



December 2, 1999
SAR Test Report for Motorola portable cellular phone (FCC ID IHDT56ZQ1).

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1. Introduction

This report supplements the report detailing SAR measurements for Motorola portable cellular phone FCC ID IHDT56ZQ1 dated December 1,1999. The report of December 1,1999 details the test results for the "standard" configuration (phone housing style R). This report details the test results for an alternate configuration (phone housing style Z). Both housing styles contain the same transceiver. The test setup and conditions of this report are identical to the referenced report. Thus only the sections relevant to the actual test results are included in this report and show those test results and also give supporting information to demonstrate close similarity of portable cellular phones.

2. Description of Test Sample

A prototype unit serial number FC826034 was measured. This unit is identical in physical construction, maximum radiated power levels and antenna structure to units that will be in production. It transmits in the frequency range of 824 to 849 MHz using AMPS and TDMA modes, and 1850 to 1910 MHz using TDMA mode. The unit was tested at its maximum transmitter power. The unit is equipped with a fixed antenna that serves as both a receive and transmit antenna. The antenna has a single operating position as shown in figure 1.



Figure 1. Front of Phone

Figure 2 shows the test unit as it is placed onto the Motorola phantom. For the purposes of the actual SAR tests the Motorola phantom head is tilted on its side by 90 degrees so that a vertically oriented measurement probe can easily scan an area where the phone is in close contact with the phantom and the SAR will be the highest.



Figure 2. Phone against side of Phantom Head.

3. Test Sample Conditions

For the purposes of these tests the subject phone was positioned on the measurement phantom per the instructions in the Motorola users manual for the subject phone. The position used for the tests is the 3-point contact position. In this position the test sample contacts the phantom's ear and cheek and is positioned with a repeatability of better than $\pm 6\%$. Since the antenna is not located on the center of the phone, the SAR was measured with the phone on both the left and right side talk positions (See figure 2). Due to the construction of the phone, the base of the antenna is 26 mm away from the phantom for the left side head, which is the closest.

4. SAR Test Results

Figure 3 shows the phone overlaid with a typical contour plot. The phone is placed on the phantom's head with the center of the phone's speaker at the center of the ear, and the center line of the phone extends downward to the center of the phantom's mouth. The same orientation and phone position are used for left and right side talk positions.

The maximum SAR level for the Motorola portable cellular phone (FCC ID IHDT56ZQ1) in the 800MHz band is 1.46 W/kg and was found on the right side head. A full data set output of the two

test conditions with the highest SAR values from the Dasy™ measurement system are included as appendix A. The test conditions included are indicated as bold numbers in the following table. All other test conditions measured lower SAR values than those included. Note that digital mode SAR data was measured only for the test conditions that resulted in the highest analog SAR value. This is because the only difference between analog and digital modes that can impact SAR is the average transmitter power.

800MHz Analog Channel	Left side head	Right side head	Conducted Power (Watts)
Low	1.46	1.44	0.32
Mid	0.96	0.99	0.35
High	0.94	1.00	0.33

800MHz Digital Channel	Left side head	Right side head	Conducted Power (Watts)
Low	0.55	0.63	0.45

