

Environmental evaluation and exposure limit according to FCC CFR 47part 1, §1.1307, §1.1310

The device is classified as mobile one tested according to FCC Part 15 sec.15.231 (operating at 916.5 MHz)* and sec.15.247 (operating at 2400 - 2480 GHz) and also single modular approved transmitter FCC ID: RI7LE910CXSAX.

* The standard section 15.231 does not contain RF Exposure limits.

Limit for power density for general population/uncontrolled exposure is 1 mW/cm² for 1500 -100000 MHz frequency range.

The power density **P (mW/cm²)** = **P_T / 4π r²**, where

PT is the transmitted power, which is equal to the peak transmitter output power 18.32 dBm plus maximum antenna gain 3 dBi, the maximum equivalent isotropically radiated power EIRP is

$$PT = 16.97 \text{ dBm} + 3 \text{ dBi} = 19.97 \text{ dBm} = 99.31 \text{ mW}$$

16.97 dBm is the EUT maximum output power with the tune up tolerance, 3 dBi – antenna gain.

The power density at 20 cm (minimum safe distance, required for mobile devices), calculated as follows:

$$99.31 \text{ mW} / 4\pi (20 \text{ cm})^2 = 0.0197 \text{ mW/cm}^2 \ll 1 \text{ mW/cm}^2$$

Maximum conducted power given in FCC ID: RI7LE910CXSAX module grant is 192.3mW (22.84dBm) in band 12, 213.3mW (23.29dBm) in band 66 and 4 and 219.3mW (23.41dBm) in band 2.

Limit for power density is f/1500= 0.48 mW/cm² for band 12 (698-716 MHz) and 1 mW/cm² for 1500 -100000 MHz for general population/uncontrolled exposure for bands 66, 4 and 2.

The gain of antennas used with the module are 8 dBi for band 12, 5.6 dBi for band 66 and 4 and 5 dBi for band 2.

The maximum equivalent isotropic radiated power EIRP is for band 12:

$$PT = 22.84 \text{ dBm} + 8 \text{ dBi} = 30.84 \text{ dBm} = 1213.38 \text{ mW}$$

The power density at 20 cm (minimum safe distance, required for mobile devices), calculated as follows:

$$1213.38 \text{ mW} / 4\pi (20 \text{ cm})^2 = 0.241 \text{ mW/cm}^2 \ll 0.48 \text{ mW/cm}^2$$

Assessment of RF hazard from BLE and LTE wireless module

$$\begin{aligned} S1/\text{limit} + S2/\text{limit} &\leq 1, \text{ i.e} \\ 0.0197/1 + 0.241/0.48 &= 0.197 + 0.502 = 0.521 \leq 1 \end{aligned}$$

The aggregate ratio of transmit power to the relevant power limits does not exceed 100% and meets the safety requirements.