

RF Exposure Report

Report No.: SABHKO-WTW-P21030299

FCC ID: 2ACIX-ZEP

Test Model: ZWM

Received Date: Mar. 10, 2021

Test Date: Mar. 10 to May 31, 2021

Issued Date: Jun. 7, 2021

Applicant: B&W Group Ltd.

Address: Dale Road Worthing, BN11 2BH United Kingdom

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

FCC Registration /
Designation Number: 198487 / TW2021



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Release Control Record

Issue No.	Description	Date Issued
SABHKO-WTW-P21030299	Original release.	Jun. 7, 2021

1 Certificate of Conformity

Product: Zeppelin Wireless Module

Brand: Bowers & Wilkins

Test Model: ZWM

Sample Status: Engineering sample

Applicant: B&W Group Ltd.

Test Date: Mar. 10 to May 31, 2021

Standards: FCC Part 2 (Section 2.1091)

References Test Guidance: KDB 447498 D01 General RF Exposure Guidance v06

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Jessica Cheng , **Date:** Jun. 7, 2021
Jessica Cheng / Senior Specialist

Approved by : Rex Lai , **Date:** Jun. 7, 2021
Rex Lai / Associate Technical Manager

2 RF Exposure

2.1 Limits For Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
0.3-1.34	614	1.63	(100)*	30
1.34-30	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

2.2 MPE Calculation Formula

$$P_d = (P_{out} * G) / (4 * \pi * r^2)$$

where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

Function	Frequency Band (MHz)	Antenna Type	Antenna Connector	Gain (dBi)	
				Chian 0	Chian 1
WLAN	2412-2462	PIFA	i-pex(MHF)	3.27	3.44
WLAN	5180-5240	PIFA	i-pex(MHF)	4.17	4.22
WLAN	5260-5320	PIFA	i-pex(MHF)	4.17	4.22
WLAN	5500-5720	PIFA	i-pex(MHF)	4.17	4.22
WLAN	5745-5825	PIFA	i-pex(MHF)	4.17	4.22
BT LE	2402-2480	PIFA	i-pex(MHF)	2.97	-
BT EDR	2402-2480	PIFA	i-pex(MHF)	2.97	-

Note: The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

2.5 Calculation Result Of Maximum Conducted Power

Function	Frequency Band (MHz)	Max AV Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WLAN	2412-2462	18.19	6.37	20	0.0568	1
WLAN	5180-5240	16.21	7.21	20	0.0437	1
WLAN	5260-5320	16.05	7.21	20	0.0421	1
WLAN	5500-5720	16.02	7.21	20	0.0419	1
WLAN	5745-5825	16.15	7.21	20	0.0431	1
BT LE	2402-2480	3.79	2.97	20	0.0009	1
BT EDR	2402-2480	1.34	2.97	20	0.0005	1

Note:

2.4GHz Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 6.37$

5.0GHz Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 7.21$

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. 2.4GHz & 5GHz WLAN technologies cannot transmit at same time.
WLAN & Bluetooth technologies can transmit at same time.

Conclusion:

The formula of calculated the MPE is:

$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

WLAN (2412-2462MHz) + BT LE = $0.0568 / 1 + 0.0009 / 1 = 0.0578$.

WLAN (5180-5240MHz) + BT LE = $0.0437 / 1 + 0.0009 / 1 = 0.0447$.

Therefore the maximum calculations of above situations are less than the "1" limit.

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