



# FCC PART 15C TESTREPORT

No. I16Z40428-SRD07

for  
**TCL Communication Ltd.**  
**LTE/UMTS/GSM handheld station**

**MODEL NAME: VFD700**

**with**

**FCC ID: 2ACCJH051**

**Hardware Version: PIO**

**Software Version: v2DS1**

**Issued Date: 2016-05-23**



**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

**Test Laboratory:**

CTTL, Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT

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

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

Email:[cttl\\_terminals@catr.cn](mailto:cttl_terminals@catr.cn), website:[www.chinattl.com](http://www.chinattl.com)



## **REPORT HISTORY**

<b>Report Number</b>	<b>Revision</b>	<b>Description</b>	<b>Issue Date</b>
I16Z40428-SRD07	Rev.0	1st edition	2016-04-01
I16Z40428-SRD07	Rev.1	2ed edition	2016-04-26
I16Z40428-SRD07	Rev.2	3rd edition	2016-05-23

## **CONTENTS**

1. TEST LABORATORY .....	5
1.1. TESTINGLOCATION .....	5
1.2. TESTINGENVIRONMENT .....	5
1.3. PROJECT DATA .....	5
1.4. SIGNATURE.....	5
2. CLIENTINFORMATION .....	6
2.1. APPLICANT INFORMATION.....	6
2.2. MANUFACTURER INFORMATION.....	6
3. EQUIPMENT UNDERTEST (EUT) AND ANCILLARY EQUIPMENT (AE) .....	7
3.1. ABOUT EUT.....	7
3.2. INTERNAL IDENTIFICATION OF EUT .....	7
3.3. INTERNAL IDENTIFICATION OF AE.....	7
3.4. GENERAL DESCRIPTION .....	8
3.5. INTERPRETATION OF THE TEST ENVIRONMENT .....	8
4. REFERENCE DOCUMENTS.....	8
4.1. DOCUMENTS SUPPLIED BY APPLICANT.....	8
4.2. REFERENCE DOCUMENTS FOR TESTING.....	8
5. TEST RESULTS.....	9
5.1. SUMMARY OF TEST RESULTS .....	9
5.2. STATEMENTS.....	9
5.3. TEST CONDITIONS.....	9
6. TEST FACILITIES UTILIZED .....	10
ANNEX A: DETAILED TEST RESULTS .....	11
A.1. MEASUREMENT METHOD .....	11
A.2. MAXIMUM OUTPUT POWER.....	12
A.2.1. PEAK OUTPUT POWER-CONDUCTED.....	12
A.2.2. AVERAGE OUTPUT POWER-CONDUCTED.....	13
A.3. PEAK POWER SPECTRAL DENSITY.....	15
A.4. DTS 6-DB SIGNAL BANDWIDTH .....	26
A.5. BAND EDGES COMPLIANCE .....	38
A.6. TRANSMITTER SPURIOUS EMISSION .....	47



A.6.1 TRANSMITTER SPURIOUS EMISSION – CONDUCTED .....	47
A.6.2 TRANSMITTER SPURIOUS EMISSION - RADIATED .....	132
<b>A.7. AC POWER-LINE CONDUCTED EMISSION.....</b>	<b>173</b>
<b>ANNEX B: ACCREDITATION CERTIFICATE .....</b>	<b>174</b>

## **1. Test Laboratory**

### **1.1. Testing Location**

Location 1:CTTL(Huayuan North Road)

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

Location 2:CTTL(Shouxiang)

Address: No. 51 Shouxiang Science Building, Xueyuan Road,  
Haidian District, Beijing, P. R. China100191

### **1.2. Testing Environment**

Normal Temperature: 15-35°C

Extreme Temperature: -10/+55°C

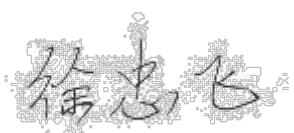
Relative Humidity: 20-75%

### **1.3. Project data**

Testing Start Date: 2016-03-01

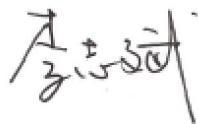
Testing End Date: 2016-05-23

### **1.4. Signature**



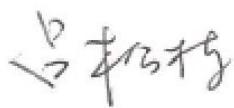
Xu Zhongfei

(Prepared this test report)



Li Zhibin

(Reviewed this test report)



Lv Songdong

(Approved this test report)



## **2. Client Information**

### **2.1. Applicant Information**

Company Name: TCL Communication Ltd  
Address: 5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park,  
Pudong Area Shanghai, P.R. China. 201203  
City: Shanghai  
Postal Code: 201203  
Country: China  
Telephone: 0086-21-31363544  
Fax: 0086-21-61460602

### **2.2. Manufacturer Information**

Company Name: TCL Communication Ltd  
Address: 5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park,  
Pudong Area Shanghai, P.R. China. 201203  
City: Shanghai  
Postal Code: 201203  
Country: China  
Telephone: 0086-21-31363544  
Fax: 0086-21-61460602

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

#### **3.1. About EUT**

Description	LTE/UMTS/GSM handheld station
Model name	VFD 700
FCC ID	2ACCJH051
IC ID	/
With WLAN Function	Yes
Frequency Range	ISM 2400MHz~2483.5MHz
Type of Modulation	DSSS/CCK/OFDM
Number of Channels	13
Antenna	Integral Antenna
MAX Conducted Power	23.06dBm(DSSS)
Power Supply	3.7V DC by Battery

#### **3.2. Internal Identification of EUT**

EUT ID*	SN or IMEI	HW Version	SW Version
UT20a	357042070003604	PIO	v2DS1
UT20a	357042070003604	PIO	v2DS1

\*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	Charger	/

##### AE1

Commercial name	Battery
Type	CAC2960003C2
Manufacturer	BYD
Length of cable	/

##### AE2

Commercial name	Charger
Type	CBA0061AA0C1
Manufacturer	/
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 LTE/UMTS/GSM handheld station with integrated antenna and inbuilt battery.

It has Bluetooth (EDR) function.

It consists of normal options: travel charger, USB cable and Phone.

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.	2015
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.

This model is a variant product which market name is 5095B; all the test results have been derived from test report of 5095B, except radiated data and part of the conducted results.

### **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°C
Voltage	V nom	3.7V(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	2015-07-01	2016-06-30
2	Test Receiver	ESCI	100344	Rohde & Schwarz	2016-03-04	2017-03-03
3	LISN	ENV216	101200	Rohde & Schwarz	2015-07-08	2016-07-07
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	2015-07-17	2016-07-16
2	Loop antenna	HFH2-Z2	829324/007	Rohde & Schwarz	2014-12-17	2017-12-16
3	BiLog Antenna	VULB9163	234	Schwarzbeck	2013-09-16	2016-09-15
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	2014-06-18	2017-06-17
6	Vector Signal Analyzer	FSV	101047	Rohde & Schwarz	2015-07-04	2016-07-03
7	Semi-anechoic chamber	/	CT000332-1074	Frankonia German	/	/

## **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

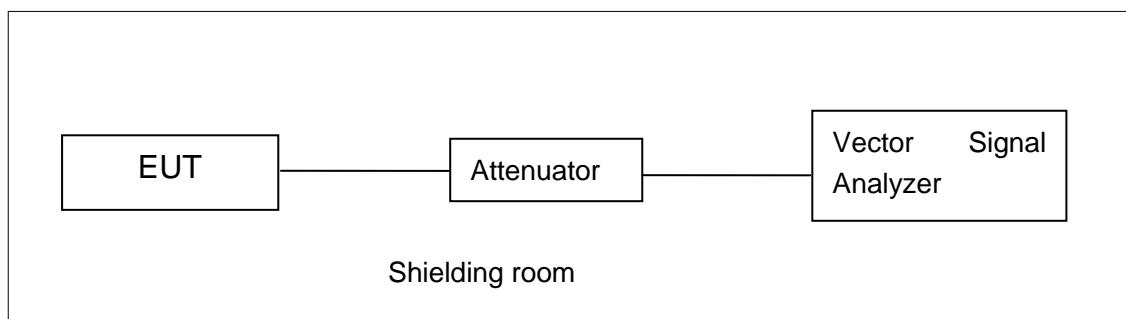


Fig.A.1.1.1: Test Setup Diagram for Conducted Measurements

#### **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;

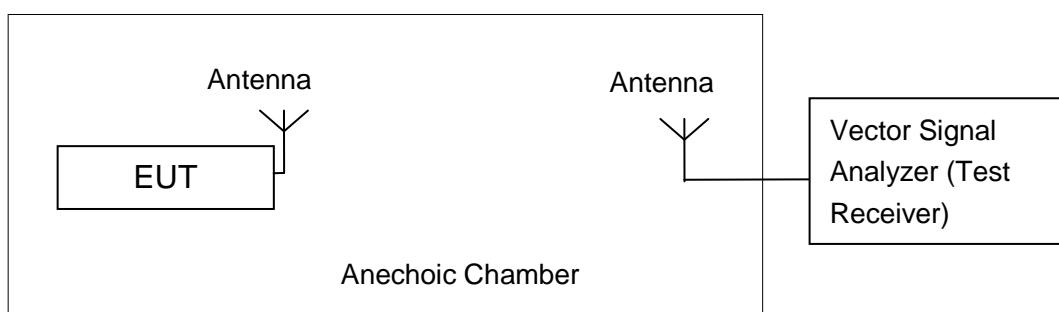


Fig.A.1.2.1: Test Setup Diagram for Radiated Measurements

## 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  $\geq [1.5 \times \text{DTS bandwidth}]$ .
- 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)	2467 MHz (Ch12)	2472 MHz (Ch13)
802.11b	1	14.78	/	/	/	/
	2	15.02	/	/	/	/
	5.5	16.51	/	/	/	/
	11	18.47	23.06	18.61	16.72	16.58
802.11g	6	16.29	/	/	/	/
	9	16.31	/	/	/	/
	12	16.84	/	/	/	/
	18	16.81	/	/	/	/
	24	17.10	/	/	/	/
	36	17.00	/	/	/	/
	48	17.26	/	/	/	/
	54	17.26	22.58	17.35	16.05	15.80

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)	2467 MHz (Ch12)	2472 MHz (Ch13)
802.11n (20MHz)	MCS0	16.38	/	/	/	/
	MCS1	16.89	/	/	/	/
	MCS2	16.78	/	/	/	/
	MCS3	16.6	/	/	/	/
	MCS4	16.89	/	/	/	/
	MCS5	17.07	/	/	/	/
	MCS6	17.09	21.41	17.16	15.09	14.81
	MCS7	17.06	/	/	/	/

The data rate MCS6 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)	2457 MHz (Ch10)	2462 MHz (Ch11)
802.11n (40MHz)	MCS0	15.13	/	/	/	/
	MCS1	15.18	/	/	/	/
	MCS2	15.11	/	/	/	/
	MCS3	15.38	/	/	/	/
	MCS4	15.33	/	/	/	/
	MCS5	15.45	19.49	15.56	15.27	14.68
	MCS6	15.39	/	/	/	/
	MCS7	15.38	/	/	/	/

The data rate MCS5 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:

- Set span = 80MHz.
- Set RBW = 1MHz.
- Set VBW = 3MHz
- Number of points in sweep = 625
- Sweep time = auto.
- Detector = RMS.
- The trigger shall be set to "free run."
- 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)	2467 MHz (Ch12)	2472 MHz (Ch13)
802.11b	11.81	16.09	11.95	9.89	9.79
802.11g	7.88	13.05	7.91	6.53	5.97

#### 802.11n-HT20 mode

Mode	Test Result (dBm)				
	2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)	2467 MHz (Ch12)	2472 MHz (Ch13)
802.11n (20MHz)	7.98	11.94	7.91	5.69	5.31

#### 802.11n-HT40 mode

Mode	Test Result (dBm)				
	2422MHz (Ch3)	2437MHz (Ch6)	2452 MHz (Ch9)	2457 MHz (Ch10)	2462 MHz (Ch11)
802.11n (40MHz)	6.93	11.14	7.09	5.49	5.23

**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	-10.82
	6	Fig.A.3.2	-7.37
	11	Fig.A.3.3	-12.16
	12	Fig.A.3.4	-12.41
	13	Fig.A.3.5	-14.02
802.11g	1	Fig.A.3.6	-16.24
	6	Fig.A.3.7	-11.94
	11	Fig.A.3.8	-17.36
	12	Fig.A.3.9	-17.31
	13	Fig.A.3.10	-17.57

**802.11n-HT20 mode**

Mode	Channel	Power Spectral Density ( dBm/3 kHz )	Conclusion
802.11n (HT20)	1	Fig.A.3.11	-18.35
	6	Fig.A.3.12	-13.01
	11	Fig.A.3.13	-17.36
	12	Fig.A.3.14	-18.86
	13	Fig.A.3.15	-18.54

