SAR EVALUATION REPORT

Test Report No. : 23LE0077-HO

Applicant	:	**FUKUDA DENSHI CO., LTD**
Type of Equipment	:	**ECG, Respiration and SpO_2 Transmitter**
Model No.	:	**LX-5630**
FCC ID	:	**DV8LX5630**
Test standard	:	**FCC47CFR 2.1093** **FCC OET Bulletin 65, Supplement C**
Test Result	:	**Complied**
Max SAR Measured	:	**0.00291W/kg(Body, 613.9875MHz)**

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 05, 2003

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

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

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CONTENTS

SECTION 1 : Client information

Company Name	:	FUKUDA DENSHI CO., LTD.
Address	:	2-35-8 Hongo, Bunkyo-ku, Tokyo,113-8420 JAPAN
Telephone Number	:	+81-3-5684-1337
Facsimile Number	:	+81-3-5684-1321
Contact Person	:	Tamotsu Toya

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

2.1 Identification of E.U.T.

APPLICANT	:	FUKUDA DENSHI CO., LTD.
Type of Equipment	:	ECG, Respiration and SpO_2 Transmitter
Model No.	:	LX-5630
Serial No.	:	2003020602
Rating	:	DC3.0V battery operation
Country of Manufacture	:	Japan
Condition of EUT	:	Production prototype
Tx Frequency	:	608.0125MHz~613.9875MHz
Modulation	:	Digital Frequency Shift Keying
Max.Output Power Tested	:	0.67dBmPeak Conducted
Antenna Type	:	Integrated antenna
Position of Antenna	:	See Photograph of right
Size of EUT	:	W94*L26.5*H90
Battery option	:	two “AA” size alkaline cell battery (LR-6)
Receipt Date of Sample	:	August 04,2003
Category Identified	:	Portable device

SECTION 3 : Requirements for compliance testing defined by the FCC

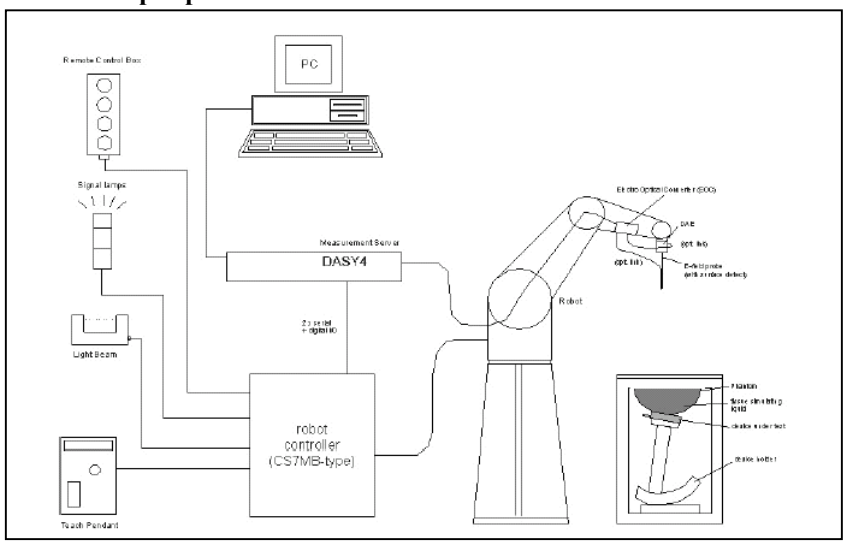
The US Federal Communications Commission has released the report and order “Guidelines for Evaluating the Environmental Effects of RF Radiation", ET Docket No. 93-62 in August 1996. The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable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

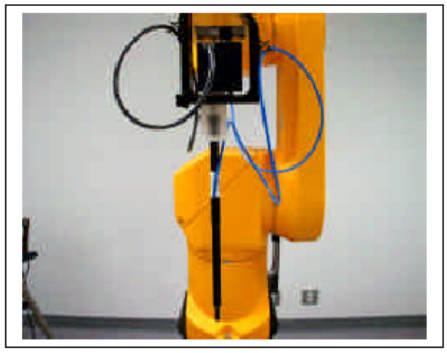
11. The device holder for handheld mobile phones.

