MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*

NRTL

914 WEST PATAPSCO AVENUE ! BALTIMORE, MARYLAND 21230-3432 ! PHONE (410) 354-3300 ! FAX (410) 354-3313

August 9, 2002

BroMax Communications, Inc.
No. 20, Kuang Fu Road
Hsin Chu Industrial Park, Hu Kou
Hsin Chu 202, Taiwan

Reference: 11M W-LAN PCMCIA Card
FCC ID: O6M-WE302

Dear Mr. Perry Yuan:

Enclosed is the EMC SAR Evaluation Report for the BroMax Communications, Inc. 11M W-LAN PCMCIA Card. The W-LAN PCMCIA Card was tested in accordance with the measurement procedures specified in FCC OET 65 Supplement C:01-01 and shown to be capable to be in compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE Std. C95.1-1992.

Please note that the FCC ID:O6M-WE302 has not had an FCC Grant of Equipment Authorizaation issued as of this time. Before marketing you must obtain one.

Thank you for using the testing services of MET Laboratories. If you have any questions regarding these results or if MET can be of further assistance to you, please feel free to contact me. We appreciate your business and look forward to working with you again soon.

Kindest Regards,
MET LABORATORIES, INC.

Marianne Bosley

Marianne Bosley
Documentation Department

Enclosures: (\BroMax Communications, Inc. \EMC12416-SAR1 draft2.rpt)

DOCTEM-23 Jan 02

Dosimetric Assessment

Test Report

for the

BroMax Communications Inc.

11M W-LAN PCMCIA Card

Tested And Evaluated
In Accordance With
FCC OET 65 Supplement C:01-01

MET REPORT: **EMC12416-SAR**1

August 9, 2002

PREPARED FOR:

BroMax Communications, Inc.
No. 20, Kuang Fu Road
Hsin Chu Industrial Park, Hu Kou
Hsin Chu 303 Taiwan

PREPARED BY:

MET Laboratories, Inc.
914 West Patapsco Avenue
Baltimore, Maryland 21230-3432

Dosimetric Assessment

Test Report

for the

BroMax Communications, Inc.
11M W-LAN PCMCIA Card

Tested And Evaluated
In Accordance With
FCC OET Supplement C:01-01

MET REPORT: **EMC12416-SAR1**

August 9, 2002

PREPARED FOR:

BroMax Communications, Inc.
No. 20, Kuang Fu Road
Hsin Chu Industrial Park, Hu Kou
Hsin Chu 303, Taiwan

Report Prepared By:	**Report Reviewed By:**
MARIANNE T. BOSLEY EMC ADMINISTRATOR	ENGINEERSNAME TEST ENGINEER

Final Review By:

CHRISTOPHER R. HARVEY
EMC LAB DIRECTOR

Engineering Statement: The measurements shown in this report were made in accordance with the procedures specified in Supplement C to OET Bulletin 65 of the Federal Communications Commission (FCC) Guidelines [FCC 2001] for uncontrolled exposure. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment evaluated is capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE Std. C95.1-1992.

CHRISTOPHER R. HARVEY
EMC LAB DIRECTOR

SAR EVALUATION
CERTIFICATE OF COMPLIANCE

FCC ID: O6M-WE302
APPLICANT: BroMax Communications, Inc.

APPLICANT NAME AND ADDRESS: BroMax Communications, Inc. No. 20, Kuang Fu Road, Hsin Chu Industrial Park, Hu Kou Hsin Chu 303, Taiwan	**DATE OF TEST:** June 25, 2002 **TEST LOCATION**: MET LABORATORIES INC. 914 West Patapsco Avenue Baltimore, Maryland 21230

EUT: 11M W-LAN PCMCIA Card
Date of Receipt: June 25, 2002
Device Category: W-LAN PCMCIA Card
RF exposure environment: Uncontrolled
Power supply: Powered by PC
Antenna: Fixed Internal
Measured Standards: FCC Part 15.247 DSSS 2.4 GHz
Modulation: DSSS
Crest Factor: DSSS = 8
TX Range: DSSS 2.412 - 2.462 GHz
RX Range: DSSS 2.412 - 2.462 GHz

Used TX Channels: DSSS: Channel 1

Maximum RF Power Output: 0.07 Watts EIRP

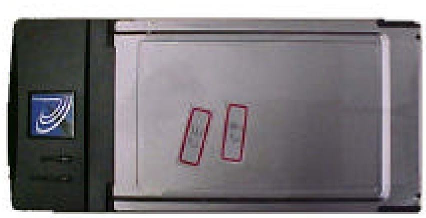
Maximum SAR Measurement: 0.031 W/kg DSSS PCMCIA Card Body
(Averaged over 1g)

This wireless portable device has been tested in accordance with the measurement procedures specified in FCC/OET Bulletin 65 Supplement C (2001) and IEEE Std. 1528-200X (July 2001), and has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE Std. C95.1 - 1992.

I attest to the accuracy of this data. All reported measurements were performed by me, or were made under my supervision, and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them..

I also certify that no party to this application has been denied the FCC benefits pursuant to Section 5.301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Chris Harvey
Director, EMC Laboratory



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List of Terms and Abbreviations

AC	Alternating Current
ANSI	American National Standards Institute
Cal	Calibration
d	Measurement Distance
dB	Decibels
dBFA	Decibels above one microamp
dBFV	Decibels above one microvolt
dBFA/m	Decibels above one microamp per meter
dBFV/m	Decibels above one microvolt per meter
DC	Direct Current
E	Electric Field
EUT	Equipment Under Test
f	Frequency
FCC	Federal Communications Commission
CISPR	Comite International Special des Perturbations Radioelectriques (International Special Committee on Radio Interference)
GRP	Ground Reference Plane
H	Magnetic Field
Hz	Hertz
IEC	International Electrotechnical Commission
IEEE	Institute for Electrical and Electronic Engineers
kHz	kilohertz
kPa	kilopascal
kV	kilovolt
LISN	Line Impedance Stabilization Network
MHz	Megahertz
MPE	Maximum Permissible Exposure
FH	microhenry
FF	microfarad
Fs	microseconds
F	conductivity
D	mass density
X_R	dielectric constant
PRF	Pulse Repetition Frequency
RF	Radio Frequency
RMS	Root-Mean-Square
SAR	Specific Absorption Rate
TWT	Traveling Wave Tube
V/m	Volts per meter

I. Objective

The 11M W-LAN PCMCIA Card is a PCMCIA wireless LAN card, with the capability of sending and receiving data in the form of individual packets of data from BroMax Communications, Inc. that operates in the DSSS 2.412 - 2.462 GHz. utilizing a fixed internal antenna. The system uses the W-LAN DSSS PCMCIA Card 2.4 Ghz standard.

