

## RF Exposure Report

**Report No.:** SA170816E07D

**FCC ID:** PPD-QCNFA344AH

**Test Model:** QCNFA344A

**Received Date:** Jan. 03, 2018

**Test Date:** Jan. 23, 2018

**Issued Date:** Apr. 11, 2018

**Applicant:** Qualcomm Atheros, Inc.

**Address:** 1700 Technology Dr San Jose California 95110 United States

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Hsin Chu Laboratory

**Lab Address:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan R.O.C.

**Test Location:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan R.O.C.

**FCC Registration /  
Designation Number:** 723255 / TW2022



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## Table of Contents

<b>Release Control Record .....</b>	<b>3</b>
<b>1      Certificate of Conformity.....</b>	<b>4</b>
<b>2      RF Exposure.....</b>	<b>5</b>
2.1    Limits For Maximum Permissible Exposure (MPE).....	5
2.2    MPE Calculation Formula .....	5
2.3    Classification .....	5
2.4    Antenna Gain .....	6
2.5    Calculation Result of Maximum Conducted Power.....	7

### Release Control Record

Issue No.	Description	Date Issued
SA170816E07D	Original release.	Apr. 11, 2018

## 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.

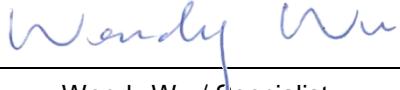
**Test Date:** Jan. 23, 2018

**Standards:** FCC Part 2 (Section 2.1091)

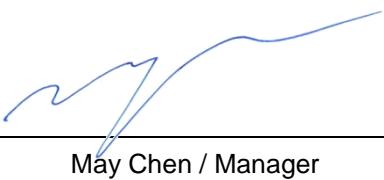
KDB 447498 D01 General RF Exposure Guidance v06

IEEE C95.1-1992

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:** Apr. 11, 2018

Wendy Wu / Specialist

**Approved by :**  , **Date:** Apr. 11, 2018

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				
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1500	...	...	f/1500	30
1500-100,000	...	...	1.0	30

f = Frequency in MHz ; \*Plane-wave equivalent power density

### 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**.

## 2.4 Antenna Gain

Antenna set 1										
Transmitter Circuit	Brand	Model	Ant. Type	2.4GHz Gain with cable loss (dBi)	5GHz Gain with cable loss (dBi)	2.4GHz Cable Loss (dB)	5G Cable Loss (dB)	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			
Antenna set 2										
Transmitter Circuit	Brand	Model	Ant. Type	2.4GHz Gain with cable loss (dBi)	5GHz Gain with cable loss (dBi)	2.4GHz Cable Loss (dB)	5G Cable Loss (dB)	Ant. Connector Type	Cable Connector Type	Cable Length (mm)
Chain (0)	HONGBO	290-30641	Dipole	1.64	Band 1&2: 2.6	0.51	Band 1&2: 0.78	RSMA	IPEX to RSMA	210
					Band 3: 2.22		Band 3: 0.61			
					Band 4: 2.38		Band 4: 0.81			
Chain (1)	HONGBO	290-30641	Dipole	1.64	Band 1&2: 2.6	0.51	Band 1&2: 0.78	RSMA	IPEX to RSMA	210
					Band 3: 2.22		Band 3: 0.61			
					Band 4: 2.38		Band 4: 0.81			
Antenna set 3										
Transmitter Circuit	Brand	Model	Ant. Type	2.4GHz Gain with cable loss (dBi)	5GHz Gain with cable loss (dBi)	2.4GHz Cable Loss (dB)	5G Cable Loss (dB)	Ant. Connector Type	Cable Connector Type	Cable Length (mm)
Chain (0)	Speed	F.0G.LS-600 8-003-00	Dipole	-1.22	Band 1&2: 1.17	0.50	Band 1&2: 0.74	RSMA	IPEX to RSMA	210
					Band 3: 1.48		Band 3: 0.75			
					Band 4: 0.38		Band 4: 0.76			
Chain (1)	Speed	F.0G.LS-600 8-003-00	Dipole	-1.22	Band 1&2: 1.17	0.50	Band 1&2: 0.74	RSMA	IPEX to RSMA	210
					Band 3: 1.48		Band 3: 0.75			
					Band 4: 0.38		Band 4: 0.76			

## 2.5 Calculation Result of Maximum Conducted Power

### WLAN:

Frequency Band (MHz)	Max. Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
2412-2472	177.828	6.63	20	0.16283	1
5180-5240	63.096	6.09	20	0.05102	1
5260-5320	63.096	6.09	20	0.05102	1
5500-5720	79.433	7.77	20	0.09456	1
5745-5825	100	7.77	20	0.11905	1

Note:

1. This power include tune-up tolerance range that specified in QCNFA344A Tune Up power table.
2. Directional gain:  
 2.4GHz: Directional gain =  $3.62\text{dBi} + 10\log(2) = 6.63\text{dBi}$   
 5GHz: UNII-1~2A: Directional gain =  $3.08\text{dBi} + 10\log(2) = 6.09\text{dBi}$   
 UNII-2C~3: Directional gain =  $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi}$

### BT-EDR

Frequency Band (MHz)	Max. Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
2402-2480	7.079	3.62	20	0.00324	1

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

### BT-LE

Frequency Band (MHz)	Max. Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
2402-2480	3.981	3.62	20	0.00182	1

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

### Conclusion:

The formula of calculated the MPE is:

$$\text{CPD1} / \text{LPD1} + \text{CPD2} / \text{LPD2} + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

$$\text{WLAN 5GHz} + \text{Bluetooth} = 0.11905 / 1 + 0.00324 / 1 = 0.12229$$

Therefore the maximum calculations of above situations are less than the "1" limit.

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