



**COMPUTATIONAL EME COMPLIANCE ASSESSMENT OF THE APX SERIES  
MODEL M25VRS9PW1CN (PMUF1980A) MOBILE RADIO AND COMPANION  
DEVICE, DIGITAL VEHICULAR REPEATER (DVR VHF), MOBEXCOM DVRS VHF  
(DQPMDVR3000P)**

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**Introduction**

This report summarizes the computational [numerical modeling] analysis performed to document compliance of the APX Series Model Number # M25VRS9PW1CN (PMUF1980A) Mobile Radio interfaced with, and transmitting simultaneously with DVR VHF, model # MOBEXCOM DVRS VHF (DQPMDVR3000P) 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)
US FCC	Mobile APX 6500	8/900 MHz	806-824, 851-869; 896-901, 935-940, 901-902, 940-941
	DVR	VHF	150.8-173.4
ISED Canada	Mobile APX 6500	8/900 MHz	806-824, 851-869; 896-901, 935-940
	DVR	VHF	138-174

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

*permissible exposure* (MPE) limits.<sup>1</sup> A total of 43 test conditions that did not conform with FCC MPE limits, and 336 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<sup>2</sup>, a total 7 configurations (requiring a total of 14 numerical simulations) have been performed, all of them addressing the exposure of the back seat passenger to the DVR VHF repeater featuring trunk-mount antennas and the APX 6500 8/900MHz 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 related IEC/IEEE 62704-2:2017 standard numerical uncertainty budget for exposure simulations with vehicle mounted wire antennas operating at the simulated frequencies is summarized in the tables on page 24 and 26 of

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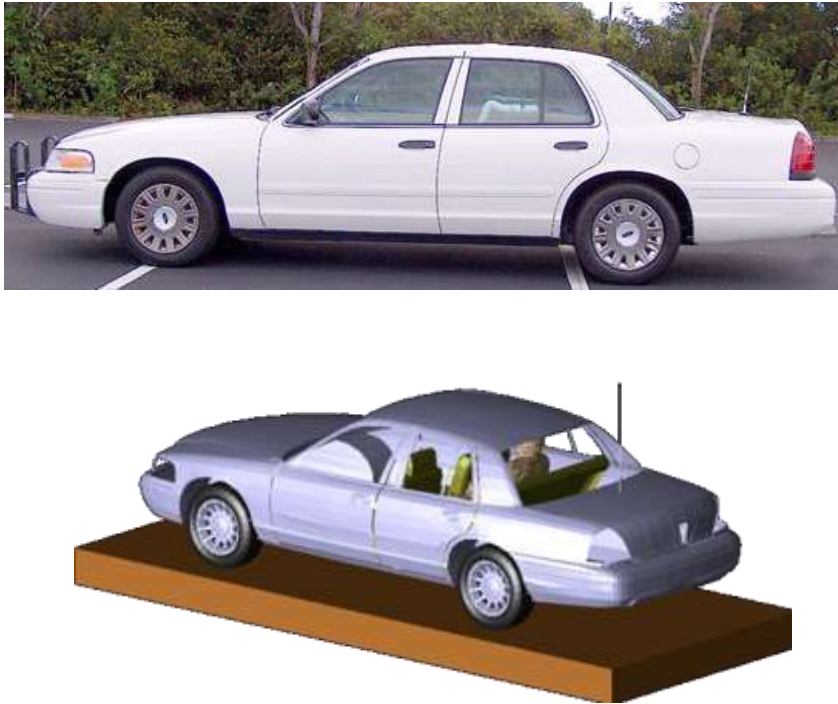
<sup>1</sup> This choice is made for process efficiency, since “MPE” is used in the United States. In this way, chances of making editorial mistakes that may then require extended interactions with the report examiner are reduced.

<sup>2</sup> SAR simulation reduction is described in the SAR Simulations Reduction Considerations section of this report.

Appendix B. The uncertainty budget for the remaining numerical antenna models is summarized on page 27 of Appendix B.

The XFDTD code validation performed by Remcom Inc. according to the IEEE/IEC 62704-2:2017 standard requirements is also provided in conjunction with 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.



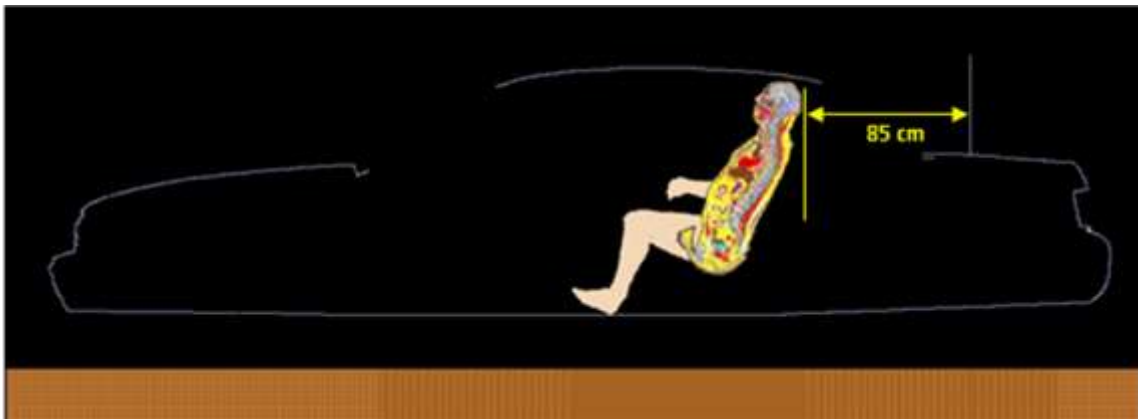
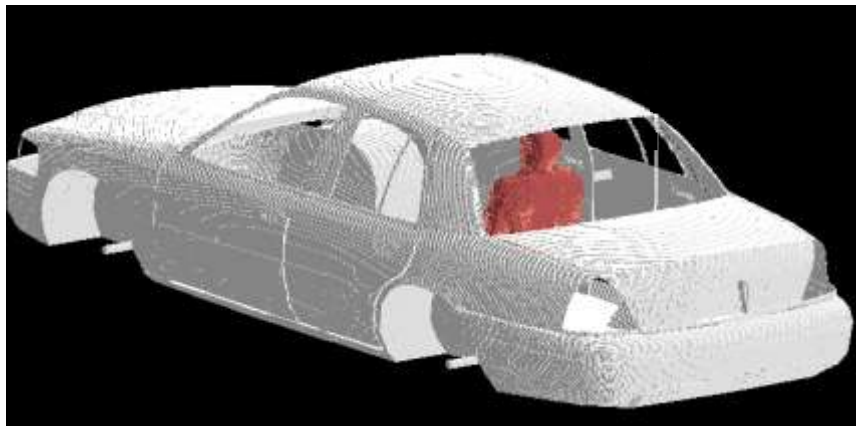
**Figure 1: Picture of the vehicle and corresponding CAD model used in XFDTD™ simulations**

