



July 26, 1999

Supplement to SAR Test Report for Motorola portable cellular phone (FCC ID IHDT56ZF1).

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1. Summary of FCC request for additional information

There was a request for additional information regarding relationship between the use of the product and the SAR test data submitted with the Report for Motorola's portable cellular phone (FCC ID IHDT56ZF1) dated May 28, 1999. The requested information may be summarized as follows:

1. Whether the use of the holster for body worn operations meets the RF Guidelines.
2. Whether the PCMCIA card can be used when the phone is in a "body-worn" configuration and, if so, will the RF Guidelines be met.
3. Whether SAR data needs to be submitted for the external antenna option.
4. Whether the product's battery options affect compliance with the RF Guidelines.

2. Body Worn Configuration Evaluation

The cellular phone (FCC ID IHDT56ZF1) can be used in a body-worn configuration using the supplied holster. With proper usage of this holster the antenna is kept at least one inch away from the user's body. We have performed an evaluation to show RF exposure compliance when used with the holster. Figure 1 shows the test unit as it is placed onto the phantom. The test sample is capable of operation in a test mode that allows control of the transmitter without the need to place actual phone calls. This guarantees that the unit does not change its transmitter power, and that the resultant SAR values will not be affected by external connections. For the purposes of this test the unit is commanded to test mode and manually set to the proper channel, transmitter power level and transmit mode of operation. The test sample was tested only in the test condition that resulted in the highest value when positioned adjacent to the phantom head (for this sample that is in analog mode and channel 384). When the test sample was tested in analog mode the crest factor (the ratio between peak and average power) was set to 1. The phone is then placed in the SAR measurement system with a fully charged battery. At the end of the test the Dasy™ system measures the drift of the SAR at a fixed point in the phantom so as to ensure that the test sample has not changed in transmitter power. For the purposes of these tests, the transmitter was operated at the highest transmitter output.



Figure 1. Phone In Supplied Belt Clip Against Phantom

Probe serial number 1375 was used for the measurements. It was calibrated at SPEAG™, and has a calibration date July 1, 1999. A copy of the calibration certificate is included as appendix B. Dipole Validation Kit type D900V2, serial number 036 was used to validate the system accuracy at 800MHz. The validation SAR value is 9.56 mW/g normalized to 1 Watt, and the Dasy™ system used for the test phone measured 10.28 mW/g normalized to 1 Watt. This is within the required accuracy, and thus the measured SAR values are considered correct. See appendix C for printout of the validation test from the Dasy™ measurement system. Dipole Validation Kit type D1800V2, serial number 226 was used to validate the system accuracy at 1900MHz. The validation SAR value is 39.9 mW/g normalized to 1 Watt, and the Dasy™ system used for the test phone measured 40.8 mW/g normalized to 1 Watt. This is within the required accuracy, and thus the measured SAR values are considered correct. See appendix C for printout of the validation test from the Dasy™ measurement system. The resultant SAR value from the evaluation is below the 1.6 mw/g limit. See appendix A for this data.

Also, the manual is currently under revision to include the following text:

"For body-worn operation, the antenna should be kept at least one inch from the body when transmitting. A carry holder with a belt clip is provided with the radio for body-worn use.

3. PCMCIA Card Utilization

The cellular phone (FCC ID IHDT56ZF1) can not be used in a body-worn configuration when a PCMCIA card is utilized. The PCMCIA card uses an cable that plugs into the bottom of the phone and when installed will physically prohibit the phone from fitting into the supplied holster.

4. External Antenna Option Evaluation

The Motorola Personal Communications Sector Product Safety Laboratory has evaluated the portable cellular phone (FCC ID IHDT56ZF1) external antenna option for the need to conduct SAR evaluation. Given the design, recommended installation and how the phone operates with this option; when properly installed and used with this option, the phone/option combination satisfies the criteria to be considered a 'mobile device' as defined in Federal Communications Commission section 47 CFR § 2.1091 titled "Radio frequency radiation exposure evaluation: mobile devices."

In section § 2.1091, paragraph (b) defines a mobile device as "a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons." The 800/1900MHz TDMA StarTAC transceiver is intended to be installed into a vehicle such that the transceiver is physically secured at one location according to the Universal Hands-Free Car Kit StarTAC & V3600 Series Cellular Phones Installation Guideline. The antenna is to be located outside of the vehicle and its location should be such that at least 40 cm of conductive horizontal surface extends in all directions from the center of the antenna. Based on the installation of the transceiver and the antenna, the transmitters radiating structure is more than 20 centimeters from the user. Thus, the 800/1900MHz TDMA StarTAC is a "mobile device" as defined in section § 2.1091 paragraph (b). The installation guide describes the recommended installation of both the transceiver and the external antenna.

