



## SPORTON International Inc.

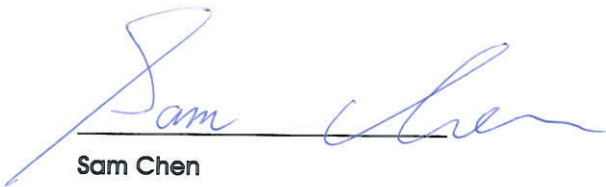
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Project No: CB10505061

### Maximum Permissible Exposure Report

|                        |                                                                                  |
|------------------------|----------------------------------------------------------------------------------|
| Applicant's company    | Xirrus, Inc.                                                                     |
| Applicant Address      | 2101 Corporate Center Drive, Thousand Oaks, CA 91320 USA                         |
| FCC ID                 | SK6-XD2240B                                                                      |
| Manufacturer's company | Lite-On Network Communication (Dongguan) Limited                                 |
| Manufacturer Address   | 30#Keji Rd.,Yin Hu Industrial Area, Qingxi Town, DongGuan City, Guangdong, China |

|                  |                                             |
|------------------|---------------------------------------------|
| Product Name     | Wireless Access Point                       |
| Brand Name       | XIRRUS, AVAYA                               |
| Model Name       | XD2240 -1, WAP9144 -1                       |
| Ref. Standard(s) | 47 CFR FCC Part 2 Subpart J, section 2.1091 |
| Received Date    | Aug. 17, 2015                               |
| Final Test Date  | Apr. 25, 2016                               |
| Submission Type  | Original Equipment                          |



Sam Chen

SPORTON INTERNATIONAL INC.



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## History of This Test Report

| REPORT NO.  | VERSION | DESCRIPTION             | ISSUED DATE  |
|-------------|---------|-------------------------|--------------|
| FA582537-03 | Rev. 01 | Initial issue of report | May 17, 2016 |
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## 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) |
| 5GHz WLAN              | 5150-5250<br>5725-5850 | 5180-5240<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. Table for Multiple List

The brand name and model numbers in the following table are all refer to the identical product.

| Brand Name | Model Name | Description                                                   |
|------------|------------|---------------------------------------------------------------|
| XIRRUS     | XD2240 -1  | All the design is the same, just for different marketing use. |
| AVAYA      | WAP9144 -1 |                                                               |

From the above models, model: XD2240 -1 was selected as representative model for the test and its data was recorded in this report.

### 1.3. 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** = Peak 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 5GHz Band:

Antenna Type : PIFA Ant.

Conducted Power for IEEE 802.11ac MCS0/Nss1 (VHT40): 23.22 dBm

| Distance (cm) | Test Freq. (MHz) | Directional Gain (dBi) | Antenna Gain (numeric) | The maximum combined Average Output Power |          | Power Density (S) (mW/cm <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Test Result |
|---------------|------------------|------------------------|------------------------|-------------------------------------------|----------|-----------------------------------------|--------------------------------------------------|-------------|
|               |                  |                        |                        | (dBm)                                     | (mW)     |                                         |                                                  |             |
| 20            | 5795             | 7.29                   | 5.3580                 | 23.2245                                   | 210.1109 | 0.2240                                  | 1                                                | Complies    |

Note:  $Directional\ Gain = 10 \log \left[ \frac{\sum_{j=1}^{N_{SS}} \left( \sum_{K=1}^{N_{ANT}} g_{j,k} \right)^2}{N_{ANT}} \right]$

For 2.4GHz Band:

Antenna Type : PIFA Ant.

Conducted Power for IEEE 802.11ac MCS0/Nss1 (VHT20): 24.23 dBm

| Distance (cm) | Test Freq. (MHz) | Directional Gain (dBi) | Antenna Gain (numeric) | The maximum combined Average Output Power |          | Power Density (S) (mW/cm <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Test Result |
|---------------|------------------|------------------------|------------------------|-------------------------------------------|----------|-----------------------------------------|--------------------------------------------------|-------------|
|               |                  |                        |                        | (dBm)                                     | (mW)     |                                         |                                                  |             |
| 20            | 2437             | 7.02                   | 5.0350                 | 24.2328                                   | 265.0239 | 0.2656                                  | 1                                                | Complies    |

Note:  $Directional\ Gain = 10 \log \left[ \frac{\sum_{j=1}^{N_{SS}} \left( \sum_{K=1}^{N_{ANT}} g_{j,k} \right)^2}{N_{ANT}} \right]$

For Bluetooth:

Antenna Type : PIFA Ant.

Conducted Power for BR (GFSK) 1 Mbps: 8.89 dBm

| Distance (cm) | Test Freq. (MHz) | Antenna Gain (dBi) | Antenna Gain (numeric) | Average Output Power |        | Power Density (S) (mW/cm <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Test Result |
|---------------|------------------|--------------------|------------------------|----------------------|--------|-----------------------------------------|--------------------------------------------------|-------------|
|               |                  |                    |                        | (dBm)                | (mW)   |                                         |                                                  |             |
| 20            | 2441             | 3.20               | 2.0893                 | 8.8882               | 7.7414 | 0.0032                                  | 1                                                | Complies    |

### Conclusion:

Both of the 2.4GHz WLAN function, 5GHz WLAN function and Bluetooth function can transmit simultaneously, the formula of calculated the MPE is:

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

**CPD = Calculation power density**

**LPD = Limit of power density**

Mode 1. 2.4GHz WLAN (Radio 1) + 2.4GHz WLAN (Radio 2) + Bluetooth (Radio 3)

Therefore, the worst-case situation is  $0.2656 / 1 + 0.2656 / 1 + 0.0032 / 1 = 0.5344$ , which is less than "1".

This confirmed that the device complies.

Mode 2. 2.4GHz WLAN (Radio 1) + 5GHz WLAN (Radio 2) + Bluetooth (Radio 3)

Therefore, the worst-case situation is  $0.2656 / 1 + 0.2240 / 1 + 0.0032 / 1 = 0.4928$ , which is less than "1".

This confirmed that the device complies.

Mode 3. 5GHz WLAN (Radio 1) + 2.4GHz WLAN (Radio 2) + Bluetooth (Radio 3)

Therefore, the worst-case situation is  $0.2240 / 1 + 0.2656 / 1 + 0.0032 / 1 = 0.4928$ , which is less than "1".

This confirmed that the device complies.

Mode 4. 5GHz WLAN (Radio 1) + 5GHz WLAN (Radio 2) + Bluetooth (Radio 3)

Therefore, the worst-case situation is  $0.2240 / 1 + 0.2240 / 1 + 0.0032 / 1 = 0.4512$ , which is less than "1".

This confirmed that the device complies.