FCC PART 15C
TEST REPORT
No.I21Z60861-IOT03

for

TCL Communication Ltd.

Tablet PC

9198S

With

FCC ID: 2ACCJB155

Hardware Version: 03

Software Version: 2C61

Issued Date: 2021-07-16

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:

CTTL-Telecommunication Technology Labs, CAICT

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

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

Email: cttl_terminals@caict.ac.cn, website: www.caict.ac.cn

©Copyright. All rights reserved by CTTL.

REPORT HISTORY

Report Number	Revision	Description	Issue Date
I21Z60861-IOT03	Rev.0	1st edition	2021-07-16
I21Z60861-IOT03	Rev.1	1.Change Page.5.Testing Location 1. 2.Add KDB-662911 D01 at Page.9 3.Add calibration information of VSA,at Page.11 4.Add Pic. (ANT10 11n40 MCS0 CH6) power of max power.at Page.16	2021-09-10
I21Z60861-IOT03	Rev.2	Add some DG informations.at P.17	2021-09-16

©Copyright. All rights reserved by CTTL.

CONTENTS

1. TEST LABORATORY 5

1.1. INTRODUCTION & ACCREDITATION 5
1.2. TESTING LOCATION 5
1.3. TESTING ENVIRONMENT 6
1.4. PROJECT DATE 6
1.5. SIGNATURE 6

2. CLIENT INFORMATION 7

2.1. APPLICANT INFORMATION 7
2.2. MANUFACTURER INFORMATION 7

3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE) 8

3.1. ABOUT EUT 8
3.2. INTERNAL IDENTIFICATION OF EUT 8
3.3. INTERNAL IDENTIFICATION OF AE 8
3.4. GENERAL DESCRIPTION 9
3.5. INTERPRETATION OF THE TEST ENVIRONMENT 9

4. REFERENCE DOCUMENTS 9

4.1. DOCUMENTS SUPPLIED BY APPLICANT 9
4.2. REFERENCE DOCUMENTS FOR TESTING 9

5. TEST RESULTS 9

5.1. SUMMARY OF TEST RESULTS 10
5.2. STATEMENTS 10
5.3. TEST CONDITIONS 10

6. TEST FACILITIES UTILIZED 11

7. MEASUREMENT UNCERTAINTY 12

7.1. MAXIMUM OUTPUT POWER 12
7.2. PEAK POWER SPECTRAL DENSITY 12
7.3. DTS 6-DB SIGNAL BANDWIDTH 12
7.4. BAND EDGES COMPLIANCE 12
7.5. TRANSMITTER SPURIOUS EMISSION 12
7.6. AC POWER-LINE CONDUCTED EMISSION 12

ANNEX A: DETAILED TEST RESULTS 13

A.1. MEASUREMENT METHOD 13

A.2. MAXIMUM OUTPUT POWER 14

A.2.1. PEAK OUTPUT POWER-CONDUCTED 14

©Copyright. All rights reserved by CTTL.

A.3. PEAK POWER SPECTRAL DENSITY **19**

A.4. DTS 6-DB SIGNAL BANDWIDTH **39**

A.5. BAND EDGES COMPLIANCE **46**

A.6. TRANSMITTER SPURIOUS EMISSION **51**

A.6.1 TRANSMITTER SPURIOUS EMISSION – CONDUCTED 51

A.6.2 TRANSMITTER SPURIOUS EMISSION - RADIATED 104

A.7. AC POWER-LINE CONDUCTED EMISSION **118**

ANNEX B: EUT PARAMETERS **123**

ANNEX C: ACCREDITATION CERTIFICATE **124**

©Copyright. All rights reserved by CTTL.

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(Huayuan North Road)

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

Location 2:CTTL(Huayuan North Road)

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

©Copyright. All rights reserved by CTTL.

1.3. Testing Environment

Normal Temperature:	15-35℃
Relative Humidity:	20-75%

1.4. Project date

Testing Start Date:	2021-05-17
Testing End Date:	2021-07-16

1.5. Signature

Xie Xiuzhen

(Prepared this test report)

Zheng Wei

(Reviewed this test report)

Hu Xiaoyu

(Approved this test report)

©Copyright. All rights reserved by CTTL.

2. Client Information

2.1. Applicant Information

Company Name:	TCL Communication Ltd.
Address:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
City:	Hong Kong
Postal Code:	/
Country:	China
Telephone:	0086-755-36611722
Fax:	0086-755-36612000-81722

2.2. Manufacturer Information

Company Name:	TCL Communication Ltd
Address:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
City:	Hong Kong
Postal Code:	/
Country:	China
Telephone:	0086-755-36611722
Fax:	0086-755-36612000-81722

©Copyright. All rights reserved by CTTL.

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

3.1. About EUT

Description	Tablet PC
Model name	9198S
FCC ID	2ACCJB155
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	29.06dBm
Power Supply	3.85V

3.2. Internal Identification of EUT

EUT ID*	SN or IMEI	HW Version	SW Version
EUT45	358861400001957	03	2C61
EUT2	358861400001775	03	2C61

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

3.3. Internal Identification of AE

AE ID*	Description	SN	Remarks
AE1	Charger	/	/
AE2	Cable	/	/

AE1

Model	QC13US
Manufacturer	BYD
Length of cable	/

AE2

Type	/
Manufacturer	/
Length of cable	0.8 meter

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

©Copyright. All rights reserved by CTTL.

3.4. General Description

The Equipment under Test (EUT) is a model of Tablet PC 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.	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 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
KDB-662911 D01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band (e.g. MIMO Smart Antenna etc)	2013

©Copyright. All rights reserved by CTTL.

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℃
Voltage	V nom	3.85V(By battery)
Humidity	H nom	20-75%

©Copyright. All rights reserved by CTTL.

6. Test Facilities Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
0	Vector Signal Analyzer	FSQ40	200089	Rohde & Schwarz	1 year	2021-05-23
1	Vector Signal Analyzer	FSQ40	200089	Rohde & Schwarz	1 year	2022-05-24
2	LISN	ENV216	101200	Rohde & Schwarz	1 year	2021-10-15
3	Test Receiver	ESCI	10034	Rohde & Schwarz	1 year	2022-02-23
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	100235	Rohde & Schwarz	1 year	2022-02-23
2	BiLog Antenna	VULB9163	9163-483	Schwarzbeck	1 year	2021-08-27
3	Antenna	3115	6914	ETS-Lindgren	1 year	2022-02-03
4	LISN	ESH3-E5	825562/028	Rohde & Schwarz	1 year	2021-10-15
5	Test Receiver	ESCI	100344	Rohde & Schwarz	1 year	2022-02-23

©Copyright. All rights reserved by CTTL.

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	5.16
1GHz ≤ f ≤18GHz	5.44
18GHz ≤ f ≤40GHz	5.28

7.6. AC Power-line Conducted Emission

Measurement Uncertainty : 3.08dB,k=2

©Copyright. All rights reserved by CTTL.

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

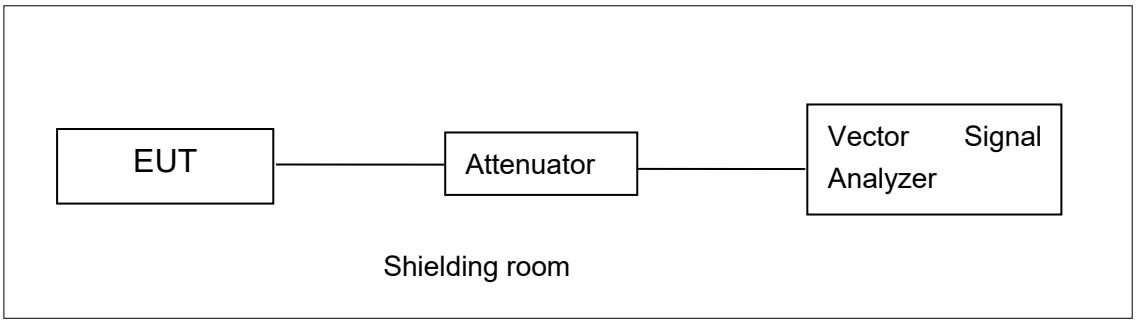


Fig.A.1.1.1: Test Setup Diagram for Conducted Measurements

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;

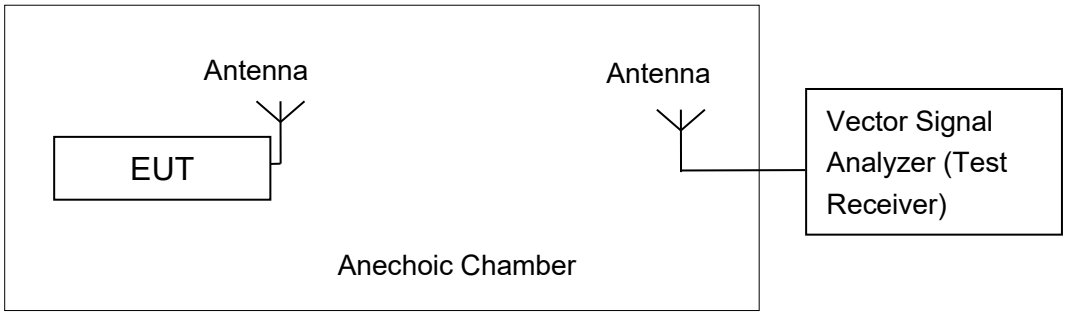


Fig.A.1.2.1: Test Setup Diagram for Radiated Measurements

©Copyright. All rights reserved by CTTL.

A.2. Maximum Output Power

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

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

Measurement Limit:

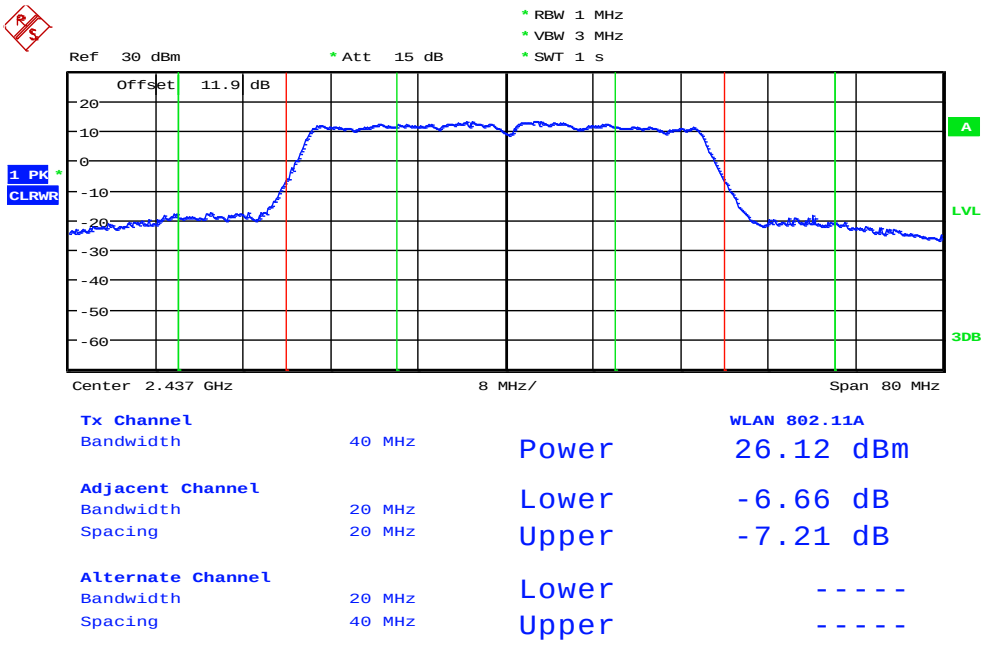
Standard	Limit (dBm)
FCC CRF Part 15.247(b)	< 30

EUT ID: EUT2

A.2.1. Peak Output Power-conducted

Measurement Results:

©Copyright. All rights reserved by CTTL.



Date: 10.SEP.2021 02:05:05

PIC. ANT10 11n40 MCS0 CH6 power

ANT9

802.11b/g mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11b	1	22.42	22.75	22.71
802.11g	6	24.31	24.89	24.54

The data rate 1Mbps and 6Mbps 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	24.34	24.96	24.54

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

©Copyright. All rights reserved by CTTL.

this condition.

802.11n-HT40 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		2422MHz (Ch3)	2437MHz (Ch6)	2452 MHz (Ch9)
802.11n(40MHz)	MCS0	25.61	25.86	26.05

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

Conclusion: Pass

ANT10

802.11b/g mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11b	1	22.58	22.34	22.54
802.11g	6	24.90	25.86	24.78

The data rate 1Mbps and 6Mbps 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	24.82	25.79	24.73

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	25.83	26.12	25.79

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

Conclusion: Pass

©Copyright. All rights reserved by CTTL.

MIMO&CDD

Ant9	0.79dBi
Ant10	0.29dBi
	For CDD: Directional Gain=3.55 dBi
	The Test Result = the Total value of (ant9+ant10)+DG • $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ *where* Each antenna is driven by no more than one spatial stream; N_{SS} = the number of independent spatial streams of data; N_{ANT} = the total number of antennas $g_{j,k} = 10^{G_k/20}$ if the kth antenna is being fed by spatial stream j, or zero if it is not; G_k is the gain in dBi of the kth antenna. The antenna gain is provided by the manufacturer。

802.11b/g mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11b	1	25.67	25.74	25.58
802.11g	6	27.99	28.13	28.11

The data rate 1Mbps and 6Mbps 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	27.99	28.06	27.96

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)

©Copyright. All rights reserved by CTTL.

802.11n(40MHz)	MCS0	28.58	29.06	29.05

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

Conclusion: Pass

©Copyright. All rights reserved by CTTL.

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:

SISO-ANT10

The measurements were performed separately in Chain 1, Chain 2, and MIMO (Chain 1+2), and only the worst cases are shown in this report.

802.11b/g mode

Mode	Channel	Power Spectral Density (dBm/3 kHz)		Conclusion
802.11b	1	Fig.A.3.1	-4.71	**P**
	6	Fig.A.3.2	-3.78	**P**
	11	Fig.A.3.3	-4.88	**P**
802.11g	1	Fig.A.3.4	-9.64	**P**
	6	Fig.A.3.5	-9.42	**P**
	11	Fig.A.3.6	-9.94	**P**

802.11n-HT20 mode

Mode	Channel	Power Spectral Density (dBm/3 kHz)		Conclusion
802.11n (HT20)	1	Fig.A.3.7	-9.54	**P**
	6	Fig.A.3.8	-8.60	**P**
	11	Fig.A.3.9	-10.52	**P**

802.11n-HT40 mode

Mode	Channel	Power Spectral Density (dBm/3 kHz)		Conclusion
802.11n (HT40)	3	Fig.A.3.10	-10.36	**P**
	6	Fig.A.3.11	-11.64	**P**
	9	Fig.A.3.12	-11.57	**P**

©Copyright. All rights reserved by CTTL.

Conclusion: Pass

MIMO&CDD

802.11b/g mode

Mode	Channel	Power Spectral Density (dBm/3 kHz) ANT9		Power Spectral Density (dBm/3 kHz) ANT10		Power Spectral Density (dBm/3 kHz)	Conclusion
802.11b	1	Fig.A.3.13	-5.34	Fig.A.3.25	-4.84	-2.07	P
	6	Fig.A.3.14	-5.53	Fig.A.3.26	-4.50	-1.97	P
	11	Fig.A.3.15	-4.77	Fig.A.3.27	-5.69	-2.20	P
802.11g	1	Fig.A.3.16	-9.16	Fig.A.3.28	-8.84	-5.99	P
	6	Fig.A.3.17	-10.70	Fig.A.3.29	-8.85	-6.67	P
	11	Fig.A.3.18	-10.02	Fig.A.3.30	-10.19	-7.09	P

802.11n-HT20 mode

Mode	Channel	Power Spectral Density (dBm/3 kHz)		Power Spectral Density (dBm/3 kHz)		Power Spectral Density (dBm/3 kHz)	Conclusion
802.11n (HT20)	1	Fig.A.3.19	-10.24	Fig.A.3.31	-9.45	-6.82	P
	6	Fig.A.3.20	-10.25	Fig.A.3.32	-9.15	-6.65	P
	11	Fig.A.3.21	-9.81	Fig.A.3.33	-10.20	-6.99	P

802.11n-HT40 mode

Mode	Channel	Power Spectral Density (dBm/3 kHz)		Power Spectral Density (dBm/3 kHz)		Power Spectral Density (dBm/3 kHz)	Conclusion
802.11n (HT40)	3	Fig.A.3.22	-13.66	Fig.A.3.34	-12.57	-10.07	P
	6	Fig.A.3.23	-12.88	Fig.A.3.35	-10.90	-8.77	P
	9	Fig.A.3.24	-13.16	Fig.A.3.36	-10.22	-8.44	P

Conclusion: Pass

Test graphs as below:

©Copyright. All rights reserved by CTTL.

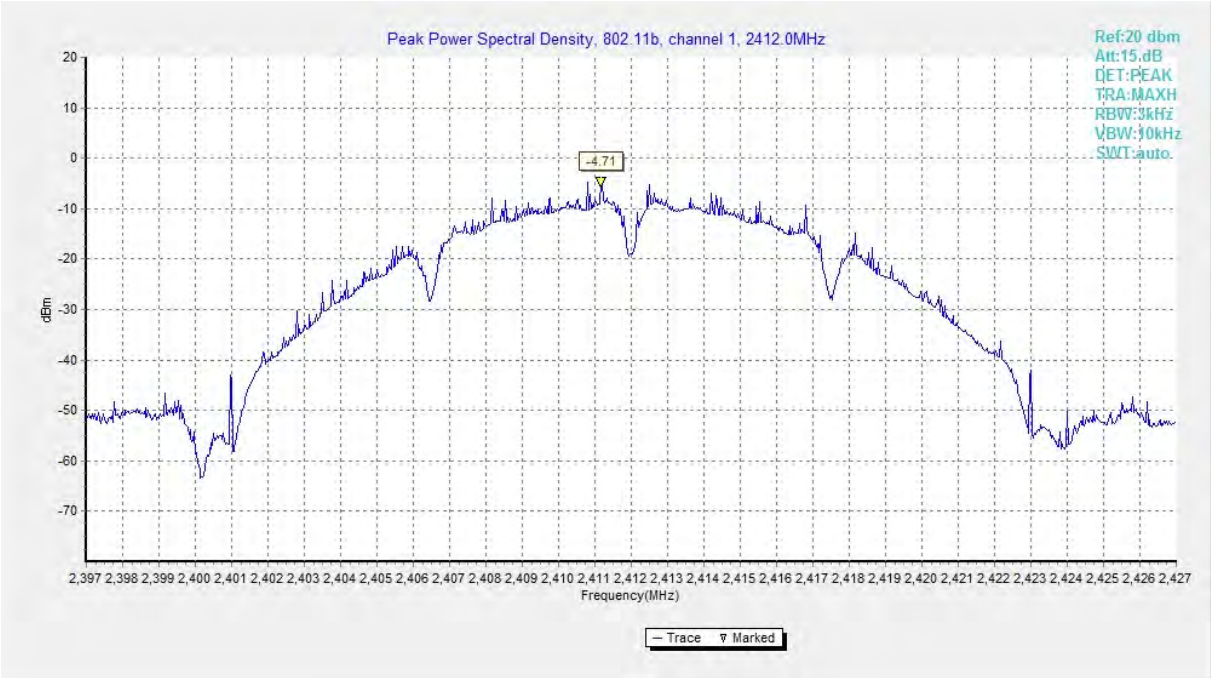


Fig.A.3.1 Power Spectral Density(802.11b,Ch1)

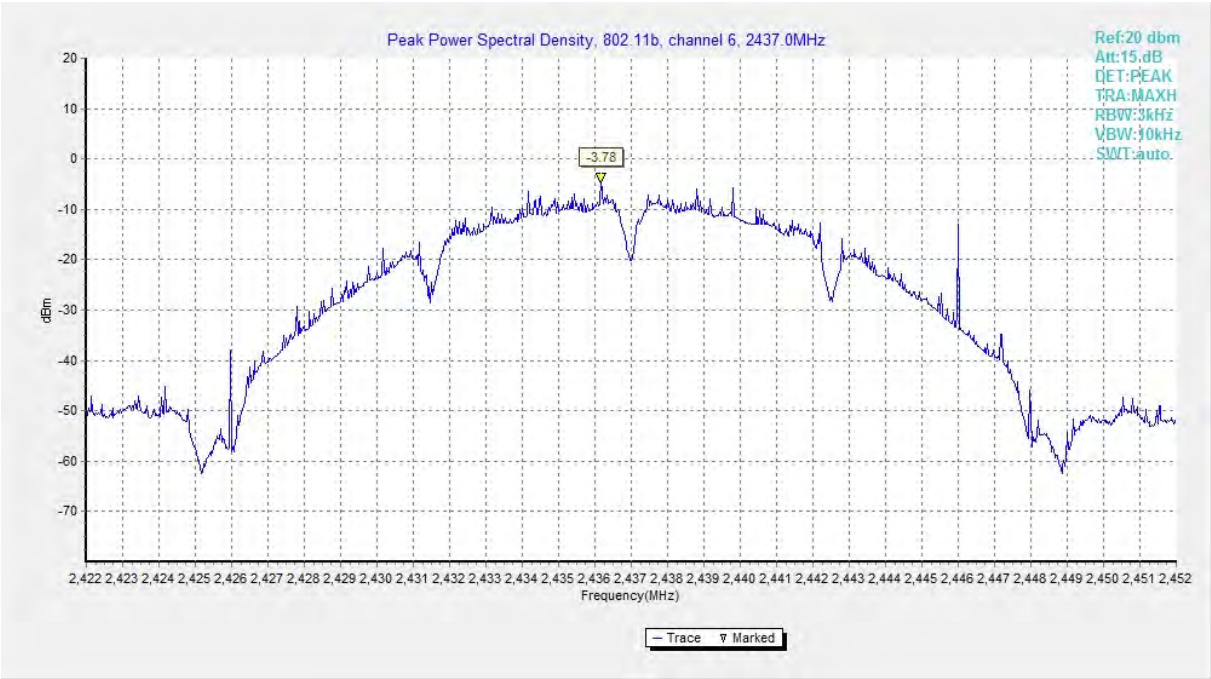


Fig.A.3.2 Power Spectral Density (802.11b, Ch 6)

©Copyright. All rights reserved by CTTL.

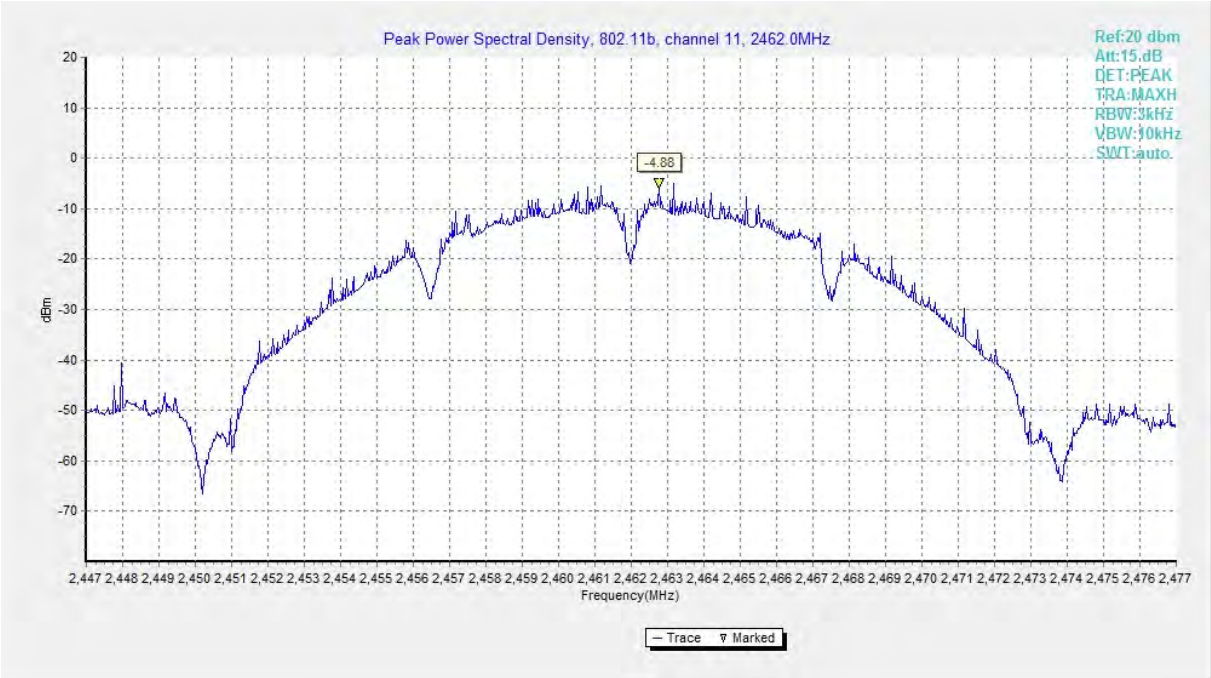


Fig.A.3.3 Power Spectral Density (802.11b, Ch 11)

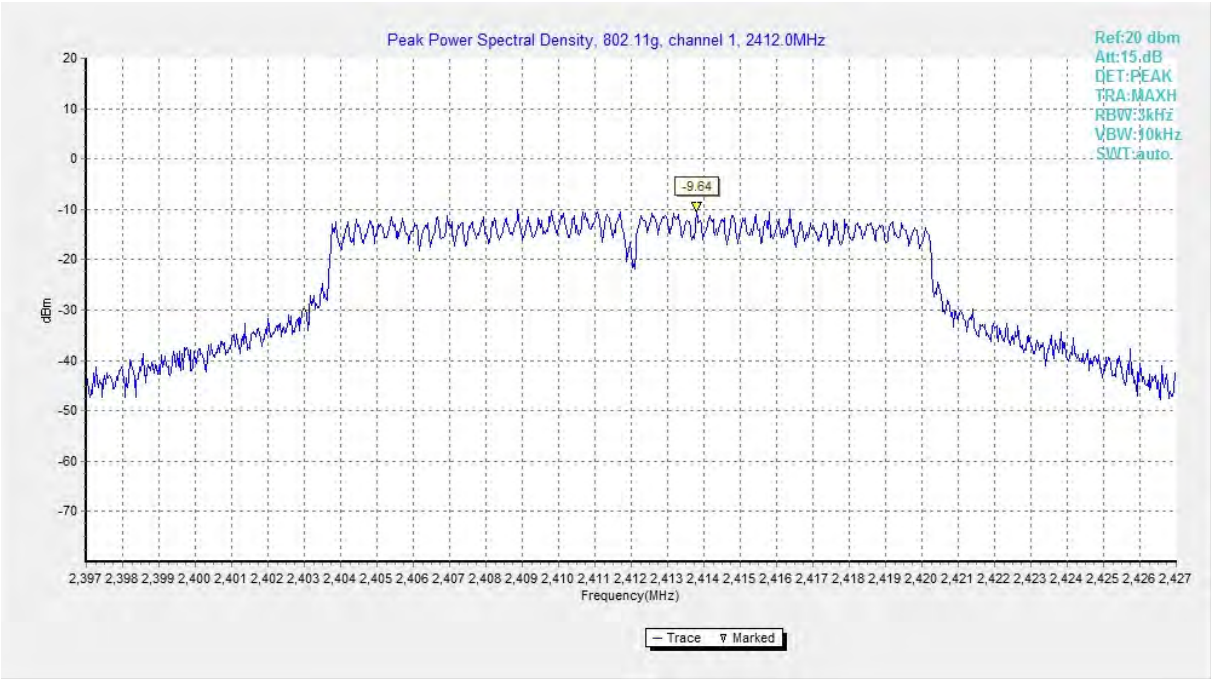


Fig.A.3.4 Power Spectral Density (802.11g, Ch 1)

©Copyright. All rights reserved by CTTL.

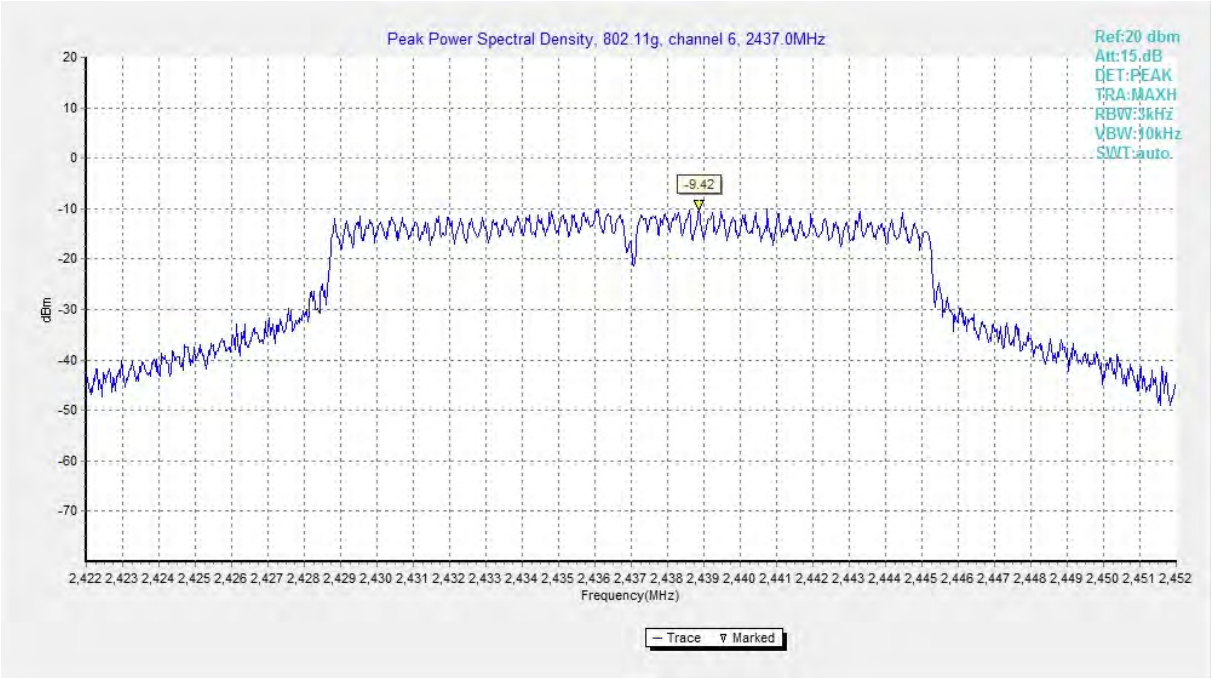


Fig.A.3.5 Power Spectral Density (802.11g, Ch 6)

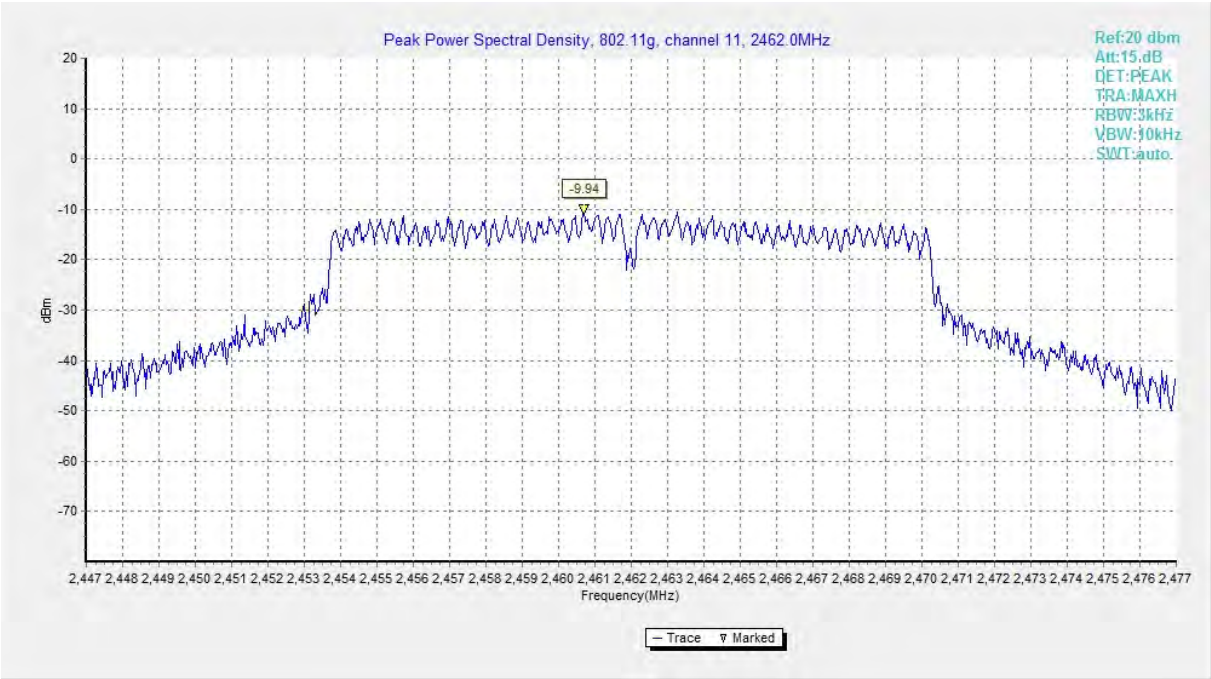


Fig.A.3.6 Power Spectral Density (802.11g, Ch 11)

©Copyright. All rights reserved by CTTL.

