



# FCC PART 15C TEST REPORT No.I23Z60212-IOT02

for

**HMD Global Oy**

**Smart Phone**

**TA-1573**

**With**

**FCC ID: 2AJOTTA-1573**

**Hardware Version: V1.0**

**Software Version: 04US\_0\_170**

**Issued Date: 2023-05-11**

**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.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S.Government.

**Test Laboratory:**

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## **REPORT HISTORY**

<b>Report Number</b>	<b>Revision</b>	<b>Description</b>	<b>Issue Date</b>
I23Z60212-IOT02	Rev.0	1st edition	2023-04-19
I23Z60212-IOT02	Rev.1	Update model of USB cable.	2023-05-11

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## **1. Test Laboratory**

### **1.1. Introduction & Accreditation**

**Telecommunication Technology Labs, CAICT** is an ISO/IEC 17025:2017 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0, and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (ISED#: 24849). The detail accreditation scope can be found on NVLAP website.

### **1.2. 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.18A, Kangding Street, Beijing Economic-Technology  
Development Area, Beijing, P. R. China 100176

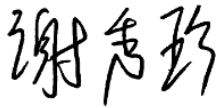
### 1.3. Testing Environment

Normal Temperature: 15-35°C  
Relative Humidity: 20-75%

### 1.4. Project date

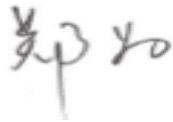
Testing Start Date: 2023-03-08  
Testing End Date: 2023-04-19

### 1.5. Signature



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Xie Xiuzhen  
(Prepared this test report)



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Zheng Wei  
(Reviewed this test report)



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Pang Shuai  
(Approved this test report)



## **2. Client Information**

### **2.1. Applicant Information**

Company Name: HMD Global Oy  
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City: Espoo  
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Telephone: +491735287964  
Fax: /

### **2.2. Manufacturer Information**

Company Name: HMD Global Oy  
Address: Bertel Jungin aukio 9, 02600 Espoo, Finland  
City: Espoo  
Contact: Reza Serafat  
Country: Finland  
Email: reza.serafat@hmdglobal.com  
Telephone: +491735287964  
Fax: /

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

#### 3.1. About EUT

Description	Smart Phone
Model name	TA-1573
FCC ID	2AJOTTA-1573
With WLAN Function	Yes
Frequency Band	ISM 2400MHz~2483.5MHz
Type of Modulation	DSSS/CCK/OFDM
Number of Channels	11
Antenna	Integral Antenna
MAX Conducted Power	24.78dBm
Power Supply	3.87V

#### 3.2. Internal Identification of EUT

EUT ID*	SN or IMEI	HW Version	SW Version
UT18a	350547140005634	V1.0	04US_0_170
UT82a	350547140019668	V1.0	04US_0_170

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

UT18a is used for Conduction test, UT82a is used for Radiation test.

#### 3.3. Internal Identification of AE

AE ID*	Description	SN
AE1	Battery	/
AE2	Charger	/
AE3	USB Cable	
AE1		
Model	HQ610	
Manufacturer	Fenghua Lithium Battery Co., Ltd	
Capacity	5000mAh	
Nominal Voltage		
AE2		
Model	AD-020U	
Manufacturer	AOHAI	
Length of cable	/	
AE3		
Model	SZN-A023A	
Manufacturer	Saibao (Jiangxi) Industry Co.,Ltd.	
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 Smart Phone 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.	2021
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices Federal Communications Commission Office of Engineering and Technology Laboratory Division GUIDANCE FOR COMPLIANCE MEASUREMENTS ON	2013
KDB 558074 D01	DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES	2019

## 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

### 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°C
Voltage	V nom	3.87V
Humidity	H nom	20-75%

## 6. Test Facilities Utilized

### Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Vector Signal Analyzer	FSQ40	200089	Rohde & Schwarz	1 year	2023-06-15
2	LISN	ENV216	101459	Rohde & Schwarz	1 year	2024-03-29
3	Test Receiver	ESCI	100766	Rohde & Schwarz	1 year	2024-03-20
4	Shielding Room	S81	/	ETS-Lindgren	/	/

### Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESW44	103015	R&S	1 year	2024-01-11
2	EMI Antenna	VULB 9163	01177	SCHWARZBECK	1 year	2023-08-03
3	EMI Antenna	3117	00139065	ETS-Lindgren	1 year	2023-09-19

## 7. Measurement Uncertainty

### 7.1. Maximum Output Power

Measurement Uncertainty: 0.387dB,k=1.96

### 7.2. Peak Power Spectral Density

Measurement Uncertainty: 0.705dB,k=1.96

### 7.3. DTS 6-dB Signal Bandwidth

Measurement Uncertainty: 60.80Hz,k=1.96

### 7.4. Band Edges Compliance

Measurement Uncertainty : 0.62dB,k=1.96

### 7.5. Transmitter Spurious Emission

#### Conducted (k=1.96)

Frequency Range	Uncertainty(dB)
$30\text{MHz} \leq f \leq 2\text{GHz}$	1.22
$2\text{GHz} \leq f \leq 3.6\text{GHz}$	1.22
$3.6\text{GHz} \leq f \leq 8\text{GHz}$	1.22
$8\text{GHz} \leq f \leq 12.75\text{GHz}$	1.51
$12.75\text{GHz} \leq f \leq 26\text{GHz}$	1.51
$26\text{GHz} \leq f \leq 40\text{GHz}$	1.59

#### Radiated (k=2)

Frequency Range	Uncertainty(dB)
9kHz-30MHz	/
$30\text{MHz} \leq f \leq 1\text{GHz}$	5.73
$1\text{GHz} \leq f \leq 18\text{GHz}$	5.58
$18\text{GHz} \leq f \leq 40\text{GHz}$	3.37

### 7.6. AC Power-line Conducted Emission

Measurement Uncertainty: 3.1dB, k=2.

## **ANNEX A: Detailed Test Results**

### **A.1. Measurement Method**

#### **A.1.1. Conducted Measurements**

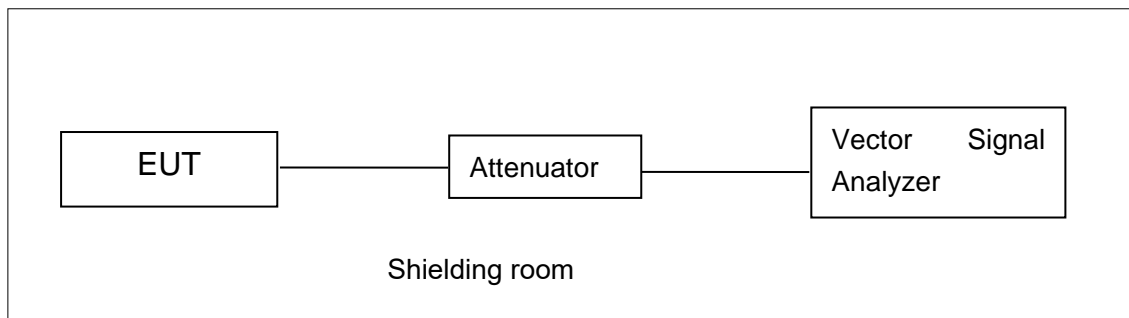
Connect the EUT to the test system as Fig.A.1.1.1 shows.

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



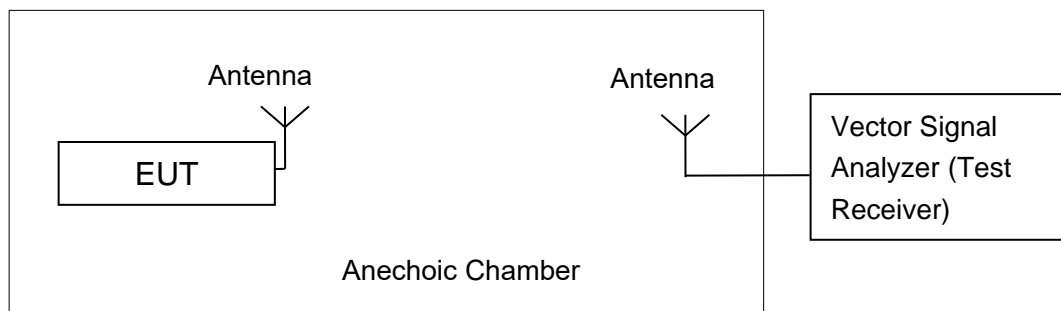
**Fig.A.1.1.1: Test Setup Diagram for Conducted Measurements**

#### **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 11.9.1.1**

- a) Set the RBW  $\geq$  DTS bandwidth.
- b) Set VBW  $\geq$  [3  $\times$  RBW].
- c) Set span  $\geq$  [3  $\times$  RBW].
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use peak marker function to determine the peak amplitude level.

