MOTOROLA SOLUTIONS

COMPUTATIONAL EME COMPLIANCE ASSESSMENT OF THE APX SERIES MODEL M25KSS9PW1BN (PMUD3490A) MOBILE RADIO AND COMPANION DEVICE, DIGITAL VEHICULAR REPEATER (DVR UHF), MOBEXCOM DVRS UHF (DQPMDVR4000P, DQPMDVR5000P, DQPMDVR6000P)

May 17, 2020

Goh Jue Yie, Giorgi Bit-Babik, Ph.D., and Antonio Faraone, Ph.D.

Motorola Solutions EME Research Lab, Plantation, Florida

Introduction

This report summarizes the computational [numerical modeling] analysis performed to document compliance of the APX Series Model Number M25KSS9PW1BN (PMUD3490A) Mobile Radio interfaced with, and transmitting simultaneously with DVR UHF, model #MOBEXCOM DVRS UHF (DQPMDVR4000P, DQPMDVR5000P, DQPMDVR6000P) and vehicle-mounted antennas with the United States 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)
FCC US	Mobile APX6500	VHF	150.8 – 173.4
	DVR	UHF	406.1- 512
ISED Canada	Mobile APX6500	VHF	138 -173.4
	DVR	UHF	406.1-430, 450-470

This computational analysis supplements the measurements conducted to evaluate the compliance of the exposure from this mobile radio and companion device DVR UHF with respect to applicable *reference level* which in the following will be referred to as *maximum*

permissible exposure (MPE) limits.[1] A total of 168 test conditions that did not conform with FCC MPE limit and 209 test conditions did not conform with ISED MPE limits were considered 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 [2], and Health Canada guidelines [1].

Employing SAR simulation reduction considerations[2], a total 25 configurations (requiring a total of 50 numerical simulations) have been performed, all of them addressing the exposure of the back seat passenger to the DVR UHF repeater featuring trunk-mount antennas and the APX6500 mobile radio featuring roof-mount antennas.

For all simulations a commercial code (XFDTD™ v7.6.0, by Remcom Inc, State College, PA, USA) based on the 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 represents the *basic restriction* for RF energy exposure up to 6 GHz and that MPE limits are in fact derived from SAR limits. Accordingly, the SAR computations provide a scientifically valid and more relevant estimate of RF energy exposures.

Method

The XFDTD™ v7.6.0 computational suite enable simulating the heterogeneous full human body model defined according to the IEC/IEEE 62704-2:2017 standard and derived from the so-called Visible Human [3], discretized in 3 mm cubic-edge voxels. The IEC/IEEE 62704-2:2017 dielectric properties for 39 body tissues are automatically assigned by XFDTD™ at the specific simulation frequency. The "seated" man model representing the passenger 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 by Remcom Inc. according to the IEEE/IEC 62704-2:2017 standard requirements is provided in conjunction with this report.

[1] This choice is made for process efficiency, since "MPE" is used in the United States. In this way, chances of making editorial mistakes that may then require extended interactions with the report examiner are reduced.
[2] SAR simulation reduction is described in the SAR Simulations Reduction Considerations section of this report.

The car model has been imported into XFDTD™ from the CAD file of the sedan vehicle defined in the IEEE/IEC 62704-2:2017 standard, 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. Figure 1 below shows both the vehicle CAD model and a picture of the actual vehicle.

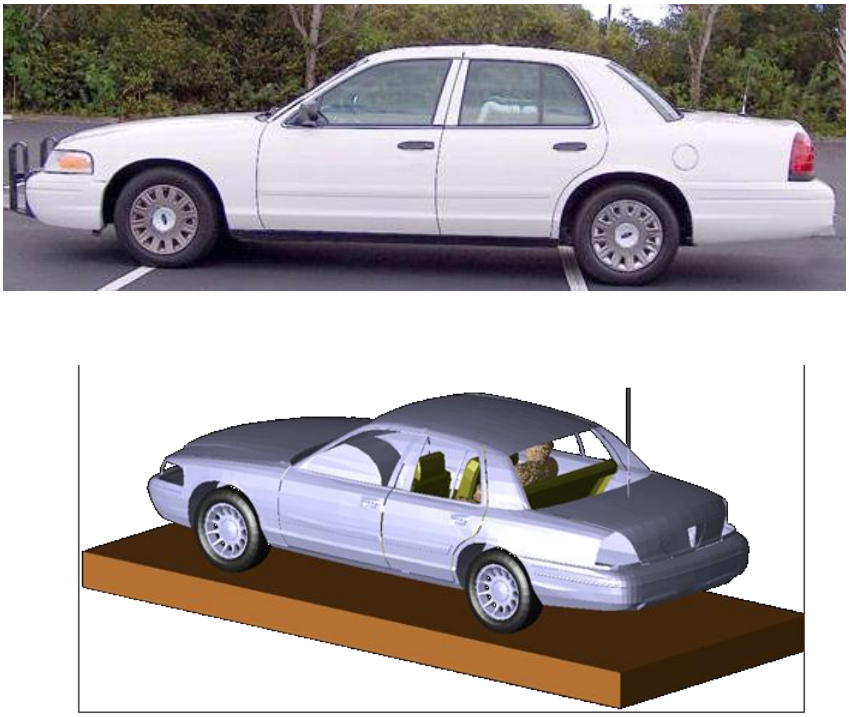


Figure 1: Picture of the vehicle and corresponding CAD model used in XFDTD™ simulations

For back seat passenger exposures, the antenna is positioned on the trunk at 85 cm distance from the passenger model head when the passenger model is located in the center of the back seat, replicating the experimental conditions used in MPE measurements. Figure 2 and figure 3 shows the XFDTD™ computational models used for passenger exposure to trunk and roof mount antennas.

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

The computational code employs a time-harmonic field excitation to produce a steady-state electromagnetic field in the exposed body model. Subsequently, the corresponding SAR distribution is automatically processed in order to determine the whole-body SAR and peak spatial average SAR distribution.

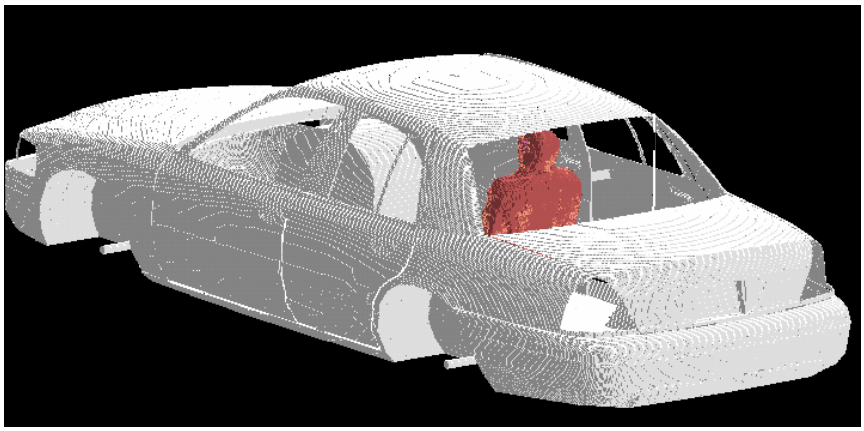


Figure 2: Passenger (back seat) model exposed to a trunk-mount antenna: XFDTD™ geometry. The antenna is installed at 85 cm from the passenger located in the center of the back seat.

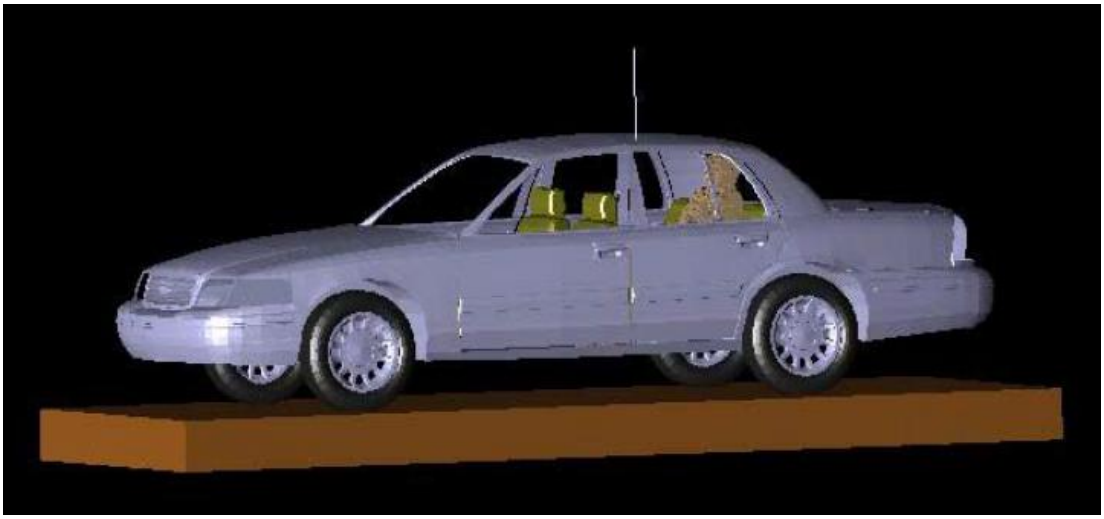


Figure 3: Passenger (back seat) model exposed to a roof-mount antenna: XFDTD™ geometry.

The maximum average output power from mobile radio antenna is 60W (VHF band), while it is 10 W from the DVR UHF repeater antenna (UHF band). Since the ohmic losses in the vehicle materials, as well as the mismatch losses at the antenna feed-point are neglected, while source-based time averaging (50% talk time for to push-to-talk operation) for the APX6500 mobile radio and (100% talk time) for DVR UHF were employed, all computational results are

normalized to half of the APX6500 mobile radio maximum average net output power, i.e., 30W (VHF band) and to full average net output power of the companion DVR UHF repeater, i.e., 10W (UHF band); minus the corresponding minimum insertion loss in excess of 0.5 dB of the feed cables supplied with the antennas, in accordance with the IEC/IEEE 62704-2:2017 standard provisions.

Results of SAR computations for car passengers

The test conditions requiring SAR computations are summarized in Table 1 (APX6500 mobile radio, 50% talk time) and Table 2 (DVR UHF, 100% talk time), together with the antenna data, the SAR results, and power density (P.D.) as obtained from the MPE measurements in the corresponding test conditions. The conditions are for antennas mounted on the center of the roof (APX6500 mobile radio) and the center of the trunk (DVR UHF). The antenna length listed in the tables includes the height of the 1.8 cm magnetic mount base used in MPE measurements to position the antenna on the vehicle. The same length was then used in the corresponding 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 Tables 1 and 2 have been simulated individually. These tables also include the interpolated adjustment factor and corresponding scaled SAR values following the requirements of the IEC/IEEE 62704-2:2017 standard.

Table 1a: Computed and adjusted SAR results for passenger exposure for APX6500 mobile radio

(Configurations exceeding FCC MPE limits)

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	HAD4007A, 1/4 Wave (144-150.8 MHz)	50.8	150.8000	0.22	Back Center	0.111	0.004	1.303	1.900	0.144	0.007
					Back Side Fig. 4 & 5	0.217	0.004	1.002	2.401	**0.218**	**0.010**
Roof	HAD4008A, 1/4 Wave (150.8-162 MHz)	47.3	162.0000	0.23	Back Center	0.028	0.001	1.352	1.896	0.038	0.003
					Back Side	0.055	0.002	1.028	2.420	0.056	0.004
Roof	HAD4009A, 1/4 Wave (162-174 MHz)	44.8	162.0000	0.21	Back Center	0.028	0.001	1.352	1.896	0.038	0.003
					Back Side	0.055	0.002	1.028	2.420	0.056	0.004
Roof	HAD4016A, 1/4 Wave (136-162 MHz)	53.1	150.8000	0.20	Back Center	0.111	0.004	1.303	1.900	0.145	0.007
					Back Side	0.216	0.004	1.002	2.401	0.217	0.010
Roof	HAD4017A, 1/4 Wave (146-174 MHz)	48.0	165.0125	0.22	Back Center	0.018	0.001	1.365	1.895	0.025	0.002
					Back Side	0.051	0.001	1.035	2.425	0.053	0.003
Roof	HAD4021A, 1/4 Wave (136 -174MHz)	53.5	165.0125	0.18	Back Center	0.018	0.001	1.365	1.895	0.025	0.002
					Back Side	0.051	0.001	1.035	2.425	0.053	0.003

Note:
Bold Green – the highest adjusted SAR results for the respective frequency bands.

