NOKIA MOBILE PHONES
Sami Savela

2000-7-21

Evaluation of SAR in Body Worn Configurations GMLNSD-3AW.

Introduction

SAR was measured when phone was placed with body worn accessory against the Flat Phantom. Body worn accessory BCH-12U (Picture 1) was tested. The measurement test equipment and setup was the same as used and referred in SAR TEST REPORT of NOKIA 6185i, FCC ID# GMLNSD-3AW.

Picture 1. Belt Clip BCH-12U.

Test method

Measurements were done with the Dasy 2 dosimetric assessment system DAE V2, SN: 213 and with the generic Twin Phantom version 3 from Schmid & Partner Engineering Ag. The phone was positioned with the body worn accessory against Flat Phantom. Both antenna positions were tested (whip in and whip up). Separation distance for BCH-12U is presented in picture 1. The point of maximum SAR was located. Then the SAR was measured with a 3-dimensional cube measurement.

Picture 2. Separation distance with Belt Clip BCH-12U

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The maximum output power level in lowest, middle and highest channel was used (824, 836 and 849 MHz on AMPS mode and 1850, 1880 and 1910 MHz on CDMA PCS mode). Brain equivalent liquid was used. In the PCS band the conductivity used is about 20% higher than the FCC recommendation. In the Cellular band the FCC recommended conductivity is about 16% higher than the conductivity used. The SAR results have such a large margin that meeting the FCC limit is evident.

Results

Graphical presentations of the test positions with SAR values are presented at the end of this report.

Analog mode AMPS, Body worn, Whip in

meas. nr:	Phone position	Frequency MHz / channel	Power dBm	SAR (1g)[mW/g]
1	Body Worn, Belt Clip (BCH-12U) against Flat Phantom	824 / 991	26.5	1.03
2	Body Worn, Belt Clip (BCH-12U) against Flat Phantom	836 / 383	26.5	0.91
3	Body Worn, Belt Clip (BCH-12U) against Flat Phantom	849 / 799	26.5	1.00
FCC ID: GMLNSD-3AW MEASURED: 2000-7-21/NMP		FCC limit		1.60[mW/g] (ANSI/IEEE)

Analog mode AMPS, Body worn, Whip up

meas. nr:	Phone position	Frequency MHz / channel	Power dBm	SAR (1g)[mW/g]
4	Body Worn, Belt Clip (BCH-12U) against Flat Phantom	824 / 991	26.5	1.01
5	Body Worn, Belt Clip (BCH-12U) against Flat Phantom	836 / 383	26.5	1.10
6	Body Worn, Belt Clip (BCH-12U) against Flat Phantom	849 / 799	26.5	1.04
FCC ID: GMLNSD-3AW MEASURED: 2000-7-21/NMP		FCC limit		1.60[mW/g] (ANSI/IEEE)

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Digital mode CDMA PCS, Body worn, Whip in

meas. nr:	Phone position	Frequency MHz / channel	Power DBm	SAR (1g)[mW/g]
7	Body Worn, Belt Clip (BCH-12U) against Flat Phantom	1850 / 25	22.5	0.43
8	Body Worn, Belt Clip (BCH-12U) against Flat Phantom	1880 / 600	22.5	0.48
9	Body Worn, Belt Clip (BCH-12U) against Flat Phantom	1910 / 1175	22.5	0.32
FCC ID: GMLNSD-3AW MEASURED: 2000-7-21/NMP		FCC limit		1.60[mW/g] (ANSI/IEEE)

Digital mode CDMA PCS, Body worn, Whip up

meas. nr:	Phone position	Frequency MHz / channel	Power DBm	SAR (1g)[mW/g]
10	Body Worn, Belt Clip (BCH-12U) against Flat Phantom	1850 / 25	22.5	0.38
11	Body Worn, Belt Clip (BCH-12U) against Flat Phantom	1880 / 600	22.5	0.40
12	Body Worn, Belt Clip (BCH-12U) against Flat Phantom	1910 / 1175	22.5	0.35
FCC ID: GMLNSD-3AW MEASURED: 2000-7-21/NMP		FCC limit		1.60[mW/g] (ANSI/IEEE)

Summary

The SAR values found for the portable cellular phone (FCC ID: GMLNSD-3AW) are below the maximum recommended levels of 1.6 mW/g.

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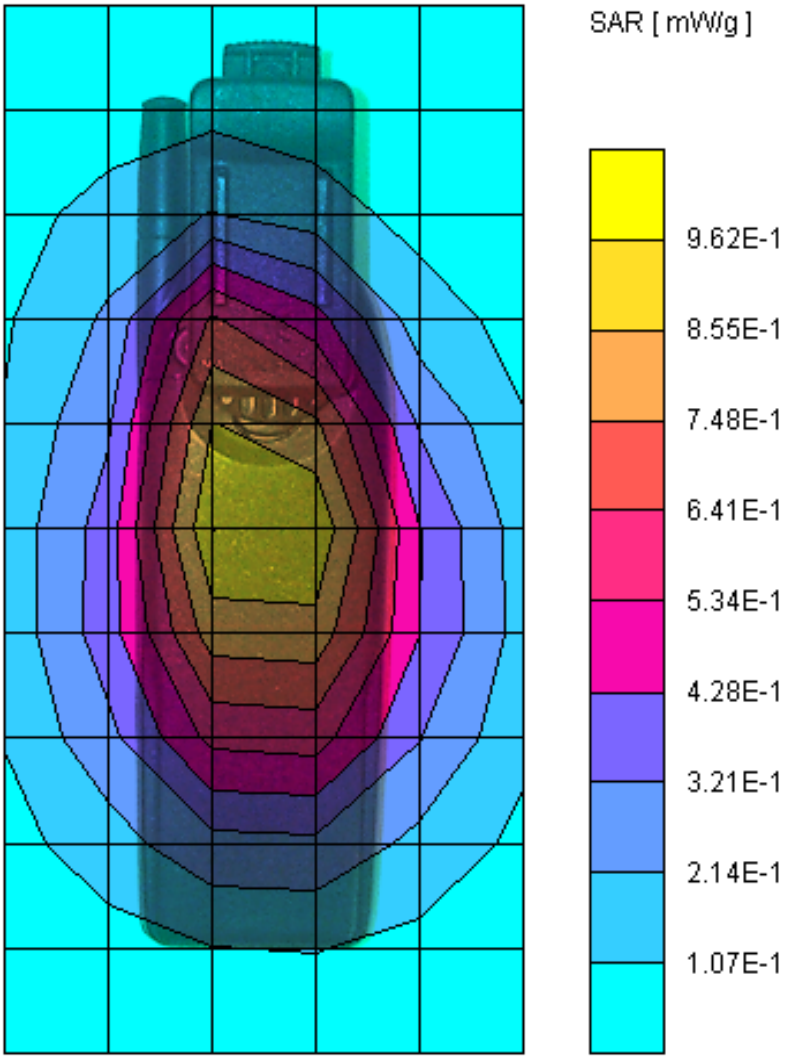
Meas 1

