



# FCC PART 15C TEST REPORT No. I21Z70369-IOT01

for

**Samsung Electronics Co., Ltd**

**Multi-band GSM/WCDMA/LTE Mobile Phone with Bluetooth, WLAN**

**SM-A037G/DSN**

**FCC ID : ZCASMA037G**

with

**Hardware Version: REV1.0**

**Software Version: A037G.001**

**Issued Date: 2021-08-11**

**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.

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## **REPORT HISTORY**

<b>Report Number</b>	<b>Revision</b>	<b>Description</b>	<b>Issue Date</b>
I21Z70369-IOT01	Rev.0	1st edition	2021-08-11
I21Z70369-IOT01	Rev.1	Del P.9 KDB662911,	2021-08-16

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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

Location 1:CTTL(Gaolizhang Road)

Address: Cuihu Cloud Center, No.1, Gaolizhang Road, Wenquan,  
Haidian District, Beijing, China

Location 2:CTTL(Shouxiang)

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

### 1.3. Testing Environment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

### 1.4. Project date

Testing Start Date: 2021-07-10

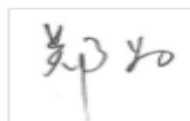
Testing End Date: 2021-08-11

### 1.5. Signature

封爱宇

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**Feng Aiyu**  
(Prepared this test report)



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**Zheng Wei**  
(Reviewed this test report)

胡晓宇



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Hu Xiaoyu  
(Approved this test report)



## 2. Client Information

### 2.1. Applicant Information

Company Name: Samsung Electronics Co., Ltd.  
Address: Address 19 Chapin Rd., Building D Pine Brook, NJ 07058  
City: /  
Country: /  
Telephone: +1-201-937-4203  
Fax: /  
Contact Jenni Chun  
Email j1.chun@samsung.com

### 2.2. Manufacturer Information

Company Name: Samsung Electronics Co., Ltd.  
Address: Samsung R5, Maetan dong 129, Samsung ro  
Youngtong gu, Suwon city 443 742, Korea  
City: Suwon city  
Postal Code: /  
Country: Korea  
Telephone: +82-10-2722-4159  
Fax: /  
Contact 조성훈 (Sunghoon Cho)  
Email ggobi.cho@samsung.com

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

#### 3.1. About EUT

Description	Multi-band GSM/WCDMA/LTE Mobile Phone with Bluetooth, WLAN
Model name	SM-A037G/DSN
FCC ID	ZCASMA037G
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	26.04dBm
Power Supply	4V

#### 3.2. Internal Identification of EUT

EUT ID*	SN or IMEI	HW Version	SW Version
UT06a	2170369UT06a	REV1.0	A037G.001
UT02a	2170369UT02a	REV1.0	A037G.001

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

#### 3.3. Internal Identification of AE

AE ID*	Description	
AE1	Charger1	/
AE2	Charger2	/
AE3	Charger3	/
AE4	Charger4	
AE5	Charger5	
AE6	USB cable	
AE7	Headset1	/
AE8	Headset2	/
AE9	Battery1	/
AE10	Battery2	/

##### AE1

Model	EP-TA50JWE
Manufacturer	HAEM Co.,Ltd
Length of cable	/

##### AE2

Model	EP-TA50JWE
Manufacturer	RFTech Electronics(HuiZhou)Co.,LTD



Length of cable	/
AE3	
Model	EP-TA50UWE
Manufacturer	Dong Yang
Length of cable	/
AE4	
Model	EP-TA50UWE
Manufacturer	HAEM Co.,Ltd
Length of cable	/
AE5	
Model	EP-TA50UWE
Manufacturer	Salcomp
Length of cable	/
AE6	
Model	EP-DR140AWE
Manufacturer	Samsung Electronics Co., Ltd.
Length of cable	/
AE7	
Model	EHS61ASFWE
Manufacturer	DONGGUAN YOUNGBO ELECTRONICS CO.,LTD
Length of cable	/
AE8	
Model	EHS61ASFWE
Manufacturer	WATA ELECTRONICS CO.,LTD
Length of cable	/
AE9	
Type	Secondary Li-ion Battery
SN	HQ-50S
Manufacturer	SCUD (Fujian) Electronics CO.,LTD
AE10	
Type	Secondary Li-ion Battery
SN	HQ-50SD
Manufacturer	SCUD (Fujian) Electronics CO.,LTD

\*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 Multi-band GSM/WCDMA/LTE Mobile Phone with Bluetooth, WLAN with integrated antenna and inbuilt battery.

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.	2018
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	2013
KDB 558074 D01	GUIDANCE FOR COMPLIANCE MEASUREMENTS ON 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	4V
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	2022-05-15
2	LISN	ENV216	101459	R&S	1 year	2022-03-16
3	Test Receiver	ESCI	100766	R&S	1 year	2022-03-09
4	Shielding Room	S81	/	ETS-Lindgren	/	/
5	Attenuator	K10	/	Rosenberger	/	/

### Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESU26	100376	R&S	1 year	2021-09-04
2	BiLog Antenna	VULB9163	9163-482	Schwarzbeck	1 year	2021-11-04
3	Dual-Ridge Waveguide Horn Antenna	3117	00058888	ETS-Lindgren	1 year	2021-09-22
4	EMI Antenna	LB-180400-25-C-KF	2110084000006	A-INFO	1 year	2022-02-28
5	Vector Signal Analyzer	FSV40	101047	R&S	1 year	2022-06-02

## 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	/
$30\text{MHz} \leq f \leq 1\text{GHz}$	5.40
$1\text{GHz} \leq f \leq 18\text{GHz}$	4.32
$18\text{GHz} \leq f \leq 40\text{GHz}$	5.26

### 7.6. AC Power-line Conducted Emission

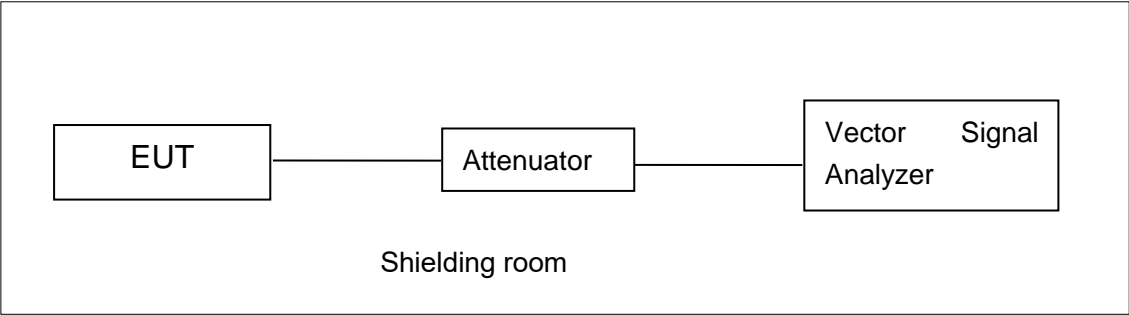
Measurement Uncertainty : 3.08dB,k=2

**ANNEX A: Detailed Test Results**

**A.1. Measurement Method**

**A.1.1. Conducted Measurements**

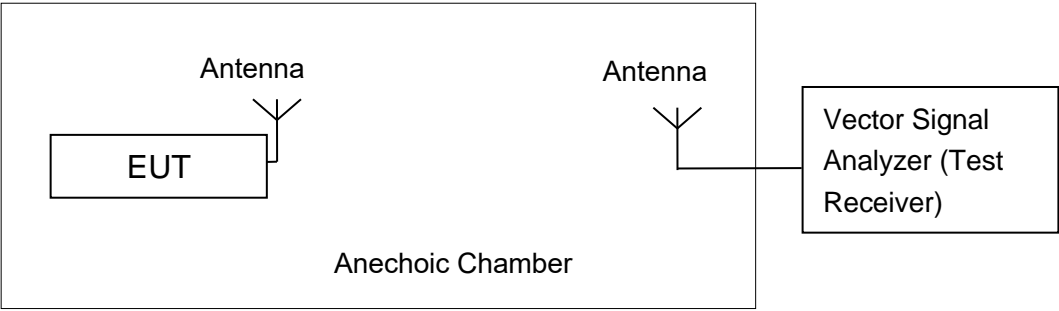
Connect the EUT to the test system as Fig.A.1.1.1 shows.  
 Set the EUT to the required work mode.  
 Set the EUT to the required channel.  
 Set the Vector Signal Analyzer and start measurement.  
 Record the values. Vector Signal Analyzer



