



FCC/ IC TEST REPORT

According to

CFR47 §15.247/ RSS-247 Issue 1

Applicant	:	Qualcomm Atheros, Inc.
Address	:	1700 Technology Drive, San Jose, CA 95110
Manufacturer	:	Qualcomm Atheros, Inc.
Address	:	1700 Technology Drive, San Jose, CA 95110
Equipment	:	Single Stream 802.11a/b/g/n/ac + BT 4.1 M.2 Type Card
Brand	:	Qualcomm Atheros
Model No.	:	QCNFA435
FCC ID	:	PPD-QCNFA435
IC ID	:	4104A-QCNFA435

- The test result refers exclusively to the test presented test model / sample.
- Without written approval of **Cerpass Technology Corp.** the test report shall not be reproduced except in full.

I HEREBY CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.10 – 2013** and the energy emitted by this equipment was **passed**.

CISPR PUB. 22 and FCC Part 15 in both radiated and conducted emission class B limits. Testing was carried out on Mar.06,2017~ Mar.13,2017 at **Cerpass Technology Corp.**

Prepared By:

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Approved by:

Miro Chueh (EMC/RF Manager)

Laboratory Accreditation:

Cerpass Technology Corporation Test Laboratory



NVLAP LAB Code:	200954-0
TAF LAB Code:	1439



Cerpass Technology (SuZhou) Co., Ltd.

NVLAP LAB Code:	200814-0
CNAS LAB Code:	L5515



Release History

Attachment No.	Version	Date	Description
SEFI1701087	Rev 01	2017-03-16	Initial release



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1. Report of Measurements and Examinations

1.1 List of Measurements and Examinations

Performed Test Item	Normative References	Test Performed	Deviation	Result
Output Power	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.247(b)(3) RSS-247 Issue 1 February 2017 Section 5.1(2)	Yes	No	Pass



2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Spreading	802.11b: DSSS 802.11g / n: OFDM
Frequency Range	802.11b/g/n(20MHz): 2412-2462MHz 802.11n(40MHz): 2422-2452MHz
Number of Channels	802.11b/g/n (20MHz):11 802.11n (40MHz): 7
Data Rate	802.11b: 11, 5.5, 2, 1 Mbps 802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps 802.11n: up to 300Mbps
Antenna Type	See antenna requirement

Host Details,

Host Manufacture	Host Type	Host Model
Lenovo	Notebook Computer	Lenovo ideapad 520-15IKB



2.2 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)

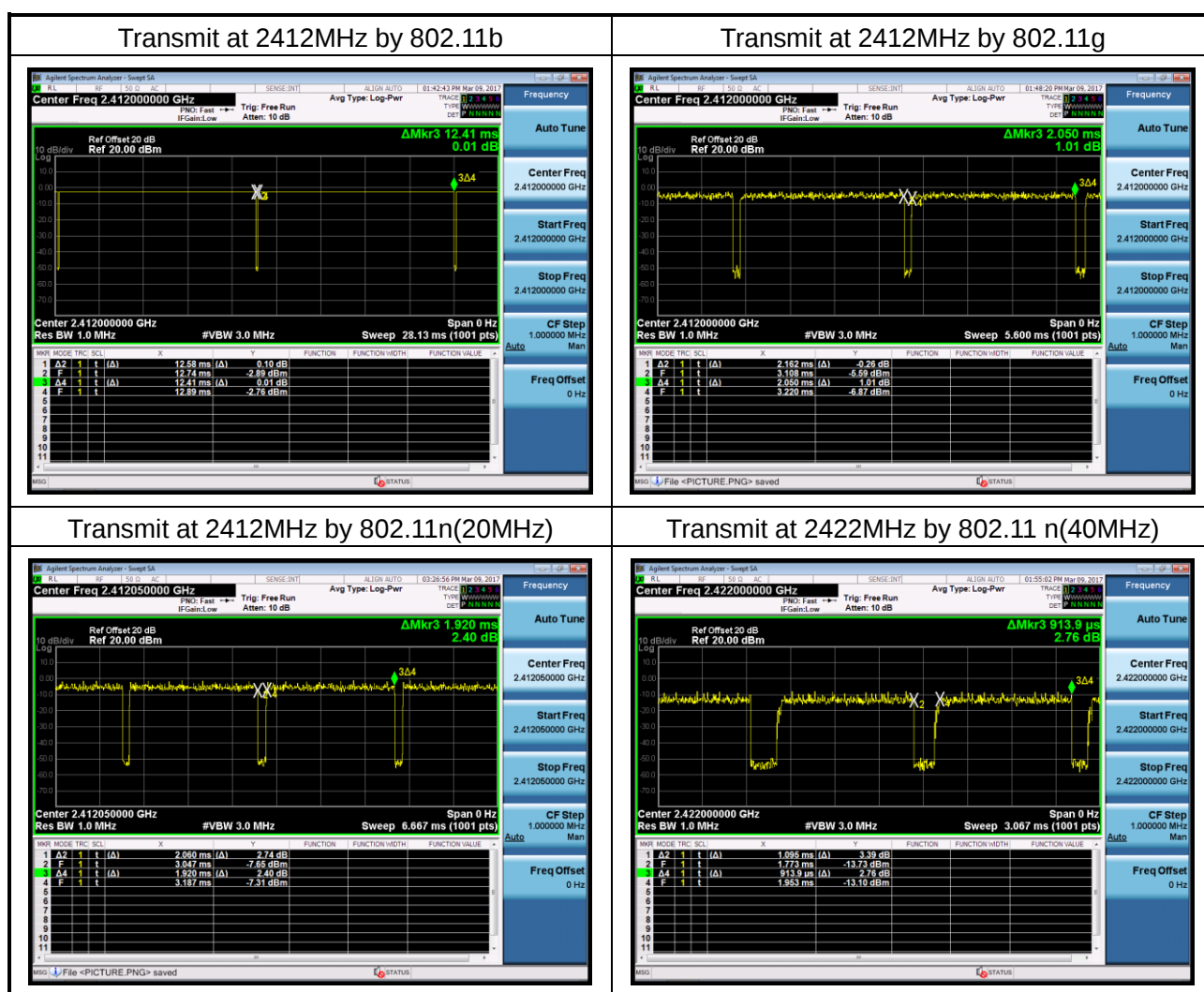
Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	---	08	2447
02	---	09	2452
03	2422	---	---
04	2427	---	---
05	2432	---	---
06	2437	---	---
07	2442	---	---



