MOTOROLA

ACCREDITED

CGISS 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:	March 18, 2003
Report Revision:	Rev. A
Manufacturer:	Motorola China
Product Description:	1.5 Watts fixed antenna UHF/RBR/ 4 channel w/ display
FCC ID:	**AZ489FT4860**
Device Model:	HCUE1081A

Test Period:	2/13/03 – 2/14/03
EME Technician:	Ed Church (EME Technician)
EME Engineer:	Deanna Zakharia (Sr. Staff Eng.)
Author:	Michael Sailsman (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 — 3/7/03

Ken Enger
Senior Resource Manager, Product Safety and EME Director

Date Approved

APPENDIX A

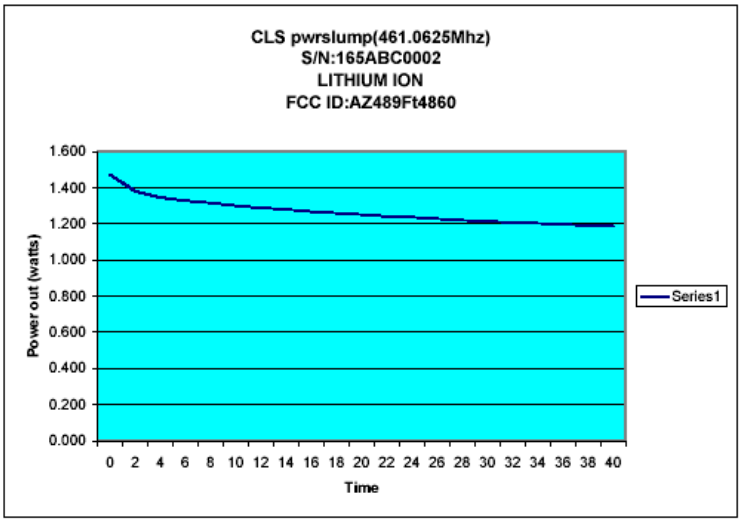
Power Slump Data/Shortened Scan

DUT Power versus time data

Equipment HP8920B Control # SMHPB030 calibration date Mar 8, 02 Due Mar 8, 04

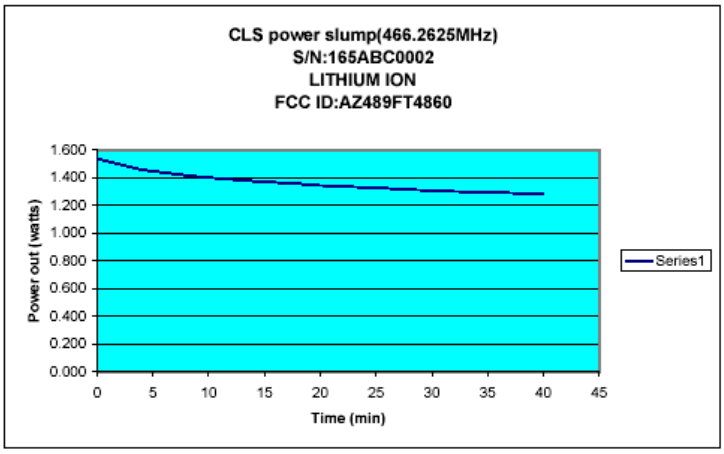
S/N: 165ABC0002
Channel 1 Frequency (10): 461.0625MHz
1 Watt

Time (min)	Power Output(W)
0	1.472
2	1.380
4	1.346
6	1.327
8	1.315
10	1.300
12	1.288
14	1.279
16	1.268
18	1.259
20	1.250
22	1.242
24	1.236
26	1.227
28	1.219
30	1.213
32	1.208
34	1.202
36	1.197
38	1.191
40	1.189



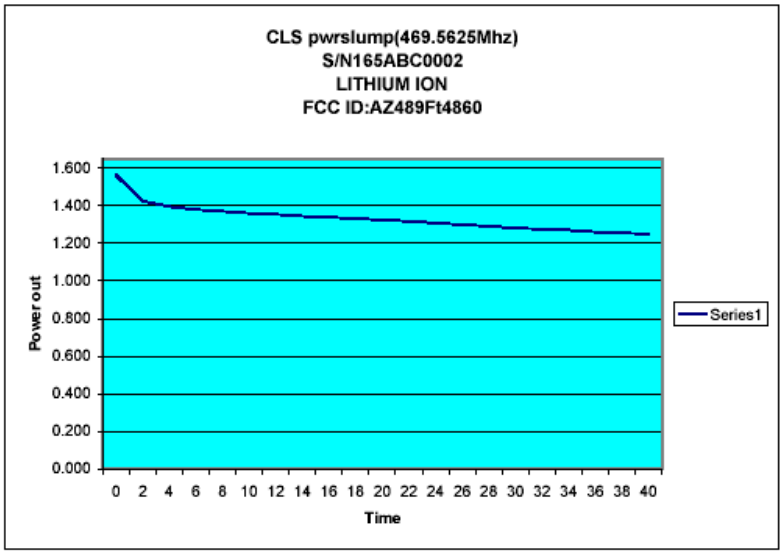
S/N: 165ABC0002
Channel 2 Frequency (43): 466.2625MHz
1 Watt

Time (min)	Power Output(W)
0	1.535
2	1.496
4	1.455
6	1.435
8	1.416
10	1.400
12	1.387
14	1.374
16	1.365
18	1.355
20	1.343
22	1.337
24	1.327
26	1.321
28	1.312
30	1.306
32	1.300
34	1.294
36	1.291
38	1.285
40	1.279



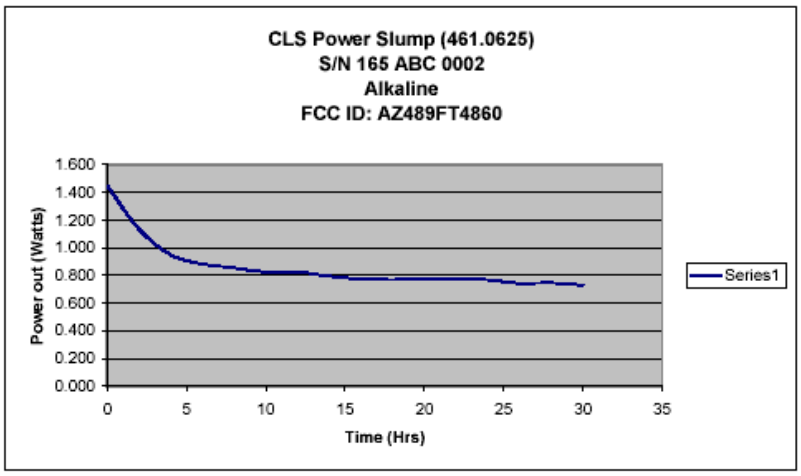
S/N: 165ABC0002
Channel 3 Frequency(56): 469.5625MHz
1.0 Watt

