# FCC PART 15C
# TEST REPORT
## No.I21Z70342-IOT03

**for**

**Samsung Electronics Co., Ltd.**

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

**SM-A037F/DS,SM-A037F**

**With**

**FCC ID: ZCASMA037F**

**Hardware Version: REV1.0**

**Software Version: A037F.001**

**Issued Date: 2021-07-13**

**Note:**

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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

| Report Number | Revision | Description | Issue Date |
|---|---|---|---|
| I21Z70342-IOT03 | Rev.0 | 1st edition | 2021-07-13 |
| | | | |

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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(BDA)

| | |
|---|---|
| Address: | No.18A, Kangding Street, Beijing Economic-Technology Development Area, Beijing, P. R. China 100176 |

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## 1.3. Testing Environment

Normal Temperature: 15-35℃

Relative Humidity: 20-75%

## 1.4. Project date

Testing Start Date: 2021-05-25

Testing End Date: 2021-07-12

## 1.5. Signature

**Xie Xiuzhen**

**(Prepared this test report)**

**Zheng Wei**

**(Reviewed this test report)**

**Hu Xiaoyu**

**(Approved this test report)**

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# 2. Client Information

## 2.1. Applicant Information

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

## 2.2. Manufacturer Information

| | |
|---|---|
| Company Name: | Samsung Electronics Co., Ltd. |
| Address /Post: | Samsung R5, Maetan dong 129, Samsung ro<br>Youngtong gu, Suwon city 443 742, Korea |
| Contact: | Sunghoon Cho |
| Email: | ggobi.cho@samsung.com |
| Telephone: | +82-10-2722-4159 |

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

## 3.1. About EUT

| | |
|---|---|
| Description | Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN |
| Model name | SM-A037F/DS，SM-A037F |
| FCC ID | ZCASMA037F |
| 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 | 22.37dBm |
| Power Supply | 4V |

## 3.2. Internal Identification of EUT

| EUT ID* | SN or IMEI | HW Version | SW Version |
|---|---|---|---|
| UT37a | / | REV1.0 | A037F.001 |
| UT17a | 2170342UT17a | REV1.0 | A037F.001 |

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

## 3.3. Internal Identification of AE

| AE ID* | Description | Remarks |
|---|---|---|
| AE1 | Charger1 | / |
| AE2 | Charger2 | / |
| AE3 | Charger3 | / |
| AE4 | Charger4 | / |
| AE5 | Charger5 | / |
| AE6 | USB cable | / |
| AE7 | Headset1 | / |
| AE8 | Headset2 | / |
| AE9 | battery | / |
| AE10 | Charger6 | No test |
| AE11 | Charger7 | No test |
| AE12 | Charger8 | No test |
| AE13 | Charger9 | No test |
| AE14 | Charger10 | No test |

AE1

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

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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 | SUCD(FUJIAN) Electronics Co.,Ltd |

AE10

| | |
|---|---|
| Model | EP-TA50JWS |
| Manufacturer | HAEM Co.,Ltd |
| Length of cable | / |

AE11

| | |
|---|---|
| Model | EP-TA50JWS |
| Manufacturer | RFTech Electronics(HuiZhou)Co.,LTD |
| Length of cable | / |

AE12

| | |
|---|---|
| Model | EP-TA50UWS |
| Manufacturer | Dong Yang |

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| | |
|---|---|
| Length of cable | / |
| AE13 | |
| Model | EP-TA50JWE |
| Manufacturer | Dong Yang |
| Length of cable | / |
| AE14 | |
| Model | EP-TA50UWE |
| Manufacturer | RFTech Electronics(HuiZhou)Co.,LTD |
| Length of cable | / |

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

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### 3.4. General Description

The Equipment under Test (EUT) is a model of Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN 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:<br>15.205 Restricted bands of operation;<br>15.209 Radiated emission limits, general requirements;<br>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 | 2013 |
| KDB 558074 D01 | Federal Communications Commission Office of Engineering and Technology Laboratory Division<br>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 |

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# 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) | / | **BR** |
| Peak Power Spectral Density | 15.247 (e) | / | **BR** |
| Occupied 6dB Bandwidth | 15.247 (a) | / | **BR** |
| Band Edges Compliance | 15.247 (d) | / | **BR** |
| Transmitter Spurious Emission - Conducted | 15.247 (d) | / | **BR** |
| Transmitter Spurious Emission - Radiated | 15.247, 15.205, 15.209 | / | **BR** |
| AC Powerline Conducted Emission | 15.107, 15.207 | / | **BR** |

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 |
| BR | Re-use test data from basic model report. |
| 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. Explanation of re-use of test data

The Equipment Under Test (EUT) model SM-A037F/DS,SM-A037F (FCC ID: ZCASMA037F) is a variant product of SM-A037M/DS,SM-A037M (FCC ID: ZCASMA037M), according to the declaration of changes provided by the applicant and FCC KDB publication 484596 D01, spot check measurements were performed on this device, all the test results are derived from test report No.I21Z60258-IOT03, except the result of radiated.

For detail differences between two models please refer the Declaration of Changes document.

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 | 4V |
| Humidity | H nom | 20-75% |

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## 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 | 2022-05-24 |
| 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 | / | / |

### 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 | 00139065 | ETS-Lindgren | 1 year | 2021-10-11 |
| 4 | Dual-Ridge Waveguide Horn Antenna | 3116 | 2663 | ETS-Lindgren | 1 year | 2021-08-05 |
| 5 | Vector Signal Analyzer | FSV40 | 101047 | R&S | 1 year | 2022-05-17 |

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# 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) |
|---|---|
| 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(dB) |
|---|---|
| 9kHz-30MHz | / |
| 30MHz ≤ f ≤ 1GHz | 5.40 |
| 1GHz ≤ f ≤18GHz | 4.32 |
| 18GHz ≤ f ≤40GHz | 5.26 |

## 7.6. AC Power-line Conducted Emission

Measurement Uncertainty : 3.10dB,k=2

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# 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

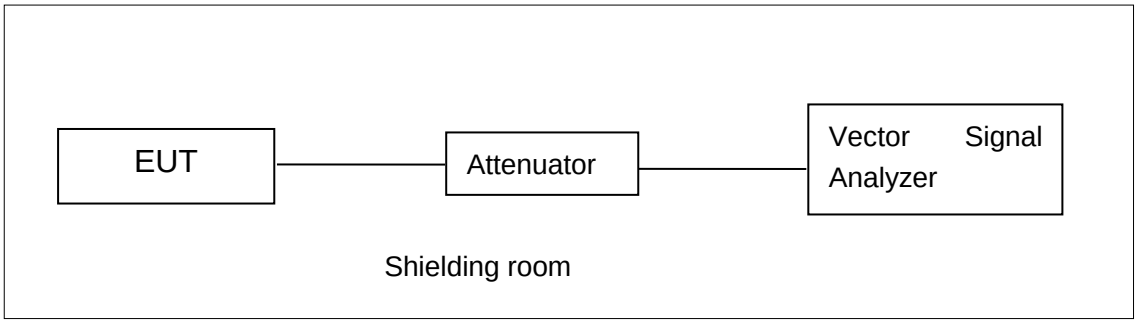


**Fig.A.1.1.1: Test Setup Diagram for Conducted Measurements**

### 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;

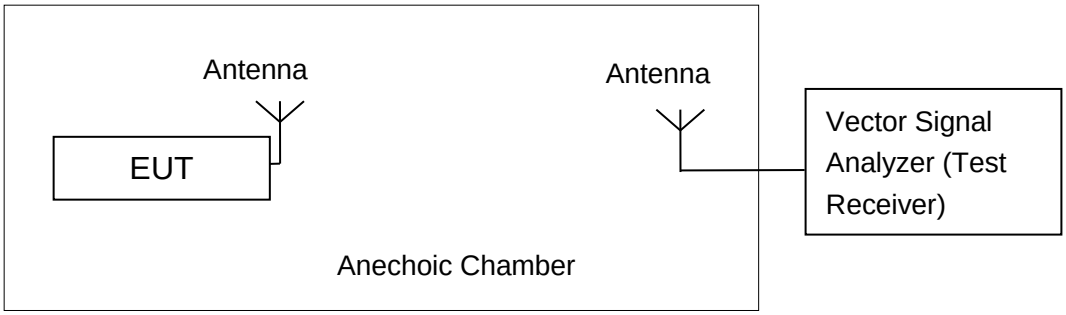


**Fig.A.1.2.1: Test Setup Diagram for Radiated Measurements**

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## 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: UT17a**

### 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 | 5.5 | 20.95 | 21.29 | 20.84 |
| 802.11g | 6 | 22.37 | 22.32 | 22.27 |

The data rate 5.5Mbps and 6Mbps are selected as worse condition, and the following cases are performed with this condition.

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**802.11n-HT20 mode**

| Mode | Data Rate (Index) | Test Result (dBm) | | |
|---|---|---|---|---|
| | | 2412MHz (Ch1) | 2437MHz (Ch6) | 2462 MHz (Ch11) |
| 802.11n(20MHz) | MCS0 | 22.19 | 22.31 | 21.71 |

The data rate MCS0 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 | 20.73 | 20.64 | 20.46 |

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

The duty cycle of all mode are100%.

The spot check result of average output power is 16.72dBm (802.11b 5.5Mbps ch6 prototype result:16.57dBm)

**Conclusion: Pass**

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## 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 | -6.08 | **P** |
| | 6 | Fig.A.3.2 | -6.13 | **P** |
| | 11 | Fig.A.3.3 | -6.79 | **P** |
| 802.11g | 1 | Fig.A.3.4 | -10.23 | **P** |
| | 6 | Fig.A.3.5 | -10.41 | **P** |
| | 11 | Fig.A.3.6 | -10.69 | **P** |

**802.11n-HT20 mode**

| Mode | Channel | Power Spectral Density ( dBm/3 kHz ) | | Conclusion |
|---|---|---|---|---|
| 802.11n (HT20) | 1 | Fig.A.3.7 | -9.65 | **P** |
| | 6 | Fig.A.3.8 | -11.22 | **P** |
| | 11 | Fig.A.3.9 | -10.45 | **P** |

**802.11n-HT40 mode**

| Mode | Channel | Power Spectral Density ( dBm/3 kHz ) | | Conclusion |
|---|---|---|---|---|
| 802.11n (HT40) | 3 | Fig.A.3.10 | -15.46 | **P** |
| | 6 | Fig.A.3.11 | -15.54 | **P** |
| | 9 | Fig.A.3.12 | -13.64 | **P** |

**Conclusion: Pass**

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**Test graphs as below:**

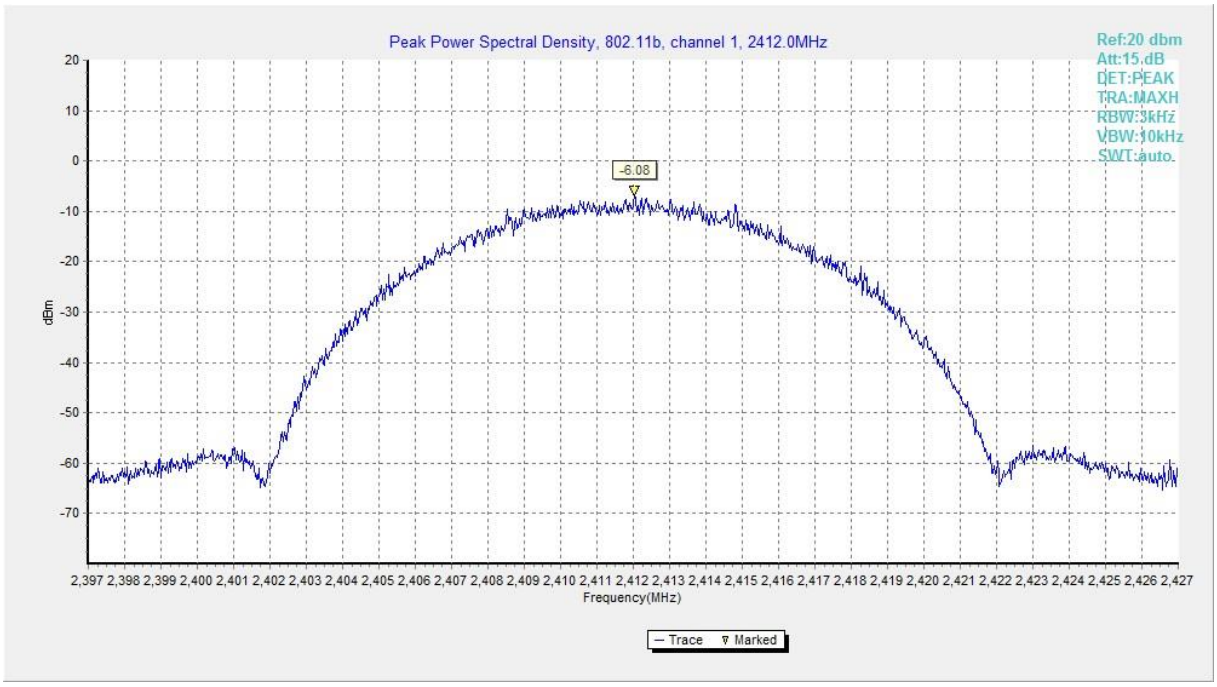


**Fig.A.3.1 Power Spectral Density(802.11b,Ch1)**

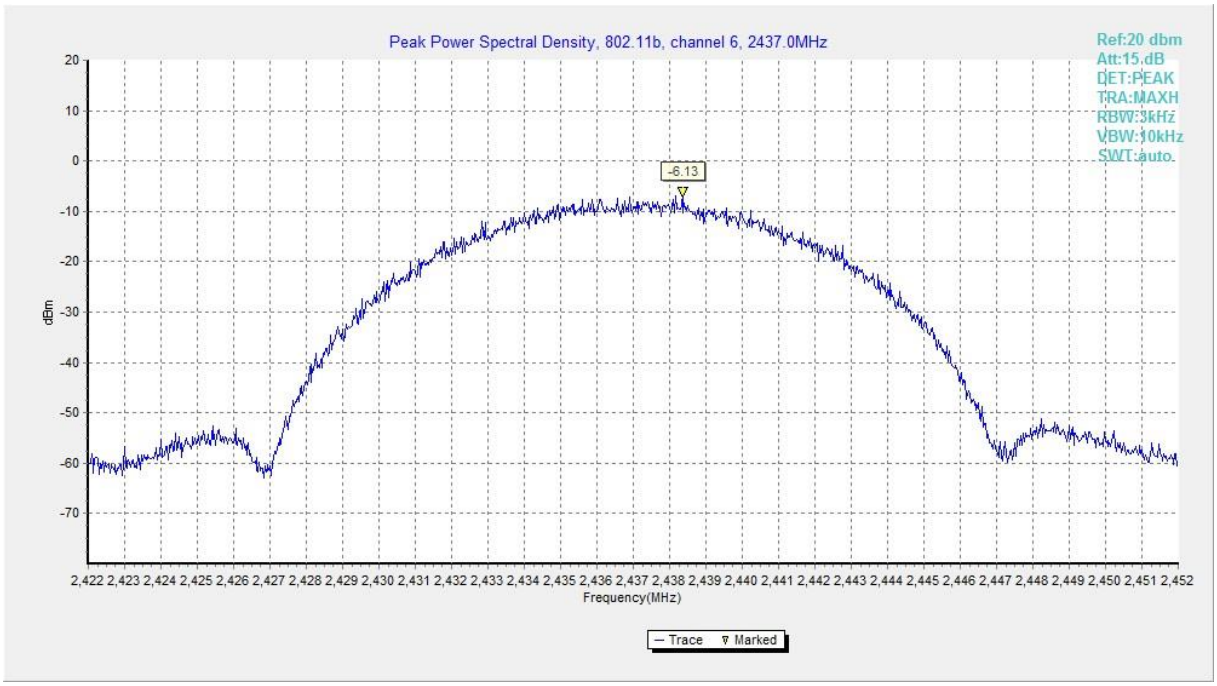


**Fig.A.3.2 Power Spectral Density (802.11b, Ch 6)**

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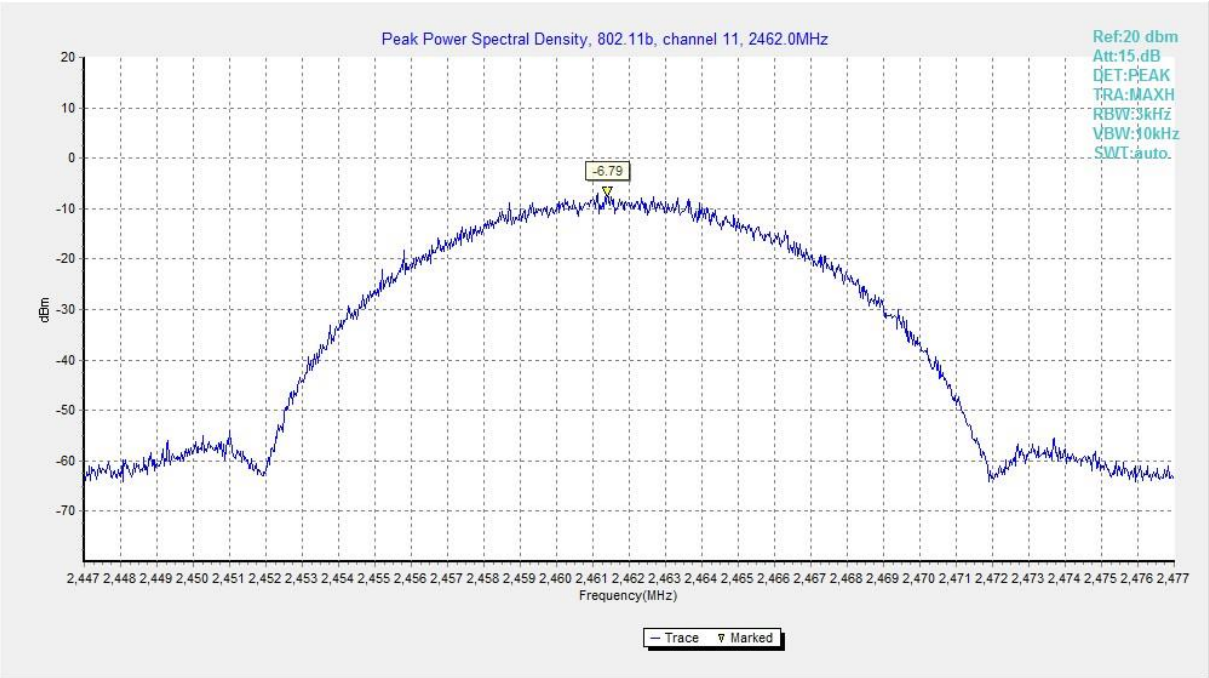


