**TCC**
**Copenhagen**

**DANAK**
Reg. Nr. 416

# SAR Compliance Test Report

| | | | |
|---|---|---|---|
| **Test Report no.:** | DTX05912-EN | **Date of Report:** | 25th of November 2002 |
| **Number of pages:** | 23 | **Contact person:** | Steven May |
| | | **Responsible Test engineer:** | Ruben Chr. Hansen |

**Testing laboratory:**
TCC Copenhagen
Nokia Danmark A/S
Frederikskaj
DK-1790 Copenhagen V
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**Client:**
Nokia UK / Southwood
Nokia House, Summit Avenue,
FARNBOROUGH
HAMPSHIRE GU14 0NG
United Kingdom
Tel. + 44 1252 866000
Fax. + 44 1252 866001

**Tested device:** FCC ID: QFXNHL-8 Model: 3650 HW: 0311 SW: CB19.2
IMEI: 004400/11/173558/3
(Detailed information for each device is listed in section 1).

**Supplement reports:**

**Testing has been Carried out in Accordance with:** FCC CFR. 47, Part 2.1093 and IEEE Std 1528-200X Draft (April 2002) Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques and FCC OET Bulletin 65, Supplement C, Edition 01-01.

**Documentation:** The documentation of the testing performed on the tested devices is archived for 15 years at Test & Certification Center, Copenhagen

**Test Results:** The tested device complies with the requirements in respect of all parameters subject to the test.
The test results and statements relate only to the items tested.
The test report shall not be reproduced except in full, without written approval of the laboratory.

**Date and signatures:** 11/25/2002

For the contents:

**Svend Bøgsted**
**TCC Manager**

**Ruben Chr. Hansen**
**SAR Test Engineer**

CONTENTS

Frederikskaj, DK-1790 Copenhagen V, Denmark
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## 1. SUMMARY FOR SAR TEST REPORT

The tests described in this report have been performed in order to demonstrate that the equipment under test complies with FCC CFR. 47, Part 2.1093 requirements, and the requirements in IEEE Std 1528-200X Draft 6.4 Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques and FCC OET Bulletin 65, Supplement C, Edition 01-01.

| | |
|---|---|
| Date of receipt | 08/19/2002 |
| Date of test | 08/19/2002 – 09/03/2002 |
| Contact person | Steven May |
| FCC ID, IMEI, HW, SW and DUT numbers | FCC ID: QFXNHL-8, IMEI: 004400/11/173558/3<br>HW: 0311   SW: CB19.2   DUT#231992 |
| Accessories | Battery, Type: BL-5C, DUT#232026 & #232027,<br>Headset Type: HDE-2 DUT#232025, |
| Document code | DTX05912-EN |
| Responsible SAR Test Engineer | Ruben Chr. Hansen |
| Measurements performed by | Leif Funch Klysner |

### 1.1 Maximum Results Found during SAR Evaluation

The equipment is deemed to fulfil the requirements if the measured values are less than or equal to the limit.

#### 1.1.1 Head Configuration

| Mode of Operation | Channel | Power EIRP [dBm] | Position | Limit [mW/g] | Measured [mW/g] | Result |
|---|---|---|---|---|---|---|
| GSM 1900 | 518 | 30.11 | Touch, left hand | 1.6 | 0.55 | **PASSED** |

#### 1.1.2 Body Worn Configuration

| Mode of Operation | Channel | Power EIRP [dBm] | Item(s) | Limit [mW/g] | Measured [mW/g] | Result |
|---|---|---|---|---|---|---|
| GSM 1900 | 518 | 30.11 | Headset HDE-2 Ant. Towards phantom. | 1.6 | 0.42 | **PASSED** |

#### 1.1.3 Body Worn Configuration, SAR values doubled, corresponding to GPRS mode.

| Mode of Operation | Channel | Power EIRP [dBm] | Item(s) | Limit [mW/g] | Measured [mW/g] | Result |
|---|---|---|---|---|---|---|
| GSM 1900 | 518 | 30.11 | Headset HDE-2 Ant. Towards phantom | 1.6 | 0.83 | **PASSED** |



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### 1.1.4 Measurement Uncertainty

| | |
|---|---|
| Combined Uncertainty | ± **12.11%** |
| Expanded Uncertainty (k=2) 95.5% | ± **24.23%** |

## 1.2 EIRP Measurements

The measurement of the EIRP from the QFXNHL-8 was performed at test laboratory RFI Ltd.

Radio Frequency Investigation Ltd.
Ewhurst Park
Ramsdell
Basingstoke
Hampshire
RG26 5RQ
England

Tel. +44 (0) 1256 851193
Fax. +44 (0) 1256 851192

## 2. DESCRIPTION OF THE DEVICE UNDER TEST

### 2.1 Device description

| | | |
|---|---|---|
| **FCC ID Number:** | QFXNHL-8 | |
| **IMEI:** | 004400/11/173558/3 | |
| **Mode(s) of operation** | GSM 1900 | GPRS |
| **Duty Cycle** | 1/8 | 2/8 |
| **Modulation Mode(s)** | Gaussian Minimum Shift Keying | Gaussian Minimum Shift Keying |
| **Maximum Device Rating** | Power Class 1 | Power Class 1 |
| **Transmitting Frequency Range [MHz]** | 1850.2 – 1909.8 | |
| **Production Unit or Identical Prototype (47 CFR. § 2.908)** | Identical Prototype | |
| **Device Category** | Portable | |
| **RF Exposure Limits** | General Population / Uncontrolled | |

Outside of USA, the transmitter of the tested device is capable of transmitting in GSM 900 and GSM 1800 modes, which are not part of this filing.

### 2.2 Picture of QFXNHL-8 (NOKIA 3650)


**Figure 1 QFXNHL-8 (NOKIA 3650)**

## 2.3 Description of the antenna

The QFXNHL-8 (NOKIA 3650) cellular phone has an integral patch antenna.

## 2.4 Battery

A Li-Ion battery, type BL-5C was used during the measurement.

## 2.5 Accessory

The following accessories are available for the QFXNHL-8 phone:

- Headset Type HDE-2

## 2.6 Body Worn Accessories

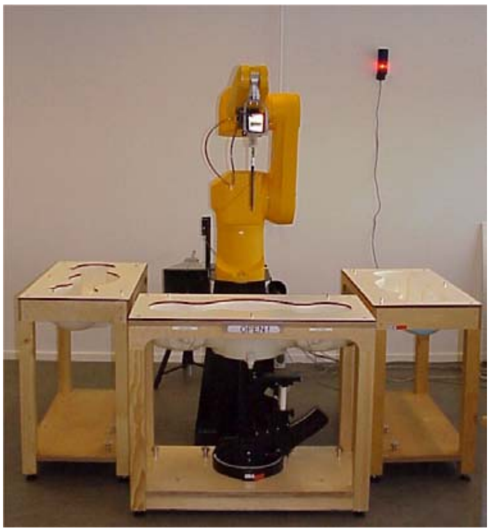
There are currently no body worn accessories available for the QFXNHL-8 phone.

## 3. DESCRIPTION OF THE TEST EQUIPMENT

The measurements were performed with an automated near-field scanning system, **DASY3**.

### 3.1 Manufacturer of DASY3

Schmid & Partner Engineering AG (SPEAG).
Zeughausstrasse 43
8004 Zurich, Switzerland
Phone 41 1 245 97 00, Fax 41 1 245 97 79
www.speag.com



### 3.2 Robot

The robot is a RX90L manufactured by Stäubli France, www.staubli.com

| | |
|---|---|
| Number of axis: | 6 |
| Payload: | 3.5 kg |
| Reach: | 1185 mm |
| Repeatability: | ± 0.025 mm |
| Control unit: | CS7/cs7M |

### 3.3 Isotropic E-field probe ET3DV6R

| | |
|---|---|
| Frequency: | 10 MHz to 3 GHz |
| Linearity: | ± 0.2 dB (30 MHz to 3 GHz) |
| Directivity: | ± 0.2 dB in HSL (rotation around probe axis)<br>± 0.4 dB in HSL (rotation normal to probe axis) |
| Dynamic range: | 5 μW/g to > 100mW/g; Linearity: ± 0.2 dB |
| Dimension: | Overall length: 330 mm<br>Tip length: 16 mm<br>Body diameter: 12 mm<br>Tip diameter: 6.8 mm<br>Distance from probe tip to dipole centers: 2.7 mm |
| Calibration: | See List of Instruments |

### 3.4 Device holder

The holder was provided by SPEAG as a part of the DASY3 system.

### 3.5 Dipole antennas for validation

The dipole antennas are matched for use near flat phantoms filled with head/body simulation solutions. The dipoles are equipped with 10 or 15 mm distance holders.

Calibration: See List of Instruments

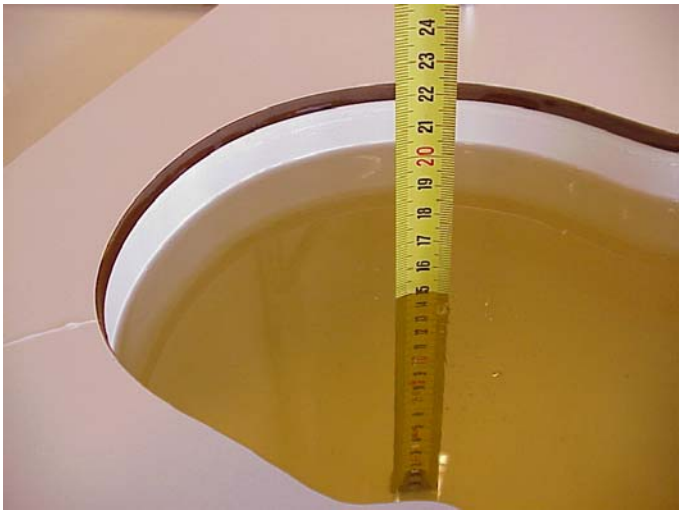
### 3.6 Phantom


The phantoms enables dosimetric evaluation of left and right hand phone usage, as well as body mounted usage at the flat phantom region.

Shell thickness: 2 ± 0.2 mm, except at Ear Reference Point, where an integrated spacer provides a 6 mm spacing from tissue simulating liquid.

### 3.7 Liquid depth

The liquid level was during measurement 15 cm ±0.5 cm.




### 3.8 Base Station Simulator

The QFXNHL-8 (NOKIA 3650) cellular phone was put into operation using a Wavetek 4400 System Simulator. Communication between the cellular phone and the System Simulator was established by air link using a Schwarzbech Broadband rigid horn antenna, Type BBHA 9120.

### 3.9 Test Conditions

### 3.10 Temperature and Humidity

Ambient temperature: 22° ± 1° C
Tissue simulating liquid temperature: 22° ± 1° C
Ambient humidity: 45 ± 10 % r.h.

