MOTOROLA SOLUTIONS

COMPUTATIONAL EME COMPLIANCE ASSESSMENT OF THE DIGITAL VEHICULAR REPEATER (DVR 800), MOBEXCOM DVRS 800 (DQPMDVR8000P) AND COMPANION APX SERIES MODEL M22KSS9PW1AN (MUD3222C) MOBILE RADIO.

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Introduction

This report summarizes the computational [numerical modeling] analysis performed to document compliance of the DVR 800, model # MOBEXCOM DVRS 800 (DQPMDVR8000P) with FCC ID # LO6-DVRS800 interfaced with, and transmitting simultaneously with Companion mobile radio, model # M22KSS9PW1AN (MUD3222C) and vehicle-mounted antennas with the US Federal Communications Commission (FCC) and Innovation, Science and Economic Development (ISED) Canada guidelines for human exposure to radio frequency (RF) emissions. The devices operate in the following frequency bands:

Regions	Device	Bands	Frequency Band (MHz)
US FCC	DVR	800 MHz Band	806-824; 851-869
	Companion Mobile	VHF Band	150.8 – 173.4
ISED Canada	DVR	800 MHz Band	806-824; 851-869
	Companion Mobile	VHF Band	138-144, 148-174

This computational analysis supplements the measurements conducted to evaluate the compliance of the exposure from this DVR and Companion mobile radio with respect to applicable *maximum permissible exposure* (MPE) limits. All simultaneous test conditions (129

in total) that did not conform with applicable MPE limits were analyzed to determine whether those conditions complied with the *specific absorption rate* (SAR) limits for general public exposure (1.6 W/kg averaged over 1 gram of tissue and 0.08 W/kg averaged over the whole body) set forth in FCC guidelines, which are based on the IEEE C95.1-1999 standard [1]. With SAR simulation reduction consideration[1], total 7 test conditions (with 14 independent simulations) had been performed addressing exposure of back seat passenger to the DVR 800 repeater with trunk-mounted antennas and Companion mobile radio (VHF) with roof-mount antennas.

For all simulations a commercial code based on Finite-Difference-Time-Domain (FDTD) methodology was employed to carry out the computational analysis. It is well established and recognized within the scientific community that SAR is the primary dosimetric quantity used to evaluate the human body's absorption of RF energy and that MPE limits are in fact derived from SAR. Accordingly, the SAR computations provide a scientifically valid and more relevant estimate of human exposure to RF energy.

Method

The simulation code employed is XFDTD™ v7.6.0, by Remcom Inc., State College, PA. This computational suite provides means to simulate the heterogeneous full human body model defined according to the IEC/IEEE 62704-2-2017 standard and derived from the so-called Visible Human [2], discretized in 3 mm voxels. The IEC/IEEE 62704-2-2017 standard dielectric properties of 39 body tissues are automatically assigned by XFDTD™ at any specific frequency. The "seated" man model was obtained from the standing model by modifying the articulation angles at the hips and the knees. Details of the computational method and model are provided in the Appendix A to this report. The evaluation of the computational uncertainties and results of the benchmark validations are provided in the Appendix B attached to this report. The XFDTD code validation performed according to IEEE/IEC 62704-1:2017 standard by Remcom Inc., is provided in conjunction with this report.

The car model has been imported into XFDTD™ from the CAD file of a sedan car having dimensions 4.98 m (L) x 1.85 m (W) x 1.18 m (H), and discretized with the minimum resolution of 3 mm and the maximum resolution of 8 mm. The Figure 1 below show both the

[1] SAR simulation reduction is described in the SAR Simulations Reduction Considerations section of this report.

CAD model and the photo of the actual car This CAD model has been incorporated into the IEC/IEEE 62704-2-2017 standard.

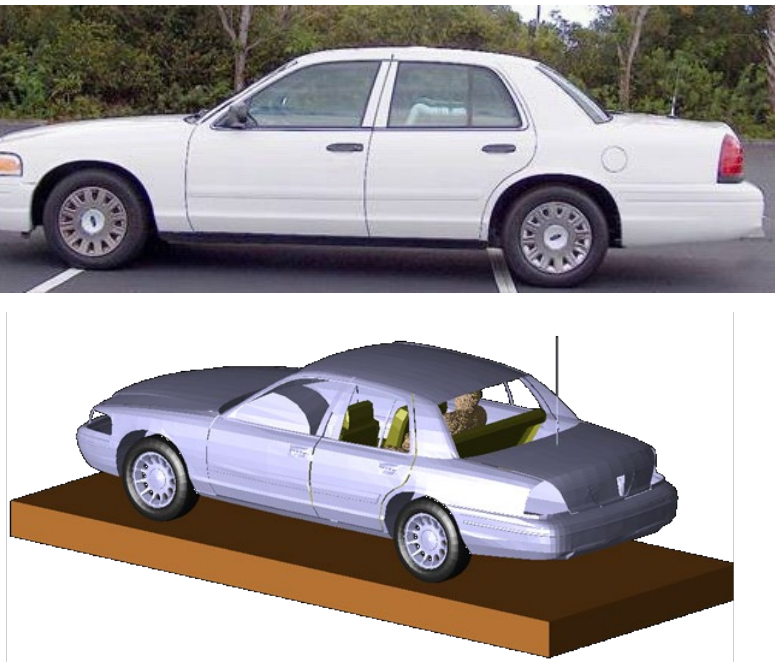


Figure 1: The photo picture of the car used in field measurements and the corresponding CAD model used in simulations

For passenger exposure, Companion mobile antenna position is on the roof and DVR 800 repeater antenna position is on the trunk. The distance of trunk mounted antenna from the passenger head when the passenger is located in the center of the back seat was set at 85 cm, to replicate the experimental conditions used in MPE measurements. Figure 2 shows some of the XFDTD™ computational models used for passenger (back seat) exposure to trunk mounted antennas.

According to the IEC/IEEE 62704-2-2017 standard for exposure simulations from vehicle mount antennas the lossy dielectric slab with 30 cm thickness, dielectric constant of 8 and conductivity of 0.01 S/m has been introduced in the computational model to properly account for the effect of the ground (pavement) on exposure.

