Kyocera Wireless Corp.
KWC 2235

SPECIFIC ABSORPTION RATE (SAR)

REPORT

CONTENTS

1 INTRODUCTION 3

2 SAR TEST FACILITY 4

3 APPLICABLE REGULATIONS 4

4 SAR TEST RESULTS SUMMARY 4

5 TECHNICAL DESCRIPTION 5

5.1 DESCRIPTION OF KWC SAR TEST FACILITY 5

6 TEST SAMPLE OPERATION 11

7 SAR TEST SYSTEM VALIDATION 14

8 SAR MEASUREMENT PROCEDURE 18

9 SAR MEASUREMENT UNCERTAINTY 18

10 TEST DATA SUMMARY 20

11 SAR PLOTS 24

12 PHOTOS 25

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 September 2001 in the KWC SAR Test Facility. The wireless device is described as follows;

EUT Type:	*Trimode, CDMA(PCS), CDMA and Analog (Cellular) Phone*
Trade Name:	*Kyocera Wireless Corp.*
Model:	*KWC-2235*
Tx Frequency :	*824.04 – 848.97 and 1851.25 – 1908.75 MHz*
Max. Output Power:	*28.2 dBm ERP Analog (in cellular band)* *26.7 dBm ERP Digital (in cellular band)* *26.4 dBm EIRP Digital (in PCS band)*
Modulation:	*CDMA and Analog*
Antenna:	*Retracting whip w/ helix*
FCC Classification:	*Non-Broadcast Transmitter Held to Ear*
Application Type:	*Certification*
Serial Number :	*BWXV012215617*
Place of Test:	*KWC, San Diego, CA, USA*
Date of Test:	*September 10-14, 2001*
FCC Rule Part:	*47 CFR 2.1093; OET Bulletin 65, Sup. C; 47 CFR 22; 47 CFR 24*

2 SAR TEST FACILITY

SAR tests were performed in the KWC SAR Test Facility located at the following address:

QCP Inc.
Building AA.
10290 Campus Point Drive
San Diego CA 92121-1522

3 APPLICABLE REGULATIONS

The KWC-2235 is designed to comply with the specific absorption rate SAR limits for distances within 20 cm of the transmitting elements of the mobile phone, and with general public uncontrolled environment Maximum Permissible Exposure (MPE) limits at distances greater than 20 cm from the transmitting elements of the device, as required by Sections 1.1307 through 1.1310, 2.1091 and 2.1093 of the 47 C.F.R. (1997). These FCC RF safety limits, which are based on a hybrid combination of the SAR and MPE requirements from ANSI/IEEE C95.1-1992 and the National Council on Radiation Protection and Measurements (NCRP) report no. 86, are also consistent with the RF safety limits defined in the IRPA Guidelines on Protection Against Non-Ionizing Radiation which are reportedly in the process of being adopted in Europe, as codified in European Pre-Standard ENV 59166-2 approved by CENELEC (1994). This test report pertains specifically to the following limit from the Code of Federal Regulations 47, Part 2 "Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube)."

4 SAR TEST RESULTS 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 ANSI/IEEE Std. C95.3 ~ 1992 . 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

5 TECHNICAL DESCRIPTION

The test sample consisted of a KWC 2235. This model will operate in CDMA PCS, CDMA and analog cellular mode. The CDMA PCS mode is designed to transmit in the 1851.25 – 1908.75 MHz band at a maximum EIRP of 26.4 dBm. The cellular FM AMPS mode is designed to transmit in the 824.04 – 848.97 MHz band at a maximum ERP of 28.2 dBm. The cellular CDMA mode is designed to transmit in the 824.04 – 848.97 MHz band at a maximum output power (ERP) of 26.7 dBm.

The KWC-2235 is a tri-mode and dual band cellular/PCS phone. The antenna is a standard retracting whip antenna tuned for dual frequency, with a helix antenna that is at the base of the whip which gets activated when the whip is retracted. Since either position is possible during use, both retracted and extended were tested, at the low, middle, and high frequencies of each band.

The KWC-2235 has provision for headset and body-worn holster to allow hands-free operation. The SAR for such operating condition was also measured at the low, middle, and high frequencies of each band.

5.1 DESCRIPTION OF KWC SAR TEST FACILITY

All tests were performed under the following environmental conditions:

Temperature Range:	15 - 35 Degrees C	(Actual 20 C)
Humidity Range:	25 - 75 %	(Actual 38 %)
Pressure:	860 - 1060 mbar	(Actual 1015 mB)

The SAR tests were performed using the following facilities:

All KWC dosimetry equipment is operated within a shielded screen room manufactured by Lindgren RF Enclosures to 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 screen room, leaving the phone as the dominate radiation source. The floor of the screen room is reflective, so four two-foot square ferrite panels are placed 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. Space beneath the DASY system limits the absorber type to ferrite tiles, although this attenuation combined with scattering of the energy is sufficient to bring the system validation within the acceptable tolerance.

DOSIMETRY SYSTEM The dosimetry equipment consists of a complete DASY3 V1.0 dosimetry system manufactured and calibrated by Schmid & Partner Engineering AG of Zurich, Switzerland, it is currently a state of the art system and from our research, it appears to be the best available at this time. The DASY3 system consists of a six axis robot, a robot controller, a teach pendant, automation software on a Pentium 200 MHz computer, data acquisition system, isotropic e-field probe, and validation kit**.**

E-FIELD PROBE This test was performed using an E-field probe with conversion factors determined by Schmid & Partner (S & P). The probe is the most important part of the system, so will be discussed in section 5.2.

PHANTOM The phantom was the so called “generic phantom” supplied by S & P, and consists of a left and right side head for simulating phone usage on both sides of the head. The phantom is constructed of fibreglass with 2 +/- 0.1 mm shell thickness. The shape of the shell is based on data from an anatomical study of a group of 33 men and 19 women to determine the maximum exposure in approximately 90% of all users. The DASY system uses a homogeneous tissue phantom based on studies concerning energy absorption of the human head, and the different absorption rates between adults and children. These studies indicated that a homogeneous phantom should overestimate SAR by no more than 15% for 1 g averages and should not underestimate SAR. In similar studies, it was found that a typical ear thickness is approximately 4 mm, so a 4 mm rubber ring is attached to the phantom at the ear area.

LIQUID DIELECTRIC The tissue simulating liquid which fills the phantom is supplied by QCP Inc.. There are two separate formulas for the two frequencies 900 MHz and 1800 MHz. This is necessary because the water molecules raise the conductivity to approximately 1.65 +/-

10% at the 1800 MHz frequency, without the addition of salt, so no salt is needed. Before the test, the permitivity and conductivity were measured with an automated Hewlett Packard 85070B dielectric probe in conjunction with a HP 8752C network analyser to monitor permitivity change due to evaporation. The electromagnetic parameters of the liquid were maintained as shown in table 1. The target values were obtained from the FCC web page for Tissue Dielectric Properties with internet address www.fcc.gov/fcc-bin/dielec.sh . The 1800 MHz liquid prepared has no salt or any conductive additive (the chemical/physical properties of the water, preservative, and sugar molecules alone provide too much conductivity). It is impossible to lower the conductivity to 1.15 S/m without a new formula with different ingredients. In other words, we would have to locate an ingredient to replace the sugar/water/preservative ingredients with materials providing similar density, permitivity, and optical properties (for the optical surface detection) but having lower conductivity at 1800 MHz. It was determined that using the 1800 MHz fluid from Schmid & Partner would overestimate the SAR by a small margin, and maintain maximum confidence.

FREQUENCY	PERMITIVITY	CONDUCTIVITY	DENSITY
900 MHz	41.8 +/- 5%	.82 +/- 10% mho/m	1 g/cm^3
1800 MHz	42.3 +/- 5%	1.62 +/- 10% mho/m	1 g/cm^3

Table 1

Schmid & Partner has supplied us with data that can be used to show the error in SAR caused by using higher conductivity. In general higher conductivity, ***over estimates*** measured SAR values. So by using a higher conductivity in the 1800 MHz band we were measuring SAR values higher than would exist in the human brain. This data is provided here in Table 2.

Distance of radiator from liquid surface	***Frequency MHz***	*Avg. volume gram*	*Increase of SAR per Increase in conductivity*	*Relative. permitivity*	*Conductivity of liquid S/m*	*Density of liquid g/cm^3*
10 mm	900	1	+ 0 .62	41.5	0.85	1
10 mm	900	10	+ 0.39	41.5	0.85	1
15 mm	900	1	+ 0.63	41.5	0.85	1
15 mm	900	10	+ 0.39	41.5	0.85	1
30 mm	900	1	+0.63	41.5	0.85	1
30 mm	900	10	+0.39	41.5	0.85	1
10 mm	1500	1	+ 0.55	40.5	1.2	1
10 mm	1500	10	+ 0.27	40.5	1.2	1
15 mm	1500	1	+ 0.55	40.5	1.2	1
15 mm	1500	10	+ 0.27	40.5	1.2	1
30 mm	1500	1	+ 0.54	40.5	1.2	1
30 mm	1500	10	+ 0.26	40.5	1.2	1
10 mm	1800	1	+ 0.43	40.0	1.65	1
10 mm	1800	10	+ 0.13	40.0	1.65	1
15 mm	1800	1	+0. 42	40.0	1.65	1
15 mm	1800	10	+ 0.13	40.0	1.65	1
30 mm	1800	1	+ 0.41	40.0	1.65	1
30 mm	1800	10	+ 0.12	40.0	1.65	1

Table 2

The E-field probe is calibrated by the manufacturer in brain simulating tissue at frequencies of 900 MHz, and 1.8 GHz, accurate to +/- 8%. Linearity is said by the manufacturer to be +/- .2 dB from 30 MHz to 3 GHz. Dynamic range is said by the manufacturer to be 5 μW/gm to > 100 mW/g. The probe contains 3 small dipoles positioned symmetrically on a triangular core to provide for isotropic detection of the field. Each dipole contains a diode at the feed point that converts the RF signal to DC, which is conducted down a high impedance line to the data acquisition system.

The data acquisition system amplifies the signals, and converts them to digital values so that they may be sent to the computer. The inputs to the signal amplifiers are auto zeroed after every measurement to prevent charge build up on the lines, which could lead to errors.

5.2 SAR SYSTEM THEORY

The human body absorbs energy from a radiating cell phone by ionic motion and oscillation of polar molecules. The human head is in the near field of the device where polarisation and field intensity are very complex. Also the human head can cause large reflections and scattering, so it is more practical to measure the field absorbed inside the head, than to measure incident power before it enters the head. Inside the lossy brain tissue, the power per unit volume is given by (next page):

$$P_v = \frac{1}{2}\ \mathbf{J} \bullet \mathbf{E}^* = \frac{1}{2}\,\sigma\,|\mathbf{E}|^2 \quad W/m^3$$

where **J** is current density

σ is conductivity of human tissue due to conductive and lossy displacement currents.

E is the electric field

But since SAR is the absorption of RF power per unit mass

$$P_g = \frac{1}{2}\ \sigma/p\ |\mathbf{E}|^2\ W/kg$$

where *p* is density of the tissue in kilograms per cubic meter.

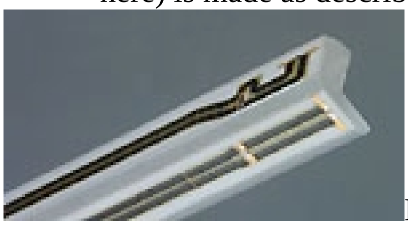
In this equation, σ is a function of frequency, and so it must be measured at the frequency of the test. It is measured in terms of the real and imaginary components of the complex permitivity;

$$\varepsilon = \varepsilon_0\,(\varepsilon' - j\varepsilon'')$$

$$\sigma = 2\pi f \times (8.854 \times 10^{-12}) \times \varepsilon''$$

$$\textbf{Loss Tangent} \equiv \tan\delta = \varepsilon'' / \varepsilon'$$

In order to measure the E field strength without distorting the field, the E field probe(shown here) is made as described by Schmid, Egger, and Kuster in [3].


E-field Probe

A major concern is that secondary coupling of the EUT radiated fields to the feed lines of the probe are minimised. This is done by making the feed lines of high impedance “twin-line” transmission line, printed very close together. In the probe tip there are three orthogonal dipoles, electrically small to minimise field distortion from coupling. The electrically small dipoles have source impedance’s of 5 to 8 MΩ due to their small size, the high resistive feed lines, and the distributed filters on the lines. This high impedance makes them less sensitive so a sophisticated Data Acquisition Electronics (DAE) box is needed to amplify, multiplex, and digitize the signals. The DAE is installed on top of the robot arm. It also detects the proximity of the phantom surface with a fiber-optic cable. It provides for multiplexing between the three dipoles, and between 1X gain and 100X amplification, and it provides some filtering that will remove unwanted signals picked up by the probe. The DAE also provides a fast digital link to the robot for stopping in the event of a touch detection. It samples the probe output for 2600 complete E field measurements per dipole, per second. These samples are used to determine the amplification needed, 1X or 100X, and the magnitude determines what diode compression correction factor should be used. These factors as well as sensitivity factors of the specific probe, which are stored in the program, are used to determine the actual field strength for the test point.

The substrate on which the dipoles are printed, has been shaped to align each dipole with the E-field *after* the field lines are distorted by the permitivity of the substrate. In other words, since the substrate and the liquid dielectric have different permitivities, the E-field will diffract as it passes through the interface, and so the dipoles have been positioned to align with the fields *after* this distortion is accounted for.

The dipole elements in the probe are offset from the tip of the probe approximately 2.7 mm so unfortunately the field strength cannot be measured at the surface of the phantom, where it is likely to be maximum. The magnitude of the field at the surface must therefore be calculated with interpolation by using the data points stepped away from the surface and curve fitting, this is done automatically by the software.

6 TEST SAMPLE OPERATION

The wireless device was made to transmit maximum power that is allowed by the software (KWC phone control software, named phone_t) in the device. The software was used to force the device to transmit maximum power for the duration of the SAR tests. The DASY 3 system checks E field strength at a fixed location before and after each scan, and checks for drift due to draining of the battery or some other effect. This shows up as “drift” on the report and if it is too high the test is repeated.

Power settings –

The nominal manufacture power levels were used for EMC tests required in 47 CFR Part 22 and Part 24. For SAR test discussed in this RF exposure test report, the conducted power level was set 0.7 dB higher than the nominal power level to include the manufacture tolerance. The radiated power (ERP/EIRP) corresponding to the conducted power level used for SAR tests was measured in the antenna range (fully anechonic chamber). The measurement procedures and technique are described in the Part 22 and Part 24 test report.

The conducted power levels and corresponding ERP/EIRP for SAR test are listed in following tables.

Table 3: Conducted power used for SAR test - Cellular

		RF output power (W or dBm) - Cellular	
		Measured	
carrier frequency (MHz)	channel	FM	CDMA
824.04	991	0.438 W / 26.42 dBm	
824.7	1013		0.313 W / 24.96 dBm
836.49	383	0.435 W / 26.39 dBm	0.316 W / 25.0 dBm
848.31	777		0.317 W / 25.01 dBm
848.97	799	0.435 W / 26.4 dBm	
Maximum Power over Band		**26.42 dBm**	**25.01dBm**

Table 4: Conducted power used for SAR test - PCS

		RF output power (W) - PCS
carrier frequency (MHz)	channel	CDMA
		measured
1851.25	25	0.210 W / 23.22 dBm
1880	600	0.218 W / 23.38 dBm
1908.75	1175	0.214 W / 23.3 dBm
Maximum Power over Band		**23.38 dBm**

Table 5: Radiated power (ERP) corresponding to Table 3 - Cellular

		RF output power ERP (W or dBm) – Cellular	
		Measured	
carrier frequency (MHz)	channel	FM	CDMA
824.04	991	28.2 dBm	
824.7	1013		26.66 dBm
836.49	383	27.8 dBm	26.39 dBm
848.31	777		26.2 dBm
848.97	799	27.6 dBm	
Max power over band		**28.2 dBm**	**26.66 dBm**

Table 6: Radiated power (EIRP) corresponding to Table 4 - PCS

		RF output power EIRP (W or dBm) - PCS
carrier frequency (MHz)	channel	CDMA
		measured
1851.25	25	26.41 dBm
1880	600	26.17 dBm
1908.75	1175	26.08 dBm
Max power over band		**26.41 dBm**

7 SAR TEST SYSTEM VALIDATION

We performed the validation test by using a dipole before the SAR tests. The following plots are the results of validation tests. The muscle tissues were calibrated by using HP85070B dielectric measurement system. The data sheets are attached below. The original validation results provided by the system manufacturer for cellular and PCS band are attached as well.

Manufacturer Validation Data

Schmid & Partner
Engineering AG

Staffelstrasse 8, 8045 Zurich, Switzerland, Telefon +41 1 280 08 60, Fax +41 1 280 08 64

DASY

Dipole Validation Kit

Type: D900V2

Serial: 024

Manufactured: December 1997
Calibrated: January 1998

1. Measurement Conditions

The measurements were performed in the flat section of the new generic twin phantom (shell thickness 2mm) filled with brain simulating sugar solution of the following electrical parameters at 900 MHz:

Relative Dielectricity	**42.3**	± 5%
Conductivity	**0.85 mho/m**	± 5%

The DASY3 System (Software version 1.0a) with a dosimetric E-field probe ET3DV4 (SN:1302, Conversion factor 5.5) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the centre marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 15mm from dipole centre to the solution surface. The included distance holder was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 5x5x7 fine cube was chosen for cube integration. Probe isotropy errors were cancelled by measuring the SAR with normal and 90° turned probe orientations and averaging. The dipole input power (forward power) was 250mW ± 3 %. The results are normalised to 1W input power.

2. SAR Measurement

Standard SAR-measurements were performed with the phantom according to the measurement conditions described in section 1. The results have been normalised to a dipole input power of 1W (forward power). The resulting averaged SAR-values are:

averaged over 1 cm^3 (1 g) of tissue:	**9.44 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**6.16 mW/g**

Note: If the liquid parameters for validation are slightly different from the ones used for initial calibration, the SAR-values will be different as well. The estimated sensitivities of SAR-values and penetration depths to the liquid parameters are listed in the DASY Application Note 4: 'SAR Sensitivities'.

3. Dipole Impedance and return loss

The impedance was measured at the SMA-connector with a network analyser and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	**1.397 ns**	(one direction)
Transmission factor:	**0.988**	(voltage transmission, one direction)

The dipole was positioned at the flat phantom sections according to section 1 and the distance holder was in place during impedance measurements.