Time (min)	Power Output(W)
0	1.563
2	1.426
4	1.396
6	1.380
8	1.371
10	1.361
12	1.355
14	1.346
16	1.340
18	1.334
20	1.324
22	1.318
24	1.309
26	1.300
28	1.291
30	1.282
32	1.276
34	1.271
36	1.262
38	1.256
40	1.250



S/N: 165ABC0002
Channel 1 Frequency (10): 461.0625MHz
1 Watt

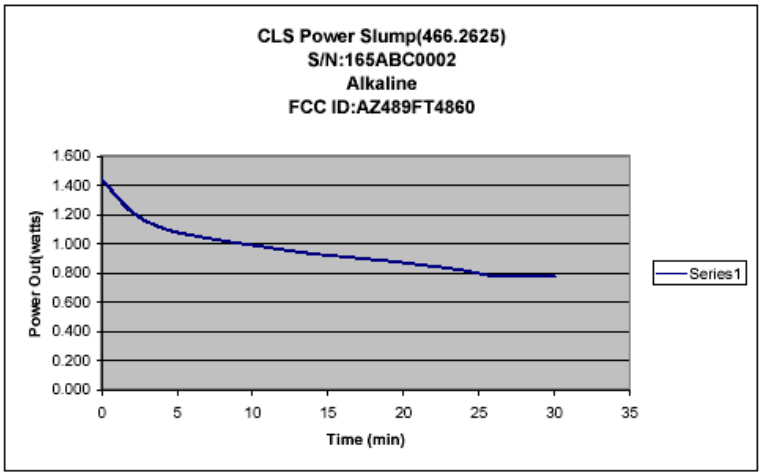
Time (min)	Power Output(W)
0	1.447
2	1.135
4	0.948
6	0.883
8	0.855
10	0.824
12	0.824
14	0.794
16	0.774
18	0.769
20	0.776
22	0.771
24	0.769
26	0.743
28	0.746
30	0.728
32	
34	
36	
38	
40	



Alkaline only last 30 minutes.

S/N: 165ABC0002
Channel 2 Frequency(43): 466.2625MHz
1.0 Watt

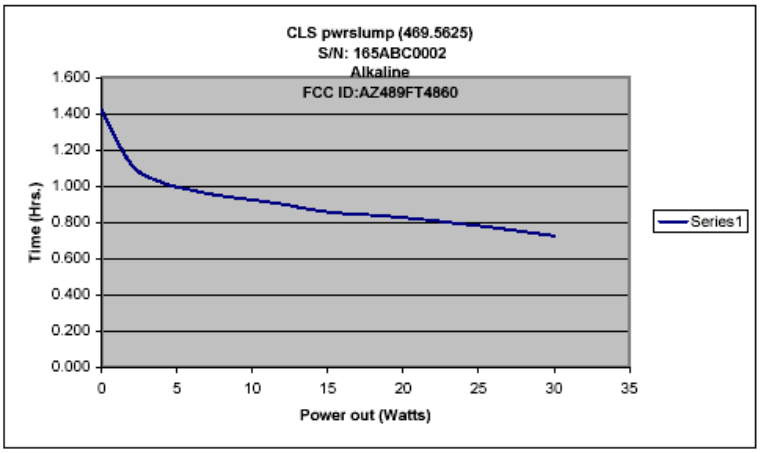
Time (min)	Power Output(W)
0	1.442
2	1.219
4	1.109
6	1.059
8	1.023
10	0.993
12	0.962
14	0.933
16	0.914
18	0.893
20	0.873
22	0.847
24	0.818
26	0.782
28	0.778
30	0.778
32	
34	
36	
38	
40	



Alkaline only last 30 minutes.

S/N: 165ABC0002
Channel 3 Frequency(56): 469.5625MHz
1.0 Watt

Time (min)	Power Output(W)
0	1.422
2	1.119
4	1.021
6	0.977
8	0.946
10	0.925
12	0.902
14	0.869
16	0.849
18	0.839
20	0.826
22	0.811
24	0.791
26	0.771
28	0.748
30	0.726
32	
34	
36	
38	
40	



Alkaline only last 30 minutes.

Shortened Scan Results

FCC ID: AZ489FT4860; Test Date: 02/17/03
CGISS EME Laboratory
RUN NUMBER: Face-R3-030217-02
MODEL #: HCUE1081A SER #: 134ABC0001
TX FREQ: 466 MHz
SIM TEMP: 21.8 C

- Accessories -
ANTENNA KIT #: Fixed
BATTERY KIT #: SNN5571A
ACCESSORIES: NONE
AUDIO ACCESSORIES: NONE

Shortened scan reflect highest S.A.R. producing configuration; Run time 8 minutes.
Representative "normal" scan run time was 20 minutes
"Shortened" scan max. calc. drift adjusted S.A.R. = 1.51 mW/g
"Normal" scan max. calc. drift adjusted S.A.R. = 1.60 mW/g (see section 7.1 run # Face-R1-030214-11)

DUT microphone 2.5 cm from phantom
Flat Phantom; Section; Position: (90°,90°);
Probe: ET3DV6 - SN1393 (Cal Date 03-22-2002); ConvF(8.00,8.00,8.00); Probe cal date: 3/22/02; Crest factor: 1.0; IEEE
Head 465 MHz: σ = 0.87 mho/m ε = 43.8 ρ = 1.00 g/cm3; DAE3 SN: 406 DAE CAL DATE: 11-11-02
Cube 5x5x7: SAR (1g): 2.71 mW/g, SAR (10g): 1.92 mW/g, (Worst-case extrapolation)
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0; SAR (1g): 2.71 mW/g, SAR (10g): 1.92 mW/g
Power drift: -0.62 dB

FCC ID: AZ489FT4860; Test Date: 02/17/03
CGISS EME Laboratory
RUN #: Face-R3-030217-03
MODEL #: HCUE1081A SER #: 134ABC0001
TX FREQ: 466 MHz
SIM TEMP: 21.8 C

ANTENNA KIT #: Fixed
BATTERY KIT #: AAA Alkaline
ACCESSORIES: NONE
AUDIO ACCESSORIES: NONE

Shortened scan reflect highest S.A.R. producing configuration; Run time 8 minutes.
Representative "normal" scan run time was 20 minutes
"Shortened" scan max. calc. drift adjusted S.A.R. = 1.50mW/g
"Normal" scan max. calc. drift adjusted S.A.R. = 1.61 mW/g (see section 7.1 run # Face-R1-030214-12)

