

# Product Safety and RF Energy Exposure Booklet for Digital Vehicular Repeater Systems (DVRS)

## **ATTENTION!**

Before using this equipment, please read this booklet which contains important operating instructions for safe usage, RF energy control and compliance with exposure limits.

8F083X03 Rev. 4.12



## RF Exposure

### **ATTENTION!**

Changes or modifications not expressly approved by Futurecom Systems Group Inc. could void the User's authority to operate the equipment.

### **ATTENTION!**

**This radio is intended for use in occupational / controlled conditions, where users have full knowledge of their exposure and can exercise control over their exposure to meet FCC limits. This radio device is NOT authorized for general population, consumer, or any other use.**

If this vehicular repeater is used in combination with a separate mobile radio transmitter, it is the responsibility of the Repeater Operator to ensure that Maximum Permissible Exposure (MPE) limits are observed at all times during repeater transmissions. The Repeater operator must ensure at all times that no person comes within the MPE distance from the vehicle body to ensure compliance with the FCC's RF energy exposure limits for the general population.

The minimum lateral distance between all possible personnel and the body of the DVRS equipped vehicle must be as specified in **Table 1** (Stand-alone DVR) and **Table 2** (DVR interfaced to a Mobile Radio i.e. DVRS).

Failure to observe the MPE distance exclusion area around the antenna may expose persons within this area to RF energy above the FCC exposure limit for bystanders (general population).

Stand Alone DVR (20W)	Recommended Lateral Distance from Antenna
VHF	82cm (50:50 Tx duty)
UHF 380-512MHz	70cm (50:50 Tx duty)
700MHz	73cm
800MHz	76cm

**Table 1 Recommended Lateral Distance - Stand Alone DVR**

Mobile Radio Rated Power	Recommended Lateral Distance from Vehicle Body
DVRS with <7 Watt Mobile Radio	20 cm
DVRS with 7 to 15 Watt Mobile Radio	30 cm
DVRS with 16 to 39 Watt Mobile Radio	60 cm
DVRS with 40 to 100 Watt Mobile Radio	90 cm

**Table 2 Recommended Lateral Distance – DVRS (DVR interfaced to a Mobile Radio)**

### **IMPORTANT**

The maximum allowed gain of the  $\lambda/4$  omni-directional antenna for the Mobexcom P25 DVR Repeater is Unity (0dBd).

## ***RF Exposure Label***



The RF Exposure Label should be affixed in the vehicle beside the mobile radio control head. The label should be in the direct view of the Repeater operator. The label is supplied with the Mobexcom P25 DVR Repeater.

## ***FCC Label***

This device complies with Part 15 of the FCC Rules.  
Operation is subject to the following two conditions:  
1) This device may not cause harmful interference, and  
2) This device must accept any interference received,  
including interference that may cause undesired  
operation.

## Installation Requirements for Compliance with Radio Frequency (RF) Energy Exposure Safety Standards

### **ATTENTION!**

To ensure compliance with RF Energy Safety Standards:

- Install only Futurecom / Motorola approved antennas and accessories and set conducted power into the DVR and Mobile antennas equal to or lower than the approved power levels – refer to **Table 3** (Stand Alone DVR) or **Table 4** (DVR interfaced to a Mobile Radio i.e. DVRS).
- Ensure the antenna installation is consistent with the DVR Antenna Installation instructions described in this document as well as with the Mobile Radio Antenna Installation Instructions published in the applicable Motorola Installation Manual.
- Ensure the **Product & RF Safety Booklets** enclosed with the Mobile Radio and the DVR are available to the end user upon completion of the installation.

#	ANTENNA			STAND ALONE DVR MODEL					
	Kit #	Freq. Range [MHz]	Type	700 MHz (20W)	800 MHz (20W)	403-430 (20W)	450-470 (20W)	470-512 (20W)	VHF (20W)
1	*HAF4016	764-870	¼ wave	20W	20W				
2	HAE6012A	380-433	¼ wave			20W			
3	HAE4003A	450-470	¼ wave				20W		
4	HAE4004	470-512	¼ wave					20W	
5	HAD4006	136-144	¼ wave						20W
6	HAD4007	144-150.8	¼ wave						20W
7	HAD4008	150.8-162	¼ wave						20W
8	HAD4009	162-174	¼ wave						20W

**Table 3 Approved Stand-Alone DVR Combinations**

**NOTE:**

Mobile RF conducted antenna power in the tables below denotes 50:50 Tx duty ratio.

