No. L0442

Deutscher Akkreditierungs Rat

**No.** DAT-P-114/01-10

# TEST REPORT

## No. EMF2003049

| | |
|---|---|
| **Test name** | Electromagnetic Field (Specific Absorption Rate) |
| **Product** | Tri Band GSM Mobile Phone |
| **Model** | C8118 |
| **Client** | CCT Mobile (HK) Limited |
| **Type of test** | Entrusted |

**Telecommunication Metrology Center**

**of Ministry of Information Industry**

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Address: No. 52, Huayuanbei Road, Beijing, P. R. China
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# GENERAL SUMMARY

| | | | |
|---|---|---|---|
| **Product** | Tri Band GSM Mobile Phone | **Model** | C8118 |
| | | **Trade mark** | |
| **Client** | CCT Mobile (HK) Limited | **Manufacturer** | Huiyang CCT Telecommunications Products Co.,Ltd. |
| **Type of test** | Entrusted | **Arrival Date of sample** | Nov. 10th, 2003 |
| **Place of sampling** | (Blank) | **Carrier of the samples** | Feynman Li |
| **Quantity of the samples** | One | **Date of product** | (Blank) |
| **Base of the samples** | (Blank) | **Items of test** | SAR |
| **Series number** | 351597001983650 | | |
| **Standard(s)** | **EN 50360–2001**: Product standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones.<br>**EN 50361–2001**: Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones.<br>**ANSI C95.1–1999**: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz<br>**IEEE 1528–2002**: DRAFT Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques. | | |
| **Conclusion** | Localized Specific Absorption Rate (SAR) of this portable wireless equipment has been measured in all cases requested by the relevant standards cited in Clause 5.2 of this test report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report.<br><br>General Judgment: **Pass**<br><br>(Stamp)<br>**Date of issue: Nov. 19th, 2003** | | |
| **Comment** | TX Freq. Band: 890–915 MHz (GSM) / 1710–1785 MHz (DCS) / 1850-1910 MHz (PCS)<br>Max. Power: 2 Watt (GSM) / 1 Watt (DCS) / 1 Watt (PCS)<br>Antenna Character: /<br>The test result only responds to the measured sample. | | |

**Approved by** (Lu Minniu) **Revised by** (Wang Hongbo) **Performed by** (Qi Dianyuan)

# TABLE OF CONTENT

# 1 COMPETENCE AND WARRANTIES

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# 3 DESCRIPTION OF EUT

## 3.1 Addressing Information Related to EUT

**Table 1: Applicant (The Client)**

| | |
|---|---|
| Name or Company | CCT Mobile (HK) Limited |
| Address/Post | 15/F., CCT Telecom Bldg., 11 Wo Shing Street, Shatin, New Territories, Hong Kong |
| City | Hong Kong |
| Postal Code | / |
| Country | China |
| Telephone | 852-26958333 |
| Fax | 852-26005278 |

**Table 2: Manufacturer**

| | |
|---|---|
| Name or Company | Huiyang CCT Telecommunications Products Co.,Ltd. |
| Address/Post | CCT Technology Park, San He Economic Development Zone, Huiyang City, GuangDong, China |
| City | Huiyang |
| Postal Code | / |
| Country | China |
| Telephone | 86-752-3500138 |
| Fax | 86-752-3500980 |

## 3.2 Constituents of EUT

**Table 3: Constituents of Samples**

| Description | Model | Serial Number | Manufacturer |
|---|---|---|---|
| Handset | C8118 | 351597001983650 | Huiyang CCT Telecommunications Products Co.,Ltd. |
| Lithium Battery | / | / | Haier |
| AC/DC Adapter | DSA-0051-05 FCH 510 60 F | 1903 | Haier |


**Figure 1: Constituents of the sample (Lithium Battery is in the Handset)**

## 3.3 General Description

Equipment Under Test (EUT) is a model of GSM Phase II portable Mobile Station (MS) with non-integrated antenna. It consists of Handset and normal options: Lithium Battery and AC/DC

Adapter as Table 3 and Fig. 1. Since it is a Tri-Band MS (GSM/DCS/PCS), SAR is tested respectively for three bands.
The sample undergoing test was selected by the Client.
Components list please refer to documents of the manufacturer.

# 4 OPERATIONAL CONDITIONS DURING TEST

## 4.1 Schematic Test Configuration

During SAR test, EUT is in Traffic Mode (Channel Allocated) at Normal Voltage Condition. A communication link is set up with a System Simulator (SS) by air link, and a call is established. The Absolute Radio Frequency Channel Number (ARFCN) is allocated to 1, 62 and 123 respectively in the case of GSM 900 MHz, or to 512, 700 and 885 respectively in the case of DCS 1800 MHz, or to 512, 661 and 810 respectively in the case of PCS 1900 MHz. The EUT is commanded to operate at maximum transmitting power.

The EUT shall use its internal transmitter. The antenna(s), battery and accessories shall be those specified by the manufacturer. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output. If a wireless link is used, the antenna connected to the output of the base station simulator shall be placed at least 50 cm away from the handset. The signal transmitted by the simulator to the antenna feeding point shall be lower than the output power level of the handset by at least 30 dB.

## 4.2 SAR Measurement Set-up

These measurements were performed with the automated near-field scanning system DASY4 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- 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 DASY3, 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.

