NOKIA MOBILE PHONES
Kari Nyyssönen

2000-8-4

Evaluation of SAR in Body Worn Configuration GMLNSW-4DX.

Introduction

SAR was measured when phone was placed with body worn accessory against the Flat Phantom. Body worn accessory Leather Carry Case CSH-1 with Belt Clip BCH-12U (Picture 1) was tested. These accessories are designed to be used together. The leather carry case cannot be used as body worn accessory without the belt clip. The measurement test equipment and setup was the same as used and referred in SAR TEST REPORT of NOKIA GMLNSW-4DX.

Picture 1. Belt Clip BCH-12U and Leather Carry Case CSH-1.

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 in body worn accessory against Flat Phantom. Separation distances is presented in picture 2. The point of maximum SAR was searched. Then the SAR was measured with a 3-dimensional cube measurement.

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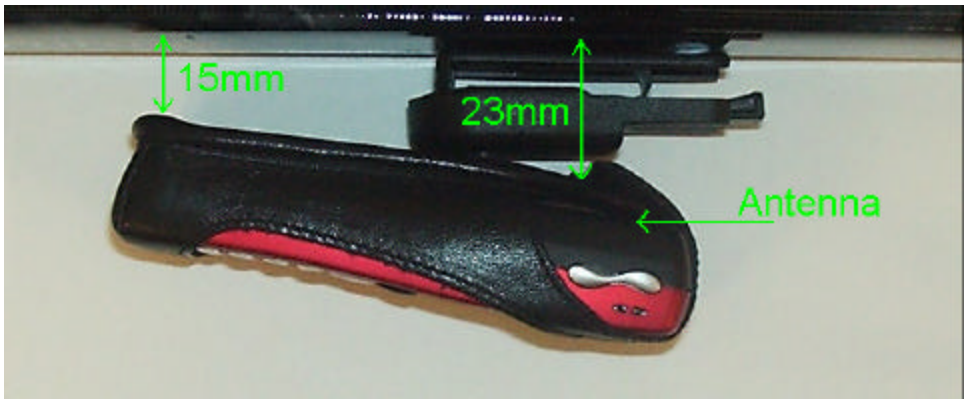

Picture 2. Separation distance with Belt Clip BCH-12U and Leather Carry Case CSH-1

The maximum output power level in lowest, middle and highest channel was used (991, 383 and 799 MHz on AMPS mode and 2, 1000, 1998 MHz on TDMA PCS mode). Brain equivalent liquid was used.

On PCS band the used conductivity is about 20% higher than FCC recommendation.

On Cellular band the used conductivity is about 16% lower than FCC recommendation. The SAR results have such big margin that meeting the FCC limit is evident.

Results

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

Analog mode AMPS, in Carry Case CSH-1

meas. nr:	Phone position	Frequency MHz / channel	Power DBm	SAR (1g)[mW/g]
1	Body Worn, Carry Case (CSH-1) against Flat Phantom	824 / 991	22.9	0.52
2	Body Worn, Carry Case (CSH-1) against Flat Phantom	836 / 383	22.8	0.42
3	Body Worn, Carry Case (CSH-1) against Flat Phantom	849 / 799	23.0	0.36
FCC ID: GMLNSW-4DX MEASURED: 2000-8-3/NMP		FCC limit		1.60[mW/g] (ANSI/IEEE)

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Digital mode TDMA (PCS), in Carry Case CSH-1

Meas. Nr:	Phone position	Frequency MHz / channel	Power DBm	SAR (1g)[mW/g]
4	Body Worn, Carry Case (CSH-1) against Flat Phantom	1850 / 2	26.2	1.02
5	Body Worn, Carry Case (CSH-1) against Flat Phantom	1880 / 1000	26.0	0.92
6	Body Worn, Carry Case (CSH-1) against Flat Phantom	1910 / 1998	25.9	0.72
FCC ID: GMLNSW-4DX MEASURED: 2000-8-3/NMP		FCC limit		1.60[mW/g] (ANSI/IEEE)

Summary

The SAR values found for the portable cellular phone (FCC ID: GMLNSW-4DX) are below the maximum recommended levels of 1.6 mW/g.

