NO.: RZA2008-1075FCC

(No. CNAS L2264)

OET 65

TEST REPORT

Test name	Electromagnetic Field (Specific Absorption Rate)
Product	802.11n 2x2 USB Dongle
FCC ID	Q72WLC322NAM
Model	WLC322NAM
Client	CHUNG NAM ELECTRONICS CO.,LTD.

TA Technology (Shanghai) Co., Ltd.

上海同耀通信技术有限公司 报告专用章

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GENERAL SUMMARY

Product	802.11n 2x2 USB Dongle	**Model**	WLC322NA
Client	CHUNG NAM ELECTRONICS CO.,LTD.	**Type of test**	Entrusted
Manufacturer	NAM TAI ELECTONICS(SHENZHEN) CO., LTD.	**Arrival Date of sample**	August 11 st, 08
Place of sampling	(Blank)	**Carrier of the samples**	Simon Au
Quantity of the samples	One	**Date of product**	(Blank)
Base of the samples	(Blank)	**Items of test**	SAR
Series number	CM860000018		
Standard(s)	**EN 50360–2001:** Product standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones. **BS EN 62209-1:2006:** Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz) **ANSI C95.1–2005:** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. **IEEE 1528–2003:** Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Experimental Techniques. **OET Bulletin 65 supplement C, published June 2001 including DA 02-1438, published June 2002:** Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits. Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65. **IEC 62209-2 :** Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 2: Procedure to determine the Specific Absorption Rate (SAR)in the head and body for 30MHz to 6GHz Handheld and Body-Mounted Devices used in close proximity to the body.		
Conclusion	Localized Specific Absorption Rate (SAR) of this portable wireless equipment has been measured in all cases requested by the relevant standards cited in Clause 7.2 of this test report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 7.1 of this test report. General Judgment: **Pass** (Stamp) **Date of issue: August 27th, 2008**		
Comment	The test result only responds to the measured sample.		

Approved by ________ Revised by ________ Performed by ________

Weizhong Yang Minbao Ling feng Shi

TABLE OF CONTENT

1. COMPETENCE AND WARRANTIES

TA Technology (Shanghai) Co., Ltd. is a test laboratory competent to carry out the tests described in this test report.

TA Technology (Shanghai) Co., Ltd. guarantees the reliability of the data presented in this test report, which is the results of measurements and tests performed for the items under test on the date and under the conditions stated in this test report and is based on the knowledge and technical facilities available at TA Technology (Shanghai) Co., Ltd. at the time of execution of the test.

TA Technology (Shanghai) Co., Ltd. is liable to the client for the maintenance by its personnel of the confidentiality of all information related to the items under test and the results of the test.

2. GENERAL CONDITIONS

This report only refers to the item that has undergone the test.

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3. DESCRIPTION OF EUT

3.1. Addressing Information Related to EUT

Table 1: Applicant (The Client)

Name or Company	CHUNG NAM ELECTRONICS CO., LTD.
Address/Post	12F, Chung Nam Building, No.1 Lockhart Road,
City	Hongkong
Postal Code	999077
Country	P.R. China
Telephone	+86-0755-28570868
Fax	+86-0755-28883371

Table 2: Manufacturer

Name or Company	NAM TAI ELECTONICS(SHENZHEN) CO., LTD.
Address/Post	No.38 Luogang Road, Luogang Industrial Zone, Bu Ji,
City	Shen Zhen
Postal Code	518101
Country	China
Telephone	+86-0755-28578082
Fax	+86-0755-28577448

3.2. Constituents of EUT

Table 3: Constituents of Samples

Description	Model	Serial Number	Manufacturer
802.11n 2x2 USB Dongle	WLC322NA	CM860000018	NAM TAI ELECTONICS(SHENZHEN) CO., LTD.

Note:
The EUT appearances see ANNEXH.

3.3. General Description

Equipment Under Test (EUT) is a model of 802.11n 2x2 USB Dongle with internal antenna. SAR is tested for 802.11b/g/n. The measurements were performed in combination with three different host products (IBM X41, IBM T61 and BenQ Joy book R55V). IBM X41and BenQ Joy book R55V has horizontal USB slot, IBM T61 and BenQ Joy book R55V laptop have vertical USB slot.

The sample under test was selected by the Client.

Components list please refer to documents of the manufacturer.

3.4. Test item

Table 4: Test item of EUT

Device type :	portable device
Exposure category:	uncontrolled environment / general population
Standards	IEEE802.11b/g, 802.11n Draft 2.0
Operating Frequency	2.4 GHz ~ 2.472 GHz ISM band 2.484GHz
Channel Bandwidth	20/40MHz Support
Protocols	802.11b: CCK, QPSK, BPSK 802.11g: OFDM Draft-11n: DBPSK, DQPSK, 16-QAM, 64-QAM
Hardware Encryption	AES, TKIP, WEP
Quality of Service	802.11e
Receive Sensitivity	54Mbps@-65dBm (Typical) MSC7 HT20@-64dBm(Typical) MSC7 HT40@-61dBm(Typical)
Operating Voltage	5.0 VDC ± 5%
Interface	USB 2.0
Antenna Connector Type	Internal Antenna for 2T2R
Antenna port impedance	50ohm

4. OPERATIONAL CONDITIONS DURING TEST

4.1. General description of test procedures

For the 802.11b/g/n SAR body tests, a communication link is set up with the test mode software for WIFI mode test. The Absolute Radio Frequency Channel Number (ARFCN) is allocated to 1, 6 and 11 respectively in the case of 2450 MHz. During the test, at the each test frequency channel, the EUT is operated at the RF continuous emission mode.

802.11b/g/n operating modes are tested independently according to the service requirements in each frequency band.802.11b modes are tested on channels 1,6,11;however,if output power reduction is necessary for channels 1 and /or 11 to meet restricted band requirements the highest output channels closest to each of these channels must be tested instead.

SAR is not required for 802.11g channels when the maximum average output power is less than 0.25dB higher than that measured on the corresponding 802.11b channels. When the maximum average output channel in each frequency band is not included in the “default test channels”, the maximum channel should be tested instead of an adjacent “default test channels”, these are referred to as the “required test channels” and are illustrated in table 4.

SAR for MIMO and similar multiple antenna configurations is measured with all antennas transmitting simultaneously. The antennas should be transmitting at close to 100% duty factor during the SAR measurements. If the test mode software does not support simultaneous transmission, each antenna is tested independently, one at a time; and the SAR measured for all antennas must be summed spatially, grid by grid, to compute the 1-g SAR. When the sum of individual 1-g SAR for all antennas are less than the SAR limit, grid by grid summing is optional. The 1-g SAR should be scaled to 100% duty factor to determine compliance.

For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than ¼ dB higher than those measured at the lowest data rate.

And according to the "3 dB rule" FCC Public Notice, DA 02-1948, June 19.2002 " **If the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s)"**. Then The Absolute Radio Frequency Channel Number (ARFCN) is firstly allocated to 2437 respectively in the case of 802.11b/g/n.

Table 4: "Default Test Channels"

Mode	GHz	Channel	Turbo Channel	"Default Test Channels"			
				15.247		UNII	
				802.11b	802.11g		
802.11b/g/n	2.412	1#		√	*		
	2.437	6	6	√	*		
	2.462	11#		√	*		

Note: #=when output power is reduced for channel 1 and /or 11to meet restricted band requirements the highest out put channels closet to each of these channels should be tested.

√=" default test channels"

*=possible 802.11g channels with maximum average output 0.25dB>=the "default test channels".

4.2. Position of module in Portable devices

For each channel, the EUT is tested at the following 6 test positions:

- Test Position 1: The EUT is connected to the portable computer with horizontal USB slot. The front side of the EUT towards the bottom of the flat phantom. (ANNEX I Picture 6-a）
- Test Position 2: The EUT is connected to the portable computer with horizontal USB slot. The top side of the EUT towards the bottom of the flat phantom.（ANNEX I Picture 6-b）
- Test Position 3: The EUT is connected to the portable computer with vertical USB slot. The left side of the EUT towards the bottom of the flat phantom.（ANNEX I Picture 6-c）
- Test Position 4: The EUT is connected to the portable computer with vertical USB slot. The right side of the EUT towards the bottom of the flat phantom.（ANNEX I Picture 6-d）
- Test Position 5: The EUT is connected to the portable computer with vertical USB slot. The top side of the EUT towards the bottom of the flat phantom.（ANNEX I Picture 6-e）
- Test Position 6: The EUT is connected to the portable computer with horizontal USB slot. The back side of the EUT towards the bottom of the flat phantom. (ANNEX I Picture 6-f）

4.3. Picture of host product

During the test, The BENQ Joy book S72 laptop, IBM T61 laptop and and BENQ Joy book R55V laptop are used as an assistant to help to setup communication. (See Picture 1)

Picture 1-a:IBM X41 Close

Picture 1-b: IBM X41 Open

Picture 1-c: BenQ Joybook R55V(118) Close

Picture 1-d: BenQ Joybook R55V(118) Open

Picture 1-e: IBM T61 Close

Picture 1-f: IBM T61 Open

Picture 1-g: IBM X41 with horizontal USB slot

Picture 1-h: BenQ Joybook R55V(118) with horizontal USB slot

Picture 1-i: IBM T61 with horizontal USB slot

Picture 1-j: BenQ Joybook R55V(118) with Vertical USB slot

Picture 1: Computer as a test assistant

5. SAR MEASUREMENTS SYSTEM CONFIGURATION

5.1. SAR Measurement Set-up

These measurements were performed with the automated near-field scanning system DASY4 from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision robot (working range greater than 0.9m) which positions the probes with a positional repeatability of better than ± 0.02mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines (length =300mm) to the data acquisition unit.

A cell controller system contains the power supply, robot controller, teaches pendant (Joystick) and remote control, is used to drive the robot motors. The PC consists of the Micron Pentium III 800 MHz computer with Windows 2003 system and SAR Measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Stäubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, meCHanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

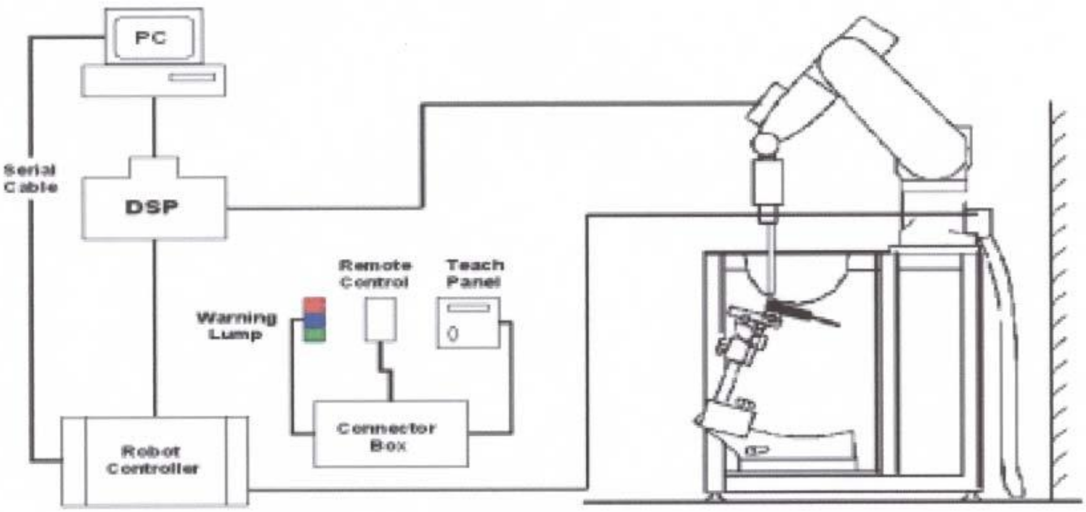


Figure 1. SAR Lab Test Measurement Set-up

The DAE4 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

5.2. Dasy4 E-field Probe System

The SAR measurements were conducted with the dosimetric probe ET3DV6 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the standard procedure with an accuracy of better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB.

5.2.1. ET3DV6 Probe Specification

Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection System (ET3DV6 only) Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.q., glycol)
Calibration	In air from 10 MHz to 2.5 GHz In brain and muscle simulating tissue at frequencies of 900MHz, 1750MHz, 1950MHz and 2450MHz (accuracy±8%) Calibration for other liquids and frequencies upon request
Frequency	10 MHz to 2.5 GHz; Linearity: ±0.2 dB (30 MHz to 2.5 GHz)
Directivity	±0.2 dB in brain tissue (rotation around probe axis) ±0.4 dB in brain tissue (rotation around probe axis)
Dynamic Range	5u W/g to > 100mW/g; Linearity: ±0.2dB
Surface Detection	±0.2 mm repeatability in air and clear liquids over diffuse reflecting surface
Dimensions	Overall length: 330mm Tip length: 16mm Body diameter: 12mm Tip diarneter: 6.8mm Distance from probe tip to dipole centers: 2.7mm
Application	General dosimetry up to 2.5GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms

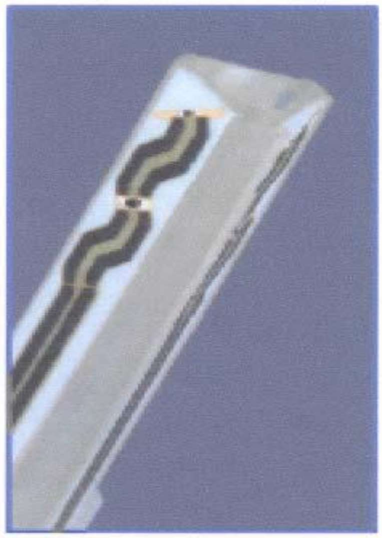


Figure 2.ET3DV6 E-field Probe

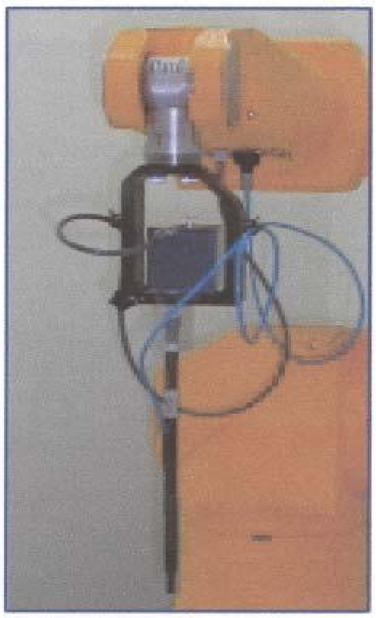


Figure 3. ET3DV6 E-field probe

5.2.2. E-field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test Chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.
E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$\mathbf{SAR} = \mathbf{C}\frac{\Delta T}{\Delta t}$$

Where: Δt = Exposure time (30 seconds),
C = Heat capacity of tissue (brain or muscle),
ΔT = Temperature increase due to RF exposure.
Or

$$\mathbf{SAR} = \frac{|E|^2 \sigma}{\rho}$$

Where:
σ = Simulated tissue conductivity,
ρ = Tissue density (kg/m3).

5.3. Other Test Equipment

5.3.1. Device Holder for Transmitters

In combination with the Generic Twin Phantom V3.0, the Mounting Device (POM) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeat ably positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

Figure 4. Device Holder

5.3.2. Phantom

The Generic Twin Phantom is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the 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 in the robot.

Shell Thickness	2±0.1 mm
Filling Volume	Approx. 20 liters
Dimensions	810 x l000 x 500 mm (H x L x W)
Available	Special

Figure 5. Generic Twin Phantom

5.4. Scanning procedure

The DASY4 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

- The ”reference“ and ”drift“ measurements are located at the beginning and end of the batch process.
  They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max± 5 %.

- The ”surface check“ measurement tests the optical surface detection system of the DASY4 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

- The “area scan“ measures the SAR above the DUT or verification dipole on a parallel plane to the surface. It is used to locate the approximate location of the peak SAR with 2D spline interpolation. The robot performs a stepped movement along one grid axis while the local electrical field strength is measured by the probe. The probe is touching the surface of the SAM during acquisition of measurement values. The standard scan uses large grid spacing for faster measurement. Standard grid
  spacing for head measurements is 15 mm in x- and y- dimension. If a finer resolution is needed, the grid spacing can be reduced. Grid spacing and orientation have no influence on the SAR result. For special applications where the standard scan method does not find the peak SAR within the grid, e.g. mobile phones with flip cover, the grid can be adapted in orientation.

- A” 7x7x7 zoom scan” measures the field in a volume around the 2D peak SAR value acquired in the previous ”coarse“ scan. This is a fine 7x7 grid where the robot additionally moves the probe in 7 steps along the z-axis away from the bottom of the Phantom. Grid spacing for the cube measurement is 5mm in x and y-direction and 5 mm in z-direction. DASY4 is also able to perform repeated zoom scans if more than 1 peak is found during area scan.

- A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 7x7x7 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 2mm steps.

