

**IEEE C95.1 2005
KDB 447498 D01 V06
47 C.F.R. Part 1, Subpart I, Section 1.1310
47 C.F.R. Part 2, Subpart J, Section 2.1091**

RF EXPOSURE REPORT

For

Wi-Fi (11a/b/g/n/ac 2Tx2R) + BT (V4.1 LE) SDIO Combo Module

Model: WCBN4503M

Trade Name: LITE-ON

Issued to

**Lite-On Technology Corp.
Bldg. C, 90, Chien 1 Road, Chung Ho, New Taipei City 23585, Taiwan, R.O.C**

Issued by

**Compliance Certification Services Inc.
No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City 24891, Taiwan. (R.O.C.)
<http://www.ccsrf.com>
service@ccsrf.com
Issued Date: January 28, 2016**



Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	January 28, 2016	Initial Issue	ALL	Doris Chu
01	February 22, 2016	1. Modify standards	P.1	Doris Chu

TABLE OF CONTENTS

1. LIMIT	4
2. EUT SPECIFICATION.....	4
3. TEST RESULTS.....	7
4. MAXIMUM PERMISSIBLE EXPOSURE	8

1. LIMIT

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

2. EUT SPECIFICATION

Product	Wi-Fi (11a/b/g/n/ac 2Tx2R) + BT (V4.1 LE) SDIO Combo Module
Model Number	WCBN4503M
Model Discrepancy	N/A
Trade Name	LITE-ON
Frequency band (Operating)	☒ Bluetooth 2.1 + EDR / 4.0: 2402 ~ 2480 MHz 802.11b/g/n HT20: 2.412GHz ~ 2.462GHz 802.11n HT40: 2.422GHz ~ 2.452GHz 802.11a/n HT20: 5.180GHz ~ 5.320GHz / 5.500 ~ 5.825GHz 802.11n HT40: 5.190GHz ~ 5.310GHz / 5.510 ~ 5.795GHz 802.11ac VHT80: 5.210GHz ~ 5.290GHz / 5.530 ~ 5.775GHz ☐ Others
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
Exposure classification	☐ Occupational/Controlled exposure ($S = 5\text{mW}/\text{cm}^2$) ☒ General Population/Uncontrolled exposure ($S=1\text{mW}/\text{cm}^2$)

Antenna Specification	BT 1. Walsin / RFMTA401029IMLB703 PIFA Antenna / 3.79 dBi 2. Walsin / RFMTA34071AIMAB701 PIFA Antenna / 3.68 dBi 3. Walsin / RFMTA34071AIMAB702 PIFA Antenna / 3.6 dBi 4. Walsin / RFMTA34071AIMAB703 PIFA Antenna / 2.39 dBi 2.4G 1. Walsin / RFMTA401029IMLB703 PIFA Antenna / 1.93 dBi 2. Walsin / RFMTA340770IMLB701 PIFA Antenna / 1.81 dBi 3. Walsin / RFMTA340740IMLB701 PIFA Antenna / 1.87 dBi 4. Walsin / RFMTA340770IMLB701 PIFA Antenna / 1.91 dBi 5. Walsin / RFMTA340745IMLB701 PIFA Antenna / 1.78 dBi 6. Walsin / RFMTA34071AIMLB701 PIFA Antenna / 1.74 dBi 7. Walsin / RFMTA340745IMLB701 PIFA Antenna / 1.61 dBi 5G 1. Walsin / RFMTA401029IMLB703 PIFA Antenna / 3.77 dBi 2. Walsin / RFMTA340770IMLB701 PIFA Antenna / 3.68 dBi 3. Walsin / RFMTA340740IMLB701 PIFA Antenna / 3.24 dBi 4. Walsin / RFMTA340770IMLB701 PIFA Antenna / 3.68 dBi 5. Walsin / RFMTA340745IMLB701 PIFA Antenna / 2.76 dBi 6. Walsin / RFMTA34071AIMLB701 PIFA Antenna / 2.75 dBi 7. Walsin / RFMTA340745IMLB701 PIFA Antenna / 2.40 dBi BT: Antenna Gain : 3.79 dBi (Numeric gain: 2.39) Worst 2.4GHz: Antenna Gain : 1.93 dBi (Numeric gain: 1.56) Worst 5GHz: Antenna Gain : 3.77 dBi (Numeric gain: 2.38) Worst 2.4GHz: Directional gain = 1.93 dBi +10log (2) = 4.94 dBi (Numeric gain: 3.12) 5GHz: Directional gain = 3.77 dBi +10log (2) = 6.78 dBi (Numeric gain: 4.76)
-----------------------	---

Maximum Average output power	Bluetooth Mode : 7.46 dBm (5.572 mW) IEEE 802.11b Mode: 21.09 dBm (128.529 mW) IEEE 802.11g Mode: 19.14 dBm (82.035 mW) IEEE 802.11n HT 20 Mode: 20.86 dBm (121.899 mW) IEEE 802.11n HT 40 Mode: 22.61 dBm (182.390 mW) IEEE 802.11a Mode: 16.61 dBm (45.814 mW) IEEE 802.11n HT20 Mode: 18.11 dBm (64.714 mW) IEEE 802.11n HT40 Mode: 17.62 dBm (57.810 mW) IEEE 802.11ac VHT80 Mode: 14.57 dBm (28.642 mW)
Maximum Tune up Power	Bluetooth Mode : 9.00 dBm (7.943 mW) IEEE 802.11b Mode: 23.00 dBm (199.526 mW) IEEE 802.11g Mode: 21.00 dBm (125.893 mW) IEEE 802.11n HT 20 Mode: 22.50 dBm (177.828 mW) IEEE 802.11n HT 40 Mode: 24.50 dBm (281.838 mW) IEEE 802.11a Mode: 18.50 dBm (70.795 mW) IEEE 802.11n HT20 Mode: 20.00 dBm (100.000 mW) IEEE 802.11n HT40 Mode: 19.50 dBm (89.125 mW) IEEE 802.11ac VHT80 Mode: 16.50 dBm (44.668 mW)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

3. TEST RESULTS

No non-compliance noted.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{377}$

Where E = Field strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

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

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = d \text{ (m)} / 100$$

Yields

$$S = \frac{30 \times (P / 1000) \times G}{377 \times (d / 100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \textbf{Equation 1}$$

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

4. MAXIMUM PERMISSIBLE EXPOSURE

Substituting the MPE safe distance using $d = 20$ cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

Bluetooth mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
40	2441	7.943	2.39	20	0.0038	1

IEEE 802.11b mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
6	2437	199.526	1.56	20	0.0619	1

IEEE 802.11g mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
6	2437	125.893	1.56	20	0.0391	1

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
6	2437	177.828	3.12	20	0.1104	1

IEEE 802.11n HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
6	2437	281.838	3.12	20	0.1750	1

IEEE 802.11a mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
116	5580	70.795	2.38	20	0.0335	1

IEEE 802.11a HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
149	5745	100.000	4.76	20	0.0947	1

IEEE 802.11a HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
46	5230	89.125	4.76	20	0.0844	1

IEEE 802.11ac VHT80 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
58	5290	44.668	4.76	20	0.0423	1