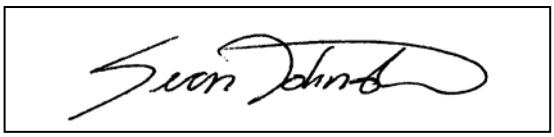
APPENDIX E - SYSTEM VALIDATION

1900 MHz SYSTEM VALIDATION DIPOLE

Type:	**1900 MHz Validation Dipole**
Asset Number:	**00032**
Serial Number:	**151**
Place of Calibration:	**Celltech Labs Inc.**
Date of Calibration:	**June 17, 2005**

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

Calibrated by: 

Approved by: 

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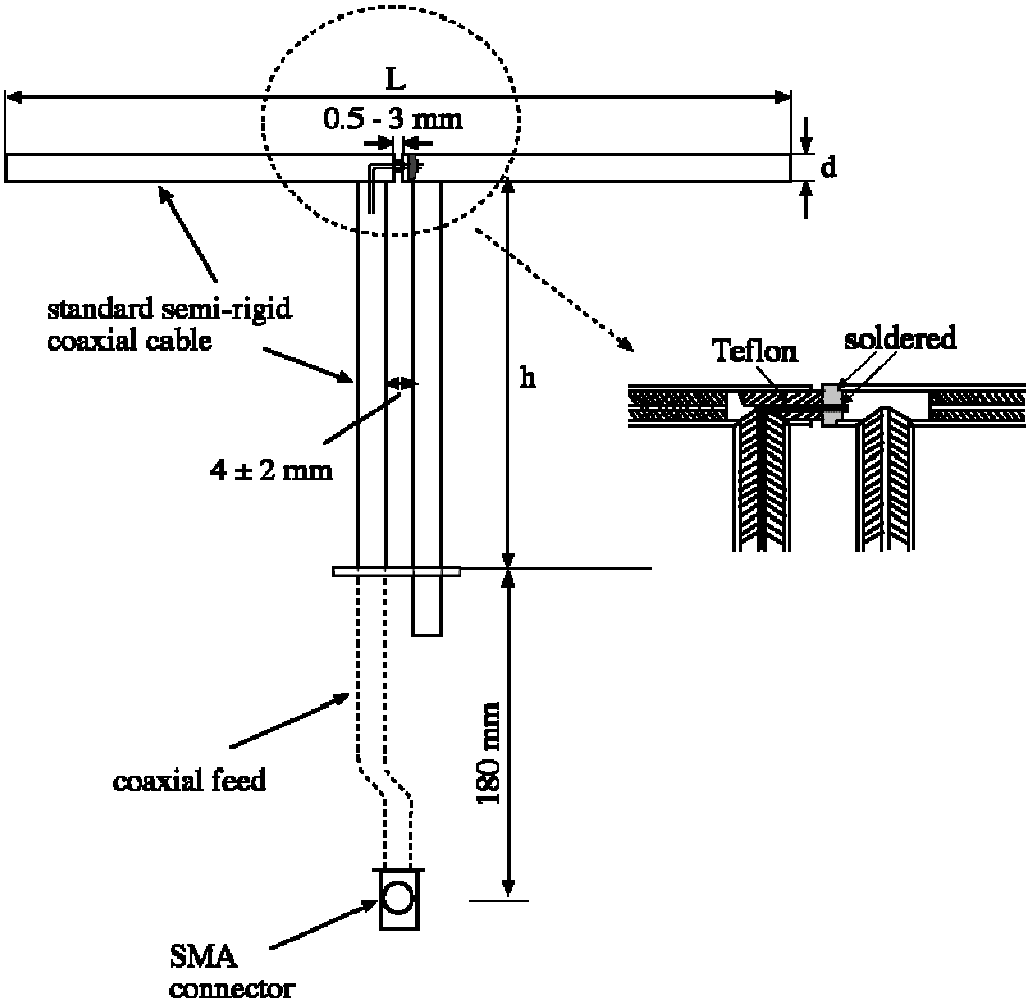
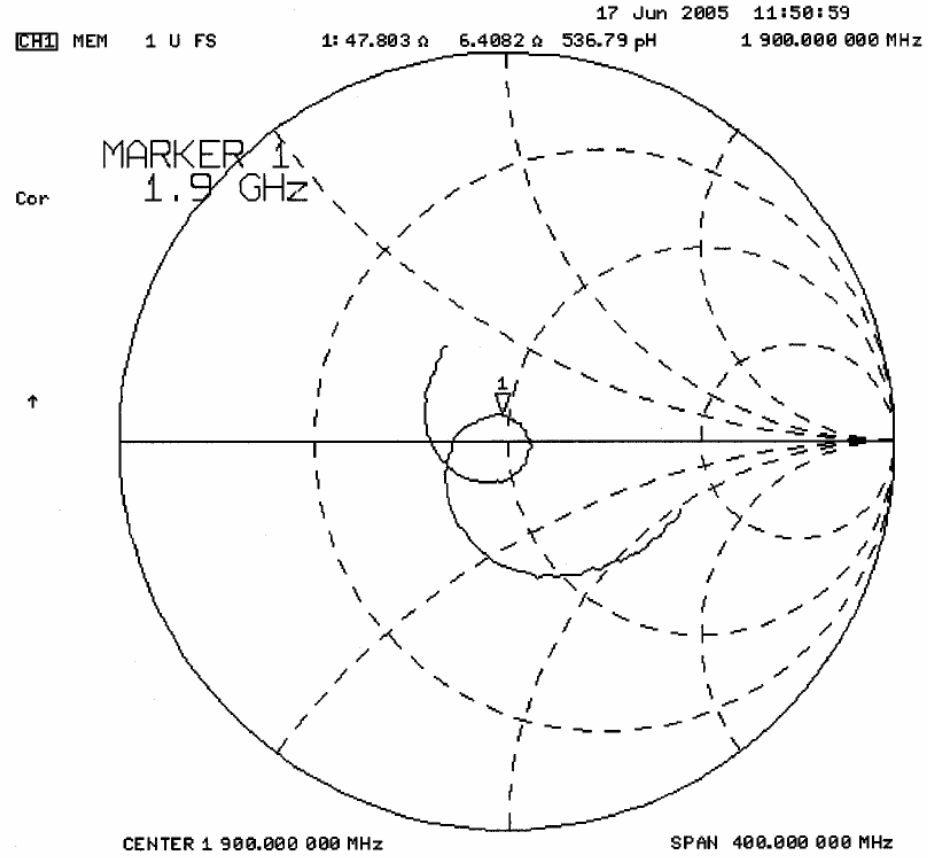
1. Dipole Construction & Electrical Characteristics