Feedpoint impedance at 900 MHz:	Re{Z} = **50.2 Ω**
	Im {Z} = **-0.0 Ω**
Return Loss at 900 MHz	**- 54.9 dB**

4. Handling

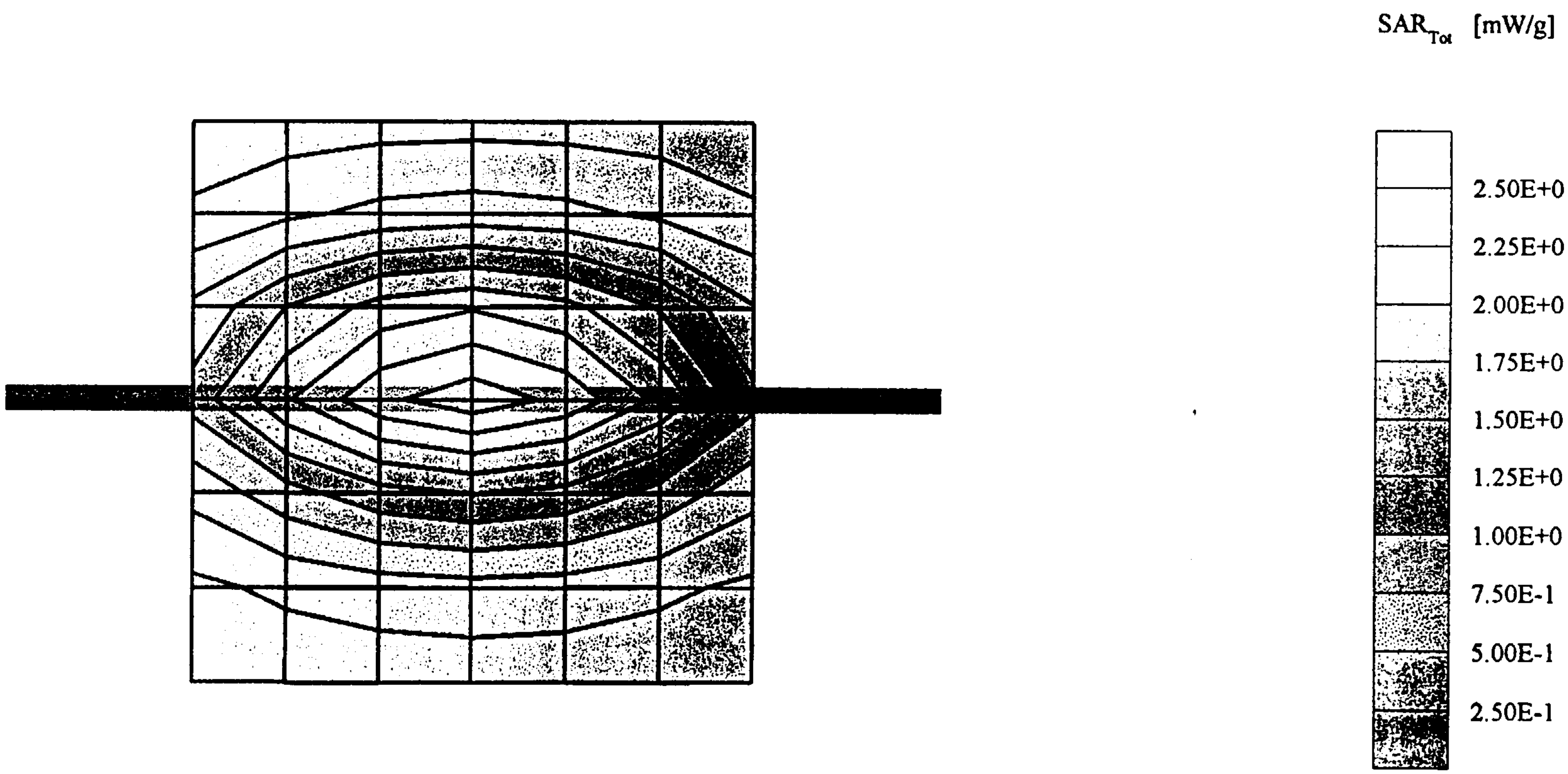
The dipole is made of standard semirigid coaxial cable. The centre conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

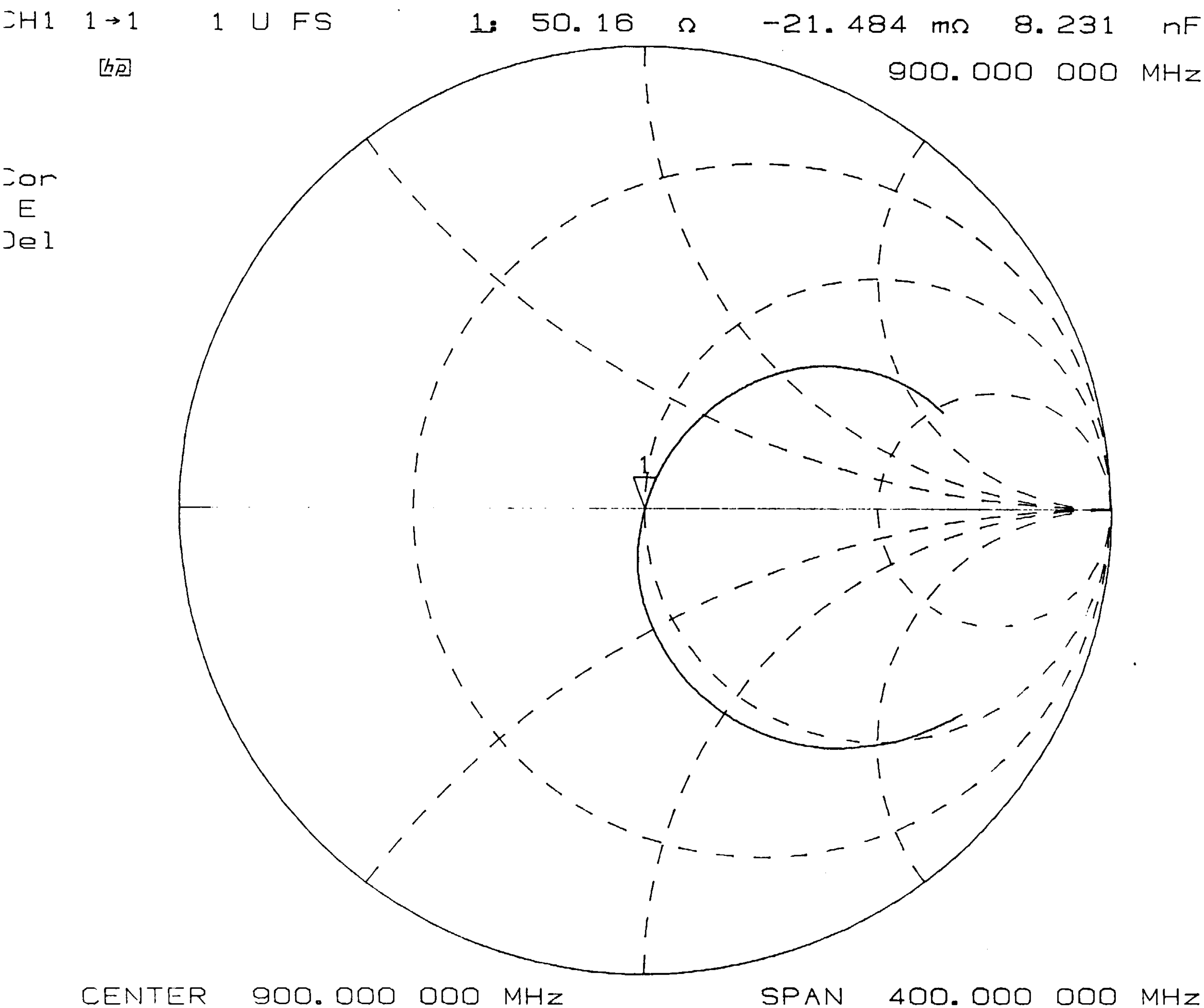
Do not apply excessive force to the dipole arms, because they might bend. If the dipole arms have to be bent back, take care to release stress to the soldered connections near the feedpoint; they might come off.

After prolonged use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

alidation Dipole D900V2 SN:024, d = 15mm

:quency: 900 [MHz]; Antanna Input Power: 250 [mW]
neric Twin Phantom; Flat Section; Grid Spacing: Dx = 15.0, Dy = 15.0, Dz = 10.0 [mm]
›be: ET3DV5 - SN1302 DAE3; ConvF(5.40,5.40,5.40); Crest factor: 1.0; }: σ = 0.85 [mho/m] ϵ_r = 42.3 ρ = 1.00 [g/cm³]
bes (2): Peak: 3.58 [mW/g] ± 0.06 dB, SAR (1g): 2.36 [mW/g] ± 0.05 dB, SAR (10g): 1.54 [mW/g] ± 0.04 dB, (Worst-case extrapolation)
ıetration depth: 13.1 (12.1, 14.4) [mm]
werdrift: 0.03 dB





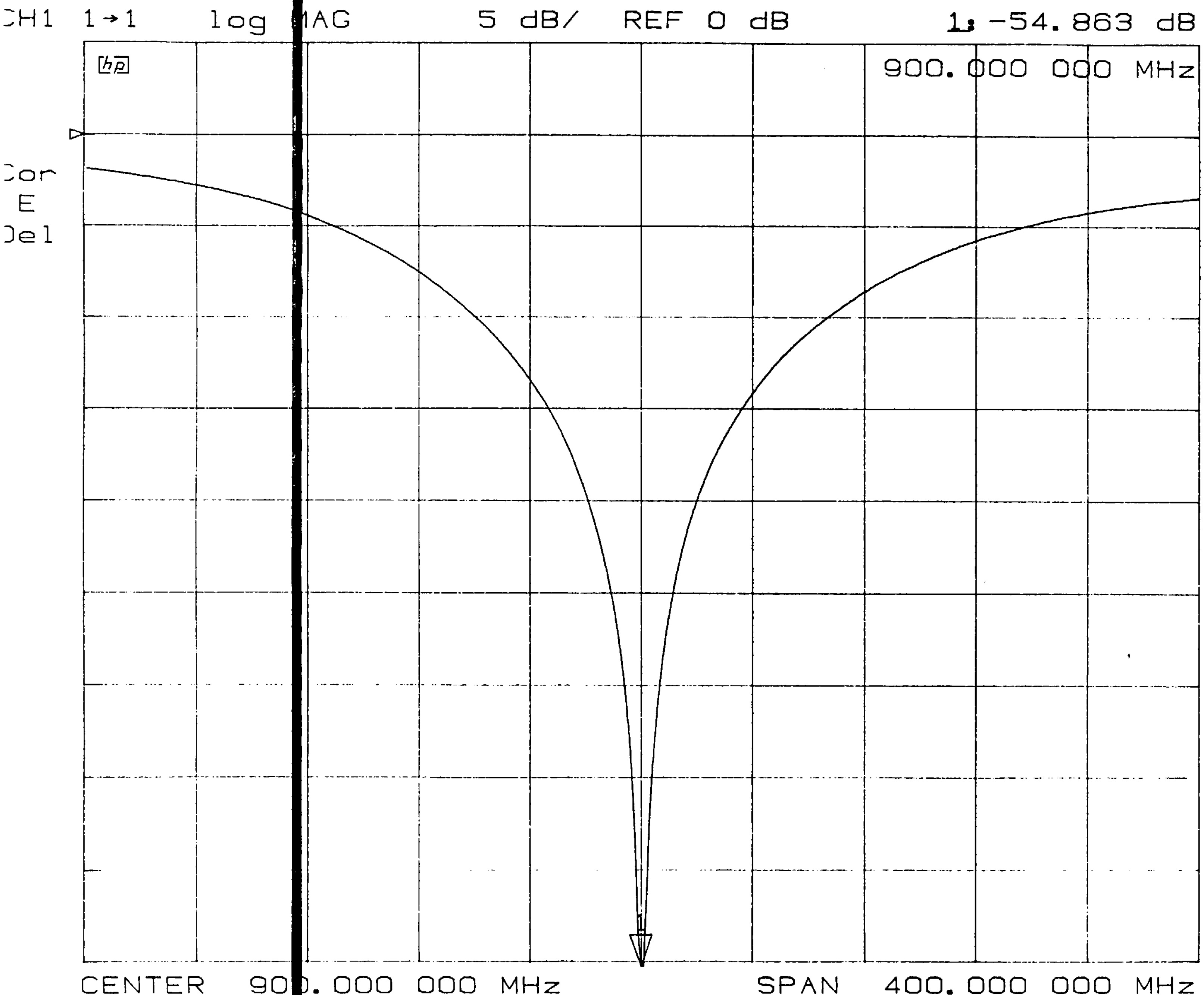
D900V2 SN: 024

S11

Flat phantom with brain simulating solution

d = 15mm

(distance from dipole center to solution)



D900V2 SN: 024

S11

Flat phantom with brain simulating solution

d = 15mm

(distance from dipole center to solution)

Staffelstrasse 8, 8045 Zurich, Switzerland, Telefon +41 1 280 08 60, Fax +41 1 280 08 64

DASY3

Dipole Validation Kit

Type: D1800V2

Serial: 220

Manufactured: December 1997
Calibrated: January 1998

1. Measurement Conditions

The measurements were performed in the flat section of the new generic twin phantom (shell thickness 2mm) filled with brain simulating sugar solution of the following electrical parameters at 1800 MHz:

Relative Dielectricity	**39.5**	± 5%
Conductivity	**1.70 mho/m**	± 10%

The DASY3 System (Software version 3.0b) with a dosimetric E-field probe ET3DV4 (SN:1302, conversion factor 4.6) was used for the measurements.

The dipole feedpoint was positioned below the centre marking and oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10mm from dipole centre to the solution surface. The included distance holder was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 5x5x7 fine cube was chosen for cube integration. Probe isotropy errors were cancelled by measuring the SAR with normal and 90° turned probe orientations and averaging. The dipole input power (forward power) was 250mW ± 3 %. The results are normalised to 1W input power.

2. SAR Measurement

Standard SAR-measurements were performed with the head phantom according to the measurement conditions described in section 1. The results (see figure) have been normalised to a dipole input power of 1W (forward power). The resulting averaged SAR-values are:

averaged over 1 cm^3 (1 g) of tissue:	**39.9 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**20.1 mW/g**

Note: If the liquid parameters for validation are slightly different from the ones used for initial calibration, the SAR-values will be different as well. The estimated sensitivities of SAR-values and penetration depths to the liquid parameters are listed in the DASY Application Note 4: 'SAR Sensitivities'.

3. Dipole Impedanc and return loss

The impedance was measured at the SMA-connector with a network analyser and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	**1.178 ns**	(one direction)
Transmission factor:	**0.993**	(voltage transmission, one direction)

The dipole was positioned at the flat phantom sections according to section 1 and the distance holder was in place during impedance measurements.

Feedpoint impedance at 1800 MHz:	Re{Z} = **49.5 Ω**
	Im {Z} = **0.6 Ω**
Return Loss at 1800 MHz	**- 42.1 dB**

4. Handling

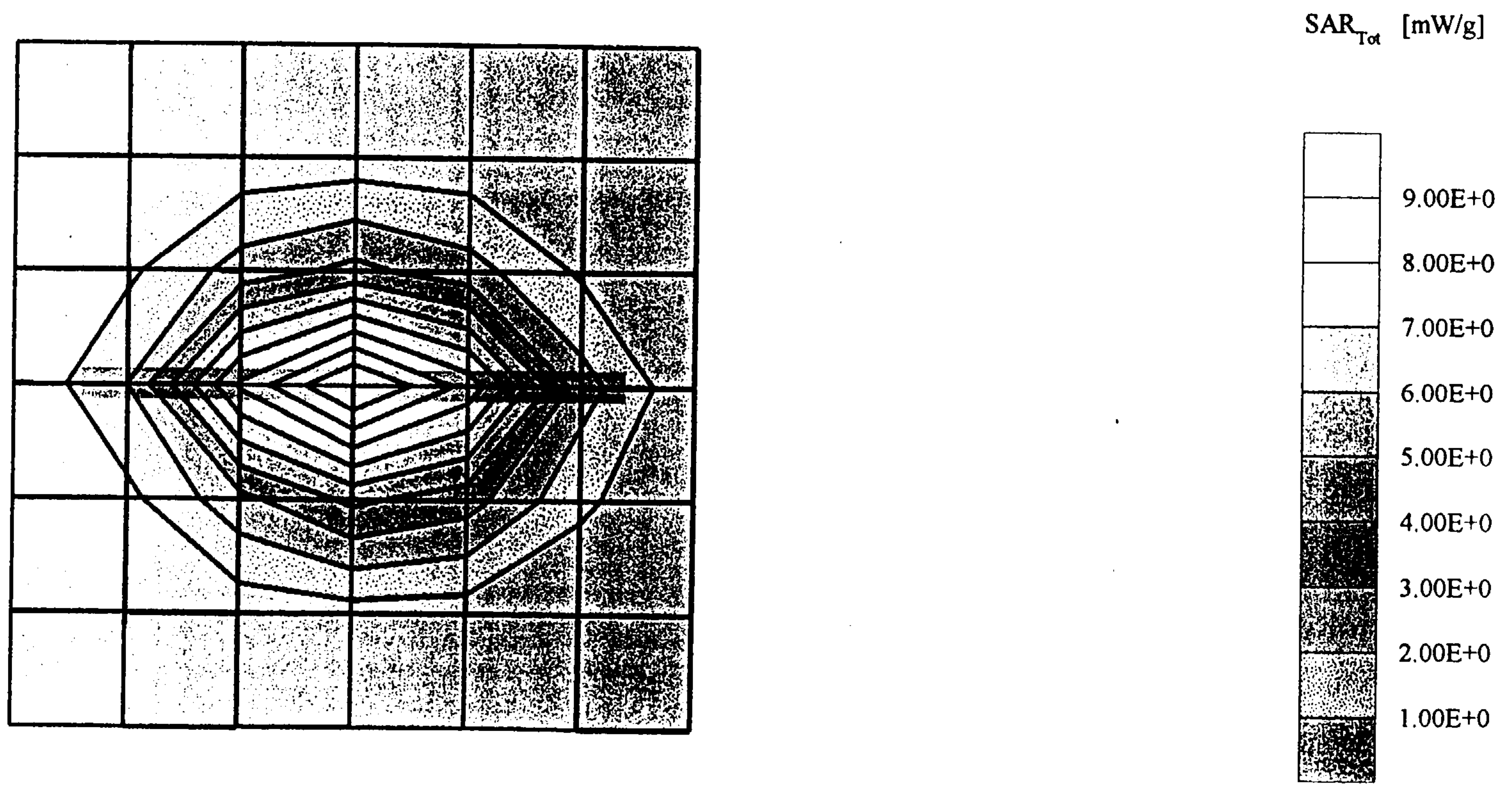
The dipole is made of standard semirigid coaxial cable. The centre conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

