APPENDIX A: SAR DISTRIBUTION COMPARISON FOR THE ACCURACY VERIFICATION

Date/Time: 11/03/03 12:25:57

Test Laboratory: Research In Motion Limited

Ambient Temperature: 24.2 (°C); Liquid Temperature: 22.5 (°C)

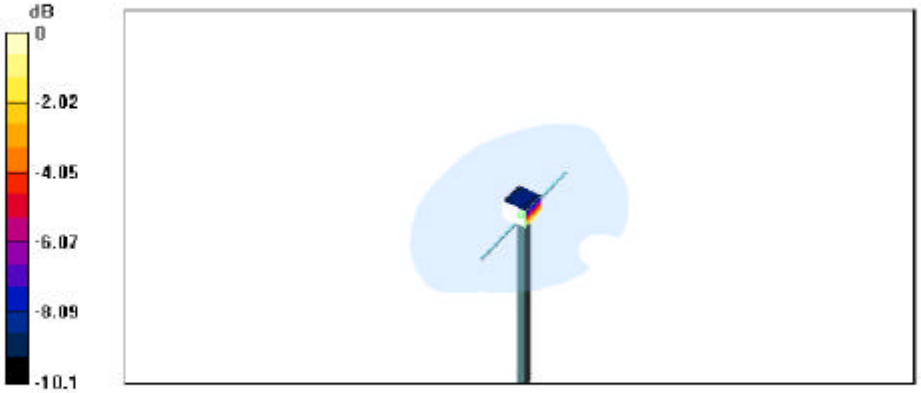
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:446

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 MHz Head (σ = 0.895 mho/m, ε_r = 42.4288, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1642; ConvF(6.6, 6.6, 6.6); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

Unnamed procedure/Zoom Scan (61x61x71)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 113.1 V/m
Power Drift = 0.01 dB
Maximum value of SAR = 11.8 mW/g

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.7 W/kg
SAR(1 g) = 8.72 mW/g; SAR(10 g) = 5.8 mW/g
Reference Value = 113.1 V/m
Power Drift = 0.01 dB
Maximum value of SAR = 9.41 mW/g



0 dB = 9.41mW/g

Date/Time: 10/31/03 13:38:55

Test Laboratory: Research In Motion Limited

Ambient Temperature: 24.4 (°C); Liquid Temperature: 22.1 (°C)

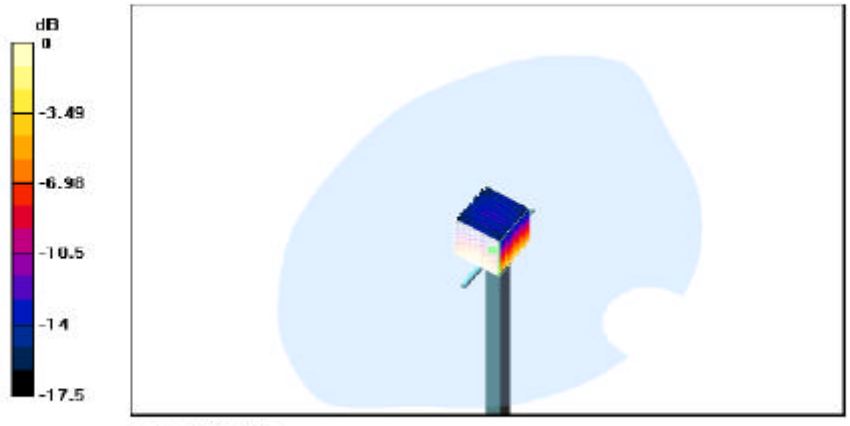
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:545

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL1900 (σ = 1.466 mho/m, ε_r = 40.4956, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1642; ConvF(5.4, 5.4, 5.4); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

Unnamed procedure/Zoom Scan (61x61x71)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 189.7 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 76.5 mW/g

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 76.2 W/kg
SAR(1 g) = 43.1 mW/g; SAR(10 g) = 22.3 mW/g
Reference Value = 189.7 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 48 mW/g



0 dB = 48mW/g

APPENDIX B: SAR DISTRIBUTION PLOTS FOR BODY-WORN CONFIGURATION

Date/Time: 11/03/03 16:41:43

Test Laboratory: Research In Motion Limited

Ambient Temperature: 24.7 (°C); Liquid Temperature: 22.6 (°C)

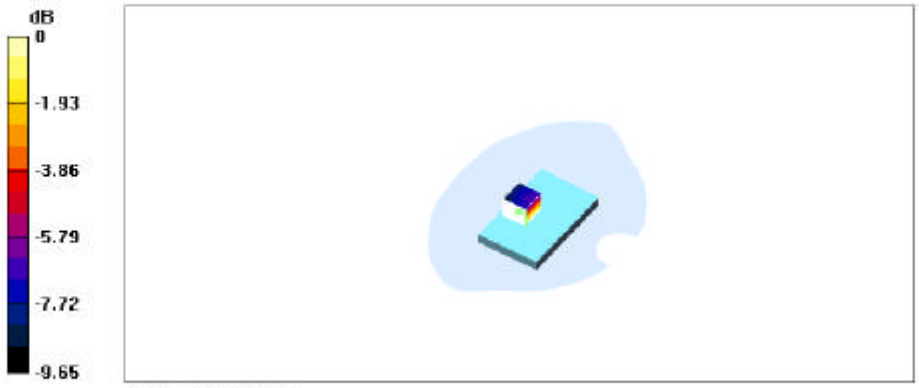
DUT: BlackBerry Wireless Handheld Model RAO30GN; Type: Sample; Configuration: Body-worn with Horizontal Holster HDW-06619-000, front side facing the belt-clip

Communication System: GSM 850; Frequency: 836.8 MHz;Duty Cycle: 1:8.3
Medium: M 835 (σ = 0.97 mho/m, ε_r = 53.8, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1642; ConvF(6.4, 6.4, 6.4); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