Table 1b: Computed and adjusted SAR results for passenger exposure for APX6500 mobile radio

(Configurations exceeding ISED MPE limits)

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	HAD4006A, 1/4 Wave (136-144 MHz)	53.8	140.0000	0.22	Back Center **Fig. 6 & 7**	0.252	0.006	1.257	1.771	**0.316**	0.010
					Back Side	0.252	0.006	1.043	2.243	0.263	**0.014**
Roof	HAD4007A, 1/4 Wave (144-150.8 MHz)	50.8	*150.8000	0.22	Back Center	0.111	0.004	1.303	1.900	0.144	0.007
					Back Side	0.217	0.004	1.002	2.401	0.218	0.010
Roof	HAD4008A, 1/4 Wave (150.8-162 MHz)	47.3	*162.0000	0.23	Back Center	0.028	0.001	1.352	1.896	0.038	0.003
					Back Side	0.055	0.002	1.028	2.420	0.056	0.004
Roof	HAD4009A, 1/4 Wave (162-174 MHz)	44.8	*162.0000	0.21	Back Center	0.028	0.001	1.352	1.896	0.038	0.003
					Back Side	0.055	0.002	1.028	2.420	0.056	0.004
Roof	HAD4016A, 1/4 Wave (136-162 MHz)	53.1	*150.8000	0.20	Back Center	0.111	0.004	1.303	1.900	0.145	0.007
					Back Side	0.216	0.004	1.002	2.401	0.217	0.010
Roof	HAD4017A, 1/4 Wave (146-174 MHz)	48.0	*165.0125	0.22	Back Center	0.018	0.001	1.365	1.895	0.025	0.002
					Back Side	0.051	0.001	1.035	2.425	0.053	0.003
Roof	HAD4021A, 1/4 Wave (136 -174MHz)	53.5	*165.0125	0.18	Back Center	0.018	0.001	1.365	1.895	0.025	0.002
					Back Side	0.051	0.001	1.035	2.425	0.053	0.003

Note
Bold Green – the highest adjusted SAR results for the respective frequency bands.
***** - Same SAR simulation configuration as Table 1a

Table 1b (continued): Computed and adjusted SAR results for passenger exposure for APX6500 mobile radio

(Configurations exceeding ISED MPE limits)

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	#HAD4022A, 5/8 Wave (132 -174 MHz)	120.3	144.0000	0.04	Back Center	0.085	0.003	1.274	1.823	0.108	0.006
					Back Side	0.121	0.003	1.026	2.306	0.124	0.007
		115.8	150.8000	0.03	Back Center	0.068	0.002	1.303	1.900	0.089	0.004
					Back Side	0.118	0.002	1.002	2.401	0.119	0.005
		104.5	158.0125	0.05	Back Center	0.060	0.002	1.335	1.897	0.080	0.004
					Back Side	0.076	0.002	1.019	2.413	0.077	0.004
		98.3	165.0125	0.09	Back Center	0.019	0.001	1.365	1.895	0.026	0.002
					Back Side	0.046	0.001	1.035	2.425	0.048	0.003
		91.7	173.0125	0.06	Back Center	0.137	0.002	1.400	1.892	0.192	0.004
					Back Side	0.226	0.005	1.054	2.438	0.238	0.012
Roof	#RAD4010ARB, 1/2 wave (136-174 MHz)	132.3	144.0000	0.02	Back Center	0.064	0.002	1.274	1.823	0.081	0.004
					Back Side	0.091	0.002	1.026	2.306	0.093	0.005
		128.6	150.8000	0.02	Back Center	0.056	0.002	1.303	1.900	0.073	0.003
					Back Side	0.090	0.002	1.002	2.401	0.091	0.004
		118.3	158.0125	0.04	Back Center	0.051	0.002	1.335	1.897	0.068	0.003
					Back Side	0.054	0.001	1.019	2.413	0.055	0.003
		114.3	165.0125	0.04	Back Center	0.018	0.001	1.365	1.895	0.024	0.002
					Back Side	0.031	0.001	1.035	2.425	0.032	0.002
		105.5	173.0125	0.04	Back Center	0.080	0.001	1.400	1.892	0.113	0.003
					Back Side	0.129	0.003	1.054	2.438	0.135	0.007

Note:
Antenna length trimmed to frequency

Table 2a: Computed and adjusted SAR results for passenger exposure for DVR UHF

(Configurations exceeding FCC MPE limits)

Mount Location	Antenna Kit#	Antenna Length (cm)	Freq (MHz)	P.D. (mW/cm^2)	Exposure Location	Computed SAR (W/kg)		Interpolated Adjustment Factors		Adjusted SAR Results (W/kg)	
						1 g	WB	1 g	WB	1 g	WB
Trunk	HAE4003A, 1/4 Wave (450-470MHz)	17.8	460.0000	0.16	Back Center	0.061	0.005	2.360	2.783	0.144	0.013
					Back Side	0.122	0.005	1.983	2.580	0.243	0.013
Trunk	HAE4004A, 1/4 Wave (470-512MHz)	16.8	484.0000	0.16	Back Center	0.064	0.004	2.264	2.742	0.145	0.011
					Back Side	0.103	0.005	1.942	2.532	0.200	0.012
Trunk	HAE6012A, 1/4 Wave (380-433MHz)	20.0	406.5000	0.10	Back Center	0.164	0.005	2.328	2.742	0.382	**0.015**
					Back Side Fig. 8 & 9	0.177	0.005	2.319	2.658	**0.410**	0.012

Note:
Bold Green – the highest adjusted SAR results for the respective frequency bands.

Table 2b: Computed and adjusted SAR results for passenger exposure for DVR UHF

(Configurations exceeding ISED MPE limits)

Mount Location	Antenna Kit#	Antenna Length (cm)	Freq (MHz)	P.D. (mW/cm^2)	Exposure Location	Computed SAR (W/kg)		Interpolated Adjustment Factors		Adjusted SAR Results (W/kg)	
						1 g	WB	1 g	WB	1 g	WB
Trunk	HAE4003A, 1/4 Wave (450-470MHz)	17.8	450.0000	0.15	Back Center	0.114	0.006	2.400	2.800	0.275	**0.016**
					Back Side	0.100	0.005	2.000	2.600	0.201	0.013
			*460.0000	0.16	Back Center	0.061	0.005	2.360	2.783	0.144	0.013
					Back Side	0.122	0.005	1.983	2.580	0.243	0.013
			470.0000	0.12	Back Center	0.090	0.004	2.320	2.766	0.209	0.011
					Back Side	0.070	0.004	1.966	2.560	0.138	0.010
Trunk	HAE4004A, 1/4 Wave (470-512MHz)	16.8	470.0000	0.14	Back Center	0.089	0.004	2.320	2.766	0.207	0.011
					Back Side	0.070	0.004	1.966	2.560	0.137	0.010
Trunk	HAE6012A, 1/4 Wave (380-433MHz)	20.0	*406.5000	0.10	Back Center	0.164	0.005	2.328	2.742	0.382	0.015
					Back Side Fig. 8 & 9	0.177	0.005	2.319	2.658	**0.410**	0.012
			417.5000	0.09	Back Center	0.075	0.004	2.346	2.757	0.176	0.011
					Back Side	0.131	0.005	2.238	2.643	0.293	0.013
			429.9875	0.07	Back Center	0.067	0.004	2.367	2.773	0.158	0.012
					Back Side	0.123	0.004	2.147	2.627	0.265	0.010

Note:
Bold Green – the highest adjusted SAR results for the respective frequency band.
***** - Same SAR simulation configuration as Table 2a

The SAR distribution in the passenger exposure condition that gave highest adjusted 1-g SAR for the APX6500 mobile radio (FCC US) is reported in Figure 4. (150.8000 MHz, passenger on the side of the back seat, HAD4007A antenna installed on the roof).

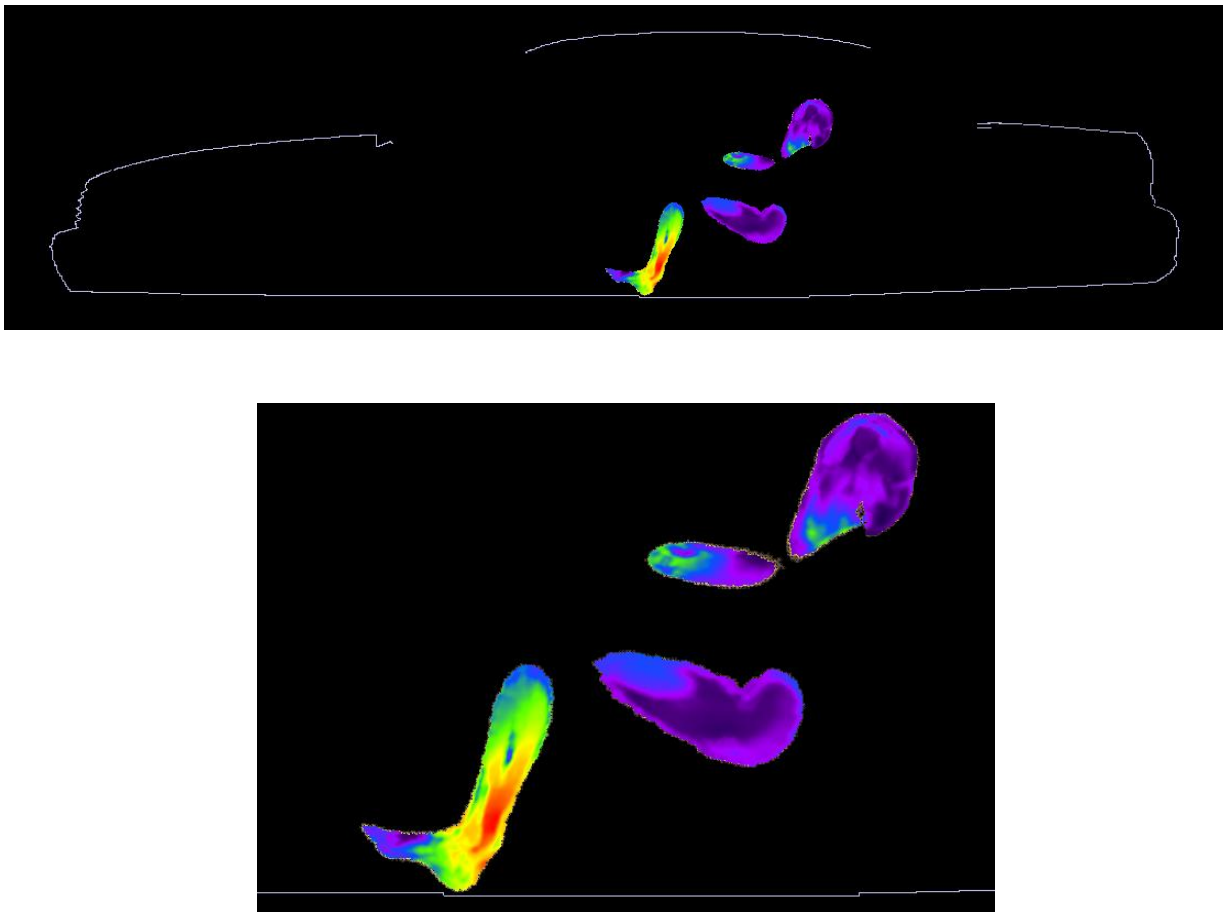
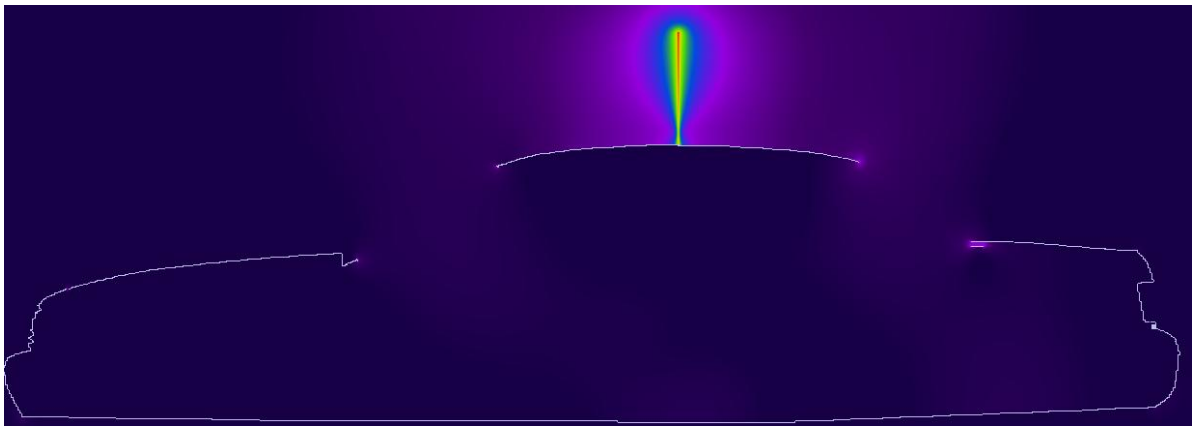
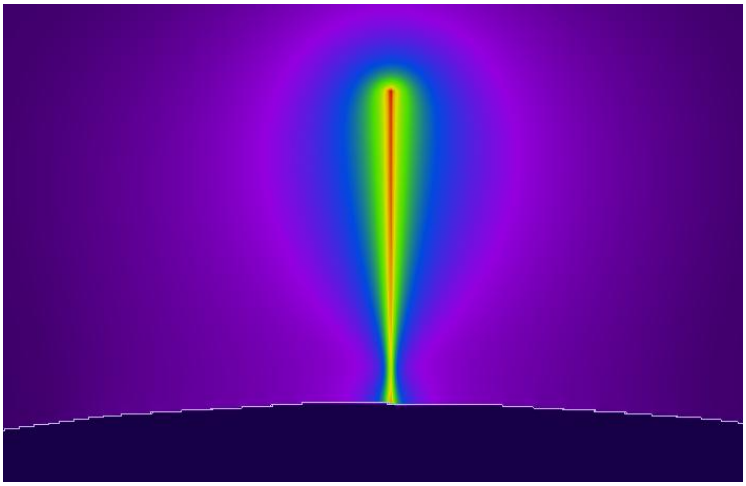