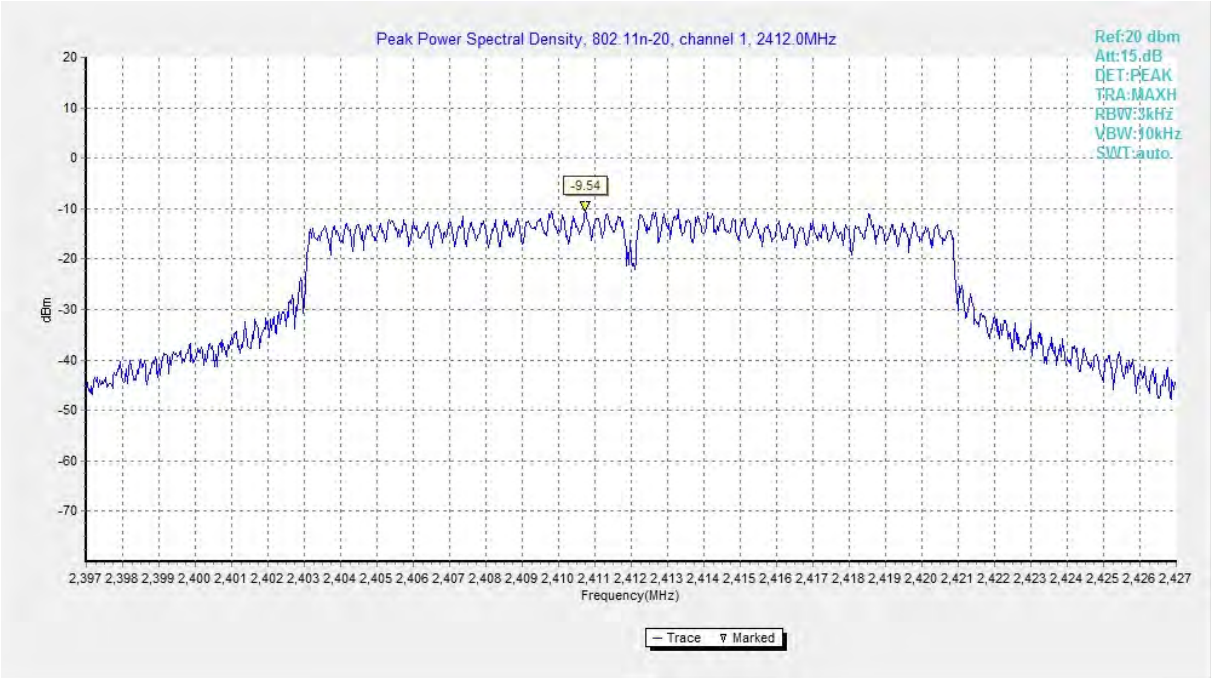


Fig.A.3.7 Power Spectral Density (802.11n-HT20, Ch 1)

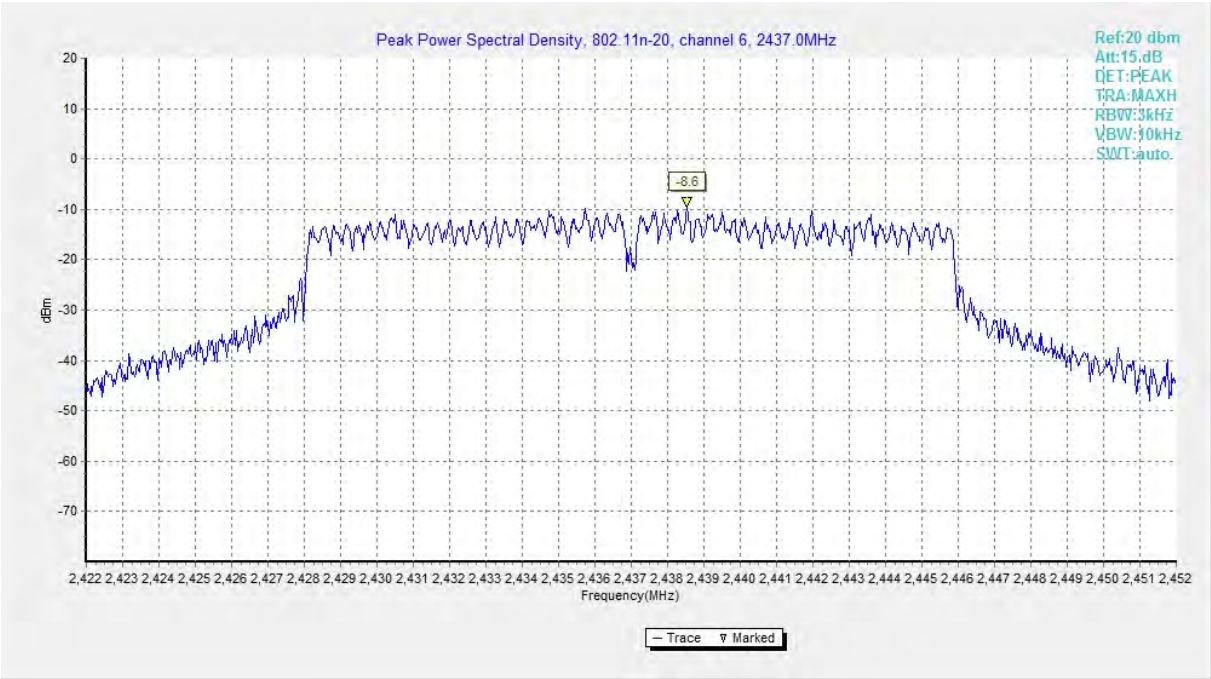


Fig.A.3.8 Power Spectral Density (802.11n-HT20, Ch 6)

©Copyright. All rights reserved by CTTL.

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

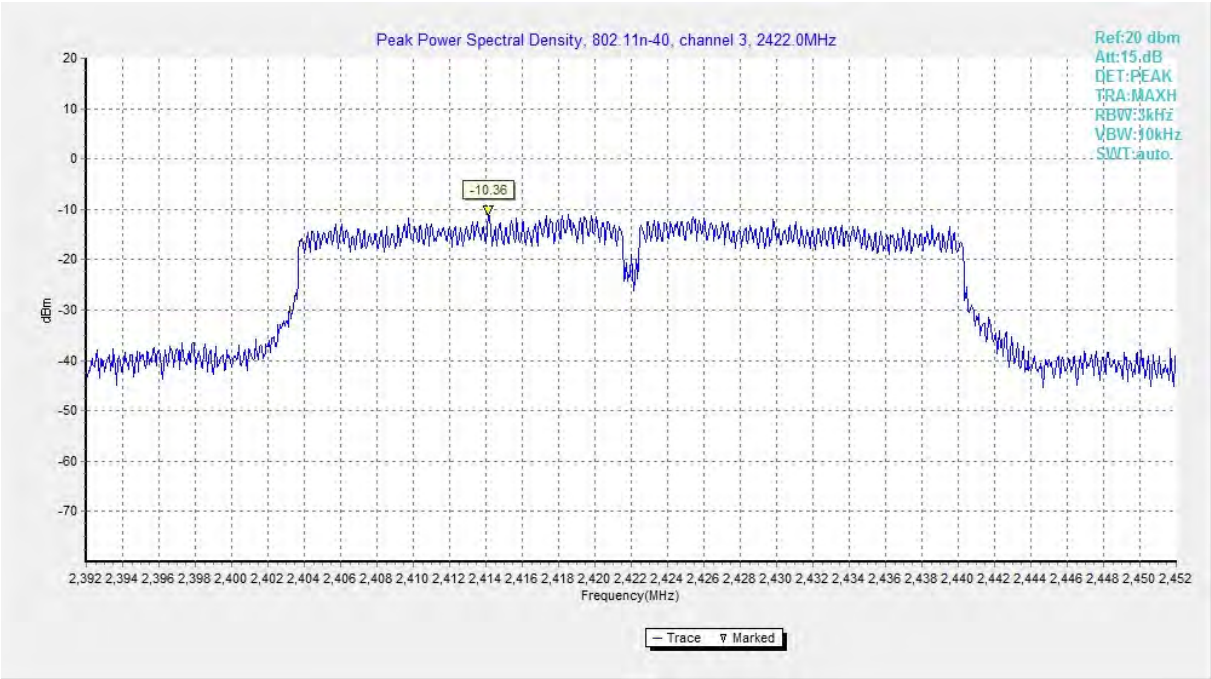


Fig.A.3.10 Power Spectral Density (802.11n-HT40, Ch 3)

©Copyright. All rights reserved by CTTL.

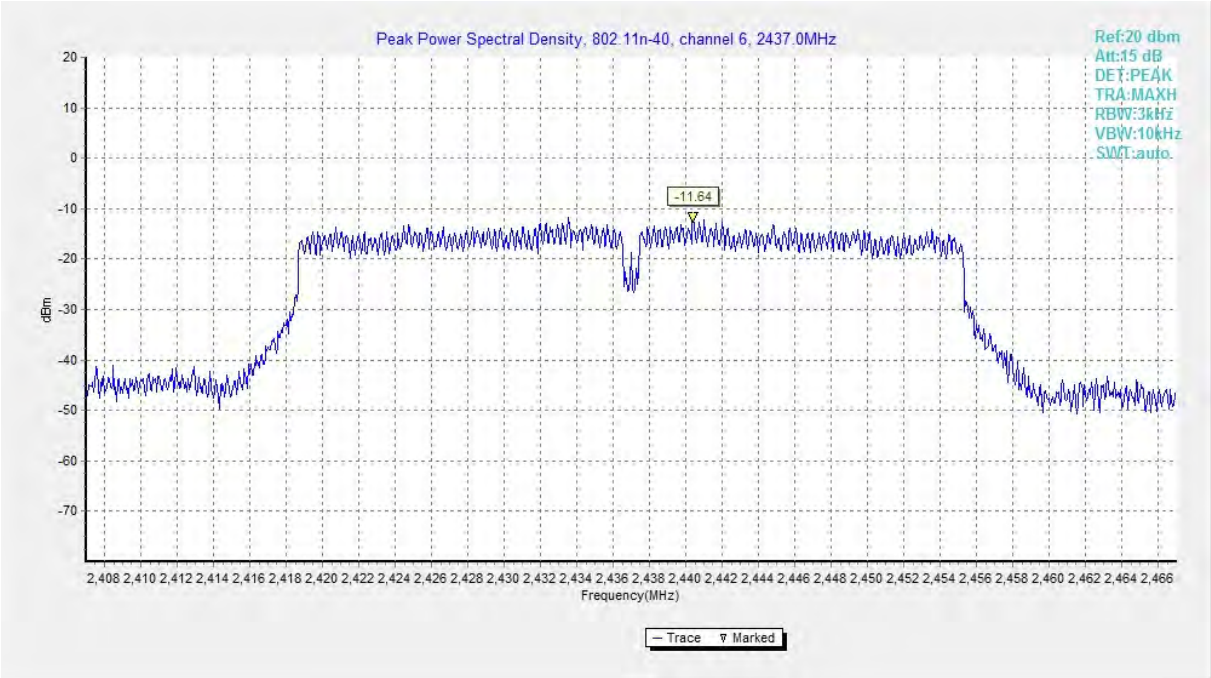


Fig.A.3.11 Power Spectral Density (802.11n-HT40, Ch 6)

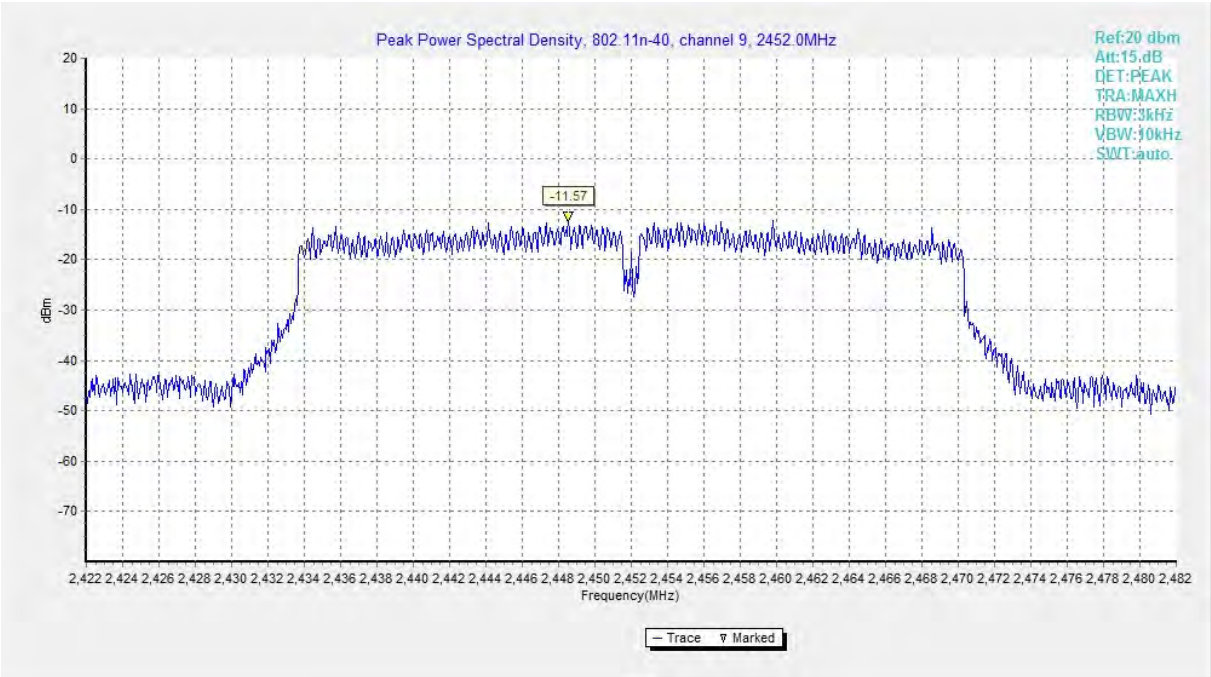


Fig.A.3.12 Power Spectral Density (802.11n-HT40, Ch 9)

©Copyright. All rights reserved by CTTL.

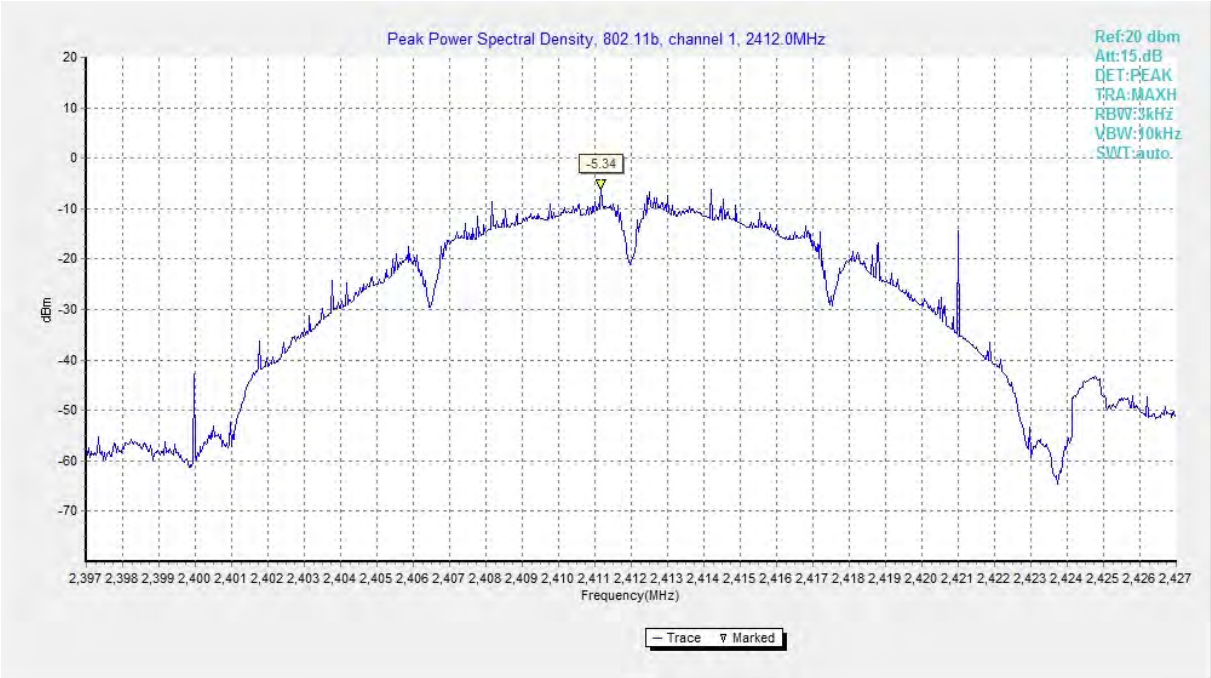


Fig.A.3.13 Power Spectral Density(802.11b,Ch1 ANT9)

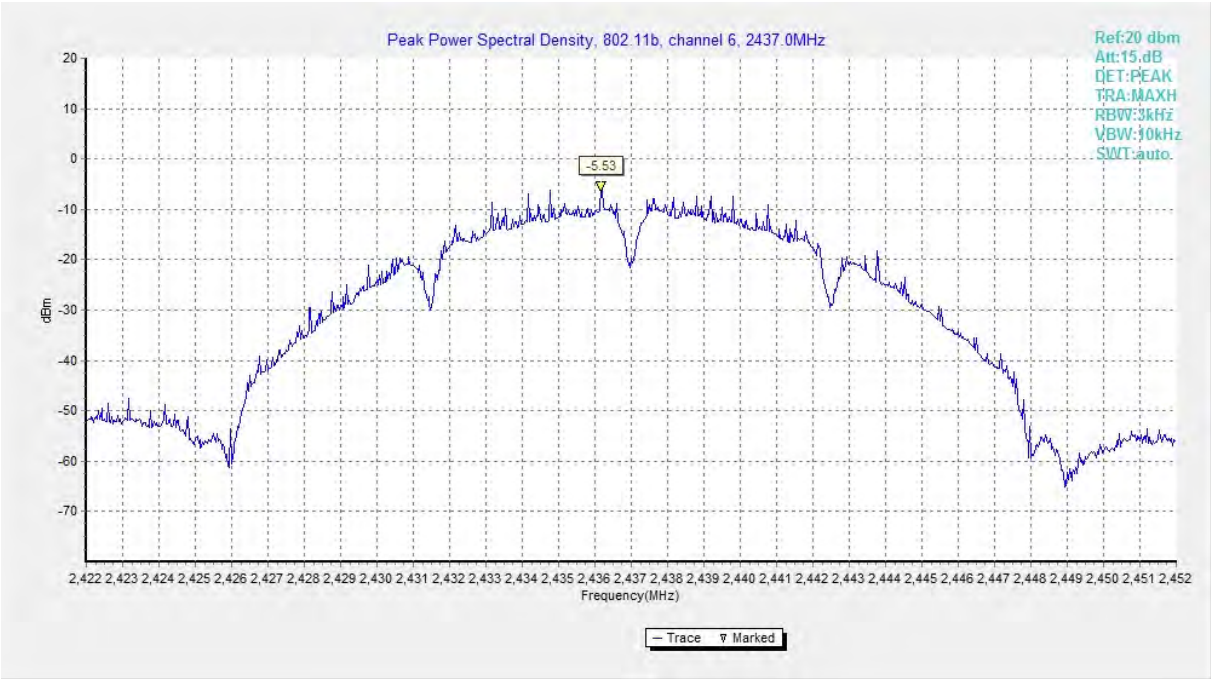


Fig.A.3.14 Power Spectral Density (802.11b, Ch 6 ANT9)

©Copyright. All rights reserved by CTTL.

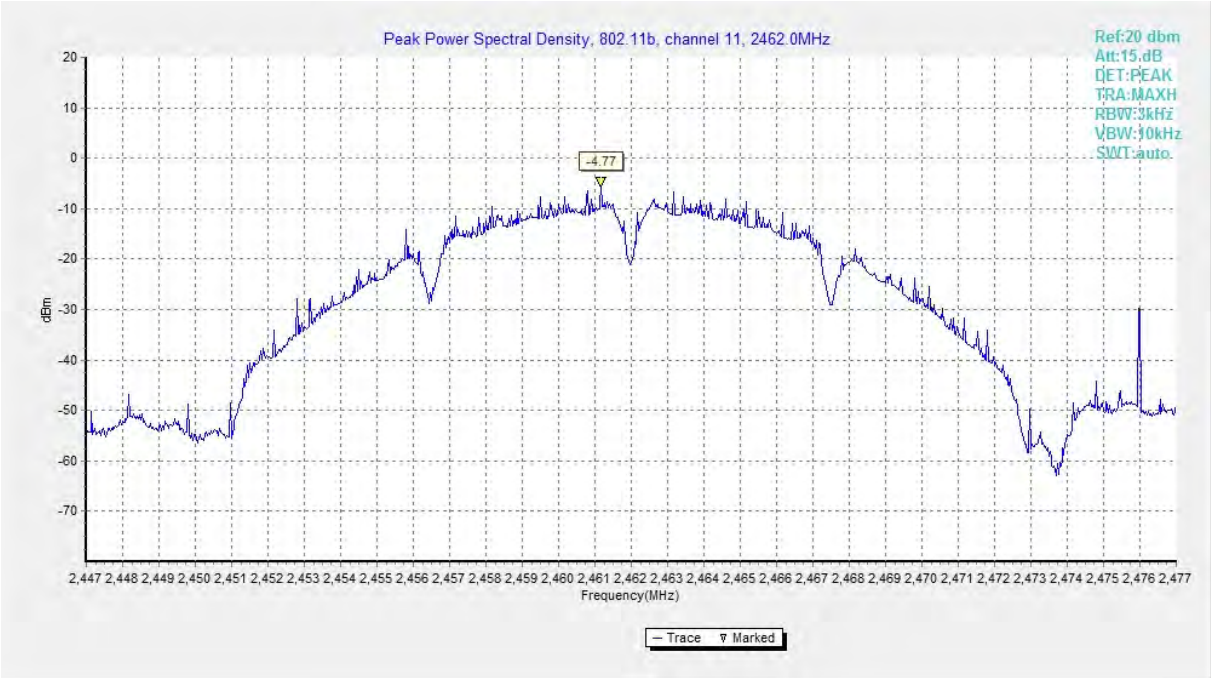


Fig.A.3.15 Power Spectral Density (802.11b, Ch 11 ANT9)

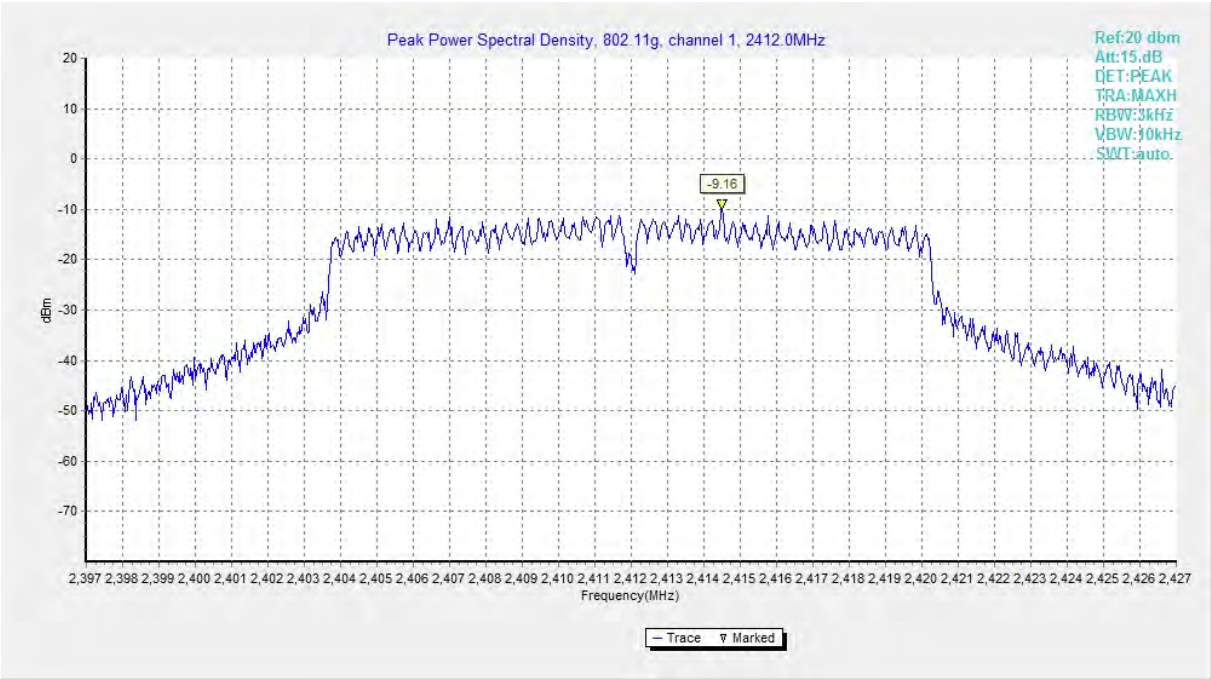


Fig.A.3.16 Power Spectral Density (802.11g, Ch 1 ANT9)

©Copyright. All rights reserved by CTTL.

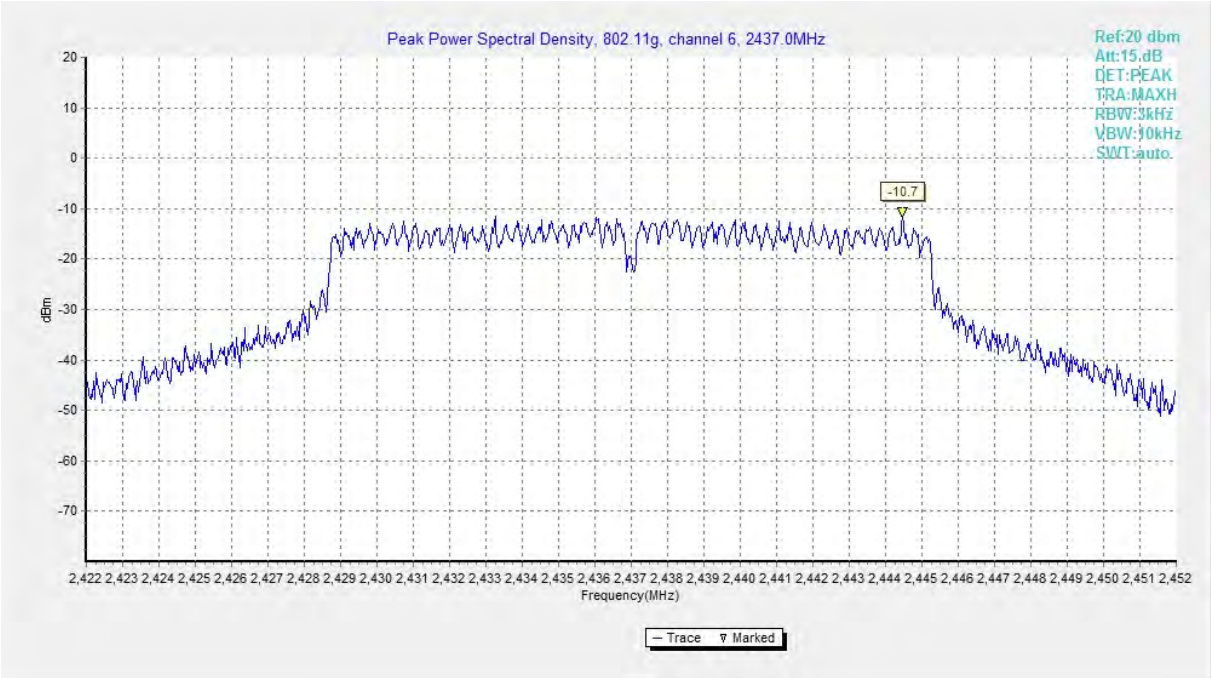


Fig.A.3.17 Power Spectral Density (802.11g, Ch 6 ANT9)

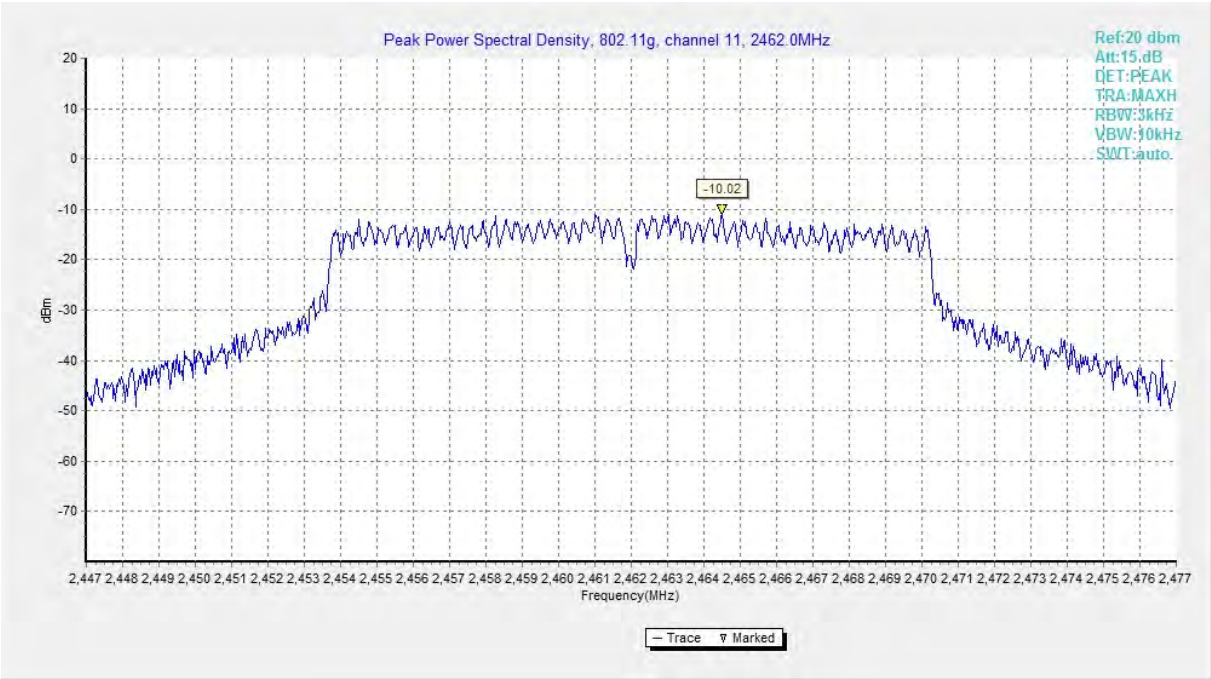


Fig.A.3.18 Power Spectral Density (802.11g, Ch 11 ANT9)

©Copyright. All rights reserved by CTTL.

