JQA

JQA File No. : KL80070136
Issue Date : July 5, 2007

TEST REPORT (SAR EVALUATION)

APPLICANT	:	TOSHIBA CORPORATION Digital Media Network Company
ADDRESS	:	2-9, Suehiro-cho, Ome, Tokyo, Japan 198-8710
PRODUCTS	:	Portable Media Player
MODEL NO.	:	MET401
SERIAL NO.	:	MG1-A07-CH031-CSJ
FCC ID	:	CJ6UMET401WL
TEST STANDARD	:	FCC/OET Bulletin 65 Supplement C (Edition 01-01)
TESTING LOCATION	:	Japan Quality Assurance Organization KITA-KANSAI Testing Center 1-7-7, Ishimaru, Minoh-shi, Osaka 562-0027, Japan
TEST RESULTS	:	Passed
DATE OF TEST	:	June 29, 2007

This report must not used by the client to claim product endorsement by NVLAP or NIST or any agency of the U.S. Government.

NVLAP®
NVLAP LAB CODE 200191-0

Y. Fukumoto
Yuichi Fukumoto
Manager
Japan Quality Assurance Organization
KITA-KANSAI Testing Center
Testing Dept. EMC Division
1-7-7, Ishimaru, Minoh-shi, Osaka 562-0027, Japan

- The measurement values stated in Test Report was made with traceable to National Institute of Advanced Industrial Science and Technology (AIST) of Japan, National Institute of Information and Communications Technology (NICT) of Japan , and Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zürich, Switzerland.
- The applicable standard, testing condition and testing method which were used for the tests are based on the request of the applicant.
- The test results presented in this report relate only to the offered test sample.
- The contents of this test report cannot be used for the purposes, such as advertisement for consumers.
- This test report shall not be reproduced except in full without the written approval of JQA.

TABLE OF CONTENTS

DEFINITIONS FOR ABBREVIATION AND SYMBOLS USED IN THIS TEST REPORT

"EUT" means Equipment Under the Test.
"N/A" means that Not Applicable.
"N/T" means that Not Tested.

☒ - indicates that the listed condition, standard or equipment is applicable for this report.
☐ - indicates that the listed condition, standard or equipment is not applicable for this report.

Documentation

1 Test Regulation

Applied Standard : FCC/OET Bulletin 65 Supplement C (Edition 01-01)
Evaluating Compliance with FCC Guidelines for Human Exposure to Radio-frequency Electromagnetic Fields
Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions

Test Procedure : FCC/OET Bulletin 65 Supplement C (Edition 01-01) and IEEE Std.1528–2003

Exposure Limits : ANSI/IEEE Std. C95.1, 1999 Edition

2 Test Location

KITA-KANSAI Testing Center
7-7, Ishimaru, 1-chome, Minoh-shi, Osaka, 562-0027, Japan
KAMEOKA EMC Branch
9-1, Ozaki, Inukanno, Nishibetsuin-cho, Kameoka-shi, Kyoto, 621-0126, Japan

3 Recognition of Test Laboratory

JQA KITA-KANSAI Testing Center Testing Department EMC Division is accredited under ISO/IEC 17025 by following accreditation bodies and the test facility of Testing Division is registered by the following bodies.

VLAC Code : VLAC-001-2 (Effective through : April 3, 2008)
NVLAP Lab Code : 200191-0 (Effective through : June 30, 2008)
BSMI Recognition No. : SL2-IS-E-6006, SL2-IN-E-6006, SL2-AI-E-6006
(Effective through : September 14, 2007)

VCCI Registration No. : R-006, R-008, R-1117, C-006, C-007, C-1674, C-2143
(Effective through : April 3, 2008)
FCC Registration No. : 683630 (Effective through : June 30, 2008)
IC Registration No. : IC 4125-1, IC 6217-1, IC 6217-2 (Effective through : November 16, 2008)

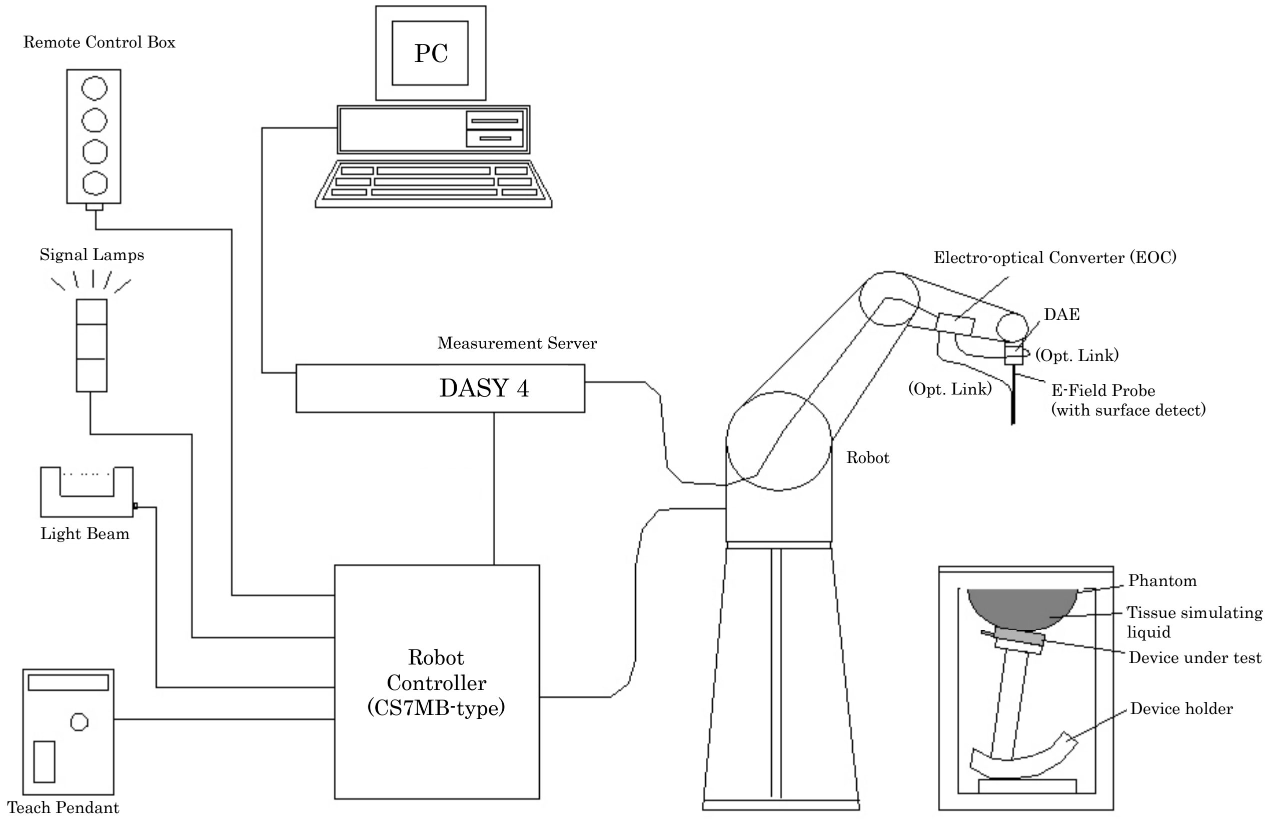
Accredited as conformity assessment body for Japan electrical appliances and material law by METI.
(Effective through : February 22, 2010)

4 Description of the Equipment Under Test

1.	Manufacturer	:	TOSHIBA CORPORATION Digital Media Network Company 2-9, Suehiro-cho, Ome, Tokyo, Japan 198-8710
2.	Products	:	Portable Media Player
3.	Model No.	:	MET401
4.	Serial No.	:	MG1-A07-CH031-CSJ
5.	Product Type	:	Pre-production
6.	Date of Manufacture	:	--
7.	Transmitting Frequency	:	2412 MHz – 2462 MHz
8.	Max. RF Output Power (Conducted / Average)	:	10.84 dBm (802.11b / 1 Mbps) 9.69 dBm (802.11g / 6 Mbps)
9.	Battery Option	:	Lithium-ion Battery Pack (P/N G71C0008B, 900mAh)
10.	Power Rating	:	3.7VDC
11.	EUT Grounding	:	None
12.	Device Category	:	Portable Device (§2.1093)
13.	Exposure Category	:	General Population/Uncontrolled Exposure
14.	FCC Rule Part(s)	:	15.247
15.	EUT Authorization	:	Certification
16.	Received Date of EUT	:	June 29, 2007

5 Measurement System Diagram

These measurements are performed using the DASY4 automated dosimetric assessment system (manufactured by Schmid & Partner Engineering AG (SPEAG) in Zürich, Switzerland). It consists of high precision robotics system, cell controller system, DASY4 measurement server, personal computer with DASY4 software, data acquisition electronic (DAE) circuit, the Electro-optical converter (EOC), near-field probe, and the twin SAM phantom containing the equivalent tissue. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF).
The Robot is connected to the cell controller to allow software manipulation of the robot. The DAE is connected to the EOC. The DAE performs the signal amplification, signal multiplexing, A/D conversion, offset measurements, mechanical surface detection, collision detection, etc. The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the DASY4 measurement server.



6 System Components

6.1 Probe Specification

Construction : Symmetrical design with triangular core
Built-in optical fiber for surface detection system
Built-in shielding against static changes

Calibration : In air form 10 MHz to 2.5 GHz
In head tissue simulating liquid (HSL) and
muscle tissue simulating liquid
900 MHz (accuracy ± 11.0%; k=2)
1450 MHz (accuracy ± 11.0%; k=2)
1810 MHz (accuracy ± 11.0%; k=2)
1950 MHz (accuracy ± 11.0%; k=2)
2450 MHz (accuracy ± 11.8%; k=2)

Frequency : 10 MHz to 3 GHz (dosimetry);
Linearity: ±0.2 dB (30 MHz to 3 GHz)

Directivity : ± 0.2 dB in HSL (rotation around probe axis)
± 0.4 dB in HSL (rotation normal probe axis)

Dynamic Range : 5 μW/g to >100 mW/g; Linearity: ± 0.2 dB

Surface Detection : ± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces

Dimensions : Overall length 330 mm
Tip length 16 mm
Body diameter 12 mm
Tip diameter 6.8 mm
Distance from probe tip to dipole centers 2.7 mm

6.2 Twin SAM Phantom

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-2003, CENELEC 50361 and IEC 62209-1. It enables the dosimetric evaluation of left and right head 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 : Volume Approx. 25 liters
Dimensions : 810 × 1000 × 500 mm (H × L × W)

6.3 Mounting Device for Transmitters

The Mounting Device enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to IEC, IEEE, CENELEC, FCC or other specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

6.4 Typical Composition of Ingredients for Liquid Tissue

Ingredients (% by weight)	Frequency (MHz)					
	835		1900		2450	
	Head	Body	Head	Body	Head	Body
Water	41.45	52.40	54.90	40.40	62.70	73.20
Salt (NaCl)	1.45	1.40	0.18	0.50	0.50	0.04
Sugar	56.00	45.00	0.00	58.00	0.00	0.00
HEC	1.00	1.00	0.00	1.00	0.00	0.00
Bactericide	0.10	0.10	0.00	0.10	0.00	0.00
Triton X-100	0.00	0.00	0.00	0.00	36.80	0.00
DGBE	0.00	0.00	44.92	0.00	0.00	26.70

Salt : 99^{+}% Pure Sodium Chloride
Sugar : 98^{+}% Pure Sucrose
Water : De-ionized, 16 $M\Omega^{+}$ resistivity
HEC : Hydroxyethyl Cellulose
DGBE : 99^{+}% Di (ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure) : Polyethylene glycol mono [4-(1,1,3,3-tetramethylbuthyl)phenyl]ether

The composition of ingredients is according to FCC/OET Bulletin 65 Supplement C.

7 Measurement Process

Area Scan for Maximum Search :

The SAR distribution at the exposed side of the head was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 10 mm × 10 mm. The evaluation on the measured area scan gives the interpolated maximum (hot spot) of the measured area.

Cube Scan for Spatial Peak SAR Evaluation :

The 1g and 10g peak evaluations were available for the predefined cube 5×5×7 scans. The grid spacing was 8 mm × 8 mm × 5 mm. The first procedure is an extrapolation to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume in a 1mm grid (35000 points). In the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is moved around until the highest averaged SAR is found. This last procedure is repeated for a 10g cube. If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

Extrapolation :

The extrapolation is based on a least square algorithm. Through the points in the first 3 cm in all z-axis, polynomials of order four are calculated. This polynomial is then used to evaluate the points between the surface and the probe tip. The points, calculated from the surface, have a distance of 1 mm from one another.

Interpolation :

The maximum interpolated value is searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) are computed by the 3D spline algorithm. The 3D spline is composed of three one-dimensional splines with the “Not a knot” –condition (x, y and z –directions). The volume is integrated with the trapezoidal algorithm.