σ = 0.79 [mho/m] ε_r = 43.3 ρ = 1.00 [g/cm^3]

Coarse Grid Dx = 20.0 Dy = 20.0 Dz = 5.0 [mm]

SAR [mW/g] Max: 0.96

SAR (1g): 1.03 [mW/g] SAR (10g): 0.728 [mW/g]



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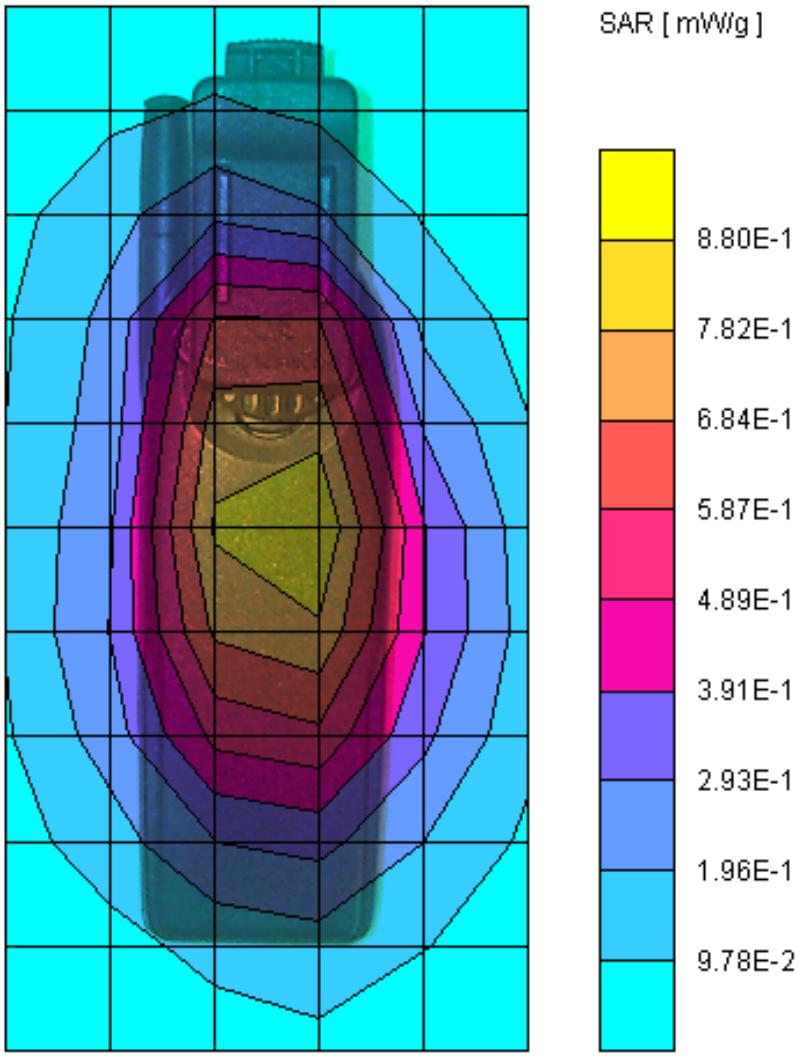
Meas 2

σ = 0.80 [mho/m] ε_r = 43.2 ρ = 1.00 [g/cm^3]

Coarse Grid Dx = 20.0 Dy = 20.0 Dz = 5.0 [mm]

SAR [mW/g] Max: 0.88

SAR (1g): 0.914 [mW/g] SAR (10g): 0.653 [mW/g]



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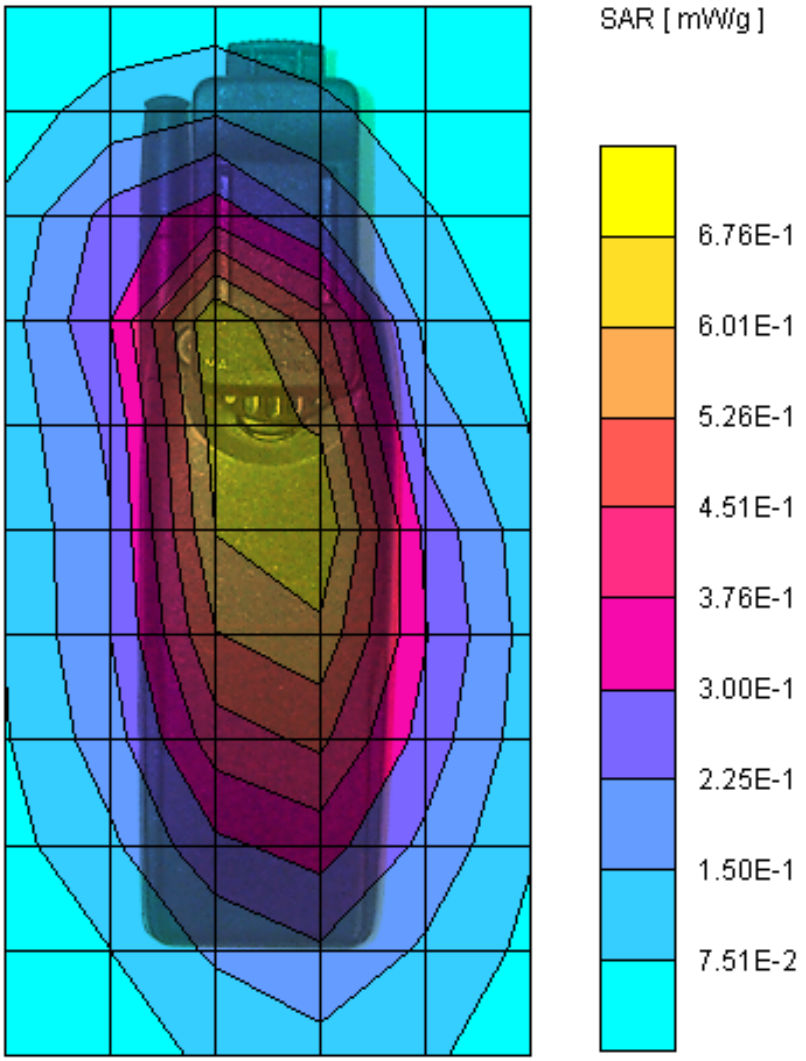
Meas 3