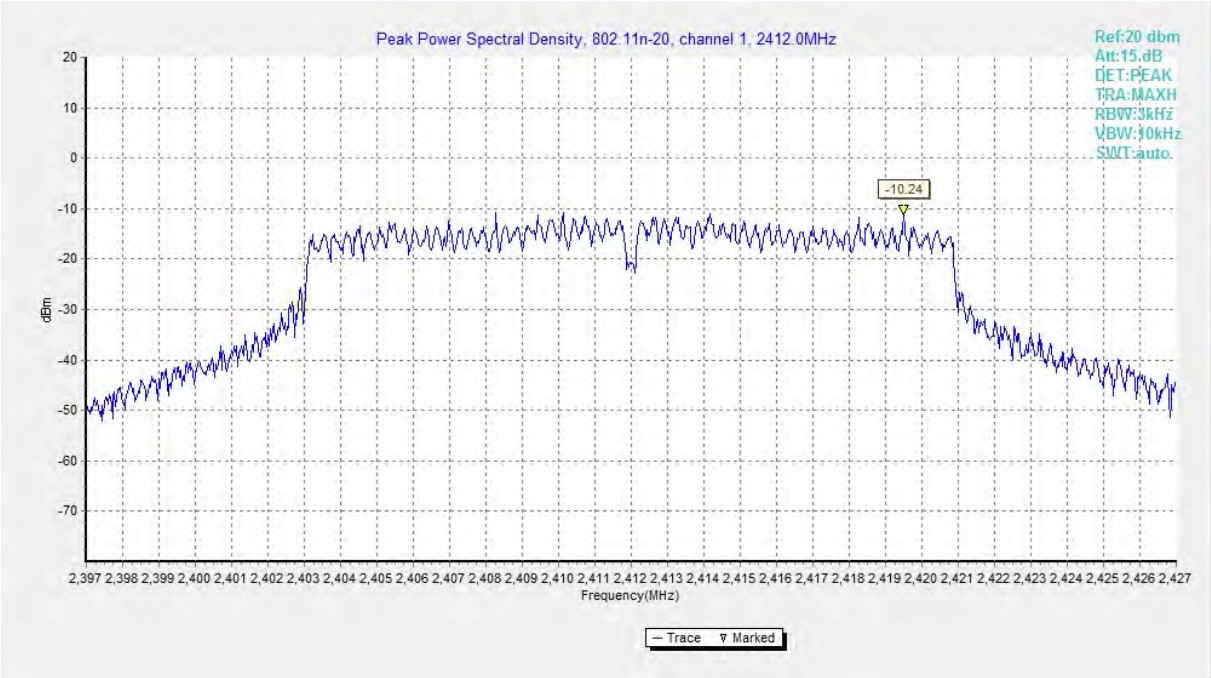


Fig.A.3.19 Power Spectral Density (802.11n-HT20, Ch 1 ANT9)

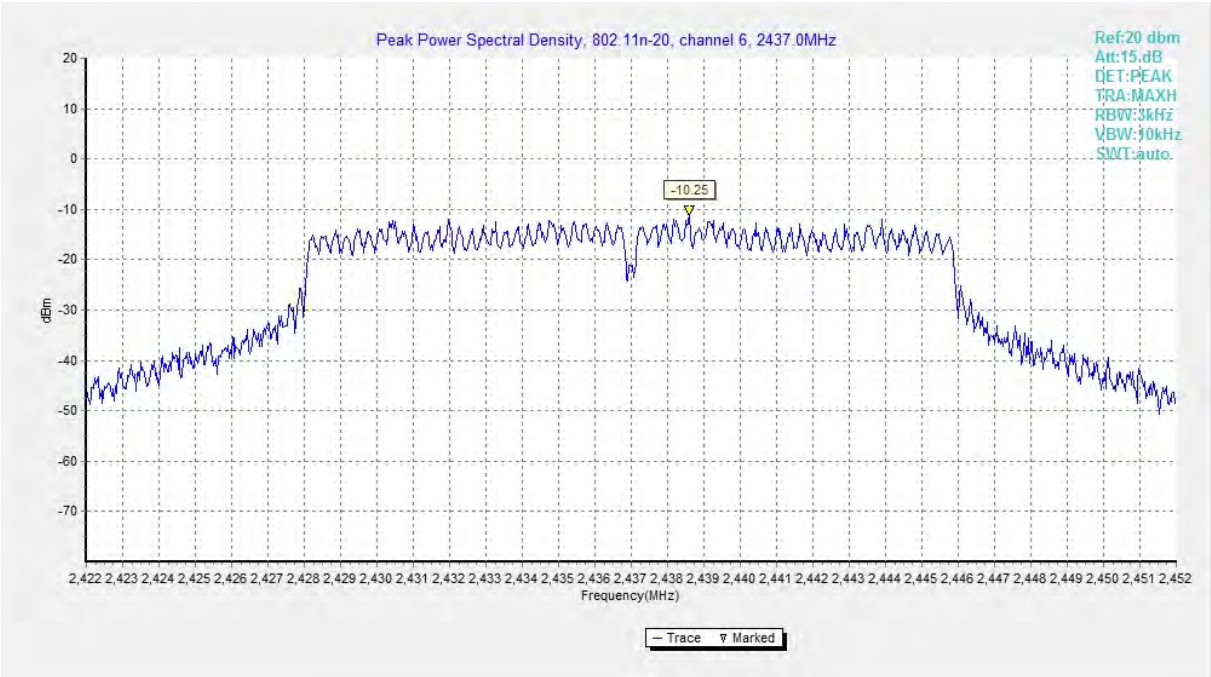


Fig.A.3.20 Power Spectral Density (802.11n-HT20, Ch 6 ANT9)

©Copyright. All rights reserved by CTTL.

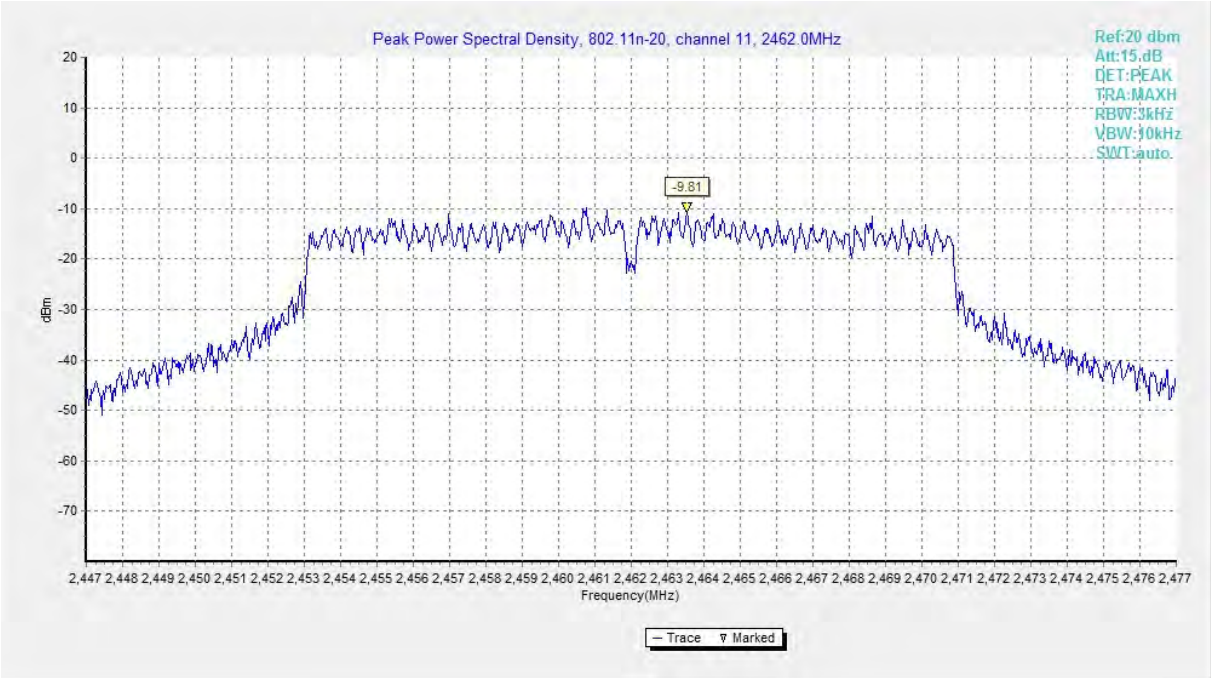


Fig.A.3.21 Power Spectral Density (802.11n-HT20, Ch 11 ANT9)

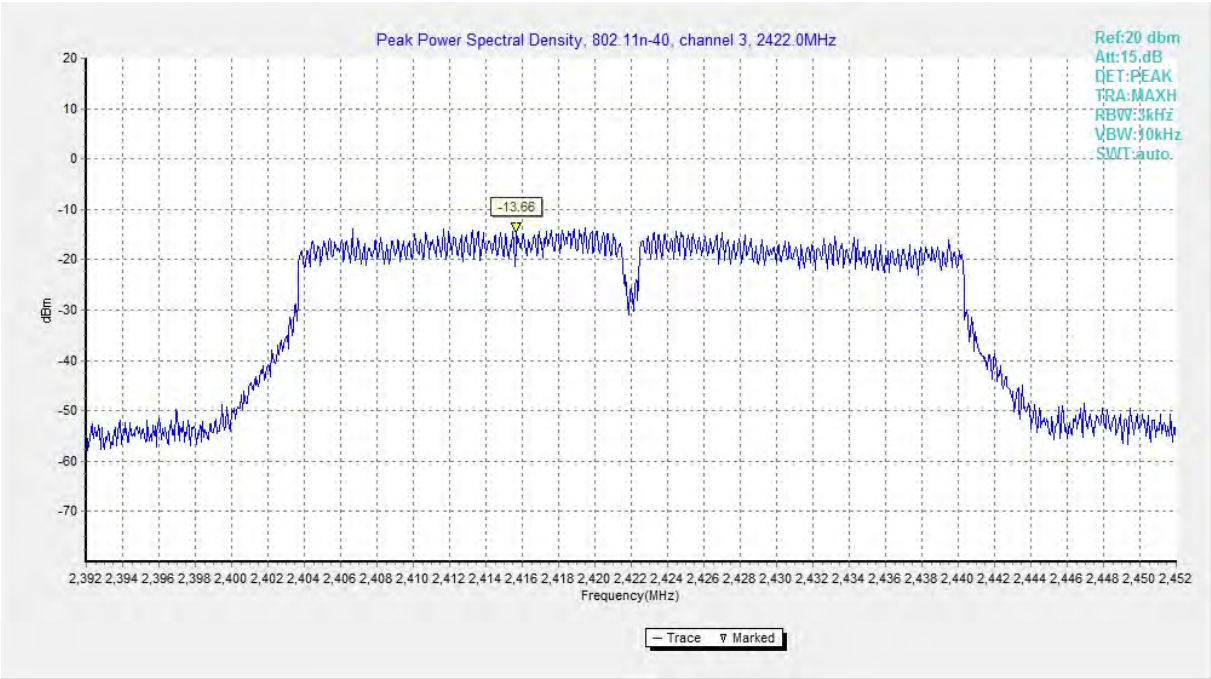


Fig.A.3.22 Power Spectral Density (802.11n-HT40, Ch 3 ANT9)

©Copyright. All rights reserved by CTTL.

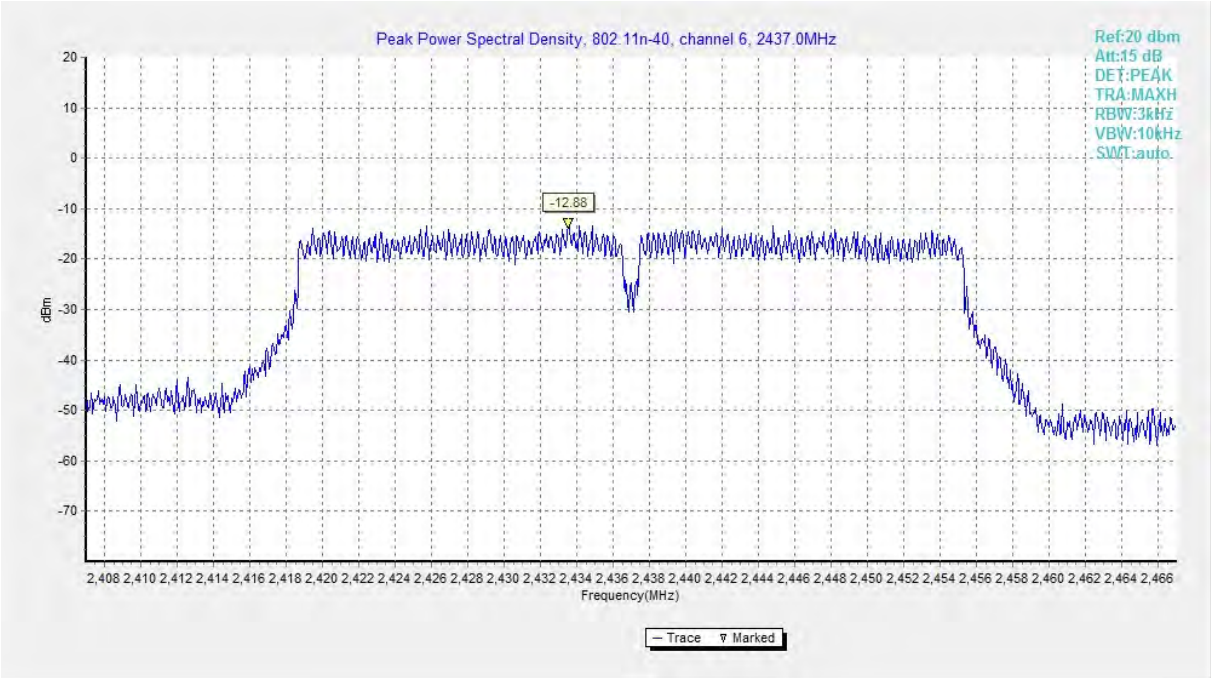


Fig.A.3.23 Power Spectral Density (802.11n-HT40, Ch 6 ANT9)

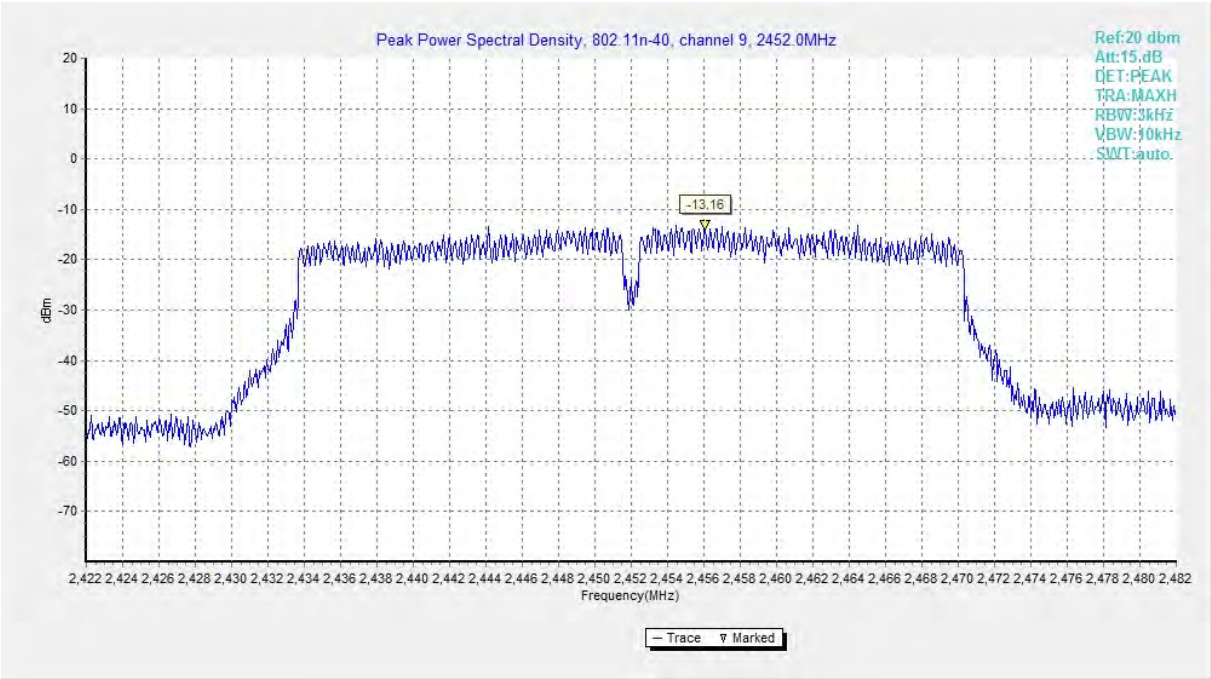


Fig.A.3.24 Power Spectral Density (802.11n-HT40, Ch 9 ANT9)

©Copyright. All rights reserved by CTTL.

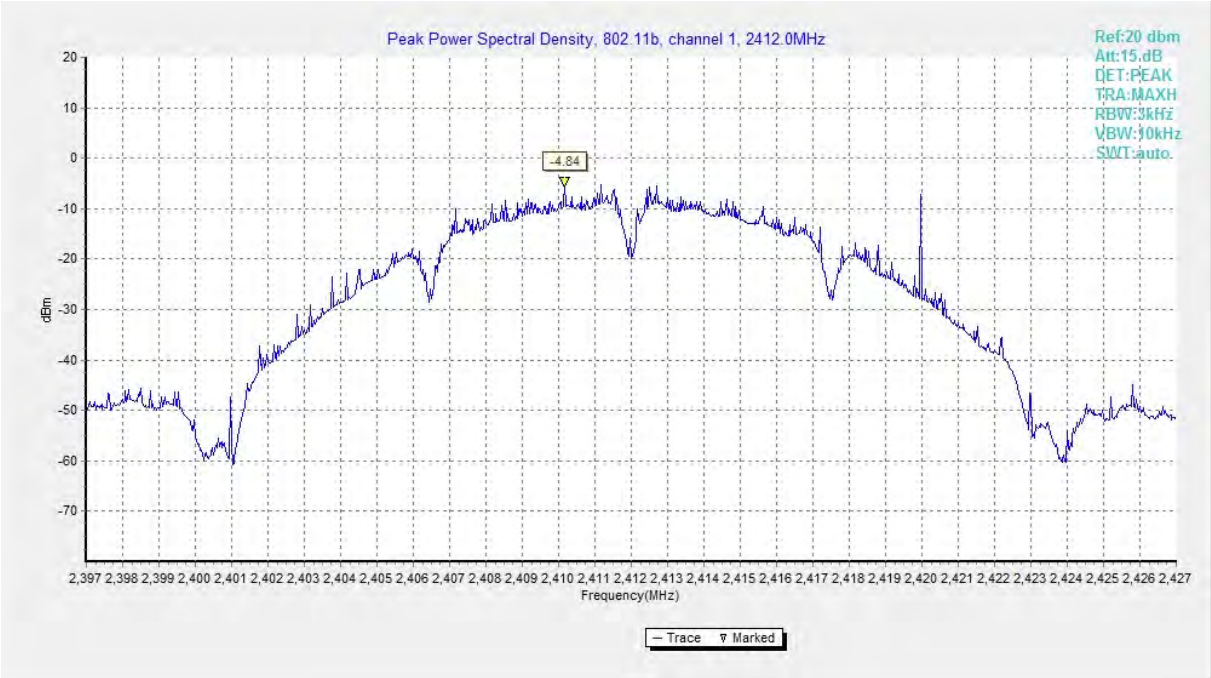


Fig.A.3.25 Power Spectral Density(802.11b,Ch1 ANT10)

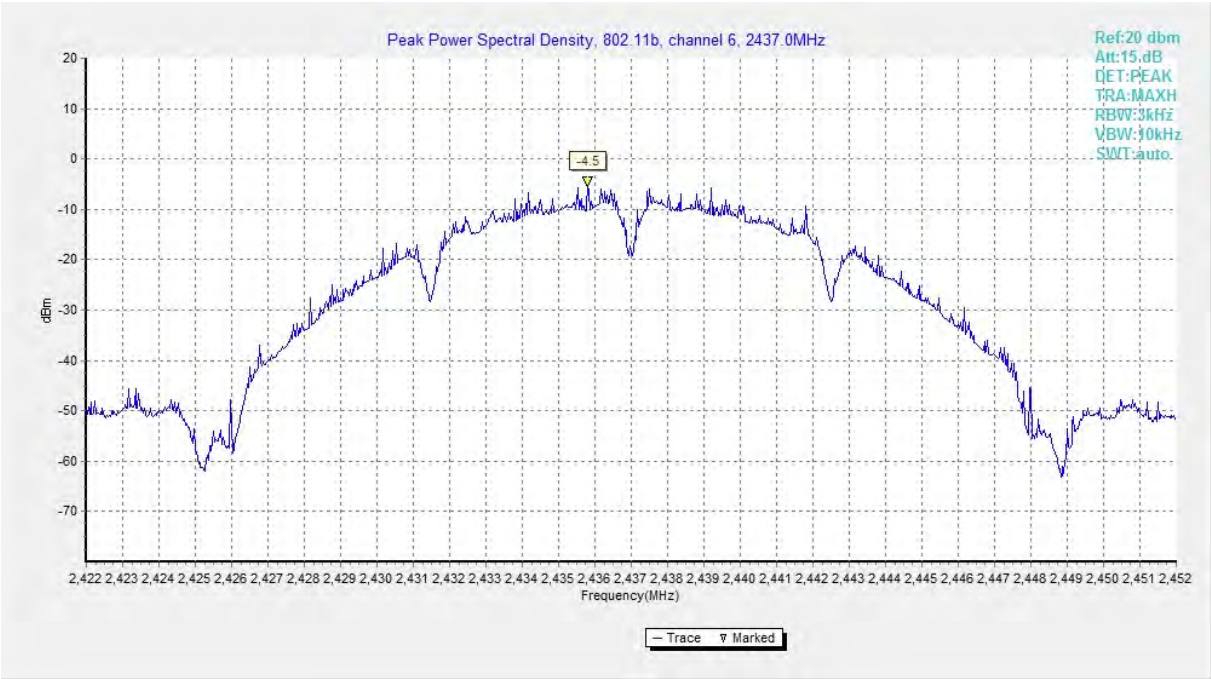


Fig.A.3.26 Power Spectral Density (802.11b, Ch 6 ANT10)

©Copyright. All rights reserved by CTTL.

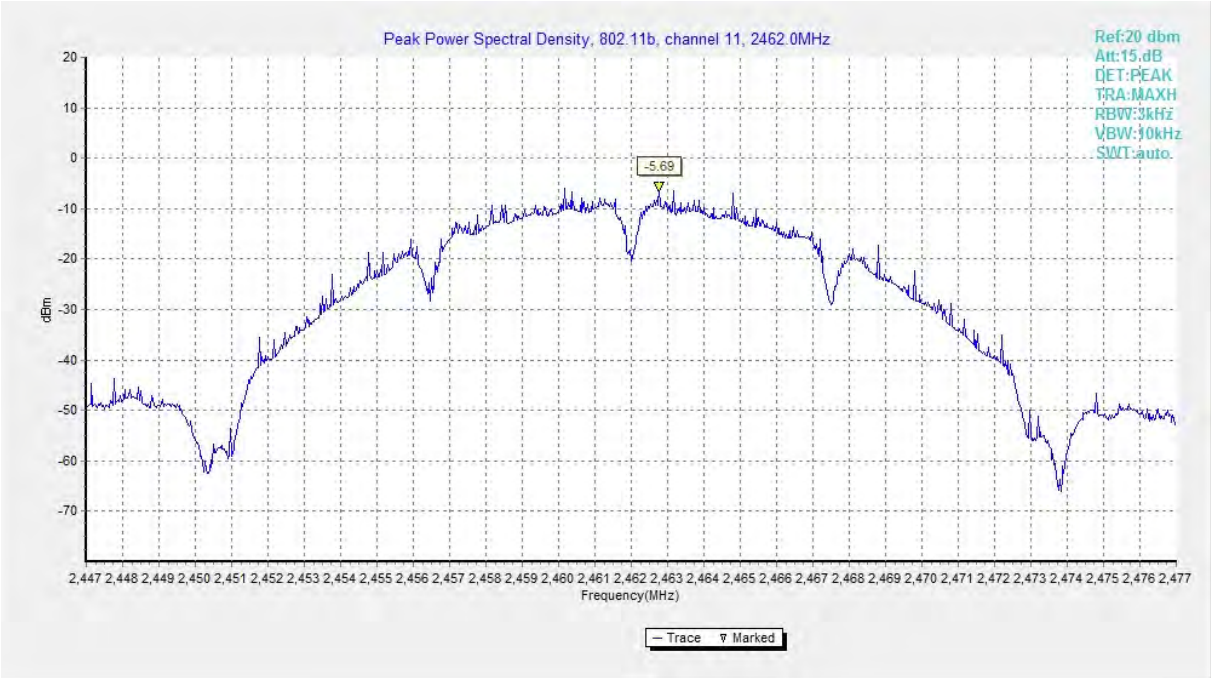


Fig.A.3.27 Power Spectral Density (802.11b, Ch 11 ANT10)

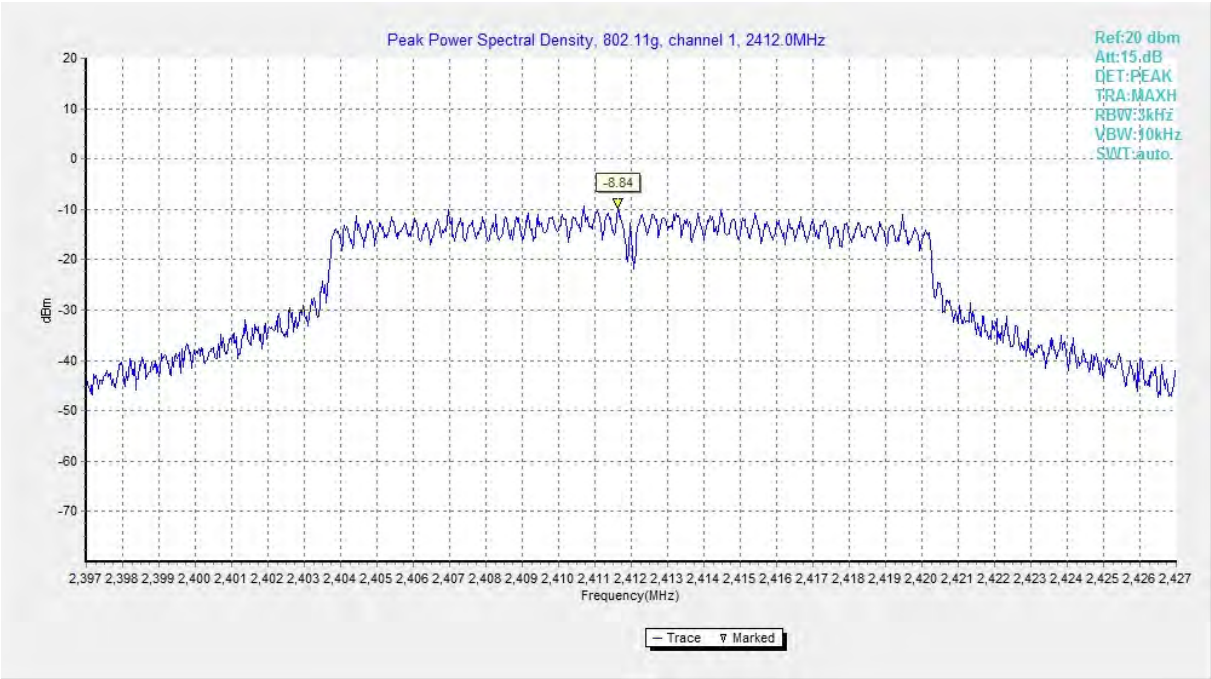


Fig.A.3.28 Power Spectral Density (802.11g, Ch 1 ANT10)

©Copyright. All rights reserved by CTTL.

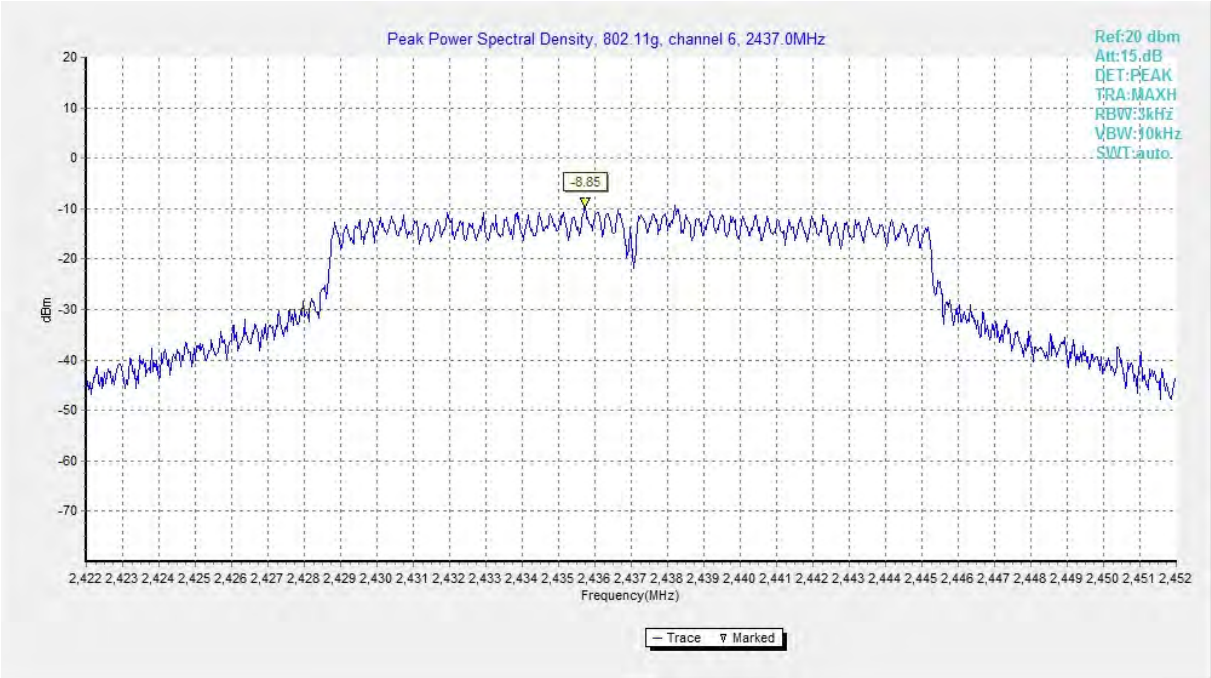


Fig.A.3.29 Power Spectral Density (802.11g, Ch 6 ANT10)

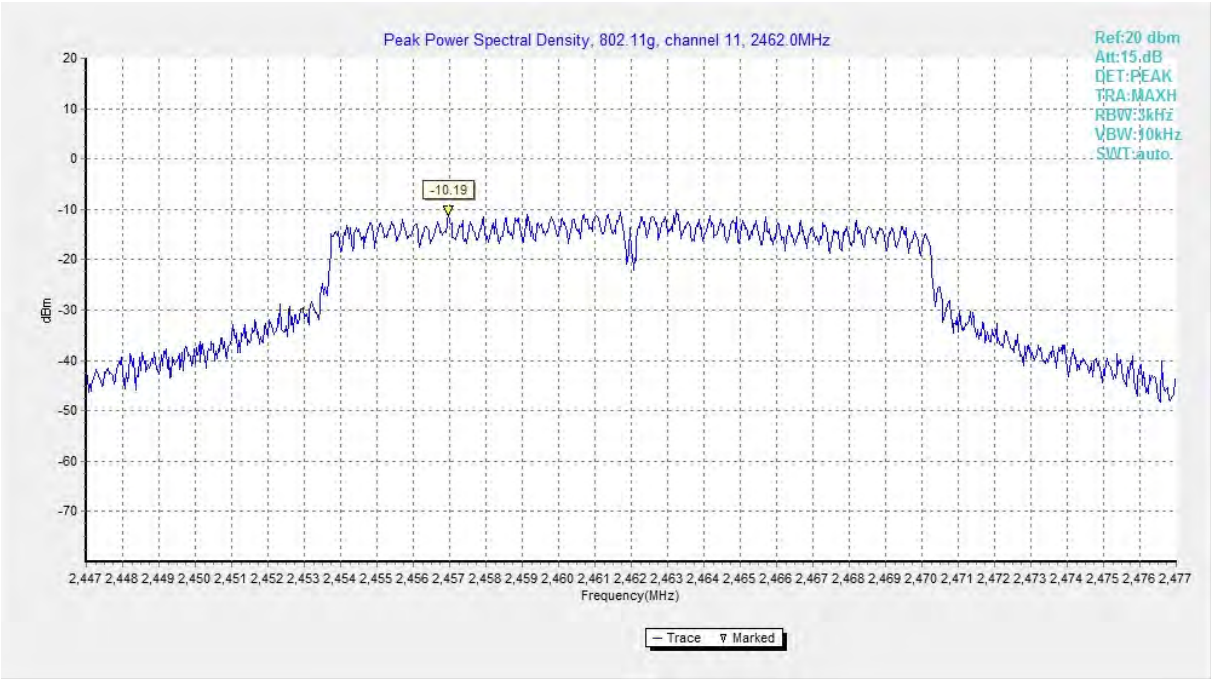


Fig.A.3.30 Power Spectral Density (802.11g, Ch 11 ANT10)

©Copyright. All rights reserved by CTTL.

