TEST REPORT

No. I23N01197-WLAN 2.4GHz

for

Shanghai Sunmi Technology Co., Ltd.

Wireless data POS System

Model Name: T5711

with

Hardware Version: Bgf6d

Software Version: SP6610A_V003_20230409_sunmi_CS

FCC ID: 2AH25V3MIX

ISED Number: 22621-V3MIX

Issued Date: 2023-08-01

Designation Number: CN1210

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 SAICT.

Test Laboratory:

Shenzhen Academy of Information and Communications Technology

Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China 518000.

Tel: +86(0)755-33322000, Fax: +86(0)755-33322001

Email: yewu@caict.ac.cn, www.saict.ac.cn

©Copyright. All rights reserved by SAICT.

REPORT HISTORY

Report Number	Revision	Description	Issue Date
I23N01197-WLAN 2.4GHz	Rev.0	1st edition	2023-08-01

Note: the latest revision of the test report supersedes all previous versions.

©Copyright. All rights reserved by SAICT.

CONTENTS

1. SUMMARY OF TEST REPORT 4
1.1. TEST ITEMS 4
1.2. TEST STANDARDS 4
1.3. TEST RESULT 4
1.4. TESTING LOCATION 4
1.5. PROJECT DATA 4
1.6. SIGNATURE 4
2. CLIENT INFORMATION 5
2.1. APPLICANT INFORMATION 5
2.2. MANUFACTURER INFORMATION 5
3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE) 6
3.1. ABOUT EUT 6
3.2. INTERNAL IDENTIFICATION OF EUT 6
3.3. INTERNAL IDENTIFICATION OF AE 6
3.4. GENERAL DESCRIPTION 6
4. REFERENCE DOCUMENTS 7
4.1. DOCUMENTS SUPPLIED BY APPLICANT 7
4.2. REFERENCE DOCUMENTS FOR TESTING 7
5. TEST RESULTS 8
5.1. TESTING ENVIRONMENT 8
5.2. TEST RESULTS 8
5.3. STATEMENTS 8
6. TEST EQUIPMENTS UTILIZED 9
7. LABORATORY ENVIRONMENT 10
8. MEASUREMENT UNCERTAINTY 11
ANNEX A: DETAILED TEST RESULTS 12
TEST CONFIGURATION 12
A.0 ANTENNA REQUIREMENT 15
A.1 MAXIMUM OUTPUT POWER 16
A.2 PEAK POWER SPECTRAL DENSITY 17
A.3 6DB BANDWIDTH 24
A.4 BAND EDGES COMPLIANCE 31
A.5 CONDUCTED EMISSION 36
A.6 RADIATED EMISSION 43
A.7 AC POWER LINE CONDUCTED EMISSION 59
A.8 99% OCCUPIED BANDWIDTH 62

©Copyright. All rights reserved by SAICT.

1. Summary of Test Report

1.1. Test Items

Description	Wireless data POS System
Model Name	T5711
Applicant's name	Shanghai Sunmi Technology Co., Ltd.
Manufacturer's Name	Shanghai Sunmi Technology Co., Ltd.

1.2. Test Standards

FCC Part15-2021; ANSI C63.10-2013; RSS-247 Issue 2; RSS-Gen Issue 5

1.3. Test Result

Pass

Please refer to 5.2 Test Results.

1.4. Testing Location

Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China 518000

1.5. Project data

Testing Start Date:	2023-05-23
Testing End Date:	2023-06-15

1.6. Signature

Lin Kanfeng
(Prepared this test report)

An Ran
(Reviewed this test report)

Zhang Bojun
(Approved this test report)

©Copyright. All rights reserved by SAICT.

2. Client Information

2.1. Applicant Information

Company Name:	Shanghai Sunmi Technology Co., Ltd.
Address:	Room 505, No.388, Song Hu Road, Yang Pu District, Shanghai, China
Contact Person	Fang Lu
E-Mail	fang.lu@sunmi.com
Telephone:	+86 18501703215
Fax:	/

2.2. Manufacturer Information

Company Name:	Shanghai Sunmi Technology Co., Ltd.
Address:	Room 505, No.388, Song Hu Road, Yang Pu District, Shanghai, China
Contact Person	Fang Lu
E-Mail	fang.lu@sunmi.com
Telephone:	+86 18501703215
Fax:	/

©Copyright. All rights reserved by SAICT.

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

3.1. About EUT

Description	Wireless data POS System
Model Name	T5711
RF Protocol	IEEE 802.11 b/g/n20/n40
Operating Frequency	2412MHz~2462MHz
Number of Channels	11
Antenna Type	Integrated
Antenna Gain	2.0 dBi
Power Supply	7.2V DC by Battery
FCC ID	2AH25V3MIX
ISED Number	22621-V3MIX
Condition of EUT as received	No abnormality in appearance

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of Shenzhen Academy of Information and Communications Technology.

3.2. Internal Identification of EUT

EUT ID*	SN or IMEI	HW Version	SW Version	Date of Receipt
UT01aa	868189060008663	Bgf6d	SP6610A_V003_20230409_sunmi_CS	2023-05-16
UT07aa	865506060003027	Bgf6d	SP6610A_V003_20230409_sunmi_CS	2023-05-30

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

*UT01aa is used for Conduction test; UT07aa is used for radiation test.

3.3. Internal Identification of AE

AE No.	Description	AE ID*
AE1	Battery	/
AE2	Charger	/
AE3	Data Cable	/

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

3.4. General Description

The Equipment under Test (EUT) is a model of Wireless data POS System with integrated antenna and battery. It consists of normal options: Lithium Battery and Charger. Manual and specifications of the EUT were provided to fulfil the test. Samples undergoing test were selected by the client.

©Copyright. All rights reserved by SAICT.

4. Reference Documents

4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part15	FCC CFR 47, Part 15, Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902-928MHz, 2400-2483.5 MHz, and 5725-5850 MHz	2021
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013
RSS-247	Spectrum Management and Telecommunications Radio Standards Specification Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices	Issue 2 February, 2017
RSS-Gen	Spectrum Management and Telecommunications Radio Standards Specification General Requirements for Compliance of Radio Apparatus	Issue 5 A2 February, 2021

©Copyright. All rights reserved by SAICT.

5. Test Results

5.1. Testing Environment

Normal Temperature: 15~35°C

Relative Humidity: 20~75%

5.2. Test Results

No	Test cases	Sub-clause of Part 15C	Sub-clause of IC	Verdict
0	Antenna Requirement	15.203	/	**P**
1	Maximum Output Power	15.247 (b)	RSS-247 section 5.4	**P**
2	Peak Power Spectral Density	15.247 (e)	RSS-247 section 5.2	**P**
3	6dB Bandwidth	15.247 (a)	RSS-247 section 5.2	**P**
4	Band Edges Compliance	15.247 (d)	RSS-247 section 5.5	**P**
5	Conducted Emission	15.247 (d)	RSS-247 section 5.5/RSS-Gen section 6.13	**P**
6	Radiated Emission	15.247, 15.205, 15.209	RSS-247 section 5.5/RSS-Gen section 6.13	**P**
7	AC Power line Conducted	15.107, 15.207	RSS-Gen section 8.8	**P**
8	99% Occupied Bandwidth	/	RSS-Gen section 6.7	**/**

See **ANNEX A** for details.

5.3. Statements

SAICT has evaluated the test cases requested by the applicant/manufacturer as listed in section 5.2 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in section 4.2.

Disclaimer:

A. After confirmation with the customer, the sample information provided by the customer may affect the validity of the measurement results in this report, and the impact and consequences arising therefrom shall be borne by the customer.

B. The samples in this report are provided by the customer, and the test results are only applicable to the samples received.

According to the customer's description, T5711 (I23N01197) is a variant product of T6721 (I23N00836). All results were from the initial model.

©Copyright. All rights reserved by SAICT.

6. Test Equipments Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due Date	Calibration Period
1	Vector Signal Analyzer	FSV40	100903	Rohde & Schwarz	2023-12-28	1 year
2	Power Sensor	U2021XA	MY55430013	Keysight	2023-12-28	1 year
3	Data Acquisiton	U2531A	TW55443507	Keysight	/	/
4	Shielding Room	S81	CT000986-1344	ETS-Lindgren	2026-09-12	5 years

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due Date	Calibration Period
1	Test Receiver	ESR7	101676	ETS-Lindgren	2023-11-23	1 year
2	BiLog Antenna	3142E	0224831	ETS-lindgren	2024-05-27	3 years
3	Horn Antenna	3117	00066577	ETS-lindgren	2025-04-17	1 year
4	Anechoic Chamber	FACT3-2.0	1285	ETS-Lindgren	2025-05-28	2 years
5	Spectrum Analyzer	FSV40	101192	ETS-Lindgren	2024-01-11	1 year
6	Loop Antenna	HLA6120	35779	TESEQ	2025-05-12	3 years
7	Horn Antenna	QSH-SL-18-26-S-20	17013	Q-par	2026-02-01	3 years
8	Test Receiver	ESCI	100702	ETS-Lindgren	2024-01-11	1 year
9	LISN	ENV216	102067	ETS-Lindgren	2024-07-13	1 year

Test software

No.	Equipment	Manufacturer	Version
1	TechMgr Software	CAICT	2.1.1
2	EMC32	Rohde & Schwarz	10.50.40

EUT is engineering software provided by the customer to control the transmitting signal.
The EUT was programmed to be in continuously transmitting mode.

Anechoic chamber

Fully anechoic chamber by ETS-Lindgren

©Copyright. All rights reserved by SAICT.

7. Laboratory Environment

Shielded room

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω

Anechoic chamber

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω
Normalised site attenuation (NSA)	< ±4 dB, 3 m distance, from 30 to 1000 MHz
Voltage Standing Wave Ratio (VSWR)	≤ 6 dB, from 1 to 18 GHz, 3 m distance
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

©Copyright. All rights reserved by SAICT.

8. Measurement Uncertainty

Test Name	Uncertainty *(k=2)*	
1. RF Output Power - Conducted	1.32dB	
2. Power Spectral Density - Conducted	1.32dBm/MHz	
3. Occupied channel bandwidth - Conducted	4.56kHz	
4. Transmitter Spurious Emission - Conducted	30MHz≤f<1GHz	1.41dB
	1GHz≤f<7GHz	1.92dB
	7GHz≤f<13GHz	2.31dB
	13GHz≤f≤26GHz	2.61dB
5. Transmitter Spurious Emission - Radiated	9kHz≤f<30MHz	1.70dB
	30MHz≤f<1GHz	4.80dB
	1GHz≤f<18GHz	4.62dB
	18GHz≤f≤40GHz	2.36dB
6. AC Power line Conducted Emission	150kHz≤f≤30MHz	2.62dB

©Copyright. All rights reserved by SAICT.

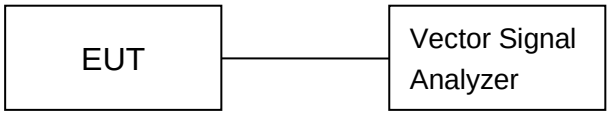
ANNEX A: Detailed Test Results

Test Configuration

The measurement is made according to ANSI C63.10.

1) Conducted Measurements

1. Connect the EUT to the test system correctly.
2. Set the EUT to the required work mode.
3. Set the EUT to the required channel.
4. Set the spectrum analyzer to start measurement.
5. Record the values.

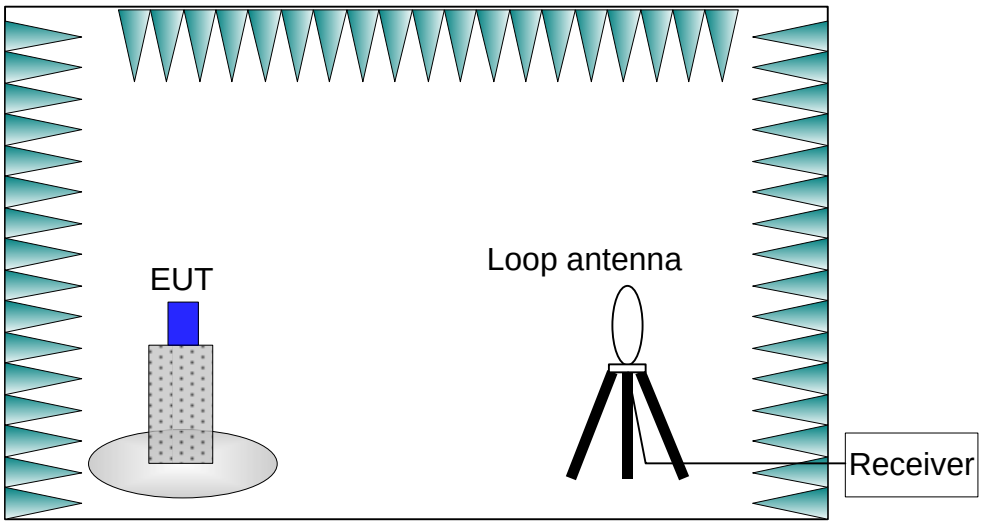


2) Radiated Measurements

Test setup:

9kHz-30MHz:

The EUT are measured in a anechoic chamber. The EUT is placed on a non-conductive stand of 80cm high, and at a measurement distance of 3m from the receiving antenna. The center of the receiving loop antenna is 1.0 meter above the ground. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT and adjusting the receiver antenna polarization.

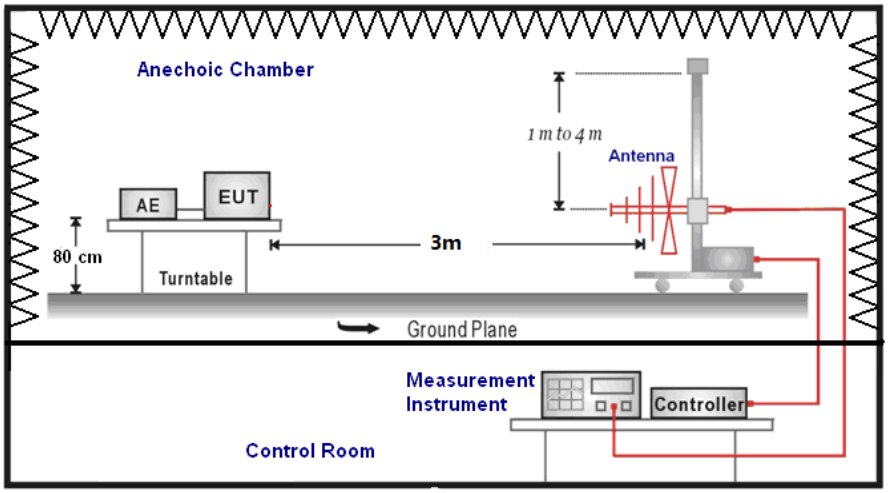


©Copyright. All rights reserved by SAICT.

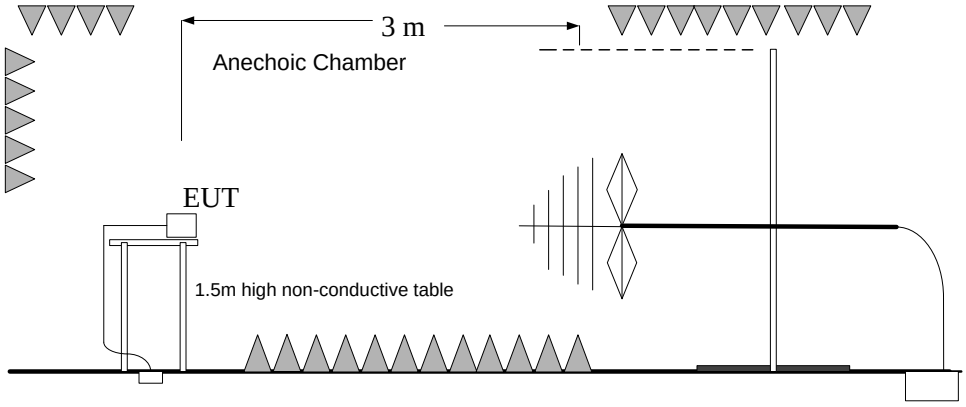
30MHz-26.5GHz:

The EUT are measured in a anechoic chamber. The EUT is placed on a non-conductive stand of 80cm high, and at a measurement distance of 3m from the receiving antenna. The center of the receiving antenna is 1.0 meter to 4.0 meter above the ground. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT and adjusting the receiver antenna polarization.

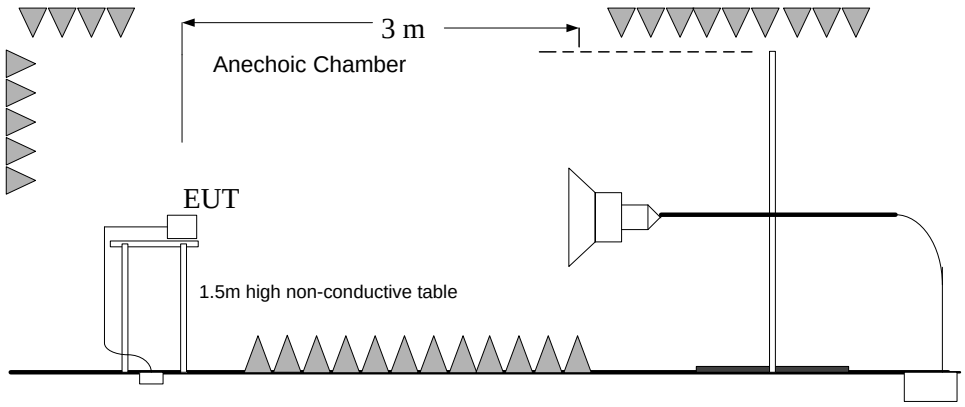
30MHz-1GHz:



1GHz-3GHz:



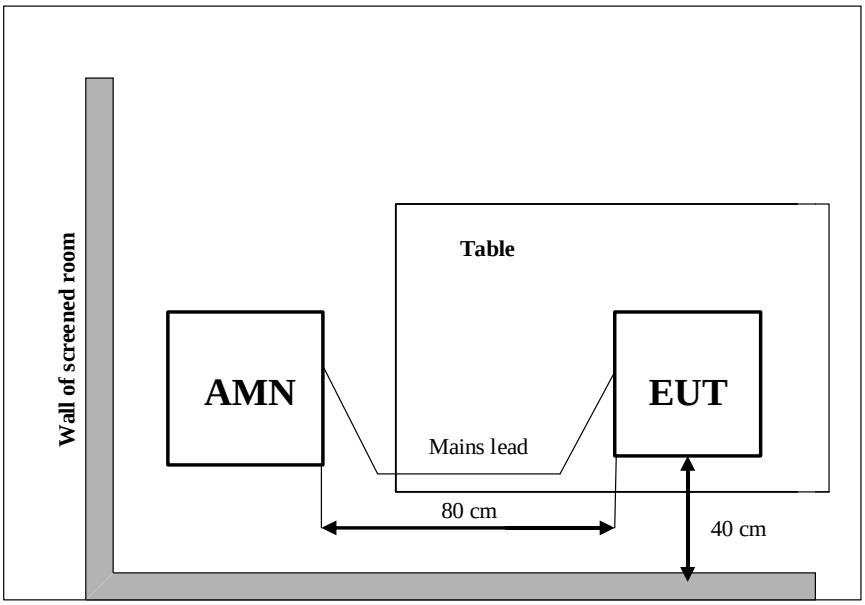
3GHz-26.5GHz:



©Copyright. All rights reserved by SAICT.

3) AC Power line Conducted Emission Measurement

For WLAN, the EUT is working under test mode. The EUT is commanded to operate at maximum transmitting power.



©Copyright. All rights reserved by SAICT.

A.0 Antenna requirement

Measurement Limit:

Standard	Requirement
FCC CRF Part 15.203	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

Note: The Directional gains of antenna used for transmitting is 2.0 dBi. The RF transmitter uses an integrate antenna without connector.

©Copyright. All rights reserved by SAICT.

A.1 Maximum Output Power

Measurement of method :See ANSI C63.10-Clause 11.9.2.3.2

Method AVGPM-G is a measurement using a gated RF average power meter.

Alternatively, measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Measurement Limit:

Standard	Limit (dBm)	E.I.R.P Limit (dBm)
FCC CRF Part 15.247(b) & RSS-247 section 5.4	< 30	< 36

Measurement Results:

Mode	Frequency (MHz)	Test Result (dBm)	E.I.R.P (dBm)	Conclusion
802.11b	2412 (CH1)	15.47	17.47	**P**
	2437 (CH6)	15.68	17.68	**P**
	2462 (CH11)	15.76	17.76	**P**
802.11g	2412 (CH1)	14.85	16.85	**P**
	2437 (CH6)	15.21	17.21	**P**
	2462 (CH11)	15.24	17.24	**P**
802.11n HT20	2412 (CH1)	13.64	15.64	**P**
	2437 (CH6)	14.03	16.03	**P**
	2462 (CH11)	14.01	16.01	**P**
802.11n HT40	2422 (CH3)	13.83	15.83	**P**
	2437 (CH6)	14.04	16.04	**P**
	2452 (CH9)	13.65	15.65	**P**

Note:

The data rate 1Mbps (11b mode), 6Mbps (11g mode) and MCS0 (11n mode) are selected as the Worst-Case. The following cases and test graphs are performed with this condition. The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

E.I.R.P value = Conducted values (with conducted samples) + Antenna Gain.

©Copyright. All rights reserved by SAICT.

A.2 Peak Power Spectral Density

Method of Measurement: See ANSI C63.10-clause 11.10.2.

Measurement Limit:

Standard	Limit
FCC CRF Part 15.247(e) & RSS-247 section 5.2	< 8 dBm/3 kHz

Measurement Results:

Mode	Channel	Frequency (MHz)	Test Results (dBm)		Conclusion
802.11b	CH 1	2412	Fig.1	-6.19	**P**
	CH 6	2437	Fig.2	-7.49	**P**
	CH 11	2462	Fig.3	-6.65	**P**
802.11g	CH 1	2412	Fig.4	-8.73	**P**
	CH 6	2437	Fig.5	-8.75	**P**
	CH 11	2462	Fig.6	-8.52	**P**
802.11n HT20	CH 1	2412	Fig.7	-11.03	**P**
	CH 6	2437	Fig.8	-11.33	**P**
	CH 11	2462	Fig.9	-11.31	**P**
802.11n HT40	CH 3	2422	Fig.10	-15.02	**P**
	CH 6	2437	Fig.11	-14.51	**P**
	CH 9	2452	Fig.12	-15.25	**P**

See below for test graphs.
Conclusion: PASS

©Copyright. All rights reserved by SAICT.

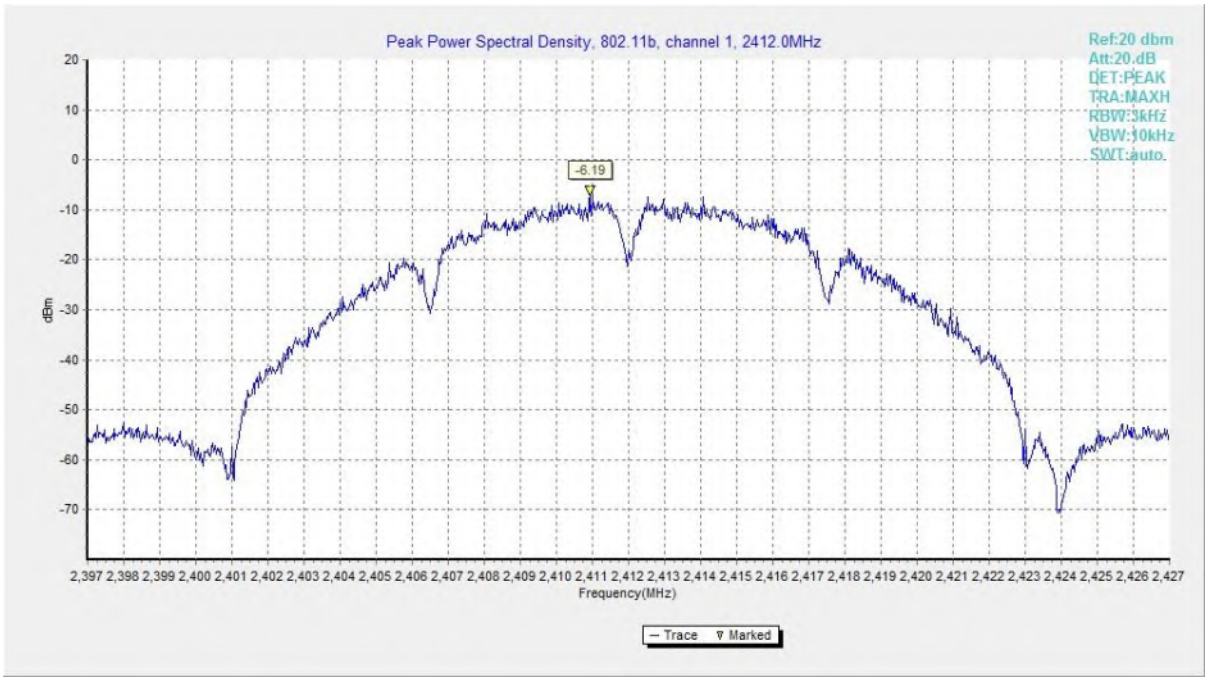


Fig.1 Power Spectral Density (802.11b, CH 1)

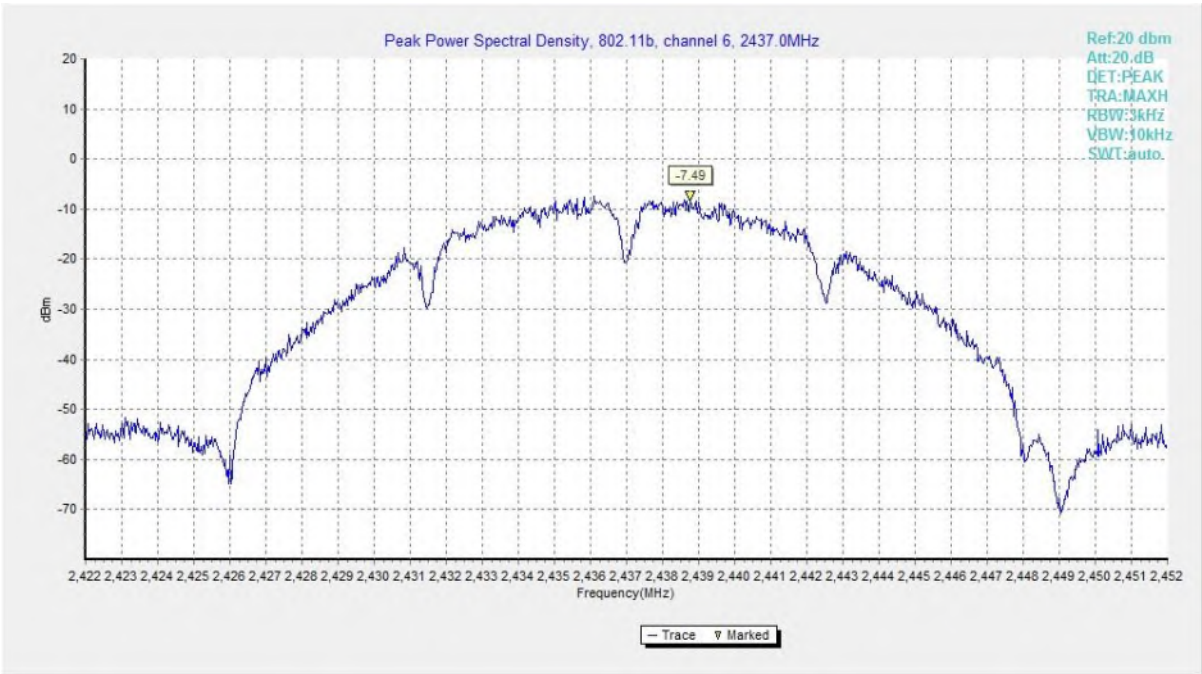


Fig.2 Power Spectral Density (802.11b, CH 6)

©Copyright. All rights reserved by SAICT.