**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 = 3MHz;



**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: EUT1**

### **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	20.09	/	/
	2	20.64	/	/
	5.5	21.86	/	/
	11	23.69	24.07	23.92
802.11g	6	25.55	/	/
	9	25.57	25.68	22.61
	12	24.56	/	/
	18	24.55	/	/
	24	24.92	/	/
	36	24.87	/	/
	48	25.25	/	/
	54	24.70	/	/

The data rate 11Mbps and 9Mbps 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	25.46	/	/
	MCS1	25.94	26.04	22.36
	MCS2	24.41	/	/
	MCS3	24.71	/	/
	MCS4	24.83	/	/
	MCS5	24.91	/	/
	MCS6	25.00	/	/
	MCS7	24.45	/	/

The data rate MCS1 are selected as worse condition, and the following cases are performed with this condition.

Note: The duty cycle of the EUT is 100%.

**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**

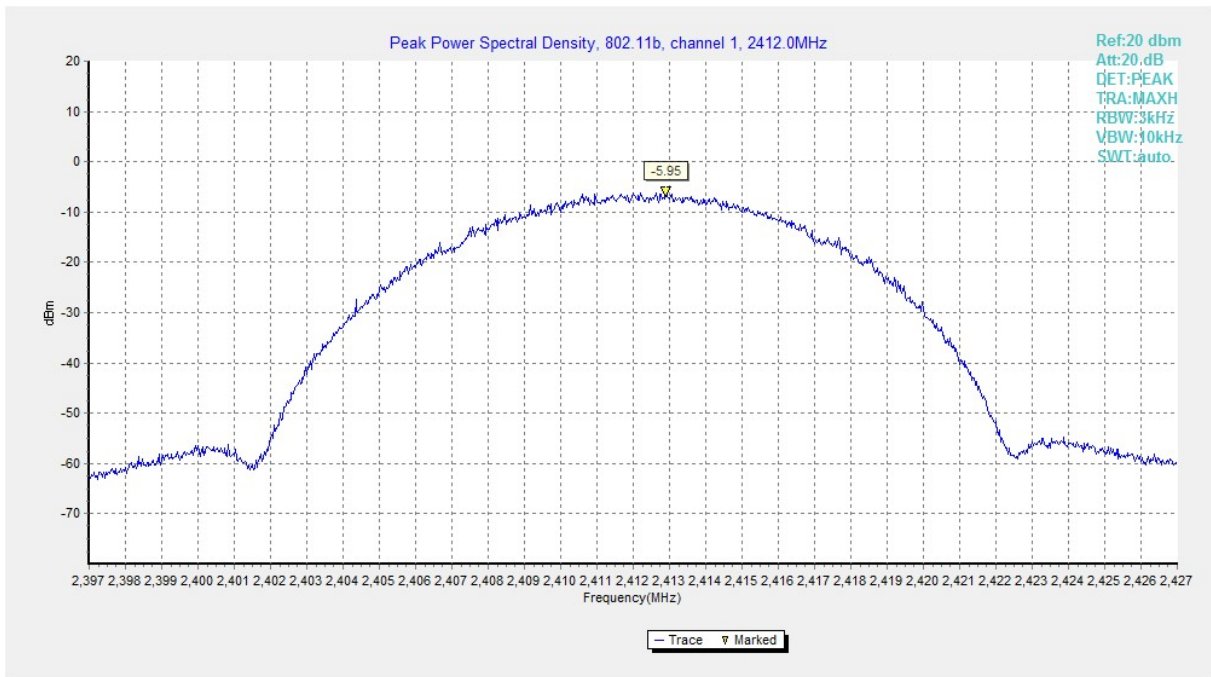
Mode	Channel	Power Spectral Density ( dBm/3 kHz )		Conclusion
802.11b	1	Fig.A.3.1	-5.95	<b>P</b>
	6	Fig.A.3.2	-5.33	<b>P</b>
	11	Fig.A.3.3	-5.45	<b>P</b>
802.11g	1	Fig.A.3.4	-6.62	<b>P</b>
	6	Fig.A.3.5	-7.54	<b>P</b>
	11	Fig.A.3.6	-7.94	<b>P</b>

**802.11n-HT20 mode**

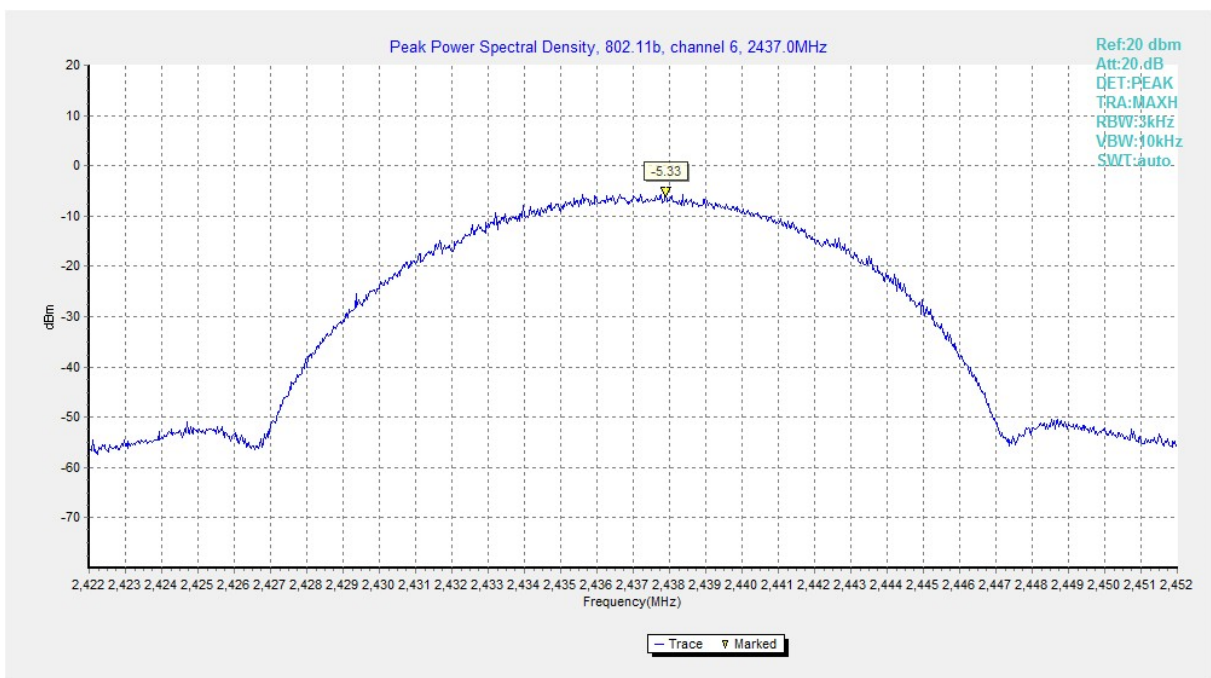
Mode	Channel	Power Spectral Density ( dBm/3 kHz )		Conclusion
802.11n (HT20)	1	Fig.A.3.7	-6.95	<b>P</b>
	6	Fig.A.3.8	-6.87	<b>P</b>
	11	Fig.A.3.9	-7.65	<b>P</b>

