APPENDIX A: SAR MEASUREMENT REPORT

See SAR Report S/N 051602-252128 that follows.

CERTIFICATE OF COMPLIANCE
SAR EVALUATION

Test Lab:	Applicant Information:
CELLTECH RESEARCH INC. Testing and Engineering Lab 1955 Moss Court Kelowna, B.C. Canada V1Y 9L3 Phone: 250 - 860-3130 Fax: 250 - 860-3110 e-mail: info@celltechlabs.com web site: www.celltechlabs.com	**ZEBRA TECHNOLOGIES CORPORATION** 30 Plan Way Warwick, RI 02886

FCC Rule Part(s):	**2.1093; ET Docket 93-62**
FCC ID:	**I28-QL320352**
Model(s):	**QL 320**
Equipment Type:	**Mobile Printer with 2.4GHz DSSS Wireless LAN Card**
Equipment Classification:	**Part 15 Spread Spectrum Transmitter (DSS)**
Modulation:	**Direct Sequence Spread Spectrum (DSSS)**
Tx Frequency Range:	**2412 - 2480 MHz**
Conducted Power Tested:	**22.0 dBm (2412 MHz)** **21.5 dBm (2437 MHz)** **21.5 dBm (2480 MHz)**
Antenna Type:	**Internal**
Power Supply:	**7.4VDC Lithium-Ion Battery (2100mAh)**
Body-Worn Accessories:	**Belt-Clip, Shoulder Harness**

Celltech Research Inc. declares under its sole responsibility that this device was found to be in compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC OET Bulletin 65, Supplement C, Edition 01-01, and Industry Canada RSS-102 Issue 1 (General Population/Uncontrolled Exposure), and was tested in accordance with the appropriate measurement standards, guidelines, and recommended practices specified in American National Standards Institute C95.1-1992.

I attest to the accuracy of data. All measurements were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Research Inc. The results and statements contained in this report pertain only to the device(s) evaluated.

Shawn McMillen
General Manager
Celltech Research Inc.

TABLE OF CONTENTS

1.0 INTRODUCTION

This measurement report shows that the ZEBRA TECHNOLOGIES CORPORATION Model: QL 320 Mobile Printer with 2.4GHz DSSS Wireless LAN Card FCC ID: I28-QL320352 complies with the requirements and procedures specified in FCC Rule Part 2.1093, ET Docket 93-62 (See Reference [1]), and Industry Canada RSS-102 Issue 1 (See Reference [2]) for mobile and portable devices. The test procedures described in American National Standards Institute C95.1-1992 (See Reference [3]) and FCC OET Bulletin 65, Supplement C, Edition 01-01 (See Reference [4]) were employed. A description of the device, operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the various provisions of the rules are included within this test report.

2.0 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

Equipment Type	Mobile Printer with DSSS Wireless LAN Card
Equipment Classification	Part 15 Spread Spectrum Transmitter (DSS)
Modulation	Direct Sequence Spread Spectrum
Tx Frequency Range	2412 - 2480 MHz
FCC ID	I28-QL320352
Model(s)	QL 320
S/N No.	Pre-production
Antenna Type	Internal
RF Conducted Output Power Tested	22.0 dBm (2412MHz) 21.5 dBm (2437MHz) 21.5 dBm (2480MHz)
Power Supply	7.4VDC Lithium-Ion Battery (2100mAh)

3.0 SAR MEASUREMENT SYSTEM

Celltech Research SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY system is comprised of the robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for brain or body SAR evaluations. 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 utilizes a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, 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.

DASY3 SAR Measurement System with SAM phantom

4.0 MEASUREMENT SUMMARY

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the EUT are reported in Appendix A.

BODY SAR MEASUREMENT RESULTS									
Freq. (MHz)	**Channel**	**Mode Tested**	**Cond. Power Before (dBm)**	**Cond. Power After (dBm)**	**Test Position**	**Phantom Section**	**Separation Distance (cm)**	**Body-Worn Accessory**	**SAR 1g (w/kg)**
2412	Low	CW	22.0	21.8	Top Side of EUT (Antenna/Printer Side)	Planar	1.0	-	0.819
2437	Mid	CW	21.5	21.3	Top Side of EUT (Antenna/Printer Side)	Planar	1.0	-	0.631
2480	High	CW	21.5	21.4	Top Side of EUT (Antenna/Printer Side)	Planar	1.0	-	0.579
2437	Mid	CW	21.5	21.4	Bottom Side of EUT (Battery Side)	Planar	0.0	Belt-Clip	0.0039
2437	Mid	CW	21.5	21.3	Bottom Side of EUT (Battery Side)	Planar	0.0	Shoulder Harness	0.0034
2437	Mid	CW	21.5	21.4	Front End of EUT (LCD Side)	Planar	0.0	-	0.0245
2437	Mid	CW	21.5	21.3	Left Side of EUT	Planar	0.0	-	0.0253
2437	Mid	CW	21.5	21.4	Right Side of EUT	Planar	0.0	-	0.0238
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak - Uncontrolled Exposure / General Population** **BODY: 1.6 W/kg (averaged over 1 gram)**									

Measured Mixture Type	**Body**	**Relative Humidity**	**62 %**
Dielectric Constant	**51.6**	**Atmospheric Pressure**	**101.0 kPa**
Conductivity	**1.99**	**Fluid Temperature**	**≈ 23 °C**
Ambient Temperature	**23.9 °C**	**Fluid Depth**	**≥ 15 cm**

Notes:

1. The SAR values measured were below the maximum limit of 1.6 w/kg (averaged over 1 gram).
2. The highest body SAR value measured was 0.819 w/kg (low channel, top side of EUT).
3. The EUT was tested for body SAR with the top side (antenna/printer side) facing the outer surface of the planar phantom. A 1.0 cm separation distance was maintained between the top side of the EUT and the outer surface of the planar phantom.
4. The EUT was tested for body SAR with the bottom side (battery side) facing the outer surface of the planar phantom and with the belt-clip accessory attached. The belt-clip and the printer end of the EUT were touching the outer surface of the planar phantom.
5. The EUT was tested for body SAR with the bottom side (battery side) touching the outer surface of the planar phantom, with the belt-clip removed, and the shoulder harness accessory attached.
6. The EUT was tested for body SAR with the front end (LCD side) touching the outer surface of the planar phantom.
7. The EUT was tested for body SAR with the left side touching the outer surface of the planar phantom.
8. The EUT was tested for body SAR with the right side touching the outer surface of the planar phantom.
9. During the entire test the conducted power was maintained to within 5% of the initial conducted power.

5.0 DETAILS OF SAR EVALUATION

The ZEBRA TECHNOLOGIES CORPORATION Model: QL 320 Mobile Printer with 2.4GHz DSSS Wireless LAN Card FCC ID: I28-QL320352 was found to be compliant for localized Specific Absorption Rate based on the following test provisions and conditions:

1. The EUT was tested for body SAR with the top side (antenna/printer side) of the device facing the outer surface of the planar phantom. A 1.0 cm separation distance was maintained between the top side of the EUT and the outer surface of the planar phantom.
2. The EUT was tested for body SAR with the bottom side (battery side) of the device facing the outer surface of the planar phantom, and with the belt-clip accessory attached. The belt-clip and the printer end of the EUT were touching the outer surface of the planar phantom.
3. The EUT was tested for body SAR with the bottom side (battery side) of the device touching the outer surface of the planar phantom, with the shoulder harness accessory attached (belt-clip was removed).
4. The EUT was tested for body SAR with the top end (LCD side) of the device touching the outer surface of the planar phantom.
5. The EUT was tested for body SAR with the left side of the device touching the outer surface of the planar phantom.
6. The EUT was tested for body SAR with the right side of the device touching the outer surface of the planar phantom.
7. The EUT was evaluated for body SAR at maximum power and the unit was operated for an appropriate period prior to the evaluation in order to minimize drift. The conducted power levels were checked before and after each test. If the conducted power level decreased more than 5% of the initial power level, then the EUT was retested. Any unusual anomalies over the course of the test also warranted a re-evaluation. The conducted power was measured according to the procedures described in FCC Part 2.1046.
8. If the SAR values measured for mid channel were 3.0dB or greater below the SAR limit of 1.6 w/kg, then only mid channel data was reported.
9. The EUT was placed into test mode using internal software and operated at maximum power in continuous transmit mode for the duration of the test.
10. The location of the maximum spatial SAR distribution (Hot Spot) was determined relative to the EUT and its antenna.
11. The EUT was tested with a fully charged battery.

6.0 EVALUATION PROCEDURES

a. (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation, both the left and right ear positions were evaluated in accordance with FCC OET Bulletin 65, Supplement C (Edition 01-01) using the SAM phantom.
(ii) For body-worn and face-held devices a planar phantom was used.
b. The SAR was determined by a pre-defined procedure within the DASY3 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 20mm x 20mm.
c. A 5x5x7 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. The depth of the simulating tissue in the planar phantom used for the SAR evaluation and system validation was no less than 15.0 cm.
e. For this particular evaluation, a stack of low-density, low-loss dielectric foamed polystyrene was used in place of the device holder.

7.0 SYSTEM VALIDATION

Prior to the assessment, the system was verified in the planar section of the SAM phantom with a 2450MHz dipole. A forward power of 250mW was applied to the dipole and system was verified to a tolerance of ±10%. The applicable verifications are listed below (see Appendix B for system validation test plot and Appendix C for dipole calibration information).

Dipole Validation Kit	Target SAR 1g (w/kg)	Measured SAR 1g (w/kg)	Ambient Temp.	Fluid Temp.	Fluid Depth	Validation Date
2450MHz	14.2	14.8	23.9°C	≈ 23.0°C	≥ 15 cm	05/29/02

8.0 TISSUE PARAMETERS

The dielectric parameters of the fluids were verified prior to the SAR evaluation using an 85070C Dielectric Probe Kit and an 8753E Network Analyzer. The dielectric parameters of the fluid are listed below (see Appendix E for printout of measured fluid dielectric parameters).

BRAIN TISSUE PARAMETERS - SYSTEM VALIDATION			
Equivalent Tissue	**Dielectric Constant ε_r**	**Conductivity σ (mho/m)**	**ρ (Kg/m³)**
2450MHz Brain (Target)	**39.2 ±5%**	**1.80 ±5%**	**1000**
2450MHz Brain (Measured - 05/29/02)	39.5	1.83	1000

BODY TISSUE PARAMETERS - EUT EVALUATION			
Equivalent Tissue	**Dielectric Constant ε_r**	**Conductivity σ (mho/m)**	**ρ (Kg/m³)**
2450MHz Body (Target)	**52.7 ±5%**	**1.95 ±5%**	**1000**
2450MHz Body (Measured - 05/29/02)	51.6	1.99	1000

9.0 EQUIVALENT TISSUES

The 2450MHz brain and body mixtures consist of consist of Glycol-monobutyl, water, and salt. The fluid was prepared according to standardized procedures and measured for dielectric parameters (permitivity and conductivity).

TISSUE MIXTURES		
INGREDIENT	**2450MHz Brain Mixture (System Validation)**	**2450MHz Body Mixture (EUT Evaluation)**
Water	55.20 %	69.95 %
Glycol Monobutyl	44.80 %	30.00 %
Salt	-	0.05 %

10.0 SAR SAFETY LIMITS

EXPOSURE LIMITS	**SAR (W/Kg)**	
	(General Population / Uncontrolled Exposure Environment)	**(Occupational / Controlled Exposure Environment)**
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	1.60	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

Notes:

1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.
2. Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

11.0 ROBOT SYSTEM SPECIFICATIONS

Specifications

POSITIONER:	Stäubli Unimation Corp. Robot Model: RX60L
Repeatability:	0.02 mm
No. of axis:	6

Data Acquisition Electronic (DAE) System

Cell Controller

Processor:	Pentium III
Clock Speed:	450 MHz
Operating System:	Windows NT
Data Card:	DASY3 PC-Board

Data Converter

Features:	Signal Amplifier, multiplexer, A/D converter, and control logic
Software:	DASY3 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-bit A/D converter for surface detection system serial link to robot direct emergency stop output for robot

E-Field Probe

Model:	ET3DV6
Serial No.:	1387
Construction:	Triangular core fiber optic detection system
Frequency:	10 MHz to 6 GHz
Linearity:	±0.2 dB (30 MHz to 3 GHz)

Phantom

Type:	SAM V4.0C
Shell Material:	Fiberglass
Thickness:	2.0 ±0.1 mm
Volume:	Approx. 20 liters

12.0 PROBE SPECIFICATION (ET3DV6)

Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g. glycol)
Calibration:	In air from 10 MHz to 2.5 GHz In brain simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy ± 8%)
Frequency:	10 MHz to >6 GHz; Linearity: ±0.2 dB (30 MHz to 3 GHz)
Directivity:	±0.2 dB in brain tissue (rotation around probe axis) ±0.4 dB in brain tissue (rotation normal to probe axis)
Dynam. Rnge:	5 μW/g to >100 mW/g; Linearity: ±0.2 dB
Srfce. Detect.	±0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Dimensions:	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application:	General dosimetry up to 3 GHz Compliance tests of mobile phone


ET3DV6 E-Field Probe

13.0 SAM PHANTOM V4.0C

The SAM phantom V4.0C is a fiberglass shell phantom with a 2.0 mm shell thickness for left and right head and flat planar area integrated in a wooden table. The shape of the fiberglass shell corresponds to the phantom defined by SCC34-SC2. The device holder positions are adjusted to the standard measurement positions in the three sections.


SAM Phantom

14.0 DEVICE HOLDER

The DASY3 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.


Device Holder

15.0 TEST EQUIPMENT LIST

SAR MEASUREMENT SYSTEM		
EQUIPMENT	**SERIAL NO.**	**CALIBRATION DATE**
DASY3 System -Robot -ET3DV6 E-Field Probe -300MHz Validation Dipole -450MHz Validation Dipole -900MHz Validation Dipole -1800MHz Validation Dipole -2450MHz Validation Dipole -SAM Phantom V4.0C -Small Planar Phantom -Large Planar Phantom	 599396-01 1387 135 136 054 247 150 N/A N/A N/A	 N/A Feb 2002 Oct 2001 Oct 2001 June 2001 June 2001 Oct 2001 N/A N/A N/A
85070C Dielectric Probe Kit	N/A	N/A
Gigatronics 8652A Power Meter -Power Sensor 80701A -Power Sensor 80701A	1835272 1833535 1833542	Feb 2002 Feb 2002 Mar 2002
E4408B Spectrum Analyzer	US39240170	Nov 2001
8594E Spectrum Analyzer	3543A02721	Feb 2002
8753E Network Analyzer	US38433013	Feb 2002
8648D Signal Generator	3847A00611	Feb 2002
5S1G4 Amplifier Research Power Amplifier	26235	N/A

16.0 MEASUREMENT UNCERTAINTIES

Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	c_i 1g	Standard Uncertainty ±% (1g)	v_i or v_{eff}
Measurement System						
Probe calibration	± 4.8	Normal	1	1	± 4.8	∞
Axial isotropy of the probe	± 4.7	Rectangular	√3	$(1-c_p)$	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	√3	(c_p)	± 3.9	∞
Spatial resolution	± 0.0	Rectangular	√3	1	± 0.0	∞
Boundary effects	± 5.5	Rectangular	√3	1	± 3.2	∞
Probe linearity	± 4.7	Rectangular	√3	1	± 2.7	∞
Detection limit	± 1.0	Rectangular	√3	1	± 0.6	∞
Readout electronics	± 1.0	Normal	1	1	± 1.0	∞
Response time	± 0.8	Rectangular	√3	1	± 0.5	∞
Integration time	± 1.4	Rectangular	√3	1	± 0.8	∞
RF ambient conditions	± 3.0	Rectangular	√3	1	± 1.7	∞
Mech. constraints of robot	± 0.4	Rectangular	√3	1	± 0.2	∞
Probe positioning	± 2.9	Rectangular	√3	1	± 1.7	∞
Extrapolation & integration	± 3.9	Rectangular	√3	1	± 2.3	∞
Test Sample Related						
Device positioning	± 6.0	Normal	√3	1	± 6.7	12
Device holder uncertainty	± 5.0	Normal	√3	1	± 5.9	8
Power drift	± 5.0	Rectangular	√3		± 2.9	∞
Phantom and Setup						
Phantom uncertainty	± 4.0	Rectangular	√3	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid conductivity (measured)	± 10.0	Rectangular	√3	0.6	± 3.5	∞
Liquid permitivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permitivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Combined Standard Uncertainty					**± 13.6**	
Expanded Uncertainty (k=2)					**± 27.1**	

Measurement Uncertainty Table in accordance with IEEE Std 1528 (Draft - see reference [5])

17.0 REFERENCES

[1] Federal Communications Commission, ET Docket 93-62, "Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation", Aug. 1996.

