UltraTech
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January 25th, 2002

FCC ID: **AFJIC-M2A**
FCC Application Processing Branch
Correspondence Reference Number: **21737**
731 Confirmation Number: **EA940445**

Attn: **Mr. Martin Perrine**

With respect to your recent queries concerning this application, please find following the information you have requested for clarification on certain items.

EMC

1. DC currents and voltages in the final amplifier stage:

DC Currents (A)	Voltages (V)
1.4	7.2
1.4	7.0
1.4	6.5
0.5	6.0
0.4	5.5 (battery endpoint)

2. There is only one antenna used with this unit (IC-M2A), the following is the antenna information:

   Manufacturer: Icom
   Type: 1/4 wave whip antenna (Rubber Duck antenna)
   Model: FA-SC56A
   Frequency Range: 150-174Mhz
   In/Out Impedance: 50 Ohms
   Gain: Less than 0dB

   The above information can also be found on page 4 of the EMC test report.

3. Frequency stability data using battery endpoint:

   Battery endpoint measured at 5.5 V, 0.4 A. At this point the frequency drift of -80Hz was measured.

4. Part 80.203 (b) 3 attestation statement has been submitted in Attestation Folder

5. The conducted and radiated emissions test results in the EMC test report is the worst-case test configuration. The alkaline battery pack is structurally similar to the Ni-Cd battery pack and the power drain of the alkaline battery pack is much greater than the Ni-Cd. Therefore, the more consistent battery pack (Ni-Cd cells) was selected for testing to represents the worst-case.

6. Please refer to the new tune-up procedure in Parts List/Tune Up Info Folder.

7. The EUT's modulation limiter was set for the frequency deviation less than ± 5kHz and was measured to be 4.5kHz maximum (please refer to our modulation limiting measurement in the EMC Test Report). This maximum frequency deviation was found to be less than FCC limit of ± 5kHz

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SAR

1. The stated value in the SAR report was the nominal value of the radio tested and not the measured value. The measured value was 5.2Watts conducted and this was the RF power tested during all SAR measurements. The affected pages showing the nominal RF power as the measured power will be revised accordingly.

2. The Drop in RF power during a typical SAR measurement was measured and was found to be 0.3dB after 15 minutes of continuous transmission using a fully charged battery pack.

3. The SAR data for the Alkaline Battery pack was re-measured and our findings are;

   - The alkaline battery pack did not change the physical dimensions of the wireless device and so would not create any change in surface RF currents due to the EUT structure.

   - For the Alkaline battery pack, the high level power of 5 watts could only be maintained for 1 to 2 minutes before the device would switch to its low power mode of 1 Watt. This was repeated several times to verify this phenomenon with fresh alkaline batteries each time. The SAR for this battery pack would therefore be much lower than for the re-chargeable battery pack supplied with the device since the high power level can not be maintained.

4. There is only one antenna used with this unit (IC-M2A), the following is the antenna information:

   Manufacturer: Icom
   Type: 1/4 wave whip antenna (Rubber Duck antenna)
   Model: FA-SC56A
   Frequency Range: 150-174Mhz
   In/Out Impedance: 50 Ohms
   Gain: Less than 0dB

   The above information can also be found on page 4 of the EMC test report.

5. Please refer to the original file ("FCC ID Label and Location Info") uploaded in "ID Label/Location Info" folder; page 2 and 3 contained the required warning label.

6. The SAR System and probes employed is manufactured by Oscar Garay of 3D-EMC Laboratories Inc. of Florida. Attached are the system specifications and probe characteristics. Calibration of the probe and is carried out in the system using the same tissue sample used in the SAR measurement phase. Probe calibration is carried out using the standard temperature transfer calibration to obtain the probe factor, and a free space calibration to obtain the amplifier factors. To determine the maximum SAR location on a device, a coarse surface scan of an area encompassing the EUT is carried out with a resolution of 10mm. A zoom scan is then carried out using a finer resolution between 2mm and 5mm depending on the size of the hot spot area determined in the coarse scan. Bilinear interpolation is then used to interpolate to a finer zoom grid size to obtain 1mm spaced points. A bilinear search algorithm is then executed to determine the peak spatial-average SAR in the zoom scan area and an attenuation vs. depth (step size 1mm) scan is carried out at that location. An exponential extrapolation is used to determine the local SAR at the surface of the tissue at the hot spot location. The surface points are then integrated along the attenuation vs. depth data to obtain a volume and the SAR averaged over 1g is computed.

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7. The 3D-EMC system predates the IEEE P1528 and did not employ the same validation procedure as specified in the IEEE P1528 standard. The verification procedure specified in the IEEE P1528 standard is not specified for muscle tissue and the values are not provided for 150MHz frequency. No validation phantom specifications are given for 150MHz and it is predicted that the validation phantom at 150MHz would have to be 2000x1600x170mm in order to meet with the P1528 phantom guidelines Because the 3D EMC system provides the user with the ability to carry out both the transfer calibrations and free space calibrations, a dipole validation test was not provided by the manufacturer. Verification of the system was carried out on a pre-tested wireless device supplied by 3D EMC to ensure that the system was measuring SAR correctly at the appropriate accuracy required relative to the reference test system located in Florida. Ultratech is acquiring the dipoles necessary to carry out the validation/verification procedures according to the P1528 standard but in lieu of this, the FCC has been accepting the attenuation vs. depth data, which is a standard output of the 3D EMC system. Historically, this system has obtained comparative SAR measurements with the SPEAG and the IDX/APREL system.

8. The probe calibration to obtain the probe factors is performed prior to the SAR measurement on the actual tissue and measuring system used in the SAR measurement. A free space calibration is also performed prior to the SAR measurement. Performing the probe calibration using the actual test system and test tissue ensures greater accuracy and repeatability of measurement.

9. The head and body phantom description stated in the report is of the older Motorola phantoms employed prior to the IEEE P1528 SAM and these descriptions has since been updated to reflect the use of the new IEEE P1528 phantoms. The head phantom now employed in these types of measurements is manufactured by APREL and do conform with the IEEE P1528 SAM requirements. The body phantom used is a flat phantom of dimensions 700x420x200mm and is made from clear polycarbonate lexan panels with wall thickness of 9mm and a base plate thickness of 2mm.

10. Tissue mixture at this frequency of 150MHz is a historical problem to formulate due to the wavelengths involved. The IEEE P1528 standard and the OET Bulletin 65 Supp C Edition 01-01 do not provide recipes for obtaining the target tissue parameters at 150MHz for either the brain or muscle simulants. The values obtained are the closest we could get to the target values.

11. The large differences in Z-Axis between some scans is due to the boundary effect which is currently not being compensated for in this system. We are aware that this can result in a large SAR overestimation on hot spots which have a narrow contour pattern and the system coding is being developed to compensate for the boundary effects which are caused by steep changes in the field gradient around the hotspot location. Compensation will be implemented in the near future on this particular system but is currently not available.

12. The liquid depth in the flat phantom used during all the SAR measurements is 150mm depth.

Should there be any further clarifications required, please do not hesitate to contact me at your earliest convenience.

Best Regards,

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3D Near Field Scanner

FOR

EMF MEASUREMENTS

AND

Dosimetric Assessment

3D-EMC Laboratory, Inc.
5440 NW 33rd Avenue, Suite 109
Fort Lauderdale, FL 33309
USA.