**Conclusion: Pass**

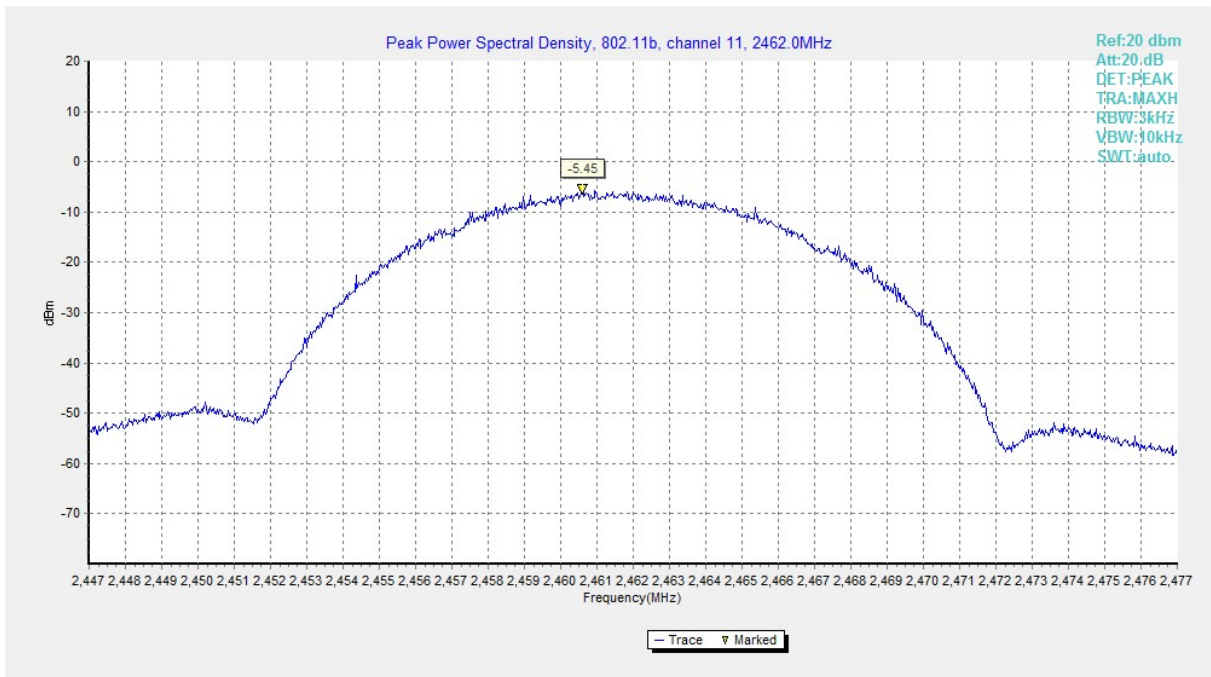
**Test graphs as below:**



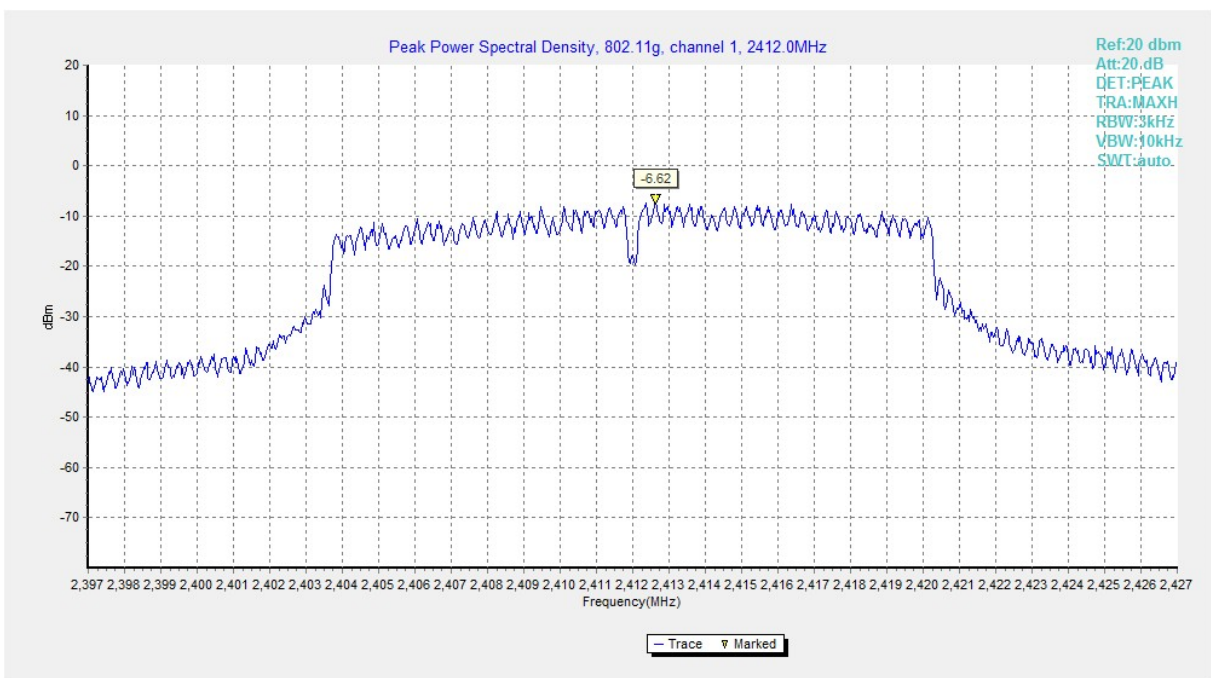
**Fig.A.3.1 Power Spectral Density(802.11b,Ch1)**



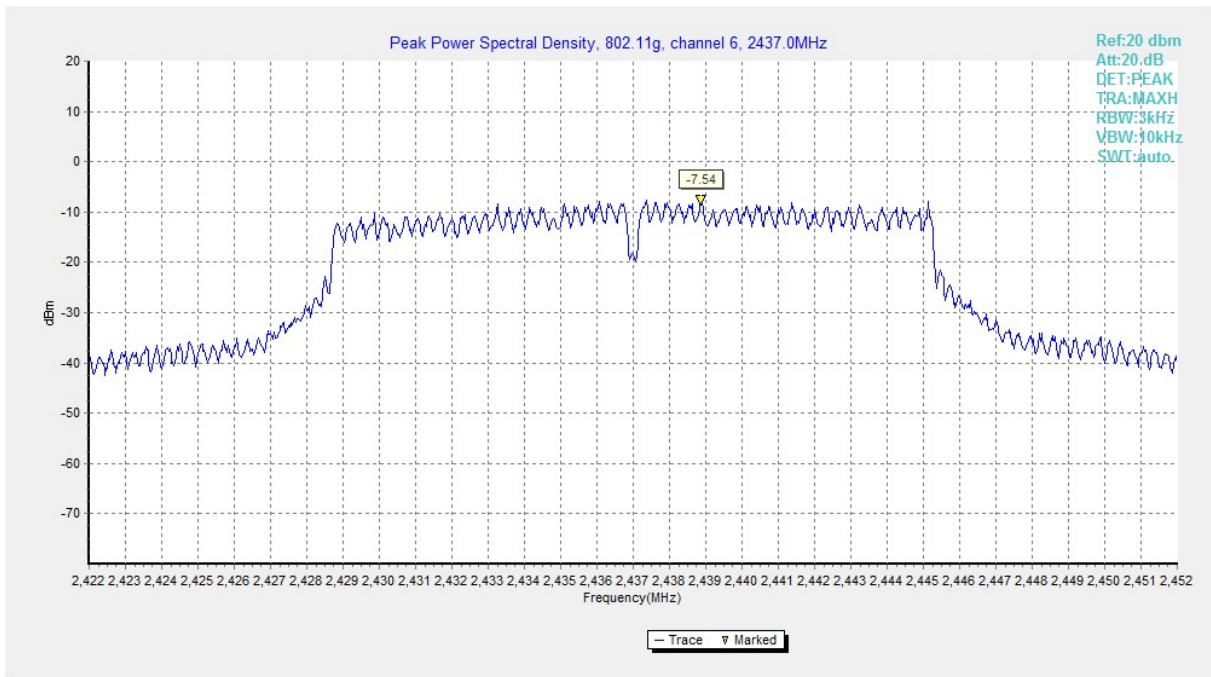
**Fig.A.3.2 Power Spectral Density (802.11b, Ch 6)**