[2] Industry Canada, "Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields", Radio Standards Specification RSS-102 Issue 1 (Provisional): September 1999.

[3] ANSI, ANSI/IEEE C95.1: 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: 1992.

[4] Federal Communications Commission, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.

[5] IEEE Standards Coordinating Committee 34, Std. P1528, DRAFT Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques: Draft, December 2001.

[6] 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: January 1996.

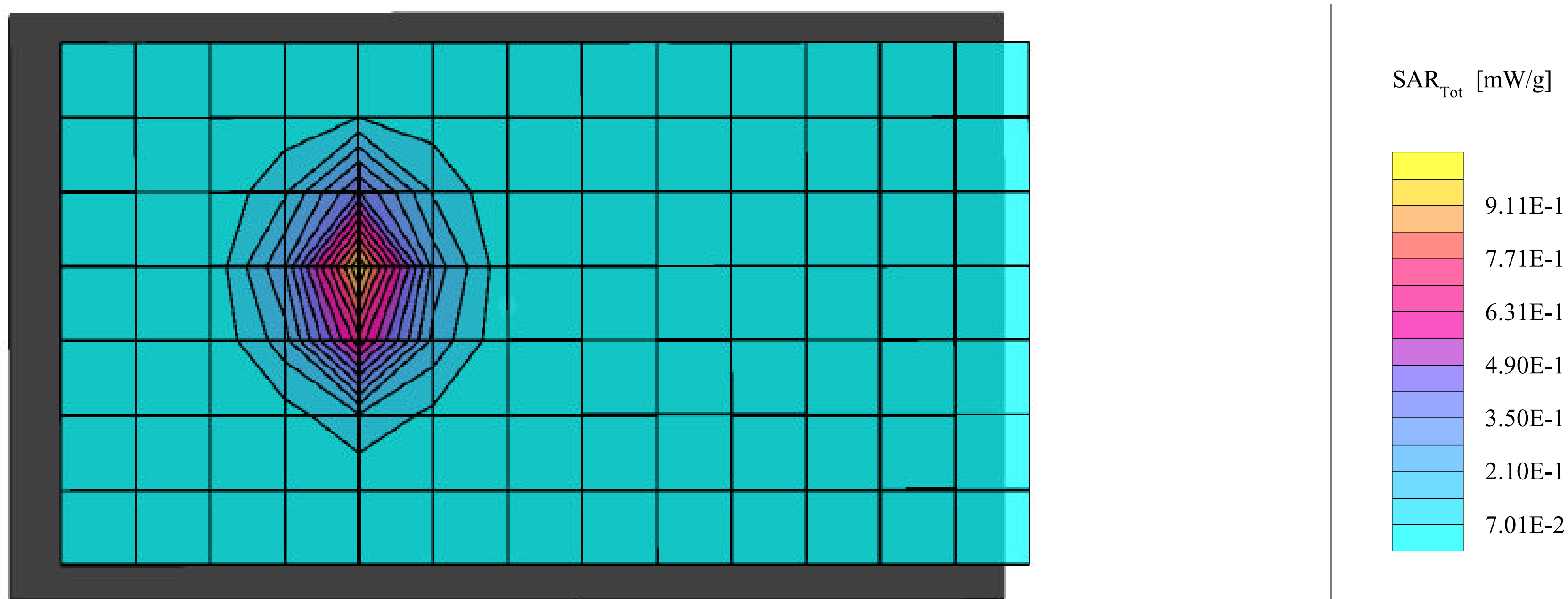
[7] Niels Kuster, Ralph Kastle, and Thomas Schmid, "Dosimetric evaluation of mobile communications equipment with know precision", IEICE Transactions of Communications, vol. E80-B, no. 5, pp. 645-652: May 1997.

APPENDIX A - SAR MEASUREMENT DATA

Zebra Technologies Corp. FCC ID: I28-QL320352

SAM Phantom; Flat Section; Position: (90°,90°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.99 mho/m ε_r = 51.6 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.20 dB
SAR (1g): 0.819 mW/g, SAR (10g): 0.394 mW/g

Body SAR - Top Side of EUT (Antenna/Printer Side)
1.0 cm Separation Distance
QL 320 Mobile Printer with DSSS WLAN Card
CW Mode
Low Channel [2412 MHz]
Conducted Power: 22.0 dBm
Ambient Temp: 23.9°C; Fluid Temp: 23.0°C
Date Tested: May 29, 2002

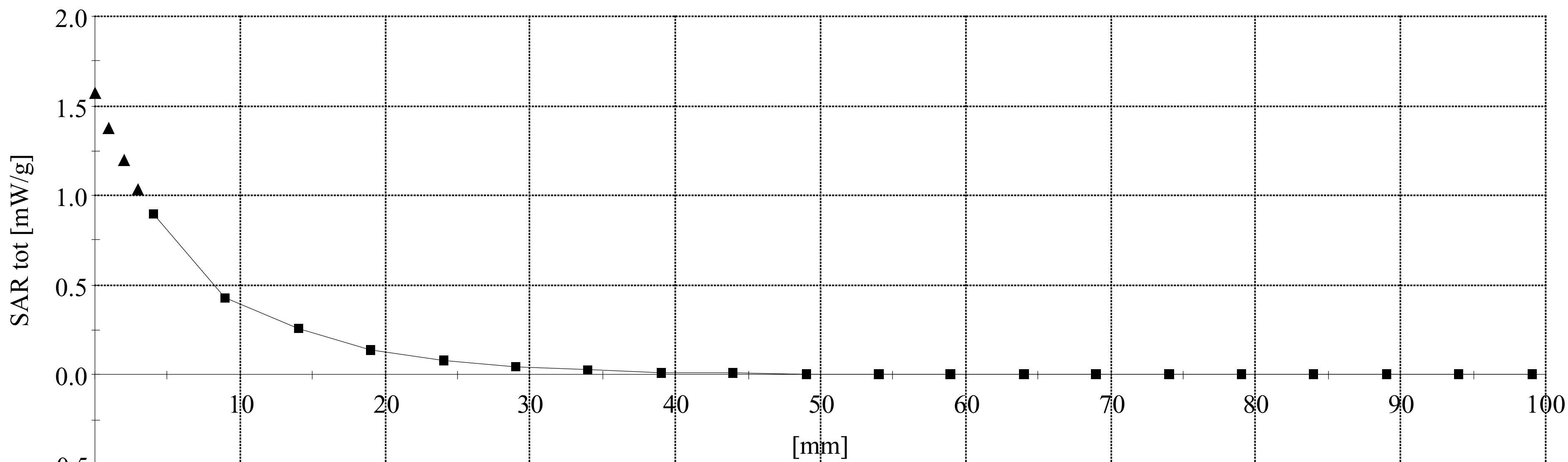


Zebra Technologies Corp. FCC ID: I28-QL320352

SAM Phantom; Flat Section
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: $\sigma = 1.99$ mho/m $\varepsilon_r = 51.6$ $\rho = 1.00$ g/cm^3

Z-Axis Extrapolation at Peak SAR Location

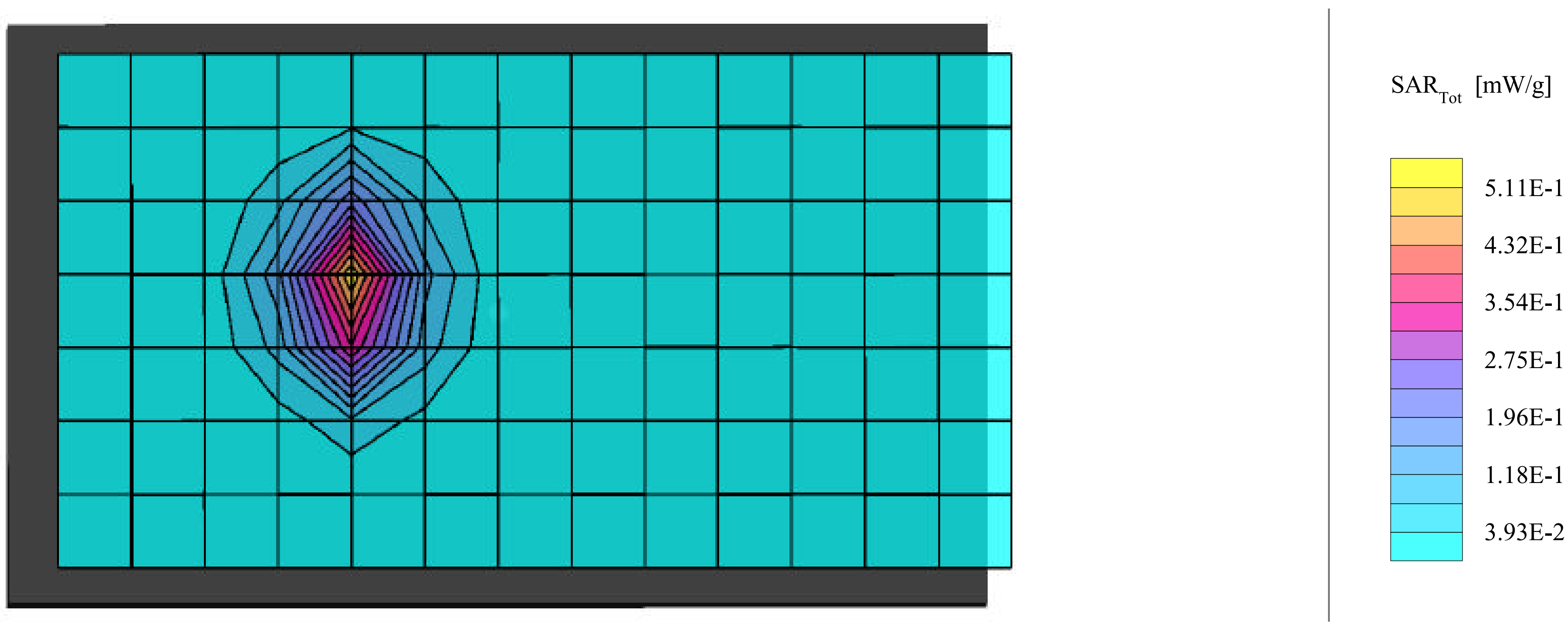
Body SAR - Top Side of EUT (Antenna/Printer Side)
1.0 cm Separation Distance
QL 320 Mobile Printer with DSSS WLAN Card
CW Mode
Low Channel [2412 MHz]
Conducted Power: 22.0 dBm
Ambient Temp: 23.9°C; Fluid Temp: 23.0°C
Date Tested: May 29, 2002



Zebra Technologies Corp. FCC ID: I28-QL320352

SAM Phantom; Flat Section; Position: (90°,90°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.99 mho/m ε_r = 51.6 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.20 dB
SAR (1g): 0.631 mW/g, SAR (10g): 0.302 mW/g

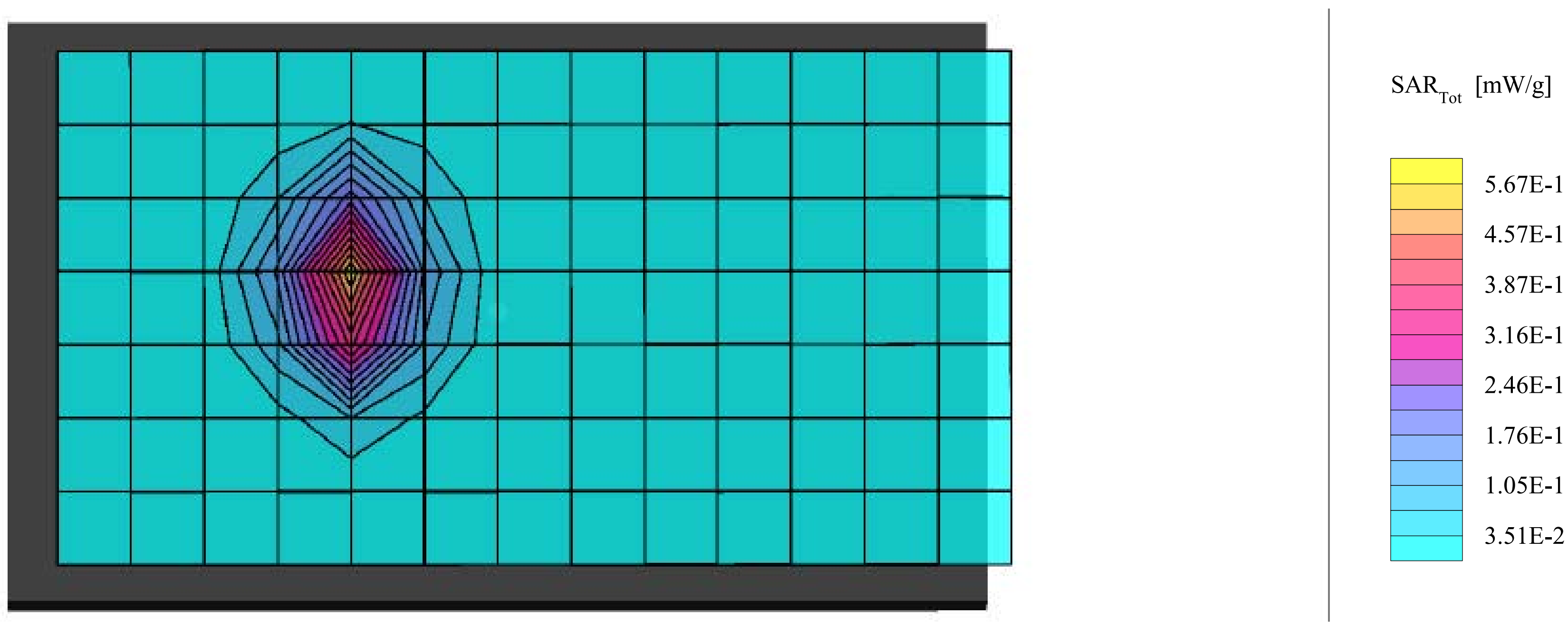
Body SAR - Top Side of EUT (Antenna/Printer Side)
1.0 cm Separation Distance
QL 320 Mobile Printer with DSSS WLAN Card
CW Mode
Mid Channel [2437 MHz]
Conducted Power: 21.5 dBm
Ambient Temp: 23.9°C; Fluid Temp: 23.0°C
Date Tested: May 29, 2002



