# FCC ID LJPNSB-7

Applicant: Nokia Mobile Phones
Correspondence Reference Number: 13328
731 Confirmation Number: EA97165

NOKIA

CORRESPONDENCE

27. April 2000

## *Equipment Authorization*

**1. *Q:* GSM 1900 is not classifies as channelized by the FCC. Please submit the carrier center frequency for the lowest and highest frequency.**

***A:*** Carrier center frequency for lowest channel (ch512) is 1850.2 MHz and for highest channel (ch810) 1909.8 MHz.

## *SAR request*

**1. *Q:* Body-worn data will be required. Address body-worn SAR compliance with respect to belt-clips, holsters or similar accessories provided with this device. Body-worn SAR may be addressed by testing SAR with a minimum separation distance, typically 0.5 cm to 1.0 cm, between the back of the device and the body phantom. If the accessories are not included with the device, only belt clips and holsters containing no metallic parts in the assembly can be used with the device providing that they keep the device separation from the body as specified in the test.**

**The specific operating requirements for body-worn SAR compliance must be included in the users manual for users to comply, indicating that it is for FCC RF exposure compliance and non-tested accessories may not comply and should be avoided. Upload the relevant pages of the manual.**

***A:*** Required body-worn data is shown in appendix 1 and modified user guide page is shown in appendix 2.

**2. *Q:* Provide SAR data for the Cheek position for the right and left hand phantom at the mid-band frequency. This is needed since the SAR data at the 90 degree position was not very low and the pattern shift between right and left hand phantom indicated some loading effect.**

***A:*** SAR data for cheek position is shown in appendix 3

**3. *Q:* Clarification is needed on the car kit accessory. If external antennas are used an evaluation of MPE compliance or qualifications for categorical exclusion requirements of Part 2.1091 need to be addressed.**

***A:*** There is no external antenna connector in LJPNSB-7 and thus no external antennas are used.

**4. *Q:* Confirm SAR compliance with the hand either by measurements or other appropriate means.**

***A:*** SAR compliance data with the hand is shown in appendix 4.

**5. *Q:* Confirm that the GSM 900 (European) capabilities indicated in the Users Manual technical information are not part of this filing. Does the phone have dual band capabilities? Verify that this application is for the PCS band only.**

***A:*** There was a mistake in User Guide technical information and it has now been corrected. There is no GSM900 capability in LJPNSB-7.

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**6. *Q:* FYI: A number of calibration dates in the SAR report attachments are out of date. Please correct all calibration dates in the next application.**

***A:*** There have been some unfortunate typos and unclear choices of words in calibration documents, but all calibrations have been up to date. We have already received new attachments and these will be used in the future filings.

## Appendix 1. Body-worn SAR Data

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# Evaluation of SAR in Body Worn Configurations LJPNSB-7

## Introduction

Our approach was to measure the SAR, when phone is used with body worn accessories or is against the Flat Phantom. Body worn accessories CSH-3 Leather Carrying Case, Leather Carrying Case from CBP-2 Travel pack and Clip-on Kit SKB-2 (Picture 1) were tested. The measurement test equipment and setup were the same as used and referred in SAR TEST REPORT of NOKIA 8290.


Picture 1. Leather Carrying Case CSH-3, Leather Carrying Case from Travel pack CBP-2 and Clip-on Kit SKB-2.

## 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. Positioning of the phone in all measurements was done according to the user guide instructions in the *Radio Frequency (RF) Signals* section, i.e. the display and keypad were facing the flat phantom in all measurements except with the Clip-on Kit SKB-2 when the display and keypad were facing out of the flat phantom. The point of the maximum SAR was sought, and the SAR value was obtained using a 3-dimensional cube measurement.

Due to the highest SAR values originally being measured on channel 512 (1850 MHz) using the head phantom, body-worn SAR was measured on the same channel with the maximum output power level. Brain equivalent liquid, which has higher conductivity than tissues in the body, was also used for the body-worn measurements, thus this method overestimated the SAR.