Unnamed procedure/Zoom Scan (61x61x71)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.5 V/m
Power Drift = -0.04 dB
Maximum value of SAR = 0.367 mW/g

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.365 W/kg
SAR(1 g) = 0.248 mW/g; SAR(10 g) = 0.176 mW/g
Reference Value = 15.5 V/m
Power Drift = -0.04 dB
Maximum value of SAR = 0.262 mW/g



0 dB = 0.262mW/g

Date/Time: 11/03/03 14:58:36

Test Laboratory: Research In Motion Limited

Ambient Temperature: 24.3 (°C); Liquid Temperature: 22.2 (°C)

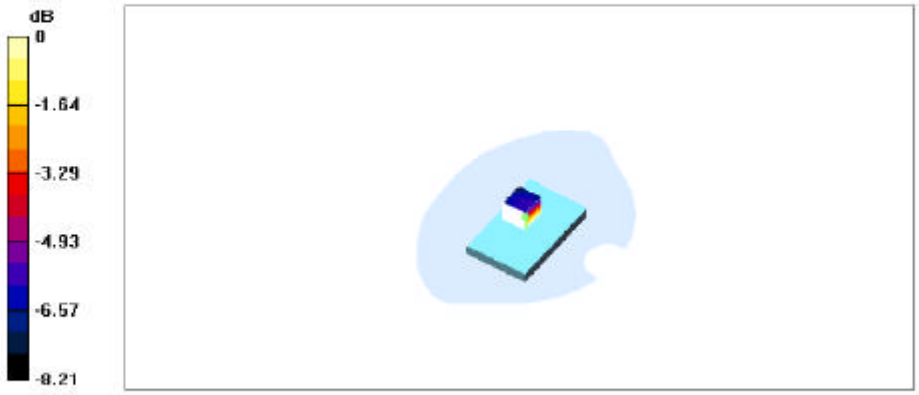
DUT: BlackBerry Wireless Handheld Model RAO30GN; Type: Sample; Configuration: Body-worn with Vertical Holster HDW-06620-000, front side facing the belt-clip

Communication System: GSM 850; Frequency: 836.8 MHz;Duty Cycle: 1:8.3
Medium: M 835 (σ = 0.97 mho/m, ε_r = 53.8, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1642; ConvF(6.4, 6.4, 6.4); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

Unnamed procedure/Zoom Scan (61x61x71)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.4 V/m
Power Drift = -0.2 dB
Maximum value of SAR = 0.21 mW/g

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.21 W/kg
SAR(1 g) = 0.173 mW/g; SAR(10 g) = 0.133 mW/g
Reference Value = 14.4 V/m
Power Drift = -0.2 dB
Maximum value of SAR = 0.182 mW/g



0 dB = 0.182mW/g

Date/Time: 11/02/03 13:13:17

Test Laboratory: Research In Motion Limited

Ambient Temperature: 24.5 (°C); Liquid Temperature: 22.4 (°C)

DUT: BlackBerry Wireless Handheld Model RAO30GN; Type: Sample; Configuration: Body-worn with Horizontal Holster HDW-06619-000, front side facing the belt-clip

Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: M1900 (σ = 1.535 mho/m, ε_r = 51.075, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1642; ConvF(4.9, 4.9, 4.9); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

Unnamed procedure/Zoom Scan (61x61x71)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.51 V/m
Power Drift = -0.03 dB
Maximum value of SAR = 0.0962 mW/g

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.096 W/kg
SAR(1 g) = 0.0671 mW/g; SAR(10 g) = 0.0443 mW/g
Reference Value = 5.51 V/m
Power Drift = -0.03 dB
Maximum value of SAR = 0.0718 mW/g

0 dB = 0.0718mW/g

file://C:\Program%20Files\DASY4\Print_Templates\Body%20worn%20with%20horizon... 05/11/2003

Date/Time: 10/31/03 15:12:57

Test Laboratory: Research In Motion Limited

Ambient Temperature: 24.5 (°C); Liquid Temperature: 22.1 (°C)

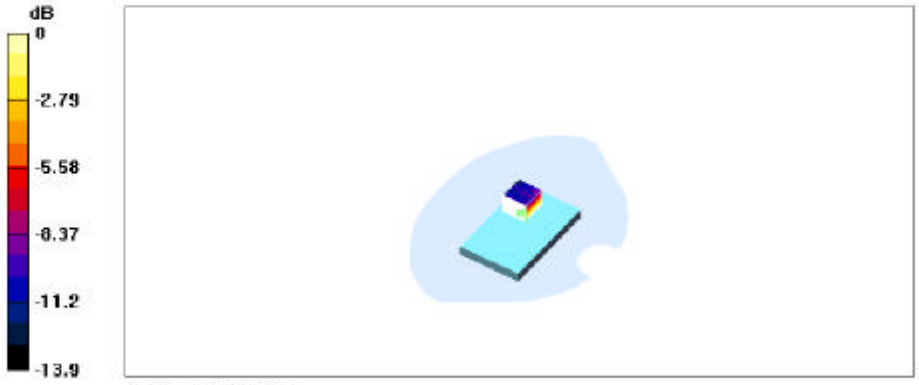
DUT: BlackBerry Wireless Handheld Model RAO30GN; Type: Sample; Configuration: Body-worn with Vertical Holster HDW-06620-000, front side facing the belt-clip

Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: M1900 (σ = 1.535 mho/m, ε_r = 51.075, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1642; ConvF(4.9, 4.9, 4.9); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

Unnamed procedure/Zoom Scan (61x61x71)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.31 V/m
Power Drift = 0.09 dB
Maximum value of SAR = 0.157 mW/g

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.157 W/kg
SAR(1 g) = 0.103 mW/g; SAR(10 g) = 0.0668 mW/g
Reference Value = 7.31 V/m
Power Drift = 0.09 dB
Maximum value of SAR = 0.109 mW/g



0 dB = 0.109mW/g

APPENDIX C: PROBE & DIPOLE CALIBRATION DATA

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

Client **RIM**

CALIBRATION CERTIFICATE

Object(s) **ET3DV6 - SN:1642**

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

Calibration date: **August 28, 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: August 28, 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.