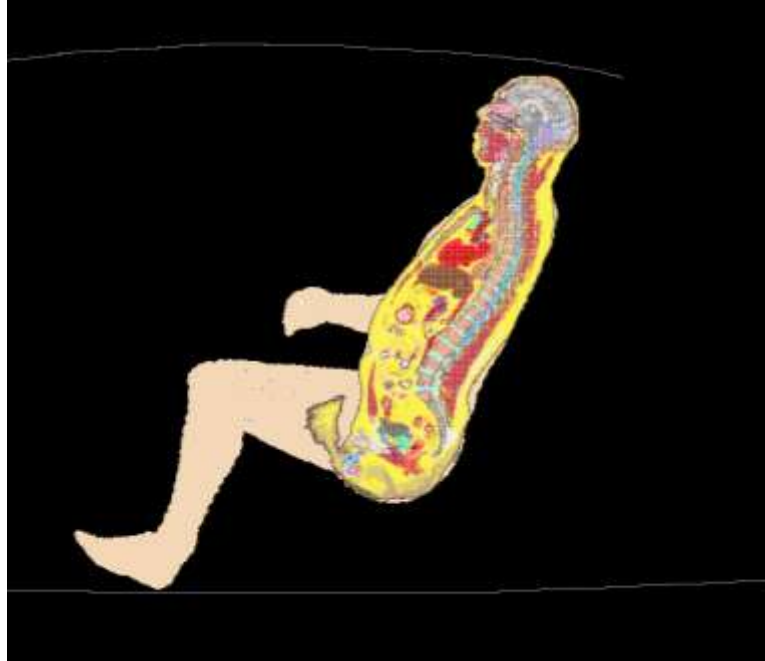
For back seat passenger exposures, the mobile radio antenna position is on the roof and companion device, DVR VHF repeater antenna position is on the trunk. The distance of trunk mounted antenna from the passenger model head when the passenger model is located in the center of the back seat is set at 85 cm, 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.

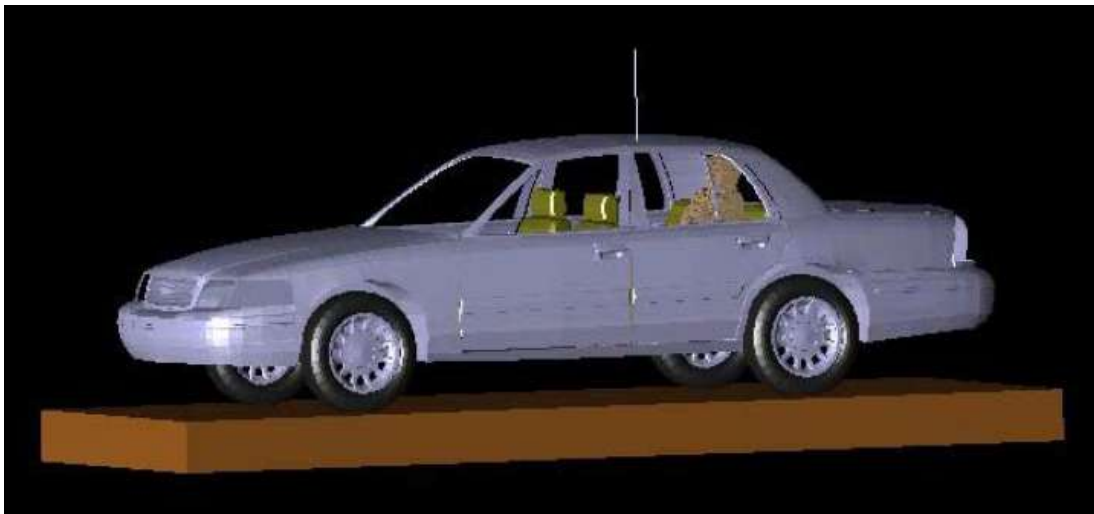
According to the IEC/IEEE 62704-2:2017 standard a lossy dielectric slab featuring 30 cm thickness, relative dielectric constant 8 and conductivity 0.01 S/m has been introduced in the computational model to properly account for the effect of the ground (pavement) on exposure.

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 42W (806-824 MHz, 851-869 MHz); 36W (896-901 MHz, 935-940 MHz); 4W (901-902 MHz, 940-941 MHz), while it is 6 W from the DVR VHF repeater antenna (VHF 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 fur to push-to-talk operation) for the APX 6500 8/900MHz

mobile radio and (100% talk time) for DVR VHF were employed, all computational results are normalized to half of the APX 6500 8/900MHz mobile radio maximum average net output power, i.e., 21W (806-825 MHz, 851-870 MHz)<sup>3</sup> and to full average net output power of the companion DVR VHF repeater, i.e., 6W (VHF 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 (APX 6500 8/900MHz mobile radio, 50% talk time) and Table 2 (DVR VHF, 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 in the center of the roof (APX 6500 8/900MHz mobile radio) and on the trunk (DVR VHF). 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.

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<sup>3</sup> Other frequency dependent power levels in 8/900 MHz band of APX 6500 mobile radio are not applicable since the required exposure simulations in this band include frequencies only within 806-824 MHz range.

**Table 1a: Computed and adjusted SAR results for back seat passenger exposure for APX 6500 8/900MHz mobile radio**  
(Configurations exceeding FCC MPE limits)

Mount Location	Antenna Kit#	Antenna Length (cm)	Freq (MHz)	P.D. (mW/cm <sup>2</sup> )	Exposure Location	Computations SAR (W/kg)		Interpolated Adjustment Factors		Adjusted SAR Results (W/kg)	
						1 g	WB	1 g	WB	1 g	WB
Roof	HAF4013A, 1/4 Wave (806-941 MHz)	7.9	806.0000	0.02	Back Center	0.03	0.001	2.69	2.70	0.09	0.002
					Back Side	0.02	0.001	1.59	2.11	0.03	0.002
Roof	HAF4036A, 1/4 Wave (806-941 MHz)	10.2	815.0000	0.02	Back Center	0.02	0.001	2.66	2.71	0.06	0.003
					Back Side	0.03	0.001	1.59	2.12	0.04	0.002
Roof	HAF4037A, 1/4 Wave (806-941 MHz)	30.3	806.0000	0.04	Back Center Fig. 4 & 5	0.05	0.002	2.69	2.70	<b>0.14</b>	<b>0.005</b>
					Back Side	0.03	0.002	1.59	2.11	0.05	0.003

Note:  
**Blue Blue** – the highest adjusted SAR results for the respective frequency bands.

**Table 1b: Computed and adjusted SAR results for back seat passenger exposure for APX 6500 8/900MHz mobile radio**  
(Configurations exceeding ISED MPE limits)

Mount Location	Antenna Kit#	Antenna Length (cm)	Freq (MHz)	P.D. (mW/cm <sup>2</sup> )	Exposure Location	Computations SAR (W/kg)		Interpolated Adjustment Factors		Adjusted SAR Results (W/kg)	
						1 g	WB	1 g	WB	1 g	WB
Roof	HAF4013A, 1/4 Wave (806-941 MHz)	7.9	#806.0000	0.02	Back Center	0.03	0.001	2.69	2.70	0.09	0.002
					Back Side	0.02	0.001	1.59	2.11	0.03	0.002
Roof	HAF4036A, 1/4 Wave (806-941 MHz)	10.2	#815.0000	0.02	Back Center	0.02	0.001	2.66	2.71	0.06	0.003
					Back Side	0.03	0.001	1.59	2.12	0.04	0.002
Roof	HAF4037A, 1/4 Wave (806-941 MHz)	30.3	#806.0000	0.04	Back Center Fig. 4 & 5	0.05	0.002	2.69	2.70	<b>0.14</b>	<b>0.005</b>
					Back Side	0.03	0.002	1.59	2.11	0.05	0.003

Note:  
**Blue Blue** – the highest adjusted SAR results for the respective frequency bands.  
Note: # Same SAR simulation configuration as FCC US.