**Measurement Limit:**

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

**EUT ID: UT18a**

### **A.2.1. Peak Output Power-conducted**

**Measurement Results:**

**Antenna Gain: -2.50dBi**

**802.11b/g mode**

Mode	Data Rate (Mbps)	Test Result (dBm)		
		2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11b	1	21.82	22.18	21.93
802.11g	6	20.78	24.05	24.03

The data rate 1Mbps and 6Mbps are selected as worst 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	21.75	24.13	24.02

The data rate MCS0 is selected as worst 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	20.73	24.78	21.58

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

Duty Cycle

Mode	802.11b	802.11g	802.11n20	802.11n40
Duty Cycle	99%	98%	98%	98%

**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	-4.33	<b>P</b>
	6	Fig.A.3.2	-3.17	<b>P</b>
	11	Fig.A.3.3	-2.80	<b>P</b>
802.11g	1	Fig.A.3.4	-8.30	<b>P</b>
	6	Fig.A.3.5	-5.22	<b>P</b>
	11	Fig.A.3.6	-5.56	<b>P</b>

**802.11n-HT20 mode**

Mode	Channel	Power Spectral Density ( dBm/3 kHz )		Conclusion
802.11n (HT20)	1	Fig.A.3.7	-8.51	<b>P</b>
	6	Fig.A.3.8	-6.65	<b>P</b>
	11	Fig.A.3.9	-5.85	<b>P</b>

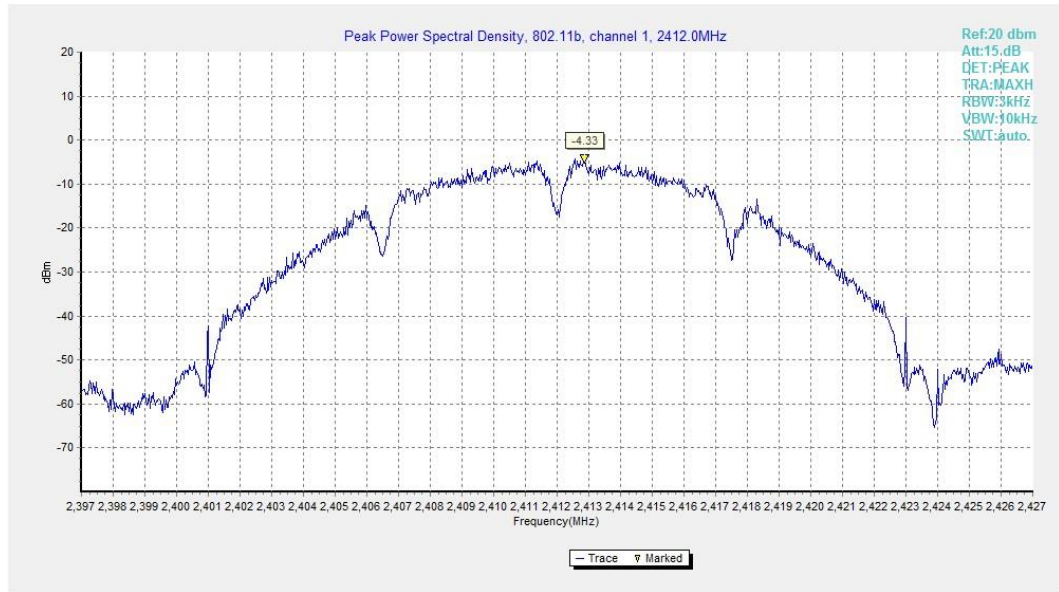
**802.11n-HT40 mode**

Mode	Channel	Power Spectral Density ( dBm/3 kHz )		Conclusion
802.11n (HT40)	3	Fig.A.3.10	-14.67	<b>P</b>
	6	Fig.A.3.11	-10.65	<b>P</b>
	9	Fig.A.3.12	-14.38	<b>P</b>

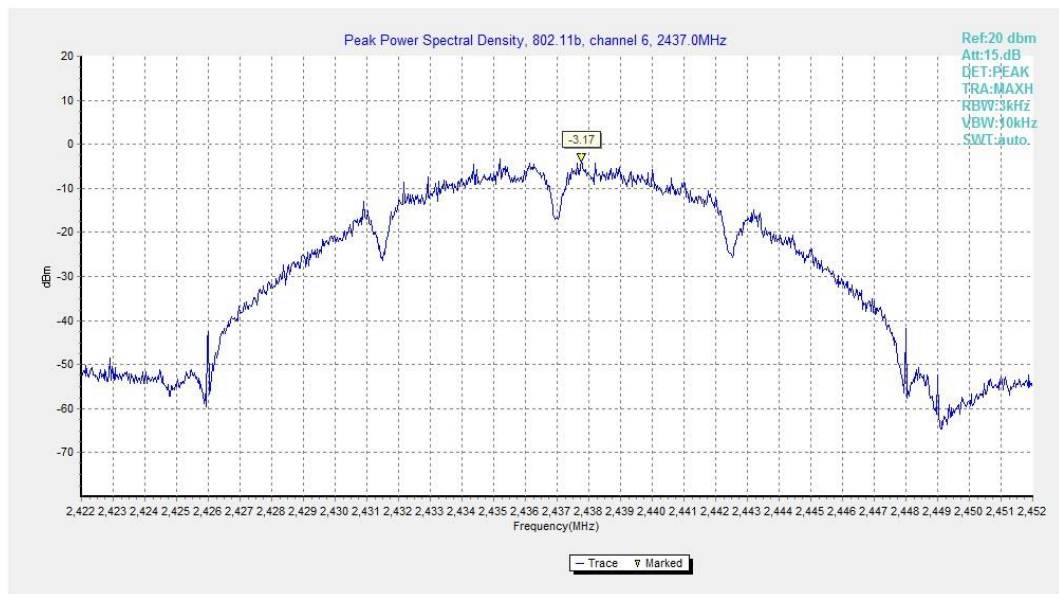
**Conclusion: Pass**



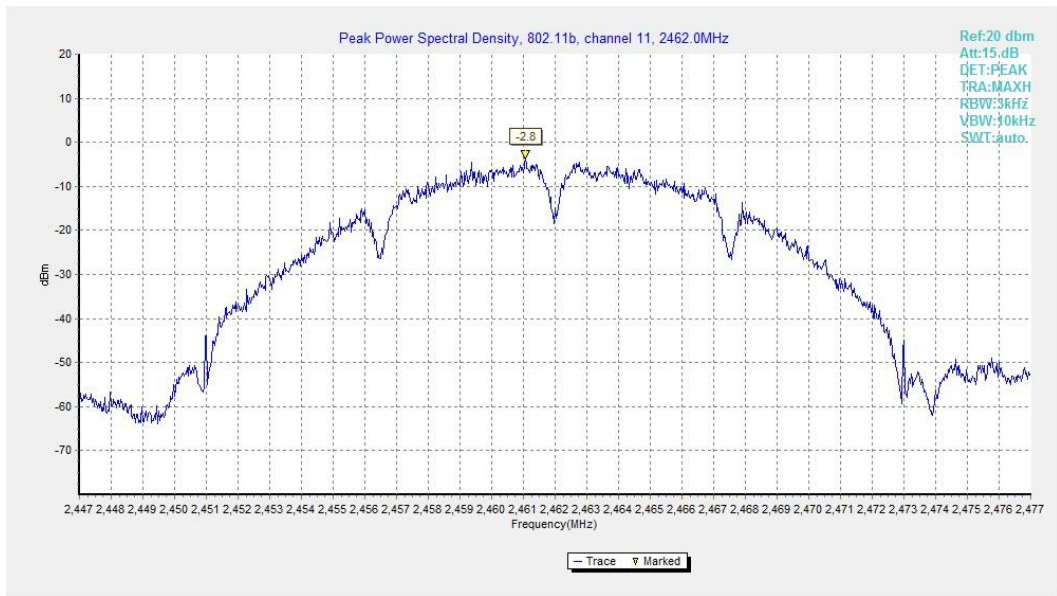
Test graphs as below:



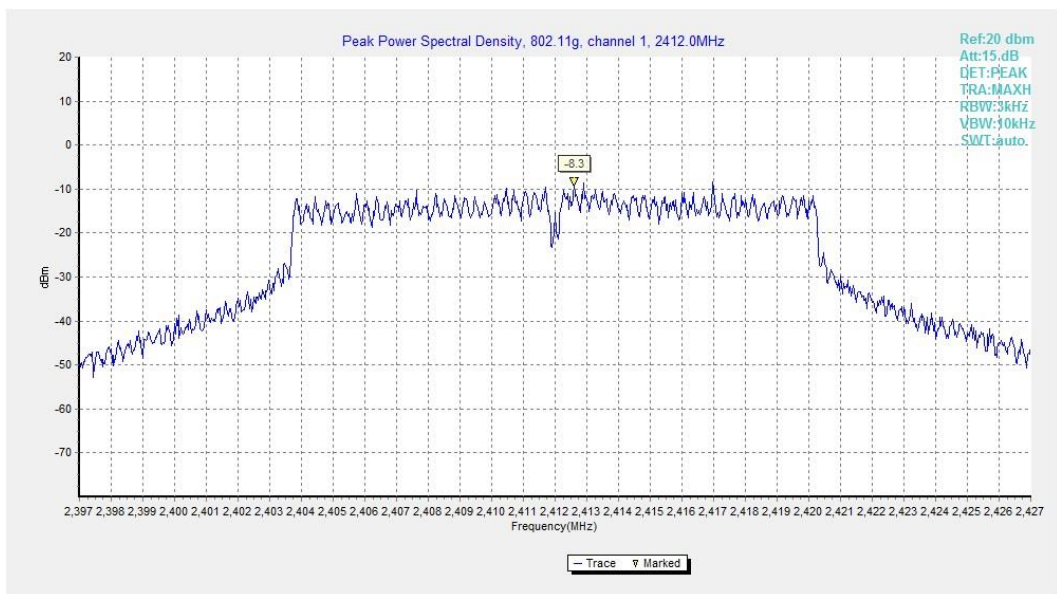
**Fig.A.3.1 Power Spectral Density(802.11b,Ch1)**



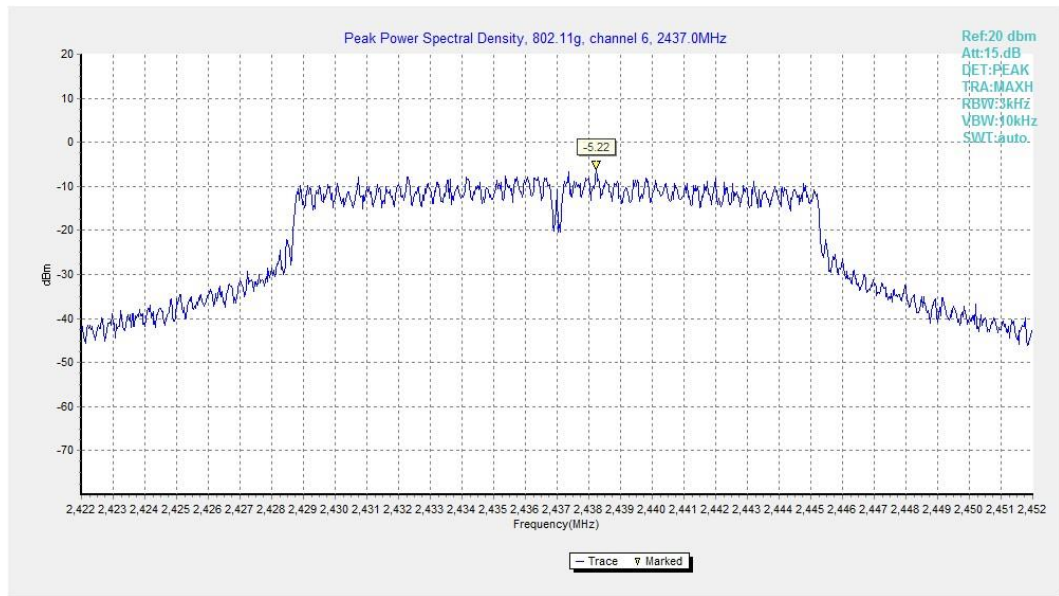
**Fig.A.3.2 Power Spectral Density (802.11b, Ch 6)**



