

## 5.12. EXPOSURE OF HUMANS TO RF FIELD [[§§ 1.1310 & 2.1091] [RSS Gen Sec 5.6 & RSS-102]

The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation.

### FCC 47 CFR § 1.1310:

TABLE 1—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> ) | Averaging time (minutes) |
|----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposures</b>        |                               |                               |                                     |                          |
| 0.3–3.0 .....                                                  | 614                           | 1.63                          | *(100)                              | 6                        |
| 3.0–30 .....                                                   | 1842/f                        | 4.89/f                        | *(900/f <sup>2</sup> )              | 6                        |
| 30–300 .....                                                   | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300–1500 .....                                                 | .....                         | .....                         | f/300                               | 6                        |
| 1500–100,000 .....                                             | .....                         | .....                         | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3–1.34 .....                                                 | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34–30 .....                                                  | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 30                       |
| 30–300 .....                                                   | 27.5                          | 0.073                         | 0.2                                 | 30                       |
| 300–1500 .....                                                 | .....                         | .....                         | f/1500                              | 30                       |
| 1500–100,000 .....                                             | .....                         | .....                         | 1.0                                 | 30                       |

f = frequency in MHz

\* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

[RSS Gen Sec 5.6 & RSS-102]

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 RSS-102.

**Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)**

| Frequency Range (MHz)                                                                                                     | Electric Field (V/m rms) | Magnetic Field (A/m rms)          | Power Density (W/m <sup>2</sup> ) | Reference Period (minutes) |
|---------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------------------------------|-----------------------------------|----------------------------|
| 0.003-10 <sup>21</sup>                                                                                                    | 83                       | 90                                | -                                 | Instantaneous*             |
| 0.1-10                                                                                                                    | -                        | 0.73/ $f$                         | -                                 | 6**                        |
| 1.1-10                                                                                                                    | 87/ $f^{0.5}$            | -                                 | -                                 | 6**                        |
| 10-20                                                                                                                     | 27.46                    | 0.0728                            | 2                                 | 6                          |
| 20-48                                                                                                                     | 58.07/ $f^{0.25}$        | 0.1540/ $f^{0.25}$                | 8.944/ $f^{0.5}$                  | 6                          |
| 48-300                                                                                                                    | 22.06                    | 0.05852                           | 1.291                             | 6                          |
| 300-6000                                                                                                                  | 3.142 $f^{0.3417}$       | 0.008335 $f^{0.3417}$             | 0.02619 $f^{0.6834}$              | 6                          |
| 6000-15000                                                                                                                | 61.4                     | 0.163                             | 10                                | 6                          |
| 15000-150000                                                                                                              | 61.4                     | 0.163                             | 10                                | 616000/ $f^{1.2}$          |
| 150000-300000                                                                                                             | 0.158 $f^{0.5}$          | 4.21 x 10 <sup>-4</sup> $f^{0.5}$ | 6.67 x 10 <sup>-5</sup> $f$       | 616000/ $f^{1.2}$          |
| <b>Note:</b> $f$ is frequency in MHz.<br>*Based on nerve stimulation (NS).<br>** Based on specific absorption rate (SAR). |                          |                                   |                                   |                            |

**Table 6: RF Field Strength Limits for Controlled Use Devices (Controlled Environment)**

| Frequency Range (MHz)                                                                                                     | Electric Field (V/m rms) | Magnetic Field (A/m rms)          | Power Density (W/m <sup>2</sup> ) | Reference Period (minutes) |
|---------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------------------------------|-----------------------------------|----------------------------|
| 0.003-10 <sup>23</sup>                                                                                                    | 170                      | 180                               | -                                 | Instantaneous*             |
| 0.1-10                                                                                                                    | -                        | 1.6/ $f$                          | -                                 | 6**                        |
| 1.29-10                                                                                                                   | 193/ $f^{0.5}$           | -                                 | -                                 | 6**                        |
| 10-20                                                                                                                     | 61.4                     | 0.163                             | 10                                | 6                          |
| 20-48                                                                                                                     | 129.8/ $f^{0.25}$        | 0.3444/ $f^{0.25}$                | 44.72/ $f^{0.5}$                  | 6                          |
| 48-100                                                                                                                    | 49.33                    | 0.1309                            | 6.455                             | 6                          |
| 100-6000                                                                                                                  | 15.60 $f^{0.25}$         | 0.04138 $f^{0.25}$                | 0.6455 $f^{0.5}$                  | 6                          |
| 6000-15000                                                                                                                | 137                      | 0.364                             | 50                                | 6                          |
| 15000-150000                                                                                                              | 137                      | 0.364                             | 50                                | 616000/ $f^{1.2}$          |
| 150000-300000                                                                                                             | 0.354 $f^{0.5}$          | 9.40 x 10 <sup>-4</sup> $f^{0.5}$ | 3.33 x 10 <sup>-4</sup> $f$       | 616000/ $f^{1.2}$          |
| <b>Note:</b> $f$ is frequency in MHz.<br>*Based on nerve stimulation (NS).<br>** Based on specific absorption rate (SAR). |                          |                                   |                                   |                            |

Note 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient

through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

Note 2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

### 5.12.1. Method of Measurements

See RSS-102 & FCC 47 CFR §§ 1.1310, 2.1091

In order to demonstrate compliance with MPE requirements, 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:

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

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

### 5.12.2. RF Evaluation

#### 5.12.2.1. FCC

| Frequency (MHz) | Max. Conducted Power (dBm) | Max. Antenna Gain (dBi) | EIRP (dBm) | EIRP* (mW) | Evaluation Distance, r (cm) | Power Density, S (mW/cm <sup>2</sup> ) | MPE Limit (mW/cm <sup>2</sup> ) |
|-----------------|----------------------------|-------------------------|------------|------------|-----------------------------|----------------------------------------|---------------------------------|
| 118.000         | 39.17                      | 0                       | 39.17      | 8260/2*    | 56                          | 0.105                                  | 0.2                             |