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

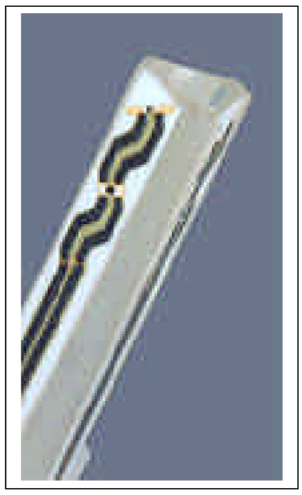
13. Validation dipole kits allowing to validate the proper functioning of the system.

4.2 System components

4.2.1 ET3DV6 Probe Specification



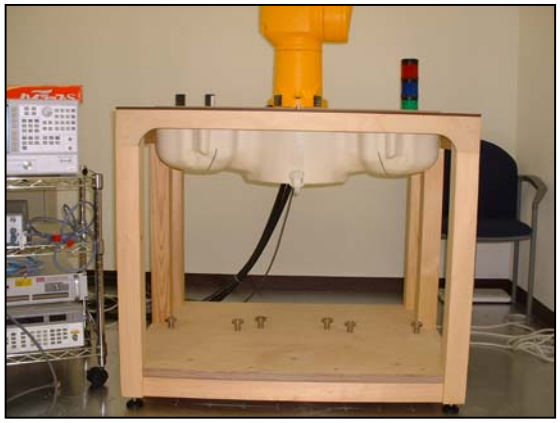
Construction:
Symmetrical design with triangular core
Built-in optical fiber for surface detection System
Built-in shielding against static charges
PEEK enclosure material (resistant to organic solvents, e.g., glycol ether)
Calibration:
Basic Broad Band calibration in air from 10 MHz to 2.5 GHz
In brain and muscle simulating tissue at
Frequencies of 450 MHz, 900 MHz, 1.8 GHz and 2.45GHz (accuracy +/- 8%)
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

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 sever

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 NiMH accus)
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 (30 MHz to 3 GHz)
Manufacture	:	Schimid & Partner Engineering AG

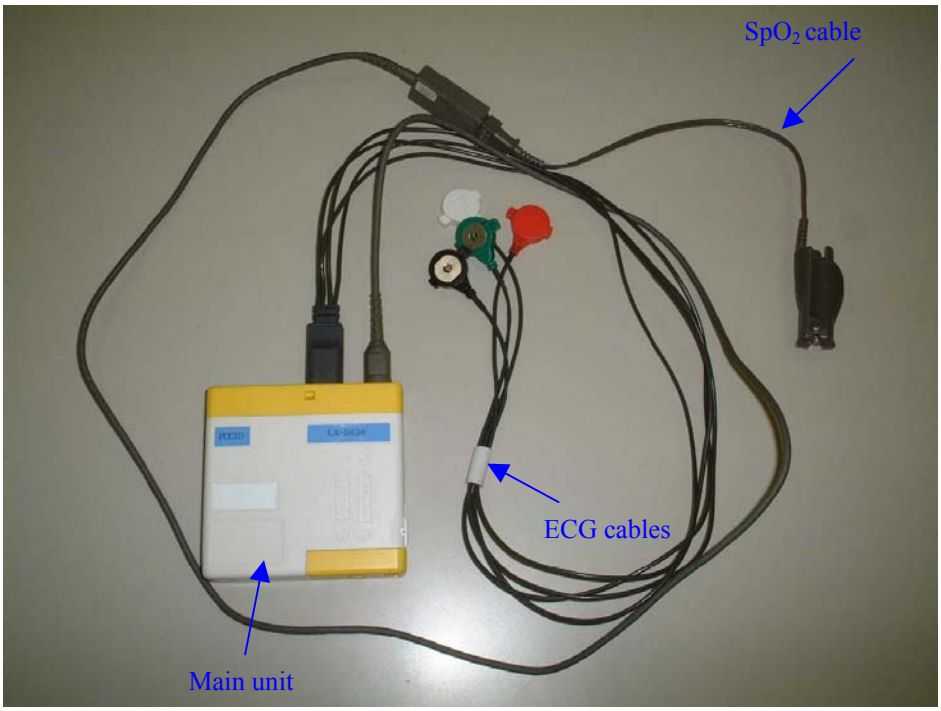
Phantom

Type	:	SAM Twin Phantom V4.0
Shell Material	:	Fiberglass
Thickness	:	2.0 +/-0.2 mm
Volume	:	Approx. 20 liters
Manufacture	:	Schimid & Partner Engineering AG

SECTION 6 : Test setup of EUT

6.1 Photographs of test setup

When users operate this EUT, it could be considered that all cables and main unit touch or get close to their bodies.
And the cable with green electrode in ECG cables and the SpO_2 cable are used for antennas.
We performed the test with cable and main unit touching to the flat phantom.
Please refer to "APPENDIX 1" for more details.