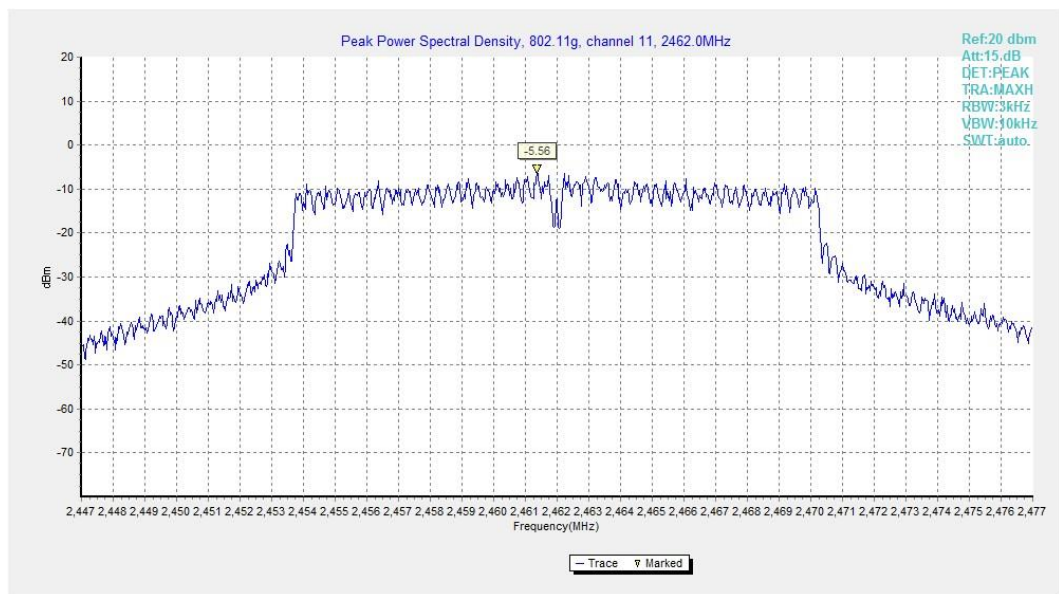
**Fig.A.3.3 Power Spectral Density (802.11b, Ch 11)**



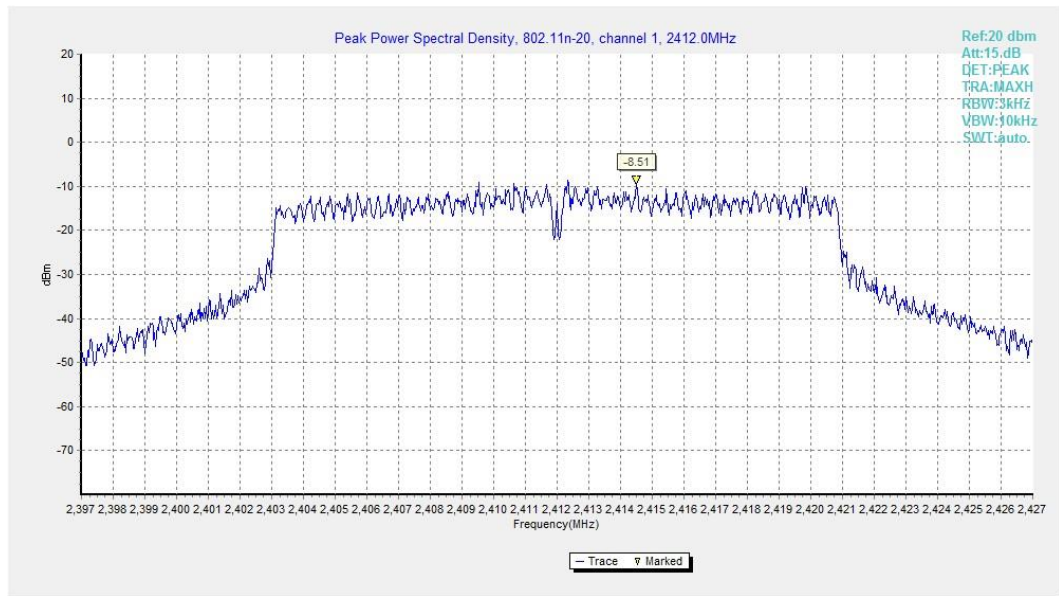
**Fig.A.3.4 Power Spectral Density (802.11g, Ch 1)**



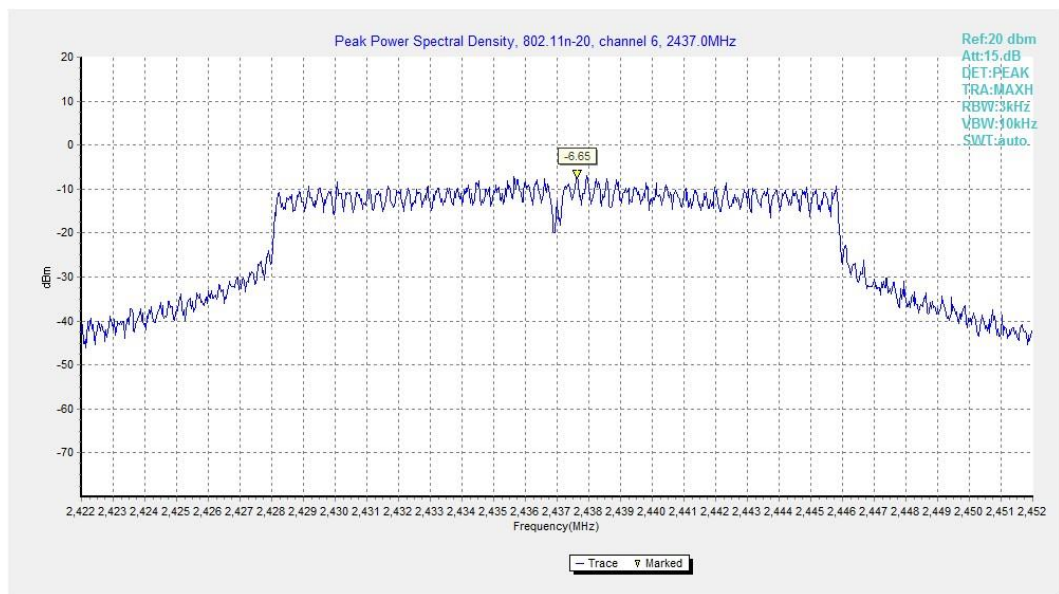
**Fig.A.3.5 Power Spectral Density (802.11g, Ch 6)**