**Fig.A.3.3 Power Spectral Density (802.11b, Ch 11)**

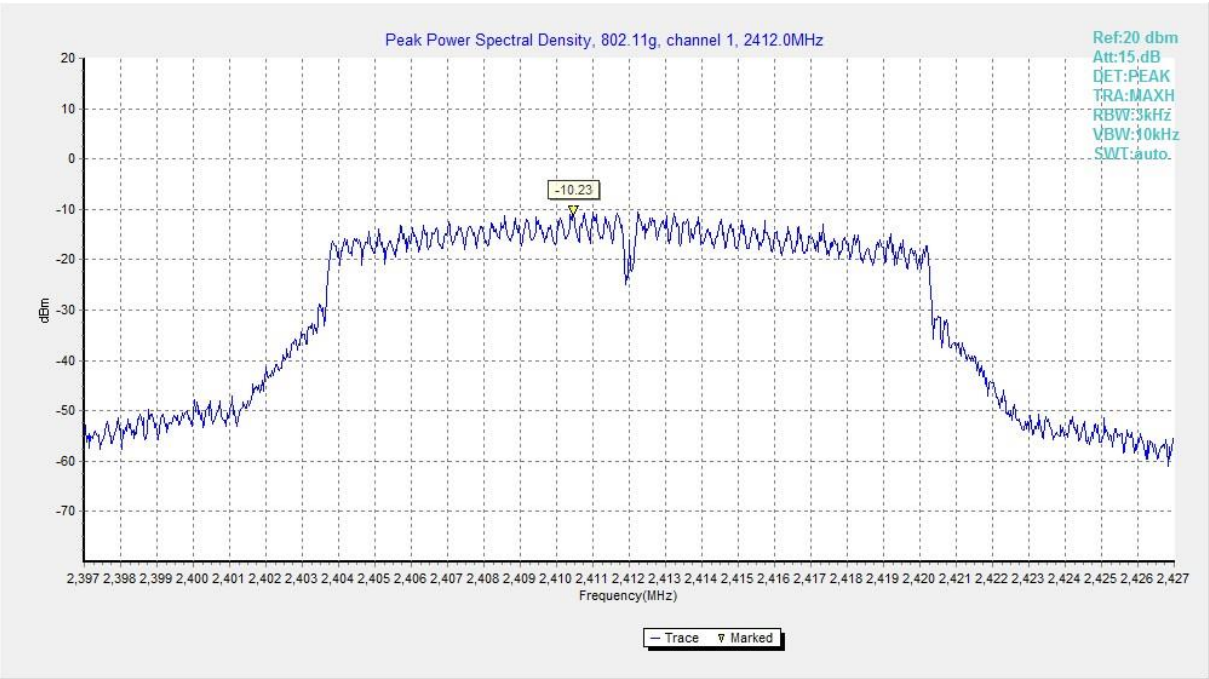


**Fig.A.3.4 Power Spectral Density (802.11g, Ch 1)**

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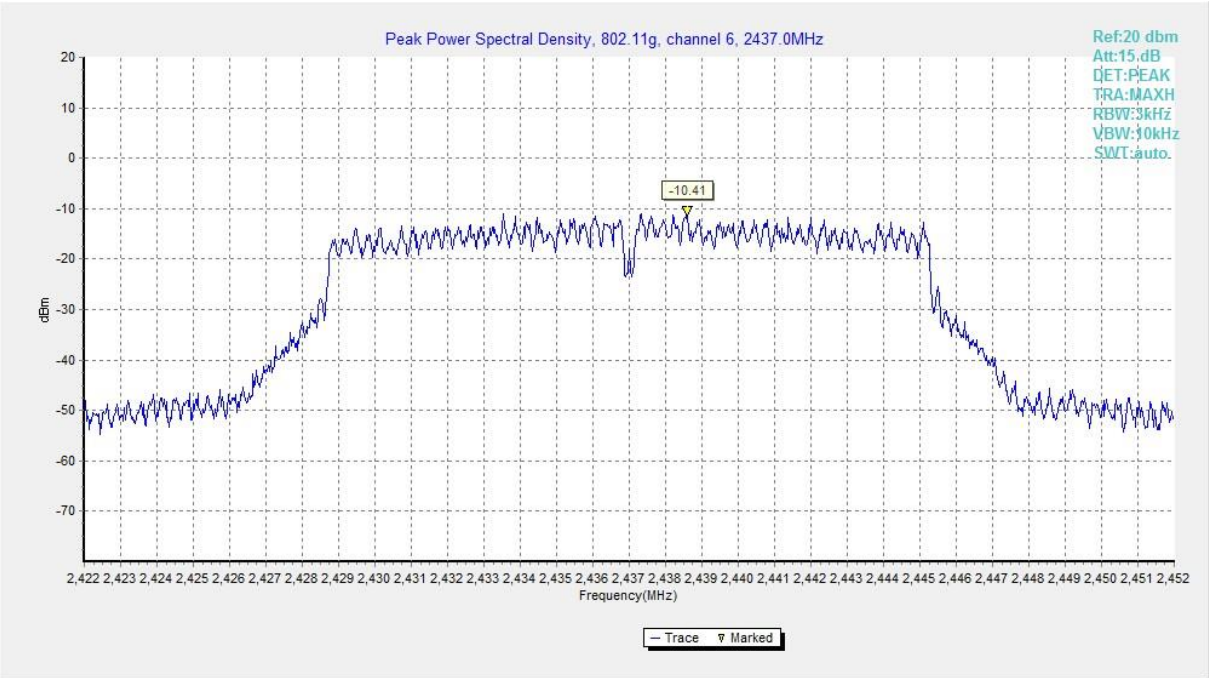


**Fig.A.3.5 Power Spectral Density (802.11g, Ch 6)**

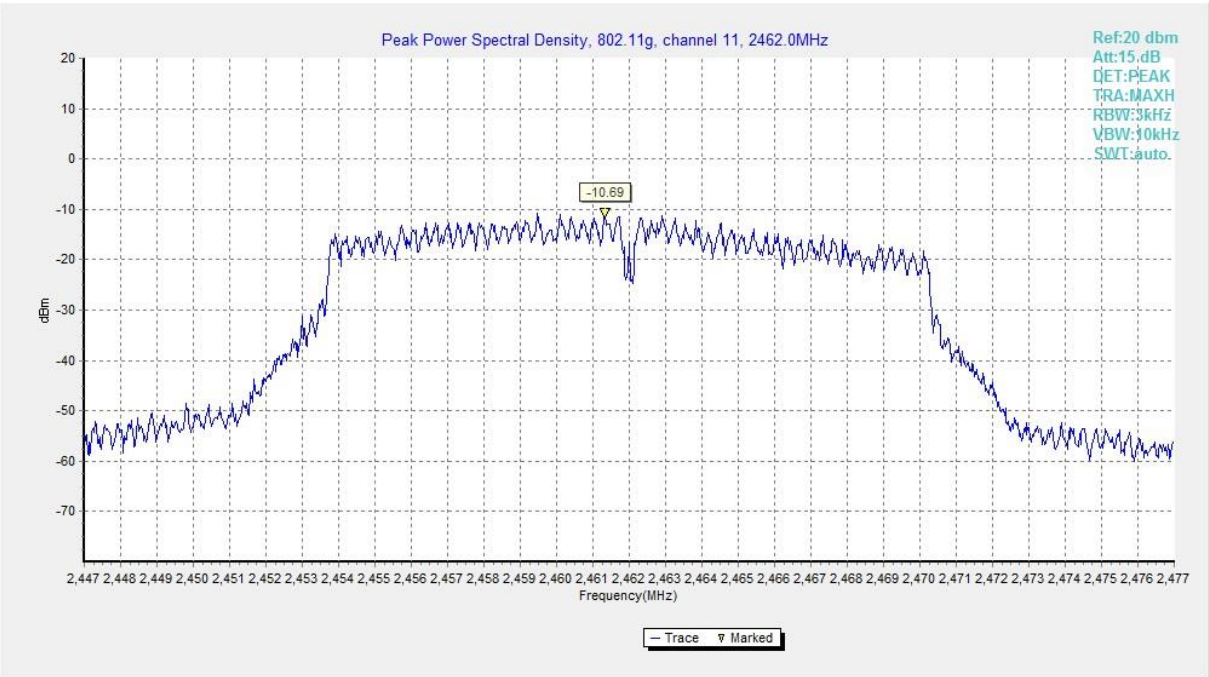


**Fig.A.3.6 Power Spectral Density (802.11g, Ch 11)**

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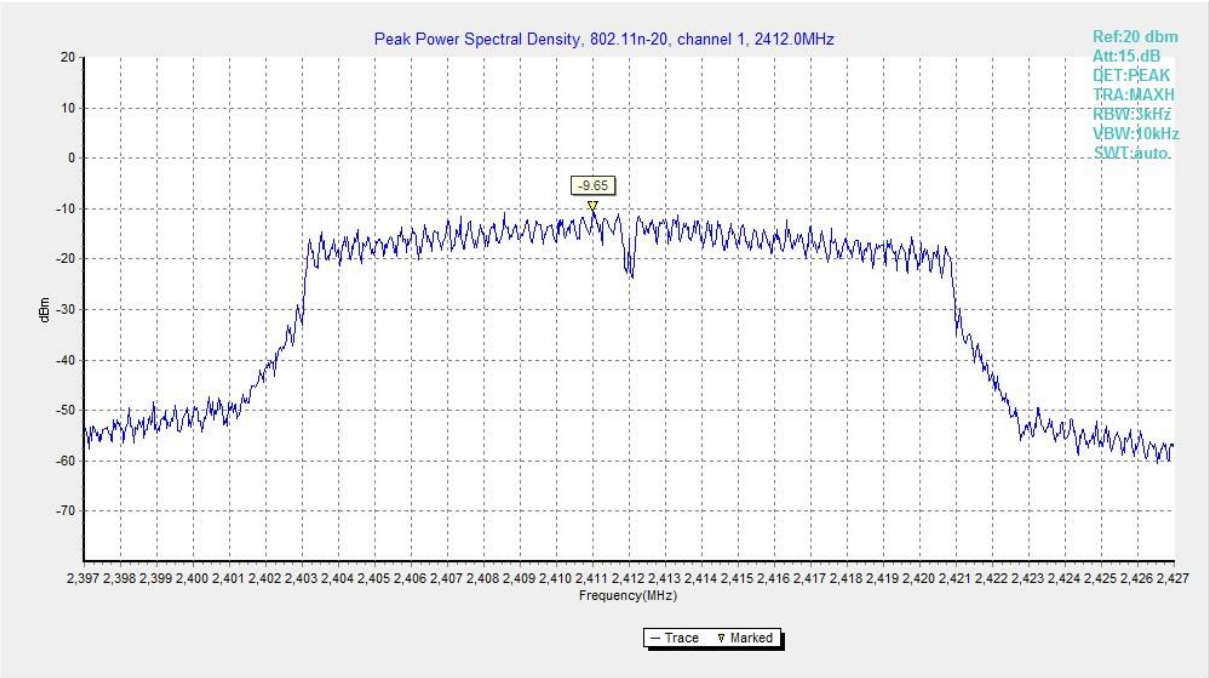


**Fig.A.3.7 Power Spectral Density (802.11n-HT20, Ch 1)**

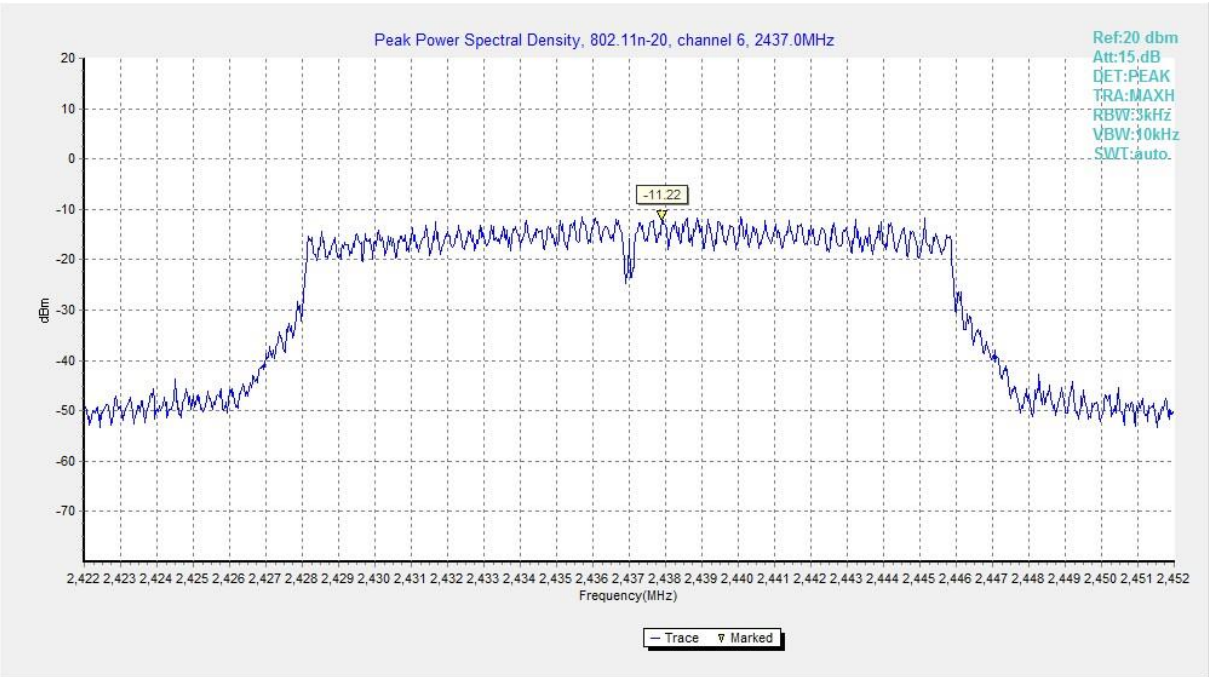


**Fig.A.3.8 Power Spectral Density (802.11n-HT20, Ch 6)**

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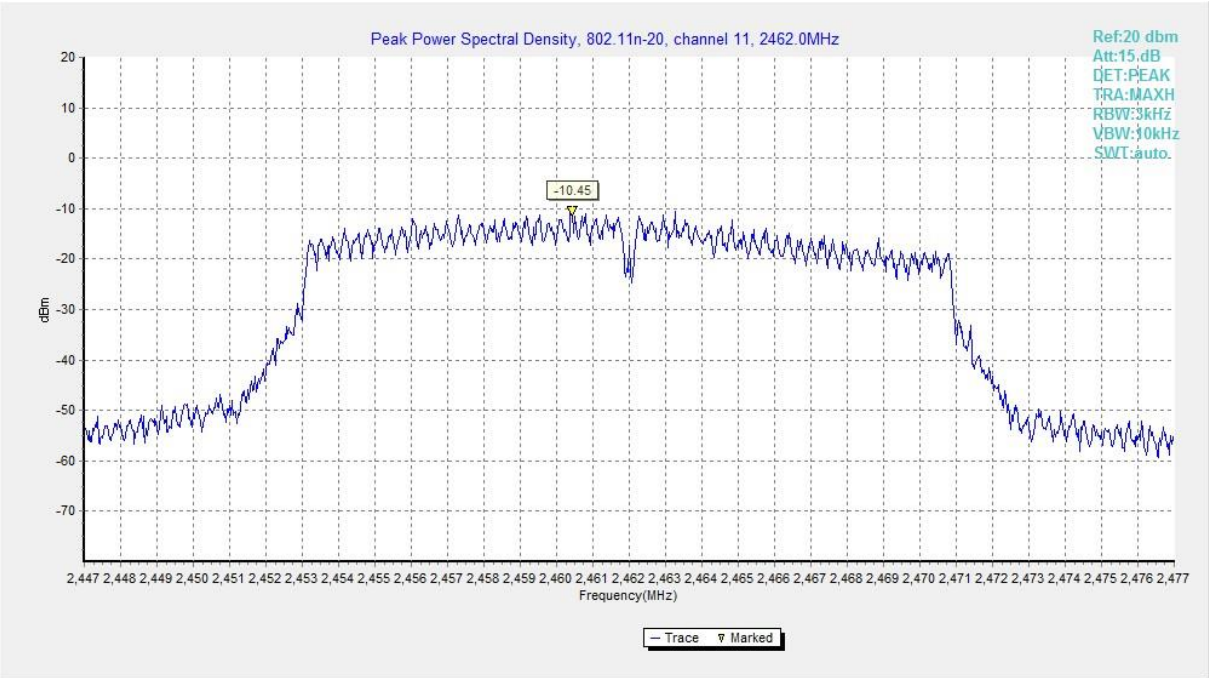


