



# FCC RADIO EXPOSURE TEST REPORT

**FCC ID** : UIDW31

**Equipment** : Wireless Router

**Brand Name** : ARRIS

**Model Name** : W31, W30

**Applicant** : ARRIS  
3871 Lakefield Drive Suite 300, Suwanee, Georgia,  
30024 United States

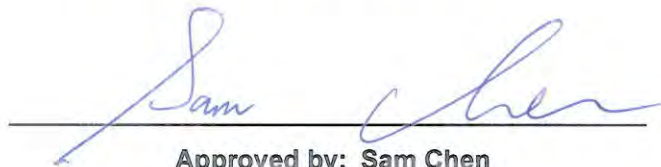
**Manufacturer** : ARRIS  
3871 Lakefield Drive Suite 300, Suwanee, Georgia,  
30024 United States

**Standard** : 47 CFR Part 2.1091

The product was received on Jul. 18, 2018, and testing was started from Jul. 23, 2018 and completed on Dec. 26, 2018. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Sam Chen

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**  
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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TEL : 886-3-656-9065  
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Report Template No.: CB Ver1.0



## Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items          | Result (PASS/FAIL) | Remark |
|---------------|-----------------|---------------------|--------------------|--------|
| 2             | -               | Exposure evaluation | PASS               | -      |

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

**Reviewed by: Sam Chen**

**Report Producer: Cindy Peng**



# 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)<br>802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)<br>802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) |
| 5GHz WLAN              | 5150-5250<br>5250-5350<br>5470-5725<br>5725-5850 | 5180-5250<br>5250-5320<br>5500-5720<br>5745-5825 | 802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)<br>802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)<br>802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)                                      |
| Bluetooth              | 2400-2483.5                                      | 2402-2480                                        | BR / EDR: FHSS (GFSK / $\pi/4$ -DQPSK / 8DPSK)<br>LE: DSSS (GFSK)                                                                                                                                            |

## 1.2 Table for Multiple Listing

The model names in the following table are all refer to the identical product.

| Model Name | Color of Device's Bottom |
|------------|--------------------------|
| W31        | Matte Black              |
| W30        | Silver                   |

From the above models, model name "W31" was selected as representative model for the test and its data was recorded in this report.



### 1.3 Table for Class II Change

This product is an extension of original one reported under Sporton project number: FA842742

Below is the table for the change of the product with respect to the original one.

| Modifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Performance Checking                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| 1. Adding the 802.11ax mode for WLAN 2.4GHz and WLAN 5GHz.<br>2. Adding the 160MHz.<br>3. Adding the WLAN 5GHz band 2 and band 3 (5250~5350 MHz, 5470~5725 MHz) for this device.                                                                                                                                                                                                                                                                                                                             | Maximum Permissible Exposure.                                |
| 4. Adding an adapter (Model Name: NBS42D120350VU).<br>5. Updating the WIFI chip (BCM43684KRFBG) version to B1 from A1. The difference between A1 (original) and B1 (new) as below:<br>(1) No functional RF changes versus A1.<br>(2) MAC/PHY related bug fixes and optimizations.<br>(3) Power and yield optimizations.<br>6. Adding the Master (Extender), Bridge (Client without radar detection) and Client without radar detection modes for WLAN 5GHz band 3 and band 4 (5470~5725 MHz, 5725~5850 MHz). | It doesn't need to verify Maximum Permissible Exposure test. |
| 7. Updating the 802.11ac data rate and data modulation of WLAN 2.4GHz to "MCS 0-11, 1024QAM" from "MCS 0-9, 256QAM".                                                                                                                                                                                                                                                                                                                                                                                         | It doesn't affect the test result.                           |
| 8. Changing the internal structure of housing.<br>9. Changing the housing color to black from white.<br>10. Removing USB port.<br>11. Changing the equipment name to "Wireless Router" from "W31".<br>Based on the modification above.<br>12. Adding a new model name "W30" which the color of device's bottom is silver.                                                                                                                                                                                    | It does not affect the test.                                 |

Note: Maximum Permissible Exposure of other modes are based on original test report.



## 1.4 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 |

Test site Designation No. TW0006 with FCC.

Test site registered number IC 4086D with Industry Canada.