8 Measurement Uncertainties

Uncertainty Component	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i (1g)**	**c_i (10g)**	**Std. Unc. (± %) 1g**	**Std. Unc. (± %) 10g**	**v_i**
Measurement System								
Probe calibration	5.9	N	1	1	1	5.9	5.9	∞
Axial isotropy	4.7	R	√3	0.7	0.7	1.9	1.9	∞
Hemispherical isotropy	9.6	R	√3	0.7	0.7	3.9	3.9	∞
Boundary effect	1.0	R	√3	1	1	0.6	0.6	∞
Linearity	4.7	R	√3	1	1	2.7	2.7	∞
System detection limits	1.0	R	√3	1	1	0.6	0.6	∞
Readout electronics	0.4	N	1	1	1	0.4	0.4	∞
Response time	0.0	R	√3	1	1	0.0	0.0	∞
Integration time	2.6	R	√3	1	1	1.5	1.5	∞
RF ambient conditions – noise	3.0	R	√3	1	1	1.7	1.7	∞
RF ambient conditions – reflections	3.0	R	√3	1	1	1.7	1.7	∞
Probe positioner mechanical tolerance	0.4	R	√3	1	1	0.2	0.2	∞
Probe positioning with respect to phantom shell	2.9	R	√3	1	1	1.7	1.7	∞
Extrapolation, interpolation and integration algorithms for max. SAR evaluation	1.0	R	√3	1	1	0.6	0.6	∞
Test Sample Related								
Test sample positioning	3.4	N	1	1	1	3.4	3.4	23
Device holder uncertainty	2.9	N	1	1	1	2.9	2.9	5
Output power variation – SAR drift measurement	5.0	R	√3	1	1	2.9	2.9	∞
Phantom and Tissue Parameters								
Phantom uncertainty	4.0	R	√3	1	1	2.3	2.3	∞
Liquid conductivity – deviation from target	5.0	R	√3	0.64	0.43	1.8	1.2	∞
Liquid Conductivity – measurement uncertainty	3.2	N	1	0.64	0.43	2.0	1.4	5
Liquid Permittivity – deviation from target	5.0	R	√3	0.6	0.49	1.7	1.4	∞
Liquid Permittivity – measurement uncertainty	3.0	N	1	0.6	0.49	1.8	1.5	5
Combined Standard Uncertainty		RSS				11.0	10.7	
Expanded Uncertainty (95% Confidence Interval)		k=2				22.0	21.4	

NOTES
1. Tol. : tolerance in influence quantity
2. Prob. Dist. : probability distributions
3. N, R : normal, rectanglar
4. Div. : divisor used to obtain standard uncertainty
5. c_i : sensitivity coefficient
6. Std. Unc. : standard uncertainty
7. Measurement uncertainties are according to IEEE Std. 1528 and IEC 62209-1.

9 Equipment Under Test Modification

☒ - No modifications were conducted by JQA to achieve compliance to the limitations.
☐ - To achieve compliance to the limitations, the following changes were made by JQA during the compliance test.

The modifications will be implemented in all production models of this equipment.

Applicant : Not Applicable
Date : Not Applicable
Typed Name : Not Applicable
Position : Not Applicable Signatory : ______________________

10 Responsible Party

Responsible Party of Test Item (Product)

Responsible Party :

Contact Person : ______________________
Signatory

11 Deviation from Standard

☒ - No deviations from the standard described in clause 1.
☐ - The following deviations were employed from the standard described in clause 1.

12 Test Results

Maximum SAR (1g)	0.908 mW/g at 2412 MHz	
Body-worn Carry Accessories	☒ - Supplied	☐ - Not supplied
Separation Distance between Device and Phantom		0 mm
Modulation Type		DSSS

Remarks : ______

13 Summary

General Remarks :

The EUT was tested according to the requirements of the following standard.
FCC/OET Bulletin 65 Supplement C (Edition 01-01)
The test configuration is shown in clause 14 to 15.
The conclusion for the test items of which are required by the applied regulation is indicated under the test results.

Test Results :

The "as received" sample;

☒ - fulfill the test requirements of the regulation mentioned on clause 1.
☐ - doesn't fulfill the test requirements of the regulation mentioned on clause 1.

Reviewed by:

S. Kino

Shigeru Kinoshita
Deputy Manager
Testing Dept. EMC Div.
JQA KITA-KANSAI Testing Center

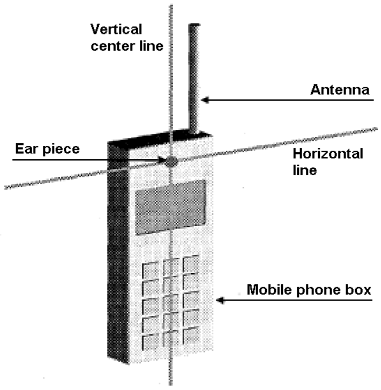
Tested by:

Y. Sakai

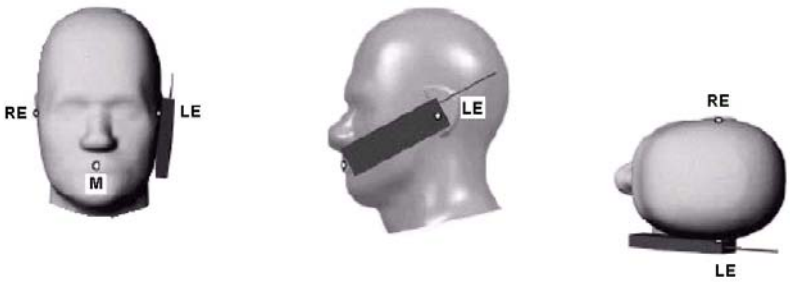
Yasuhisa Sakai
Engineer
Testing Dept. EMC Div.
JQA KITA-KANSAI Testing Center

14 Test Arrangement

14.1 Cheek-Touch Position

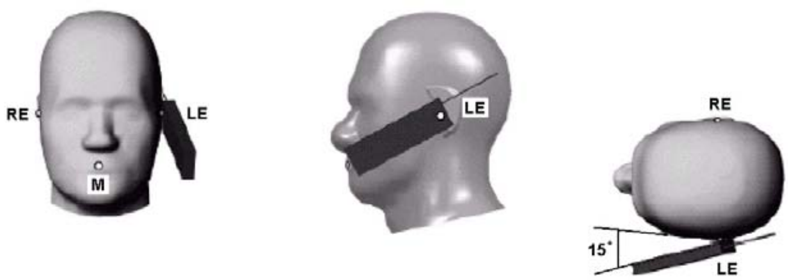


1. Position the device with the vertical center line of the body of the device and the horizontal line crossing the center of the ear piece in a plane parallel to the sagittal plane of the phantom.
2. While maintaining the device in this plane, align the vertical center line with the reference plane containing the three ear and mouth reference points (M, RE and LE) and align the center of the ear piece with the line RE-LE.
3. Translate the mobile phone box towards the phantom with the ear piece aligned with the line RE-LE until the phone touches the ear.
4. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the box until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost.



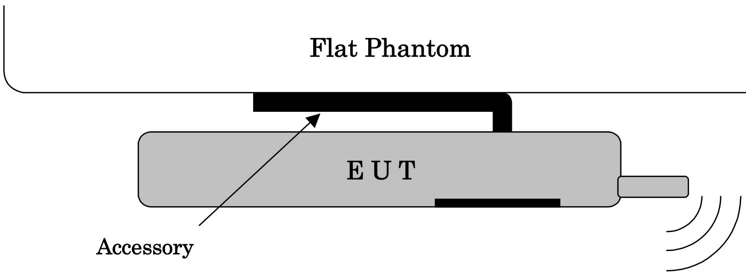
14.2 Ear-Tilt Position

1. Position the device in the “Cheek/Touch Position”.
2. While maintaining the device in the reference plane and pivoting against the ear, move it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost.



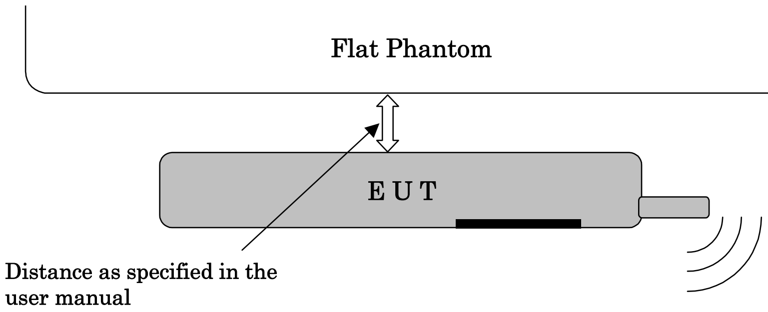
14.3 Body-worn Configuration

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. Devices with a headset output should be tested with a headset connected to the device. Both the physical spacing to the body of the user as dictated by the accessory and the materials used in an accessory affect the SAR produced by the transmitting device. For purpose of determining test requirements, accessories may be divided into two categories: those that do not contain metallic components and those that do.



When multiple accessories that do not contain metallic components are supplied with the device, the device may be tested with only the accessory that dictates the closest spacing to the body. When multiple accessories that contain metallic components are supplied with the device, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component (e.g., the same metallic belt-clip used with different holsters with no other metallic components), only the accessory that dictates the closest spacing to the body must be tested.

Body-worn accessories may not always be supplied or available as options for some devices that are intended to be authorized for body-worn use. A separation distance of 1.5 cm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances. Other separation distances may be used, but they should not exceed 2.5 cm. In these cases, the device may use body-worn accessories that provide a separation distance greater than that tested for the device provided however that the accessory contains no metallic components.



Lap-held device (e.g. laptop computer)
SAR is tested for a lap-held position with the bottom of the computer in direct contact against a flat phantom.

15 Equipment Under Test Tune-Up Procedures

The following procedures had been used to prepare the EUT for the SAR test.

Conducted power measurements:

Communication system : Wireless LAN 802.11b (1 Mbps)
Modulation type : Direct Sequence Spread Spectrum (DSSS)

Channel	Frequency (MHz)	Average Power (dBm)
1	2412	10.84
6	2437	10.58
11	2462	10.64

Communication system : Wireless LAN 802.11g (6 Mbps)
Modulation type : Orthogonal Frequency Division Multiplexing (OFDM)

Channel	Frequency (MHz)	Average Power (dBm)
1	2412	9.69
6	2437	9.48
11	2462	9.49

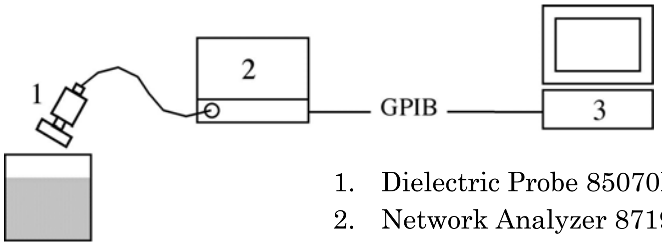
To setup the desire channel frequency and the maximum output power, RF test mode prepared by the manufacturer was used to program the EUT.

Maximum conducted power was measured by replacing the antenna with an adapter for conductive measurements, before and after the SAR measurements was done.

Appendix A: Test Data

A.1 Tissue Verification

The tissue dielectric parameters of the tissue medium at the middle of a device transmission band should be within ±5% of the parameters specified at that target frequency. It is verified by using the dielectric probe and the network analyzer.



1. Dielectric Probe 85070D
2. Network Analyzer 8719ET
3. Personal Computer

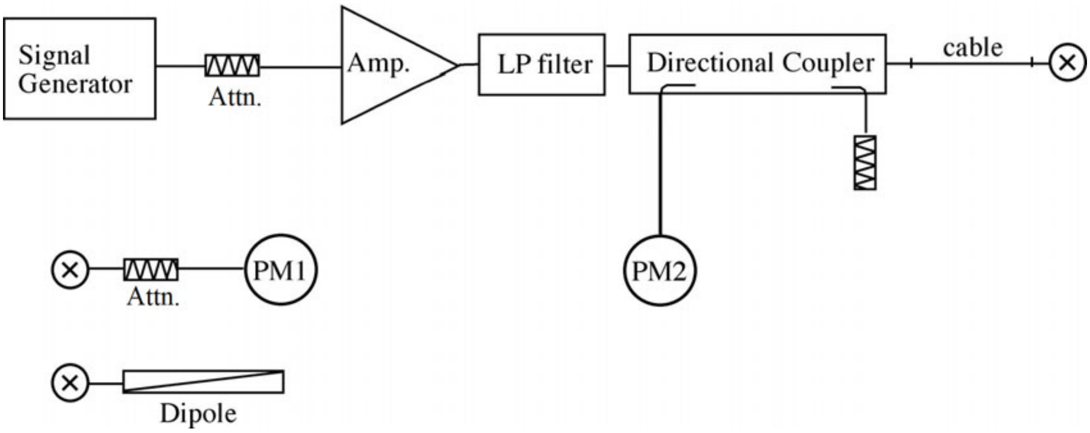
Tissue Verification Results :

Ambient Conditions : 23°C 72%					Date : June 29, 2007	
Liquid		Parameters	Target	Measured	Deviation [%]	Limit [%]
Medium	Temp. [°C]					
Muscle 2450 MHz	23.0	Permittivity	52.7	51.66	-1.97	± 5
		Conductivity	1.95	2.018	+3.49	± 5

A.2 System Validation

The power meter PM1 (including Attenuator) measures the forward power at the location of the validation dipole connector. The signal generator is adjusted for 250 mW at the dipole connector and the power meter PM2 is read at that level. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter PM2.