The objective of the procedure was to perform a dosimetric assessment of the W-LAN PCMCIA card in the 2.4 Ghz standard. The measurements have been carried out with the dosimetric assessment system “SARA2", and were made according to the Supplement C to OET Bulletin 65 of the Federal Communications Commission (FCC) Guidelines [FCC 2001] for evaluating compliance of mobile and portable devices with FCC limits for human exposure in the general population to radio frequency emissions.

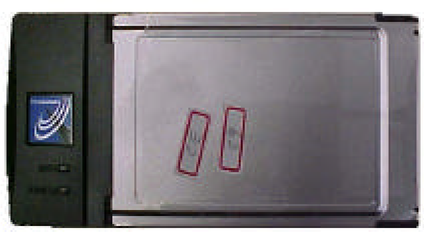


Figure 1: Photograph of the top of device under test

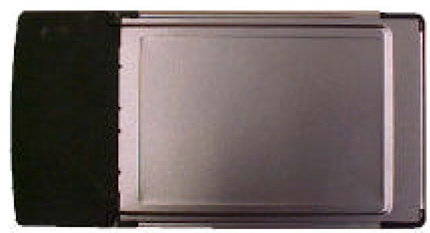


Figure 2: Photograph of bottom of device under test

II. Introduction

A. Exposure Criteria

In the United States, the most recent FCC RF exposure criteria is documented in the publication OET 65 Supplement C Edition 01-01 [FCC 2001] are based upon the IEEE Standard C95.1[IEEE1999], which sets limits for human exposure to radio frequency electromagnetic fields in the frequency range 3kHz to 300GHz.

B. Exposed Population, Duration of Exposure and Frequencies

According to the American Standard [IEEE 1999], controlled environments are locations where there is exposure that may be incurred by persons who are aware of the potential for exposure; for example, as a hazard of employment. Uncontrolled environments are locations where there is the exposure of individuals who have no knowledge or control of their exposure. The exposures may occur in living quarters or workplaces. For exposure in controlled environments higher field strengths are admissible, and the duration of exposure is considered.

C. Maximum Permissible Exposure and SAR Limits

Specific absorption rate (SAR) is the biological relevant parameter describing the effects of electromagnetic fields in the frequency range of interest. It is a measure of the power absorbed per unit mass and may be spatially averaged over the total mass of an exposed body or its parts. The SAR is calculated from the r.m.s. electric field strength E inside the human body, the conductivity F and the mass density D of the biological tissue:

$$\mathrm{SAR} = \frac{*E*^{2}\, F}{D}$$

It can be difficult to determine the SAR just by measurement (e.g. whole body averaged SAR), so the standard specifies maximum permissible exposures (MPE) in terms of external electric field strength, magnetic field strength, and power density, which is more readily measurable, derived from the SAR limits. The limits for these factors have been fixed so that even under worst case conditions, the SAR limits are not exceeded.

The MPE for the relevant frequency range may be exceeded if the exposure can be shown, by appropriate techniques, to produce SAR values below the corresponding limits.

D. SAR Limit

The comparison between the American exposure limits and the measured data is made using the spatial peak SAR. The power level of the device under test guarantees that the whole body averaged SAR is not exceeded.

The SAR limit is valid for uncontrolled environment and mobile, respectively portable transmitters. Table 1 shows the SAR values have to be averaged over a mass of 1g (SAR_{1g}) with the shape of a cube.

Standard	Status	SAR limit [W/kg]
OET 65 Supplement C Edition 01-01	In Force	1.6

Table 1. SAR Limit

III. FCC Measurement Procedure Requirements

A. FCC Measurement Procedure

The Federal Communications Commission (FCC) published a report and order in August 1996 [FCC 1996], requiring routine dosimetric assessment of mobile telecommunications devices prior to equipment authorization or use. In 2001 the Commission's Office of Engineering and Technology released Edition 01-01 of Supplement C to OET Bulletin 65. This edition replaced Edition 97-01, and provided additional guidance and information for evaluating compliance of mobile and portable devices with FCC limits for human exposure to radio frequency emissions [FCC 2001].

B. Configuration of Device Operation and Determination of Equipment and Test to be Used

Body-worn and Other Configurations

a. Phantom Requirements **-** A flat phantom shall be used for body-worn configurations. The phantom shall consist of material with electrical properties similar to the corresponding tissues.

b. Test Position **-** The body-worn configurations shall be tested with the supplied accessories (belt-clips, holsters, etc.) attached to the device in normal use configuration. Devices with a headset output shall be tested with a connected headset.

c. Test To Be Performed **-** In order to determine test requirements, accessories shall be divided into two categories: those that do contain metallic components, and those that do not.

For multiple accessories that do not contain metallic components, the device may be tested only with that accessory which provides the closest spacing to the body.

For multiple accessories that contain metallic components, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component, only the accessory that provides the closest spacing to the body must be tested.

If there are no body-worn accessories, a separation distance of 1.5 cm between the back of the device and the flat phantom is recommended. Other separation distances may be used, but they shall 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 the accessory contains no metallic components.

The SAR test shall be performed with the antenna fully extended and retracted for devices with retractable antenna. All factors that may affect the exposure shall also be tested; i.e. optional antennas or optional battery packs which may significantly change the volume, lengths, flip open/closed, etc. of the device, or any other accessories which might have the potential to considerably increase the peak spatial-average SAR value.