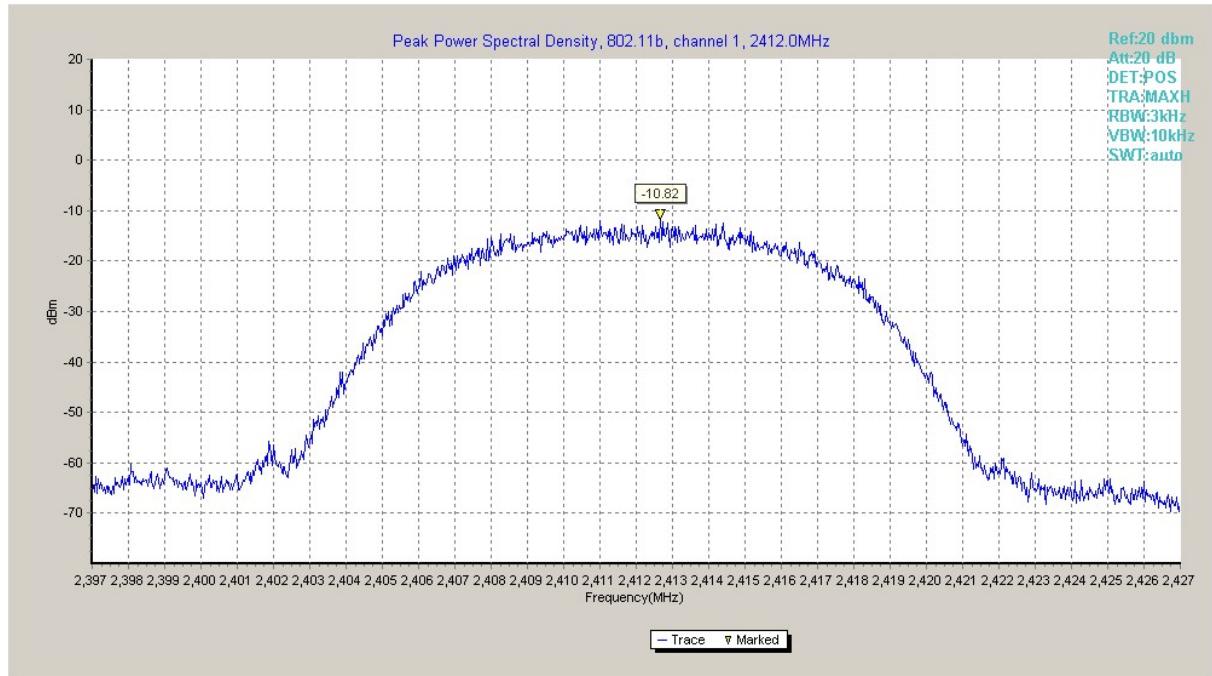
**802.11n-HT40 mode**

Mode	Channel	Power Spectral Density ( dBm/3 kHz )	Conclusion
802.11n (HT40)	3	Fig.A.3.16	-19.46
	6	Fig.A.3.17	-15.87

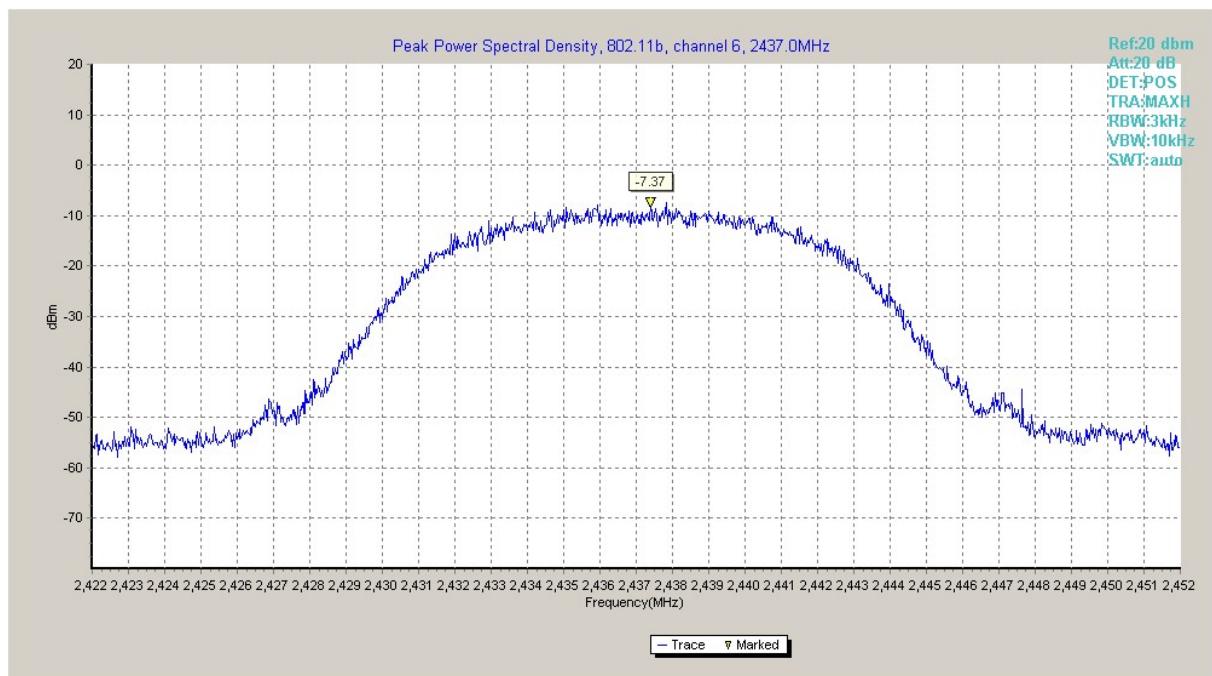
	9	Fig.A.3.18	-20.63	P
	10	Fig.A.3.19	-19.09	P
	11	Fig.A.3.20	-20.24	P

**Conclusion: Pass**

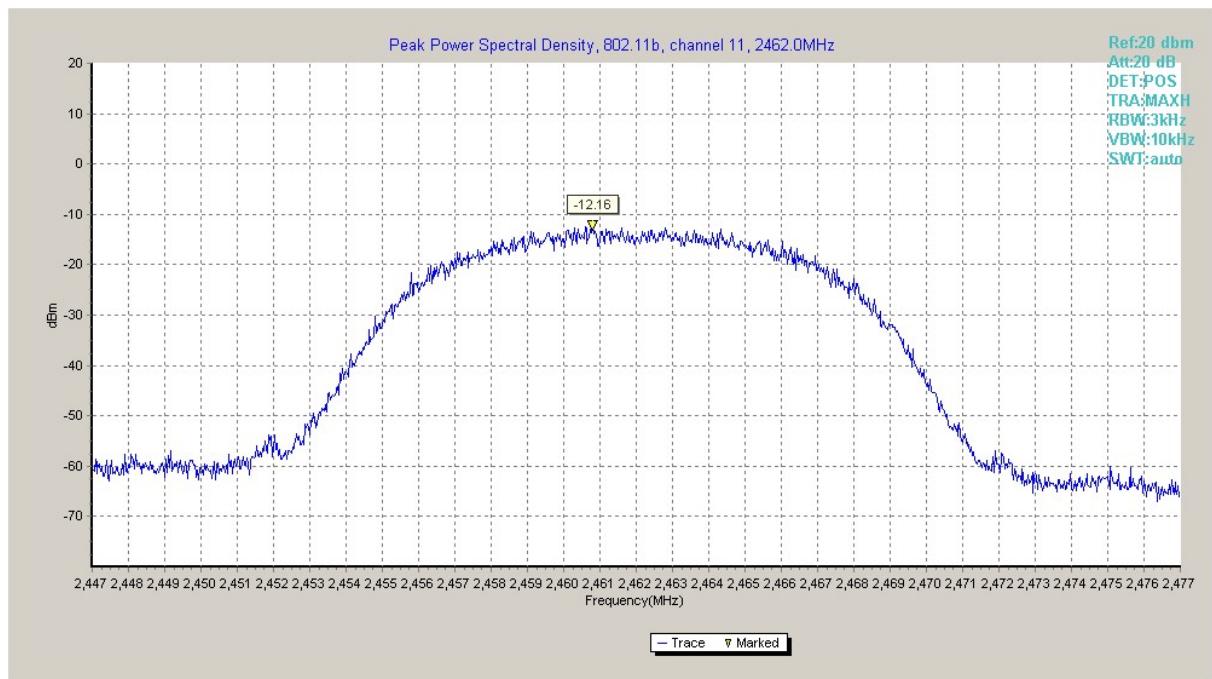
**Test graphs as below:**



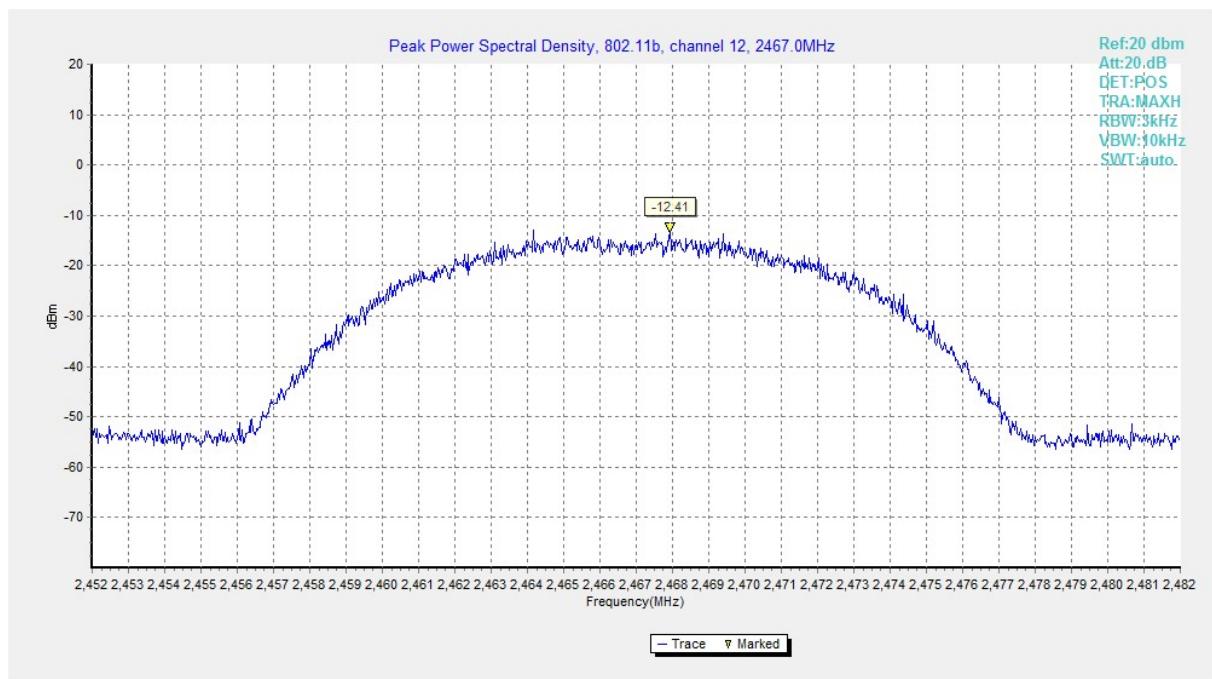
**Fig.A.3.1      Power Spectral Density(802.11b,Ch1)**



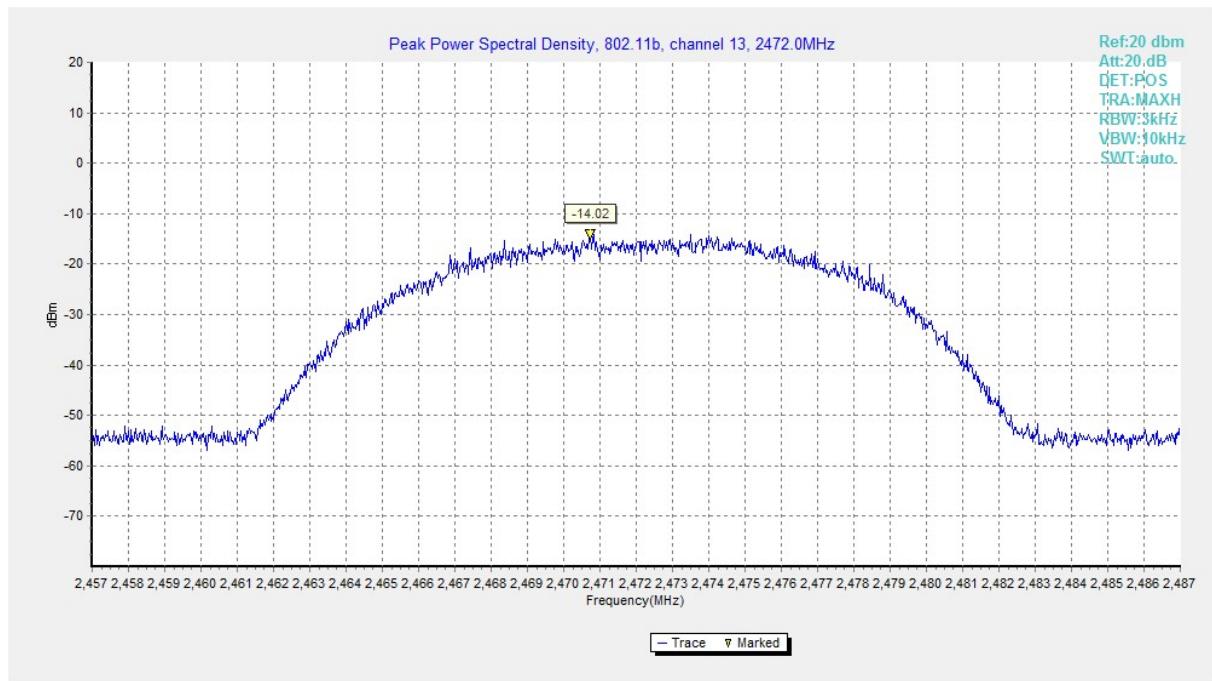
**Fig.A.3.2 Power Spectral Density (802.11b, Ch 6)**