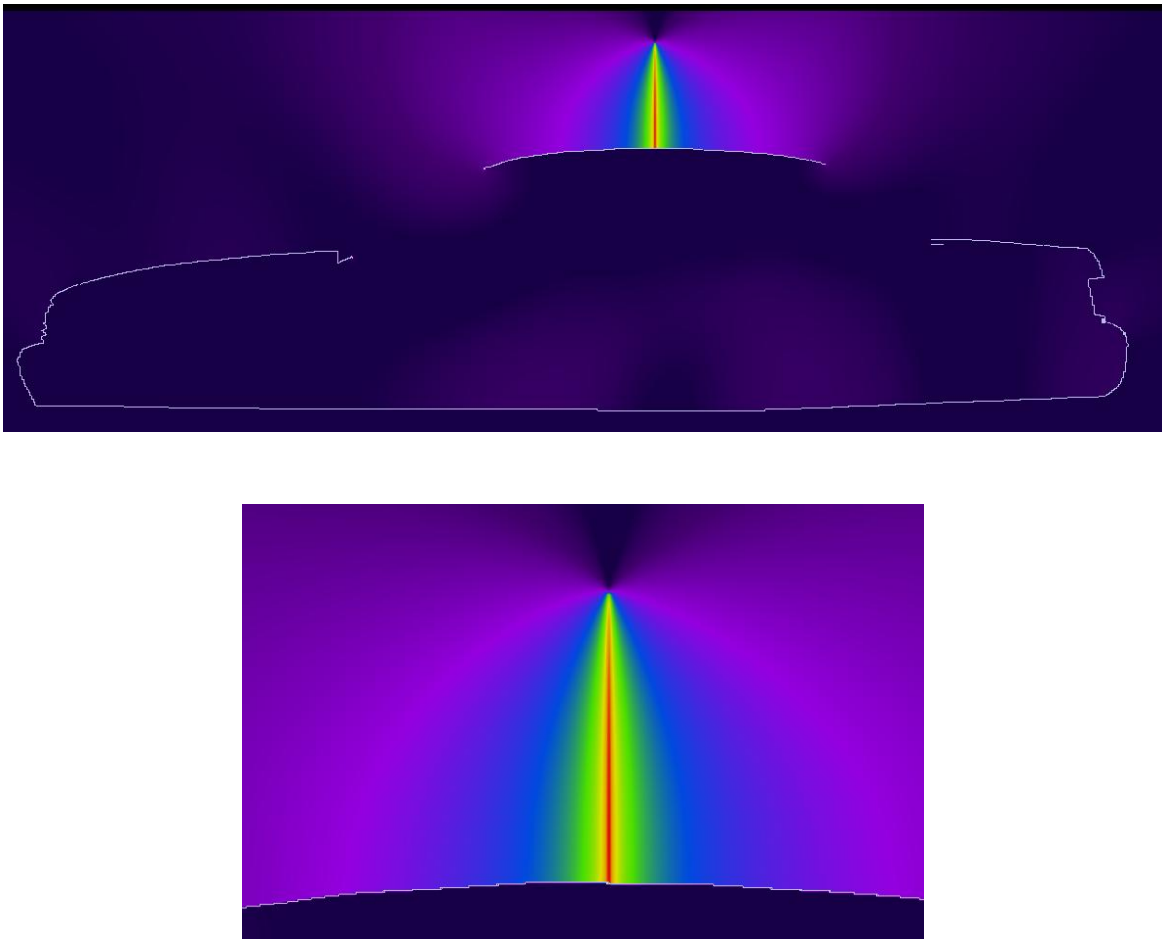
Figure 4. SAR distribution at 150.8000 MHz in the passenger model located on the side of the back seat, produced by the roof-mount HAD4007A antenna. The SAR distribution plot is relative to the plane where the peak 1-g average SAR for this exposure condition occurs.

The plots in Figure 5 illustrate the E and H field distributions in the plane of the antenna corresponding to the exposure condition resulting in the SAR distribution in Figure 4.





a)



b)

Figure 5. (a) E-field magnitude distribution corresponding to exposure condition of Figure 4, and (b) H-field magnitude distribution corresponding to exposure condition of Figure 4.

The SAR distribution in the passenger exposure condition that gave highest adjusted 1-g SAR for the APX6500 mobile radio (ISED Canada) is reported in Figure 6. (140.0000 MHz, passenger on the center of the back seat, HAD4006A antenna installed on the roof).

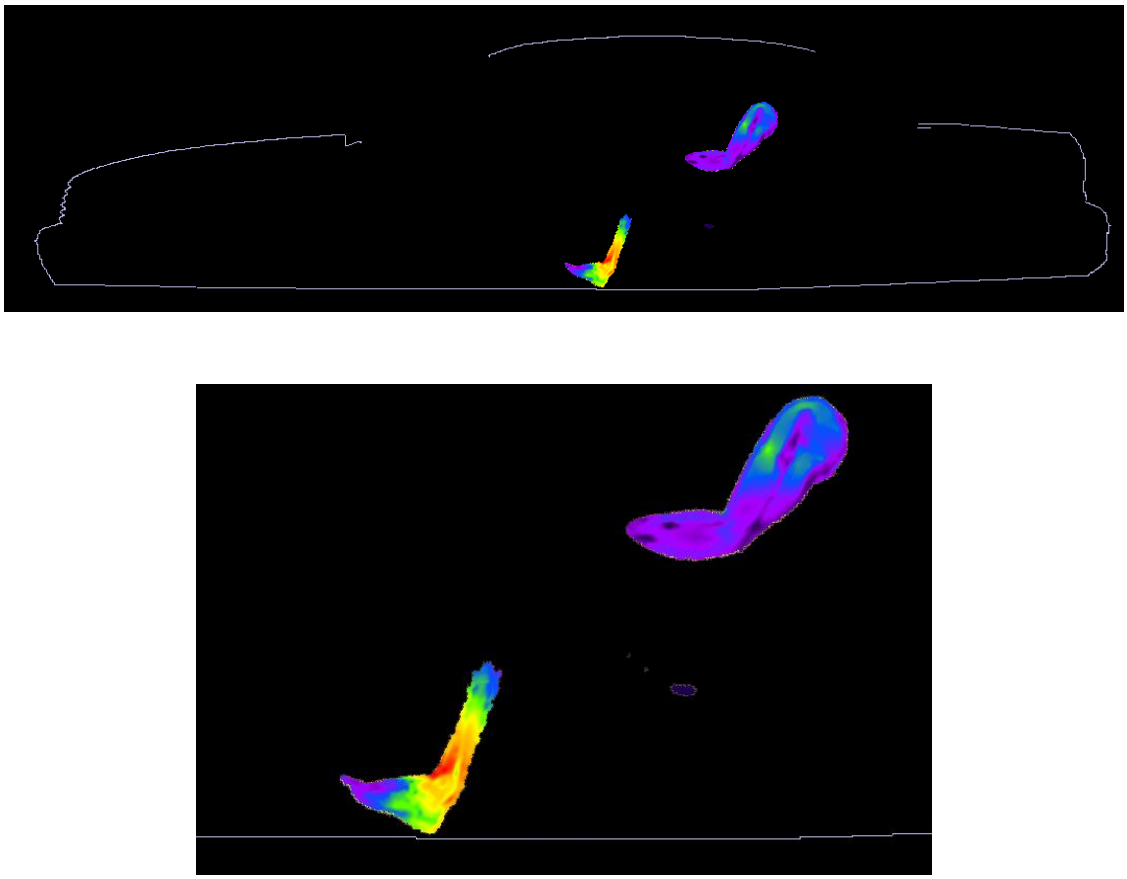
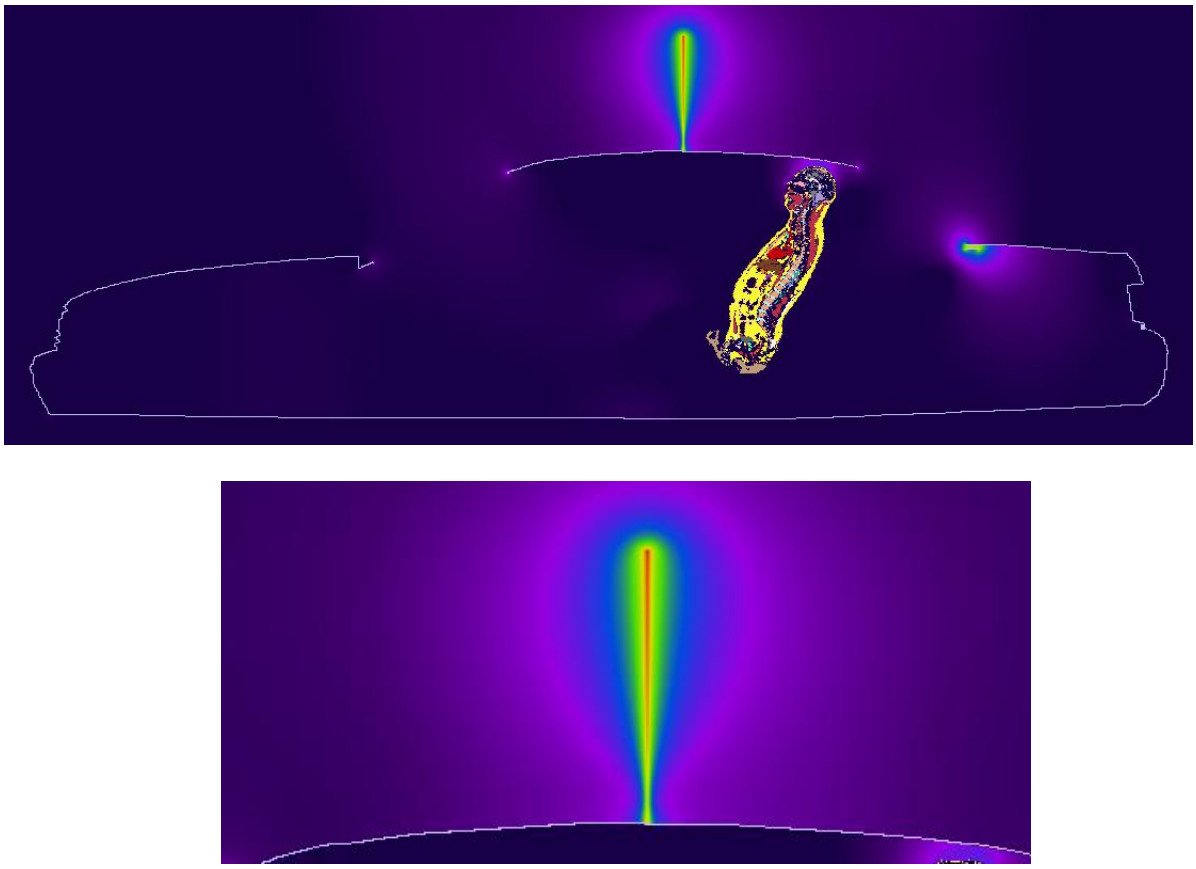
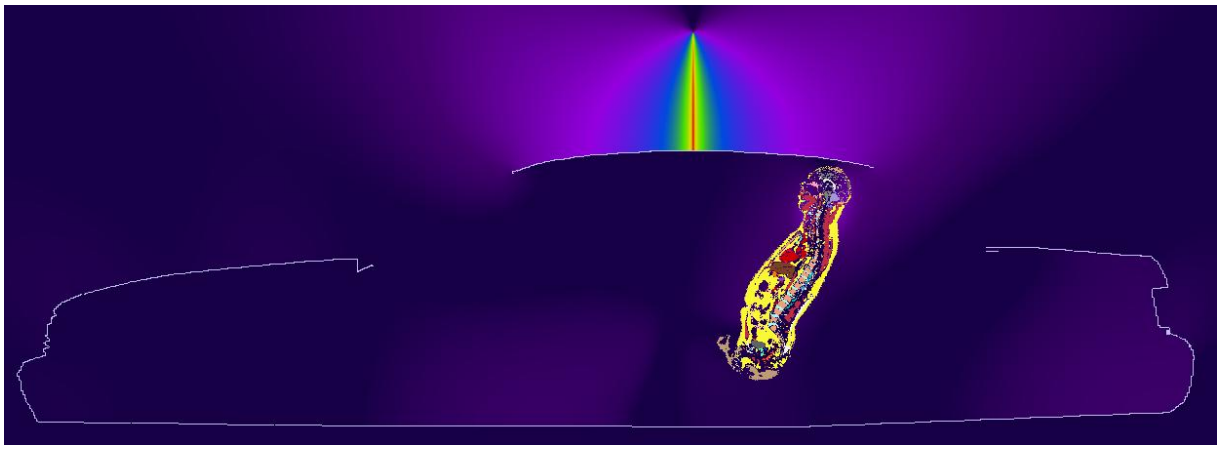


