FCC PART 15C
TESTREPORT
No. I17Z61083-IOT02

For

Lenovo(Shanghai) Electronics Technology Co., Ltd.

Portable Tablet Computer

Lenovo TB-7304I

with

FCC ID: O57TB7304I

Hardware Version: Lenovo Tablet TB-7304I

Software Version: TB-7304I_RF01_170728

Issued Date: 2017-08-08

TESTING
NVLAP LAB CODE 600118-0

Note:

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Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

Tel:+86(0)10-62304633-2512, Fax:+86(0)10-62304633-2504

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I17Z61083-IOT02	Rev.0	1st edition	2017-08-08

CONTENTS

1. Test Laboratory

1.1. Testing Location

Conducted testing Location: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China100191

Radiated testing Location: CTTL(BDA)

Address: No. 18 Jia Kangding Street, BDA District, Beijing, P. R. China 100191

1.2. Testing Environment

Normal Temperature: 15-35℃

Extreme Temperature: 0/+45℃

Relative Humidity: 20-75%

1.3. Project data

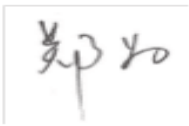
Testing Start Date: 2017-07-12

Testing End Date: 2017-08-02

1.4. Signature

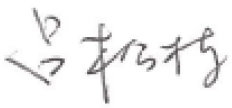
Jiang Xue

(Prepared this test report)



Zheng Wei

(Reviewed this test report)



Lv Songdong

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	Lenovo(Shanghai) Electronics Technology Co., Ltd.
Address:	NO.68 BUILDING, 199 FENJU RD, Pilot Free Trade Zone, 200131, China
City:	Shanghai
Postal Code:	200131
Country:	China
Telephone:	+86-21-50504500-8281
Fax:	+86-21-50504500-8281

2.2. Manufacturer Information

Company Name:	Lenovo PC HK Limited
Address:	23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong
City:	Hong Kong
Postal Code:	/
Country:	China
Telephone:	+86-10-57877542
Fax:	+86-10-58863425

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Portable Tablet Computer
Model name	Lenovo TB-7304I
FCC ID	O57TB7304I
IC ID	/
With WLAN Function	Yes
Frequency Range	ISM 2400MHz~2483.5MHz
Type of Modulation	DSSS/CCK/OFDM
Number of Channels	11
Antenna	Integral Antenna
MAX Conducted Power	21.18dBm(OFDM)
Power Supply	3.8V DC by Battery

3.2. Internal Identification of EUT

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	865485030009655	Lenovo Tablet TB-7304I	TB-7304I_RF01_170728
EUT2	865485030010364	Lenovo Tablet TB-7304I	TB-7304I_RF01_170728

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE

AE ID*	Description	SN
AE1	Battery	/
AE2	Battery	/
AE3	Charger	/
AE4	Charger	/

AE1

Model	SB18C15123
Manufacturer	Sunwoda
Capacitance	3500mAh
Nominal voltage	3.85V

AE2

Model	SB18C15124
Manufacturer	SCUD
Capacitance	3500mAh
Nominal voltage	3.85V

AE3

Model	C-P56
Manufacturer	Huntkey
Length of cable	/

AE4

Model	C-P57
Manufacturer	Acbel
Length of cable	/

*AE ID: is used to identify the test sample in the lab internally.

3.4. General Description

The Equipment under Test (EUT) is a model of Portable Tablet Computer with integrated antenna and inbuilt battery.
It has Bluetooth (EDR) function.
It consists of normal options: travel charger, USB cable.
Manual and specifications of the EUT were provided to fulfil the test.
Samples undergoing test were selected by the client.

3.5. Interpretation of the Test Environment

For the test methods, the test environment uncertainty figures correspond to an expansion factor k=2.
Measurement Uncertainty

Parameter	Uncertainty
temperature	0.48°C
humidity	2 %
DC voltages	0.003V

4. Reference Documents

4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part15	FCC CFR 47, Part 15, Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902-928MHz, 2400-2483.5 MHz, and 5725-5850 MHz.	2016
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013

5. Test Results

5.1. Summary of Test Results

SUMMARY OF MEASUREMENT RESULTS	Sub-clause of Part15C	Sub-clause of IC	Verdict
Maximum Peak Output Power	15.247 (b)	/	P
Peak Power Spectral Density	15.247 (e)	/	P
Occupied 6dB Bandwidth	15.247 (a)	/	P
Band Edges Compliance	15.247 (d)	/	P
Transmitter Spurious Emission - Conducted	15.247 (d)	/	P
Transmitter Spurious Emission - Radiated	15.247, 15.205, 15.209	/	P
AC Powerline Conducted Emission	15.107, 15.207	/	P

Please refer to **ANNEX A** for detail.

