TEST REPORT

According to

FCC Rules and Regulations Part 15 Subpart C (15.247) /

RSS-210 Issue 8

Applicant	: Qualcomm Atheros, Inc.
Address	: 1700 Technology Drive, San Jose, CA95110
Equipment	: 802.11 a/b/g/n/ac+ BT 4.1 M.2 Type Card
Model No.	: QCNFA34AC(NFA344), QCNFA34AC(NFA345)
FCC ID	: PPD-QCNFA34AC
IC	4104A-QCNFA34AC

The test result refers exclusively to the test presented test model / sample.,

- Without written approval of ***Cerpass Technology (Suzhou) Co.,Ltd.*** the test report shall not be reproduced except in full.
- The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Rules and Regulations Part 15/RSS-210. The test report has been issued separately.
- The test report must not be used by the clients to claim product certification approval by ***NVLAP*** or any agency of the Government.

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History of this test report

■ ORIGINAL.

☐ Additional attachment as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

according to

FCC Rules and Regulations Part 15 Subpart C /

RSS-210 Issue 8

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I **HEREBY** CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4** The equipment was ***passed*** the test performed according to **FCC Rules and Regulations Part 15 Subpart C (2010)/ RSS-210 Issue 8.**
The test was carried out on Dec 04, 2014 at ***Cerpass Technology (Suzhou) Co.,Ltd***

Signature

Miro Chueh/ Technical director

1. Report of Measurements and Examinations

1.1 List of Measurements and Examinations

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 15 Subpart E	PASS
Canada RSS-210: 2010	PASS

2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Product	802.11 a/b/g/n/ac+ BT 4.1 M.2 Type Card
Model No.	QCNFA34AC(NFA344), QCNFA34AC(NFA345)
Variant No. Description	NFA344: This SKU supports 2T2R MIMO NFA345: This SKU supports 1T2R
Host Type	Notebook Computer
Host Model	Lenovo Yoga 3 14xxxx; 80JHxxxx; 80KQxxxx (“x”=0- 9, A- Z, a-z, any symbol or blank for marketing use only)
Antenna Type	PIFA
Antenna Peak Gain	2400- 2500MHz: 0.95dBi 5150- 5850MHz: 1.55dBi
Power Supply	DC 3.3V from host equipment
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM BT-LE (GFSK) for DTS 256QAM for OFDM in 11ac mode and 11n (HT20), 11n (HT40) mode of 2.4GHz Band
Modulation technology	DSSS, OFDM, DTS
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n : up to 400Mbps 802.11ac: up to 866.7Mbps BT-LE(GFSK): 1Mbps
Operating Frequency	**For 15.407:** 802.11a: 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz, 5.5~5.72GHz
	For 15.247: 2.4GHz: 2.412 ~ 2.462GHz 5GHz: 5.745 ~ 5.825GHz BT-LE(GFSK): 2.402 ~ 2.480GHz
Number of channel	**For 15.407:** 20 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 10 for 802.11n (HT40), 802.11ac (VHT40) 5 for 802.11ac (VHT80)

	For 15.247(2.4GHz): 11 for 802.11b, 802.11g, 802.11n (HT20), 802.11n_256QAM(BW20) 7 for 802.11n (HT40), 802.11n_256QAM(BW40) 40 for BT-LE(GFSK) **For 15.247(5GHz):** 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)

NOTE:

- The modular has two variant designs as following table:

Variant No.	Description
SKU #1	NFA344: This SKU supports 2T2R MIMO.
SKU #2	NFA345: This SKU supports 1T2R.

- The EUT incorporates a 2T2R function SKU #1 (NFA344), 1T2R function SKU #2 (NFA345).

