SPECIFIC ABSORPTION RATE
TEST REPORT

For

Two Way Radio

Model Name: 3108, 3208

Trade Name: --

FCC ID: T4K3108U1

Report No.: QZAGC013080604E7

Date of Issue: Jul.02, 2008

Prepared For

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TABLE OF CONTENT

1. GENERAL SUMMARY

Product Name	**Two-way Radio**
Standard(s)	**47CFR §2.1093:** Radiofrequency Radiation Exposure Evaluation: Portable Devices **FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01):** Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields **ANSI C95.1–1999:** 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 Body Due to Wireless Communications Devices: Experimental Techniques.
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 5.2 of this test report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report. General Judgment: **Pass**
Comment	TX Freq. Band: 400 MHz-470 MHz RX Freq. Band: 400 MHz-470 MHz Antenna Character: build outside The test result only responds to the measured sample.

Prepared By: Tony Tian

Tony Tian Jul.02, 2008

Checked By: Terry Yang

Terry Yang Jul.02, 2008

Authorized By King Zhang

King Zhang Jul.02, 2008

2. ADMINISTRATIVE DATE

2.1 IDENTIFICATION OF THE RESPONSIBLE TESTING LABORATORY

Company Name:	ShenZhen Electronic Product Quality Testing Center
Department:	Testing Department
Address:	Electronic Testing Building, ShaHe Road, NanShan District, ShenZhen, P. R. China
Responsible Test Lab Managers:	Mr. Li'an Wu

2.2 IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION(S)

Company Name:	ShenZhen Electronic Product Quality Testing Center
Address:	Electronic Testing Building, ShaHe Road, NanShan District, ShenZhen, P. R. China

2.3 ORGANIZATION ITEM

Report No.:	QZAGC013080604E7
Project Leader:	Mr. Terry Yang
Responsible for Accreditation scope:	Mr. King Zhang
Start of Testing:	2008-06-28
End of Testing:	2008-07-02

2.4 IDENTIFICATION OF APPLICANT

Company Name:	Qixiang Electron Science & Technology Co., Ltd.
Address:	Qixiang Building, Tangxi Industrial Zone, Luojiang District, Quanzhou 362011, Fujian Province, China

2.5 IDENTIFICATION OF MANUFACTURE

Company Name:	Qixiang Electron Science & Technology Co., Ltd.
Address:	Qixiang Building, Tangxi Industrial Zone, Luojiang District, Quanzhou 362011, Fujian Province, China

Notes: This data is based on the information by the applicant.

3. EQUIPMENT UNDER TEST (EUT)

3.1 IDENTIFICATION OF THE EQUIPMENT UNDER TEST

Brand Name:	--	
Type Name:	3108, 3208	
General description:	Test frequency	Two-way Radio 400-470MHz
	Development Stage	Identical prototype
	Accessories	--
	Battery Model	--
	Battery specification	DC 7.4, 1300mAh
	Antenna type	Build outside
	Operation mode	PTT
	Modulation mode	FM
	Max. Power	3.51W

NOTE:

1. The EUT consists of Hand Telephone Set and normal options: Lithium Battery, as listed above.
2. Please refer to Appendix C for the photographs of the EUT. For a more detailed features description about the EUT, please refer to User's Manual.

3.2 IDENTIFICATION OF ALL USED TEST SAMPLE OF THE EQUIPMENT UNDER TEST

EUT Code	Serial Number	Hardware Version	Software Version
1	--	--	--

NOTE:

Specific Absorption Rate (SAR) is a measure of the rate energy absorption due to exposure to an RF transmitting source (wireless portable device).

4. OPERATIONAL CONDITIONS DURING TEST

4.1 SCHEMATIC TEST CONFIGURATION

During SAR test, EUT is in Traffic Mode (Channel Allocated) at Normal Voltage Condition.

The operating frequency is on the Bottom, Middle or Top Channel of the EUT.

The EUT is commanded to operate at maximum transmitting power.

The EUT shall use its internal transmitter. The antenna(s), battery and accessories shall be those specified by the manufacturer. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output.

4.2 SAR MEASUREMENT SYSTEM

The SAR measurement system being used is the Index SAR SARA2 system, which consists of a

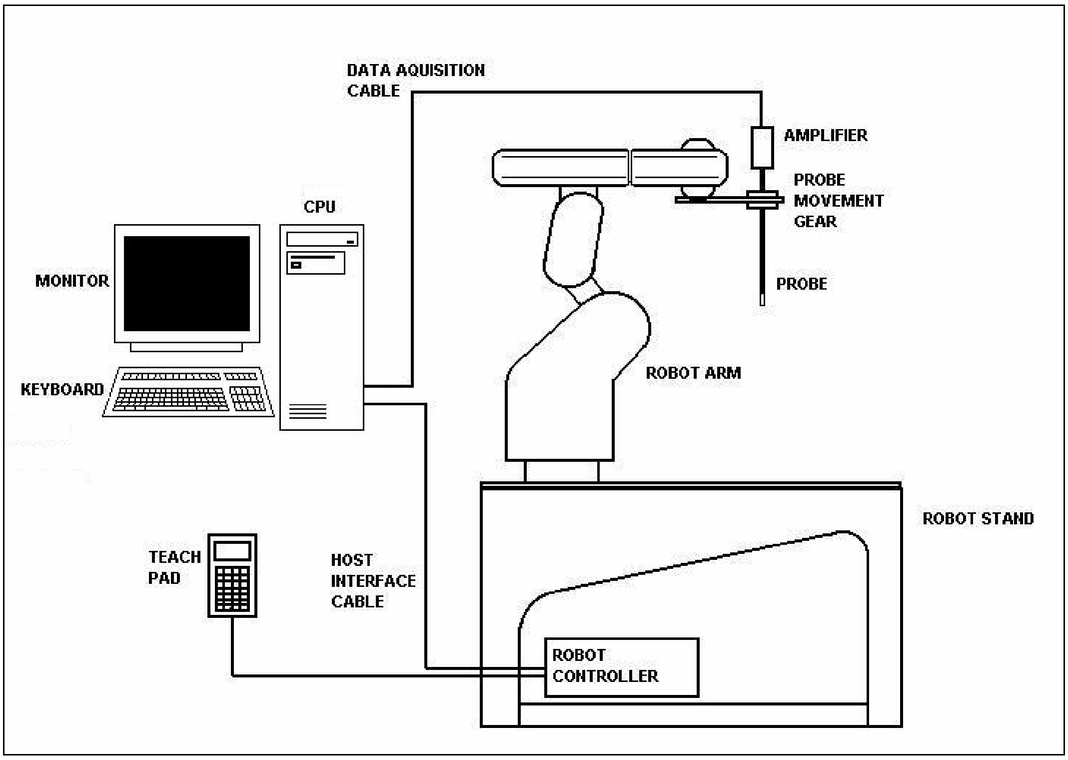


Figure1. SAR Lab Test Measurement Set-up

Mitsubishi RV-E2 6-axis robot arm and controller. Index SAR probe and amplifier and SAM phantom Head Shape. The system is controlled remotely from a PC, which contains the software to control the robot and data acquisition equipment. The software also displays the data obtained from test scans.

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

4.2.1 ROBOT SYSTEM SPECIFICATION

The robot is used to articulate the probe to programmed positions inside the phantom head to obtain the SAR readings from the DUT.

Robot and Stand

Type	Mitsubishi Movemaster RV-2A / 6 axis vertical articulated robot
Dimensions (robot)	Height: 790mm (in home position)
Dimensions (robot stand)	1010L x 450W x 820H mm
Weight	Approx. 36 kg
Position repeatability	+/- 0.04mm
Drive Method	AC servomotor
Expandability	Extra axis expansion capability for probe calibration applications E-Field probe

Robot Controller Unit

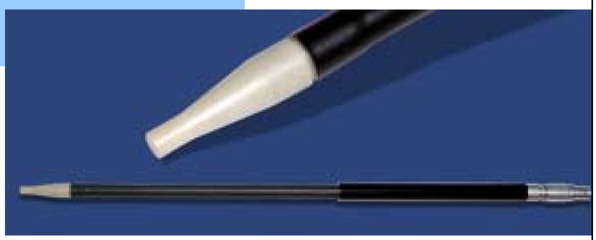
Type	CR1 - 571
Dimensions	212W x 290D x 151H mm
Weight	8 kg
Power source	single-phase 100 - 240 VAC

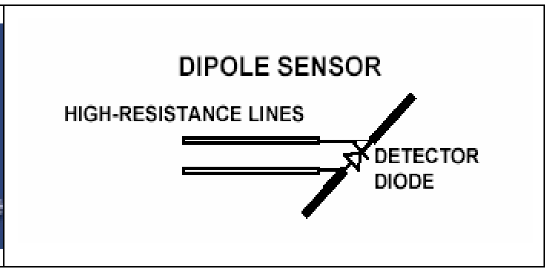
4.2.2 PROBE AND AMPLIFIER SPECIFICATION

IXP-050 Indexsar isotropic immersible SAR probe

The probes are constructed using three orthogonal dipole sensors arranged on an interlocking, triangular prism core. The probes have built-in shielding against static charges and are contained within a PEEK cylindrical enclosure material at the tip (showed in figure 2). The system uses diode compression potential (DCP) to determine SAR values for different types of modulation. Crest factor is not used for determining SAR values. The DCP for different types of modulation is determined during the probe calibration procedure.

