



## SAR TEST REPORT

Test Report No. : 26HE0182-HO-C-5

Applicant : Sony Computer Entertainment Inc.  
Type of Equipment : PSP  
Model No. : PSP-1001  
FCC ID : AK8PSP1001B2  
Test standard : FCC47CFR 2.1093  
FCC OET Bulletin 65, Supplement C  
Test Result : Complied  
Max. SAR Measured : 0.103W/kg (Body, 2437MHz)

1. This test report shall not be reproduced except full or partial, without the written approval of UL Apex Co., Ltd.
2. The results in this report apply only to the sample tested.
3. This equipment is in compliance with the above standard. We hereby certify that the data contain a true representation of the SAR profile.
4. The test results in this test report are traceable to the national or international standards.

Date of test : April 10, 2006

Tested by :

Hisayoshi Sato  
EMC Services

Approved by :

Hironobu Shimoji  
Group Leader of EMC Services

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## **SECTION 1 : Client information**

|                  |                                                         |
|------------------|---------------------------------------------------------|
| Company Name     | Sony Computer Entertainment Inc.                        |
| Brand name       | Sony                                                    |
| Address          | 2-6-21 Minami-Aoyama, Minato-ku, Tokyo, 107-0062, Japan |
| Telephone Number | +81-3-6483-8625                                         |
| Facsimile Number | +81-3-6483-8607                                         |
| Contact Person   | Tatsuya Suzuki                                          |

## **SECTION 2 : Equipment under test (E.U.T.)**

### **2.1 Identification of E.U.T.**

|                           |                                                                                                                                                      |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type of Equipment         | PSP                                                                                                                                                  |
| Model No.                 | PSP-1001                                                                                                                                             |
| Serial No.                | 20005508-PSP1001 has Antenna, model: HFS11-SO01, manufactured by Hitachi.<br>20005478-PSP1001 has Antenna, model: UBA-CUW1000, manufactured by Sony. |
| Country of Manufacture    | China                                                                                                                                                |
| AC Adapter* <sup>1)</sup> | Model Name : Model: PSP-100 (Mitsumi, ADP-553SR)                                                                                                     |
|                           | Rating (output) : DC5V                                                                                                                               |
| Battery* <sup>2)</sup>    | Type : Li-ion Battery                                                                                                                                |
|                           | Model Name : PSP-110                                                                                                                                 |
|                           | Rating : DC3.6V/1800mAh                                                                                                                              |
|                           | Manufacturer : Sony                                                                                                                                  |
| Accessories               | Earphone, USB cable                                                                                                                                  |
| Condition of EUT          | Production prototype<br>(Not for sale: This sample is equivalent to mass-produced items.)                                                            |
| Operation Clock           | 22MHz, 27MHz, 37MHz, 22 or 24MHz (switching), 48MHz, 111MHz                                                                                          |
| Receipt Date of Sample    | March 20, 2006                                                                                                                                       |
| Category Identified       | Portable device                                                                                                                                      |

## **2.2 Identification of Wireless LAN Module**

### **2.2.1 Product Description**

#### **Radio Specification**

Wireless LAN Module (IEEE802.11b)

|                                |                    |
|--------------------------------|--------------------|
| Equipment Type                 | Transceiver        |
| Frequency of Operation         | 2412-2462 MHz      |
| Max. Output Power              | 14.16dBm (26.06mW) |
| Type of Modulation             | DSSS               |
| Mode of Operation              | Simplex            |
| Method of frequency generation | Crystal            |
| Power Supply                   | DC3.2V             |

#### **Antenna**

|                               |                     |                  |
|-------------------------------|---------------------|------------------|
| Antenna model * <sup>3)</sup> | UBA-CUW1000         | HFS11-SO01       |
| Antenna type                  | Monopole antenna    | Monopole antenna |
| Antenna Gain                  | 2.0 dBi (Max.)      | 5.0 dBi (Max)    |
| Antenna location              | Refer to Appendix 1 |                  |

\*<sup>3)</sup> Antenna : Either UBA-CUW1000 or HFS11-SO01 will be installed in PSP-1001.

### **SECTION 3 : Test standard information**

#### **3.1 Requirements for compliance testing defined by the FCC**

The US Federal Communications Commission has released the report and order "Guidelines for Evaluating the Environmental Effects of RF Radiation", ET Docket No. 93-62 in August 1996. The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g for an uncontrolled environment and 8.0 mW/g for an occupational/controlled environment as recommended by the ANSI/IEEE standard C95.1-1992. According to the Supplement C of OET Bulletin 65 "Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at maximum output power (radiated from the antenna) under "worst-case" conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

**1** Specific Absorption Rate (SAR) is a measure of the rate of energy absorption due to exposure to an RF transmitting source (wireless portable device).

**2** IEEE/ANSI Std. C95.1-1992 limits are used to determine compliance with FCC ET Docket 93-62.

### **3.2 Exposure limit**

#### **(A) Limits for Occupational/Controlled Exposure (W/kg)**

| Spatial Average<br>(averaged over the whole body) | Spatial Peak<br>(averaged over any 1g of tissue) | Spatial Peak<br>(hands/wrists/feet/ankles averaged over 10g) |
|---------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------|
| 0.4                                               | 8.0                                              | 20.0                                                         |

#### **(B) Limits for General population/Uncontrolled Exposure (W/kg)**

| Spatial Average<br>(averaged over the whole body) | Spatial Peak<br>(averaged over any 1g of tissue) | Spatial Peak<br>(hands/wrists/feet/ankles averaged over 10g) |
|---------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------|
| 0.08                                              | 1.6                                              | 4.0                                                          |

**Occupational/Controlled Environments:** are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

**General Population/Uncontrolled Environments:** are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

|                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------|
| <p><b>NOTE:GENERAL POPULATION/UNCONTROLLED EXPOSURE<br/>SPATIAL PEAK(averaged over any 1g of tissue) LIMIT<br/>1.6 W/kg</b></p> |
|---------------------------------------------------------------------------------------------------------------------------------|

## **SECTION 4 : Test result**

### **4.1 Result of Max. SAR value**

**Max. SAR Measured (IEEE 802.11b) : 0.103 W/kg (Body, 2437MHz)**

### **4.2 Test Location**

UL Apex Co., Ltd. Head Office EMC Lab.  
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN  
Telephone : +81 596 24 8116  
Facsimile : +81 596 24 8124

## **SECTION 5 : Operation of E.U.T. during testing**

### **5.1 Operating modes**

|                |                                                                                                                                                                                                                                                                                         |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating mode | <p>The frequency band and the modulation used in this test are shown as a following.</p> <p>1. IEEE 802.11b mode</p> <p>Frequency band : 2412-2462MHz</p> <p>Channel : 1ch(2412MHz), 6ch(2437MHz), 11ch(2462MHz)</p> <p>Modulation : DSSS (DBPSK,DQPSK,CCK)</p> <p>Crest factor : 1</p> |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### **5.2 Measurement procedure**

This EUT is composed two kinds of antennas, we were measured in each of different EUT.  
20005478-PSP1001 has Antenna, model: UBA-CUW1000, manufactured by Sony.  
20005508-PSP1001 has Antenna, model: HFS11-SO01, manufactured by Hitachi.

#### **1. ANT. UBA-CUW1000 (EUT S/N: 20005478-PSP1001)**

The 11b (DSSS) test was performed in the CCK(11Mbps) modulation because it was the highest peak power and data rate.

- Step1. Decision of SAR Measurement position  
The purpose of this examination is to decide the position of the sample in the SAR measurement.
- Step2. Conformation of the Low and High channels  
The purpose of this examination is to measure SAR value of Low (2412MHz) and High (2462MHz) channels. This test was performed at the worst condition of Step1.

#### **2. ANT. HFS11-SO01 (EUT S/N: 20005508-PSP1001)**

The 11b (DSSS) test was performed in the CCK(11Mbps) modulation because it was the highest peak power and data rate.

- Step3. Decision of SAR Measurement position  
The purpose of this examination is to decide the position of the sample in the SAR measurement.
- Step4. Conformation of the Low and High channels  
The purpose of this examination is to measure SAR value of Low (2412MHz) and High (2462MHz) channels. This test was performed at the worst condition of Step3.

#### **3. Change distance between EUT and SAM Twin Phantom**

- Step5. The measurement was performed with the distance,5mm,10mm and 15mm to check if the shortest distance (0mm) may not have the worst value at the conditions of the highest SAR value.As a result, the shortest distance (0mm) had the worst value.

### **5.3 Test setup of EUT**

When users operate or carry the EUT, it could be considered to touch or get close to their bodies. In order to assume this situation, we performed the test at the following positions. Please refer to "APPENDIX 1" for more details.

(1) Front:

The test was performed in touch with Front surface of the EUT to the flat section of SAM Twin phantom.

(2) Back :

The test was performed in touch with Back of the EUT to the flat section of SAM Twin phantom.

(3) Top :

The test was performed in touch with Top surface of the EUT to the flat section of SAM Twin phantom.

(4) Bottom :

The test was performed in touch with Bottom surface of the EUT to the flat section of SAM Twin phantom.

(5) Left Side :

The test was performed in touch with Left Side surface of the EUT to the flat section of SAM Twin phantom.

(6 ) Front (5mm) :

The measurement opened 5mm distance between EUT and SAM Twin Phantom.

(7) Front (10mm):

The measurement opened 10mm distance between EUT and SAM Twin Phantom.

(8 ) Front (15mm) :

The measurement opened 15mm distance between EUT and SAM Twin Phantom.

\*The test setup photograph is put on appendix 1.

## SECTION 6 : Test surrounding

### 6.1 Measurement uncertainty

The uncertainty budget has been determined for the DASY4 measurement system according to the SPEAG documents [6][7] and is given in the following Table.

| Error Description                    | Uncertainty value $\pm$ % | Probability distribution | divisor    | (ci) 1g | Standard Uncertainty (1g)      | vi or veff |
|--------------------------------------|---------------------------|--------------------------|------------|---------|--------------------------------|------------|
| <b>Measurement System</b>            |                           |                          |            |         |                                |            |
| Probe calibration                    | $\pm 6.8$                 | Normal                   | 1          | 1       | $\pm 6.8$                      | $\infty$   |
| Axial isotropy of the probe          | $\pm 4.7$                 | Rectangular              | $\sqrt{3}$ | 0.7     | $\pm 1.9$                      | $\infty$   |
| Spherical isotropy of the probe      | $\pm 9.6$                 | Rectangular              | $\sqrt{3}$ | 0.7     | $\pm 3.9$                      | $\infty$   |
| Boundary effects                     | $\pm 2.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 1.2$                      | $\infty$   |
| Probe linearity                      | $\pm 4.7$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 2.7$                      | $\infty$   |
| Detection limit                      | $\pm 1.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 0.6$                      | $\infty$   |
| Readout electronics                  | $\pm 1.0$                 | Normal                   | 1          | 1       | $\pm 1.0$                      | $\infty$   |
| Response time                        | $\pm 0.8$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 0.5$                      | $\infty$   |
| Integration time                     | $\pm 2.6$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 1.5$                      | $\infty$   |
| RF ambient Noise                     | $\pm 3.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 1.7$                      | $\infty$   |
| RF ambient Reflections               | $\pm 3.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 1.7$                      | $\infty$   |
| Mech. constraints of robot           | $\pm 0.8$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 0.5$                      | $\infty$   |
| Probe positioning                    | $\pm 9.9$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 5.7$                      | $\infty$   |
| Extrap. and integration              | $\pm 4.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 2.3$                      | $\infty$   |
| <b>Test Sample Related</b>           |                           |                          |            |         |                                |            |
| Device positioning                   | $\pm 2.9$                 | Normal                   | 1          | 1       | $\pm 2.9$                      | 16         |
| Device holder uncertainty            | $\pm 3.6$                 | Normal                   | 1          | 1       | $\pm 3.6$                      | 12         |
| Power drift                          | $\pm 5.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 2.9$                      | $\infty$   |
| <b>Phantom and Setup</b>             |                           |                          |            |         |                                |            |
| Phantom uncertainty                  | $\pm 4.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 2.3$                      | $\infty$   |
| Liquid conductivity (target)         | $\pm 5.0$                 | Rectangular              | $\sqrt{3}$ | 0.64    | $\pm 1.8$                      | $\infty$   |
| Liquid conductivity (meas.)          | $\pm 5.0$                 | Normal                   | 1          | 0.64    | $\pm 3.2$                      | $\infty$   |
| Liquid permittivity (target)         | $\pm 5.0$                 | Rectangular              | $\sqrt{3}$ | 0.6     | $\pm 1.7$                      | $\infty$   |
| Liquid permittivity (meas.)          | $\pm 5.0$                 | Normal                   | 1          | 0.6     | $\pm 3.0$                      | $\infty$   |
|                                      |                           |                          |            |         |                                |            |
| <b>Combined Standard Uncertainty</b> |                           |                          |            |         | <b><math>\pm 13.515</math></b> |            |
| <b>Expanded Uncertainty (k=2)</b>    |                           |                          |            |         | <b><math>\pm 27.0</math></b>   |            |

The test result shows that the power drift exceeded  $\pm 5\%$ . Therefore, the uncertainty of power drift expanded to  $\pm 10\%$ . However, the extended uncertainty ( $k=2$ ) of a test is less than 30%.

**SECTION 7 : Confirmation before testing****7.1 Conducted power**

| [11b / 11Mbps] EUT S/N: 20005478-PSP1001 (Ant UBA-CUW1000) |                |                         |                       |                |                 |                   |
|------------------------------------------------------------|----------------|-------------------------|-----------------------|----------------|-----------------|-------------------|
| Ch                                                         | Freq.<br>[MHz] | S/A<br>Reading<br>[dBm] | Cable<br>Loss<br>[dB] | Atten.<br>[dB] | Result<br>[dBm] | Converted<br>[mW] |
| Low                                                        | 2412.0         | -7.04                   | 0.91                  | 19.87          | 13.74           | 23.66             |
| Mid                                                        | 2437.0         | -7.25                   | 0.92                  | 19.88          | 13.55           | 22.65             |
| High                                                       | 2462.0         | -7.38                   | 0.96                  | 19.88          | 13.46           | 22.18             |

| [11b / 11Mbps] EUT S/N: 20005508-PSP1001 (ANT.HFS11-SO01) |                |                         |                       |                |                 |                   |
|-----------------------------------------------------------|----------------|-------------------------|-----------------------|----------------|-----------------|-------------------|
| Ch                                                        | Freq.<br>[MHz] | S/A<br>Reading<br>[dBm] | Cable<br>Loss<br>[dB] | Atten.<br>[dB] | Result<br>[dBm] | Converted<br>[mW] |
| Low                                                       | 2412.0         | -6.62                   | 0.91                  | 19.87          | 14.16           | 26.06             |
| Mid                                                       | 2437.0         | -6.70                   | 0.92                  | 19.88          | 14.10           | 25.70             |
| High                                                      | 2462.0         | -7.10                   | 0.96                  | 19.88          | 13.74           | 23.66             |

| [11b / Check of data rate] EUT S/N: 20005478-PSP1001 (Ant UBA-CUW1000) |                |                         |                       |                |                 |                   |
|------------------------------------------------------------------------|----------------|-------------------------|-----------------------|----------------|-----------------|-------------------|
| Rate<br>[Mbps]                                                         | Freq.<br>[MHz] | S/A<br>Reading<br>[dBm] | Cable<br>Loss<br>[dB] | Atten.<br>[dB] | Result<br>[dBm] | Converted<br>[mW] |
| 11.0                                                                   | 2437.0         | -7.25                   | 0.92                  | 19.88          | 13.55           | 22.65             |
| 5.5                                                                    | 2437.0         | -8.71                   | 0.92                  | 19.88          | 12.09           | 16.18             |
| 2.0                                                                    | 2437.0         | -9.92                   | 0.92                  | 19.88          | 10.88           | 12.25             |
| 1.0                                                                    | 2437.0         | -10.45                  | 0.92                  | 19.88          | 10.35           | 10.84             |

| [11b / Check of data rate] EUT S/N: 20005508-PSP1001 (ANT.HFS11-SO01) |                |                         |                       |                |                 |                   |
|-----------------------------------------------------------------------|----------------|-------------------------|-----------------------|----------------|-----------------|-------------------|
| Rate<br>[Mbps]                                                        | Freq.<br>[MHz] | S/A<br>Reading<br>[dBm] | Cable<br>Loss<br>[dB] | Atten.<br>[dB] | Result<br>[dBm] | Converted<br>[mW] |
| 11.0                                                                  | 2437.0         | -6.70                   | 0.92                  | 19.88          | 14.10           | 25.70             |
| 5.5                                                                   | 2437.0         | -7.91                   | 0.92                  | 19.88          | 12.89           | 19.45             |
| 2.0                                                                   | 2437.0         | -9.21                   | 0.92                  | 19.88          | 11.59           | 14.42             |
| 1.0                                                                   | 2437.0         | -9.70                   | 0.92                  | 19.88          | 11.10           | 12.88             |

Sample Calculation:

Result = Reading + Cable Loss (supplied by customer)+ Attenuator

UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

## SECTION 8 : Measurement results

### 8.1 ANT. UBA-CUW1000

#### 8.1.1 Body 2450MHz SAR

Liquid Depth (cm) : 15.0      Model : PSP-1001  
Parameters :  $\epsilon_r = 50.2$ ,  $\sigma = 1.95$       Serial No. : 20005478-PSP1001  
Ambient temperature (deg.c.) : 24.8      Modulation : DSSS  
Relative Humidity (%) : 44      Crest factor : 1  
Date : April 10, 2006      Measured By : Hisayoshi Sato

| BODY SAR MEASUREMENT RESULTS (ANT. UBA-CUW1000)         |                         |       |                                |                    |                       |           |                    |                        |       |                                   |
|---------------------------------------------------------|-------------------------|-------|--------------------------------|--------------------|-----------------------|-----------|--------------------|------------------------|-------|-----------------------------------|
| Frequency                                               |                         |       | Modulation<br>(Data rate[bps]) | Phantom<br>Section | EUT Set-up Conditions |           |                    | Liquid Temp.[deg.c]    |       | SAR(1g)<br>[W/kg]                 |
| Mode                                                    | Channel                 | [MHz] |                                |                    | Battery               | Position  | Separation<br>[mm] | Before                 | After | Maximum<br>value<br>of multi-peak |
| 11b                                                     | Step1. Position search  |       |                                |                    |                       |           |                    |                        |       |                                   |
|                                                         | 6                       | 2437  | CCK(11Mbps)                    | Flat               | PSP-110(sony)         | Front     | 0                  | 23.7                   | 23.7  | 0.071                             |
|                                                         | 6                       | 2437  | CCK(11Mbps)                    | Flat               | PSP-110(sony)         | Back      | 0                  | 23.7                   | 23.7  | 0.037                             |
|                                                         | 6                       | 2437  | CCK(11Mbps)                    | Flat               | PSP-110(sony)         | Top       | 0                  | 23.8                   | 23.8  | 0.030                             |
|                                                         | 6                       | 2437  | CCK(11Mbps)                    | Flat               | PSP-110(sony)         | Bottom    | 0                  | 23.8                   | 23.8  | 0.019                             |
|                                                         | 6                       | 2437  | CCK(11Mbps)                    | Flat               | PSP-110(sony)         | Left Side | 0                  | 24.1                   | 24.1  | 0.071                             |
|                                                         | Step2. Frequency Change |       |                                |                    |                       |           |                    |                        |       |                                   |
|                                                         | 1                       | 2412  | CCK(11Mbps)                    | Flat               | PSP-110(sony)         | Front     | 0                  | 23.8                   | 23.8  | 0.066                             |
|                                                         | 11                      | 2462  | CCK(11Mbps)                    | Flat               | PSP-110(sony)         | Front     | 0                  | 24.0                   | 24.0  | 0.069                             |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT                   |                         |       |                                |                    |                       |           |                    | Body SAR: 1.6 W/kg     |       |                                   |
| Spatial Peak Uncontrolled Exposure / General Population |                         |       |                                |                    |                       |           |                    | (averaged over 1 gram) |       |                                   |

\* The measurement data is put on appendix 3.

