IEEE C95.1
KDB447498 D03
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	WCBN4507R
	WCBN4508R
Wi-Fi (11a/b/g/n 2Tx2R)+BT (V4.1LE) USB Combo Module	WCBN4507R(32U)
	WCBN4508R(32U)

Trade Name: LITE-ON

Issued to

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

Issued by

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Testing Laboratory
1309

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	September 2, 2015	Initial Issue	ALL	Doris Chu

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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	WCBN4507R
		WCBN4508R
	Wi-Fi (11a/b/g/n 2Tx2R)+BT (V4.1LE) USB Combo Module	WCBN4507R(32U)
		WCBN4508R(32U)
Model Discrepancy	MT7662U – 802.11abgn + ac + BT (WCBN4507R / WCBN4508R) MT7632U – 802.11abgn + BT (WCBN4507R(32U) / WCBN4508R(32U))	
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. Tyco PCB Antenna 2195488-1: Gain: 0.32 dBi 2. Walsin PCB Antenna RFPCA311147IMAB701: Gain: 4.37 dBi 2.4G 1. Tyco PCB Antenna 2195488-2: 4.06 dBi 2195488-3: 4.92 dBi 2. Walsin PCB Antenna RFPCA311131IMLB701: 4.94 dBi RFPCA311148IMLB701: 4.12 dBi 5G 1. Tyco PCB Antenna 2195488-2: 0.96 dBi 2195488-3: 3.54 dBi 2. Walsin PCB Antenna RFPCA311131IMLB701: 5.54 dBi RFPCA311148IMLB701: 5.53 dBi BT: Antenna Gain : 4.37 dBi (Numeric gain: 2.74) Worst 2.4GHz: Antenna Gain : 4.94 dBi (Numeric gain: 3.12) Worst 5GHz: Antenna Gain : 5.54 dBi (Numeric gain: 3.58) Worst 2.4GHz: Directional gain = 4.94 dBi +10log (2) = 7.95 dBi (Numeric gain: 6.24) 5GHz: Directional gain = 5.54 dBi +10log (2) = 8.55 dBi (Numeric gain: 7.16)
Maximum Average output power	Bluetooth Mode : 9.50 dBm (8.913 mW) IEEE 802.11b Mode: 16.85 dBm (48.417 mW) IEEE 802.11g Mode: 15.95 dBm (39.355 mW) IEEE 802.11n HT 20 Mode: 18.82 dBm (76.208 mW) IEEE 802.11n HT 40 Mode: 16.87 dBm (48.641 mW) IEEE 802.11a Mode: 14.86 dBm (30.620 mW) IEEE 802.11n HT20 Mode: 17.78 dBm (59.979 mW) IEEE 802.11n HT40 Mode: 15.79 dBm (37.931 mW) IEEE 802.11ac VHT80 Mode: 15.76 dBm (37.670 mW)

Maximum Tune up Power	Bluetooth Mode : 11.00 dBm (12.589 mW) IEEE 802.11b Mode: 18.00 dBm (63.096 mW) IEEE 802.11g Mode: 17.00 dBm (50.119 mW) IEEE 802.11n HT 20 Mode: 20.00 dBm (100.000 mW) IEEE 802.11n HT 40 Mode: 18.00 dBm (63.096 mW) IEEE 802.11a Mode: 16.00 dBm (39.811 mW) IEEE 802.11n HT20 Mode: 19.00 dBm (79.433 mW) IEEE 802.11n HT40 Mode: 17.00 dBm (50.119 mW) IEEE 802.11ac VHT80 Mode: 17.00 dBm (50.119 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 (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

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

Where d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

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 / cm^2

Bluetooth mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
1	2402	12.589	2.74	20	0.0069	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	63.096	3.12	20	0.0392	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	50.119	3.12	20	0.0311	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	100	6.24	20	0.1242	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	63.096	6.24	20	0.0784	1

IEEE 802.11a mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
36	5180	39.811	3.58	20	0.0284	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	79.433	7.16	20	0.1132	1

IEEE 802.11a HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
159	5795	50.119	7.16	20	0.0714	1

IEEE 802.11ac VHT80 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
122	5610	50.119	7.16	20	0.0714	1