**Fig.A.3.9 Power Spectral Density (802.11n-HT20, Ch 11)**

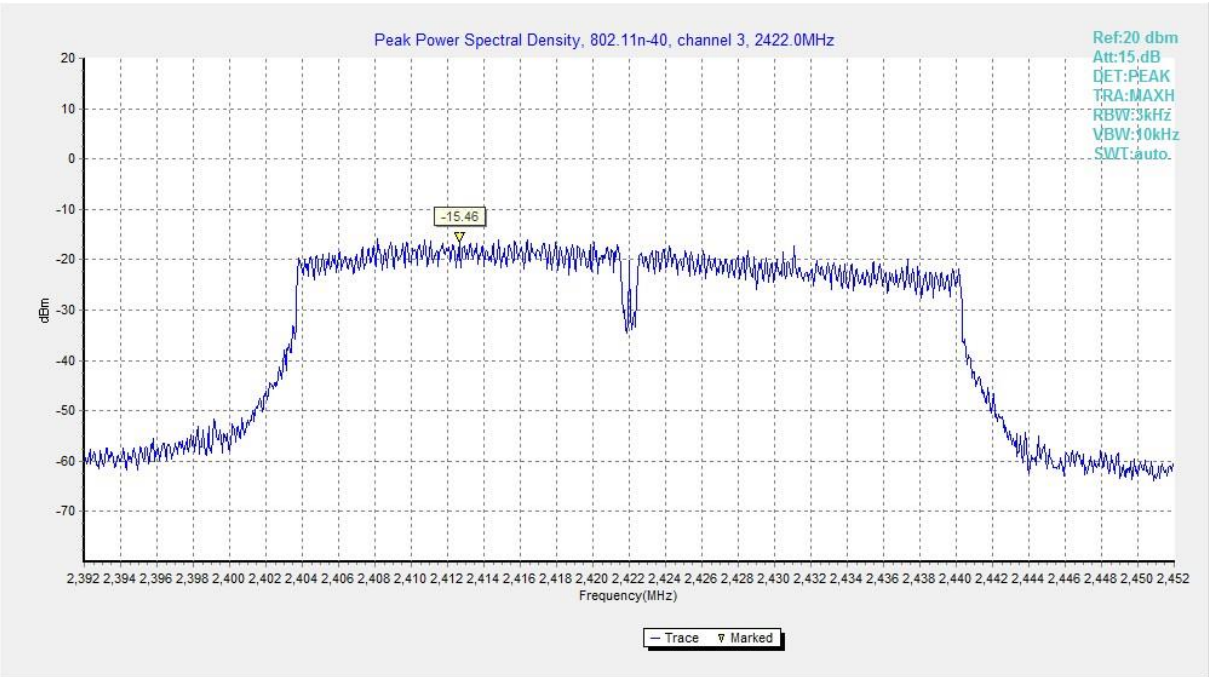


**Fig.A.3.10 Power Spectral Density (802.11n-HT40, Ch 3)**

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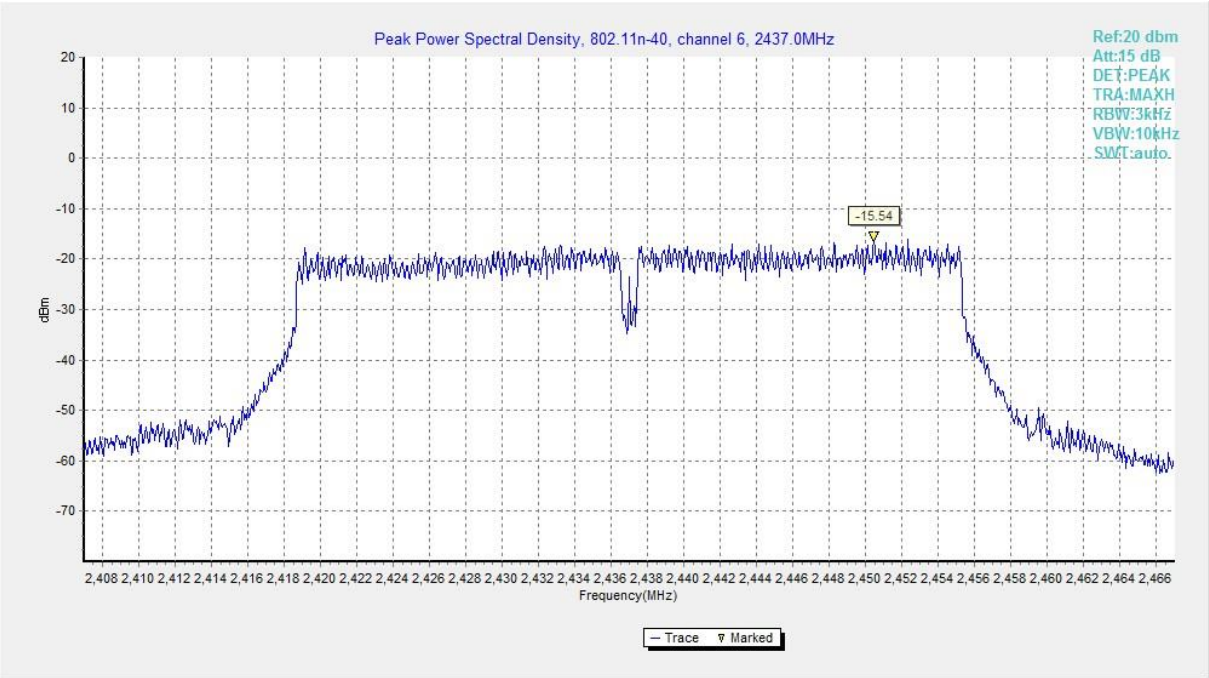


**Fig.A.3.11 Power Spectral Density (802.11n-HT40, Ch 6)**

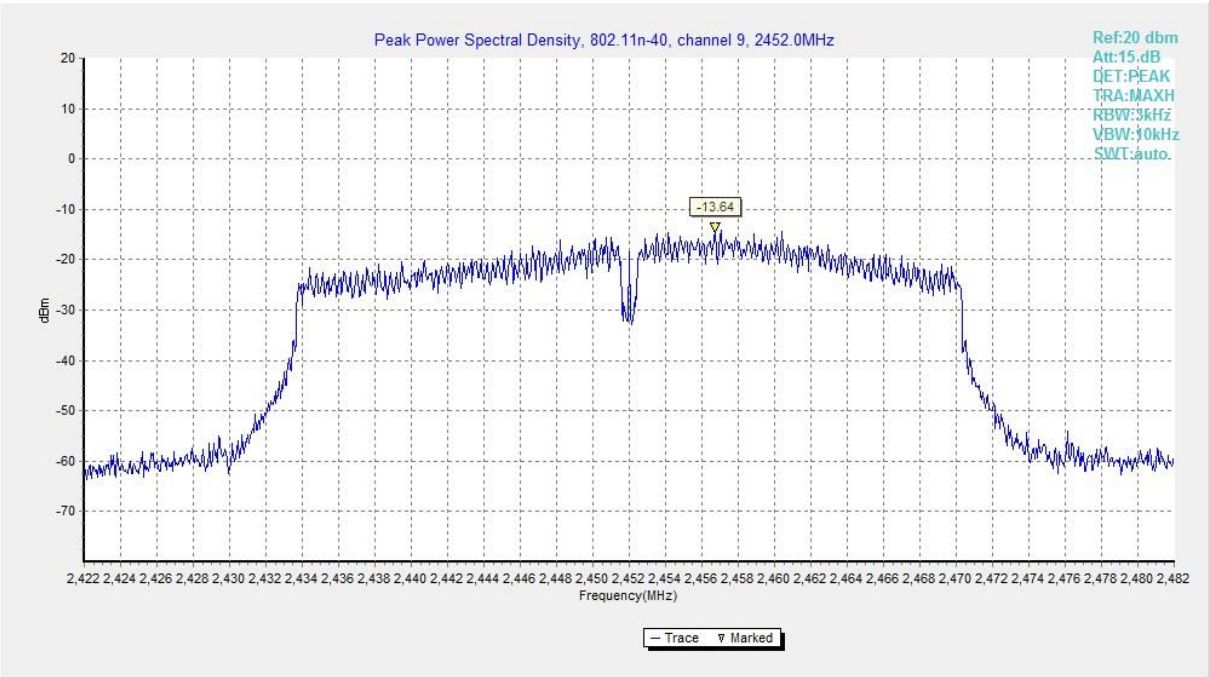


**Fig.A.3.12 Power Spectral Density (802.11n-HT40, Ch 9)**

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## 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: UT17a**

**Measurement Result:**

**802.11b/g mode**

| Mode | Channel | Occupied 6dB Bandwidth ( MHz) | | conclusion |
|---|---|---|---|---|
| 802.11b | 1 | Fig.A.4.1 | 7.25 | **P** |
| | 6 | Fig.A.4.2 | 7.65 | **P** |
| | 11 | Fig.A.4.3 | 7.50 | **P** |
| 802.11g | 1 | Fig.A.4.4 | 15.90 | **P** |
| | 6 | Fig.A.4.5 | 16.45 | **P** |
| | 11 | Fig.A.4.6 | 15.40 | **P** |

**802.11n-HT20 mode**

| Mode | Channel | Occupied 6dB Bandwidth ( MHz) | | conclusion |
|---|---|---|---|---|
| 802.11n (HT20) | 1 | Fig.A.4.7 | 16.65 | **P** |
| | 6 | Fig.A.4.8 | 17.65 | **P** |
| | 11 | Fig.A.4.9 | 14.65 | **P** |

**802.11n-HT40 mode**

| Mode | Channel | Occupied 6dB Bandwidth ( MHz) | | conclusion |
|---|---|---|---|---|
| 802.11n (HT40) | 3 | Fig.A.4.10 | 33.60 | **P** |
| | 6 | Fig.A.4.11 | 36.48 | **P** |
| | 9 | Fig.A.4.12 | 25.44 | **P** |

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**Conclusion: Pass**

**Test graphs as below:**

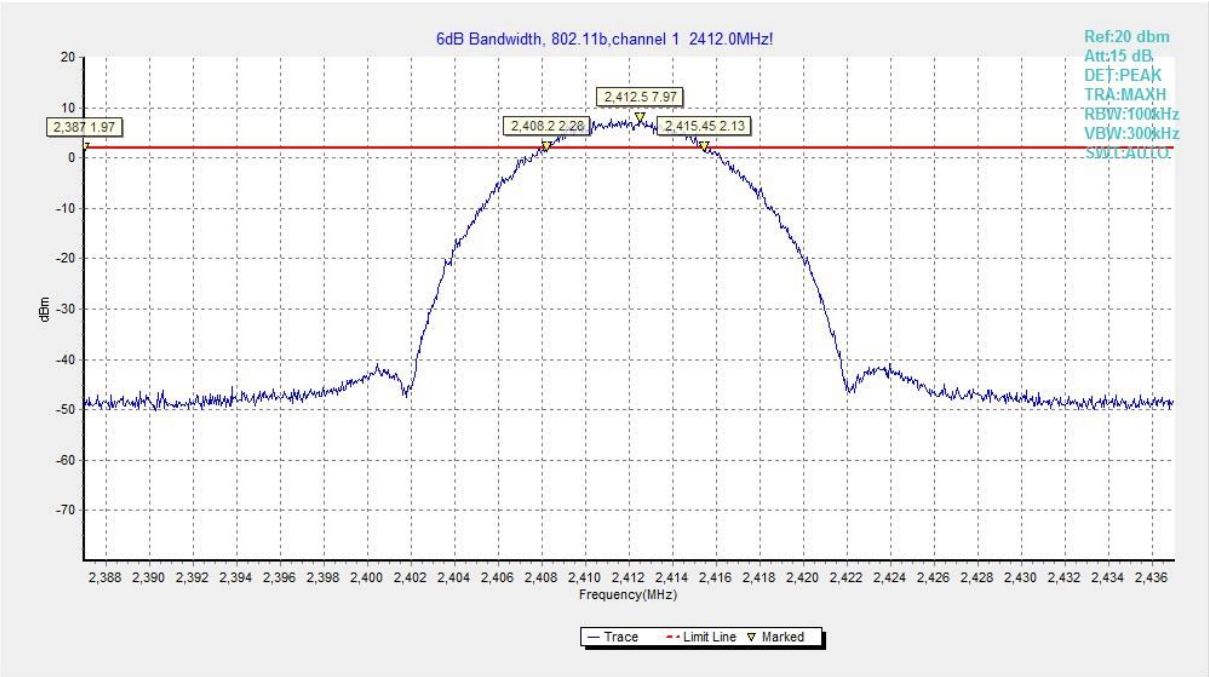


**Fig.A.4.1 Occupied 6dB Bandwidth(802.11b,Ch 1)**

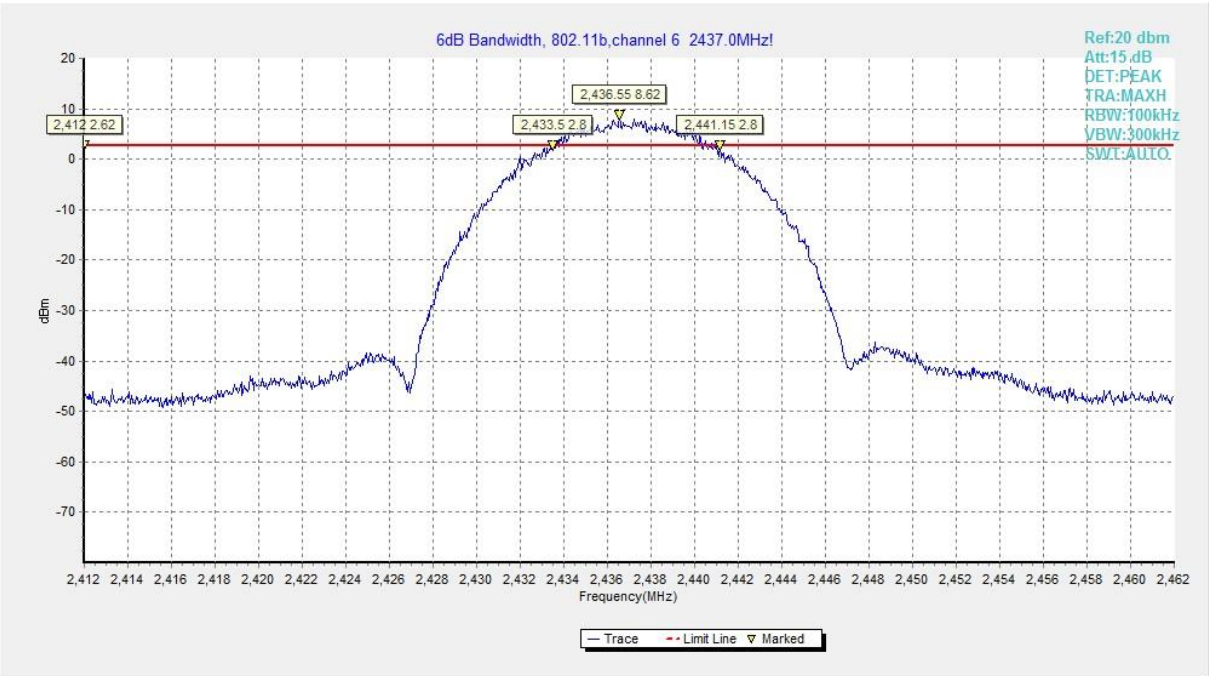


**Fig.A.4.2 Occupied 6dB Bandwidth (802.11b, Ch 6)**

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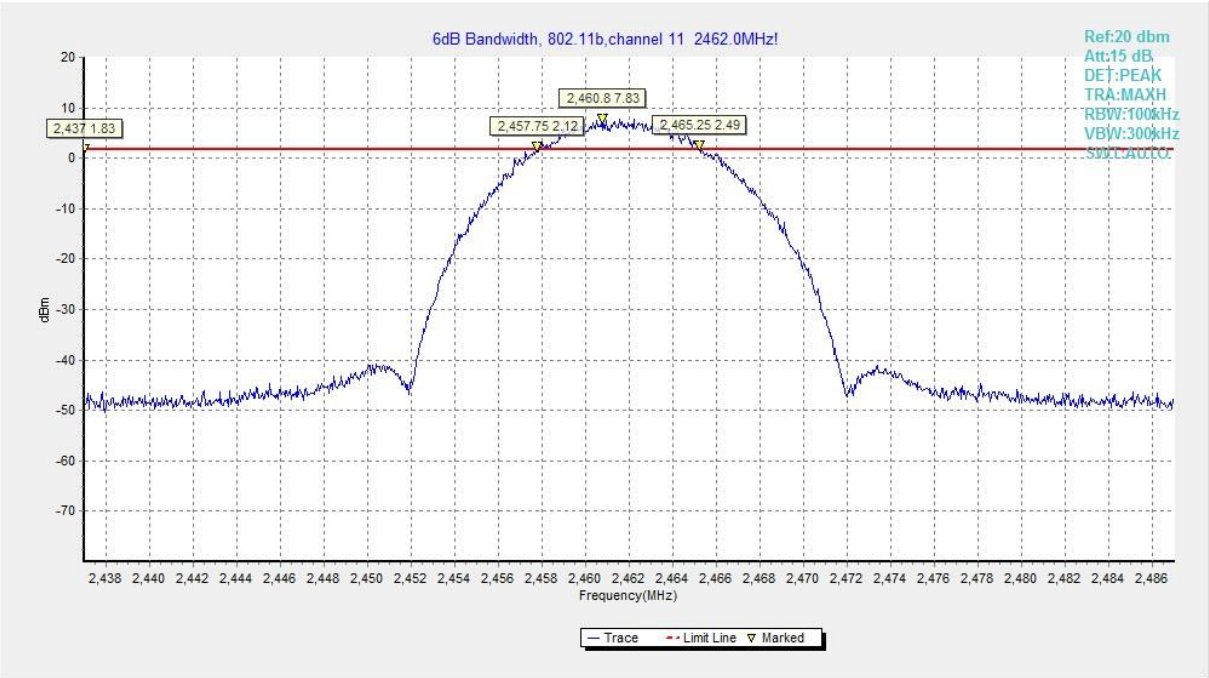