The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. However, if the SAR measured at the middle channel for each test configuration is at least 2.0 dB lower than the SAR limit, testing at the high and low channels is optional.

IV Measurement System Used

A. Measurement System - SARA2 System Specification

The SAR measurement system being used is the IndexSAR SARA2 system, which consists of a Mitsubishi RV-E2 6-axis robot arm and controller, IndexSAR probe and amplifier and SAM phantom Head Shape. The robot is used to articulate the probe to programmed positions inside the phantom head to obtain the SAR readings from the EUT.

The system is controlled remotely from a PC, which contains the software to control the robot and data acquisition equipment. The software also displays the data obtained from test scans.

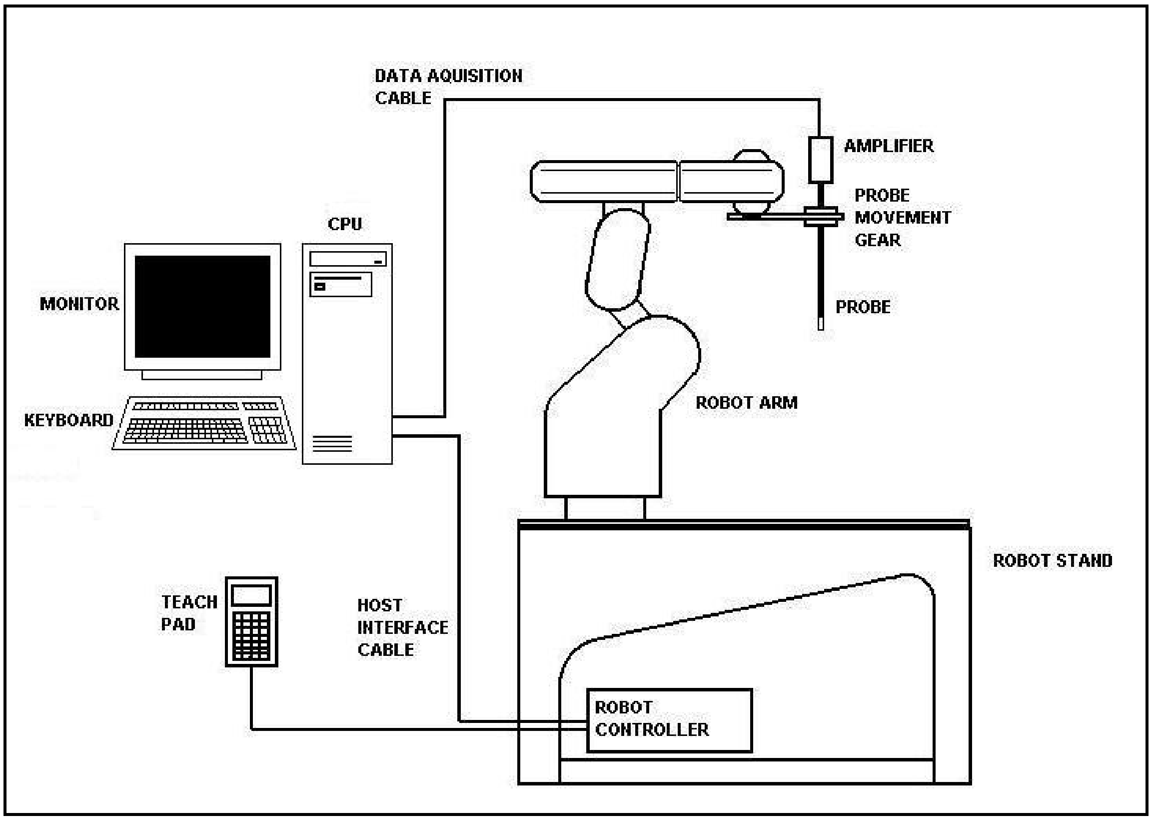


Figure 3. Block Diagram of SARA 2 System

The position and digitised shape of the phantom heads/flat baths are made available to the software for accurate positioning of the probe and reduction of set-up time.

The SAM phantom heads/flat baths are individually digitised using a Mitutoyo CMM machine to a precision of 0.001mm. The data is then converted into a shape format for the software, providing an accurate description of the phantom shell.

In operation, the system first performs an area (2D) scan at a fixed depth within the liquid from the inside wall of the phantom. When the maximum SAR point has been found, the system will then carry out a 3D scan centred at that point to determine volume averaged SAR level.

Robot/Controller:

Model	Mitsibishi Movemaster RV-2E 6 Axis Robot
Repeatability	+/-0.04mm
Speed	Up to 3500 mm/sec

Data Acquisition (Minimum requirements):

Processor	Pentium III
Clock Speed	700MHz
Operating System	Windows 98 or 2000
I/O	Two RS232, or One RS232 and One USB
Software	SARA2 Ver.xx, IXU-010X Utility Software Ver.xx, Microsoft Excel
Memory	10GB Hard drive, CDROM

IXP-050 IndexSAR isotropic immersible SAR probe

The probes are constructed using three orthogonal dipole sensors arranged on an interlocking, triangular prism core. The probes have built-in shielding against static charges and are contained within a PEEK cylindrical enclosure material at the tip. Probe calibration is described in the Calibration report appendix.

IXP-010 Amplifier

The amplifier unit has multi-pole connector to connect to the probe and a multiplexer selects between the 3-channel single-ended inputs. A 16-bit AtoD converter with programmable gain is used along with an on-board micro-controller with non-volatile firmware. Battery life is around 150 hours and data are transferred to the PC via 3m of duplex optical fibre and a self-powered RS232 to optical converter.

Phantoms:

SAM Twin Horizontal Phantom per IEEE Draft 1528:

The SAM Twin Horizontal is fabricated to the CAD files as specified by FCC OET 65 Supplement C 01-01 and IEEE Draft 1528. It is mounted on a dielectric table which includes mounting brackets for EUT positioners and a shelf for dipole holders. The phantom has three integrated positioning reference points.