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 (FSK) of the EUT.
The test configuration was tested at the low, middle and high channels in the frequency of operation.

SECTION 7 : Measurement outline

This EUT was transmitted frequency of 608.0125MHz through 613.9875MHz.
We performed the measurement as follows.

7.1 Conversion Factor of probe

Body Conv F at 600MHz : 7.0

It is shown our calibaration data as follows.

Body Conv F at 900MHz : 6.5
Body Conv F at 1800MHz : 5.1
Body Conv F at 2450MHz : 4.4

From these values, the Conv F at 600MHz was determined by linear interpolation.

7.2 Measurement of simulated tissue liquid parameter

The Type of the used liquid : Muscle 900MHz
Measured frequency : 600MHz

The dielectric parameters were checked prior to assessment using the HP85070d dielectric probe kit.
The check method measured permittivity and conductivity by 600MHz.

7.3 Target value(dielectric parameters measurement)of 600MHz

Muscle(Transverse_Fibr)
Relative Permittivity εr : 56.0
Coductivity σ [mho/m] : 0.85

Dielectric parameters is the value computed from the homepage of FCC (http://www.fcc.gov/fcc-bin/dielec.sh)
The tissue parameters provided here are derived from the 4-Cole-Cole Analysis in "Compilation of the Dielectric Properties of Body Tissues at RF and Microwave Frequencies" by Camelia Gabriel, Brooks Air Force Technical Report AL/OE-TR-1996-0037.

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 measured dielectric parameters are reported in each correspondent section.

8.2 Head 900MHz

Type of liquid	:	**Head 900 MHz**
Ambient temperature (deg.c.)	:	**24.5**
Relative Humidity (%)	:	**55**
Lquid depth (cm)	:	**15.5**

Date : August 05,2003
Measured By : Miyo Ikuta

DIELECTRIC PARAMETERS MEASUREMENT RESULTS						
Liquid Temp [deg.c]		Parameters	Target Value	Measured	Deviation [%]	Limit [%]
Before	After					
23.3	23.3	Relative Permittivity εr	41.5	40.7	-1.9	+/-10
		Coductivity σ [mho/m]	0.97	0.94	-3.1	+/-5

8.3 Muscle 900MHz

We measured dielectric parameters in 600MHz.
Please refer to " Section 7 " for the target values(600MHz).

Type of liquid	:	**Muscle 900 MHz**
Ambient temperature (deg.c.)	:	**23.2**
Relative Humidity (%)	:	**53**
Liquid depth (cm)	:	**15.8**

Date : August 05,2003
Measured By : Miyo Ikuta

DIELECTRIC PARAMETERS MEASUREMENT RESULTS						
Liquid Temp [deg.c]		Parameters	Target Value (600MHz)	Measured (600MHz)	Deviation [%]	Limit [%]
Before	After					
22.6	22.6	Relative Permittivity εr	56.0	56.8	1.4	+/-10
		Conductivity σ [mho/m]	0.85	0.75	-11.76	+/-5

Comment 1 : Since the deviation of the target value and measured value of conductivity exceeded +/-5%, it is inclued in the uncertainty evaluation. Please refer to a Section 11.

8.4 Simulated Tissues

Ingredient	MiXTURE(%) Head 900MHz	MiXTURE(%) Muscle 900MHz
Water	40.3	50.8
Cellulose	0.24	-
Salt	1.3	0.94
Preventol	0.18	0.1
Sugar	57.9	48.2

Note:DGMBE(Diethylenglycol-monobuthyl ether)