Terms used in Verdict column

P	Pass, The EUT complies with the essential requirements in the standard.
NP	Not Perform, The test was not performed by CTTL
NA	Not Applicable, The test was not applicable
F	Fail, The EUT does not comply with the essential requirements in the standard
F	Fail, The EUT does not comply with the essential requirements in the standard

5.2. Statements

The test cases as listed in section 5.1 of this report for the EUT specified in section 3 was performed by CTTL and according to the standards or reference documents listed in section 4.2

The EUT met all requirements of the standards or reference documents, and only the WLAN function was tested in this report.

5.3. Test Conditions

T nom	Normal Temperature
T min	Low Temperature
T max	High Temperature
V nom	Normal Voltage

For this report, if the test cases listed above are tested under normal temperature and normal voltage, and also under norm humidity, the specific condition is shown as follows:

Temperature	T nom	26℃
Voltage	V nom	3.8V (By battery)
Humidity	H nom	44%

6. Test Facilities Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Calibration Due date
1	Vector Signal Analyzer	FSQ40	200089	Rohde & Schwarz	2016-06-07	2018-06-01
2	Test Receiver	ESCI	100344	Rohde & Schwarz	2017-02-16	2018-03-15
3	LISN	ENV216	101200	Rohde & Schwarz	2017-07-04	2018-08-03
4	Shielding Room	S81	/	ETS-Lindgren	/	/

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Calibration Due date
1	Test Receiver	ESCI 7	100948	Rohde & Schwarz	2017-06-26	2018-07-25
2	Loop antenna	HFH2-Z2	829324/007	Rohde & Schwarz	2014-12-17	2017-12-16
3	BiLog Antenna	VULB9163	302	Schwarzbeck	2017-02-28	2020-03-27
4	Dual-Ridge Waveguide Horn Antenna	3115	6914	EMCO	2014-12-16	2017-12-15
5	Dual-Ridge Waveguide Horn Antenna	3116	2661	ETS-Lindgren	2017-06-17	2020-06-16
6	Vector Signal Analyzer	FSV	101047	Rohde & Schwarz	2017-06-28	2018-06-27
7	Semi-anechoic chamber	/	CT000332-1074	Frankonia German	/	/

7. Measurement Uncertainty

7.1. Maximum Output Power

Measurement Uncertainty: 0.339dB,k=1.96

7.2. Peak Power Spectral Density

Measurement Uncertainty: 0.705dBm/MHz,k=1.96

7.3. DTS 6-dB Signal Bandwidth

Measurement Uncertainty: 60.80Hz,k=1.96

7.4. Band Edges Compliance

Measurement Uncertainty : 0.62dBm,k=1.96

7.5. Transmitter Spurious Emission

Conducted (k=1.96)

Frequency Range	Uncertainty(dBm)
30MHz ≤ f ≤ 2GHz	1.22
2GHz ≤ f ≤3.6GHz	1.22
3.6GHz ≤ f ≤8GHz	1.22
8GHz ≤ f ≤12.75GHz	1.51
12.75GHz ≤ f ≤26GHz	1.51
26GHz ≤ f ≤40GHz	1.59

Radiated (k=2)

Frequency Range	Uncertainty(dBm)
30MHz ≤ f ≤ 1GHz	4.86
1GHz ≤ f ≤18GHz	5.26
18GHz ≤ f ≤40GHz	5.28

7.6. AC Power-line Conducted Emission

Measurement Uncertainty : 3.38dBm,k=2

ANNEX A: Detailed Test Results

A.1. Measurement Method

A.1.1. Conducted Measurements

Connect the EUT to the test system as Fig.A.1.1.1 shows.
Set the EUT to the required work mode.
Set the EUT to the required channel.
Set the Vector Signal Analyzer and start measurement.
Record the values. Vector Signal Analyzer