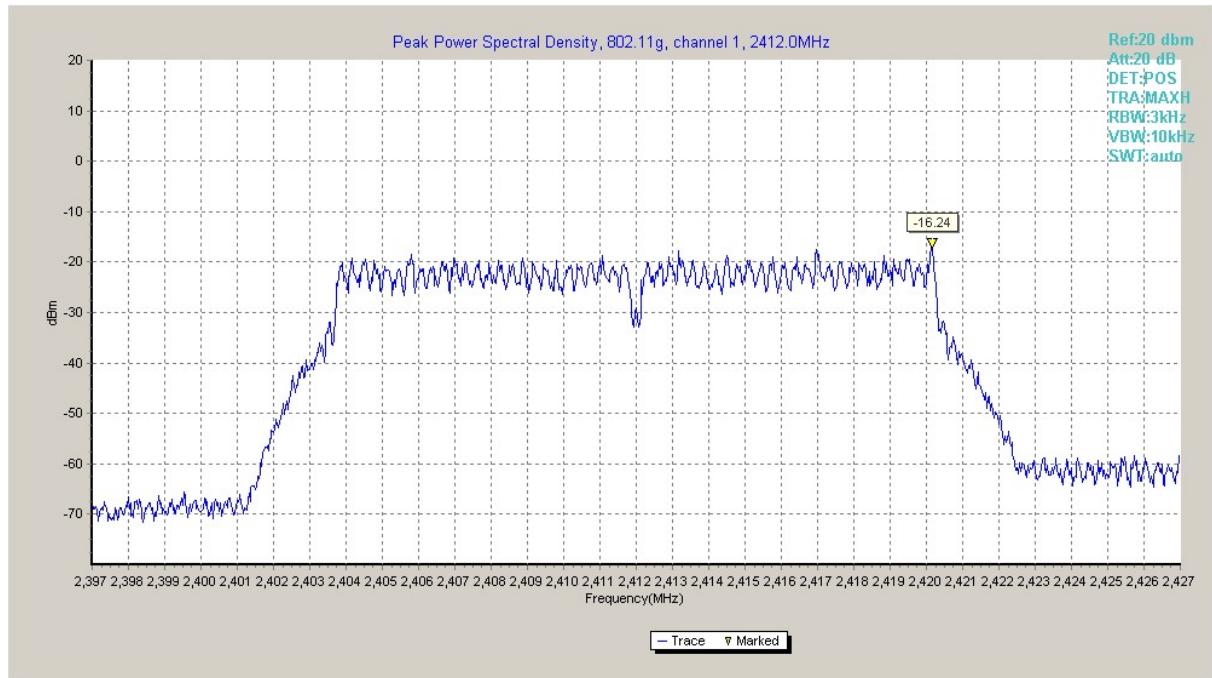
**Fig.A.3.3 Power Spectral Density (802.11b, Ch 11)**



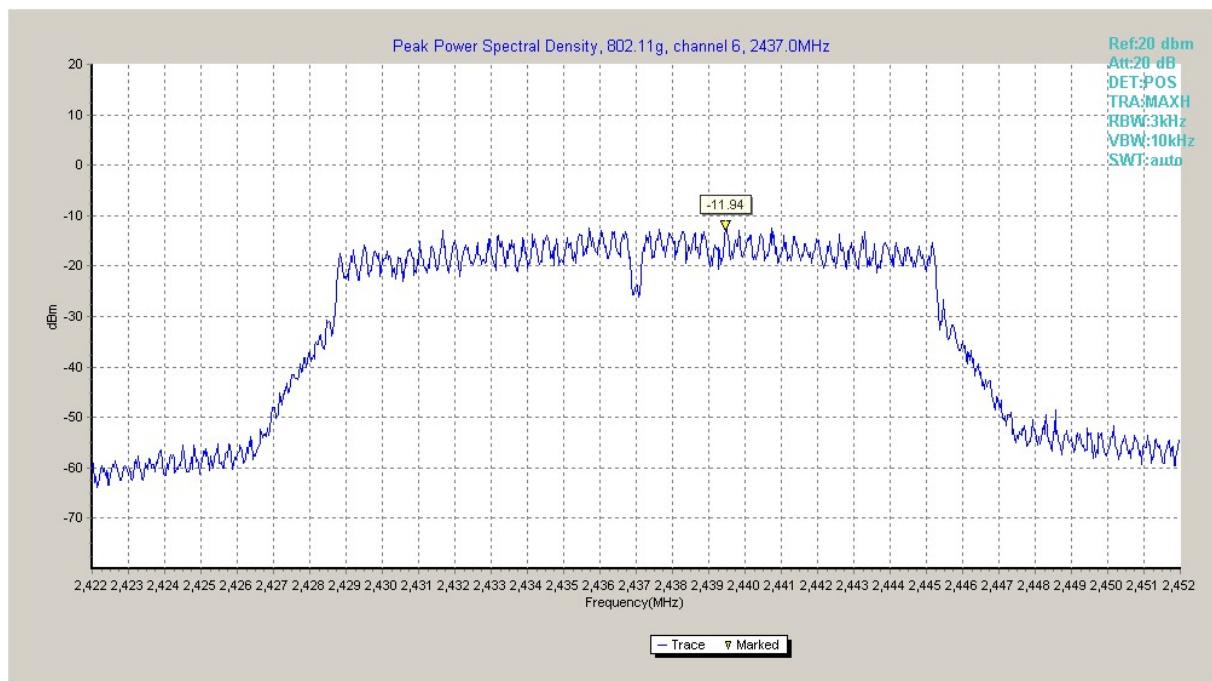
**Fig.A.3.4 Power Spectral Density (802.11b, Ch 12)**



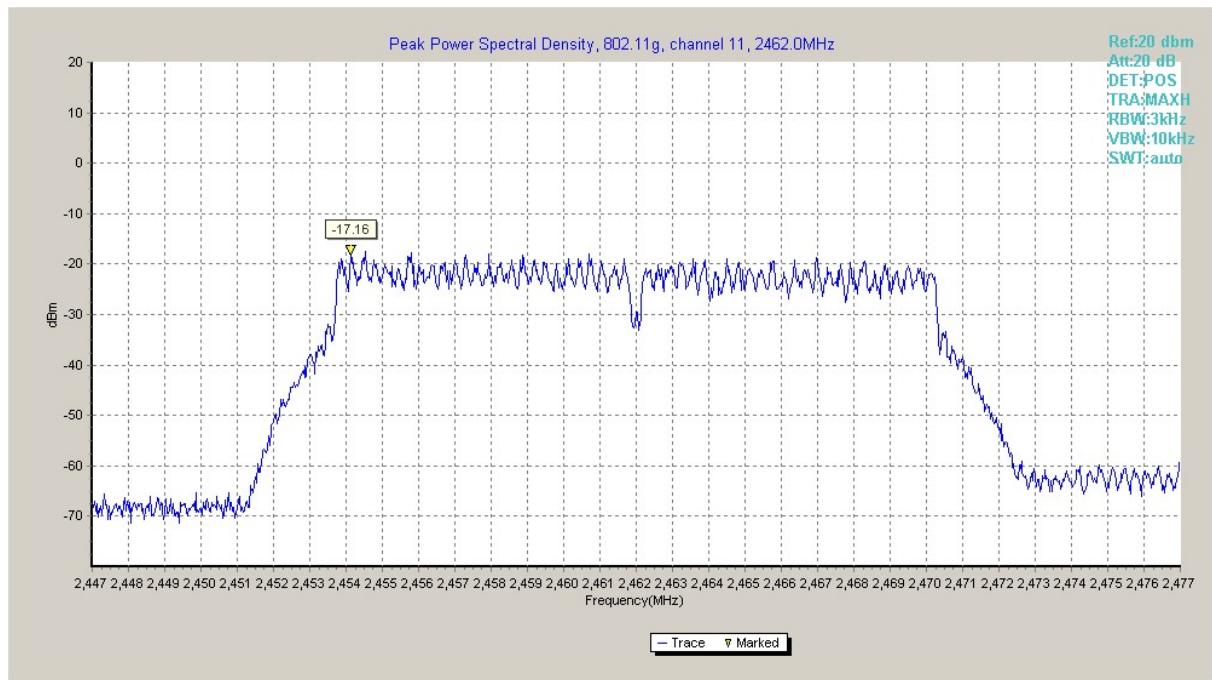
**Fig.A.3.5      Power Spectral Density (802.11b, Ch 13)**



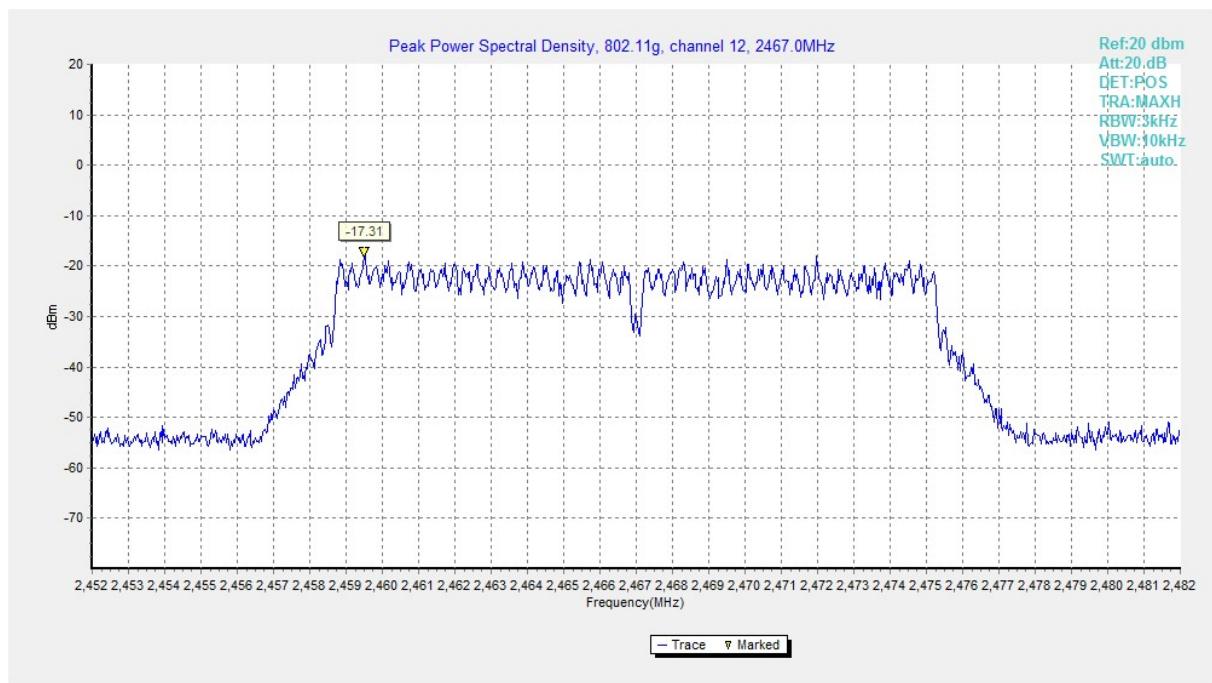
**Fig.A.3.6      Power Spectral Density (802.11g, Ch 1)**



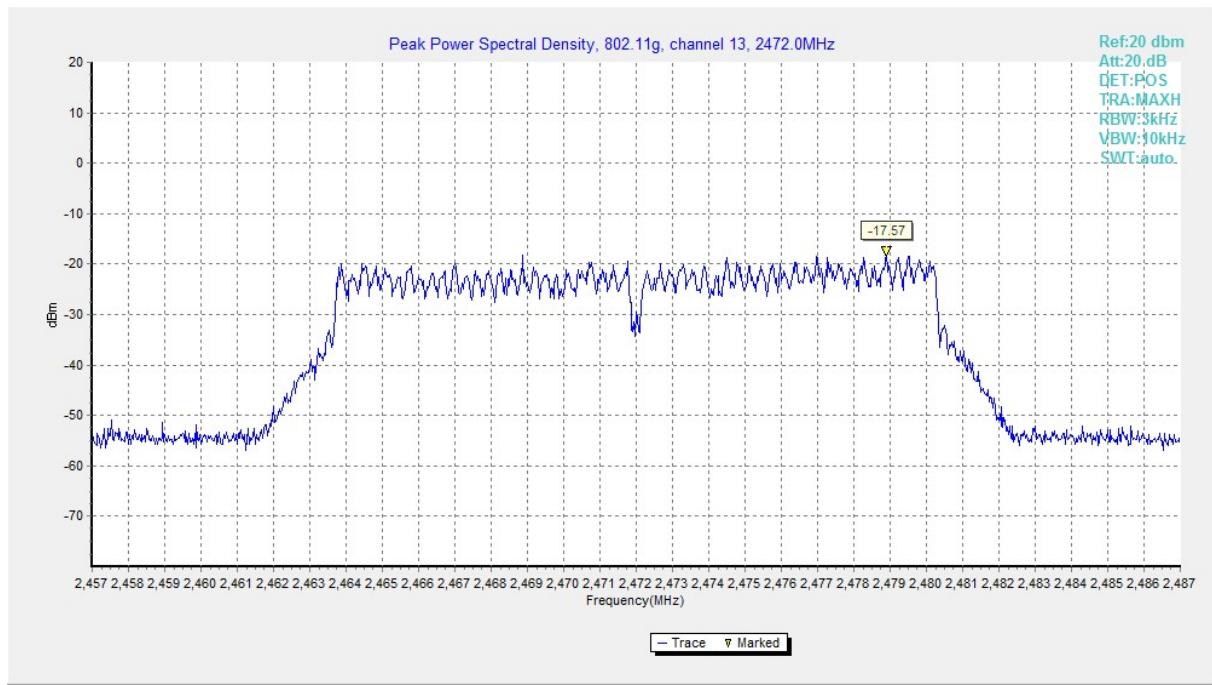
**Fig.A.3.7 Power Spectral Density (802.11g, Ch 6)**