## 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 30 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 (WLAN 2.4GHz)

| Mode     | DG (dBi) | Power (dBm) | EIRP (dBm) | Tolerance (dB) | Tune-up EIRP (dBm) | Tune-up EIRP (W) | Distance (cm) | S (mW/cm <sup>2</sup> ) | S Limit (mW/cm <sup>2</sup> ) |
|----------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|
| 2.4G;G1D | 4.22     | 29.97       | 34.19      | 0.50           | 34.69              | 2.94442          | 30            | 0.26047                 | 1.00000                       |

For Radio 3 (WLAN 5GHz Band 1~2)

| Mode     | DG (dBi) | Power (dBm) | EIRP (dBm) | Tolerance (dB) | Tune-up EIRP (dBm) | Tune-up EIRP (W) | Distance (cm) | S (mW/cm <sup>2</sup> ) | S Limit (mW/cm <sup>2</sup> ) |
|----------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|
| 5.2G;D1D | 5.71     | 29.81       | 35.52      | 0.48           | 36.00              | 3.98107          | 30            | 0.35218                 | 1.00000                       |
| 5.3G;D1D | 5.71     | 23.97       | 29.68      | 0.31           | 29.99              | 0.99770          | 30            | 0.08822                 | 1.00000                       |

For Radio 2 (WLAN 5GHz Band 3~4)

| Mode     | DG (dBi) | Power (dBm) | EIRP (dBm) | Tolerance (dB) | Tune-up EIRP (dBm) | Tune-up EIRP (W) | Distance (cm) | S (mW/cm <sup>2</sup> ) | S Limit (mW/cm <sup>2</sup> ) |
|----------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|
| 5.6G;D1D | 5.82     | 23.95       | 29.77      | 0.22           | 29.99              | 0.99770          | 30            | 0.08822                 | 1.00000                       |
| 5.8G;D1D | 5.82     | 29.93       | 35.75      | 0.25           | 36.00              | 3.98107          | 30            | 0.35218                 | 1.00000                       |

For Radio 4 (Bluetooth)

| Mode       | DG (dBi) | Power (dBm) | EIRP (dBm) | Tolerance (dB) | Tune-up EIRP (dBm) | Tune-up EIRP (W) | Distance (cm) | S (mW/cm <sup>2</sup> ) | S Limit (mW/cm <sup>2</sup> ) |
|------------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|
| 2.4G;BT-BR | 4.12     | 2.95        | 7.07       | 0.50           | 7.57               | 0.00571          | 30            | 0.00050                 | 1.00000                       |
| 2.4G;BT-LE | 4.12     | 2.72        | 6.84       | 0.50           | 7.34               | 0.00542          | 30            | 0.00047                 | 1.00000                       |

Simultaneous Transmission Analysis Mode:

Radio 1 (WLAN 2.4GHz) + Radio 3 (WLAN 5GHz Band 1~2) + Radio 2 (WLAN 5GHz Band 3~4) + Radio 4 (Bluetooth)

| Mode       | DG (dBi) | Power (dBm) | EIRP (dBm) | Tolerance (dB) | Tune-up EIRP (dBm) | Tune-up EIRP (W) | Distance (cm) | S (mW/cm <sup>2</sup> ) | S Limit (mW/cm <sup>2</sup> ) | Ratio (S/Limit) |
|------------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|-----------------|
| 2.4G;G1D   | 4.22     | 29.97       | 34.19      | 0.50           | 34.69              | 2.94442          | 30            | 0.26047                 | 1.00000                       | 0.26047         |
| 5.2G;D1D   | 5.71     | 29.81       | 35.52      | 0.48           | 36.00              | 3.98107          | 30            | 0.35218                 | 1.00000                       | 0.35218         |
| 5.8G;D1D   | 5.82     | 29.93       | 35.75      | 0.25           | 36.00              | 3.98107          | 30            | 0.35218                 | 1.00000                       | 0.35218         |
| 2.4G;BT-BR | 4.12     | 2.95        | 7.07       | 0.50           | 7.57               | 0.00571          | 30            | 0.00050                 | 1.00000                       | 0.00050         |
|            |          |             |            |                |                    |                  |               |                         | Sum Ratio                     | 0.96533         |
|            |          |             |            |                |                    |                  |               |                         | Ratio Limit                   | 1               |

—THE END—