## 8.2 ANT. HFS11-SO01

### 8.2.1 Body 2450MHz SAR

Liquid Depth (cm) : 15.0      Model : PSP-1001  
Parameters :  $\epsilon_r = 50.2$ ,  $\sigma = 1.95$       Serial No. : 20005508-PSP1001  
Ambient temperature (deg.c.) : 24.8      Modulation : DSSS  
Relative Humidity (%) : 44      Crest factor : 1  
Date : April 10, 2006      Measured By : Hisayoshi Sato

| BODY SAR MEASUREMENT RESULTS (Ant.HFS11-SO01)                                                    |                         |       |                                |                    |                       |           |                    |                                              |       |                                   |
|--------------------------------------------------------------------------------------------------|-------------------------|-------|--------------------------------|--------------------|-----------------------|-----------|--------------------|----------------------------------------------|-------|-----------------------------------|
| Frequency                                                                                        |                         |       | Modulation<br>(Data rate[bps]) | Phantom<br>Section | EUT Set-up Conditions |           |                    | Liquid Temp.[deg.c]                          |       | SAR(1g)<br>[W/kg]                 |
| Mode                                                                                             | Channel                 | [MHz] |                                |                    | Battery               | Position  | Separation<br>[mm] | Before                                       | After | Maximum<br>value<br>of multi-peak |
| 11b                                                                                              | Step4. Position search  |       |                                |                    |                       |           |                    |                                              |       |                                   |
|                                                                                                  | 6                       | 2437  | CCK(11Mbps)                    | Flat               | PSP-110(Sony)         | Front     | 0                  | 24.1                                         | 24.1  | 0.103                             |
|                                                                                                  | 6                       | 2437  | CCK(11Mbps)                    | Flat               | PSP-110(Sony)         | Back      | 0                  | 24.0                                         | 24.0  | 0.040                             |
|                                                                                                  | 6                       | 2437  | CCK(11Mbps)                    | Flat               | PSP-110(Sony)         | Top       | 0                  | 24.0                                         | 24.0  | 0.064                             |
|                                                                                                  | 6                       | 2437  | CCK(11Mbps)                    | Flat               | PSP-110(Sony)         | Bottom    | 0                  | 23.9                                         | 23.9  | 0.0042                            |
|                                                                                                  | 6                       | 2437  | CCK(11Mbps)                    | Flat               | PSP-110(Sony)         | Left Side | 0                  | 24.2                                         | 24.2  | 0.070                             |
|                                                                                                  | Step5. Frequency Change |       |                                |                    |                       |           |                    |                                              |       |                                   |
|                                                                                                  | 1                       | 2412  | CCK(11Mbps)                    | Flat               | PSP-110(Sony)         | Front     | 0                  | 24.1                                         | 24.1  | 0.081                             |
|                                                                                                  | 11                      | 2462  | CCK(11Mbps)                    | Flat               | PSP-110(Sony)         | Front     | 0                  | 24.0                                         | 24.0  | 0.067                             |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak Uncontrolled Exposure / General Population |                         |       |                                |                    |                       |           |                    | Body SAR: 1.6 W/kg<br>(averaged over 1 gram) |       |                                   |

| BODY SAR MEASUREMENT RESULTS (Ant.HFS11-SO01)                                                    |         |       |                                |                    |                       |          |                    |                                              |       |                                   |
|--------------------------------------------------------------------------------------------------|---------|-------|--------------------------------|--------------------|-----------------------|----------|--------------------|----------------------------------------------|-------|-----------------------------------|
| Frequency                                                                                        |         |       | Modulation<br>(Data rate[bps]) | Phantom<br>Section | EUT Set-up Conditions |          |                    | Liquid Temp.[deg.c]                          |       | SAR(1g)<br>[W/kg]                 |
| Mode                                                                                             | Channel | [MHz] |                                |                    | Battery               | Position | Separation<br>[mm] | Before                                       | After | Maximum<br>value<br>of multi-peak |
| Change distance between EUT and SAM phantom                                                      |         |       |                                |                    |                       |          |                    |                                              |       |                                   |
| 11b                                                                                              | 6       | 2462  | CCK(11Mbps)                    | Flat               | PSP-110(Sony)         | Front    | 5                  | 24.0                                         | 24.0  | 0.032                             |
|                                                                                                  | 6       | 2462  | CCK(11Mbps)                    | Flat               | PSP-110(Sony)         | Front    | 10                 | 23.9                                         | 23.9  | 0.013                             |
|                                                                                                  | 6       | 2462  | CCK(11Mbps)                    | Flat               | PSP-110(Sony)         | Front    | 15                 | 23.8                                         | 23.8  | 0.010                             |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak Uncontrolled Exposure / General Population |         |       |                                |                    |                       |          |                    | Body SAR: 1.6 W/kg<br>(averaged over 1 gram) |       |                                   |

\* The measurement data is put on appendix 3.

## **APPENDIX 1 : Photographs of test setup**

## Photograph EUT



**Photograph Antenna location**



**Photograph EUT with Accessory**



**(1) Front**



**(2) Back**



**(3) Top**



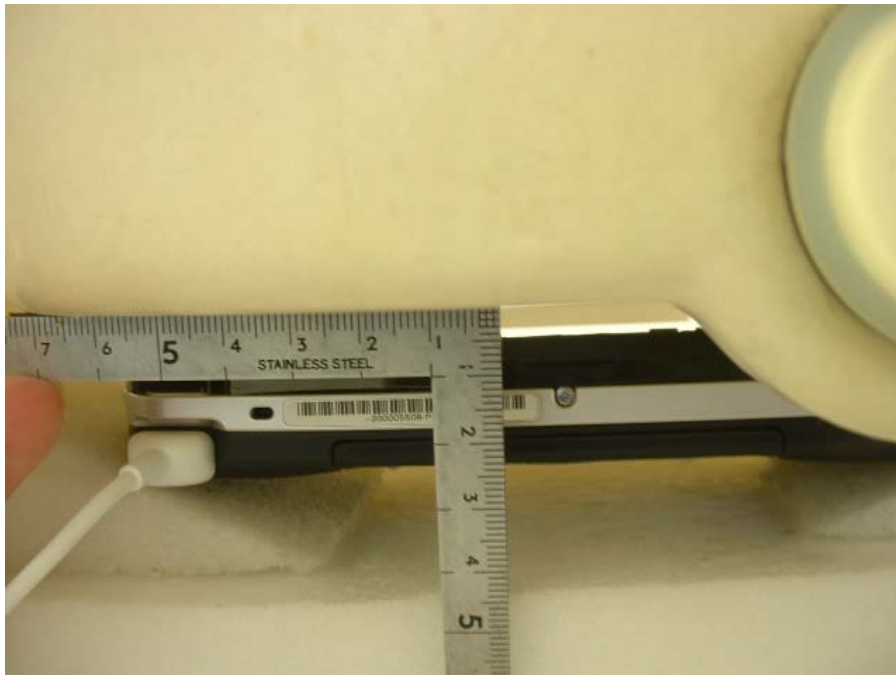
**(4) Bottom**



**(5) Left Side**

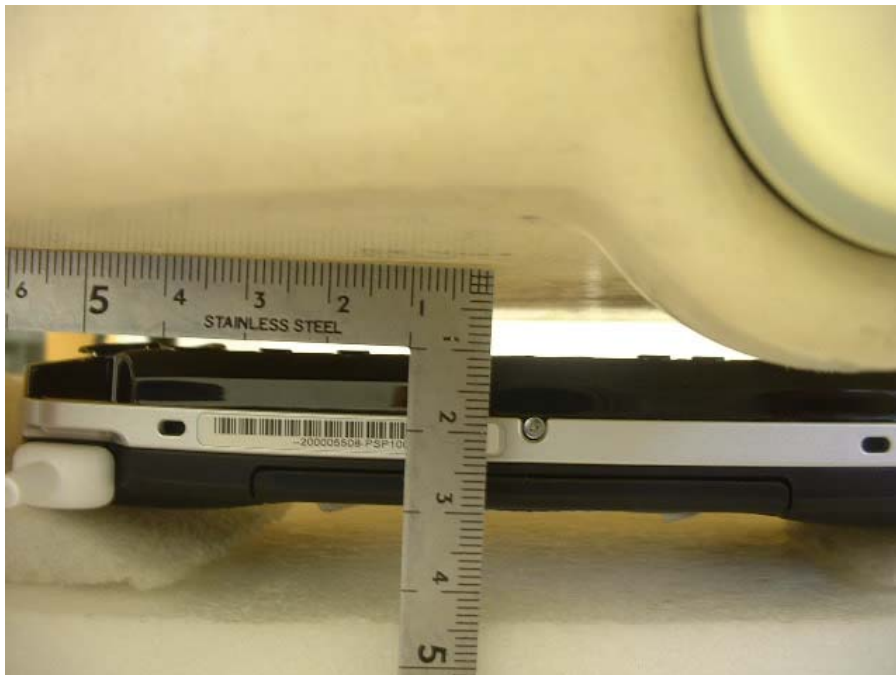
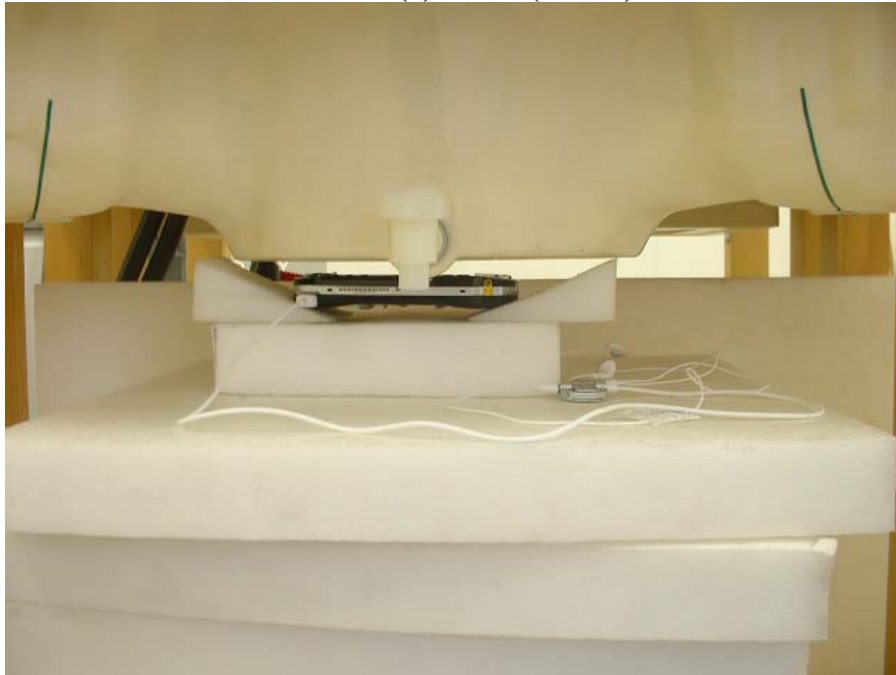


**(6) Front (5mm)**



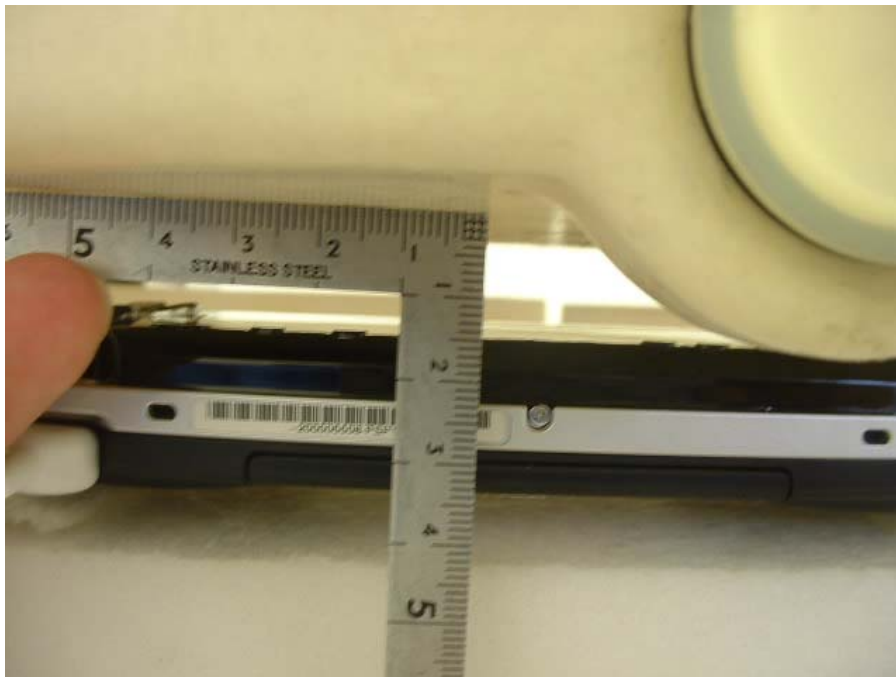
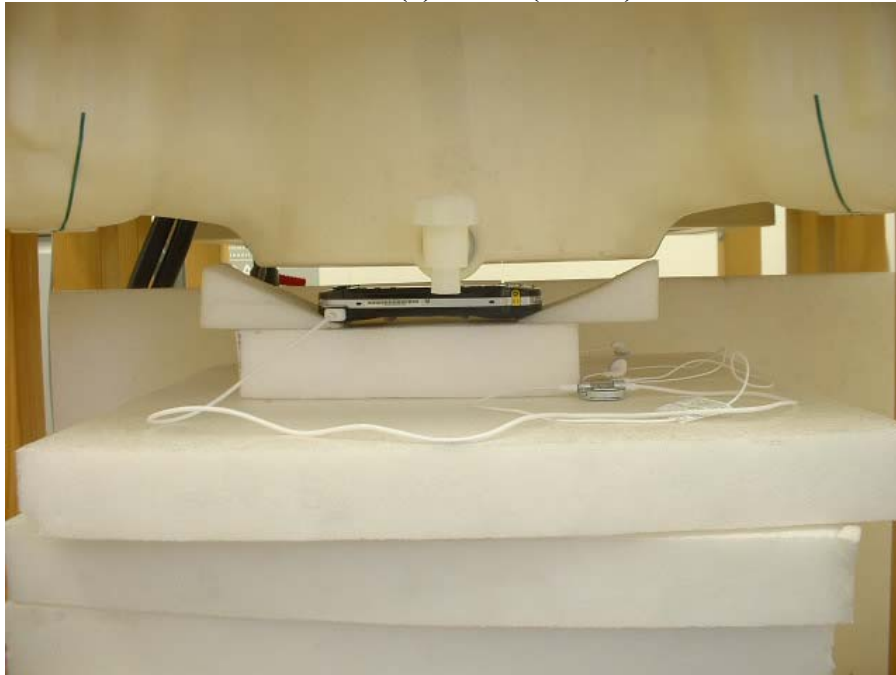


(7) Front (10mm)





**(8) Front (15mm)**





## APPENDIX 2 : Test instruments

### Equipment & calibration information

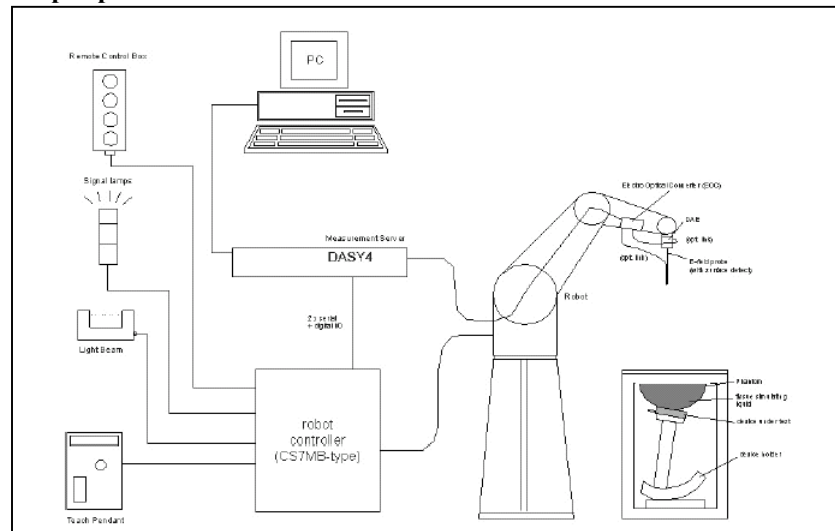
#### 1. Equipment used

| Name of Equipment                | Manufacture                   | Model number          | Serial number | Calibration                                |            |
|----------------------------------|-------------------------------|-----------------------|---------------|--------------------------------------------|------------|
|                                  |                               |                       |               | Last Cal                                   | due date   |
| Power Meter                      | Agilent                       | E4417A                | GB41290639    | 2005/11/09                                 | 2006/11/08 |
| Power Sensor                     | Agilent                       | E9300B                | US40010300    | 2005/11/28                                 | 2006/11/27 |
| Power Sensor                     | Agilent                       | E9327A                | US40440545    | 2005/11/23                                 | 2006/11/22 |
| Spectrum Analyzer                | Agilent                       | E4448A                | MY44020357    | 2005/09/16                                 | 2006/09/15 |
| S-Parameter Network Analyzer     | Agilent                       | 8753ES                | US39174808    | 2003/10/23                                 | 2006/10/22 |
| Signal Generator                 | Rohde&Schwarz                 | SML40                 | 100023        | 2005/01/05                                 | 2006/01/04 |
| RF Amplifier                     | OPHIR                         | 5056F                 | 1005          | 2005/05/20                                 | 2006/05/19 |
| Dosimetric E-Field Probe         | Schmid&Partner Engineering AG | EX3DV3                | 3507          | 2005/04/12                                 | 2006/04/11 |
| Data Acquisition Electronics     | Schmid&Partner Engineering AG | DAE3                  | 509           | 2005/05/26                                 | 2006/05/25 |
| Robot,SAM Phantom                | Schmid&Partner Engineering AG | DASY4                 | I021834       | N/A                                        | N/A        |
| Attenuator                       | Agilent                       | US40010300            | 08498-60012   | 2005/12/16                                 | 2006/12/15 |
| Attenuator                       | Agilent                       | 8493C                 | 71389         | 2005/06/03                                 | 2006/06/02 |
| Microwave Cable                  | Hirose Electric               | U.FL-2LP-066-A-(200)- |               | 2005/09/06                                 | 2006/09/05 |
| 2450MHz System Validation Dipole | Schmid&Partner Engineering AG | D2450V2               | 713           | 2005/09/02                                 | 2007/09/01 |
| Dual Directional Coupler         | N/A                           | Narda                 | 03702         | N/A                                        | N/A        |
| Thermo-Hygrometer                | Custom                        | CTH-190               | MOS-10        | 2005/03/07                                 | 2007/03/06 |
| Digital thermometer              | HANNA                         | Checktemp-2           | 03702         | N/A                                        | N/A        |
| Body 2.4GHz                      | N/A                           | N/A                   | N/A           | Daily check<br>Target value $\pm$ 5%       |            |
| Head 2.4GHz                      | N/A                           | N/A                   | N/A           | Daily check<br>Target value $\pm$ 5%       |            |
| SAR room                         | -                             | -                     | -             | Daily check<br>Ambient<br>Noise <0.012W/kg |            |

## 2. Dosimetry assessment setup

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 0.9 m), which positions the probes with a positional repeatability of better than  $\pm 0.02$  mm. 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 to the data acquisition unit. The SAR measurements were conducted with the dosimetry probe ET3DV6, SN: 1684 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the procedure described in [2] with accuracy of better than  $\pm 10\%$ . The spherical isotropy was evaluated with the procedure described in [3] and found to be better than  $\pm 0.25$  dB. The phantom used was the SAM Twin Phantom as described in FCC supplement C, IEEE P1528 and CENELEC EN50361.