**Fig.A.4.3 Occupied 6dB Bandwidth (802.11b, Ch 11)**

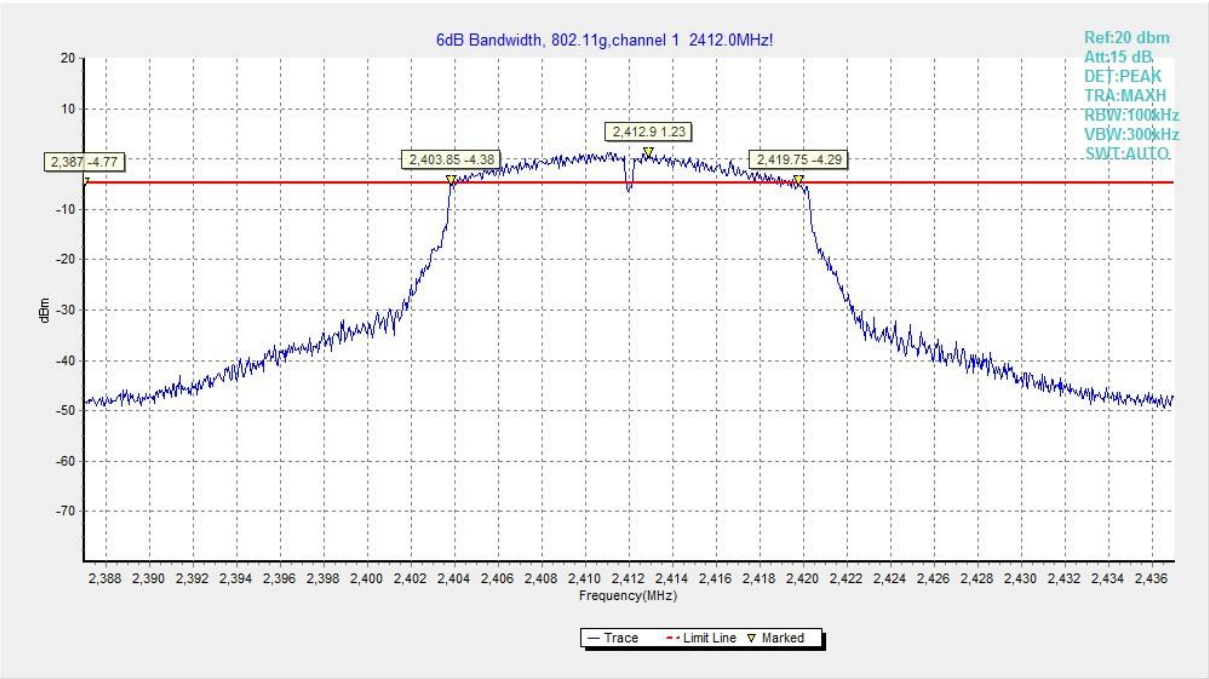


**Fig.A.4.4 Occupied 6dB Bandwidth (802.11g, Ch 1)**

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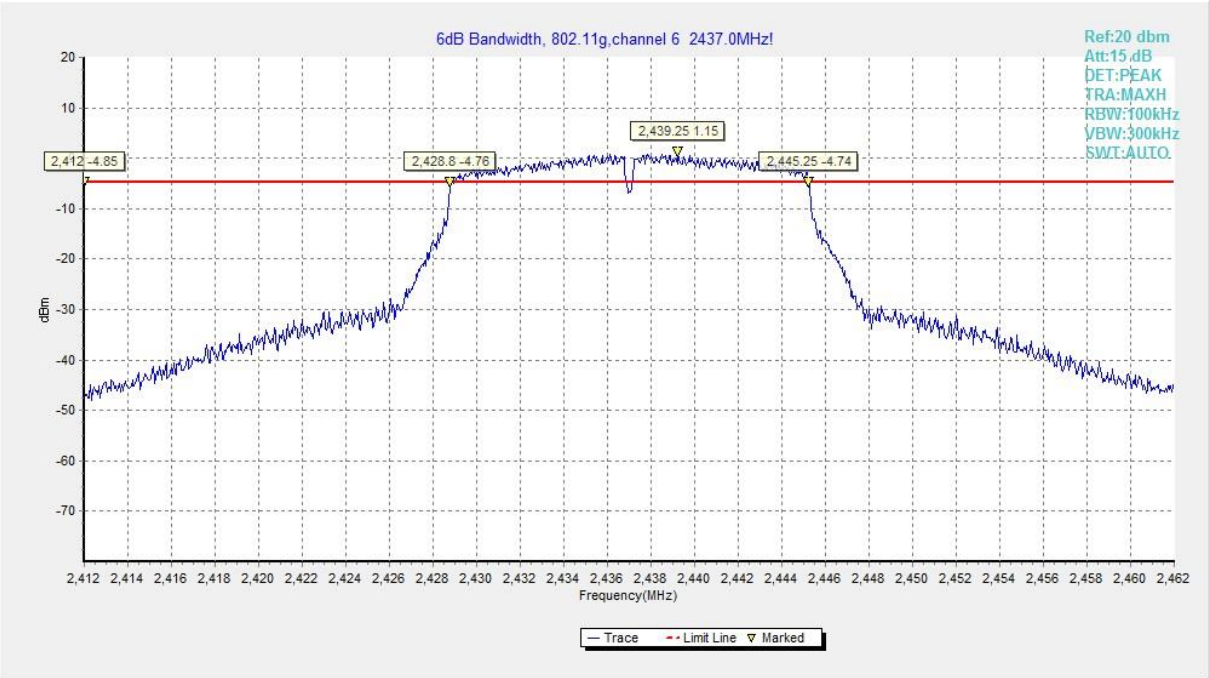


**Fig.A.4.5 Occupied 6dB Bandwidth (802.11g, Ch 6)**

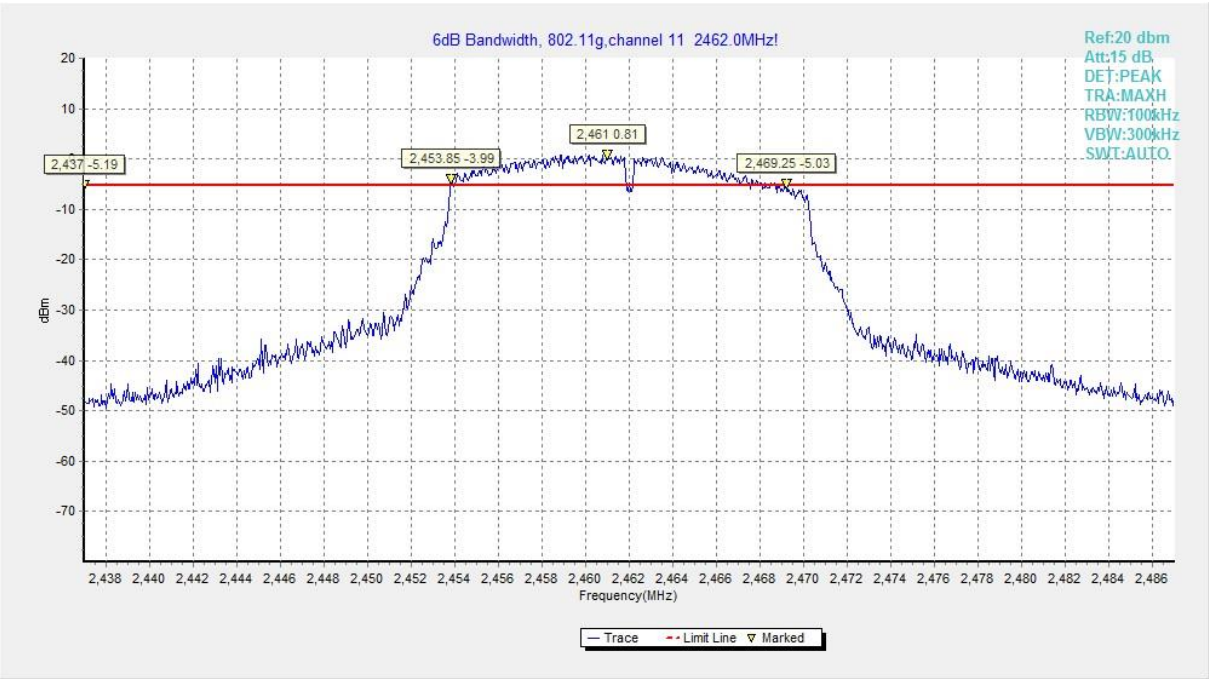


**Fig.A.4.6 Occupied 6dB Bandwidth (802.11g, Ch 11)**

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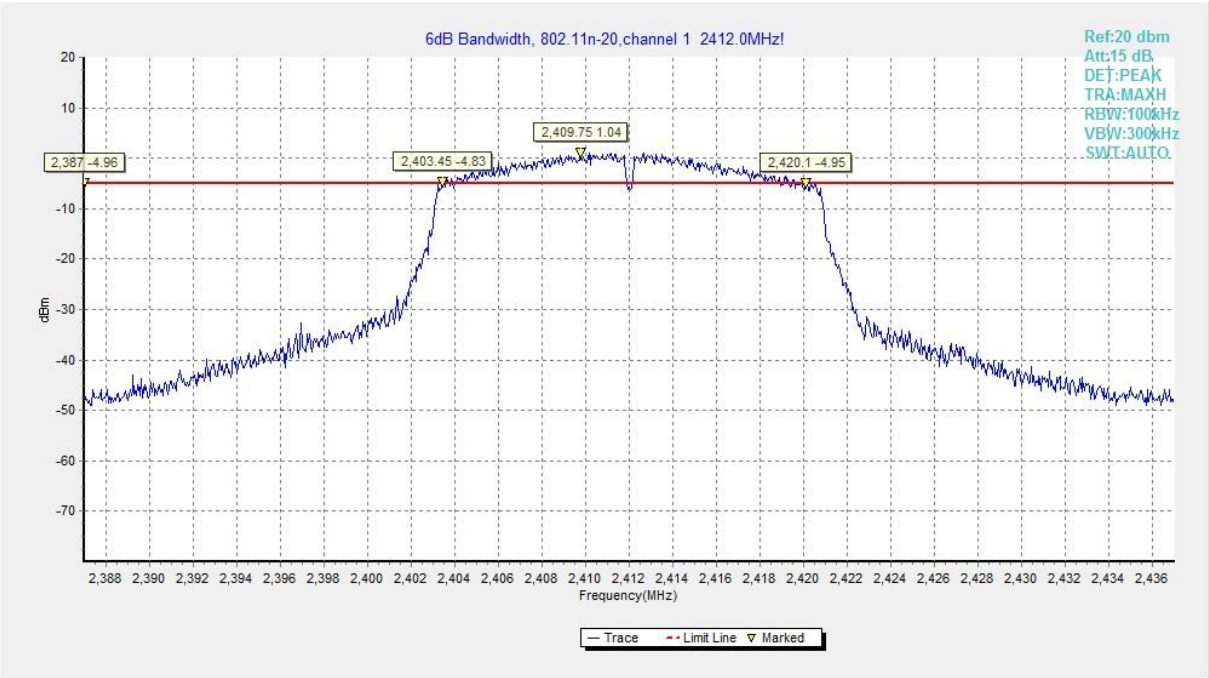


**Fig.A.4.7 Occupied 6dB Bandwidth (802.11n-20MHz, Ch 1)**

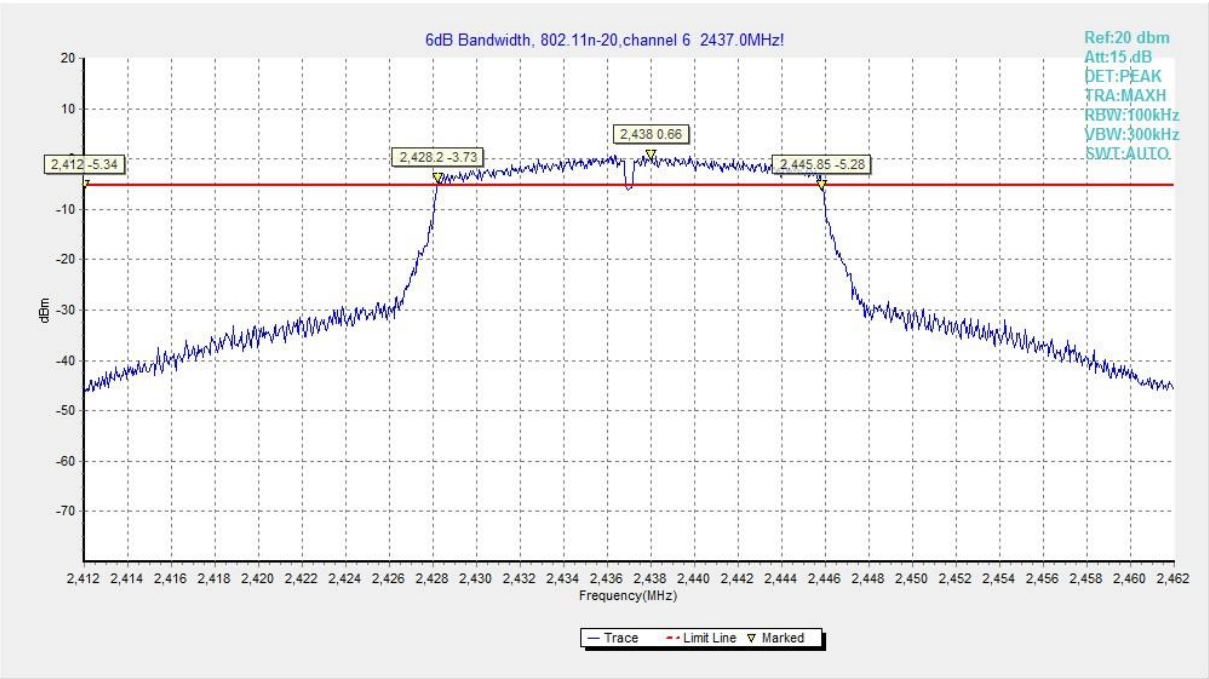


**Fig.A.4.8 Occupied 6dB Bandwidth (802.11n-HT20, Ch 6)**

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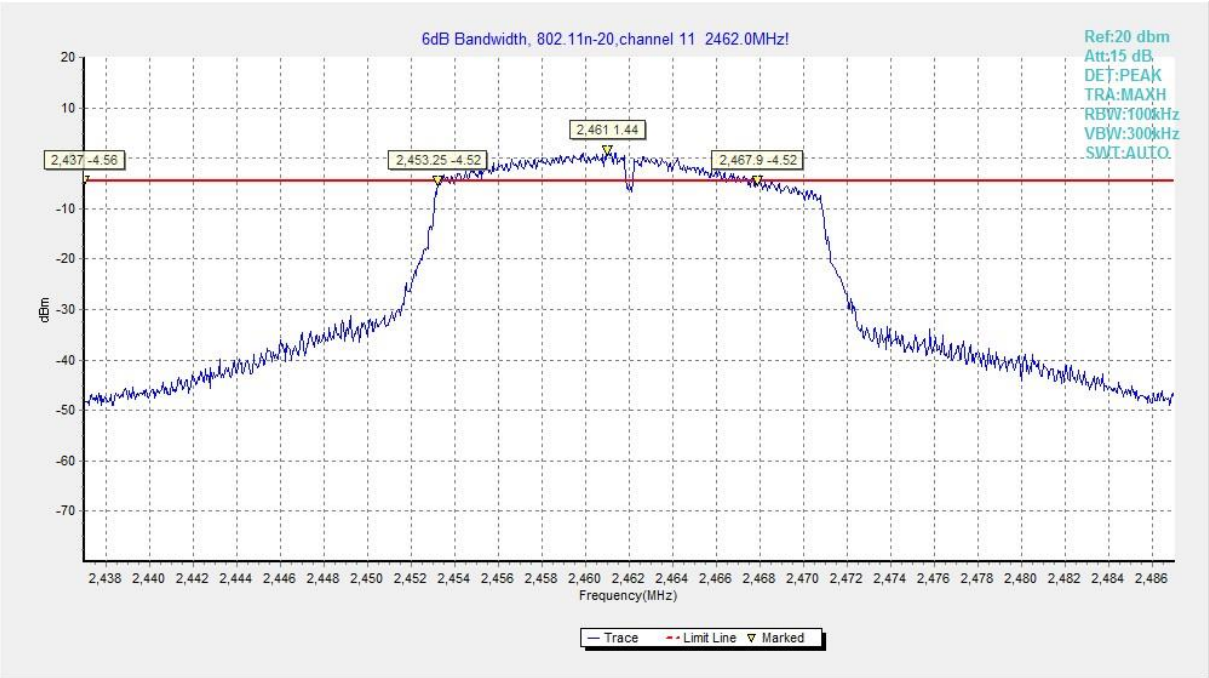