**Table 2a: Computed and adjusted SAR results for back seat passenger exposure for  
DVR VHF**

(Configurations exceeding FCC MPE limits)

Mount Location	Antenna Kit#	Antenna Length (cm)	Freq (MHz)	P.D. (mW/cm <sup>2</sup> )	Exposure Location	Computed SAR (W/kg)		Interpolated Adjustment Factors		Adjusted SAR Results (W/kg)	
						1 g	WB	1 g	WB	1 g	WB
Trunk	HAD4008A, 1/4 Wave (150.8-162MHz)	47.3	162.0000	0.23	Back Center	0.16	0.007	1.92	2.42	0.31	0.018
					Back Side Fig. 6 & 7	0.16	0.006	4.11	2.98	<b>0.67</b>	<b>0.019</b>
Trunk	HAD4009A, 1/4 Wave (162-174MHz)	44.8	173.4000	0.19	Back Center	0.10	0.005	1.94	2.43	0.19	0.013
					Back Side	0.13	0.005	4.03	2.97	0.52	0.015

Note:  
**Blue** – the highest adjusted SAR results for the respective frequency band.

**Table 2b: Computed and adjusted SAR results for back seat passenger exposure for  
DVR VHF**

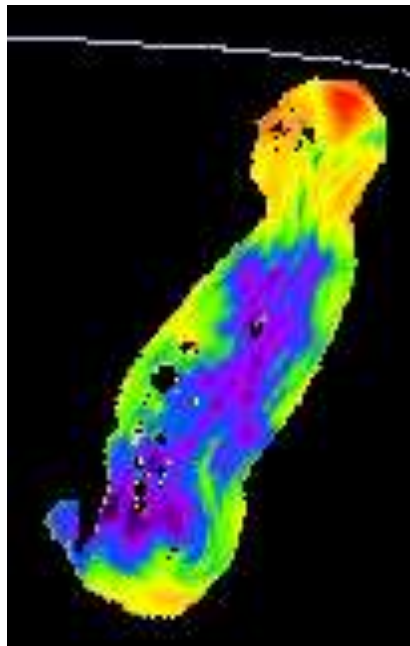
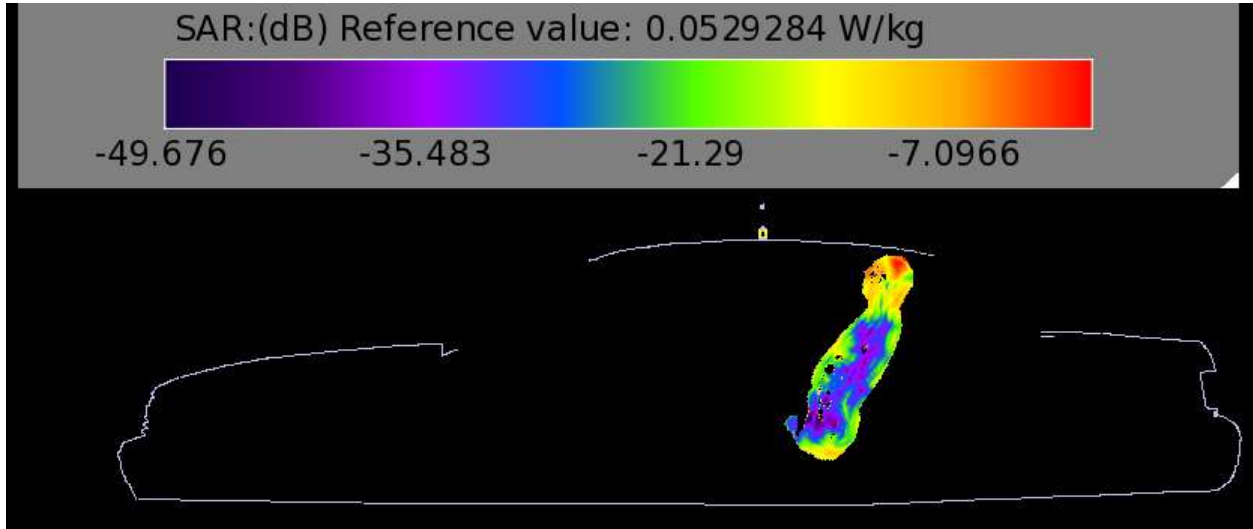
(Configurations exceeding ISED MPE limits)

Mount Location	Antenna Kit#	Antenna Length (cm)	Freq (MHz)	P.D. (mW/cm <sup>2</sup> )	Exposure Location	Computed SAR (W/kg)		Interpolated Adjustment Factors		Adjusted SAR Results (W/kg)	
						1 g	WB	1 g	WB	1 g	WB
Trunk	HAD4006A, 1/4 Wave (136-144MHz)	53.8	140.0000	0.20	Back Center	0.07	0.003	1.77	2.26	0.12	0.006
					Back Side	0.05	0.003	3.74	2.71	0.20	0.008
Trunk	HAD4007A, 1/4 Wave (144-150.8MHz)	50.8	144.0000	0.15	Back Center	0.19	0.008	1.82	2.31	0.34	0.018
					Back Side	0.07	0.005	3.93	2.83	0.27	0.014
Trunk	HAD4008A, 1/4 Wave (150.8-162MHz)	47.3	#162.0000	0.23	Back Center	0.16	0.007	1.92	2.42	0.31	0.018
					Back Side Fig. 6 & 7	0.16	0.006	4.11	2.98	<b>0.67</b>	<b>0.019</b>
Trunk	HAD4009A, 1/4 Wave (162-174MHz)	44.8	#173.4000	0.19	Back Center	0.10	0.005	1.94	2.43	0.19	0.013
					Back Side	0.13	0.005	4.03	2.97	0.52	0.015

Note:  
**Blue** – the highest adjusted SAR results for the respective frequency band.  
Note: # Same SAR simulation configuration as FCC US.

