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## RF Exposure Report

**Report No.:** SA150107E06

**FCC ID:** PPD-QCNFA344A

**Test Model:** QCNFA344A

**Received Date:** Jan. 07, 2015

**Test Date:** Feb. 06 to 25, 2015

**Issued Date:** Mar. 11, 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  
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**Test Location (1):** No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin  
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### Release Control Record

Issue No.	Description	Date Issued
SA150107E06	Original release.	Mar. 11, 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


**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:** Mar. 11, 2015  
Lori Chung / Specialist

**Approved by :**  , **Date:** Mar. 11, 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 <sup>2</sup> )	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

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

where

Pd = power density in mW/cm<sup>2</sup>

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

### 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 <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
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 <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
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 <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
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 <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
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: 15.407 (5GHz):**
**802.11a**

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

- NOTE:
1. 5150~5250MHz: Directional gain = 3.08dBi + 10log(2) = 6.09dBi
  2. 5250~5350MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi
  3. 5470~5725MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi
  4. 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 <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
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
5745 - 5825	19.01	79.622	7.77	20	0.09479	1.00

- NOTE:
1. 5150~5250MHz: Directional gain = 3.08dBi + 10log(2) = 6.09dBi
  2. 5250~5350MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi
  3. 5470~5725MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi
  4. 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 <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
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
5755 - 5795	17.51	56.368	7.77	20	0.06711	1.00

- NOTE:
1. 5150~5250MHz: Directional gain = 3.08dBi + 10log(2) = 6.09dBi
  2. 5250~5350MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi
  3. 5470~5725MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi
  4. 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 <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
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
5775	13.01	20	7.77	20	0.02381	1.00

- NOTE:
1. 5150~5250MHz: Directional gain = 3.08dBi + 10log(2) = 6.09dBi
  2. 5250~5350MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi
  3. 5470~5725MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi
  4. 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 <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
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:

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

**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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