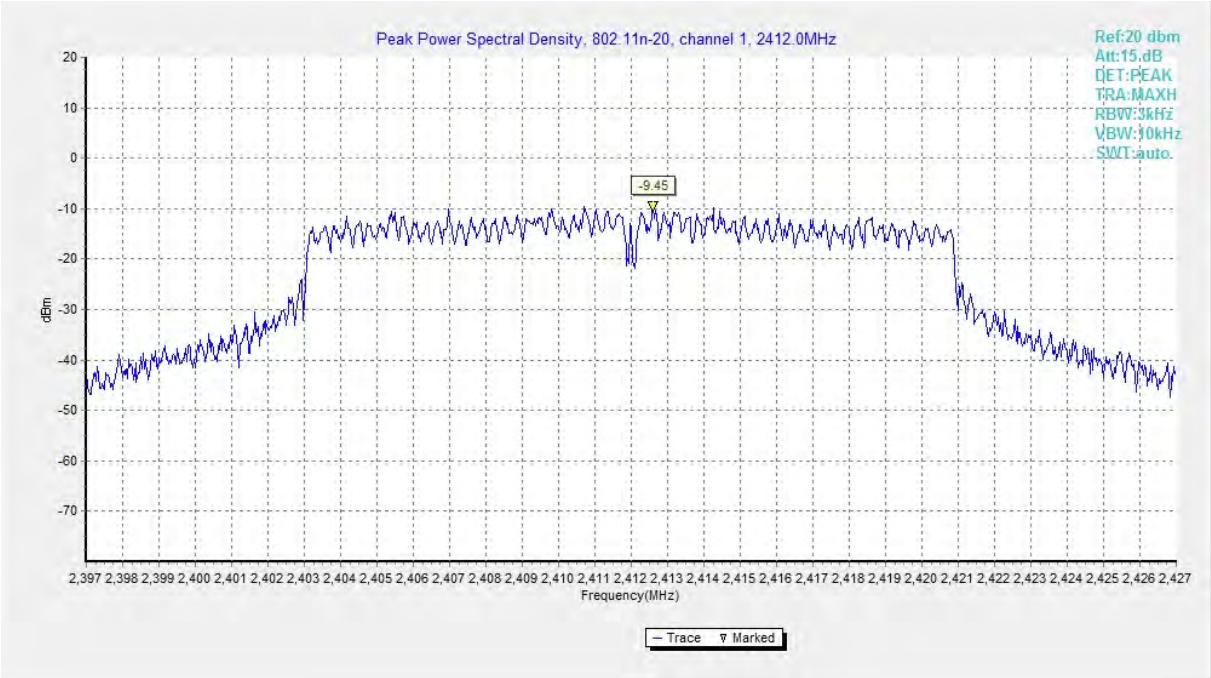


Fig.A.3.31 Power Spectral Density (802.11n-HT20, Ch 1 ANT10)

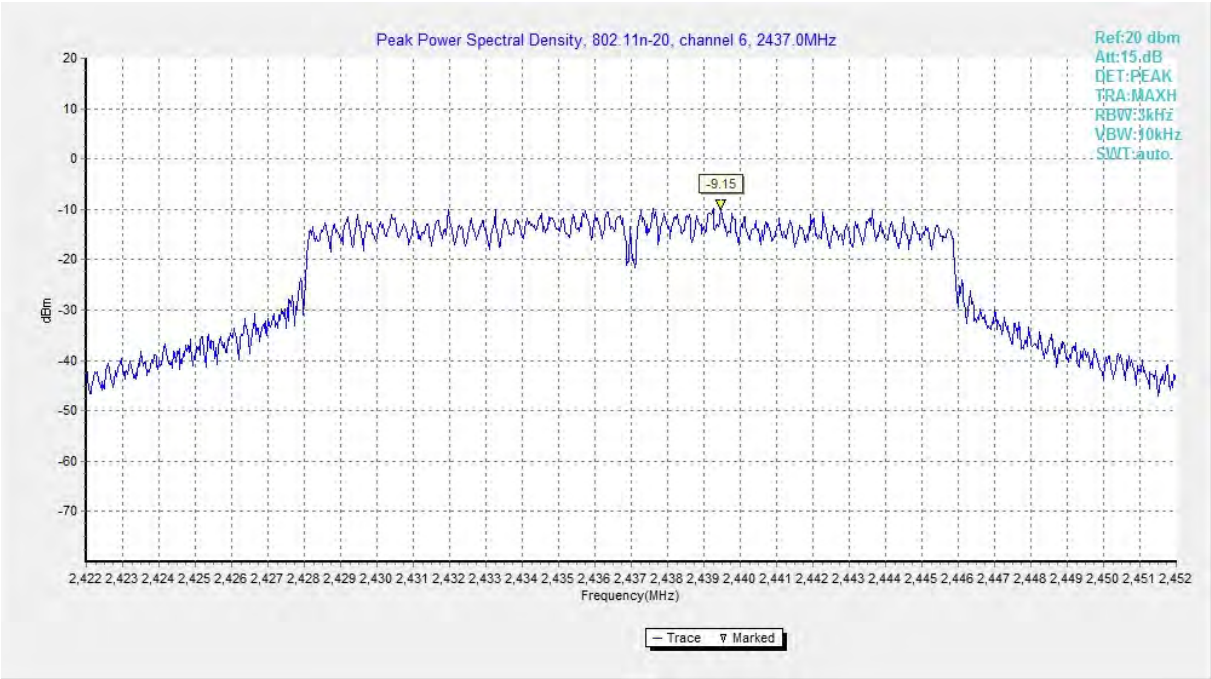


Fig.A.3.32 Power Spectral Density (802.11n-HT20, Ch 6 ANT10)

©Copyright. All rights reserved by CTTL.

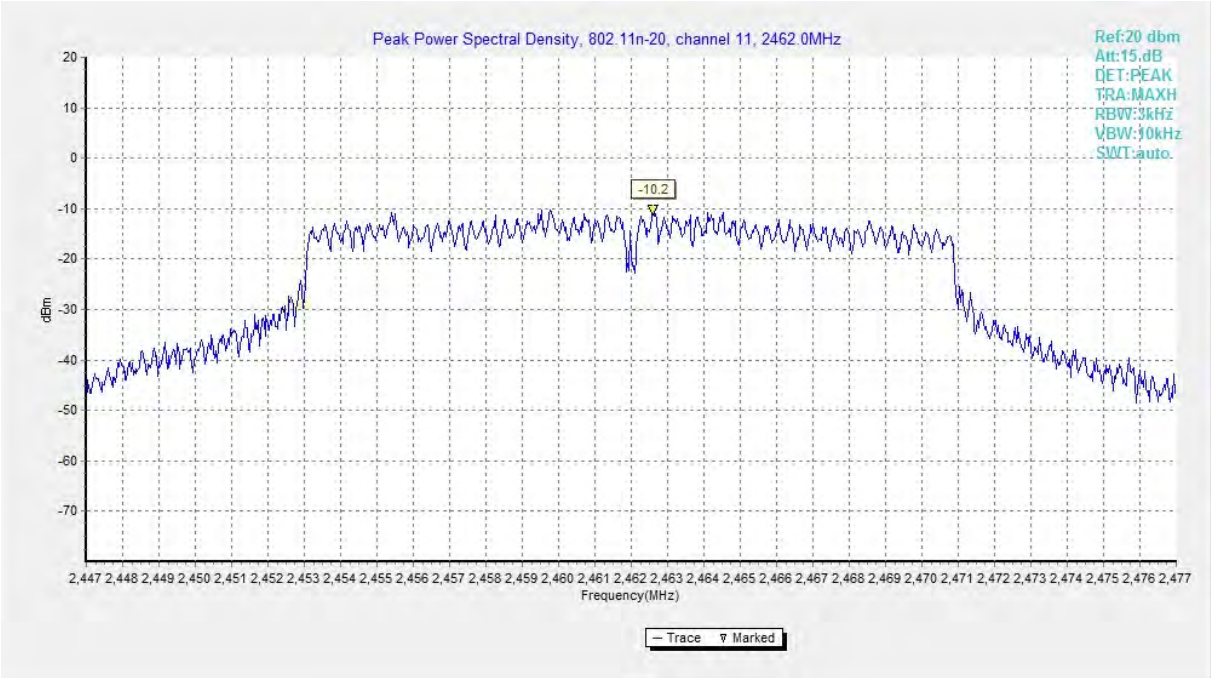


Fig.A.3.33 Power Spectral Density (802.11n-HT20, Ch 11 ANT10)

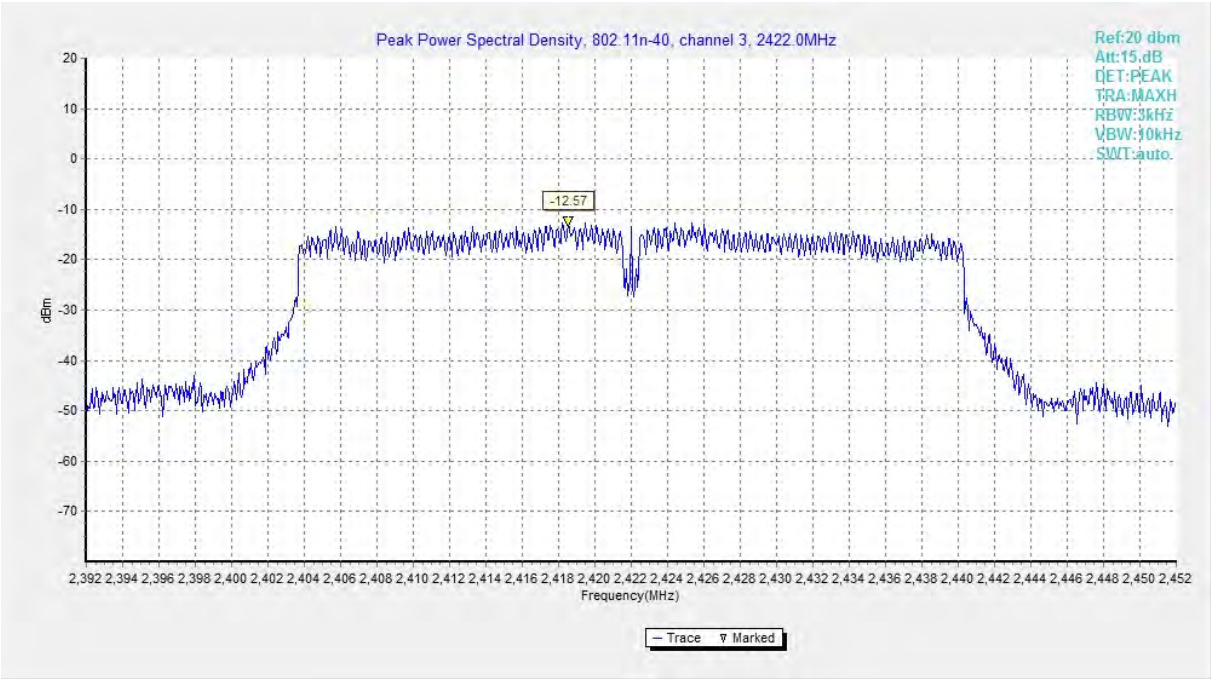


Fig.A.3.34 Power Spectral Density (802.11n-HT40, Ch 3 ANT10)

©Copyright. All rights reserved by CTTL.

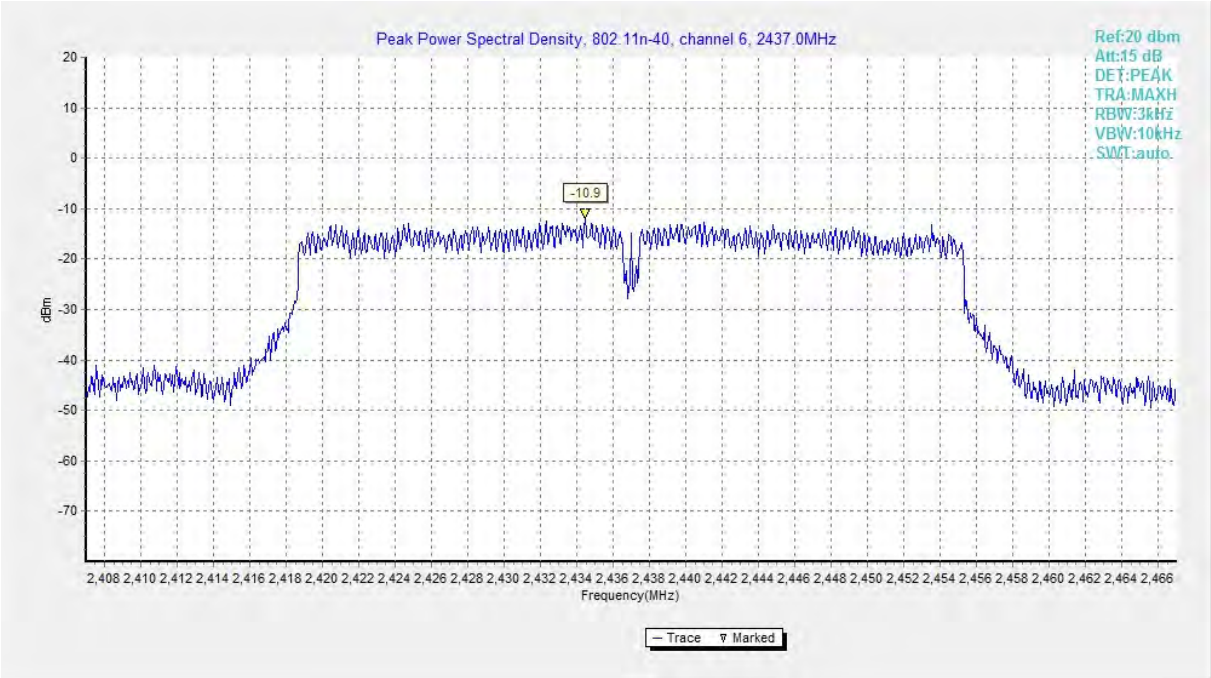


Fig.A.3.35 Power Spectral Density (802.11n-HT40, Ch 6 ANT10)

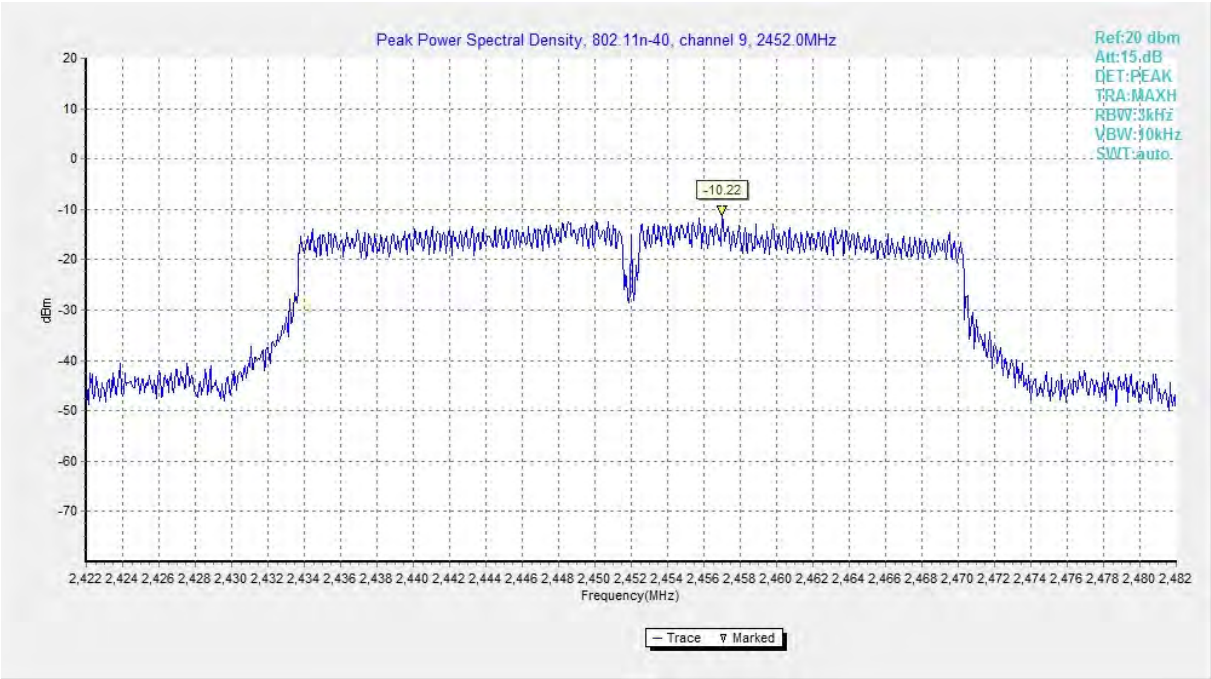


Fig.A.3.36 Power Spectral Density (802.11n-HT40, Ch 9 ANT10)

©Copyright. All rights reserved by CTTL.

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: EUT2

Measurement Result:

The measurements were performed separately in Chain 1, Chain 2, and MIMO (Chain 1+2), and only the worst cases are shown in this report.

802.11b/g mode

Mode	Channel	Occupied 6dB Bandwidth (MHz)		conclusion
802.11b	1	Fig.A.4.1	8.05	**P**
	6	Fig.A.4.2	8.05	**P**
	11	Fig.A.4.3	8.10	**P**
802.11g	1	Fig.A.4.4	15.05	**P**
	6	Fig.A.4.5	15.10	**P**
	11	Fig.A.4.6	15.25	**P**

802.11n-HT20 mode

Mode	Channel	Occupied 6dB Bandwidth (MHz)		conclusion
802.11n (HT20)	1	Fig.A.4.7	15.05	**P**
	6	Fig.A.4.8	16.55	**P**
	11	Fig.A.4.9	15.95	**P**

802.11n-HT40 mode

Mode	Channel	Occupied 6dB Bandwidth (MHz)		conclusion
802.11n (HT40)	3	Fig.A.4.10	35.12	**P**
	6	Fig.A.4.11	35.68	**P**

©Copyright. All rights reserved by CTTL.

	9	Fig.A.4.12	35.12	**P**

Conclusion: Pass

Test graphs as below:

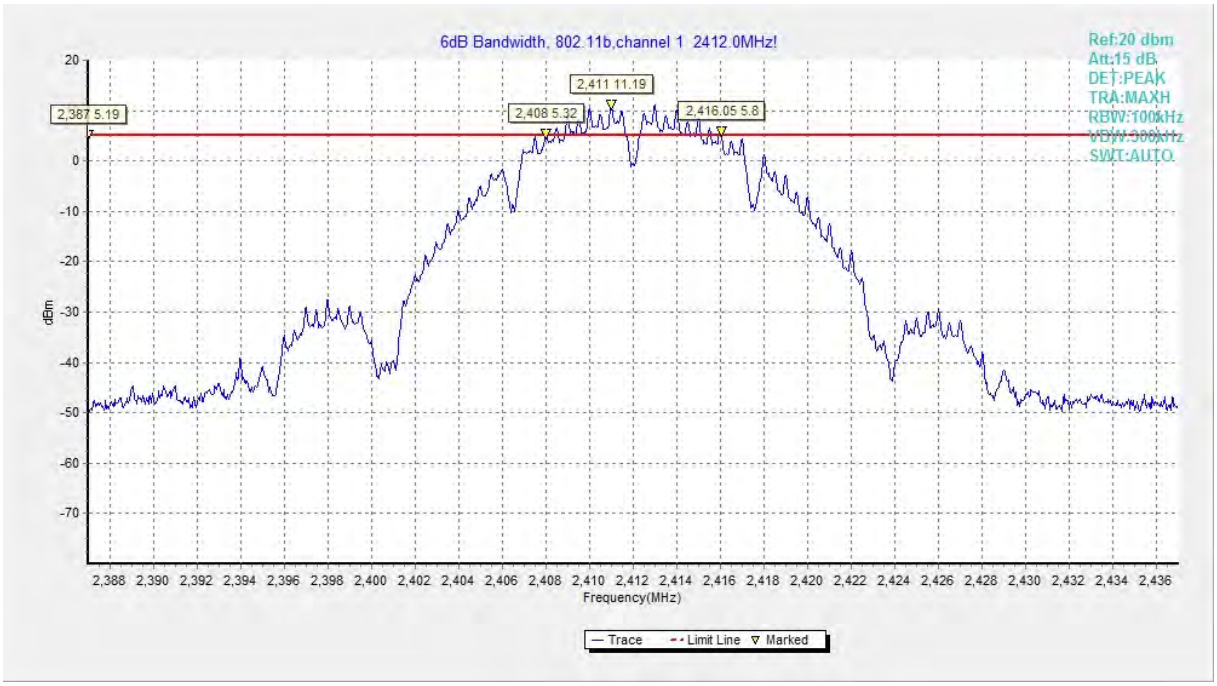
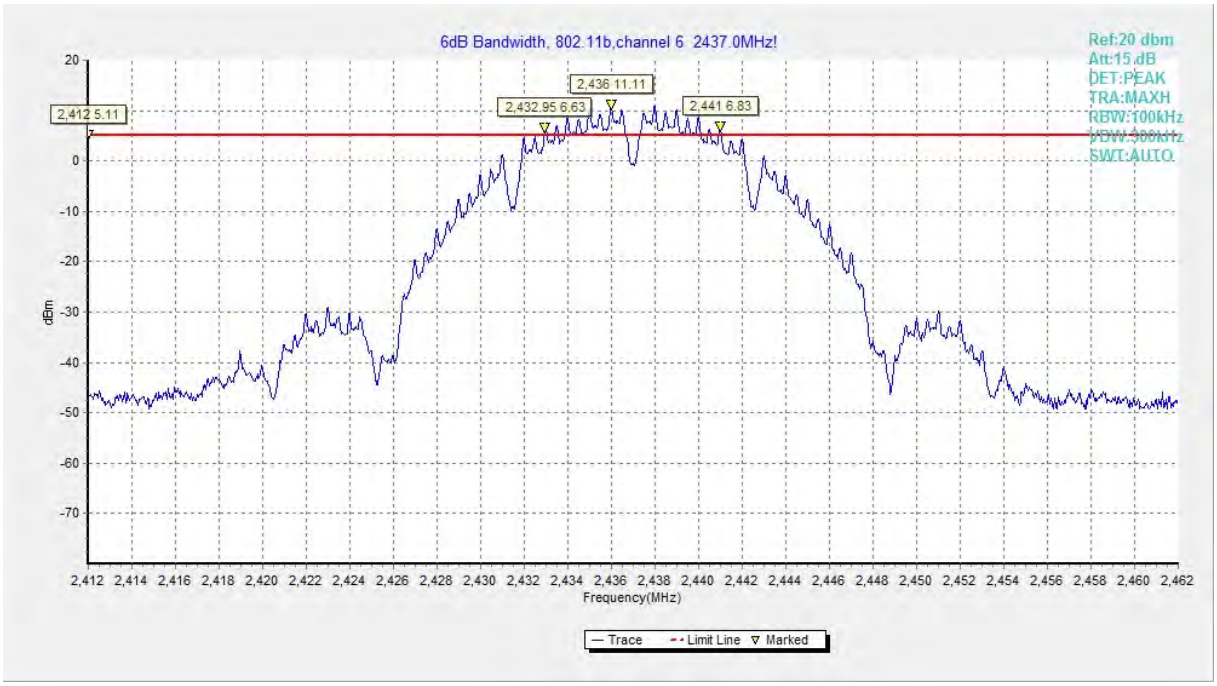


Fig.A.4.1 Occupied 6dB Bandwidth(802.11b,Ch 1)



©Copyright. All rights reserved by CTTL.

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

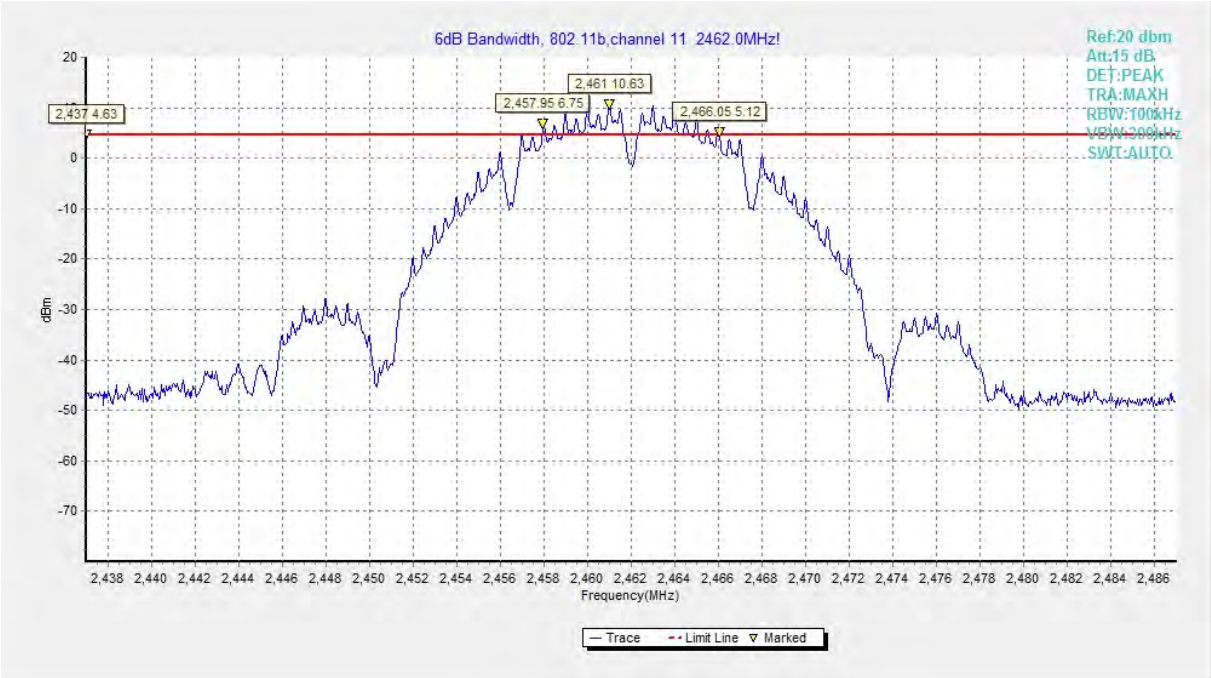


Fig.A.4.3 Occupied 6dB Bandwidth (802.11b, Ch 11)

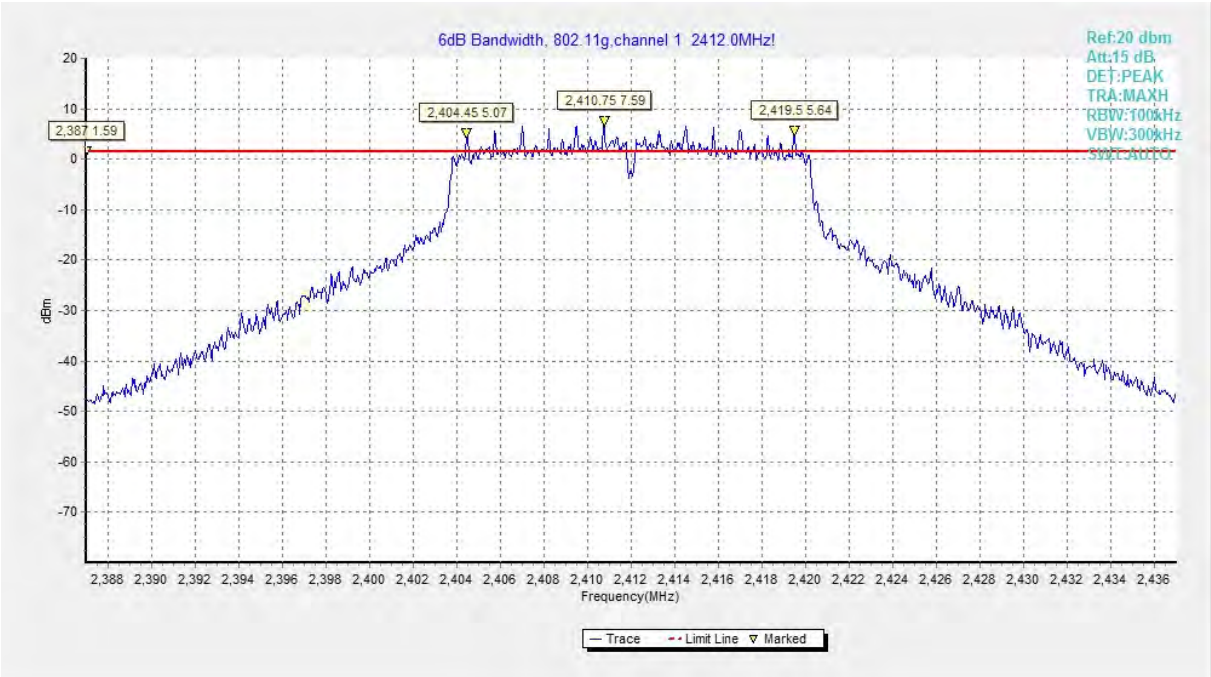


Fig.A.4.4 Occupied 6dB Bandwidth (802.11g, Ch 1)

©Copyright. All rights reserved by CTTL.

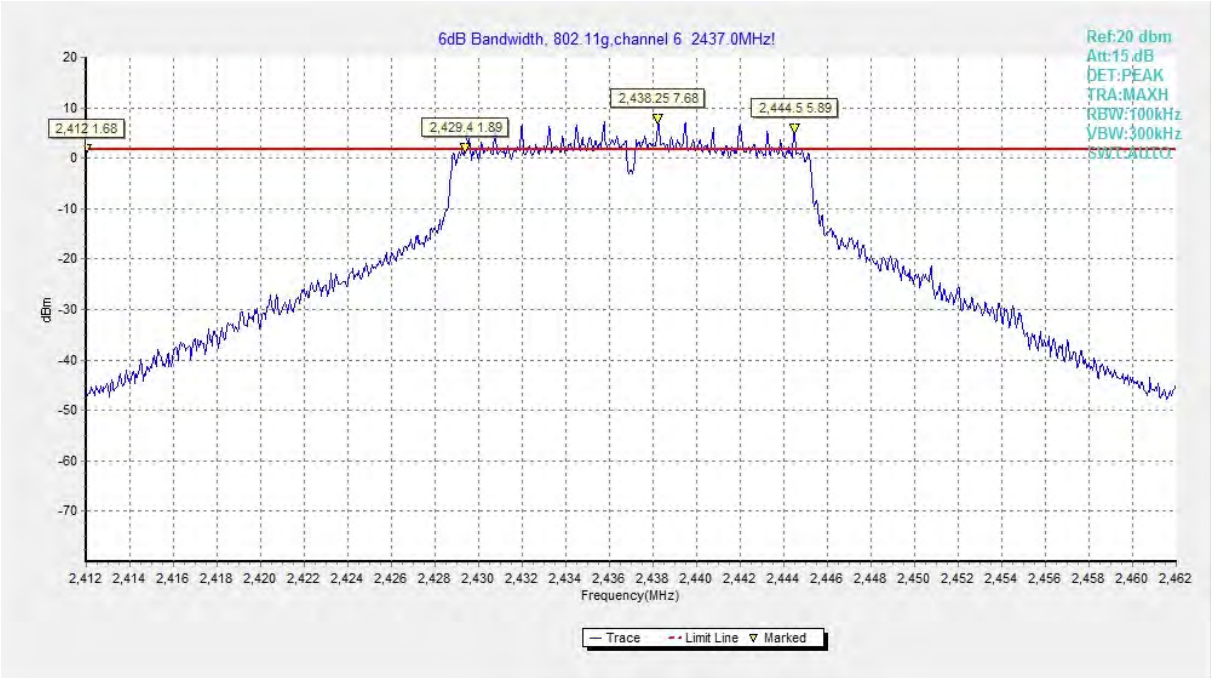


Fig.A.4.5 Occupied 6dB Bandwidth (802.11g, Ch 6)

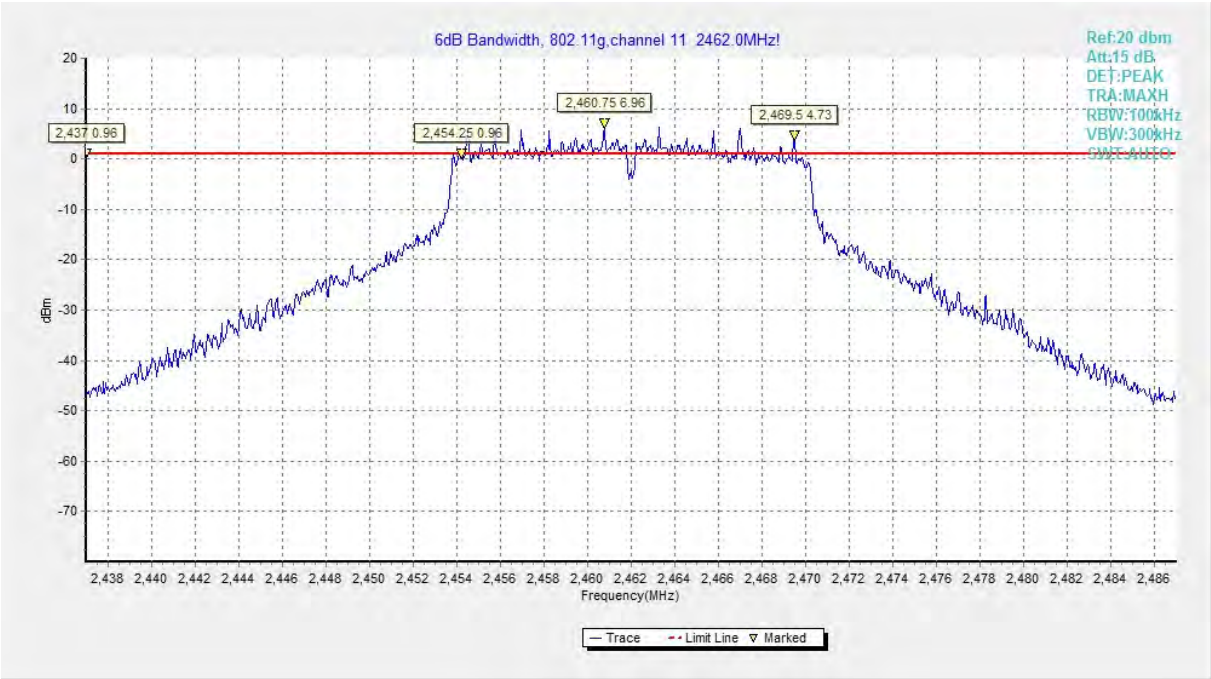


Fig.A.4.6 Occupied 6dB Bandwidth (802.11g, Ch 11)

©Copyright. All rights reserved by CTTL.