5.5. Data Storage and Evaluation

5.5.1. Data Storage

The DASY4 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DA4". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

5.5.2. Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	Normi, ai_0, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	Dcp_i
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	
	- Density	

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY4 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot c\,f \,/\, d\,c\,p_i$$

With V_i = compensated signal of channel i (i = x, y, z)

U_i = input signal of channel i (i = x, y, z)

cf = crest factor of exciting field (DASY parameter)

dcp_i = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes: $$E_i = (V_i \,/\, Norm_i \cdot ConvF)^{1/2}$$

H-field probes: $$H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) \,/\, f$$

With V_i = compensated signal of channel i (i = x, y, z)

$Norm_i$ = sensor sensitivity of channel i (i = x, y, z)

[mV/(V/m)^2] for E-field Probes

$ConvF$ = sensitivity enhancement in solution

a_{ij} = sensor sensitivity factors for H-field probes

f = carrier frequency [GHz]

E_i = electric field strength of channel i in V/m

H_i = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}$$

The primary field data are used to calculate the derived field units.

$$SAR = (E_{tot}^2 \cdot \quad) \,/\, (\quad \cdot 1000)$$

with SAR = local specific absorption rate in mW/g

$\boldsymbol{E_{tot}}$ = total field strength in V/m

= conductivity in [mho/m] or [Siemens/m]

= equivalent tissue density in g/cm^3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 / 3770 \quad \text{or} \quad \boldsymbol{P_{pwe} = H_{tot}^2 \cdot 37.7}$$

with P_{pwe} = equivalent power density of a plane wave in mW/cm^2

$\boldsymbol{E_{tot}}$ = total electric field strength in V/m

$\boldsymbol{H_{tot}}$ = total magnetic field strength in A/m

5.6. System Specifications

5.6.1. Robotic System Specifications

Specifications

Positioner: Stäubli Unimation Corp. Robot Model: RX90L

Repeatability: ±0.02 mm

No. of Axis: 6

Data Acquisition Electronic (DAE) System

Cell Controller

Processor: Pentium III

Clock Speed: 800 MHz

Operating System: Windows 2003

Data Converter

Features: Signal Amplifier, multiplexer, A/D converter, and control logic

Software: DASY4 software

Connecting Lines: Optical downlink for data and status info. Optical uplink for commands and clock.

5.7. System validation

System validation is performed by using a validation dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a plexiglass spacer. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 1000 mW. To adjust this power a power meter is used. The power sensor is connected to the cable before the validation to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the validation to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test.

Validation results have to be equal or near the values determined during dipole calibration with the relevant liquids and test system (±10 %).

System validation is performed regularly on all frequency bands where tests are performed with the DASY 4 system. Results are stored to have a long time overview of system performance and are shown in EN test reports at request.

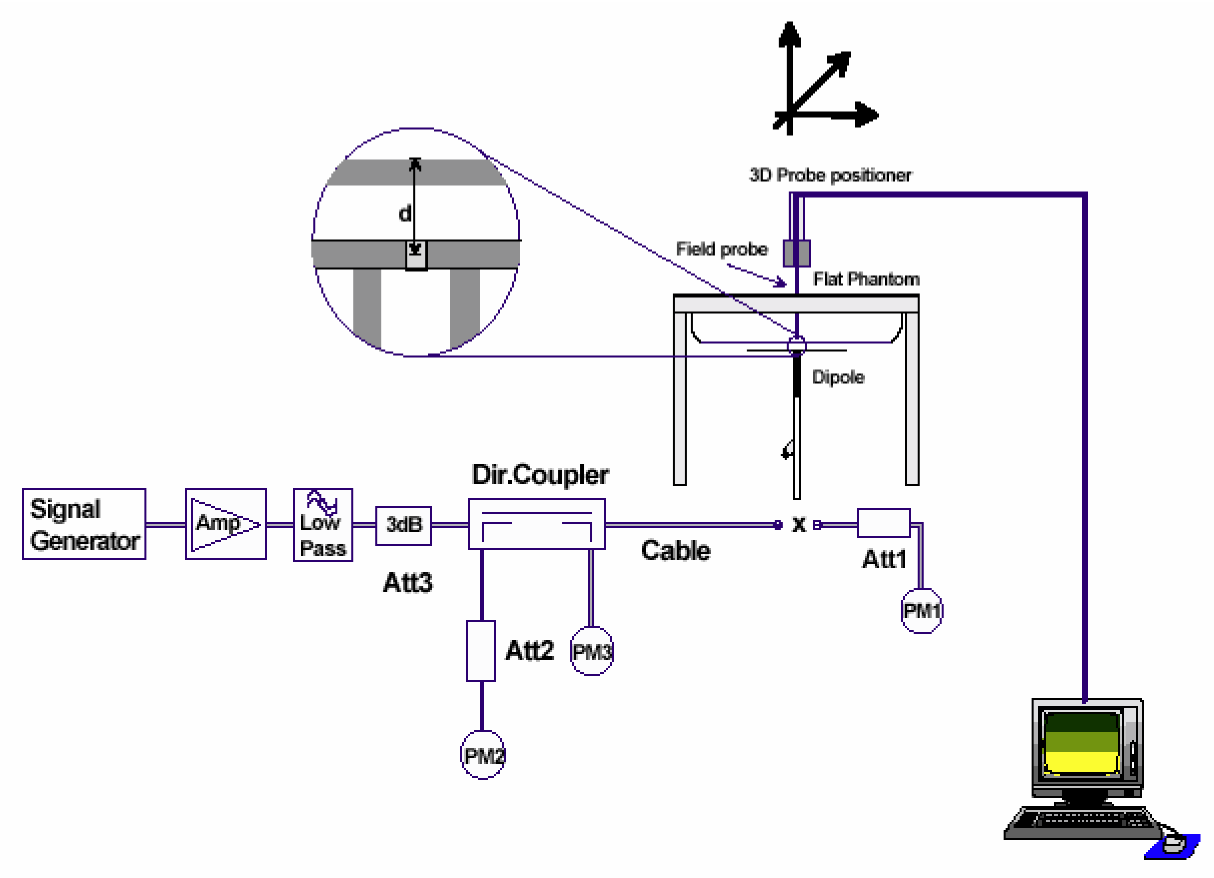


Figure 6. System validation Set-up

5.8. Equivalent Tissues

The liquid used for the frequency range of 800-2000 MHz consisted of water, sugar, salt, Preventol,Glycol and Cellulose. The liquid has previously been proven to be suited for worst-case. The Table 5 shows the detail solution. It’s satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528.

Table 5: Composition of the Body Tissue Equivalent Matter

MIXTURE%	FREQUENCY(Body) 2450MHz
Water	73.2
Glycol	26.7
Salt	0.1
Dielectric Parameters Target Value	f=2450MHz ε=52.70 σ=1.95

6. LABORATORY ENVIRONMENT

Table 6: The Ambient Conditions during Test

Temperature	Min. = 20°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

7. CHARACTERISTICS OF THE TEST

7.1. Applicable Limit Regulations

EN 50360–2001: Product standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones.
It specifies the maximum exposure limit of 2.0 W/kg as averaged over any 10 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

ANSI C95.1–2005: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.
It specifies the maximum exposure limit of 1.6 W/kg as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

7.2. Applicable Measurement Standards

BS EN 62209-1:2006: Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)

IEEE 1528–2003: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Experimental Techniques.

OET Bulletin 65 supplement C, published June 2001 including DA 02-1438, published June 2002: Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits. Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65.

IEC 62209-2: Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 2: Procedure to determine the Specific Absorption Rate (SAR) in the head and body for 30MHz to 6GHz Handheld and Body-Mounted Devices used in close proximity to the body.

8. CONDUCTED OUTPUT POWER MEASUREMENT

8.1. Summary

During the process of testing, the EUT was controlled via Digital Radio Communication tester to ensure the maximum power transmission and proper modulation. This result contains conducted output power and ERP for the EUT. In all cases, the measured peak output power should be greater and with in 5% than EMI measurement.

8.2. Power Drift

To control the output power stability during the SAR test, DASY4 system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in Table 10 to Table 12 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 0.21dB.

8.3. Conducted Power

8.3.1. Measurement Methods

The EUT was set up for the maximum output power. The channel power was measured .The measurements were done both before and after SAR tests for each test band.

8.3.2. Measurement result

Table 7: Conducted Power Measurement Results

802.11b (1Mbps)		Conduct power	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	15.5	15.54
6	2437	15.5	15.54
11	2462	15.5	15.58
802.11b (2Mbps)		**Conduct power**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	15.5	15.57
6	2437	15.5	15.53
11	2462	15.5	15.54
802.11b (5.5Mbps)		**Conduct power**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	15.5	15.53

6	2437	15.5	15.56
11	2462	15.5	15.57
802.11b (11Mbps)		**Conduct power**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	15.5	15.59
6	2437	15.5	15.58
11	2462	15.5	15.54
8902.11g (6Mbps)		**Conduct power**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	14	14.12
6	2437	14	14.14
11	2462	14	14.16
8902.11g (9Mbps)		**Conduct power**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	14	14.18
6	2437	14	14.15
11	2462	14	14.12
8902.11g (12Mbps)		**Conduct power**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	14	14.12
6	2437	14	14.10
11	2462	14	14.10
8902.11g (18Mbps)		**Conduct power(AV)**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	14	14.15
6	2437	14	14.12
11	2462	14	14.13
8902.11g (24Mbps)		**Conduct power**	
channel	**Before Test (dBm)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	14	14.11
6	2437	14	14.13
11	2462	14	14.13
8902.11g (36Mbps)		**Conduct power**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	14	14.12
6	2437	14	14.15
11	2462	14	14.16
8902.11g (48Mbps)		**Conduct power**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**

1	2412	14	14.11
6	2437	14	14.13
11	2462	14	14.12
8902.11g (54Mbps)		**Conduct power**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	14	14.12
6	2437	14	14.15
11	2462	14	14.12
802.11n (78Mbps)		**Conduct power**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	12	12.13
6	2437	12	12.18
11	2462	12	12.13
802.11n (104Mbps)		**Conduct power**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	12	12.12
6	2437	12	12.13
11	2462	12	12.16
802.11n (117Mbps)		**Conduct power**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	12	12.18
6	2437	12	12.15
11	2462	12	12.18
802.11n (130Mbps)		**Conduct power**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	12	12.18
6	2437	12	12.16
11	2462	12	12.12
8902.11n (52Mbps)		**Conduct power**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	12	12.16
6	2437	12	12.12
11	2462	12	12.11
8902.11n (58.5Mbps)		**Conduct power**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	12	12.14
6	2437	12	12.14
11	2462	12	12.13
8902.11n (65Mbps)		**Conduct power**	

channel	Frequency(MHz)	Before Test (dBm)	After Test (dBm)
1	2412	12	12.12
6	2437	12	12.14
11	2462	12	12.16
8902.11n (13Mbps)		**Conduct power(AV)**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	12	12.15
6	2437	12	12.15
11	2462	12	12.14
8902.11n (26Mbps)		**Conduct power(AV)**	
channel	**channel**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	12	12.15
6	2437	12	12.14
11	2462	12	12.10
802.11n (39Mbps)		**Conduct power**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	12	12.13
6	2437	12	12.15
11	2462	12	12.15
8902.11n (39Mbps)		**Conduct power**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	12	12.16
6	2437	12	12.10
11	2462	12	12.16
8902.11n (19.5Mbps)		**Conduct power(AV)**	
channel	**Frequency(MHz)**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	12	12.18
6	2437	12	12.17
11	2462	12	12.18
8902.11n (6.5Mbps)		**Conduct power(AV)**	
channel	**channel**	**Before Test (dBm)**	**After Test (dBm)**
1	2412	12	12.14
6	2437	12	12.14
11	2462	12	12.12

9. TEST RESULTS

9.1. Dielectric Performance

Table 8: Dielectric Performance of Body Tissue Simulating Liquid

Measurement is made at temperature 22.5 °C and relative humidity 51%. Liquid temperature during the test: 22.3°C				
Frequency (MHz)		**Target value**	**Measurement value**	**Difference percentage**
2450 (Body)	Permittivity ε_r	52.70	52.29	-0.78 %
	Conductivity σ	1.95	1.98	1.54 %

9.2. System Validation Results

Table 9: System Validation

Measurement is made at temperature 23.2 °C, relative humidity 50%, and input power 250 mW. Liquid temperature during the test: 22.3°C							
Liquid parameters	**Frequency**	**Permittivity ε**			**Conductivity σ (S/m)**		
	2450MHz	52.29			1.98		
Verification results	**Frequency**	**Target value (W/kg)**		**Measurement value (W/kg)**		**Difference percentage**	
		10 g Average	**1 g Average**	**10 g Average**	**1 g Average**	**10 g Average**	**1g Average**
	2450MHz	6.20	13.4	6.24	13.50	0.75%	0.65%

Note：

1. Target Values used derive from the SPEAG calibration certificate and 250 mW is used as feeding power to the validation dipole (SPEAG using).
2. The graph results see ANNEX D.

9.3. Summary of Measurement Results

Table 10: SAR Values (802.11b)

Liquid Temperature: 22.4℃					
Limit of SAR (W/kg)		**10g Average**	**1g Average**	**Power Drift (dB)**	**Graph Results**
		2.0	**1.6**	**± 0.21**	
Test Case Of Body		**Measurement Result (W/kg)**		**Power Drift(dB)**	
Different Test Position	**Channel**	**10g Average**	**1g Average**		
IBM X41					
Test Position 1	Middle	0.293	0.565	0.090	Figure 8
Test Position 2	Middle	0.083	0.182	0.003	Figure 10
IBM T61					
Test Position 3	Middle	0.239	0.486	-0.081	Figure 12
BenQ Joybook R55V					
Test Position 4	Middle	0.227	0.434	0.064	Figure 14
Test Position 5	Middle	0.083	0.181	0.075	Figure 16
Test Position 6	High	0.524	1.100	-0.068	Figure 18
	Middle	0.483	1.050	0.035	Figure 20
	Low	0.503	1.120	0.069	Figure 22

Note: 1.The value with blue color is the maximum SAR Value of each test band.

2. The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8 W/kg), testing at the high and low channels is optional.

Table 11: SAR Values (802.11g)

Liquid Temperature: 22.4℃						
Limit of SAR (W/kg)		**10g Average**	**1g Average**	**Power Drift (dB)**	**Graph Results**
		2.0	**1.6**	**± 0.21**	
Test Case Of Body		**Measurement Result (W/kg)**		**Power Drift(dB)**	
Different Test Position	**Channel**	**10g Average**	**1g Average**		
BenQ Joybook R55V					
Test Position 6	Low	0.321	0.726	0.059	Figure 24

Note: 1.802.11g was tested by wrost Case of 802.11b.

2. The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8 W/kg), testing at the high and low channels is optional.

Table 12: SAR Values (802.11n)

Liquid Temperature: 22.4℃					
Limit of SAR (W/kg)		**10g Average**	**1g Average**	**Power Drift (dB)**	**Graph Results**
		2.0	**1.6**	**± 0.21**	
Test Case Of Body		**Measurement Result (W/kg)**		**Power Drift(dB)**	
Different Test Position	**Channel**	**10g Average**	**1g Average**		
IBM X41					
Test Position 1	Middle	0.137	0.275	0.052	Figure 26
Test Position 2	Middle	0.032	0.073	-0.038	Figure 28
IBM T61					
Test Position 3	Middle	0.080	0.170	0.124	Figure 30
BenQ Joybook R55V					
Test Position 4	Middle	0.125	0.230	0.041	Figure 32
Test Position 5	Middle	0.034	0.076	0.169	Figure 34
Test Position 6	Middle	0.189	0.412	0.059	Figure 36

Note: 1.The value with blue color is the maximum SAR Value of each test band.

2. The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8 W/kg), testing at the high and low channels is optional.

9.4. Conclusion

Localized Specific Absorption Rate (SAR) of this portable wireless device has been measured in all cases requested by the relevant standards cited in Clause 7.2 of this report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 7.1 of this test report.

10. MEASUREMENT UNCERTAINTY

No.	a	Type	c	d	e=f(d、k)	f	h=c×f / e	k
	Uncertainty Component		Tol. (±%)	Prob. Dist	Div.	c_1(1g)	1g u (± %)	v_1
1	System repetivity	A	0.5	N	1	1	0.5	9
	Measurement system							
2	Probe Calibration	B	5	N	2	1	2.5	∞
3	Axial isotropy	B	4.7	R	$\sqrt{3}$	$(1-cp)^{1/2}$	4.3	∞
4	Hemisphere Isotropy	B	9.4	R	$\sqrt{3}$	$\sqrt{C_P}$		∞
5	Boundary Effect	B	0.4	R	$\sqrt{3}$	1	0.23	∞
6	Linearity	B	4.7	R	$\sqrt{3}$	1	2.7	∞
7	System Detection Limits	B	1.0	R	$\sqrt{3}$	1	0.6	∞
8	Readout Electronics	B	1.0	N	1	1	1.0	∞
9	RF Ambient Conditions	B	3.0	R	$\sqrt{3}$	1	1.73	∞
10	Probe Positioner Mechanical Tolerance	B	0.4	R	$\sqrt{3}$	1	0.2	∞
11	Probe Positioning with respect to Phantom Shell	B	2.9	R	$\sqrt{3}$	1	1.7	∞
12	Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	B	3.9	R	$\sqrt{3}$	1	2.3	∞
	Test Sample Related							
13	Test Sample Positioning	A	4.9	N	1	1	4.9	N-1
14	Device Holder Uncertainty	A	6.1	N	1	1	6.1	N-1
15	Output Power Variation-SAR drift measurement	B	5.0	R	$\sqrt{3}$	1	2.9	∞
	Phantom and Tissue Parameters							
16	Phantom Uncertainty(shape and thickness tolerances)	B	1.0	R	$\sqrt{3}$	1	0.6	∞
17	Liquid Conductivity-deviation from target values	B	5.0	R	$\sqrt{3}$	0.64	1.7	∞
18	Liquid Conductivity-measurement uncertainty	B	5.0	N	1	0.64	1.7	M
19	Liquid Permittivity-deviation from target values	B	5.0	R	$\sqrt{3}$	0.6	1.7	∞
20	Liquid Permittivity- measurement uncertainty	B	5.0	N	1	0.6	1.7	M
Combined Standard Uncertainty				RSS			11.25	
Expanded Uncertainty (95 % CONFIDENCE INTERVAL)				K=2			22.5	

11. MAIN TEST INSTRUMENTS

Table 13: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	Agilent 8753E	US37390326	September 15, 2007	One year
02	Dielectric Probe Kit	Agilent 85070E	US44020115	No Calibration Requested	
03	Power meter	Agilent E4417A	GB41291714	March 14, 2008	One year
04	Power sensor	Agilent 8481H	MY41091316	March 14, 2008	One year
05	Signal Generator	HP 8341B	2730A00804	September 15, 2007	One year
06	Amplifier	IXA-020	0401	No Calibration Requested	
07	Validation Kit 2450MHz	SPEAG D2450V2	712	January 30, 2008	One year
08	E-field Probe	ET3DV6	1531	January 29, 2008	One year
09	DAE	DAE4	452	July 21, 2008	One year

12. TEST PERIOD

The test is performed from August 19 2008 to August 21, 2008.

