TCC
San Diego

1819-02

ACCREDITED

SAR Compliance Test Report

Test report no.:	WR599.001	**Date of report:**	2005-07-12
Template version:	4	**Number of pages:**	67
Testing laboratory:	TCC San Diego 12278 Scripps Summit Drive San Diego, CA 92131, USA Tel. +1 858 831 5000 Fax +1 858 831 6500	**Client:**	Nokia Mobile Phones, Inc. 12278 Scripps Summit Drive San Diego, CA 92131, USA Tel. +1 858 831 5000 Fax +1 858 831 6500
Responsible test engineer:	Julian Kim	**Product contact person:**	Leland Treebs
Measurements made by:	Julian Kim		
Tested device:	RM-66		
FCC ID:	QMNRM-66	**IC:**	661X-RM66
Supplement reports:	-		

Testing has been carried out in accordance with:

47CFR §2.1093
Radiofrequency Radiation Exposure Evaluation: Portable Devices

FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01)
Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields

RSS-102
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

IEEE 1528 - 2003
IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques

Documentation: The documentation of the testing performed on the tested devices is archived for 15 years at TCC San Diego.

Test results: **The tested device complies with the requirements in respect of all parameters subject to the test.** The test results and statements relate only to the items tested. The test report shall not be reproduced except in full, without written approval of the laboratory.

Date and signatures: **2005-07-12**

For the contents:

Nerina Walton
Lab Manager

Julian Kim
Senior Certification Engineer

CONTENTS

1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Period of test	2005-06-16 to 2005-07-08
SN, HW and SW numbers of tested device	SN: 044/12052363 HW: 3000 SW: HL100_05wk19.nbr
Batteries used in testing	BL-6C
Headsets used in testing	HS-9 and HS-1C
Other accessories used in testing	SD card
State of sample	Prototype Unit
Notes	-

1.2 Maximum Results

The maximum measured SAR values for Head configuration and Body Worn configuration are given in section 1.2.1 and 1.2.2 respectively. The device conforms to the requirements of the standard(s) when the maximum measured SAR value is less than or equal to the limit.

1.2.1 Head Configuration

Mode	Ch / *f* (MHz)	Conducted power	Position	SAR limit (1g avg)	Measured SAR value (1g avg)	Result
AMPS 800	799 / 848.97	25.2 dBm	Left Cheek	1.6 W/kg	1.11 W/kg	PASSED
CDMA 800	777 / 848.31	24.7 dBm	Left Cheek	1.6 W/kg	1.01 W/kg	PASSED
CDMA 1900	600 / 1880.00	23.3 dBm	Left Tilt	1.6 W/kg	1.17 W/kg	PASSED

1.2.2 Body Worn Configuration

Mode	Ch / *f* (MHz)	Conducted power	Separation distance	SAR limit (1g avg)	Measured SAR value (1g avg)	Result
AMPS 800	991 / 824.04	26.1 dBm	2.2 cm	1.6 W/kg	1.05 W/kg	PASSED
CDMA 800	777 / 848.31	24.7 dBm	2.2 cm	1.6 W/kg	0.89 W/kg	PASSED
CDMA 1900	600 /1880.00	23.3 dBm	2.2 cm	1.6 W/kg	0.74 W/kg	PASSED

1.2.3 Maximum Drift

Maximum drift during measurements	0.16 dB

1.2.4 Measurement Uncertainty

Extended Uncertainty (k=2) 95%	± 29.8 %

2. DESCRIPTION OF THE DEVICE UNDER TEST

Device category	Portable
Exposure environment	General population / Uncontrolled

Modes and Bands of Operation	AMPS 800	CDMA 800	CDMA 1900
Modulation Mode	FM	QPSK	QPSK
Duty Cycle	1	1	1
Transmitter Frequency Range (MHz)	824 – 849	824 – 849	1850 – 1910

2.1 Picture of the Device

2.2 Description of the Antenna

The device has an internal patch antenna.

3. TEST CONDITIONS

3.1 Temperature and Humidity

Ambient temperature (°C):	21.2 to 22.2
Ambient humidity (RH %):	34 to 59

3.2 Test Signal, Frequencies, and Output Power

The device was put into operation by using a call tester. Communication between the device and the call tester was established by air link.

The device output power was set to maximum power level for all tests; a fully charged battery was used for every test sequence.

In all operating bands the measurements were performed on lowest, middle and highest channels.

4. DESCRIPTION OF THE TEST EQUIPMENT

4.1 Measurement System and Components

The measurements were performed using an automated near-field scanning system, DASY 4 software version 4.5, manufactured by Schmid & Partner Engineering AG (SPEAG) in Switzerland. The SAR extrapolation algorithm used in all measurements on the device was the 'worst-case extrapolation' algorithm.

The following table lists calibration dates of SPEAG components:

Test Equipment	Serial Number	Calibration interval	Calibration expiry
DAE V1	604	12 months	2005-10
E-field Probe ET3DV6	1739	12 months	2005-08
Dipole Validation Kit, D835V2	478	24 months	2006-10
Dipole Validation Kit, D1900V2	534	24 months	2006-10

Additional test equipment used in testing:

Test Equipment	Model	Serial Number	Calibration interval	Calibration expiry
Signal Generator	Agilent E4436B	US 39260114	24 months	2006-05
Amplifier	Milmega AS0822-8L	1004832	-	-
Power Meter	Agilent E4417A	GB41290918	12 months	2005-10
Power Sensor	Agilent E9327A	US 40440897	12 months	2006-03
Power Sensor	Agilent E9323A	US 40411295	12 months	2005-11
Call Tester	Agilent 8960/E5515C	US 40440119	12 months	2006-06
Vector Network Analyzer	Agilent 8753ES	MY40002861	12 months	2006-06
Dielectric Probe Kit	Agilent 85070D	US 01440165	-	-

4.1.1 Isotropic E-field Probe SN1739

Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., butyl diglycol)
Calibration	Calibration certificate in Appendix C
Frequency	10 MHz to 3 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Optical Surface Detection	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.4 dB in HSL (rotation normal to probe axis)
Dynamic Range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
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 phones Fast automatic scanning in arbitrary phantoms

4.2 Phantoms

The phantom used for all tests i.e. for both system checking and device testing, was the twin-headed "SAM Phantom", manufactured by SPEAG. The phantom conforms to the requirements of IEEE 1528 - 2003.

System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.

The SPEAG device holder (see Section 5.1) was used to position the device in all tests whilst a tripod was used to position the validation dipoles against the flat section of phantom.

4.3 Tissue Simulants

Recommended values for the dielectric parameters of the simulating liquids are given in IEEE 1528 - 2003 and FCC Supplement C to OET Bulletin 65. All tests were carried out using simulants whose dielectric parameters were within ± 5% of the recommended values. All tests were carried out within 24 hours of measuring the dielectric parameters.

The depth of the tissue simulant was 15.0 ± 0.5 cm measured from the ear reference point during system checking and device measurements.

4.3.1 Tissue Simulant Recipes

The following recipes were used for Head and Body tissue simulants:

800MHz band

Ingredient	Head (% by weight)	Body (% by weight)
Deionised Water	39.74	55.97
HEC	0.25	1.21
Sugar	58.31	41.76
Preservative	0.15	0.27
Salt	1.55	0.79

1900MHz band

Ingredient	Head (% by weight)	Body (% by weight)
Deionised Water	54.88	69.02
Butyl Diglycol	44.91	30.76
Salt	0.21	0.22

4.3.2 System Checking

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyser. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system checking results (dielectric parameters and SAR values) are given in the table below.