σ = 0.81 [mho/m] ε_r = 43.1 ρ = 1.00 [g/cm^3]

Coarse Grid Dx = 20.0 Dy = 20.0 Dz = 5.0 [mm]

SAR [mW/g] Max: 0.68

SAR (1g): 0.997 [mW/g] SAR (10g): 0.611 [mW/g]



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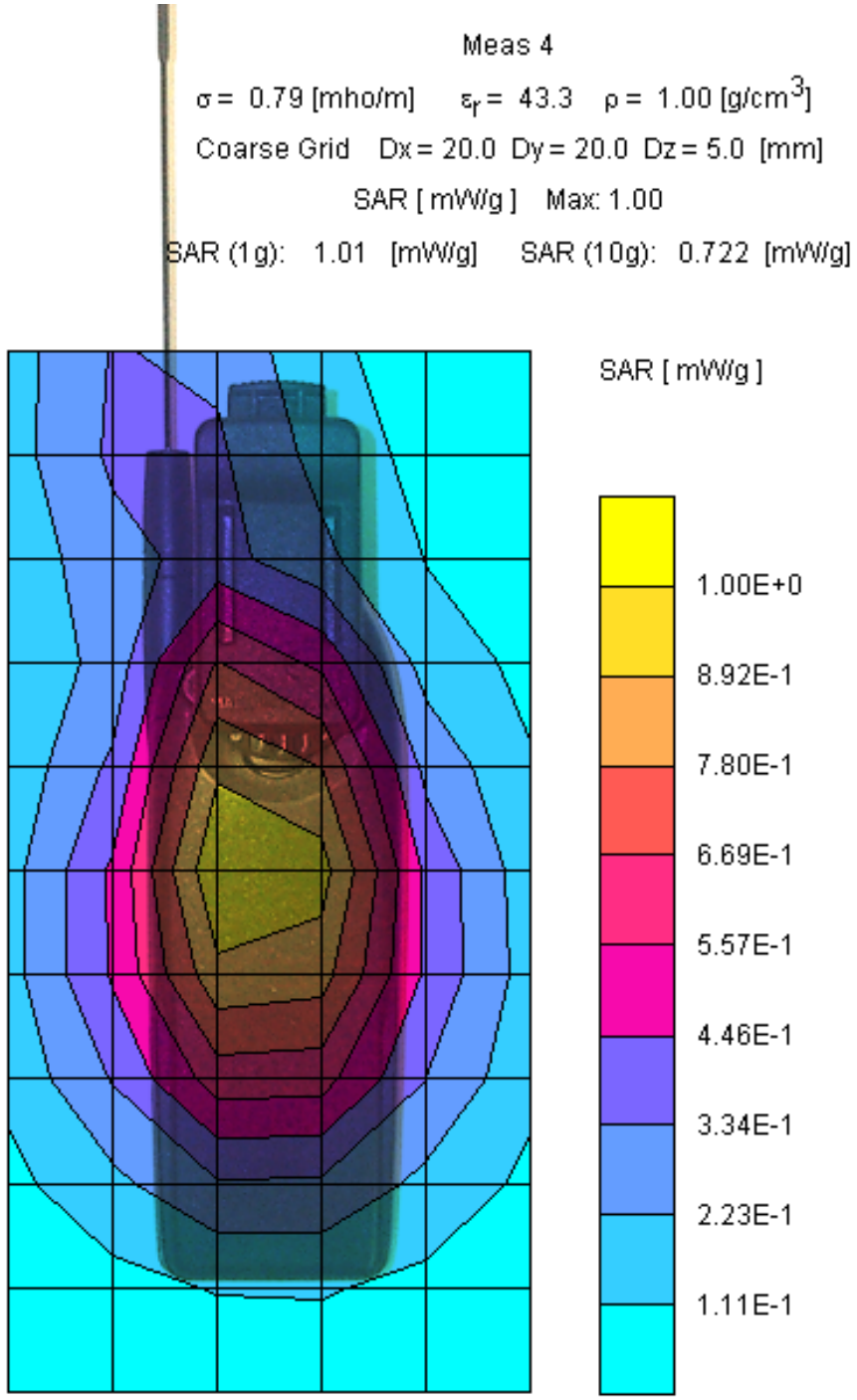
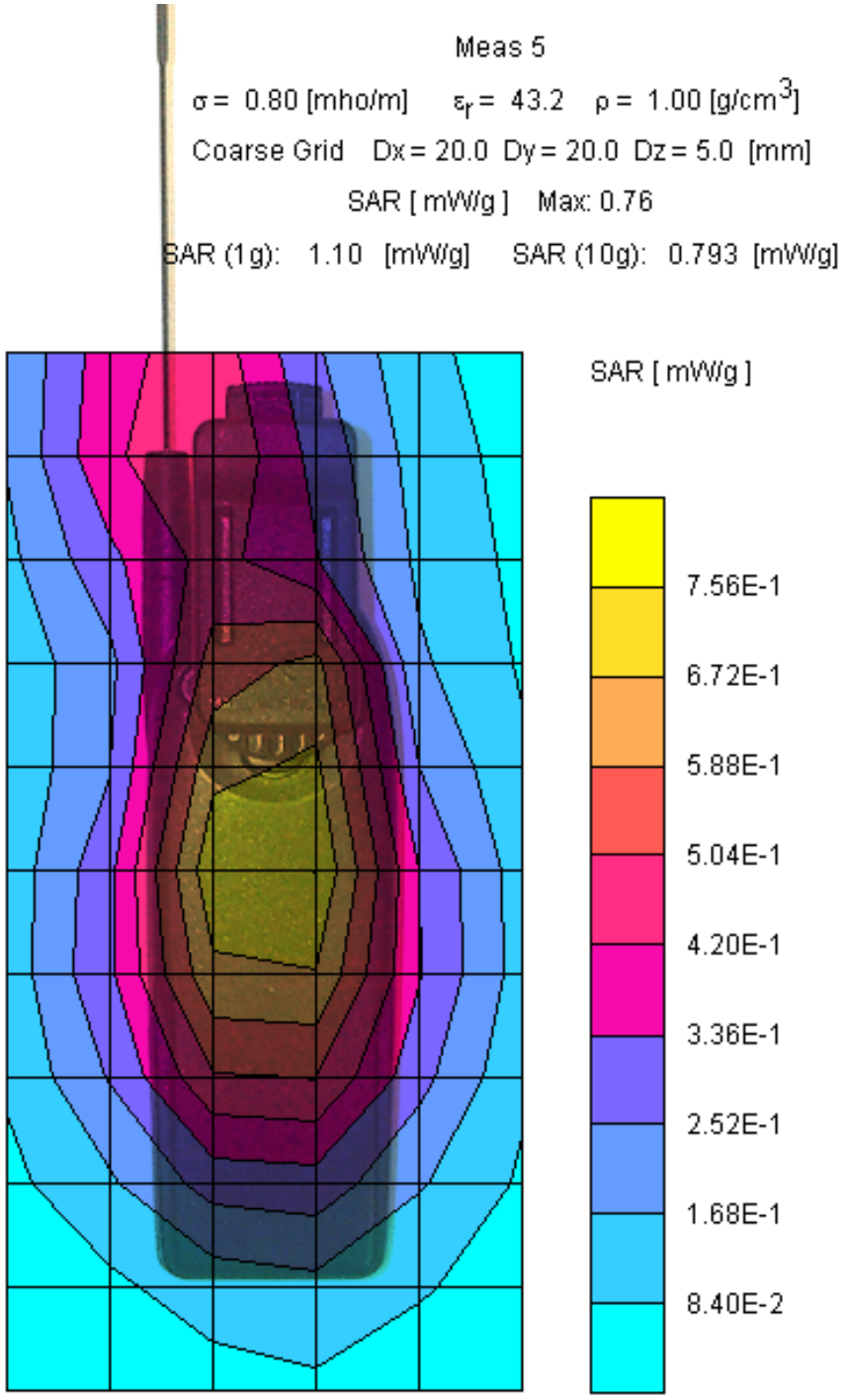
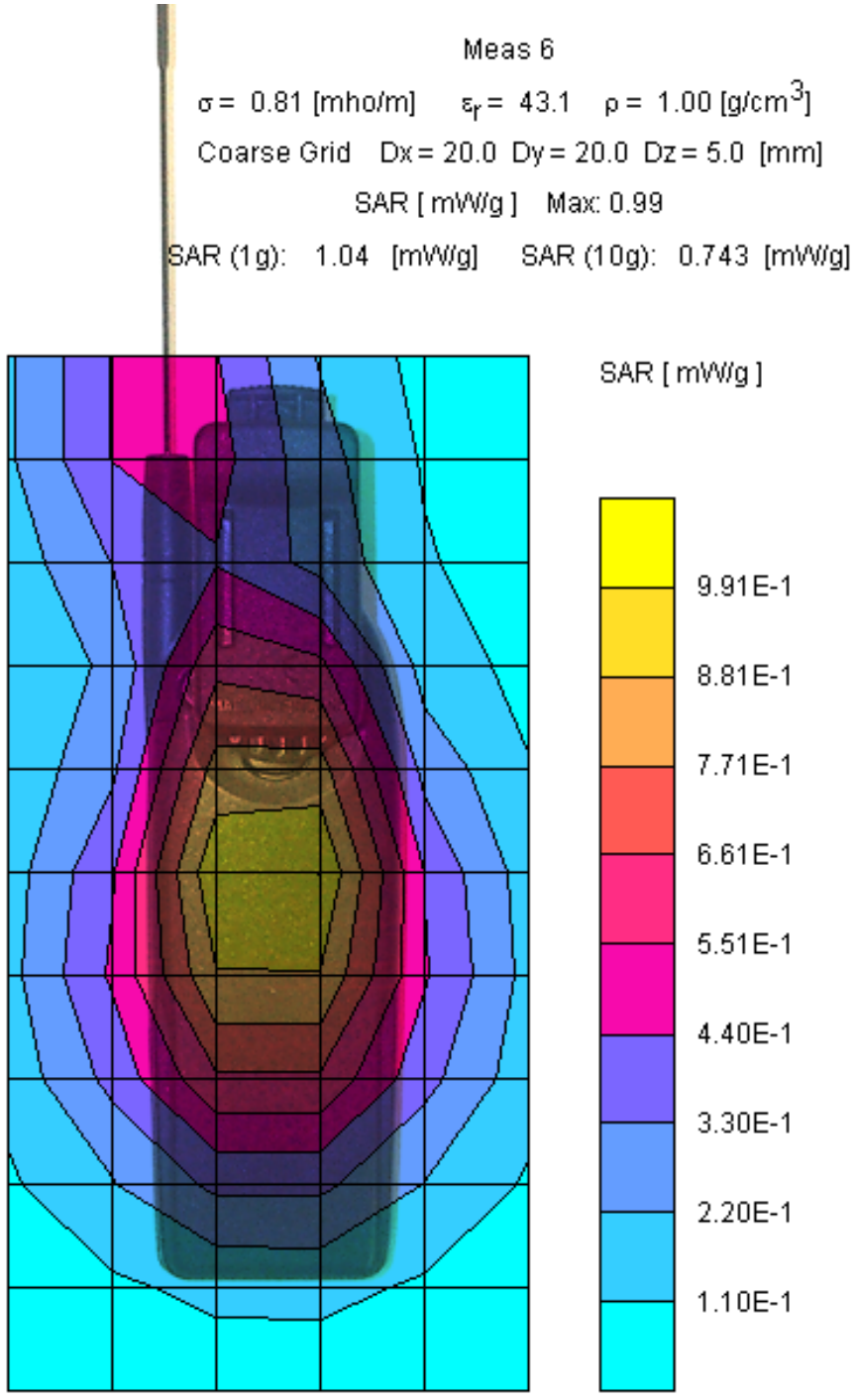