**Fig.A.4.9 Occupied 6dB Bandwidth (802.11n-HT20, Ch 11)**

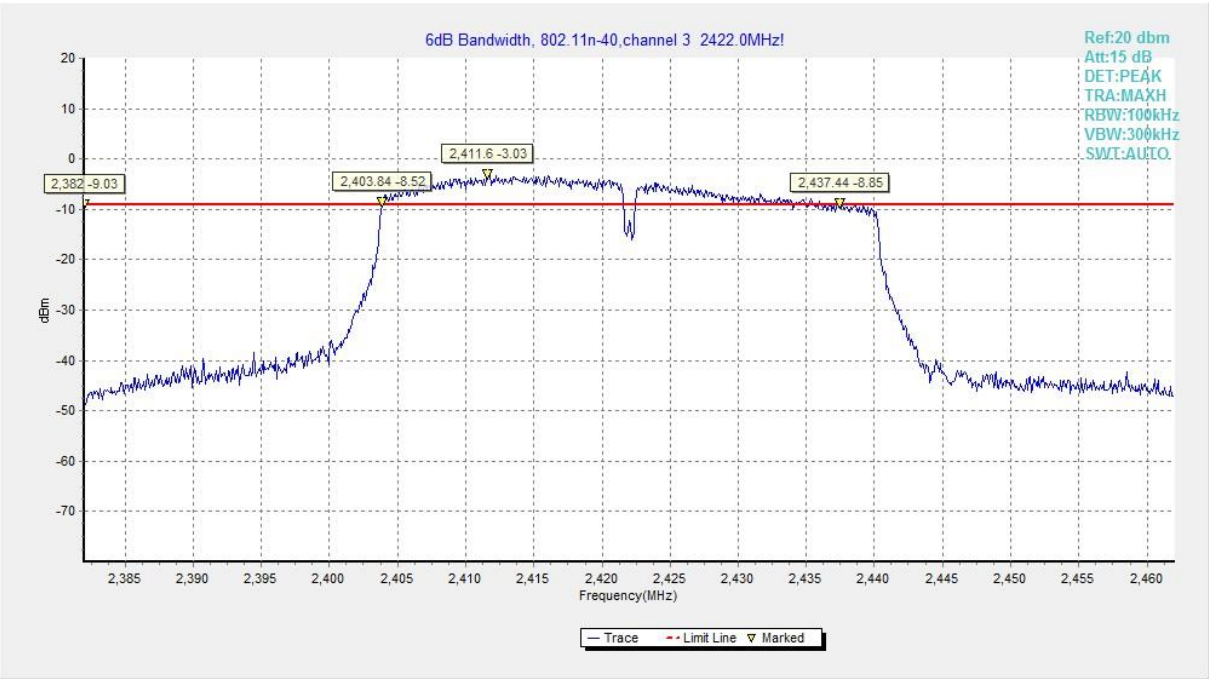


**Fig.A.4.10 Occupied 6dB Bandwidth (802.11n-40MHz, Ch 3)**

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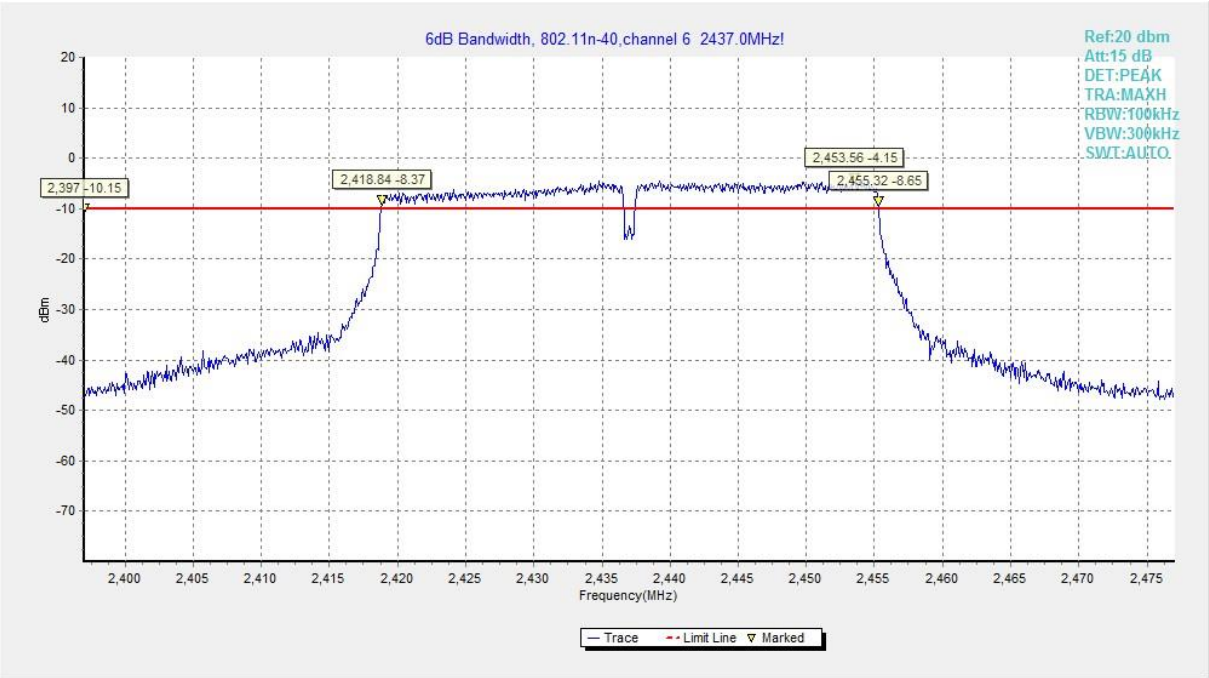


**Fig.A.4.11 Occupied 6dB Bandwidth (802.11n-HT40, Ch 6)**

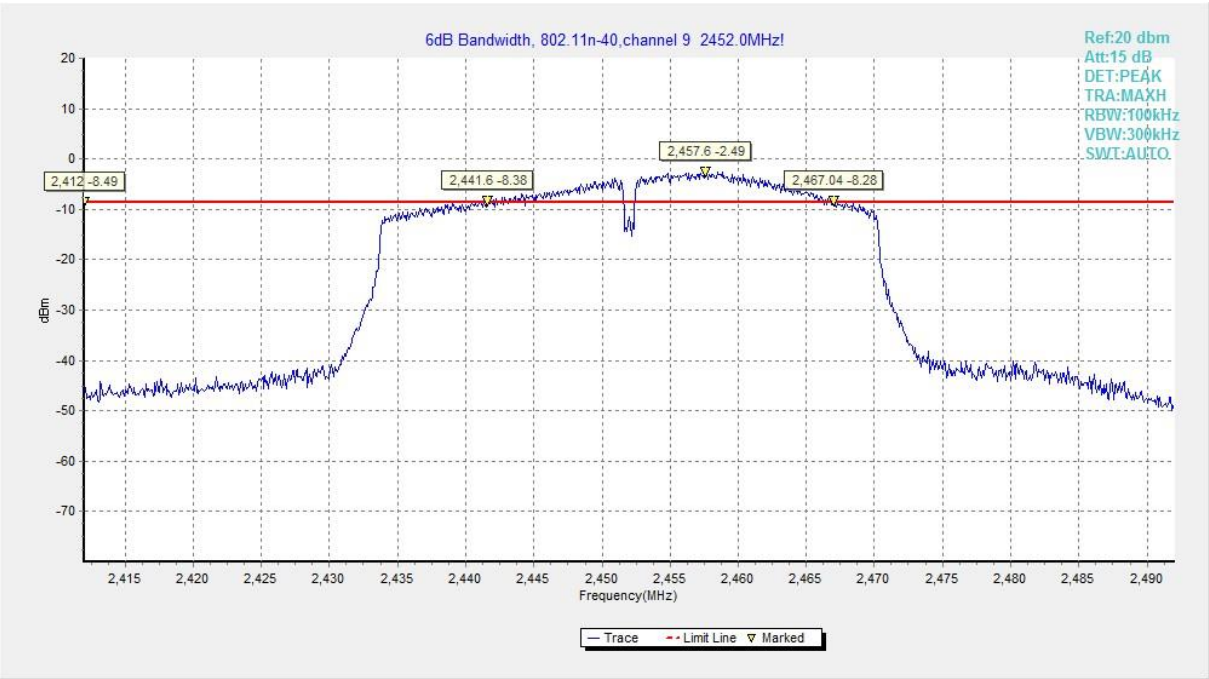


**Fig.A.4.12 Occupied 6dB Bandwidth (802.11n-HT40, Ch 9)**

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## 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: UT17a**

**Measurement Result:**

**802.11b/g mode**

| Mode | Channel | Test Results | Conclusion |
|---|---|---|---|
| 802.11b | 1 | Fig.A.5.1 | **P** |
| | 11 | Fig.A.5.2 | **P** |
| 802.11g | 1 | Fig.A.5.3 | **P** |
| | 11 | Fig.A.5.4 | **P** |

**802.11n-HT20 mode**

| Mode | Channel | Test Results | Conclusion |
|---|---|---|---|
| 802.11n (HT20) | 1 | Fig.A.5.5 | **P** |
| | 11 | Fig.A.5.6 | **P** |

**802.11n-HT40 mode**

| Mode | Channel | Test Results | Conclusion |
|---|---|---|---|
| 802.11n (HT40) | 3 | Fig.A.5.7 | **P** |
| | 9 | Fig.A.5.8 | **P** |

**Conclusion: Pass**

**Test graphs as below:**

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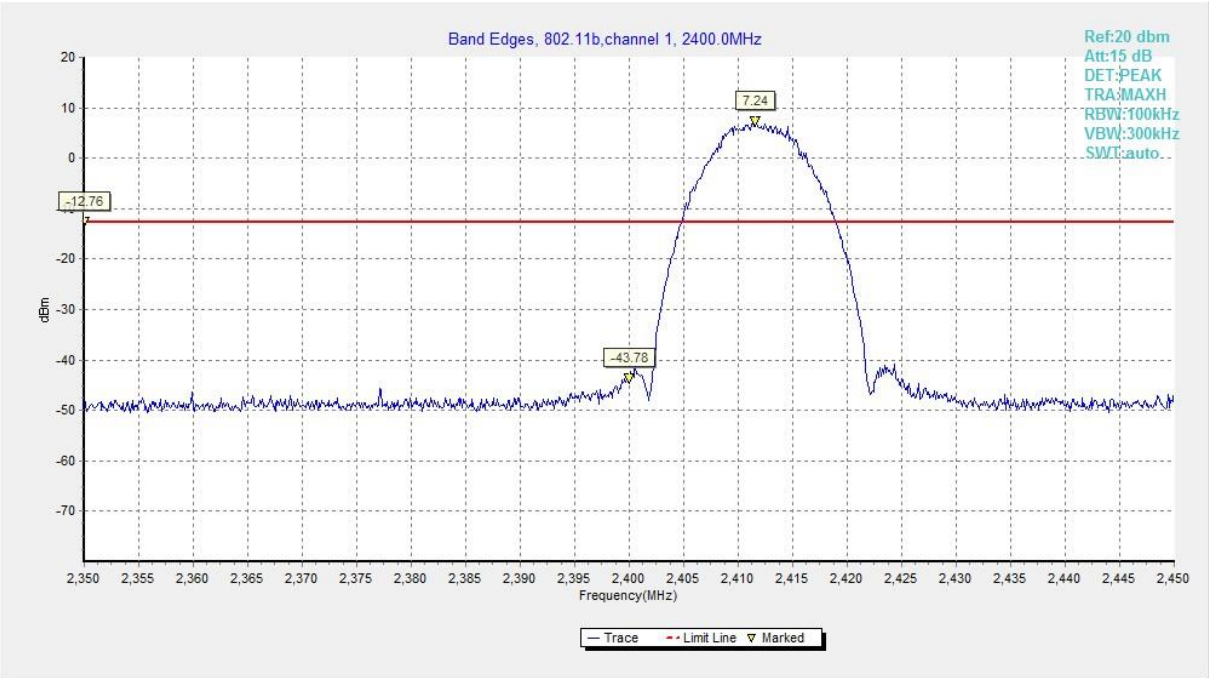


