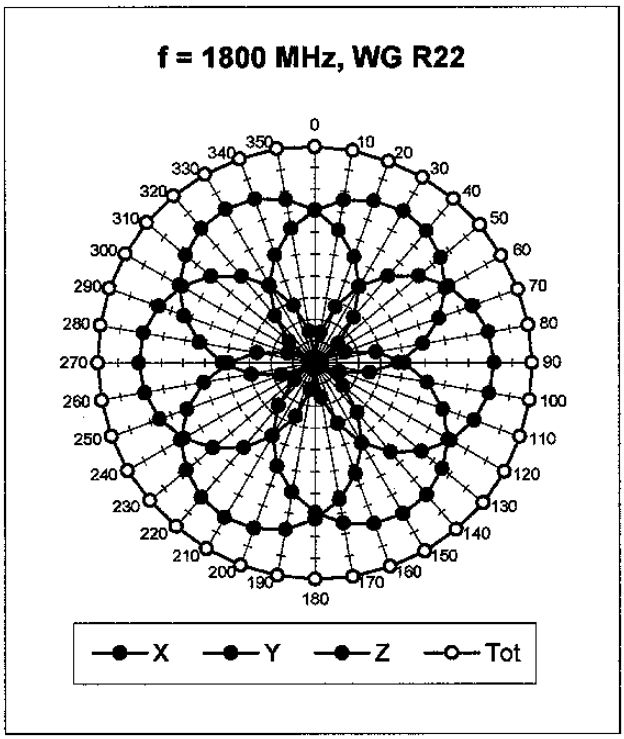
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	13.9	9.2
SAR_{be} [%]	With Correction Algorithm	0.2	0.0

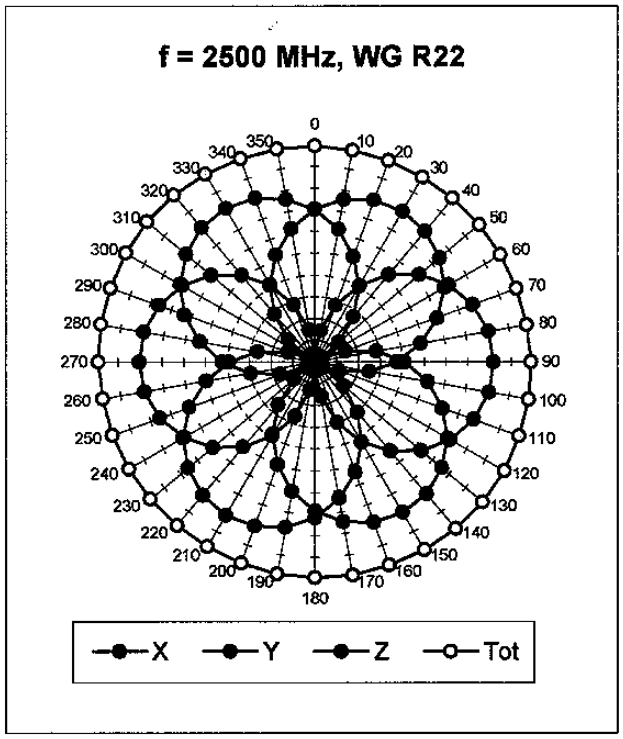
Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.6 ± 0.2**	mm