	E-filed Probe
Type	Three orthogonal dipole sensors arranged on triangular, interlocking substrates
Dimensions	Overall length: 350mm Tip length: 10mm Body diameter: 12mm Tip diameter: 5mm Distance from probe tip to dipole centers: 2.5mm
Interfacing	Lemo 6 pole latching connector for interfacing to high impedance amplifier
Isotropy	+/- 0.5dB in brain liquids (rotation about probe axis) typically +/- 0.15dB +/- 0.5dB in brain liquids (rotation normal to probe axis)
Calibration	Indexsar calibration in brain tissue simulating liquids at frequency of 450MHz, 900MHz, 1800MHz and 1900MHz
Dynamic Range	0.001W/kg to 100W/kg in liquid. Linearity +/- 0.2W/kg





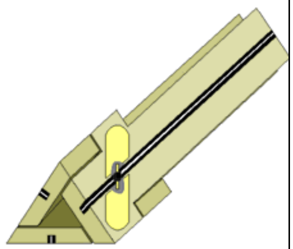
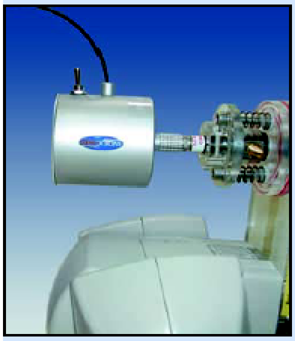
		

Figure2. Specification and characterization parameters of indexsar probe

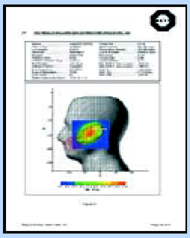
IFA-010 Amplifier

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



Probe Amplifier and PC Interface

Type	High impedance inputs with 3 independent x,y,z sensor channels giving simultaneous measurement data every 2ms. Reads true average of modulated signals without the need for duty cycle corrections
Ranges	Software selectable of x1 to 63
Cable	Optical cable with self-powered 9 way RS232 converter. 3m cable length supplied as standard. Other lengths to order.
Power Requirements	2 x AAA batteries giving approximately 100 hours usage.



'Word' report format
The results of each frequency scan are presented in a Microsoft 'Word' document with all the necessary measurement parameters automatically tabulated. Users can customise the layout and in some cases language changes are possible.

4.2.3 PHANTOMS AND SIMULANT LIQUID

4.2.3.1 SAR HEAD PHANTOM (SAM)

The Indexsar SAM Upright Phantom is fabricated to the shape defined in these CAD files by Antennessa.

Head Phantom

Type 2	Upright SAM phantom
Dimensions	Height: 320mm Baseplate diameter: 275mm
Weight	empty: 1.2 kg filled: 7.2 kg
Wall thickness	2.0 mm ±0.2
Construction	Low loss resin / Strengthened saggital seam

It is mounted on the base table, which holds the robotic positioner. Both mechanical and laser-based registration systems are utilised to register the phantom position in relationship to the robot co-ordinate system. In the SARA2 implementation, the SAM phantom is mounted on a supporting table made of low dielectric loss material, which includes mounting brackets for DUT positioners, dipole holders and (optionally) a shelf for supporting larger devices like laptop computers.

4.2.3.2 Box phantom

The box phantom used for body testing and for validation is manufactured from Perspex.

IXB – 070 Specification and characterization parameters

Constructional details	
Internal dimensions:	200mm x 200mm x 200mm
Thickness of base:	2mm +/- 0.2mm
Wall thickness:	4mm
Material:	PMMA
Frequency range	300MHz – 6GHz
Dielectric properties	Relative permittivity 2.7 Loss tangent <0.02

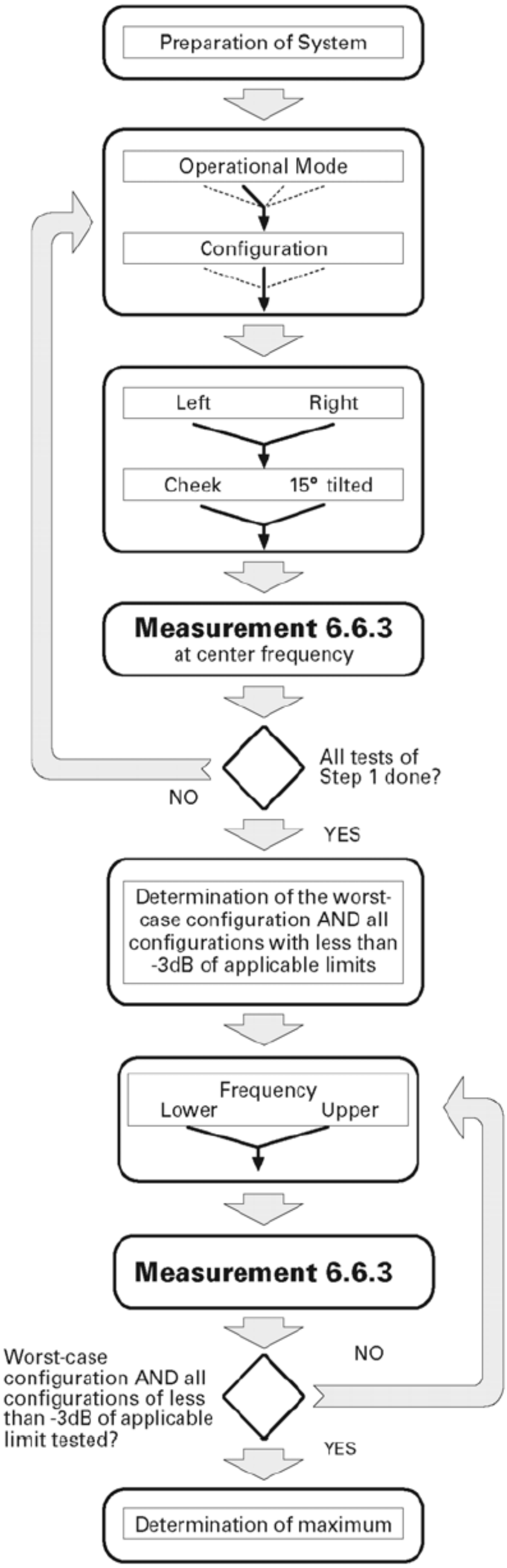
Tissue-simulant volume required for 150mm depth (6 litres)

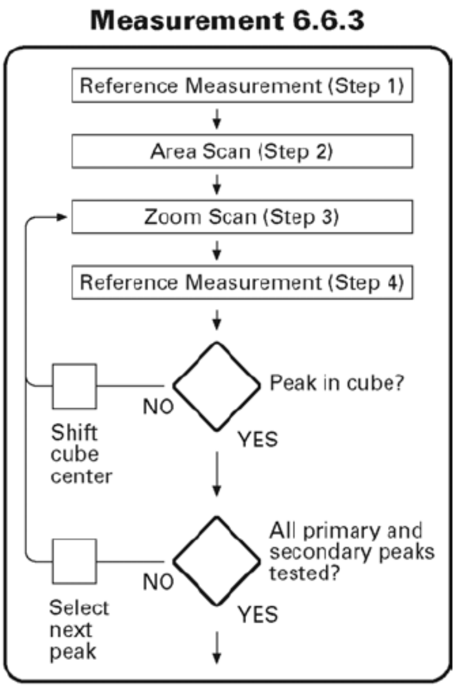
4.2.3.3 SIMULANT LIQUIDS

Simulant liquids that are used for testing at frequencies of 450-520MHz, which are made mainly of sugar, salt and water solutions may be left in the phantoms. Approximately 7litres are needed for an upright head compared to about 27litres for a horizontal bath phantom.

