MOTOROLA

ACCREDITED

MFRL EME Test Laboratory
8000 West Sunrise Blvd
Fort Lauderdale, FL. 33322

S.A.R. EME Compliance Test Report
Part 2 of 2

Attention:	FCC
Date of Report:	July 10, 2003
Report Revision:	Rev. B
Manufacturer:	Motorola South - ARAD
Product Description:	Data Terminal w/ GPRS: 1.8W EGSM, 0.8W DCS1800 & PCS1900; TDMA: 1:8 duty cycle, GMSK modulation; WLAN: 100mW, Direct Spread Spectrum; Bluetooth: 1mW, Frequency Hopping Spread Spectrum (FHSS)
FCC ID:	**AZ489FT7003**
Device Model:	F4415A (VA00016AC, VA00024AD)

Test Period:	12/10/02 – 2/04/03
Test Engineer:	Andy Gessner (EME Technician)
Author:	Michael Sailsman Global EME Regulatory Affairs Liaison

Note: Based on the information and the testing results provided herein, the undersigned certifies that when used as stated in the operating instructions supplied, said product complies with the national and international reference standards and guidelines listed in section 2.0 of this report.

Signature on File	Signature on File	7/11/03
C.K. Chou Motorola Chief EME Scientist	Ken Enger Senior Resource Manager, Product Safety and EME Director	Date Approved

APPENDIX A

Power Slump Data/Shortened Scan

DUT Power versus time data (FNN5105A battery)

HDT600 with GPRS g18, WLAN S24 and Bluetooth
Power Measurements for EME
Model F4415A

Initial Power Measurements E-GSM S/N 296SCQ0210 g18 IMEI 350030950093586				E-GSM Power Slump @ 902.4 MHz (Ch. 62)		
Frequency (MHz)	Power (W)	% off max of 2.0 watts	Power (dBm)	Time (min)	Power (W)	Power (dBm)
880.2000	1.980	-1.0%	32.97	0	1.942	32.88
902.4000	1.960	-2.0%	32.92	1	1.942	32.88
914.8000	1.970	-1.5%	32.94	2	1.939	32.88
				3	1.939	32.88
				4	1.943	32.88
				5	1.937	32.87
				6	1.943	32.88
				7	1.940	32.88
				8	1.939	32.88
				9	1.939	32.87
				10	1.943	32.88
				11	1.935	32.87
				12	1.932	32.86
				13	1.940	32.88
				14	1.940	32.88
				15	1.937	32.87
				16	1.938	32.87
				17	1.938	32.87
				18	1.940	32.88
				19	1.937	32.87
				20	1.936	32.87
				21	1.936	32.87
				22	1.935	32.87
				23	1.937	32.87
				24	1.935	32.87
				25	1.944	32.89
				26	1.937	32.87
				27	1.933	32.86
				28	1.938	32.87
				29	1.940	32.88
				30	1.937	32.87
				31	1.940	32.88
				32	1.934	32.87
				33	1.938	32.87
				34	1.938	32.87
				35	1.933	32.86
				36	1.933	32.86
				37	1.939	32.88
				38	1.937	32.87
				39	1.935	32.87
				40	1.937	32.87

Power output measured with:
HP438A Power Meter, with:
HP8482H Power Sensor.
Calibration date: 13.10.02
Data recorded with:
HP34970 Data Acquisition
Calibration date: 24.12.01

Test Mode: TDMA
Maximum duty cycle: 12.5%

HDT600 with GPRS g18, WLAN S24 and Bluetooth
Power Measurements for EME
Model F4415A

Initial Power Measurements PCS1900 S/N 296SCQ0210 g18 IMEI 350030950093586				PCS1900 Power Slump @ 1880.0 MHz (Ch. 661)		
Frequency (MHz)	Power (W)	% off max of 1.0 watts	Power (dBm)	Time (min)	Power (W)	Power (dBm)
1850.2000	1.023	2.3%	30.10	0	1.008	30.04
1880.0000	1.016	1.6%	30.07	1	1.007	30.03
1909.8000	0.990	-1.0%	29.96	2	1.004	30.02
				3	1.014	30.06
				4	1.006	30.02
				5	1.008	30.03
				6	1.010	30.04
				7	1.006	30.03
				8	1.001	30.00
				9	1.009	30.04
				10	1.006	30.02
				11	1.008	30.03
				12	1.008	30.04
				13	1.003	30.01
				14	1.001	30.00
				15	1.004	30.02
				16	1.004	30.02
				17	1.009	30.04
				18	1.007	30.03
				19	1.006	30.03
				20	1.005	30.02
				21	1.010	30.05
				22	1.005	30.02
				23	1.006	30.03
				24	1.006	30.03
				25	1.005	30.02
				26	1.008	30.03
				27	1.007	30.03
				28	1.001	30.01
				29	1.007	30.03
				30	1.009	30.04
				31	1.008	30.04
				32	1.005	30.02
				33	1.004	30.02
				34	1.008	30.04
				35	1.008	30.04
				36	1.006	30.03
				37	1.005	30.02
				38	1.008	30.03
				39	1.007	30.03
				40	1.008	30.03

Power output measured with:
HP438A Power Meter, with:
HP8482H Power Sensor.
Calibration date: 13.10.02
Data recorded with:
HP34970 Data Acquisition
Calibration date: 24.12.01

Test Mode: TDMA
Maximum duty cycle: 12.5%

*Note: The DCS 1800 MHz band is not regulated by the FCC.

HDT600 with GPRS g18, WLAN S24 and Bluetooth
Power Measurements for EME
Model F4415A

Initial Power Measurements DCS1800 S/N 296SCQ0210 g18 IMEI 350030950093586				DCS1800 Power Slump @ 1747.4 MHz (Ch. 698)		
Frequency (MHz)	Power (W)	% off max of 1.0 watts	Power (W)	Time (min)	Power (W)	Power (dBm)
1710.2000	0.985	-1.5%	29.93	0	1.037	30.16
1747.4000	1.045	4.5%	30.19	1	1.032	30.14
1784.8000	0.976	-2.4%	29.89	2	1.033	30.14
				3	1.034	30.14
				4	1.036	30.15
				5	1.035	30.15
				6	1.031	30.13
				7	1.034	30.14
				8	1.036	30.16
				9	1.032	30.14
				10	1.034	30.15
				11	1.032	30.14
				12	1.030	30.13
				13	1.033	30.14
				14	1.033	30.14
				15	1.036	30.15
				16	1.033	30.14
				17	1.033	30.14
				18	1.036	30.15
				19	1.027	30.12
				20	1.032	30.14
				21	1.034	30.15
				22	1.027	30.12
				23	1.031	30.13
				24	1.031	30.13
				25	1.029	30.12
				26	1.038	30.16
				27	1.034	30.15
				28	1.034	30.15
				29	1.032	30.14
				30	1.028	30.12
				31	1.030	30.13
				32	1.032	30.14
				33	1.031	30.13
				34	1.033	30.14
				35	1.028	30.12
				36	1.039	30.17
				37	1.038	30.16
				38	1.035	30.15
				39	1.034	30.15
				40	1.030	30.13

Power output measured with:
HP438A Power Meter, with:
HP8482H Power Sensor.
Calibration date: 13.10.02
Data recorded with:
HP34970 Data Acquisition
Calibration date: 24.12.01

Test Mode: TDMA
Maximum duty cycle: 12.5%

HDT600 with GPRS g18, WLAN S24 and Bluetooth
Power Measurements for EME
Model F4415A

Initial Power Measurements WLAN S/N 296SCQ0210 S24 S/N 00A0F8343AA2				WLAN Power Slump @ 2.437 GHz		
Frequency (GHz)	Power (mW)	% off max of 160 milliwatts	Power (dBm)		Power (mW)	Power (dBm)
2.4120	143.0	-10.6%	21.55	0	151.6	21.81
2.4370	156.0	-2.5%	21.93	1	149.4	21.74
2.4620	165.0	3.1%	22.17	2	149.5	21.75
				3	149.1	21.73
				4	148.6	21.72
				5	148.7	21.72
				6	147.8	21.70
				7	148.0	21.70
				8	148.0	21.70
				9	147.8	21.70
				10	148.1	21.71
				11	147.5	21.69
				12	148.2	21.71
				13	147.4	21.69
				14	147.5	21.69
				15	147.2	21.68
				16	147.6	21.69
				17	147.7	21.69
				18	146.8	21.67
				19	147.3	21.68
				20	147.1	21.68
				21	147.0	21.67
				22	147.2	21.68
				23	146.8	21.67
				24	146.8	21.67
				25	146.7	21.66
				26	146.9	21.67
				27	146.9	21.67
				28	146.8	21.67
				29	146.9	21.67
				30	146.8	21.67
				31	146.8	21.67
				32	146.4	21.65
				33	146.6	21.66
				34	146.3	21.65
				35	146.5	21.66
				36	146.3	21.65
				37	146.4	21.66
				38	145.7	21.63
				39	145.8	21.64
				40	146.3	21.65

Power output measured with:
HP438A Power Meter, with:
HP8482H Power Sensor.
Calibration date: 13.10.02
Data recorded with:
HP34970 Data Acquisition
Calibration date: 24.12.01

Test Mode: CW

HDT600 with GPRS g18, WLAN S24 and Bluetooth
Power Measurements for EME
Model F4415A

Initial Power Measurements Bluetooth S/N 296SCQ0210				Bluetooth Power Slump @ 2.44 GHz		
Frequency (GHz)	Power (mW)	% off max of 1.15 milliwatts	Power (dBm)	Time (min)	Power (mW)	Power (dBm)
2.4020	0.724	-37.0%	-1.40	0	0.847	-0.72
2.4400	0.852	-25.9%	-0.70	1	0.839	-0.76
2.4800	0.955	-17.0%	-0.20	2	0.842	-0.75
				3	0.834	-0.79
				4	0.833	-0.79
				5	0.829	-0.81
				6	0.832	-0.80
				7	0.827	-0.82
				8	0.822	-0.85
				9	0.819	-0.87
				10	0.824	-0.84
				11	0.821	-0.85
				12	0.827	-0.82
				13	0.822	-0.85
				14	0.821	-0.86
				15	0.815	-0.89
				16	0.820	-0.86
				17	0.824	-0.84
				18	0.818	-0.87
				19	0.824	-0.84
				20	0.823	-0.85
				21	0.822	-0.85
				22	0.819	-0.87
				23	0.820	-0.86
				24	0.818	-0.87
				25	0.823	-0.84
				26	0.821	-0.86
				27	0.820	-0.86
				28	0.823	-0.84
				29	0.820	-0.86
				30	0.816	-0.88
				31	0.814	-0.89
				32	0.810	-0.92
				33	0.814	-0.89
				34	0.816	-0.88
				35	0.816	-0.88
				36	0.815	-0.89
				37	0.812	-0.90
				38	0.822	-0.85
				39	0.818	-0.87
				40	0.826	-0.83

Power output measured with:
HP438A Power Meter, with:
HP8482H Power Sensor.
Calibration date: 13.10.02
Data recorded with:
HP34970 Data Acquisition
Calibration date: 24.12.01

