5. RF EXPOSURE EVALUATION

5.1 Maximum Permissible Exposure (MPE)

5.1.1 Applicable Standard

According to subpart 15.247(i)and 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);

5.1.2 Measurement Result

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)			
NFC	13.56	/	/	-30.52	0.0009	20	0.00000018	0.979
BT	2402-2480	3.46	2.22	13.0	19.95	20	0.0088	1
BLE	2402-2480	3.46	2.22	7.0	5.01	20	0.0022	1
2.4G Wi-Fi	2412-2462	3.46	2.22	24.5	281.84	20	0.1245	1
5.2G Wi-Fi	5180-5240	0.87	1.22	13.0	19.95	20	0.0048	1
5.8G Wi-Fi	5745-5825	1.82	1.52	14.0	25.12	20	0.0076	1

Note:
The tune-up power and antenna gain was declared by the applicant.
The BT, 2.4G Wi-Fi and 5G Wi-Fi cannot transmit simultaneously.
For NFC, the power of EUT: E Field@3m is 64.68dBuV/m =-30.52dBm
Note: E[dBμV/m] = EIRP[dBm] + 95.2 for d = 3 m.

Result: The device compliant the MPE-Based Exemption at 20cm distances.