DVR: 7V083X06 (DQPMVDVR8000P) Freq Range: 806-825, 851-870MHz, Trunk Mounted Antenna: HAF4016A, 1/4 wave, 0dBd  
 FCC ID: LO6-DVRS800 Maximum conducted power delivered to antenna: DVR (W) / Mobile (W)

Mobile	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna
XTL5000 VHF (147-174MHz) FCC ID: AZ492FT3806 Max Power: DVR / Mobile	HAD4007A, 1/4 wave, 0dBd	HAD4008A, 1/4 wave, 0dBd	HAD4009A, 1/4 wave, 0dBd			
XTL5000 VHF (147-174MHz) FCC ID: AZ492FT3808 Max Power: DVR / Mobile	HAD4007A, 1/4 wave, 0dBd	HAD4008A, 1/4 wave, 0dBd	HAD4009A, 1/4 wave, 0dBd			
XTL5000 UHF R1(380-470MHz) FCC ID: AZ492FT4870 Max Power: DVR / Mobile	HAE6012A, 1/4 wave, 0dBd	HAE6013A, 1/2 wave, 2dBd	HAE4003A, 1/4 wave, 0dBd	HAE4011A, 1/2 wave, 3.5dBd		
XTL5000 UHF R1(380-470MHz) FCC ID: AZ492FT4862 Max Power: DVR / Mobile	HAE6012A, 1/4 wave, 0dBd	HAE6013A, 1/2 wave, 2dBd	HAE4003A, 1/4 wave, 0dBd	HAE4011A, 1/2 wave, 3.5dBd		
XTL5000 UHF R2(470-512MHz) FCC ID: AZ492FT4867 Max Power: DVR / Mobile	HAE6016A, 1/4 wave, 0dBd	HAE4003A, 1/4 wave, 0dBd	HAE4011A, 1/2 wave, 3.5dBd	HAE4012A, 1/4 wave, 3.5dBd	HAE4013A, 1/4 wave, 3.5dBd	HAE4004A, 1/4 wave, 0dBd
XTL5000 700/800MHz FCC ID: AZ492FT5823 Max Power: DVR / Mobile	HAF4013A, 1/4 wave, 3dBd	HAF4014A, 1/4 wave, 3dBd	HAF4016A, 1/4 wave, 0dBd	HAF4017A, 1/4 wave, 3dBd		

**Table 4A Approved 800 DVRS Configurations**

DVR: 7V083X05 (DQPMVDVR7000P) Freq Range: 764-776, 794-806MHz, Trunk Mounted Antenna: HAF4016A, 1/4 wave, 0dBd  
 FCC ID: LO6-DVRS700 Maximum conducted power delivered to antenna: DVR (W) / Mobile (W)

Mobile	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna
XTL5000 VHF (147-174MHz) FCC ID: AZ492FT3806 Max Power: DVR / Mobile	HAD4007A, 1/4 wave, 0dBd	HAD4008A, 1/4 wave, 0dBd	HAD4009A, 1/4 wave, 0dBd			
XTL5000 VHF (147-174MHz) FCC ID: AZ492FT3808 Max Power: DVR / Mobile	HAD4007A, 1/4 wave, 0dBd	HAD4008A, 1/4 wave, 0dBd	HAD4009A, 1/4 wave, 0dBd	RAD4010A, 1/2 wave, 3dBd		
XTL5000 UHF R1(380-470MHz) FCC ID: AZ492FT4870 Max Power: DVR / Mobile	HAE6012A, 1/4 wave, 0dBd	HAE6013A, 1/2 wave, 2dBd	HAE4003A, 1/4 wave, 0dBd	HAE4011A, 1/2 wave, 3.5dBd		
XTL5000 UHF R1(380-470MHz) FCC ID: AZ492FT4862 Max Power: DVR / Mobile	HAE6012A, 1/4 wave, 0dBd	HAE6013A, 1/2 wave, 2dBd	HAE4003A, 1/4 wave, 0dBd	HAE4011A, 1/2 wave, 3.5dBd		
XTL5000 UHF R2(470-512MHz) FCC ID: AZ492FT4867 Max Power: DVR / Mobile	HAE6016A, 1/4 wave, 0dBd	HAE4003A, 1/4 wave, 0dBd	HAE4011A, 1/2 wave, 3.5dBd	HAE4012A, 1/4 wave, 3.5dBd	HAE4013A, 1/4 wave, 3.5dBd	HAE4004A, 1/4 wave, 0dBd
XTL5000 700/800MHz FCC ID: AZ492FT5823 Max Power: DVR / Mobile	HAF4013A, 1/4 wave, 3dBd	HAF4014A, 1/4 wave, 3dBd	HAF4016A, 1/4 wave, 0dBd	HAF4017A, 1/4 wave, 3dBd		