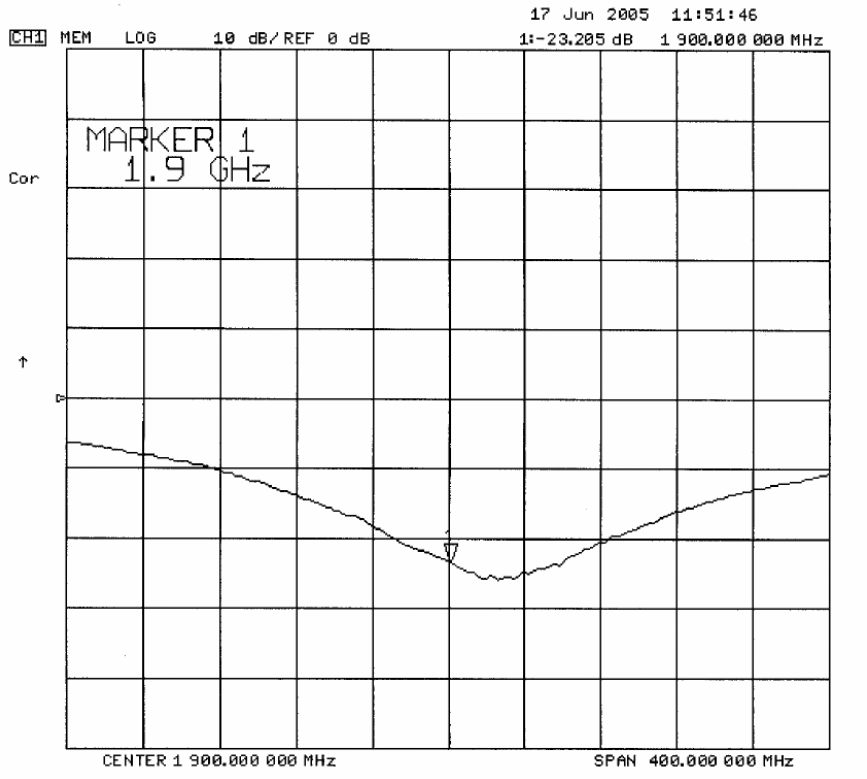
The validation dipole was constructed in accordance with the IEEE Standard “Annex G (informative) Reference dipoles for use in system validation”. The electrical properties were measured using an HP 8753ET Network Analyzer. The network analyzer was calibrated to the validation dipole N-type connector 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 1900MHz	Re{Z} = 47.803Ω
	Im{Z} = 6.4002Ω
Return Loss at 1900MHz	-23.205dB