System checking, head tissue simulant

f [MHz]	Description	SAR [W/kg], 1g	Dielectric Parameters		Temp [°C]
			ε_r	σ [S/m]	
835	Reference result	2.34	41.8	0.89	N/A
	± 10% window	2.11 – 2.57			
	2005-06-16	2.43	40.6	0.89	21.2
	2005-06-17	2.45	41.0	0.89	21.4
	2005-06-20	2.42	40.6	0.88	21.5
	2005-06-21	2.42	40.6	0.88	21.3
	2005-06-22	2.41	41.0	0.89	21.2
1900	Reference result	9.91	39.4	1.44	N/A
	± 10% window	8.92 – 10.90			
	2005-06-24	10.7	38.2	1.44	21.2
	2005-06-27	10.6	38.2	1.43	21.6
	2005-06-28	10.4	38.2	1.43	22.0
	2005-06-29	10.5	38.2	1.45	21.6

System checking, body tissue simulant

f [MHz]	Description	SAR [W/kg], 1g	Dielectric Parameters		Temp [°C]
			ε_r	σ [S/m]	
835	Reference result	2.44	54.3	1.00	N/A
	± 10% window	2.20 – 2.68			
	2005-06-30	2.39	53.2	0.95	22.0
	2005-07-05	2.38	53.8	0.95	21.6
	2005-07-06	2.40	53.3	0.96	22.2
1900	Reference result	9.85	51.3	1.59	N/A
	± 10% window	8.87 – 10.83			
	2005-07-07	10.2	51.0	1.58	22.2
	2005-07-08	9.93	51.6	1.57	21.6

Plots of the system checking scans are given in Appendix A.

4.3.3 Tissue Simulants used in the Measurements

Head tissue simulant measurements

f [MHz]	Description	Dielectric Parameters		Temp [°C]
		ε_r	σ [S/m]	
836.5	Recommended value	41.5	0.90	N/A
	± 5% window	39.4 – 43.6	0.86 – 0.95	
	2005-06-16	40.5	0.89	21.2
	2005-06-17	41.0	0.89	21.4
	2005-06-20	40.6	0.89	21.5
	2005-06-21	40.6	0.89	21.3
	2005-06-22	41.0	0.89	21.2
1880	Recommended value	40.0	1.40	N/A
	± 5% window	38.0 – 42.0	1.33 – 1.47	
	2005-06-24	38.3	1.42	21.2
	2005-06-27	38.3	1.41	21.6
	2005-06-28	38.4	1.41	22.0
	2005-06-29	38.4	1.43	21.6

Body tissue simulant measurements

f [MHz]	Description	Dielectric Parameters		Temp [°C]
		ε_r	σ [S/m]	
836.5	Recommended value	55.2	0.97	N/A
	± 5% window	52.4 – 58.0	0.92 – 1.02	
	2005-06-30	53.2	0.95	22.0
	2005-07-05	53.7	0.96	21.6
	2005-07-06	53.3	0.97	22.2
1880	Recommended value	53.3	1.52	N/A
	± 5% window	50.6 – 56.0	1.44 – 1.60	
	2005-07-07	51.1	1.56	22.2
	2005-07-08	51.7	1.55	21.6

5. DESCRIPTION OF THE TEST PROCEDURE

5.1 Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the DASY system.

Device holder supplied by SPEAG

A Nokia designed spacer (illustrated below) was used to position the device within the SPEAG holder. The spacer positions the device so that the holder has minimal effect on the test results but still holds the device securely. The spacer was removed before the tests.

Nokia spacer

5.2 Test Positions

5.2.1 Against Phantom Head

Measurements were made in “cheek” and “tilt” positions on both the left hand and right hand sides of the phantom.

The positions used in the measurements were according to IEEE 1528 - 2003 "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”.

Photo of the device in “closed cheek” position

Photo of the device in “closed tilt” position

Photo of the device in “open cheek” position

Photo of the device in “open tilt” position

5.2.2 Body Worn Configuration

The device was placed in the SPEAG holder using the Nokia spacer and placed below the flat section of the phantom. The distance between the device and the phantom was kept at the separation distance indicated in the photo below using a separate flat spacer that was removed before the start of the measurements. The device was oriented with its antenna facing the phantom since this orientation gives higher results.

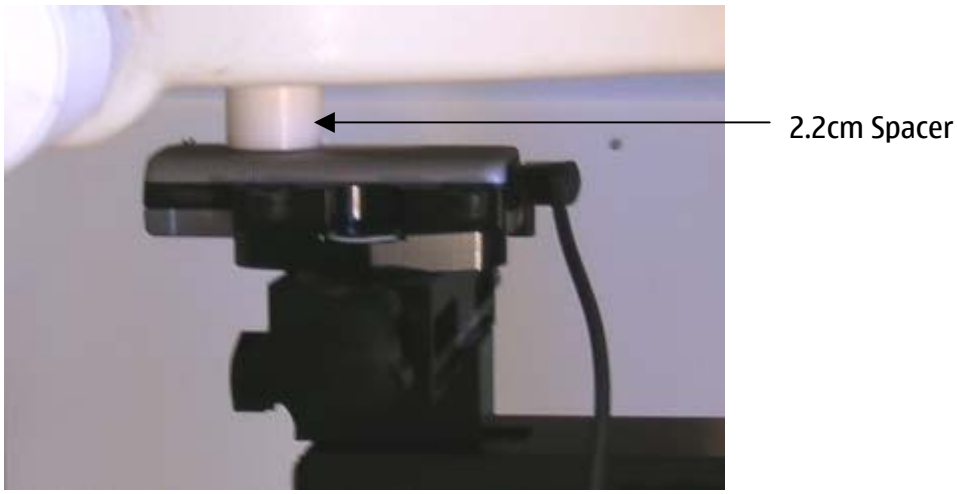


Photo of the device positioned for Body SAR measurement. The spacer was removed for the tests.

5.3 Scan Procedures

First, area scans were used for determination of the field distribution. Next a zoom scan, a minimum of 5x5x7 points covering a volume of at least 30x30x30mm was performed around the highest E-field value to determine the averaged SAR value. Drift was determined by measuring the same point at the start of the area scan and again at the end of the zoom scan.

5.4 SAR Averaging Methods

The maximum SAR value was averaged over a cube of tissue using interpolation and extrapolation.

The interpolation, extrapolation and maximum search routines within Dasy4 are all based on the modified Quadratic Shepard's method (Robert J. Renka, "Multivariate Interpolation Of Large Sets Of Scattered Data", University of North Texas ACM Transactions on Mathematical Software, vol. 14, no. 2, June 1988, pp. 139-148).

The interpolation scheme combines a least-square fitted function method with a weighted average method. A trivariate 3-D / bivariate 2-D quadratic function is computed for each measurement point and fitted to neighbouring points by a least-square method. For the zoom scan, inverse distance weighting is incorporated to fit distant points more accurately. The interpolating function is finally calculated as a weighted average of the quadratics.

In the zoom scan, the interpolation function is used to extrapolate the Peak SAR from the deepest measurement points to the inner surface of the phantom.

