SAR EVALUATION REPORT

Report No.: 26AE0214-HO-13

Applicant	:	**FUJITSU LIMITED**
Type of Equipment	:	**Personal Computer**
Model No.	:	**P1510D**
FCC ID	:	**EJE-WB0037**
Test standard	:	**FCC47CFR 2.1093** **FCC OET Bulletin 65, Supplement C**
Test Result	:	**Complied (IEEE 802.11a/b/g+Bluetooth)**

Max SAR Measured
IEEE 802.11b/g + Bluetooth : **0.337 W/kg (Body,11b 2462MHz / BT 2402MHz)**

IEEE 802.11a (5150-5350MHz Band) + Bluetooth
: **1.171 W/kg (Body, 11a 5250MHz / BT2402MHz)**

IEEE 802.11a (5725-5850MHz Band)
: **0.546 W/kg (Body, 11a 5745MHz)**

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 : August 30, 2005

Tested by :

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EMC Lab.Head Office

Approved by :

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CONTENTS PAGE

SECTION 1 : Client information......3

SECTION 2 : Equipment under test......4

SECTION 3 : Requirements for compliance testing defined by the FCC......7

SECTION 4 : Dosimetry assessment setup......7

SECTION 5 : Test system specifications......11

SECTION 6 : Test setup of EUT......12

SECTION 7 : Measurement uncertainty......16

SECTION 8 : Simulated tissue liquid parameter......17

SECTION 9 : System validation data......18

SECTION 10 : Evaluation procedure......19

SECTION 11 : Exposure limit......20

SECTION 12 : SAR Measurement results......21

SECTION 13 : Equipment & calibration information......23

SECTION 14 : References......24

APPENDIX 1 : Photographs of test setup...... 25
APPENDIX 2 : SAR Measurement data...... 30
APPENDIX 3 : Validation Measurement data...... 39
APPENDIX 4 : System Validation Dipole (D2450V2,S/N: 765)...... 41
APPENDIX 5 : Dosimetric E-Field Probe Calibration (ET3DV6,S/N: 1684)...... 51

SECTION 1 : Client information

Company Name	:	FUJITSU LIMITED
Brand Name	:	FUJITSU
Address	:	1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki 211-8588, Japan
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Contact Person	:	Tsuyoshi Uchihara

SECTION 2 : Equipment under test

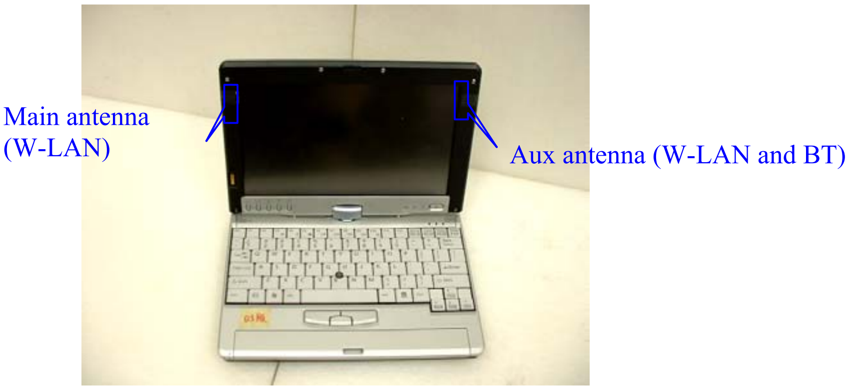
2.1 Identification of EUT

Applicant	:	FUJITSU LIMITED
Type of Equipment	:	Personal Computer
Model No.	:	P1510D
Serial No.	:	R5100002
Country of Manufacture	:	Japan
Receipt Date of Sample	:	August 29, 2005
Condition of EUT	:	Engineering prototype (Not for sale: This sample is equivalent to mass-produced items.)
Size of EUT	:	230*160*35
Category Identified	:	Portable device
Supply	:	DC16.0V / 2.5A
Battery	:	This PC (model : P1510D) has two types.