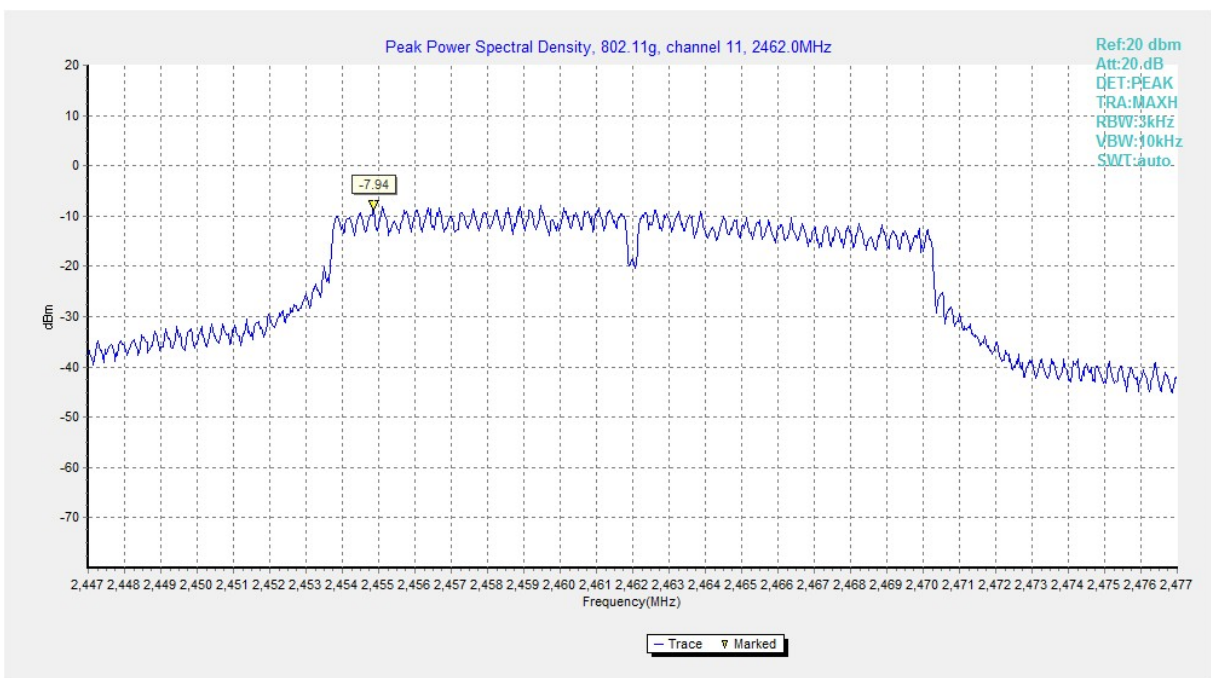
**Fig.A.3.3 Power Spectral Density (802.11b, Ch 11)**



