# SAR TEST REPORT

## No. 2009EEE00927

**For**

**HUAWEI Technologies Co., Ltd.**

**HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth**

**U3315h**

**With**

**Hardware Version: HD3U330M VER.B**

**Software Version: V100R001C01B703**

**FCCID: QISU3315H**

**Issued Date: 2009-03-10**

Deutscher Akkreditierungs Rat

*No.* **DAT-P-114/01-01**

CNAS 检 测 CNAS L0442

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of TMC Beijing.

**Test Laboratory:**

TMC Beijing, Telecommunication Metrology Center of Ministry of Information Industry

No. 52, Huayuan Bei Road, Haidian District, Beijing, P. R. China 100083.

Tel:+86(0)10-62303288-2084, Fax:+86(0)10-62304793 Email:welcome@emcite.com. www.emcite.com

# TABLE OF CONTENT

# 1 Test Laboratory

## 1.1 Testing Location

| | |
|---|---|
| Company Name: | TMC Beijing, Telecommunication Metrology Center of MII |
| Address: | No 52, Huayuan beilu, Haidian District, Beijing,P.R.China |
| Postal Code: | 100083 |
| Telephone: | +86-10-62303288 |
| Fax: | +86-10-62304793 |

## 1.2 Testing Environment

| | |
|---|---|
| Temperature: | 18°C~25 °C, |
| Relative humidity: | 30%~ 70% |
| Ground system resistance: | < 0.5 Ω |

Ambient noise is checked and found very low and in compliance with requirement of standards.
Reflection of surrounding objects is minimized and in compliance with requirement of standards.

## 1.3 Project Data

| | |
|---|---|
| Project Leader: | Qi Dianyuan |
| Test Engineer: | Lin Xiaojun |
| Testing Start Date: | March 4, 2009 |
| Testing End Date: | March 5, 2009 |

## 1.4 Signature

Lin Xiaojun
**(Prepared this test report)**

Qi Dianyuan
**(Reviewed this test report)**

Lu Bingsong
**Deputy Director of the laboratory**
**(Approved this test report)**

# 2 Client Information

## 2.1 Applicant Information

| | |
|---|---|
| Company Name: | HUAWEI Technologies Co., Ltd. |
| Address /Post: | Bantian, Longgang District, Shenzhen, Guangdong |
| City: | Shenzhen |
| Postal Code: | 518129 |
| Country: | China |
| Telephone: | 010－82836505/010-82836728 |
| Fax: | 010－82836567 |

## 2.2 Manufacturer Information

| | |
|---|---|
| Company Name: | HUAWEI Technologies Co., Ltd. |
| Address /Post: | Bantian, Longgang District, Shenzhen, Guangdong |
| City: | Shenzhen |
| Postal Code: | 518129 |
| Country: | China |
| Telephone: | 010－82836505/010-82836728 |
| Fax: | 010－82836567 |

# 3 Equipment Under Test (EUT) and Ancillary Equipment (AE)

## 3.1 About EUT

| | |
|---|---|
| Description: | HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth |
| Model: | U3315h |
| Test Frequency Band: | GSM 850/GSM 1900 |
| GPRS Class: | 10 |

## 3.2 Internal Identification of EUT used during the test

| EUT ID* | SN or IMEI | HW Version | SW Version |
|---|---|---|---|
| EUT1 | 359743020000222 | HD3U330M VER.B | V100R001C01B703 |

*EUT ID: is used to identify the test sample in the lab internally.

## 3.3 Internal Identification of AE used during the test

| AE ID* | Description | Model | SN | Manufacturer |
|---|---|---|---|---|
| AE1 | Travel Adapter | CHG5065-3C | HKY8B0401581 | HUAWEI technologies Co., Ltd |
| AE2 | Battery | HBU570 | FMT811506853Y | Shenzhen FMT Co., Ltd. |

*AE ID: is used to identify the test sample in the lab internally.

# 4 CHARACTERISTICS OF THE TEST

## 4.1 Applicable Limit Regulations

**EN 50360–2006:** Product standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones.

It specifies the maximum exposure limit of **2.0 W/kg** as averaged over any 10 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

**ANSI C95.1–1999:** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

It specifies the maximum exposure limit of **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

## 4.2 Applicable Measurement Standards

**EN 62209-1–2006:** Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz).

**IEEE 1528–2003:** Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques.

**OET Bulletin 65 (Edition 97-01) and Supplement C(Edition 01-01):** Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits.

**IEC 62209-1:** Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1:Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)

**IEC 62209-2 (Draft)**: Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures – Part 2: Procedure to determine the Specific Absorption Rate (SAR)in the head and body for 30MHz to 6GHz Handheld and Body-Mounted Devices used in close proximity to the Body.

They specify the measurement method for demonstration of compliance with the SAR limits for such equipments.

# 5 OPERATIONAL CONDITIONS DURING TEST

## 5.1 Schematic Test Configuration

### 5.1.1 SAR Measurement Procedures for WCDMA 850MHz and WCDMA 1900MHZ

For the SAR tests at WCDMA 850MHz and WCDMA 1900MHz, a communication link is set up with a System Simulator (SS) by air link. The maximum output power were verified on high, middle and low channels for each test band according to section 5.2 of 3GPP TS 34.121 using 12.2kbps RMC and AMR with TPC set to all “1’s”

(Please see 6.2.2 Table 3 for the above detailed power measurement results.)

Head and body SAR are both measured using the 12.2kbps RMC with TPC bits configured to all “1”s, and not required for 12.2kbps AMR, because the maximum output power for 1.2kps AMR is less than 0.25dB higher than that measured in 12.2kbps RMC. For body SAR measurement, the multiple $DPDCH_n$ configurations are also not required, because the EUT can’t support it.

### 5.1.2 SAR Measurement Procedures for GSM 850MHz and GSM 1900MHZ

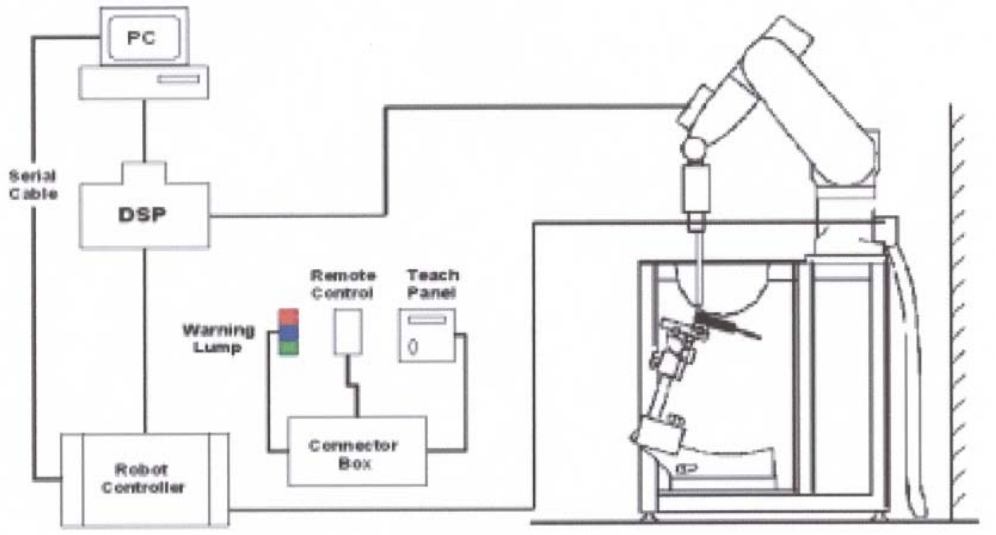
For the SAR tests at GSM 850 and GSM 1900, a communication link is set up with a System Simulator (SS) by air link. The EUT is commanded to operate at maximum transmitting power.

In order to determine the highest value of the peak spatial-average SAR of the EUT, it was tested at middle frequency (cheek and tilt, for both left and right sides of the SAM phantom). After found the worst case, perform the tests at the high and low frequencies. In addition, for all other conditions where the peak spatial-average SAR value determined is within 3 dB of the applicable SAR limit, all other test frequencies shall be tested as well.

## 5.2 SAR Measurement Set-up

These measurements were performed with the automated near-field scanning system DASY4 Professional from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision robot (working range greater than 0.9m) which positions the probes with a positional repeatability of better than ± 0.02mm. Special E-field and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines (length =300mm) to the data acquisition unit.

A cell controller system contains the power supply, robot controller, teaches pendant (Joystick), and remote control, is used to drive the robot motors. The PC consists of the Micron Pentium III 800 MHz computer with Windows 2000 system and SAR Measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Stäubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.




**Picture 1: SAR Lab Test Measurement Set-up**

The DAE consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

## 5.3 Dasy4 E-field Probe System

The SAR measurements were conducted with the dosimetric probe ES3DV3 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the standard procedure with an accuracy of better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB.

### ES3DV3 Probe Specification

| | |
|---|---|
| Construction | Symmetrical design with triangular core<br>Interleaved sensors<br>Built-in shielding against static charges<br>PEEK enclosure material (resistant to organic solvents, e.g., DGBE) |
| Calibration | Basic Broad Band Calibration in air<br>Conversion Factors (CF) for HSL 900 and HSL 1810<br>Additional CF for other liquids and frequencies upon request |
| Frequency | 10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz) |
| Directivity | ± 0.2 dB in HSL (rotation around probe axis)<br>± 0.3 dB in tissue material (rotation normal to probe axis) |

**Picture 2: ES3DV3 E-field Probe**

| | |
|---|---|
| Dynamic Range | 5 μW/g to > 100 mW/g; Linearity: ± 0.2 dB |
| Dimensions | Overall length: 330 mm (Tip: 20 mm)<br>Tip diameter: 3.9 mm (Body: 12 mm)<br>Distance from probe tip to dipole centers: 2.0 mm |
| Application | General dosimetry up to 4 GHz<br>Dosimetry in strong gradient fields<br>Compliance tests of mobile phones |

**Picture3:ES3DV3 E-field probe**

## 5.4 E-field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

Where: $\Delta t$ = Exposure time (30 seconds),
$C$ = Heat capacity of tissue (brain or muscle),
$\Delta T$ = Temperature increase due to RF exposure.

Or

$$SAR = \frac{|E|^2 \sigma}{\rho}$$

Where:
$\sigma$ = Simulated tissue conductivity,
$\rho$ = Tissue density (kg/m$^3$).

**Picture 4: Device Holder**

## 5.5 Other Test Equipment

### 5.5.1 Device Holder for Transmitters

In combination with the Generic Twin Phantom V3.0, the Mounting Device (POM) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeatably positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

### 5.5.2 Phantom

The Generic Twin Phantom is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

| | |
|---|---|
| Shell Thickness | 2±0. l mm |
| Filling Volume | Approx. 20 liters |
| Dimensions | 810 x l000 x 500 mm (H x L x W) |
| Available | Special |

**Picture 5: Generic Twin Phantom**

## 5.6 Equivalent Tissues

The liquid used for the frequency range of 800-2000 MHz consisted of water, sugar, salt and Cellulose. The liquid has been previously proven to be suited for worst-case. The Table 1 and 2 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528.

**Table 1. Composition of the Head Tissue Equivalent Matter**

| MIXTURE % | FREQUENCY 850MHz |
|---|---|
| Water | 41.45 |
| Sugar | 56.0 |
| Salt | 1.45 |
| Preventol | 0.1 |
| Cellulose | 1.0 |
| Dielectric Parameters Target Value | f=850MHz ε=41.5 σ=0.90 |
| MIXTURE % | FREQUENCY 1900MHz |
| Water | 55.242 |
| Glycol monobutyl | 44.452 |
| Salt | 0.306 |
| Dielectric Parameters Target Value | f=1900MHz ε=40.0 σ=1.40 |

**Table 2. Composition of the Body Tissue Equivalent Matter**

| MIXTURE % | FREQUENCY 850MHz |
|---|---|
| Water | 52.5 |
| Sugar | 45.0 |
| Salt | 1.4 |
| Preventol | 0.1 |
| Cellulose | 1.0 |
| Dielectric Parameters Target Value | f=850MHz ε=55.2 σ=0.97 |
| MIXTURE % | FREQUENCY 1900MHz |
| Water | 69.91 |
| Glycol monobutyl | 29.96 |
| Salt | 0.13 |
| Dielectric Parameters Target Value | f=1900MHz ε=53.3 σ=1.52 |

### 5.7 System Specifications

### 5.7.1 Robotic System Specifications

**Specifications**

**Positioner:** Stäubli Unimation Corp. Robot Model: RX90L
**Repeatability:** ±0.02 mm
**No. of Axis:** 6

**Data Acquisition Electronic (DAE) System**

**Cell Controller**

**Processor:** Pentium III
**Clock Speed:** 800 MHz
**Operating System:** Windows 2000

**Data Converter**

**Features:**Signal Amplifier, multiplexer, A/D converter, and control logic
**Software:** DASY4 software
**Connecting Lines:** Optical downlink for data and status info.
Optical uplink for commands and clock

# 6 CONDUCTED OUTPUT POWER MEASUREMENT

### 6.1 Summary

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMU-200) to ensure the maximum power transmission and proper modulation. This result contains conducted output power and ERP for the EUT. In all cases, the measured peak output power should be greater and within 5% than EMI measurement.

### 6.2 Conducted Power

#### 6.2.1 Measurement Methods

The EUT was set up for the maximum output power. The channel power was measured with Agilent Spectrum Analyzer E4440A. These measurements were done at low, middle and high channels for each test bands both before and after SAR test.

### 6.2.2 Measurement result

**Table 3: Conducted Power Measurement Results**

| **WCDMA 850 (12.2kbps RMC)** | **Conducted Power** | | |
|---|---|---|---|
| | **Channel 4132 (826.4MHz)** | **Channel 4182 (836.4MHz)** | **Channel 4233 (846.6MHz)** |
| Before Test (dBm) | 22.56 | 22.48 | 22.53 |
| After Test (dBm) | 22.55 | 22.47 | 22.52 |
| **WCDMA 1900 (12.2kbps RMC)** | **Conducted Power** | | |
| | **Channel 9262 (1852.4MHz)** | **Channel 9400 (1880MHz)** | **Channel 9538 (1907.6MHz)** |
| Before Test (dBm) | 22.44 | 22.52 | 22.48 |
| After Test (dBm) | 22.43 | 22.51 | 22.49 |
| **WCDMA 850 (64kbps AMR)** | **Conducted Power** | | |
| | **Channel 4132 (826.4MHz)** | **Channel 4182 (836.4MHz)** | **Channel 4233 (846.6MHz)** |
| Before Test (dBm) | 22.55 | 22.46 | 22.52 |
| After Test (dBm) | 22.54 | 22.47 | 22.51 |
| **WCDMA 1900 (64kbps AMR)** | **Conducted Power** | | |
| | **Channel 9262 (1852.4MHz)** | **Channel 9400 (1880MHz)** | **Channel 9538 (1907.6MHz)** |
| Before Test (dBm) | 22.42 | 22.50 | 22.46 |
| After Test (dBm) | 22.43 | 22.51 | 22.47 |
| **HSDPA 850 (βc/βd=2/15)** | **Conducted Power** | | |
| | **Channel 4132 (826.4MHz)** | **Channel 4182 (836.4MHz)** | **Channel 4233 (846.6MHz)** |
| Before Test (dBm) | 22.27 | 22.38 | 22.32 |
| After Test (dBm) | 22.26 | 22.39 | 22.31 |
| **HSDPA 850 (βc/βd=12/15)** | **Conducted Power** | | |
| | **Channel 4132 (826.4MHz)** | **Channel 4182 (836.4MHz)** | **Channel 4233 (846.6MHz)** |
| Before Test (dBm) | 21.21 | 21.16 | 21.28 |
| After Test (dBm) | 21.22 | 21.17 | 21.27 |
| **HSDPA 850 (βc/βd=15/8)** | **Conducted Power** | | |
| | **Channel 4132 (826.4MHz)** | **Channel 4182 (836.4MHz)** | **Channel 4233 (846.6MHz)** |
| Before Test (dBm) | 20.81 | 20.74 | 20.63 |
| After Test (dBm) | 20.82 | 20.73 | 20.61 |
| **HSDPA 850 (βc/βd=15/4)** | **Conducted Power** | | |
| | **Channel 4132 (826.4MHz)** | **Channel 4182 (836.4MHz)** | **Channel 4233 (846.6MHz)** |
| Before Test (dBm) | 19.75 | 19.70 | 19.58 |
| After Test (dBm) | 19.76 | 19.71 | 19.57 |

| **HSDPA 1900 (βc/βd=2/15)** | **Conducted Power** | | |
|---|---|---|---|
| | **Channel 9262 (1852.4MHz)** | **Channel 9400 (1880MHz)** | **Channel 9538 (1907.6MHz)** |
| Before Test (dBm) | 22.52 | 22.56 | 22.63 |
| After Test (dBm) | 22.51 | 22.57 | 22.64 |
| **HSDPA 1900 (βc/βd=12/15)** | **Conducted Power** | | |
| | **Channel 9262 (1852.4MHz)** | **Channel 9400 (1880MHz)** | **Channel 9538 (1907.6MHz)** |
| Before Test (dBm) | 21.23 | 21.41 | 21.39 |
| After Test (dBm) | 21.24 | 21.42 | 21.38 |
| **HSDPA 1900 (βc/βd=15/8)** | **Conducted Power** | | |
| | **Channel 9262 (1852.4MHz)** | **Channel 9400 (1880MHz)** | **Channel 9538 (1907.6MHz)** |
| Before Test (dBm) | 21.08 | 21.15 | 21.19 |
| After Test (dBm) | 21.07 | 21.16 | 21.18 |
| **HSDPA 1900 (βc/βd=15/4)** | **Conducted Power** | | |
| | **Channel 9262 (1852.4MHz)** | **Channel 9400 (1880MHz)** | **Channel 9538 (1907.6MHz)** |
| Before Test (dBm) | 20.23 | 20.17 | 20.05 |
| After Test (dBm) | 20.24 | 20.18 | 20.04 |
| **GSM 850MHz** | **Conducted Power** | | |
| | **Channel 128 (824.2MHz)** | **Channel 190 (836.6MHz)** | **Channel 251 (848.8MHz)** |
| Before Test (dBm) | 32.23 | 32.25 | 32.18 |
| After Test (dBm) | 32.24 | 32.24 | 32.17 |
| **GSM 850MHz GPRS** | **Conducted Power** | | |
| | **Channel 128 (824.2MHz)** | **Channel 190 (836.6MHz)** | **Channel 251 (848.8MHz)** |
| Before Test (dBm) | 32.22 | 32.24 | 32.16 |
| After Test (dBm) | 32.21 | 32.25 | 32.17 |
| **GSM 850MHz EGPRS** | **Conducted Power** | | |
| | **Channel 128 (824.2MHz)** | **Channel 190 (836.6MHz)** | **Channel 251 (848.8MHz** |
| Before Test (dBm) | 26.81 | 26.87 | 26.84 |
| After Test (dBm) | 26.80 | 26.88 | 26.83 |
| **GSM 1900MHZ** | **Conducted Power** | | |
| | **Channel 512 (1850.2MHz)** | **Channel 661 (1880MHz)** | **Channel 810 (1909.8MHz)** |
| Before Test (dBm) | 29.55 | 29.62 | 29.58 |
| After Test (dBm) | 29.54 | 29.63 | 29.57 |
| **GSM 1900MHZ GPRS** | **Conducted Power** | | |

| | Channel 512 (1850.2MHz) | Channel 661 (1880MHz) | Channel 810 (1909.8MHz) |
|---|---|---|---|
| Before Test (dBm) | 29.54 | 29.61 | 29.55 |
| After Test (dBm) | 29.53 | 29.60 | 29.56 |
| **GSM 1900MHZ EGPRS** | **Conducted Power** | | |
| | **Channel 512 (1850.2MHz)** | **Channel 661 (1880MHz)** | **Channel 810 (1909.8MHz)** |
| Before Test (dBm) | 26.35 | 26.44 | 26.27 |
| After Test (dBm) | 26.36 | 26.43 | 26.28 |

**Note:** HSDPA body SAR are not required, because maximum average output power of each RF channel with HSDPA active is not 1/4 dB higher than that measured without HSDPA and the maximum SAR for WCDMA850 and WCDMA1900 are not above 75% of the SAR limit (see table 9,10,13 and 14 for the SAR measurement results).