### 3. Configuration and peripherals



The DASY4 system for performing compliance tests consist of the following items:

1. A standard high precision 6-axis robot (Stäubli RX family) with controller and software.  
An arm extension for accommodating the data acquisition electronics (DAE).
2. A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
3. A data acquisition electronic (DAE), which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
4. The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection.  
The EOC is connected to the measurement server.
5. The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
6. A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
7. A computer operating Windows 2000.
8. DASY4 software.
9. Remote control with teaches pendant and additional circuitry for robot safety such as warning lamps, etc.
10. The SAM twin phantom enabling testing left-hand and right-hand usage.
11. The device holder for handheld mobile phones.
12. Tissue simulating liquid mixed according to the given recipes.
13. Validation dipole kits allowing to validate the proper functioning of the system.

## 4. System components

### 4.2.1 EX3DV3 Probe Specification

#### Construction:

Symmetrical design with triangular core  
Built-in shielding against static charges  
PEEK enclosure material (resistant to organic solvents, e.g., glycol ether)

#### Calibration:

Basic Broad Band calibration in air : 10-3000 MHz  
Frequencies of 900 MHz, 1.8 GHz, 2.45GHz, 5.2GHz and 5.8GHz(Head and Body)

#### Frequency:

10 MHz to > 6GHz; Linearity: +/-0.2 dB(30 MHz to 3 GHz)

#### Directivity:

+/-0.3 dB in HSL (rotation around probe axis)  
+/-0.5 dB in tissue material (rotation normal probe axis)

#### Dynamic Range:

10uW/g to > 100 mW/g; Linearity: +/-0.2 dB(noise: typically < 1uW/g)

#### Dimensions:

Overall length: 330 mm (Tip: 20 mm)  
Tip diameter: 2.5mm (Body: 12 mm)  
Typical distance from probe tip to dipole centers: 1 mm

#### Application:

Highprecision dosimetric measurement in any exposure scenario  
(e.g., very strong gradient fields). Only probe which enables compliance  
testing for frequencies up to 6GHz with precision of better 30%.



**EX3DV3 E-field Probe**

## **SAM Twin Phantom**

### **Construction:**

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X, CENELEC EN 50361 and IEC 62209. 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 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 with the robot.

### **Shell Thickness:**

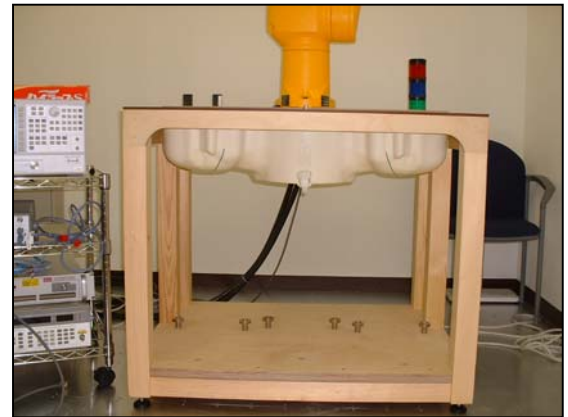
2 +/-0.2 mm

### **Filling Volume:**

Approx. 25 liters

### **Dimensions:**

(H x L x W): 810 x 1000 x 500 mm



**SAM Twin Phantom**

## **Device Holder for Transmitters**

In combination with the SAM Twin Phantom V4.0, the Mounting Device 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 repeatedly positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

\* Note: A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produced infinite number of configurations.

To produce the worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.



**Device Holder**

Device holder couldn't be used at this SAR measurement.

## 5. Test system specifications

### Robot RX60L

|                      |   |                                           |
|----------------------|---|-------------------------------------------|
| Number of Axes       | : | 6                                         |
| Payload              | : | 1.6 kg                                    |
| Reach                | : | 800mm                                     |
| Repeatability        | : | +/-0.025mm                                |
| Control Unit         | : | CS7M                                      |
| Programming Language | : | V+                                        |
| Manufacture          | : | Stäubli Unimation Corp. Robot Model: RX60 |

### DASY4 Measurement server

|             |   |                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Features    | : | 166MHz low power Pentium MMX<br>32MB chipdisk and 64MB RAM Serial link to DAE (with watchdog supervision)<br>16 Bit A/D converter for surface detection system<br>Two serial links to robot (one for real-time communication which is supervised by watchdog)<br>Ethernet link to PC (with watchdog supervision)<br>Emergency stop relay for robot safety chainTwo expansion slots for future applications |
| Manufacture | : | Schimid & Partner Engineering AG                                                                                                                                                                                                                                                                                                                                                                           |

### Data Acquisition Electronic (DAE)

|                      |   |                                                                                                                                                                                                                                                                        |
|----------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Features             | : | Signal amplifier, multiplexer, A/D converter and control logic<br>Serial optical link for communication with DASY4 embedded system (fully remote controlled) 2 step probe touch detector for mechanical surface detection and emergency robot stop (not in -R version) |
| Measurement Range    | : | 1 $\mu$ V to > 200 mV (16 bit resolution and two range settings: 4mV, 400mV)                                                                                                                                                                                           |
| Input Offset voltage | : | < 1 $\mu$ V (with auto zero)                                                                                                                                                                                                                                           |
| Input Resistance     | : | 200 M $\Omega$                                                                                                                                                                                                                                                         |
| Battery Power        | : | > 10 h of operation (with two 9 V battery)                                                                                                                                                                                                                             |
| Dimension            | : | 60 x 60 x 68 mm                                                                                                                                                                                                                                                        |
| Manufacture          | : | Schimid & Partner Engineering AG                                                                                                                                                                                                                                       |

### Software

|                      |   |                                   |
|----------------------|---|-----------------------------------|
| Item                 | : | Dosimetric Assesment System DASY4 |
| Type No.             | : | SD 000 401A, SD 000 402A          |
| Software version No. | : | 4.5                               |
| Manufacture / Origin | : | Schimid & Partner Engineering AG  |

### E-Field Probe

|              |   |                                         |
|--------------|---|-----------------------------------------|
| Model        | : | EX3DV3                                  |
| Serial No.   | : | 3507                                    |
| Construction | : | Symmetrical design with triangular core |
| Frequency    | : | 10 MHz to 6 GHz                         |
| Linearity    | : | +/-0.2 dB (30 MHz to 3 GHz)             |
| Manufacture  | : | Schimid & Partner Engineering AG        |

### Phantom

|                |   |                                  |
|----------------|---|----------------------------------|
| Type           | : | SAM Twin Phantom V4.0            |
| Shell Material | : | Fiberglass                       |
| Thickness      | : | 2.0 +/-0.2 mm                    |
| Volume         | : | Approx. 25 liters                |
| Manufacture    | : | Schimid & Partner Engineering AG |

## 6. Simulated Tissues Composition of 2450MHz

| Ingredient | MIXTURE(%)   |                |
|------------|--------------|----------------|
|            | Head 2450MHz | Muscle 2450MHz |
| Water      | 45.0         | 69.83          |
| DGMBE      | 55.0         | 30.2           |

Note:DGMBE(Diethylenglycol-monobuthyl ether)

## 7. Validation Measurement

### Simulated tissue liquid parameter

#### 7-a Simulated Tissue Liquid Parameter confirmation

The dielectric parameters were checked prior to assessment using the HP85070D dielectric probe kit.  
The dielectric parameters measurement are reported in each correspondent section.

#### 7-b Head 2450 MHz

Type of liquid : Head 2450 MHz  
Ambient temperature (deg.c.) : 24.8  
Relative Humidity (%) : 44  
Liquid depth (cm) : 15.0

| DIELECTRIC PARAMETERS MEASUREMENT RESULTS |           |                     |       |                                    |              |          |               |           |
|-------------------------------------------|-----------|---------------------|-------|------------------------------------|--------------|----------|---------------|-----------|
| Date                                      | Frequency | Liquid Temp [deg.c] |       | Parameters                         | Target Value | Measured | Deviation [%] | Limit [%] |
|                                           |           | Before              | After |                                    |              |          |               |           |
| 10-Apr                                    | 2450      | 24.2                | 24.2  | Relative Permittivity $\epsilon_r$ | 39.2         | 37.6     | -4.1          | +/-10     |
|                                           |           |                     |       | Coductivity $\sigma$ [mho/m]       | 1.80         | 1.82     | 1.1           | +/-5      |

#### 7-c Muscle 2450 MHz

Type of liquid : Muscle 2450 MHz  
Ambient temperature (deg.c.) : 24.8  
Relative Humidity (%) : 44  
Liquid depth (cm) : 15.0

| DIELECTRIC PARAMETERS MEASUREMENT RESULTS |           |                     |       |                                    |              |          |               |           |
|-------------------------------------------|-----------|---------------------|-------|------------------------------------|--------------|----------|---------------|-----------|
| Date                                      | Frequency | Liquid Temp [deg.c] |       | Parameters                         | Target Value | Measured | Deviation [%] | Limit [%] |
|                                           |           | Before              | After |                                    |              |          |               |           |
| 10-Apr                                    | 2450      | 24.2                | 24.2  | Relative Permittivity $\epsilon_r$ | 52.7         | 50.2     | -4.7          | +/-5      |
|                                           |           |                     |       | Coductivity $\sigma$ [mho/m]       | 1.95         | 1.95     | 0.0           | +/-5      |

## 8. System validation data

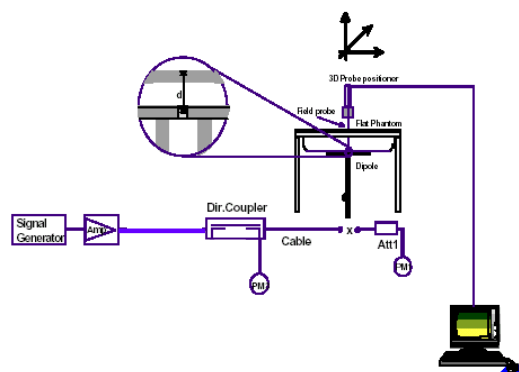
Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of +/-10%. The validation results are in the table below. Please refer to APPENDIX3.

### System validation of 2450MHz

Type of liquid : HEAD 2450MHz  
Frequency : 2450MHz  
Ambient temperature (deg.c.) : 24.8  
Relative Humidity (%) : 44  
Dipole : D2450V2 SN:713  
Power : 250mW

| SYSTEM PERFORMANCE CHECK |                       |       |                                       |          |                                  |          |                                            |          |                  |              |
|--------------------------|-----------------------|-------|---------------------------------------|----------|----------------------------------|----------|--------------------------------------------|----------|------------------|--------------|
| Date                     | Liquid (HEAD 2450MHz) |       |                                       |          |                                  |          | System dipole validation target & measured |          |                  |              |
|                          | Liquid Temp [deg.c.]  |       | Relative Permittivity<br>$\epsilon_r$ |          | Conductivity<br>$\sigma$ [mho/m] |          | SAR 1g [W/kg]                              |          | Deviation<br>[%] | Limit<br>[%] |
|                          | Before                | After | Target                                | Measured | Target                           | Measured | Target                                     | Measured |                  |              |
| 10-Apr                   | 24.2                  | 24.2  | 39.2                                  | 37.6     | 1.80                             | 1.82     | 13.1                                       | 13.3     | 1.5              | +/-10        |

Note: Please refer to Attachment for the result representation in plot format



2450MHz System  
performance check setup

Test system for the system performance check setup diagram

## 9. Validation uncertainty

UL Apex Co., Ltd.  
Head Office EMC Lab.  
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN  
Telephone : +81 596 24 8116  
Facsimile : +81 596 24 8124

The uncertainty budget has been determined for the DASY4 measurement system according to the SPEAG documents[6][7] and is given in the following Table.

| Error Description                    | Uncertainty value $\pm$ % | Probability distribution | divisor    | (ci) 1g | Standard Uncertainty (1g)      | vi or veff |
|--------------------------------------|---------------------------|--------------------------|------------|---------|--------------------------------|------------|
| <b>Measurement System</b>            |                           |                          |            |         |                                |            |
| Probe calibration                    | $\pm 6.8$                 | Normal                   | 1          | 1       | $\pm 6.8$                      | $\infty$   |
| Axial isotropy of the probe          | $\pm 4.7$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 2.7$                      | $\infty$   |
| Spherical isotropy of the probe      | $\pm 9.6$                 | Rectangular              | $\sqrt{3}$ | 0       | 0                              | $\infty$   |
| Boundary effects                     | $\pm 2.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 1.2$                      | $\infty$   |
| Probe linearity                      | $\pm 4.7$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 2.7$                      | $\infty$   |
| Detection limit                      | $\pm 1.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 0.6$                      | $\infty$   |
| Readout electronics                  | $\pm 1.0$                 | Normal                   | 1          | 1       | $\pm 1.0$                      | $\infty$   |
| Response time                        | 0                         | Rectangular              | $\sqrt{3}$ | 1       | 0                              | $\infty$   |
| Integration time                     | 0                         | Rectangular              | $\sqrt{3}$ | 1       | 0                              | $\infty$   |
| RF ambient Noise                     | $\pm 3.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 1.7$                      | $\infty$   |
| RF ambient Reflections               | $\pm 3.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 1.7$                      | $\infty$   |
| Mech. constraints of robot           | $\pm 0.8$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 0.5$                      | $\infty$   |
| Probe positioning                    | $\pm 9.9$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 5.7$                      | $\infty$   |
| Extrap. and integration              | $\pm 4.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 2.3$                      | $\infty$   |
| <b>Dipole</b>                        |                           |                          |            |         |                                |            |
| Dipole Axis to Liquid Distance       | $\pm 2.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 1.2$                      | $\infty$   |
| Input power and SAR drift meas.      | $\pm 4.7$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 2.7$                      | $\infty$   |
| <b>Phantom and Setup</b>             |                           |                          |            |         |                                |            |
| Phantom uncertainty                  | $\pm 4.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 2.3$                      | $\infty$   |
| Liquid conductivity (target)         | $\pm 5.0$                 | Rectangular              | $\sqrt{3}$ | 0.64    | $\pm 1.8$                      | $\infty$   |
| Liquid conductivity (meas.)          | $\pm 5.0$                 | Normal                   | 1          | 0.64    | $\pm 3.2$                      | $\infty$   |
| Liquid permittivity (target)         | $\pm 5.0$                 | Rectangular              | $\sqrt{3}$ | 0.6     | $\pm 1.7$                      | $\infty$   |
| Liquid permittivity (meas.)          | $\pm 5.0$                 | Normal                   | 1          | 0.6     | $\pm 3.0$                      | $\infty$   |
|                                      |                           |                          |            |         |                                |            |
| <b>Combined Standard Uncertainty</b> |                           |                          |            |         | <b><math>\pm 12.151</math></b> |            |
| <b>Expanded Uncertainty (k=2)</b>    |                           |                          |            |         | <b><math>\pm 24.3</math></b>   |            |

## 10. Validation Measurement data

### System Validation / Dipole 2450 MHz / Forward Conducted Power : 250mW

Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.82$  mho/m;  $\epsilon_r = 37.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(8.25, 8.25, 8.25); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (51x51x1):** Measurement grid:  $dx=20$ mm,  $dy=20$ mm

Maximum value of SAR (interpolated) = 23.4 mW/g

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 89.7 V/m; Power Drift = 0.099 dB

Peak SAR (extrapolated) = 28.5 W/kg

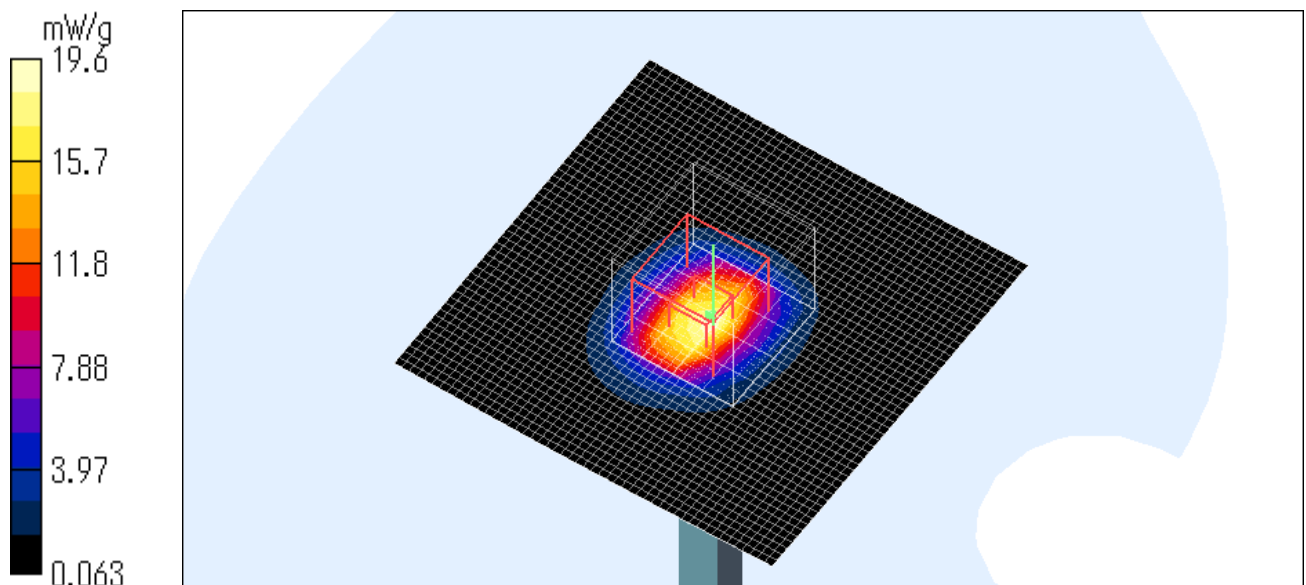
**SAR(1 g) = 13.3 mW/g; SAR(10 g) = 5.96 mW/g**

Maximum value of SAR (measured) = 19.6 mW/g

Test Date = 04/10/06

Ambient Temperature = 24.8 degree C.

