RADIO TEST REPORT

For

Shenzhen Eview GPS Technology

Personal Mobile Alarm System

Test Model: EV-07B-4G

List Model No.: N/A

Prepared for	:	Shenzhen Eview GPS Technology
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Date of receipt of test sample	:	April 16, 2019
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	April 16, 2019~May 17, 2019
Date of Report	:	May 20, 2019

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RADIO TEST REPORT
ETSI EN 300 328 V2.1.1 (2016-11)
Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

Report Reference No.	**: LCS190415004AED**
Date of Issue	: May 20, 2019
Testing Laboratory Name.....	**: Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	: 101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure.....	: Full application of Harmonised standards ■ Partial application of Harmonised standards ☐ Other standard testing method ☐
Applicant's Name.....	: Shenzhen Eview GPS Technology
Address	: #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Test Specification	
Standard	: ETSI EN 300 328 V2.1.1 (2016-11)
Test Report Form No.	: LCSEMC-1.0
TRF Originator.....	: Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	: Dated 2017-06

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Test Item Description.	**: Personal Mobile Alarm System**
Trade Mark.....	: N/A
Test Model	: EV-07B-4G
Ratings	: DC 3.7V by Rechargeable Li-ion Battery (800mAh) Recharged by DC 5V 1000mA Adapter
Result	**: Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Aking Jin	Leo Lee	Gavin Liang
Aking Jin/ File administrator	Leo Lee/ Technique principal	Gavin Liang/ Manager

RADIO -- TEST REPORT

Test Report No. : LCS190415004AED	May 20, 2019 Date of issue

Test Model.....	: EV-07B-4G
EUT.....	: Personal Mobile Alarm System
Applicant.....	**: Shenzhen Eview GPS Technology**
Address.....	: #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Telephone.....	: /
Fax.....	: /
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Telephone.....	: /
Fax.....	: /
Factory.....	**: Shenzhen Eview GPS Technology**
Address.....	: #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Telephone.....	: /
Fax.....	: /

Test Result	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
000	May 20, 2019	Initial Issue	Gavin Liang

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TABLE OF CONTENTS

Test Report Description Page

1. GENERAL INFORMATION 7
1.1. PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) 7
1.2. OBJECTIVE 11
1.3. RELATED SUBMITTAL(S)/GRANT(S) 11
1.4. TEST METHODOLOGY 11
1.5. DESCRIPTION OF TEST FACILITY 12
1.6. SUPPORT EQUIPMENT LIST 12
1.7. EXTERNAL I/O 12
1.8. LIST OF MEASURING EQUIPMENT 13
1.9. MEASUREMENT UNCERTAINTY 14
1.10. TEST ENVIRONMENT 14
1.11. DESCRIPTION OF TEST MODES 14
2. SYSTEM TEST CONFIGURATION 15
2.1. JUSTIFICATION 15
2.2. EUT EXERCISE SOFTWARE 15
2.3. SPECIAL ACCESSORIES 15
2.4. BLOCK DIAGRAM/SCHEMATICS 15
2.5. EQUIPMENT MODIFICATIONS 15
2.6. CONFIGURATION OF TEST SETUP 15
3. SUMMARY OF TEST RESULT 16
4. RF OUTPUT POWER 17
4.1. LIMIT 17
4.2. TEST SETUP 17
4.3. TEST PROCEDURE 18
4.4. TEST RESULT 19
4.5. RECEIVER CATEGORY 19
5. POWER SPECTRAL DENSITY 20
5.1. LIMIT 20
5.2. TEST SETUP 20
5.3. TEST PROCEDURE 20
5.4. TEST RESULT 21
6. DUTY CYCLE, TX-SEQUENCE, TX-GAP 22
6.1. LIMIT 22
6.2. TEST SETUP 22
6.3. TEST PROCEDURE 22
6.4. TEST RESULT 22
7. MEDIUM UTILISATION (MU) FACTOR 23
7.1. LIMIT 23
7.2. TEST SETUP 23
7.3. TEST PROCEDURE 23
7.4. TEST RESULT 23
8. ADAPTIVITY AND RECEIVER BLOCKING 24
8.1. LIMIT 24
8.2. TEST SETUP 25
8.3. TEST PROCEDURE 25
8.4. TEST RESULT 25
9. OCCUPIED CHANNEL BANDWIDTH 26
9.1. LIMIT 26
9.2. TEST SETUP 26
9.3. TEST PROCEDURE 26
9.4. TEST RESULT 27

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10. TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN 28
10.1. LIMIT 28
10.2. TEST SETUP 28
10.3. TEST PROCEDURE 29
10.4. TEST RESULT 30
11. TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN 31
11.1. LIMIT 31
11.2. TEST SETUP 31
11.3. TEST PROCEDURE 32
11.4. TEST RESULT 32
12. RECEIVER SPURIOUS EMISSIONS 33
12.1. LIMIT 33
12.2. TEST SETUP 33
12.3. TEST PROCEDURE 34
12.4. TEST RESULT 34
13. RECEIVER BLOCKING 35
13.1. LIMIT 35
13.2. TEST SETUP 36
13.3. TEST PROCEDURE 36
13.4. TEST RESULT 36
14. PHOTOGRAPHS OF TEST SETUP 37

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	:	Personal Mobile Alarm System
Model No.	:	EV-07B-4G
Model Declaration	:	N/A
Test Model	:	EV-07B-4G
Power Supply	:	DC 3.7V by Rechargeable Li-ion Battery (800mAh) Recharged by DC 5V 1000mA Adapter
Hardware Version	:	EV07B-LTE1-V2.01
Software Version	:	V1.0.6.25
3G	:	
Support Band	:	☐WCDMA Band II(US-Band) ☒WCDMA Band V(US-Band) ☒WCDMA Band I(EU-Band) ☒WCDMA Band VIII(EU-Band)
Release Version	:	R8
Uplink	:	WCDMA Band I: 1920MHz ~ 1980MHz WCDMA Band VIII: 880MHz~915MHz
Downlink	:	WCDMA Band I: 2110MHz ~ 2170MHz WCDMA Band VIII: 925MHz~960MHz
Type Of Modulation	:	WCDMA: BPSK; HSDPA/HSUPA: BPSK
Antenna Description	:	PIFA Antenna, -1.42dBi (max.) For WCDMA Band I; -2.67dBi (max.) For WCDMA Band VIII
Power Class	:	Level 3
LTE	:	
Support Band	:	☒E-UTRA Band 3(EU-Band) ☒E-UTRA Band 5(No EU-Band) ☒E-UTRA Band 28(EU-Band)
LTE Release Version	:	R9
FDD Band	:	Uplink: E-UTRA Band 3: 1710MHz ~ 1785MHz E-UTRA Band 28: 703MHz ~ 748MHz Downlink: E-UTRA Band 3: 1805MHz ~ 1880MHz E-UTRA Band 28: 758MHz ~ 803MHz
Type Of Modulation	:	QPSK/16-QAM
Antenna Description	:	PIFA Antenna, -1.57dBi (max.) For LTE Band 3; -3.26dBi (max.) For LTE Band 28
Power Class	:	Class 3
Bluetooth	:	
Frequency Range	:	2.402-2.480GHz
Channel Number	:	40 channels
Channel Spacing	:	2MHz
Modulation Type	:	GFSK
Bluetooth Version	:	V4.0 (Support only BT LE)
Antenna Description	:	PIFA Antenna, -0.87dBi (Max.)
WIFI(2.4G Band)	:	
Frequency Range	:	2412-2472MHz
Channel Spacing	:	5MHz
Channel Number	:	13 Channel for 20MHz bandwidth(2412~2472MHz) (Not applicable 802.11n-HT40)
Modulation Type	:	802.11b: DSSS; 802.11g/n: OFDM
Antenna Description	:	PIFA Antenna, -0.87dBi (Max.)
GPS Receiver	:	
Receive Frequency	:	1575.42MHz
Channel Number	:	1
Antenna Description	:	Ceramic Antenna

Product Information

a) The type of modulation used by the equipment:

☐FHSS

☒other forms of modulation

b) In case of FHSS modulation:

•In case of non-Adaptive Frequency Hopping equipment:

The number of Hopping Frequencies: .....

•In case of Adaptive Frequency Hopping Equipment:

The maximum number of Hopping Frequencies: .....

The minimum number of Hopping Frequencies: .....

The Dwell Time: .....

The Minimum Channel Occupation Time: .....

c) Adaptive / non-adaptive equipment:

☐non-adaptive Equipment

☒adaptive Equipment without the possibility to switch to a non-adaptive mode

☐adaptive Equipment which can also operate in a non-adaptive mode

d) In case of adaptive equipment:

The Channel Occupancy Time implemented by the equipment:

☒The equipment has implemented an LBT based DAA mechanism

- In case of equipment using modulation different from FHSS:

☐The equipment is Frame Based equipment

☒The equipment is Load Based equipment

☐The equipment can switch dynamically between Frame Based and Load Based equipment

The CCA time implemented by the equipment: 20µs

The value q as referred to in clause 4.3.2.5.2.2.2 4

☐The equipment has implemented an non-LBT based DAA mechanism

☐The equipment can operate in more than one adaptive mode

e) In case of non-adaptive Equipment:

The maximum RF Output Power (e.i.r.p.): ……dBm

The maximum (corresponding) Duty Cycle: 100 %

Equipment with dynamic behaviour, that behaviour is described here. (e.g. the different combinations of duty cycle and corresponding power levels to be declared):

f) The worst case operational mode for each of the following tests:

- RF Output Power (worst case 802.11b)

DSSS, OFDM

- Power Spectral Density (worst case 802.11b)

DSSS, OFDM

- Duty cycle, Tx-Sequence, Tx-gap

.....

- Dwell time, Minimum Frequency Occupation & Hopping Sequence (only for FHSS equipment)

.....

- Hopping Frequency Separation (only for FHSS equipment)

.....

- Medium Utilisation

.....

- Adaptivity & Receiver Blocking (worst case 802.11b)

DSSS, OFDM

- Occupied Channel Bandwidth (worst case 802.11n20)

DSSS, OFDM

- Transmitter unwanted emissions in the OOB domain (worst case 802.11b)

DSSS, OFDM

- Transmitter unwanted emissions in the spurious domain (worst case 802.11b)

DSSS, OFDM

- Receiver spurious emissions (worst case 802.11n20)

DSSS, OFDM

g) The different transmit operating modes (tick all that apply):

☒Operating mode 1: Single Antenna Equipment

☒Equipment with only 1 antenna

☐Equipment with 2 diversity antennas but only 1 antenna active at any moment in time

☐Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1 antenna is used. (e.g. IEEE 802.11™ [i.3] legacy mode in smart antenna systems)

☐Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming

☐Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [i.3] legacy mode)

☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1

☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2

NOTE: Add more lines if more channel bandwidths are supported.

☐Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming

☐Single spatial stream / Standard throughput (e.g. IEEE 802.11™ [i.3] legacy mode)

☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1

☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2

NOTE: Add more lines if more channel bandwidths are supported.

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h) In case of Smart Antenna Systems:

- The number of Receive chains: .....
- The number of Transmit chains: .....

☐symmetrical power distribution

☐asymmetrical power distribution

In case of beam forming, the maximum beam forming gain: .....

NOTE: Beam forming gain does not include the basic gain of a single antenna.

i) Operating Frequency Range(s) of the equipment:

- Operating Frequency Range 1: 2412MHz to 2472MHz
- Operating Frequency Range 2: ……MHz to ……MHz

NOTE: Add more lines if more Frequency Ranges are supported.

j) Occupied Channel Bandwidth(s):

- Occupied Channel Bandwidth 1: 17.772MHz (20MHz norminal bandwidth)
- Occupied Channel Bandwidth 2: ……MHz (…MHz norminal bandwidth)

NOTE: Add more lines if more channel bandwidths are supported.

k) Type of Equipment (stand-alone, combined, plug-in radio device, etc.):

☒Stand-alone

☐Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)

☐Plug-in radio device (Equipment intended for a variety of host systems)

Other .....

l) The extreme operating conditions that apply to the equipment:

Operating temperature range: -20° C to 45° C

Operating voltage range: 3.7V ☐AC ■DC

Details provided are for the: ■stand-alone equipment

☐combined (or host) equipment

☐test jig

m) The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p levels:

- Antenna Type

☒PIFA Antenna

Antenna Gain: -0.87dBi

If applicable, additional beamforming gain (excluding basic antenna gain): ..... dB

☐Temporary RF connector provided

☐No temporary RF connector provided

☐Dedicated Antennas (equipment with antenna connector)

☐Single power level with corresponding antenna(s)

☐Multiple power settings and corresponding antenna(s)

Number of different Power Levels: .....

Power Level 1: ..... dBm

Power Level 2: ..... dBm

Power Level 3: ..... dBm

NOTE 1: Add more lines in case the equipment has more power levels.
NOTE 2: These power levels are conducted power levels (at antenna connector).

n) The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices:

Details provided are for the: ☒stand-alone equipment
☐combined (or host) equipment
☐test jig
Supply Voltage ☐AC mains State AC voltage ……. V
☒ DC State DC voltage: 3.7V

In case of DC, indicate the type of power source
☐Internal Power Supply
☐External Power Supply or AC/DC adapter
☒Battery: 3.7V
☐Other: .....

o) Describe the test modes available which can facilitate testing:
The EUT can transmit in engineering mode.

p) The equipment type (e.g. Bluetooth®, IEEE 802.11™ [i.3], proprietary, etc.):
IEEE 802.11™

1.2. Objective

This Type approval report is prepared on behalf of **Shenzhen Eview GPS Technology** in accordance with ETSI EN 300 328 V2.1.1 (2016-11), Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

The objective is to determine compliance with ETSI EN 300 328 V2.1.1 (2016-11).

1.3. Related Submittal(s)/Grant(s)

No Related Submittals.

1.4. Test Methodology

All measurements contained in this report were conducted with ETSI EN 300 328 V2.1.1 (2016-11).

1.5. Description of Test Facility

FCC Registration Number is 254912.
Industry Canada Registration Number is 9642A-1.
EMSD Registration Number is ARCB0108.
UL Registration Number is 100571-492.
TUV SUD Registration Number is SCN1081.
TUV RH Registration Number is UA 50296516-001.
NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.

1.6. Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
---	---	---	---	---

1.7. External I/O

I/O Port Description	Quantity	Cable
SIM Card Slot	1	N/A

1.8. List Of Measuring Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	X-series USB Peak and Average Power Sensor Agilent	Agilent	U2021XA	MY54080022	2018-10-25	2019-10-24
2	4 CH. Simultaneous Sampling 14 Bits 2MS/s	Agilent	U2531A	MY54080016	2018-10-25	2019-10-24
3	Test Software	Ascentest	AT890-SW	20160630	N/A	N/A
4	RF Control Unit	Ascentest	AT890-RFB	N/A	2018-06-16	2019-06-15
5	MXA Signal Analyzer	Agilent	N9020A	MY49061051	2018-06-16	2019-06-15
6	DC Power Supply	Agilent	E3642A	N/A	2018-11-15	2019-11-14
7	MXG Vector Signal Generator	Agilent	N5182A	MY47071151	2018-06-16	2019-06-15
8	ESG Vector Signal Generator	Agilent	E4438C	MY49072627	2018-06-16	2019-06-15
9	PSG Analog Signal Generator	Agilent	E8257D	MY4520521	2018-06-16	2019-06-15
10	Temperature & Humidity Chamber	GUANGZHOU GOGNWEN	GDS-100	70932	2018-10-10	2019-10-09
11	EMI Test Software	AUDIX	E3	/	2018-06-16	2019-06-15
12	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2018-06-16	2019-06-15
13	Positioning Controller	MF	MF-7082	/	2018-06-16	2019-06-15
14	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2018-07-26	2019-07-25
15	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-07-26	2019-07-25
16	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2018-07-02	2019-07-01
17	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2018-09-20	2019-09-19
18	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2018-09-20	2019-09-19
19	EMI Test Receiver	R&S	ESR 7	101181	2018-06-16	2019-06-15
20	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2018-11-15	2019-11-14
21	AMPLIFIER	QuieTek	QTK	CHM/0809065	2018-11-15	2019-11-14
22	RF Cable-R03m	Jye Bao	RG142	CB021	2018-06-16	2019-06-15
23	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2018-06-16	2019-06-15
24	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	103818	2018-06-16	2019-06-15
25	6dB Attenuator	/	100W/6dB	1172040	2018-06-16	2019-06-15
26	3dB Attenuator	/	2N-3dB	/	2018-06-16	2019-06-15
Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.						

1.9. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Occupied Channel Bandwidth	5 %
RF output power, conducted	1,5 dB
Power Spectral Density, conducted	3 dB
Unwanted Emissions, conducted	3 dB
All emissions, radiated	6 dB
Temperature	1 °C
Humidity	5 %
DC and low frequency voltages	3 %
Time	5 %
Duty Cycle	5 %

1.10. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	22.9
Humidity (%RH)	25-75	52.4
Barometric pressure (mbar)	860-1060	950-1000

1.11. Description Of Test Modes

LCS has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Transmit by 802.11b
Mode 2: Transmit by 802.11g
Mode 3: Transmit by 802.11n(20MHz)
Mode 4: Receive by 802.11b
Mode 5: Receive by 802.11g
Mode 6: Receive by 802.11n(20MHz)

Note:

(1) For portable device, radiated spurious emission was verified over X, Y, Z Axis, and shown the worst case (X axis) on this report.

(2) Regard to the frequency band operation for systems using Wide Band modulation: the lowest, middle, highest frequency channel for conducted test, and the lowest, highest frequency channel for radiation spurious test.

(3) The extreme test condition for temperature was declared by the manufacturer.

2. SYSTEM TEST CONFIGURATION

2.1. Justification

The system was configured for testing in engineering mode.

2.2. EUT Exercise Software

N/A.

2.3. Special Accessories

N/A.

2.4. Block Diagram/Schematics

Please refer to the related document.

2.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

2.6. Configuration of Test Setup

Please refer to the test setup photo.