13. TEST LOCATION

The test is performed at TA Technology (Shanghai) Co., Ltd.

*******END OF REPORT BODY*******

ANNEX A： MEASUREMENT PROCESS

The evaluation was performed with the following procedure:

Step 1: Measurement of the SAR value at a fixed location above the ear point was measured and was used as a reference value for assessing the power drop.

Step 2: 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 15 mm x 15 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

Step 3: Around this point, a volume of 32 mm x 32 mm x 34 mm was assessed by measuring 7 x 7x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

a. The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

b. The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot"-condition (in x ~ y and z-directions). The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.

c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

Step 4: Re-measurement the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation is repeated.

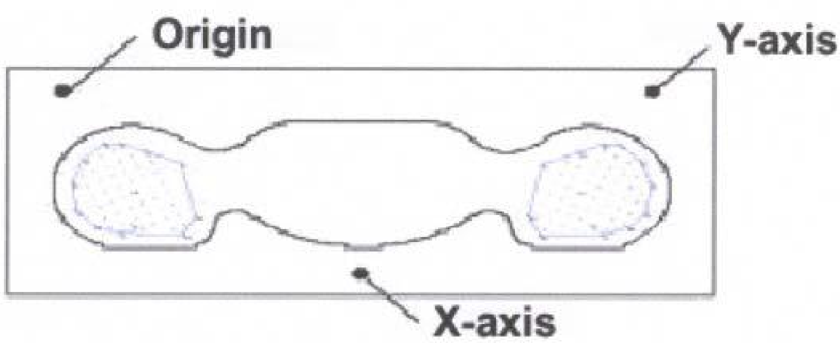
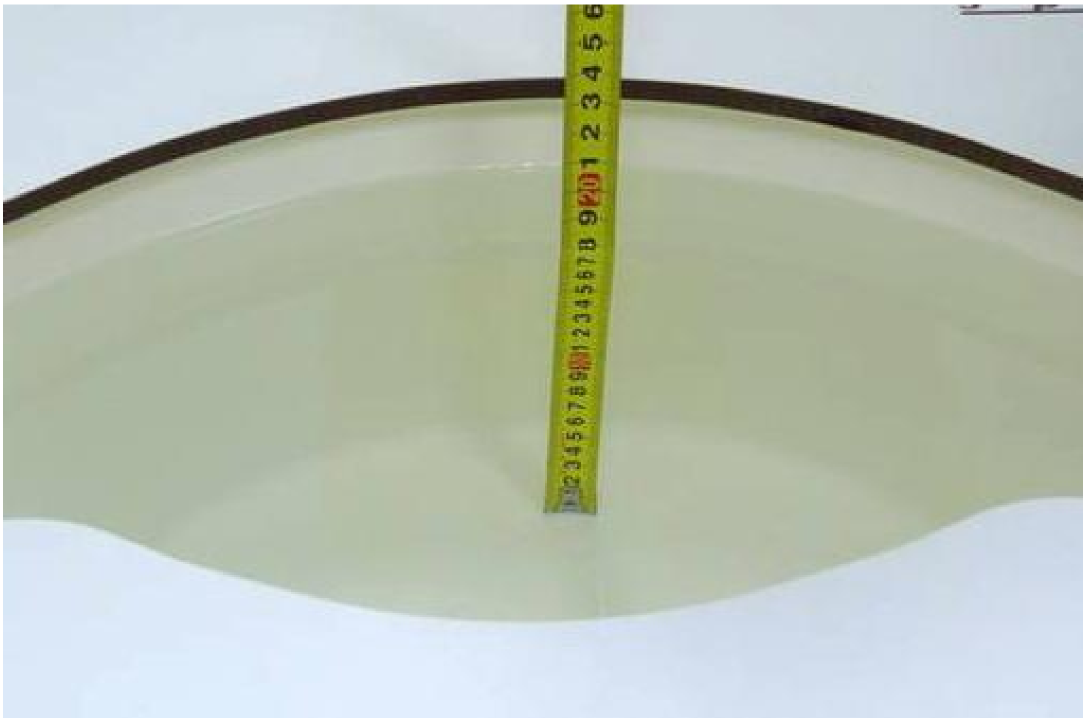


Figure 7 SAR Measurement Points in Area Scan

ANNEX B： TEST LAYOUT

Picture 2: Specific Absorption Rate Test Layout



Picture 3: Liquid depth in the Phantom (2450 MHz)

ANNEX C： GRAPH RESULTS

802.11b with IBM X41 Test Position 1 Middle Frequency

Communication System: 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 2437 MHz; σ = 1.97 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Probe: ET3DV6 - SN1531; ConvF(4.1, 4.1, 4.1);

Electronics: DAE4 Sn452;

Test Position 1 Middle/Area Scan (41x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.667 mW/g

Test Position 1 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.0 V/m; Power Drift = 0.090 dB

Peak SAR (extrapolated) = 1.26 W/kg

SAR(1 g) = 0.565 mW/g; SAR(10 g) = 0.293 mW/g

Maximum value of SAR (measured) = 0.682 mW/g

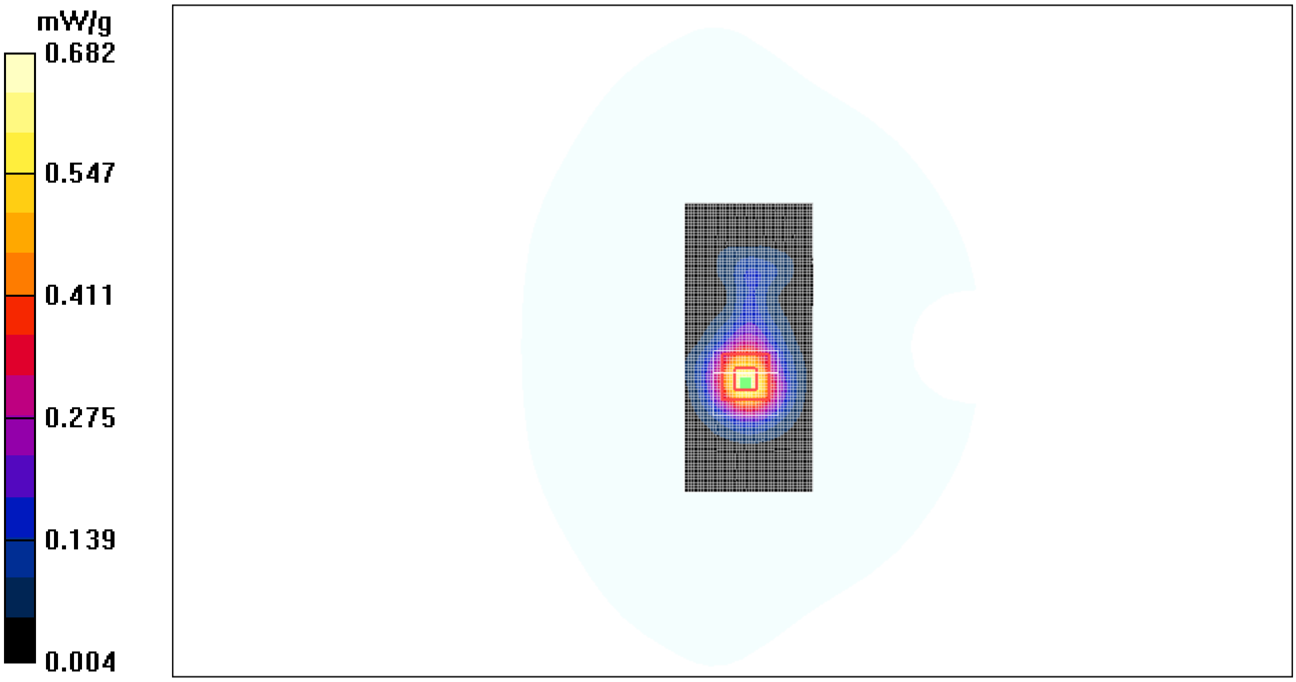


Figure 8 802.11b with IBM X41 Test Position 1 Channel 6

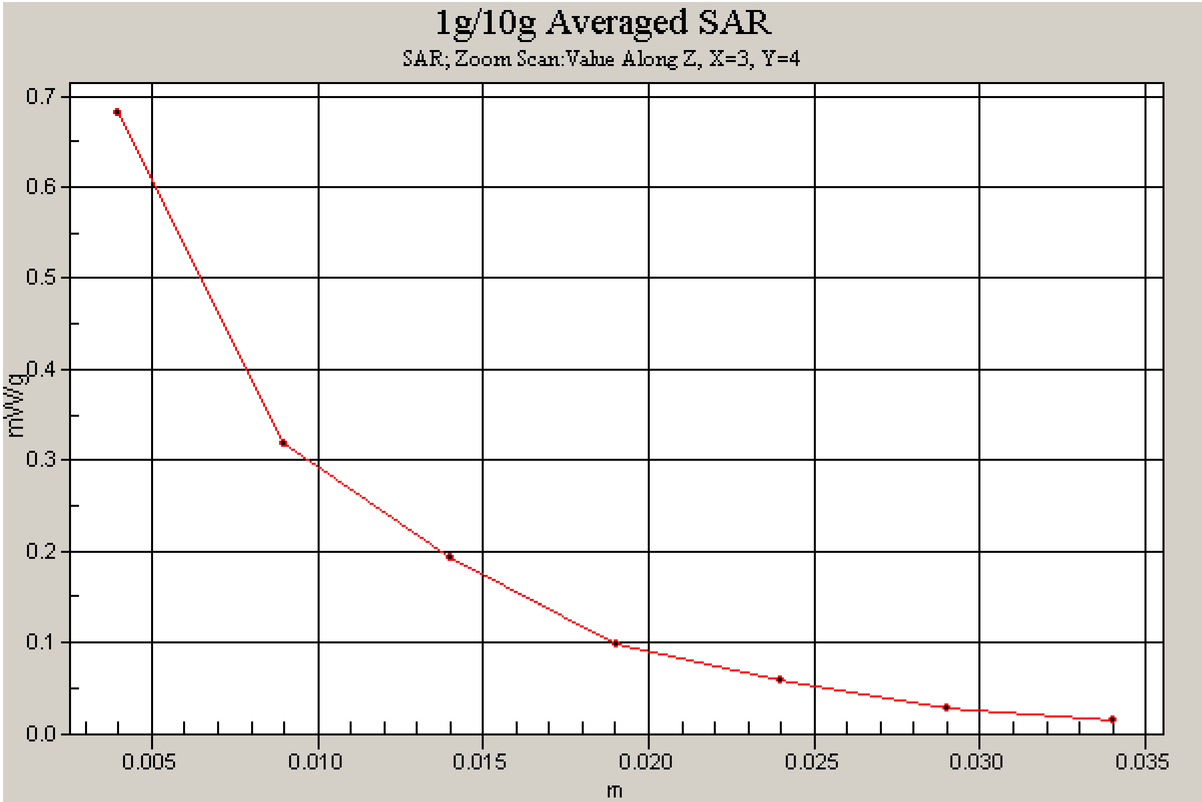


Figure 9 Z-Scan at power reference point [802.11b with IBM X41 Test Position 1 Channel 6])

802.11b with IBM X41 Test Position 2 Middle Frequency

Communication System: 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 2437 MHz; σ = 1.97 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Probe: ET3DV6 - SN1531; ConvF(4.1, 4.1, 4.1);

Electronics: DAE4 Sn452;

Test Position 2 Middle/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.196 mW/g

Test Position 2 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.97 V/m; Power Drift = 0.003 dB

Peak SAR (extrapolated) = 0.404 W/kg

SAR(1 g) = 0.182 mW/g; SAR(10 g) = 0.083 mW/g

Maximum value of SAR (measured) = 0.193 mW/g

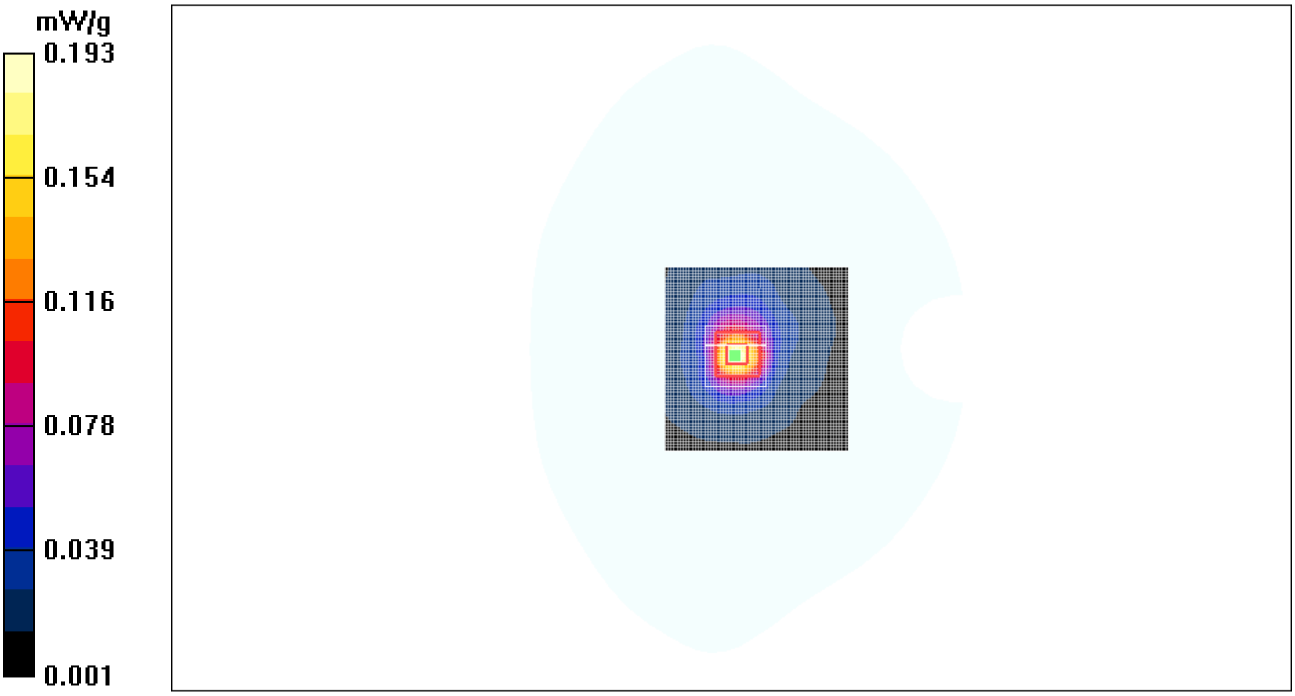


Figure 10 802.11b with IBM X41 Test Position 2 Channel 6

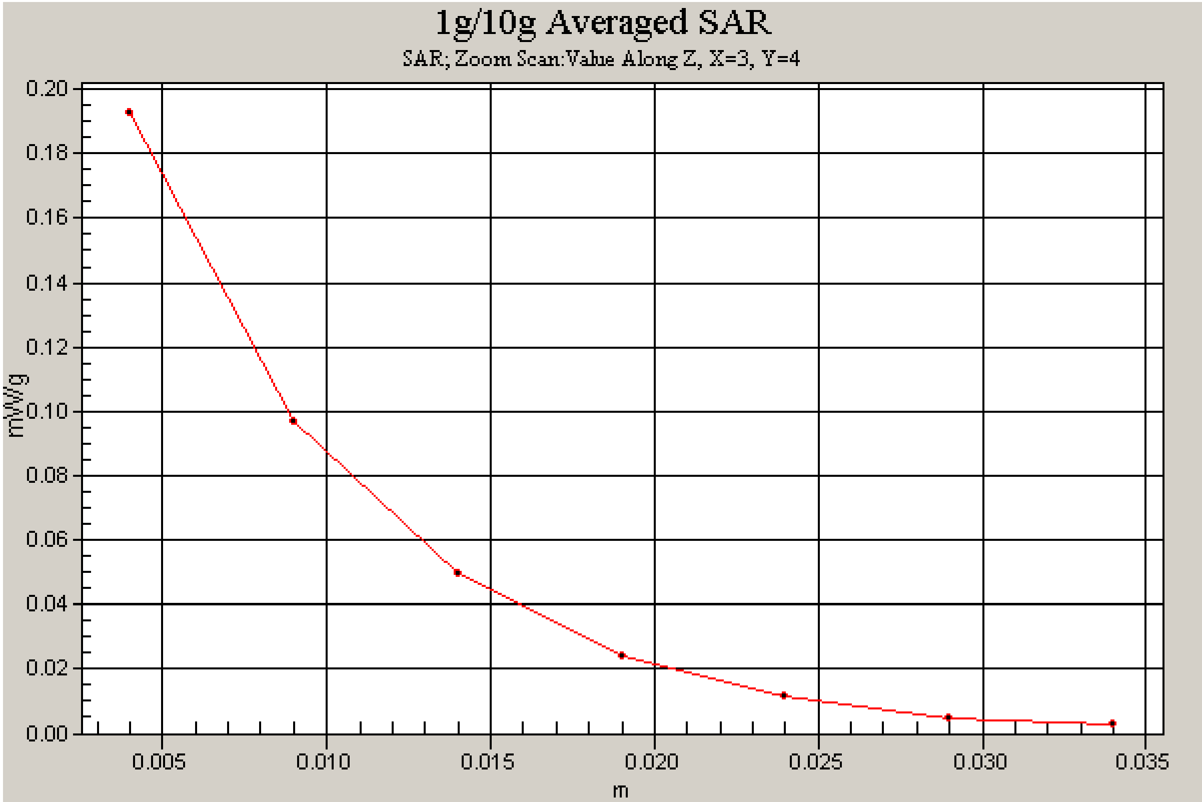


Figure 11 Z-Scan at power reference point [802.11b with IBM X41 Test Position 2 Channel 6])

