

RF Exposure report for IC-SAT100M

EXHIBIT 1. RF EXPOSURE REQUIREMENTS [§§ 1.1310 & 2.1091] [RSS Gen Sec 5.6 & RSS-102]

1.1. Limits

§ 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 ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
1500-100,000	-	-	5	
(B) Limits for General Population/Uncontrolled Exposure				
1500-100,000	-	-	1	

f = frequency in MHz

* = Plane-wave equivalent power density

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 cannot exercise control over their exposure.

[RSS Gen Sec 5.6 & RSS-102]

RF Field Strength Limits for Controlled Use Devices (Controlled Environment)

Frequency Range	Electric Field	Magnetic Field	Power Density	Reference Period
100-6000	$15.60 f^{0.25}$	$0.04138 f^{0.25}$	$0.6455 f^{0.5}$	6
Note: f is frequency in MHz.				

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 ²)	Reference Period (minutes)
300-6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
Note: f is frequency in MHz.				

1.2. Overview and Evaluation:

For the host device IC-SAT100M the BT radio is housed in the main interface unit and the Iridium SAT radio module is in the Antenna unit. Both modules are separated by a distance of more than 20cm since the Antenna is mounted away from the main interface unit.

Since there is no collocation, the RF exposures of each radio are evaluated separately to see if any additional restrictions are needed to the Individual modular grant conditions.

1. For the Iridium SAT Radio as per module grant the max antenna gain allowed is 3dBi with an RF safety distance of 20cm.

As per RF EXP test report (TUV SUD Product Service Document 75932207 Report 02 Issue 2 submitted in this filing), the Power density at 16cm, with an antenna gain of 3dBi, for general population is 3.77W/m^2

At $f=1616\text{ MHz}$

Limit for FCC is 10 W/m^2

Limit for ISED is 4.08 W/m^2

The Module meets the power density limit at the grant specified distance of 20cm.

Antenna gain of SAT-100M is 2.8dBic ($2.8-3.0=-0.2\text{dBi}$) $<3\text{dBi}$

2. For BT module as per module grant requires an RF safety distance of 20cm.

From report in Hosiden filing of VIYHRM1086 submitted in this filing

$f=2402\text{ MHz}$

BT LE

Power density $S=0.0023\text{mW/m}^2$

BT (BR/EDR)

Power density $S=0.00232\text{mW/m}^2$

Power density Limit for FCC is 1 mW/m^2

Power density Limit for ISED is 5.35 W/m^2

The Module meets the power density limit at the grant specified distance of 20cm.

1.3. Verdict:

For the IC-SAT100M device, the Iridium Satellite module and Hosiden BT modules must be separated from each other and from persons by a distance of at least 20cm.

1.4. Users manual warnings for compliance

1.4.1. Satellite Antenna unit warning of the SAT100M

■ Safety training information



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 IC RF Exposure Requirements, the transmitter antenna installation shall comply with the following three conditions:

1. The transmitter antenna gain shall not exceed 3 dBi.
2. The antenna is required to be located outside of a vehicle and kept at a distance of 20 centimeters (7.9 inches) or more between the transmitting antenna of this device and any persons during operation. For small vehicle as worst case, the antenna shall be located on the roof top at any place on the center line along the vehicle in order to achieve 20 centimeters (7.9 inches) separation distance. In order to ensure this distance is met, the installation of the antenna must be mounted at least 20 centimeters (7.9 inches) away from the nearest edge of the vehicle in order to protect against exposure to bystanders.
3. Transmit only when people outside the vehicle are at least the recommended minimum distance of 20 centimeters (7.9 inches) away from the properly installed antenna. This separation distance will ensure that there is sufficient distance from a properly installed externally-mounted antenna to satisfy the RF exposure requirements in the applicable RF exposure compliance standards.



To ensure that your exposure to RF electromagnetic energy is within the FCC and IC 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 and IC 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 and IC RF exposure compliance requirements to be exceeded. The radio is transmitting when the status indicator lights red. 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, aircraft, and blasting sites.

1.4.2. Warning for unit installed with BT of the SAT100M

(Pamphlet to be supplied with each unit)

**Safety training information for the
Bluetooth unit**

The following sentences are safety training information for the Bluetooth unit.

Read carefully and completely before using it.

- This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment should be installed and operated, keeping the radiator at least 20 cm away from person's body.
- The device is designed to use an integrated antenna. Do not modify the antenna or any other part of the module. Any modifications will invalidate the modular certifications and require new approvals for the host system.
- Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles d'exposition aux fréquences radioélectriques (RF) CNR-102 de l'ISDE. Cet équipement doit être installé et utilisé en gardant une distance de 20 cm ou plus entre le radiateur et le corps humain.

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