SKU #1 (NFA344)			
MODULATION	MODE DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	2Tx CDD	2Rx
802.11g	6 ~ 54Mbps	2Tx CDD	2Rx
802.11n (HT20) (2.4GHz)	MCS 0~7	2Tx CDD / beamforming	2Rx
	MCS 8~15	2Tx	2Rx
	MCS 0~8, Nss=1 (256QAM)	2Tx CDD / beamforming	2Rx
	MCS 0~8, Nss=2 (256QAM)	2Tx	2Rx
802.11n (HT40) (2.4GHz)	MCS 0~7	2Tx CDD / beamforming	2Rx
	MCS 8~15	2Tx	2Rx
	MCS 0~8, Nss=1 (256QAM)	2Tx CDD / beamforming	2Rx
	MCS 0~8, Nss=2 (256QAM)	2Tx	2Rx
802.11a	6 ~ 54Mbps	2Tx CDD /	2Rx

		beamforming	
802.11n (HT20) (5GHz)	MCS 0~7	2Tx CDD / beamforming	2Rx
	MCS 8~15	2Tx	2Rx
802.11n (HT40) (5GHz)	MCS 0~7	2Tx CDD / beamforming	2Rx
	MCS 8~15	2Tx	2Rx
802.11ac (VHT20) (5GHz)	MCS 0~8, Nss=1	2Tx CDD / beamforming	2Rx
	MCS 0~8, Nss=2	2Tx	2Rx
802.11ac (VHT40) (5GHz)	MCS 0~8, Nss=1	2Tx CDD / beamforming	2Rx
	MCS 0~8, Nss=2	2Tx	2Rx
802.11ac (VHT80) (5GHz)	MCS 0~9, Nss=1	2Tx CDD / beamforming	2Rx
	MCS 0~9, Nss=2	2Tx	2Rx

SKU #2 (NFA345)			
MODULATION	MODULATION	MODULATION	
802.11b	1 ~ 11Mbps	1Tx (Fix main port)	1Rx (Fix main port) or 2Rx
802.11g	6 ~ 54Mbps	1Tx (Fix main port)	1Rx (Fix main port) or 2Rx
802.11n (HT20) (2.4GHz)	MCS 0~7 MCS 0~8, Nss=1 (256QAM)	1Tx (Fix main port)	1Rx (Fix main port) or 2Rx
802.11n (HT40) (2.4GHz)	MCS 0~7 MCS 0~8, Nss=1 (256QAM)	1Tx (Fix main port)	1Rx (Fix main port) or 2Rx
802.11a	6 ~ 54Mbps	1Tx (Fix main port)	1Rx (Fix main port) or 2Rx
802.11n (HT20) (5GHz)	MCS 0~7	1Tx (Fix main port)	1Rx (Fix main port) or 2Rx
802.11n (HT40) (5GHz)	MCS 0~7	1Tx (Fix main port)	1Rx (Fix main port) or 2Rx

802.11ac (VHT20) (5GHz)	MCS 0~8, Nss=1	1Tx (Fix main port)	1Rx (Fix main port) or 2Rx
802.11ac (VHT40) (5GHz)	MCS 0~8, Nss=1	1Tx (Fix main port)	1Rx (Fix main port) or 2Rx
802.11ac (VHT80) (5GHz)	MCS 0~9, Nss=1	1Tx (Fix main port)	1Rx (Fix main port) or 2Rx

- WLAN/BT coexistence mode:
  - **NFA344:**

  2TX 5GHz WLAN (Main + Aux) + BT (Main) concurrent.

  2TX 2.4GHz WLAN+ BT timely shared at Main antenna.

  - **NFA345:**

  1TX 2.4GHz WLAN+ BT timely shared at Main antenna.

