RF Exposure Evaluation

LIMIT

The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500	-	-	f/300	6
1500–100,000	-	-	5	6
(B) Limits for General Population/Uncontrolled Exposure				
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

Note: f = frequency in MHz

EVALUATION METHOD

Transmission formula: **$Pd = (Pout*G)/(4*pi*r^2)$**

Where

Pd = power density in mW/cm^2, **Pout** = output power to antenna in mW, **G** = gain of antenna in linear scale;

Pi = 3.1416, **R** = distance between observation point and center of the radiator in cm

TEST RESULT

☒ **Passed** ☐ **Not Applicable**

Radio Type	Frequency range (MHz)	Conducted Average Power (dBm)	Maximum Tune-up (dBm)	Power Density (mW/cm2)	Limit (mW/cm2)	Result
WIFI	2412-2472	21.97	22.00	0.0562	1.0000	Pass
EDR(USB dongle)	2402-2480	4.00	4.00	0.0005	1.0000	Pass
BLE(USB dongle)	2402-2480	4.00	4.00	0.0005	1.0000	Pass
2.4G WiFi(USB dongle)	2412-2472	15.00	15.00	0.0052	1.0000	Pass
5G WiFi(USB dongle)	5180-5240	15.00	15.00	0.0099	1.0000	Pass
5G WiFi (USB dongle)	5260-5320	15.50	15.50	0.0112	1.0000	Pass
5G WiFi (USB dongle)	5500-5720	10.00	10.00	0.0031	1.0000	Pass
5G WiFi (USB dongle)	5745-5825	15.00	15.00	0.0099	1.0000	Pass

Consider the BT and wifi can transmitting simultaneously, the total transmitting MPE rate as below formula:

MPE rate=Power density of WIFI /limit + Power density of 5G WiFi /limit <1

The worst case is 5G WiFi and WIFI transmitting simultaneously, the result as below:

Evaluation mode	Power density/limit	Sum of the MPE rate	limit
WIFI	0.0562	0.0674	1
5G WiFi	0.0112		

Note:

1) *The maximum antenna gain is 2.51dBi*
2) *USB dongle the maximum antenna gain is 2.00dBi(5G WiFi), -0.80dBi(2.4G WiFi), -0.20dBi(BT),*
3) *The exposure evaluation safety distance is 20cm.*