SAR Test Report

On

Dual-Band Tri-mode AMPS/CDMA Cellular Phone

FCC Part 22 and Part 24 Certification	
FCC ID:	**OVFKWC-SE44**
Model:	**SE44**

STATEMENT OF COMPLIANCE

Kyocera Wireless Corp declares under its sole responsibility that the product, FCC ID: OVFKWC-SE44 to which this declaration relates, is in conformity with the appropriate General Population/Uncontrolled RF exposure standards, recommendations and guidelines. It also declares that the product was tested in accordance with the appropriate measurement standards, guidelines and recommended practices.

Any deviations from these standards, guidelines and recommended practices are noted: NONE.

Date of Test:	November 1, 2003 – December 11, 2003
Test performed by:	Kyocera Wireless Corp 10300 Campus Point Drive CA 92121
Report Prepared by:	Patrick Bowen, Senior Engineer
Report Reviewed by:	C. K. Li, Engineer, Senior Staff/Manager

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1 INTRODUCTION

This test report describes an environmental evaluation measurement of specific absorption rate (SAR) distribution in simulated human head tissues exposed to radio frequency (RF) radiation from a wireless portable device manufactured by Kyocera Wireless Corp. (KWC). These measurements were performed for compliance with the rules and regulations of the U.S. Federal Communications Commission (FCC). The testing was performed in accordance with FCC OET Bulletin 65 Supplement C (01/01) and IEEE P1528-200X Draft CD1.0.

2 EQUIPMENT UNDER TEST (EUT)

The wireless device is described as follows:

FCC ID:	OVFKWC-SE44			
Product:	Tri-mode Dual-Band Analog/PCS Phone			
Trade Name:	Kyocera Wireless Corp			
Model Number:	SE44			
EUT S/N:	QJ0T			
Type:	[ ] Identical Prototype, [X] Pre-production			
Device Category:	Portable			
RF Exposure Environment:	General Population / Uncontrolled			
Antenna Type:	Top-loaded Helix Whip	**Antenna Location:**	Right	
Detachable Antenna:	Yes	**Antenna Dimensions:**	81.5mm (L) x 7.25mm (W)	
External Input:	Audio/Digital Data			
Quantity:	Quantity production is planned			
FCC Rule Parts:	§22H	§22H	§22.901(d)	§24H
Modes:	800 AMPS	800 CDMA	800 CDMA1X	1900 CDMA
Multiple Access Scheme:	FDMA	CDMA	CDMA	CDMA
Duty Cycle:	1:1	1:1	1:1	1:1
TX Frequency (MHz):	824 – 849	824 – 849	824 – 849	1850 - 1910
Emission Designators:	40K0F1D	40K0F8W	1M25F9W	1M25F9W
Max. Output Power (W)	0.406 ERP	0.392 ERP		0.607 EIRP
Note: The OVFKWC-SE44 transmitter is disabled by software while operating in the head position with the slide is in the closed position.				

3 ACCESSORIES:

KWC Battery Models: TXBAT10011 and TXBAT10024 (3.7V, 1100mAh)
There are two battery options available to operate SE44. Both batteries are mechanically and electrically equivalent. The only difference between the two models is the product color (blue or gray). All measurements were done with production batteries.

KWC Holster Model: TXLCC10049

4 SAR TEST RESULT SUMMARY

This device has been tested for localised specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE Std. C95.1 ~ 1992 and has been tested in accordance with the measurement procedures specified in IEEE P1528-200X Draft 6.5. Normal antenna operating positions were incorporated, with the device transmitting at frequencies consistent with normal usage of the device. The device has been shown to be capable of compliance for localised specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE std. C95.1-1992

4.1 Maximum Results Found during SAR Evaluation

The equipment is deemed to fulfil the requirements if the measured values are less than or equal to the limit.

4.2 Head Configuration

Mode	Ch/f(MHz)	Conducted Power (dBm)	Device Position	Measured (mW/g)	Result
AMPS	383 (836.5)	25.03	Left Cheek	1.49	**PASSED**
CDMA-800	383(836.49)	24.51	Left Cheek	1.26	**PASSED**
CDMA-1900	25(1815.3)	23.29	Right Cheek	0.86	**PASSED**

4.3 Body Worn Configuration (with KWC body worn accessories)

Mode/	Ch/f(MHz)	Conducted Power (dBm)	Device Position	Measured (mW/g)	Result
AMPS	383 (836.5)	25.03	Waist level	0.85	**PASSED**
CDMA-800	383 (836.5)	24.51	Waist level	0.79	**PASSED**
CDMA-1900	25(1815.3)	23.29	Waist level	0.99	**PASSED**

4.4 Measurement Uncertainty

Combined Uncertainty (Assessment & Source)	**± 10.32 %**
Extended Uncertainty (k=2)	**± 20.6 %**

5 TEST CONDITIONS

5.1 Ambient Conditions

All tests were performed under the following environmental conditions:

Ambient Temperature:	22 $\pm$1 Degrees C
Tissue simulating liquid temperature:	22 $\pm$1 Degrees C
Humidity:	38 %
Pressure:	1015 mB

5.2 RF characteristics of the test site

All SAR measurements were performed inside a shielded room that provide isolation from external EM fields.

The E-field probes of the DASY 3 system are capable of detecting signals as low as 5μW/g in the liquid dielectric, and so external fields are minimised by the shielded room, leaving the phone as the dominate radiation source. 2 two-foot square ferrite panels are placed on the floor of the room beneath the phantom area of the DASY system to minimise reflected energy that would otherwise re-enter the phantom and combine constructively or destructively with the desired fields. These ferrite panels provide roughly 12 to 13 dB of attenuation in the frequency range of 900 MHz, and 7 to 8 dB of attenuation in the frequency range of 1.9 GHz.

5.3 Test Signal, Frequencies and Output Power

The device was controlled by using Kyocera Wireless Phone Support Toolkit, Test Code Controller.

In all operating bands, the measurements were performed on low, mid and high channels.

The phone was set to nominal maximum power level during all tests and at the beginning of the each test. Radiated power output was measured in KWC antenna range, fully an-echoic chamber from the same unit that was used in SAR testing.

DASY3 system measures power drift during SAR testing by comparing E-field in the same location at the beginning and at the end of measurement. These records were used to monitor stability of power output.

5.4 Device Test Conditions

The EUT was tested with a fully charged standard battery as supplied with the handset. Conducted RF power measurements were performed before and after each SAR measurements to confirm the output power.

6 DESCRIPTION OF THE TEST EQUIPMENT

6.1 Dosimetric System

The measurements were performed with an automated near-field scanning system, DASY3, manufactured by Schmid & Partner Engineering AG (SPEAG) of Zurich, Switzerland. The system is comprised of high precision robot, robot controller, computer, near-field probe, probe alignment sensor and the SAM phantom containing brain or muscle equivalent material. The overall RSS uncertainty of the measurement system is ±10.32% with an expanded uncertainty of ±20.5% (K=2). The measurement uncertainty budget is given in section 6. Below is a list of the calibrated equipment used for the measurements:

Test Equipment	Serial Number	Cal. Due Date
DASY3 DAE3 V1	494	02-18-04
E-field Probe ET3DV6	1663	10-10-04
E-field Probe ET3DV6	1664	08-29-04
Dipole Validation kit, D835V2	453	02-11-04
Dipole Validation kit, D1900V2	5D003	02-20-04

The calibration records of E-field probe are attached in Appendix C.

6.2 Additional equipment needed in validation

Test Equipment	Serial Number	Cal. Due Date
Signal Generator, HP E4421B	US38440337	04-08-05
Power meter, Giga-tronics 8541C	1834885	02-23-04
Power Sensor, Giga-tronics 80601A	1831662	01-13-04
Thermometer	--	--

6.3 Tissue Stimulants

All dielectric parameters of tissue stimulants were measured within 24 hours of SAR measurements. The depth of the tissue stimulant in the ear reference point and flat reference point of the phantom were at least 15cm during all the tests.