Ingredients (% by weight)	Frequency (MHz)	
	450	
Tissue Type	Head	Body
Water	--	--
Salt(NaCl)	--	--
Sugar	--	--
HEC	--	--
Bacterial de	--	--
DGBE	--	--
Acticide SPX	--	--
Dielectric Constant	43.5	56.7
Conductivity (S/m)	0.87	0.94

4.2.4 SAR MEASUREMENT PROCEDURE





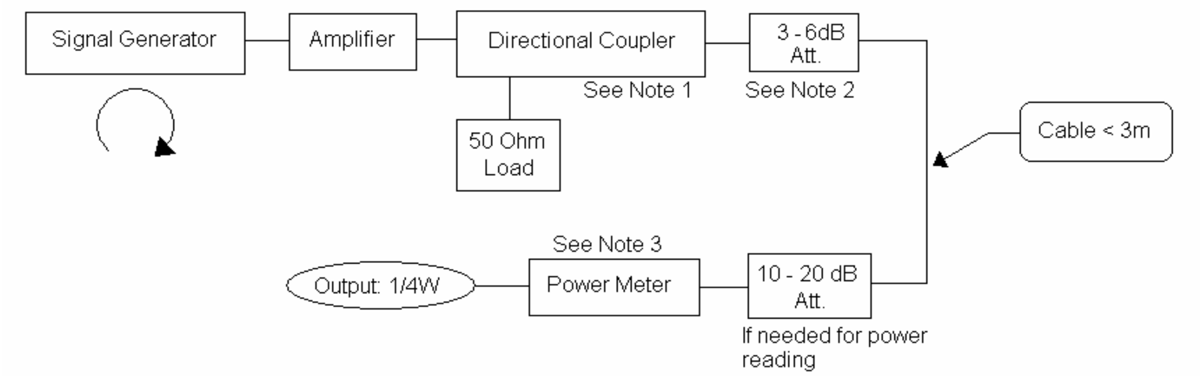
Channel	Left				Right			
	Cheek		Tilt		Cheek		Tilt	
	Retracted	Extended	Retracted	Extended	Retracted	Extended	Retracted	Extended
Mode 1:								
High			S2(-1.4dB)	S2(-0.4dB)			S2(-2.2dB)	S2(-1.4dB)
Middle	S1(-4dB)	S1(-4dB)	S1(-1.5dB)	S1(-0.5dB)	S1(-5dB)	S1(-5dB)	S1(-2.5dB)	S1(-1.5dB)
Low			S2(-1.3dB)	S2(-0.7dB)			S2(-2.7dB)	S2(-0.6dB)
Mode 2:								
High			S2(-2.7dB)	S2(-1.1dB)				
Middle	S1(-5dB)	S1(-5dB)	S1(-2.5dB)	S1(-1dB)	S1(-6dB)	S1(-6dB)	S1(-5dB)	S1(-5dB)
Low			S2(-2.2dB)	S2(-0.8dB)				

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

Above is the scanning procedure flow chart and table from the IEEE p1528 standard. This is the procedure for which all compliant testing should be carried out to ensure that all variations of the device position and transmission behavior are tested.

4.2.5 VALIDATION TESTING USING BOX PHANTOMS

The following procedure, recommended for performing validation tests using box phantoms is based on the procedures described in the draft IEEE standard P1528. Setup according to the setup diagram below:



With the SG and Amp and with directional coupler in place, set up the source signal at the relevant frequency and use a power meter to measure the power at the end of the SMA cable that you intend to connect to the balanced dipole. Adjust the SG to make this, say, 0.25W (24 dBm). If this level is too high to read directly with the power meter sensor, insert a calibrated attenuator (e.g. 10 or 20 dB) and make a suitable correction to the power meter reading.

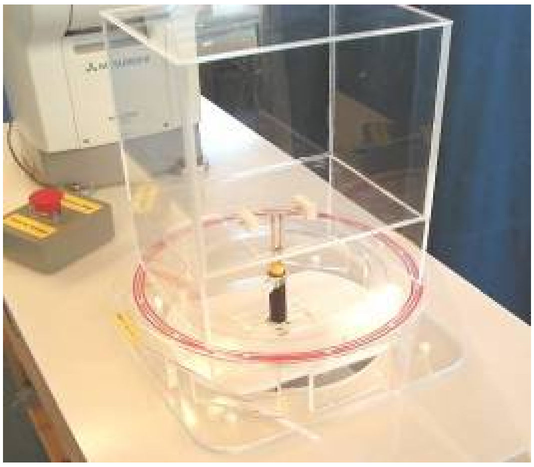
Note 1: In this method, the directional coupler is used for monitoring rather than setting the exact feed power level. If, however, the directional coupler is used for power measurement, you should check the frequency range and power rating of the coupler and measure the coupling factor (referred to output) at the test frequency using a VNA.

Note 2: Remember that the use of a 3dB attenuator (as shown in Figure 8.1 of P1528) means that you need an RF amplifier of 2 times greater power for the same feed power. The other issue is the cable length. You might get up to 1dB of loss per meter of cable, so the cable length after the coupler needs to be quite short.

Note 3: For the validation testing done using CW signals, most power meters are suitable. However, if you are measuring the output of a modulated signal from either a signal generator or a handset, you must ensure that the power meter correctly reads the modulated signals.

4.2.5.1 SETTING UP THE BOX PHANTOM FOR VALIDATION TESTING

The main purpose of the box phantom is for validation of the system. By placing the box phantom in place of the upright head, using the box phantom dipole holder the system can now be used to check that the probe and software are giving accurate readings.



4.2.5.2 EQUIPMENTS AND RESULTS OF VALIDATION TESTING

name	Type and specification
Signal generator	SML02
Directional coupler	400MHz-3GHz
Amplifier	3W 502(10-2500MHz)
Reference dipole	IXD-045 validation dipole

Results：

Frequency	Date	Target value(1g)	Test value(1g)
450.000MHz	2008.06.28	4.9	4.964(Body)
450.000MHz	2008.06.28	4.9	5.148(Head)

4.2.6 SARA2 INTERPOLATION AND EXTRAPOLATION SCHEMES

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

4.2.7 INTERPOLATION OF 2D AREA SCANS

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

4.2.8 EXTRAPOLATION OF 3D SCANS

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

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

4.2.9 INTERPOLATION OF 3D SCAN AND VOLUME AVERAGING

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

For each row of data in the depth direction, the data are extrapolated and interpolated to less than 1mm spacing and average values are calculated from the phantom surface for the row of data over distances corresponding to the requisite depth for 10g and 1g cubes. These results in two 2D arrays of data, which are then cubic B-spline interpolated to sub mm lateral resolution. A search routine then moves an averaging square around through the 2D array and records the maximum value of the corresponding 1g and 10g volume averages. For the definition of the surface in this procedure, the digitized position of the head shell surface is used for measurement in head-shaped phantoms. For measurements in rectangular, box phantoms, the distance between the phantom wall and the closest set of gridded data points is entered into the software. For measurements in box-shaped phantoms, this distance is under the control of the user. The effective distance must be greater than 2.5mm as this is the tip-sensor distance and to avoid interface proximity effects, it should be at least 5mm. A value of 6 or 8mm is recommended. This distance is called dbe.

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

The default step size (dstep) used is 3.5mm, but this is under user-control. The compromise is with time of scan, so it is not practical to make it much smaller or scan times become long and power-drop influences become larger.

The robot positioning system specification for the repeatability of the positioning (dss) is +/- 0.04mm.

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

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

4.2.10 PROBE ANISOTROPY AND BOUNDARY PROXIMITY INFLUENCE CORRECTION SOFTWARE (VIRTUAL PROBE MINIATURIZATION VPM SOFTWARE)

Indexsar Report IXS0223 provides a background to the factors affecting measurements at high frequencies when using SAR probes of size 8 – 5mm tip diameter. Although the Indexsar probes are at the smaller end of this range, SAR probes are not isotropic in 5GHz phantom field gradients and ad

1) At >5GHz, the SAR field decays to 1/e of its value within 3-4mm of the surface of a phantom with a source adjacent. So, measurements are significantly affected by small errors in the separation distances employed between the probe and the phantom surface. The distance between the probe tip and the plane of the sensors should be allowed for using the same value as th at declared in the probe calibration document. Distances between the probe tip and phantom surface should be measured accurately to 0.1mm. The best way to assure this is to use the robot to position the probe in light contact with the phantom wall and then to withdraw the probe by the selected amount under robot control.

2) The preferred test geometry at 5GHz is for testing at the bottom of an open phantom. If tests at the side of a phantom are performed, it will be necessary to apply VPM corrections as described below. In either case, careful monitoring of probe spacing from the phantom is required. Probe isotropy is improved for measuring fields polarized either normal to or parallel to the probe axis. If the source polarization is known, this arrangement should be established, if possible.

3) The probe calibration factors including boundary correction terms should be carefully entered from the calibration document. The probe calibration factors require that the probe be oriented in a known rotational position. The red spot on the Indexsar probe should be aligned facing away from the robot arm.
4) The latest SARA2 software (VPM editions) contain support for correcting for probe anisotropy in strong field gradients and include a procedure for correcting for boundary proximity influences. As noted above, the probe has to be oriented in a given rotational position and some familiarity with the new measurement procedures is necessary. The calculations can be performed either with or without the extended correction schemes applied.
5) If boundary corrections are used, it may be preferable to go rather closer to the phantom surface than is usually recommended and to perform scans using small steps between the measurement planes so that good data on the SAR profiles are collected within the first 10mm of the phantom depth.

5. CHARACTERISTICS OF THE TEST

5.1 APPLICABLE LIMIT REGULATIONS

47CFR §2.1093: Radiofrequency Radiation Exposure Evaluation: Portable Devices

FCC OET Bulletin 65(Edition 97-01), Supplement C (Edition 01-01): Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields

ANSI C95.1–1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

Note: Occupational/Controlled Exposure Partial-body **limits 8 W/kg applied to EUT.**

5.2 APPLICABLE MEASUREMENT STANDARDS

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

They specify the measurement method for demonstration of compliance with the SAR limits for such equipments.