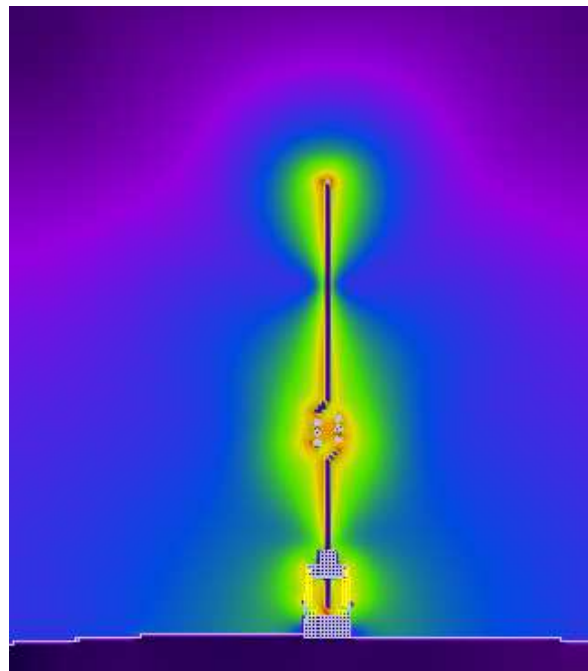
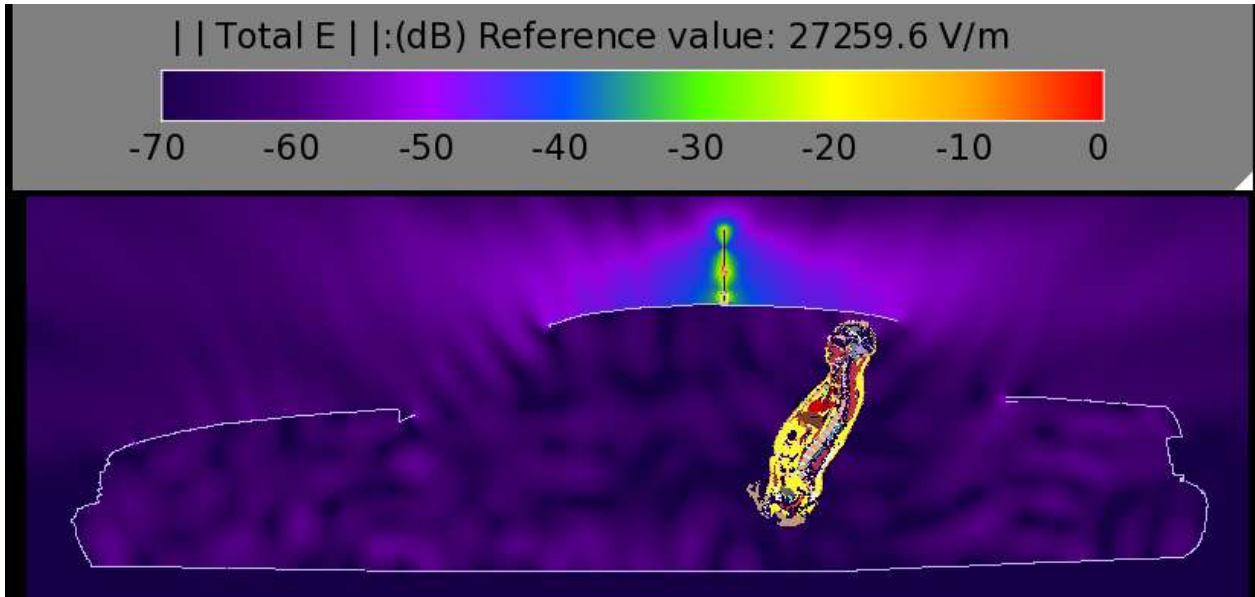


The SAR distribution in the passenger exposure condition that gave highest adjusted 1-g SAR for the APX 6500 8/900MHz mobile radio (FCC US and ISED Canada) is reported in Figure 4. (806.0000 MHz, passenger in the center of the back seat, HAF4037A antenna installed on the roof).

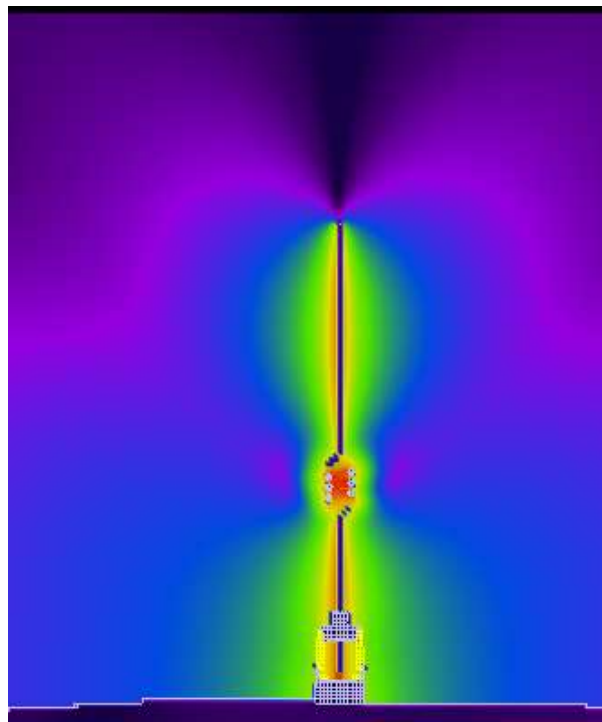
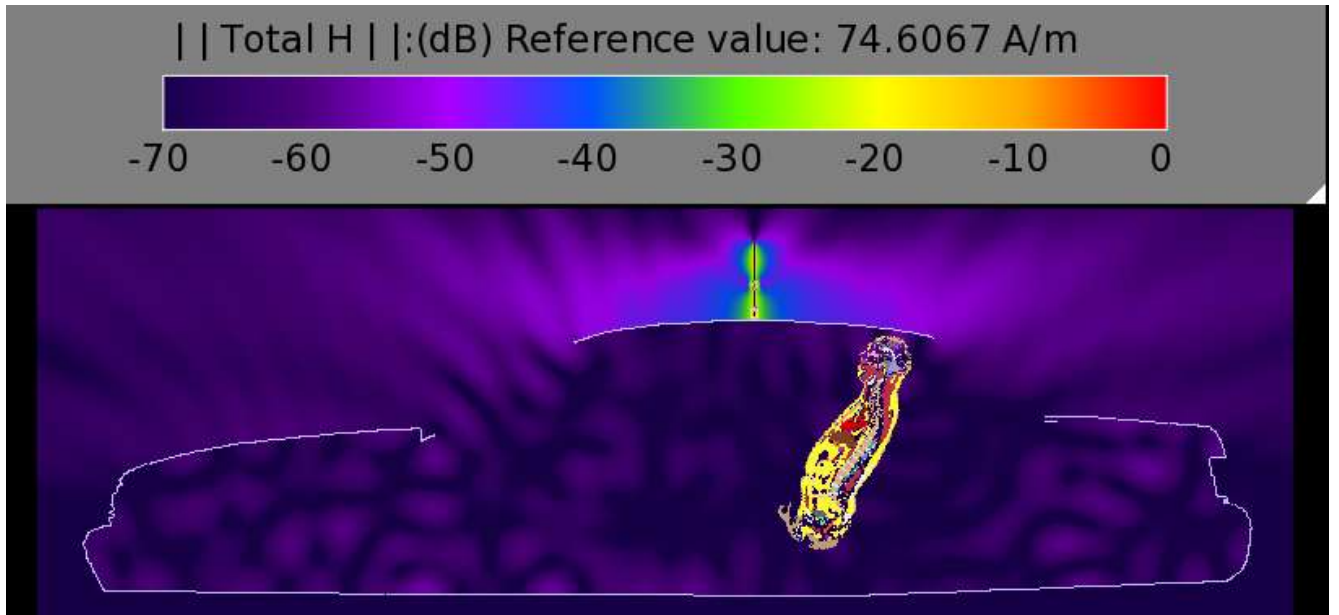


**Figure 4. SAR distribution at 806.0000 MHz in the passenger model located in the center of the back seat, produced by the roof-mount HAE4037A antenna. The SAR distribution plot is relative to the plane where the peak 1-g average SAR for this exposure condition occurs.**

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.



