SAR EVALUATION REPORT

Report No. : 25BE0174-HO-1

Applicant	:	**Nikon Corporation**
Type of Equipment	:	**Wireless Transmitter**
Model No.	:	**WT-2A**
FCC ID	:	**CGJWT02**
Test standard	:	**FCC47CFR 2.1093** **FCC OET Bulletin 65, Supplement C**
Test Result	:	**Complied**
Max SAR Measured	:	**0.267 W/kg (Head, 2462MHz)**

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 : November 09,10 and 14

Tested by :

Miyo Ikuta
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SECTION 1 : Client information

Company Name	:	Nikon Corporation
Brand Name	:	Nikon
Address	:	1-6-3, Nishi-ohi, Shinagawa-ku Tokyo 146-8601, Japan
Telephone Number	:	+81-3-3773-8395
Facsimile Number	:	+81-3-3773-8112
Contact Person	:	Kenji Ishizuki

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

2.1 Identification of E.U.T.

Applicant	:	Nikon Corporation
Type of Equipment	:	Wireless Transmitter
Model No.	:	WT-2A
Serial No.	:	230001
Country of Manufacture	:	JAPAN
Receipt Date of Sample	:	November 5, 2004
Condition of EUT	:	Production model
Rating	:	DC 13.5 V / 0.25 A
Category Identified	:	Portable device

2.2 Product Description of EUT

Tx Frequency	:	2412MHz~2462MHz
Modulation	:	DSSS, OFDM
Max.Output Power Tested	:	11.96 dBm Peak Conducted
Rating (Inner)	:	DC 3.3V
Size of EUT	:	65 * 147 * 35 mm (L*W*H)
Antenna Type	:	1/4λ monopole Antenna (Nomal Antenna) 3/2λ Co-liner Antenna (Option Antenna)
Antenna Gain	:	-1.5dBi（Normal Antenna） 4.0dBi（Option Antenna）
Size of antenna	: :	10 * 29 * 19 mm (L*W*H)（Normal Antenna） Length 22cm / Diamete 7mm (Option Antenna)
Position of Antenna	:	See photographs of the following

2.3 Information of the host device

Type of Equipment	:	Digital Camera
Model No.	:	D2H
Serial No.	:	2625373
Manufacture	:	Nikon

The normal antenna attached

The option antenna attached

SECTION 3 : Requirements for compliance testing defined by the FCC

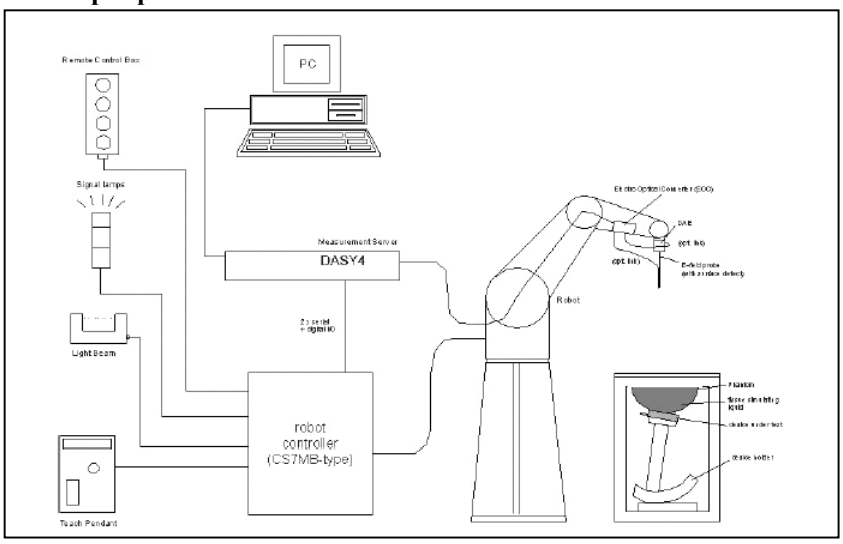
The US Federal Communications Commission has released the report and order “Guidelines for Evaluating the Environmental Effects of RF Radiation", ET Docket No. 93-62 in August 1996. The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable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

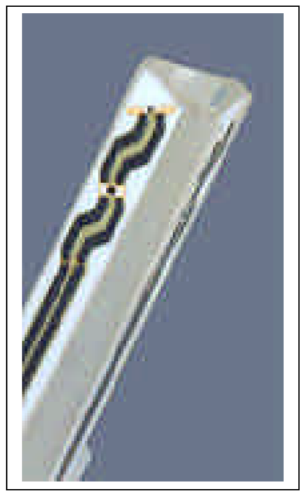
13. Validation dipole kits allowing to validate the proper functioning of the system.