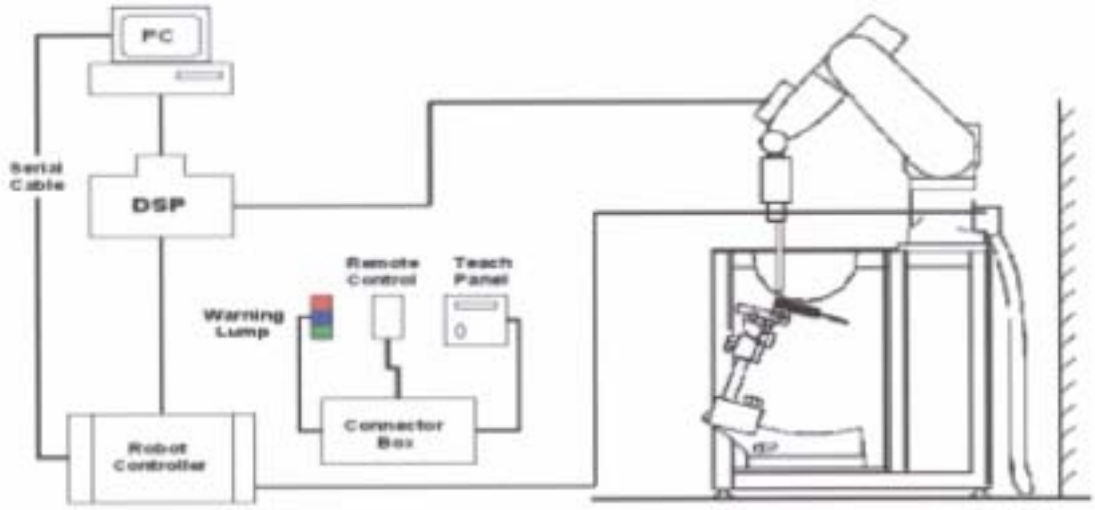



Figure 2. SAR Lab Test Measurement Set-up

The DAE3 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.

### 4.3 Dasy4 E-field Probe System

The SAR measurements were conducted with the dosimetric probe ET3DV6 (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.

**ET3DV6 Probe Specification**

| | |
|---|---|
| Construction | Symmetrical design with triangular core<br>Built-in optical fiber *for* surface detection System(ET3DV6 only)<br>Built-in shielding against static charges<br>PEEK enclosure material(resistant to organic solvents, e.q., glycol) |
| Calibration | In air from 10 MHz to 2.5 GHz<br>In brain and muscle simulating tissue at frequencies of 450MHz, 900MHz and 1.8GHz (accuracy±8%)<br>Calibration for other liquids and frequencies upon request |
| Frequency | I 0 MHz to > 6 GHz; Linearity: ±0.2 dB (30 MHz to 3 GHz) |
| Directivity | ±0.2 dB in brain tissue (rotation around probe axis) |

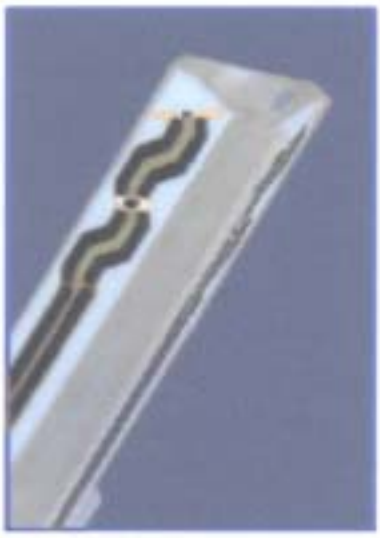


**Figure 3. ET3DV6 E-field Probe**

| | |
|---|---|
| | ±0.4 dB in brain tissue (rotation normal probe axis) |
| Dynamic Range | 5u W/g to > 100mW/g; Linearity: ±0.2dB |
| Surface Detection | ±0.2 mm repeatability in air and clear liquids over diffuse reflecting surface(ET3DV6 only) |
| Dimensions | Overall length: 330mm |
| | Tip length: 16mm |
| | Body diameter: 12mm |
| | Tip diarneter: 6.8mm |
| | Distance from probe tip to dipole centers: 2.7mm |
| Application | General dosimetry up to 3GHz |
| | Compliance tests of mobile phones |
| | Fast automatic scanning in arbitrary phantoms |

**Figure 4. ET3DV6 E-field probe**

## 4.4 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:

σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m3).

## 4.5 Other Test Equipment

### 4.5.1 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 repeat ably positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

**Figure 5. Device Holder**

### 4.5.2 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 |

**Figure 6. Generic Twin Phantom**

## 4.6 Equivalent Tissues

The liquid used for the frequency range of 800-2000 MHz consisted of water, sugar, salt and Cellulose. The liquid has previously been proven to be suited for worst-case. The Table 4 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528.

**Table 4. Composition of the Head Tissue Equivalent Matter**

| MIXTURE % | FREQUENCY 800-960MHz |
|---|---|
| Water | 40.29 |
| Sugar | 57.90 |
| Salt | 1.38 |
| Preventol | 0.18 |
| Cellulose | 0.24 |
| Dielectric Parameters<br>Target Value | f=900MHz ε =41.5 σ =0.97 |

| MIXTURE % | FREQUENCY 1710-1880MHz |
|---|---|
| Water | 55.242 |
| Glycol monobutyl | 44.452 |
| Salt | 0.306 |
| Dielectric Parameters<br>Target Value | f=1800MHz ε =40.0 σ =1.40<br>f=1900MHz ε =40.0 σ =1.40 |

**Composition of the Body Tissue Equivalent Matter**

| MIXTURE % | FREQUENCY 1900MHz |
|---|---|
| Water | 69.91 |
| Glycol monobutyl | 29.96 |
| Salt | 0.13 |
| Dielectric Parameters<br>Target Value | f=1900MHz ε =53.3 σ =1.52 |

## 4.7 System Specifications

### 4.7.1 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:** DASY3 software

**Connecting Lines:** Optical downlink for data and status info.
Optical uplink for commands and clock

# 5 CHARACTERISTICS OF THE TEST

## 5.1 Applicable Limit Regulations

**EN 50360–2001:** 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.

## 5.2 Applicable Measurement Standards

**EN 50361–2001:** Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones.

**IEEE 1528–2002:** DRAFT Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques.

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

# 6 LABORATORY ENVIRONMENT

**Table 5: The Ambient Conditions during EMF Test**

| | |
|---|---|
| Temperature | Min. = 15 ºC, Max. = 30 ºC |
| Relative humidity | Min. = 30%, Max. = 70% |
| Ground system resistance | < 0.5 Ω |
| Ambient noise is checked and found very low and in compliance with requirement of standards.<br>Reflection of surrounding objects is minimized and in compliance with requirement of standards. | |

# 7 TEST RESULTS

## 7.1 Dielectric Performance

**Table 6: Dielectric Performance of Head Tissue Simulating Liquid**

| Measurement is made at temperature 22.5 ºC and relative humidity 49%.<br>Liquid temperature during the test: 21.4ºC | | | |
|---|---|---|---|
| / | **Frequency** | **Permittivity ε** | **Conductivity σ (S/m)** |
| **Target value** | 900 MHz | 41.5 | 0.97 |
| | 1800 MHz | 40.0 | 1.40 |
| | 1900 MHz | 40.0 | 1.40 |
| **Measurement value (Average of 10 tests)** | 900 MHz | 40.23 | 0.96 |
| | 1800 MHz | 39.7 | 1.42 |
| | 1900 MHz | 39.66 | 1.46 |

**Table 7: Dielectric Performance of Body Tissue Simulating Liquid**

| Measurement is made at temperature 22.6 ºC and relative humidity 51%.<br>Liquid temperature during the test: 22.0ºC | | | |
|---|---|---|---|
| / | **Frequency** | **Permittivity ε** | **Conductivity σ (S/m)** |
| **Target value** | 1900 MHz | 53.30 | 1.52 |
| **Measurement value (Average of 10 tests)** | 1900 MHz | 52.9 | 1.54 |

## 7.2 System Validation

**Table 8: System Validation**

| Measurement is made at temperature 23.3 °C, relative humidity 47%, input power 250 mW.<br>Liquid temperature during the test: 22.6°C | | | | |
|---|---|---|---|---|
| **Liquid parameters** | | **Frequency** | **Permittivity ε** | **Conductivity σ (S/m)** |
| | | 900 MHz | 40.23 | 0.96 |
| | | 1800 MHz | 39.7 | 1.42 |
| | | 1900 MHz | 39.66 | 1.46 |

| **Verification results** | **Frequency** | **Target value (W/kg)** | | **Measurement value (W/kg)** | |
|---|---|---|---|---|---|
| | | **10 g Average** | **1 g Average** | **10 g Average** | **1 g Average** |
| | **900 MHz** | 1.69 | 2.60 | 1.70 | 2.64 |
| | **1800 MHz** | 4.72 | 8.79 | 4.72 | 9.14 |
| | **1900 MHz** | 5.04 | 9.59 | 4.91 | 9.8 |

## 7.3 Summary of Measurement Results (Head, GSM 900 MHz Band)

**Table 9: SAR Values (GSM 900 MHz Band, head)**

| Temperature: 23.4 °C, humidity: 51%.<br>Liquid temperature during the test: 22.5°C | | |
|---|---|---|
| **Limit of SAR (W/kg)** | **10 g Average** | **1 g Average** |
| | 2.0 | 1.6 |
| **Test Case** | **Measurement Result (W/kg)** | |
| | **10 g Average** | **1 g Average** |
| Left hand, Touch cheek, Top frequency | 0.537 | 0.806 |
| Left hand, Touch cheek, Mid frequency | 0.653 | 0.977 |
| Left hand, Touch cheek, Bottom frequency | 0.788 | 1.17 |
| Left hand, Tilt 15 Degree, Top frequency | 0.274 | 0.404 |
| Left hand, Tilt 15 Degree, Mid frequency | 0.339 | 0.5 |
| Left hand, Tilt 15 Degree, Bottom frequency | 0.417 | 0.61 |
| Right hand, Touch cheek, Top frequency | 0.485 | 0.73 |
| Right hand, Touch cheek, Mid frequency | 0.599 | 0.896 |
| Right hand, Touch cheek, Bottom frequency | 0.733 | 1.09 |
| Right hand, Tilt 15 Degree, Top frequency | 0.263 | 0.384 |
| Right hand, Tilt 15 Degree, Mid frequency | 0.33 | 0.479 |
| Right hand, Tilt 15 Degree, Bottom frequency | 0.398 | 0.573 |

## 7.4 Summary of Measurement Results (Head, DCS 1800 MHz Band)

**Table 10: SAR Values (DCS 1800 MHz Band, head)**

| Temperature: 23.6 °C, humidity: 49%.<br>Liquid temperature during the test: 22.1°C | | |
|---|---|---|
| **Limit of SAR (W/kg)** | **10 g Average** | **1 g Average** |
| | 2.0 | 1.6 |
| **Test Case** | **Measurement Result (W/kg)** | |
| | **10 g Average** | **1 g Average** |
| Left hand, Touch cheek, Top frequency | 0.247 | 0.415 |
| Left hand, Touch cheek, Mid frequency | 0.231 | 0.381 |
| Left hand, Touch cheek, Bottom frequency | 0.221 | 0.363 |
| Left hand, Tilt 15 Degree, Top frequency | 0.273 | 0.493 |
| Left hand, Tilt 15 Degree, Mid frequency | 0.244 | 0.435 |
| Left hand, Tilt 15 Degree, Bottom frequency | 0.225 | 0.396 |
| Right hand, Touch cheek, Top frequency | 0.225 | 0.396 |
| Right hand, Touch cheek, Mid frequency | 0.202 | 0.351 |
| Right hand, Touch cheek, Bottom frequency | 0.192 | 0.325 |
| Right hand, Tilt 15 Degree, Top frequency | 0.252 | 0.457 |
| Right hand, Tilt 15 Degree, Mid frequency | 0.219 | 0.392 |
| Right hand, Tilt 15 Degree, Bottom frequency | 0.203 | 0.362 |