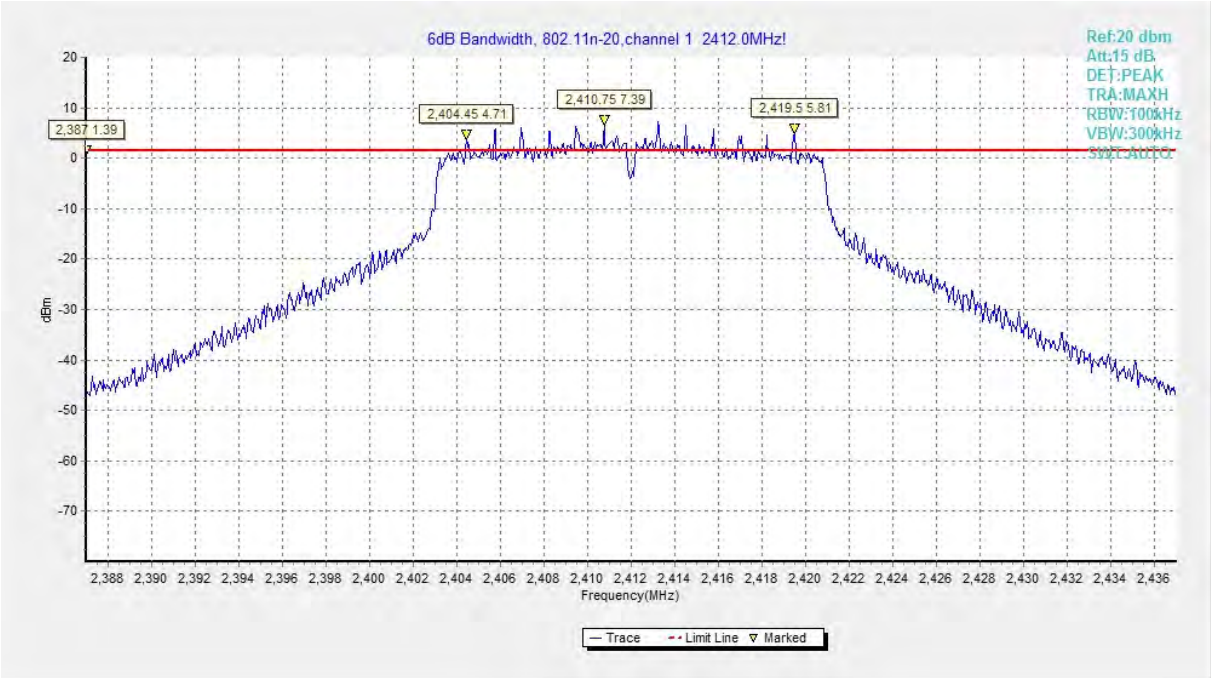


Fig.A.4.7 Occupied 6dB Bandwidth (802.11n-20MHz, Ch 1)

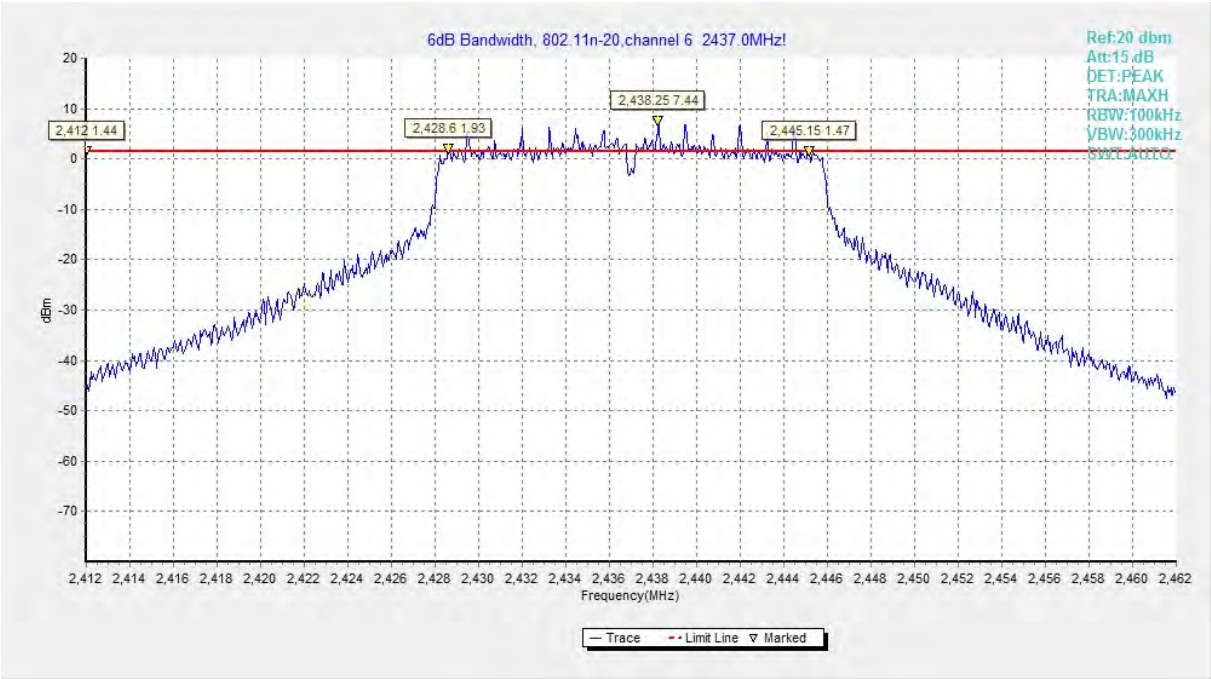


Fig.A.4.8 Occupied 6dB Bandwidth (802.11n-HT20, Ch 6)

©Copyright. All rights reserved by CTTL.

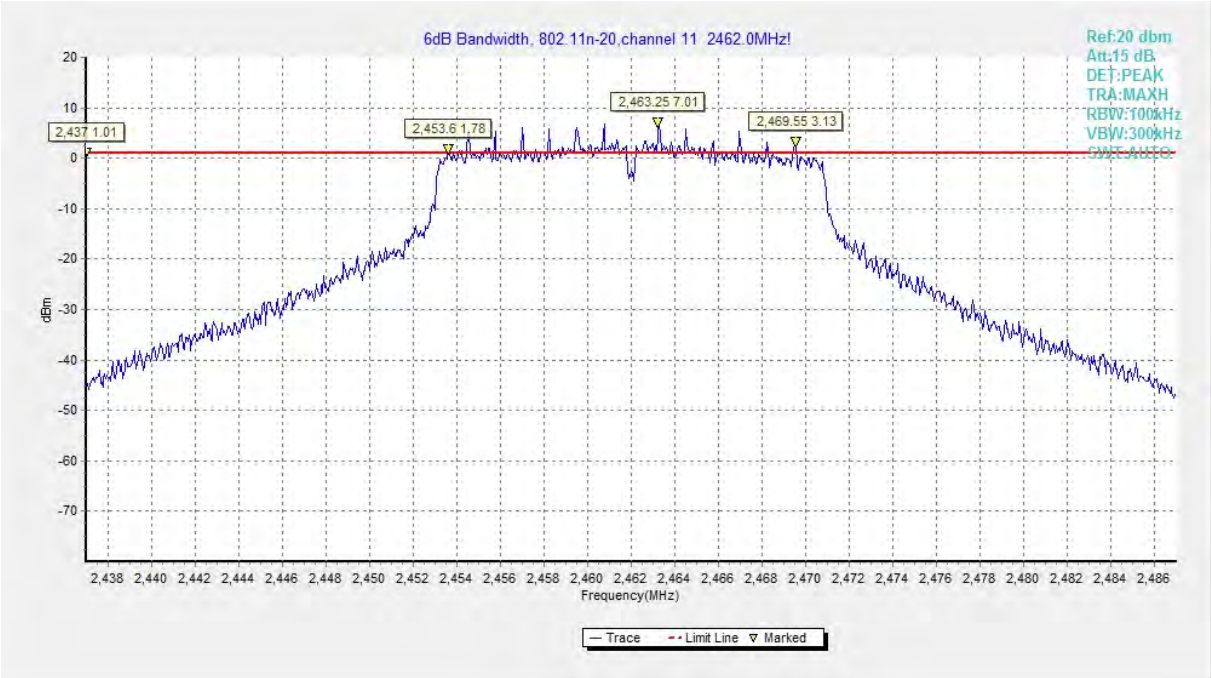


Fig.A.4.9 Occupied 6dB Bandwidth (802.11n-HT20, Ch 11)

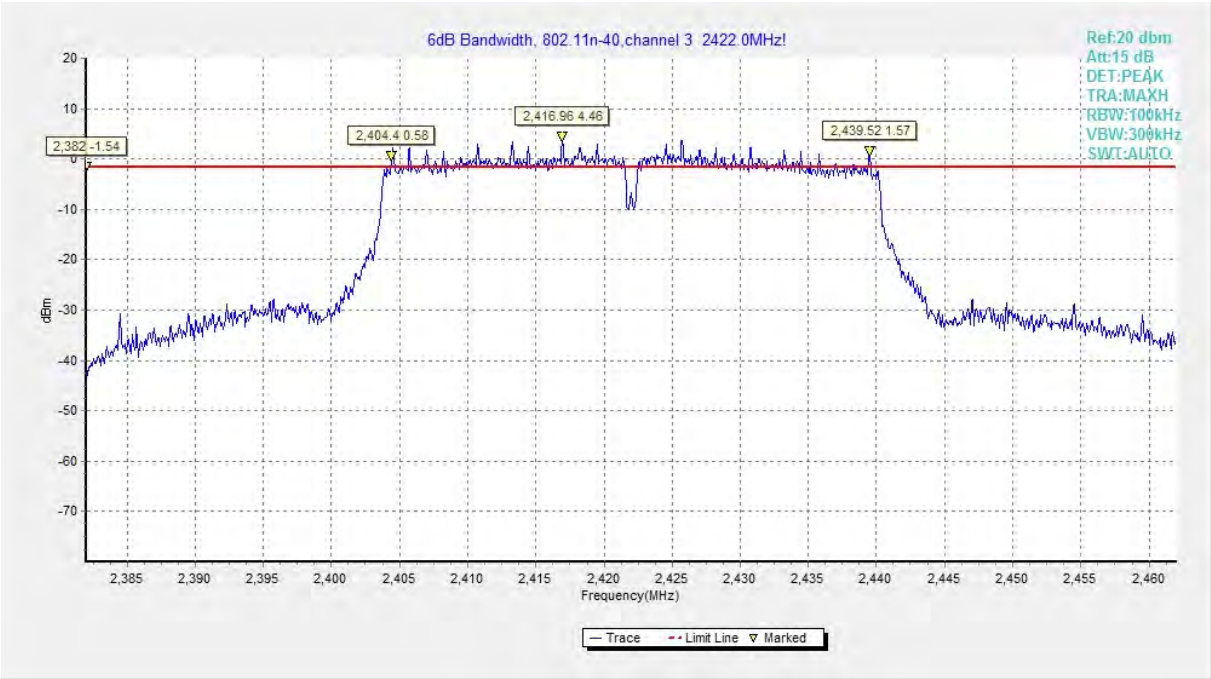


Fig.A.4.10 Occupied 6dB Bandwidth (802.11n-40MHz, Ch 3)

©Copyright. All rights reserved by CTTL.

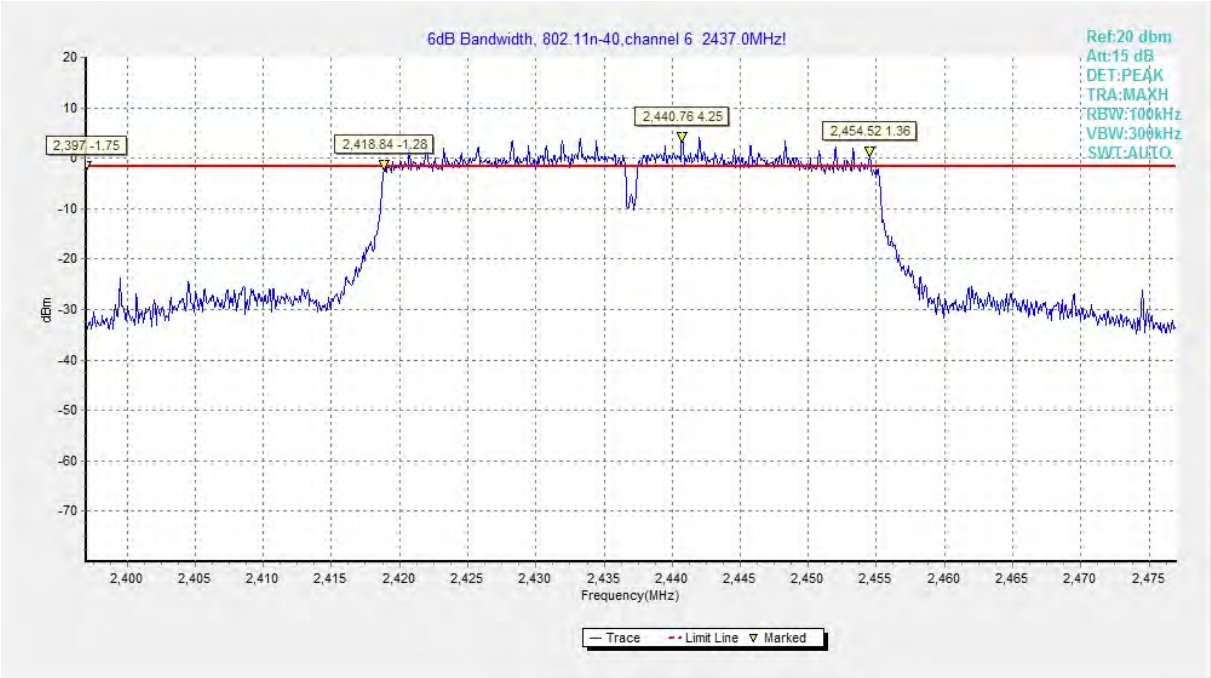


Fig.A.4.11 Occupied 6dB Bandwidth (802.11n-HT40, Ch 6)

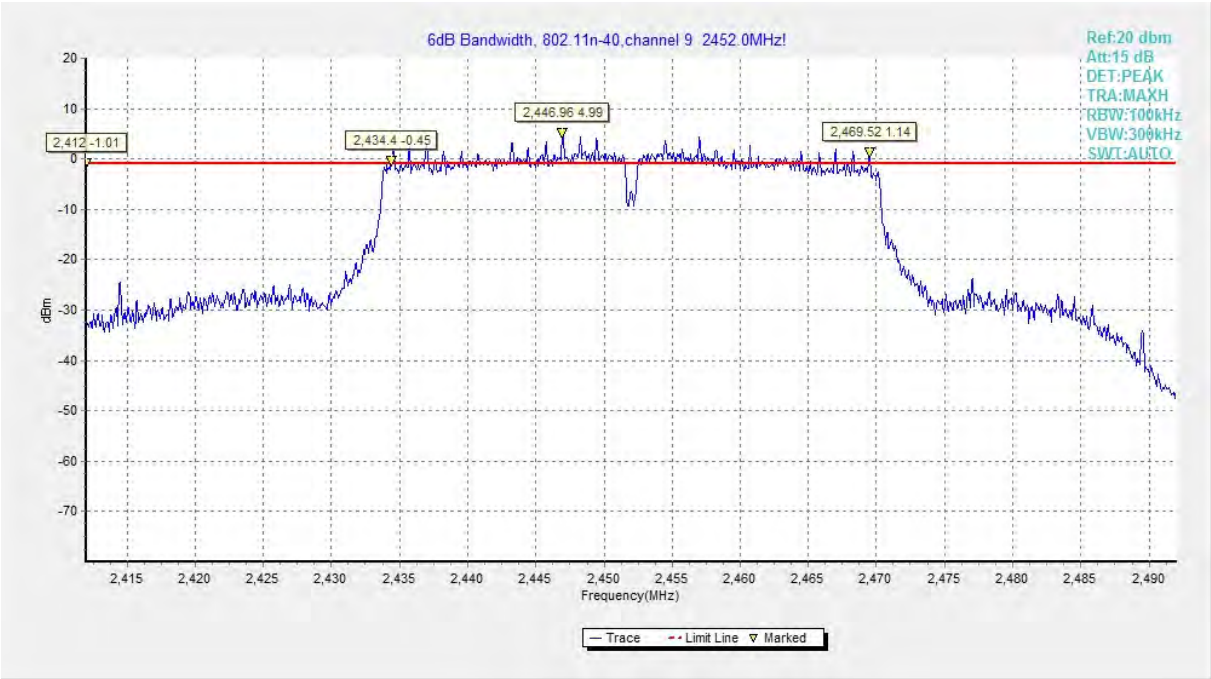


Fig.A.4.12 Occupied 6dB Bandwidth (802.11n-HT40, Ch 9)

©Copyright. All rights reserved by CTTL.

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: EUT2

Measurement Result:

The measurements were performed separately in Chain 1, Chain 2, and MIMO (Chain 1+2), and only the worst cases are shown in this report.

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:

©Copyright. All rights reserved by CTTL.

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

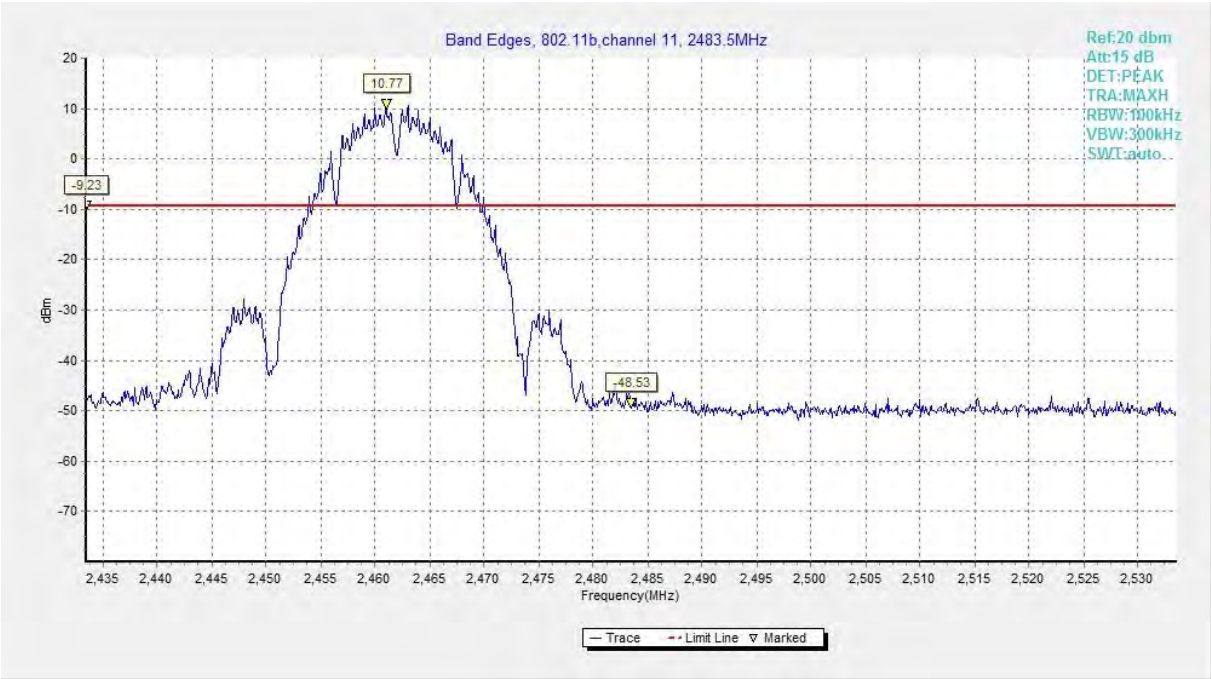


Fig.A.5.2 Band Edges (802.11b, Ch 11)

©Copyright. All rights reserved by CTTL.

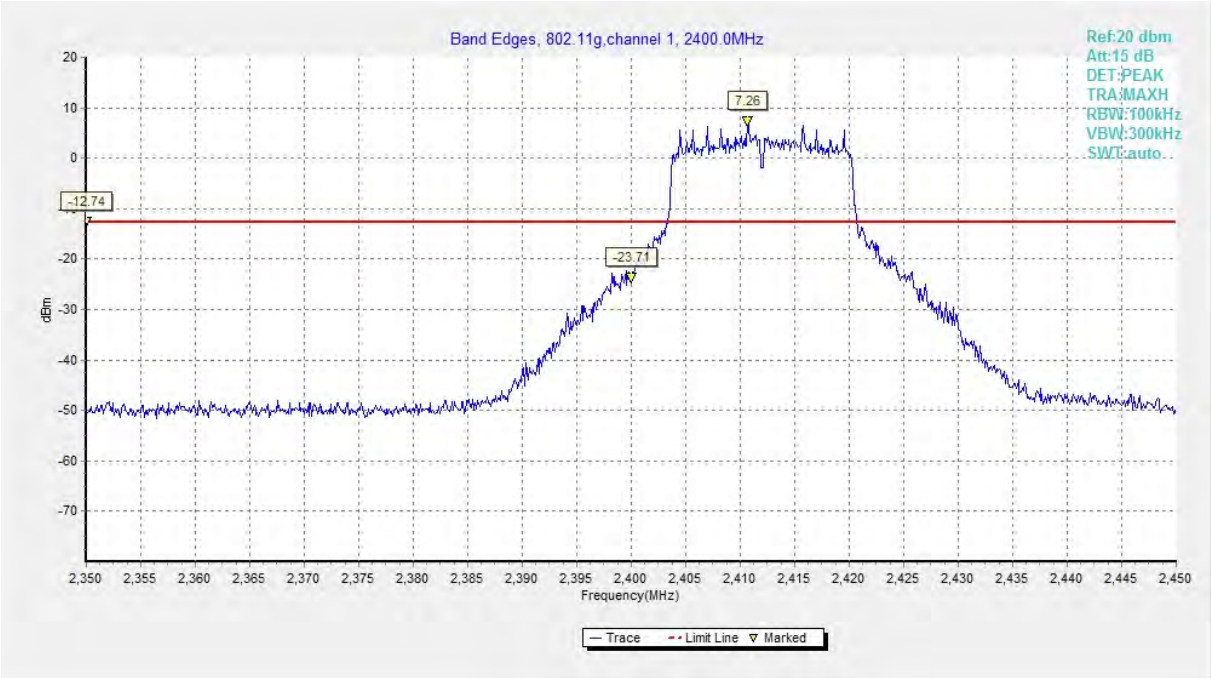


Fig.A.5.3 Band Edges (802.11g, Ch 1)

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

©Copyright. All rights reserved by CTTL.

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

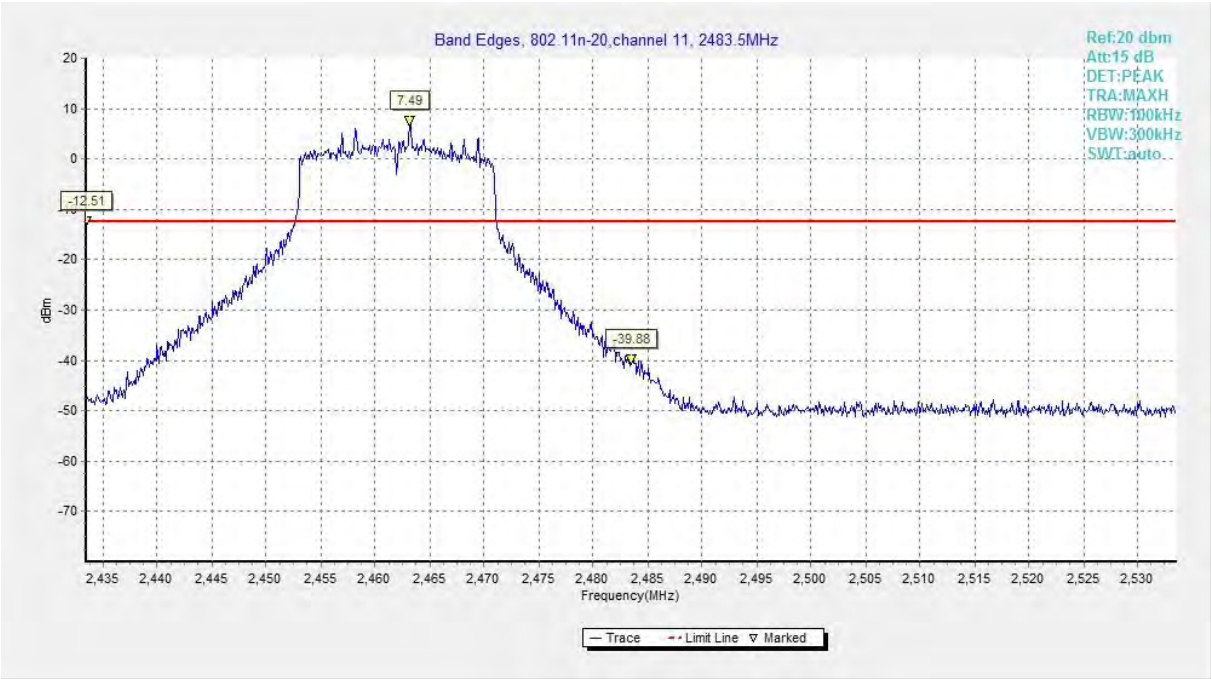


Fig.A.5.6 Band Edges (802.11n-HT20, Ch 11)

©Copyright. All rights reserved by CTTL.

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

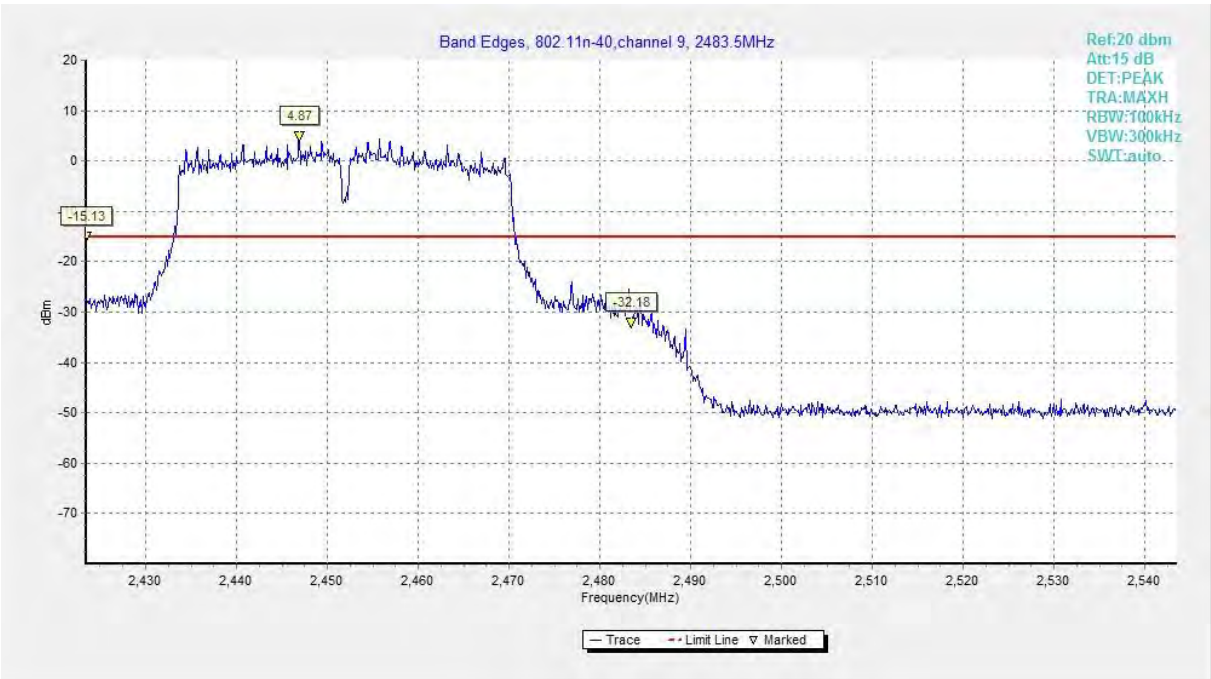


Fig.A.5.8 Band Edges (802.11n-HT40, Ch 9)

©Copyright. All rights reserved by CTTL.

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: EUT2

Measurement Results:

The measurements were performed separately in Chain 1, Chain 2, and MIMO (Chain 1+2), and only the worst cases are shown in this report.

©Copyright. All rights reserved by CTTL.

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**

©Copyright. All rights reserved by CTTL.

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**

©Copyright. All rights reserved by CTTL.

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**

©Copyright. All rights reserved by CTTL.

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:

©Copyright. All rights reserved by CTTL.

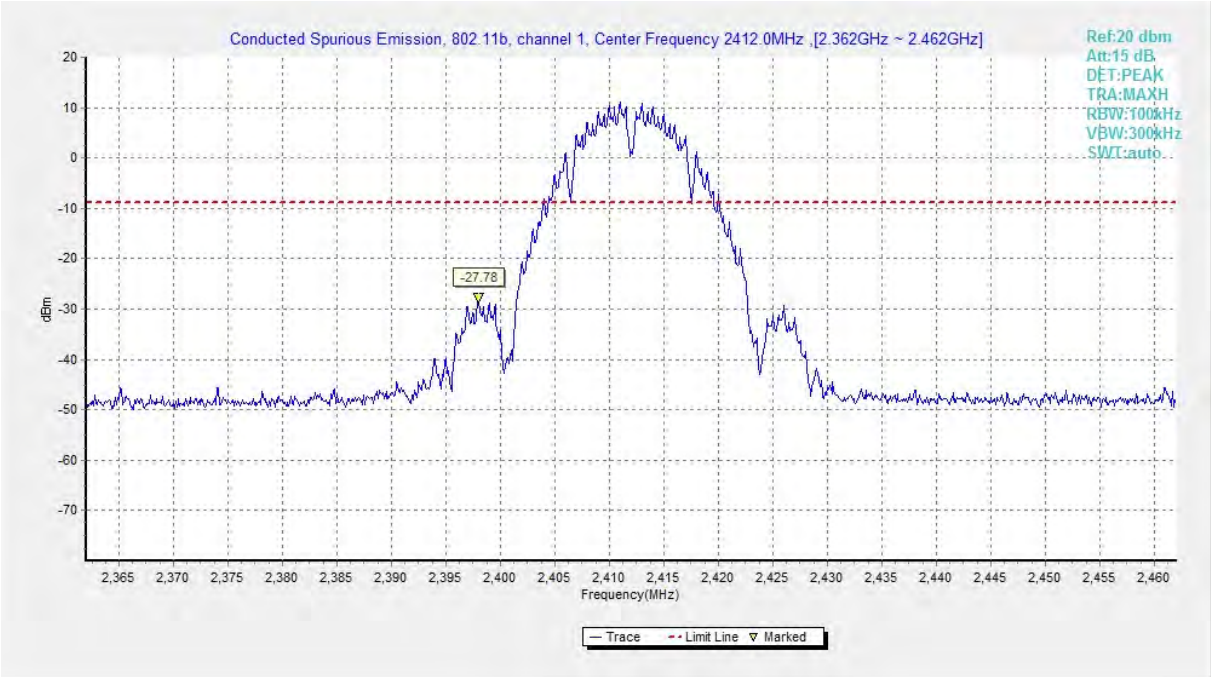


Fig.A.6.1.1 Transmitter Spurious Emission - Conducted (802.11b, Ch1, Center Frequency)

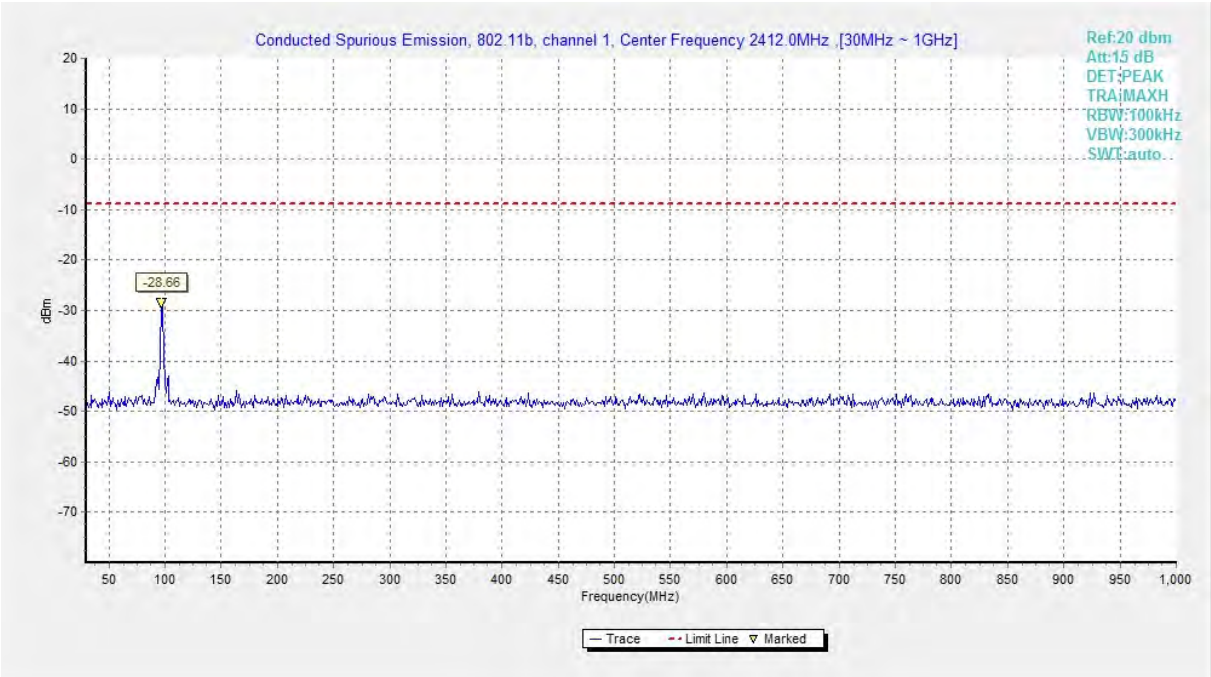


Fig.A.6.1.2 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 30 MHz-1 GHz)

©Copyright. All rights reserved by CTTL.

