



RF EXPOSURE REPORT

REPORT NO.: SA110718E01 R1

MODEL NO.: RT-N53

FCC ID: MSQ-RTN53

APPLICANT: ASUSTEK Computer Inc.

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Taiwan.

ISSUED BY: Bureau Veritas Consumer Products Services
(H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
SA110718E01	Original release	Aug. 19, 2011
SA110718E01 R1	Modified the maximum peak output power test	Sep. 15, 2011



1. CERTIFICATION

PRODUCT: ASUS Dual band Wireless N Router
BRAND NAME: ASUS
MODEL NO.: RT-N53
TEST SAMPLE: R&D SAMPLE
APPLICANT: ASUSTEK Computer Inc.
STANDARDS: FCC Part 2 (Section 2.1091)
FCC OET Bulletin 65, Supplement C (01-01)
IEEE C95.1

The above equipment (Model: RT-N53) 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:** Sep. 15, 2011
(Claire Kuan, Specialist)

APPROVED BY :  , **DATE:** Sep. 15, 2011
(May Chen, Deputy 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

$$P_d = (P_{out} * G) / (4 * \pi * r^2)$$

where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 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 20cm away from the body of the user. So, this device is classified as **Mobile Device**.

5. ANTENNA GAIN

There are two antennas provided to this EUT, please refer to the following table:

Transmitter Circuit	Brand	Antenna Type	2.4G Gain (dBi) Net gain	2.4G (dBi) Cable loss	5G Gain (dBi) Net gain	Antenna Connector
Chain (0)	Arcadyan	PCB Printed	1.44	1.2	3.53	NA
Chain (1)	Arcadyan	PCB Printed	3.55	2	4.52	NA

The EUT incorporates CDD function with 802.11a, 802.11g.

6. CALCULATION RESULT OF MAXIMUM CONDUCTED POWER

For 15.247(2.4GHz):

802.11b:

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
2412-2462	151.4	1.44	20	0.0419	1.00

802.11g:

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
2412-2462	649.9	5.6	20	0.469	1.00

Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2]$
 Effective Legacy Gain (dBi)=5.6

802.11n(20MHz):

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
2412-2462	656.8	3.55	20	0.2959	1.00

802.11n(40MHz):

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
2422-2452	449.6	3.55	20	0.202	1.00

For 15.247(5GHz):

802.11a:

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
5745 ~ 5825	335.8	7	20	0.335	1.00

Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2]$
 Effective Legacy Gain (dBi)=7

802.11n(20MHz):

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
5745 ~ 5825	335.8	4.52	20	0.189	1.00

802.11n(40MHz):

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
5755 ~ 5795	335.8	4.52	20	0.189	1.00

For 15.407(5GHz):
802.11a:

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
5180 ~ 5240	13.4	7	20	0.013	1.00

Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2]$
Effective Legacy Gain (dBi)=7

802.11n(20MHz):

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
5180 ~ 5240	19.8	4.52	20	0.011	1.00

802.11n(40MHz):

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
5190 ~ 5230	43.9	4.52	20	0.025	1.00

CONCLUSION:

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

$$CPD_1 / LPD_1 + CPD_2 / LPD_2 + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

Therefore, the worst-case situation is $0.469 / 1 + 0.335 / 1 = 0.804$, which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.

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