### 3.11 SAR measurement system verification

The SAR measurements were verified using a dipole antenna placed under the flat section of the generic twin phantom. A power level of 250 mW supplied to the dipole antenna was used for the verification. The results are normalised to 1 W input power. The power level was controlled during verification, using a directional coupler and a power meter. A SAR measurement was performed to verify that the measured SAR was within ± 10% from the target value indicated in the dipole(s) calibration certificate. The test was made at 1800 MHz, which is within 100 MHz of the mid-band frequency of the D.U.T. The verification was performed every morning before measurements of the D.U.T. The liquid depth was 15.0 cm ±0.5 cm.

| Liquid | Date | Frequency [MHz] | Description | SAR averaged over 1g [mW/g] | Dielectric Parameters | |
|---|---|---|---|---|---|---|
| | | | | | $\varepsilon_r$ | σ [S/m] |
| Head | 08/20/02 | 1800 | Measured | 39.6 | 38.8 | 1.38 |
| | | | Reference | 37.4 | 40.7 | 1.35 |
| | 08/22/02 | 1800 | Measured | 39.4 | 38.7 | 1.38 |
| | | | Reference | 37.4 | 40.7 | 1.35 |

| Liquid | Date | Frequency [MHz] | Description | SAR averaged over 1g [mW/g] | Dielectric Parameters | |
|---|---|---|---|---|---|---|
| | | | | | $\varepsilon_r$ | σ [S/m] |
| Body | 08/26/02 | 1800 | Measured | 39.88 | 51.1 | 1.50 |
| | | | Reference | 40.8 | 53.5 | 1.45 |
| | 09/02/02 | 1800 | Measured | 39.84 | 51.3 | 1.48 |
| | | | Reference | 40.8 | 53.5 | 1.45 |
| | 09/03/02 | 1800 | Measured | 39.96 | 51.2 | 1.48 |
| | | | Reference | 40.8 | 53.5 | 1.45 |

### 3.12 Synthetic head tissue simulating liquid parameters, measured values:

The tissue simulating liquids are measured using a HP 85070A dielectric probe kit.

| Date | Frequency [MHz] | Description | $\varepsilon_r$ Relative permittivity | $\sigma$ [S/m] Conductivity |
|---|---|---|---|---|
| 08/20/02 | 1880 | Measured | 38.5 | 1.46 |
| | | Recommended | 40.0 | 1.40 |
| 08/22/02 | 1880 | Measured | 38.3 | 1.46 |
| | | Recommended | 40.0 | 1.40 |

### 3.13 Synthetic muscle tissue simulating liquid parameters, measured values:

| Frequency band [MHz] | | Description | $\varepsilon_r$ Relative permittivity | $\sigma$ [S/m] Conductivity |
|---|---|---|---|---|
| 08/26/02 | 1880 | Measured | 51.1 | 1.50 |
| | | Recommended | 53.5 | 1.52 |
| 09/02/02 | 1880 | Measured | 51.0 | 1.57 |
| | | Recommended | 53.5 | 1.52 |
| 09/03/02 | 1880 | Measured | 50.9 | 1.57 |
| | | Recommended | 53.5 | 1.52 |

Recommended values are adopted from OET Bulletin 65 (97-01) Supplement C (01-01).

### 3.14 Synthetic tissue simulating liquid recipes

#### 3.14.1 1880 MHz

| Ingredients | Head (% by weight) | Body (% by weight) |
|---|---|---|
| De-ionized Water | 54.88 | 69.02 |
| Di(ethylene glycol) butyl ether | 44.91 | 30.76 |
| Salt | 0.21 | 0.22 |



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# 4. DEVICE POSITIONING

## 4.1 Positioning procedures

The cellular phone was measured in 2 positions on both the "left hand" and "right hand" side of the phantom with the antenna in both extended and retracted positions. Furthermore the cellular phone was measured in the carrying case under the flat section of the phantom.

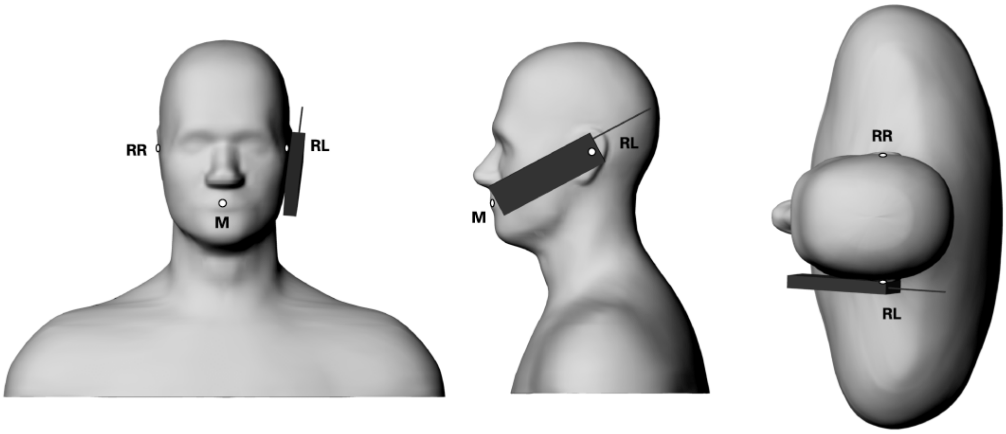



**Figure 2.** "Cheek/Touch" Position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the plane for phone positioning, are indicated.

### 4.1.1 Cheek/Touch Position

1) The phone was positioned with the vertical centerline of the body of the phone and the horizontal line crossing the center of the earpiece in a plane parallel to the sagittal plane of the phantom ("initial position"). While maintaining the phone in this plane, the vertical center line was aligned with the reference plane containing the three ear and mouth reference points (RE, LE and M) and the center of the ear piece was aligned with the line RE-LE
2) The mobile phone was moved towards the phantom with the earpiece aligned with the line LE-RE until the phone touched the ear. While maintaining the phone contact with the ear, the bottom of the phone was moved until a point on the front side was in contact with the cheek of the phantom or until contact with the ear was lost.

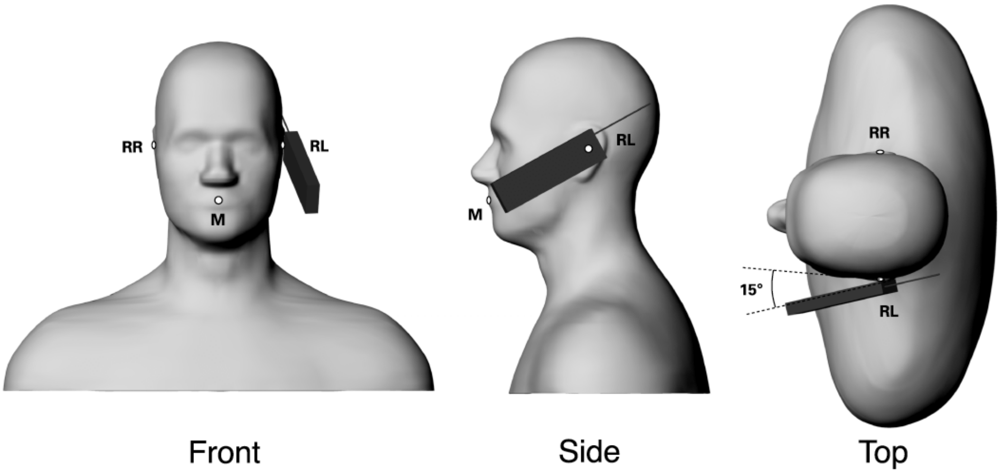



**Figure 3.** "Ear/Tilted Position." The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the plane for phone positioning, are indicated.

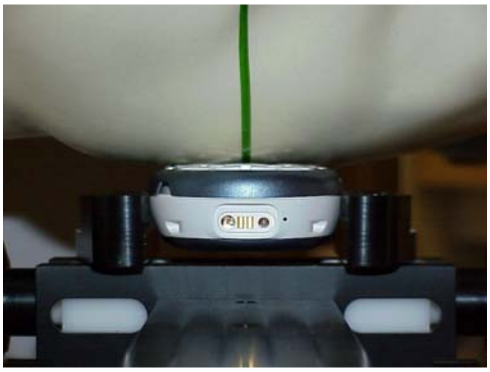
### 4.1.2 Ear/Tilted Position

1) The phone was positioned in the "cheek/touch" position as described above;
2) While the phone was maintained in the reference plane described above and pivoting against the ear, the phone was moved outward away from the mouth by an angle of 15 degrees or until contact with the ear was lost.

### 4.1.3 Photos of setup


Tilted, left hand


Tilted, right hand


Touch, left hand


Touch, right hand

### 4.1.4 Body Worn Configuration

The phone was positioned into the holder and placed below the flat section of the phantom. The distance between the phone and the phantom was setup by means of a 15 mm distance spacer, as seen on photo. The distance spacer was removed before measurements.


**Figure 4 QFXNHL-8 under flat section of phantom.**

### 4.2 Scan Procedure

First coarse scans are used for quick determination of the field distribution. The distance of the probe tip to the inner surface of the phantom was 2 mm during the coarse scan measurements. At the peak SAR location determined by the extrapolated data from the coarse scan, a cube scan, 5x5x7 with a spacing of 8 mm between each scan point, is performed to determine the averaged SAR-distribution for 1g and 10g.

### 4.3 SAR averaging methods

The maximum SAR value is averaged over its volume using interpolation and extrapolation.

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a knot" –condition [W. Gander, Computermathematatik, p. 141-150] (x,y and z –directions) [Numerical Recipes in C, Second Edition, p 123ff ].

The extrapolation is based on least square algorithm [W. Gander, Computermathematik, p.168-180]. Through the points in the first 3cm in all z-axis, polynomials of order four are calculated. This polynomial is then used to evaluate the points between the surface and the probe tip. The points, calculated from the surface, have a distance (resolution) of 1mm from one another.

# 5. MEASUREMENT UNCERTAINTY

## 5.1 Description of individual measurement uncertainty

| Uncertainty description | Error | Distrib. | Weight | Std. Dev. |
|---|---|---|---|---|
| | | | | |
| - Axial isotropy | ±0.2 dB | U-shape | 0.5 | ±2.4% |
| - Spherical isotropy | ±0.4 dB | U-shape | 0.5 | ±4.8% |
| - Spatial resolution | ±0.5 dB | Normal | 1 | ±0.5% |
| - Linearity error | ±0.2 dB | Rectang. | 1 | ±2.7% |
| - Calibration error | ±3.3% | Normal | 1 | ±3.3% |
| **Total Probe Uncertainty** | | | | ±**6.87%** |
| | | | | |
| - Data acquisition error | ±1% | Rectang. | 1 | ±0.6% |
| - ELF and RF disturbances | ±0.25% | Normal | 1 | ±0.25% |
| - Conductivity assessment | ±10% | Rectang. | 1 | ±5.8% |
| **Total SAR Evaluation Uncertainty** | | | | ±**5.84%** |
| | | | | |
| - Extrapol + boundary effect | ±3% | Normal | 1 | ±3% |
| - Probe positioning error | ±0.1mm | Normal | 1 | ±1% |
| - Integrat and cube orient | ±3% | Normal | 1 | ±3% |
| - Cube shape inaccuracies | ±2% | Rectang. | 1 | ±1.2% |
| **Total Spatial Peak SAR Evaluation Uncertainty** | | | | ±**4.52%** |
| | | | | |
| **Total Measurement Uncertainty** | | | | ±**10.09%** |

## 5.2 Source Uncertainty

| Uncertainty description | Error | Distrib. | Weight | Std. Dev. |
|---|---|---|---|---|
| | | | | |
| - Device positioning | ±6% | Normal | 1 | ±6% |
| - Laboratory set up | ±3% | Normal | 1 | ±3% |
| | | | | |
| **Total Source Uncertainty** | | | | ±**6.71%** |

## 5.3 Estimation of the total measurement uncertainty

| **Uncertainty description** | **Uncertainty** |
|---|---|
| | |
| - Total Measurement Uncertainty | ± 10.09% |
| - Total Source Uncertainty | ± 6.71% |
| | |
| **Combined Uncertainty** | ± **12.11%** |
| **Expanded Uncertainty (k=2) 95.5%** | ± **24.23%** |



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## 6. RESULTS

The SAR results shown in the tables are maximum SAR values averaged over 1 gram of tissue. Also shown are the EIRP power, the connection between low, mid and high channels, channel numbers and frequency. The results indicated as bold numbers in the tables are included in the appendix as SAR distribution plots.