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3. SUMMARY OF TEST RESULT

☒ No deviations from the test standards
☐ Deviations from the test standards as below description:

Technical requirements for the equipment using wide band modulations other than FHSS:

Performed Test Item	Normative References	Test Performed	Deviation
RF Output Power & Receiver Category	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Power Spectral Density	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Duty cycle, Tx-Sequence, Tx-gap	ETSI EN 300 328 V2.1.1 (2016-11)	N/A	N/A
Medium Utilisation (MU) factor	ETSI EN 300 328 V2.1.1 (2016-11)	N/A	N/A
Adaptivity	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Occupied Channel Bandwidth	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Transmitter unwanted emissions in the out-of-band domain	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Transmitter unwanted emissions in the spurious domain	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Receiver Spurious Emissions	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Receiver Blocking	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No

Note:
1. The EUT can operate in an adaptive mode, and can't operate in a non-adaptive mode which is stated by the supplier.
2. The EUT is equipment which using wide band modulations other than FHSS. It is an adaptive equipment which can't operate in non-adaptive mode.

4. RF OUTPUT POWER

4.1. Limit

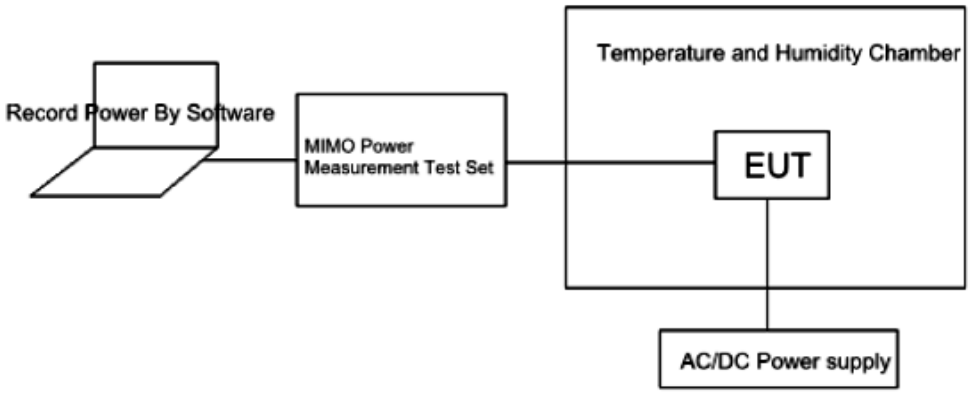
For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm.

The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. For non-adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be equal to or less than the value declared by the supplier.

This limit shall apply for any combination of power level and intended antenna assembly.

4.2. Test Setup

For Conducted Measurement



4.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.2

Step 1:

• The fast power sensor use the following setting: Sample speed 1 MS/s.

Step 2:

• Connect the power sensor to the transmit port, sample the transmit signal and store the raw data.Use these stored samples in all following steps.

Step 3:

• Find the start and stop times of each burst in the stored measurement samples.

Step 4:

• Between the start and stop times of each individual burst calculate the RMS power over the burst. Save these Pburst values, as well as the start and stop times for each burst.

Step 5:

• The highest of all Pburst values (value "A" in dBm) will be used for maximum e.i.r.p. calculations.

Step 6:

• Add the (stated) antenna assembly gain "G" in dBi of the individual antenna.
• If applicable, add the additional beamforming gain "Y" in dB.

The RF Output Power (P) shall be calculated using the formula below:
P = A + G + Y

4.4. Test Result

Please refer to the 2.4G WIFI RF Test Data Appendix 5.4.2.

4.5. Receiver Category

Receiver Category 1: Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p. shall be considered as receiver category 1 equipment.

Receiver Category 2:Non-adaptive equipment with a Medium Utilization (MU) factor greater than 1 % and less than or equal to 10 % or adaptive equipment with a maximum RF output power of 10 dBm e.i.r.p. shall be considered as receiver category 2 equipment.

Receiver Category 3: Non-adaptive equipment with a maximum Medium Utilization (MU) factor of 1 % or adaptive equipment with a maximum RF output power of 0 dBm e.i.r.p. shall be considered as receiver category 3 equipment.

As this an adaptivity device with a maximum power of greater than 10dBm, **it belongs to recevier category 1**.

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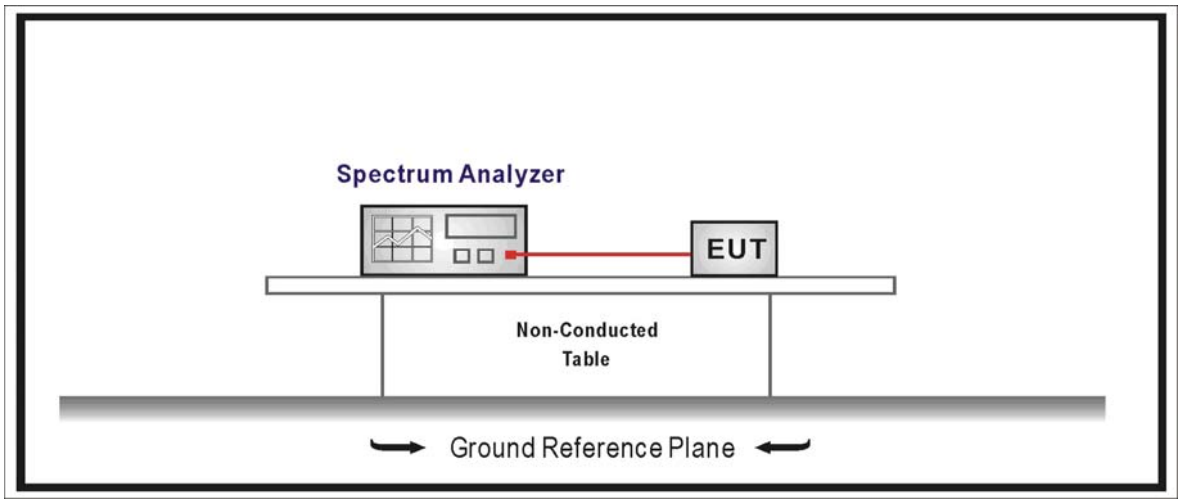
5. POWER SPECTRAL DENSITY

5.1. Limit

For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to 10dBm per MHz.

5.2. Test Setup



5.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.3

Step 1:

Connect the UUT to the spectrum analyser and use the following settings:

- Start Frequency: 2 400 MHz
- Stop Frequency: 2 483,5 MHz
- Resolution BW: 10 kHz
- Video BW: 30 kHz
- Sweep Points: > 8 350
- Detector: RMS
- Trace Mode: Max Hold
- Sweep time: Auto

For non-continuous signals, wait for the trace to be completed. Save the (trace) data set to a file.

Step 2:

For each frequency point, add up the amplitude (power) values for the different transmit chains and use this as the new data set.

Step 3:

Add up the values for amplitude (power) for all the samples in the file.

Step 4:

Normalize the individual values for amplitude so that the sum is equal to the RF Output Power (e.i.r.p.).

Step 5:

Starting from the first sample in the file (lowest frequency), add up the power of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.

Step 6:

Shift the start point of the samples added up in step 5 by 1 sample and repeat the procedure in step 5 (i.e. sample #2 to #101).

Step 7:

Repeat step 6 until the end of the data set and record the radiated Power Spectral Density values for each of the 1 MHz segments. From all the recorded results, the highest value is the maximum Power Spectral Density for the UUT.

5.4. Test Result

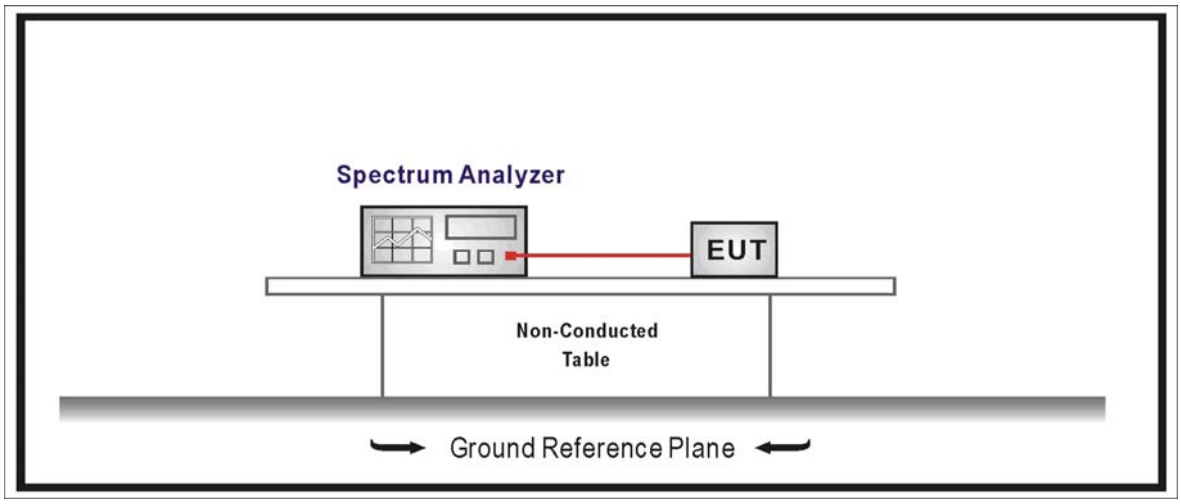
Please refer to the 2.4G WIFI RF Test Data Appendix 5.4.3.

6. DUTY CYCLE, TX-SEQUENCE, TX-GAP

6.1. Limit

The Duty Cycle shall be equal to or less than the maximum value declared by the supplier.
The maximum Tx-sequence Time and the minimum Tx-gap Time shall be according to the formula below: Maximum Tx-Sequence Time = Minimum Tx-gap Time = M
where M is in the range of 3,5 ms to 10 ms.

6.2. Test Setup



6.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.2

6.4. Test Result

These requirements apply to non-adaptive frequency hopping equipment or to adaptive frequency hopping equipment operating in a non-adaptive mode.
These requirements do not apply for equipment with a maximum declared RF Output power of less than 10dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10dBm E.I.R.P.
No applicable.

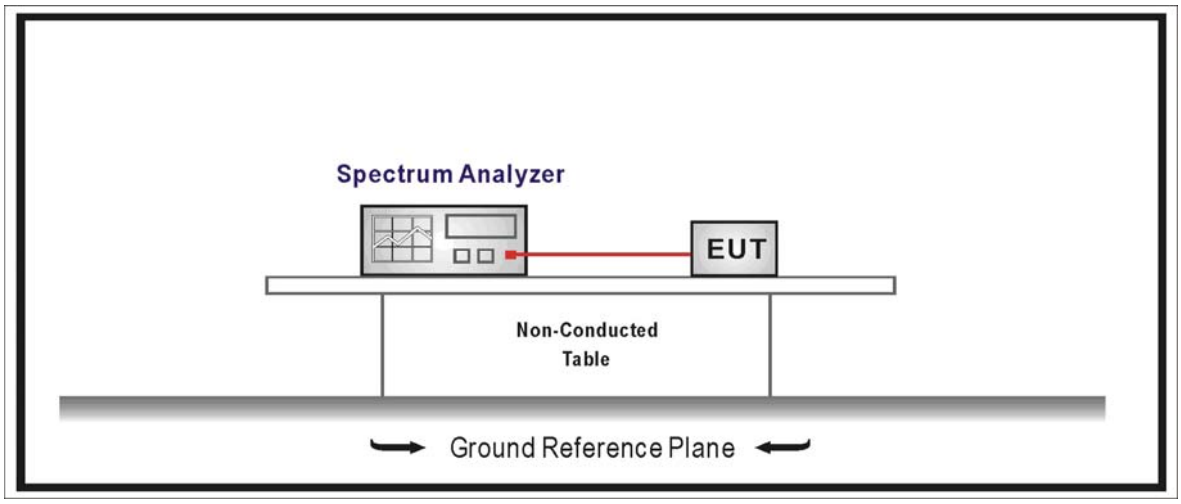
7. MEDIUM UTILISATION (MU) FACTOR

7.1. Limit

For non-adaptive equipment

The maximum Medium Utilisation factor for non-adaptive Frequency Hopping equipment shall be 10 %.

7.2. Test Setup



7.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.2

7.4. Test Result

This requirement does not apply to adaptive equipment unless operating in a non-adaptive mode.
In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10dBm E.I.R.P.
No applicable.

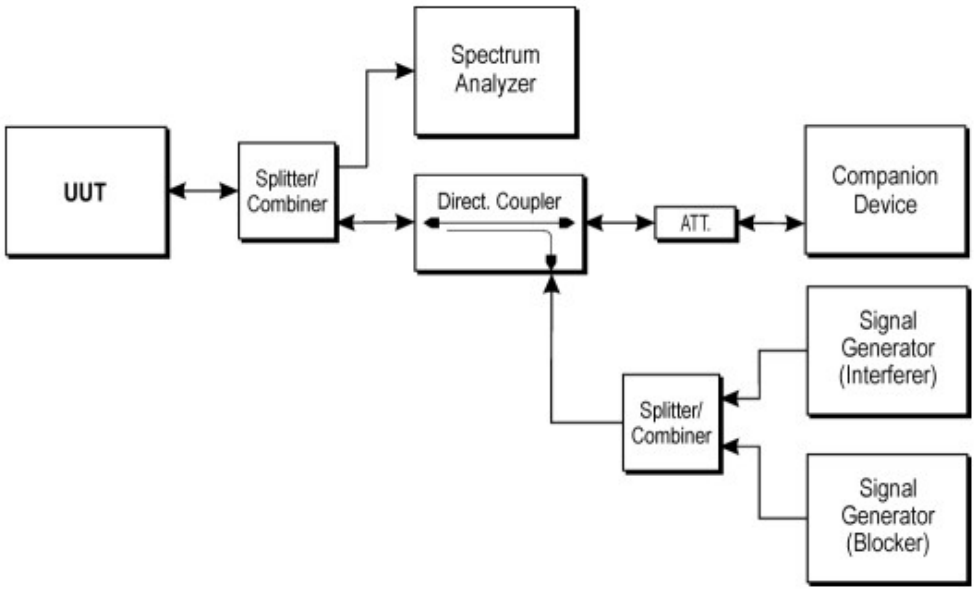
8. ADAPTIVITY AND RECEIVER BLOCKING

8.1. Limit

Adaptivity Limit
☐ Non-LBT based Detect and Avoid --- The channel shall remain unavailable for a minimum time equal to 1 s after which the channel may be considered again as an 'available' channel; --- COT ≤ 40 ms; --- COT ≤ 60 ms; --- Idle Period shall be minimum 5% of COT with a minimum of 100us; --- Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm);
☐ LBT based Detect and Avoid(Frame Based Equipment) --- The CCA observation time shall be not less than 20 us; --- The CCA time used by the equipment shall be declared by the supplier; --- COT = 1-10 ms; --- Idle Period = 5% of COT; --- Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm);
☒ LBT based Detect and Avoid(Load Based Equipment) --- The CCA observation time shall be not less than 20 us; --- The CCA time used by the equipment shall be declared by the supplier; --- COT ≤ (13 / 32) * q ms; q = [4~32]; 1.625ms~13ms; --- R = number of clear idle slots are randomly [1~q]. Every time an Extended CCA is required and the 'R' value stored in a counter. --- Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm);
☐ Short Control Signalling Transmissions: --- Short Control Signalling Transmissions shall have a maximum duty cycle of 10% within an observation period of 50ms.

8.2. Test Setup

Conducted measurements



8.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.7

1) The EUT connect to a companion device during the test. Adjust the received signal level at the EUT to the value defined in table 6 of ETSI EN 300 328 V2.1.1 (2016-11) Clause 4.3.2.10.2
2) the analyzer shall be set as below: RBW=8MHz and VBW=28MHz.
3) Configure the EUT for normal transmission with a sufficiently high payload to allow demonstration of compliance of the adaptive mechanism on the channel being tested.
4) Adding the interference signal and blocking signal.
5) Record the data.

8.4. Test Result

Please refer to the 2.4G WIFI RF Test Data Appendix 5.4.6.

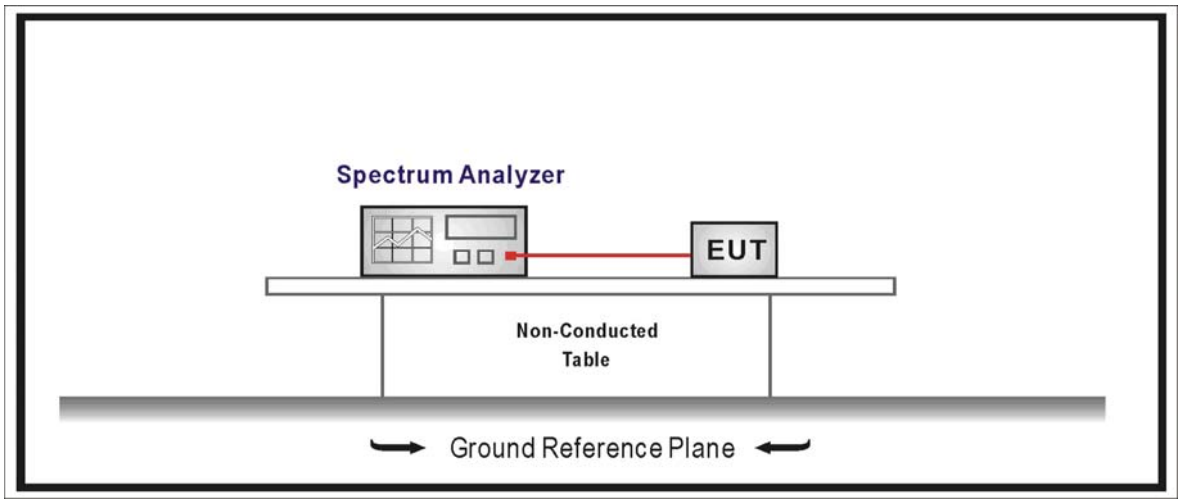
9. OCCUPIED CHANNEL BANDWIDTH

9.1. Limit

The Occupied Channel Bandwidth shall fall completely within the band given in 2.4GHz to 2.4835GHz.

In addition, for non-adaptive systems using wide band modulations other than FHSS and with e.i.r.p greater than 10 dBm, the occupied channel bandwidth shall be less than 20 MHz.

