MOTOROLA

28th October 2004

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

Re: Form 731 Confirmation Number: EA547876 with **FCC ID: ABZ99FT4064**

Dear Mr. Lyles;

Motorola Inc., 8000 West Sunrise Boulevard, Fort Lauderdale, Florida, herein submits its response to the 8th August 2004 for information in Correspondence Number 27328 and 27329.

Q1) Please update the antenna installations to included vehicle requirements consistent with the compliance testing preformed. Particularly dimensions to assure spacing requirements similar to the only included about the passenger seat.

R1) Radio installation manual section 4.2 states "Be sure that the distance from the antenna location on the trunk lid will be at least 85cm (33 inches) from the front surface of the rear seat-back to assure compliance with RF Energy Safety standards." The 85cm distance between antenna and rear seat passenger is illustrated in Appendix A of MPE report.

Q2) The user manual contains reference to a large number of antennas that were not evaluated. Please justify inclusion.

R2) Motorola has one general or common user manual for this product line which includes a list of optional antennas that cover both the VHF and UHF bands. All antennas listed in the user manual which cover the frequency range for this filing were tested and included in the MPE report.

Q3) Section 6.1.1 first paragraph does not mention the configurations that are first used prior to the measurements in the second paragraph. Also, please double check the accuracy of the distances stated in the note of the second paragraph. Update as appropriate.

R3) Each antenna type (¼ and ½ wave) was positioned on the center of the trunk and tested directly behind the vehicle (position 1) as to represent a by-stander. Each antenna type was tested across the frequency range of the device. Additional frequencies were tested based on an antenna's limited frequency range. The overall highest configuration (antenna and frequency) for both antenna types was then tested at two additional by-stander positions: 2) off the corner of the trunk (45 degrees from position1) and 3) the side of the trunk (90 degrees from position 1).

The distances noted in section 6.1.1 are correct and agree with appendix A.

Q4) Please detail the duty factor and signal characteristics for the data mode of the radio.

R4) The duty cycle varies depending on the loading of the system. The data mode is packet based with the maximum packet size of 1500 bytes. The duty cycle will always be less than 10 % because of the system design restrictions and the normal operating parameters of the radio. The radio and system in which it operates on is never intended to allow a streaming data mode.
The standard APCO signaling as specified in TIA/EIA 102.CAAA paragraph 1.3.3.5 with C4FM modulation is utilized.

Q5) Please provide an additional summary table showing partial body MPE averaged over the upper half of the body for the roof top configurations and for the high gain antenna mounted on the trunk.

R5) We respectfully note that this compliance assessment would not require considering partial body average. The wavelength of the radiated field is not short enough compared with the antenna and the relevant portions of the car affecting the bystander exposure so as to produce a shadow region for the electromagnetic field.

Q6) Please provide details of each of the SAR scan made include contours and calculation string to obtain the final reported values.

R6) Scan details: for this filing, only the passenger with trunk mounted antenna HAE4002A produced noncompliant MPE results. The number of reported scans was increased to include both these antenna conditions that produced highest peak 1-g or whole body average SAR. Therefore a total of two scans are reported (Fig. 4 and Fig. 5).