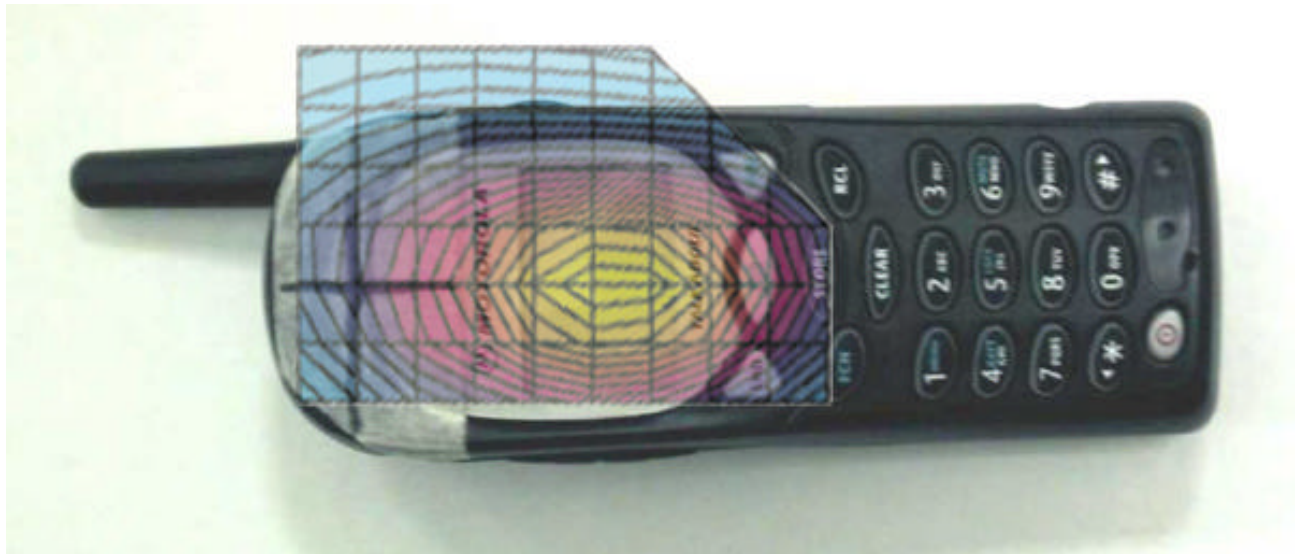


Figure 3. 800MHz Contour Plot Overlaid on Face of Phone.

The maximum SAR level for the Motorola portable cellular phone (FCC ID IHDT56ZQ1) in the 1900MHz band is 0.83 W/kg and was found on the left side head. A full data set output of the test condition with the highest SAR values from the Dasy™ measurement system is included as appendix A. The test condition included is indicated as a bold number in the following table. All other test conditions measured lower SAR values than those included. Figure 4 shows the contour plot of the highest test condition overlaid onto a picture of the phone.

1900MHz Channel	Left side head	Right side head	Conducted Power (Watts)
Low	0.76	0.83	0.47
Mid	0.75	0.75	0.50
High	0.70	0.82	0.44

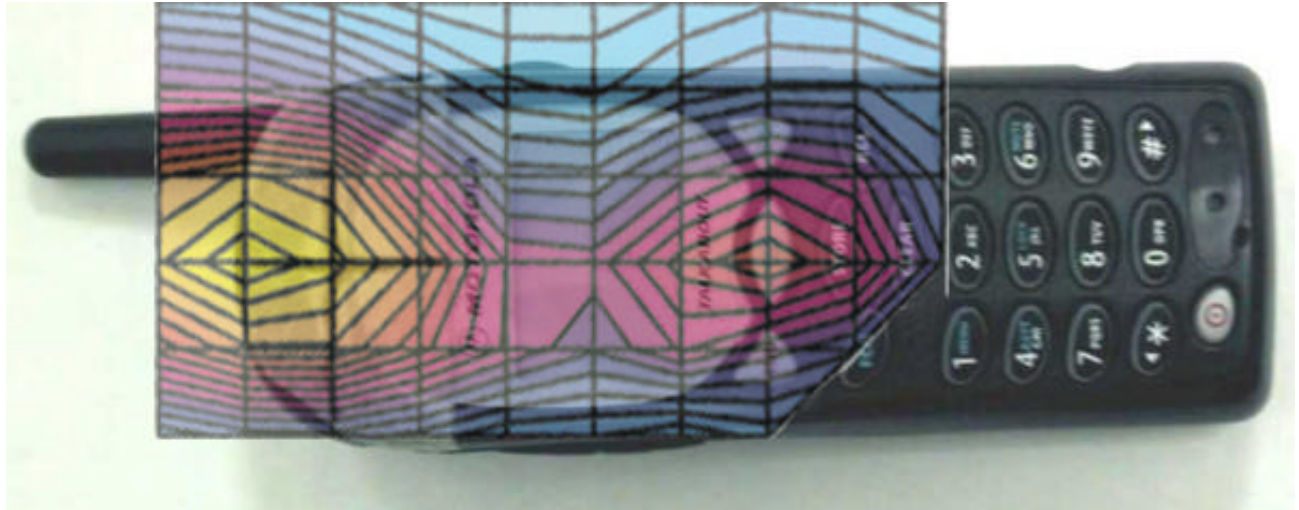


Figure 4. 1900MHz Contour Plot Overlaid on Face of Phone.

5. Body Worn Configuration

The cellular phone (FCC ID IHDT56ZQ1) can be used in a body-worn configuration using the supplied belt clip. We have performed an evaluation to show RF exposure compliance when used with the belt clip. Figure 5 shows the test unit as it is placed onto the phantom.