Zebra Technologies Corp. FCC ID: I28-QL320352

SAM Phantom; Flat Section; Position: (90°,90°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.99 mho/m ε_r = 51.6 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.14 dB
SAR (1g): 0.579 mW/g, SAR (10g): 0.276 mW/g

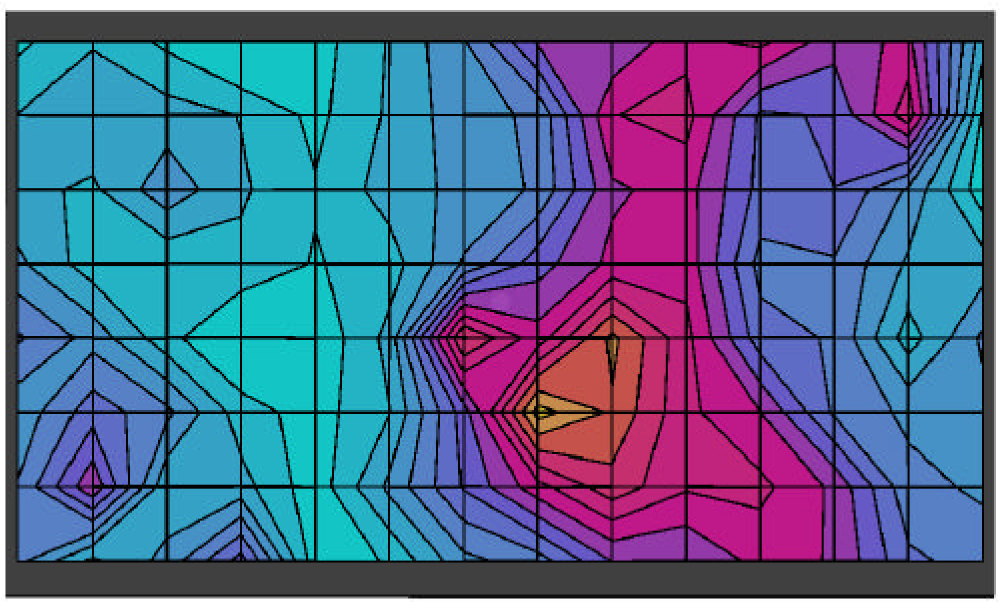
Body SAR - Top Side of EUT (Antenna/Printer Side)
1.0 cm Separation Distance
QL 320 Mobile Printer with DSSS WLAN Card
CW Mode
High Channel [2480 MHz]
Conducted Power: 21.5 dBm
Ambient Temp: 23.9°C; Fluid Temp: 23.0°C
Date Tested: May 29, 2002

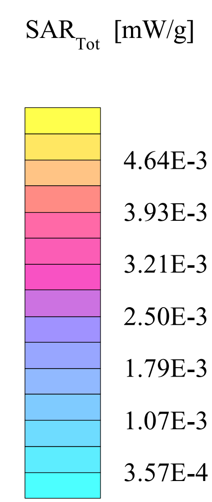


Zebra Technologies Corp. FCC ID: I28-QL320352

SAM Phantom; Flat Section; Position: (90°,90°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: $\sigma = 1.99$ mho/m $\varepsilon_r = 51.6$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.15 dB
SAR (1g): 0.0039 mW/g, SAR (10g): 0.0024 mW/g

Body SAR - Bottom Side of EUT (Battery Side)
With Belt-Clip Accessory
Belt-Clip & Printer End Touching Planar Phantom
QL 320 Mobile Printer with DSSS WLAN Card
CW Mode
Mid Channel [2437 MHz]
Conducted Power: 21.5 dBm
Ambient Temp: 23.9°C; Fluid Temp: 23.0°C
Date Tested: May 29, 2002





Zebra Technologies Corp. FCC ID: I28-QL320352

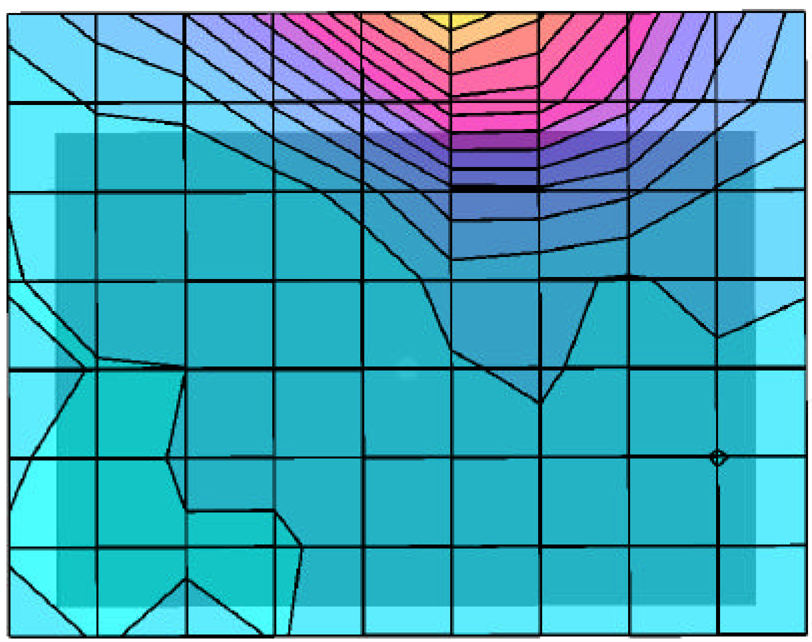
SAM Phantom; Flat Section; Position: (90°,90°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.99 mho/m ε_r = 51.6 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.20 dB
SAR (1g): 0.0034 mW/g, SAR (10g): 0.0018 mW/g

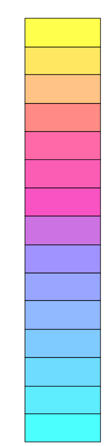
Body SAR - Bottom Side of EUT (Battery Side)
With Shoulder Harness Accessory
0.0 cm Separation Distance
QL 320 Mobile Printer with DSSS WLAN Card
CW Mode
Mid Channel [2437 MHz]
Conducted Power: 21.5 dBm
Ambient Temp: 23.9°C; Fluid Temp: 23.0°C
Date Tested: May 29, 2002

Zebra Technologies Corp. FCC ID: I28-QL320352

SAM Phantom; Flat Section; Position: (90°,180°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.99 mho/m ε_r = 51.6 ρ = 1.00 g/cm³
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.15 dB
SAR (1g): 0.0245 mW/g, SAR (10g): 0.0158 mW/g

Body SAR - Front End of EUT (LCD Side)
0.0 cm Separation Distance
QL 320 Mobile Printer with DSSS WLAN Card
CW Mode
Mid Channel [2437 MHz]
Conducted Power: 21.5 dBm
Ambient Temp: 23.9°C; Fluid Temp: 23.0°C
Date Tested: May 29, 2002

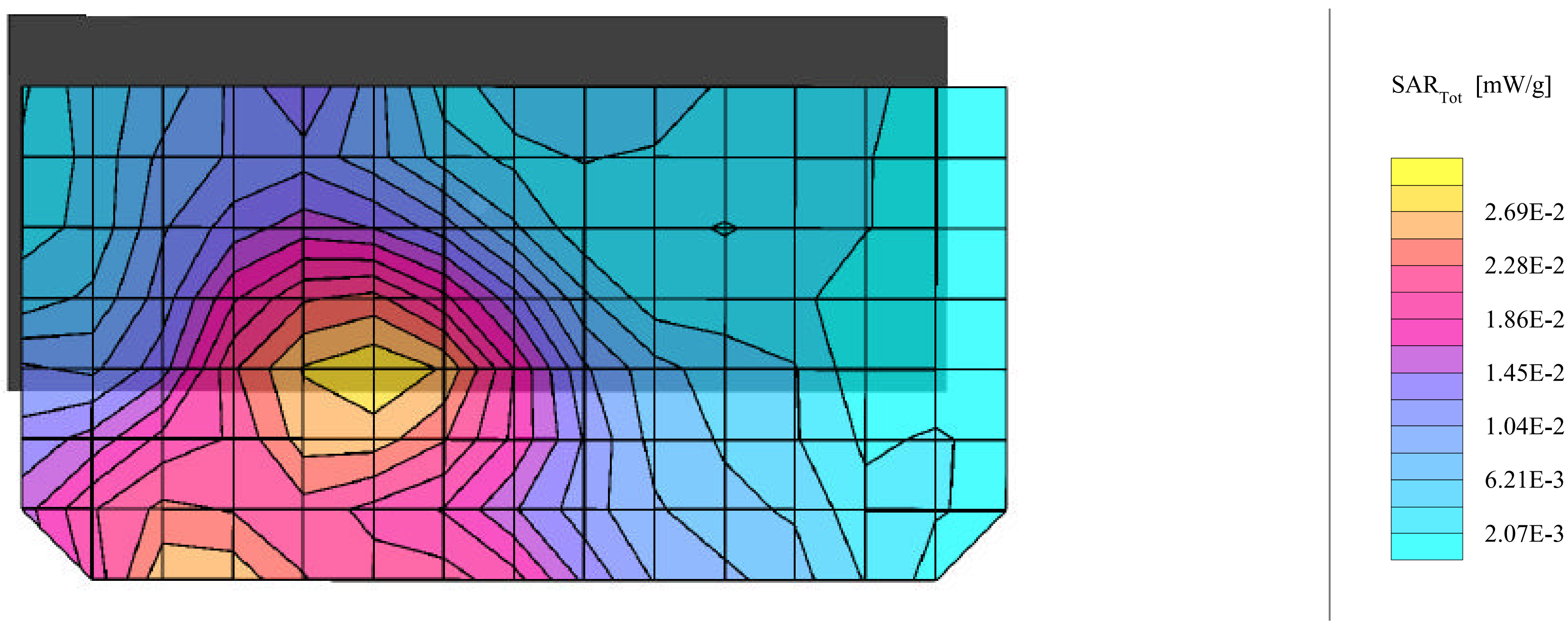




Zebra Technologies Corp. FCC ID: I28-QL320352

SAM Phantom; Flat Section; Position: (90°,90°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.99 mho/m ε_r = 51.6 ρ = 1.00 g/cm³
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: 0.20 dB
SAR (1g): 0.0253 mW/g, SAR (10g): 0.0157 mW/g

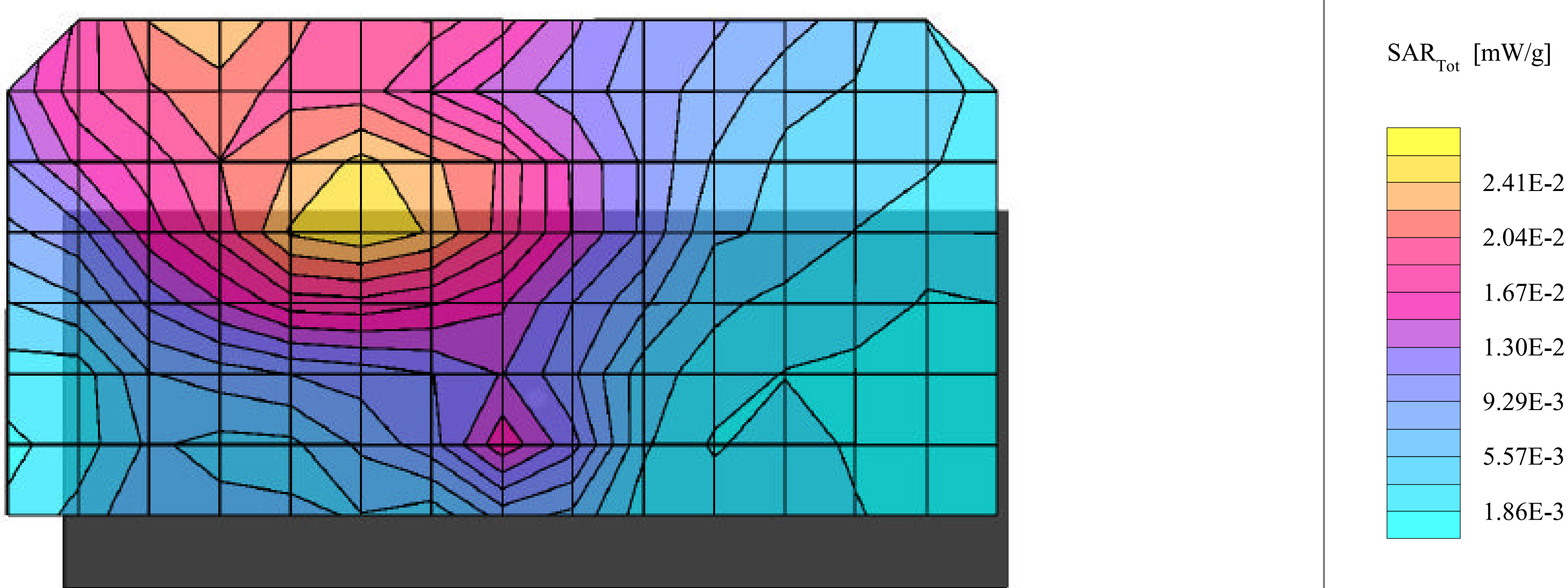
Body SAR - Left Side of EUT
0.0 cm Separation Distance
QL 320 Mobile Printer with DSSS WLAN Card
CW Mode
Mid Channel [2437 MHz]
Conducted Power: 21.5 dBm
Ambient Temp: 23.9°C; Fluid Temp: 23.0°C
Date Tested: May 29, 2002



Zebra Technologies Corp. FCC ID: I28-QL320352

SAM Phantom; Flat Section; Position: (90°,90°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.99 mho/m ε_r = 51.6 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.15 dB
SAR (1g): 0.0238 mW/g, SAR (10g): 0.0144 mW/g

Body SAR - Right Side of EUT
0.0 cm Separation Distance
QL 320 Mobile Printer with DSSS WLAN Card
CW Mode
Mid Channel [2437 MHz]
Conducted Power: 21.5 dBm
Ambient Temp: 23.9°C; Fluid Temp: 23.0°C
Date Tested: May 29, 2002