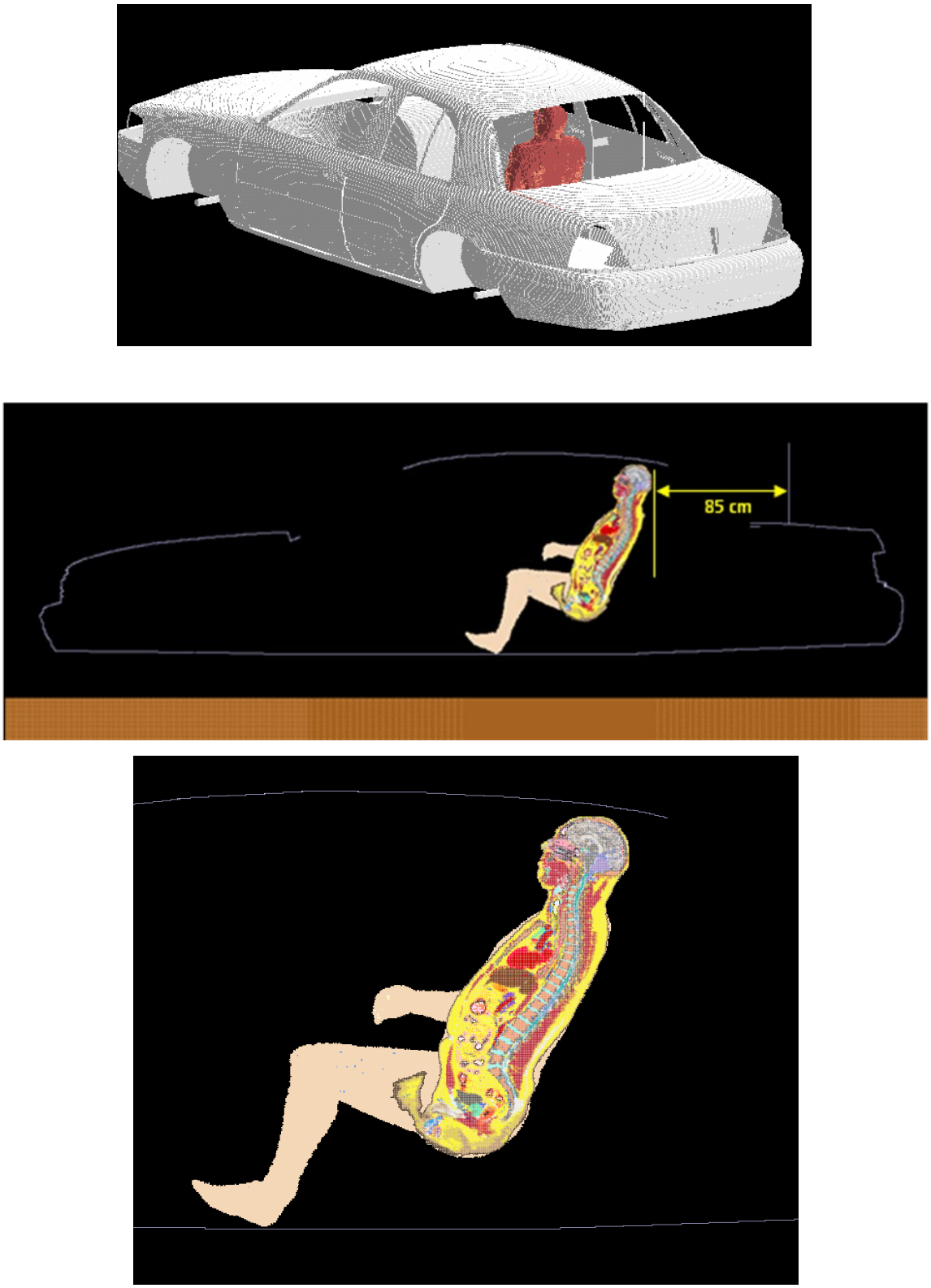


Figure 2: Passenger (back seat) model exposed to a trunk-mount antenna: XFDTD geometry. The antenna is mounted at 85 cm from the passenger located in the center of the back seat.

The computational code employs a time-harmonic excitation to produce a steady state electromagnetic field in the exposed body. Subsequently, the corresponding SAR distribution is automatically processed in order to determine the whole-body and 1-g average SAR. The maximum average output power from DVR 800 repeater is 10W and Companion mobile radio is 60W. Since the ohmic losses in the car materials, as well as the mismatch losses at the antenna feed-point are neglected, and source-based time averaging (100% talk time) for DVR 800 repeater and (50% talk time) for Companion mobile radio were employed, all computational results are normalized to full average net output power of DVR 800 repeater, i.e., 10 W and half the average net output power of Companion radio, i.e., 30W; less the corresponding minimum insertion loss in excess of 0.5 dB of the feed cables supplied with the antennas. This power normalization is in accordance with the IEC/IEEE 62704-2-2017 standard.

Results of SAR computations for car passengers

The test conditions requiring SAR computations are summarized in Table 1 (DVR 800, 100% talk time) and Table 2 (Companion mobile, 50% talk time), together with the antenna data, the SAR results, and power density (P.D.) as obtained from the measurements in the corresponding test conditions. The conditions are for antennas mounted on the trunk (DVR 800) and on the roof (Companion mobile). The antenna length in Table 1 & 2 includes the 1.8 cm magnetic mount base used in measurements to position the antenna on the vehicle. The same length was used in simulation model.

The passenger is located in the center or on the side of the rear seat corresponding to the respective configurations defined in the IEC/IEEE 62704-2-2017 standard.

All the transmit frequency, antenna length, and passenger location combinations reported in Table 1 & 2 have been simulated individually. These tables also include the interpolated adjustment factor and corresponding SAR scaled values following requirement of the IEC/IEEE 62704-2-2017 standard.

Table 1a: DVR 800 repeater computed and adjusted SAR results for back seat passenger exposure (100% talk-time)
(configurations exceeding FCC MPE limits in the combined exposure conditions):

Mount Location	Antenna Kit#	Antenna Length (cm)	Freq (MHz)	P.D. (mW/cm^2)	Exposure Location	Computations SAR (W/kg)		Interpolated Adjustment Factors		Adjusted SAR Results (W/kg)	
						1 g	WB	1 g	WB	1 g	WB
Trunk	HAF4016A, 1/4 Wave (764-870MHz)	10.8	815.0000	0.06	Back Center	0.09	0.003	1.02	2.18	0.09	0.007
					Back Side **Fig 3 & 4**	0.10	0.003	1.37	1.89	**0.14**	0.005

Note:
Bold Blue – the highest SAR results computed for the respective frequency bands

Table 1b: DVR 800 repeater computed and adjusted SAR results for back seat passenger exposure (100% talk-time)
(configurations exceeding ISED Canada MPE limits in the combined exposure conditions):

Mount Location	Antenna Kit#	Antenna Length (cm)	Freq (MHz)	P.D. (mW/cm^2)	Exposure Location	Computations SAR (W/kg)		Interpolated Adjustment Factors		Adjusted SAR Results (W/kg)	
						1 g	WB	1 g	WB	1 g	WB
Trunk	HAF4016A, 1/4 Wave (764-870MHz)	10.8	#815.0000	0.06	Back Center	0.09	0.003	1.02	2.18	0.09	0.007
					Back Side	0.10	0.003	1.37	1.89	**0.14**	0.005

Notes:
Bold Blue – the highest SAR results computed for the respective frequency bands
Same SAR simulation configuration as FCC US.

Table 2a: Companion mobile radio computed and adjusted SAR results for back seat passenger exposure (50% talk-time, VHF band)
(configurations exceeding FCC MPE limits in the combined exposure conditions):

Mount Location	Antenna Kit#	Antenna Length (cm)	Freq (MHz)	P.D. (mW/cm^2)	Exposure Location	Computations SAR (W/kg)		Interpolated Adjustment Factors		Adjusted SAR Results (W/kg)	
						1 g	WB	1 g	WB	1 g	WB
Roof	HAD4008A, 1/4 Wave (150.8-162 MHz)	47.3	162.0000	0.20	Back Center	0.03	0.001	1.35	1.90	0.04	0.003
					Back Side **Fig 5 & 6**	0.05	0.002	1.03	2.42	**0.06**	0.004
	HAD4009A, 1/4 Wave (162-174 MHz)	44.8	162.0000	0.20	Back Center	0.03	0.001	1.35	1.90	0.04	0.003
					Back Side	0.05	0.002	1.03	2.42	0.06	0.004

Note:
Bold Blue – the highest SAR results computed for the respective frequency bands

Table 2b: Companion mobile radio computed and adjusted SAR results for back seat passenger exposure (50% talk-time, VHF band)
(configurations exceeding ISED Canada MPE limits in the combined exposure conditions):

Mount Location	Antenna Kit#	Antenna Length (cm)	Freq (MHz)	P.D. (mW/cm^2)	Exposure Location	Computations SAR (W/kg)		Interpolated Adjustment Factors		Adjusted SAR Results (W/kg)	
						1 g	WB	1 g	WB	1 g	WB
Roof	HAD4021A, 1/4 Wave (136 -174MHz)	53.5	150.8000	0.16	Back Center	0.11	0.004	1.30	1.90	0.14	0.007
					Back Side	0.22	0.004	1.00	2.40	0.22	0.010
	HAD4017A, 1/4 Wave (146-174 MHz)	48.0	165.9000	0.15	Back Center	0.02	0.001	1.37	1.89	0.03	0.002
					Back Side	0.06	0.001	1.04	2.43	0.06	0.004
	HAD4016A, 1/4 Wave (136-162 MHz)	53.1	156.2000	0.15	Back Center	0.11	0.003	1.33	1.90	0.15	0.006
					Back Side	0.13	0.003	1.01	2.41	0.14	0.006
	HAD4006A, 1/4 Wave (136-144 MHz)	53.8	140.0000	0.14	Back Center **Fig. 7 & 8**	0.25	0.006	1.26	1.77	**0.32**	0.010
					Back Side	0.25	0.006	1.04	2.24	0.26	0.014
	HAD4007A, 1/4 Wave (144-150.8 MHz)	50.8	150.8000	0.17	Back Center	0.11	0.004	1.30	1.90	0.14	0.007
					Back Side	0.22	0.004	1.00	2.40	0.22	0.010
	HAD4008A, 1/4 Wave (150.8-162 MHz)	47.3	#162.0000	0.20	Back Center	0.03	0.001	1.35	1.90	0.04	0.003
					Back Side	0.05	0.002	1.03	2.42	0.06	0.004
	HAD4009A, 1/4 Wave (162-174 MHz)	44.8	#162.0000	0.20	Back Center	0.03	0.001	1.35	1.90	0.04	0.003
					Back Side	0.05	0.002	1.03	2.42	0.06	0.004

Notes:
Bold Blue – the highest SAR results computed for the respective frequency bands
Same SAR simulation configuration as FCC US.

The SAR distribution in the exposure condition that gave highest adjusted 1-g SAR for DVR 800 (FCC and ISED Canada) is reported in Figure 3 (815.0000 MHz, passenger on the side of the back seat, HAF4016A antenna).