### 6.1 Head Configuration

| **Position** | **GSM 1900** | | | |
|---|---|---|---|---|
| | Channel | Low | Mid | High |
| | Channel # | 518 | 661 | 804 |
| | Frequency [MHz] | 1851.4 | 1880.0 | 1908.6 |
| | EIRP [dBm] | 30.11 | 29.42 | 28.44 |
| Touch, left hand | Antenna in | **0.550** | **0.532** | **0.506** |
| Tilted, left hand | Antenna in | 0.334 | 0.260 | 0.190 |
| Touch, right hand | Antenna in | 0.539 | 0.513 | 0.481 |
| Tilted, right hand | Antenna in | 0.331 | 0.266 | 0.197 |

### 6.2 Body Configuration

| **Accessory** | **GSM 1900** | | | |
|---|---|---|---|---|
| | Channel | Low | Mid | High |
| | Channel # | 518 | 661 | 804 |
| | Frequency [MHz] | 1851.4 | 1880.0 | 1908.6 |
| | EIRP [dBm] | 30.11 | 29.42 | 28.44 |
| Headset HDE-2 | Antenna towards phantom | **0.415** | **0.354** | **0.327** |

### 6.3 SAR values doubled, corresponding to GPRS mode.

| **Accessory** | **GSM 1900** | | | |
|---|---|---|---|---|
| | Channel | Low | Mid | High |
| | Channel # | 518 | 661 | 804 |
| | Frequency [MHz] | 1851.4 | 1880.0 | 1908.6 |
| | EIRP [dBm] | 30.11 | 29.42 | 28.44 |
| Headset HDE-2 | Antenna towards phantom | 0.830 | 0.708 | 0.654 |

# LIST OF INSTRUMENTS

| Equipment no | Equipment | Type | Serial no | Manufacturer | Next week | Next year |
|---|---|---|---|---|---|---|
| 12524 | Spectrum Analyzer 10KHz | MS610B | MT11820 | Anritsu | | |
| 13172 | Power Supply 15V DC 4 A | PL154 | 43068 | Thurlby&Thandar | | |
| 13376 | Power Meter Digital | NRVD | 840297/008 | Rohde&Schwarz | 36 | 2003 |
| 13393 | RF Amplifier 10-2,4GHz +: | ZHL-42W | D091395-1 | Mini-Circuits | | |
| 14509 | Double Ridged Horn Anter | BBHA9120-LF | BBHA 9120 LF-A/105 | Schwarzbech Mess El. | | |
| 14824 | Vector Signal Generator 3 | SMIQ03B | 826046/034 | Rohde&Schwarz | 33 | 2003 |
| 14867 | Digital Weight 0-3100g 0,( | BP3100S | 81006038 | Sartorius | | |
| 15001 | Digital Radio Comm. Teste | CTS55 | 828273/014 | Rohde&Schwarz | | |
| 15199 | Industrial Robot f SAR Me | RX90L | 598299-01 | Stäubli | | |
| 15200 | Robot Controller Unit | Dasy3 | ------------------ | Stäubli | | |
| 15201 | Phantom for 900MHz | Generic Twin Phantom V3 | ------------------ | Schmid&Partner | | |
| 15202 | Phantom for 1800MHz | Generic Twin Phantom V3 | ------------------ | Schmid&Partner | | |
| 15203 | Phone Test Fixture | ------------------ | ------------------ | Schmid&Partner | | |
| 15204 | Dipole Antenna 900MHz S | D900V2 | 33 | Schmid&Partner | | |
| 15205 | Dipole Antenna 1800MHz | D1800V2 | 230 | Schmid&Partner | 43 | 2003 |
| 15206 | Dummy Probe f SAR Meas | ------------------ | ------------------ | Schmid&Partner | | |
| 15207 | Probe f SAR Measuremen | ET3DV5 | 1345 | Schmid&Partner | | |
| 15208 | Probe f SAR Measuremen | ET3DV5 | 1344 | Schmid&Partner | | |
| 15209 | Dielectric Probe Kit | HP85070B | US33020403 | Hewlett Packard | | |
| 15319 | Closed Torso Mannequin ' | V2.0 | ------------------ | Schmid&Partner | | |
| 15859 | Digital Radio Communicat | 4201S | 113217 | Wavetek | | |
| 15883 | RF Shielded Box | 248390 | LX658054 | Wavetek | | |
| 16744 | Dosimetric Assessment S) | DAE3V1 | 339 | Schmid&Partner | 51 | 2002 |
| 16954 | Radio Communication Tes | 4400M | 411216 | Wavetek | | |
| 17266 | RF S-Parameter Network / | AT8753ES | MY40001091 | Agilent Technologies | 32 | 2003 |



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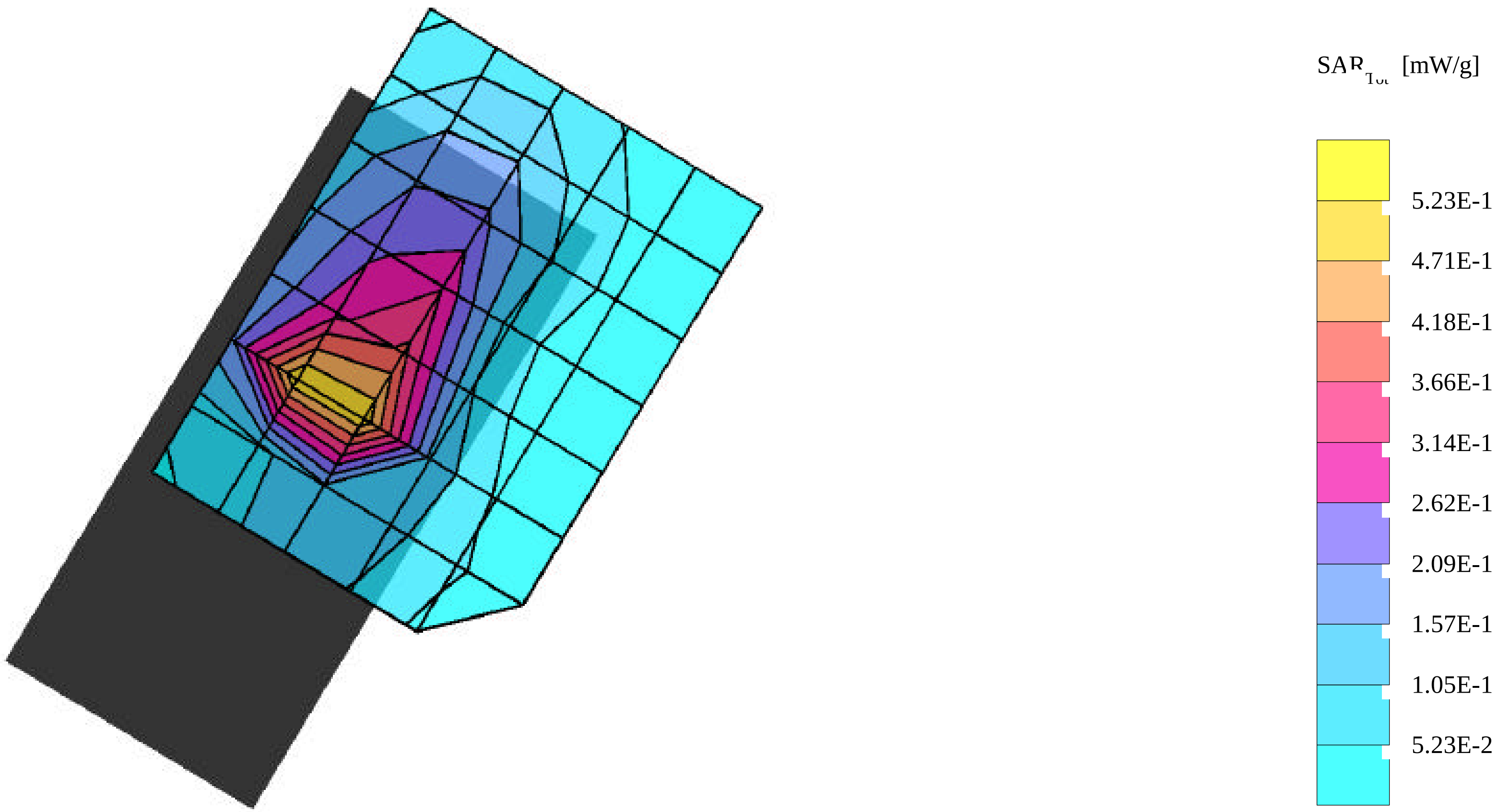
## 7. ANNEX A: SAR DISTRIBUTION PRINTOUTS

08/22/02 Temp = 22° C ± 1°

# QFXNHL-8

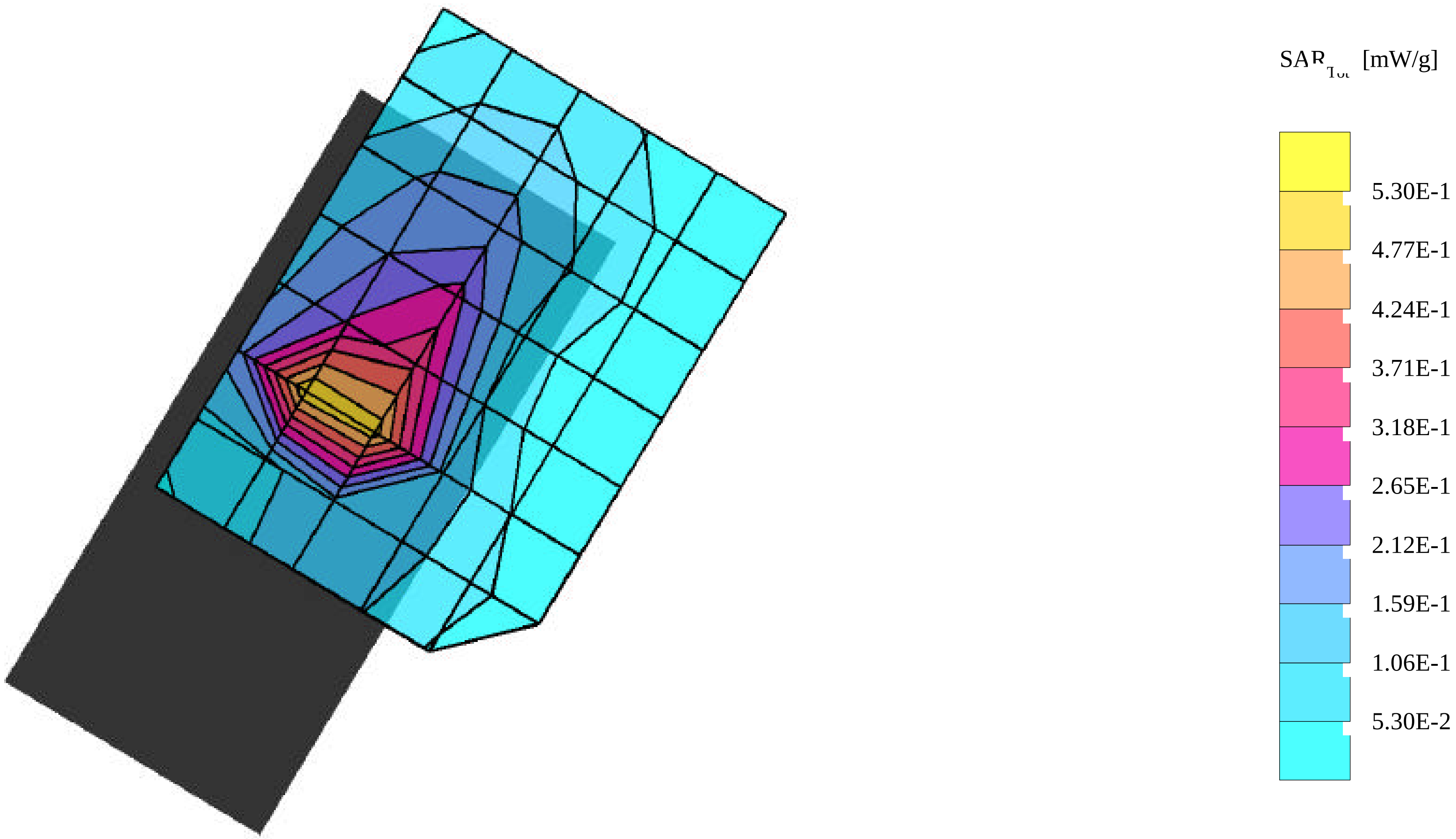
SAM High Band Phantom; Left Hand Section; Position: (90°,59°); Mode: GSM;
; SAM touch left 1900 MHz Ant; Probe: ET3DV6R - SN1429; ConvF(5.00,5.00,5.00); Crest factor: 8.0; Head 1900 MHz (SAM): $\sigma$ = 1.46 mho/m $\varepsilon_r$ = 38.3 $\rho$ = 1.00 g/cm$^3$
Cube 5x5x7: SAR (1g): 0.550 mW/g, SAR (10g): 0.312 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.03 dB



