



1<sup>st</sup> November 2001

Mr. Martin Perrine  
Authorization & Evaluation Division  
Federal Communications Commission Laboratory  
7435 Oakland Mills Road  
Columbia, MD 21046

Re: Form 731 Confirmation Number: EA102194 with FCC ID: AZ489FT4851.

Dear Mr. Perrine;

Motorola Inc., 8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322, herein submits its response to the 23<sup>rd</sup> October 2001 request for information in Correspondence Number 21029.

Q1.) Confirmation that the dielectric properties stated in the SAR data sheets in Appendix A of the SAR report are measured values.

R1.) The dielectric properties stated in Appendix A of the SAR report are measured values.

Q2) Confirmation that the unit was operating normally in respects to power output. A large drop in output radiated power was noted during in your "before and after" measurement on SAR report page 15. If not please provide new SAR data. Please confirm that the "before and after" power was measured for each test. There is no change in the reported values from test to test.

R2.) Careful review of the data shows that the product was operating normally with respect to power output at the time of testing.

Some portable two-way radios do exhibit large power slumps during the time it takes to run a SAR measurement. This two-way radio does not have a removable antenna. This makes actual before and after power out measurements impractical. For this reason a power vs. time characteristic curve was generated on the radio for a time interval greater than the expected SAR measurement duration. This curve is then used to determine the power slump characteristics at the actual end time of the SAR measurement. "Before and after" power measurements were not performed after each test for the reasons given above. The reason for the exact "before and after" power output reported is due to the methodology used in determining the power slump. Since the same respective battery and radio were used for the measurements, and the same time durations for the SAR measurements were observed, the reported power slumps are identical.

Q3.) Liquid depth during test.

R3.) The liquid depth was 12 cm. See explanation in R5.

Q4.) A statement with additional detail regarding the calibration of the probe at 450 MHZ. Please discuss the FDTD computations referenced in the 25 May 2001 test letter from SPEAG. Please include a sample calculation of how the calibration factors are used to obtain the final measurement.

R4.) For probe calibration, Motorola sends all our probes to SPEAG annually same as other SAR test labs. SPEAG is responsible for all the calibration of the probes. The following is a statement directly from SPEAG regarding this issue:

“For our numerical analysis of the performance of the dosimetric E-field probes we have developed a high resolution FDTD probe model. The probe was simulated using a graded mesh with the smallest grid spacing of 0.125 mm at the probe tip. In order to mimic the real world as much as possible, we have included in the numerical probe model all materials used for manufacturing of dosimetric field probes, i.e., eccostock, fibre, ceramics, air and silicon. The probe response was assessed by calculating the gap voltage over the modeled dipoles (attached is the PDF file of the paper in which the pre model has been presented). The conversion factor was calculated by evaluating the probe response when in air and when immersed in the lossy medium. This model has been experimentally validated in great extend for the various frequencies for which we have obtained experimentally assessed conversion factors. The results have demonstrated that this approach is greatly reliable and that it can be further improved by utilization of the experimentally assessed conversion factors such that the uncertainty can be kept below 8% at 450 MHz.”

Q5.) Provide a statement itemizing the similarities and differences between the phantoms used by your company and SPEAG for the system verification measurement. Please include a discussion on expected effects on verification results.

R5.) The following chart shows a comparison between the Motorola (PCS) flat phantom used for system verification and that used by SPEAG:

Phantom type	Dimensions (cm) (W x L x H)	Thickness (cm)	Permittivity	Loss tangent	Liquid depth (cm)
<b>SPEAG</b>	70 x 40 x 21	0.2	3.70	0.03	15
<b>Motorola (PCS)</b>	23.6 x 40.5 x 12	0.2	2.71	0.01	12

Due to the unavailability of the recommended FCC Supplement C flat phantom size at the time of product measurement, Motorola’s system verification procedure utilized a smaller flat phantom. XFDTD-based numerical calculations were performed to determine the performance impact of using a smaller flat phantom. The following results show that the expected performance difference is approximately 0.5%:

**Simulation Parameters**

Freq. = 450 MHz  
 Normalization Power = 1.0 W Forward  
 Dipole to phantom distance = 1.5 cm,  
 Sigma = 0.94 S/m, Permittivity = 56.6

Motorola PCS phantom: (23.6 x 40.5 x 12) cm

**Peak SAR = 5.68 W/kg**  
**1 g. Avg. SAR = 3.85 W/kg**

Hypothetical “Larger” phantom: (33 x 50 x 15) cm

**Peak SAR = 5.65 W/kg**  
**1g. Avg. SAR = 3.84 W/kg**

(Note: Hypothetical “larger” antenna represents a dimensional compromise between FCC Supplement C and IEEE recommendations for flat phantoms.)

For further clarification, to date SPEAG has not made available calibration dipoles for frequencies below 800 MHz. Motorola Florida Research Lab developed the dipole used for system verification in the 400 MHz band.

Contact me at (954) 723-5793 if you require any additional information.

Regards,  
 /s/ **Mike Ramnath**  
 FCC Liaison  
 Email: [mike.ramnath@motorola.com](mailto:mike.ramnath@motorola.com)