6. MEASUREMENT UNCERTAINTY

Table 6.1 – Measurement uncertainty evaluation

Uncertainty Component	Section in IEEE 1528	Tol. (%)	Prob Dist	Div	c_i	$c_i . u_i$ (%)	v_i
Measurement System							
Probe Calibration	E2.1	±5.8	N	1	1	±5.8	∞
Axial Isotropy	E2.2	±4.7	R	√3	$(1-c_p)^{1/2}$	±1.9	∞
Hemispherical Isotropy	E2.2	±9.6	R	√3	$(c_p)^{1/2}$	±3.9	∞
Boundary Effect	E2.3	±8.3	R	√3	1	±4.8	∞
Linearity	E2.4	±4.7	R	√3	1	±2.7	∞
System Detection Limits	E2.5	±1.0	R	√3	1	±0.6	∞
Readout Electronics	E2.6	±1.0	N	1	1	±1.0	∞
Response Time	E2.7	±0.8	R	√3	1	±0.5	∞
Integration Time	E2.8	±2.6	R	√3	1	±1.5	∞
RF Ambient Conditions - Noise	E6.1	±3.0	R	√3	1	±1.7	∞
RF Ambient Conditions - Reflections	E6.1	±3.0	R	√3	1	±1.7	∞
Probe Positioner Mechanical Tolerance	E6.2	±0.4	R	√3	1	±0.2	∞
Probe Positioning with respect to Phantom Shell	E6.3	±2.9	R	√3	1	±1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E5.2	±3.9	R	√3	1	±2.3	∞
Test sample Related							
Test Sample Positioning	E4.2.1	±6.0	N	1	1	±6.0	11
Device Holder Uncertainty	E4.1.1	±5.0	N	1	1	±5.0	7
Output Power Variation - SAR drift measurement	6.6.3	±10.0	R	√3	1	±5.8	∞
Phantom and Tissue Parameters							
Phantom Uncertainty (shape and thickness tolerances)	E3.1	±4.0	R	√3	1	±2.3	∞
Conductivity Target - tolerance	E3.2	±5.0	R	√3	0.64	±1.8	∞
Conductivity - measurement uncertainty	E3.3	±5.5	N	1	0.64	±3.5	5
Permittivity Target - tolerance	E3.2	±5.0	R	√3	0.6	±1.7	∞
Permittivity - measurement uncertainty	E3.3	±2.9	N	1	0.6	±1.7	5
Combined Standard Uncertainty			RSS			**±14.9**	206
Coverage Factor for 95%			**k=2**				
Expanded Standard Uncertainty						**±29.8**	

7. RESULTS

The measured Head SAR values for the test device are tabulated below:

AMPS800 Head SAR Results

Test Configuration			SAR, averaged over 1g (W/kg)		
			Ch 991 824.04 MHz	Ch 384 836.52 MHz	Ch 799 848.97 MHz
Power			26.1 dBm	25.1 dBm	25.2 dBm
Left	Cheek	Closed	1.01	0.95	**1.11**
		Open	-	0.37	-
	Tilt	Closed	-	0.68	-
		Open	-	0.19	-
Right	Cheek	Closed	0.95	1.00	1.09
		Open	-	0.39	-
	Tilt	Closed	-	0.61	-
		Open	-	0.20	-
Left cheek with SD card		Closed	-	-	**1.11**
Left cheek with SD card and Bluetooth active		Closed	-	-	1.10
Left cheek with Bluetooth active only		Closed	-	-	1.09

CDMA800 Head SAR Results

Test Configuration			SAR, averaged over 1g (W/kg)		
			Ch 1013 824.70 MHz	Ch 384 836.52 MHz	Ch 777 848.31 MHz
Power			25.2 dBm	24.7 dBm	24.7 dBm
Left	Cheek	Closed	-	-	**1.01**
		Open	-	0.33	-
	Tilt	Closed	-	0.65	-
		Open	-	0.16	-
Right	Cheek	Closed	-	-	0.99
		Open	-	0.33	-
	Tilt	Closed	-	0.62	-
		Open	-	0.16	-
Left cheek with SD card		Closed	-	-	0.96

CDMA1900 Head SAR Results

Test Configuration			SAR, averaged over 1g (W/kg)		
			Ch 25 1851.25 MHz	Ch 600 1880.00 MHz	Ch 1175 1908.75 MHz
Power			22.8 dBm	23.3 dBm	23.3 dBm
Left	Cheek	Closed	0.90	1.01	0.94
		Open	0.44	0.46	0.40
	Tilt	Closed	1.00	**1.17**	1.06
		Open	-	0.28	-
Right	Cheek	Closed	0.56	0.72	0.67
		Open	-	0.37	-
	Tilt	Closed	0.75	0.93	0.89
		Open	-	0.29	-
Left tilt with SD card		Closed	-	**1.17**	
Left tilt with SD card and Bluetooth active		Closed	-	1.16	-
Left tilt with Bluetooth active only		Closed	-	1.15	-

The measured Body SAR values for the test device are tabulated below:

AMPS800 Body SAR Results

Test configuration		SAR, averaged over 1g (W/kg)		
		Ch 991 824.04 MHz	Ch 384 836.52 MHz	Ch 799 848.97 MHz
Power		26.1 dBm	25.1 dBm	25.2 dBm
Without headset	Closed	0.93	0.93	0.96
Headset HS-9	Closed	**1.05**	0.83	0.90
Headset HS-1C	Closed	-	0.57	-
Headset HS-9 with SD card	Closed	1.03	-	-
Headset HS-9 with SD card, and Bluetooth active	Closed	1.03	-	-
Headset HS-9 with Bluetooth active only	Closed	1.03	-	-

CDMA800 Body SAR Results

Test configuration		SAR, averaged over 1g (W/kg)		
		Ch 1013 824.70 MHz	Ch 384 836.52 MHz	Ch 777 848.31 MHz
Power		25.2 dBm	24.7 dBm	24.7 dBm
Without headset	Closed	-	-	**0.89**
Headset HS-9	Closed	0.80	-	-
Headset HS-1C	Closed	-	0.47	-

CDMA1900 Body SAR Results

Test configuration		SAR, averaged over 1g (W/kg)		
		Ch 25 1851.25 MHz	Ch 600 1880.00 MHz	Ch 1175 1908.75 MHz
Power		**22.8 dBm**	**23.3 dBm**	**23.3 dBm**
Without headset	Closed	-	0.71	-
Headset HS-9	Closed	-	0.68	-
Headset HS-1C	Closed	0.70	**0.73**	0.66
Headset HS-1C with SD card, and Bluetooth active	Closed	-	**0.74**	-

Plots of the Measurement scans are given in Appendix B.