9.2. Test Setup



9.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.8

Step 1:

Connect the UUT to the spectrum analyser and use the following settings:

• Centre Frequency: The centre frequency of the channel under test

• Resolution BW: ~ 1 % of the span without going below 1 %

(we set RBW=430KHz for 802.11b/g/n20 and 1MHz for 802.11n40)

• Video BW: 3 × RBW (we set VBW=1.2MHz for 802.11b/g/n20 and 3MHz for 802.11n40)

• Frequency Span: 2 × Occupied Channel Bandwidth

(we set Span=40MHz(for 802.11b/g/n20) & 80MHz(for 802.11n40))

• Detector Mode: RMS

• Trace Mode: Max Hold

Step 2:

Wait until the trace is completed. Find the peak value of the trace and place the analyser marker on this peak.

Step 3:

Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

9.4. Test Result

Please refer to the 2.4G WIFI RF Test Data Appendix 5.4.7.

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10. TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN

10.1. Limit

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 3.

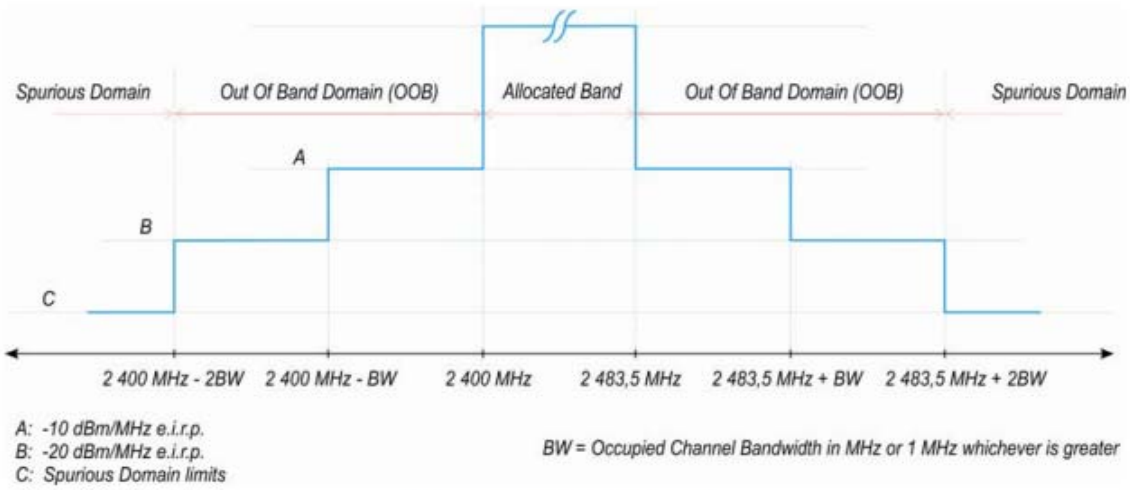
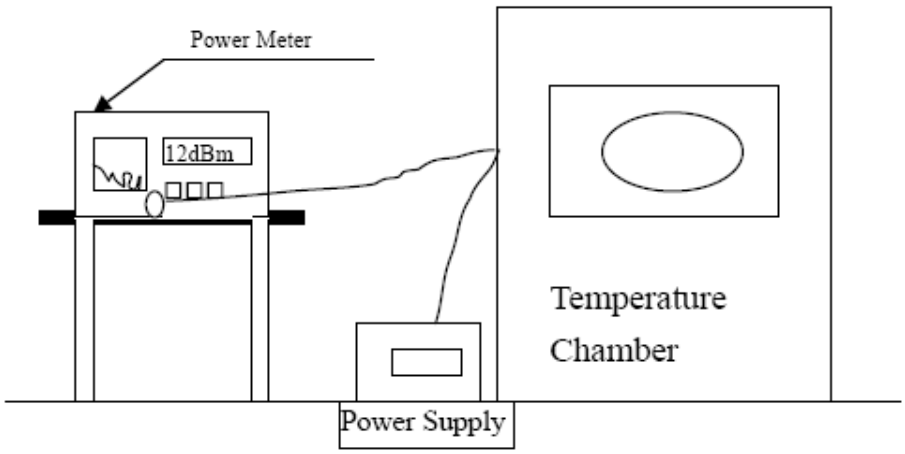


Figure 3: Transmit mask

10.2. Test Setup

For Conducted Measurement



10.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.9

Step 1:

• Connect the UUT to the spectrum analyser and use the following settings:
- Centre Frequency: 2 484 MHz
- Span: 0 Hz
- Resolution BW: 1 MHz
- Filter mode: Channel filter
- Video BW: 3 MHz
- Detector Mode: RMS
- Trace Mode: Clear / Write
- Sweep Mode: Continuous
- Sweep Points: 5 000
- Trigger Mode: Video trigger

NOTE 1: In case video triggering is not possible, an external trigger source may be used.

- Sweep Time: Suitable to capture one transmission burst

Step 2: (segment 2 483,5 MHz to 2 483,5 MHz + BW)

• Adjust the trigger level to select the transmissions with the highest power level.

• For frequency hopping equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.

• Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.

• Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.

• Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 3: (segment 2 483,5 MHz + BW to 2 483,5 MHz + 2BW)

• Change the centre frequency of the analyser to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483,5 MHz + BW to 2 483,5 MHz + 2BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW - 0,5 MHz.

Step 4: (segment 2 400 MHz - BW to 2 400 MHz)

• Change the centre frequency of the analyser to 2 399,5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

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Step 5: (segment 2 400 MHz - 2BW to 2 400 MHz - BW)

• Change the centre frequency of the analyser to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

Step 6:

• In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain "G" in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figures 1 or 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.

• In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain "G" in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. Comparison with the applicable limits shall be done using any of the options given below:

- Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain "Y" in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figures 1 or 3.

- Option 2: the limits provided by the mask given in figures 1 or 3 shall be reduced by 10 x log10(Ach) and the additional beamforming gain "Y" in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

NOTE 2: Ach refers to the number of active transmit chains.

It shall be recorded whether the equipment complies with the mask provided in figures 1 or 3.

10.4. Test Result

Please refer to the 2.4G WIFI RF Test Data Appendix 5.4.8.

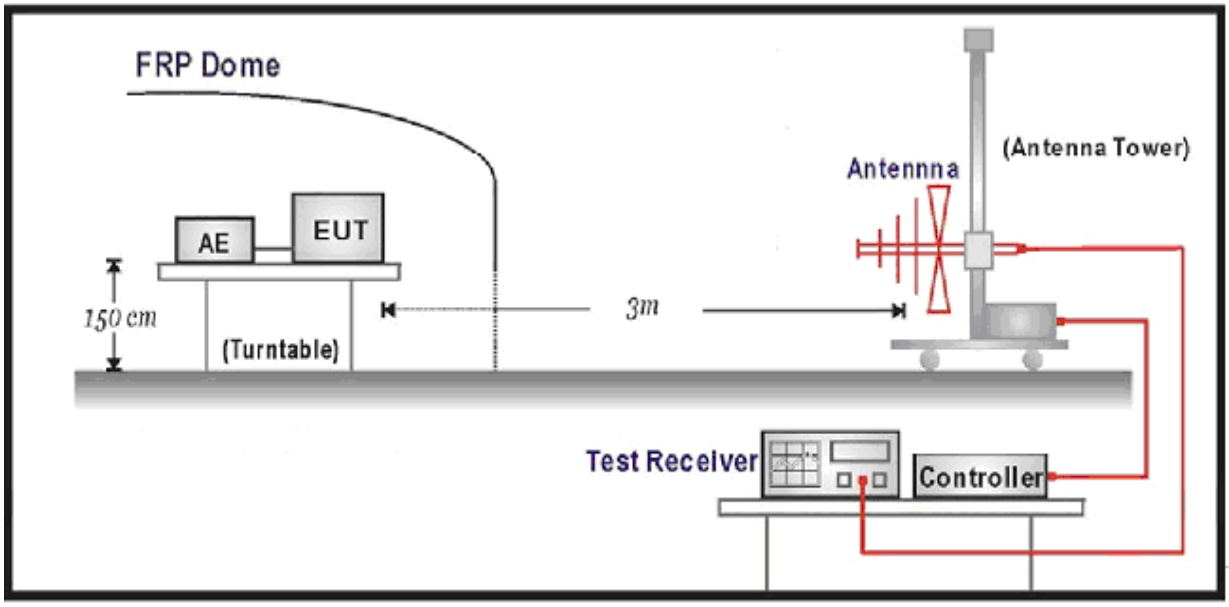
11. TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

11.1. Limit

Transmitter Limits for Spurious Emissions		
Frequency Range	Maximum power E.R.P. (≤ 1GHz) E.I.R.P. (> 1GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

11.2. Test Setup

For Radiated Measurement



11.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.10

Step 1:

The sensitivity of the spectrum analyser should be such that the noise floor is at least 12 dB below the limits given in tables 1 or 4.

Step 2:

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyser settings:

• Resolution bandwidth: 100 kHz

• Video bandwidth: 300 kHz

• Detector mode: Peak

• Trace Mode: Max Hold

• Sweep Points: ≥ 9 970

NOTE 1: For spectrum analysers not supporting this high number of sweep points, the frequency band may need to be segmented.

• Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT. For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on the same hopping frequency in different hopping sequences. Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.3.10.2.1.2 and compared to the limits given in tables 1 or 4.

Step 3:

The emissions over the range 1 GHz to 12,75 GHz shall be identified.

Spectrum analyser settings:

• Resolution bandwidth: 1 MHz

• Video bandwidth: 3 MHz

• Detector mode: Peak

• Trace Mode: Max Hold

• Sweep Points: ≥ 11 750

NOTE 2: For spectrum analysers not supporting this high number of sweep points, the frequency band may need to be segmented.

• Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT.

11.4. Test Result

Please refer to the 2.4G WIFI RF Test Data Appendix 5.4.9.

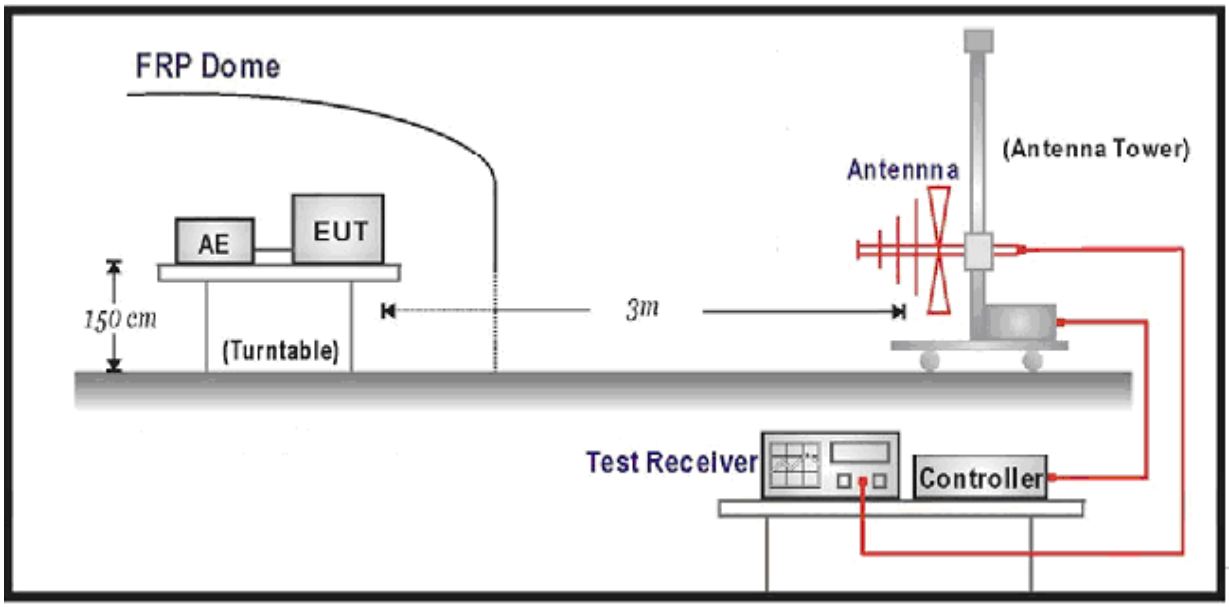
12. RECEIVER SPURIOUS EMISSIONS

12.1. Limit

Spurious emissions limits for receivers		
Frequency Range	Maximum power E.R.P. (≤ 1GHz) E.I.R.P. (> 1GHz)	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12.75 GHz	-47 dBm	1 MHz

12.2. Test Setup

For Radiated Measurement



12.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.11

Step 1:

The sensitivity of the spectrum analyser should be such that the noise floor is at least 12 dB below the limits given in tables 2 or 5.

Step 2:

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyser settings:

• Resolution bandwidth: 100 kHz
• Video bandwidth: 300 kHz
• Detector mode: Peak
• Trace Mode: Max Hold
• Sweep Points: ≥ 9 970
• Sweep time: Auto

Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.3.11.2.1.2 and compared to the limits given in tables 2 or 5.

Step 3:

The emissions over the range 1 GHz to 12,75 GHz shall be identified.

Spectrum analyser settings:

• Resolution bandwidth: 1 MHz
• Video bandwidth: 3 MHz
• Detector mode: Peak
• Trace Mode: Max Hold
• Sweep Points: ≥ 11 750
• Sweep time: Auto

Allow the trace to stabilize. Any emissions identified during the sweeps above that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.3.11.2.1.2 and compared to the limits given in tables 2 or 5. Frequency Hopping equipment may generate a block (or several blocks) of spurious emissions anywhere within the spurious domain. If this is the case, only the highest peak of each block of emissions shall be measured using the procedure in clause 5.3.11.2.1.2.

Step 4:

• In case of conducted measurements on smart antenna systems (equipment with multiple receive chains), the steps 2 and 3 need to be repeated for each of the active receive chains (Ach).The limits used to identify emissions during this pre-scan need to be reduced with 10 × log10 (Ach) (number of active receive chains).

12.4. Test Result

Please refer to the 2.4G WIFI RF Test Data Appendix 5.4.10.

13. RECEIVER BLOCKING

13.1. Limit

Adaptive Frequency Hopping equipment shall comply with the requirements defined in clause 4.3.1.12.4

Table 6: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 6 dB	2 380 2 503,5	-53	CW
P_{min} + 6 dB	2 300 2 330 2 360	-47	CW
P_{min} + 6 dB	2 523,5 2 553,5 2 583,5 2 613,5 2 643,5 2 673,5	-47	CW
NOTE 1: P_{min} is the minimum level of wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

Table 7: Receiver Blocking parameters receiver category 2 equipment

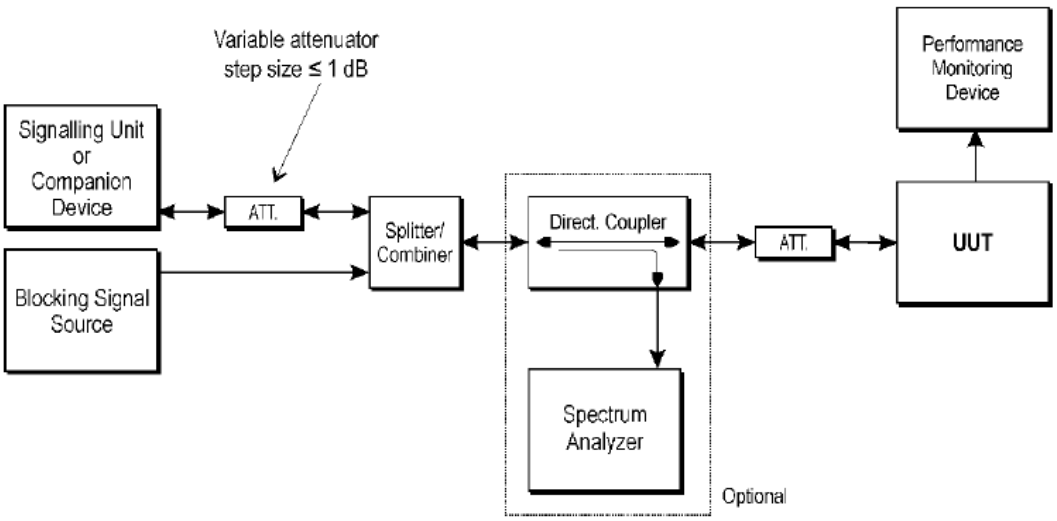
Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 6 dB	2 380 2 503,5	-57	CW
P_{min} + 6 dB	2 300 2 583,5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

Table 8: Receiver Blocking parameters receiver category 3 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 12 dB	2 380 2 503,5	-57	CW
P_{min} + 12 dB	2 300 2 583,5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

13.2. Test Setup

Conducted measurements



13.3. Test Procedure

Step 1:

• For non-frequency hopping equipment, the UUT shall be set to the lowest operating channel.

Step 2:

• The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3:

• With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6. The attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still met. The resulting level for the wanted signal at the input of the UUT is Pmin.

• This signal level (Pmin) is increased by the value provided in the table corresponding to the receiver category and type of equipment.

Step 4:

• The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment. It shall be verified and recorded in the test report that the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is met.

Step 5:

• Repeat step 4 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.

Step 6:

• For non-frequency hopping equipment, repeat step 2 to step 5 with the UUT operating at the highest operating channel.

13.4. Test Result

Please refer to the 2.4G WIFI RF Test Data Appendix 5.4.11.

