MOTOROLA

December 18, 2001

Supplement to SAR Test Report for Motorola portable cellular phone (FCC ID IHDT56BJ1).

Prepared by:
Steven Hauswirth, Senior Staff Engineer
Motorola Personal Communications Sector Product Safety Laboratory
Harvard, Illinois

1) Summary of FCC request for additional information

There was a request for additional information regarding Motorola's SAR Test Report for Motorola portable cellular phone (FCC ID IHDT56BJ1). The requested information is addressed below in the same numbering sequence received.

3. *The original SAR report was not tested with a carrying case. The new SAR report measured only at 1900 MHz indicates a carrying case. Please provide SAR data with the carrying case in the Part 22 modes(analog and CDMA).*

There was a typo in the Dec. 7th amendment. There is only the plastic belt clip. This belt clip was used for testing in both the Oct. 9th filing and the Dec. 7th amendment.

4. *For body-worn, please state phantom support plate material, thickness, opening dimensions, and measured dielectric constant and loss tangent.*

The "flat" phantom is made out of 1" thick natural High Density Polyethylene with a thickness at the bottom equal to 2.0mm. It measures 52.7cm(long) x 26.7cm(wide) x 21.2cm(tall). The measured dielectric constant of the material used is less than 2.3 and the loss tangent is less than 0.0046 all the way up to 2.184GHz.

5. *OET 65 Supplement C was released in June 2001. FCC is using these procedures for our in-lab testing. Please re-submit all SAR results using Supplement C (phantom, liquid, positions), or submit firm target date when your lab will begin using these procedures.*

Due to manufacturing problems our test equipment supplier is having, we have not received a large enough quantity of the required equipment to transition over to the new Supplement C 01-01 procedures. When we receive this needed equipment we will change to the new procedures. Currently that date is to be determined. Our understanding is that the new standard head (SAM) phantom is still optional because the Commission has not issued a Public Notice establishing a transition period.

6. *Please submit tilt position data, per Suppl C methods.*

Please see see response to question #5.

7. *Figures 19 & 20 are not very useful. Photos of actual position, holder, phantom, and device as tested are needed.*

New photos of the radio in the head adjacent position are shown below:

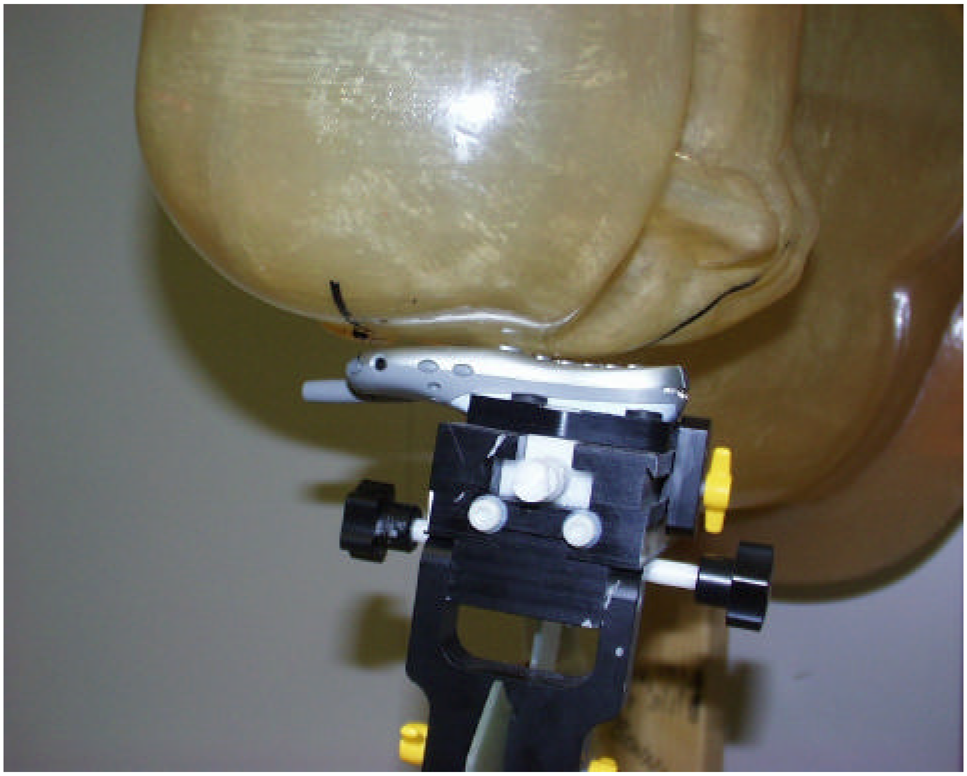

Figure 1. Top View of Phone Placed Against Head with Antenna Retracted

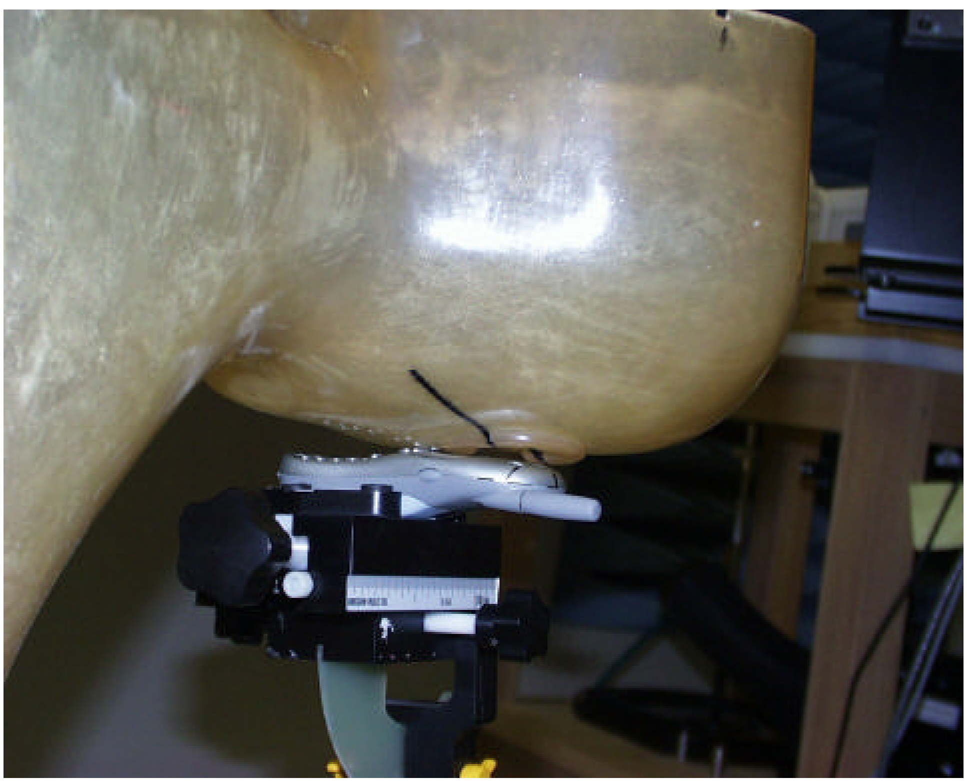

Figure 2. Back View of Phone Placed Against Head with Antenna Retracted

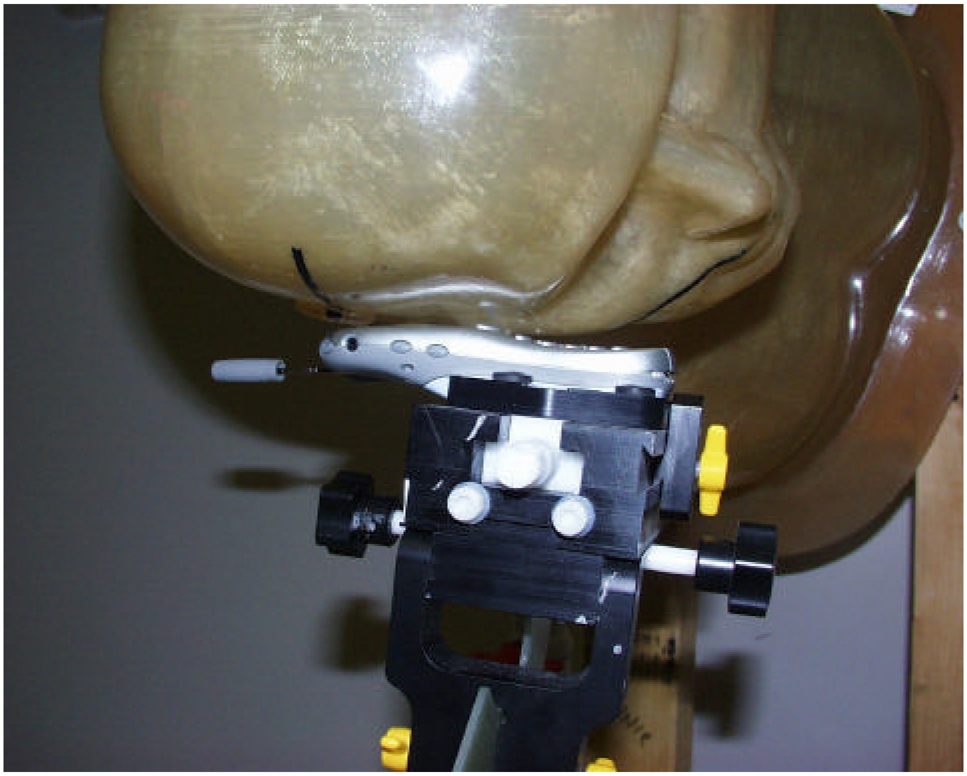

Figure 3. Top View of Phone Placed Against Head with Antenna Extended.