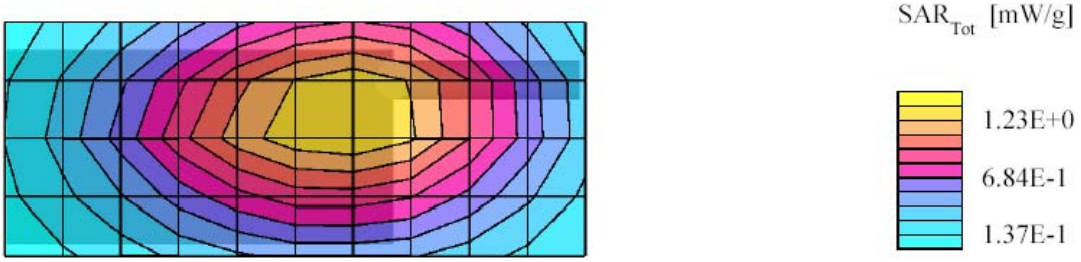
DUT microphone 2.5 cm from phantom
Flat Phantom;; Position: (90°,90°);
Probe: ET3DV6 - SN1393 (Cal Date 03-22-2002); ConvF(8.00,8.00,8.00); Probe cal date: 3/22/02; Crest factor: 1.0; IEEE
Head 465 MHz: σ = 0.87 mho/m ε = 43.8 ρ= 1.00 g/cm3; DAE3 SN: 406 DAE CAL DATE: 11-11-02
Cube 5x5x7: SAR (1g): 2.17 mW/g, SAR (10g): 1.55 mW/g, (Worst-case extrapolation)
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0; SAR (1g): 2.17 mW/g, SAR (10g): 1.55 mW/g
Power drift : -1.23 dB

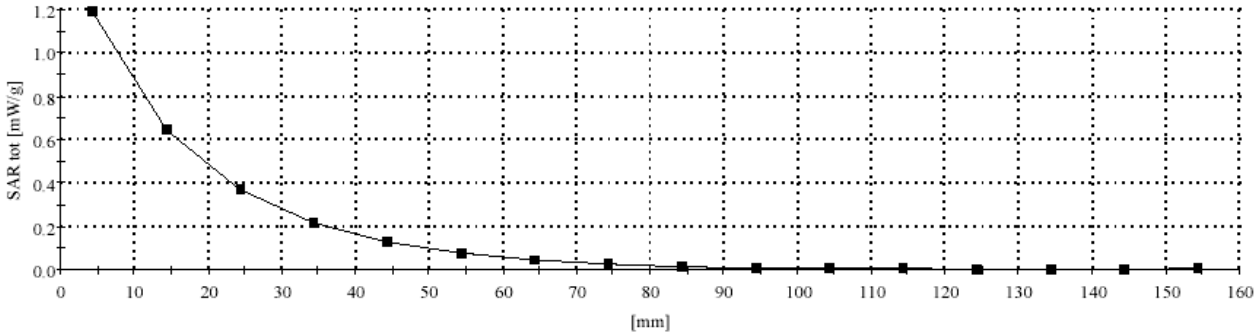
APPENDIX B
Data Results

FCC ID: AZ489FT4860; Test Date: 2/13/03
CGISS EME Laboratory
RUN NUMBER: Ab-R1-030213-06
MODEL NUMBER: HCUE1081A; SERIAL NUMBER: 134ABC0001
TX FREQ: 466.2625MHz
SIM TEMP: 20.9 C

ANTENNA KIT #: Fixed
BATTERY KIT #: AAA Alkaline
ACCESSORIES: Belt Clip #: HCLN4013A
AUDIO ACCESSORIES: RSM #: HMN9026A

DUT with carry case against phantom
Phantom; Section; Position: (90°,90°);
Probe: ET3DV6 - SN1393 (Cal Date 03-22-2002); ConvF(8.20,8.20,8.20); Probe cal date: 3/22/02; Crest factor: 1.0; FCC Body 466: σ = 0.93 mho/m ε = 54.7 ρ = 1.00 g/cm3; DAE3 SN: 406 DAE CAL DATE: 11-11-02
Cube 7x7x7: SAR (1g): 1.25 mW/g, SAR (10g): 0.893 mW/g * Max outside, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0; Max at 24.0, 88.5, 4.4
Power drift: -1.50 dB

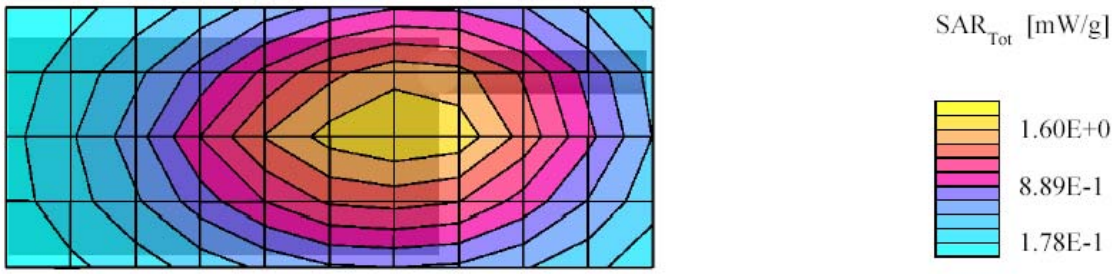


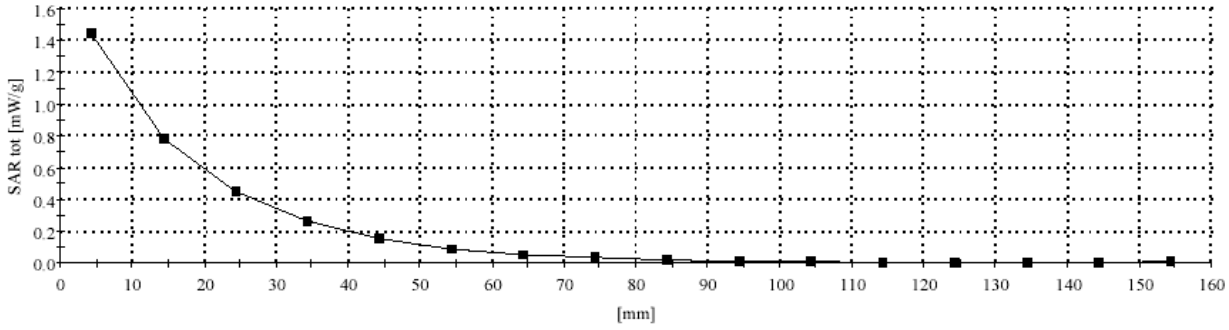


FCC ID: AZ489FT4860; Test Date: 2/14/03
CGISS EME Laboratory
RUN NUMBER: Ab-R1-030214-02
MODEL NUMBER: HCUE1081A; SERIAL NUMBER: 134ABC0001
TX FREQ: 466.2625MHz
SIM TEMP: 20.9 C

ANTENNA KIT #: Fixed
BATTERY KIT #: AAA Alkaline
ACCESSORIES: Belt Clip #: HCLN4013A
AUDIO ACCESSORIES: Earbud w/PTT mic #: HMN9025B.