1999

Positioner

Type	6 axis, vertically articulated
Repeatability	±0.05mm
Accuracy	±0.05mm
Memory	2000 points, 320KB program
	Auxiliary (by floppy or program)
Weight	Approx. 45Kg
Motor Type	AC servo motor
Position Detection	Incremental Absolute Encoder
Scanning Modes	Horizontal, Vertical and Curvature (grid & linear)
Maximum Speed	100~180°/sec (all axis)
Teaching	Point method, remote (teach pendant)
	Program method (robot language)
Pendant	Keyboard Panel
	LCD screen (640x480)
	TMS320C30DSP processor
Load	6Kg

Positioner Controller

Motion	PTP, CP (3 dimensional line and arc)
Teaching	Teaching type and MDI type, parallel use
Language	FARAL
Memory Capacity	Point: 160KB Program: 320KB
Maximum Number of Program	128
Program Editing	Teaching pendant or Computer editor
Location Repeatability	Absolute encoder (8192 P/R)
Program Execution Mode	Step, Cycle, Continue, Dry run
Communication	RS-232 and Serial port
Selectable Coordinate System	Cartesian coordinate
Articulated coordinate	Tool coordinate
Auxiliary Memory Device	Program position data and parameter back up
Weight	25Kg
Dimension	433mm(W) × 523 mm(D) × 158 mm(H)
Power Supply	AC 220V(±10%), 1.5KVA, 7A, 60Hz

Positioner Table

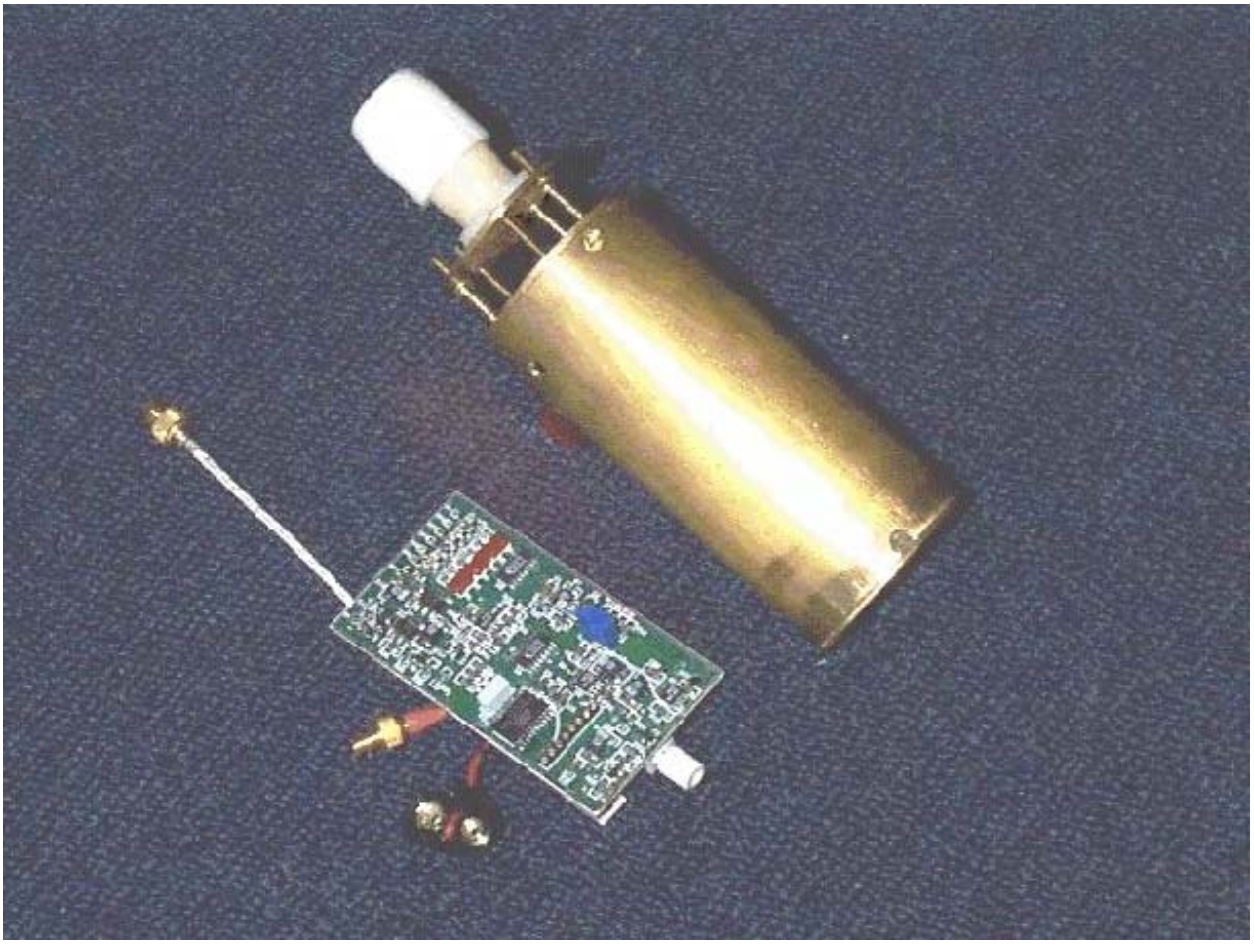
Material	Top 3.8Cm (plywood) Legs 10 × 10 cm (solid wood) Side & Drawers (plywood 19mm)
Dimensions	Approx. 120Cm × 85Cm × 100Cm Formica covered Retractable brakes, storage compartment

Computer

Processor	Pentium
RAM	32MB
Operating System	Microsoft Windows NT v4.0
GPIB Interface	National Instruments AT-GPIB/TNT
Monitor	≥ 17 inch
Option	Custom option available

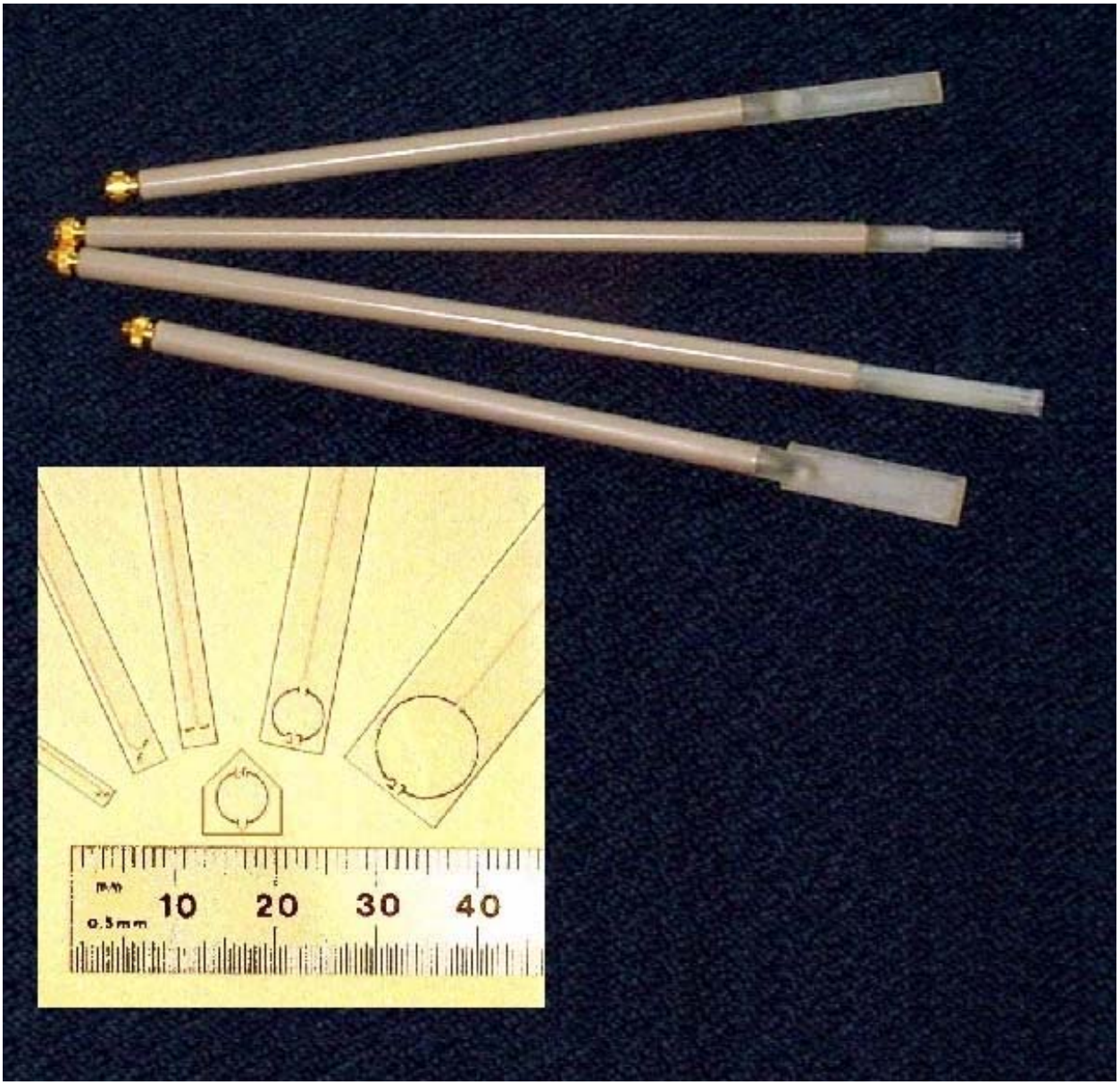
Software

Control Panel	v2.2 (user friendly interface)
Measurements	Free Space, SAR (in liquid medium), Calibrations
Operation	Control 4 channels simultaneously (3 axis probes, temperature probe)
Output Data	mV, V/m, A/m, mW/cm^2, °C
Format	Predefined measurements procedures according to FCC Guidelines (OET 65, etc.)
Logging	Record for every measurement and calibration in a text file.
Requirements	Microsoft Windows NT v4.0
Robot control	Axis coordination for horizontal, vertical and curvature scanning