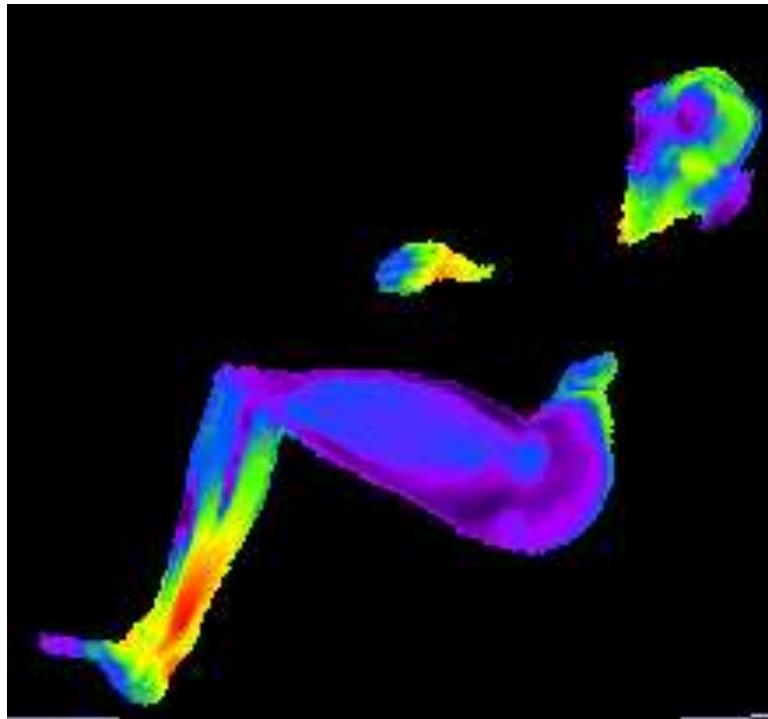
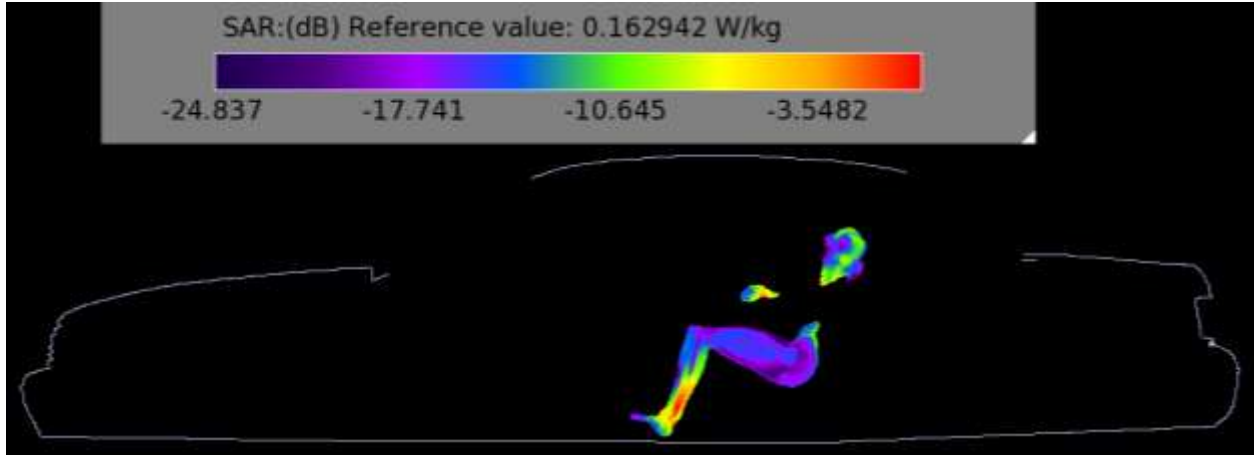
a)



b)

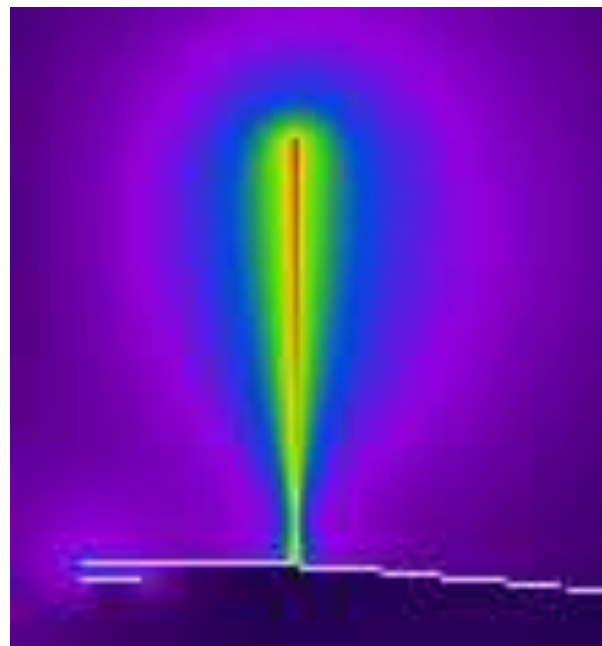
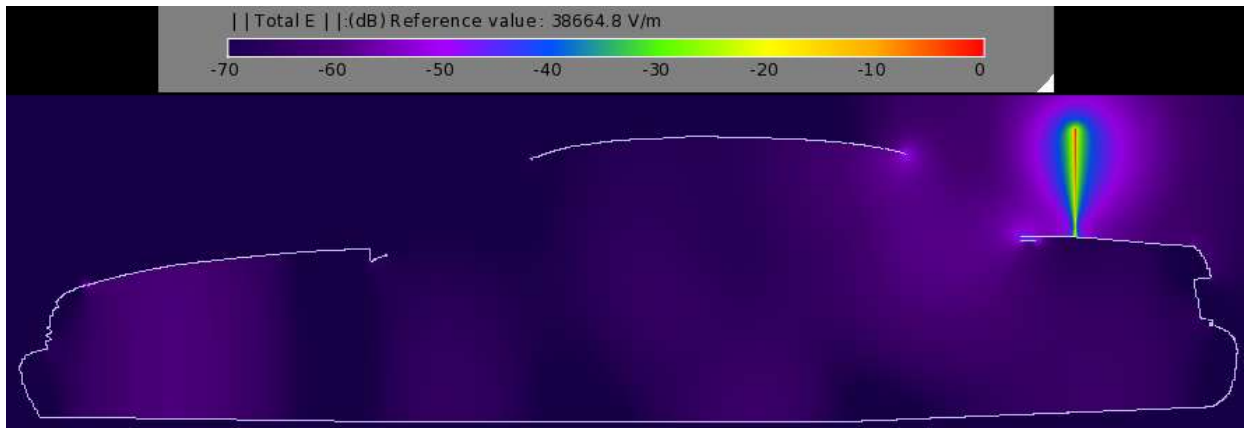
Figure 5. (a) E-field magnitude distribution corresponding to exposure condition of Figure 4, and (b) H-field magnitude distribution corresponding to exposure condition of Figure 4.

The SAR distribution in the passenger exposure condition that produced the highest adjusted 1-g SAR for the Companion Device DVR VHF (FCC US and ISED Canada) is reported in Figure 6. (162.0000 MHz, passenger on the side of the back seat, HAD4008A antenna installed on the trunk).