Meas 5
σ = 0.80 [mho/m] εr = 43.2 ρ = 1.00 [g/cm3]
Coarse Grid Dx = 20.0 Dy = 20.0 Dz = 5.0 [mm]
SAR [mW/g] Max: 0.76
SAR (1g): 1.10 [mW/g] SAR (10g): 0.793 [mW/g]
SAR [mW/g]
7.56E-1
6.72E-1
5.88E-1
5.04E-1
4.20E-1
3.36E-1
2.52E-1
1.68E-1
8.40E-2


Meas 6
σ = 0.81 [mho/m] εr = 43.1 ρ = 1.00 [g/cm3]
Coarse Grid Dx = 20.0 Dy = 20.0 Dz = 5.0 [mm]
SAR [mW/g] Max: 0.99
SAR (1g): 1.04 [mW/g] SAR (10g): 0.743 [mW/g]
SAR [mW/g]
9.91E-1
8.81E-1
7.71E-1
6.61E-1
5.51E-1
4.40E-1
3.30E-1
2.20E-1
1.10E-1

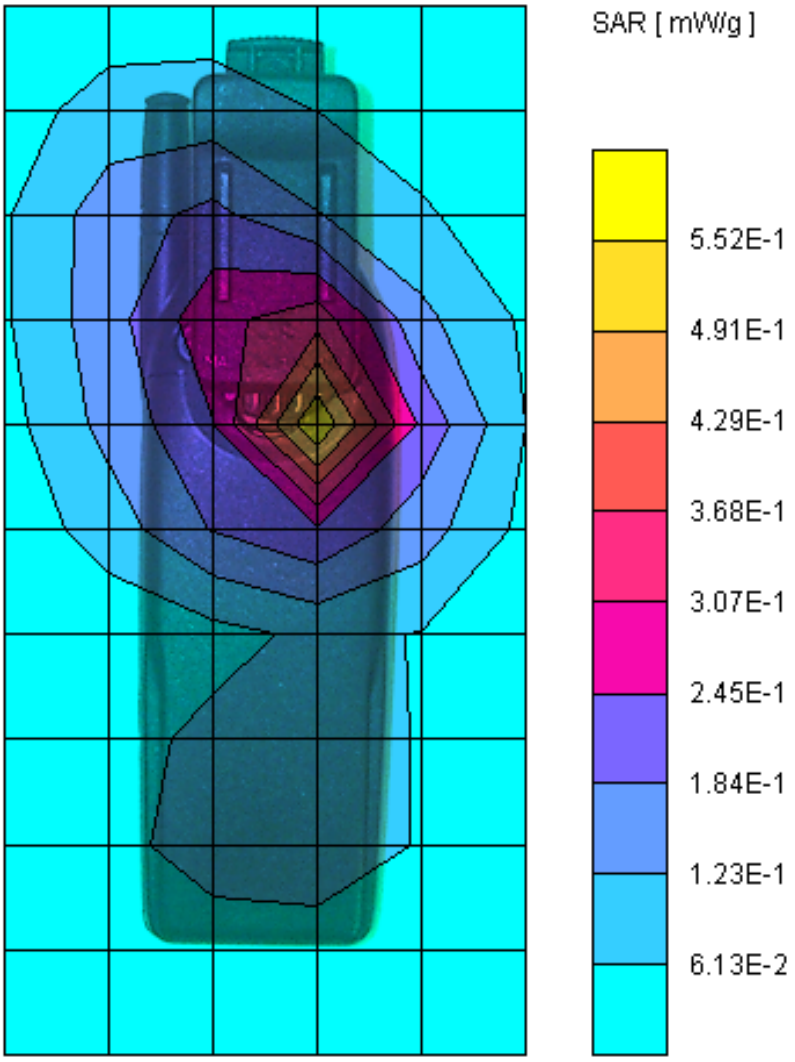
Meas 7

σ = 1.71 [mho/m] ε_r = 42.1 ρ = 1.00 [g/cm^3]

Coarse Grid Dx = 20.0 Dy = 20.0 Dz = 5.0 [mm]

SAR [mW/g] Max: 0.55

SAR (1g): 0.429 [mW/g] SAR (10g): 0.244 [mW/g]