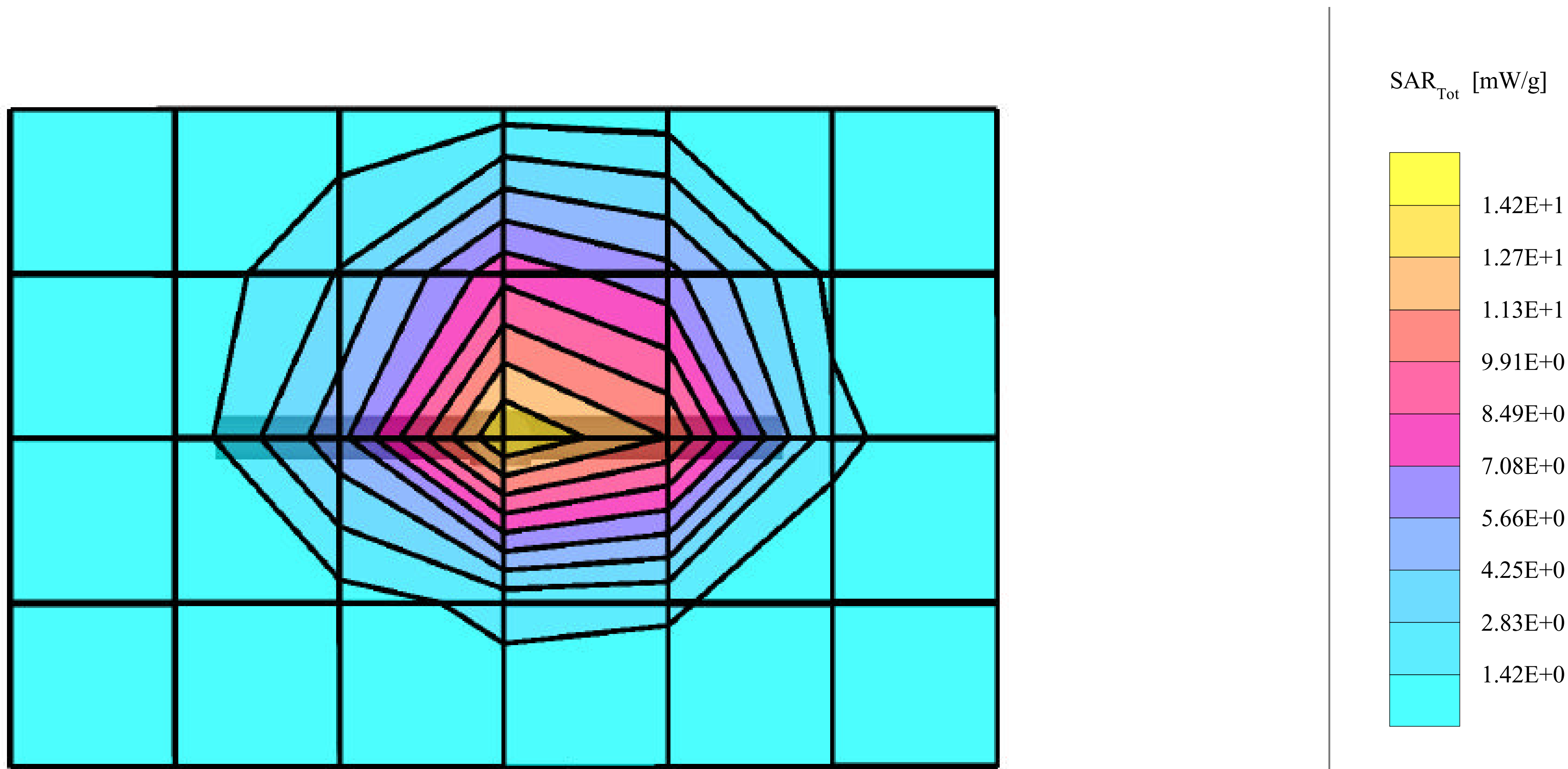


APPENDIX B - SYSTEM VALIDATION

Dipole 2450MHz

SAM Phantom; Flat Section
Probe: ET3DV6 - SN1387; ConvF(4.70,4.70,4.70); Crest factor: 1.0; 2450 MHz Brain: $\sigma = 1.83$ mho/m $\varepsilon_r = 39.5$ $\rho = 1.00$ g/cm^3
Cube 5x5x7: Peak: 31.8 mW/g, SAR (1g): 14.8 mW/g, SAR (10g): 6.63 mW/g, (Worst-case extrapolation)
Penetration depth: 6.0 (5.7, 6.7) [mm]
Powerdrift: 0.04 dB

Conducted Power: 250mW
Validation Date: May 29, 2002



APPENDIX C - DIPOLE CALIBRATION

Celltech
Testing and Engineering Services Lab

2450MHz SYSTEM VALIDATION DIPOLE

Type:	**2450MHz Validation Dipole**
Serial Number:	**150**
Place of Calibration:	**Celltech Research Inc.**
Date of Calibration:	**October 24, 2001**

Celltech Research Inc. hereby certifies that this device has been calibrated on the date indicated above.

Calibrated by:

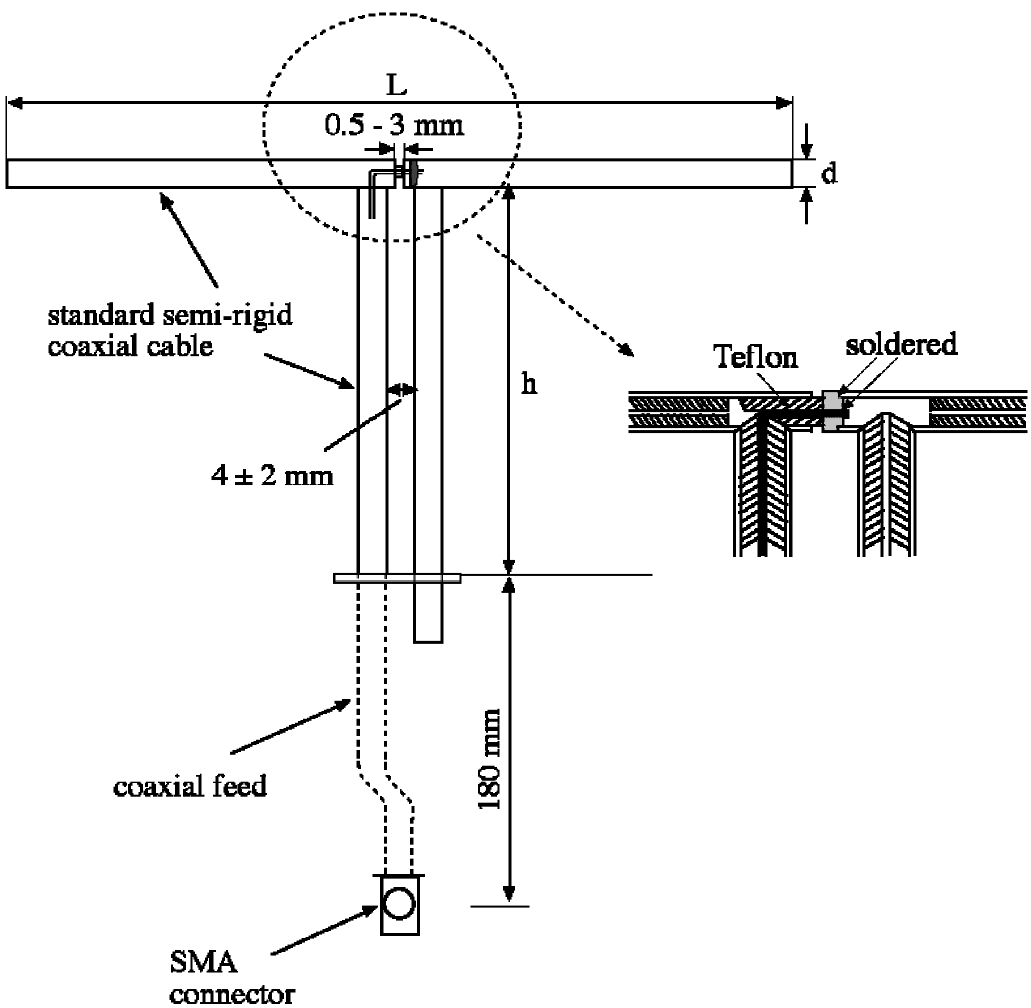
Approved by:

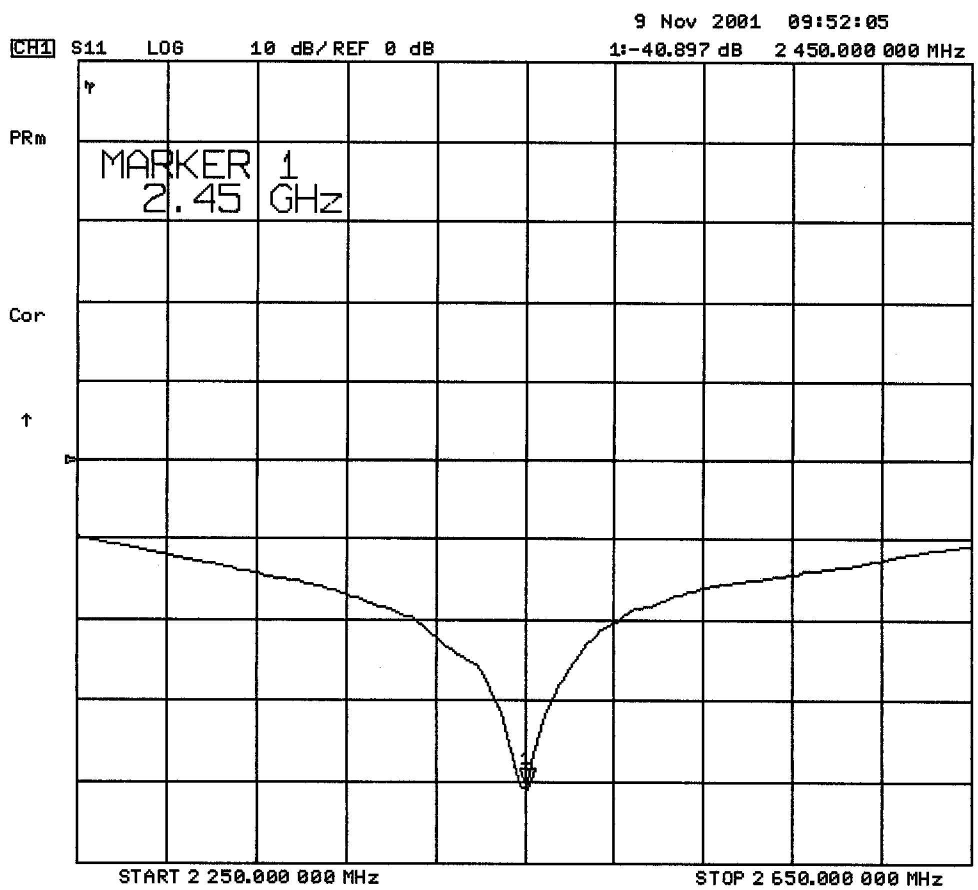
Celltech Research Inc. 1955 Moss Court, Kelowna, B.C. Canada V1Y 9L3
Tel. 250-860-3130 • Fax. 250-860-3110 • e-mail: info@celltechlabs.com
www.celltechlabs.com

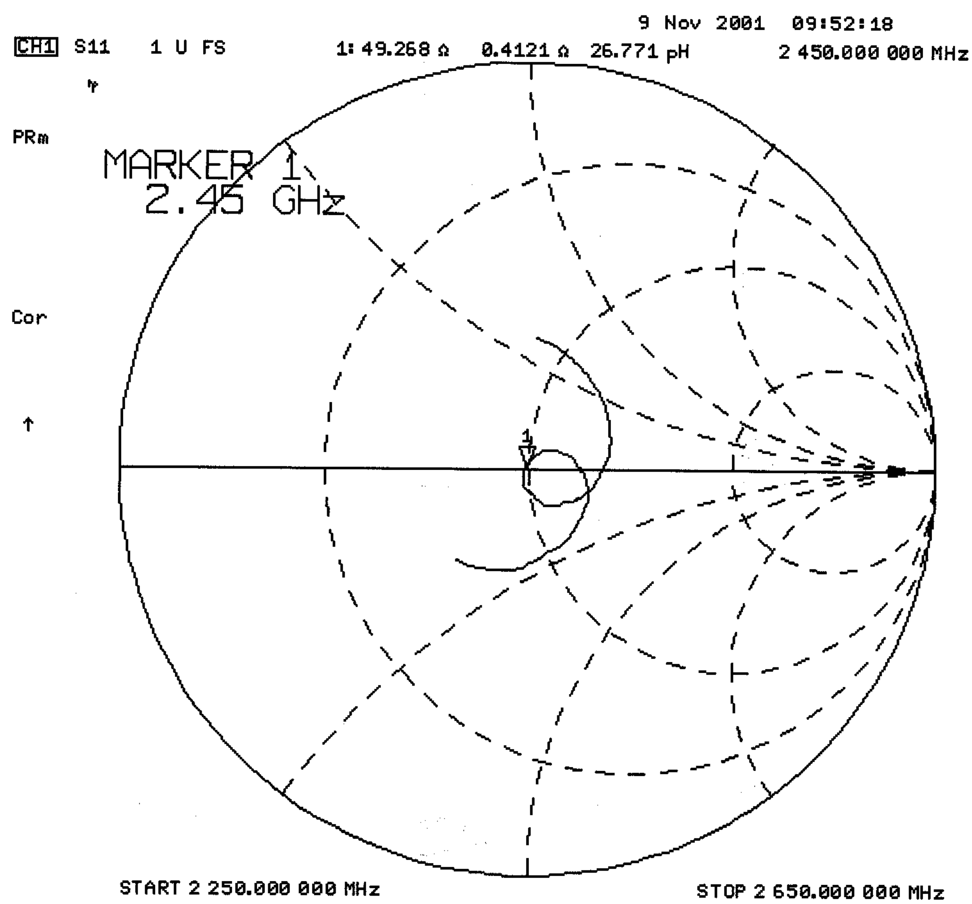
1. Dipole Construction & Electrical Characteristics

The validation dipole was constructed in accordance with the IEEE Std "Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques". The electrical properties were measured using an HP 8753E Network Analyzer. The network analyzer was calibrated to the validation dipole N-type connector feed point using an HP85032E Type N calibration kit. The dipole was placed parallel to a planar phantom at a separation distance of 10.0mm from the simulating fluid using a loss-less dielectric spacer. The measured input impedance is:

Feed point impedance at 2450MHz	Re{Z} = 49.268Ω
	Im{Z} = 0.4121Ω
Return Loss at 2450MHz	-40.897dB




9 Nov 2001 09:52:05
CH1 S11 LOG 10 dB/ REF 0 dB
1:-40.897 dB 2 450.000 000 MHz
PRm
MARKER 1
2.45 GHz
Cor
START 2 250.000 000 MHz
STOP 2 650.000 000 MHz


9 Nov 2001 09:52:18
CH1 S11 1 U FS
1: 49.268 Ω 0.4121 Ω 26.771 pH 2 450.000 000 MHz
PRm
MARKER 1
2.45 GHz
Cor
START 2 250.000 000 MHz
STOP 2 650.000 000 MHz