**Table 4B Approved 700 DVRS Configurations**

DVR: 7V083X04 (DQPM DVR6000P) Freq Range: 470-512MHz, Trunk Mounted Antenna: HAE4004A, 1/4 wave, 0dBd, HAE6016A, 1/4 wave, 0dBd  
 FCC ID: LO6-DVRSUHF Maximum conducted power delivered to antenna: DVR (W) / Mobile (W)

Mobile	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna
XTL5000 VHF (147-174MHz) FCC ID: AZ492FT3806 Max Power: DVR / Mobile	HAD4007A, 1/4 wave, 0dBd Future approval	HAD4008A, 1/4 wave, 0dBd Future approval	HAD4009A, 1/4 wave, 0dBd Future approval			
XTL5000 VHF (147-174MHz) FCC ID: AZ492FT3808 Max Power: DVR / Mobile	HAD4007A, 1/4 wave, 0dBd Future approval	HAD4008A, 1/4 wave, 0dBd Future approval	HAD4009A, 1/4 wave, 0dBd Future approval			
XTL5000 UHF R1(380-470MHz) FCC ID: AZ492FT4870 Max Power: DVR / Mobile	HAE6012A, 1/4 wave, 0dBd Future approval	HAE6013A, 1/2 wave, 2dBd Future approval	HAE4003A, 1/4 wave, 0dBd Future approval	HAE4011A, 1/2 wave, 3.5dBd Future approval		
XTL5000 UHF R1(380-470MHz) FCC ID: AZ492FT4862 Max Power: DVR / Mobile	HAE6012A, 1/4 wave, 0dBd Future approval	HAE6013A, 1/2 wave, 2dBd Future approval	HAE4003A, 1/4 wave, 0dBd Future approval	HAE4011A, 1/2 wave, 3.5dBd Future approval		
XTL5000 UHF R2(470-512MHz) FCC ID: AZ492FT4867 Max Power: DVR / Mobile	HAE6016A, 1/4 wave, 0dBd Future approval	HAE4003A, 1/4 wave, 0dBd Future approval	HAE4011A, 1/2 wave, 3.5dBd Future approval	HAE4012A, 1/4 wave, 3.5dBd Future approval	HAE4013A, 1/4 wave, 3.5dBd Future approval	HAE4004A, 1/4 wave, 0dBd Future approval
XTL5000 700/800MHz FCC ID: AZ492FT5823 Max Power: DVR / Mobile	HAF4013A, 1/4 wave, 3dBd Future approval	HAF4014A, 1/4 wave, 3dBd Future approval	HAF4016A, 1/4 wave, 0dBd Future approval	HAF4017A, 1/4 wave, 3dBd Future approval		

**Table 4C Approved 470-512MHz DVRS Configurations**

DVR: 7V083X03 (DQPM D VR5000P) Freq Range: 450-470MHz, Trunk Mounted Antenna: HAE4003A, 1/4 wave, 0dBd, HAE6016A, 1/4 wave, 0dBd  
 FCC ID: LO6-DVRSUHF Maximum conducted power delivered to antenna: DVR (W) / Mobile (W)

