Maximum Permissible Exposure Report

1. Product Information

FCC ID	2AUU8-BB2713-1
Product name	15'' Screen Bluetooth PA spearker
Model Number	BB2713
Power supply	DC 11.1V By Battery(4000mAh) Recharged By DC 12V 2A Adapter parameters Input: AC 100-240V 50/60Hz 0.35A Output: DC 12V 2A
Hardware version	MJ-Q12-MAIN V2.0
Software version	QI_4.4.2_20190506084607
2.4G WLAN Operation frequency	2412-2462MHz
Modulation Type	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK); IEEE 802.11g/n: OFDM(64QAM, 16QAM, QPSK, BPSK)
Channel Number	11 channels for 20MHz bandwidth(2412~2462MHz) 7 channels for 40MHz bandwidth(2422~2452MHz)
Spacing	5 MHz
Bluetooth Operation frequency	2402MHz-2480MHz
Bluetooth Version	Bluetooth V5.0
Channel Number	79 channels for Bluetooth V5.0 (BT Classics)
Channel Spacing	1MHz for Bluetooth V5.0 (BT Classics)
Modulation Type	GFSK, π/4-DQPSK for V5.0 (BT Classics)
Antenna Type	Internal antenna for 2.4G WLAN(DTS) Internal antenna for Bluetooth V5.0 (BT Classics)
Antenna Gain	3.0 dBi (maximum) for 2.4G WLAN(DTS) 2.0 dBi (maximum) for Bluetooth V5.0 (BT Classics)
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Fixed Equipment

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.

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	$(900/f^2)$*	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/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	$(180/f^2)$*	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

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

BB2713 can only use antennas certificated as follows provided by manufacturer;

Internal Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain
Antenna 0	Internal antenna	2412 MHz – 2462 MHz	3.0dBi
Antenna 1	Internal antenna	2402 MHz – 2480 MHz	2.0dBi

6. Conducted Power

BT

Mode	Channel	Frequency(MHz)	Peak Conducted Output Power (dBm)
GFSK	0	2402	-1.122
	39	2441	-1.444
	78	2480	-1.818
π/4DQPSK	0	2402	-0.417
	39	2441	-0.815
	78	2480	-1.171

2.4G WLAN

Test Mode	Channel	Frequency (MHz)	Measured Peak Output Power (dBm)
IEEE 802.11b	1	2412	12.502
	6	2437	13.188
	11	2462	13.954
IEEE 802.11g	1	2412	8.906
	6	2437	9.744
	11	2462	10.024
IEEE 802.11n HT20	1	2412	9.159
	6	2437	9.727
	11	2462	10.162
IEEE 802.11n HT40	1	2422	7.508
	6	2437	7.907
	11	2452	8.234

7. Manufacturing Tolerance

BT

GFSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	-1.0	-1.0	-1.0
Tolerance ±(dB)	1.0	1.0	1.0
π/4-DQPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	-1.0	-1.0	-1.0
Tolerance ±(dB)	1.0	1.0	1.0

2.4G WLAN

IEEE 802.11b (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	13.0	13.0	13.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11g (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	9.0	9.0	10.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	9.0	9.0	10.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Peak)			
Channel	Channel 3	Channel 6	Channel 9
Target (dBm)	8.0	8.0	8.0
Tolerance ±(dB)	1.0	1.0	1.0

8. Measurement Results

8.1 Standalone MPE Evaluation

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.

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW					
IEEE 802.11b	14.00	25.1189	3.000	2.00	100%	0.0100	1.0000
IEEE 802.11g	11.00	12.5893	3.000	2.00	100%	0.0050	1.0000
IEEE 802.11n HT20	11.00	12.5893	3.000	2.00	100%	0.0050	1.0000
IEEE 802.11n HT20	9.00	7.9433	3.000	2.00	100%	0.0032	1.0000
GFSK	0	1.0000	2.000	1.58	100%	0.0003	1.0000
π/4DQPSK	0	1.0000	2.000	1.58	100%	0.0003	1.0000

Remark:
1. Output power including tune-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer.

8.2 Simultaneous Transmission MPE

The sample support BT modular and 2.4G WLAN modular, BT and 2.4G WLAN share difference antenna, need consider simultaneous transmission;

Maximum Simultaneous transmission SAR Ratio for BT and NFC;

MPE ratios $_{BT}$	MPE ratios $_{2.4G\ WLAN}$	∑MPE ratios	Limit	Results
< 0.0003	< 0.01	< 0.0103	1.0	PASS

9. 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---------------