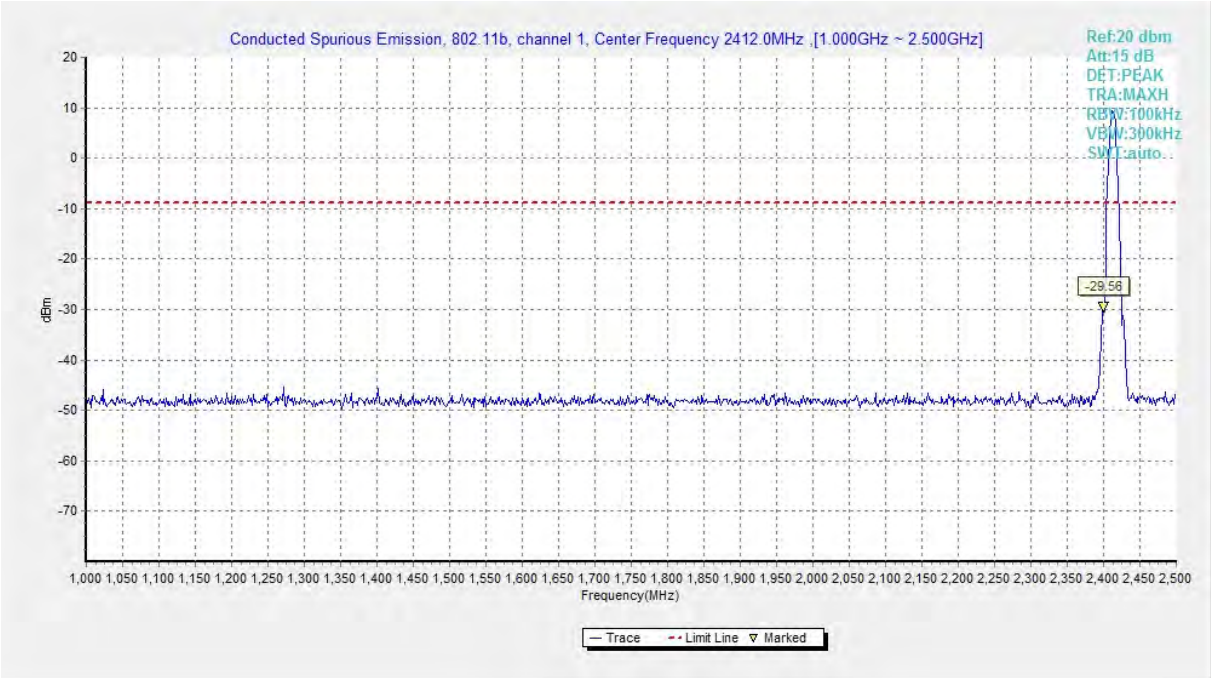


Fig.A.6.1.3 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 1 GHz-2.5 GHz)

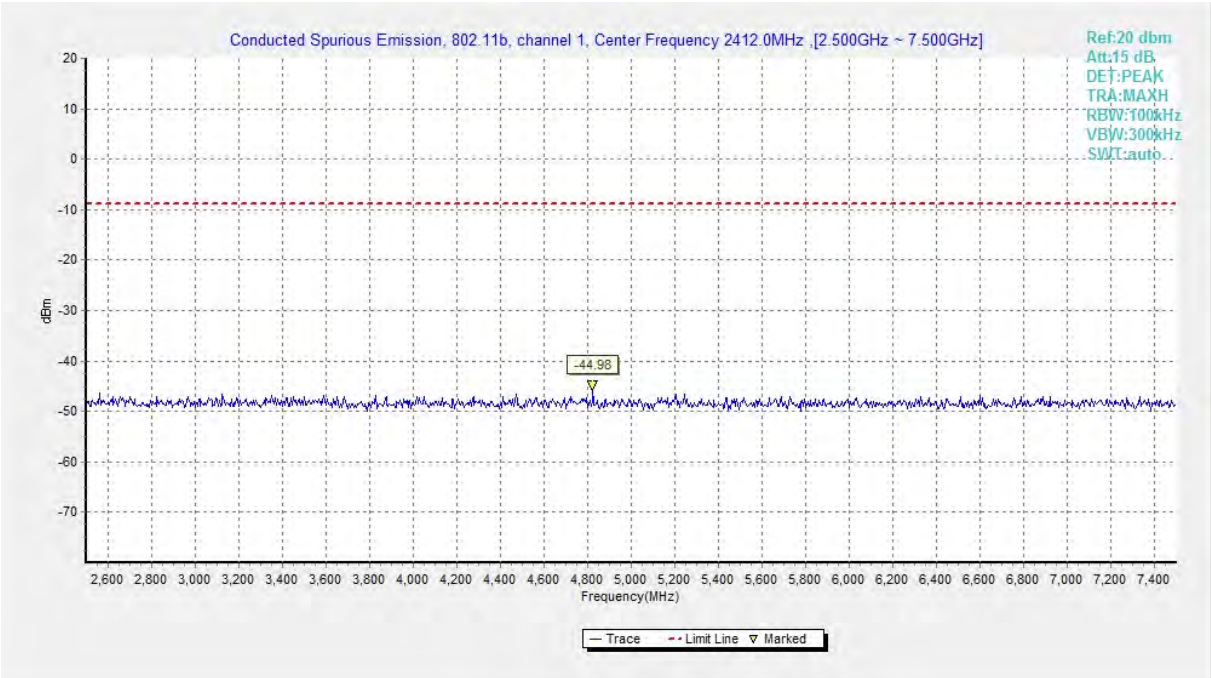


Fig.A.6.1.4 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 2.5 GHz-7.5 GHz)

©Copyright. All rights reserved by CTTL.

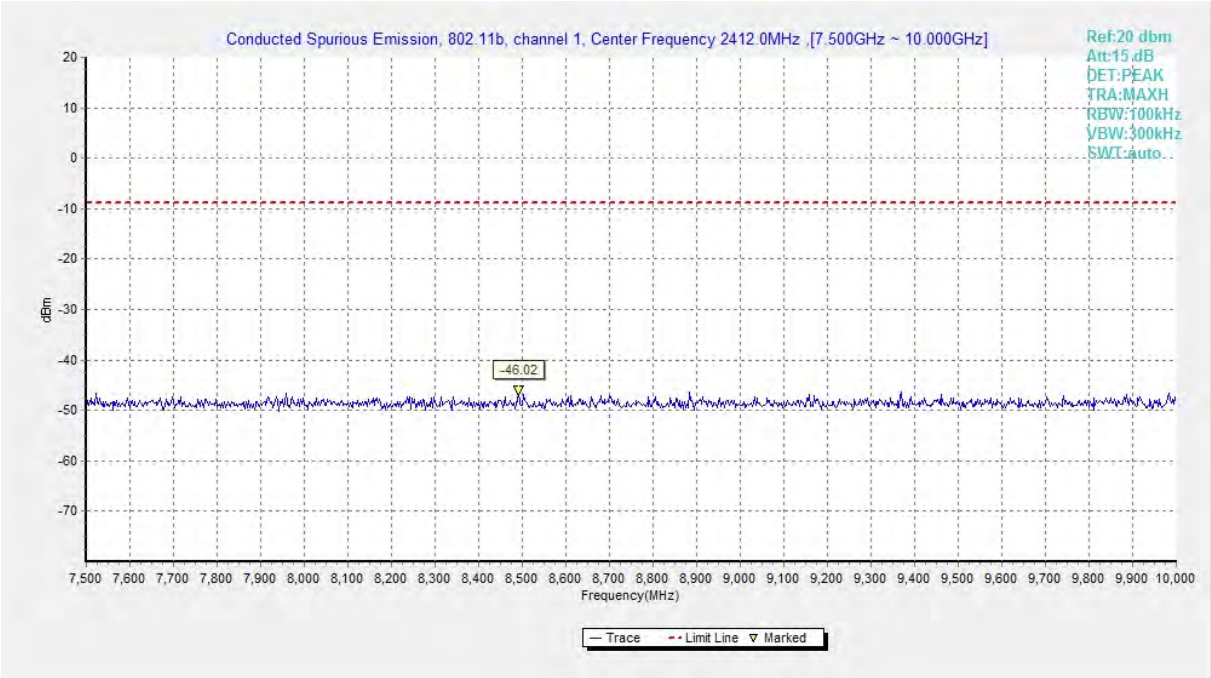


Fig.A.6.1.5 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 7.5 GHz-10 GHz)

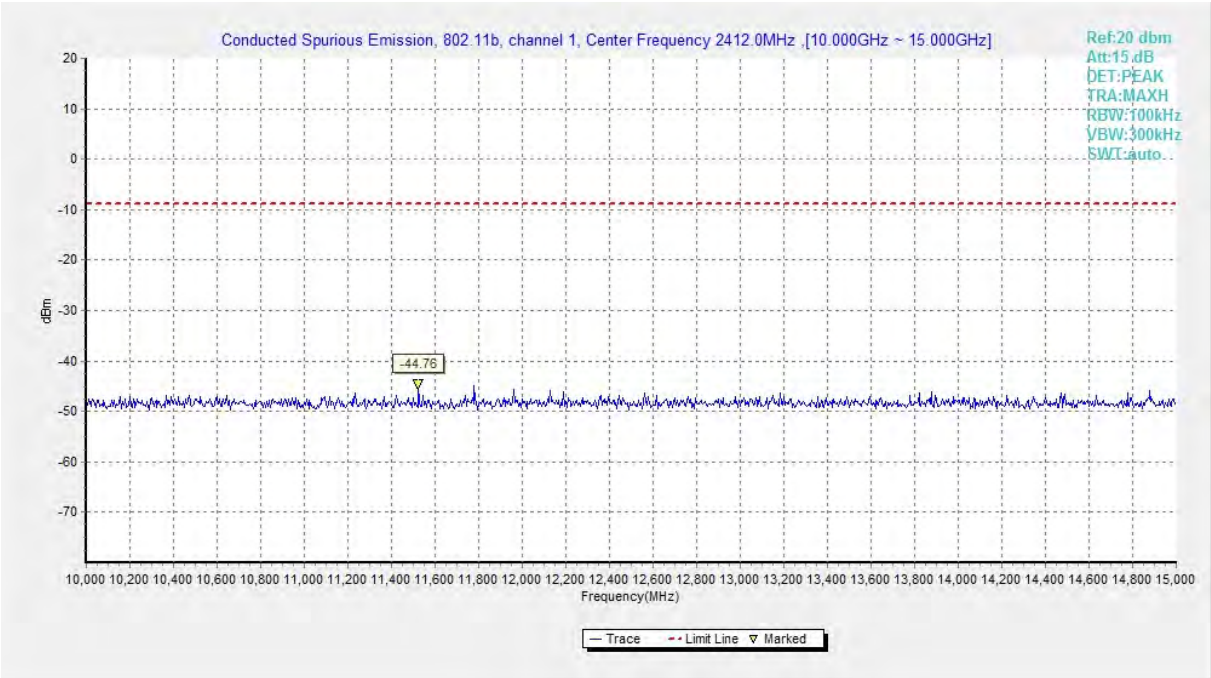


Fig.A.6.1.6 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 10 GHz-15 GHz)

©Copyright. All rights reserved by CTTL.

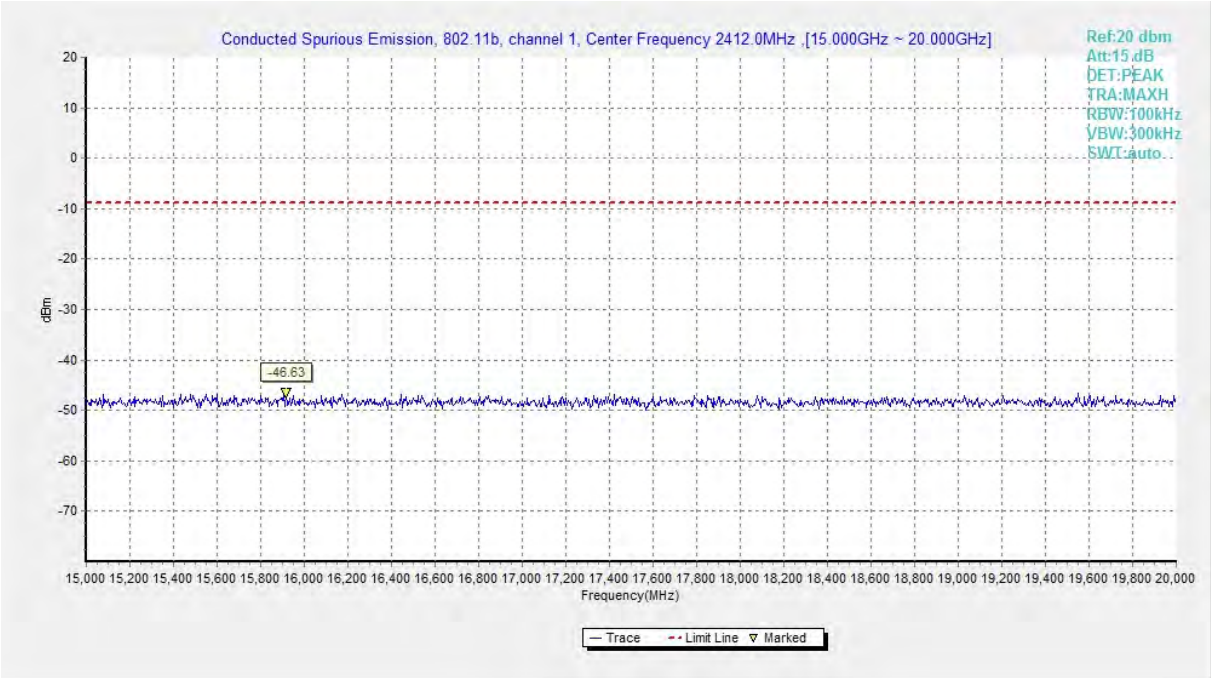


Fig.A.6.1.7 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 15 GHz-20 GHz)

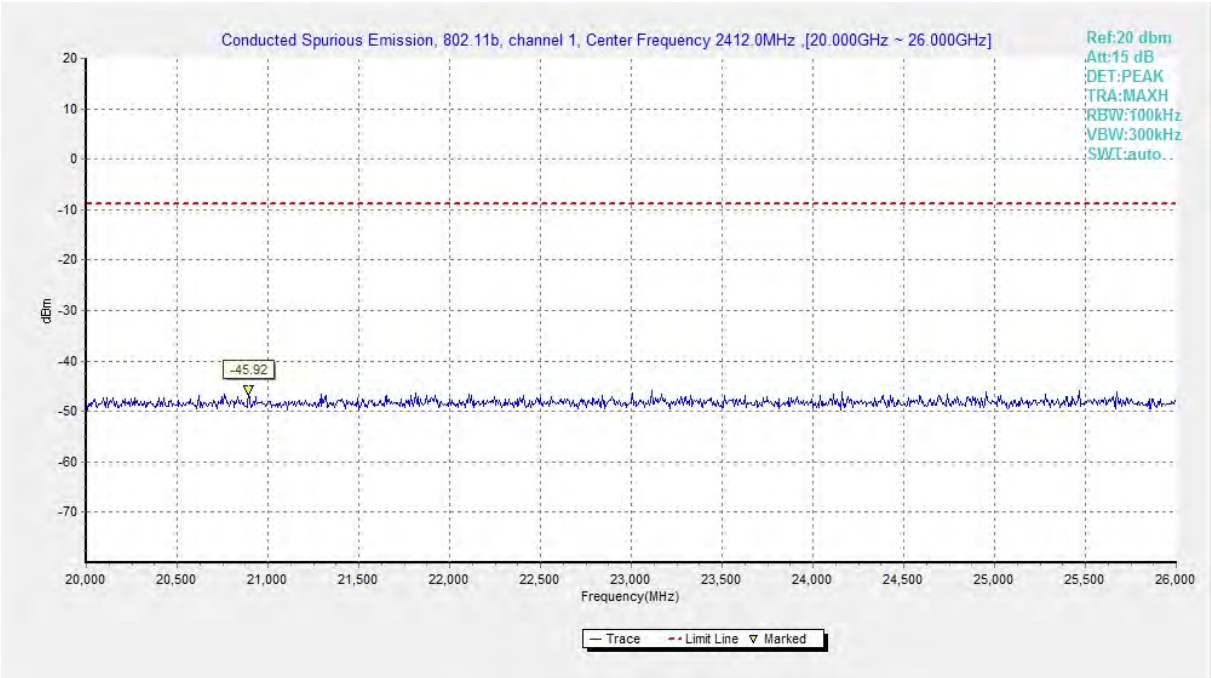


Fig.A.6.1.8 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 20 GHz-26 GHz)

©Copyright. All rights reserved by CTTL.

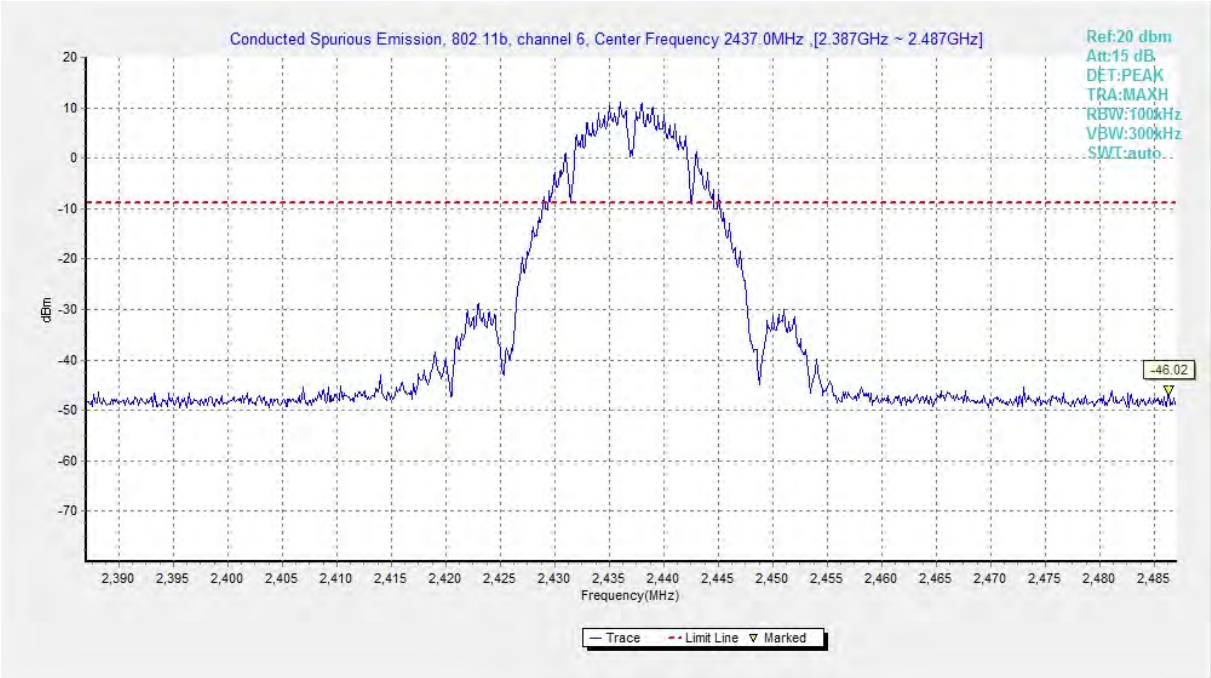


Fig.A.6.1.9 Transmitter Spurious Emission - Conducted (802.11b, Ch6, Center Frequency)

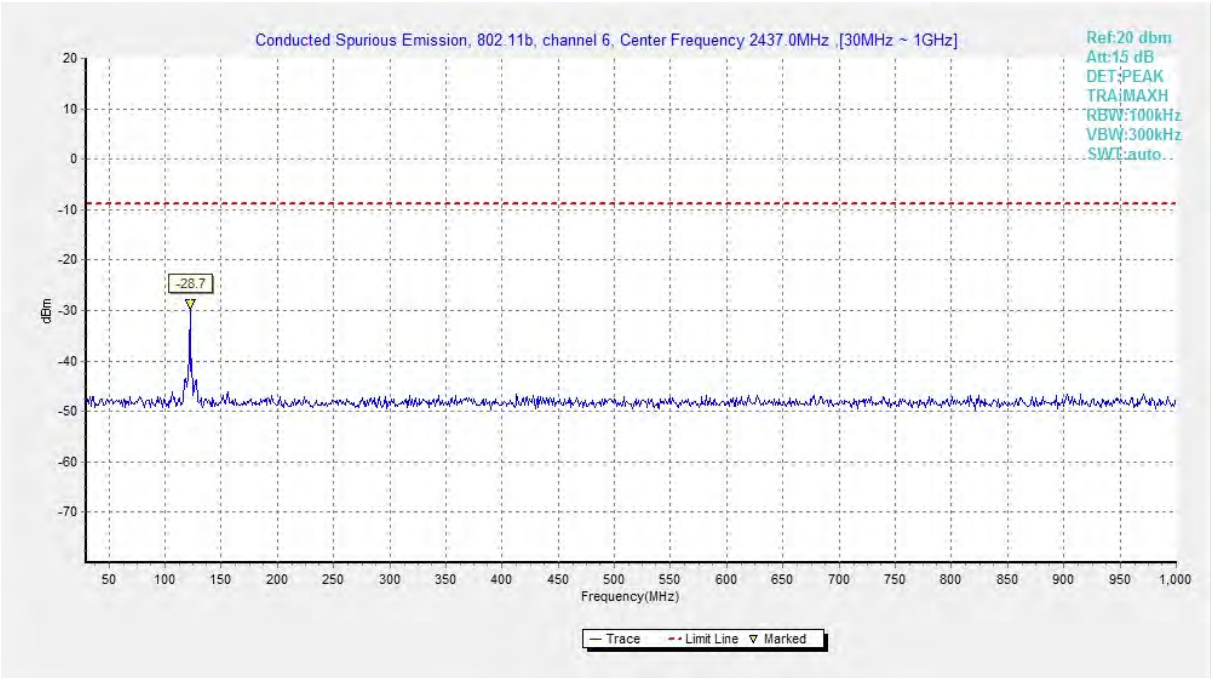


Fig.A.6.1.10 Transmitter Spurious Emission - Conducted (802.11b, Ch6, 30 MHz-1 GHz)

©Copyright. All rights reserved by CTTL.

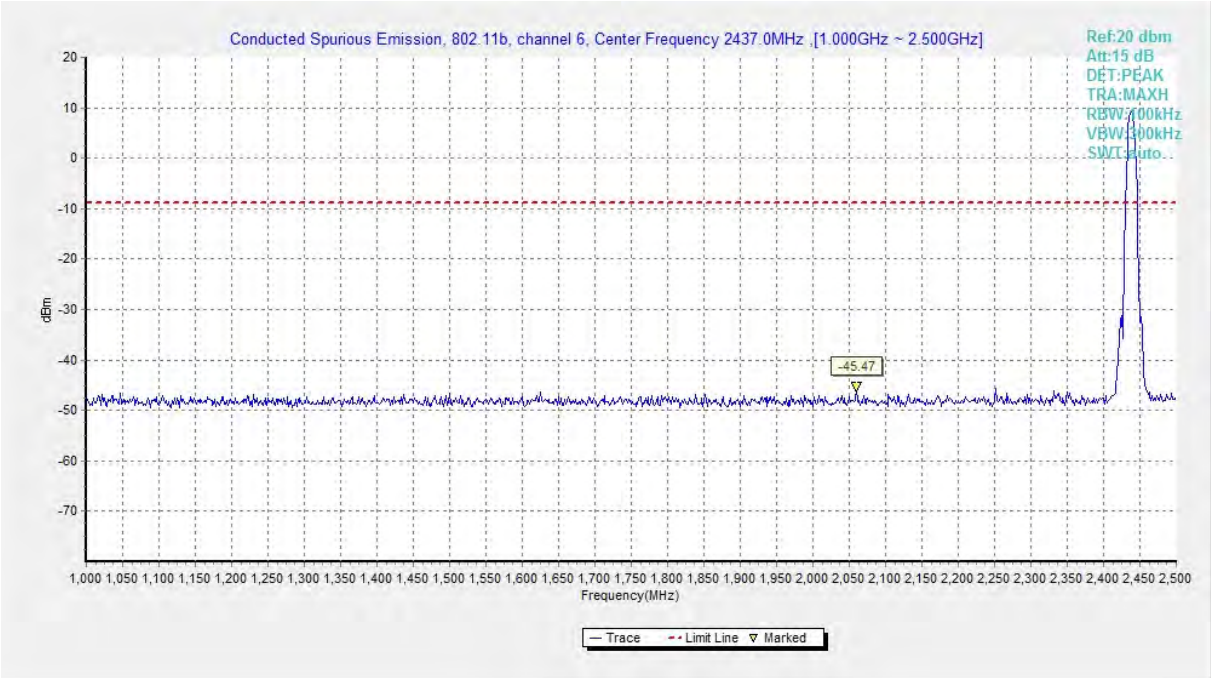


Fig.A.6.1.11 Transmitter Spurious Emission - Conducted (802.11b, Ch6, 1 GHz-2.5 GHz)

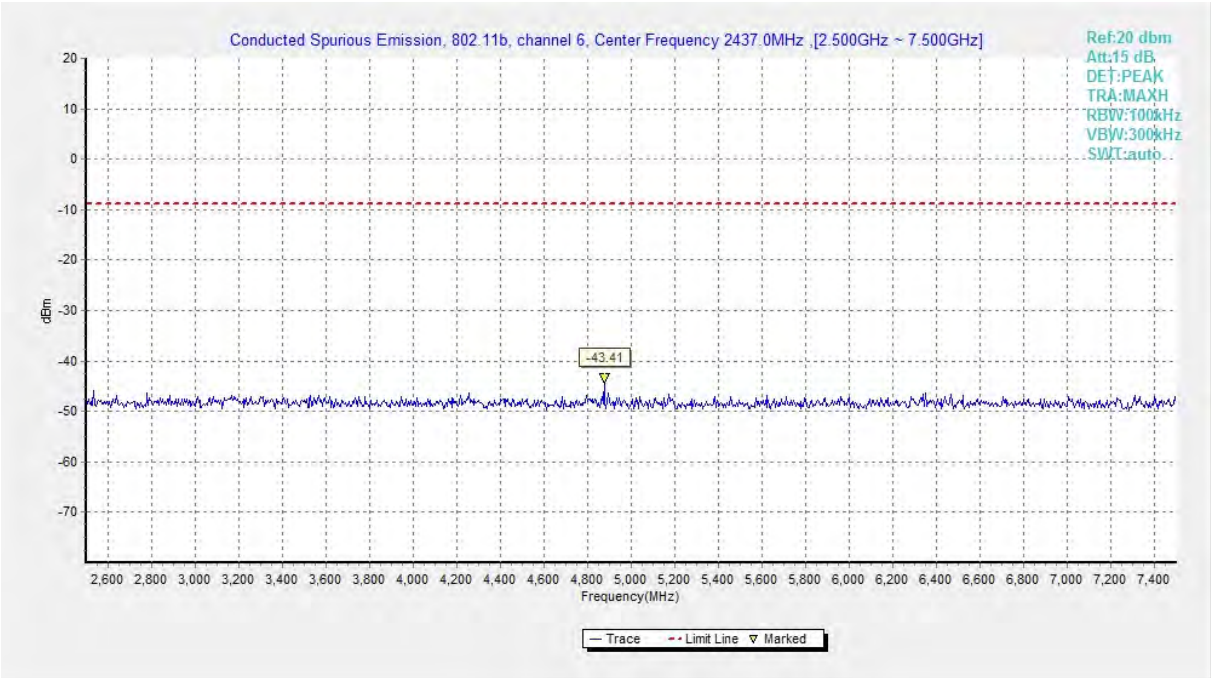


Fig.A.6.1.12 Transmitter Spurious Emission - Conducted (802.11b, Ch6, 2.5 GHz-7.5 GHz)

©Copyright. All rights reserved by CTTL.