Test Mode: CW

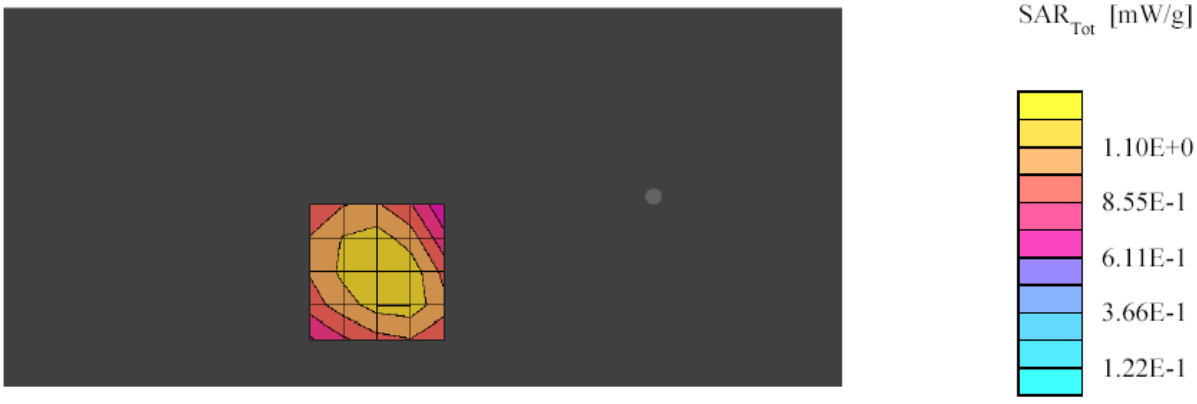
Shortened Scan Results

FCC ID: AZ489FT7003; Test Date: 1/03/03
MFRL EME Laboratory
RUN NUMBER: 030103-01
MODEL NUMBER: F4415A SERIAL NUMBER: 296SCQ0210
TX FREQ: 902.4MHz

- Accessories -
Antenna: FAF5211A internal
Battery Kit: FNN5105A
Carry: None
Audio Acc. None

Shortened scan reflect highest S.A.R. producing configuration; Run time 10 minutes.
Representative "normal" scan run time was 16 minutes
"Shortened" scan max. calc. S.A.R. = 0.87mW/g
"Normal" scan max. calc. S.A.R. = 0.82 mW/g (see section 7.1 run # 021210-01)

Back facing phantom
MFRL TEST Phantom; Device Section; Position: (90°,90°);
Probe: ET3DV6R A2LA - SN1418; ConvF(5.60,5.60,5.60); Probe cal date: 5/21/02; Crest factor: 8.0; Body 900MHz: σ = 1.04 mho/m ε = 54.7 ρ = 1.04 g/cm3; PROBE CALIBRATION DATE:020521
Cube 5x5x7: SAR (1g): 0.844 mW/g, SAR (10g): 0.587 mW/g, (Worst-case extrapolation)
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0

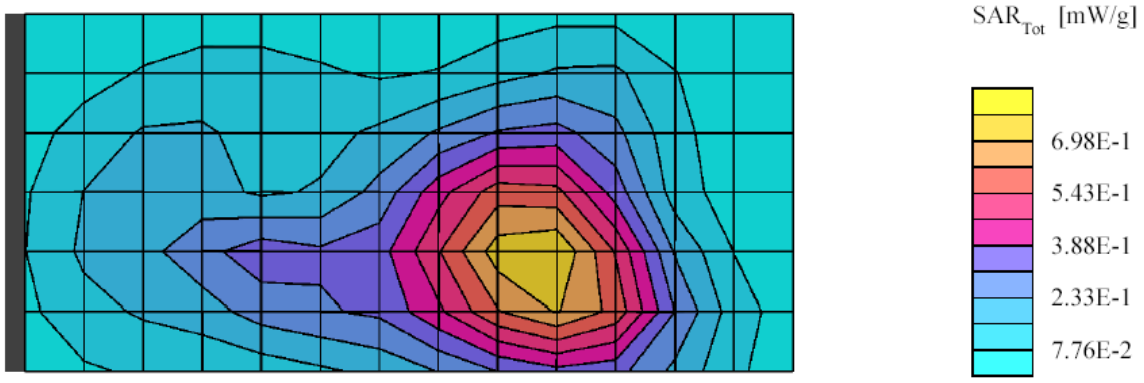


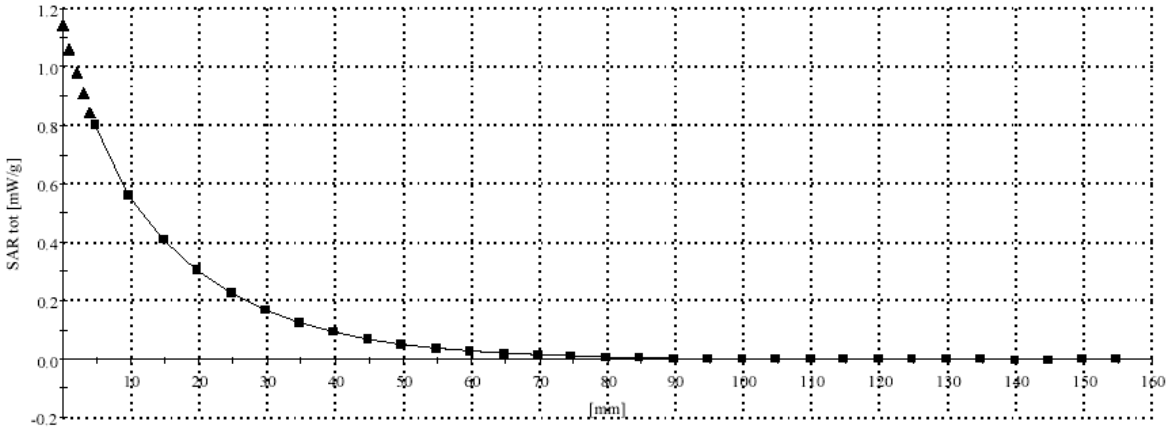
APPENDIX B
Data Results

FCC ID: AZ489FT7003; Test Date: 12/10/02
MFRL EME Laboratory
RUN NUMBER: 021210-01
MODEL NUMBER: F4415A SERIAL NUMBER: 296SCQ0210
TX FREQ: 902.4MHz

Antenna: FAF5211A internal
Battery Kit: FNN5105A
Carry: None
Audio Acc. None

DUT Back facing phantom
MFRL TEST Phantom; Device Section; Position: (90°,90°);
Probe: ET3DV6R A2LA - SN1418; ConvF(5.60,5.60,5.60); Probe cal date: 5/21/02; Crest factor: 8.0; Body 900MHz: σ = 1.04 mho/m ε = 55.1 ρ = 1.04 g/cm3; PROBE CALIBRATION DATE:020521
Cube 5x5x7: SAR (1g): 0.797 mW/g, SAR (10g): 0.553 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0; Max at 63.0, 130.5, 4.7
Power drift: -0.00

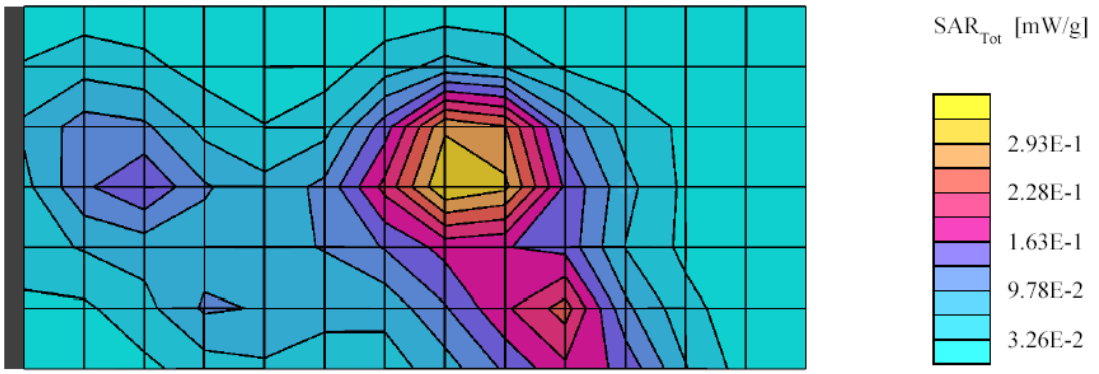


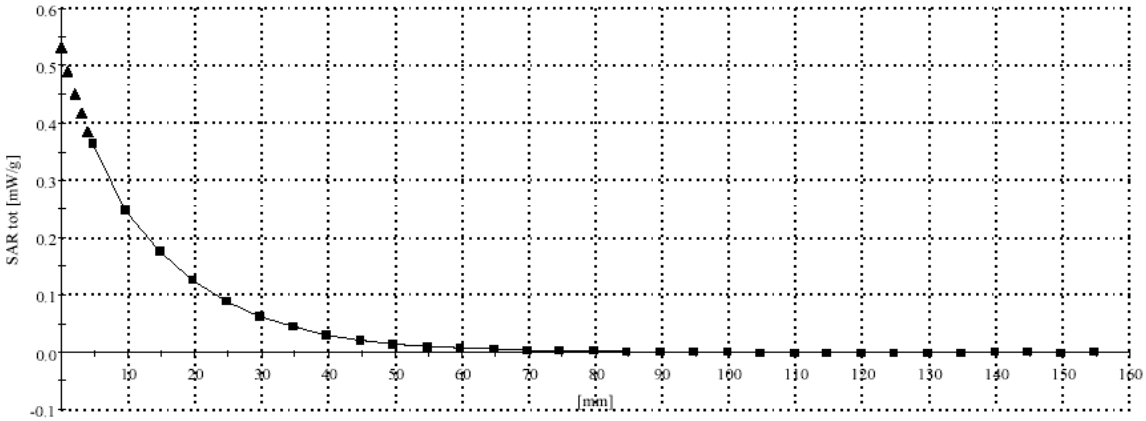


FCC ID: AZ489FT7003; Test Date: 2/04/03
MFRL EME Laboratory
RUN NUMBER: 030204-03
MODEL NUMBER: F4415A SERIAL NUMBER: 296SCQ0210
TX FREQ: 1850MHz

Antenna: FAF5211A internal
Battery Kit: FNN5105A
Carry: None
Audio Acc. None

DUT backside towards phantom
MFRL TEST Phantom; Device Section; Position: (90°,90°);
Probe: ET3DV6R A2LA - SN1418; ConvF(4.30,4.30,4.30); Probe cal date: 5/21/02; Crest factor: 8.0; Body 1800MHz: σ = 1.59 mho/m ε = 53.5 ρ = 1.04 g/cm3; PROBE CALIBRATION DATE:020521
Cube 7x7x7: SAR (1g): 0.359 mW/g, SAR (10g): 0.230 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0; Max at 39.0, 111.0, 4.7
Power drift: -0.04