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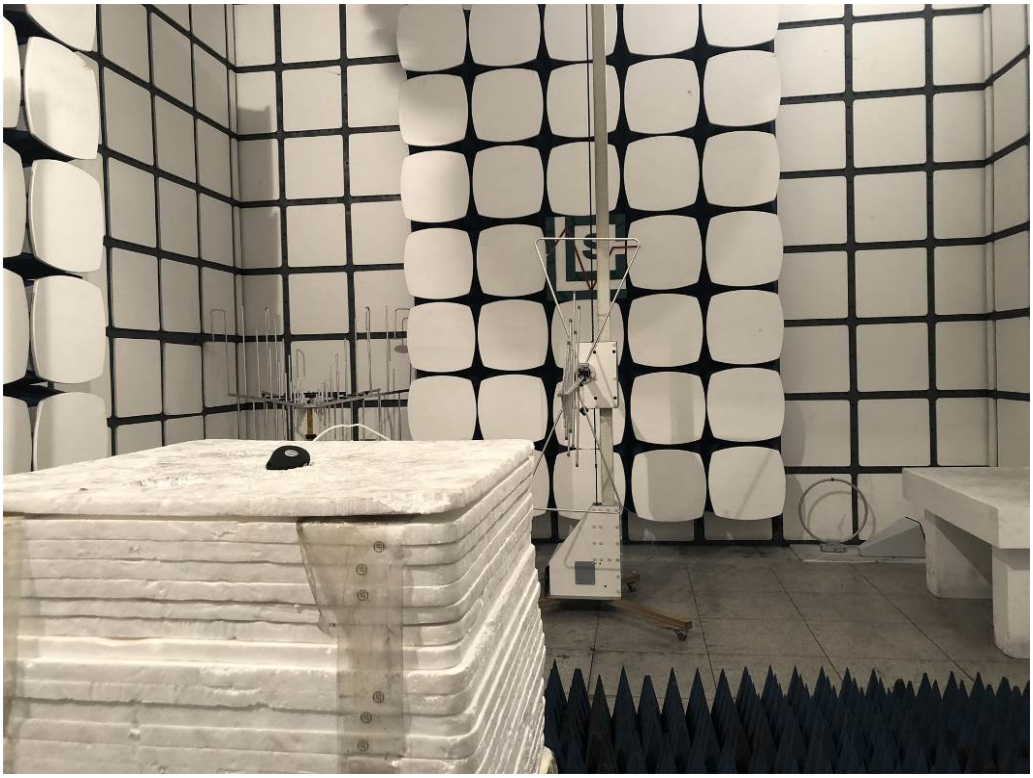
14. PHOTOGRAPHS OF TEST SETUP



Spurious Emission below 1GHz

Spurious Emission above 1GHz

----------THE END OF REPORT----------

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2.4G WIFI RF Test Data Appendix

Product Name: Personal Mobile Alarm System

Test Model: EV-07B-4G

Environmental Conditions

Temperature:	22.9 ° C
Relative Humidity:	52.4%
ATM Pressure:	100.0 kPa
Test Engineer:	Diamond.Lu
Supervised by:	Tom.Liu

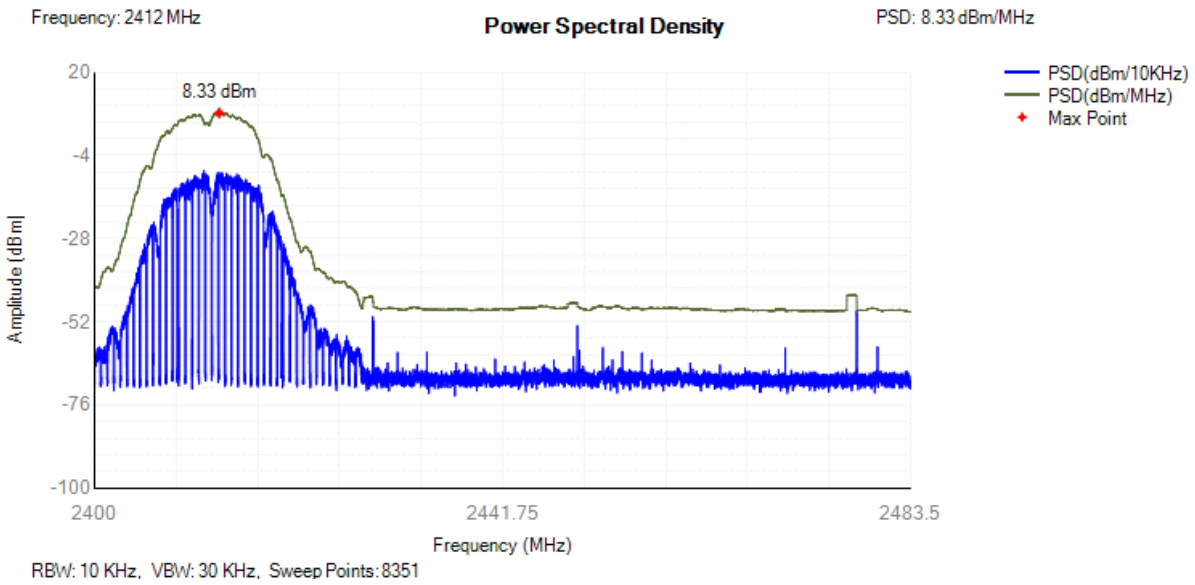
5.4.2 RF Output Power

Condition	Mode	Frequency (MHz)	Max Burst RMS Power (dBm)	Max EIRP (dBm)	Limit (dBm)	Verdict
NVNT	b	2412	16.68	16.68	20	Pass
NVNT	b	2442	15.29	15.29	20	Pass
NVNT	b	2472	17.11	17.11	20	Pass
NVNT	g	2412	11.69	11.69	20	Pass
NVNT	g	2442	13.60	13.60	20	Pass
NVNT	g	2472	11.86	11.86	20	Pass
NVNT	n20	2412	11.34	11.34	20	Pass
NVNT	n20	2442	13.79	13.79	20	Pass
NVNT	n20	2472	12.42	12.42	20	Pass

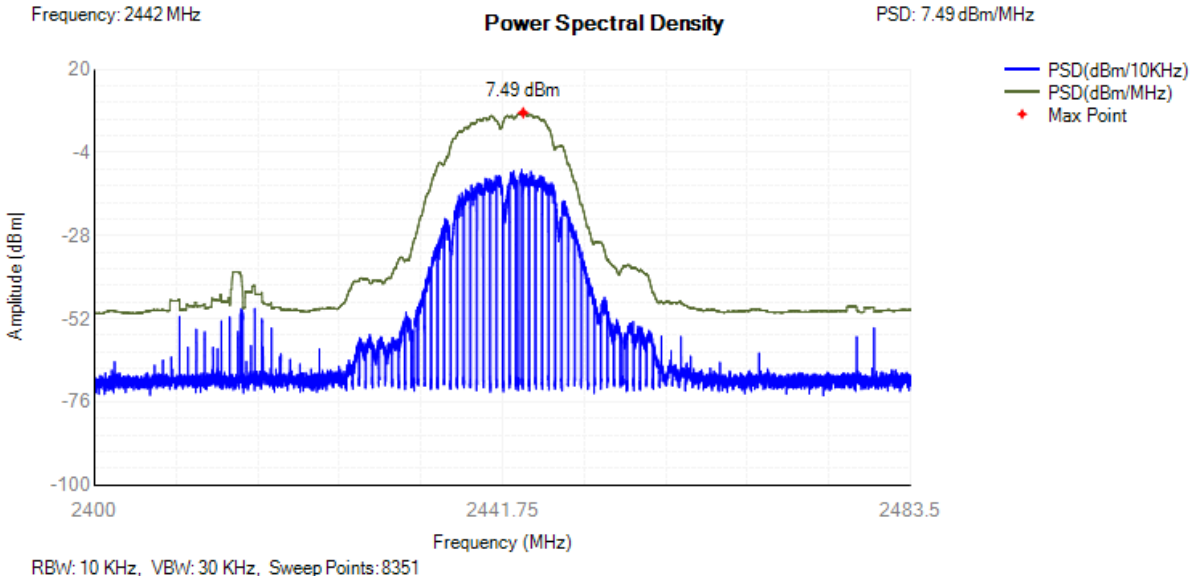
5.4.3 Power Spectral Density

Condition	Mode	Frequency (MHz)	Max PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
NVNT	b	2412	8.33	10	Pass
NVNT	b	2442	7.49	10	Pass
NVNT	b	2472	8.63	10	Pass
NVNT	g	2412	1.93	10	Pass
NVNT	g	2442	3.43	10	Pass
NVNT	g	2472	1.47	10	Pass
NVNT	n20	2412	1.52	10	Pass
NVNT	n20	2442	3.53	10	Pass
NVNT	n20	2472	1.75	10	Pass