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**Results**

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

## Digital mode GSM PCS (1900MHz)

| meas. nr: | Phone position | Frequency MHz / channel | Power, dBm EIRP*) | SAR (1g)[mW/g] |
|---|---|---|---|---|
| 1 | Body Worn, Carrying Case (CSH-3) against Flat Phantom | 1850 / 512 | 31.4 | 0.26 |
| 2 | Body Worn, Carrying Case (from Travel Pack CBP-2) against Flat Phantom | 1850 / 512 | 31.4 | 0.38 |
| 3 | Body Worn, Clip-on Kit (SKB-2) against Flat Phantom | 1850 / 512 | 31.4 | 0.54 |
| 4 | Body Worn, Display against Flat Phantom | 1850 / 512 | 31.4 | 0.82 |
| **FCC ID: LJPNSB-7** MEASURED: 2000-4-20/NMP | | FCC limit | | 1.60[mW/g] (ANSI/IEEE) |

***) Radiated power was measured by FCC accredited test lab**

**Summary**

The SAR values found for the portable cellular phone (FCC ID: LJPNSB-7) are below the maximum recommended levels of 1.6 mW/g.

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$\sigma = 1.72$ [mho/m] $\varepsilon_r = 41.6$ $\rho = 1.00$ [g/cm$^3$]
Coarse Grid Dx = 15.0 Dy = 15.0 Dz = 5.0 [mm]
SAR [ mW/g ] Max: 0.28
SAR (1g): 0.255 [mW/g] SAR (10g): 0.146 [mW/g]