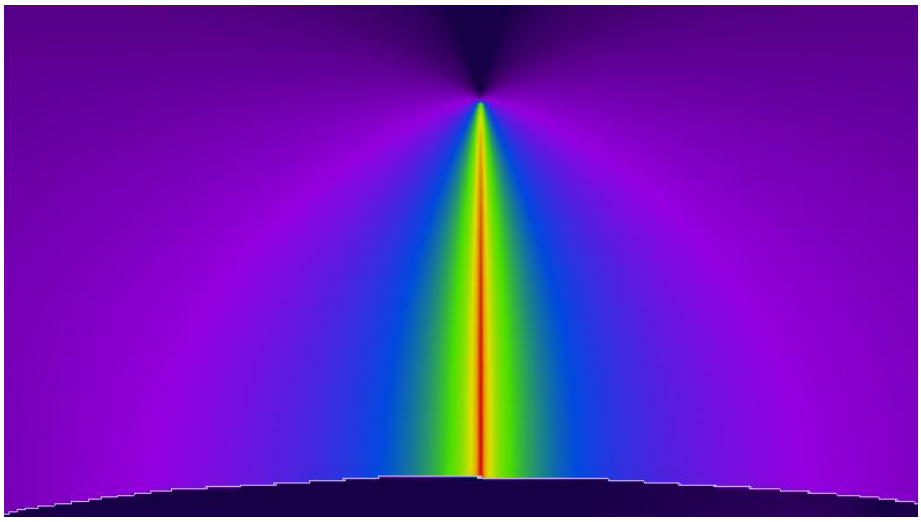
Figure 6. SAR distribution at 140.0000 MHz in the passenger model located on the center of the back seat, produced by the roof-mount HAD4006A antenna. The SAR distribution plot is relative to the plane where the peak 1-g average SAR for this exposure condition occurs.

The plots in Figure 7 illustrate the E and H field distributions in the plane of the antenna corresponding to the exposure condition resulting in the SAR distribution in Figure 6.



a)





b)

Figure 7. (a) E-field magnitude distribution corresponding to exposure condition of Figure 6, and (b) H-field magnitude distribution corresponding to exposure condition of Figure 6.

The SAR distribution in the passenger exposure condition that produced the highest adjusted 1-g SAR for the DVR UHF is reported in Figure 8 (406.5000 MHz, passenger on the side of the back seat, HAE6012A antenna installed on the trunk).

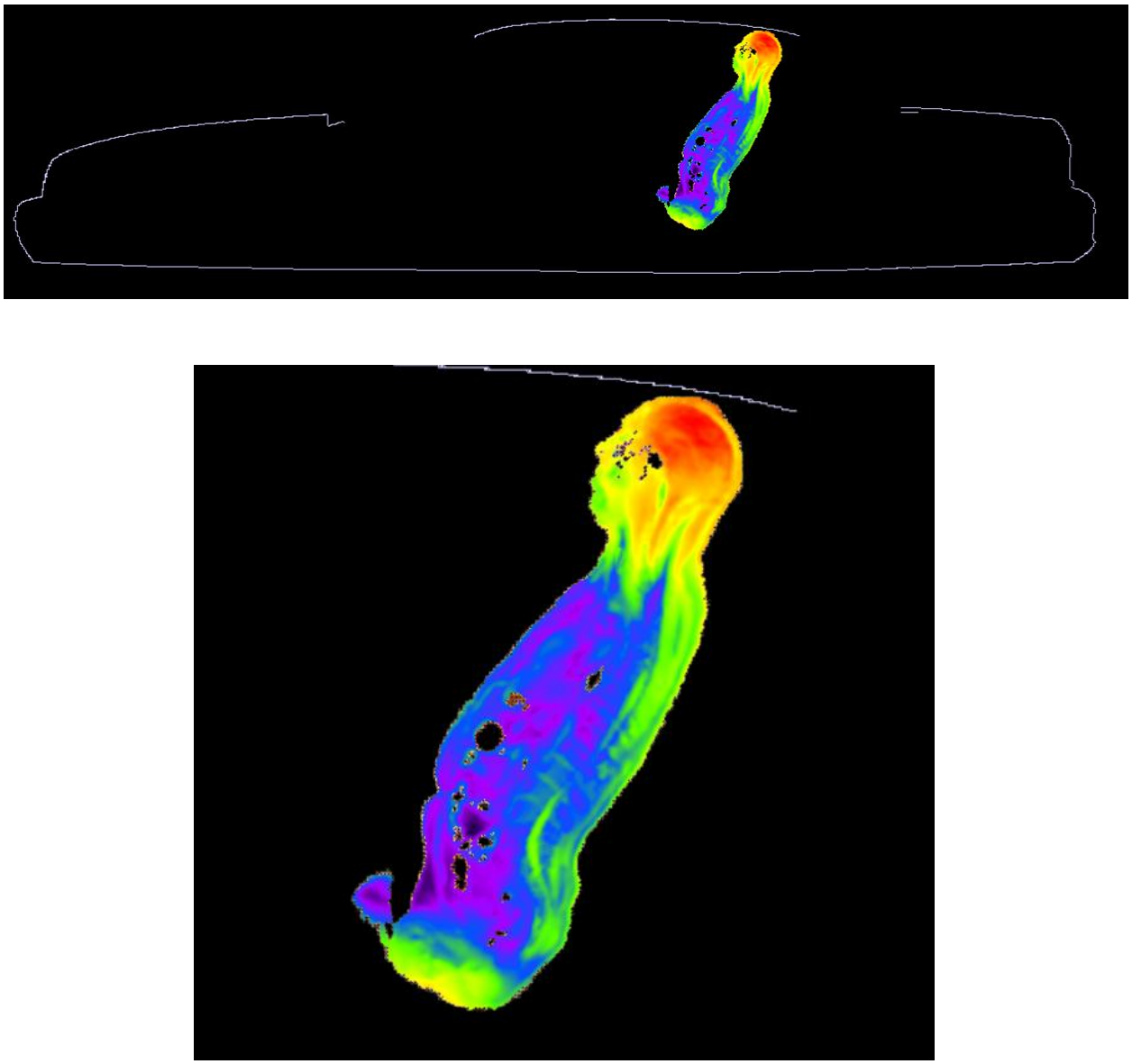
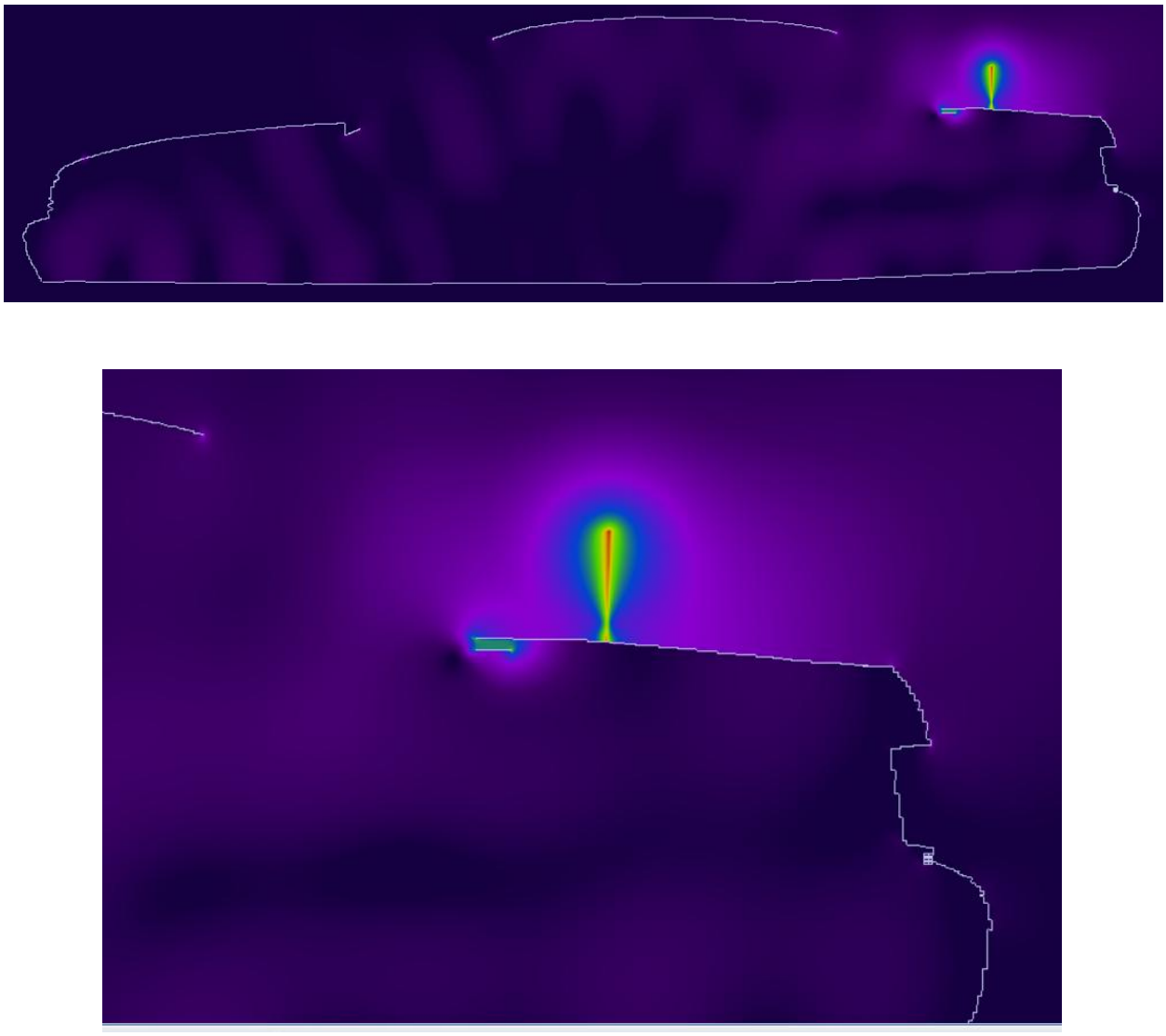
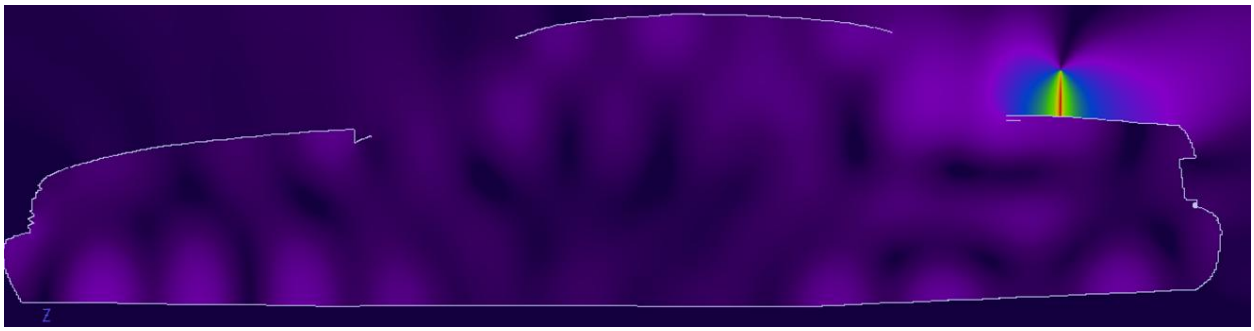