The list of ingredients and the percent composition used for the Head and Muscle tissue simulates are listed in the table below:

	835 MHz		1900 MHz	
Ingredient	***HEAD***	***MUSCLE***	***HEAD***	***MUSCLE***
Water	51.07%	65.45%	54%	69.91%
Cellulose	0.23%	--	--	--
Glycol monobutyl	--	--	44.91%	29.96%
Sugar	47.31%	34.31%	--	--
Preventol	0.24%	0.1%	--	--
Salt	1.15%	0.62%	0.21%	0.13%

The ingredients above are adopted from Application Note: Recipes for Head/Muscle Tissue Simulating Liquid by SPEAG.

6.4 Phantoms Description

SAM v4.0 phantom, manufactured by SPEAG, was used during the measurement. It has fiberglass shell integrated in a wooden table. The shape of the shell corresponds to the phantom defined in IEEE 1528-200X. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. Reference markings on the phantom allow the complete set-up of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

The thickness of phantom shell is 2mm except for the ear, where an integrated ear spacer provides 6mm spacing from the tissue boundary. Manufacturer reports tolerance in shell thickness to be ± 0.1mm**.**

6.5 Isotropic E-Field Probe

Model	• ET3DV6 
Construction	• Symmetrical design with triangular core • Built-in optical fiber for surface detection system • Built-in shielding against static charges • PEEK enclosure material (resistant to organic solvents, e.g., glycol)
Calibration	• Calibration certificate in Appendix C
Frequency	• 10MHz to 3GHz (dosimetry); Linearity: ± 0.2dB (30MHz to 3GHz)
Optical Surface	• ± 0.2mm repeatability in air and clear liquid over diffuse reflecting
Detection	• Surface
Directivity	• ± 0.2dB in HSL (rotation around probe axis) • ± 0.4dB in HSL (rotation normal to probe axis)
Dynamic Range	• 5 uW/g to > 100 mW/g; Linearity: ± 0.2dB
Dimensions	• Overall length: 330mm • Tip length: 16mm • Body diameter: 12mm • Tip diameter: 6.8mm • Distance from probe tip to dipole centers: 2.7mm
Application	• General dosimetry up to 3GHz • Compliance tests of mobile phones • Fast automatic scanning in arbitrary phantoms.

7 SYSTEM VALIDATION

The probes are calibrated annually by the manufacturer. Dielectric parameters of the stimulating liquids are measured with an automated Hewlett Packard 85070B dielectric probe in conjunction with an Agilent 8753C-network analyser.

The SAR measurements of the device were done within 24 hours of system accuracy verification, which was done using the dipole validation kit. Power level of 20dBm was supplied to a dipole antenna placed under the flat section of SAM phantom. The validation results are in the table below and printouts of the validation test are attached in Appendix A. All the measured parameters were within the specification.

Note since the validation reference in muscle liquid is not available, the system validation with head tissues was done for the device testing in muscle. Based on OET 65 Supplement C EAB Part 22/24 SAR review Reminder Sheet 01/2002, this is a valid test.

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Tissue	Freq. (MHz)	Description	Validation SAR (mW/g), 1g	Dielectric Parameters		Temp. (°C)	Test date	Comments
				ε_r	σ (S/m)			Validation testing -
Head	835	Measured	1.07	**41.5**	**0.92**	22±1	11-02-03	For device testing in head liquid
		Measured	1.08	**41.0**	**0.89**	22±1	11-03-03	For device testing in muscle
		Measured	1.10	**40.9**	**0.88**	22±1	11-04-03	For device testing in head liquid
		Measured	1.04	**42.6**	**0.89**	22±1	11-13-03	For device testing in head liquid
		Measured	1.05	**41.0**	**0.89**	22±1	11-14-03	For device testing in head liquid
		SPEAG Reference	1.04	41.9	0.89	---	02-11-02	
		FCC Reference*	---	41.5	0.90	20-26	---	
	1900	Measured	4.35	**39.7**	**1.43**	22±1	11-01-03	For device testing in muscle
		Measured	4.30	**40.0**	**1.43**	22±1	11-01-03	For device testing in head liquid
		Measured	4.47	**40.3**	**1.43**	22±1	11-03-03	For device testing in muscle
		SPEAG Reference	4.56	39.1	1.47	---	02-20-02	
		FCC Reference*	---	40.0	1.40	20-26	---	
Muscle	835	Measured	---	**54.0**	**0.95**	22±1	11-03-03	for device testing in muscle
		Measured	---	**54.0**	**0.95**	22±1	11-04-03	for device testing in muscle
		Measured	---	**41.0**	**0.89**	22±1	11-14-03	for device testing in muscle
		Measured	---	**55.9**	**0.98**	22±1	12-10-03	for device testing in muscle
		FCC Reference*	---	55.2	0.97	---	---	
	1900	Measured	---	**53.4**	**1.49**	22±1	11-01-03	for device testing in muscle
		Measured	---	**53.3**	**1.48**	22±1	11-03-03	for device testing in muscle
		Measured	---	**53.2**	**1.49**	22±1	12-11-03	for device testing in muscle
		FCC Reference*	---	53.3	1.52	20-26	---	

FCC reference values are adopted from OET Bulletin 65 (97-01) Supplement C (01-01).

8 DESCRIPTION OF THE TEST PROCEDURE

Measurements were made on both left-hand side and right hand side of the phantom.

The device was position against phantom according to OET Bulletin 65 (97-01) Supplement C (01-01). Definitions of terms used in aligning the device to a head phantom are available in IEEE Draft Standard P1528-2001 "Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"

8.1 Test Positions

The device was placed in the holder. The bottom of the device aligns with the bottom of the holder clamp to provide a standard positioning and ensure enough free space for antenna.

Device holder was provided by SPEAG together with DASY3.

8.1.1 Initial Ear Position

The device was initially positioned with the earpiece region pressed against the ear spacer of a head phantom parallel to the "Neck-Front" (N-F) line defined along the base of the ear spacer that contains the "Ear Reference Point" (ERP). The "test device reference point" (point A) is aligned to the ERP on the head phantom and the "vertical centerline" is aligned to the "phantom reference plane".

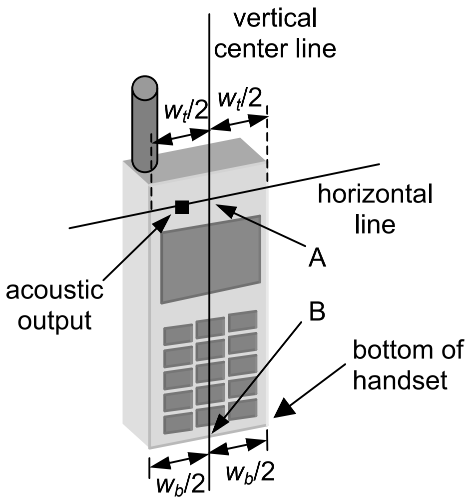


Figure 8-1 – Handset vertical and horizontal reference lines.

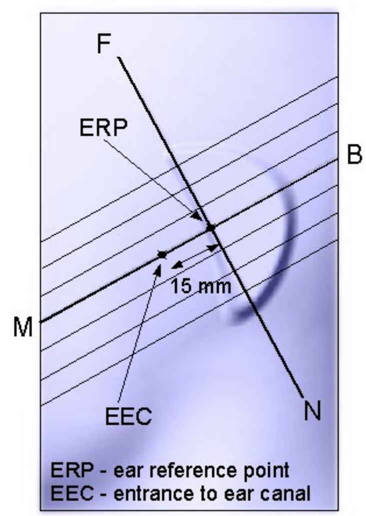


Figure 8-2 - Close up side view of phantom showing the ear region.

8.1.2 Cheek Position

"Initial ear position" alignments are maintained and the device is brought toward the mouth of the head phantom by pivoting along the "Neck-Front" line until any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom or when any portion of a foldout, sliding or similar keypad cover opened to its intended self-adjusting normal use position is in contact with the cheek or mouth of the phantom.

