

## 5.13. RF EXPOSURE REQUIREMENTS @ 1.1310 & 2.1091

### 5.13.1. Limits

- **FCC 1.1310:-** The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b).

**LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Average Time (minutes)
<b>(A) Limits for Occupational/Control Exposures</b>				
300-1500	...	...	F/300	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
300-1500	...	...	F/1500	6

F = Frequency in MHz

### 5.13.2. Method of Measurements

Refer to FCC @ 1.1310 and 2.1091

- In order to demonstrate compliance with MPE requirements (see Section 2.1091), the following information is typically needed:
  - (1) Calculation that estimates the minimum separation distance (20 cm or more) between an antenna and persons required to satisfy power density limits defined for free space.
  - (2) Antenna installation and device operating instructions for installers (professional/unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirement
  - (3) Any caution statements and/or warning labels that are necessary in order to comply with the exposure limits
  - (4) Any other RF exposure related issues that may affect MPE compliance

**Calculation Method of RF Safety Distance:**

$$S = \frac{PG}{4\pi \cdot r^2} = \frac{EIRP}{4\pi \cdot r^2}$$

Where: P: power input to the antenna in mW  
 EIRP: Equivalent (effective) isotropic radiated power.  
 S: power density mW/cm<sup>2</sup>  
 G: numeric gain of antenna relative to isotropic radiator  
 r: distance to centre of radiation in cm

FCC radio frequency exposure limits may be exceeded at distances closer than r cm from the antenna of this device

$$r = \sqrt{\frac{PG}{4\pi \cdot S}} = \sqrt{\frac{EIRP}{4\pi \cdot S}}$$

FCC radio frequency exposure limits may not be exceeded at distances closer than r cm from the antenna of this device

**5.13.3. Evaluation of RF Exposure Compliance Requirements**

Lowest Frequency, **F[MHz]** = 380

MPE Limit for Occupational/Controlled Exposure, **S<sub>controlled</sub>[mW/cm<sup>2</sup>]** = F / 300 = 380 / 300 = 1.27

MPE Limit for General Population/Uncontrolled Exposure, **S<sub>uncontrolled</sub>[mW/cm<sup>2</sup>]** = F / 1500 = 380 / 1500 = 0.253

Maximum RF Power conducted, **P<sub>conducted</sub>[dBm]** = 34.91

Maximum Antenna Gain, **G[dBd]** = 0

Maximum EIRP, **P<sub>EIRP</sub>[dBm]** = 34.91 + 2.15 = 37.06

Calculated RF Safety Distance for Occupational/Controlled Exposure, **r<sub>safety\_controlled</sub>[cm]** = 18

Calculated RF Safety Distance for General Population/Uncontrolled Exposure, **r<sub>safety\_uncontrolled</sub>[cm]** = 40

Specified Safety Separation Distance in User's Manual = 40

Antenna Gain (dBd)	Maximum EIRP (dBm)	Calculated RF Safety Distance (cm)	Specified Separation distance (cm)	Compliance
0	36.98	18, 40	40	Complies



## **NOTE**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.



## **ATTENTION!**

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

### **USA Users:**

Do not use the DVE in the frequency band 406.0MHz – 406.1MHz. This frequency band is reserved for distress beacons



## **IMPORTANT**

This manual contains important safety and operating instructions, therefore keep this manual always on hand!

Prior to using any product, follow all warning, safety and operating instructions written on the product and in the Users Manual. **All instructions should be saved for reference in the future!**

## **RF EXPOSURE**

Frequency Band	Minimum Separation Distance
VHF	66cm (26.0")
UHF	40cm (15.75")

Table 1 DVE Minimum Separation Distance for Different Frequency Bands



## **ATTENTION!**

To satisfy FCC/IC RF exposure requirements, a separation distance as per Table 1 or more should be maintained between 0dBd (2.15dBi) omni directional antenna of this device and persons. To ensure compliance, operation at closer than this distance is not allowed.



## **RADIO OPERATOR**

Futurecom requires the MOBEXCOM DVE operator to ensure FCC Requirements for Radio Frequency Exposure are met. The DVE output power has to be set such that the maximum power into 0dBd

(2.15dBi) omni directional antenna does not exceed 3.0W at the antenna connector. The minimum distance between all possible personnel and the antenna at 3.0W must be at least as shown in Table 1.

**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). IT IS THE RESPONSIBILITY OF THE OPERATOR TO ENSURE THAT MPE LIMITS ARE OBSERVED AT ALL TIMES DURING TRANSMISSIONS. THE OPERATOR MUST ENSURE AT ALL TIMES THAT NO PERSON COMES WITHIN MPE DISTANCE FROM THE ANTENNA.**



### **ATTENTION!**

The MOBEXCOM DVE 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 is NOT authorized for general population, consumer, or any other use.

## **ANTENNA INSTALLATION**



### **IMPORTANT**

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

### **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 DVE 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 the distance specified in Table 1 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.

**NOTE:**

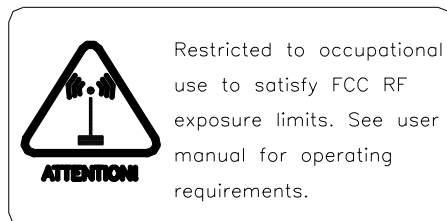
Any two metal pieces rubbing against each other (such as seat springs, shift levers, trunk and hood lids, exhaust pipes etc.) in close proximity to the antenna can cause severe receiver interference.

***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.

***RF Exposure Label*****RF EXPOSURE LABEL INSTALLATION LOCATION****IMPORTANT**

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 operator. The label is supplied with the MOBEXCOM DVE.