DUT with carry case against phantom
Phantom; Section; Position: (90°,90°);
Probe: ET3DV6 - SN1393 (Cal Date 03-22-2002); ConvF(8.20,8.20,8.20); Probe cal date: 3/22/02; Crest factor: 1.0; FCC Body 466: σ = 0.94 mho/m ε = 54.9 ρ = 1.00 g/cm3; DAE3 SN: 406 DAE CAL DATE: 11-11-02
Cube 7x7x7: SAR (1g): 1.58 mW/g, SAR (10g): 1.12 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0; Max at 27.0, 94.5, 4.4
Power drift: -1.46 dB

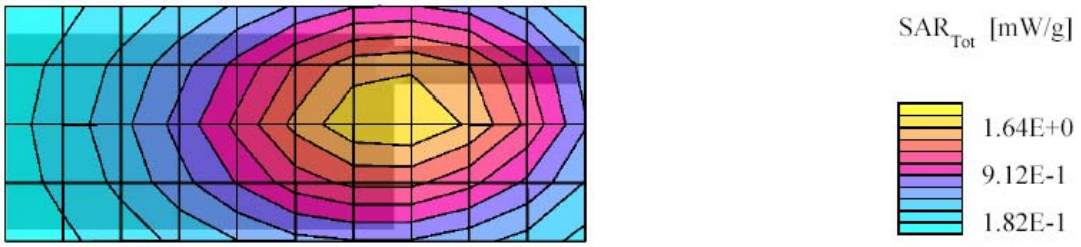


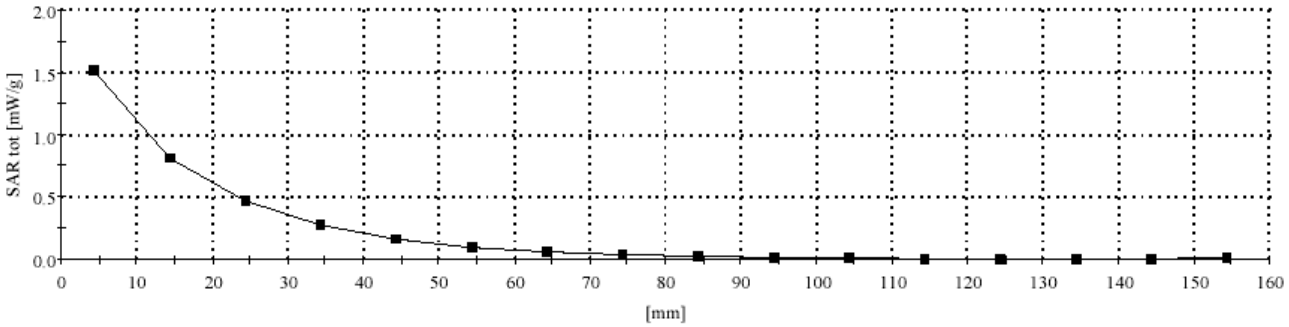


FCC ID: AZ489FT4860; Test Date: 2/14/03
CGISS EME Laboratory
RUN NUMBER: Ab-R1-030214-05
MODEL NUMBER: HCUE1081A; SERIAL NUMBER: 134ABC0001
TX FREQ: 466.2625MHz
SIM TEMP: 20.9 C

ANTENNA KIT #: Fixed
BATTERY KIT #: AAA Alkaline
ACCESSORIES: NONE
AUDIO ACCESSORIES: Earbud w/PTT mic #: HMN9025B

DUT Back towards phantom w/ antenna 2.5cm separation
Flat Phantom; Section; Position: (90°,90°);
Probe: ET3DV6 - SN1393 (Cal Date 03-22-2002); ConvF(8.20,8.20,8.20); Probe cal date: 3/22/02; Crest factor: 1.0; FCC Body 466: σ = 0.94 mho/m ε = 54.9 ρ = 1.00 g/cm3; DAE3 SN: 406 DAE CAL DATE: 11-11-02
Cube 7x7x7: SAR (1g): 1.63 mW/g, SAR (10g): 1.16 mW/g * Max outside, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0; Max at 27.0, 100.5, 4.4
Power drift: -1.68 dB

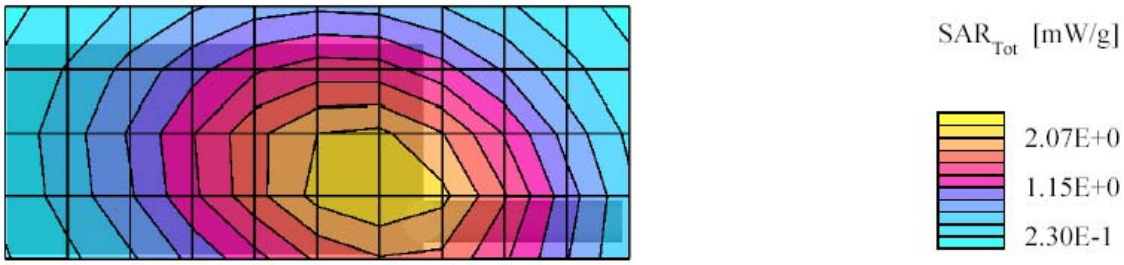


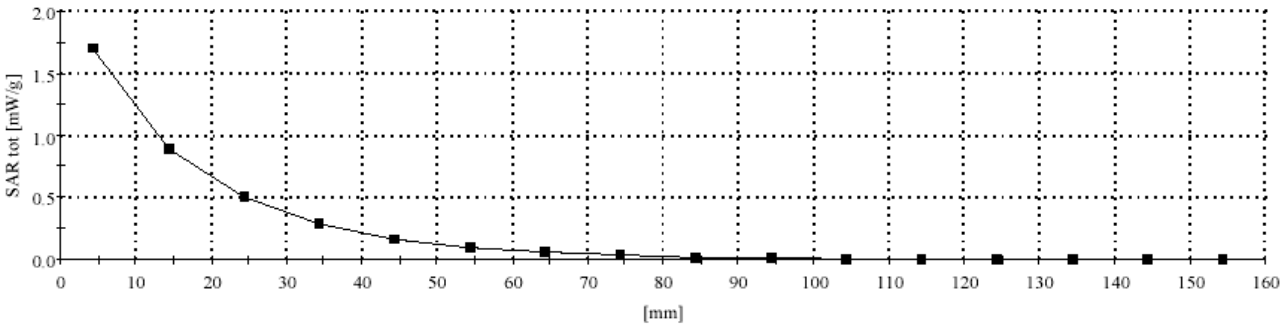


FCC ID: AZ489FT4860; Test Date: 2/14/03
CGISS EME Laboratory
RUN NUMBER: Face-R1-030214-12
MODEL NUMBER: HCUE1081A; SERIAL NUMBER: 134ABC0001
TX FREQ: 466.2625MHz
SIM TEMP: 21.4 C