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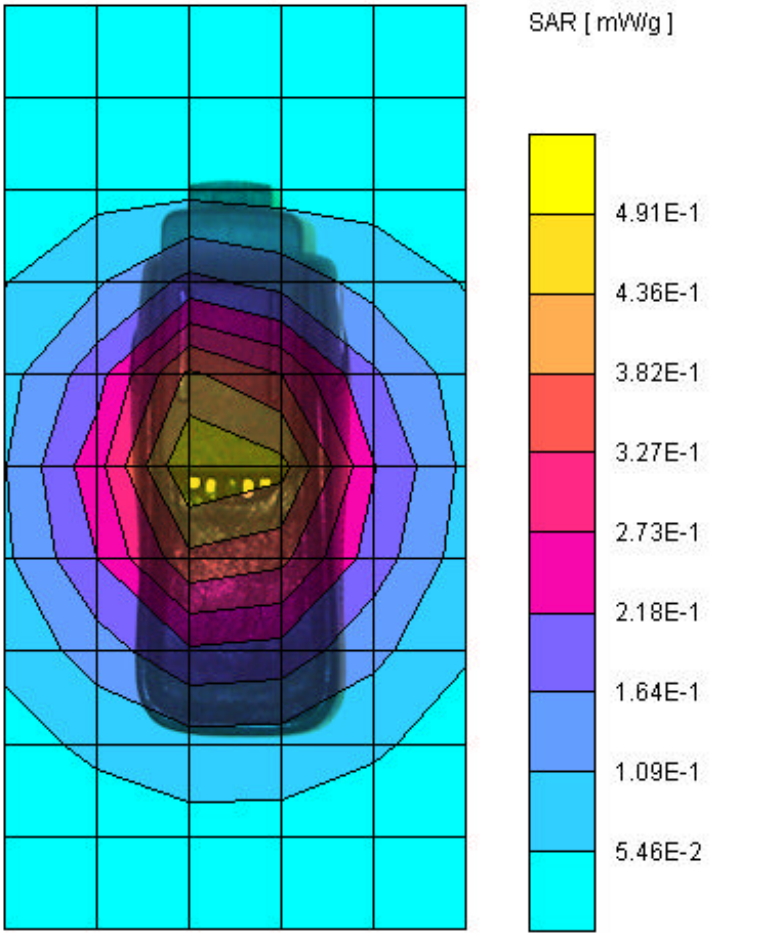
Meas 1

σ = 0.79 [mho/m] ε_r = 44.8 ρ = 1.00 [g/cm^3]

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

SAR [mW/g] Max: 0.49

SAR (1g): 0.522 [mW/g] SAR (10g): 0.356 [mW/g]



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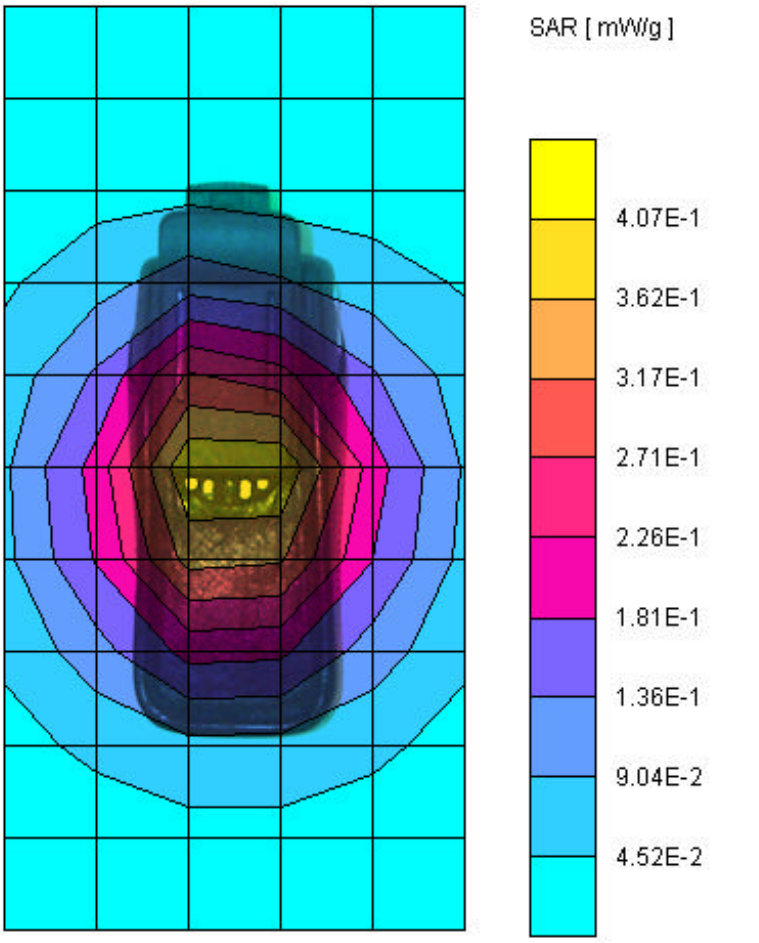
Meas 2