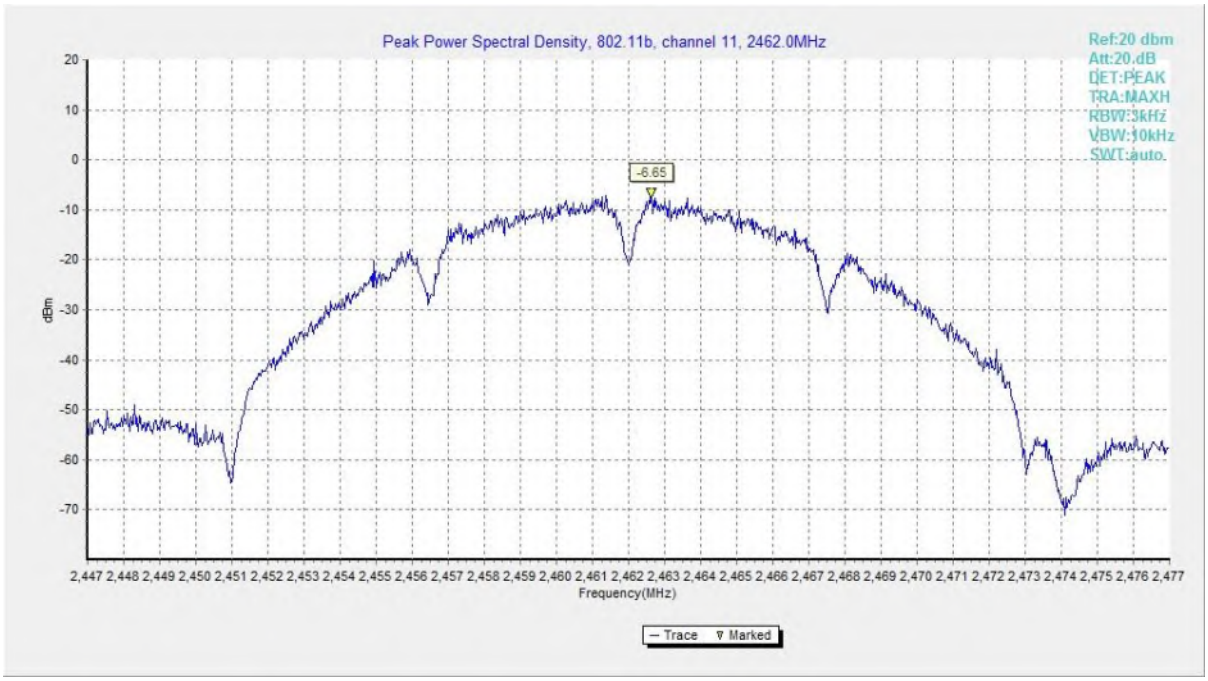


Fig.3 Power Spectral Density (802.11b, CH 11)

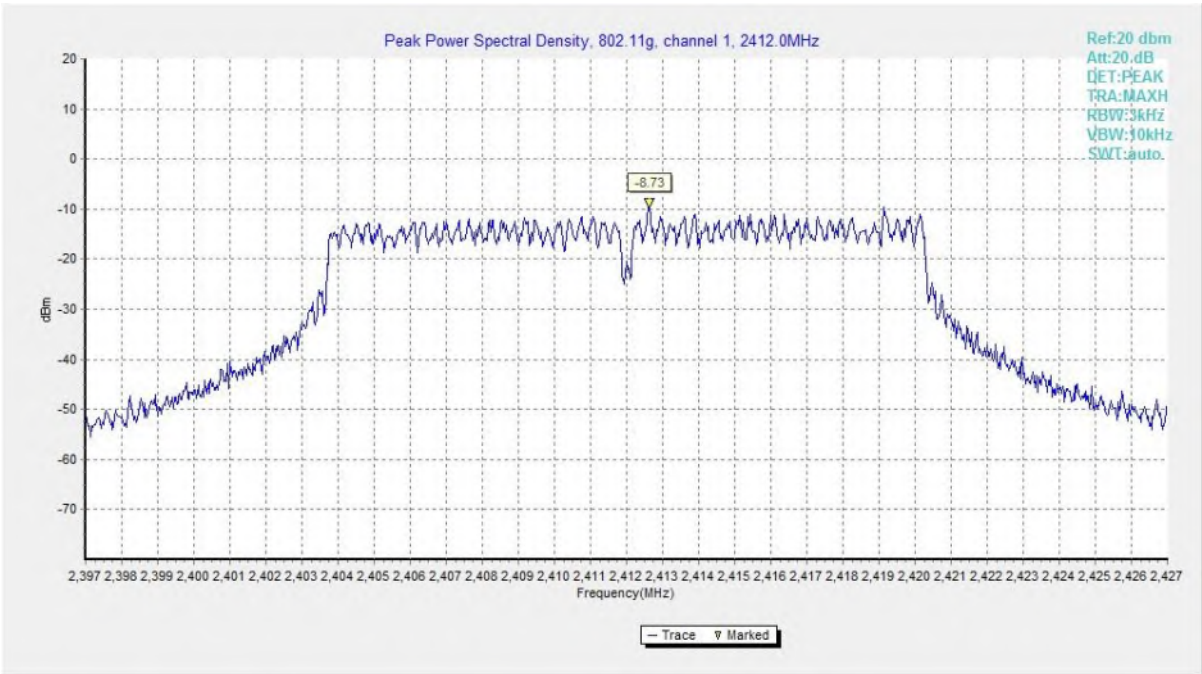


Fig.4 Power Spectral Density (802.11g, CH 1)

©Copyright. All rights reserved by SAICT.

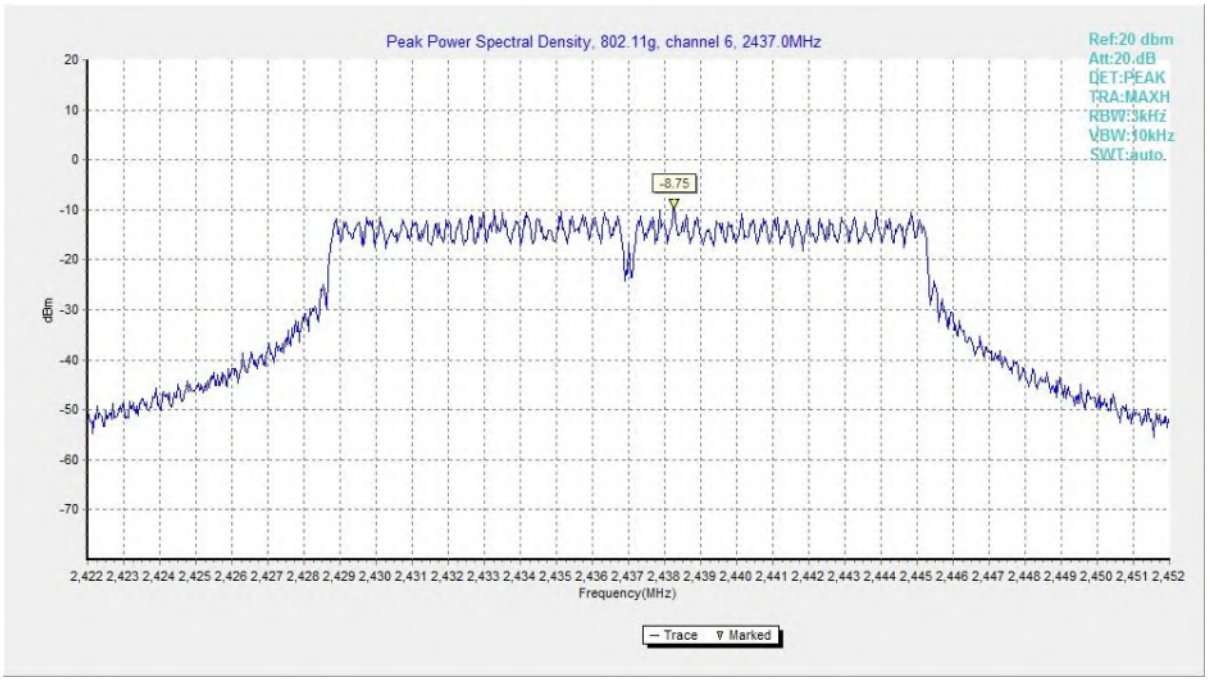


Fig.5 Power Spectral Density (802.11g, CH 6)

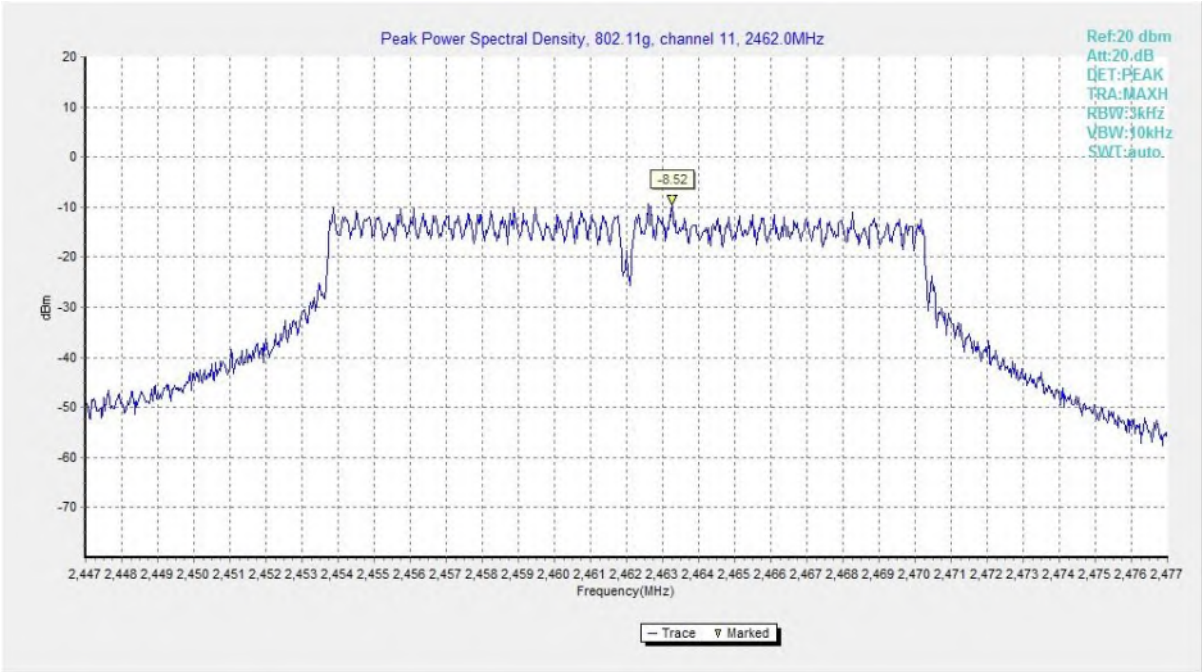


Fig.6 Power Spectral Density (802.11g, CH 11)

©Copyright. All rights reserved by SAICT.

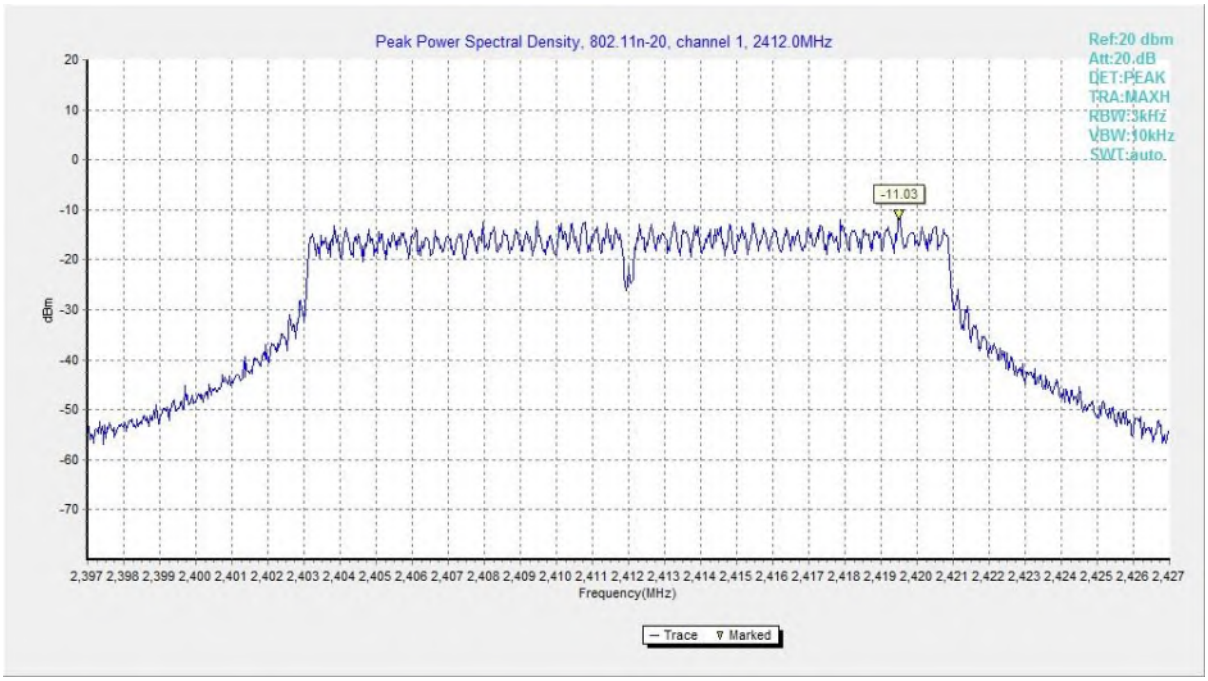


Fig.7 Power Spectral Density (802.11n HT20, CH 1)

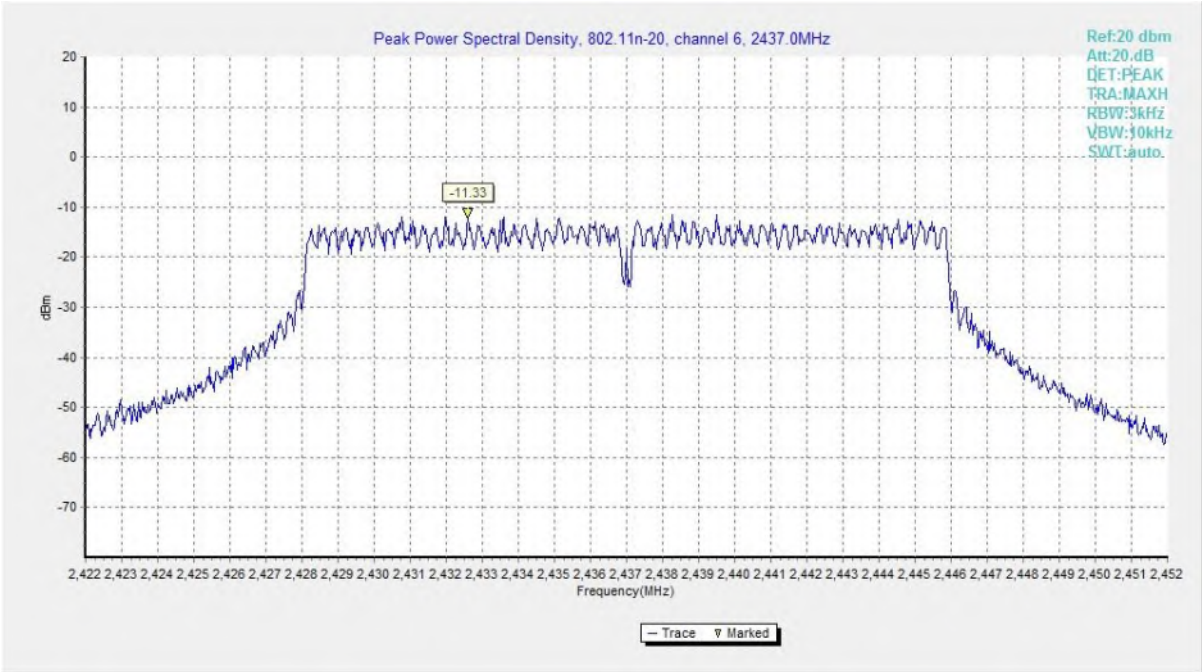


Fig.8 Power Spectral Density (802.11n HT20, CH 6)

©Copyright. All rights reserved by SAICT.

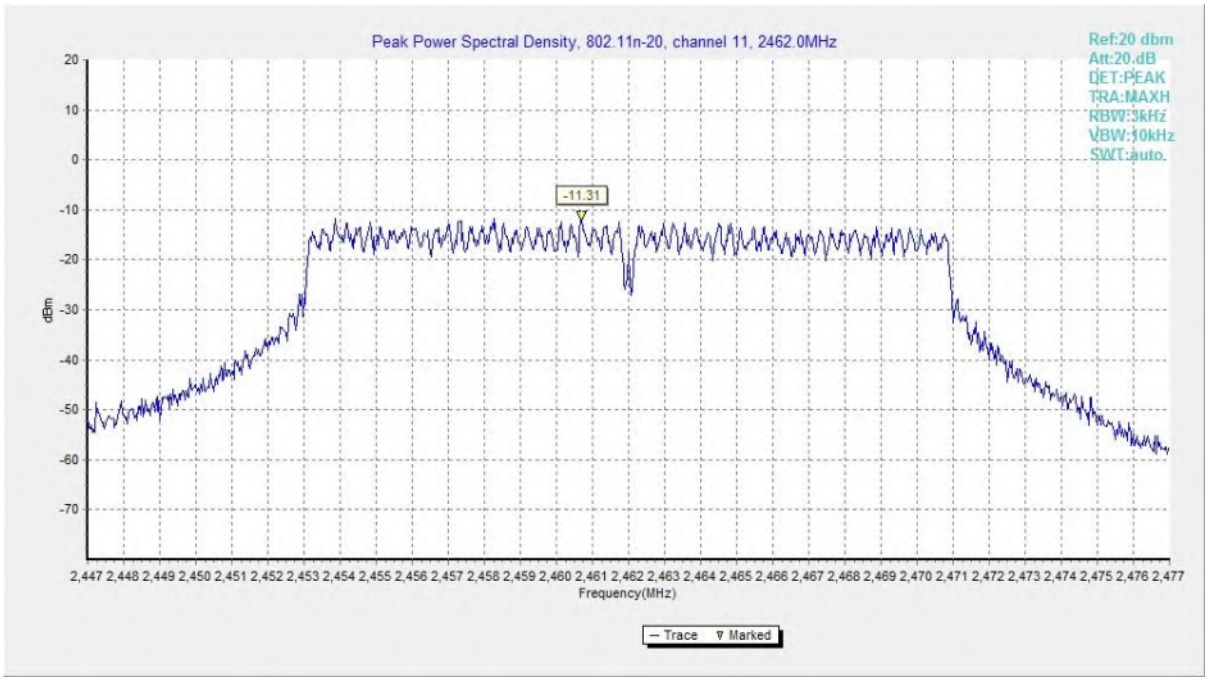


Fig.9 Power Spectral Density (802.11n HT20, CH 11)

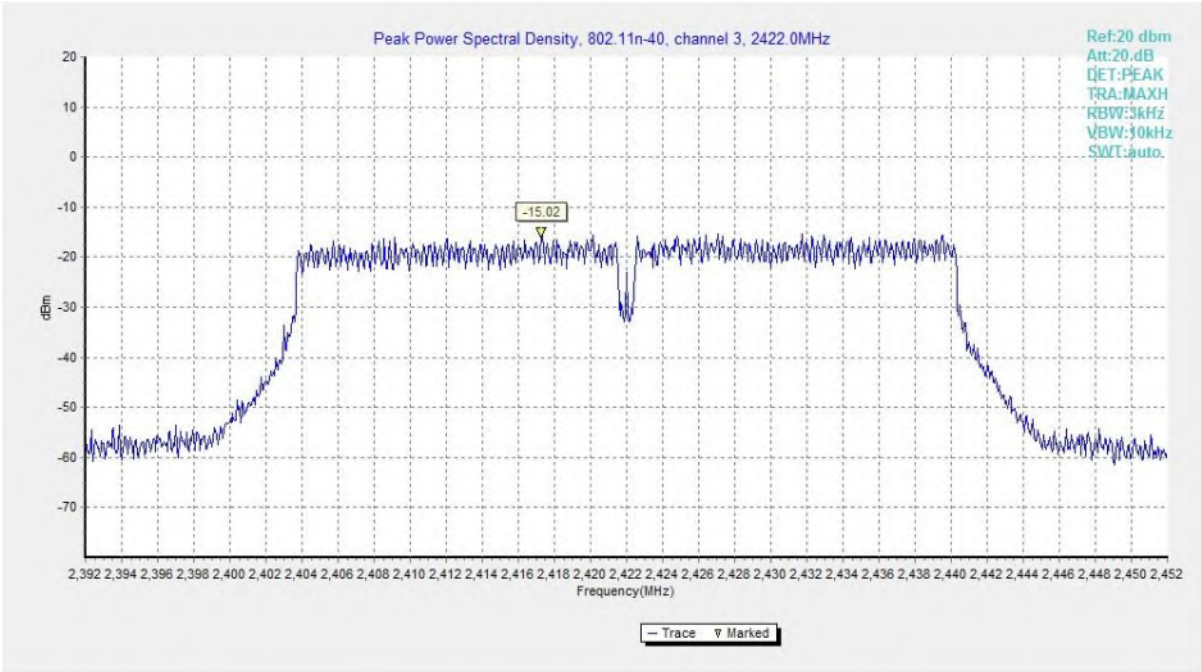


Fig.10 Power Spectral Density (802.11n HT40, CH 3)

©Copyright. All rights reserved by SAICT.

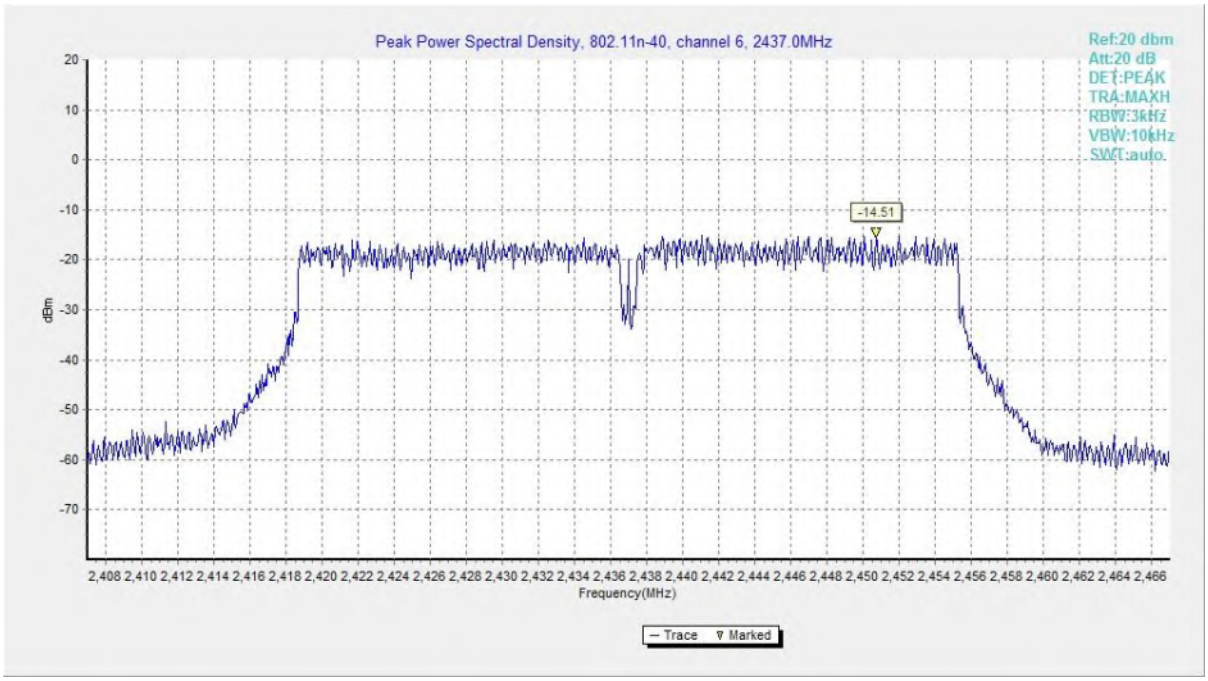


Fig.11 Power Spectral Density (802.11n HT40, CH 6)

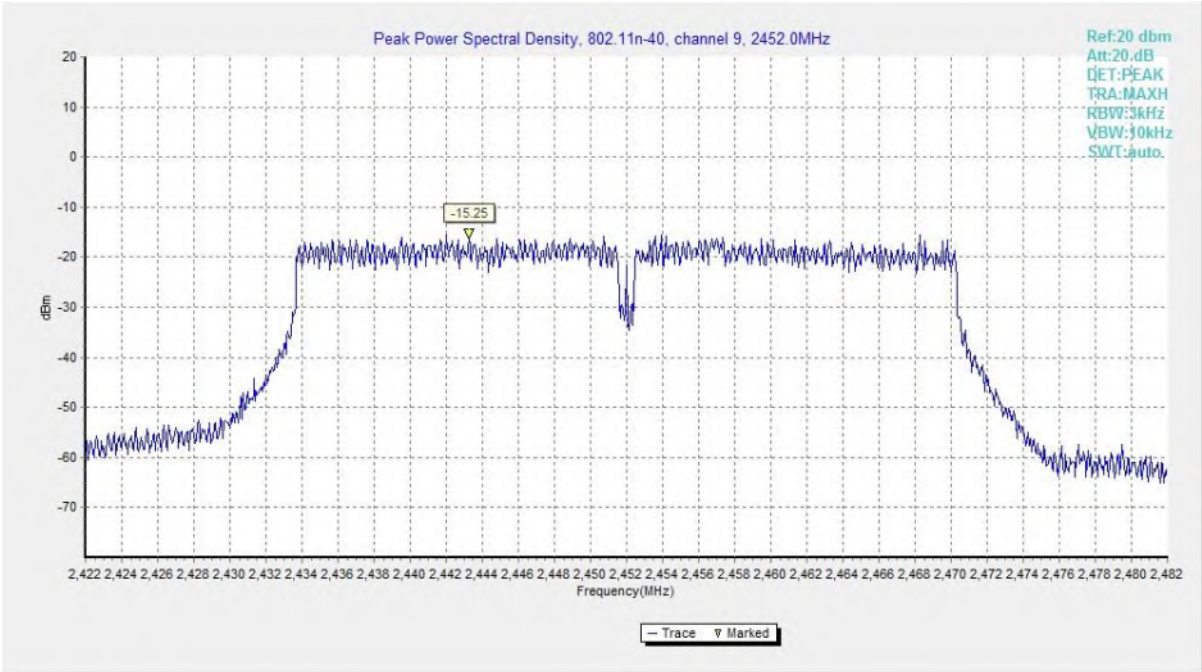


Fig.12 Power Spectral Density (802.11n HT40, CH 9)

©Copyright. All rights reserved by SAICT.

A.3 6dB Bandwidth

Method of Measurement: See ANSI C63.10-clause 11.8.

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.247 (a) RSS-247 section 5.2	≥ 500

Measurement Result:

Mode	Channel	Frequency (MHz)	Test Results (kHz)		Conclusion
802.11b	CH 1	2412	Fig.13	8550	**P**
	CH 6	2437	Fig.14	9000	**P**
	CH 11	2462	Fig.15	8050	**P**
802.11g	CH 1	2412	Fig.16	16350	**P**
	CH 6	2437	Fig.17	16350	**P**
	CH 11	2462	Fig.18	16300	**P**
802.11n HT20	CH 1	2412	Fig.19	17300	**P**
	CH 6	2437	Fig.20	17600	**P**
	CH 11	2462	Fig.21	17600	**P**
802.11n HT40	CH 3	2422	Fig.22	36080	**P**
	CH 6	2437	Fig.23	36320	**P**
	CH 9	2452	Fig.24	36320	**P**

See below for test graphs.
Conclusion: PASS

©Copyright. All rights reserved by SAICT.