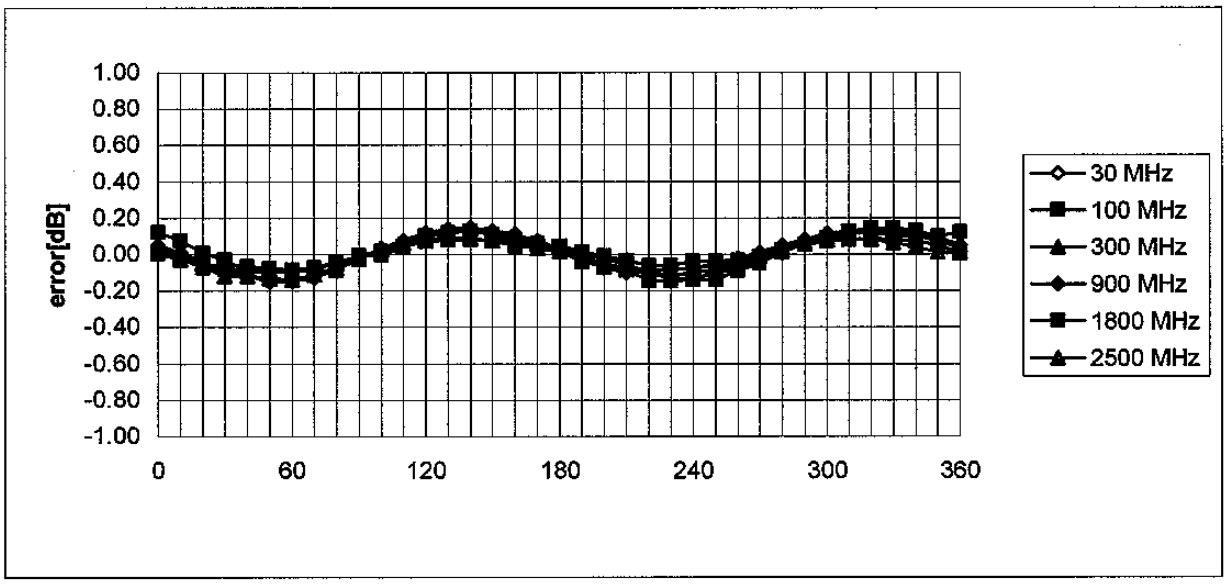
Receiving Pattern (ϕ , θ = 0°





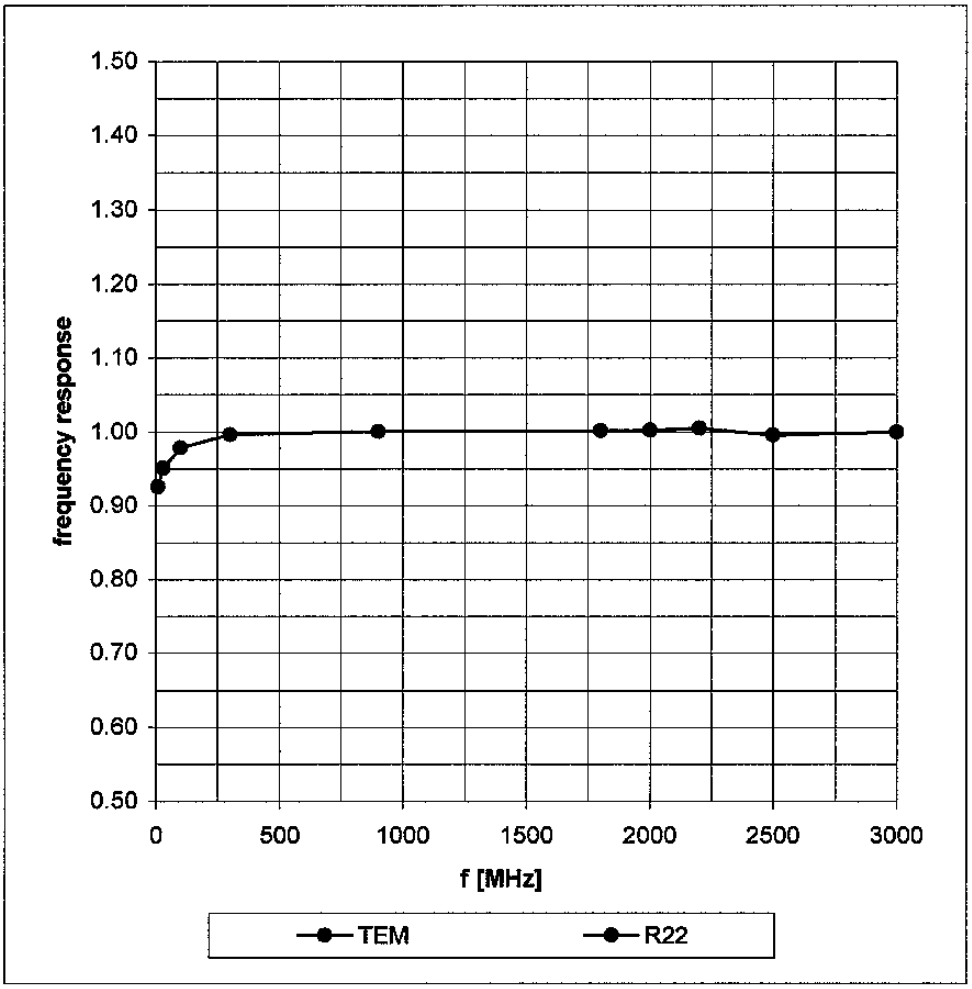


Isotropy Error (ϕ), θ = 0°



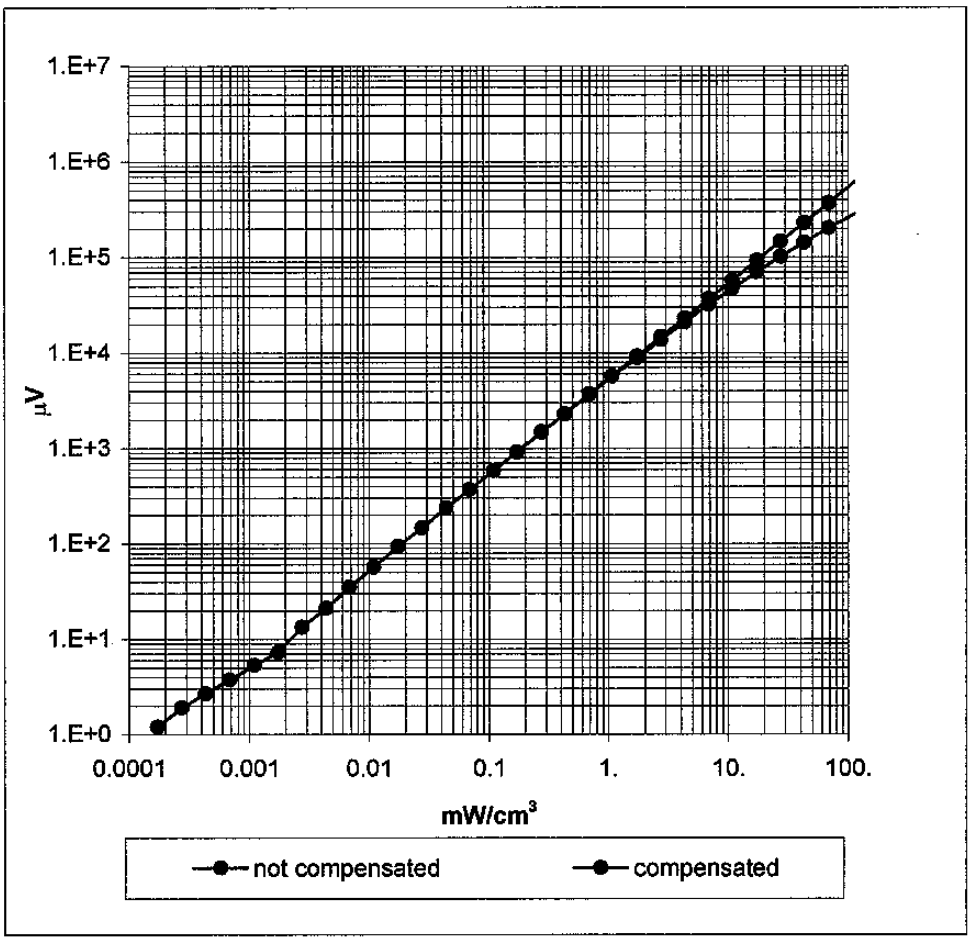
Frequency Response of E-Field

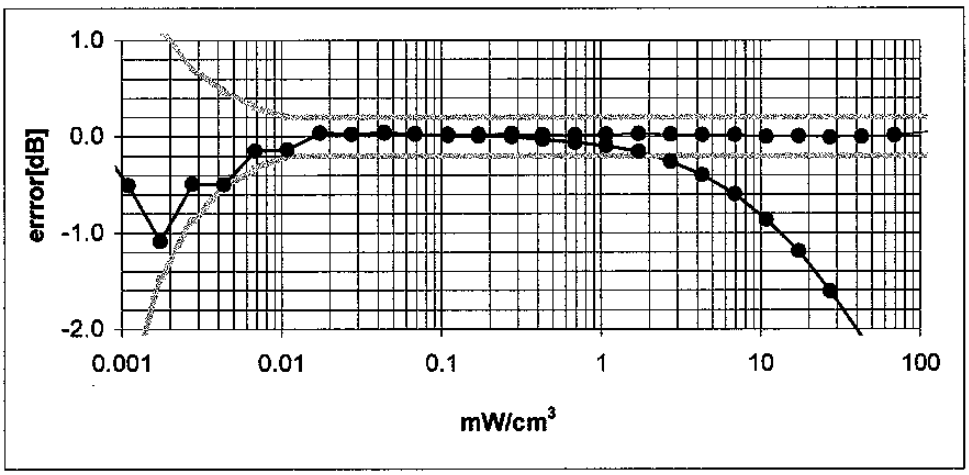
(TEM-Cell:ifi110, Waveguide R22)



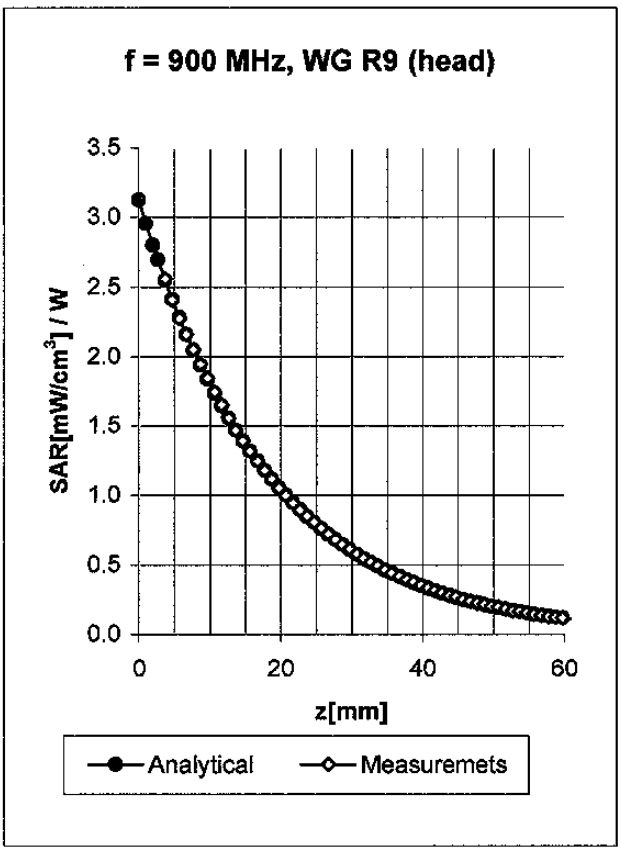
Dynamic Range f(SAR_{brain})