880-KP0301061-A

Page 1 (1)

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:1642

Manufactured: November 7, 2001
Last calibration: July 26, 2002
Recalibrated: August 28, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1642 **August 28, 2003**

DASY - Parameters of Probe: ET3DV6 SN:1642

Sensitivity in Free Space

Diode Compression

NormX	1.64 $\mu V/(V/m)^2$	DCP X	96	mV
NormY	1.86 $\mu V/(V/m)^2$	DCP Y	96	mV
NormZ	1.61 $\mu V/(V/m)^2$	DCP Z	96	mV

Sensitivity in Tissue Simulating Liquid

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

Valid for f=800-1000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	6.6 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	6.6 ± 9.5% (k=2)	Alpha	0.27
ConvF Z	6.6 ± 9.5% (k=2)	Depth	3.41

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

Valid for f=1710-1910 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	5.4 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	5.4 ± 9.5% (k=2)	Alpha	0.48
ConvF Z	5.4 ± 9.5% (k=2)	Depth	2.57

Boundary Effect

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

Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	10.8	6.6
SAR_{be} [%]	With Correction Algorithm	0.6	0.6

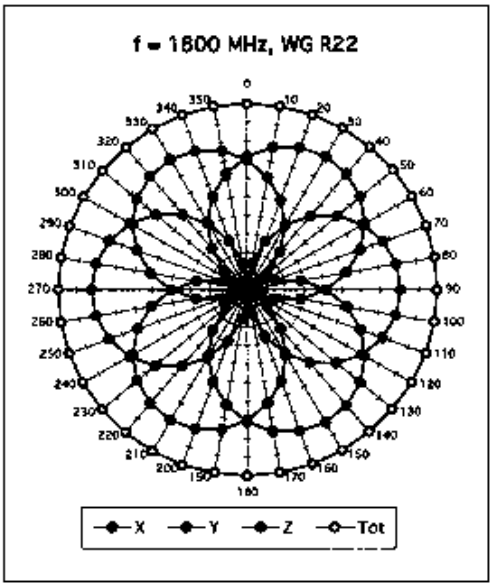
Head 1800 MHz **Typical SAR gradient: 10 % per mm**

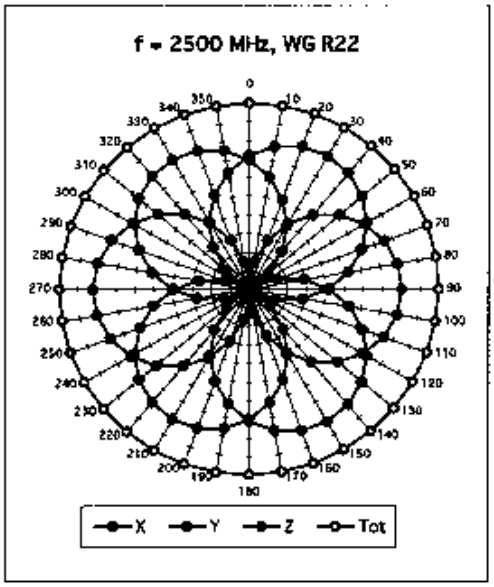
Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	12.7	8.5
SAR_{be} [%]	With Correction Algorithm	0.2	0.1

Sensor Offset

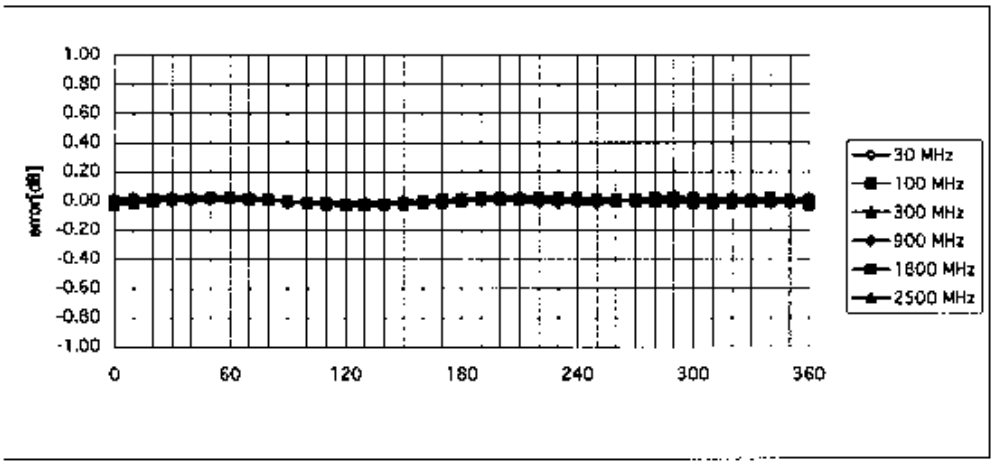
Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.0 ± 0.2	mm