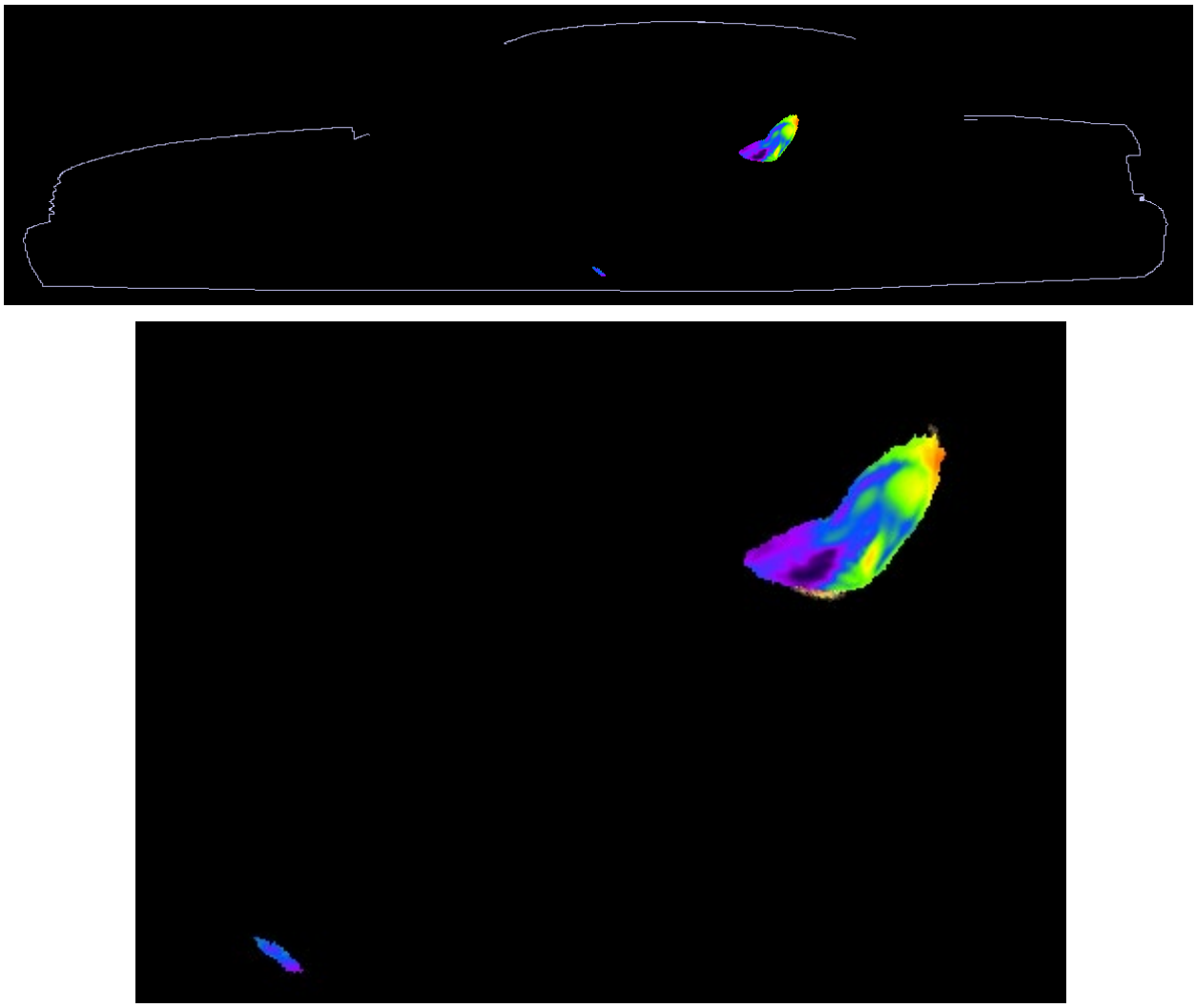
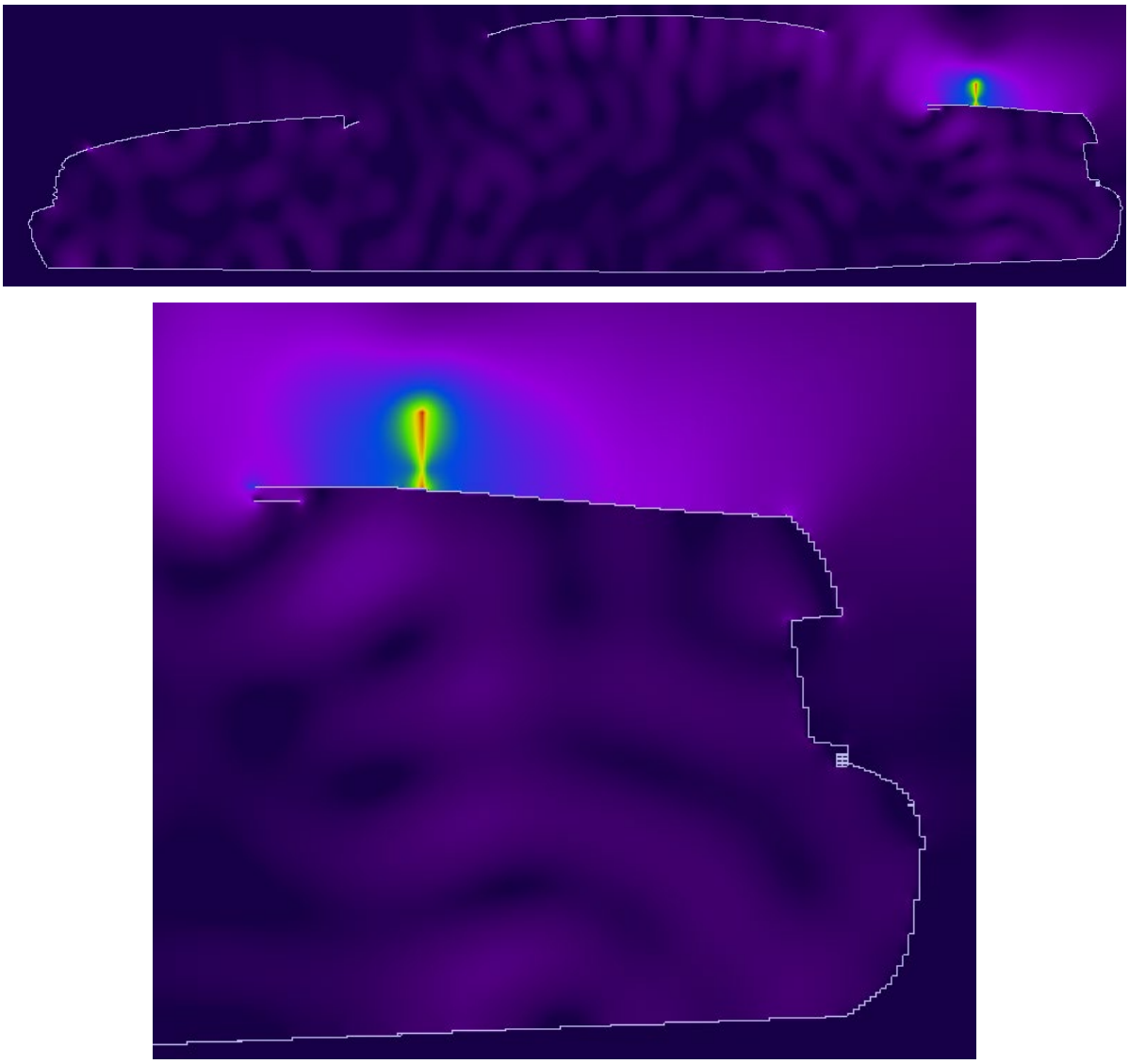
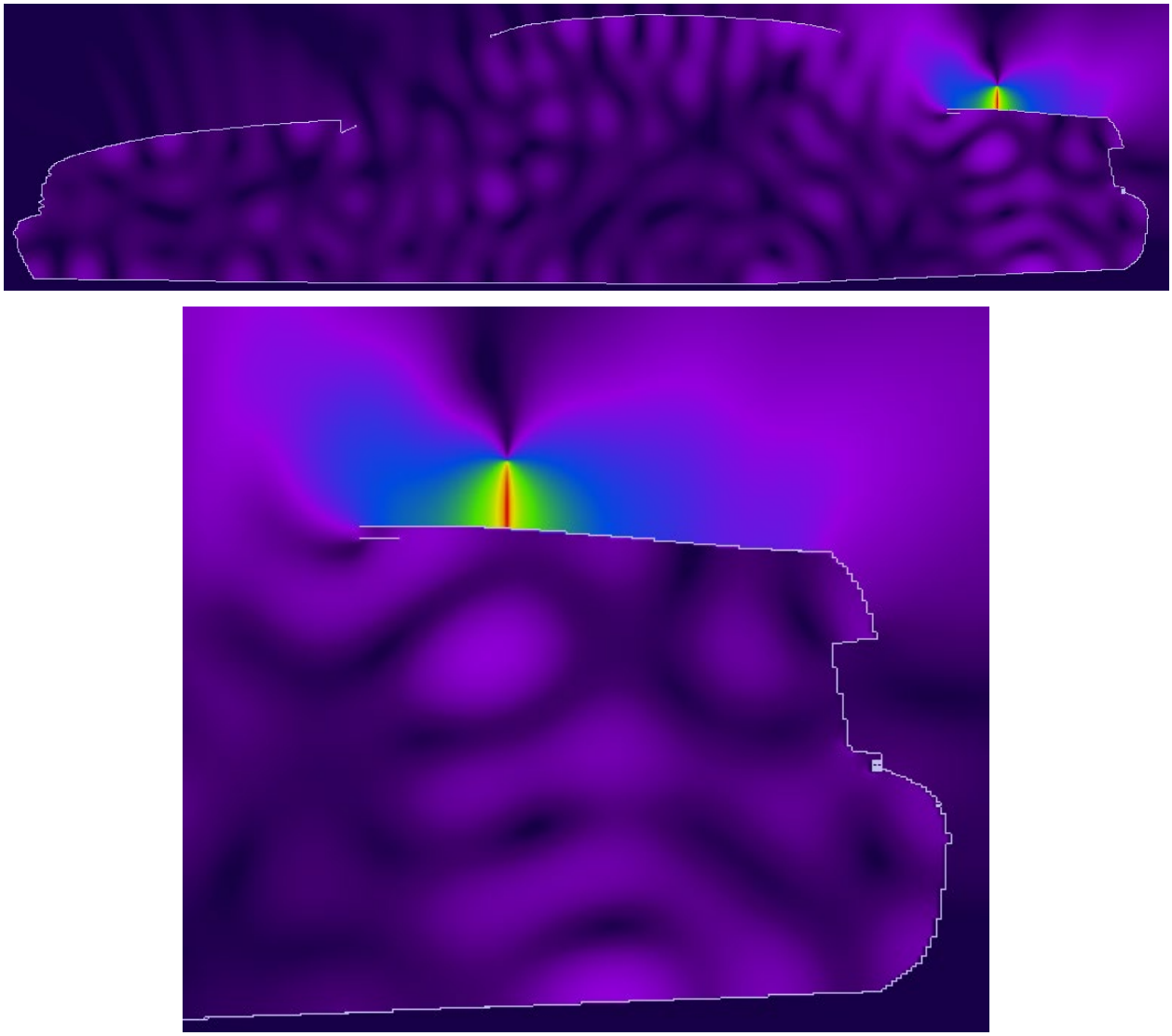