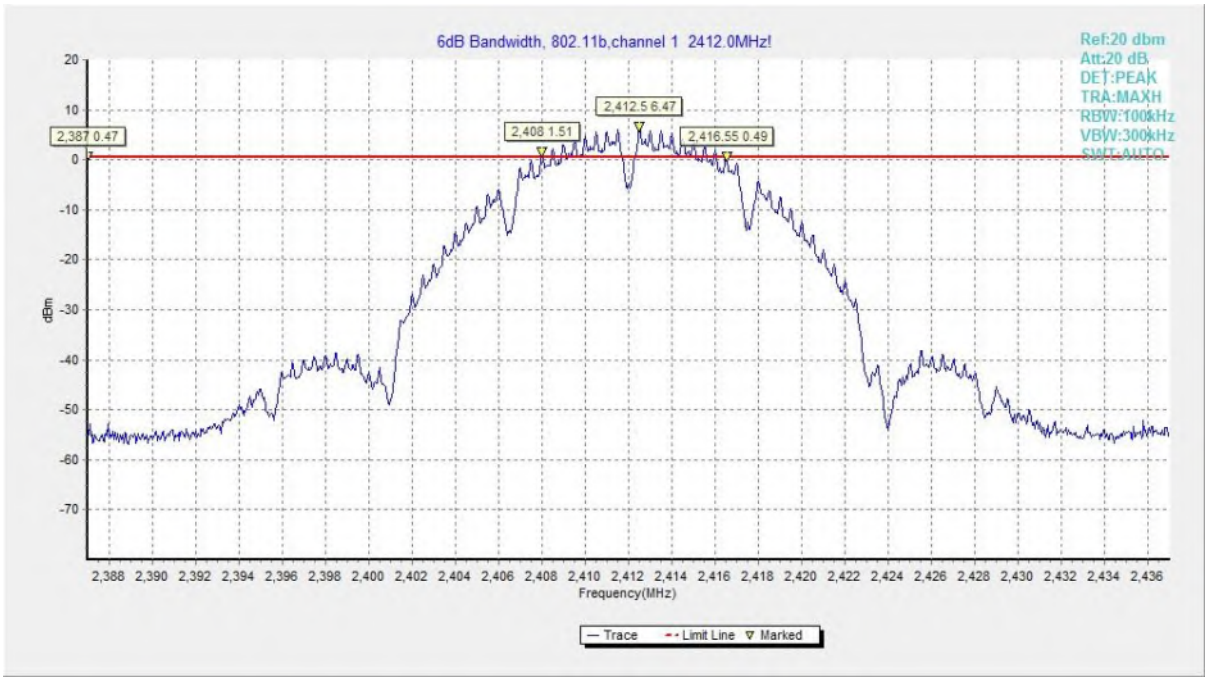


Fig.13 6dB Bandwidth (802.11b, CH 1)

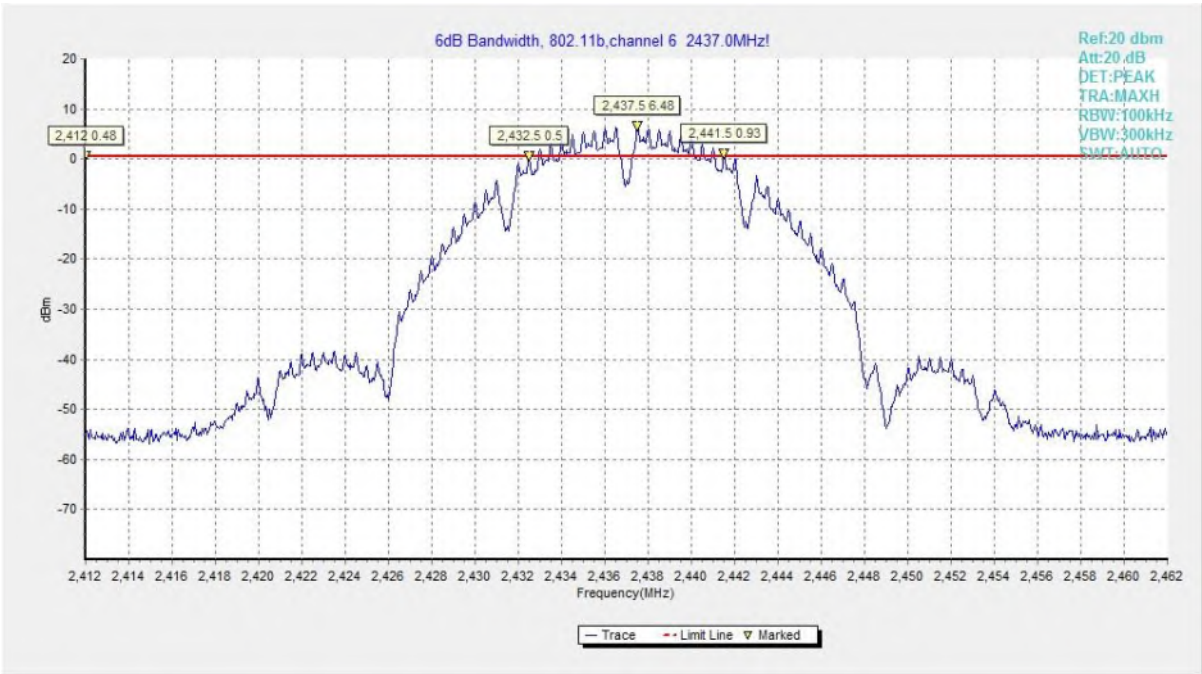


Fig.14 6dB Bandwidth (802.11b, CH 6)

©Copyright. All rights reserved by SAICT.

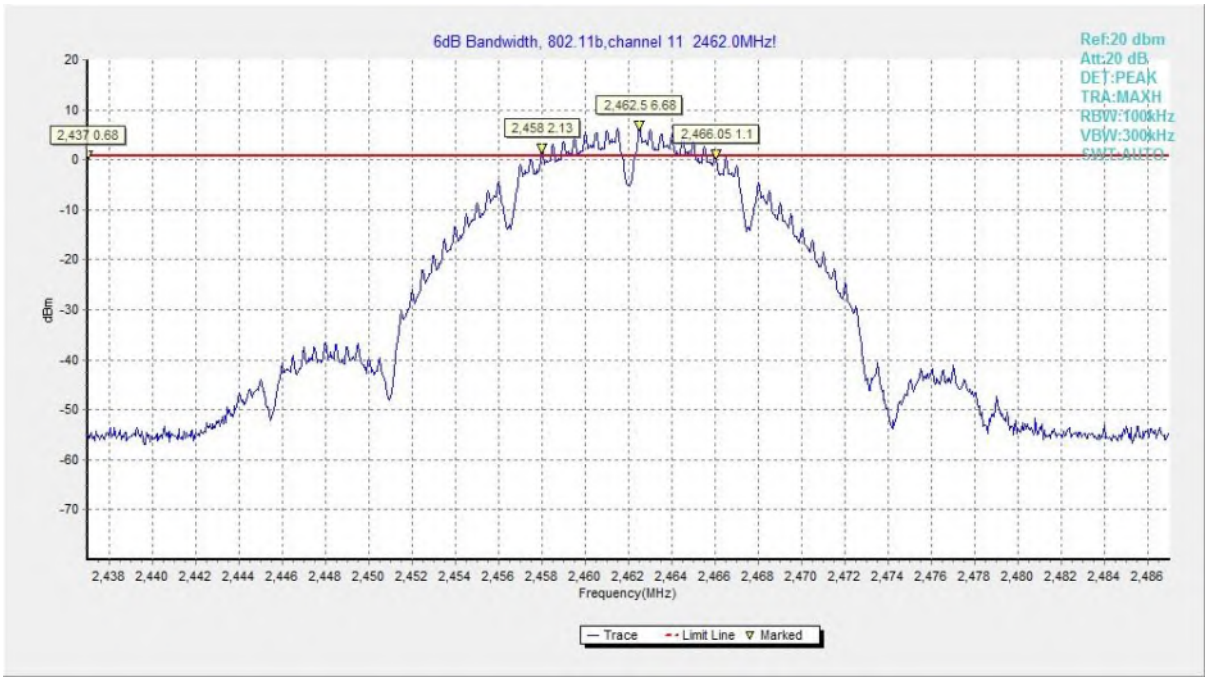


Fig.15 6dB Bandwidth (802.11b, CH 11)

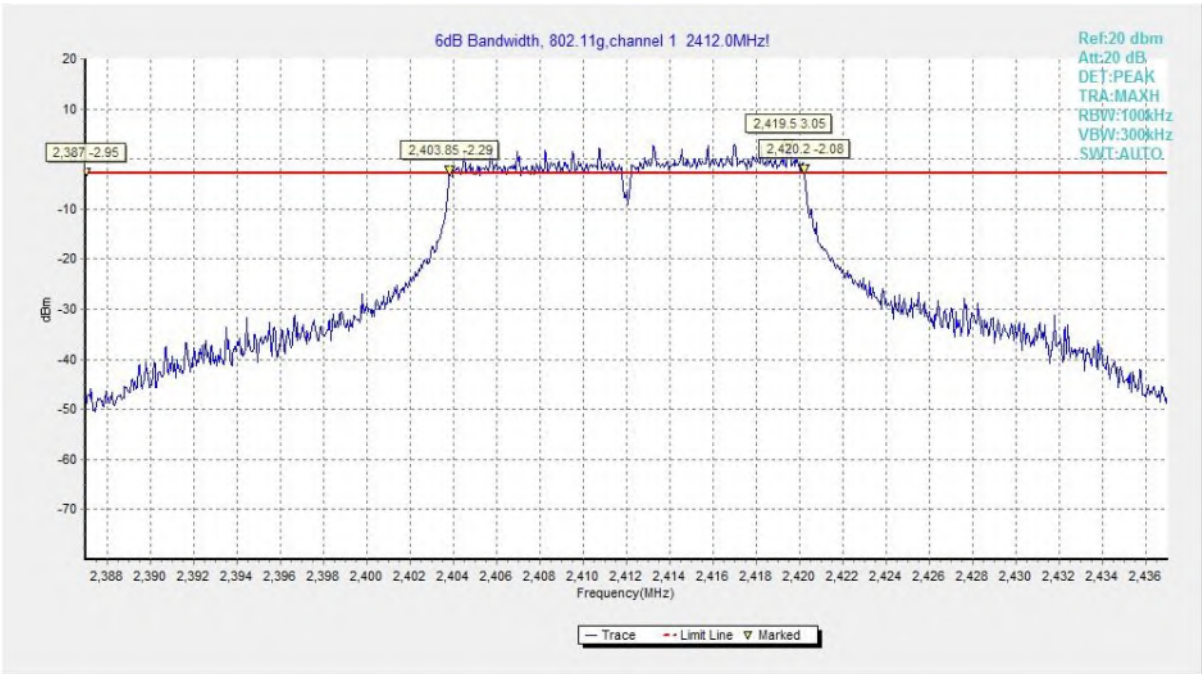


Fig.16 6dB Bandwidth (802.11g, CH 1)

©Copyright. All rights reserved by SAICT.

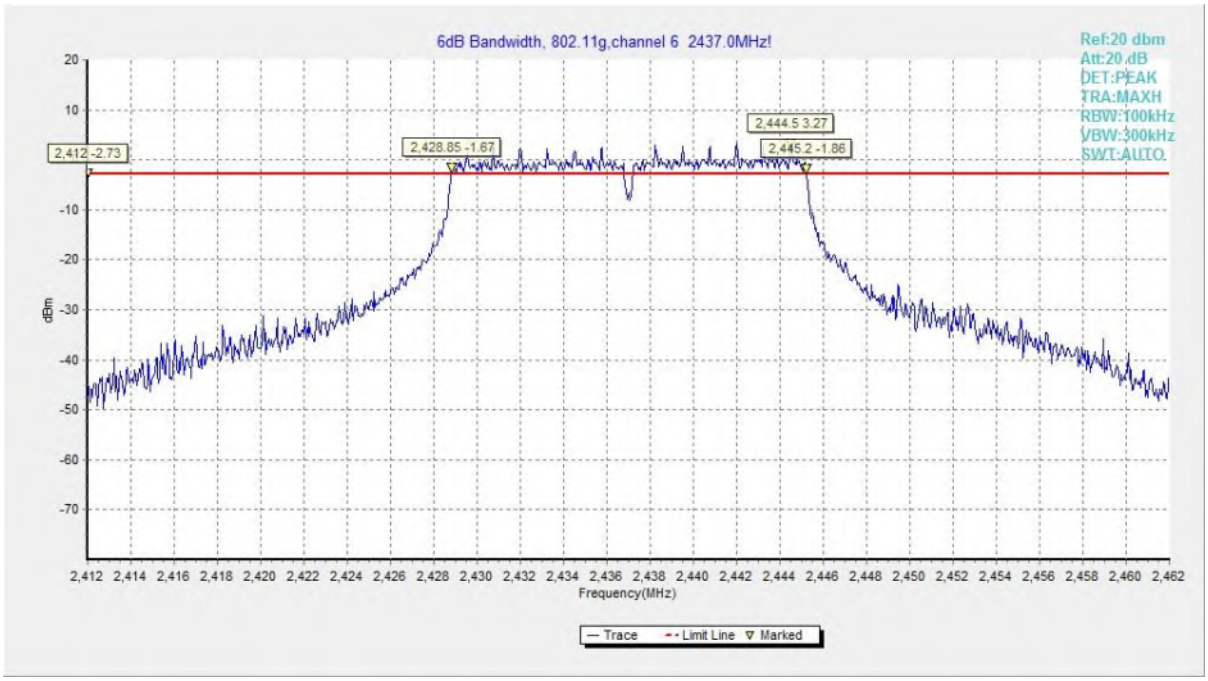


Fig.17 6dB Bandwidth (802.11g, CH 6)

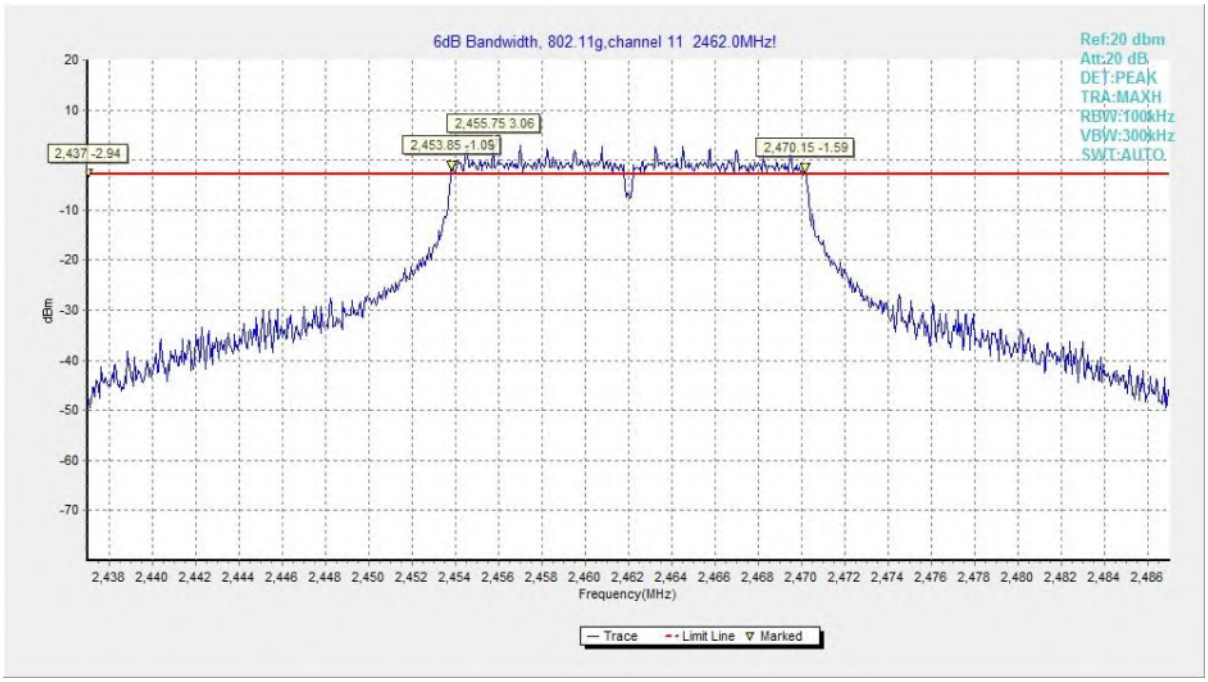


Fig.18 6dB Bandwidth (802.11g, CH 11)

©Copyright. All rights reserved by SAICT.

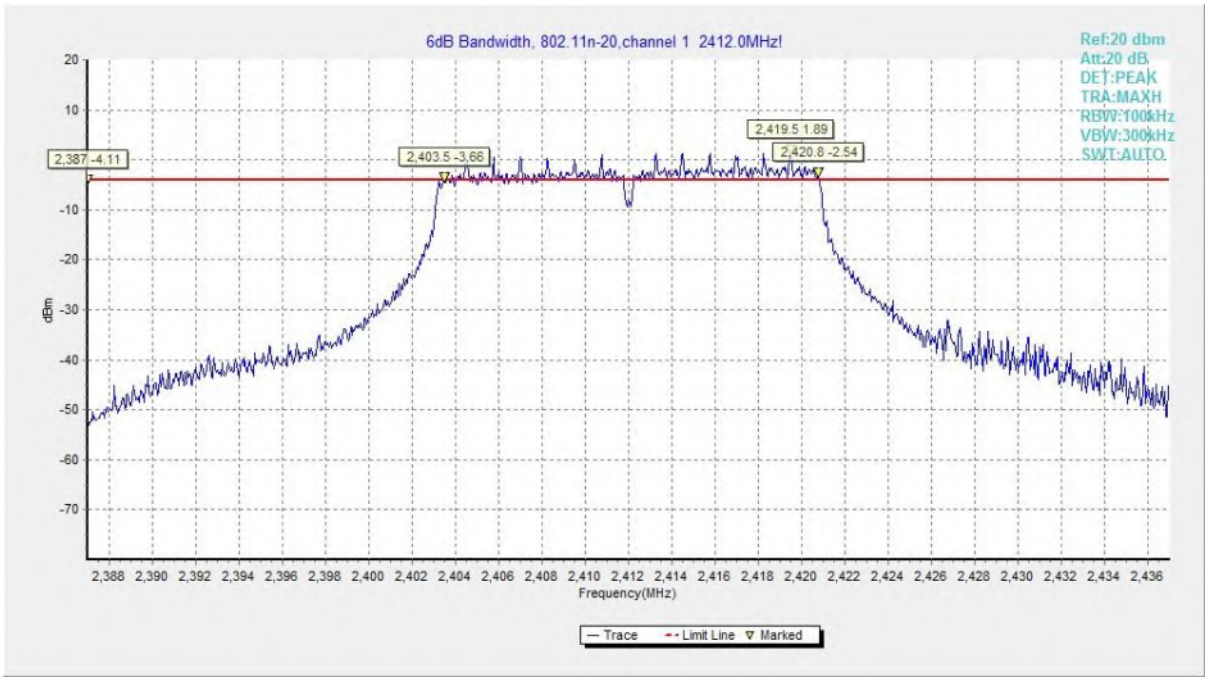


Fig.19 6dB Bandwidth (802.11n HT20, CH 1)

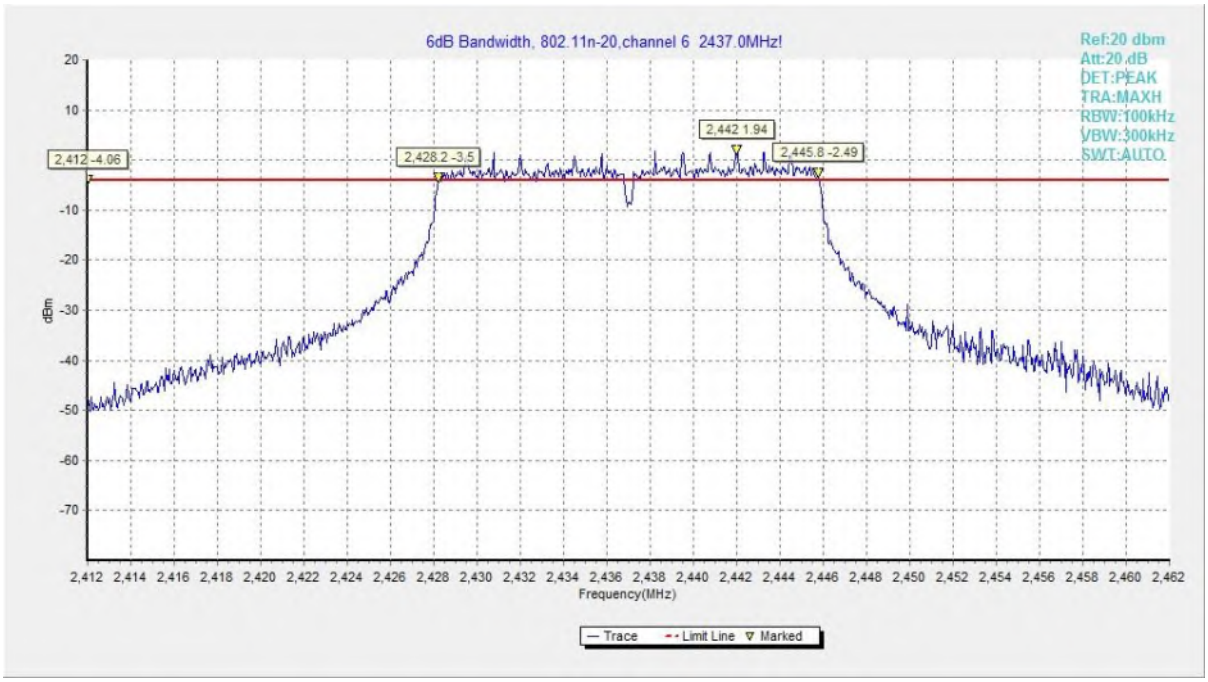


Fig.20 6dB Bandwidth (802.11n HT20, CH 6)

©Copyright. All rights reserved by SAICT.

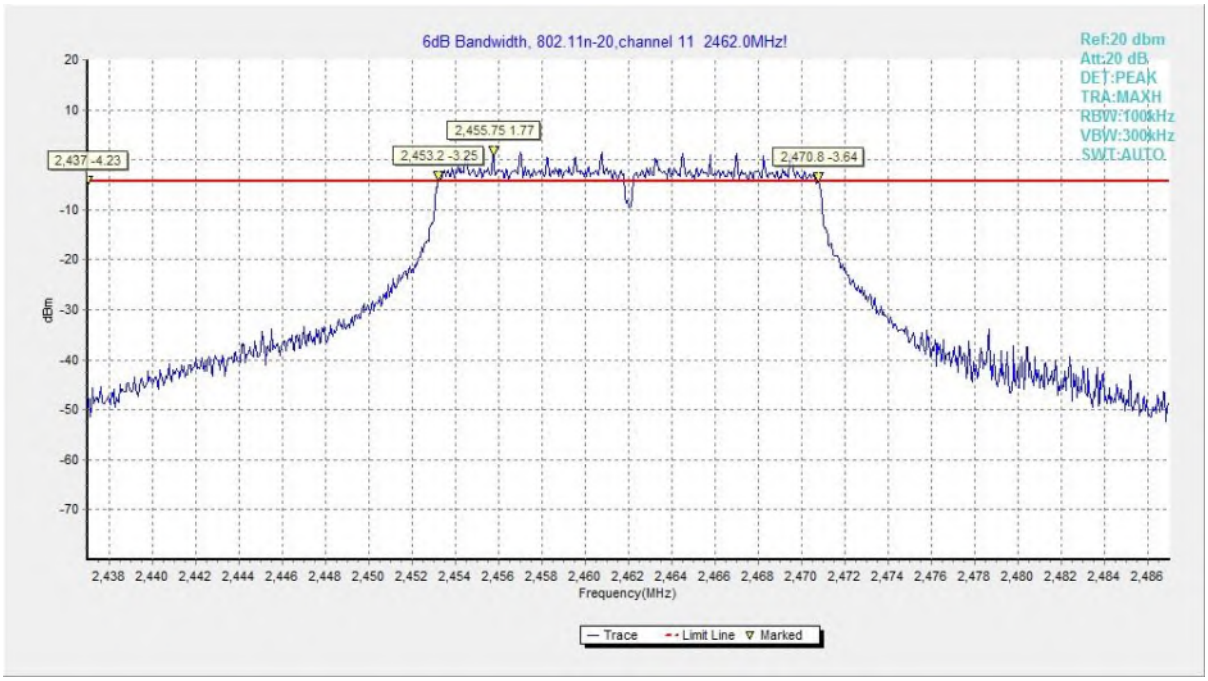


Fig.21 6dB Bandwidth (802.11n HT20, CH 11)

Fig.22 6dB Bandwidth (802.11n HT40, CH 3)

©Copyright. All rights reserved by SAICT.

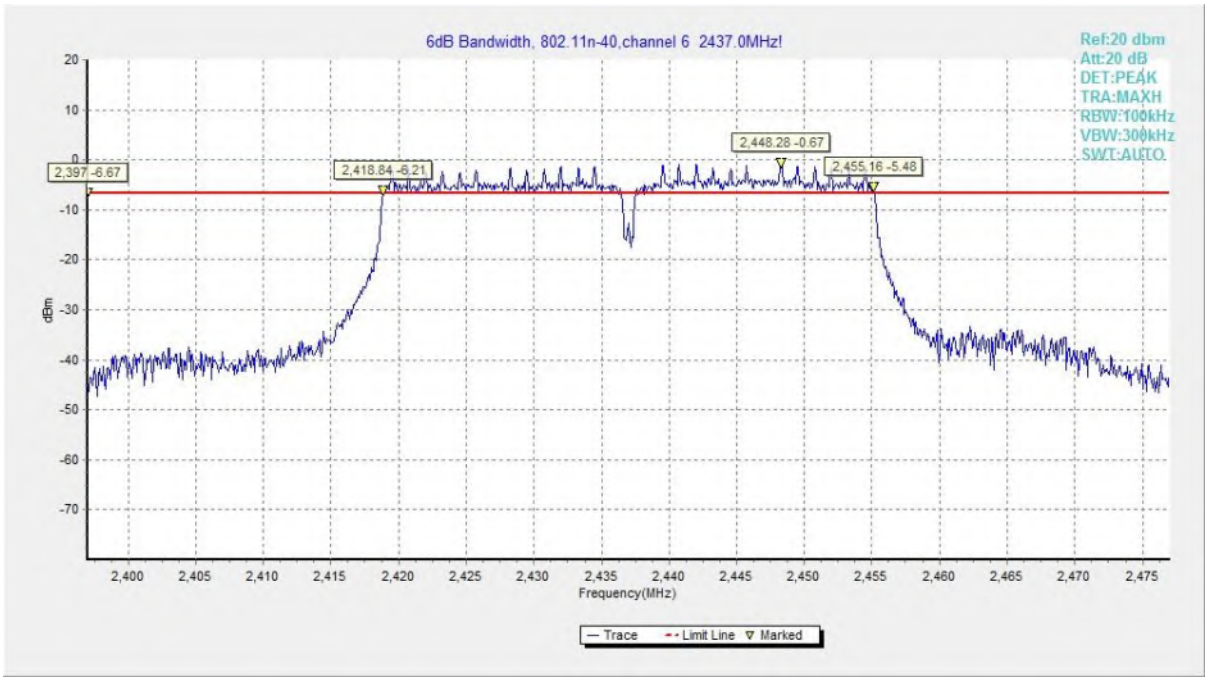


Fig.23 6dB Bandwidth (802.11n HT40, CH 6)

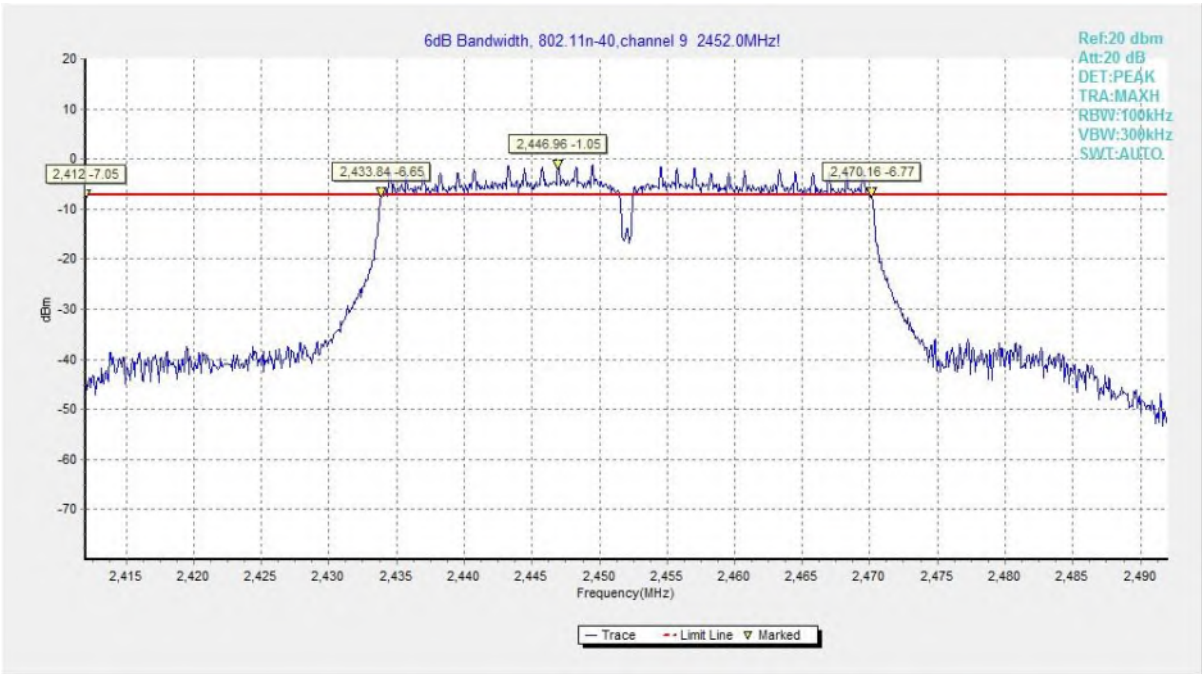


Fig.24 6dB Bandwidth (802.11n HT40, CH 9)

©Copyright. All rights reserved by SAICT.