## 7.5 Summary of Measurement Results (Head, PCS 1900 MHz Band)

**Table 11: SAR Values (PCS 1900 MHz Band, head)**

| Temperature: 23.1 °C, humidity: 50%.<br>Liquid temperature during the test: 22.4°C | | | |
|---|---|---|---|
| **Limit of SAR (W/kg)** | **10 g Average** | **1 g Average** | **Conducted Power before/after each test (dBm)** |
| | 2.0 | 1.6 | |
| **Test Case** | **Measurement Result (W/kg)** | | |
| | **10 g Average** | **1 g Average** | |
| Left hand, Touch cheek, Top frequency | 0.138 | 0.225 | **29.32/29.29** |
| Left hand, Touch cheek, Mid frequency | 0.22 | 0.363 | **29.89/29.93** |
| Left hand, Touch cheek, Bottom frequency | 0.286 | 0.47 | **29.66/29.71** |
| Left hand, Tilt 15 Degree, Top frequency | 0.127 | 0.221 | **29.30/29.35** |
| Left hand, Tilt 15 Degree, Mid frequency | 0.22 | 0.384 | **29.91/29.96** |
| Left hand, Tilt 15 Degree, Bottom frequency | 0.302 | 0.523 | **29.74/29.72** |
| Right hand, Touch cheek, Top frequency | 0.129 | 0.228 | **29.38/29.31** |
| Right hand, Touch cheek, Mid frequency | 0.223 | 0.391 | **29.85/29.88** |
| Right hand, Touch cheek, Bottom frequency | 0.295 | 0.518 | **29.64/29.67** |
| Right hand, Tilt 15 Degree, Top frequency | 0.124 | 0.223 | **29.34/29.29** |
| Right hand, Tilt 15 Degree, Mid frequency | 0.227 | 0.404 | **29.86/29.84** |
| Right hand, Tilt 15 Degree, Bottom frequency | 0.318 | 0.561 | **29.64/29.65** |

## 7.6 Summary of Measurement Results (Body-Worn, PCS 1900 MHz Band)

**Table 12: SAR Values (PCS 1900 MHz Band, body-worn)**

| Temperature: 23.5 ℃, humidity: 48%.<br>Liquid temperature during the test: 22.4℃ | | | |
|---|---|---|---|
| **Limit of SAR (W/kg)** | **10 g Average** | **1 g Average** | **Conducted Power before/after each test (dBm)** |
| | **2.0** | **1.6** | |
| **Test Case** | **Measurement Result (W/kg)** | | |
| | **10 g Average** | **1 g Average** | |
| Display of EUT towards the phantom, Top Frequency | 0.152 | 0.243 | **29.30/29.33** |
| Display of EUT towards the phantom, Mid Frequency | 0.143 | 0.227 | **29.90/29.85** |
| Display of EUT towards the phantom, Bottom Frequency | 0.123 | 0.188 | **29.72/29.75** |
| Display of EUT towards the ground, Top frequency | 0.247 | 0.406 | **29.31/29.28** |
| Display of EUT towards the ground, Mid frequency | 0.241 | 0.391 | **29.83/29.91** |
| Display of EUT towards the ground, Bottom frequency | 0.191 | 0.317 | **29.68/29.65** |

## 7.7 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.

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.

## 8 Measurement Uncertainty

| No. | Error source | Type | Uncertainty Value (%) | Probability Distribution | k | $c_i$ | Standard Uncertainty (%) $u_i'$ (%) | Degree of freedom $V_{eff}$ or $v_i$ |
|---|---|---|---|---|---|---|---|---|
| 1 | System repetivity | A | 0.5 | N | 1 | 1 | 0.5 | 9 |
| | Measurement system | | | | | | | |
| 2 | —probe calibration | B | 7 | N | 2 | 1 | 3.5 | ∞ |
| 3 | —axial isotropy of the probe | B | 4.7 | R | $\sqrt{3}$ | $\sqrt{0.5}$ | 4.3 | ∞ |
| 4 | —hemisphere isotropy of the probe | B | 9.4 | R | $\sqrt{3}$ | $\sqrt{0.5}$ | | |
| 5 | —spatial resolution | B | 0 | R | $\sqrt{3}$ | 1 | 0 | ∞ |
| 6 | —boundary effect | B | 11.0 | R | $\sqrt{3}$ | 1 | 6.4 | ∞ |
| 7 | —probe linearity | B | 4.7 | R | $\sqrt{3}$ | 1 | 2.7 | ∞ |
| 8 | —detection limit | B | 1.0 | R | $\sqrt{3}$ | 1 | 0.6 | ∞ |
| 9 | —electronic readout | B | 1.0 | N | 1 | 1 | 1.0 | ∞ |
| 10 | —RF interference | B | 3.0 | R | $\sqrt{3}$ | 1 | 1.73 | ∞ |
| 11 | — probe mechanical positioning constraint | B | 0.4 | R | $\sqrt{3}$ | 1 | 0.2 | ∞ |
| 12 | — matching between probe and phantom references | B | 2.9 | R | $\sqrt{3}$ | 1 | 1.7 | ∞ |
| 13 | — SAR interpolation and extrapolation | B | 3.9 | R | $\sqrt{3}$ | 1 | 2.3 | ∞ |
| | Uncertainties of the DUT | | | | | | | |
| 14 | —position of the DUT | A | 4.9 | N | 1 | 1 | 4.9 | 5 |
| 15 | —holder of the DUT | A | 6.1 | N | 1 | 1 | 6.1 | 5 |
| 16 | —drift of the output power | B | 5.0 | R | $\sqrt{3}$ | 1 | 2.9 | ∞ |
| | physical parameters | | | | | | | |
| 17 | —phantom shell | B | 1.0 | R | $\sqrt{3}$ | 1 | 0.6 | ∞ |
| 18 | — liquid conductivity (deviation from target) | B | 5.0 | R | $\sqrt{3}$ | 0.6 | 1.7 | ∞ |
| 19 | — liquid conductivity(measurement error) | B | 10.0 | R | $\sqrt{3}$ | 0.6 | 3.4 | ∞ |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 20 | — liquid permittivity(deviation from target) | B | 5.0 | R | $\sqrt{3}$ | 0.6 | 1.7 | ∞ |
| 21 | — liquid permittivity(measurement error) | B | 5.0 | R | $\sqrt{3}$ | 0.6 | 1.7 | ∞ |
| Combined standard uncertainty | | $u_c^{'} = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$ | | | | | 13.5 | 88.7 |
| Expanded uncertainty (confidence interval of 95 %) | | $u_e = 2u_c$ | | N | | k=2 | 27 | |