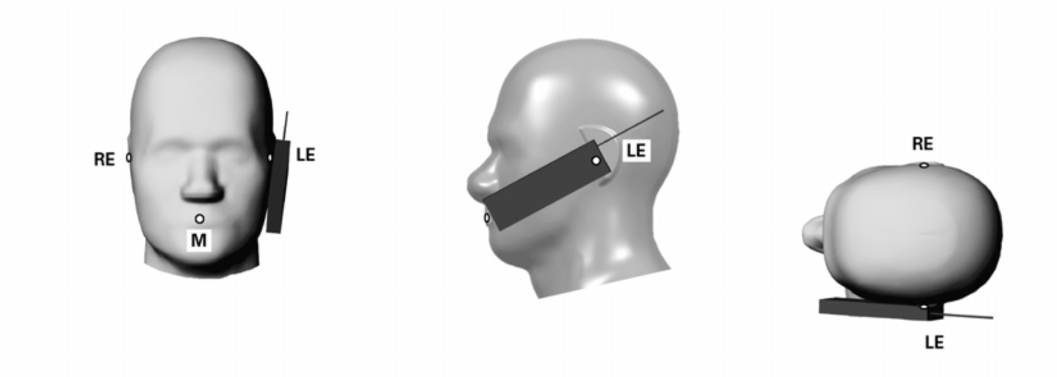


Figure 8.3 - Phone position 1, "cheek" or "touch" position.

8.1.3 Tilt Position

In the "cheek position", if the earpiece of the device is not in full contact with the phantom's ear spacer and the peak SAR location for the "cheek position" is located at the ear spacer region or corresponds to the earpiece region of the handset, the device is returned to the "initial ear position" by rotating it away from the mouth until the earpiece is in full contact with the ear spacer. Otherwise, the device is moved away from the cheek perpendicular to the line passes through both "ear reference points" for approximate 2-3cm. While it is in this position, the device is tilted away from the mouth with respect to the "test device reference point" by 15^{o}. After the tilt, it is then moved back toward the head perpendicular to the line passes through both "ear reference point" until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process is repeated with a tilt angle less than 15^{o} so that the device and its antenna would touch the phantom simultaneously.

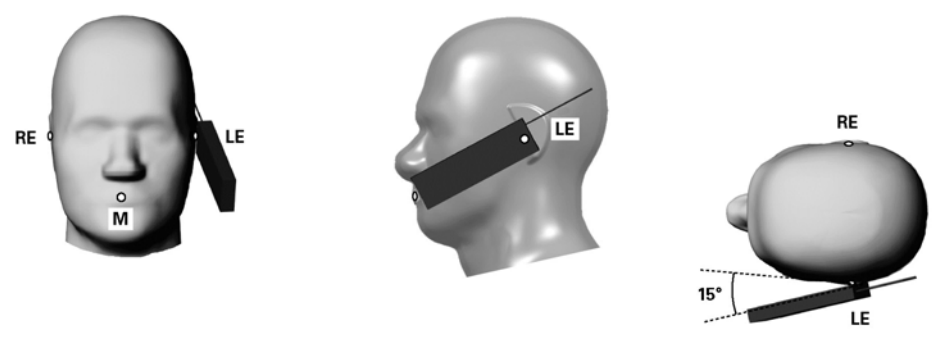


Figure 8-4 - Phone position 2, "tilted" position.

8.1.3 Body Worn Configuration

KWC body worn accessories were tested for the FCC RF exposure compliance. The phone was positioned into the carrying case and placed below the flat phantom. Hands-free headset was connected during measurements.

The SAR levels were also measured with 25.0mm air space for the hands-free application, which allow user to use other body-worn holster that contains no metal and provides at least 25.0mm separation from the closest point of the handset to the body.

8.2 Scan Procedures

First coarse scans are used for quick determination of the field distribution. Next a cube scans, 7x7x7 points; spacing between each point 5x5x5mm, is performed around the highest E-field value to determine the averaged SAR-distribution over 1g.

8.3 SAR Averaging Methods

The maximum SAR value is average over its volume using interpolation and extrapolation.

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the “Not a knot” –condition [W. Gander, Computermathematik, p. 141-150] (x, y and z – directions) [numerical Recipes in C, Second Edition, p 123].

The extrapolation is based on least square algorithm [W. Gander, Computermathematik, p. 168-180]. Through the points in the first 30mm in all z-axis, polynomials of order four are calculated. This polynomial is then used to evaluate the points between the surface and the probe tip. The points, calculated from the surface, have a distance of 1mm from one another.

9 MEASUREMENT UNCERTAINTY

Description of individual measurement uncertainty

Uncertainty Description	Uncert. Value (± %)	Probability distribution	Divisor	C_i^1 1g	Stand. Uncert (1g) (±%)	V_i^2 or V_{eff}
Measurement system						
Probe calibration	4.4	N	1	1	4.4	∞
Axial isotropy of the probe	4.7	R	√3	$(1-C_p)^{1/2}$	1.9	∞
Sph. Isotropy of the probe	9.6	R	√3	$(C_p)^{1/2}$	3.9	∞
Spatial resolution	0.0	R	√3	1	0.0	∞
Boundary effects	5.5	R	√3	1	3.2	∞
Probe linearity	4.7	R	√3	1	2.7	∞
Detection limit	1.0	R	√3	1	0.6	∞
Readout electronics	1.0	N	1	1	1.0	∞
Response time	0.8	R	√3	1	0.5	∞
Integration time	1.4	R	√3	1	0.8	∞
RF ambient conditions	3.0	R	√3	1	1.7	∞
Mech. Constrains of robot	0.4	R	√3	1	0.2	∞
Probe positioning	2.9	R	√3	1	1.7	∞
Extrap. and integration	3.9	R	√3	1	2.3	∞
Test Sample Related						
Device positioning	3.0	N	√3	1	1.7	∞
Power drift	5.0	N	√3	1	2.9	∞
Phantom and setup						
Phantom uncertainty	4.0	R	1	1	2.3	∞
Liquid conductivity (target)	5.0	R	√3	0.6	1.7	∞
Liquid conductivity (meas.)	10.0	R	√3	0.6	3.5	∞
Liquid permittivity (target)	5.0	R	√3	0.6	1.7	∞
Liquid permittivity (meas.)	5.0	R	√3	0.6	1.7	∞
Combined Standard Uncertainty:					**10.32**	
Extended Standard Uncertainty (k=2):					**20.6**	

N: Normal
R: Rectangular

10 TEST DATA

10.1 Head SAR Test Results

The following tables list the SAR results in each configuration and operating mode. The channels tested for each configuration have similar SAR distributions. Highest SAR (bold **blue** color) plots for each configuration is provided in Appendix B.

AMPS 800 HEAD		**Channel:**	991	383	799
		Frequency (MHz):	824.04	836.49	848.97
		Power before Test (dBm):	25.02	25.03	25.01
		Power after Test (dBm):	24.67	24.92	24.91
Configuration	**Test Position**	**Antenna Position**	**SAR, 1g (W/kg)**		
Left Head	Cheek/Touch	Extended	1.19	**1.49**	1.20
		Retracted	0.83	0.72	**1.14**
	Ear/Tilt	Extended	0.64	**0.76**	0.64
		Retracted	0.43	0.39	**0.56**
Right Head	Cheek/Touch	Extended	1.07	**1.39**	1.09
		Retracted	0.76	0.69	**1.02**
	Ear/Tilt	Extended	0.59	**0.75**	0.60
		Retracted	0.39	0.40	**0.50**

CDMA 800 HEAD		**Channel:**	1013	383	777
		Frequency (MHz):	824.70	836.49	848.31
		Power before Test (dBm):	24.52	24.50	25.54
		Power after Test (dBm):	24.50	24.51	24.68
Configuration	**Test Position**	**Antenna Position**	**SAR, 1g (W/kg)**		
Left Head	Cheek/Touch	Extended	1.13	**1.26**	1.11
		Retracted	0.80	0.67	**0.99**
	Ear/Tilt	Extended	0.60	**0.62**	0.61
		Retracted	0.40	**1.32**	0.47
Right Head	Cheek/Touch	Extended	0.99	**1.17**	0.96
		Retracted	0.69	0.57	**0.84**
	Ear/Tilt	Extended	0.56	**0.63**	0.53
		Retracted	0.38	0.33	**0.43**