Liquid Temperature = Before 24.2 degree C. , After 24.2 degree C.



---

UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

## 11. System Validation Dipole (D2450V2,S/N: 713)

**Calibration Laboratory of  
Schmid & Partner  
Engineering AG**  
Zeughausstrasse 43, 8004 Zurich, Switzerland



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

Accredited by the Swiss Federal Office of Metrology and Accreditation  
The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client **UL A-pex (MTT)**

Certificate No: D2450V2-713\_Sep05

### CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 713**

Calibration procedure(s) **QA CAL-05.v6  
Calibration procedure for dipole validation kits**

Calibration date: **September 2, 2005**

Condition of the calibrated item **In Tolerance**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature ( $22 \pm 3$ )°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards          | ID #             | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration |
|----------------------------|------------------|-------------------------------------------|-----------------------|
| Power meter EPM E442       | GB37480704       | 12-Oct-04 (METAS, No. 251-00412)          | Oct-05                |
| Power sensor HP 8481A      | US37292783       | 12-Oct-04 (METAS, No. 251-00412)          | Oct-05                |
| Reference 20 dB Attenuator | SN: 5086 (20g)   | 11-Aug-05 (METAS, No 251-00498)           | Aug-06                |
| Reference 10 dB Attenuator | SN: 5047.2 (10r) | 11-Aug-05 (METAS, No 251-00498)           | Aug-06                |
| Reference Probe ES3DV2     | SN 3025          | 29-Oct-04 (SPEAG, No. ES3-3025_Oct04)     | Oct-05                |
| DAE4                       | SN 601           | 07-Jan-05 (SPEAG, No. DAE4-601_Jan05)     | Jan-06                |

| Secondary Standards       | ID #             | Check Date (in house)                    | Scheduled Check        |
|---------------------------|------------------|------------------------------------------|------------------------|
| Power sensor HP 8481A     | MY41092317       | 18-Oct-02 (SPEAG, in house check Oct-03) | In house check: Oct-05 |
| RF generator R&S SML-03   | 100698           | 27-Mar-02 (SPEAG, in house check Dec-03) | In house check: Dec-05 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (SPEAG, in house check Nov-04) | In house check: Nov-05 |

|                |                           |                                   |                              |
|----------------|---------------------------|-----------------------------------|------------------------------|
| Calibrated by: | Name<br><b>Mike Meili</b> | Function<br>Laboratory Technician | Signature<br><i>M. Meili</i> |
| Approved by:   | <b>Katja Pokovic</b>      | Technical Manager                 | <i>Katja Pokovic</i>         |

Issued: September 2, 2005

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**Calibration Laboratory of**  
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**Engineering AG**  
Zeughausstrasse 43, 8004 Zurich, Switzerland



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

**Glossary:**

|       |                                 |
|-------|---------------------------------|
| TSL   | tissue simulating liquid        |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A   | not applicable or not measured  |

**Calibration is Performed According to the Following Standards:**

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

**Additional Documentation:**

- DASY4 System Handbook

**Methods Applied and Interpretation of Parameters:**

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

**Measurement Conditions**

DASY system configuration, as far as not given on page 1.

|                              |                           |             |
|------------------------------|---------------------------|-------------|
| DASY Version                 | DASY4                     | V4.6        |
| Extrapolation                | Advanced Extrapolation    |             |
| Phantom                      | Modular Flat Phantom V5.0 |             |
| Distance Dipole Center - TSL | 10 mm                     | with Spacer |
| Area Scan resolution         | dx, dy = 15 mm            |             |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm         |             |
| Frequency                    | 2450 MHz $\pm$ 1 MHz      |             |

**Head TSL parameters**

The following parameters and calculations were applied.

|                                  | Temperature         | Permittivity   | Conductivity         |
|----------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters      | 22.0 °C             | 39.2           | 1.80 mho/m           |
| Measured Head TSL parameters     | (22.0 $\pm$ 0.2) °C | 38.5 $\pm$ 6 % | 1.73 mho/m $\pm$ 6 % |
| Head TSL temperature during test | (21.6 $\pm$ 0.2) °C | 38.4 $\pm$ 6 % | 1.75 mho/m $\pm$ 6 % |

**SAR result with Head TSL**

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | condition          |                                |
|-------------------------------------------------------|--------------------|--------------------------------|
| SAR measured                                          | 250 mW Input power | 13.2 mW / g                    |
| SAR normalized                                        | normalized to 1W   | 52.8 mW / g                    |
| SAR for nominal Head TSL parameters <sup>1</sup>      | normalized to 1W   | 53.2 mW / g $\pm$ 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                                |
|---------------------------------------------------------|--------------------|--------------------------------|
| SAR measured                                            | 250 mW Input power | 6.19 mW / g                    |
| SAR normalized                                          | normalized to 1W   | 24.8 mW / g                    |
| SAR for nominal Head TSL parameters <sup>1</sup>        | normalized to 1W   | 24.9 mW / g $\pm$ 16.5 % (k=2) |

<sup>1</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

**Body TSL parameters**

The following parameters and calculations were applied.

|                                  | Temperature     | Permittivity | Conductivity     |
|----------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters      | 22.0 °C         | 52.7         | 1.95 mho/m       |
| Measured Body TSL parameters     | (22.0 ± 0.2) °C | 52.5 ± 6 %   | 2.03 mho/m ± 6 % |
| Body TSL temperature during test | (21.8 ± 0.2) °C | 52.5 ± 6 %   | 2.04 mho/m ± 6 % |

**SAR result with Body TSL**

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | condition          |                            |
|-------------------------------------------------------|--------------------|----------------------------|
| SAR measured                                          | 250 mW input power | 13.5 mW / g                |
| SAR normalized                                        | normalized to 1W   | 54.0 mW / g                |
| SAR for nominal Body TSL parameters <sup>2</sup>      | normalized to 1W   | 52.8 mW / g ± 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                            |
|---------------------------------------------------------|--------------------|----------------------------|
| SAR measured                                            | 250 mW input power | 6.25 mW / g                |
| SAR normalized                                          | normalized to 1W   | 25.0 mW / g                |
| SAR for nominal Body TSL parameters <sup>2</sup>        | normalized to 1W   | 24.4 mW / g ± 16.5 % (k=2) |

<sup>2</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

## Appendix

### Antenna Parameters with Head TSL

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $51.7 \Omega + 3.7 j\Omega$ |
| Return Loss                          | -28.1 dB                    |

### Antenna Parameters with Body TSL

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $47.6 \Omega + 4.8 j\Omega$ |
| Return Loss                          | -25.3 dB                    |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.161 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

|                 |              |
|-----------------|--------------|
| Manufactured by | SPEAG        |
| Manufactured on | July 5, 2002 |

## DASY4 Validation Report for Head TSL

Date/Time: 02.09.2005 10:54:01

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN713**

Communication System: CW-2450; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: HSL U10 BB;

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.75$  mho/m;  $\epsilon_r = 38.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.4, 4.4, 4.4); Calibrated: 29.10.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 22.07.2004
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA
- Measurement SW: DASY4, V4.6 Build 13; Postprocessing SW: SEMCAD, V1.8 Build 156

**Pin = 250 mW; d = 10 mm/Area Scan (41x61x1):**

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 16.7 mW/g

**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:**

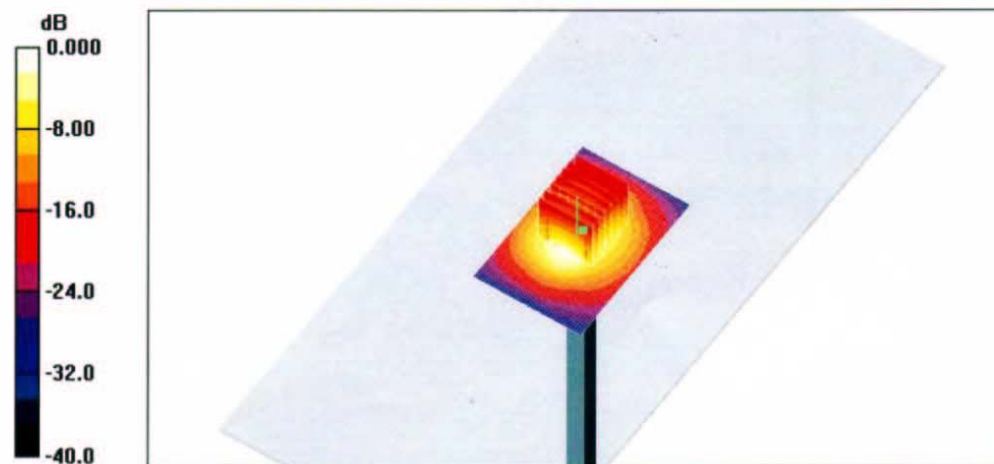
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 91.8 V/m; Power Drift = 0.035 dB

Peak SAR (extrapolated) = 27.1 W/kg

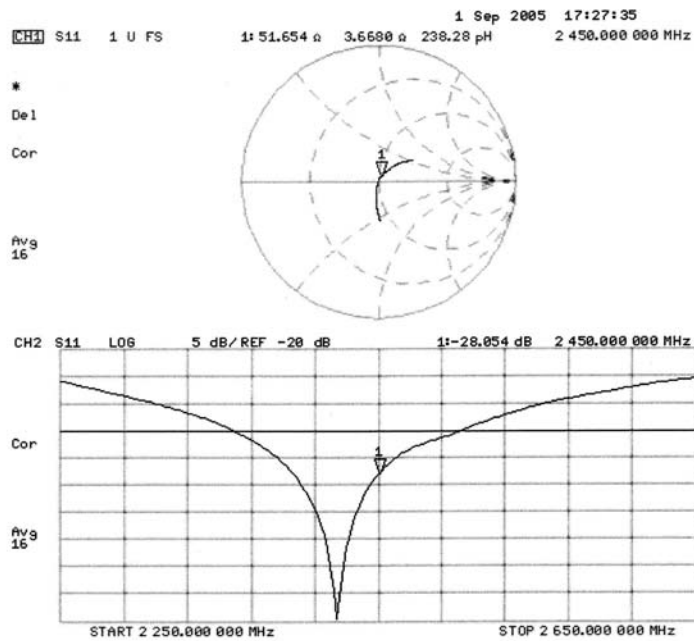
**SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.19 mW/g**

Maximum value of SAR (measured) = 15.0 mW/g



0 dB = 15.0mW/g

### Impedance Measurement Plot for Head TSL



## DASY4 Validation Report for Body TSL

Date/Time: 02.09.2005 12:04:42

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN713**

Communication System: CW-2450; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: MSL 2450;

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2.04$  mho/m;  $\epsilon_r = 52.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.13, 4.13, 4.13); Calibrated: 29.10.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 22.07.2004
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA
- Measurement SW: DASY4, V4.6 Build 13; Postprocessing SW: SEMCAD, V1.8 Build 156

**Pin = 250 mW; d = 10 mm/Area Scan (81x81x1):**

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 15.3 mW/g

**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:**

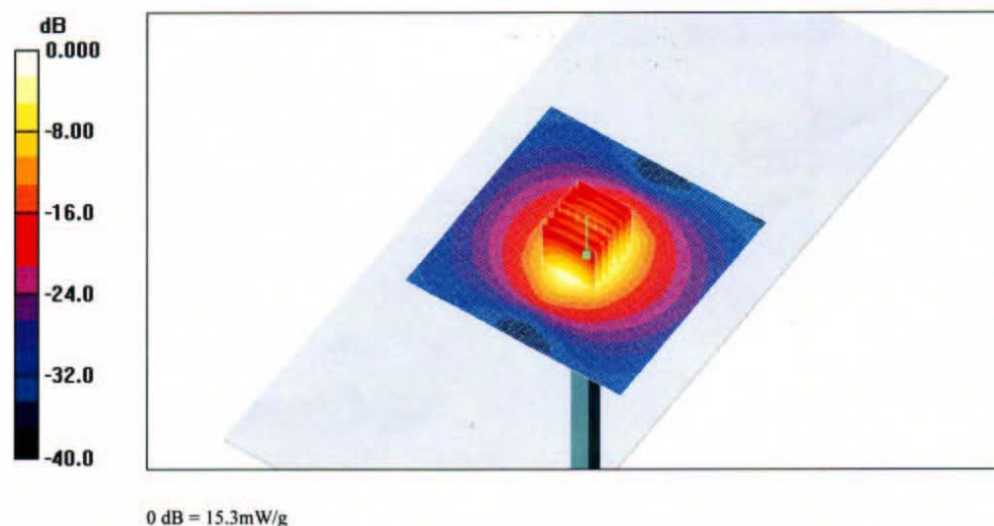
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.3 V/m; Power Drift = -0.062 dB

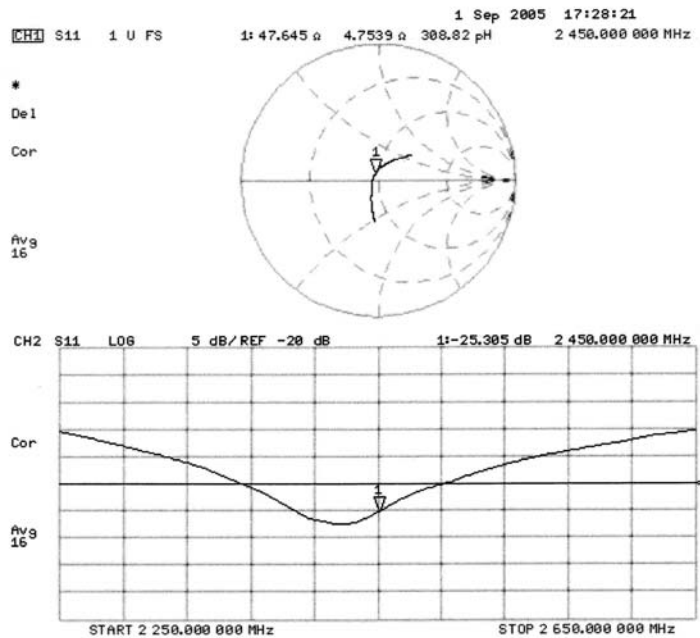
Peak SAR (extrapolated) = 27.6 W/kg

**SAR(1 g) = 13.5 mW/g; SAR(10 g) = 6.25 mW/g**

Maximum value of SAR (measured) = 15.3 mW/g



### Impedance Measurement Plot for Body TSL



## 12. Dosimetric E-Field Probe Calibration (EX3DV3,S/N: 3507)

**Calibration Laboratory of  
Schmid & Partner  
Engineering AG**  
Zaughausstrasse 43, 8004 Zurich, Switzerland



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Accreditation No.: SCS 108

Client **UL-Apex (MTT)**

Certificate No: **EX3-3507\_Apr05**

| CALIBRATION CERTIFICATE                                                                                                                                                                                                                                                       |                                                                                      |                                           |                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------|------------------------|
| Object                                                                                                                                                                                                                                                                        | EX3DV3 - SN:3507                                                                     |                                           |                        |
| Calibration procedure(s)                                                                                                                                                                                                                                                      | QA CAL-01.v5 and QA CAL-14.v2<br>Calibration procedure for dosimetric E-field probes |                                           |                        |
| Calibration date:                                                                                                                                                                                                                                                             | April 12, 2005                                                                       |                                           |                        |
| Condition of the calibrated item                                                                                                                                                                                                                                              | In Tolerance                                                                         |                                           |                        |
| This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).<br>The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. |                                                                                      |                                           |                        |
| All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.                                                                                                                                                |                                                                                      |                                           |                        |
| Calibration Equipment used (M&TE critical for calibration)                                                                                                                                                                                                                    |                                                                                      |                                           |                        |
| Primary Standards                                                                                                                                                                                                                                                             | ID #                                                                                 | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration  |
| Power meter E4419B                                                                                                                                                                                                                                                            | GB41293874                                                                           | 5-May-04 (METAS, No. 251-00388)           | May-05                 |
| Power sensor E4412A                                                                                                                                                                                                                                                           | MY41495277                                                                           | 5-May-04 (METAS, No. 251-00388)           | May-05                 |
| Reference 3 dB Attenuator                                                                                                                                                                                                                                                     | SN: S5054 (3c)                                                                       | 10-Aug-04 (METAS, No. 251-00403)          | Aug-05                 |
| Reference 20 dB Attenuator                                                                                                                                                                                                                                                    | SN: S5086 (20b)                                                                      | 3-May-04 (METAS, No. 251-00389)           | May-05                 |
| Reference 30 dB Attenuator                                                                                                                                                                                                                                                    | SN: S5129 (30b)                                                                      | 10-Aug-04 (METAS, No. 251-00404)          | Aug-05                 |
| Reference Probe ES3DV2                                                                                                                                                                                                                                                        | SN: 3013                                                                             | 7-Jan-05 (SPEAG, No. ES3-3013_Jan05)      | Jan-06                 |
| DAE4                                                                                                                                                                                                                                                                          | SN: 617                                                                              | 19-Jan-05 (SPEAG, No. DAE4-617_Jan05)     | Jan-06                 |
| Secondary Standards                                                                                                                                                                                                                                                           | ID #                                                                                 | Check Date (in house)                     | Scheduled Check        |
| Power sensor HP 8481A                                                                                                                                                                                                                                                         | MY41092180                                                                           | 18-Sep-02 (SPEAG, in house check Oct-03)  | In house check: Oct-05 |
| RF generator HP 8648C                                                                                                                                                                                                                                                         | US3642U01700                                                                         | 4-Aug-99 (SPEAG, in house check Dec-03)   | In house check: Dec-05 |
| Network Analyzer HP 8753E                                                                                                                                                                                                                                                     | US37390585                                                                           | 18-Oct-01 (SPEAG, in house check Nov-04)  | In house check: Nov-05 |
| Calibrated by:                                                                                                                                                                                                                                                                | Name<br><b>Rico Valters</b>                                                          | Function<br><b>Laboratory Technician</b>  | Signature<br>          |
| Approved by:                                                                                                                                                                                                                                                                  | Name<br><b>Kolja Polovic</b>                                                         | Function<br><b>Technical Manager</b>      | Signature<br>          |
|                                                                                                                                                                                                                                                                               |                                                                                      |                                           | Issued: April 12, 2005 |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory.                                                                                                                                                               |                                                                                      |                                           |                        |

