FCC §15.247 (i) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 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

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

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm2)
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:

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

Mode	Frequency (MHz)	Antenna Gain		Max Tune Up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
BLE	2402-2480	1.10	1.29	-0.5	0.89	20	0.00023	1.0
GSM850	824-849	-0.5	0.89	23.97	249.46	20	0.044	0.55
GSM1900	1850-1910	-1.1	0.78	20.97	125.03	20	0.019	1.0
LTE Band 2	1850-1910	-1.1	0.78	24.0	251.19	20	0.039	1.0
LTE Band 4	1710-1755	-1.0	0.79	23.0	199.53	20	0.031	1.0
LTE Band 5	824-849	-0.5	0.89	24.0	251.19	20	0.044	0.55
LTE Band 12	699-716	-0.4	0.91	24.0	251.19	20	0.045	0.466
LTE Band 13	777-787	-0.4	0.91	24.0	251.19	20	0.045	0.518
LTE Band 25	1850-1915	-1.1	0.78	25.0	316.23	20	0.049	1.0

Note: 1. The antenna gain was provided by the applicant.
2. The BLE function can transmit at the same time with the GSM/NB-IoT/eMTC.
3. Please refer to the MPE report of the FCC ID: XMR201707BG96 for the GSM/LTE output power.

So the worst simultaneous transmitting consideration:

The ratio=MPE_{BLE}/limit + $MPE_{NB\text{-}IoT}$/limit=0.00023/1.0+0.045/0.466
=0.097＜1.0

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliance