

**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

802.11n, 2.4G 2T2R Wireless LAN USB Module

Model: WN4645R

Trade Name: SONY

Issued to

**Sony Corporation
1-7-1 Konan Minato-ku, Tokyo 108-0075 Japan**

Issued by

**Compliance Certification Services Inc.
Wugu Laboratory
No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City 24891, Taiwan. (R.O.C.)
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Testing Laboratory
1309

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	July 3, 2017	Initial Issue	ALL	Vicki Huang
01	July 20, 2017	1. Revise antenna specification.	P.6	Angel Cheng

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1. TEST RESULT CERTIFICATION

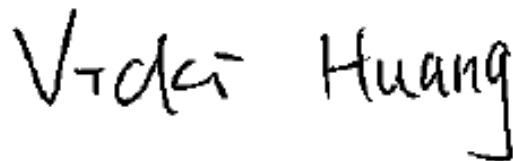
We hereby certify that:

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.

Tested by:


Vicki Huang
 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	802.11n, 2.4G 2T2R Wireless LAN USB Module
Model	WN4645R
Brand name	SONY
Model Discrepancy	N/A
Frequency band (Operating)	<input checked="" type="checkbox"/> 802.11b/g/n HT20: 2412MHz ~ 2462MHz 802.11n HT40: 2422MHz ~ 2452MHz <input type="checkbox"/> Others
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm ²) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm ²)

<p>Antenna Specification</p>	<p>2.4GHz Band Walsin / RFMTA200700NNLB002 Antenna 1: Gain: 1.53dBi Antenna 2: Gain: -0.29dBi</p> <p>2.4GHz: Antenna Gain : 1.53 dBi (Numeric gain: 1.42) Worst</p> <p>Directional gain = 0.71 dBi (Numeric gain: 1.18)</p> <p><i>Directional gain=</i> $10\log(((10^{(Ant1/10)}+10^{(Ant2/10)})/2))=10\log(((10^{(1.53/10)}+10^{(-0.29/10)})/2))=0.71\text{ dBi}$</p>
<p>Maximum Average output power</p>	<p>IEEE 802.11b Mode: 17.68 dBm (58.614 mW) IEEE 802.11g Mode: 17.98 dBm (62.806 mW) IEEE 802.11n HT 20 Mode: 19.31 dBm (85.310 mW) IEEE 802.11n HT 40 Mode: 19.82 dBm (95.940 mW)</p>
<p>Maximum Tune up Power</p>	<p>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: 20.00 dBm (100.000 mW) IEEE 802.11n HT 40 Mode: 20.50 dBm (112.202 mW)</p>
<p>Evaluation applied</p>	<p><input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A</p>

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:

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

Changing to units of mW and cm, using:

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

$$d (cm) = d(m) / 100$$

Yields

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

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)
6	2437	100	1.18	20	0.0235	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	112.202	1.18	20	0.0263	1