Certificate No: EX3-3507\_Apr05

Page 1 of 10

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The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

#### Glossary:

|                          |                                                                                                                                                      |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| TSL                      | tissue simulating liquid                                                                                                                             |
| NORM <sub>x,y,z</sub>    | sensitivity in free space                                                                                                                            |
| ConF                     | sensitivity in TSL / NORM <sub>x,y,z</sub>                                                                                                           |
| DCP                      | diode compression point                                                                                                                              |
| Polarization $\phi$      | $\phi$ rotation around probe axis                                                                                                                    |
| Polarization $\vartheta$ | $\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis |

#### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

#### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not effect the  $E^2$ -field uncertainty inside TSL (see below *ConvF*).
- NORM(f)<sub>x,y,z</sub> = NORM<sub>x,y,z</sub> \* frequency\_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP<sub>x,y,z</sub>**: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* *ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

EX3DV3 SN:3507

April 12, 2005

# Probe EX3DV3

## SN:3507

Manufactured: December 15, 2003  
Last calibrated: February 20, 2004  
Recalibrated: April 12, 2005

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

EX3DV3 SN:3507

April 12, 2005

## DASY - Parameters of Probe: EX3DV3 SN:3507

### Sensitivity in Free Space<sup>A</sup>

### Diode Compression<sup>B</sup>

|       |              |                 |       |       |
|-------|--------------|-----------------|-------|-------|
| NormX | 0.71 ± 10.1% | $\mu V/(V/m)^2$ | DCP X | 96 mV |
| NormY | 0.74 ± 10.1% | $\mu V/(V/m)^2$ | DCP Y | 96 mV |
| NormZ | 0.73 ± 10.1% | $\mu V/(V/m)^2$ | DCP Z | 96 mV |

### Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

### Boundary Effect

TSL 900 MHz Typical SAR gradient: 5 % per mm

|                                                    |        |        |
|----------------------------------------------------|--------|--------|
| Sensor Center to Phantom Surface Distance          | 2.0 mm | 3.0 mm |
| SAR <sub>oe</sub> [%] Without Correction Algorithm | 3.4    | 1.2    |
| SAR <sub>oe</sub> [%] With Correction Algorithm    | 0.2    | 0.4    |

TSL 1810 MHz Typical SAR gradient: 10 % per mm

|                                                    |        |        |
|----------------------------------------------------|--------|--------|
| Sensor Center to Phantom Surface Distance          | 2.0 mm | 3.0 mm |
| SAR <sub>oe</sub> [%] Without Correction Algorithm | 3.3    | 1.8    |
| SAR <sub>oe</sub> [%] With Correction Algorithm    | 0.6    | 0.7    |

### Sensor Offset

Probe Tip to Sensor Center 1.0 mm

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Page 8).

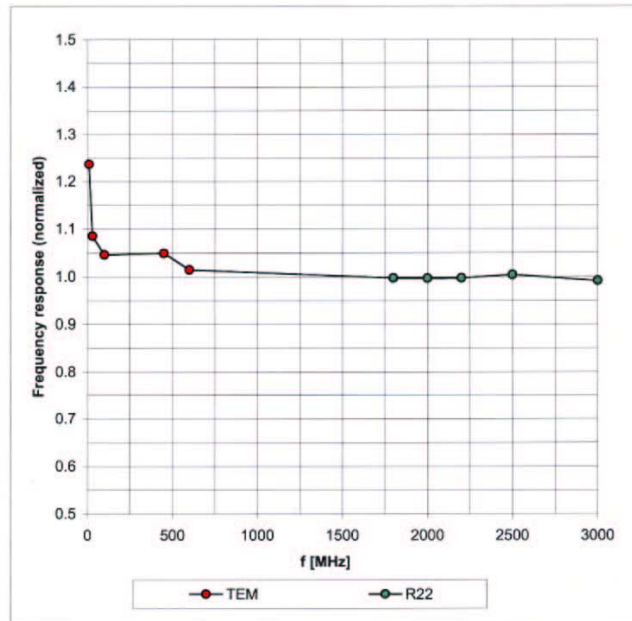
<sup>B</sup> Numerical linearization parameter: uncertainty not required.

EX3DV3 SN:3507

April 12, 2005

## Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)

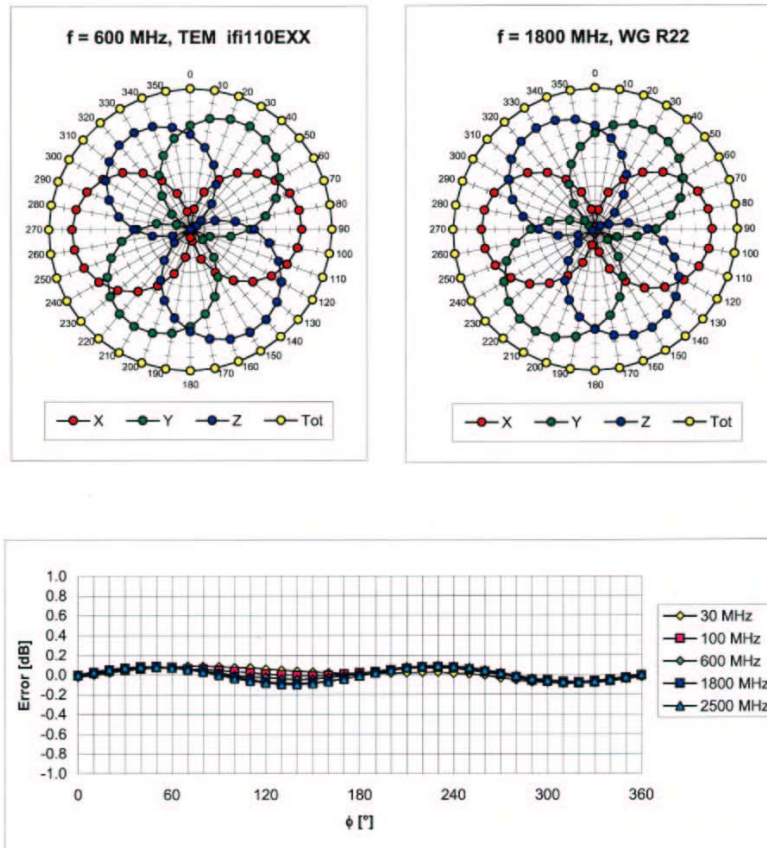


Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

EX3DV3 SN:3507

April 12, 2005

### Receiving Pattern ( $\phi$ ), $\theta = 0^\circ$

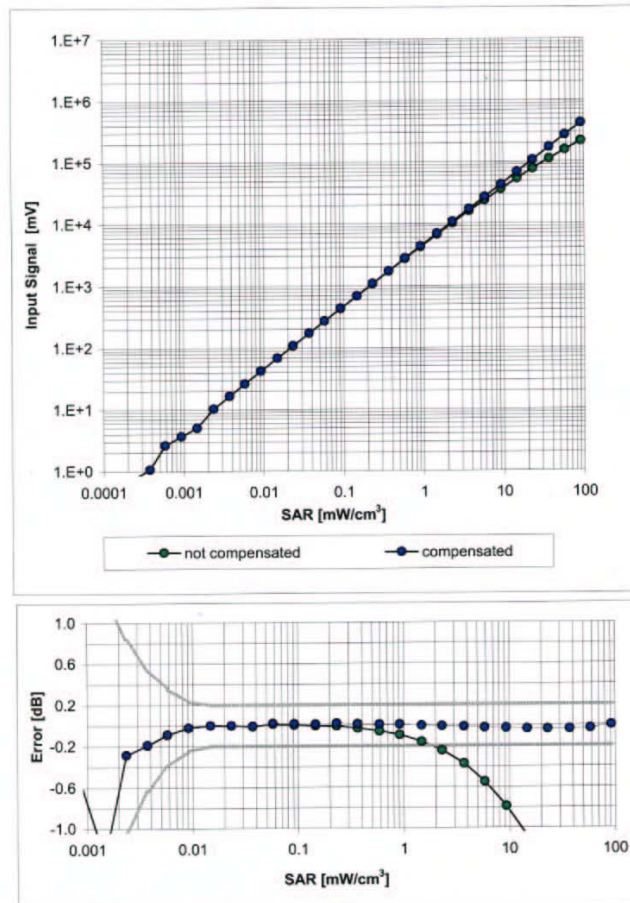


Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

EX3DV3 SN:3507

April 12, 2005

**Dynamic Range  $f(\text{SAR}_{\text{head}})$**   
(Waveguide R22,  $f = 1800 \text{ MHz}$ )

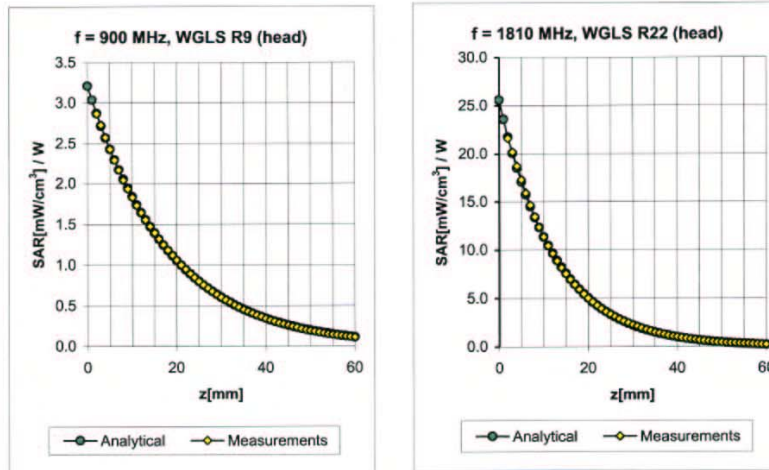


Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

EX3DV3 SN:3507

April 12, 2005

## Conversion Factor Assessment



| f [MHz] | Validity [MHz] <sup>c</sup> | TSL  | Permittivity | Conductivity | Alpha | Depth | ConvF Uncertainty   |
|---------|-----------------------------|------|--------------|--------------|-------|-------|---------------------|
| 900     | ± 50 / ± 100                | Head | 41.5 ± 5%    | 0.97 ± 5%    | 0.74  | 0.66  | 10.48 ± 11.0% (k=2) |
| 1810    | ± 50 / ± 100                | Head | 40.0 ± 5%    | 1.40 ± 5%    | 0.51  | 0.77  | 9.10 ± 11.0% (k=2)  |
| 2450    | ± 50 / ± 100                | Head | 39.2 ± 5%    | 1.80 ± 5%    | 0.46  | 0.81  | 8.25 ± 11.8% (k=2)  |
| 900     | ± 50 / ± 100                | Body | 55.0 ± 5%    | 1.05 ± 5%    | 0.79  | 0.62  | 10.42 ± 11.0% (k=2) |
| 1810    | ± 50 / ± 100                | Body | 53.3 ± 5%    | 1.52 ± 5%    | 0.30  | 1.78  | 8.70 ± 11.0% (k=2)  |
| 2450    | ± 50 / ± 100                | Body | 52.7 ± 5%    | 1.95 ± 5%    | 0.33  | 1.59  | 7.72 ± 11.8% (k=2)  |

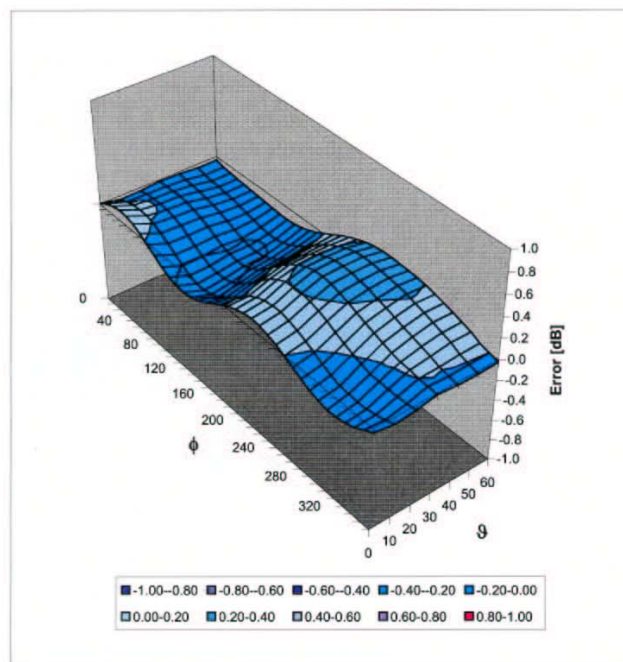
<sup>c</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

EX3DV3 SN:3507

April 12, 2005

### Deviation from Isotropy in HSL

Error ( $\phi$ ,  $\theta$ ),  $f = 900$  MHz

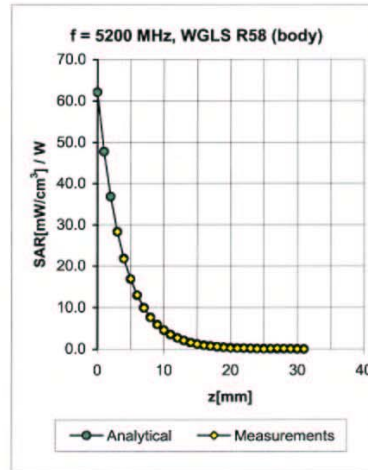
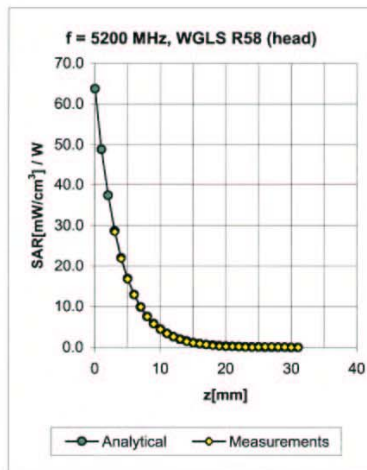


Uncertainty of Spherical Isotropy Assessment:  $\pm 2.6\%$  ( $k=2$ )

EX3DV3 SN:3507

April 12, 2005

## Appendix<sup>D</sup>



| f [MHz] <sup>D</sup> | Validity [MHz] | TSL  | Permittivity | Conductivity | Alpha | Depth | ConvF Uncertainty  |
|----------------------|----------------|------|--------------|--------------|-------|-------|--------------------|
| 5200                 | ± 50           | Head | 36.0 ± 5%    | 4.76 ± 5%    | 0.41  | 1.80  | 5.37 ± 13.6% (k=2) |
| 5800                 | ± 50           | Head | 35.3 ± 5%    | 5.27 ± 5%    | 0.45  | 1.80  | 4.67 ± 13.6% (k=2) |
| 5200                 | ± 50           | Body | 49.0 ± 5%    | 5.30 ± 5%    | 0.45  | 1.90  | 4.86 ± 13.6% (k=2) |
| 5800                 | ± 50           | Body | 48.2 ± 5%    | 6.00 ± 5%    | 0.45  | 1.90  | 4.32 ± 13.6% (k=2) |

<sup>D</sup> Accreditation for ConvF assessment above 3000 MHz is currently applied for. Accreditation is expected in spring 2005.

### 13. References

- [1]ANSI, ANSI/IEEE C95.1-1992: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz, The Institute of Electrical and Electronics Engineers, Inc., New York, NY 10017, 1992.
- [2] Katja Pokovic, Thomas Schmid, and Niels Kuster, "Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies", in ICECOM '97, Dubrovnik, October 15-17, 1997, pp. 120-124.
- [3] Katja Pokovic, Thomas Schmid, and Niels Kuster, "E-field probe with improved isotropy in brain simulating liquids", in Proceedings of the ELMAR, Zadar, Croatia, 23-25 June, 1996, pp.172-175.
- [4] W. Gander, Computermathematik, Birkhaeuser, Basel, 1992.
- [5] W. H. Press, S. A. Teukolsky, W. T. Vetterling, and B. P. Flannery, Numerical Recipes in C, The Art of Scientific Computing, Second Edition, Cambridge University Press, 1992.
- [6]SPEAG uncertainty document for DASY 4 System from SPEAG (Shimid & Partner Engineering AG).
- [7]SPEAG uncertainty document for "the 5-6GHz Extension" from SPEAG (Shimid & Partner Engineering AG).

### **APPENDIX 3 : SAR Measurement data**

## 1. Evaluation procedure

The evaluation was performed with the following procedure:

**Step 1:** Measurement of the E-field at a fixed location above the ear point or central position of flat phantom was used as a reference value for assessing the power drop.

**Step 2:** The SAR distribution at the exposed side of head or body position was measured at a distance of each device from the inner surface of the shell. The area covered the entire dimension of the antenna of EUT and the horizontal grid spacing was 20 mm x 20 mm . Based on these data, the area of the maximum absorption was determined by spline interpolation.

**Step 3:** Around this point found in the Step 2 (area scan) , a volume of 32mm x 32mm x 30mm was assessed by measuring 5 x 5 x 7 points. And for any secondary peaks found in the Step2 which are within 2dB of maximum peak and not with this Step3 (Zoom scan) is repeated. On the basis of this data set, the spatial peak SAR value was evaluated under the following procedure:

(1). The data at the surface were extrapolated, since the center of the dipoles is 1mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation was based on a least square algorithm [4]. 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.

(2). The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed by 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) [4], [5]. The volume was integrated with the trapezoidal-algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.