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

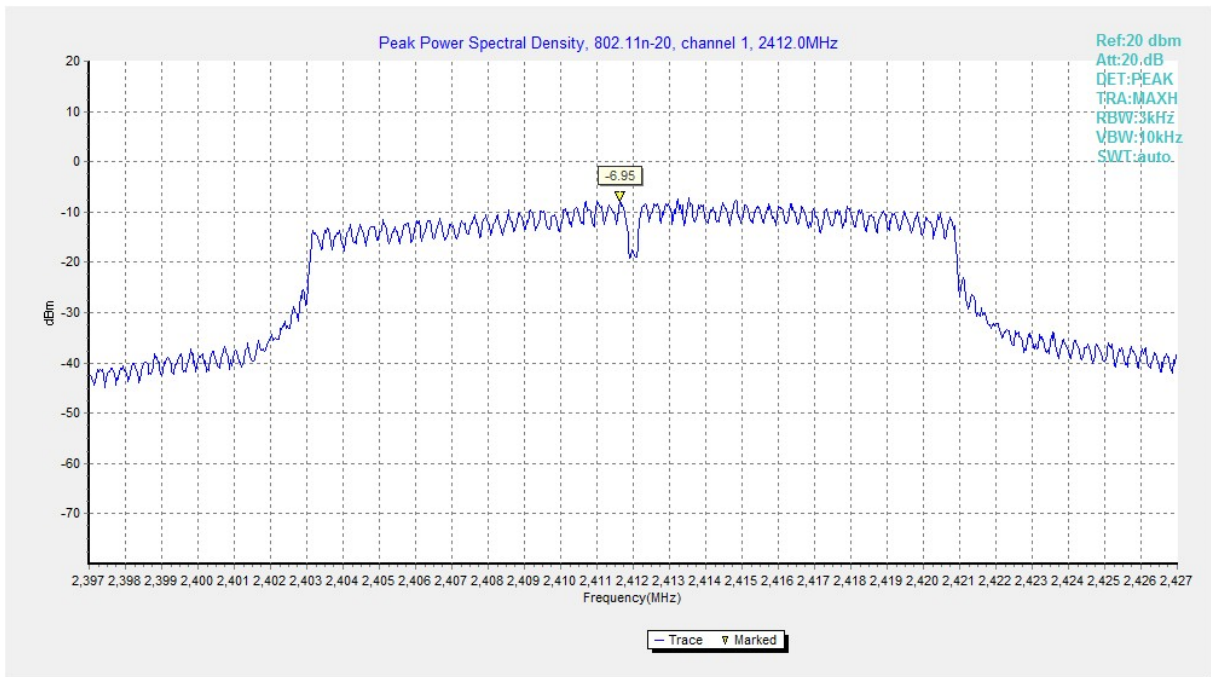


**Fig.A.3.5 Power Spectral Density (802.11g, Ch 6)**

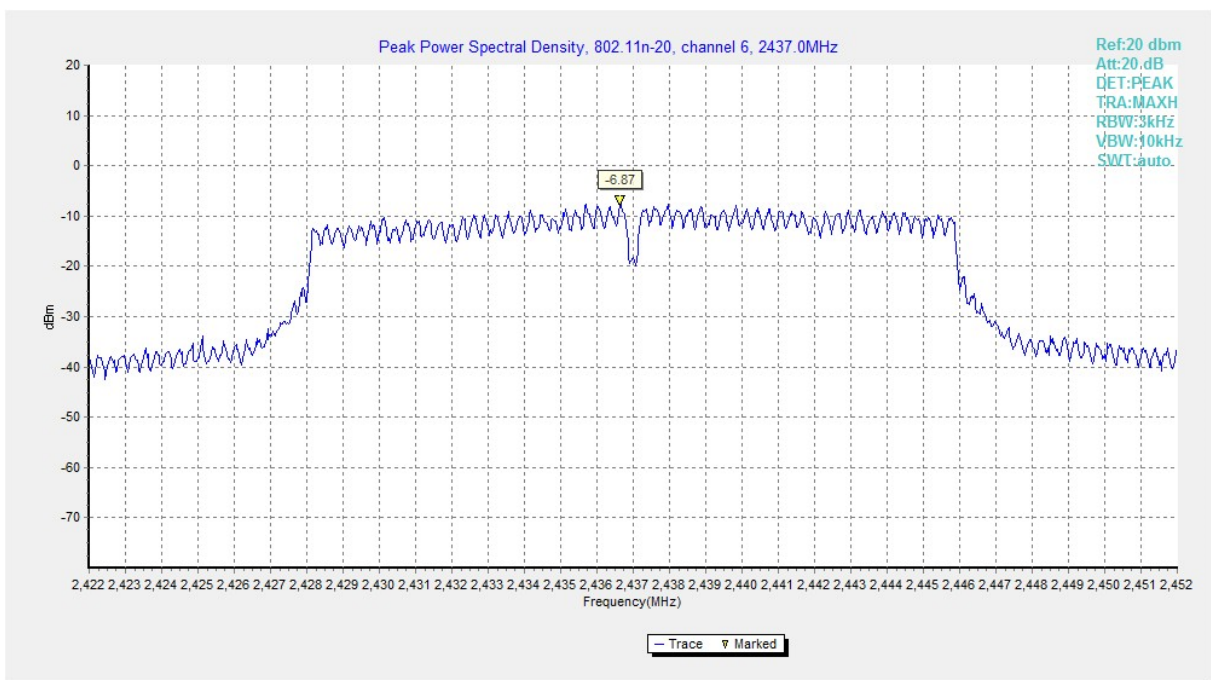


**Fig.A.3.6 Power Spectral Density (802.11g, Ch 11)**





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



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

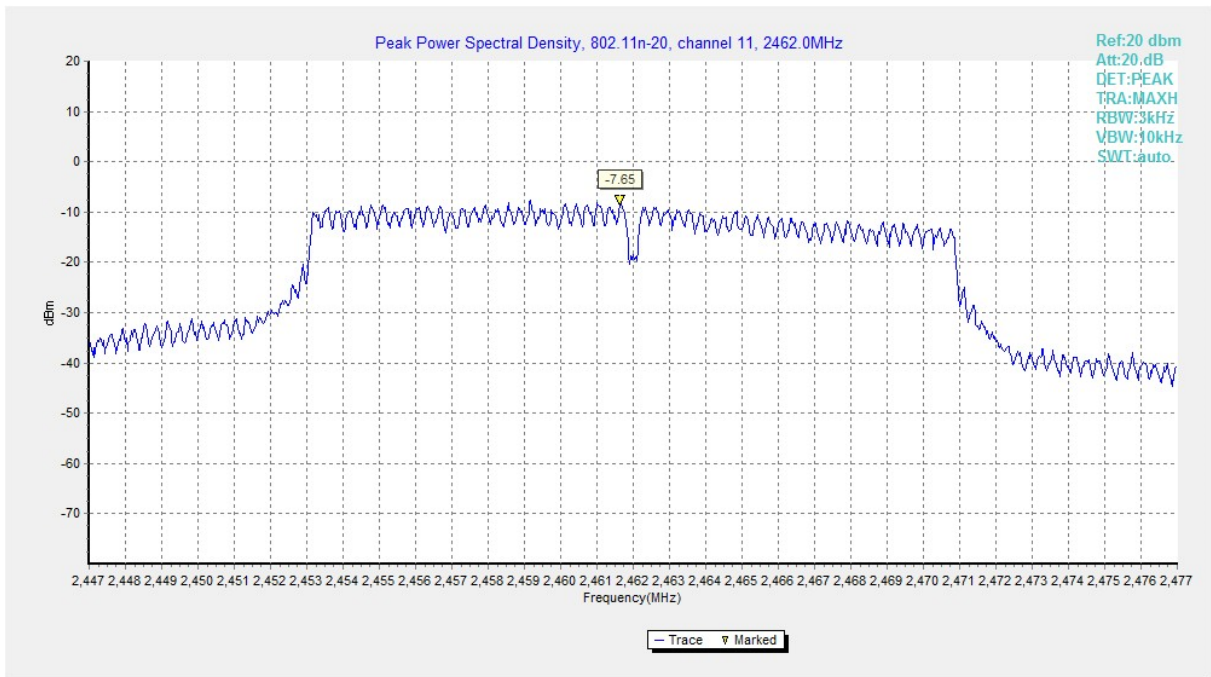


Fig.A.3.9 Power Spectral Density (802.11n-HT20, Ch 11)

#### **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: EUT1**

**Measurement Result:**

**SISO ANT0:**

**802.11b/g mode**

Mode	Channel	Occupied 6dB Bandwidth ( kHz)		conclusion
802.11b	1	Fig.A.4.1	8100.00	<b>P</b>
	6	Fig.A.4.2	8250.00	<b>P</b>
	11	Fig.A.4.3	8150.00	<b>P</b>
802.11g	1	Fig.A.4.4	16000.00	<b>P</b>
	6	Fig.A.4.5	16450.00	<b>P</b>
	11	Fig.A.4.6	16370.00	<b>P</b>

**802.11n-HT20 mode**

Mode	Channel	Occupied 6dB Bandwidth ( kHz)		conclusion
802.11n (HT20)	1	Fig.A.4.7	17250.00	<b>P</b>
	6	Fig.A.4.8	17700.00	<b>P</b>
	11	Fig.A.4.9	17700.00	<b>P</b>

**Test graphs as below:**

**SISO ANT0:**

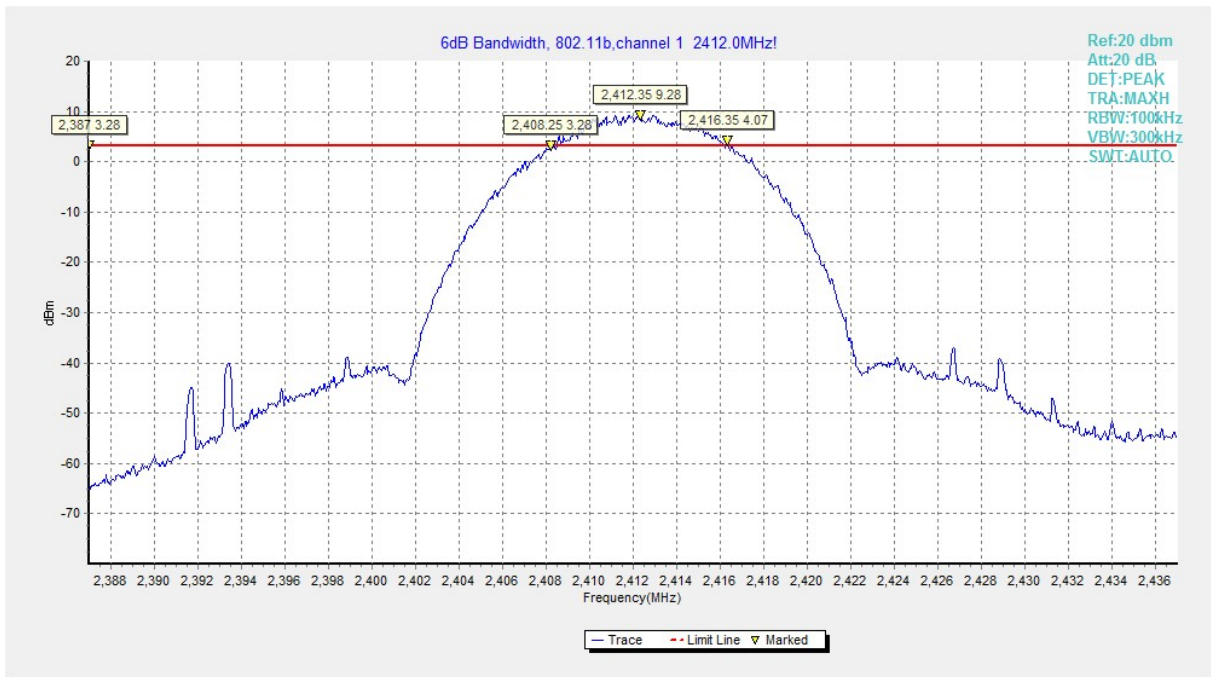


Fig.A.4.1 Occupied 6dB Bandwidth(802.11b,Ch 1)