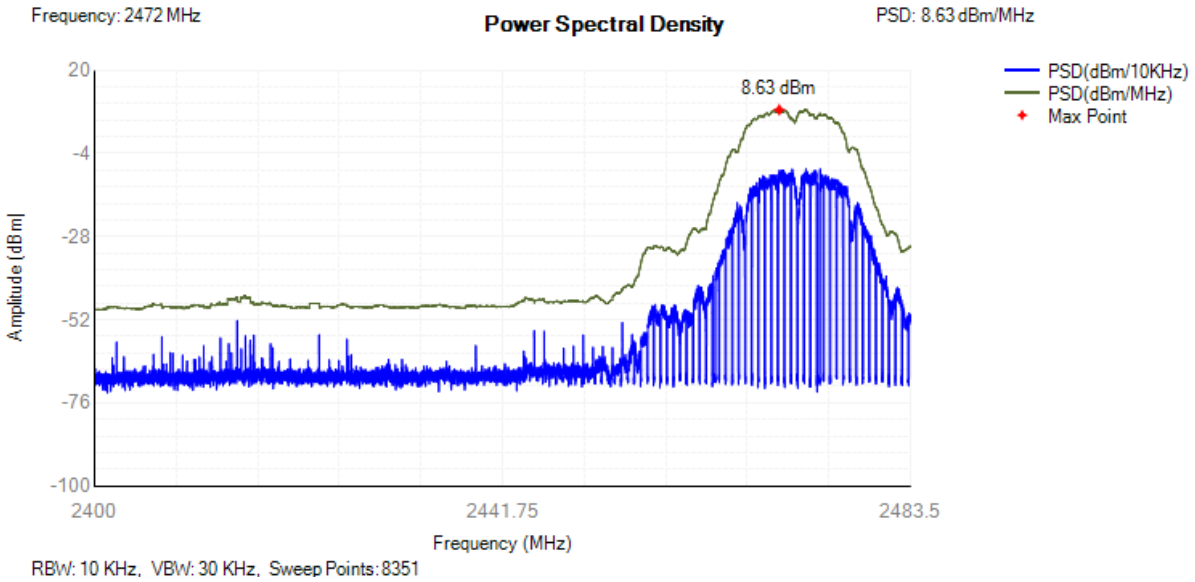
PSD NVNT b 2412MHz



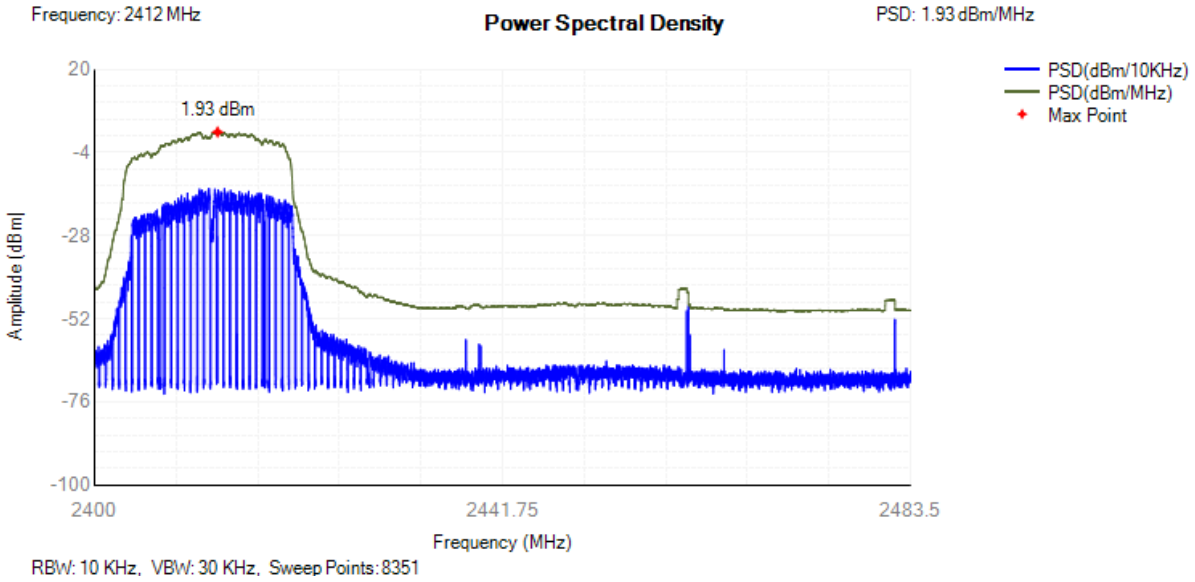
PSD NVNT b 2442MHz



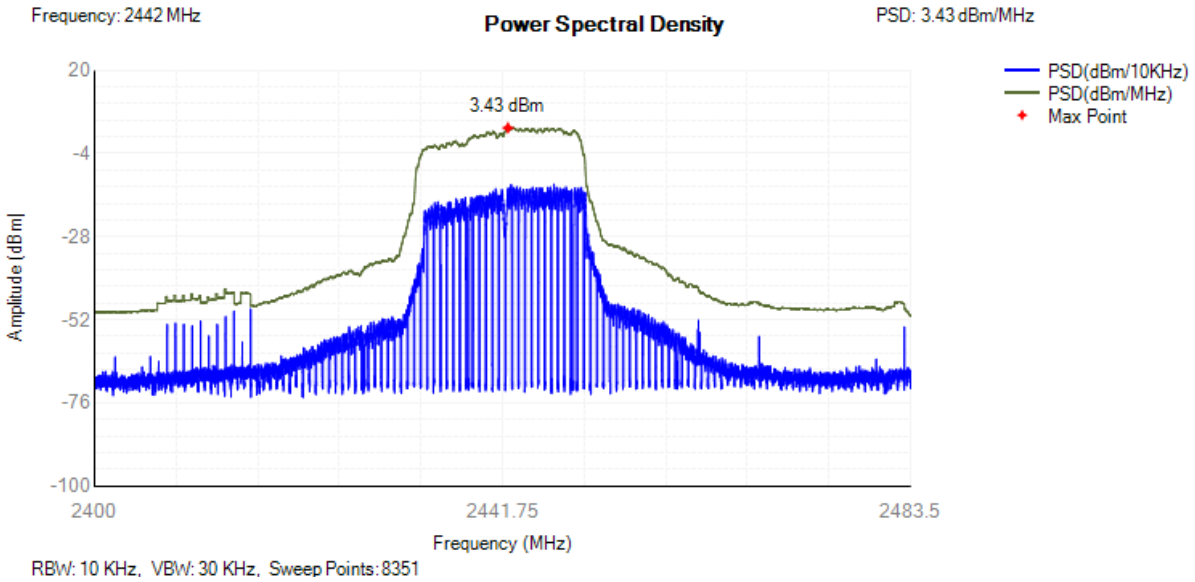
PSD NVNT b 2472MHz



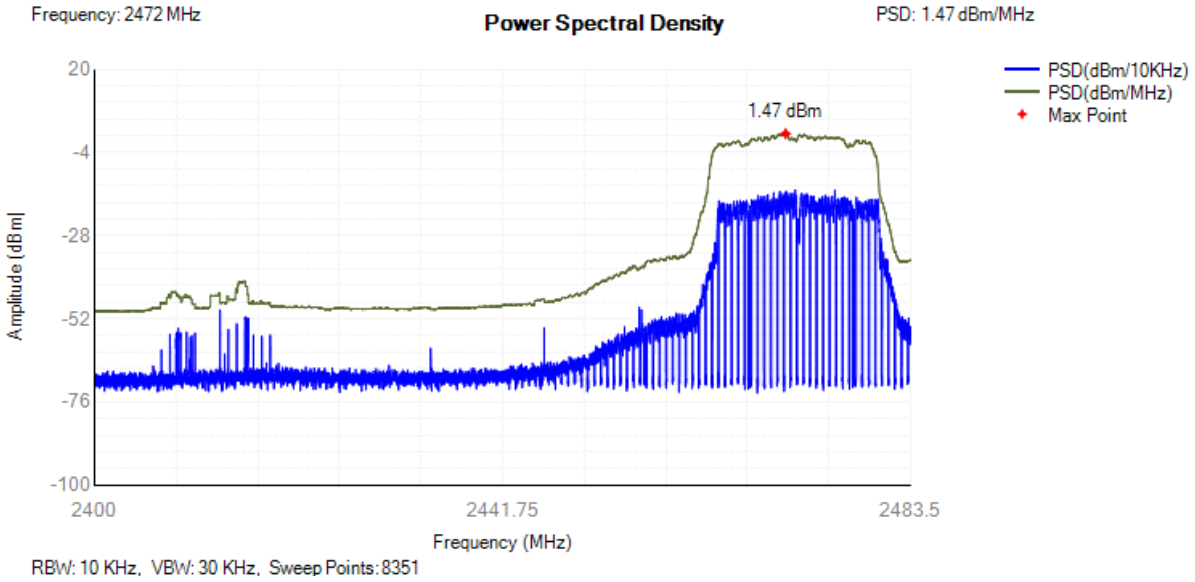
PSD NVNT g 2412MHz



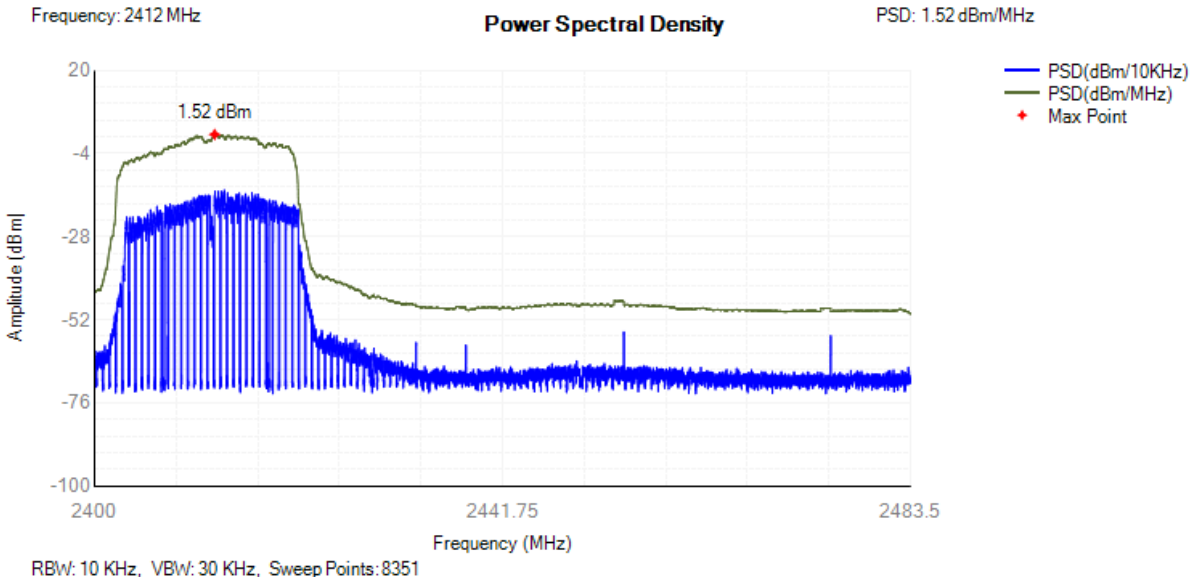
PSD NVNT g 2442MHz



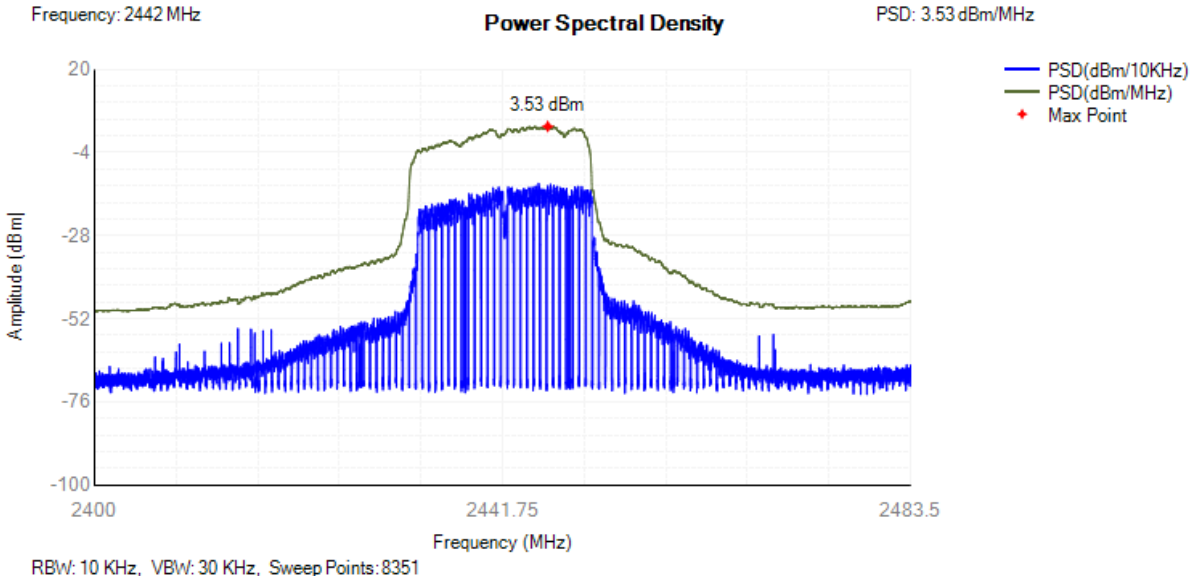
PSD NVNT g 2472MHz



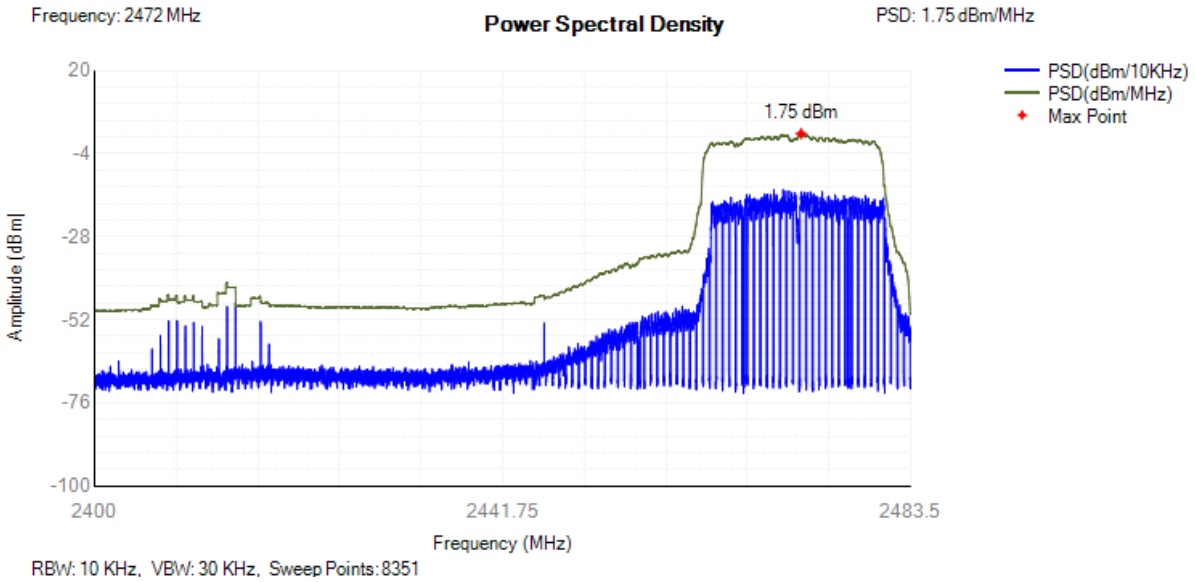
PSD NVNT n20 2412MHz



PSD NVNT n20 2442MHz



PSD NVNT n20 2472MHz



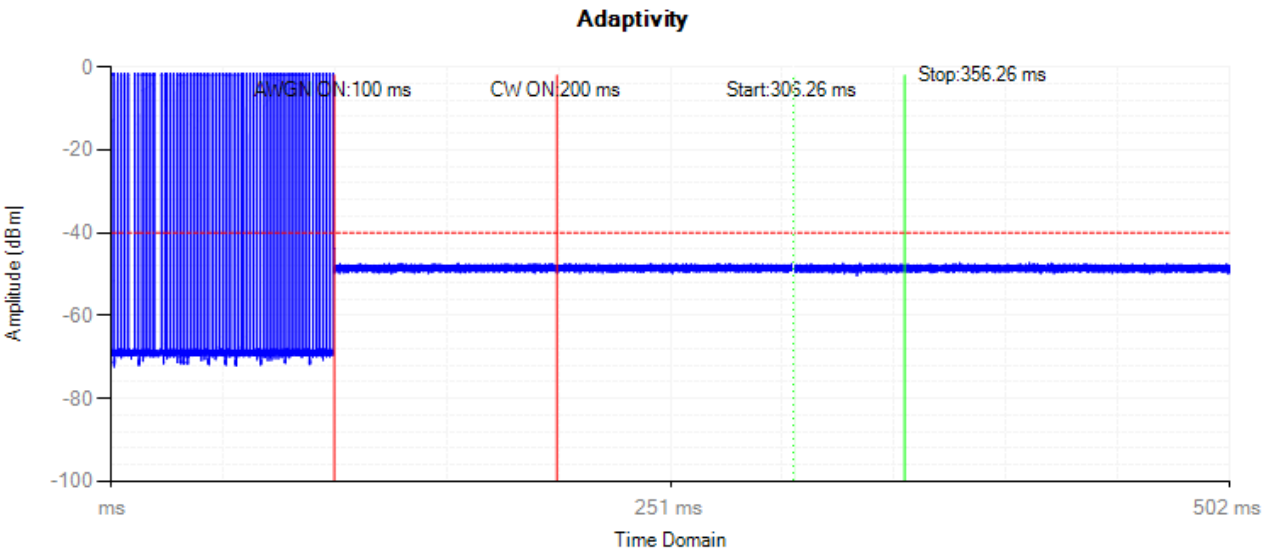
PSD NVNT n40 2412MHz

5.4.6 Adaptivity And Receiver Blocking

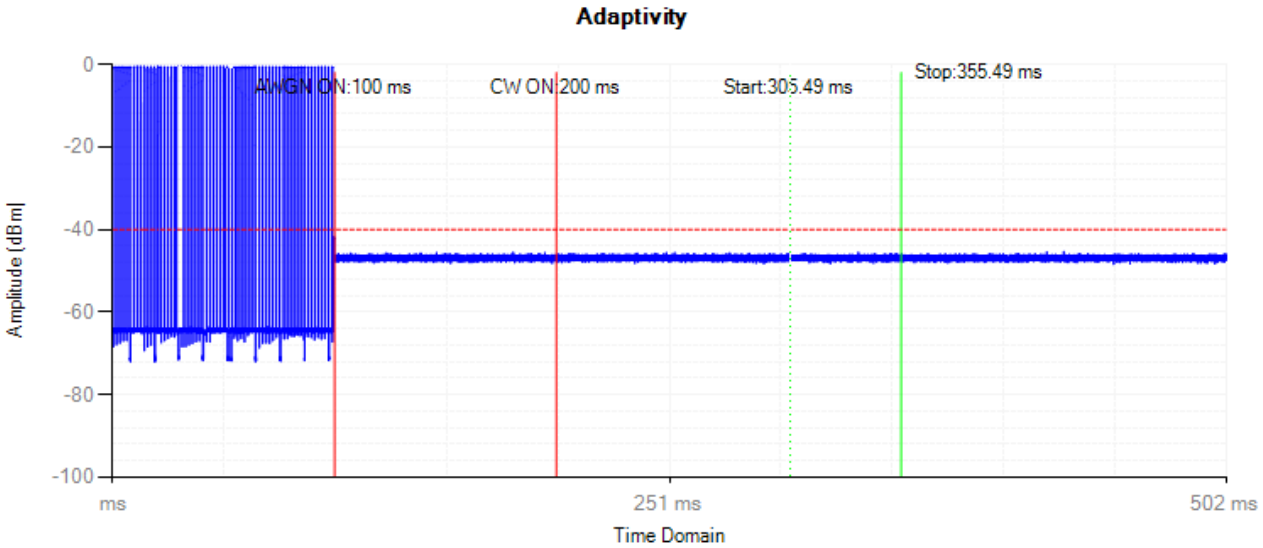
Summary Of Test Result		
Test Mode	Channel	Conclusion
802.11b	Low	Pass
	High	Pass
802.11g	Low	Pass
	High	Pass
802.11n20	Low	Pass
	High	Pass
802.11n40	Low	Pass
	High	Pass
Note: All modulation of EUT which maximum output power is more than 10dbm have been tested.		

The Worst Test Mode	802.11b: Low Channel
AWGN Interference Level (dBm)	-63.23
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max. COT (ms)	1.33
Pulse width (ms)	0
Duty Cycle (%)	0
The Worst Test Mode	802.11b: High Channel
AWGN Interference Level (dBm)	-64.25
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max COT (ms)	3.02
Pulse width (ms)	0
Duty Cycle (%)	0

Test plot (802.11b-Low channel):

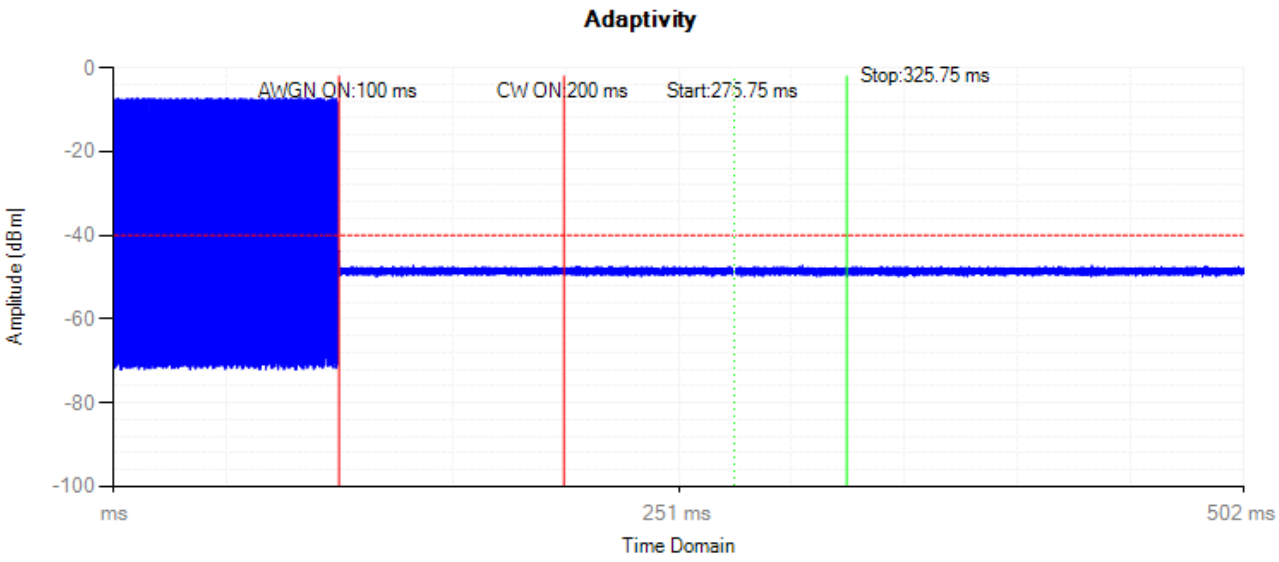


Test plot (802.11b-High channel):

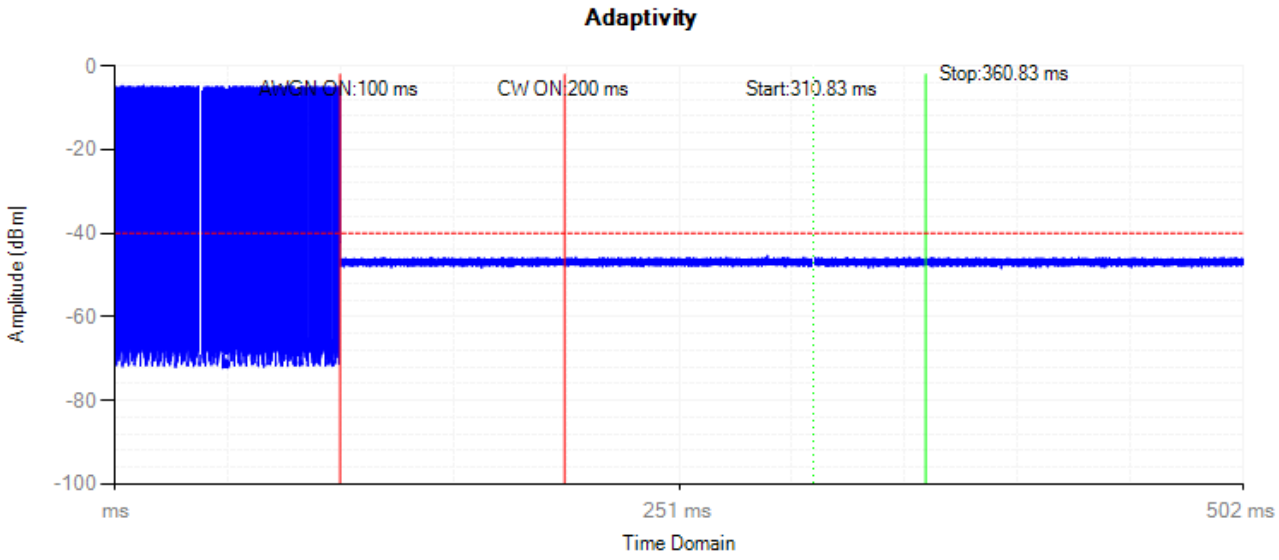


Test Mode	802.11g: Low Channel
AWGN Interference Level (dBm)	-64.15
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max COT (ms)	1.22
Pulse width (ms)	0
Duty Cycle (%)	0
Test Mode	802.11g: High Channel
AWGN Interference Level (dBm)	-63.26
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max COT (ms)	2.06
Pulse width (ms)	0
Duty Cycle (%)	0

Test plot (802.11g-Low channel):

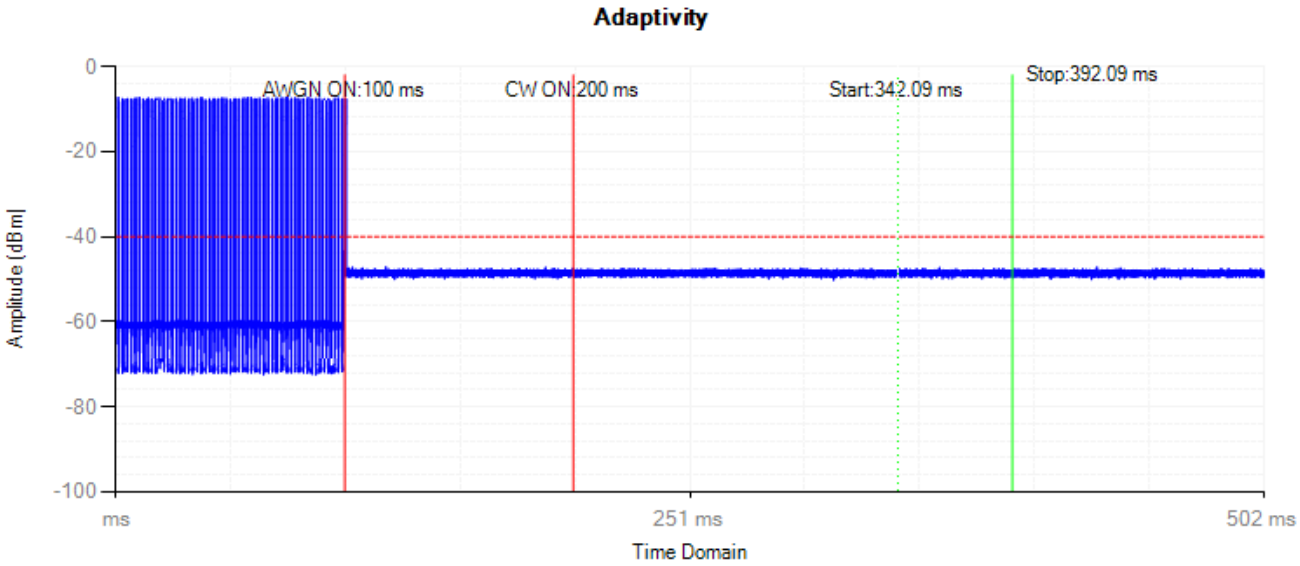


Test plot (802.11g-High channel):