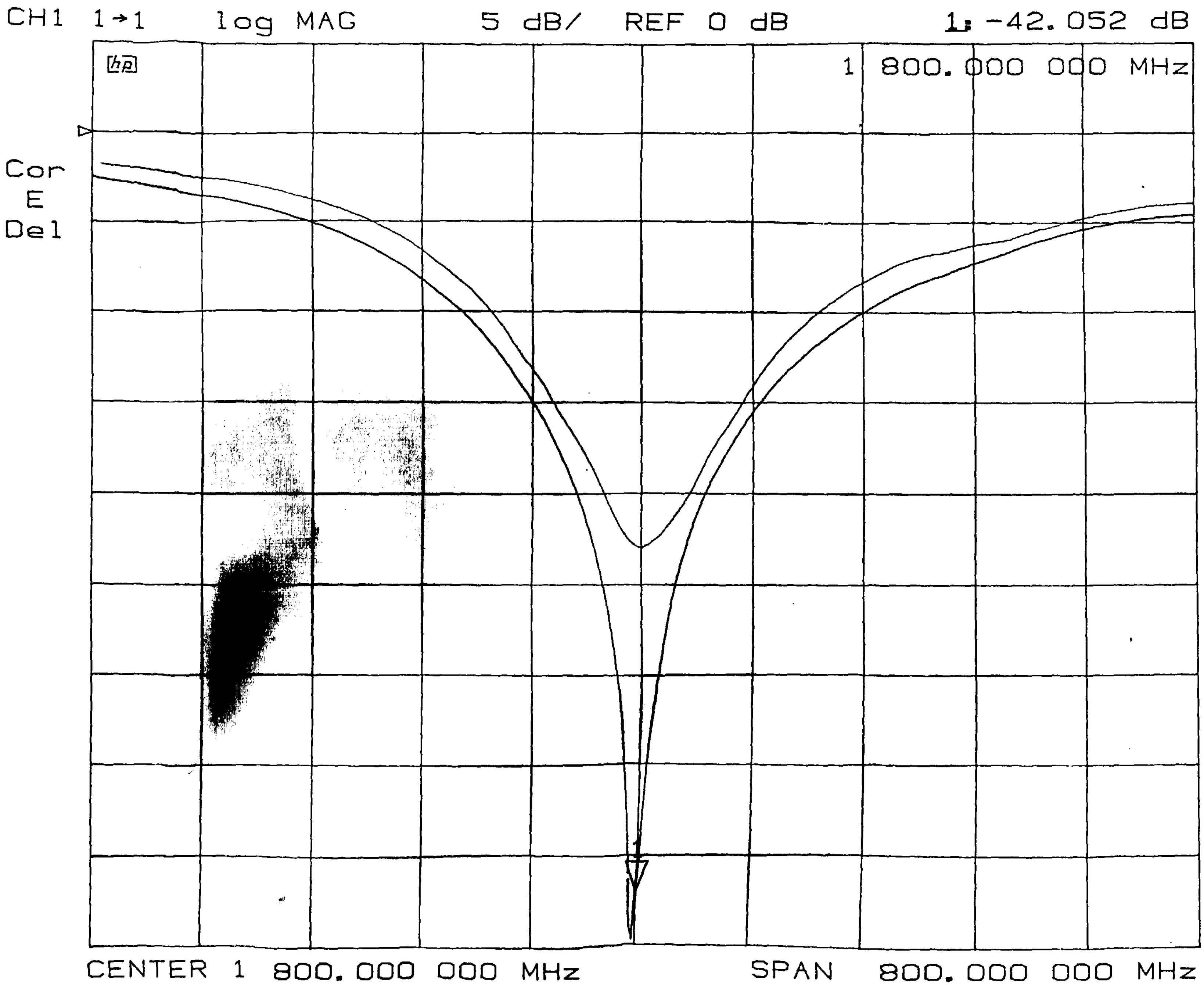
Do not apply excessive force to the dipole arms, because they might bend. If the dipole arms have to be bent back, take care to release stress to the soldered connections near the feedpoint; they might come off.

After prolonged use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

Validation Dipole D1800V2 SN:220, d = 10mm

Frequency: 1800 [MHz]; Antanna Input Power: 250 [mW]
Generic Twin Phantom; Flat Section; Grid Spacing: Dx = 15.0, Dy = 15.0, Dz = 10.0 [mm]
Probe: ET3DV5 - SN1302 DAE3; ConvF(4.60,4.60,4.60); Crest factor: 1.0; }: σ = 1.70 [mho/m] ε_r = 39.5 ρ = 1.00 [g/cm³]
Cubes (2): Peak: 19.2 [mW/g] ± 0.06 dB, SAR (1g): 9.97 [mW/g] ± 0.05 dB, SAR (10g): 5.02 [mW/g] ± 0.04 dB, (Worst-case extrapolation)
Penetration depth: 7.4 (7.2, 8.0) [mm]
Powerdrift: 0.03 dB





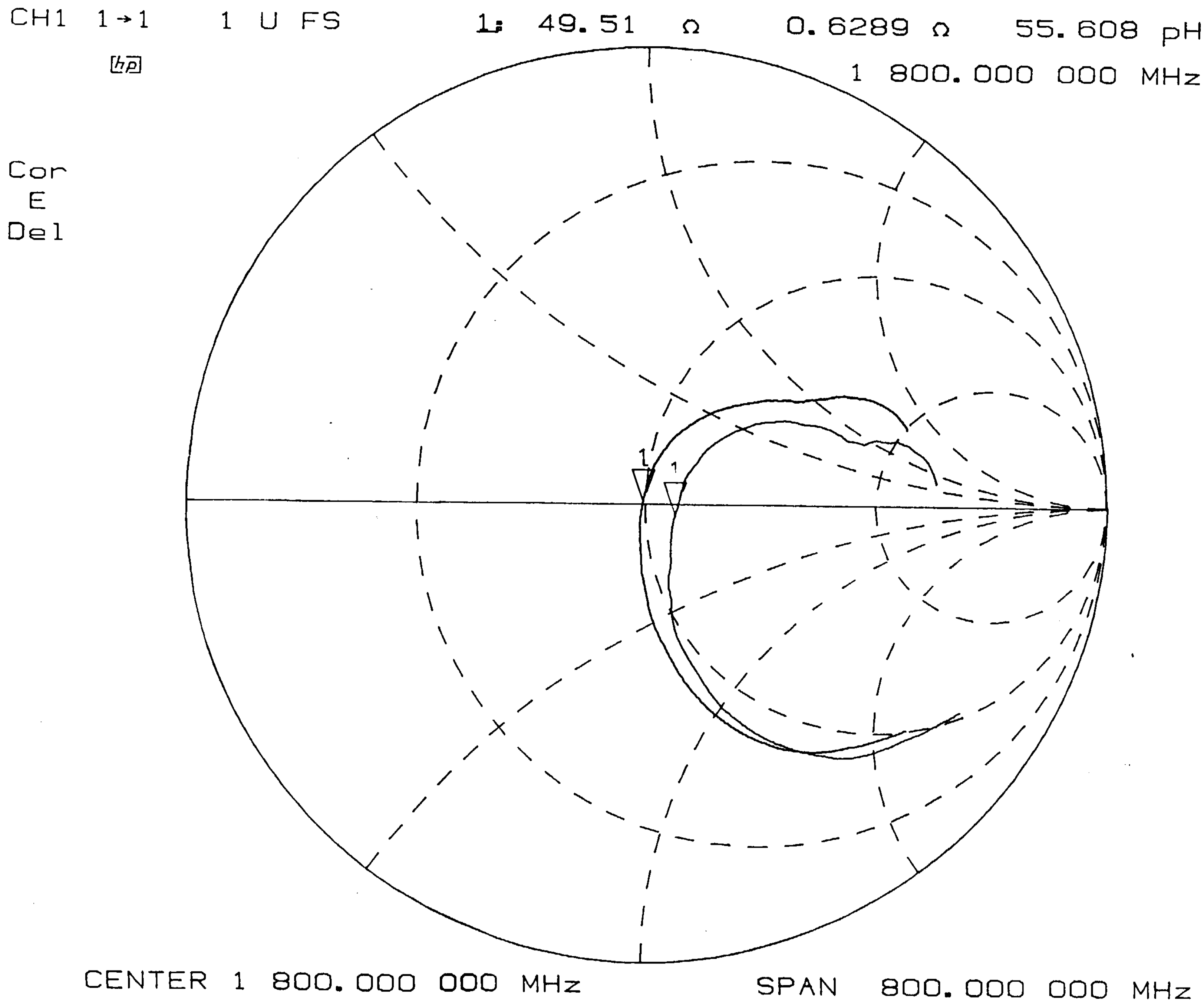
D1800V2 SN

S11

Flat phantom wi
brain simulating
solution

blk: d = 10mm
red: d = 20mm

(distance from dipo
center to solution)



D1800V2 SN

S11

Flat phantom wi
brain simulating
solution

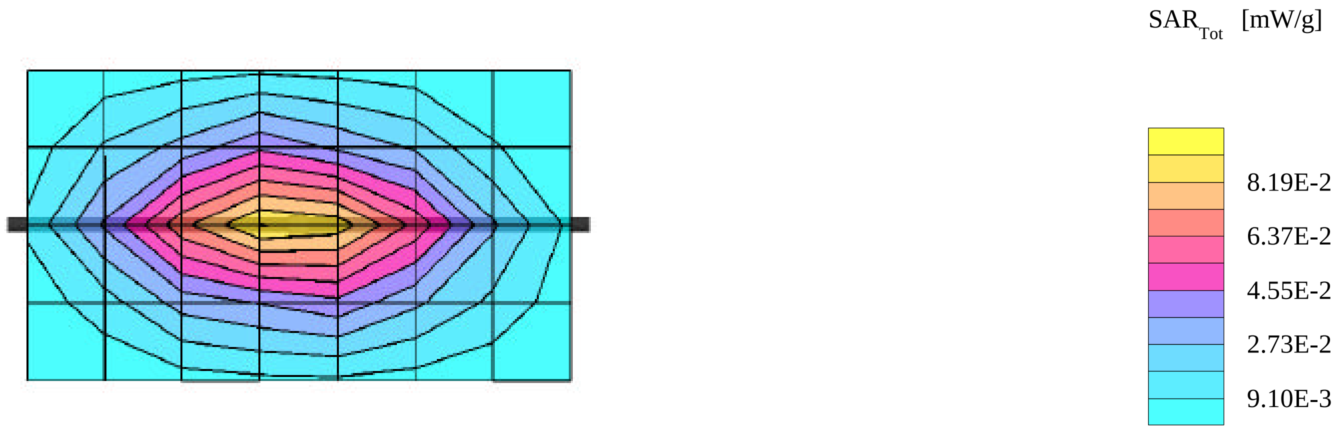
blk: d = 10mm
red: d = 20mm

(distance from dipo
center to solution)

Brain Tissue Validation Test Results

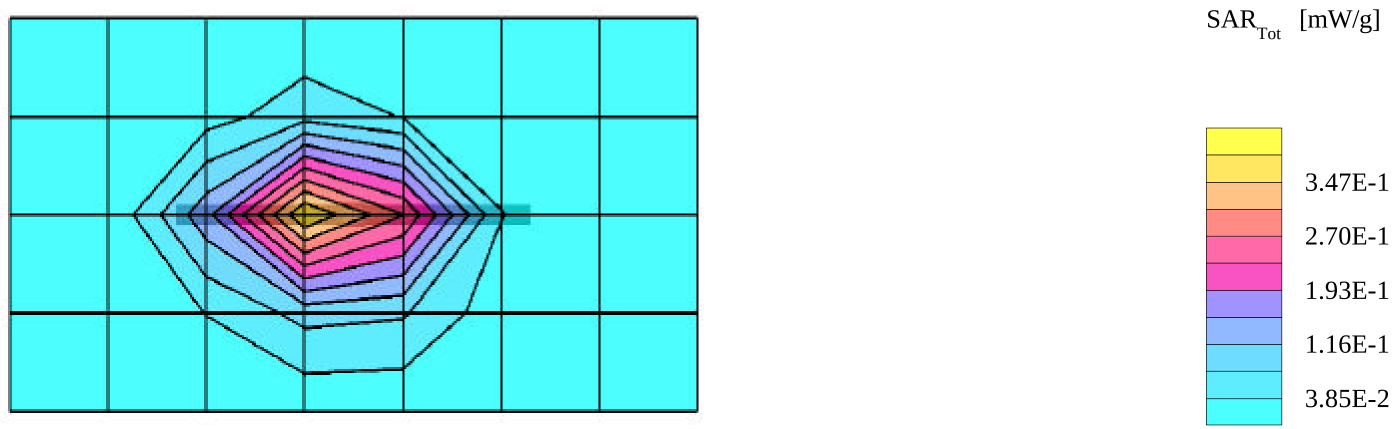
09-10-01, 900MHz Validation, Target=0.0944mW/g

SAR (1g): 0.0902 [mW/g] ± 0.07 dB, SAR (10g): 0.0589 [mW/g] ± 0.07 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.70,5.70,5.70)
Brain 900 MHz: σ = 0.85 [mho/m] ϵ_r = 42.8 ρ = 1.00 [g/cm^3]
File Name: Validation in Cellular band 09-10-01.DA3
Operator: DWS



09-13-2001, 1800MHz Validation, Target=0.399mW/g

SAR (1g): 0.386 [mW/g] ± 0.05 dB, SAR (10g): 0.197 [mW/g] ± 0.05 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: σ = 1.68 [mho/m] ε_r = 41.2 ρ = 1.00 [g/cm³]
File Name: FCC ValidationFlat 1800MHz 09-13-2001.DA3
Operator: DWS



Muscle Tissue Calibration Data Sheet

Reference math : OFF   Title: 09-10-01

835MHz Muscle

Pt#	Frequency (GHz)	Data real	Data imag
1	0.001000000	787.73	63.35
2	0.015995000	195.47	255.37
3	0.030990000	105.86	167.60
4	0.045985000	85.25	116.55
5	0.060980000	77.06	89.95
6	0.075975000	73.43	73.68
7	0.090970000	71.27	62.78
8	0.105965000	69.30	54.82
9	0.120960000	68.19	49.39
10	0.135955000	67.35	44.49
11	0.150950000	66.48	41.05
12	0.165945000	66.06	38.26
13	0.180940000	65.64	35.48
14	0.195935000	65.19	33.61
15	0.210930000	64.66	31.89
16	0.225925000	64.25	30.43
17	0.240920000	63.87	29.14
18	0.255915000	63.70	28.04
19	0.270910000	63.37	27.13
20	0.285905000	63.08	26.21
21	0.300900000	62.81	25.35
22	0.315895000	62.58	24.70
23	0.330890000	62.26	24.11
24	0.345885000	62.09	23.69
25	0.360880000	61.93	23.20
26	0.375875000	61.74	22.70
27	0.390870000	61.50	22.29
28	0.405865000	61.23	21.90
29	0.420860000	61.04	21.63
30	0.435855000	60.92	21.31
31	0.450850000	60.74	21.10
32	0.465845000	60.54	20.79
33	0.480840000	60.34	20.54
34	0.495835000	60.19	20.45
35	0.510830000	60.07	20.22
36	0.525825000	59.87	20.01
37	0.540820000	59.69	19.89
38	0.555815000	59.50	19.71
39	0.570810000	59.35	19.62
40	0.585805000	59.19	19.48
41	0.600800000	59.08	19.36
42	0.615795000	58.90	19.26
43	0.630790000	58.73	19.16
44	0.645785000	58.58	19.09
45	0.660780000	58.44	19.02
46	0.675775000	58.30	18.94
47	0.690770000	58.12	18.87
48	0.705765000	57.99	18.78
49	0.720760000	57.83	18.74
50	0.735755000	57.67	18.71
51	0.750750000	57.56	18.67
52	0.765745000	57.40	18.62
53	0.780740000	57.27	18.57
54	0.795735000	57.10	18.52
55	0.810730000	56.96	18.50
56	0.825725000	56.84	18.47
57	0.840720000	56.69	18.47*
58	0.855715000	56.55	18.45
59	0.870710000	56.47	18.42
60	0.885705000	56.30	18.38
61	0.900700000	56.17	18.38
62	0.915695000	56.04	18.33
63	0.930690000	55.89	18.35
64	0.945685000	55.78	18.32
65	0.960680000	55.65	18.29
66	0.975675000	55.55	18.27
67	0.990670000	55.41	18.27
68	1.005665000	55.31	18.24
69	1.020660000	55.17	18.27
70	1.035655000	55.06	18.27

* σ = 0.93 mho/m

71	1.050650000	55.00	18.25
72	1.065645000	54.87	18.27
73	1.080640000	54.79	18.28
74	1.095635000	54.64	18.29
75	1.110630000	54.53	18.32
76	1.125625000	54.40	18.36
77	1.140620000	54.26	18.38
78	1.155615000	54.16	18.39
79	1.170610000	54.05	18.37
80	1.185605000	53.89	18.35
81	1.200600000	53.75	18.38
82	1.215595000	53.62	18.39
83	1.230590000	53.53	18.39
84	1.245585000	53.46	18.39
85	1.260580000	53.35	18.38
86	1.275575000	53.21	18.39
87	1.290570000	53.11	18.41
88	1.305565000	52.99	18.44
89	1.320560000	52.89	18.48
90	1.335555000	52.83	18.47
91	1.350550000	52.70	18.47
92	1.365545000	52.58	18.51
93	1.380540000	52.45	18.52
94	1.395535000	52.35	18.55
95	1.410530000	52.25	18.57
96	1.425525000	52.15	18.59
97	1.440520000	52.04	18.60
98	1.455515000	51.95	18.61
99	1.470510000	51.82	18.61
100	1.485505000	51.69	18.64
101	1.500500000	51.60	18.64
102	1.515495000	51.51	18.64
103	1.530490000	51.40	18.67
104	1.545485000	51.29	18.68
105	1.560480000	51.18	18.68
106	1.575475000	51.09	18.70
107	1.590470000	51.00	18.68
108	1.605465000	50.91	18.70
109	1.620460000	50.81	18.71
110	1.635455000	50.71	18.72
111	1.650450000	50.63	18.75
112	1.665445000	50.53	18.73
113	1.680440000	50.45	18.77
114	1.695435000	50.37	18.77
115	1.710430000	50.25	18.78
116	1.725425000	50.16	18.79
117	1.740420000	50.07	18.82
118	1.755415000	49.98	18.85
119	1.770410000	49.89	18.87
120	1.785405000	49.81	18.87
121	1.800400000	49.70	18.88
122	1.815395000	49.62	18.91
123	1.830390000	49.51	18.90
124	1.845385000	49.42	18.93
125	1.860380000	49.31	18.94
126	1.875375000	49.25	18.94
127	1.890370000	49.15	18.95
128	1.905365000	49.09	18.93
129	1.920360000	48.99	18.94
130	1.935355000	48.89	18.94
131	1.950350000	48.85	18.94
132	1.965345000	48.76	18.95
133	1.980340000	48.69	18.96
134	1.995335000	48.65	18.98
135	2.010330000	48.55	18.98
136	2.025325000	48.50	19.00
137	2.040320000	48.44	19.02
138	2.055315000	48.36	19.04
139	2.070310000	48.29	19.09
140	2.085305000	48.22	19.11
141	2.100300000	48.13	19.15
142	2.115295000	48.07	19.17
143	2.130290000	47.99	19.17
144	2.145285000	47.92	19.20