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:
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%)



Inside view of ET3DV6 E-field Probe

Frequency:
10 MHz to 3GHz; Linearity: +/-0.2 dB

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

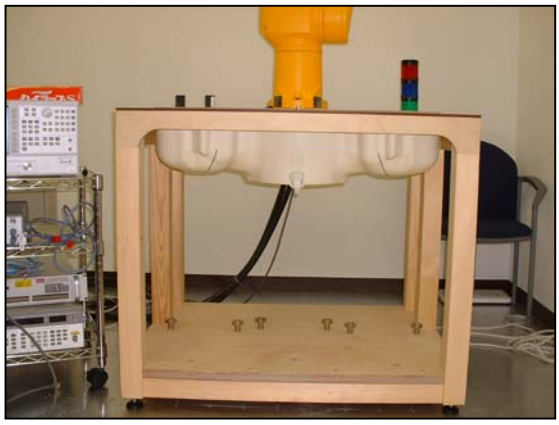
Optical Surface Detection:
+/-0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces.

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

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 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 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

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.	:	4.1
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
Manufacture	:	Schimid & Partner Engineering AG

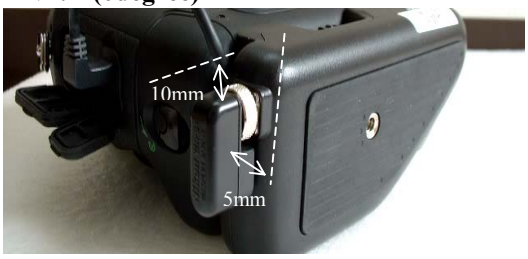
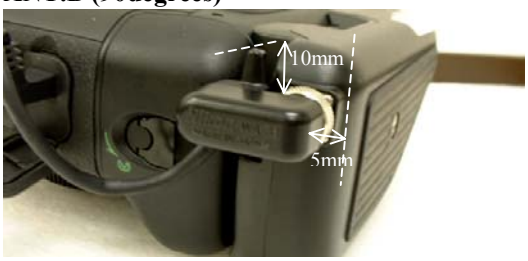
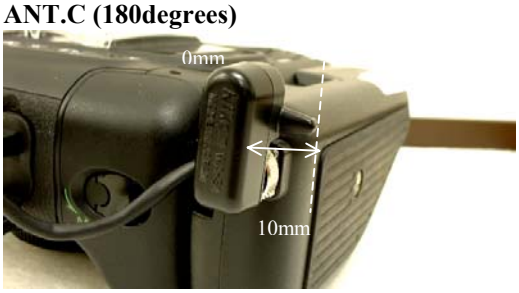
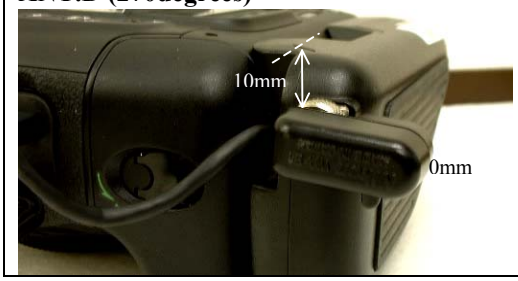
Phantom

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

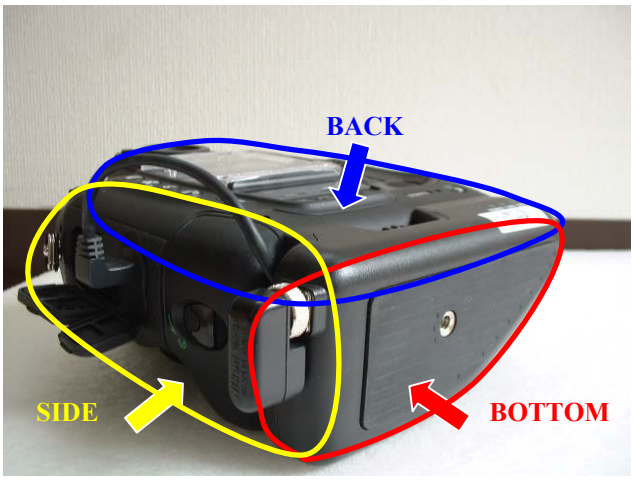
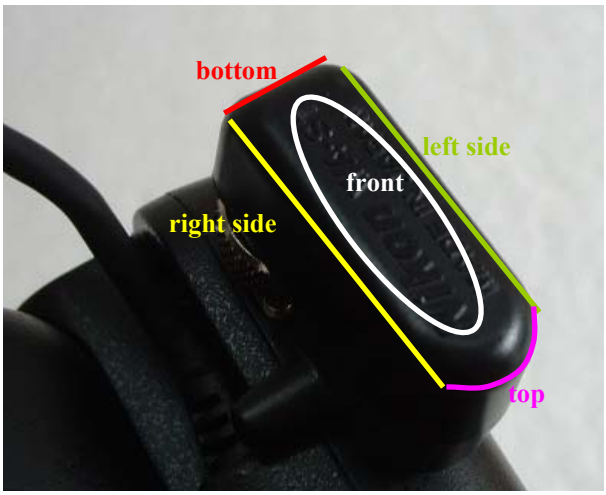
SECTION 6 : Test setup of EUT

6.1 Nomal antenna position

This antenna of EUT can rotate at 0 - 270 degrees (ANT.A ~ ANT.D).
"ANT.A" (0 degree) is an original station.