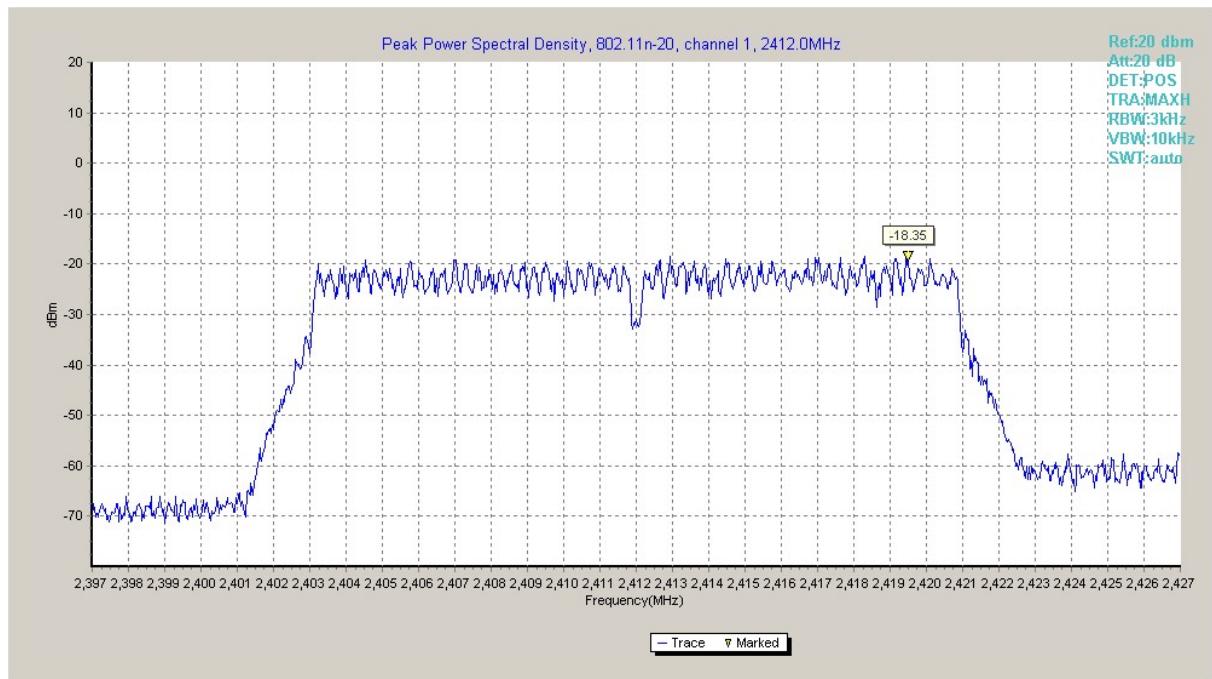
**Fig.A.3.8 Power Spectral Density (802.11g, Ch 11)**



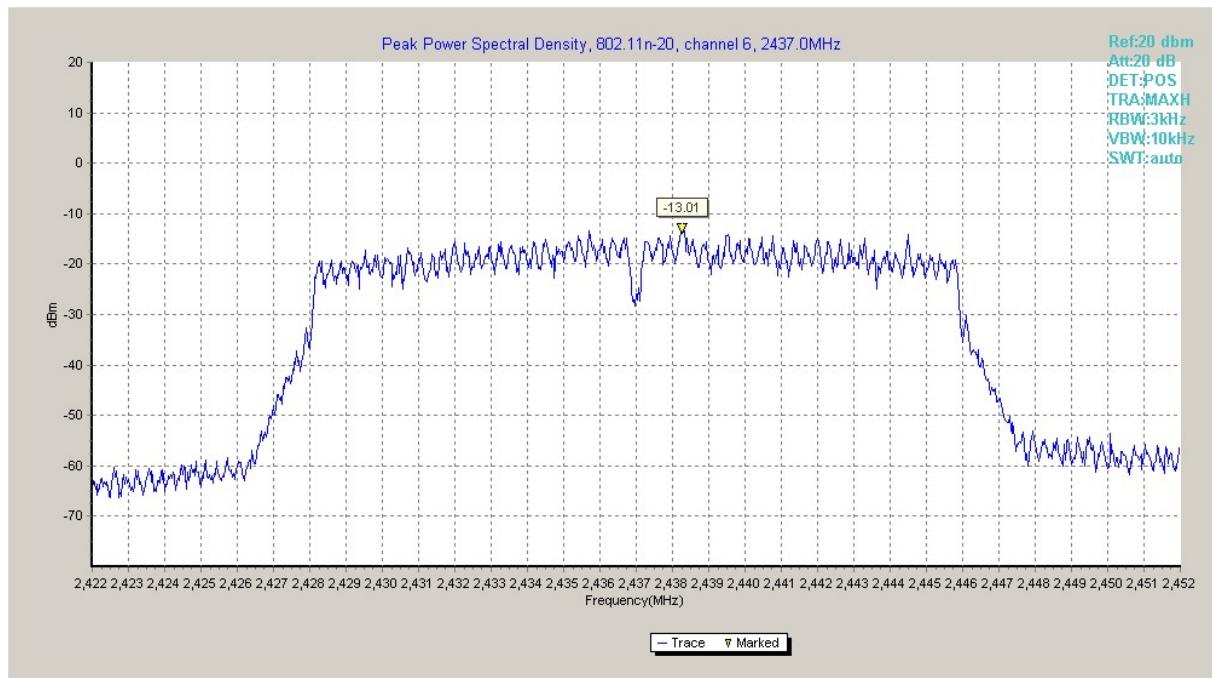
**Fig.A.3.9 Power Spectral Density (802.11g, Ch 12)**



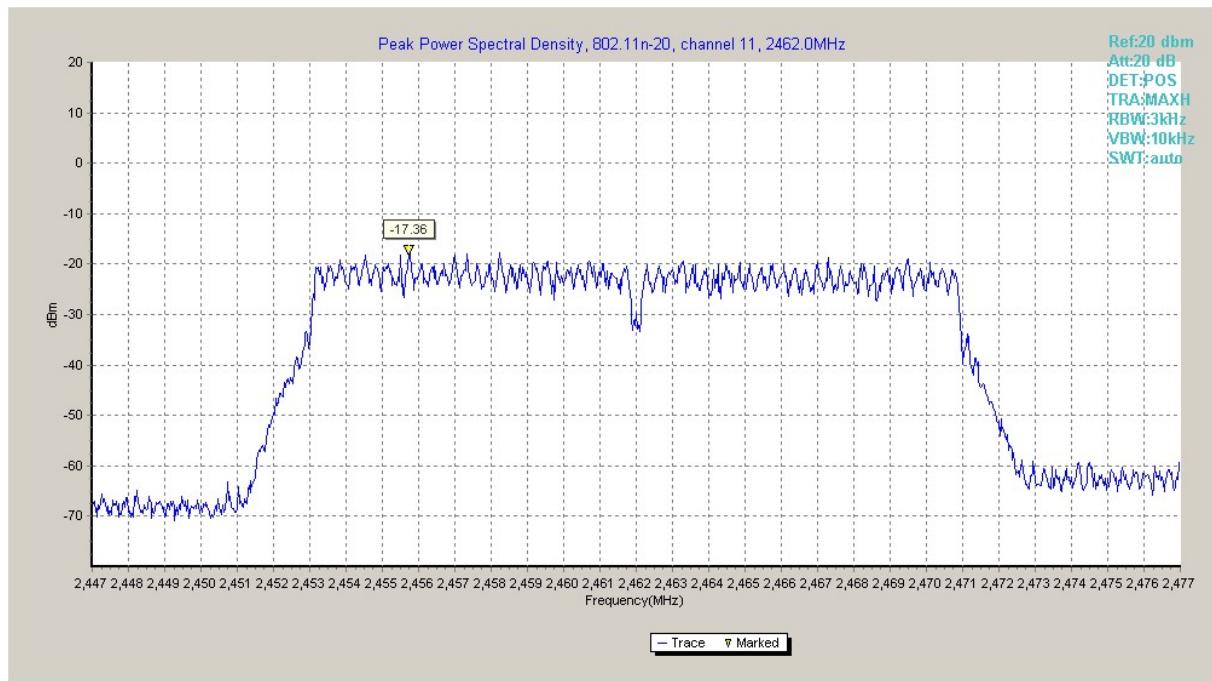
**Fig.A.3.10 Power Spectral Density (802.11g, Ch 13)**



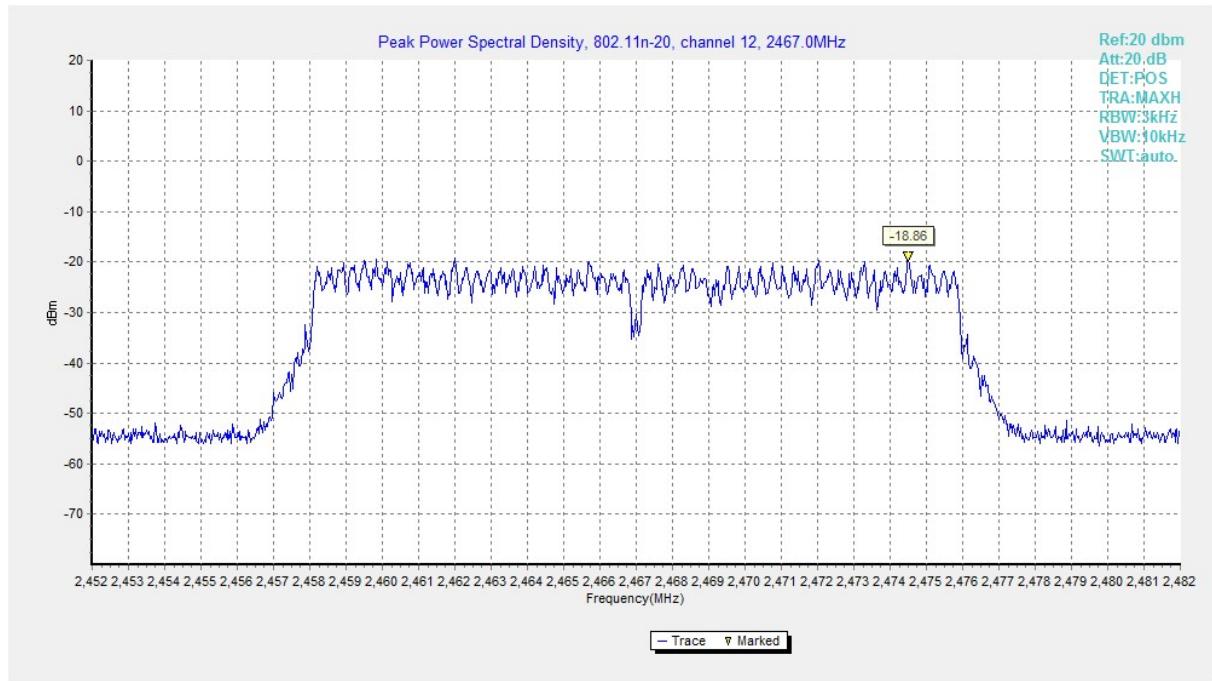
**Fig.A.3.11 Power Spectral Density (802.11n-HT20, Ch 1)**



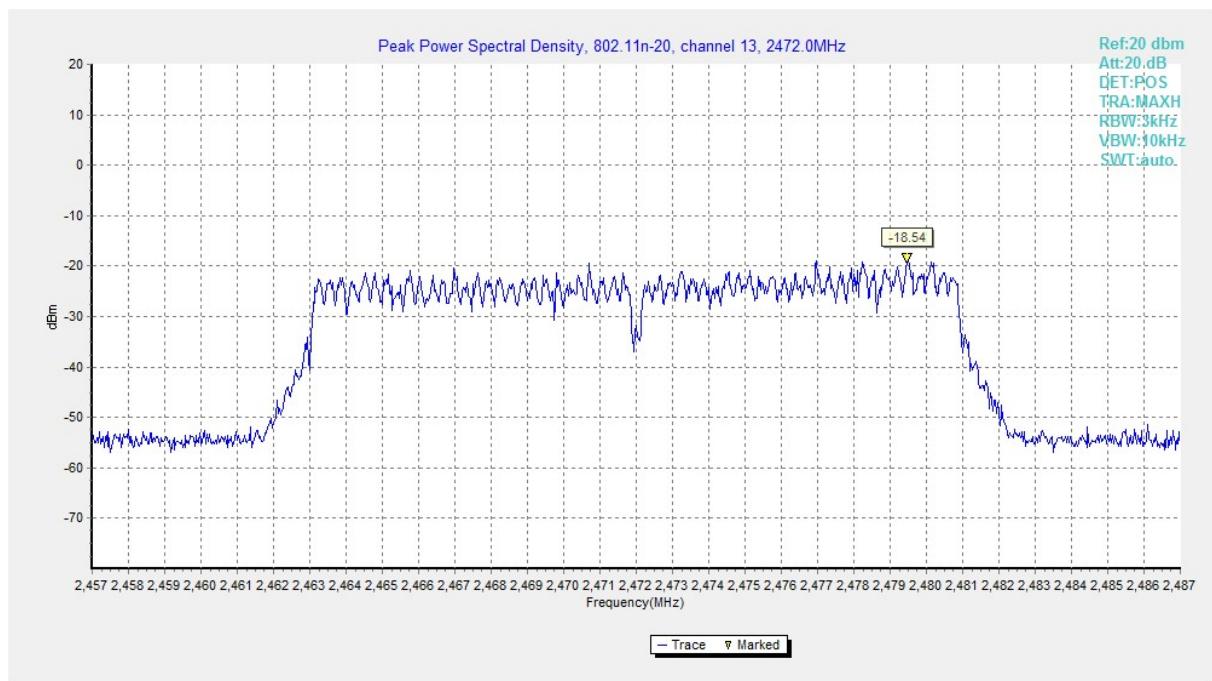
**Fig.A.3.12 Power Spectral Density (802.11n-HT20, Ch 6)**



