# SAR EVALUATION REPORT

## Report No. : 23KE0051-HO-1

| | | |
|---|---|---|
| **Applicant** | : | **NIHON KOHDEN CORPORATION** |
| **Type of Equipment** | : | **Telemetry Unit** |
| **Model No.** | : | **ZB-101AA** |
| **FCC ID** | : | **B6BZB-101AA** |
| **Test standard** | : | **FCC47CFR 2.1093**<br>**FCC OET Bulletin 65, Supplement C** |
| **Test Result** | : | **Complied** |
| **Max SAR Measured** | : | **0.736W/kg( Body, Face , 2412MHz )** |

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 above regulation. 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:** July 8 ,2003

**Tested by:** M. Ikuta
Miyo Ikuta
Head Office EMC Lab.

**Approved by:** T. Maeno
Tetsuo Maeno
Site Manager of Head Office EMC Lab.

*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*

# CONTENTS

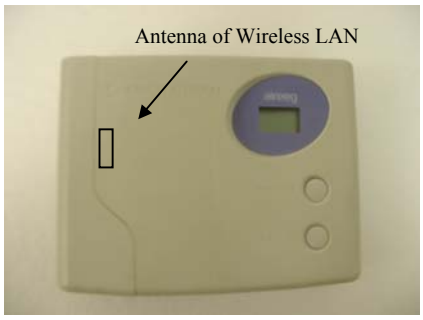
## SECTION 1 : Client information

| | | |
|---|---|---|
| Company Name | : | NIHON KOHDEN CORPORATION |
| Brand Name | : | NIHON KOHDEN |
| Address | : | 1-31-4 Nishiochiai Shinjuku-ku, Tokyo, 161-8560, Japan , |
| Telephone Number | : | 81-3-5996-8066 |
| Facsimile Number | : | 81-3-5996-8103 |
| Contact Person | : | Kazuteru Yanagihara |

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

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

| | | |
|---|---|---|
| APPLICANT | : | NIHON KOHDEN CORPORATION |
| Type of Equipment | : | Telemetry Unit |
| Model No. | : | ZB-101AA |
| Serial No. | : | 91002 |
| Rating | : | DC 3.3V +/- 0.3V |
| Country of Manufacture | : | JAPAN |
| Receipt Date of Sample | : | July 07,2003 |
| Condition of EUT | : | Production prototype |
| Tx Frequency | : | 2412MHz~2462MHz |
| Modulation | : | DSSS [DBPSK,DQPSK,CCK] |
| Max.Output Power Tested | : | 16.25dBmPeak Conducted |
| Antenna Type | : | C-coupling exciter circuit Antenna |
| Position of Antenna | : | See Photograph of right |
| Size of EUT | : | W147.5*L54.0*H114.5 |
| Battery option | : | Only one model with EUT |
| Category Identified | : | Portable device |



## SECTION 3 : Requirements for compliance testing defined by the FCC

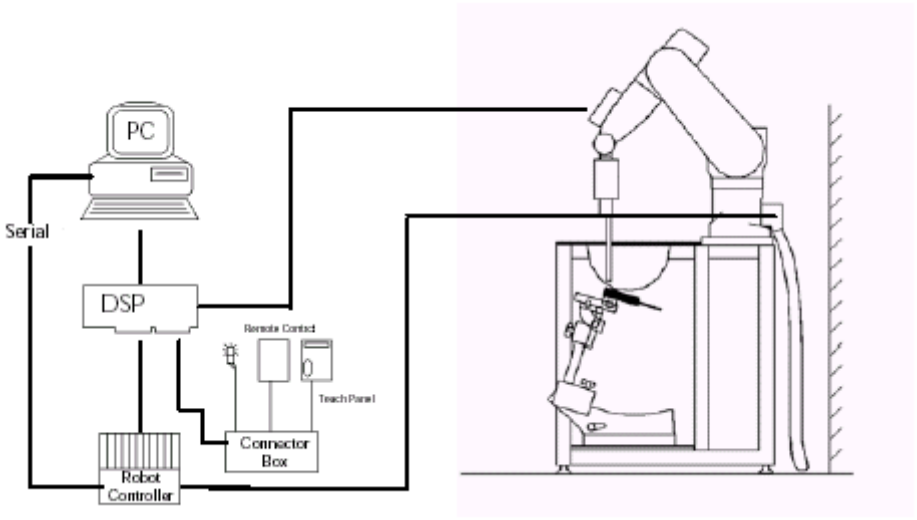
The US Federal Communications Commission has released the report and order “Guidelines for Evaluating the Environmental Effects of RF Radiation", ET Docket No. 93-62 in August 1996. The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable 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.

## SECTION 4 : Dosimetry assessment setup

These measurements were performed with the automated near-field scanning system DASY3 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 +/- 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 +/-10%. The spherical isotropy was evaluated with the procedure described in [3] and found to be better than +/-0.25 dB. The phantom used was the SAM Twin Phantom as described in FCC supplement C, IEE P1528 and CENELEC EN50361.

## 4.1 Configuration and peripherals




**The DASY3 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.

2. An arm extension for accommodating the data acquisition electronics (DAE).

3. 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.

4. 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.

5. A unit to operate the optical surface detector, which is connected to the EOC.

6. The Electro-optical coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the PC plug-in card.

7. The functions of the PC plug-in card based on a DSP is to perform the time critical task such as signal filtering, surveillance of the robot operation fast movement interrupts.

8. A computer operating Windows 98

9. DASY3 software

10. Remote control with teaches pendant and additional circuitry for robot safety such as warning lamps, etc.

11. The SAM phantom enabling testing left-hand and right-hand usage.

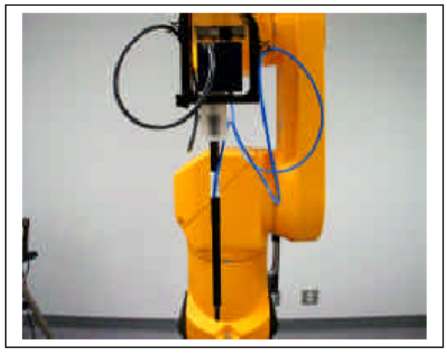
12. The device holder for handheld EUT.

13. Tissue simulating liquid mixed according to the given recipes (see Application Note).

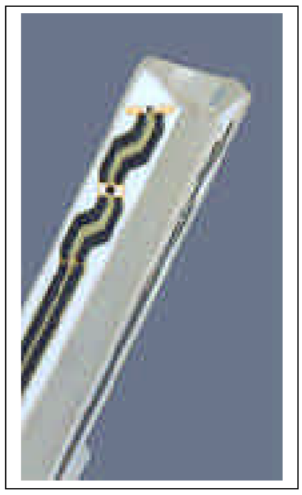
14. System validation dipoles to validate the proper functioning of the system.