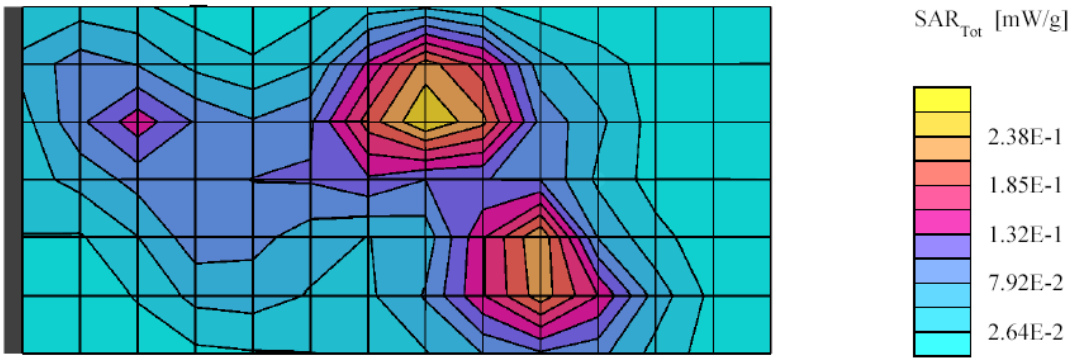


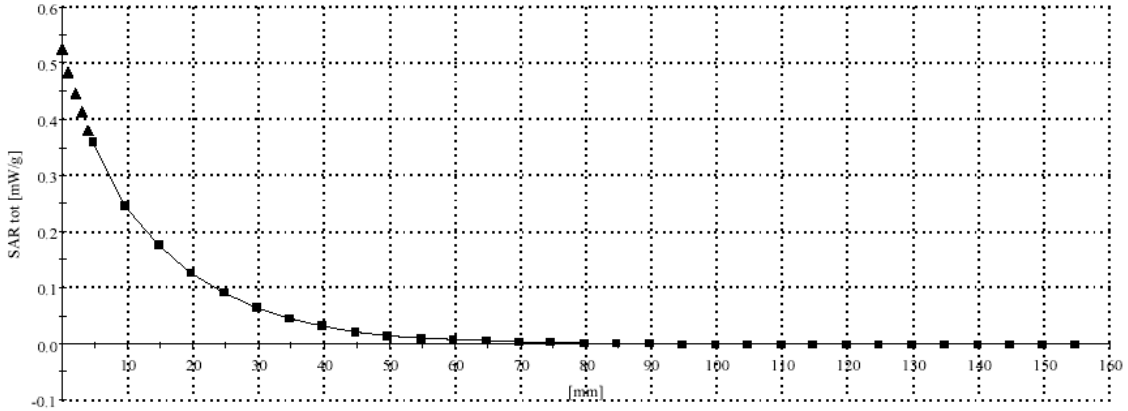


FCC ID: AZ489FT7003; Test Date: 2/04/03
MFRL EME Laboratory
RUN NUMBER: 030204-01
MODEL NUMBER: F4415A SERIAL NUMBER: 296SCQ0210
TX FREQ: 1710.2MHz *Note: The DCS 1800 MHz band is not regulated by the FCC.

Antenna: FAF5211A internal
Battery Kit: FNN5105A
Carry Case: None
Audio Acc. None

DUT Back against phantom
MFRL TEST Phantom; Device Section; Position: (90°,90°);
Probe: ET3DV6R A2LA - SN1418; ConvF(4.50,4.50,4.50); Probe cal date: 5/21/02; Crest factor: 8.0; Body 1800MHz: σ = 1.43 mho/m ε = 53.9 ρ = 1.04 g/cm3; PROBE CALIBRATION DATE:020521
Cube 7x7x7: SAR (1g): 0.357 mW/g, SAR (10g): 0.231 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0; Max at 39.0, 112.5, 4.7
Power drift: -0.02

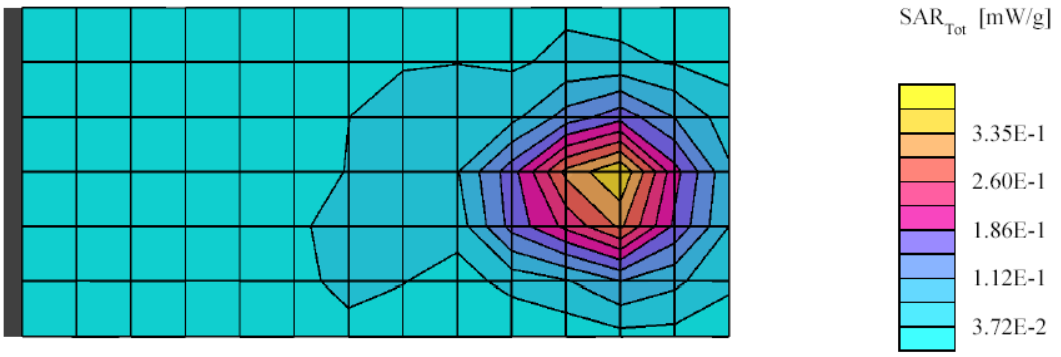


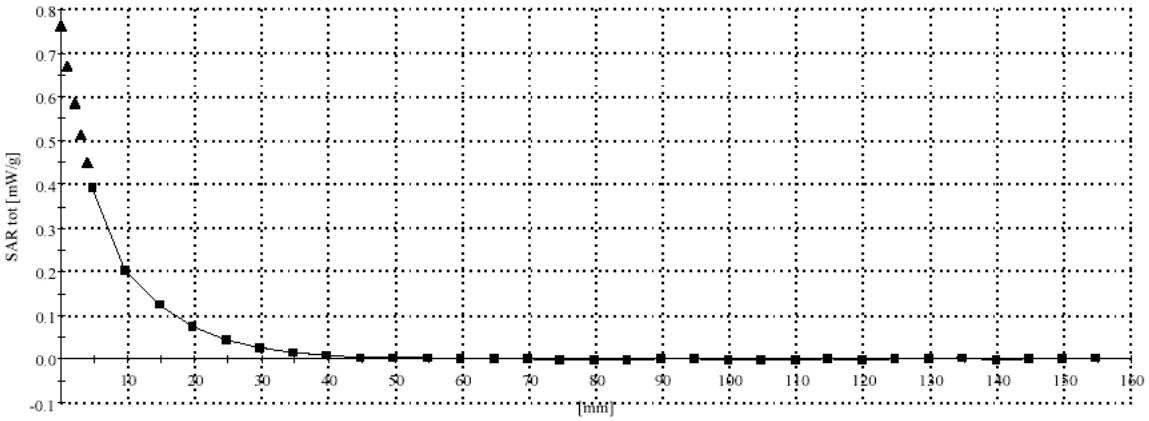


FCC ID: AZ489FT7003; Test Date: 12/26/02
MFRL EME Laboratory
RUN NUMBER: 021226-01
MODEL NUMBER: F4415A SERIAL NUMBER: 296SCQ0210
TX FREQ: 2.437GHz

Antenna: FAF5213A internal
Battery Kit: FNN5105A
Carry: None
Audio Acc. None

DUT Back against phantom
MFRL TEST Phantom; Device Section; Position: (90°,90°);
Probe: ET3DV6R A2LA - SN1418; ConvF(3.60,3.60,3.60); Probe cal date: 5/21/02; Crest factor: 1.0; Body 2450MHz: σ = 1.99 mho/m ε = 53.8 ρ = 1.04 g/cm3; PROBE CALIBRATION DATE:020421
Cube 5x5x7: SAR (1g): 0.394 mW/g, SAR (10g): 0.220 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0; Max at 48.0, 162.0, 4.7
Power drift: -0.02





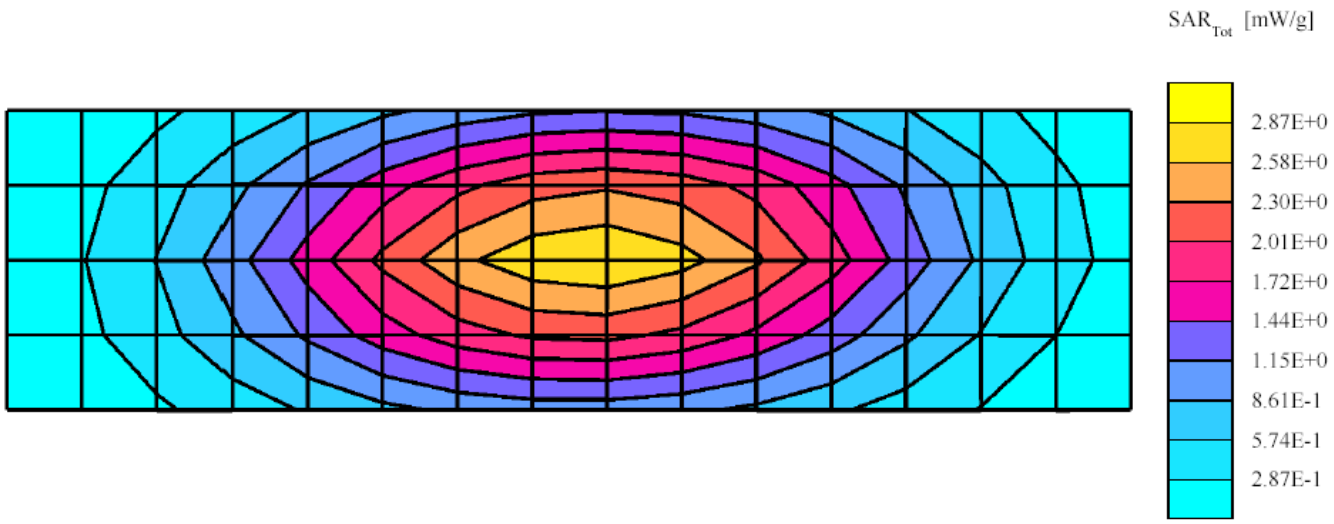
APPENDIX C
Dipole System Performance Check Results

Dipole validations at the head from SPEAG are provided in APPENDIX D herein. The CGISS EME lab validated the SPEAG dipole to the applicable IEEE system performance targets. System validation was performed using FCC body tissue parameters to generate the system performance target values for body at the applicable frequency. The results of the MFRL/CGISS' respective EME daily system performance checks as well as the new target assessment at the body are provided in this appendix.

SPEAG 900 MHz Dipole; Model D900V2, SN 158; Test Date:12/10/02
MFRL EME Lab
Run #: Sys Perf-R1-021210
TX Freq: 900 MHz
Start Power; 250mW

Target SAR normalized to 1W= 11.44 W/Kg
Calculated SAR @ 1W including drift = 11.2w/kg

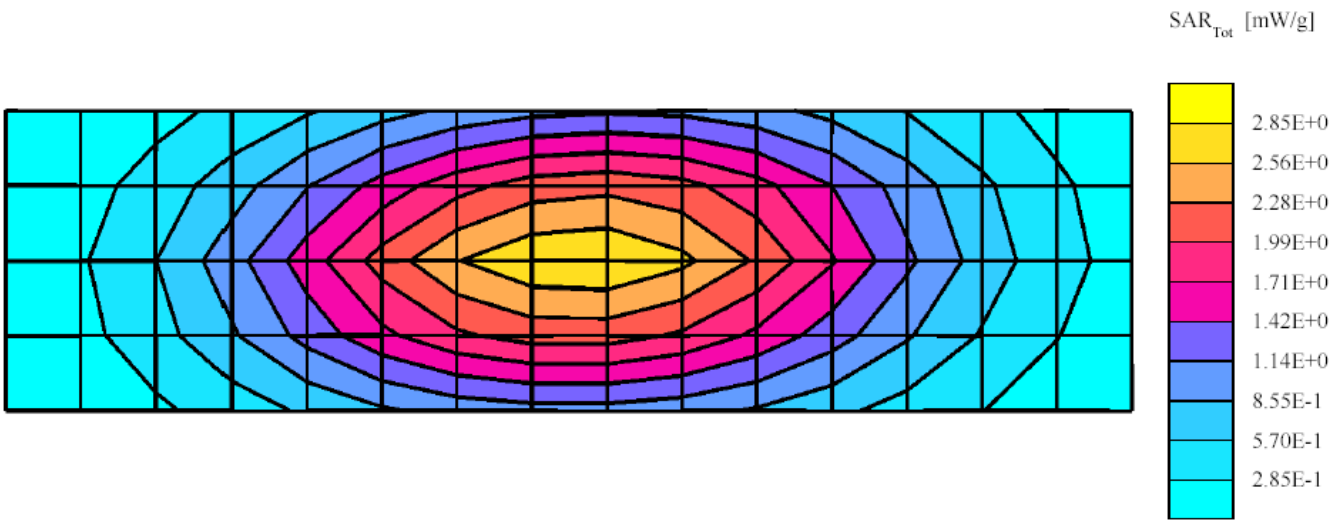
MFRL TEST 900MHz; 900MHz Device
Probe: ET3DV6R A2LA - SN1418;Probe Cal Date: 5/21/02ConvF(5.60,5.60,5.60); Crest factor: 1.0; Body 900MHz: σ= 1.04 mho/m ε= 55.1 ρ= 1.04 g/cm3; probe calibration date: 020521
Cubes (2): Peak: 4.34 mW/g ± 0.05 dB, SAR (1g): 2.80 mW/g ± 0.04 dB, SAR (10g): 1.80 mW/g ± 0.03 dB, (Worst-case extrapolation) Penetration depth: 12.4 (11.3, 13.8) [mm]
Power drift: -0.01 dB