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

**Step 4:** Re-measurement of the E-field at the same location as in Step 1.

## 2. Measurement data (ANT. : UBA-CUW1000)

**PSP-1001 (Ant : UBA-CUW1000 : PSP-110(Sony))/ Body / Front / 2437MHz / 11b(11Mbps)**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (71x81x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) =  $0.087 \text{ mW/g}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $6.88 \text{ V/m}$ ; Power Drift =  $-0.216 \text{ dB}$

Peak SAR (extrapolated) =  $0.127 \text{ W/kg}$

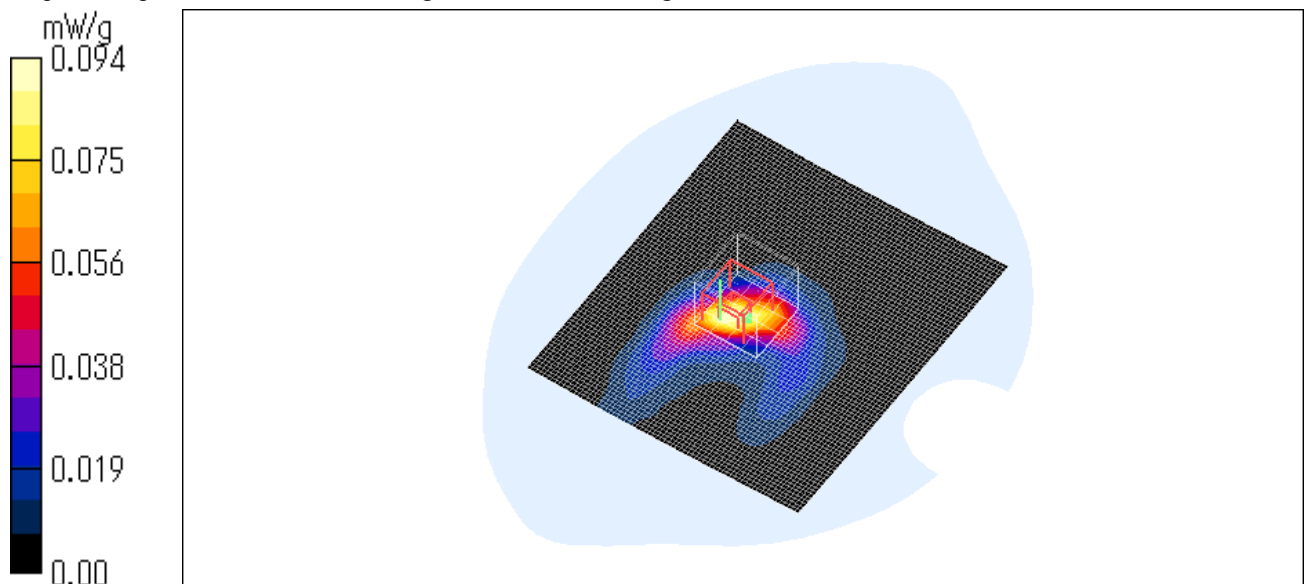
**SAR(1 g) =  $0.071 \text{ mW/g}$ ; SAR(10 g) =  $0.036 \text{ mW/g}$**

Maximum value of SAR (measured) =  $0.094 \text{ mW/g}$

Test Date = 04/10/06

Ambient Temperature =  $24.8 \text{ degree C.}$

Liquid Temperature = Before  $23.7 \text{ degree C.}$  , After  $23.7 \text{ degree C.}$



UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

**PSP-1001 (Ant : UBA-CUW1000, Battery : PSP-110(Sony))/ Body / Back / 2437MHz / 11b(11Mbps)**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (71x81x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) =  $0.047 \text{ mW/g}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $2.80 \text{ V/m}$ ; Power Drift =  $-0.190 \text{ dB}$

Peak SAR (extrapolated) =  $0.055 \text{ W/kg}$

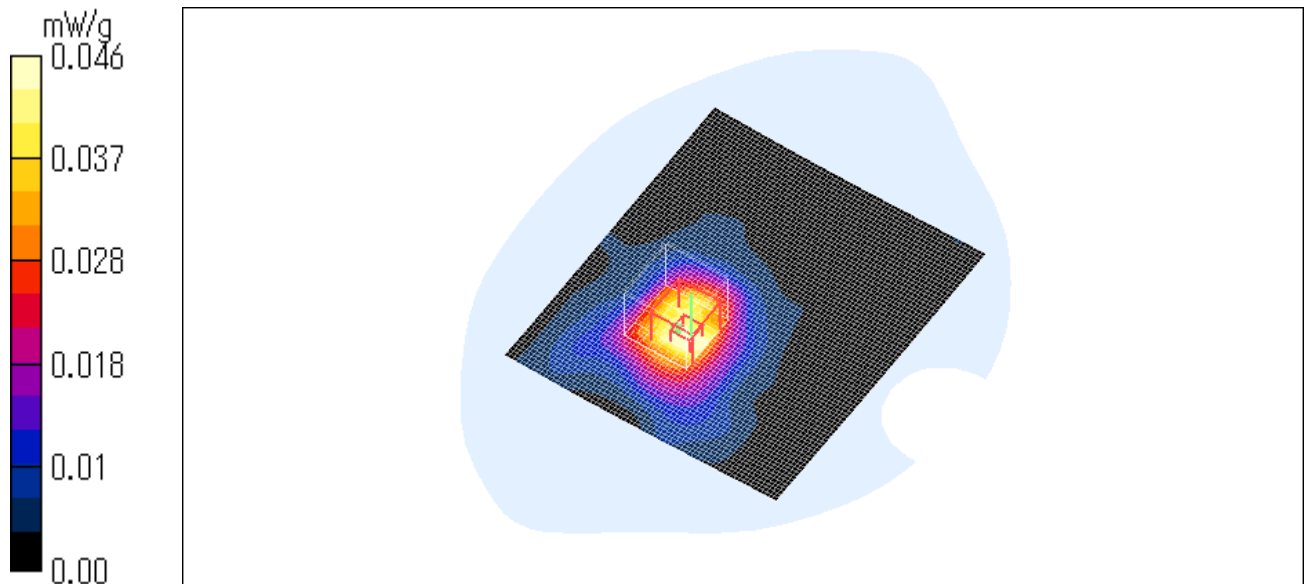
**SAR(1 g) =  $0.037 \text{ mW/g}$ ; SAR(10 g) =  $0.022 \text{ mW/g}$**

Maximum value of SAR (measured) =  $0.046 \text{ mW/g}$

Test Date = 04/10/06

Ambient Temperature =  $24.8 \text{ degree C.}$

Liquid Temperature = Before  $23.7 \text{ degree C.}$  , After  $23.7 \text{ degree C.}$



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UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

**PSP-1001 (Ant : UBA-CUW1000, Battery : PSP-110(Sony))/ Body / Top / 2437MHz / 11b(11Mbps)**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (71x81x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) =  $0.042 \text{ mW/g}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $3.83 \text{ V/m}$ ; Power Drift =  $-0.205 \text{ dB}$

Peak SAR (extrapolated) =  $0.056 \text{ W/kg}$

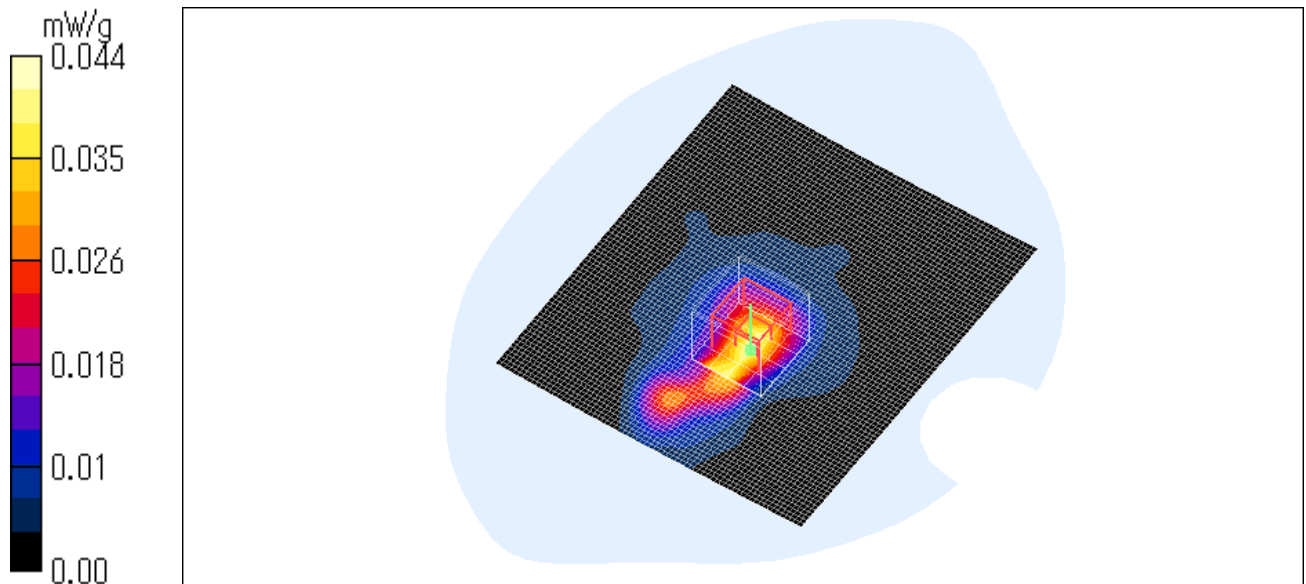
**SAR(1 g) =  $0.030 \text{ mW/g}$ ; SAR(10 g) =  $0.015 \text{ mW/g}$**

Maximum value of SAR (measured) =  $0.044 \text{ mW/g}$

Test Date = 04/10/06

Ambient Temperature =  $24.8 \text{ degree C.}$

Liquid Temperature = Before  $23.8 \text{ degree C.}$  , After  $23.8 \text{ degree C.}$



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UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

**PSP-1001 (Ant : UBA-CUW1000, Battery : PSP-110(Sony))/ Body / Bottom / 2437MHz / 11b(11Mbps)**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (51x81x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) =  $0.022 \text{ mW/g}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $1.68 \text{ V/m}$ ; Power Drift =  $-0.223 \text{ dB}$

Peak SAR (extrapolated) =  $0.034 \text{ W/kg}$

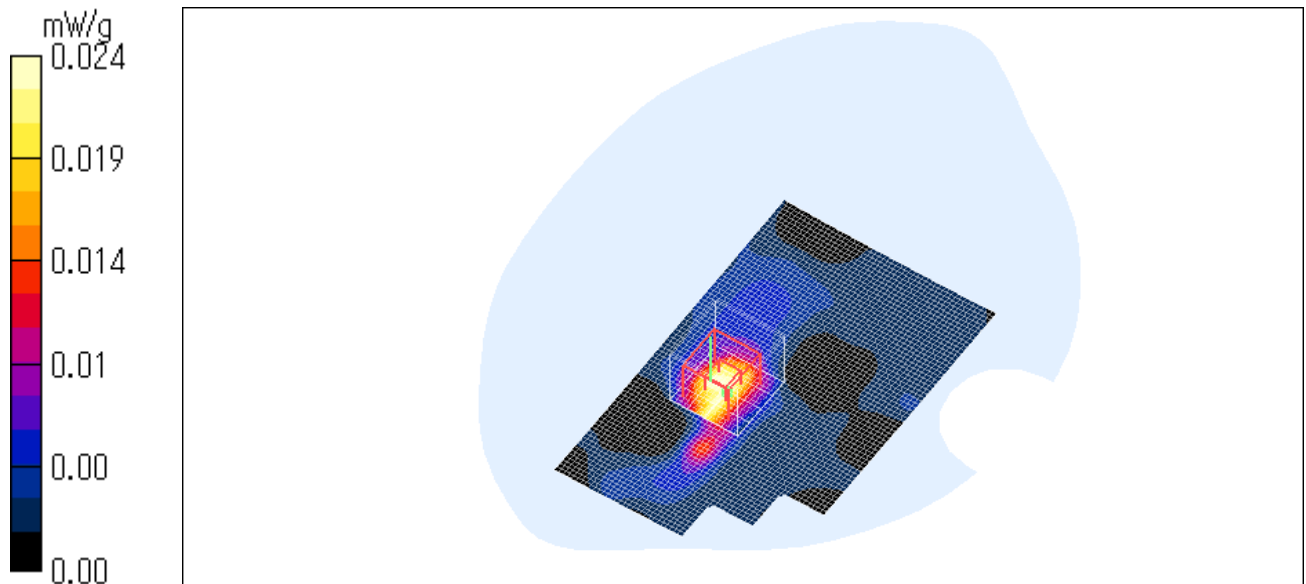
**SAR(1 g) =  $0.019 \text{ mW/g}$ ; SAR(10 g) =  $0.00903 \text{ mW/g}$**

Maximum value of SAR (measured) =  $0.024 \text{ mW/g}$

Test Date = 04/10/06

Ambient Temperature =  $24.8 \text{ degree C.}$

Liquid Temperature = Before  $23.8 \text{ degree C.}$  , After  $23.8 \text{ degree C.}$



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UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

**PSP-1001 (Ant : UBA-CUW1000, Battery : PSP-110(Sony))/ Body / Left side / 2437MHz / 11b(11Mbps)**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (71x81x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) =  $0.064 \text{ mW/g}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $6.22 \text{ V/m}$ ; Power Drift =  $-0.211 \text{ dB}$

Peak SAR (extrapolated) =  $0.181 \text{ W/kg}$

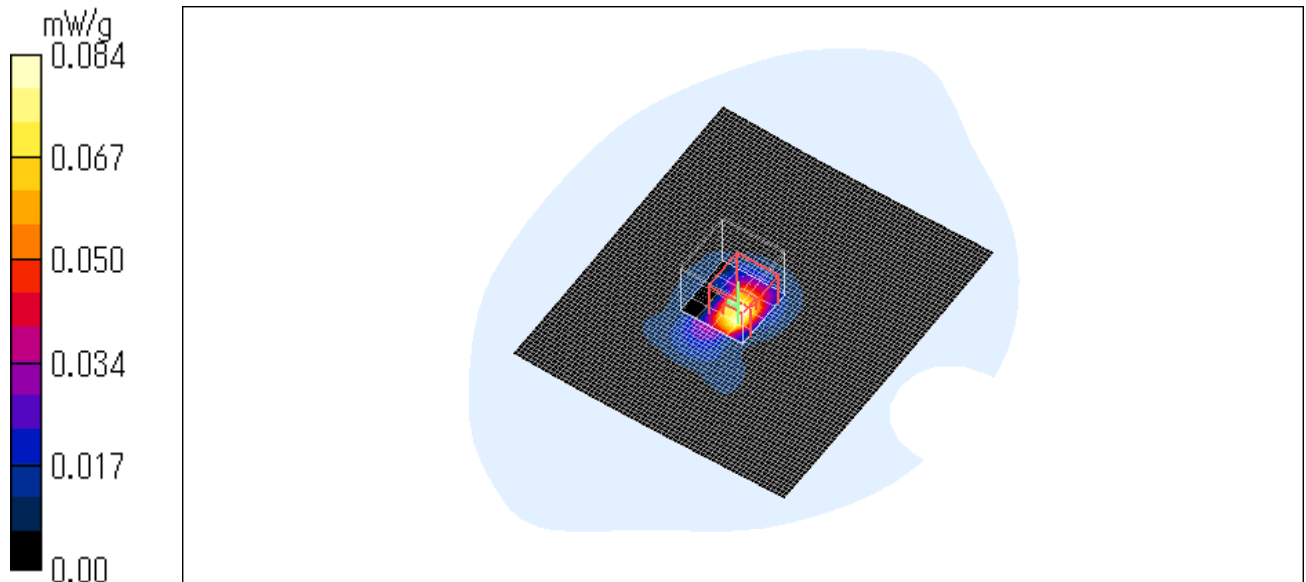
**SAR(1 g) =  $0.071 \text{ mW/g}$ ; SAR(10 g) =  $0.025 \text{ mW/g}$**

Maximum value of SAR (measured) =  $0.084 \text{ mW/g}$

Test Date = 04/10/06

Ambient Temperature =  $24.8 \text{ degree C.}$

Liquid Temperature = Before  $24.1 \text{ degree C.}$  , After  $24.1 \text{ degree C.}$



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UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

**PSP-1001 (Ant : UBA-CUW1000, Battery : PSP-110(Sony))/ Body / Front / 2412MHz / 11b(11Mbps)**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (51x81x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) =  $0.093 \text{ mW/g}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $3.96 \text{ V/m}$ ; Power Drift =  $-0.191 \text{ dB}$

Peak SAR (extrapolated) =  $0.120 \text{ W/kg}$

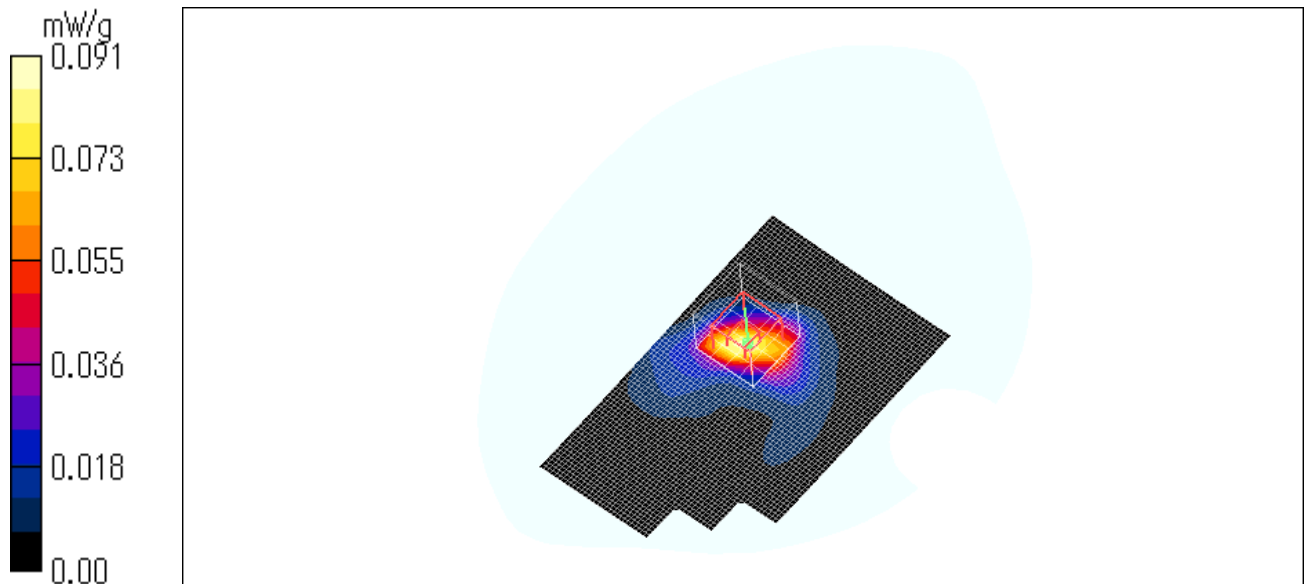
**SAR(1 g) =  $0.066 \text{ mW/g}$ ; SAR(10 g) =  $0.033 \text{ mW/g}$**

Maximum value of SAR (measured) =  $0.091 \text{ mW/g}$

Test Date = 04/10/06

Ambient Temperature =  $24.8 \text{ degree C.}$

Liquid Temperature = Before  $23.8 \text{ degree C.}$  , After  $23.8 \text{ degree C.}$



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UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

**PSP-1001 (Ant : UBA-CUW1000, Battery : PSP-110(Sony))/ Body / Front / 2462MHz / 11b(11Mbps)**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (71x81x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) = 0.077 mW/g

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 5.56 V/m; Power Drift = -0.201 dB

Peak SAR (extrapolated) = 0.129 W/kg

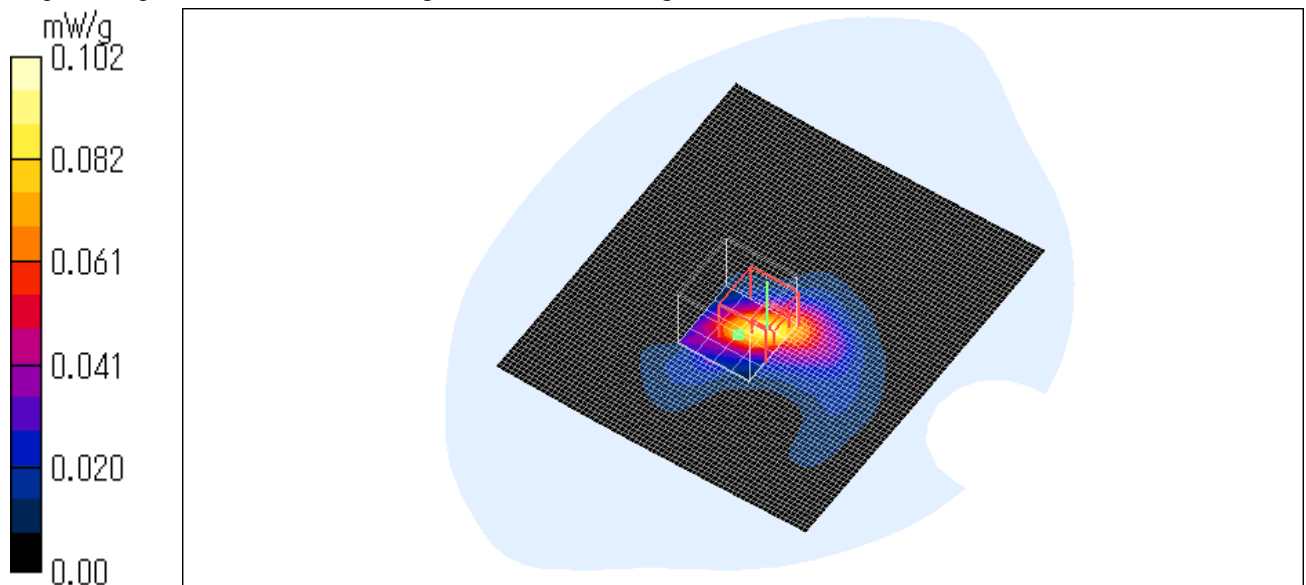
**SAR(1 g) = 0.069 mW/g; SAR(10 g) = 0.033 mW/g**

Maximum value of SAR (measured) = 0.102 mW/g

Test Date = 04/10/06

Ambient Temperature = 24.8 degree C.