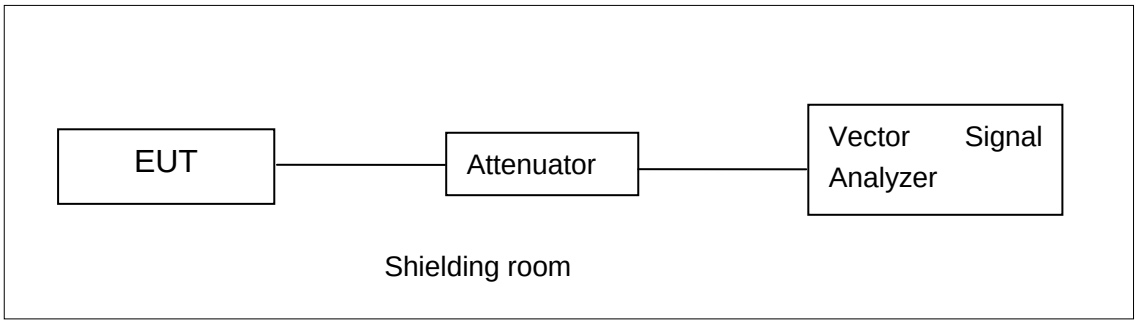


Fig.A.1.1.1: Test Setup Diagram for Conducted Measurements

A.1.2. Radiated Emission Measurements

In the case of radiated emission, the used settings are as follows,
Sweep frequency from 30 MHz to 1GHz, RBW = 100 kHz, VBW = 300 kHz;
Sweep frequency from 1 GHz to 26GHz, RBW = 1MHz, VBW = 10Hz;

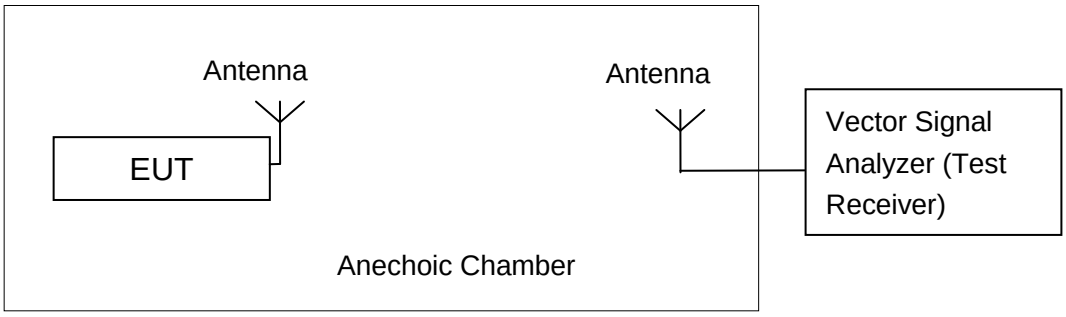


Fig.A.1.2.1: Test Setup Diagram for Radiated Measurements

A.2. Maximum Output Power

Method of Measurement: See ANSI C63.10-2013-clause 11.9.1.2

a) Set the RBW = 1 MHz.
b) Set the VBW = 3 MHz.
c) Set the span ≥ [1.5 × DTS bandwidth].
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select the peak detector).

Measurement Limit:

Standard	Limit (dBm)
FCC CRF Part 15.247(b)	< 30

EUT ID: EUT2

A.2.1. Peak Output Power-conducted

Measurement Results:

802.11b/g mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11b	1	17.10	/	/
	2	17.29	/	/
	5.5	18.57	/	/
	11	20.06	20.59	20.09
802.11g	6	20.48	/	/
	9	20.23	/	/
	12	20.45	/	/
	18	20.36	/	/
	24	20.63	/	/
	36	20.57	/	/
	48	20.69	/	/
	54	20.72	21.18	20.77

The data rate 11Mbps and 54Mbps are selected as worse condition, and the following cases are performed with this condition.

802.11n-HT20 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11n (20MHz)	MCS0	20.20	/	/
	MCS1	19.60	/	/
	MCS2	19.48	/	/
	MCS3	20.04	/	/
	MCS4	20.06	/	/
	MCS5	20.34	20.54	20.32
	MCS6	20.33	/	/
	MCS7	20.32	/	/

The data rate MCS5 is selected as worse condition, and the following cases are performed with this condition.

802.11n-HT40 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		2422MHz (Ch3)	2437MHz (Ch6)	2452 MHz (Ch9)
802.11n (40MHz)	MCS0	20.05	20.01	20.08
	MCS1	19.86	/	/
	MCS2	19.88	/	/
	MCS3	19.61	/	/
	MCS4	19.62	/	/
	MCS5	19.90	/	/
	MCS6	19.87	/	/
	MCS7	19.57	/	/

The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

Conclusion: Pass

A.2.2. Average Output Power-conducted

Method of Measurement: See ANSI C63.10-2013-clause 11.9.2.2.2

The procedure for this method is as follows:

a) Set span = 80MHz.

b) Set RBW = 1MHz.

c) Set VBW = 3MHz

d) Number of points in sweep = 625

e) Sweep time = auto.

f) Detector = RMS.

g) The trigger shall be set to “free run.”

h) Trace average 100 traces in power averaging (rms) mode.

i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s

band power measurement function, with band limits set equal to the OBW band edges.