APPENDIX A: SYSTEM CHECKING SCANS

Date: 2005-06-16; Test Laboratory: TCC San Diego

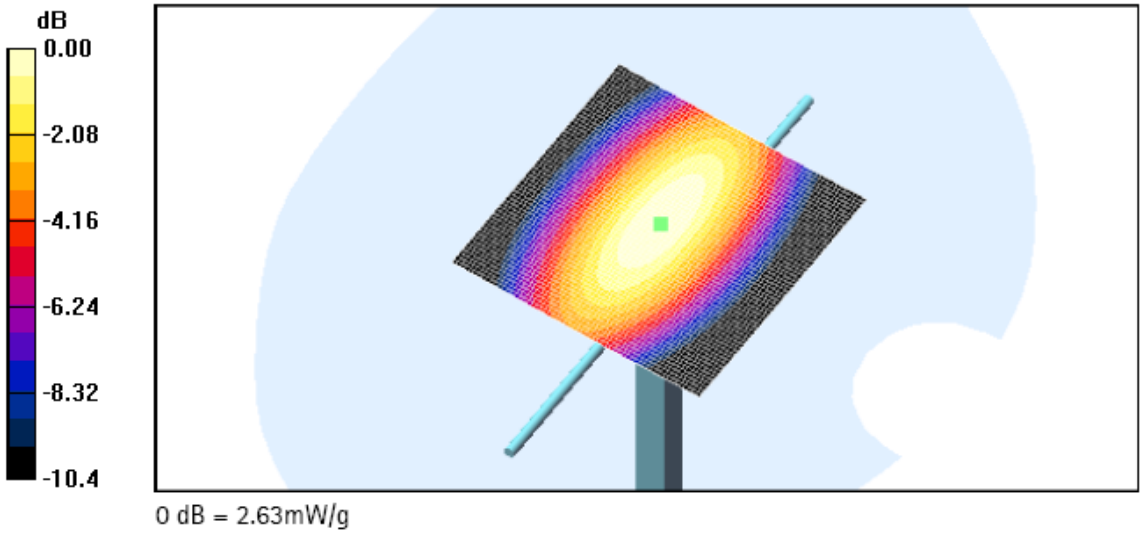
Dipole 835 MHz; Serial No. 478; Head Validation

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.886 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3 ; Temperature (liq.) = 21.2 °C
Phantom section: Flat Section ; **Advanced Extrapolation**

DASY4 Configuration:
- Probe: ET3DV6 - SN1739; ConvF(6.79, 6.79, 6.79); Calibrated: 8/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM1; Type: SAM; Serial: TP-1035
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

835MHz validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.64 mW/g

835MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.9 V/m; Power Drift = -0.020 dB
Peak SAR (extrapolated) = 3.69 W/kg
SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.58 mW/g
Maximum value of SAR (measured) = 2.63 mW/g



0 dB = 2.63mW/g

Date: 2005-06-17; Test Laboratory: TCC San Diego

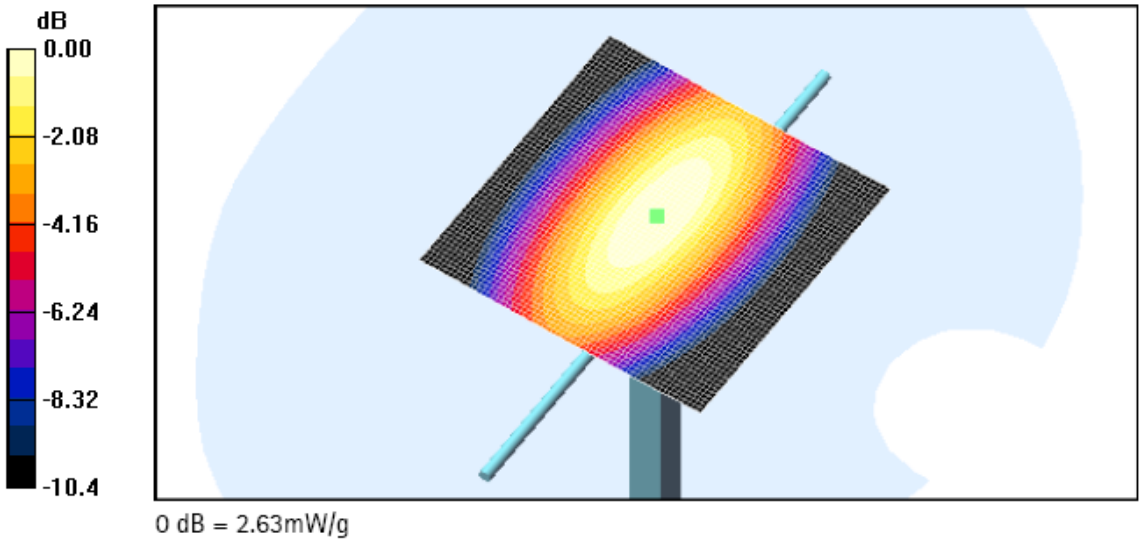
Dipole 835 MHz; Serial No. 478; Head Validation

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.886 mho/m; ε_r = 41; ρ = 1000 kg/m^3 ; Temperature (liq.) = 21.4 °C
Phantom section: Flat Section ; **Advanced Extrapolation**

DASY4 Configuration:
- Probe: ET3DV6 - SN1739; ConvF(6.79, 6.79, 6.79); Calibrated: 8/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM1; Type: SAM; Serial: TP-1035
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

835MHz validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.66 mW/g

835MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.9 V/m; Power Drift = 0.010 dB
Peak SAR (extrapolated) = 3.69 W/kg
SAR(1 g) = 2.45 mW/g; SAR(10 g) = 1.59 mW/g
Maximum value of SAR (measured) = 2.63 mW/g



0 dB = 2.63mW/g

Date: 2005-06-20; Test Laboratory: TCC San Diego

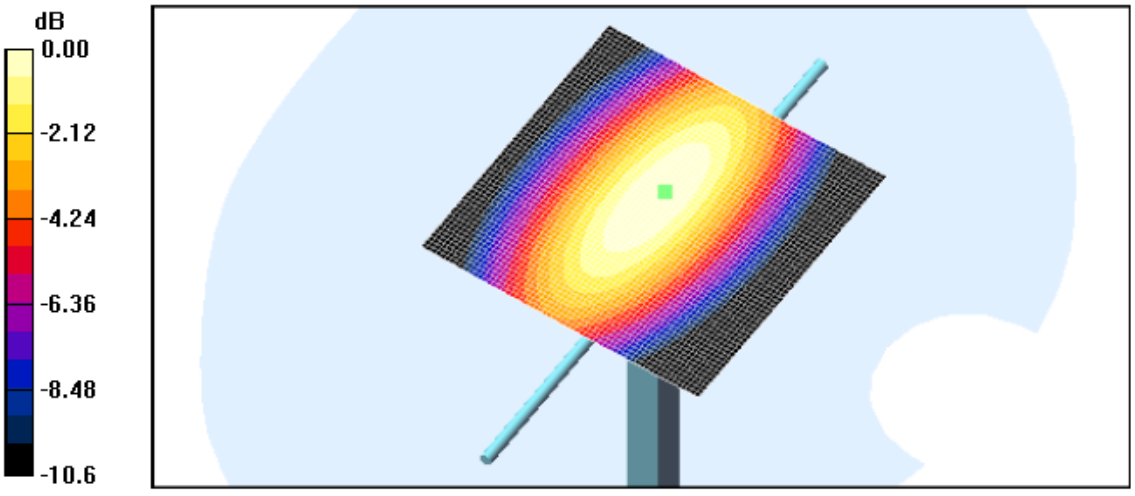
Dipole 835 MHz; Serial No. 478; Head Validation

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.884 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3 ; Temperature (liq.) = 21.5 °C
Phantom section: Flat Section ; **Advanced Extrapolation**

DASY4 Configuration:
- Probe: ET3DV6 - SN1739; ConvF(6.79, 6.79, 6.79); Calibrated: 8/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM1; Type: SAM; Serial: TP-1035
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