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

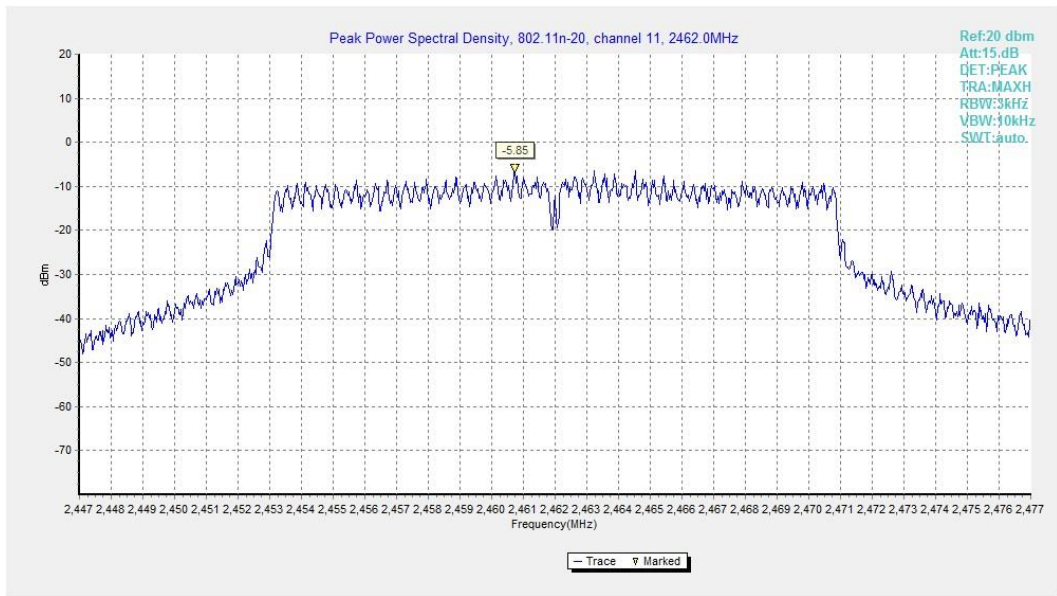


**Fig.A.3.7 Power Spectral Density (802.11n-HT20, Ch 1)**

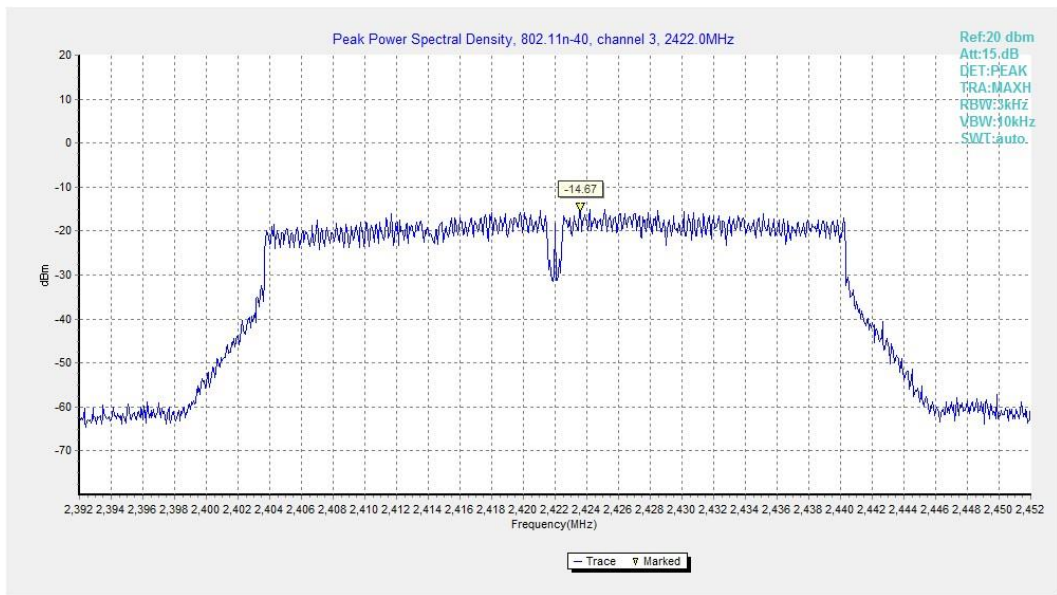


**Fig.A.3.8 Power Spectral Density (802.11n-HT20, Ch 6)**

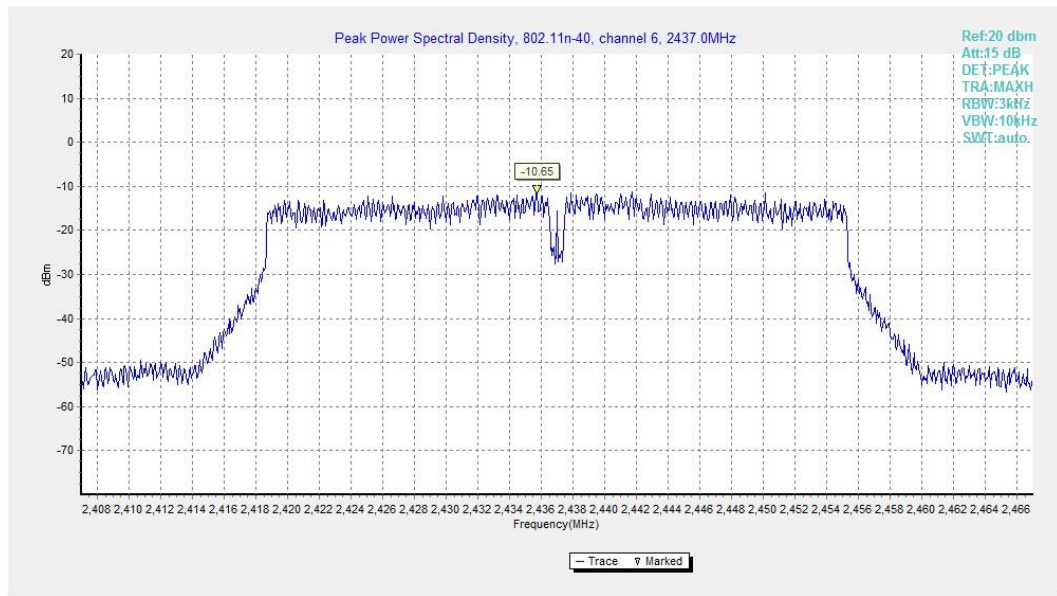




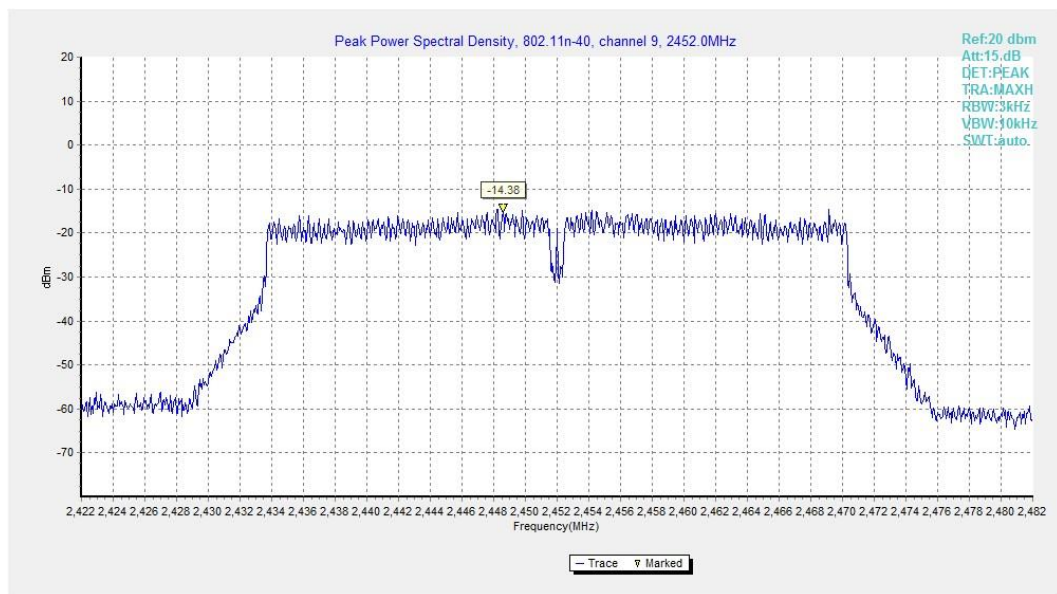
**Fig.A.3.9 Power Spectral Density (802.11n-HT20, Ch 11)**



**Fig.A.3.10 Power Spectral Density (802.11n-HT40, Ch 3)**



**Fig.A.3.11 Power Spectral Density (802.11n-HT40, Ch 6)**



**Fig.A.3.12 Power Spectral Density (802.11n-HT40, Ch 9)**

#### **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)	≥ 500

**EUT ID: UT18a**

**Measurement Result:**

##### **802.11b/g mode**

Mode	Channel	Occupied 6dB Bandwidth ( MHz)		conclusion
802.11b	1	Fig.A.4.1	8.05	<b>P</b>
	6	Fig.A.4.2	9.00	<b>P</b>
	11	Fig.A.4.3	8.50	<b>P</b>
802.11g	1	Fig.A.4.4	15.65	<b>P</b>
	6	Fig.A.4.5	15.45	<b>P</b>
	11	Fig.A.4.6	15.60	<b>P</b>

##### **802.11n-HT20 mode**

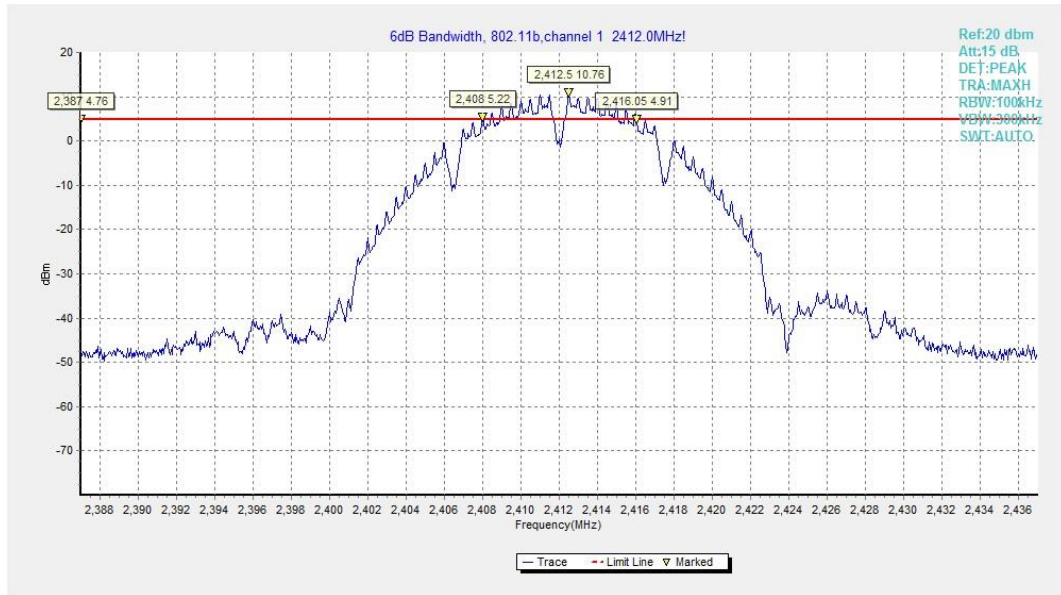
Mode	Channel	Occupied 6dB Bandwidth ( MHz)		conclusion
802.11n (HT20)	1	Fig.A.4.7	16.30	<b>P</b>
	6	Fig.A.4.8	16.30	<b>P</b>
	11	Fig.A.4.9	15.15	<b>P</b>