SECTION 9 : System validation data

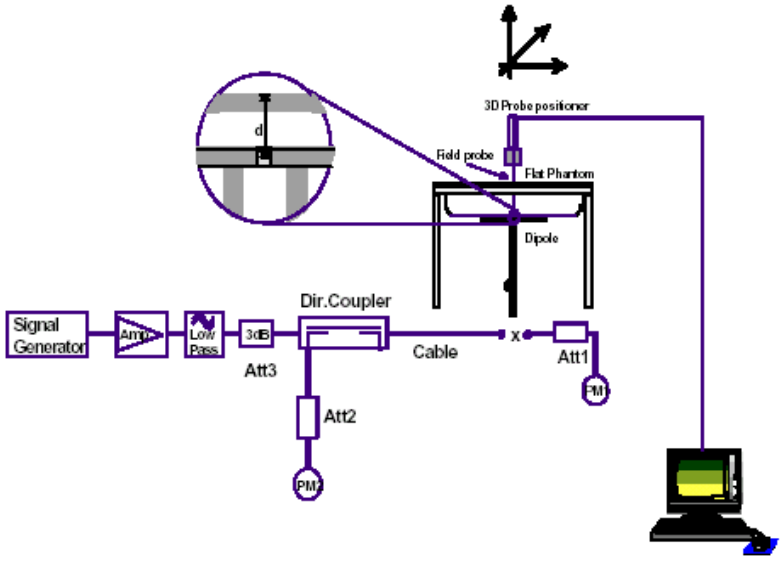
Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of +/-10%. The validation results are tabulated below. And SAR plot is attached in the APPENDIX 3. IEEE P1528 Recommended Reference Value

Type of liquid	:	**HEAD 900MHz**
Frequency	:	**900MHz**
Liquid depth (cm)	:	**15.5**
Ambient temperature (deg.c.)	:	**24.5**
Relative Humidity (%)	:	**55**
Dipole	:	**D900V2 SN:155**
Power	:	**250mW**

Date : August 05,2003
Measured By : Miyo Ikuta

SYSTEM PERFORMANCE CHECK									
Liquid (HEAD 900MHz)						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		
23.3	23.3	41.5	40.7	0.97	0.94	2.7	2.65	-1.9	+/-10

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



Test system for the system performance check setup diagram

900MHz 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 EUT(180 x 260) 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 2dBof 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 SAR value at the same location as in Step 1. It is measured SAR-drift(the difference between the SAR measured in Step 4 and Step 1)

SECTION 11 : 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	2
Device holder uncertainty	±3.6	Rectangular	√3	1	±3.6	0
Power drift	±5.0	Rectangular	√3	1	±2.9	∞
Phantom and Setup						
Phantom uncertainty	±4.0	Rectangular	√3	1	±2.3	∞
Liquid conductivity (target)	±11.8	Rectangular	√3	0.64	±4.4	∞
Liquid conductivity (meas.)	±10.0	Rectangular	√3	0.64	±3.7	∞
Liquid permittivity (target)	±5.0	Rectangular	√3	0.6	±1.7	∞
Liquid permittivity (meas.)	±5.0	Rectangular	√3	0.6	±1.7	∞
Combined Standard Uncertainty					**±11.55**	
Expanded Uncertainty (k=2)					**±23.1**	

SECTION 12 : 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 13 : SAR Measurement results

12.1 Conducted power measurement results

Date : July 31,2003
Measured By : Miyo Ikuta

CONDUCTED POWER MEASUREMENT RESULTS										
Frequency [MHz]	Before				After				Deviation [%]	Limit [%]
	Reading [dBm]	Connecter loss [dB]	Result [dBm]	Convert [mW]	Reading [dBm]	Connecter loss [dB]	Result [dBm]	Convert [mW]		
608.0125	-5.11	5.78	0.67	1.17	-5.33	5.78	0.45	1.11	-4.9	+/-5
611.0000	-5.20	5.38	0.18	1.04	-5.17	5.38	0.21	1.05	0.7	+/-5
613.9875	-5.09	5.02	-0.07	0.98	-5.09	5.02	-0.07	0.98	0.0	+/-5

12.2 Body 900MHz SAR

Liquid Depth (cm)	:	**15.8**	Model	:	**LX-5630**
Parameters	:	ε_r =**56.8**, σ =**0.75**	Serial No.	:	**2003020602**
Ambient Temperature[deg.c.]	:	**23.2**	Modulation	:	**FSK**
Relative Humidity (%)	:	**53**	Crest factor	:	**1**

Date : August 05,2003
Measured By : Miyo Ikuta

BODY SAR MEASUREMENT RESULTS							
Frequency		Phantom Section	EUT Set-up Conditions		Liquid Temp.[deg.c]		SAR(1g) [w/kg] (Maximum value of multi-peak)
Channel	MHz		Antenna	Separation [mm]	Before	After	
Mid	611.00	Flat	Fixed	0	22.1	22.1	**0.0015**
Low	608.0125	Flat	Fixed	0	22.0	22.0	**0.00193**
High	613.9875	Flat	Fixed	0	22.0	22.0	**0.00291**
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 : Consideration of SAR evaluation