### 6.2.3 Power Drift

To control the output power stability during the SAR test, DASY4 system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in Table 7 to Table 26 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

# 7 TEST RESULTS

## 7.1 Dielectric Performance

**Table 4: Dielectric Performance of Head Tissue Simulating Liquid**

| Measurement is made at temperature 23.3 °C and relative humidity 49%.<br>Liquid temperature during the test: 22.5°C<br>Measurement Date : 850 MHz **Mar 4, 2009** 1900 MHz **Mar 5, 2009** | | | |
|---|---|---|---|
| / | **Frequency** | **Permittivity ε** | **Conductivity σ (S/m)** |
| **Target value** | 850 MHz | 41.5 | 0.90 |
| | 1900 MHz | 40.0 | 1.40 |
| **Measurement value (Average of 10 tests)** | 850 MHz | 40.3 | 0.92 |
| | 1900 MHz | 39.2 | 1.42 |

**Table 5: Dielectric Performance of Body Tissue Simulating Liquid**

| Measurement is made at temperature 23.3 °C and relative humidity 49%.<br>Liquid temperature during the test: 22.5°C<br>Measurement Date : 850 MHz **Mar 4, 2009** 1900 MHz **Mar 5, 2009** | | | |
|---|---|---|---|
| / | **Frequency** | **Permittivity ε** | **Conductivity σ (S/m)** |
| **Target value** | 850 MHz | 55.2 | 0.97 |
| | 1900 MHz | 53.3 | 1.52 |
| **Measurement value (Average of 10 tests)** | 850 MHz | 53.7 | 1.00 |
| | 1900 MHz | 52.3 | 1.56 |

## 7.2 System Validation

**Table 6: System Validation**

| Measurement is made at temperature 23.3 °C, relative humidity 49%, input power 250 mW.<br>Liquid temperature during the test: 22.5°C<br>Measurement Date : 850 MHz **Mar 4, 2009** 1900 MHz **Mar 5, 2009** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Liquid parameters** | Dipole calibration Target value | **Frequency** | | **Permittivity ε** | | **Conductivity σ (S/m)** | |
| | | 835 MHz | | 39.9 | | 0.88 | |
| | | 1900 MHz | | 38.9 | | 1.38 | |
| | Actural Measurement value | 835 MHz | | 40.4 | | 0.90 | |
| | | 1900 MHz | | 39.2 | | 1.42 | |
| **Verification results** | **Frequency** | **Target value (W/kg)** | | **Measured value (W/kg)** | | **Deviation** | |
| | | **10 g Average** | **1 g Average** | **10 g Average** | **1 g Average** | **10 g Average** | **1 g Average** |
| | 835 MHz | 1.60 | 2.48 | 1.62 | 2.50 | 1.25% | 0.81% |
| | 1900 MHz | 5.09 | 9.73 | 5.27 | 9.91 | 3.54% | 1.9% |

Note：Target values are the data of the dipole validation results, please check Annex F for the Dipole Calibration Certificate.

## 7.3 Summary of Measurement Results (WCDMA 850)

**Table 7: SAR Values (Head, WCDMA 850 MHz Band) – Slide down**

| **Limit of SAR (W/kg)** | **10 g Average** | **1 g Average** | **Power Drift (dB)** |
|---|---|---|---|
| | **2.0** | **1.6** | |
| **Test Case** | **Measurement Result** | | |
| | **10 g Average** | **1 g Average** | |
| Left hand, Touch cheek, Top frequency(See Fig.1) | 0.100 | 0.134 | 0.178 |
| Left hand, Touch cheek, Mid frequency(See Fig.3) | 0.073 | 0.099 | -0.135 |
| Left hand, Touch cheek, Bottom frequency(See Fig.5) | 0.111 | 0.150 | 0.092 |
| Left hand, Tilt 15 Degree, Mid frequency(See Fig.7) | 0.050 | 0.067 | 0.164 |
| Right hand, Touch cheek, Mid frequency(See Fig.9) | 0.062 | 0.084 | 0.097 |
| Right hand, Tilt 15 Degree, Mid frequency(See Fig.11) | 0.051 | 0.069 | 0.00786 |

**Table 8: SAR Values (Head, WCDMA 850 MHz Band) – Slide up**

| **Limit of SAR (W/kg)** | **10 g Average** | **1 g Average** | **Power Drift (dB)** |
|---|---|---|---|
| | **2.0** | **1.6** | |
| **Test Case** | **Measurement Result (W/kg)** | | |
| | **10 g Average** | **1 g Average** | |
| Left hand, Touch cheek, Top frequency(See Fig.13) | 0.391 | 0.544 | -0.156 |
| Left hand, Touch cheek, Mid frequency(See Fig.15) | 0.288 | 0.398 | 0.082 |
| Left hand, Touch cheek, Bottom frequency(See Fig.17) | 0.336 | 0.464 | -0.159 |

| | | | |
|---|---|---|---|
| Left hand, Tilt 15 Degree, Mid frequency(See Fig.19) | 0.193 | 0.264 | -0.169 |
| Right hand, Touch cheek, Mid frequency(See Fig.21) | 0.283 | 0.392 | -0.130 |
| Right hand, Tilt 15 Degree, Mid frequency(See Fig.23) | 0.212 | 0.296 | 0.052 |

**Table 9: SAR Values (Body, WCDMA 850 MHz Band) – Slide down**

| Limit of SAR (W/kg) | 10 g Average | 1 g Average | Power Drift (dB) |
|---|---|---|---|
| | 2.0 | 1.6 | |
| Test Case | Measurement Result (W/kg) | | |
| | 10 g Average | 1 g Average | |
| Body, Towards Ground, Top frequency (See Fig.25) | 0.193 | 0.279 | 0.026 |
| Body, Towards Ground, Mid frequency (See Fig.27) | 0.141 | 0.204 | 0.027 |
| Body, Towards Ground, Bottom frequency (See Fig.29) | 0.221 | 0.318 | -0.074 |
| Body, Towards Phantom, Top frequency (See Fig.31) | 0.090 | 0.122 | 0.149 |
| Body, Towards Phantom, Mid frequency (See Fig.33) | 0.064 | 0.086 | -0.014 |
| Body, Towards Phantom, Bottom frequency (See Fig.35) | 0.101 | 0.137 | 0.107 |

**Table 10: SAR Values (Body, WCDMA 850 MHz Band) – Slide up**

| Limit of SAR (W/kg) | 10 g Average | 1 g Average | Power Drift (dB) |
|---|---|---|---|
| | 2.0 | 1.6 | |
| Test Case | Measurement Result (W/kg) | | |
| | 10 g Average | 1 g Average | |
| Body, Towards Ground, Top frequency (See Fig.37) | 0.406 | 0.562 | 0.123 |
| Body, Towards Ground, Mid frequency (See Fig.39) | 0.362 | 0.502 | 0.074 |
| Body, Towards Ground, Bottom frequency (See Fig.41) | 0.388 | 0.536 | -0.005 |
| Body, Towards Phantom, Top frequency (See Fig.43) | 0.377 | 0.521 | -0.085 |
| Body, Towards Phantom, Mid frequency (See Fig.45) | 0.320 | 0.442 | 0.005 |
| Body, Towards Phantom, Bottom frequency (See Fig.47) | 0.370 | 0.508 | 0.076 |
| Body, Towards Ground, Top frequency with Headset (See Fig.49) | 0.388 | 0.541 | -0.170 |

## 7.4 Summary of Measurement Results (WCDMA 1900)

**Table 11: SAR Values (Head, WCDMA 1900 MHz Band) – Slide down**

| Limit of SAR (W/kg) | 10 g Average | 1 g Average | Power Drift (dB) |
|---|---|---|---|
| | 2.0 | 1.6 | |
| Test Case | Measurement Result (W/kg) | | |
| | 10 g Average | 1 g Average | |
| Left hand, Touch cheek, Top frequency(See Fig.51) | 0.268 | 0.431 | -0.141 |

| | | | |
|---|---|---|---|
| Left hand, Touch cheek, Mid frequency(See Fig.53) | 0.311 | 0.501 | 0.123 |
| Left hand, Touch cheek, Bottom frequency(See Fig.55) | 0.283 | 0.438 | 0.052 |
| Left hand, Tilt 15 Degree, Mid frequency(See Fig.57) | 0.213 | 0.370 | 0.072 |
| Right hand, Touch cheek, Mid frequency(See Fig.59) | 0.269 | 0.422 | -0.119 |
| Right hand, Tilt 15 Degree, Mid frequency(See Fig.61) | 0.214 | 0.382 | -0.115 |

**Table 12: SAR Values (Head, WCDMA 1900 MHz Band) – Slide up**

| **Limit of SAR (W/kg)** | **10 g Average** | **1 g Average** | **Power Drift (dB)** |
|---|---|---|---|
| | **2.0** | **1.6** | |
| **Test Case** | **Measurement Result (W/kg)** | | |
| | **10 g Average** | **1 g Average** | |
| Left hand, Touch cheek, Top frequency (See Fig.63) | 0.227 | 0.389 | 0.100 |
| Left hand, Touch cheek, Mid frequency (See Fig.65) | 0.266 | 0.455 | 0.023 |
| Left hand, Touch cheek, Bottom frequency (See Fig.67) | 0.271 | 0.460 | -0.029 |
| Left hand, Tilt 15 Degree, Mid frequency (See Fig.69) | 0.122 | 0.193 | 0.133 |
| Right hand, Touch cheek, Mid frequency (See Fig.71) | 0.249 | 0.404 | 0.024 |
| Right hand, Tilt 15 Degree, Mid frequency (See Fig.73) | 0.138 | 0.228 | 0.056 |

**Table 13: SAR Values (Body, WCDMA 1900 MHz Band) – Slide down**

| **Limit of SAR (W/kg)** | **10 g Average** | **1 g Average** | **Power Drift (dB)** |
|---|---|---|---|
| | **2.0** | **1.6** | |
| **Test Case** | **Measurement Result (W/kg)** | | |
| | **10 g Average** | **1 g Average** | |
| Body, Towards Ground, Top frequency (See Fig.75) | 0.243 | 0.443 | 0.083 |
| Body, Towards Ground, Mid frequency (See Fig.77) | 0.262 | 0.482 | 0.030 |
| Body, Towards Ground, Bottom frequency (See Fig.79) | 0.245 | 0.451 | 0.057 |
| Body, Towards Phantom, Top frequency (See Fig.81) | 0.070 | 0.109 | 0.112 |
| Body, Towards Phantom, Mid frequency (See Fig.83) | 0.078 | 0.120 | 0.165 |
| Body, Towards Phantom, Bottom frequency (See Fig.85) | 0.073 | 0.112 | 0.069 |
| Body, Towards Ground, Mid frequency with Headset (See Fig.87) | 0.249 | 0.453 | 0.140 |

**Table 14: SAR Values (Body, WCDMA 1900 MHz Band) – Slide up**

| **Limit of SAR (W/kg)** | **10 g Average** | **1 g Average** | **Power Drift (dB)** |
|---|---|---|---|
| | **2.0** | **1.6** | |
| **Test Case** | **Measurement Result (W/kg)** | | |
| | **10 g Average** | **1 g Average** | |
| Body, Towards Ground, Top frequency (See Fig.89) | 0.180 | 0.297 | 0.041 |

| | | | |
|---|---|---|---|
| Body, Towards Ground, Mid frequency (See Fig.91) | 0.194 | 0.320 | 0.044 |
| Body, Towards Ground, Bottom frequency (See Fig.93) | 0.210 | 0.341 | -0.126 |
| Body, Towards Phantom, Top frequency (See Fig.95) | 0.107 | 0.168 | 0.178 |
| Body, Towards Phantom, Mid frequency (See Fig.97) | 0.116 | 0.184 | -0.107 |
| Body, Towards Phantom, Bottom frequency (See Fig.99) | 0.125 | 0.198 | 0.011 |

## 7.5 Summary of Measurement Results (GSM 850)

**Table 15: SAR Values (Head, GSM 850 MHz Band) – Slide down**

| Limit of SAR (W/kg) | 10 g Average | 1 g Average | Power Drift (dB) |
|---|---|---|---|
| | 2.0 | 1.6 | |
| Test Case | Measurement Result (W/kg) | | |
| | 10 g Average | 1 g Average | |
| Left hand, Touch cheek, Top frequency(See Fig.101) | 0.118 | 0.163 | -0.172 |
| Left hand, Touch cheek, Mid frequency(See Fig.103) | 0.145 | 0.204 | -0.115 |
| Left hand, Touch cheek, Bottom frequency(See Fig.105) | 0.163 | 0.218 | 0.096 |
| Left hand, Tilt 15 Degree, Mid frequency(See Fig.107) | 0.107 | 0.145 | -0.041 |
| Right hand, Touch cheek, Mid frequency(See Fig.109) | 0.144 | 0.200 | 0.045 |
| Right hand, Tilt 15 Degree, Mid frequency(See Fig.111) | 0.118 | 0.164 | 0.135 |

**Table 16: SAR Values (Head, GSM 850 MHz Band) – Slide up**

| Limit of SAR (W/kg) | 10 g Average | 1 g Average | Power Drift (dB) |
|---|---|---|---|
| | 2.0 | 1.6 | |
| Test Case | Measurement Result (W/kg) | | |
| | 10 g Average | 1 g Average | |
| Left hand, Touch cheek, Top frequency(See Fig.113) | 0.337 | 0.463 | -0.017 |
| Left hand, Touch cheek, Mid frequency(See Fig.115) | 0.352 | 0.480 | 0.094 |
| Left hand, Touch cheek, Bottom frequency(See Fig.117) | 0.287 | 0.398 | 0.025 |
| Left hand, Tilt 15 Degree, Mid frequency(See Fig.119) | 0.206 | 0.285 | -0.133 |
| Right hand, Touch cheek, Mid frequency(See Fig.121) | 0.334 | 0.463 | 0.071 |
| Right hand, Tilt 15 Degree, Mid frequency(See Fig.123) | 0.173 | 0.237 | -0.006 |

**Table 17: SAR Values (Body, GSM 850 MHz Band) – Slide down**

| Limit of SAR (W/kg) | 10 g Average | 1 g Average | Power Drift (dB) |
|---|---|---|---|
| | 2.0 | 1.6 | |
| Test Case | Measurement Result (W/kg) | | |
| | 10 g Average | 1 g Average | |
| Body, Towards Ground, Top frequency (See Fig.125) | 0.262 | 0.380 | -0.189 |

| | | | |
|---|---|---|---|
| Body, Towards Ground, Mid frequency (See Fig.127) | 0.345 | 0.501 | -0.051 |
| Body, Towards Ground, Bottom frequency (See Fig.129) | 0.416 | 0.609 | -0.073 |
| Body, Towards Phantom, Top frequency (See Fig.131) | 0.113 | 0.153 | -0.009 |
| Body, Towards Phantom, Mid frequency (See Fig.133) | 0.138 | 0.186 | -0.128 |
| Body, Towards Phantom, Bottom frequency (See Fig.135) | 0.159 | 0.213 | -0.144 |

**Table 18: SAR Values (Body, GSM 850 MHz Band) – Slide up**

| Limit of SAR (W/kg) | 10 g Average | 1 g Average | Power Drift (dB) |
|---|---|---|---|
| | 2.0 | 1.6 | |
| Test Case | Measurement Result (W/kg) | | |
| | 10 g Average | 1 g Average | |
| Body, Towards Ground, Top frequency (See Fig.137) | 0.712 | 0.999 | -0.144 |
| Body, Towards Ground, Mid frequency (See Fig.139) | 0.782 | 1.09 | -0.113 |
| Body, Towards Ground, Bottom frequency (See Fig.141) | 0.803 | 1.11 | 0.004 |
| Body, Towards Phantom, Top frequency (See Fig.143) | 0.593 | 0.822 | -0.040 |
| Body, Towards Phantom, Mid frequency (See Fig.145) | 0.652 | 0.900 | 0.154 |
| Body, Towards Phantom, Bottom frequency (See Fig.147) | 0.650 | 0.895 | -0.139 |
| Body, Towards Ground, Bottom frequency with EGPRS(See Fig.149) | 0.274 | 0.376 | 0.051 |
| Body, Towards Ground, Bottom frequency with Headset(See Fig.151) | 0.404 | 0.561 | -0.175 |