08/22/02 Temp = 22° C ± 1°

# QFXNHL-8

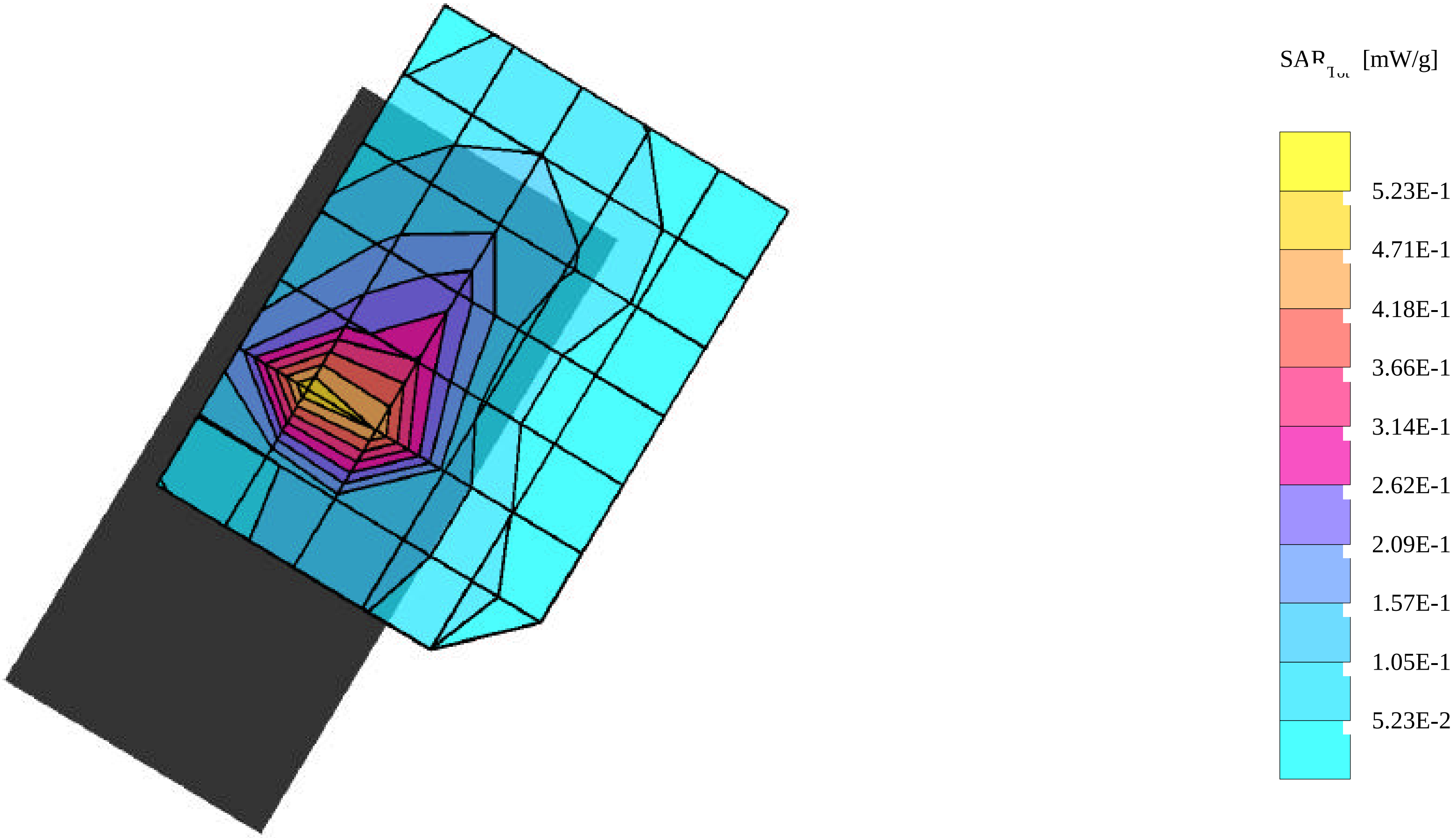
SAM High Band Phantom; Left Hand Section; Position: (90°,59°); Mode: GSM;
; SAM touch left 1900 MHz Ant; Probe: ET3DV6R - SN1429; ConvF(5.00,5.00,5.00); Crest factor: 8.0; Head 1900 MHz (SAM): $\sigma$ = 1.46 mho/m $\varepsilon_r$ = 38.3 $\rho$ = 1.00 g/cm$^3$
Cube 5x5x7: SAR (1g): 0.532 mW/g, SAR (10g): 0.293 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.04 dB



08/22/02 Temp = 22° C ± 1°

# QFXNHL-8

SAM High Band Phantom; Left Hand Section; Position: (90°,59°); Mode: GSM;
; SAM touch left 1900 MHz Ant; Probe: ET3DV6R - SN1429; ConvF(5.00,5.00,5.00); Crest factor: 8.0; Head 1900 MHz (SAM): $\sigma$ = 1.46 mho/m $\varepsilon_r$ = 38.3 $\rho$ = 1.00 g/cm$^3$
Cube 5x5x7: SAR (1g): 0.506 mW/g, SAR (10g): 0.276 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: 0.05 dB

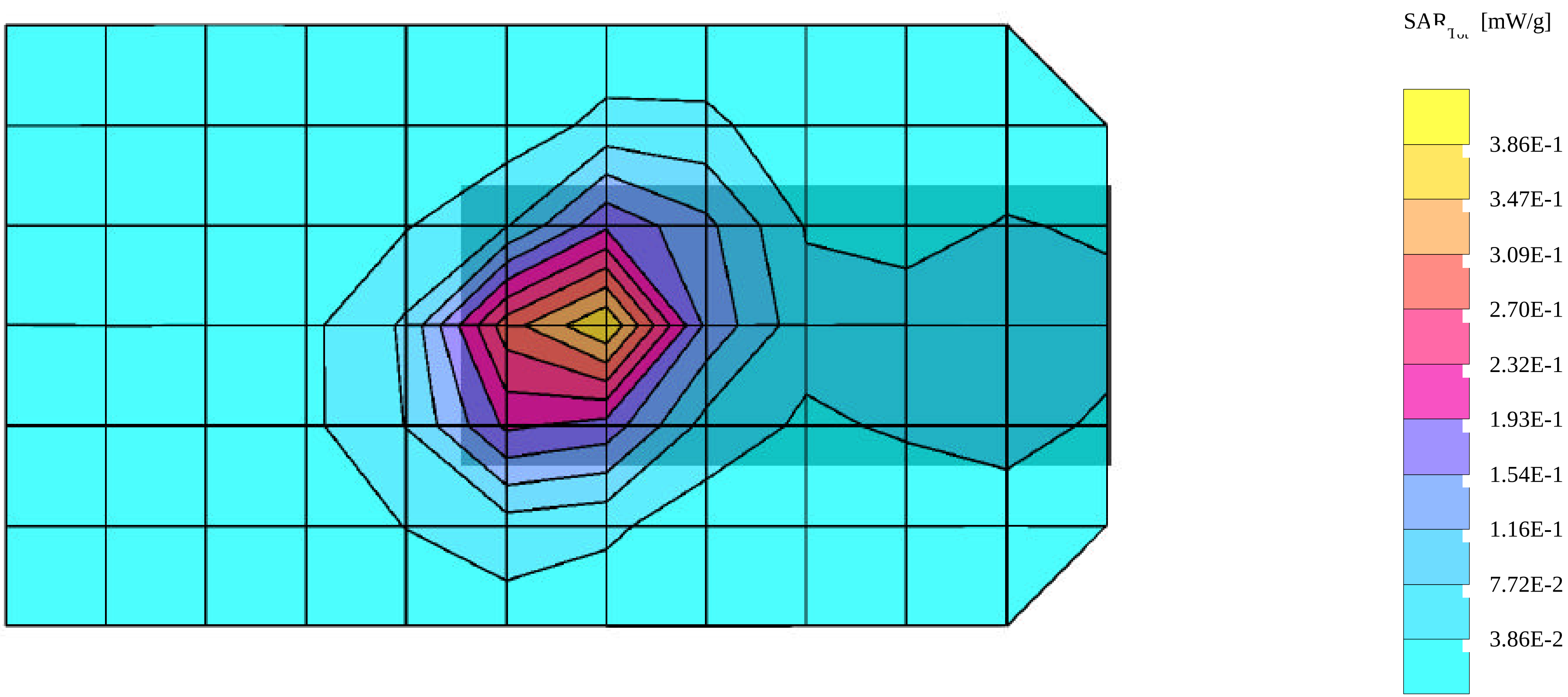



TCC, Copenhagen

09/03/02 Temp = 22° C ± 1°

# QFXNHL-8

SAM High Band Phantom; Flat Section; Position: (90°,270°); Mode: GSM;
; SAM Body, Ant; Probe: ET3DV6R - SN1429; ConvF(4.70,4.70,4.70); Crest factor: 8.0; Body 1800-2000 MHz (SAM): $\sigma$ = 1.57 mho/m $\varepsilon_r$ = 50.9 $\rho$ = 1.00 g/cm$^3$
Cube 5x5x7: SAR (1g): 0.415 mW/g, SAR (10g): 0.242 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.03 dB

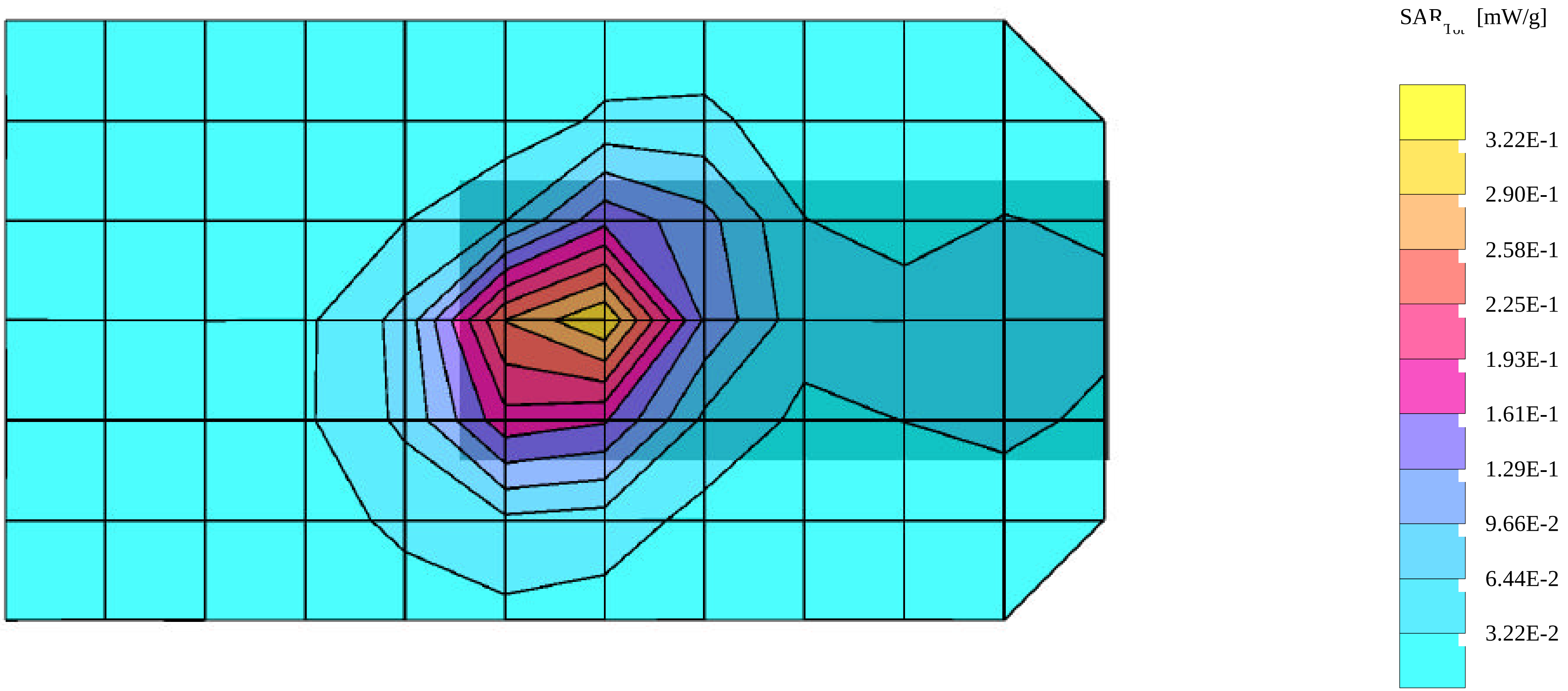



TCC, Copenhagen

09/03/02 Temp = 22° C ± 1°

# QFXNHL-8

SAM High Band Phantom; Flat Section; Position: (90°,270°); Mode: GSM;
; SAM Body, Ant; Probe: ET3DV6R - SN1429; ConvF(4.70,4.70,4.70); Crest factor: 8.0; Body 1800-2000 MHz (SAM): $\sigma$ = 1.57 mho/m $\varepsilon_r$ = 50.9 $\rho$ = 1.00 g/cm$^3$
Cube 5x5x7: SAR (1g): 0.354 mW/g, SAR (10g): 0.206 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: 0.00 dB