Standard Battery (Li ion Battery) Model name CP229720 Serial No. Pippin_Battery_3_01 V / mAh 10.8Vdc / 2600mAh	
Option Battery(Li ion Battery) Model name CP229725 Serial No. Pippin_Battery_6_01 V / mAh 10.8Vdc / 5200mAh	

Photografhs of EUT

Note type use



Tablet type use

2.2 Product description of EUT

This EUT has IEEE802.11 a/b/g module which consists of 2.4GHz and 5GHz in the same chip, and the other module is Bluetooth.
Main antenna is used in the W-LAN(IEEE802.11 a/b/g) modes, Aux antenna is used in the W-LAN(IEEE802.11 a/b/g) and Bluetooth.

2.3 Product description of Wireless LAN module

This Wireless LAN module has IEEE.802.11a/b/g.

The description only of the IEEE.802.11 b/g modes are shown below.

Tx Frequency	: 2412-2462MHz (802.11b/g)
Modulation	: DSSS,OFDM
Rating	: DC3.3V
Max.Output Power Tested	: 20.36 dBm Peak Conducted

The description only of the IEEE.802.11a mode is shown below.

Tx Frequency	: 5180-5320MHz (5150-5250MHz & 5250-5350MHz Band) 5745-5825MHz (5725-5850MHz Band)
Modulation	: OFDM
Rating	: DC3.3V
Max.Output Power Tested (5210MHz)	: 13.34 dBm Peak Conducted
Max.Output Power Tested (5745MHz)	: 20.03 dBm Peak Conducted

2.3.1 Product description of Antenna (Main antenna and Aux antenna)

Antenna Type	: Monopole Antenna(M/N:YCE-5008)
Antenna Connector	: U.FL
Antenna Gain	: 2.4GHz(Max.) Main -4.78dBi, Aux -1.49dBi 5GHz(Max.) Main 0.90dBi, Aux -0.97dBi (These antenna gains are values in which antenna were mounted to the PC.)

2.4 Product description of Bluetooth module

Tx Frequency	: 2402-2480MHz (Bluetooth)
Modulation	: FHSS
Rating	: DC3.3V
Max.Output Power Tested	: 11.32 dBm Peak Conducted

2.4.1 Product description of Antenna(Aux antenna)

Antenna Type	: Monopole Antenna(M/N:YCE-5008)
Antenna Connector	: U.FL
Antenna Gain	: Aux -1.49dBi (These antenna gains are values in which antenna were mounted to the PC.)

SECTION 3 : Requirements for compliance testing defined by the FCC

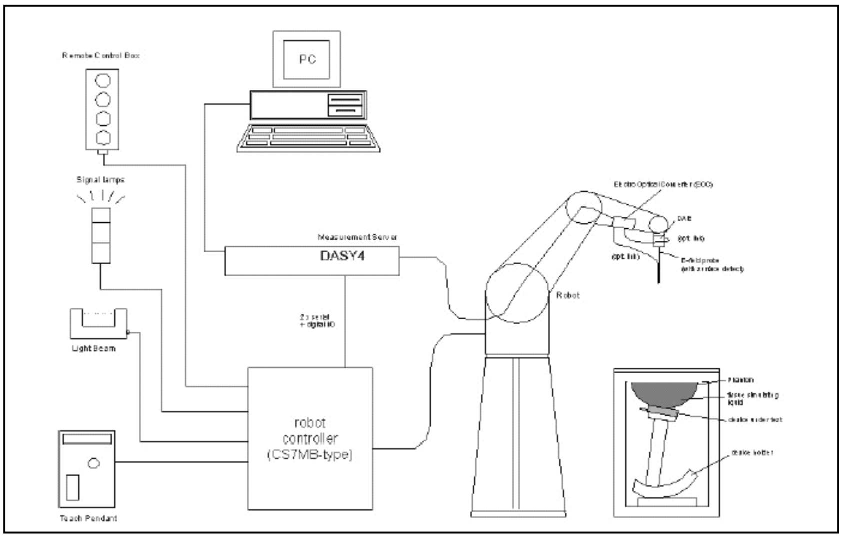
The US Federal Communications Commission has released the report and order "Guidelines for Evaluating the Environmental Effects of RF Radiation", ET Docket No. 93-62 in August 1996. The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable 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 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 +/- 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, IEEE P1528 and CENELEC EN50361.