Figure 3. SAR distribution at 815.0000 MHz in the passenger model located on the side of the back seat, produced by the trunk-mount HAF4016A antenna. The contour plot is relative to the plane where the peak 1-g average SAR for this exposure condition occurs.

The two pictures below in Figure 4 show the E and H field distributions in the plane of the antenna corresponding to the condition in Figure 3.



a)



b)

Figure 4. (a) E-field magnitude distribution corresponding to exposure condition of Figure 3, and (b) H-field magnitude distribution corresponding to exposure condition of Figure 3.

The highest adjusted 1-g SAR was produced in the passenger exposure condition with HAF4016A antenna at 815.0000 MHz (passenger on the side of the back seat).

The SAR distribution in the exposure condition that gave highest adjusted 1-g SAR for Companion mobile radio (FCC) is reported in Figure 5. (162.0000 MHz, passenger on the side of the back seat, HAD4008A antenna).

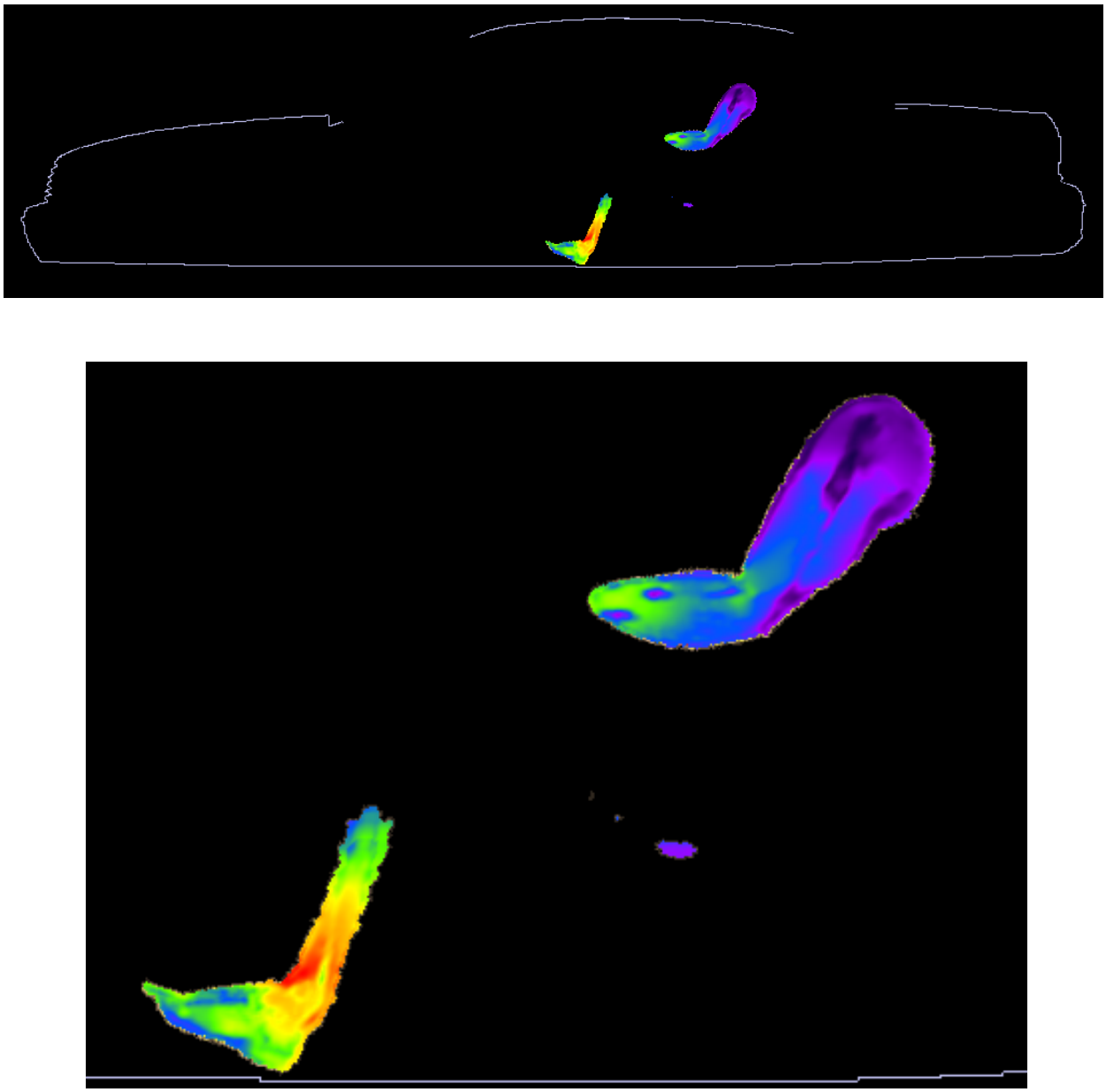
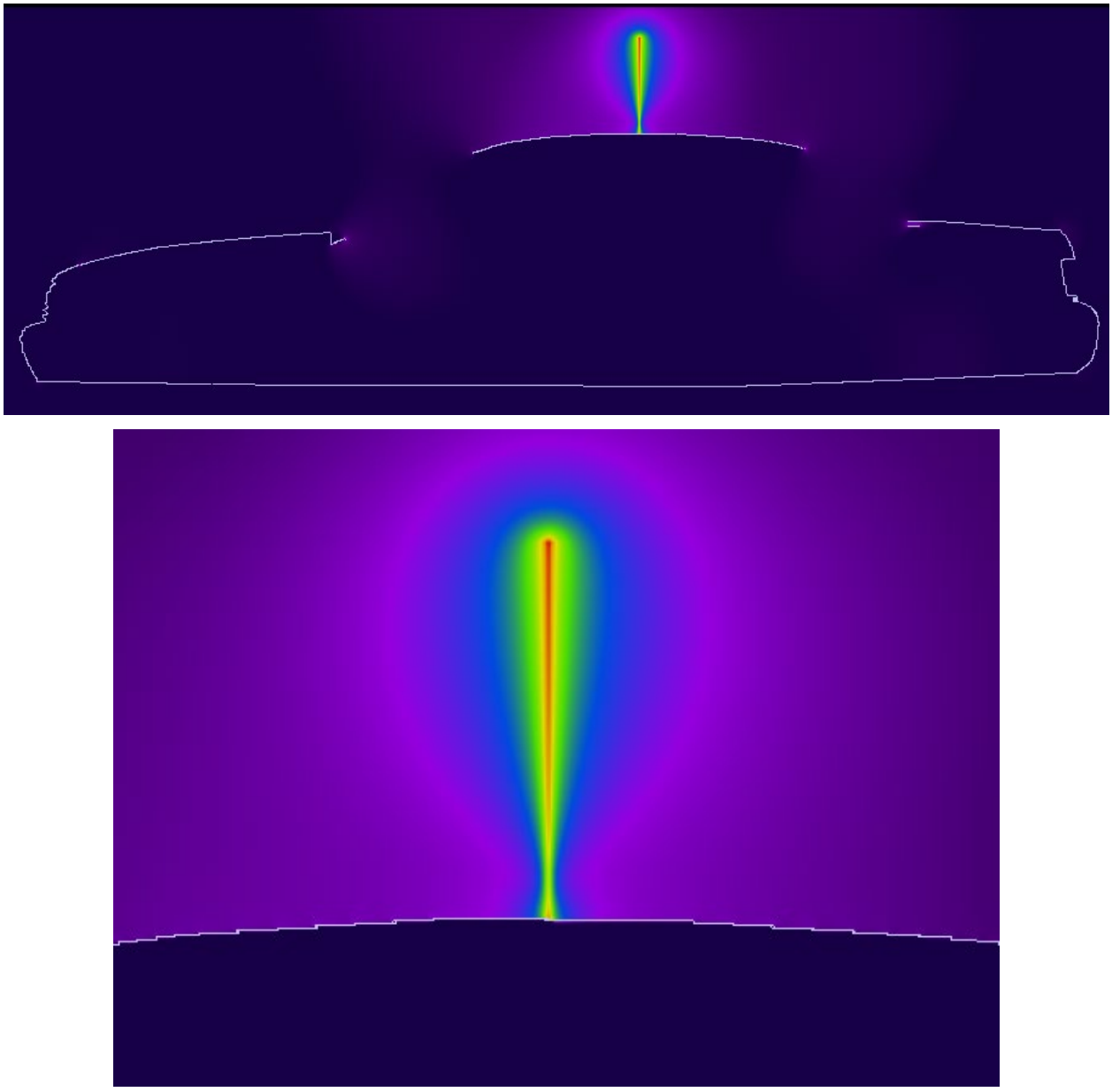
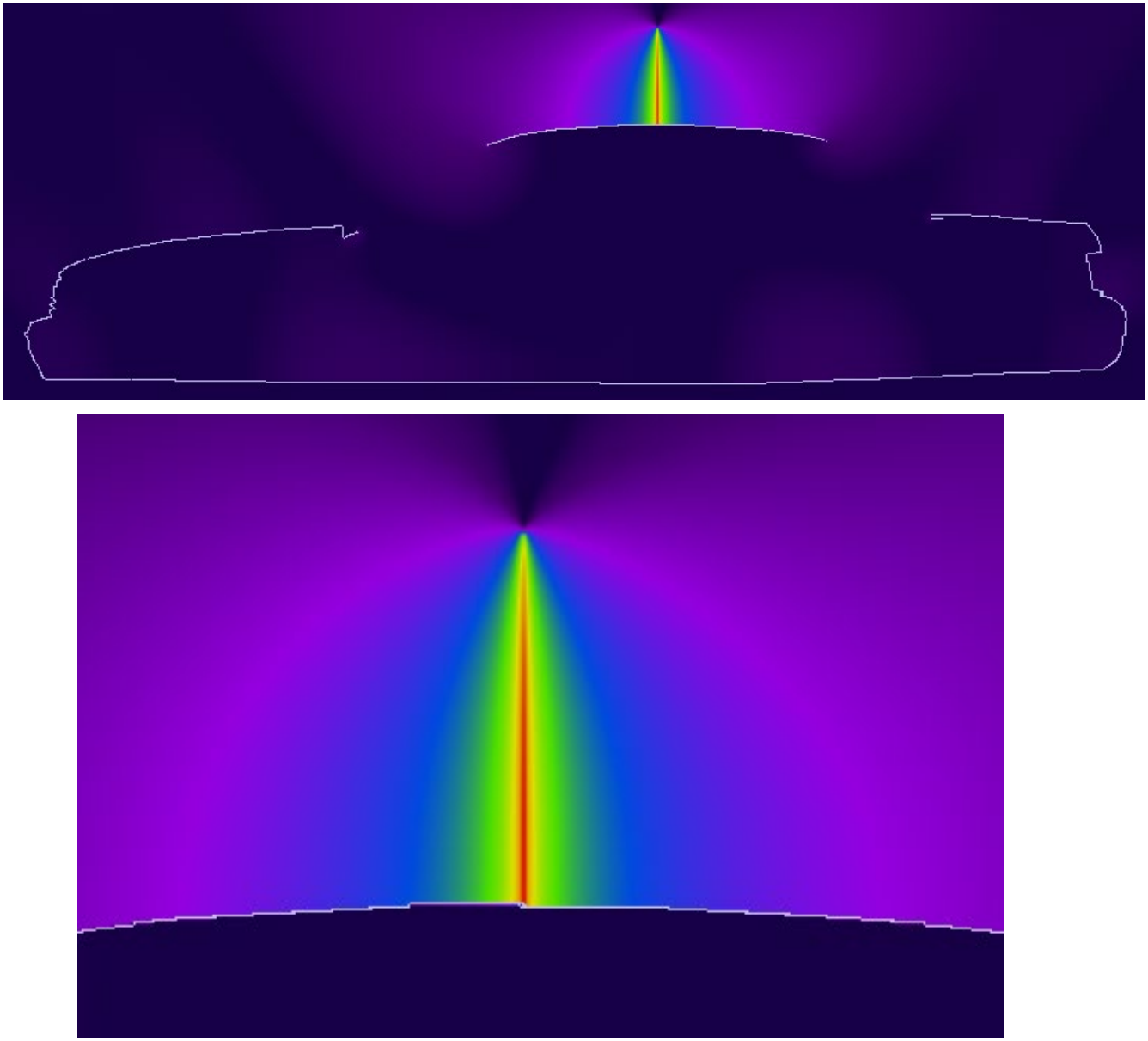


Figure 5. SAR distribution at 162.0000 MHz in the passenger model located on the side of the back seat, produced by the roof-mount HAD4008A antenna. The contour plot is relative to the plane where the peak 1-g average SAR for this exposure condition occurs.

The pictures below in Figure 6 show the E and H field distributions in the plane of the antenna corresponding to the condition in Figure 5.



a)



b)

Figure 6. (a) E-field magnitude distribution corresponding to exposure condition of Figure 5, and (b) H-field magnitude distribution corresponding to exposure condition of Figure 5.

The SAR distribution in the exposure condition that gave highest adjusted 1-g SAR for Companion mobile radio (ISED Canada) is reported in Figure 7. (140.0000 MHz, passenger on the center of the back seat, HAD4006A antenna).