Liquid Temperature = Before 24.0 degree C. , After 24.0 degree C.



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UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

### 3. Measurement data (ANT. : HFS11-SO01)

**PSP-1001 (Ant : HFS11-SO01, Battery : PSP-110(Sony)) / Body / Front / 2437MHz / 11b(11Mbps)**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (71x81x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) =  $0.143 \text{ mW/g}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $7.69 \text{ V/m}$ ; Power Drift =  $-0.064 \text{ dB}$

Peak SAR (extrapolated) =  $0.182 \text{ W/kg}$

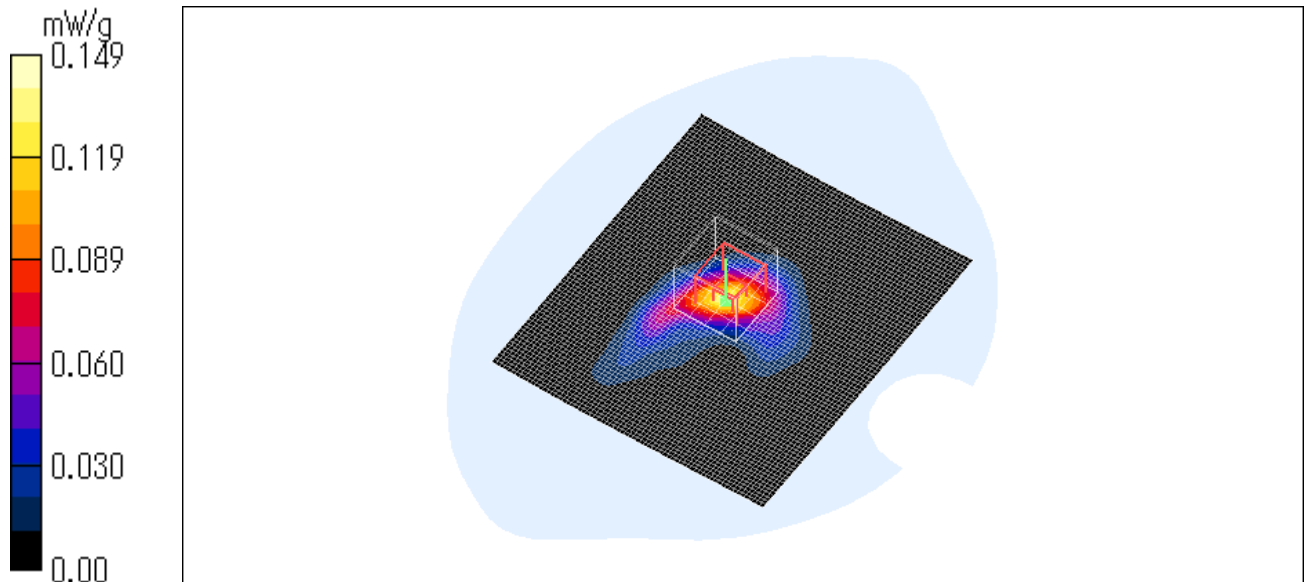
**SAR(1 g) =  $0.103 \text{ mW/g}$ ; SAR(10 g) =  $0.051 \text{ mW/g}$**

Maximum value of SAR (measured) =  $0.149 \text{ mW/g}$

Test Date = 04/10/06

Ambient Temperature =  $24.8 \text{ degree C.}$

Liquid Temperature = Before  $24.1 \text{ degree C.}$  , After  $24.1 \text{ degree C.}$



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UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

### Z-axis scan at max SAR location

**PSP-1001 (Ant : HFS11-SO01, Battery : PSP-110(Sony)) / Body / Front / 2437MHz / 11b(11Mbps)**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASy4 (High Precision Assessment)

DASy4 Configuration:

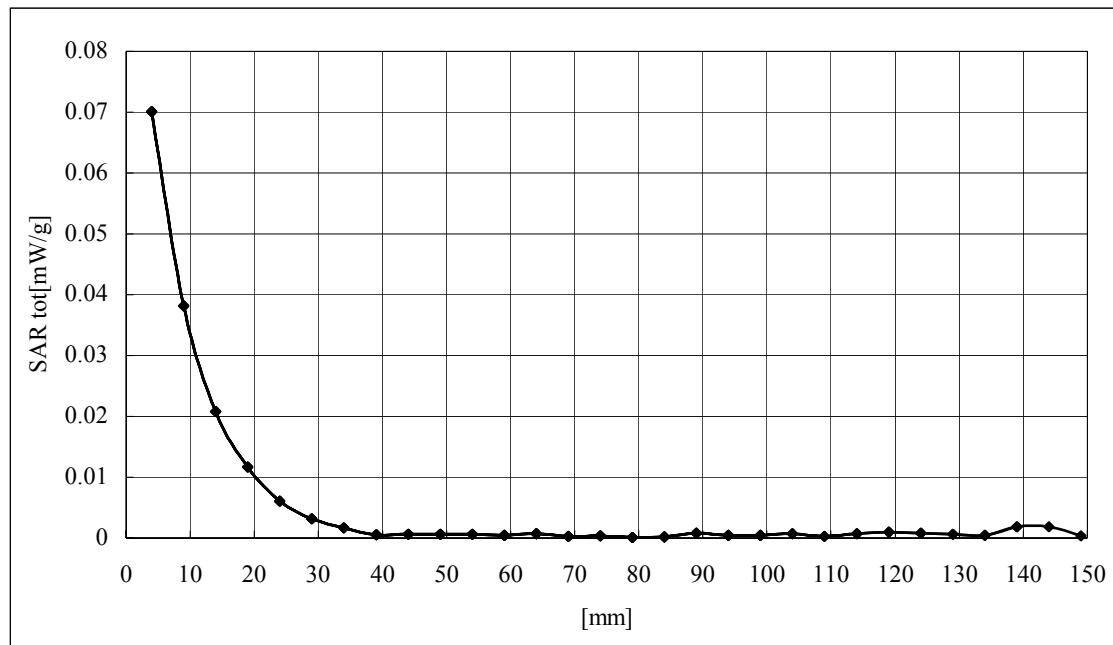
Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASy4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145



**PSP-1001 (Ant : HFS11-SO01, Battery : PSP-110(Sony)) / Body / Back / 2437MHz / 11b(11Mbps)**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASYS4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASYS4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (71x81x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) = 0.068 mW/g

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 2.53 V/m; Power Drift = 0.051 dB

Peak SAR (extrapolated) = 0.066 W/kg

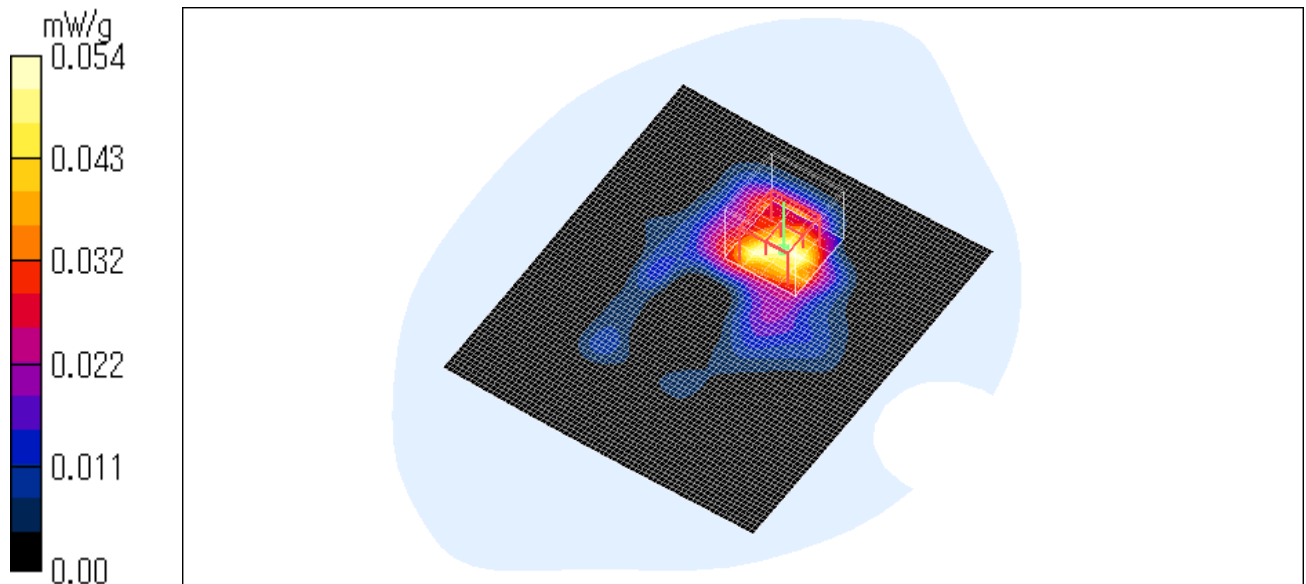
**SAR(1 g) = 0.040 mW/g; SAR(10 g) = 0.023 mW/g**

Maximum value of SAR (measured) = 0.054 mW/g

Test Date = 04/10/06

Ambient Temperature = 24.8 degree C.

Liquid Temperature = Before 24.0 degree C. , After 24.0 degree C.



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UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

**PSP-1001 (Ant : HFS11-SO01, Battery : PSP-110(Sony)) / Body / Top / 2437MHz / 11b(11Mbps)**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (71x81x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) =  $0.075 \text{ mW/g}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $6.54 \text{ V/m}$ ; Power Drift =  $0.00 \text{ dB}$

Peak SAR (extrapolated) =  $0.126 \text{ W/kg}$

**SAR(1 g) =  $0.064 \text{ mW/g}$ ; SAR(10 g) =  $0.029 \text{ mW/g}$**

Maximum value of SAR (measured) =  $0.093 \text{ mW/g}$

**Zoom Scan (5x5x7)/Cube 1:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $6.54 \text{ V/m}$ ; Power Drift =  $0.00 \text{ dB}$

Peak SAR (extrapolated) =  $0.107 \text{ W/kg}$

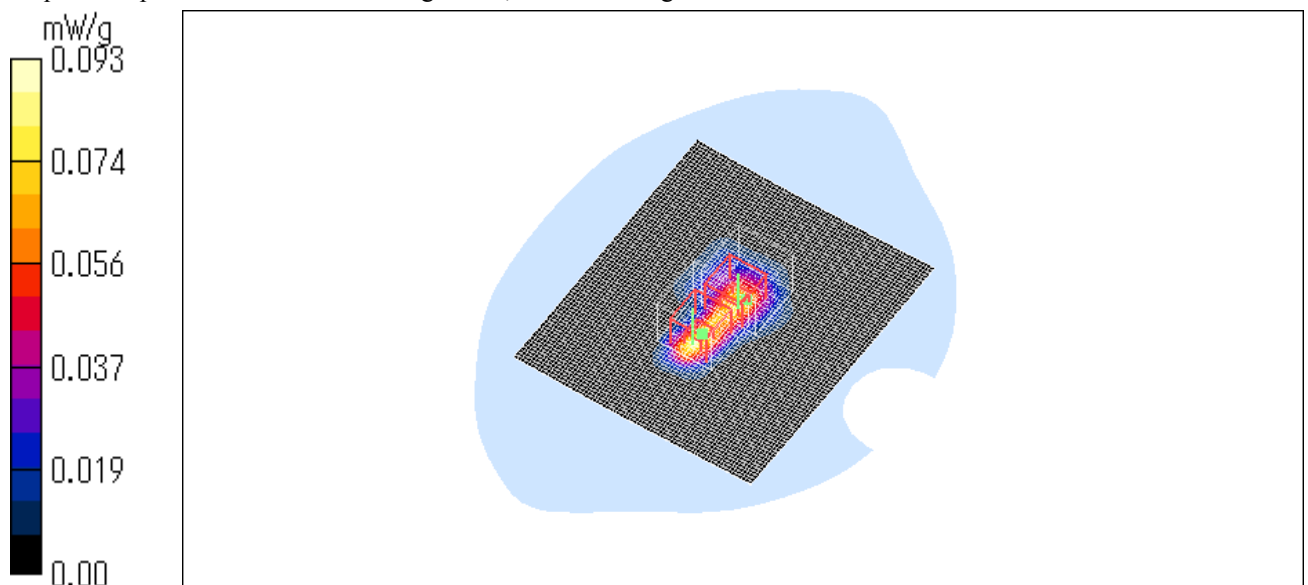
**SAR(1 g) =  $0.057 \text{ mW/g}$ ; SAR(10 g) =  $0.028 \text{ mW/g}$**

Maximum value of SAR (measured) =  $0.081 \text{ mW/g}$

Test Date = 04/10/06

Ambient Temperature =  $24.8 \text{ degree C.}$

Liquid Temperature = Before  $24.0 \text{ degree C.}$  , After  $24.0 \text{ degree C.}$



UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

**PSP-1001 (Ant : HFS11-SO01, Battery : PSP-110(Sony))/ Body / Bottom / 2437MHz / 11b(11Mbps)**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (71x81x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) =  $0.019 \text{ mW/g}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $0.945 \text{ V/m}$ ; Power Drift =  $-0.199 \text{ dB}$

Peak SAR (extrapolated) =  $0.021 \text{ W/kg}$

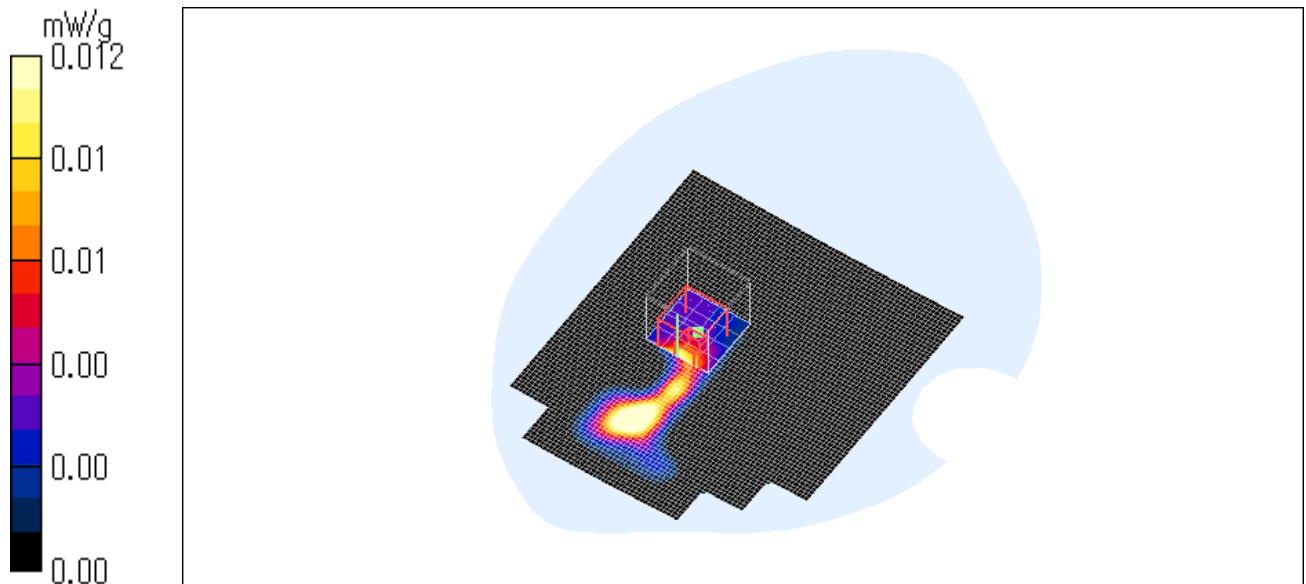
**SAR(1 g) =  $0.00426 \text{ mW/g}$ ; SAR(10 g) =  $0.00171 \text{ mW/g}$**

Maximum value of SAR (measured) =  $0.012 \text{ mW/g}$

Test Date = 04/10/06

Ambient Temperature =  $24.8 \text{ degree C.}$

Liquid Temperature = Before  $23.9 \text{ degree C.}$  , After  $23.9 \text{ degree C.}$



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UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

**PSP-1001 (Ant : HFS11-SO01, Battery : PSP-110(Sony))/ Body / Left Side / 2437MHz / 11b(11Mbps)**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (71x81x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) =  $0.086 \text{ mW/g}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $6.34 \text{ V/m}$ ; Power Drift =  $-0.206 \text{ dB}$