ET3DV6 SN:1642 **August 28, 2003**





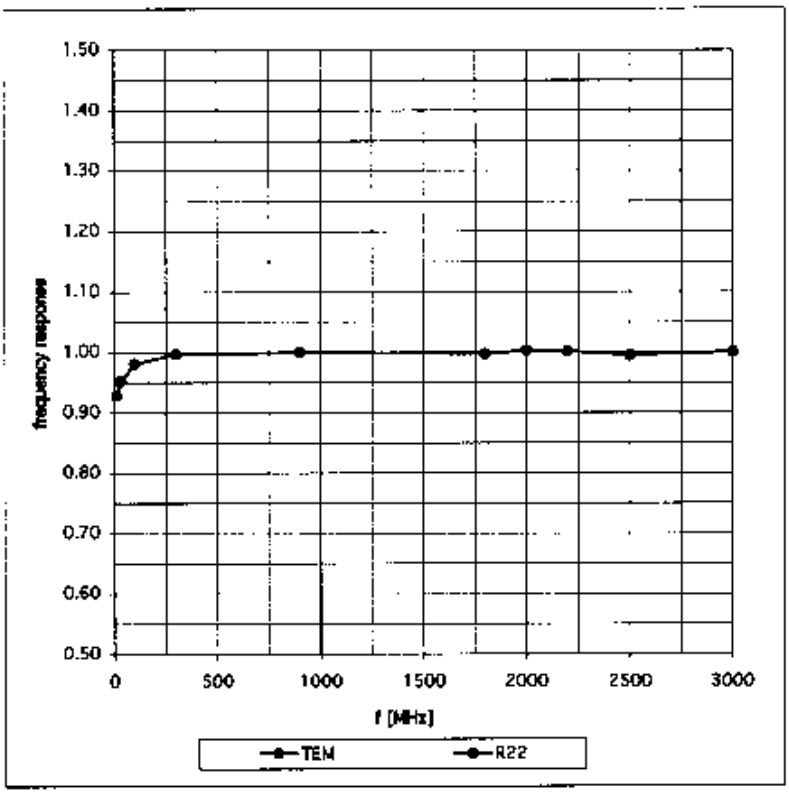
Isotropy Error (ϕ), θ = 0°



ET3DV6 SN:1642 **August 28, 2003**

Frequency Response of E-Field

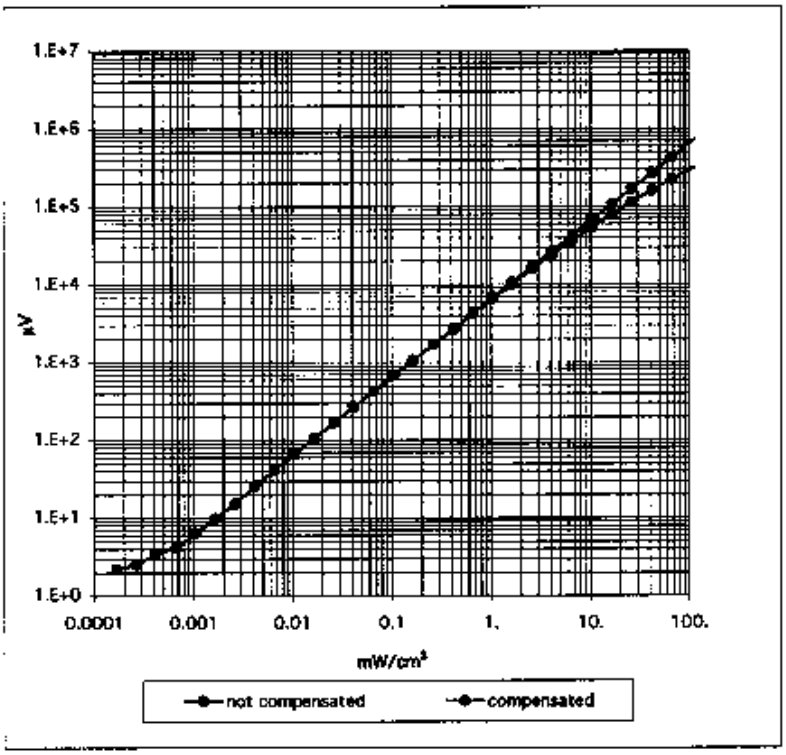
(TEM-Cell:ifi110, Waveguide R22)

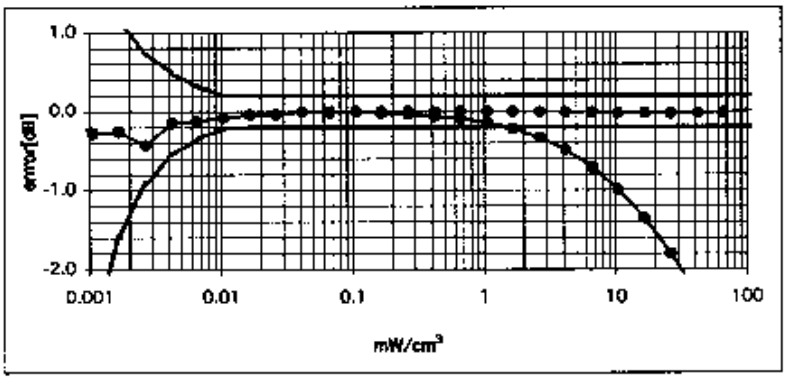


ET3DV6 SN:1642 **August 28, 2003**

Dynamic Range f(SARhead)

(Waveguide R22)