145	2.160280000	47.83	19.23
146	2.175275000	47.74	19.25
147	2.190270000	47.65	19.28
148	2.205265000	47.58	19.30
149	2.220260000	47.51	19.32
150	2.235255000	47.43	19.33
151	2.250250000	47.35	19.34
152	2.265245000	47.28	19.35
153	2.280240000	47.18	19.38
154	2.295235000	47.10	19.41
155	2.310230000	47.05	19.42
156	2.325225000	46.97	19.42
157	2.340220000	46.90	19.44
158	2.355215000	46.83	19.46
159	2.370210000	46.75	19.47
160	2.385205000	46.66	19.52
161	2.400200000	46.59	19.54
162	2.415195000	46.51	19.55
163	2.430190000	46.44	19.58
164	2.445185000	46.37	19.59
165	2.460180000	46.28	19.61
166	2.475175000	46.21	19.65
167	2.490170000	46.14	19.65
168	2.505165000	46.05	19.67
169	2.520160000	45.97	19.69
170	2.535155000	45.91	19.70
171	2.550150000	45.81	19.73
172	2.565145000	45.74	19.74
173	2.580140000	45.66	19.73
174	2.595135000	45.58	19.76
175	2.610130000	45.51	19.77
176	2.625125000	45.45	19.78
177	2.640120000	45.36	19.79
178	2.655115000	45.28	19.80
179	2.670110000	45.22	19.81
180	2.685105000	45.14	19.80
181	2.700100000	45.07	19.82
182	2.715095000	45.02	19.84
183	2.730090000	44.95	19.84
184	2.745085000	44.88	19.86
185	2.760080000	44.81	19.87
186	2.775075000	44.73	19.87
187	2.790070000	44.67	19.90
188	2.805065000	44.61	19.91
189	2.820060000	44.55	19.92
190	2.835055000	44.48	19.93
191	2.850050000	44.41	19.96
192	2.865045000	44.34	19.96
193	2.880040000	44.27	19.97
194	2.895035000	44.20	19.99
195	2.910030000	44.14	20.01
196	2.925025000	44.08	20.01
197	2.940020000	44.01	20.03
198	2.955015000	43.95	20.03
199	2.970010000	43.89	20.04
200	2.985005000	43.82	20.07
201	3.000000000	43.76	20.08

Reference math : OFF   Title: 09-11-01

1800 MHz Muscle

Pt#	Frequency (GHz)	Data real	Data imag
1	0.000100000	0.00	-73.24
2	0.015099500	125.70	51.83
3	0.030099000	64.82	-9.77
4	0.045098500	66.12	-5.85
5	0.060098000	66.68	-3.55
6	0.075097500	66.74	-2.27
7	0.090097000	66.55	-1.34
8	0.105096500	66.66	-0.27
9	0.120096000	66.38	0.30
10	0.135095500	66.28	0.73
11	0.150095000	66.26	1.41
12	0.165094500	66.07	1.72
13	0.180094000	65.88	2.22
14	0.195093500	65.90	2.43
15	0.210093000	65.68	2.86
16	0.225092500	65.61	3.08
17	0.240092000	65.37	3.45
18	0.255091500	65.25	3.71
19	0.270091000	65.19	4.02
20	0.285090500	65.09	4.20
21	0.300090000	64.92	4.44
22	0.315089500	64.78	4.69
23	0.330089000	64.70	4.98
24	0.345088500	64.62	5.04
25	0.360088000	64.45	5.26
26	0.375087500	64.30	5.50
27	0.390087000	64.22	5.71
28	0.405086500	64.08	5.95
29	0.420086000	63.99	6.11
30	0.435085500	63.86	6.23
31	0.450085000	63.77	6.42
32	0.465084500	63.66	6.58
33	0.480084000	63.50	6.79
34	0.495083500	63.45	6.99
35	0.510083000	63.36	7.16
36	0.525082500	63.19	7.28
37	0.540082000	63.06	7.44
38	0.555081500	62.94	7.63
39	0.570081000	62.89	7.78
40	0.585080500	62.78	7.86
41	0.600080000	62.65	8.06
42	0.615079500	62.51	8.22
43	0.630079000	62.42	8.32
44	0.645078500	62.30	8.53
45	0.660078000	62.23	8.64
46	0.675077500	62.11	8.77
47	0.690077000	62.00	8.92
48	0.705076500	61.90	9.01
49	0.720076000	61.74	9.17
50	0.735075500	61.66	9.31
51	0.750075000	61.55	9.47
52	0.765074500	61.47	9.58
53	0.780074000	61.36	9.71
54	0.795073500	61.24	9.80
55	0.810073000	61.12	9.92
56	0.825072500	61.04	10.06
57	0.840072000	60.93	10.16
58	0.855071500	60.82	10.29
59	0.870071000	60.70	10.38
60	0.885070500	60.61	10.51
61	0.900070000	60.51	10.62
62	0.915069500	60.43	10.72
63	0.930069000	60.30	10.85
64	0.945068500	60.20	10.97
65	0.960068000	60.10	11.06
66	0.975067500	59.99	11.17
67	0.990067000	59.89	11.28
68	1.005066500	59.79	11.39
69	1.020066000	59.68	11.48
70	1.035065500	59.58	11.60

71	1.050065000	59.47	11.67
72	1.065064500	59.35	11.77
73	1.080064000	59.25	11.89
74	1.095063500	59.15	11.96
75	1.110063000	59.06	12.07
76	1.125062500	58.95	12.15
77	1.140062000	58.85	12.22
78	1.155061500	58.73	12.32
79	1.170061000	58.65	12.40
80	1.185060500	58.56	12.49
81	1.200060000	58.47	12.58
82	1.215059500	58.38	12.68
83	1.230059000	58.26	12.75
84	1.245058500	58.15	12.85
85	1.260058000	58.05	12.96
86	1.275057500	57.95	13.00
87	1.290057000	57.84	13.09
88	1.305056500	57.75	13.17
89	1.320056000	57.66	13.24
90	1.335055500	57.57	13.34
91	1.350055000	57.50	13.40
92	1.365054500	57.39	13.47
93	1.380054000	57.29	13.55
94	1.395053500	57.19	13.63
95	1.410053000	57.07	13.73
96	1.425052500	56.99	13.79
97	1.440052000	56.88	13.87
98	1.455051500	56.78	13.94
99	1.470051000	56.71	14.01
100	1.485050500	56.59	14.09
101	1.500050000	56.50	14.13
102	1.515049500	56.40	14.19
103	1.530049000	56.30	14.26
104	1.545048500	56.21	14.34
105	1.560048000	56.10	14.39
106	1.575047500	56.02	14.44
107	1.590047000	55.92	14.50
108	1.605046500	55.82	14.57
109	1.620046000	55.77	14.62
110	1.635045500	55.66	14.67
111	1.650045000	55.59	14.75
112	1.665044500	55.50	14.79
113	1.680044000	55.42	14.85
114	1.695043500	55.33	14.92
115	1.710043000	55.23	14.98
116	1.725042500	55.15	15.04
117	1.740042000	55.07	15.10
118	1.755041500	54.98	15.14
119	1.770041000	54.91	15.21
120	1.785040500	54.82	15.26
121	1.800040000	54.73	15.34 *
122	1.815039500	54.67	15.39
123	1.830039000	54.57	15.45
124	1.845038500	54.48	15.51
125	1.860038000	54.41	15.57
126	1.875037500	54.30	15.63
127	1.890037000	54.22	15.67
128	1.905036500	54.14	15.73
129	1.920036000	54.05	15.77
130	1.935035500	53.96	15.82
131	1.950035000	53.88	15.88
132	1.965034500	53.80	15.91
133	1.980034000	53.71	15.96
134	1.995033500	53.65	16.00
135	2.010033000	53.55	16.03
136	2.025032500	53.49	16.10
137	2.040032000	53.43	16.15
138	2.055031500	53.35	16.19
139	2.070031000	53.29	16.27
140	2.085030500	53.23	16.27
141	2.100030000	53.13	16.33
142	2.115029500	53.06	16.40
143	2.130029000	52.99	16.45
144	2.145028500	52.94	16.49

* σ = 1.54 mho/m

145	2.160028000	52.86	16.54
146	2.175027500	52.79	16.57
147	2.190027000	52.71	16.64
148	2.205026500	52.64	16.68
149	2.220026000	52.56	16.72
150	2.235025500	52.48	16.77
151	2.250025000	52.42	16.83
152	2.265024500	52.35	16.86
153	2.280024000	52.28	16.92
154	2.295023500	52.22	16.96
155	2.310023000	52.14	16.99
156	2.325022500	52.07	17.05
157	2.340022000	52.02	17.10
158	2.355021500	51.94	17.15
159	2.370021000	51.87	17.21
160	2.385020500	51.81	17.27
161	2.400020000	51.73	17.31
162	2.415019500	51.66	17.37
163	2.430019000	51.60	17.42
164	2.445018500	51.50	17.46
165	2.460018000	51.43	17.53
166	2.475017500	51.36	17.57
167	2.490017000	51.29	17.61
168	2.505016500	51.21	17.67
169	2.520016000	51.15	17.70
170	2.535015500	51.06	17.75
171	2.550015000	50.99	17.82
172	2.565014500	50.91	17.84
173	2.580014000	50.83	17.89
174	2.595013500	50.76	17.92
175	2.610013000	50.65	17.98
176	2.625012500	50.61	18.02
177	2.640012000	50.54	18.07
178	2.655011500	50.45	18.11
179	2.670011000	50.36	18.17
180	2.685010500	50.29	18.18
181	2.700010000	50.18	18.23
182	2.715009500	50.13	18.29
183	2.730009000	50.04	18.32
184	2.745008500	49.98	18.36
185	2.760008000	49.89	18.38
186	2.775007500	49.80	18.41
187	2.790007000	49.71	18.46
188	2.805006500	49.64	18.49
189	2.820006000	49.56	18.53
190	2.835005500	49.49	18.58
191	2.850005000	49.42	18.61
192	2.865004500	49.35	18.62
193	2.880004000	49.25	18.66
194	2.895003500	49.18	18.68
195	2.910003000	49.09	18.71
196	2.925002500	49.00	18.75
197	2.940002000	48.95	18.77
198	2.955001500	48.88	18.80
199	2.970001000	48.81	18.82
200	2.985000500	48.72	18.84
201	3.000000000	48.66	18.87

8 SAR MEASUREMENT PROCEDURE

DEVICE POSITIONING The phone was tested in the primary test position that is described by Supplement C of OET Bulletin 65 from the Office of Engineering & Technology, of the FCC. The procedure places the surface of the phone in contact with the phantom.

9 SAR MEASUREMENT UNCERTAINTY

The possible errors included in this measurement arise from device positioning uncertainty, device manufacturing uncertainty, liquid dielectric permitivity uncertainty, liquid dielectric conductivity uncertainty, uncertainty due to disturbance of the fields by the probe.

These will be discussed as they are of much importance to the final dosimetric assessment. Every attempt is made to reduce uncertainty, as well as to test for worst case SAR. These uncertainties are likely to be pessimistic, but they should be considered when comparing data taken from one lab to another. Thomas Schmid of Schmid and Partners has performed a study of SAR repeatability due to many different uncertainties, this is likely the most complete study of the topic so it is referred to here.

Device positioning; this uncertainty is due to different operators positioning the device on the phantom differently, it depends on the operators, the device design, the phantom, and the device holder. Repeatability for some devices in Schmid’s study was as poor as +/- 30% for the “touch” position. For the “intended use” position the repeatability was approximately +/- 5%, depending on the device tested, overall a figure of +/- 6% was taken as typical device positioning uncertainty. One operator is used at the KWC lab, trained to place the phone as close as possible to phantom, and the test is performed after the position of maximum SAR is determined. This minimises device positioning error. Typically the phone is clamped in the holder in the horizontal position, and a short wooden dowel is placed in a small hole where the center of the ear speaker resides, this wooden dowel allows the operator to line up the speaker with the ear canal. Once aligned, the tooth pick is removed, and the phone is raised up until it touches the phantom on the ear. Then the cradle is rocked so the phone rocks toward the chin of the phantom, touching as closely as possible without depressing the keypad. This puts the phone as close as possible to the phantom, allowing maximum SAR to be measured, for most positions. In the event that this may not produce maximum SAR, the phone is placed in several other positions and a coarse scan is run for each position. The DASY system has a command called “move to max” which allows the probe to be sent to the point of max field intensity found with the coarse scan. This gives a visual indication of where the maximum surface currents may be, and allows the operator to position this point of the phone as close as possible to the phantom.

Liquid dielectric permittivity and conductivity; The average permittivity of a typical human head was determined by Dr. Gabriel and has been listed by the FCC (OET bulletin 65 supplement C) as 41.5 at 835 MHz and 40.0 at 1800 MHz. Since SAR is defined as the time rate of absorption per unit of weight, only the macroscopic simulation of the tissue's permittivity, permeability, and conductivity are required. These electrical properties are obtained with a liquid which uses sugar to raise the permittivity, salt to raise the conductivity, and cellulose to hold the two in suspension. After installing the liquid it is measured with an HP 85070A dielectric probe kit. The achievable accuracy of this device is +/- 5% for the permittivity and +/- 10% for the conductivity. The liquid is also measured at the beginning of each SAR measurement day, to check for evaporation.

FIELD DISTURBANCES Errors due to disturbance of the fields by the probe; because the polarisation of the fields are unknown, the near field probe must measure all polarisation's without disturbing them by being present. Three orthogonal dipoles are located at the tip of a special dielectric support, with diodes at the feed points sensitive to fields as small as 5 microWatt/gm. To prevent secondary coupling of the fields to the feed lines, the lines are high resistance printed lines with distributed filters integrated in the lines, after the diode. Much research has been put into these probe designs, so their uncertainty is considered minimized. There are other uncertainties, such as laboratory setup uncertainty, the reader should refer to attachment 10 of the March 1998 minutes of the IEEE standards coordinating committee, by Thomas Schmid. Mr. Schmid's preliminary uncertainty figure is –12% to +52% for the SAR measurement. As stated before this is possible, but believed to be pessimistic because many of the sources of uncertainty have been reduced or eliminated, at considerable expense. All practical precautionary measures are taken to reduce these errors in the KWC SAR lab.

Surface Detection The surface detection on the DASY system is mechanical and optical, it is checked and compared automatically to ensure correct operation. This can indicate that the optical surface detection is not in agreement with the mechanical, which might mean the liquid needs to be stirred. This process insures minimum distance from the surface of the phantom for measurements.

10 TEST DATA SUMMARY

The device, which was tested, is the final production model in both the analogue and digital modes. Both applicable configurations in holding to an ear situation, i.e., with the antenna retracted and with the antenna extended, were tested. The SAR values measured indicate that the device produces SAR levels below the limit of 1.6 mW/g for the one gram average.

Parameters of brain and muscle tissue

	Frequency	**Permittivity**	**Conductivity (S/m)**	**Notes**
Brain	835 MHz	41.5	0.90	specified by OET Bulletin 65, Supplement C
Muscle	835 MHz	55.2	0.97	specified by OET bulletin 65, supplemental
Brain	1800 MHz	40.5	1.65	specified by DASY3-user manual
Muscle	1800 MHz	54	1.45	specified by OET bulletin 65, supplemental C.

ANSI/IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak (Brain) Uncontrolled Exposure/General Population	1.6 W/kg (mW/g)

Brain SAR Test Results

FREQ. MHZ	CH.#	SERIAL NUMBER	MODULATION	CONDUCTED POWER *BEFORE* TEST	ANTENNA POSITION	1 GRAM AVG.SAR (MW/G)	CONDUCTED POWER *AFTER* TEST
824	991	BWXV0122151617	ANALOG	26.39 dBm	Ext	1.25	26.44 dBm
824	991	BWXV0122151617	ANALOG		Ret	0.964	
836.5	383	BWXV0122151617	ANALOG	26.35 dBm	Ext	1.25	26.42 dBm
836.5	383	BWXV0122151617	ANALOG		Ret	1.14	
849	799	BWXV0122151617	ANALOG	26.35 dBm	Ext	1.34	26.43 dBm
849	799	BWXV0122151617	ANALOG		Ret	1.27	
848.3	777	BWXV0122151617	Cellular CDMA	24.91 dBm	Ext	1.02	25.11 dBm
848.3	777	BWXV0122151617	Cellular CDMA		Ret	0.984	
1851.25	25	BWXV0122151617	PCS CDMA	23.16 dBm	Ext	1.26	23.27 dBm
1851.25	25	BWXV0122151617	PCS CDMA		Ret	1.40	
1880	600	BWXV0122151617	PCS CDMA	23.19 dBm	Ext	1.13	23.56 dBm
1880	600	BWXV0122151617	PCS CDMA		Ret	1.25	
1908.75	1175	BWXV0122151617	PCS CDMA	23.17 dBm	Ext	1.05	23.42 dBm
1908.75	1175	BWXV0122151617	PCS CDMA		Ret	1.16	

The highest SAR (at head) in the cellular band is 1.34 mW/g. The highest SAR (at head) in PCS band is 1.40 mW/g.

The KWC-2235 has provision for headset and body-worn holster to allow hands-free operation. The SAR for such operating condition was measured. The following is the summary of the results.

Body-worn SAR Test Results (with beltclip)

FREQ. MHZ	CH.#	SERIAL NUMBER	MODULATION	CONDUCTED POWER *BEFORE* TEST	ANTENNA POSITION	1 GRAM AVG.SAR (MW/G)	CONDUCTED POWER *AFTER* TEST
824	991	BWXV0122151617	ANALOG	26.39 dBm	Ext	0.496	26.44 dBm
824	991	BWXV0122151617	ANALOG		Ret	0.443	
836.5	383	BWXV0122151617	ANALOG	26.35 dBm	Ext	0.512	26.42 dBm
836.5	383	BWXV0122151617	ANALOG		Ret	0.403	
849	799	BWXV0122151617	ANALOG	26.35 dBm	Ext	0.657	26.43 dBm
849	799	BWXV0122151617	ANALOG		Ret	0.432	
828.3	777	BWXV0122151617	Cellular CDMA	24.91 dBm	Ext	0.516	25.11 dBm
828.3	777	BWXV0122151617	Cellular CDMA		Ret	0.342	
1851.25	25	BWXV0122151617	PCS CDMA	23.16 dBm	Ext	0.323	23.35 dBm
1851.25	25	BWXV0122151617	PCS CDMA		Ret	0.341	
1880	600	BWXV0122151617	PCS CDMA	23.19 dBm	Ext	0.271	23.56 dBm
1880	600	BWXV0122151617	PCS CDMA		Ret	0.290	
1908.75	1175	BWXV0122151617	PCS CDMA	23.17 dBm	Ext	0.257	23.42 dBm
1908.75	1175	BWXV0122151617	PCS CDMA		Ret	0.266	

The highest SAR (at waist) in the cellular band is 0.657 mW/g. The highest SAR (at waist) in PCS band is 0.341 mW/g.