## 4.2 System components

### 4.2.1 ET3DV6 Probe Specification

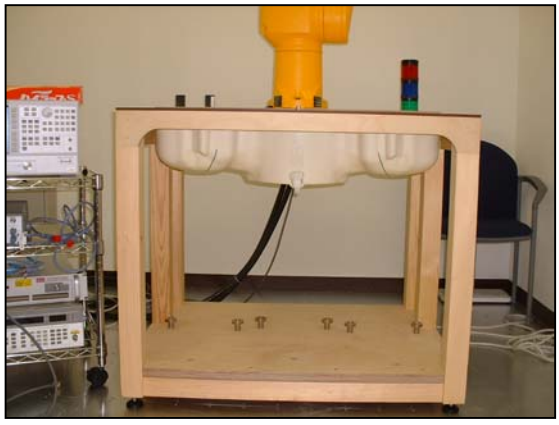


**Construction:**
Symmetrical design with triangular core
Built-in optical fiber for surface detection System
Built-in shielding against static charges
PEEK enclosure material (resistant to organic solvents, e.g., glycol ether)
**Calibration:**
Basic Broad Band calibration in air from 10 MHz to 2.5 GHz
In brain and muscle simulating tissue at
Frequencies of 450 MHz, 900 MHz, 1.8 GHz and 2.45GHz (accuracy +/- 8%)
**Frequency:**
10 MHz to 3GHz; Linearity: +/-0.2 dB
(30 MHz to 3 GHz)
**Directivity:**
+/-0.2 dB in brain tissue (rotation around probe axis)
+/-0.4 dB in brain tissue (rotation normal probe axis)
**Dynamic Range:**
5 mW/g to > 100 mW/g;Linearity: +/-0.2 dB
**Optical Surface Detection:**
+/-0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces.
**Dimensions:**
Overall length: 330 mm (Tip: 16 mm)
Tip length: 16 mm
Body diameter: 12 mm (Body: 12 mm)
Tip diameter: 6.8 mm
Distance from probe tip to dipole centers: 2.7 mm
**Application:**
General dosimetric up to 3 GHz
Compliance tests of mobile phones
Fast automatic scanning in arbitrary phantoms



**Inside view of ET3DV6 E-field Probe**

### 4.2.2 SAM Phantom



**Construction:**
The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X, CENELEC 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 Phantom**

### 4.2.3 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 couldn't be used at this SAR measurement.

**Device Holder**

## SECTION 5 : Test system specifications

**Positioner**

| | |
|---|---|
| **Robot:** | Stäubli Unimation Corp. Robot Model: RX60L |
| **Repeatability:** | 0.02 mm |
| **No. of axis:** | 6 |

**Data Acquisition Electronic (DAE) System**

**Cell Controller**

| | |
|---|---|
| **Processor:** | Pentium III |
| **Clock Speed:** | 450 MHz |
| **Operating System:** | Windows 98 |
| **Data Card:** | DASY3 PC-Board |

**Data Converter**

| | |
|---|---|
| **Features:** | Signal Amplifier, multiplexer, A/D converter, and control logic |
| **Software:** | DASY3 software |
| **Connecting Lines:** | Optical downlink for data and status info.<br>Optical uplink for commands and clock |

**PC Interface Card**

| | |
|---|---|
| **Function:** | 24 bit (64 MHz) DSP for real time processing<br>Link to DAE3<br>16-bit A/D converter for surface detection system<br>serial link to robot<br>direct emergency stop output for robot |

**E-Field Probe**

| | |
|---|---|
| **Model:** | ET3DV6 |
| **Serial No.:** | 1684 |
| **Construction:** | Triangular core fiber optic detection system |
| **Frequency:** | 10 MHz to 6 GHz |
| **Linearity:** | +/-0.2 dB (30 MHz to 3 GHz) |

**Phantom**

| | |
|---|---|
| **Type:** | SAM Twin Phantom V4.0 |
| **Shell Material:** | Fiberglass |
| **Thickness:** | 2.0 +/-0.2 mm |
| **Volume:** | Approx. 20 liters |

# SECTION 6 : Test setup of EUT

## 6.1 Photographs of test setup

This EUT is operated with put on the waist. At that time , this EUT could be considered to touch or get close to their bodies. In order to assume these situation, we performed the test at the following positions. Please refer to "APPENDIX 1" for more details.

1.Front : We performed the test with front of EUT touching to the center of flat phantom.

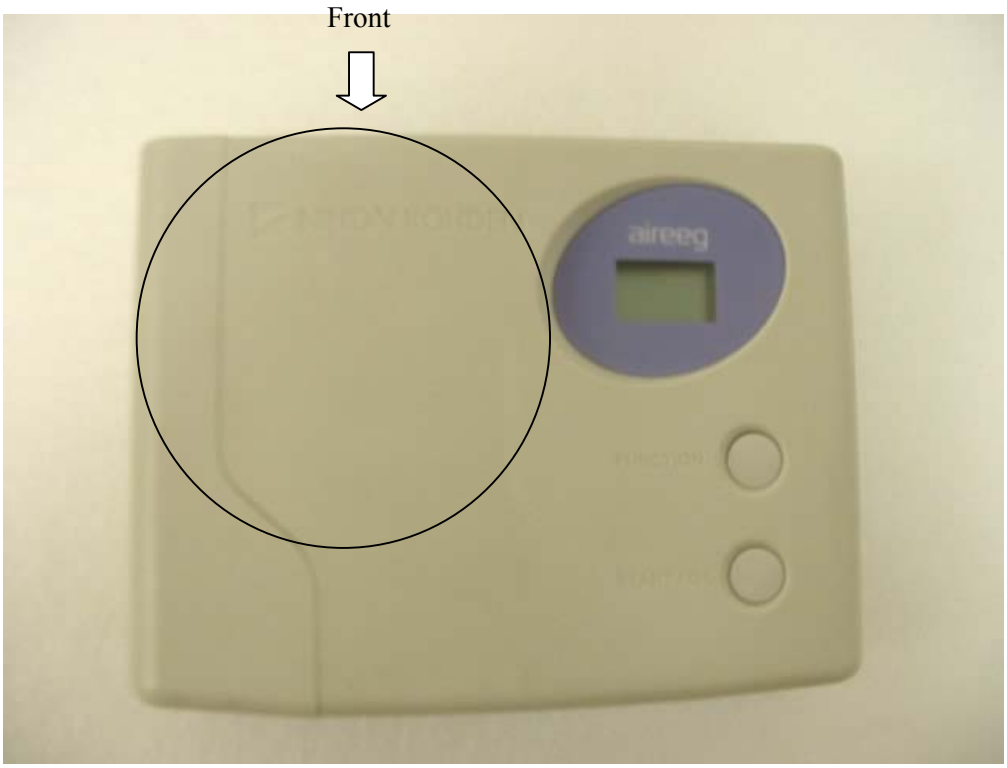
2.Back : We performed the test with Back of EUT touching to the center of flat phantom.

