RF EXPOSURE REPORT

REPORT NO.:	SA130930E04
MODEL NO.:	WRT1900AC
FCC ID:	Q87-WRT1900AC
RECEIVED:	Sep. 30, 2013
TESTED:	Oct. 09, 2013 and Jan. 17 to 22, 2014
ISSUED:	Feb. 14, 2014

APPLICANT:	Linksys LLC
ADDRESS:	131 Theory Drive Irvine California 92617 United States

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
LAB ADDRESS:	No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (1):	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

This report should not be used by the client to claim product certification, approval, or endorsement by any government agencies.

TABLE OF CONTENTS

RELEASE CONTROL RECORD 3
1. CERTIFICATION 4
2. RF EXPOSURE LIMIT 5
3. MPE CALCULATION FORMULA 5
4. CLASSIFICATION 5
5. ANTENNA GAIN 6
6. CALCULATION RESULT OF MAXIMUM CONDUCTED POWER 7

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
SA130930E04	Original release	Feb. 14, 2014

1. CERTIFICATION

PRODUCT:	Linksys Smart Wi-Fi Router
BRAND NAME:	Linksys
MODEL NO.:	WRT1900AC
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	Linksys LLC
TESTED DATE:	Oct. 09, 2013 and Jan. 17 to 22, 2014
STANDARDS:	FCC Part 2 (Section 2.1091)
	FCC OET Bulletin 65, Supplement C (01-01)
	IEEE C95.1

The above equipment (Model: WRT1900AC) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : _____ , **DATE:** *Feb. 14, 2014*
(Lori Chung, Specialist)

APPROVED BY : _____ , **DATE:** *Feb. 14, 2014*
(May Chen, Manager)

2. RF EXPOSURE LIMIT

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

FREQUENCY RANGE (MHz)	ELECTRIC FIELD STRENGTH (V/m)	MAGNETIC FIELD STRENGTH (A/m)	POWER DENSITY (mW/cm^2)	AVERAGE TIME (minutes)
LIMITS FOR GENERAL POPULATION / UNCONTROLLED EXPOSURE				
300-1500	…	…	F/1500	30
1500-100,000	…	…	1.0	30

F = Frequency in MHz

3. MPE CALCULATION FORMULA

$Pd = (Pout*G) / (4*pi*r^2)$

where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

pi = 3.1416

r = distance between observation point and center of the radiator in cm

4. CLASSIFICATION

The antenna of this product, under normal use condition, is at least 27cm away from the body of the user. So, this device is classified as **Mobile Device**.

5. ANTENNA GAIN

The antennas provided to the EUT, please refer to the following table:

Transmitter Circuit	Brand	Gain (dBi)	Cable Loss (dB)	Net Gain (dBi)	Frequency Range (GHz to GHz)	Antenna Type	Connecter Type
Chain (0)	LINKSYS	2.5	1	1.5	2.4 ~ 2.4835	DIPOLE	R-SMA
		2.6	1.6	1	5.15 ~ 5.25		
		3.8	1.9	1.9	5.725 ~ 5.85		
Chain (1)	LINKSYS	2.5	1	1.5	2.4 ~ 2.4835	DIPOLE	R-SMA
		2.6	1.5	1.1	5.15 ~ 5.25		
		3.8	2.1	1.7	5.725 ~ 5.85		
Chain (2)	LINKSYS	2.5	1	1.5	2.4 ~ 2.4835	DIPOLE	R-SMA
		2.6	1.5	1.1	5.15 ~ 5.25		
		3.8	2.1	1.7	5.725 ~ 5.85		
Chain (3)	LINKSYS	2.5	0.5	2	2.4 ~ 2.4835	DIPOLE	R-SMA
		2.6	0.9	1.7	5.15 ~ 5.25		
		3.8	1.6	2.2	5.725 ~ 5.85		

6. CALCULATION RESULT OF MAXIMUM CONDUCTED POWER

For 15.247 (2.4GHz):

802.11b:

FREQUENCY BAND (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
2412 - 2462	838.786	7.65	27	0.53298	1.00

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 7.65dBi.

802.11g:

FREQUENCY BAND (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
2412 - 2462	664.545	7.65	27	0.42227	1.00

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 7.65dBi.

802.11n (HT20):

FREQUENCY BAND (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
2412 - 2462	622.703	7.65	27	0.39568	1.00

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 7.65dBi.

802.11n (HT40):

FREQUENCY BAND (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
2422 - 2452	162.982	7.65	27	0.10356	1.00

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 7.65dBi.

For 15.247 (5GHz):

802.11a:

FREQUENCY BAND (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
5745 - 5825	487.878	7.9	27	0.32838	1.00

NOTE: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20}$)^2 / 4] = 7.9dBi.

802.11ac (VHT20):

FREQUENCY BAND (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
5745 - 5825	608.021	7.9	27	0.40924	1.00

NOTE: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20}$)^2 / 4] = 7.9dBi.

802.11ac (VHT40):

FREQUENCY BAND (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
5755 - 5795	416.829	7.9	27	0.28056	1.00

NOTE: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20}$)^2 / 4] = 7.9dBi.

802.11ac (VHT80):

FREQUENCY BAND (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
5775	460.019	7.9	27	0.30963	1.00

NOTE: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20}$)^2 / 4] = 7.9dBi.

For 15.407 (5GHz):
For 3TX:

802.11a:

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
5180 - 5240	38.122	6.08	27	0.01687	1.00

NOTE: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)^2 / 3] = 6.08dBi.

802.11ac (VHT20):

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
5180 - 5240	39.293	6.08	27	0.01739	1.00

NOTE: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)^2 / 3] = 6.08dBi.

802.11ac (VHT40):

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
5190 - 5230	46.905	6.08	27	0.02076	1.00

NOTE: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)^2 / 3] = 6.08dBi.

802.11ac (VHT80):

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
5210	45.611	6.08	27	0.02019	1.00

NOTE: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20}$)^2 / 3] = 6.08dBi.

For 4TX:

802.11a:

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
5180 - 5240	29.597	7.25	27	0.01715	1.00

NOTE: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20}$)^2 / 4] = 7.25dBi.

802.11ac (VHT20):

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
5180 - 5240	31.158	7.25	27	0.01806	1.00

NOTE: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20}$)^2 / 4] = 7.25dBi.

802.11ac (VHT40):

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
5190 - 5230	36.330	7.25	27	0.02105	1.00

NOTE: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20}$)^2 / 4] = 7.25dBi.

802.11ac (VHT80):

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
5210	33.909	7.25	27	0.01965	1.00

NOTE: Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20}$)^2 / 4] = 7.25dBi.

CONCLUSION:

Both of the WLAN (2.4GHz & 5GHz) can transmit simultaneously, the formula of calculated the MPE is:

$CPD_1 / LPD_1 + CPD_2 / LPD_2$ + ……etc. < 1
CPD = Calculation power density
LPD = Limit of power density

Therefore, the worst-case situation is 0.53298 / 1 + 0.40924 / 1= 0.942, which is less than “1”. This confirmed that the device comply with FCC 1.1310 MPE limit.

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