Maximum Permissible Exposure Evaluation

FCC ID:2AUDF-CQ121D

1. Client Information

Applicant	:	Shenzhen ADDX Innovation Technology co., LTD.
Address	:	NO.2902, Building 9A-1.Shenzhen Bay Technology and Ecological Park, Nanshan District, Shenzhen, China
Manufacturer	:	Shenzhen ADDX Innovation Technology co., LTD.
Address	:	NO.2902, Building 9A-1.Shenzhen Bay Technology and Ecological Park, Nanshan District, Shenzhen, China

2. General Description of EUT

EUT Name	:	Smart PTZ Battery Camera	
Models No.	:	CQ1	
Product Description	:	Operation Frequency:	Bluetooth (BLE) V5.0:2402MHz~2480MHz 802.11b/g/n(HT20): 2412MHz~2462MHz
		Number of Channel:	BLE: 40 channels 802.11b/g/n(HT20):11 channels
		Modulation Type:	BLE: 40 channels 802.11b: DSSS(CCK, DQPSK, DBPSK) 802.11g/n: OFDM(QPSK, BPSK, 16QAM, 64QAM)
		Antenna Gain:	0.5dBi PCB Antenna for Bluetooth 2.62dBi External Antenna for 2.4G WiFi
Power Rating		Input: DC 5V, 1.5A DC 3.7V by 9000mAh Rechargeable Li-ion battery	
Software Version	:	V0.8.1	
Hardware Version	:	CQ121D_C01_V2	
Connecting I/O Port(S)	:	Please refer to the User's Manual	

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MPE Calculations for WIFI

1. **Antenna Gain:**

   Bluetooth PCB Antenna: 0.5dBi.
   2.4G WiFi Rod Antenna: 2.62dBi.

2. **EUT Operation Condition:**

   Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

3. **Exposure Evaluation:**

   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 the 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. **Test Result:**

2.4G WiFi MPE Result								
Mode	N_{TX}	Freq. (MHz)	Conducted Power(max) (dBm)	Turn-up Power (dB)	Max tune up power (dBm) [P]	ANT Gain (dBi) [G]	Distance (cm) [R]	Power Density (mW/ cm^2) [S]
802.11b	1	2412	16.164	16±1	17	2.62	20	0.0182
		2437	15.445	15±1	16	2.62	20	0.0145
		2462	15.732	16±1	17	2.62	20	0.0182
802.11g	1	2412	13.552	14±1	15	2.62	20	0.0115
		2437	13.018	13±1	14	2.62	20	0.0091
		2462	13.281	13±1	14	2.62	20	0.0091
802.11n20	1	2412	13.418	13±1	14	2.62	20	0.0091
		2437	13.05	13±1	14	2.62	20	0.0091
		2462	12.802	13±1	14	2.62	20	0.0091

Note:
N_{TX}= Number of Transmit Antennas
RF Output power specifies that Maximum Conducted Peak Output Power.

Bluetooth LE Worst Maximum MPE Result								
Mode	N_{TX}	Freq. (MHz)	Conducted Power(max) (dBm)	Turn-up Power (dB)	Max tune up power (dBm) [P]	ANT Gain (dBi) [G]	Distance (cm) [R]	Power Density (mW/ cm^2) [S]
GFSK	1	2402	-4.522	-5±1	-4	0.5	20	0.00009
		2440	-4.747	-5±1	-4	0.5	20	0.00009
		2480	-4.437	-4±1	-3	0.5	20	0.00011
Note: N_{TX}= Number of Transmit Antennas RF Output power specifies that Maximum Conducted Peak Output Power.								

5. Conclusion:

As specified in Table 1B of 47 CFR 1.1310- Limits for Maximum Permissible Exposure (MPE),

Limits for General Population/ Uncontrolled Exposure

Frequency Range (MHz)	Power density (mW/ cm^2)
300-1,500	F/1500
1,500-100,000	1.0

For 2.4WIFI:2412~2462 MHz
MPE limit S: 1mW/ cm^2

Maximum Simultaneous transmission MPE Ratios for WiFi and Bluetooth support

Maximum MPE ratio $_{WiFi}$	Maximum MPE ratio $_{BLE}$	∑MPE ratios	Limit	Results
0.0182	0.00011	0.01831	1	PASS

So, RF exposure limit warning or SAR test are not required.

The EUT will only be used with a separation of 20cm or greater between the antenna and nearby persons and can therefore be considered a mobile transmitter per 47 CFR2.1091 (b).

The RF Exposure Information page from the manual is included here for reference.

Note

For a more detailed features description, please refer to the RF Test Report.

6. Conclusion:

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

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