The dipole antenna is matched to be used near flat phantom filled with tissue simulating solution. A specific distance holder is used in the positioning of the antenna to ensure correct spacing between the phantom and the dipole.



System Validation Results :

System Validation Dipole : D2450V2, S/N: 714 Ambient Conditions : 23°C 72% Depth of Liquid : 15.0 cm Date : June 29, 2007						
Liquid		Measured SAR (mW/g)		Target	Deviation [%]	Limit [%]
Medium	Temp. [°C]	1g SAR	Normalized to 1 W			
Muscle 2450 MHz	23.0	13.7	54.8	51.2	+7.03	± 10

NOTES :
1. The results were normalized to 1 W forward power.
2. The numerical reference SAR values of SPEAG validation dipoles are given in DASY4 manual. These were calculated using the finite-difference time-domain method and the geometry parameters as defined in the reference documents (e.g., IEEE Std. 1528, IEC 62209-1).
3. Please refer to attachment for the result presentation in plot format.

A.3 SAR Measurement Data

A.3.1 Back Position

CONFIDENTIAL

802.11b (1 Mbps) – Duty Cycle: 100 % Date : June 29, 2007

EUT Set-up Configuration		Frequency		Power [dBm] (Average)		Limit [mW/g]	SAR (1g) [mW/g]	Tissue Temp. [°C]
Separation	Antenna	Channel	MHz	Start	End			
0 mm	Fixed	1	2412	--	--	1.6	**	--
		6	2437	10.58	10.53		0.750	23.0
		11	2462	--	--		**	--
802.11g (6 Mbps) – Duty Cycle: 100 %								
0 mm	Fixed	1	2412	--	--	1.6	**	--
		6	2437	9.48	9.46		0.559	23.0
		11	2462	--	--		**	--

NOTES :
1. Depth of Liquid : 15.0 cm
2. Transmitter power was measured at the antenna-conducted terminal.
3. The SAR result marked at ** is optional, because the SAR measured at the middle channel for that configuration is at least 3.0 dB lower than the SAR limit.
4. Please refer to attachment for the result presentation in plot format.

A.3.2 Front Position

CONFIDENTIAL

802.11b (1 Mbps) – Duty Cycle: 100 %								Date : June 29, 2007
EUT Set-up Configuration		Frequency		Power [dBm] (Average)		Limit [mW/g]	SAR (1g) [mW/g]	Tissue Temp. [°C]
Separation	Antenna	Channel	MHz	Start	End			
0 mm	Fixed	1	2412	--	--	1.6	**	--
		6	2437	10.58	10.53		0.328	23.0
		11	2462	--	--		**	--
802.11g (6 Mbps) – Duty Cycle: 100 %								
0 mm	Fixed	1	2412	--	--	1.6	**	--
		6	2437	9.48	9.46		0.241	23.0
		11	2462	--	--		**	--

NOTES :
1. Depth of Liquid : 15.0 cm
2. Transmitter power was measured at the antenna-conducted terminal.
3. The SAR result marked at ** is optional, because the SAR measured at the middle channel for that configuration is at least 3.0 dB lower than the SAR limit.
4. Please refer to attachment for the result presentation in plot format.

A.3.3 Side (Right) Position

CONFIDENTIAL

802.11b (1 Mbps) – Duty Cycle: 100 % Date : June 29, 2007

EUT Set-up Configuration		Frequency		Power [dBm] (Average)		Limit [mW/g]	SAR (1g) [mW/g]	Tissue Temp. [°C]
Separation	Antenna	Channel	MHz	Start	End			
0 mm	Fixed	1	2412	--	--	1.6	**	--
		6	2437	10.58	10.53		0.650	23.0
		11	2462	--	--		**	--
802.11g (6 Mbps) – Duty Cycle: 100 %								
0 mm	Fixed	1	2412	--	--	1.6	**	--
		6	2437	9.48	9.46		0.506	23.0
		11	2462	--	--		**	--

NOTES :
1. Depth of Liquid : 15.0 cm
2. Transmitter power was measured at the antenna-conducted terminal.
3. The SAR result marked at ** is optional, because the SAR measured at the middle channel for that configuration is at least 3.0 dB lower than the SAR limit.
4. Please refer to attachment for the result presentation in plot format.

A.3.4 Top Position

CONFIDENTIAL

EUT Set-up Configuration		Frequency		Power [dBm] (Average)		Limit [mW/g]	SAR (1g) [mW/g]	Tissue Temp. [°C]
Separation	Antenna	Channel	MHz	Start	End			
802.11b (1 Mbps) – Duty Cycle: 100 %					Date : June 29, 2007			
0 mm	Fixed	1	2412	10.84	10.84	1.6	0.908	23.0
		6	2437	10.58	10.53		0.815	23.0
		11	2462	10.64	10.64		0.637	23.0
802.11g (6 Mbps) – Duty Cycle: 100 %								
0 mm	Fixed	1	2412	--	--	1.6	**	--
		6	2437	9.48	9.46		0.596	23.0
		11	2462	--	--		**	--

NOTES :
1. Depth of Liquid : 15.0 cm
2. Transmitter power was measured at the antenna-conducted terminal.
3. The SAR result marked at ** is optional, because the SAR measured at the middle channel for that configuration is at least 3.0 dB lower than the SAR limit.
4. Please refer to attachment for the result presentation in plot format.

Appendix B: Test Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
E-Field Probe	ET3DV6	SPEAG	S-2	2006/11	1 Year
DAE	DAE3 V1	SPEAG	S-3	2006/11	1 Year
Robot	RX60L	SPEAG	S-7	N/A	N/A
Probe Alignment Unit	LB1RX60L	SPEAG	S-13	N/A	N/A
Network Analyzer	8719ET	Agilent	B-53	2006/6	1 Year
Dielectric Probe Kit	85070D	Agilent	B-54	N/A	N/A
2450MHz Dipole	D2450V2	SPEAG	S-6	2006/11	1 Year
Signal Generator	MG3681A	Anritsu	B-3	2007/2	1 Year
RF Amplifier	A0840-3833-R	R&K	A-34	N/A	N/A
Low Pass Filter	LSM2700-3BA	LARK	D-92	2006/12	1 Year
Power Meter	E4417A	Agilent	B-51	2006/6	1 Year
Power Sensor	E9300B	Agilent	B-32	2006/6	1 Year
Power Meter	N1911A	Agilent	B-63	2006/6	1 Year
Power Sensor	N1921A	Agilent	B-64	2006/6	1 Year
Attenuator	4T-10	Weinschel	D-73	2007/6	1 Year

Appendix C: Attachments

Exhibit	Contents	No. of page(s)
1	System Validation Plots	1
2	SAR Test Plots	11
3	Dosimetric E-Field Probe – ET3DV6, S/N: 1679	9
4	System Validation Dipole – D2450V2, S/N: 714	9

Attachment 1 – System Validation Plots

Date/Time: 2007/06/29 9:39:55

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

System Validation

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 714

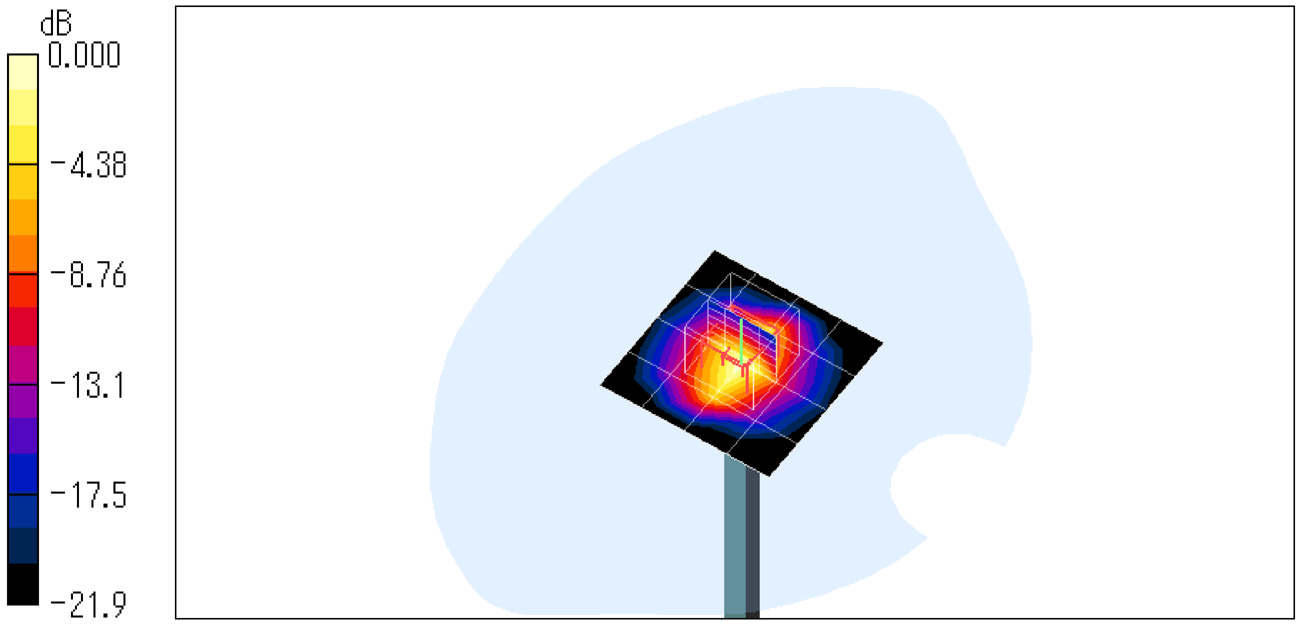
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2450 MHz; σ = 2.02 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.29, 4.29, 4.29); Calibrated: 2006/11/16
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn508; Calibrated: 2006/11/09
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Antenna Input Power 250 mW/Area Scan (5x5x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (measured) = 15.3 mW/g

Antenna Input Power 250 mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 90.5 V/m; Power Drift = -0.025 dB
Peak SAR (extrapolated) = 31.8 W/kg
SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.26 mW/g
Maximum value of SAR (measured) = 15.2 mW/g



0 dB = 15.2mW/g

Attachment 2 – SAR Test Plots

Date/Time: 2007/06/29 13:14:55

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

802.11b 6ch (2437MHz) - back

DUT: Portable Media Player; Type: MET401; Serial: MG1-A07-CH031-CSJ

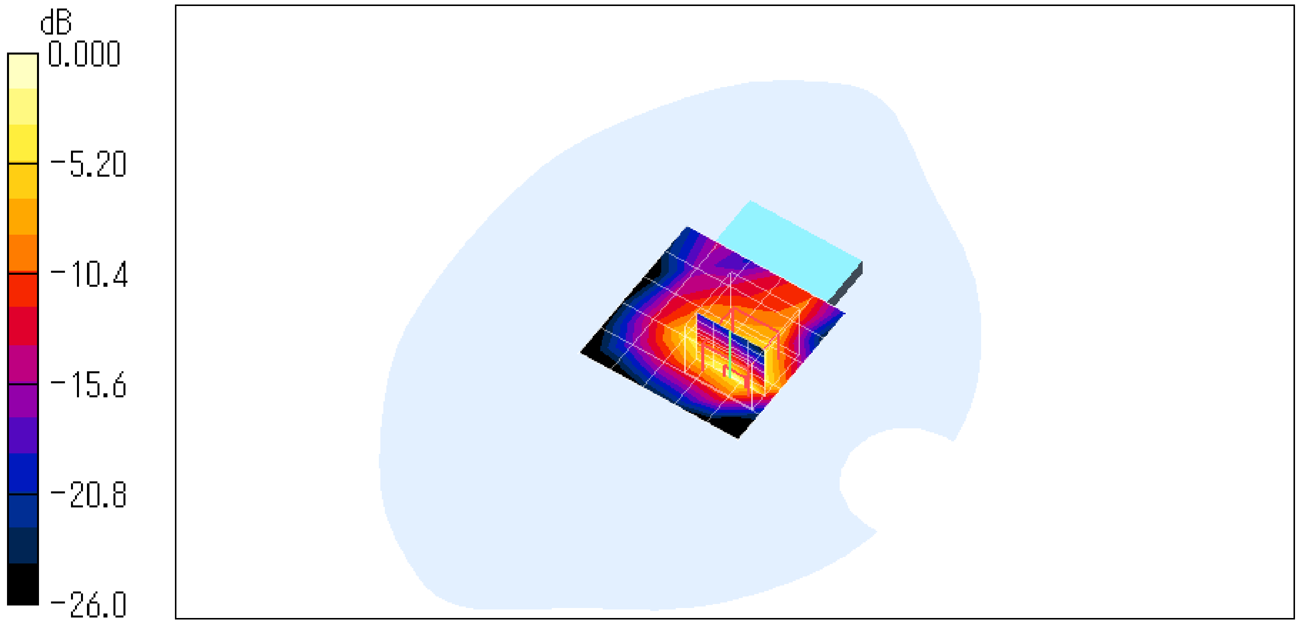
Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2437 MHz; σ = 2.02 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.29, 4.29, 4.29); Calibrated: 2006/11/16
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn508; Calibrated: 2006/11/09
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn/Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.704 mW/g