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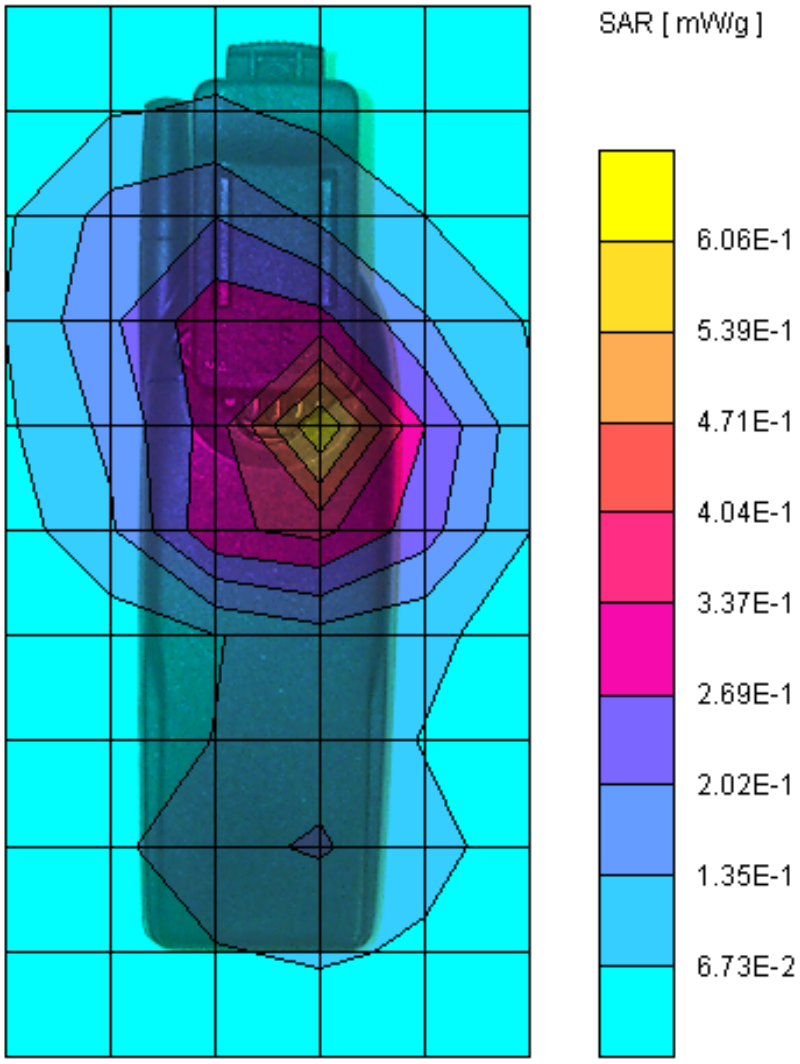
Meas 8

σ = 1.74 [mho/m] ε_r = 41.9 ρ = 1.00 [g/cm^3]

Coarse Grid Dx = 20.0 Dy = 20.0 Dz = 5.0 [mm]

SAR [mW/g] Max: 0.61

SAR (1g): 0.476 [mW/g] SAR (10g): 0.275 [mW/g]



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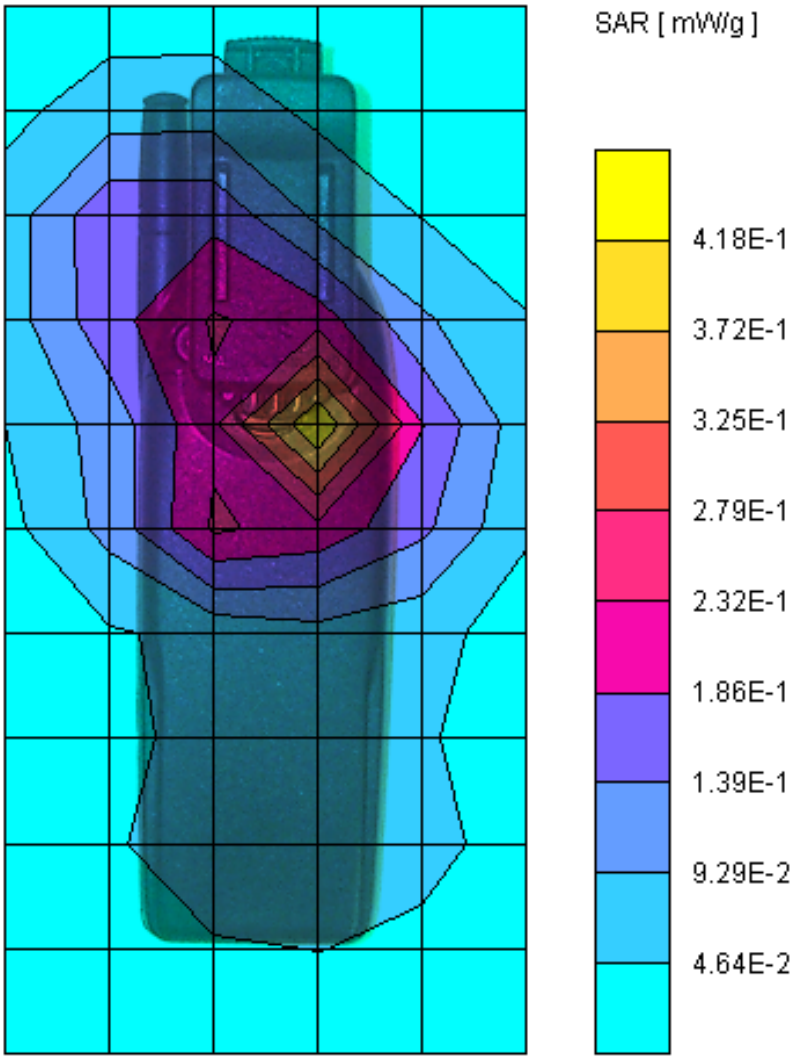
Meas 9

σ = 1.77 [mho/m] ε_r = 41.7 ρ = 1.00 [g/cm^3]

Coarse Grid Dx = 20.0 Dy = 20.0 Dz = 5.0 [mm]

SAR [mW/g] Max: 0.42

SAR (1g): 0.319 [mW/g] SAR (10g): 0.182 [mW/g]