##### **802.11n-HT40 mode**

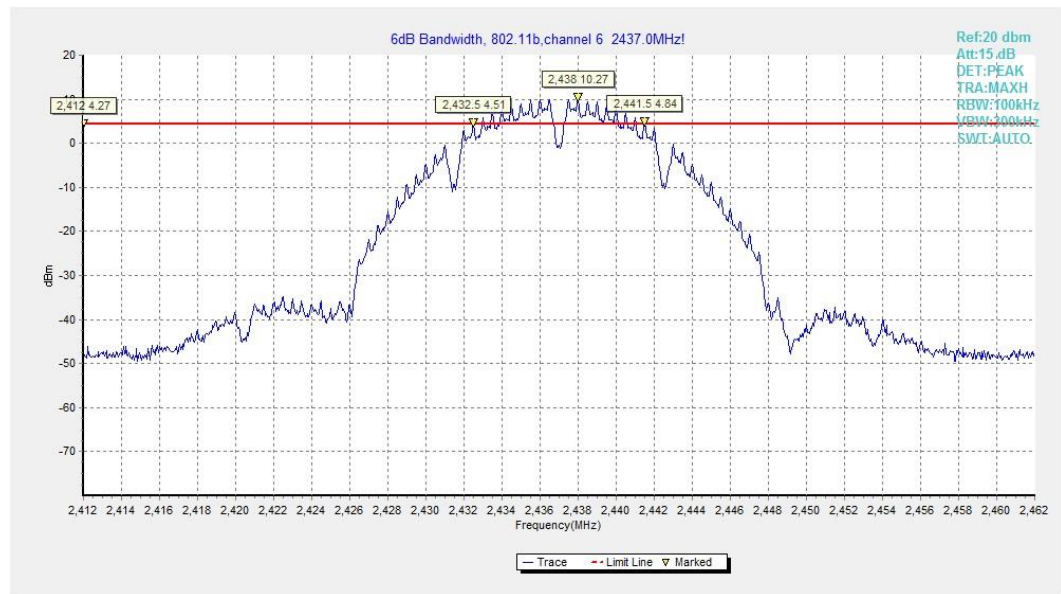
Mode	Channel	Occupied 6dB Bandwidth ( MHz)		conclusion
802.11n (HT40)	3	Fig.A.4.10	35.68	<b>P</b>
	6	Fig.A.4.11	36.08	<b>P</b>
	9	Fig.A.4.12	35.68	<b>P</b>

**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)**



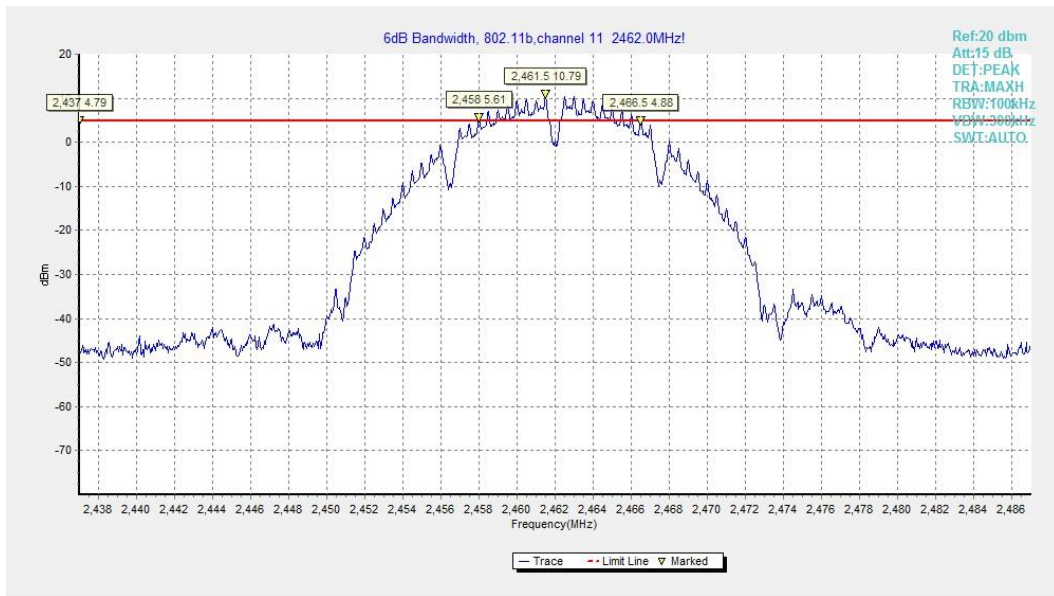


Fig.A.4.3 Occupied 6dB Bandwidth (802.11b, Ch 11)

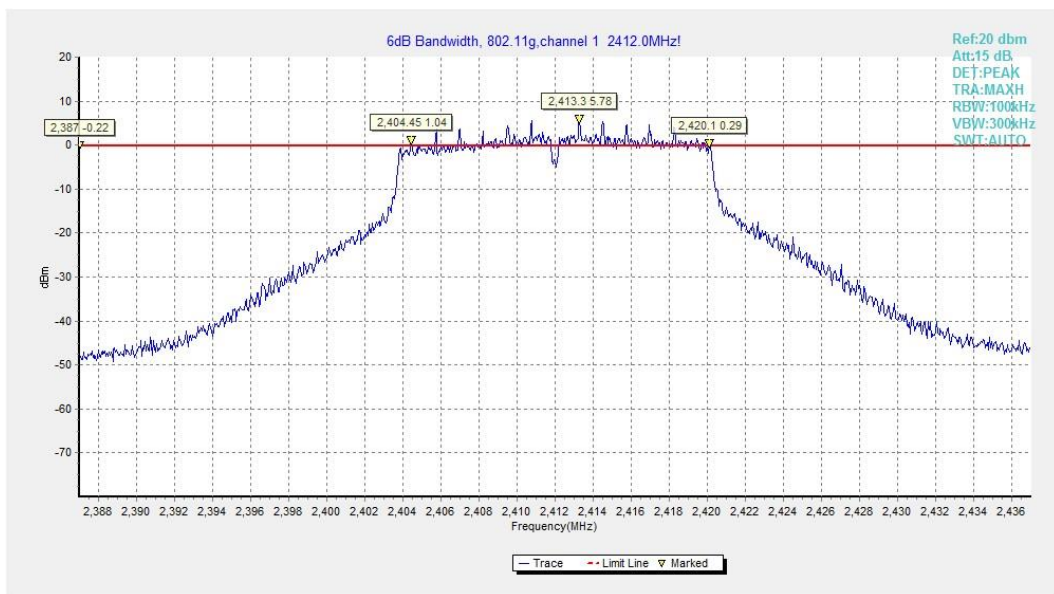


Fig.A.4.4 Occupied 6dB Bandwidth (802.11g, Ch 1)

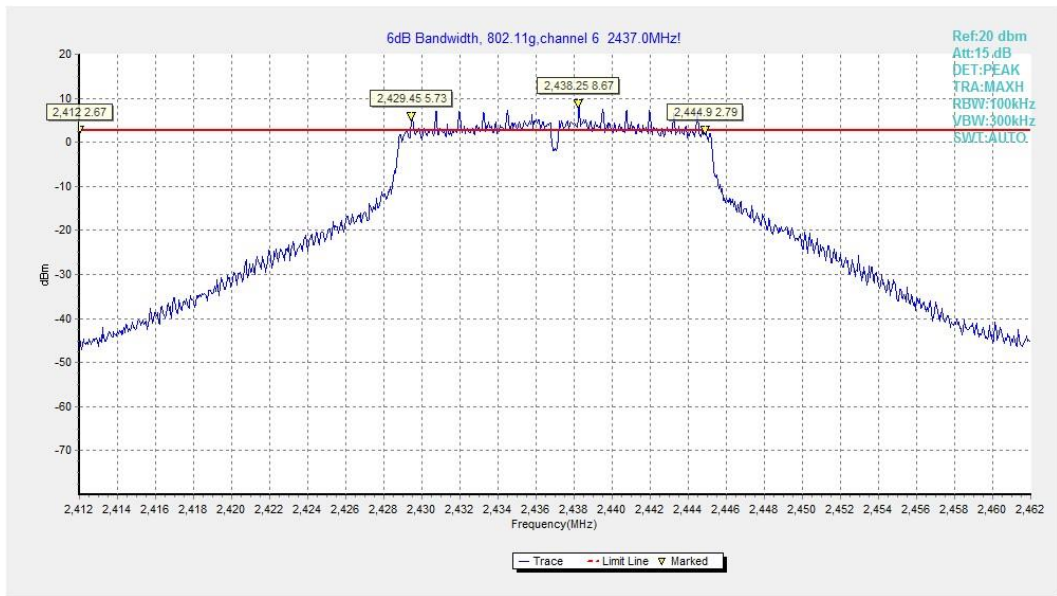


Fig.A.4.5 Occupied 6dB Bandwidth (802.11g, Ch 6)

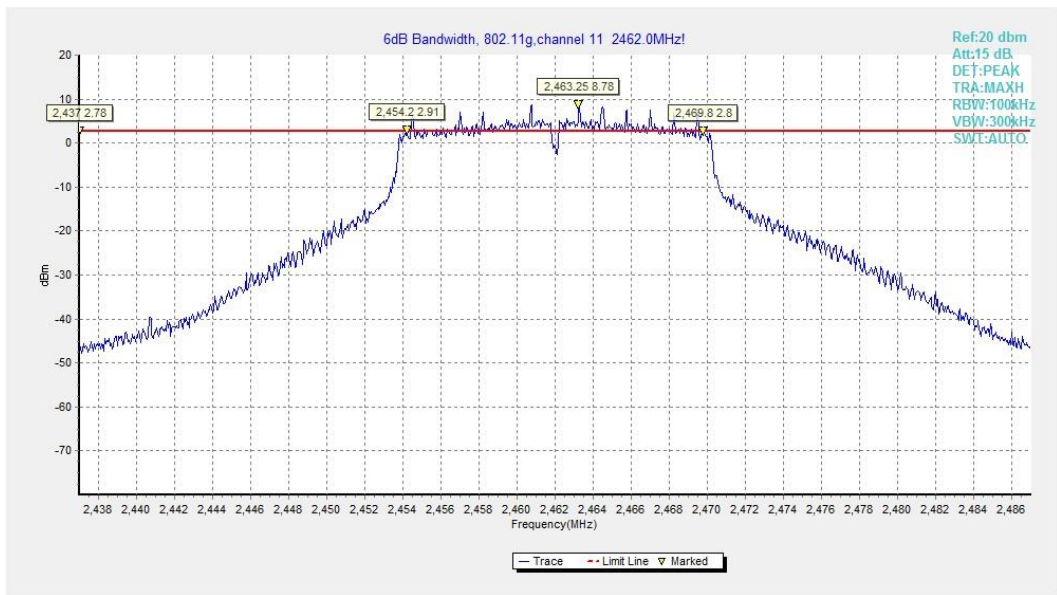


Fig.A.4.6 Occupied 6dB Bandwidth (802.11g, Ch 11)