2.3 Duty cycle

Test Item	Duty cycle
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Mode	Frequency (MHz)	Measurement (%)
802.11b	2412	98.60%
802.11g	2412	94.80%
802.11n(20MHz)	2412	93.20%
802.11n(40MHz)	2422	83.50%





2.4 Test Manner

Test Manner	
1	During testing, the interface cables and equipment positions were varied according to RSS-247 Issue 1
2	Adjust the EUT at the test mode and the test channel. Then test.
Test mode	
1	Transmit by 802.11b
2	Transmit by 802.11g
3	Transmit by 802.11n (20MHz)
4	Transmit by 802.11n (40MHz)



2.5 General Information of Test

Test Site:	CerpPASS Technology Corp.
Performand 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

2.6 Measurement Uncertainty

Measurement Item	Measurement Frequency	Polarization	Uncertainty
Radiated Emission	30 MHz ~ 40GHz	Vertical	±4.11 dB
		Horizontal	±4.10 dB
Maximum Peak Output Power	---	---	±1.4 dB



3. Antenna Requirements

3.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

3.2 Antenna Construction and Directional Gain

Antenna	Manufacturer	Ant Type	Ant Part number	Peak Gain
Main(chain 0)	Amphenol	PIFA	DC33001GX00	-1.00dBi for 2.40~2.50GHz band -1.73dBi for 5.15~5.35GHz band -0.68dBi for 5.47~5.725GHz band -1.81dBi for 5.725~5.85GHz band
Aux(chain 1)			DC33001GX10	-1.63dBi for 2.40~2.50GHz band -3.79dBi for 5.15~5.35GHz band -3.24dBi for 5.47~5.725GHz band -4.66dBi for 5.725~5.85GHz band
Main(chain 0)	SPEED	PIFA	DC33001GV00	0.65dBi for 2.40~2.50GHz band 0.86dBi for 5.15~5.35GHz band -1.29dBi for 5.47~5.725GHz band -3dBi for 5.725~5.85GHz band
Aux(chain 1)			DC33001GV10	-0.14dBi for 2.40~2.50GHz band -1.73dBi for 5.15~5.35GHz band -1.57dBi for 5.47~5.725GHz band -3.87dBi for 5.725~5.85GHz band

Note: The EUT will collocation two kinds of antenna, we choose one of the high peak gain antenna for all RF testing.



4. Maximum Output Power

4.1 Test Limit

The maximum power shall be less 1Watt (30dBm).

The conducted output power limits specified in §15.247(b) are based on the use of transmit antennae with directional gains that do not exceed 6 dBi. If transmit antennae with an effective directional gain greater than 6 dBi are used, then the conducted output power from the EUT shall be reduced as specified in §15.247(b) and (c).