CDMA 1900 HEAD		**Channel:**	25	600	1175
		Frequency (MHz):	1851.25	1880	1908.75
		Power before Test (dBm):	23.23	23.28	23.23
		Power after Test (dBm):	23.29	23.22	23.16
Configuration	**Test Position**	**Antenna Position**	**SAR, 1g (W/kg)**		
Left Head	Cheek/Touch	Extended	**0.76**	0.72	0.57
		Retracted	0.20	0.11	**0.21**
	Ear/Tilt	Extended	**0.57**	0.52	0.42
		Retracted	**0.15**	0.08	0.13
Right Head	Cheek/Touch	Extended	**0.86**	0.79	0.63
		Retracted	0.25	0.19	**0.27**
	Ear/Tilt	Extended	**0.59**	0.57	0.48
		Retracted	**0.12**	0.07	0.11

10.2 Body Worn SAR Test Result

For each mode, corresponding SAR distribution printouts of maximum results per set-up (in blue below). For example, the device was tested with a 25.0mm air gap or with a KWC holster, are shown in Appendix B. The rest of SAR distributions is substantially similar or equivalent to the plots submitted regardless of used channel.

Waist Level SAR with KWC Body Worn Accessories

AMPS 800 BODY			**Channel:**	991	383	799
			Frequency (MHz):	824.04	836.49	848.97
			Power before Test (dBm):	25.02	25.03	25.01
			Power after Test (dBm):	24.67	24.92	24.91
Configuration	**Test Position**	**Slide Position**	**Antenna Position**	**SAR, 1g (W/kg)**		
Flat	Air Gap – 25.0mm	Opened	Extended	---	**0.77**	---
		Opened	Retracted	---	**0.39**	---
		Closed	Extended	0.70	**0.85**	0.59
		Closed	Retracted	0.44	0.40	**0.65**
	Kyocera Holster: (TXLCC10049)	Opened	Extended	---	**0.73**	---
		Opened	Retracted	---	**0.38**	---
		Closed	Extended	0.68	**0.84**	0.63
		Closed	Retracted	0.46	0.43	**0.71**

Note: -- *SAR measured at the middle channel is at least 3dB lower than the SAR limit, testing at the low and high channels are optional for this test configuration.*

CDMA 800 BODY			**Channel:**	1013	383	777
			Frequency (MHz):	824.70	836.49	848.31
			Power before Test (dBm):	24.52	24.50	25.54
			Power after Test (dBm):	24.50	24.51	24.68
Configuration	**Test Position**	**Slide Position**	**Antenna Position**	**SAR, 1g (W/kg)**		
Flat	Air Gap – 25.0mm	Opened	Extended	---	**0.79**	---
		Opened	Retracted	---	**0.36**	---
		Closed	Extended	0.62	**0.72**	0.51
		Closed	Retracted	0.36	0.32	**0.50**
	Kyocera Holster: (TXLCC10049)	Opened	Extended	---	**0.73**	---
		Opened	Retracted	---	**0.38**	---
		Closed	Extended	0.61	**0.71**	0.55
		Closed	Retracted	0.39	0.36	**0.61**

Note: -- *SAR measured at the middle channel is at least 3dB lower than the SAR limit, testing at the low and high channels are optional for this test configuration.*

CDMA 1900 BODY		**Channel:**		25	600	1175
		Frequency (MHz):		1851.25	1880	1908.75
		Power before Test (dBm):		23.23	23.28	23.23
		Power after Test (dBm):		23.29	23.22	23.16
Configuration	**Test Position**	**Slide Position**	**Antenna Position**	**SAR, 1g (W/kg)**		
Flat	Air Gap - 25.0mm	Opened	Extended	---	**0.75**	---
		Opened	Retracted	---	**0.31**	---
		Closed	Extended	**0.99**	0.62	0.72
		Closed	Retracted	**0.32**	0.28	0.20
	Kyocera Holster: (TXLCC10049)	Opened	Extended	---	**0.43**	---
		Opened	Retracted	---	**0.24**	---
		Closed	Extended	**0.61**	0.53	0.36
		Closed	Retracted	**0.29**	0.23	0.17

Note: -- *SAR measured at the middle channel is at least 3dB lower than the SAR limit, testing at the low and high channels are optional for this test configuration.*

11 TEST SETUP PHOTOS

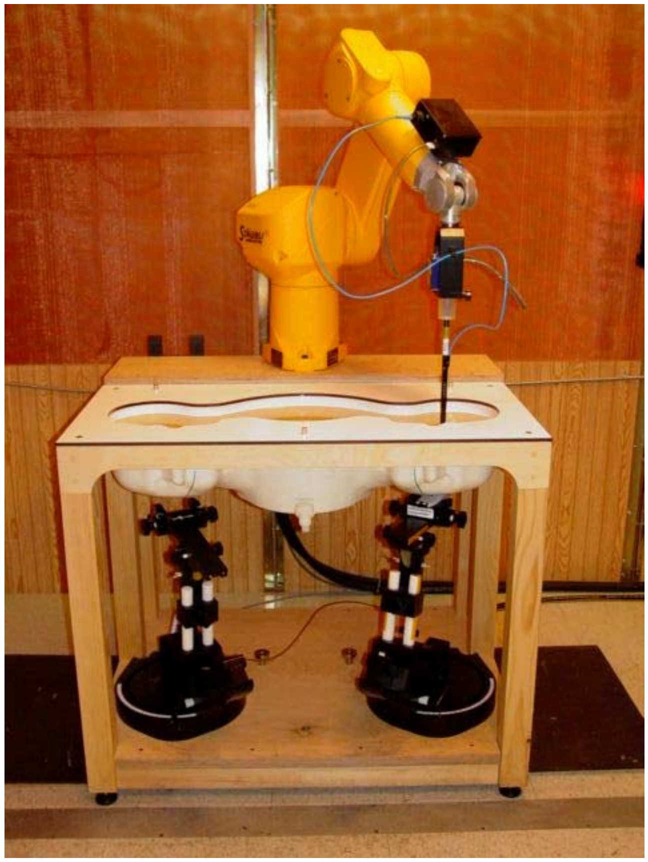


Figure 11.1 DASY 3 System

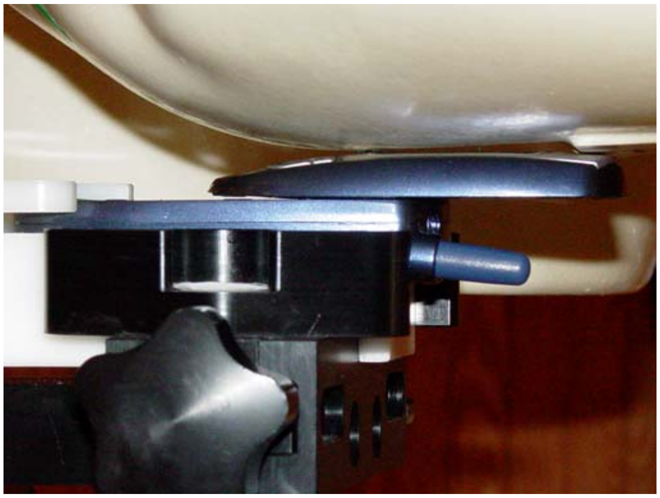


Figure 11.2 phone against the head
(left cheek, slide opened, antenna retracted position)