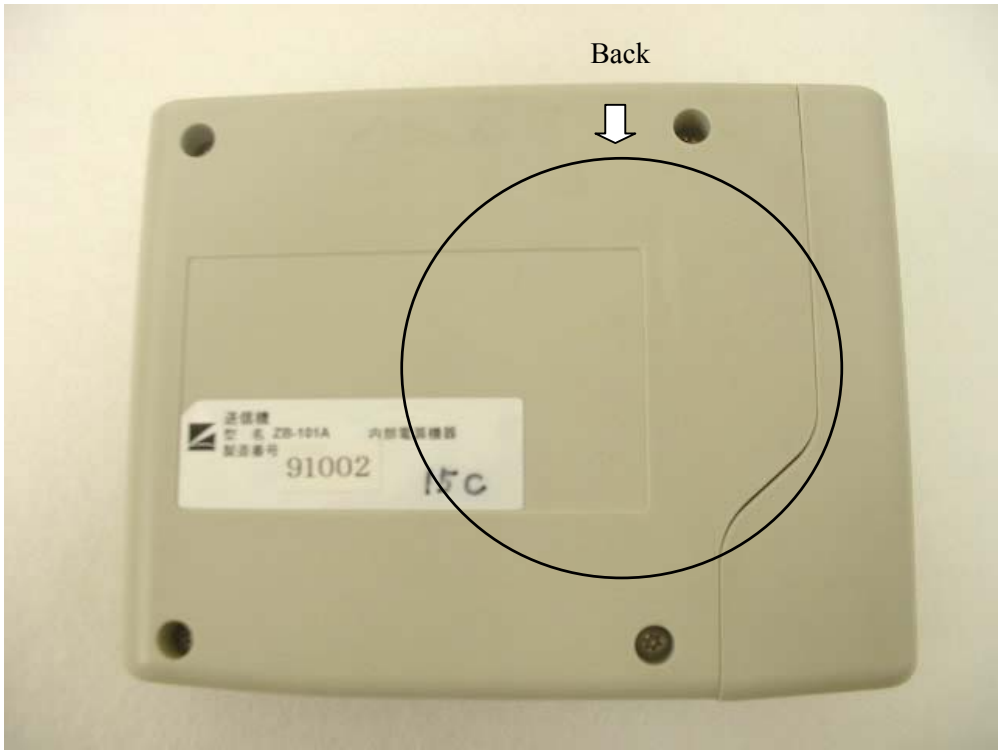
3.Left side : We performed the test with left side of EUT touching to the center of flat phantom.

4.Right side : We performed the test with right side of EUT touching to the center of flat phantom.

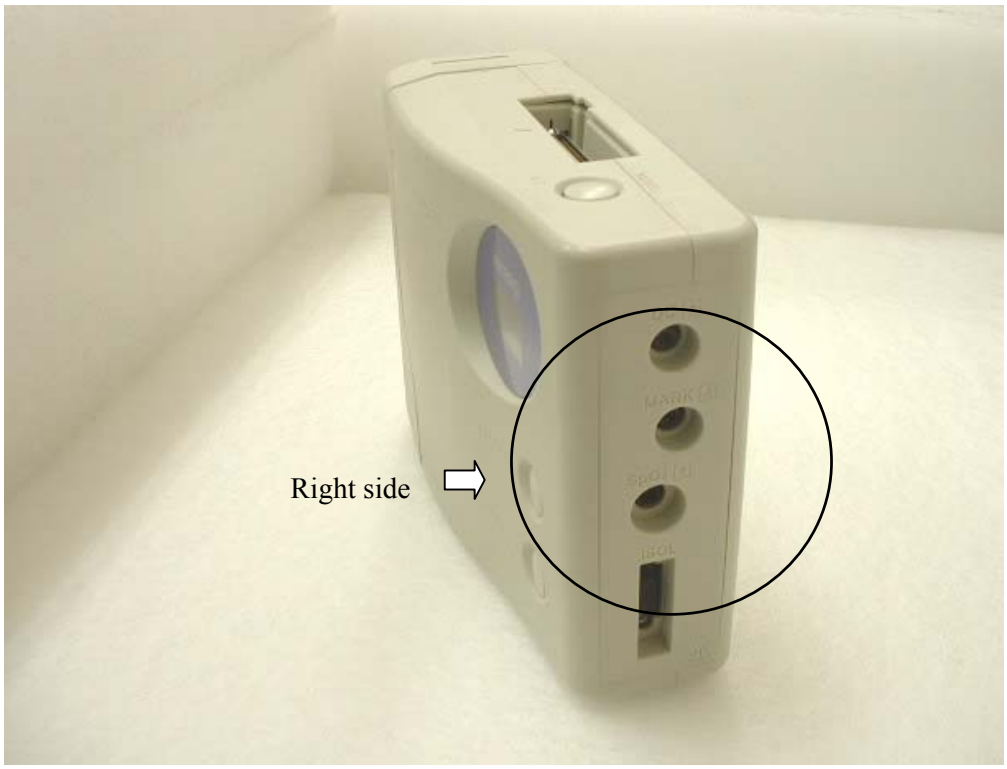
5.Top : We performed the test with top of EUT touching to the center of flat phantom.

6.Bottom : We performed the test with bottom of EUT touching to the center of flat phantom.