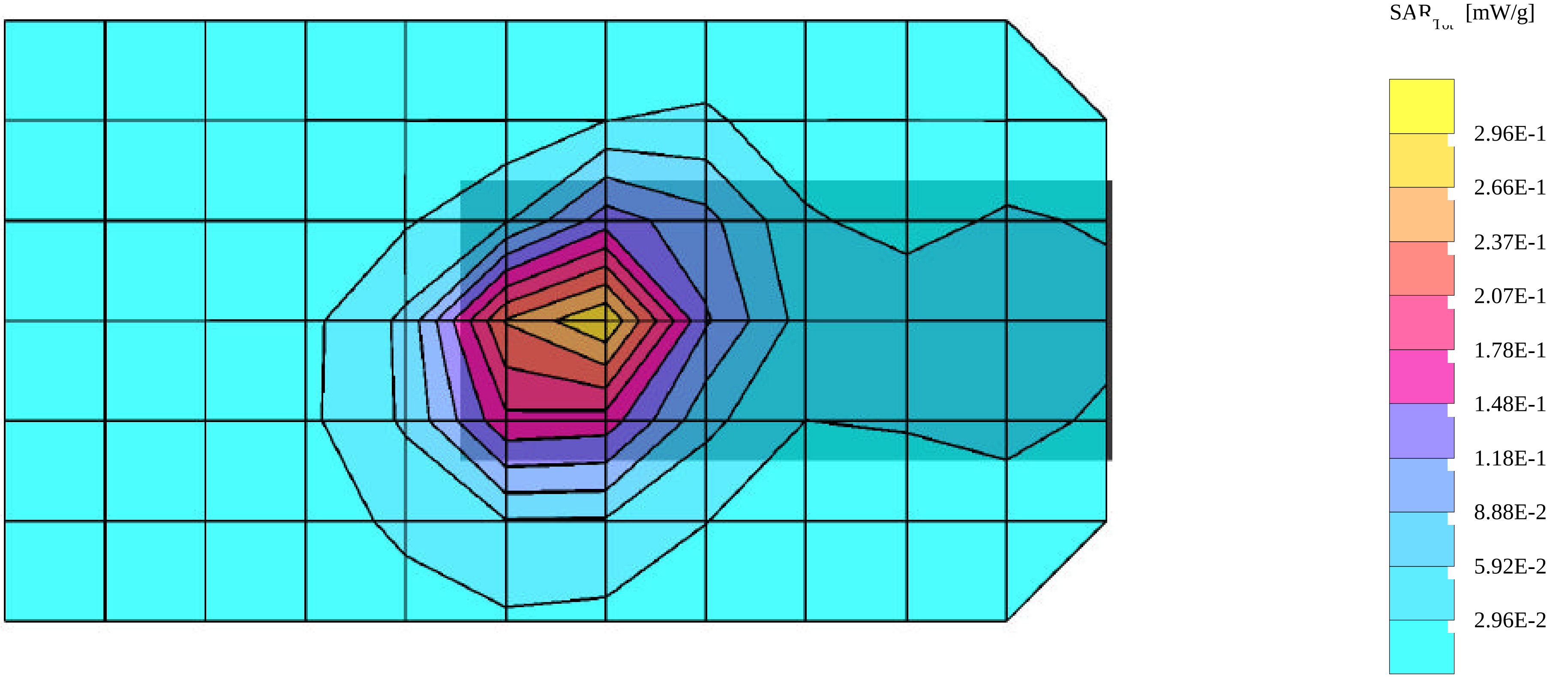



TCC, Copenhagen

09/03/02 Temp = 22° C ± 1°

# QFXNHL-8

SAM High Band Phantom; Flat Section; Position: (90°,270°); Mode: GSM;
; SAM Body, Ant; Probe: ET3DV6R - SN1429; ConvF(4.70,4.70,4.70); Crest factor: 8.0; Body 1800-2000 MHz (SAM): $\sigma$ = 1.57 mho/m $\varepsilon_r$ = 50.9 $\rho$ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.327 mW/g, SAR (10g): 0.189 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.05 dB

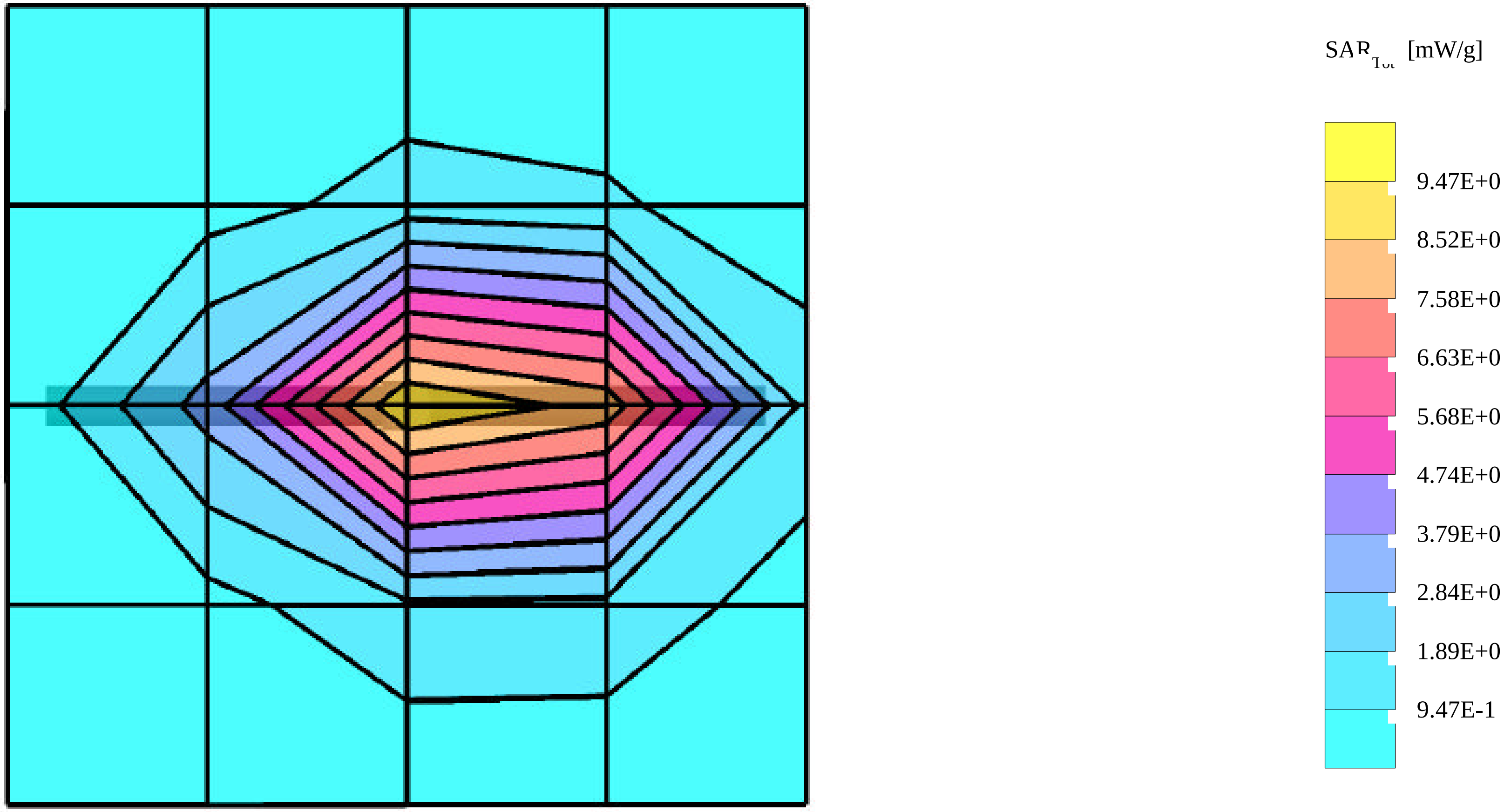



TCC, Copenhagen

## 8. ANNEX B: VALIDATION PLOTS

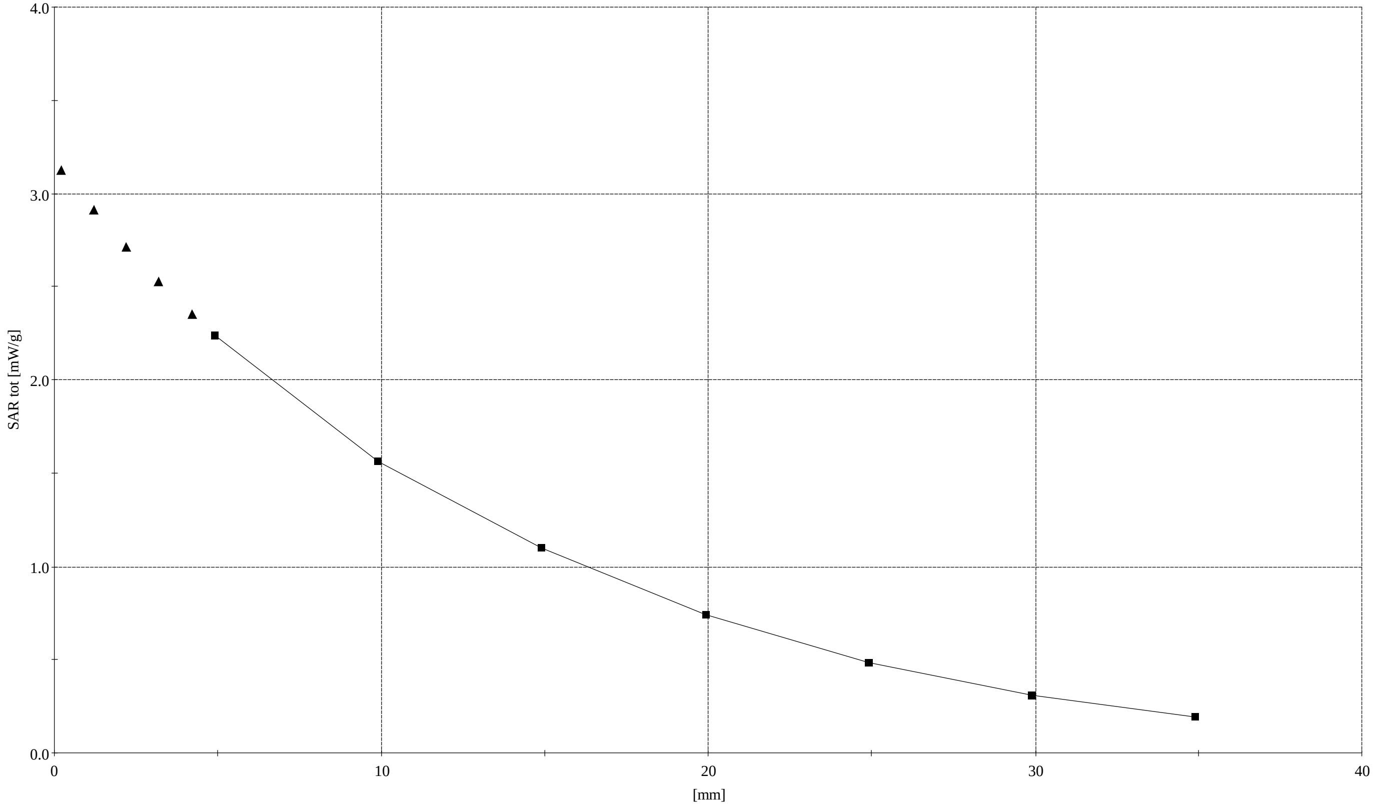
# Dipole 1800 MHz

SAM High Band Phantom; Flat Section; Position: (90°,90°); horinzontal angle until touching head (80°-90°);
; Head - 20; Probe: ET3DV6R - SN1429; ConvF(5.00,5.00,5.00); Crest factor: 1.0; Head 1800 MHz (SAM): $\sigma$ = 1.38 mho/m $\varepsilon_r$ = 38.8 $\rho$ = 1.00 g/cm³
Cubes (2): SAR (1g): 9.93 mW/g ± 0.02 dB, SAR (10g): 5.15 mW/g ± 0.02 dB, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: 0.07 dB



# Dipole 1800 MHz

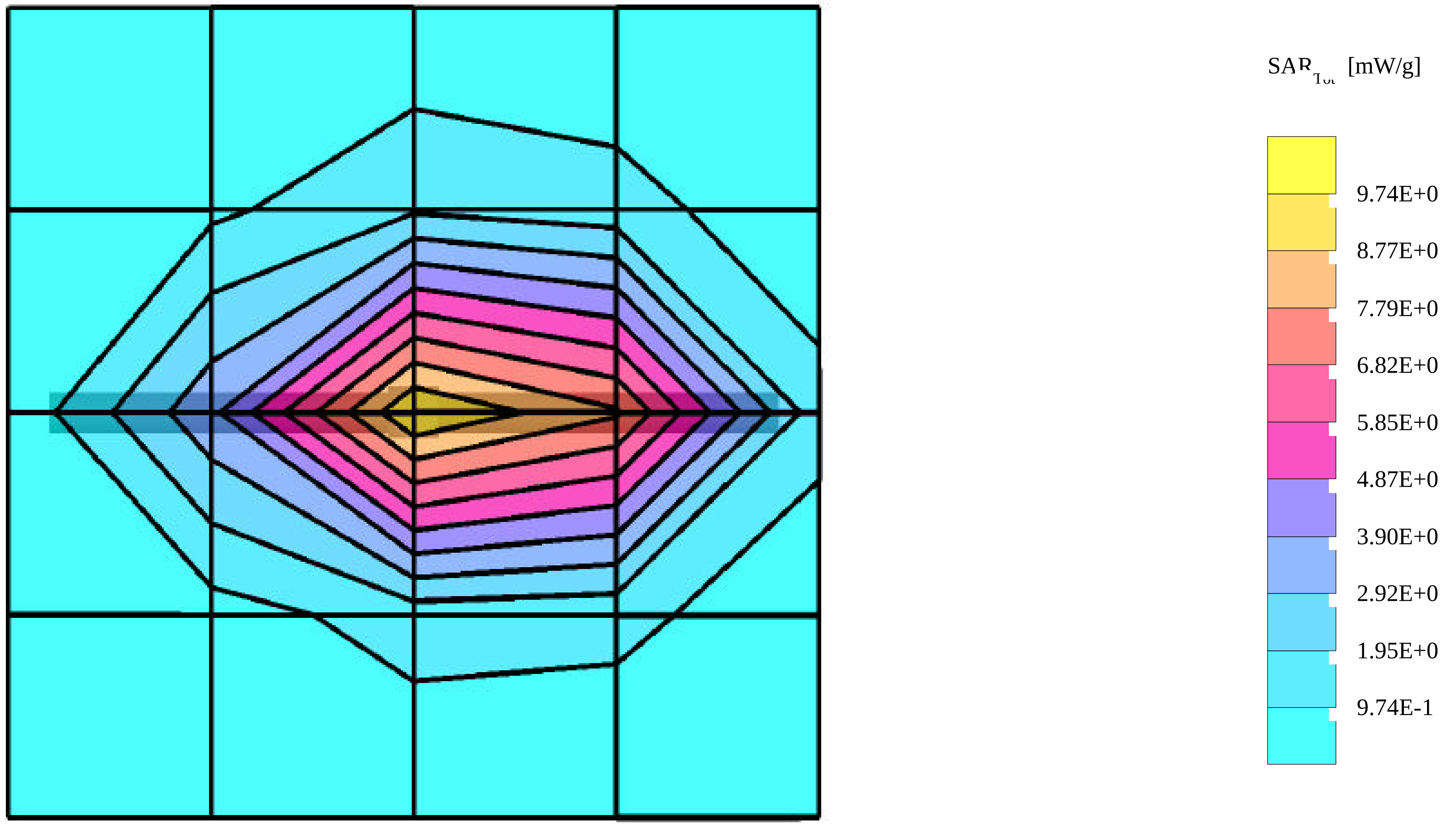
SAM High Band Phantom; Flat Section; Position: (90°,59°); horinzontal angle until touching head (80°-90°);
; Head - 20; Probe: ET3DV6R - SN1429; ConvF(5.00,5.00,5.00); Crest factor: 1.0; Head 1800 MHz (SAM): $\sigma$ = 1.38 mho/m $\varepsilon_r$ = 38.8 $\rho$ = 1.00 g/cm$^3$
Cube 7x7x7: SAR (1g): 9.89 mW/g, SAR (10g): 5.12 mW/g, (Worst-case extrapolation)
Cube 7x7x7: Dx = 5.0, Dy = 5.0, Dz = 5.0



08/22/02 Temp = 22° C ± 1°

# Dipole 1800 MHz

SAM High Band Phantom; Flat Section; Position: (90°,90°); horinzontal angle until touching head (80°-90°);
; Head - 22; Probe: ET3DV6R - SN1429; ConvF(5.00,5.00,5.00); Crest factor: 1.0; Head 1800 MHz (SAM): $\sigma$ = 1.38 mho/m $\varepsilon_r$ = 38.7 $\rho$ = 1.00 g/cm$^3$
Cubes (2): SAR (1g): 9.91 mW/g ± 0.03 dB, SAR (10g): 5.16 mW/g ± 0.02 dB, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.01 dB

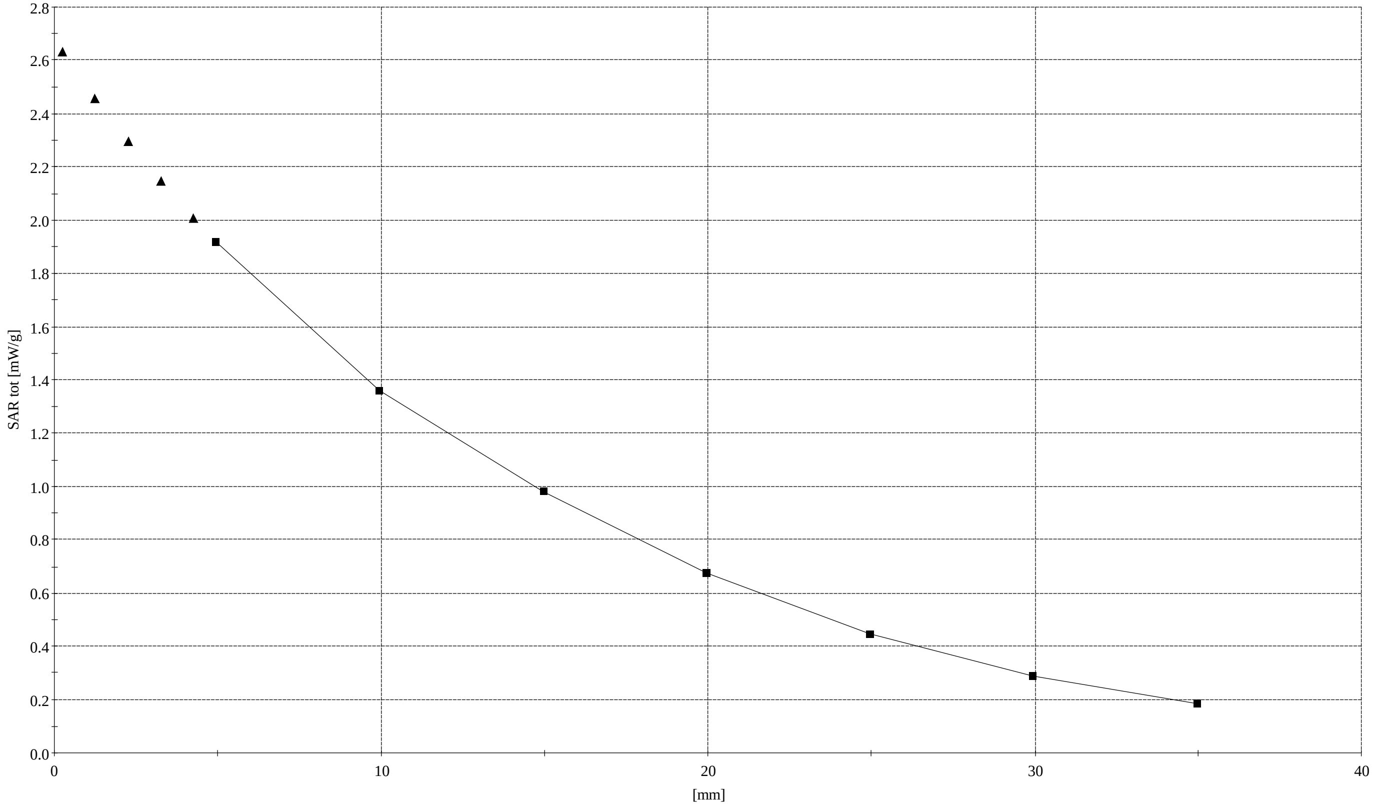



TCC, Copenhagen

08/22/02 Temp = 22° C ± 1°

# Dipole 1800 MHz

SAM High Band Phantom; Flat Section; Position: (90°,59°); horinzontal angle until touching head (80°-90°);
; Head - 22; Probe: ET3DV6R - SN1429; ConvF(5.00,5.00,5.00); Crest factor: 1.0; Head 1800 MHz (SAM): $\sigma$ = 1.38 mho/m $\varepsilon_r$ = 38.7 $\rho$ = 1.00 g/cm$^3$
Cube 5x5x7: SAR (1g): 9.84 mW/g, SAR (10g): 5.13 mW/g, (Worst-case extrapolation)
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0