4.1 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.

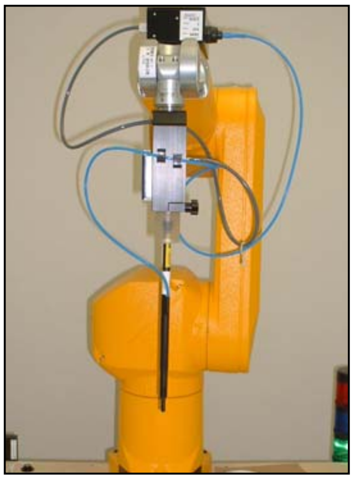
11. The device holder for handheld mobile phones.

12. Tissue simulating liquid mixed according to the given recipes.

13. Validation dipole kits allowing to validate the proper functioning of the system.

4.2 System components

4.2.1 ET3DV6 Probe Specification

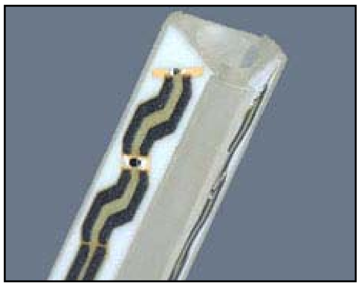


Construction:
Symmetrical design with triangular core
Built-in optical fiber for surface detection System
Built-in shielding against static charges
PEEK enclosure material (resistant to organic solvents, e.g., glycol ether)

Calibration:
Conversion Factors (CF) for
900MHz, 1800MHz and 2450MHz (Head and Body)

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)



ET3DV6 E-field Probe

Dynamic Range:
5 mW/g to > 100 mW/g;Linearity: +/-0.2 dB

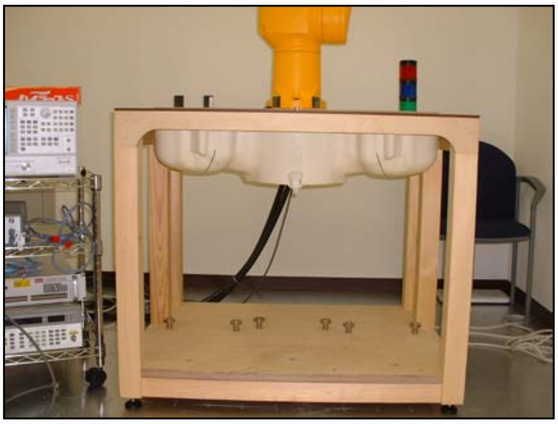
Optical Surface Detection:
+/-0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces.

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

4.2.2 SAM Twin Phantom



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

4.2.3 Device Holder for Transmitters

Device Holder

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.

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SECTION 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+
Manuafacture	:	Stäubli Unimation Corp. Robot Model: RX60

DASY4 Measurement server

Features	:	166MHz low power Pentium MMX 32MB chipdisk and 64MB RAM Serial link to DAE (with watchdog supervision) 16 Bit A/D converter for surface detection system Two serial links to robot (one for real-time communication which is supervised by watchdog) Ethernet link to PC (with watchdog supervision) 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 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 µV to > 200 mV (16 bit resolution and two range settings: 4mV, 400mV)
Input Offset voltage	:	< 1 µV (with auto zero)
Input Resistance	:	200 MΩ
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	:	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)
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

SECTION 6 : Test setup of EUT

6.1 Photographs of test setup

When users operate or carry this EUT, it could be considered to touch or get close to their bodies.
This EUT can be used also as a Tablet PC. In order to assume these situations, we performed the test at the following positions. Please refer to "APPENDIX 1" for more details.