Validation Dipole Dimensions

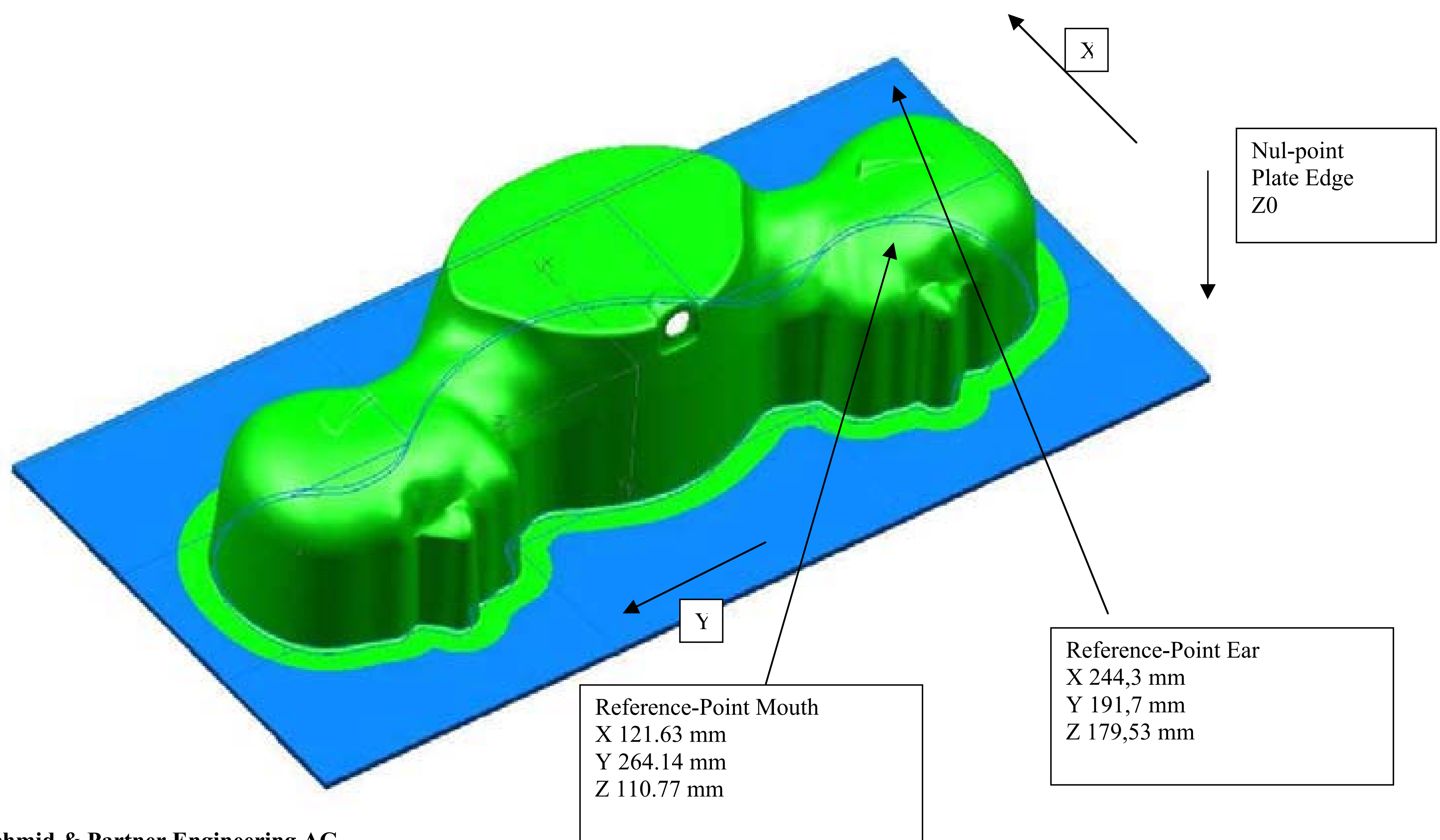
Frequency (MHz)	L (mm)	h (mm)	d (mm)
300	420.0	250.0	6.2
450	288.0	167.0	6.2
835	161.0	89.8	3.6
900	149.0	83.3	3.6
1450	89.1	51.7	3.6
1800	72.0	41.7	3.6
1900	68.0	39.5	3.6
2000	64.5	37.5	3.6
2450	51.8	30.6	3.6
3000	41.5	25.0	3.6

2. Validation Phantom

The validation phantom is the SAM (Specific Anthropomorphic Mannequin) phantom manufactured by Schmid & Partner Engineering AG. The SAM phantom is a Fiberglass shell integrated in a wooden table. The shape of the shell corresponds to the phantom defined by SCC34-SC2. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

Shell Thickness: 2 ± 0.1 mm
Filling Volume: Approx. 20 liters
Dimensions: 50 cm (W) x 100 cm (L)

SAM Twin-Phantom



Schmid & Partner Engineering AG

2450MHz Dipole Calibration

2450MHz Dipole Calibration

3. Measurement Conditions

The planar phantom was filled with brain simulating tissue having the following electrical parameters at 2450MHz:

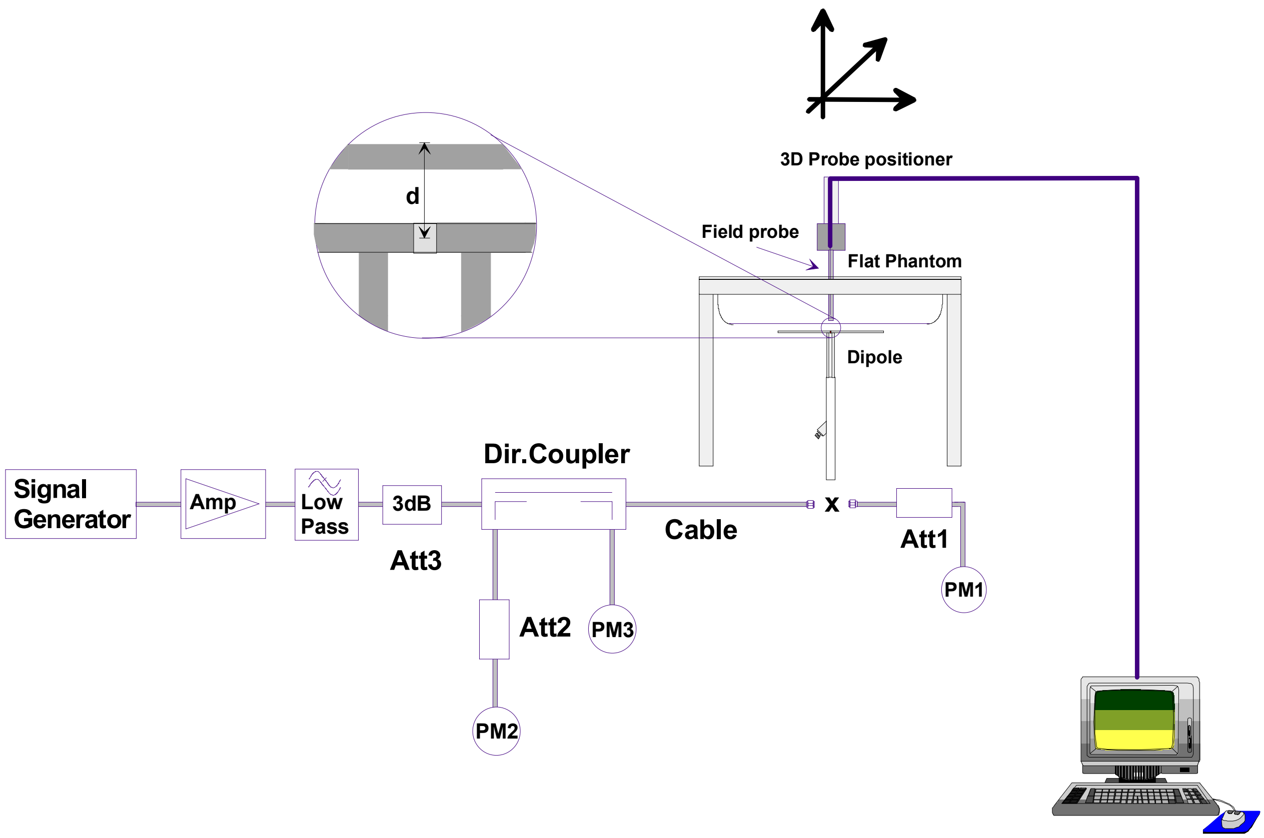
Relative Permitivity:	39.2	± 5%
Conductivity:	1.80 mho/m	± 5%
Temperature:	23.1°C	

The 2450MHz simulating tissue consists of the following ingredients:

Ingredient	Percentage by weight
Water	54.95%
Glycol Monobutyl	44.98%
Salt	0.07%
Target Dielectric Parameters at 22°C	ε_r =39.2 σ = 1.80 S/m

4. SAR Measurement

The SAR measurement was performed with the E-field probe in mechanical detection mode only. The setup and determination of the forward power into the dipole was performed using the following procedures.



First, the power meter PM1 (including attenuator Att1) is connected to the cable to measure the forward power at the location of the dipole connector (X). The signal generator is adjusted for the desired forward power at the dipole connector (taking into account the attenuation of Att1) as read by power meter PM2. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter PM2. If the signal generator does not allow adjustment in 0.01dB steps, the remaining difference at PM2 must be taken into consideration. PM3 records the reflected power from the dipole to ensure that the value is not changed from the previous value. The reflected power should be 20dB below the forward power.

Ten SAR measurements were performed in order to achieve repeatability and to establish an average target value.

Validation Dipole SAR Test Results

Validation Measurement	SAR @ 0.25W Input averaged over 1g	SAR @ 1W Input averaged over 1g	SAR @ 0.25W Input averaged over 10g	SAR @ 1W Input averaged over 10g	Peak SAR @ 0.25W Input
Test 1	14.2	56.80	6.33	25.32	30.5
Test 2	14.3	57.20	6.34	25.36	30.8
Test 3	14.2	56.80	6.33	25.32	30.4
Test 4	14.1	56.40	6.32	25.28	30.1
Test 5	14.3	57.20	6.33	25.32	30.7
Test 6	14.0	56.00	6.31	25.24	30.0
Test 7	14.2	56.80	6.33	25.32	30.4
Test 8	14.2	56.80	6.33	25.32	30.5
Test 9	14.4	57.60	6.34	25.36	30.8
Test10	14.2	56.80	6.32	25.28	30.4
Average Value	14.21	56.84	6.32	25.31	30.46

The results have been normalized to 1W (forward power) into the dipole.

Averaged over 1cm (1g) of tissue: 56.84 mW/g

Averaged over 10cm (10g) of tissue: 25.31 mW/g

Dipole 2450MHz

SAM Phantom; Flat Section

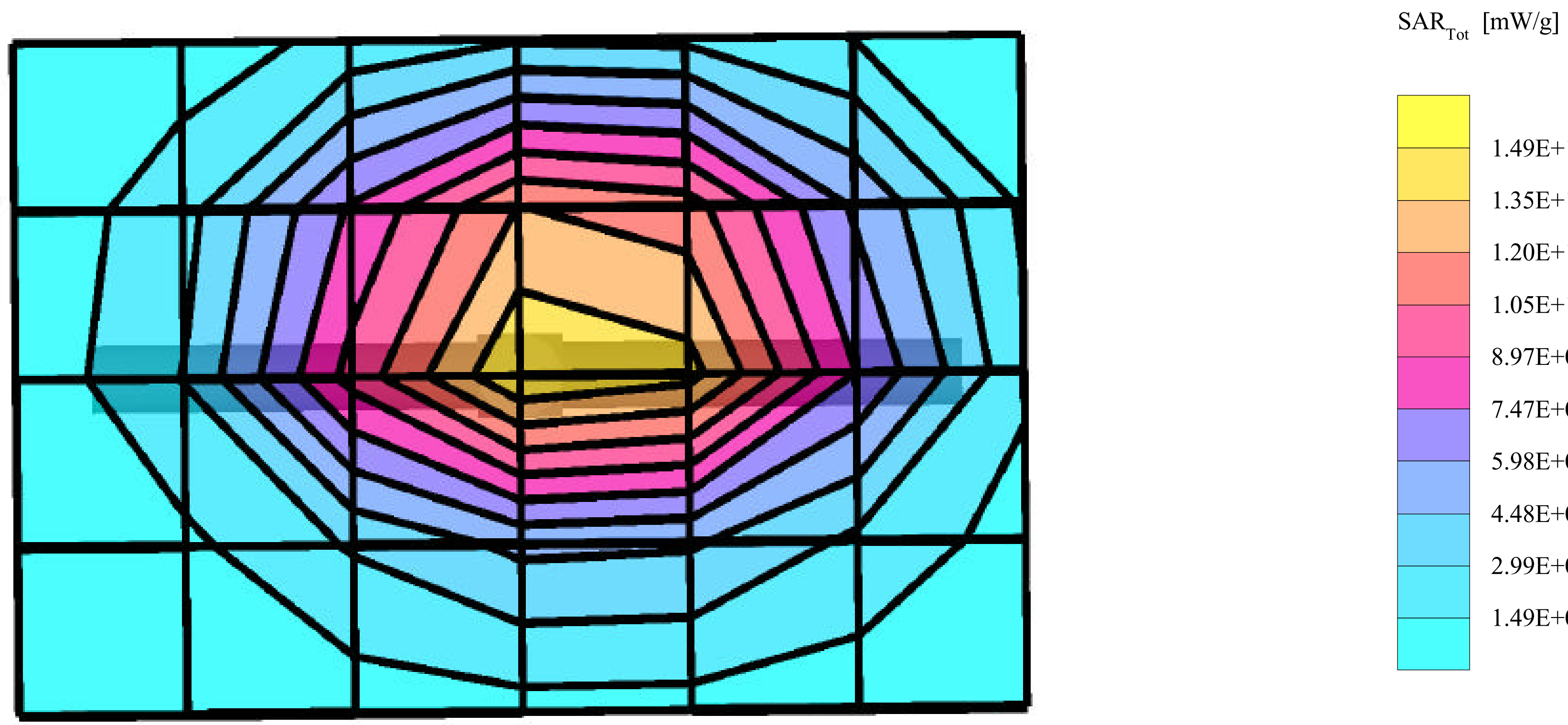
Probe: ET3DV6 - SN1590; ConvF(4.93,4.93,4.93); Crest factor: 1.0; 2450 MHz Brain: $\sigma = 1.80$ mho/m $\varepsilon_r = 39.2$ $\rho = 1.00$ g/cm^3

Cube 5x5x7: Peak: 30.5 mW/g, SAR (1g): 14.2 mW/g, SAR (10g): 6.33 mW/g, (Worst-case extrapolation)

Penetration depth: 6.2 (5.9, 7.0) [mm]

Powerdrift: 0.03 dB

Calibration Date: October 24, 2001



APPENDIX D - PROBE CALIBRATION

Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Calibration Certificate

Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1387**
Place of Calibration:	**Zurich**
Date of Calibration:	**February 22, 2002**
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:

Approved by:

Probe ET3DV6

SN:1387

Manufactured:	September 21, 1999
Last calibration:	September 22, 1999
Recalibrated:	February 22, 2002

Calibrated for System DASY3

DASY3 - Parameters of Probe: ET3DV6 SN:1387

Sensitivity in Free Space

NormX	**1.58**	$\mu V/(V/m)^2$
NormY	**1.67**	$\mu V/(V/m)^2$
NormZ	**1.67**	$\mu V/(V/m)^2$

Diode Compression

DCP X	**97**	mV
DCP Y	**97**	mV
DCP Z	**97**	mV

Sensitivity in Tissue Simulating Liquid

Head 900 MHz ε_r **= 41.5 ± 5%** σ **= 0.97 ± 5% mho/m**
Head 835 MHz ε_r **= 41.5 ± 5%** σ **= 0.90 ± 5% mho/m**