Body-worn/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.78 V/m; Power Drift = -0.189 dB
Peak SAR (extrapolated) = 3.12 W/kg
SAR(1 g) = 0.750 mW/g; SAR(10 g) = 0.262 mW/g



0 dB = 0.704mW/g

Date/Time: 2007/06/29 15:06:55

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

802.11g 6ch (2437MHz) - back

DUT: Portable Media Player; Type: MET401; Serial: MG1-A07-CH031-CSJ

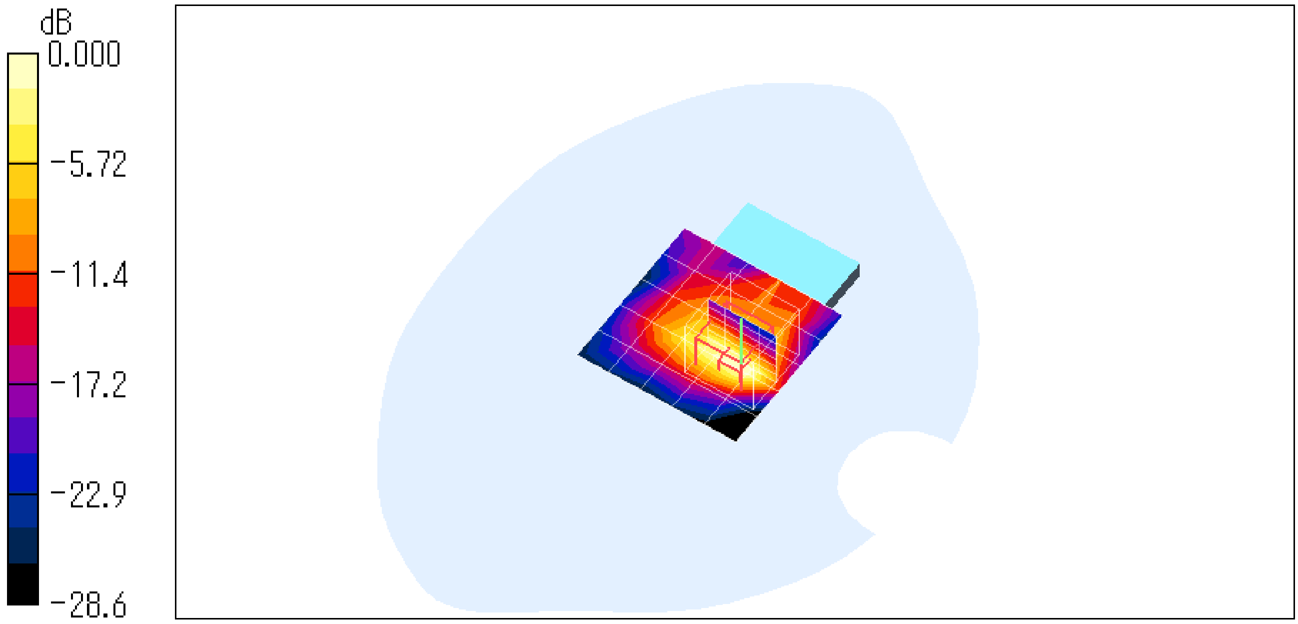
Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2437 MHz; σ = 2.02 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.29, 4.29, 4.29); Calibrated: 2006/11/16
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn508; Calibrated: 2006/11/09
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn/Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.481 mW/g

Body-worn/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.70 V/m; Power Drift = 0.126 dB
Peak SAR (extrapolated) = 2.07 W/kg
SAR(1 g) = 0.559 mW/g; SAR(10 g) = 0.205 mW/g
Maximum value of SAR (measured) = 0.528 mW/g



0 dB = 0.528mW/g

Date/Time: 2007/06/29 13:31:40

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

802.11b 6ch (2437MHz) - front

DUT: Portable Media Player; Type: MET401; Serial: MG1-A07-CH031-CSJ

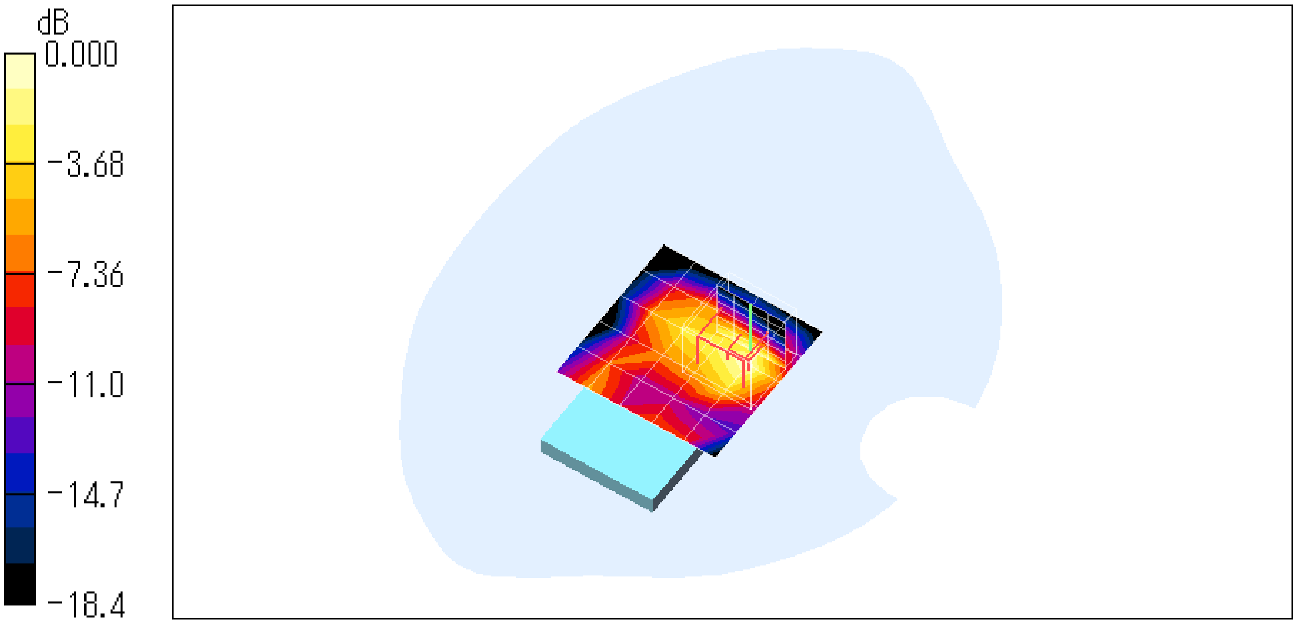
Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2437 MHz; σ = 2.02 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.29, 4.29, 4.29); Calibrated: 2006/11/16
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn508; Calibrated: 2006/11/09
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn/Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.329 mW/g

Body-worn/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.0 V/m; Power Drift = 0.004 dB
Peak SAR (extrapolated) = 0.907 W/kg
SAR(1 g) = 0.328 mW/g; SAR(10 g) = 0.146 mW/g
Maximum value of SAR (measured) = 0.349 mW/g



0 dB = 0.349mW/g

Date/Time: 2007/06/29 15:23:51

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

802.11g 6ch (2437MHz) - front

DUT: Portable Media Player; Type: MET401; Serial: MG1-A07-CH031-CSJ

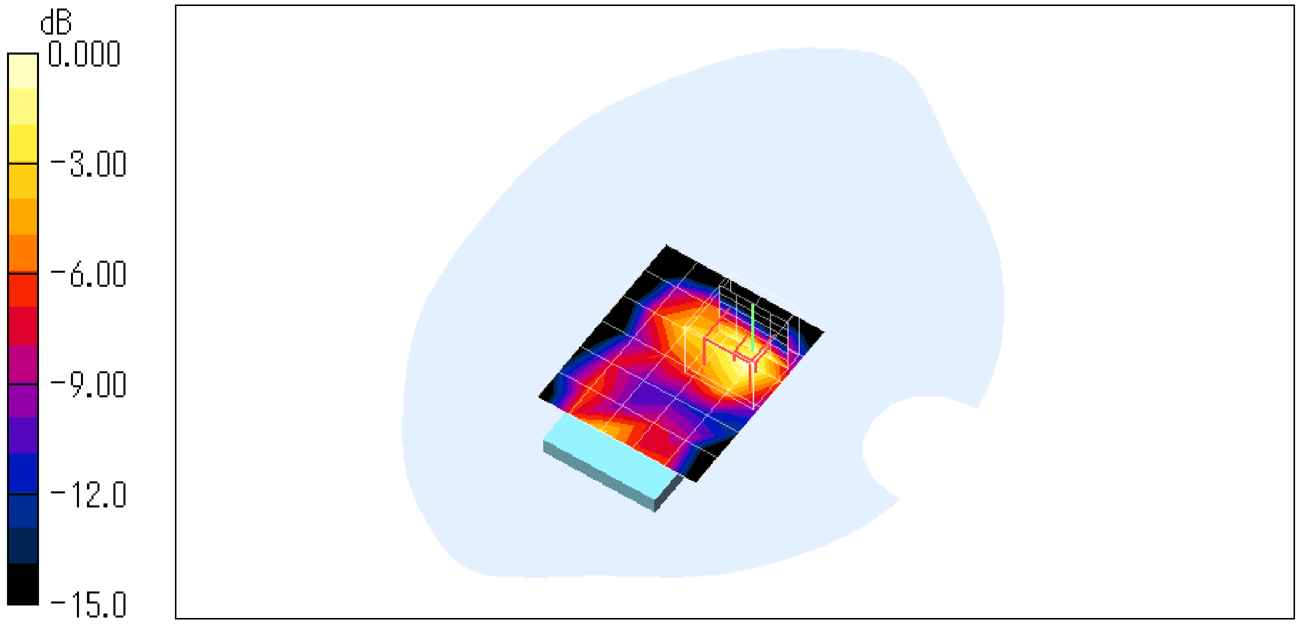
Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2437 MHz; σ = 2.02 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.29, 4.29, 4.29); Calibrated: 2006/11/16
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn508; Calibrated: 2006/11/09
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn/Area Scan (6x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.243 mW/g

Body-worn/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.53 V/m; Power Drift = 0.032 dB
Peak SAR (extrapolated) = 0.681 W/kg
SAR(1 g) = 0.241 mW/g; SAR(10 g) = 0.106 mW/g
Maximum value of SAR (measured) = 0.248 mW/g



0 dB = 0.248mW/g

Date/Time: 2007/06/29 13:52:30

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

802.11b 6ch (2437MHz) - side (right)

DUT: Portable Media Player; Type: MET401; Serial: MG1-A07-CH031-CSJ

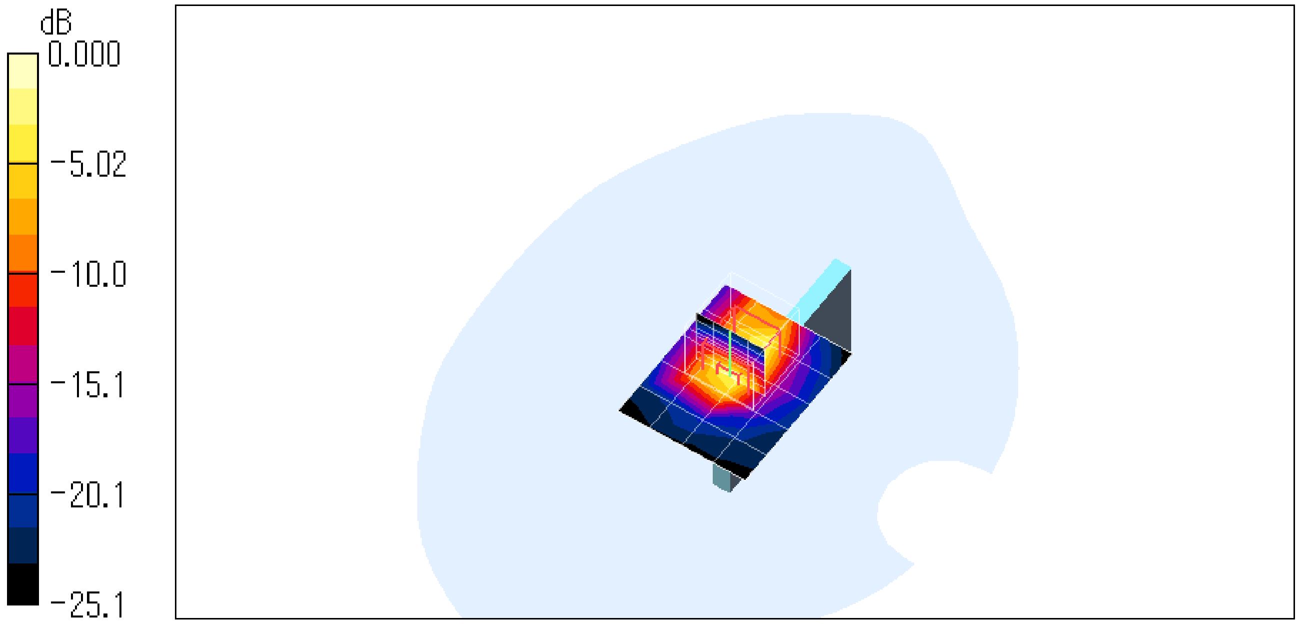
Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2437 MHz; σ = 2.02 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.29, 4.29, 4.29); Calibrated: 2006/11/16
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn508; Calibrated: 2006/11/09
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn/Area Scan (5x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.686 mW/g