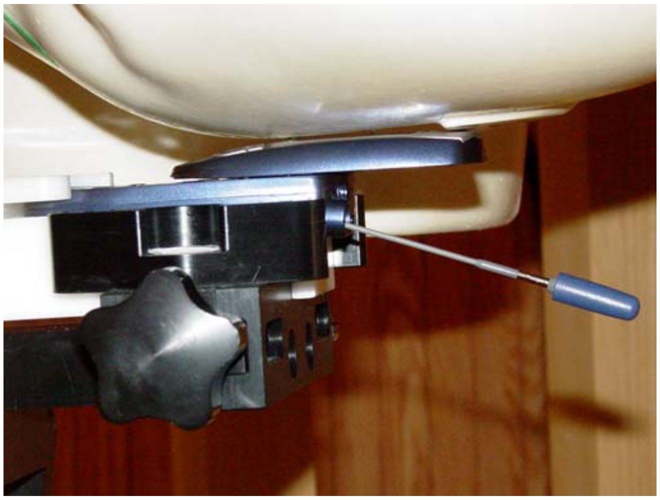


Figure 11.3 phone against the head
(left cheek, slide opened, antenna extended position)

Figure 11.4 phone against the head
(left tilt, slide opened, antenna retracted position)

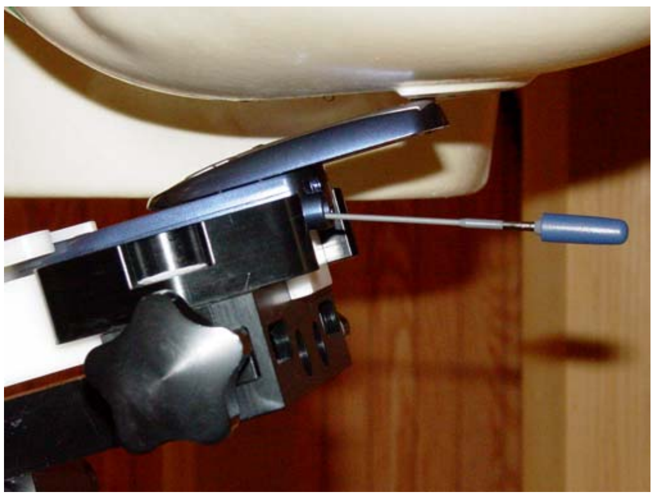


Figure 11.5 phone against the head
(left tilt, slide opened, antenna extended position)

Figure 11.6 body SAR set-up
(with 25.0mm air separation, slide closed, antenna retracted position)

Figure 11.7 body SAR set-up
(with 25.0mm air separation, slide closed, antenna extended position)

Figure 11.8 body SAR set-up
(with 25.0mm air separation, slide opened, antenna retracted position)

Figure 11.9 body SAR set-up
(with 25.0mm air separation, slide opened, antenna extended position)

Figure 11.10 body SAR set-up
(with holster, slide closed, antenna retracted position)

Figure 11.11 body SAR set-up
(with holster, slide closed, antenna extended position)

Figure 11.12 body SAR set-up
(with holster, slide opened, antenna retracted position)

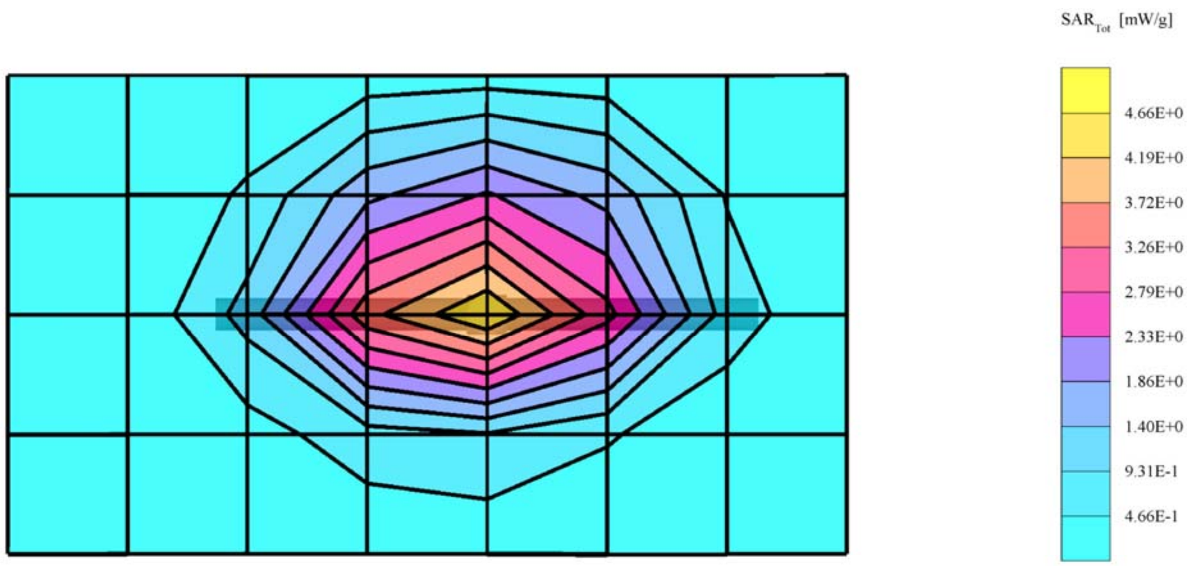
Figure 11.13 body SAR set-up
(with holster, slide opened, antenna extended position)

Appendix A: Validation test printout

11/01/03

Dipole 1900MHz
Dipole validation:
Liquid Temp: 22C+/-1deg.

for f < 1 GHz, distance to the liquid d = 10 mm
for f > 1 GHz, distance to the liquid d=15 mm
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 1900 MHz
Probe: ET3DV6 - SN1664; ConvF(5.40,5.40,5.40); Crest factor: 1.0; 1900 MHz Brain: σ = 1.43 mho/m ε_r = 39.7 ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 4.35 mW/g ± 0.05 dB, SAR (10g): 2.20 mW/g ± 0.05 dB, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.14 dB



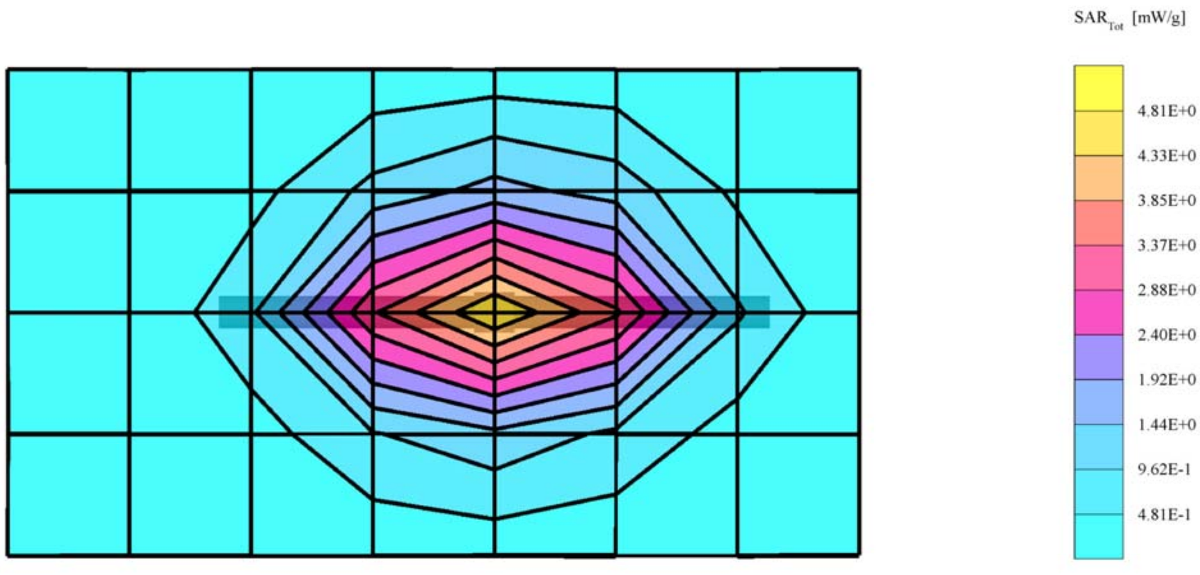
KWC

11/01/03

Dipole 1900MHz

Dipole validation:
Liquid Temp: 22C+/-1deg.