SAM Upright Phantom per CENELEC EN50361:

The SAM Upright Phantom is fabricated to the CAD files as specified by CENELEC EN50361. It is mounted on the base table which holds the robotic positioner. The phantom and robot alignment is assured by both mechanical and laser registration systems.

Flat Bath Phantom for testing above 800 MHz:

The Flat Bath Box Phantom is fabricated to the specifications of the OET 65 Supplement C and CENELEC EN50361 standard. It is mounted on a similar rotational base to that of which the SAM upright phantom is attached to. It is positioned in place of the SAM upright head when doing validations or flat bath testing

Phantom Properties:

Phantom Type	Material	Permittivity (g)	Conductivity (F - S/m)
SAM Upright Phantom	Head:polyurethane Resin Base:PVC	<3.15 above 200 MHz	<0.02 below 2 GHz
Box Phantom/holder	Clear: Perspex	<2.85 above 500 MHz	<0.015 below 2 GHz

Table 2. Phamtom Properties

Test Environment:	Dedicated test area
Climate Control:	Temperature and Humidity
Shielded Chamber:	Anechoic material strategically positioned to minimize room reflections
Ambient Noise:	very low

B. Measurement Procedure

Figure 4. Photograph of SARA 2 System

The major components of the test bench are shown in the picture above. A test set and dipole antenna control the handset via an air link and a low-mass phone holder can position the phone at either ear. Graduated scales are provided to set the phone in the 15 degree position. The upright phantom head holds approx. 7 liters of simulant liquid. The phantom is filled and emptied through a 45mm diameter penetration hole in the top of the head.

After an area scan has been performed at a fixed distance of 8mm from the surface of the phantom on the source side, a 3D scan is set up around the location of the maximum spot SAR. First, a point within the scan area is visited by the probe and a SAR reading taken at the start of testing. At the end of testing, the probe is returned to the same point and a second reading is taken. Comparison between these start and end readings enables the power drift during measurement to be assessed.

SARA2 Interpolation and Extrapolation schemes

SARA2 software contains support for both 2D cubic B-spline interpolation as well as 3D cubic B-spline interpolation. In addition, for extrapolation purposes, a general n^{-th} order polynomial fitting routine is implemented following a singular value decomposition algorithm presented in [4]. A 4^{th} order polynomial fit is used by default for data extrapolation, but a linear-logarithmic fitting function can be selected as an option. The polynomial fitting procedures have been tested by comparing the fitting coefficients generated by the SARA2 procedures with those obtained using the polynomial fit functions of Microsoft Excel when applied to the same test input data.

Interpolation of 2D area scan

The 2D cubic B-spline interpolation is used after the initial area scan at fixed distance from the phantom shell wall. The initial scan data are collected with approx. 10mm spatial resolution and spline interpolation is used to find the location of the local maximum to within a 1mm resolution for positioning the subsequent 3D scanning.

Extrapolation of 3D scan

For the 3D scan, data are collected on a spatially regular 3D grid having (by default) 6.4 mm steps in the lateral dimensions and 3.5 mm steps in the depth direction (away from the source). SARA2 enables full control over the selection of alternative step sizes in all directions.

The digitised shape of the head/flat bath is available to the SARA2 software, which decides which points in the 3D array are sufficiently well within the shell wall to be 'visited' by the SAR probe. After the data collection, the data are extrapolated in the depth direction to assign values to points in the 3D array closer to the shell wall. A notional extrapolation value is also assigned to the first point outside the shell wall so that subsequent interpolation schemes will be applicable right up to the shell wall boundary.

Interpolation of 3D scan and volume averaging

The procedure used for defining the shape of the volumes used for SAR averaging in the SARA2 software follow the method of adapting the surface of the 'cube' to conform with the curved inner surface of the phantom. This is called, here, the conformal scheme.

For each row of data in the depth direction, the data are extrapolated and interpolated to less than 1mm spacing and average values are calculated from the phantom surface for the row of data over distances corresponding to the requisite depth for 10g and 1g cubes. This results in two 2D arrays of data, which are then cubic B-spline interpolated to sub mm lateral resolution. A search routine then moves an averaging square around through the 2D array and records the maximum value of the corresponding 1g and 10g volume averages. For the definition of the surface in this procedure, the digitised position of the headshell surface is used for measurement in head-shaped phantoms. For measurements in rectangular, box phantoms, the distance between the phantom wall and the closest set of gridded data points is entered into the software.

For measurements in box-shaped phantoms, this distance is under the control of the user. The effective distance must be greater than 2.5mm as this is the tip-sensor distance and to avoid interface proximity effects, it should be at least 5mm. A value of 6 or 8mm is recommended. This distance is called **dbe** in EN 50361.

For automated measurements inside the head, the distance cannot be less than 2.5mm, which is the radius of the probe tip and to avoid interface proximity effects, a minimum clearance distance of x mm is retained. The actual value of dbe will vary from point to point depending upon how the spatially-regular 3D grid points fit within the shell. The greatest separation is when a grid point is just not visited due to the probe tip dimensions. In this case the distance could be as large as the step-size plus the minimum clearance distance (i.e with x=5 and a step size of 3.5, dbe will be between 3.5 and 8.5mm).

The default step size (**dstep** in EN 50361) used is 3.5mm, but this is under user-control. The compromise is with time of scan, so it is not practical to make it much smaller or scan times become long and power-drop influences become larger. The robot positioning system specification for the repeatability of the positioning (**dss** in EN50361) is +/- 0.04mm.

The phantom shell is made by an industrial moulding process from the CAD files of the SAM shape, with both internal and external moulds. For the upright phantoms, the external shape is subsequently digitised on a Mitutoyo CMM machine (Euro C574) to a precision of 0.001mm. Wall thickness measurements made non-destructively with an ultrasonic sensor indicate that the shell thickness (**dph**) away from the ear is 2.0 +/- 0.1mm. The ultrasonic measurements were calibrated using additional mechanical measurements on available cut surfaces of the phantom shells. See support document IXS-020x.

