

# Radio Exposure Evaluation Report

**FCC ID** : PPQ-WCBN3516A  
**Equipment** : 802.11 a/b/g/n 1x1 + BT5.0 + Zigbee(15.4) IoT Module  
**Brand Name** : LITE-ON  
**Model Name** : WCBN3516A  
**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 Jan. 31, 2019, and testing was started from Feb. 21, 2019 and completed on Mar. 05, 2019. 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 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 United States government.

The test results in this 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: Allen Lin

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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**Photographs of EUT V01**



### History of this test report

Report No.	Version	Description	Issued Date
FA912411	01	Initial issue of report	Mar. 29, 2019



### 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) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5240 5260-5320 5500-5700 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
Bluetooth	2400-2483.5	2405-2480	LE: DSSS (GFSK)
ZigBee	2400-2483.5	2405-2480	DSSS (O-QPSK)

## 1.2 Testing Location

Testing Location			
<input checked="" type="checkbox"/>	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)	
		TEL : 886-3-327-3456	FAX : 886-3-327-0973
Test site Designation No. TW1190 with FCC.			
<input type="checkbox"/>	JHUBEI	ADD : No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County, Taiwan (R.O.C.)	
		TEL : 886-3-656-9065	FAX : 886-3-656-9085
Test site Designation No. TW0006 with FCC.			

## 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:

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

**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

### WLAN 2.4G Function:

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	4.60	19.39	23.99	0.50	24.49	0.28119	20	0.05594	1.00000
2.4G;D1D	4.60	21.94	26.54	0.50	27.04	0.50582	20	0.10063	1.00000

### WLAN 5G Function:

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	4.30	20.46	24.76	0.50	25.26	0.33574	20	0.06679	1.00000
5.3G;D1D	4.30	20.41	24.71	0.50	25.21	0.33189	20	0.06603	1.00000
5.6G;D1D	4.30	20.91	25.21	0.50	25.71	0.37239	20	0.07408	1.00000
5.8G;D1D	4.30	16.02	20.32	0.50	20.82	0.12078	20	0.02403	1.00000

### Zigbee Function:

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	4.70	2.26	6.96	0.50	7.46	0.00557	20	0.00111	1.00000

### Bluetooth Function:

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	4.70	1.74	6.44	0.50	6.94	0.00494	20	0.00098	1.00000



**WLAN 2.4G + Bluetooth Function:**

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	4.60	21.94	26.54	0.50	27.04	0.50582	20	0.10063	1.00000	0.10063
2.4G;BT-LE	4.70	1.74	6.44	0.50	6.94	0.00494	20	0.00098	1.00000	0.00098
									Sum Ratio	0.10161
									Ratio Limit	1

**WLAN 5G + Bluetooth Function:**

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	4.30	20.91	25.21	0.50	25.71	0.37239	20	0.07408	1.00000	0.07408
2.4G;BT-LE	4.70	1.74	6.44	0.50	6.94	0.00494	20	0.00098	1.00000	0.00098
									Sum Ratio	0.07506
									Ratio Limit	1

**WLAN 2.4G + Zigbee**

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	4.60	21.94	26.54	0.50	27.04	0.50582	20	0.10063	1.00000	0.10063
2.4G;G1D	4.70	2.26	6.96	0.50	7.46	0.00557	20	0.00111	1.00000	0.00111
									Sum Ratio	0.10174
									Ratio Limit	1

**WLAN 5G + Zigbee**

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	4.30	20.91	25.21	0.50	25.71	0.37239	20	0.07408	1.00000	0.07408
2.4G;G1D	4.70	2.26	6.96	0.50	7.46	0.00557	20	0.00111	1.00000	0.00111
									Sum Ratio	0.07519
									Ratio Limit	1

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