802.11b with IBM T61 Test Position 3 Middle Frequency

Communication System: 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 2437 MHz; σ = 1.97 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Probe: ET3DV6 - SN1531; ConvF(4.1, 4.1, 4.1);

Electronics: DAE4 Sn452;

Test Position 3 Middle/Area Scan (41x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.561 mW/g

Test Position 3 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.4 V/m; Power Drift = -0.081 dB

Peak SAR (extrapolated) = 0.966 W/kg

SAR(1 g) = 0.486 mW/g; SAR(10 g) = 0.239 mW/g

Maximum value of SAR (measured) = 0.559 mW/g

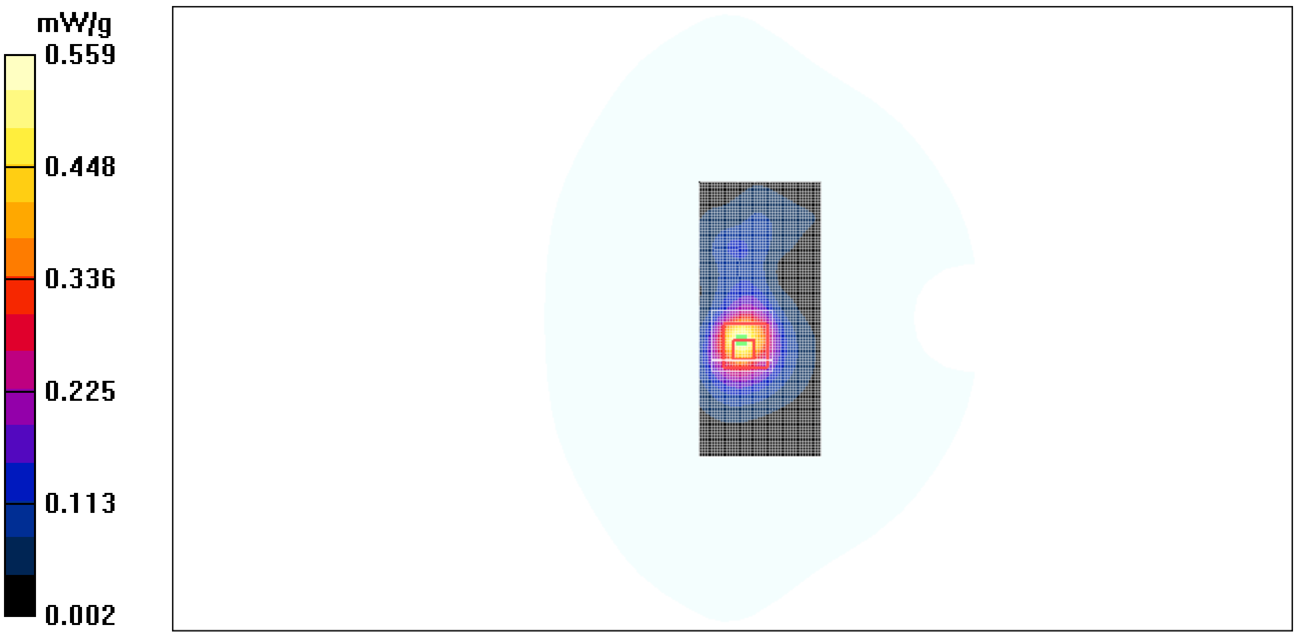


Figure 12 802.11b with IBM T61 Test Position 3 Channel 6

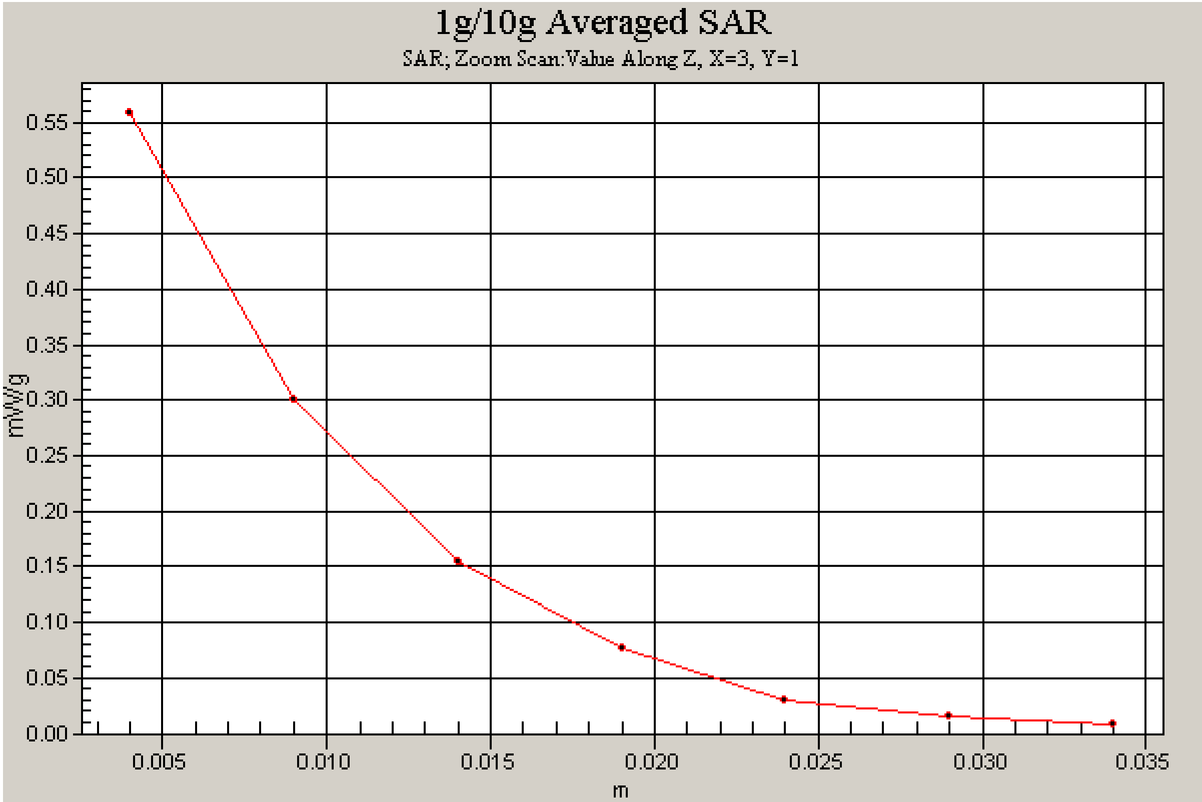


Figure 13 Z-Scan at power reference point (802.11b with IBM T61 Test Position 3 Channel 6)

802.11b with BenQ Joybook R55V Test Position 4 Middle Frequency

Communication System: 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 2437 MHz; σ = 1.97 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Probe: ET3DV6 - SN1531; ConvF(4.1, 4.1, 4.1);

Electronics: DAE4 Sn452;

Test Position 4 Middle/Area Scan (41x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.427 mW/g

Test Position 4 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.2 V/m; Power Drift = 0.064 dB

Peak SAR (extrapolated) = 1.43 W/kg

SAR(1 g) = 0.434 mW/g; SAR(10 g) = 0.227 mW/g

Maximum value of SAR (measured) = 0.485 mW/g

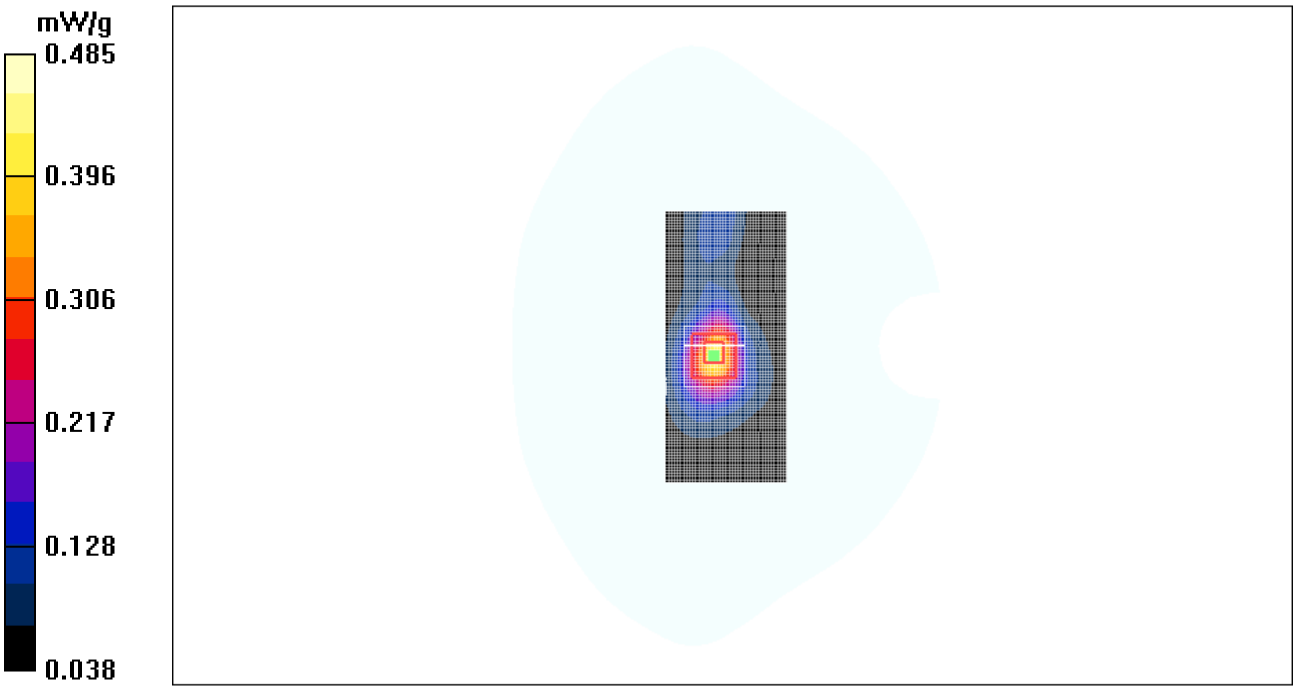


Figure 14 802.11b with BenQ Joybook R55V Test Position 4 Channel 6

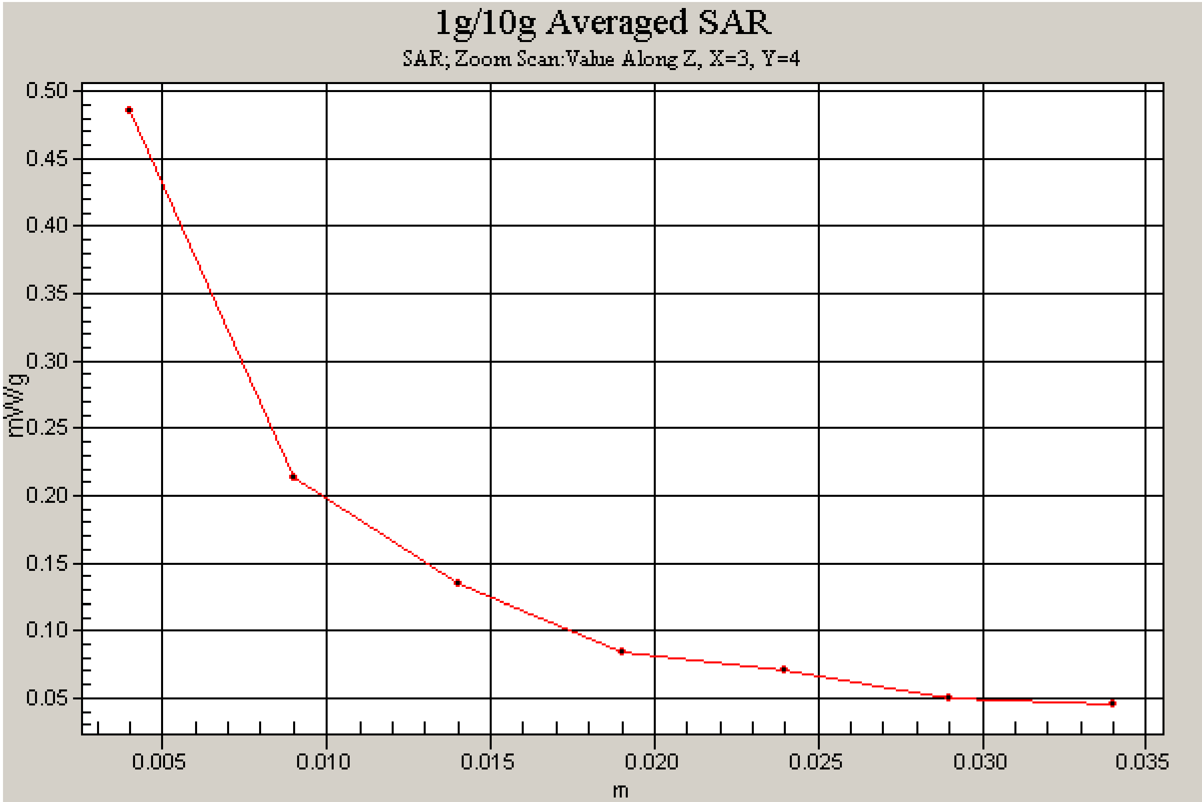


Figure 15 Z-Scan at power reference point (802.11b With BenQ Joybook R55V Test Position 4 Channel 6)

802.11b with BenQ Joybook R55V Test Position 5 Middle Frequency

Communication System: 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 2437 MHz; σ = 1.97 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Probe: ET3DV6 - SN1531; ConvF(4.1, 4.1, 4.1);

Electronics: DAE4 Sn452;

Test Position 5 Middle/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.184 mW/g

Test Position 5 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.66 V/m; Power Drift = 0.075 dB