1. Bluetooth Front : The test was performed in touch with Bluetooth front to the flat section of SAM twin phantom.

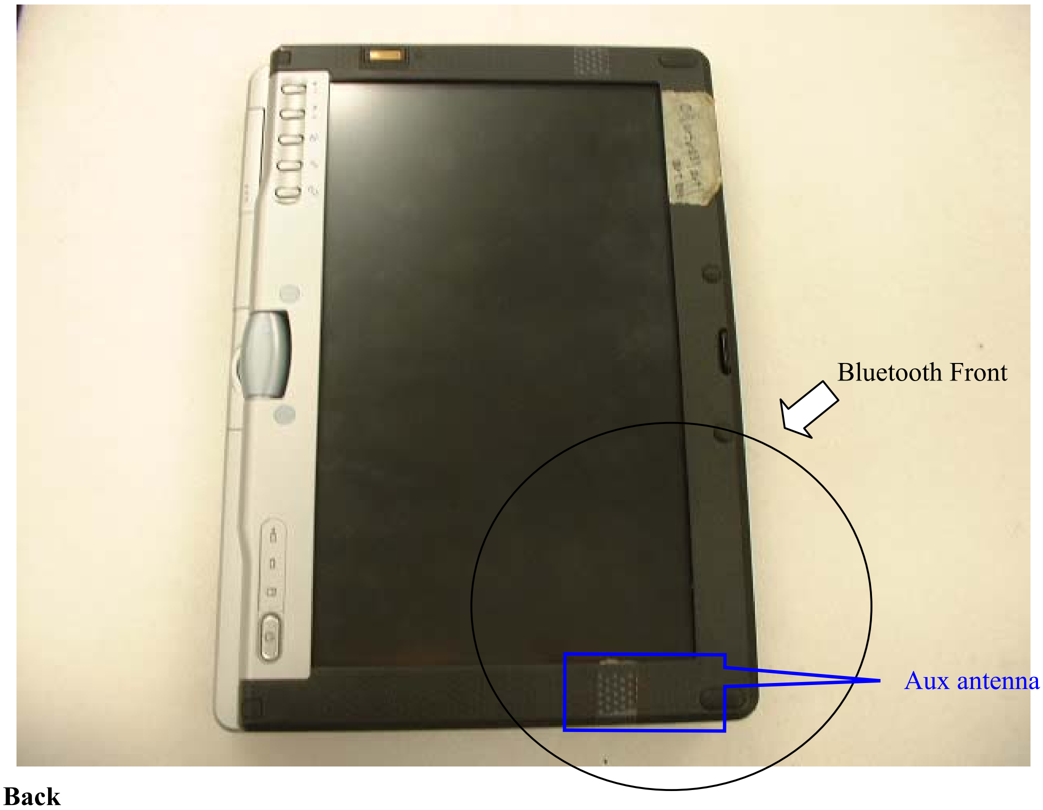
2. Bluetooth Back : The test was performed in distanced 15mm with Bluetooth back to the flat section of SAM twin phantom.

3. Bluetooth Bottom : The test was performed in touch with Bluetooth bottom to the flat section of SAM twin phantom.

4. Bluetooth Side : The test was performed in touch with Bluetooth side to the flat section of SAM twin phantom.

“Front”and “ Side” positions are assumed when users operate in the tablet type use.
When users operate or carry this EUT, it is can be touched to the user’s Body. Therefore,”Front”and “Side” positions were tested in the touch to the phantom.
However, “Back” position is assumed when users operate in the note type use. Therefore “Back” position was tested in the distance15mm from the phantom.