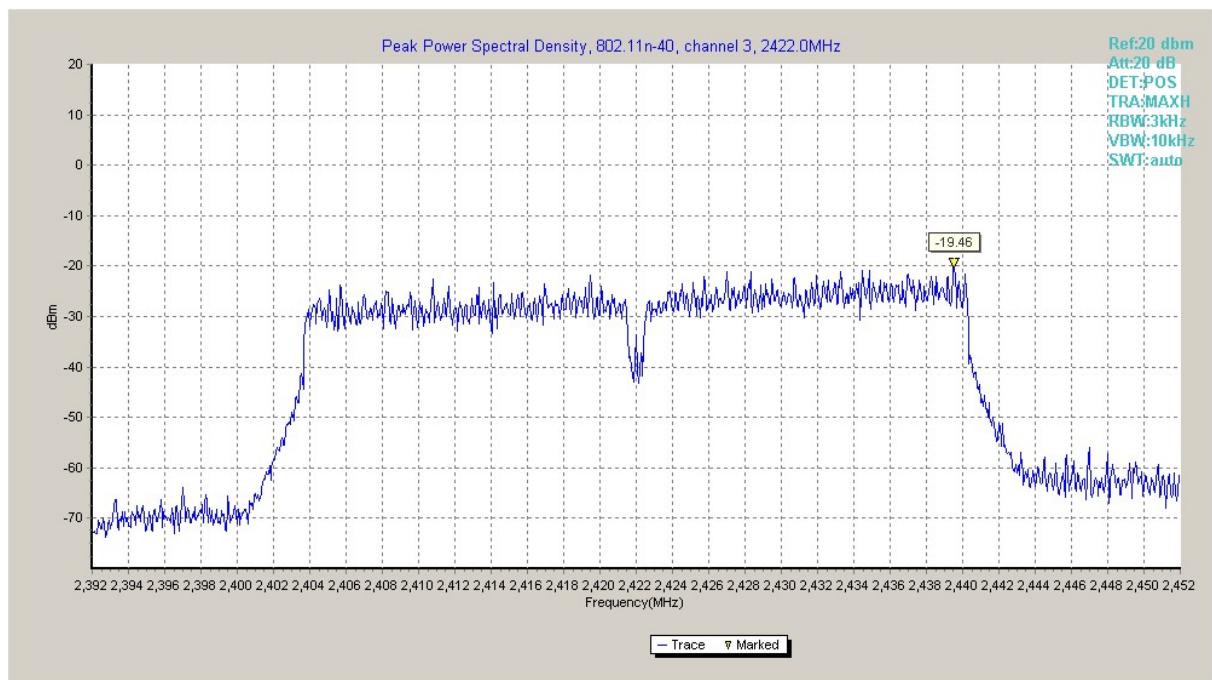
**Fig.A.3.13 Power Spectral Density (802.11n-HT20, Ch 11)**



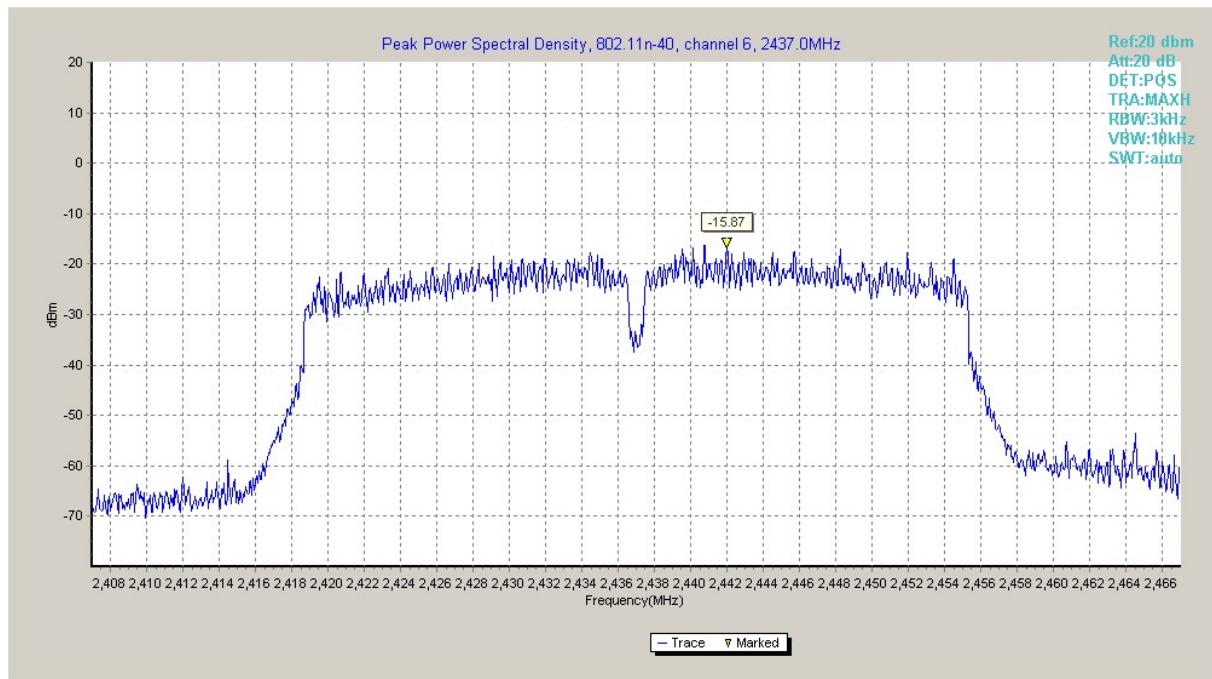
**Fig.A.3.14 Power Spectral Density (802.11n-HT20, Ch 12)**



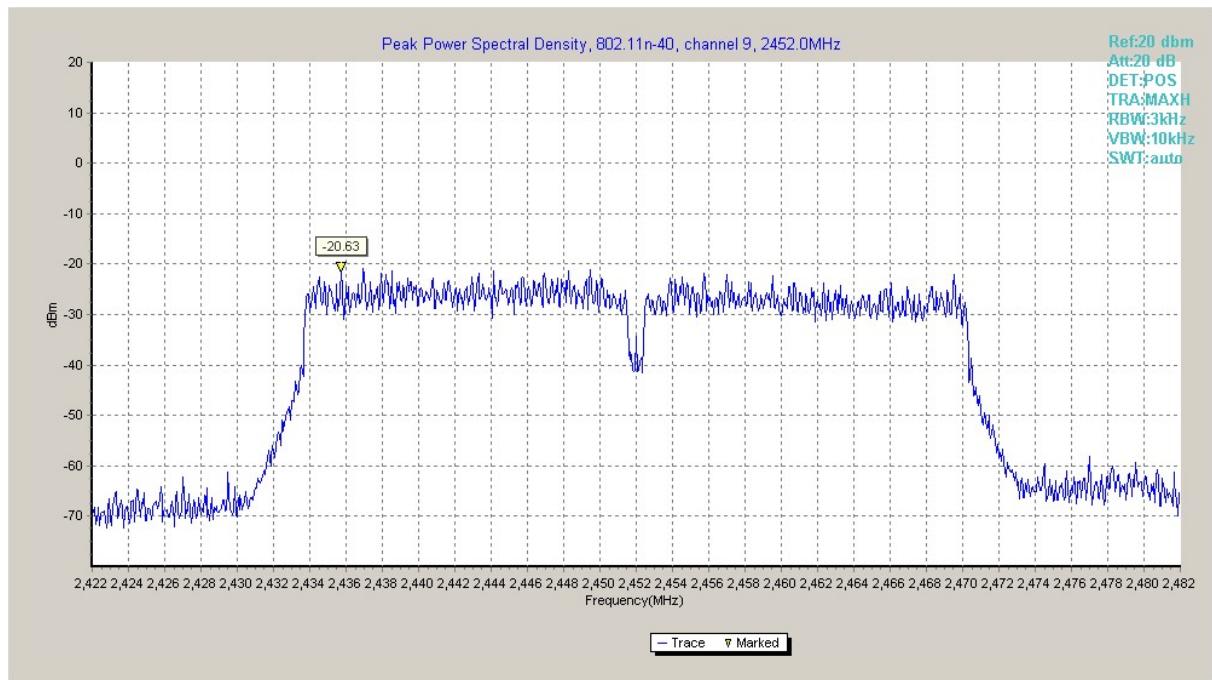
**Fig.A.3.15 Power Spectral Density (802.11n-HT20, Ch 13)**



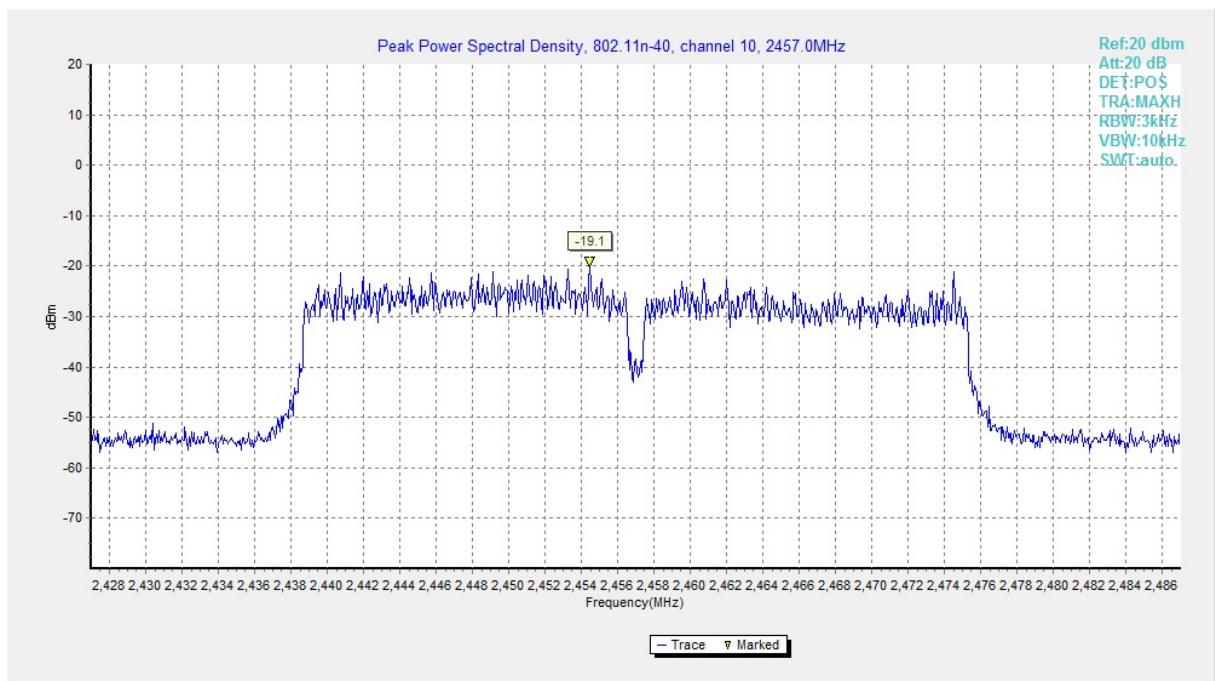
**Fig.A.3.16 Power Spectral Density (802.11n-HT40, Ch 3)**