2. Validation Dipole VSWR Data





3. 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

4. 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 ± 0.1 mm
Filling Volume: Approx. 25 liters
Dimensions: 50 cm (W) x 100 cm (L)

5. 1900 MHz System Validation Setup

1900 MHz System Validation Setup

6. Measurement Conditions

The SAM phantom was filled with 1900 MHz brain simulating tissue.

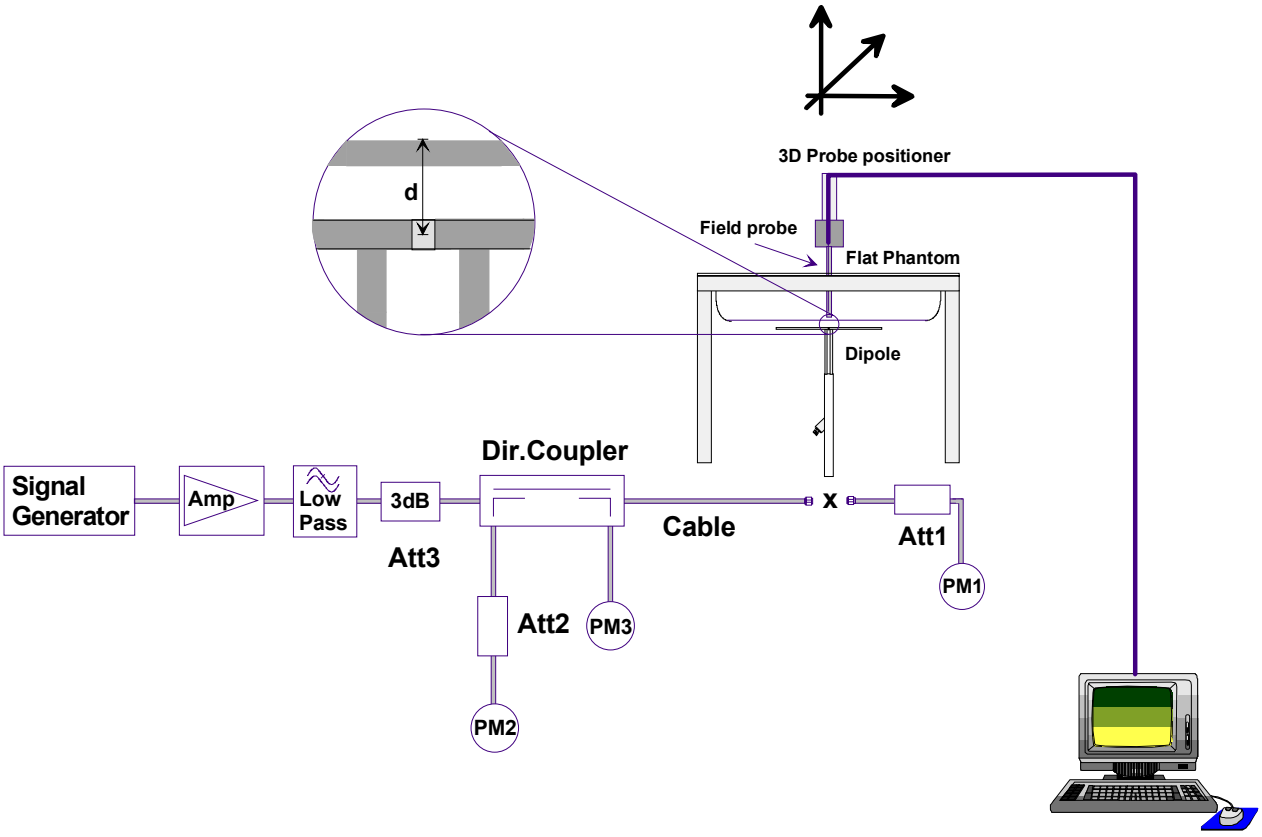
Relative Permittivity:	38.4
Conductivity:	1.40 mho/m
Ambient Temperature:	23.4 °C
Fluid Temperature:	22.7 °C
Fluid Depth:	≥ 15.0 cm
Barometric Pressure:	100.6 kPa
Humidity:	35%