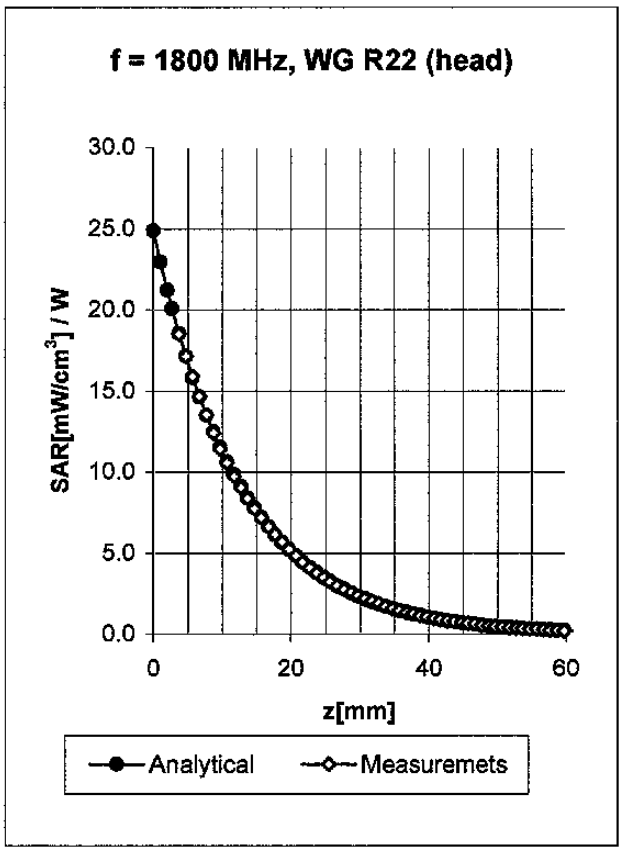
(Waveguide R22)





Conversion Factor Assessment





Head **900 MHz** ε_r **= 41.5 ± 5%** σ **= 0.97 ± 5% mho/m**

Valid for f=855-945 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

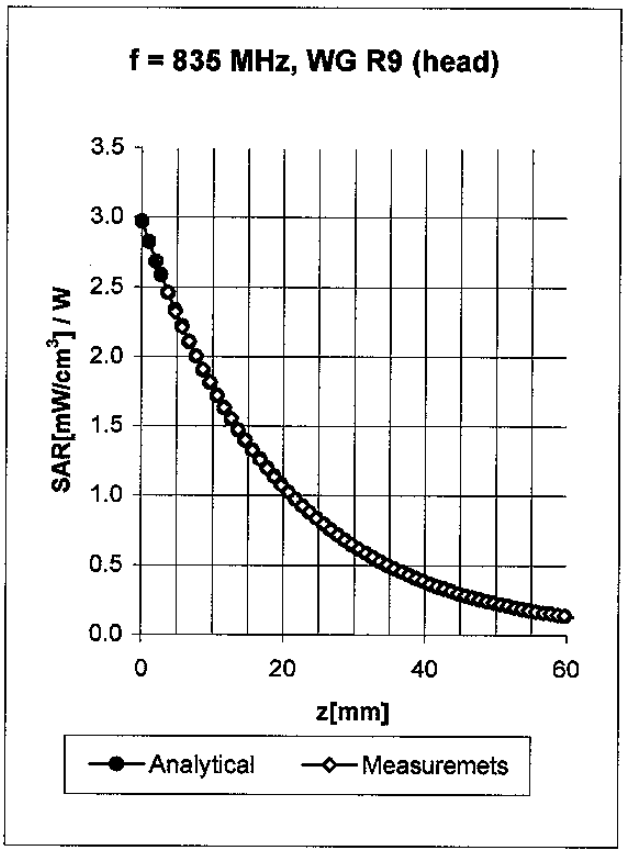
ConvF X	**6.3** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.3** ± 9.5% (k=2)	Alpha	**0.41**
ConvF Z	**6.3** ± 9.5% (k=2)	Depth	**2.46**

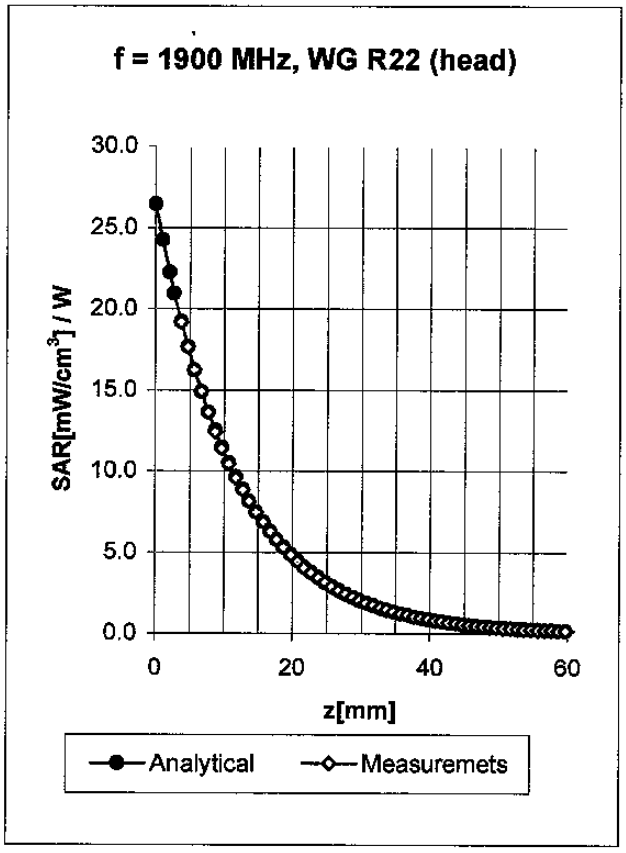
Head **1800 MHz** ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**

Valid for f=1710-1890 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**5.0** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.0** ± 9.5% (k=2)	Alpha	**0.51**
ConvF Z	**5.0** ± 9.5% (k=2)	Depth	**2.62**

Conversion Factor Assessment





Head **835 MHz** ε_r **= 41.5 ± 5%** σ **= 0.90 ± 5% mho/m**

Valid for f=793-877 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

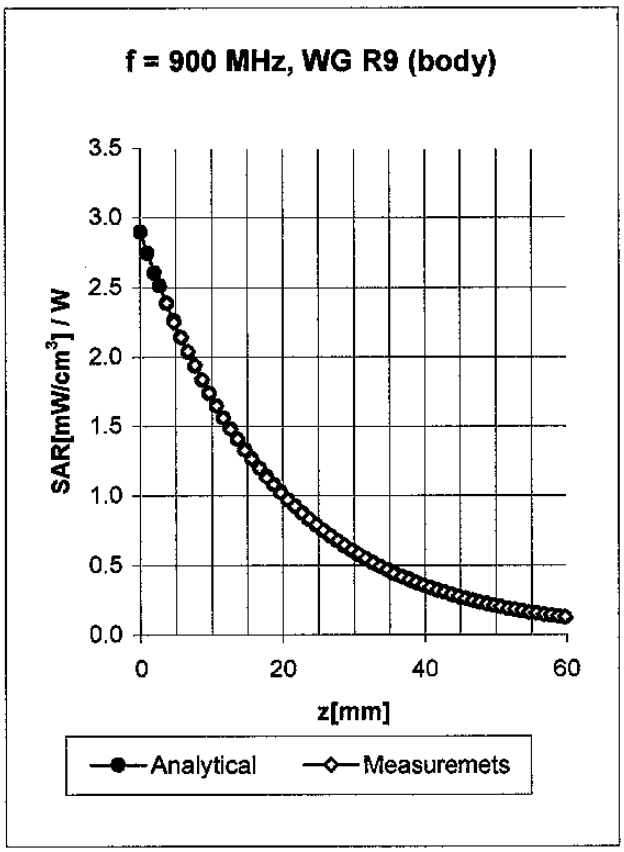
ConvF X	**6.4** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.4** ± 9.5% (k=2)	Alpha	**0.46**
ConvF Z	**6.4** ± 9.5% (k=2)	Depth	**2.20**