\*50% duty cycle applied

#### 5.12.2.2. RSS 102 (ISED Canada)

| Frequency (MHz) | Max. Conducted Power (dBm) | Max. Antenna Gain (dBi) | EIRP (dBm) | EIRP* (mW) | Evaluation Distance, r (cm) | Power Density, S (mW/cm <sup>2</sup> ) | MPE Limit (mW/cm <sup>2</sup> ) |
|-----------------|----------------------------|-------------------------|------------|------------|-----------------------------|----------------------------------------|---------------------------------|
| 118.000         | 39.17                      | 0                       | 39.17      | 8260/2*    | 56                          | 0.105                                  | 0.1291                          |

\*50% duty cycle applied

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## SAFETY TRAINING INFORMATION

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Your Icom radio generates RF electromagnetic energy during transmit mode. This radio is designed for and classified as “Occupational Use Only,” meaning it must be used only during the course of employment by individuals aware of the hazards, and the ways to minimize such hazards. This radio is **NOT** intended for use by the “General Population” in an uncontrolled environment.

- For compliance with FCC and Industry Canada RF Exposure Requirements, the transmitter antenna installation shall comply with the following two conditions:

1. The transmitter antenna gain shall not exceed 0 dBi.
2. The antenna is required to be located outside of a vehicle and kept at a distance of 56 centimeters or more between the transmitting antenna of this device and any persons during operation. For a small vehicle, the antenna as worst case, the antenna shall be located on the roof top at any place on the centre line along the vehicle in order to achieve 56 centimeters separation distance. In order to ensure this distance is met, the installation of the antenna must be mounted at least 56 centimeters away from the nearest edge of the vehicle in order to protect against exposure to bystanders.



To ensure that your exposure to RF electromagnetic energy is within the FCC allowable limits for occupational use, always adhere to the following guidelines:

- **DO NOT** operate the radio without a proper antenna attached, as this may damage the radio and may also cause you to exceed FCC RF exposure limits. A proper antenna is the antenna supplied with this radio by the manufacturer or an antenna specifically authorized by the manufacturer for use with this radio.
- **DO NOT** transmit for more than 50% of total radio use time (“50% duty cycle”). Transmitting more than 50% of the time can cause FCC RF exposure compliance requirements to be exceeded. The radio is transmitting when the “TX” indicator appears. You can cause the radio to transmit by pressing the PTT switch.

### Electromagnetic Interference/Compatibility

During transmissions, your Icom radio generates RF energy that can possibly cause interference with other devices or systems. To avoid such interference, turn off the radio in areas where signs are posted to do so. **DO NOT** operate the transmitter in areas that are sensitive to electromagnetic radiation such as hospitals, and blasting sites.

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# INFORMATION EN MATIÈRE DE SÉCURITÉ

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AVERTISSEMENT

Votre radio Icom produit une énergie électromagnétique de radiofréquences (RF), en mode de transmission. Cette radio est conçue pour un «usage professionnel seulement» et classée comme tel, ce qui signifie qu'elle doit être utilisée uniquement dans le cadre d'un travail par des personnes conscientes des dangers et des mesures visant à minimiser ces dangers. Elle **N'EST PAS** conçue pour une «utilisation grand public», dans un environnement non contrôlé.

- Afin de satisfaire aux exigences de la FCC et d'Industrie Canada en matière d'exposition aux RF, il est nécessaire que l'antenne soit installée conformément aux deux conditions suivantes:

1. Le gain de l'antenne du radio émetteur ne doit pas dépasser 0 dBi.
2. Il faut que l'antenne émettrice de cet appareil soit placée à l'extérieur d'un véhicule et tenue éloignée d'au moins 56 centimètres de toute personne pendant le fonctionnement. Dans le pire des cas, pour un petit véhicule, l'antenne doit être placée sur le toit, n'importe où dans l'axe central du véhicule, afin de respecter une distance de 56 cm du bord le plus rapproché du véhicule et ainsi éviter que les personnes présentes soient exposées.



MISE EN GARDE

Afin de vous assurer que votre exposition à une énergie électromagnétique de RF se situe dans les limites permises par la FCC pour une utilisation grand public, veuillez en tout temps respecter les directives suivantes:

- **NE PAS** faire fonctionner la radio sans qu'une antenne appropriée y soit fixée, car ceci risque d'endommager la radio et causer une exposition supérieure aux limites établies par la FCC. L'antenne appropriée est celle qui est fournie avec cette radio par le fabricant ou une antenne spécialement autorisée par le fabricant pour être utilisée avec cette radio.
- **NE PAS** émettre pendant plus de 50% du temps total d'utilisation de l'appareil («50% du facteur d'utilisation»). Émettre pendant plus de 50% du temps total d'utilisation peut causer une exposition aux RF supérieure aux limites établies par la FCC. La radio est en train d'émettre lorsque le témoin du mode de transmission s'affiche sur l'écran ACL. La radio émettra si vous appuyez sur le bouton du microphone.

## Interférence électromagnétique et compatibilité

En mode de transmission, votre radio Icom produit de l'énergie de RF qui peut provoquer des interférences avec d'autres appareils ou systèmes. Pour éviter de telles interférences, mettez la radio hors tension dans les secteurs où une signalisation l'exige. **NE PAS** faire fonctionner l'émetteur dans des secteurs sensibles au rayonnement électromagnétique tels que les hôpitaux et les sites de dynamitage.