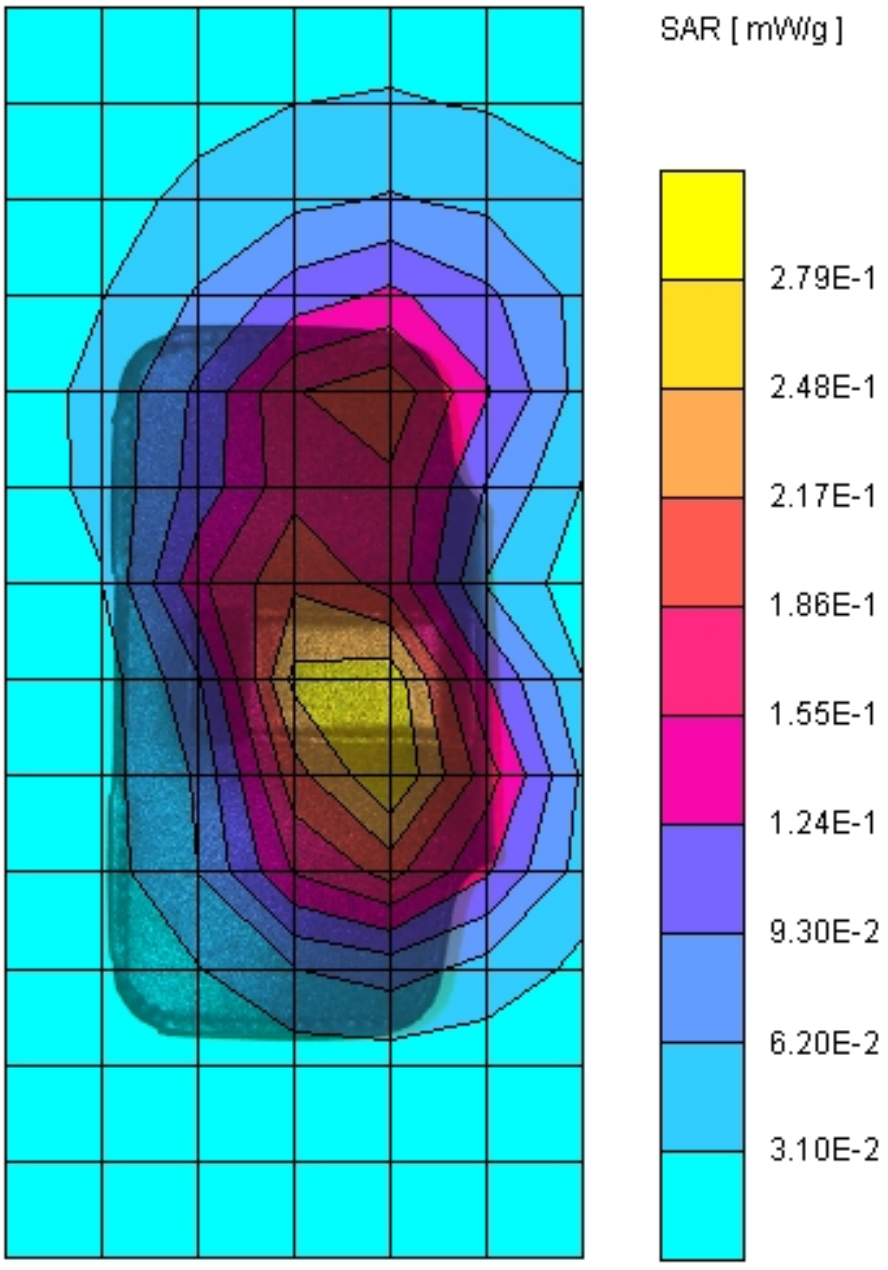


Figure 1. SAR-plot LJPNSB-7 with Carrying Case CSH-3

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$\sigma = 1.72$ [mho/m] $\varepsilon_r = 41.6$ $\rho = 1.00$ [g/cm$^3$]
Coarse Grid Dx = 15.0 Dy = 15.0 Dz = 5.0 [mm]
SAR [ mW/g ] Max: 0.39
SAR (1g): 0.380 [mW/g] SAR (10g): 0.197 [mW/g]

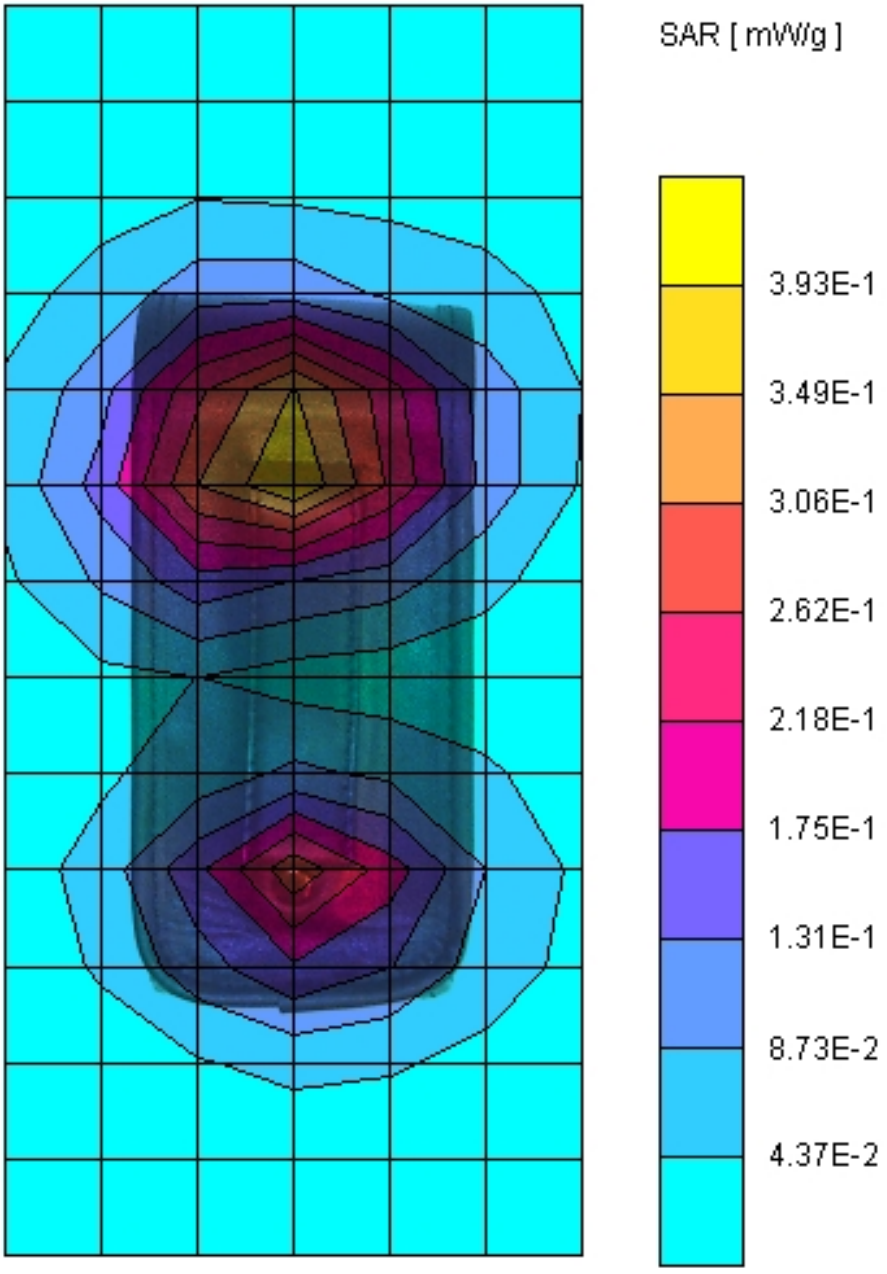


Figure 2. SAR-plot LJPNSB-7 with Carrying Case from CBP-2

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$\sigma = 1.72$ [mho/m] $\varepsilon_r = 41.6$ $\rho = 1.00$ [g/cm$^3$]
Coarse Grid Dx = 20.0 Dy = 20.0 Dz = 5.0 [mm]
SAR [ mW/g ] Max: 0.42
SAR (1g): 0.540 [mW/g] SAR (10g): 0.283 [mW/g]