Figure 5. Phone In Supplied Belt Clip Against Phantom

The following table shows the SAR values for the body worn condition for 800MHz analog mode. A full data set output of the test condition with the highest SAR values from the Dasy™ measurement system is included as appendix B. The test condition included is as indicated as a bold number in the following table. All other test conditions measured lower SAR values than those included.

800MHz Channel	Belt Clip
Low	0.64
Mid	0.37
High	0.34

The following table shows the SAR values for the body worn condition for 1900MHz TDMA mode. A full data set output of the test condition with the highest SAR values from the Dasy™ measurement system is included as appendix B. The test condition included is as indicated as a bold number in the following table. All other test conditions measured lower SAR values than those included.

1900MHz Channel	Belt Clip
Low	0.44
Mid	0.50
High	0.54

6. Battery Options

The cellular phone (FCC ID IHDT56ZQ1) uses only one battery model. This model was used for all testing.

7. Summary

The SAR values found for the portable cellular phone (FCC ID IHDT56ZQ1) are below the maximum recommended levels of 1.6 W/kg.

Appendix A

The following pages are printouts from the Dasy™ measurement system of the data as indicated.

s/n FC826034

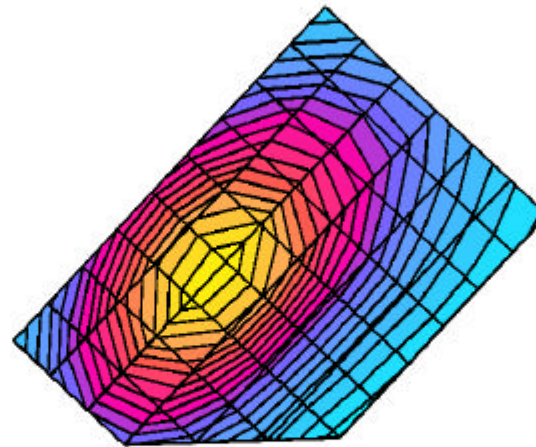
Left ear Referenced Phantom; Left ear Phantom Section; Position: (90°,180°); Frequency: 837 MHz

Probe: ET3DV6R - SN1418; ConvF(5.71,5.71,5.71); Crest factor: 1.0; Brain 835MHz: $\sigma = 0.86$ mho/m $\epsilon_r = 43.4$ $\rho = 1.00$ g/cm³

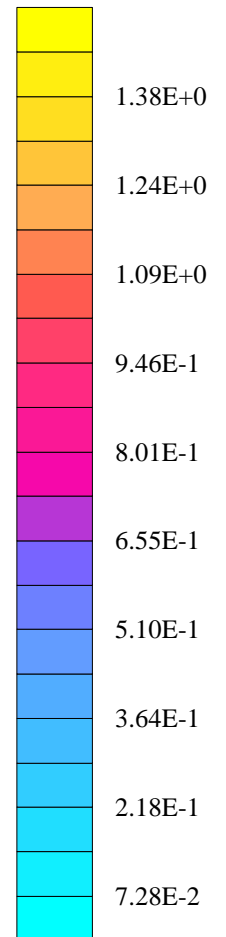
Cube 4x4x7: SAR (1g): 1.46 mW/g, SAR (10g): 1.06 mW/g, (Worst-case extrapolation)

Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0

Powerdrift: 0.20 dB



SAR_{Tot} [mW/g]



11/16/99

s/n FC826034

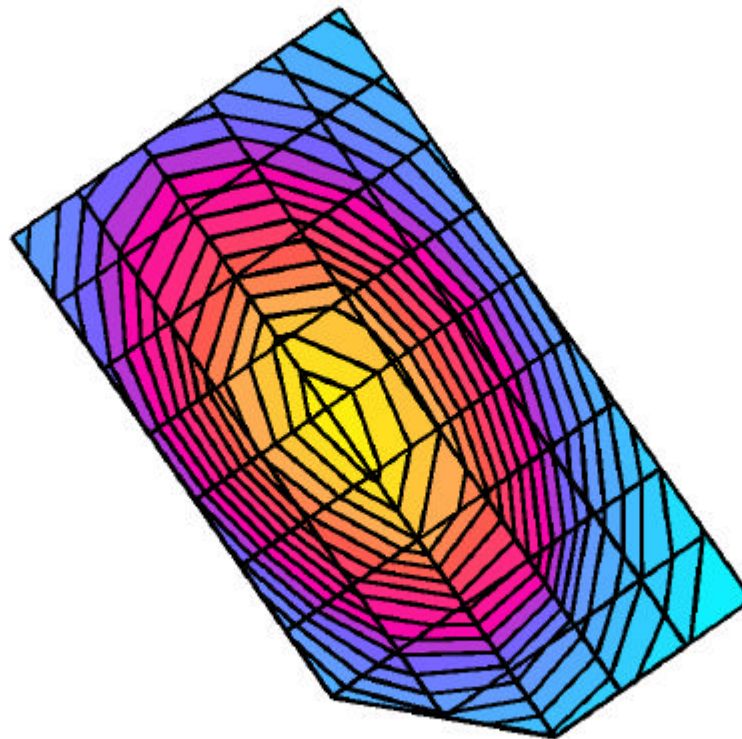
Referenced Right Head Andy Phantom; R_Head Section; Position: (90°,90°); Frequency: 837 MHz

