

Section 15.247(i) – Radio Frequency Hazard Information

All transmitters in this device are required to be operated in a manner that ensures that the public is not exposed to harmful levels of RF energy.

Software in the product allows only one transmitter module to be active at a time with NO simultaneous transmissions possible with each device operating on an individual basis.

An assessment has been carried on each device.

NFC Transmitter

The RF Exposure Procedures as defined in KDB 447498 D04 have been applied.

When tested the 13.560 MHz transmitter had a field strength of 33.1 dBuV/m (Quasi Peak detector) that was measured at a test distance of 10 metres.

This gives a calculated transmitter power of 0.007 uW.

Calculations were made using the formula:

$$\text{Power (watts)} = ((\text{field strength (V/m)} \times \text{distance (metres)})^2) / 30$$

In normal use the transmitter in this device may come in close contact with the human body, the hand, when cards are placed in or near the device when a transaction is carried out.

As the radiated power is below 1 mW this transmitter will be below the SAR testing threshold and therefore no further action will be required.

Bluetooth Transmitter

The Bluetooth transmitter has been installed in accordance with the module manufacturer's installation instructions.

The equipment grant for this device shows a transmitter power of 4.5 mW.

As per clause 4.3.1 a) the 1-g the SAR test exclusion threshold has been calculated to be:

$$[(\text{transmitter power (mW)}) / \text{separation distance (mm)}] \times [\sqrt{F(\text{GHz})}] \leq 3.0$$

$$[4.5 \text{ mW} / \text{distance (mm)}] \times [\sqrt{2.402}] = 3.0$$

$$4.5 / (3.0 / 2.480) = 3.72 \text{ mm}$$

The SAR test excursion can be applied as the distance less than 5 mm has been calculated.

900 MHz RFID Device

As per Section 15.247 (i) Spread spectrum transmitters operating in the 902 – 928 MHz band are required to comply with CFR 47, Section 1.1307(b)(1).

In accordance with this section, FCC KDB 447498 D04 and also Section 2.1091, this device has been defined as a mobile device whereby a distance of 20 cm or greater can normally be maintained between the user and the device antenna.

This grant power for this device is listed at 0.483 W

Calculations have been made using General Population (Uncontrolled Exposure) limits that are defined in Section 1.1310.

- General Population / Uncontrolled exposure is $(f/1500)$ mW/cm²

As this radio can operate over the range of 917 to 928 MHz the lowest frequency of operation which will give the worst case result.

The power density at 917 MHz gives 0.611 mW/cm²

The client advises that the antenna has a gain of 1

A worst case scenario duty cycle of 100% has been used for the calculations.

The minimum distance from the antenna at which the MPE is met is calculated from the following

Field strength in V/m (FS),
Transmit power in watts from the FCC Grant (P),
Transmit antenna gain (G),
Transmitter duty cycle (DC),
Separation distance in metres (D)

The calculation is as follows:

$$FS = (\sqrt{30 * P * G * DC}) / D$$
$$D = (\sqrt{30 * P * G * DC}) / FS$$

$$\text{Power Density} = 0.611 \text{ mW/cm}^2 = E^2/3770$$

$$E = \sqrt{0.611 * 3770}$$

$$E = 48.0 \text{ V/m}$$

$$D = (\sqrt{30 * 0.438 * 1 * 1}) / 48.0$$

$$D = 0.0755 \text{ metres or } 7.5 \text{ cm}$$

Result: Complies if a safe distance of at least 20 cm is applied to this device.

Cellular Device

Two models of cellular module can be used in this device.

These modules have been installed in-accordance with the manufacturer's module installation instructions.

Software in the product allows only one transmitter module to be active at a time with NO simultaneous transmissions possible with each device operating on an individual basis.

As per the Equipment Authorisation Grant for both modules the antenna has been positioned with a separation distance of at least 20 cm from all persons.

Result: Complies