for f < 1 GHz, distance to the liquid d = 10 mm
for f > 1 GHz, distance to the liquid d=15 mm
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 1900 MHz
Probe: ET3DV6 - SN1664; ConvF(5.40,5.40,5.40); Crest factor: 1.0; 1900 MHz Brain: σ = 1.43 mho/m ε_r = 40.0 ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 4.30 mW/g ± 0.01 dB, SAR (10g): 2.14 mW/g ± 0.01 dB, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.02 dB



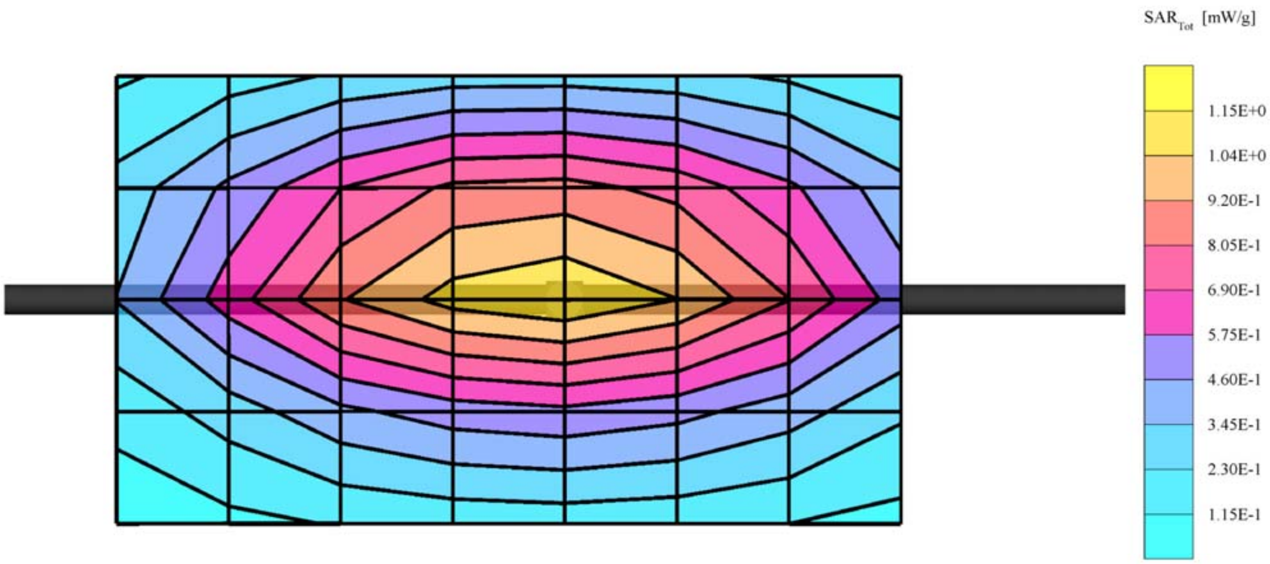
KWC

11/02/03

Dipole 835MHz

Dipole validation:
Liquid Temp: 22C+/-1deg.

for f < 1 GHz, distance to the liquid d = 10 mm
for f > 1 GHz, distance to the liquid d=15 mm
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 835 MHz
Probe: ET3DV6 - SN1664; ConvF(6.60,6.60,6.60); Crest factor: 1.0; 835 MHz Brain: σ = 0.92 mho/m ε_r = 41.5 ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 1.07 mW/g ± 0.06 dB, SAR (10g): 0.662 mW/g ± 0.02 dB, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.01 dB



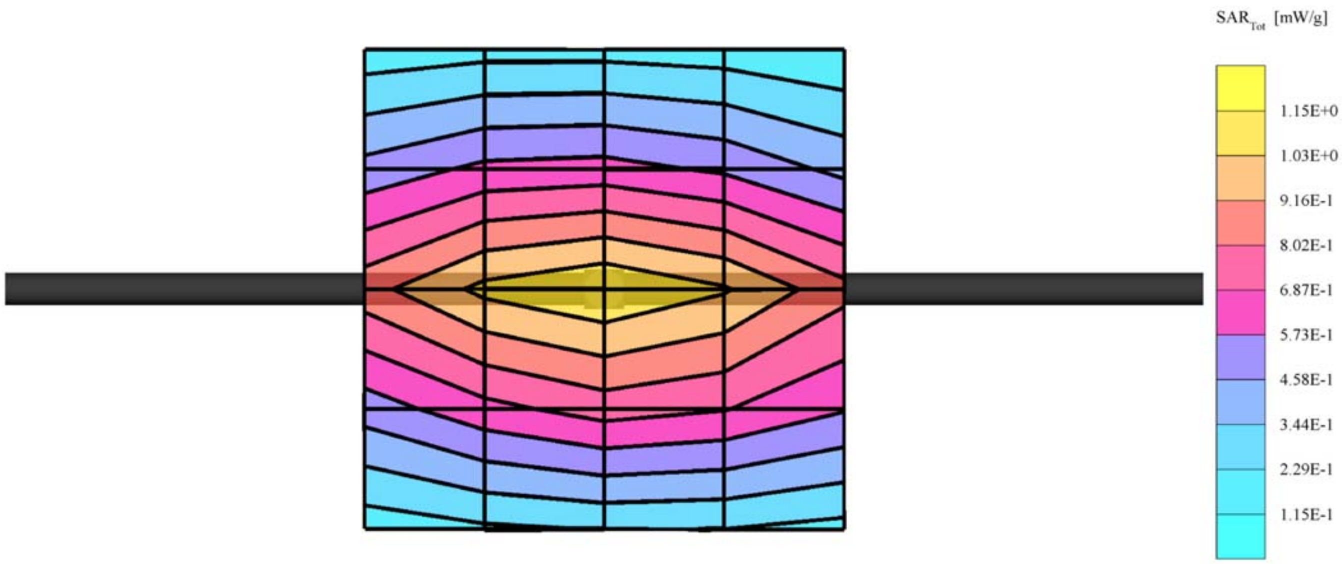
KWC

11/03/03

Dipole 835MHz

Dipole validation:
Liquid Temp: 22C+/-1deg.

for f < 1 GHz, distance to the liquid d = 10 mm
for f > 1 GHz, distance to the liquid d=15 mm
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 835 MHz
Probe: ET3DV6 - SN1664; ConvF(6.60,6.60,6.60); Crest factor: 1.0; 835 MHz Brain: σ = 0.89 mho/m ε_r = 41.0 ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 1.08 mW/g ± 0.01 dB, SAR (10g): 0.670 mW/g ± 0.04 dB, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.01 dB



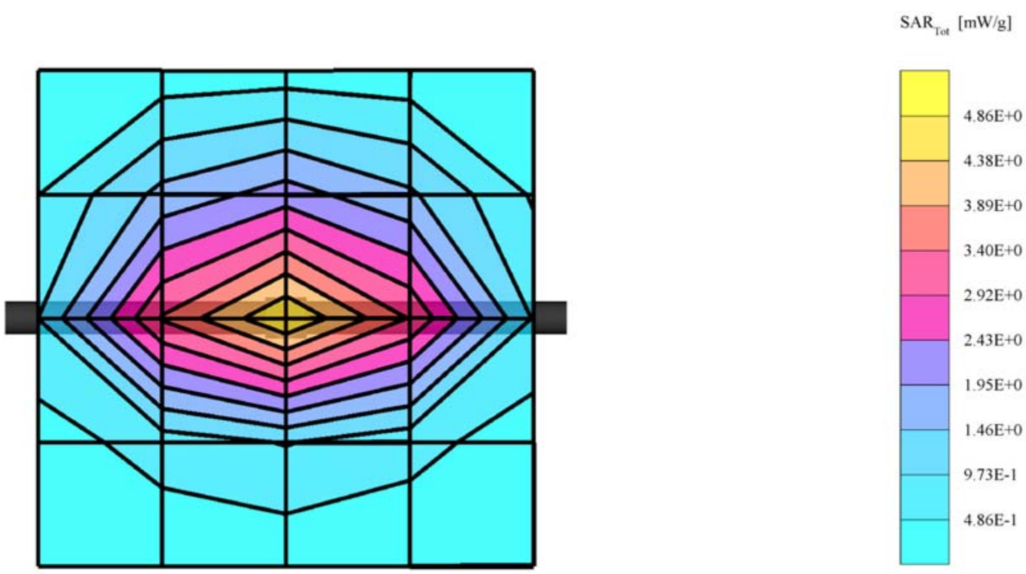
KWC

11/03/03

Dipole 1900MHz

Dipole validation:
Liquid Temp: 22C+/-1deg.