Body-worn/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.4 V/m; Power Drift = -0.057 dB
Peak SAR (extrapolated) = 2.04 W/kg
SAR(1 g) = 0.650 mW/g; SAR(10 g) = 0.252 mW/g
Maximum value of SAR (measured) = 0.747 mW/g



0 dB = 0.747mW/g

Date/Time: 2007/06/29 14:52:42

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

802.11g 6ch (2437MHz) - side (right)

DUT: Portable Media Player; Type: MET401; Serial: MG1-A07-CH031-CSJ

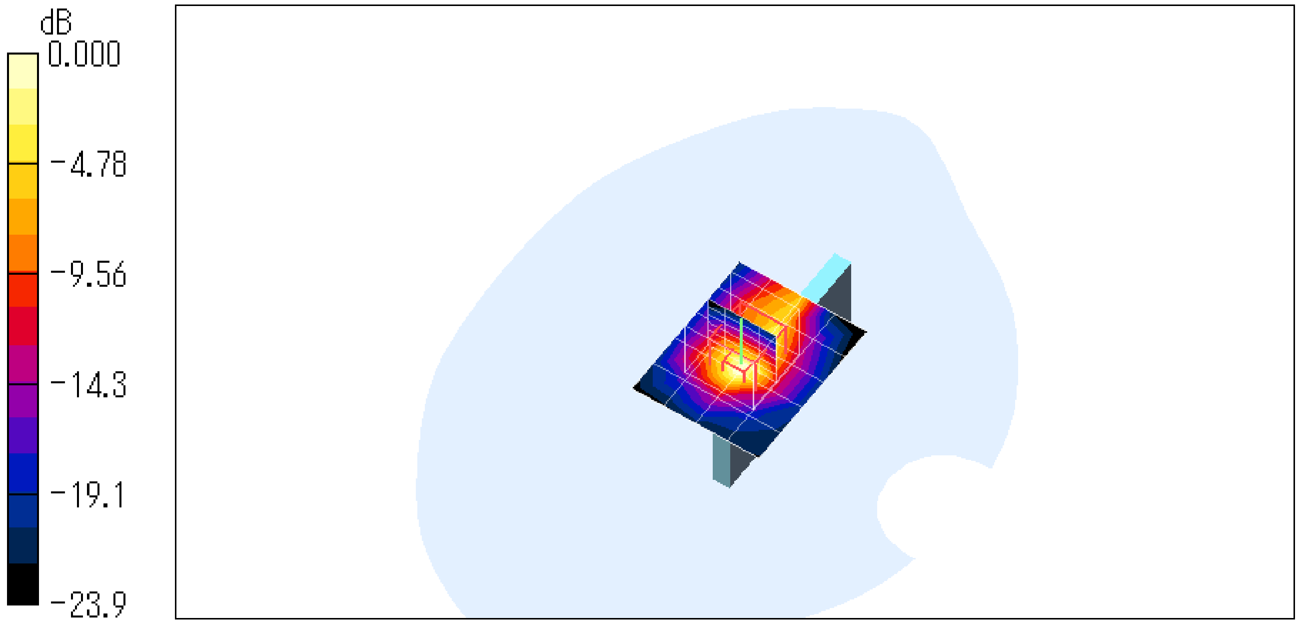
Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2437 MHz; σ = 2.02 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.29, 4.29, 4.29); Calibrated: 2006/11/16
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn508; Calibrated: 2006/11/09
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn/Area Scan (5x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.574 mW/g

Body-worn/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.2 V/m; Power Drift = -0.074 dB
Peak SAR (extrapolated) = 1.72 W/kg
SAR(1 g) = 0.506 mW/g; SAR(10 g) = 0.195 mW/g
Maximum value of SAR (measured) = 0.570 mW/g



0 dB = 0.570mW/g

Date/Time: 2007/06/29 15:58:38

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

802.11b 1ch (2412MHz) - top

DUT: Portable Media Player; Type: MET401; Serial: MG1-A07-CH031-CSJ

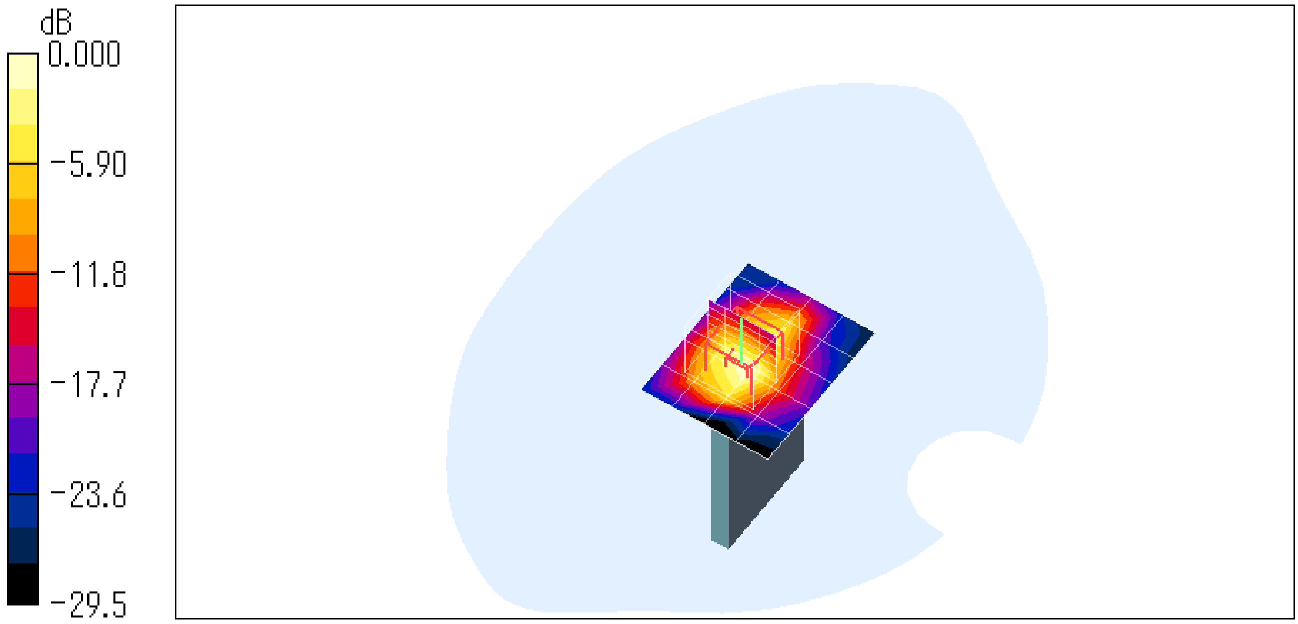
Communication System: WLAN; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2412 MHz; σ = 2.02 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.29, 4.29, 4.29); Calibrated: 2006/11/16
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn508; Calibrated: 2006/11/09
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn/Area Scan (5x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.936 mW/g

Body-worn/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.5 V/m; Power Drift = -0.158 dB
Peak SAR (extrapolated) = 2.04 W/kg
SAR(1 g) = 0.908 mW/g; SAR(10 g) = 0.402 mW/g
Maximum value of SAR (measured) = 0.996 mW/g



0 dB = 0.996mW/g

Date/Time: 2007/06/29 16:07:14

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

802.11b 1ch (2412MHz) - top

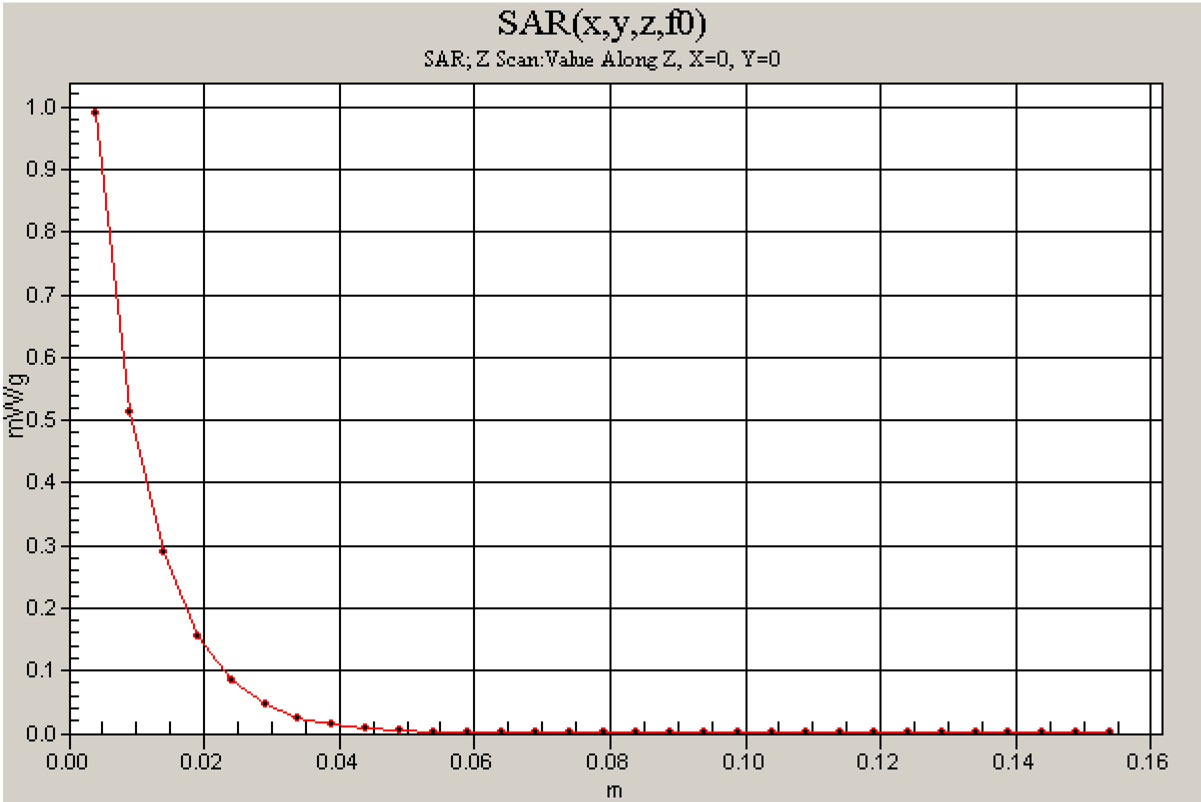
DUT: Portable Media Player; Type: MET401; Serial: MG1-A07-CH031-CSJ

Communication System: WLAN; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2412 MHz; σ = 2.02 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.29, 4.29, 4.29); Calibrated: 2006/11/16
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn508; Calibrated: 2006/11/09
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.989 mW/g



Date/Time: 2007/06/29 14:10:37

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

802.11b 6ch (2437MHz) - top

DUT: Portable Media Player; Type: MET401; Serial: MG1-A07-CH031-CSJ

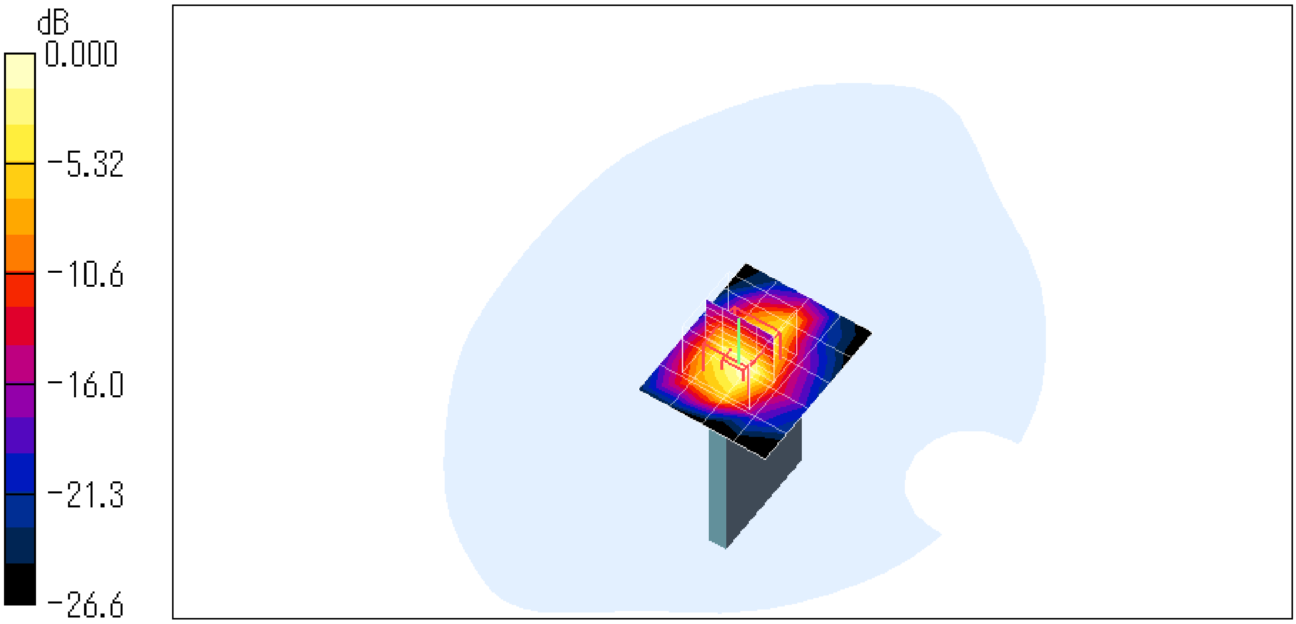
Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2437 MHz; σ = 2.02 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.29, 4.29, 4.29); Calibrated: 2006/11/16
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn508; Calibrated: 2006/11/09
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn/Area Scan (5x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.815 mW/g

