

## 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.

**Address:** 20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C.

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

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

**Test Location:** No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)



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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 :**

  
Polly Chien / Specialist

**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 <sup>2</sup> ) | 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

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

where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = 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 <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|----------------------|-----------------|--------------------|---------------|-------------------------------------|-----------------------------|
| WLAN: 2412-2462      | 19.39           | 6.52               | 20            | <b>0.078</b>                        | 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            | <b>0.103</b>                        | 1                           |
| BT EDR: 2402-2480    | 9.58            | 3.79               | 20            | 0.004                               | 1                           |
| BT LE: 2402-2480     | 9.97            | 3.79               | 20            | <b>0.005</b>                        | 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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