835MHz validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.62 mW/g

835MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.1 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.64 W/kg
SAR(1 g) = 2.42 mW/g; SAR(10 g) = 1.58 mW/g
Maximum value of SAR (measured) = 2.61 mW/g



0 dB = 2.61mW/g

Date: 2005-06-21; Test Laboratory: TCC San Diego

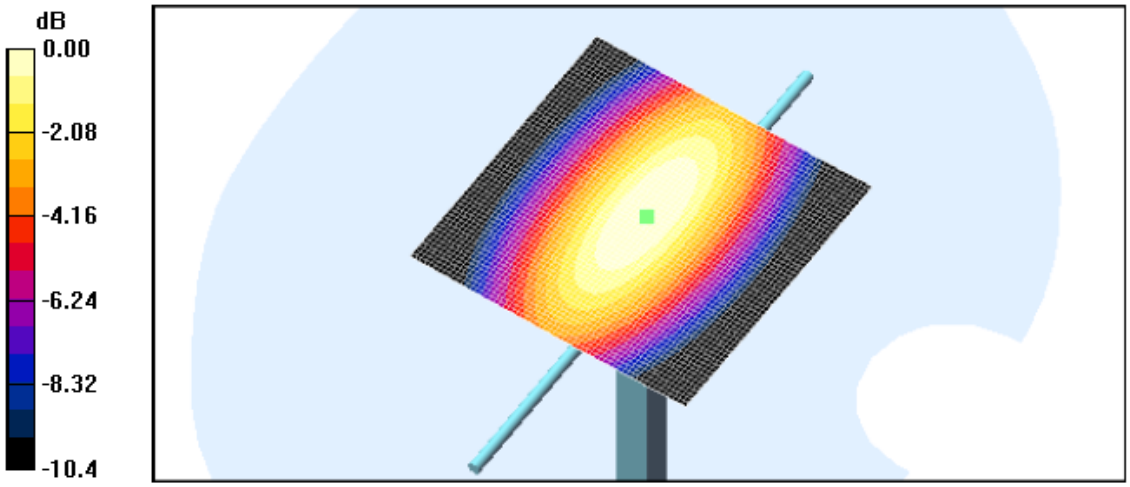
Dipole 835 MHz; Serial No. 478; Head Validation

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.883 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3 ; Temperature (liq.) = 21.3 °C
Phantom section: Flat Section ; **Advanced Extrapolation**

DASY4 Configuration:
- Probe: ET3DV6 - SN1739; ConvF(6.79, 6.79, 6.79); Calibrated: 8/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM1; Type: SAM; Serial: TP-1035
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

835MHz validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.65 mW/g

835MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.0 V/m; Power Drift = -0.012 dB
Peak SAR (extrapolated) = 3.63 W/kg
SAR(1 g) = 2.42 mW/g; SAR(10 g) = 1.58 mW/g
Maximum value of SAR (measured) = 2.60 mW/g



0 dB = 2.60mW/g

Date: 2005-06-22; Test Laboratory: TCC San Diego

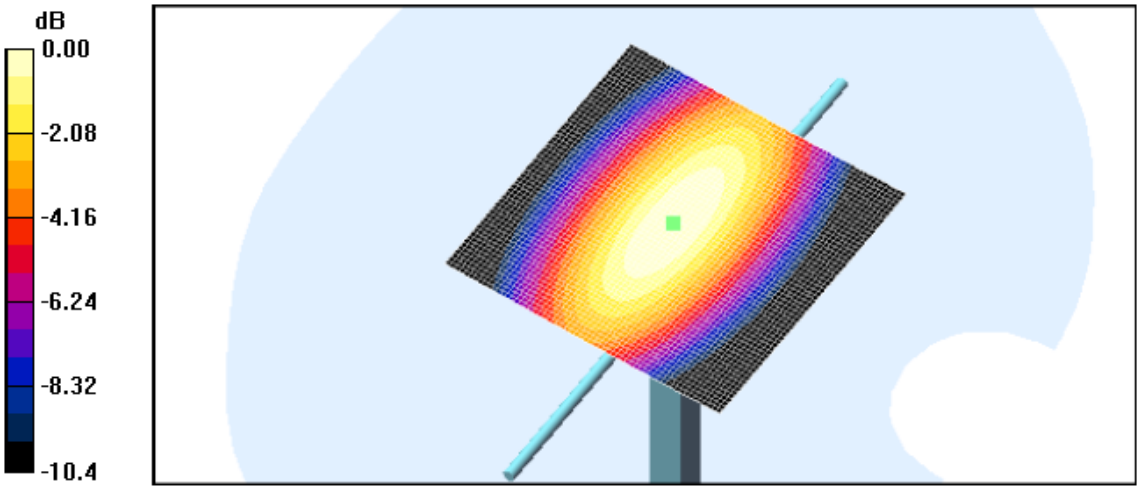
Dipole 835 MHz; Serial No. 478; Head Validation

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.885 mho/m; ε_r = 41; ρ = 1000 kg/m^3 ; Temperature (liq.) = 21.2 °C
Phantom section: Flat Section ; **Advanced Extrapolation**

DASY4 Configuration:
- Probe: ET3DV6 - SN1739; ConvF(6.79, 6.79, 6.79); Calibrated: 8/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM1; Type: SAM; Serial: TP-1035
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

835MHz validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.60 mW/g

835MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.5 V/m; Power Drift = 0.012 dB
Peak SAR (extrapolated) = 3.61 W/kg
SAR(1 g) = 2.41 mW/g; SAR(10 g) = 1.57 mW/g
Maximum value of SAR (measured) = 2.60 mW/g



0 dB = 2.60mW/g

Date: 2005-06-24; Test Laboratory: TCC San Diego

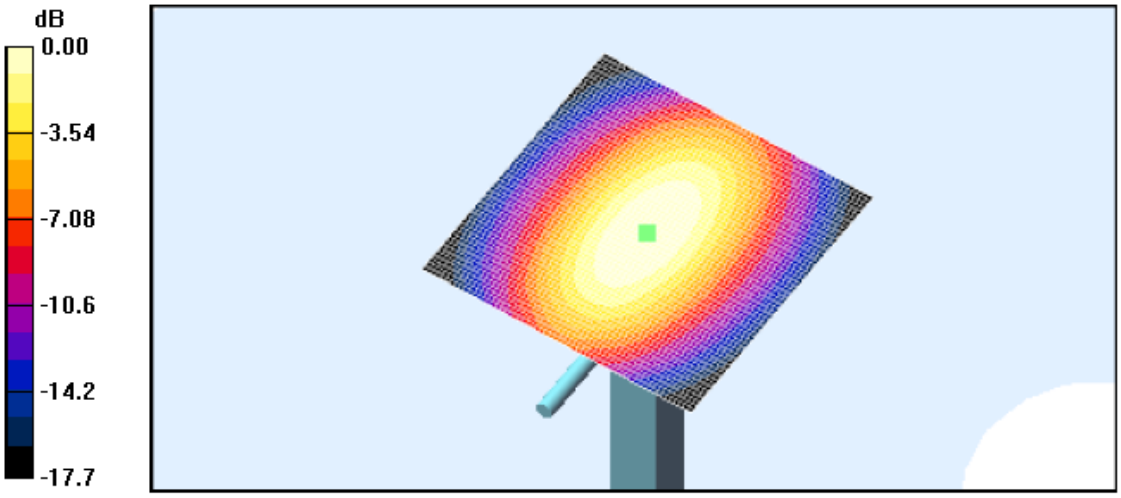
Dipole 1900 MHz; Serial No. 534; Head Validation