Bluetooth Front



Bluetooth Back

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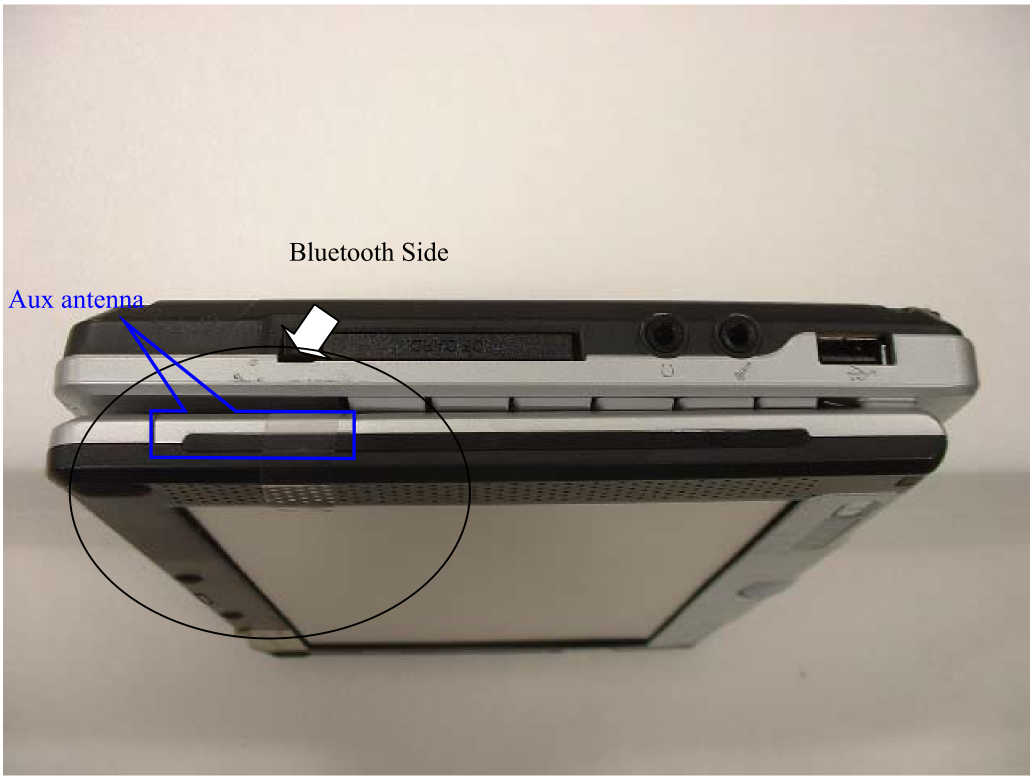
Bluetooth Bottom

Bluetooth Side



6.2 EUT Tune-up procedure

This EUT has Bluetooth.
The frequency range and the modulation used in this test are shown as a following.

Bluetooth
TX Frequency : 2402-2480MHz
Channel : 1ch(2402MHz),40ch(2441MHz),79ch(2480MHz)
Modulation : GFSK,FHSS [DH5]
Crest factor : 1

6.3 Method of measurement

Bluetooth

Step1. The searching for the worst position

Step2. The changing to the channels
This test was performed at the worst position of Step1.

Step3. The changing to the Hopping On
This test was performed at the worst position of Step1

SECTION 7 : Measurement uncertainty

7.1 Uncertainty of Bluetooth mode testing

The uncertainty budget has been determined for the DASY4 measurement system according to SPEAG documents [7] 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	±1.0	Rectangular	√3	1	±0.6	∞
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	±2.6	Rectangular	√3	1	±1.5	∞
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	±1.0	Rectangular	√3	1	±0.6	∞
Test Sample Related						
Device positioning	±2.9	Rectangular	√3	1	±2.9	6
Device holder uncertainty	±3.6	Rectangular	√3	1	±3.6	3
Power drift	±10.0	Rectangular	√3	1	±5.8	∞
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.)	±5.0	Normal	1	0.64	±3.2	∞
Liquid permittivity (target)	±5.0	Rectangular	√3	0.6	±1.7	∞
Liquid permittivity (meas.)	±5.0	Normal	1	0.6	±3.0	∞
Combined Standard Uncertainty					**±12.057**	
Expanded Uncertainty (k=2)					**±24.1**	

The test result shows that the power drift exceeded ±5%. Therefore, the uncertainty of power drift expanded to ±10%.(Refer to the APPENDIX 6) However, the extended uncertainty (k= 2) of a test is less than 30%.

SECTION 8 : Simulated tissue liquid parameter

8.1 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.