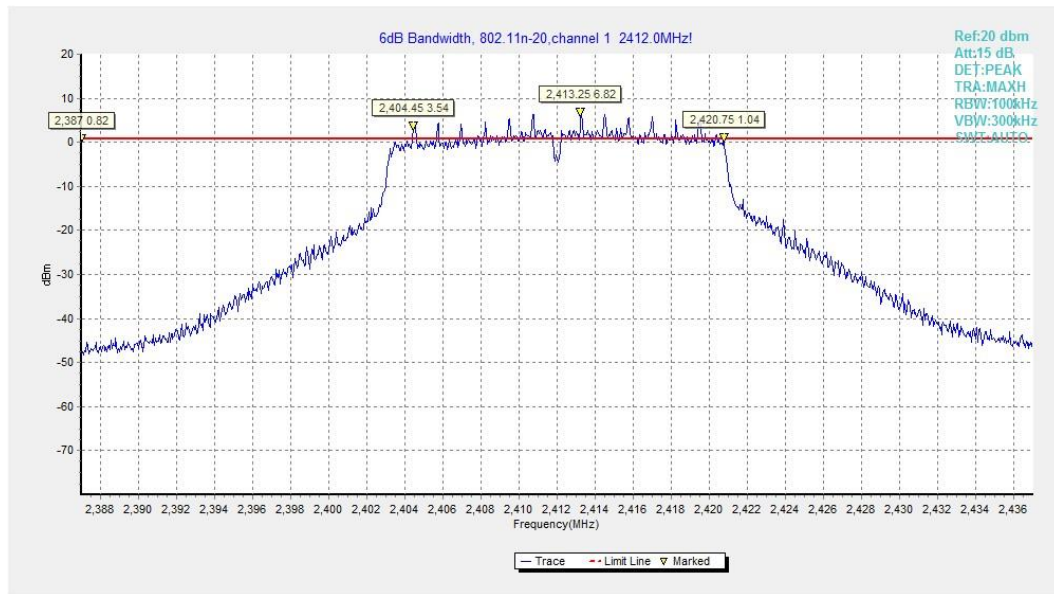


Fig.A.4.7 Occupied 6dB Bandwidth (802.11n-20MHz, Ch 1)

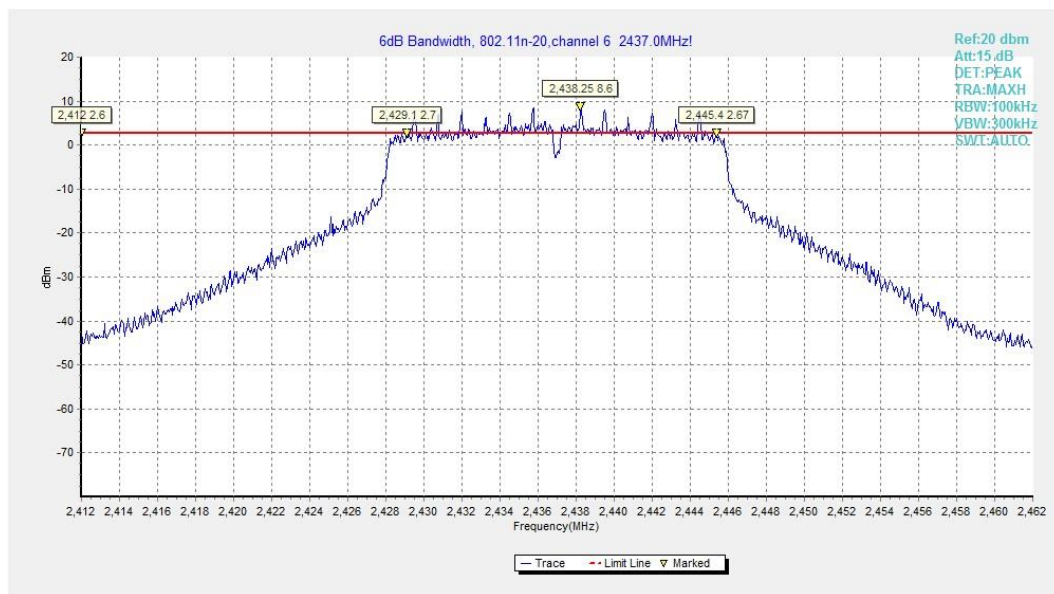
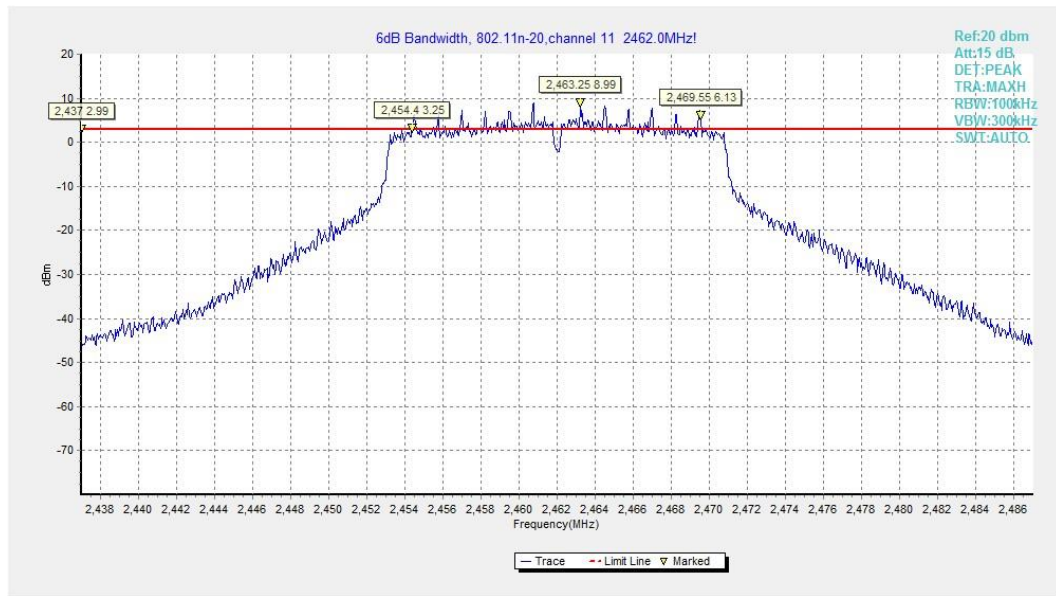
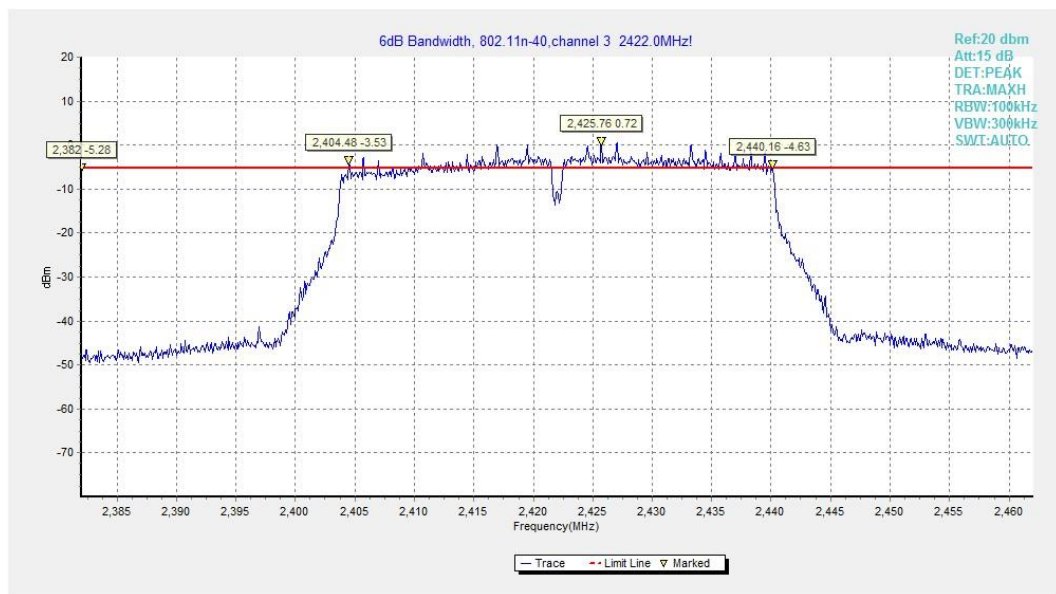


Fig.A.4.8 Occupied 6dB Bandwidth (802.11n-HT20, Ch 6)