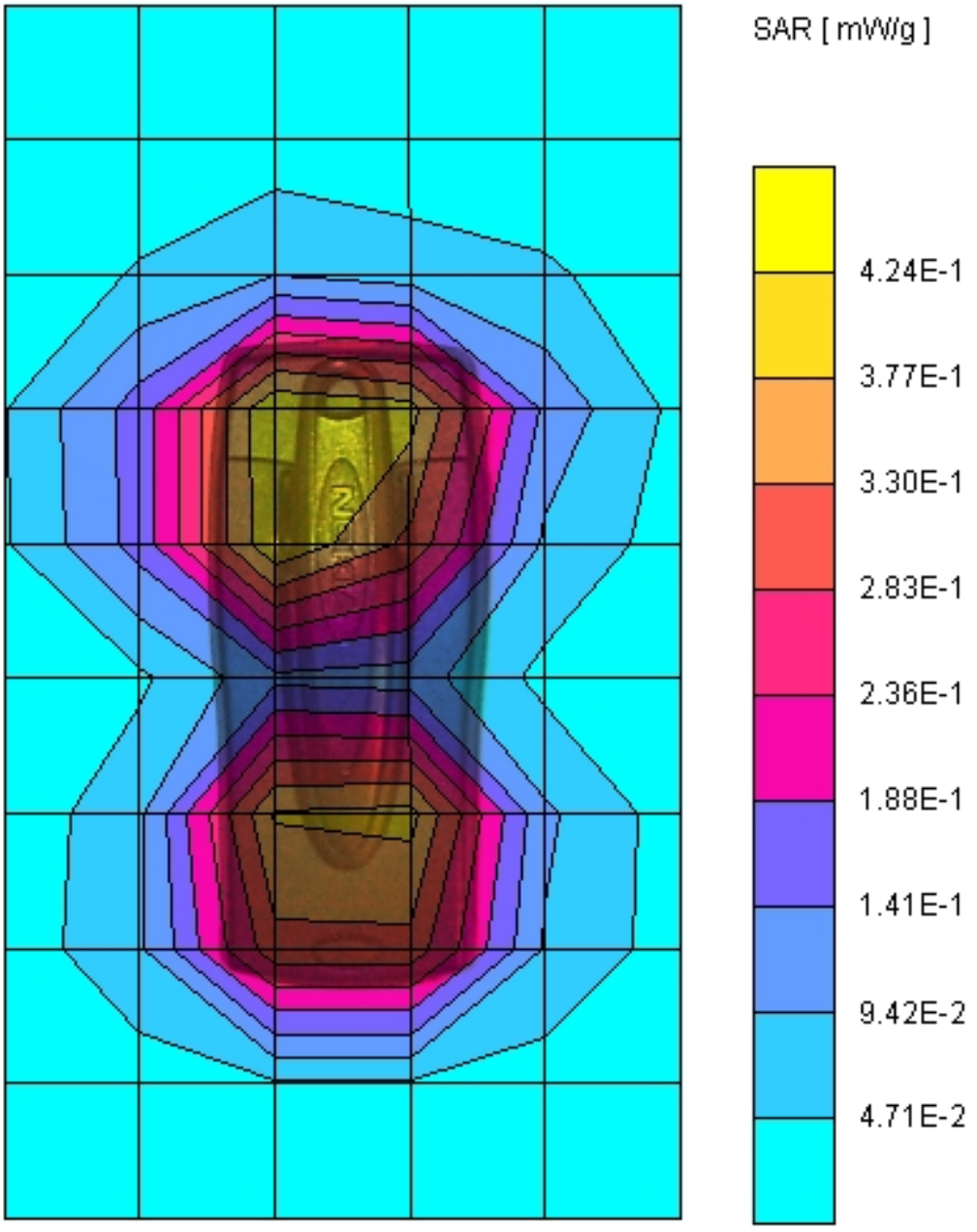


Figure 3. SAR-plot LJPNSB-7 with Clip-on Kit SKB-2

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$\sigma = 1.72$ [mho/m] $\varepsilon_r = 41.6$ $\rho = 1.00$ [g/cm$^3$]
Coarse Grid Dx = 20.0 Dy = 20.0 Dz = 5.0 [mm]
SAR [ mW/g ] Max: 0.89
SAR (1g): 0.823 [mW/g] SAR (10g): 0.447 [mW/g]