The SAR levels were also evaluated with 22.5 mm air space in both cellular and PCS bands. The following is the summary of the results.

Body-worn SAR Test Results (with 22.5 mm air space)

FREQ. MHZ	CH.#	SERIAL NUMBER	MODULATION	CONDUCTED POWER *BEFORE* TEST	ANTENNA POSITION	1 GRAM AVG.SAR (MW/G)	CONDUCTED POWER *AFTER* TEST
824	991	BWXV0122151617	ANALOG	26.39 dBm	Ext	0.532	26.44 dBm
824	991	BWXV0122151617	ANALOG		Ret	0.509	
836.5	383	BWXV0122151617	ANALOG	26.35 dBm	Ext	0.512	26.42 dBm
836.5	383	BWXV0122151617	ANALOG		Ret	0.486	
849	799	BWXV0122151617	ANALOG	26.35 dBm	Ext	0.512	26.43 dBm
849	799	BWXV0122151617	ANALOG		Ret	0.424	
836.5	383	BWXV0122151617	Cellular CDMA	24.89 dBm	Ext	0.356	25.07 dBm
836.5	383	BWXV0122151617	Cellular CDMA		Ret	0.394	
1851.25	25	BWXV0122151617	PCS CDMA	23.16 dBm	Ext	0.273	23.35 dBm
1851.25	25	BWXV0122151617	PCS CDMA		Ret	0.296	
1880	600	BWXV0122151617	PCS CDMA	23.19 dBm	Ext	0.243	23.56 dBm
1880	600	BWXV0122151617	PCS CDMA		Ret	0.248	
1908.75	1175	BWXV0122151617	PCS CDMA	23.17 dBm	Ext	0.205	23.42 dBm
1908.75	1175	BWXV0122151617	PCS CDMA		Ret	0.214	

11 SAR PLOTS

KWC-2235, FM ch991

SAR (1g): 1.25 [mW/g] ± 0.09 dB, SAR (10g): 0.899 [mW/g] ± 0.11 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Brain 835 MHz: σ = 0.85 [mho/m] ε_r = 43.5 ρ = 1.00 [g/cm³]
File Name: K1 P4A #1617, FCC Test, FM ch991, 09-10-01.DA3
Operator: DWS

KWC-2235, FM ch991

SAR (1g): 0.964 [mW/g] ± 0.09 dB, SAR (10g): 0.683 [mW/g] ± 0.13 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Brain 835 MHz: σ = 0.85 [mho/m] ε_r = 43.5 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, FM ch991, 09-10-01.DA3
Operator: DWS

KWC-2235, FM ch383

SAR (1g): 1.25 [mW/g] ± 0.00 dB, SAR (10g): 0.847 [mW/g] ± 0.03 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Brain 835 MHz: σ = 0.85 [mho/m] ε_r = 43.5 ρ = 1.00 [g/cm³]
File Name: K1 P4A #1617, FCC Test, FM ch383, 09-10-01.DA3
Operator: DWS

KWC-2235, FM ch383

SAR (1g): 1.14 [mW/g] ± 0.06 dB, SAR (10g): 0.777 [mW/g] ± 0.08 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Brain 835 MHz: σ = 0.85 [mho/m] ε_r = 43.5 ρ = 1.00 [g/cm³]
File Name: K1 P4A #1617, FCC Test, FM ch383, 09-10-01.DA3
Operator: DWS

KWC-2235, FM ch799

SAR (1g): 1.34 [mW/g] ± 0.02 dB, SAR (10g): 0.912 [mW/g] ± 0.04 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Brain 835 MHz: σ = 0.85 [mho/m] ε_r = 43.5 ρ = 1.00 [g/cm³]
File Name: K1 P4A #1617, FCC Test, FM ch799, 09-10-01.DA3
Operator: DWS

KWC-2235, FM ch799

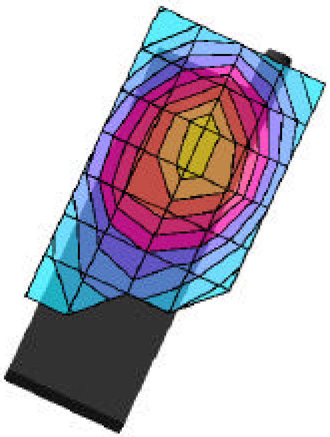
SAR (1g): 1.27 [mW/g] ± 0.03 dB, SAR (10g): 0.872 [mW/g] ± 0.11 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Brain 835 MHz: σ = 0.85 [mho/m] ε_r = 43.5 ρ = 1.00 [g/cm³]
File Name: K1 P4A #1617, FCC Test, FM ch799, 09-10-01.DA3
Operator: DWS

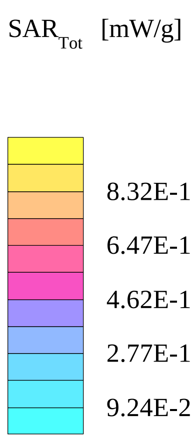
KWC-2235, CDMA ch777

SAR (1g): 1.02 [mW/g] ± 0.09 dB, SAR (10g): 0.687 [mW/g] ± 0.08 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Brain 835 MHz: $\sigma = 0.85$ [mho/m] $\varepsilon_r = 43.5$ $\rho = 1.00$ [g/cm³]
File Name: K1 P4A #1617, FCC Test, CDMA ch777, 09-10-01.DA3
Operator: DWS

KWC-2235, CDMA ch777

SAR (1g): 0.984 [mW/g] ± 0.06 dB, SAR (10g): 0.676 [mW/g] ± 0.10 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Brain 835 MHz: σ = 0.85 [mho/m] ε_r = 43.5 ρ = 1.00 [g/cm³]
File Name: K1 P4A #1617, FCC Test, CDMA ch777, 09-10-01.DA3
Operator: DWS





KWC-2235, PCS ch25

SAR (1g): 1.26 [mW/g] ± 0.06 dB, SAR (10g): 0.640 [mW/g] ± 0.06 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1353; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: σ = 1.68 [mho/m] ε_r = 41.2 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, PCS ch25, 09-13-01.DA3
Operator: DWS

KWC-2235, PCS ch25

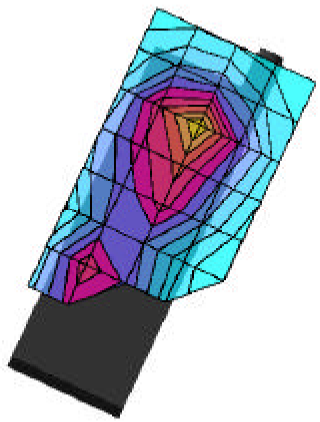
SAR (1g): 1.40 [mW/g] ± 0.17 dB, SAR (10g): 0.719 [mW/g] ± 0.17 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1353; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: σ = 1.68 [mho/m] ε_r = 41.2 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, PCS ch25, 09-13-01.DA3
Operator: DWS

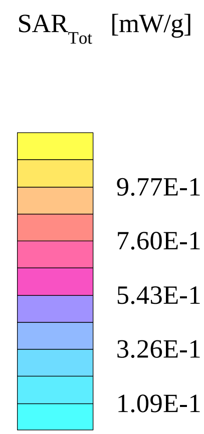
KWC-2235, PCS ch600

SAR (1g): 1.13 [mW/g] ± 0.10 dB, SAR (10g): 0.577 [mW/g] ± 0.09 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1353; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: σ = 1.68 [mho/m] ε_r = 41.2 ρ = 1.00 [g/cm³]
File Name: K1 P4A #1617, FCC Test, PCS ch600, 09-13-01.DA3
Operator: DWS

KWC-2235, PCS ch600

SAR (1g): 1.25 [mW/g] ± 0.13 dB, SAR (10g): 0.638 [mW/g] ± 0.11 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1353; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: σ = 1.68 [mho/m] ε_r = 41.2 ρ = 1.00 [g/cm³]
File Name: K1 P4A #1617, FCC Test, PCS ch600, 09-13-01.DA3
Operator: DWS





KWC-2235, PCS ch1175

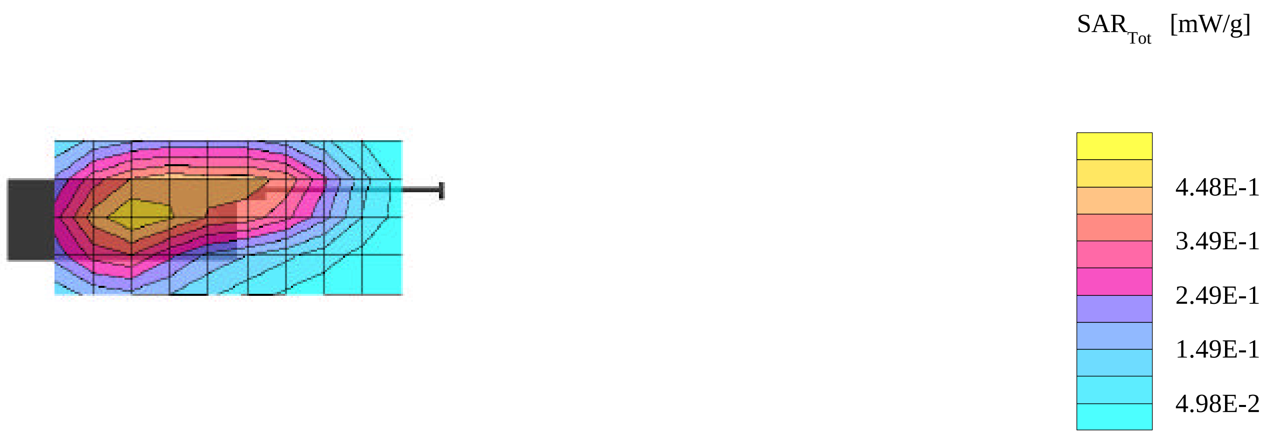
SAR (1g): 1.05 [mW/g] ± 0.16 dB, SAR (10g): 0.545 [mW/g] ± 0.11 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1353; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: σ = 1.68 [mho/m] ε_r = 41.2 ρ = 1.00 [g/cm³]
File Name: K1 P4A #1617, FCC Test, PCS ch1175, 09-13-01.DA3
Operator: DWS

KWC-2235, PCS ch1175

SAR (1g): 1.16 [mW/g] ± 0.13 dB, SAR (10g): 0.600 [mW/g] ± 0.07 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1353; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: σ = 1.68 [mho/m] ε_r = 41.2 ρ = 1.00 [g/cm³]
File Name: K1 P4A #1617, FCC Test, PCS ch1175, 09-13-01.DA3
Operator: DWS

KWC-2235, FM ch991, muscle with beltclip

SAR (1g): 0.496 [mW/g] ± 0.06 dB, SAR (10g): 0.369 [mW/g] ± 0.05 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Muscle 835 MHz: σ = 0.93 [mho/m] ε_r = 56.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, FM ch991, muscle with beltclip, 09-10-01.DA3
Operator: DWS

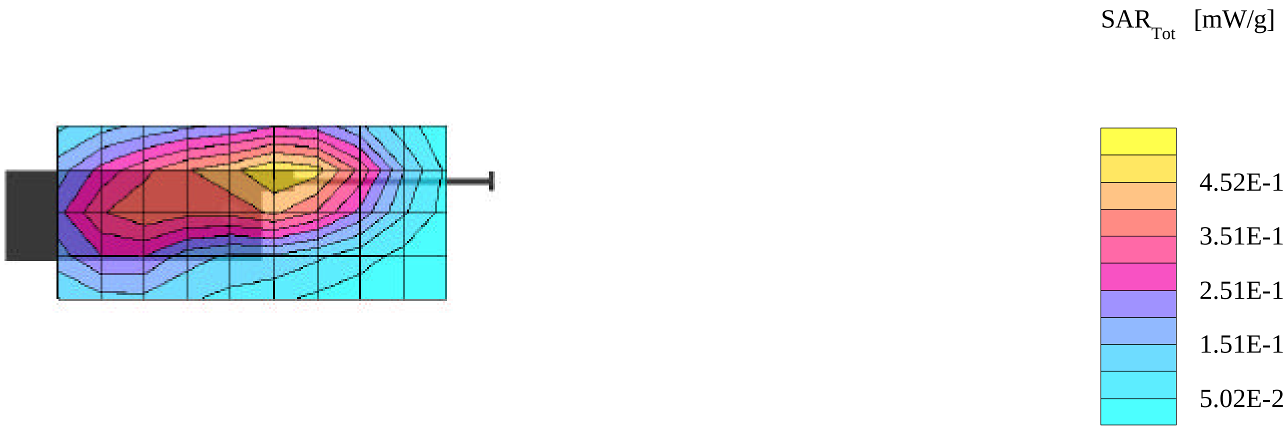


KWC-2235, FM ch991, muscle with beltclip

SAR (1g): 0.443 [mW/g] ± 0.06 dB, SAR (10g): 0.327 [mW/g] ± 0.05 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Muscle 835 MHz: σ = 0.93 [mho/m] ε_r = 56.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, FM ch991, muscle with beltclip, 09-10-01.DA3
Operator: DWS

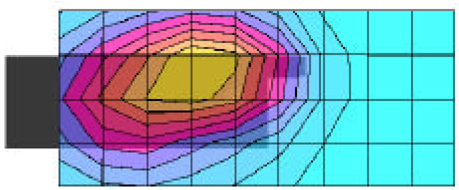
KWC-2235, FM ch383, muscle with beltclip

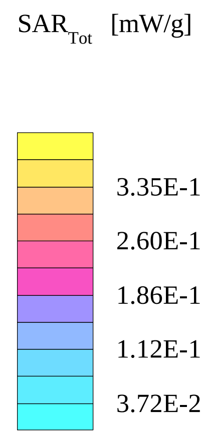
SAR (1g): 0.512 [mW/g] ± 0.01 dB, SAR (10g): 0.364 [mW/g] ± 0.03 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Muscle 835 MHz: σ = 0.93 [mho/m] ε_r = 56.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, FM ch383, muscle with beltclip, 09-10-01.DA3
Operator: DWS



KWC-2235, FM ch383, muscle with beltclip

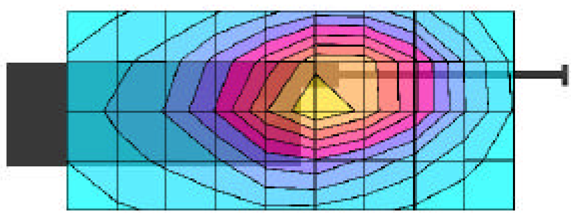
SAR (1g): 0.403 [mW/g] ± 0.13 dB, SAR (10g): 0.287 [mW/g] ± 0.12 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Muscle 835 MHz: σ = 0.93 [mho/m] ε_r = 56.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, FM ch383, muscle with beltclip, 09-10-01.DA3
Operator: DWS

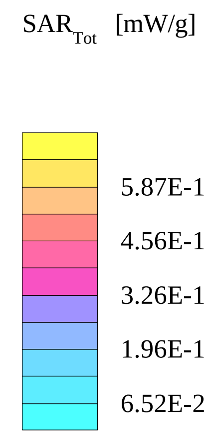




KWC-2235, FM ch799, muscle with beltclip

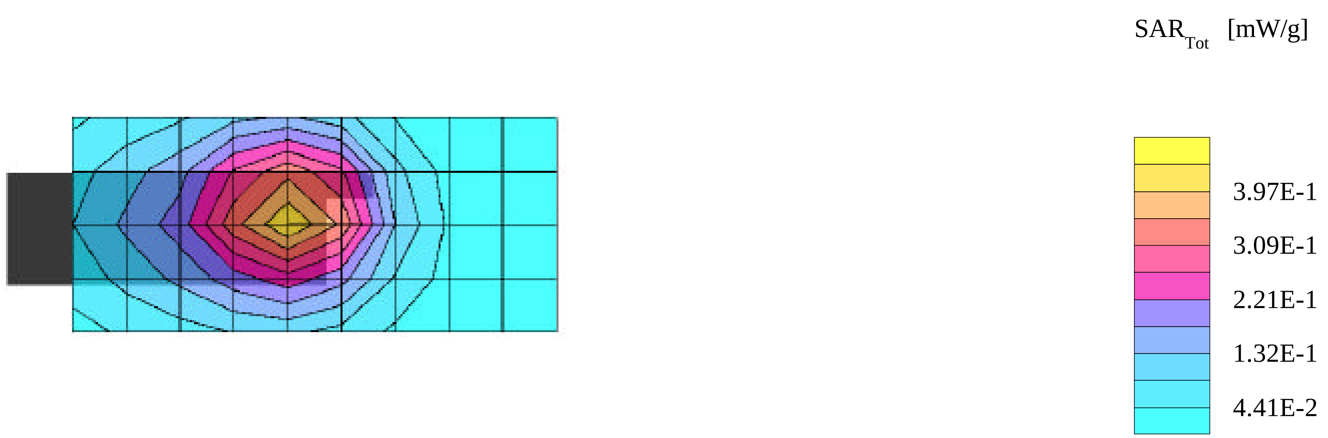
SAR (1g): 0.657 [mW/g] ± 0.03 dB, SAR (10g): 0.469 [mW/g] ± 0.04 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Muscle 835 MHz: σ = 0.93 [mho/m] ε_r = 56.7 ρ = 1.00 [g/cm³]
File Name: K1 P4A #1617, FCC Test, FM ch799, muscle with beltclip, 09-10-01.DA3
Operator: DWS





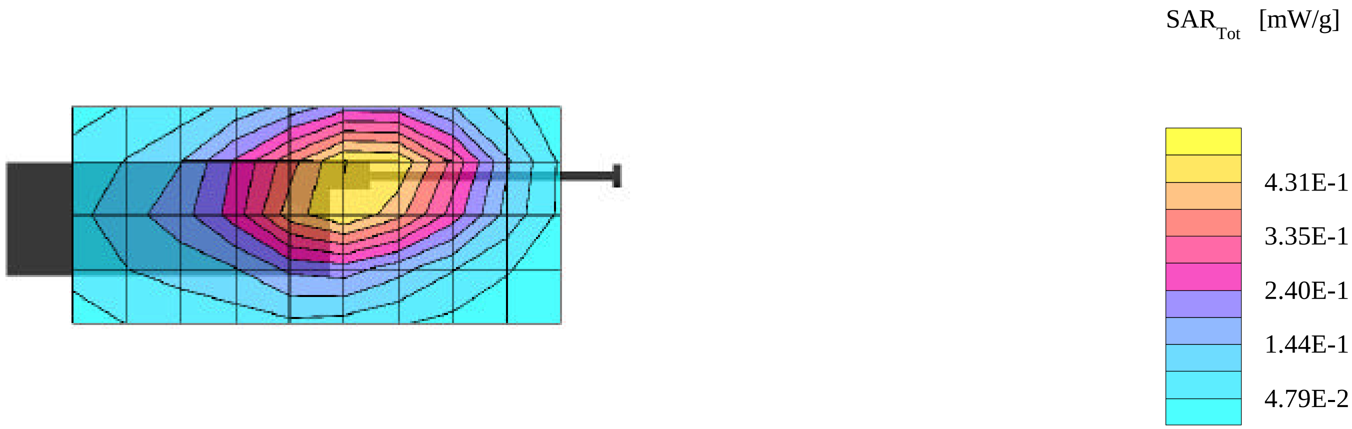
KWC-2235, FM ch799, muscle with beltclip