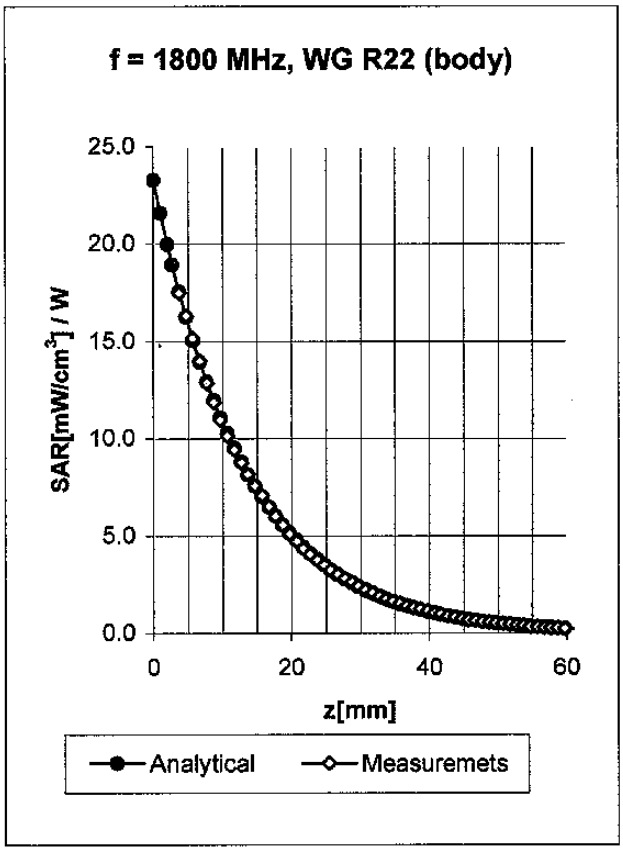
Head **1900 MHz** ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**

Valid for f=1805-1995 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**4.8** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.8** ± 9.5% (k=2)	Alpha	**0.54**
ConvF Z	**4.8** ± 9.5% (k=2)	Depth	**2.58**

Conversion Factor Assessment





Body **900 MHz** ε_r **= 55.0 ± 5%** σ **= 1.05 ± 5% mho/m**

Valid for f=855-945 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

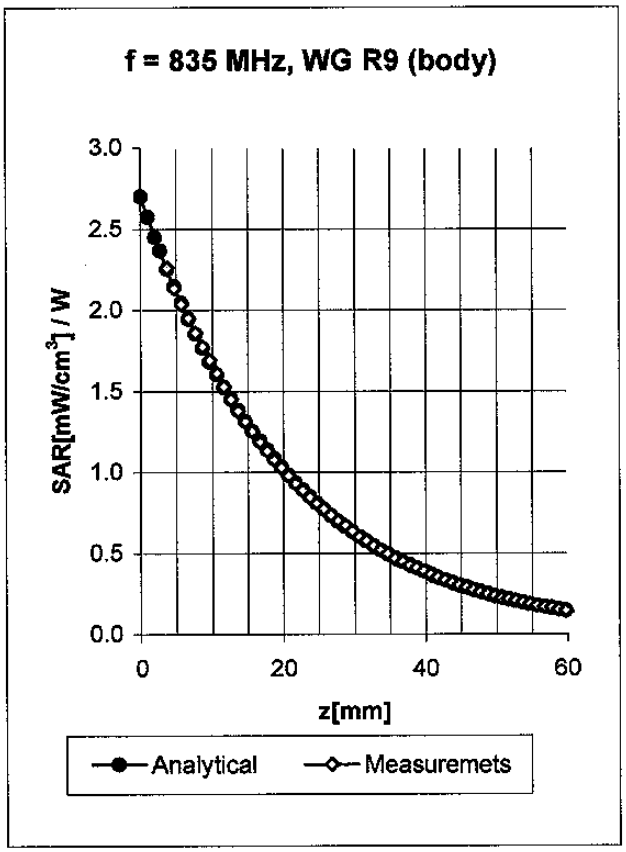
ConvF X	**6.2** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.2** ± 9.5% (k=2)	Alpha	**0.56**
ConvF Z	**6.2** ± 9.5% (k=2)	Depth	**2.08**

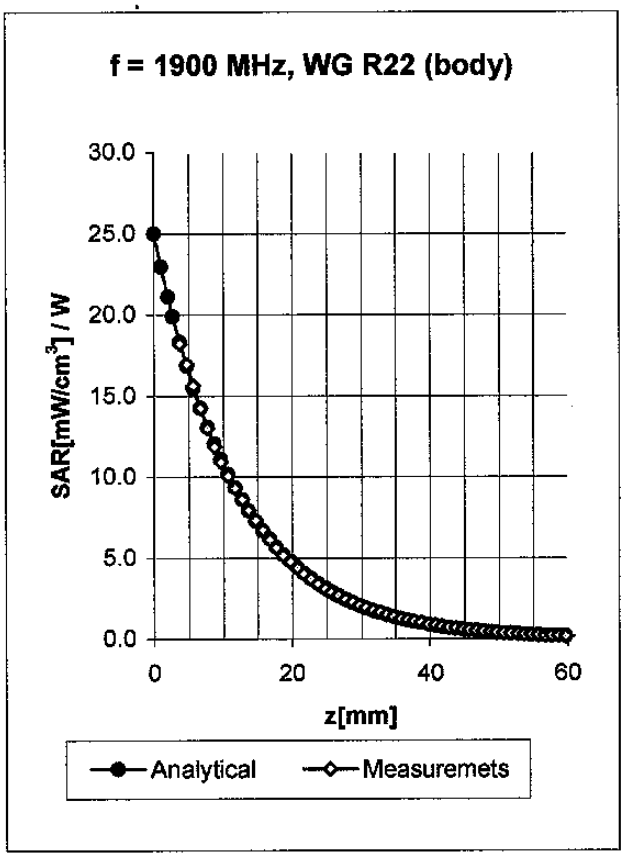
Body **1800 MHz** ε_r **= 53.3 ± 5%** σ **= 1.52 ± 5% mho/m**

Valid for f=1710-1890 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	**4.7** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.7** ± 9.5% (k=2)	Alpha	**0.62**
ConvF Z	**4.7** ± 9.5% (k=2)	Depth	**2.59**

Conversion Factor Assessment





Body **835 MHz** ε_r **= 55.2 ± 5%** σ **= 0.97 ± 5% mho/m**

Valid for f=793-877 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

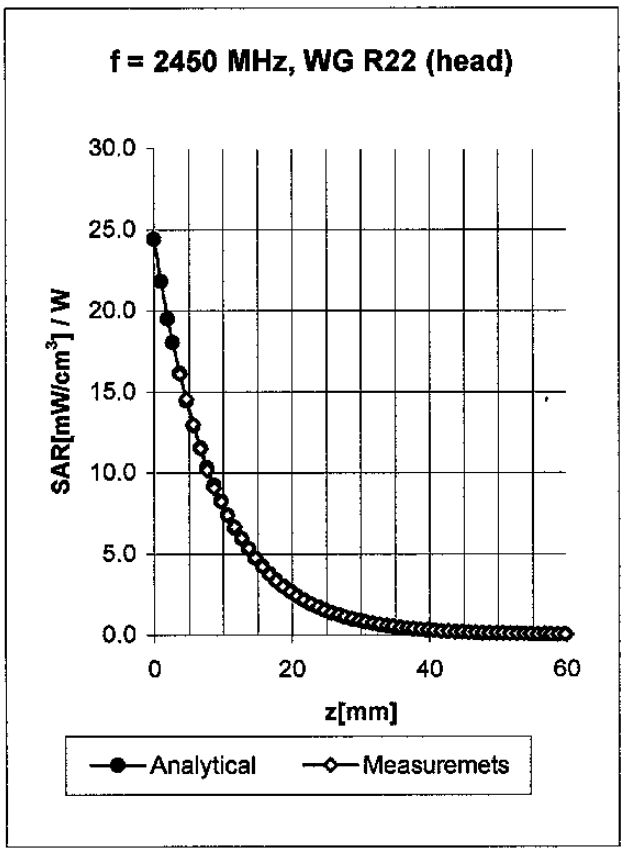
ConvF X	**6.3** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.3** ± 9.5% (k=2)	Alpha	**0.44**
ConvF Z	**6.3** ± 9.5% (k=2)	Depth	**2.40**