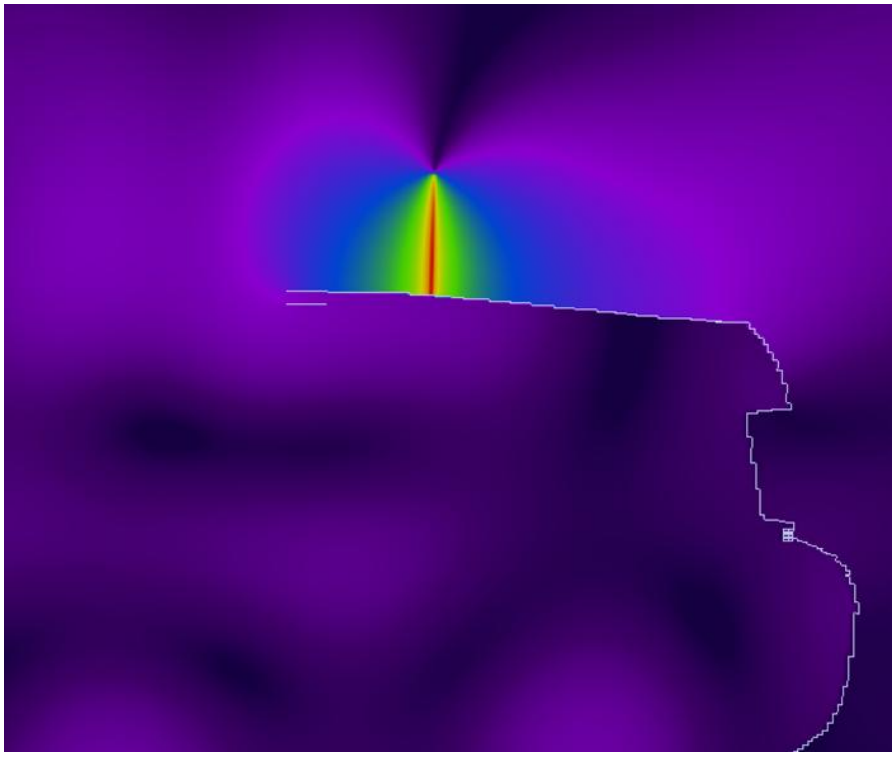
Figure 8. SAR distribution at 406.5000 MHz in the passenger model located on the side of the back seat, produced by the trunk-mount HAE6012A antenna. The SAR distribution plot is relative to the plane where the peak 1-g average SAR for this exposure condition occurs.

The plots in Figure 9 illustrate the E and H field distributions in the plane of the antenna corresponding to the exposure condition resulting in the SAR distribution in Figure 8.



a)





b)

Figure 9. (a) E-field magnitude distribution corresponding to exposure condition of Figure 8, and (b) H-field magnitude distribution corresponding to exposure condition of Figure 8.

SAR Simulation Reduction Considerations

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

If the highest MPE configuration SAR value is above 50% of the SAR limit, a subsequent SAR simulation shall be performed on the subsequent highest MPE configuration (ranked in descending percentage of the MPE limit). If the subsequent adjusted SAR value is below 75% of the limit, no further SAR evaluation is needed for that antenna, otherwise further SAR simulations for the remaining antenna configurations shall continue until the adjusted SAR value is below 75% of the SAR limit.

Table 3 and Table 4 below lists all the configurations that did not conform to applicable MPE limits (ranked in descending percentage of the MPE limit), to which the aforementioned SAR simulation reduction considerations were applied.

Table 3: SAR Simulation Reduction Considerations for Back Seat Passenger (FCC)

DVR UHF		APX6500 VHF		Combine MPE (%)	Exposure Location	DVR UHF Adjusted SAR Results (W/kg)		APX6500 VHF Adjusted SAR Results (W/kg)		Combine Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAE4003A	460.0000	HAD4007A	150.80000	163.7	Back Center	0.144	0.013	0.144	0.007	0.288	0.020	
					Back Side	0.243	0.013	0.218	0.010	0.461	0.023	
HAE4003A	450.0000	HAD4007A	150.80000	161.8								The highest MPE configuration has SAR below 50% of the limit
HAE4003A	470.0000	HAD4007A	150.80000	149.2								
HAE4003A	460.0000	HAD4008A	162.00000	169.4	Back Center	0.144	0.013	0.038	0.003	0.182	0.016	
					Back Side	0.243	0.013	0.056	0.004	0.299	0.017	
HAE4003A	450.0000	HAD4008A	162.00000	167.5								The highest MPE configuration has SAR below 50% of the limit
HAE4003A	460.0000	HAD4008A	156.40000	163.9								
HAE4003A	450.0000	HAD4008A	156.40000	162.0								
HAE4003A	470.0000	HAD4008A	162.00000	154.9								
HAE4003A	470.0000	HAD4008A	156.40000	149.4								
HAE4003A	460.0000	HAD4008A	150.80000	148.3								
HAE4003A	450.0000	HAD4008A	150.80000	146.4								
HAE4003A	470.0000	HAD4008A	150.80000	133.8								
HAE4003A	460.0000	HAD4009A	162.00000	161.4	Back Center	0.144	0.013	0.038	0.003	0.182	0.016	
					Back Side	0.243	0.013	0.056	0.004	0.299	0.017	
HAE4003A	450.0000	HAD4009A	162.00000	159.5								The highest MPE configuration has SAR below 50% of the limit
HAE4003A	460.0000	HAD4009A	165.01250	158.2								
HAE4003A	450.0000	HAD4009A	165.01250	156.3								
HAE4003A	470.0000	HAD4009A	162.00000	146.9								
HAE4003A	470.0000	HAD4009A	165.01250	143.7								
HAE4003A	460.0000	HAD4009A	173.01250	120.7								
HAE4003A	450.0000	HAD4009A	173.01250	118.8								
HAE4003A	470.0000	HAD4009A	173.01250	106.2								

Table 3 (continued): SAR Simulation Reduction Considerations for Back Seat Passenger (FCC)

DVR UHF		APX6500 VHF		Combine MPE (%)	Exposure Location	DVR UHF Adjusted SAR Results (W/kg)		APX6500 VHF Adjusted SAR Results (W/kg)		Combine Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAE4003A	460.0000	HAD4016A	150.80000	152.4	Back Center	0.144	0.013	0.145	0.007	0.289	0.020	
					Back Side	0.243	0.013	0.217	0.010	0.459	0.023	
HAE4003A	450.0000	HAD4016A	150.80000	150.5								The highest MPE configuration has SAR below 50% of the limit
HAE4003A	460.0000	HAD4016A	156.40000	146.5								
HAE4003A	450.0000	HAD4016A	156.40000	144.6								
HAE4003A	460.0000	HAD4016A	162.00000	143.4								
HAE4003A	450.0000	HAD4016A	162.00000	141.5								
HAE4003A	470.0000	HAD4016A	150.80000	137.9								
HAE4003A	470.0000	HAD4016A	156.40000	132.0								
HAE4003A	470.0000	HAD4016A	162.00000	128.9								
HAE4003A	460.0000	HAD4017A	165.01250	164.6	Back Center	0.144	0.013	0.025	0.002	0.169	0.015	
					Back Side	0.243	0.013	0.053	0.003	0.295	0.016	
HAE4003A	450.0000	HAD4017A	165.01250	162.7								The highest MPE configuration has SAR below 50% of the limit
HAE4003A	460.0000	HAD4017A	158.01250	155.2								
HAE4003A	450.0000	HAD4017A	158.01250	153.3								
HAE4003A	470.0000	HAD4017A	165.01250	150.1								
HAE4003A	470.0000	HAD4017A	158.01250	140.7								
HAE4003A	460.0000	HAD4017A	150.80000	138.7								
HAE4003A	450.0000	HAD4017A	150.80000	136.8								
HAE4003A	470.0000	HAD4017A	150.80000	124.2								
HAE4003A	460.0000	HAD4017A	173.01250	117.7								
HAE4003A	450.0000	HAD4017A	173.01250	115.8								
HAE4003A	470.0000	HAD4017A	173.01250	103.2								
HAE4003A	460.0000	HAD4021A	165.01250	143.7	Back Center	0.144	0.013	0.025	0.002	0.169	0.015	
					Back Side	0.243	0.013	0.053	0.003	0.296	0.016	
HAE4003A	460.0000	HAD4021A	158.01250	142.4								The highest MPE configuration has SAR below 50% of the limit
HAE4003A	450.0000	HAD4021A	165.01250	141.8								
HAE4003A	450.0000	HAD4021A	158.01250	140.5								
HAE4003A	460.0000	HAD4021A	150.80000	138.4								
HAE4003A	450.0000	HAD4021A	150.80000	136.5								
HAE4003A	470.0000	HAD4021A	165.01250	129.2								
HAE4003A	470.0000	HAD4021A	158.01250	127.9								
HAE4003A	470.0000	HAD4021A	150.80000	123.9								
HAE4003A	460.0000	HAD4021A	173.01250	109.1								
HAE4003A	450.0000	HAD4021A	173.01250	107.2								

Table 3 (Continued): SAR Simulation Reduction Considerations for Back Seat Passenger (FCC)

DVR UHF		APX6500 VHF		Combine MPE (%)	Exposure Location	DVR UHF Adjusted SAR Results (W/kg)		APX6500 VHF Adjusted SAR Results (W/kg)		Combine Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAE4004A	484.0000	HAD4007A	150.80000	159.7	Back Center	0.145	0.011	0.144	0.007	0.289	0.018	
					Back Side	0.200	0.012	0.218	0.010	0.418	0.022	
HAE4004A	470.0000	HAD4007A	150.80000	154.0								The highest MPE configuration has SAR below 50% of the limit
HAE4004A	512.0000	HAD4007A	150.80000	152.8								
HAE4004A	498.0000	HAD4007A	150.80000	139.3								
HAE4004A	484.0000	HAD4008A/	162.00000	165.4	Back Center	0.145	0.011	0.038	0.003	0.183	0.014	
					Back Side	0.200	0.012	0.056	0.004	0.256	0.016	
HAE4004A	484.0000	HAD4008A	156.40000	159.9								The highest MPE configuration has SAR below 50% of the limit
HAE4004A	470.0000	HAD4008A	162.00000	159.7								
HAE4004A	512.0000	HAD4008A	162.00000	158.5								
HAE4004A	470.0000	HAD4008A	156.40000	154.2								
HAE4004A	512.0000	HAD4008A	156.40000	153.0								
HAE4004A	498.0000	HAD4008A	162.00000	145.0								
HAE4004A	484.0000	HAD4008A	150.80000	144.3								
HAE4004A	498.0000	HAD4008A	156.40000	139.5								
HAE4004A	470.0000	HAD4008A	150.80000	138.6								
HAE4004A	512.0000	HAD4008A	150.80000	137.4								
HAE4004A	498.0000	HAD4008A	150.80000	123.9								
HAE4004A	484.0000	HAD4009A	162.00000	157.4	Back Center	0.145	0.011	0.038	0.003	0.182	0.014	
					Back Side	0.200	0.012	0.056	0.004	0.256	0.016	
HAE4004A	484.0000	HAD4009A	165.01250	154.2								The highest MPE configuration has SAR below 50% of the limit
HAE4004A	470.0000	HAD4009A	162.00000	151.7								
HAE4004A	512.0000	HAD4009A	162.00000	150.5								
HAE4004A	470.0000	HAD4009A	165.01250	148.5								
HAE4004A	512.0000	HAD4009A	165.01250	147.3								
HAE4004A	498.0000	HAD4009A	162.00000	137.0								
HAE4004A	498.0000	HAD4009A	165.01250	133.8								
HAE4004A	484.0000	HAD4009A	173.01250	116.7								
HAE4004A	470.0000	HAD4009A	173.01250	111.0								
HAE4004A	512.0000	HAD4009A	173.01250	109.8								

Table 3 (continued): SAR Simulation Reduction Considerations for Back Seat Passenger (FCC)