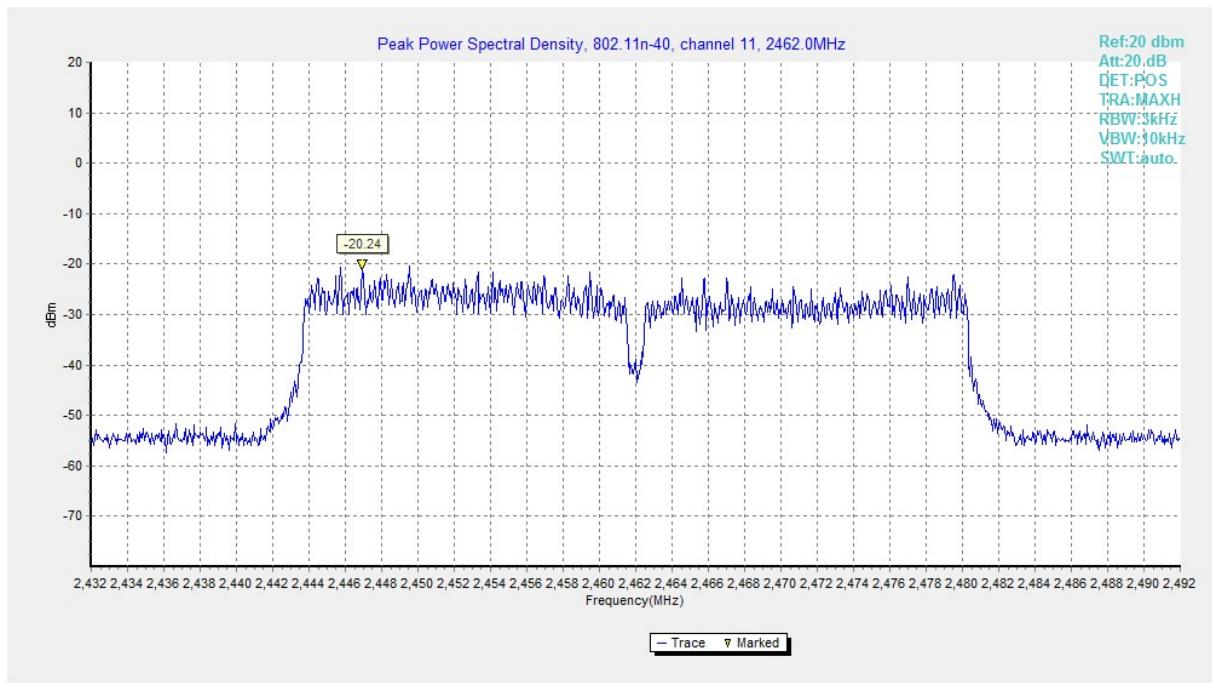
**Fig.A.3.17 Power Spectral Density (802.11n-HT40, Ch 6)**



**Fig.A.3.18 Power Spectral Density (802.11n-HT40, Ch 9)**



**Fig.A.3.19 Power Spectral Density (802.11n-HT40, Ch 10)**



**Fig.A.3.20 Power Spectral Density (802.11n-HT40, Ch 11)**

#### A.4. DTS 6-dB Signal Bandwidth

**Method of Measurement: See ANSI C63.10-2013 section 11.8.1.**

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) = 300 kHz.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

**Measurement Limit:**

Standard	Limit (kHz)
FCC 47 CFR Part 15.247 (a)	$\geq 500$

**EUT ID: EUT2**

**Measurement Result:**

**802.11b/g mode**

Mode	Channel	Occupied 6dB Bandwidth ( kHz)	conclusion
802.11b	1	Fig.A.4.1	10100
	6	Fig.A.4.2	8600
	11	Fig.A.4.3	9900
	12	Fig.A.4.4	11000
	13	Fig.A.4.5	10950
802.11g	1	Fig.A.4.6	16500
	6	Fig.A.4.7	15700
	11	Fig.A.4.8	16500
	12	Fig.A.4.9	16500
	13	Fig.A.4.10	16500

**802.11n-HT20 mode**

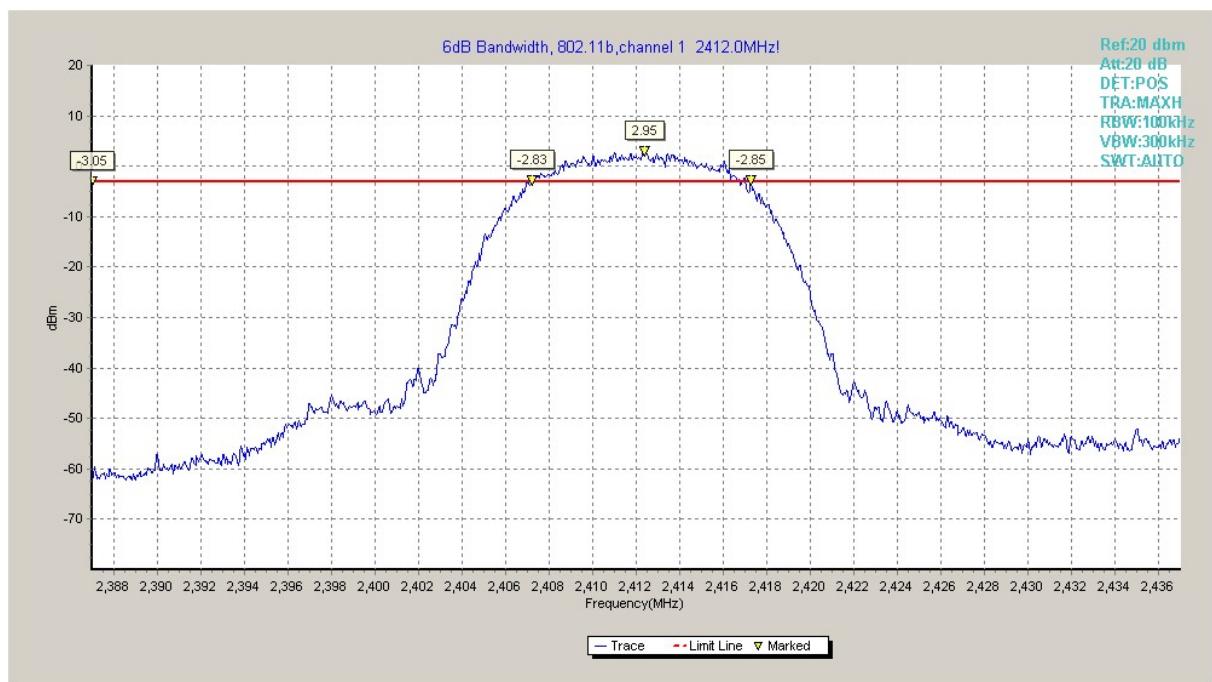
Mode	Channel	Occupied 6dB Bandwidth ( kHz)	conclusion
802.11n (HT20)	1	Fig.A.4.11	16400
	6	Fig.A.4.12	17250
	11	Fig.A.4.13	17700
	12	Fig.A.4.14	17700
	13	Fig.A.4.15	17700

**802.11n-HT40 mode**

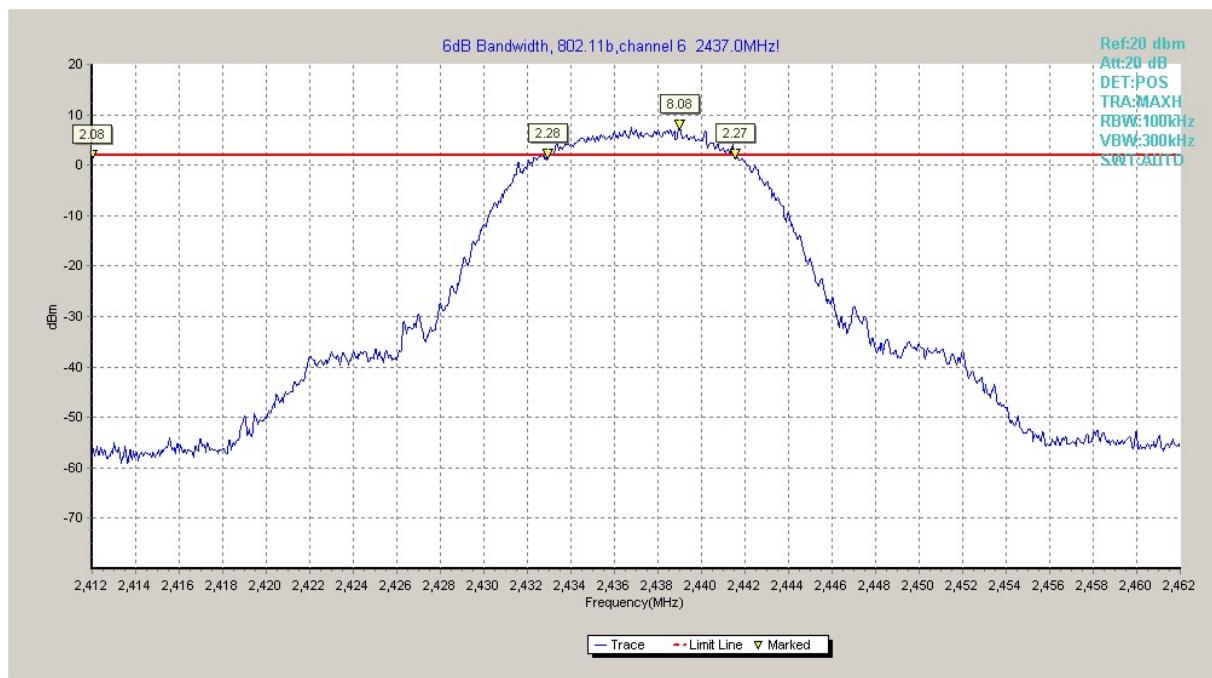
Mode	Channel	Occupied 6dB Bandwidth ( kHz)		conclusion
802.11n (HT40)	3	Fig.A.4.16	36000	P
	6	Fig.A.4.17	35120	P
	9	Fig.A.4.18	36000	P
	10	Fig.A.4.19	35680	P
	11	Fig.A.4.20	36480	P

**Conclusion: Pass**

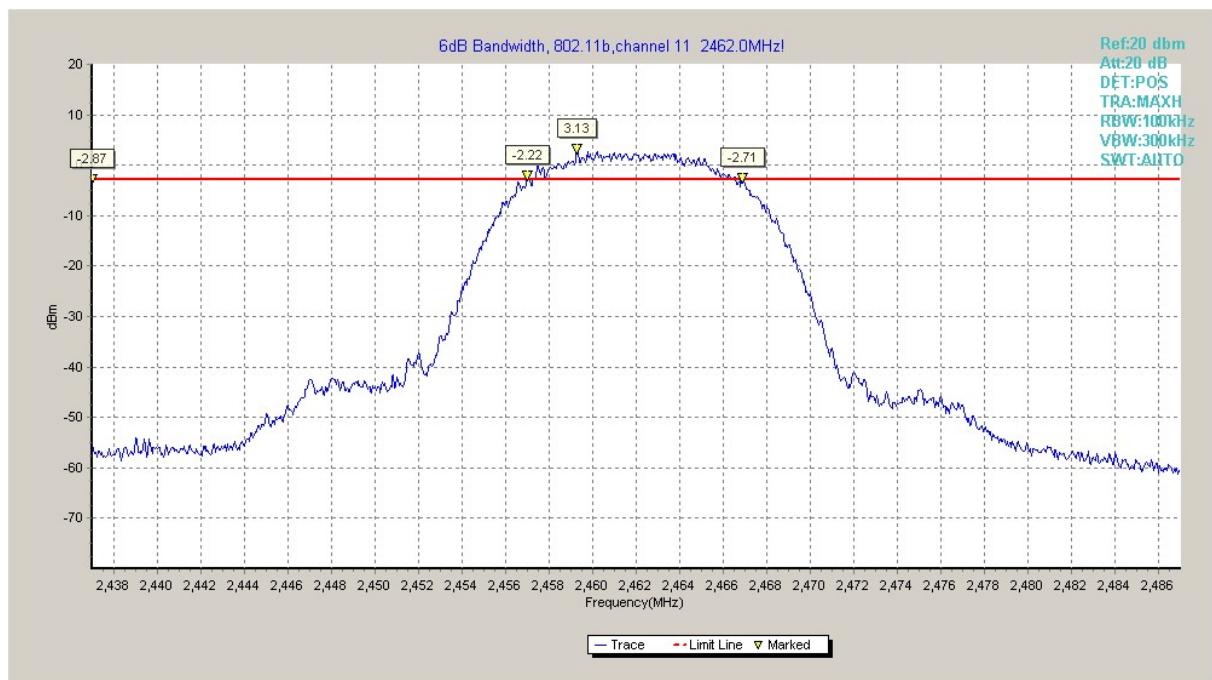
**Test graphs as below:**



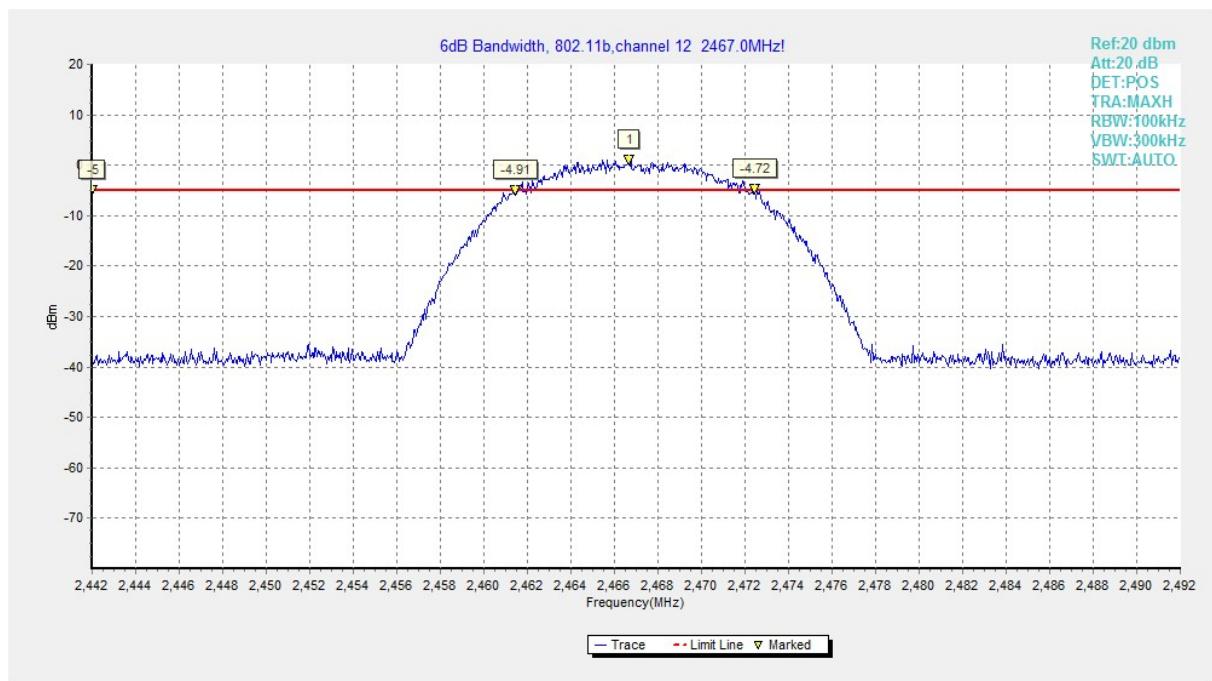
**Fig.A.4.1 Occupied 6dB Bandwidth(802.11b,Ch 1)**



