



June 21, 2001

Mr. Steve Dayhoff and Mr. Kwok Chan
 Authorization & Evaluation Division
 Federal Communications Commission Laboratory
 7435 Oakland Mills Road
 Columbia, MD 21046

Re: Form 731 Confirmation Number: EA 100436 with FCC ID: AZ489FT4844.

Gentlemen;

Motorola Inc., 8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322, herein submits its response to the June 18 and May 18, 2001 request for information on FCC ID: AZ489FT4844, EA100436 via correspondence number 19334. This response supplements the correspondence that was submitted on 23 May 2001 to the FCC.

Q1. The differences in head and body dielectric parameters are about - 30% in dielectric constant and 8% in conductivity. The increase in conductivity may not cover the substantial decrease in dielectric constant. Please either re-test, or find ways to selectively re-test to show compliance for the head configurations.

A1. The SAR measurements for the face have been re-tested in the flat phantom following the recommendations by Andy Leimer. Tissue simulant meeting the dielectric parameters of the IEEE Head Tissue requirements ($\epsilon_r = 41.5 - 45.8$, $\sigma = 0.83 - 0.91$ S/m) at the center band of the product (436.7 MHz), were used for these measurements. The Table below contains the results of the additional tests:

s: 0.88 S/m
 e: 44.59

Frequency (MHz)	Antenna Type	Battery Type	Body-Worn Accessory	Body Position	Measured SAR (mW/g)
403.425	PMAE4002A	JMNN4023	None	Face	1.00
436.425	NAE6483	JMNN4023	None	Face	4.58
469.975	PMAE4003A	JMNN4023	None	Face	4.89

Numerical simulations and experimental measurements were also performed to support the claim that SAR measurements performed in the Muscle mixture are overestimated in comparison with IEEE Head mixture. The IEEE Head mixture has a conductivity 14% lower and permittivity 25% lower than the Muscle mixture. The measurements were made on a flat phantom exposed to a 450 MHz half-wavelength dipole source at 16 mm to the liquid. The following table summarizes the results. In both cases, the Muscle tissue overestimates the SARs in comparison to the IEEE Head tissue.

Muscle and IEEE Head SAR Comparison

	Tissue	Dielectric	Conductivity	SAR	Change
Method		Constant	(S/m)	(W/kg)	
FDTD	Muscle	58.47	1.01	2.26	
	IEEE Head	44	0.87	2.11	-6.6%
Measurement	Muscle	58.47	1.01	2.61	
	IEEE Head	44.08	0.87	2.4	-8.0%
	Change	-24.7%	-13.9%		

The table found in the SPEAG Application Note and IEEE SCC34 draft P1528 Table E3, providing the change in sensitivity as a function of change in permittivity and conductivity is based on an approximate equation and assumes antenna current normalization, which is not appropriate for this comparison since devices are power rated. When the comparison is normalized to power, the effect from conductivity is much higher than from permittivity. The table is also only valid for “the estimation of the influence of small parameter errors on the measured SAR values,” as indicated in the Application Note.

$$\frac{DSAR}{SAR_0} = S_s \Big|_{s_0} \frac{Ds}{s_0} + S_e \Big|_{e_0} \frac{De}{e_0}$$

$S_{s,e}$ = Sensitivity

Valid only for small $\frac{Ds}{s_0}, \frac{De}{e_0}$

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

Regards,

/s/ **Mike Ramnath**

FCC Liaison

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