



# RF Exposure Evaluation Report

**Equipment** : Wireless LAN Network Module  
**Brand Name** : Arcadyan  
**Model No.** : WN9711BTAAC-YA  
**FCC ID** : RAXWN9711  
**Standard** : 47 CFR Part 2.1091  
**Applicant** : Arcadyan Technology Corporation  
No.8, Sec.2, Guangfu Rd.,Hsinchu, 30071 Taiwan  
**Manufacturer** : Arcadyan Technology Corporation  
No.8, Sec.2, Guangfu Rd.,Hsinchu, 30071 Taiwan

The product sample received on Jun. 05, 2017 and completely tested on Aug. 29, 2017. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with 47 CFR Part 2.1091 and pass the limit.

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Cliff Chang  
SPORTON INTERNATIONAL INC.





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## REVISION HISTORY

[illegible]

# 1 General Description

## 1.1 EUT General Information

| RF General Information |                                                  |                                                  |                                                                                                 |
|------------------------|--------------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------------------------------|
| Evaluation Mode        | Frequency Range (MHz)                            | Operating Frequency (MHz)                        | Modulation Type                                                                                 |
| 2.4GHz WLAN            | 2400-2483.5                                      | 2412-2462                                        | 802.11b: DSSS (DBPSK, DQPSK, CCK)<br>802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)                 |
| 5GHz WLAN              | 5150-5250<br>5250-5350<br>5470-5725<br>5725-5850 | 5180-5240<br>5260-5320<br>5500-5720<br>5745-5825 | 802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)<br>802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) |
| Bluetooth              | 2400-2483.5                                      | 2402-2480                                        | BR / EDR: FHSS (GFSK / $\pi/4$ -DQPSK / 8DPSK)<br>LE: DSSS (GFSK)                               |

## 1.2 Testing Location

| Testing Location                    |        |                                                                                                                               |
|-------------------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/>            | HWA YA | ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.<br>TEL : 886-3-327-3456 FAX : 886-3-327-0973   |
| <input checked="" type="checkbox"/> | JHUBEI | ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.<br>TEL : 886-3-656-9065 FAX : 886-3-656-9085 |

## 2 Maximum Permissible Exposure

### 2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm <sup>2</sup> ) | Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|------------------------------------------|------------------------------------------------------------------|
| 0.3-3.0               | 614                               | 1.63                              | (100)*                                   | 6                                                                |
| 3.0-30                | 1842 / f                          | 4.89 / f                          | (900 / f)*                               | 6                                                                |
| 30-300                | 61.4                              | 0.163                             | 1.0                                      | 6                                                                |
| 300-1500              |                                   |                                   | F/300                                    | 6                                                                |
| 1500-100,000          |                                   |                                   | 5                                        | 6                                                                |

(B) Limits for General Population / Uncontrolled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm <sup>2</sup> ) | Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|------------------------------------------|------------------------------------------------------------------|
| 0.3-1.34              | 614                               | 1.63                              | (100)*                                   | 30                                                               |
| 1.34-30               | 824/f                             | 2.19/f                            | (180/f)*                                 | 30                                                               |
| 30-300                | 27.5                              | 0.073                             | 0.2                                      | 30                                                               |
| 300-1500              |                                   |                                   | F/1500                                   | 30                                                               |
| 1500-100,000          |                                   |                                   | 1.0                                      | 30                                                               |

Note: f = frequency in MHz ; \*Plane-wave equivalent power density

### 2.2 MPE Calculation Method

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

**E** = Electric field (V/m)

**P** = RF output power (W)

**G** = EUT Antenna numeric gain (numeric)

**d** = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$



## 2.3 Calculated Result and Limit

**Exposure Environment: General Population / Uncontrolled Exposure**

**For Radio 1:**

| Mode        | DG (dBi) | Power (dBm) | EIRP (dBm) | EIRP (W) | Distance (cm) | S (mW/cm <sup>2</sup> ) | S Limit (mW/cm <sup>2</sup> ) |
|-------------|----------|-------------|------------|----------|---------------|-------------------------|-------------------------------|
| 2.4G;G1D    | 3.16     | 19.87       | 23.03      | 0.20091  | 20            | 0.03997                 | 1.00000                       |
| 5.2G;D1D    | 4.42     | 20.15       | 24.57      | 0.28642  | 20            | 0.05698                 | 1.00000                       |
| 2.4G;BT-EDR | 3.16     | 4.55        | 7.71       | 0.0059   | 20            | 0.00117                 | 1.00000                       |

**For Radio 2:**

| Mode     | DG (dBi) | Power (dBm) | EIRP (dBm) | EIRP (W) | Distance (cm) | S (mW/cm <sup>2</sup> ) | S Limit (mW/cm <sup>2</sup> ) |
|----------|----------|-------------|------------|----------|---------------|-------------------------|-------------------------------|
| 5.3G;D1D | 4.42     | 20.59       | 25.01      | 0.31696  | 20            | 0.06306                 | 1.00000                       |

**Simultaneous Transmission Analysis Mode:**

**1. Radio 1 (2.4GHz + Bluetooth) + Radio 2 (5GHz)**

| Mode                  | DG (dBi) | Power (dBm) | EIRP (dBm) | EIRP (W) | Distance (cm) | S (mW/cm <sup>2</sup> ) | S Limit (mW/cm <sup>2</sup> ) | Ratio (S/Limit) |
|-----------------------|----------|-------------|------------|----------|---------------|-------------------------|-------------------------------|-----------------|
| (Radio 1) 2.4G;G1D    | 3.16     | 19.87       | 23.03      | 0.20091  | 20            | 0.03997                 | 1.00000                       | 0.03997         |
| (Radio 1) 2.4G;BT-EDR | 3.16     | 4.55        | 7.71       | 0.00590  | 20            | 0.00117                 | 1.00000                       | 0.00117         |
| (Radio 2) 5.3G;D1D    | 4.42     | 20.59       | 25.01      | 0.31696  | 20            | 0.06306                 | 1.00000                       | 0.06306         |
|                       |          |             |            |          |               |                         | Sum Ratio                     | 0.1042          |
|                       |          |             |            |          |               |                         | Ratio Limit                   | 1               |

**2. Radio 1 (5GHz + Bluetooth) + Radio 2 (5GHz)**

| Mode                  | DG (dBi) | Power (dBm) | EIRP (dBm) | EIRP (W) | Distance (cm) | S (mW/cm <sup>2</sup> ) | S Limit (mW/cm <sup>2</sup> ) | Ratio (S/Limit) |
|-----------------------|----------|-------------|------------|----------|---------------|-------------------------|-------------------------------|-----------------|
| (Radio 1) 5.2G;D1D    | 4.42     | 20.15       | 24.57      | 0.28642  | 20            | 0.05698                 | 1.00000                       | 0.05698         |
| (Radio 1) 2.4G;BT-EDR | 3.16     | 4.55        | 7.71       | 0.00590  | 20            | 0.00117                 | 1.00000                       | 0.00117         |
| (Radio 2) 5.3G;D1D    | 4.42     | 20.59       | 25.01      | 0.31696  | 20            | 0.06306                 | 1.00000                       | 0.06306         |
|                       |          |             |            |          |               |                         | Sum Ratio                     | 0.12121         |
|                       |          |             |            |          |               |                         | Ratio Limit                   | 1               |