## 7.6 Summary of Measurement Results (GSM 1900)

**Table 19: SAR Values (Head, GSM 1900 MHz Band) – Slide down**

| Limit of SAR (W/kg) | 10 g Average | 1 g Average | Power Drift (dB) |
|---|---|---|---|
| | 2.0 | 1.6 | |
| Test Case | Measurement Result (W/kg) | | |
| | 10 g Average | 1 g Average | |
| Left hand, Touch cheek, Top frequency(See Fig.153) | 0.158 | 0.258 | 0.001 |
| Left hand, Touch cheek, Mid frequency(See Fig.155) | 0.174 | 0.280 | -0.166 |
| Left hand, Touch cheek, Bottom frequency(See Fig.157) | 0.166 | 0.263 | 0.040 |
| Left hand, Tilt 15 Degree, Mid frequency(See Fig.159) | 0.112 | 0.196 | 0.005 |
| Right hand, Touch cheek, Mid frequency(See Fig.161) | 0.141 | 0.241 | 0.067 |
| Right hand, Tilt 15 Degree, Mid frequency(See Fig.163) | 0.130 | 0.237 | 0.069 |

**Table 20: SAR Values (Head, GSM 1900 MHz Band) – Slide up**

| Limit of SAR (W/kg) | 10 g Average | 1 g Average | Power Drift (dB) |
|---|---|---|---|
| | 2.0 | 1.6 | |
| Test Case | Measurement Result (W/kg) | | |

| | 10 g Average | 1 g Average | |
|---|---|---|---|
| Left hand, Touch cheek, Top frequency(See Fig.165) | 0.102 | 0.175 | 0.191 |
| Left hand, Touch cheek, Mid frequency(See Fig.167) | 0.131 | 0.227 | 0.081 |
| Left hand, Touch cheek, Bottom frequency(See Fig.169) | 0.155 | 0.264 | 0.132 |
| Left hand, Tilt 15 Degree, Mid frequency(See Fig.171) | 0.066 | 0.106 | 0.049 |
| Right hand, Touch cheek, Mid frequency(See Fig.173) | 0.083 | 0.138 | -0.100 |
| Right hand, Tilt 15 Degree, Mid frequency(See Fig.175) | 0.073 | 0.123 | 0.158 |

**Table 21: SAR Values (Body, GSM 1900 MHz Band) – Slide down**

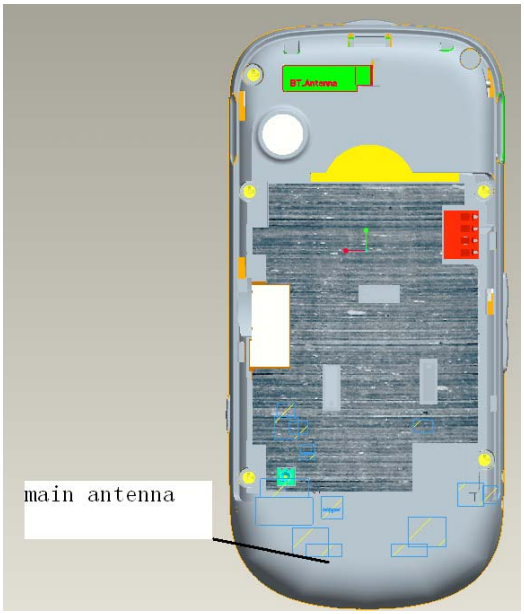
| Limit of SAR (W/kg) | 10 g Average | 1 g Average | Power Drift (dB) |
|---|---|---|---|
| | 2.0 | 1.6 | |
| Test Case | Measurement Result (W/kg) | | |
| | 10 g Average | 1 g Average | |
| Body, Towards Ground, Top frequency (See Fig.177) | 0.234 | 0.430 | -0.016 |
| Body, Towards Ground, Mid frequency (See Fig.179) | 0.391 | 0.714 | -0.076 |
| Body, Towards Ground, Bottom frequency (See Fig.181) | 0.374 | 0.688 | 0.048 |
| Body, Towards Phantom, Top frequency (See Fig.183) | 0.118 | 0.188 | -0.060 |
| Body, Towards Phantom, Mid frequency (See Fig.185) | 0.138 | 0.218 | 0.011 |
| Body, Towards Phantom, Bottom frequency (See Fig.187) | 0.141 | 0.223 | -0.030 |
| Body, Towards Ground, Mid frequency with EGPRS(See Fig.189) | 0.166 | 0.302 | -0.008 |
| Body, Towards Ground, Mid frequency with Headset(See Fig.191) | 0.166 | 0.301 | -0.070 |

**Table 22: SAR Values (Body, GSM 1900 MHz Band) – Slide up**

| Limit of SAR (W/kg) | 10 g Average | 1 g Average | Power Drift (dB) |
|---|---|---|---|
| | 2.0 | 1.6 | |
| Test Case | Measurement Result (W/kg) | | |
| | 10 g Average | 1 g Average | |
| Body, Towards Ground, Top frequency (See Fig.193) | 0.323 | 0.525 | -0.078 |
| Body, Towards Ground, Mid frequency (See Fig.195) | 0.350 | 0.567 | -0.007 |
| Body, Towards Ground, Bottom frequency (See Fig.197) | 0.420 | 0.675 | -0.182 |
| Body, Towards Phantom, Top frequency (See Fig.199) | 0.157 | 0.247 | -0.027 |
| Body, Towards Phantom, Mid frequency (See Fig.201) | 0.181 | 0.287 | -0.035 |
| Body, Towards Phantom, Bottom frequency (See Fig.203) | 0.223 | 0.359 | 0.083 |

## 7.7 Summary of Measurement Results (Bluetooth function)

The distance between BT antenna and GSM antenna is >5cm. The location of the antennas inside mobile phone is shown below:




The output power of BT antenna is as following:

| **Channel** | **Ch 0**<br>**2402 MHz** | **Ch 39**<br>**2441 Mhz** | **Ch 78**<br>**2480 MHz** |
|---|---|---|---|
| Peak Conducted<br>Output Power(dBm) | -0.57 | -0.37 | -0.82 |

According to the output power measurement result and the distance between the two antennas, we can draw the conclusion that: stand-alone SAR and simultaneous transmission SAR are not required for BT transmitter, because the output power of BT transmitter is $\leqslant 2P_{Ref}$ and its antenna is $\geqslant$5cm from other antenna

With the request of the client, we perform the tests with dominant GSM transmitter and co-located Bluetooth transmitter both ON under the worst case for body tests.

**Table 23: SAR Values (WCDMA 850MHz Band-Body with Bluetooth) – Slide up**

| **Limit of SAR (W/kg)** | **10 g Average** | **1 g Average** | **Power Drift (dB)** |
|---|---|---|---|
| | 2.0 | 1.6 | |
| **Test Case** | **Measurement Result (W/kg)** | | |
| | **10 g Average** | **1 g Average** | |
| Body, Towards Ground, Top frequency(See Fig.205) | 0.407 | 0.569 | 0.032 |

**Table 24: SAR Values (WCDMA 1900 MHz Band-Body with Bluetooth) – Slide down**

| **Limit of SAR (W/kg)** | **10 g Average** | **1 g Average** | **Power Drift (dB)** |
|---|---|---|---|
| | 2.0 | 1.6 | |
| **Test Case** | **Measurement Result (W/kg)** | | |
| | **10 g Average** | **1 g Average** | |
| Body, Towards Ground, Mid frequency(See Fig.207) | 0.271 | 0.495 | 0.131 |

**Table 25: SAR Values (GSM 850MHz Band-Body with Bluetooth) – Slide up**

| Limit of SAR (W/kg) | 10 g Average | 1 g Average | Power Drift (dB) |
|---|---|---|---|
| | 2.0 | 1.6 | |
| Test Case | Measurement Result (W/kg) | | |
| | 10 g Average | 1 g Average | |
| Body, Towards Ground, Bottom frequency(See Fig.209) | 0.508 | 0.704 | 0.187 |

**Table 26: SAR Values (GSM 1900 MHz Band-Body with Bluetooth) – Slide up**

| Limit of SAR (W/kg) | 10 g Average | 1 g Average | Power Drift (dB) |
|---|---|---|---|
| | 2.0 | 1.6 | |
| Test Case | Measurement Result (W/kg) | | |
| | 10 g Average | 1 g Average | |
| Body, Towards Ground, Mid frequency(See Fig.211) | 0.203 | 0.373 | -0.136 |

### 7.8 Conclusion

Localized Specific Absorption Rate (SAR) of this portable wireless device has been measured in all cases requested by the relevant standards cited in Clause 5.2 of this report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report.

The maximum SAR values are obtained at the case of **GSM 850 Body, Towards Ground,Slide up, Bottom frequency with GPRS (Table 18)**, and the value are: **0.803(10g), 1.11(1g)**

## 8 Measurement Uncertainty

| SN | a | Type | c | d | e = f(d,k) | f | h = c x f / e | k |
|---|---|---|---|---|---|---|---|---|
| | Uncertainty Component | | Tol. (± %) | Prob. Dist. | Div. | $c_i$ (1 g) | 1 g $u_i$ (±%) | $v_i$ |
| 1 | System repetivity | A | 0.5 | N | 1 | 1 | 0.5 | 9 |
| | Measurement System | | | | | | | |
| 2 | Probe Calibration | B | 5 | N | 2 | 1 | 2.5 | ∞ |
| 3 | Axial Isotropy | B | 4.7 | R | √3 | $(1\text{-cp})^{1/2}$ | 4.3 | ∞ |
| 4 | Hemispherical Isotropy | B | 9.4 | R | √3 | $\sqrt{c_p}$ | | ∞ |
| 5 | Boundary Effect | B | 0.4 | R | √3 | 1 | 0.23 | ∞ |
| 6 | Linearity | B | 4.7 | R | √3 | 1 | 2.7 | ∞ |
| 7 | System Detection Limits | B | 1.0 | R | √3 | 1 | 0.6 | ∞ |
| 8 | Readout Electronics | B | 1.0 | N | 1 | 1 | 1.0 | ∞ |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9 | RF Ambient Conditions | B | 3.0 | R | √3 | 1 | 1.73 | ∞ |
| 10 | Probe Positioner Mechanical Tolerance | B | 0.4 | R | √3 | 1 | 0.2 | ∞ |
| 11 | Probe Positioning with respect to Phantom Shell | B | 2.9 | R | √3 | 1 | 1.7 | ∞ |
| 12 | Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation | B | 3.9 | R | √3 | 1 | 2.3 | ∞ |
| | Test sample Related | | | | | | | |
| 13 | Test Sample Positioning | A | 4.9 | N | 1 | 1 | 4.9 | N-1 |
| 14 | Device Holder Uncertainty | A | 6.1 | N | 1 | 1 | 6.1 | N-1 |
| 15 | Output Power Variation - SAR drift measurement | B | 5.0 | R | √3 | 1 | 2.9 | ∞ |
| | Phantom and Tissue Parameters | | | | | | | |
| 16 | Phantom Uncertainty (shape and thickness tolerances) | B | 1.0 | R | √3 | 1 | 0.6 | ∞ |
| 17 | Liquid Conductivity - deviation from target values | B | 5.0 | R | √3 | 0.64 | 1.7 | ∞ |
| 18 | Liquid Conductivity - measurement uncertainty | B | 5.0 | N | 1 | 0.64 | 1.7 | M |
| 19 | Liquid Permittivity - deviation from target values | B | 5.0 | R | √3 | 0.6 | 1.7 | ∞ |
| 20 | Liquid Permittivity - measurement uncertainty | B | 5.0 | N | 1 | 0.6 | 1.7 | M |
| | Combined Standard Uncertainty | | | RSS | | | 11.25 | |
| | Expanded Uncertainty (95% CONFIDENCE INTERVAL) | | | K=2 | | | 22.5 | |

# 9 MAIN TEST INSTRUMENTS

**Table 27: List of Main Instruments**

| No. | Name | Type | Serial Number | Calibration Date | Valid Period |
|---|---|---|---|---|---|
| 01 | Network analyzer | HP 8753E | US38433212 | August 30,2008 | One year |
| 02 | Power meter | NRVD | 101253 | June 20, 2008 | One year |
| 03 | Power sensor | NRV-Z5 | 100333 | | |
| 04 | Power sensor | NRV-Z6 | 100011 | September 2, 2008 | One year |
| 05 | Signal Generator | E4433B | US37230472 | September 4, 2008 | One Year |
| 06 | Amplifier | VTL5400 | 0505 | No Calibration Requested | |
| 07 | BTS | CMU 200 | 105948 | August 15, 2008 | One year |
| 08 | E-field Probe | SPEAG ES3DV3 | 3149 | October 1, 2008 | One year |
| 09 | DAE | SPEAG DAE4 | 771 | November 20, 2008 | One year |
| 10 | Dipole Validation Kit | SPEAG D835V2 | 443 | February 18, 2009 | Two years |
| 11 | Dipole Validation Kit | SPEAG D1900V2 | 541 | February 19, 2009 | Two years |

***END OF REPORT BODY***

# ANNEX A MEASUREMENT PROCESS

The evaluation was performed with the following procedure:

Step 1: Measurement of the SAR value at a fixed location above the reference point was measured and was used as a reference value for assessing the power drop.

Step 2: The SAR distribution at the exposed side of the phantom was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the flat phantom and the horizontal grid spacing was 10 mm x 10 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

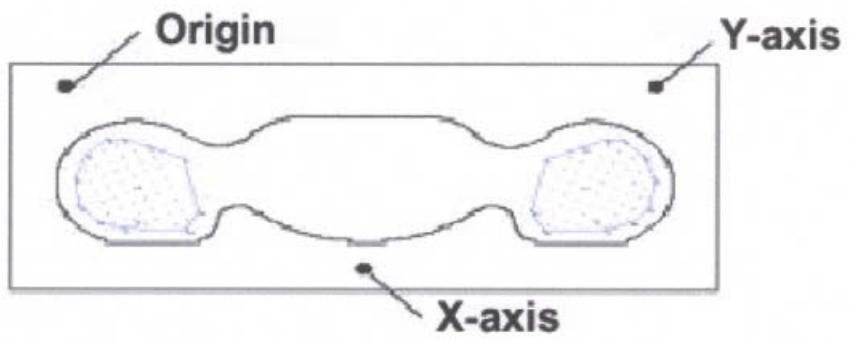
Step 3: Around this point, a volume of 30 mm x 30 mm x 30 mm was assessed by measuring 7 x 7x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

a. The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

b. The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot"-condition (in x ~ y and z-directions). The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.

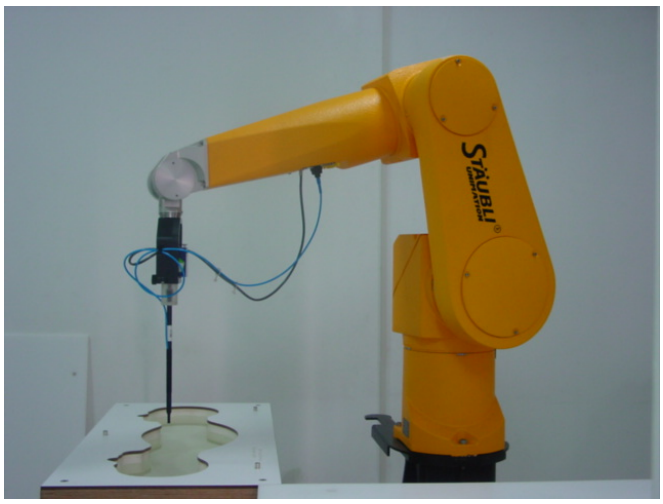
c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

Step 4: Re-measurement the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation is repeated.