# 9 MAIN TEST INSTRUMENTS

**Table 13: List of Main Instruments**

| No. | Name | Type | Serial Number | Calibration Date | Valid Period |
|---|---|---|---|---|---|
| 01 | Network analyzer | HP 8753C | 3146A01905 | May 22,2003 | One year |
| 02 | S-parameter test set | HP 85047A | 3033A02437 | | |
| 03 | Dielectric Probe Kit | Agilent 85070C | US99360113 | No Calibration Requested | |
| 04 | Power meter | HP 436A | 2101A11858 | October 4,2003 | One year |
| 05 | Power sensor | HP 8481H | 2349A07289 | | |
| 06 | Signal Generator | MG 3633A | M73386 | No Calibration Requested | |
| 07 | Amplifier | AT 50S1G4A | 26549 | No Calibration Requested | |
| 08 | Validation Kit 835MHz | SPEAG D 835V2 | 443 | September 3, 2003 | Two years |
| 09 | Validation Kit 900MHz | SPEAG D 900V2 | 125 | September 3, 2003 | Two years |
| 10 | Validation Kit 1800MHz | SPEAG D 1800V2 | 2d010 | September 3, 2003 | Two years |
| 11 | Validation Kit 1900MHz | 1900 V2 | 541 | September 3, 2003 | Two years |
| 12 | BTS | CMD 55 | 831256/052 | December 28, 2002 | One year |
| 13 | BTS | CMU 200 | 100680 | September 13, 2003 | One year |
| 14 | E-field Probe | SPEAG ET3DV6 | 1738 | December 9, 2002 | Two years |
| 15 | DAE | SPEAG DAE3 | 536 | October 24, 2002 | Two years |

# 10 TEST PERIOD

The test is performed from Nov 10, 2003 to Nov 18 2003.

# 11 TEST LOCATION

The test is performed at
Radio Communication & Electromagnetic Compatibility Laboratory of
Telecommunication Metrology Center of
Ministry of Information Industry of
The People's Republic of China

***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 ear 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 head was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 20 mm x 20 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

Step 3: Around this point, a volume of 32 mm x 32 mm x 34 mm was assessed by measuring 5 x 5 x 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.

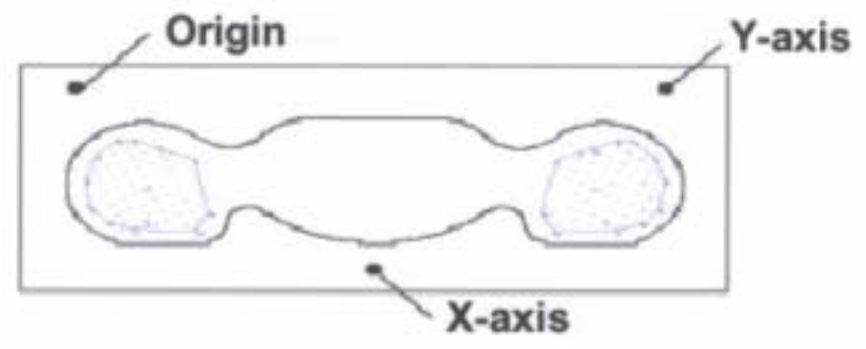
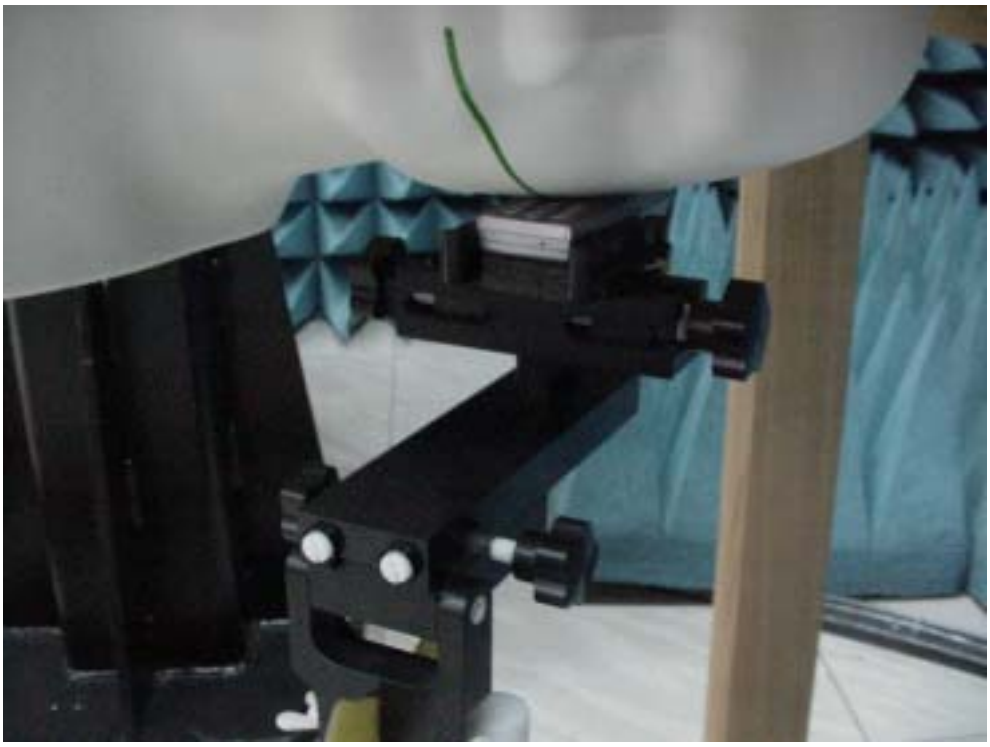



