§1.1307 (b) &§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.

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/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:

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

Result

For worst case:

For Sample 3A34-1

Mode	Frequency (MHz)	Antenna Gain#		Tune up conducted power#		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
Bluetooth Module(BLE)	2402-2480	-2.92	0.51	1.0	1.26	20	0.0001	1.0
NFC	13.56	/	/	-20	0.631	20	<<0.0001	0.98

Note:
1. The tune-up power and antenna gain was declared by the applicant.
2. EIRP(dBm)=E(dBuV/m)-95.2 for 3 meters distance, E(dBuV/m)=74.53dBuV/m@3m
3. The device built in a certified Bluetooth module, FCC ID: 2BOJX-LGT185.

Simultaneous transmitting consideration (worst case):

The ratio=MPE_{BT}/limit $_{BT}$+ MPE_{NFC}/limit $_{NFC}$ = 0.0001/1+0.0001 /0.98=0.0002＜1.0

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

For Sample 3A34-2

Mode	Frequency (MHz)	Antenna Gain#		Tune up conducted power#		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
Module (2.4G Wi-Fi /BT)	2402-2480	2.21	1.66	7	5.01	20	0.002	1.0
	2412-2462	2.21	1.66	18	63.10	20	0.021	1.0
NFC	13.56	/	/	-20	0.631	20	<<0.0001	0.98

Note:
1. The tune-up power and antenna gain was declared by the applicant.
2. EIRP(dBm)=E(dBuV/m)-95.2 for 3 meters distance, E(dBuV/m)=72.58dBuV/m@3m
3. The device built in a certified 2.4G Wi-Fi/ BT module, FCC ID: 2ANDL-CBU.

Simultaneous transmitting consideration (worst case):

The ratio=$MPE_{2.4G\ Wi\text{-}Fi}$/limit $_{2.4G\ Wi\text{-}Fi}$+ MPE_{NFC}/limit $_{NFC}$ = 0.021/1+0.0001 /0.98=0.022＜1.0

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

Result: Compliant.