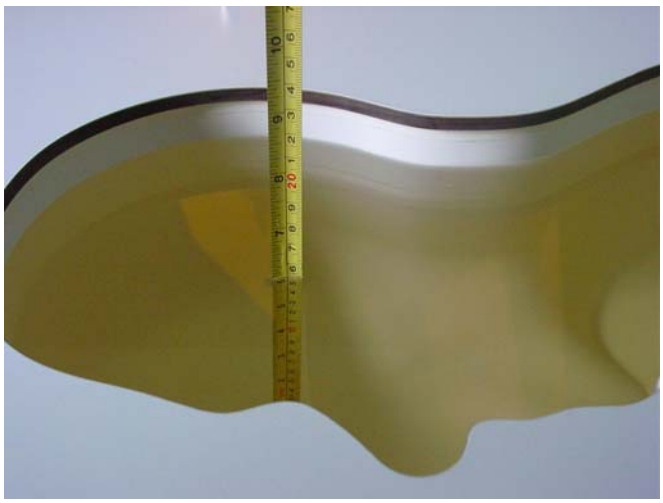



**Picture A: SAR Measurement Points in Area Scan**

# ANNEX B TEST LAYOUT




**Picture B1: Specific Absorption Rate Test Layout**



**Picture B2: Liquid depth in the Flat Phantom (850 MHz Head)**

**Picture B3: Liquid depth in the Flat Phantom (1900MHz Head)**

**Picture B4: Liquid depth in the Flat Phantom (850 MHz Body)**

**Picture B5: Liquid depth in the Flat Phantom (1900MHz Body)**

# ANNEX C GRAPH RESULTS

## WCDMA 850 Left Cheek High – Slide down

Date/Time: 2009-3-4 7:47:03
Electronics: DAE4 Sn771
Medium: 850 HEAD
Medium parameters used (interpolated): f = 846.6 MHz; $\sigma$ = 0.917 mho/m; $\varepsilon_r$ = 40.3; $\rho$ = 1000 kg/$m^3$
Ambient Temperature:23.3°C Liqiud Temperature: 22.5°C
Communication System: WCDMA 850 Frequency: 846.6 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(6.56, 6.56, 6.56)

**Left Cheek High/Area Scan (51x81x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.147 mW/g

**Left Cheek High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.14 V/m; Power Drift = 0.178 dB
Peak SAR (extrapolated) = 0.168 W/kg
**SAR(1 g) = 0.134 mW/g; SAR(10 g) = 0.100 mW/g**
Maximum value of SAR (measured) = 0.143 mW/g

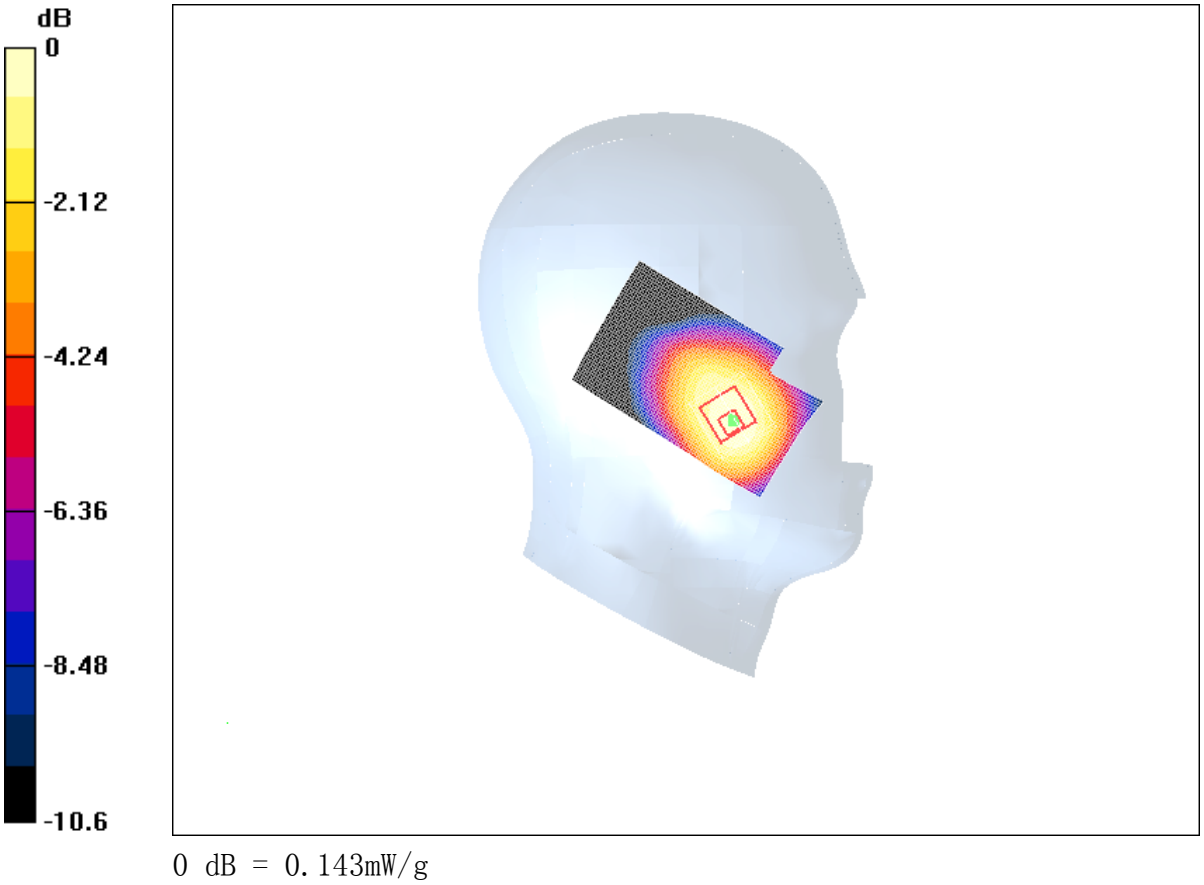



**Fig. 1 Left Hand Touch Cheek WCDMA 850MHz CH4233 – Slide down**

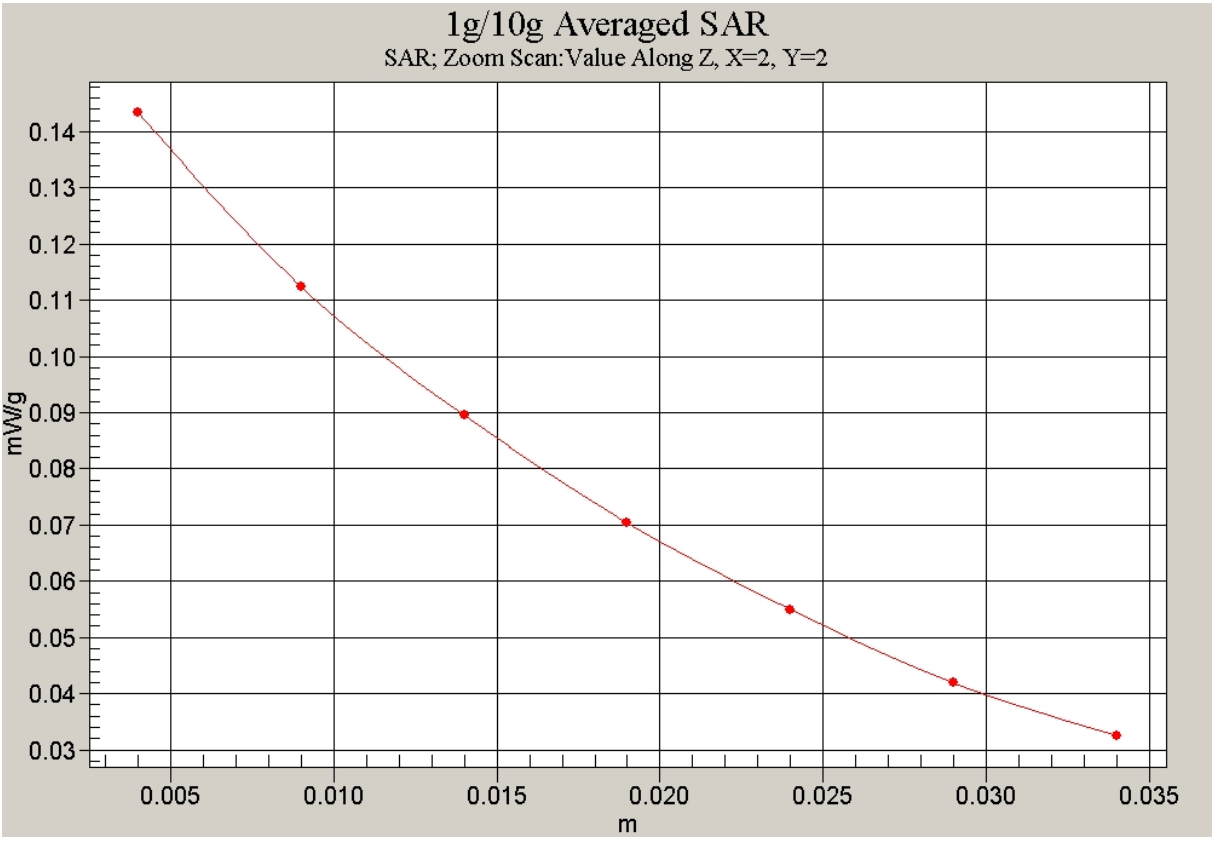



**Fig. 2 Z-Scan at power reference point (WCDMA 850MHz CH4233) – Slide down**

**WCDMA 850 Left Cheek Middle – Slide down**

Date/Time: 2009-3-4 8:01:15
Electronics: DAE4 Sn771
Medium: 850 HEAD
Medium parameters used (interpolated): f = 836.4 MHz; $\sigma$ = 0.907 mho/m; $\varepsilon_r$ = 40.4; $\rho$ = 1000 kg/$m^3$
Ambient Temperature:23.3°C Liqiud Temperature: 22.5°C
Communication System: WCDMA 850 Frequency: 836.4 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(6.56, 6.56, 6.56)

**Left Cheek Middle/Area Scan (51x81x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.109 mW/g

**Left Cheek Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.69 V/m; Power Drift = -0.135 dB
Peak SAR (extrapolated) = 0.125 W/kg
**SAR(1 g) = 0.099 mW/g; SAR(10 g) = 0.073 mW/g**
Maximum value of SAR (measured) = 0.105 mW/g

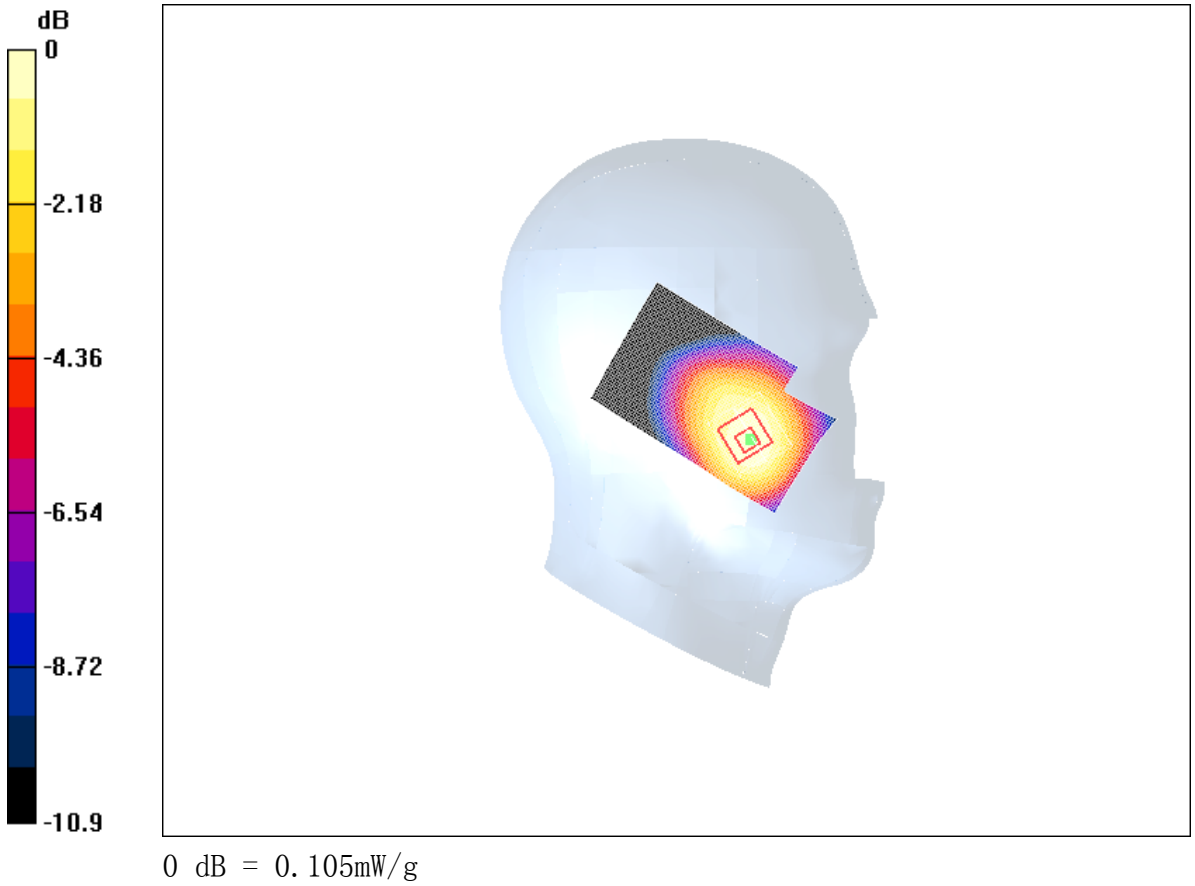



**Fig. 3 Left Hand Touch Cheek WCDMA 850MHz CH4182 – Slide down**

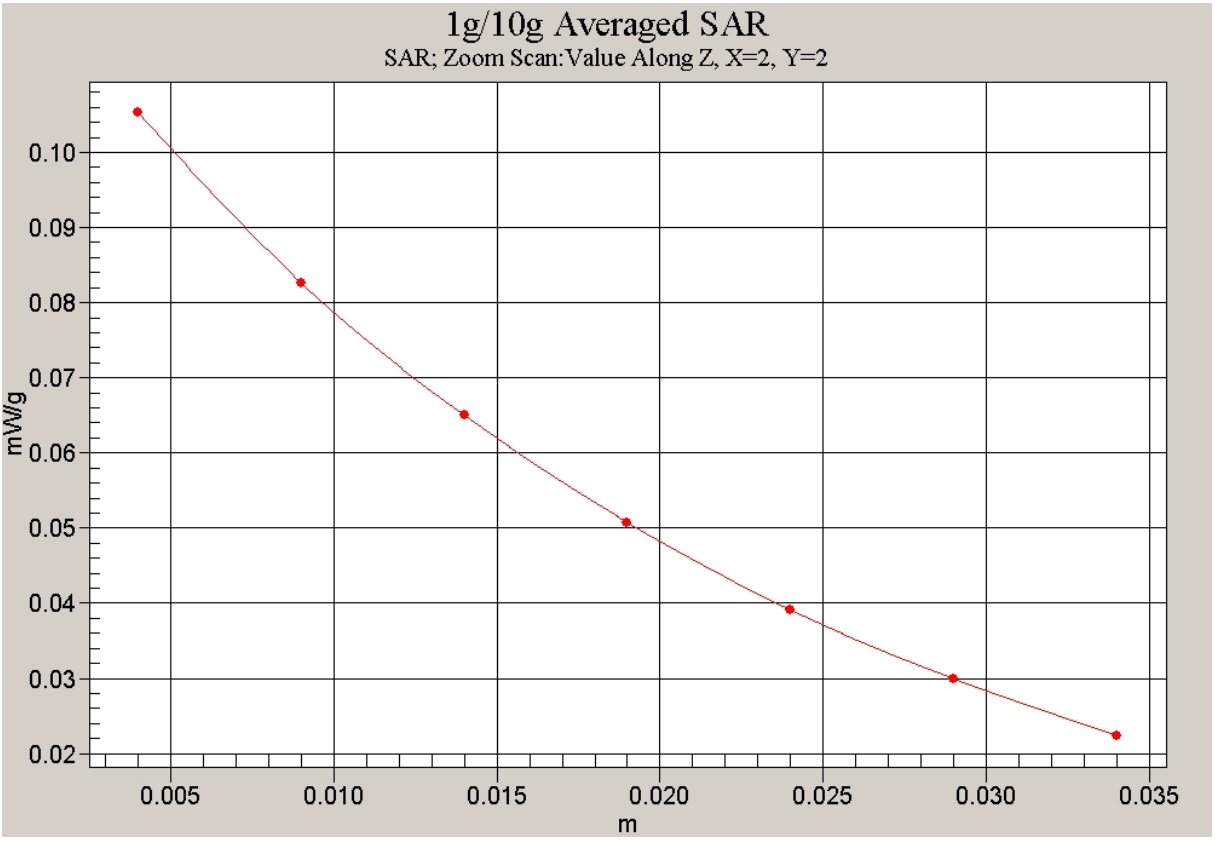



**Fig. 4 Z-Scan at power reference point (WCDMA 850MHz CH4182) – Slide down**

**WCDMA 850 Left Cheek Low – Slide down**

Date/Time: 2009-3-4 8:15:28
Electronics: DAE4 Sn771
Medium: 850 HEAD
Medium parameters used (interpolated): f = 826.4 MHz; $\sigma$ = 0.897 mho/m; $\varepsilon_r$ = 40.4; $\rho$ = 1000 kg/$m^3$
Ambient Temperature:23.3°C Liqiud Temperature: 22.5°C
Communication System: WCDMA 850 Frequency: 826.4 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(6.56, 6.56, 6.56)

**Left Cheek Low/Area Scan (51x81x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.165 mW/g

**Left Cheek Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.76 V/m; Power Drift = 0.092 dB
Peak SAR (extrapolated) = 0.194 W/kg
**SAR(1 g) = 0.150 mW/g; SAR(10 g) = 0.111 mW/g**
Maximum value of SAR (measured) = 0.160 mW/g