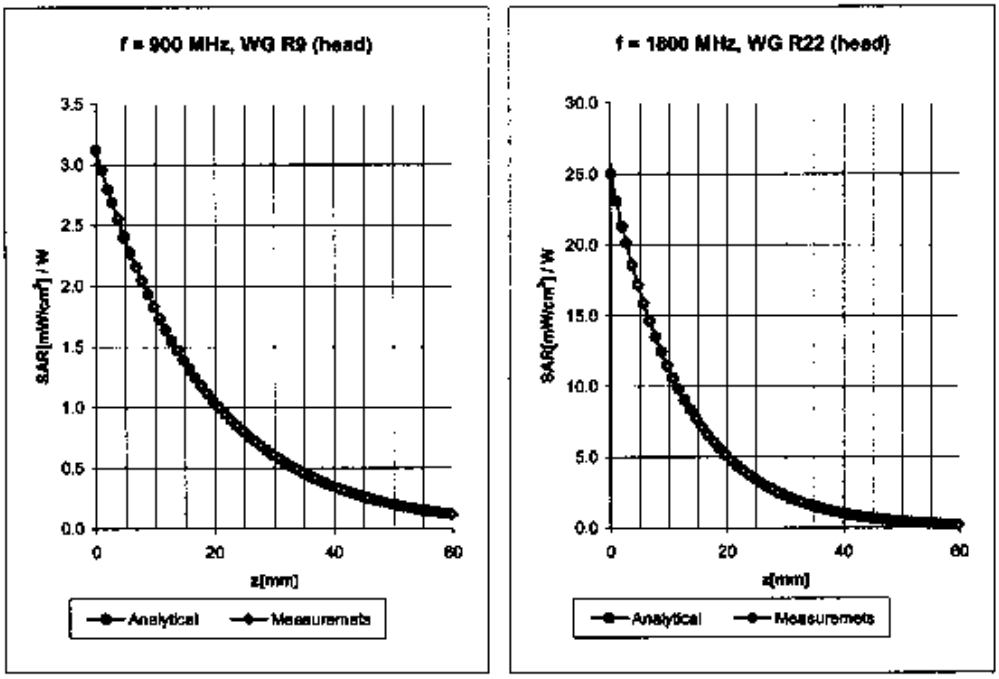




Page 6 of 9

ET3DV6 SN:1642 **August 28, 2003**

Conversion Factor Assessment



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

Valid for f=800-1000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	6.6 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	6.6 ± 9.5% (k=2)	Alpha	0.27
ConvF Z	6.6 ± 9.5% (k=2)	Depth	3.41

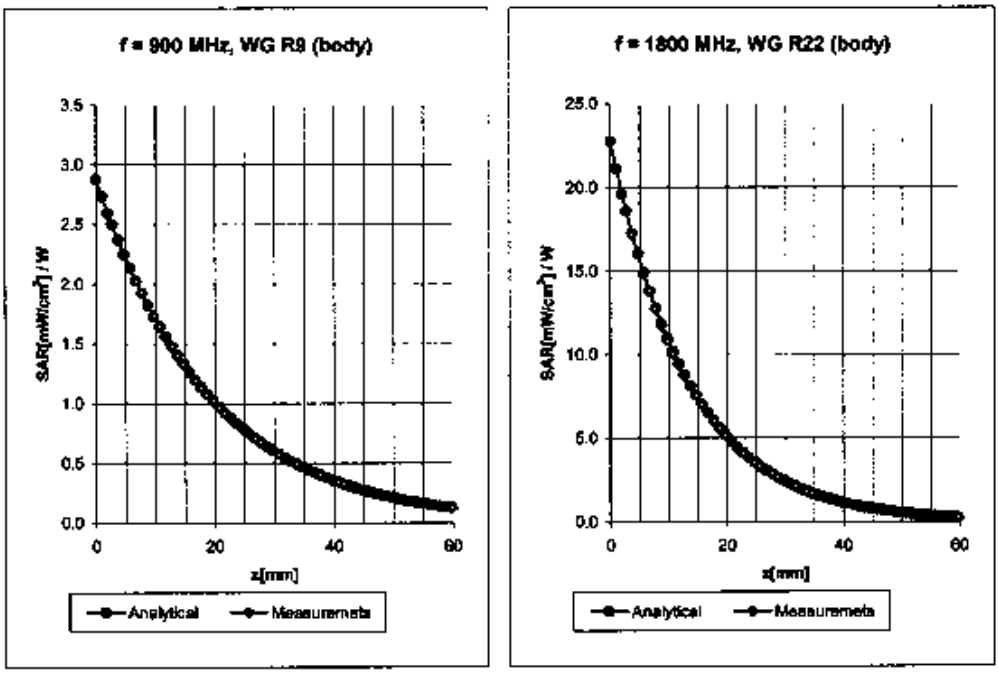
Head 1800 MHz ε_r = 40.0 ± 5% σ = 1.40 ± 5% mho/m

Valid for f=1710-1910 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	5.4 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	5.4 ± 9.5% (k=2)	Alpha	0.48
ConvF Z	5.4 ± 9.5% (k=2)	Depth	2.57

ET3DV6 SN:1642 **August 28, 2003**

Conversion Factor Assessment



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

Valid for f=800-1000 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	6.4 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	6.4 ± 9.5% (k=2)	Alpha	0.38
ConvF Z	6.4 ± 9.5% (k=2)	Depth	2.58

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

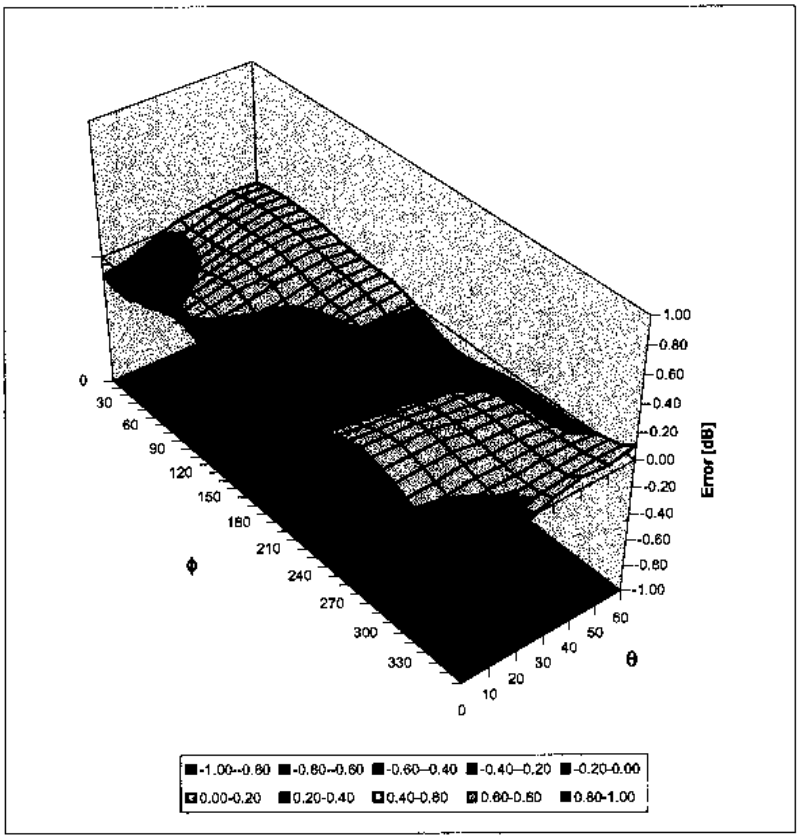
Valid for f=1710-1910 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	4.9 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	4.9 ± 9.5% (k=2)	Alpha	0.58
ConvF Z	4.9 ± 9.5% (k=2)	Depth	2.60