DVR UHF		APX6500 VHF		Combine MPE (%)	Exposure Location	DVR UHF Adjusted SAR Results (W/kg)		APX6500 VHF Adjusted SAR Results (W/kg)		Combine Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAE4004A	484.0000	HAD4016A	150.80000	148.4	Back Center	0.145	0.011	0.145	0.007	0.290	0.018	
					Back Side	0.200	0.012	0.217	0.010	0.417	0.022	
HAE4004A	470.0000	HAD4016A	150.80000	142.7								The highest MPE configuration has SAR below 50% of the limit
HAE4004A	484.0000	HAD4016A	156.40000	142.5								
HAE4004A	512.0000	HAD4016A	150.80000	141.5								
HAE4004A	484.0000	HAD4016A	162.00000	139.4								
HAE4004A	470.0000	HAD4016A	156.40000	136.8								
HAE4004A	512.0000	HAD4016A	156.40000	135.6								
HAE4004A	470.0000	HAD4016A	162.00000	133.7								
HAE4004A	512.0000	HAD4016A	162.00000	132.5								
HAE4004A	498.0000	HAD4016A	150.80000	128.0								
HAE4004A	498.0000	HAD4016A	156.40000	122.1								
HAE4004A	498.0000	HAD4016A	162.00000	119.0								
HAE4004A	484.0000	HAD4017A	165.01250	160.6	Back Center	0.145	0.011	0.025	0.002	0.170	0.014	
					Back Side	0.200	0.012	0.053	0.003	0.253	0.015	
HAE4004A	470.0000	HAD4017A	165.01250	154.9								The highest MPE configuration has SAR below 50% of the limit
HAE4004A	512.0000	HAD4017A	165.01250	153.7								
HAE4004A	484.0000	HAD4017A	158.01250	151.2								
HAE4004A	470.0000	HAD4017A	158.01250	145.5								
HAE4004A	512.0000	HAD4017A	158.01250	144.3								
HAE4004A	498.0000	HAD4017A	165.01250	140.2								
HAE4004A	484.0000	HAD4017A	150.80000	134.7								
HAE4004A	498.0000	HAD4017A	158.01250	130.8								
HAE4004A	470.0000	HAD4017A	150.80000	129.0								
HAE4004A	512.0000	HAD4017A	150.80000	127.8								
HAE4004A	498.0000	HAD4017A	150.80000	114.3								
HAE4004A	484.0000	HAD4017A	173.01250	113.7								
HAE4004A	470.0000	HAD4017A	173.01250	108.0								
HAE4004A	512.0000	HAD4017A	173.01250	106.8								

Table 3 (Continued): SAR Simulation Reduction Considerations for Back Seat Passenger (FCC)

DVR UHF		APX6500 VHF		Combine MPE (%)	Exposure Location	DVR UHF Adjusted SAR Results (W/kg)		APX6500 VHF Adjusted SAR Results (W/kg)		Combine Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAE4004A	484.0000	HAD4021A	165.01250	139.7	Back Center	0.145	0.011	0.025	0.002	0.169	0.014	
					Back Side	0.200	0.012	0.053	0.003	0.253	0.015	
HAE4004A	484.0000	HAD4021A	158.01250	138.4								The highest MPE configuration has SAR below 50% of the limit
HAE4004A	484.0000	HAD4021A	150.80000	134.4								
HAE4004A	470.0000	HAD4021A	165.01250	134.0								
HAE4004A	512.0000	HAD4021A	165.01250	132.8								
HAE4004A	470.0000	HAD4021A	158.01250	132.7								
HAE4004A	512.0000	HAD4021A	158.01250	131.5								
HAE4004A	470.0000	HAD4021A	150.80000	128.7								
HAE4004A	512.0000	HAD4021A	150.80000	127.5								
HAE4004A	498.0000	HAD4021A	165.01250	119.3								
HAE4004A	498.0000	HAD4021A	158.01250	118.0								
HAE4004A	498.0000	HAD4021A	150.80000	114.0								
HAE4004A	484.0000	HAD4021A	173.01250	105.1								
HAE6012A	406.5000	HAD4007A	150.80000	149.1	Back Center	0.382	0.015	0.144	0.007	0.526	0.022	
					Back Side	0.410	0.012	0.218	0.010	0.627	0.023	
HAE6012A	417.5000	HAD4007A	150.80000	143.6								The highest MPE configuration has SAR below 50% of the limit
HAE6012A	429.9875	HAD4007A	150.80000	133.2								
HAE6012A	406.5000	HAD4008A	162.00000	154.8	Back Center	0.382	0.015	0.038	0.003	0.419	0.017	
					Back Side	0.410	0.012	0.056	0.004	0.466	0.016	
HAE6012A	406.5000	HAD4008A	156.40000	149.3								The highest MPE configuration has SAR below 50% of the limit
HAE6012A	417.5000	HAD4008A	162.00000	149.3								
HAE6012A	417.5000	HAD4008A	156.40000	143.8								
HAE6012A	429.9875	HAD4008A	162.00000	138.9								
HAE6012A	406.5000	HAD4008A	150.80000	133.7								
HAE6012A	429.9875	HAD4008A	156.40000	133.4								
HAE6012A	417.5000	HAD4008A	150.80000	128.2								
HAE6012A	429.9875	HAD4008A	150.80000	117.8								

Table 3 (continued): SAR Simulation Reduction Considerations for Back Seat Passenger (FCC)

DVR UHF		APX6500 VHF		Combine MPE (%)	Exposure Location	DVR UHF Adjusted SAR Results (W/kg)		APX6500 VHF Adjusted SAR Results (W/kg)		Combine Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAE6012A	406.5000	HAD4009A	162.00000	146.8	Back Center	0.382	0.015	0.038	0.003	0.419	0.017	
					Back Side	0.410	0.012	0.056	0.004	0.466	0.016	
HAE6012A	406.5000	HAD4009A	165.01250	143.6								The highest MPE configuration has SAR below 50% of the limit
HAE6012A	417.5000	HAD4009A	162.00000	141.3								
HAE6012A	417.5000	HAD4009A	165.01250	138.1								
HAE6012A	429.9875	HAD4009A	162.00000	130.9								
HAE6012A	429.9875	HAD4009A	165.01250	127.7								
HAE6012A	406.5000	HAD4009A	173.01250	106.1								
HAE6012A	417.5000	HAD4009A	173.01250	100.6								
HAE6012A	406.5000	HAD4016A	150.80000	137.8	Back Center	0.382	0.015	0.145	0.007	0.526	0.022	
					Back Side	0.410	0.012	0.217	0.010	0.626	0.023	
HAE6012A	417.5000	HAD4016A	150.80000	132.3								The highest MPE configuration has SAR below 50% of the limit
HAE6012A	406.5000	HAD4016A	156.40000	131.9								
HAE6012A	406.5000	HAD4016A	162.00000	128.8								
HAE6012A	417.5000	HAD4016A	156.40000	126.4								
HAE6012A	417.5000	HAD4016A	162.00000	123.3								
HAE6012A	429.9875	HAD4016A	150.80000	121.9								
HAE6012A	429.9875	HAD4016A	156.40000	116.0								
HAE6012A	429.9875	HAD4016A	162.00000	112.9								

Table 3 (continued): SAR Simulation Reduction Considerations for Back Seat Passenger (FCC)

DVR UHF		APX6500 VHF		Combine MPE (%)	Exposure Location	DVR UHF Adjusted SAR Results (W/kg)		APX6500 VHF Adjusted SAR Results (W/kg)		Combine Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAE6012A	406.5000	HAD4017A	165.01250	150.0	Back Center	0.382	0.015	0.025	0.002	0.407	0.017	
					Back Side	0.410	0.012	0.053	0.003	0.462	0.016	
HAE6012A	417.5000	HAD4017A	165.01250	144.5								The highest MPE configuration has SAR below 50% of the limit
HAE6012A	406.5000	HAD4017A	158.01250	140.6								
HAE6012A	417.5000	HAD4017A	158.01250	135.1								
HAE6012A	429.9875	HAD4017A	165.01250	134.1								
HAE6012A	429.9875	HAD4017A	158.01250	124.7								
HAE6012A	406.5000	HAD4017A	150.80000	124.1								
HAE6012A	417.5000	HAD4017A	150.80000	118.6								
HAE6012A	429.9875	HAD4017A	150.80000	108.2								
HAE6012A	406.5000	HAD4017A	173.01250	103.1								
HAE6012A	406.5000	HAD4021A	165.01250	129.1	Back Center	0.382	0.015	0.025	0.002	0.406	0.017	
					Back Side	0.410	0.012	0.053	0.003	0.463	0.016	
HAE6012A	406.5000	HAD4021A	158.01250	127.8								The highest MPE configuration has SAR below 50% of the limit
HAE6012A	406.5000	HAD4021A	150.80000	123.8								
HAE6012A	417.5000	HAD4021A	165.01250	123.6								
HAE6012A	417.5000	HAD4021A	158.01250	122.3								
HAE6012A	417.5000	HAD4021A	150.80000	118.3								
HAE6012A	429.9875	HAD4021A	165.01250	113.2								
HAE6012A	429.9875	HAD4021A	158.01250	111.9								
HAE6012A	429.9875	HAD4021A	150.80000	107.9								

Table 4: SAR Simulation Reduction Considerations for Back Seat Passenger (ISED Canada)

DVR UHF		APX6500 VHF		Combine MPE (%)	Exposure Location	DVR UHF Adjusted SAR Results (W/kg)		APX6500 VHF Adjusted SAR Results (W/kg)		Combine Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAE4003A	460.0000	HAD4006A	140.00000	268.8	Back Center	0.144	0.013	0.316	0.010	0.460	0.023	
					Back Side	0.243	0.013	0.263	0.014	0.506	0.027	
HAE4003A	450.0000	HAD4006A	140.00000	264.7								The highest MPE configuration has SAR below 50% of the limit
HAE4003A	460.0000	HAD4006A	144.00000	256.4								
HAE4003A	450.0000	HAD4006A	144.00000	252.3								
HAE4003A	470.0000	HAD4006A	140.00000	243.4								
HAE4003A	470.0000	HAD4006A	144.00000	231.0								
HAE4003A	460.0000	HAD4007A	150.80000	266.1	Back Center	0.144	0.013	0.144	0.007	0.288	0.020	
					Back Side	0.243	0.013	0.218	0.010	0.461	0.023	
HAE4003A	450.0000	HAD4007A	150.80000	262.0								The highest MPE configuration has SAR below 50% of the limit
HAE4003A	460.0000	HAD4007A	144.00000	245.0								
HAE4003A	450.0000	HAD4007A	144.00000	240.9								
HAE4003A	470.0000	HAD4007A	150.80000	240.7								
HAE4003A	470.0000	HAD4007A	144.00000	219.6								
HAE4003A	460.0000	HAD4008A	162.00000	275.0	Back Center	0.144	0.013	0.038	0.003	0.182	0.016	
					Back Side	0.243	0.013	0.056	0.004	0.299	0.017	
HAE4003A	450.0000	HAD4008A	162.00000	270.9								The highest MPE configuration has SAR below 50% of the limit
HAE4003A	460.0000	HAD4008A	156.40000	266.4								
HAE4003A	450.0000	HAD4008A	156.40000	262.3								
HAE4003A	470.0000	HAD4008A	162.00000	249.6								
HAE4003A	460.0000	HAD4008A	150.80000	242.3								
HAE4003A	470.0000	HAD4008A	156.40000	241.0								
HAE4003A	450.0000	HAD4008A	150.80000	238.2								
HAE4003A	470.0000	HAD4008A	150.80000	216.9								

Table 4 (continued): SAR Simulation Reduction Considerations for Back Seat Passenger (ISED Canada)

DVR UHF		APX6500 VHF		Combine MPE (%)	Exposure Location	DVR UHF Adjusted SAR Results (W/kg)		APX6500 VHF Adjusted SAR Results (W/kg)		Combine Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAE4003A	460.0000	HAD4009A	162.00000	262.5	Back Center	0.144	0.013	0.038	0.003	0.182	0.016	
					Back Side	0.243	0.013	0.056	0.004	0.299	0.017	
HAE4003A	450.0000	HAD4009A	162.00000	258.4								The highest MPE configuration has SAR below 50% of the limit
HAE4003A	460.0000	HAD4009A	165.01250	257.5								
HAE4003A	450.0000	HAD4009A	165.01250	253.4								
HAE4003A	470.0000	HAD4009A	162.00000	237.1								
HAE4003A	470.0000	HAD4009A	165.01250	232.1								
HAE4003A	460.0000	HAD4009A	173.01250	199.5								
HAE4003A	450.0000	HAD4009A	173.01250	195.4								
HAE4003A	470.0000	HAD4009A	173.01250	174.1								
HAE4003A	460.0000	HAD4016A	150.80000	248.6	Back Center	0.144	0.013	0.145	0.007	0.289	0.020	
					Back Side	0.243	0.013	0.217	0.010	0.459	0.023	
HAE4003A	450.0000	HAD4016A	150.80000	244.5								The highest MPE configuration has SAR below 50% of the limit
HAE4003A	460.0000	HAD4016A	144.00000	243.8								
HAE4003A	450.0000	HAD4016A	144.00000	239.7								
HAE4003A	460.0000	HAD4016A	156.40000	239.5								
HAE4003A	450.0000	HAD4016A	156.40000	235.4								
HAE4003A	460.0000	HAD4016A	162.00000	234.7								
HAE4003A	450.0000	HAD4016A	162.00000	230.6								
HAE4003A	470.0000	HAD4016A	150.80000	223.2								
HAE4003A	470.0000	HAD4016A	144.00000	218.4								
HAE4003A	470.0000	HAD4016A	156.40000	214.1								
HAE4003A	470.0000	HAD4016A	162.00000	209.3								
HAE4003A	460.0000	HAD4017A	165.01250	267.5	Back Center	0.144	0.013	0.025	0.002	0.169	0.015	
					Back Side	0.243	0.013	0.053	0.003	0.295	0.016	
HAE4003A	450.0000	HAD4017A	165.01250	263.4								The highest MPE configuration has SAR below 50% of the limit
HAE4003A	460.0000	HAD4017A	158.01250	253.0								
HAE4003A	450.0000	HAD4017A	158.01250	248.9								
HAE4003A	470.0000	HAD4017A	165.01250	242.1								
HAE4003A	470.0000	HAD4017A	158.01250	227.6								
HAE4003A	460.0000	HAD4017A	150.80000	227.4								
HAE4003A	450.0000	HAD4017A	150.80000	223.3								
HAE4003A	470.0000	HAD4017A	150.80000	202.0								
HAE4003A	460.0000	HAD4017A	173.01250	194.8								
HAE4003A	450.0000	HAD4017A	173.01250	190.7								
HAE4003A	460.0000	HAD4017A	146.00000	187.1								
HAE4003A	450.0000	HAD4017A	146.00000	183.0								
HAE4003A	470.0000	HAD4017A	173.01250	169.4								
HAE4003A	470.0000	HAD4017A	146.00000	161.7								