Amplifier (Isolator)

Enclosure	Shielded Instrumentation Amplifier (brass cylinder 5.0cm diameter, 10.0cm length)
Proximity Sensor	Opto-mechanic with Emergency Stop Sampling 50 times/sec
Dynamic Range	1μV to >400mV (adjustable)
Input Offset	Automatic Zero
Input Impedance	>30MΩ
Noise	<1μV Typical RMS
Sampling Rate	50 times/sec for each axis
Source	>200 hours of operation (9V Battery)
Data Interface	Digital Serial, 16bits



Probe (Mechanical characteristics)

Body Materials	Dielectric constant 2.5 measured at 10GHz
	Loss Tangent 0.0004 measured at 10GHz
Dimensions	30.0cm length, body diameter 9.5mm
Substrate	Quartz, thickness 0.63mm
	Resistive lines 25µms width, 25µms separation
Sensors	Gold plated
Connector	Gold plated, miniature 7pins (comparable to NARDA)
	(Materials subject to change without notice)

Triangular E Field Probe	Tip Diameter	4mm
	Dipole length	2mm
	Offset	2,25mm
	Body Length	300mm

Models (standards)

E-Field	I-beam (cross-section)	2.5mm Dipole length 7.5mm O.D. tip, Offset 3mm typical
	Triangular (cross-section)	1.0mm Dipole length, 4.5mm O.D. tip, Offset 1.5mm typical (smallest commercially available)
H-Field	single loop	5.0mm diameter 10.0mm diameter
	3D	5mm diameter

(All the sensors are designed for use in free space measurements or in a lossy liquid medium)
(Other designs upon request)
(Materials and dimensions maybe changed without notice)

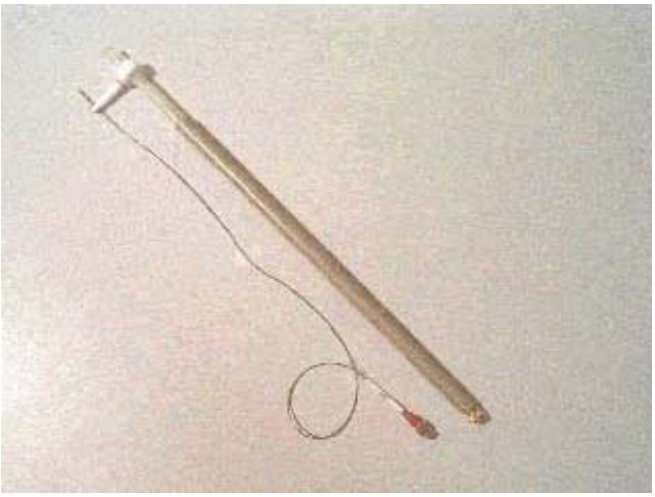
E-Field Probes (Electric Characteristics)

Frequency Band	10MHz to 10GHz
Spatial Resolution	≤ $25mm^3$
Impedance	≈ 2MΩ
Angular Response	±0.2dB (isotropicity)
Dynamic Range	2μW/g ~ 100mW/g
Detector	Low Barrier Schottky HSCH 5331

H-Field Probes (Electric Characteristics)

Type	Single loop with broadband response (except 3D H-Field probe)
Dimensions	5.0mm and 10.0mm diameter
Frequency	10MHz to 2.5GHz
Dynamic Range	2mA/m ~ 2.0A/m
Detector	Medium Barrier Schottky HSCH 5311/10
E-Field Response	<< 1.0%

Temperature Probe



Manufacturer	BSD
Type	Thermistor NTC
Dimensions	Length 300mm diameter 1.0mm
Accuracy	0.01°C
Accuracy(T)	±0.2°C
Range	0°C to 50°C

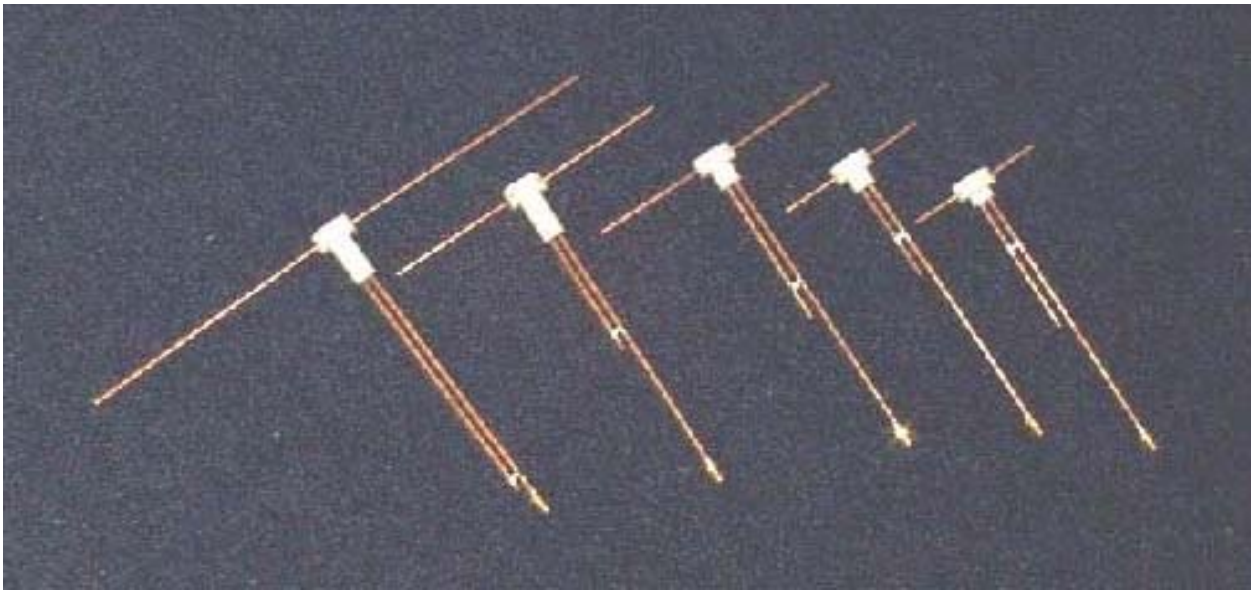
Human Shaped Phantoms (Standards)

Material	Fiberglass (semi-transparent)
Thickness	Approx. 1.5mm, (except area that need reinforcement)
Models	Head and shoulder, left and right ear, or face
	(Approx. 60cm cranial circumference) approx. 20 liters
	Half Full Body (open back for SAR) 175cm height
	approx. 60 liters
	Full Body (standing) for Anechoic Chamber use (antenna development)
	approx. 70 liters
Planar	For Calibration (rectangular box)
	(Approx. 60cm × 40cm × 20cm) approx. 15 liters
Pump	12Volts submergible (1000 liters/hour)

(All Phantoms are mounted on wooden supporting structures)
(Economic version, thicker wall, are available)

DUT Holder

Material	Non-magnetic (Plastic)
Adjustments	Height (50 centimeters)
	Cam adjustment for battery replacement
	Azimuth (360 degrees)
	Elevation (180 degrees)
	Easy to read indicator to obtain high degree of repeatability in the position of DUT in compliance with guidelines of FCC or CENELEC



Antennas for calibration

Type	Balanced Standard Dipole (include impedance and radiation patterns)
Frequency	835 ~ 1900 MHz (other frequencies optional)
Power	100W
Connector	SMA

Simulated Tissue Measurement Kit

Type	Coaxial Wave Guide
Length	Approx. 35cm
Connector	SMA
Range	Above 100MHz
Software	Excel worksheet (include)

The following is the amendment for SAR Test Report:

EXHIBIT 4. MEASUREMENTS, EXAMINATIONS & TEST DATA

4.1. TEST SETUP

EUT Information		Condition	
Radio Type	Handheld Portable VHF Radio Transceiver	Robot Type	6 Axis
Model Number	IC-M2A	Scan Type	SAR
Serial Number	0015	Measured Field	E
Frequency Band (MHz)	156.050 - 157.425	Phantom Type	2mm base Flat Phantom
Frequency Tested (MHz)	156.050, 157.425	Phantom Position	Head Front, Body-Worn
Nominal Output Power (W)	5 W (Conducted)	Room Temperature	23 ± 1 °C
Antenna Type	Fixed Monopole	Room Humidity	35%
Signal Type	FM	Tissue Temperature	23°C
Duty Cycle	50 %*		

Type of Tissue	Muscle	Brain
Target Frequency (MHz)	150	150
Target Dielectric Constant	61.9	52.30
Target Conductivity (S/m)	0.80	0.76
Composition (by weight)	DI Water – 32,881.0g (49.97%) Sugar – 31,291.0g (47.56%) Salt – 1465.0g (2.23%) HEC – 110.0g (0.17%) Bactericide – 50.0g (0.08%)	DI Water – 28,761.0g (42.81%) Sugar – 35,763.0g (53.23%) Salt – 2,476.0g (3.69%) HEC – 100.0g (0.15%) Bactericide – 80.0g (0.12%)
Measured Dielectric Constant	65.5	62.58
Measured Conductivity (S/m)	0.85	0.81
Probe Name	UT-ETR-0200-1	UT-ETR-0200-1
Probe Orientation	Isotropic	Isotropic
Probe Offset (mm)	2.25	2.25
Sensor Factor	10.8	10.8
Conversion Factor	0.5084	0.5167
Calibration Date (MM/DD/YY)	11/08/2001	11/09/2001

* EUT is transmitting with 100% duty cycle but **50% duty factor** can only be applied for truly PTT device, that is using a mechanical switch and the device is designed for PTT that does not have feasibility to be connected to wired lines through an operator.

EXHIBIT 5. SAR SYSTEM CONFIGURATION & TEST METHODOLOGY

5.1. MEASUREMENT SYSTEM SPECIFICATIONS

Positioning Equipment	Probe
Type : 3D Near Field Scanner Location Repeatability : 0.1mm Speed 180 ^{o}/sec AC motors	Sensor : E-Field Spatial Resolution : 0.1 cm^3 Isotropic Response : ± 0.25 dB Dynamic Range : 2 µW/g to 100 mW/g
Computer	**Phantom**
Type : Pentium III 500MHz Memory : 256 MB RAM Operating System : Windows 2000 Pro Monitor : 19" SVGA	Tissue : Simulated Tissue with electrical characteristics similar to those of the human at normal body temperature. Left/Right Head: IEEE P1528 Compliant SAM manufactured by Aprel Body/Frontal Head: IEEE Flat Phantom 2mm Base

5.2. TEST PROCEDURES

In the SAR measurement, the positioning of the probes must be performed with sufficient accuracy to obtain repeatable measurements in the presence of rapid spatial attenuation phenomena. The accurate positioning of the E-field probe is accomplished by using a high precision robot. The robot can be taught to position the probe sensor following a specific pattern of points. In a first sweep, the sensor is positioned as close as possible to the interface, with the sensor enclosure touching the inside of the fiberglass shell. The SAR is measured on a grid of points, which covers the curved surface of the phantom in an area larger than the size of the DUT. After the initial scan, a high-resolution grid is used to locate the absolute maximum measured energy point. At this location, attenuation versus depth scan will be accomplished by the measurement system to calculate the SAR value.

5.3. PHANTOM

For Head mounted devices placed next to the ear, the phantom used in the evaluation of the RF exposure of the user of the wireless device is a IEEE P1528 compliant SAM phantom, shaped like a human head and filled with a mixture simulating the dielectric characteristics of the brain. A left sided head and a right sided head are evaluated to determine the worst case orientation for SAR. For body mounted and frontal held push-to-talk devices, a flat phantom of dimensions 70x42x20cm with a base plate thickness of 2mm is used.

5.4. SIMULATED TISSUE

Simulated Tissue: Suggested in a paper by George Hartsgrove and colleagues in University of Ottawa Ref.: Bioelectromagnetics 8:29-36 (1987)

Ingredient	Quantity
Water	40.4 %
Sugar	56.0 %
Salt	2.5 %
HEC	1.0 %
Bactericide	0.1 %

Table. Example of composition of simulated tissue.

This simulated tissue is mainly composed of water, sugar and salt. At higher frequencies, in order to achieve the proper conductivity, the solution does not contain salt. Also, at these frequencies, D.I. water and alcohol is preferred.

Target Frequency	Head		Body	
(MHz)	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

Tissue Density : Approximately 1.25 g/cm^3

5.4.1. Preparation

We determine the volume needs and carefully measure all components. A clean container is used where the ingredients will be mixed. A stirring paddle mounted to a drill press is used to stir the mixture. First we heat the DI water to about 40 ^{o}C to help the ingredients dissolve and then we pour the salt and the bactericide. We stir until all the ingredients are completely dissolved. We continue stirring slowly while adding the sugar. We avoid high RPM from the mixing device to prevent air bubbles in the mixture. Later on, we add the HEC to maintain the solution homogeneous. Mixing time is approximately 30 to 40 min.

5.5. MEASUREMENT OF ELECTRICAL CHARACTERISTICS OF SIMULATED TISSUE

1) Network Analyzer HP8753C or others

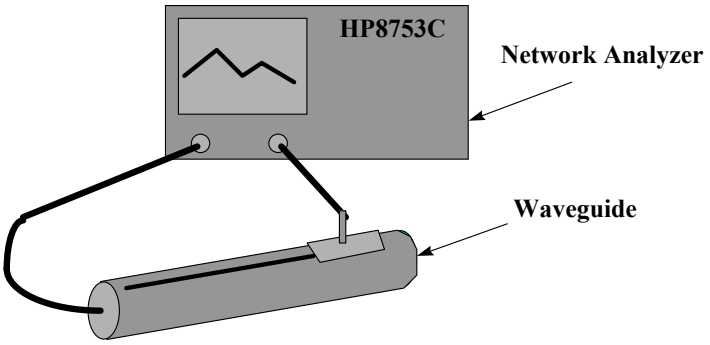
2) Slotted Coaxial Waveguide

5.5.1. Description of the slotted coaxial waveguide

The cylindrical waveguide is constructed with copper tube of about 30 to 40 cm in length, generally 12.5 mm diameter, with connectors at both ends. Inside of this tube, a conductive rod about 6.3 mm is coaxial supported by the two ends connectors (radiator). A slot 3 mm wide start at the beginning of the tube to approximately two thirds of the tube length. The outer edge of the slotted tube is marked in increments of 1 centimeter (10 to 12), and 0.5 centimeter for higher frequencies. A saddle piece containing the sampling probe is inserted in the slot so the tip of the probe is close but not in contact with the inner conductor (radiator).

To measure the electrical characteristics of the liquid simulated tissue, we fill the coaxial waveguide with the mixture, select CW frequency and measure amplitude and phase with the Network Analyzer for every point in the slot (typically 11). An effort is made to keep the resultant dielectric constant and conductivity within 5 % of published data.

Electrical Characteristics Measurement Setup



$$c = 3 \cdot 10^8 \text{ m/s}$$

$$A = \frac{\Delta A}{20} \ln_{10} \frac{1}{m}$$

$$\theta = \frac{\Delta\theta \cdot 2\pi}{360}$$

$$\lambda = \frac{c}{f} \cdot \frac{100}{2.54} \text{inches}$$

$$\varepsilon_{re} = \frac{(A^2 + \theta^2) \cdot \lambda^2}{4\pi^2}$$

$$\theta' = \left| \frac{|A| \cdot \lambda}{4\pi\sqrt{\varepsilon_{re}}} \right|$$

$$S = \tan(2\theta')$$

$$\varepsilon_r = \frac{\varepsilon_{re}}{\sqrt{(1 + S^2)}}$$

$$\sigma = S \cdot 2\pi \cdot f \cdot 8.854 \cdot 10^{12} \cdot \varepsilon_r \text{ (S/m)}$$

where;

ΔA is the amplitude attenuation in dB

$\Delta\theta$ is the phase change in degrees for 5 cm of wave propagation in the slotted line

f is the frequency of interest in Hz.