ET3DV6 SN:1642 **August 28, 2003**

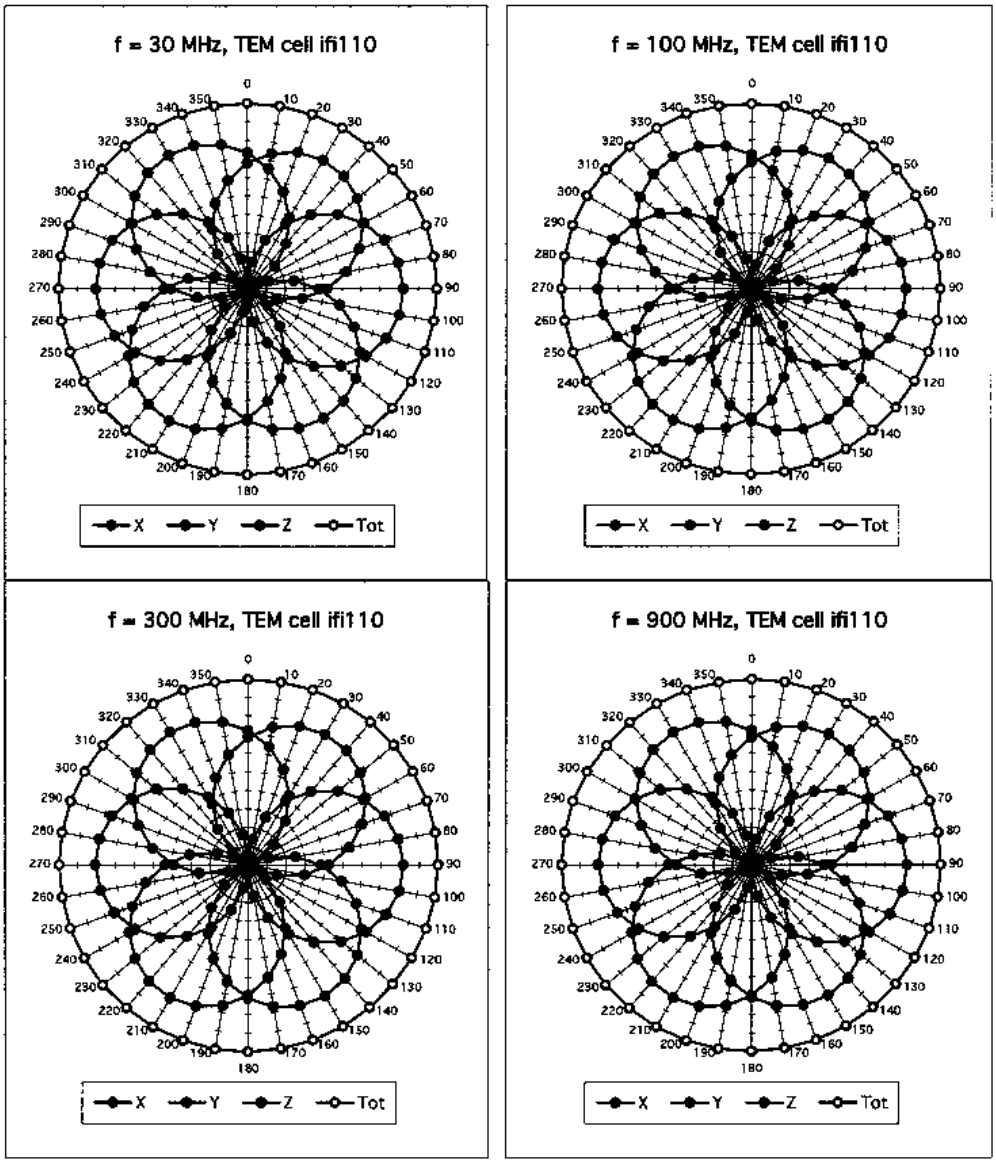
Deviation from Isotropy in HSL

Error (θ,φ), f = 900 MHz



ET3DV6 SN:1642 **August 28, 2003**

Receiving Pattern (ϕ), θ = 0°



Schmid & Partner Engineering AG

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

Calibration Certificate

835 MHz System Validation Dipole

Type:	D835V2
Serial Number:	446
Place of Calibration:	Zurich
Date of Calibration:	November 12, 2001
Calibration Interval:	24 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:

Schmid & Partner Engineering AG

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

DASY

Dipole Validation Kit

Type: D835V2

Serial: 446

Manufactured: October 24, 2001
Calibrated: November 12, 2001

1. Measurement Conditions

The measurements were performed in the flat section of the new generic twin phantom filled with head simulating solution of the following electrical parameters at 835 MHz:

Relative Dielectricity	42.3	± 5%
Conductivity	0.91 mho/m	± 5%

The DASY3 System (Software version 3.1c) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.27 at 900 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 15mm 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 20mm was aligned with the dipole. The 5x5x7 fine cube was chosen for cube integration. Probe isotropy errors were cancelled by measuring the SAR with normal and 90° turned probe orientations and averaging.
The dipole input power (forward power) was 250mW ± 3 %. The results are normalized to 1W input power.