Setup of nomal antenna				
Rotate type of nomal antenna	Camera position	Antenna Position	Separation	
ANT.A (0degree) 	BACK	bottom	10mm	Tested
	BOTTOM	left side	5mm	Tested
	SIDE	front	0mm	Tested
ANT.B (90degrees) 	BACK	right side	10mm	Tested
	BOTTOM	bottom	5mm	Tested
	SIDE	front	0mm	- *1
ANT.C (180degrees) 	BACK	top	0mm	Tested
	BOTTOM	right side	10mm	- *2
	SIDE	front	0mm	- *1
ANT.D (270degrees) 	BACK	left side	10mm	- *3
	BOTTOM	top	0mm	- *4
	SIDE	front	0mm	- *1

*1: This setup was not tested because it was the same arrangement as a setup of ANT.A/SIDE/(front).
*2: This setup was not tested because it was the same arrangement as a setup of ANT.B/BACK/(right side).
*3: This setup was not tested because the arrangement of ANT.A/BOTTOM/(left side) was set to the worst conditions.
*4: This setup was not tested because it was the same arrangement as a setup of ANT.C/BACK/(top).

Camera position	Nomal antenna position
	

ANT.A _BACK

ANT.A _ BOTTOM

ANT.A _SIDE

ANT.B _BACK

ANT.B _BOTTOM

ANT.C_BACK

6.2 Option antenna position

Setup of Option Antenna		
Photo of option antenna	Antenna Position	Separation
	Side	0mm
	Top	0mm

7.3 EUT Tune-up procedure

This EUT has IEEE.802.11b/11g modes.
The frequency range and the modulation were used in the testing of each mode are shown as the following.

1. IEEE 802.11b mode
Frequency band : 2412-2462MHz
Channel : 1ch(2412MHz),6ch(2437MHz),11ch(2462MHz)
Modulation : DSSS(CCK)
Crest factor : 1

2. IEEE 802.11g mode
Frequency band : 2412-2462MHz
Channel : 1ch(2412MHz),6ch(2437MHz),11ch(2462MHz)
Modulation : OFDM(64QAM & QPSK)
Crest factor : 1

SECTION 7 : Measurement uncertainty

The uncertainty budget has been determined for the DASY4 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	±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	74
Device holder uncertainty	±3.6	Rectangular	√3	1	±3.6	7
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	Rectangular	√3	0.64	±1.8	∞
Liquid permittivity (target)	±10.0	Rectangular	√3	0.6	±3.5	∞
Liquid permittivity (meas.)	±10.0	Rectangular	√3	0.6	±3.5	∞
Combined Standard Uncertainty					**±12.273**	
Expanded Uncertainty (k=2)					**±24.5**	

The result of some test showed that the power drift has exceeded 5%. Therefore, the uncertainty of power drift expanded to 10%. 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.

8.1.1 Head 2450MHz

Type of liquid	:	**Head 2450 MHz**
Ambient temperature (deg.c.)	:	**25.0 (November 9 and 10) / 24.5 (November 14)**
Relative Humidity (%)	:	**41(November 9) / 43 (November 10) / 47 (November 14)**
Lquid depth (cm)	:	**15.2**

Measured By : Miyo Ikuta

DIELECTRIC PARAMETERS MEASUREMENT RESULTS							
Date	Liquid Temp [deg.c]		Parameters	Target Value	Measured	Deviation [%]	Limit [%]
	Before	After					
Novemer 9	24.2	24.2	Relative Permittivity εr	39.2	35.9	-8.4	+/-10
			Coductivity σ [mho/m]	1.80	1.85	2.8	+/-5
Novemer 10	24.0	24.0	Relative Permittivity εr	39.2	35.8	-8.7	+/-10
			Coductivity σ [mho/m]	1.80	1.86	3.3	+/-5
Novemer 14	24.0	24.0	Relative Permittivity εr	39.2	35.4	-9.7	+/-10
			Coductivity σ [mho/m]	1.80	1.86	3.3	+/-5

8.1.2 Muscle 2450MHz

Type of liquid : **Muscle 2450 MHz**
Ambient temperature (deg.c.) : **24.5**
Relative Humidity (%) : **43**
Liquid depth (cm) : **15.1**

Measured By : Miyo Ikuta

DIELECTRIC PARAMETERS MEASUREMENT RESULTS							
Date	Liquid Temp [deg.c]		Parameters	Target Value	Measured	Deviation [%]	Limit [%]
	Before	After					
November 10	23.2	23.2	Relative Permittivity εr	52.7	50.1	-4.9	+/-5
			Coductivity σ [mho/m]	1.95	2	2.6	+/-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

