



# FCC RADIO TEST REPORT

**FCC ID** : PPD-QCNFA344AH  
**Equipment** : 802.11a/b/g/n/ac + BT 4.1 M.2 2230 Type Card  
**Brand Name** : Qualcomm Atheros  
**Model Name** : QCNFA344A  
**Applicant** : Qualcomm Atheros, Inc.  
1700 Technology Drive, San Jose, CA 95110  
**Manufacturer** : Qualcomm Atheros, Inc.  
1700 Technology Drive, San Jose, CA 95110  
**Standard** : FCC Part 15 Subpart C §15.247

Equipment: Qualcomm Atheros QCNFA344A tested inside of Lenovo Notebook Computer.

The product was received on Jan. 09, 2020 and testing was started from Jan. 31, 2020 and completed on Jan. 31, 2020. We, SPORTON INTERNATIONAL INC., EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this partial report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Louis Wu

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan



## Table of Contents

<b>History of this test report.....</b>	<b>3</b>
<b>Summary of Test Result.....</b>	<b>4</b>
<b>1 General Description.....</b>	<b>5</b>
1.1 Product Feature of Equipment Under Test.....	5
1.2 Product Specification of Equipment Under Test.....	6
1.3 Modification of EUT .....	6
1.4 Testing Location .....	6
1.5 Applicable Standards.....	6
<b>2 Test Configuration of Equipment Under Test.....</b>	<b>7</b>
2.1 Carrier Frequency Channel .....	7
2.2 Test Mode .....	8
2.3 EUT Operation Test Setup .....	8
<b>3 Test Result.....</b>	<b>9</b>
3.1 Output Power Measurement.....	9
3.2 Antenna Requirements.....	10
<b>4 List of Measuring Equipment .....</b>	<b>11</b>
<b>Appendix A. Conducted Test Results</b>	



## History of this test report



## Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.247(b)(3)	Peak Output Power	Pass	-
3.2	15.203 & 15.247(b)	Antenna Requirement	Pass	-

**Note:** The test plan for power measurement is designated by manufacturer as worst case for Test Lab. measurement. Then, all test cases are performed, based on the worst power measured by Test Lab, and reported accordingly.

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Amy Chen



## 1 General Description

### 1.1 Product Feature of Equipment Under Test

Product Feature	
<b>Equipment</b>	802.11a/b/g/n/ac + BT 4.1 M.2 2230 Type Card
<b>Brand Name</b>	Qualcomm Atheros
<b>Model Name</b>	QCNFA344A
<b>FCC ID</b>	PPD-QCNFA344AH
<b>Sample 1</b>	EUT with Host 1
<b>Sample 2</b>	EUT with Host 2
<b>EUT supports Radios application</b>	WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
<b>EUT Stage</b>	Production Unit

**Remark:**

1. The above EUT's information was declared by manufacturer.
2. Equipment: Qualcomm Atheros QCNFA344A tested inside of Lenovo Notebook Computer.

The product was installed into Notebook Computer (Brand Name: Lenovo, Model Name: IdeaPad Flex 5 14ARE05) during test, and the host information was recorded in the following table.

Host Information	
<b>Host 1</b>	Host with AWAN Antenna
<b>Host 2</b>	Host with High-Tek Antenna

Antenna Information														
Antenna 1	Manufacturer			AWAN			Antenna 2	Manufacturer			AWAN			
	Ant. Type			PIFA				Ant. Type			PIFA			
	Part Number			025.901MZ.0001				Part Number			025.901N0.0001			
	Min Freq.	Max Freq.	Peak Gain (dBi)	Min Freq.	Max Freq.	Peak Gain (dBi)		Min Freq.	Max Freq.	Peak Gain (dBi)	Min Freq.	Max Freq.	Peak Gain (dBi)	
	2400 MHz	2483.5MHz	1.23	5470 MHz	5725 MHz	-3.97		2400 MHz	2483.5MHz	0.73	5470 MHz	5725 MHz	-2.16	
	5150 MHz	5250 MHz	-0.12	5725 MHz	5850 MHz	-3.33		5150 MHz	5250 MHz	-0.88	5725 MHz	5850 MHz	-0.77	
Antenna 1	5250 MHz	5350 MHz	-1.47					5250 MHz	5350 MHz	-0.9				
	Manufacturer			High-tek			Antenna 2	Manufacturer			High-tek			
	Ant. Type			PIFA				Ant. Type			PIFA			
	Part Number			025.901N3.0001				Part Number			025.901N4.0001			
	Min Freq.	Max Freq.	Peak Gain (dBi)	Min Freq.	Max Freq.	Peak Gain (dBi)		Min Freq.	Max Freq.	Peak Gain (dBi)	Min Freq.	Max Freq.	Peak Gain (dBi)	
	2400 MHz	2483.5MHz	2.95	5470 MHz	5725 MHz	2.03		2400 MHz	2483.5MHz	1.27	5470 MHz	5725 MHz	-0.76	
	5150 MHz	5250 MHz	1.24	5725 MHz	5850 MHz	2.54		5150 MHz	5250 MHz	0.83	5725 MHz	5850 MHz	-0.06	
	5250 MHz	5350 MHz	0.5					5250 MHz	5350 MHz	0.83				