A.4 Band Edges Compliance

Method of Measurement: See ANSI C63.10-clause 11.13.3.

Measurement Limit:

Standard	Limit (dB)
FCC 47 CFR Part 15.247 (d) & RSS-247 section 5.5	> 20

Measurement Result:

Mode	Channel	Frequency (MHz)	Test Results (dB)		Conclusion
802.11b	CH 1	2412	Fig.25	48.85	**P**
	CH 11	2462	Fig.26	61.35	**P**
802.11g	CH 1	2412	Fig.27	33.99	**P**
	CH 11	2462	Fig.28	46.74	**P**
802.11n HT20	CH 1	2412	Fig.29	33.75	**P**
	CH 11	2462	Fig.30	48.47	**P**
802.11n HT40	CH 3	2422	Fig.31	37.35	**P**
	CH 9	2452	Fig.32	38.68	**P**

See below for test graphs.
Conclusion: PASS

©Copyright. All rights reserved by SAICT.

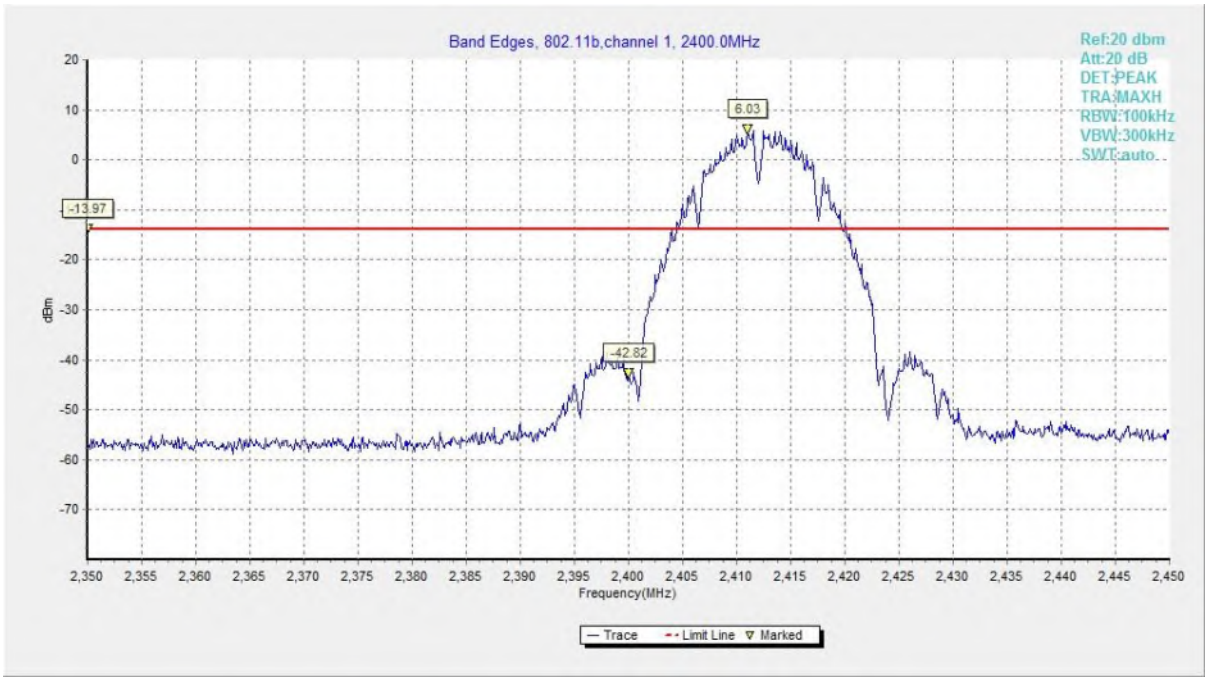


Fig.25 Band Edges (802.11b, CH 1)

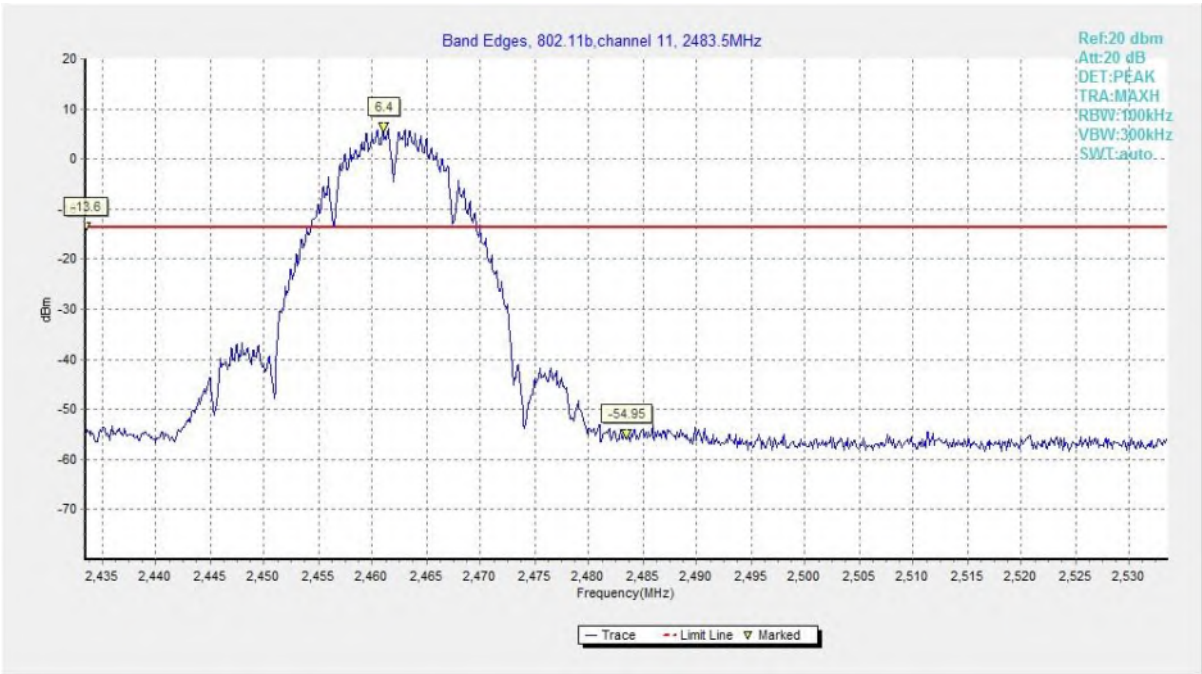


Fig.26 Band Edges (802.11b, CH 11)

©Copyright. All rights reserved by SAICT.

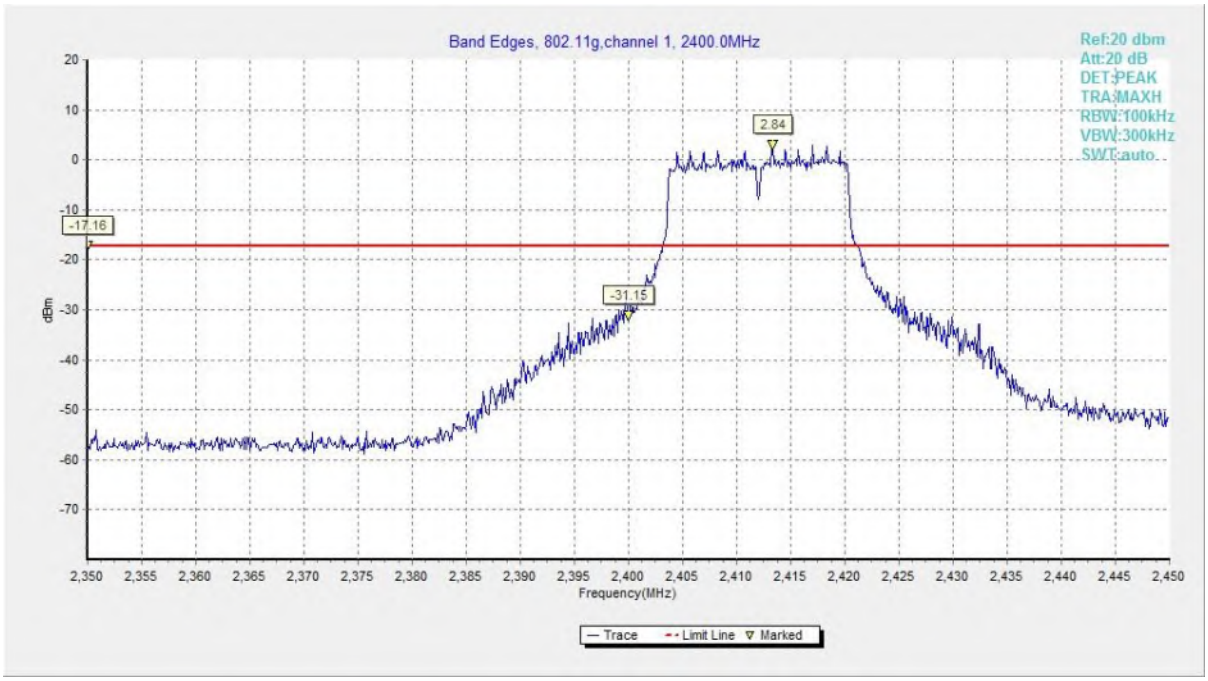


Fig.27 Band Edges (802.11g, CH 1)

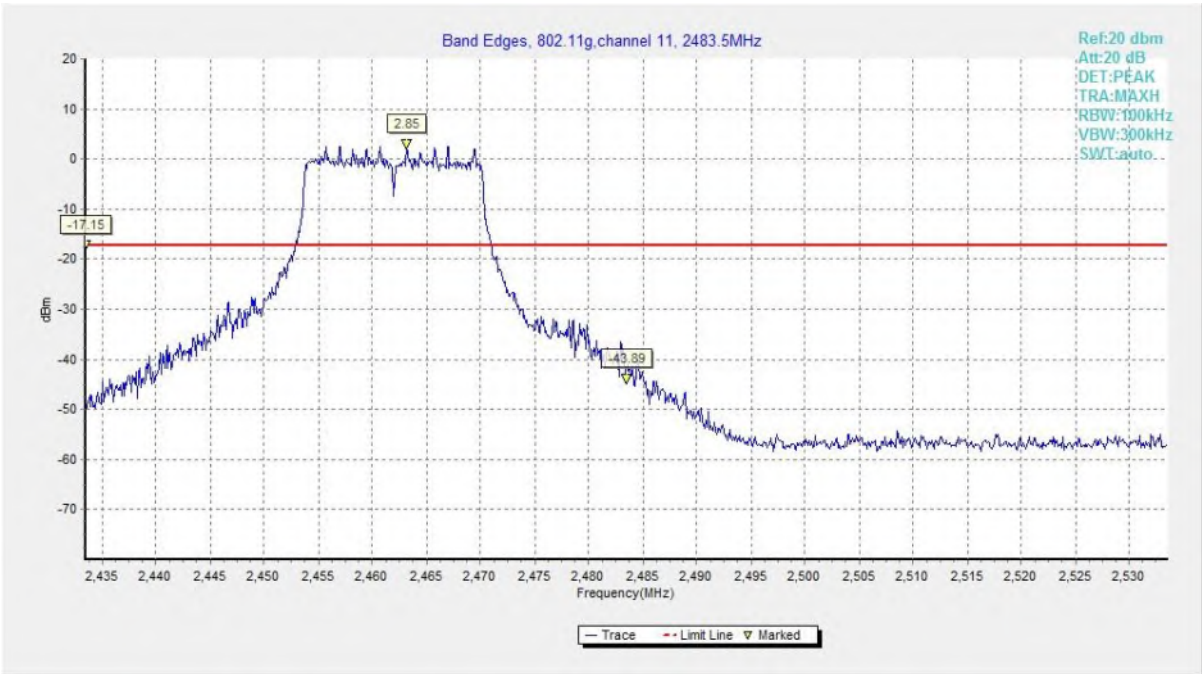


Fig.28 Band Edges (802.11g, CH 11)

©Copyright. All rights reserved by SAICT.

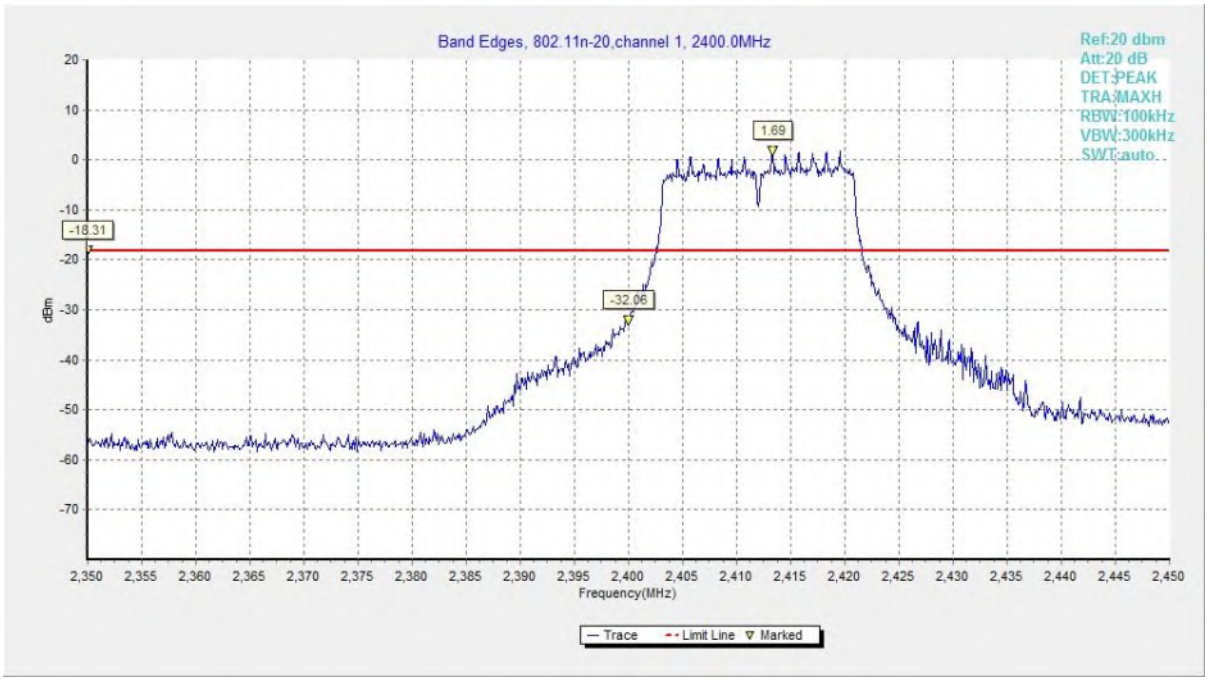


Fig.29 Band Edges (802.11n HT20, CH 1)

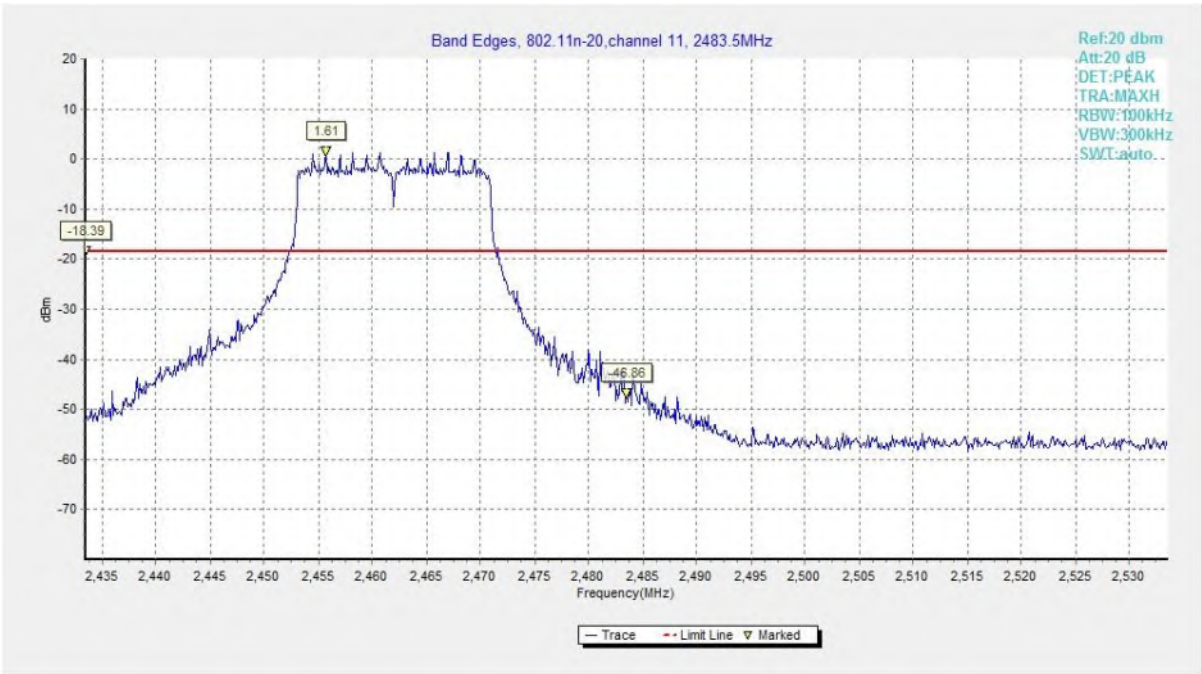


Fig.30 Band Edges (802.11n HT20, CH 11)

©Copyright. All rights reserved by SAICT.

Fig.31 Band Edges (802.11n HT40, CH 3)

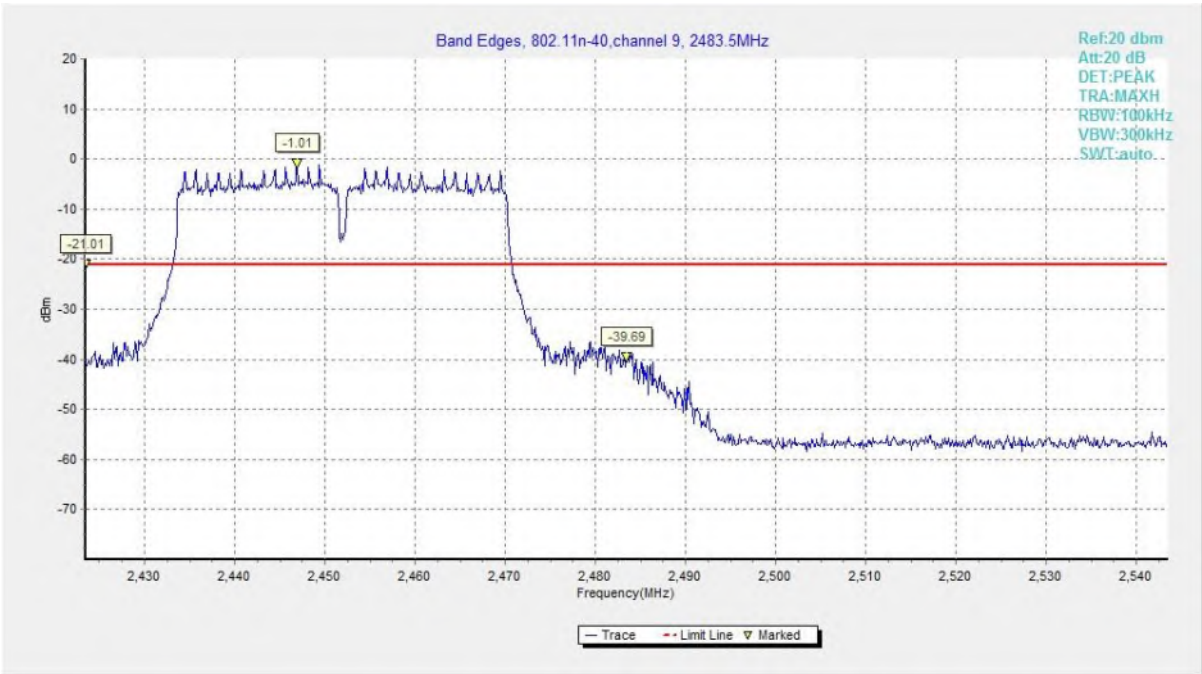


Fig.32 Band Edges (802.11n HT40, CH 9)

©Copyright. All rights reserved by SAICT.

A.5 Conducted Emission

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

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (d) & RSS-247 section 5.5/RSS-Gen section 6.13	30dB below peak output power in 100kHz bandwidth

Measurement Results:

Mode	Channel	Frequency (MHz)	Frequency Range	Test Results	Conclusion
802.11b	CH 1	2412	30MHz-26GHz	Fig.33	**P**
	CH 6	2437	30MHz-26GHz	Fig.34	**P**
	CH 11	2462	30MHz-26GHz	Fig.35	**P**
802.11g	CH 1	2412	30MHz-26GHz	Fig.36	**P**
	CH 6	2437	30MHz-26GHz	Fig.37	**P**
	CH 11	2462	30MHz-26GHz	Fig.38	**P**
802.11n HT20	CH 1	2412	30MHz-26GHz	Fig.39	**P**
	CH 6	2437	30MHz-26GHz	Fig.40	**P**
	CH 11	2462	30MHz-26GHz	Fig.41	**P**
802.11n HT40	CH 3	2422	30MHz-26GHz	Fig.42	**P**
	CH 6	2437	30MHz-26GHz	Fig.43	**P**
	CH 9	2452	30MHz-26GHz	Fig.44	**P**

See below for test graphs.
Conclusion: PASS

©Copyright. All rights reserved by SAICT.

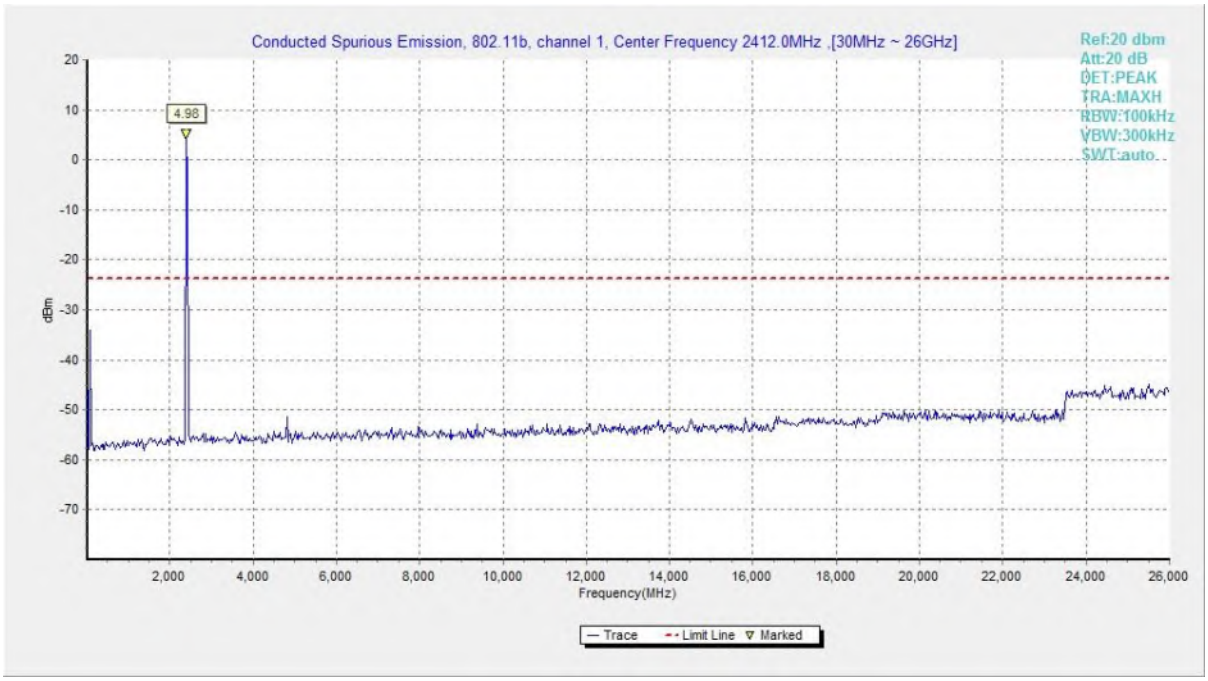


Fig.33 Conducted Spurious Emission (802.11b, CH1)

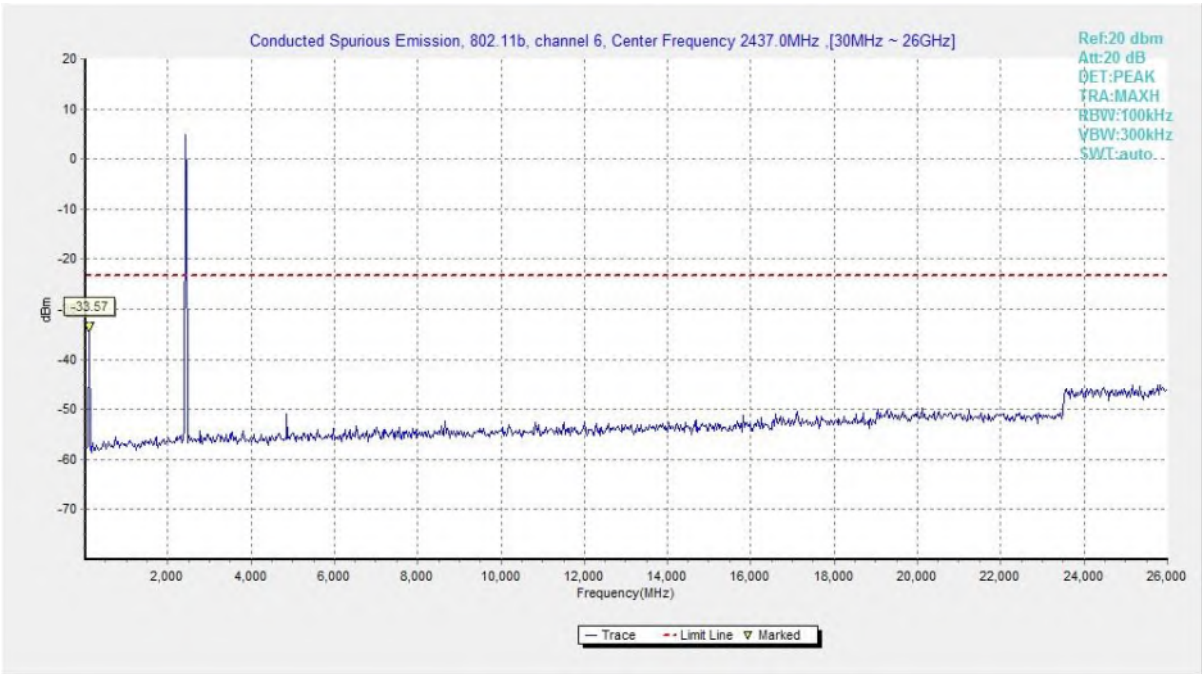


Fig.34 Conducted Spurious Emission (802.11b, CH6)

©Copyright. All rights reserved by SAICT.