ANTENNA KIT #: Fixed
BATTERY KIT #: AAA Alkaline
ACCESSORIES: NONE
AUDIO ACCESSORIES: NONE

DUT microphone w/ 2.5cm separation from phantom
Flat Phantom; Section; Position: (90°,90°);
Probe: ET3DV6 - SN1393 (Cal Date 03-22-2002); ConvF(8.00,8.00,8.00); Probe cal date: 3/22/02; Crest factor: 1.0; IEEE
Head 466 MHz: σ = 0.88 mho/m ε = 43.9 ρ = 1.00 g/cm3; DAE3 SN: 406 DAE CAL DATE: 11-11-02
Cube 7x7x7: SAR (1g): 1.95 mW/g, SAR (10g): 1.39 mW/g * Max outside, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0; Max at 42.0, 88.5, 4.4
Power drift: -2.02 dB





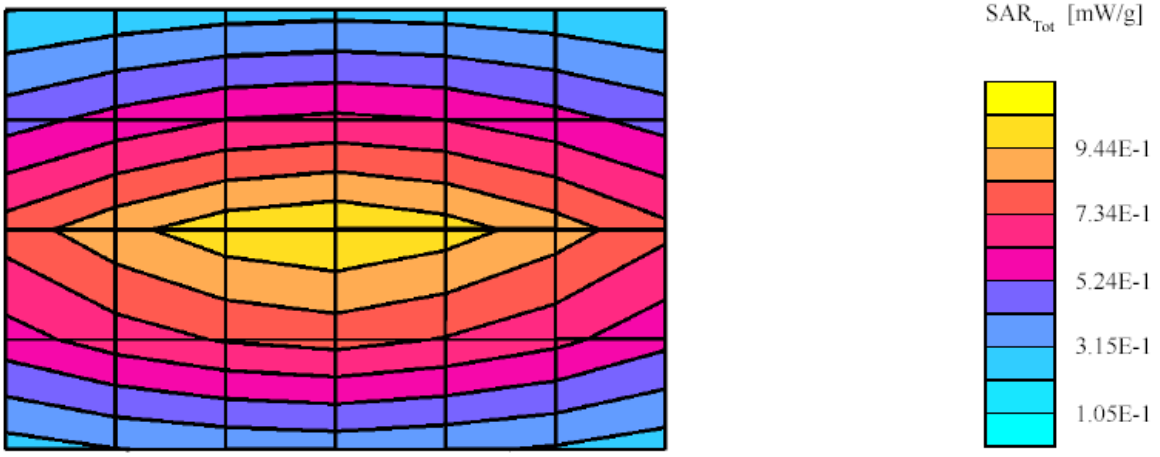
APPENDIX C

Dipole System Performance Check Results

SPEAG 450 MHz Dipole; D450V2 SN1001; Test Date:2/13/03
CGISS EME Lab
Run #: Sys Perf_R3_030213-04
TX Freq: 450 MHz
Start Power; 250mW

Target at 1W is 4.41 mW/g (1g)
SAR calculated is 4.17 mW/g, Percent from target (including drift) for 1g is -5.45%

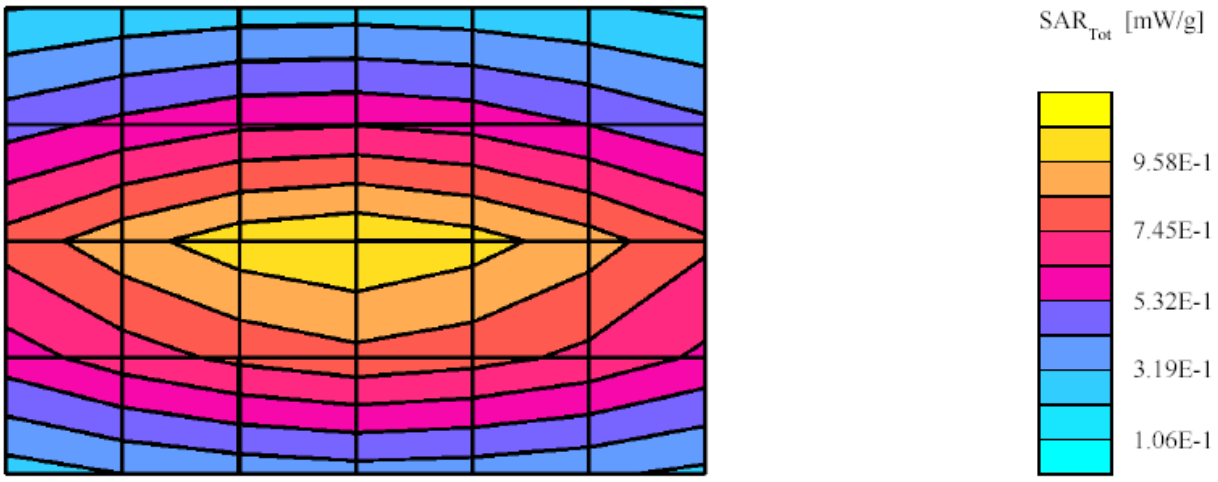
Probe: ET3DV6 - SN1393 (Cal Date 03-22-2002);Probe Cal Date: 3/22/02ConvF(8.20,8.20,8.20); Crest factor: 1.0; FCC Body 450: σ = 0.92 mho/m ε = 54.9 ρ = 1.00 g/cm3; DAE3: SN:406 DAE Cal Date: 11/11/02
Cubes (2): Peak: 1.58 mW/g ± 0.07 dB, SAR (1g): 1.04 mW/g ± 0.07 dB, SAR (10g): 0.695 mW/g ± 0.07 dB, (Worst-case extrapolation) Penetration depth: 13.3 (11.9, 15.1) [mm]
Power drift: -0.01 dB



SPEAG 450 MHz Dipole; D450V2 SN1001; Test Date:2/14/03
CGISS EME Lab
Run #: Sys Perf_R3_030214-01
TX Freq: 450 MHz
Start Power; 250mW

Target at 1W is 4.41 mW/g (1g)
SAR calculated is 4.25 mW/g, Percent from target (including drift) for 1g is -3.63%