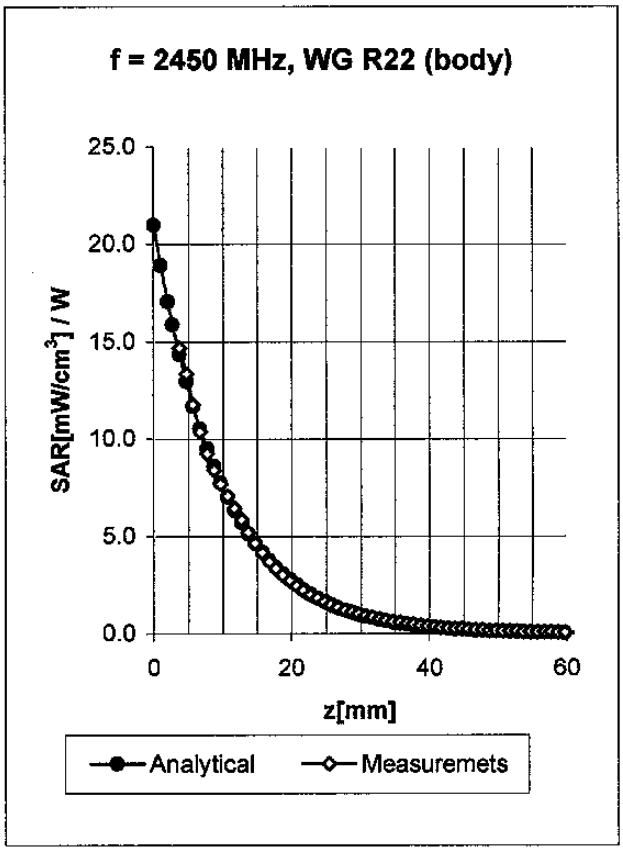
Body **1900 MHz** ε_r **= 53.3 ± 5%** σ **= 1.52 ± 5% mho/m**

Valid for f=1805-1995 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	**4.6** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.6** ± 9.5% (k=2)	Alpha	**0.65**
ConvF Z	**4.6** ± 9.5% (k=2)	Depth	**2.48**

Conversion Factor Assessment





Head **2450** **MHz** ε_r **= 39.2 ± 5%** σ **= 1.80 ± 5% mho/m**

Valid for f=2328-2573 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**4.6** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**4.6** ± 8.9% (k=2)	Alpha	**1.04**
ConvF Z	**4.6** ± 8.9% (k=2)	Depth	**1.85**

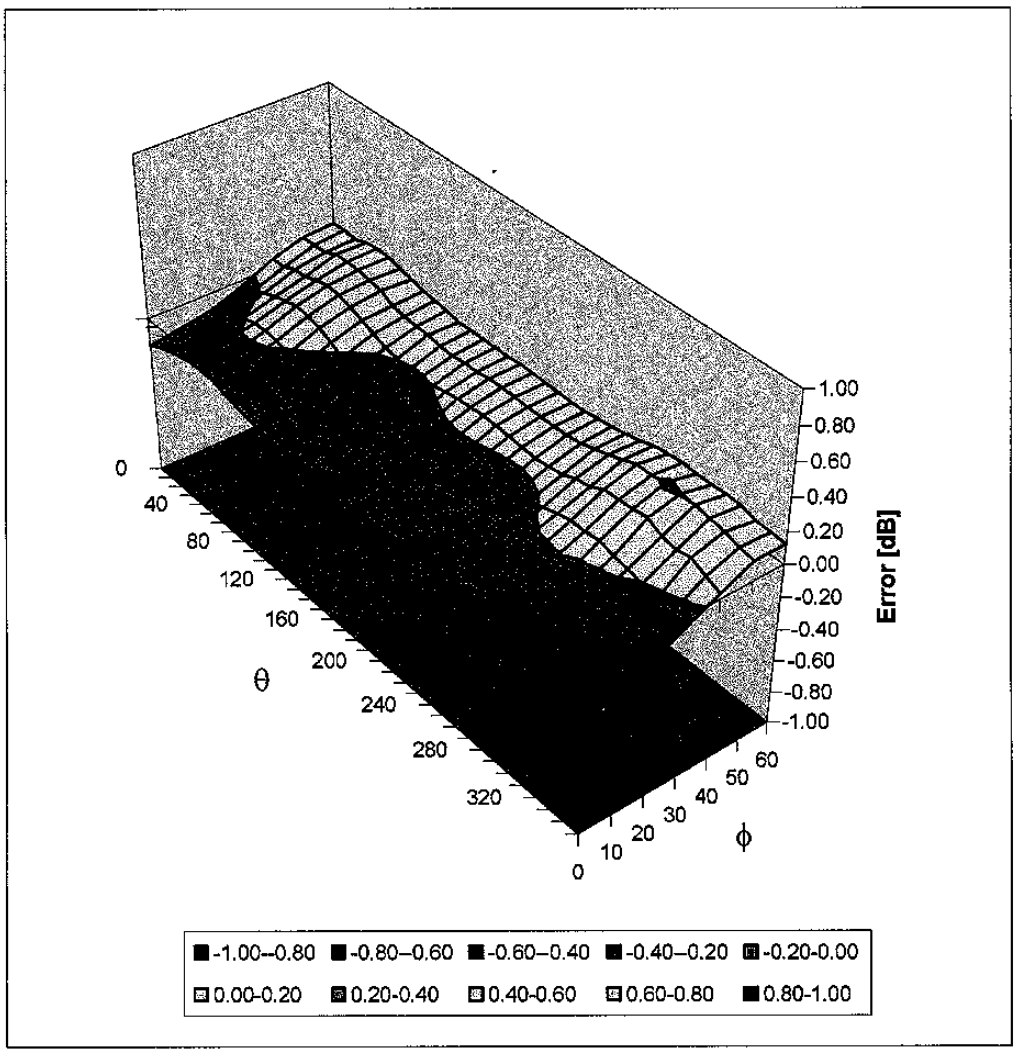
Body **2450** **MHz** ε_r **= 52.7 ± 5%** σ **= 1.95 ± 5% mho/m**

Valid for f=2328-2573 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	**4.3** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**4.3** ± 8.9% (k=2)	Alpha	**1.10**
ConvF Z	**4.3** ± 8.9% (k=2)	Depth	**1.75**

Deviation from Isotropy in HSL

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



A1234

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

Client RFI

CALIBRATION CERTIFICATE

Object(s)	DAE3 - SN 450
Calibration procedure(s)	QA CAL-06 v2 Calibration procedure for the data acquisition unit (DAE)
Calibration date:	May 19, 2003
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date	Scheduled Calibration
Fluke Process Calibrator Type 702	SN: 6295803	3-Sep-01	Sep-03