Probe: ET3DV6R - SN1418; ConvF(5.71,5.71,5.71); Crest factor: 1.0; Brain 835MHz: $\sigma = 0.86$ mho/m $\epsilon_r = 43.4$ $\rho = 1.00$ g/cm³

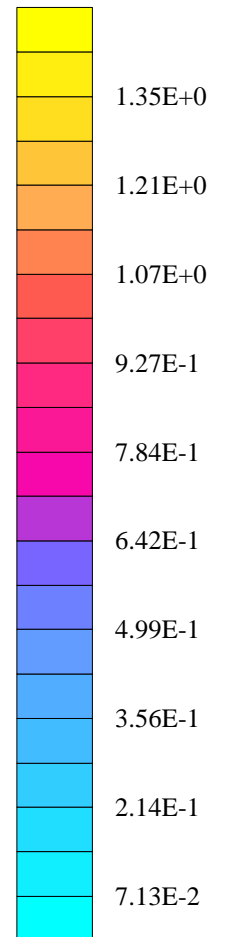
Cube 4x4x7: SAR (1g): 1.44 mW/g, SAR (10g): 1.02 mW/g, (Worst-case extrapolation)

Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0

Powerdrift: 0.10 dB



SAR_{Tot} [mW/g]



11/16/99

s/n FC826034

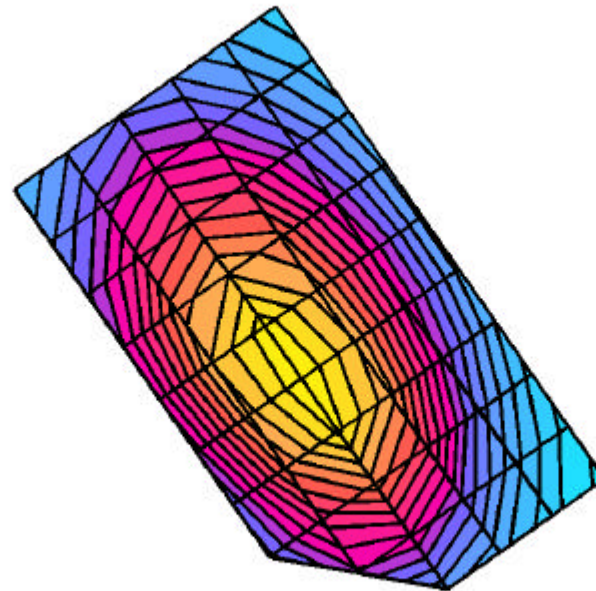
Referenced Right Head Andy Phantom; R_Head Section; Position: (90°,90°); Frequency: 837 MHz

Probe: ET3DV6R - SN1418; ConvF(5.71,5.71,5.71); Crest factor: 1.0; Brain 835MHz: $\sigma = 0.86$ mho/m $\epsilon_r = 43.4$ $\rho = 1.00$ g/cm³

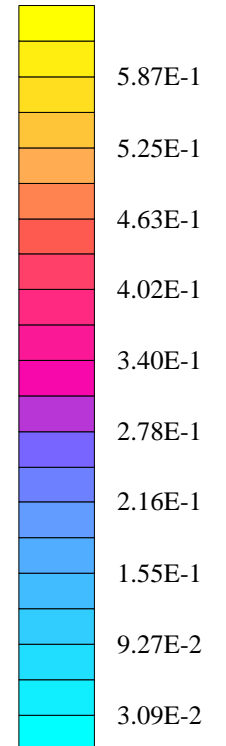
Cube 4x4x7: SAR (1g): 0.626 mW/g, SAR (10g): 0.456 mW/g, (Worst-case extrapolation)

Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0

Powerdrift: 0.07 dB



SAR_{Tot} [mW/g]