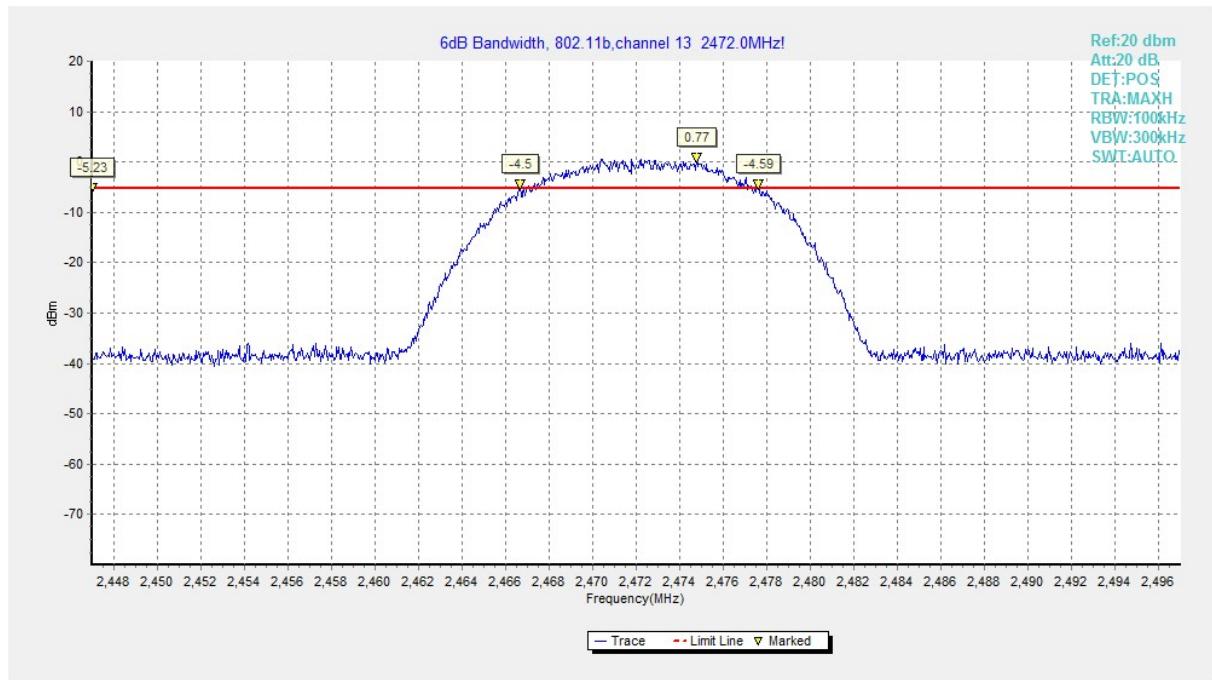
**Fig.A.4.2 Occupied 6dB Bandwidth (802.11b, Ch 6)**



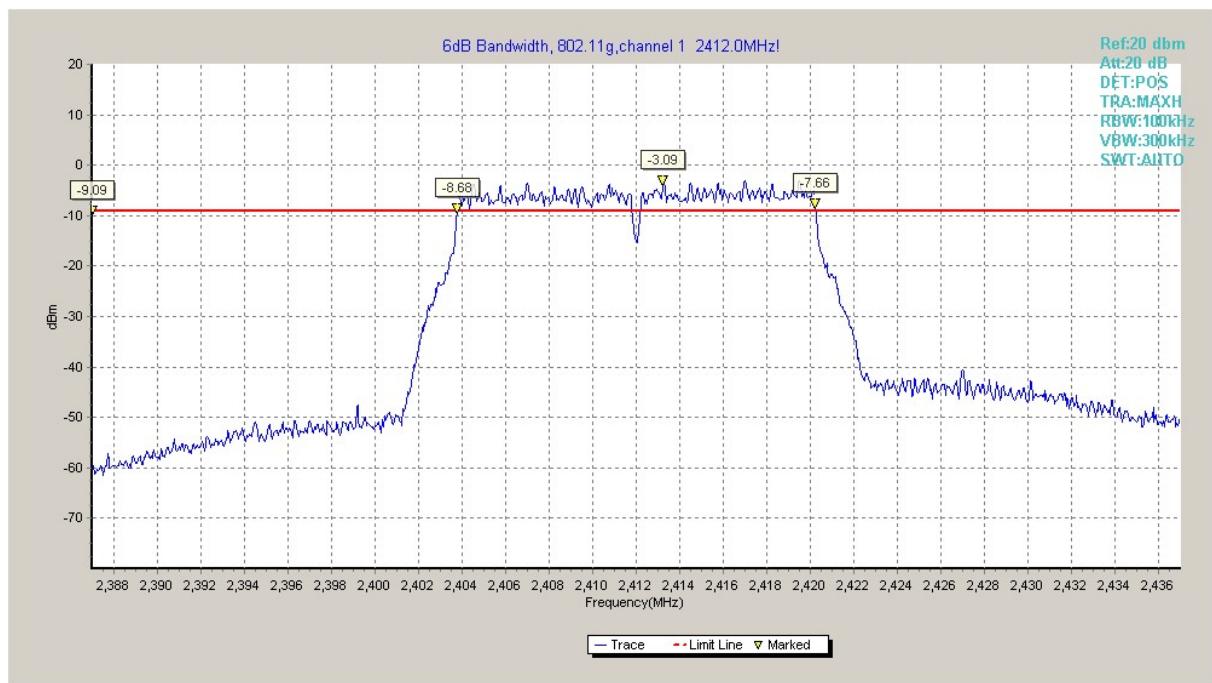
**Fig.A.4.3 Occupied 6dB Bandwidth (802.11b, Ch 11)**



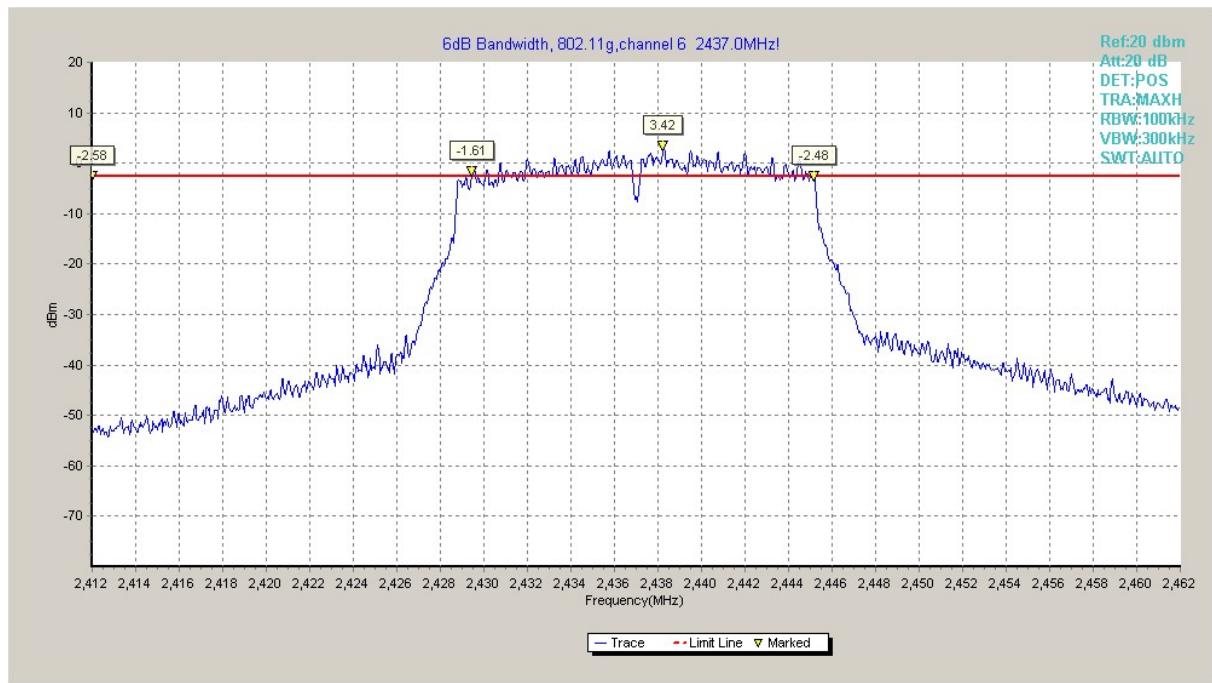
**Fig.A.4.4 Occupied 6dB Bandwidth (802.11b, Ch 12)**



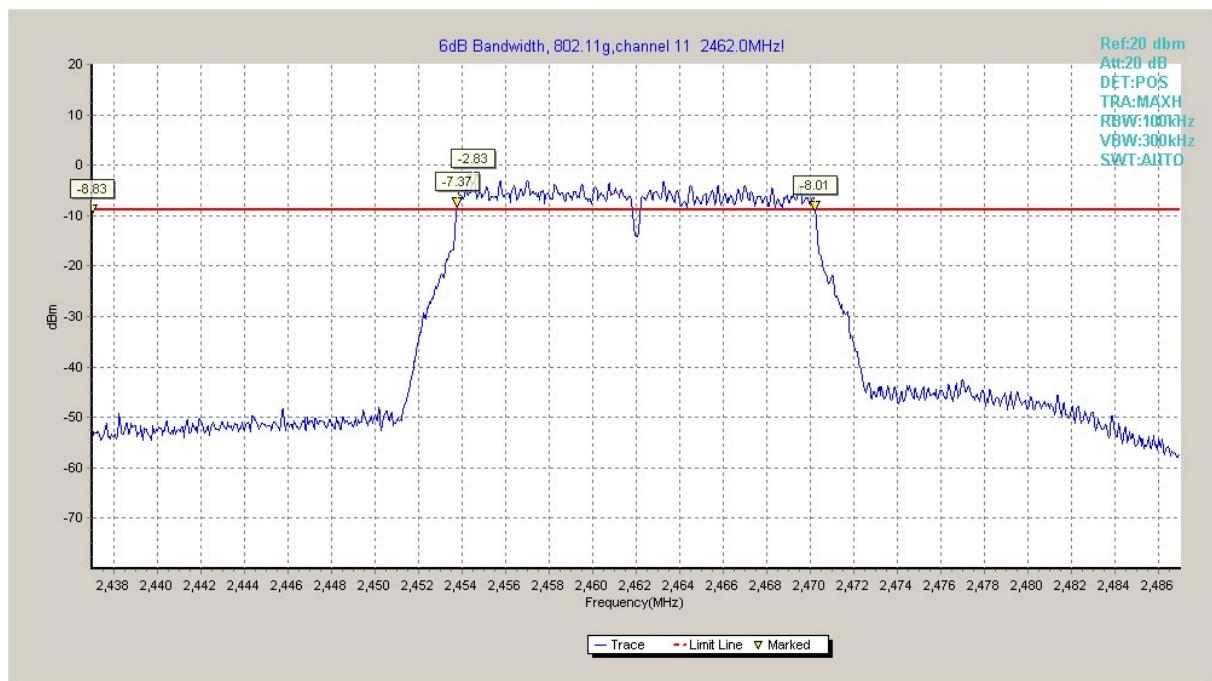
**Fig.A.4.5 Occupied 6dB Bandwidth (802.11b, Ch 13)**