The measument SAR value of this EUT was 0.00291W/kg. (result of SAR measurement of a Section13)

The point in this testing was the measurement result of Conductibity which had -11.8% deviation between target value and measured value.
We know that it is specified which the target value of conductibity is within +/-5% in IEEE1528.
However, the target value of liquid at 600MHz is also assumption.
Furthermore, the uncertainty including 11.8% was 23.1%. This is filled to the limit value (30%) of uncertainty.

The SAR evaluation of this EUT does not have problems because the measured value is significantly low.

SECTION 15: Equipment & calibration information

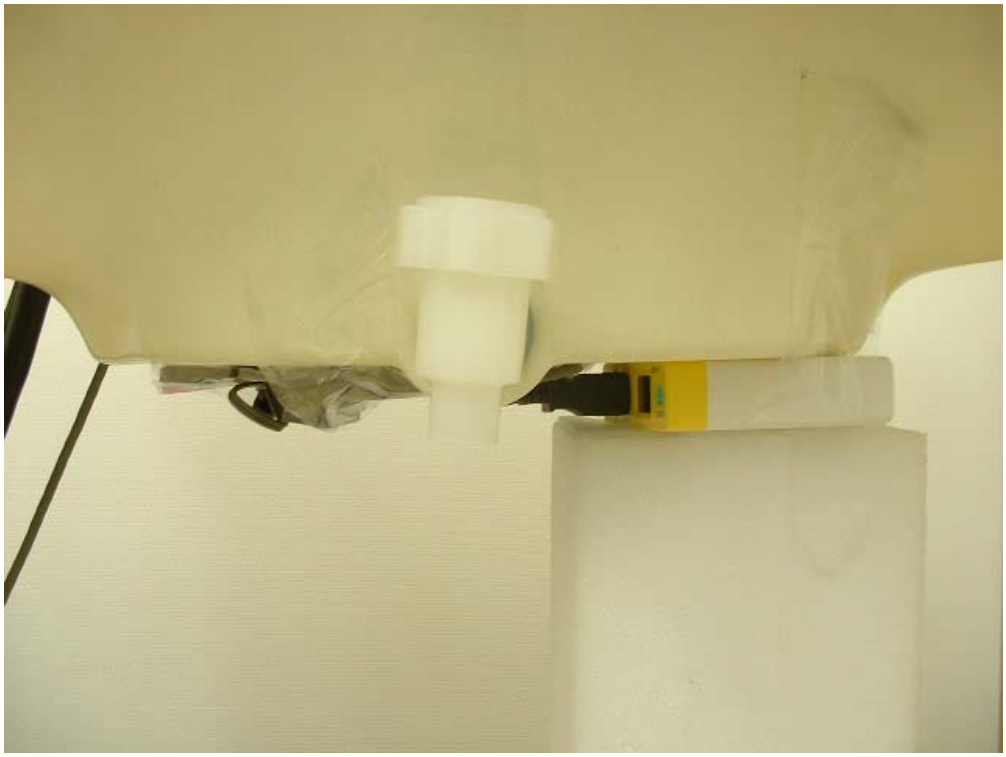
Name of Equipment	Manufacture	Model number	Serial number	Calibration	
				Last Cal	due date
Power Meter	Agilent	E4417A	GB41290639	2002/11/08	2003/11/07
Power Sensor	Agilent	E9300B	US40010300	2002/11/14	2003/11/13
Power Sensor	Agilent	E9327A	US40440576	2003/04/14	2004/04/13
S-Parameter Network Analyzer	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	DASY4	I021834	N/A	N/A
Attenuator	Agilent.	US40010300	08498-60012	2002/12/24	2003/12/23
900MHz System Validation Dipole	Schmid&Partner Engineering AG	D900V2	155	2002/11/13	2004/11/12
Dual Directional Coupler	N/A	Narda	03702	N/A	N/A
Head 900MHz	N/A	N/A	N/A	N/A	N/A
Body 900MHz	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.

