Maximum Permissible Exposure Report

1. Product Information

FCC ID:	2AZUH-F6BC
Product name	Remote Control Car
Test Model	F6BC
Additional Model No.	F3, F3B, F3C, F3BC, F5, F5B, F5C, F5BC, F6, F6B, F6C, F6BC, F8, F8B, F8C, F8BC, F9, F9B, F9C, F9BC, F11, F11B, F11C, F11BC, F12, F12B, F12C,F12BC,tr10,tr11,tr12,tr16,tr18,tr20,tr23,tr25,tr28,fc600 ,fc20,fc25 ,yc100,yc200,yc250,yc280,yc300,yc350,yc400,yc450
Model Declaration	PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Power supply	Input: DC 5V, 0.5-2A DC 3.7V by Rechargeable Li-ion Battery, 600mAh
Operation frequency	2402MHz-2480MHz 5180MHz-5240MHz 5745MHz-5825MHz
Antenna Type	Bluetooth: PCB Antenna, -0.58dBi(Max.) WLAN: Internal Antenna, 2.0dBi(Max.)
Antenna Gain	-0.58dBi(Max.) 2.0dBi(Max.)
Hardware version	V1.2
Software version	V1.0
Channel Number	79 channels for Bluetooth V5.0 (BDR/EDR) 40 channels for Bluetooth V5.0 (BT LE) 4 channels for 20MHz bandwidth (5180-5240MHz) 2 channels for 40MHz bandwidth (5190~5230MHz) 1 channels for 80MHz bandwidth (5210MHz) 5 channels for 20MHz bandwidth(5745-5825MHz) 2 channels for 40MHz bandwidth(5755~5795MHz) 1 channels for 80MHz bandwidth(5775MHz)
Channel Spacing	5MHz
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Mobile Devices

2. Evaluation Method

Systems operating under the provisions of FCC 47 CFR 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.
In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is ≤ 1.0. The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

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3. Limit

3. 1 Refer Evaluation Method

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: Radiofrequency radiation exposure limits.
FCC CFR 47 part2 2.1091: Radiofrequency radiation exposure evaluation: Mobile Devices

3. 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/cm²)	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/f²)*	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/cm²)	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/f²)*	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

4. 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

5. Antenna Information

Remote Control Car can only use antennas certificated as follows provided by manufacturer;

Antenna type and antenna number	Operate frequency band	Maximum antenna gain	Notes
PCB Antenna	2402MHz-2480MHz	-0.58dBi	BT Antenna
Internal Antenna	5180MHz-5240MHz 5745MHz-5825MHz	2.0dBi	WiFi Antenna

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6. Conducted Power

[BT Max Conducted Power]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
GFSK	0	2402	-8.192
	39	2441	-6.193
	78	2480	-5.931
π/4DQPSK	0	2402	-7.404
	39	2441	-5.645
	78	2480	-5.600
8DPSK	0	2402	-6.968
	19	2441	-5.411
	39	2480	-5.452

[BLE Max Conducted Power]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
BT LE	0	2402	-8.365
	19	2440	-6.311
	39	2480	-6.108

[5.2GWIFI Max Conducted Power]

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)
11A	36	5180	14.49
	40	5200	13.25
	48	5240	12.83
11N20 SISO	36	5180	13.68
	40	5200	13.08
	48	5240	12.93
11N40 SISO	38	5190	13.57
	46	5230	13.40
11AC20 SISO	36	5180	12.60
	40	5200	12.03
	48	5240	11.63
11AC40 SISO	38	5190	13.18
	46	5230	12.78
11AC80 SISO	42	5210	13.00

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[5.8WIFI Max Conducted Power]

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)
11A	149	5745	13.98
	157	5785	13.93
	165	5825	14.11
11N20 SISO	149	5745	12.96
	157	5785	13.59
	165	5825	13.54
11N40 SISO	151	5755	12.42
	159	5795	12.82
11AC20 SISO	149	5745	12.60
	157	5785	12.03
	165	5825	11.63
11AC40 SISO	151	5755	13.18
	159	5795	12.78
11AC80 SISO	155	5775	12.66

7. Measurement Results

BT

GFSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	-8.0	-6.0	-5.0
Tolerance ±(dB)	1.0	1.0	1.0
π/4DQPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	-7.0	-5.0	-5.0
Tolerance ±(dB)	1.0	1.0	1.0
8DPSK (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	-6.0	-5.0	-5.0
Tolerance ±(dB)	1.0	1.0	1.0