  1TX 5GHz WLAN+ BT concurrent

2.2 Antenna list

Manufacturer	Part Number
HongLin Electronics Co., Ltd	Tx1 Antenna: DC33001DB00 / Tx2 Antenna: DC33001DB10
LUXSHARE-ICT	Tx1 Antenna: DC33001D900 / Tx2 Antenna: DC33001D910

2.3 Carrier Frequency of Channels

For 2.4G 802.11b, 802.11g, 802.11n (20MHz)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	11	2462
06	2437	---	---

For 2.4G 802.11n (40MHz)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	---	08	2447
02	---	09	2452
03	2422	---	---

04	2427	---	---
05	2432	---	---
06	2437	---	---
07	2442	---	---

For 2.4G BT-LE

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

For 5.8G

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
149	5745	161	5805
153	5765	165	5825
157	5785		

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40)

Channel	Frequency(MHz)
151	5755
159	5795

1 channel is provided for 802.11ac (VHT80)

Channel	Frequency(MHz)
155	5775

2.4 General Information of Test

Test Site:	Cerpass Technology (Suzhou) Co.,Ltd
Test Site Location :	No.66,Tangzhuang Road, Suzhou Industrial Park, Jiangsu 215006, China
NVLAP LAB Code :	200814-0
FCC Registration Number :	916572, 331395
IC Registration Number :	7290A-1, 7290A-2
VCCI Registration Number :	T-1945 for Telecommunication Test C-2919 for Conducted emission test R-2670 for Radiated emission test below 1GHz G-227 for Radiated emission test above 1GHz
Frequency Range Investigated:	Conducted: from 150kHz to 30MHz Radiation: from 30MHz to 25000MHz
Test Distance:	The test distance of radiated emission from antenna to EUT is 3 M.

2.5 Measurement Uncertainty

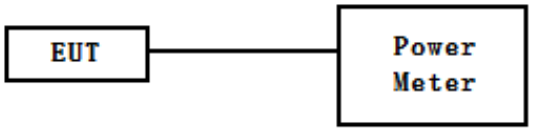
Measurement Item	Measurement Frequency	Polarization	Uncertainty
Conducted Emission	9 kHz ~ 30 MHz	LINE/NEUTRAL	±2.71 dB
Radiated Emission	30 MHz ~ 25GHz	Vertical	±4.11 dB
		Horizontal	±4.10 dB
Occupied Bandwidth	---	---	±7500 Hz
Maximum Peak Output Power	---	---	±1.4 dB
Band Edges	---	---	±2.2 dB
Power Spectral Density	---	---	±2.2 dB

3. Maximum Conducted Output Power (Peak Power)

3.1 Test Procedures

The antenna port（RF output）of the EUT was connected to the input（RF input）of a Spectrum Analyser. Power was read directly from the Spectrum Analyser and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

3.2 Test Setup Layout



3.3 Measurement equipment

Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
Series Power Meter	ANRITSU	ML2495A	1224005	2014/03/27	2015/03/26
Power Sensor	ANRITSU	MA2411B	1207295	2014/03/27	2015/03/26

3.4 Test Results

<NFA344_2T2R SKU1> (Unite: dBm)

Configurations	Mode		
	Channel / Frequency (MHz)		
<SKU1> 2.4GHz WLAN Peak Power (Tx1+Tx2)	802.11b		
	1/2412	6/2437	11/2462
	21.95+23.08=25.51	22.07+22.97=25.52	22.34+23.04=25.69
	802.11g		
	1/2412	6/2437	11/2462
	20.88+21.34=25.61	23.67+24.12=26.89	19.98+20.36=23.17
	802.11n(HT20)		
	1/2412	6/2437	11/2462
	19.77+19.65=22.71	24.12+24.87=27.49	19.11+19.98=22.54
	802.11n(HT40)		
	3/2422	6/2437	9/2452
	18.21+17.65=20.93	21.45+22.12=24.78	16.58+17.01=19.79
	802.11ac(VHT20)		
	1/2412	6/2437	11/2462
	19.67+19.55=22.61	24.22+24.49=27.35	19.10+19.58=22.34
	802.11ac(VHT40)		
	3/2422	6/2437	9/2452
	18.12+17.64=20.88	21.76+21.88=24.83	16.43+17.22=19.82