802.11b/g mode

Mode	Test Result (dBm)		
	2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11b	13.56	12.92	12.83
802.11g	12.13	11.54	11.33

802.11n-HT20 mode

Mode	Test Result (dBm)		
	2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11n (20MHz)	11.77	11.02	10.82

802.11n-HT40 mode

Mode	Test Result (dBm)		
	2422MHz (Ch3)	2437MHz (Ch6)	2452 MHz (Ch9)
802.11n(40MHz)	11.42	10.71	10.68

Conclusion: Pass

A.3. Peak Power Spectral Density

Method of Measurement: See ANSI C63.10-2013-clause 11.10.2

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to RBW = 3 kHz.
d) Set the VBW = 10 kHz.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.

Measurement Limit:

Standard	Limit
FCC CRF Part 15.247(e)	< 8 dBm/3 kHz

Measurement Results:

802.11b/g mode

Mode	Channel	Power Spectral Density (dBm/3 kHz)		Conclusion
802.11b	1	Fig.A.3.1	-11.08	**P**
	6	Fig.A.3.2	-9.90	**P**
	11	Fig.A.3.3	-9.79	**P**
802.11g	1	Fig.A.3.4	-13.19	**P**
	6	Fig.A.3.5	-12.81	**P**
	11	Fig.A.3.6	-13.21	**P**

802.11n-HT20 mode

Mode	Channel	Power Spectral Density (dBm/3 kHz)		Conclusion
802.11n (HT20)	1	Fig.A.3.7	-13.88	**P**
	6	Fig.A.3.8	-14.96	**P**
	11	Fig.A.3.9	-14.88	**P**

802.11n-HT40 mode

Mode	Channel	Power Spectral Density (dBm/3 kHz)		Conclusion
802.11n (HT40)	3	Fig.A.3.10	-16.16	**P**
	6	Fig.A.3.11	-16.91	**P**
	9	Fig.A.3.12	-17.48	**P**

Conclusion: Pass

Test graphs as below:

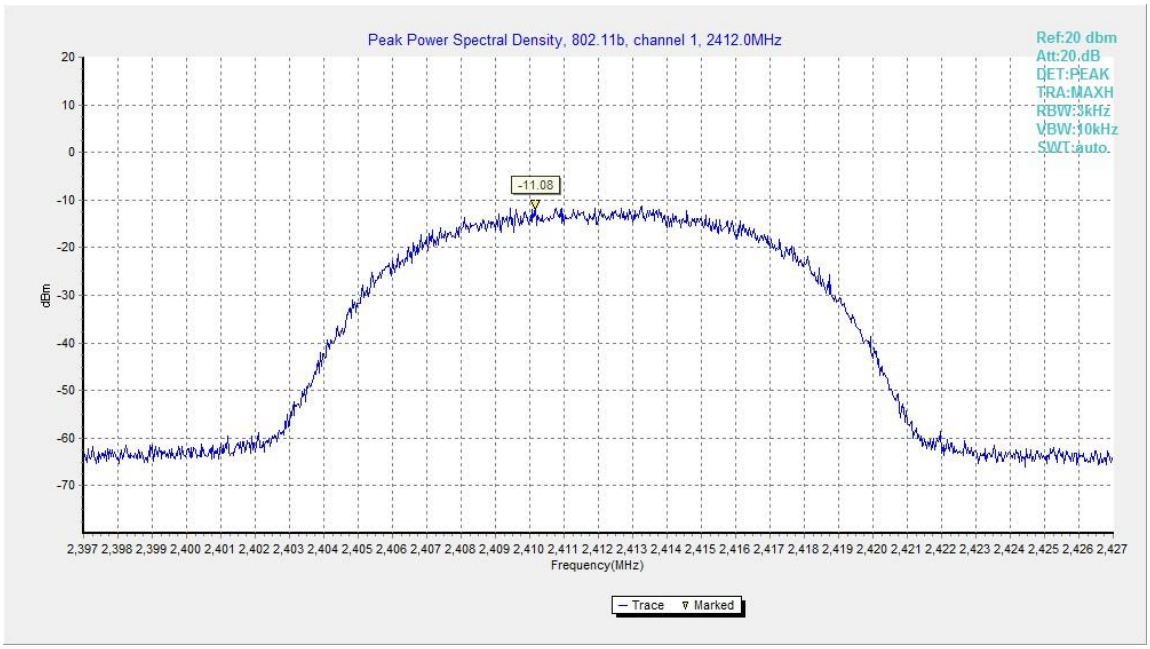


Fig.A.3.1 Power Spectral Density(802.11b,Ch1)