Table 4 (continued): SAR Simulation Reduction Considerations for Back Seat Passenger (ISED Canada)

DVR UHF		APX6500 VHF		Combine MPE (%)	Exposure Location	DVR UHF Adjusted SAR Results (W/kg)		APX6500 VHF Adjusted SAR Results (W/kg)		Combine Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAE4003A	460.0000	HAD4021A	165.01250	235.1	Back Center	0.144	0.013	0.025	0.002	0.169	0.015	
					Back Side	0.243	0.013	0.053	0.003	0.296	0.016	
HAE4003A	460.0000	HAD4021A	158.01250	233.1								The highest MPE configuration has SAR below 50% of the limit
HAE4003A	450.0000	HAD4021A	165.01250	231.0								
HAE4003A	450.0000	HAD4021A	158.01250	229.0								
HAE4003A	460.0000	HAD4021A	150.80000	226.9								
HAE4003A	460.0000	HAD4021A	144.00000	226.7								
HAE4003A	450.0000	HAD4021A	150.80000	222.8								
HAE4003A	450.0000	HAD4021A	144.00000	222.6								
HAE4003A	470.0000	HAD4021A	165.01250	209.7								
HAE4003A	470.0000	HAD4021A	158.01250	207.7								
HAE4003A	470.0000	HAD4021A	150.80000	201.5								
HAE4003A	470.0000	HAD4021A	144.00000	201.3								
HAE4003A	460.0000	HAD4021A	173.01250	181.5								
HAE4003A	450.0000	HAD4021A	173.01250	177.4								
HAE4003A	470.0000	HAD4021A	173.01250	156.1								
HAE4003A	460.0000	#HAD4022A	144.00000	127.1	Back Center	0.144	0.013	0.108	0.006	0.252	0.019	
					Back Side	0.243	0.013	0.124	0.007	0.366	0.019	
HAE4003A	460.0000	#HAD4022A	150.80000	123.1	Back Center	0.144	0.013	0.089	0.004	0.233	0.017	
					Back Side	0.243	0.013	0.119	0.005	0.361	0.018	
HAE4003A	460.0000	#HAD4022A	158.01250	137.6	Back Center	0.144	0.013	0.080	0.004	0.224	0.017	
					Back Side	0.243	0.013	0.077	0.004	0.320	0.017	
HAE4003A	460.0000	#HAD4022A	165.01250	164.3	Back Center	0.144	0.013	0.026	0.002	0.170	0.015	
					Back Side	0.243	0.013	0.048	0.003	0.290	0.016	
HAE4003A	460.0000	#HAD4022A	173.01250	147.4	Back Center	0.144	0.013	0.192	0.004	0.336	0.017	
					Back Side	0.243	0.013	0.238	0.012	0.481	0.025	
HAE4003A	450.0000	#HAD4022A	165.01250	160.2	Back Center	0.275	0.016	0.026	0.002	0.300	0.018	
					Back Side	0.201	0.013	0.048	0.003	0.249	0.015	
HAE4003A	450.0000	#HAD4022A	173.01250	143.3	Back Center	0.275	0.016	0.192	0.004	0.467	0.020	
					Back Side	0.201	0.013	0.238	0.012	0.439	0.024	
HAE4003A	470.0000	#HAD4022A	165.01250	138.9	Back Center	0.209	0.011	0.026	0.002	0.235	0.013	
					Back Side	0.138	0.010	0.048	0.003	0.185	0.013	
HAE4003A	450.0000	#HAD4022A	158.01250	133.5	Back Center	0.275	0.016	0.080	0.004	0.355	0.020	
					Back Side	0.201	0.013	0.077	0.004	0.278	0.016	
HAE4003A	450.0000	#HAD4022A	144.00000	123.0	Back Center	0.275	0.016	0.108	0.006	0.382	0.021	
					Back Side	0.201	0.013	0.124	0.007	0.324	0.019	
HAE4003A	470.0000	#HAD4022A	173.01250	122.0	Back Center	0.209	0.011	0.192	0.004	0.401	0.015	
					Back Side	0.138	0.010	0.238	0.012	0.376	0.022	
HAE4003A	450.0000	#HAD4022A	150.80000	119.0	Back Center	0.275	0.016	0.089	0.004	0.363	0.020	
					Back Side	0.201	0.013	0.119	0.005	0.319	0.018	
HAE4003A	470.0000	#HAD4022A	158.01250	112.2	Back Center	0.209	0.011	0.080	0.004	0.289	0.015	
					Back Side	0.138	0.010	0.077	0.004	0.215	0.014	
HAE4003A	470.0000	#HAD4022A	144.00000	101.7	Back Center	0.209	0.011	0.108	0.006	0.316	0.017	
					Back Side	0.138	0.010	0.124	0.007	0.261	0.017	

Note: # Antenna length trimmed to frequency

Table 4 (continued): SAR Simulation Reduction Considerations for Back Seat Passenger (ISED Canada)

DVR UHF		APX6500 VHF		Combine MPE (%)	Exposure Location	DVR UHF Adjusted SAR Results (W/kg)		APX6500 VHF Adjusted SAR Results (W/kg)		Combine Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAE4003A	460.0000	#RAD4010ARB	144.00000	119.4	Back Center	0.144	0.013	0.081	0.004	0.226	0.017	
					Back Side	0.243	0.013	0.093	0.005	0.336	0.018	
HAE4003A	460.0000	#RAD4010ARB	150.80000	116.0	Back Center	0.144	0.013	0.073	0.003	0.217	0.016	
					Back Side	0.243	0.013	0.091	0.004	0.333	0.017	
HAE4003A	460.0000	#RAD4010ARB	158.01250	116.4	Back Center	0.144	0.013	0.068	0.003	0.212	0.016	
					Back Side	0.243	0.013	0.055	0.003	0.297	0.016	
HAE4003A	460.0000	#RAD4010ARB	165.01250	125.2	Back Center	0.144	0.013	0.024	0.002	0.168	0.015	
					Back Side	0.243	0.013	0.032	0.002	0.275	0.015	
HAE4003A	460.0000	#RAD4010ARB	173.01250	130.1	Back Center	0.144	0.013	0.113	0.003	0.257	0.016	
					Back Side	0.243	0.013	0.135	0.007	0.378	0.020	
HAE4003A	450.0000	#RAD4010ARB	173.01250	126.0	Back Center	0.275	0.016	0.113	0.003	0.387	0.018	
					Back Side	0.201	0.013	0.135	0.007	0.336	0.020	
HAE4003A	450.0000	#RAD4010ARB	165.01250	121.1	Back Center	0.275	0.016	0.024	0.002	0.299	0.017	
					Back Side	0.201	0.013	0.032	0.002	0.233	0.015	
HAE4003A	450.0000	#RAD4010ARB	144.00000	115.3	Back Center	0.275	0.016	0.081	0.004	0.356	0.020	
					Back Side	0.201	0.013	0.093	0.005	0.294	0.017	
HAE4003A	450.0000	#RAD4010ARB	158.01250	112.3	Back Center	0.275	0.016	0.068	0.003	0.342	0.019	
					Back Side	0.201	0.013	0.055	0.003	0.255	0.015	
HAE4003A	450.0000	#RAD4010ARB	150.80000	111.9	Back Center	0.275	0.016	0.073	0.003	0.347	0.019	
					Back Side	0.201	0.013	0.091	0.004	0.291	0.017	
HAE4003A	470.0000	#RAD4010ARB	173.01250	104.7	Back Center	0.209	0.011	0.113	0.003	0.321	0.013	
					Back Side	0.138	0.010	0.135	0.007	0.273	0.017	
HAE4004A	470.0000	HAD4006A	140.00000	251.9	Back Center	0.207	0.011	0.316	0.010	0.523	0.021	
					Back Side	0.137	0.010	0.263	0.014	0.400	0.025	
HAE4004A	470.0000	HAD4006A	144.00000	239.5								The highest MPE configuration has SAR below 50% of the limit
HAE4004A	470.0000	HAD4007A	150.80000	249.2	Back Center	0.207	0.011	0.316	0.010	0.523	0.021	
					Back Side	0.137	0.010	0.263	0.014	0.400	0.025	
HAE4004A	470.0000	HAD4007A	144.00000	228.1								The highest MPE configuration has SAR below 50% of the limit

Note: # Antenna length trimmed to frequency

Table 4 (Continued): SAR Simulation Reduction Considerations for Back Seat Passenger (ISED Canada)

DVR UHF		APX6500 VHF		Combine MPE (%)	Exposure Location	DVR UHF Adjusted SAR Results (W/kg)		APX6500 VHF Adjusted SAR Results (W/kg)		Combine Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAE4004A	470.0000	HAD4008A	162.00000	258.1	Back Center	0.207	0.011	0.038	0.003	0.245	0.014	
					Back Side	0.137	0.010	0.056	0.004	0.194	0.014	
HAE4004A	470.0000	HAD4008A	156.40000	249.5								The highest MPE configuration has SAR below 50% of the limit
HAE4004A	470.0000	HAD4008A	150.80000	225.4								
HAE4004A	470.0000	HAD4009A	162.00000	245.6	Back Center	0.207	0.011	0.038	0.003	0.245	0.014	
					Back Side	0.137	0.010	0.056	0.004	0.194	0.014	
HAE4004A	470.0000	HAD4009A	165.01250	240.6								The highest MPE configuration has SAR below 50% of the limit
HAE4004A	470.0000	HAD4009A	173.01250	182.6								
HAE4004A	470.0000	HAD4016A	150.80000	231.7	Back Center	0.207	0.011	0.145	0.007	0.352	0.018	
					Back Side	0.137	0.010	0.217	0.010	0.354	0.021	
HAE4004A	470.0000	HAD4016A	144.00000	226.9								The highest MPE configuration has SAR below 50% of the limit
HAE4004A	470.0000	HAD4016A	156.40000	222.6								
HAE4004A	470.0000	HAD4016A	162.00000	217.8								
HAE4004A	470.0000	HAD4017A	165.01250	250.6	Back Center	0.207	0.011	0.025	0.002	0.232	0.013	
					Back Side	0.137	0.010	0.053	0.003	0.190	0.014	
HAE4004A	470.0000	HAD4017A	158.01250	236.1								The highest MPE configuration has SAR below 50% of the limit
HAE4004A	470.0000	HAD4017A	150.80000	210.5								
HAE4004A	470.0000	HAD4017A	173.01250	177.9								
HAE4004A	470.0000	HAD4017A	146.00000	170.2								
HAE4004A	470.0000	HAD4021A	165.01250	218.2	Back Center	0.207	0.011	0.025	0.002	0.232	0.013	
					Back Side	0.137	0.010	0.053	0.003	0.190	0.014	
HAE4004A	470.0000	HAD4021A	158.01250	216.2								The highest MPE configuration has SAR below 50% of the limit
HAE4004A	470.0000	HAD4021A	150.80000	210.0								
HAE4004A	470.0000	HAD4021A	144.00000	209.8								

Table 4 (continued): SAR Simulation Reduction Considerations for Back Seat Passenger (ISED Canada)