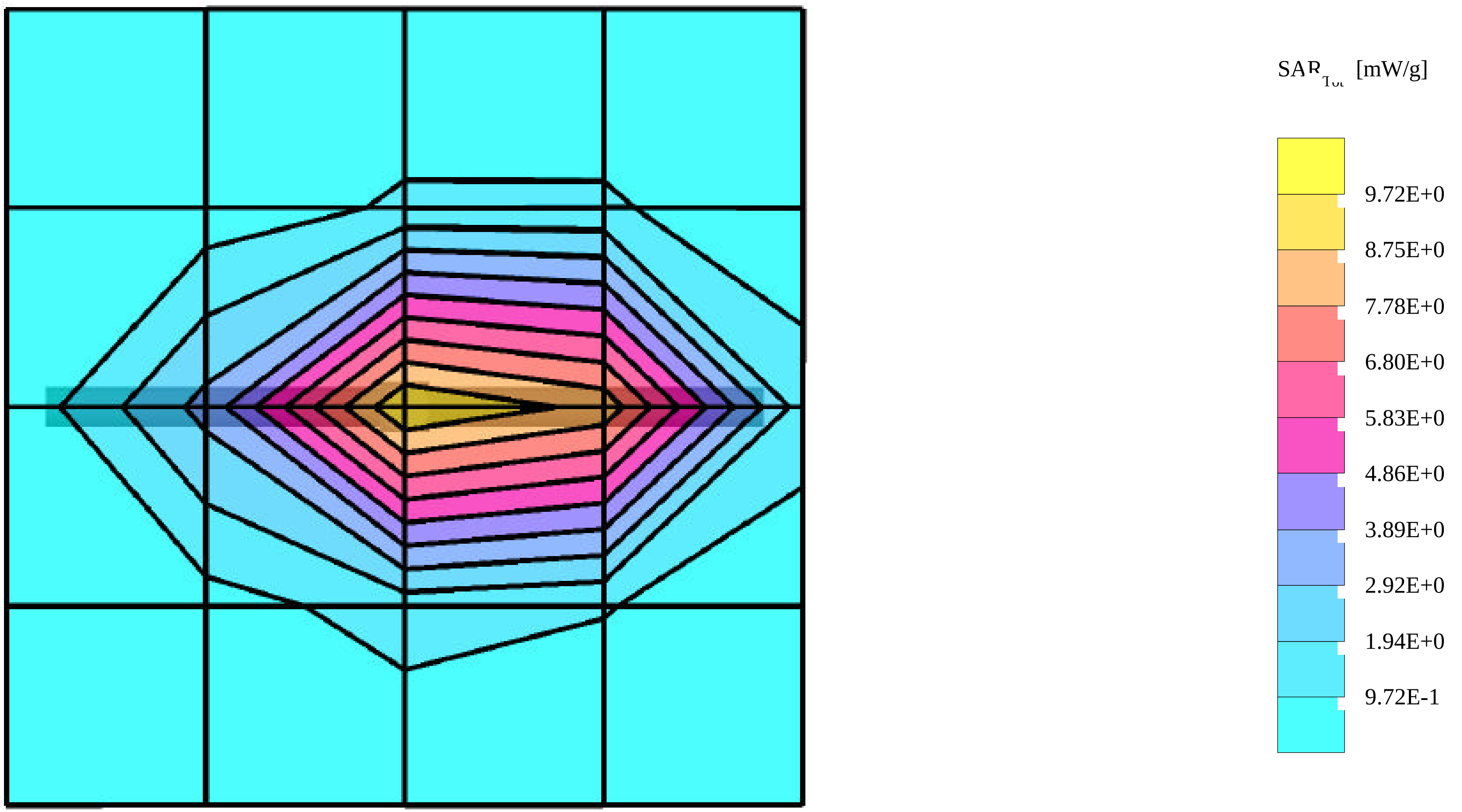



TCC, Copenhagen

08/26/02 Temp = 22° C ± 1°

# Dipole 1800 MHz

SAM High Band Phantom; Flat Section; Position: (90°,90°); Body;
; Body - 26; Probe: ET3DV6R - SN1429; ConvF(4.70,4.70,4.70); Crest factor: 1.0; Validation Body 1800-2000 MHz (SAM): $\sigma$ = 1.50 mho/m $\varepsilon_r$ = 51.1 $\rho$ = 1.00 g/cm$^3$
Cubes (2): SAR (1g): 9.97 mW/g ± 0.04 dB, SAR (10g): 5.21 mW/g ± 0.03 dB, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.00 dB

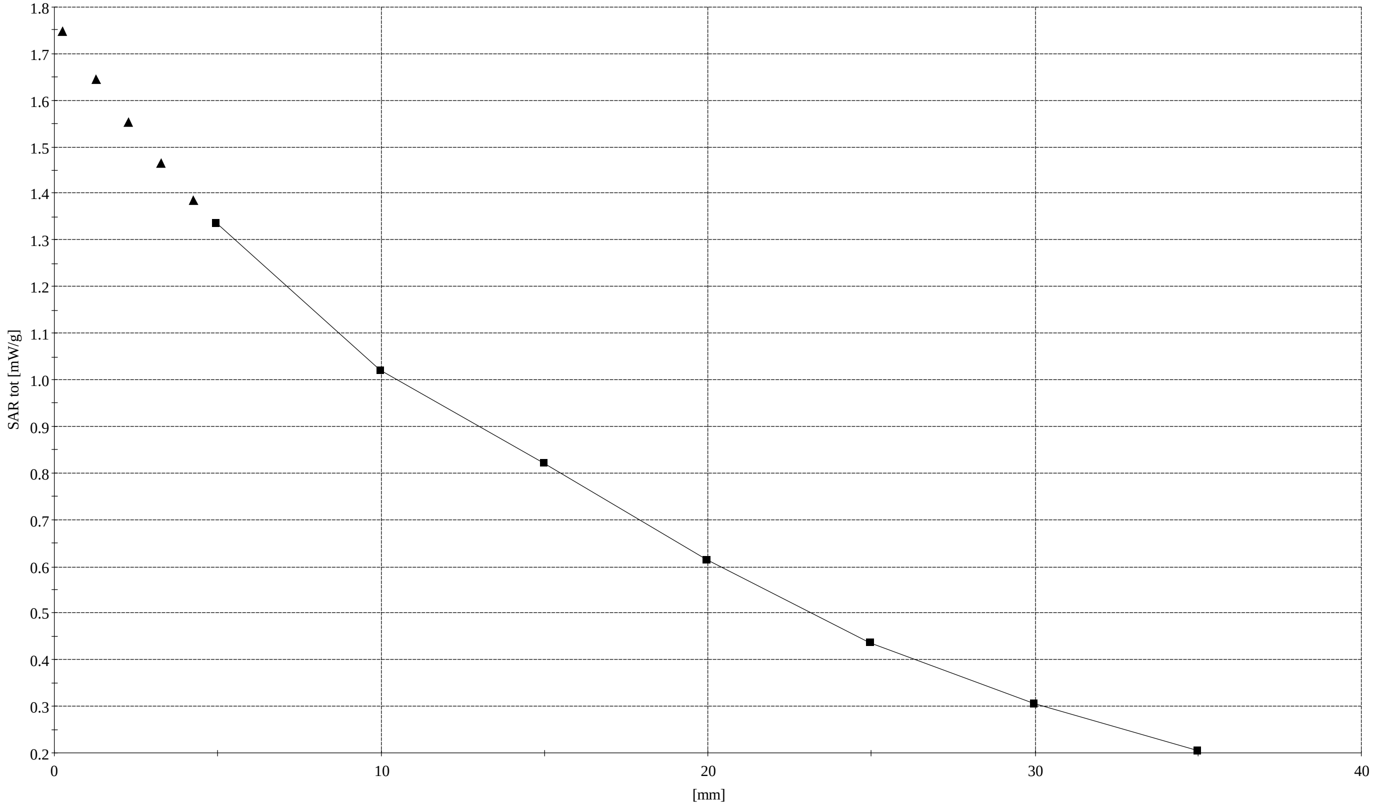



TCC, Copenhagen

08/26/02 Temp = 22° C ± 1°

# Dipole 1800 MHz

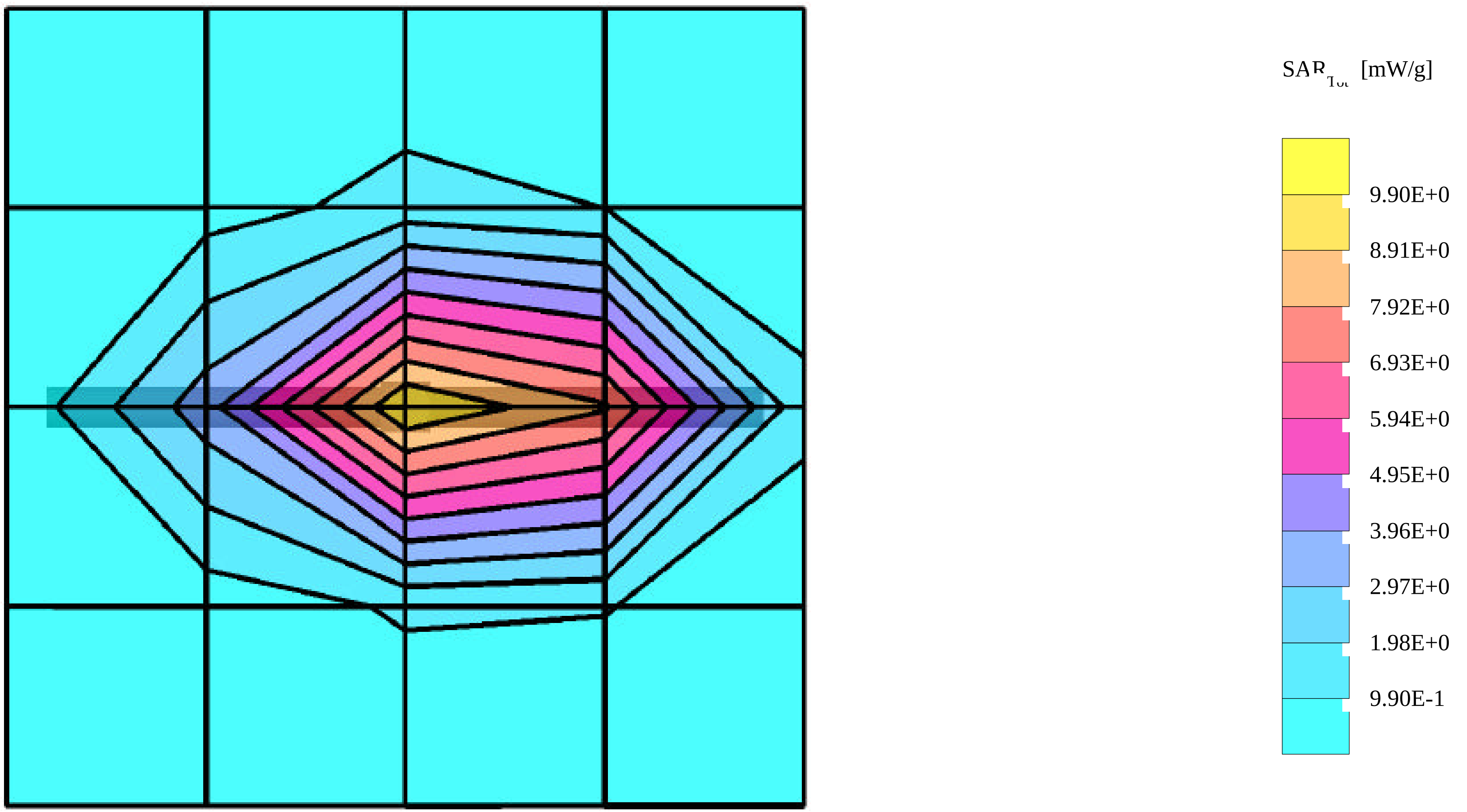
SAM High Band Phantom; Flat Section; Position: (90°,59°); Body;
; Body - 26; Probe: ET3DV6R - SN1429; ConvF(4.70,4.70,4.70); Crest factor: 1.0; Validation Body 1800-2000 MHz (SAM): $\sigma$ = 1.50 mho/m $\varepsilon_r$ = 51.1 $\rho$ = 1.00 g/cm$^3$
Cube 5x5x7: SAR (1g): 9.88 mW/g, SAR (10g): 5.17 mW/g, (Worst-case extrapolation)
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0



