

FCC ID : 2AOKI-WFM63BUWM1

1. RF EXPOSURE EVALUATION

According to FCC 1.1310: 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/cm²)	Average Time
(A) Limits for Occupational/Control Exposures				
300-1500	--	--	F/300	6
1500-100000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
300-1500	--	--	F/1500	6
1500-100000	--	--	1	30

Friis transmission formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

Where

P_d = Power density in mW/cm².

P_{out} =output power to antenna in mW.

G = Numeric gain of the antenna relative to isotropic antenna.

π =3.1416.

R = distance between observation point and center of the radiator in 20cm.

P_d the limit of MPE, 1mW/cm². If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

2. EUT TECHNICAL DESCRIPTION

Characteristics	Description
Product	WIFI Module
Model Number	WF-M63B-UWM1

Device Type	Bluetooth V5.1
Data Rate	1Mbps for GFSK modulation 2Mbps for $\pi/4$ -DQPSK modulation 3Mbps for 8DPSK modulation
Modulation:	GFSK, $\pi/4$ -DQPSK, 8DPSK
Operating Frequency Range(s)	2402-2480MHz
Number of Channels	79 channels
Antenna Type	PCB Antenna
Antenna Gain	-5.43dBi (Note: The antenna information is provided by the customers, which will have a certain impact on the test results.)

BLE Version	V5.1
Device Type	Bluetooth with BLE mode
Data Rate	1Mbps and 2Mbps
Modulation	GFSK
Operating Frequency Range	2402-2480MHz
Number of Channels	40 Channels
Antenna Type	PCB Antenna
Antenna Gain	-5.43dBi (Note: The antenna information is provided by the customers, which will have a certain impact on the test results.)

IEEE 802.11 WLAN Mode Supported	802.11b 802.11g 802.11n(20MHz channel bandwidth) 802.11n(40MHz channel bandwidth)
Modulation	DSSS, OFDM
Operating Frequency Range	2412-2462MHz for 802.11b/g/n(20) 2422-2452MHz for 802.11n(40)
Number of Channels	11 channels for 802.11b/g/n(20) 7 Channels for 802.11n(40)
Antenna Type	PCB Antenna
Antenna Gain	Ant1: 1.91dBi, Ant2: 2.47dBi (Note: The antenna information is provided by the customers, which will have a certain impact on the test results.)

Wifi Type	UNII-1: 5150MHz-5250MHz Band UNII-2A: with 5250MHz-5350MHz Band UNII-2C: with 5470MHz-5725MHz Band UNII-3: with 5725MHz-5850MHz Band
WLAN Supported	802.11a 802.11n(20MHz channel bandwidth) 802.11n(40MHz channel bandwidth) 802.11ac(20MHz channel bandwidth) 802.11ac(40MHz channel bandwidth) 802.11ac(80MHz channel bandwidth)
Data Rate	802.11a:54/48/36/24/18/12/9/6Mbps 802.11n:up to 600 Mbps 802.11ac/ax:up to 1.733Gbps
Modulation	OFDM
Frequency Range	5150MHz-5250MHz Band
	5180-5240MHz for 802.11a 5180-5240MHz for 802.11n(HT20) 5190-5230MHz for 802.11n(HT40) 5180-5240MHz for 802.11ac(HT20) 5190-5230MHz for 802.11ac(HT40) 5210MHz for 802.11ac(HT80)
	5250MHz-5350MHz Band
	5260-5320MHz for 802.11a 5260-5320MHz for 802.11n(HT20) 5270-5310MHz for 802.11n(HT40) 5260-5320MHz for 802.11ac(HT20) 5270-5310MHz for 802.11ac(HT40) 5290MHz for 802.11ac(HT80)
	5470MHz-5725MHz Band
	5500-5700MHz for 802.11a 5500-5700MHz for 802.11n(HT20) 5510-5670MHz for 802.11n(HT40) 5500-5700MHz for 802.11ac(HT20) 5510-5670MHz for 802.11ac(HT40) 5530-5610MHz for 802.11ac(HT80)

	5725MHz-5850MHz Band
	5745-5825MHz for 802.11a 5745-5825MHz for 802.11n(HT20) 5755-5795MHz for 802.11n(HT40) 5745-5825MHz for 802.11ac(HT20) 5755-5795MHz for 802.11ac(HT40) 5775MHz for 802.11ac(HT80)
TPC Function	Not Applicable
Antenna Type	PCB Antenna
Antenna Gain	Ant1: 6.11dBi, Ant2: 4.76dBi (Note: The antenna information is provided by the customers, which will have a certain impact on the test results.)

3. Measurement Result

Mode	Max Conducted Power (dBm)	Antenna gain (dBi)	Antenna Gain Numeric	R (cm)	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
BT	5.19	-5.43	0.29	20	0.0002	1
2.4G WIFI	16.55	2.47	1.77	20	0.016	1
5G WIFI	14.86	6.11	4.08	20	0.025	1

Note: All the modes are tested, only the worst data are described in the table.

Conclusion of simultaneous transmitter:

Transmitting simultaneously, the formula of calculated the MPE is:

$$CPD1/LPD1 + CPD2/LPD2 + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

Therefore the worst-case situation is $0.0002/1 + 0.025/1 = 0.0252$, which is less than 1, this confirmed that the device comply with FCC 1.1310 MPE limit.

----- The End -----