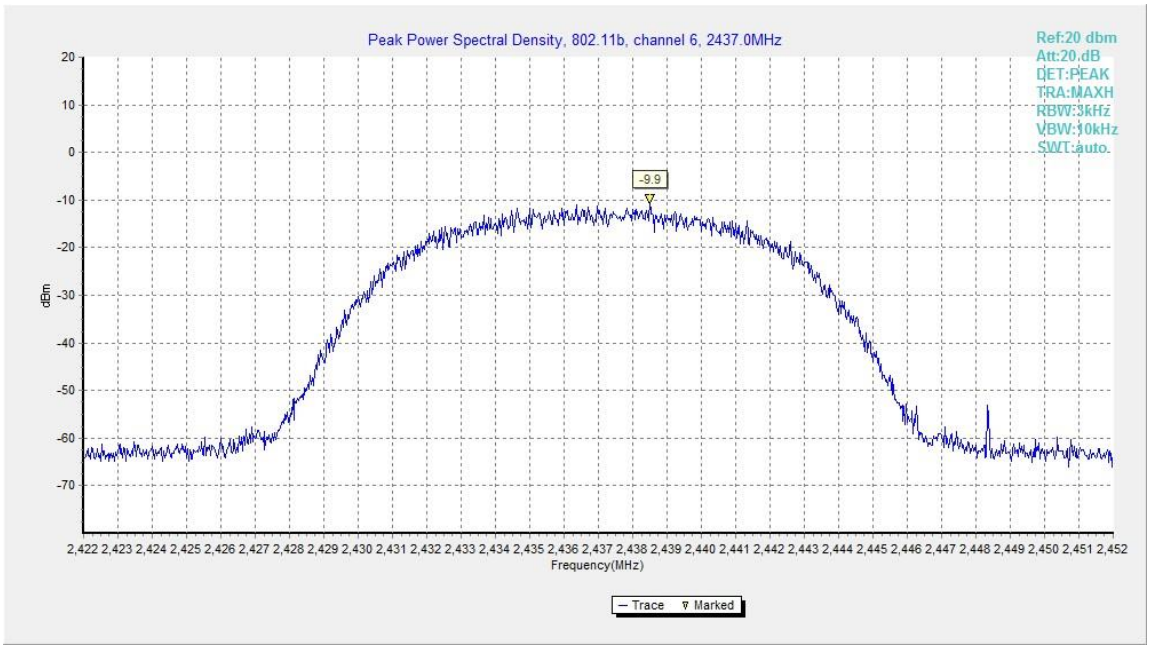


Fig.A.3.2 Power Spectral Density (802.11b, Ch 6)

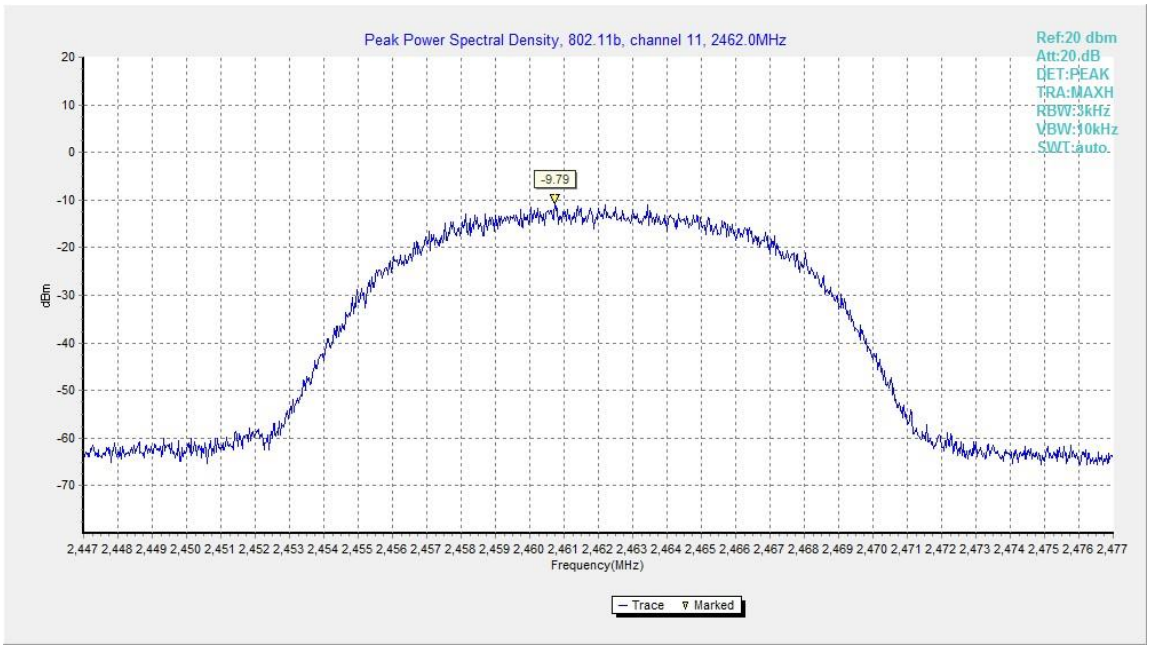


Fig.A.3.3 Power Spectral Density (802.11b, Ch 11)