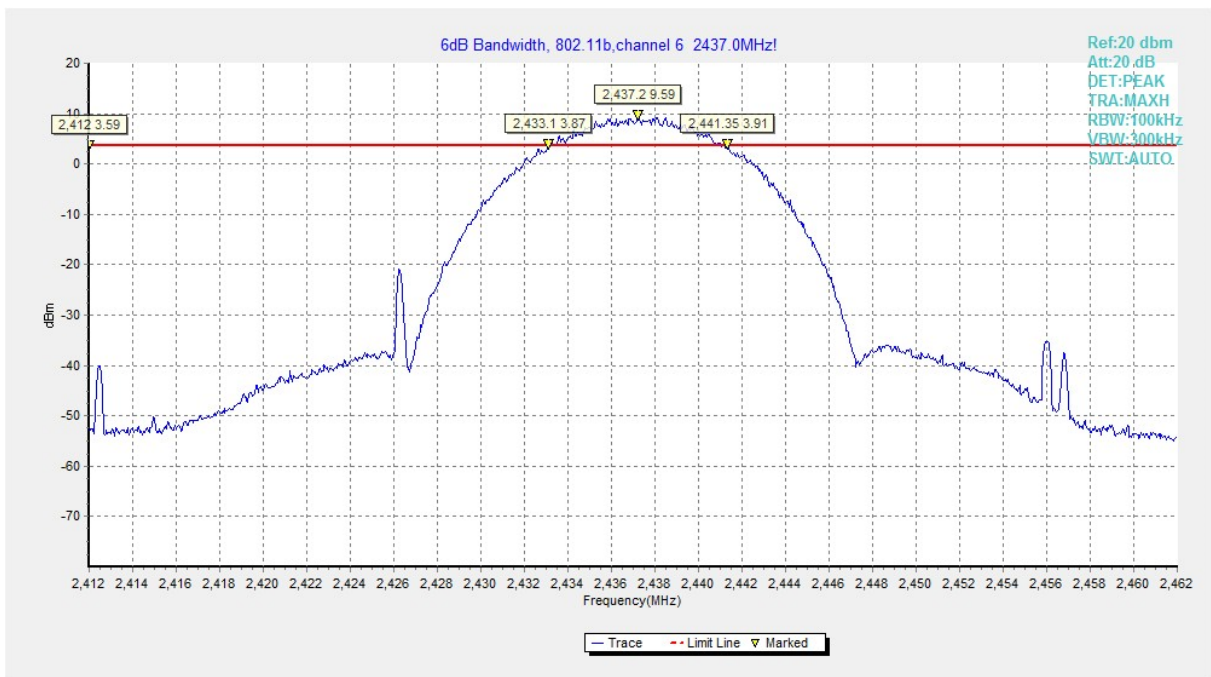


Fig.A.4.2 Occupied 6dB Bandwidth (802.11b, Ch 6)



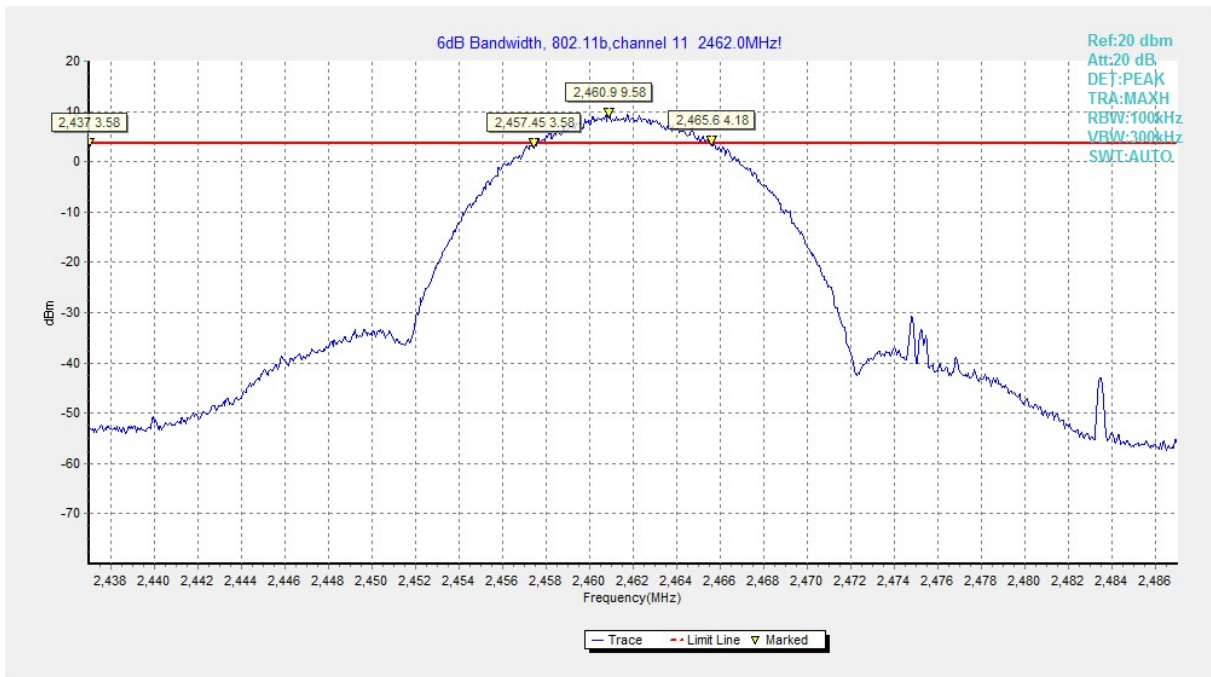


Fig.A.4.3 Occupied 6dB Bandwidth (802.11b, Ch 11)