09/02/02 Temp = 22° C ± 1°

# Dipole 1800 MHz

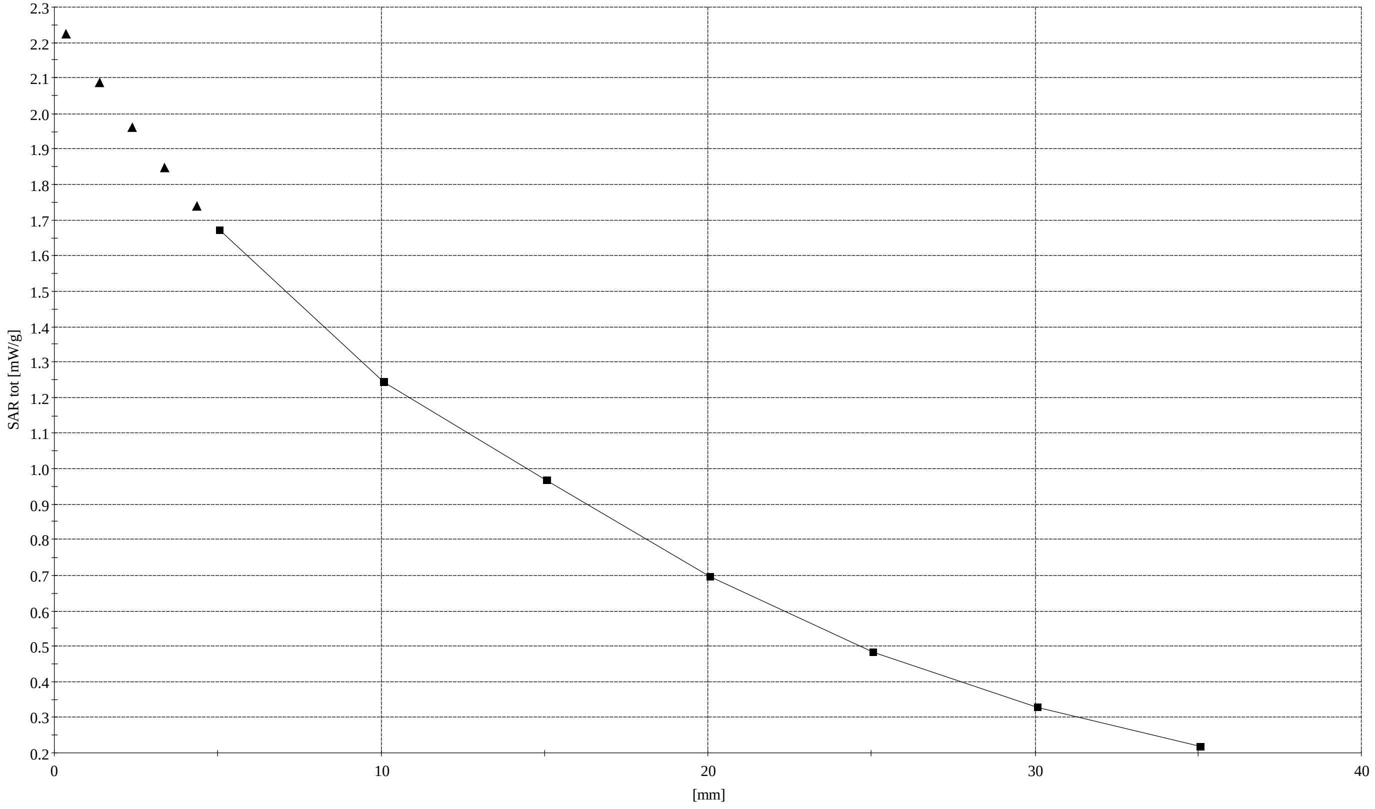
SAM High Band Phantom; Flat Section; Position: (90°,90°); horinzontal angle until touching head (80°-90°);
; Body - 02; Probe: ET3DV6R - SN1429; ConvF(4.70,4.70,4.70); Crest factor: 1.0; Validation Body 1800-2000 MHz (SAM): σ = 1.48 mho/m $\varepsilon_r$ = 51.3 ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 9.96 mW/g ± 0.05 dB, SAR (10g): 5.21 mW/g ± 0.04 dB, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: 0.05 dB



09/02/02 Temp = 22° C ± 1°

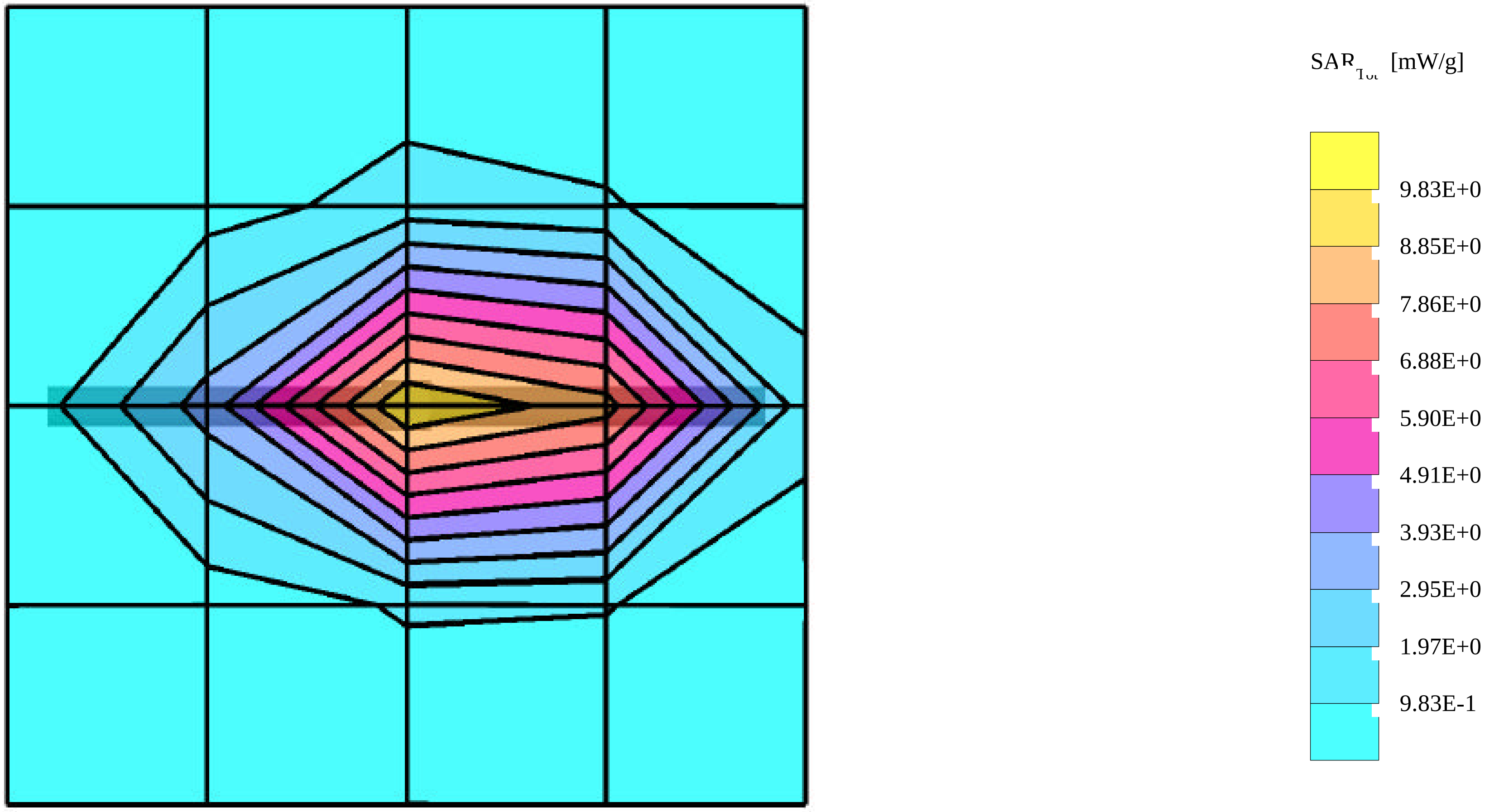
# Dipole 1800 MHz

SAM High Band Phantom; Flat Section; Position: (90°,59°); horinzontal angle until touching head (80°-90°);
; Body - 02; Probe: ET3DV6R - SN1429; ConvF(4.70,4.70,4.70); Crest factor: 1.0; Validation Body 1800-2000 MHz (SAM): $\sigma$ = 1.48 mho/m $\epsilon_r$ = 51.3 $\rho$ = 1.00 g/cm$^3$
Cube 5x5x7: SAR (1g): 9.85 mW/g, SAR (10g): 5.17 mW/g, (Worst-case extrapolation)
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0



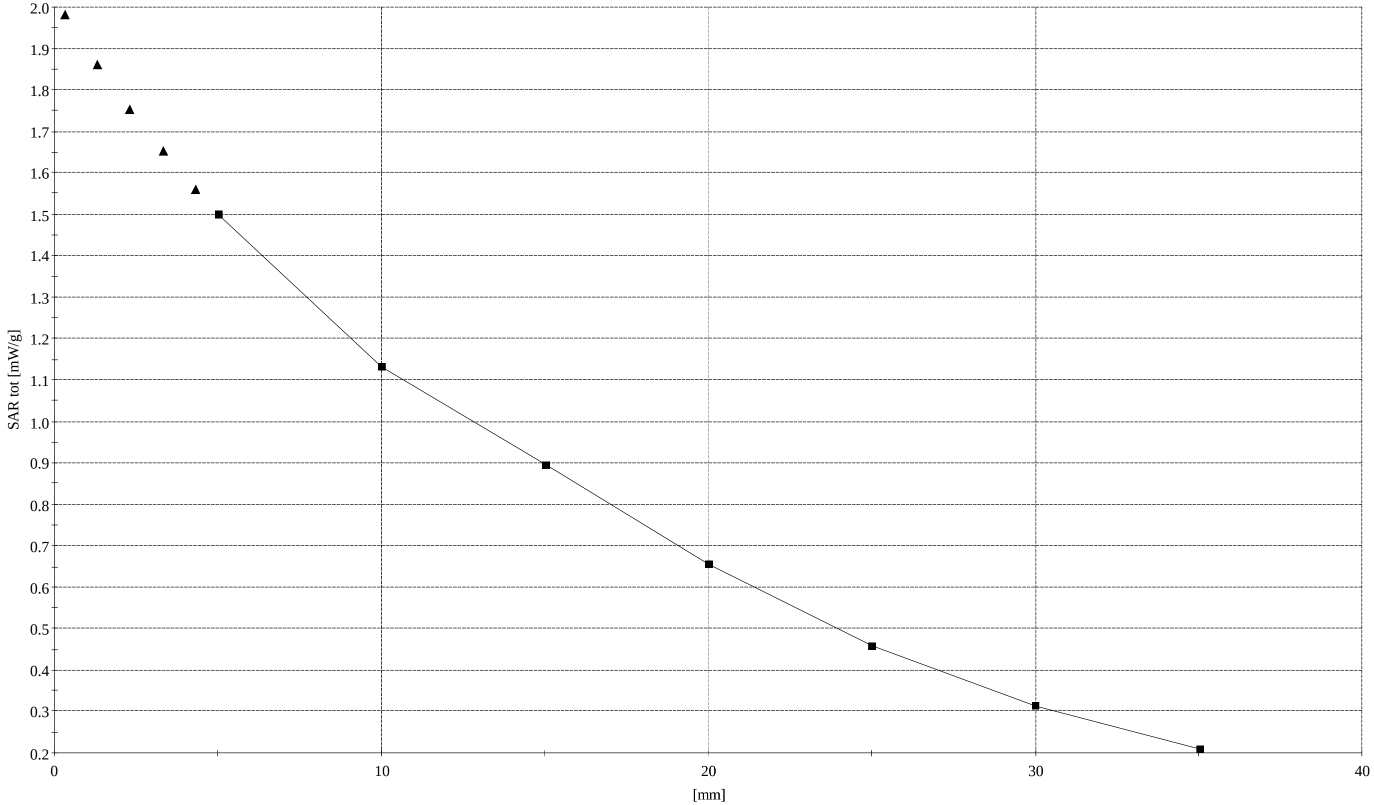
# Dipole 1800 MHz

SAM High Band Phantom; Flat Section; Position: (90°,90°); horinzontal angle until touching head (80°-90°);
; Body - 03; Probe: ET3DV6R - SN1429; ConvF(4.70,4.70,4.70); Crest factor: 1.0; Validation Body 1800-2000 MHz (SAM): $\sigma$ = 1.48 mho/m $\varepsilon_r$ = 51.2 $\rho$ = 1.00 g/cm³
Cubes (2): SAR (1g): 9.99 mW/g ± 0.05 dB, SAR (10g): 5.24 mW/g ± 0.04 dB, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: 0.05 dB



# Dipole 1800 MHz

SAM High Band Phantom; Flat Section; Position: (90°,59°); horinzontal angle until touching head (80°-90°);
; Body - 03; Probe: ET3DV6R - SN1429; ConvF(4.70,4.70,4.70); Crest factor: 1.0; Validation Body 1800-2000 MHz (SAM): $\sigma$ = 1.48 mho/m $\varepsilon_r$ = 51.2 $\rho$ = 1.00 g/cm$^3$
Cube 5x5x7: SAR (1g): 9.87 mW/g, SAR (10g): 5.20 mW/g, (Worst-case extrapolation)
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0



## 9. ANNEX C: CALIBRATION CERTIFICATES




Frederikskaj, DK-1790 Copenhagen V, Denmark
Tel. +4533292929 Fax. +4533292001

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: | **230** |
| Place of Calibration: | **Zurich** |
| Date of Calibration: | **October 25, 2001** |
| 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: *Pokovic Katja*

Approved by: *N. Kuster*