For the upright phantom, the alignment is based upon registration of the rotation axis of the phantom on its 253mm diameter baseplate bearing and the position of the probe axis when commanded to go to the axial position. A laser alignment tool is provided (procedure detailed elsewhere). This enables the registration of the phantom tip (dmis) to be assured to within approx. 0.2mm. This alignment is done with reference to the actual probe tip after installation and probe alignment. The rotational positioning of the phantom is variable – offering advantages for special studies, but locating pins ensure accurate repositioning at the principal positions (LH and RH ears).

C. Uncertainty Assessment - Table 3. Uncertainty budget of SARA2

Uncertainty Component	Sec.	Tol. (+/-)			Prob. Dist.	Divisor (descrip)	Divisor (value)	c1	Standard Uncertainty (%)	
		(dB)		(%)						sqr
Measurement System										
Probe Calibration	E1.1			10	N	1 or k	2	1	5.00	25.00
Axial Isotropy	E1.2	0.25	5.93	5.93	R	%v3	1.73	0	0.00	0.00
Hemispherical Isotropy	E1.2	0.5	12.20	12.20	R	%v3	1.73	1	7.04	49.63
Boundary effects	E1.3		4	4.00	R	%v3	1.73	1	2.31	5.33
Linearity	E1.4	0.04	0.93	0.93	R	%v3	1.73	1	0.53	0.29
System Detection Limits	E1.5		1	1.00	R	%v3	1.73	1	0.58	0.33
Readout Electronics	E1.6		1	1.00	N	1 or k	1.00	1	1.00	1.00
Response time	E1.7		0	0.00	R	%v3	1.73	1	0.00	0.00
Integration time	E1.8		1.8	1.80	R	%v3	1.73	1	1.04	1.08
RF Ambient Conditions	E5.1		3	3.00	R	%v3	1.73	1	1.73	3.00
Probe Positioner Mechanical Tolerance	E5.2		0.6	0.60	R	%v3	1.73	1	0.35	0.12
Probe Position wrt. Phantom Shell	E5.3		5	3.80	R	%v3	1.73	1	2.19	4.81
SAR Evaluation Algorithms	E4.2		8	4.00	R	%v3	1.73	1	2.31	5.33
Test Sample Related										
Test Sample Positioning	E3.2.1		10	10.00	R	%v3	1.73	1	5.77	33.33
Device Holder Uncertainty	E3.1.1		10	8.00	R	%v3	1.73	1	4.62	21.33
Output Power Variation	E5.6.2		5	5.00	R	%v3	1.73	1	2.89	8.33
Phantom and Tissue Parameters										
Phantom Uncertainty (shape and thickness)	E2.1		4	4.00	R	%v3	1.73	0.5	1.15	1.33
Liquid conductivity (Deviation from target)	E2.2		5	5.00	R	%v3	1.73	0.5	1.44	2.08
Liquid conductivity (measurement uncert.)	E2.2		10	10.00	R	%v3	1.73	0.5	2.89	8.33
Liquid permittivity (Deviation from target)	E2.2		5	5.00	R	%v3	1.73	0.5	1.44	2.08
Liquid permittivity (measurement uncert.)	E2.2		5	5.00	R	%v3	1.73	0.5	1.44	2.08
Combined standard uncertainty					**RSS**			13.2		
Expanded uncertainty k=2 (95% Confidence Level)				**25.9%**						

Table 3 includes the preliminary uncertainty budget. The extended uncertainty is assessed to be 25.9%. This uncertainty includes probe calibration, positioning and evaluation errors, as well as errors of the correct dielectric parameters for the tissue simulating liquid, etc.

V. SAR Results Summary

The tables below contain the measured SAR values averaged over a mass of 1 g in the shape of a cube.

SAR results for 2.4 GHZ band for PCMCIA card

PCMCIA TEST POSITION	CHANNEL NUMBER (Note: EGSM)	FREQUENCY (GHz)	Max.1g SAR (W/kg)
Antenna perpendicular to the headbox	1	2.4	0.027
Antenna parallel to the headbox	1	2.4	0.031

Table 4. SAR Results - 2.4 GHz

The above antenna test results represent the maximum SAR values with fixed internal antenna.

Before the measurements, the test site ambient conditions were checked performing SAR measurements with the pcmcia card not operational.

VI. Test Details

A. Administrative Data

Date of validation: 2.45 GHz , Body: June 25, 2002

Date of measurement: DSSS 2.45 GHZ , Body:June 25, 2002

Maximum RF Power Output: 0.07 Watts EIRP

Maximum SAR Measurement: 0.031 W/kg DSSS PCMCIA Card Body

B. Description of Test Sample and Test Conditions

EUT:	802.11b 2.4 Ghz W-LAN PCMCIA Card
Date of Receipt:	June 25, 2002
FCC ID:	FCC ID: O6M-WE302
Device Category:	Part 15.247 DSSS
RF exposure environment:	Uncontrolled
Power supply:	Powered by laptop
Antenna:	Fixed Internal
Measured Standards:	2.4 GHz
Modulation:	DSSS
Crest Factor:	DSSS = 8
TX Range:	DSSS 2.412 - 2.462 GHz
RX Range:	DSSS 2.412 - 2.462 GHz

Used TX Channels: DSSS: Channel 1

The EUT was set to maximum RF power output on channel one through the PCMCIA Card software.

The EUT is a mobile device and it was the prototype of the final product.

C. Tissue Recipes

The following recipes are provided in percentage by weight.

2.4 GHZ, Body: 67.8% De-Ionized Water
0.18% Salt
00% Sugar
32.02% DGBE

D. Material Parameters

Simulant	Freq [GHz]	Room Temp [C]	Liquid Temp [C]	Parameters	Target Value	Measured Value	Deviation [%]	Limit [%]
Body	2.45	24.1	24.3	χ_r	52.7	51.6	2.08	+/- 5%
				F	1.95	1.9	2.56	+/- 5%

Table 5: Parameters of the tissue simulating liquid, June 25, 2002.