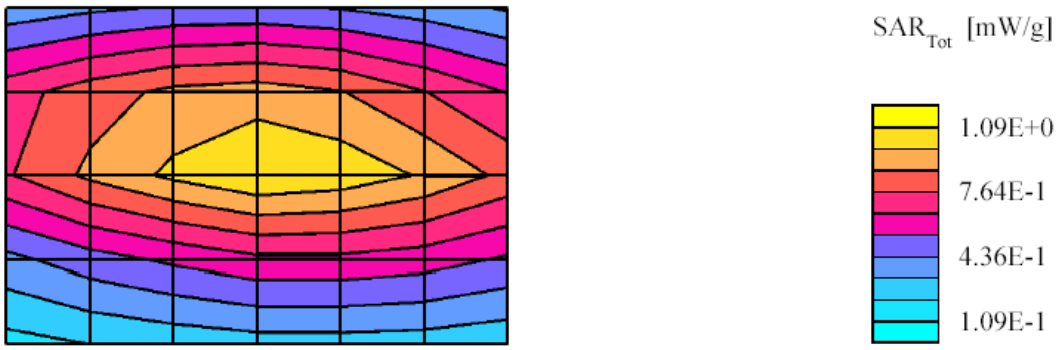
Probe: ET3DV6 - SN1393 (Cal Date 03-22-2002);Probe Cal Date: 3/22/02ConvF(8.20,8.20,8.20); Crest factor: 1.0; FCC Body 450: σ = 0.92 mho/m ε= 55.1 ρ = 1.00 g/cm3; DAE3: SN:406 DAE Cal Date: 11/11/02
Cubes (2): Peak: 1.61 mW/g ± 0.06 dB, SAR (1g): 1.06 mW/g ± 0.06 dB, SAR (10g): 0.706 mW/g ± 0.06 dB, (Worst-case extrapolation) Penetration depth: 13.3 (11.8, 15.1) [mm]
Power drift: -0.01 dB



SPEAG 450 MHz Dipole; D450V2 SN1001; Test Date:2/14/03
CGISS EME Lab
Run #: Sys Perf_R3_030214-10
TX Freq:450 MHz
Sim Tissue Temp: 20.9 (Celsius)
Start Power; 250mW

Target at 1W is 4.63 mW/g (1g)
SAR calculated is 4.44 mW/g, Percent from target for 1g is -4.10%

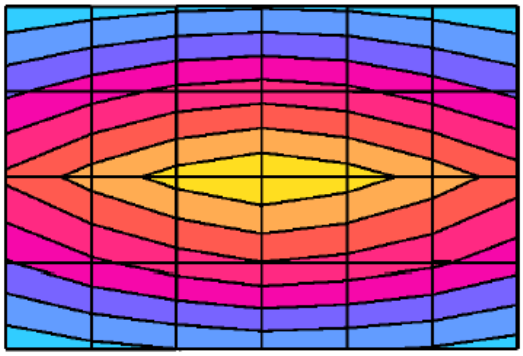
Flat Phantom; Probe: ET3DV6 - SN1393 (Cal Date 03-22-2002); ConvF(8.00,8.00,8.00); Probe cal date: 3/22/02; Crest factor: 1.0; IEEE Head 450 MHz: σ = 0.86 mho/m ε = 44.2 ρ = 1.00 g/cm3; DAE3: SN:406 DAE Cal Date: 11/11/02
Cubes (2): SAR (1g): 1.11 mW/g ± 0.05 dB, SAR (10g): 0.730 mW/g ± 0.05 dB, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0; Max at 27.0, 46.5, 4.4
Power drift: 0.00 dB



SPEAG 450 MHz Dipole; D450V2 SN1001; Test Date: 2/17/03
CGISS EME Lab
Run #: Sys Perf_R3_030217-01
TX Freq:450 MHz
Sim Tissue Temp: 20.9 (Celsius)
Start Power; 250mW

- Comments-
Target at 1W is 4.63 mW/g (1g)
SAR calculated is 4.60 mW/g, Percent from target for 1g is 0.65 %

Flat Phantom; Probe: ET3DV6 - SN1393 (Cal Date 03-22-2002); ConvF(8.00,8.00,8.00); Probe cal date: 3/22/02; Crest factor: 1.0; IEEE Head 450 MHz: σ = 0.86 mho/m ε = 44.1 ρ = 1.00 g/cm3; DAE3: SN:406 DAE Cal Date: 11/11/02
Cubes (2): SAR (1g): 1.15 mW/g ± 0.05 dB, SAR (10g): 0.753 mW/g ± 0.05 dB, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0; Max at 30.0, 45.0, 4.4
Power drift: 0.01 dB



SYSTEM PERFORMANCE CHECK TARGET SAR

Date:	1/16/2003	Frequency (MHz):	450
Lab Location:	CGISS	Mixture Type:	FCC Body
Robot System:	CGISS 3	Ambient Temp.(°C):	22.6, (Humid: 45%)
Probe Serial #:	ET3DV6-1393	Tissue Temp.(°C):	21.5
DAE Serial #:	406		

Tissue Characteristics

Permitivity:	55.4	Phantom Type/SN:	80302002C/S7
Conductivity:	0.92	Distance (mm):	15 (tissue/dipole cnt)

Reference Source:	D450V2	(Dipole)
Reference SN:	1001	

Power to Dipole: 250 mW

Measured SAR Value:	1.1 mW/g,	0.732	mW/g (10g avg.)
Power Drift:	-0.01 dB		

New Target/Measured SAR Value: (normalized to 1.0 W, including drift)	4.41 mW/g,	2.93	mW/g (10g avg.)

Test performed by: J. Fortier Initial:

Sys. Per. Chk. Form: 021024

Dipole D450V2 SN1001; Test date:01/16/03

Run #: Sys Val_R3_030116-06
Model #: D450V2
Robot: CGISS-3
TX Freq: 450 MHz
Start Power: 250mW
DAE3: SN:406

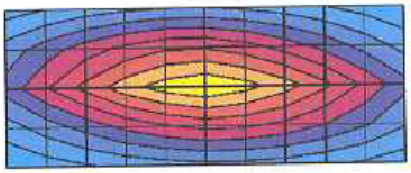
Phantom #:80302002C/S7
SN: 1001
Tester: J. Fortier
Sim Tissue Temp: 21.5 (Celsius)

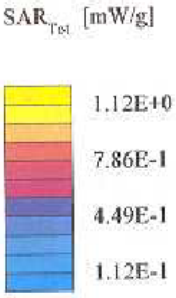
DAE Cal Date: 11/11/02

- Comments-

Target at 1W is 4.41 mW/g (1g), 2.93 mW/g (10g)

Flat; Probe: ET3DV6 - SN1393 SPEAG; ConvF(8.20,8.20,8.20); Crest factor: 1.0; FCC Body 450: σ = 0.92 mho/m ε_r = 55.4 ρ = 1.00 g/cm^3
Cubes (2): Peak: 1.69 mW/g ± 0.07 dB, SAR (1g): 1.10 mW/g ± 0.07 dB, SAR (10g): 0.732 mW/g ± 0.06 dB, (Worst-case extrapolation)
Penetration depth: 13.2 (11.7, 15.0) [mm]
Powerdrift: -0.01 dB