6. LABORATORY ENVIRONMENT

Table: The Ambient Conditions during SAR Test

Temperature	Min. = 15 °C, Max. = 30 °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. TEST RESULTS

7.1 DIELECTRIC PERFORMANCE

The measured 1-gram averaged SAR values of the device against the head and the body are provided in Tables 1 and 2 respectively. The humidity and ambient temperature of test facility were 54% ~60% and 22.0 °C ~24.9°C respectively. The SAM head phantom（SN 0380 SH and SN 0381 SH）were full of the head tissue simulating liquid. The depth of the body tissue was 15.1cm. The distance between the back of the device and the bottom of the flat phantom is 1.5cm. A base station simulator was used to control the device during the SAR measurement. The phone was supplied with full-charged battery for each measurement.

For body-worn measurements, the device was tested against flat phantom representing the user body. Under measurement phone was put on in the belt holder.

Table 1: Dielectric Performance of Body Tissue Simulating Liquid

Temperature: 22.9~23.5°C, humidity: 54~60%.			
/	Frequency	Permittivity ε	Conductivity σ (S/m)
Target value	400.000 MHz	56.85	0.945
Validation value (Jun.28)	400.000 MHz	56.78	0.941
Target value	435.000 MHz	56.66	0.928
Validation value (Jun.28)	435.000 MHz	56.62	0.923
Target value	470.000 MHz	56.11	0.932
Validation value (Jun.28)	470.000 MHz	56.07	0.927

Table 2: Summary of Measurement Body Results

Temperature: 22.9~23.5°C, humidity: 48~58%.		
Limit of SAR (W/kg)	1 g Average	
	8	
Test Case	Measurement Result (W/kg)	
	1 g Average (W/kg)	Power level (dBm)
Body, Bottom Channel (400.000 MHz), FM, 100% Duty Cycle	4.332	35.37
Body, Mid Channel (435.000 MHz) FM, 100% Duty Cycle	4.414	35.32
Body, Top Channel (470.000 MHz) FM, 100% Duty Cycle	4.229	35.45

Table 3: Dielectric Performance of Head Tissue Simulating Liquid

Temperature: 22.5~23.9°C, humidity: 54~60%.			
/	Frequency	Permittivity ε	Conductivity σ (S/m)
Target value	400.000 MHz	43.83	0.857
Validation value (Jun.28)	400.000 MHz	43.78	0.852
Target value	435.000 MHz	43.61	0.875
Validation value (Jun.28)	435.000 MHz	43.57	0.870
Target value	470.000MHz	43.16	0.894
Validation value (Jun.28)	470.000MHz	42.13	0.889

Table 4: Summary of Measurement Head Results

Temperature: 22.3~23.5°C, humidity: 48~58%.		
Limit of SAR (W/kg)	1 g Average	
	8	
Test Case	Measurement Result (W/kg)	
	1 g Average (W/kg)	Power level (dBm)
Body, Bottom Channel (400.000MHz) FM, 100% Duty Cycle	4.113	35.37
Body, Mid Channel (435.000MHz) FM, 100% Duty Cycle	4.129	35.32
Body, Top Channel (470.000MHz) FM, 100% Duty Cycle	4.018	35.45

7.2 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 5.2 of this report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report.

8. MEASUREMENT UNCERTAINTIES

No	Uncertainty Component	Type	Uncertainty Value (%)	Probability Distribution	k	c_i	Standard Uncertainty (%) u_i(%)	Degree of freedom V_{eff} or v_i
	Measurement System							
1	—Probe Calibration	B	3.6	N	1	1	3.60	∞
2	—Axial isotropy	B	4.23	R	$\sqrt{3}$	$\sqrt{1-cp}$	0.00	∞
3	—Hemispherical Isotropy	B	10.7	R	$\sqrt{3}$	$\sqrt{cp}$	6.18	∞
4	—Boundary Effect	B	1.7	R	$\sqrt{3}$	1	0.98	∞
5	—Linearity	B	2.98	R	$\sqrt{3}$	1	1.69	∞
6	—System Detection Limits	B	1.00	R	$\sqrt{3}$	1	0.60	∞
7	—Readout Electronics	B	1.00	N	1	1	1.00	∞
8	—Response Time	B	0.80	R	$\sqrt{3}$	1	0.50	∞
9	—Integration Time	B	2.60	R	$\sqrt{3}$	1	1.50	∞
10	—RF Ambient Conditions	B	3.00	R	$\sqrt{3}$	1	1.70	∞
11	—Probe Position Mechanical tolerance	B	1.14	R	$\sqrt{3}$	1	0.33	∞
12	—Probe Position with respect to Phantom Shell	B	2.86	R	$\sqrt{3}$	1	0.83	∞
13	—Extrapolation, Interpolation and Integration Algorithms for Max. SAR evaluation	B	3.6	R	$\sqrt{3}$	1	2.08	∞
	Uncertainties of the DUT							
14	—Position of the DUT	A	2.90	N	1	1	2.90	0
15	—Holder of the DUT	A	3.60	N	1	1	3.60	0

16	—Output Power Variation –SAR drift measurement	B	5.0	R	$\sqrt{3}$	1	2.89	∞
	Phantom and Tissue Parameters							
17	—Phantom Uncertainty(shape and thickness tolerances)	B	1.43	R	$\sqrt{3}$	1	0.83	∞
18	—Liquid Conductivity Target –tolerance	B	5.0	R	$\sqrt{3}$	0.7	2.02	∞
19	—Liquid Conductivity –measurement Uncertainty)	B	2.0	R	$\sqrt{3}$	0.7	0.81	∞
20	—Liquid Permittivity Target tolerance	B	5.0	R	$\sqrt{3}$	0.6	1.73	∞
21	—Liquid Permittivity –measurement uncertainty	B	1.0	R	$\sqrt{3}$	0.6	0.35	∞
Combined Standard Uncertainty				RSS			±8.95%	
Expanded uncertainty (Confidence interval of 95 %)				K= 2.003935			±17.9%	

9. MAIN TEST INSTRUMENTS

No.	EQUIPMENT	TYPE	Due Date
1	E-Field SAR Probe	IXP-050 (SN 0206)	2009-07-22
2	Six-axis AC Servo industrial robot	RV-2A (SN AN406018)	2009-04-26
3	System Validation Dipole 450MHZ	IXD-045 (SN 00)	2009-04-26
4	Probe Amplifier and PC Interface	IFA-010 (SN 0027)	2009-04-26
5	SAM Head Phantom	SN 0380 SH	2009-04-26
6	SAM Head Phantom	SN 0381 SH	2009-04-26
7	Box Phantom	IXB–070	2009-04-26