5.6. SYSTEM DESCRIPTION

The measurement system consists of an E-field probe, instrumentation amplifiers, RF transparent cable connecting the amplifiers to the computer, the robotics arm with its extension and proximity sensors, a phantom with simulated tissue and a radio holder to support the device under test. The E-field probe is a three channel device used to measure RF electric fields in the near vicinity of the source. The three sensors are mutually orthogonal positioned dipoles, and are constructed over a quartz substrate. Located in the center of the dipole is a Schottky diode. High impedance lines are connecting the sensor to the amplifier and then optically linked to the computer. The probe has an isotropic response and is transparent to the RF fields.

Calibration is performed by two steps:

1) Determination of free space E-field from amplified probe outputs in a test RF field. This calibration is performed in a TEM cell when the frequency is below 1 GHz and in a waveguide or some other methodologies above 1 GHz. For the free space calibration, we place the probe in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees until the three channels show the maximum reading. This reading equate to 1mW/cm^2 if that power density is available in the correspondent cavity.

2) Correlation of the measured free space E-field, to temperature rise in a dielectric medium. E-field temperature correlation calibration is performed in a planar phantom filled with the appropriate simulated tissue.

For temperature correlation calibration, a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe. First, the location of the maximum E-field close to the phantom's inner surface is determined as a function of power into the RF source; in this case, a dipole. Then, the E-field probe is moved sideways so that the temperature probe, while affixed to the E-field probe is placed at the previous location of the E-field probe. Finally, temperature changes for 30 seconds exposure at the same RF power levels used for the E-field measurement are recorded. The following equation relates SAR to initial temperature slope:

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

where:
Δt = exposure time (30 seconds),
C = heat capacity of tissue (brain or muscle),
ΔT = temperature increase due to RF exposure.

The heat capacity used for brain simulated tissue is 2.7 joules/^{0}C/g and 3.0 joules/^{0}C/g for muscle.

SAR is proportional to □T / □t, the initial rate of tissue heating, before thermal diffusion takes place. Now, it's possible to quantify the electric field in the simulated tissue by equating the thermally derived SAR to the E-field;

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

where:
σ = Simulated tissue conductivity,
ρ = Tissue density (1.25 g/cm^3 for simulated tissue)

5.7. DATA EXTRAPOLATION (CURVE FITTING)

The distance from the center of the sensor (diode) to the end of the protective tube is called the 'probe offset'. To compensate we use an exponential curve fitting method to obtain the peak surface value from the voltages measured at the distance from the inner surface of the phantom. At the point where the highest voltage was recorded, the field is measured as close as possible to the phantom's surface and every 1mm along the ` Z ` axis for a distance of 50 mm. The appropriate exponential curve is obtained from all the points measured and used to define an exponential decay of the energy density versus depth.

$$E(z) = E_0 \cdot e^{-z/\delta} \text{ (mV)}$$

5.8. INTERPOLATION AND GRAM AVERAGING

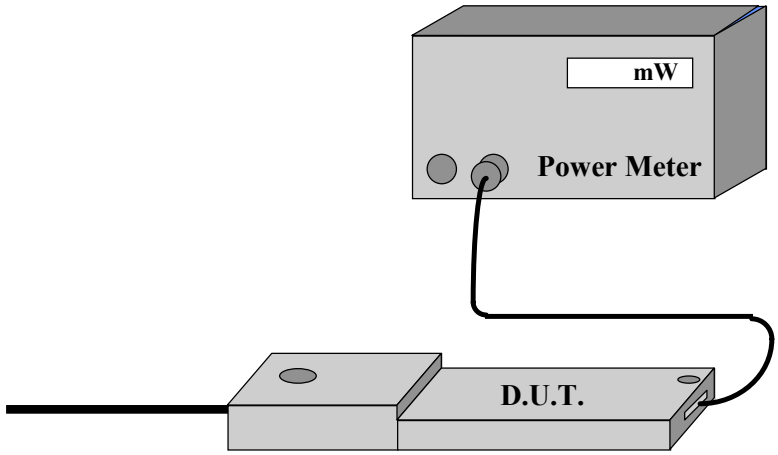
The voltage, (1 cm) above the phantoms surface (E_{tot} 1 cm), is needed to calculate the exposure over one gram of tissue. This SAR value that estimates the average over 1 gram of tissue, is obtained by taking the integral over 1 cm^2 surface of the measured field along the exponential decay curve of the energy density with depth.

$$SAR(mW/g) = \int_{v=1g} SAR(\bullet)dv = \int_{s=1cm^2} \int_0^{1cm} E(z) \cdot \frac{CF}{SensorFactor} dzds$$

5.9. POWER MEASUREMENT

Whenever possible, a conducted power measurement is performed. To accomplish this, we utilize a fully charged battery, a calibrated power meter and a cable adapter provided by the manufacturer. The data of the cable and related circuit losses are also provided by the manufacturer. The power measurement is then performed across the operational band and the channel with the highest output power is recorded.

Power measurement is performed before and after the SAR to verify if the battery was delivering full power at the time of testing. A difference in output power would determine a need for battery replacement and to repeat the SAR test.



Measured Power + Cable and Switching Mechanism Loss

5.10. POSITIONING OF D.U.T.

The clear SAM phantom shell have been previously marked with a highly visible grid with a defined centre line, so it can easily be seen through the liquid simulated tissue. In the case of testing a cellular phone, this line is connecting the ear channel with the corner of the lips. The D.U.T. is then placed by centering the speaker with the ear channel and the center of the radio width with the corner of the mouth.

For HAND HELD devices (push-to-talk), or any other type of wireless transmitters postioned in front of the face, the D.U.T. will be positioned 2.5cm distance from a flat phantom to simulate the frontal facial position in use. All body-worn operating configurations are tested using a flat phantom. The length and width of the phantom is at least twice the corresponding dimensions of the test device, including its antenna.

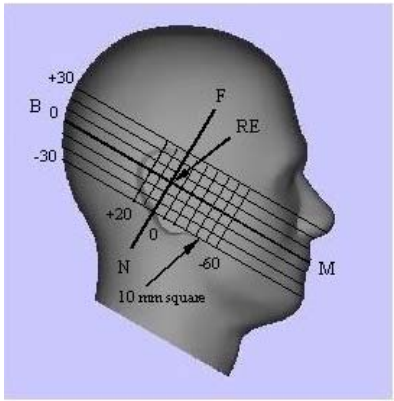


Figure 5.1 – Side view of the phantom showing relevant marking

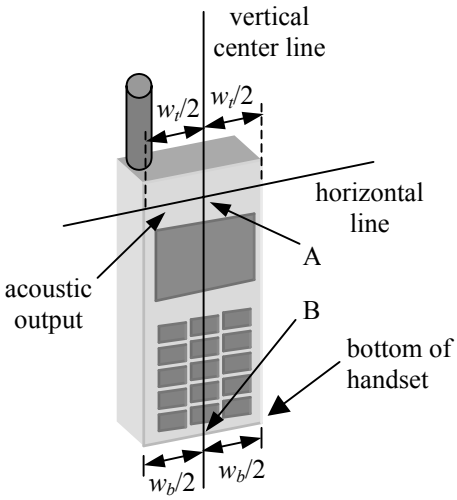


Figure 5.2a – Handset vertical and horizontal reference lines – fixed case

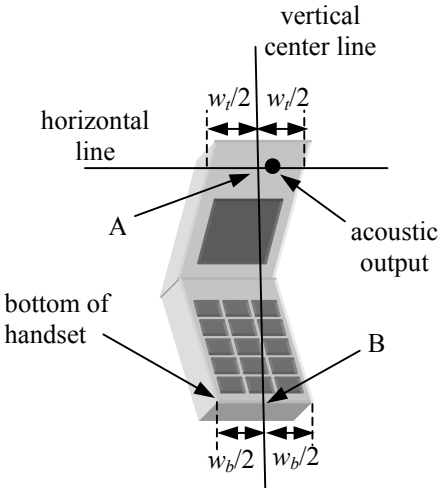


Figure 5.2b – Handset vertical and horizontal reference lines – "clam-shell"