8.2 Head 2450 MHz

Type of liquid : **Head 2450 MHz**
Ambient temperature (deg.c.) : **24.8**
Relative Humidity (%) : **63**
Lquid depth (cm) : **15.2**

DIELECTRIC PARAMETERS MEASUREMENT RESULTS								
Date	Frequency	Liquid Temp [deg.c]		Parameters	Target Value	Measured	Deviation [%]	Limit [%]
		Before	After					
23-Aug	2450	24.6	24.6	Relative Permittivity εr	39.2	37.5	-4.3	+/-5
				Coductivity σ [mho/m]	1.80	1.89	5.0	+/-5

8.3 Muscle 2450 MHz

Type of liquid : **Muscle 2450 MHz**
Ambient temperature (deg.c.) : **24.8**
Relative Humidity (%) : **63**
Lquid depth (cm) : **15.2**

DIELECTRIC PARAMETERS MEASUREMENT RESULTS								
Date	Frequency	Liquid Temp [deg.c]		Parameters	Target Value	Measured	Deviation [%]	Limit [%]
		Before	After					
23-Aug	2450	24.6	24.6	Relative Permittivity εr	52.7	50.9	-3.4	+/-5
				Coductivity σ [mho/m]	1.95	1.95	0.0	+/-5

8.4 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)

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 in the table below.Please refer to APPENDIX 3.

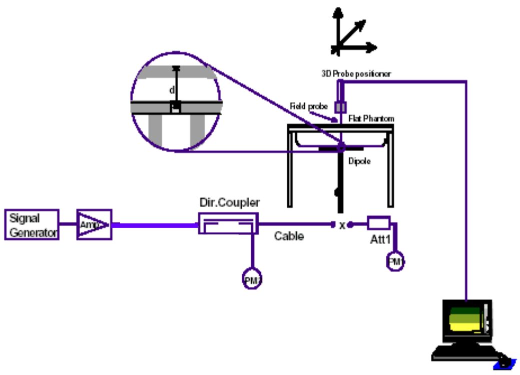
9.1 System validation of 2450MHz

Type of liquid	:	**HEAD 2450MHz**
Ambient temperature (deg.c.)	:	**24.8**
Relative Humidity (%)	:	**63**
Lquid depth (cm)	:	**15.2**
Dipole	:	**D2450V2 SN:765**
Power	:	**250mW**

SYSTEM PERFORMANCE CHECK										
Date	Liquid (HEAD 2450MHz)						System dipole validation target & measured			
	Liquid Temp [deg.c.]		Relative Permittivity εr		Conductivity σ [mho/m]		SAR 1g [W/kg]		Deviation [%]	Limit [%]
	Before	After	Target	Measured	Target	Measured	Target	Measured		
30-Aug	24.6	24.6	39.2	37.5	1.80	1.89	13.1	14.0	6.9	+/-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 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 32 mm x 32 mm x 30 mm 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 2.7 mm 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.

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 Colocation of SAR value

There is around 21~22cm separation between Main antenna in IEEE 802.11a/b/g transmission and Aux antenna in Bluetooth transmission.
The SAR value is high in Bluetooth, and there might be any influence from Aux antenna in Bluetooth transmission. Therefore, as the worse case, the maximum SAR value of EUT is calculated by adding maximum SAR values of IEEE 802.11a/b/g and Bluetooth as shown below:

Max. SAR value = Max. SAR value (IEEE 802.11a/b/g) ＋ Max. SAR value (Bluetooth)

12.2 Result of Max. SAR value

Max. SAR Measured (IEEE 802.11b/g + Bluetooth) *1 : **0.337 W/kg**
=0.216(from test report :26AE0214-HO-5) + 0.121 (this report)

Max. SAR Measured (IEEE 802.11a + Bluetooth) *1
(5150-5350MHz Band) : 1.171 W/kg
=1.05(from test report No.26AE0214-HO-6) + 0.121(this report)

(5725-5850MHz Band) : 0.546 W/kg (Aux antenna) *1*2
(Data was quoted from test report : 26AE0214-HO-6)

*1
Aux antenna has the switching function from IEEE 802.11a/b/g to Bluetooth in Bluetooth transmission.
The SAR values of Aux antenna in IEEE 802.11a/b/g and Aux antenna in Bluetooth are not summed up, because Aux antenna cannot transmit IEEE 802.11a/b/g and Bluetooth simultaneously.

*2
In IEEE802.11a SAR test, the maximum SAR value of Aux antenna in IEEE 802.11a is higher than the sum of the maximum SAR values of Main antenna in IEEE 802.11a and Aux antenna in Bluetooth.