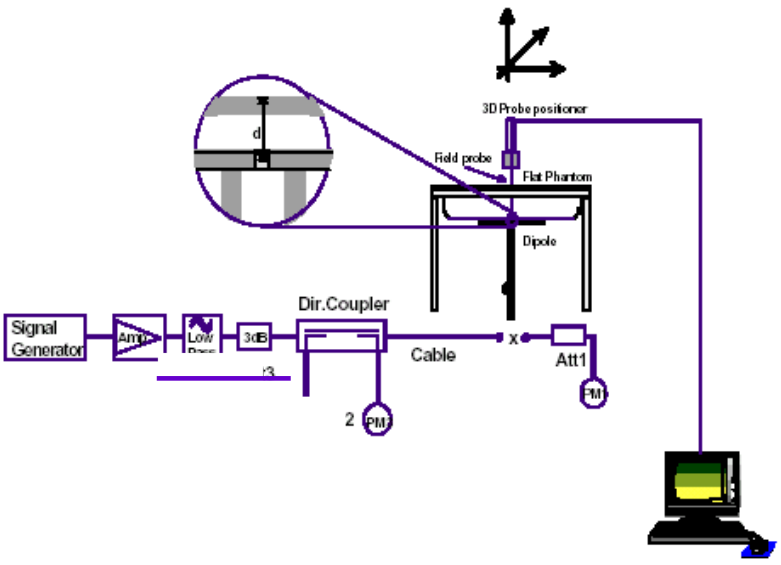
Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of +/-10%. The validation results are tabulated below. Please refer to APPENDIX 3.

Type of liquid	:	**HEAD 2450MHz**
Frequency	:	**2450MHz**
Dipole	:	**D2450V2 SN:713**
Liquid depth (cm)	:	**15.2**
Ambient temperature (deg.c.)	:	**25.0 (November 9 and 10) / 24.5 (November 14)**
Relative Humidity (%)	:	**41(November 9) / 43(November 10) / 47 (November 14)**
Power	:	**250mW**

Measured By : Miyo Ikuta

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		
November 9	24.2	24.2	39.2	35.9	1.80	1.85	13.1	13.7	4.6	+/-10
November 10	24.0	24.0	39.2	35.8	1.80	1.86	13.1	14.0	6.9	+/-10
November 14	24.0	24.0	39.2	35.4	1.80	1.86	13.1	13.9	6.1	+/-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

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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 section 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 the antenna of the 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 x5 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-axis.
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 of the normal antenna

12.1 Measurement results of Head 2450 SAR

12.1.1 Conducted power measurement results

CONDUCTED POWER MEASUREMENT RESULTS											
		Before				After					
Modulation	Frequency [MHz]	Reading [dBm]	Cable loss [dB]	Result [dBm]	Convert [mW]	Reading [dBm]	Cable loss [dB]	Result [dBm]	Convert [mW]	Deviation [%]	Limit [%]
DSSS	2412	6.39	0.2	6.59	4.56	6.31	0.2	6.51	4.48	-1.8	+/-5
	2437	6.56	0.2	6.76	4.74	6.51	0.2	6.71	4.69	-1.1	+/-5
	2462	6.68	0.2	6.88	4.87	6.77	0.2	6.97	4.98	2.2	+/-5
OFDM (64QAM)	2412	10.81	0.2	11.01	12.62	10.79	0.2	10.99	12.56	-0.5	+/-5
	2437	11.59	0.2	11.79	15.10	11.65	0.2	11.85	15.31	1.4	+/-5
	2462	11.75	0.2	11.95	15.67	11.76	0.2	11.96	15.70	0.2	+/-5
OFDM (QPSK)	2412	10.21	0.2	10.41	10.99	10.22	0.2	10.42	11.02	0.2	+/-5
	2437	10.81	0.2	11.01	12.62	10.75	0.2	10.95	12.45	-1.4	+/-5
	2462	10.98	0.2	11.18	13.12	10.98	0.2	11.18	13.12	0.0	+/-5

12.1.2 Head 2450MHz SAR of normal antenna

Liquid Depth (cm)	:	**15.2**	Model	:	**WT-2A**
Parameters	:	ε_r =**35.9**, σ =**1.85**	Serial No.	:	**230001**
Ambient Temperature[deg.c.]	:	**25.0**	Modulation	:	**DSSS**
Relative Humidity (%)	:	**41**	Crest factor	:	**1**

Date : November 09, 2004
Measured By : Miyo Ikuta

HEAD SAR MEASUREMENT RESULTS OF NORMAL ANTENNA										
Frequency		Modulation	Phantom Section	EUT Set-up Conditions				Liquid Temp.[deg.c]		SAR(1g) [W/kg]
Channel	[MHz]			Rotate type	Camera position	Antenna position	Separation [mm]	Before	After	Maximum value of multi-peak
Mid	2437	DSSS	Flat	A (0degree)	BACK	bottom	10	24.2	24.2	**0.0101**
Mid	2437	DSSS	Flat	A (0degree)	BOTTOM	left side	5	24.2	24.2	**0.133**
Mid	2437	DSSS	Flat	A (0degree)	SIDE	front	0	24.2	24.2	**0.218**
Mid	2437	DSSS	Flat	B (90degrees)	BACK	right side	10	24.2	24.2	**0.079**
Mid	2437	DSSS	Flat	B (90degrees)	BOTTOM	bottom	5	24.4	24.4	**0.0391**
Mid	2437	DSSS	Flat	C (180degrees)	BACK	top	0	24.2	24.2	**0.0303**
Low	2412	DSSS	Flat	A (0degree)	SIDE	front	0	24.4	24.4	**0.252**
High	2462	DSSS	Flat	A (0degree)	SIDE	front	0	24.4	24.4	**0.267**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population								**Head SAR: 1.6 W/kg (averaged over 1 gram)**		