Parameters were measured before and after testing. These values reflect both measurements.

E. System Validation:

Following equipment is used for the system validation:

Signal Generator (Agilent E4432B)
RF Amplifier (Mini-Circuits ZHL-42)
Dual Directional Coupler (HP11691D)
The HP 8564E Spectrum Analyzer (used for RF power measurement)
Cables, Attenuate and Adapters

The recommended (IEEE Std 1528) set-up was used:

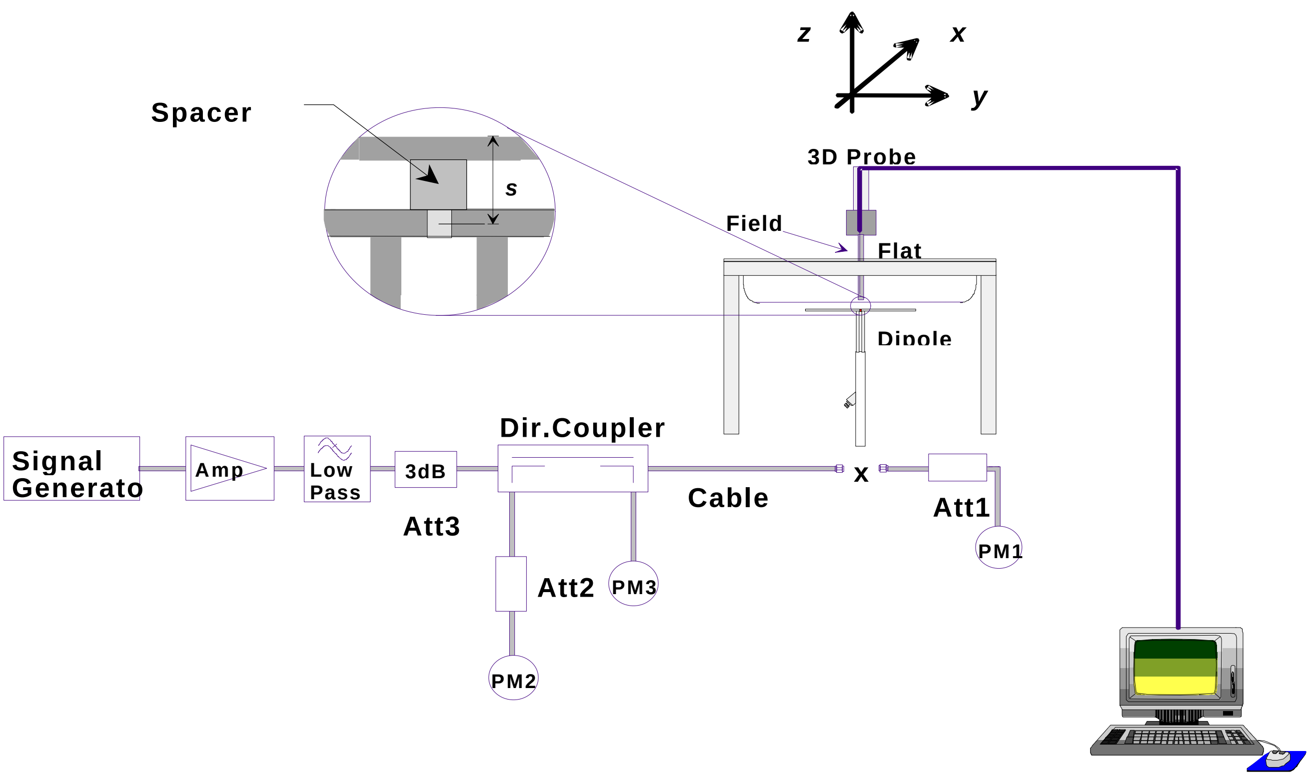
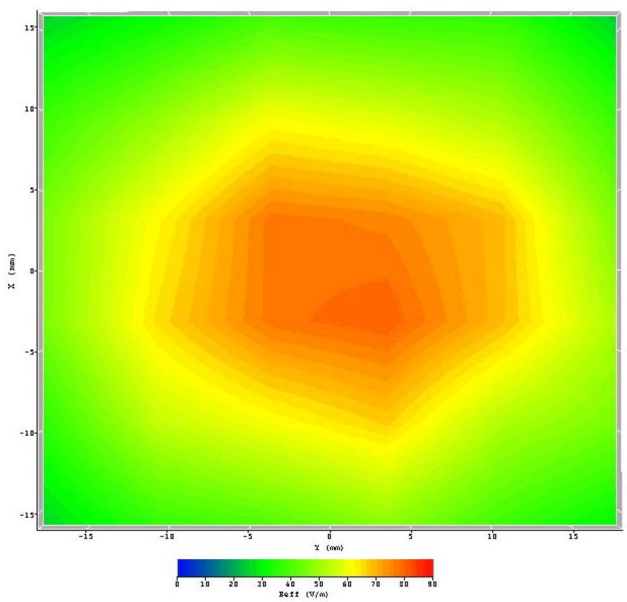


Figure 5. Performance Check Setup Diagram

F. Performance Checking

System Validation results Summary.- June 25, 2002

Simulant	Freq [GHz]	Room Temp [C]	Liquid Temp [C]	Parameters	Target Value	Measured Value	Deviation [%]	Limit [%]
Body	2.45	24.1	24.3	X_r	52.7	51.6	2.08	+/- 5%
				F	1.95	1.9	2.56	+/- 5%
				1g SAR	52.4	47.848	8.68	+/- 10



1 Watts (CW) RF forward power @ 2.4GHz
Max 1g SAR (W/Kg) =47.848 (Measured)
1 Watt Target SAR/IEEE Std. = 52.4 (W/Kg) @ 2.4GHz