**Fig.A.5.1 Band Edges (802.11b, Ch 1)**

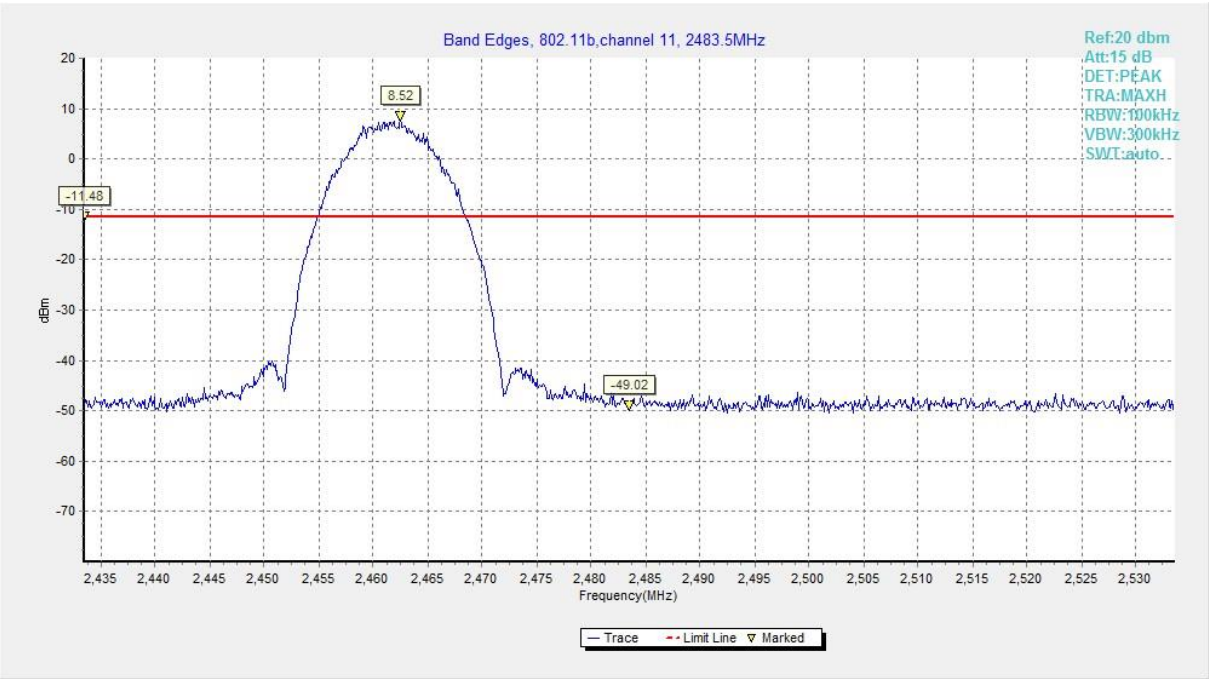


**Fig.A.5.2 Band Edges (802.11b, Ch 11)**

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

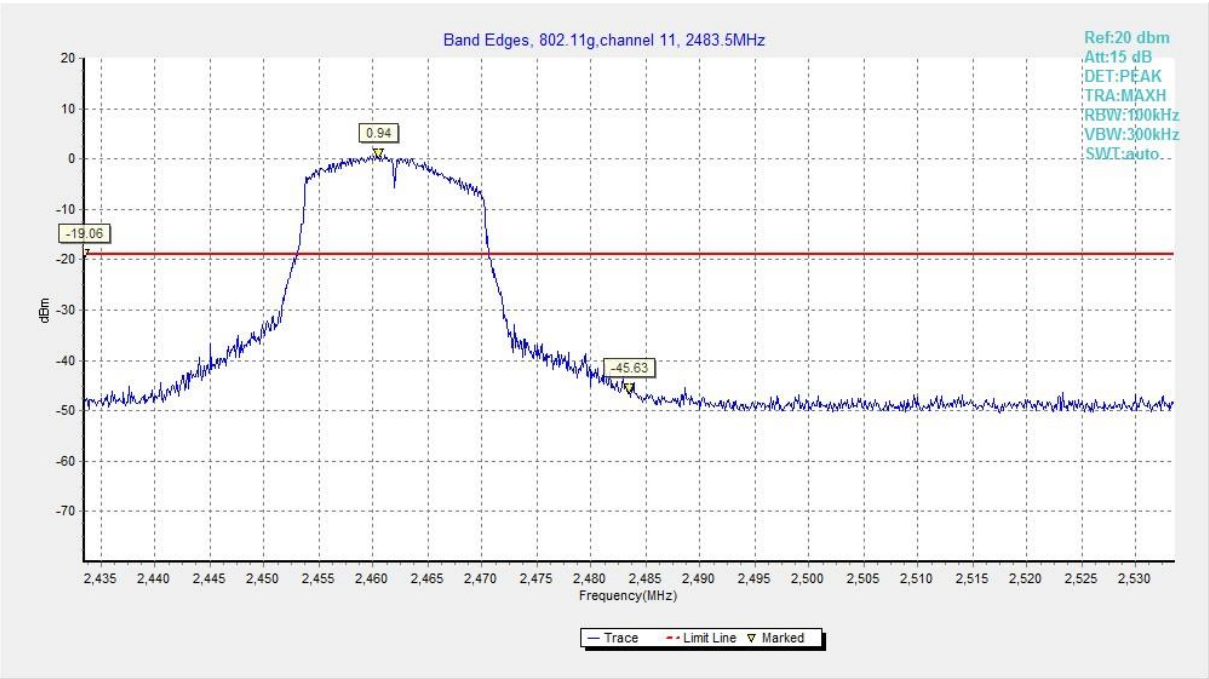


**Fig.A.5.4 Band Edges (802.11g, Ch 11)**

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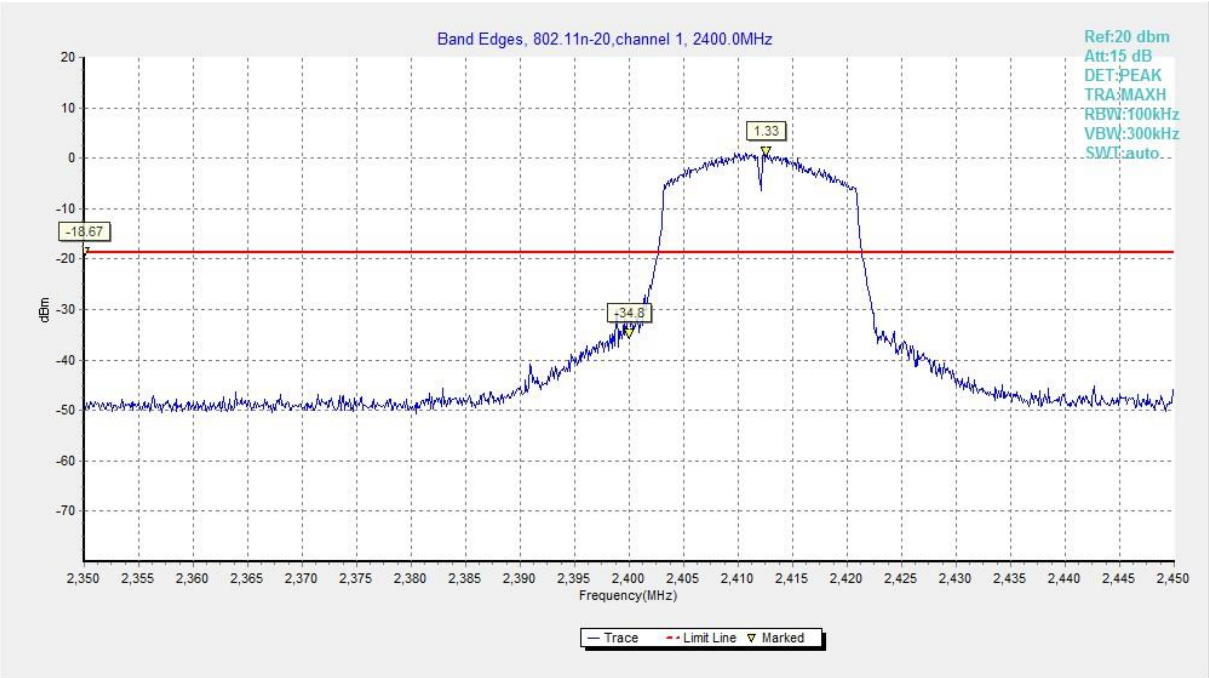


**Fig.A.5.5 Band Edges (802.11n-HT20, Ch 1)**

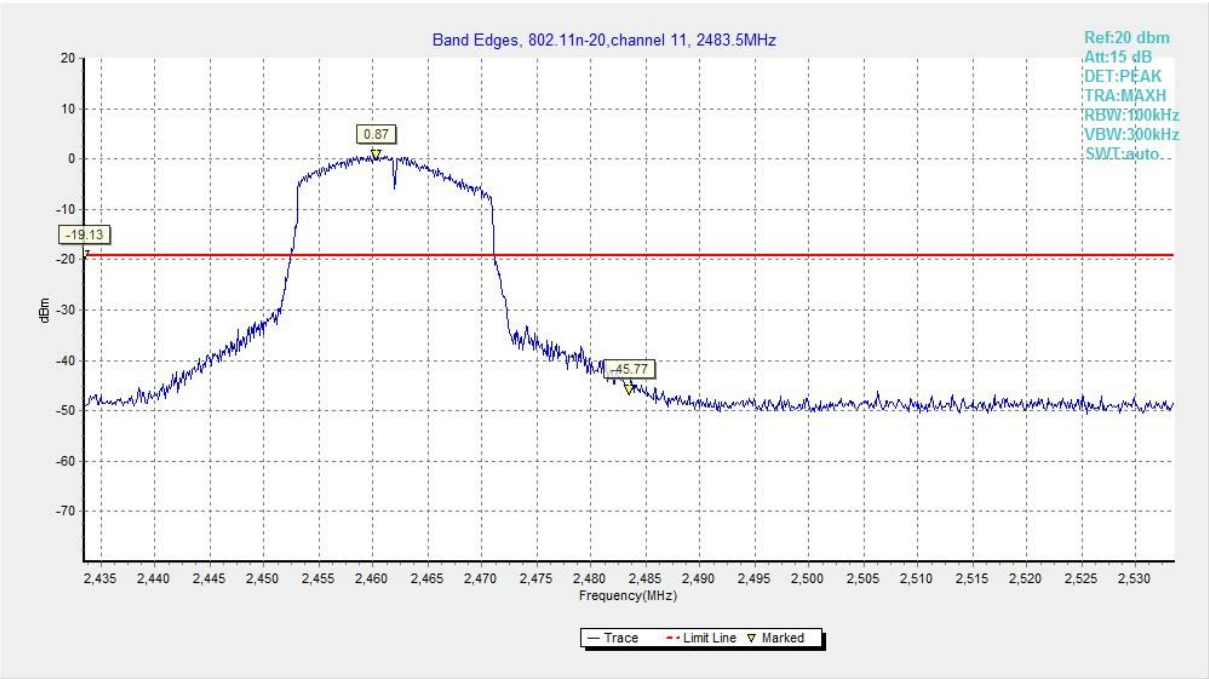


**Fig.A.5.6 Band Edges (802.11n-HT20, Ch 11)**

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

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

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## 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 ≥ 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:**

| Standard | Limit |
|---|---|
| FCC 47 CFR Part 15.247 (d) | 20dB below peak output power in 100 kHz bandwidth |

**EUT ID: UT17a**

**Measurement Results:**

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**802.11b mode**

| MODE | Channel | Frequency Range | Test Results | Conclusion |
|---|---|---|---|---|
| 802.11b | 1 | 2.412 GHz | Fig.A.6.1.1 | **P** |
| | | 30 MHz ~ 1 GHz | Fig.A.6.1.2 | **P** |
| | | 1 GHz ~ 2.5 GHz | Fig.A.6.1.3 | **P** |
| | | 2.5 GHz ~ 7.5 GHz | Fig.A.6.1.4 | **P** |
| | | 7.5 GHz ~ 10 GHz | Fig.A.6.1.5 | **P** |
| | | 10 GHz ~ 15 GHz | Fig.A.6.1.6 | **P** |
| | | 15 GHz ~ 20 GHz | Fig.A.6.1.7 | **P** |
| | | 20 GHz ~ 26 GHz | Fig.A.6.1.8 | **P** |
| | 6 | 2.437 GHz | Fig.A.6.1.9 | **P** |
| | | 30 MHz ~ 1 GHz | Fig.A.6.1.10 | **P** |
| | | 1 GHz ~ 2.5 GHz | Fig.A.6.1.11 | **P** |
| | | 2.5 GHz ~ 7.5 GHz | Fig.A.6.1.12 | **P** |
| | | 7.5 GHz ~ 10 GHz | Fig.A.6.1.13 | **P** |
| | | 10 GHz ~ 15 GHz | Fig.A.6.1.14 | **P** |
| | | 15 GHz ~ 20 GHz | Fig.A.6.1.15 | **P** |
| | | 20 GHz ~ 26 GHz | Fig.A.6.1.16 | **P** |
| | 11 | 2.462 GHz | Fig.A.6.1.17 | **P** |
| | | 30 MHz ~ 1 GHz | Fig.A.6.1.18 | **P** |
| | | 1 GHz ~ 2.5 GHz | Fig.A.6.1.19 | **P** |
| | | 2.5 GHz ~ 7.5 GHz | Fig.A.6.1.20 | **P** |
| | | 7.5 GHz ~ 10 GHz | Fig.A.6.1.21 | **P** |
| | | 10 GHz ~ 15 GHz | Fig.A.6.1.22 | **P** |
| | | 15 GHz ~ 20 GHz | Fig.A.6.1.23 | **P** |
| | | 20 GHz ~ 26 GHz | Fig.A.6.1.24 | **P** |

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**802.11g mode**

| MODE | Channel | Frequency Range | Test Results | Conclusion |
|---|---|---|---|---|
| 802.11g | 1 | 2.412 GHz | Fig.A.6.1.25 | **P** |
| | | 30 MHz ~ 1 GHz | Fig.A.6.1.26 | **P** |
| | | 1 GHz ~ 2.5 GHz | Fig.A.6.1.27 | **P** |
| | | 2.5 GHz ~ 7.5 GHz | Fig.A.6.1.28 | **P** |
| | | 7.5 GHz ~ 10 GHz | Fig.A.6.1.29 | **P** |
| | | 10 GHz ~ 15 GHz | Fig.A.6.1.30 | **P** |
| | | 15 GHz ~ 20 GHz | Fig.A.6.1.31 | **P** |
| | | 20 GHz ~ 26 GHz | Fig.A.6.1.32 | **P** |
| | 6 | 2.437 GHz | Fig.A.6.1.33 | **P** |
| | | 30 MHz ~ 1 GHz | Fig.A.6.1.34 | **P** |
| | | 1 GHz ~ 2.5 GHz | Fig.A.6.1.35 | **P** |
| | | 2.5 GHz ~ 7.5 GHz | Fig.A.6.1.36 | **P** |
| | | 7.5 GHz ~ 10 GHz | Fig.A.6.1.37 | **P** |
| | | 10 GHz ~ 15 GHz | Fig.A.6.1.38 | **P** |
| | | 15 GHz ~ 20 GHz | Fig.A.6.1.39 | **P** |
| | | 20 GHz ~ 26 GHz | Fig.A.6.1.40 | **P** |
| | 11 | 2.462 GHz | Fig.A.6.1.41 | **P** |
| | | 30 MHz ~ 1 GHz | Fig.A.6.1.42 | **P** |
| | | 1 GHz ~ 2.5 GHz | Fig.A.6.1.43 | **P** |
| | | 2.5 GHz ~ 7.5 GHz | Fig.A.6.1.44 | **P** |
| | | 7.5 GHz ~ 10 GHz | Fig.A.6.1.45 | **P** |
| | | 10 GHz ~ 15 GHz | Fig.A.6.1.46 | **P** |
| | | 15 GHz ~ 20 GHz | Fig.A.6.1.47 | **P** |
| | | 20 GHz ~ 26 GHz | Fig.A.6.1.48 | **P** |

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**802.11n-HT20 mode**

| MODE | Channel | Frequency Range | Test Results | Conclusion |
|---|---|---|---|---|
| 802.11n (HT20) | 1 | 2.412 GHz | Fig.A.6.1.49 | **P** |
| | | 30 MHz ~ 1 GHz | Fig.A.6.1.50 | **P** |
| | | 1 GHz ~ 2.5 GHz | Fig.A.6.1.51 | **P** |
| | | 2.5 GHz ~ 7.5 GHz | Fig.A.6.1.52 | **P** |
| | | 7.5 GHz ~ 10 GHz | Fig.A.6.1.53 | **P** |
| | | 10 GHz ~ 15 GHz | Fig.A.6.1.54 | **P** |
| | | 15 GHz ~ 20 GHz | Fig.A.6.1.55 | **P** |
| | | 20 GHz ~ 26 GHz | Fig.A.6.1.56 | **P** |
| | 6 | 2.437 GHz | Fig.A.6.1.57 | **P** |
| | | 30 MHz ~ 1 GHz | Fig.A.6.1.58 | **P** |
| | | 1 GHz ~ 2.5 GHz | Fig.A.6.1.59 | **P** |
| | | 2.5 GHz ~ 7.5 GHz | Fig.A.6.1.60 | **P** |
| | | 7.5 GHz ~ 10 GHz | Fig.A.6.1.61 | **P** |
| | | 10 GHz ~ 15 GHz | Fig.A.6.1.62 | **P** |
| | | 15 GHz ~ 20 GHz | Fig.A.6.1.63 | **P** |
| | | 20 GHz ~ 26 GHz | Fig.A.6.1.64 | **P** |
| | 11 | 2.462 GHz | Fig.A.6.1.65 | **P** |
| | | 30 MHz ~ 1 GHz | Fig.A.6.1.66 | **P** |
| | | 1 GHz ~ 2.5 GHz | Fig.A.6.1.67 | **P** |
| | | 2.5 GHz ~ 7.5 GHz | Fig.A.6.1.68 | **P** |
| | | 7.5 GHz ~ 10 GHz | Fig.A.6.1.69 | **P** |
| | | 10 GHz ~ 15 GHz | Fig.A.6.1.70 | **P** |
| | | 15 GHz ~ 20 GHz | Fig.A.6.1.71 | **P** |
| | | 20 GHz ~ 26 GHz | Fig.A.6.1.72 | **P** |

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**802.11n-HT40 mode**

| MODE | Channel | Frequency Range | Test Results | Conclusion |
|---|---|---|---|---|
| 802.11n (HT40) | 3 | 2.422 GHz | Fig.A.6.1.73 | **P** |
| | | 30 MHz ~ 1 GHz | Fig.A.6.1.74 | **P** |
| | | 1 GHz ~ 2.5 GHz | Fig.A.6.1.75 | **P** |
| | | 2.5 GHz ~ 7.5 GHz | Fig.A.6.1.76 | **P** |
| | | 7.5 GHz ~ 10 GHz | Fig.A.6.1.77 | **P** |
| | | 10 GHz ~ 15 GHz | Fig.A.6.1.78 | **P** |
| | | 15 GHz ~ 20 GHz | Fig.A.6.1.79 | **P** |
| | | 20 GHz ~ 26 GHz | Fig.A.6.1.80 | **P** |
| | 6 | 2.437 GHz | Fig.A.6.1.81 | **P** |
| | | 30 MHz ~ 1 GHz | Fig.A.6.1.82 | **P** |
| | | 1 GHz ~ 2.5 GHz | Fig.A.6.1.83 | **P** |
| | | 2.5 GHz ~ 7.5 GHz | Fig.A.6.1.84 | **P** |
| | | 7.5 GHz ~ 10 GHz | Fig.A.6.1.85 | **P** |
| | | 10 GHz ~ 15 GHz | Fig.A.6.1.86 | **P** |
| | | 15 GHz ~ 20 GHz | Fig.A.6.1.87 | **P** |
| | | 20 GHz ~ 26 GHz | Fig.A.6.1.88 | **P** |
| | 9 | 2.452 GHz | Fig.A.6.1.89 | **P** |
| | | 30 MHz ~ 1 GHz | Fig.A.6.1.90 | **P** |
| | | 1 GHz ~ 2.5 GHz | Fig.A.6.1.91 | **P** |
| | | 2.5 GHz ~ 7.5 GHz | Fig.A.6.1.92 | **P** |
| | | 7.5 GHz ~ 10 GHz | Fig.A.6.1.93 | **P** |
| | | 10 GHz ~ 15 GHz | Fig.A.6.1.94 | **P** |
| | | 15 GHz ~ 20 GHz | Fig.A.6.1.95 | **P** |
| | | 20 GHz ~ 26 GHz | Fig.A.6.1.96 | **P** |