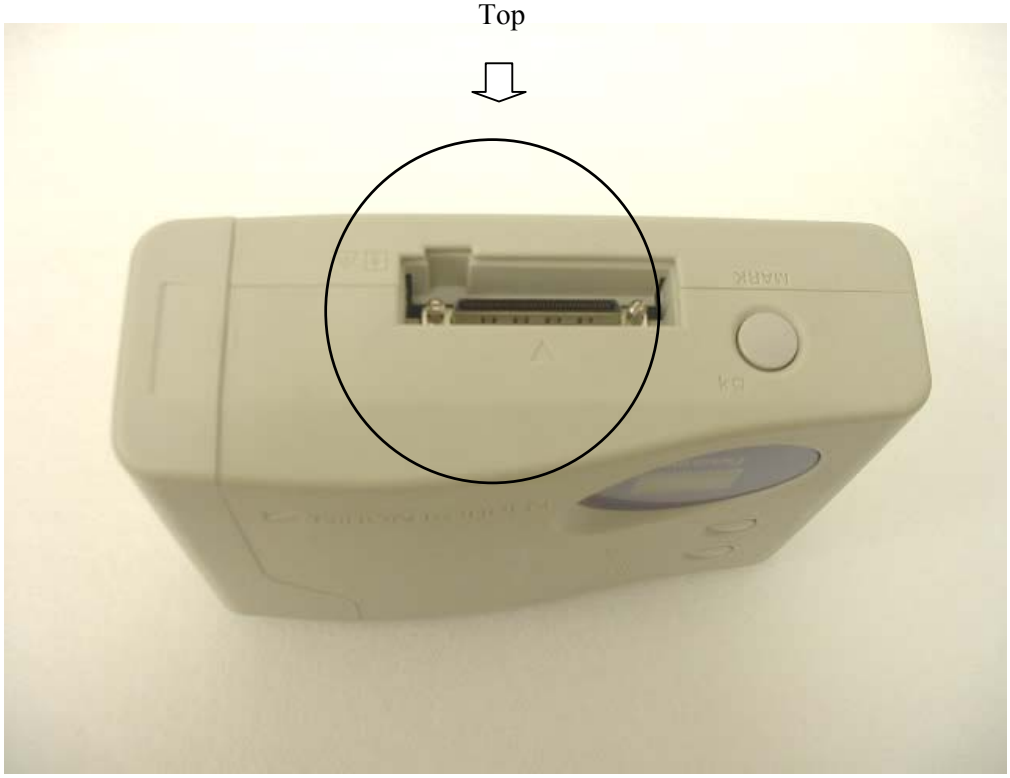


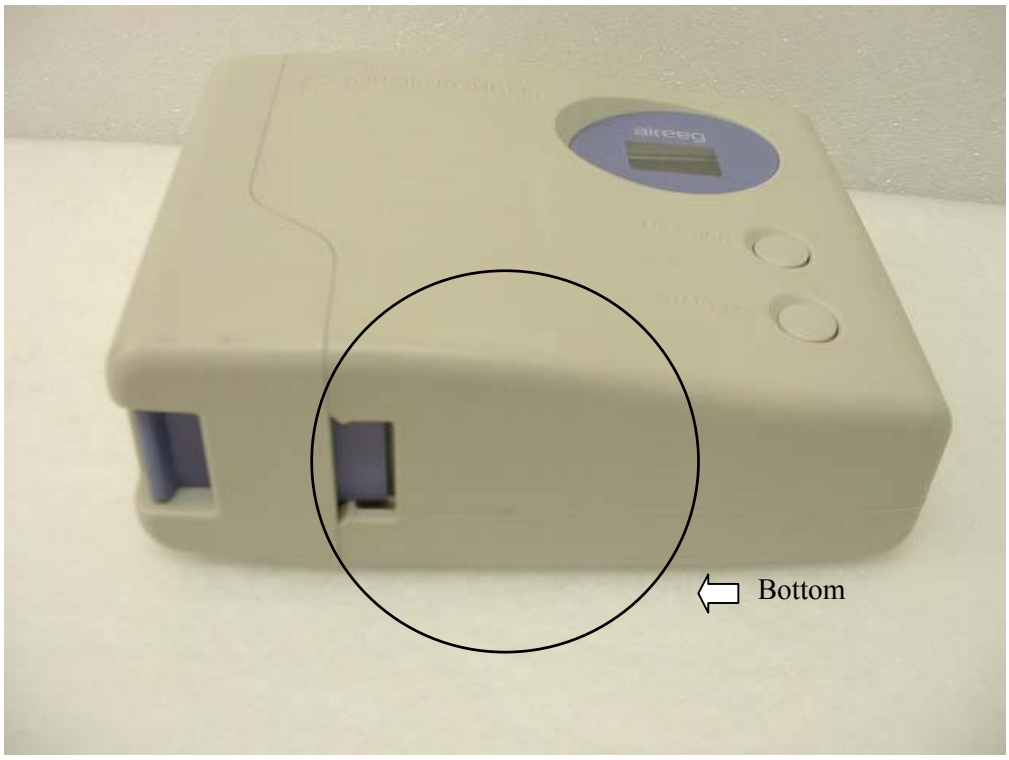

Back
91002


Left side




Top






### 6.2 EUT Tune-up procedure

In order to measure SAR value, we used continuous transmission mode. The test set up mode was prepared by manufacturer.
Value of Crest Factor = 1 was used for SAR testing according modulation (DSSS) of the EUT.
The test configuration tested at the low, middle and high frequency channels (2412MHz,2437MHz and 2462MHz) of wireless LAN.

## SECTION 7 : Measurement uncertainty

The uncertainty budget has been determined for the DASY3 measurement system according to the NIS81 [13] and the NIST1297 [6] documents and is given in the following Table.

| Error Description | Uncertainty value ± % | Probability distribution | divisor | (ci)1 1g | Standard Uncertainty (1g) | vi or veff |
|---|---|---|---|---|---|---|
| **Measurement System** | | | | | | |
| Probe calibration | ±4.8 | Normal | 1 | 1 | ±4.8 | ∞ |
| Axial isotropy of the probe | ±4.7 | Rectangular | √3 | $(1-c_p)^{1/2}$ | ±1.9 | ∞ |
| Spherical isotropy of the probe | ±9.6 | Rectangular | √3 | $(c_p)^{1/2}$ | ±3.9 | ∞ |
| Boundary effects | ±5.5 | Rectangular | √3 | 1 | ±3.2 | ∞ |
| Probe linearity | ±4.7 | Rectangular | √3 | 1 | ±2.7 | ∞ |
| Detection limit | ±1.0 | Rectangular | √3 | 1 | ±0.6 | ∞ |
| Readout electronics | ±1.0 | Normal | 1 | 1 | ±1.0 | ∞ |
| Response time | ±0.8 | Rectangular | √3 | 1 | ±0.5 | ∞ |
| Integration time | ±1.4 | Rectangular | √3 | 1 | ±0.8 | ∞ |
| RF ambient conditions | ±3.0 | Rectangular | √3 | 1 | ±1.7 | ∞ |
| Mech. constraints of robot | ±0.4 | Rectangular | √3 | 1 | ±0.2 | ∞ |
| Probe positioning | ±2.9 | Rectangular | √3 | 1 | ±1.7 | ∞ |
| Extrap. and integration | ±3.9 | Rectangular | √3 | 1 | ±2.3 | ∞ |
| **Test Sample Related** | | | | | | |
| Device positioning | ±6.0 | Rectangular | √3 | 1 | ±6.7 | 7 |
| Device holder uncertainty | ±5.0 | Rectangular | √3 | 1 | ±5.9 | 5 |
| Power drift | ±5.0 | Rectangular | √3 | 1 | ±2.9 | ∞ |
| **Phantom and Setup** | | | | | | |
| Phantom uncertainty | ±4.0 | Rectangular | √3 | 1 | ±2.3 | ∞ |
| Liquid conductivity (target) | ±5.0 | Rectangular | √3 | 0.64 | ±1.8 | ∞ |
| Liquid conductivity (meas.) | ±10.0 | Rectangular | √3 | 0.64 | ±3.7 | ∞ |
| Liquid permittivity (target) | ±10.0 | Rectangular | √3 | 0.6 | ±3.5 | ∞ |
| Liquid permittivity (meas.) | ±5.0 | Rectangular | √3 | 0.6 | ±1.7 | ∞ |
| | | | | | | |
| **Combined Standard Uncertainty** | | | | | **±14.1** | |
| **Expanded Uncertainty (k=2)** | | | | | **±28.2** | |