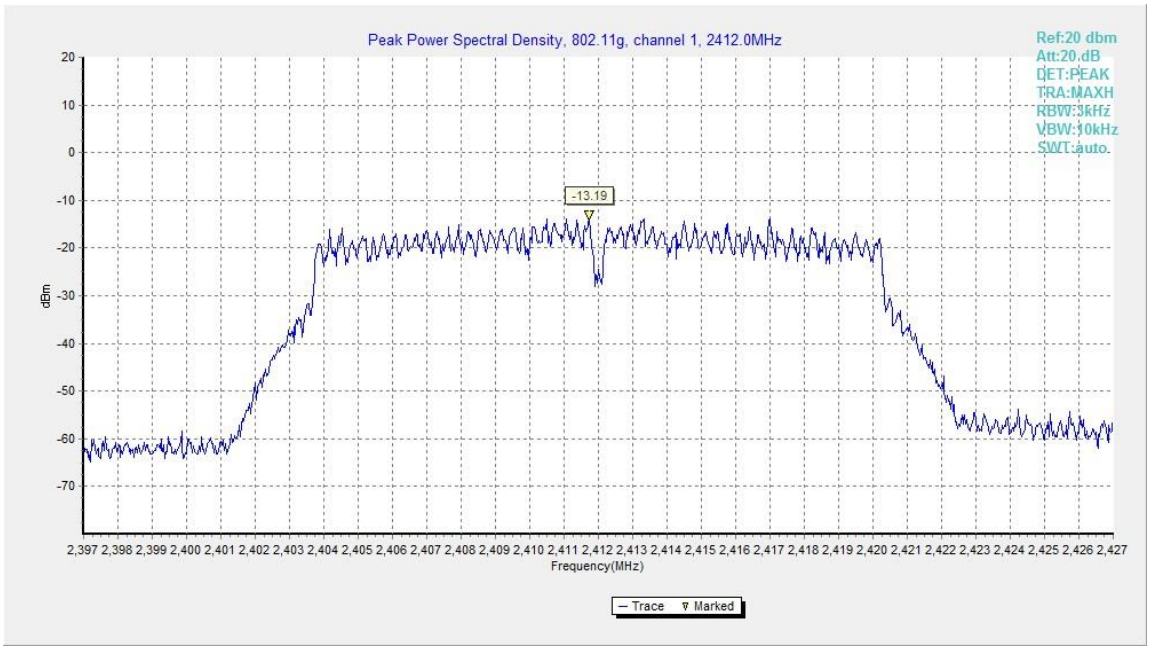


Fig.A.3.4 Power Spectral Density (802.11g, Ch 1)