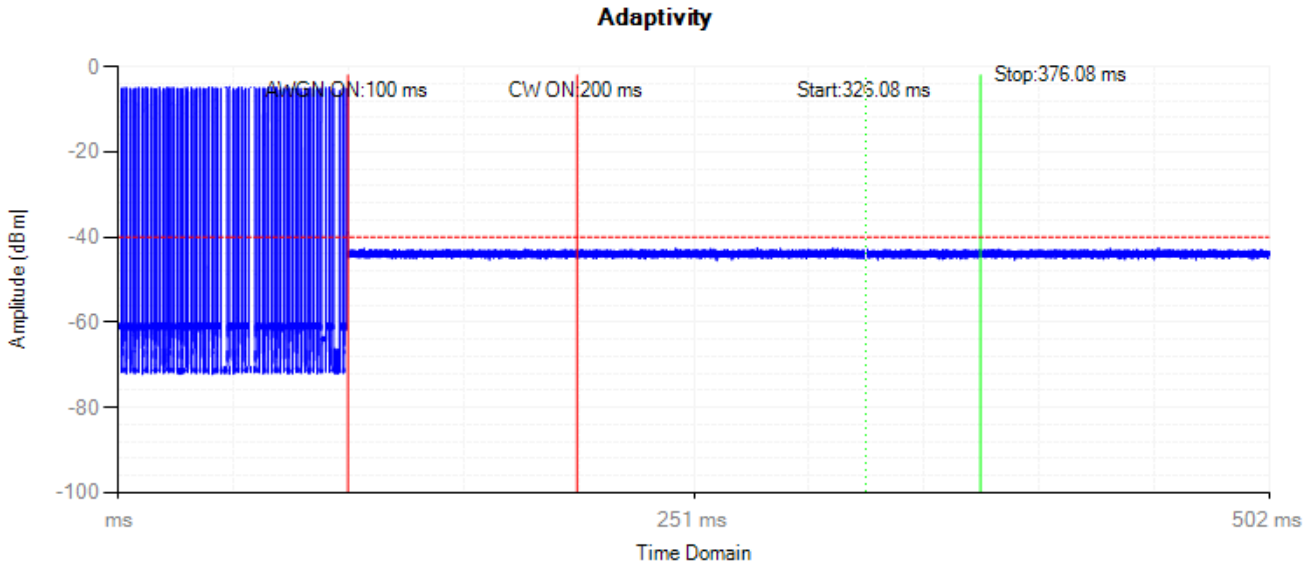


The Worst Test Mode	802.11n20: Low Channel
AWGN Interference Level (dBm)	-64.50
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max. COT (ms)	2.51
Pulse width (ms)	0
Duty Cycle (%)	0
The Worst Test Mode	802.11n20: High Channel
AWGN Interference Level (dBm)	-64.81
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max COT (ms)	2.05
Pulse width (ms)	0
Duty Cycle (%)	0

Test plot (802.11n20-Low channel):

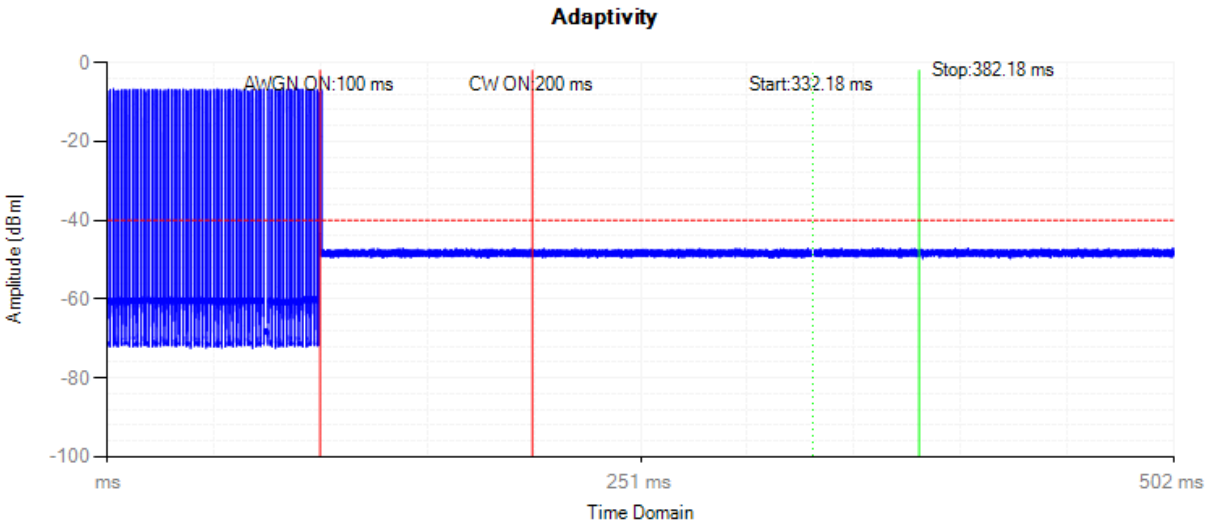


Test plot (802.11n20-High channel):

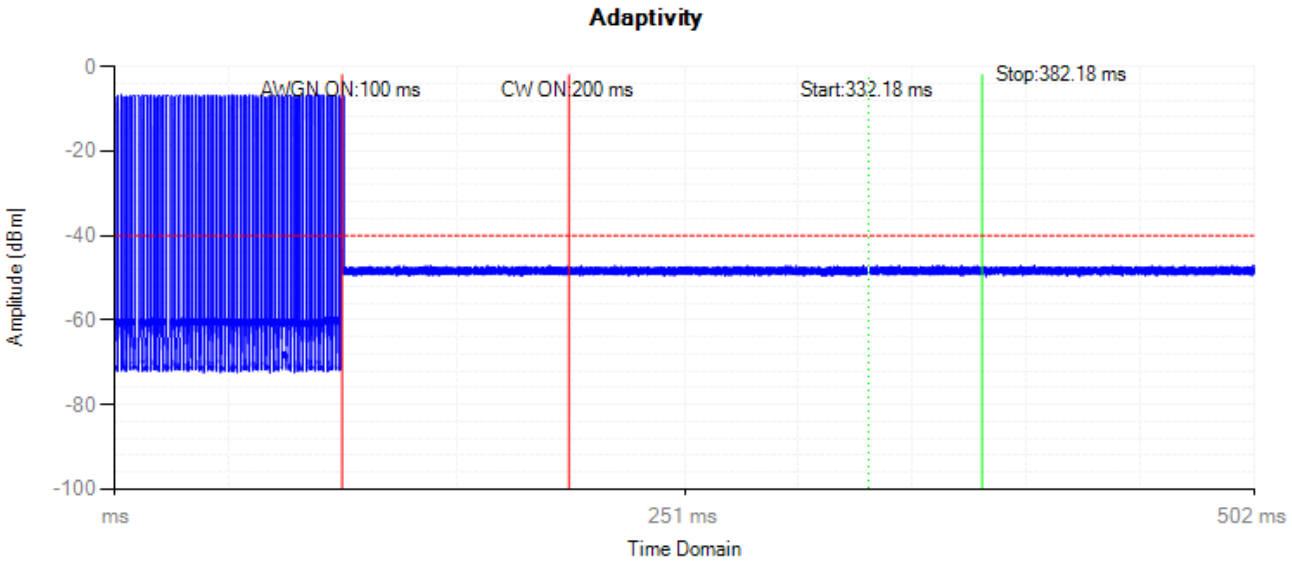


The Worst Test Mode	802.11n40: Low Channel
AWGN Interference Level (dBm)	-64.55
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max. COT (ms)	2.90
Pulse width (ms)	0
Duty Cycle (%)	0
The Worst Test Mode	802.11n40: High Channel
AWGN Interference Level (dBm)	-63.05
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max COT (ms)	2.11
Pulse width (ms)	0
Duty Cycle (%)	0

Test plot (802.11n40-Low channel):



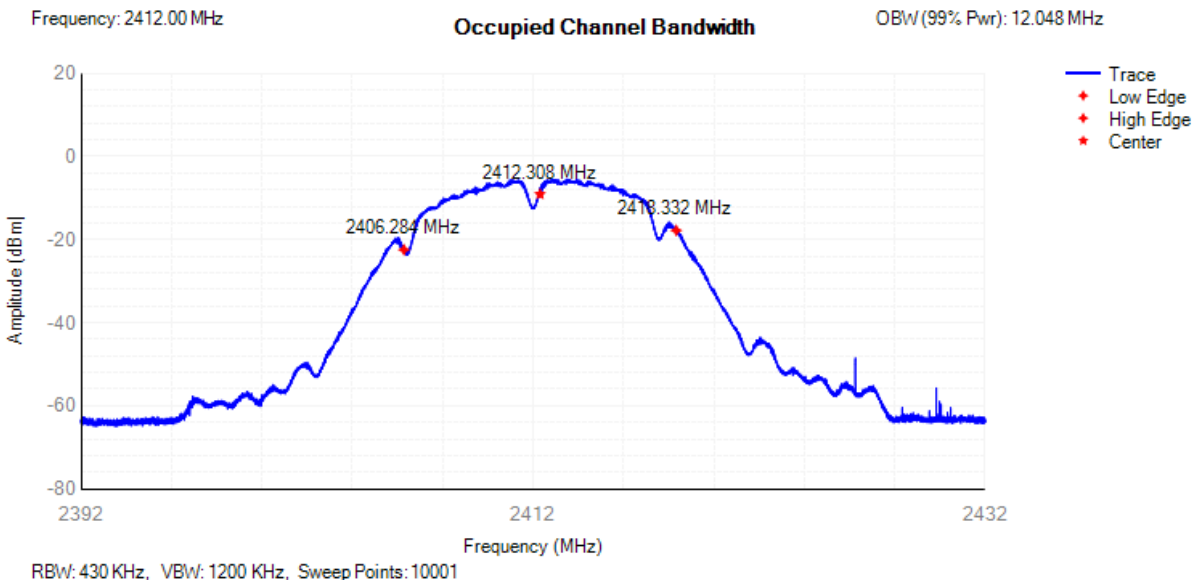
Test plot (802.11n40-High channel):



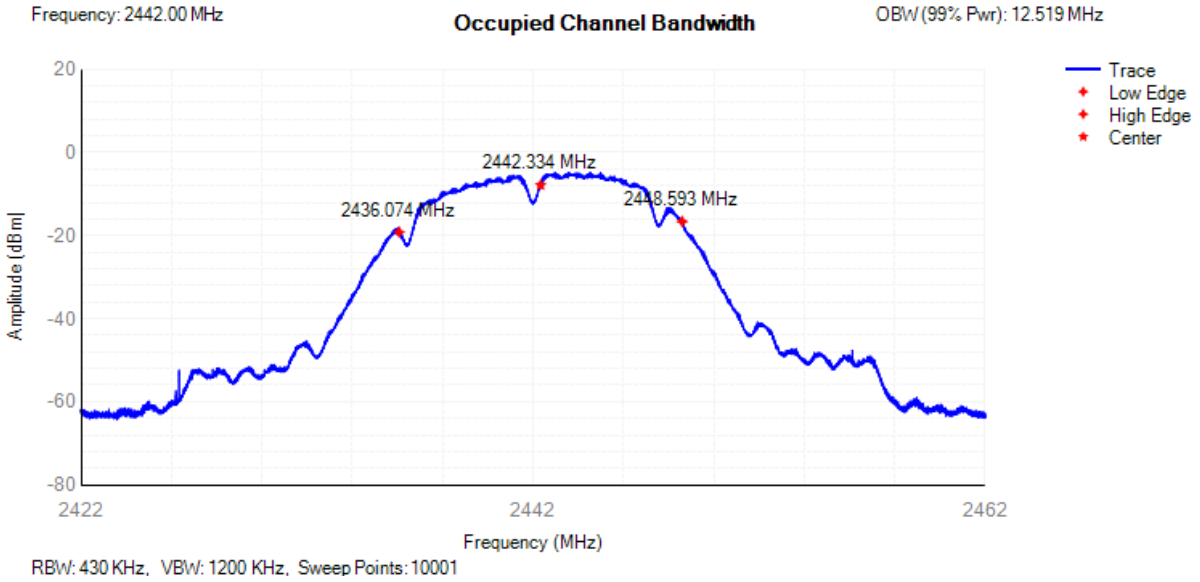
5.4.7 Occupied Channel Bandwidth

Condition	Mode	Frequency (MHz)	Center Frequency (MHz)	OBW (MHz)	Lower Edge (MHz)	Upper Edge (MHz)	Limit OBW (MHz)	Verdict
NVNT	b	2412	2412.308	12.048	2406.284	2418.332	2400 - 2483.5MHz	Pass
NVNT	b	2442	2442.334	12.519	2436.074	2448.593	2400 - 2483.5MHz	Pass
NVNT	b	2472	2472.040	12.750	2465.665	2478.416	2400 - 2483.5MHz	Pass
NVNT	g	2412	2412.115	16.300	2403.965	2420.265	2400 - 2483.5MHz	Pass
NVNT	g	2442	2442.132	16.458	2433.903	2450.361	2400 - 2483.5MHz	Pass
NVNT	g	2472	2472.005	16.593	2463.709	2480.302	2400 - 2483.5MHz	Pass
NVNT	n20	2412	2412.116	17.448	2403.391	2420.84	2400 - 2483.5MHz	Pass
NVNT	n20	2442	2442.082	17.678	2433.242	2450.921	2400 - 2483.5MHz	Pass
NVNT	n20	2472	2472.00	17.772	2463.114	2480.886	2400 - 2483.5MHz	Pass