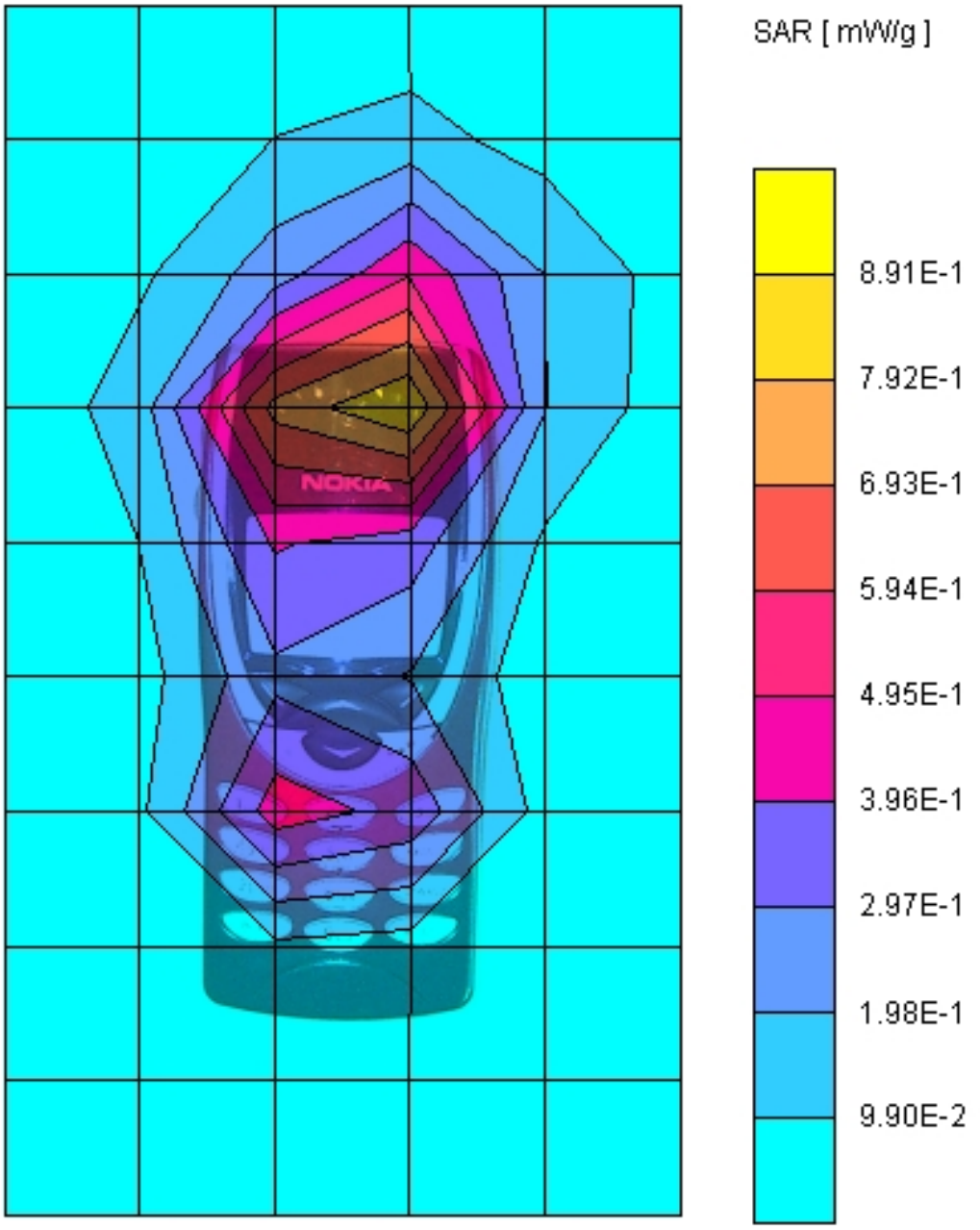


Figure 4. SAR-plot LJPNSB-7 body worn

## Appendix 2. FCC RF Exposure Info in User Guide

## Radio Frequency (RF) Signals

Your wireless handheld portable telephone is a low-power radio transmitter and receiver. When it is ON, it receives and sends out radio frequency (RF) signals.