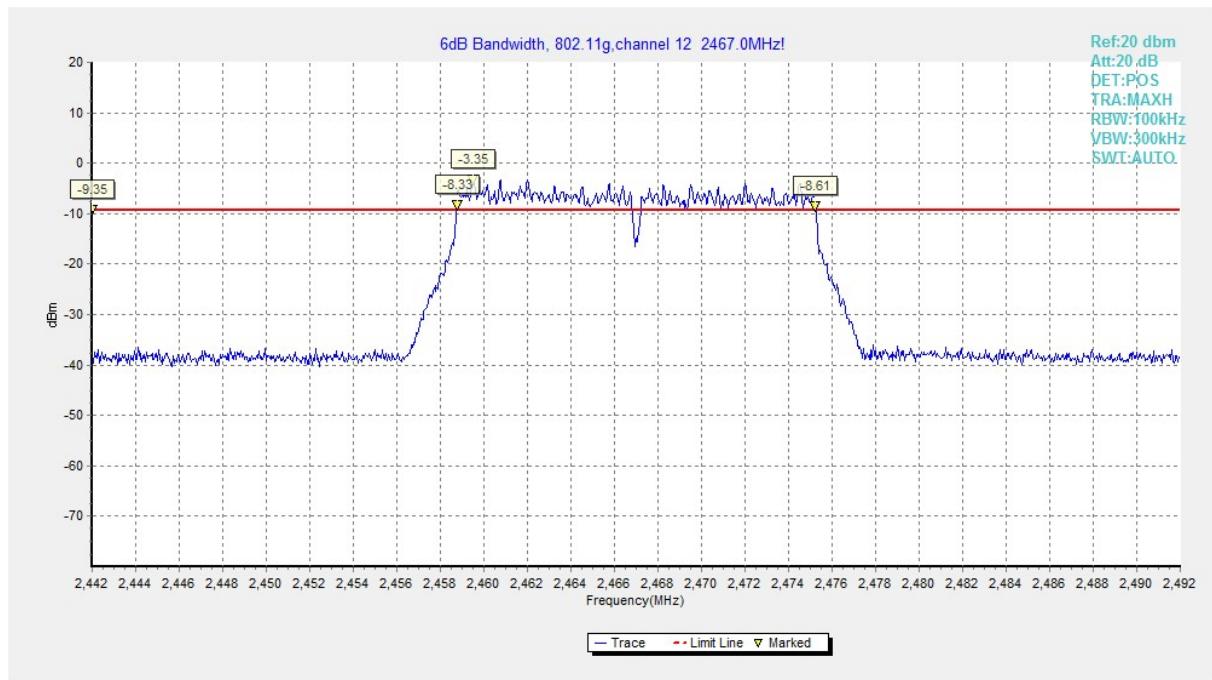
**Fig.A.4.6 Occupied 6dB Bandwidth (802.11g, Ch 1)**



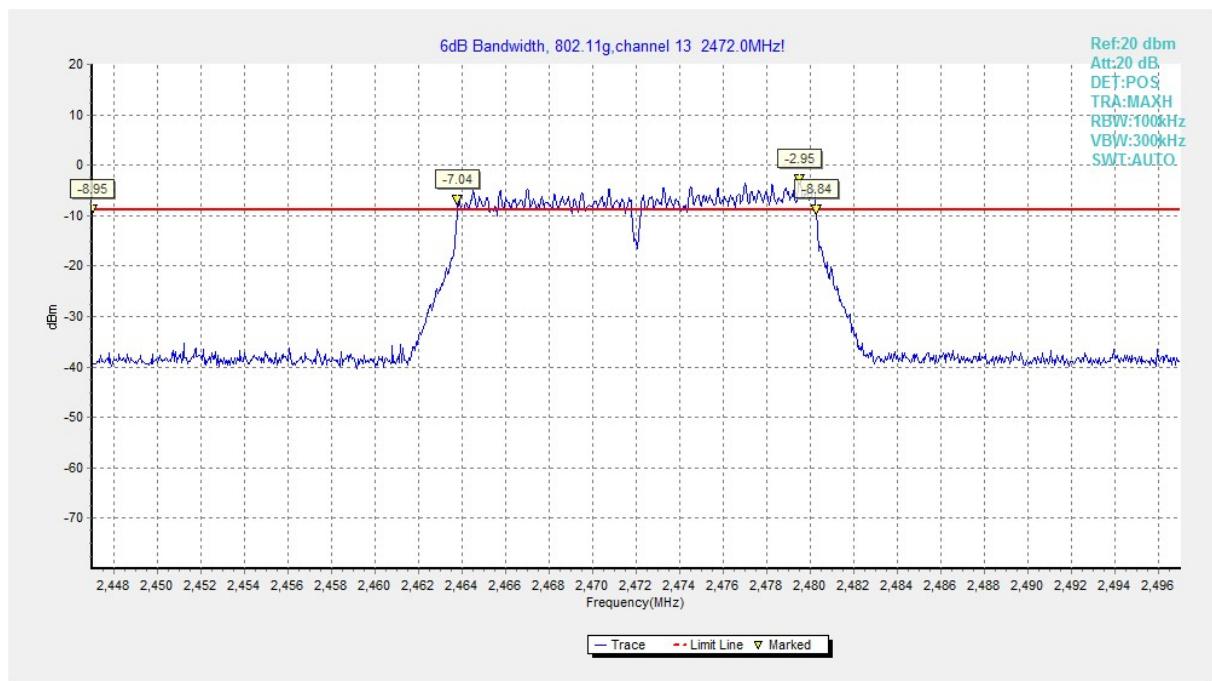
**Fig.A.4.7 Occupied 6dB Bandwidth (802.11g, Ch 6)**



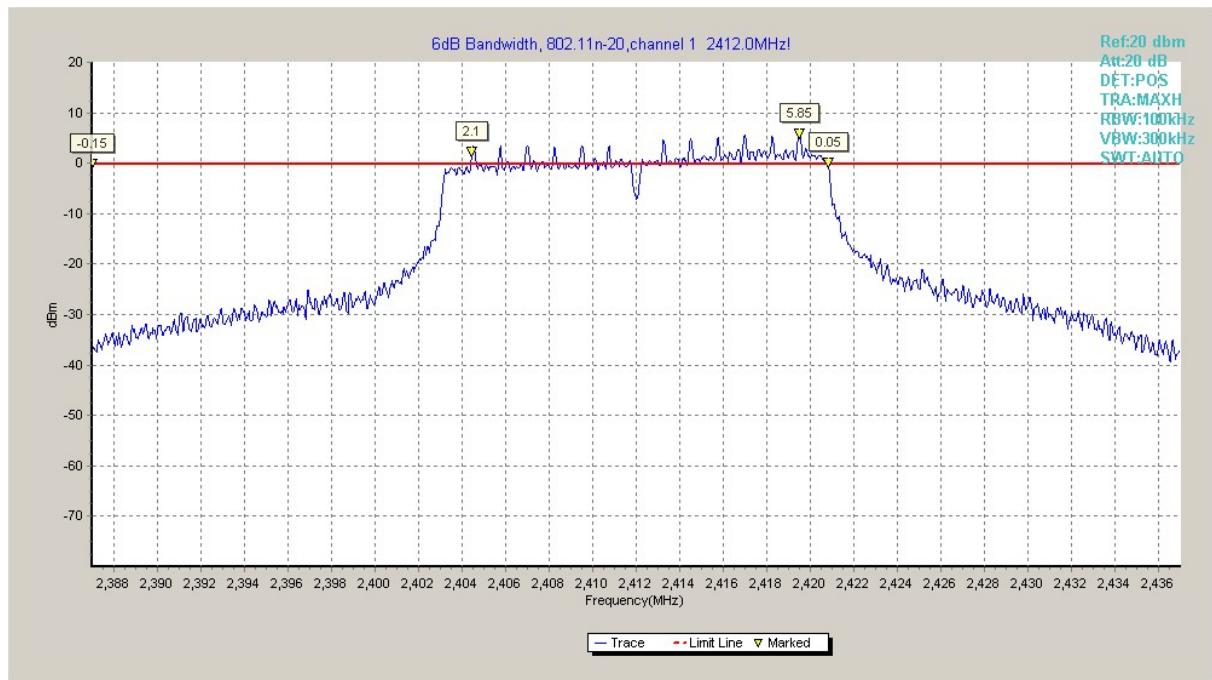
**Fig.A.4.8 Occupied 6dB Bandwidth (802.11g, Ch 11)**



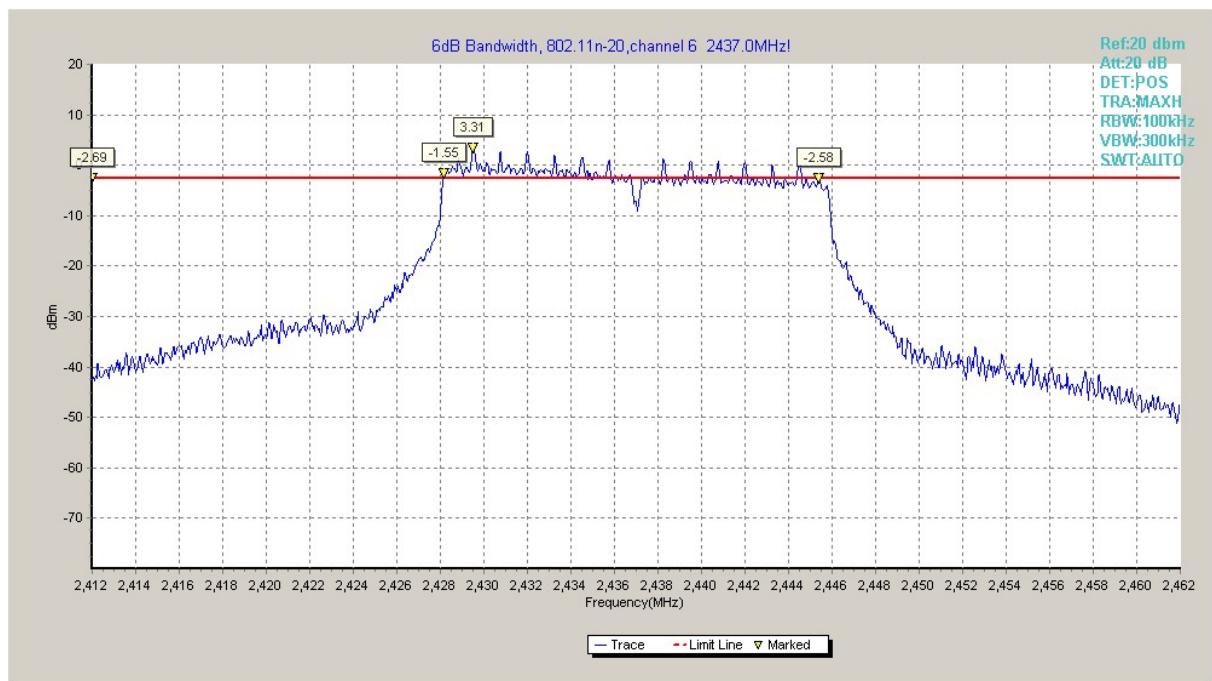
**Fig.A.4.9 Occupied 6dB Bandwidth (802.11g, Ch 12)**



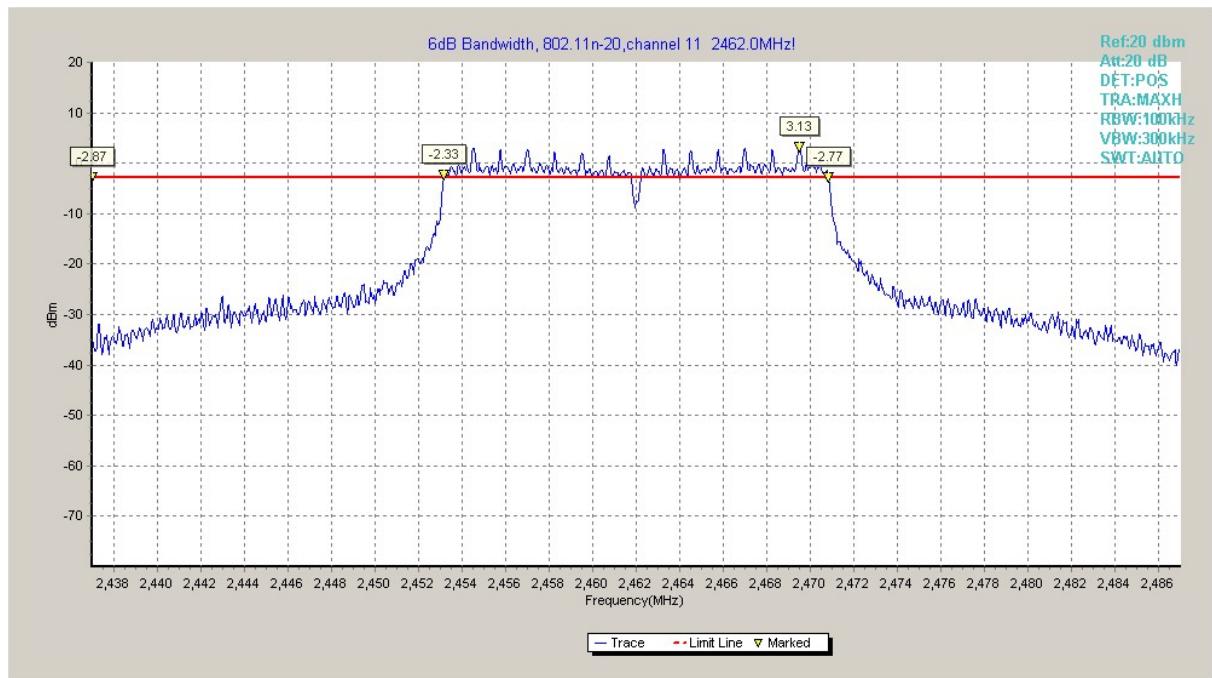
**Fig.A.4.10 Occupied 6dB Bandwidth (802.11g, Ch 13)**



**Fig.A.4.11 Occupied 6dB Bandwidth (802.11n-20MHz, Ch 1)**



**Fig.A.4.12 Occupied 6dB Bandwidth (802.11n-HT20, Ch 6)**



**Fig.A.4.13 Occupied 6dB Bandwidth (802.11n-HT20, Ch 11)**