Figure 6. Validation Measurement - 2.45GHz in body tissue in flat bath

G. Photographs of Device Under Test - Antenna is internally installed antenna

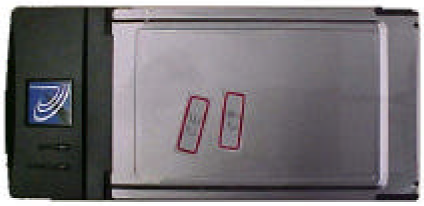


Figure 7. Top view

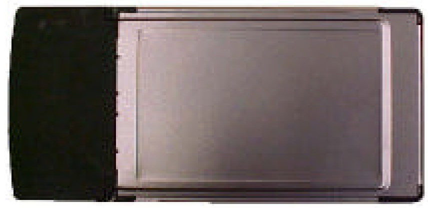


Figure 8. Bottom view

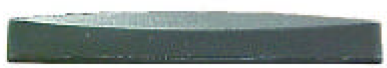


Figure 9. Front view

H. Test Positions for the Device Under Test

Due to the antenna being internally installed, there are only two test positions as described in the FCC Sar testing policy for PCMCIA cards employed in this testing. In each position the card is inserted into a laptop computer.

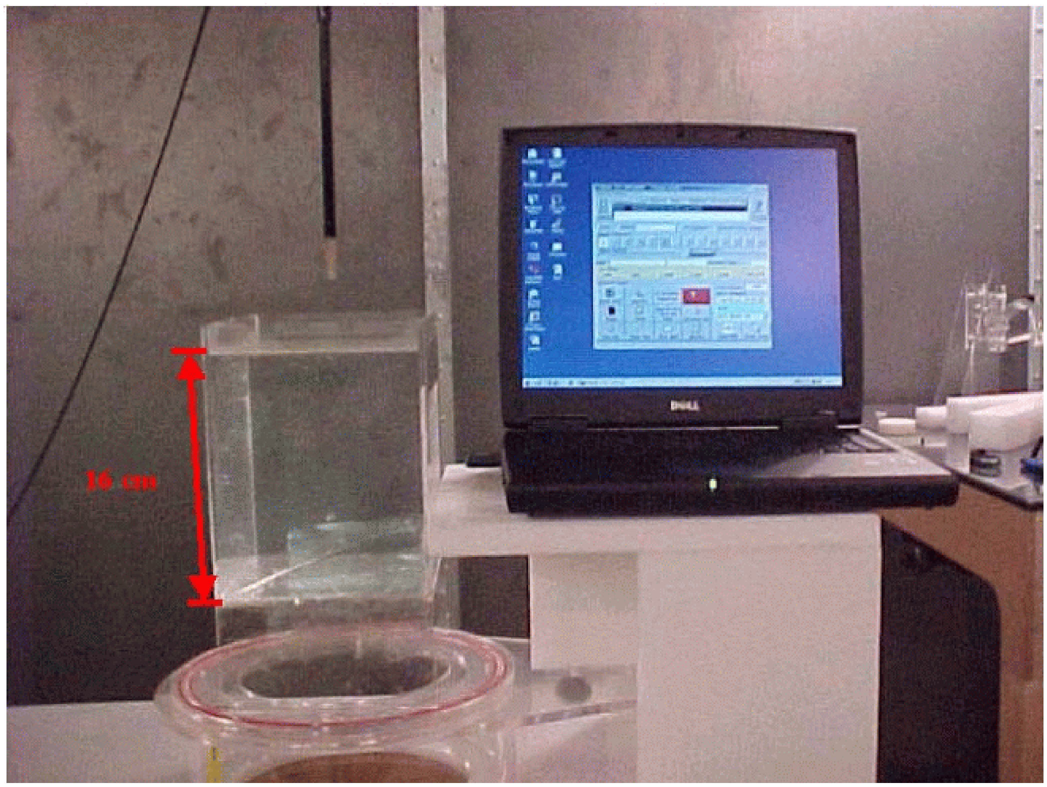


Figure 10. Position #1 - Antenna perpendicular to the headbox - 2.4 Ghz

The PCMCIA Card's antenna is separated from the flat phantom by 2.5cm

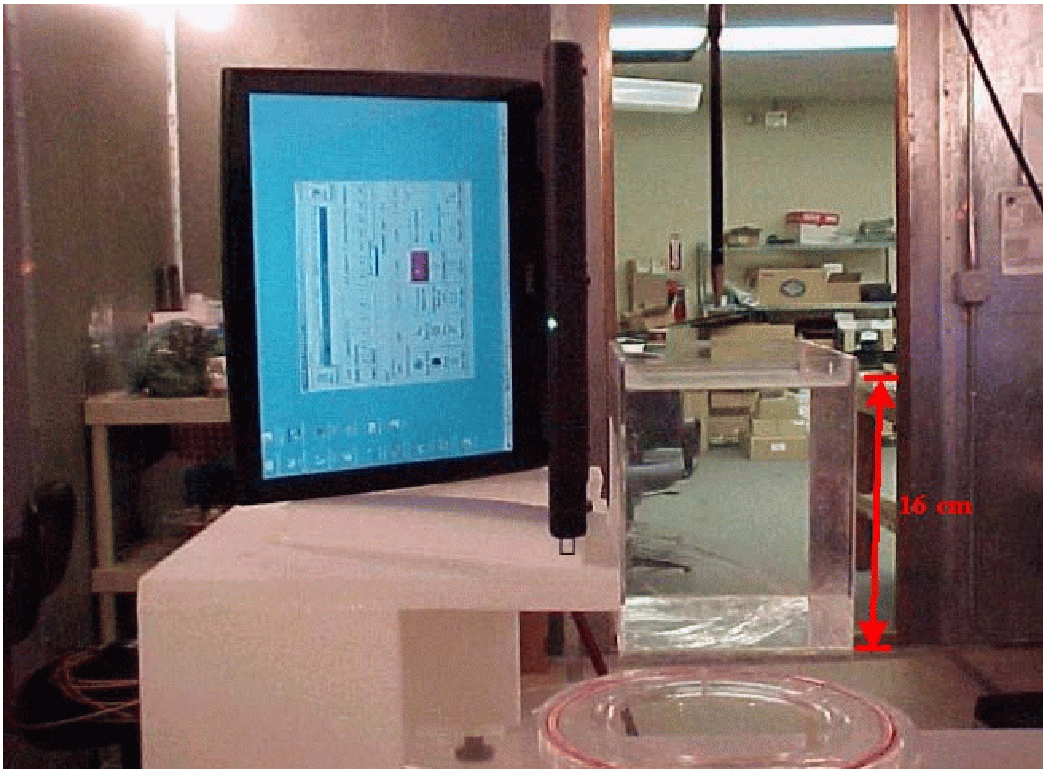


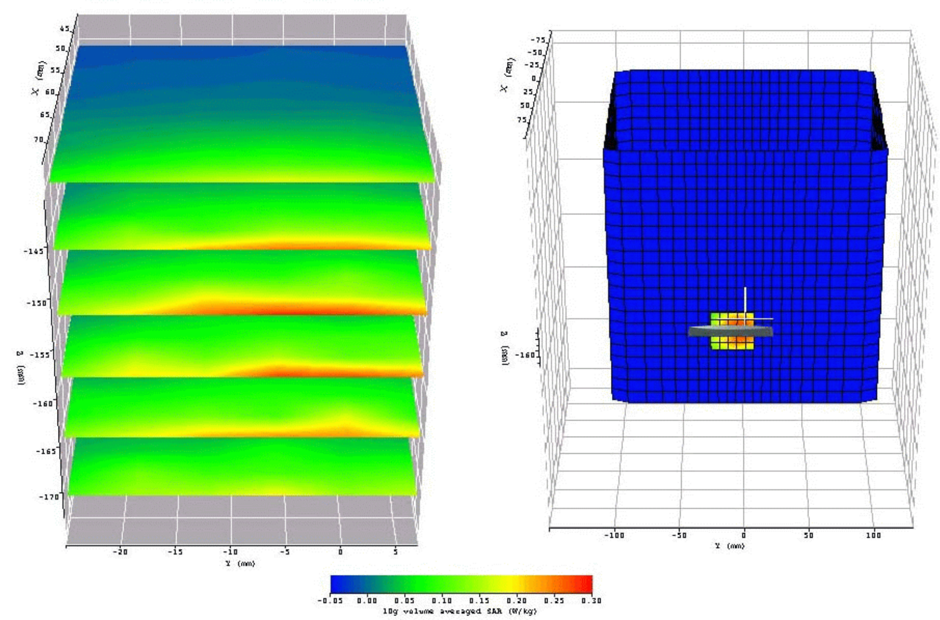
Figure 11. Position #2 - Antenna parallel to the headbox - 2.4 GHz

