

**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

802.11a/b/g/n 2T2R Wireless LAN USB Module

Model: WN4519R

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.
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Issued Date: February 03, 2017**



Testing Laboratory
1309

Revision History

Rev.		Issue Date		Revisions	Effect Page	Revised By
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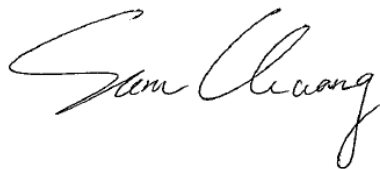
1. TEST RESULT CERTIFICATION

We hereby certify that:

The equipment has been tested by Compliance Certification Services Inc., and found compliance with the requirement of the applicable standards. The test record, data evaluation and Equipment under Test (EUT) configurations represented herein are true and accurate accounts of the measurement of the sample's RF characteristics under the conditions specified in this report.

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
IEEE C95.1 2005 KDB 447498 D03 47 C.F.R. Part 1, Subpart I, Section 1.1310 47 C.F.R. Part 2, Subpart J, Section 2.1091	No non-compliance noted

Approved by:



Sam Chuang
Manager
Compliance Certification Services Inc.

Prepared by:



Angel Cheng
Report coordinator
Compliance Certification Services Inc.

2. 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.

3. EUT SPECIFICATION

Product	802.11a/b/g/n 2T2R Wireless LAN USB Module
Model	WN4519R
Brand name	LITE-ON
Model Discrepancy	N/A
Frequency band (Operating)	☒ 802.11b/g/n HT20: 2412MHz ~ 2462MHz 802.11n HT40: 2422MHz ~ 2452MHz 802.11a/n HT20: 5180MHz ~ 5700MHz / 5745MHz ~ 5825MHz 802.11n HT40: 5190MHz ~ 5670MHz / 5755MHz ~ 5795MHz ☐ 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	2.4G Auden PIFA Antenna T-0082 Ant 1: Gain: 1.53dBi Ant 2: Gain: -0.29dBi PSA PIFA Antenna RFMTA200700NNLB002 Ant 1: Gain: 1.53dBi Ant 2: Gain: -0.29dBi 5G Auden PIFA Antenna T-0082 Ant 1: Gain: 2.99dBi Ant 2: Gain: 2.75dBi PSA PIFA Antenna RFMTA200700NNLB002 Ant 1: Gain: 2.62dBi Ant 2: Gain: 2.49dBi 2.4GHz: Antenna Gain : 1.53 dBi (Numeric gain: 1.42) Worst 5GHz: Antenna Gain : 2.99 dBi (Numeric gain: 1.99) Worst 2.4GHz: Directional gain = 1.53 dBi +10log (2) = 4.54 dBi (Numeric gain: 2.84) 5GHz: Directional gain = 2.99 dBi +10log (2) = 6.00 dBi (Numeric gain: 3.98)
Maximum Average output power	IEEE 802.11b Mode: 17.85 dBm (60.954 mW) IEEE 802.11g Mode: 17.47 dBm (55.847 mW) IEEE 802.11n HT 20 Mode: 16.60 dBm (45.709 mW) IEEE 802.11n HT 40 Mode: 15.66 dBm (36.813 mW) IEEE 802.11a Mode: 18.36 dBm (68.549 mW) IEEE 802.11n HT 20 Mode: 19.34 dBm (85.901 mW) IEEE 802.11n HT 40 Mode: 19.53 dBm (89.743 mW)
Maximum Tune up Power	IEEE 802.11b Mode: 18.50 dBm (70.795 mW) IEEE 802.11g Mode: 18.50 dBm (70.795 mW) IEEE 802.11n HT 20 Mode: 17.50 dBm (56.234 mW) IEEE 802.11n HT 40 Mode: 16.50 dBm (44.668 mW) IEEE 802.11a Mode: 18.50 dBm (70.795 mW) IEEE 802.11n HT 20 Mode: 19.50 dBm (89.125 mW) IEEE 802.11n HT 40 Mode: 20.00 dBm (100.000 mW)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Notes: For 2.4GHz and 5GHz could not be use as transmit/receive at the same time.

4. 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

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

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

5. 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

IEEE 802.11b mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
6	2437	70.795	1.42	20	0.0200	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	1.42	20	0.0200	1

IEEE 802.11n HT 20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
11	2463	56.234	2.84	20	0.0318	1

IEEE 802.11n HT 40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
6	2437	44.668	2.84	20	0.0252	1

IEEE 802.11a mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
165	5825	70.795	1.99	20	0.0280	1

IEEE 802.11n HT 20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
165	5825	89.125	3.98	20	0.0706	1

IEEE 802.11n HT 40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm2)
110	5550	100	3.98	20	0.0792	1

6. SIMULTANEOUS TRANSMISSION SAR ANALYSIS

Both of the 2.4GHz, 5GHz can transmit simultaneously, the formula of calculated the MPE is:

$$\text{CPD1} / \text{LPD1} + \text{CPD2} / \text{LPD2} + \text{CPD3} / \text{LPD3} \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

2.4GHz + 5GHz

Therefore, the worst-case situation is $0.0318 / 1 + 0.0792 / 1 = 0.111$, which is less than "1".