Paragraph (c) gives the descriptions of types of mobile devices that are subject to routine environmental evaluation for RF exposure based on frequencies of operation and transmit EIRP. The 800/1900MHz TDMA StarTAC operates at a transmit frequencies of 824 to 849MHz and 1850 to 1910MHz. It has a transmit conducted power of less than 0.6 Watt. The mobile antenna supplied with the transceiver has a maximum gain of 5dBi, and minimum cable loss of 1.56dB at 800MHz and 2.7dB at 1900MHz, also there is a loss of 3dB in the coupling of the antenna to the cable, together resulting in a maximum EIRP of 0.50 Watts. Since the transceivers transmit frequency is 800MHz and its EIRP with the supplied antenna is below 1.5 Watts, the 800/1900MHz TDMA StarTAC is "categorically excluded from routine environmental evaluation" per paragraph (c), and thus SAR evaluation is not required.

5. Battery Options affect on Compliance with the RF Guidelines

The cellular phone (FCC ID IHDT56ZF1) does have several battery options when used in a body-worn configuration, but since the SAR found for body worn use was lower than what was found for head adjacent use, and the margins are believed sufficient for head adjacent use, they should also be sufficient for body worn use. By making this statement, Motorola should not be considered to have agreed that there is 15% performance variation due to the battery options that would give rise to SAR differences of the magnitude of 15%.

Appendix A

Measurement Results of Cellular Phone FCC ID IHDT56ZF1 used in a Body-Worn Holster Data

07/21/99

FCC ID IHDT56ZF1 S/N: EDF4082AZGJ

CH384/PWR 2/ JK

TEST POSITION: PHONE IN BELT CLIP (Recommended Position)

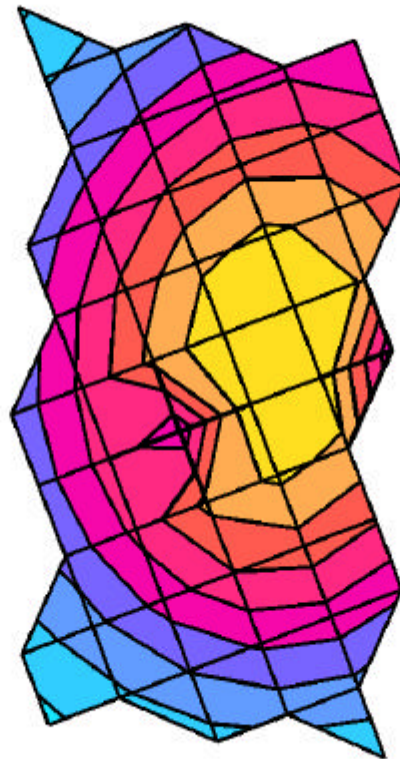
MOT FLAT Phantom; MOTO FLAT Section; Position: (0°,0°); Frequency: 837 MHz

Probe: ET3DV6 - SN1375; ConvF(6.59,6.59,6.59); Crest factor: 1.0; Muscle 800 MHz: $\sigma = 1.10$ mho/m $\epsilon_r = 52.0$ $\rho = 1.00$ g/cm³

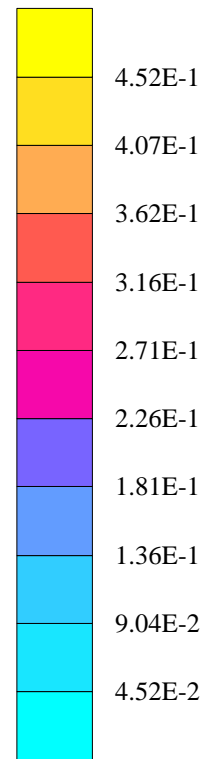
Cube 5x5x7: SAR (1g): 0.892 [mW/g], SAR (10g): 0.629 [mW/g], (Worst-case extrapolation)

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

Powerdrift: -0.64 dB



SAR_{Tot} [mW/g]



Appendix B

The following page is a copy of the Calibration Certificate for Dasy™ probe serial number 1375.

Calibration Certificate

Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1375

Place of Calibration:

Zurich

Date of Calibration:

July 1, 1999

Calibration Interval:

12 months

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:

C. Schilli

Approved by:

C. Schilli

Appendix C

The following page is the printout from the Dasy™ measurement system validation tests.