The 1900 MHz tissue simulant consists of the following ingredients:

Ingredient	Percentage by weight
Water	55.85%
Glycol	44.00%
Salt	0.15%
Target Dielectric Parameters at 22 °C	ε_r = 40.0 σ = 1.40 S/m

7. 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 50dB below the forward power.

8. Validation Dipole SAR Test Results

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

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	9.97	39.88	5.20	20.80	17.7
Test 2	10.0	40.00	5.19	20.76	17.9
Test 3	10.1	40.40	5.21	20.84	18.1
Test 4	9.98	39.92	5.20	20.80	17.8
Test 5	9.96	39.84	5.19	20.76	17.7
Test 6	9.99	39.96	5.18	20.72	17.9
Test 7	9.89	39.56	5.16	20.64	17.5
Test 8	9.95	39.80	5.19	20.76	17.6
Test 9	9.96	39.84	5.20	20.80	17.6
Test 10	9.92	39.68	5.19	20.76	17.5
Average	9.972	39.888	5.191	20.764	17.73

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

1g/10g Averaged	Average Measured SAR @ 1W Input	IEEE Target SAR @ 1W Input	Deviation (%)
1 gram	39.888	39.7	+ 0.474
10 gram	20.764	20.5	+ 1.29

1900 MHz System Validation - June 17, 2005

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 151
Ambient Temp: 23.4 °C; Fluid Temp: 22.7 °C; Barometric Pressure: 100.6 kPa; Humidity: 35%
Communication System: CW
Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL1900 (σ = 1.40 mho/m; ε_r = 38.4; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(5.44, 5.44, 5.44); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 25/01/2005
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

1900 MHz System Validation/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

1900 MHz System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.6 V/m; Power Drift = -0.018 dB
Peak SAR (extrapolated) = 17.7 W/kg
SAR(1 g) = 9.97 mW/g; SAR(10 g) = 5.20 mW/g

1900 MHz System Validation/Zoom Scan 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.6 V/m; Power Drift = -0.025 dB
Peak SAR (extrapolated) = 17.9 W/kg
SAR(1 g) = 10.0 mW/g; SAR(10 g) = 5.19 mW/g

1900 MHz System Validation/Zoom Scan 3 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.1 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 18.1 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.21 mW/g

1900 MHz System Validation/Zoom Scan 4 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.8 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 17.8 W/kg
SAR(1 g) = 9.98 mW/g; SAR(10 g) = 5.20 mW/g

1900 MHz System Validation/Zoom Scan 5 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.8 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 17.7 W/kg
SAR(1 g) = 9.96 mW/g; SAR(10 g) = 5.19 mW/g