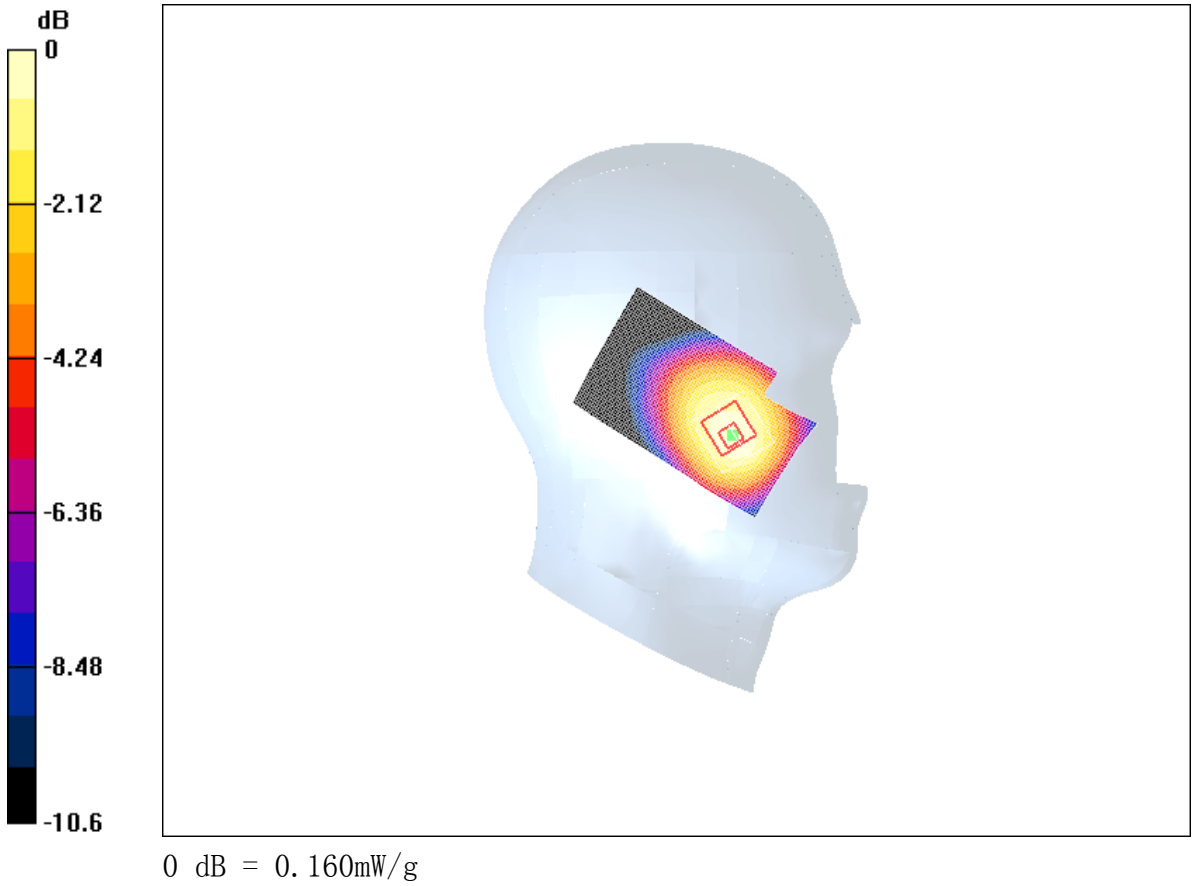



**Fig. 5 Left Hand Touch Cheek WCDMA 850MHz CH4132 – Slide down**

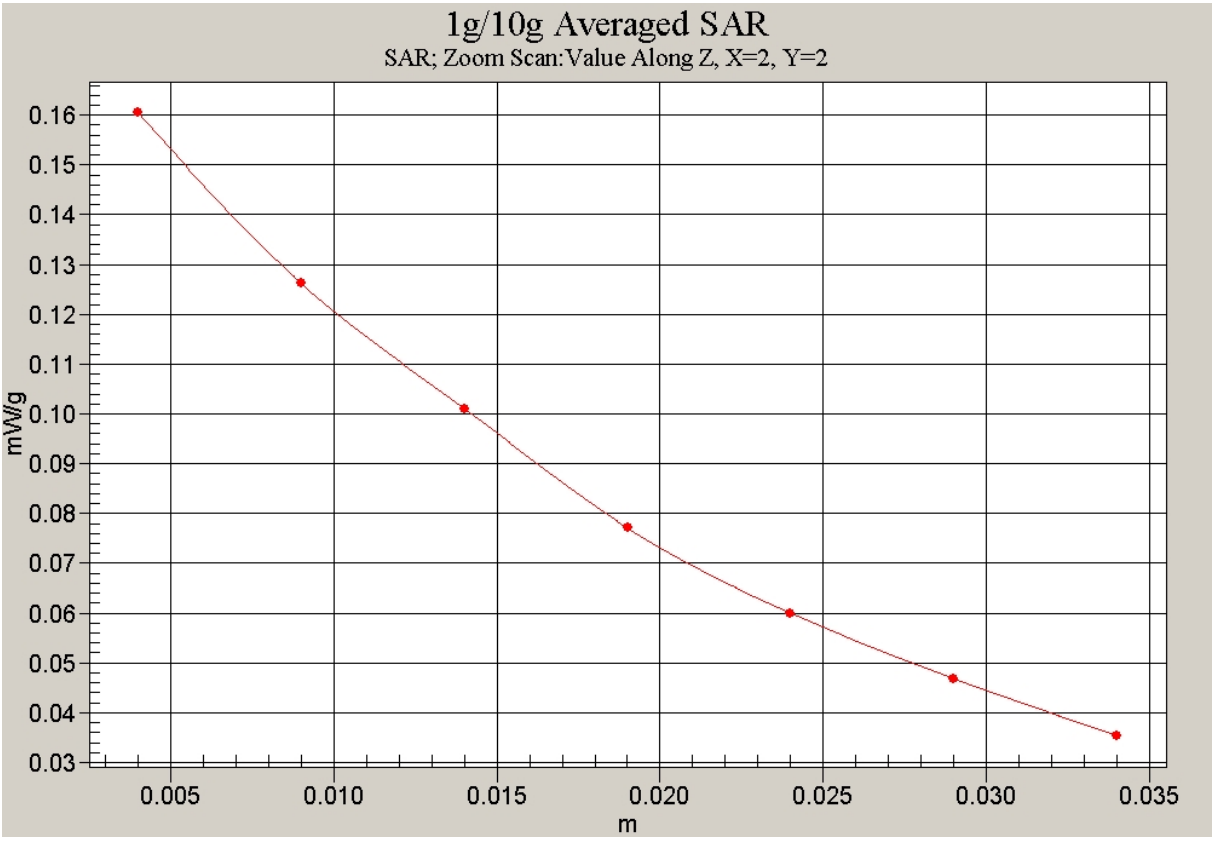



**Fig. 6 Z-Scan at power reference point (WCDMA 850MHz CH4132) – Slide down**

**WCDMA 850 Left Tilt Middle – Slide down**

Date/Time: 2009-3-4 8:29:36
Electronics: DAE4 Sn771
Medium: 850 HEAD
Medium parameters used (interpolated): f = 836.4 MHz; $\sigma$ = 0.907 mho/m; $\varepsilon_r$ = 40.4; $\rho$ = 1000 kg/$m^3$
Ambient Temperature:23.3°C Liqiud Temperature: 22.5°C
Communication System: WCDMA 850 Frequency: 836.4 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(6.56, 6.56, 6.56)

**Left Tilt Middle/Area Scan (51x81x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.072 mW/g

**Left Tilt Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.45 V/m; Power Drift = 0.164 dB
Peak SAR (extrapolated) = 0.086 W/kg
**SAR(1 g) = 0.067 mW/g; SAR(10 g) = 0.050 mW/g**
Maximum value of SAR (measured) = 0.071 mW/g


0 dB = 0.071mW/g

**Fig. 7 Left Hand Tilt 15°WCDMA 850MHz CH4182 – Slide down**

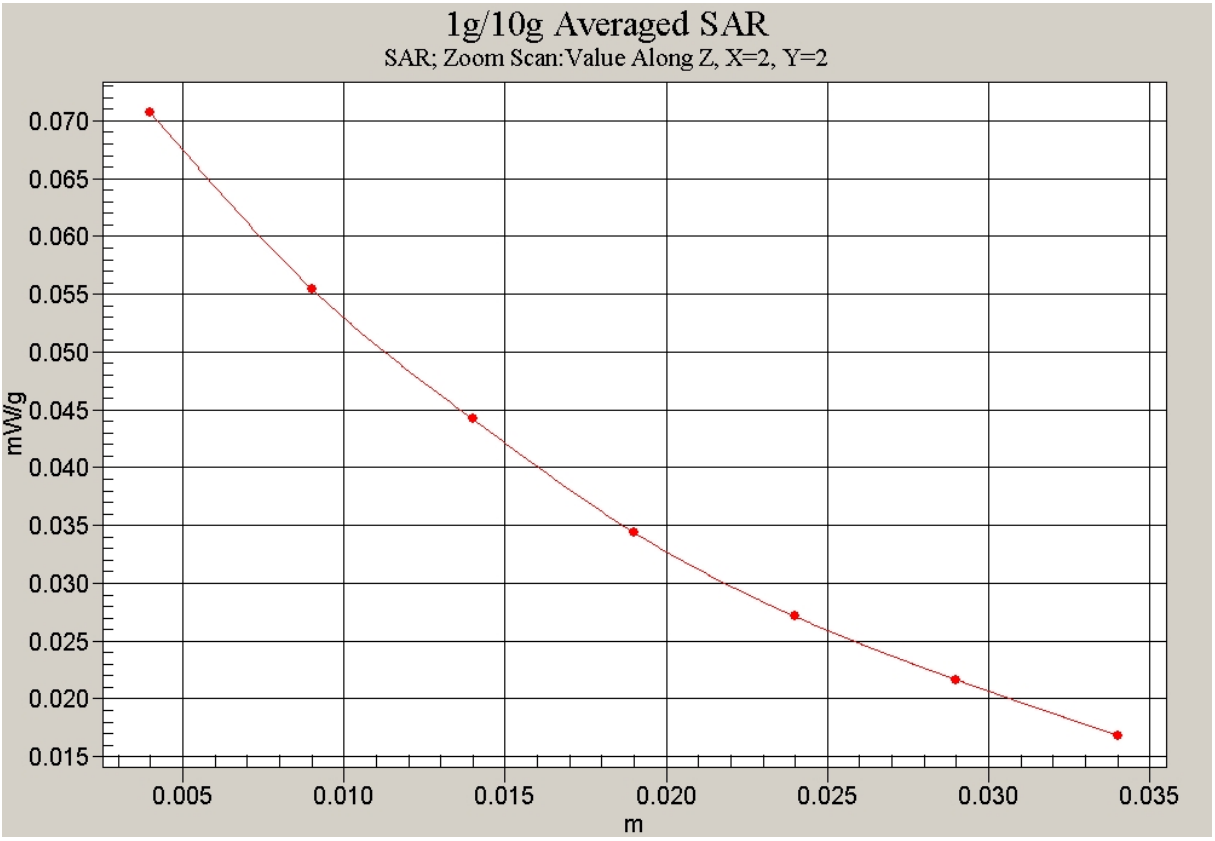



**Fig. 8 Z-Scan at power reference point (WCDMA 850MHz CH4182) – Slide down**

**WCDMA 850 Right Cheek Middle – Slide down**

Date/Time: 2009-3-4 8:43:55
Electronics: DAE4 Sn771
Medium: 850 HEAD
Medium parameters used (interpolated): f = 836.4 MHz; $\sigma$ = 0.907 mho/m; $\varepsilon_r$ = 40.4; $\rho$ = 1000 kg/$m^3$
Ambient Temperature:23.3°C Liqiud Temperature: 22.5°C
Communication System: WCDMA 850 Frequency: 836.4 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(6.56, 6.56, 6.56)

**Right Cheek Middle/Area Scan (51x81x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.089 mW/g

**Right Cheek Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.83 V/m; Power Drift = 0.097 dB
Peak SAR (extrapolated) = 0.110 W/kg
**SAR(1 g) = 0.084 mW/g; SAR(10 g) = 0.062 mW/g**
Maximum value of SAR (measured) = 0.091 mW/g

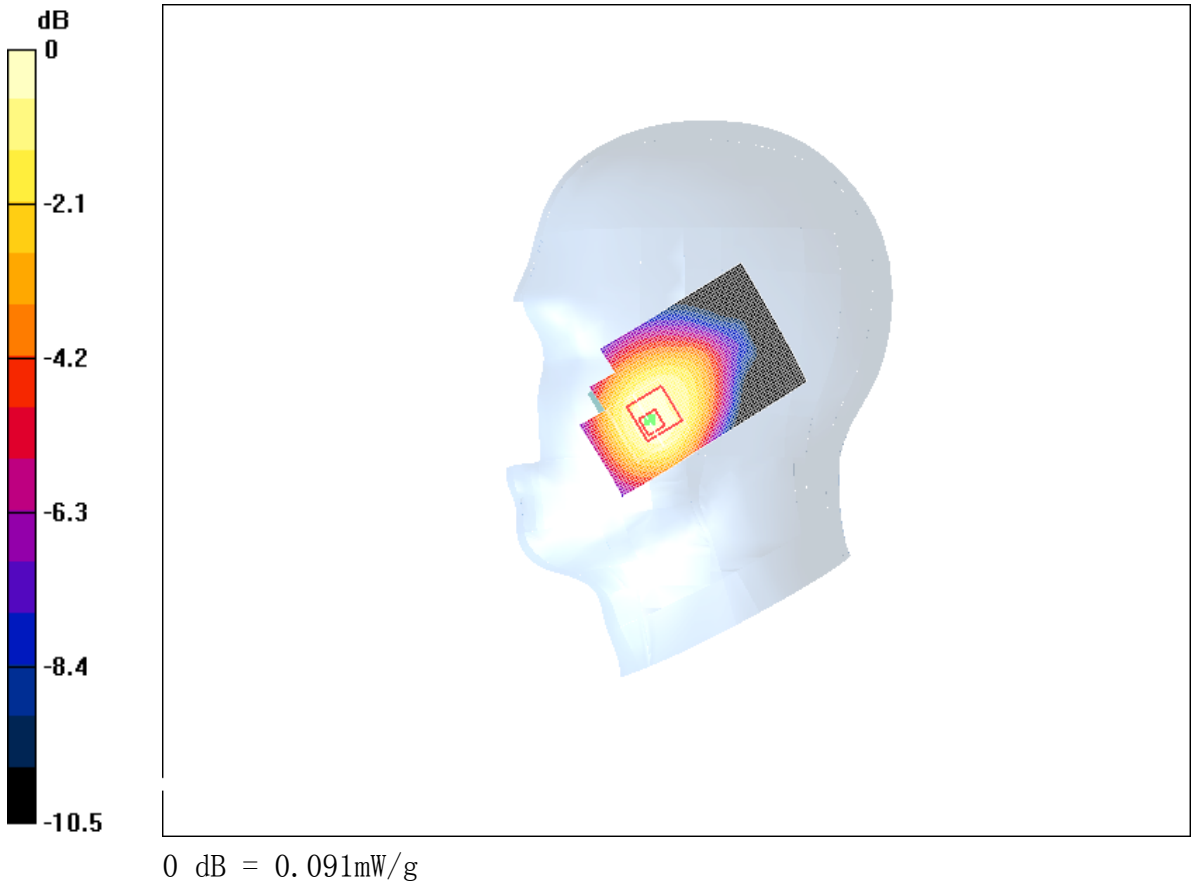



**Fig.9 Right Hand Touch Cheek WCDMA 850MHz CH4182 – Slide down**

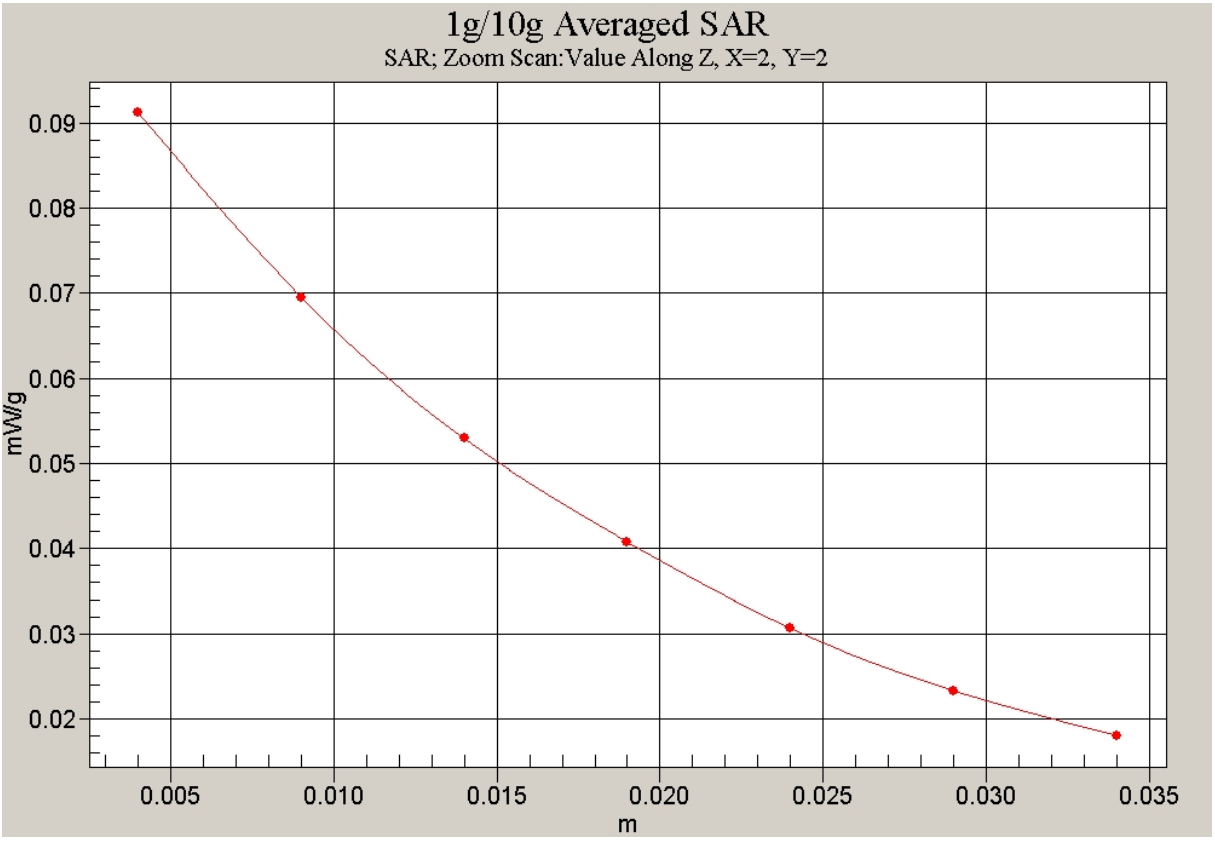



**Fig. 10 Z-Scan at power reference point (WCDMA 850MHz CH4182) – Slide down**

**WCDMA 850 Right Tilt Middle – Slide down**

Date/Time: 2009-3-4 8:57:27
Electronics: DAE4 Sn771
Medium: 850 HEAD
Medium parameters used (interpolated): f = 836.4 MHz; $\sigma$ = 0.907 mho/m; $\varepsilon_r$ = 40.4; $\rho$ = 1000 kg/$m^3$
Ambient Temperature:23.3°C Liqiud Temperature: 22.5°C
Communication System: WCDMA 850 Frequency: 836.4 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(6.56, 6.56, 6.56)