# SECTION 8 : Simulated tissue liquid parameter

## 8.1 Simulated Tissue Liquid Parameter confirmation

The dielectric parameters were checked prior to assessment using the HP85070A dielectric probe kit.
The dielectric parameters measured are reported in each correspondent section.

### 8.1.1 Head 2450MHz

Type of liquid : **Head 2450 MHz**
Ambient temperature (deg.c.) : **23.8**
Relative Humidity (%) : **68**
Lquid depth (cm) : **15.9**

Date : July 08,2003
Measured By : Miyo Ikuta

| DIELECTRIC PARAMETERS MEASUREMENT RESULTS | | | | | | |
|---|---|---|---|---|---|---|
| Liquid Temp [deg.c] | | Parameters | Target Value | Measured | Deviation [%] | Limit [%] |
| Before | After | | | | | |
| 23.8 | 23.8 | Relative Permittivity εr | 39.2 | 35.9 | -8.4 | +/-10 |
| | | Coductivity σ [mho/m] | 1.80 | 1.81 | 0.5 | +/-5 |

### 8.1.2 Muscle 2450MHz

Type of liquid : **Muscle 2450 MHz**
Ambient temperature (deg.c.) : **21.0**
Relative Humidity (%) : **58**
Liquid depth (cm) : **15.1**

Date : July 08,2003
Measured By : Miyo Ikuta

| DIELECTRIC PARAMETERS MEASUREMENT RESULTS | | | | | | |
|---|---|---|---|---|---|---|
| Liquid Temp [deg.c] | | Parameters | Target Value | Measured | Deviation [%] | Limit [%] |
| Before | After | | | | | |
| 21.3 | 21.3 | Relative Permittivity εr | 52.7 | 48.9 | -7.2 | +/-10 |
| | | Conductivity σ [mho/m] | 1.95 | 2.03 | +4.1 | +/-5 |

## 8.2 Simulated Tissues

| Ingredient | MiXTURE(%) | |
|---|---|---|
| | Head 2450MHz | Muscle 2450MHz |
| Water | 45.0 | 69.83 |
| DGMBE | 55.0 | 30.17 |

Note:DGMBE(Diethylenglycol-monobuthyl ether)

## SECTION 9 : System validation data

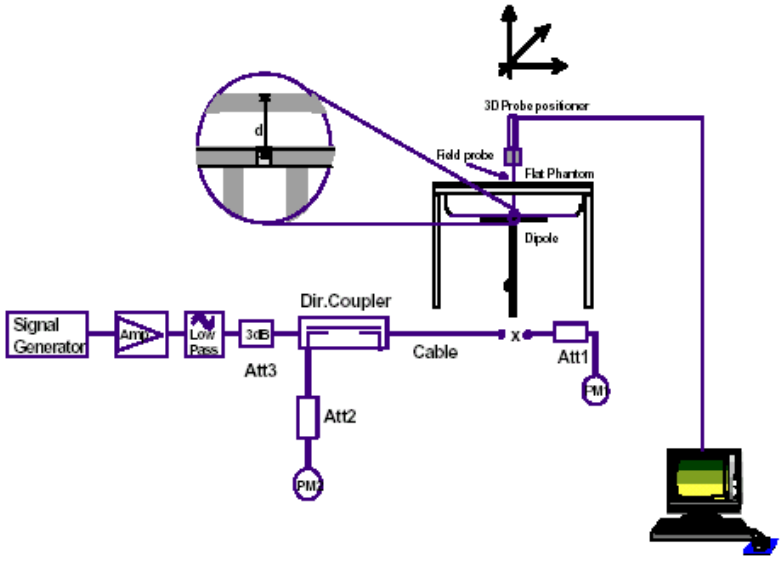
Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of +/-10%. The validation results are tabulated below. And SAR plot is attached in the APPENDIX 3. IEEE P1528 Recommended Reference Value

| | | |
|---|---|---|
| Type of liquid | : | **HEAD 2450MHz** |
| Frequency | : | **2450MHz** |
| Liquid depth (cm) | : | **15.9** |
| Ambient temperature (deg.c.) | : | **23.8** |
| Relative Humidity (%) | : | **68** |
| Dipole | : | **D2450V2 SN:713** |
| Power | : | **250mW** |

Date : July 08,2003
Measured By : Miyo Ikuta

| SYSTEM PERFORMANCE CHECK | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Liquid (HEAD 2450MHz) | | | | | | System dipole validation target & measured | | | |
| temperature (deg.c.) | | Relative Permittivity εr | | Conductivity σ [mho/m] | | SAR 1g [W/kg] | | Deviation [%] | Limit [%] |
| Before | Afterx | Target | Measured | Target | Measured | Target | Measured | | |
| 23.8 | 23.8 | 39.2 | 35.9 | 1.80 | 1.81 | 13.1 | 13.9 | +6.1 | +/-10 |

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




**Test system for the system performance check setup diagram**

**2450MHz System performance check setup**

## SECTION 10 : Evaluation procedure

**The evaluation was performed with the following procedure:**

**Step 1:** Measurement of the SAR value 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 head or 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, a volume of 32 mm x 32 mm x 30 mm was assessed by measuring 5 x5 x 7 points. 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 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm [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 SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation was repeated.

## SECTION 11 : Exposure limit

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

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

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

| Spatial Average (averaged over the whole body | Spatial Peak (averaged over any 1g of tissue) | Spatial Peak (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.