2. SAR Measurement

Standard SAR-measurements were performed with the phantom according to the measurement conditions described in section 1. The results have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values are:

averaged over 1 cm^3 (1 g) of tissue:	**10.7 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**6.84 mW/g**

Note: If the liquid parameters for validation are slightly different from the ones used for initial calibration, the SAR-values will be different as well.

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:	1.401 ns	(one direction)
Transmission factor:	0.993	(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 835 MHz:	Re{Z} = 49.8 Ω
	Im {Z} = -4.8 Ω
Return Loss at 835 MHz	-26.4 dB

4. Handling

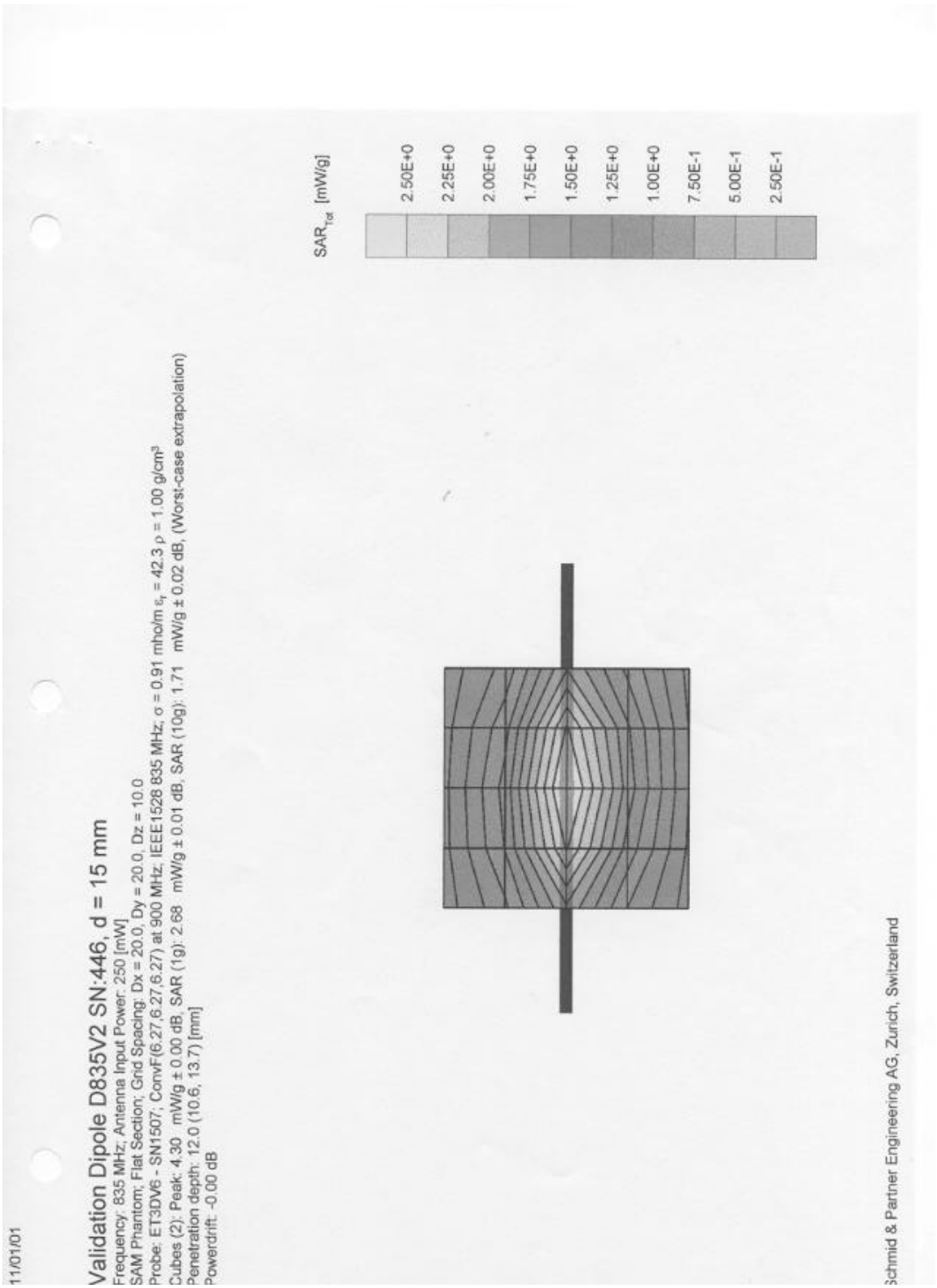
Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

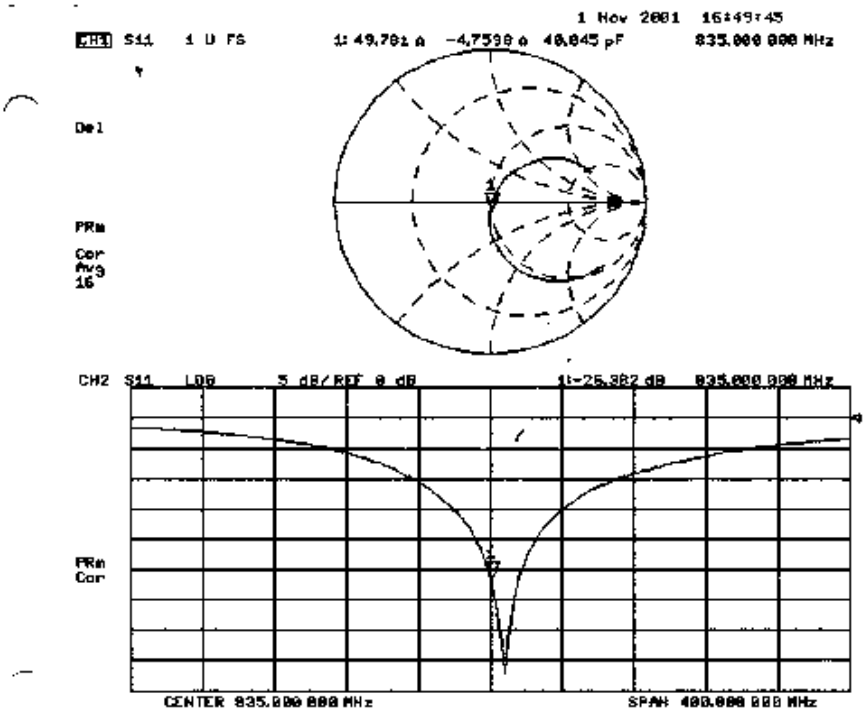
5. Design

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.

