

RF EXPOSURE REPORT

REPORT NO.: SA120120E03

MODEL NO.: AR5BMD22

FCC ID: PPD-AR5BMD22

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TESTED: Apr. 14, 2012

ISSUED: Apr. 17, 2012

APPLICANT: Qualcomm Atheros, Inc.

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ISSUED BY: Bureau Veritas Consumer Products Services
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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
SA120120E03	Original release	Apr. 17, 2012

1. CERTIFICATION

PRODUCT: 802.11 a/b/g/n + BT Combo Card
BRAND NAME: Atheros
MODEL NO.: AR5BMD22
TEST SAMPLE: R&D SAMPLE
APPLICANT: Qualcomm Atheros, Inc.
STANDARDS: FCC Part 2 (Section 2.1091)
FCC OET Bulletin 65, Supplement C (01-01)
IEEE C95.1

The above equipment (Model: AR5BMD22) 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.

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(Midoli Peng, Specialist)

APPROVED BY : May Chen, **DATE:** Apr. 17, 2012
(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

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

No.	Brand	Model	Antenna Type	Connector	Antenna Gain (dBi)< included cable loss>			
					For 2.4GHz	For 5GHz (5.15~5.35)	For 5GHz (5.47~5.725)	For 5GHz (5.725~5.850)
1&2	WNC	81.EBJ15.005	PIFA	IPEX	3.62	3.08	4.76	4.76

Cable Loss:

No.	Brand	Model	Cable Loss(dB)				Cable Length
			For 2.4GHz	For 5GHz (5.15~5.35)	For 5GHz (5.47~5.725)	For 5GHz (5.725~5.850)	
1&2	WNC	81-EBJ15.005	1.15	1.70	1.74	1.79	300

Note:

1. Above antenna gains of antenna are Total (H+V).
2. The EUT incorporates CDD function with 802.11a/b/g.

6. CALCULATION RESULT OF MAXIMUM CONDUCTED POWER

For WLAN (2.4GHz):

Single chain - 802.11b

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
2412-2462	125.893	3.62	20	0.058	1.00

Single chain - 802.11g

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
2412-2462	263.027	3.62	20	0.120	1.00

Multiple chain - 802.11b

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
2412-2462	129.439	6.63	20	0.119	1.00

Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

Effective Legacy Gain (dBi)=6.63

Multiple chain - 802.11g

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
2412-2462	335.783	6.63	20	0.307	1.00

Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

Effective Legacy Gain (dBi)=6.63

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	320.670	3.62	20	0.146	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	263.652	3.62	20	0.121	1.00

For 15.247(5GHz):

Single chain - 802.11a

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
5745 ~ 5825	151.356	4.76	20	0.090	1.00

Multiple chain - 802.11a

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
5745 ~ 5825	232.305	7.77	20	0.277	1.00

Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

Effective Legacy Gain (dBi)=7.77

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	176.315	4.76	20	0.105	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	176.315	4.76	20	0.105	1.00

For 15.407(5GHz):

Single chain - 802.11a

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
5180-5240 5260-5320 5500-5580 & 5660-5700	52.481	4.76	20	0.031	1.00

Multiple chain - 802.11a

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
5180-5240 5260-5320 5500-5580 & 5660-5700	52.007	7.77	20	0.062	1.00

Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

Effective Legacy Gain (dBi) =7.77

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 5260-5320 5500-5580 & 5660-5700	41.831	4.76	20	0.025	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 5270-5310 5510-5550 & 5670	42.760	4.76	20	0.025	1.00

For Bluetooth: GFSK

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
2402-2480	2.286	3.62	20	0.001	1.00

8DPSK

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
2402-2480	4.989	3.62	20	0.002	1.00

GFSK(LE mode):

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
2402-2480	2.630	3.62	20	0.001	1.00

CONCLUSION:

Both of the WLAN and Bluetooth 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 $0.307 / 1 + 0.002 / 1 = 0.309$, which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.

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