ConvF X	**6.6**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.6**	± 9.5% (k=2)	Alpha	**0.40**
ConvF Z	**6.6**	± 9.5% (k=2)	Depth	**2.38**

Head 1800 MHz ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**
Head 1900 MHz ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**

ConvF X	**5.4**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.4**	± 9.5% (k=2)	Alpha	**0.57**
ConvF Z	**5.4**	± 9.5% (k=2)	Depth	**2.18**

Boundary Effect

Head 900 MHz Typical SAR gradient: 5 % per mm

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	9.7	5.4
SAR_{be} [%]	With Correction Algorithm	0.3	0.6

Head 1800 MHz Typical SAR gradient: 10 % per mm

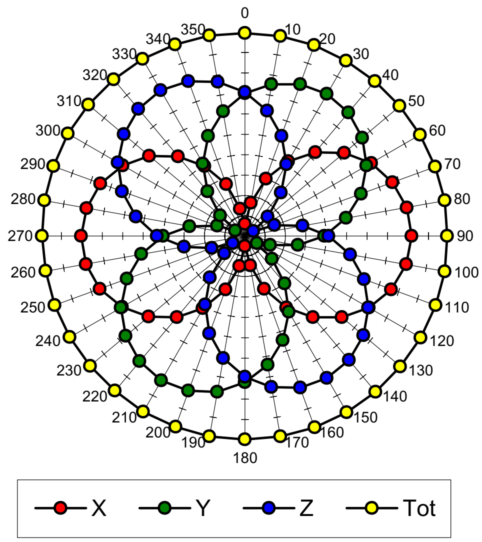
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	11.5	7.3
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

Sensor Offset

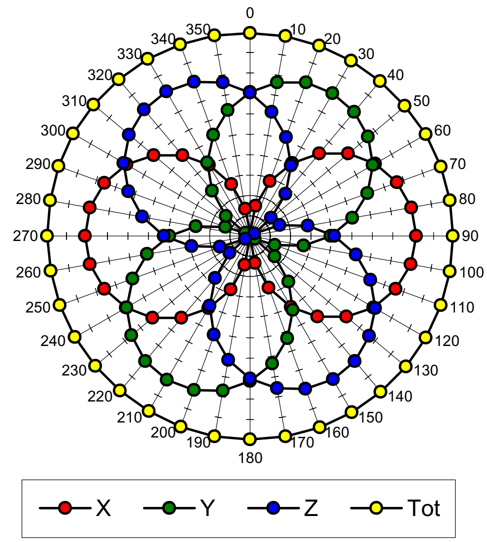
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.3 ± 0.2**	mm

Receiving Pattern (ϕ, θ = 0°)

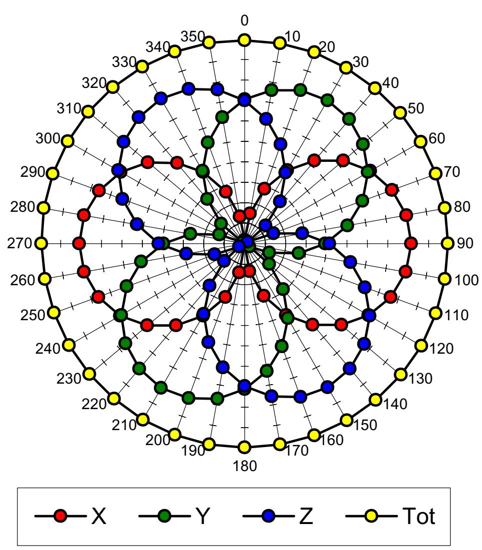
f = 30 MHz, TEM cell ifi110



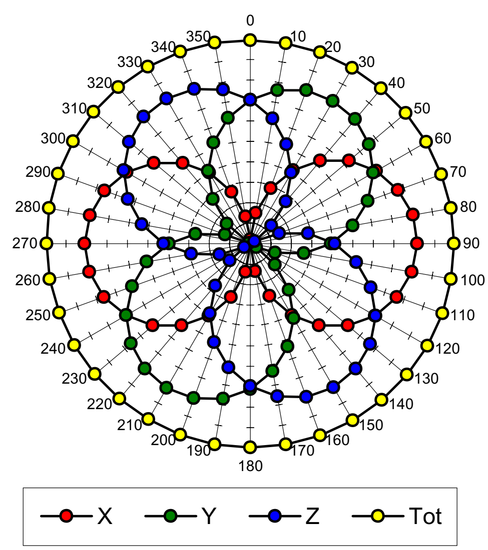
f = 100 MHz, TEM cell ifi110



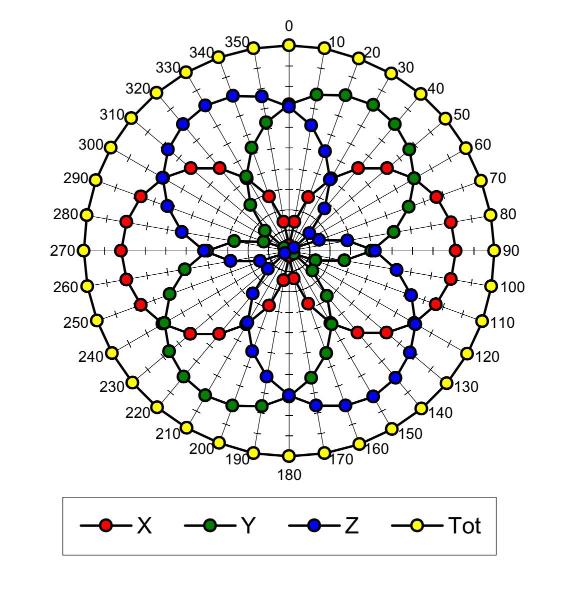
f = 300 MHz, TEM cell ifi110



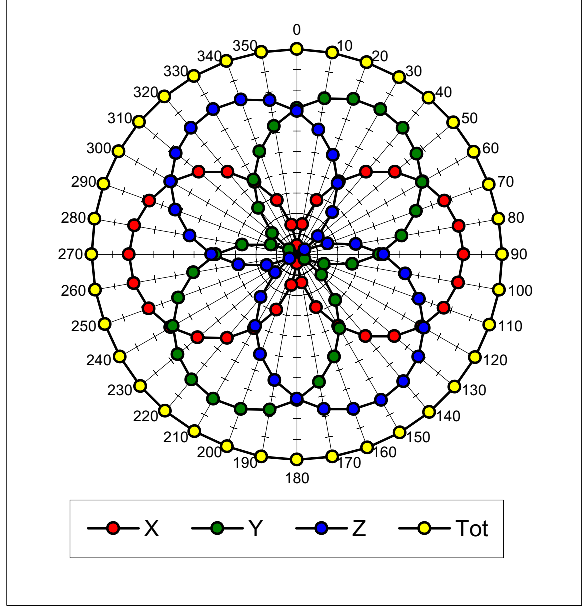
f = 900 MHz, TEM cell ifi110



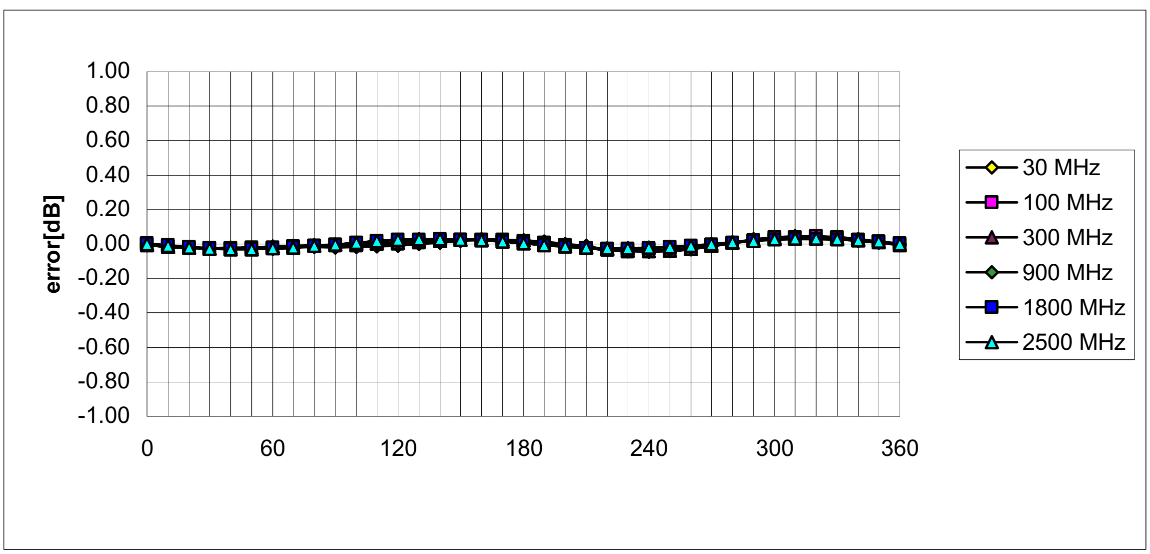
f = 1800 MHz, WG R22



f = 2500 MHz, WG R22

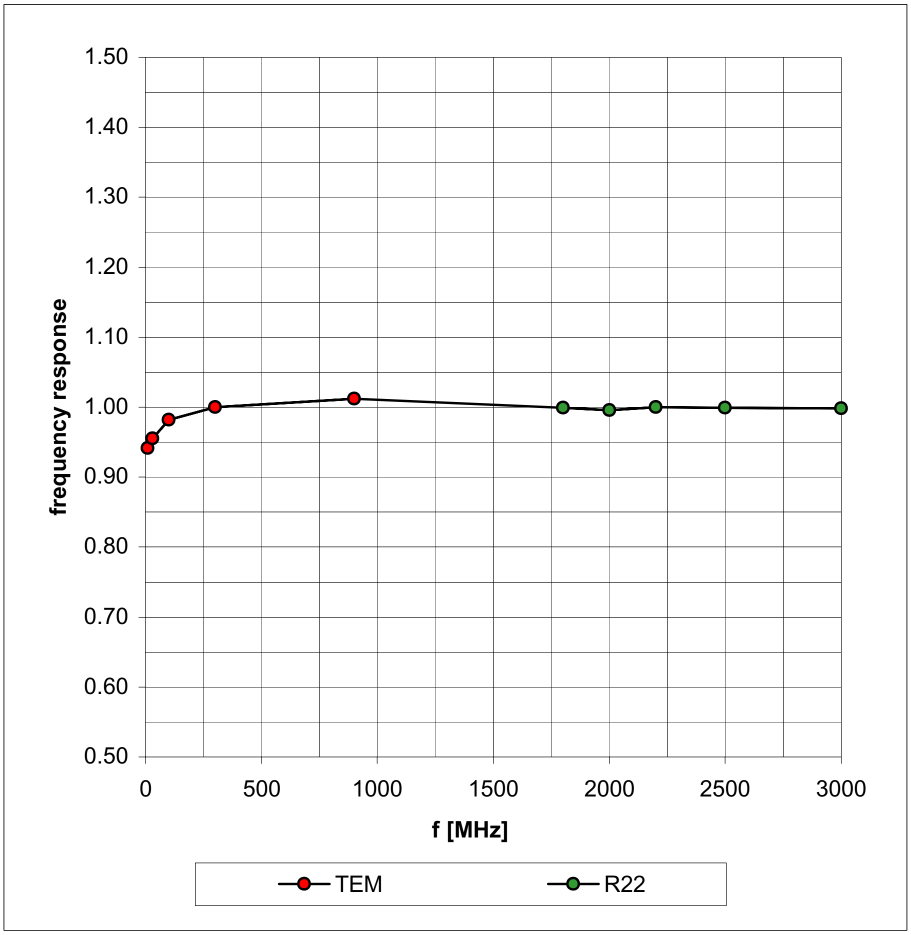


Isotropy Error (ϕ), θ = 0°



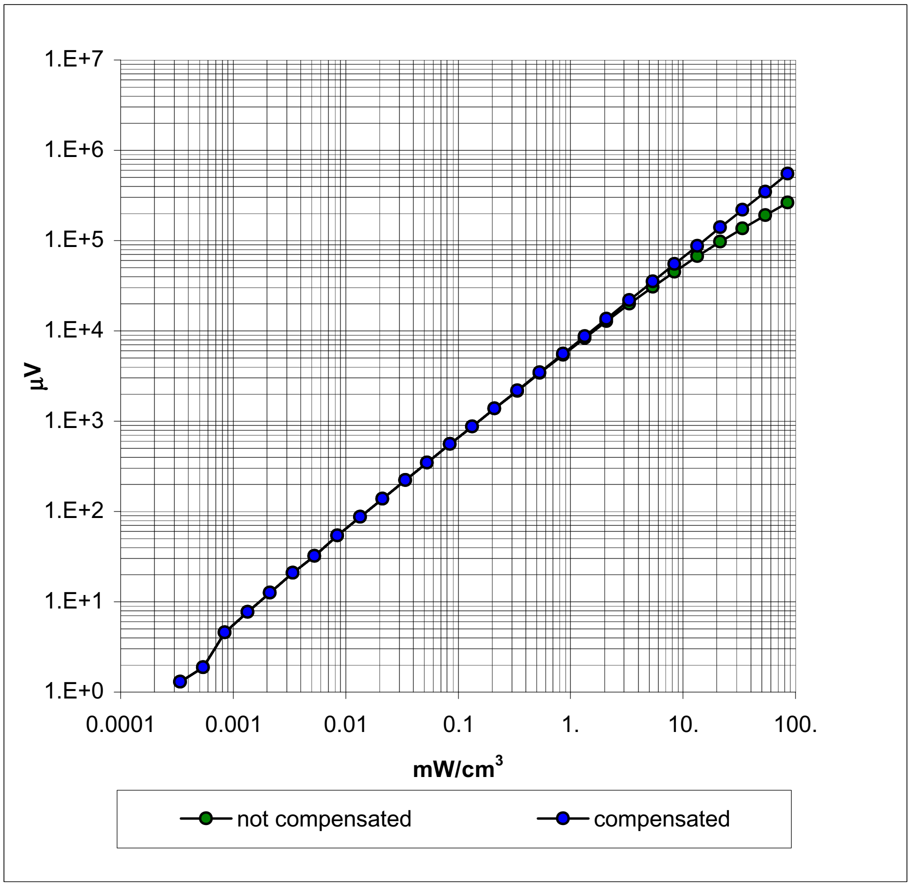
Frequency Response of E-Field

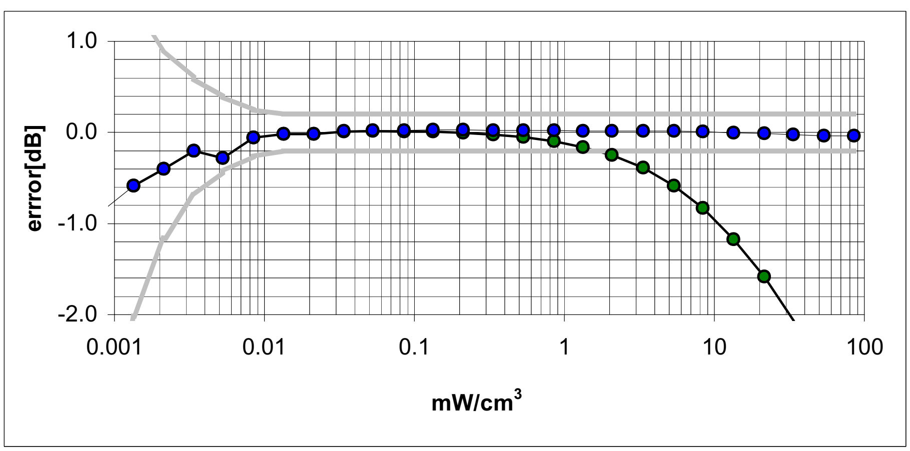
(TEM-Cell:ifi110, Waveguide R22)