SAR (1g): 0.432 [mW/g] ± 0.06 dB, SAR (10g): 0.302 [mW/g] ± 0.04 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Muscle 835 MHz: σ = 0.93 [mho/m] ε_r = 56.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, FM ch799, muscle with beltclip, 09-10-01.DA3
Operator: DWS



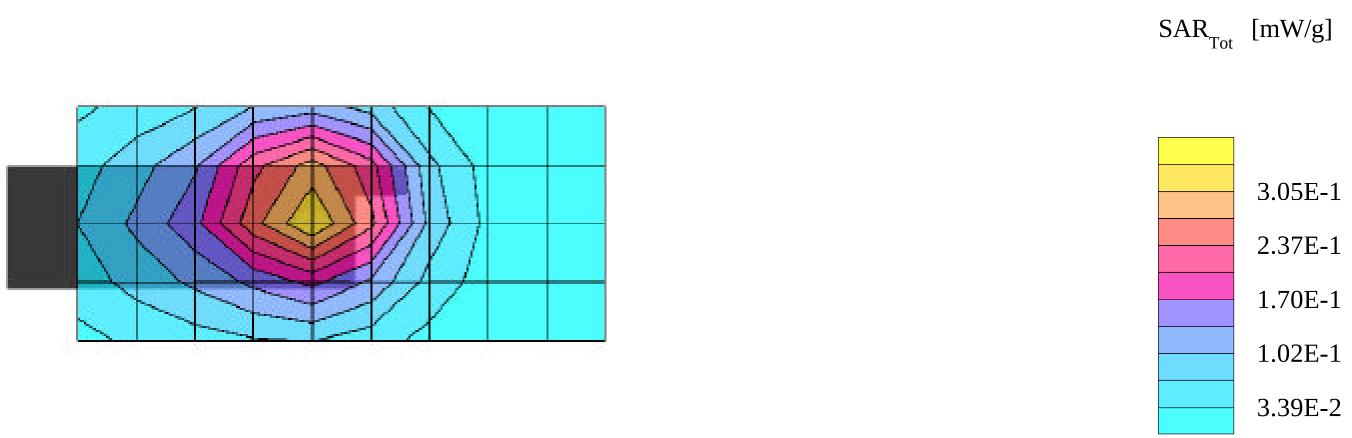
KWC-2235, CDMA ch777, muscle with beltclip

SAR (1g): 0.516 [mW/g] ± 0.07 dB, SAR (10g): 0.368 [mW/g] ± 0.06 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Muscle 835 MHz: σ = 0.93 [mho/m] ε_r = 56.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, CDMA ch777, muscle with beltclip 09-10-01.DA3
Operator: DWS



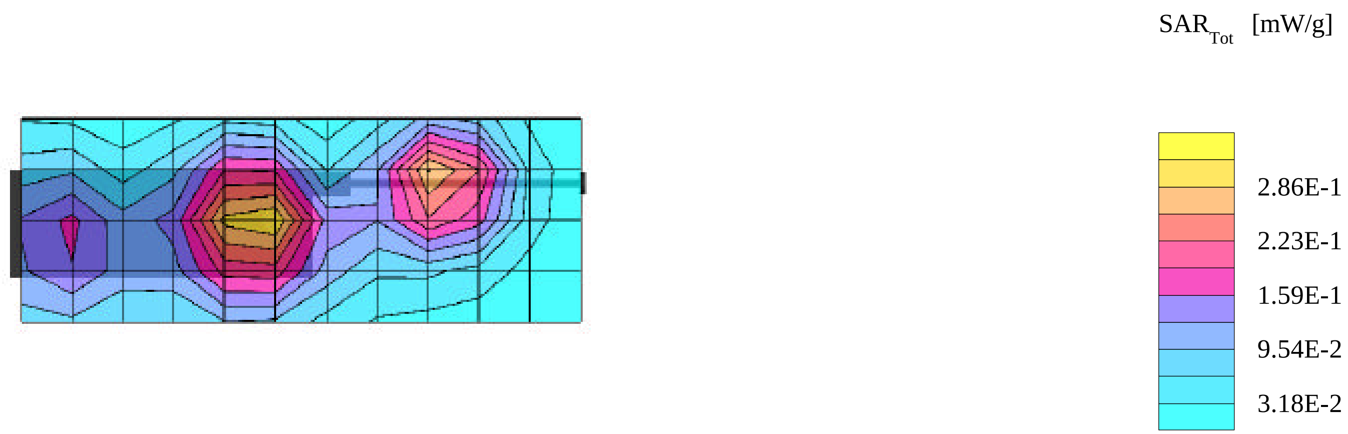
KWC-2235, CDMA ch777, muscle with beltclip

SAR (1g): 0.342 [mW/g] ± 0.03 dB, SAR (10g): 0.240 [mW/g] ± 0.05 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Muscle 835 MHz: σ = 0.93 [mho/m] ε_r = 56.7 ρ = 1.00 [g/cm³]
File Name: K1 P4A #1617, FCC Test, CDMA ch777, muscle with beltclip 09-10-01.DA3
Operator: DWS



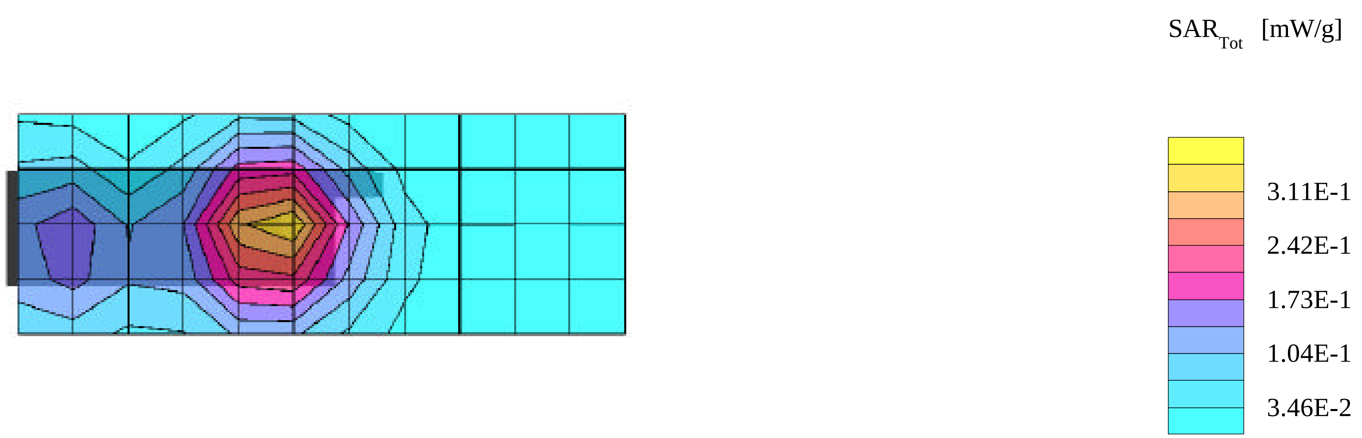
KWC-2235, PCS ch25, muscle with beltclip

SAR (1g): 0.323 [mW/g] ± 0.05 dB, SAR (10g): 0.196 [mW/g] ± 0.06 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(4.50,4.50,4.50)
Muscle 1800MHz: σ = 1.54 [mho/m] ε_r = 54.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, PCS ch25, muscle with beltclip, 09-10-01.DA3
Operator: DWS



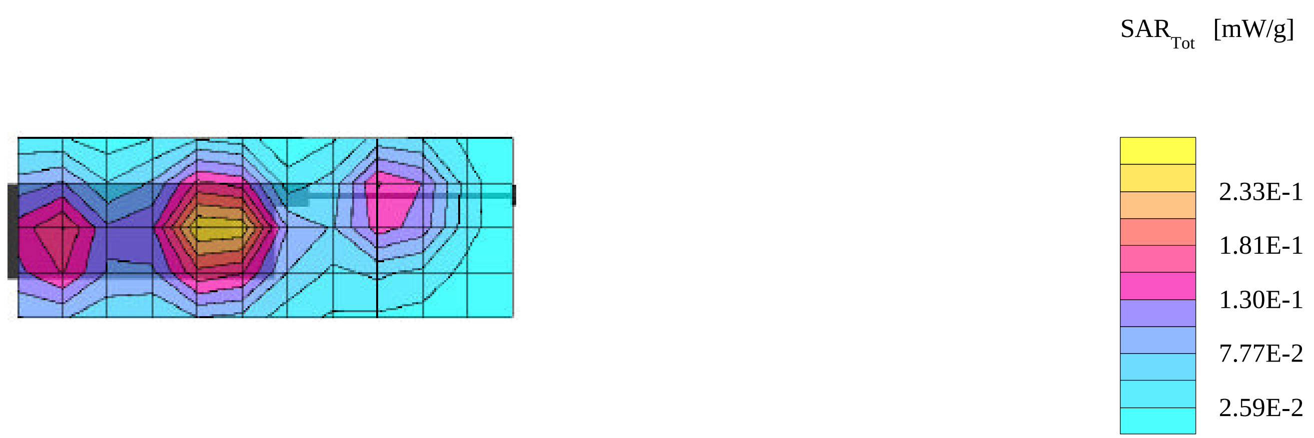
KWC-2235, PCS ch25, muscle with beltclip

SAR (1g): 0.341 [mW/g] ± 0.03 dB, SAR (10g): 0.207 [mW/g] ± 0.05 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(4.50,4.50,4.50)
Muscle 1800MHz: σ = 1.54 [mho/m] ε_r = 54.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, PCS ch25, muscle with beltclip, 09-10-01.DA3
Operator: DWS



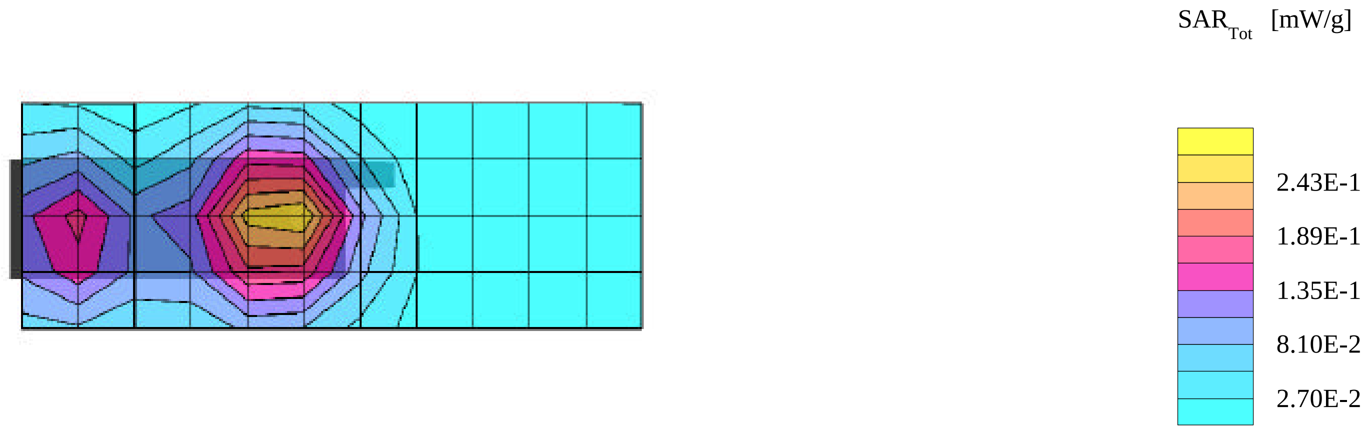
KWC-2235, PCS ch600, muscle with beltclip

SAR (1g): 0.271 [mW/g] ± 0.09 dB, SAR (10g): 0.162 [mW/g] ± 0.08 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(4.50,4.50,4.50)
Muscle 1800MHz: σ = 1.54 [mho/m] ε_r = 54.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, PCS ch600, muscle with beltclip, 09-10-01.DA3
Operator: DWS



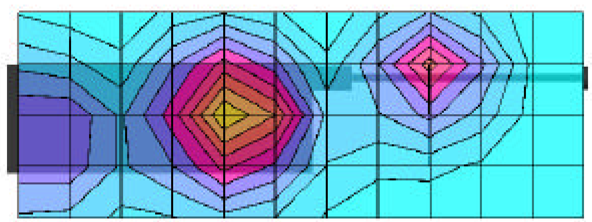
KWC-2235, PCS ch600, muscle with beltclip

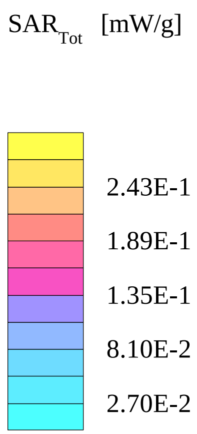
SAR (1g): 0.290 [mW/g] ± 0.10 dB, SAR (10g): 0.174 [mW/g] ± 0.08 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(4.50,4.50,4.50)
Muscle 1800MHz: σ = 1.54 [mho/m] ε_r = 54.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, PCS ch600, muscle with beltclip, 09-10-01.DA3
Operator: DWS



KWC-2235, PCS ch1175, muscle with beltclip

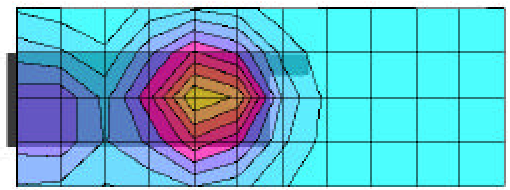
SAR (1g): 0.257 [mW/g] ± 0.03 dB, SAR (10g): 0.155 [mW/g] ± 0.04 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(4.50,4.50,4.50)
Muscle 1800MHz: σ = 1.54 [mho/m] ε_r = 54.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, PCS ch1175, muscle with beltclip, 09-10-01.DA3
Operator: DWS

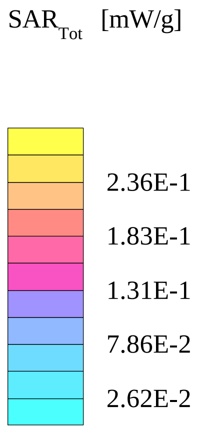




KWC-2235, PCS ch1175, muscle with beltclip

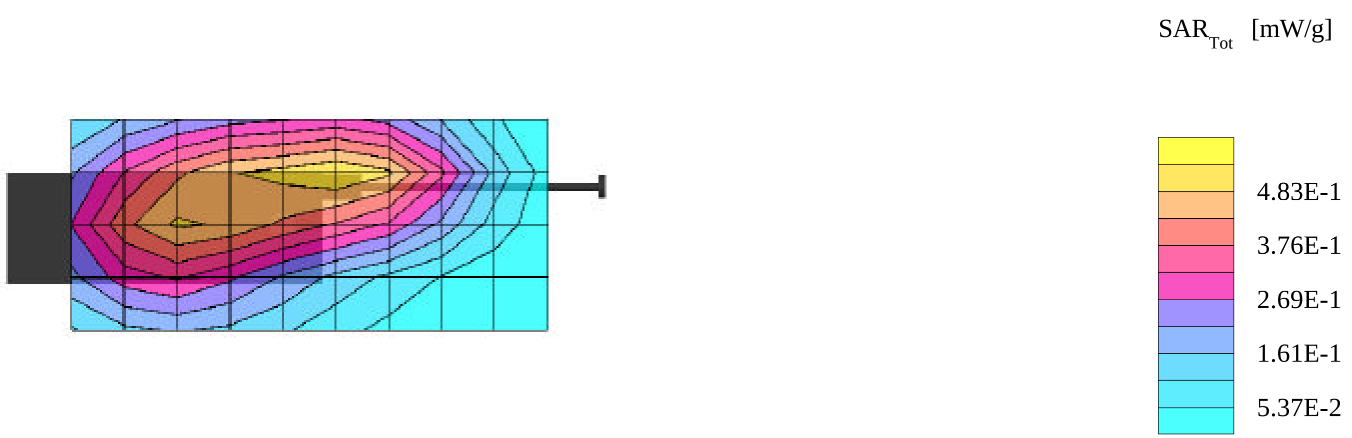
SAR (1g): 0.266 [mW/g] ± 0.03 dB, SAR (10g): 0.160 [mW/g] ± 0.00 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(4.50,4.50,4.50)
Muscle 1800MHz: σ = 1.54 [mho/m] ϵ_r = 54.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, PCS ch1175, muscle with beltclip, 09-10-01.DA3
Operator: DWS





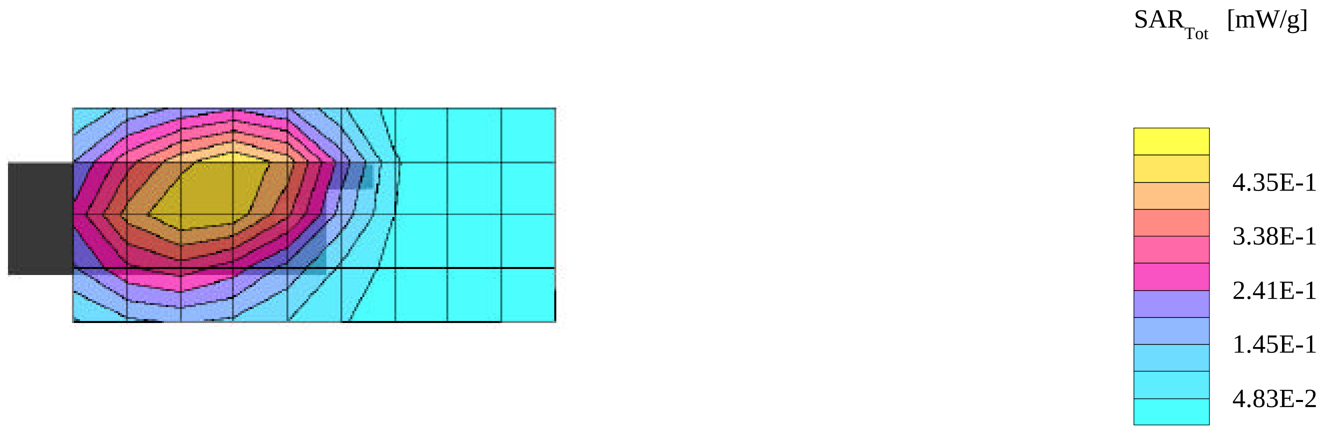
KWC-2235, FM ch991, muscle, separation=22.5mm