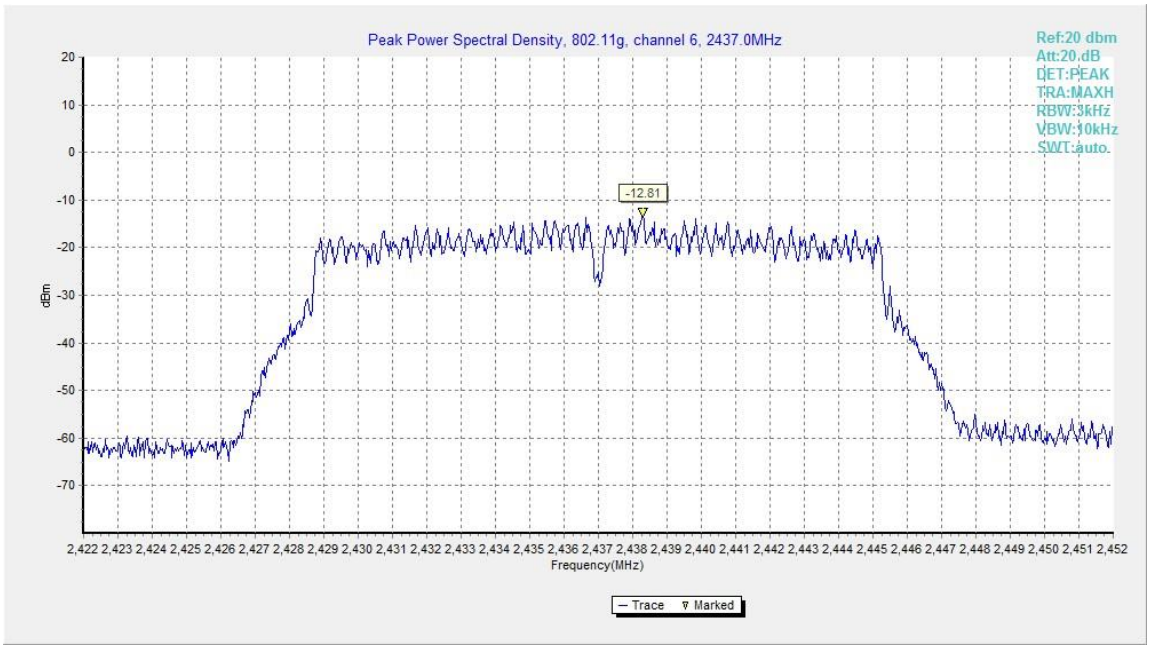


Fig.A.3.5 Power Spectral Density (802.11g, Ch 6)

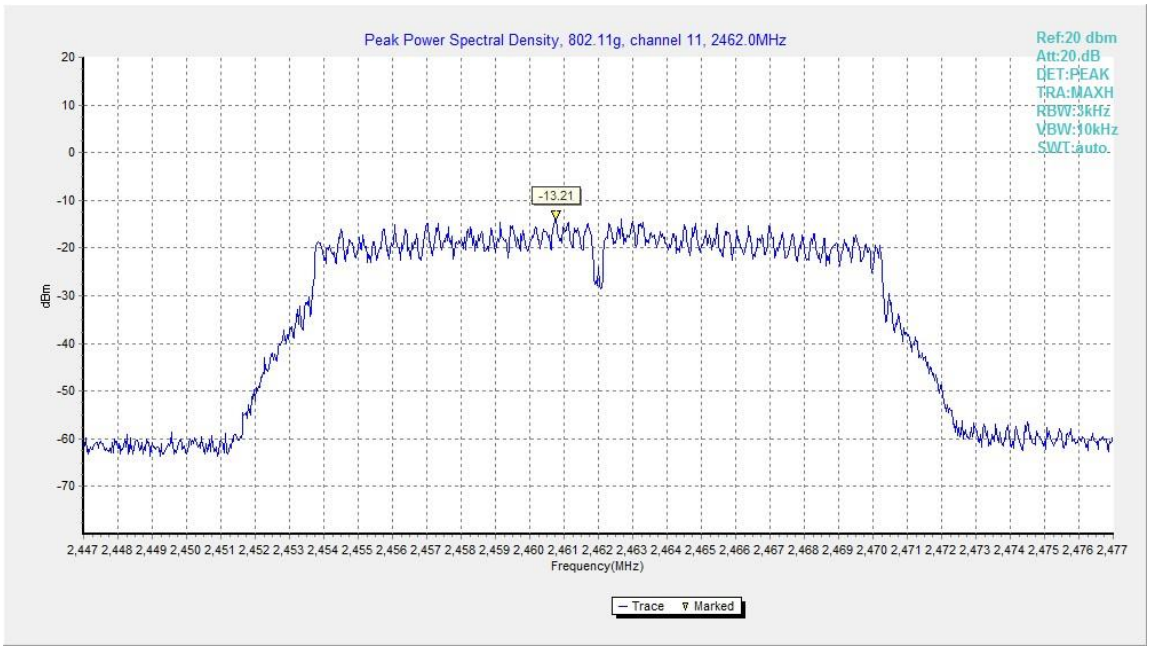


Fig.A.3.6 Power Spectral Density (802.11g, Ch 11)