for f < 1 GHz, distance to the liquid d = 10 mm
for f > 1 GHz, distance to the liquid d=15 mm
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 1900 MHz
Probe: ET3DV6 - SN1664; ConvF(5.40,5.40,5.40); Crest factor: 1.0; 1900 MHz Brain: σ = 1.43 mho/m ε_r = 40.3 ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 4.47 mW/g ± 0.03 dB, SAR (10g): 2.26 mW/g ± 0.01 dB, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.03 dB



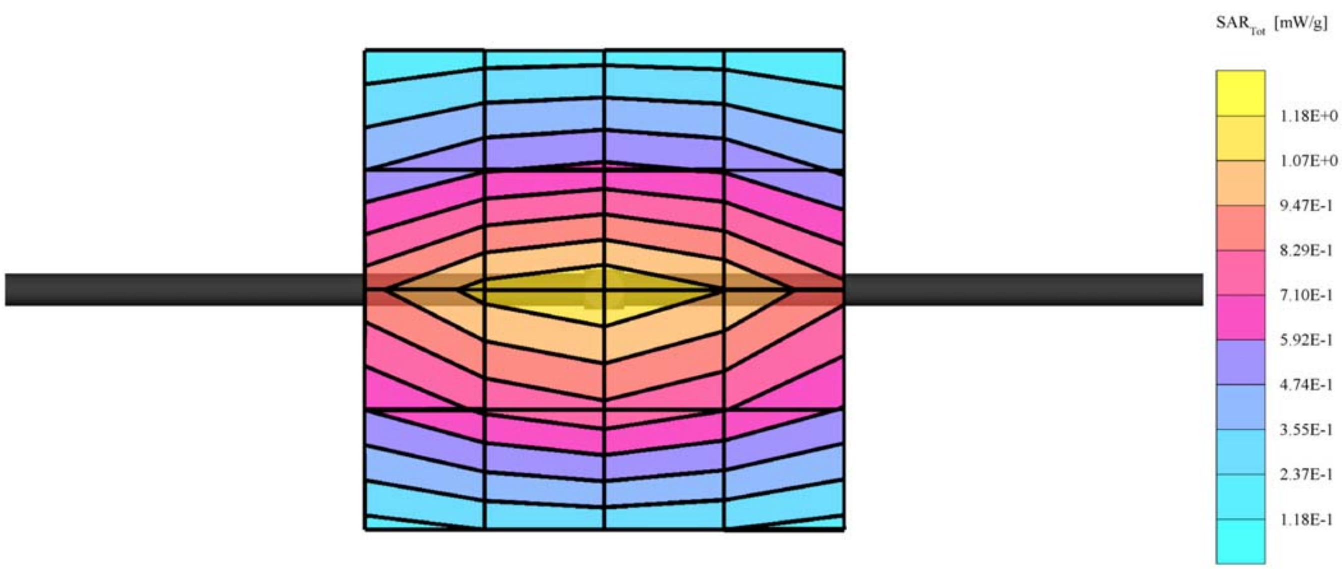
KWC

11/04/03

Dipole 835MHz

Dipole validation:
Liquid Temp: 22C+/-1deg.

for f < 1 GHz, distance to the liquid d = 10 mm
for f > 1 GHz, distance to the liquid d=15 mm
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 835 MHz
Probe: ET3DV6 - SN1664; ConvF(6.60,6.60,6.60); Crest factor: 1.0; 835 MHz Brain: σ = 0.88 mho/m ε_r = 40.9 ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 1.10 mW/g ± 0.02 dB, SAR (10g): 0.683 mW/g ± 0.08 dB, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.22 dB



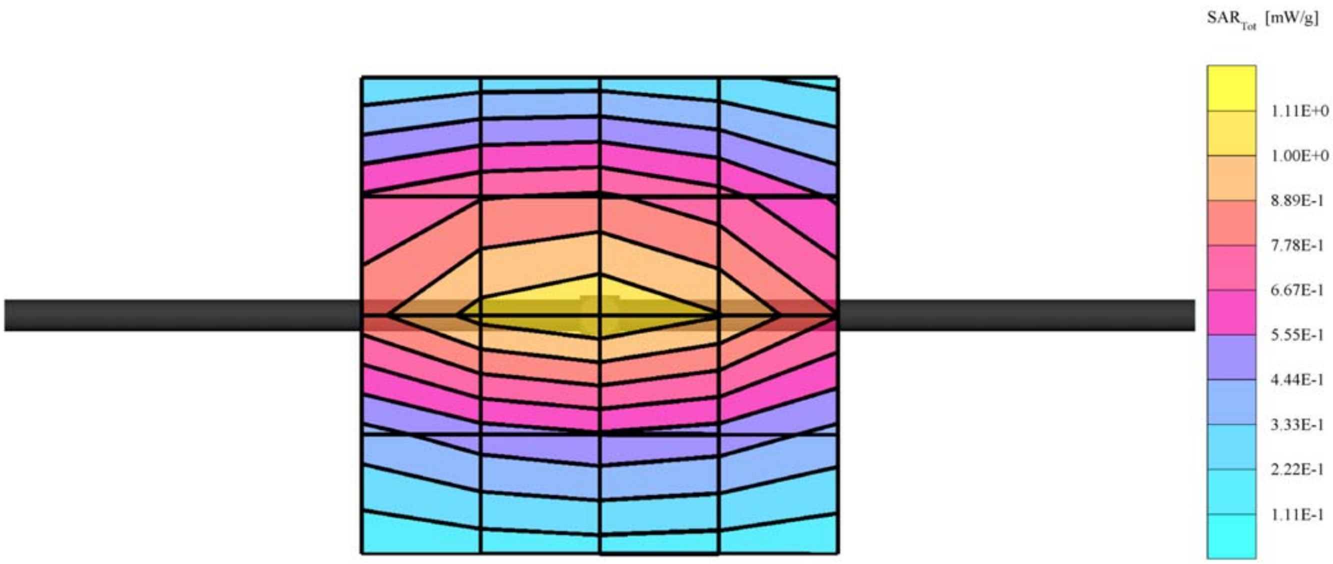
KWC

11/13/03

Dipole 835MHz

Dipole validation:
Liquid Temp: 22 +\- 1deg.C

for f < 1 GHz, distance to the liquid d = 10 mm
for f > 1 GHz, distance to the liquid d=15 mm
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 835 MHz
Probe: ET3DV6 - SN1664; ConvF(6.60,6.60,6.60); Crest factor: 1.0; 835 MHz Brain: σ = 0.89 mho/m ε_r = 42.6 ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 1.04 mW/g ± 0.04 dB, SAR (10g): 0.655 mW/g ± 0.03 dB, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.18 dB