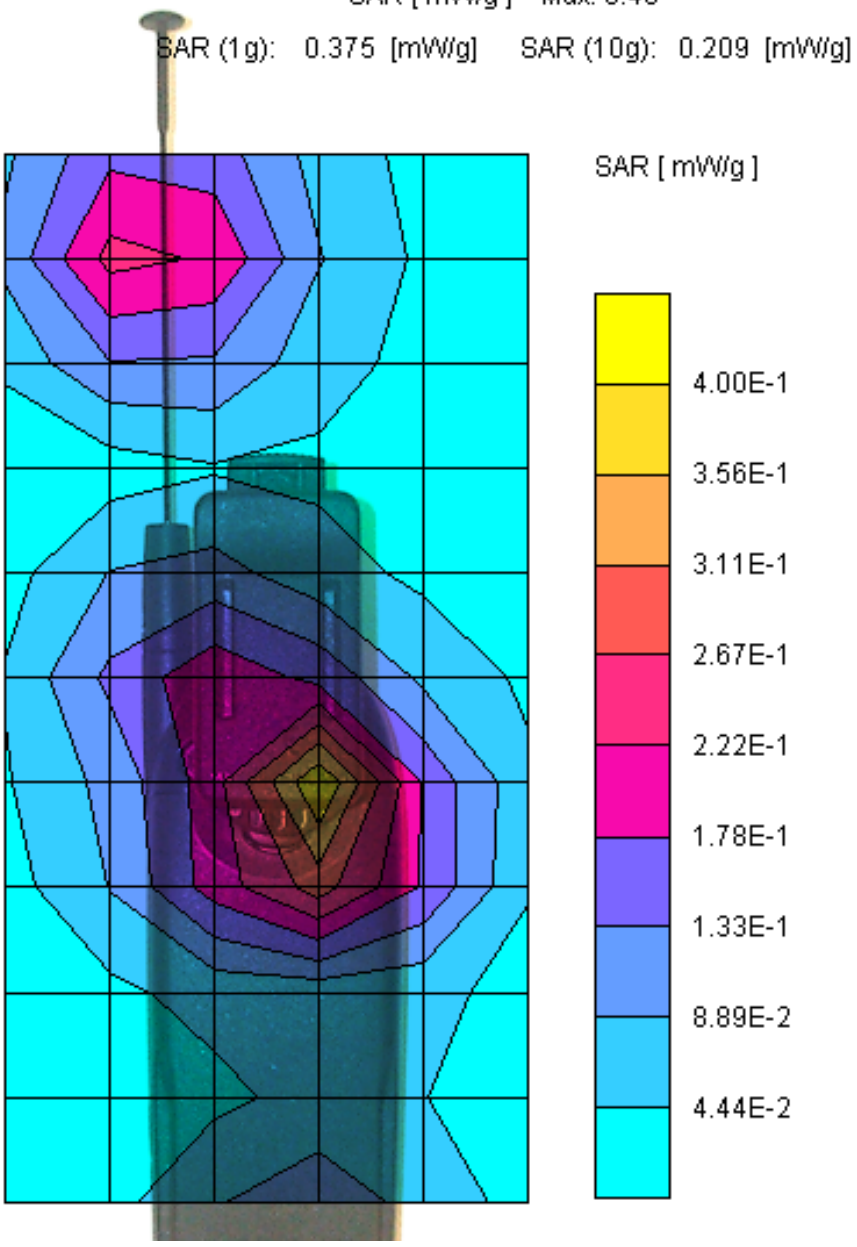
Meas 10

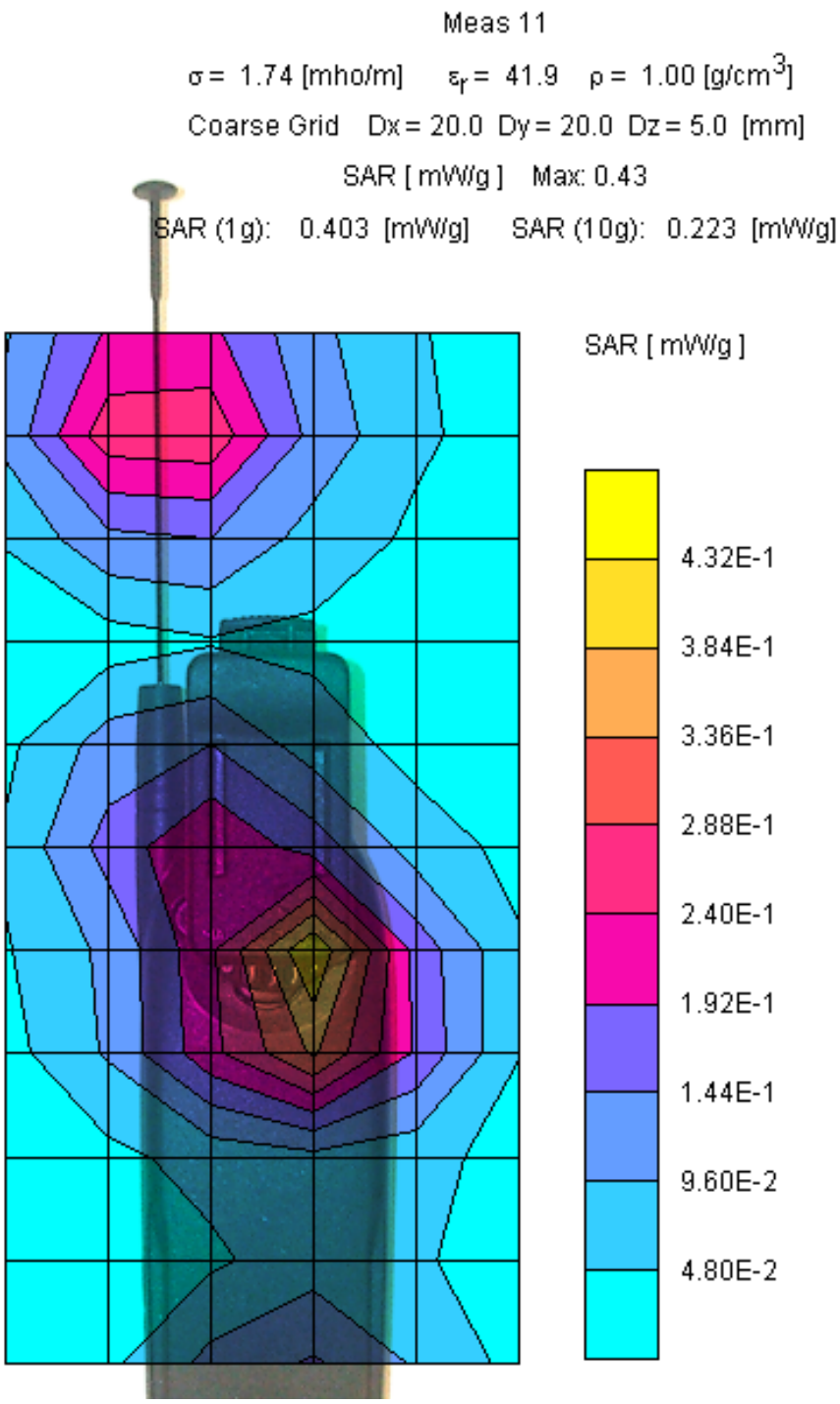
σ = 1.71 [mho/m] ε_r = 42.1 ρ = 1.00 [g/cm^3]