Liquid Depth (cm)	:	**15.2**	Model	:	**WT-2A**
Parameters	:	ε_r =**35.9**, σ =**1.85**	Serial No.	:	**230001**
Ambient Temperature[deg.c.]	:	**25.0**	Modulation	:	**OFDM**
Relative Humidity (%)	:	**41**	Crest factor	:	**1**

Date : November 09, 2004
Measured By : Miyo Ikuta

HEAD SAR MEASUREMENT RESULTS OF NORMAL ANTENNA

Frequency		Modulation	Phantom Section	EUT Set-up Conditions				Liquid Temp.[deg.c]		SAR(1g) [W/kg]
Channel	[MHz]			Rotate type	Camera position	Antenna position	Separation [mm]	Before	After	Maximum value of multi-peak
Mid	2437	OFDM(64QAM)	Flat	A (0degree)	BACK	bottom	10	24.2	24.2	**0.0138**
Mid	2437	OFDM(64QAM)	Flat	A (0degree)	BOTTOM	left side	5	24.2	24.2	**0.132**
Mid	2437	OFDM(64QAM)	Flat	A (0degree)	SIDE	front	0	24.2	24.2	**0.231**
Mid	2437	OFDM(64QAM)	Flat	B (90degrees)	BACK	right side	10	24.4	24.4	**0.103**
Mid	2437	OFDM(64QAM)	Flat	B (90degrees)	BOTTOM	bottom	5	24.4	24.4	**0.0404**
Mid	2437	OFDM(64QAM)	Flat	C (180degrees)	BACK	top	0	24.2	24.2	**0.0278**
Low	2412	OFDM(64QAM)	Flat	A (0degree)	SIDE	front	0	24.4	24.4	**0.202**
High	2462	OFDM(64QAM)	Flat	A (0degree)	SIDE	front	0	24.4	24.4	**0.217**
Mid	2437	OFDM(QPSK)	Flat	A (0degree)	BACK	bottom	10	24.2	24.2	**0.00994**
Mid	2437	OFDM(QPSK)	Flat	A (0degree)	BOTTOM	left side	5	24.2	24.2	**0.105**
Mid	2437	OFDM(QPSK)	Flat	A (0degree)	SIDE	front	0	24.2	24.2	**0.249**
Mid	2437	OFDM(QPSK)	Flat	B (90degrees)	BACK	right side	10	24.4	24.4	**0.0907**
Mid	2437	OFDM(QPSK)	Flat	B (90degrees)	BOTTOM	bottom	5	24.4	24.4	**0.0537**
Mid	2437	OFDM(QPSK)	Flat	C (180degrees)	BACK	top	0	24.3	24.4	**0.0314**
Low	2412	OFDM(QPSK)	Flat	A (0degree)	SIDE	front	0	24.2	24.2	**0.212**
High	2462	OFDM(QPSK)	Flat	A (0degree)	SIDE	front	0	24.4	24.4	**0.229**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population								**Head SAR: 1.6 W/kg (averaged over 1 gram)**		

12.2 Measurement results of Body 2450 SAR

12.2.1 Conducted power measurement results

CONDUCTED POWER MEASUREMENT RESULTS											
		Before				After					
Modulation	Frequency [MHz]	Reading [dBm]	Cable loss [dB]	Result [dBm]	Convert [mW]	Reading [dBm]	Cable loss [dB]	Result [dBm]	Convert [mW]	Deviation [%]	Limit [%]
DSSS	2412	6.43	0.2	6.63	4.60	6.24	0.2	6.44	4.41	-4.3	+/-5
	2437	6.38	0.2	6.58	4.55	6.45	0.2	6.65	4.62	1.6	+/-5
	2462	6.66	0.2	6.86	4.85	6.65	0.2	6.85	4.84	-0.2	+/-5
OFDM (64QAM)	2412	10.87	0.2	11.07	12.79	10.85	0.2	11.05	12.74	-0.5	+/-5
	2437	11.61	0.2	11.81	15.17	11.75	0.2	11.95	15.67	3.3	+/-5
	2462	11.69	0.2	11.89	15.45	11.64	0.2	11.84	15.28	-1.1	+/-5
OFDM (QPSK)	2412	10.21	0.2	10.41	10.99	10.19	0.2	10.39	10.94	-0.5	+/-5
	2437	10.75	0.2	10.95	12.45	10.68	0.2	10.88	12.25	-1.6	+/-5
	2462	10.91	0.2	11.11	12.91	10.76	0.2	10.96	12.47	-3.4	+/-5

