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

Applicable Standard

According to subpart 15.247 (i) and subpart 1.1310, 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

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

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = 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 (worst case):

Mode	Frequency (MHz)	Maximum Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
Wi-Fi	2412	-0.36	0.92	17.00	50.12	20	**0.0092**	**1.00**
BLE 1Mbps	2402	2.94	1.97	4.50	2.82	20	0.0010	1.00
BLE 2Mbps	2402	2.94	1.97	4.50	2.82	20	**0.0010**	**1.00**
GSM850	824.2	-0.66	0.86	26.00	398.11	20	**0.0681**	**0.55**
GSM1900	1850.2	1.74	1.49	23.00	199.53	20	0.0592	1.23
WCDMA B2	1852.4	1.74	1.49	25.00	316.23	20	0.0939	1.23
WCDMA B4	1712.4	1.74	1.49	25.00	316.23	20	0.0939	1.14
WCDMA B5	826.4	-0.66	0.86	25.00	316.23	20	0.0540	0.55
LTE B2	1850.7	1.74	1.49	25.00	316.23	20	0.0939	1.23
LTE B4	1710.7	1.74	1.49	25.00	316.23	20	0.0939	1.14
LTE B5	824.7	-0.66	0.86	25.00	316.23	20	0.0540	0.55
LTE B7	2502.5	2.32	1.71	25.00	316.23	20	0.1073	1.00
LTE B12	699.7	-0.66	0.86	25.00	316.23	20	0.0540	0.47
LTE B13	779.5	-0.51	0.89	25.00	316.23	20	0.0559	0.52
LTE B25	1850.7	2.32	1.71	25.00	316.23	20	0.1073	1.00
LTE B26(814-824)	814.7	-0.66	0.86	25.00	316.23	20	0.0540	0.54
LTE B26(824-849)	824.7	-0.66	0.86	25.00	316.23	20	0.0540	0.55
LTE B38	2572.5	2.28	1.69	25.00	316.23	20	0.1063	1.00
LTE B41	2498.5	2.28	1.69	25.00	316.23	20	0.1063	1.00

Note:
(1) The tune-up output powers are all declared by the Manufacturer.
(2) The LTE module FCC ID: XMR201903EG25G.
(3) Wi-Fi & BLE & GSM/WCDMA/LTE can transmit simultaneously; the worst condition is Wi-Fi & BLE & GSM850 as below:

$$\sum_i \frac{S_i}{S_{Limit,i}} = 0.0092/1.00+0.0010/1.00+0.0681/0.55=0.1340 < 1.0$$

Conclusion: The device meets MPE at distance 20cm.