

RF Exposure Report

Report No.: SA180223C02 R1

FCC ID: NKR-DHUME997

Test Model: Catapult ERM997-1

Received Date: Feb. 23, 2018

Test Date: Mar. 23 ~ May 07, 2018

Issued Date: Jul. 04, 2018

Applicant: Wistron NeWeb Corp.

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Release Control Record

Issue No.	Description	Date Issued
SA180223C02	Original release	May 14, 2018
SA180223C02 R1	Revising Test Model Name.	Jul. 04, 2018

1 Certificate of Conformity

Product: Marvell 88W8997 11ac 2x2 and BT Combo module

Brand: WNC

Test Model: Catapult ERM997-1

Sample Status: Engineering sample

Applicant: Wistron NeWeb Corp.

Test Date: Mar. 23 ~ May 07, 2018

Standards: FCC Part 2 (Section 2.1091)

KDB 447498 D01 General RF Exposure Guidance v06

IEEE C95.1

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 :


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Date:

Jul. 04, 2018

Approved by :



Bruce Chen / Project Engineer

Date:

Jul. 04, 2018

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				
300-1500	...	...	F/1500	30
1500-100,000	...	...	1.0	30

F = Frequency in MHz

2.2 MPE Calculation Formula

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

where

Pd = power density in mW/cm²

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 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**.

3 Calculation Result of Maximum Conducted Power

Frequency Band (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WLAN: 2412-2462	19.39	6.52	20	0.078	1
WLAN: 5180-5240	17.24	9.26	20	0.089	1
WLAN: 5260-5320	17.29	9.26	20	0.090	1
WLAN: 5500-5700	17.74	9.26	20	0.100	1
WLAN: 5745-5825	17.88	9.26	20	0.103	1
BT EDR: 2402-2480	9.58	3.79	20	0.004	1
BT LE: 2402-2480	9.97	3.79	20	0.005	1

Note:

WLAN

2.4GHz Band: Directional gain = $G_{ANT\ MAX} + 10 \log(N_{ANT}/N_{SS}) = 3.51\ dBi + 10 \log(2/1) = 6.52\ dBi$

5GHz Band: Directional gain = $G_{ANT\ MAX} + 10 \log(N_{ANT}/N_{SS}) = 6.25\ dBi + 10 \log(2/1) = 9.26\ dBi$

BT: antenna gain: 3.79dBi

Frequency Band	Max Power (dBm)			Total Power (dBm)	Power Limit (dBm)
	WLAN	BT EDR	BT LE		
2.4GHz	19.39	9.58	-	19.82	30
2.4GHz	19.39	-	9.97	19.86	30

Conclusion:

*The BT could transmit simultaneously either with WLAN 2.4GHz or 5GHz at the same time.

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 2.4GHz + BT = $0.078 + 0.005 = 0.083$

WLAN 5GHz + BT = $0.103 + 0.005 = 0.108$

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

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