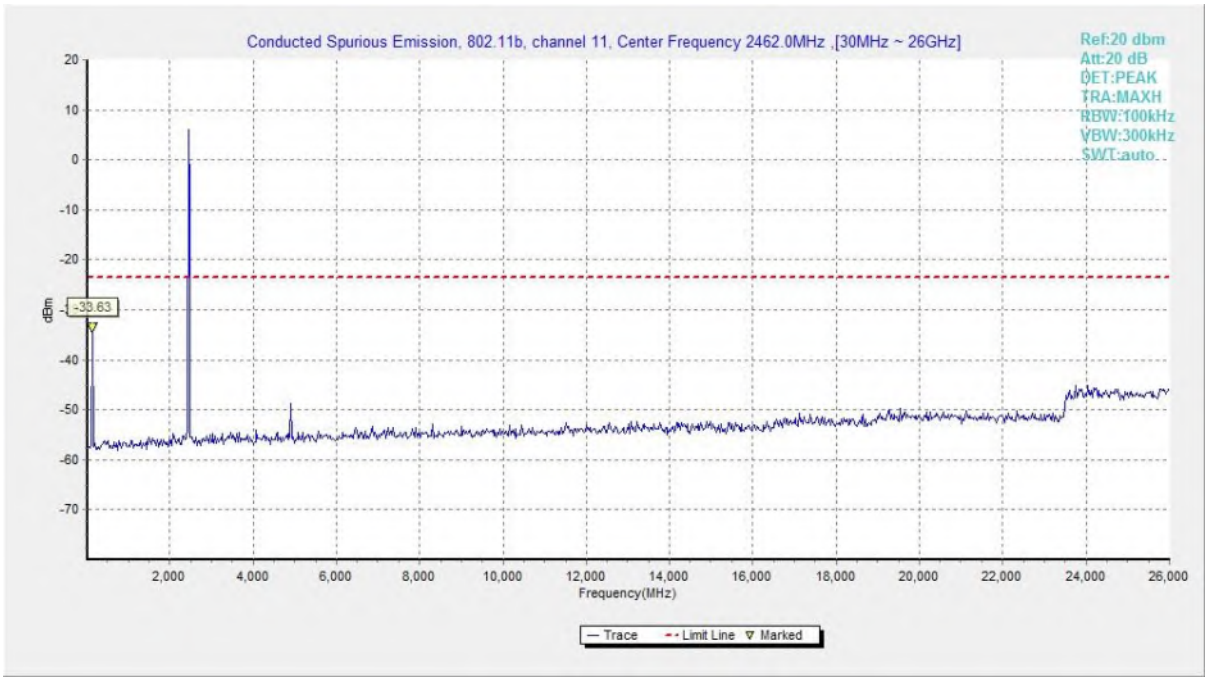


Fig.35 Conducted Spurious Emission (802.11b, CH11)

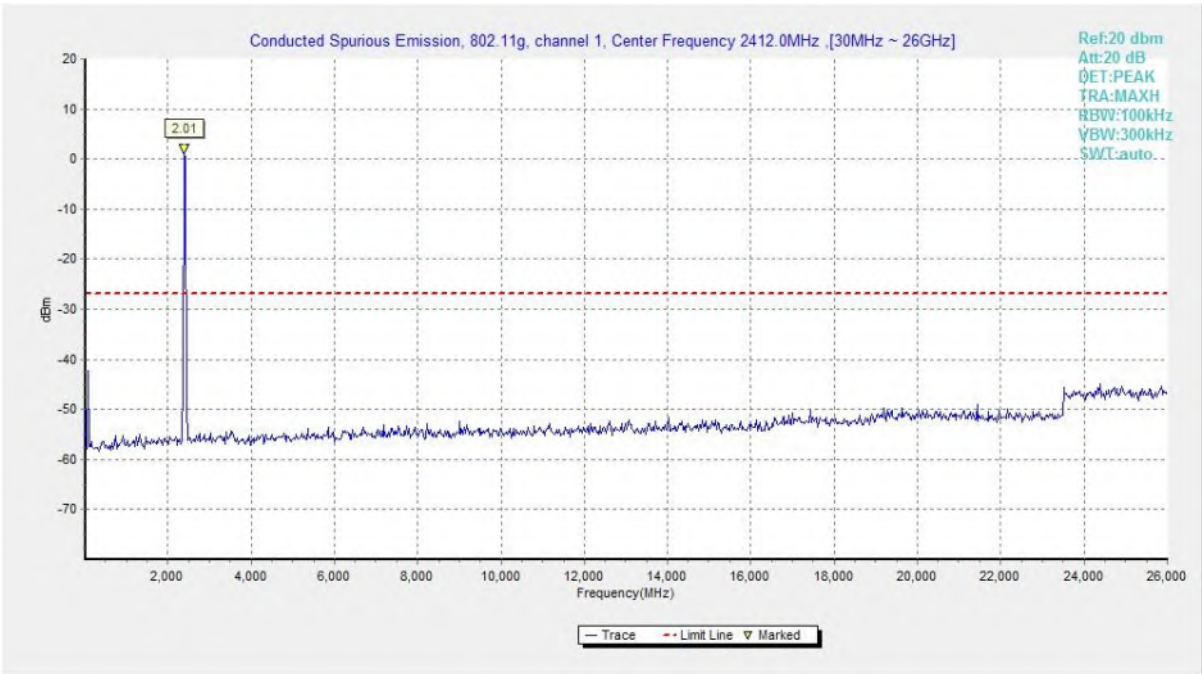


Fig.36 Conducted Spurious Emission (802.11g, CH1)

©Copyright. All rights reserved by SAICT.

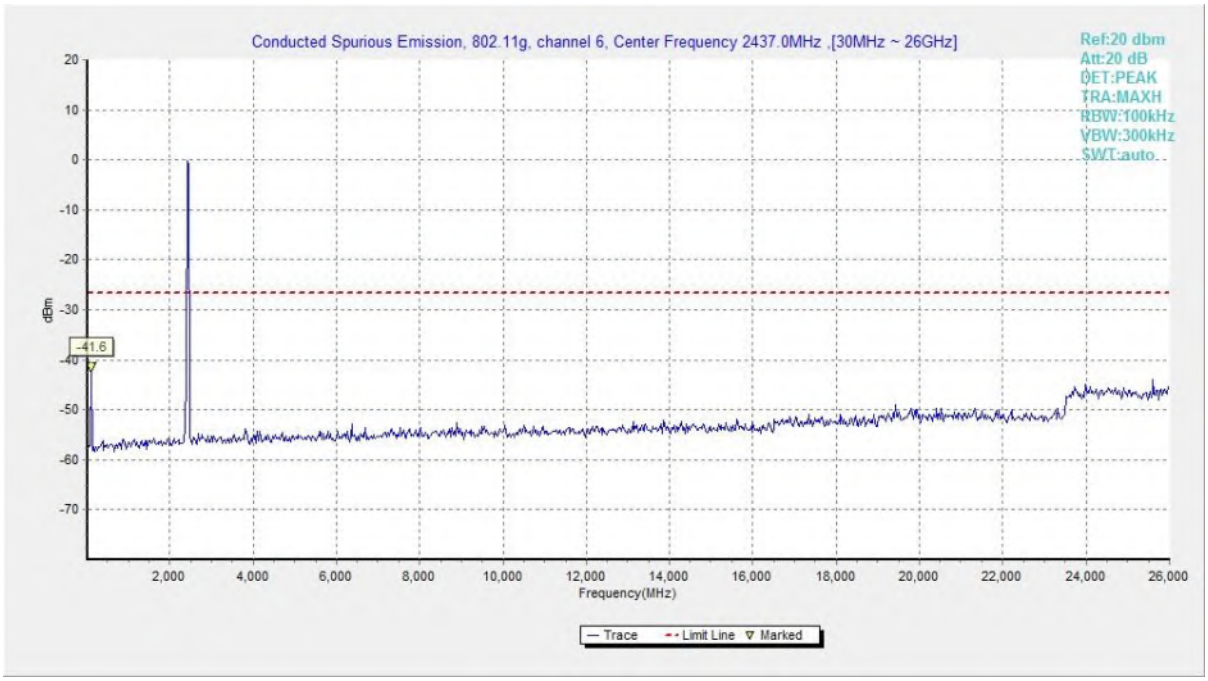


Fig.37 Conducted Spurious Emission (802.11g, CH6)

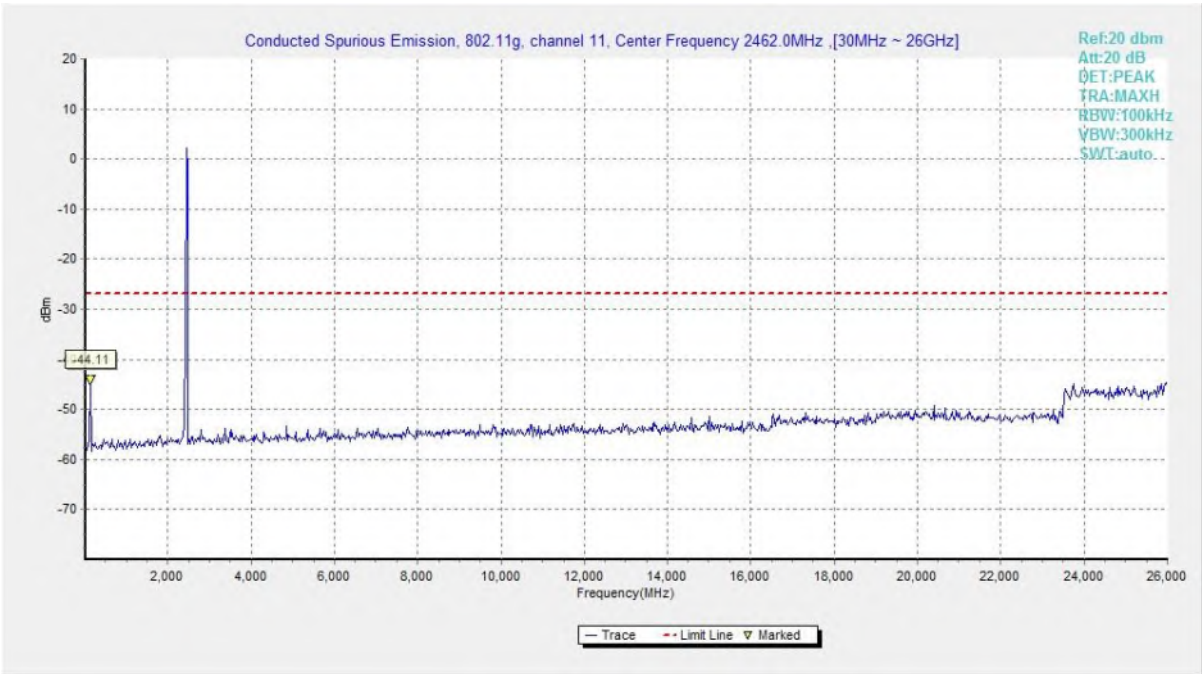


Fig.38 Conducted Spurious Emission (802.11g, CH11)

©Copyright. All rights reserved by SAICT.

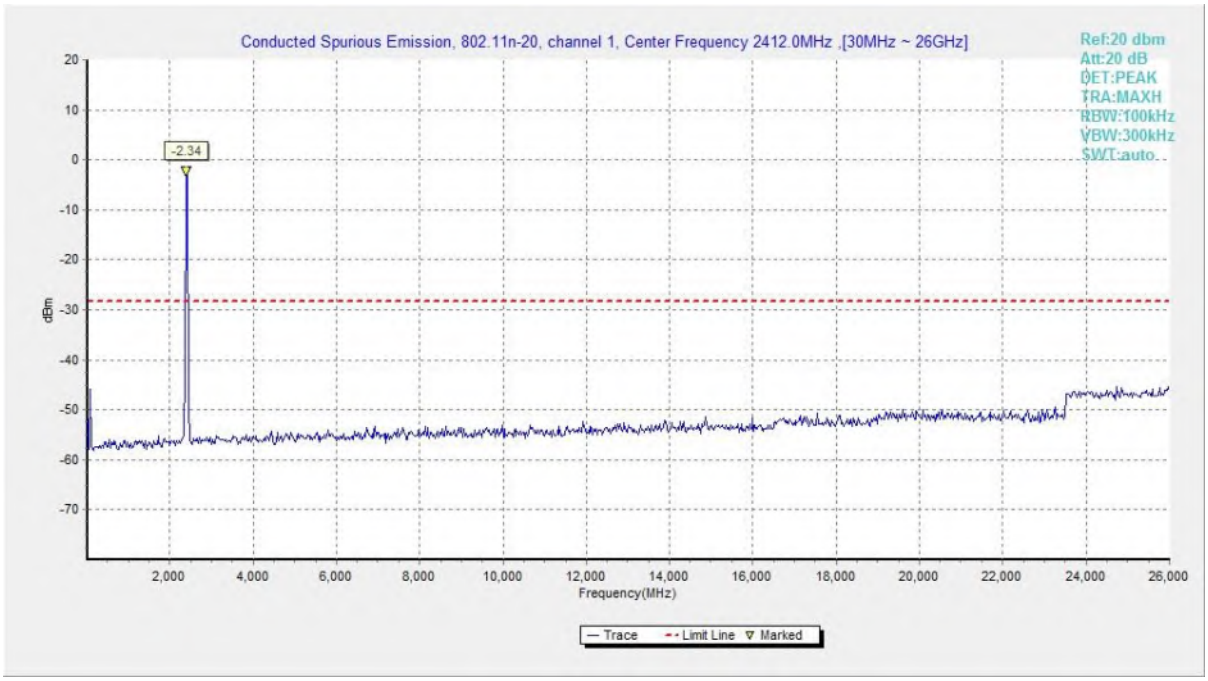


Fig.39 Conducted Spurious Emission (802.11n HT20, CH1)

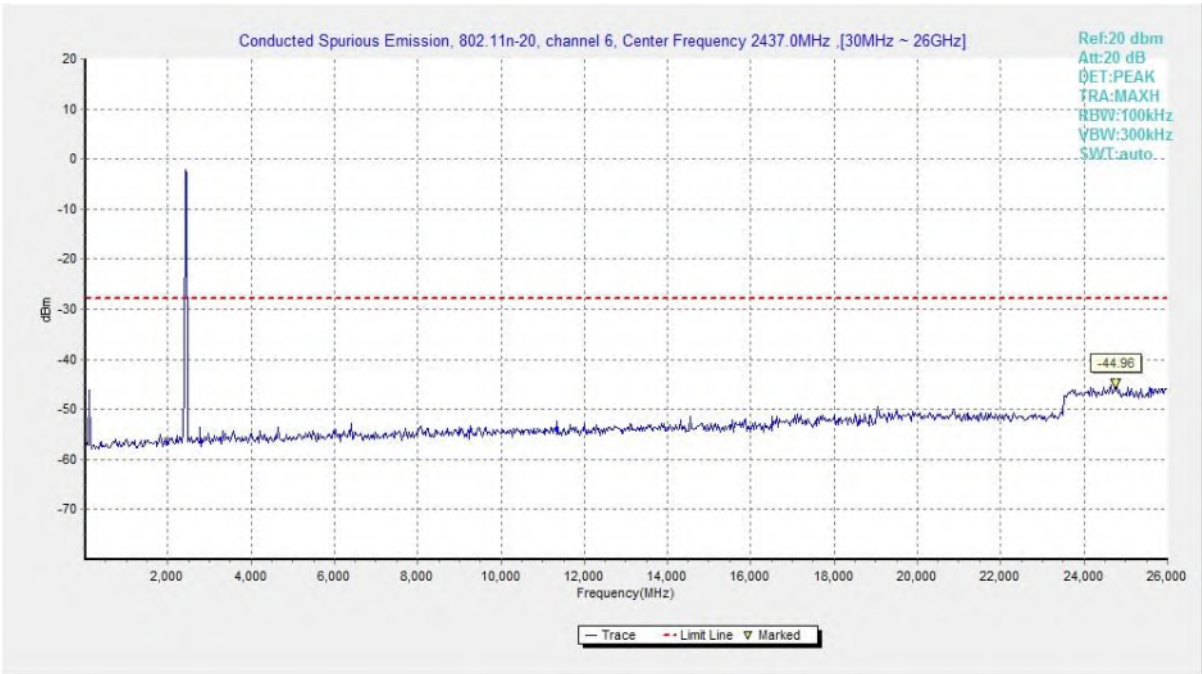


Fig.40 Conducted Spurious Emission (802.11n HT20, CH6)

©Copyright. All rights reserved by SAICT.

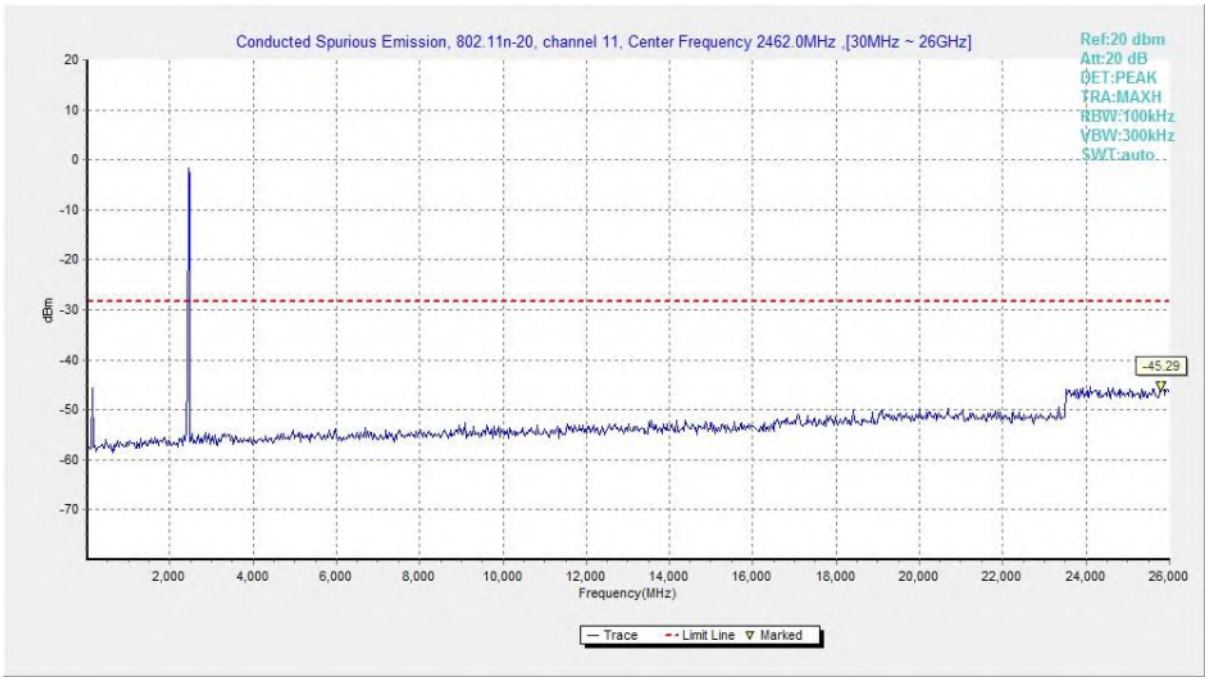


Fig.41 Conducted Spurious Emission (802.11n HT20, CH11)

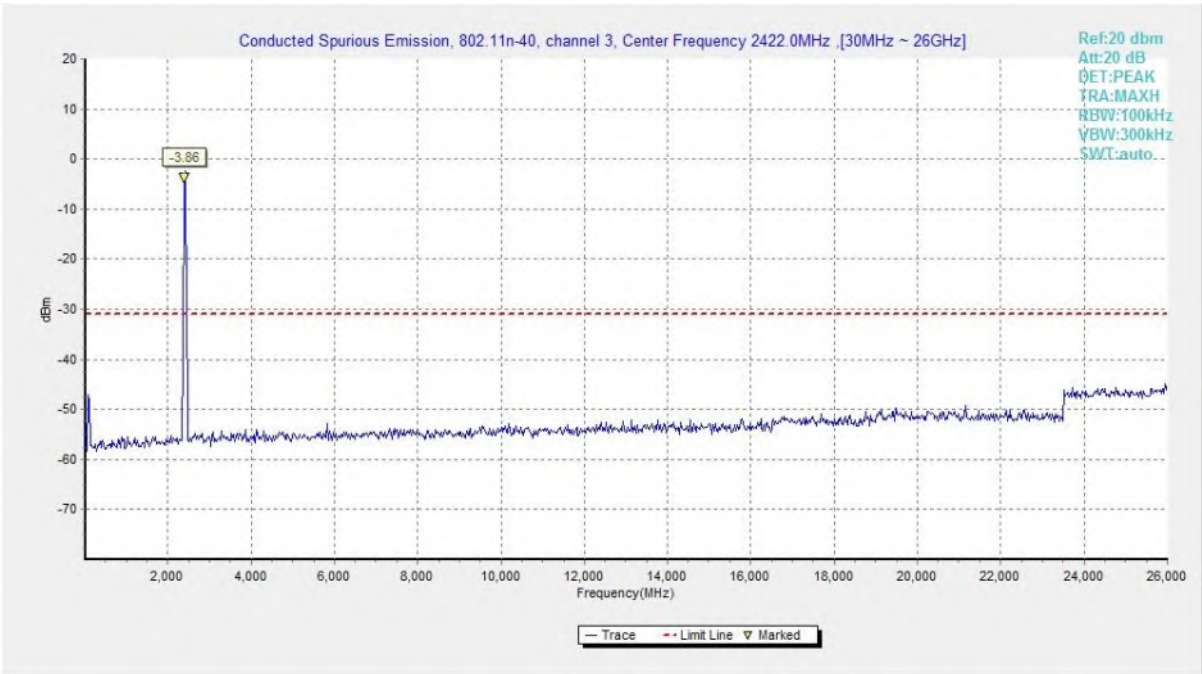


Fig.42 Conducted Spurious Emission (802.11n HT40, CH3)

©Copyright. All rights reserved by SAICT.

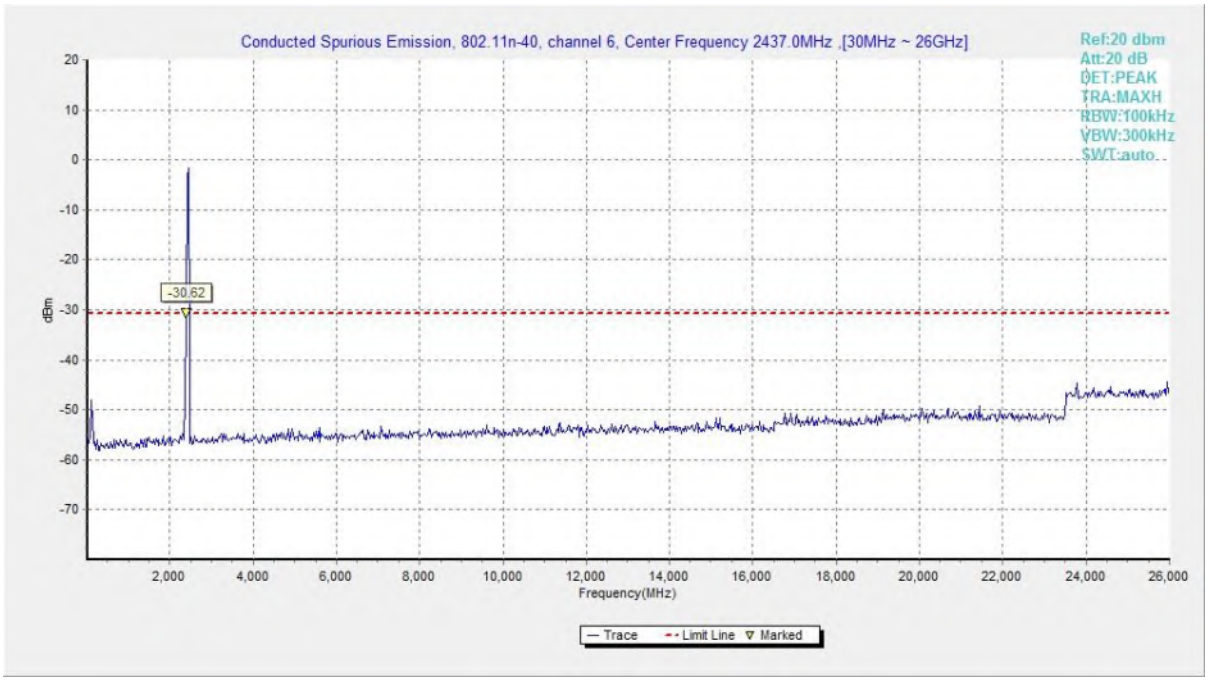


Fig.43 Conducted Spurious Emission (802.11n HT40, CH6)

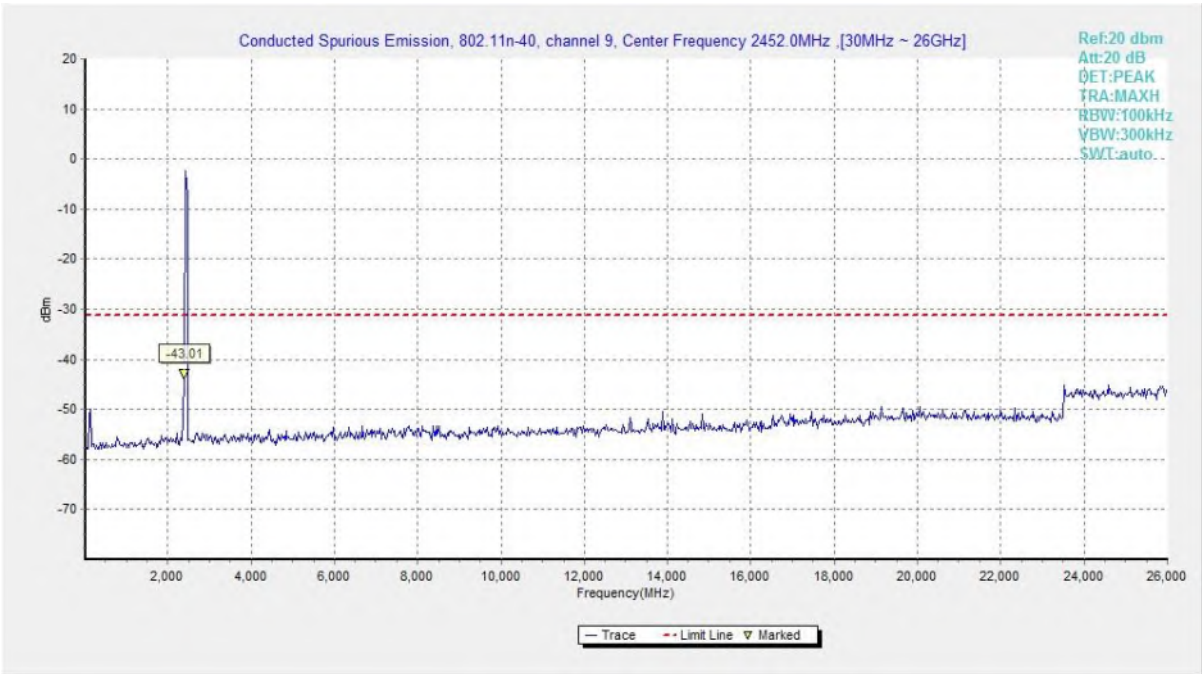


Fig.44 Conducted Spurious Emission (802.11n HT40, CH9)

©Copyright. All rights reserved by SAICT.