σ = 0.80 [mho/m] ε_r = 44.6 ρ = 1.00 [g/cm^3]

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

SAR [mW/g] Max: 0.41

SAR (1g): 0.420 [mW/g] SAR (10g): 0.286 [mW/g]



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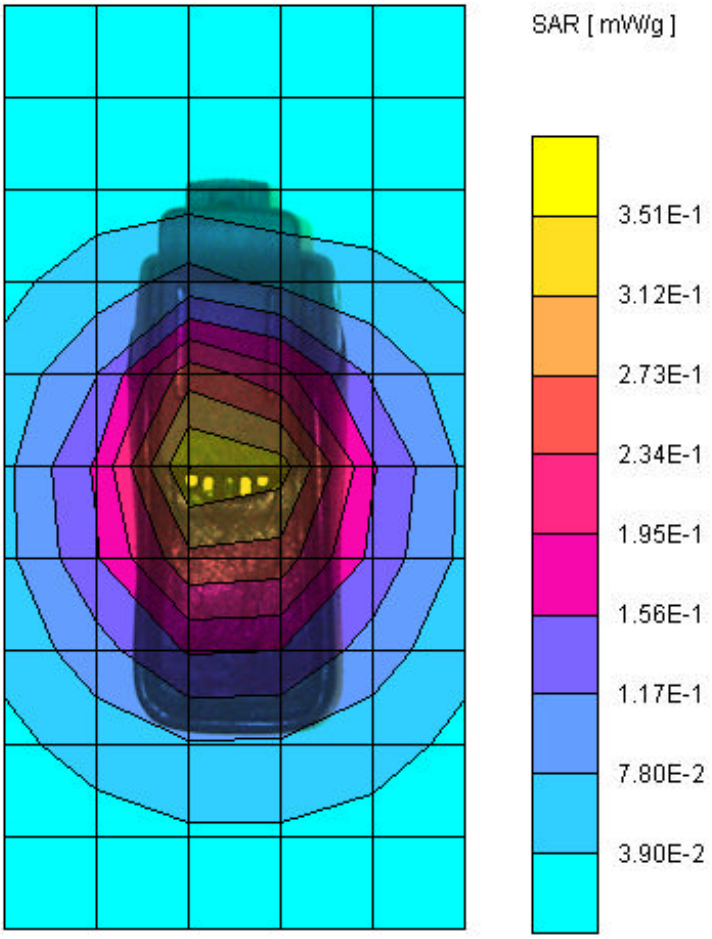
Meas 3

σ = 0.82 [mho/m] ε_r = 44.5 ρ = 1.00 [g/cm^3]

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

SAR [mW/g] Max: 0.35

SAR (1g): 0.359 [mW/g] SAR (10g): 0.244 [mW/g]