Dynamic Range f(SAR_{brain})

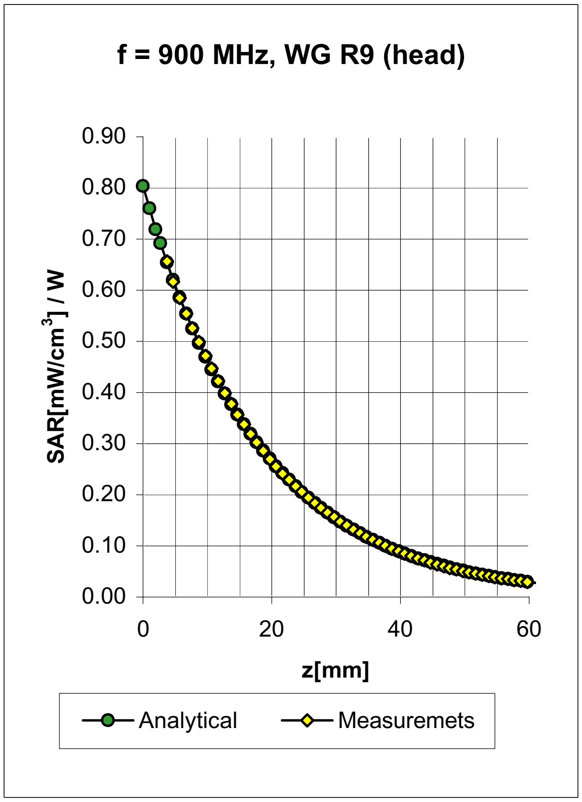
(Waveguide R22)

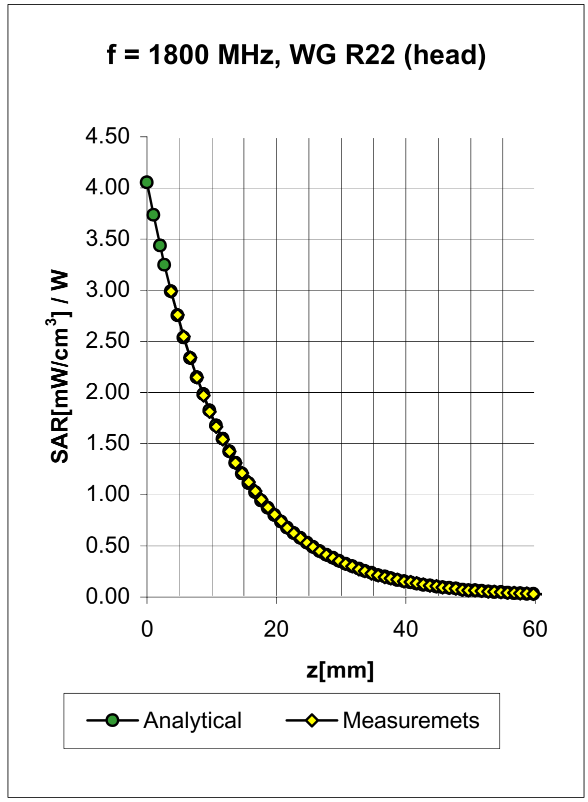




ET3DV6 SN:1387 February 22, 2002

Conversion Factor Assessment

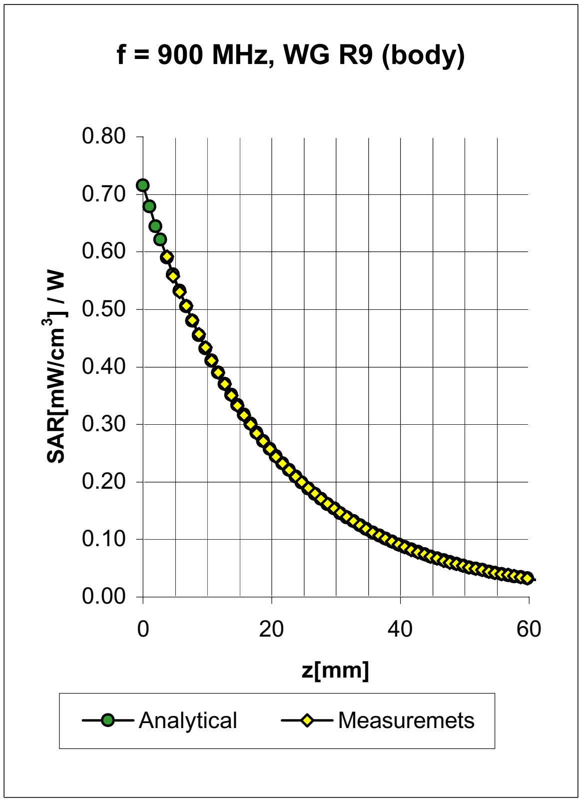


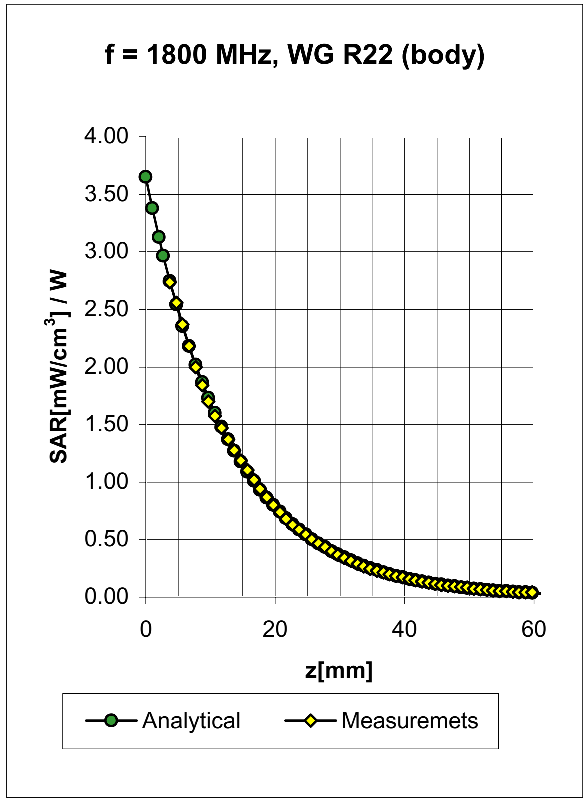


Head	**900 MHz**		**ε_r = 41.5 ± 5%**	**σ = 0.97 ± 5% mho/m**	
Head	**835 MHz**		**ε_r = 41.5 ± 5%**	**σ = 0.90 ± 5% mho/m**	
	ConvF X	**6.6**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.6**	± 9.5% (k=2)	Alpha	**0.40**
	ConvF Z	**6.6**	± 9.5% (k=2)	Depth	**2.38**

Head	**1800 MHz**		**ε_r = 40.0 ± 5%**	**σ = 1.40 ± 5% mho/m**	
Head	**1900 MHz**		**ε_r = 40.0 ± 5%**	**σ = 1.40 ± 5% mho/m**	
	ConvF X	**5.4**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**5.4**	± 9.5% (k=2)	Alpha	**0.57**
	ConvF Z	**5.4**	± 9.5% (k=2)	Depth	**2.18**

Conversion Factor Assessment



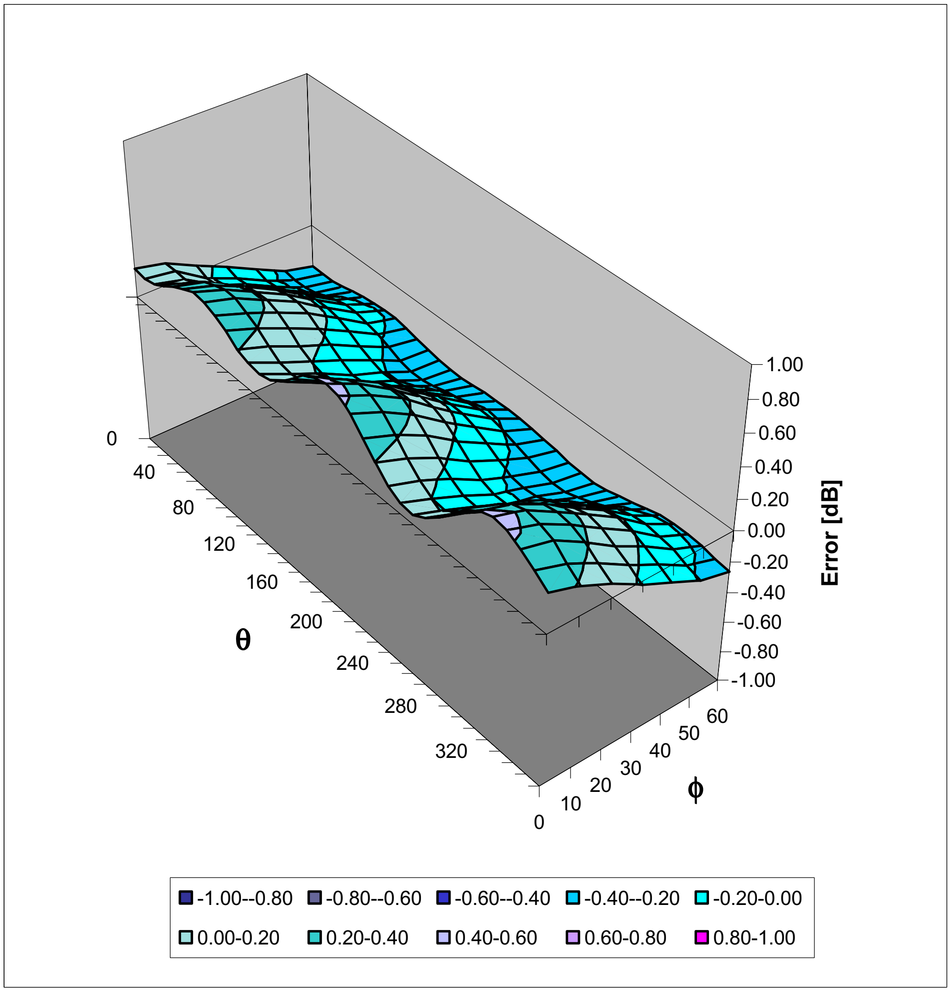


Body	**900 MHz**		ε_r = **55.0 ± 5%**	σ = **1.05 ± 5% mho/m**	
Body	**835 MHz**		ε_r = **55.2 ± 5%**	σ = **0.97 ± 5% mho/m**	
	ConvF X	**6.3**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.3**	± 9.5% (k=2)	Alpha	**0.42**
	ConvF Z	**6.3**	± 9.5% (k=2)	Depth	**2.44**

Body	**1800 MHz**		ε_r = **53.3 ± 5%**	σ = **1.52 ± 5% mho/m**	
Body	**1900 MHz**		ε_r = **53.3 ± 5%**	σ = **1.52 ± 5% mho/m**	
	ConvF X	**5.0**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**5.0**	± 9.5% (k=2)	Alpha	**0.76**
	ConvF Z	**5.0**	± 9.5% (k=2)	Depth	**2.01**

Deviation from Isotropy in HSL

Error (θϕ), f = 900 MHz



Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1387**
Place of Assessment:	**Zurich**
Date of Assessment:	**February 25, 2002**
Probe Calibration Date:	**February 22, 2002**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1800 MHz.

Assessed by:

Dosimetric E-Field Probe ET3DV6 SN:1387

Conversion Factor (± standard deviation)

150 MHz	ConvF	**9.2 ± 8%**	ε_r = **52.3** **σ = 0.76 mho/m** (head tissue)
300 MHz	ConvF	**8.0 ± 8%**	ε_r = **45.3** **σ = 0.87 mho/m** (head tissue)
450 MHz	ConvF	**7.3 ± 8%**	ε_r = **43.5** **σ = 0.87 mho/m** (head tissue)
2450 MHz	ConvF	**4.7 ± 8%**	ε_r = **39.2** **σ = 1.80 mho/m** (head tissue)
150 MHz	ConvF	**8.8 ± 8%**	ε_r = **61.9** **σ = 0.80 mho/m** (body tissue)
450 MHz	ConvF	**7.7 ± 8%**	ε_r = **56.7** **σ = 0.94 mho/m** (body tissue)
2450 MHz	ConvF	**4.3 ± 8%**	ε_r = **52.7** **σ = 1.95 mho/m** (body tissue)

APPENDIX E - MEASURED FLUID DIELECTRIC PARAMETERS

2450MHz System Validation

Measured Fluid Dielectric Parameters (Brain)

May 29, 2002

Frequency	e'	e''
2.400000000 GHz	39.7641	13.3060
2.402000000 GHz	39.7563	13.3148
2.404000000 GHz	39.7507	13.3161
2.406000000 GHz	39.7380	13.3122
2.408000000 GHz	39.7259	13.3191
2.410000000 GHz	39.7127	13.3410
2.412000000 GHz	39.7005	13.3509
2.414000000 GHz	39.6999	13.3480
2.416000000 GHz	39.6926	13.3536
2.418000000 GHz	39.6731	13.3613
2.420000000 GHz	39.6679	13.3595
2.422000000 GHz	39.6536	13.3600
2.424000000 GHz	39.6376	13.3817
2.426000000 GHz	39.6300	13.3933
2.428000000 GHz	39.6352	13.3968
2.430000000 GHz	39.6267	13.4007
2.432000000 GHz	39.6211	13.4079
2.434000000 GHz	39.5872	13.4084
2.436000000 GHz	39.5869	13.4250
2.438000000 GHz	39.5848	13.4264
2.440000000 GHz	39.5742	13.4210
2.442000000 GHz	39.5594	13.4305
2.444000000 GHz	39.5525	13.4359
2.446000000 GHz	39.5342	13.4542
2.448000000 GHz	39.5292	13.4552
2.450000000 GHz	39.5178	13.4619
2.452000000 GHz	39.5217	13.4665
2.454000000 GHz	39.5004	13.4649
2.456000000 GHz	39.4932	13.4763
2.458000000 GHz	39.4857	13.4937
2.460000000 GHz	39.4579	13.5006
2.462000000 GHz	39.4605	13.5036
2.464000000 GHz	39.4687	13.5130
2.466000000 GHz	39.4473	13.5143
2.468000000 GHz	39.4348	13.5192