Figure 2 SAR Measurement Points in Area Scan

## ANNEX B TEST LAYOUT

Picture 1 Specific Absorption Rate Test Layout



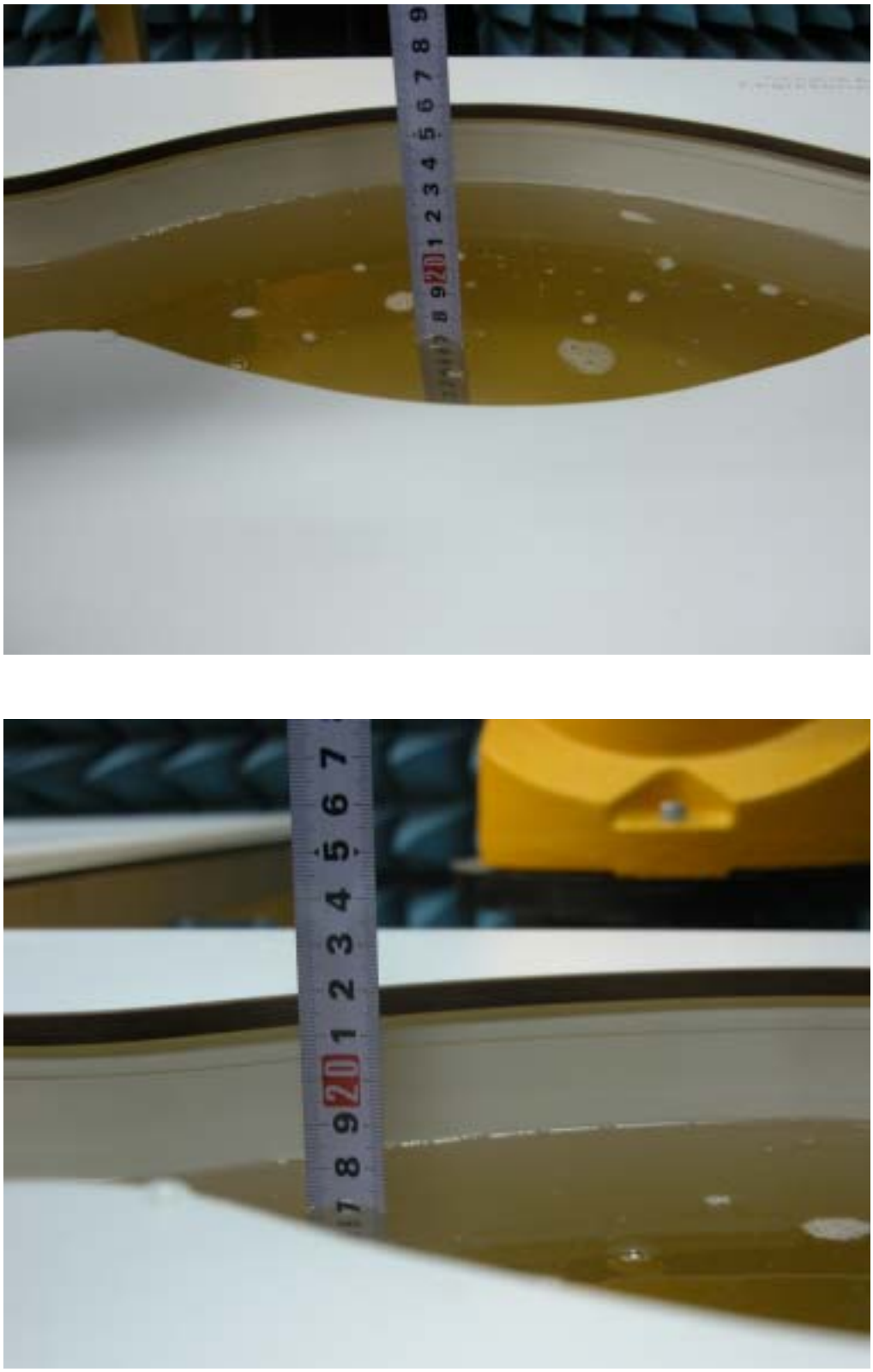
Picture 2 Left Hand Touch Cheek Position

Picture 3 Left Hand Tilt 15° Position

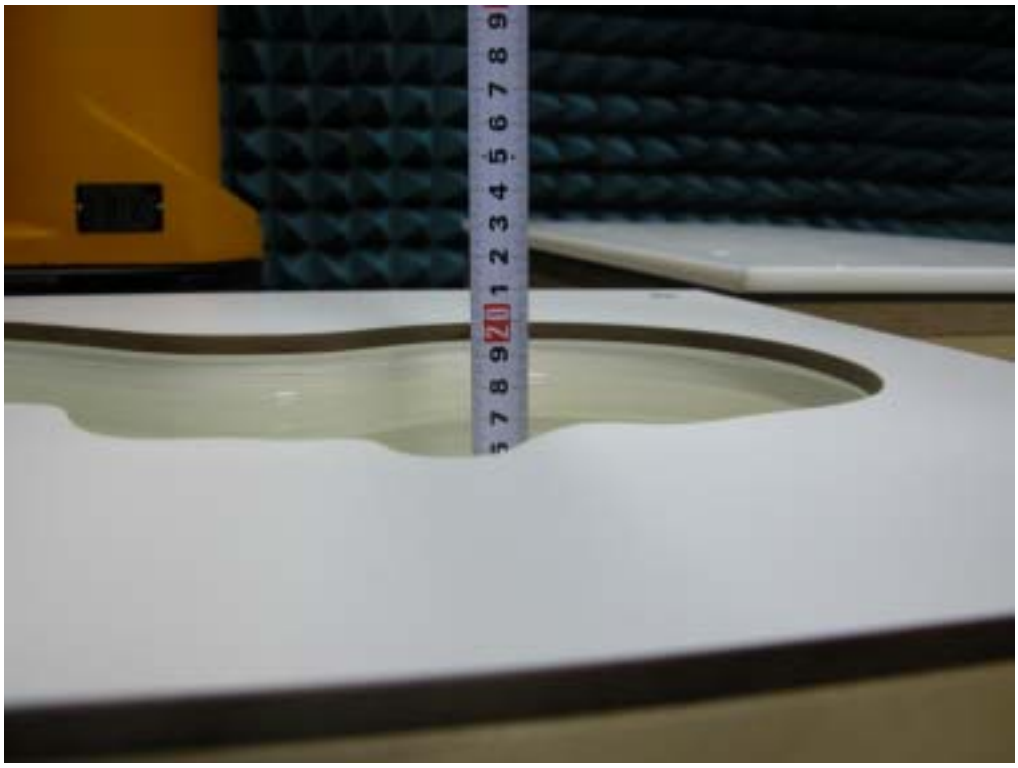
Picture 4 Right Hand Touch Cheek Position