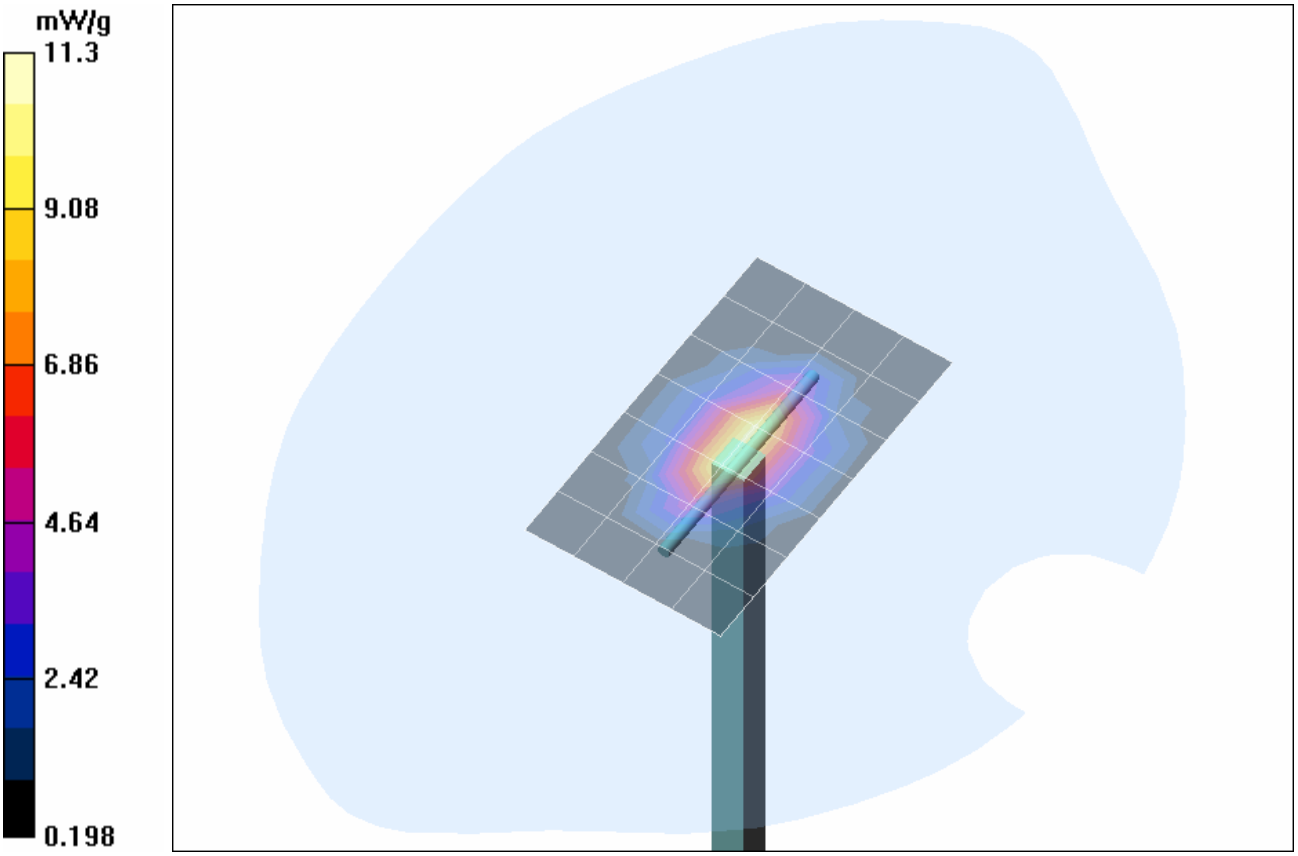
1900 MHz System Validation/Zoom Scan 6 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.6 V/m; Power Drift = -0.081 dB
Peak SAR (extrapolated) = 17.9 W/kg
SAR(1 g) = 9.99 mW/g; SAR(10 g) = 5.18 mW/g

1900 MHz System Validation/Zoom Scan 7 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.6 V/m; Power Drift = -0.019 dB
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 9.89 mW/g; SAR(10 g) = 5.16 mW/g