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.44 mho/m; ε_r = 38.2; ρ = 1000 kg/m^3 ; Temperature (liq.) = 21.2 °C
Phantom section: Flat Section; **Advanced Extrapolation**

DASY4 Configuration:
- Probe: ET3DV6 - SN1739; ConvF(5.1, 5.1, 5.1); Calibrated: 8/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

1900MHz validation/Area Scan (61x61x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 12.1 mW/g

1900MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.8 V/m; Power Drift = 0.019 dB
Peak SAR (extrapolated) = 18.9 W/kg
SAR(1 g) = 10.7 mW/g; SAR(10 g) = 5.56 mW/g
Maximum value of SAR (measured) = 12.1 mW/g



0 dB = 12.1mW/g

Date: 2005-06-27; Test Laboratory: TCC San Diego

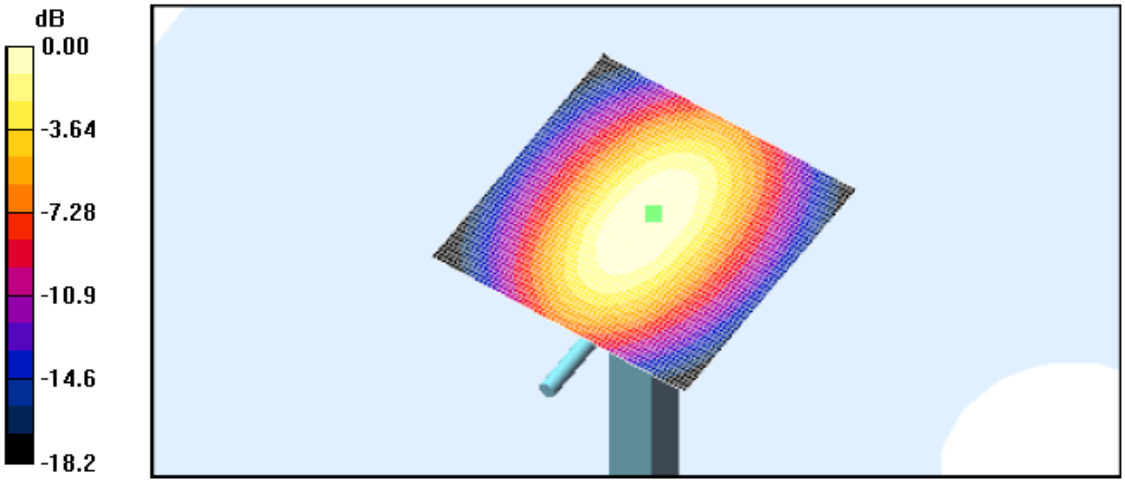
Dipole 1900 MHz; Serial No. 534; Head Validation

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.43 mho/m; ε_r = 38.2; ρ = 1000 kg/m^3 ; Temperature (liq.) = 21.6 °C
Phantom section: Flat Section; **Advanced Extrapolation**

DASY4 Configuration:
- Probe: ET3DV6 - SN1739; ConvF(5.1, 5.1, 5.1); Calibrated: 8/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

1900MHz validation/Area Scan (61x61x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 12.2 mW/g

1900MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.1 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 18.9 W/kg
SAR(1 g) = 10.6 mW/g; SAR(10 g) = 5.49 mW/g
Maximum value of SAR (measured) = 11.9 mW/g



0 dB = 11.9mW/g

Date: 2005-06-28; Test Laboratory: TCC San Diego

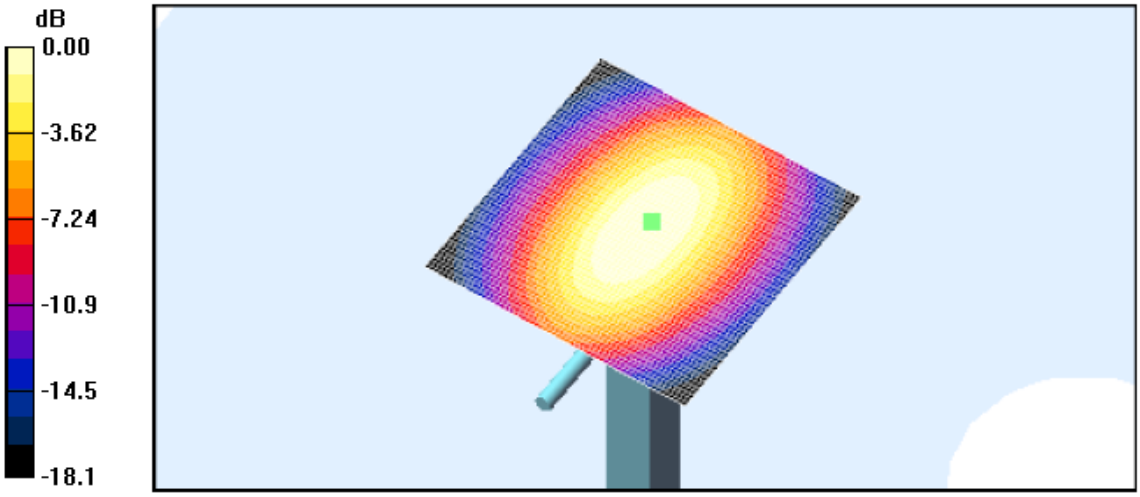
Dipole 1900 MHz; Serial No. 534; Head Validation

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.43 mho/m; ε_r = 38.2; ρ = 1000 kg/m^3 ; Temperature (liq.) = 22.0 °C
Phantom section: Flat Section; **Advanced Extrapolation**

DASY4 Configuration:
- Probe: ET3DV6 - SN1739; ConvF(5.1, 5.1, 5.1); Calibrated: 8/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

1900MHz validation/Area Scan (61x61x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 11.9 mW/g

1900MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.5 V/m; Power Drift = -0.021 dB
Peak SAR (extrapolated) = 18.6 W/kg
SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.42 mW/g
Maximum value of SAR (measured) = 11.7 mW/g



0 dB = 11.7mW/g

Date: 2005-06-29; Test Laboratory: TCC San Diego

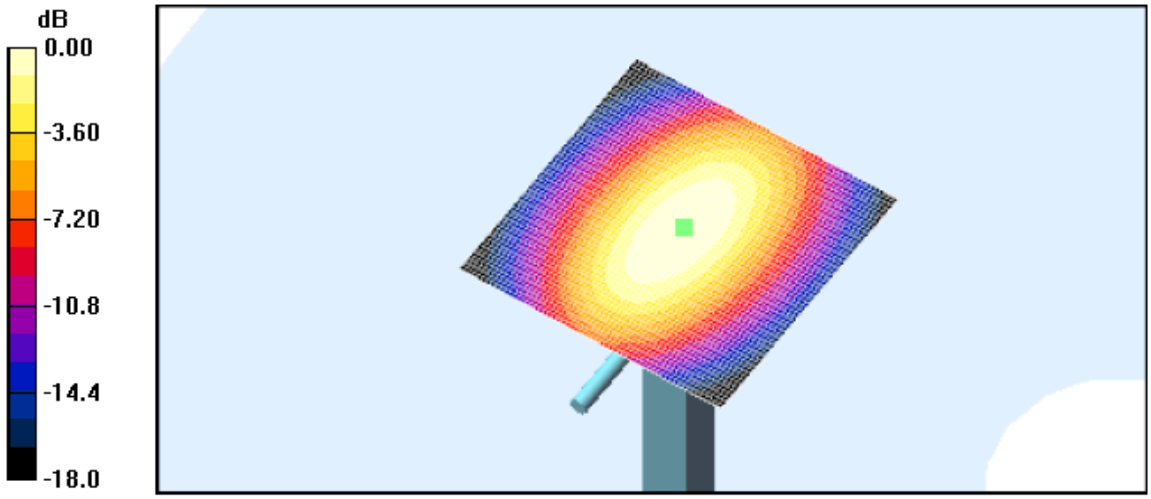
Dipole 1900 MHz; Serial No. 534; Head Validation