Body-worn/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.9 V/m; Power Drift = 0.077 dB
Peak SAR (extrapolated) = 1.84 W/kg
SAR(1 g) = 0.815 mW/g; SAR(10 g) = 0.359 mW/g
Maximum value of SAR (measured) = 0.894 mW/g



0 dB = 0.894mW/g

Date/Time: 2007/06/29 16:12:11

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

802.11b 11ch (2462MHz) - top

DUT: Portable Media Player; Type: MET401; Serial: MG1-A07-CH031-CSJ

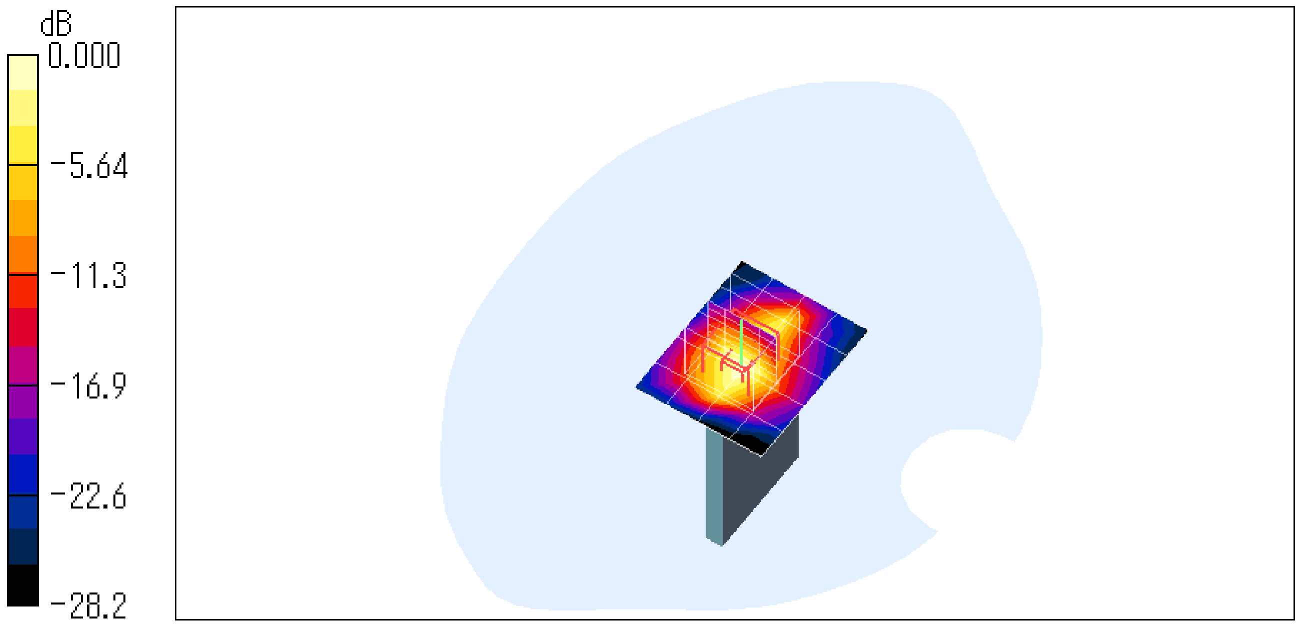
Communication System: WLAN; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2462 MHz; σ = 2.02 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.29, 4.29, 4.29); Calibrated: 2006/11/16
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn508; Calibrated: 2006/11/09
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn/Area Scan (5x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.703 mW/g

Body-worn/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.9 V/m; Power Drift = 0.024 dB
Peak SAR (extrapolated) = 1.48 W/kg
SAR(1 g) = 0.637 mW/g; SAR(10 g) = 0.275 mW/g
Maximum value of SAR (measured) = 0.697 mW/g



0 dB = 0.697mW/g

Date/Time: 2007/06/29 14:39:29

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

802.11g 6ch (2437MHz) - top

DUT: Portable Media Player; Type: MET401; Serial: MG1-A07-CH031-CSJ

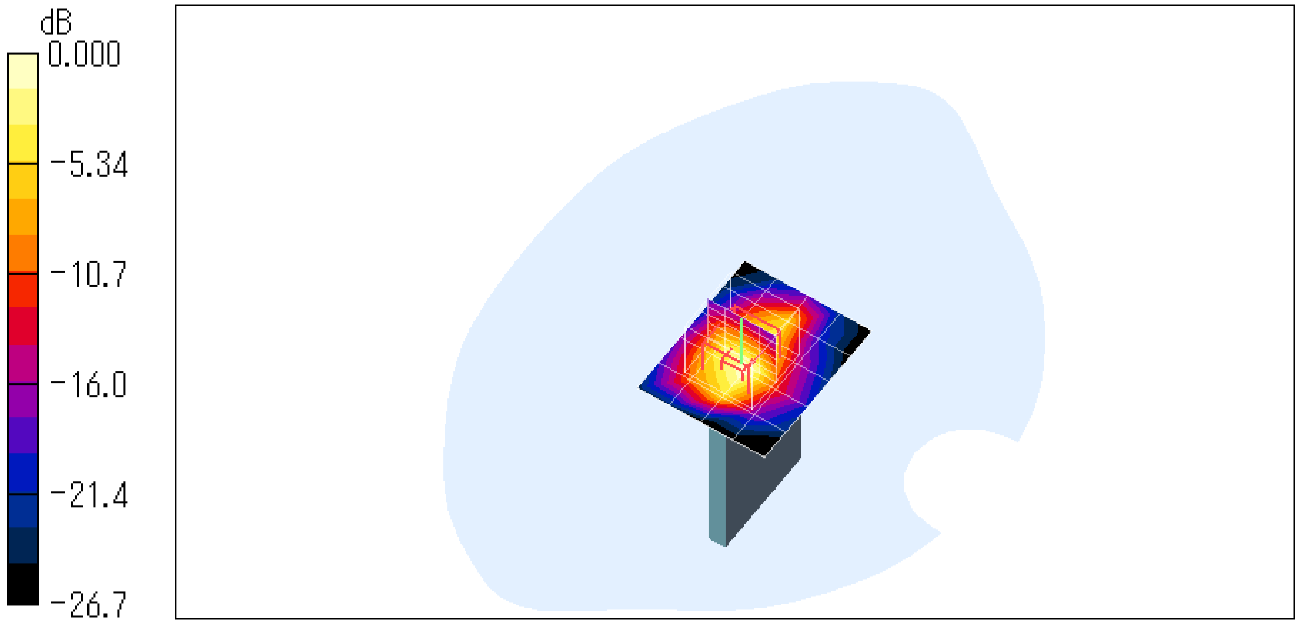
Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2437 MHz; σ = 2.02 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.29, 4.29, 4.29); Calibrated: 2006/11/16
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn508; Calibrated: 2006/11/09
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn/Area Scan (5x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.621 mW/g

Body-worn/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.1 V/m; Power Drift = -0.052 dB
Peak SAR (extrapolated) = 1.37 W/kg
SAR(1 g) = 0.596 mW/g; SAR(10 g) = 0.260 mW/g
Maximum value of SAR (measured) = 0.657 mW/g



0 dB = 0.657mW/g

Attachment 3 – Dosimetric E-Field Probe – ET3DV6, S/N: 1679 Calibration Data

Client **JQA (MTT)**

Certificate No: ET3-1679_Nov06

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1679
Calibration procedure(s)	QA CAL-01.v5 Calibration procedure for dosimetric E-field probes
Calibration date:	November 16, 2006
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-06 (METAS, No. 217-00592)	Aug-07
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-06 (METAS, No. 217-00593)	Aug-07
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	21-Jun-06 (SPEAG, No. DAE4-654_Jun06)	Jun-07

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: November 17, 2006

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

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

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

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

Probe ET3DV6

SN:1679

Manufactured:	May 7, 2002
Last calibrated:	December 15, 2005
Recalibrated:	November 16, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1679

Sensitivity in Free Space[A]

NormX	**1.92** ± 10.1%	$\mu V/(V/m)^2$
NormY	**1.82** ± 10.1%	$\mu V/(V/m)^2$
NormZ	**1.90** ± 10.1%	$\mu V/(V/m)^2$

Diode Compression[B]

DCP X	**94** mV
DCP Y	**97** mV
DCP Z	**97** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL 900 MHz Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	8.0	4.3
SAR_{be} [%]	With Correction Algorithm	0.1	0.2

TSL 1810 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	11.8	8.1
SAR_{be} [%]	With Correction Algorithm	0.5	0.5

Sensor Offset

Probe Tip to Sensor Center **2.7** mm

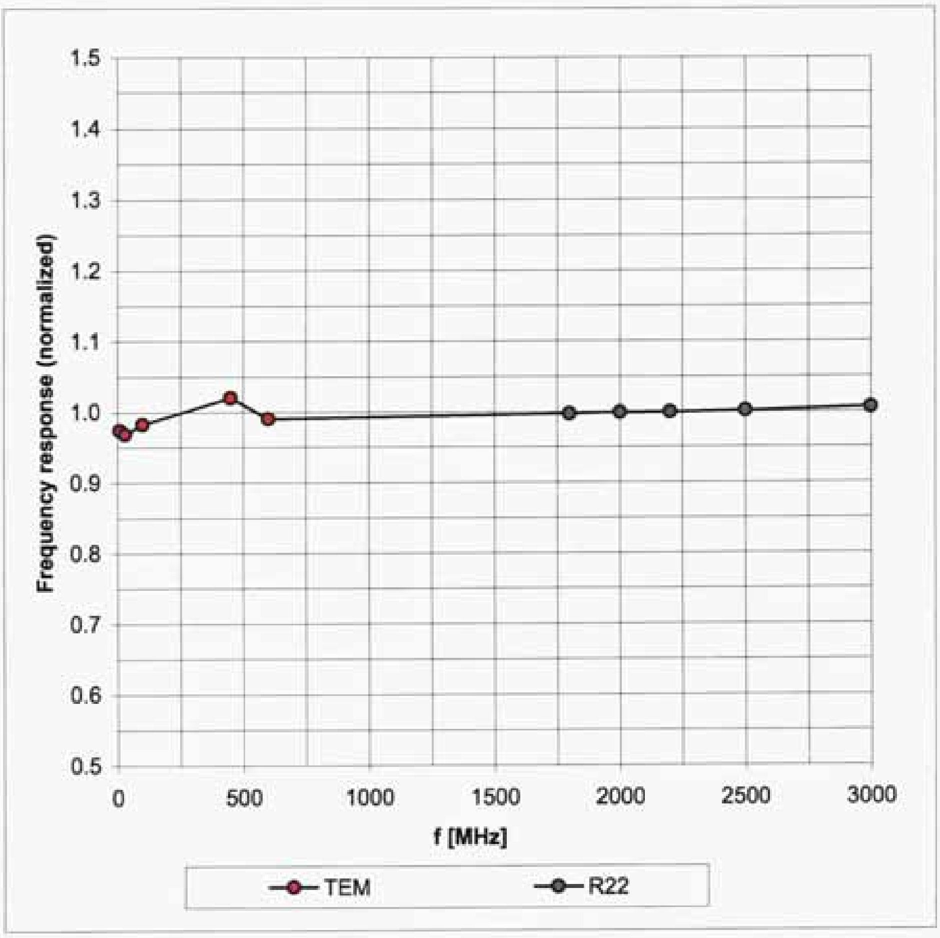
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