Motorola CGISS EME Lab

SYSTEM PERFORMANCE CHECK TARGET SAR

Date:	1/16/2003	Frequency (MHz):	450
Lab Location:	CGISS	Mixture Type:	IEEE Head
Robot System:	CGISS 3	Ambient Temp.(°C):	22.4, (Humid: 45.0%)
Probe Serial #:	ET3DV6-1393	Tissue Temp.(°C):	21.2
DAE Serial #:	406		

Tissue Characteristics

Permitivity:	43.3	Phantom Type/SN:	80302002B/S6
Conductivity:	0.87	Distance (mm):	15 (tissue/dipole cnt)

Reference Source:	D450V2 (Dipole)
Reference SN:	1001

Power to Dipole: 250 mW

Measured SAR Value:	1.16 mW/g,	0.767 mW/g (10g avg.)
Power Drift:	0.01 dB	
New Target/Measured SAR Value: (normalized to 1.0 W, including drift)	4.63 mW/g,	3.06 mW/g (10g avg.)

Test performed by: J. Fortier Initial:

Sys. Per. Chk. Form: 021024

Dipole D450V2 SN1001; Test date:01/16/03

Run #: Sys Val_R3_030116-05
Model #: D450V2
Robot: CGISS-3
TX Freq: 450 MHz
Start Power: 250mW
DAE3: SN:406

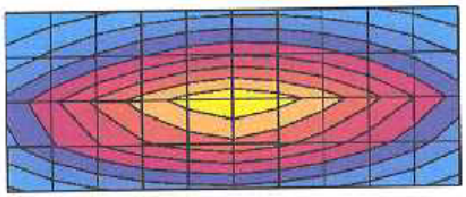
Phantom #:80302002B/S6
SN: 1001
Tester: J. Fortier
Sim Tissue Temp: 21.2 (Celsius)

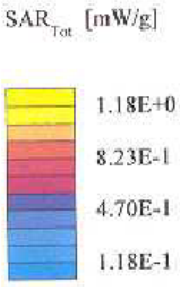
DAE Cal Date: 11/11/02

- Comments-

Target at 1W is 4.9 mW/g (1g)

SAR calculated is 4.63 mW/g, Percent from IEEE-1528 target (including drift) for 1g is 5.5%
Flat; Probe: ET3DV6 - SN1393 SPEAG; ConvF(8.00,8.00,8.00); Crest factor: 1.0; IEEE Head 450 MHz: σ = 0.87 mho/m ε_r = 43.3 ρ = 1.00 g/cm^3
Cubes (2): Peak: 1.78 mW/g ± 0.04 dB, SAR (1g): 1.16 mW/g ± 0.05 dB, SAR (10g): 0.767 mW/g ± 0.05 dB, (Worst-case extrapolation)
Penetration depth: 12.8 (11.4, 14.5) [mm]
Powerdrift: 0.01 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:	ET3DV6
Serial Number:	1393
Place of Calibration:	Zurich
Date of Calibration:	March 22, 2002
Calibration Interval:	12 months

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:	N. Vellen
Approved by:	Jelenić Katja

DASY3 - Parameters of Probe: ET3DV6 SN:1393

Sensitivity in Free Space

NormX	1.80 $\mu V/(V/m)^2$	DCP X	95	mV
NormY	1.49 $\mu V/(V/m)^2$	DCP Y	95	mV
NormZ	1.80 $\mu V/(V/m)^2$	DCP Z	95	mV

Sensitivity in Tissue Simulating Liquid

Head	**900 MHz**	ε_r = **41.5 ± 5%**	σ = **0.97 ± 5% mho/m**	
Head	**835 MHz**	ε_r = **41.5 ± 5%**	σ = **0.90 ± 5% mho/m**	
	ConvF X	**7.1** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**7.1** ± 9.5% (k=2)	Alpha	**0.32**
	ConvF Z	**7.1** ± 9.5% (k=2)	Depth	**2.56**
Head	**1800 MHz**	ε_r = **40.0 ± 5%**	σ = **1.40 ± 5% mho/m**	
Head	**1900 MHz**	ε_r = **40.0 ± 5%**	σ = **1.40 ± 5% mho/m**	
	ConvF X	**5.5** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**5.5** ± 9.5% (k=2)	Alpha	**0.44**
	ConvF Z	**5.5** ± 9.5% (k=2)	Depth	**2.49**

Boundary Effect

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

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	8.4	4.8
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	10.7	7.3
SAR_{be} [%]	With Correction Algorithm	0.2	0.3

Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.7 ± 0.2**	mm

Schmid & Partner
Engineering AG

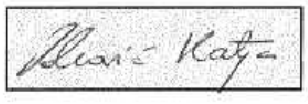
Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1393**
Place of Assessment:	**Zurich**
Date of Assessment:	**April 24, 2002**
Probe Calibration Date:	**March 22, 2002**

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

Assessed by: 

Schmid & Partner
Engineering AG

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

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1393**
Place of Assessment:	**Zurich**
Date of Assessment:	**March 25, 2002**
Probe Calibration Date:	**March 22, 2002**

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

Assessed by: 

Dosimetric E-Field Probe ET3DV6 SN:1393

Conversion factor (± standard deviation)

835 MHz	ConvF	**7.2 ± 8%**	ε_r = **41.5** σ = **0.90 mho/m** (head tissue)
835 MHz	ConvF	**6.9 ± 8%**	ε_r = **55.2** σ = **0.97 mho/m** (body tissue)
900 MHz	ConvF	**6.8 ± 8%**	ε_r = **55.0** σ = **1.05 mho/m** (body tissue)
1800 MHz	ConvF	**5.1 ± 8%**	ε_r = **53.3** σ = **1.52 mho/m** (body tissue)
1950 MHz	ConvF	**4.9 ± 8%**	ε_r = **53.3** σ = **1.52 mho/m** (body tissue)
2450 MHz	ConvF	**4.2 ± 10%**	ε_r = **52.7** σ = **1.95 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

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1393**
Place of Assessment:	**Zurich**
Date of Assessment:	**April 24, 2002**
Probe Calibration Date:	**March 22, 2002**

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

Assessed by:

Dosimetric E-Field Probe ET3DV6 SN:1393

Conversion factor (± standard deviation)

150 MHz	ConvF	**8.9 ± 8%**	ε_r = 61.9 σ = 0.80 mho/m (body tissue)
236 MHz	ConvF	**8.7 ± 8%**	ε_r = 59.8 σ = 0.87 mho/m (body tissue)
300 MHz	ConvF	**8.6 ± 8%**	ε_r = 58.2 σ = 0.92 mho/m (body tissue)
350 MHz	ConvF	**8.5 ± 8%**	ε_r = 57.7 σ = 0.93 mho/m (body tissue)
450 MHz	ConvF	**8.2 ± 8%**	ε_r = 56.7 σ = 0.94 mho/m (body tissue)
784 MHz	ConvF	**7.0 ± 8%**	ε_r = 55.4 σ = 0.97 mho/m (body tissue)
1450 MHz	ConvF	**5.6 ± 8%**	ε_r = 54.0 σ = 1.30 mho/m (body tissue)

