

FCC&IC RF ExposureEvaluation

1. Product Information

FCC ID:	2AHYK09586AIO
Product name	all in one
Model number	GK-MWZE501
Power supply	AC120V
Modulation Type	BT BLE 2.4G WIFI 5G WIFI
Antenna Type	Antenna
Antenna Gain	2.0±0.5dBi (For BT,Ble,2.4G wifi,5G wifi)
Bluetooth Operation frequency	2402MHz-2480MHz
Ble Operation frequency	2402MHz-2480MHz
2.4G wifi Operation frequency	2412MHz-2462MHz
5G wifiOperation frequency	5180MHz-5825MHz
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Fix Device

2. Evaluation method and Limit

According to ANSI/IEEE C95.1-1992, the Criteria Listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

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 Exposure				
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
300-1,500			f/300	6
1,500-100,000			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
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

The MPE was calculated at **20 cm** to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

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

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna

3. Antenna Information

Product can only use antennas certificated as follows provided by manufacturer;

Antenna Type:	Bluetooth	FPC Antenna
	Ble	FPC Antenna
	2.4G WIFI	FPC Antenna
	5G WIFI	FPC Antenna
Antenna gain:	Bluetooth	2.5dBi
	Ble	2.5dBi
	2.4G WIFI	2.5dBi
	5G WIFI	2.5dBi

4. Conducted Power

4.1 Test Setup Block Diagram



4.2 Test Procedure

- 1) The EUT was directly connected to the spectrum analyser and antenna output port as show in the Block diagram;
- 2) Reading peak power in peak detector.

4.3 Measurement Equipment

Item	Equipment	Manufacturer	Model No.	Inventory No.	Last Cal.	Next Cal.
1	Spectrum Analyzer	Keysight	N9010A	MY56070788	2019-01-23	2020-01-22

Conducted Power Results

BT3.0

Mode	Channel	Frequency(MHz)	Conducted Peak Output Power(dBm)
GFSK	0	2402	4.903
	39	2441	5.831
	78	2480	5.303

BLE

Mode	Channel	Frequency(MHz)	Conducted Peak Output Power(dBm)
GFSK	0	2402	3.726
	19	2440	3.283
	39	2480	2.585

2.4G WIFI

Mode 1	Channel	Frequency(MHz)	Conducted Peak Output Power(dBm)
2.4G WIFI	Low	2412	12.02
	Middle	2437	12.68
	High	2462	13.41

5G WIFI

Mode 1	Channel	Frequency(MHz)	Conducted Peak Output Power(dBm)
5G WIFI	Low	5290	14.65
	Middle	5530	15.43
	High	5775	11.43

5. Manufacturing tolerance**Bluetooth**

GFSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	5.5	5.5	5.5
Tolerance $\pm$ (dB)	1	1	1

Ble

GFSK (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	3.5	3.5	3.5
Tolerance $\pm$ (dB)	1	1	1

2.4G wifi

Channel	Low	Middle	High
Target (dBm)	12	12	12
Tolerance $\pm$ (dB)	2	2	2

5G wifi

Channel	Low	Middle	High
Target (dBm)	12	12	12
Tolerance $\pm$ (dB)	4	4	4

6. Evaluation Results

FCC:

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Maximum Output Power Limit (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)
Bluetooth	2402	2.5	6.5	9	0.00794	1.000	7.9400	0.00158	1.000
Ble	2402	2.5	4.5	7	0.00501	1.000	5.0119	0.00100	1.000
2.4G wifi	2412	2.5	14	16.5	0.04500	1.000	44.668	0.00900	1.000
5G wifi	5180	2.5	16	18.5	0.07100	0.050	70.795	0.01400	1.000

Note: The product has two antenna, BT and BLE, 2.4G wifi and 5G wifi can not working simultaneously.

Stimulation Transmission

Band	Frequency	Power Density / Limit	$\Sigma(\text{Power Density / Limit})$ Of Wifi + Bluetooth
Bluetooth	2402	0.000158	0.009158
2.4G WIFI	2412	0.009	
Bluetooth	2402	0.00158	0.01558
5G WIFI	5180	0.014	
BLE	2402	0.001	0.010
2.4G WIFI	2412	0.009	
BLE	2402	0.001	0.015
5G WIFI	5180	0.014	

Remark:

- Output power including tune up tolerance;
- $\Sigma(\text{Power Density / Limit})$: This is a summation of [(power density for each transmitter/antenna include in the simultaneous transmission)/(corresponding MPE limit)], for WIFI + Bluetooth.
- Considering the WiFi/Bluetooth transmitter of the EIRP performance listed in the table above, the aggregated (power density / limit) is smaller than 1, and MPE of 2 collocated transmitters is compliant
- The 2.4g /5G WiFi of this device has two antennas, and the signal is sent by the same chip. Both antennas are tested, and the test data evaluated here is the data of the worst mode ANT1

7. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 and RSS-102 Issue 5 for the uncontrolled RF Exposure.

.....THE END OF REPORT.....