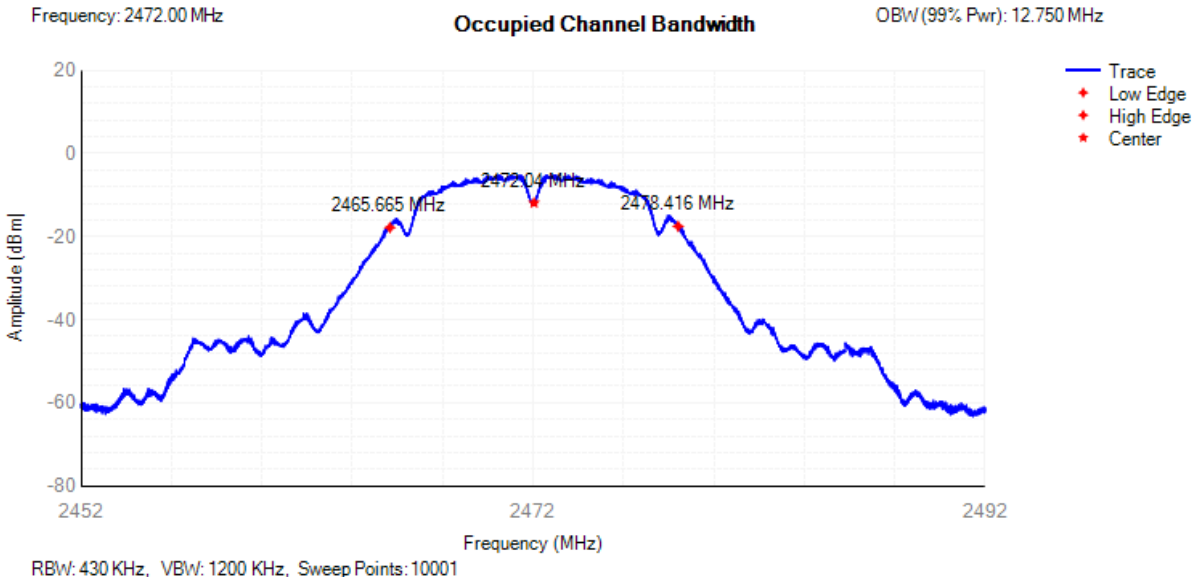
OBW NVNT b 2412MHz



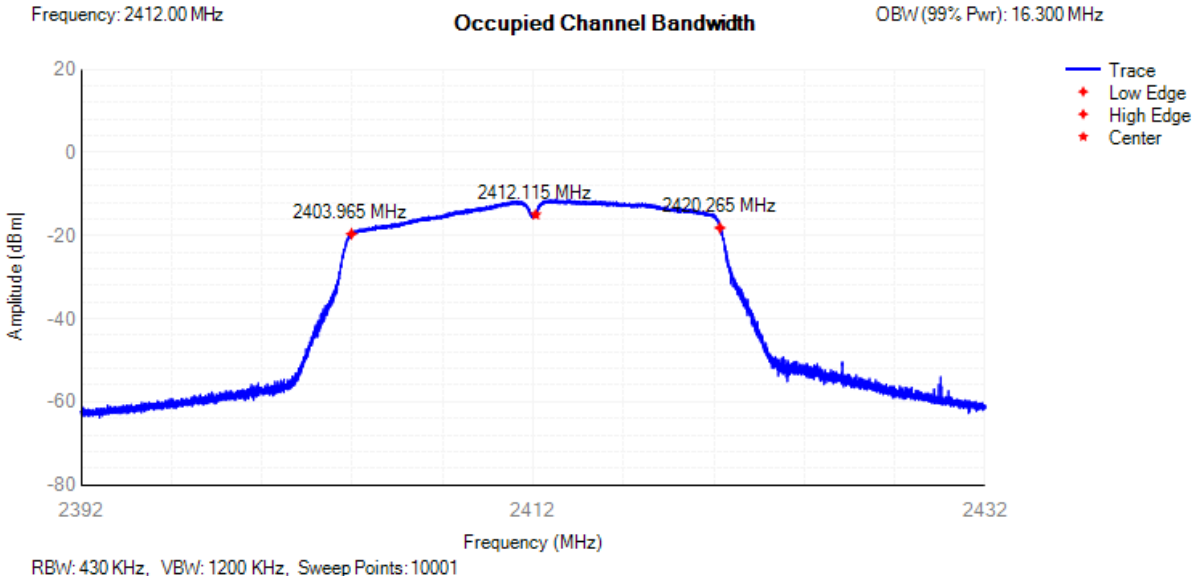
OBW NVNT b 2442MHz



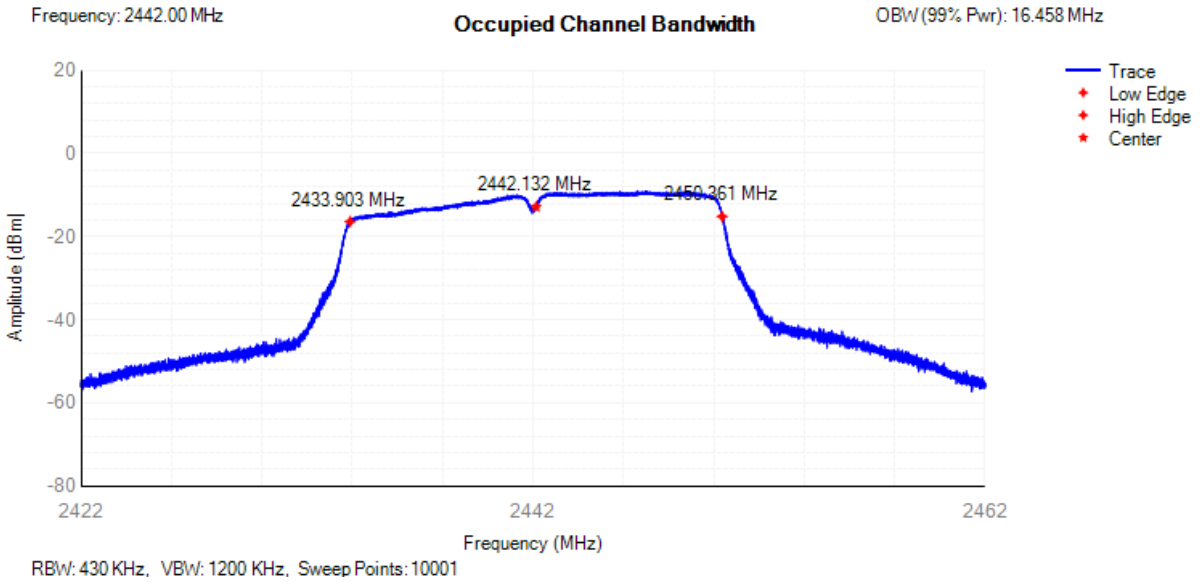
OBW NVNT b 2472MHz



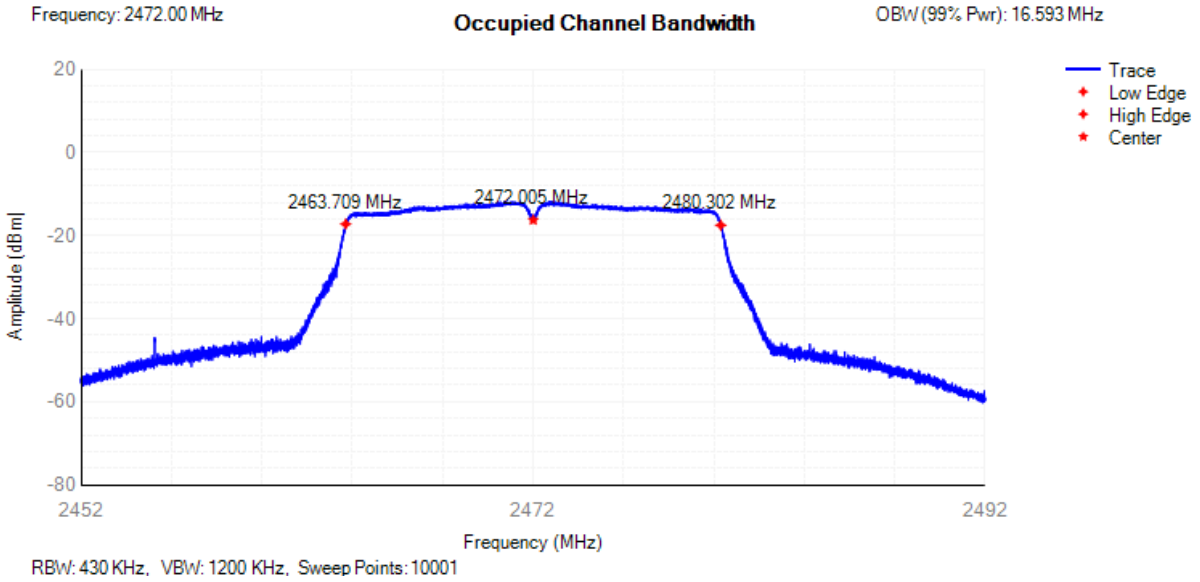
OBW NVNT g 2412MHz



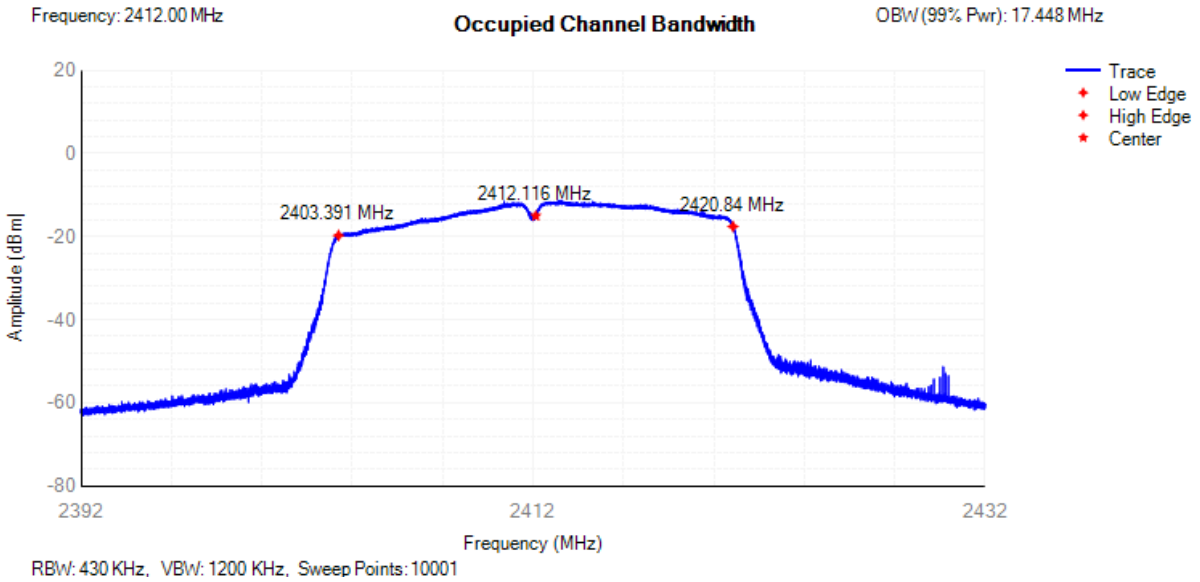
OBW NVNT g 2442MHz



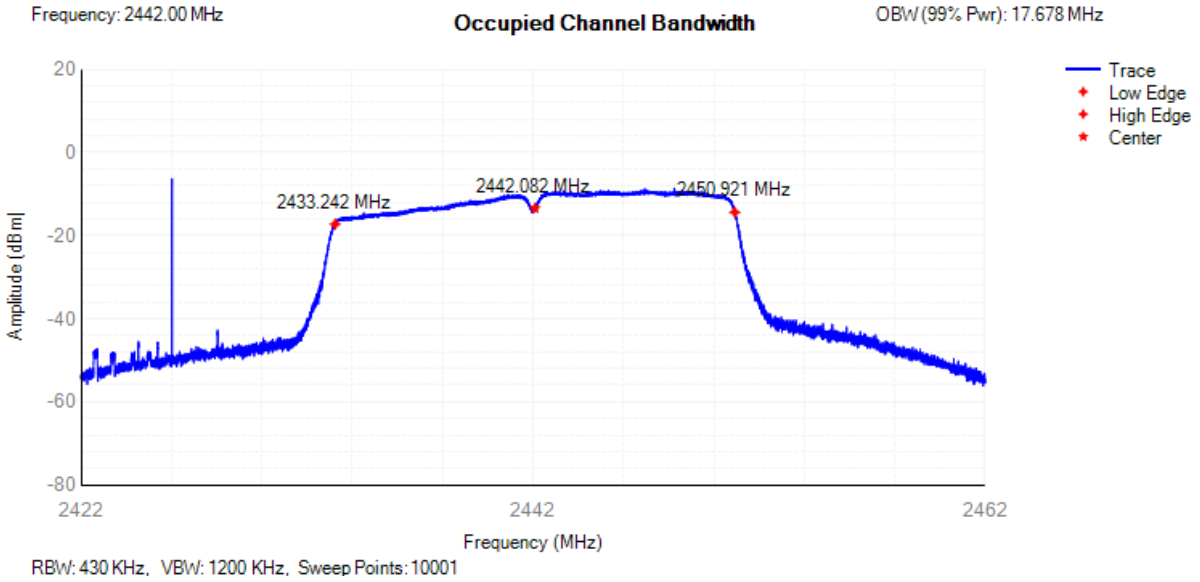
OBW NVNT g 2472MHz



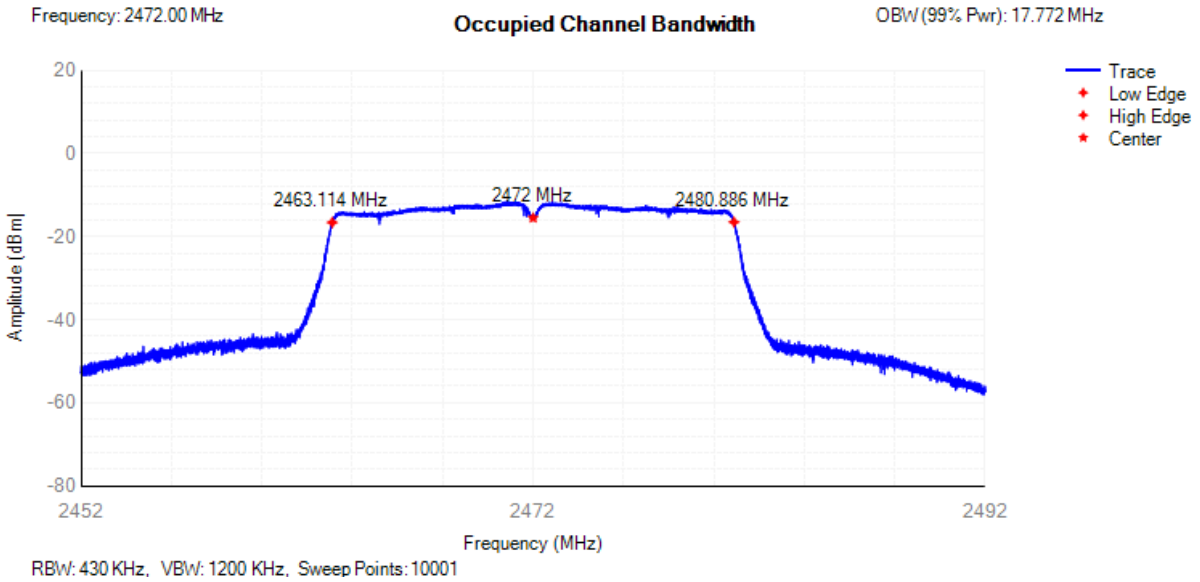
OBW NVNT n20 2412MHz



OBW NVNT n20 2442MHz



OBW NVNT n20 2472MHz



5.4.8 Transmitter unwanted emissions in the out-of-band domain

Condition	Mode	Frequency (MHz)	OOB Frequency (MHz)	Level (dBm/MHz)	Limit (dBm/MHz)	Verdict
NVNT	b	2412	2399.5	-52.17	-10	Pass
NVNT	b	2412	2398.5	-75.48	-10	Pass
NVNT	b	2412	2397.5	-76.19	-10	Pass
NVNT	b	2412	2396.5	-76.1	-10	Pass
NVNT	b	2412	2395.5	-76.19	-10	Pass
NVNT	b	2412	2394.5	-76.06	-10	Pass
NVNT	b	2412	2393.5	-76.18	-10	Pass
NVNT	b	2412	2392.5	-76.16	-10	Pass
NVNT	b	2412	2391.5	-76.24	-10	Pass
NVNT	b	2412	2390.5	-76.23	-10	Pass
NVNT	b	2412	2389.5	-76.11	-10	Pass
NVNT	b	2412	2388.5	-76.21	-10	Pass
NVNT	b	2412	2388.451	-69.87	-10	Pass
NVNT	b	2412	2387.451	-76.23	-20	Pass
NVNT	b	2412	2386.451	-71.41	-20	Pass
NVNT	b	2412	2385.451	-73.36	-20	Pass
NVNT	b	2412	2384.451	-74.25	-20	Pass
NVNT	b	2412	2383.451	-74.24	-20	Pass
NVNT	b	2412	2382.451	-74.58	-20	Pass
NVNT	b	2412	2381.451	-74.68	-20	Pass
NVNT	b	2412	2380.451	-75.85	-20	Pass
NVNT	b	2412	2379.451	-74.88	-20	Pass
NVNT	b	2412	2378.451	-74.93	-20	Pass
NVNT	b	2412	2377.451	-74.99	-20	Pass
NVNT	b	2412	2376.451	-75.69	-20	Pass
NVNT	b	2412	2376.402	-75	-20	Pass
NVNT	b	2472	2484	-38.76	-10	Pass
NVNT	b	2472	2485	-38.35	-10	Pass
NVNT	b	2472	2486	-75.95	-10	Pass
NVNT	b	2472	2487	-75.84	-10	Pass
NVNT	b	2472	2488	-75.97	-10	Pass
NVNT	b	2472	2489	-76.01	-10	Pass
NVNT	b	2472	2490	-56.61	-10	Pass
NVNT	b	2472	2491	-76.03	-10	Pass
NVNT	b	2472	2492	-76.03	-10	Pass
NVNT	b	2472	2493	-60.08	-10	Pass

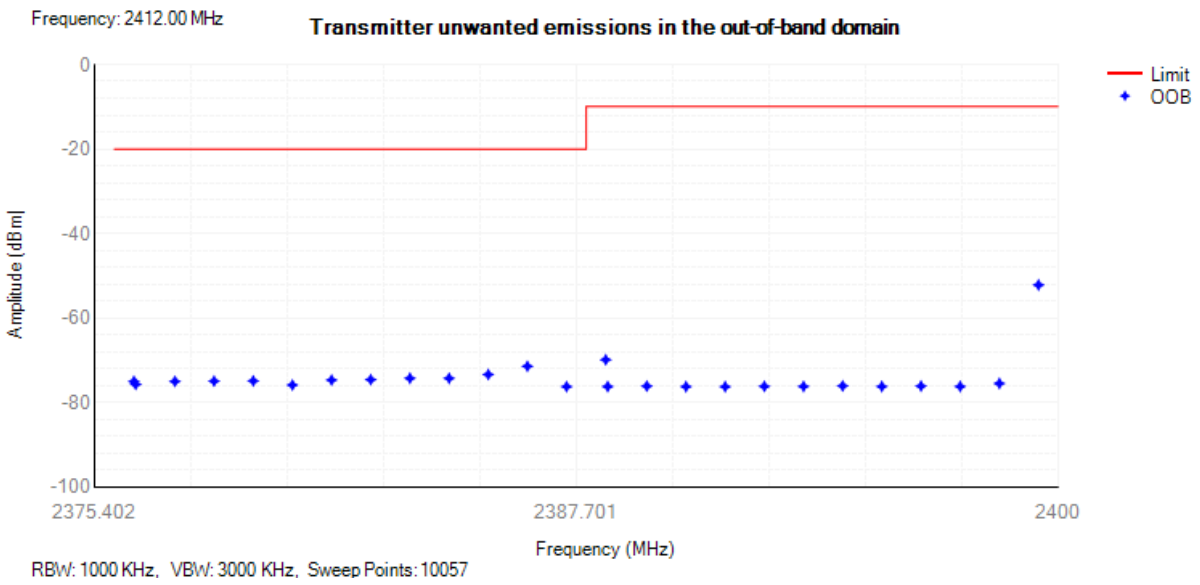
NVNT	b	2472	2494	-75.97	-10	Pass
NVNT	b	2472	2495	-62.54	-10	Pass
NVNT	b	2472	2495.693	-76.01	-10	Pass
NVNT	b	2472	2496.693	-75.97	-20	Pass
NVNT	b	2472	2497.693	-61.4	-20	Pass
NVNT	b	2472	2498.693	-63.15	-20	Pass
NVNT	b	2472	2499.693	-63.44	-20	Pass
NVNT	b	2472	2500.693	-63.34	-20	Pass
NVNT	b	2472	2501.693	-76.02	-20	Pass
NVNT	b	2472	2502.693	-63.34	-20	Pass
NVNT	b	2472	2503.693	-62.04	-20	Pass
NVNT	b	2472	2504.693	-75.93	-20	Pass
NVNT	b	2472	2505.693	-75.95	-20	Pass
NVNT	b	2472	2506.693	-59.31	-20	Pass
NVNT	b	2472	2507.693	-75.82	-20	Pass
NVNT	b	2472	2508.386	-75.88	-20	Pass
NVNT	g	2412	2399.5	-62.96	-10	Pass
NVNT	g	2412	2398.5	-63.37	-10	Pass
NVNT	g	2412	2397.5	-66.39	-10	Pass
NVNT	g	2412	2396.5	-66.34	-10	Pass
NVNT	g	2412	2395.5	-63.77	-10	Pass
NVNT	g	2412	2394.5	-63.62	-10	Pass
NVNT	g	2412	2393.5	-65.66	-10	Pass
NVNT	g	2412	2392.5	-65.29	-10	Pass
NVNT	g	2412	2391.5	-69.91	-10	Pass
NVNT	g	2412	2390.5	-67.72	-10	Pass
NVNT	g	2412	2389.5	-66.17	-10	Pass
NVNT	g	2412	2388.5	-69.4	-10	Pass
NVNT	g	2412	2387.5	-70.36	-10	Pass
NVNT	g	2412	2386.5	-72.02	-10	Pass
NVNT	g	2412	2385.5	-72.54	-10	Pass
NVNT	g	2412	2384.5	-70.41	-10	Pass
NVNT	g	2412	2383.5	-69.82	-20	Pass
NVNT	g	2412	2382.5	-70.72	-20	Pass
NVNT	g	2412	2381.5	-72.17	-20	Pass
NVNT	g	2412	2380.5	-74.72	-20	Pass
NVNT	g	2412	2379.5	-77.43	-20	Pass
NVNT	g	2412	2378.5	-74.17	-20	Pass
NVNT	g	2412	2377.5	-74.04	-20	Pass
NVNT	g	2412	2376.5	-75.75	-20	Pass
NVNT	g	2412	2375.5	-76.59	-20	Pass