Peak SAR (extrapolated) = 0.392 W/kg

SAR(1 g) = 0.181 mW/g; SAR(10 g) = 0.083 mW/g

Maximum value of SAR (measured) = 0.196 mW/g

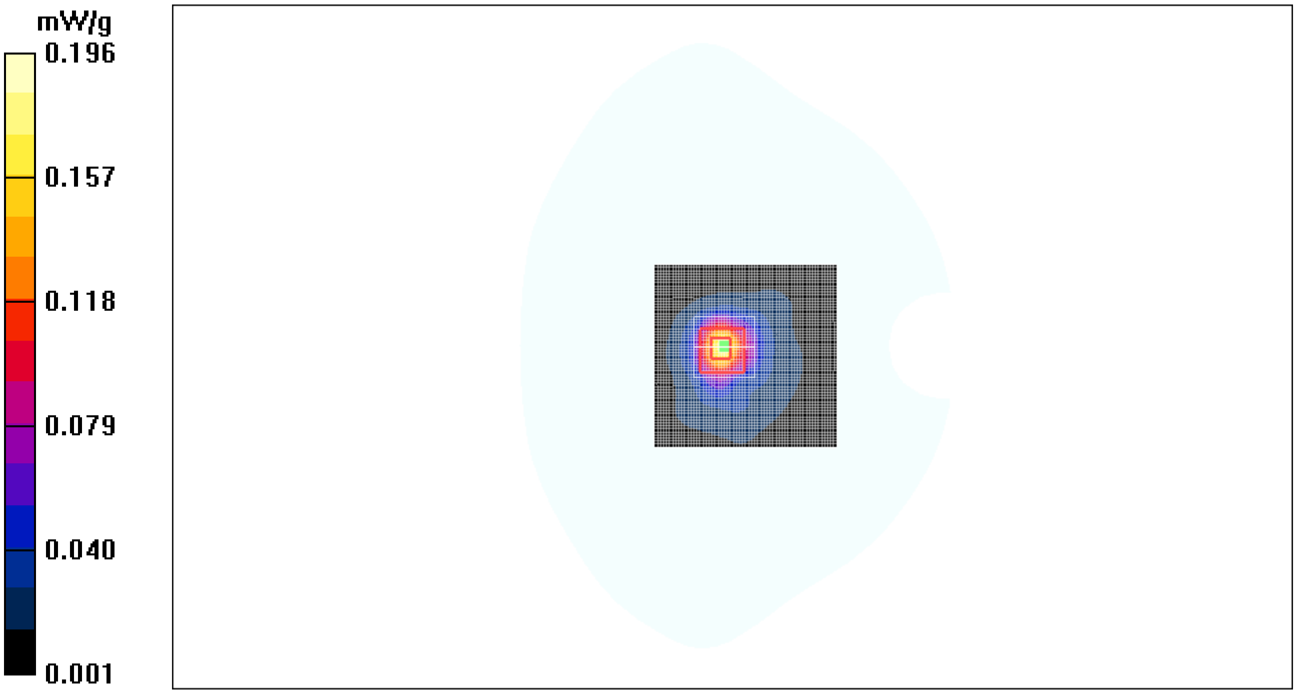


Figure 16 802.11b with BenQ Joybook R55V Test Position 5 Channel 6

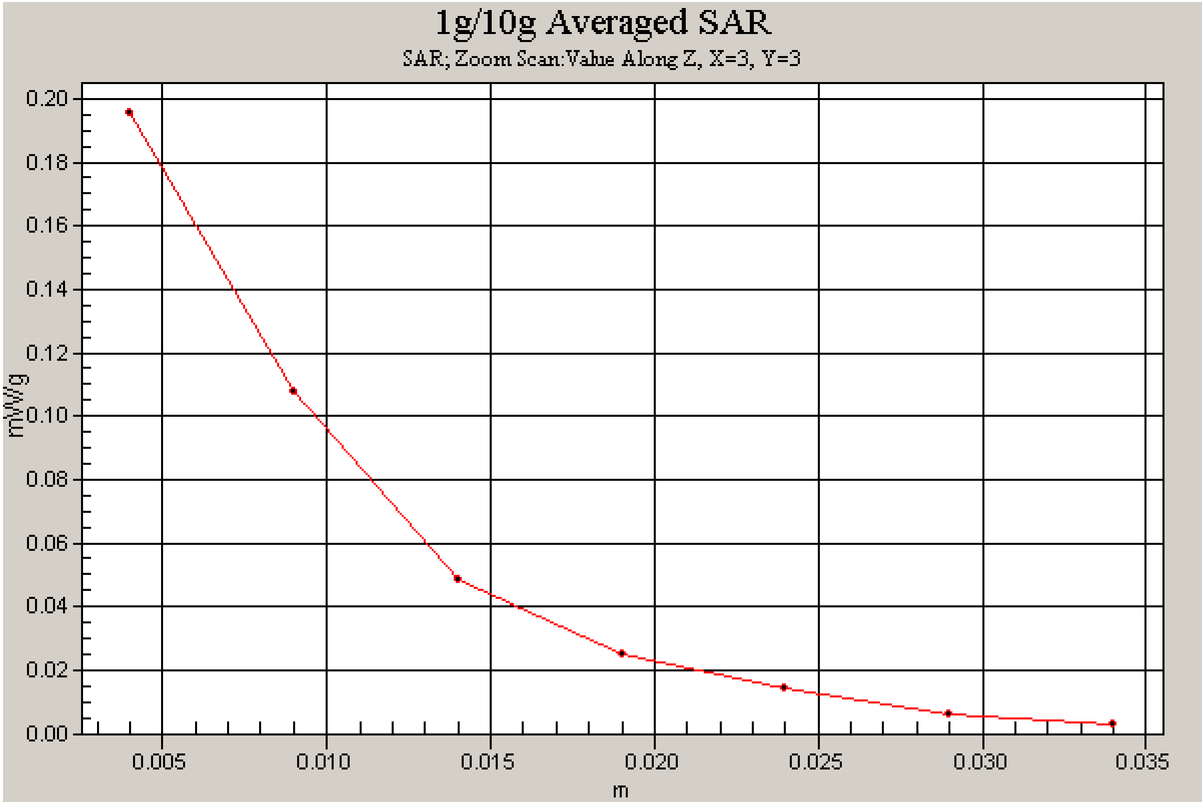


Figure 17 Z-Scan at power reference point (802.11b with BenQ Joybook R55V Test Position 5 Channel 6)

802.11b with BenQ Joybook R55V Test Position 6 High Frequency

Communication System: 802.11b; Frequency: 2462 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2462 MHz; σ = 2.01 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Probe: ET3DV6 - SN1531; ConvF(4.1, 4.1, 4.1);

Electronics: DAE4 Sn452;

Test Position 6 High/Area Scan (41x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.58 mW/g

Test Position 6 High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 17.8 V/m; Power Drift = -0.068 dB

Peak SAR (extrapolated) = 2.59 W/kg

SAR(1 g) = 1.1 mW/g; SAR(10 g) = 0.524 mW/g

Maximum value of SAR (measured) = 1.23 mW/g

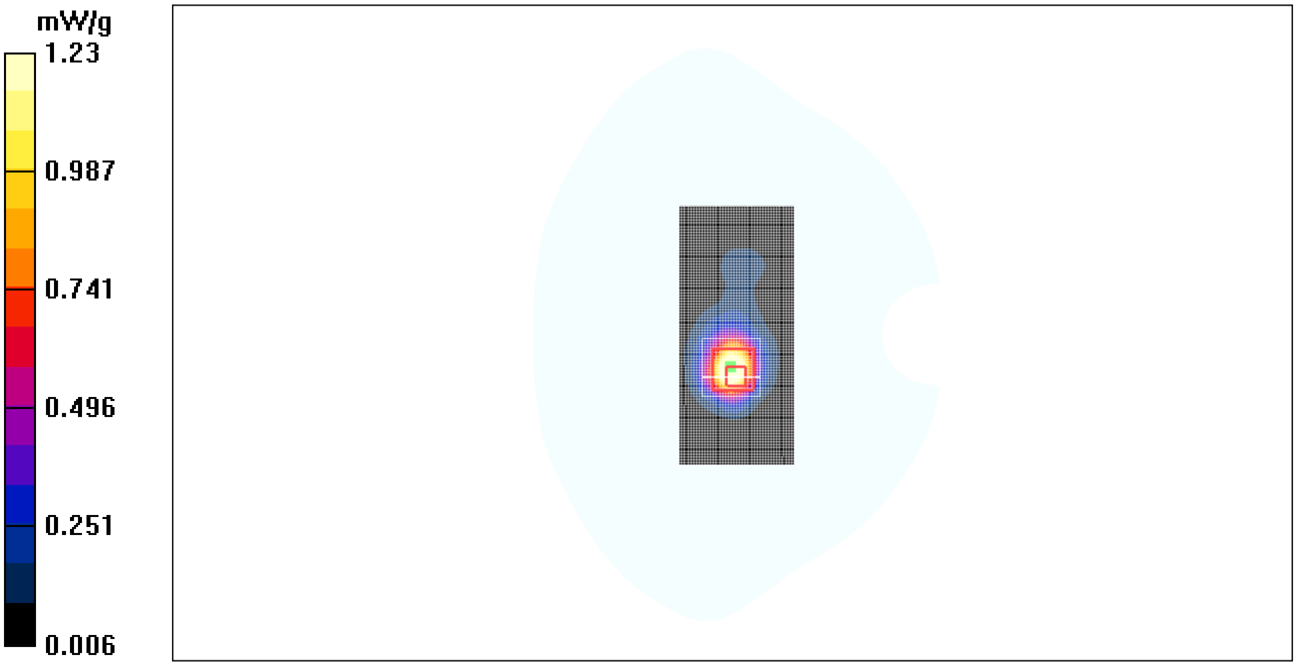


Figure 18 802.11b with BenQ Joybook R55V Test Position 6 Channel 11

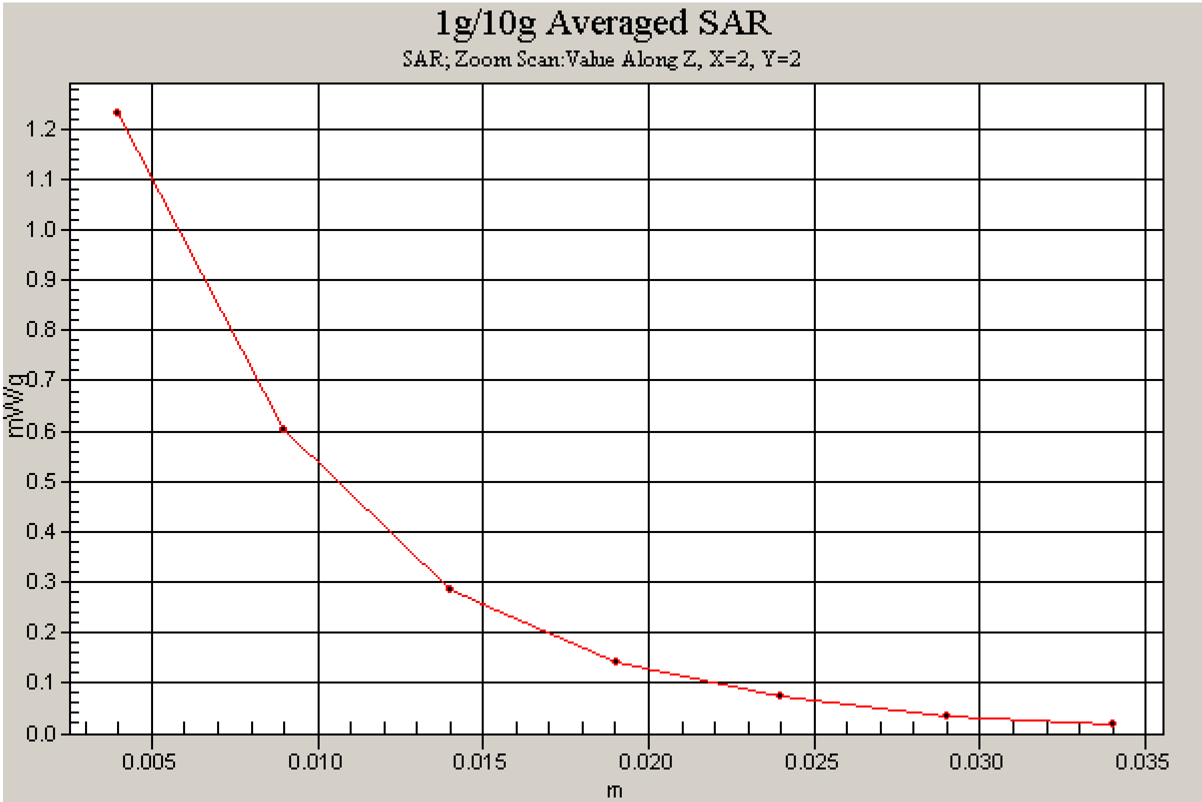


Figure 19 Z-Scan at power reference point [802.11b with BenQ Joybook R55V Test Position 6 Channel 11)

802.11b with BenQ Joybook R55V Test Position 6 Middle Frequency

Communication System: 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 2437 MHz; σ = 1.97 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Probe: ET3DV6 - SN1531; ConvF(4.1, 4.1, 4.1);

Electronics: DAE4 Sn452;

Test Position 6 Middle/Area Scan (41x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.35 mW/g

Test Position 6 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.5 V/m; Power Drift = 0.035 dB

Peak SAR (extrapolated) = 2.59 W/kg

SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.483 mW/g

Maximum value of SAR (measured) = 1.17 mW/g

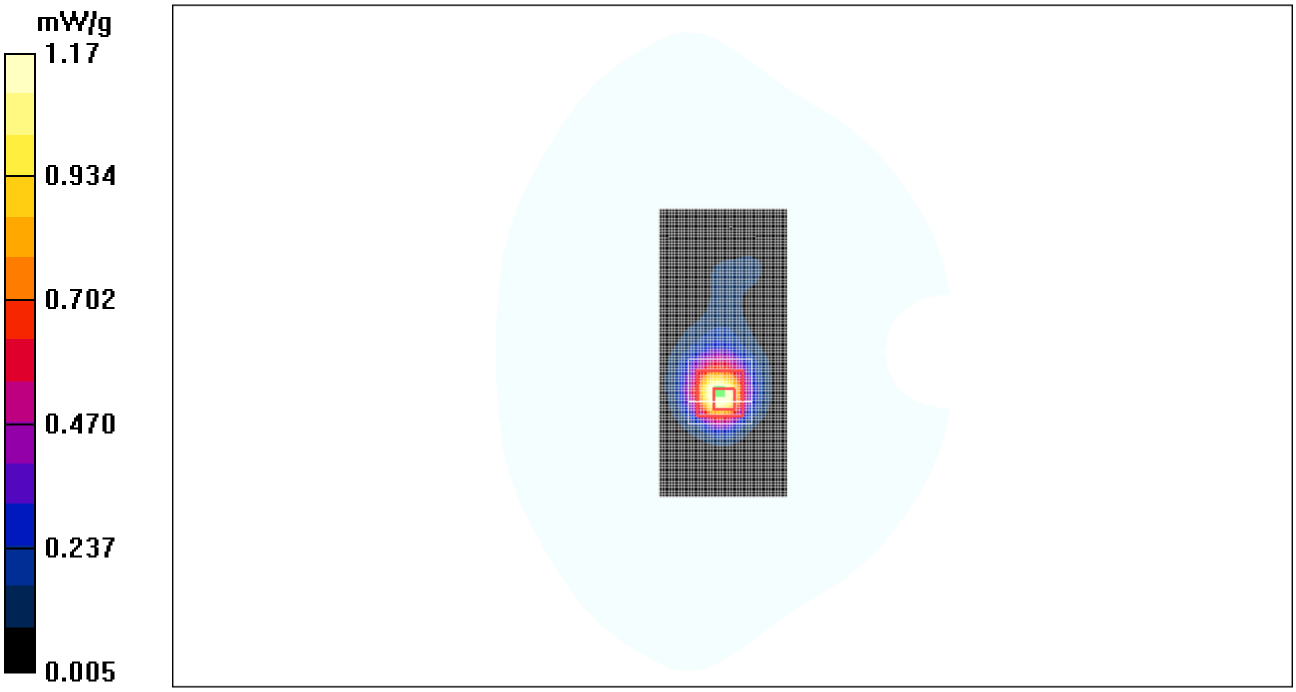


Figure 20 802.11b with BenQ Joybook R55V Test Position 6 Channel 6

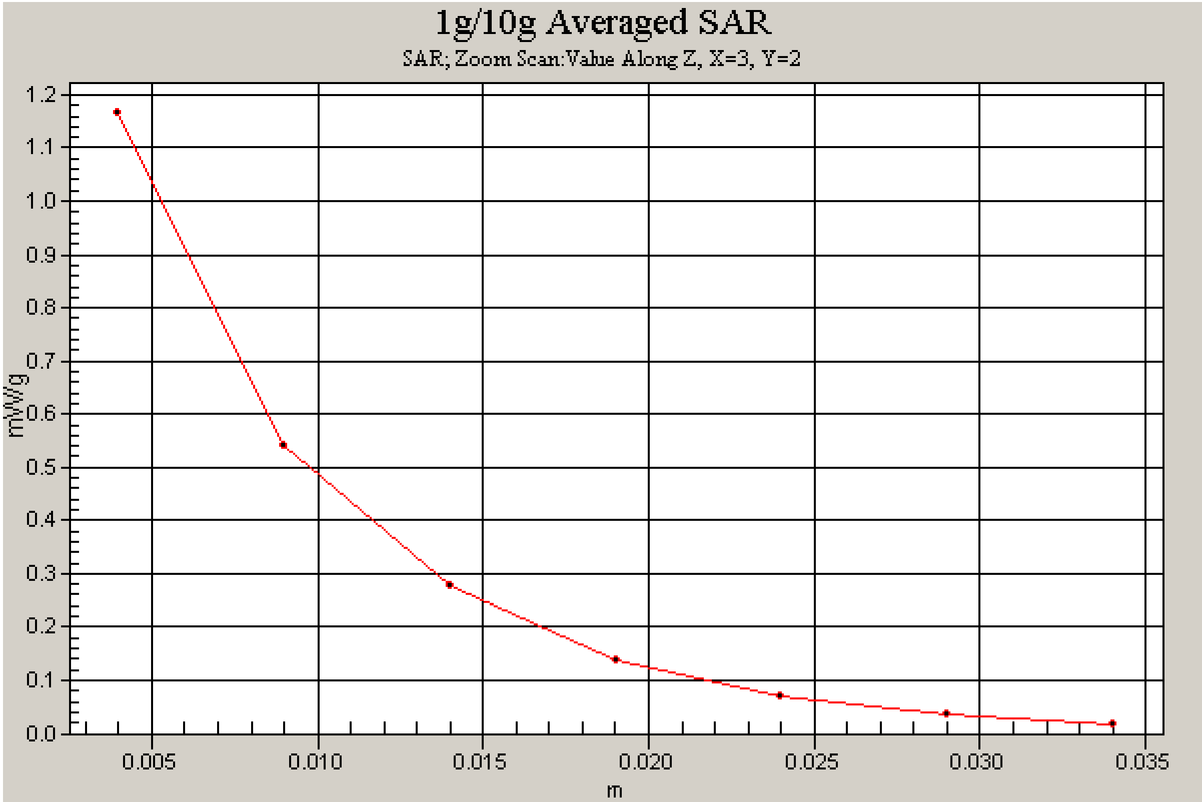


Figure 21 Z-Scan at power reference point [802.11b with BenQ Joybook R55V Test Position 6 Channel 6])

802.11b with BenQ Joybook R55V Test Position 6 Low Frequency

Communication System: 802.11b; Frequency: 2412 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2412 MHz; σ = 1.94 mho/m; ε_r = 52.4; ρ = 1000 kg/m^3

Probe: ET3DV6 - SN1531; ConvF(4.1, 4.1, 4.1);

Electronics: DAE4 Sn452;

Test Position 6 Low/Area Scan (41x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.60 mW/g

Test Position 6 Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.5 V/m; Power Drift = 0.069 dB