SAR (1g): 0.532 [mW/g] ± 0.03 dB, SAR (10g): 0.373 [mW/g] ± 0.02 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Muscle 835 MHz: σ = 0.93 [mho/m] ε_r = 56.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, FM ch991, muscle no beltclip, 09-10-01.DA3
Operator: DWS



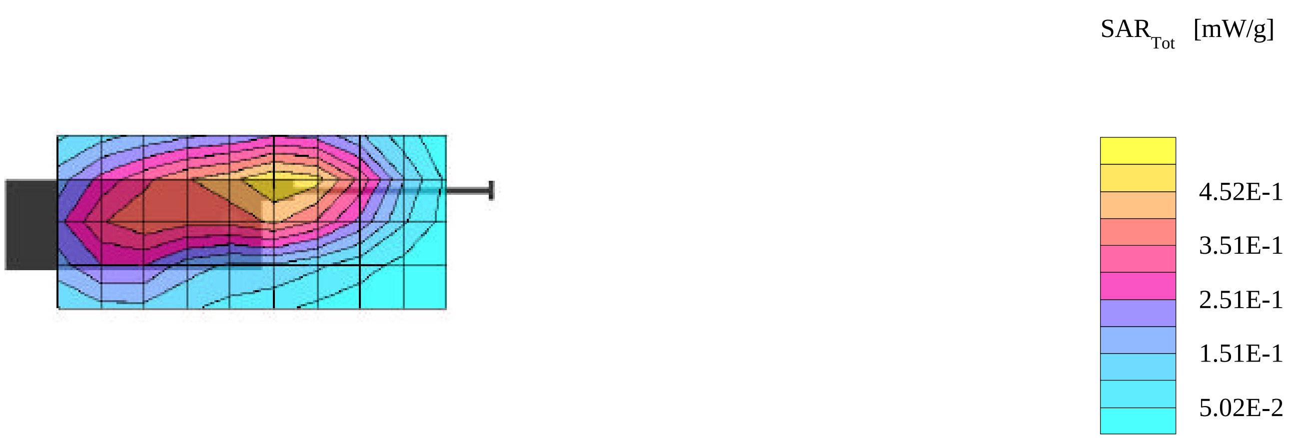
KWC-2235, FM ch991, muscle, separation=22.5mm

SAR (1g): 0.509 [mW/g] ± 0.04 dB, SAR (10g): 0.375 [mW/g] ± 0.04 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Muscle 835 MHz: σ = 0.93 [mho/m] ε_r = 56.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, FM ch991, muscle no beltclip, 09-10-01.DA3
Operator: DWS



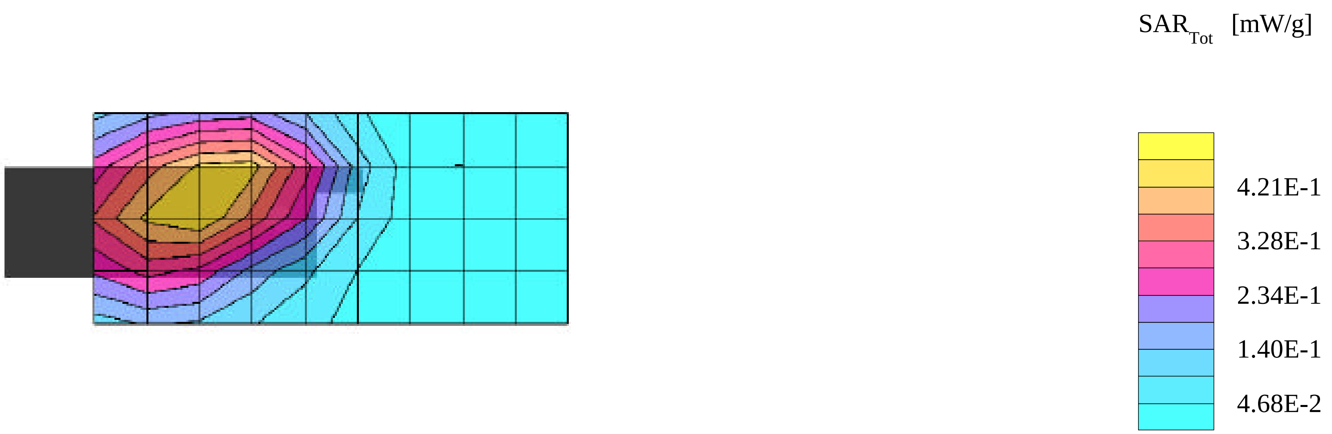
KWC-2235, FM ch383, muscle with beltclip

SAR (1g): 0.512 [mW/g] ± 0.01 dB, SAR (10g): 0.364 [mW/g] ± 0.03 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Muscle 835 MHz: σ = 0.93 [mho/m] ε_r = 56.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, FM ch383, muscle with beltclip, 09-10-01.DA3
Operator: DWS



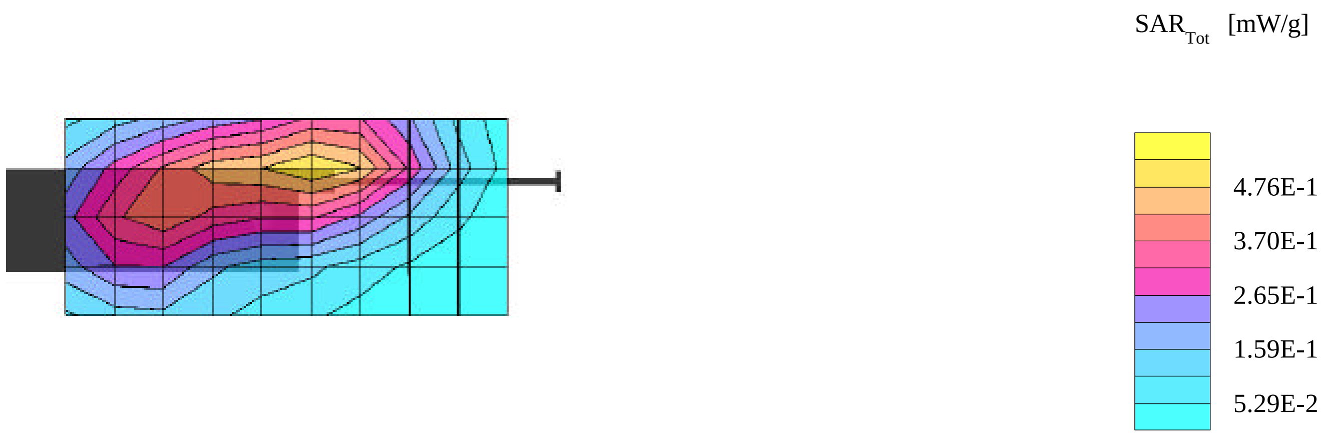
KWC-2235, FM ch383, muscle, separation=22.5mm

SAR (1g): 0.486 [mW/g] ± 0.05 dB, SAR (10g): 0.356 [mW/g] ± 0.03 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Muscle 835 MHz: σ = 0.93 [mho/m] ε_r = 56.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, FM ch383, muscle no beltclip, 09-10-01.DA3
Operator: DWS



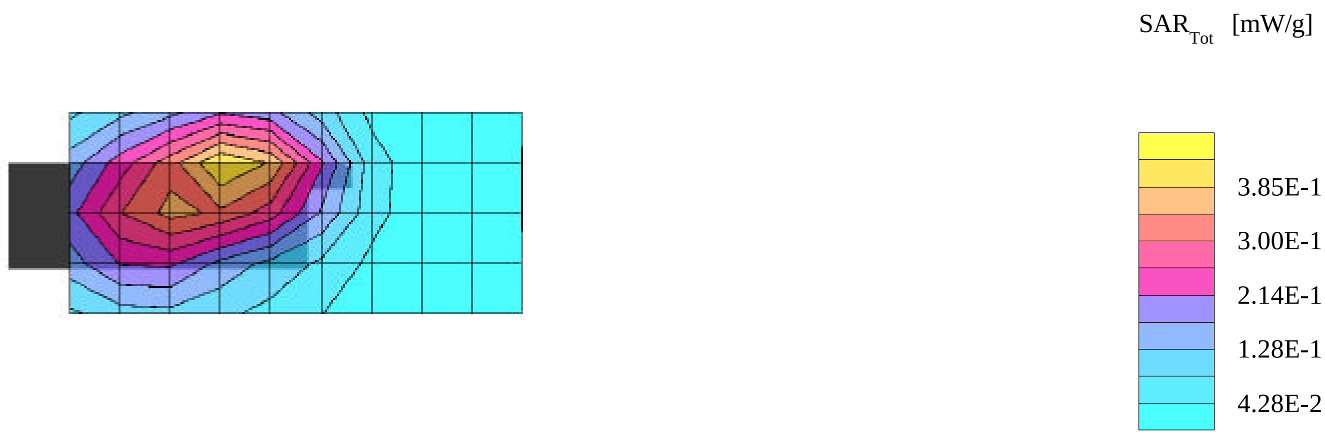
KWC-2235, FM ch799, muscle, separation=22.5mm

SAR (1g): 0.512 [mW/g] ± 0.06 dB, SAR (10g): 0.363 [mW/g] ± 0.07 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Muscle 835 MHz: σ = 0.93 [mho/m] ε_r = 56.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, FM ch799, muscle no beltclip, 09-10-01.DA3
Operator: DWS



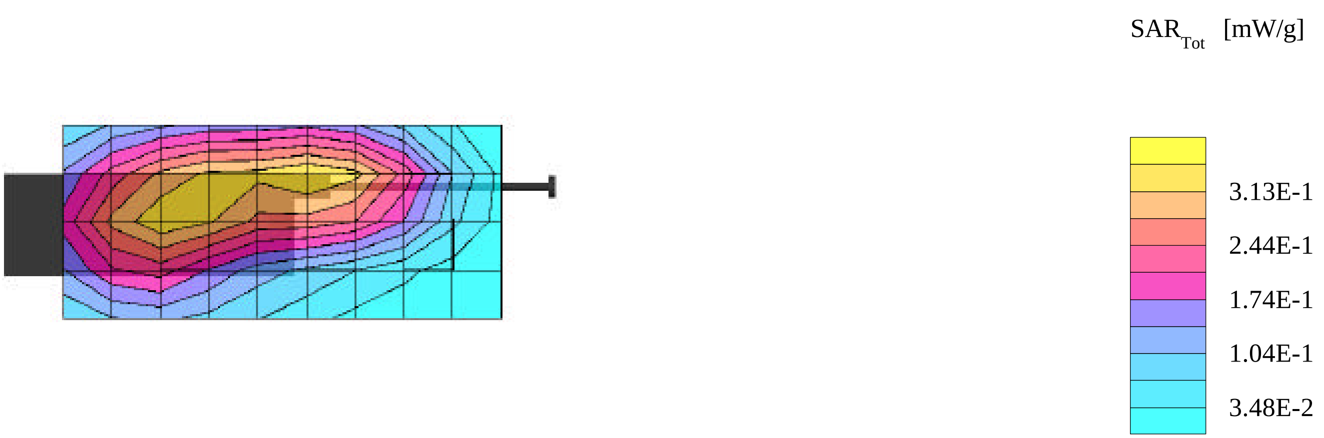
KWC-2235, FM ch799, muscle, separation=22.5mm

SAR (1g): 0.424 [mW/g] ± 0.11 dB, SAR (10g): 0.304 [mW/g] ± 0.10 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Muscle 835 MHz: σ = 0.93 [mho/m] ε_r = 56.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, FM ch799, muscle no beltclip, 09-10-01.DA3
Operator: DWS



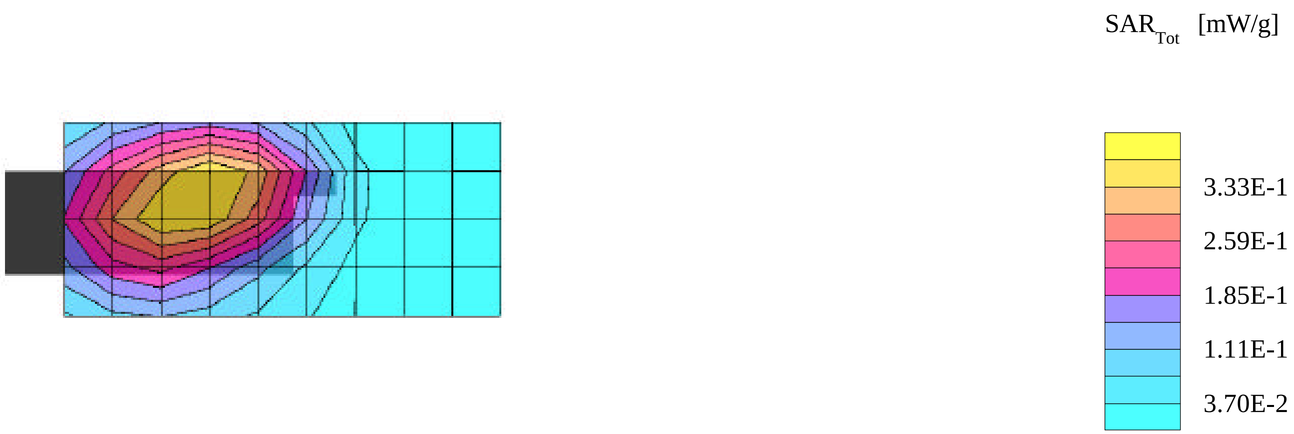
KWC-2235, CDMA ch383, muscle, separation=22.5mm

SAR (1g): 0.356 [mW/g] ± 0.09 dB, SAR (10g): 0.251 [mW/g] ± 0.09 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Muscle 835 MHz: σ = 0.93 [mho/m] ε_r = 56.7 ρ = 1.00 [g/cm³]
File Name: K1 P4A #1617, FCC Test, CDMA ch383, muscle no beltclip, 09-10-01.DA3
Operator: DWS



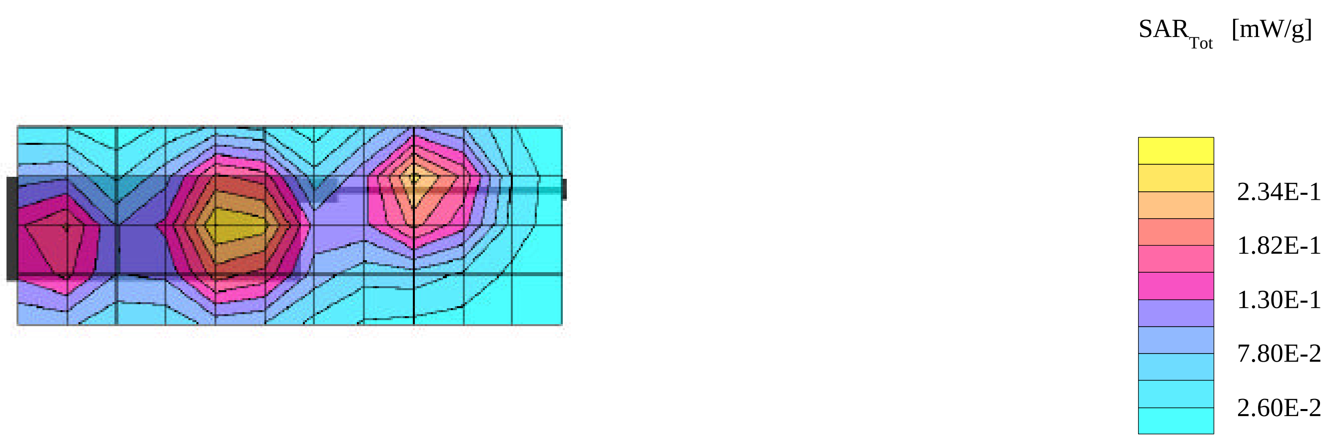
KWC-2235, CDMA ch383, muscle, separation=22.5mm

SAR (1g): 0.394 [mW/g] ± 0.10 dB, SAR (10g): 0.288 [mW/g] ± 0.05 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(5.36,5.36,5.36)
Muscle 835 MHz: σ = 0.93 [mho/m] ε_r = 56.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, CDMA ch383, muscle no beltclip, 09-10-01.DA3
Operator: DWS



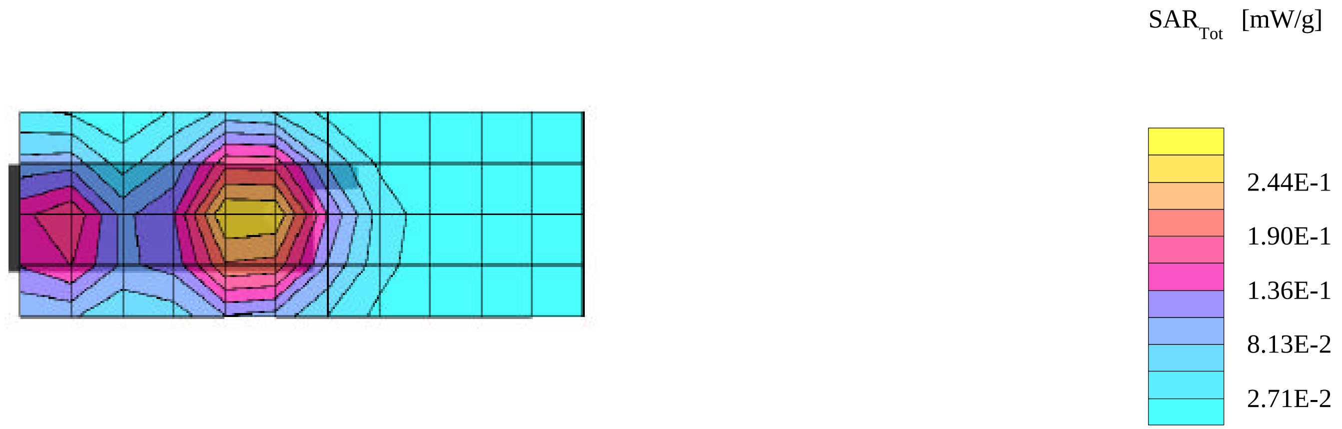
KWC-2235, PCS ch25, muscle, separation=22.5mm

SAR (1g): 0.273 [mW/g] ± 0.02 dB, SAR (10g): 0.167 [mW/g] ± 0.03 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(4.50,4.50,4.50)
Muscle 1800MHz: σ = 1.54 [mho/m] ε_r = 54.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, PCS ch25, muscle no beltclip, 09-10-01.DA3
Operator: DWS