DVR UHF		APX6500 VHF		Combine MPE (%)	Exposure Location	DVR UHF Adjusted SAR Results (W/kg)		APX6500 VHF Adjusted SAR Results (W/kg)		Combine Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAE4004A	470.0000	#HAD4022A	144.00000	110.2	Back Center	0.207	0.011	0.108	0.006	0.315	0.016	
					Back Side	0.137	0.010	0.124	0.007	0.261	0.017	
HAE4004A	470.0000	#HAD4022A	150.80000	106.2	Back Center	0.207	0.011	0.089	0.004	0.296	0.015	
					Back Side	0.137	0.010	0.119	0.005	0.256	0.016	
HAE4004A	470.0000	#HAD4022A	158.01250	120.7	Back Center	0.207	0.011	0.080	0.004	0.287	0.015	
					Back Side	0.137	0.010	0.077	0.004	0.214	0.014	
HAE4004A	470.0000	#HAD4022A	165.01250	147.4	Back Center	0.207	0.011	0.026	0.002	0.233	0.013	
					Back Side	0.137	0.010	0.048	0.003	0.185	0.013	
HAE4004A	470.0000	#HAD4022A	173.01250	130.5	Back Center	0.207	0.011	0.192	0.004	0.399	0.015	
					Back Side	0.137	0.010	0.238	0.012	0.376	0.022	
HAE4004A	470.0000	#RAD4010ARB	144.00000	102.5	Back Center	0.207	0.011	0.081	0.004	0.288	0.015	
					Back Side	0.137	0.010	0.093	0.005	0.230	0.015	
HAE4004A	470.0000	#RAD4010ARB	165.01250	108.3	Back Center	0.207	0.011	0.024	0.002	0.231	0.013	
					Back Side	0.137	0.010	0.032	0.002	0.170	0.012	
HAE4004A	470.0000	#RAD4010ARB	173.01250	113.2	Back Center	0.207	0.011	0.113	0.003	0.320	0.013	
					Back Side	0.137	0.010	0.135	0.007	0.273	0.017	
HAE6012A	406.5000	HAD4006A	140.00000	240.1	Back Center	0.382	0.015	0.316	0.010	0.698	0.025	
					Back Side	0.410	0.012	0.263	0.014	0.673	0.027	
HAE6012A	417.5000	HAD4006A	140.00000	231.3								The highest MPE configuration has SAR below 50% of the limit
HAE6012A	406.5000	HAD4006A	144.00000	227.7								
HAE6012A	417.5000	HAD4006A	144.00000	218.9								
HAE6012A	429.9875	HAD4006A	140.00000	213.8								
HAE6012A	429.9875	HAD4006A	144.00000	201.4								
HAE6012A	406.5000	HAD4007A	150.80000	237.4	Back Center	0.382	0.015	0.144	0.007	0.526	0.022	
					Back Side	0.410	0.012	0.218	0.010	0.627	0.023	
HAE6012A	417.5000	HAD4007A	150.80000	228.6								The highest MPE configuration has SAR below 50% of the limit
HAE6012A	406.5000	HAD4007A	144.00000	216.3								
HAE6012A	429.9875	HAD4007A	150.80000	211.1								
HAE6012A	417.5000	HAD4007A	144.00000	207.5								
HAE6012A	429.9875	HAD4007A	144.00000	190.0								

Note: # Antenna length trimmed to frequency

Table 4 (Continued): SAR Simulation Reduction Considerations for Back Seat Passenger (ISED Canada)

DVR UHF		APX6500 VHF		Combine MPE (%)	Exposure Location	DVR UHF Adjusted SAR Results (W/kg)		APX6500 VHF Adjusted SAR Results (W/kg)		Combine Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAE6012A	406.5000	HAD4008A	162.00000	246.3	Back Center	0.382	0.015	0.038	0.003	0.419	0.017	
					Back Side	0.410	0.012	0.056	0.004	0.466	0.016	
HAE6012A	406.5000	HAD4008A	156.40000	237.7								The highest MPE configuration has SAR below 50% of the limit
HAE6012A	417.5000	HAD4008A	162.00000	237.5								
HAE6012A	417.5000	HAD4008A	156.40000	228.9								
HAE6012A	429.9875	HAD4008A	162.00000	220.0								
HAE6012A	406.5000	HAD4008A	150.80000	213.6								
HAE6012A	429.9875	HAD4008A	156.40000	211.4								
HAE6012A	417.5000	HAD4008A	150.80000	204.8								
HAE6012A	429.9875	HAD4008A	150.80000	187.3								
HAE6012A	406.5000	HAD4009A	162.00000	233.8	Back Center	0.382	0.015	0.038	0.003	0.419	0.017	
					Back Side	0.410	0.012	0.056	0.004	0.466	0.016	
HAE6012A	406.5000	HAD4009A	165.01250	228.8								The highest MPE configuration has SAR below 50% of the limit
HAE6012A	417.5000	HAD4009A	162.00000	225.0								
HAE6012A	417.5000	HAD4009A	165.01250	220.0								
HAE6012A	429.9875	HAD4009A	162.00000	207.5								
HAE6012A	429.9875	HAD4009A	165.01250	202.5								
HAE6012A	406.5000	HAD4009A	173.01250	170.8								
HAE6012A	417.5000	HAD4009A	173.01250	162.0								
HAE6012A	429.9875	HAD4009A	173.01250	144.5								
HAE6012A	406.5000	HAD4016A	150.80000	219.9	Back Center	0.382	0.015	0.145	0.007	0.526	0.022	
					Back Side	0.410	0.012	0.217	0.010	0.626	0.023	
HAE6012A	406.5000	HAD4016A	144.00000	215.1								The highest MPE configuration has SAR below 50% of the limit
HAE6012A	417.5000	HAD4016A	150.80000	211.1								
HAE6012A	406.5000	HAD4016A	156.40000	210.8								
HAE6012A	417.5000	HAD4016A	144.00000	206.3								
HAE6012A	406.5000	HAD4016A	162.00000	206.0								
HAE6012A	417.5000	HAD4016A	156.40000	202.0								
HAE6012A	417.5000	HAD4016A	162.00000	197.2								
HAE6012A	429.9875	HAD4016A	150.80000	193.6								
HAE6012A	429.9875	HAD4016A	144.00000	188.8								
HAE6012A	429.9875	HAD4016A	156.40000	184.5								
HAE6012A	429.9875	HAD4016A	162.00000	179.7								

Table 4 (continued): SAR Simulation Reduction Considerations for Back Seat Passenger (ISED Canada)

DVR UHF		APX6500 VHF		Combine MPE (%)	Exposure Location	DVR UHF Adjusted SAR Results (W/kg)		APX6500 VHF Adjusted SAR Results (W/kg)		Combine Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAE6012A	406.5000	HAD4017A	165.01250	238.8	Back Center	0.382	0.015	0.025	0.002	0.407	0.017	
					Back Side	0.410	0.012	0.053	0.003	0.462	0.016	
HAE6012A	417.5000	HAD4017A	165.01250	230.0								The highest MPE configuration has SAR below 50% of the limit
HAE6012A	406.5000	HAD4017A	158.01250	224.3								
HAE6012A	417.5000	HAD4017A	158.01250	215.5								
HAE6012A	429.9875	HAD4017A	165.01250	212.5								
HAE6012A	406.5000	HAD4017A	150.80000	198.7								
HAE6012A	429.9875	HAD4017A	158.01250	198.0								
HAE6012A	417.5000	HAD4017A	150.80000	189.9								
HAE6012A	429.9875	HAD4017A	150.80000	172.4								
HAE6012A	406.5000	HAD4017A	173.01250	166.1								
HAE6012A	406.5000	HAD4017A	146.00000	158.4								
HAE6012A	417.5000	HAD4017A	173.01250	157.3								
HAE6012A	417.5000	HAD4017A	146.00000	149.6								
HAE6012A	429.9875	HAD4017A	173.01250	139.8								
HAE6012A	429.9875	HAD4017A	146.00000	132.1								
HAE6012A	406.5000	HAD4021A	165.01250	206.4	Back Center	0.382	0.015	0.025	0.002	0.406	0.017	
					Back Side	0.410	0.012	0.053	0.003	0.463	0.016	
HAE6012A	406.5000	HAD4021A	158.01250	204.4								The highest MPE configuration has SAR below 50% of the limit
HAE6012A	406.5000	HAD4021A	150.80000	198.2								
HAE6012A	406.5000	HAD4021A	144.00000	198.0								
HAE6012A	417.5000	HAD4021A	165.01250	197.6								
HAE6012A	417.5000	HAD4021A	158.01250	195.6								
HAE6012A	417.5000	HAD4021A	150.80000	189.4								
HAE6012A	417.5000	HAD4021A	144.00000	189.2								
HAE6012A	429.9875	HAD4021A	165.01250	180.1								
HAE6012A	429.9875	HAD4021A	158.01250	178.1								
HAE6012A	429.9875	HAD4021A	150.80000	171.9								
HAE6012A	429.9875	HAD4021A	144.00000	171.7								
HAE6012A	406.5000	HAD4021A	173.01250	152.8								
HAE6012A	417.5000	HAD4021A	173.01250	144.0								
HAE6012A	429.9875	HAD4021A	173.01250	126.5								

Table 4 (continued): SAR Simulation Reduction Considerations for Back Seat Passenger (ISED Canada)

DVR UHF		APX6500 VHF		Combine MPE (%)	Exposure Location	DVR UHF Adjusted SAR Results (W/kg)		APX6500 VHF Adjusted SAR Results (W/kg)		Combine Adjusted SAR Results (W/kg)		SAR Simulation Reduction
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			1g	WB	1g	WB	1g	WB	
HAE6012A	406.5000	#HAD4022A	158.01250	108.9	Back Center	0.382	0.015	0.080	0.004	0.462	0.019	
					Back Side	0.410	0.012	0.077	0.004	0.487	0.016	
HAE6012A	406.5000	#HAD4022A	165.01250	135.6	Back Center	0.382	0.015	0.026	0.002	0.408	0.017	
					Back Side	0.410	0.012	0.048	0.003	0.457	0.015	
HAE6012A	406.5000	#HAD4022A	173.01250	118.7	Back Center	0.382	0.015	0.192	0.004	0.574	0.019	
					Back Side	0.410	0.012	0.238	0.012	0.648	0.024	
HAE6012A	417.5000	#HAD4022A	165.01250	126.8	Back Center	0.176	0.011	0.026	0.002	0.202	0.014	
					Back Side	0.293	0.013	0.048	0.003	0.341	0.016	
HAE6012A	417.5000	#HAD4022A	173.01250	109.9	Back Center	0.176	0.011	0.192	0.004	0.368	0.015	
					Back Side	0.293	0.013	0.238	0.012	0.532	0.025	
HAE6012A	429.9875	#HAD4022A	165.01250	109.3	Back Center	0.158	0.012	0.026	0.002	0.184	0.014	
					Back Side	0.265	0.010	0.048	0.003	0.313	0.013	
HAE6012A	417.5000	#HAD4022A	158.01250	100.1	Back Center	0.176	0.011	0.080	0.004	0.256	0.015	
					Back Side	0.293	0.013	0.077	0.004	0.370	0.017	
HAE6012A	406.5000	#RAD4010ARB	173.01250	101.4	Back Center	0.382	0.015	0.113	0.003	0.494	0.017	
					Back Side	0.410	0.012	0.135	0.007	0.545	0.019	

Note: # Antenna length trimmed to frequency

Results of SAR Computations for combined exposure

From all simulated results, the highest peak 1-g SAR values were identified for both DVR UHF and APX6500 mobile radio exposures and then summed up to produce the composite combined peak SAR value for corresponding locations of the human body model. Tables 5 and 6 present the highest combined peak 1-g and whole-body SAR values, respectively.

Table 5: Worst case peak 1-g average SAR for passenger exposure conditions and combined 1-g average SAR from simultaneous exposure.

	Passenger location	DVR UHF [W/kg]	Mobile APX6500 [W/kg]	Total 1-g SAR [W/kg]
FCC	Back Center	0.382	0.145	0.527
	Back Side	0.410	0.218	0.628
ISED Canada	Back Center	0.382	0.316	0.698
	Back Side	0.410	0.263	0.673

Table 6: Worst case peak whole body average SAR for passenger exposure conditions and combined whole body average SAR from simultaneous exposure.

	Passenger location	DVR UHF [W/kg]	Mobile APX6500 [W/kg]	Total WB SAR [W/kg]
FCC	Back Center	0.015	0.007	0.022
	Back Side	0.013	0.010	0.023
ISED Canada	Back Center	0.016	0.010	0.026
	Back Side	0.013	0.014	0.027

In summary, the maximum combined peak 1-g SAR is 0.698 W/kg, less than the 1.6 W/kg limit, while the maximum combined whole-body average SAR is 0.027 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 products, the present analysis shows that the computed SAR values are compliant with the FCC and ISED Canada general public 1-g and whole body SAR limits.

References

[1] Health Canada Safety Code 6 (2015). Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz.

[2] United States Federal Communication Commission, “Evaluating compliance with FCC guidelines for human exposure to radiofrequency electromagnetic fields,” OET Bulletin 65 (Ed. 97-01), August 1997

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

[4] ICNIRP (International Commission on Non-Ionising Radiation Protection) 1998. *Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz)*. Health Phys. 74:494–522.

[5] IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz. IEEE Std C95.1-2019 (Revision of IEEE Std C95.1-2005/ Incorporates IEEE Std C95.1-2019/Cor 1-2019) .