

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. 1



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 Vehicle Body
VHF	82cm (50:50 Tx duty)
UHF 403-512MHz	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

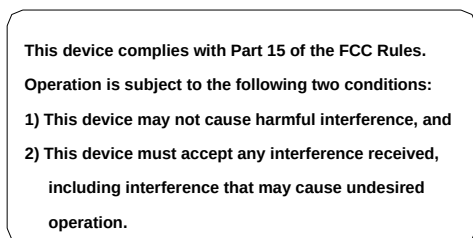
The maximum allowed gain of the $\lambda/4$ omni-directional antenna for the Mobexcom P25 DVR Repeater is Unity (0dBd).

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



Transmit Duty Cycle Alert Tones for DVRS

In order to satisfy the FCC's RF Exposure limits, a maximum transmitting duty factor of 50% over any 30 minute period should not be exceeded.

The DVRS is equipped with a software algorithm that tracks mobile radio transmission time and duty factor on a rolling 25 minute basis. If the mobile radio transmit duty factor approaches 50% at the end of any 25 minute period, then the DVRS will transmit an alert tone over the air to the listening subscriber radios in order to alert users to cut back on talk time.

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

#	Antenna			DVR Band						Mobile Radio Band						
	Kit #	Freq. Range [MHz]	Type	700 MHz (20W)	800 MHz (20W)	380-430 (20W)	450-470 (20W)	470-512 (20W)	VHF (20W)	700 MHz (30W)	800 MHz (35W)	380-470 (40W)	450-520 (45W)	380-470 (110W)	VHF (50W)	VHF (110W)
1	HAF4013	764-870	¼ wave, 3db							X	X					
2	HAF4014	764-870	¼ wave, 3db							X	X					
3	*HAF4016	764-870	¼ wave	5W / 12.6W*	X					X	X					
4	HAF4017	764-870	¼ wave, 3db							X	X					
5	HAE6012A	380-433	¼ wave			X						X		X		
6	HAE6013	380-470	½ wave, 2db									X		X		
7	HAE6016	450-512	Low wideband										X			
8	HAE4003A	450-470	¼ wave				X					X	X	X		
9	HAE4011	445-470	½ wave, 3.5db									X	X	X		
10	HAE4012	470-495	½ wave, 3.5db										X			
11	HAE4013	494-512	½ wave, 3.5db										X			
12	HAE4004	470-512	¼ wave					X					X			
13	HAD4006	136-144	¼ wave						6W						X	X
14	HAD4007	144-150.8	¼ wave						6W						57W	57W
15	HAD4008	150.8-162	¼ wave						6W						57W	57W
16	HAD4009	162-174	¼ wave						6W						57W	57W
17	*RAD4010A	136-174	½ wave												X	* 120W

Table 4 Approved DVRS Configurations

* DVR RF Power into DVR Antenna HAF4016 can be 12.6W only when used with Mobile Radio equipped with ½ wave length antenna RAD4010A. VHF Mobile radio with RAD4010A can only be used in conjunction with 700MHz DVR (equipped with HAF4016 antenna).

X – Band Combination not currently FCC Approved.

Empty cells – Unused Configuration.

Non Empty Cells – MPE / SAR compliant power output.

VHF mobiles are limited to 57 Watts and 147-174 MHz when using 1/4 wave antennas.

Due to the ERP limitations enforced by FCC the antenna cables may not be trimmed.

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.