**NOTE:GENERAL POPULATION/UNCONTROLLED EXPOSURE**
**SPATIAL PEAK(averaged over any 1g of tissue) LIMIT**
**1.6 W/kg**

# SECTION 12 : SAR Measurement results

## 12.1 Conducted power measurement results

Date : July 08,2003
Measured By : Miyo Ikuta

| CONDUCTED POWER MEASUREMENT RESULTS | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Frequency [MHz] | Before | | | | | After | | | | | Deviation [%] | Limit [%] |
| | Reading [dBm] | Att. [dB] | Cable loss[dB] | Result [dBm] | Convert [mW] | Reading [dBm] | Att. [dB] | Cable loss[dB] | Result [dBm] | Convert [mW] | | |
| 2412 | 5.9 | 10 | 0.35 | 16.25 | 42.17 | 5.7 | 10 | 0.35 | 16.05 | 40.27 | -4.5 | +/-5 |
| 2437 | 5.8 | 10 | 0.35 | 16.15 | 41.21 | 5.7 | 10 | 0.35 | 16.05 | 40.27 | -2.3 | +/-5 |
| 2462 | 5.3 | 10 | 0.35 | 15.65 | 36.73 | 5.1 | 10 | 0.35 | 15.45 | 35.08 | -4.5 | +/-5 |

## 12.2 Body 2450MHz SAR

| | | | | | |
|---|---|---|---|---|---|
| Liquid Depth (cm) | : | **15.1** | Model | : | **ZB-101AA** |
| Parameters | : | $\varepsilon_r$ =**48.9**, $\sigma$ =**2.03** | Serial No. | : | **91002** |
| Ambient Temperature[deg.c.] | : | **22.8** | Modulation | : | **DSSS** |
| Relative Humidity (%) | : | **58** | Crest factor | : | **1** |

Date : July 08,2003
Measured By : Miyo Ikuta

| BODY SAR MEASUREMENT RESULTS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Frequency | | Phantom Section | EUT Set-up Conditions | | | Liquid Temp.[deg.c] | | SAR(1g) [w/kg] |
| Channel | MHz | | Antenna | Position | Separation [mm] | Before | After | |
| Mid | 2437 | Flat | Fixed | Front | 0 | 21.8 | 21.8 | **0.695** |
| Mid | 2437 | Flat | Fixed | Back | 0 | 21.8 | 21.8 | **0.0481** |
| Mid | 2437 | Flat | Fixed | Left side | 0 | 22.0 | 21.8 | **0.0162** |
| Mid | 2437 | Flat | Fixed | Right side | 0 | 21.8 | 21.6 | **0.0073** |
| Mid | 2437 | Flat | Fixed | Top | 0 | 21.6 | 21.3 | **0.0462** |
| Mid | 2437 | Flat | Fixed | Bottom | 0 | 21.3 | 21.3 | **0.0632** |
| Low | 2412 | Flat | Fixed | Front | 0 | 21.3 | 21.3 | **0.736** |
| High | 2462 | Flat | Fixed | Front | 0 | 21.3 | 21.3 | **0.429** |
| **ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population** | | | | | | **Body SAR: 1.6 W/kg (averaged over 1 gram)** | | |

## SECTION 13 : Equipment & calibration information

| Name of Equipment | Manufacture | Model number | Serial number | Calibration | |
|---|---|---|---|---|---|
| | | | | Last Cal | due date |
| Power Meter | Agilent | E4417A | GB41290639 | 2002/11/08 | 2003/11/07 |
| Power Sensor | Agilent | E9300B | US40010300 | 2002/11/14 | 2003/11/13 |
| Power Sensor | Agilent | E9327A | US40440544 | 2003/02/21 | 2004/02/20 |
| S-Parameter Network Analyzer | Agilent | 8753ES | US39174808 | 2000/10/05 | 2003/10/04 |
| Signal Generator | Rohde&Schwarz | SML03 | 100332 | 2003/06/24 | 2004/06/23 |
| RF Amplifier | OPHIR | 5056F | 1005 | 2003/02/06 | 2004/02/05 |
| Dosimetric E-Field Probe | Schmid&Partner Engineering AG | ET3DV6 | 1684 | 2002/11/20 | 2003/11/19 |
| Data Acquisition Electronics | Schmid&Partner Engineering AG | DAE3 V1 | 509 | 2003/04/10 | 2004/04/09 |
| Robot,SAM Phantom | Schmid&Partner Engineering AG | DASY3 | I021834 | N/A | N/A |
| Attenuator | Agilent. | US40010300 | 08498-60012 | 2002/12/24 | 2003/12/23 |
| Attenuator | HIROSE ELECTRIC Co.,LTD | AT-110 | - | 2003/02/04 | 2004/02/03 |
| 2450MHz System Validation Dipole | Schmid&Partner Engineering AG | D2450V2 | 713 | 2002/11/15 | 2004/11/14 |
| Dual Directional Coupler | N/A | Narda | 03702 | N/A | N/A |
| Head 2450MHz | N/A | N/A | N/A | N/A | N/A |
| Body 2450MHz | N/A | N/A | N/A | N/A | N/A |

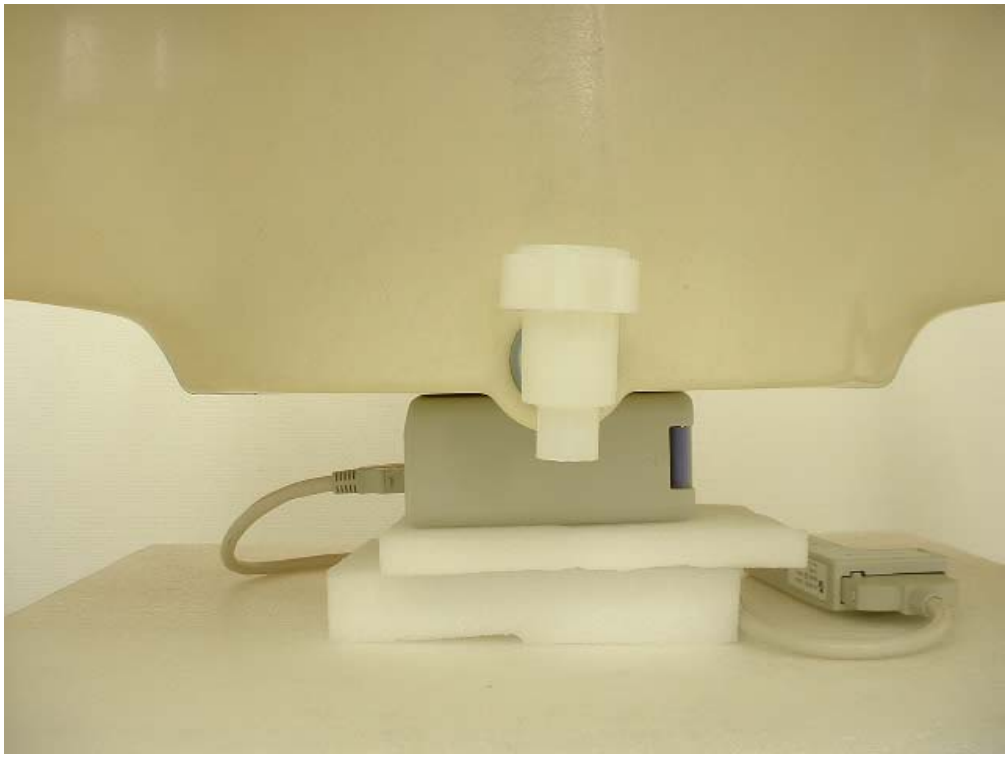
## SECTION 14 : References

[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 Recepies in C, The Art of Scientific Computing, Second Edition, Cambridge University Press, 1992.
[6] Barry N. Taylor and Christ E. Kuyatt, "Guidelines for evaluating and expressing the uncertainty of NIST measurement results", Tech. Rep., National Institute of Standards and Technology,1994.