**Right Tilt Middle/Area Scan (51x81x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.073 mW/g

**Right Tilt Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.97 V/m; Power Drift = 0.00786 dB
Peak SAR (extrapolated) = 0.088 W/kg
**SAR(1 g) = 0.069 mW/g; SAR(10 g) = 0.051 mW/g**
Maximum value of SAR (measured) = 0.074 mW/g

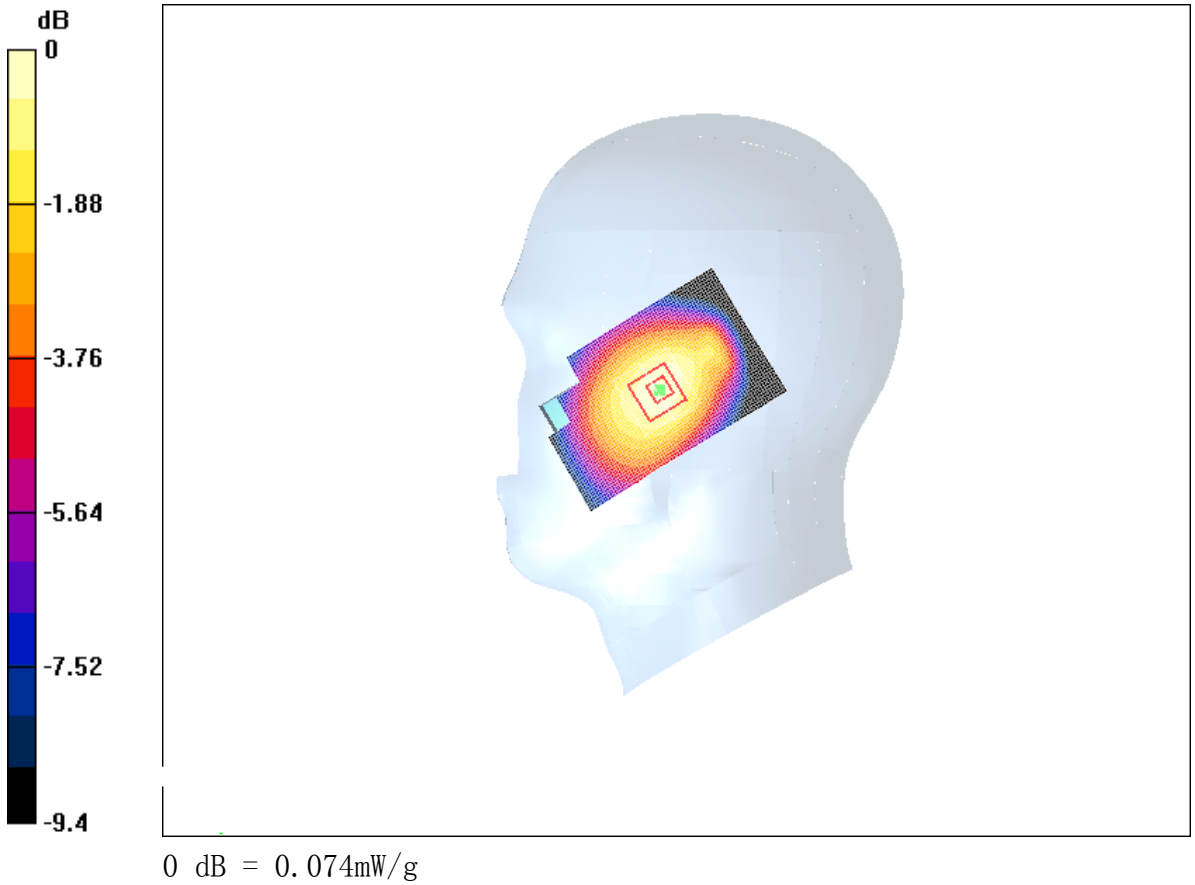



**Fig. 11 Right Hand Tilt 15°WCDMA 850MHz CH4182 – Slide down**

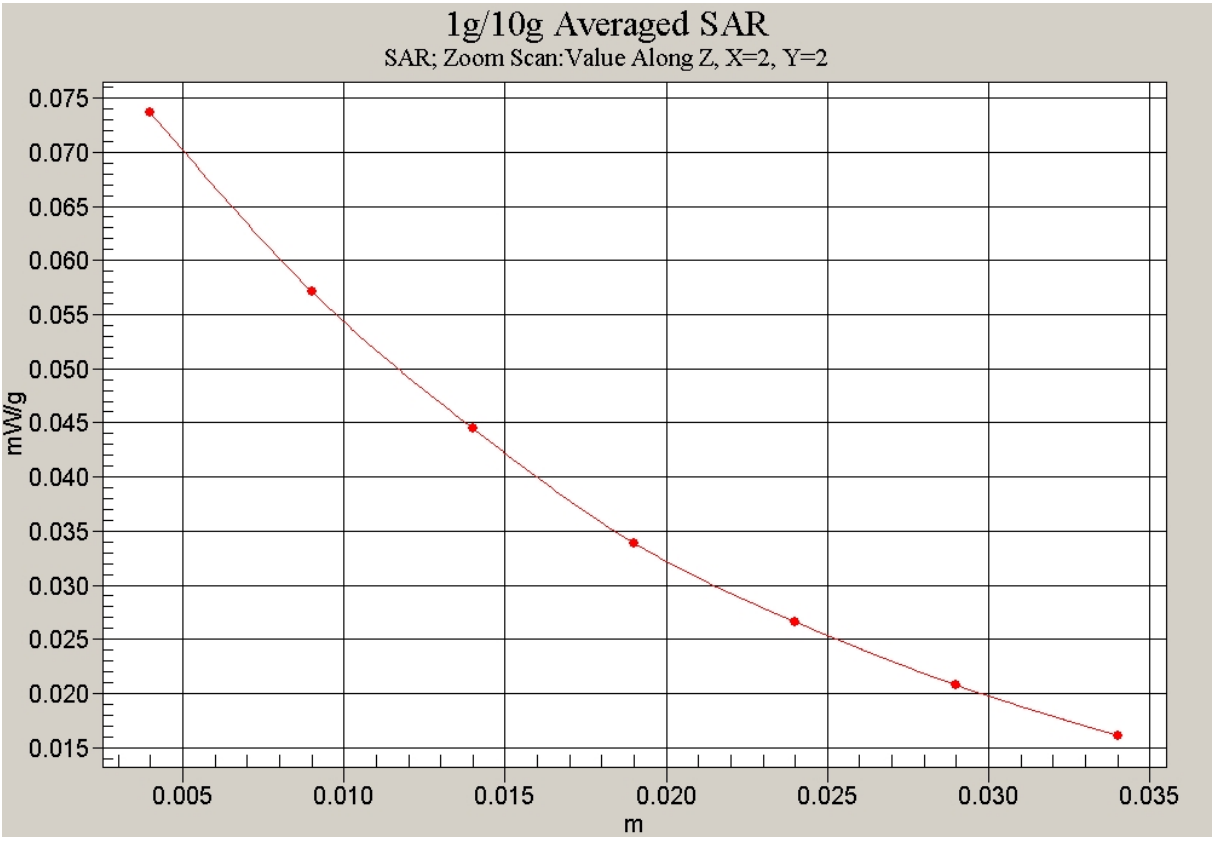


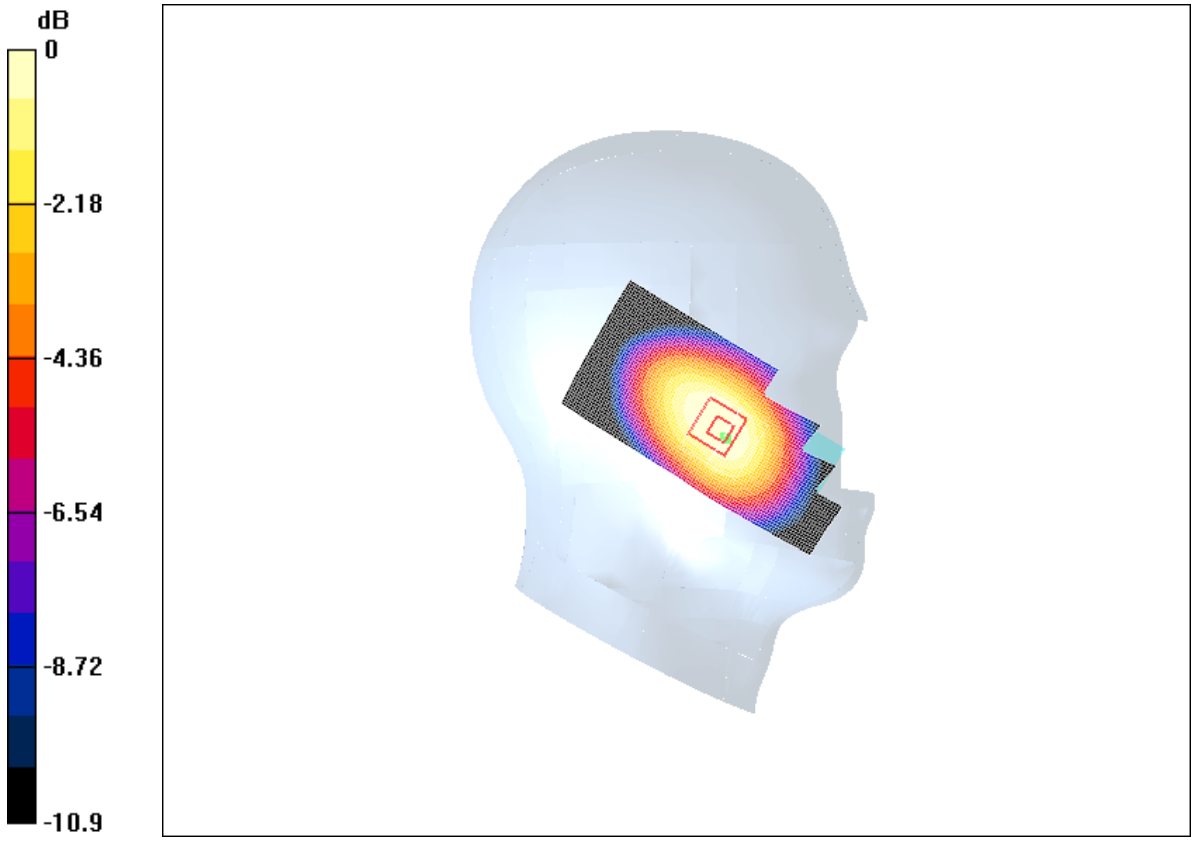

**Fig. 12 Z-Scan at power reference point (WCDMA 850MHz CH4182) – Slide down**

**WCDMA 850 Left Cheek High – Slide up**

Date/Time: 2009-3-4 9:12:30
Electronics: DAE4 Sn771
Medium: 850 HEAD
Medium parameters used (interpolated): f = 846.6 MHz; $\sigma$ = 0.917 mho/m; $\varepsilon_r$ = 40.3; $\rho$ = 1000 kg/$m^3$
Ambient Temperature:23.3°C Liqiud Temperature: 22.5°C
Communication System: WCDMA 850 Frequency: 846.6 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(6.56, 6.56, 6.56)

**Left Cheek High/Area Scan (51x101x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.605 mW/g

**Left Cheek High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.2 V/m; Power Drift = -0.156 dB
Peak SAR (extrapolated) = 0.718 W/kg
**SAR(1 g) = 0.544 mW/g; SAR(10 g) = 0.391 mW/g**
Maximum value of SAR (measured) = 0.581 mW/g




0 dB = 0.581mW/g

**Fig. 13 Left Hand Touch Cheek WCDMA 850MHz CH4233 – Slide** up

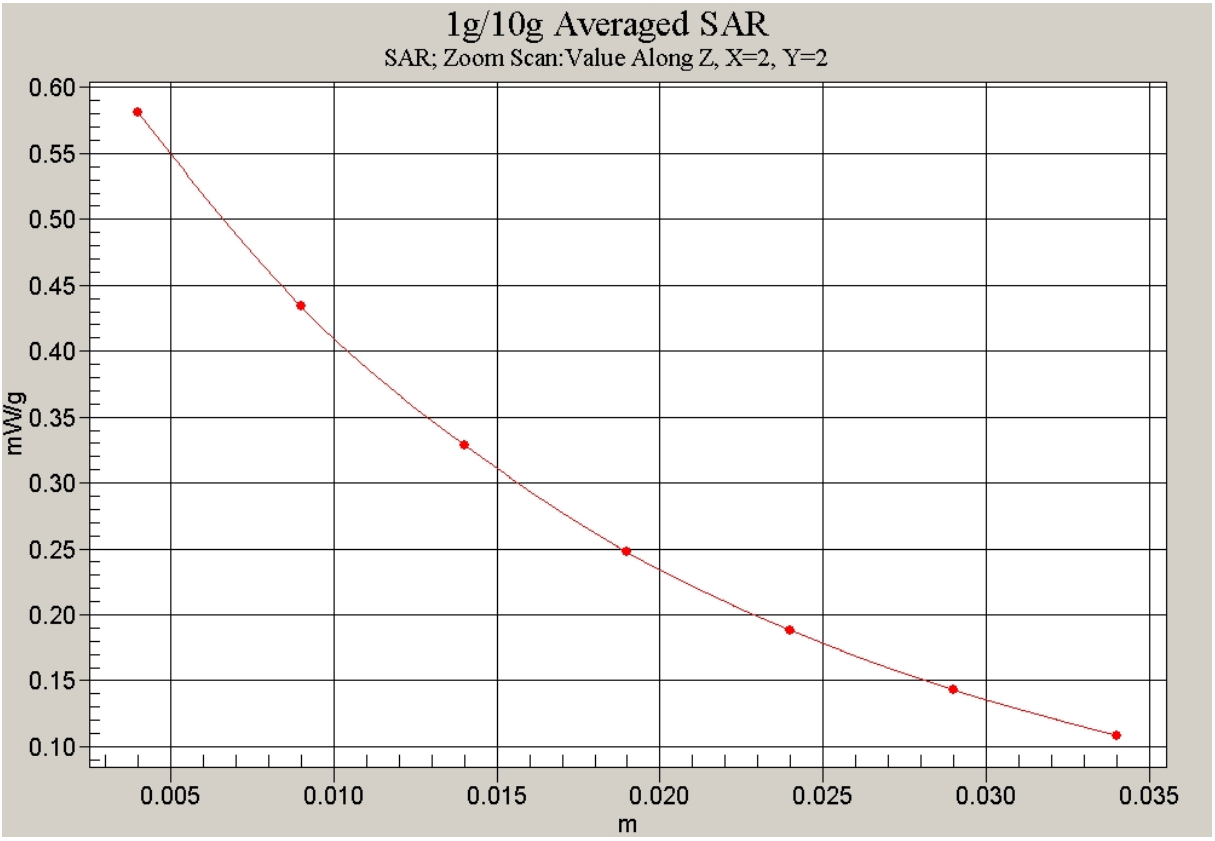



**Fig. 14 Z-Scan at power reference point (WCDMA 850MHz CH4233) – Slide** up

**WCDMA 850 Left Cheek Middle – Slide up**

Date/Time: 2009-3-4 9:26:54
Electronics: DAE4 Sn771
Medium: 850 HEAD
Medium parameters used (interpolated): f = 836.4 MHz; $\sigma$ = 0.907 mho/m; $\varepsilon_r$ = 40.4; $\rho$ = 1000 kg/$m^3$
Ambient Temperature:23.3°C Liqiud Temperature: 22.5°C
Communication System: WCDMA 850 Frequency: 836.4 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(6.56, 6.56, 6.56)

**Left Cheek Middle/Area Scan (51x101x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.433 mW/g

**Left Cheek Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.28 V/m; Power Drift = 0.082 dB
Peak SAR (extrapolated) = 0.523 W/kg
**SAR(1 g) = 0.398 mW/g; SAR(10 g) = 0.288 mW/g**
Maximum value of SAR (measured) = 0.424 mW/g