SPEAG 900 MHz Dipole; Model D900V2, SN 158; Test Date: 12/13/02
Motorola CGISS EME Lab
Run #: Sys Perf-R1-021213
TX Freq: 900 MHz
Start Power; 250mW

Target SAR normalized to 1W = 11.44 W/Kg
Calculated SAR @ 1W including drift = 11.21 w/kg

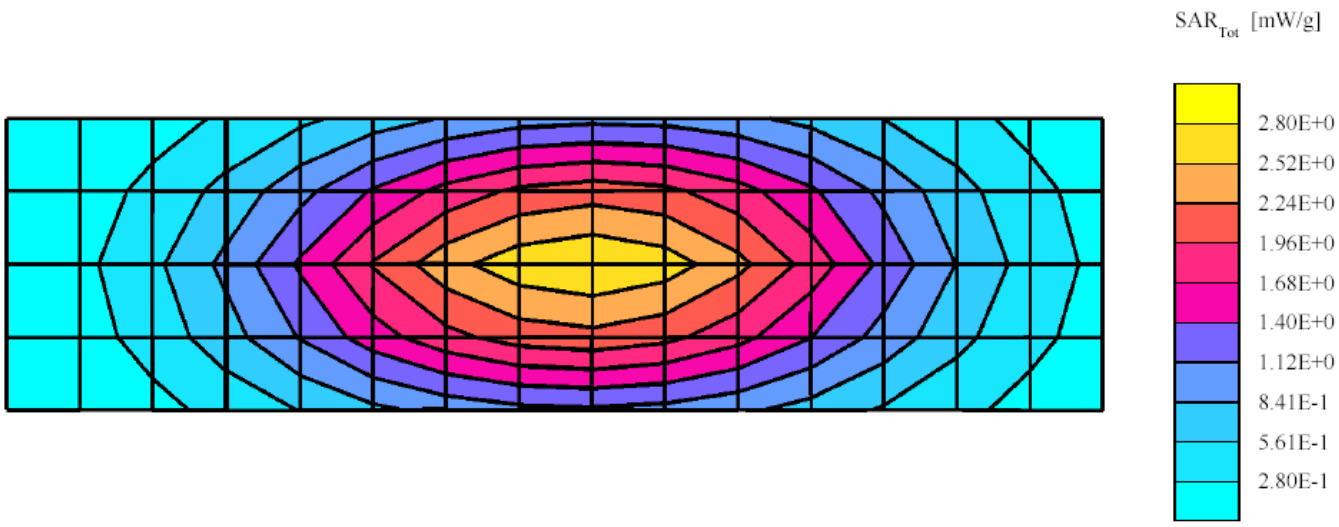
MFRL TEST 900MHz; Probe: ET3DV6R A2LA - SN1418;Probe Cal Date: 5/21/02ConvF(5.60,5.60,5.60); Crest factor: 1.0; Body 900MHz: σ= 1.04 mho/m ε= 55.1 ρ= 1.04 g/cm3; PROBE CAL DATE: 020521
Cubes (2): Peak: 4.33 mW/g ± 0.04 dB, SAR (1g): 2.79 mW/g ± 0.03 dB, SAR (10g): 1.80 mW/g ± 0.03 dB, (Worst-case extrapolation) Penetration depth: 12.4 (11.3, 13.9) [mm]
Power drift: -0.02 dB



SPEAG 900 MHz Dipole; Model D900V2, SN 158; Test Date:12/14/02
Motorola CGISS EME Lab
Run #: Sys Perf-R1-021214
TX Freq: 900MHz
Start Power; 250mW

Target SAR normalized to 1W= 11.44 W/Kg
Calculated SAR @ 1W = 11.04w/kg

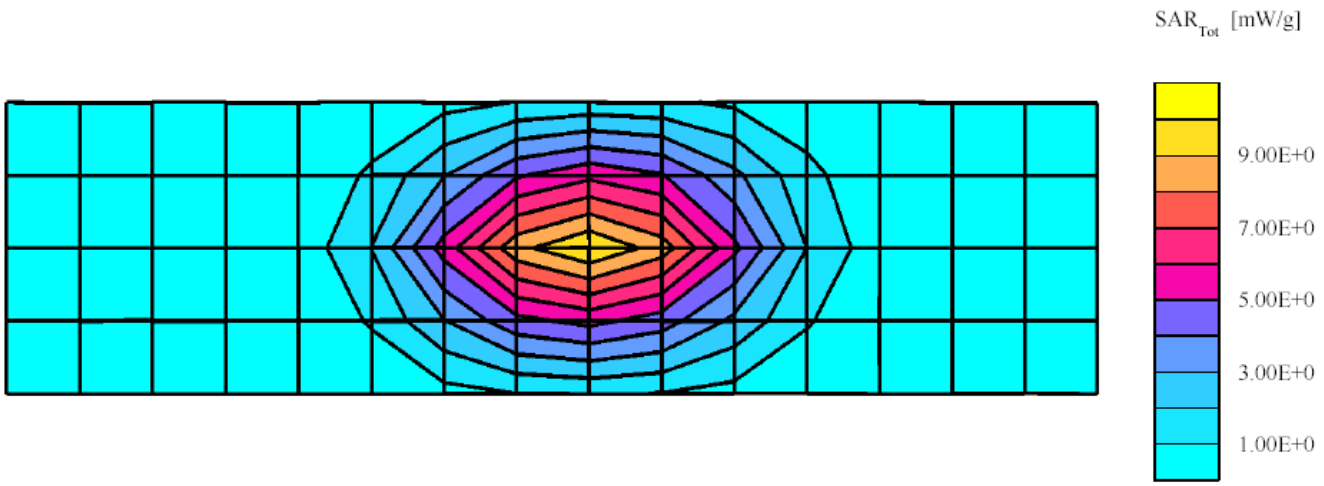
MFRL TEST 900MHz;
Probe: ET3DV6R A2LA - SN1418;Probe Cal Date: 5/21/02ConvF(5.60,5.60,5.60); Crest factor: 1.0; Body 900MHz: ϭ= 1.03 mho/m εr = 54.8 ρ= 1.04 g/cm3; probe cal date: 020521
Cubes (2): Peak: 4.31 mW/g ± 0.01 dB, SAR (1g): 2.78 mW/g ± 0.01 dB, SAR (10g): 1.79 mW/g ± 0.02 dB, (Worst-case extrapolation) Penetration depth: 12.4 (11.3, 13.8) [mm]
Power drift: 0.03 dB



SPEAG 1800 MHz Dipole; Model D1800V2, SN 2d043; Test Date:12/19/02
MFRL EME Lab
Run #: Sys Perf-R1-021219
TX Freq: 1800 MHz
Start Power; 250mW

Target SAR normalized to 1W= 38.16 W/kg
Calculated SAR @ 1W including drift = 38.57 W/kg

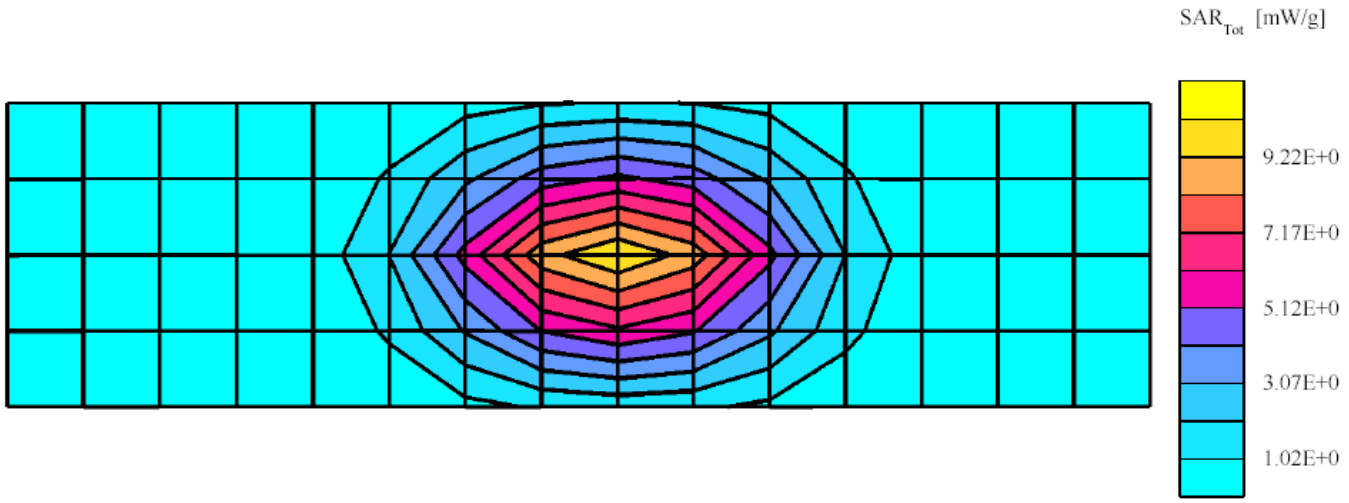
MFRL TEST 1800 MHz; Probe: ET3DV6R A2LA - SN1418;Probe Cal Date: 5/21/02ConvF(4.50,4.50,4.50); Crest factor: 1.0; Body 1800MHz: σ= 1.50 mho/m ε= 53.4 ρ= 1.04 g/cm3; PROBE CALIBRATION DATE:020521
Cubes (2): Peak: 17.4 mW/g ± 0.02 dB, SAR (1g): 9.62 mW/g ± 0.01 dB, SAR (10g): 5.11 mW/g ± 0.00 dB, (Worst-case extrapolation) Penetration depth: 9.0 (8.4, 10.2) [mm]
Power drift: -0.01 dB



SPEAG 1800 MHz Dipole; Model D1800V2, SN 2d043; Test Date:12/20/02
MFRL EME Lab
Run #: Sys Perf-R1-021220
TX Freq: 1800 MHz
Start Power; 250mW