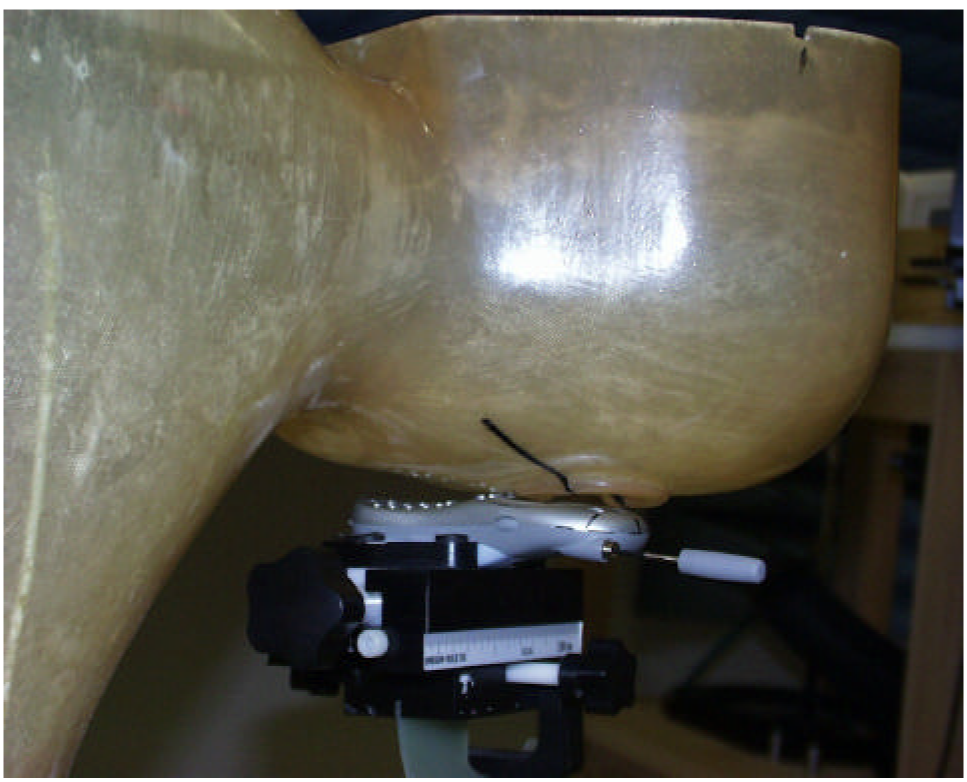

Figure 4. Back View of Phone Placed Against Head with Antenna Extended.

8. *Oct 9 SAR report section 4.1 shows probe SN 383, plots show SN 1523. Please clarify and correct as necessary.*

The serial numbers of two pieced of equipment were swapped in the Oct 9th filing. SN1523 is the serial number of the E-field probe and SN 383 is the serial number of the DASY 3 DAE Box. The corrected table is shown below:

Description	Serial Number	Cal Due Date
DASY3 DAE V1	SN383	3/1/2002
E-Field Probe ETDV6	SN1523	4/11/2002

9. *Please describe exact methods and reasons for extrapolated SAR data in Dec 7 SAR report section 3. If device is operating properly, SAR should not be scaled. Is data in Oct 9 report scaled also?*

The exact method of extrapolation is New SAR = Old SAR * 10^(drift/10). The SAR reported at the end of the measurement process by DASY can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process (this is the worst case SAR when there are negative drifts). The device is operating properly and does have the characteristic that the output power is reduced over time. The results in the Oct 9 report were not scaled, this can be verified by comparing the tables of data in section 3 to the output plots included in appendix 2 & 3 in the Oct 9th filing.

11. *It does not appear to state anywhere what phantom was used. Is this a Suppl C SAM phantom test?*

The head phantoms used for all the SAR measurements in the Oct. 9 and Dec. 7 reports were the same ones that has been used for the previous filings. This phantom can be seen in Figures 19 & 20 of the Oct 9th filing. This is not the new standard head (SAM) phantom.