Mobile	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna
XTL5000 VHF (147-174MHz) FCC ID: AZ492FT3806 Max Power: DVR / Mobile	HAD4007A, 1/4 wave, 0dBd 10W / 57W	HAD4008A, 1/4 wave, 0dBd 10W / 57W	HAD4009A, 1/4 wave, 0dBd 10W / 57W			
XTL5000 VHF (147-174MHz) FCC ID: AZ492FT3808 Max Power: DVR / Mobile	HAD4007A, 1/4 wave, 0dBd 10W / 57W	HAD4008A, 1/4 wave, 0dBd 10W / 57W	HAD4009A, 1/4 wave, 0dBd 10W / 57W			
XTL5000 UHF R1(380-470MHz) FCC ID: AZ492FT4870 Max Power: DVR / Mobile	HAE6012A, 1/4 wave, 0dBd 10W / 120W	HAE6013A, 1/2 wave, 2dBd 10W / 120W	HAE4003A, 1/4 wave, 0dBd 10W / 120W	HAE4011A, 1/2 wave, 3.5dBd 10W / 120W		
XTL5000 UHF R1(380-470MHz) FCC ID: AZ492FT4862 Max Power: DVR / Mobile	HAE6012A, 1/4 wave, 0dBd 10W / 48W	HAE6013A, 1/2 wave, 2dBd 10W / 48W	HAE4003A, 1/4 wave, 0dBd 10W / 48W	HAE4011A, 1/2 wave, 3.5dBd 10W / 48W		
XTL5000 UHF R2(470-512MHz) FCC ID: AZ492FT4867 Max Power: DVR / Mobile	HAE6016A, 1/4 wave, 0dBd 10W / 54W	HAE4003A, 1/4 wave, 0dBd 10W / 54W	HAE4011A, 1/2 wave, 3.5dBd 10W / 54W	HAE4012A, 1/4 wave, 3.5dBd 10W / 54W	HAE4013A, 1/4 wave, 3.5dBd 10W / 54W	HAE4004A, 1/4 wave, 0dBd 10W / 54W
XTL5000 700/800MHz FCC ID: AZ492FT5823 Max Power: DVR / Mobile	HAF4013A, 1/4 wave, 3dBd 10W / 42W	HAF4014A, 1/4 wave, 3dBd 10W / 42W	HAF4016A, 1/4 wave, 0dBd 10W / 42W	HAF4017A, 1/4 wave, 3dBd 10W / 42W		

**Table 4D Approved 450-470MHz DVRS Configurations**

DVR: 7V083X07 (DQPM DVR4000P) Freq Range: 380-430MHz, Trunk Mounted Antenna: HAE6012A, 1/4 wave, 0dBd  
 FCC ID: LO6-DVRSUHF Maximum conducted power delivered to antenna: DVR (W) / Mobile (W)

Mobile	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna
XTL5000 VHF (147-174MHz) FCC ID: AZ492FT3806 Max Power: DVR / Mobile	HAD4007A, 1/4 wave, 0dBd Future approval	HAD4008A, 1/4 wave, 0dBd Future approval	HAD4009A, 1/4 wave, 0dBd Future approval			
XTL5000 VHF (147-174MHz) FCC ID: AZ492FT3808 Max Power: DVR / Mobile	HAD4007A, 1/4 wave, 0dBd Future approval	HAD4008A, 1/4 wave, 0dBd Future approval	HAD4009A, 1/4 wave, 0dBd Future approval			
XTL5000 UHF R1(380-470MHz) FCC ID: AZ492FT4870 Max Power: DVR / Mobile	HAE6012A, 1/4 wave, 0dBd Future approval	HAE6013A, 1/2 wave, 2dBd Future approval	HAE4003A, 1/4 wave, 0dBd Future approval	HAE4011A, 1/2 wave, 3.5dBd Future approval		
XTL5000 UHF R1(380-470MHz) FCC ID: AZ492FT4862 Max Power: DVR / Mobile	HAE6012A, 1/4 wave, 0dBd Future approval	HAE6013A, 1/2 wave, 2dBd Future approval	HAE4003A, 1/4 wave, 0dBd Future approval	HAE4011A, 1/2 wave, 3.5dBd Future approval		
XTL5000 UHF R2(470-512MHz) FCC ID: AZ492FT4867 Max Power: DVR / Mobile	HAE6016A, 1/4 wave, 0dBd Future approval	HAE4003A, 1/4 wave, 0dBd Future approval	HAE4011A, 1/2 wave, 3.5dBd Future approval	HAE4012A, 1/4 wave, 3.5dBd Future approval	HAE4013A, 1/4 wave, 3.5dBd Future approval	HAE4004A, 1/4 wave, 0dBd Future approval
XTL5000 700/800MHz FCC ID: AZ492FT5823 Max Power: DVR / Mobile	HAF4013A, 1/4 wave, 3dBd Future approval	HAF4014A, 1/4 wave, 3dBd Future approval	HAF4016A, 1/4 wave, 0dBd Future approval	HAF4017A, 1/4 wave, 3dBd Future approval		

**Table 4E Approved 380-430MHz DVRS Configurations**

DVR: 7V083X01 (DQPM DVR3000P) Freq Range: 136-174MHz, Trunk Mounted Antenna: HAD4006A, 1/4 wave, 0dBd, HAD4007A, 1/4 wave, 0dBd, HAD4008A, 1/4 wave, 0dBd, HAD4009A, 1/4 wave, 0dBd  
 FCC ID: LO6-DVRSVHF Maximum conducted power delivered to antenna: DVR (W) / Mobile (W)