Target SAR normalized to 1W= 38.16 W/kg
Calculated SAR @ 1W = 38.5W/kg

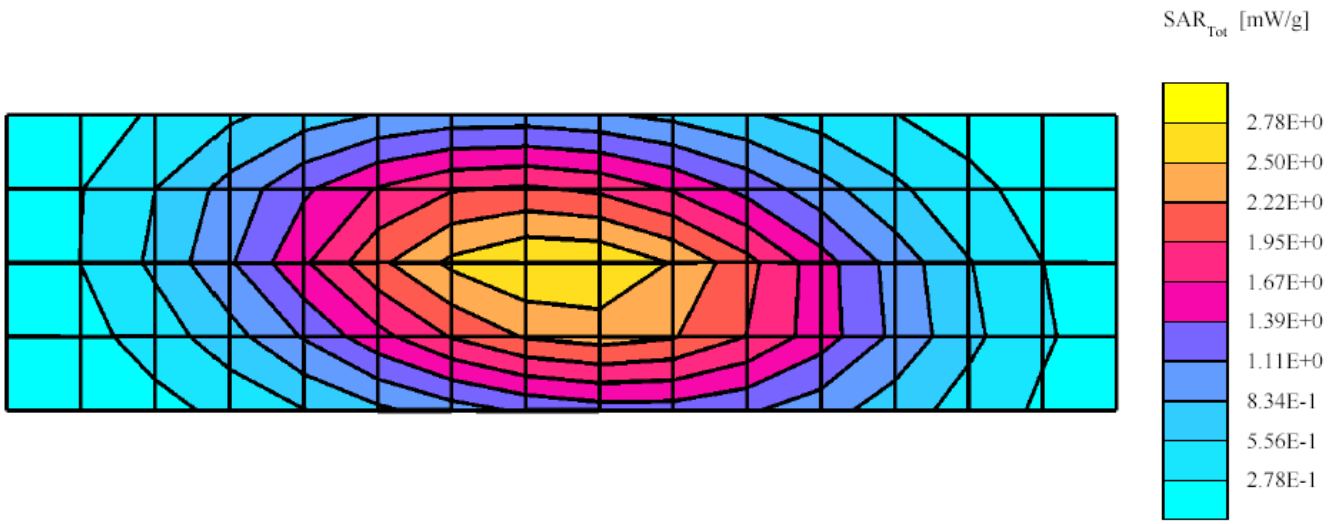
MFRL TEST 1800 MHz; Probe: ET3DV6R A2LA - SN1418;Probe Cal Date: 5/21/02ConvF(4.40,4.40,4.40); Crest factor: 1.0; Body 1800MHz: σ= 1.50 mho/m ε = 53.5 ρ= 1.04 g/cm3; PROBE CALIBRATION DATE:020521
Cubes (2): Peak: 17.9 mW/g ± 0.00 dB, SAR (1g): 9.86 mW/g ± 0.01 dB, SAR (10g): 5.22 mW/g ± 0.01 dB, (Worst-case extrapolation) Penetration depth: 9.0 (8.3, 10.2) [mm]
Power drift: -0.00 dB



SPEAG 900 MHz Dipole; Model D900V2, SN 158; Test Date:12/20/02
MFRL EME Lab
Run #: Sys Perf-R1-021220
TX Freq: 900 MHz
Start Power; 250mW

Target SAR normalized to 1W= 11.44 W/kg
Calculated SAR @ 1W including drift = 11.09 W/kg

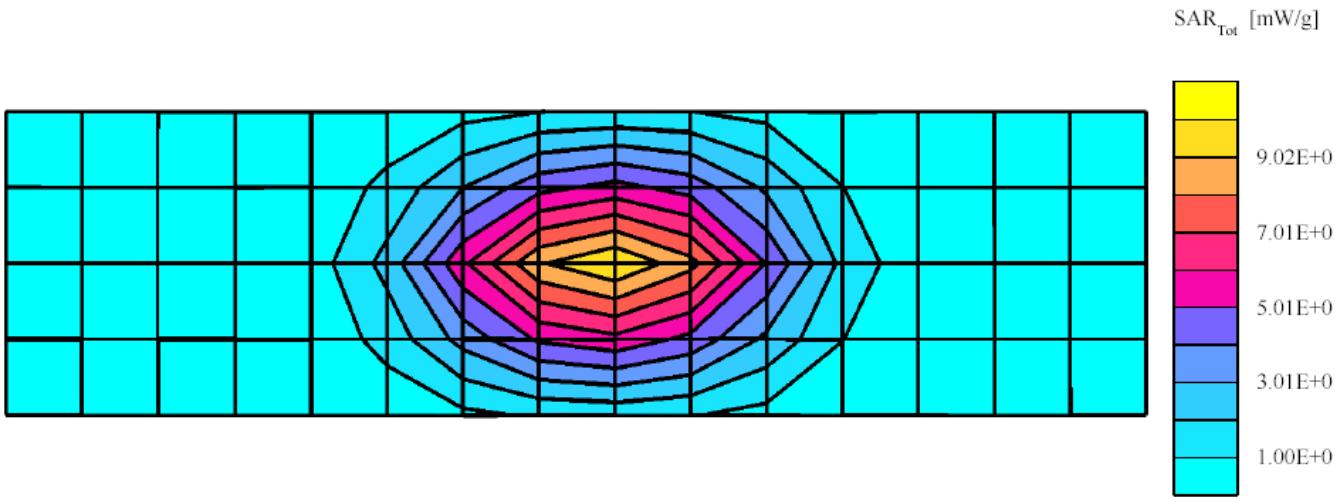
MFRL TEST 900MHz; Probe: ET3DV6R A2LA - SN1418;Probe Cal Date: 5/21/02ConvF(5.60,5.60,5.60); Crest factor: 1.0; Body 900MHz: σ= 1.03 mho/m ε= 54.7 ρ= 1.04 g/cm3; PROBE CAL DATE: 020521
Cubes (2): Peak: 4.27 mW/g ± 0.04 dB, SAR (1g): 2.76 mW/g ± 0.03 dB, SAR (10g): 1.77 mW/g ± 0.03 dB, (Worst-case extrapolation) Penetration depth: 12.4 (11.4, 13.9) [mm]
Power drift: -0.02 dB



SPEAG 1800 MHz Dipole; Model D1800V2, SN 2d043; Test Date:12/21/02
MFRL EME Lab
Run #: Sys Perf-R1-021221
TX Freq: 1800 MHz
Start Power; 250mW

Target SAR normalized to 1W= 38.16 W/Kg
Calculated SAR @ 1W including drift = 38.65 w/kg

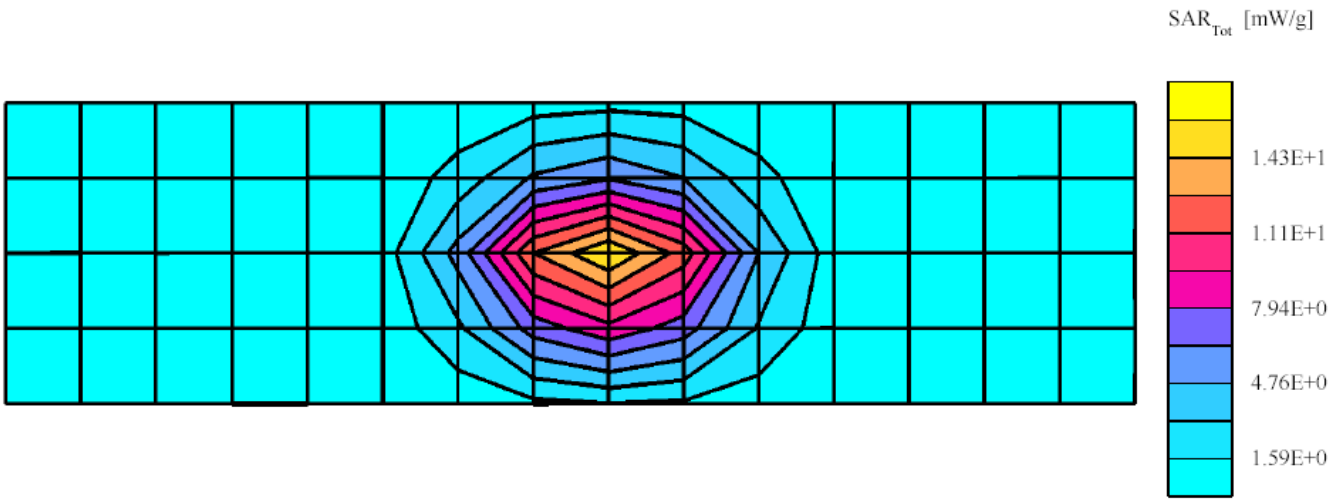
MFRL TEST 1800MHz; Probe: ET3DV6R A2LA - SN1418;Probe Cal Date: 5/21/02ConvF(4.40,4.40,4.40); Crest factor: 1.0; Body 1800MHz: σ= 1.48 mho/m ε= 53.1 ρ= 1.04 g/cm3; PROBE CALIBRATION DATE: 020521
Cubes (2): Peak: 17.3 mW/g ± 0.05 dB, SAR (1g): 9.64 mW/g ± 0.01 dB, SAR (10g): 5.15 mW/g ± 0.02 dB, (Worst-case extrapolation) Penetration depth: 9.0 (8.3, 10.3) [mm]
Power drift: -0.01 dB



SPEAG 2450 MHz Dipole; Model D2450V2, SN 703; Test Date:12/26/02
MFRL EME Lab
Run #: Sys Perf-R1-021226
TX Freq: 2450MHz
Start Power; 250mW

Target SAR normalized to 1W= 56.65 W/kg
Calculated SAR @ 1W including drift = 60.14W/kg

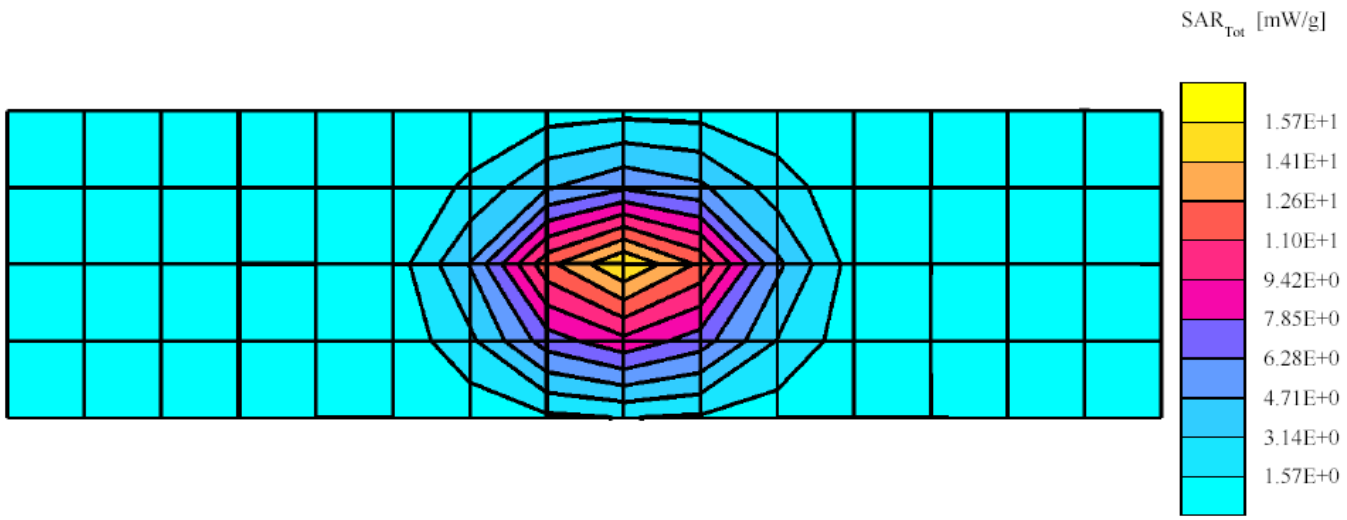
MFRL TEST 2450MHz; Probe: ET3DV6R A2LA - SN1418;Probe Cal Date: 5/21/02ConvF(3.60,3.60,3.60); Crest factor: 1.0; Body 2450MHz: σ= 1.99 mho/m ε= 53.8 ρ= 1.04 g/cm3; PROBE CAL DATE: 020423
Cubes (2): Peak: 29.8 mW/g ± 0.01 dB, SAR (1g): 15.0 mW/g ± 0.01 dB, SAR (10g): 7.06 mW/g ± 0.01 dB, (Worst-case extrapolation) Penetration depth: 7.4 (7.1, 8.4) [mm]
Power drift: -0.01 dB



SPEAG 2450 MHz Dipole; Model D2450V2, SN 703; Test Date:12/27/02
MFRL EME Lab
Run #: Sys Perf-R1-021227
TX Freq: 2450MHz
Start Power; 250mW