SECTION 16 : APPENDIX

APPENDIX 1 : Photographs of test setup



APPENDIX 2 : SAR Measurement data

LX-5630 / Body / 611.00MHz

Crest factor: 1
Medium: M900 (σ = 0.75mho/m(600MHz), ε_r = 56.8(600MHz), ρ = 1000 kg/m^3)
Phantom section: Flat Section

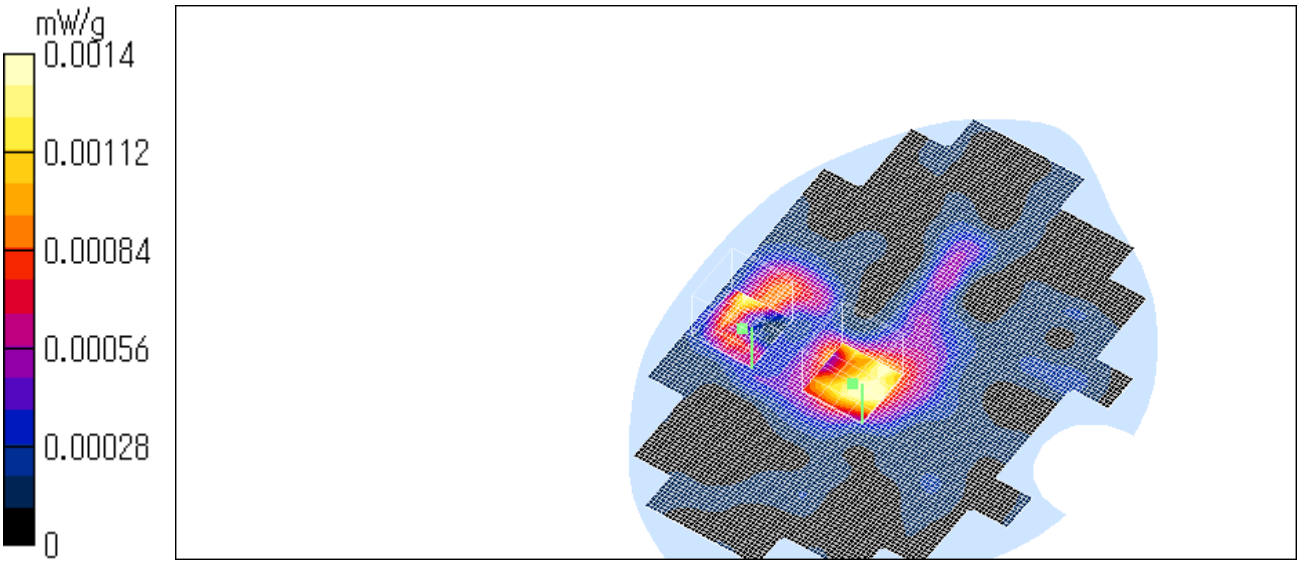
DASY4 Configuration:
- Probe: ET3DV6 - SN1684; ConvF(7, 7, 7); Calculation
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Phantom: SAM 1196
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Area Scan (91x131x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR = 0.00155 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 0.00542 W/kg
SAR(1 g) = 0.0015 mW/g; SAR(10 g) = 0.000854 mW/g
Maximum value of SAR = 0.00176 mW/g

Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 0.00585 W/kg
SAR(1 g) = 0.00106 mW/g; SAR(10 g) = 0.00043 mW/g
Maximum value of SAR = 0.0014 mW/g

Teast date = 08 / 05 / 03
Reference Value = 1.32 V/m
Conducted Power = Before: 0.18 dBm After: 0.21 dBm
Ambient Temperature = 23.2 degree.
Liquid Temperature = Before 22.1 degree.C , After 22.1 degree.C