A.6 Radiated Emission

Method of Measurement: See ANSI C63.10-clause 11.11&11.12.

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209 & RSS-247 section 5.5/RSS-Gen section 6.13	20dB below peak output power

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Limit in restricted band:

Frequency of emission (MHz)	Field strength (μV/m)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Condition:

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Frequency of emission (MHz)	RBW/VBW	Sweep Time (s)
30-1000	120kHz/300kHz	5
1000-4000	1MHz/3MHz	15
4000-18000	1MHz/3MHz	40
18000-26500	1MHz/3MHz	20

Note: According to the performance evaluation, the radiated emission margin of EUT is over 20dB in the band from 9kHz to 30MHz.Therefore, the measurement starts from 30MHz to tenth harmonic. The measurement results include the horizontal polarization and vertical polarization measurements. For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

©Copyright. All rights reserved by SAICT.

Measurement Results:

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11b	CH 1	1 GHz ~ 18 GHz	Fig.45	**P**
	CH 6	1 GHz ~ 18 GHz	Fig.46	**P**
	CH 11	1 GHz ~ 18 GHz	Fig.47	**P**
	Restricted Band (CH1)	2.38 GHz ~ 2.45 GHz	Fig.48	**P**
	Restricted Band (CH11)	2.45 GHz ~ 2.5 GHz	Fig.49	**P**
802.11g	CH 1	1 GHz ~ 18 GHz	Fig.50	**P**
	CH 6	1 GHz ~ 18 GHz	Fig.51	**P**
	CH 11	1 GHz ~ 18 GHz	Fig.52	**P**
	Restricted Band (CH1)	2.38 GHz ~ 2.45 GHz	Fig.53	**P**
	Restricted Band (CH11)	2.45 GHz ~ 2.5 GHz	Fig.54	**P**
802.11n HT20	CH 1	1 GHz ~ 18 GHz	Fig.55	**P**
	CH 6	1 GHz ~ 18 GHz	Fig.56	**P**
	CH 11	1 GHz ~ 18 GHz	Fig.57	**P**
	Restricted Band (CH1)	2.38 GHz ~ 2.45 GHz	Fig.58	**P**
	Restricted Band (CH11)	2.45 GHz ~ 2.5 GHz	Fig.59	**P**
802.11n HT40	CH 3	1 GHz ~ 18 GHz	Fig.60	**P**
	CH 6	1 GHz ~ 18 GHz	Fig.61	**P**
	CH 9	1 GHz ~ 18 GHz	Fig.62	**P**
	Restricted Band (CH3)	2.38 GHz ~ 2.45 GHz	Fig.63	**P**
	Restricted Band (CH9)	2.45 GHz ~ 2.5 GHz	Fig.64	**P**
/	All Channels	9 kHz ~ 30 MHz	Fig.65	**P**
		30 MHz ~ 1 GHz	Fig.66	**P**
		18 GHz ~ 26.5 GHz	Fig.67	**P**

©Copyright. All rights reserved by SAICT.

Worst-Case Result:

802.11b CH11 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB)
3365.700000	44.06	74.00	29.94	V	-0.4
5860.800000	48.32	74.00	25.68	V	4.7
7777.714286	43.63	74.00	30.37	H	5.8
10533.857143	46.94	74.00	27.06	V	8.8
17118.857143	53.57	74.00	20.43	H	18.4
17940.000000	54.56	74.00	19.44	V	19.0

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB)
3365.700000	31.63	54.00	22.37	V	-0.4
5860.800000	35.47	54.00	18.53	V	4.7
7777.714286	31.45	54.00	22.55	H	5.8
10533.857143	34.38	54.00	19.62	V	8.8
17118.857143	41.38	54.00	12.62	H	18.4
17940.000000	42.12	54.00	11.88	V	19.0

802.11g CH11 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB)
3526.500000	44.16	74.00	29.84	V	0.1
4790.400000	45.99	74.00	28.01	V	4.0
8276.571429	45.87	74.00	28.13	V	6.0
11174.142857	46.60	74.00	27.40	V	9.7
16936.285714	52.26	74.00	21.74	H	18.2
17939.142857	52.56	74.00	21.44	H	19.0

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB)
3526.500000	32.07	54.00	21.93	V	0.1
4790.400000	33.97	54.00	20.03	V	4.0
8276.571429	32.99	54.00	21.01	V	6.0
11174.142857	34.43	54.00	19.57	V	9.7
16936.285714	41.76	54.00	12.24	H	18.2
17939.142857	42.12	54.00	11.88	H	19.0

©Copyright. All rights reserved by SAICT.

802.11n HT20 CH6 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB)
3891.300000	46.28	74.00	27.72	H	1.9
5383.200000	46.74	74.00	27.26	V	3.7
8191.285714	44.49	74.00	29.51	V	6.0
10412.142857	47.00	74.00	27.00	V	9.1
12719.142857	47.25	74.00	26.75	V	11.1
16954.285714	54.27	74.00	19.73	V	18.2

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB)
3891.300000	33.09	54.00	20.91	H	1.9
5383.200000	34.44	54.00	19.56	V	3.7
8191.285714	32.18	54.00	21.82	V	6.0
10412.142857	34.84	54.00	19.16	V	9.1
12719.142857	34.99	54.00	19.01	V	11.1
16954.285714	41.76	54.00	12.24	V	18.2

802.11n HT40 CH6 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB)
3742.800000	45.86	74.00	28.14	H	0.9
5806.200000	47.69	74.00	26.31	V	4.5
9162.000000	45.10	74.00	28.90	V	6.7
11909.142857	47.25	74.00	26.75	H	10.2
16903.285714	53.72	74.00	20.28	H	18.1
17934.000000	53.60	74.00	20.40	V	19.0

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB)
3742.800000	32.45	54.00	21.55	H	0.9
5806.200000	35.28	54.00	18.72	V	4.5
9162.000000	32.41	54.00	21.59	V	6.7
11909.142857	34.45	54.00	19.55	H	10.2
16903.285714	41.46	54.00	12.54	H	18.1
17934.000000	42.03	54.00	11.97	V	19.0

Note:

A "reference path loss" is established and the A_{Rpl} is the attenuation of “reference path loss”, and Antenna Factor, the gain of the preamplifier, the cable loss. P_{Mea} is the field strength recorded from the instrument.The measurement results are obtained as described below:

Result = P_{Mea} + Cable Loss + Antenna Factor - Gain of the preamplifier

See below for test graphs.

Conclusion: PASS

©Copyright. All rights reserved by SAICT.

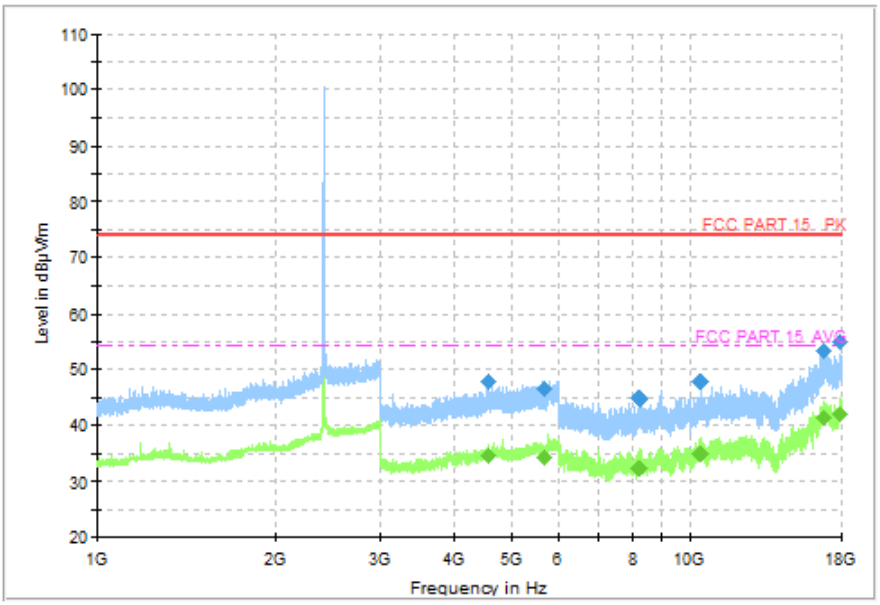


Fig.45 Radiated Spurious Emission (802.11b, CH1, 1GHz-18GHz)

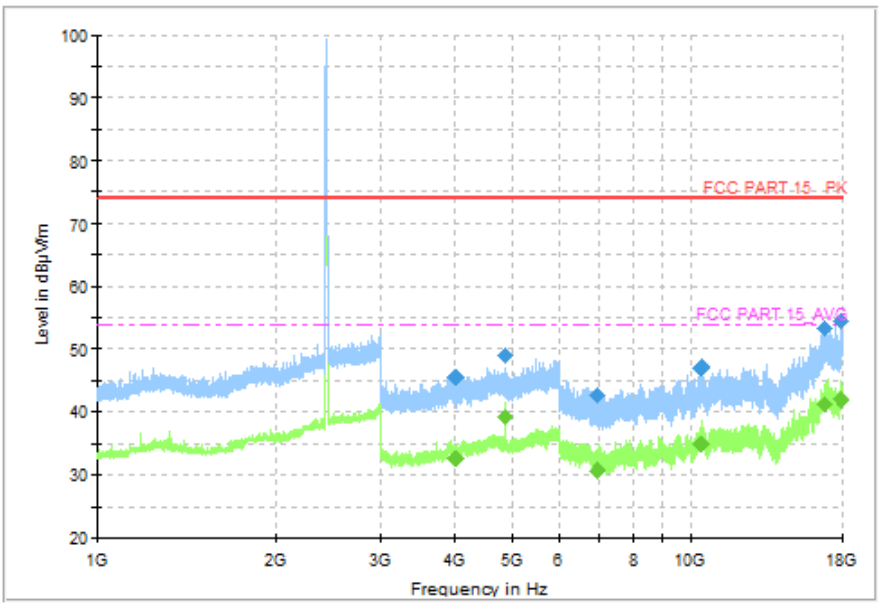


Fig.46 Radiated Spurious Emission (802.11b, CH6, 1GHz-18GHz)

©Copyright. All rights reserved by SAICT.

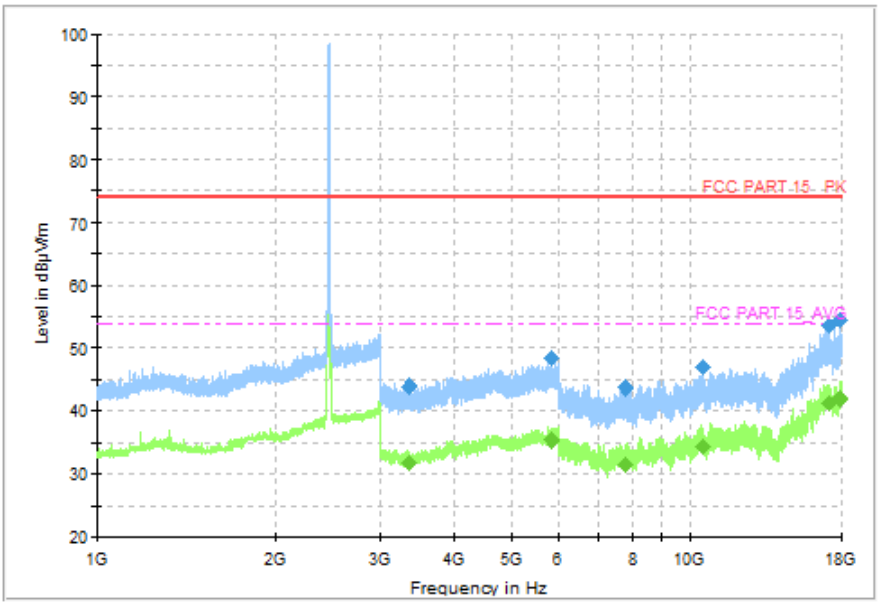


Fig.47 Radiated Spurious Emission (802.11b, CH11, 1GHz-18GHz)

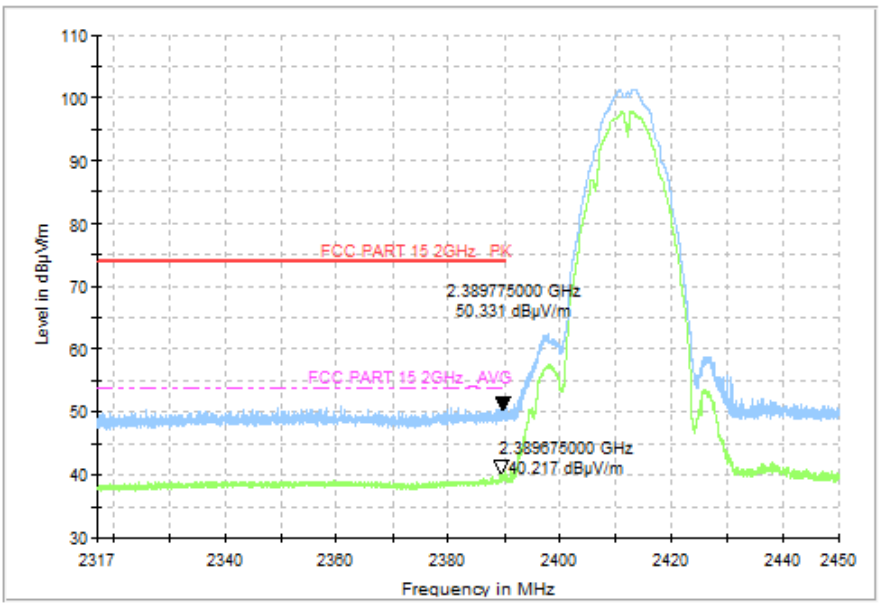


Fig.48 Radiated Restricted Band (802.11b, CH1, 2.38GHz~2.45GHz)

©Copyright. All rights reserved by SAICT.

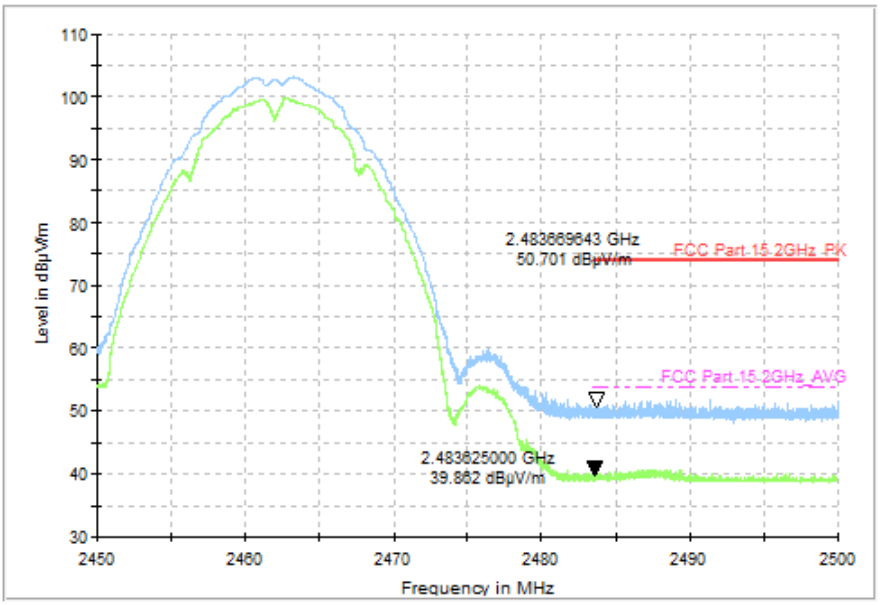


Fig.49 Radiated Restricted Band (802.11b, CH11, 2.45GHz~2.5GHz)

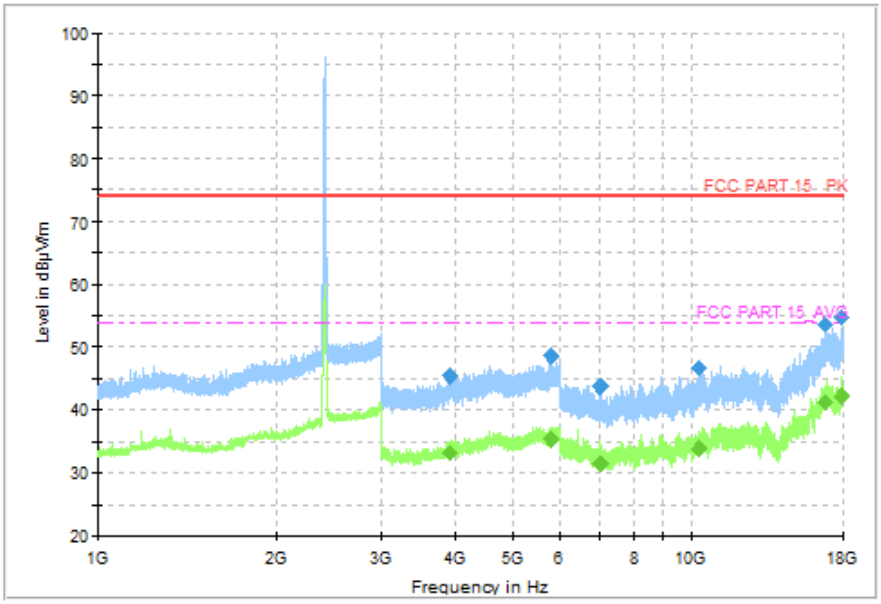


Fig.50 Radiated Spurious Emission (802.11g, CH1, 1GHz-18GHz)

©Copyright. All rights reserved by SAICT.

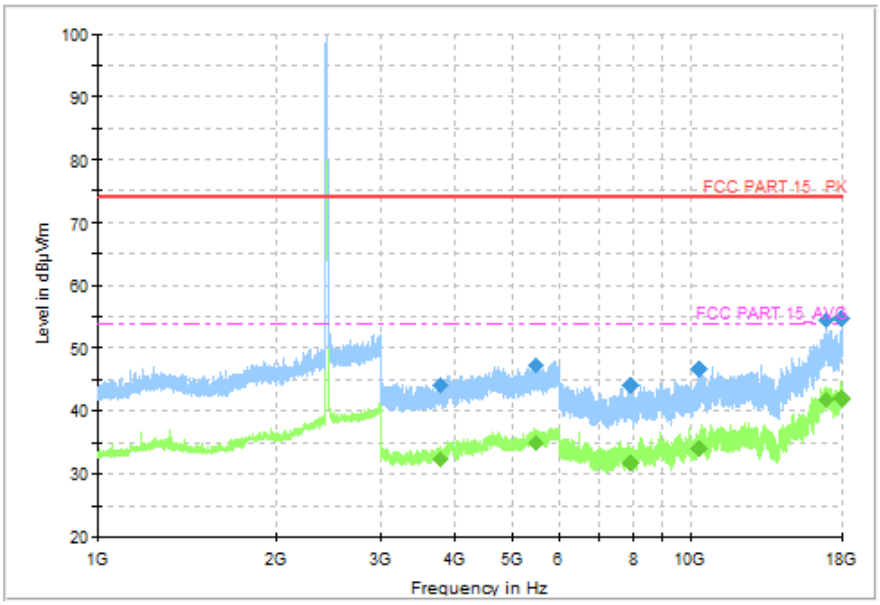


Fig.51 Radiated Spurious Emission (802.11g, CH6, 1GHz-18GHz)

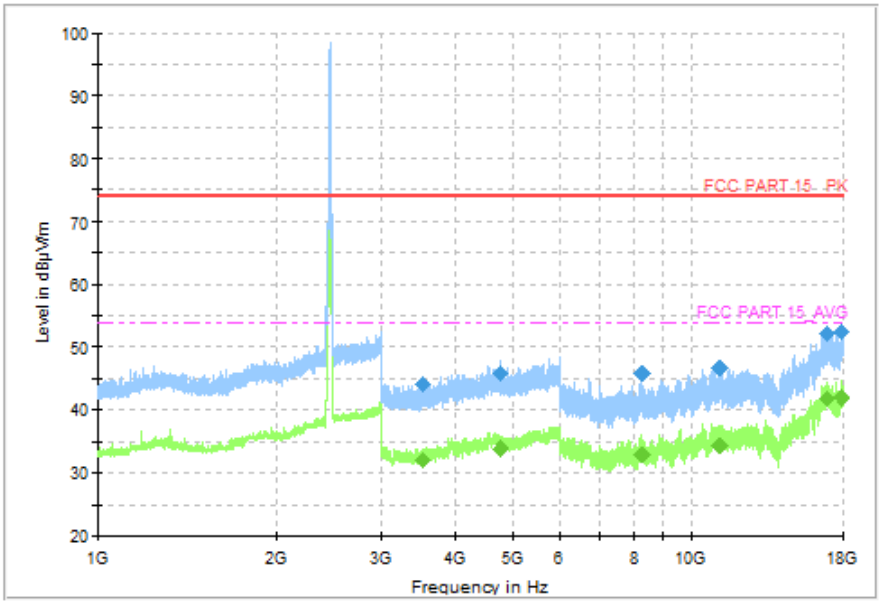


Fig.52 Radiated Spurious Emission (802.11g, CH11, 1GHz-18GHz)

©Copyright. All rights reserved by SAICT.

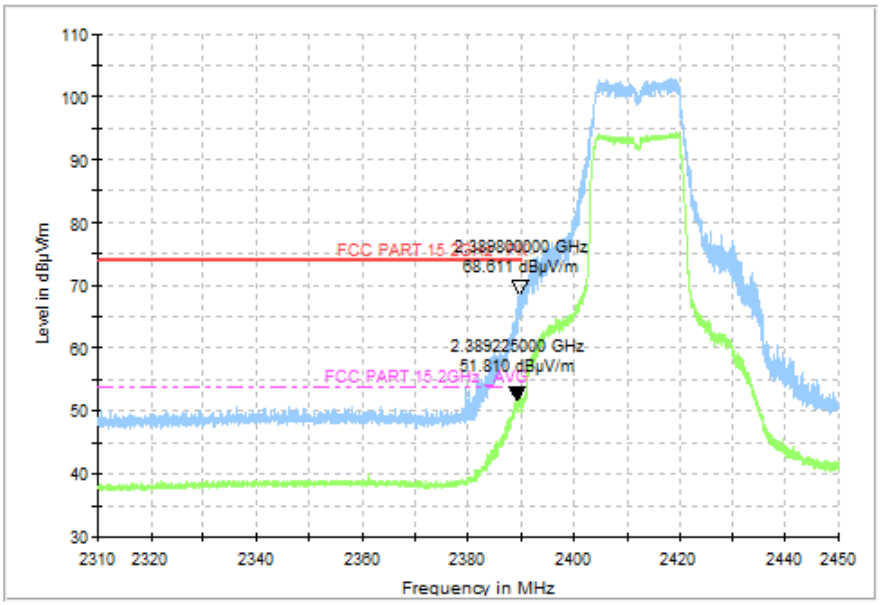


Fig.53 Radiated Restricted Band (802.11g, CH1, 2.38GHz~2.45GHz)

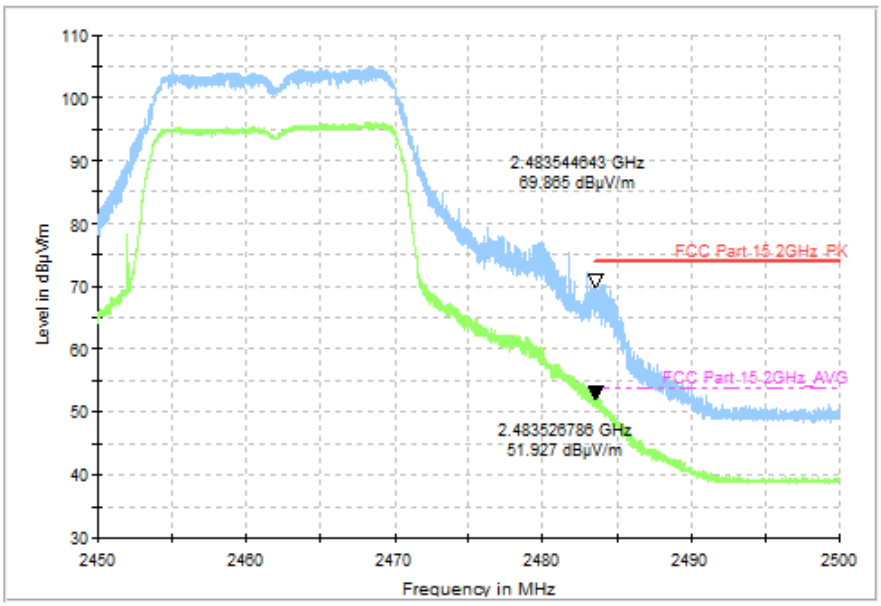


Fig.54 Radiated Restricted Band (802.11g, CH11, 2.45GHz~2.5GHz)

©Copyright. All rights reserved by SAICT.

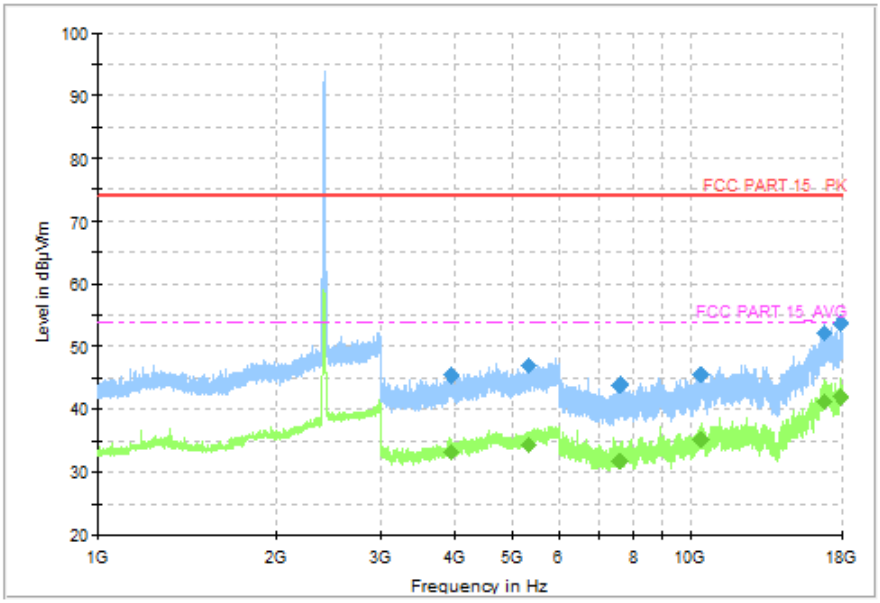


Fig.55 Radiated Spurious Emission (802.11n HT20, CH1, 1GHz-18GHz)

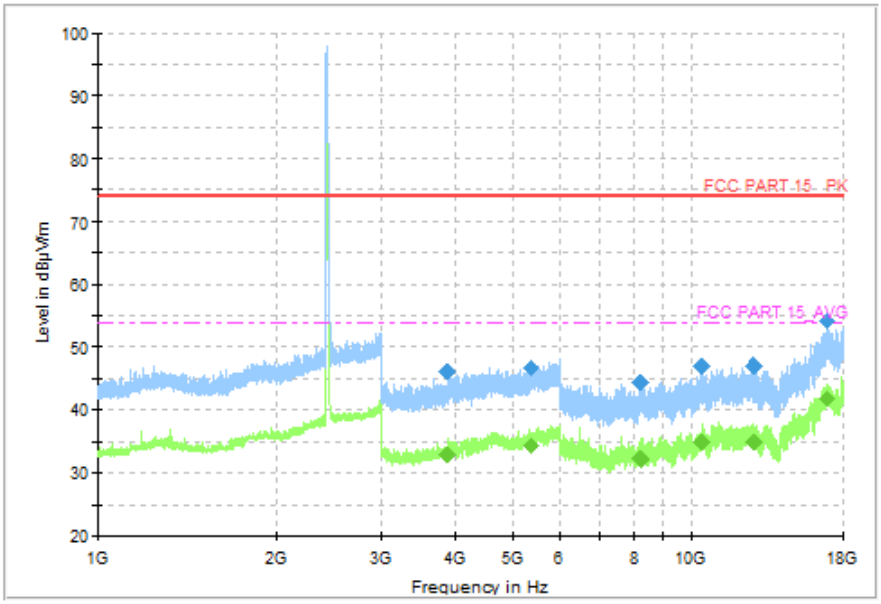


Fig.56 Radiated Spurious Emission (802.11n HT20, CH6, 1GHz-18GHz)

©Copyright. All rights reserved by SAICT.