12.3 Only Bluetooth SAR test result

12.3.1 Conducted power of Bluetooth

[Bluetooth]						
Ch	Freq. [MHz]	S/A Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Converted [mW]
Low	2402.0	6.88	1.46	2.93	11.27	13.39
Mid	2441.0	6.97	1.43	2.92	11.32	13.55
High	2479.9	6.88	1.38	2.88	11.14	13.01

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

12.3.2 Body 2450MHz SAR of Bluetooth

Liquid Depth (cm)	:	**15.2**	Model	:	**P1510D**
Parameters	:	ε_r =**50.9** σ =**1.95**	Serial No.	:	**R5100002**
Ambient temperature (deg.c.)	:	**24.8**	Modulation	:	**GFSK,FHSS**
Relative Humidity (%)	:	**63**	Crest factor	:	**1**
Date	:	**August 30**	Measured By	:	**Miyo Ikuta**

BODY SAR MEASUREMENT RESULTS OF BLUETOOTH										
Frequency			Modulation	Phantom Section	EUT Set-up Conditions			Liquid Temp.[deg.c]		SAR(1g) [W/kg]
Mode	Channel	[MHz]			Antenna	Position	Separation [mm]	Before	After	Maximum value of multi-peak
Bluetooth	**Step 1 Position search**									
	Mid	2441	GFSK (Hopping OFF)	Flat	Aux	Bluetooth Front	0	24.6	24.6	**0.103**
	Mid	2441	GFSK (Hopping OFF)	Flat	Aux	Bluetooth Back	15	24.4	24.3	**0.00864**
	Mid	2441	GFSK (Hopping OFF)	Flat	Aux	Bluetooth Bottom	0	24.6	24.6	**0.00127**
	Mid	2441	GFSK (Hopping OFF)	Flat	Aux	Bluetooth Side	0	24.6	24.6	**0.111**
	Step 2 Frequency Change									
	Low	2402	GFSK (Hopping OFF)	Flat	Aux	Bluetooth Side	0	24.6	24.5	**0.121**
	High	2480	GFSK (Hopping OFF)	Flat	Aux	Bluetooth Side	0	24.4	24.4	**0.104**
	Step 3 Hopping ON									
	-	-	FHSS (Hopping ON)	Flat	Aux	Bluetooth Side	0	24.4	24.4	**0.114**

SECTION 13 : Equipment & calibration information

Name of Equipment	Manufacture	Model number	Serial number	Calibration	
				Last Cal	due date
Power Meter	Agilent	E4417A	GB41290639	2004/11/09	2005/11/08
Power Sensor	Agilent	E9300B	US40010300	2004/11/15	2005/11/14
Power Sensor	Agilent	E9327A	US40440576	2004/11/23	2005/11/22
Spectrum Analyzer	Agilent	E4448A	MY44020357	2005/06/03	2006/06/02
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	TSJ	TCBP0206	-	2005/02/24	2006/02/23
Dosimetric E-Field Probe	Schmid&Partner Engineering AG	ET3DV6	1684	2004/09/02	2005/09/01
Data Acquisition Electronics	Schmid&Partner Engineering AG	DAE3	516	2005/03/10	2006/03/09
Robot,SAM Phantom	Schmid&Partner Engineering AG	DASY4	I021834	N/A	N/A
Attenuator	Agilent	US40010300	08498-60012	2004/12/16	2005/12/15
Attenuator	Orient Microwave	BX10-0476-00	-	2005/03/16	2006/03/15
Microwave Cable (Conducted cable)	Suhner	SUCOFLEX 104	233011/4	2005/02/03	2006/02/02
Microwave Cable (Conducted cable)	Hirose Electric	U.FL-2LP-066-A-(200)	-	2005/07/22	2006/07/21
2450MHz System Validation Dipole	Schmid&Partner Engineering AG	D2450V2	765	2004/11/15	2005/11/14
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
Ambient Noise <0.012W/kg	SAR room	-	-	2005/8/30	-

SECTION 14 : References

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[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.
[7] SPEAG documents Uncertainty document for DASY4 System from SPEAG(Shimid & Partner Engineering AG)