In August 1996, the Federal Communications Commission (FCC) adopted RF exposure guidelines that included safety levels for handheld wireless phones. Those guidelines are consistent with safety standards previously set by both U.S and international standards bodies:

- ANSI C95.1 (1992)*, NCRP Report 86 (1986)*, ICNIRP (1996)*, and RSS-102 issue 1.

Those standards were based on comprehensive and periodic evaluations of the relevant scientific literature. For example, over 120 scientists, engineers, and physicians from universities, government health agencies, and industry reviewed the available body of research to develop the ANSI Standard (C95.1).

The design of your phone complies with the FCC guidelines (and those standards).

To maintain compliance with FCC RF exposure guidelines, use only Nokia approved accessories. When carrying the phone while it is on, place the phone in Nokia approved belt clip, carrying case or holster, or place the phone in a pocket so that the keypad faces your body.

*American National Standards Institute, National Council on Radiation Protection and Measurements; International Commission on Non-Ionizing Radiation Protection.

## Appendix 3. SAR Data for Cheek Position

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# SAR in Cheek position LJPNSB-7

## Introduction

This document provides additional SAR data of Cheek position for LJPNSB-7. The measurement test equipment and setup were the same as used and referred in SAR TEST REPORT of NOKIA 8290.

The mobile phone was tested in the cheek position on left and right sides of the phantom. SAR was measured with the maximum output power level.

## Definition of the cheek position

a) The device was positioned with the centre of the ear-piece against the ear reference point, and with the vertical centre line of the body of the device in a plane parallel to the sagittal plane of the phantom.
b) While maintaining the device in this plane, the center line was aligned with the reference plane containing the three ear and mouth reference points.
c) While maintaining the device in the reference plane, it was moved until any point on the front side is in contact with the cheek of the phantom.

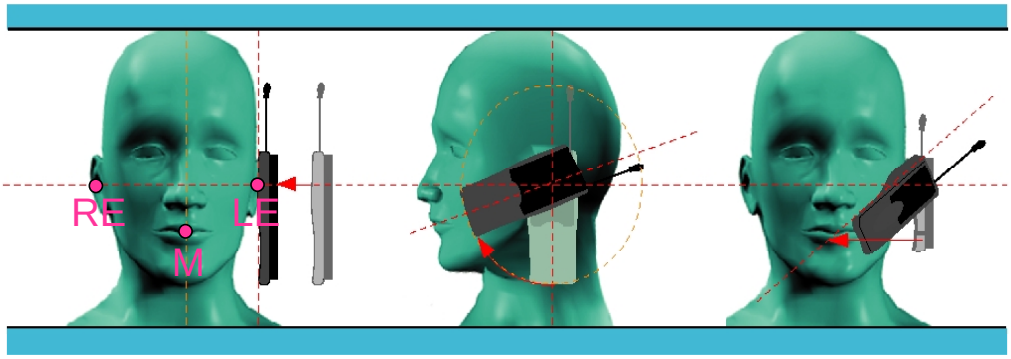


*Figure 1**: Cheek position of the mobile phone on the left side and reference points***

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**Results**

Graphical presentations of test positions with the highest SAR values are presented at the end of this report. Unfortunately the used SAR measurement system cannot do measurements on the areas where the phantom surface has sharp edges. There is another hot spot appearing in this area. However, since the surface of the phantom is curving sharply, we believe that this will not cause a large error in the results. As a reference, the whole area can be checked in body-worn SAR measurements, where the phone is measured against the flat-phantom. It clearly shows that the upper hot spot causes higher SAR values when the whole phone is positioned closer to the flat-phantom than is possible in the cheek position.

## Digital mode GSM 1900, Left Hand Phantom

| meas nr: | Phone position | Frequency MHz / channel | Power EIRP*) [dBm] | SAR (1g)[mW/g] |
|---|---|---|---|---|
| 1 | Cheek | 1850 / 512 | 31.4 | 0.54 |
| 2 | Cheek | 1880 / 661 | 29.9 | 0.49 |
| 3 | Cheek | 1910 / 810 | 29.4 | 0.45 |
| **FCC ID: LJPNSB-7** MEASURED: 2000-4-12/ NMP | | FCC limit | | 1.60[mW/g] (ANSI/IEEE) |