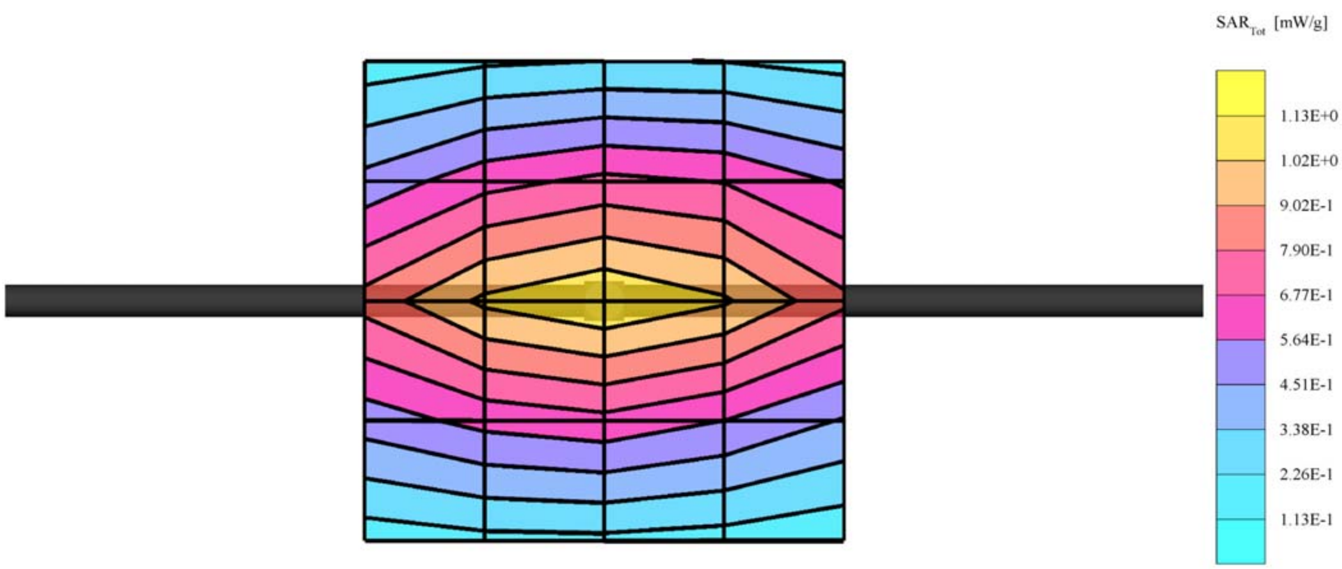
Kyocera Wireless Corp.

11/13/03

Dipole 835MHz

Dipole validation:
Liquid Temp: 22 +\- 1deg.C

for f < 1 GHz, distance to the liquid d = 10 mm
for f > 1 GHz, distance to the liquid d=15 mm
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 835 MHz
Probe: ET3DV6 - SN1664; ConvF(6.60,6.60,6.60); Crest factor: 1.0; 835 MHz Brain: σ = 0.89 mho/m ε_r = 41.0 ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 1.05 mW/g ± 0.01 dB, SAR (10g): 0.658 mW/g ± 0.01 dB, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.18 dB



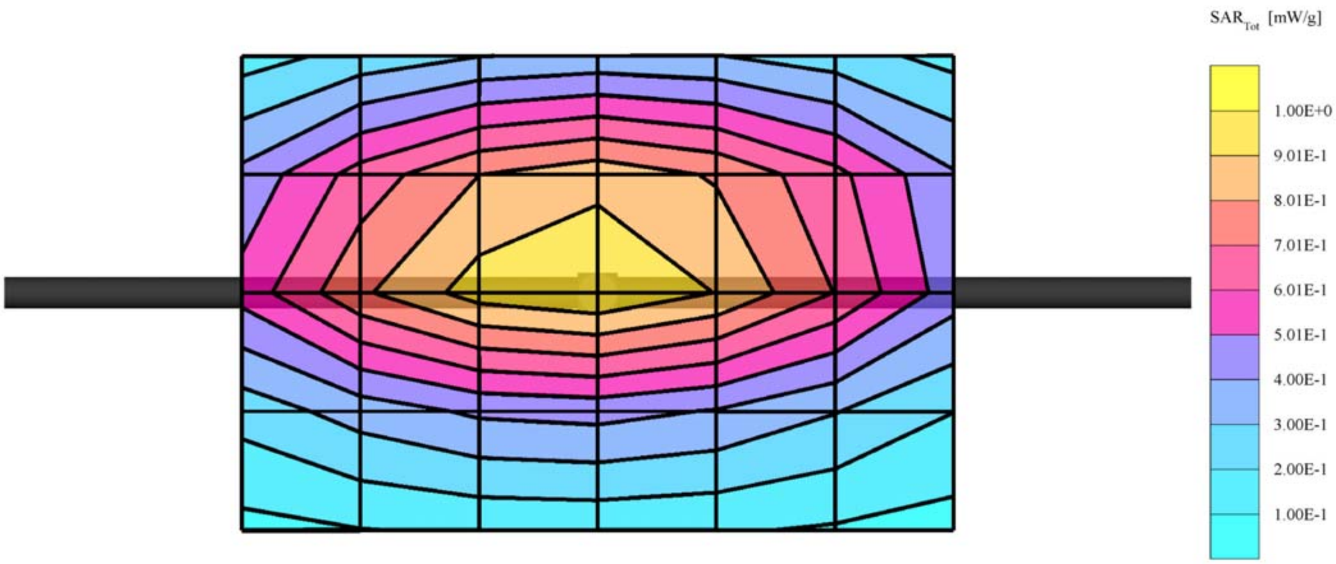
Kyocera Wireless Corp.

12/10/03

Dipole 835MHz

Dipole validation:
Liquid Temp = 22C+\- 1deg.C

for f < 1 GHz, distance to the liquid d = 10 mm
for f > 1 GHz, distance to the liquid d=15 mm
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 835 MHz
Probe: ET3DV6 - SN1663; ConvF(6.70,6.70,6.70); Crest factor: 1.0; 835 MHz Brain: σ = 0.89 mho/m ε_r = 42.1 ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 1.02 mW/g ± 0.03 dB, SAR (10g): 0.649 mW/g ± 0.02 dB, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.02 dB



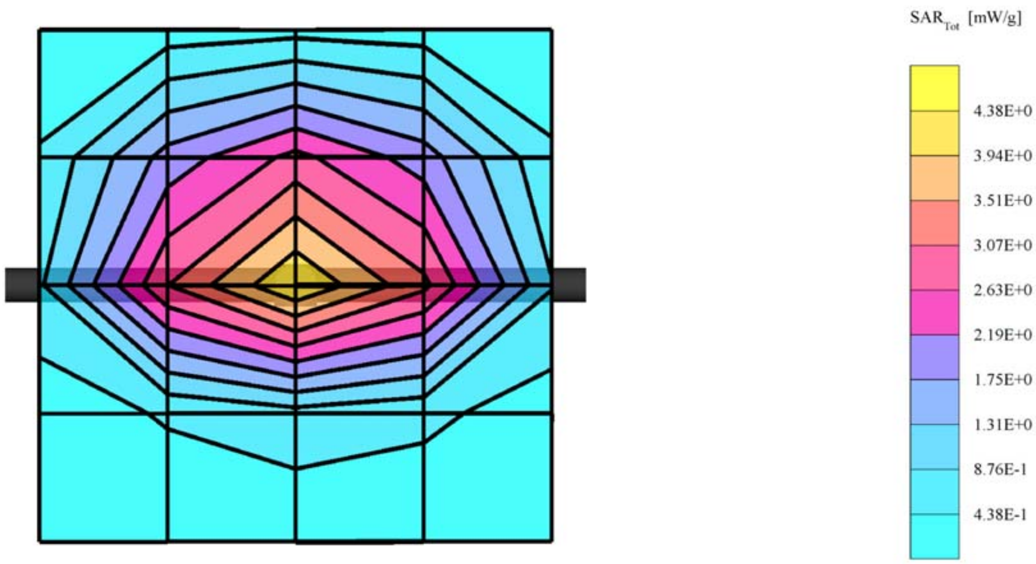
Kyocera Wireless Corp.

12/11/03

Dipole 1900MHz

Dipole validation:
Liquid Temp = 22C+\- 1deg.C

for f < 1 GHz, distance to the liquid d = 10 mm
for f > 1 GHz, distance to the liquid d=15 mm
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 1900 MHz
Probe: ET3DV6 - SN1663; ConvF(5.20,5.20,5.20); Crest factor: 1.0; 1900 Mhz Brain: σ = 1.44 mho/m ε_r = 39.0 ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 4.56 mW/g ± 0.03 dB, SAR (10g): 2.31 mW/g ± 0.03 dB, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: 0.05 dB



Kyocera Wireless Corp.

Appendix B: SAR distribution printout

Please see separate attachment

Appendix C: probe calibration parameters

Please see separate attachment