FCC§1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	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;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculation formula:

Prediction of power density at the distance of the applicable MPE limit
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:

Mode	Frequency (MHz)	Antenna Gain		Conducted output power including Tune-up Tolerance		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
LTE B4	1710-1755	-2.6	0.55	23	199.53	20.00	0.022	1.0
LTE B13	777-787	-2.6	0.55	24	251.19	20.00	0.028	0.52
WLAN 2.4G	2412-2462	3	2.00	20	100.00	20.00	0.04	1.0
WLAN 5G	5180-5825	3	2.00	17	50.12	20.00	0.02	1.0
Bluetooth	2402-2480	3	2.00	7	5.01	20.00	0.002	1.0

The WLAN 2.4G, 5G or Bluetooth can`t transmit simultaneously, can transmit simultaneously with WWAN:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$=S_{WLAN}/S_{limit\text{-}WLAN}+ S_{WWAN}/S_{limit\text{-}WWAN}$

=0.04/1+0.028/0.52

=0.09

< 1.0

Result: The device meet FCC MPE at 20 cm distance