***) Radiated power was measured by FCC accredited test lab**

## Digital mode GSM 1900, Right Hand Phantom

| meas nr: | Phone position | Frequency MHz / channel | Power EIRP*) [dBm] | SAR (1g)[mW/g] |
|---|---|---|---|---|
| 4 | Cheek | 1850 / 512 | 31.4 | 0.68 |
| 5 | Cheek | 1880 / 661 | 29.9 | 0.62 |
| 6 | Cheek | 1910 / 810 | 29.4 | 0.54 |
| **FCC ID: LJPNSB-7** MEASURED: 2000-4-12 / NMP | | FCC limit | | 1.60[mW/g] (ANSI/IEEE) |

***) Radiated power was measured by FCC accredited test lab**

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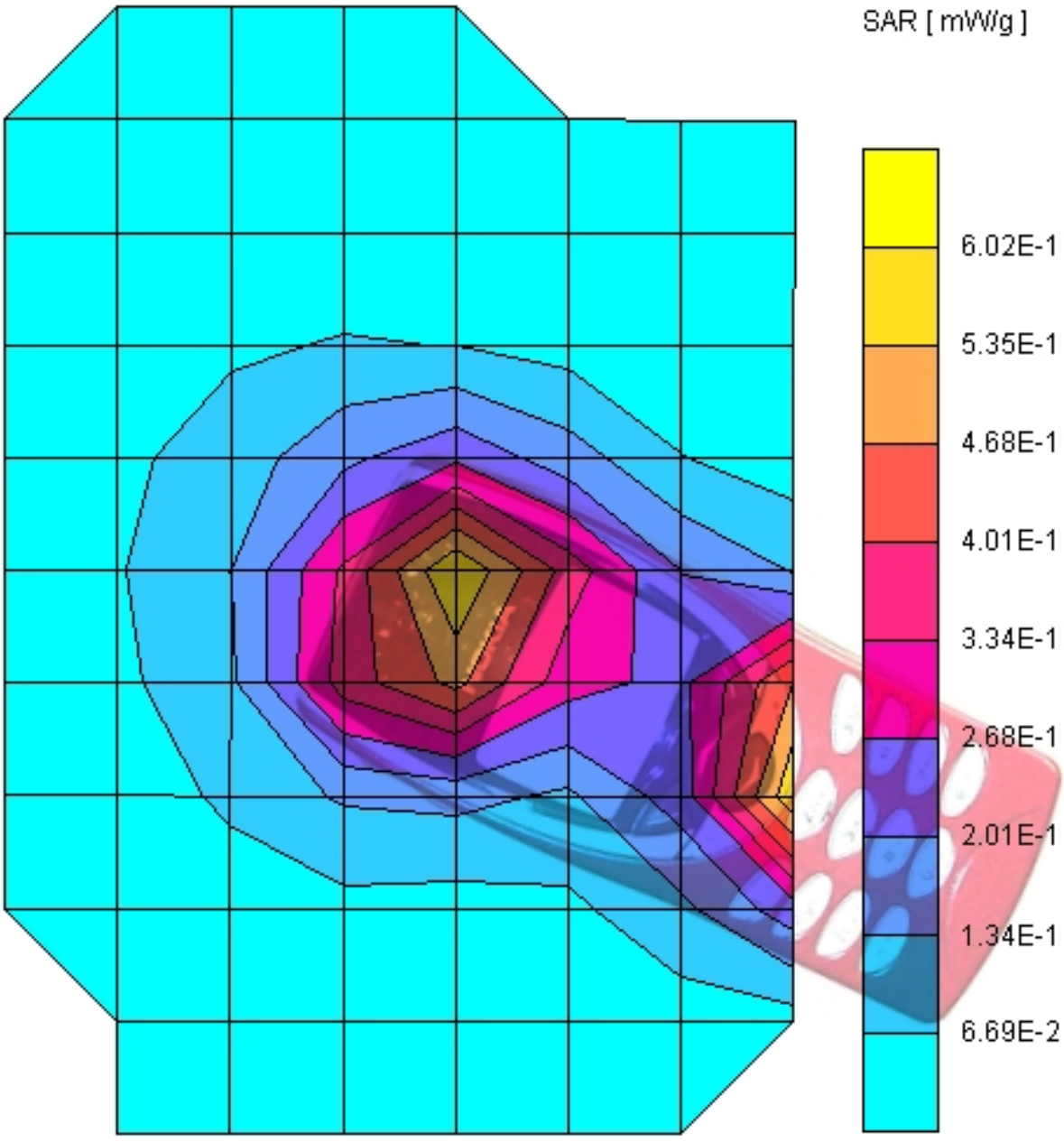
$\sigma = 1.72$ [mho/m] $\varepsilon_r = 41.6$ $\rho = 1.00$ [g/cm$^3$]
Coarse Grid Dx = 15.0 Dy = 15.0 Dz = 5.0 [mm]
SAR [ mW/g ] Max: 0.60
SAR (1g): 0.541 [mW/g] SAR (10g): 0.297 [mW/g]