	Name	Function	Signature
Calibrated by:	Eric Hainfeld	Technician	
Approved by:	Fin Bomholt	R&D Director	

Date issued: May 19, 2003

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

1. DC Voltage Measurement

DA - Converter Values from DAE

High Range:	1LSB =	6.1μV ,	full range =	400 mV
Low Range:	1LSB =	61nV ,	full range =	4 mV

Software Set-up: Calibration time: 3 sec Measuring time: 3 sec

Setup	X	Y	Z
High Range	405.5951302	405.2833984	405.4842344
Low Range	3.97291	3.94768	3.97214
Connector Position	75 °		

High Range	Input	Reading in μV	% Error
Channel X + Input	200mV	199999	0.00
	20mV	20002.4	0.01
Channel X - Input	20mV	-19998.8	-0.01
Channel Y + Input	200mV	200001	0.00
	20mV	19996.9	-0.02
Channel Y - Input	20mV	-20005	0.03
Channel Z + Input	200mV	200001	0.00
	20mV	20002.2	0.01
Channel Z - Input	20mV	-20001.1	0.01

Low Range	Input	Reading in μV	% Error
Channel X + Input	2mV	2000.1	0.00
	0.2mV	200.09	0.05
Channel X - Input	0.2mV	-200.44	0.22
Channel Y + Input	2mV	2000.2	0.01
	0.2mV	199.19	-0.41
Channel Y - Input	0.2mV	-200.64	0.32
Channel Z + Input	2mV	2000	0.00
	0.2mV	199.03	-0.48
Channel Z - Input	0.2mV	-201.51	0.75

2. Common mode sensitivity

Software Set-up
Calibration time: 3 sec, Measuring time: 3 sec
High/Low Range

in μV	Common mode Input Voltage	High Range Reading	Low Range Reading
Channel X	200mV	0.77918	-0.79661
	- 200mV	0.070618	0.74578
Channel Y	200mV	-7.4139	-7.8046
	- 200mV	6.277	6.1409
Channel Z	200mV	-0.18007	-1.493
	- 200mV	-1.7404	-0.80548

3. Channel separation

Software Set-up
Calibration time: 3 sec, Measuring time: 3 sec
High Range

in μV	Input Voltage	Channel X	Channel Y	Channel Z
Channel X	200mV	-	0.754	-0.74565
Channel Y	200mV	0.47052	-	3.2555
Channel Z	200mV	-2.397	-0.54072	-

4. AD-Converter Values with inputs shorted

in LSB	Low Range	High Range
Channel X	16211	15939
Channel Y	16815	16418
Channel Z	16584	16099

5. Input Offset Measurement

Measured after 15 min warm-up time of the Data Acquisition Electronic.
Every Measurement is preceded by a calibration cycle.

Software set-up:

Calibration time:	3 sec
Measuring time:	3 sec
Number of measurements:	100, Low Range

Input 10MΩ

in µV	Average	min. Offset	max. Offset	Std. Deviation
Channel X	-0.71	-2.07	-0.11	0.33
Channel Y	-0.26	-1.20	0.30	0.24
Channel Z	-1.18	-2.39	-0.06	0.28

Input shorted

in µV	Average	min. Offset	max. Offset	Std. Deviation
Channel X	0.00	-0.96	0.56	0.26
Channel Y	-0.71	-1.98	0.16	0.23
Channel Z	-0.94	-1.18	-0.53	0.14

6. Input Offset Current

in fA	Input Offset Current
Channel X	< 25
Channel Y	< 25
Channel Z	< 25

7. Input Resistance

	Calibrating	Measuring
Channel X	200 kΩ	200.4 MΩ
Channel Y	200 kΩ	199.7 MΩ
Channel Z	199.9 kΩ	198.9 MΩ

8. Low Battery Alarm Voltage

in V	Alarm Level
Supply (+ Vcc)	7.62 V
Supply (- Vcc)	-7.65 V

9. Power Consumption

in mA	Switched off	Stand by	Transmitting
Supply (+ Vcc)	0.000	5.59	13.8
Supply (- Vcc)	-0.010	-7.76	-9.07

10. Functional test

Touch async pulse 1	ok
Touch async pulse 2	ok
Touch status bit 1	ok
Touch status bit 2	ok
Remote power off	ok
Remote analog Power control	ok
Modification Status	B – C

A1236

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

Cusc USD 23/05/03.

Client RFI

CALIBRATION CERTIFICATE

Object(s) D1800V2 - SN:2d009

Calibration procedure(s) QA CAL-05.v2
Calibration procedure for dipole validation kits

Calibration date: May 14, 2003

Condition of the calibrated item In Tolerance (according to the specific calibration document)

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
RF generator R&S SML-03	100698	27-Mar-2002 (R&S, No. 20-92389)	In house check: Mar-05
Power sensor HP 8481A	MY41092317	18-Oct-02 (Agilent, No. 20021018)	Oct-04
Power sensor HP 8481A	US37292783	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Power meter EPM E442	GB37480704	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Network Analyzer HP 8753E	US38432426	3-May-00 (Agilent, No. 8702K064602)	In house check: May 03

	Name	Function	Signature
Calibrated by:	Judith Mueller	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: May 14, 2003

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

Schmid & Partner Engineering AG

s p e a g

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Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

DASY

Dipole Validation Kit

Type: D1800V2

Serial: 2d009

Manufactured: July 23, 2001
Calibrated: May 14, 2003

1. Measurement Conditions

The measurements were performed in the flat section of the SAM twin phantom filled with head simulating solution of the following electrical parameters at 1800 MHz:

Relative Dielectricity	**39.2**	± 5%
Conductivity	**1.36 mho/m**	± 5%

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 5.3 at 1800 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10mm from dipole center to the solution surface. The included distance holder was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 7x7x7 fine cube was chosen for cube integration.
The dipole input power (forward power) was 250 mW ± 3 %. The results are normalized to 1W input power.

2. SAR Measurement with DASY4 System

Standard SAR-measurements were performed according to the measurement conditions described in section 1. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ET3DV6 SN:1507 and applying the advanced extrapolation are:

averaged over 1 cm^3 (1 g) of tissue: **38.2 mW/g** ± 16.8 % (k=2)[1]

averaged over 10 cm^3 (10 g) of tissue: **20.1 mW/g** ± 16.2 % (k=2)[1]

[1] validation uncertainty

3. Dipole Impedance and Return Loss

The impedance was measured at the SMA-connector with a network analyzer and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	**1.184 ns**	(one direction)
Transmission factor:	**0.998**	(voltage transmission, one direction)

The dipole was positioned at the flat phantom sections according to section 1 and the distance holder was in place during impedance measurements.

Feedpoint impedance at 1800 MHz:	Re{Z} = **47.2 Ω**
	Im {Z} = **-8.4 Ω**
Return Loss at 1800 MHz	**-20.8 dB**

4. Measurement Conditions

The measurements were performed in the flat section of the SAM twin phantom filled with body simulating glycol solution of the following electrical parameters at 1800 MHz:

Relative Dielectricity	**51.6**	± 5%
Conductivity	**1.49 mho/m**	± 5%

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 5.0 at 1800 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10mm from dipole center to the solution surface. The included distance holder was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 7x7x7 fine cube was chosen for cube integration.
The dipole input power (forward power) was 250 mW ± 3 %. The results are normalized to 1W input power.