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.45 mho/m; ε_r = 38.2; ρ = 1000 kg/m^3 ; Temperature (liq.) = 21.6 °C
Phantom section: Flat Section; **Advanced Extrapolation**

DASY4 Configuration:
- Probe: ET3DV6 - SN1739; ConvF(5.1, 5.1, 5.1); Calibrated: 8/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

1900MHz validation/Area Scan (61x61x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 12.1 mW/g

1900MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.7 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 18.7 W/kg
SAR(1 g) = 10.5 mW/g; SAR(10 g) = 5.49 mW/g
Maximum value of SAR (measured) = 11.9 mW/g



0 dB = 11.9mW/g

Date: 2005-06-30; Test Laboratory: TCC San Diego

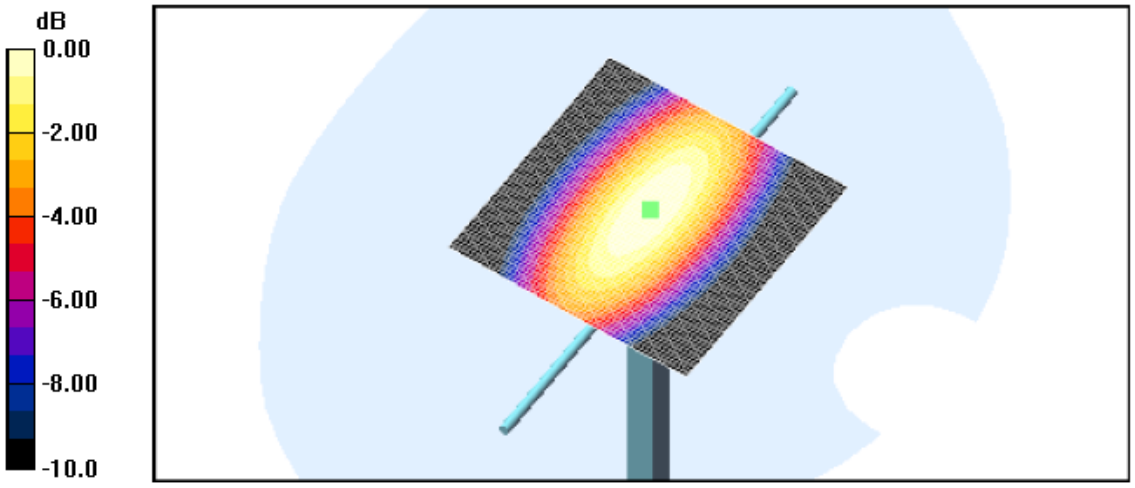
Dipole 835 MHz; Serial No. 478; Body Validation

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.951 mho/m; ε_r = 53.2; ρ = 1000 kg/m^3 ; Temperature (liq.) = 22.0 °C
Phantom section: Flat Section; **Advanced Extrapolation**

DASY4 Configuration:
- Probe: ET3DV6 - SN1739; ConvF(6.47, 6.47, 6.47); Calibrated: 8/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM1; Type: SAM; Serial: TP-1035
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

835MHz validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.59 mW/g

835MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.9 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.47 W/kg
SAR(1 g) = 2.39 mW/g; SAR(10 g) = 1.57 mW/g
Maximum value of SAR (measured) = 2.59 mW/g



0 dB = 2.59mW/g

Date: 2005-07-05; Test Laboratory: TCC San Diego

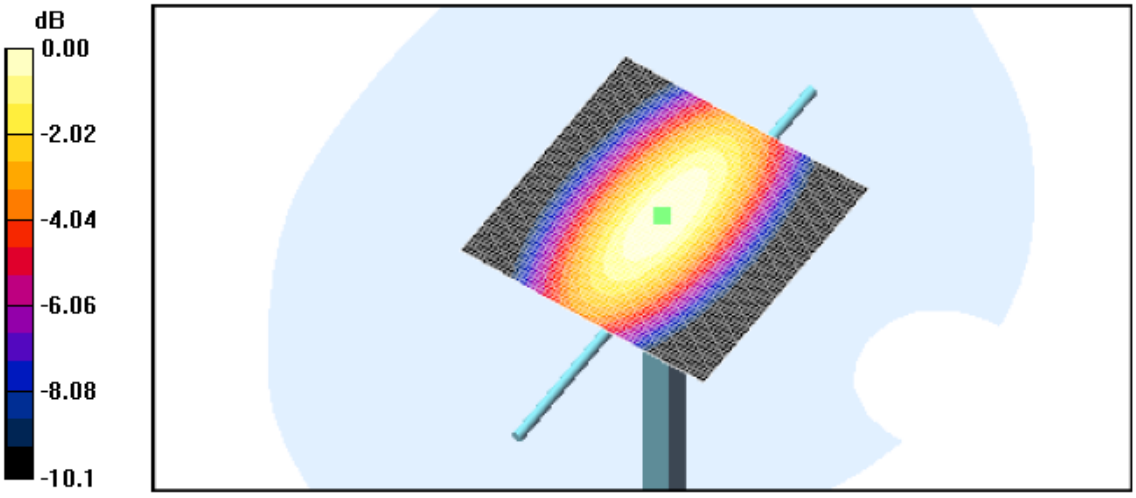
Dipole 835 MHz; Serial No. 478; Body Validation

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.953 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3 ; Temperature (liq.) = 21.6 °C
Phantom section: Flat Section; **Advanced Extrapolation**

DASY4 Configuration:
- Probe: ET3DV6 - SN1739; ConvF(6.47, 6.47, 6.47); Calibrated: 8/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM1; Type: SAM; Serial: TP-1035
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

835MHz validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.59 mW/g

835MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.6 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.49 W/kg
SAR(1 g) = 2.38 mW/g; SAR(10 g) = 1.56 mW/g
Maximum value of SAR (measured) = 2.59 mW/g