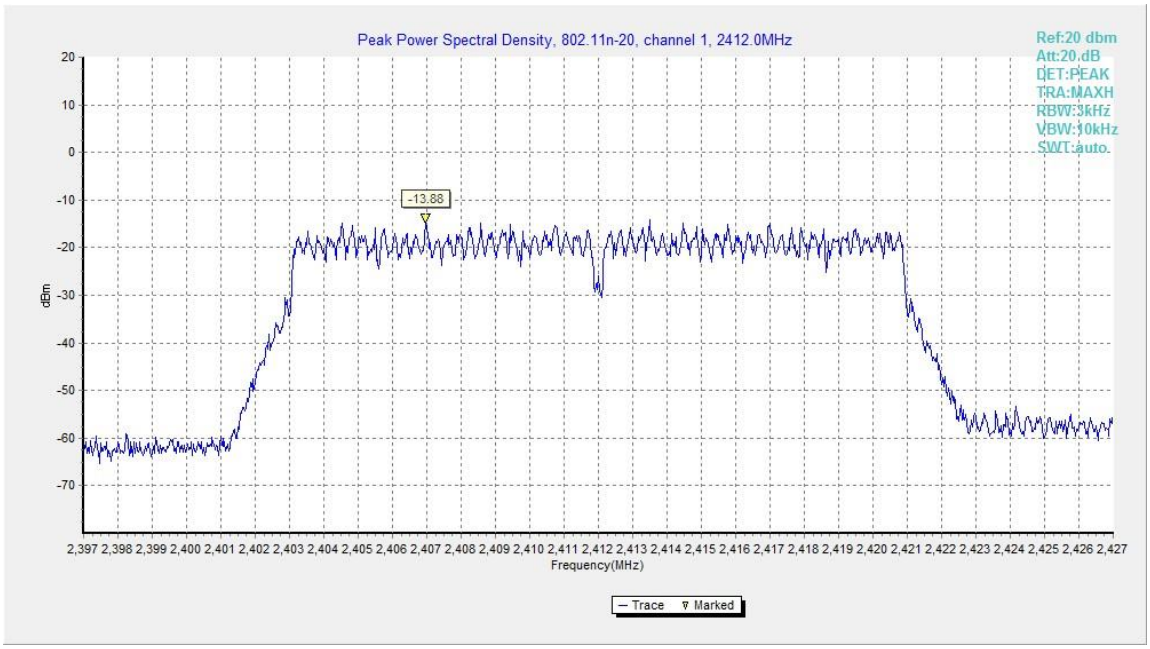


Fig.A.3.7 Power Spectral Density (802.11n-HT20, Ch 1)

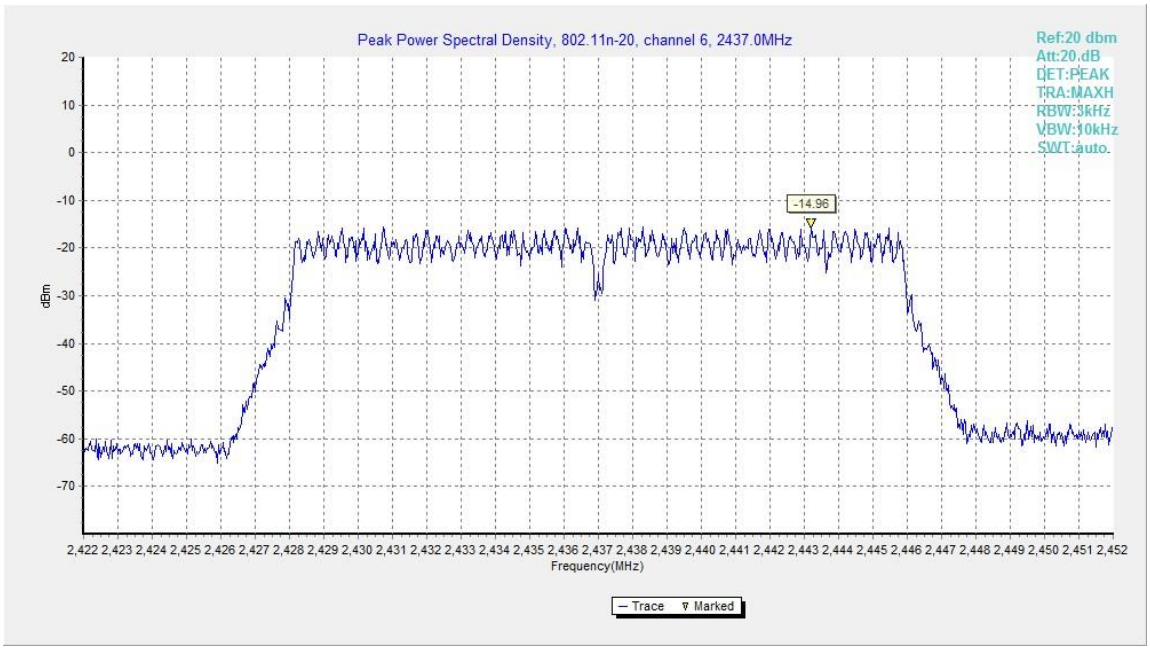


Fig.A.3.8 Power Spectral Density (802.11n-HT20, Ch 6)