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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

Product	Model
Wi-Fi (11a/b/g/n/ac 2Tx2R)+BT (V4.1LE) USB Combo Module	WCBN4510R
	WCBN4510R(2M)
	WCBN4512R
Wi-Fi (11a/b/g/n 2Tx2R)+BT (V4.1LE) USB Combo Module	WCBN4510R(32U)
	WCBN4510R(32U2M)

Trade Name: LITE-ON

Issued to

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Issued by

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Revision History

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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 / Model Number	Product	Model
	Wi-Fi (11a/b/g/n/ac 2Tx2R)+BT (V4.1LE) USB Combo Module	WCBN4510R
		WCBN4510R(2M)
		WCBN4512R
	Wi-Fi (11a/b/g/n 2Tx2R)+BT (V4.1LE) USB Combo Module	WCBN4510R(32U)
		WCBN4510R(32U2M)
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 = 5mW/cm ²) ☒ General Population/Uncontrolled exposure (S=1mW/cm ²)	

Antenna Specification	BT 1. Walsin / PIFA Antenna RFMTA401029IMLB701 / 3.79dBi 2. Walsin / Dipole Antenna SOUND BAR / 4.18dBi 2.4G 1. Walsin / PIFA Antenna RFMTA401029IMLB701 / 1.93dBi 2. Walsin / Dipole Antenna SOUND BAR / 3.9dBi 3. Walsin / PIFA Antenna Integral Antenna1 / 1.92dBi Integral Antenna2 / 1.91dBi 5G 1. Walsin / PIFA Antenna RFMTA401029IMLB701 / 3.77dBi 2. Walsin / Dipole Antenna SOUND BAR / 6.11dBi 3. Walsin / PIFA Antenna Integral Antenna1 / 1.74dBi Integral Antenna2 / 1.74dBi BT: Antenna Gain : 3.79 dBi (Numeric gain: 2.39) Worst 2.4GHz: Antenna Gain : 3.90 dBi (Numeric gain: 2.45) Worst 5GHz: Antenna Gain : 6.11 dBi (Numeric gain: 4.08) Worst 2.4GHz: Directional gain = 3.90 dBi +10log (2) = 6.91 dBi (Numeric gain: 4.91) 5GHz: Directional gain = 6.11 dBi +10log (2) = 9.12 dBi (Numeric gain: 8.17)
Maximum Average output power	Bluetooth Mode : 8.35 dBm (6.839 mW) IEEE 802.11b Mode: 17.53 dBm (56.624 mW) IEEE 802.11g Mode: 16.97 dBm (49.774 mW) IEEE 802.11n HT 20 Mode: 19.92 dBm (98.175 mW) IEEE 802.11n HT 40 Mode: 18.06 dBm (63.973 mW) IEEE 802.11a Mode: 15.25 dBm (33.497 mW) IEEE 802.11n HT20 Mode: 17.87 dBm (61.235 mW) IEEE 802.11n HT40 Mode: 18.10 dBm (64.565 mW) IEEE 802.11ac VHT80 Mode: 15.50 dBm (35.481 mW)
Maximum Tune up Power	Bluetooth Mode : 10.00 dBm (10.000 mW) IEEE 802.11b Mode: 19.50 dBm (89.125 mW) IEEE 802.11g Mode: 18.50 dBm (70.795 mW) IEEE 802.11n HT 20 Mode: 21.50 dBm (141.254 mW) IEEE 802.11n HT 40 Mode: 20.00 dBm (100.000 mW) IEEE 802.11a Mode: 17.00 dBm (50.119 mW) IEEE 802.11n HT20 Mode: 19.50 dBm (89.125 mW) IEEE 802.11n HT40 Mode: 20.00 dBm (100.000 mW) IEEE 802.11ac VHT80 Mode: 17.50 dBm (56.234 mW)

Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A
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Remark:

Model Discrepancy :

Model	Main Chipset	Function	Antenna Mode
WCBN4510R	Media Tek MT7662U	Wi-Fi (11a/b/g/n/ac) + Bluetooth	Triple External Antennas for WiFi&BT
WCBN4510R(2M)	Media Tek MT7662U	Wi-Fi (11a/b/g/n/ac) + Bluetooth	Two Metal Antenna for WiFi Single External Antenna for BT
WCBN4512R	Media Tek MT7662U	Wi-Fi (11a/b/g/n/ac) + Bluetooth	Two Metal Antenna for WiFi Single External Antenna for BT
WCBN4510R(32U)	Media Tek MT7632U	Wi-Fi (11a/b/g/n) + Bluetooth	Triple External Antennas for WiFi&BT
WCBN4510R(32U2M)	Media Tek MT7632U	Wi-Fi (11a/b/g/n) + Bluetooth	Two Metal Antenna for WiFi Single External Antenna for BT

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:

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

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)
1	2402	10.000	2.39	20	0.0048	1

IEEE 802.11b mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
1	2412	89.125	2.45	20	0.0435	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	70.795	2.45	20	0.0345	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	141.254	4.91	20	0.1380	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	100.000	4.91	20	0.0977	1

IEEE 802.11a mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
56	5280	50.119	4.08	20	0.0407	1

IEEE 802.11a HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
140	5700	89.125	8.17	20	0.1449	1

IEEE 802.11a HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
54	5270	100.000	8.17	20	0.1626	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	56.234	8.17	20	0.0914	1