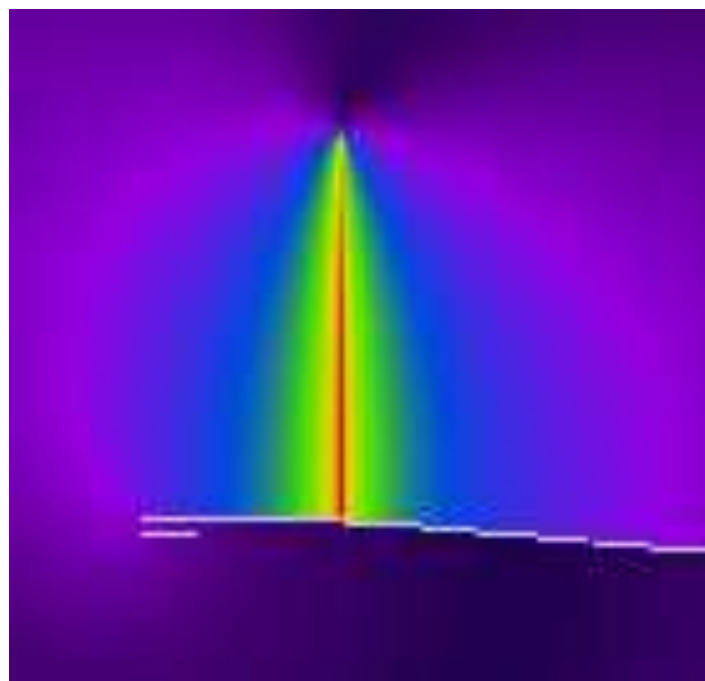
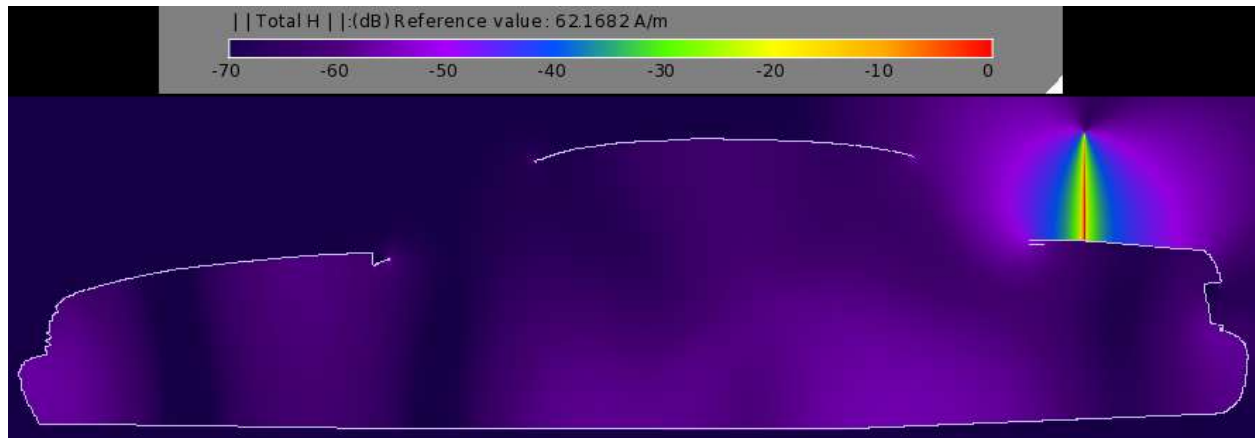


**Figure 6. SAR distribution at 162.0000 MHz in the passenger model located on the side of the back seat, produced by the trunk-mount HAD4008A antenna. The SAR distribution plot is relative to the plane where the peak 1-g average SAR for this exposure condition occurs.**

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.**

### **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 US)**

DVRS VHF		APX 6500 8/900MHz Mobile		Combine MPE (%)	Exposure Location	DVRS VHF Adjusted SAR Results (W/kg)		APX 6500 8/900MHz Adjusted SAR Results (W/kg)		Combined Adjusted SAR Results (W/kg)		SAR Simulation Reduction	
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			Ig	WB	Ig	WB	Ig	WB		
HAD4008A	162.0000	HAF4013A	806.0000	119.4	Back Center	0.31	0.018	0.09	0.002	0.40	0.020	The highest MPE configuration has SAR below 50% of the limit	
					Back Side	0.67	0.019	0.03	0.002	0.70	0.021		
			815.0000	118.5									
			824.0000	117.4									
			851.0000	117.7									
			860.0000	118.2									
			869.0000	117.8									
			896.0000	117.9									
			898.5000	117.7									
			900.0000	117.7									
			901.5000	116.7									
			935.0000	117.3									
			937.5000	117.2									
			939.0000	117.1									
			940.5000	116.7									
HAD4008A	162.0000	HAF4036A	815.0000	119.4	Back Center	0.31	0.018	0.06	0.003	0.37	0.021	The highest MPE configuration has SAR below 50% of the limit	
					Back Side	0.67	0.019	0.04	0.002	0.71	0.021		
			806.0000	119.4									
			824.0000	118.4									
			851.0000	117.9									
			860.0000	118.3									
			869.0000	118.1									
			896.0000	117.9									
			898.5000	117.8									
			900.0000	117.9									
			901.5000	116.7									
			935.0000	117.5									
			937.5000	117.2									
			939.0000	117.1									
			940.5000	116.7									
HAD4008A	162.0000	HAF4037A	806.0000	123.0	Back Center	0.31	0.018	0.14	0.005	0.45	0.023	The highest MPE configuration has SAR below 50% of the limit	
					Back Side	0.67	0.019	0.05	0.003	0.72	0.022		
			806.0000	119.4									
			815.0000	121.2									
			824.0000	119.7									
			851.0000	119.8									
			860.0000	120.2									
			869.0000	121.3									
			896.0000	119.4									
			898.5000	119.5									
			900.0000	119.6									
			901.5000	116.8									
			935.0000	119.4									
			937.5000	118.4									
939.0000	118.0												
			940.5000	116.8									
HAD4009A	173.4000	HAF4037A	806.0000	100.5	Back Center	0.19	0.013	0.14	0.005	0.33	0.018		
					Back Side	0.52	0.015	0.05	0.003	0.57	0.018		