12. *The body liquid values exceed the 5% tolerance of Suppl C, e.g., by 10%. Please provide estimates of how this will affect reported SAR, using Kuster/Balzano theory or similar. Please adjust measurement uncertainty value of 12% accordingly.*

The body tissue simulates do exceed the 5% tolerance but in the direction that overestimates SAR. According to the sensitivities published by Schmid & Partner Engineering AG in the *Application Note: SAR Sensitivites* (attached as appendix 1):

- The difference in conductivity between the Oct 9th filing and Supplement C 01-01:
  - In the 900MHz band yields a overestimate in SAR of ~7.7%.
  - In the 1800MHz band yields a overestimate in SAR of ~4.1%.
- The difference in permitivity between the Oct 9th filing and Supplement C 01-01:
  - In the 900MHz band yields a overestimate in SAR of ~5.1%.
  - In the 1800MHz band yields a overestimate in SAR of ~5.5%

13. *Please provide probe calibration certificate.*

The Probe calibration certificates and the additional conversion factors certificates that cover the permitivity and conductivity that we have used are attached as appendix 2.

14. *The validation liquid parameters do not agree with Suppl C. Please provide firm target date when Suppl C parameters will be used in all validations, or re-submit all test results accordingly.*

Please see response to question #5.

Appendix 1

Application Note: SAR Sensitivites

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1 Introduction

The measured SAR-values in homogeneous phantoms depend strongly on the electrical parameters of the liquid. Liquids with exactly matching parameters are difficult to produce; there is always a small error involved in the production or measurement of the liquid parameters. The following sensitivities allow the estimation of the influence of small parameter errors on the measured SAR values. The calculations are based on an approximation formula [1] for the SAR of an electrical dipole near the phantom surface and a adapted plane wave approximation for the penetration depth. The sensitivities are given in percent SAR change per percent change in the controlling parameter:

$$S(x) = \frac{d\,SAR / SAR}{d\,x / x}$$

The controlling parameters x are:

- ε : permitivity
- σ : conductivity
- ρ : brain density (= one over integration volume)
- d : distance of the radiator from the liquid surface

For example: If the liquid permitivity increases by 2 percent and the sensitivity of the SAR to permitivity is -0.62 then the SAR will decrease by 1.24 percent.

The sensitivities are given for surface SAR values and averaged SAR values for 1 g and 10 g cubes and for dipole distances d of 10mm, 15mm and 30mm from the liquid surface.

2 Sensitivities

2.1 f = 900 Mhz, e_r = 41.5, s = 0.85 S/m, r = 1 g/cm^3

	Parameter	e	s	d	r
d=10mm:	**Surface**	- 0.74	+ 0.88	- 1.55	—
	1 g	- 0.62	+ 0.62	- 1.55	0.09
	10 g	- 0.51	+ 0.39	- 1.55	0.17
d=15mm:	**Surface**	- 0.72	+ 0.89	- 1.47	—
	1 g	- 0.59	+ 0.63	- 1.47	0.09
	10 g	- 0.48	+ 0.39	- 1.47	0.17
d=30mm:	**Surface**	- 0.72	+ 0.89	- 1.71	—
	1 g	- 0.59	+ 0.63	- 1.71	0.09
	10 g	- 0.48	+ 0.39	- 1.71	0.17

2.2 f = 1500 Mhz, e_r = 40.5, s = 1.2 S/m, r = 1 g/cm^3

	Parameter	e	s	d	r
d=10mm:	**Surface**	- 0.73	+ 0.92	- 1.46	—
	1 g	- 0.56	+ 0.55	- 1.46	0.12
	10 g	- 0.42	+ 0.27	- 1.46	0.22
d=15mm:	**Surface**	- 0.73	+ 0.92	- 1.55	—
	1 g	- 0.55	+ 0.55	- 1.55	0.12
	10 g	- 0.41	+ 0.27	- 1.55	0.22
d=30mm:	**Surface**	- 0.78	+ 0.91	- 2.00	—
	1 g	- 0.60	+ 0.54	- 2.00	0.12
	10 g	- 0.47	+ 0.26	- 2.00	0.22

2.3 f = 1800 Mhz, e_r = 40, s = 1.65 S/m, r = 1 g/cm^3

	Parameter	e	s	d	r
d=10mm:	**Surface**	- 0.70	+ 0.89	- 1.47	—
	1 g	- 0.48	+ 0.43	- 1.47	0.16
	10 g	- 0.34	+ 0.13	- 1.47	0.26
d=15mm:	**Surface**	- 0.72	+ 0.89	- 1.70	—
	1 g	- 0.49	+ 0.42	- 1.70	0.16
	10 g	- 0.35	+ 0.13	- 1.70	0.26
d=30mm:	**Surface**	- 0.75	+ 0.88	- 2.00	—
	1 g	- 0.53	+ 0.41	- 2.00	0.16
	10 g	- 0.39	+ 0.12	- 2.00	0.26