



RF Exposure Evaluation

FCC ID: 2A8T3-MINIBOOM2

1. Client Information

Applicant	:	UPGRAYDE LTD
Address	:	32 Hatfield Road, London, England, W4 1AF, United Kingdom
Manufacturer	:	CASUN TECHNOLOGIES CO., LTD
Address	:	Room 3368, 3/F, Shenzhou Chengyun Industrial Park, No.2 Bei'er Road, Longgang District, Shenzhen, China

2. General Description of EUT

EUT Name	:	WIRELESS SPEAKER
Model(s) No.	:	miniBOOM 2, miniBOOM
Model Different	:	All these models are identical in the same PCB, layout and electrical circuit, the only difference is appearance.
Sample ID	:	RW-C-202209-0110-3-1#&RW-C-202209-0110-3-2#
Product Description	Operation Frequency:	Bluetooth 5.1: 2402MHz~2480MHz
	Number of Channel:	79 channels
	RF Output Power:	-5.8dBm
	Antenna Gain:	2.0dBi PCB Antenna
Power Supply	:	USB Input: DC 5V DC 3.7V by 300mAh Rechargeable Li-ion battery
Software Version	:	DL_9B99_: M3_: M3_IC: AC6965E_: 5D27- HAA2820 EQ aGO Mini v005_DRC
Hardware Version	:	XQZL-M3-HAA2820(TYPC)-V4.0
Remark: The antenna gain provided by the applicant, the adapter and verified for the RF conduction test and adapter provided by TOBY test lab.		

Note: More test information about the EUT please refer the RF Test Report.

The RF Exposure Evaluation for FCC:

SAR Test Exclusion Calculations

FCC: According to 447498 D04 Interim General RF Exposure Guidance v01.

The SAR-based exemption formula of § 1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by Formula (B.2).

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

and f is in GHz, d is the separation distance (cm), and $ERP_{20\text{cm}}$ is per Formula (B.1). The example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)									
	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

Calculation:

Test separation: 5mm					
Bluetooth Mode (GFSK)					
Frequency (GHz)	Conducted Power (dBm)	Turn-up Power Tolerance (dB)	Max power of tune up tolerance (dBm)	Max power of tune up tolerance (mW)	Limit P _{th} (mW)
2.402	-10.53	-10±1	-9	0.126	3
2.441	-8.27	-8±1	-7	0.2	3
2.480	-6.49	-6±1	-5	0.316	3
Bluetooth Mode (π/4-DQPSK)					
Frequency (GHz)	Conducted Power (dBm)	Turn-up Power Tolerance (dB)	Max power of tune up tolerance (dBm)	Max power of tune up tolerance (mw)	Limit P _{th} (mW)
2.402	-10.27	-10±1	-9	0.126	3
2.441	-8.16	-8±1	-7	0.2	3
2.480	-5.80	-5±1	-4	0.398	3
Bluetooth Mode (8-DPSK)					
2.402	-10.02	-10±1	-9	0.126	3
2.441	-8.08	-8±1	-7	0.2	3
2.480	-5.88	-5±1	-4	0.398	3

The measurement results comply with the FCC Limit per 47 CFR 2.1093 for the uncontrolled RF Exposure and SAR Exclusion Threshold per KDB 447498 D04, No SAR is required.

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