5. SAR Measurement with DASY4 System

Standard SAR-measurements were performed according to the measurement conditions described in section 4. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ET3DV6 SN:1507 and applying the advanced extrapolation are:

averaged over 1 cm^3 (1 g) of tissue:	**36.7 mW/g** ± 16.8 % $(k=2)^2$
averaged over 10 cm^3 (10 g) of tissue:	**19.6 mW/g** ± 16.2 % $(k=2)^2$

6. Dipole Impedance and Return Loss

The dipole was positioned at the flat phantom sections according to section 4 and the distance holder was in place during impedance measurements.

Feedpoint impedance at 1800 MHz:	Re{Z} = **43.4 Ω**
	Im {Z} = **-8.8 Ω**
Return Loss at 1800 MHz	**-18.7 dB**

7. Handling

Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

8. Design

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.

9. Power Test

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

---

[2] validation uncertainty

Date/Time: 05/12/03 17:38:29

Test Laboratory: SPEAG, Zurich, Switzerland
File Name: SN2d009_SN1507_HSL1800_120503.da4

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN2d009
Program: Dipole Calibration

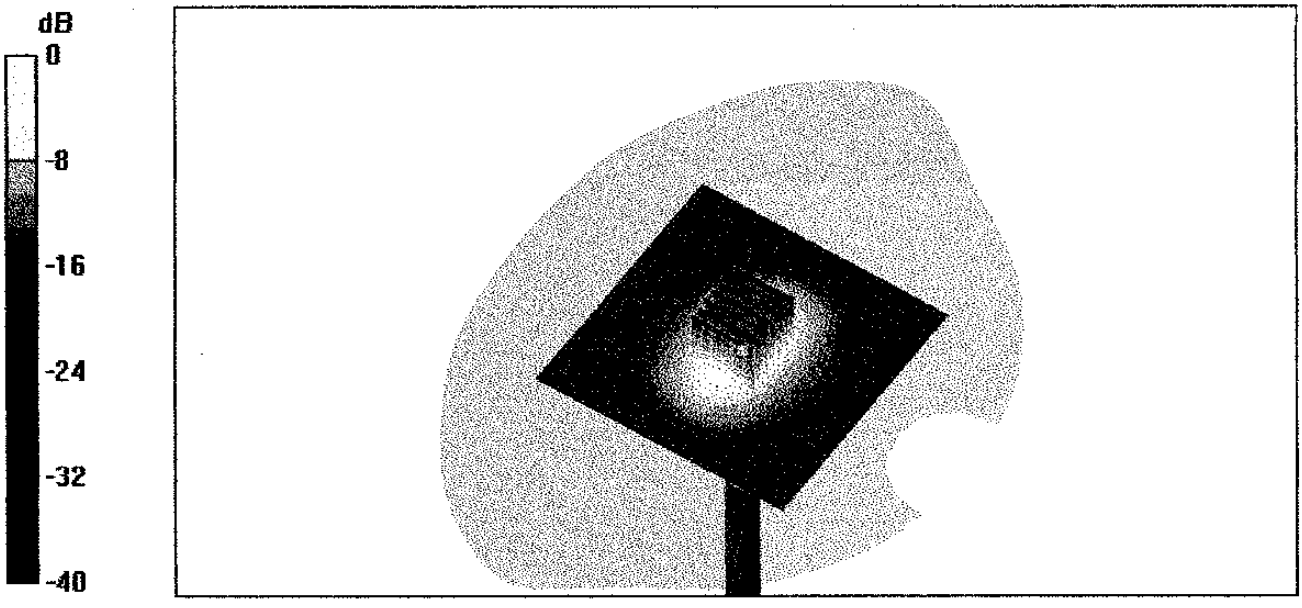
Communication System: CW-1800; Frequency: 1800 MHz;Duty Cycle: 1:1
Medium: HSL 1800 MHz (σ = 1.36 mho/m, ε_r = 39.22, ρ = 1000 kg/m^3)
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(5.3, 5.3, 5.3); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

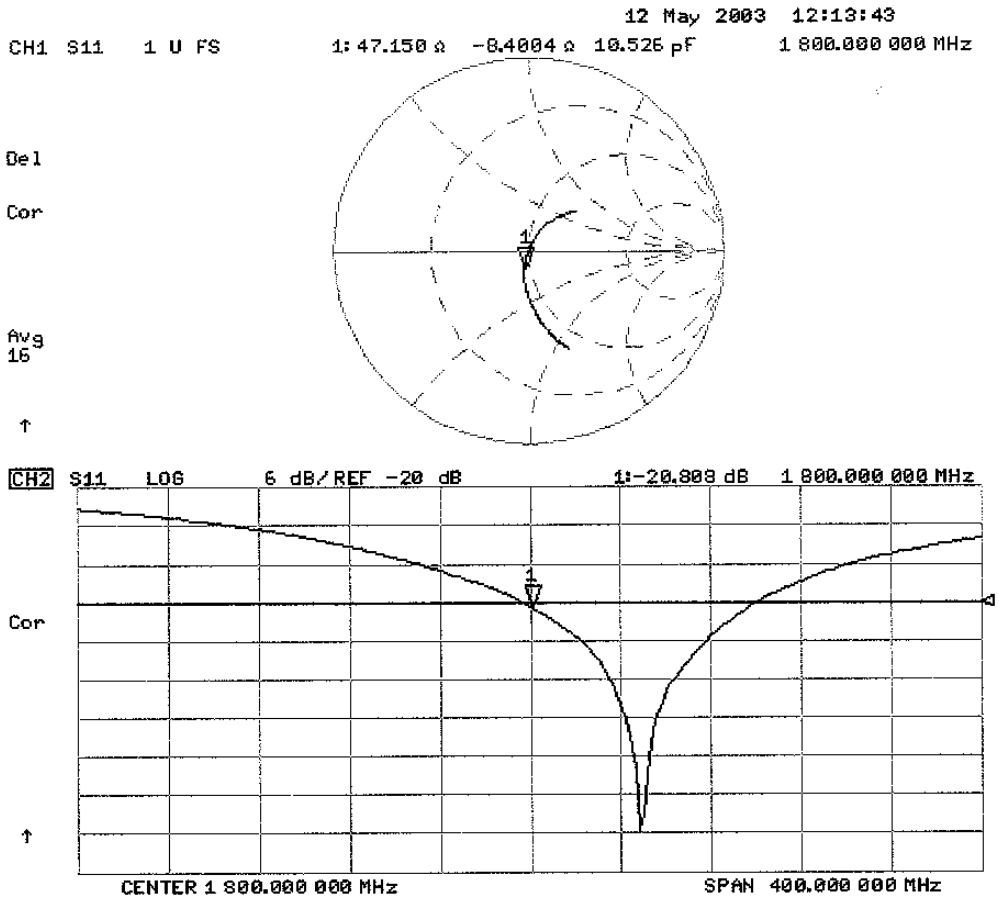
Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 93.7 V/m
Power Drift = -0.01 dB
Maximum value of SAR = 10.7 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 16.5 W/kg
SAR(1 g) = 9.56 mW/g; SAR(10 g) = 5.03 mW/g
Reference Value = 93.7 V/m
Power Drift = -0.01 dB
Maximum value of SAR = 10.7 mW/g



0 dB = 10.7mW/g

2d009


12 May 2003 12:13:43
CH1 S11 1 U FS
1: 47.150 Ω -8.4004 Ω 10.526 pF
1 800.000 000 MHz
Del
Cor
Avg
16
CH2 S11 LOG
6 dB/ REF -20 dB
1:-20.808 dB 1 800.000 000 MHz
Cor
CENTER 1 800.000 000 MHz
SPAN 400.000 000 MHz

Date/Time: 05/14/03 12:55:22

Test Laboratory: SPEAG, Zurich, Switzerland
File Name: SN2d009_SN1507_M1800_140503da4.da4

