

RF Exposure Report

Report No.: SA171207E10A

FCC ID: PPD-QCNFA435

Test Model: QCNFA435

Received Date: Jan. 03, 2018

Test Date: Jan. 26, 2018

Issued Date: Apr. 19, 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
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FCC Registration /
Designation Number: 723255 / TW2022



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Release Control Record

Issue No.	Description	Date Issued
SA171207E10A	Original release.	Apr. 19, 2018

1 Certificate of Conformity

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

Brand: Qualcomm Atheros

Test Model: QCNFA435

Sample Status: R&D SAMPLE

Applicant: Qualcomm Atheros, Inc.

Test Date: Jan. 26, 2018

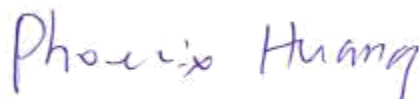
Standards: FCC Part 2 (Section 2.1091)

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. 19, 2018

Phoenix Huang / Specialist

Approved by :



Date:

Apr. 19, 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 ²)	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 ²)*	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/cm²

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

Original

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 (dB)	5GHz Cable Loss (dB)	Connector Type	Cable Length (mm)
1	Chain (0)	WNC	81.EBJ15.005	PIFA	3.00	5.15~5.35GHz: 2.56	1.15	5.15~5.35GHz: 1.70	IPEX	300
						5.47~5.725GHz: 4.76		5.47~5.725GHz: 1.74		
						5.725~5.85GHz: 4.76		5.725~5.85GHz: 1.79		
	Chain (1)	WNC	81.EBJ15.005	PIFA	3.62	5.15~5.35GHz: 3.08	1.15	5.15~5.35GHz: 1.70	IPEX	300
						5.47~5.725GHz: 3.31		5.47~5.725GHz: 1.74		
						5.725~5.85GHz: 2.42		5.725~5.85GHz: 1.79		
2	Chain (0)	WNC	81.ED415.001	PIFA	0.22	5.15~5.35GHz: 5.56	0.96	5.15~5.35GHz: 1.29	IPEX	300
						5.47~5.725GHz: 5.03		5.47~5.725GHz: 1.36		
						5.725~5.85GHz: 3.14		5.725~5.85GHz: 1.38		
	Chain (1)	WNC	81.ED415.001	PIFA	1.48	5.15~5.35GHz: 5.17	0.96	5.15~5.35GHz: 1.29	IPEX	300
						5.47~5.725GHz: 5.34		5.47~5.725GHz: 1.36		
						5.725~5.85GHz: 2.94		5.725~5.85GHz: 1.38		

Newly

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 (dB)	5GHz Cable Loss (dB)	Ant. Connector Type	Cable Connector Type	Cable Length (mm)
3	Chain (0)	HONGBO	290-30641	Dipole	1.64	5.15~5.35GHz: 2.6	0.51	5.15~5.35GHz: 0.78	RSMA	IPEX to RSMA	210
						5.47~5.725GHz: 2.22		5.47~5.725GHz: 0.61			
						5.725~5.85GHz: 2.38		5.725~5.85GHz: 0.81			
	Chain (1)	HONGBO	290-30641	Dipole	1.64	5.15~5.35GHz: 2.6	0.51	5.15~5.35GHz: 0.78	RSMA	IPEX to RSMA	210
						5.47~5.725GHz: 2.22		5.47~5.725GHz: 0.61			
						5.725~5.85GHz: 2.38		5.725~5.85GHz: 0.81			
4	Chain (0)	Speed	F.0G.LS-6008-003-00	Dipole	-1.22	5.15~5.35GHz: 1.17	0.5	5.15~5.35GHz: 0.74	RSMA	IPEX to RSMA	210
						5.47~5.725GHz: 1.48		5.47~5.725GHz: 0.75			
						5.725~5.85GHz: 0.38		5.725~5.85GHz: 0.76			
	Chain (1)	Speed	F.0G.LS-6008-003-00	Dipole	-1.22	5.15~5.35GHz: 1.17	0.5	5.15~5.35GHz: 0.74	RSMA	IPEX to RSMA	210
						5.47~5.725GHz: 1.48		5.47~5.725GHz: 0.75			
						5.725~5.85GHz: 0.38		5.725~5.85GHz: 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 ²)	Limit (mW/cm ²)
2412-2472	112.202	3.62	20	0.05137	1
5180-5240	50.119	5.56	20	0.03587	1
5260-5320	50.119	5.56	20	0.03587	1
5500-5720	50.119	5.03	20	0.03175	1
5745-5825	50.119	7.46	20	0.02984	1

Note: This power include tune-up tolerance range that specified in QCNFA435 Tune Up power table.

BT-EDR

Frequency Band (MHz)	Max. Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2402-2480	3.981	3.62	20	0.0182	1

Note: This power include tune-up tolerance range that specified in QCNFA435 Tune Up power table.

BT-LE

Frequency Band (MHz)	Max. Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2402-2480	3.981	3.62	20	0.0182	1

Note: This power include tune-up tolerance range that specified in QCNFA435 Tune Up power table.

Conclusion:

The formula of calculated the MPE is:

$$CPD1 / LPD1 + CPD2 / LPD2 +etc. < 1$$

CPD = Calculation power density

LPD = Limit of power density

$$WLAN\ 5GHz + Bluetooth = 0.03587 / 1 + 0.0182 / 1 = 0.03769$$

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

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