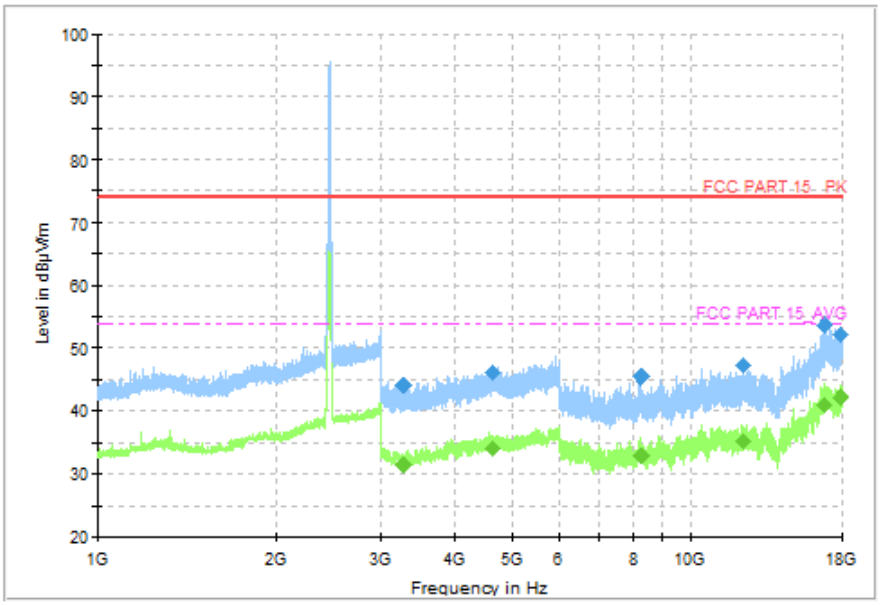


Fig.57 Radiated Spurious Emission (802.11n HT20, CH11, 1GHz-18GHz)

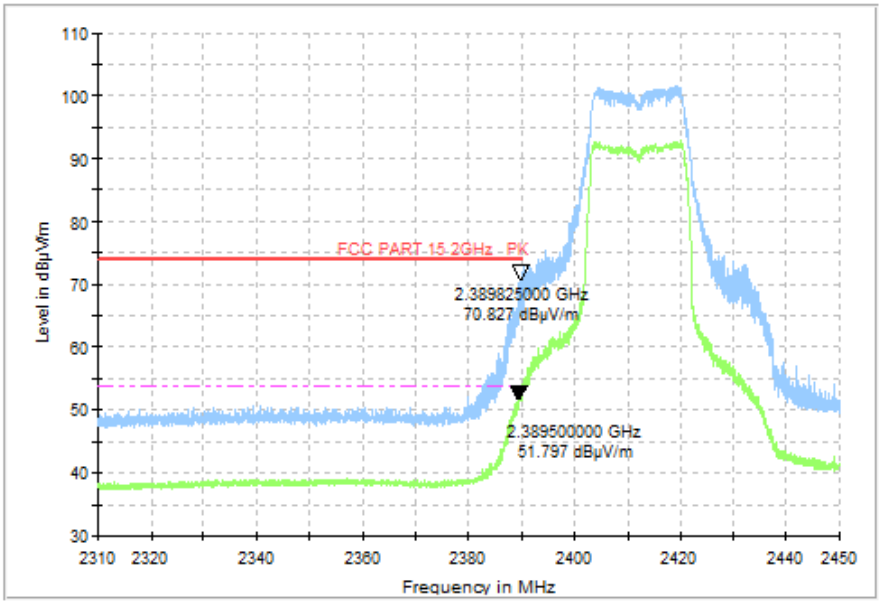


Fig.58 Radiated Restricted Band (802.11n HT20, CH1, 2.38GHz~2.45GHz)

©Copyright. All rights reserved by SAICT.

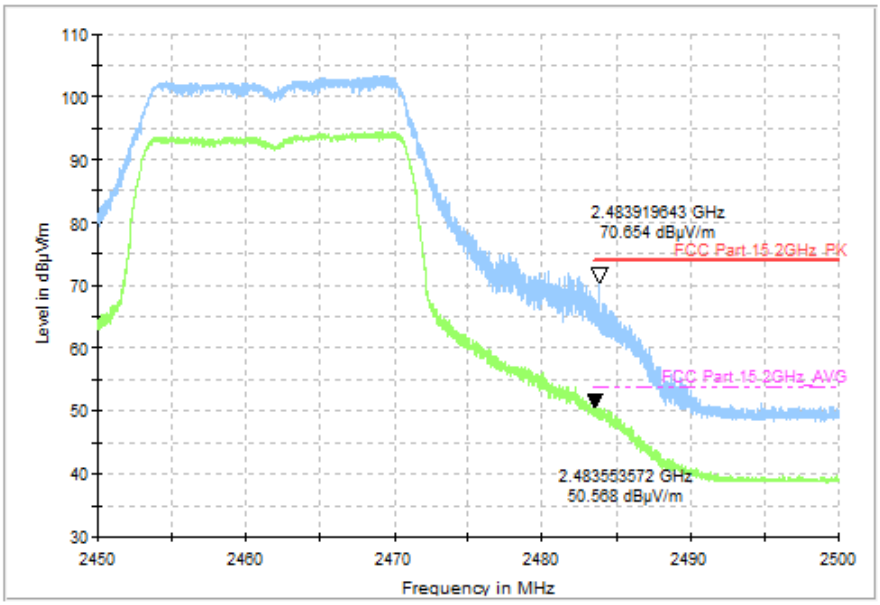


Fig.59 Radiated Restricted Band (802.11n HT20, CH11, 2.45GHz~2.5GHz)

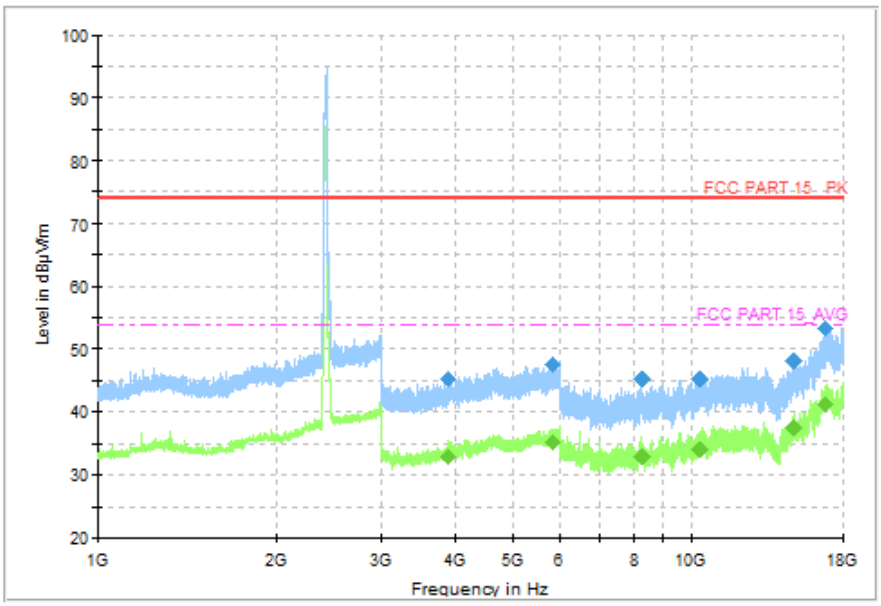


Fig.60 Radiated Spurious Emission (802.11n HT40, CH3, 1GHz-18GHz)

©Copyright. All rights reserved by SAICT.

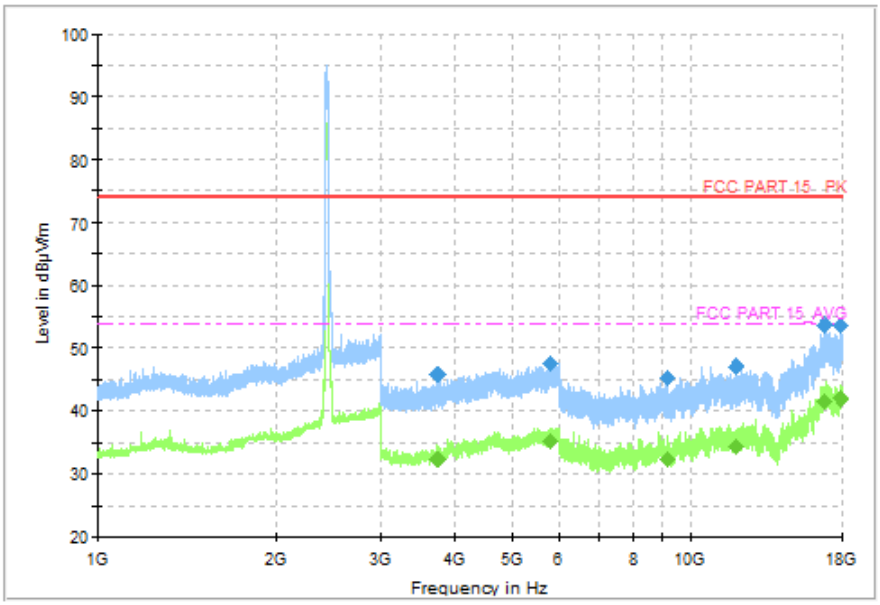


Fig.61 Radiated Spurious Emission (802.11n HT40, CH6, 1GHz-18GHz)

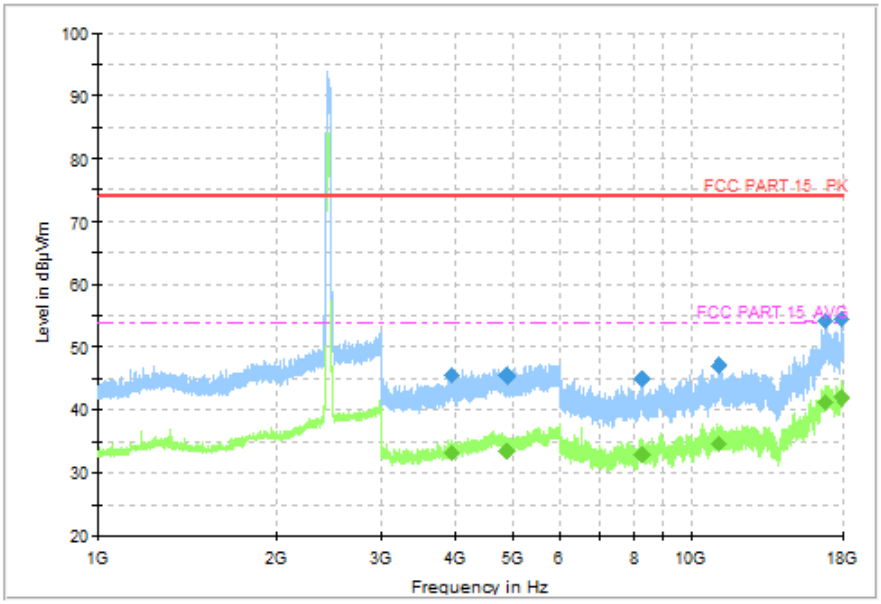


Fig.62 Radiated Spurious Emission (802.11n HT40, CH9, 1GHz-18GHz)

©Copyright. All rights reserved by SAICT.

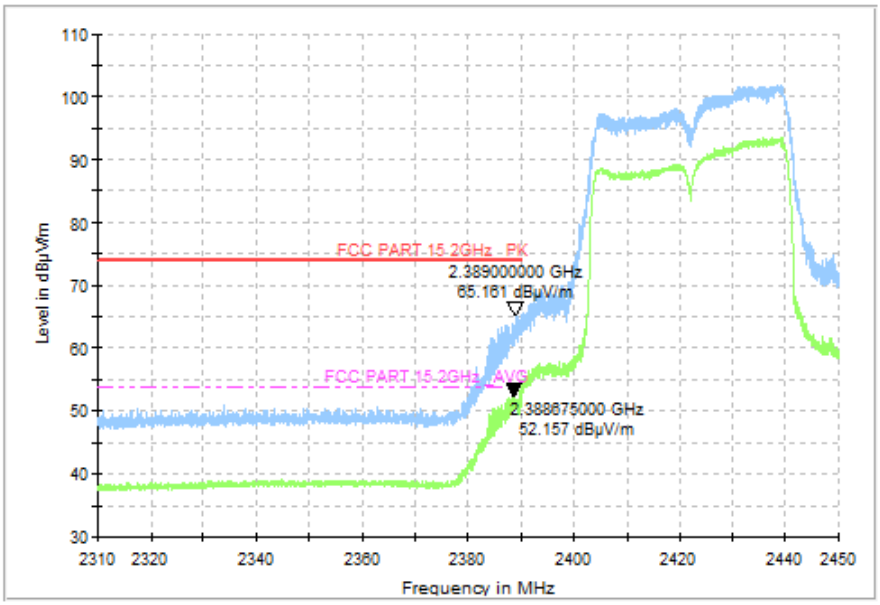


Fig.63 Radiated Restricted Band (802.11n HT40, CH3, 2.38GHz~2.45GHz)

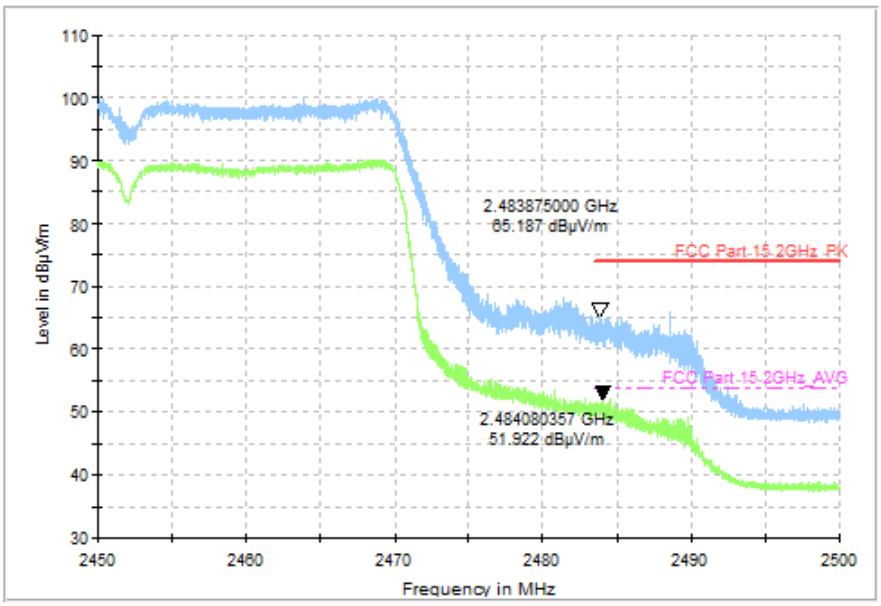


Fig.64 Radiated Restricted Band (802.11n HT40, CH9, 2.45GHz~2.5GHz)

©Copyright. All rights reserved by SAICT.

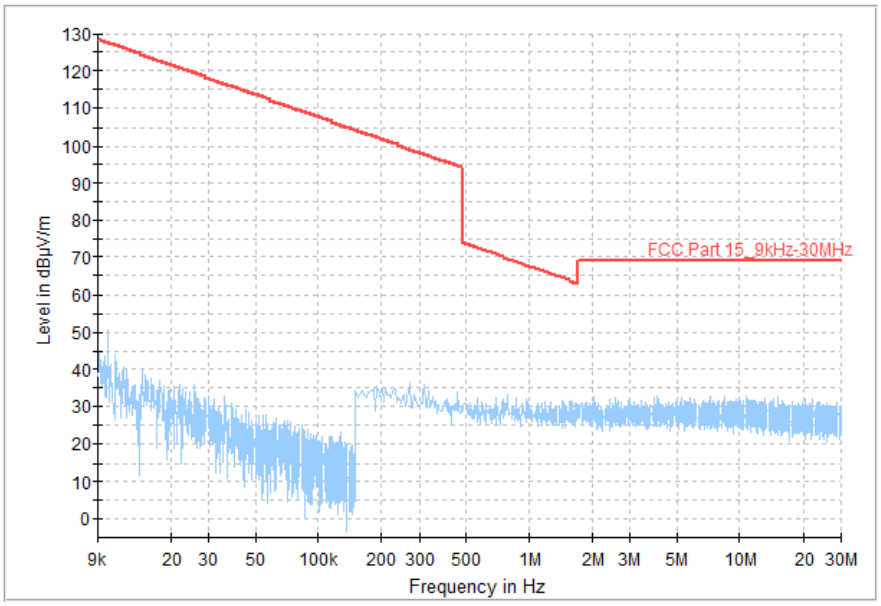


Fig.65 Radiated Spurious Emission (All Channels, 9KHz-30MHz)

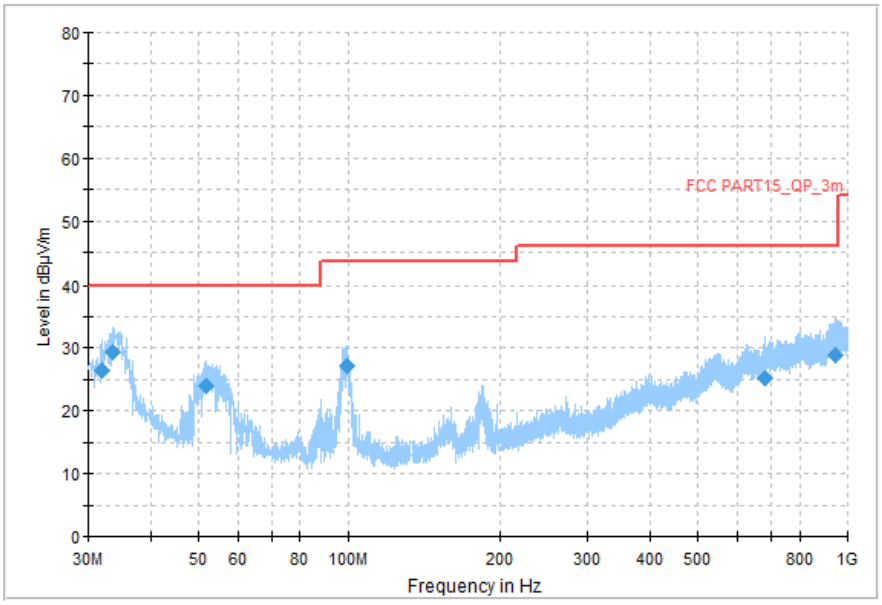


Fig.66 Radiated Spurious Emission (All Channels, 30MHz-1GHz)

©Copyright. All rights reserved by SAICT.

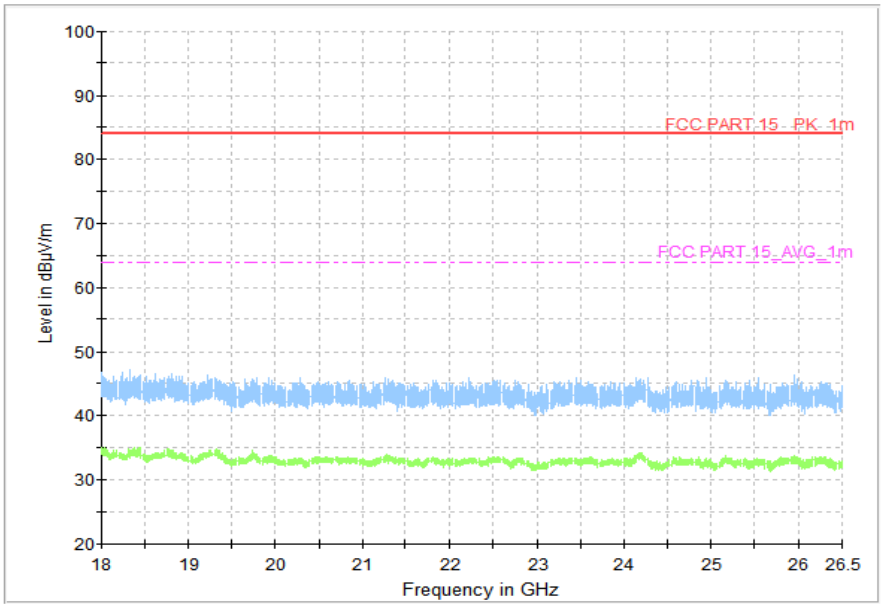


Fig.67 Radiated Spurious Emission (All Channels, 18GHz-26.5GHz)

©Copyright. All rights reserved by SAICT.

A.7 AC Power line Conducted Emission

Method of Measurement: See ANSI C63.10-clause 6.2.

Test Condition:

Voltage (V)	Frequency (Hz)
120	60

Measurement Result and limit:

WLAN (Quasi-peak Limit) - AE2

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV)		Conclusion
		Traffic	Idle	
0.15 to 0.5	66 to 56	Fig.68	Fig.69	**P**
0.5 to 5	56			
5 to 30	60			
Note: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

WLAN (Average Limit) - AE2

Frequency range (MHz)	Average-peak Limit (dBμV)	Result (dBμV)		Conclusion
		Traffic	Idle	
0.15 to 0.5	56 to 46	Fig.68	Fig.69	**P**
0.5 to 5	46			
5 to 30	50			
Note: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

Note: The measurement results include the L1 and N measurements.

See below for test graphs.

Conclusion: PASS

©Copyright. All rights reserved by SAICT.

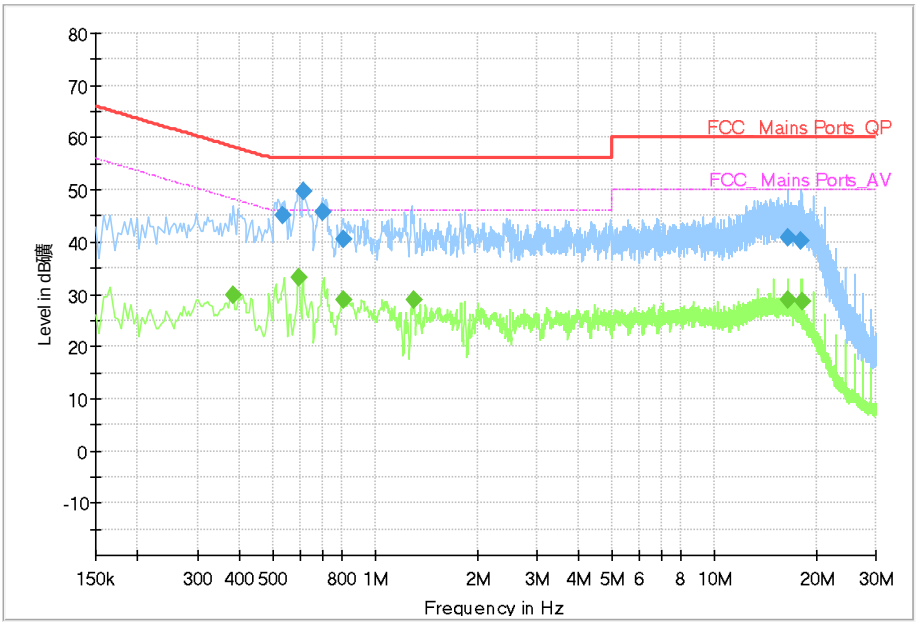


Fig.68 AC Power line Conducted Emission (Traffic, 120V)

Measurement Results: Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.534000	45.03	56.00	10.97	N	ON	10
0.614000	49.67	56.00	6.33	N	ON	10
0.698000	45.62	56.00	10.38	N	ON	10
0.806000	40.65	56.00	15.35	N	ON	10
16.530000	40.86	60.00	19.14	N	ON	11
18.106000	40.22	60.00	19.78	N	ON	11

Measurement Results: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.382000	29.74	48.24	18.50	N	ON	10
0.598000	33.31	46.00	12.69	N	ON	10
0.806000	28.96	46.00	17.04	N	ON	10
1.302000	29.01	46.00	16.99	N	ON	10
16.534000	28.82	50.00	21.18	N	ON	11
18.110000	28.61	50.00	21.39	N	ON	11

©Copyright. All rights reserved by SAICT.

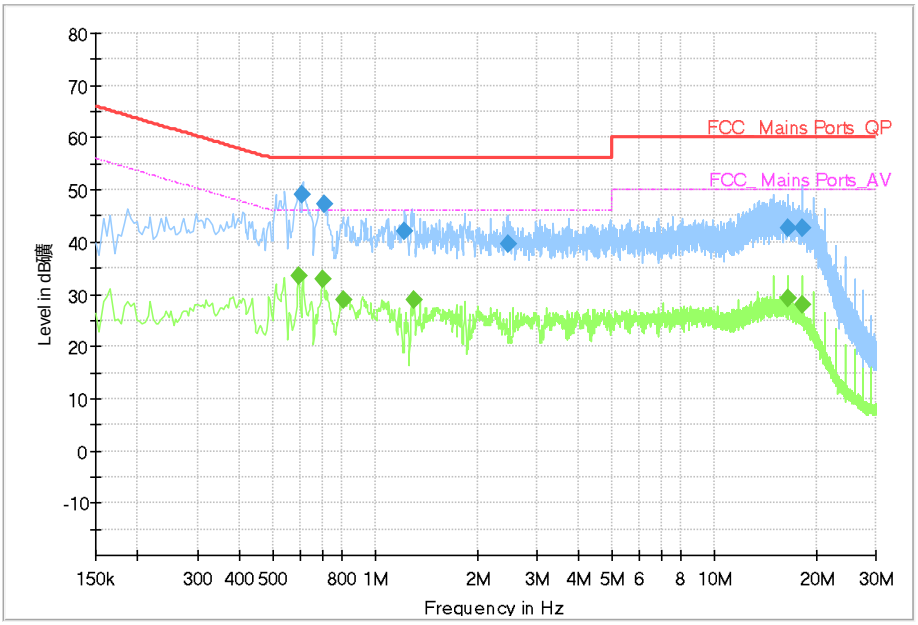


Fig.69 AC Power line Conducted Emission (Idle, 120V)

Measurement Results: Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.610000	49.21	56.00	6.79	N	ON	10
0.706000	47.13	56.00	8.87	N	ON	10
1.222000	42.03	56.00	13.97	N	ON	10
2.462000	39.65	56.00	16.35	N	ON	10
16.542000	42.83	60.00	17.17	N	ON	11
18.118000	42.72	60.00	17.28	N	ON	11

Measurement Results: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.598000	33.56	46.00	12.44	N	ON	10
0.702000	32.76	46.00	13.24	N	ON	10
0.806000	29.05	46.00	16.95	N	ON	10
1.302000	29.06	46.00	16.94	N	ON	10
16.542000	29.34	50.00	20.66	N	ON	11
18.118000	28.01	50.00	21.99	N	ON	11

©Copyright. All rights reserved by SAICT.

A.8 99% Occupied Bandwidth

Method of Measurement: See RSS-Gen- section 6.7.

Measurement Limit:

Standard	Limit
RSS-Gen section 6.7	/

Measurement Result:

Mode	Channel	Frequency (MHz)	Test Results (MHz)		Conclusion
802.11b	CH 1	2412	Fig.70	13.84	**P**
	CH 6	2437	Fig.71	13.92	**P**
	CH 11	2462	Fig.72	13.88	**P**
802.11g	CH 1	2412	Fig.73	16.72	**P**
	CH 6	2437	Fig.74	16.72	**P**
	CH 11	2462	Fig.75	16.76	**P**
802.11n HT20	CH 1	2412	Fig.76	17.84	**P**
	CH 6	2437	Fig.77	17.88	**P**
	CH 11	2462	Fig.78	17.84	**P**
802.11n HT40	CH 3	2422	Fig.79	36.88	**P**
	CH 6	2437	Fig.80	36.80	**P**
	CH 9	2452	Fig.81	36.72	**P**

See below for test graphs.
Conclusion: PASS

©Copyright. All rights reserved by SAICT.