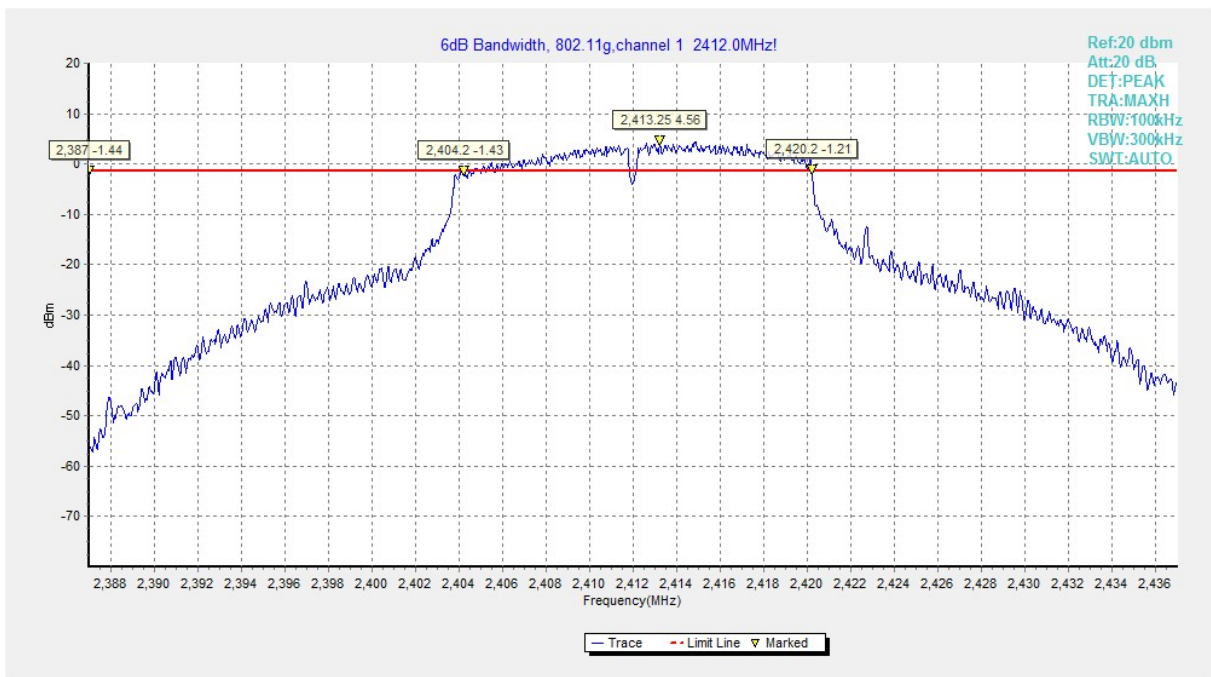


Fig.A.4.4 Occupied 6dB Bandwidth (802.11g, Ch 1)

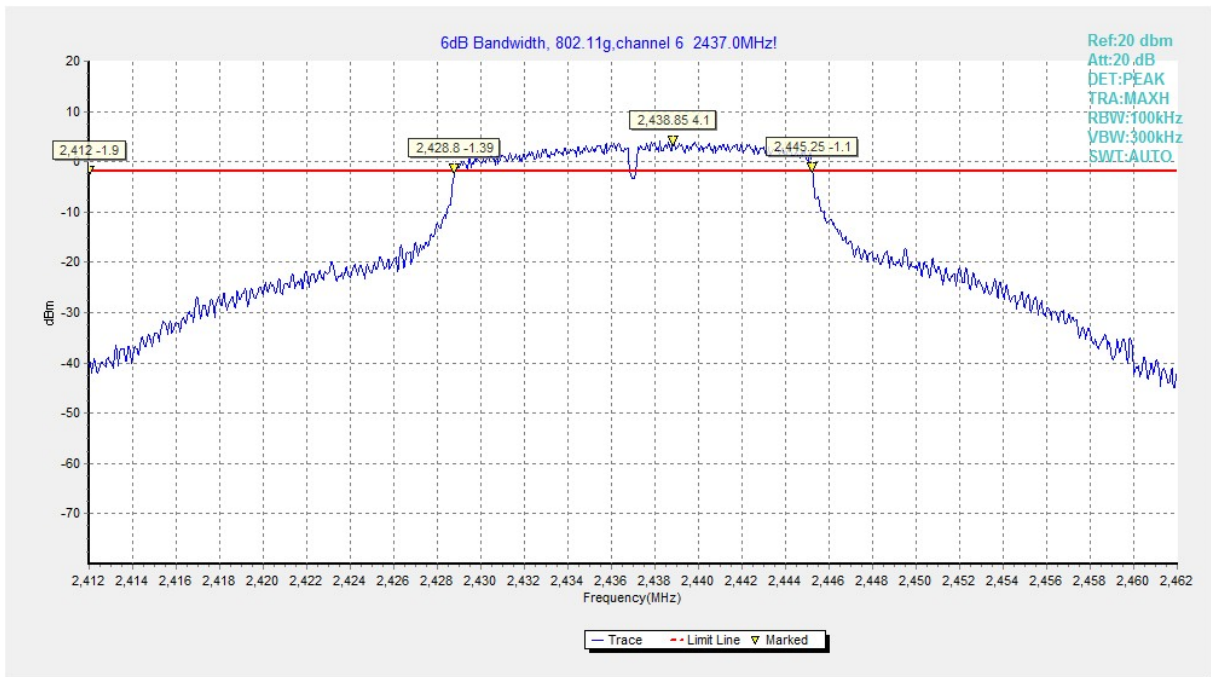


Fig.A.4.5 Occupied 6dB Bandwidth (802.11g, Ch 6)

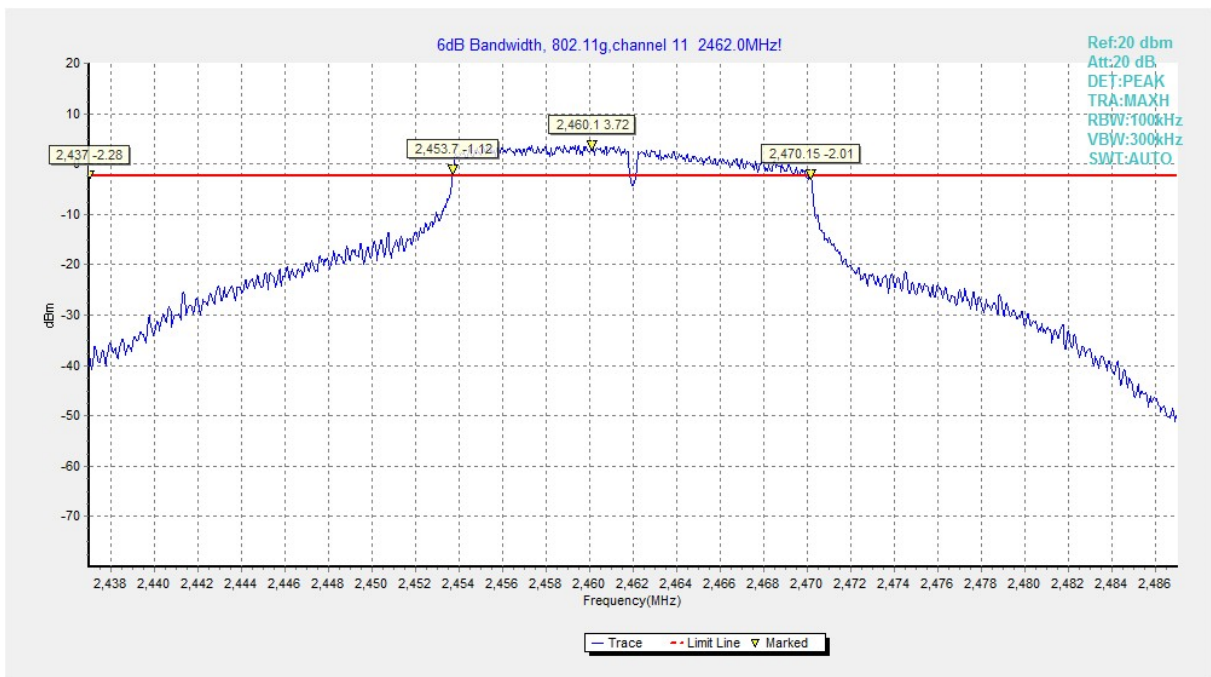


Fig.A.4.6 Occupied 6dB Bandwidth (802.11g, Ch 11)