Calculation string: the SAR is computed and averaged by XFDTD according to the method illustrated in the appendix titled "specific information for SAR computations". In that appendix, point 9a recites “The twelve E-field phasors at the edges of each Yee voxel are combined to yield the SAR associated to that voxel. In particular, the average is performed on the SAR values computed at the 12 edges of each voxel. Notice that in XFDTD™ the dielectric tissue properties are assigned to the voxel edges, thereby allowing said averaging procedure.” Point 10a recites “XFDTD™ computes the Specific Absorption Rate (SAR) in each complete cell containing lossy dielectric material and with a non-zero material density. To be considered a complete cell, the twelve cell edges must belong to lossy dielectric materials. The averaging calculation uses an interpolation scheme for finding the averages. Cubical spaces centered on a cell are formed and the mass and average SAR of the sample cubes are found. The size of the sample cubes increases until the total mass of the enclosed exceeds either 1 or 10 grams. The mass and average SAR value of each cube is saved and used to interpolate the average SAR values at either 1 or 10 grams. The interpolation is performed using two methods (polynomial fit and rational function fit) and the one with the lowest error is chosen. The sample cube must meet some conditions to be considered valid. The cube may contain some non-tissue cells, but some checks are performed on the distribution of the non-tissue cells. A valid cube will not contain an entire side or corner of non-tissue cells." Point 12b recites" The input impedance and the total power radiated under the impedance match conditions that occur at the test frequency are provided by XFDTD™. XFDTD™ computes the input impedance by following the method outlined in [8], which consists in performing the integration of the steady-state magnetic field around the feed point edge to compute the steady-state feed point current (I), which is then used to divide the feed-gap steady-state voltage (V). The net rms radiated power is computed as

$$P_{XFDTD} = \frac{1}{2}\mathrm{Re}\left\{VI^*\right\}$$

Both the input impedance and the net rms radiated power are provided by XFDTD™ at the end of each individual simulation."

Q7) Appendix title "specific information for SAR computations" mention that the vehicle used perfect conductors. Please detail how the passenger seats were handled. Passenger seats are typically not conductive.

R7) To further clarify how the passenger seats were handled for the SAR computational assessments; page 12 of Appendix D was revised as follows: "The car model is constituted by perfect electric conductor" and "The passenger model is surrounded by air, as the seat, which is made out of poorly conductive fabrics, is not included in the computational model."

Q8) Appendix title "specific information for SAR computations" mentioned that the antenna was modeled with a 1 mm radius wire. Please justify since the antenna photographed appear to be much larger.

R8) The Appendix titled "specific information for SAR computations" reports that "The voxel size in all our simulations was 5 mm, and the antenna radius is always at least 1 mm (1 mm for the short quarter-wave antennas and 1.5 mm for the long gain antennas), so there was no need to specify a "thin wire" material". The pictures (Appendix D pg 8) show the HAE4003A antenna, which has a radius of about 1 mm and HAE6015A antenna which has a radius of 1.5 mm. Page 7 of Appendix D was revised with the following sentence: "Because the field impinges on the bystander or passenger model at a distance of several tens of voxels from the antenna, the details of antenna wire modeling are not expected to have significant impact on the exposure level."

Q9) Appendix title "specific information for SAR computations" mentioned that modeled and measured values were compared. Measured values could not be located. How were positions of both measurement and modeling controlled/determined. Please provide additional details of both measurement and computation to allow thorough comparison. Also, if available please provide similar validations for external to the vehicle.

R9) The pictures and the tables showing the simulated electric and magnetic fields at the rear seat are shown in appendix D on page 13 and page 14. The corresponding average value of the average equivalent power density of those simulated field is compared with measured MPE value.

Q10) Please confirm that 20 cm spacing to vehicle was worst case for MPE measurements. Were scans made at other distances to verify?

R10) Distances greater than 20cm from the vehicle would decrease MPE results therefore measurements at greater distances are not necessary. IEEE std C95.1 recommends not making measurements of less than 20cm from a re-radiating object.

Q11) Please provide a summary table of MPE results.

R11) The MPE report has been revised to include a summary table. See attached MPE report.

Q12) Please explain how MPE is determined from E and or H field measurements for comparison to limits. Power density appears to be determined for comparison. How is power density determined?

R12) The Narda probes both measure E and H fields in percent of power density (mW/cm^2). Both by-stander and passenger configurations are assessed by taking 10 or 3 measurements respectively and then averaged. A 50% duty cycle is then applied to the average. In some cases additional scaling is done but only when the initial power is less then maximum power. These calculations are listed in section 11.1.
The final or power density max calc is then compared to the power density MPE for uncontrolled environments in accordance in IEEE std C95.1

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

Sincerely,
/s/ Mike Ramnath (signed)
Manager, Regulatory Compliance
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