Target SAR normalized to 1W= 56.65 W/kg
Calculated SAR @ 1W = 60.4W/kg

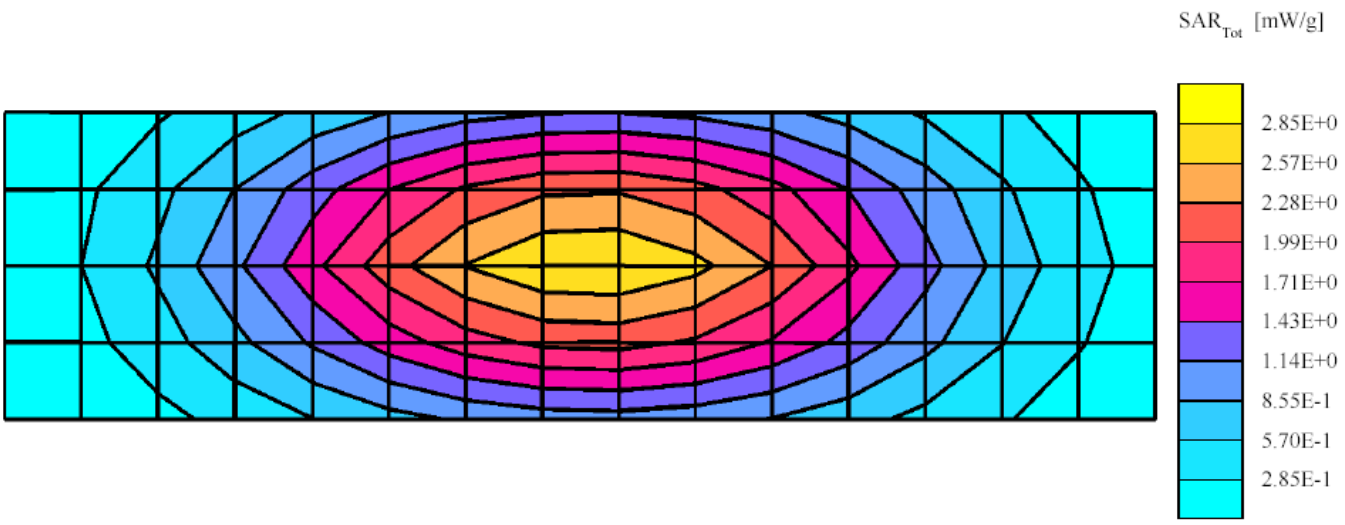
MFRL TEST 2450MHz; Probe: ET3DV6R A2LA - SN1418;Probe Cal Date: 5/21/02ConvF(3.60,3.60,3.60); Crest factor: 1.0; Body 2450MHz: ς= 2.03 mho/m ε= 53.6 ρ= 1.04 g/cm3; PROBE CAL DATE: 020423
Cubes (2): Peak: 29.9 mW/g ± 0.04 dB, SAR (1g): 15.1 mW/g ± 0.03 dB, SAR (10g): 7.07 mW/g ± 0.01 dB, (Worst-case extrapolation) Penetration depth: 7.4 (7.0, 8.3) [mm]
Power drift: 0.00 dB



SPEAG 900 MHz Dipole; Model D900V2, SN 158; Test Date:1/03/03
MFRL EME Lab
Run #: Sys Perf-R1-030103
TX Freq: 900MHz
Start Power; 250mW

Target SAR normalized to 1W= 11.44 W/kg
Calculated SAR @ 1W including drift = 11.27W/kg

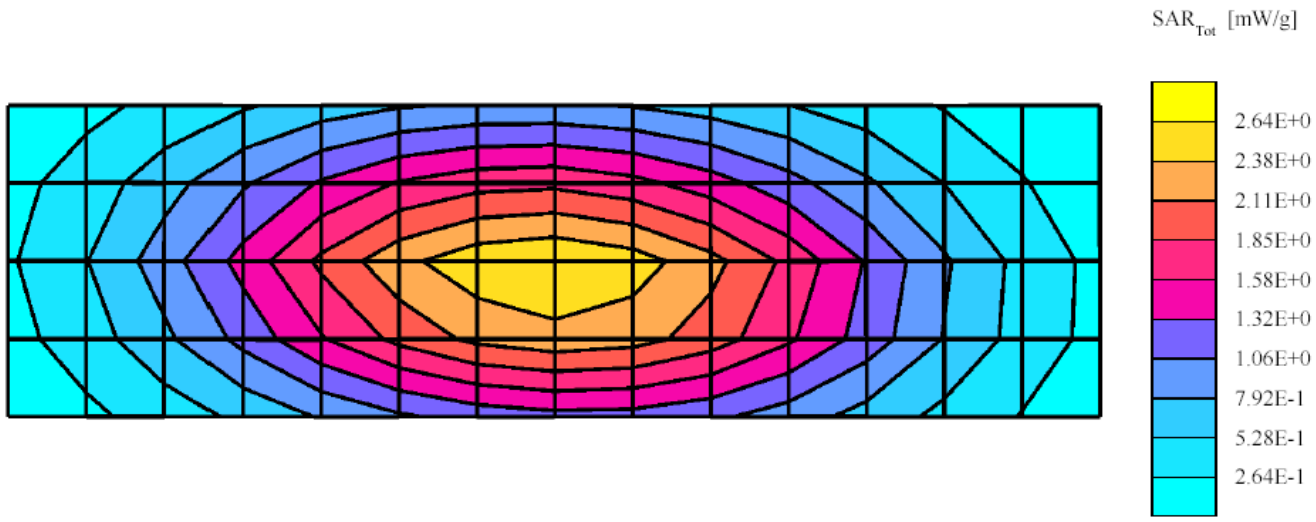
MFRL TEST 900MHz; Device Probe: ET3DV6R A2LA - SN1418;Probe Cal Date: 5/21/02ConvF(5.60,5.60,5.60); Crest factor: 1.0; Body 900MHz: σ= 1.03 mho/m ε= 54.7 ρ= 1.04 g/cm3; PROBE CAL DATE: 020521
Cubes (2): Peak: 4.35 mW/g ± 0.01 dB, SAR (1g): 2.81 mW/g ± 0.02 dB, SAR (10g): 1.80 mW/g ± 0.03 dB, (Worst-case extrapolation) Penetration depth: 12.4 (11.4, 13.8) [mm]
Power drift: -0.01 dB



SPEAG 900 MHz Dipole; Model D900V2, SN 158; Test Date:1/29/03
MFRL EME Lab
Run #: Sys Perf-R1-030129
TX Freq: 900MHz
Start Power; 250mW

Target SAR normalized to 1W= 11.44 W/Kg
Measured SAR @ 1W including drift = 10.53w/kg

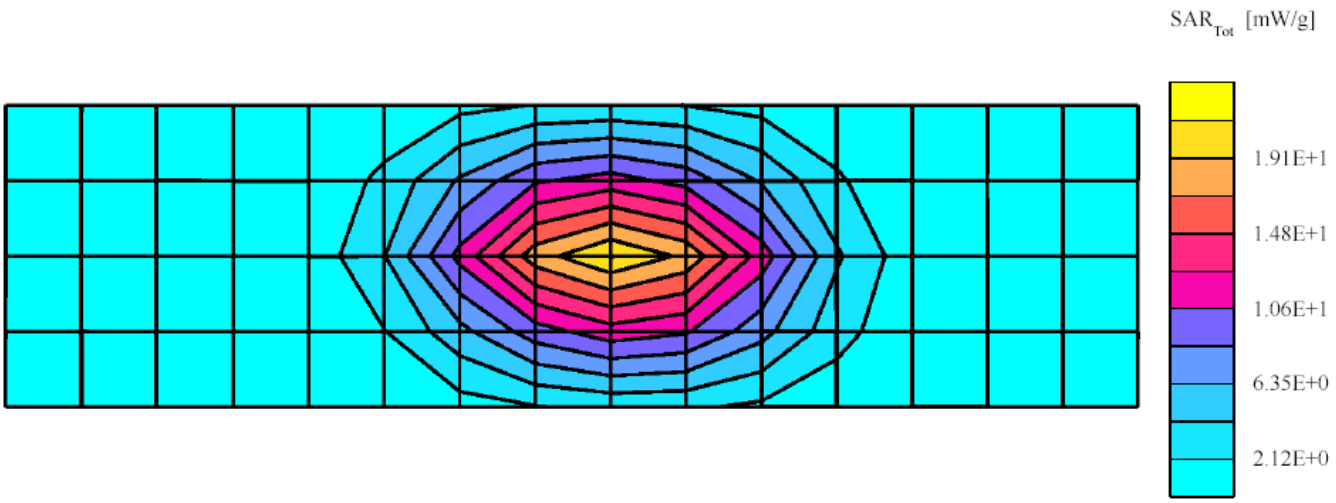
MFRL 900; Probe: ET3DV6R A2LA - SN1418;Probe Cal Date: 5/21/02ConvF(5.70,5.70,5.70); Crest factor: 1.0; Body 900MHz: σ = 1.02 mho/m εr = 56.9 ρ = 1.04 g/cm3; PROBE CAL DATE: 020521
Cubes (2): Peak: 4.04 mW/g ± 0.02 dB, SAR (1g): 2.62 mW/g ± 0.03 dB, SAR (10g): 1.69 mW/g ± 0.03 dB, (Worst-case extrapolation) Penetration depth: 12.5 (11.4, 13.8) [mm]
Power drift: -0.02 dB



SPEAG 1800 MHz Dipole; Model D1800V2, SN 2d043; Test Date:2/4/03
MFRL EME Lab
Run #: 030204
TX Freq: 1800MHz
Start Power; 250mW

Target SAR normalized to 1W= 38.16 W/Kg
Actual SAR @ 1W including drift = 40.68w/kg

Probe: ET3DV6R A2LA - SN1418;Probe Cal Date: 5/21/02ConvF(4.40,4.40,4.40); Crest factor: 1.0; Body 1800MHz: σ = 1.49 mho/m ε = 53.8 ρ = 1.04 g/cm3; PROBE CALIBRATION DATE: 020521
Cubes (2): Peak: 36.3 mW/g ± 0.08 dB, SAR (1g): 20.2 mW/g ± 0.04 dB, SAR (10g): 10.8 mW/g ± 0.01 dB, (Worst-case extrapolation) Penetration depth: 8.9 (8.3, 10.1) [mm]
Power drift: -0.03 dB

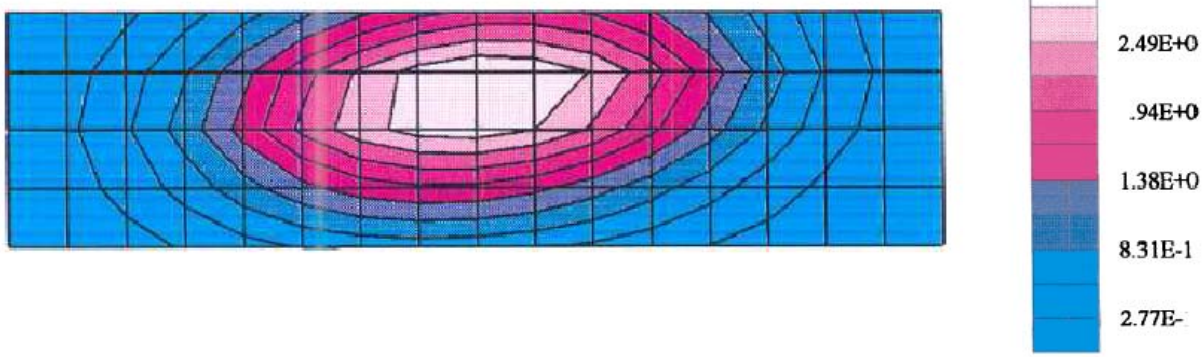


System Performance Check

Date:	05/09/2003	
Lab Location:	MFRL	
Robot System:	DASY I	
Probe Serial Number:	1417	
DAE S/N:	357	
Frequency:	900	MHz
Mixture:	BODY	
Mixture Characteristics		
Relative Dielectric Constant:	54.0	
Conductivity:	1.05	S/m
Power Output (Incident - Reflected):	252-3	mW
Measured SAR:	2.86	mW/g
SAR Normalized to 1W:	11.44	mW/g/W
Test Performed By:		