Peak SAR (extrapolated) = 2.75 W/kg

SAR(1 g) = 1.12 mW/g; SAR(10 g) = 0.503 mW/g

Maximum value of SAR (measured) = 1.26 mW/g

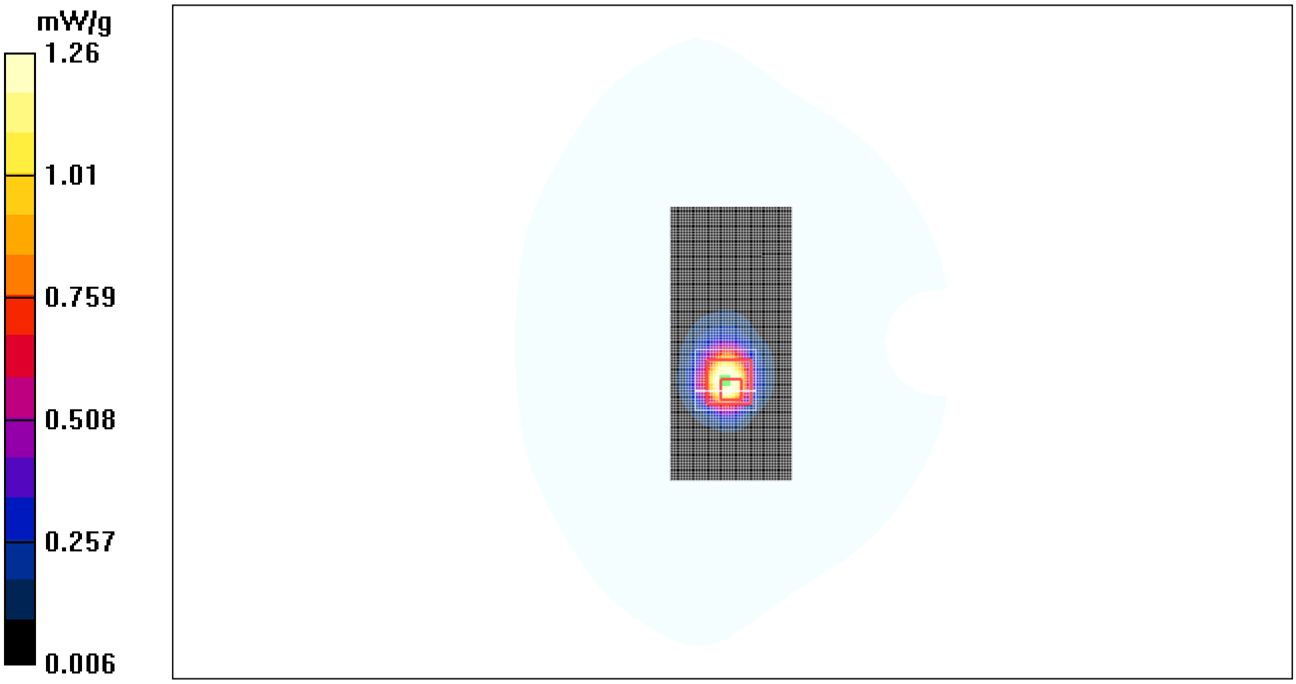


Figure 22 802.11b with BenQ Joybook R55V Test Position 6 Channel 1

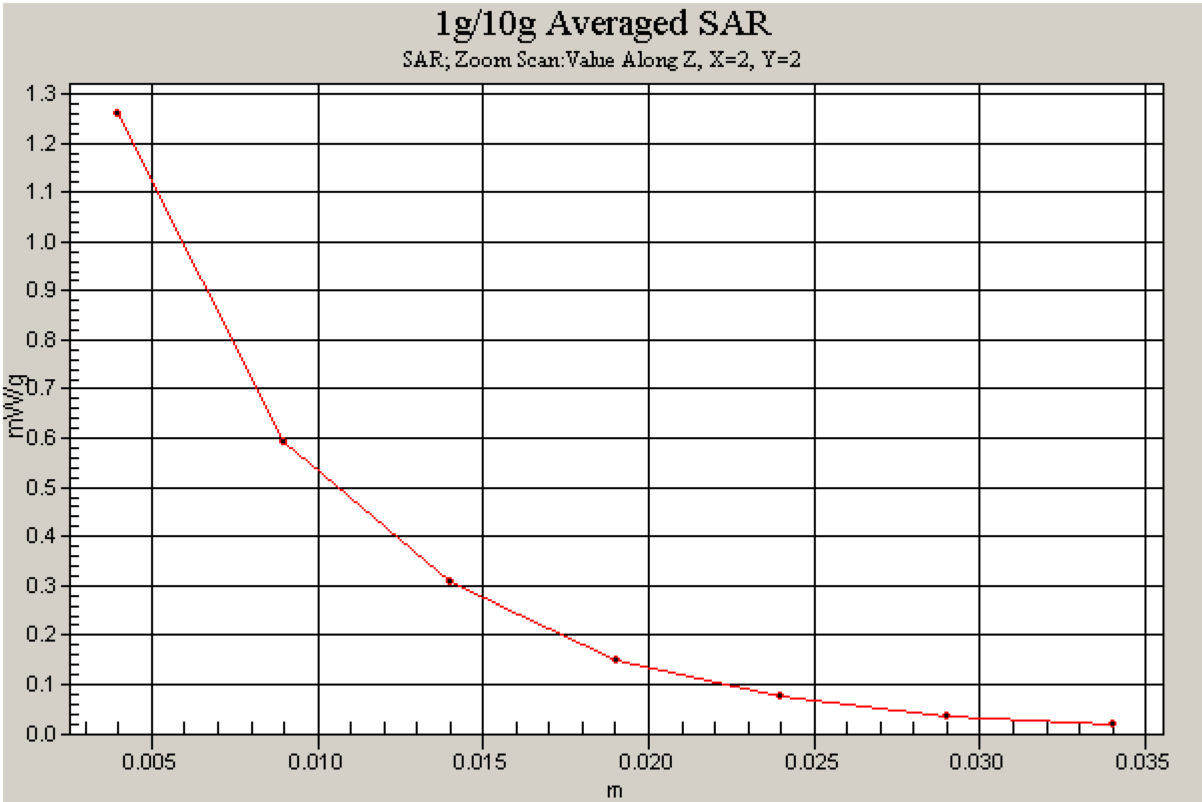


Figure 23 Z-Scan at power reference point [802.11b with BenQ Joybook R55V Test Position 6 Channel 1])

802.11g with BenQ Joybook R55V Test Position 6 Low Frequency

Communication System: 802.11g; Frequency: 2412 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2412 MHz; σ = 1.94 mho/m; ε_r = 52.4; ρ = 1000 kg/m^3

Probe: ET3DV6 - SN1531; ConvF(4.1, 4.1, 4.1);

Electronics: DAE4 Sn452;

Test Position 6 Low/Area Scan (41x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.947 mW/g

Test Position 6 Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.9 V/m; Power Drift = 0.059dB

Peak SAR (extrapolated) = 1.82 W/kg

SAR(1 g) = 0.726 mW/g; SAR(10 g) = 0.321 mW/g

Maximum value of SAR (measured) = 0.800 mW/g

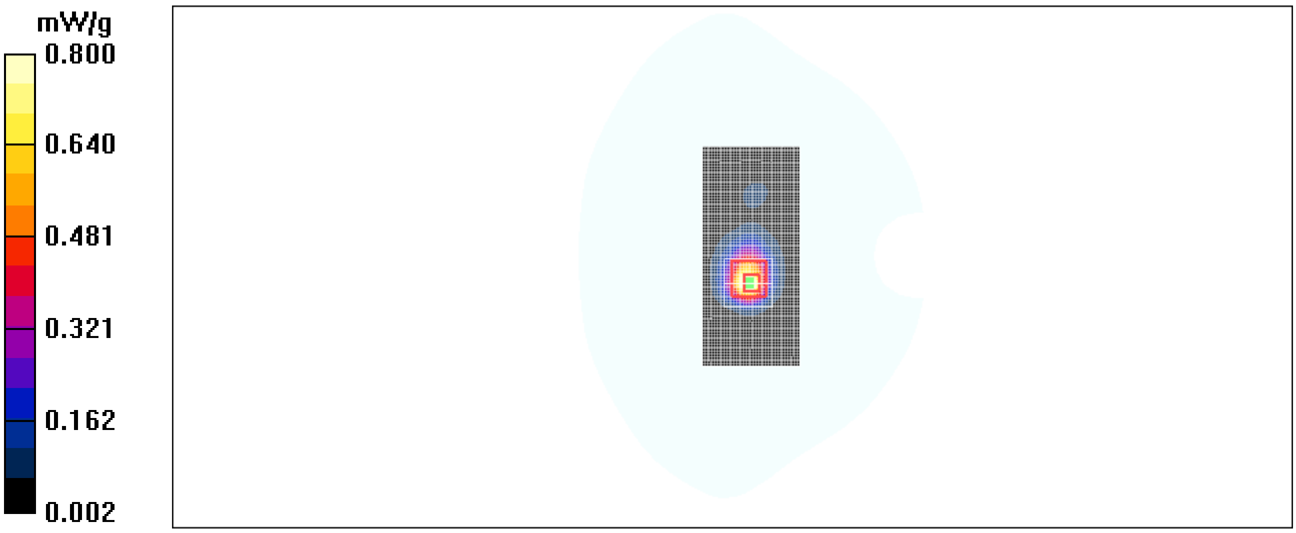


Figure 24 802.11g with BenQ Joybook R55V Test Position 6 Channel 1

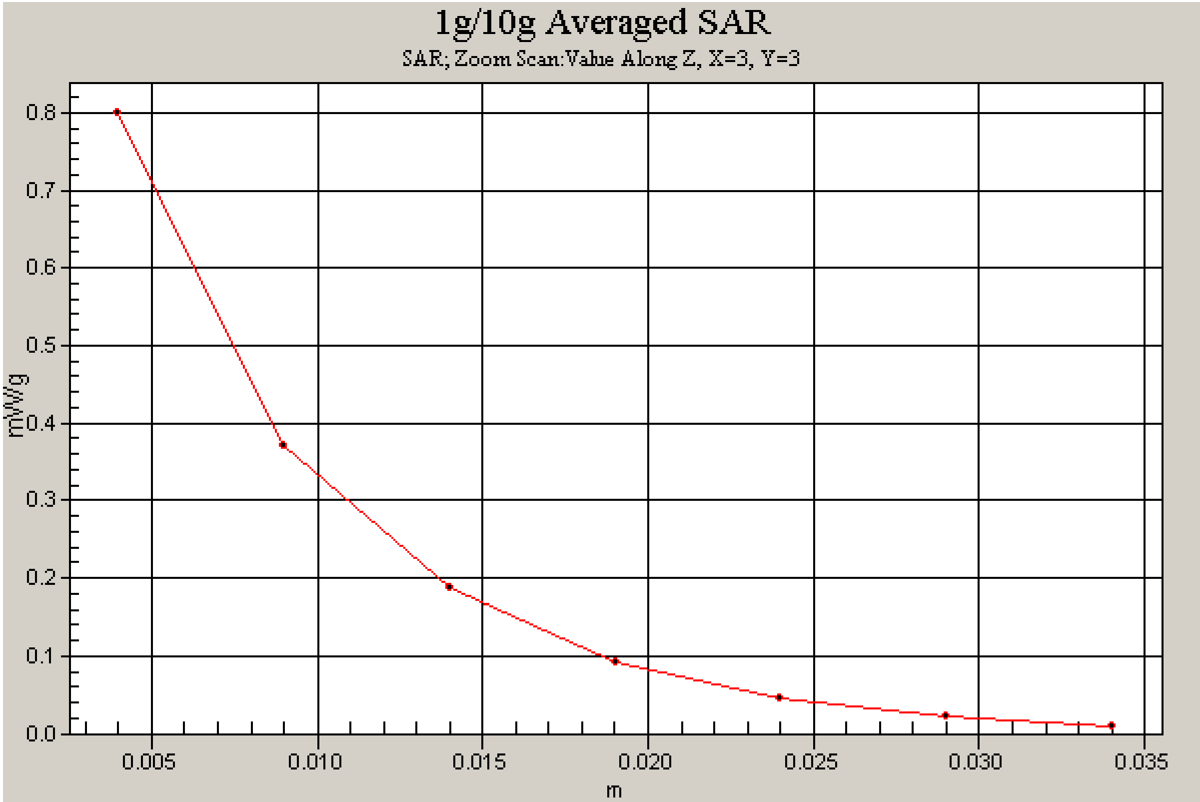


Figure 25 Z-Scan at power reference point [802.11g with BenQ Joybook R55V Test Position 6 Channel 1])

802.11n with IBM X41 Test Position 1 Middle Frequency

Communication System: 802.11n; Frequency: 2437 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 2437 MHz; σ = 1.97 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Probe: ET3DV6 - SN1531; ConvF(4.1, 4.1, 4.1);

Electronics: DAE4 Sn452;

Test Position 1 Middle/Area Scan (41x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.331 mW/g

Test Position 1 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.48 V/m; Power Drift = 0.052 dB

Peak SAR (extrapolated) = 0.586 W/kg

SAR(1 g) = 0.275 mW/g; SAR(10 g) = 0.137 mW/g

Maximum value of SAR (measured) = 0.300 mW/g

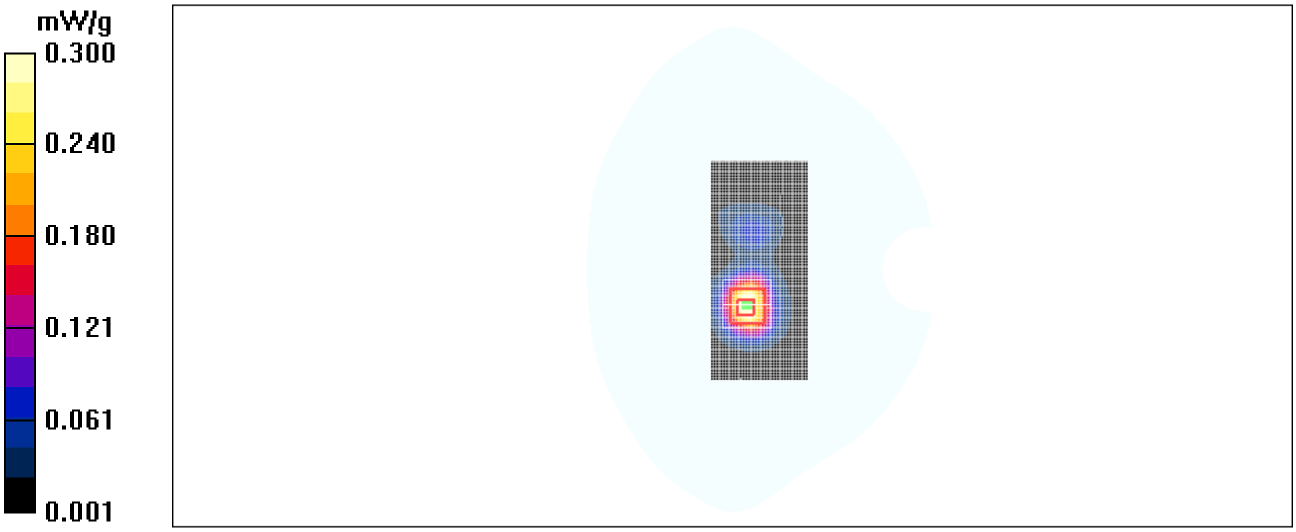


Figure 26 802.11n with IBM X41 Test Position 1 Channel 6

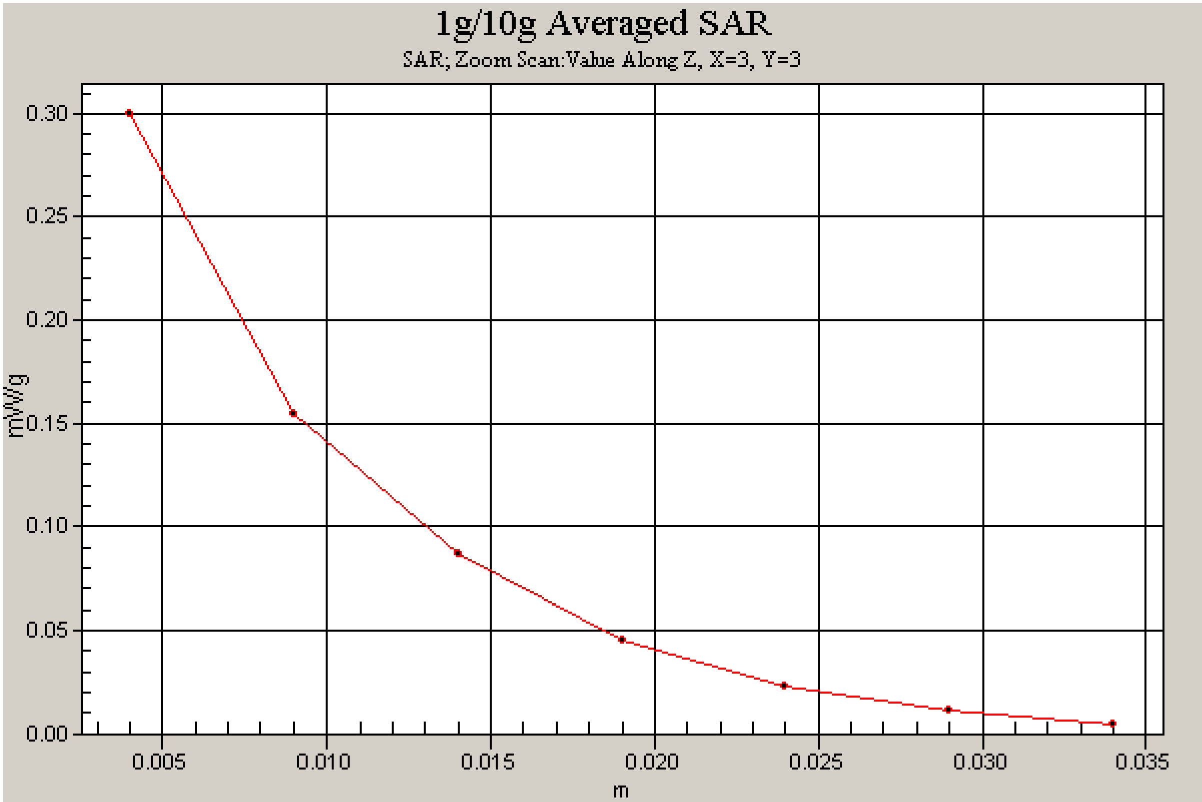


Figure 27 Z-Scan at power reference point [802.11n with IBM X41 Test Position 1 Channel 6])