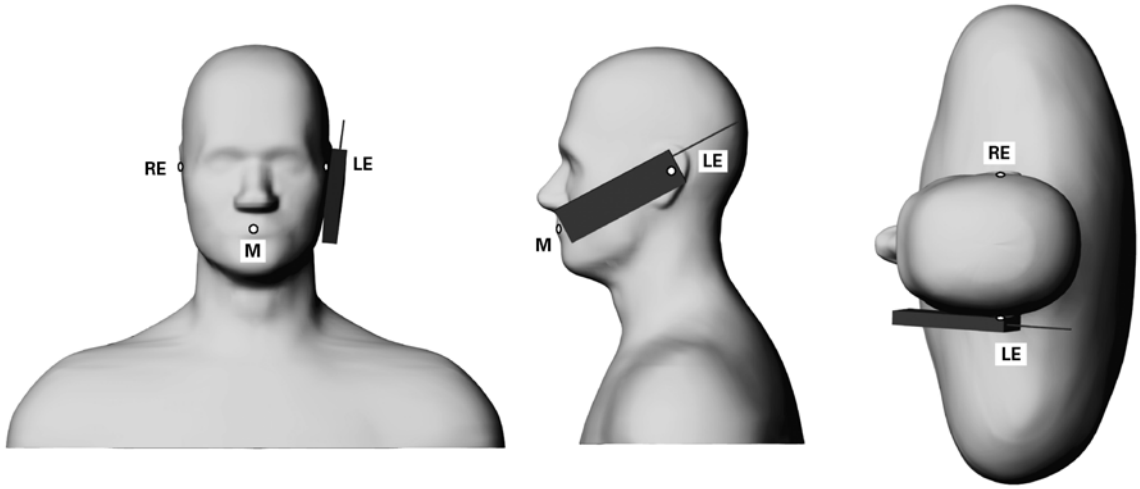


Figure 5.3 – Phone position 1, "cheek" or "touch" position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning, are indicated. The shoulders are shown for illustration purposes only (also see Section 4).

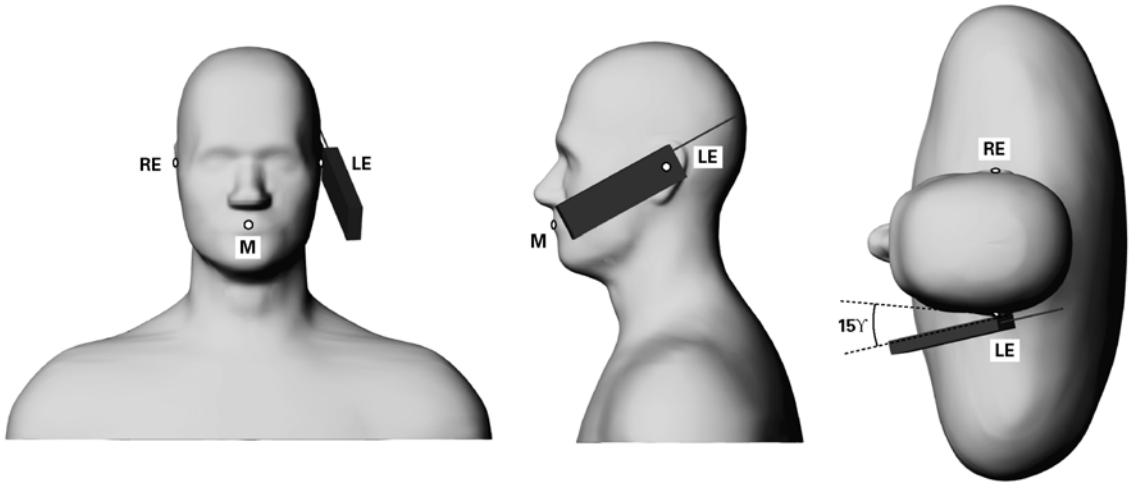


Figure 5.4 – Phone position 2, "tilted position." The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning, are indicated. The shoulders are shown for illustration purposes only (also see Section 4).

5.11. SAR MEASUREMENT UNCERTAINTY

This uncertainty analysis covers the 3D-EMC Laboratory test procedure for Specific Absorption Rate (SAR) associated with wireless telephones and similar devices.

Standards Covered Are:

WGMTE 96/4 - Secretary SC211/B

FCC 96-326, ET Docket No. 93-62

Industry Canada RSS 102

ACA Radiocommunications (Electromagnetic Radiation – Human Exposure) Amendment Standard 2000 (No. 1)

The laboratory test procedure, and this uncertainty analysis, may be used to cover all standards above. It is based on test equipment and procedures specified by 3D-EMC Laboratories, Inc. located in Ft. Lauderdale, Florida.

Measurement Uncertainty:

Table I. Estimated SAR Measurement Uncertainty

Contribution	Error (±dB)	Probability Distribution	Type Evaluation	Standard Uncertainty (±dB)
A. Field Measurement Errors:		Rectangular	Type B	
Isotropy in Phantom BTS Liquid	0.8			0.46
Frequency Response	0.2			0.12
Linearity	0.2			0.12
Probe Calibration Error (rss)	0.7			0.40
Duty Factor Variability	0.2			0.12
B. Spatial Peak SAR Errors:		Normal	Type A	
Extrapolation & Interpolation, and Position	0.2			0.20
Integration & Search Routine	0.1			0.10
Cube Shape	0.2			0.20
C. Additional Errors:		Rectangular	Type B	
Solution Variability (Worst-Case SAR)	0.21			0.12
D. Combined Standard Uncertainty, u_c:		Normal	-	0.52
E. Expanded Uncertainty, U:		Normal (k=2)	-	1.04
		95% Confidence	-	27.14%

EXHIBIT 7. TEST RESULTS OF BODY-WORN CONFIGURATION WITH BELT CLIP (M/N: MB-68)

Test results of body-worn configuration with the belt clip (M/N: MB-68) are presented in following order:

Test Configuration	Frequency (MHz)	SAR (W/Kg)	Location of hot spot (mm) * Base of antenna as reference point (0, 0)
Bottom of the EUT in contact with the phantom	156.050	0.853 (1.705)	(0, -120)
	157.425	0.855 (1.710)	(20, -120)
Tip of the antenna in contact with the phantom	156.050	0.876 (1.751)	(15, 145)
	157.425	0.713 (1.425)	(0, 150)
EUT parallel to the phantom	156.050	0.467 (0.934)	(5, 20)
	157.425	0.417 (0.833)	(0, 25)

*** The SAR Measurement inside the parenthesis indicates the reading before 50 % duty factor is applied for the half-duplex type PTT**

Test Information

Date : 13/11/2001
Time : 10:41:08 AM

Product	: Handheld VHF radio transceiver	**Test**	: SAR
Manufacturer	: ICOM AMERICA	**Frequency (MHz)**	: 156.0
Model Number	: IC-M2A	**Nominal Output Power (W)**	: 5.0
Serial Number	: 0015	**Antenna Type**	: Monopole
FCC ID Number	: AFJ-IC-M2A	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 65.6
Simulated Tissue	: Muscle	**Conductivity**	: 0.85

Probe	: UT-ETR-0200-1	**Antenna Position**	: Fixed
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 37.2
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.508	**Cable Insertion Loss (dB)**	: 0.0
Calibrated Date	: 08/11/2001	**Compensated Power (dBm)**	: 37.2

Amplifier Setting :

Channel 1 : 0.0084 Channel 2 : 0.0080 Channel 3 : 0.0099

Location of Maximum Field :

X = 0 Y = -120

Measured Values (mV) :

93.815	66.875	39.385	26.802	20.324	16.042
13.015	10.211	8.825	7.002	5.960	

Peak Voltage (mV) : 222.649 **1 Cm Voltage (mV)** : 4.894 **SAR (W/Kg)** : 1.705

Test Information

Date : 13/11/2001
Time : 9:51:33 AM

Product	: Handheld VHF radio transceiver	**Test**	: SAR
Manufacturer	: ICOM AMERICA	**Frequency (MHz)**	: 157.4
Model Number	: IC-M2A	**Nominal Output Power (W)**	: 5.0
Serial Number	: 0015	**Antenna Type**	: Monopole
FCC ID Number	: AFJ-IC-M2A	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 65.6
Simulated Tissue	: Muscle	**Conductivity**	: 0.85

Probe	: UT-ETR-0200-1	**Antenna Position**	: Fixed
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 37.2
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.508	**Cable Insertion Loss (dB)**	: 0.0
Calibrated Date	: 08/11/2001	**Compensated Power (dBm)**	: 37.2

Amplifier Setting :

Channel 1 : 0.0084 Channel 2 : 0.0080 Channel 3 : 0.0099

Location of Maximum Field :

X = 20 Y = -120

Measured Values (mV) :