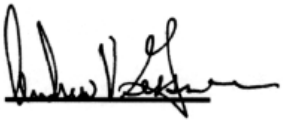
900 MHz Dipole SN:158

FLAT HDPE, 9x16";
Probe: ET3DV6 A2LA - SN1417; ConvF(6.10,6.10,6.10); Crest factor: 1.0; Body 900: σ = 1.05 mho/m ε_r = 54.0 ρ = 1.00 g/cm^3
Cubes (2): Peak: 4.46 mW/g ± 0.01 dB, SAR (1g): 2.86 mW/g ± 0.00 dB, SAR (10g): 1.82 mW/g ± 0.01 dB, (Worst-case extrapolation)
Penetration depth: 12.1 (11.2, 13.4) [mm]
Powerdrift: 0.01 dB
Input power 250mW to Dipole SN: 158
Target SAR normalized to 1W= 11.4mW/g
RT:24 RH:39.4% TT: 23



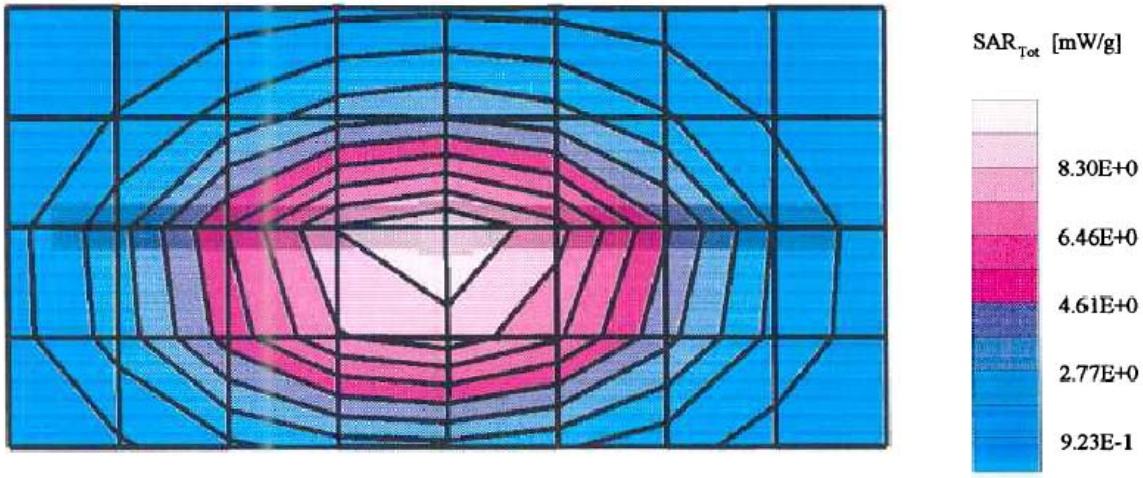
MFRL LABORATORY TESTED

System Performance Check

Date:	05/08/2003	
Lab Location:	MFRL	
Robot System:	DASY 1	
Probe Serial Number:	1417	
DAE S/N:	357	
Frequency:	1800	MHz
Mixture:	1800 BODY	
Mixture Characteristics		
Relative Dielectric Constant:	53.8	
Conductivity:	1.50	S/m
Power Output (Incident - Reflected):	253-2	mW
Measured SAR:	9.54	mW/g
SAR Normalized to 1W:	38.16	mW/g/W
Test Performed By:		

Dipole 1800 MHz

FLAT HDPE, 9x16"; center
Probe: ET3DV6 A2LA - SN1417; ConvF(4.60,4.60,4.60); Crest factor: 1.0; Body 1800: σ = 1.50 mho/m ε_r = 53.8 ρ = 1.00 g/cm^3
Cubes (2): Peak: 17.2 mW/g ± 0.01 dB, SAR (1g): 9.54 mW/g ± 0.00 dB, SAR (10g): 5.12 mW/g ± 0.00 dB, (Worst-case extrapolation)
Penetration depth: 9.2 (8.5, 10.3) [mm]
Powerdrift: 0.02 dB
Input power 250mW to dipole SN: 2d043
Target SAR normalized to 1W= 38.1mW/g
RT:24 RH:39.4% TT: 23



MFRL LABORATORY TESTED

SYSTEM PERFORMANCE CHECK TARGET SAR

Date:	7/1/2002	Frequency (MHz):	2450
Lab Location:	CGISS	Mixture Type:	FCC Body
Robot System:	CGISS 1	Ambient Temp.(°C):	22.3
Probe Serial #:	ET3DV6-1547	Tissue Temp.(°C):	24
DAE Serial #:	363		

Tissue Characteristics

Permitivity:	51.6	Phantom Type/SN:	40302002A / S8
Conductivity:	1.91	Distance (mm):	10

Reference Source:	D2450V2	(Dipole)
Reference SN:	703	

Power to Dipole: 250 mW
Power Output (radio) _____ mW

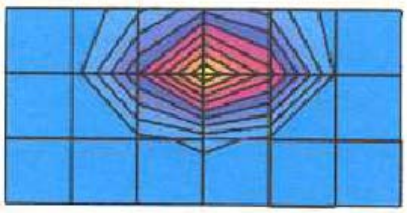
Measured SAR Value:	14 mW/g,	6.54	mW/g (10g avg.)
Power Drift:	-0.05 dB		
New Target/Measured SAR Value: (normalized to 1.0 W, including drift)	56.65 mW/g,	26.46	mW/g (10g avg.)

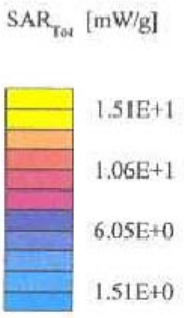
Test performed by: Stephen C. Whalen Initial: SCW

SPEAG Dipole 2450MHz. Test Date:07/01/02

Run #: Sys Perf_R1_020701-02 Phantom #: 40302002A / S8
Model #: D2450V2 SN: 703
Robot: CGISS-1 Tester: S. Whalen
TX Freq: 2450 MHz Sim Tissue Temp: 24.0 (Celsius)
Start Power: 250mW
DAE3: SN363-V1 DAE Cal Date: 5/23/02
- Comments-
New Target at 1W is 56.65 (including drift) (1g)

Flat Phantom;
Probe: ET3DV6 - SN1547;Probe Cal Date: 11/16/01ConvF(4.00,4.00,4.00); Crest factor: 1.0; FCC Body_2450MHz: σ = 1.91 mho/m ε_r = 51.6 ρ = 1.00 g/cm^3
Cubes (2): Peak: 28.9 mW/g ± 0.07 dB, SAR (1g): 14.0 mW/g ± 0.04 dB, SAR (10g): 6.54 mW/g ± 0.01 dB, (Worst-case extrapolation)
Penetration depth: 7.3 (6.7, 8.6) [mm]
Powerdrift: -0.05 dB





Motorola CGISS EME Lab

APPENDIX D

Calibration Certificates

Schmid & Partner
Engineering AG

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

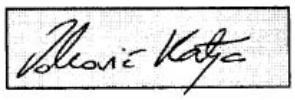
Calibration Certificate

Dosimetric E-Field Probe

Type	ET3DV6R
	1418
Place of Calibration	Zurich
Date of Calibration	May 21, 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	

DASY3 - Parameters of Probe: ET3DV6R SN:1418

Sensitivity in Free Space

NormX	**2.27** $\mu V/(V/m)^2$	DCP X	**95**
NormY	**2.12** $\mu V/(V/m)^2$	DCP Y	**95**
NormZ	**2.35** $\mu V/(V/m)^2$	DCP Z	**95**

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	**5.8** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**5.8** ± 9.5% (k=2)	Alpha	**0.49**
	ConvF Z	**5.8** ± 9.5% (k=2)	Depth	**2.19**
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	**4.8** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**4.8** ± 9.5% (k=2)	Alpha	**0.60**
	ConvF Z	**4.8** ± 9.5% (k=2)	Depth	**2.24**

Boundary Effect

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

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	10.3	5.5
SAR_{be} [%]	With Correction Algorithm	0.3	0.5

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

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	12.9	8.2
SAR_{be} [%]	With Correction Algorithm	0.1	0.2

Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm

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	**ET3DV6R**
Serial Number	**1418**
Place of Assessment	**Zurich**
Date of Summary	**May 23, 2002**
Probe Calibration Date	**May 21, 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 ET3DV6R SN:1418

Conversion factor (± standard deviation)

150 MHz	ConvF	**8.1 ± 8%**	ε_r = 52.3 ±5% σ = 0.76 ±5% mho/m (head tissue)
300 MHz	ConvF	**7.0 ± 8%**	ε_r = 45.3 ±5% σ = 0.87 ±5% mho/m (head tissue)
368 MHz	ConvF	**6.8 ± 8%**	ε_r = 44.5 ±5% σ = 0.87 ±5% mho/m (head tissue)
450 MHz	ConvF	**6.6 ± 8%**	ε_r = 43.5 ±5% σ = 0.87 ±5% mho/m (head tissue)
1750 MHz	ConvF	**4.9 ± 8%**	ε_r = 40.0 ±5% σ = 1.37 ±5% mho/m (head tissue)
1900 MHz	ConvF	**4.6 ± 8%**	ε_r = 40.0 ±5% σ = 1.40 ±5% mho/m (head tissue)
2000 MHz	ConvF	**4.6 ± 8%**	ε_r = 37.0 ±5% σ = 1.40 ±5% mho/m (head tissue)
2450 MHz	ConvF	**4.2 ± 8%**	ε_r = 32.0 ±5% σ = 1.80 ±5% mho/m (head tissue)

Dosimetric E-Field Probe ET3DV6R SN:1418

Conversion factor (± standard deviation)

35 MHz	ConvF	**8.0 ± 15%**	**ε_r = 78.0 ±5%** **σ = 0.65 ±5% mho/m** (body tissue)
75 MHz	ConvF	**7.9 ± 10%**	**ε_r = 70.0 ±5%** **σ = 0.70 ±5% mho/m** (body tissue)
150 MHz	ConvF	**7.7 ± 8%**	**ε_r = 61.9 ±5%** **σ = 0.80 ±5% mho/m** (body tissue)
300 MHz	ConvF	**7.1 ± 8%**	**ε_r = 58.2 ±5%** **σ = 0.92 ±5% mho/m** (body tissue)
368 MHz	ConvF	**6.9 ± 8%**	**ε_r = 57.5 ±5%** **σ = 0.93 ±5% mho/m** (body tissue)
450 MHz	ConvF	**6.8 ± 8%**	**ε_r = 56.7 ±5%** **σ = 0.94 ±5% mho/m** (body tissue)
835 MHz	ConvF	**5.7± 8%**	**ε_r = 55.2 ±5%** **σ = 0.97 ±5% mho/m** (body tissue)
900 MHz	ConvF	**5.6 ± 8%**	**ε_r = 55.0 ±5%** **σ = 1.05 ±5% mho/m** (body tissue)
925 MHz	ConvF	**5.6 ± 8%**	**ε_r = 55.0 ±5%** **σ = 1.06 ±5% mho/m** (body tissue)
1500 MHz	ConvF	**4.8 ± 8%**	**ε_r = 53.9 ±5%** **σ = 1.33 ±5% mho/m** (body tissue)