Dosimetric E-Field Probe ET3DV6 SN:1393

Conversion factor (± standard deviation)

150 MHz	ConvF	**9.8 ± 8%**	**ε_r = 52.3** **σ = 0.76 mho/m** (head tissue)
236 MHz	ConvF	**8.9 ± 8%**	**ε_r = 48.3** **σ = 0.82 mho/m** (head tissue)
300 MHz	ConvF	**8.4 ± 8%**	**ε_r = 45.3** **σ = 0.87 mho/m** (head tissue)
350 MHz	ConvF	**8.3 ± 8%**	**ε_r = 44.7** **σ = 0.87 mho/m** (head tissue)
400 MHz	ConvF	**8.1 ± 8%**	**ε_r = 44.4** **σ = 0.87 mho/m** (head tissue - CENELEC)
450 MHz	ConvF	**8.0 ± 8%**	**ε_r = 43.5** **σ = 0.87 mho/m** (head tissue)
784 MHz	ConvF	**7.3 ± 8%**	**ε_r = 41.8** **σ = 0.90 mho/m** (head tissue)
835 MHz	ConvF	**7.2 ± 8%**	**ε_r = 41.5** **σ = 0.90 mho/m** (head tissue)
835 MHz	ConvF	**7.2 ± 8%**	**ε_r = 42.5** **σ = 0.98 mho/m** (head tissue - CENELEC)
900 MHz	ConvF	**7.1 ± 8%**	**ε_r = 41.5** **σ = 0.98 mho/m** (head tissue - CENELEC)

Dosimetric E-Field Probe ET3DV6 SN:1393

Conversion factor (± standard deviation)

1450 MHz	ConvF	**6.1 ± 8%**	**ε_r = 40.5** **σ = 1.20 mho/m** (head tissue)
1900 MHz	ConvF	**5.4 ± 8%**	**ε_r = 40.0** **σ = 1.40 mho/m** (head tissue)
2450 MHz	ConvF	**4.6 ± 8%**	**ε_r = 39.2** **σ = 1.80 mho/m** (head tissue)

Schmid & Partner
Engineering AG

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

Calibration Certificate

450 MHz System Validation Dipole

Type:	**D450V2**
Serial Number:	**1001**
Place of Calibration:	**Zurich**
Date of Calibration:	**April 5, 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 phantom filled with head simulating liquid of the following electrical parameters at 450 MHz:

Relative Dielectricity	**44.5**	± 5%
Conductivity	**0.86 mho/m**	± 5%

The DASY3 System (Software version 3.1d) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 7.2 at 450 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 and the dipole was oriented parallel to the longer side of the phantom. The standard measuring distance was 15mm from dipole center to the liquid surface including the 6mm thick phantom shell. 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 389 mW ± 3 %. The results are normalized to 1W input power.

2. SAR Measurement

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

averaged over 1 cm^3 (1 g) of tissue:	**4.77 mW/g** (Advanced Extrapolation)
averaged over 10 cm^3 (10 g) of tissue:	**3.17 mW/g** (Advanced Extrapolation)

Advanced extrapolation has been applied to the measured SAR values to compensate for the probe boundary effect (see DASY User Manual for details).

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

3. Dipole Impedance and Return Loss

The impedance was measured at the SMA-connector with a network analyzer and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	1.342 ns	(one direction)
Transmission factor:	0.997	(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 450 MHz:	Re{Z} = 57.9 Ω
	Im {Z} = -6.0 Ω
Return Loss at 450 MHz	-20.8 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.

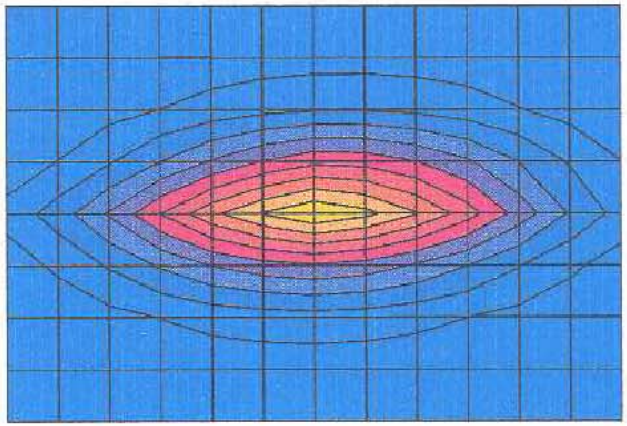
6. Power Test

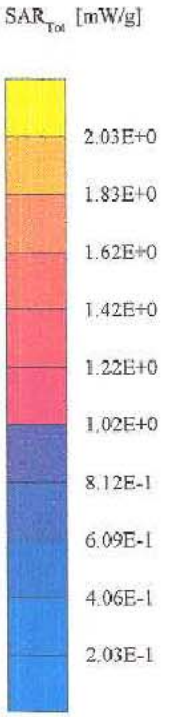
After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

03/27/02

Validation Dipole D450V2 SN:1001, d = 15 mm

Frequency: 450 MHz; Antenna Input Power: 388 [mW]
Phantom Name: Calibration, Grid Spacing: Dx = 20.0, Dy = 20.0, Dz = 10.0
Probe: ET3DV6 - SN1507; ConvF(7.20,7.20,7.20); Crest factor: 1.0; Head 450 MHz: σ = 0.86 mho/m ε_r = 44.5 ρ = 1.00 g/cm³
Cubes (2): Peak: 2.81 mW/g ± 0.03 dB, SAR (1g): 1.85 mW/g ± 0.03 dB, SAR (10g): 1.23 mW/g ± 0.03 dB , (Advanced extrapolation)
Penetration depth: 13.1 (12.0, 14.4) [mm]





APPENDIX E
Illustration of Body-Worn Accessories

The purpose of this appendix is to illustrate the body-worn carry accessories for FCC ID: AZ489FT4860. 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 HCLN4013A
Back View

Photo 2.
Model HCLN4013A
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 distance between DUT ant. base and phantom surface. (mm)	Comments
HCLN4013A	Yes	27	NA

Audio accessory Model	Tested ?	Separation distance between DUT ant. base and phantom surface. (mm)	Comments
HMN9026B	Yes	NA	NA
HMN9039B	Yes	NA	NA
HMN9038A	Yes	NA	NA
HMN9025B	Yes	NA	NA
NTN9159C	Yes	NA	NA
RLN5598A	Yes	NA	NA