6. Power Test

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.





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

Client **RIM**

CALIBRATION CERTIFICATE

Object(s)	D1900V2 - SN:545
Calibration procedure(s)	QA CAL-05.v2 Calibration procedure for dipole validation kits
Calibration date:	August 22, 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	US37390585	18-Oct-01 (Agilent, No. 24BR1033101)	In house check: Oct 03

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

Date issued: August 24, 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

DASY

Dipole Validation Kit

Type: D1900V2

Serial: 545

Manufactured: November 15, 2001
Calibrated: August 22, 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 1900 MHz:

Relative Dielectricity	**40.2**	± 5%
Conductivity	**1.46 mho/m**	± 5%

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 5.2 at 1900 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 spacer 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:	**41.2 mW/g ± 16.8 % (k=2)**[1]
averaged over 10 cm^3 (10 g) of tissue:	**21.3 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:	**1.198 ns**	(one direction)
Transmission factor:	**0.984**	(voltage transmission, one direction)

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

Feedpoint impedance at 1900 MHz:	Re{Z} = **49.7 Ω**
	Im {Z} = **0.96 Ω**
Return Loss at 1900 MHz	**-39.9 dB**

4. 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.

5. 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.

Small end caps have been added to the dipole arms in order to improve matching when loaded according to the position as explained in Section 1. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

6. Power Test

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

Date/Time: 08/22/03 15:40:53

Test Laboratory: SPEAG, Zurich, Switzerland
File Name: SN545_SN1507_HSL1900_220803.da4

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN545
Program: Dipole Calibration

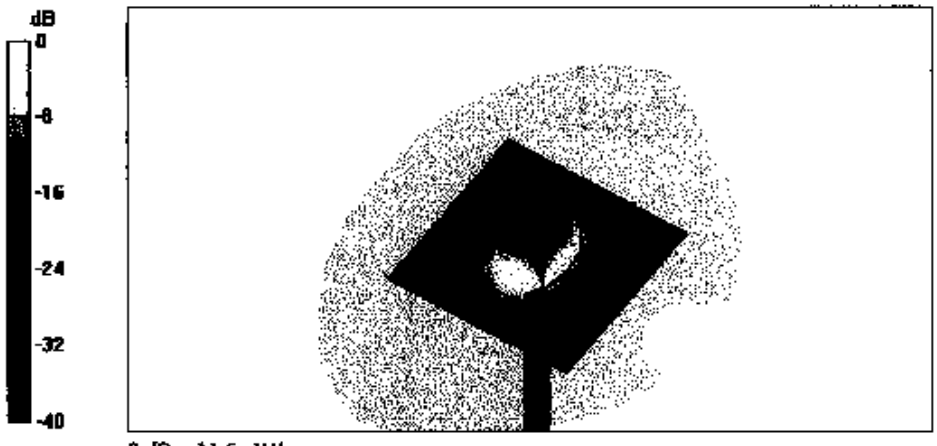
Communication System: CW-1900; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL 1900 MHz (σ = 1.46 mho/m, ϵ_r = 40.17, ρ = 1000 kg/m^3)
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(5.2, 5.2, 5.2); 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

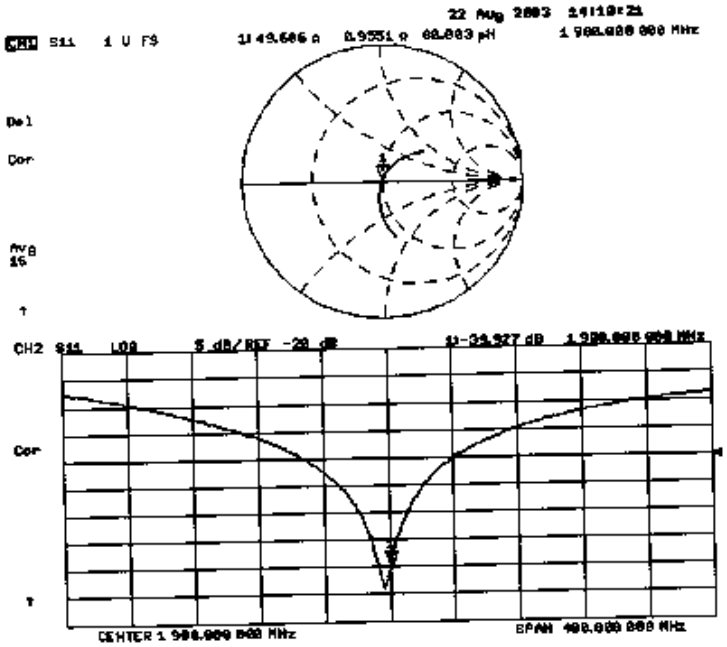
Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): *Measurement grid:* dx=15mm, dy=15mm
Reference Value = 93.6 V/m
Power Drift = 0.05 dB
Maximum value of SAR = 11.5 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 17.7 W/kg
SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.32 mW/g
Reference Value = 93.6 V/m
Power Drift = 0.05 dB
Maximum value of SAR = 11.5 mW/g



0 dB = 11.5mW/g

545



APPENDIX D: SAR SET UP PHOTOS

Figure D1. Body worn configuration with Vertical and Horizontal foam holsters