2450MHz EUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

May 29, 2002

Frequency	e'	e''
2.400000000 GHz	51.7638	14.3976
2.410000000 GHz	51.7183	14.4289
2.420000000 GHz	51.6838	14.4919
2.430000000 GHz	51.6642	14.5296
2.440000000 GHz	51.6190	14.5813
2.450000000 GHz	51.5810	14.6285
2.460000000 GHz	51.5495	14.6795
2.470000000 GHz	51.5192	14.7183
2.480000000 GHz	51.4910	14.7516
2.490000000 GHz	51.4592	14.7750
2.500000000 GHz	51.4212	14.8071
2.510000000 GHz	51.3608	14.8237
2.520000000 GHz	51.3124	14.8746
2.530000000 GHz	51.2555	14.9034
2.540000000 GHz	51.2067	14.9605
2.550000000 GHz	51.1720	14.9924
2.560000000 GHz	51.1281	15.0220
2.570000000 GHz	51.0887	15.0655
2.580000000 GHz	51.0457	15.0993
2.590000000 GHz	51.0095	15.1287
2.600000000 GHz	50.9724	15.1564

APPENDIX F - SAM PHANTOM CERTIFICATE OF CONFORMITY

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 BA
Series No	TP-1002 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

Tests

The series production process used allows the limitation to test of first articles.
Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards	Liquid type HSL 1800 and others according to the standard.	Pre-series, First article

Standards

[1] CENELEC EN 50361
[2] IEEE P1528-200x draft 6.5
[3] IEC PT 62209 draft 0.9
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

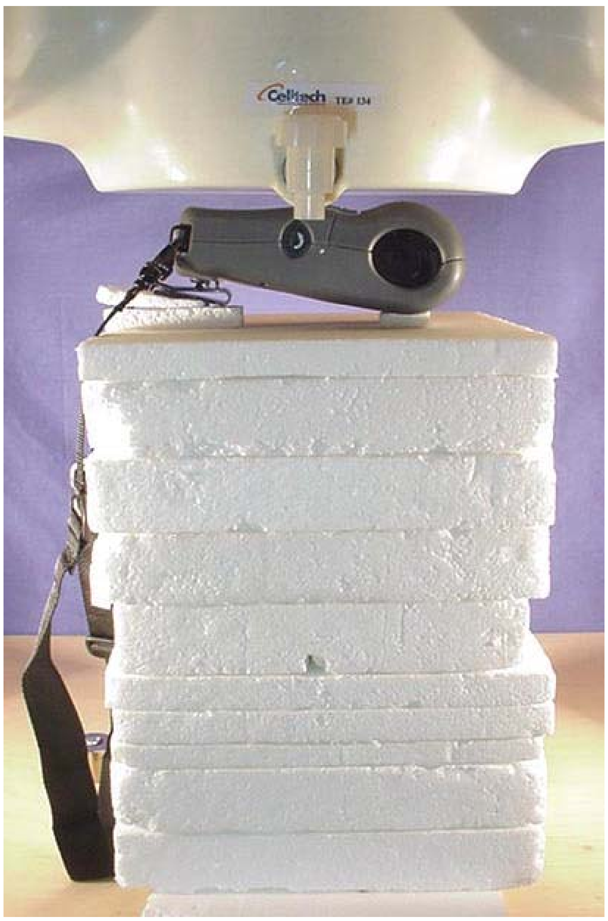
Date 18.11.2001

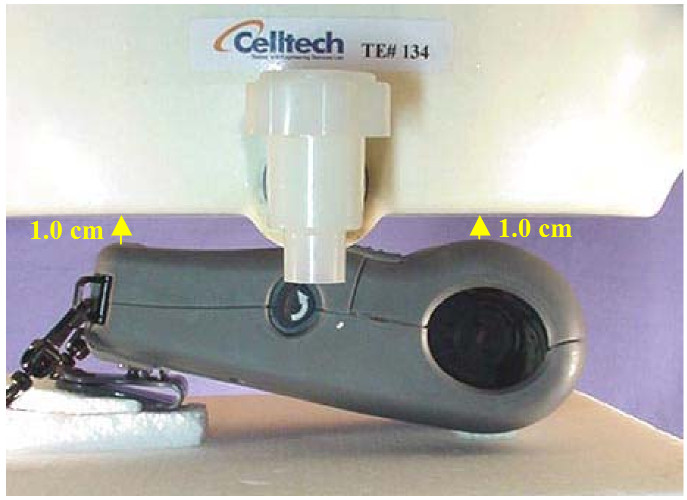
Signature / Stamp

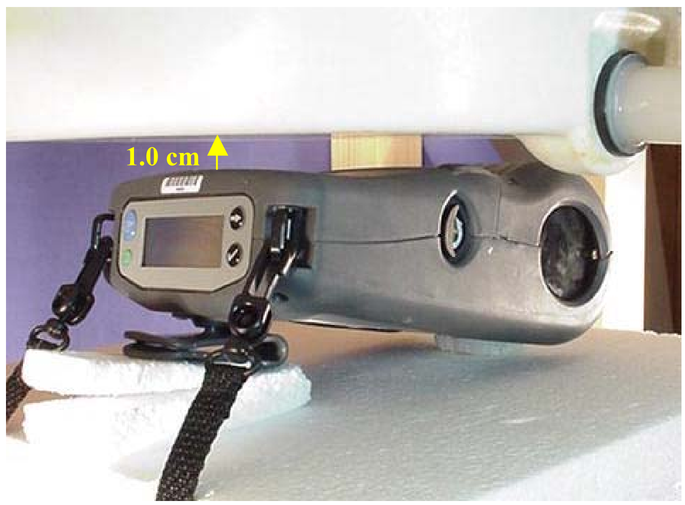
Schmid & Partner
Engineering AG
Zeughausstrasse 43, CH-8004 Zurich
Tel. +41 1 245 97 00, Fax +41 1 245 97 79

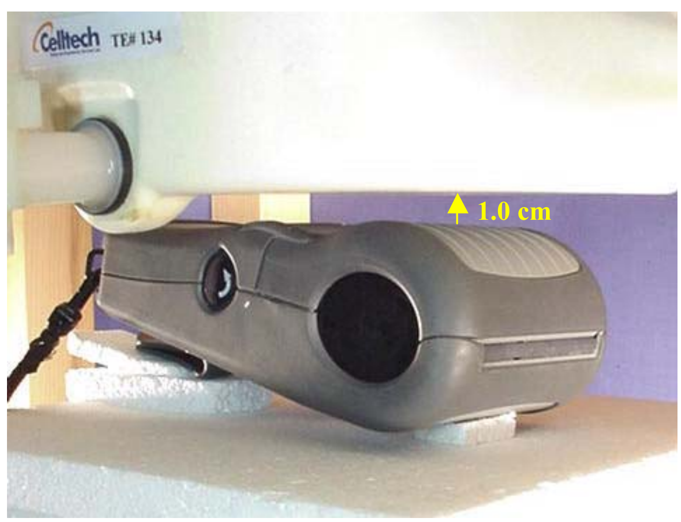
APPENDIX G - SAR TEST SETUP & EUT PHOTOGRAPHS

SAR TEST SETUP PHOTOGRAPHS
Top Side of EUT (Antenna/Printer Side)
(1.0 cm Separation Distance)

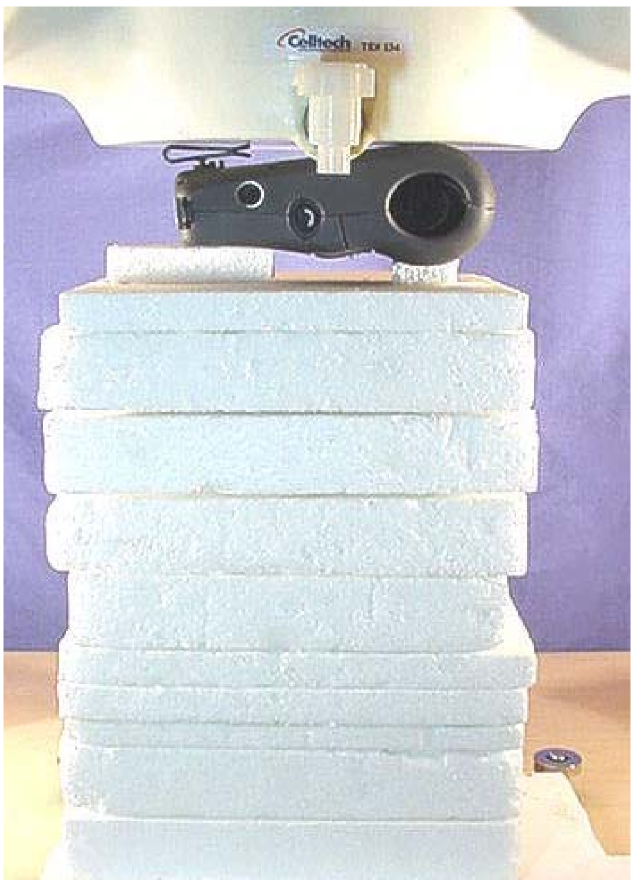




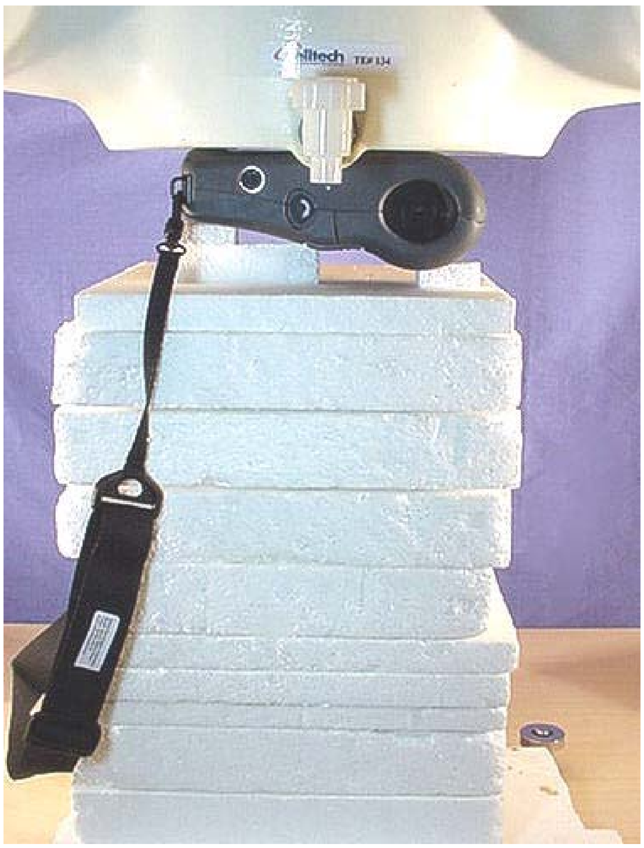


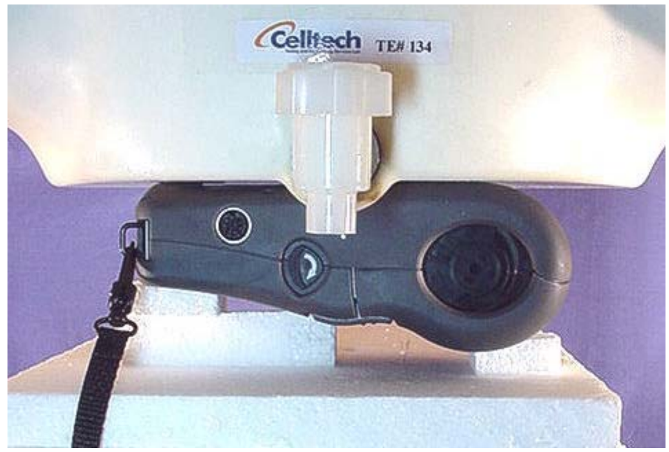


SAR TEST SETUP PHOTOGRAPHS
Bottom Side of EUT (Battery Side)
with Belt-Clip Accessory
(Belt-Clip & Printer End Touching Phantom)

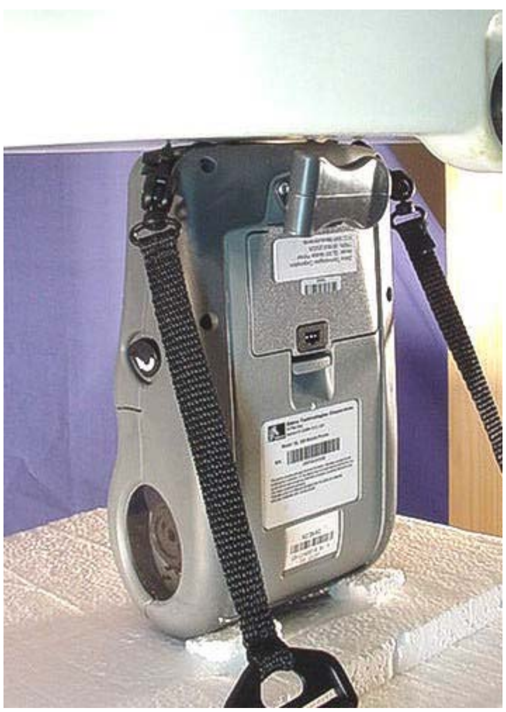


SAR TEST SETUP PHOTOGRAPHS
Bottom Side of EUT (Battery Side)
with Shoulder Harness Accessory
(0.0cm Separation Distance)

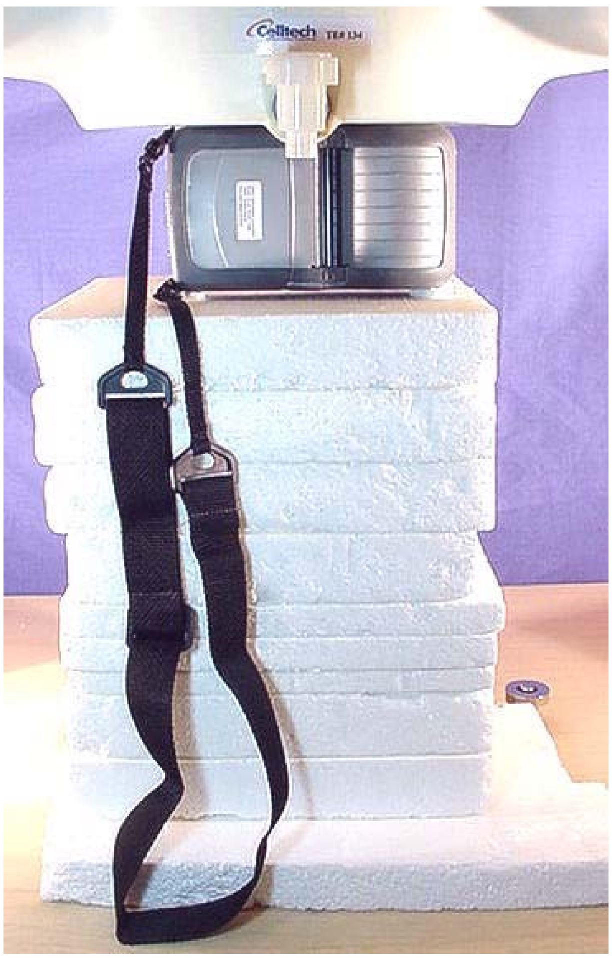




SAR TEST SETUP PHOTOGRAPHS
Front End of EUT (LCD Side)
(0.0 cm Separation Distance)



SAR TEST SETUP PHOTOGRAPHS
Left Side of EUT
(0.0 cm Separation Distance)



SAR TEST SETUP PHOTOGRAPHS
Right Side of EUT
(0.0 cm Separation Distance)

EUT PHOTOGRAPHS
With Belt-Clip Accessory

EUT PHOTOGRAPHS
With Shoulder Harness Accessory