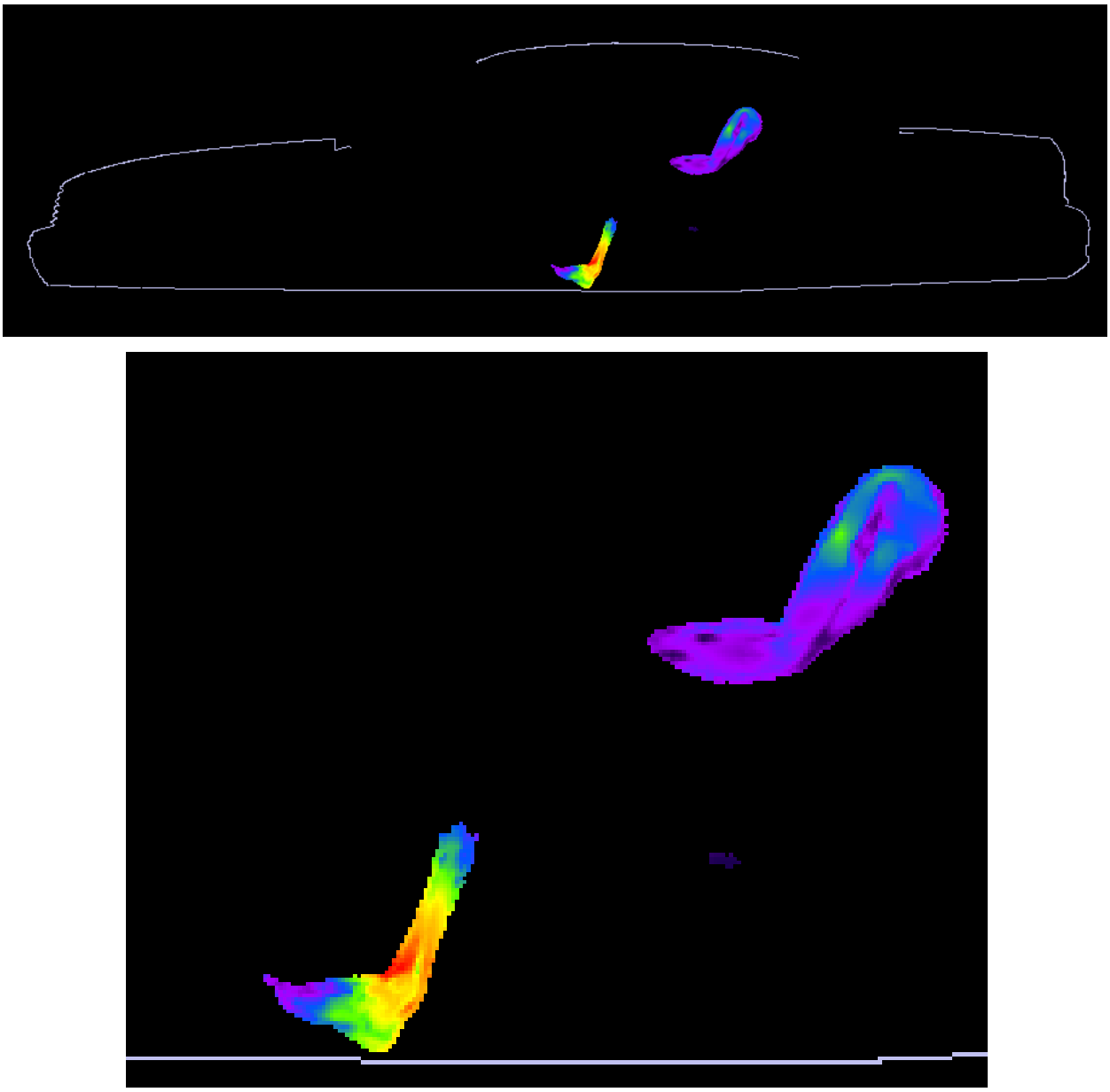
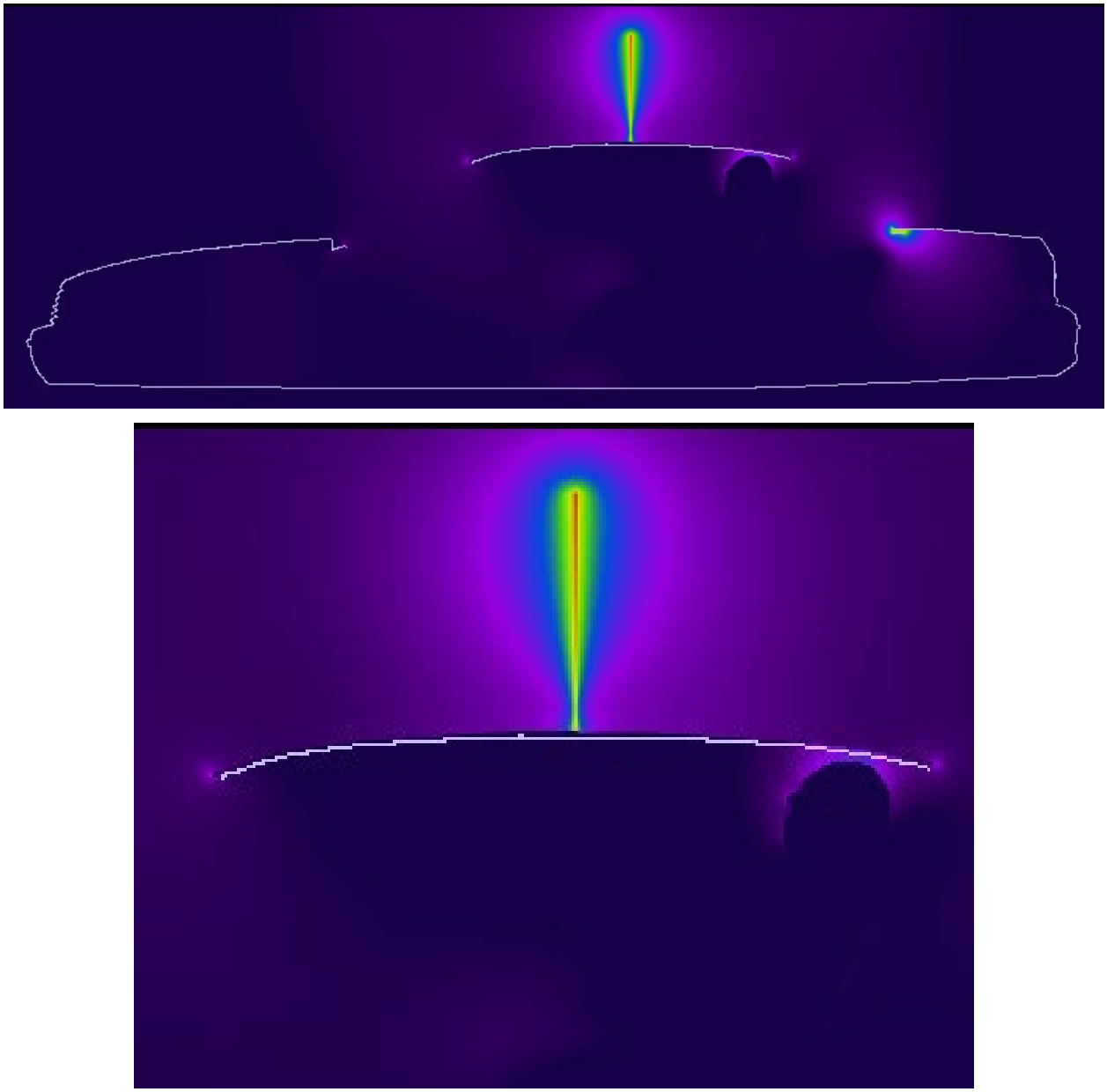
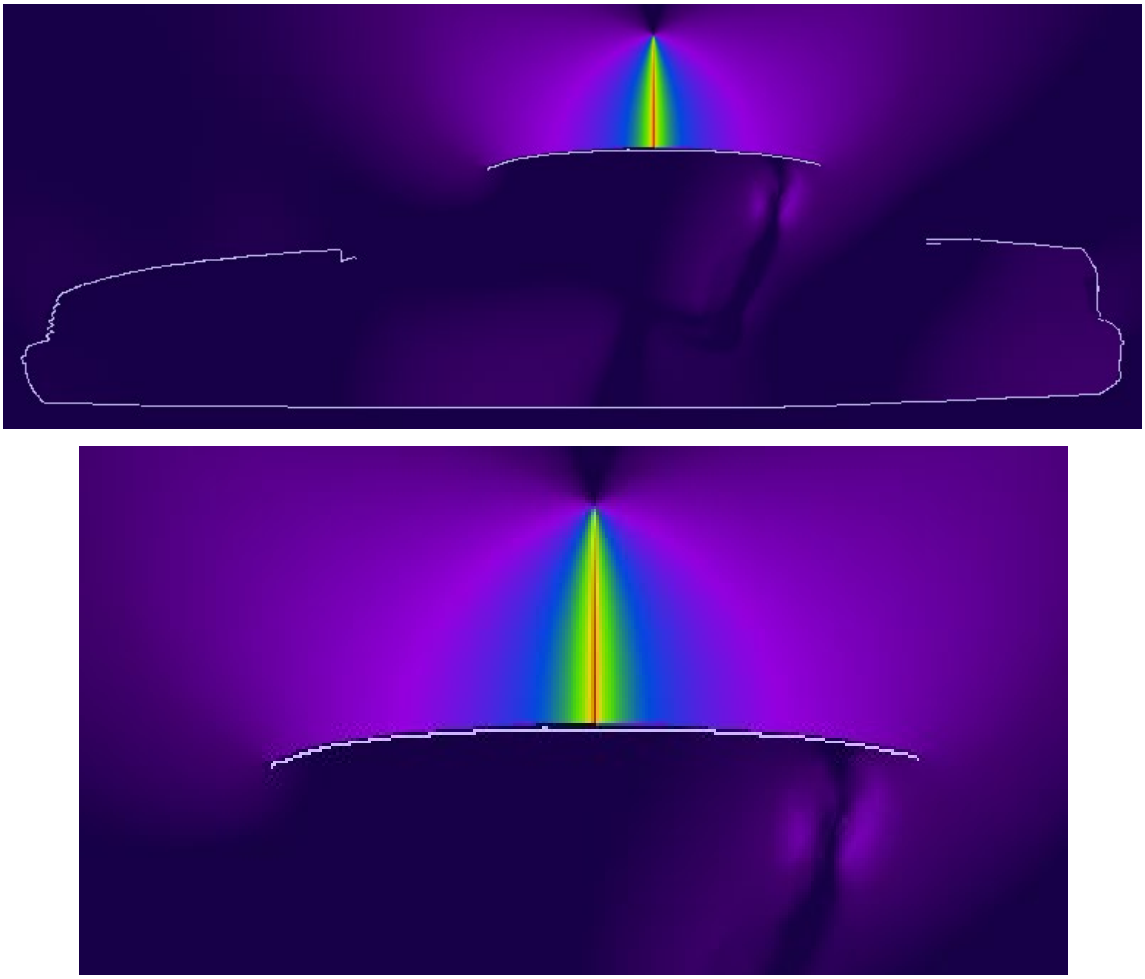


Figure 7. SAR distribution at 140.0000 MHz in the passenger model located on the center of the back seat, produced by the roof-mount HAD4006A antenna. The contour plot is relative to the plane where the peak 1-g average SAR for this exposure condition occurs.