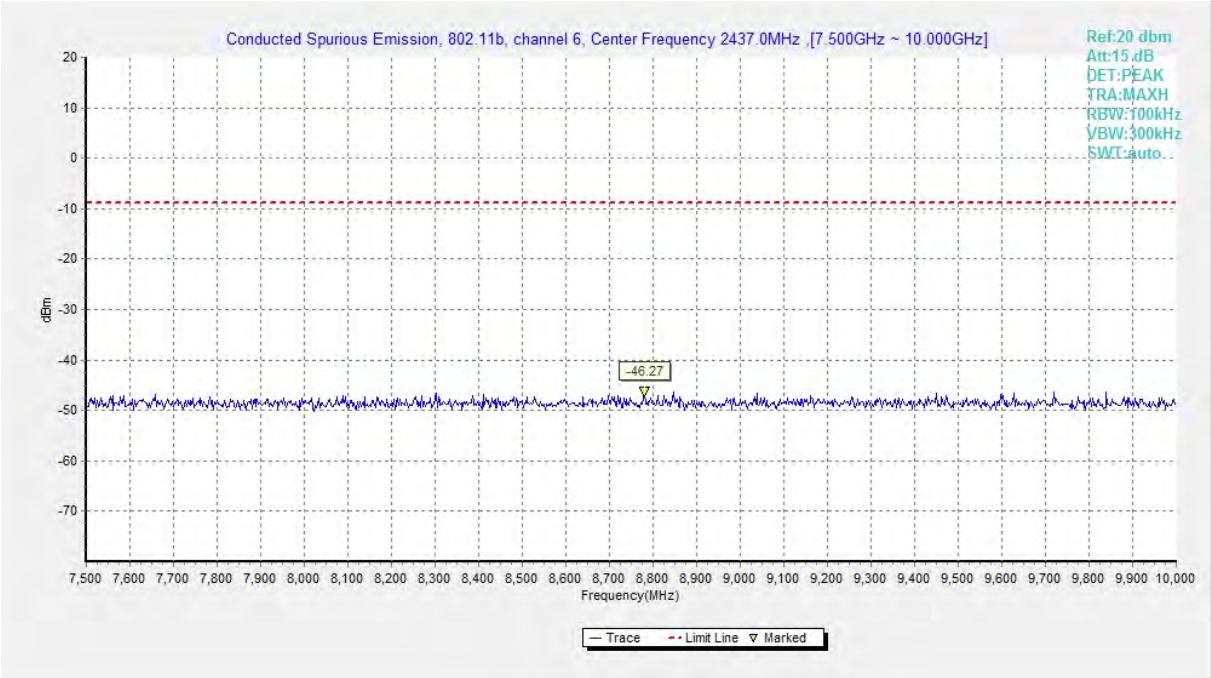


Fig.A.6.1.13 Transmitter Spurious Emission - Conducted (802.11b, Ch6, 7.5 GHz-10 GHz)

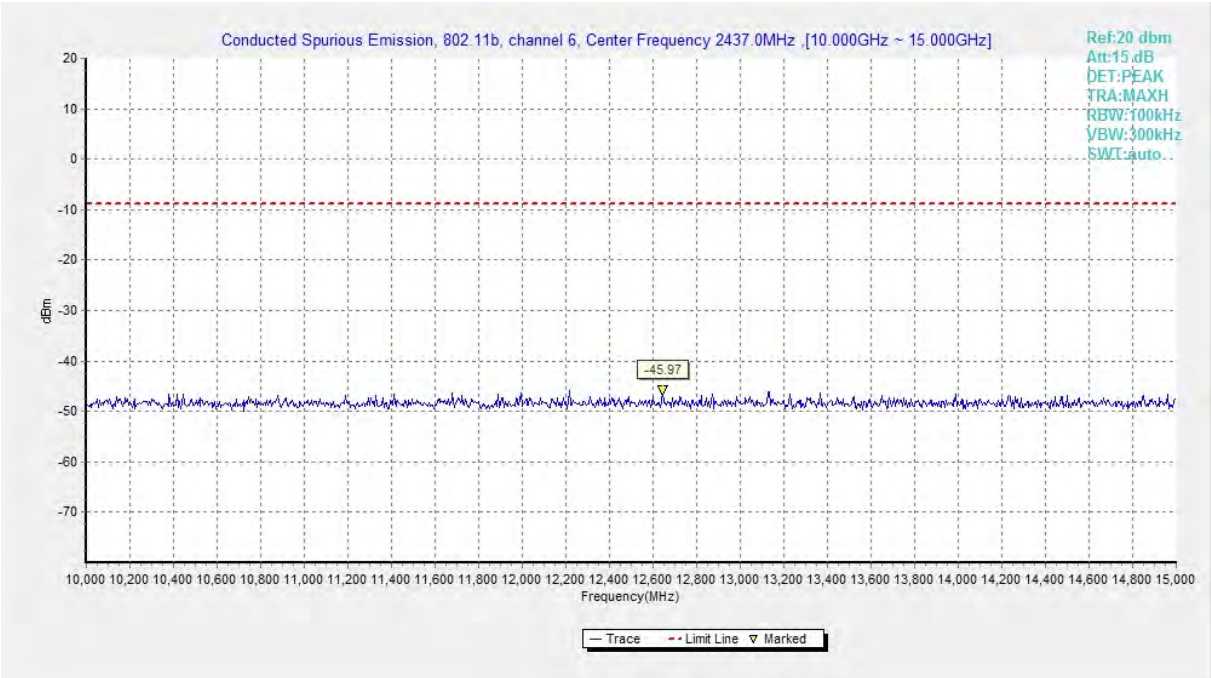


Fig.A.6.1.14 Transmitter Spurious Emission - Conducted (802.11b, Ch6, 10 GHz-15 GHz)

©Copyright. All rights reserved by CTTL.

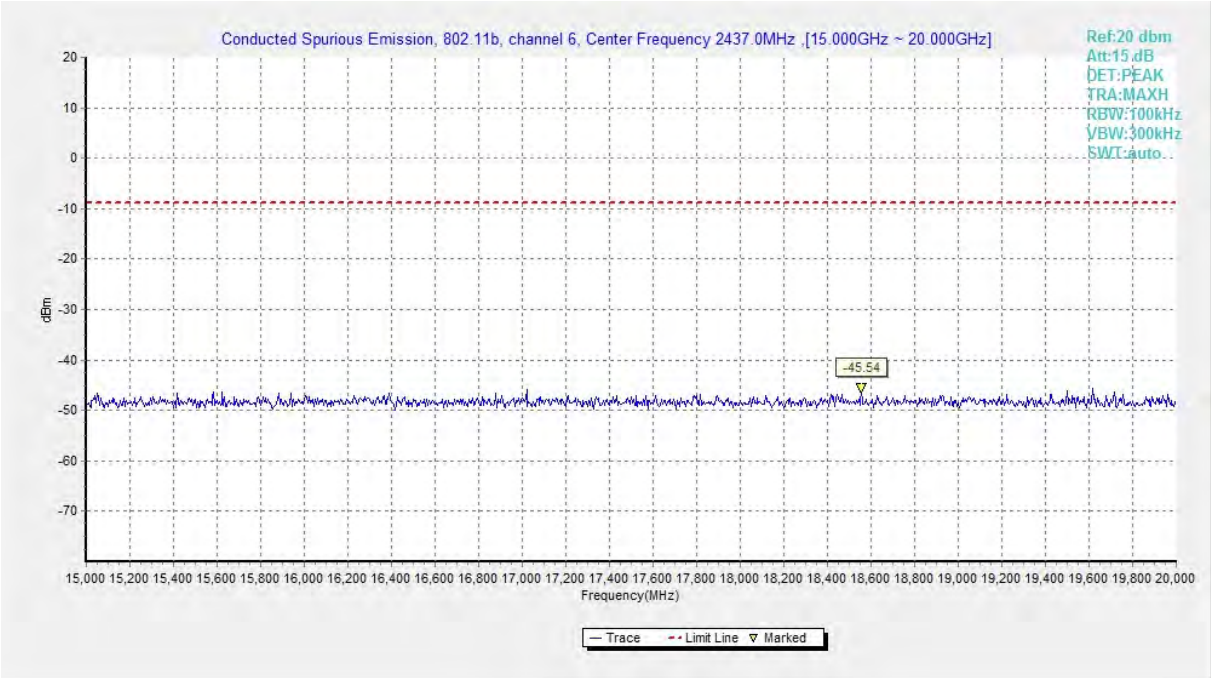


Fig.A.6.1.15 Transmitter Spurious Emission - Conducted (802.11b, Ch6, 15 GHz-20 GHz)

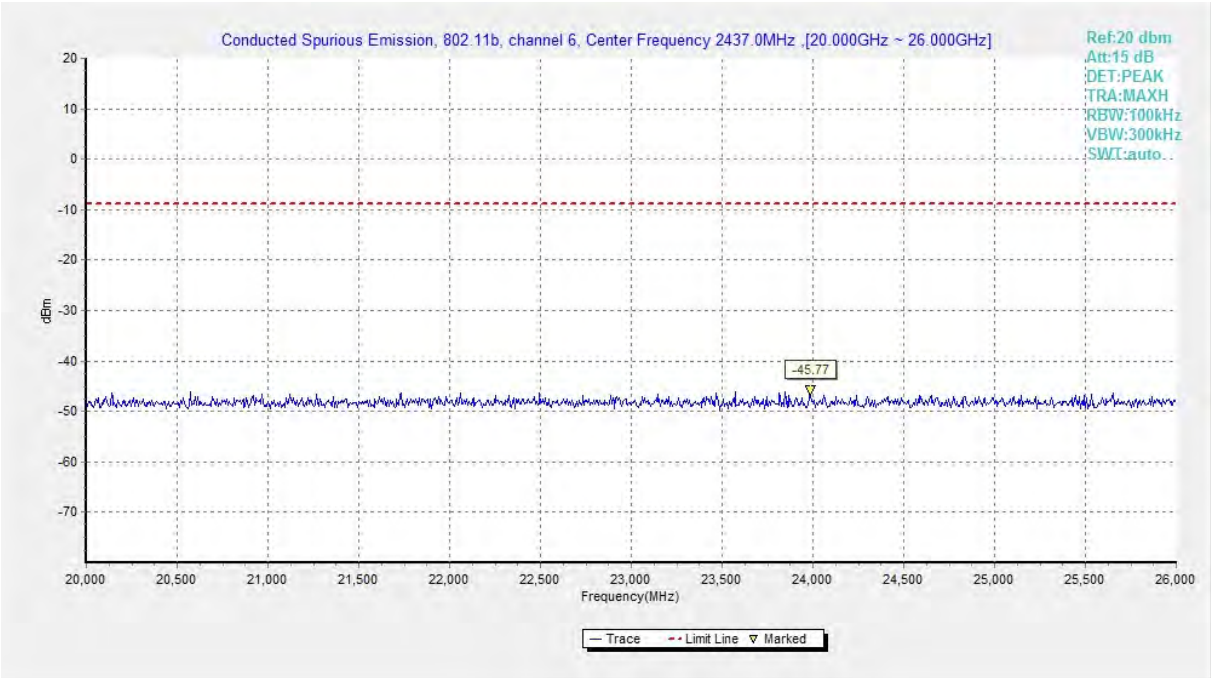


Fig.A.6.1.16 Transmitter Spurious Emission - Conducted (802.11b, Ch6, 20 GHz-26 GHz)

©Copyright. All rights reserved by CTTL.

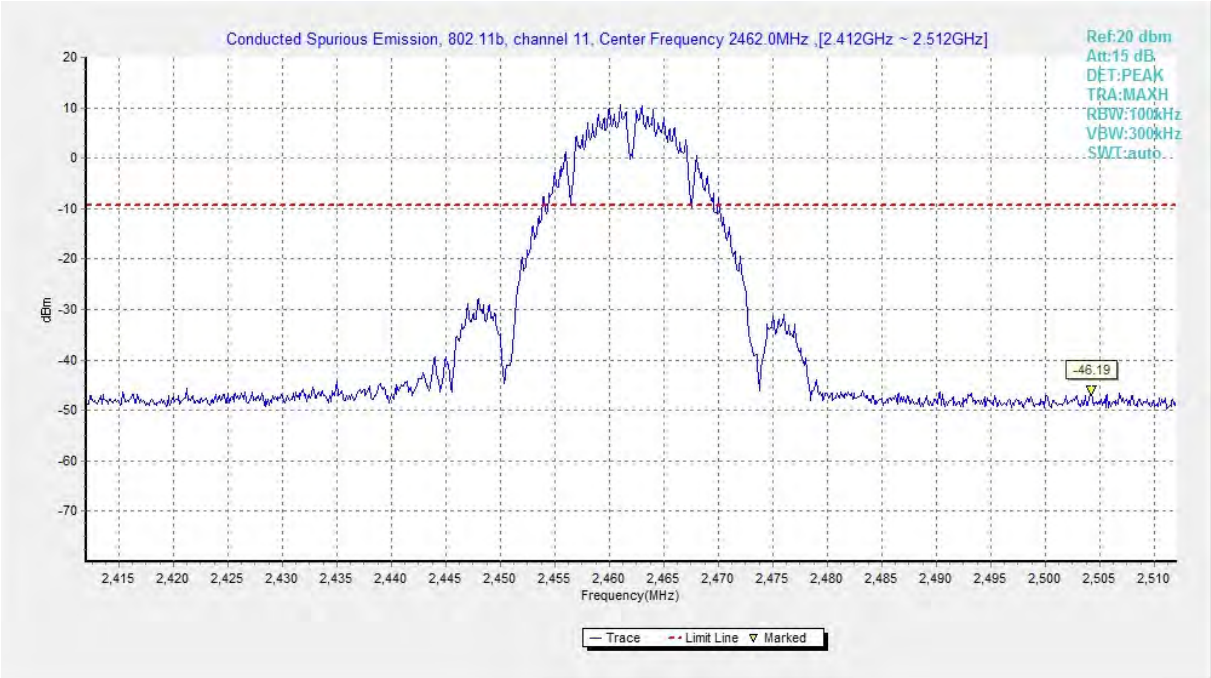


Fig.A.6.1.17 Transmitter Spurious Emission - Conducted (802.11b, Ch11, Center Frequency)

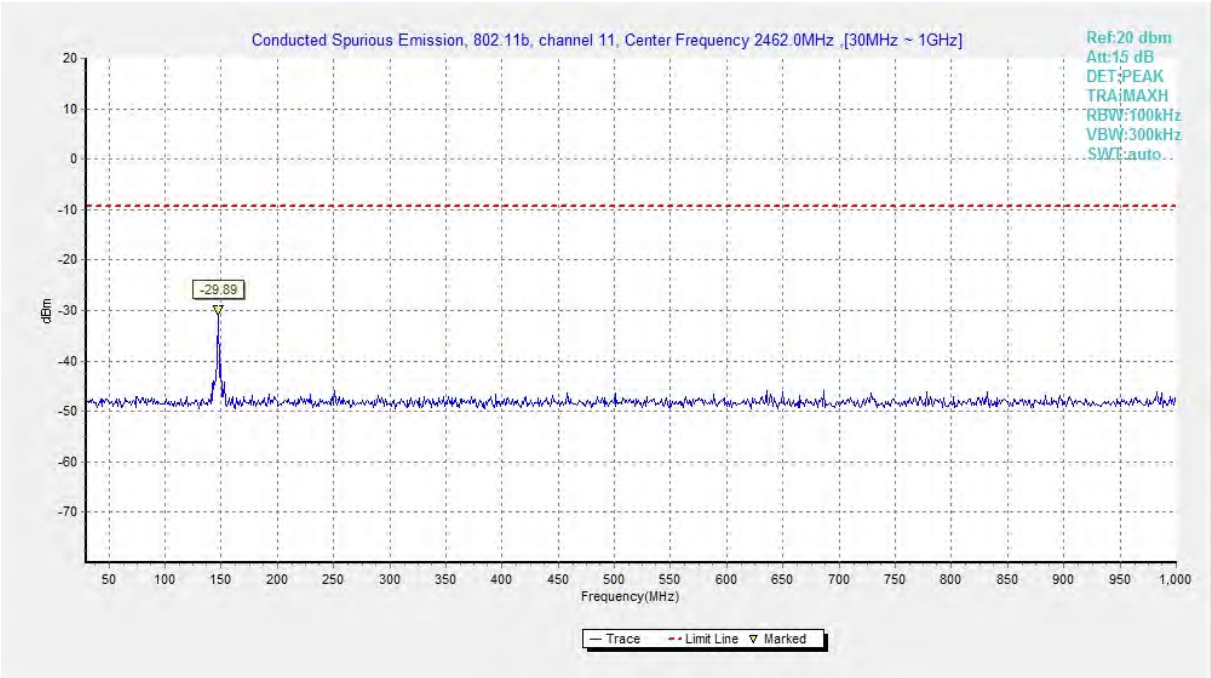


Fig.A.6.1.18 Transmitter Spurious Emission - Conducted (802.11b, Ch11, 30 MHz-1 GHz)

©Copyright. All rights reserved by CTTL.

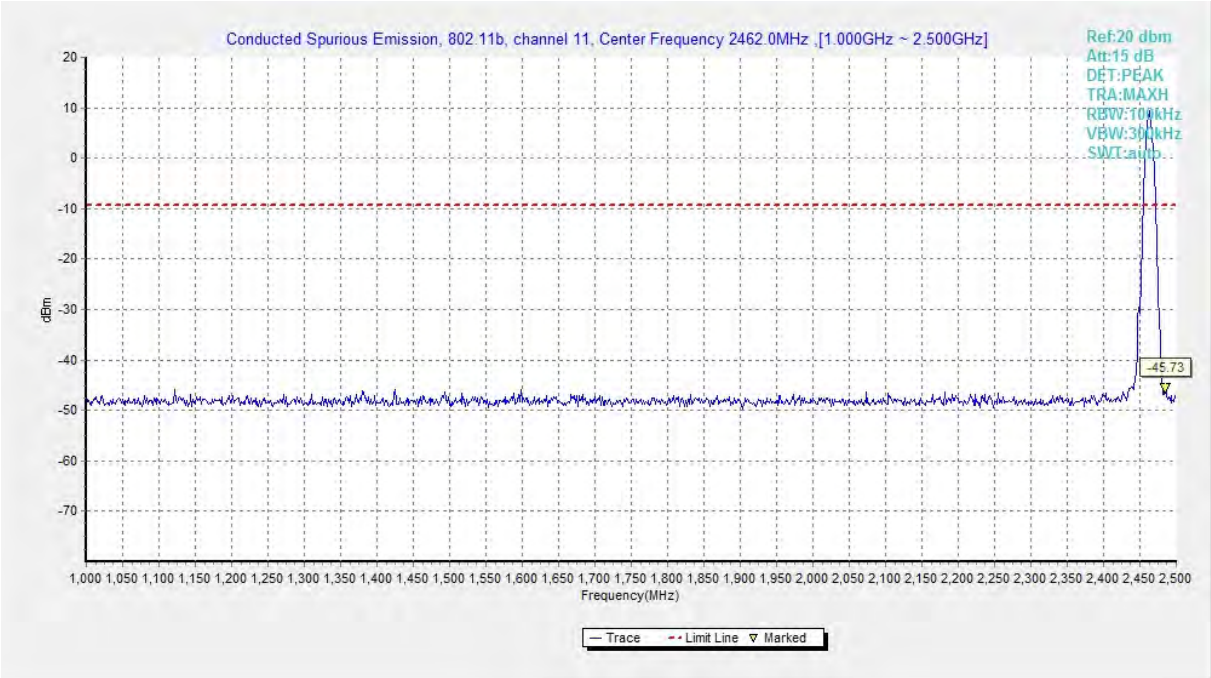


Fig.A.6.1.19 Transmitter Spurious Emission - Conducted (802.11b, Ch11, 1 GHz-2.5 GHz)

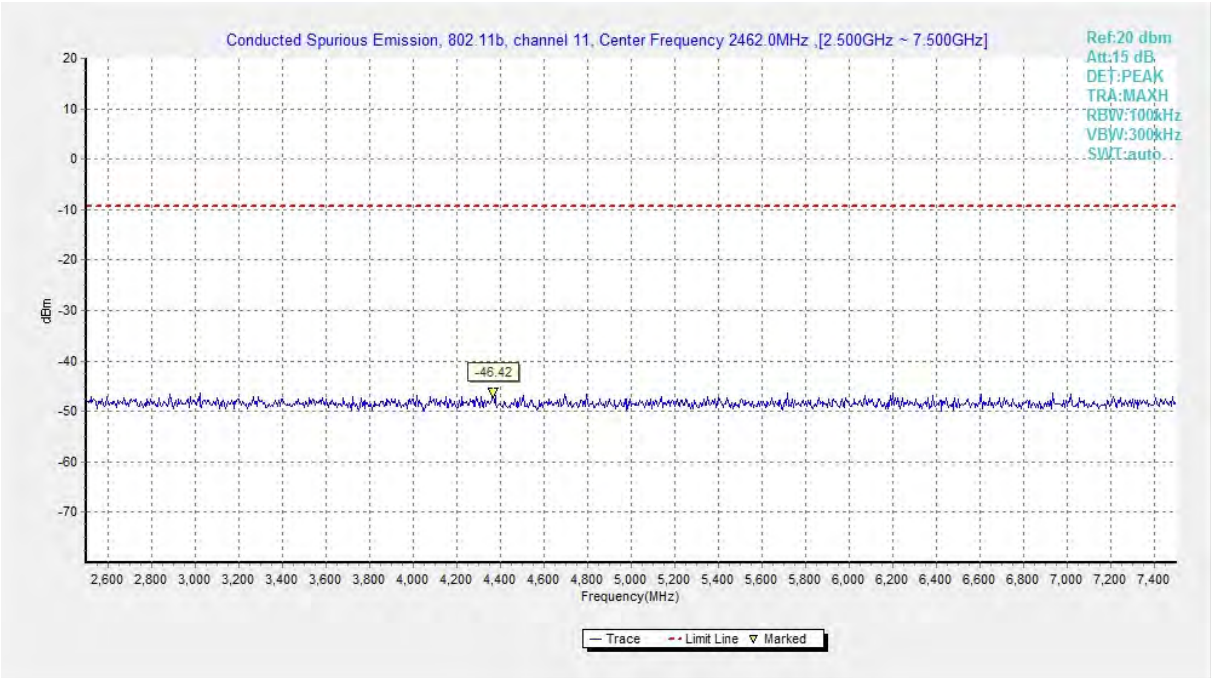


Fig.A.6.1.20 Transmitter Spurious Emission - Conducted (802.11b, Ch11, 2.5 GHz-7.5 GHz)

©Copyright. All rights reserved by CTTL.

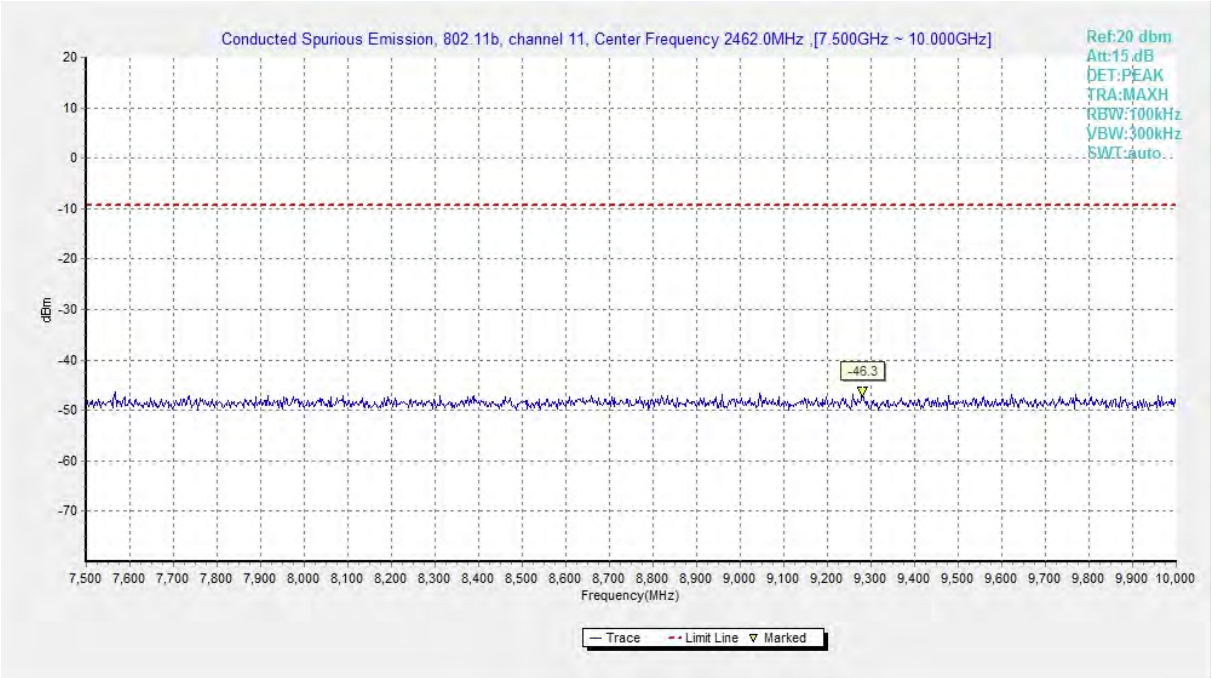


Fig.A.6.1.21 Transmitter Spurious Emission - Conducted (802.11b, Ch11, 7.5 GHz-10 GHz)

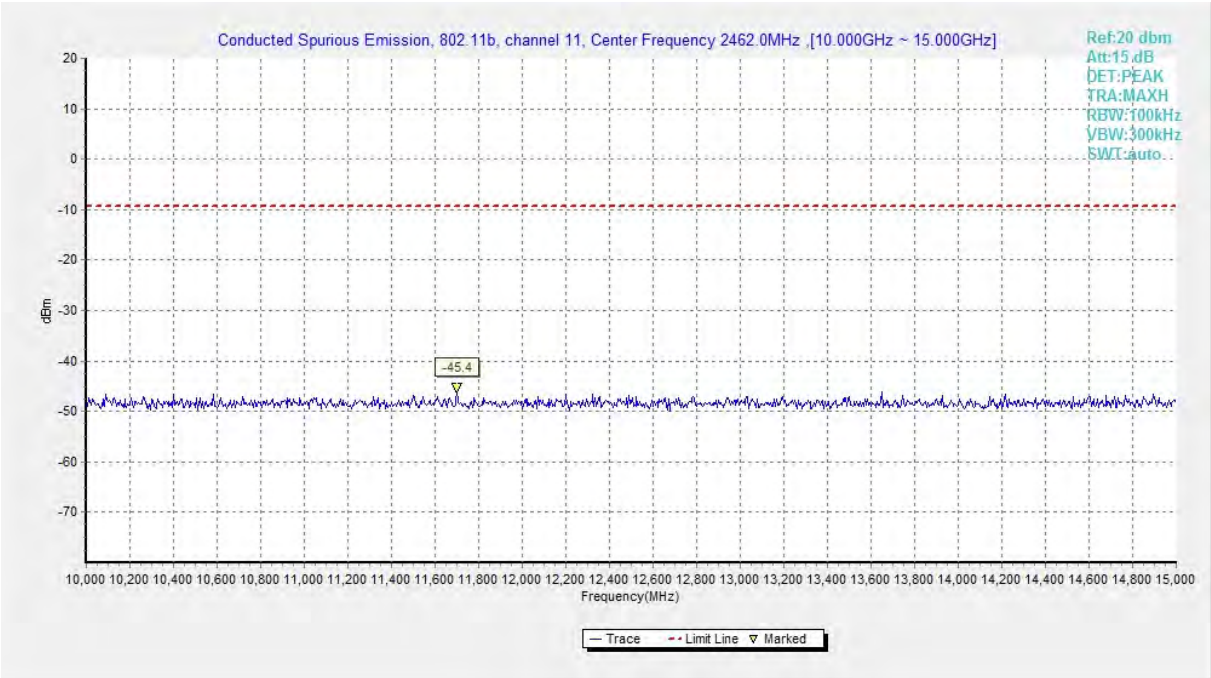


Fig.A.6.1.22 Transmitter Spurious Emission - Conducted (802.11b, Ch11, 10 GHz-15 GHz)

©Copyright. All rights reserved by CTTL.

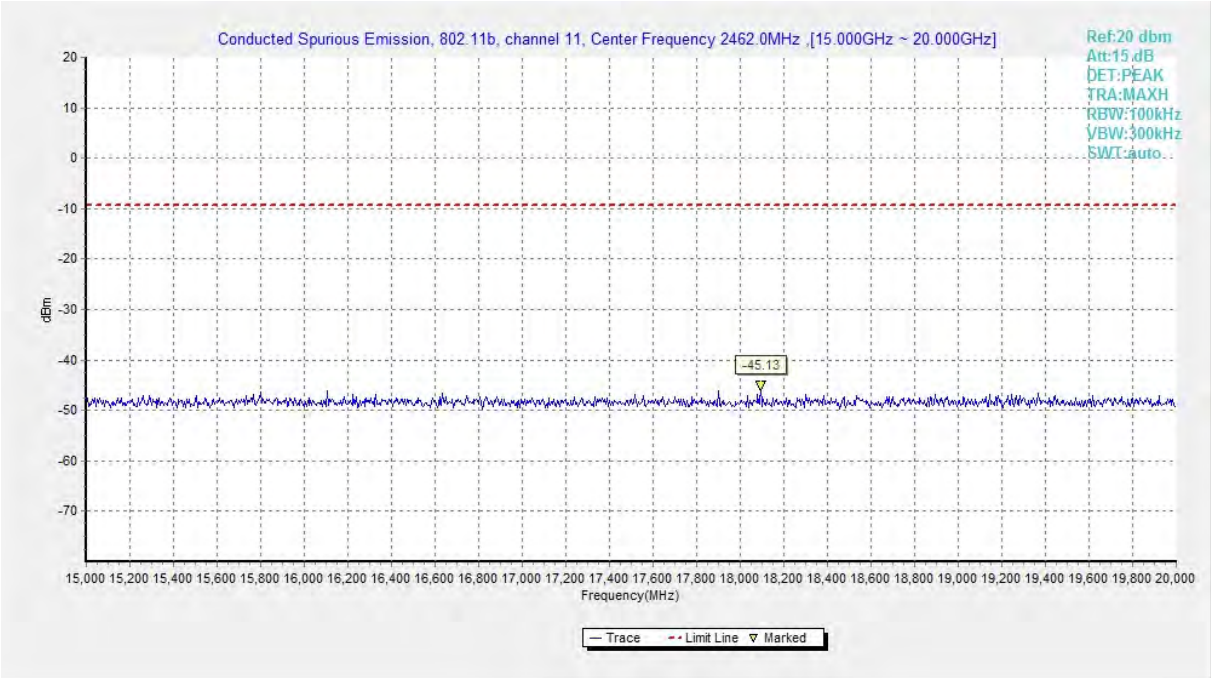


Fig.A.6.1.23 Transmitter Spurious Emission - Conducted (802.11b, Ch11, 15 GHz-20 GHz)

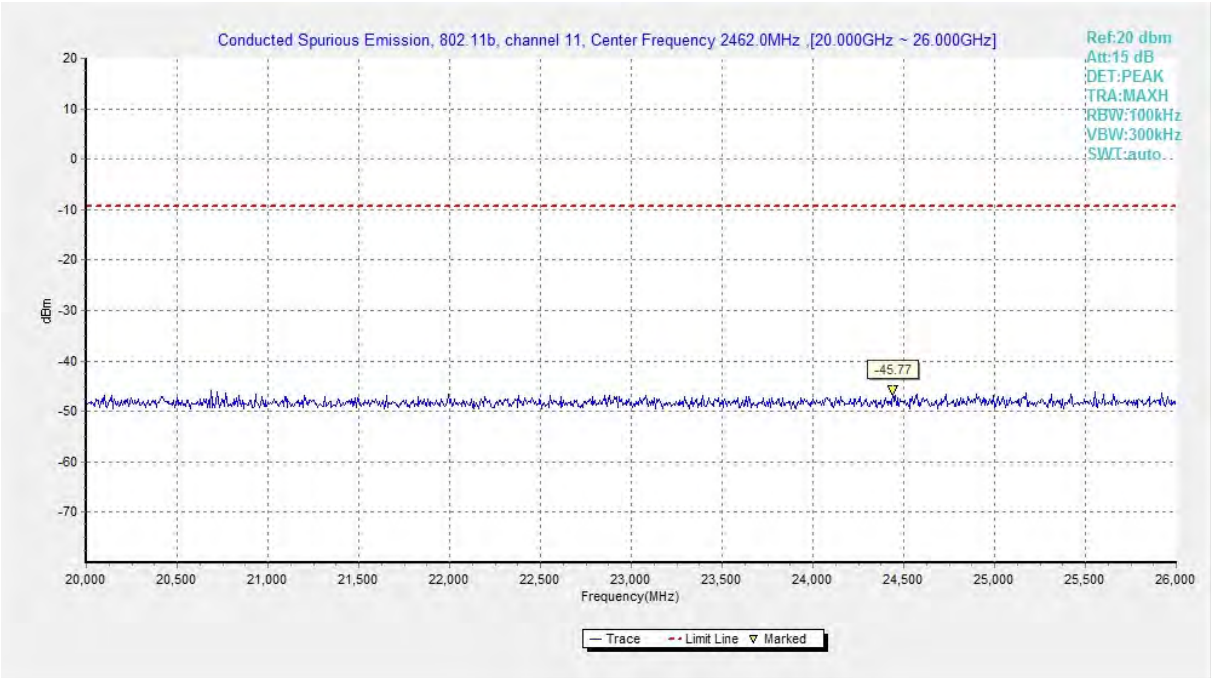


Fig.A.6.1.24 Transmitter Spurious Emission - Conducted (802.11b, Ch11, 20 GHz-26 GHz)

©Copyright. All rights reserved by CTTL.