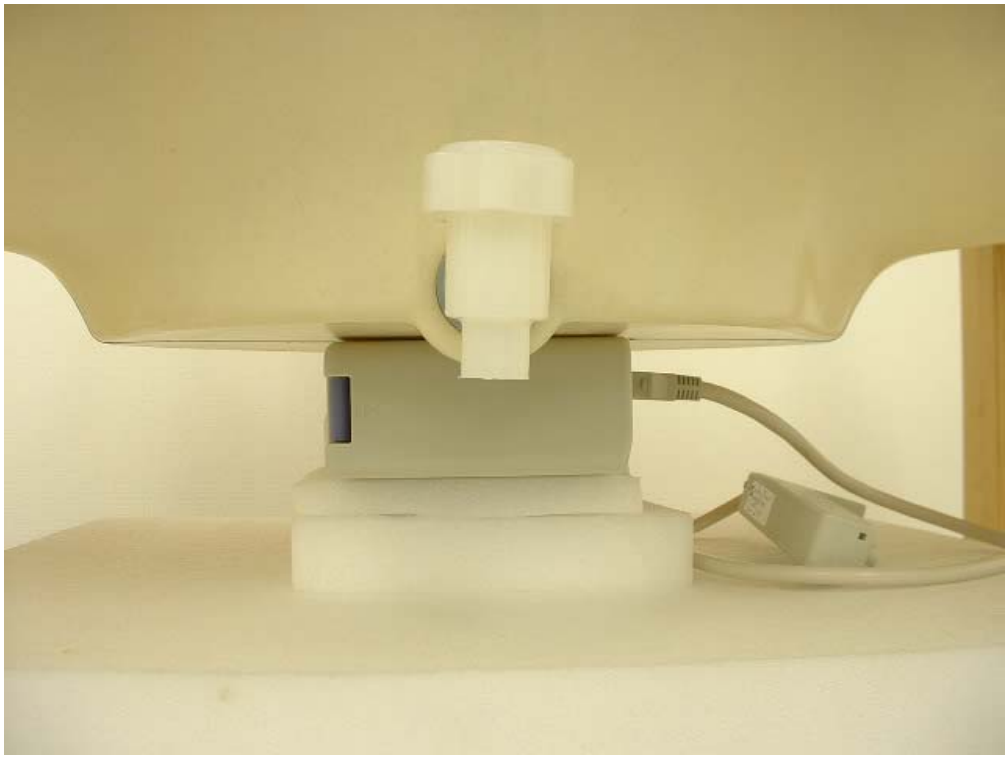
## SECTION 15 : APPENDIX

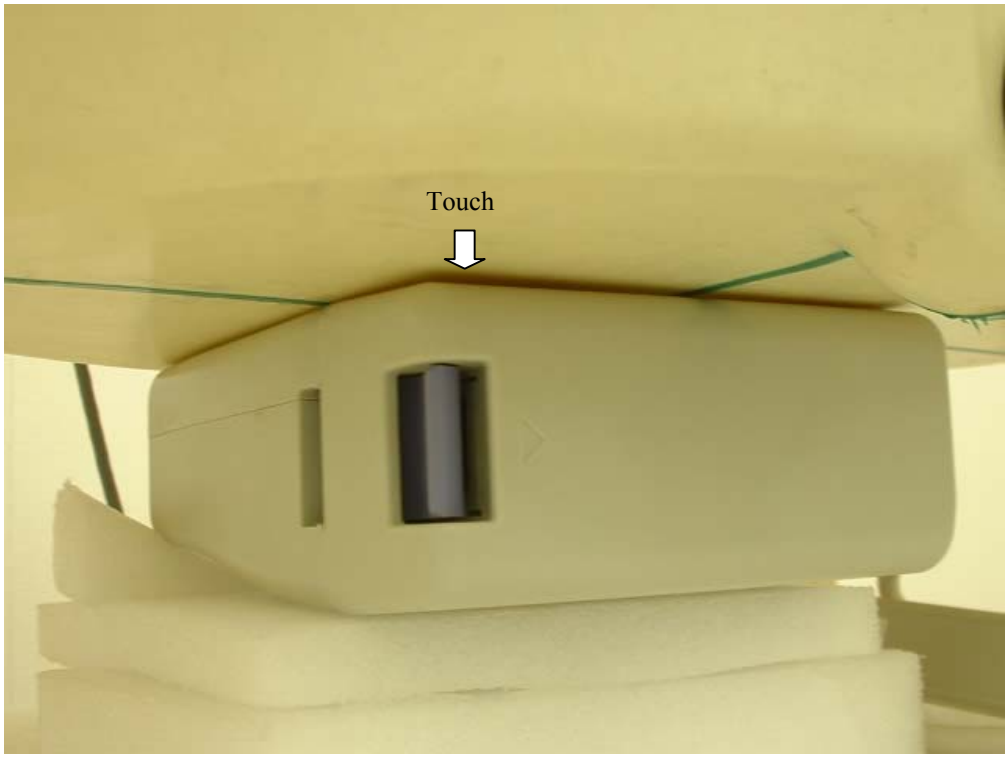
# APPENDIX 1 : Photographs of test setup

