RF EXPOSURE REPORT

REPORT NO.:	SA141008E03 R1
MODEL NO.:	QCNFA435
FCC ID:	PPD-QCNFA435
RECEIVED:	Oct. 08, 2014
TESTED:	Dec. 09 to 10, 2014
ISSUED:	Jan. 06, 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.

This report should not be used by the client to claim product certification, approval, or endorsement by any government agencies.

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification

TABLE OF CONTENTS

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
SA141008E03	Original release	Dec. 18, 2014
SA141008E03 R1	Revised the product name.	Jan. 06, 2015

1. CERTIFICATION

PRODUCT:	Single Stream 802.11a/b/g/n/ac + BT 4.1 M.2 Type Card
BRAND NAME:	Qualcomm Atheros
MODEL NO.:	QCNFA435
TEST SAMPLE:	R&D SAMPLE
APPLICANT:	Qualcomm Atheros, Inc.
TESTED:	Dec. 09 to 10, 2014
STANDARDS:	FCC Part 2 (Section 2.1091)
	KDB 447498 D03
	IEEE C95.1

The above equipment (Model: QCNFA435) 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:** Jan. 06, 2015
(Lori Chung, Specialist)

Approved by : _____ , **Date:** Jan. 06, 2015
(May Chen, 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

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

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

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:

Ant. No.	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)
1	Main	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		
	Aux	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		
2	Main	WNC	81.ED415.001	PIFA	0.22	Band 1&2: 5.56	0.96	Band 1&2: 1.29	IPEX	300
						Band 3: 5.03		Band 3: 1.36		
						Band 4: 3.14		Band 4: 1.38		
	Aux	WNC	81.ED415.001	PIFA	1.48	Band 1&2: 5.17	0.96	Band 1&2: 1.29	IPEX	300
						Band 3: 5.34		Band 3: 1.36		
						Band 4: 2.93		Band 4: 1.38		

Note: 1. Above antenna gains of antenna are Total (H+V).
2. All of antenna can be application for WLAN and Bluetooth.

6. 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)
2412-2462	22.0	158.489	3.62	20	0.07257	1.00

NOTE: 1. This power include tune-up tolerance range that specified in QCNFA435 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)
2412-2462	21.0	125.893	3.62	20	0.05764	1.00

NOTE: 1. This power include tune-up tolerance range that specified in QCNFA435 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)
2412-2462	21.0	125.893	3.62	20	0.05764	1.00

NOTE: 1. This power include tune-up tolerance range that specified in QCNFA435 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)
2422-2452	19.5	89.125	3.62	20	0.04081	1.00

NOTE: 1. This power include tune-up tolerance range that specified in QCNFA435 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	17.5	56.234	4.76	20	0.03348	1.00

NOTE: 1. This power include tune-up tolerance range that specified in QCNFA435 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	17.5	56.234	4.76	20	0.03348	1.00

NOTE: 1. This power include tune-up tolerance range that specified in QCNFA435 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	16.5	44.668	4.76	20	0.02659	1.00

NOTE: 1. This power include tune-up tolerance range that specified in QCNFA435 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	16.0	50.119	4.76	20	0.02984	1.00

NOTE: 1. This power include tune-up tolerance range that specified in QCNFA435 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	17.5	56.234	5.56	20	0.04025	1.00
5500 -5580 & 5660 - 5720	17.5	56.234	5.34	20	0.03826	1.00

NOTE: 1. This power include tune-up tolerance range that specified in QCNFA435 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	17.5	56.234	5.56	20	0.04025	1.00
5500 -5580 & 5660 - 5720	17.5	56.234	5.34	20	0.03826	1.00

NOTE: 1. This power include tune-up tolerance range that specified in QCNFA435 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	16.0	39.811	5.56	20	0.02849	1.00
5510 - 5550 & 5670- 5710	17.0	50.119	5.34	20	0.03410	1.00

NOTE: 1. This power include tune-up tolerance range that specified in QCNFA435 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	14.0	25.119	5.56	20	0.01798	1.00
5530, 5690	17.0	39.811	5.34	20	0.02709	1.00

NOTE: 1. This power include tune-up tolerance range that specified in QCNFA435 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 QCNFA435 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 0.00647 / 1 + 0.04025 / 1 = 0.0467, which is less than “1”. This confirmed that the device comply with FCC 1.1310 MPE limit.

--- END ---