**Conclusion: Pass**

**Test graphs as below:**

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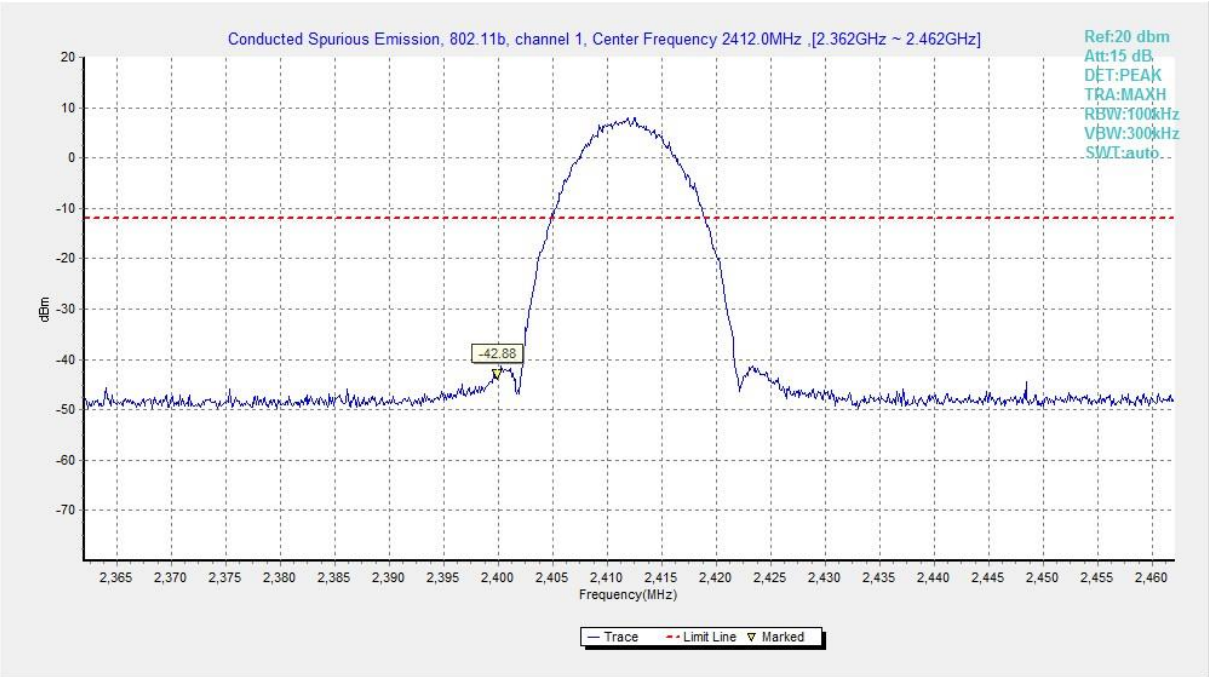


**Fig.A.6.1.1 Transmitter Spurious Emission - Conducted (802.11b, Ch1, Center Frequency)**

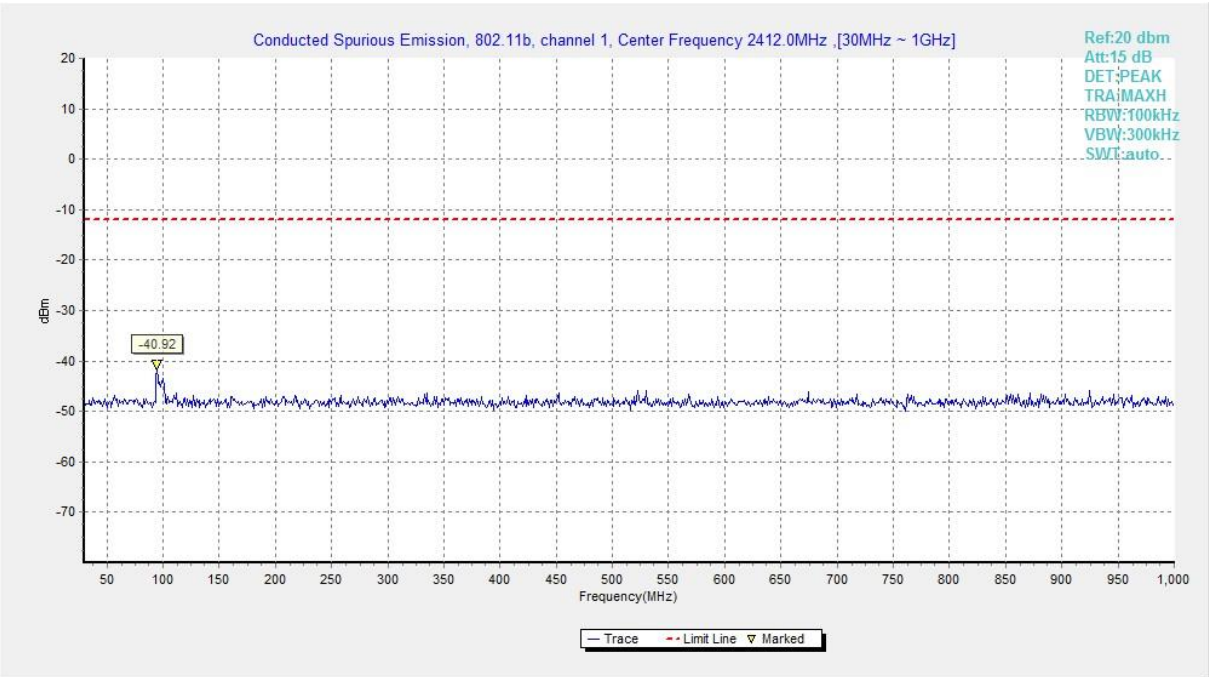


**Fig.A.6.1.2 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 30 MHz-1 GHz)**

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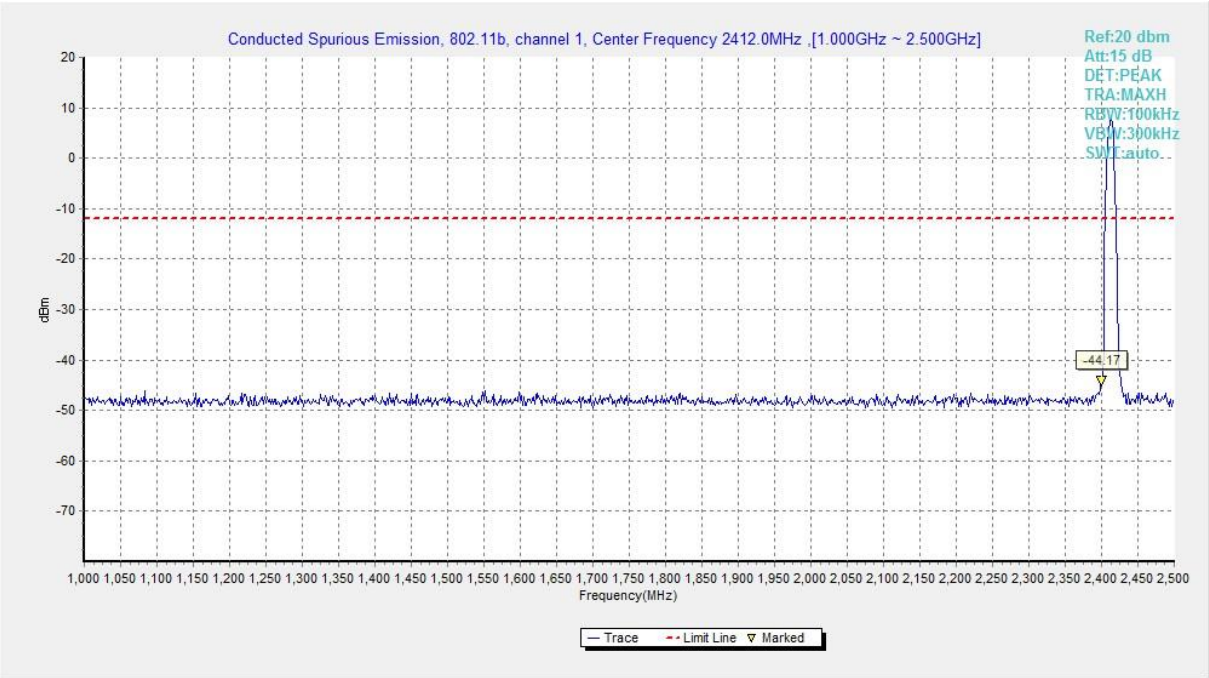


**Fig.A.6.1.3 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 1 GHz-2.5 GHz)**

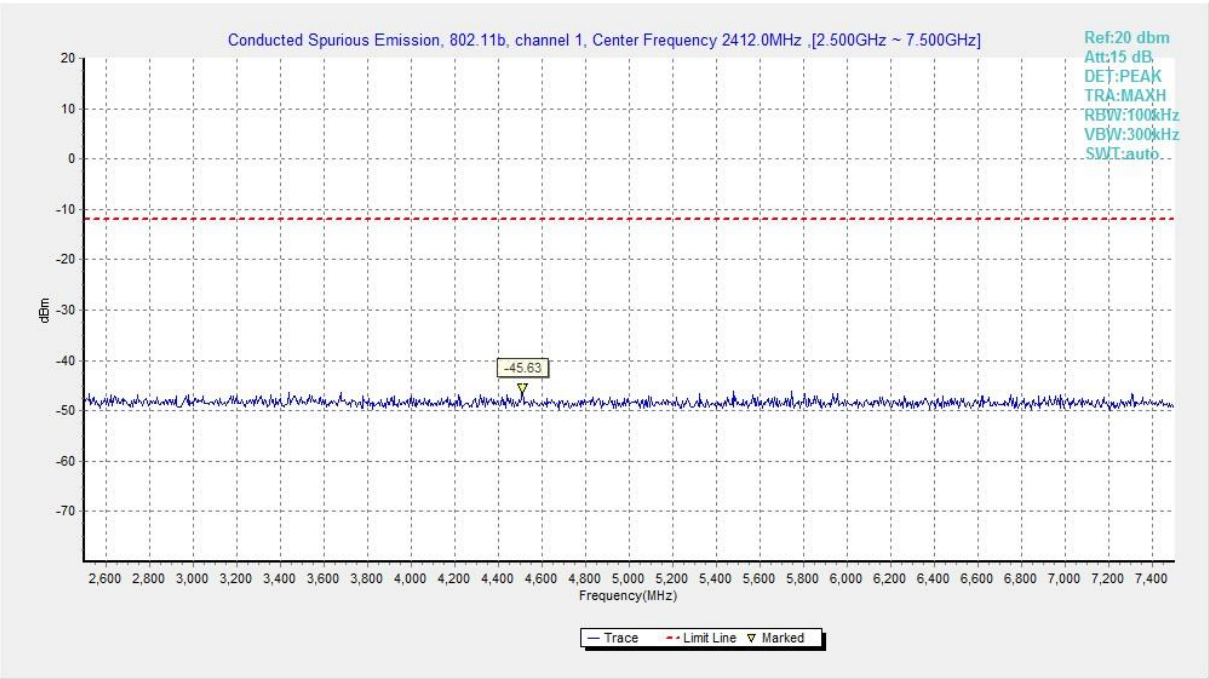


**Fig.A.6.1.4 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 2.5 GHz-7.5 GHz)**

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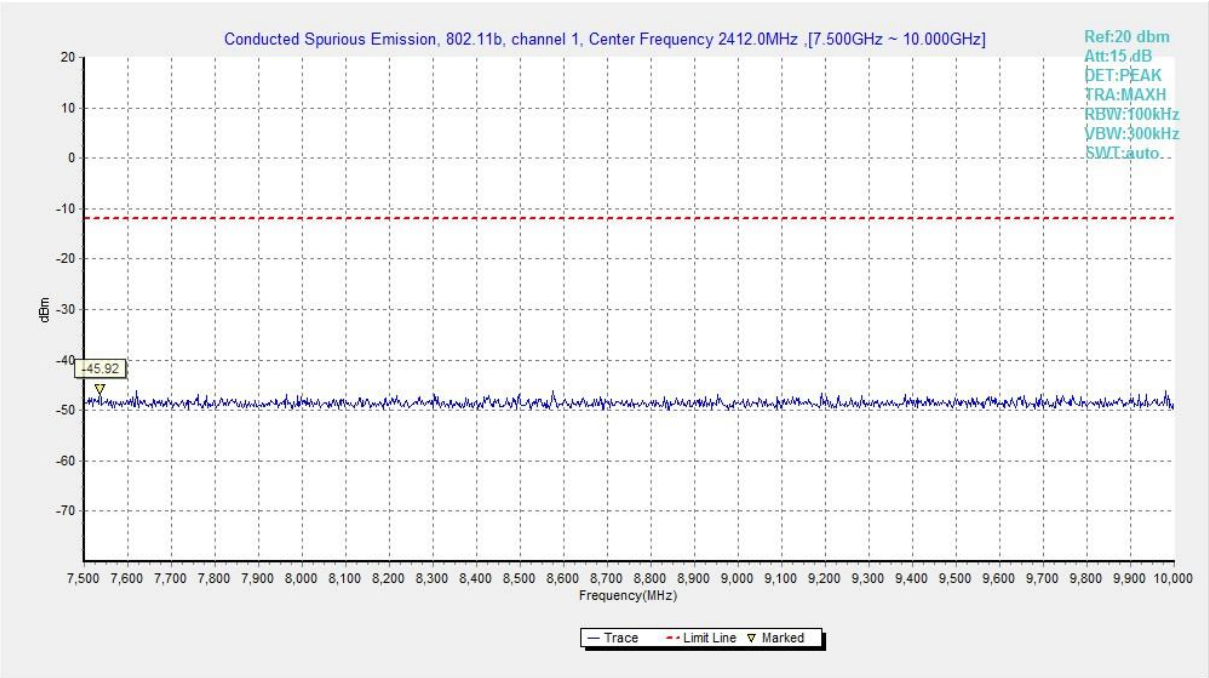