Dipole 900MHz

Forward Power : 0.25W

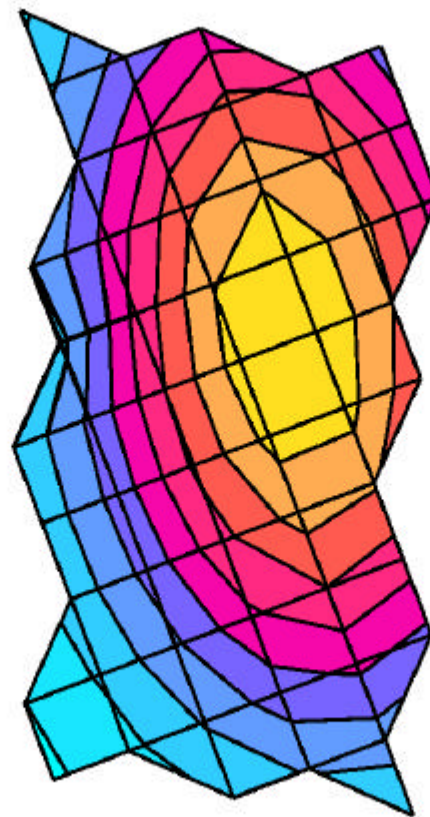
MOT FLAT Phantom; MOTO FLAT Section; Position: (0°,0°); Frequency: 900 MHz

Probe: ET3DV6 - SN1375; ConvF(6.59,6.59,6.59); Crest factor: 1.0; Brain 900Mhz: $\sigma = 0.85$ mho/m $\epsilon_r = 43.0$ $\rho = 1.00$ g/cm³

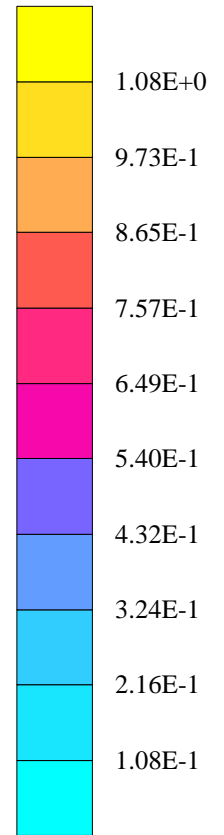
Cube 5x5x7: SAR (1g): 2.57 [mW/g], SAR (10g): 1.67 [mW/g], (Worst-case extrapolation)

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

Powerdrift: -0.07 dB



SAR_{Tot} [mW/g]



Dipole 1800 MHz

Forward Power : 258mW

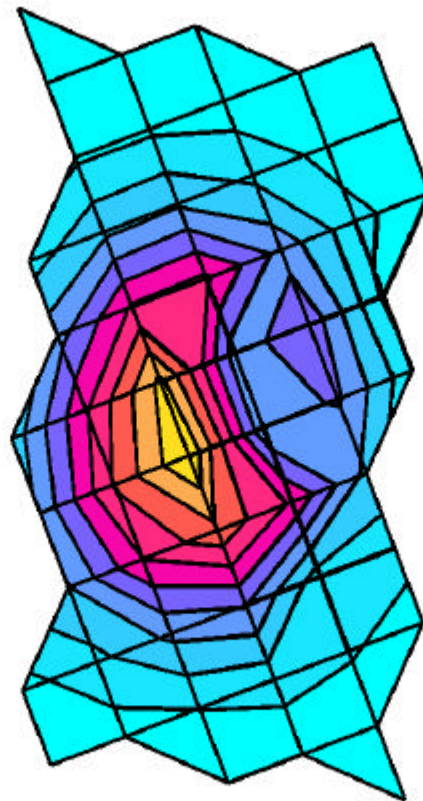
MOT FLAT Phantom; MOTO FLAT Section; Position: (0°,0°); Frequency: 1800 MHz

Probe: ET3DV6 - SN1375; ConvF(5.79,5.79,5.79); Crest factor: 1.0; Brain 1800 MHz: $\sigma = 1.71$ mho/m $\epsilon_r = 41.0$ $\rho = 1.00$ g/cm³

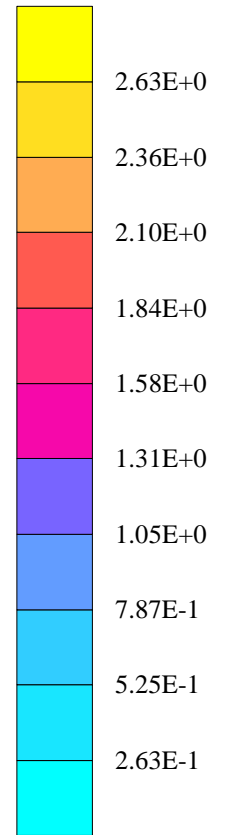
Cubes (2): SAR (1g): 10.2 mW/g \pm 0.03 dB, SAR (10g): 4.99 mW/g \pm 0.24 dB, (Worst-case extrapolation)

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

Powerdrift: -0.02 dB



SAR_{Tot} [mW/g]



Appendix D

The following page is a copy of the first page of the Dasy™ Users Manual

Schmid & Partner Engineering AG

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Preliminary Manual

DASY3 V1.0b

for Windows 95

March 98 Edition
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