12.2.2 Body 2450MHz SAR of normal antenna

Liquid Depth (cm)	:	**15.1**	Model	:	**WT-2A**
Parameters	:	ε_r =**50.1**, σ =**2.00**	Serial No.	:	**230001**
Ambient Temperature[deg.c.]	:	**24.5**	Modulation	:	**DSSS**
Relative Humidity (%)	:	**43**	Crest factor	:	**1**

Date : November 10, 2004
Measured By : Miyo Ikuta

BODY SAR MEASUREMENT RESULTS OF NORMAL ANTENNA										
Frequency		Modulation	Phantom Section	EUT Set-up Conditions				Liquid Temp.[deg.c]		SAR(1g) [W/kg]
Channel	[MHz]			Rotate type	Camera position	Antenna position	Separation [mm]	Before	After	Maximum value of multi-peak
Mid	2437	DSSS	Flat	A (0degree)	BACK	bottom	10	23.0	23.0	**0.0361**
Mid	2437	DSSS	Flat	A (0degree)	BOTTOM	left side	5	23.1	23.1	**0.0899**
Mid	2437	DSSS	Flat	A (0degree)	SIDE	front	0	23.1	23.1	**0.214**
Mid	2437	DSSS	Flat	B (90degrees)	BACK	right side	10	23.2	23.2	**0.0738**
Mid	2437	DSSS	Flat	B (90degrees)	BOTTOM	bottom	5	23.2	23.2	**0.0808**
Mid	2437	DSSS	Flat	C (180degrees)	BACK	top	0	23.2	23.2	**0.0345**
Low	2412	DSSS	Flat	A (0degree)	SIDE	front	0	23.3	23.4	**0.24**
High	2462	DSSS	Flat	A (0degree)	SIDE	front	0	23.3	23.3	**0.231**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population								**Body SAR: 1.6 W/kg (averaged over 1 gram)**		

Liquid Depth (cm)	:	**15.1**	Model	:	**WT-2A**
Parameters	:	ε_r =**50.1**, σ =**2.00**	Serial No.	:	**230001**
Ambient Temperature[deg.c.]	:	**24.5**	Modulation	:	**OFDM**
Relative Humidity (%)	:	**43**	Crest factor	:	**1**

BODY SAR MEASUREMENT RESULTS OF NORMAL ANTENNA

Frequency		Modulation	Phantom Section	EUT Set-up Conditions				Liquid Temp.[deg.c]		SAR(1g) [W/kg]
Channel	[MHz]			Rotate type	Camera position	Antenna position	Separation [mm]	Before	After	Maximum value of multi-peak
Mid	2437	OFDM(64QAM)	Flat	A (0degree)	BACK	bottom	10	23.0	23.0	**0.0438**
Mid	2437	OFDM(64QAM)	Flat	A (0degree)	BOTTOM	left side	5	23.1	23.1	**0.0777**
Mid	2437	OFDM(64QAM)	Flat	A (0degree)	SIDE	front	0	23.1	23.1	**0.214**
Mid	2437	OFDM(64QAM)	Flat	B (90degrees)	BACK	right side	10	23.2	23.2	**0.0646**
Mid	2437	OFDM(64QAM)	Flat	B (90degrees)	BOTTOM	bottom	5	23.2	23.2	**0.0664**
Mid	2437	OFDM(64QAM)	Flat	C (180degrees)	BACK	top	0	23.1	23.1	**0.0237**
Low	2412	OFDM(64QAM)	Flat	A (0degree)	SIDE	front	0	23.3	23.3	**0.189**
High	2462	OFDM(64QAM)	Flat	A (0degree)	SIDE	front	0	23.3	23.3	**0.192**
Mid	2437	OFDM(QPSK)	Flat	A (0degree)	BACK	bottom	10	23.0	23.0	**0.0424**
Mid	2437	OFDM(QPSK)	Flat	A (0degree)	BOTTOM	left side	5	23.1	23.1	**0.0735**
Mid	2437	OFDM(QPSK)	Flat	A (0degree)	SIDE	front	0	23.1	23.1	**0.214**
Mid	2437	OFDM(QPSK)	Flat	B (90degrees)	BACK	right side	10	23.1	23.1	**0.096**
Mid	2437	OFDM(QPSK)	Flat	B (90degrees)	BOTTOM	bottom	5	23.3	23.3	**0.0665**
Mid	2437	OFDM(QPSK)	Flat	C (180degrees)	BACK	top	0	23.1	23.1	**0.0231**
Low	2412	OFDM(QPSK)	Flat	A (0degree)	SIDE	front	0	23.2	23.2	**0.172**
High	2462	OFDM(QPSK)	Flat	A (0degree)	SIDE	front	0	23.3	23.3	**0.209**
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 : SAR Measurement results of the option antenna