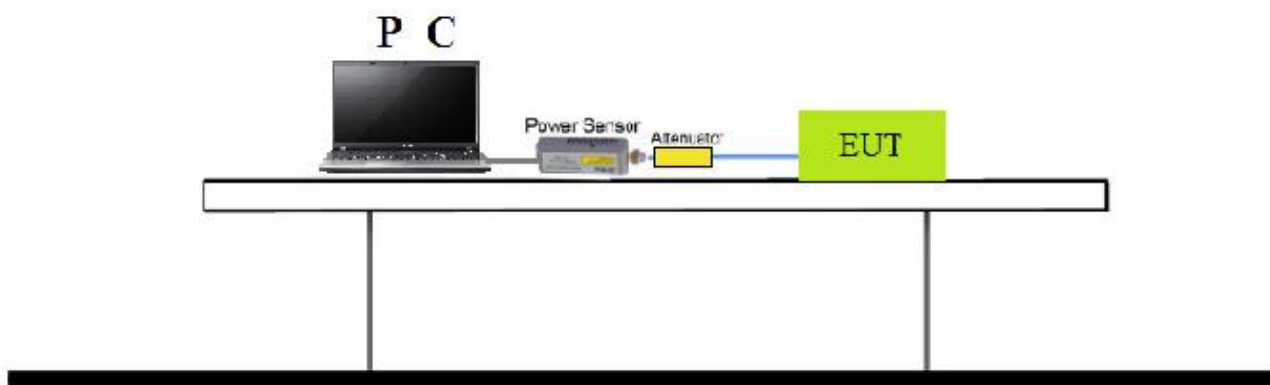
Per RSS247 Issue 1 Section 5.4(4), for DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum conducted output power shall not exceed 1W.

4.2 Test Procedure

The EUT was tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The maximum conducted AVG output power using KDB 558074 D01v04 - Section 9.2.3.2 AVGPM-G Average Power Method.

The Maximum peak conducted output power using KDB 558074 D01v04 - Section 9.1.1 RBW ≥ DTS bandwidth Method.

4.3 Test Setup Layout



4.4 Measurement Equipment

Instrument	Manufacturer	Type No.	Serial No.	Calibration Date	Valid Date.
PC	Lenovo	E40-70	MP078UQV	N/A	N/A
POWER SENSOR	Agilent	U2021XA	MY53260020	2016/03/27	2017/03/26
Series Power Meter	ANRITSU	ML2495A	1224005	2016/03/27	2017/03/26
Temperature/Humidity Meter	Zhicheng	ZC1-11	CEP-TH-003	2016/03/31	2017/03/30



4.5 Test Result and Data

Power output test was verified over all data rates of each mode shown as below, and then choose the maximum power output (blue marker) for final test of each channel.

MCS Index for 802.11n	Spatial Streams	Data Rate(Mbps)					
		802.11b	802.11g	20MHz Bandwidth		40MHz Bandwidth	
				800ns GI	400ns GI	800ns GI	400ns GI
0	1	1	6	6.5	7.2	13.5	15.0
1	1	2	9	13.0	14.4	27.0	30.0
2	1	5.5	12	19.5	21.7	40.5	45.0
3	1	11	18	26.0	28.9	54.0	60.0
4	1	--	24	39.0	43.3	81.0	90.0
5	1	--	36	52.0	57.8	108.0	120.0
6	1	--	48	58.5	65.0	121.5	135.0
7	1	--	54	65.0	72.2	135.0	150.0
8	2	--	--	13.0	14.4	27.0	30.0
9	2	--	--	26.0	28.9	54.0	60.0
10	2	--	--	39.0	43.3	81.0	90.0
11	2	--	--	52.0	57.8	108.0	120.0
12	2	--	--	78.0	86.7	162.0	180.0
13	2	--	--	104.0	115.6	216.0	240.0
14	2	--	--	117.0	130.0	243.0	270.0
15	2	--	--	130.0	144.0	270.0	300.0



Test Item	Maximum Output Power
Test Mode	Transmit by 802.11b
Test Date	2017-03-08

Channel No.	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)	Required Limit (dBm)	Result
01	2412	22.15	20.09	30	Pass
06	2437	22.21	20.24	30	Pass
11	2462	22.14	20.23	30	Pass

Test Item	Maximum Output Power
Test Mode	Transmit by 802.11g
Test Date	2017-03-08

Channel No.	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)	Required Limit (dBm)	Result
01	2412	22.06	17.25	30	Pass
06	2437	22.68	19.12	30	Pass
11	2462	22.05	17.64	30	Pass

Test Item	Maximum Output Power
Test Mode	Transmit by 802.11n (20MHz)
Test Date	2017-03-08

Channel No.	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)	Required Limit (dBm)	Result
01	2412	22.27	17.43	30	Pass
06	2437	22.81	19.25	30	Pass
11	2462	21.50	16.65	30	Pass



Test Item	Maximum Output Power
Test Mode	Transmit by 802.11n (40MHz)
Test Date	2017-03-08

Channel No.	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)	Required Limit (dBm)	Result
03	2422	22.01	16.12	30	Pass
06	2437	22.62	18.16	30	Pass
09	2452	21.26	14.64	30	Pass