LX-5630 / Body / 608.0125MHz

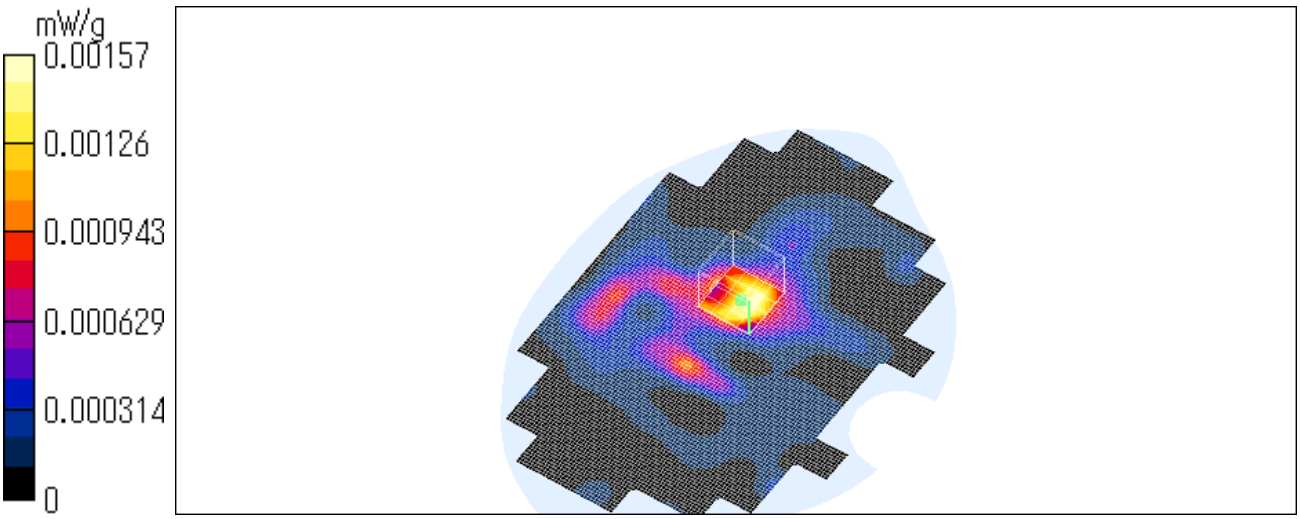
Crest factor: 1
Medium: M900 (σ = 0.75 mho/m (600MHz), ε_r = 56.8 (600MHz), ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1684; ConvF(7, 7, 7) ;Calculation
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Phantom: SAM 1196
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Area Scan (91x131x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR = 0.00177 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 0.00844 W/kg
SAR(1 g) = 0.00193 mW/g; SAR(10 g) = 0.000887 mW/g
Maximum value of SAR = 0.00157 mW/g

Teast date = 08 / 05 / 03
Reference Value = 0.665 V/m
Conducted Power = Before: 0.67 dBm After: 0.45 dBm
Ambient Temperature = 23.2 degree.
Liquid Temperature = Before 22.0 degree.C , After 22.0 degree.C



LX-5630 / Body / 613.9875MHz

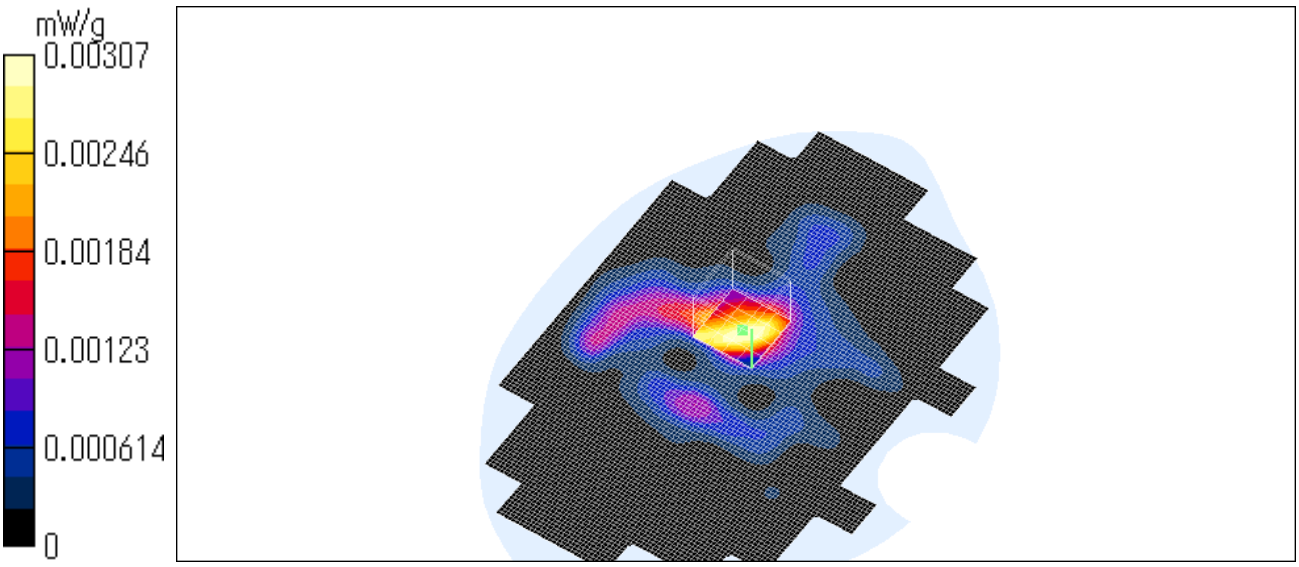
Crest factor: 1
Medium: M900 (σ = 0.75mho/m(600MHz), ε_r = 56.8(600MHz), ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1684; ConvF(7, 7, 7); Calculation
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Phantom: SAM 1196
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Area Scan (91x131x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR = 0.00391 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 0.00822 W/kg
SAR(1 g) = 0.00291 mW/g; SAR(10 g) = 0.00148 mW/g
Maximum value of SAR = 0.00307 mW/g