The pictures below in Figure 8 show the E and H field distributions in the plane of the antenna corresponding to the condition in Figure 7.



a)



b)

Figure 8. (a) E-field magnitude distribution corresponding to exposure condition of Figure 7, and (b) H-field magnitude distribution corresponding to exposure condition of Figure 7.

SAR Simulation Reduction Considerations

Per Response to Inquiry to FCC (Tracking Number 528198), for a particular antenna that has more than one configuration which exceeds the MPE limit, SAR evaluation shall begin with the worst case configuration (mount location and frequency channel). If the SAR value is less than 50% of the limit, no further SAR evaluation is needed for that antenna.

If the worst case configuration SAR value is above 50% of the limit, SAR evaluation shall be done on the subsequent worse configuration (ranked in descending MPE percentage to limit). If the subsequent SAR value is below 75% of the limit, no further SAR evaluation is needed for that antenna, otherwise the SAR evaluation for the remaining antenna configurations shall continue until the SAR value is below 75% of the limit.

Table 3 below list all the configurations that did not conform to applicable MPE limits (ranked in descending MPE percentage to limit) and apply SAR simulation reduction consideration as mentioned above.

Table 3a: SAR Simulation Reduction Considerations for Passenger (back seat) (FCC)

DVR 800		APX 4500 VHF Mobile		Combine MPE (%)	Exposure Location	DVR 800 Adjusted SAR Results (W/kg)		APX 4500 VHF Mobile Adjusted SAR Results (W/kg)		Combined Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAF4016A	815.0000	HAD4008A	162.0000	110.0	Back Center Back Side	0.09 0.14	0.007 0.005	0.04 0.06	0.003 0.004	0.13 0.20	0.010 0.009	
HAF4016A	806.0000	HAD4008A	162.0000	109.3								The highest MPE configuration has SAR below 50% of the limit.
HAF4016A	824.0000	HAD4008A	162.0000	107.6								
HAF4016A	851.0000	HAD4008A	162.0000	106.8								
HAF4016A	869.0000	HAD4008A	162.0000	102.9								
HAF4016A	815.0000	HAD4008A	156.2000	101.4								
HAF4016A	806.0000	HAD4008A	156.2000	100.7								
HAF4016A	815.0000	HAD4009A	162.0000	111.0	Back Center Back Side	0.09 0.14	0.007 0.005	0.04 0.06	0.003 0.004	0.13 0.20	0.010 0.009	
HAF4016A	806.0000	HAD4009A	162.0000	110.3								The highest MPE configuration has SAR below 50% of the limit.
HAF4016A	824.0000	HAD4009A	162.0000	108.6								
HAF4016A	851.0000	HAD4009A	162.0000	107.8								
HAF4016A	860.0000	HAD4009A	162.0000	106.7								
HAF4016A	860.0000	HAD4008A	162.0000	105.7								
HAF4016A	869.0000	HAD4009A	162.0000	103.9								

Table 3b: SAR Simulation Reduction Considerations for Passenger (back seat) (ISED Canada)

DVR 800		APX 4500 VHF Mobile		Combine MPE (%)	Exposure Location	DVR 800 Adjusted SAR Results (W/kg)		APX 4500 VHF Mobile Adjusted SAR Results (W/kg)		Combined Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAF4016A	815.0000	HAD4021A	150.8000	148.2	Back Center Back Side	0.09 0.14	0.007 0.005	0.14 0.22	0.007 0.010	0.23 0.36	0.014 0.015	
HAF4016A	806.0000	HAD4021A	150.8000	146.6								The highest MPE configuration has SAR below 50% of the limit.
HAF4016A	815.0000	HAD4021A	158.3000	144.7								
HAF4016A	815.0000	HAD4021A	140.0000	143.9								
HAF4016A	824.0000	HAD4021A	150.8000	143.3								
HAF4016A	806.0000	HAD4021A	158.3000	143.1								
HAF4016A	806.0000	HAD4021A	140.0000	142.3								
HAF4016A	851.0000	HAD4021A	150.8000	141.7								
HAF4016A	824.0000	HAD4021A	158.3000	139.8								
HAF4016A	860.0000	HAD4021A	150.8000	139.4								
HAF4016A	824.0000	HAD4021A	140.0000	139.0								
HAF4016A	851.0000	HAD4021A	158.3000	138.2								
HAF4016A	851.0000	HAD4021A	140.0000	137.4								
HAF4016A	815.0000	HAD4021A	144.0000	136.0								
HAF4016A	860.0000	HAD4021A	158.3000	135.9								
HAF4016A	860.0000	HAD4021A	140.0000	135.1								
HAF4016A	806.0000	HAD4021A	144.0000	134.4								
HAF4016A	869.0000	HAD4021A	150.8000	133.4								
HAF4016A	824.0000	HAD4021A	144.0000	131.1								
HAF4016A	869.0000	HAD4021A	158.3000	129.9								
HAF4016A	851.0000	HAD4021A	144.0000	129.5								
HAF4016A	869.0000	HAD4021A	140.0000	129.1								
HAF4016A	860.0000	HAD4021A	144.0000	127.2								
HAF4016A	869.0000	HAD4021A	144.0000	121.2								
HAF4016A	815.0000	HAD4021A	165.9000	113.1								
HAF4016A	806.0000	HAD4021A	165.9000	111.5								
HAF4016A	824.0000	HAD4021A	165.9000	108.2								
HAF4016A	851.0000	HAD4021A	165.9000	106.6								
HAF4016A	860.0000	HAD4021A	165.9000	104.3								
HAF4016A	815.0000	HAD4017A	165.9000	141.5	Back Center Back Side	0.09 0.14	0.007 0.005	0.03 0.06	0.002 0.004	0.12 0.20	0.009 0.009	
HAF4016A	815.0000	HAD4017A	158.3000	141.1								The highest MPE configuration has SAR below 50% of the limit.
HAF4016A	806.0000	HAD4017A	165.9000	139.9								
HAF4016A	806.0000	HAD4017A	158.3000	139.5								
HAF4016A	824.0000	HAD4017A	165.9000	136.6								
HAF4016A	824.0000	HAD4017A	158.3000	136.2								
HAF4016A	851.0000	HAD4017A	165.9000	135.0								
HAF4016A	851.0000	HAD4017A	158.3000	134.6								
HAF4016A	860.0000	HAD4017A	165.9000	132.7								
HAF4016A	860.0000	HAD4017A	158.3000	132.3								
HAF4016A	869.0000	HAD4017A	165.9000	126.7								
HAF4016A	869.0000	HAD4017A	158.3000	126.3								
HAF4016A	815.0000	HAD4017A	150.8000	115.4								
HAF4016A	806.0000	HAD4017A	150.8000	113.8								
HAF4016A	824.0000	HAD4017A	150.8000	110.5								
HAF4016A	851.0000	HAD4017A	150.8000	108.9								
HAF4016A	860.0000	HAD4017A	150.8000	106.6								
HAF4016A	869.0000	HAD4017A	150.8000	100.6								
HAF4016A	815.0000	HAD4016A	156.2000	143.4	Back Center Back Side	0.09 0.14	0.007 0.005	0.15 0.14	0.006 0.006	0.24 0.28	0.013 0.011	
HAF4016A	806.0000	HAD4016A	156.2000	141.8								The highest MPE configuration has SAR below 50% of the limit.
HAF4016A	815.0000	HAD4016A	150.8000	141.7								
HAF4016A	806.0000	HAD4016A	150.8000	140.1								
HAF4016A	824.0000	HAD4016A	156.2000	138.5								
HAF4016A	851.0000	HAD4016A	156.2000	136.9								
HAF4016A	824.0000	HAD4016A	150.8000	136.8								
HAF4016A	815.0000	HAD4016A	162.0000	135.3								
HAF4016A	851.0000	HAD4016A	150.8000	135.2								
HAF4016A	860.0000	HAD4016A	156.2000	134.6								
HAF4016A	806.0000	HAD4016A	162.0000	133.7								
HAF4016A	860.0000	HAD4016A	150.8000	132.9								
HAF4016A	824.0000	HAD4016A	162.0000	130.4								
HAF4016A	851.0000	HAD4016A	162.0000	128.8								
HAF4016A	869.0000	HAD4016A	156.2000	128.6								
HAF4016A	869.0000	HAD4016A	150.8000	126.9								
HAF4016A	860.0000	HAD4016A	162.0000	126.5								
HAF4016A	869.0000	HAD4016A	162.0000	120.5								
HAF4016A	815.0000	HAD4016A	144.0000	117.6								
HAF4016A	806.0000	HAD4016A	144.0000	116.0								
HAF4016A	824.0000	HAD4016A	144.0000	112.7								
HAF4016A	851.0000	HAD4016A	144.0000	111.1								
HAF4016A	860.0000	HAD4016A	144.0000	108.8								
HAF4016A	869.0000	HAD4016A	144.0000	102.8								