100.638	68.566	40.748	28.030	20.290	15.537
12.465	9.920	7.886	6.746	5.575	

Peak Voltage (mV) : 247.670 **1 Cm Voltage (mV)** : 4.575 **SAR (W/Kg)** : 1.710

Test Information

Date : 12/11/2001
Time : 4:08:59 PM

Product	: Handheld VHF radio transceiver	**Test**	: SAR
Manufacturer	: ICOM AMERICA	**Frequency (MHz)**	: 156.0
Model Number	: IC-M2A	**Nominal Output Power (W)**	: 5.0
Serial Number	: 0015	**Antenna Type**	: Monopole
FCC ID Number	: AFJ-IC-M2A	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 65.6
Simulated Tissue	: Muscle	**Conductivity**	: 0.85

Probe	: UT-ETR-0200-1	**Antenna Position**	: Fixed
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 37.2
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.508	**Cable Insertion Loss (dB)**	: 0.0
Calibrated Date	: 08/11/2001	**Compensated Power (dBm)**	: 37.2

Amplifier Setting :

Channel 1 : 0.0084 Channel 2 : 0.0080 Channel 3 : 0.0099

Location of Maximum Field :

X = 15 Y = 145

Measured Values (mV) :

84.920	54.235	32.095	21.000	15.497	12.010
9.397	7.268	5.578	4.320	3.433	

Peak Voltage (mV) : 222.705 **1 Cm Voltage (mV)** : 2.943 **SAR (W/Kg)** : 1.751

Test Information

Date : 12/11/2001
Time : 5:01:27 PM

Product	: Handheld VHF radio transceiver	**Test**	: SAR
Manufacturer	: ICOM AMERICA	**Frequency (MHz)**	: 157.4
Model Number	: IC-M2A	**Nominal Output Power (W)**	: 5.0
Serial Number	: 0015	**Antenna Type**	: Monopole
FCC ID Number	: AFJ-IC-M2A	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 65.6
Simulated Tissue	: Muscle	**Conductivity**	: 0.85

Probe	: UT-ETR-0200-1	**Antenna Position**	: Fixed
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 37.2
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.508	**Cable Insertion Loss (dB)**	: 0.0
Calibrated Date	: 08/11/2001	**Compensated Power (dBm)**	: 37.2

Amplifier Setting :

Channel 1 : 0.0084 Channel 2 : 0.0080 Channel 3 : 0.0099

Location of Maximum Field :

X = 0 Y = 150

Measured Values (mV) :

59.854	39.158	24.875	18.131	13.655	10.546
8.467	6.509	5.305	4.224	3.393	

Peak Voltage (mV) : 136.996 **1 Cm Voltage (mV)** : 3.334 **SAR (W/Kg)** : 1.425

Test Information

Date : 12/11/2001
Time : 1:38:55 PM

Product	: Handheld VHF radio transceiver	**Test**	: SAR
Manufacturer	: ICOM AMERICA	**Frequency (MHz)**	: 156.0
Model Number	: IC-M2A	**Nominal Output Power (W)**	: 5.0
Serial Number	: 0015	**Antenna Type**	: Monopole
FCC ID Number	: AFJ-IC-M2A	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 65.6
Simulated Tissue	: Muscle	**Conductivity**	: 0.85

Probe	: UT-ETR-0200-1	**Antenna Position**	: Fixed
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 37.2
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.508	**Cable Insertion Loss (dB)**	: 0.0
Calibrated Date	: 08/11/2001	**Compensated Power (dBm)**	: 37.2

Amplifier Setting :

Channel 1 : 0.0084 Channel 2 : 0.0080 Channel 3 : 0.0099

Location of Maximum Field :

X = 5 Y = 20

Measured Values (mV) :

23.365	21.534	19.045	17.524	16.309	15.326
14.524	13.663	13.005	12.284	11.666	

Peak Voltage (mV) : 27.418 **1 Cm Voltage (mV)** : 13.969 **SAR (W/Kg)** : 0.934

Test Information

Date : 12/11/2001
Time : 11:46:10 AM

Product	: Handheld VHF radio transceiver	**Test**	: SAR
Manufacturer	: ICOM AMERICA	**Frequency (MHz)**	: 157.4
Model Number	: IC-M2A	**Nominal Output Power (W)**	: 5.0
Serial Number	: 0015	**Antenna Type**	: Monopole
FCC ID Number	: AFJ-IC-M2A	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 65.6
Simulated Tissue	: Muscle	**Conductivity**	: 0.85

Probe	: UT-ETR-0200-1	**Antenna Position**	: Fixed
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 37.2
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.508	**Cable Insertion Loss (dB)**	: 0.0
Calibrated Date	: 08/11/2001	**Compensated Power (dBm)**	: 37.2

Amplifier Setting :

Channel 1 : 0.0084 Channel 2 : 0.0080 Channel 3 : 0.0099

Location of Maximum Field :

X = 0 Y = 25

Measured Values (mV) :

21.000	19.152	17.118	15.799	14.825	13.915
13.072	12.353	11.727	11.092	10.476	

Peak Voltage (mV) : 24.487 **1 Cm Voltage (mV)** : 12.634 **SAR (W/Kg)** : 0.833

EXHIBIT 8. TEST RESULTS OF BODY-WORN CONFIGURATION WITH ROTARY BELT CLIP (M/N: MB-87)

Test results of body-worn configuration with the rotary belt clip (M/N: MB-87) are presented in following order:

Test Configuration	Frequency (MHz)	SAR (W/Kg)	Location of hot spot (mm) * Base of antenna as reference point (0, 0)
Bottom of the EUT in contact with the phantom	156.050	1.034 (2.067)	(15, -115)
	157.425	**1.266 (2.531)**	**(20, -115)**
Tip of the antenna in contact with the phantom	156.050	1.083 (2.166)	(10, 140)
	157.425	1.086 (2.172)	(15, 140)
EUT parallel to the phantom	156.050	0.524 (1.047)	(0, 15)
	157.425	0.509 (1.017)	(5, 20)

*** The SAR Measurement inside the parenthesis indicates the reading before 50 % duty factor is applied for the half-duplex type PTT**

Test Information

Date : 13/11/2001
Time : 6:22:47 PM

Product	: Handheld VHF radio transceiver	**Test**	: SAR
Manufacturer	: ICOM AMERICA	**Frequency (MHz)**	: 156.0
Model Number	: IC-M2A	**Nominal Output Power (W)**	: 5.0
Serial Number	: 0015	**Antenna Type**	: Monopole
FCC ID Number	: AFJ-IC-M2A	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 65.6
Simulated Tissue	: Muscle	**Conductivity**	: 0.85

Probe	: UT-ETR-0200-1	**Antenna Position**	: Fixed
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 37.2
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.508	**Cable Insertion Loss (dB)**	: 0.0
Calibrated Date	: 08/11/2001	**Compensated Power (dBm)**	: 37.2

Amplifier Setting :

Channel 1 : 0.0084 Channel 2 : 0.0080 Channel 3 : 0.0099

Location of Maximum Field :

X = 15 Y = -115

Measured Values (mV) :

104.227	63.568	34.166	22.052	16.010	11.571
8.790	6.604	5.282	4.008	3.157	

Peak Voltage (mV) : 303.026 **1 Cm Voltage (mV)** : 2.531 **SAR (W/Kg)** : 2.067

Test Information

Date : 13/11/2001
Time : 5:40:29 PM

Product	: Handheld VHF radio transceiver	**Test**	: SAR
Manufacturer	: ICOM AMERICA	**Frequency (MHz)**	: 157.4
Model Number	: IC-M2A	**Nominal Output Power (W)**	: 5.0
Serial Number	: 0015	**Antenna Type**	: Monopole
FCC ID Number	: AFJ-IC-M2A	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 65.6
Simulated Tissue	: Muscle	**Conductivity**	: 0.85

Probe	: UT-ETR-0200-1	**Antenna Position**	: Fixed
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 37.2
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.508	**Cable Insertion Loss (dB)**	: 0.0
Calibrated Date	: 08/11/2001	**Compensated Power (dBm)**	: 37.2

Amplifier Setting :

Channel 1 : 0.0084 Channel 2 : 0.0080 Channel 3 : 0.0099

Location of Maximum Field :

X = 20 Y = -115

Measured Values (mV) :