Teast date = 08 / 05 / 03
Reference Value = 0.846 V/m
Conducted Power = Before: -0.07 dBm After: -0.07 dBm:
Ambient Temperature = 23.2 degree.
Liquid Temperature = Before 22.0 degree.C , After 22.0 degree.C

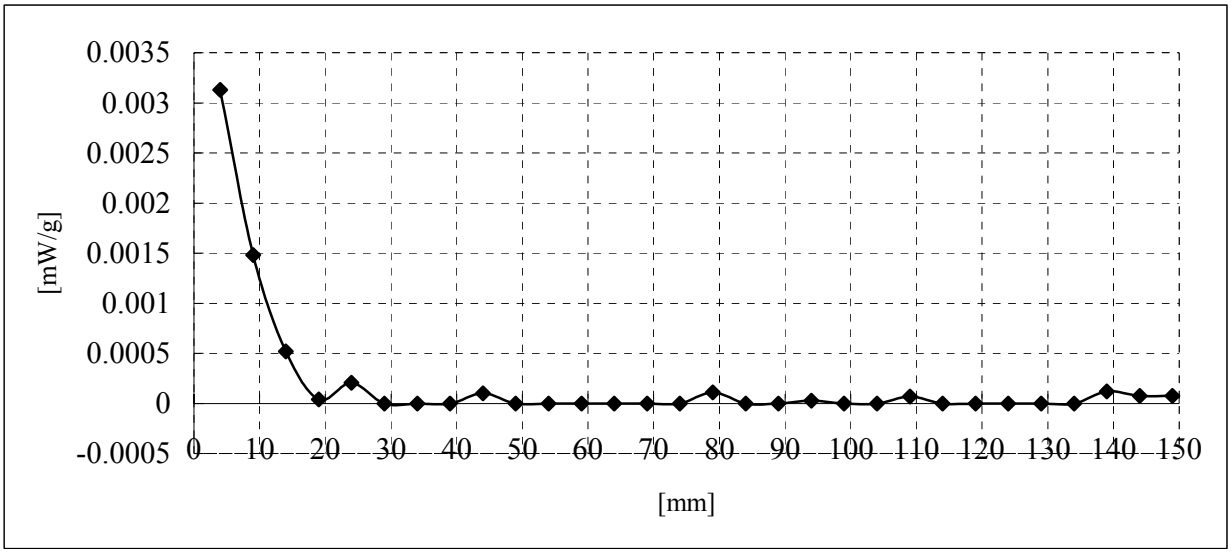


Z-axis scan at max SAR location

LX-5630 / Body / 613.9875MHz

Crest factor: 1
Medium: M900 (σ = 0.75mho/m(600MHz), ε_r = 56.8(600MHz), ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1684; ConvF(7, 7, 7); Calculation
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Phantom: SAM 1196
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115



APPENDIX 3 : Validation Measurement data

System Validation / Dipole 900 MHz / Forward Conducted Power : 250mW

Crest factor: 1
Medium: HSL900 (σ = 0.94 mho/m, ε_r = 40.7, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1684; ConvF(6.8, 6.8, 6.8); Calibrated: 2002/11/20
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Phantom: SAM 1196
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Area Scan (51x51x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR = 2.8 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 3.91 W/kg
SAR(1 g) = 2.65 mW/g; SAR(10 g) = 1.69 mW/g
Maximum value of SAR = 2.85 mW/g

Test date = 08 / 05 / 03
Reference Value = 56.9 V/m
Power Drift = -0.05 dB
Ambient Temperature = 24.5 degree.
Liquid Temperature = Before 23.3 degree.C , After 23.3 degree.C