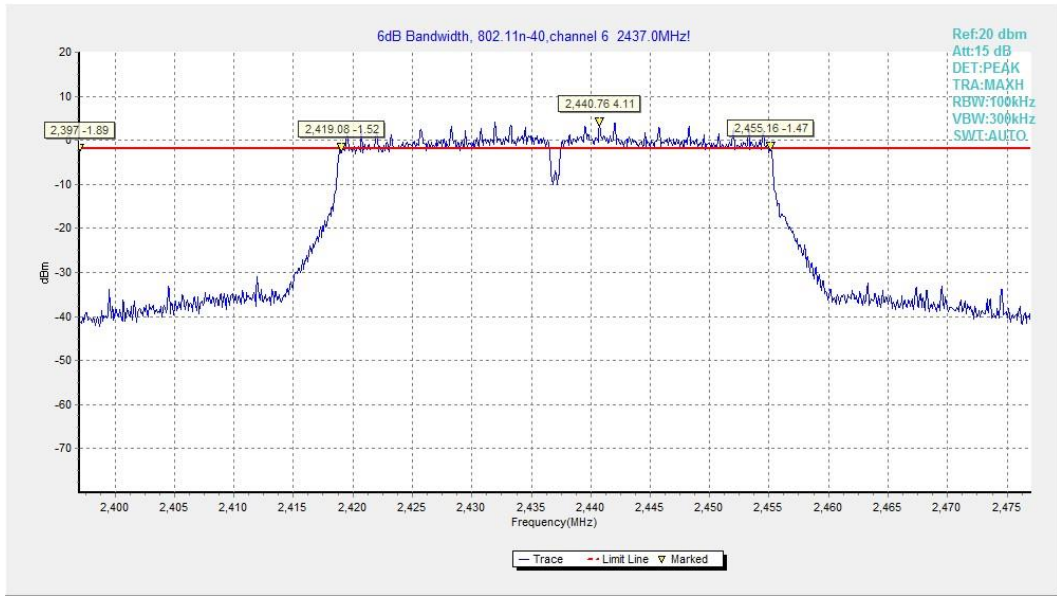


**Fig.A.4.9 Occupied 6dB Bandwidth (802.11n-HT20, Ch 11)**

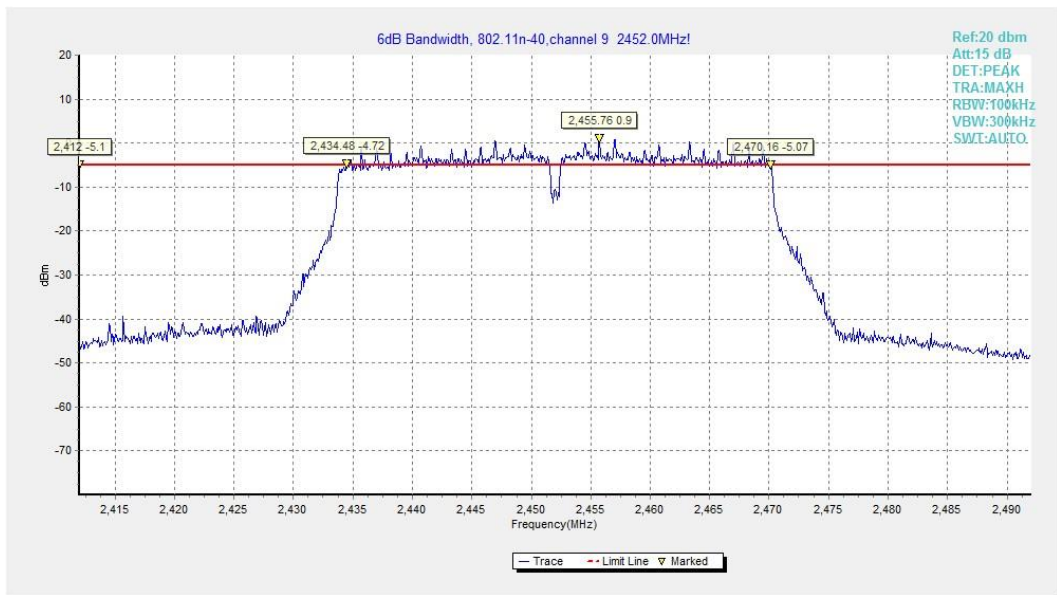


**Fig.A.4.10 Occupied 6dB Bandwidth (802.11n-40MHz, Ch 3)**





**Fig.A.4.11 Occupied 6dB Bandwidth (802.11n-HT40, Ch 6)**



**Fig.A.4.12 Occupied 6dB Bandwidth (802.11n-HT40, Ch 9)**

### **A.5. Band Edges Compliance**

**Method of Measurement: See ANSI C63.10-2013-clause 6.10.4**

Connect the spectrum analyzer to the EUT using an appropriate RF cable connected to the EUT output. Configure the spectrum analyzer settings as described below.

- a) Set Span = 100MHz
- b) Sweep Time: coupled
- c) Set the RBW= 100 kHz
- c) Set the VBW= 300 kHz
- d) Detector: Peak
- e) Trace: Max hold

**Measurement Limit:**

Standard	Limit (dBc)
FCC 47 CFR Part 15.247 (d)	> 20

**EUT ID: UT18a**

**Measurement Result:**

**802.11b/g mode**

Mode	Channel	Test Results	Conclusion
802.11b	1	Fig.A.5.1	<b>P</b>
	11	Fig.A.5.2	<b>P</b>
802.11g	1	Fig.A.5.3	<b>P</b>
	11	Fig.A.5.4	<b>P</b>

**802.11n-HT20 mode**

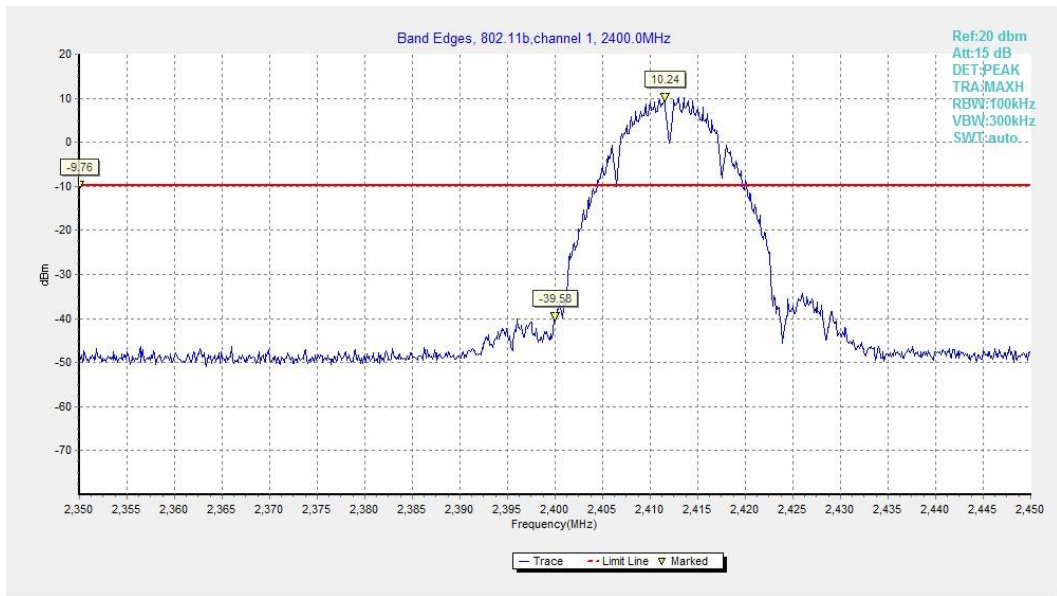
Mode	Channel	Test Results	Conclusion
802.11n (HT20)	1	Fig.A.5.5	<b>P</b>
	11	Fig.A.5.6	<b>P</b>

**802.11n-HT40 mode**

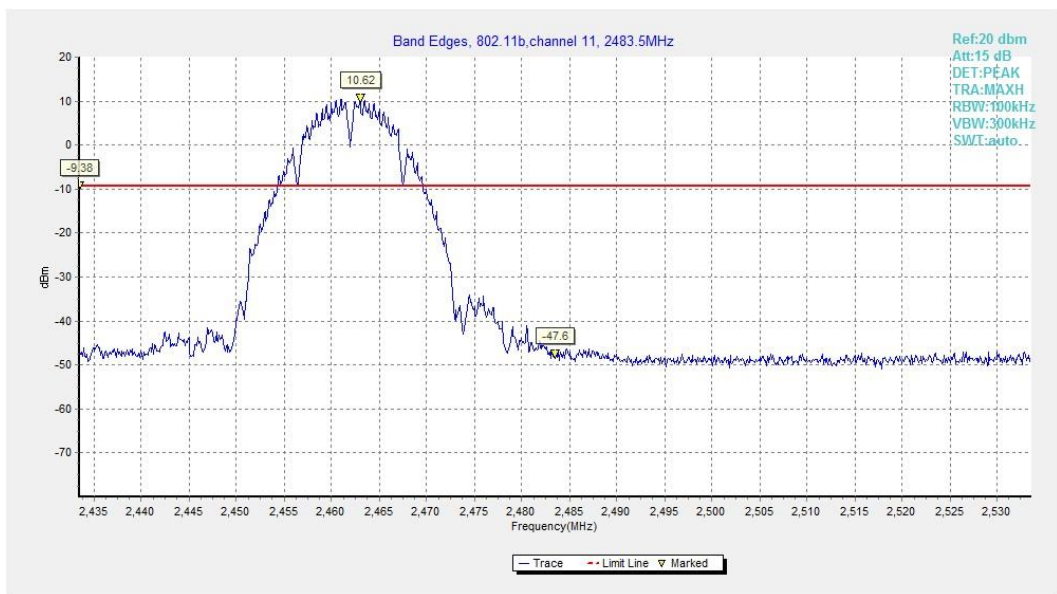
Mode	Channel	Test Results	Conclusion
802.11n (HT40)	3	Fig.A.5.7	<b>P</b>
	9	Fig.A.5.8	<b>P</b>