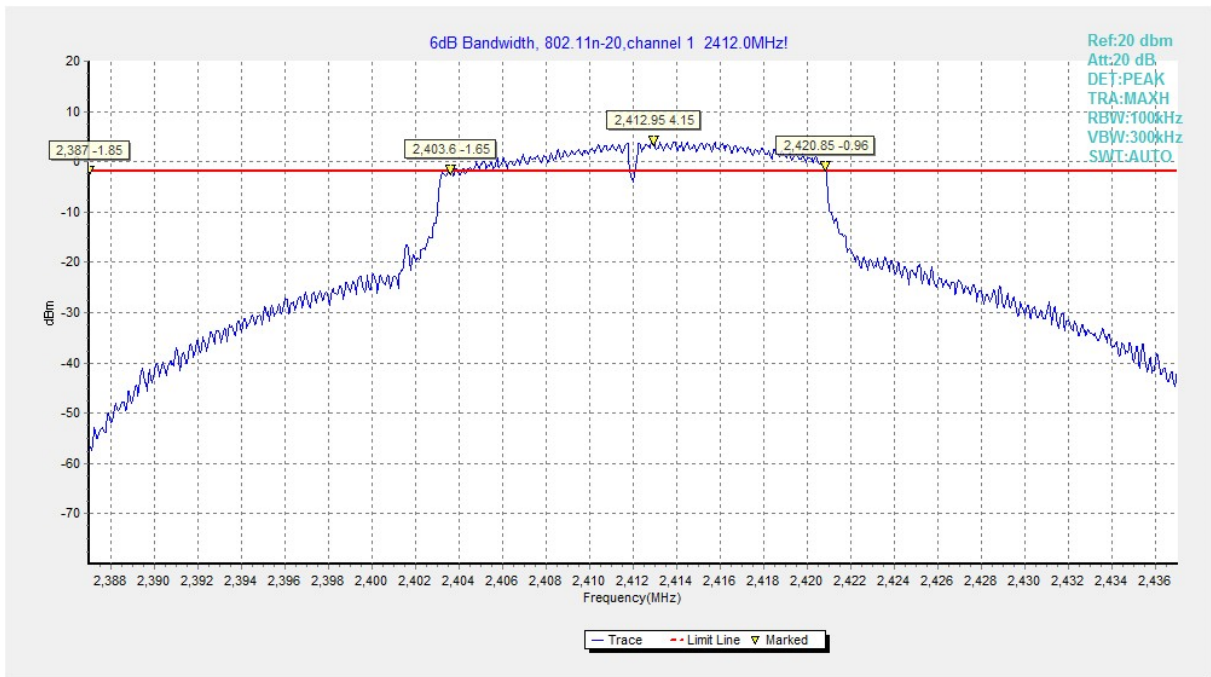


Fig.A.4.7 Occupied 6dB Bandwidth (802.11n-20MHz, Ch 1)

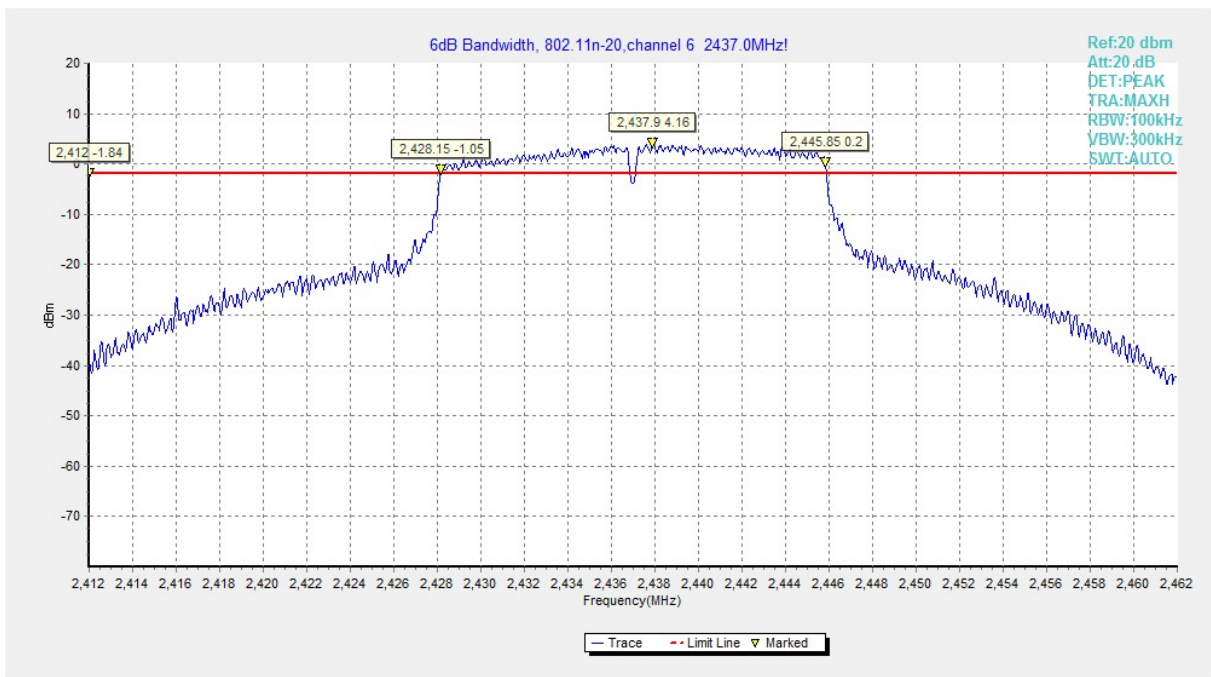


Fig.A.4.8 Occupied 6dB Bandwidth (802.11n-HT20, Ch 6)

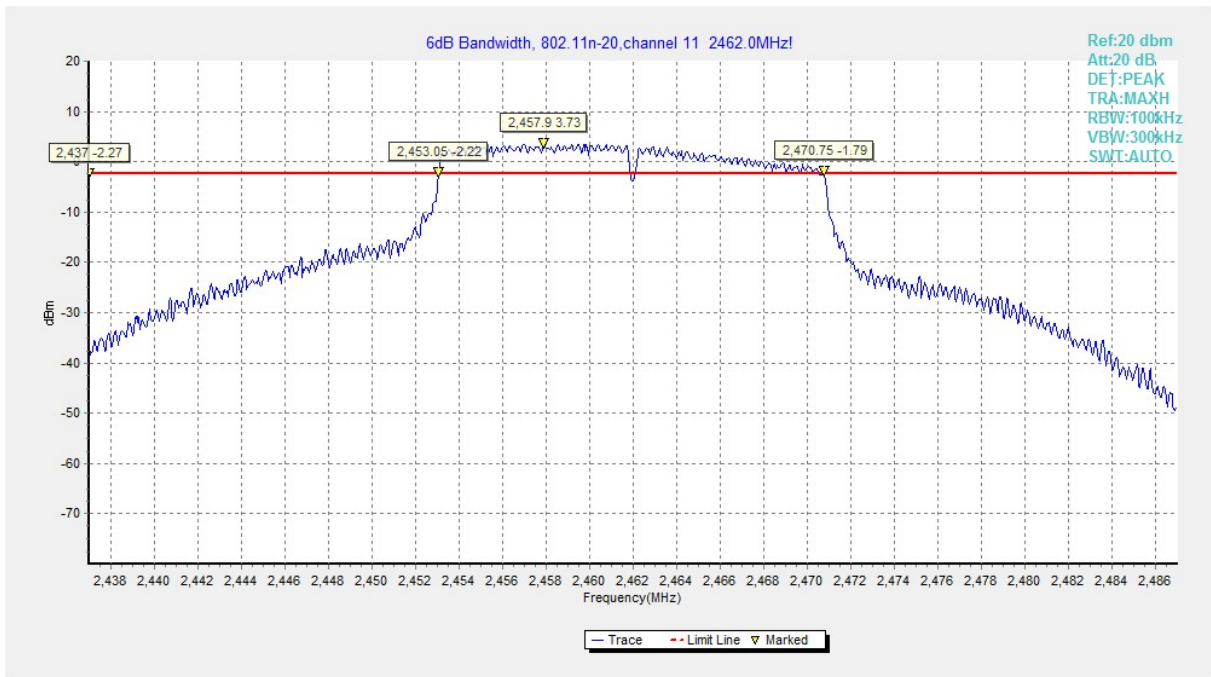


Fig.A.4.9 Occupied 6dB Bandwidth (802.11n-HT20, Ch 11)

### **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: EUT1**

**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>

**Test graphs as below:**