802.11n with IBM X41 Test Position 2 Middle Frequency

Communication System: 802.11n; Frequency: 2437 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 2437 MHz; σ = 1.97 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Probe: ET3DV6 - SN1531; ConvF(4.1, 4.1, 4.1);

Electronics: DAE4 Sn452;

Test Position 2 Middle/Area Scan (51x51x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.080 mW/g

Test Position 2 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.41 V/m; Power Drift = -0.038 dB

Peak SAR (extrapolated) = 0.174 W/kg

SAR(1 g) = 0.073 mW/g; SAR(10 g) = 0.032 mW/g

Maximum value of SAR (measured) = 0.085 mW/g

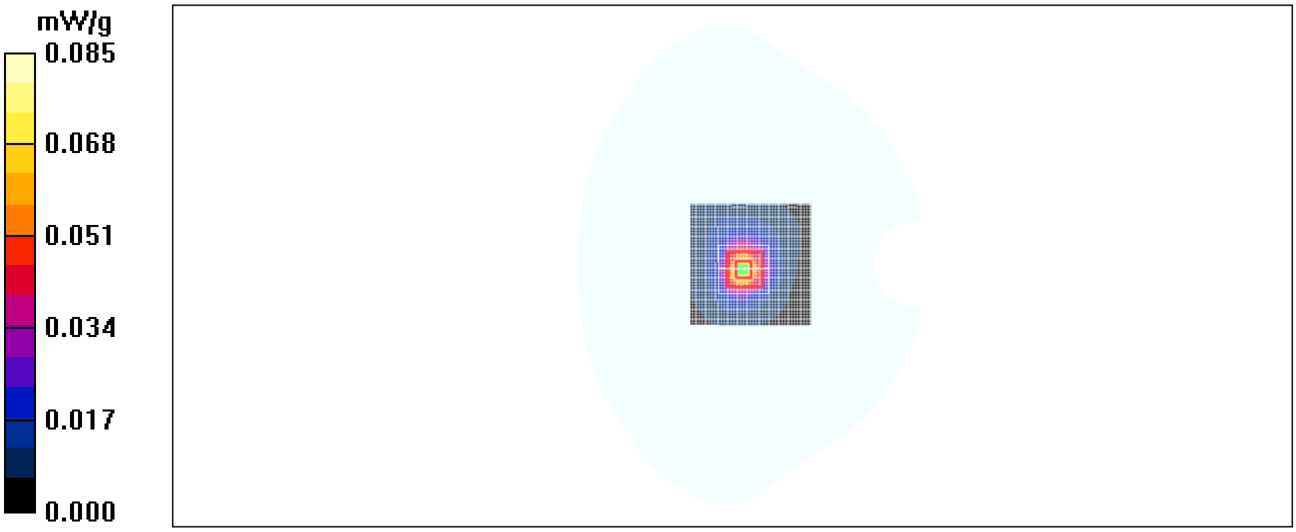


Figure 28 802.11n with IBM X41 Test Position 2 Channel 6

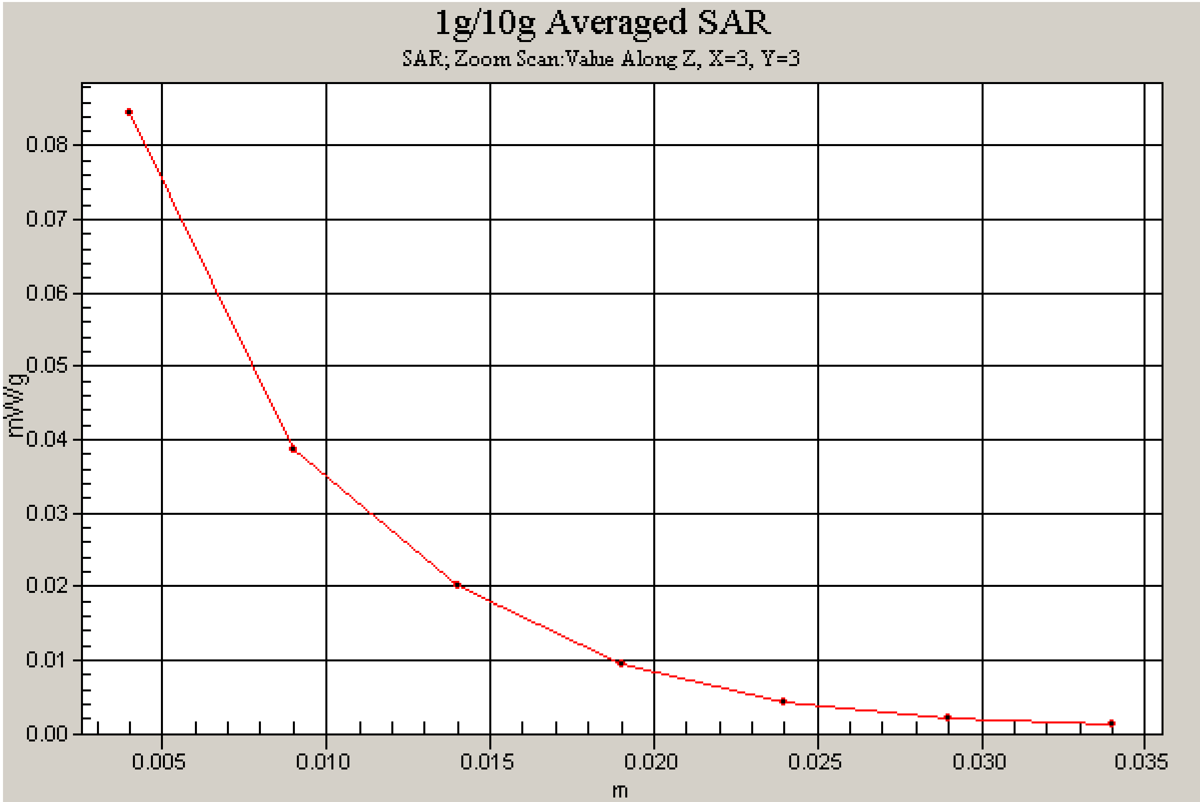


Figure 29 Z-Scan at power reference point [802.11n with IBM X41 Test Position 2 Channel 6])

802.11n with IBM T61 Test Position 3 Middle Frequency

Communication System: 802.11n; Frequency: 2437 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 2437 MHz; σ = 1.97 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Probe: ET3DV6 - SN1531; ConvF(4.1, 4.1, 4.1);

Electronics: DAE4 Sn452;

Test Position 3 Middle/Area Scan (41x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.190 mW/g

Test Position 3 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.30 V/m; Power Drift = 0.124 dB

Peak SAR (extrapolated) = 0.384 W/kg

SAR(1 g) = 0.170 mW/g; SAR(10 g) = 0.080 mW/g

Maximum value of SAR (measured) = 0.190 mW/g

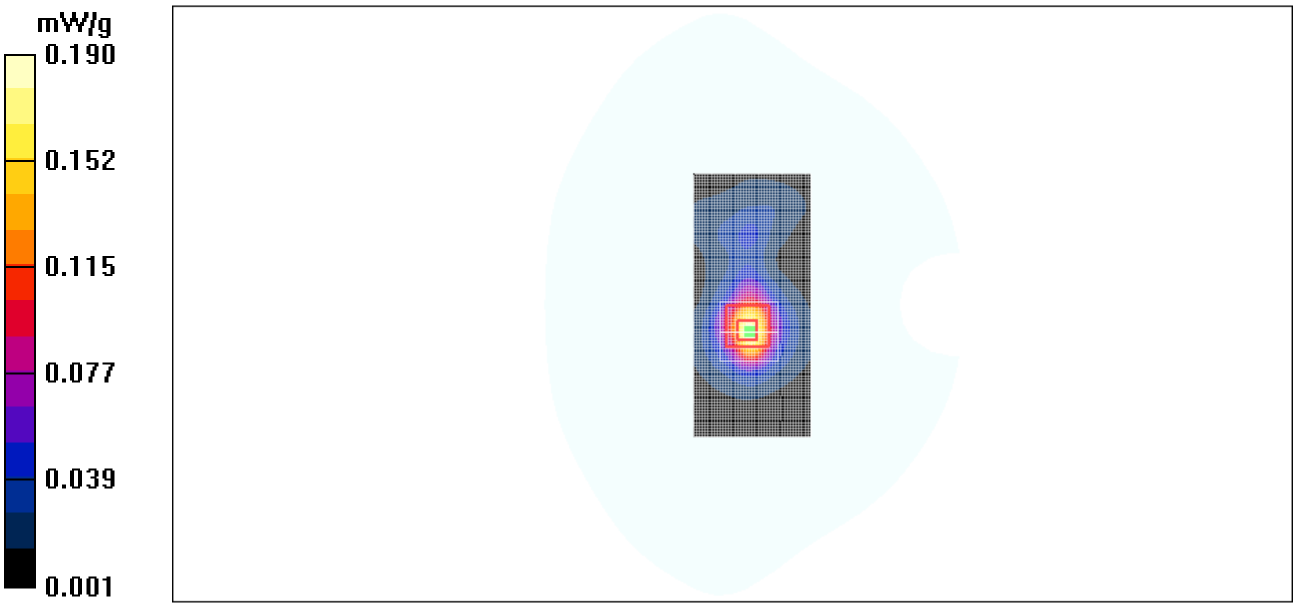


Figure 30 802.11n with IBM T61 Test Position 3 Channel 6

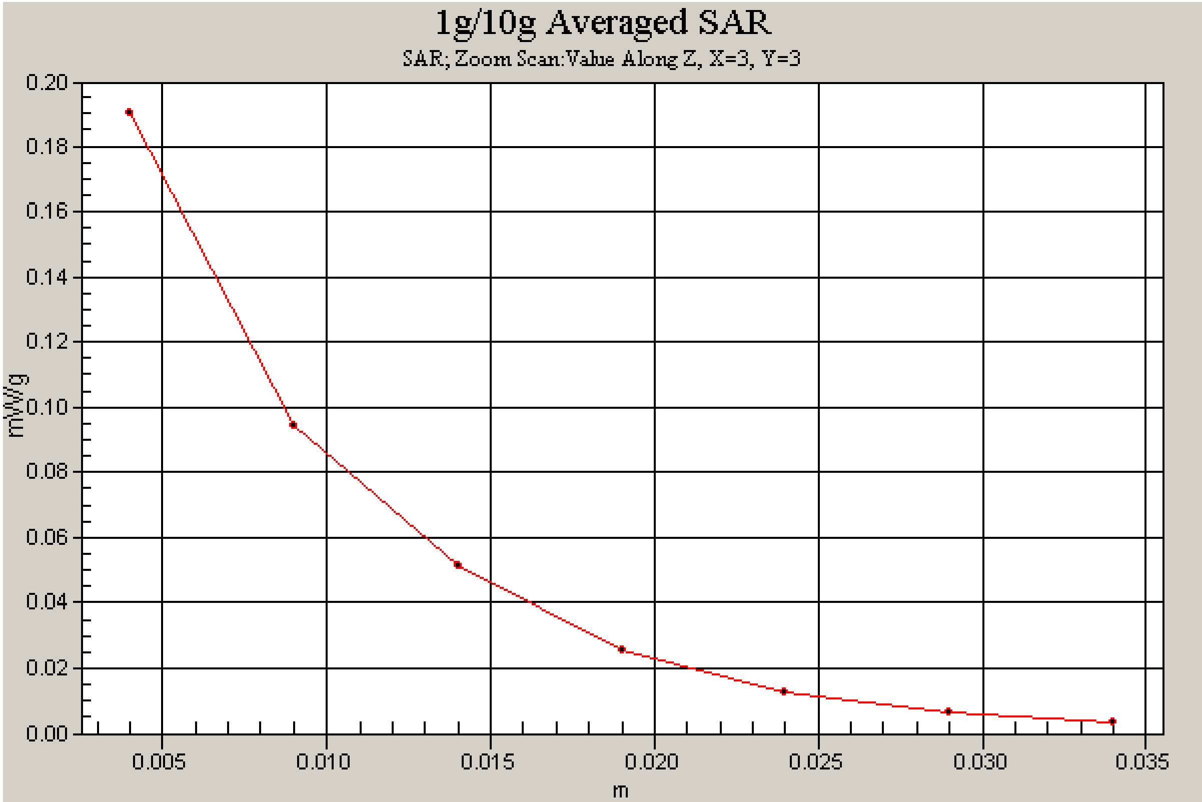


Figure 31 Z-Scan at power reference point [802.11n with IBM T61 Test Position 3 Channel 6])

802.11n with BenQ Joybook R55V Test Position 4 Middle Frequency

Communication System: 802.11n; Frequency: 2437 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 2437 MHz; σ = 1.97 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Probe: ET3DV6 - SN1531; ConvF(4.1, 4.1, 4.1);

Electronics: DAE4 Sn452;

Test Position 4 Middle/Area Scan (41x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.255 mW/g

Test Position 4 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.69 V/m; Power Drift = 0.041 dB

Peak SAR (extrapolated) = 0.548 W/kg

SAR(1 g) = 0.230 mW/g; SAR(10 g) = 0.125 mW/g

Maximum value of SAR (measured) = 0.248 mW/g

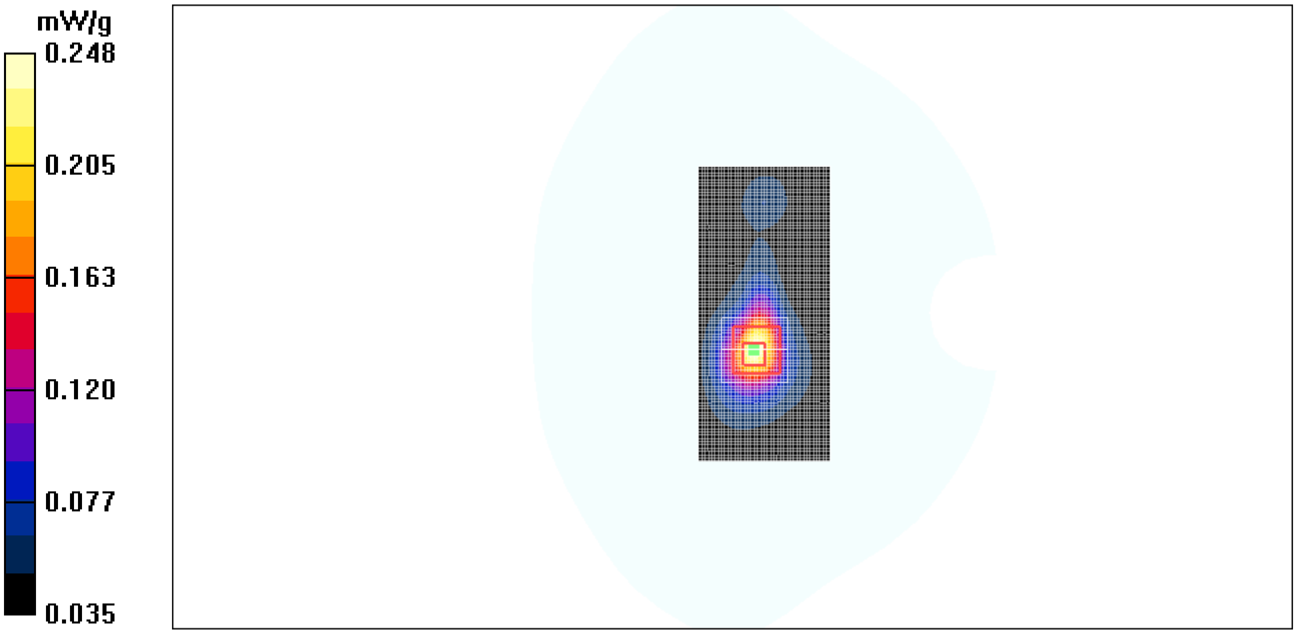


Figure 32 802.11n with BenQ Joybook R55V Test Position 4 Channel 6

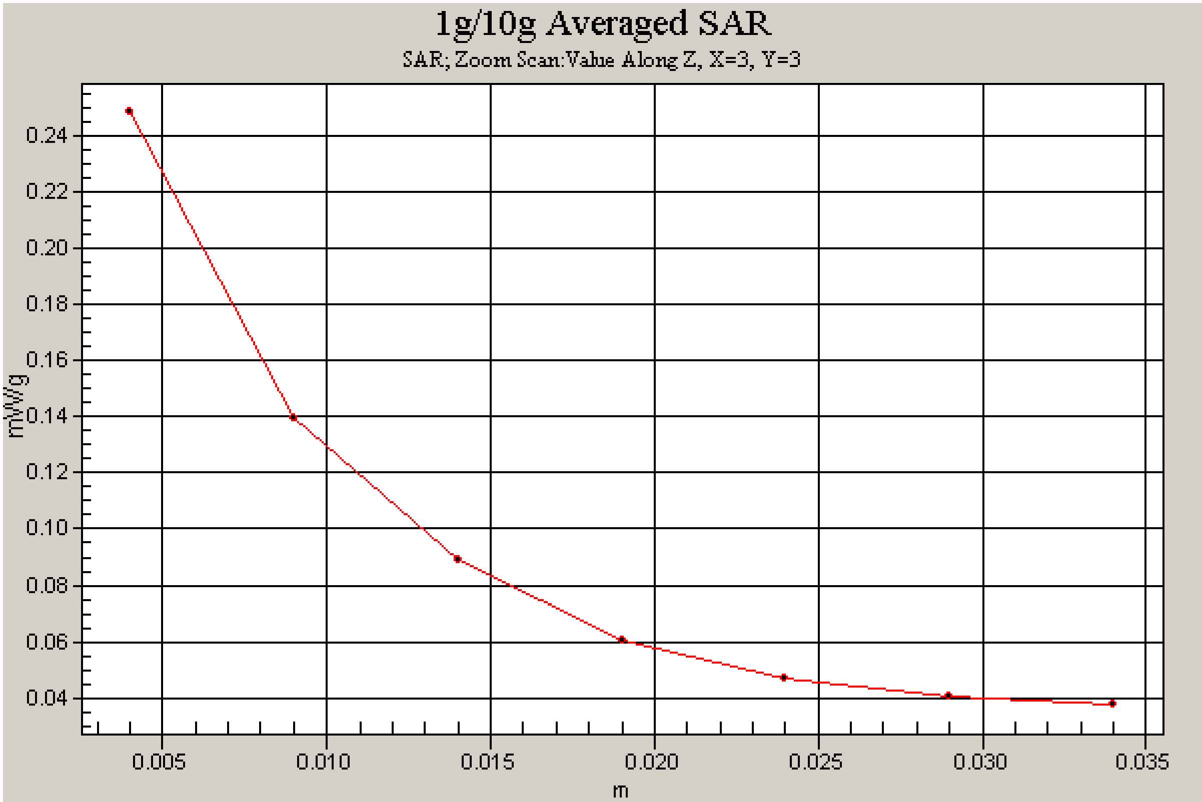


Figure 33 Z-Scan at power reference point [802.11n With BenQ Joybook R55V Test Position 4 Channel 6]))