13.1 Measurement results of Head 2450 SAR

13.1.1 Conducted power measurement results

CONDUCTED POWER MEASUREMENT RESULTS											
		Before				After					
Modulation	Frequency [MHz]	Reading [dBm]	Cable loss [dB]	Result [dBm]	Convert [mW]	Reading [dBm]	Cable loss [dB]	Result [dBm]	Convert [mW]	Deviation [%]	Limit [%]
DSSS	2412	6.29	0.2	6.49	4.46	6.32	0.2	6.52	4.49	0.7	+/-5
	2437	6.60	0.2	6.80	4.79	6.47	0.2	6.67	4.65	-2.9	+/-5
	2462	6.61	0.2	6.81	4.80	6.59	0.2	6.79	4.78	-0.5	+/-5
OFDM (64QAM)	2412	10.69	0.2	10.89	12.27	10.76	0.2	10.96	12.47	1.6	+/-5
	2437	11.56	0.2	11.76	15.00	11.54	0.2	11.74	14.93	-0.5	+/-5
	2462	11.68	0.2	11.88	15.42	11.59	0.2	11.79	15.10	-2.1	+/-5
OFDM (QPSK)	2412	10.31	0.2	10.51	11.25	10.32	0.2	10.52	11.27	0.2	+/-5
	2437	10.89	0.2	11.09	12.85	10.88	0.2	11.08	12.82	-0.2	+/-5
	2462	11.03	0.2	11.23	13.27	10.89	0.2	11.09	12.85	-3.2	+/-5

13.1.2 Head 2450MHz SAR of option antenna

Liquid Depth (cm)	:	**15.2**	Model	:	**WT-2A**
Parameters	:	ε_r =**35.4**, σ =**1.86**	Serial No.	:	**230001**
Ambient Temperature[deg.c.]	:	**24.5**	Modulation	:	**DSSS**
Relative Humidity (%)	:	**47**	Crest factor	:	**1**

Date : November 14 , 2004
Measured By : Miyo Ikuta

HEAD SAR MEASUREMENT RESULTS OF OPTION ANTENNA									
Frequency		Modulation	Phantom Section	EUT Set-up Conditions			Liquid Temp.[deg.c]		SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]	Before	After	Maximum value of multi-peak
Mid	2437	DSSS	Flat	Fixed	Top	0	24.0	24.0	**0.00102**
Mid	2437	DSSS	Flat	Fixed	Side	0	24.0	24.0	**0.216**
Low	2412	DSSS	Flat	Fixed	Side	0	24.0	24.0	**0.222**
High	2462	DSSS	Flat	Fixed	Side	0	24.0	24.0	**0.228**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population							**Head SAR: 1.6 W/kg (averaged over 1 gram)**		

Liquid Depth (cm)	:	**15.2**	Model	:	**WT-2A**
Parameters	:	ε_r =**35.4**, σ =**1.86**	Serial No.	:	**230001**
Ambient Temperature[deg.c.]	:	**24.5**	Modulation	:	**OFDM**
Relative Humidity (%)	:	**47**	Crest factor	:	**1**

HEAD SAR MEASUREMENT RESULTS OF OPTOPN ANTENNA

Frequency		Modulation	Phantom Section	EUT Set-up Conditions			Liquid Temp.[deg.c]		SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]	Before	After	Maximum value of multi-peak
Mid	2437	OFDM(64QAM)	Flat	Fixed	Top	0	24.0	24.0	**0.000839**
Mid	2437	OFDM(64QAM)	Flat	Fixed	Side	0	24.0	24.0	**0.217**
Low	2412	OFDM(64QAM)	Flat	Fixed	Side	0	24.0	24.0	**0.176**
High	2462	OFDM(64QAM)	Flat	Fixed	Side	0	24.0	24.0	**0.206**
Mid	2437	OFDM(QPSK)	Flat	Fixed	Top	0	24.0	24.0	**0.000936**
Mid	2437	OFDM(QPSK)	Flat	Fixed	Side	0	24.0	24.0	**0.224**
Low	2412	OFDM(QPSK)	Flat	Fixed	Side	0	24.0	24.0	**0.195**
High	2462	OFDM(QPSK)	Flat	Fixed	Side	0	24.0	24.0	**0.207**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population							**Head SAR: 1.6 W/kg (averaged over 1 gram)**		

13.2 Measurement results of Body 2450 SAR

13.2.1 Conducted power measurement results

CONDUCTED POWER MEASUREMENT RESULTS											
		Before				After					
Modulation	Frequency [MHz]	Reading [dBm]	Cable loss [dB]	Result [dBm]	Convert [mW]	Reading [dBm]	Cable loss [dB]	Result [dBm]	Convert [mW]	Deviation [%]	Limit [%]
DSSS	2412	6.43	0.2	6.63	4.60	6.24	0.2	6.44	4.41	-4.3	+/-5
	2437	6.38	0.2	6.58	4.55	6.45	0.2	6.65	4.62	1.6	+/-5
	2462	6.66	0.2	6.86	4.85	6.65	0.2	6.85	4.84	-0.2	+/-5
OFDM (64QAM)	2412	10.87	0.2	11.07	12.79	10.85	0.2	11.05	12.74	-0.5	+/-5
	2437	11.61	0.2	11.81	15.17	11.65	0.2	11.85	15.31	0.9	+/-5
	2462	11.69	0.2	11.89	15.45	11.64	0.2	11.84	15.28	-1.1	+/-5
OFDM (QPSK)	2412	10.21	0.2	10.41	10.99	10.19	0.2	10.39	10.94	-0.5	+/-5
	2437	10.75	0.2	10.95	12.45	10.68	0.2	10.88	12.25	-1.6	+/-5
	2462	10.91	0.2	11.11	12.91	10.76	0.2	10.96	12.47	-3.4	+/-5