Dosimetric E-Field Probe ET3DV6R SN:1418

Conversion factor (± standard deviation)

1750 MHz	ConvF	**4.5 ± 8%**	ε_r = 53.4 ±5% σ = 1.49 ±5% mho/m (body tissue)
1800 MHz	ConvF	**4.4 ± 8%**	ε_r = 53.3 ±5% σ = 1.52 ±5% mho/m (body tissue)
1900 MHz	ConvF	**4.3 ± 8%**	ε_r = 53.3 ±5% σ = 1.52 ±5% mho/m (body tissue)
2000 MHz	ConvF	**4.1 ± 8%**	ε_r = 53.3 ±5% σ = 1.52 ±5% mho/m (body tissue)
2450 MHz	ConvF	**3.6 ± 8%**	ε_r = 52.7 ±5% σ = 1.95 ±5% mho/m (body tissue)

Schmid & Partner
Engineering AG

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

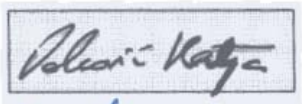
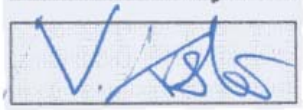
Calibration Certificate

900 MHz System Validation Dipole

Type	D900V2
Serial Number	158
Place of Calibration	Zurich
Date of Calibration	August 2, 2002
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	

1. Measurement Conditions

The measurements were performed in the flat section of the new SAM twin phantom filled with head simulating solution of the following electrical parameters at 900 MHz:

Relative Dielectricity	**41.7**	± 5%
Conductivity	**0.97 mho/m**	± 5%

The DASY3 System (Software version 3.1d) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.5 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.

2.1. SAR Measurement with DASY3 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 worst-case extrapolation are:

averaged over 1 cm^3 (1 g) of tissue:	**11.2 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**7.08 mW/g**

2.2 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:	**10.5 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**6.76 mW/g**

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:	**1.394 ns**	(one direction)
Transmission factor:	**0.991**	(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 900 MHz:	**Re{Z} = 49.4 Ω**
	Im {Z} = -5.1 Ω
Return Loss at 900 MHz	**-25.7 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.

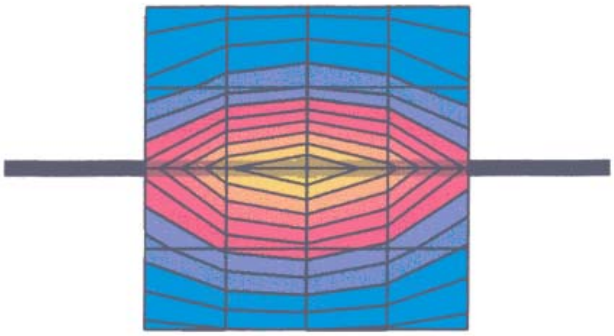
5. Design

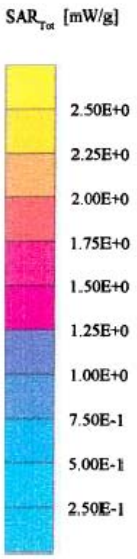
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

6. Power Test

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

'alidation Dipole D900V2 SN:158, d=15 mm
equency: 900 MHz; Antenna Input Power: 250 [mW]
AM Phantom; Flat Section; Grid Spacing: Dx = 20.0, Dy = 20.0, Dz = 10.0
obe: ET3DV6 - SN1507; ConvF(6.50,6.50,6.50) at 900 MHz; IEEE 1528 900 MHz: σ = 0.97 mho/m ε_r = 41.7 ρ = 1.00 g/cm³
bes (2): Peak: 4.41 mW/g ± 0.03 dB, SAR (1g): 2.79 mW/g ± 0.02 dB, SAR (10g): 1.77 mW/g ± 0.01 dB, (Worst-case extrapolation)
netration depth: 11.6 (10.7, 12.9) [mm]
werdrift: -0.02 dB





Schmid & Partner
Engineering AG

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

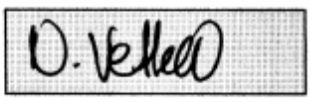
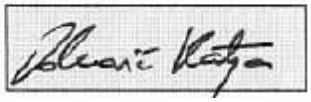
Calibration Certificate

1800 MHz System Validation Dipole

Type:	D1800V2
Serial Number:	2d043
Place of Calibration:	Zurich
Date of Calibration:	June 13, 2002
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:	

1. Measurement Conditions

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

Relative Dielectricity	**38.9**	± 5%
Conductivity	**1.35 mho/m**	± 5%

The DASY3 System (Software version 3.1d) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 5.3 at 1800 MHz) was used for the measurements.

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

The coarse grid with a grid spacing of 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.

2.1. SAR Measurement with DASY3 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 worst-case extrapolation are:

averaged over 1 cm^3 (1 g) of tissue:	**40.0 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**21.0 mW/g**

2.2 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:	**36.8 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**19.8 mW/g**

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:	**1.206 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 holder was in place during impedance measurements.

Feedpoint impedance at 1800 MHz:	Re{Z} = **49.0 Ω**
	Im {Z} = **-2.8 Ω**
Return Loss at 1800 MHz	**-30.5 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.

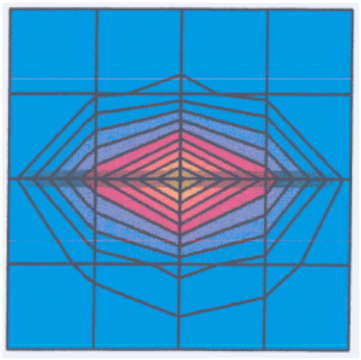
5. Design

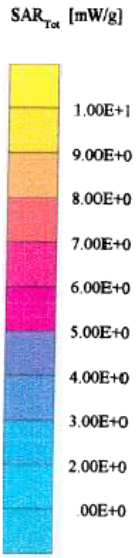
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

6. Power Test

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

alidation Dipole D1800V2 SN:2d043, d = 10 mm
equency: 1800 MHz; Antenna Input Power: 250 [mW]
M Phantom; Flat Section; Grid Spacing: Dx = 20.0, Dy = 20.0, Dz = 10.0
obe: ET3DV6 - SN1507; ConvF(5.30,5.30,5.30) at 1800 MHz; IEEE1528 1800 MHz: σ = 1.35 mho/m ε_r = 38.9 ρ = 1.00 g/cm^3
bes (2): Peak: 18.4 mW/g ± 0.00 dB, SAR (1g): 9.99 mW/g ± 0.02 dB, SAR (10g): 5.26 mW/g ± 0.02 dB, (Worst-case extrapolation)
netration depth: 8.4 (8.0, 9.2) [mm]
werdrift: 0.01 dB





Schmid & Partner
Engineering AG

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

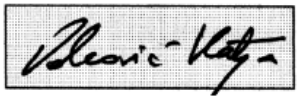
Calibration Certificate

2450 MHz System Validation Dipole

Type	**D2450V2**
Serial Number:	**703**
Place of Calibration:	**Zurich**
Date of Calibration:	**June 19, 2002**
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	

1. Measurement Conditions

The measurements were performed in the flat section of the new SAM twin phantom filled with head simulating solution of the following electrical parameters at 2450 MHz:

Relative permitivity	**38.3**	± 5%
Conductivity	**1.90 mho/m**	± 10%

The DASY3 System (Software version 3.1d) with a dosimetric E-field probe ET3DV6 (SN:1507, conversion factor 5.0 at 2450 MHz) was used for the measurements.

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

The coarse grid with a grid spacing of 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.

2.1. SAR Measurement with DASY3 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 worst-case extrapolation are:

averaged over 1 cm^3 (1 g) of tissue:	**56.4 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**26.1 mW/g**

2.2 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:	**53.2 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**24.9 mW/g**

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:	**1.148 ns**	(one direction)
Transmission factor:	**0.987**	(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 2450 MHz:	Re{Z} = **51.2 Ω**
	Im {Z} = **2.7 Ω**
Return Loss at 2450 MHz	**- 30.6 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.

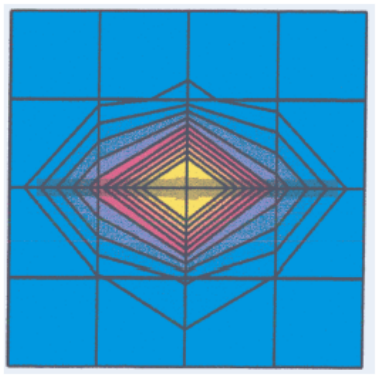
Small end caps have been added to the dipole arms in order to improve matching when loaded according to the position as explained in Section 1.

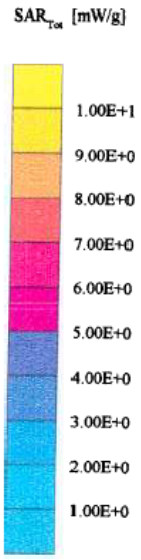
6. Power Test

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

Validation Dipole D2450V2 SN703, d = 10 mm

quency: 2450 MHz; Antenna Input Power: 250 [mW]
M Phantom; Flat Section; Grid Spacing: Dx = 20.0, Dy = 20.0, Dz = 10.0
be: ET3DV6 - SN1507; ConvF(5.00,5.00,5.00) at 2450 MHz; IEEE1528 2450 MHz: σ = 1.90 mho/m ε_r = 38.3 ρ = 1.00 g/cm³
bes (2): Peak: 28.8 mW/g ± 0.04 dB, SAR (1g): 14.1 mW/g ± 0.02 dB, SAR (10g): 6.52 mW/g ± 0.01 dB, (Worst-case extrapolation)
netration depth: 6.5 (6.4, 7.0) [mm]
werdrift: -0.00 dB





APPENDIX E
Illustration of Body-Worn Accessories

The purpose of this appendix is to illustrate the body-worn carry accessories for FCC ID: AZ489FT7003. The sample that was used in the following photos represents the product used to obtain the results presented herein and was used in this section to demonstrate the different body-worn accessories.

Photo 1.
Model FHN6394A
Back View

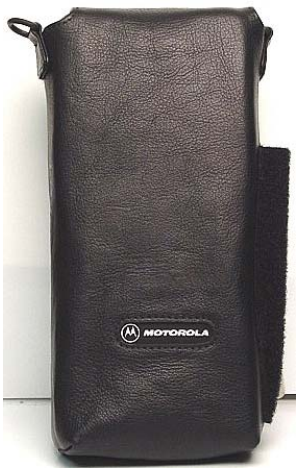


Photo 2.
Model FHN6394A
Front View

Photo 3.
Model FHN6394A
Side View

Photo 4.
Model FHN6395A
Back View

Photo 5.
Model FHN6395A
Front View

Photo 6.
Model FHN6395A
Side View

Photo 7.
Model FHN6396A
Back View

Photo 8.
Model FHN6396A
Front View

Photo 9.
Model FHN6396A
Side View

Photo 10.
Model FHN6396A w/ attached shoulder strap
Side View

Appendix F
Accessories and options test status and separation distances

The following table summarizes the body spacing distance provided by each of the body-worn accessories:

Carry Case Model	Tested ?	Separation distances between device and phantom surface. Range (mm)	Comments
FHN6394A	Yes	11- 40	NA
FHN6396A	Yes	12 - 16	NA
FHN6395A	No	11 - 40	Similar to FHN6394A; w/ opening for the display and keypad