RF Exposure Report

Report No.:	SA150107E07
FCC ID:	PPD-QCNFA364A
Test Model:	QCNFA364A
Received Date:	Jan. 07, 2015
Test Date:	Feb. 04, 2015
Issued Date:	Mar. 10, 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.

Table of Contents

Release Control Record **3**

1 Certificate of Conformity **4**

2 RF Exposure **5**

2.1 Limits for Maximum Permissible Exposure (MPE) 5
2.2 MPE Calculation Formula 5
2.3 Classification 5

3 Antenna Gain **6**

4 Calculation Result **7**

Release Control Record

Issue No.	Description	Date Issued
SA150107E07	Original release.	Mar. 10, 2015

1 Certificate of Conformity

Product:	802.11a/b/g/n/ac + BT 4.1 M.2 2230 Type Card
Brand:	Qualcomm Atheros
Test Model:	QCNFA364A
Sample Status:	ENGINEERING SAMPLE
Applicant:	Qualcomm Atheros, Inc.
Test Date:	Feb. 04, 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 : Phoenix Huang , **Date:** Mar. 10, 2015

Phoenix Huang / Specialist

Approved by : , **Date:** Mar. 10, 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

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

where

Pd = power density in mW/cm^2

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

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 QCNFA364A 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 QCNFA364A 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 QCNFA364A 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 QCNFA364A 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	22.01	158.866	6.09	20	0.12846	1.00
5500 - 5720	22.01	158.866	7.77	20	0.18913	1.00
5745 - 5825	22.01	158.866	7.77	20	0.18913	1.00

NOTE: 1. 5150~5350MHz: Directional gain = 3.08dBi + 10log(2) = 6.09dBi

2. 5470~5725MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi

3. 5725~5850MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi

4. This power include tune-up tolerance range that specified in QCNFA364A 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	22.01	158.866	6.09	20	0.12846	1.00
5500 - 5720	22.01	158.866	7.77	20	0.18913	1.00
5745 - 5825	22.01	158.866	7.77	20	0.18913	1.00

NOTE: 1. 5150~5350MHz: Directional gain = 3.08dBi + 10log(2) = 6.09dBi

2. 5470~5725MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi

3. 5725~5850MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi

4. This power include tune-up tolerance range that specified in QCNFA364A 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	22.01	158.866	6.09	20	0.12846	1.00
5510 - 5710	22.01	158.866	7.77	20	0.18913	1.00
5755 - 5795	22.01	158.866	7.77	20	0.18913	1.00

NOTE: 1. 5150~5350MHz: Directional gain = 3.08dBi + 10log(2) = 6.09dBi

2. 5470~5725MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi

3. 5725~5850MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi

4. This power include tune-up tolerance range that specified in QCNFA364A 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	18.01	63.246	6.09	20	0.05114	1.00
5530 - 5690	21.01	126.192	7.77	20	0.15023	1.00
5775	19.01	79.622	7.77	20	0.09479	1.00

NOTE: 1. 5150~5350MHz: Directional gain = 3.08dBi + 10log(2) = 6.09dBi

2. 5470~5725MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi

3. 5725~5850MHz: Directional gain = 4.76dBi + 10log(2) = 7.77dBi

4. This power include tune-up tolerance range that specified in QCNFA364A 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	11.5	14.125	3.62	20	0.00647	1.00

NOTE: 1. This power include tune-up tolerance range that specified in QCNFA364A 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 0.18913 / 1 + 0.00647 / 1 = 0.196, which is less than “1”.

--- END ---