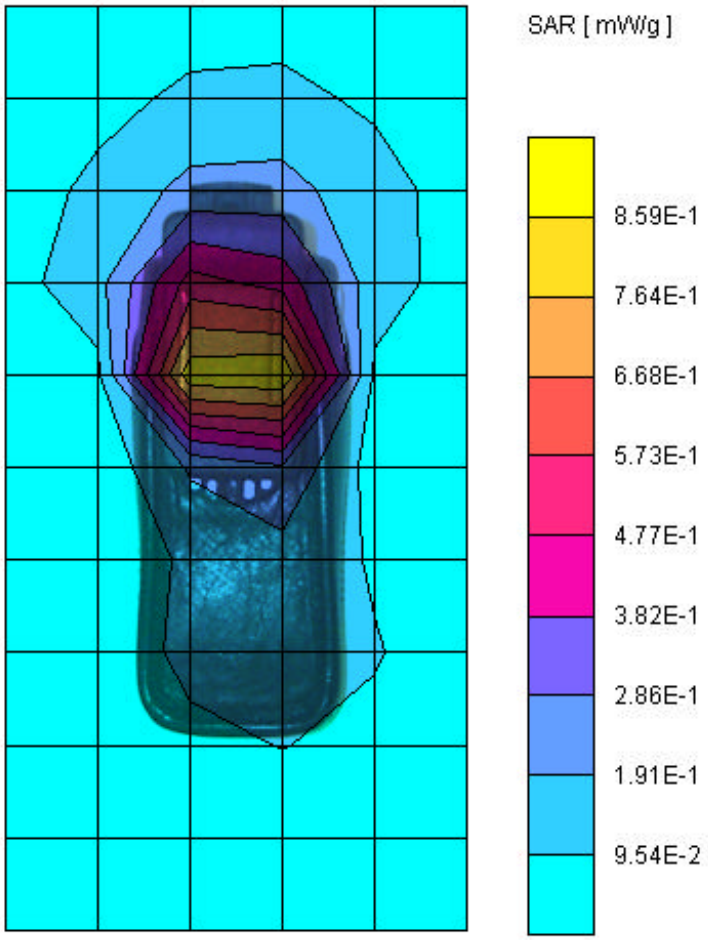
Meas 4

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: 0.86

SAR (1g): 1.02 [mW/g] SAR (10g): 0.536 [mW/g]



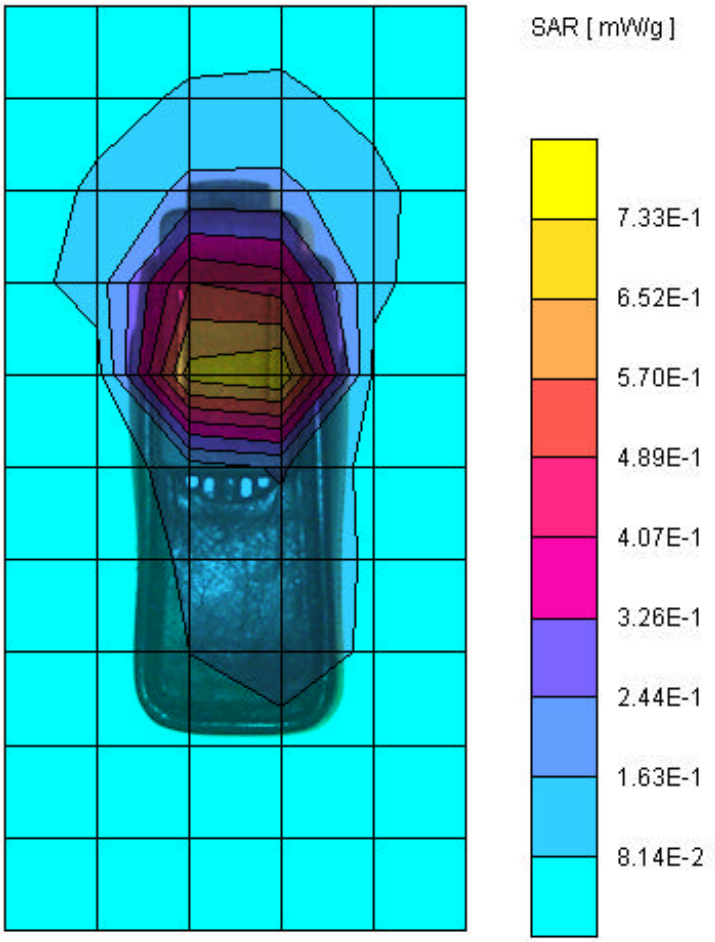
Meas 5

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: 0.73

SAR (1g): 0.918 [mW/g] SAR (10g): 0.473 [mW/g]



Meas 6

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: 0.58

SAR (1g): 0.723 [mW/g] SAR (10g): 0.366 [mW/g]