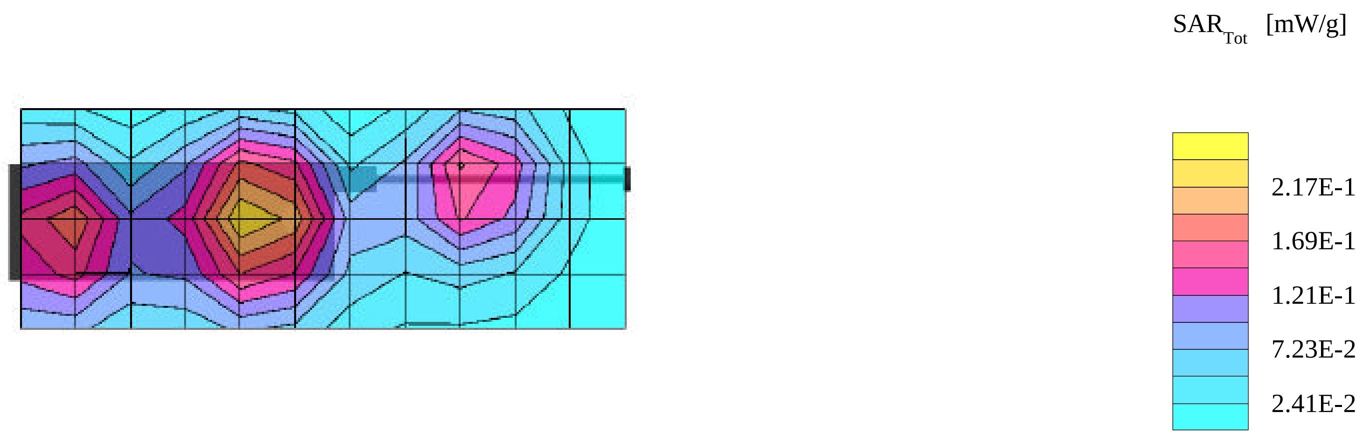
KWC-2235, PCS ch25, muscle, separation=22.5mm

SAR (1g): 0.296 [mW/g] ± 0.05 dB, SAR (10g): 0.182 [mW/g] ± 0.04 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(4.50,4.50,4.50)
Muscle 1800MHz: σ = 1.54 [mho/m] ε_r = 54.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, PCS ch25, muscle no beltclip, 09-10-01.DA3
Operator: DWS



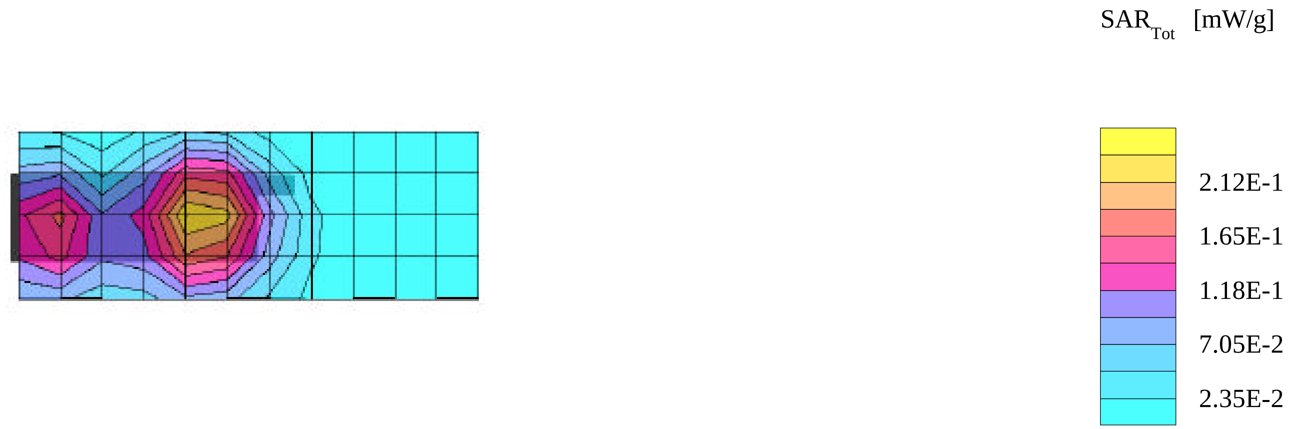
KWC-2235, PCS ch600, muscle, separation=22.5mm

SAR (1g): 0.243 [mW/g] ± 0.07 dB, SAR (10g): 0.148 [mW/g] ± 0.07 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(4.50,4.50,4.50)
Muscle 1800MHz: σ = 1.54 [mho/m] ε_r = 54.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, PCS ch600, muscle no beltclip, 09-11-01.DA3
Operator: DWS



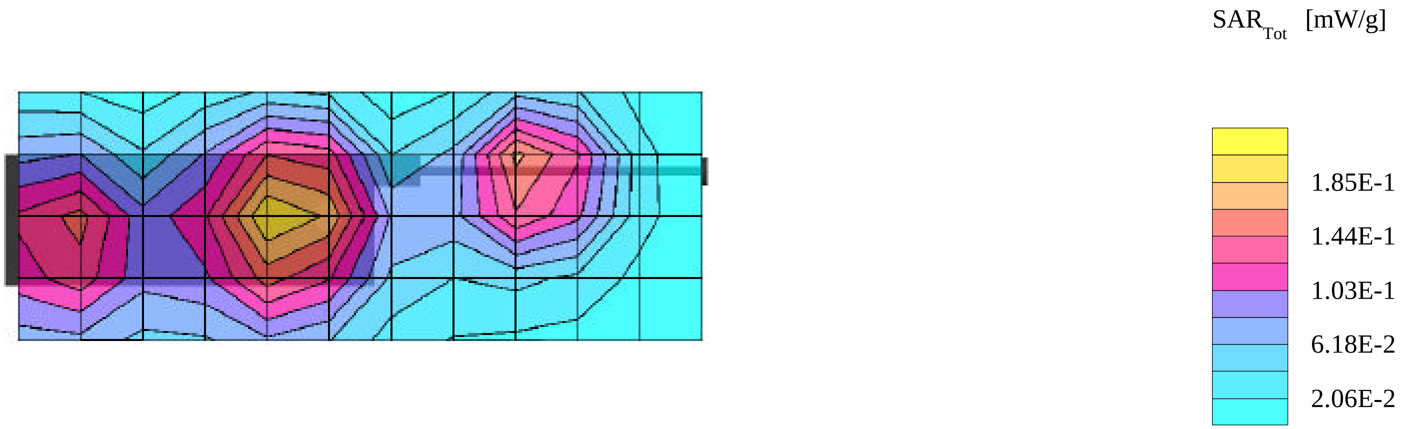
KWC-2235, PCS ch600, muscle, separation=22.5mm

SAR (1g): 0.248 [mW/g] ± 0.07 dB, SAR (10g): 0.151 [mW/g] ± 0.08 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(4.50,4.50,4.50)
Muscle 1800MHz: σ = 1.54 [mho/m] ε_r = 54.7 ρ = 1.00 [g/cm³]
File Name: K1 P4A #1617, FCC Test, PCS ch600, muscle no beltclip, 09-11-01.DA3
Operator: DWS



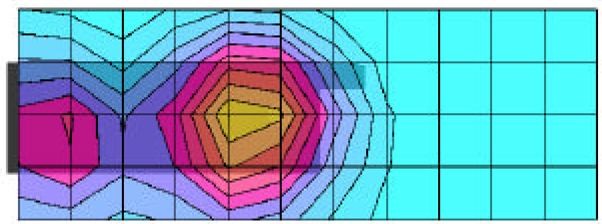
KWC-2235, PCS ch1175, muscle, separation=22.5mm

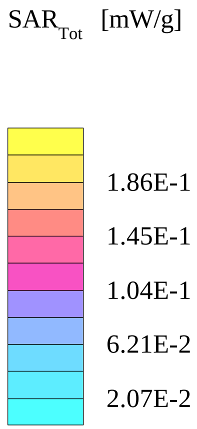
SAR (1g): 0.205 [mW/g] ± 0.08 dB, SAR (10g): 0.125 [mW/g] ± 0.07 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(4.50,4.50,4.50)
Muscle 1800MHz: σ = 1.54 [mho/m] ε_r = 54.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, PCS ch1175, muscle no beltclip, 09-11-01.DA3
Operator: DWS



KWC-2235, PCS ch1175, muscle, separation=22.5mm

SAR (1g): 0.214 [mW/g] ± 0.03 dB, SAR (10g): 0.130 [mW/g] ± 0.04 dB
Cubes (2) (Worst-case extrapolation)
Generic Twin Phantom; Flat Section
Probe: ET3DV5 - SN1353; ConvF(4.50,4.50,4.50)
Muscle 1800MHz: σ = 1.54 [mho/m] ε_r = 54.7 ρ = 1.00 [g/cm^3]
File Name: K1 P4A #1617, FCC Test, PCS ch1175, muscle no beltclip, 09-11-01.DA3
Operator: DWS





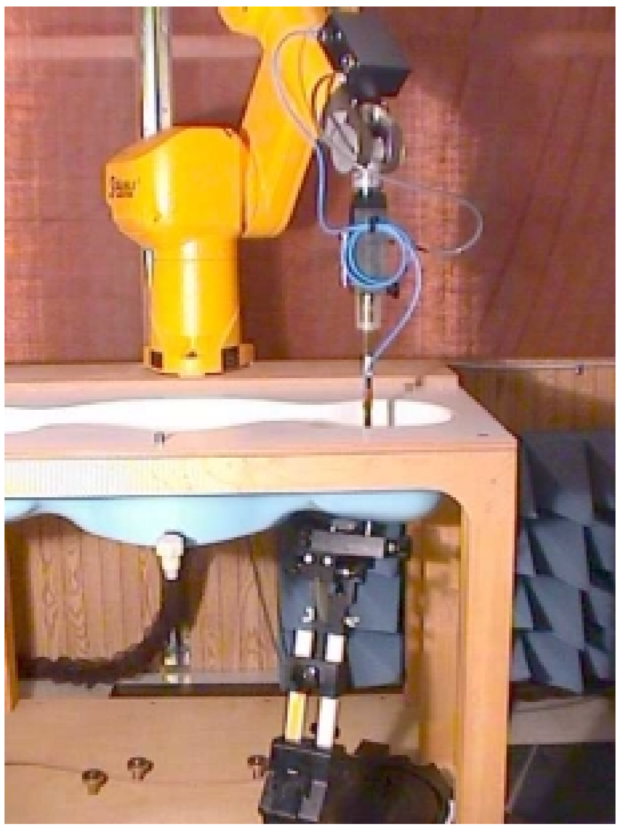
12 PHOTOS

KWC-2235

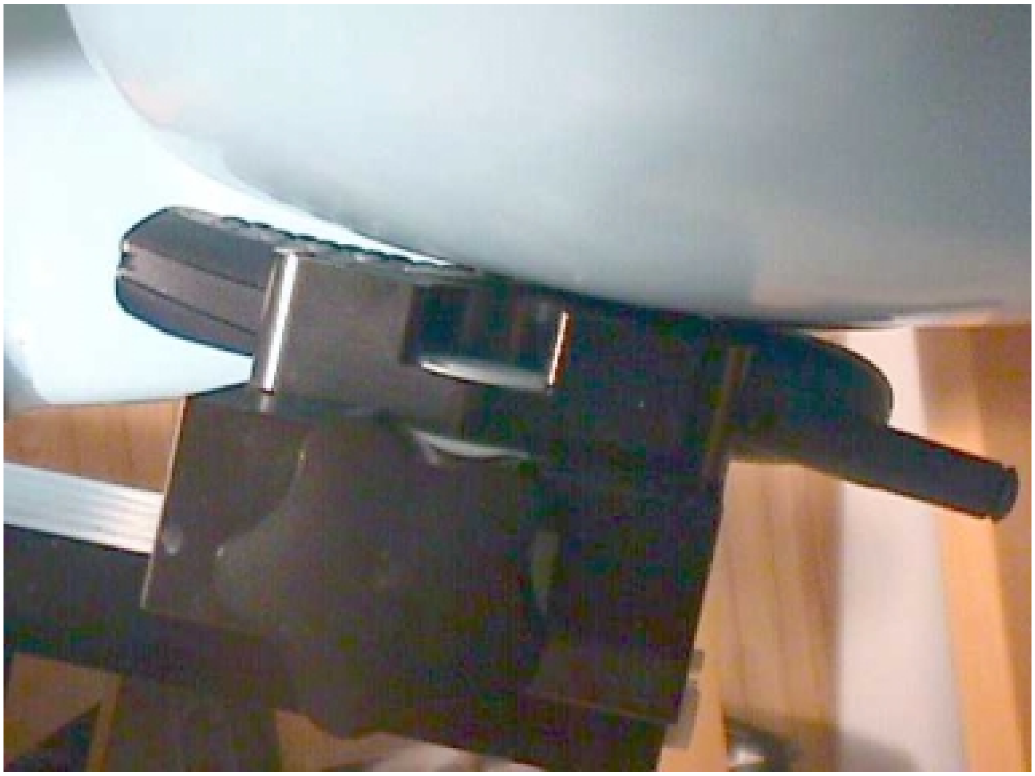
SAR Tester

Left Head SAR Test

(a)



(b)



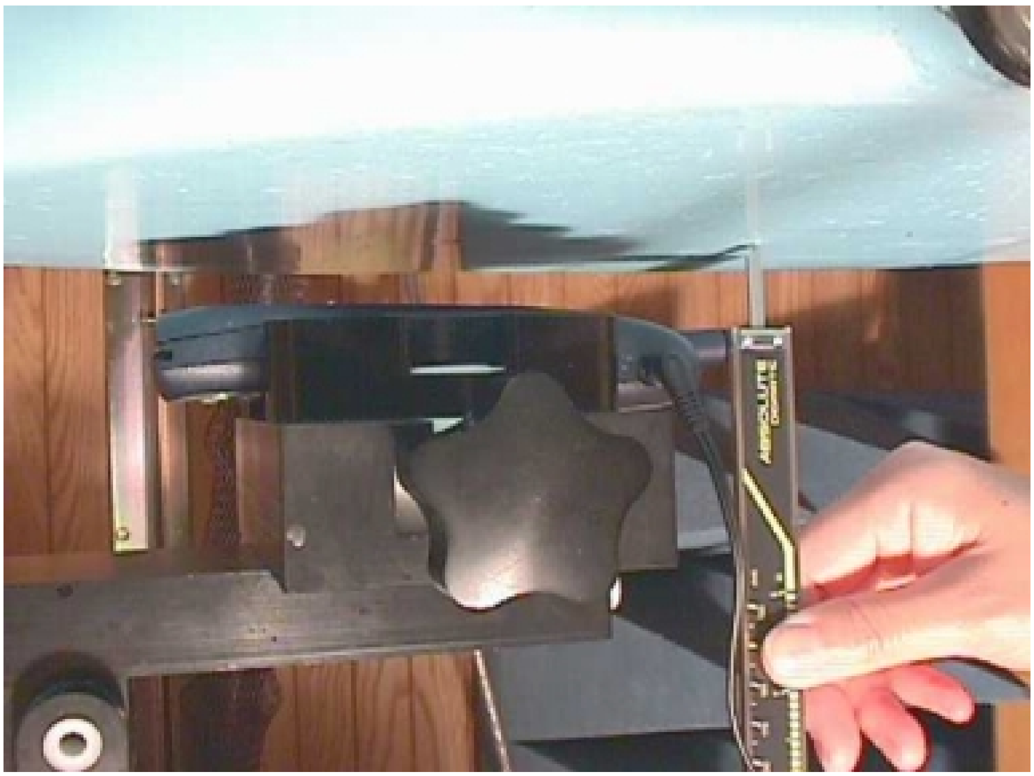
Body-Worn SAR Test

(a)

(b)

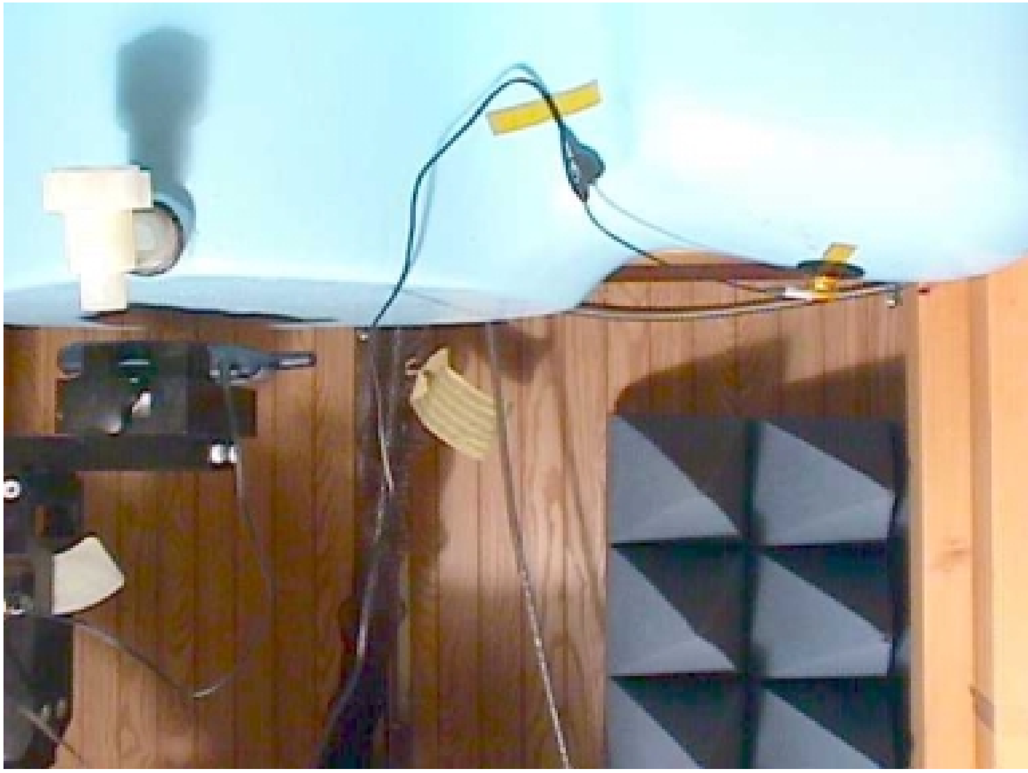
(c)

(d)



(e)

(f)



Belt Clip

(a)

(b)

(d)

References

[1] Klaus Meier, Voker Hombach, Ralf Kastle, Roger Yew-Siow Tay, and Neils Kuster "The dependence of Electromagnetic Energy Absorption upon Human-Head Modeling at 1800 MHz" IEEE Transactions on Microwave Theory and Techniques, Vol. 45 No 11, November 1997

[2] Volker Hombach, Klaus Meier, Michael Burkhardt, Eberhard Kuhn, and Neils Kuster "The Dependence of EM Energy Absorption Upon Human Head Modeling at 900 MHz" " IEEE Transactions on Microwave Theory and Techniques, Vol. 44 No 10, October 1996

[3] Thomas Schmid, Oliver Egger, Niels Kuster "Automated E-Field Scanning System for Dosimetric Assessments" IEEE Transactions on Microwave Theory and Techniques, Vol 44, No 1, January 1996

[4] Niels Kuster, Q. Balzano, and J.C. Lin "Mobile Communications Safety" Chapman & Hall, First edition 1997