

RF Exposure Report

Report No.: SA150107E06B

FCC ID: PPD-QCNFA344AH

Test Model: QCNFA344A

Received Date: Jan. 07, 2015

Test Date: Feb. 06 to 25, 2015 and May 07, 2015

Issued Date: May 13, 2015

Applicant: Qualcomm Atheros, Inc.

Address: 1700 Technology Drive, San Jose, CA 95110

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.

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A D T

Release Control Record

Issue No.	Description	Date Issued
SA150107E06B	Original release.	May 13, 2015



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1 Certificate of Conformity

Product: 802.11a/b/g/n/ac + BT 4.1 M.2 2230 Type Card

Brand: Qualcomm Atheros

Test Model: QCNFA344A

Sample Status: R&D SAMPLE

Applicant: Qualcomm Atheros, Inc.

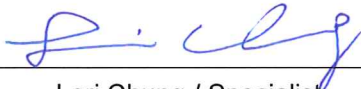
Test Date: Feb. 06 to 25, 2015 and May 07, 2015

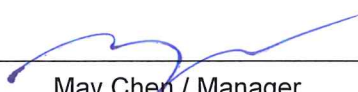
Standards: FCC Part 2 (Section 2.1091)

KDB 447498 D03

IEEE C95.1

The above equipment 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:** May 13, 2015
Lori Chung / Specialist

Approved by :  , **Date:** May 13, 2015
May Chen / Manager

2 RF Exposure

2.1 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

2.2 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

2.3 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**.

3 Antenna Gain

The antenna gain was declared by client; please refer to the following table:

Transmitter Circuit	Brand	Model	Ant. Type	2.4GHz Gain with cable loss (dBi)	5GHz Gain with cable loss (dBi)	2.4GHz Cable Loss (dBi)	5G Cable Loss (dBi)	Connector Type	Cable Length (mm)
Chain (0)	WNC	81-EBJ15.005	PIFA	3.00	Band 1&2: 2.56	1.15	Band 1&2: 1.70	IPEX	300
					Band 3: 4.76		Band 3: 1.74		
					Band 4: 4.76		Band 4: 1.79		
Chain (1)	WNC	81-EBJ15.005	PIFA	3.62	Band 1&2: 3.08	1.15	Band 1&2: 1.70	IPEX	300
					Band 3: 3.31		Band 3: 1.74		
					Band 4: 2.42		Band 4: 1.79		

Note: 1. Above antenna gains of antenna are Total (H+V).

4 Calculation Result of Maximum Conducted Power

For WLAN: 15.247 (2.4GHz):

802.11b

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2412-2472	23.51	224.404	6.63	20	0.20548	1.00

NOTE: 1. Directional gain = 3.62dBi + 10log(2) = 6.63dBi
2. This power include tune-up tolerance range that specified in QCNFA344A Tune Up power table

802.11g

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2412-2472	22.51	178.25	6.63	20	0.16321	1.00

NOTE: 1. Directional gain = 3.62dBi + 10log(2) = 6.63dBi
2. This power include tune-up tolerance range that specified in QCNFA344A Tune Up power table

VHT20

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2412-2472	22.51	178.25	6.63	20	0.16321	1.00

NOTE: 1. Directional gain = 3.62dBi + 10log(2) = 6.63dBi
2. This power include tune-up tolerance range that specified in QCNFA344A Tune Up power table

VHT40

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2422-2462	21.51	141.59	6.63	20	0.12965	1.00

NOTE: 1. Directional gain = 3.62dBi + 10log(2) = 6.63dBi
2. This power include tune-up tolerance range that specified in QCNFA344A Tune Up power table

For WLAN: 15.247 (5GHz):

802.11a

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
5745 - 5825	20.51	112.468	7.77	20	0.13389	1.00

NOTE: 1. 5725~5850MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi
2. This power include tune-up tolerance range that specified in QCNFA344A Tune Up power table

802.11ac (VHT20)

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
5745 - 5825	19.01	79.622	7.77	20	0.09479	1.00

NOTE: 1. 5725~5850MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi
2. This power include tune-up tolerance range that specified in QCNFA344A Tune Up power table

802.11ac (VHT40)

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
5755 - 5795	18.51	70.962	7.77	20	0.08448	1.00

NOTE: 1. 5725~5850MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi
2. This power include tune-up tolerance range that specified in QCNFA344A Tune Up power table

802.11ac (VHT80)

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
5775	18.51	70.962	7.77	20	0.08448	1.00

NOTE: 1. 5725~5850MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi
2. This power include tune-up tolerance range that specified in QCNFA344A Tune Up power table

For WLAN: 15.407 (5GHz):

802.11a

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
5180 - 5240, 5260 - 5320	19.01	79.622	6.09	20	0.06438	1.00
5500 - 5720	20.51	112.468	7.77	20	0.13389	1.00

NOTE: 1. 5150~5250MHz: Directional gain = 3.08dBi + 10log(2) = 6.09dBi
2. 5470~5725MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi
3. This power include tune-up tolerance range that specified in QCNFA344A Tune Up power table

802.11ac (VHT20)

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
5180 - 5240, 5260 - 5320	19.01	79.622	6.09	20	0.06438	1.00
5500 - 5720	19.01	79.622	7.77	20	0.09479	1.00

NOTE: 1. 5150~5250MHz: Directional gain = 3.08dBi + 10log(2) = 6.09dBi
2. 5470~5725MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi
3. This power include tune-up tolerance range that specified in QCNFA344A Tune Up power table

802.11ac (VHT40)

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
5190 - 5230, 5270 - 5310	18.01	63.246	6.09	20	0.05114	1.00
5510 - 5710	18.01	63.246	7.77	20	0.07529	1.00

NOTE: 1. 5150~5250MHz: Directional gain = 3.08dBi + 10log(2) = 6.09dBi
2. 5470~5725MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi
3. This power include tune-up tolerance range that specified in QCNFA344A Tune Up power table

802.11ac (VHT80)

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
5210 - 5290	15.01	31.698	6.09	20	0.02563	1.00
5530 - 5690	17.51	56.368	7.77	20	0.06711	1.00

NOTE: 1. 5150~5250MHz: Directional gain = 3.08dBi + 10log(2) = 6.09dBi
2. 5470~5725MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi
3. This power include tune-up tolerance range that specified in QCNFA344A Tune Up power table

For Bluetooth:

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2402-2480	13.00	19.953	3.62	20	0.00914	1.00

NOTE: 1. This power include tune-up tolerance range that specified in QCNFA344A Tune Up power table

Conclusion:

Both of the Bluetooth and WLAN (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 $0.13389 / 1 + 0.00914 / 1 = 0.143$, which is less than "1".

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