130.522	86.238	56.261	39.515	28.434	22.198
17.937	14.736	11.904	10.079	8.589	

Peak Voltage (mV) : 305.901 **1 Cm Voltage (mV)** : 6.958 **SAR (W/Kg)** : 2.531

Test Information

Date : 13/11/2001
Time : 3:57:13 PM

Product	: Handheld VHF radio transceiver	**Test**	: SAR
Manufacturer	: ICOM AMERICA	**Frequency (MHz)**	: 156.0
Model Number	: IC-M2A	**Nominal Output Power (W)**	: 5.0
Serial Number	: 0015	**Antenna Type**	: Monopole
FCC ID Number	: AFJ-IC-M2A	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 65.6
Simulated Tissue	: Muscle	**Conductivity**	: 0.85

Probe	: UT-ETR-0200-1	**Antenna Position**	: Fixed
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 37.2
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.508	**Cable Insertion Loss (dB)**	: 0.0
Calibrated Date	: 08/11/2001	**Compensated Power (dBm)**	: 37.2

Amplifier Setting :

Channel 1 : 0.0084 Channel 2 : 0.0080 Channel 3 : 0.0099

Location of Maximum Field :

X = 10 Y = 140

Measured Values (mV) :

90.718	59.014	37.594	28.739	22.288	17.912
14.723	11.949	10.005	8.133	6.781	

Peak Voltage (mV) : 199.321 **1 Cm Voltage (mV)** : 5.773 **SAR (W/Kg)** : 2.166

Test Information

Date : 13/11/2001
Time : 4:49:49 PM

Product	: Handheld VHF radio transceiver	**Test**	: SAR
Manufacturer	: ICOM AMERICA	**Frequency (MHz)**	: 157.4
Model Number	: IC-M2A	**Nominal Output Power (W)**	: 5.0
Serial Number	: 0015	**Antenna Type**	: Monopole
FCC ID Number	: AFJ-IC-M2A	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 65.6
Simulated Tissue	: Muscle	**Conductivity**	: 0.85

Probe	: UT-ETR-0200-1	**Antenna Position**	: Fixed
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 37.2
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.508	**Cable Insertion Loss (dB)**	: 0.0
Calibrated Date	: 08/11/2001	**Compensated Power (dBm)**	: 37.2

Amplifier Setting :

Channel 1 : 0.0084 Channel 2 : 0.0080 Channel 3 : 0.0099

Location of Maximum Field :

X = 15 Y = 140

Measured Values (mV) :

88.511	58.637	39.153	27.586	21.612	16.698
13.751	11.371	9.340	7.783	6.269	

Peak Voltage (mV) : 195.030 **1 Cm Voltage (mV)** : 5.575 **SAR (W/Kg)** : 2.172

Test Information

Date : 13/11/2001
Time : 3:04:55 PM

Product	: Handheld VHF radio transceiver	**Test**	: SAR
Manufacturer	: ICOM AMERICA	**Frequency (MHz)**	: 156.0
Model Number	: IC-M2A	**Nominal Output Power (W)**	: 5.0
Serial Number	: 0015	**Antenna Type**	: Monopole
FCC ID Number	: AFJ-IC-M2A	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 65.6
Simulated Tissue	: Muscle	**Conductivity**	: 0.85

Probe	: UT-ETR-0200-1	**Antenna Position**	: Fixed
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 37.2
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.508	**Cable Insertion Loss (dB)**	: 0.0
Calibrated Date	: 08/11/2001	**Compensated Power (dBm)**	: 37.2

Amplifier Setting :

Channel 1 : 0.0084 Channel 2 : 0.0080 Channel 3 : 0.0099

Location of Maximum Field :

X = 0 Y = 15

Measured Values (mV) :

25.891	23.602	21.331	19.903	18.786	17.757
16.890	16.039	15.298	14.612	14.023	

Peak Voltage (mV) : 29.494 **1 Cm Voltage (mV)** : 16.668 **SAR (W/Kg)** : 1.047

Test Information

Date : 13/11/2001
Time : 2:19:09 PM

Product	: Handheld VHF radio transceiver	**Test**	: SAR
Manufacturer	: ICOM AMERICA	**Frequency (MHz)**	: 157.4
Model Number	: IC-M2A	**Nominal Output Power (W)**	: 5.0
Serial Number	: 0015	**Antenna Type**	: Monopole
FCC ID Number	: AFJ-IC-M2A	**Signal**	: CW

Phantom	: Waist	**Dielectric Constant**	: 65.6
Simulated Tissue	: Muscle	**Conductivity**	: 0.85

Probe	: UT-ETR-0200-1	**Antenna Position**	: Fixed
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 37.2
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.508	**Cable Insertion Loss (dB)**	: 0.0
Calibrated Date	: 08/11/2001	**Compensated Power (dBm)**	: 37.2

Amplifier Setting :

Channel 1 : 0.0084 Channel 2 : 0.0080 Channel 3 : 0.0099

Location of Maximum Field :

X = 5 Y = 20

Measured Values (mV) :

24.647	22.483	20.476	19.206	18.074	17.095
16.277	15.568	14.824	14.197	13.516	

Peak Voltage (mV) : 27.975 **1 Cm Voltage (mV)** : 16.009 **SAR (W/Kg)** : 1.017

EXHIBIT 9. TEST RESULTS OF HEAD FRONT CONFIGURATION

Test Configuration	Frequency (MHz)	SAR (W/Kg)	Location of hot spot (mm) * Base of antenna as reference point (0, 0)
EUT parallel to the phantom with 15 mm separation	156.050	0.759 (1.517)	(-10, 30)
	157.425	0.692 (1.384)	(-5, 25)

*** The SAR Measurement inside the parenthesis indicates the reading before 50 % duty factor is applied for the half-duplex type PTT**

Test Information

Date : 09/11/2001
Time : 5:23:47 PM

Product	: Handheld VHF radio transceiver	**Test**	: SAR
Manufacturer	: ICOM AMERICA	**Frequency (MHz)**	: 156.0
Model Number	: IC-M2A	**Nominal Output Power (W)**	: 5.0
Serial Number	: 0015	**Antenna Type**	: Monopole
FCC ID Number	: AFJ-IC-M2A	**Signal**	: CW

Phantom	: Head - Front	**Dielectric Constant**	: 62.6
Simulated Tissue	: Brain	**Conductivity**	: 0.81

Probe	: UT-ETR-0200-1	**Antenna Position**	: Fixed
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 37.2
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.517	**Cable Insertion Loss (dB)**	: 0.0
Calibrated Date	: 09/11/2001	**Compensated Power (dBm)**	: 37.2

Amplifier Setting :

Channel 1 : 0.0084 Channel 2 : 0.0080 Channel 3 : 0.0099

Location of Maximum Field :

X = -10 Y = 30

Measured Values (mV) :

37.318	33.118	30.652	27.501	25.796	24.426
23.099	21.903	20.812	19.746	18.782	

Peak Voltage (mV) : 38.898 **1 Cm Voltage (mV)** : 21.793 **SAR (W/Kg)** : 1.517

Test Information

Date : 12/11/2001
Time : 9:49:07 AM

Product	: Handheld VHF radio transceiver	**Test**	: SAR
Manufacturer	: ICOM AMERICA	**Frequency (MHz)**	: 157.4
Model Number	: IC-M2A	**Nominal Output Power (W)**	: 5.0
Serial Number	: 0015	**Antenna Type**	: Monopole
FCC ID Number	: AFJ-IC-M2A	**Signal**	: CW

Phantom	: Head - Front	**Dielectric Constant**	: 62.6
Simulated Tissue	: Brain	**Conductivity**	: 0.81

Probe	: UT-ETR-0200-1	**Antenna Position**	: Fixed
Probe Offset (mm)	: 2.250	**Measured Power (dBm) (conducted)**	: 37.2
Sensor Factor (mV)	: 10.8		
Conversion Factor	: 0.517	**Cable Insertion Loss (dB)**	: 0.0
Calibrated Date	: 09/11/2001	**Compensated Power (dBm)**	: 37.2

Amplifier Setting :

Channel 1 : 0.0084 Channel 2 : 0.0080 Channel 3 : 0.0099

Location of Maximum Field :

X = -5 Y = 25

Measured Values (mV) :

33.914	30.782	27.421	25.012	23.496	22.070
20.940	19.801	18.935	17.964	17.102	

Peak Voltage (mV) : 37.046 **1 Cm Voltage (mV)** : 21.183 **SAR (W/Kg)** : 1.384