802.11n with BenQ Joybook R55V Test Position 5 Middle Frequency

Communication System: 802.11n; Frequency: 2437 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 2437 MHz; σ = 1.97 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Probe: ET3DV6 - SN1531; ConvF(4.1, 4.1, 4.1);

Electronics: DAE4 Sn452;

Test Position 5 Middle/Area Scan (51x51x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.082 mW/g

Test Position 5 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.15 V/m; Power Drift = 0.169 dB

Peak SAR (extrapolated) = 0.175 W/kg

SAR(1 g) = 0.076 mW/g; SAR(10 g) = 0.034 mW/g

Maximum value of SAR (measured) = 0.086 mW/g

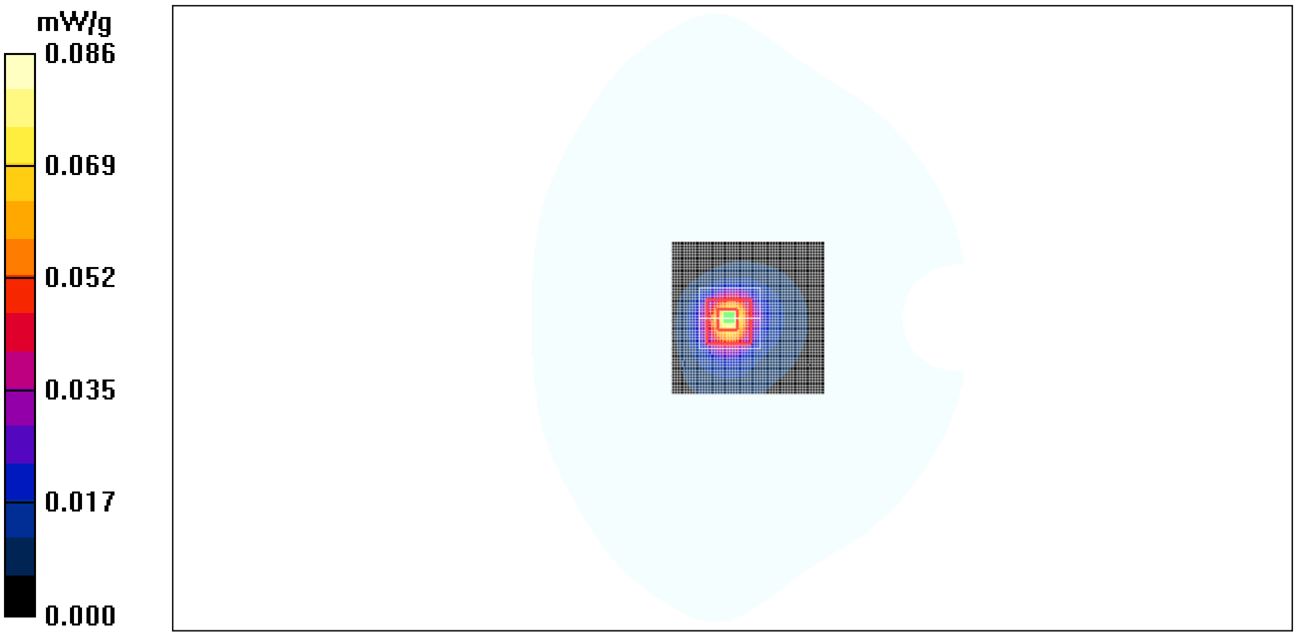


Figure 34 802.11n with BenQ Joybook R55V Test Position 5 Channel 6

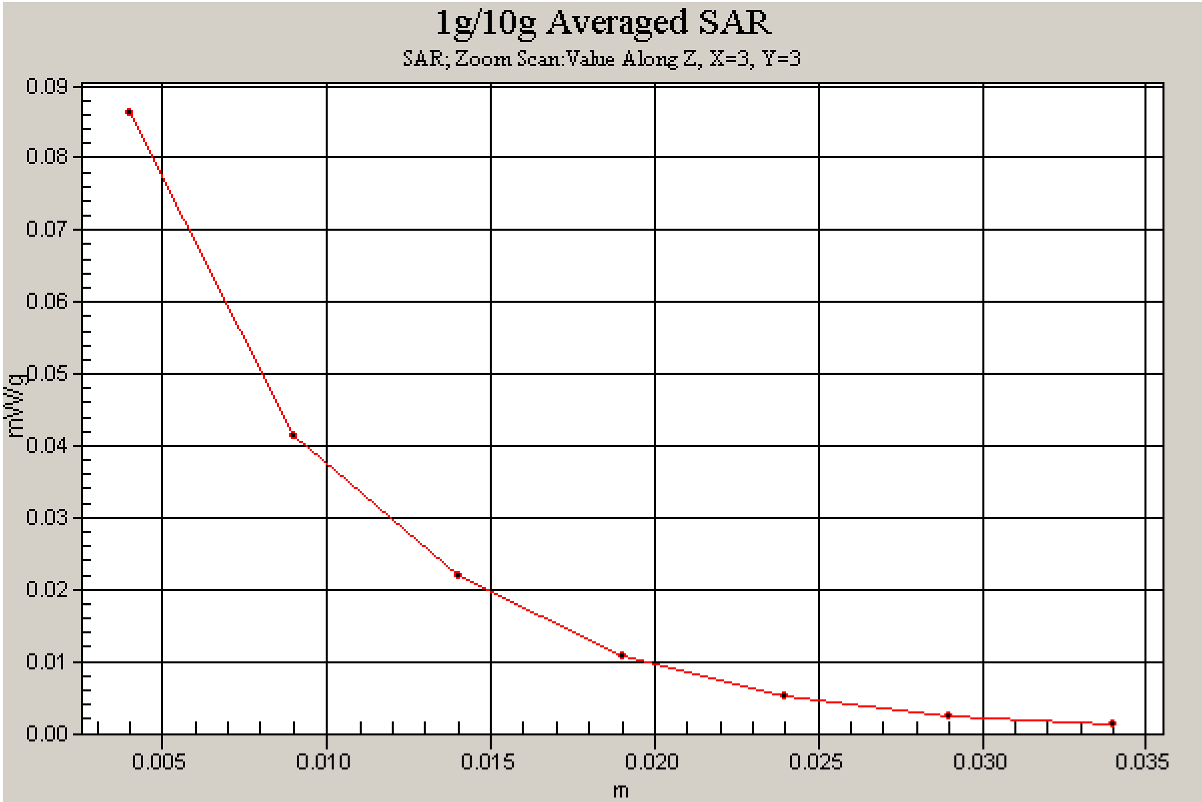


Figure 35 Z-Scan at power reference point [802.11n with BenQ Joybook R55V Test Position 5 Channel 6])

802.11n with BenQ Joybook R55V Test Position 6 Middle Frequency

Communication System: 802.11n; Frequency: 2437 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 2437 MHz; σ = 1.97 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Probe: ET3DV6 - SN1531; ConvF(4.1, 4.1, 4.1);

Electronics: DAE4 Sn452;

Test Position 6 Middle/Area Scan (41x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.475 mW/g

Test Position 6 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.25 V/m; Power Drift = 0.059 dB

Peak SAR (extrapolated) = 1.01 W/kg

SAR(1 g) = 0.412 mW/g; SAR(10 g) = 0.189 mW/g

Maximum value of SAR (measured) = 0.452 mW/g

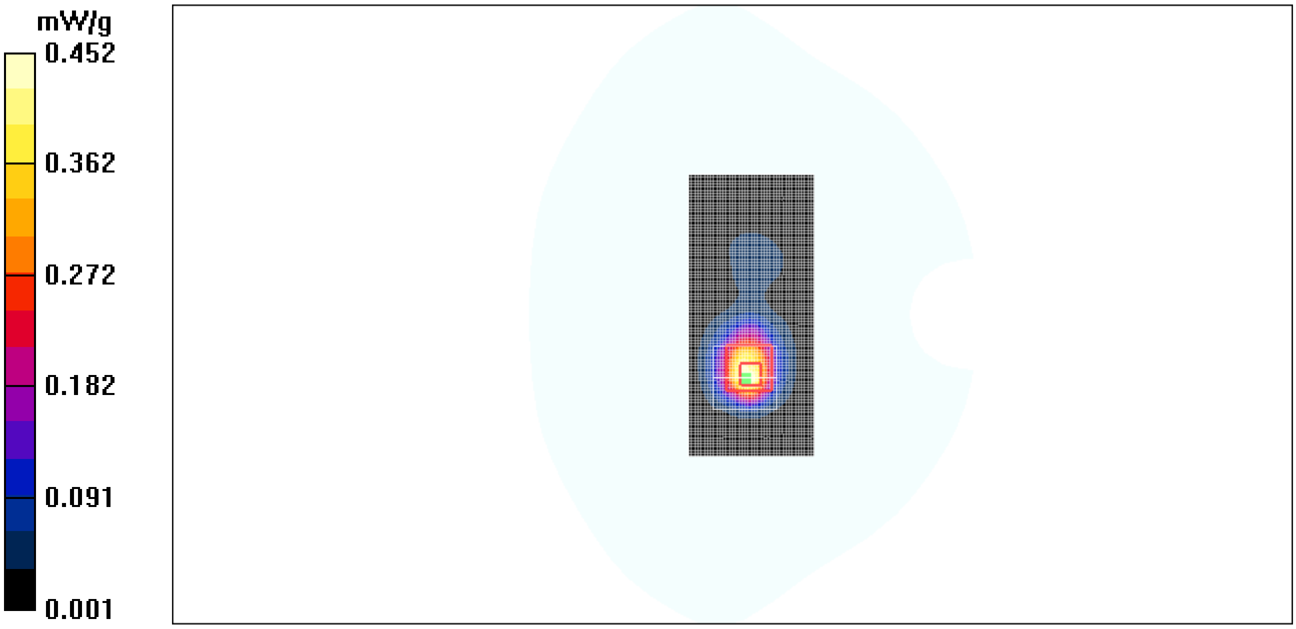


Figure 36 802.11n with BenQ Joybook R55V Test Position 6 Channel 6

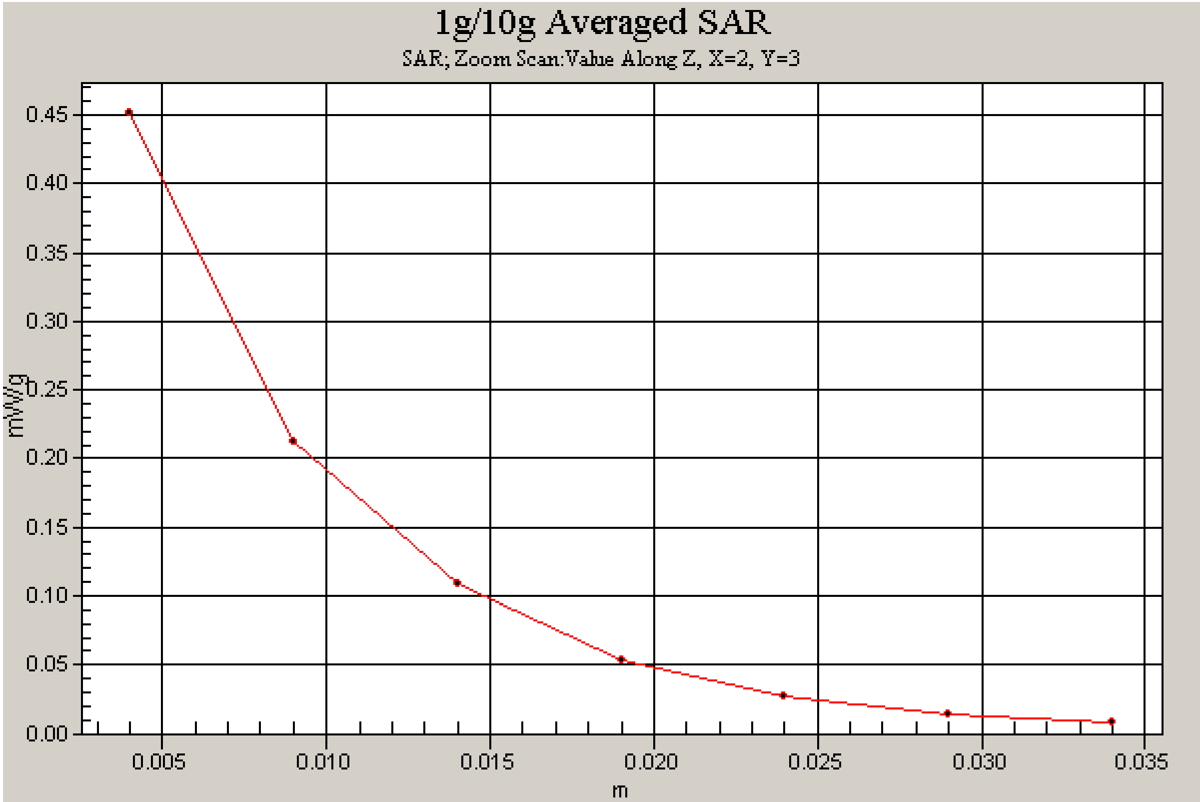


Figure 37 Z-Scan at power reference point [802.11n with BenQ Joybook R55V Test Position 6 Channel 6])

ANNEX D： SYSTEM VALIDATION RESULTS

System Performance Check at 2450 MHz

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 712

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz; σ = 1.98 mho/m; ε_r = 52.29; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1531; ConvF(4.1, 4.1, 4.1);

Electronics: DAE4 Sn452;

d=10mm, Pin=250mW/Area Scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 16.8 mW/g

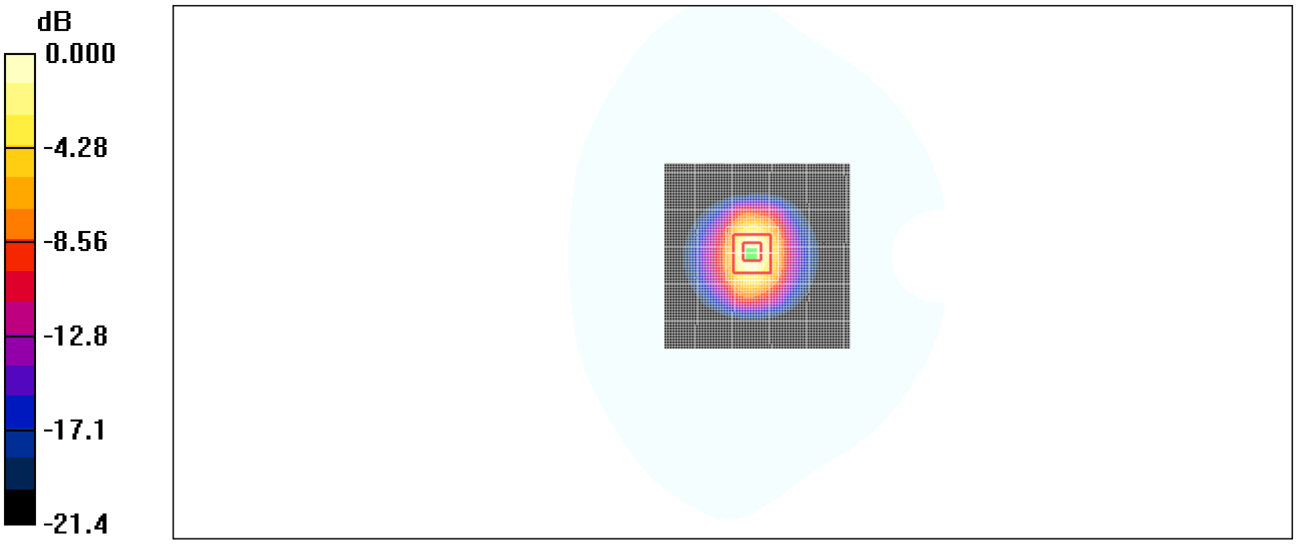
d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 91.7 V/m; Power Drift = -0.100 dB

Peak SAR (extrapolated) = 29.1 W/kg

SAR(1 g) = 13.5 mW/g; SAR(10 g) = 6.24 mW/g

Maximum value of SAR (measured) = 15.2 mW/g



0 dB = 15.2mW/g

Figure 31 System Performance Check 835MHz 250mW