The antenna of the PCMCIA card is separated from the phantom by 2.5 cm.

Appendix A. SAR DISTRIBUTIONS (AREA SCANS)

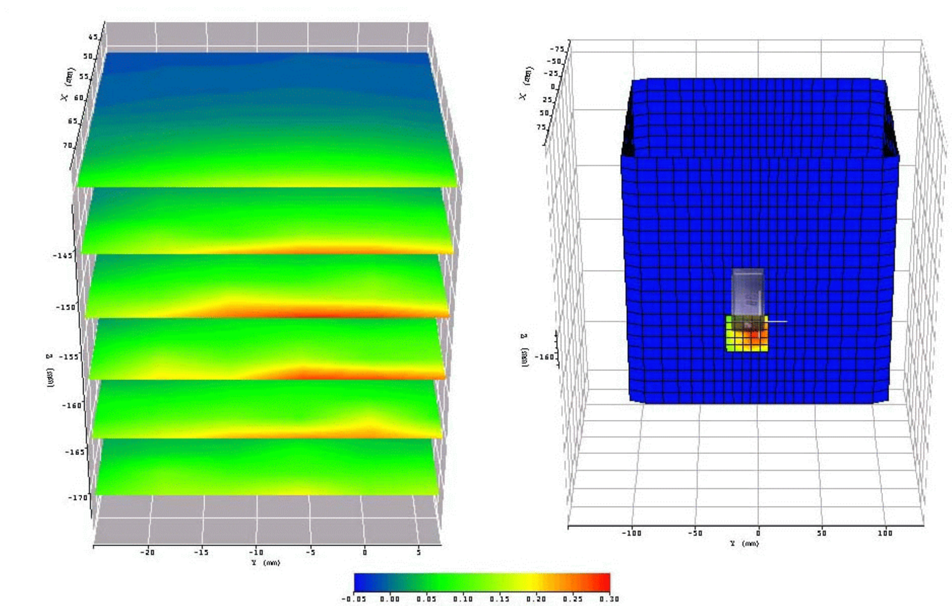
BroMax Communications, Inc. FCCID: O6M-WE302 11M W-LAN PCMCIA Card

Test Position: Antenna perpendicular to the headbox
Probe: IXP-050 – S/N 0082 –SARf(0.52, 0.53, 0.53)**- Probe Cal Date** 03/2002
Med. Parameters 2.4 GHz**;** χ_r = 51.6; **F** = 1.9
Room Temperature: 24.1 C
Simulant Liquid Temperature: 24.3 C
CH 1; **Crest Factor** = 8 (DSSS)
SAR Drift < 1%
SAR (1g): .027 W/kg ; June 25, 2002



BroMax Communications, Inc. **FCCID: O6M-WE302** **11M W-LAN PCMCIA Card**

Test Position: Antenna parallel to the headbox
Probe: IXP-050 – S/N 0082 –SARf(0.52, 0.53, 0.53)**- Probe Cal Date** 03/2002
Med. Parameters 2.4 GHz**;** X_r = 51.6**;** F = 1.9
Room Temperature: 24.1 C
Simulant Liquid Temperature: 24.3 C
CH 1**; Crest Factor =** 8 (DSSS)
SAR Drift < 1%
SAR (1g):.031 W/kg ; June 25, 2002



END OF REPORT