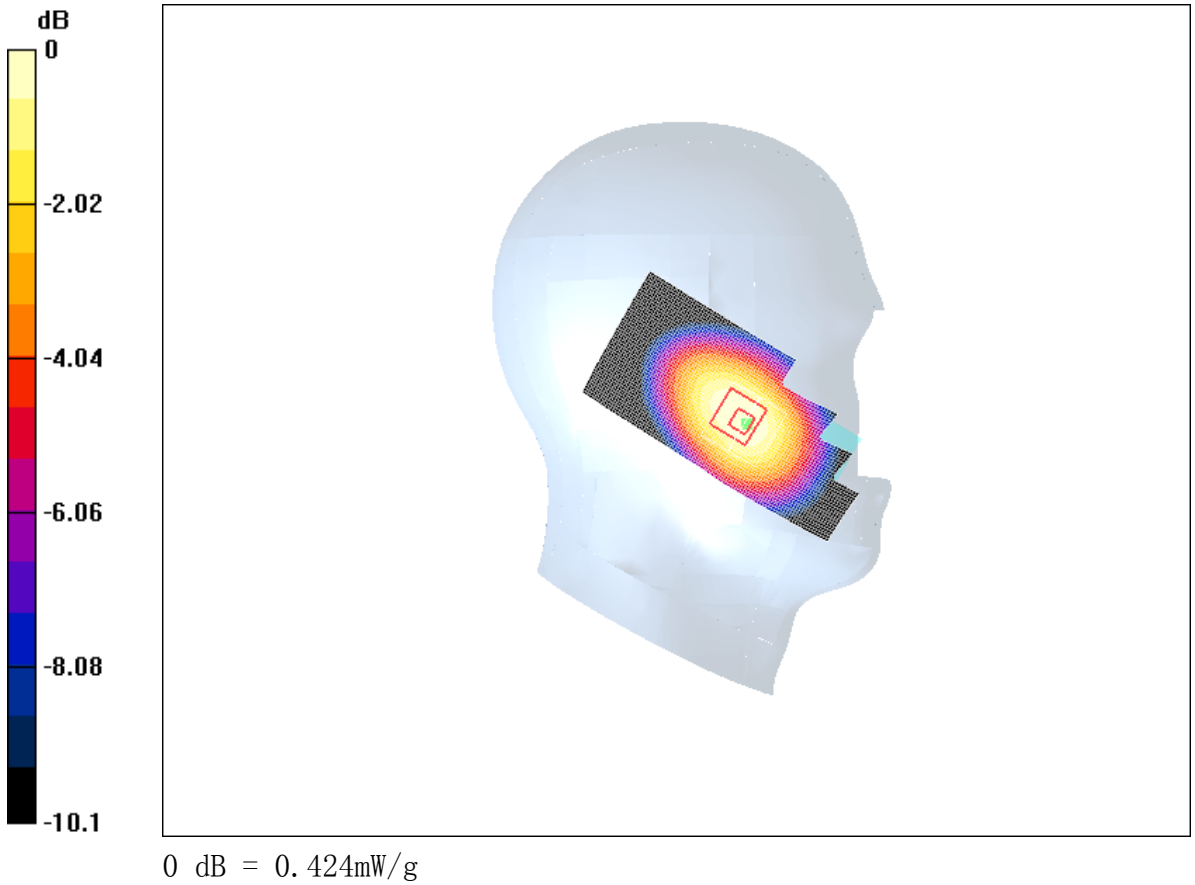



**Fig. 15 Left Hand Touch Cheek WCDMA 850MHz CH4182 – Slide** up

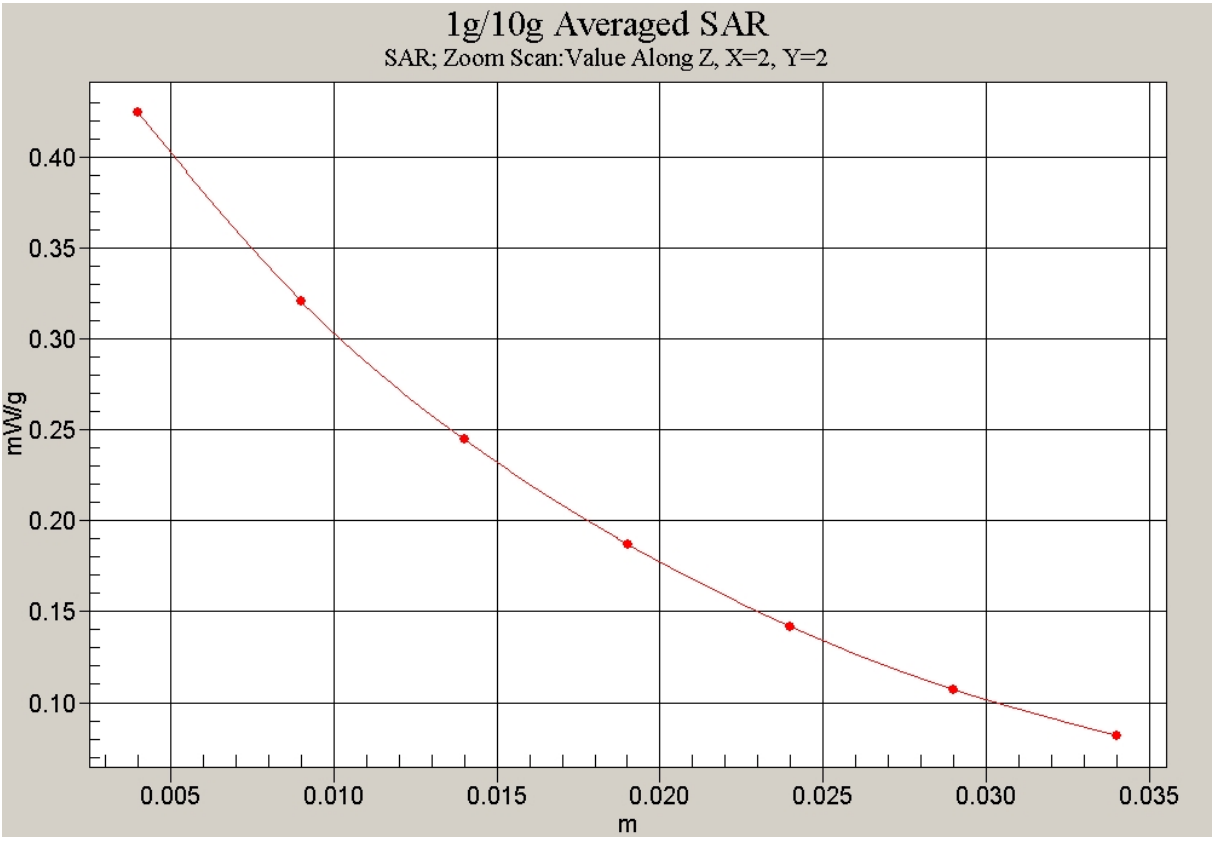



**Fig. 16 Z-Scan at power reference point (WCDMA 850MHz CH4182) – Slide** up

**WCDMA 850 Left Cheek Low – Slide up**

Date/Time: 2009-3-4 9:40:42
Electronics: DAE4 Sn771
Medium: 850 HEAD
Medium parameters used (interpolated): f = 826.4 MHz; $\sigma$ = 0.897 mho/m; $\varepsilon_r$ = 40.4; $\rho$ = 1000 kg/$m^3$
Ambient Temperature:23.3°C Liqiud Temperature: 22.5°C
Communication System: WCDMA 850 Frequency: 826.4 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(6.56, 6.56, 6.56)

**Left Cheek Low/Area Scan (51x101x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.489 mW/g

**Left Cheek Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.6 V/m; Power Drift = -0.159 dB
Peak SAR (extrapolated) = 0.616 W/kg
**SAR(1 g) = 0.464 mW/g; SAR(10 g) = 0.336 mW/g**
Maximum value of SAR (measured) = 0.495 mW/g

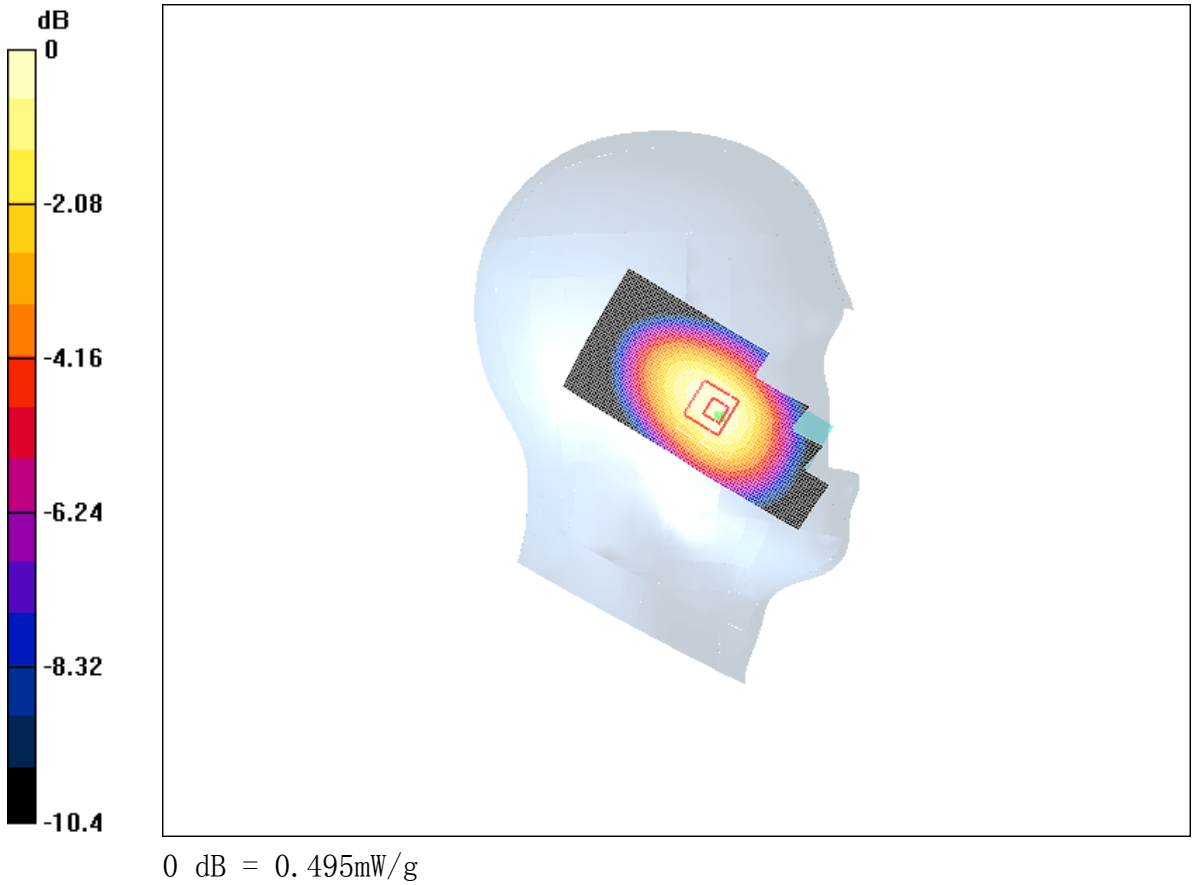



**Fig. 17 Left Hand Touch Cheek WCDMA 850MHz CH4132 – Slide** up

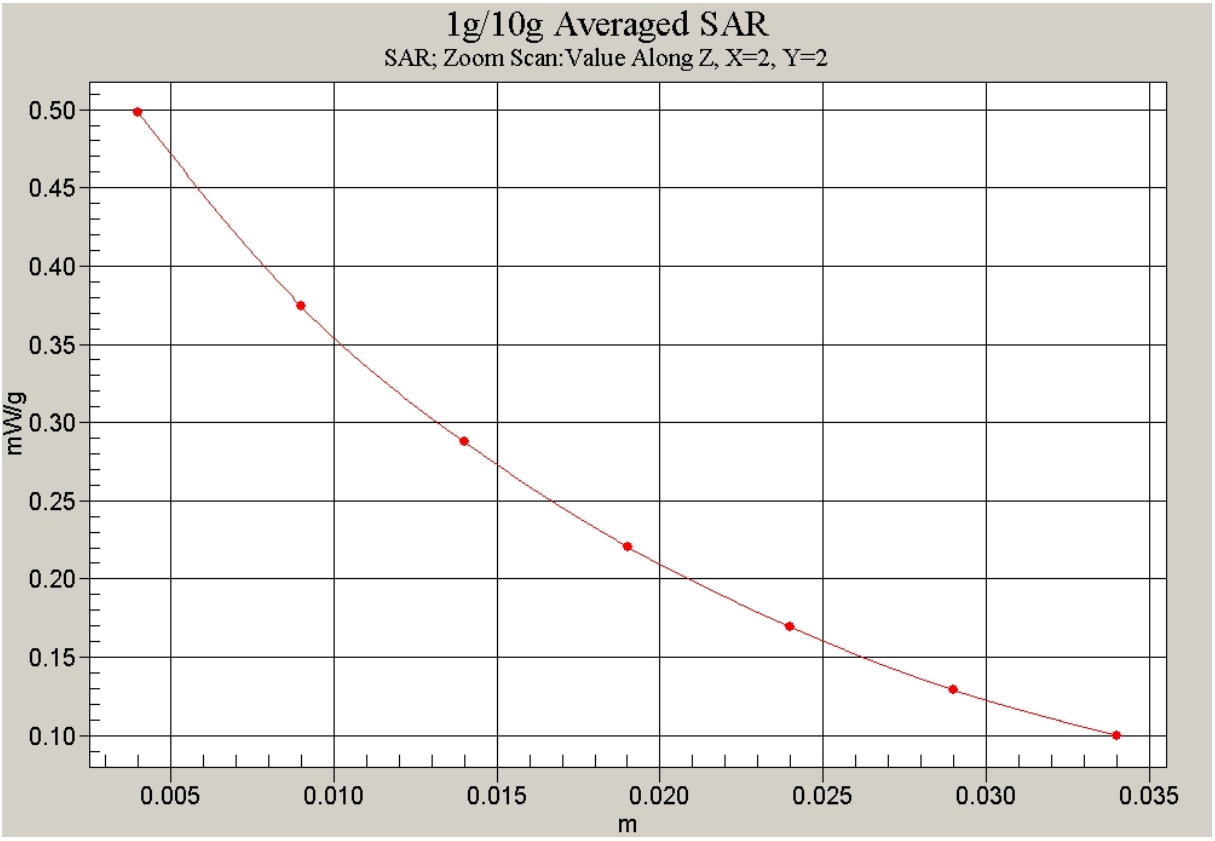



**Fig. 18 Z-Scan at power reference point (WCDMA 850MHz CH4132) – Slide** up

**WCDMA 850 Left Tilt Middle – Slide up**

Date/Time: 2009-3-4 9:54:13
Electronics: DAE4 Sn771
Medium: 850 HEAD
Medium parameters used (interpolated): f = 836.4 MHz; $\sigma$ = 0.907 mho/m; $\varepsilon_r$ = 40.4; $\rho$ = 1000 kg/$m^3$
Ambient Temperature:23.3°C Liqiud Temperature: 22.5°C
Communication System: WCDMA 850 Frequency: 836.4 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(6.56, 6.56, 6.56)

**Left Tilt Middle/Area Scan (51x101x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.278 mW/g

**Left Tilt Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.3 V/m; Power Drift = -0.169 dB
Peak SAR (extrapolated) = 0.344 W/kg
**SAR(1 g) = 0.264 mW/g; SAR(10 g) = 0.193 mW/g**
Maximum value of SAR (measured) = 0.279 mW/g