**Conclusion: Pass**

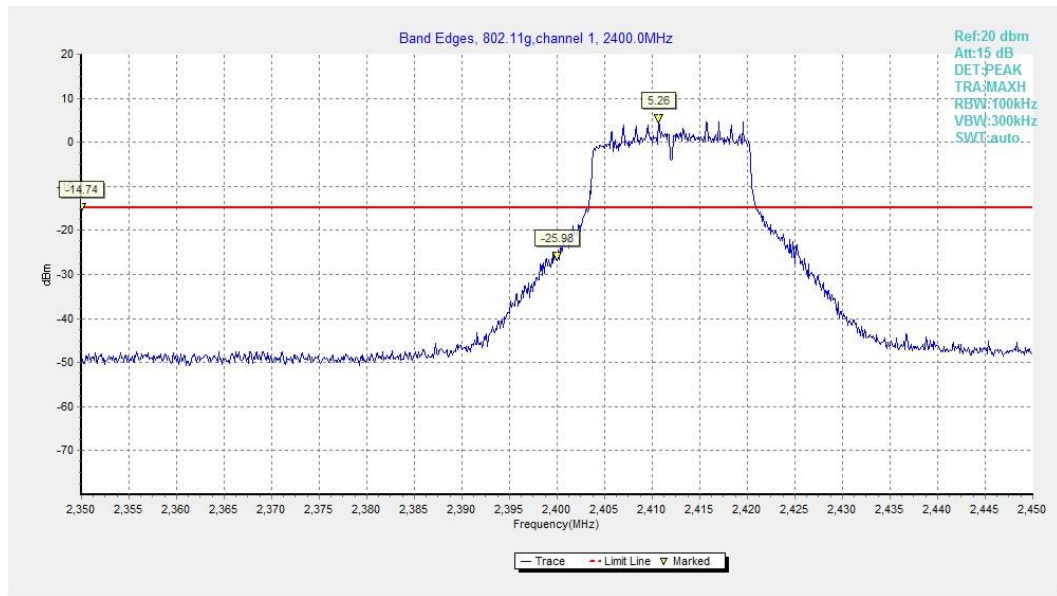
**Test graphs as below:**



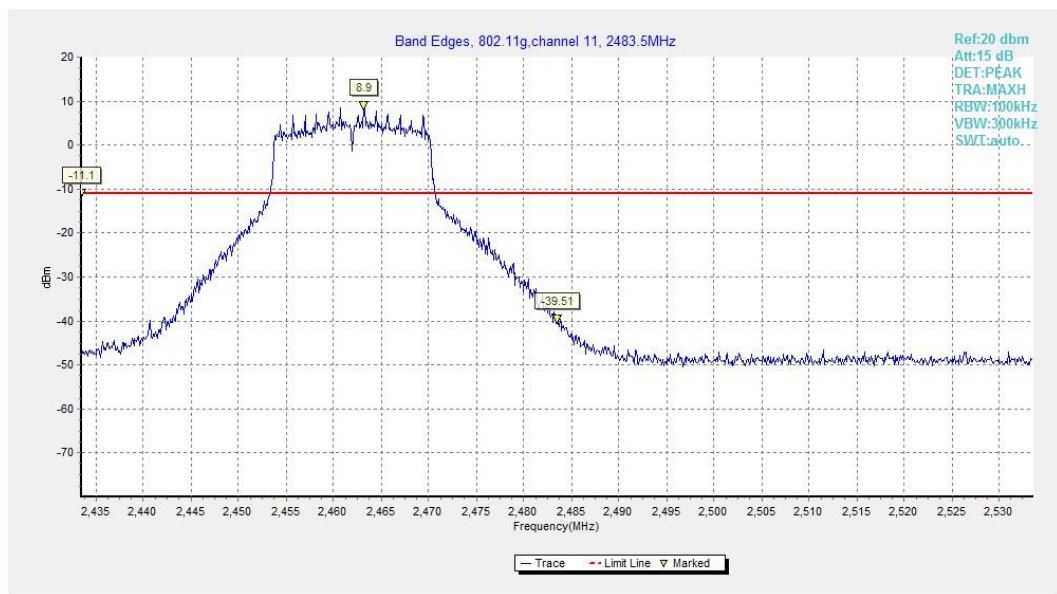
**Fig.A.5.1 Band Edges (802.11b, Ch 1)**



**Fig.A.5.2 Band Edges (802.11b, Ch 11)**

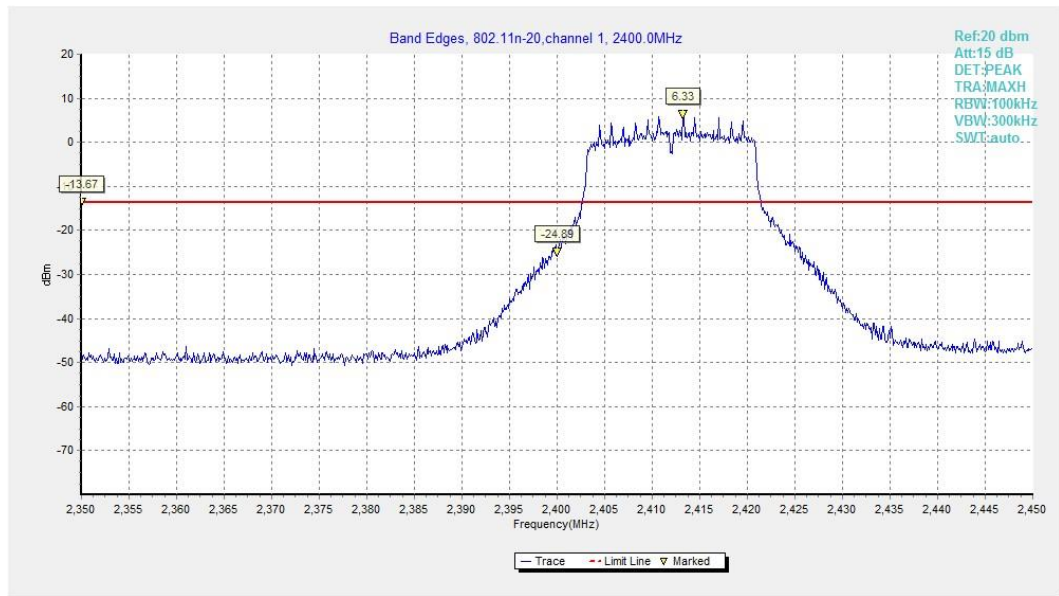


**Fig.A.5.3 Band Edges (802.11g, Ch 1)**

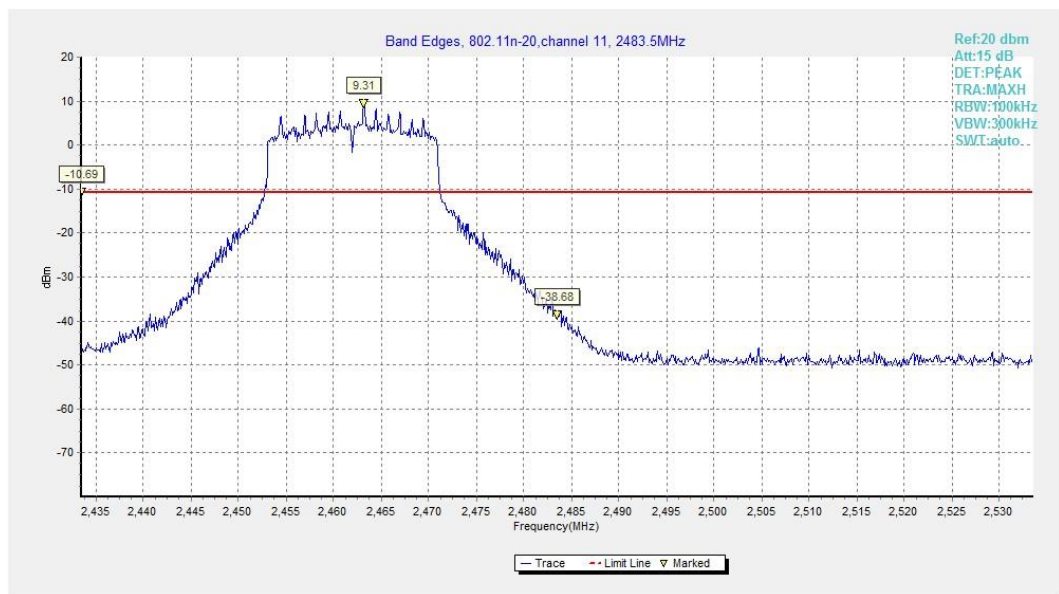


**Fig.A.5.4 Band Edges (802.11g, Ch 11)**





**Fig.A.5.5 Band Edges (802.11n-HT20, Ch 1)**



**Fig.A.5.6 Band Edges (802.11n-HT20, Ch 11)**



Fig.A.5.7 Band Edges (802.11n-HT40, Ch 3)

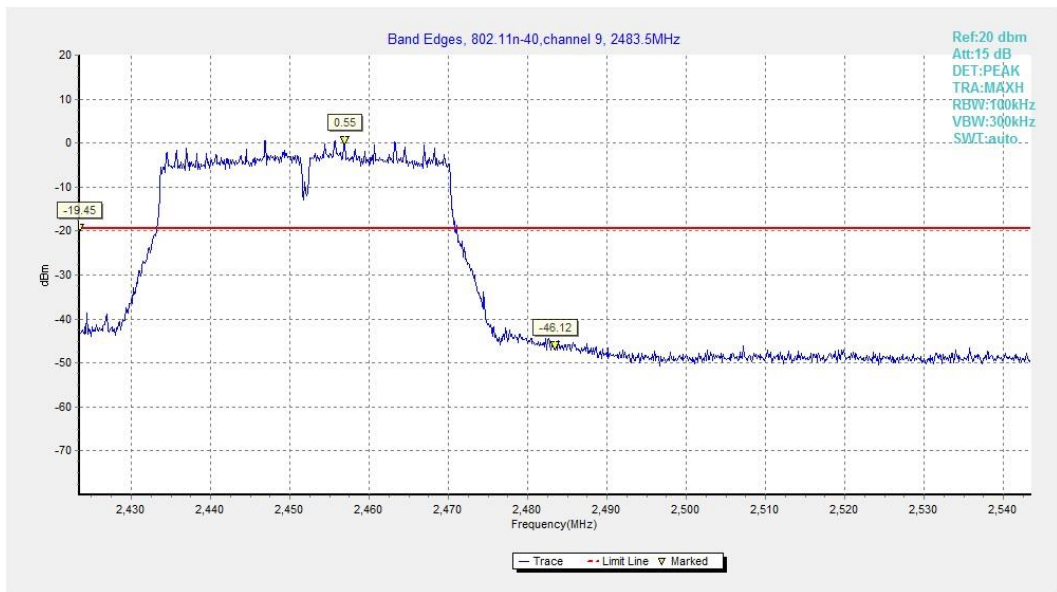


Fig.A.5.8 Band Edges (802.11n-HT40, Ch 9)

## **A.6. Transmitter Spurious Emission**

### **A.6.1 Transmitter Spurious Emission – Conducted**

**Method of Measurement: See ANSI C63.10-2013-clause 11.11**

Establish a reference level by using the following procedure:

- a) Set instrument center frequency to DTS channel center frequency
- b) Set the span to  $\geq 1.5$  times the DTS bandwidth
- c) Set the RBW= 100 kHz
- d) Set the VBW= 300 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 PSD level

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

Establish an emission level by using the following procedure:

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100 kHz.
- c) Set the VBW = 300 kHz.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

#### **Measurement Limit:**

<b>Standard</b>	<b>Limit</b>
FCC 47 CFR Part 15.247 (d)	20dB below peak output power in 100 kHz bandwidth

**EUT ID: UT18a**

**Measurement Results:**