**Remark:** All the tests were performed with "High-Tek Antenna" as representative.



## 1.2 Product Specification of Equipment Under Test

Standards-related Product Specification	
<b>Tx/Rx Frequency Range</b>	2402 MHz ~ 2480 MHz
<b>Number of Channels</b>	40
<b>Carrier Frequency of Each Channel</b>	40 Channel (37 hopping + 3 advertising channel)
<b>Average Power to Antenna</b>	3.00 dBm (0.0020 W)
<b>Type of Modulation</b>	Bluetooth LE : GFSK

## 1.3 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.4 Testing Location

<b>Test Site</b>	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
<b>Test Site Location</b>	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan
<b>Test Site No.</b>	<b>Sporton Site No.</b> TH05-HY

**Note:** The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: TW1190

## 1.5 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- ANSI C63.10-2013

**Remark:** All test items were verified and recorded according to the standards and without any deviation during the test.



## 2 Test Configuration of Equipment Under Test

### 2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	0	2402	21	2444
	1	2404	22	2446
	2	2406	23	2448
	3	2408	24	2450
	4	2410	25	2452
	5	2412	26	2454
	6	2414	27	2456
	7	2416	28	2458
	8	2418	29	2460
	9	2420	30	2462
	10	2422	31	2464
	11	2424	32	2466
	12	2426	33	2468
	13	2428	34	2470
	14	2430	35	2472
	15	2432	36	2474
	16	2434	37	2476
	17	2436	38	2478
	18	2438	39	2480
	19	2440	-	-
	20	2442	-	-



## 2.2 Test Mode

Final test modes are considering the modulation and worse data rates as below table.

Summary table of Test Cases	
Test Item	Data Rate / Modulation
	Bluetooth – LE / GFSK
Conducted Test Cases	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps

## 2.3 EUT Operation Test Setup

The RF test items, utility “QCARCT\_V3.0.169.0” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

### 3 Test Result

#### 3.1 Output Power Measurement

##### 3.1.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for average output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the average output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

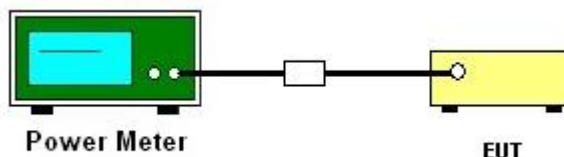
##### 3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

##### 3.1.3 Test Procedures

1. For Average Power, the testing follows ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G
2. The RF output of EUT was connected to the power meter by RF cable and attenuator.
3. The path loss was compensated to the results for each measurement.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Measure the conducted output power and record the results in the test report.

##### 3.1.4 Test Setup



##### 3.1.5 Test Result of Average Output Power

Please refer to Appendix A.



## 3.2 Antenna Requirements

### 3.2.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

### 3.2.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

### 3.2.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	Testo	608-H2	41410069	N/A	Jun. 17, 2019	Jan. 31, 2020	Jun. 16, 2020	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054S NO10	10MHz~6GHz	Dec. 23, 2019	Jan. 31, 2020	Dec. 22, 2020	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101566	10Hz~40GHz	Jul. 15, 2019	Jan. 31, 2020	Jul. 14, 2020	Conducted (TH05-HY)
Switch Box & RF Cable	Burgeon	ETF-058	EC120838 2	N/A	Mar. 27, 2019	Jan. 31, 2020	Mar. 26, 2020	Conducted (TH05-HY)

## Appendix A. Test Result of Conducted Test Items

Test Engineer:	Kathy Chen	Temperature:	21~25	°C
Test Date:	2020/1/31	Relative Humidity:	51~54	%

<u><b>TEST RESULTS DATA</b></u>					
<u><b>Average Power Table</b></u>					
<u><b>(Reporting Only)</b></u>					
Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Average Conducted Power (dBm)
BLE	1Mbps	1	0	2402	2.30
BLE	1Mbps	1	19	2440	2.80
BLE	1Mbps	1	39	2480	3.00

—————THE END—————