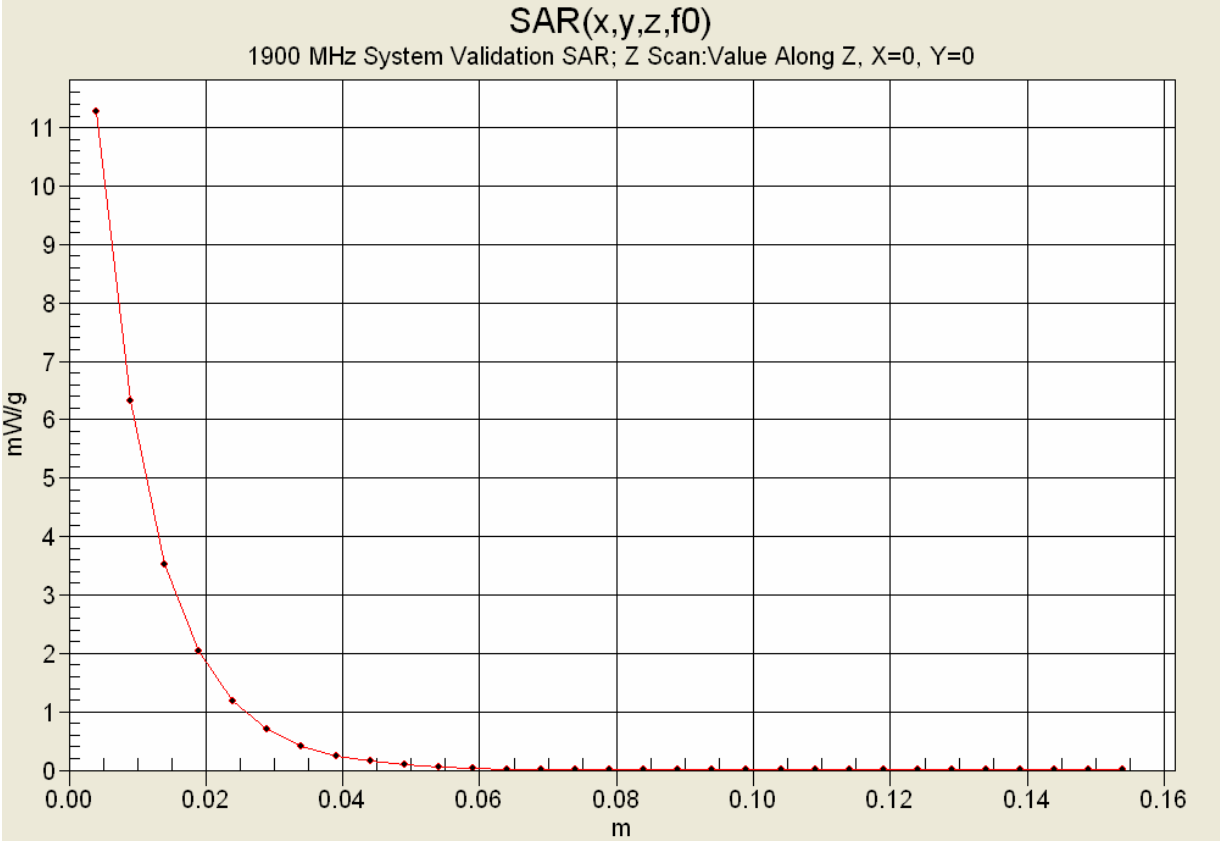
1900 MHz System Validation/Zoom Scan 8 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.0 V/m; Power Drift = -0.016 dB
Peak SAR (extrapolated) = 17.6 W/kg
SAR(1 g) = 9.95 mW/g; SAR(10 g) = 5.19 mW/g

1900 MHz System Validation/Zoom Scan 9 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.0 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 17.6 W/kg
SAR(1 g) = 9.96 mW/g; SAR(10 g) = 5.20 mW/g

1900 MHz System Validation/Zoom Scan 10 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.7 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 9.92 mW/g; SAR(10 g) = 5.19 mW/g



1 g average of 10 measurements: 9.972 mW/g
10 g average of 10 measurements: 5.191 mW/g



System Validation - 1900 MHz Dipole (Brain)

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Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
Fri 17/Jun/2005
Freq Frequency(GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

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Freq	FCC_eH	FCC_sH	Test_e	Test_s
1.8000	40.00	1.40	38.82	1.30
1.8100	40.00	1.40	38.66	1.32
1.8200	40.00	1.40	38.64	1.33
1.8300	40.00	1.40	38.60	1.33
1.8400	40.00	1.40	38.57	1.34
1.8500	40.00	1.40	38.47	1.34
1.8600	40.00	1.40	38.40	1.36
1.8700	40.00	1.40	38.44	1.37
1.8800	40.00	1.40	38.34	1.38
1.8900	40.00	1.40	38.39	1.38
1.9000	40.00	1.40	38.37	1.40
1.9100	40.00	1.40	38.32	1.41
1.9200	40.00	1.40	38.34	1.42
1.9300	40.00	1.40	38.30	1.42
1.9400	40.00	1.40	38.31	1.44
1.9500	40.00	1.40	38.27	1.44
1.9600	40.00	1.40	38.20	1.46
1.9700	40.00	1.40	38.23	1.47
1.9800	40.00	1.40	38.11	1.49
1.9900	40.00	1.40	38.02	1.50
2.0000	40.00	1.40	38.11	1.52