Configurations	Mode				
	Channel / Frequency (MHz)				
<SKU1> 5.8GHz WLAN Peak Power (Tx1+Tx2)	802.11a				
	149/5745	153/5765	157/5785	161/5805	165/5825
	20.95+21.13=24.04	20.68+20.95=23.81	20.88+20.59=23.73	20.57+20.66=23.61	20.14+20.23=23.18
	802.11n(HT20)				
	149/5745	153/5765	157/5785	161/5805	165/5825
	20.96+21.46=24.21	20.72+20.89=23.80	21.06+21.55=24.30	20.95+20.62=23.78	20.17+20.68=23.42
	802.11n(HT40)				
	151/5755		159/5795		
	20.96+20.99=23.97		21.24+21.13=24.18		
	802.11ac(VHT20)				
	149/5745	153/5765	157/5785	161/5805	165/5825
	20.95+21.32=24.13	20.99+21.13=24.06	21.15+21.48=24.31	20.96+21.22=23.59	20.85+20.89=23.87
	802.11ac(VHT40)				
	151/5755		159/5795		
	20.06+20.88=23.47		21.07+20.94=24.01		
	802.11ac(VHT80)				
	155/5775				
	21.02+20.94=23.98				

Configurations	Mode		
	Channel / Frequency (MHz)		
<SKU1> Bluetooth Peak Power (Tx2)	Bluetooth(GFSK)		
	0/2402	39/2441	78/2480
	10.12	10.66	10.94

Configurations	Mode		
	Channel / Frequency (MHz)		
<SKU1> Bluetooth Peak Power (Tx2)	Bluetooth(8DPSK)		
	0/2402	39/2441	78/2480
	8.27	8.60	8.61

Configurations	Mode		
	Channel / Frequency (MHz)		
<SKU1> Bluetooth Peak Power (Tx2)	Bluetooth(BT-LE)		
	0/2402	39/2440	78/2480
	2.15	2.39	2.44

<NFA345_1T2R SKU2> (Unite: dBm)

Configurations	Mode		
	Channel / Frequency (MHz)		
<SKU2> 2.4GHz WLAN Peak Power (Tx1)	802.11b		
	1/2412	6/2437	11/2462
	22.01	22.23	22.30
	802.11g		
	1/2412	6/2437	11/2462
	24.02	23.65	23.47
	802.11n(HT20)		
	1/2412	6/2437	11/2462
	24.22	24.28	24.28
	802.11n(HT40)		
	3/2422	6/2437	9/2452
	21.17	22.78	20.95

Configurations	Mode				
	Channel / Frequency (MHz)				
<SKU2> 5.8GHz WLAN Peak Power (Tx1)	802.11a				
	149/5745	153/5765	157/5785	161/5805	165/5825
	21.68	21.68	21.74	21.79	21.85
	802.11n(HT20)				
	149/5745	153/5765	157/5785	161/5805	165/5825
	21.86	21.93	22.02	21.67	21.07
	802.11n(HT40)				
	151/5755		159/5795		
	20.68		20.98		
	802.11ac(VHT20)				
	149/5745	153/5765	157/5785	161/5805	165/5825
	21.89	21.78	22.12	21.55	21.64
	802.11ac(VHT40)				
	151/5755		159/5795		
	20.01		21.05		
	802.11ac(VHT80)				
	155/5775				
	21.02				

Configurations	Mode		
	Channel / Frequency (MHz)		
<SKU2> Bluetooth Peak Power (Tx2)	Bluetooth(GFSK)		
	0/2402	39/2441	78/2480
	10.01	10.45	10.98

Configurations	Mode		
	Channel / Frequency (MHz)		
<SKU2> Bluetooth Peak Power (Tx2)	Bluetooth(8DPSK)		
	0/2402	39/2441	78/2480
	8.44	8.53	8.65

Configurations	Mode		
	Channel / Frequency (MHz)		
<SKU2> Bluetooth Peak Power (Tx2)	Bluetooth(BT-LE)		
	0/2402	39/2440	78/2480
	2.26	2.34	2.37