ANNEX A

PHOTOS OF TEST SETUP

SARA2 SYSTEM TEST LAYOUT

SAMPLE TEST BODY POSIZITION DURING TEST

SAMPLE TEST HEAD POSIZITION DURING TEST

ANNEX B

PHOTOGRAPHS OF TEST SAMPLE

TOP VIEW OF SAMPLE

BOTTOM VIEW OF SAMPLE

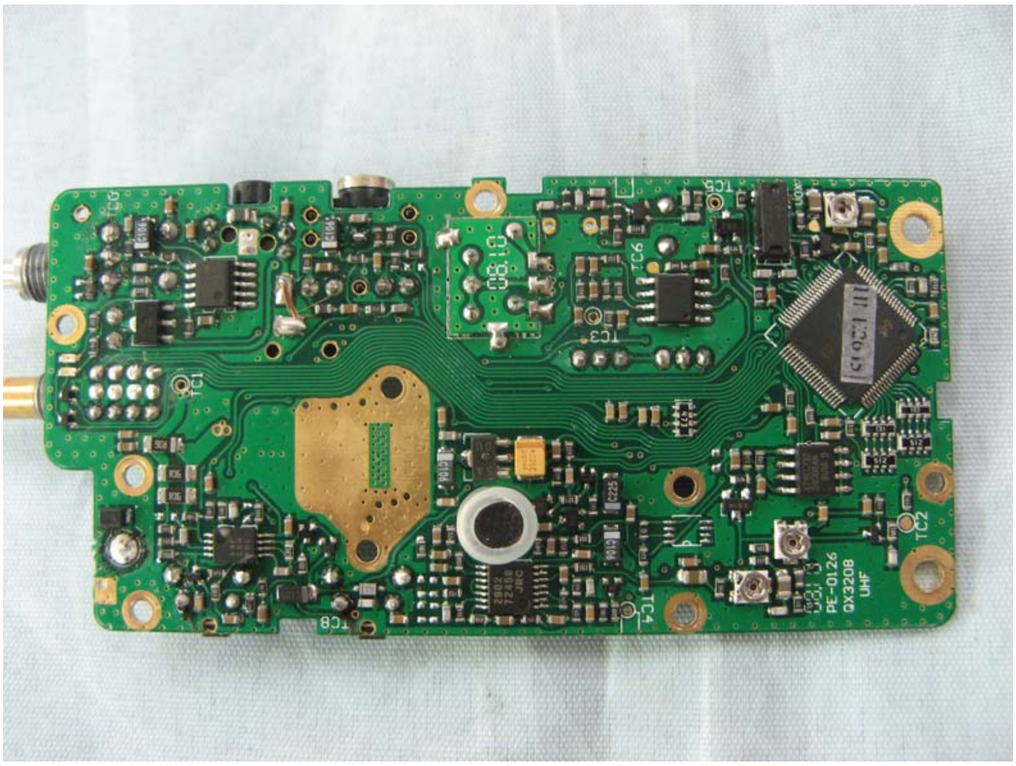
LEFT VIEW OF SAMPLE

RIGHT VIEW OF SAMPLE

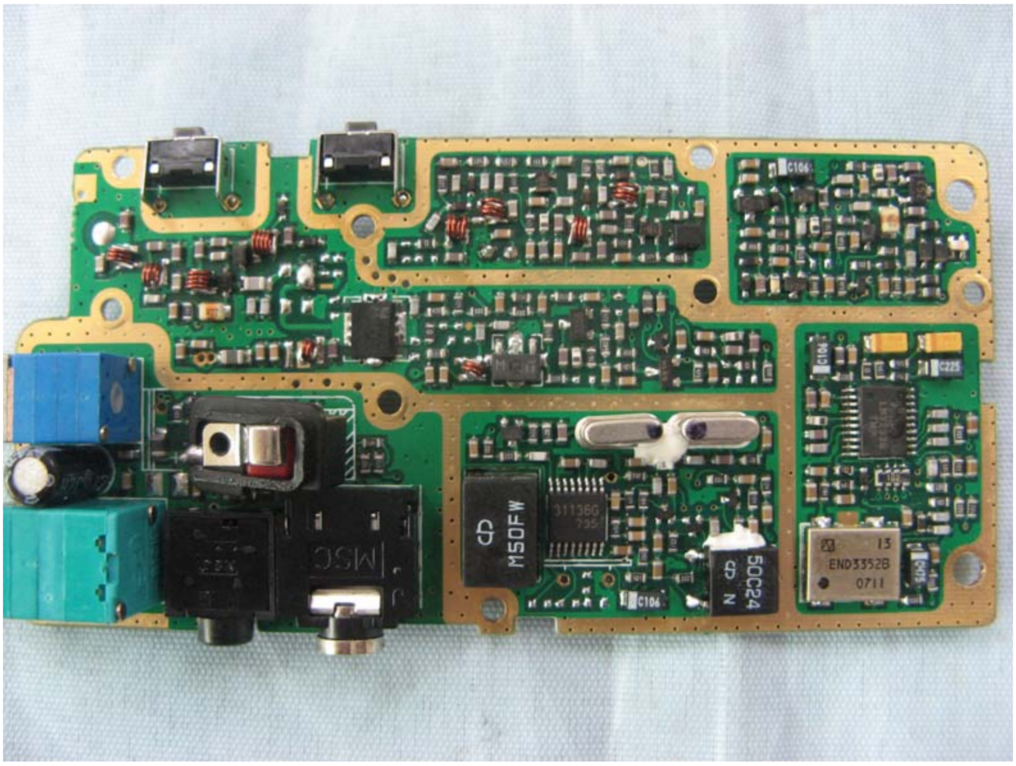
FRONT VIEW OF SAMPLE

BACK VIEW OF SAMPLE

INTERNAL VIEW OF SAMPLE -1



INTERNAL VIEW OF SAMPLE -2

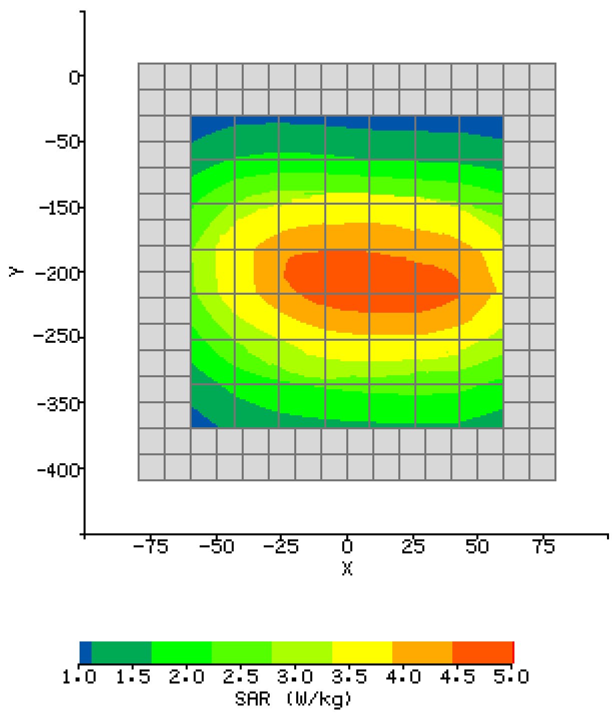


ANNEX C

SAR TEST REPORT

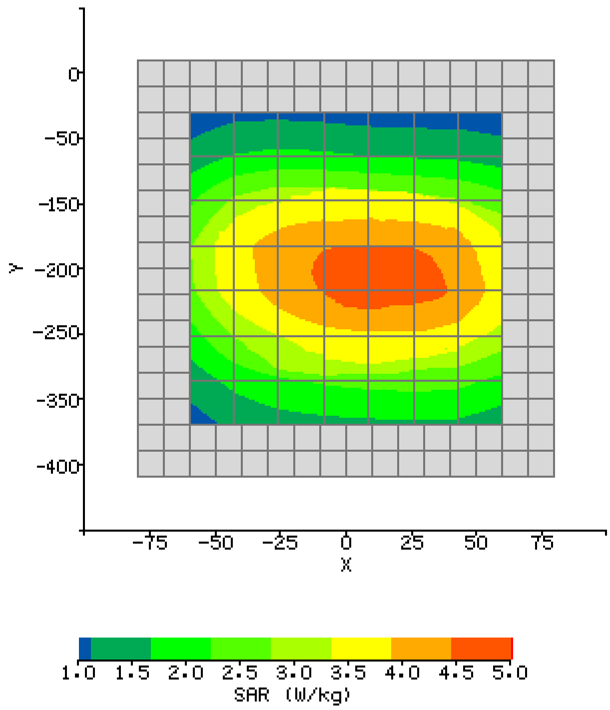
SAR TEST BODY (BOTTOM CHANNEL)

System / software:	SARA2 / 2.40 VPM		Input Power Drift:	0.00dB
Date / Time:	2008-06-28 12:51		DUT Battery Model/No:	--
Filename:	3108U1_B_1.txt		Probe Serial Number:	0206
Ambient Temperature:	22.5°C		Liquid Simulant:	BODY tissue
Device Under Test:	3108		Relative Permittivity:	56.78
Relative Humidity:	50%		Conductivity:	0.941
Phantom S/No:	HeadBox75mm.csv		Liquid Temperature:	22.2°C
Phantom Rotation:	180°		Max SAR X-axis Location:	12.75mm
DUT Position:	400_B_BODY		Max SAR Y-axis Location:	-1.66 mm
Antenna Configuration:	BUILD OUTSIDE		Max E Field:	74.23 V/m
Test Frequency:	400.125MHz		SAR 1g:	4.332 W/kg
Air Factors:	417 / 368 / 414		SAR 10g:	3.875 W/kg
Conversion Factors:	.267 / .267 /.267		SAR Start:	2.988 W/kg
Type of Modulation:	FM		SAR End:	2.973 W/kg
Modn. Duty Cycle:	100%		SAR Drift during Scan:	-0.44 %
Diode Compression Factors (V*200):	20 / 20 / 20		Probe battery last changed:	20/05/05
Input Power Level:	MAX POWER		Extrapolation:	poly4



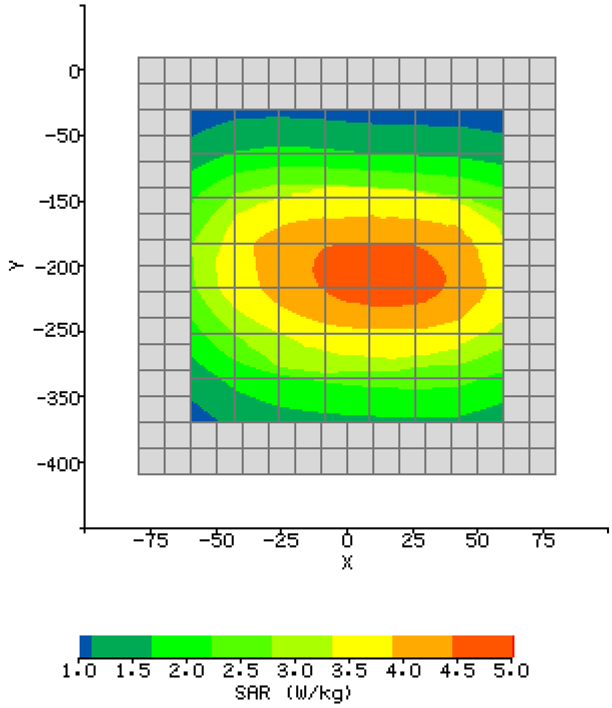
SAR TEST BODY (MIDDLE CHANNEL)