**Front**

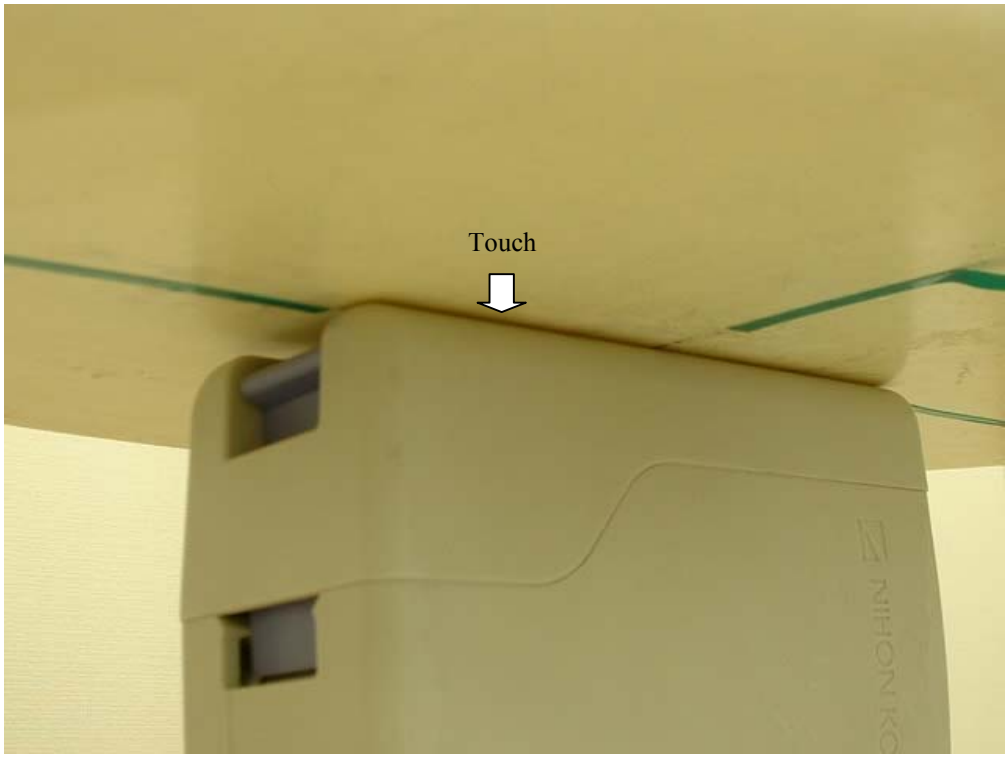


**Back**



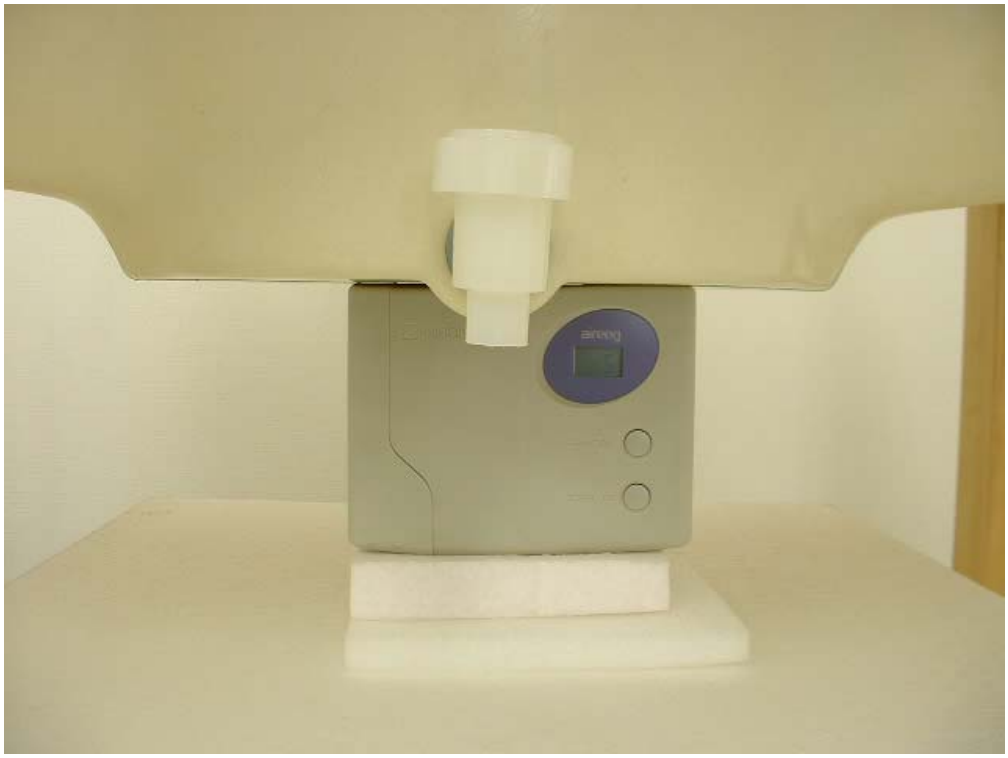


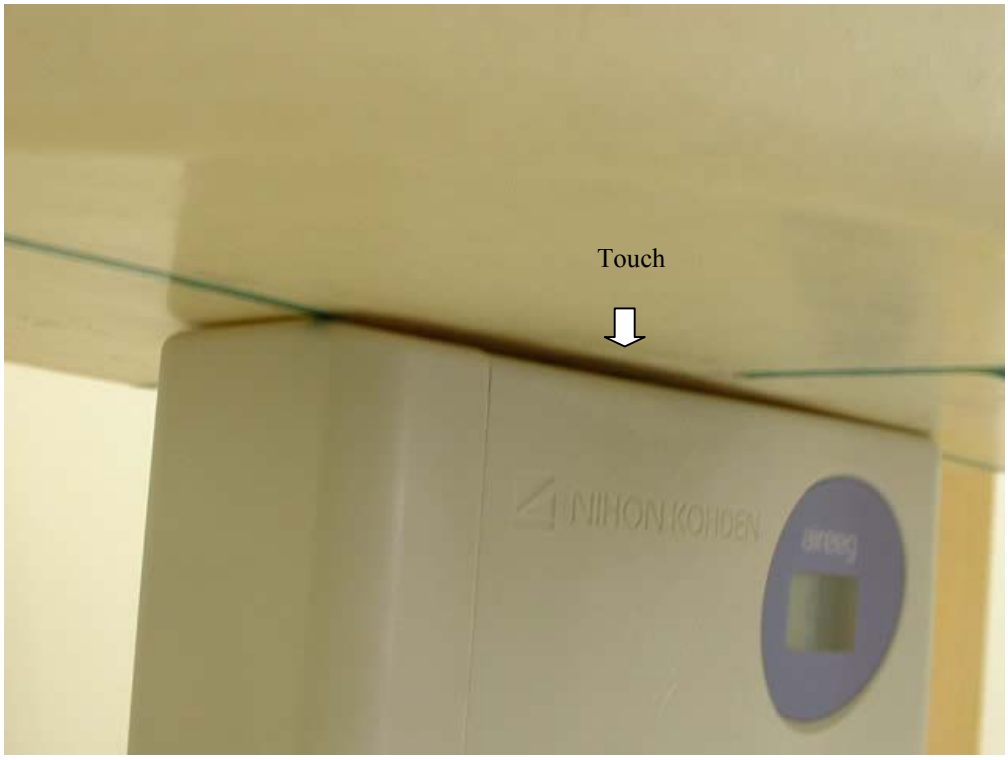
## Left Side



## Right Side

**Top**





## Bottom