

# Radio Exposure Evaluation Report

**FCC ID** : PPQ-WCBN3509R  
**Equipment** : Wireless LAN Module  
**Brand Name** : LITEON  
**Model Name** : WCBN3509R, WCBN3509R(AU)  
**Applicant** : LITE-ON TECHNOLOGY CORP.  
Bldg. C, 90, Chien 1 Road, Chung Ho, New Taipei City  
23585, Taiwan, R.O.C  
**Manufacturer** : LITE-ON TECHNOLOGY (Changzhou) CO., LTD  
A9 Building, No.88 Yanghu Road, Wujin Hi-Tech  
Industrial Development Zone, Changzhou City, Jiangsu  
Province 213100 China  
**Standard** : 47 CFR Part 2.1091

The product was received on Aug. 12, 2019, and testing was started from Aug. 22, 2019 and completed on Aug. 22, 2019. We, SPORTON INTERNATIONAL INC. Hsinhua Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091, KDB447498 D01 General RF Exposure Guidance v06 and shown compliance with the applicable technical standards.

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



Approved by: Allen Lin

**SPORTON INTERNATIONAL INC. Hsinhua Laboratory**

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### Photographs of EUT V02



### History of this test report

| Report No.  | Version | Description  | Issued Date   |
|-------------|---------|--|---------------|
| FA980219-03 | 01      | Initial issue of report  | Mar. 16, 2021 |
| FA980219-03 | 02      | Photographs of EUT was added<br>(for Host system)<br>This report is the latest version replacing<br>for the report issued on Mar. 16, 2021 | Mar. 23, 2021 |
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### Summary of Test Result

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

|  |
|--|
| <b>Declaration of Conformity:</b>  |
| The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. |
| <b>Comments and Explanations:</b>  |
| None   |

Reviewed by: Sam Tsai

Report Producer: Debby Hung



# 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>5500-5700<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 Listing

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

| Model Name    | Description  |
|---------------|--|
| WCBN3509R     | All the models are identical, the difference are "chip model name" and "software". |
| WCBN3509R(AU) |  |

Note: The Model Name WCBN3509R(AU) configuration was pretested and found to be the worst case and measured during the test.

## 1.3 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA980219-01

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

| Modifications   | Performance Checking  |
|---|---|
| <ol style="list-style-type: none"> <li>Master SKU was added</li> <li>Antenna was added (For Limit Module Master DFS)</li> </ol> | The MPE was evaluated, and the test result of original test report was found to be the worst case scenario. |



### 1.4 Testing Location

|  |   |                            |
|--|---|----------------------------|
| <b>Test Lab. : Sporton International Inc. Hsinhua Laboratory</b> |   |                            |
| <input checked="" type="checkbox"/> Hsinhua                      | <b>ADD:</b> No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)         |                            |
| <b>(TAF: 3785)</b>   | <b>TEL:</b> 886-3-327-3456  | <b>FAX:</b> 886-3-327-0973 |
| Test site Designation No. TW1190 with FCC.                       |   |                            |
| <input type="checkbox"/> Wen 33rd.St.                            | <b>ADD:</b> No.14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) |                            |
| <b>(TAF: 3785)</b>   | <b>TEL:</b> 886-3-318-0787  | <b>FAX:</b> 886-3-318-0287 |
| Test site Designation No. TW0008 with FCC.                       |   |                            |

Laboratory number TAF 3785 is a spin-off from the original Laboratory number TAF 1190.

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

#### 2.4GHz WLAN

| 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 | 3.74     | 21.18       | 24.92      | 0.50           | 25.42              | 0.34834          | 20            | 0.06930                 | 1.00000                       |
| 2.4G;D1D | 3.74     | 22.99       | 26.73      | 0.50           | 27.23              | 0.52845          | 20            | 0.10513                 | 1.00000                       |

#### 5GHz WLAN

| 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 | 3.80     | 22.28       | 26.08      | 0.50           | 26.58              | 0.45499          | 20            | 0.09052                 | 1.00000                       |
| 5.3G;D1D | 3.80     | 22.17       | 25.97      | 0.50           | 26.47              | 0.44361          | 20            | 0.08825                 | 1.00000                       |
| 5.6G;D1D | 3.80     | 22.57       | 26.37      | 0.50           | 26.87              | 0.48641          | 20            | 0.09677                 | 1.00000                       |
| 5.8G;D1D | 3.80     | 21.27       | 25.07      | 0.50           | 25.57              | 0.36058          | 20            | 0.07174                 | 1.00000                       |

#### 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-LE  | 3.74     | 7.48        | 11.22      | 0.50           | 11.72              | 0.01486          | 20            | 0.00296                 | 1.00000                       |
| 2.4G;BT-BR  | 3.74     | 7.53        | 11.27      | 0.50           | 11.77              | 0.01503          | 20            | 0.00299                 | 1.00000                       |
| 2.4G;BT-EDR | 3.74     | 7.51        | 11.25      | 0.50           | 11.75              | 0.01496          | 20            | 0.00298                 | 1.00000                       |





Bluetooth+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> ) | Ratio (S/Limit) |
|------------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|-----------------|
| 2.4G;D1D   | 3.74     | 22.99       | 26.73      | 0.50           | 27.23              | 0.52845          | 20            | 0.10513                 | 1.00000                       | 0.10513         |
| 2.4G;BT-BR | 3.74     | 7.53        | 11.27      | 0.50           | 11.77              | 0.01503          | 20            | 0.00299                 | 1.00000                       | 0.00299         |
|            |          |             |            |                |                    |                  |               |                         | Sum Ratio                     | 0.10812         |
|            |          |             |            |                |                    |                  |               |                         | Ratio Limit                   | 1               |

Bluetooth+WLAN 5GHz

| 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) |
|------------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|-----------------|
| 5.6G;D1D   | 3.80     | 22.57       | 26.37      | 0.50           | 26.87              | 0.48641          | 20            | 0.09677                 | 1.00000                       | 0.09677         |
| 2.4G;BT-BR | 3.74     | 7.53        | 11.27      | 0.50           | 11.77              | 0.01503          | 20            | 0.00299                 | 1.00000                       | 0.00299         |
|            |          |             |            |                |                    |                  |               |                         | Sum Ratio                     | 0.09976         |
|            |          |             |            |                |                    |                  |               |                         | Ratio Limit                   | 1               |

—————THE END—————