System / software:	SARA2 / 2.40 VPM		**Input Power Drift:**	0.00dB
Date / Time:	2008-06-28 13:46		**DUT Battery Model/No:**	--
Filename:	3108U1_M_1.txt		**Probe Serial Number:**	0206
Ambient Temperature:	22.5°C		**Liquid Simulant:**	BODY tissue
Device Under Test:	3108		**Relative Permittivity:**	56.62
Relative Humidity:	50%		**Conductivity:**	0.923
Phantom S/No:	HeadBox75mm.csv		**Liquid Temperature:**	22.2°C
Phantom Rotation:	180°		**Max SAR X-axis Location:**	5.19 mm
DUT Position:	435_M_BODY		**Max SAR Y-axis Location:**	-3.44 mm
Antenna Configuration:	BUILD OUTSIDE		**Max E Field:**	70.14 V/m
Test Frequency:	434.875MHz		**SAR 1g:**	4.414 W/kg
Air Factors:	417 / 368 / 414		**SAR 10g:**	4.018 W/kg
Conversion Factors:	.267 / .267 /.267		**SAR Start:**	2.858 W/kg
Type of Modulation:	FM		**SAR End:**	2.801 W/kg
Modn. Duty Cycle:	100%		**SAR Drift during Scan:**	-0.28%
Diode Compression Factors (V*200):	20 / 20 / 20		**Probe battery last changed:**	20/05/05
Input Power Level:	MAX POWER		**Extrapolation:**	poly4



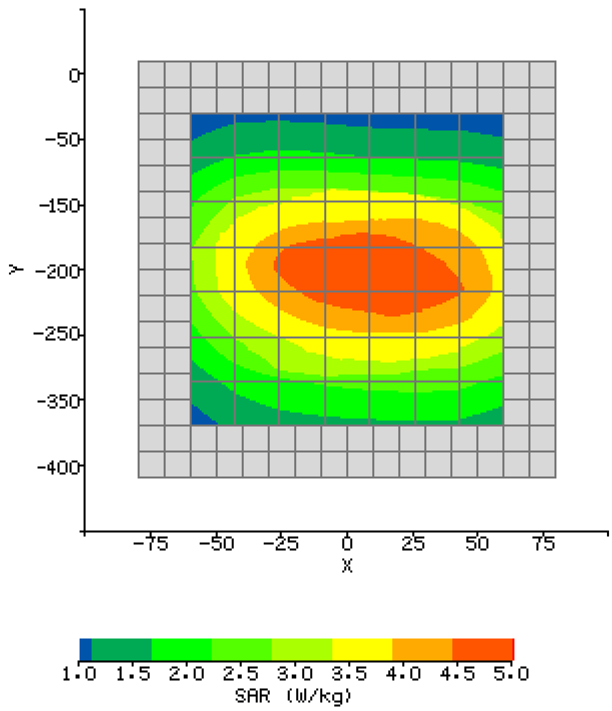
SAR TEST BODY (TOP CHANNEL)

System / software:	SARA2 / 2.40 VPM		**Input Power Drift:**	0.00dB
Date / Time:	2008-06-28 14:28		**DUT Battery Model/No:**	--
Filename:	3108U1_T_1.txt		**Probe Serial Number:**	0206
Ambient Temperature:	22.5°C		**Liquid Simulant:**	BODY tissue
Device Under Test:	3108		**Relative Permittivity:**	56.07
Relative Humidity:	50%		**Conductivity:**	0.927
Phantom S/No:	HeadBox75mm.csv		**Liquid Temperature:**	22.2°C
Phantom Rotation:	180°		**Max SAR X-axis Location:**	12.36 mm
DUT Position:	470_T_BODY		**Max SAR Y-axis Location:**	0.26 mm
Antenna Configuration:	BUILD OUTSIDE		**Max E Field:**	68.01 V/m
Test Frequency:	469.875MHz		**SAR 1g:**	4.229 W/kg
Air Factors:	417 / 368 / 414		**SAR 10g:**	3.921 W/kg
Conversion Factors:	.267 / .267 /.267		**SAR Start:**	2.599 W/kg
Type of Modulation:	FM		**SAR End:**	2.611 W/kg
Modn. Duty Cycle:	100%		**SAR Drift during Scan:**	-0.45%
Diode Compression Factors (V*200):	20 / 20 / 20		**Probe battery last changed:**	20/05/05
Input Power Level:	MAX POWER		**Extrapolation:**	poly4



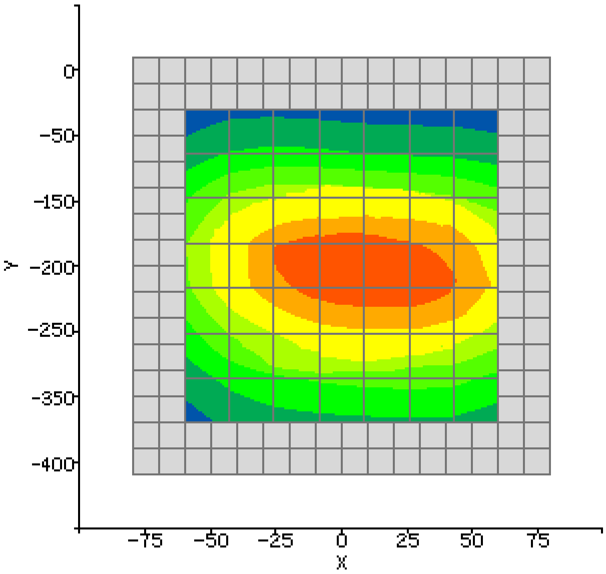
SAR TEST HEAD (BOTTOM CHANNEL)

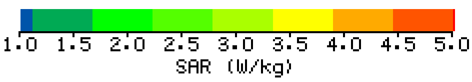
System / software:	SARA2 / 2.40 VPM		**Input Power Drift:**	0.00dB
Date / Time:	2008-06-29 08:40		**DUT Battery Model/No:**	--
Filename:	3108U1_B_2.txt		**Probe Serial Number:**	0206
Ambient Temperature:	22.3°C		**Liquid Simulant:**	Head tissue
Device Under Test:	3108		**Relative Permittivity:**	43.78
Relative Humidity:	50%		**Conductivity:**	0.852
Phantom S/No:	HeadBox75mm.csv		**Liquid Temperature:**	22.2°C
Phantom Rotation:	180°		**Max SAR X-axis Location:**	-10.77 mm
DUT Position:	400_BOTTOM_Head		**Max SAR Y-axis Location:**	-20.55 mm
Antenna Configuration:	BUILD OUTSIDE		**Max E Field:**	64.33 V/m
Test Frequency:	400.125MHz		**SAR 1g:**	4.113 W/kg
Air Factors:	417 / 368 / 414		**SAR 10g:**	3.511W/kg
Conversion Factors:	.267 / .267 /.267		**SAR Start:**	2.124 W/kg
Type of Modulation:	FM		**SAR End:**	2.121 W/kg
Modn. Duty Cycle:	100%		**SAR Drift during Scan:**	-0.21%
Diode Compression Factors (V*200):	20 / 20 / 20		**Probe battery last changed:**	20/05/05
Input Power Level:	MAX POWER		**Extrapolation:**	poly4



SAR TEST HEAD (MIDDLE CHANNEL)

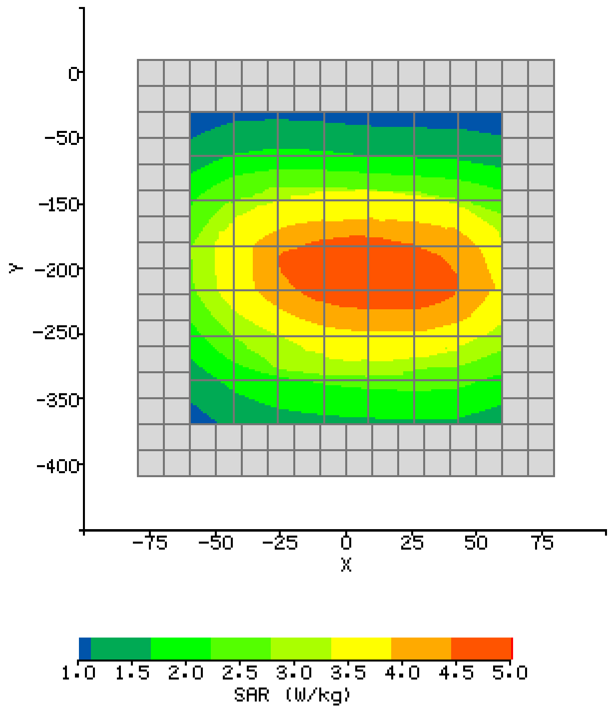
System / software:	SARA2 / 2.40 VPM		**Input Power Drift:**	0.00dB
Date / Time:	2008-06-29 11:37		**DUT Battery Model/No:**	--
Filename:	3108U1_M_2.txt		**Probe Serial Number:**	0206
Ambient Temperature:	22.3°C		**Liquid Simulant:**	Head tissue
Device Under Test:	3108		**Relative Permittivity:**	43.57
Relative Humidity:	50%		**Conductivity:**	0.870
Phantom S/No:	HeadBox75mm.csv		**Liquid Temperature:**	22.2°C
Phantom Rotation:	180°		**Max SAR X-axis Location:**	-6.08mm
DUT Position:	435_MIDDLE_Head		**Max SAR Y-axis Location:**	-13.19mm
Antenna Configuration:	BUILD OUTSIDE		**Max E Field:**	63.29 V/m
Test Frequency:	434.875MHz		**SAR 1g:**	4.129 W/kg
Air Factors:	417 / 368 / 414		**SAR 10g:**	3.466W/kg
Conversion Factors:	.267 / .267 /.267		**SAR Start:**	2.871W/kg
Type of Modulation:	FM		**SAR End:**	2.8628W/kg
Modn. Duty Cycle:	100%		**SAR Drift during Scan:**	-0.43%
Diode Compression Factors (V*200):	20 / 20 / 20		**Probe battery last changed:**	20/05/05
Input Power Level:	MAX POWER		**Extrapolation:**	poly4