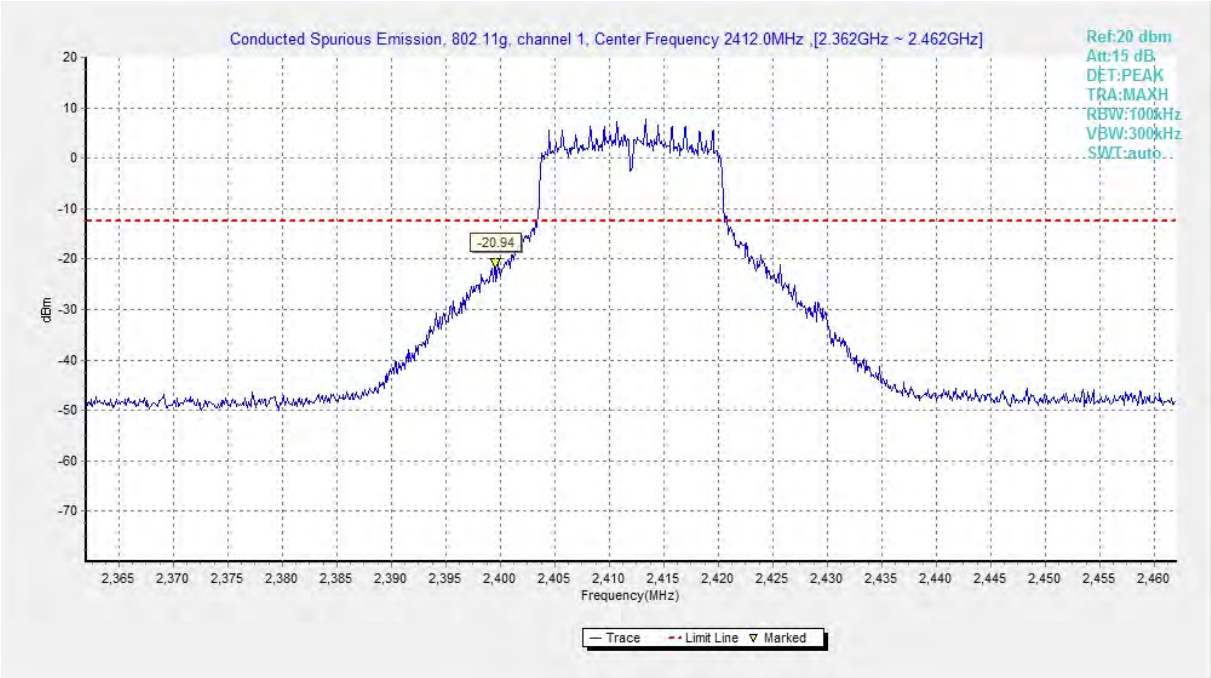


Fig.A.6.1.25 Transmitter Spurious Emission - Conducted (802.11g, Ch1, Center Frequency)

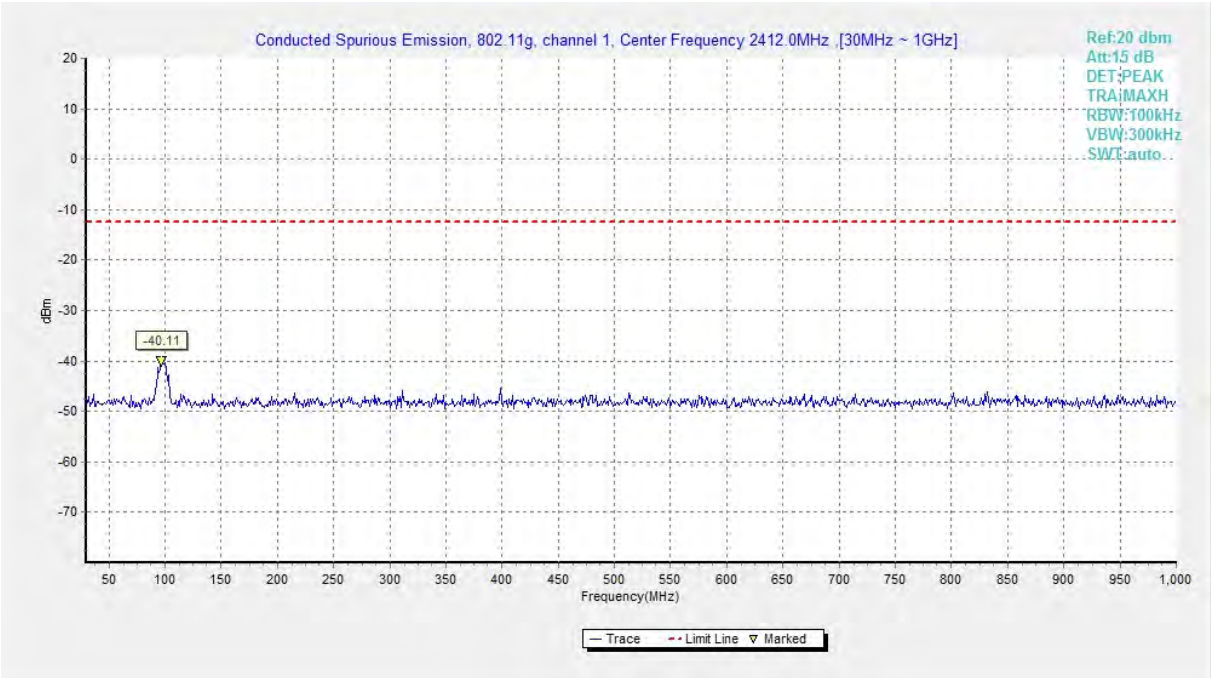


Fig.A.6.1.26 Transmitter Spurious Emission - Conducted (802.11g, Ch1, 30 MHz-1 GHz)

©Copyright. All rights reserved by CTTL.

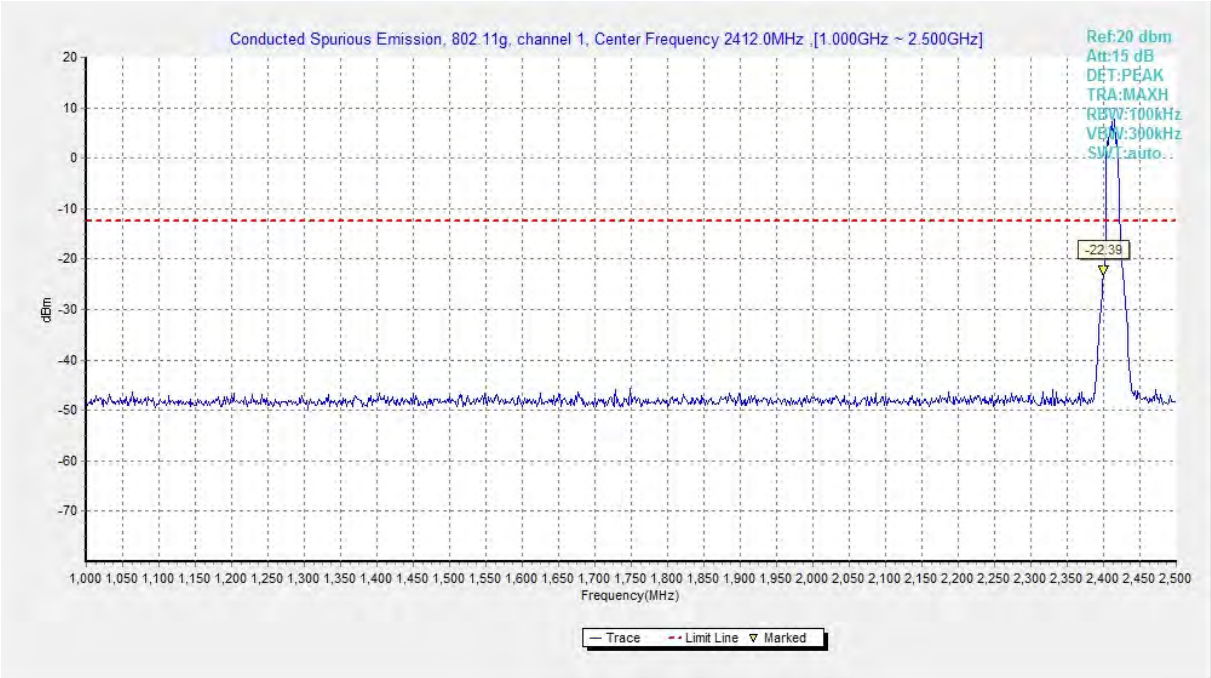


Fig.A.6.1.27 Transmitter Spurious Emission - Conducted (802.11g, Ch1, 1 GHz-2.5 GHz)

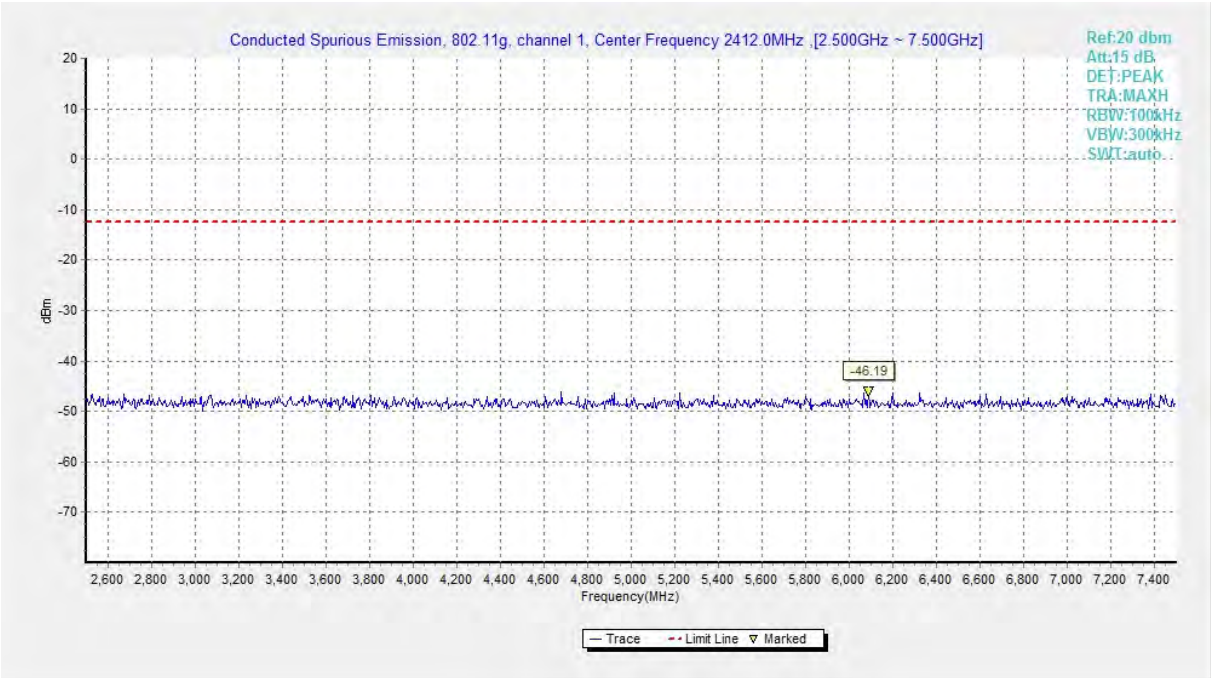


Fig.A.6.1.28 Transmitter Spurious Emission - Conducted (802.11g, Ch1, 2.5 GHz-7.5 GHz)

©Copyright. All rights reserved by CTTL.

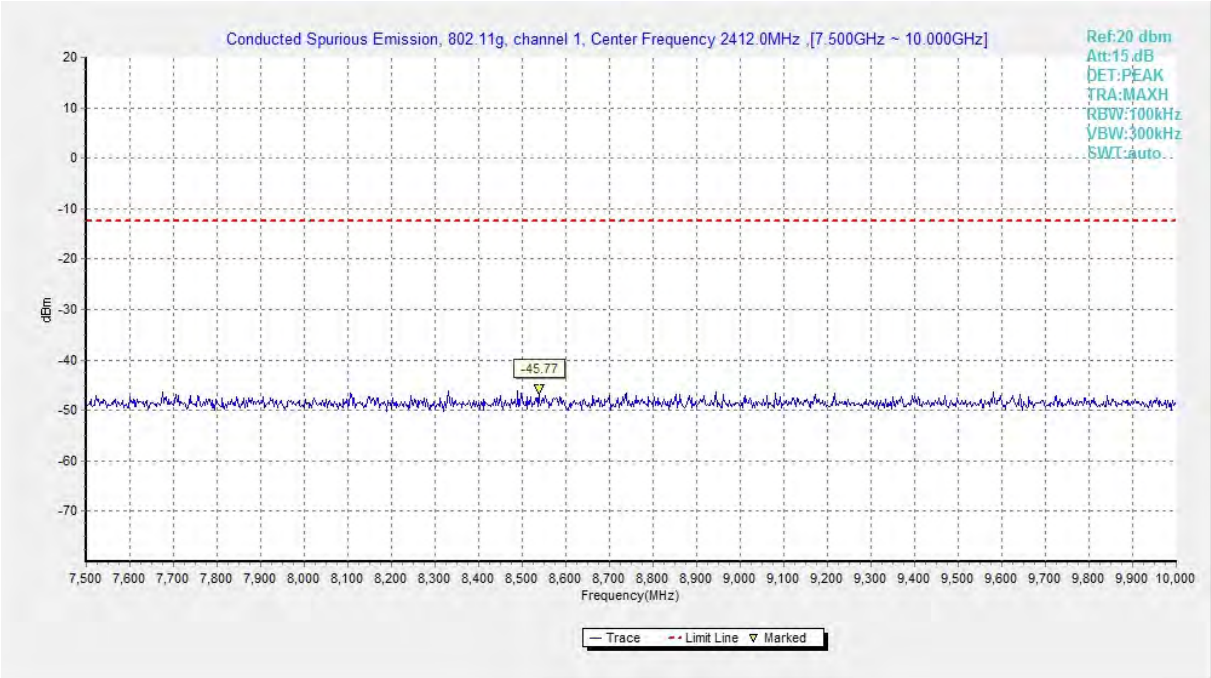


Fig.A.6.1.29 Transmitter Spurious Emission - Conducted (802.11g, Ch1, 7.5 GHz-10 GHz)

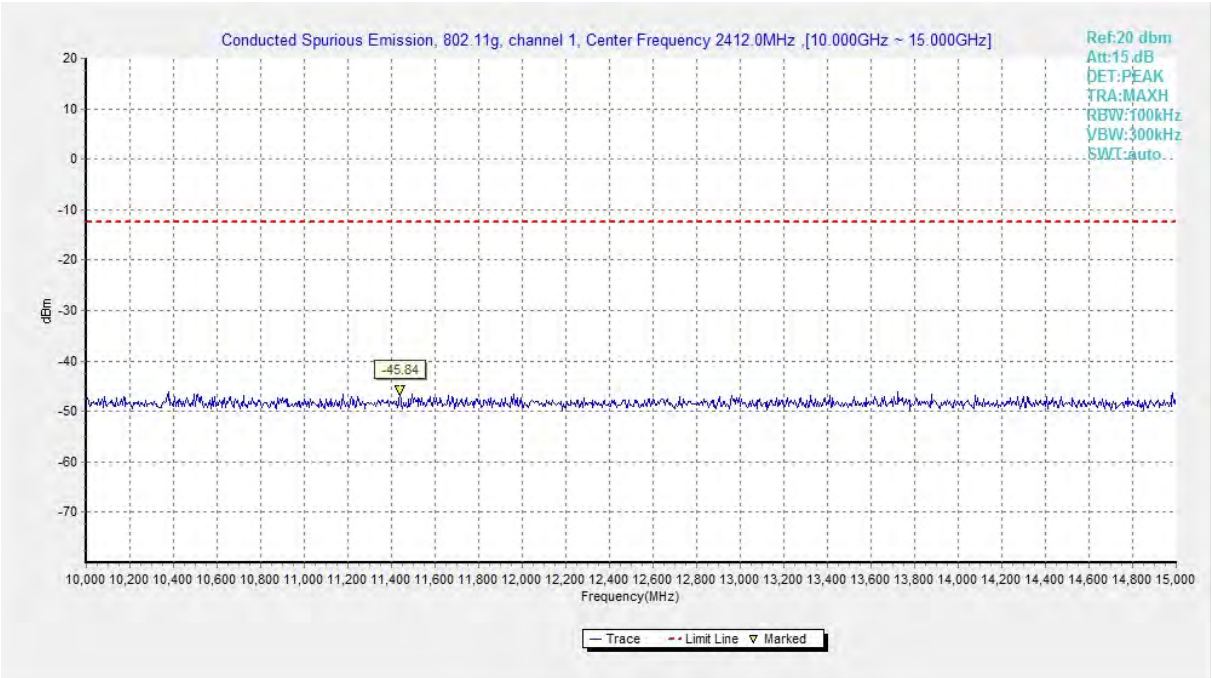


Fig.A.6.1.30 Transmitter Spurious Emission - Conducted (802.11g, Ch1, 10 GHz-15 GHz)

©Copyright. All rights reserved by CTTL.

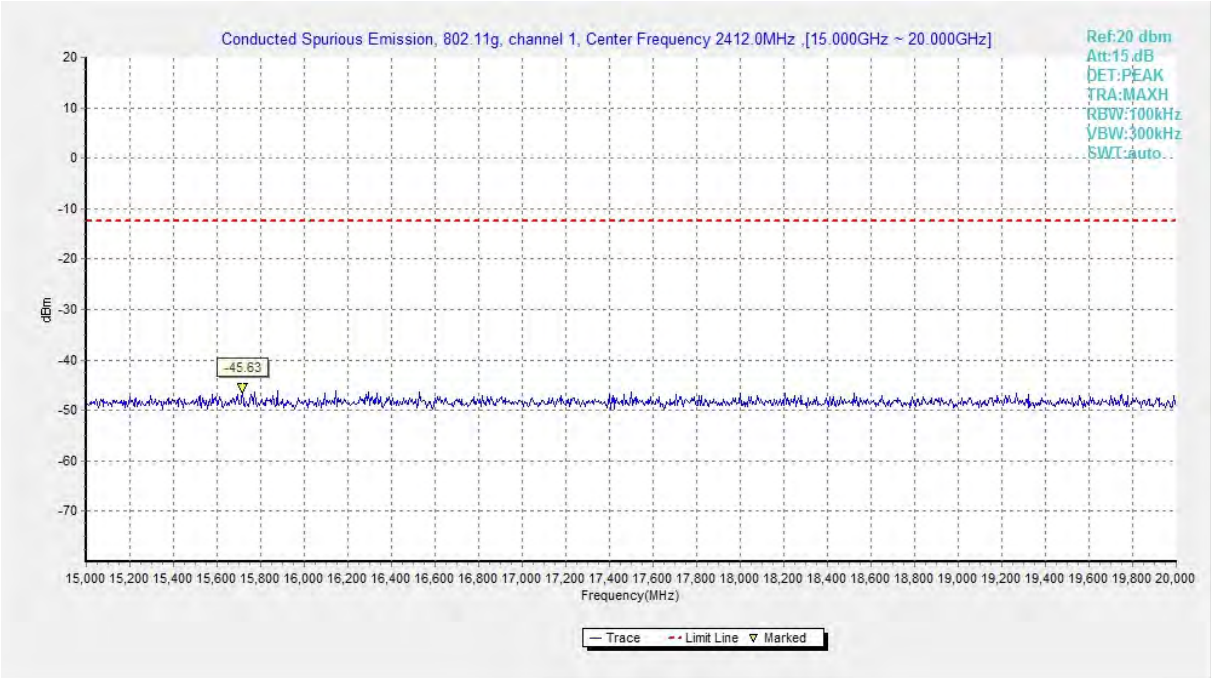


Fig.A.6.1.31 Transmitter Spurious Emission - Conducted (802.11g, Ch1, 15 GHz-20 GHz)

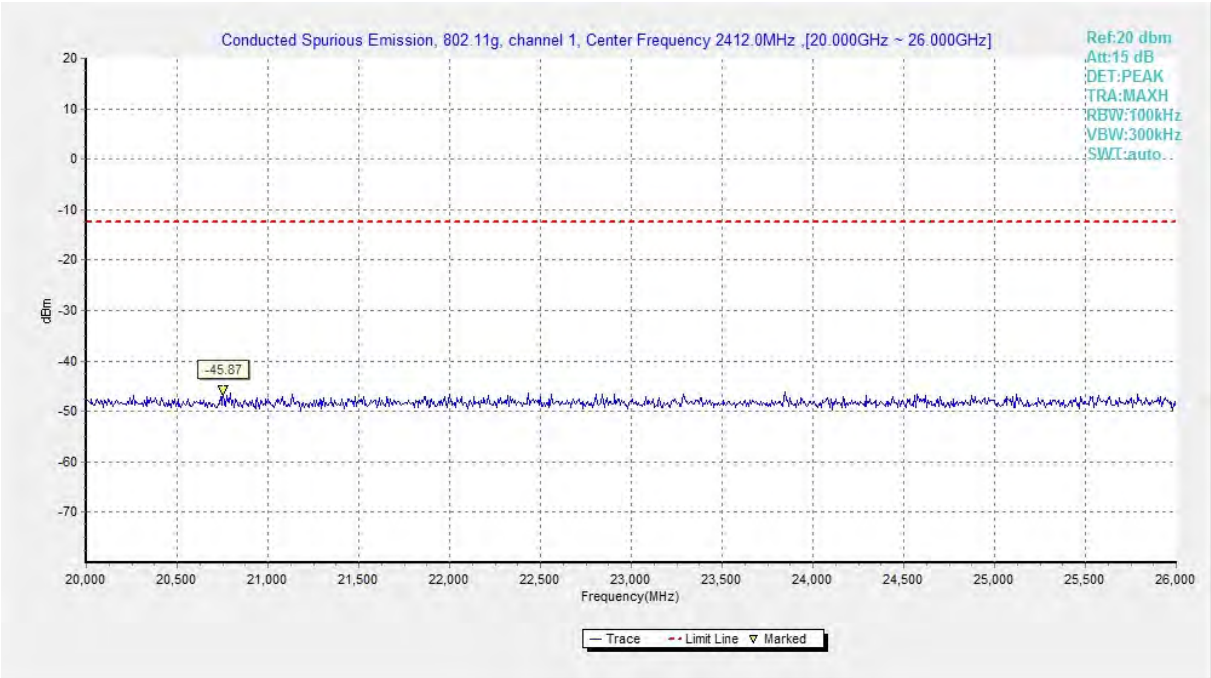


Fig.A.6.1.32 Transmitter Spurious Emission - Conducted (802.11g, Ch1, 20 GHz-26 GHz)

©Copyright. All rights reserved by CTTL.

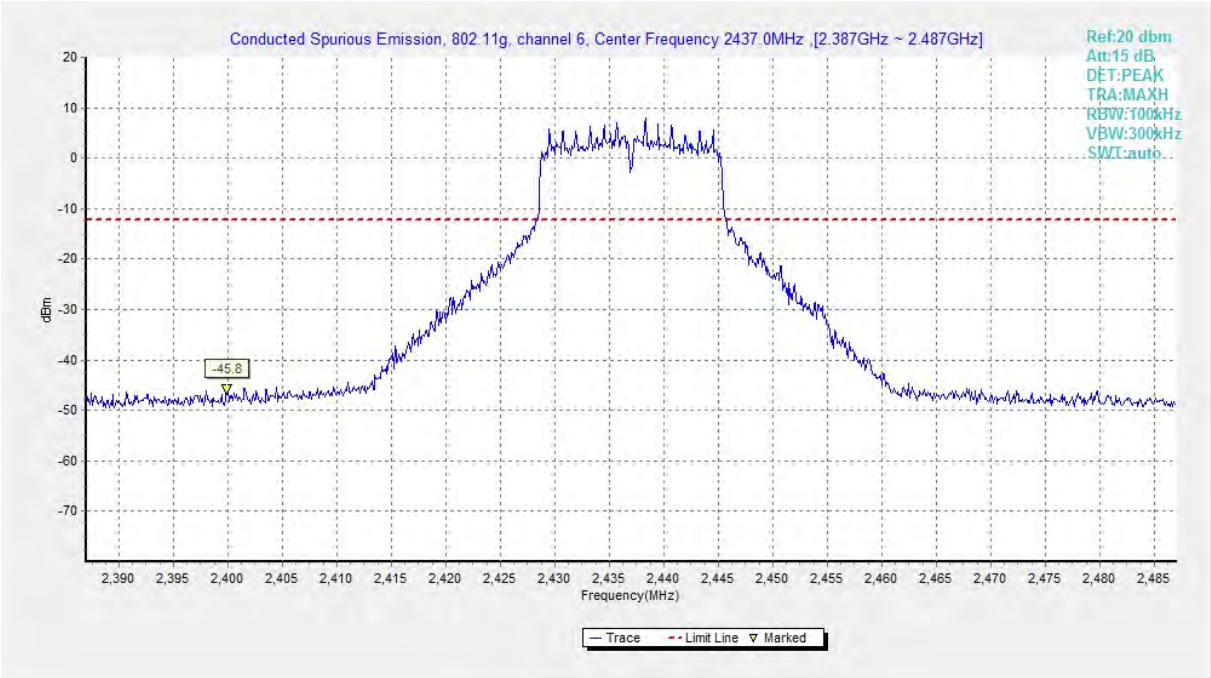


Fig.A.6.1.33 Transmitter Spurious Emission - Conducted (802.11g, Ch6, Center Frequency)

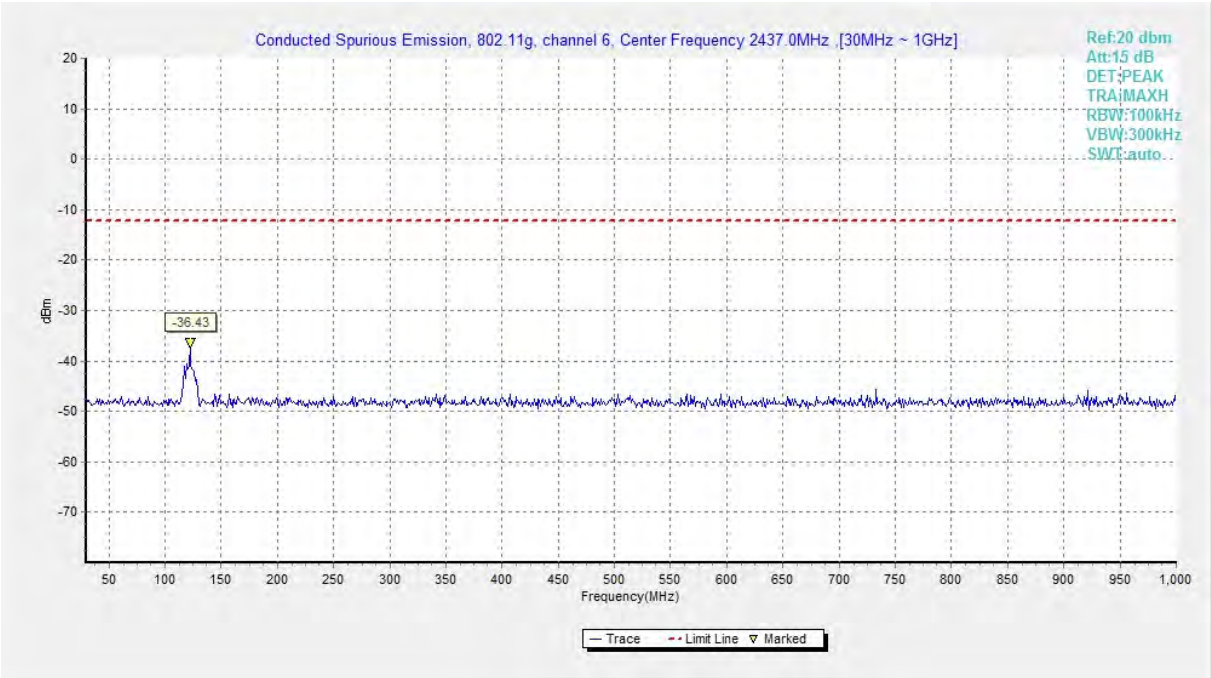


Fig.A.6.1.34 Transmitter Spurious Emission - Conducted (802.11g, Ch6, 30 MHz-1 GHz)

©Copyright. All rights reserved by CTTL.

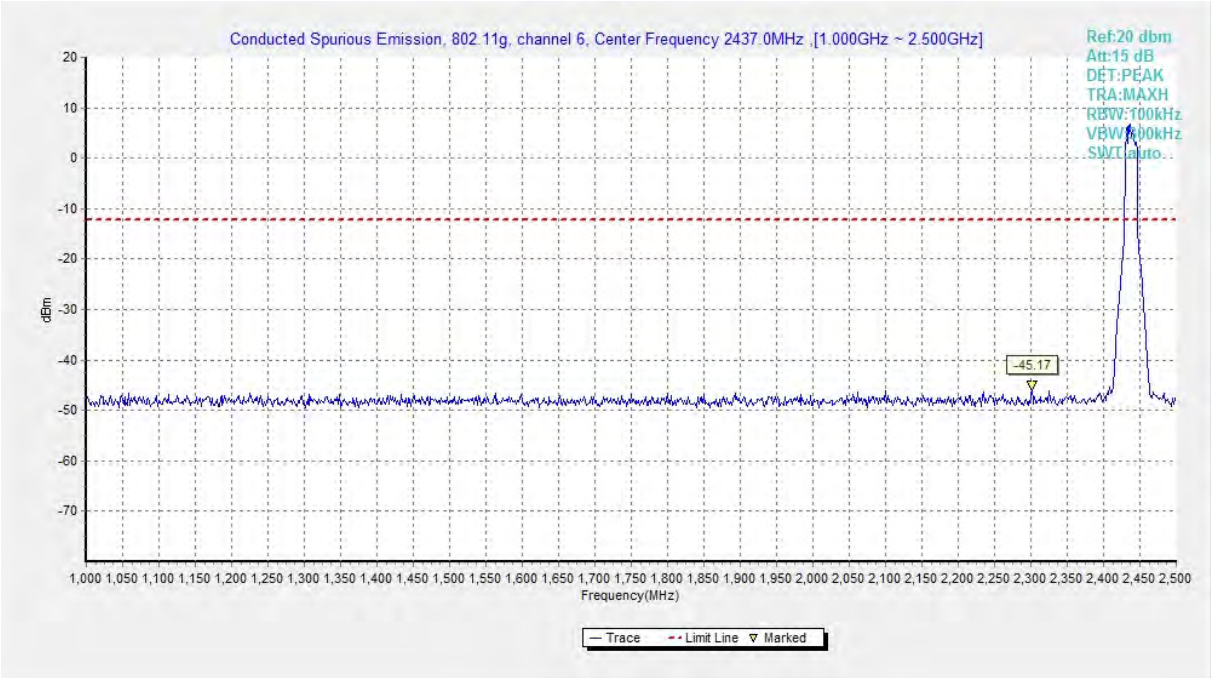


Fig.A.6.1.35 Transmitter Spurious Emission - Conducted (802.11g, Ch6, 1 GHz-2.5 GHz)

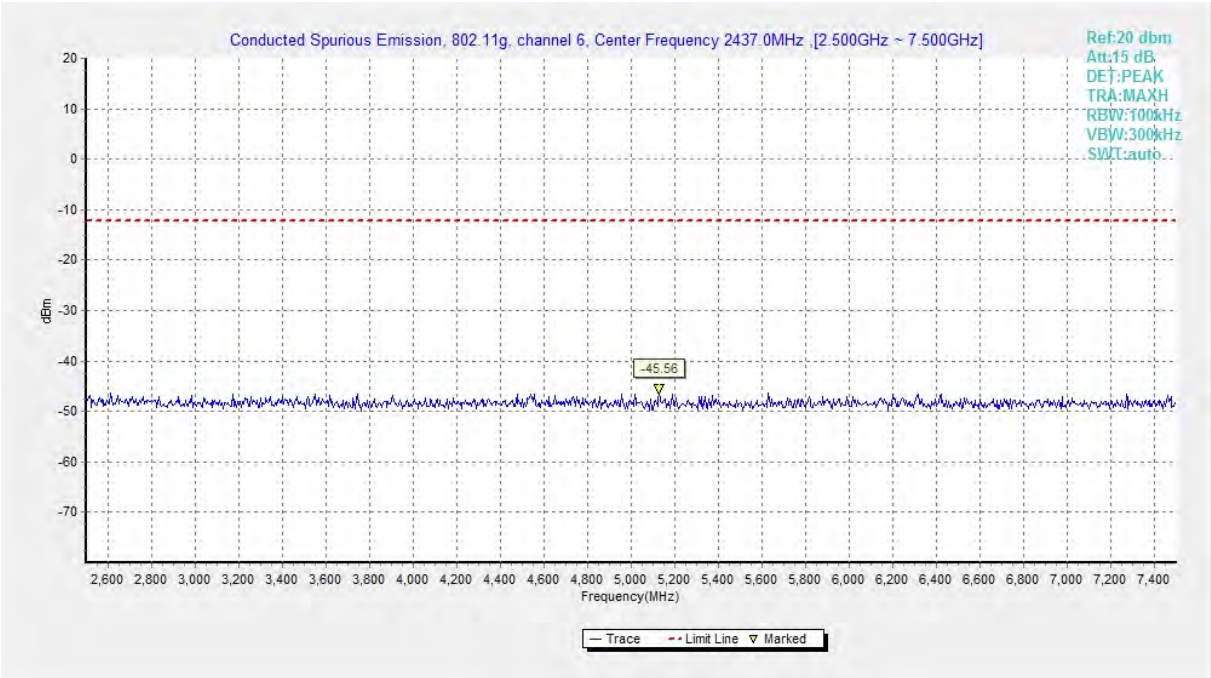


Fig.A.6.1.36 Transmitter Spurious Emission - Conducted (802.11g, Ch6, 2.5 GHz-7.5 GHz)

©Copyright. All rights reserved by CTTL.