0 dB = 2.59mW/g

Date: 2005-07-06; Test Laboratory: TCC San Diego

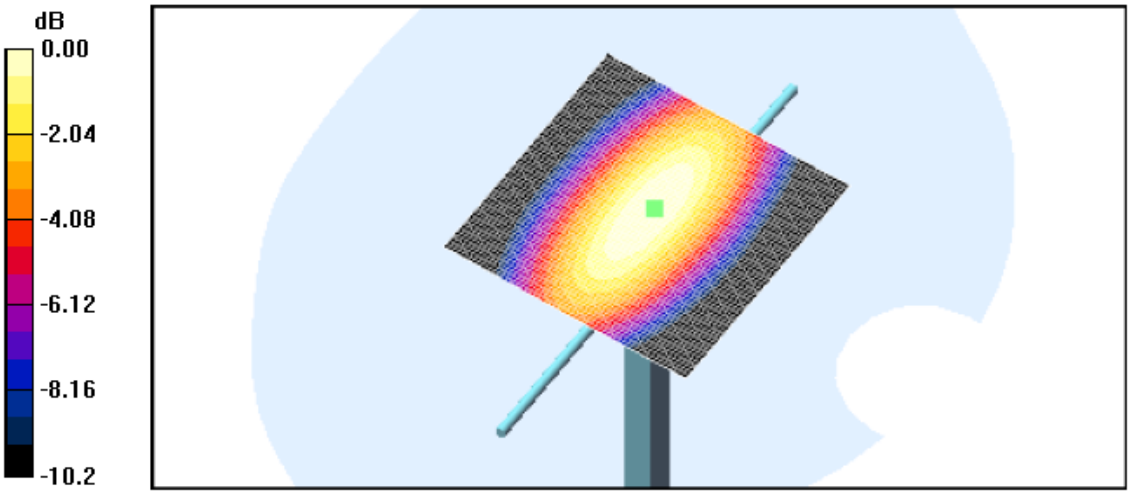
Dipole 835 MHz; Serial No. 478; Body Validation

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.963 mho/m; ε_r = 53.3; ρ = 1000 kg/m^3 ; Temperature (liq.) = 22.2 °C
Phantom section: Flat Section; **Advanced Extrapolation**

DASY4 Configuration:
- Probe: ET3DV6 - SN1739; ConvF(6.47, 6.47, 6.47); Calibrated: 8/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM1; Type: SAM; Serial: TP-1035
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

835MHz validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.59 mW/g

835MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.6 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.50 W/kg
SAR(1 g) = 2.4 mW/g; SAR(10 g) = 1.58 mW/g
Maximum value of SAR (measured) = 2.60 mW/g



0 dB = 2.60mW/g

Date: 2005-07-07; Test Laboratory: TCC San Diego

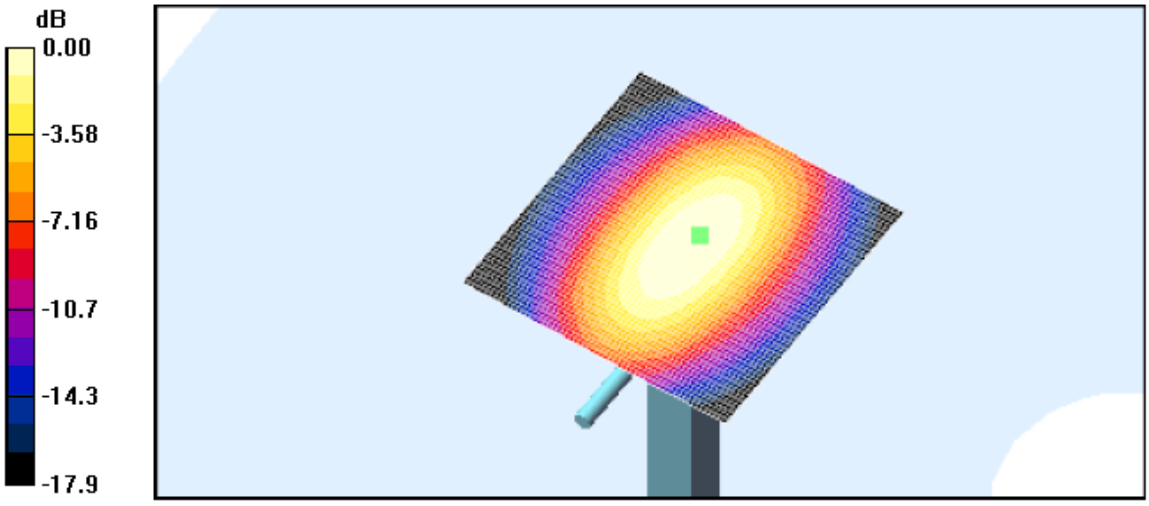
Dipole 1900 MHz; Serial No. 534; Body Validation

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.58 mho/m; ε_r = 51; ρ = 1000 kg/m^3 ; Temperature (liq.) = 22.2 °C
Phantom section: Flat Section; **Advanced Extrapolation**

DASY4 Configuration:
- Probe: ET3DV6 - SN1739; ConvF(4.57, 4.57, 4.57); Calibrated: 8/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

1900MHz validation/Area Scan (61x61x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 11.8 mW/g

1900MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.6 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 17.6 W/kg
SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.32 mW/g
Maximum value of SAR (measured) = 11.6 mW/g



0 dB = 11.6mW/g

Date: 2005-07-08; Test Laboratory: TCC San Diego

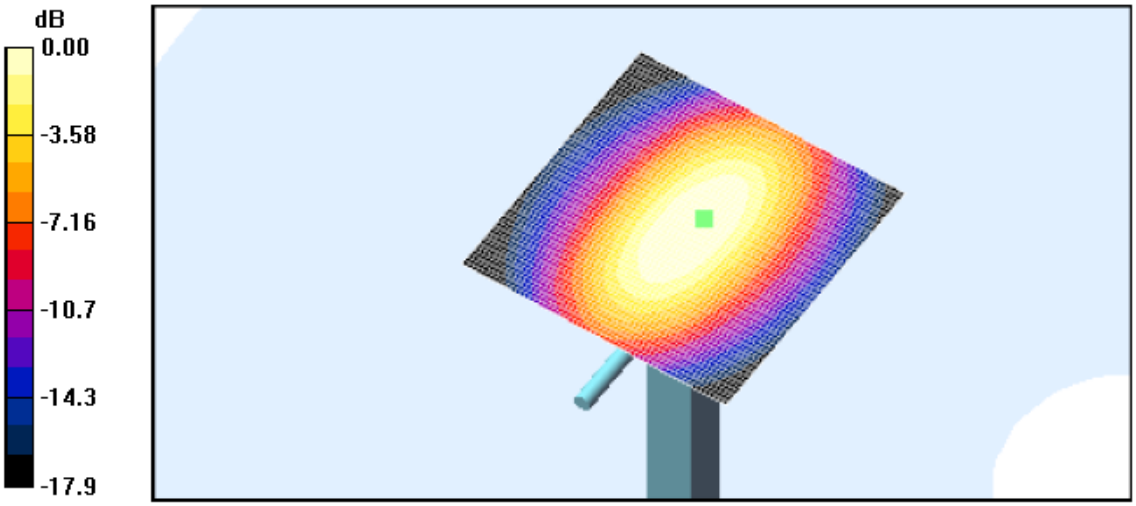
Dipole 1900 MHz; Serial No. 534; Body Validation

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3 ; Temperature (liq.) = 21.6 °C
Phantom section: Flat Section; **Advanced Extrapolation**

DASY4 Configuration:
- Probe: ET3DV6 - SN1739; ConvF(4.57, 4.57, 4.57); Calibrated: 8/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

1900MHz validation/Area Scan (61x61x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 11.5 mW/g

1900MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.3 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 17.1 W/kg
SAR(1 g) = 9.93 mW/g; SAR(10 g) = 5.21 mW/g
Maximum value of SAR (measured) = 11.2 mW/g



0 dB = 11.2mW/g