BLE

BT LE (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	-8.0	-6.0	-6.0
Tolerance ±(dB)	1.0	1.0	1.0

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5.2GWIFI

11A (Peak)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	14.0	13.0	12.0
Tolerance ±(dB)	1.0	1.0	1.0
11N20 SISO (Peak)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	13.0	13.0	12.0
Tolerance ±(dB)	1.0	1.0	1.0
11N40 SISO (Peak)			
Channel	Channel 38		Channel 46
Target (dBm)	13.0		13.0
Tolerance ±(dB)	1.0		1.0
11AC20 SISO (Peak)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	12.0	12.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
11AC40 SISO (Peak)			
Channel	Channe38		Channel 46
Target (dBm)	13.0		12.0
Tolerance ±(dB)	1.0		1.0
11AC80 SISO (Peak)			
Channel	Channel 42		
Target (dBm)	13.0		
Tolerance ±(dB)	1.0		

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5.8GWIFI

11A (Peak)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	13.0	13.0	14.0
Tolerance ±(dB)	1.0	1.0	1.0
11N20 SISO (Peak)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	12.0	13.0	13.0
Tolerance ±(dB)	1.0	1.0	1.0
11N40 SISO (Peak)			
Channel	Channel 151		Channel 159
Target (dBm)	12.0		12.0
Tolerance ±(dB)	1.0		1.0
11AC20 SISO (Peak)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	12.0	12.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
11AC40 SISO (Peak)			
Channel	Channe151		Channel 159
Target (dBm)	13.0		12.0
Tolerance ±(dB)	1.0		1.0
11AC80 SISO (Peak)			
Channel	Channel 155		
Target (dBm)	12.0		
Tolerance ±(dB)	1.0		

8. Evaluation Results

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 =20cm, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

BT

Band/Mode	f (GHz)	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm2)	MPE Limits (mW/cm2)
		dBm	mW				
GFSK	2.480	-4.0	0.3981	-0.58	0.8750	0.000069	1.0000
π/4DQPSK	2.480	-4.0	0.3981	-0.58	0.8750	0.000069	1.0000
8DPSK	2.441	-4.0	0.3981	-0.58	0.8750	0.000069	1.0000

BLE

Band/Mode	f (GHz)	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm2)	MPE Limits (mW/cm2)
		dBm	mW				
BT LE	2.480	-5.0	0.3162	-0.58	0.8750	0.000055	1.0000

5.2GWIFI

Band/Mode	f (GHz)	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm2)	MPE Limits (mW/cm2)
		dBm	mW				
11A	5.180	15.0	31.6228	2.0	1.5849	0.009976	1.0000
11N20 SISO	5.180	14.0	25.1189	2.0	1.5849	0.007924	1.0000
11N40 SISO	5.190	14.0	25.1189	2.0	1.5849	0.007924	1.0000
11AC20 SISO	5.180	13.0	19.9526	2.0	1.5849	0.006294	1.0000
11AC40 SISO	5.190	14.0	25.1189	2.0	1.5849	0.007924	1.0000
11AC80 SISO	5.210	14.0	25.1189	2.0	1.5849	0.007924	1.0000

5.8GWIFI

Band/Mode	f (GHz)	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm2)	MPE Limits (mW/cm2)
		dBm	mW				
11A	5.825	15.0	31.6228	2.0	1.5849	0.009976	1.0000
11N20 SISO	5.785	14.0	25.1189	2.0	1.5849	0.007924	1.0000
11N40 SISO	5.795	13.0	19.9526	2.0	1.5849	0.006294	1.0000
11AC20 SISO	5.745	13.0	19.9526	2.0	1.5849	0.006294	1.0000
11AC40 SISO	5.755	14.0	25.1189	2.0	1.5849	0.007924	1.0000
11AC80 SISO	5.775	13.0	19.9526	2.0	1.5849	0.006294	1.0000

Remark:
1. Output power including turn-up tolerance;
2. Output power is burst average power;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer;
4. MPE values = $PG/4\pi R^2$

9. Simultaneous Transmission for SAR Exclusion

The sample supports two transmit antenna, the ANT 1 used for BT and ANT 2 used for 5GWIFI . So need consider simultaneous transmission;

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Mode	ANT1 Threshold	ANT2 Threshold	Simultaneous Transmission for SAR Exclusion	SAR Test Exclusion
BT+5GWIFI	0.000069	0.009976	0.010045<1.0	Yes

10. Conclusion

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

----------THE END OF REPORT----------