

RF Exposure evaluation

FCC ID	2BFQ8-YIIOT-T23
Product Name	camera
Model/Type reference	YIIOT-T23
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Mobile Device

1. Reference

ANSI C95.1–1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

FCC CFR 47 part1 1.1310: Radio frequency radiation exposure limits.

FCC CFR 47 part2 2.1091: Radio frequency radiation exposure evaluation: mobile devices

2. Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
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 - 1500	/	/	f/300	6
1500 - 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 - 3.0	614	1.63	(100) *	30
3.0 - 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

3. MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S=PG/4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

4. Antenna Information

405-ECO-WiFi can only use antennas certificated as follows provided by manufacturer;

Antenna No.	Type of antenna:	Gain of the antenna (Max.)	Frequency range:
2.4G ANT	FPC Antenna	3.88dBi	2412-2462MHz
5G ANT	FPC Antenna	3.45dBi for 5.2GWIFI 3.58dBi for 5.8GWIFI	5000-5825MHz

5. Conducted Peak Output Power

2.4G WIFI

Mode	Channel	Power(dBm)
IEEE 802.11b	1	13.15
	6	12.80
	11	11.05
IEEE 802.11g	1	11.20
	6	11.57
	11	11.06
IEEE 802.11n_20	1	10.51
	6	10.66
	11	10.20
IEEE 802.11n_40	3	10.73
	6	11.03
	9	10.71
IEEE 802.11ax_20	1	12.97
	6	14.20
	11	12.90
IEEE 802.11ax_40	3	14.07
	6	13.95
	9	13.54

5.2G WIFI

Mode	Channel	Power(dBm)
IEEE 802.11a	36	12.03
	40	12.03
	48	11.92
IEEE 802.11n_20	36	11.86
	40	11.83
	48	11.73
IEEE 802.11n_40	38	11.32
	46	11.18
IEEE 802.11ac_20	36	11.93
	40	11.97
	48	11.77
IEEE 802.11ac_40	38	11.49
	46	11.33
IEEE 802.11ac_80	42	10.42

5.8G WIFI

Mode	Channel	Power(dBm)
IEEE 802.11a	149	11.34
	157	11.86
	165	12.48
IEEE 802.11n_20	149	11.75
	157	11.83
	165	12.33
IEEE 802.11n_40	151	11.51
	159	11.82
IEEE 802.11ac_20	149	11.78
	157	11.6
	165	12.12
IEEE 802.11ac_40	151	11.35
	159	11.85
IEEE 802.11ac_80	155	9.74

6. Manufacturing Tolerance

2.4G WIFI

Mode	11b		
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	14.0	10.0	12.0
Tolerance \pm (dB)	1.0	1.0	1.0
Mode	11g		
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	14.0	14.0	14.0
Tolerance \pm (dB)	1.0	1.0	1.0
Mode	11n(HT20)		
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	11.0	14.0	13.0
Tolerance \pm (dB)	1.0	1.0	1.0
Mode	11n(HT40)		
Channel	Channel 3	Channel 6	Channel 9
Target (dBm)	13.0	14.0	11.0
Tolerance \pm (dB)	1.0	1.0	1.0

5.2G WIFI

Mode	11a		
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	11.0	11.0	11.0
Tolerance \pm (dB)	1.0	1.0	1.0
Mode	11n(HT20)		
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	11.0	11.0	11.0
Tolerance \pm (dB)	1.0	1.0	1.0
Mode	11n(HT40)		
Channel	Channel 38	Channel 46	
Target (dBm)	11.0	11.0	
Tolerance \pm (dB)	1.0	1.0	
Mode	11ac(HT20)		
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	13.0	11.0	11.0
Tolerance \pm (dB)	1.0	1.0	1.0
Mode	11ac(HT40)		
Channel	Channel 38	Channel 46	
Target (dBm)	10.0	10.0	
Tolerance \pm (dB)	1.0	1.0	
Mode	11ac(HT80)		
Channel	Channel 42		
Target (dBm)	10.0		
Tolerance \pm (dB)	1.0		

5.8G WIFI

Mode	11a		
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	13.0	14.0	15.0
Tolerance ± (dB)	1.0	1.0	1.0
Mode	11n(HT20)		
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	13.0	13.0	14.0
Tolerance ± (dB)	1.0	1.0	1.0
Mode	11n(HT40)		
Channel	Channel 151	Channel 159	
Target (dBm)	13.0	13.0	
Tolerance ± (dB)	1.0	1.0	
Mode	11ac(HT20)		
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	13.0	13.0	14.0
Tolerance ± (dB)	1.0	1.0	1.0
Mode	11ac(HT40)		
Channel	Channel 151	Channel 159	
Target (dBm)	13.0	13.0	
Tolerance ± (dB)	1.0	1.0	
Mode	11ac(HT80)		
Channel	Channel 155		
Target (dBm)	11.0		
Tolerance ± (dB)	1.0		

7. Standalone MPE Result

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r = 20\text{cm}$, as well as the gain of the used antenna is 2.8dBi(Max), the RF power density can be obtained.

Mode	Output power		Antenna Gain (dBi)	Antenna Gain(linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
2.4GWIFI	15	31.62	3.88	2.44	0.01537	1.0000
5.2GWIFI	14	25.12	3.45	2.21	0.01106	1.0000
5.8GWIFI	16	39.81	3.58	2.28	0.01806	1.0000

Remark:

1. Output power (Peak) including turn-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer.

8. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

-----End of the report-----