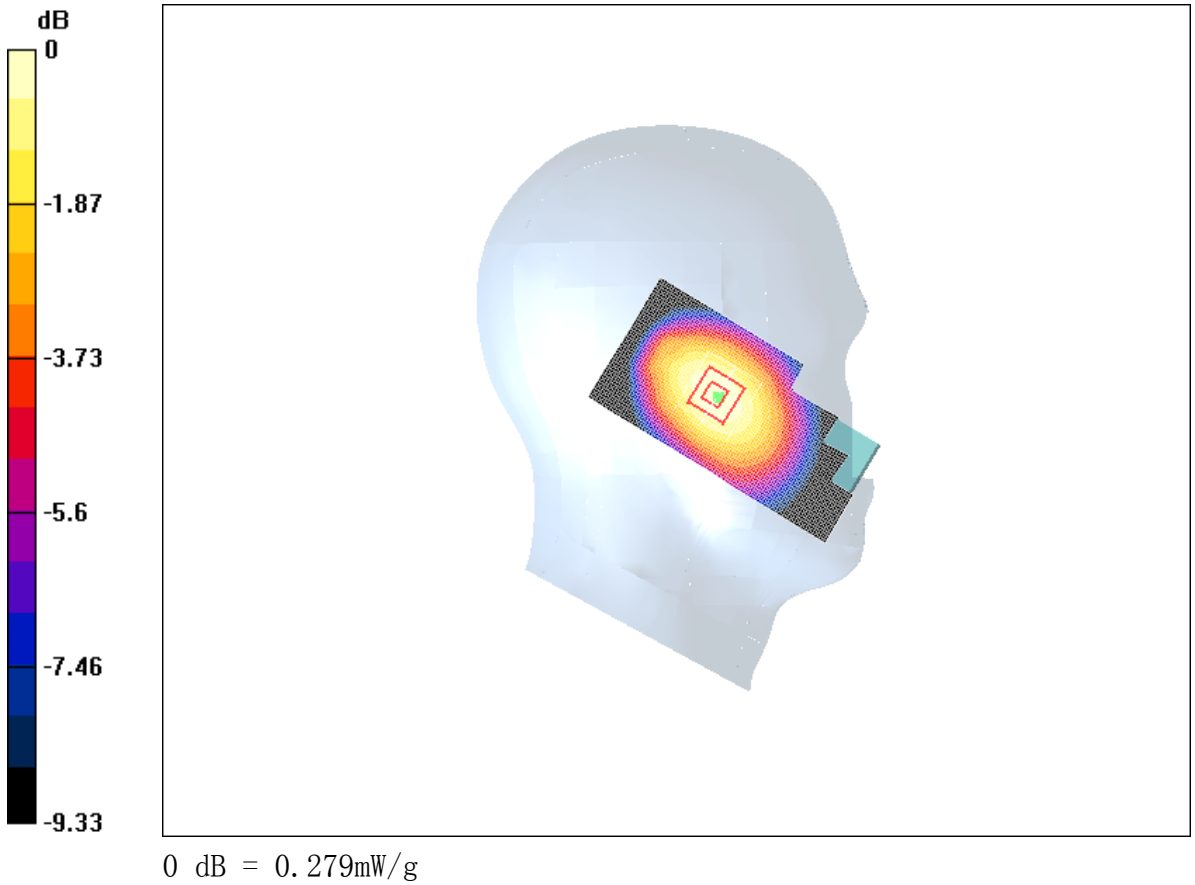



**Fig. 19 Left Hand Tilt 15°WCDMA 850MHz CH4182 – Slide** up

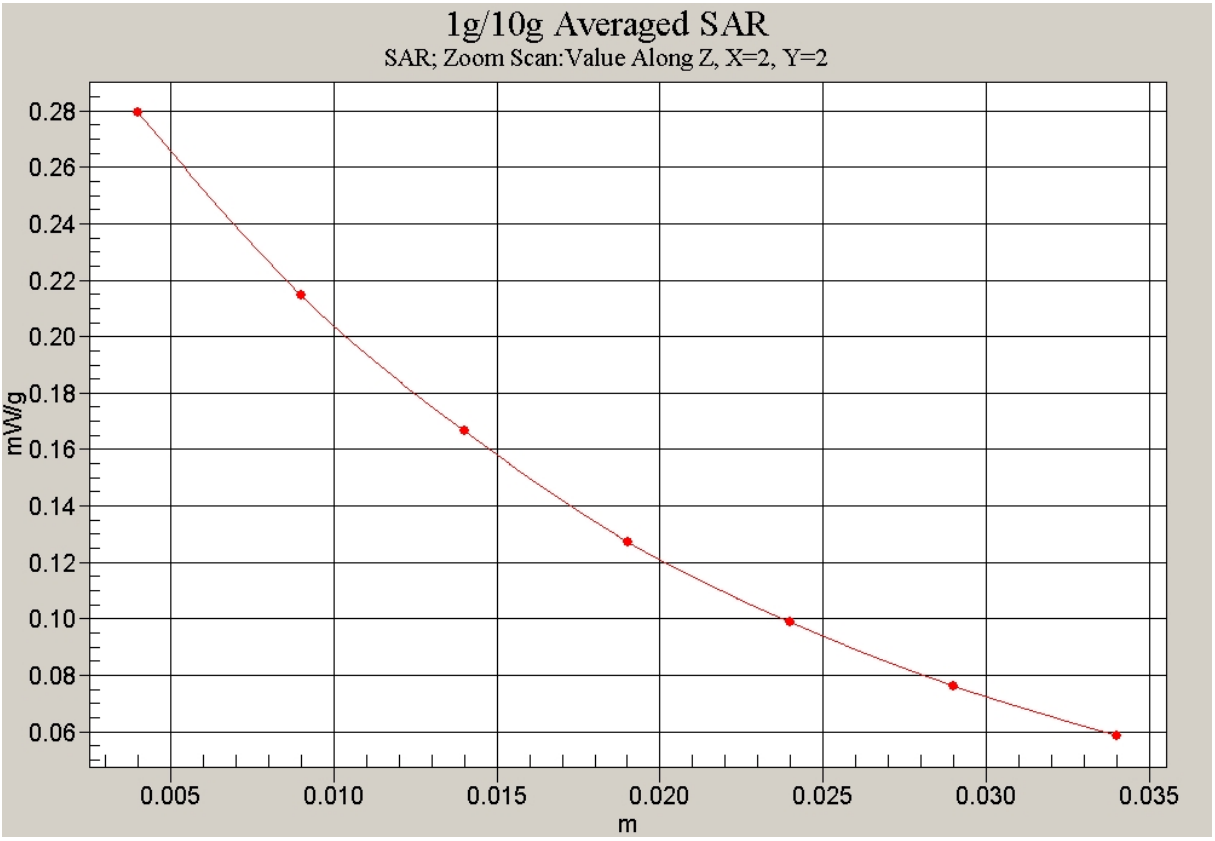


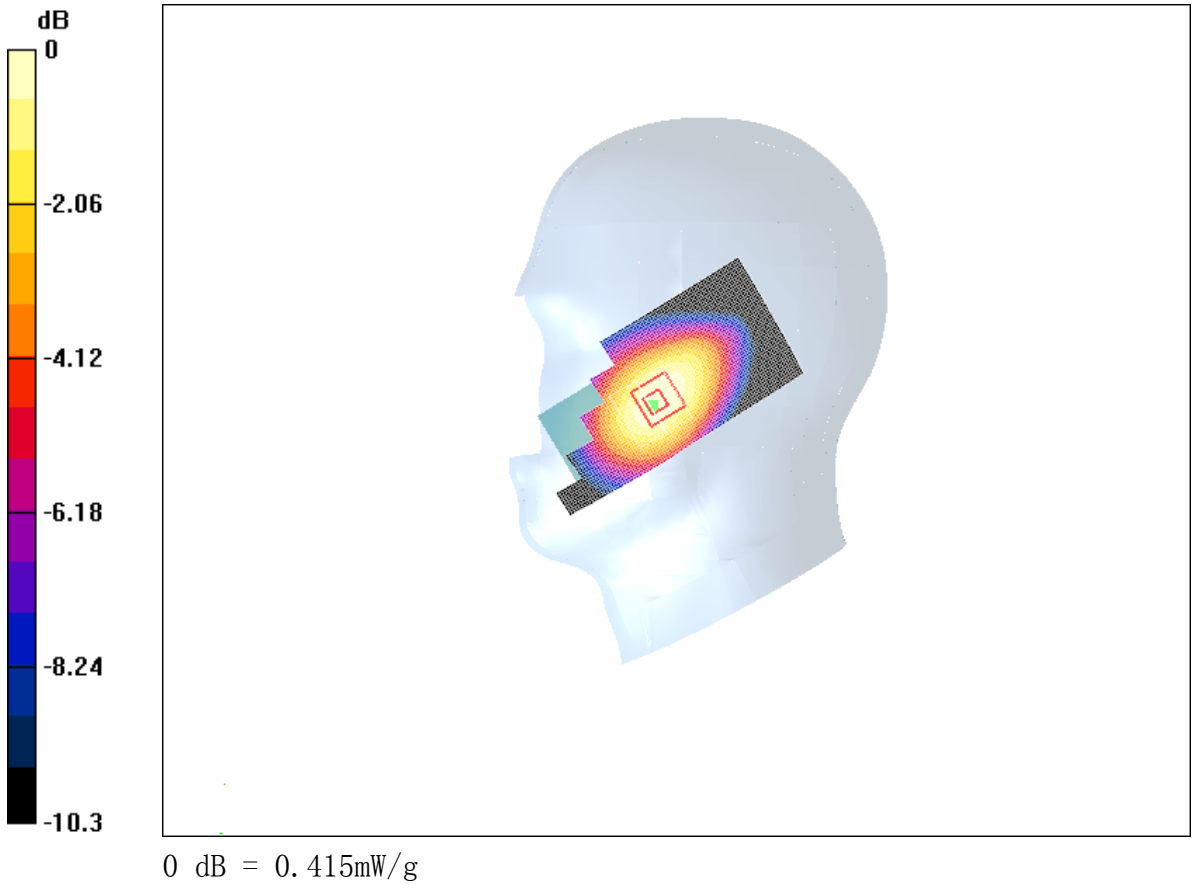

**Fig. 20 Z-Scan at power reference point (WCDMA 850MHz CH4182) – Slide** up

**WCDMA 850 Right Cheek Middle – Slide up**

Date/Time: 2009-3-4 10:08:22
Electronics: DAE4 Sn771
Medium: 850 HEAD
Medium parameters used (interpolated): f = 836.4 MHz; $\sigma$ = 0.907 mho/m; $\varepsilon_r$ = 40.4; $\rho$ = 1000 kg/$m^3$
Ambient Temperature:23.3°C Liqiud Temperature: 22.5°C
Communication System: WCDMA 850 Frequency: 836.4 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(6.56, 6.56, 6.56)

**Right Cheek Middle/Area Scan (51x101x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.415 mW/g

**Right Cheek Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.07 V/m; Power Drift = -0.130 dB
Peak SAR (extrapolated) = 0.512 W/kg
**SAR(1 g) = 0.392 mW/g; SAR(10 g) = 0.283 mW/g**
Maximum value of SAR (measured) = 0.415 mW/g




0 dB = 0.415mW/g

**Fig.21 Right Hand Touch Cheek WCDMA 850MHz CH4182 – Slide** up

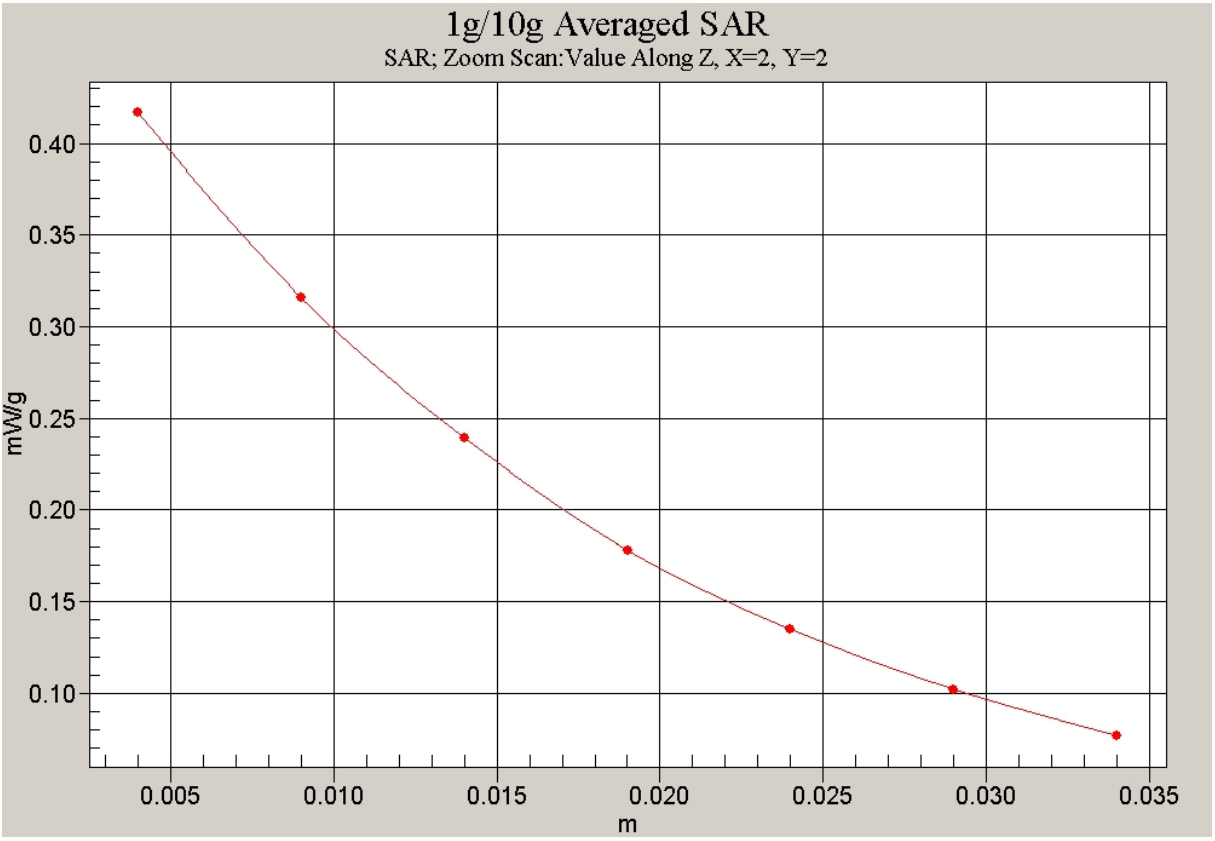


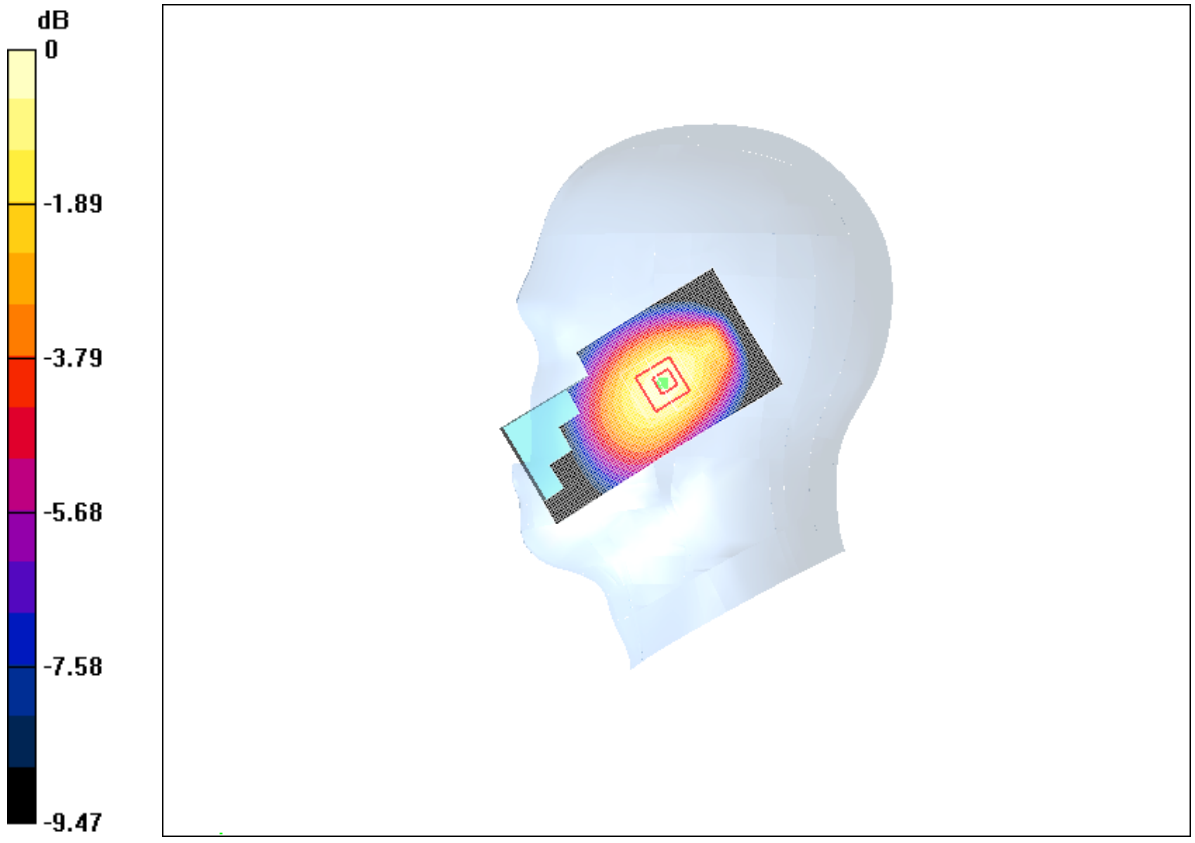

**Fig. 22 Z-Scan at power reference point (WCDMA 850MHz CH4182) – Slide** up

**WCDMA 850 Right Tilt Middle – Slide up**

Date/Time: 2009-3-4 10:22:08
Electronics: DAE4 Sn771
Medium: 850 HEAD
Medium parameters used (interpolated): f = 836.4 MHz; $\sigma$ = 0.907 mho/m; $\varepsilon_r$ = 40.4; $\rho$ = 1000 kg/$m^3$
Ambient Temperature:23.3°C Liqiud Temperature: 22.5°C
Communication System: WCDMA 850 Frequency: 836.4 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(6.56, 6.56, 6.56)

**Right Tilt Middle/Area Scan (51x101x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.303 mW/g

**Right Tilt Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14 V/m; Power Drift = 0.052 dB
Peak SAR (extrapolated) = 0.391 W/kg
**SAR(1 g) = 0.296 mW/g; SAR(10 g) = 0.212 mW/g**
Maximum value of SAR (measured) = 0.315 mW/g




0 dB = 0.315mW/g

**Fig. 23 Right Hand Tilt 15°WCDMA 850MHz CH4182 – Slide** up

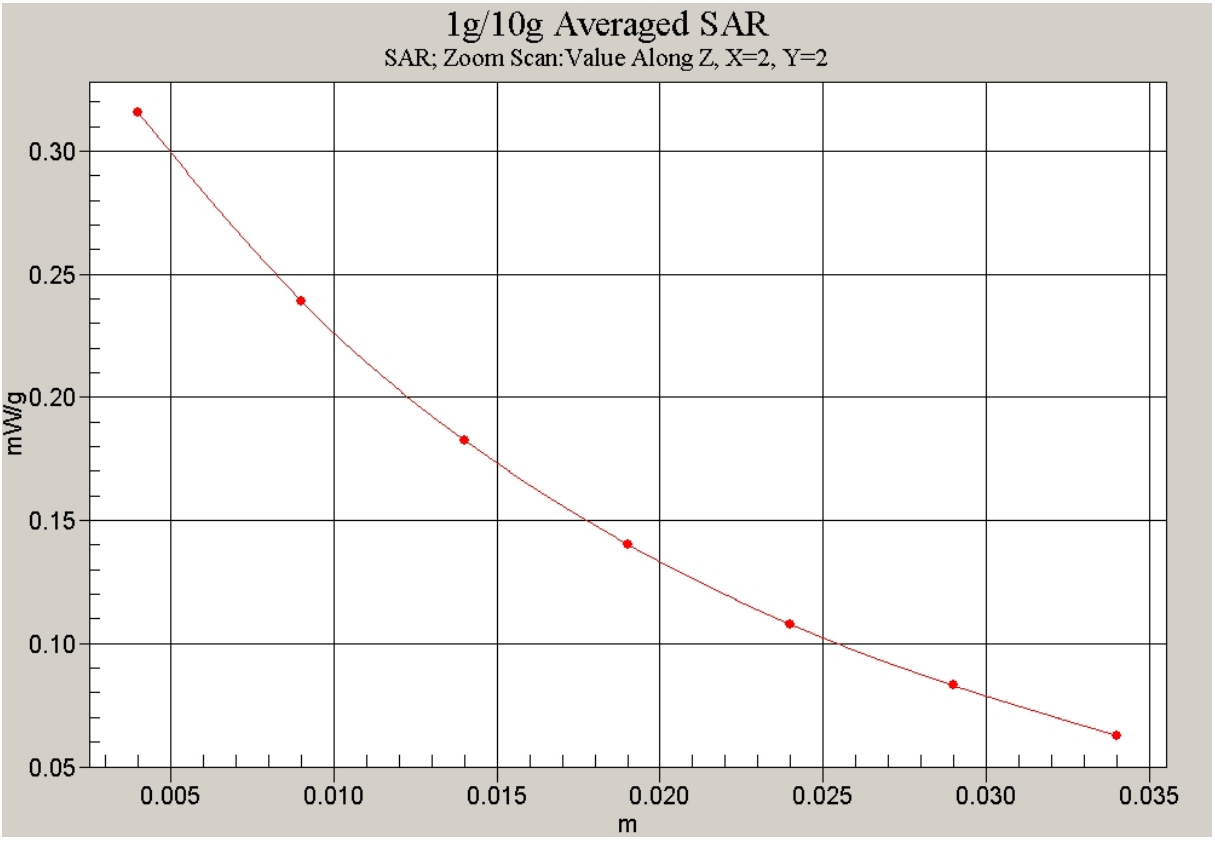



**Fig. 24 Z-Scan at power reference point (WCDMA 850MHz CH4182) – Slide** up