11/08/99

s/n FC826034

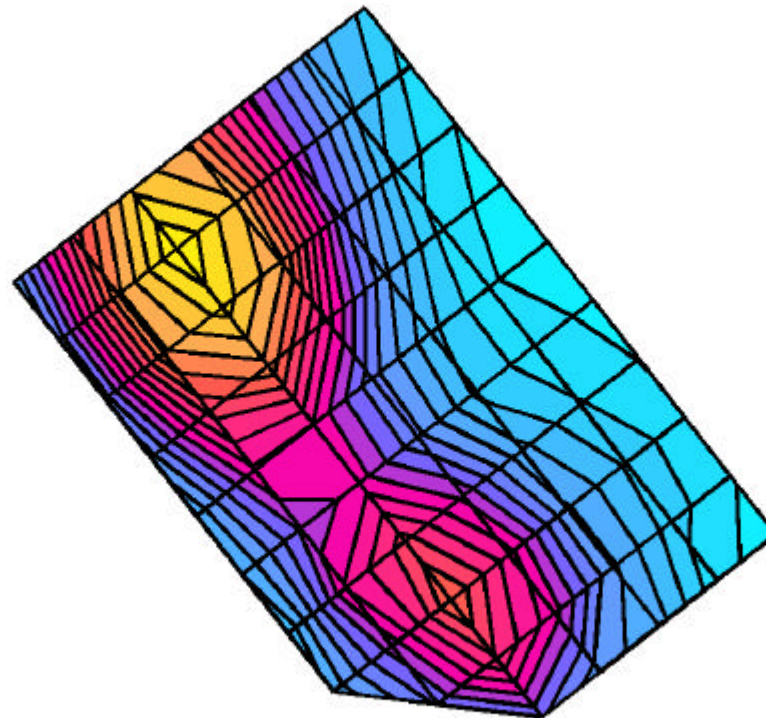
right Phantom; right ear#% Section; Position: (90°,0°); Frequency: 1853 MHz

Probe: ET3DV6R - SN1418; ConvF(5.15,5.15,5.15); Crest factor: 3.0; Brain 1800 MHz: $\sigma = 1.80$ mho/m $\epsilon_r = 40.0$ $\rho = 1.00$ g/cm³

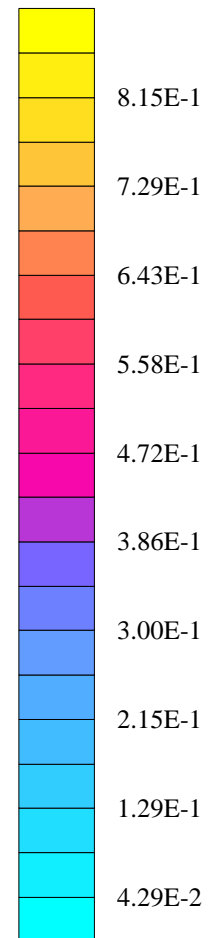
Cube 5x5x7: SAR (1g): 0.828 mW/g, SAR (10g): 0.478 mW/g * Max outside, (Worst-case extrapolation)

Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0

Powerdrift: -0.27 dB



SAR_{Tot} [mW/g]



Appendix B

The following pages are printouts from the Dasy™ measurement system of the data as indicated.