SAR TEST HEAD (TOP CHANNEL)

System / software:	SARA2 / 2.40 VPM		**Input Power Drift:**	0.00dB
Date / Time:	2008-06-29 12:39		**DUT Battery Model/No:**	--
Filename:	3108U1_TOP_2.txt		**Probe Serial Number:**	0206
Ambient Temperature:	22.5°C		**Liquid Simulant:**	Head tissue
Device Under Test:	3108U1		**Relative Permittivity:**	42.13
Relative Humidity:	50%		**Conductivity:**	0.889
Phantom S/No:	HeadBox75mm.csv		**Liquid Temperature:**	22.2°C
Phantom Rotation:	180°		**Max SAR X-axis Location:**	12.33 mm
DUT Position:	470_TOP_Head		**Max SAR Y-axis Location:**	-0.48 mm
Antenna Configuration:	BUILD OUTSIDE		**Max E Field:**	61.44 V/m
Test Frequency:	469.875MHz		**SAR 1g:**	4.018 W/kg
Air Factors:	417 / 368 / 414		**SAR 10g:**	3.411 W/kg
Conversion Factors:	.267 / .267 /.267		**SAR Start:**	2.769 W/kg
Type of Modulation:	FM		**SAR End:**	2.711 W/kg
Modn. Duty Cycle:	100%		**SAR Drift during Scan:**	-0.31%
Diode Compression Factors (V*200):	20 / 20 / 20		**Probe battery last changed:**	20/05/05
Input Power Level:	MAX POWER		**Extrapolation:**	poly4

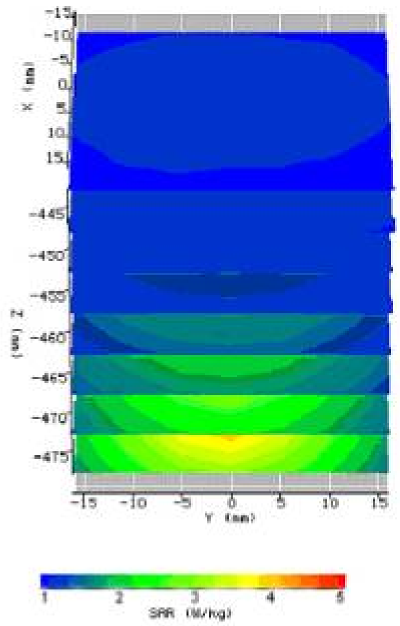


ANNEX D

SYSTEM PERFORMANCE CHECK DATA

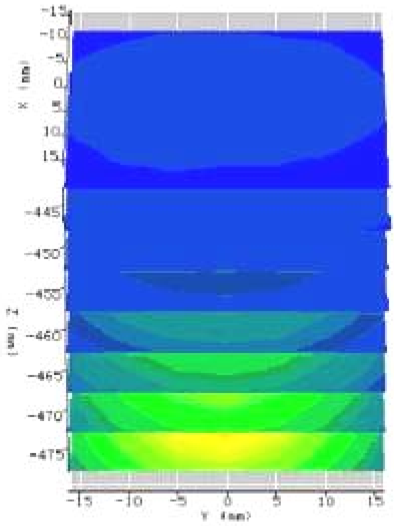
SYSTEM CHEEK BODY (BOTTOM CHANNEL)

System / software:	SARA2 / 2.40 VPM		**Input Power Drift:**	0.01dB
Date / Time:	2008-06-28 09:35		**DUT Battery Model/No:**	--
Filename:	SysCheek_B_400MHz.tx		**Probe Serial Number:**	0206
Ambient Temperature:	23.5°C		**Liquid Simulant:**	Body tissue
Device Under Test:	IXD-045 antenna		**Relative Permittivity:**	56.78
Relative Humidity:	50%		**Conductivity:**	0.941
Phantom S/No:	HeadBox75mm.csv		**Liquid Temperature:**	22.2°C
Phantom Rotation:	180°		**Max SAR X-axis Location:**	0.00 mm
DUT Position:	400 Body		**Max SAR Y-axis Location:**	0.00 mm
Antenna Configuration:	IXD-045antenna		**Max E Field:**	71.36 V/m
Test Frequency:	400.125MHz		**SAR 1g:**	4.911 W/kg
Air Factors:	417 / 368 / 414		**SAR 10g:**	3.814 W/kg
Conversion Factors:	.267 / .267 /.267		**SAR Start:**	0.892 W/kg
Type of Modulation:	FM		**SAR End:**	0.854 W/kg
Modn. Duty Cycle:	100%		**SAR Drift during Scan:**	0.89%
Diode Compression Factors (V*200):	20 / 20 / 20		**Probe battery last changed:**	20/05/05
Input Power Level:	30dBm		**Extrapolation:**	poly4



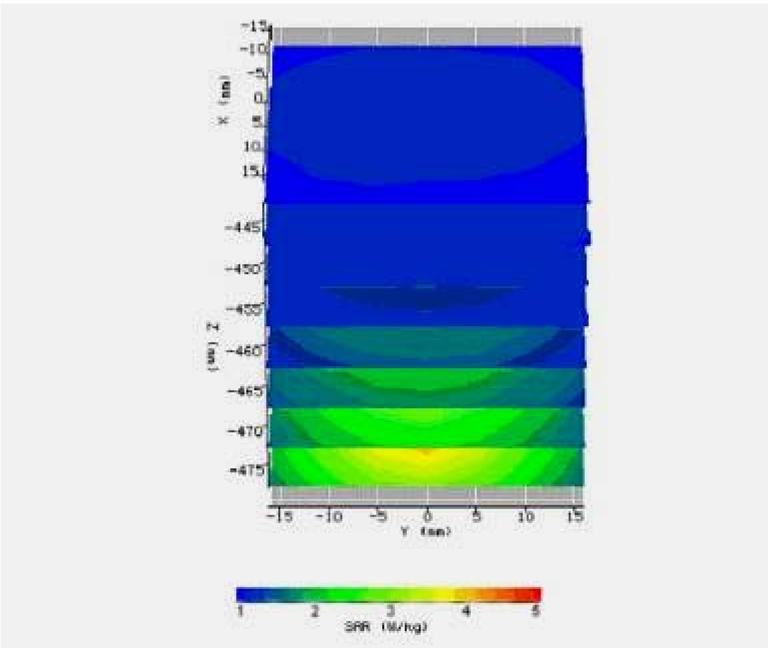
SYSTEM CHEEK BODY (MIDDLE CHANNEL)

System / software:	SARA2 / 2.40 VPM		**Input Power Drift:**	0.01dB
Date / Time:	2008-06-28 09:48		**DUT Battery Model/No:**	--
Filename:	SysCheek_B_435MHz.txt		**Probe Serial Number:**	0206
Ambient Temperature:	23.5°C		**Liquid Simulant:**	Body tissue
Device Under Test:	IXD-045 antenna		**Relative Permittivity:**	56.62
Relative Humidity:	50%		**Conductivity:**	0.923
Phantom S/No:	HeadBox75mm.csv		**Liquid Temperature:**	22.2°C
Phantom Rotation:	180°		**Max SAR X-axis Location:**	6.12mm
DUT Position:	435 Body		**Max SAR Y-axis Location:**	0.00 mm
Antenna Configuration:	IXD-045antenna		**Max E Field:**	71.73 V/m
Test Frequency:	434.875MHz		**SAR 1g:**	4.833 W/kg
Air Factors:	417 / 368 / 414		**SAR 10g:**	3.861 W/kg
Conversion Factors:	.267 / .267 /.267		**SAR Start:**	0.878 W/kg
Type of Modulation:	FM		**SAR End:**	0.885 W/kg
Modn. Duty Cycle:	100%		**SAR Drift during Scan:**	1.15%
Diode Compression Factors (V*200):	20 / 20 / 20		**Probe battery last changed:**	20/05/05
Input Power Level:	30dBm		**Extrapolation:**	poly4