Mobile	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna	Roof Mounted Antenna
XTL5000 VHF (147-174MHz) FCC ID: AZ492FT3806 Max Power: DVR / Mobile	HAD4007A, 1/4 wave, 0dBd 6W / 57W	HAD4008A, 1/4 wave, 0dBd 6W / 57W	HAD4009A, 1/4 wave, 0dBd 6W / 57W			
XTL5000 VHF (147-174MHz) FCC ID: AZ492FT3808 Max Power: DVR / Mobile	HAD4007A, 1/4 wave, 0dBd 6W / 57W	HAD4008A, 1/4 wave, 0dBd 6W / 57W	HAD4009A, 1/4 wave, 0dBd 6W / 57W			
XTL5000 UHF R1(380-470MHz) FCC ID: AZ492FT4870 Max Power: DVR / Mobile	HAE6012A, 1/4 wave, 0dBd Future approval	HAE6013A, 1/2 wave, 2dBd Future approval	HAE4003A, 1/4 wave, 0dBd Future approval	HAE4011A, 1/2 wave, 3.5dBd Future approval		
XTL5000 UHF R1(380-470MHz) FCC ID: AZ492FT4862 Max Power: DVR / Mobile	HAE6012A, 1/4 wave, 0dBd Future approval	HAE6013A, 1/2 wave, 2dBd Future approval	HAE4003A, 1/4 wave, 0dBd Future approval	HAE4011A, 1/2 wave, 3.5dBd Future approval		
XTL5000 UHF R2(470-512MHz) FCC ID: AZ492FT4867 Max Power: DVR / Mobile	HAE6016A, 1/4 wave, 0dBd Future approval	HAE4003A, 1/4 wave, 0dBd Future approval	HAE4011A, 1/2 wave, 3.5dBd Future approval	HAE4012A, 1/4 wave, 3.5dBd Future approval	HAE4013A, 1/4 wave, 3.5dBd Future approval	HAE4004A, 1/4 wave, 0dBd Future approval
XTL5000 700/800MHz FCC ID: AZ492FT5823 Max Power: DVR / Mobile	HAF4013A, 1/4 wave, 3dBd Future approval	HAF4014A, 1/4 wave, 3dBd Future approval	HAF4016A, 1/4 wave, 0dBd Future approval	HAF4017A, 1/4 wave, 3dBd Future approval		

**Table 4F Approved 136-174MHz DVRS Configurations**

## ***Antenna Installation Instructions***

### **IMPORTANT**

To assure optimum performance and compliance with RF Energy Safety standards, these antenna installation guidelines and instructions are limited to metal-body vehicles with appropriate ground planes and take into account the potential exposure of back seat passengers and bystanders outside the vehicle.

### **Selecting an Antenna Site/Location on a Metal Body Vehicle**

#### **External installation**

Check the requirements of the antenna supplier and install the vehicle antenna external to a metal body vehicle in accordance with those requirements.

#### **Roof top**

For optimum performance and compliance with RF Energy Safety standards, mount the mobile radio antenna in the center area of the roof.

#### **Trunk lid**

For optimum performance and compliance with RF Energy Safety standards, mount the DVRS antenna in the center area of the trunk.

#### **Before installing an antenna on the trunk lid:**

- Ensure that the distance from the antenna location on the trunk lid will be at least 85 cm (33 inches) from the front surface of the rear seat-back to assure compliance with RF Energy Safety standards.
- Ensure that the trunk lid is grounded by connecting grounding straps between the trunk lid and the vehicle chassis.
- Ensure that the antenna cable can be easily routed to the radio. Route the antenna cable as far away as possible from any vehicle electronic control units and associated wiring.
- Check the antenna location for any electrical interference.
- Ensure that any other mobile radio antenna on this vehicle is at least 1ft (30.48cm) away from the DVR and its associated mobile radio antennas.

#### **NOTE:**

Any two metal pieces rubbing against each other (such as seat springs, shift levers, trunk and hood lids, exhaust pipes etc.) in close proximity to the antenna can cause severe receiver interference.

### ***Mobile Radio / DVR Antenna separation***

To ensure interference-free performance when both the Mobile Radio and the DVR are active, the two antennas must be mounted in such way as to provide 30dB minimum antenna isolation.