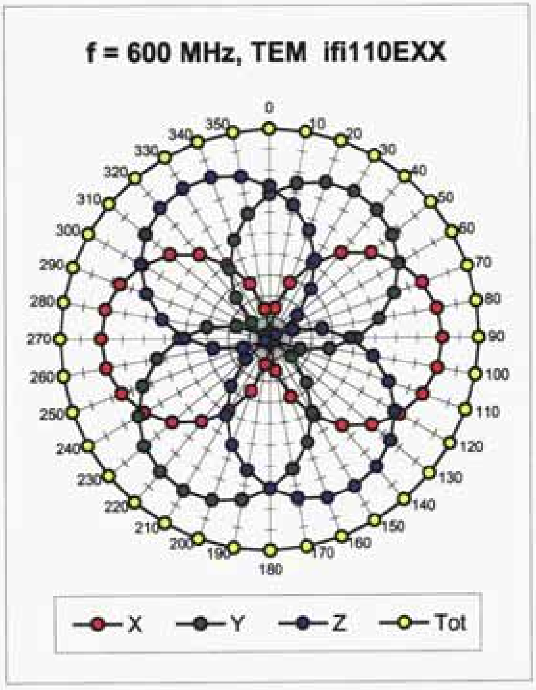
Frequency Response of E-Field

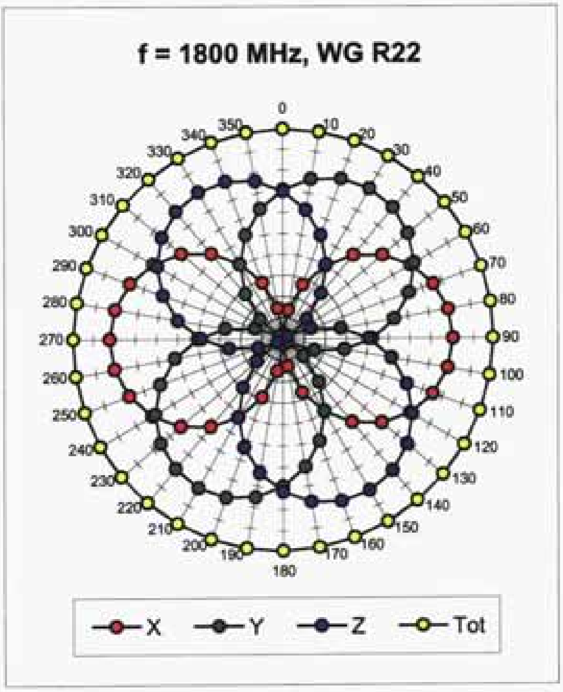
(TEM-Cell:ifi110 EXX, Waveguide: R22)

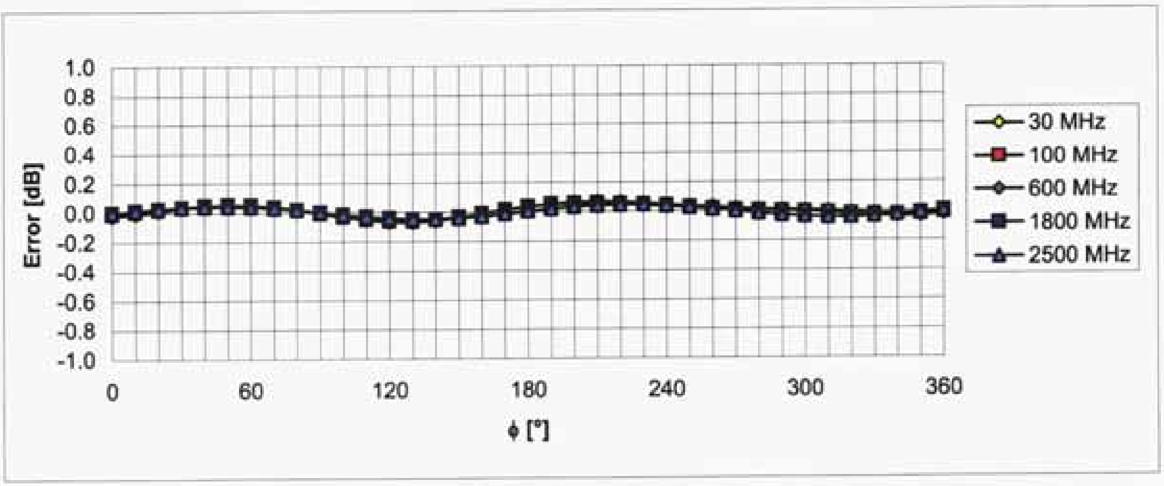


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), $\vartheta = 0°$



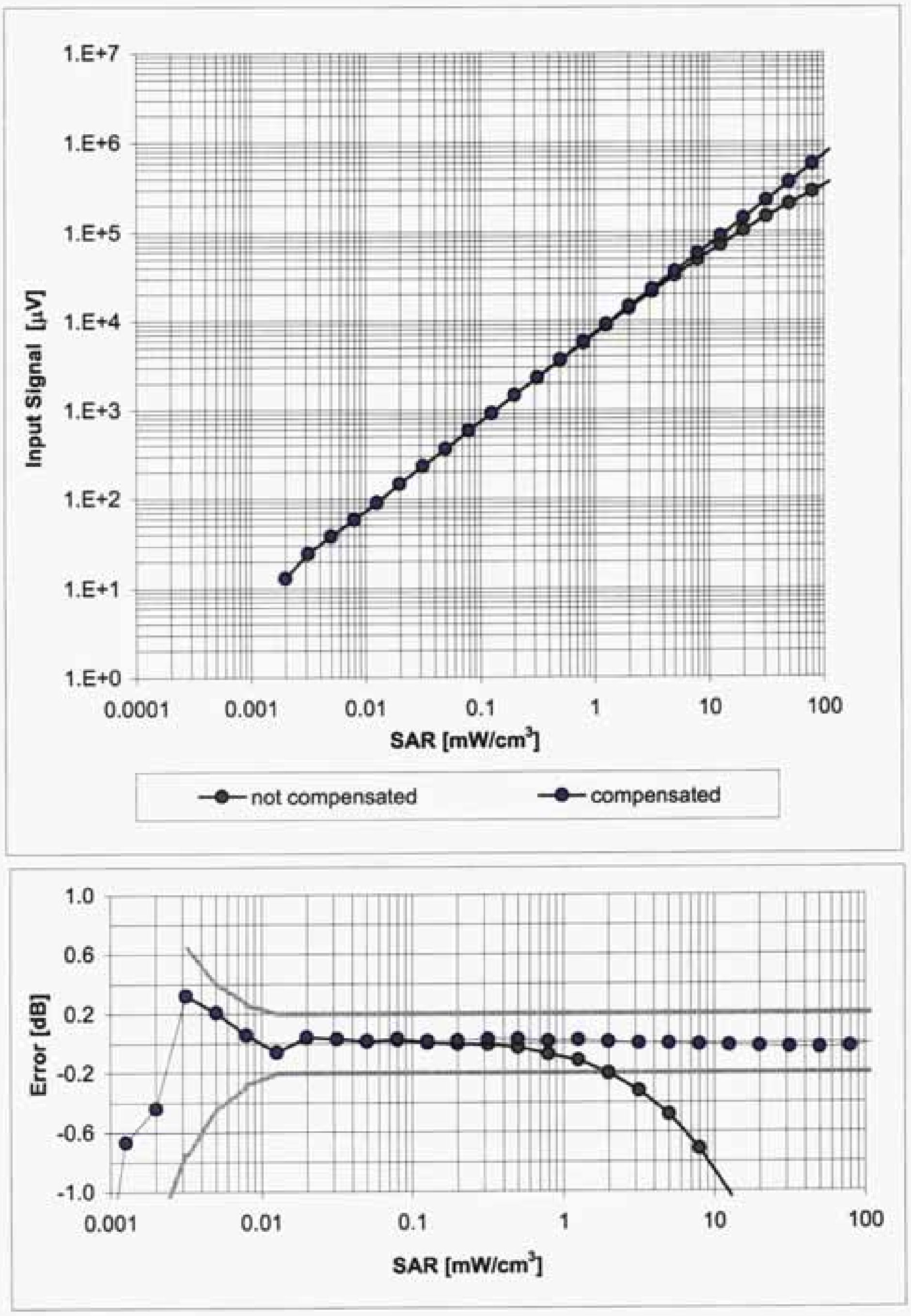




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

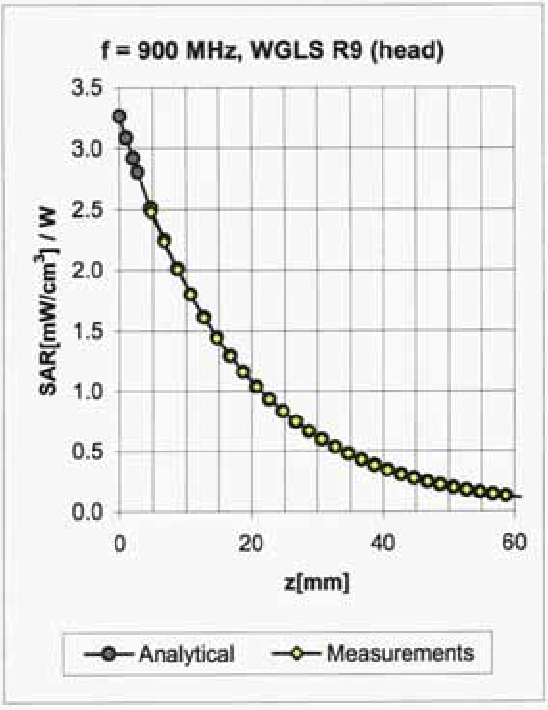
Dynamic Range f(SAR_{head})

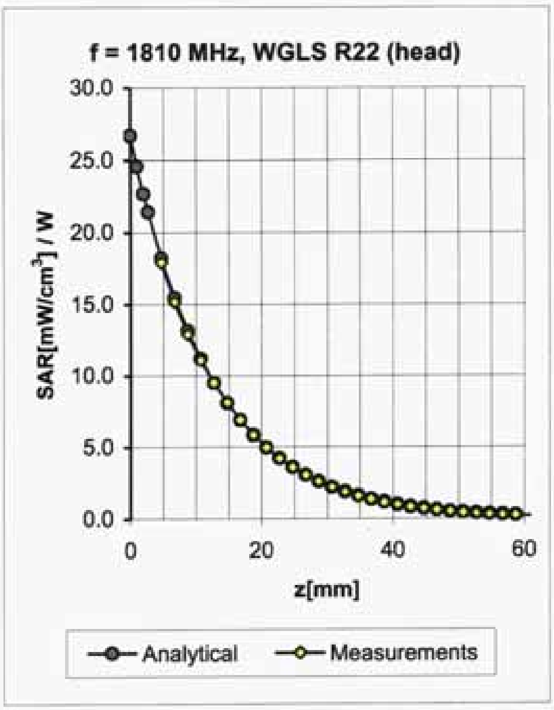
(Waveguide R22, f = 1800 MHz)



Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



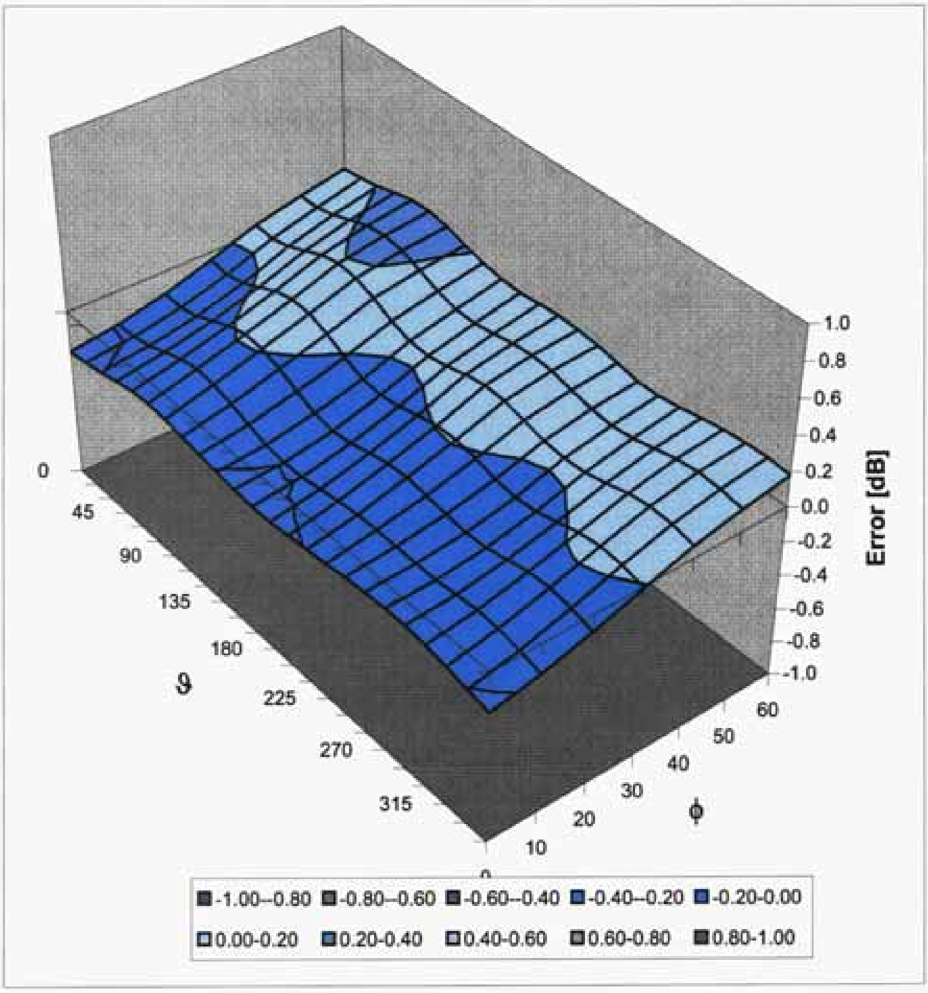


f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.28	2.60	6.58	± 11.0% (k=2)
1450	± 50 / ± 100	Head	40.5 ± 5%	1.20 ± 5%	0.53	2.30	5.70	± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.48	2.64	5.22	± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.58	2.50	4.89	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.71	1.93	4.41	± 11.8% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.30	2.78	6.45	± 11.0% (k=2)
1450	± 50 / ± 100	Body	54.0 ± 5%	1.30 ± 5%	0.57	2.26	5.09	± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.62	2.61	4.61	± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.71	2.44	4.38	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.72	1.84	4.29	± 11.8% (k=2)