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

DVRS VHF		APX 6500 8900MHz Mobile		Combine MPE (%)	Exposure Location	DVRS VHF Adjusted SAR Results (W/kg)		APX 6500 8900MHz 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				
HAD4006A	140.0000	HAF4013A	806.0000	160.7	Back Center	0.12	0.007	0.09	0.002	0.21	0.009	The highest MPE configuration has SAR below 50% of the limit			
					Back Side	0.20	0.008	0.03	0.002	0.23	0.010				
			815.0000	158.9											
			824.0000	156.6											
			851.0000	157.2											
			860.0000	158.2											
			869.0000	157.4											
			896.0000	157.6											
			898.5000	157.1											
			900.0000	157.3											
			901.5000	155.1											
			935.0000	156.3											
			937.5000	156.1											
			939.0000	156.0											
	940.5000		155.0												
			144.0000		806.0000	139.0									
						815.0000	137.2								
						824.0000	134.9								
						851.0000	135.5								
						860.0000	136.5								
						869.0000	135.7								
						896.0000	135.9								
						898.5000	135.4								
						900.0000	135.6								
						901.5000	133.4								
						935.0000	134.6								
						937.5000	134.4								
						939.0000	134.3								
				940.5000	133.3										
HAD4006A	140.0000	HAF4036A	815.0000	160.8	Back Center	0.12	0.007	0.06	0.003	0.18	0.010	The highest MPE configuration has SAR below 50% of the limit			
					Back Side	0.20	0.008	0.04	0.002	0.24	0.010				
			806.0000	160.7											
			824.0000	158.5											
			851.0000	157.6											
			860.0000	158.5											
			869.0000	158.1											
			896.0000	157.7											
			898.5000	157.5											
			900.0000	157.7											
			901.5000	155.0											
			935.0000	156.9											
			937.5000	156.1											
			939.0000	155.8											
	940.5000		155.0												
			144.0000		806.0000	139.0									
						815.0000	139.1								
						824.0000	136.8								
						851.0000	135.9								
						860.0000	136.8								
						869.0000	136.4								
						896.0000	136.0								
						898.5000	135.8								
						900.0000	136.0								
						901.5000	133.3								
						935.0000	135.2								
						937.5000	134.4								
						939.0000	134.1								
				940.5000	133.3										

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

DVRS VHF		APX 6500 8900MHz Mobile		Combine MPE (%)	Exposure Location	DVRS VHF Adjusted SAR Results (W/kg)		APX 6500 8900MHz 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			
HAD4006A	140.0000	HAF4037A	806.0000	168.4	Back Center	0.12	0.007	0.14	0.005	0.26	0.012	The highest MPE configuration has SAR below 50% of the limit		
					Back Side	0.20	0.008	0.05	0.003	0.25	0.011			
			815.0000	164.7										
			824.0000	161.4										
			851.0000	161.6										
			860.0000	162.5										
			869.0000	164.9										
			896.0000	161.0										
			898.5000	161.1										
			900.0000	161.4										
			901.5000	155.3										
			935.0000	161.0										
			937.5000	158.8										
			939.0000	157.9										
	940.5000	155.2												
		144.0000	HAF4037A	806.0000	146.7									
	815.0000			143.0										
	824.0000			139.7										
	851.0000			139.9										
	860.0000			140.8										
	869.0000			143.2										
	896.0000			139.3										
	898.5000			139.4										
	900.0000			139.7										
	901.5000			133.6										
	935.0000			139.3										
937.5000	137.1													
939.0000	136.2													
940.5000	133.5													
HAD4007A	144.0000	HAF4013A	806.0000	122.2	Back Center	0.34	0.018	0.09	0.002	0.43	0.020	The highest MPE configuration has SAR below 50% of the limit		
					Back Side	0.27	0.014	0.03	0.002	0.30	0.016			
			815.0000	120.4										
			824.0000	118.1										
			851.0000	118.7										
			860.0000	119.7										
			869.0000	118.9										
			896.0000	119.1										
			898.5000	118.6										
			900.0000	118.8										
			901.5000	116.6										
			935.0000	117.8										
			937.5000	117.6										
			939.0000	117.5										
940.5000	116.5													

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

DVRS VHF		APX 6500 8900MHz Mobile		Combine MPE (%)	Exposure Location	DVRS VHF Adjusted SAR Results (W/kg)		APX 6500 8900MHz 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		
HAD4007A	144.0000	HAF4036A	815.0000	122.3	Back Center	0.34	0.018	0.06	0.003	0.40	0.021	The highest MPE configuration has SAR below 50% of the limit	
					Back Side	0.27	0.014	0.04	0.002	0.31	0.016		
			806.0000	122.2									
			824.0000	120.0									
			851.0000	119.1									
			860.0000	120.0									
			869.0000	119.6									
			896.0000	119.2									
			898.5000	119.0									
			900.0000	119.2									
			901.5000	116.5									
			935.0000	118.4									
937.5000	117.6												
939.0000	117.3												
940.5000	116.5												
HAD4007A	144.0000	HAF4037A	806.0000	129.9	Back Center	0.34	0.018	0.14	0.005	0.48	0.023	The highest MPE configuration has SAR below 50% of the limit	
					Back Side	0.27	0.014	0.05	0.003	0.32	0.017		
			815.0000	126.2									
			824.0000	122.9									
			851.0000	123.1									
			860.0000	124.0									
			869.0000	126.4									
			896.0000	122.5									
			898.5000	122.6									
			900.0000	122.9									
			901.5000	116.8									
			935.0000	122.5									
937.5000	120.3												
939.0000	119.4												
940.5000	116.7												

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

DVR5 VHF		APX 6500 8900MHz Mobile		Combine MPE (%)	Exposure Location	DVR5 VHF Adjusted SAR Results (W/kg)		APX 6500 8900MHz 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		
HAD4008A	162.0000	HAF4013A	806.0000	187.1	Back Center	0.31	0.018	0.09	0.002	0.40	0.020	The highest MPE configuration has SAR below 50% of the limit	
			806.0000	187.1	Back Side	0.67	0.019	0.03	0.002	0.70	0.021		
			815.0000	185.3									
			824.0000	183.0									
			851.0000	183.6									
			860.0000	184.6									
			869.0000	183.8									
			896.0000	184.0									
			898.5000	183.5									
			900.0000	183.7									
			901.5000	181.5									
			935.0000	182.7									
			937.5000	182.5									
			939.0000	182.4									
	940.5000		181.4										
	156.4000			806.0000	119.5								
				815.0000	117.7								
				824.0000	115.4								
				851.0000	116.0								
				860.0000	117.0								
				869.0000	116.2								
				896.0000	116.4								
				898.5000	115.9								
				900.0000	116.1								
				901.5000	113.9								
				935.0000	115.1								
				937.5000	114.9								
				939.0000	114.8								
940.5000		113.8											
HAD4008A	162.0000	HAF4036A	815.0000	187.2	Back Center	0.31	0.018	0.06	0.003	0.37	0.021	The highest MPE configuration has SAR below 50% of the limit	
			815.0000	187.2	Back Side	0.67	0.019	0.04	0.002	0.71	0.021		
			806.0000	187.1									
			824.0000	184.9									
			851.0000	184.0									
			860.0000	184.9									
			869.0000	184.5									
			896.0000	184.1									
			898.5000	183.9									
			900.0000	184.1									
			901.5000	181.4									
			935.0000	183.3									
			937.5000	182.5									
			939.0000	182.2									
	156.4000			940.5000	181.4								
				806.0000	119.5								
				815.0000	119.6								
				824.0000	117.3								
				851.0000	116.4								
				860.0000	117.3								
				869.0000	116.9								
				896.0000	116.5								
				898.5000	116.3								
				900.0000	116.5								
				901.5000	113.8								
				935.0000	115.7								
				937.5000	114.9								
				939.0000	114.6								
940.5000	113.8												