Picture 1. LJPNSB-7 Left side cheek position channel 512

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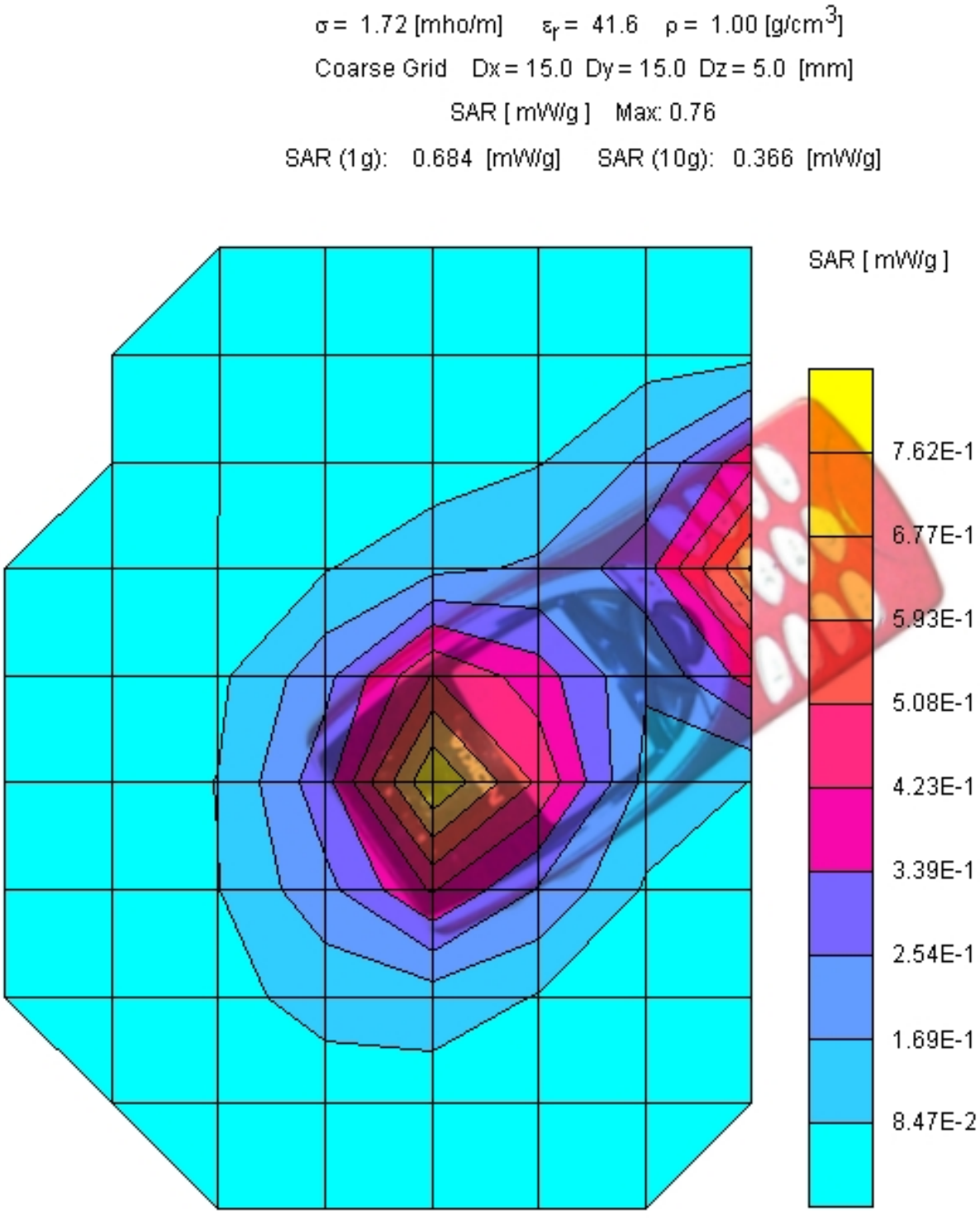


Picture 2. LJPNSB-7 Right side cheek position channel 512