[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Attachment 4 – System Validation Dipole – D2450V2, S/N: 714 Calibration Data

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

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

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

Accreditation No.: SCS 108

Client **JQA (MTT)**

Certificate No: D2450V2-714_Nov06

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 714
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	November 10, 2006
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Power sensor HP 8481A	US37292783	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference Probe ES3DV2	SN 3025	19-Oct-06 (SPEAG, No. ES3-3025_Oct06)	Oct-07
DAE4	SN 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

	Name	Function	Signature
Calibrated by:	Marcel Fehr	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 14, 2006

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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

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

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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.3 ± 6 %	1.78 mho/m ± 6 %
Head TSL temperature during test	(20.5 ± 0.2) °C	-------	------

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	condition	
SAR measured	250 mW input power	13.6 mW / g
SAR normalized	normalized to 1W	54.4 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**54.7 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.27 mW / g
SAR normalized	normalized to 1W	25.1 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**25.1 mW / g ± 16.5 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.8 ± 6 %	1.96 mho/m ± 6 %
Body TSL temperature during test	(21.5 ± 0.2) °C	-------	------

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	condition	
SAR measured	250 mW input power	13.4 mW / g
SAR normalized	normalized to 1W	53.6 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**53.0 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.17 mW / g
SAR normalized	normalized to 1W	24.7 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**24.5 mW / g ± 16.5 % (k=2)**

[2] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.9 Ω + 3.3 jΩ
Return Loss	– 28.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.5 Ω + 4.7 jΩ
Return Loss	– 25.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.163 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 05, 2002

DASY4 Validation Report for Head TSL

Date/Time: 10.11.2006 15:13:50

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN714

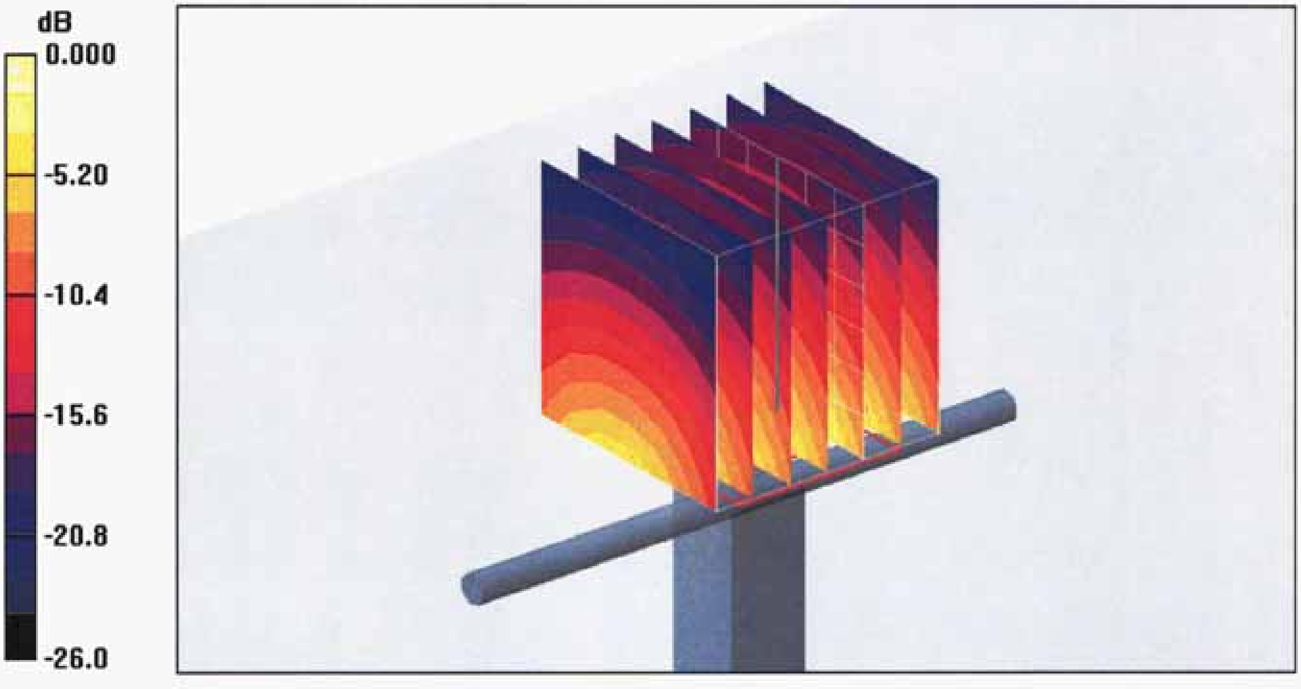
Communication System: CW-2450; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: HSL U10 BB_060425;
Medium parameters used: f = 2450 MHz; σ = 1.77 mho/m; ε_r = 38.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025 (HF); ConvF(4.5, 4.5, 4.5); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

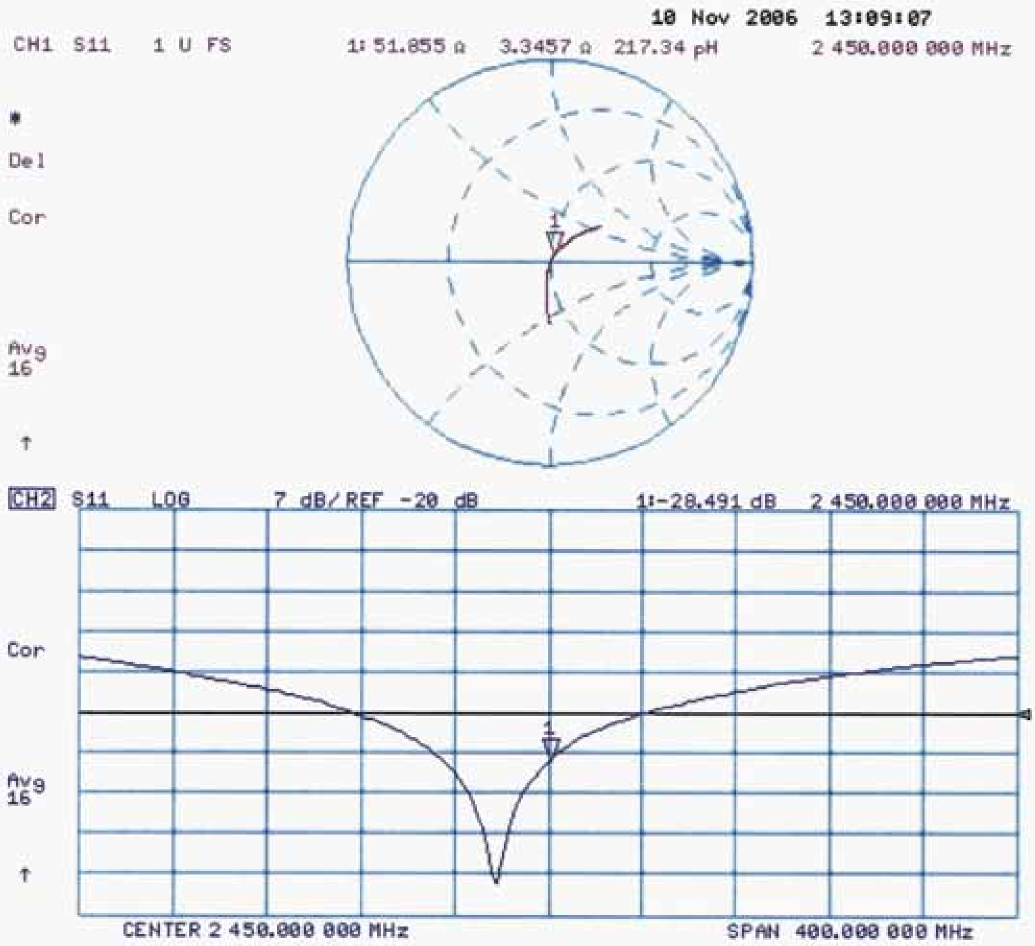
Pin = 250 mW; d = 10 mm/Zoom Scan 2 2 (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.0 V/m; Power Drift = -0.055 dB
Peak SAR (extrapolated) = 28.4 W/kg
SAR(1 g) = 13.6 mW/g; SAR(10 g) = 6.27 mW/g
Maximum value of SAR (measured) = 15.2 mW/g



0 dB = 15.2mW/g

Impedance Measurement Plot for Head TSL



.DASY4 Validation Report for Body TSL

Date/Time: 10.11.2006 17:50:27

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN714

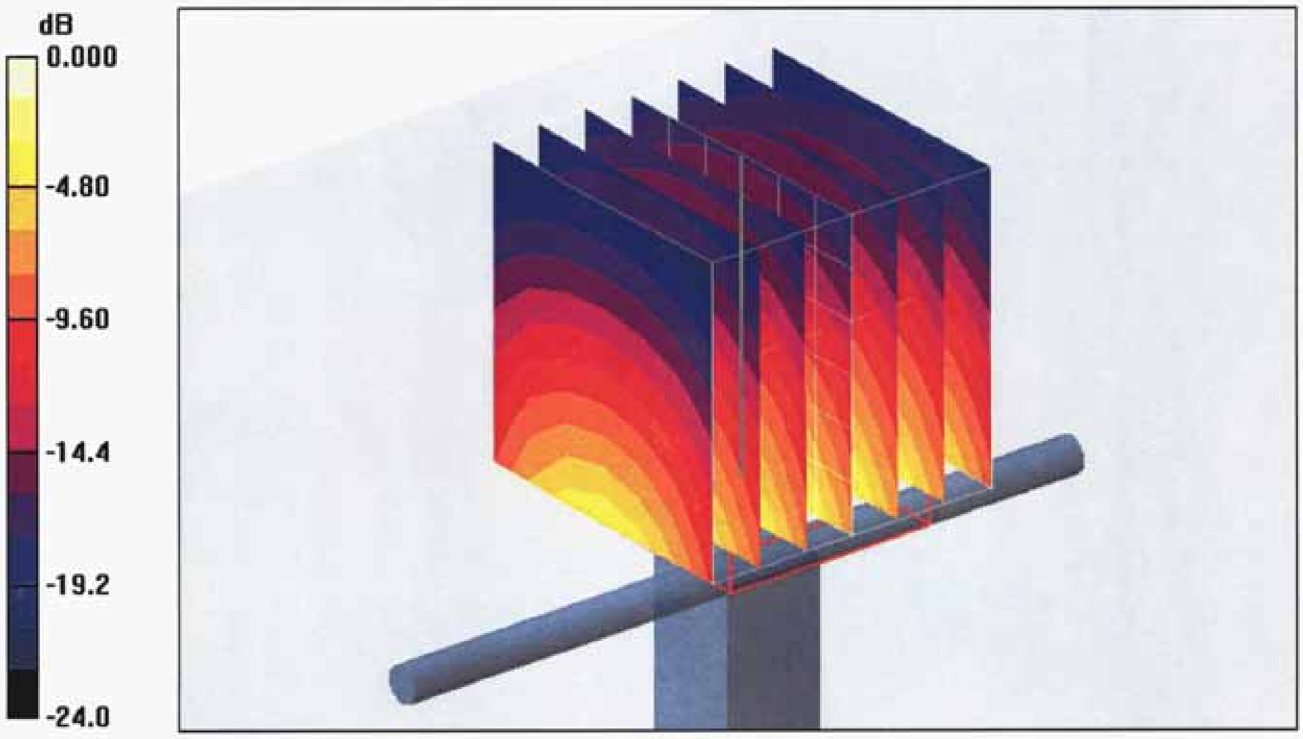
Communication System: CW-2450; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: MSL U10;
Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025 (HF); ConvF(4.16, 4.16, 4.16); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.4 V/m; Power Drift = -0.016 dB
Peak SAR (extrapolated) = 28.1 W/kg
SAR(1 g) = 13.4 mW/g; SAR(10 g) = 6.17 mW/g
Maximum value of SAR (measured) = 15.2 mW/g



0 dB = 15.2mW/g

Impedance Measurement Plot for Body TSL