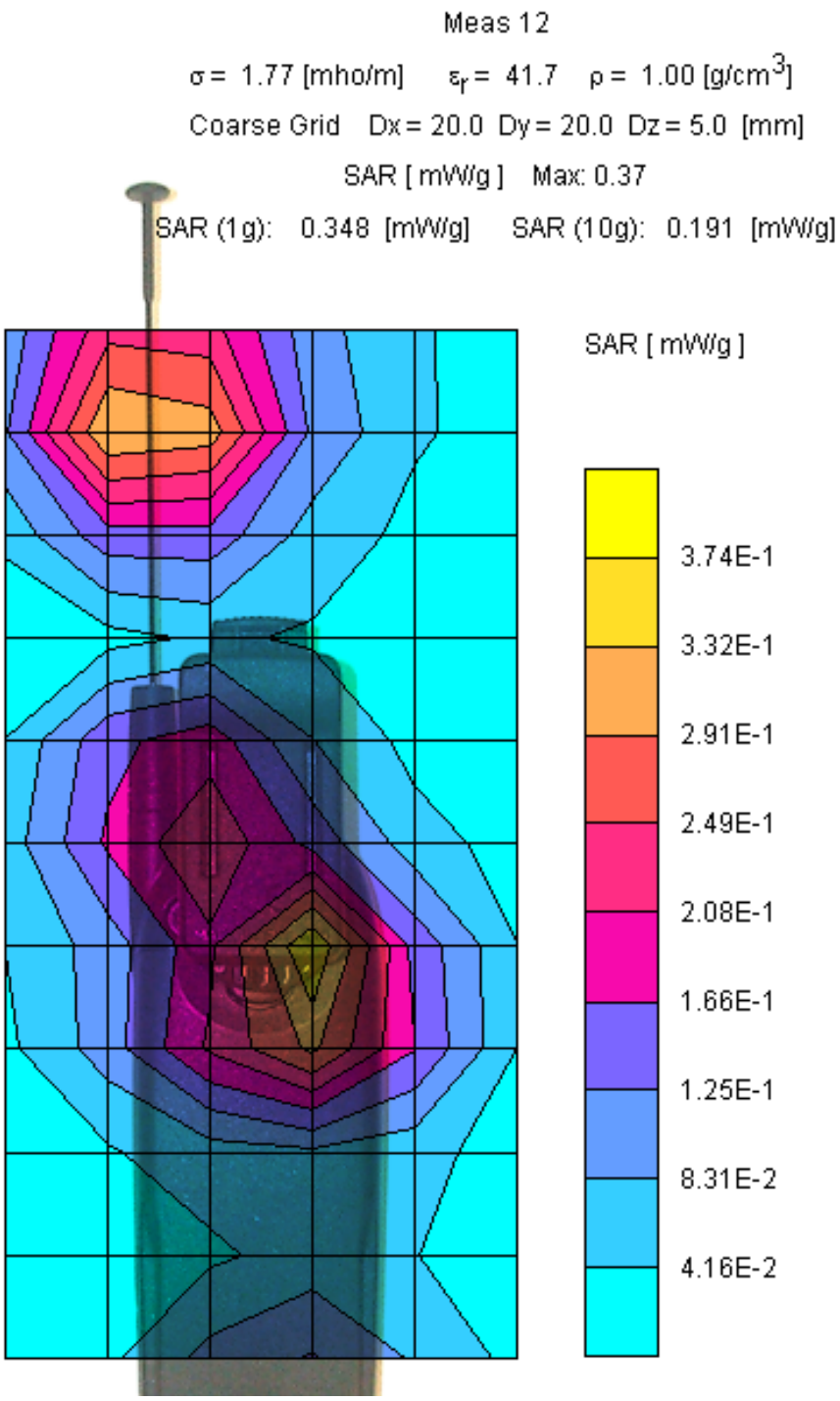
Coarse Grid Dx = 20.0 Dy = 20.0 Dz = 5.0 [mm]

SAR [mW/g] Max: 0.40

SAR (1g): 0.375 [mW/g] SAR (10g): 0.209 [mW/g]




Meas 11
σ = 1.74 [mho/m] ε_r = 41.9 ρ = 1.00 [g/cm^3]
Coarse Grid Dx = 20.0 Dy = 20.0 Dz = 5.0 [mm]
SAR [mW/g] Max: 0.43
SAR (1g): 0.403 [mW/g] SAR (10g): 0.223 [mW/g]
SAR [mW/g]
4.32E-1
3.84E-1
3.36E-1
2.88E-1
2.40E-1
1.92E-1
1.44E-1
9.60E-2
4.80E-2


Meas 12
σ = 1.77 [mho/m] ε_r = 41.7 ρ = 1.00 [g/cm^3]
Coarse Grid Dx = 20.0 Dy = 20.0 Dz = 5.0 [mm]
SAR [mW/g] Max: 0.37
SAR (1g): 0.348 [mW/g] SAR (10g): 0.191 [mW/g]
SAR [mW/g]
3.74E-1
3.32E-1
2.91E-1
2.49E-1
2.08E-1
1.66E-1
1.25E-1
8.31E-2
4.16E-2