13.2.2 Body 2450MHz SAR of option antenna

Liquid Depth (cm)	:	**15.1**	Model	:	**WT-2A**
Parameters	:	ε_r =**50.1**, σ =**2.00**	Serial No.	:	**230001**
Ambient Temperature[deg.c.]	:	**24.5**	Modulation	:	**DSSS**
Relative Humidity (%)	:	**43**	Crest factor	:	**1**

Date : November 10, 2004
Measured By : Miyo Ikuta

BODY SAR MEASUREMENT RESULTS OF OPTION ANTENNA									
Frequency		Modulation	Phantom Section	EUT Set-up Conditions			Liquid Temp.[deg.c]		SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]	Before	After	Maximum value of multi-peak
Mid	2437	DSSS	Flat	Fixed	Top	0	23.2	23.2	**0.00139**
Mid	2437	DSSS	Flat	Fixed	Side	0	23.2	23.2	**0.244**
Low	2412	DSSS	Flat	Fixed	Side	0	23.2	23.2	**0.239**
High	2462	DSSS	Flat	Fixed	Side	0	23.2	23.2	**0.233**
Mid	2437	DSSS	Flat	Fixed	Side	5	23.2	23.2	**0.094**
Mid	2437	DSSS	Flat	Fixed	Side	10	23.2	23.2	**0.04**
Mid	2437	DSSS	Flat	Fixed	Side	15	23.2	23.2	**0.0337**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population							**Body SAR: 1.6 W/kg (averaged over 1 gram)**		

Liquid Depth (cm)	:	**15.1**	Model	:	**WT-2A**
Parameters	:	**ε_r =50.1, σ =2.00**	Serial No.	:	**230001**
Ambient Temperature[deg.c.]	:	**24.5**	Modulation	:	**OFDM**
Relative Humidity (%)	:	**43**	Crest factor	:	**1**

BODY SAR MEASUREMENT RESULTS OF OPTION ANTENNA

Frequency		Modulation	Phantom Section	EUT Set-up Conditions			Liquid Temp.[deg.c]		SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]	Before	After	Maximum value of multi-peak
Mid	2437	OFDM(64QAM)	Flat	Fixed	Top	0	23.2	23.2	**0.000639**
Mid	2437	OFDM(64QAM)	Flat	Fixed	Side	0	23.2	23.2	**0.232**
Low	2412	OFDM(64QAM)	Flat	Fixed	Side	0	23.2	23.2	**0.182**
High	2462	OFDM(64QAM)	Flat	Fixed	Side	0	23.2	23.2	**0.227**
Mid	2437	OFDM(QPSK)	Flat	Fixed	Top	0	23.2	23.2	**0.000821**
Mid	2437	OFDM(QPSK)	Flat	Fixed	Side	0	23.2	23.2	**0.229**
Low	2412	OFDM(QPSK)	Flat	Fixed	Side	0	23.2	23.2	**0.19**
High	2462	OFDM(QPSK)	Flat	Fixed	Side	0	23.2	23.2	**0.207**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population							**Body SAR: 1.6 W/kg (averaged over 1 gram)**		

SECTION 14 : Equipment & calibration information

Name of Equipment	Manufacture	Model number	Serial number	Calibration	
				Last Cal	due date
Power Meter	Agilent	E4416A	GB41290974	2004/03/03	2005/03/02
Power Sensor	Agilent	E9327A	US40440545	2004/03/11	2005/03/10
Spectrum Analyzer	Agilent	E4448A	MY44020357	2004/06/12	2005/06/11
S-Parameter Network Analyzer	Agilent	8753ES	US39174808	2003/10/23	2006/10/22
Signal Generator	Rohde&Schwarz	SML40	100023	2003/11/26	2004/11/25
RF Amplifier	OPHIR	5056F	1005	2004/02/17	2005/02/16
Dosimetric E-Field Probe	Schmid&Partner Engineering AG	ET3DV6	1684	2004/09/02	2005/09/01
Data Acquisition Electronics	Schmid&Partner Engineering AG	DAE3 V1	509	2004/04/22	2005/04/21
Robot,SAM Phantom	Schmid&Partner Engineering AG	DASY4	I021834	N/A	N/A
Attenuator	Orient Microwave	BX10-0476-00	-	2004/03/30	2005/03/29
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 15 : 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.