11/15/99

s/n FC826034 BeltClip

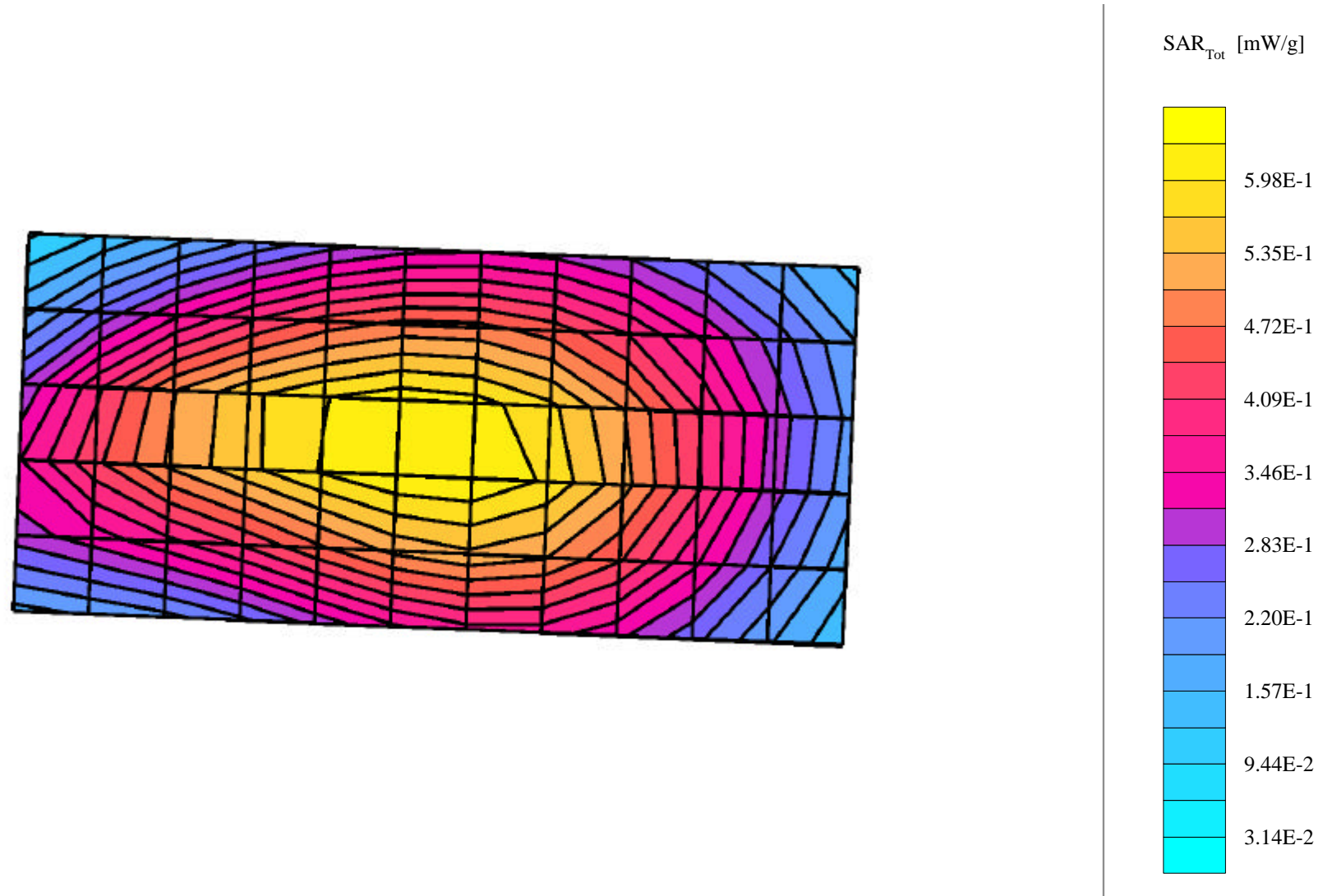
Old Flat Phantom Phantom; Section; Position: (90°,90°); Frequency: 900 MHz

Probe: ET3DV6R - SN1418; ConvF(5.71,5.71,5.71); Crest factor: 1.0; Brain 900 MHz: $\sigma = 0.89$ mho/m $\epsilon_r = 40.6$ $\rho = 1.00$ g/cm³

Cube 4x4x7: SAR (1g): 0.642 mW/g, SAR (10g): 0.471 mW/g, (Worst-case extrapolation)

Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0

Powerdrift: 0.22 dB



11/15/99

s/n FC826034

Old Flat Phantom Phantom; Section; Position: (90°,0°); Frequency: 1900 MHz

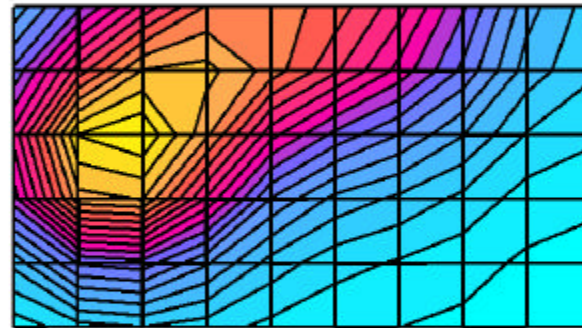
Probe: ET3DV6R - SN1418; ConvF(5.15,5.15,5.15); Crest factor: 3.0; Brain 1800 MHz: $\sigma = 1.76$ mho/m $\epsilon_r = 39.0$ $\rho = 1.00$ g/cm³

Cube 5x5x7: SAR (1g): 0.542 mW/g, SAR (10g): 0.292 mW/g, (Worst-case extrapolation)

Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0

Penetration depth: 7.5 (7.2, 8.1) [mm]

Powerdrift: -0.04 dB



SAR_{Tot} [mW/g]