Table 3b continued: SAR Simulation Reduction Considerations for Passenger (back seat) (ISED Canada)

DVR 800		APX 4500 VHF Mobile		Combine MPE (%)	Exposure Location	DVR 800 Adjusted SAR Results (W/kg)		APX 4500 VHF Mobile Adjusted SAR Results (W/kg)		Combined Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAF4016A	815.0000	HAD4006A	140.0000	131.8	Back Center	0.09	0.007	0.32	0.010	0.41	0.017	
					Back Side	0.14	0.005	0.26	0.014	0.40	0.019	
HAF4016A	806.0000	HAD4006A	140.0000	130.2								The highest MPE configuration has SAR below 50% of the limit.
HAF4016A	824.0000	HAD4006A	140.0000	126.9								
HAF4016A	851.0000	HAD4006A	140.0000	125.3								
HAF4016A	860.0000	HAD4006A	140.0000	123.0								
HAF4016A	869.0000	HAD4006A	140.0000	117.0								
HAF4016A	815.0000	HAD4006A	144.0000	115.3								
HAF4016A	806.0000	HAD4006A	144.0000	113.7								
HAF4016A	824.0000	HAD4006A	144.0000	110.4								
HAF4016A	851.0000	HAD4006A	144.0000	108.8								
HAF4016A	860.0000	HAD4006A	144.0000	106.5								
HAF4016A	869.0000	HAD4006A	144.0000	100.5								
HAF4016A	815.0000	HAD4007A	150.8000	155.9	Back Center	0.09	0.007	0.14	0.007	0.23	0.014	
					Back Side	0.14	0.005	0.22	0.010	0.36	0.015	
HAF4016A	806.0000	HAD4007A	150.8000	154.3								The highest MPE configuration has SAR below 50% of the limit.
HAF4016A	824.0000	HAD4007A	150.8000	151.0								
HAF4016A	851.0000	HAD4007A	150.8000	149.4								
HAF4016A	815.0000	HAD4007A	148.0000	149.0								
HAF4016A	806.0000	HAD4007A	148.0000	147.4								
HAF4016A	860.0000	HAD4007A	150.8000	147.1								
HAF4016A	824.0000	HAD4007A	148.0000	144.1								
HAF4016A	851.0000	HAD4007A	148.0000	142.5								
HAF4016A	869.0000	HAD4007A	150.8000	141.1								
HAF4016A	860.0000	HAD4007A	148.0000	140.2								
HAF4016A	869.0000	HAD4007A	148.0000	134.2								
HAF4016A	815.0000	HAD4007A	144.0000	108.2								
HAF4016A	806.0000	HAD4007A	144.0000	106.6								
HAF4016A	824.0000	HAD4007A	144.0000	103.3								
HAF4016A	851.0000	HAD4007A	144.0000	101.7								
HAF4016A	815.0000	HAD4008A	162.0000	176.7	Back Center	0.09	0.007	0.04	0.003	0.13	0.010	
					Back Side	0.14	0.005	0.06	0.004	0.20	0.009	
HAF4016A	806.0000	HAD4008A	162.0000	175.1								The highest MPE configuration has SAR below 50% of the limit.
HAF4016A	824.0000	HAD4008A	162.0000	171.8								
HAF4016A	851.0000	HAD4008A	162.0000	170.2								
HAF4016A	860.0000	HAD4008A	162.0000	167.9								
HAF4016A	815.0000	HAD4008A	156.2000	163.4								
HAF4016A	869.0000	HAD4008A	162.0000	161.9								
HAF4016A	806.0000	HAD4008A	156.2000	161.8								
HAF4016A	824.0000	HAD4008A	156.2000	158.5								
HAF4016A	851.0000	HAD4008A	156.2000	156.9								
HAF4016A	860.0000	HAD4008A	156.2000	154.6								
HAF4016A	869.0000	HAD4008A	156.2000	148.6								
HAF4016A	815.0000	HAD4008A	150.8000	125.1								
HAF4016A	806.0000	HAD4008A	150.8000	123.5								
HAF4016A	824.0000	HAD4008A	150.8000	120.2								
HAF4016A	851.0000	HAD4008A	150.8000	118.6								
HAF4016A	860.0000	HAD4008A	150.8000	116.3								
HAF4016A	869.0000	HAD4008A	150.8000	110.3								
HAF4016A	815.0000	HAD4009A	162.0000	178.3	Back Center	0.09	0.007	0.04	0.003	0.13	0.010	
					Back Side	0.14	0.005	0.06	0.004	0.20	0.009	
HAF4016A	806.0000	HAD4009A	162.0000	176.7								The highest MPE configuration has SAR below 50% of the limit.
HAF4016A	824.0000	HAD4009A	162.0000	173.4								
HAF4016A	851.0000	HAD4009A	162.0000	171.8								
HAF4016A	860.0000	HAD4009A	162.0000	169.5								
HAF4016A	869.0000	HAD4009A	162.0000	163.5								
HAF4016A	815.0000	HAD4009A	167.7000	124.4								
HAF4016A	806.0000	HAD4009A	167.7000	122.8								
HAF4016A	824.0000	HAD4009A	167.7000	119.5								
HAF4016A	851.0000	HAD4009A	167.7000	117.9								
HAF4016A	860.0000	HAD4009A	167.7000	115.6								
HAF4016A	869.0000	HAD4009A	167.7000	109.6								

Results of SAR computations for combined exposure

From all simulated results the worst case peak SAR values were identified for both DVR 800 and Companion mobile radio exposure and then combined to produce the composite peak SAR value for the corresponding locations of the human body model. Table 4 and Table 5 present the worst case composite peak SAR value.

Table 4: Worst case peak 1-g average SAR for passenger exposure conditions and combined 1-g average SAR from simultaneous exposure.

	Passenger location	DVR 800 [W/kg]	Companion mobile radio	Total [W/kg]
FCC US	Back Center	0.09	0.04	0.13
	Back Side	0.14	0.06	0.20
ISED Canada	Back Center	0.09	0.32	0.41
	Back Side	0.14	0.26	0.40

Table 5: Worst case peak whole body average SAR for passenger exposure conditions and combined whole body average SAR from simultaneous exposure.

	Passenger location	DVR 800 [W/kg]	Companion mobile radio	Total [W/kg]
FCC US	Back Center	0.007	0.003	0.010
	Back Side	0.005	0.004	0.009
ISED Canada	Back Center	0.007	0.010	0.017
	Back Side	0.005	0.014	0.019

From Table 4 and Table 5 the maximum combined peak 1-g SAR is 0.41 W/kg, less than the 1.6 W/kg limit, while the maximum combined whole-body average SAR is 0.019 W/kg, less than the 0.08 W/kg limit.

Conclusions

Under the test conditions described for evaluating passenger exposure to the RF electromagnetic fields emitted by vehicle-mounted antennas used in conjunction with these mobile radio products, the present analysis shows that the computed SAR values are compliant with the FCC US and ISED Canada exposure limits for the general public.

References

[1] IEEE Standard C95.1-1999. *IEEE Standard for Safety Levels with Respect to Human Exposure to RF Electromagnetic Fields*, 3 kHz to 300 GHz.

[2] http://www.nlm.nih.gov/research/visible/visible_human.html

[3] Simon,W., Bit-Babik, G., "Effect of the variation in population on the whole-body average SAR of persons exposed to vehicle mounted antennas W. Simon", ICEAA September 2-7, 2012, Cape 1380 Town.