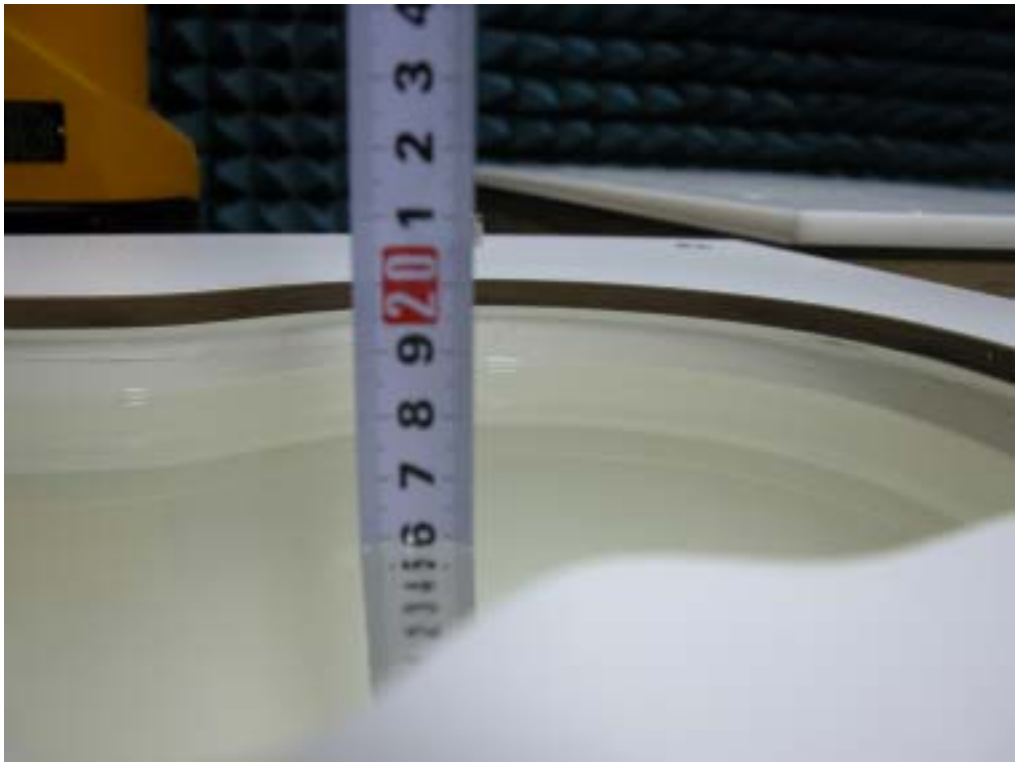
Picture 5 Right Hand Tilt 15° Position

Picture 6 Flat Phantom -- Body-worn Position (the distance from handset to the bottom of the Phantom is 1.5cm)