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN2d009
Program: Dipole Calibration

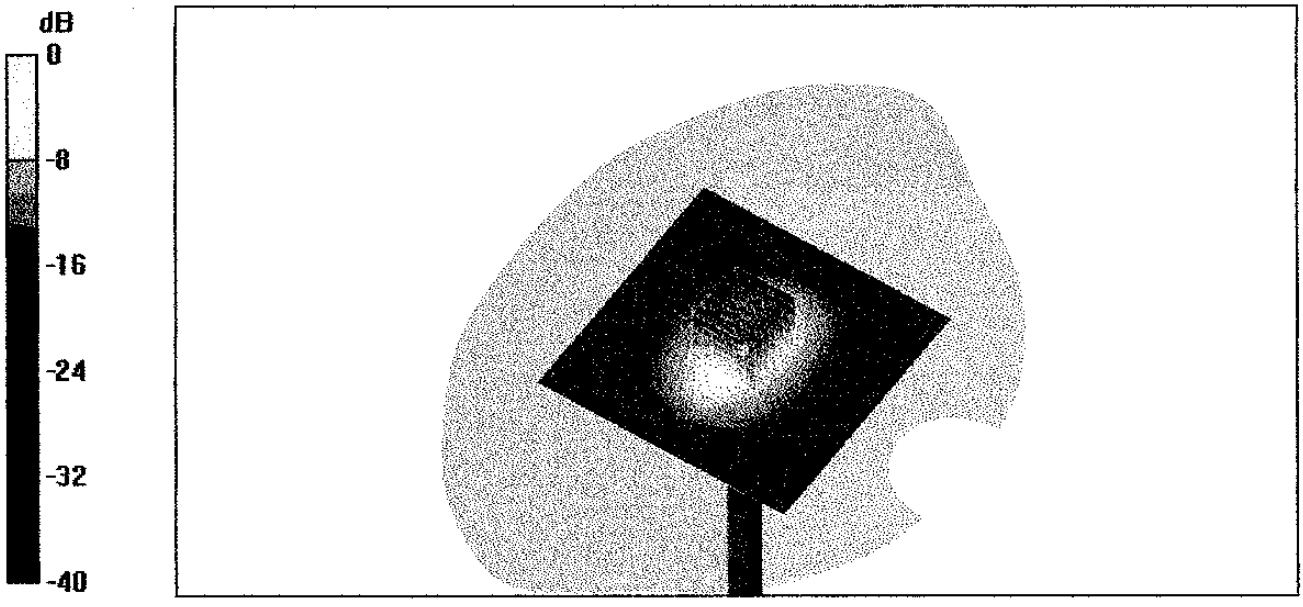
Communication System: CW-1800; Frequency: 1800 MHz;Duty Cycle: 1:1
Medium: Muscle 1800 MHz (σ = 1.49 mho/m, ε_r = 51.55, ρ = 1000 kg/m^3)
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(5, 5, 5); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- *Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115*

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 89.6 V/m
Power Drift = 0.02 dB
Maximum value of SAR = 10.3 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 15.1 W/kg
SAR(1 g) = 9.17 mW/g; SAR(10 g) = 4.9 mW/g
Reference Value = 89.6 V/m
Power Drift = 0.02 dB
Maximum value of SAR = 10.3 mW/g



0 dB = 10.3mW/g

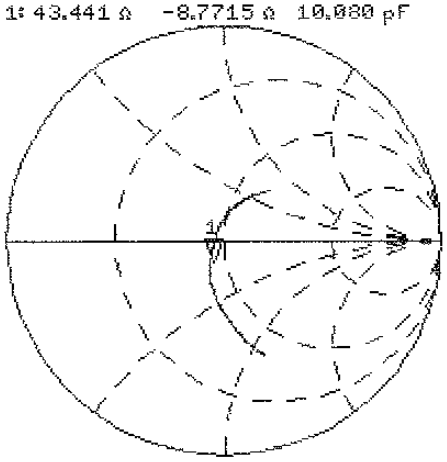
2d003
Body

14 May 2003 10:12:49

CH1 S11 1 U FS 1: 43.441 Ω -8.7715 Ω 10.080 pF 1 800.000 000 MHz

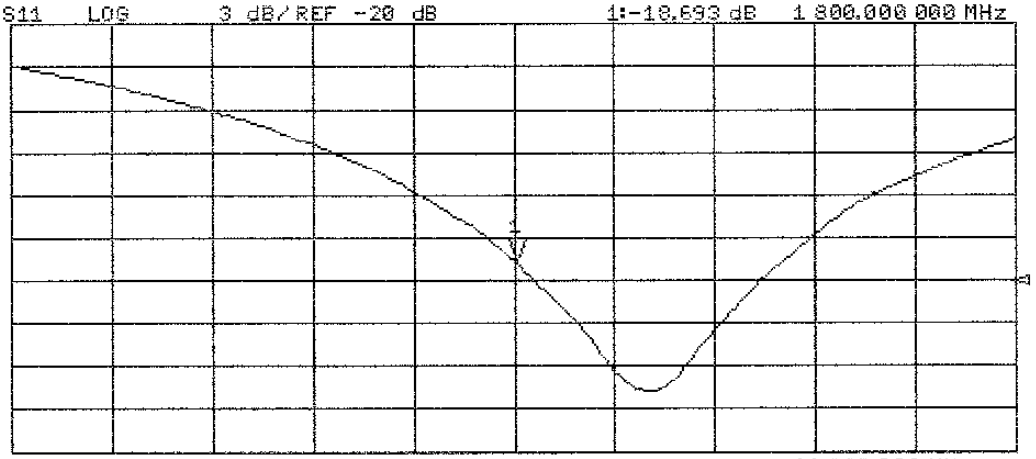
Del

PRm
Cor
Avg
16



CH2 S11 LOG 3 dB/ REF -20 dB 1:-18.693 dB 1 800.000 000 MHz

PRm
Cor



CENTER 1 800.000 000 MHz SPAN 400.000 000 MHz

Appendix 5 Photographs of EUT

This appendix contains the following photographs:

Photo Reference Number	Title
PHT/45320JD07/001	Sample 2 Display
PHT/45320JD07/002	Sample 2 Open Display and Keypad
PHT/45320JD07/003	Sample 2 Open Rear
PHT/45320JD07/004	Sample 2 Rear
PHT/45320JD07/005	Front of Case
PHT/45320JD07/006	Rear of Case
PHT/45320JD07/007	PHF
PHT/45320JD07/008	Left view of set up, Body position with PHF, Rear facing phantom
PHT/45320JD07/009	Right view of set up, Body position with PHF, Rear facing phantom
PHT/45320JD07/010	Body position with PHF Rear facing phantom Sample 2
PHT/45320JD07/011	Body position with PHF and case, Rear facing phantom Sample 2
PHT/45320JD07/012	1900 MHz Fluid Level

These pages are not included in the total number of pages for this report.

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PHT/45320JD07/001 Sample 2 Display

PHT/45320JD07/002 Sample 2 Open Display and Keypad

PHT/45320JD07/003 Sample 2 Open Rear

PHT/45320JD07/004 Sample 2 Rear

PHT/45320JD07/005 Front of Case

PHT/45320JD07/006 Rear of Case

PHT/45320JD07/007 PHF

PHT/45320JD07/008 Left view of set up, Body position with PHF, Rear facing phantom

PHT/45320JD07/009 Right view of set up, Body position with PHF, Rear facing phantom

PHT/45320JD07/010 Body position with PHF Rear facing phantom Sample 2

PHT/45320JD07/011 Body position with PHF and case, Rear facing phantom Sample 2

PHT/45320JD07/0012 1900 MHz Fluid Level