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

DVRS VHF		APX 6500 8900MHz Mobile		Combine MPE (%)	Exposure Location	DVRS VHF Adjusted SAR Results (W/kg)		APX 6500 8900MHz 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			
HAD4008A	162.0000	HAF4037A	806.0000	194.8	Back Center	0.31	0.018	0.14	0.005	0.45	0.023	The highest MPE configuration has SAR below 50% of the limit		
					Back Side	0.67	0.019	0.05	0.003	0.72	0.022			
			815.0000	191.1										
			824.0000	187.8										
			851.0000	188.0										
			860.0000	188.9										
			869.0000	191.3										
			896.0000	187.4										
			898.5000	187.5										
			900.0000	187.8										
			901.5000	181.7										
			935.0000	187.4										
			937.5000	185.2										
			939.0000	184.3										
	940.5000		181.6											
			156.4000	806.0000	127.2									
	815.0000			123.5										
	824.0000			120.2										
	851.0000			120.4										
	860.0000			121.3										
	869.0000			123.7										
	896.0000			119.8										
	898.5000			119.9										
	900.0000			120.2										
	901.5000			114.1										
	935.0000			119.8										
	937.5000			117.6										
	939.0000			116.7										
940.5000	114.0													

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

DVRS VHF		APX 6500 8900MHz Mobile		Combine MPE (%)	Exposure Location	DVRS VHF Adjusted SAR Results (W/kg)		APX 6500 8900MHz Adjusted SAR Results (W/kg)		Combined Adjusted SAR Results (W/kg)		SAR Simulation Reduction	
Antenna Kit#	Freq (MHz)	Antenna Kit#	Freq (MHz)			Ig	WB	Ig	WB	Ig	WB		
HAD4009A	173.4000	HAF4013A	806.0000	152.2	Back Center	0.19	0.013	0.09	0.002	0.28	0.015	The highest MPE configuration has SAR below 50% of the limit	
					Back Side	0.52	0.015	0.03	0.002	0.55	0.017		
			815.0000	150.4									
			824.0000	148.1									
			851.0000	148.7									
			860.0000	149.7									
			869.0000	148.9									
			896.0000	149.1									
			898.5000	148.6									
			900.0000	148.8									
			901.5000	146.6									
			935.0000	147.8									
	937.5000		147.6										
	939.0000		147.5										
	940.5000		146.5										
	162.0000		806.0000	142.8									
			815.0000	141.0									
			824.0000	138.7									
			851.0000	139.3									
			860.0000	140.3									
			869.0000	139.5									
			896.0000	139.7									
			898.5000	139.2									
			900.0000	139.4									
			901.5000	137.2									
			935.0000	138.4									
			937.5000	138.2									
	939.0000		138.1										
	940.5000		137.1										
	167.7000		806.0000	133.6									
			815.0000	131.8									
			824.0000	129.5									
			851.0000	130.1									
			860.0000	131.1									
			869.0000	130.3									
			896.0000	130.5									
			898.5000	130.0									
			900.0000	130.2									
			901.5000	128.0									
			935.0000	129.2									
			937.5000	129.0									
	939.0000		128.9										
940.5000	127.9												

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

DVRS VHF		APX 6500 8900MHz Mobile		Combine MPE (%)	Exposure Location	DVRS VHF Adjusted SAR Results (W/kg)		APX 6500 8900MHz 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		
HAD4009A	173.4000	HAF4036A	815.0000	152.3	Back Center	0.19	0.013	0.06	0.003	0.25	0.016	The highest MPE configuration has SAR below 50% of the limit	
					Back Side	0.52	0.015	0.04	0.002	0.56	0.017		
			806.0000	152.2									
			824.0000	150.0									
			851.0000	149.1									
			860.0000	150.0									
			869.0000	149.6									
			896.0000	149.2									
			898.5000	149.0									
			900.0000	149.2									
			901.5000	146.5									
			935.0000	148.4									
			937.5000	147.6									
			939.0000	147.3									
			940.5000	146.5									
			806.0000	142.8									
			815.0000	142.9									
			824.0000	140.6									
	851.0000		139.7										
	860.0000		140.6										
	869.0000		140.2										
	896.0000		139.8										
	898.5000		139.6										
	900.0000		139.8										
	901.5000		137.1										
	935.0000		139.0										
	937.5000		138.2										
	939.0000		137.9										
	940.5000		137.1										
	806.0000		133.6										
	815.0000		133.7										
	824.0000		131.4										
	851.0000		130.5										
	860.0000		131.4										
	869.0000		131.0										
	896.0000		130.6										
	898.5000		130.4										
	900.0000		130.6										
	901.5000		127.9										
	935.0000		129.8										
	937.5000		129.0										
	939.0000		128.7										
940.5000	127.9												
	162.0000												
	167.7000												

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

DVRS VHF		APX 6500 8900MHz Mobile		Combine MPE (%)	Exposure Location	DVRS VHF Adjusted SAR Results (W/kg)		APX 6500 8900MHz 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		
HAD4009A	173.4000	HAF4037A	806.0000	159.9	Back Center	0.19	0.013	0.14	0.005	0.33	0.018	The highest MPE configuration has SAR below 50% of the limit	
			815.0000	156.2	Back Side	0.52	0.015	0.05	0.003	0.57	0.018		
			824.0000	152.9									
			851.0000	153.1									
			860.0000	154.0									
			869.0000	156.4									
			896.0000	152.5									
			898.5000	152.6									
			900.0000	152.9									
			901.5000	146.8									
			935.0000	152.5									
			937.5000	150.3									
			939.0000	149.4									
			940.5000	146.7									
			806.0000	150.5									
			815.0000	146.8									
			824.0000	143.5									
			851.0000	143.7									
	860.0000		144.6										
	869.0000		147.0										
	896.0000		143.1										
	898.5000		143.2										
	900.0000		143.5										
	901.5000		137.4										
	935.0000		143.1										
	937.5000		140.9										
	939.0000		140.0										
	940.5000		137.3										
	806.0000		141.3										
	815.0000		137.6										
	824.0000		134.3										
	851.0000		134.5										
	860.0000		135.4										
	869.0000		137.8										
	896.0000		133.9										
	898.5000		134.0										
	900.0000		134.3										
	901.5000		128.2										
	935.0000		133.9										
	937.5000		131.7										
	939.0000		130.8										
	940.5000		128.1										



**Results of SAR Computations for combined exposure**

From all simulated results, the highest peak 1-g SAR values were identified for both DVR VHF and APX 6500 8/900MHz 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 VHF [W/kg]	Mobile APX 6500 8/900 MHz [W/kg]	Total 1-g SAR [W/kg]
FCC	Back Center	0.31	0.14	0.45
	Back Side	0.67	0.05	0.72
ISED Canada	Back Center	0.34	0.14	0.48
	Back Side	0.67	0.05	0.72

**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 VHF [W/kg]	Mobile APX 6500 8/900 MHz [W/kg]	Total WB SAR [W/kg]
FCC	Back Center	0.018	0.005	0.023
	Back Side	0.019	0.003	0.022
ISED Canada	Back Center	0.018	0.005	0.023
	Back Side	0.019	0.003	0.022

In summary, the maximum combined peak 1-g SAR is 0.72 W/kg, less than the 1.6 W/kg limit, while the maximum combined whole-body average SAR is 0.023 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] IEEE Standard C95.1-1999. *IEEE Standard for Safety Levels with Respect to Human Exposure to RF Electromagnetic Fields*, 3 kHz to 300 GHz.
- [3] [http://www.nlm.nih.gov/research/visible/visible\\_human.html](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) .