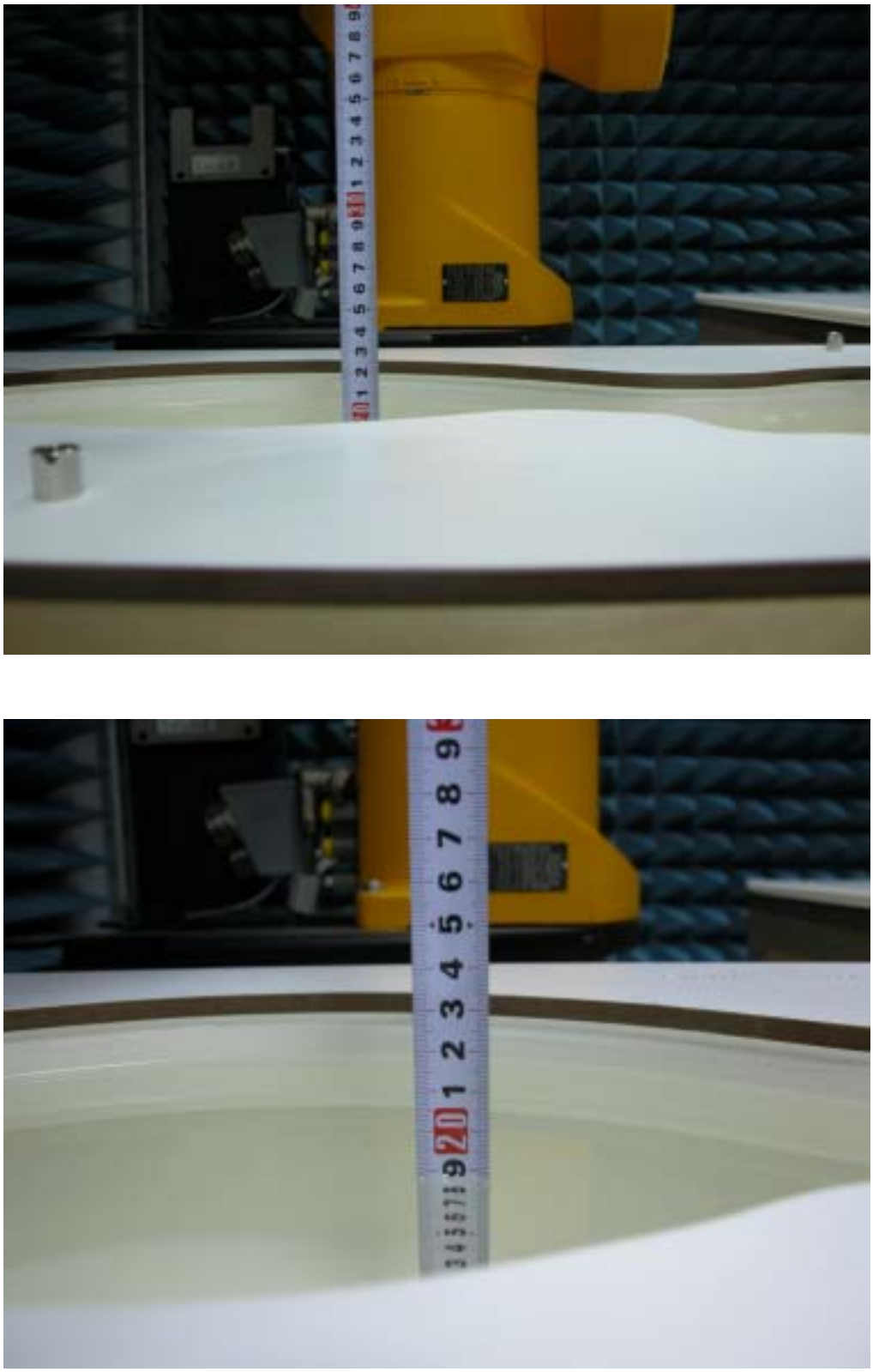


Picture 7 Liquid depth in the Head Phantom (Head 900MHz)





Picture 8 Liquid depth in the Head Phantom (Head 1800MHz,1900MHz)



Picture 9 Liquid depth in the Flat Phantom (Body 1900MHz)

## ANNEX C GRAPH RESULTS

Test Laboratory: TMC
File Name: SAR Test GSM 900 Left.da4

**DUT: CCT C8118 Type & Serial Number: 351597001983650**
**Program: SAR Test C8118 Left; C8118 GSM 900 Left Cheek L**

Communication System: GSM 900; Frequency: 890.2 MHz; Duty Cycle: 1:8.3
Phantom section: LeftSection

**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm
Reference Value = 28.9 V/m
Peak SAR = 1.58 mW/g
SAR(1 g) = 1.17 mW/g; SAR(10 g) = 0.788 mW/g
Power Drift = -0.006 dB
**Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

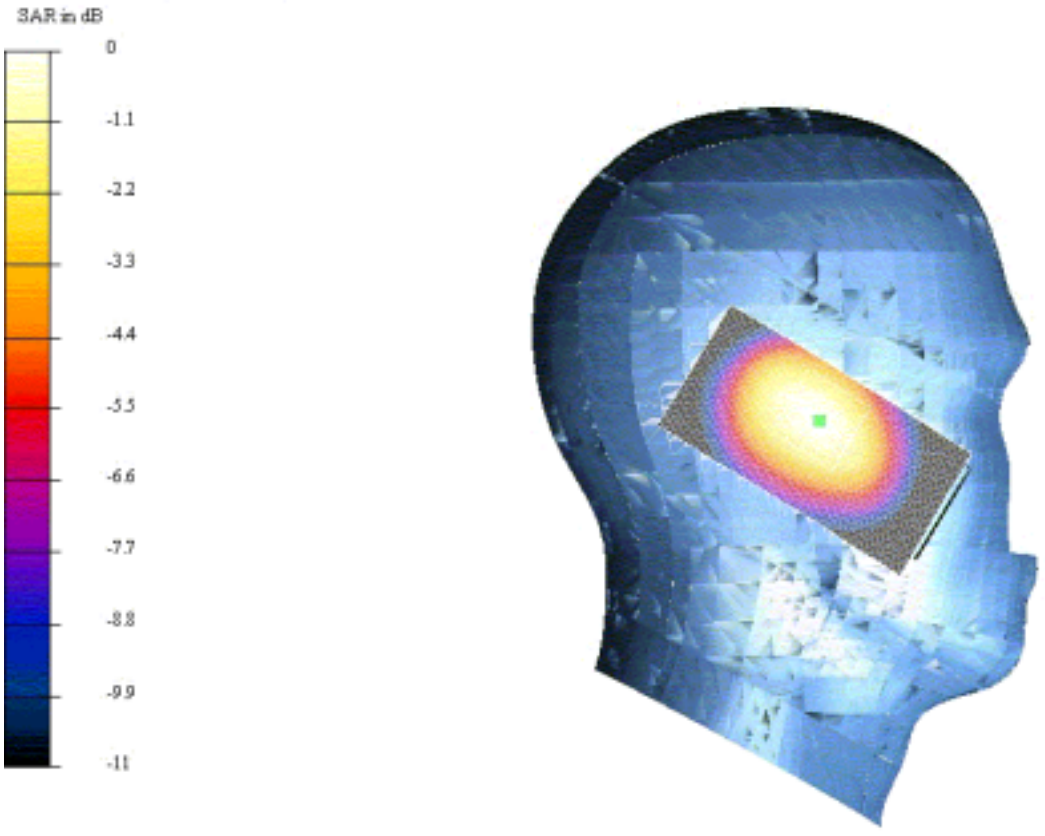



**Fig. 1 Left Hand Touch Cheek 900MHz CH1**