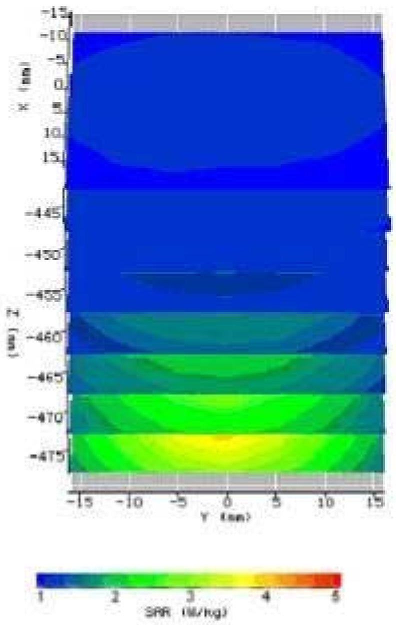
SYSTEM CHEEK BODY (TOP CHANNEL)

System / software:	SARA2 / 2.40 VPM		**Input Power Drift:**	0.01dB
Date / Time:	2008-06-28 10:17		**DUT Battery Model/No:**	--
Filename:	SysCheek_B_470MHz.txt		**Probe Serial Number:**	0206
Ambient Temperature:	23.7°C		**Liquid Simulant:**	Body tissue
Device Under Test:	IXD-045 antenna		**Relative Permittivity:**	56.07
Relative Humidity:	50%		**Conductivity:**	0.927
Phantom S/No:	HeadBox75mm.csv		**Liquid Temperature:**	22.2°C
Phantom Rotation:	180°		**Max SAR X-axis Location:**	0.00 mm
DUT Position:	470 Body		**Max SAR Y-axis Location:**	0.00 mm
Antenna Configuration:	IXD-045antenna		**Max E Field:**	71.28 V/m
Test Frequency:	469.875MHz		**SAR 1g:**	4.878 W/kg
Air Factors:	417 / 368 / 414		**SAR 10g:**	3.940 W/kg
Conversion Factors:	.267 / .267 /.267		**SAR Start:**	0.838 W/kg
Type of Modulation:	FM		**SAR End:**	0.841 W/kg
Modn. Duty Cycle:	100%		**SAR Drift during Scan:**	0.09%
Diode Compression Factors (V*200):	20 / 20 / 20		**Probe battery last changed:**	20/05/05
Input Power Level:	30dBm		**Extrapolation:**	poly4



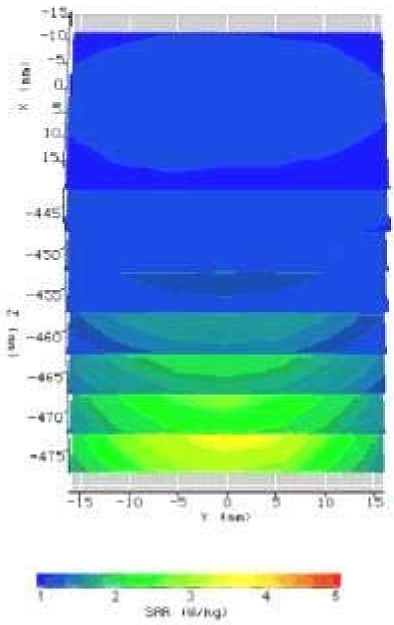
SYSTEM CHEEK HEAD (BOTTOM CHANNEL)

System / software:	SARA2 / 2.40 VPM		**Input Power Drift:**	0.01dB
Date / Time:	2008-06-29 11:22		**DUT Battery Model/No:**	--
Filename:	SysCheek_H_400MHz.txt		**Probe Serial Number:**	0206
Ambient Temperature:	23.7°C		**Liquid Simulant:**	Head tissue
Device Under Test:	IXD-045 antenna		**Relative Permittivity:**	43.78
Relative Humidity:	50%		**Conductivity:**	0.852
Phantom S/No:	HeadBox75mm.csv		**Liquid Temperature:**	22.2°C
Phantom Rotation:	180°		**Max SAR X-axis Location:**	0.00 mm
DUT Position:	400 Head		**Max SAR Y-axis Location:**	0.00 mm
Antenna Configuration:	IXD-045antenna		**Max E Field:**	74.84 V/m
Test Frequency:	400.125MHz		**SAR 1g:**	4.851W/kg
Air Factors:	417 / 368 / 414		**SAR 10g:**	3.647 W/kg
Conversion Factors:	.267 / .267 /.267		**SAR Start:**	0.638 W/kg
Type of Modulation:	FM		**SAR End:**	0.626W/kg
Modn. Duty Cycle:	100%		**SAR Drift during Scan:**	1.28%
Diode Compression Factors (V*200):	20 / 20 / 20		**Probe battery last changed:**	20/05/05
Input Power Level:	30dBm		**Extrapolation:**	poly4



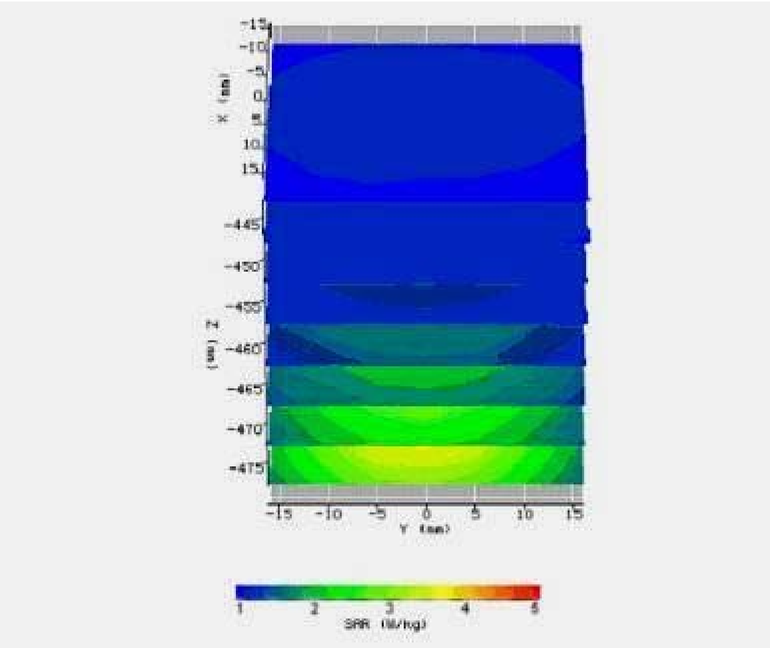
SYSTEM CHEEK HEAD (MIDDLE CHANNEL)

System / software:	SARA2 / 2.40 VPM		**Input Power Drift:**	0.00dB
Date / Time:	2008-06-18 11:57		**DUT Battery Model/No:**	--
Filename:	SysCheek_H_435MHz.txt		**Probe Serial Number:**	0206
Ambient Temperature:	23.7°C		**Liquid Simulant:**	Head tissue
Device Under Test:	IXD-045 antenna		**Relative Permittivity:**	43.57
Relative Humidity:	50%		**Conductivity:**	0.870
Phantom S/No:	HeadBox75mm.csv		**Liquid Temperature:**	22.2°C
Phantom Rotation:	180°		**Max SAR X-axis Location:**	5.13 mm
DUT Position:	435 Head		**Max SAR Y-axis Location:**	0.00 mm
Antenna Configuration:	IXD-045antenna		**Max E Field:**	74.49 V/m
Test Frequency:	434.875MHz		**SAR 1g:**	4.821 W/kg
Air Factors:	417 / 368 / 414		**SAR 10g:**	3.772 W/kg
Conversion Factors:	.267 / .267 /.267		**SAR Start:**	0.780 W/kg
Type of Modulation:	FM		**SAR End:**	0.784 W/kg
Modn. Duty Cycle:	100%		**SAR Drift during Scan:**	1.23 %
Diode Compression Factors (V*200):	20 / 20 / 20		**Probe battery last changed:**	20/05/05
Input Power Level:	30dBm		**Extrapolation:**	poly4



SYSTEM CHEEK HEAD (TOP CHANNEL)

System / software:	SARA2 / 2.40 VPM		**Input Power Drift:**	0.01dB
Date / Time:	2008-06-28 12:26		**DUT Battery Model/No:**	--
Filename:	SysCheek_H_470MHz.txt		**Probe Serial Number:**	0206
Ambient Temperature:	23.7°C		**Liquid Simulant:**	Head tissue
Device Under Test:	IXD-045 antenna		**Relative Permittivity:**	42.13
Relative Humidity:	50%		**Conductivity:**	0.889
Phantom S/No:	HeadBox75mm.csv		**Liquid Temperature:**	22.2°C
Phantom Rotation:	180°		**Max SAR X-axis Location:**	1.01 mm
DUT Position:	470 Head		**Max SAR Y-axis Location:**	0.00 mm
Antenna Configuration:	IXD-045antenna		**Max E Field:**	73.11/m
Test Frequency:	469.875MHz		**SAR 1g:**	4.801w/kg
Air Factors:	417 / 368 / 414		**SAR 10g:**	3.818w/kg
Conversion Factors:	.267 / .267 /.267		**SAR Start:**	0.827 W/kg
Type of Modulation:	FM		**SAR End:**	0.825 W/kg
Modn. Duty Cycle:	100%		**SAR Drift during Scan:**	2.11 %
Diode Compression Factors (V*200):	20 / 20 / 20		**Probe battery last changed:**	20/05/05
Input Power Level:	30dBm		**Extrapolation:**	poly4



----END OF REPORT----