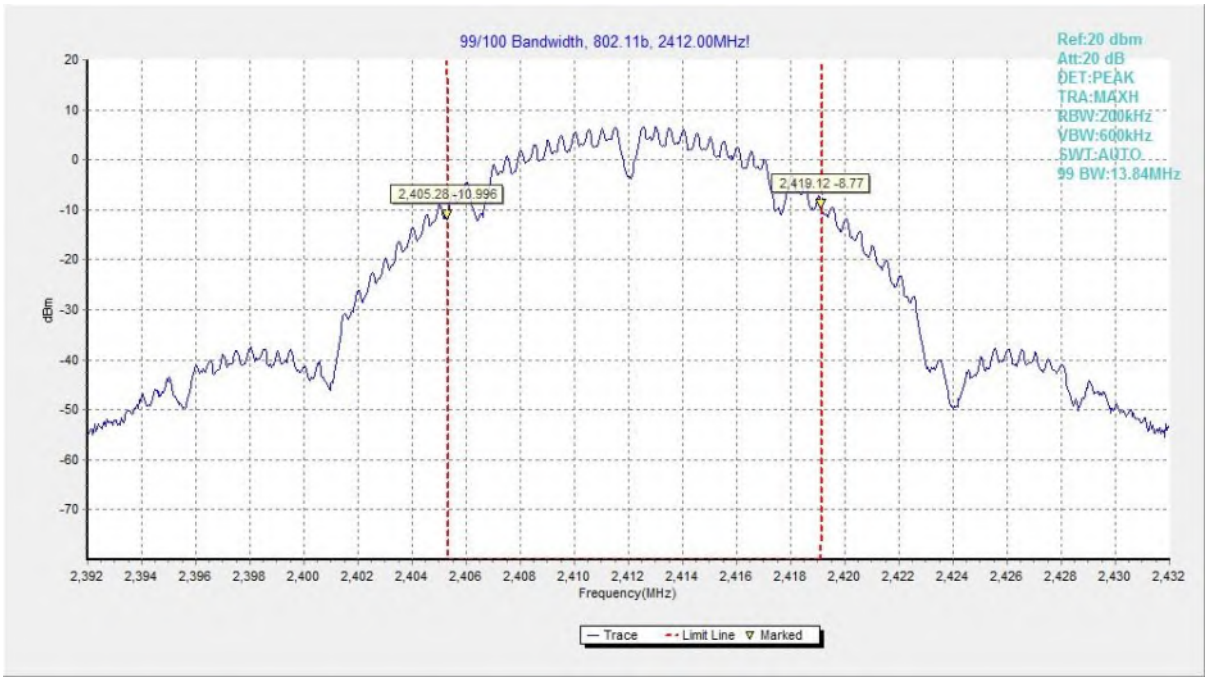


Fig.70 99% Occupied Bandwidth (802.11b, CH 1)

Fig.71 99% Occupied Bandwidth (802.11b, CH 6)

©Copyright. All rights reserved by SAICT.

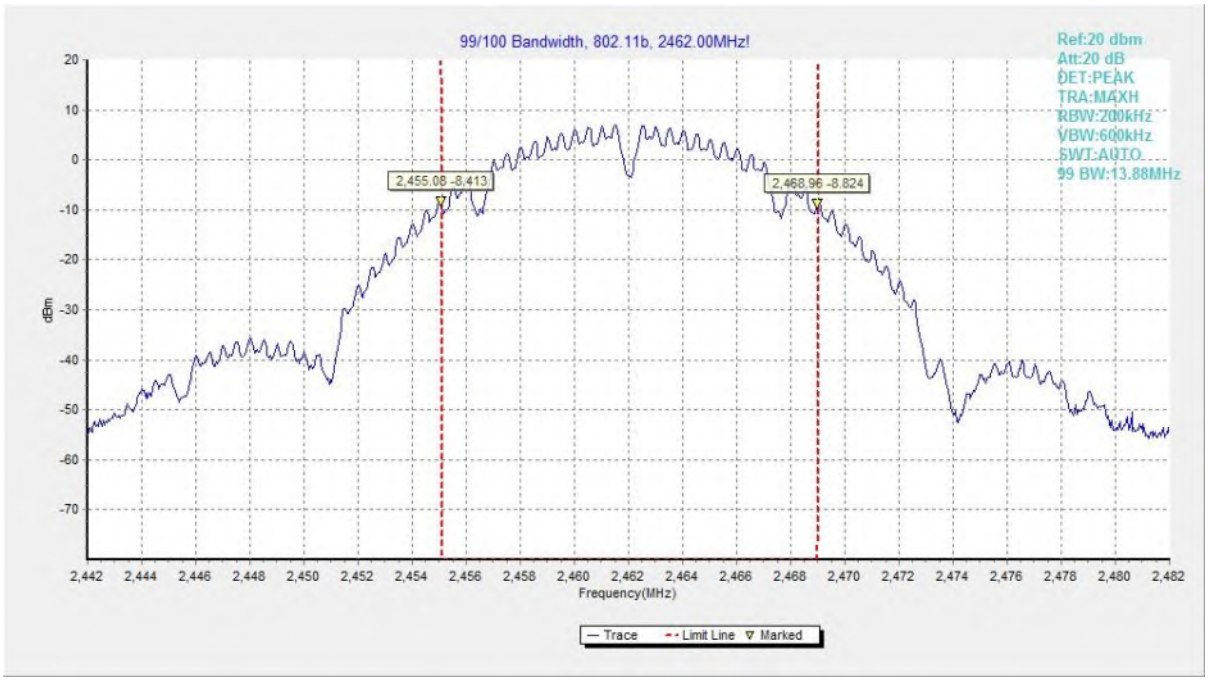


Fig.72 99% Occupied Bandwidth (802.11b, CH 11)

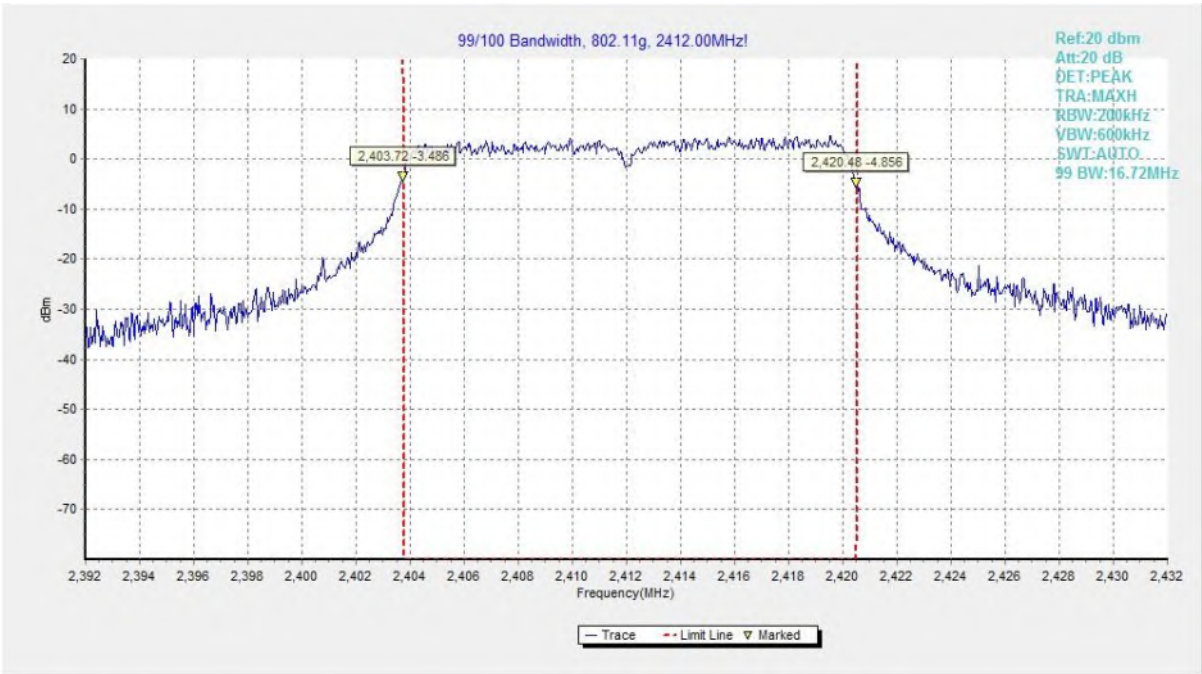


Fig.73 99% Occupied Bandwidth (802.11g, CH 1)

©Copyright. All rights reserved by SAICT.

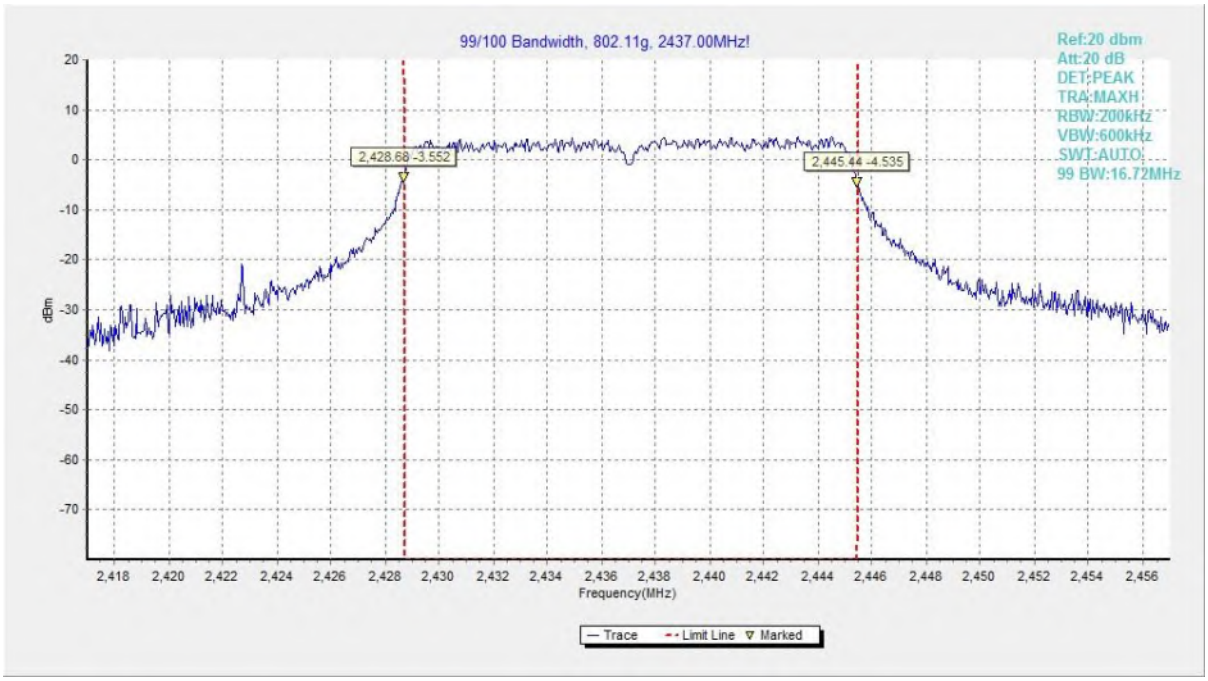


Fig.74 99% Occupied Bandwidth (802.11g, CH 6)

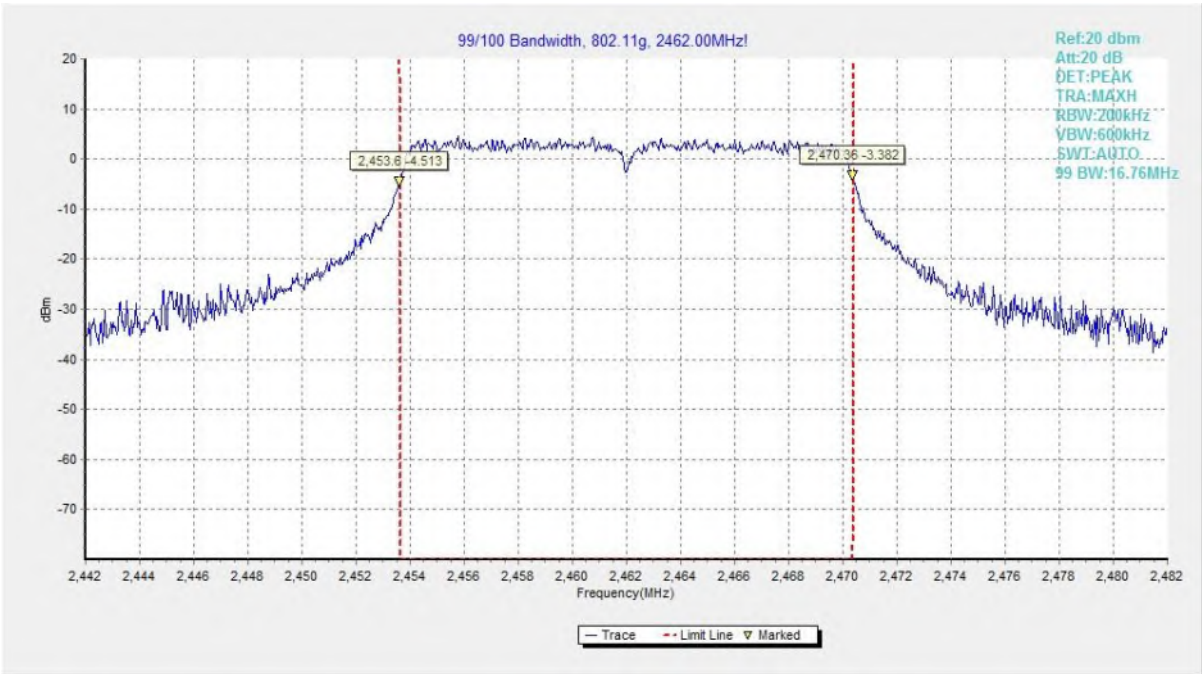


Fig.75 99% Occupied Bandwidth (802.11g, CH 11)

©Copyright. All rights reserved by SAICT.

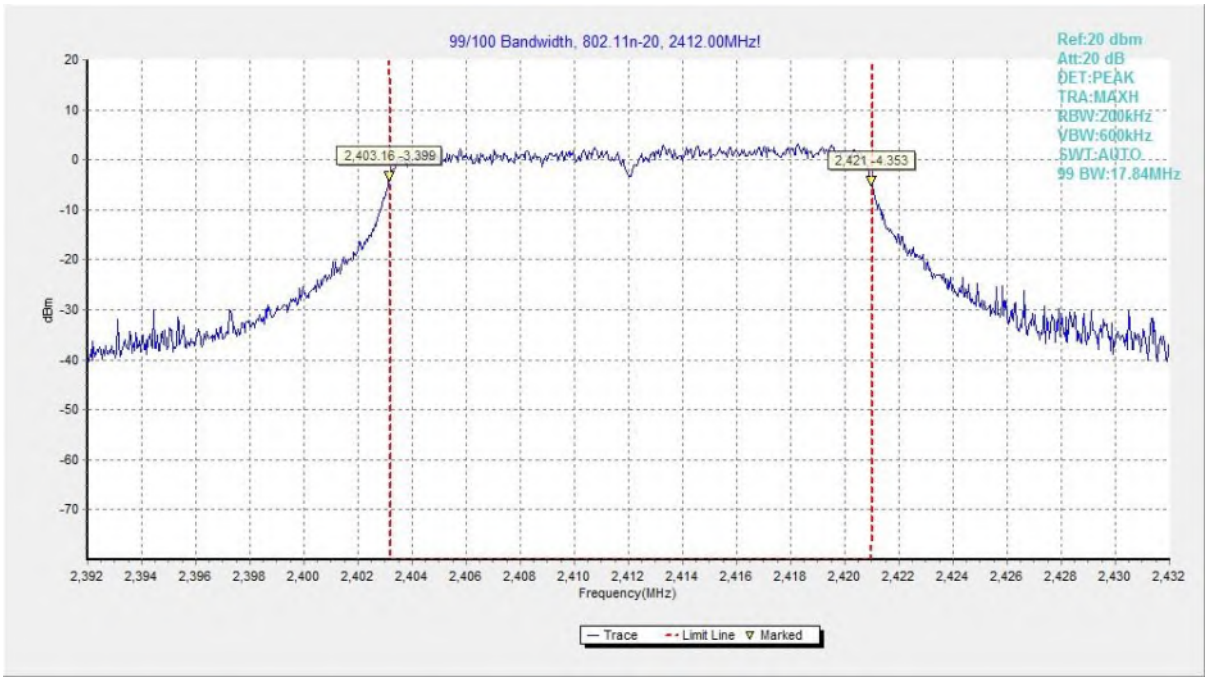


Fig.76 99% Occupied Bandwidth (802.11n HT20, CH 1)

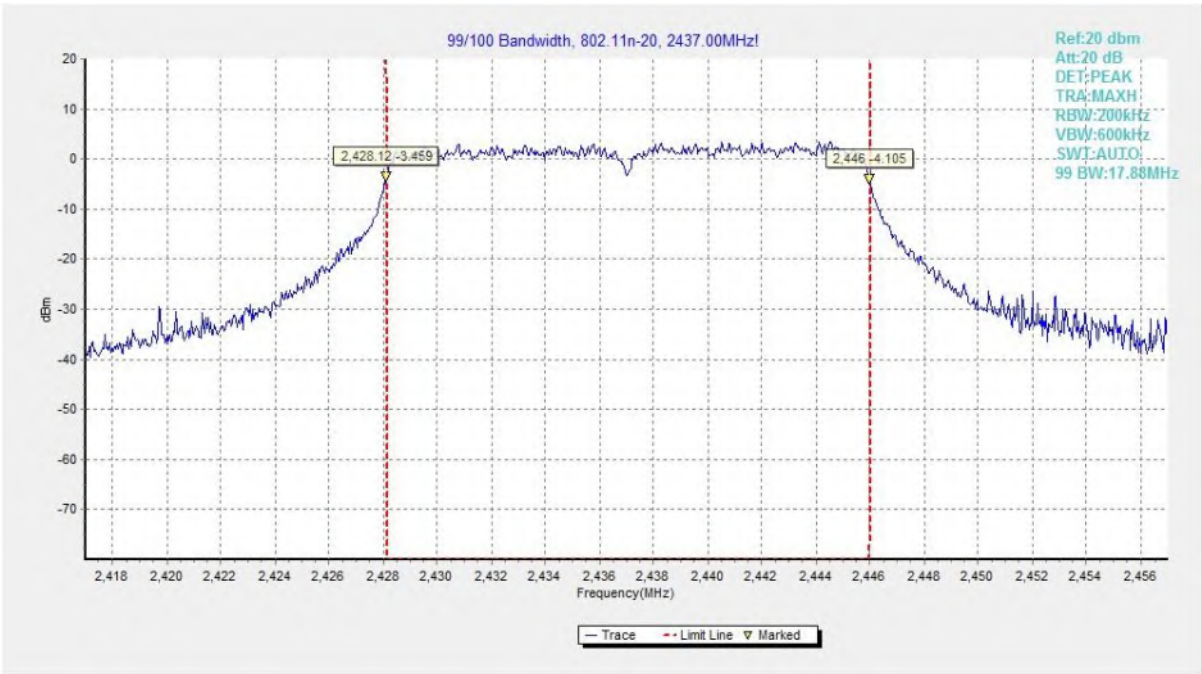


Fig.77 99% Occupied Bandwidth (802.11n HT20, CH 6)

©Copyright. All rights reserved by SAICT.

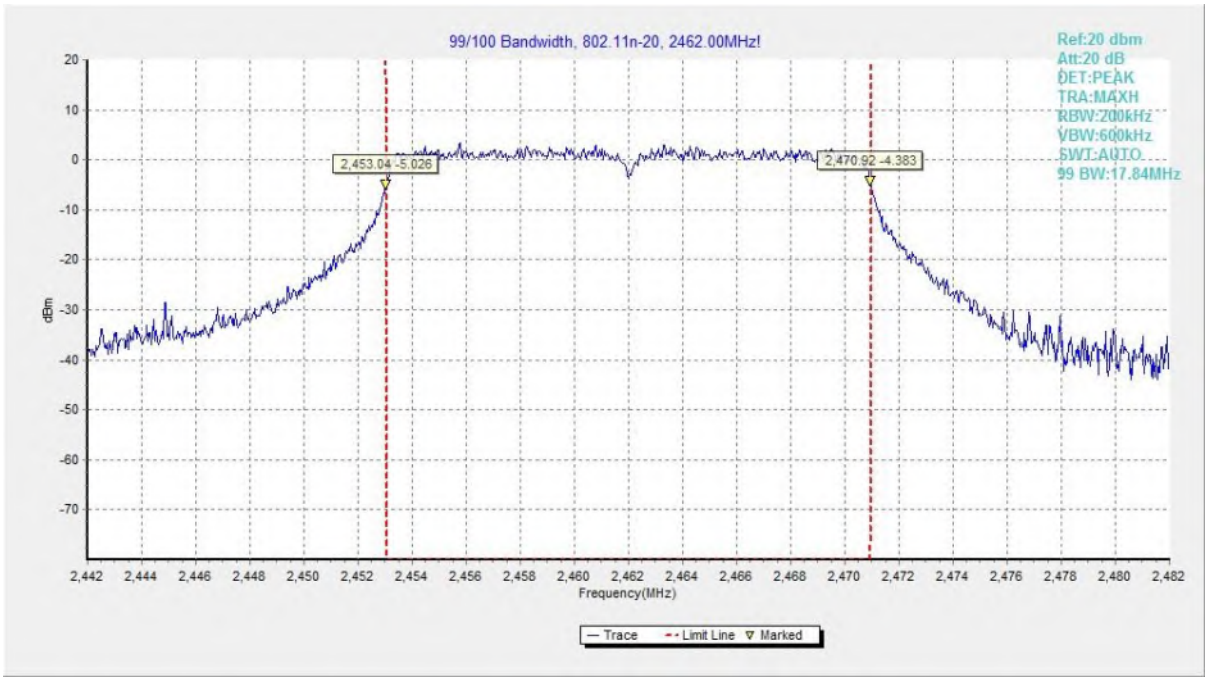


Fig.78 99% Occupied Bandwidth (802.11n HT20, CH 11)

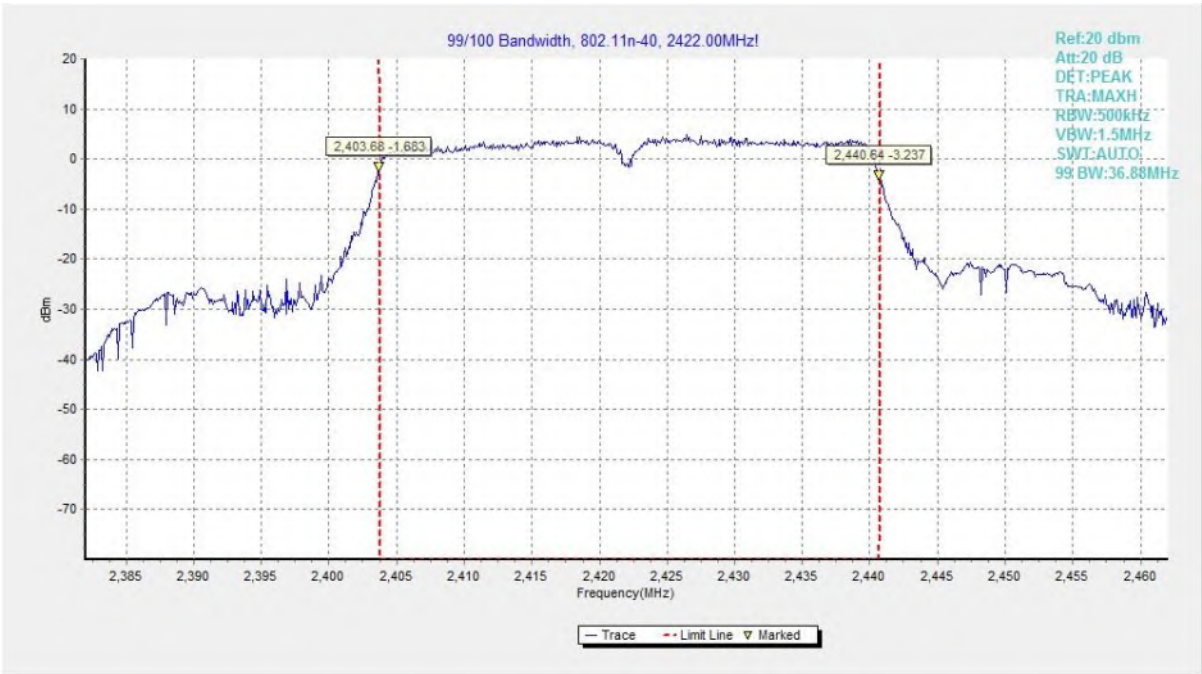


Fig.79 99% Occupied Bandwidth (802.11n HT40, CH 3)

©Copyright. All rights reserved by SAICT.

Fig.80 99% Occupied Bandwidth (802.11n HT40, CH 6)

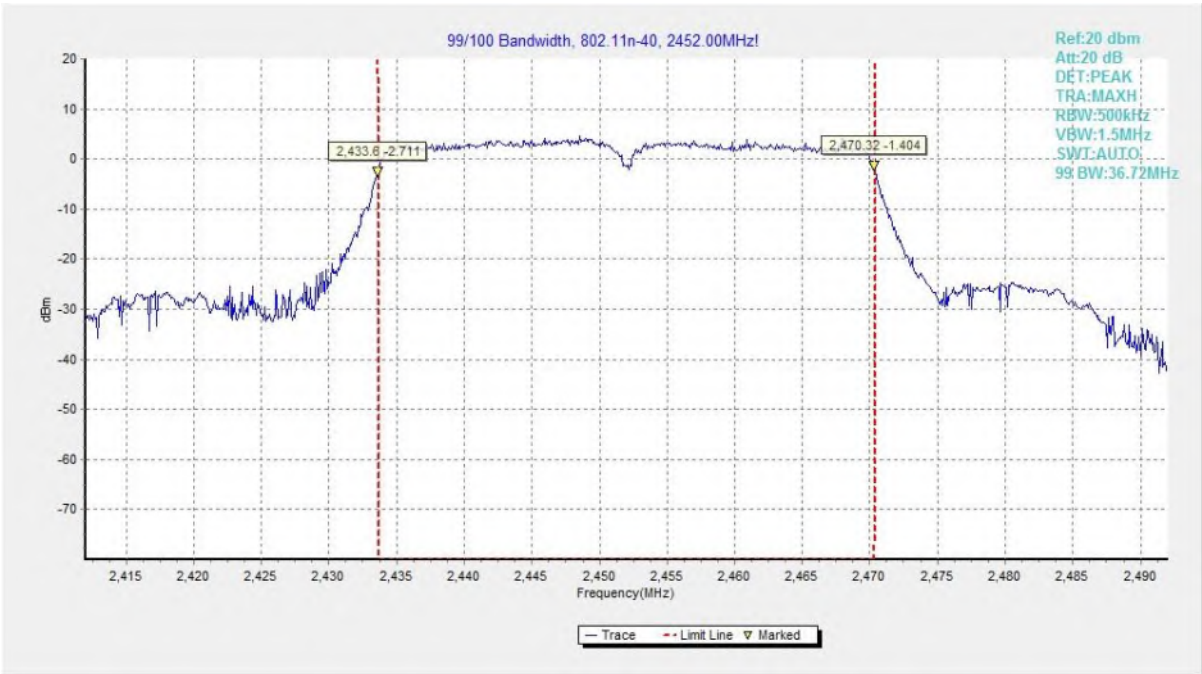


Fig.81 99% Occupied Bandwidth (802.11n HT40, CH 9)

*****END OF REPORT*****

©Copyright. All rights reserved by SAICT.