Peak SAR (extrapolated) =  $0.156 \text{ W/kg}$

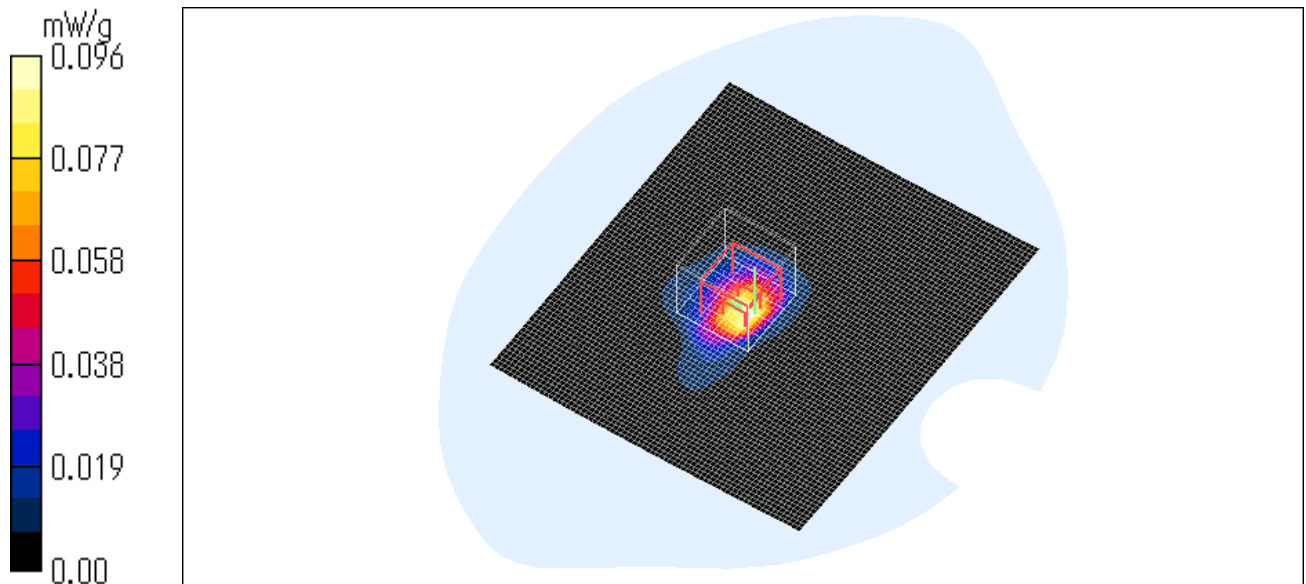
**SAR(1 g) =  $0.070 \text{ mW/g}$ ; SAR(10 g) =  $0.030 \text{ mW/g}$**

Maximum value of SAR (measured) =  $0.096 \text{ mW/g}$

Test Date = 04/10/06

Ambient Temperature =  $24.8 \text{ degree C.}$

Liquid Temperature = Before  $24.2 \text{ degree C.}$  , After  $24.2 \text{ degree C.}$



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UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

**PSP-1001 (Ant : HFS11-SO01, Battery : PSP-110(Sony))/ Body / Front / 2412MHz / 11b(11Mbps)**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (71x81x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) =  $0.110 \text{ mW/g}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $5.90 \text{ V/m}$ ; Power Drift =  $-0.158 \text{ dB}$

Peak SAR (extrapolated) =  $0.138 \text{ W/kg}$

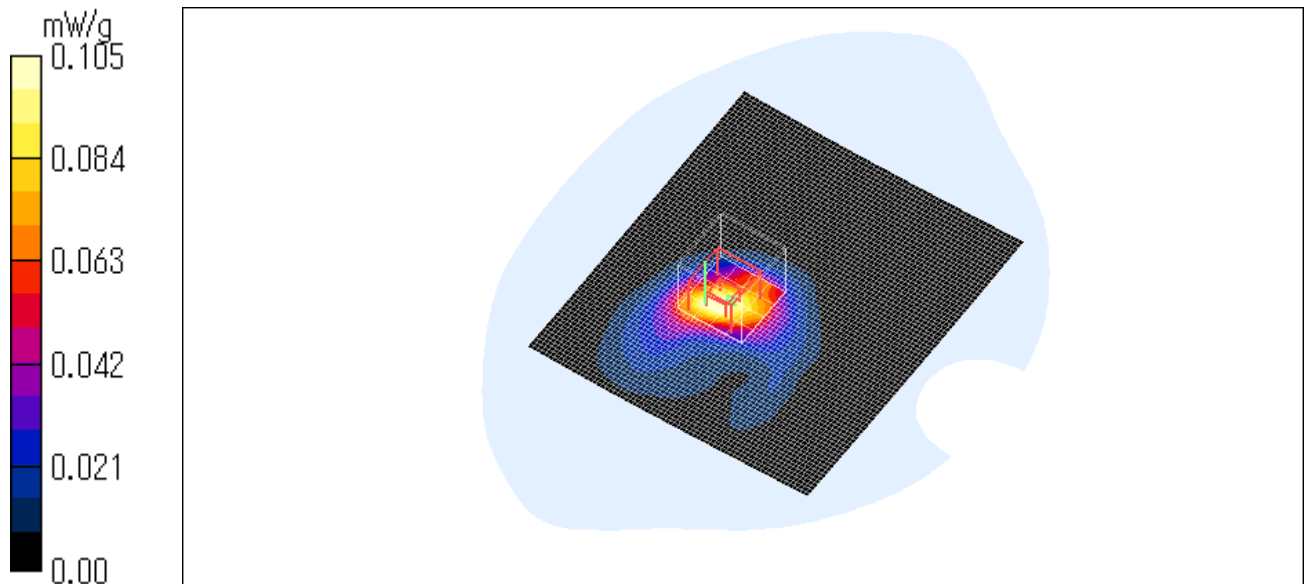
**SAR(1 g) =  $0.081 \text{ mW/g}$ ; SAR(10 g) =  $0.042 \text{ mW/g}$**

Maximum value of SAR (measured) =  $0.105 \text{ mW/g}$

Test Date = 04/10/06

Ambient Temperature =  $24.8 \text{ degree C.}$

Liquid Temperature = Before  $24.1 \text{ degree C.}$  , After  $24.1 \text{ degree C.}$



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UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

**PSP-1001 (Ant : HFS11-SO01, Battery : PSP-110(Sony))/ Body / Front / 2462MHz / 11b(11Mbps)**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (71x81x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) =  $0.082 \text{ mW/g}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $6.06 \text{ V/m}$ ; Power Drift =  $-0.169 \text{ dB}$

Peak SAR (extrapolated) =  $0.116 \text{ W/kg}$

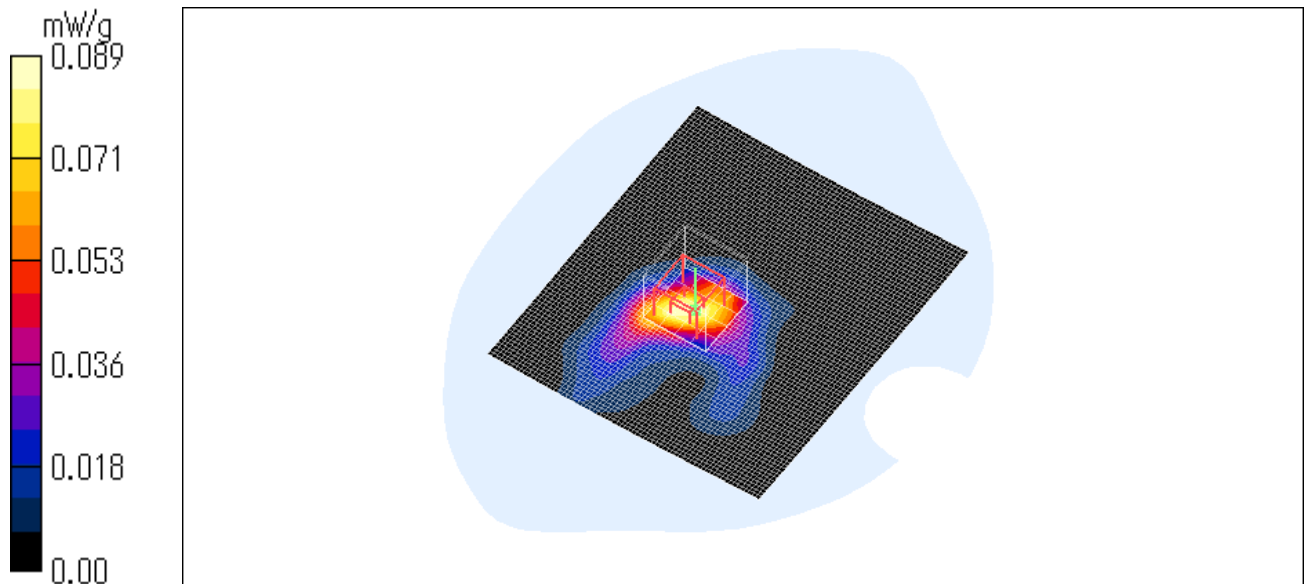
**SAR(1 g) =  $0.067 \text{ mW/g}$ ; SAR(10 g) =  $0.035 \text{ mW/g}$**

Maximum value of SAR (measured) =  $0.089 \text{ mW/g}$

Test Date = 04/10/06

Ambient Temperature =  $24.8 \text{ degree C.}$

Liquid Temperature = Before  $24.0 \text{ degree C.}$  , After  $24.0 \text{ degree C.}$



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UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

**PSP-1001 (Ant : HFS11-SO01, Battery : PSP-110(Sony))/ Body / Front / 2437MHz / 11b(11Mbps)  
/ Separated 5mm**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (71x81x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) =  $0.049 \text{ mW/g}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $4.43 \text{ V/m}$ ; Power Drift =  $-0.158 \text{ dB}$

Peak SAR (extrapolated) =  $0.053 \text{ W/kg}$

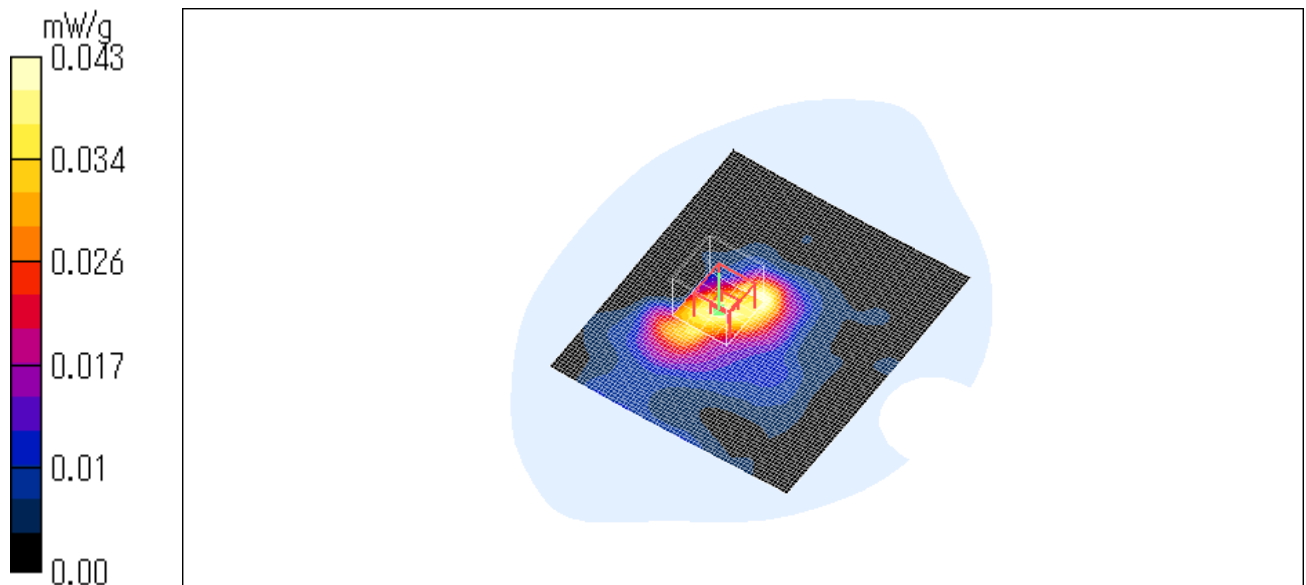
**SAR(1 g) =  $0.032 \text{ mW/g}$ ; SAR(10 g) =  $0.018 \text{ mW/g}$**

Maximum value of SAR (measured) =  $0.043 \text{ mW/g}$

Test Date = 04/10/06

Ambient Temperature =  $24.8 \text{ degree C.}$

Liquid Temperature = Before  $24.0 \text{ degree C.}$  , After  $24.0 \text{ degree C.}$



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UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

**PSP-1001 (Ant : HFS11-SO01, Battery : PSP-110(Sony))/ Body / Front / 2437MHz / 11b(11Mbps)  
/ Separated 10mm**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (71x81x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) =  $0.023 \text{ mW/g}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $2.21 \text{ V/m}$ ; Power Drift =  $-0.201 \text{ dB}$

Peak SAR (extrapolated) =  $0.023 \text{ W/kg}$

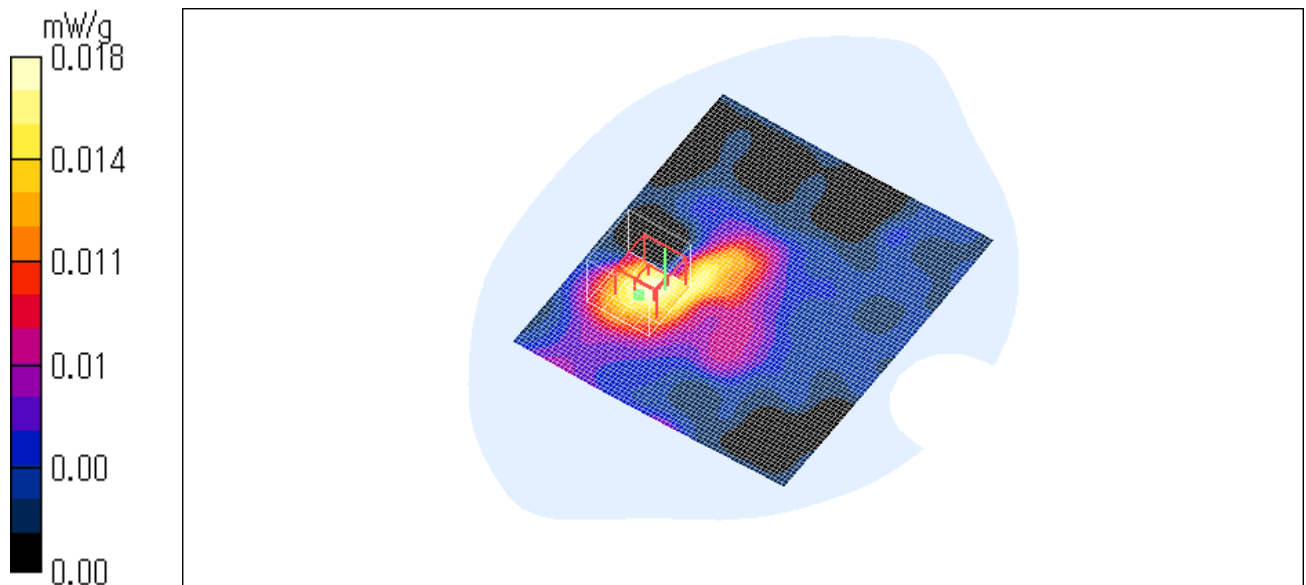
**SAR(1 g) =  $0.013 \text{ mW/g}$ ; SAR(10 g) =  $0.0077 \text{ mW/g}$**

Maximum value of SAR (measured) =  $0.018 \text{ mW/g}$

Test Date = 04/10/06

Ambient Temperature =  $24.8 \text{ degree C.}$

Liquid Temperature = Before  $23.9 \text{ degree C.}$  , After  $23.9 \text{ degree C.}$



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UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

**PSP-1001 (Ant : HFS11-SO01, Battery : PSP-110(Sony))/ Body / Front / 2437MHz / 11b(11Mbps)  
/ Separated 15mm**

Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

Probe: EX3DV3 - SN3507; ConvF(7.72, 7.72, 7.72); Calibrated: 2005/04/12

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE3 Sn509; Calibrated: 2005/05/26

Phantom: SAM 1196

Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Area Scan (71x81x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) =  $0.015 \text{ mW/g}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $2.01 \text{ V/m}$ ; Power Drift =  $-0.212 \text{ dB}$

Peak SAR (extrapolated) =  $0.016 \text{ W/kg}$

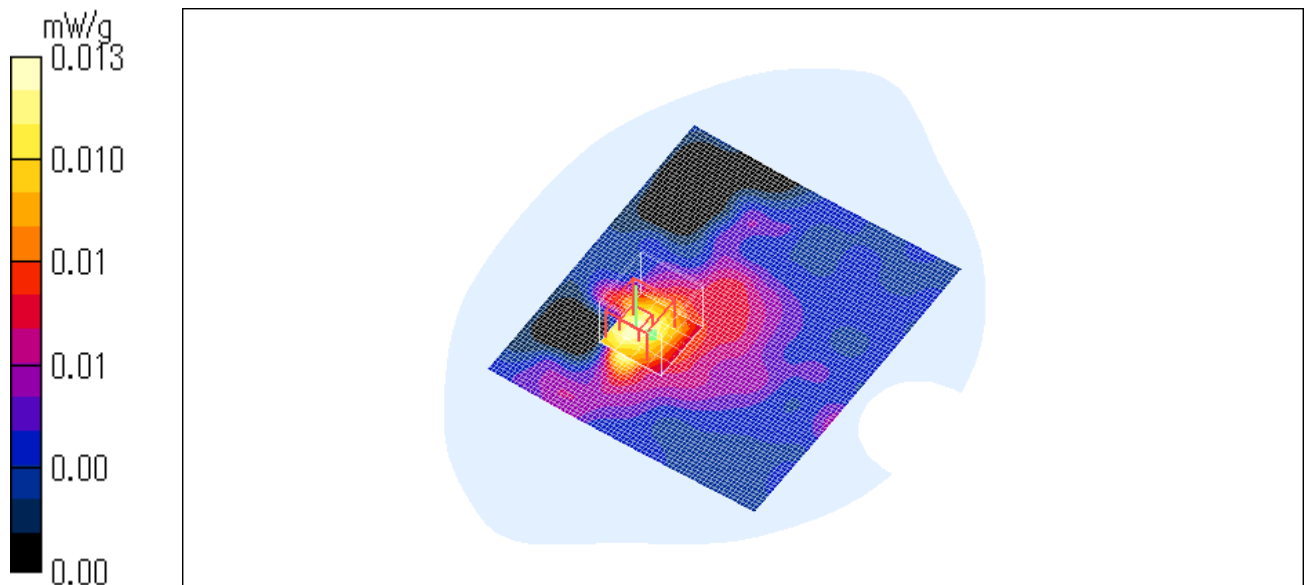
**SAR(1 g) =  $0.010 \text{ mW/g}$ ; SAR(10 g) =  $0.00505 \text{ mW/g}$**

Maximum value of SAR (measured) =  $0.013 \text{ mW/g}$

Test Date = 04/10/06

Ambient Temperature =  $24.8 \text{ degree C.}$

Liquid Temperature = Before  $23.8 \text{ degree C.}$  , After  $23.8 \text{ degree C.}$



**UL Apex Co., Ltd.**

**Head Office EMC Lab.**

**4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN**

**Telephone : +81 596 24 8116**

**Facsimile : +81 596 24 8124**