**Fig.A.6.1.5 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 7.5 GHz-10 GHz)**

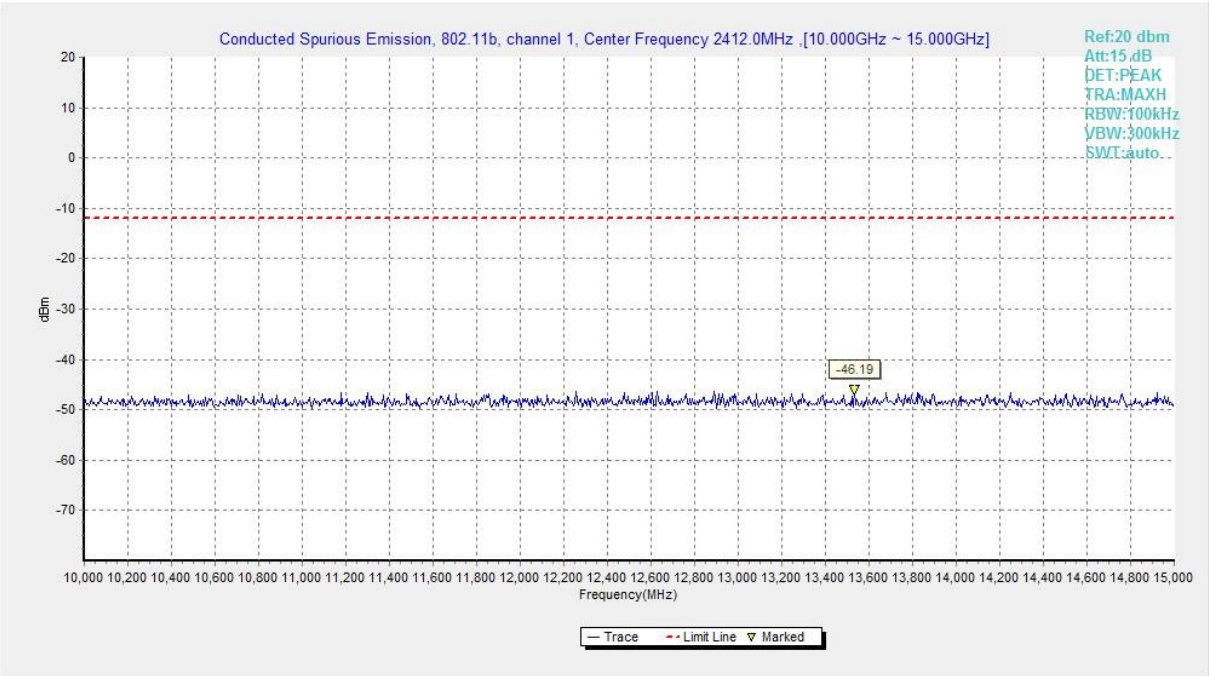


**Fig.A.6.1.6 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 10 GHz-15 GHz)**

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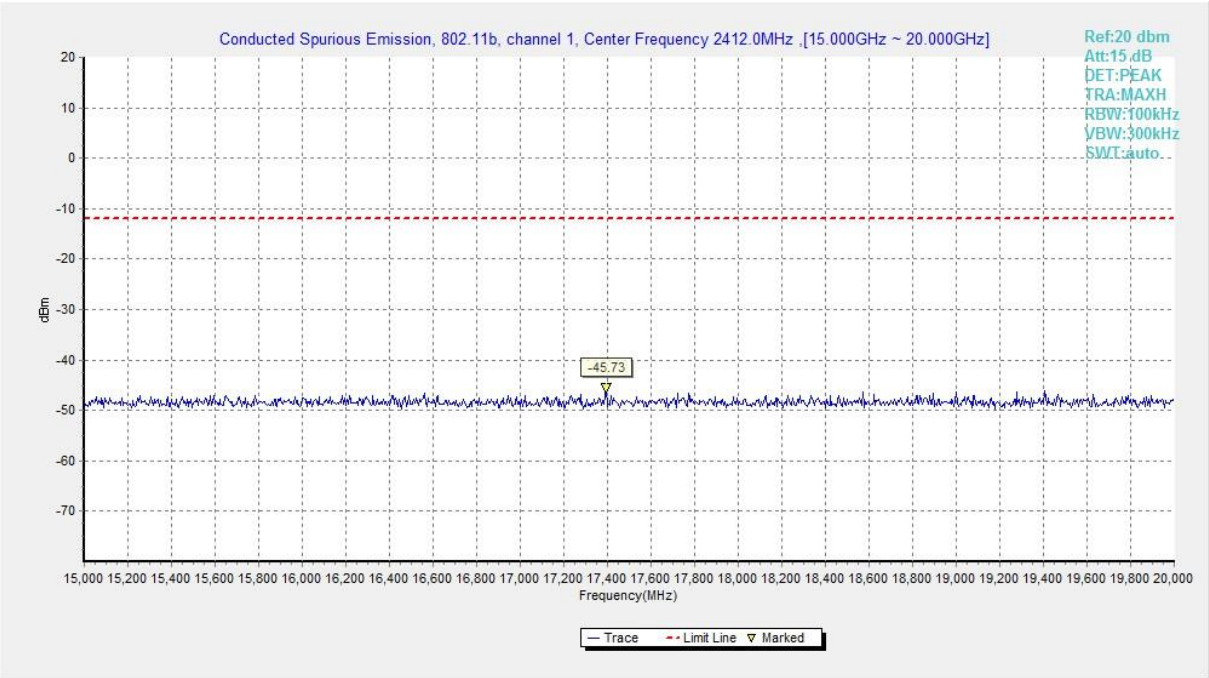


**Fig.A.6.1.7 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 15 GHz-20 GHz)**

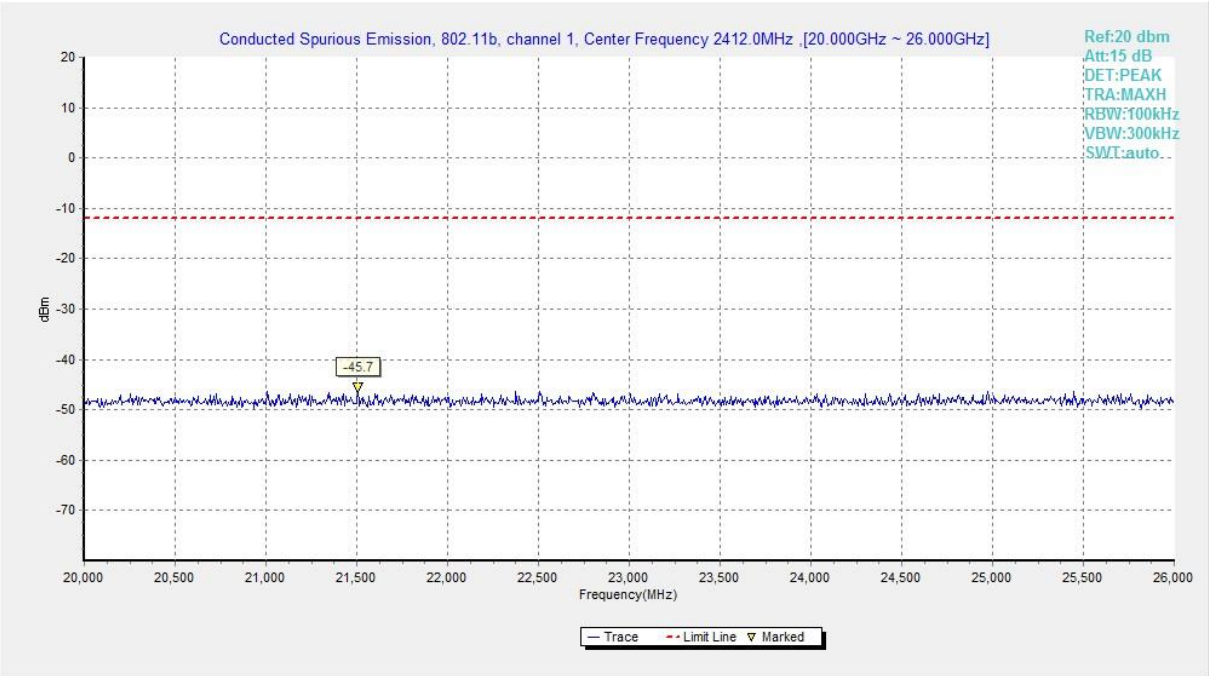


**Fig.A.6.1.8 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 20 GHz-26 GHz)**

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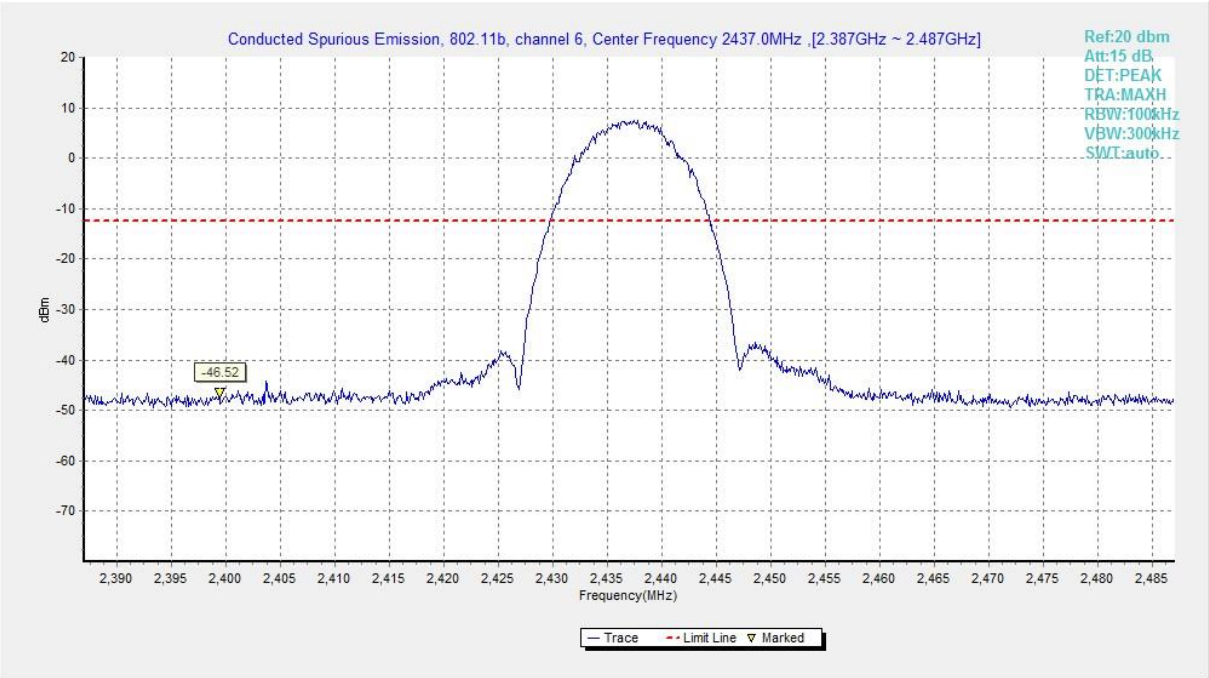


**Fig.A.6.1.9 Transmitter Spurious Emission - Conducted (802.11b, Ch6, Center Frequency)**

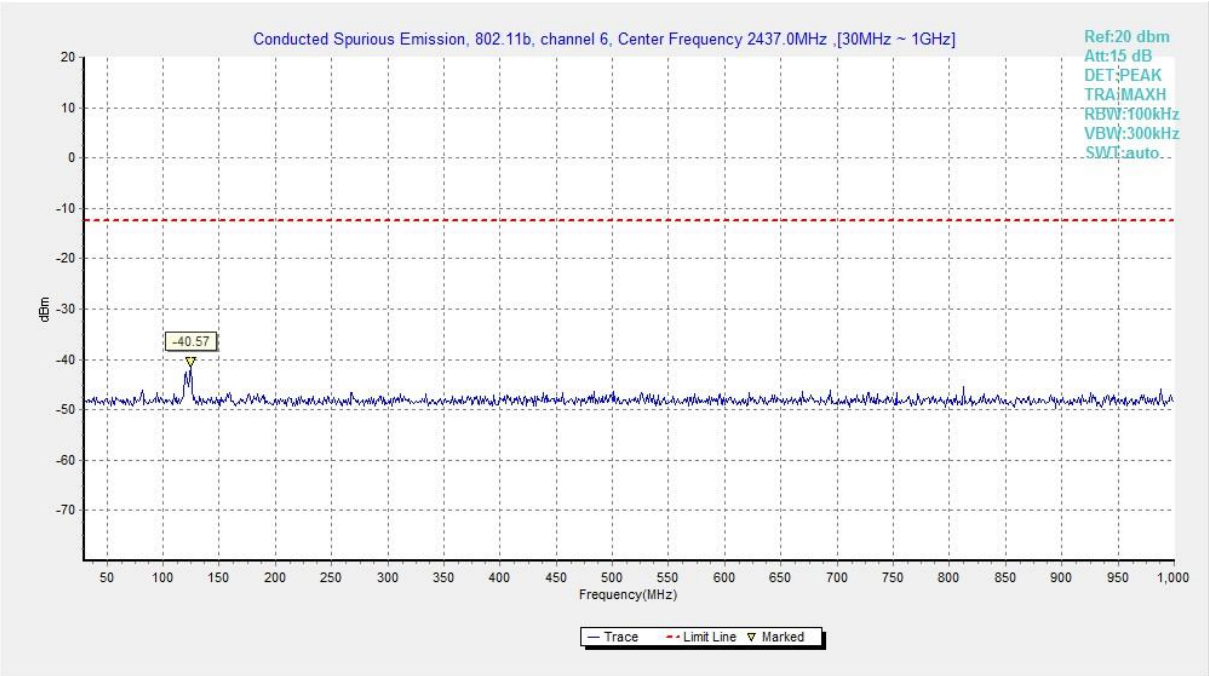


**Fig.A.6.1.10 Transmitter Spurious Emission - Conducted (802.11b, Ch6, 30 MHz-1 GHz)**

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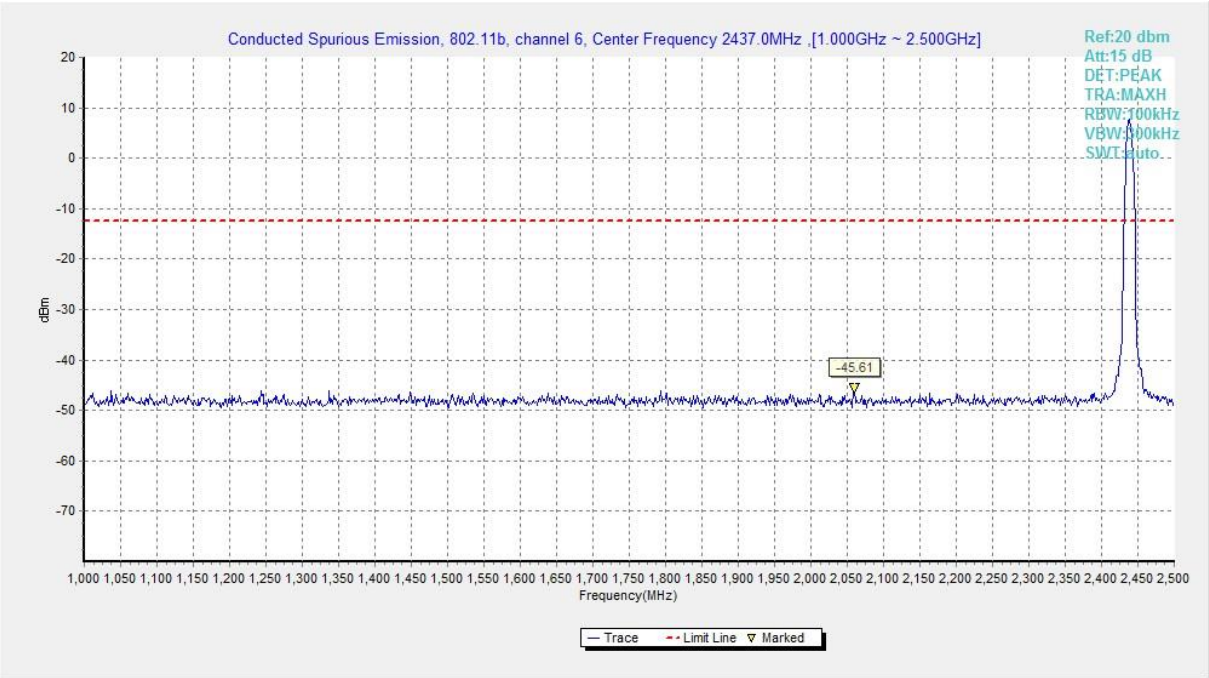


**Fig.A.6.1.11 Transmitter Spurious Emission - Conducted (802.11b, Ch6, 1 GHz-2.5 GHz)**

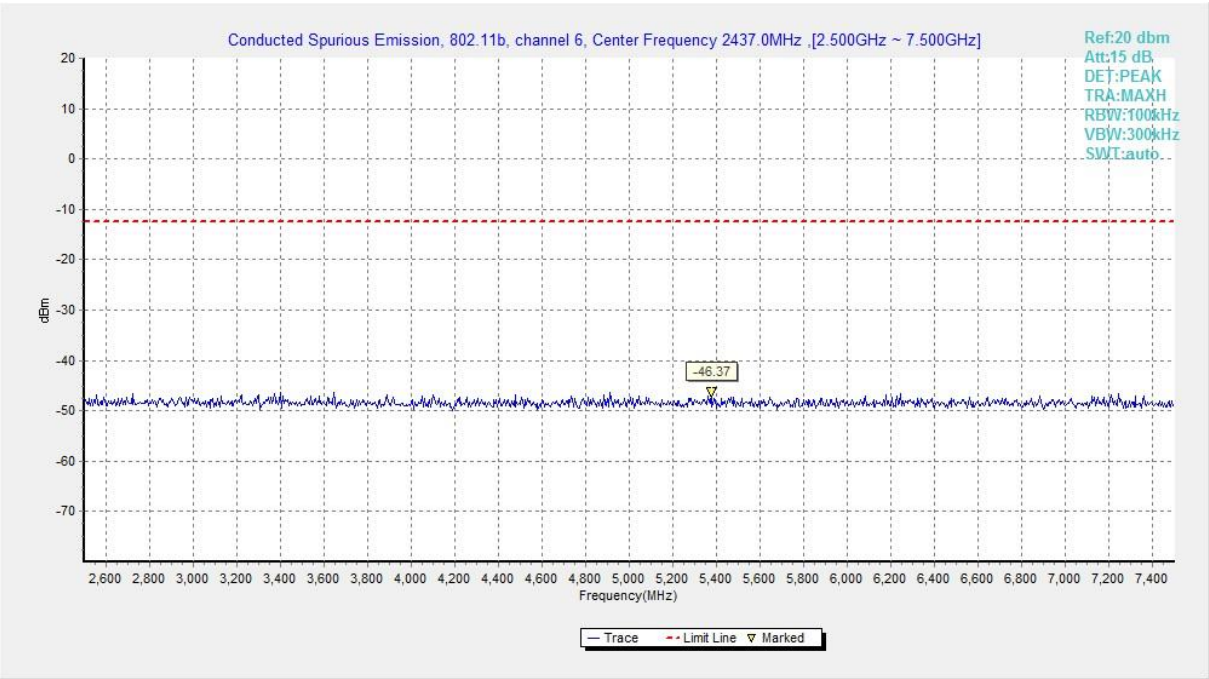


**Fig.A.6.1.12 Transmitter Spurious Emission - Conducted (802.11b, Ch6, 2.5 GHz-7.5 GHz)**

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