NVNT	g	2412	2374.5	-74.97	-20	Pass
NVNT	g	2412	2373.5	-76.17	-20	Pass
NVNT	g	2412	2372.5	-75.32	-20	Pass
NVNT	g	2412	2371.5	-77.68	-20	Pass
NVNT	g	2412	2370.5	-78.03	-20	Pass
NVNT	g	2412	2369.5	-74.2	-20	Pass
NVNT	g	2412	2368.5	-77.13	-20	Pass
NVNT	g	2472	2484	-61.92	-10	Pass
NVNT	g	2472	2485	-62.1	-10	Pass
NVNT	g	2472	2486	-59.31	-10	Pass
NVNT	g	2472	2487	-61.44	-10	Pass
NVNT	g	2472	2488	-62.48	-10	Pass
NVNT	g	2472	2489	-64.29	-10	Pass
NVNT	g	2472	2490	-64.5	-10	Pass
NVNT	g	2472	2491	-65.23	-10	Pass
NVNT	g	2472	2492	-68.38	-10	Pass
NVNT	g	2472	2493	-64.62	-10	Pass
NVNT	g	2472	2494	-69.73	-10	Pass
NVNT	g	2472	2495	-68.7	-10	Pass
NVNT	g	2472	2496	-66.94	-10	Pass
NVNT	g	2472	2497	-68.98	-10	Pass
NVNT	g	2472	2498	-67.9	-10	Pass
NVNT	g	2472	2499	-72.92	-10	Pass
NVNT	g	2472	2500	-71.99	-20	Pass
NVNT	g	2472	2501	-71.6	-20	Pass
NVNT	g	2472	2502	-69.76	-20	Pass
NVNT	g	2472	2503	-73.29	-20	Pass
NVNT	g	2472	2504	-72.51	-20	Pass
NVNT	g	2472	2505	-73.26	-20	Pass
NVNT	g	2472	2506	-71.7	-20	Pass
NVNT	g	2472	2507	-75.15	-20	Pass
NVNT	g	2472	2508	-73.03	-20	Pass
NVNT	g	2472	2509	-74.38	-20	Pass
NVNT	g	2472	2510	-74.87	-20	Pass
NVNT	g	2472	2511	-75.03	-20	Pass
NVNT	g	2472	2512	-73.93	-20	Pass
NVNT	g	2472	2513	-75.28	-20	Pass
NVNT	g	2472	2514	-76.73	-20	Pass
NVNT	g	2472	2515	-74.06	-20	Pass
NVNT	n20	2412	2399.5	-64.45	-10	Pass
NVNT	n20	2412	2398.5	-63.59	-10	Pass

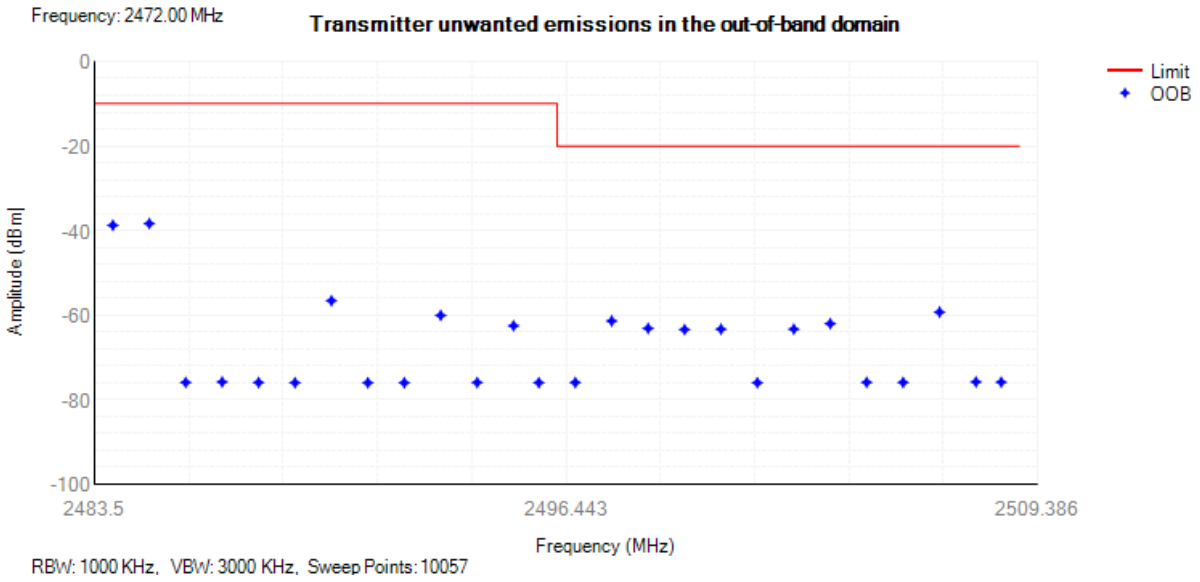
NVNT	n20	2412	2397.5	-66.16	-10	Pass
NVNT	n20	2412	2396.5	-64.88	-10	Pass
NVNT	n20	2412	2395.5	-66.08	-10	Pass
NVNT	n20	2412	2394.5	-66.09	-10	Pass
NVNT	n20	2412	2393.5	-66.74	-10	Pass
NVNT	n20	2412	2392.5	-67.06	-10	Pass
NVNT	n20	2412	2391.5	-66.76	-10	Pass
NVNT	n20	2412	2390.5	-66.8	-10	Pass
NVNT	n20	2412	2389.5	-67.06	-10	Pass
NVNT	n20	2412	2388.5	-70.41	-10	Pass
NVNT	n20	2412	2387.5	-70.7	-10	Pass
NVNT	n20	2412	2386.5	-72.11	-10	Pass
NVNT	n20	2412	2385.5	-71.92	-10	Pass
NVNT	n20	2412	2384.5	-70.35	-10	Pass
NVNT	n20	2412	2383.5	-73.47	-20	Pass
NVNT	n20	2412	2382.5	-73.76	-20	Pass
NVNT	n20	2412	2381.5	-74.07	-20	Pass
NVNT	n20	2412	2380.5	-73.92	-20	Pass
NVNT	n20	2412	2379.5	-75.54	-20	Pass
NVNT	n20	2412	2378.5	-75.1	-20	Pass
NVNT	n20	2412	2377.5	-75.92	-20	Pass
NVNT	n20	2412	2376.5	-76.24	-20	Pass
NVNT	n20	2412	2375.5	-76.24	-20	Pass
NVNT	n20	2412	2374.5	-77.5	-20	Pass
NVNT	n20	2412	2373.5	-76.88	-20	Pass
NVNT	n20	2412	2372.5	-77.43	-20	Pass
NVNT	n20	2412	2371.5	-77.27	-20	Pass
NVNT	n20	2412	2370.5	-77.1	-20	Pass
NVNT	n20	2412	2369.5	-76.63	-20	Pass
NVNT	n20	2412	2368.5	-77.89	-20	Pass
NVNT	n20	2472	2484	-62.89	-10	Pass
NVNT	n20	2472	2485	-65.73	-10	Pass
NVNT	n20	2472	2486	-62.72	-10	Pass
NVNT	n20	2472	2487	-61.94	-10	Pass
NVNT	n20	2472	2488	-63.48	-10	Pass
NVNT	n20	2472	2489	-67	-10	Pass
NVNT	n20	2472	2490	-67.78	-10	Pass
NVNT	n20	2472	2491	-65.58	-10	Pass
NVNT	n20	2472	2492	-66.25	-10	Pass
NVNT	n20	2472	2493	-68.2	-10	Pass
NVNT	n20	2472	2494	-68.75	-10	Pass

NVNT	n20	2472	2495	-70.35	-10	Pass
NVNT	n20	2472	2496	-67.95	-10	Pass
NVNT	n20	2472	2497	-66.99	-10	Pass
NVNT	n20	2472	2498	-69.51	-10	Pass
NVNT	n20	2472	2499	-71.24	-10	Pass
NVNT	n20	2472	2500	-70.64	-20	Pass
NVNT	n20	2472	2501	-71.25	-20	Pass
NVNT	n20	2472	2502	-70.85	-20	Pass
NVNT	n20	2472	2503	-71.52	-20	Pass
NVNT	n20	2472	2504	-73.09	-20	Pass
NVNT	n20	2472	2505	-72.44	-20	Pass
NVNT	n20	2472	2506	-72.18	-20	Pass
NVNT	n20	2472	2507	-71.91	-20	Pass
NVNT	n20	2472	2508	-73.81	-20	Pass
NVNT	n20	2472	2509	-74.77	-20	Pass
NVNT	n20	2472	2510	-73.81	-20	Pass
NVNT	n20	2472	2511	-75.71	-20	Pass
NVNT	n20	2472	2512	-74.02	-20	Pass
NVNT	n20	2472	2513	-75.9	-20	Pass
NVNT	n20	2472	2514	-74.31	-20	Pass
NVNT	n20	2472	2515	-75.4	-20	Pass

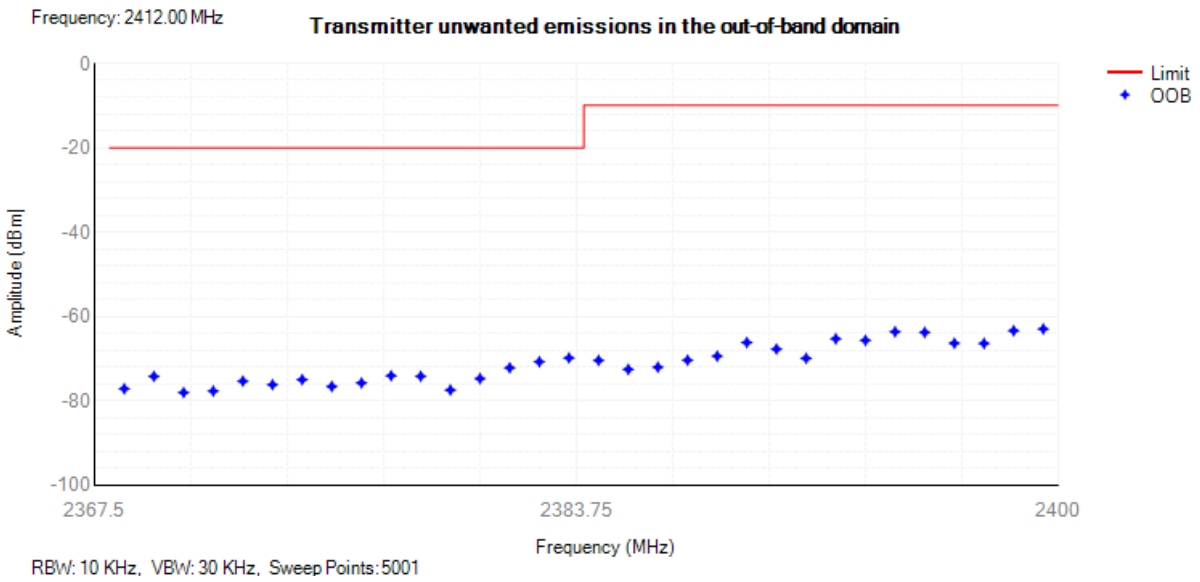
Tx. Emissions OOB NVNT b 2412MHz



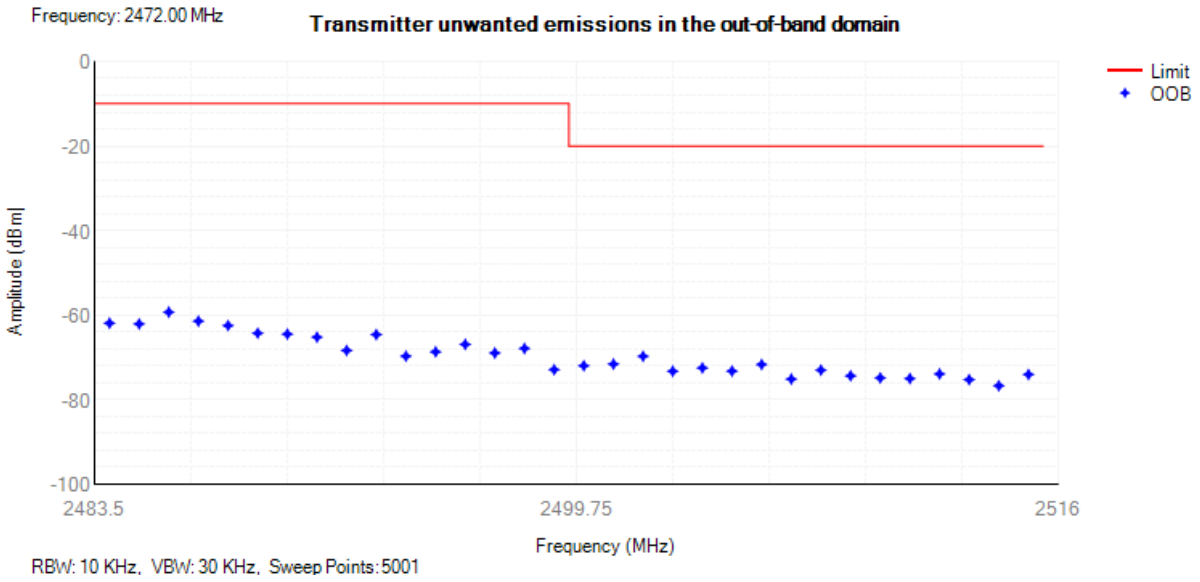
Tx. Emissions OOB NVNT b 2472MHz



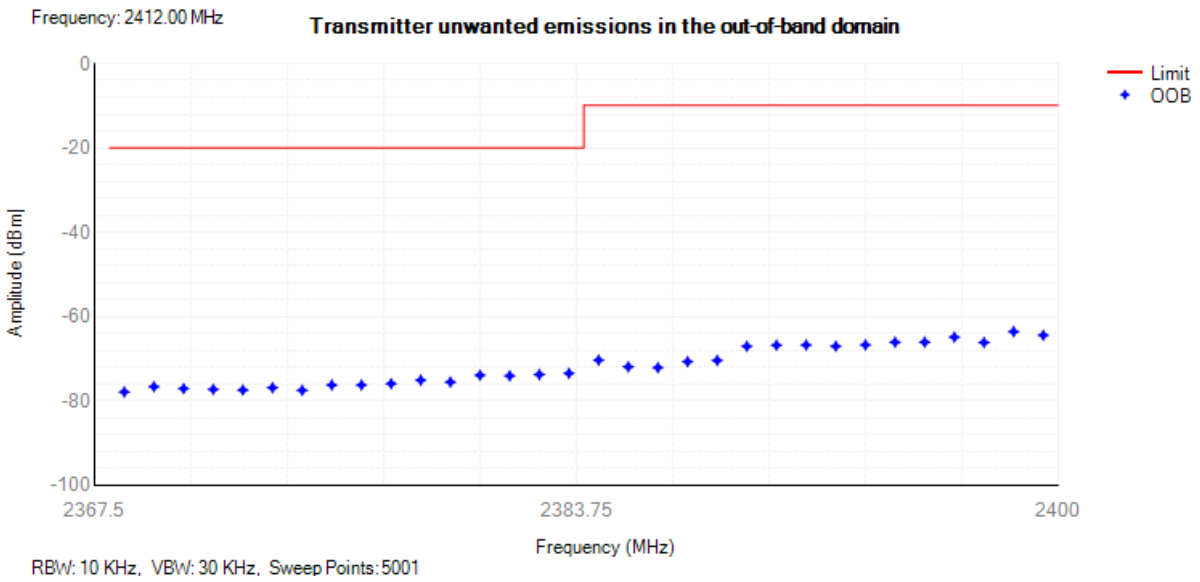
Tx. Emissions OOB NVNT g 2412MHz



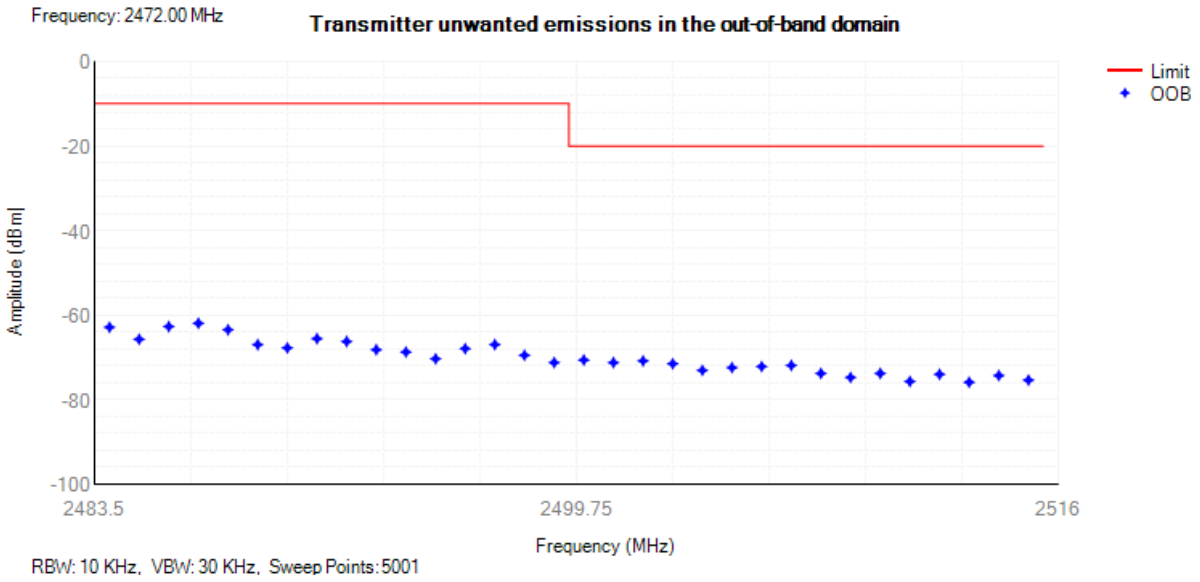
Tx. Emissions OOB NVNT g 2472MHz



Tx. Emissions OOB NVNT n20 2412MHz



Tx. Emissions OOB NVNT n20 2472MHz



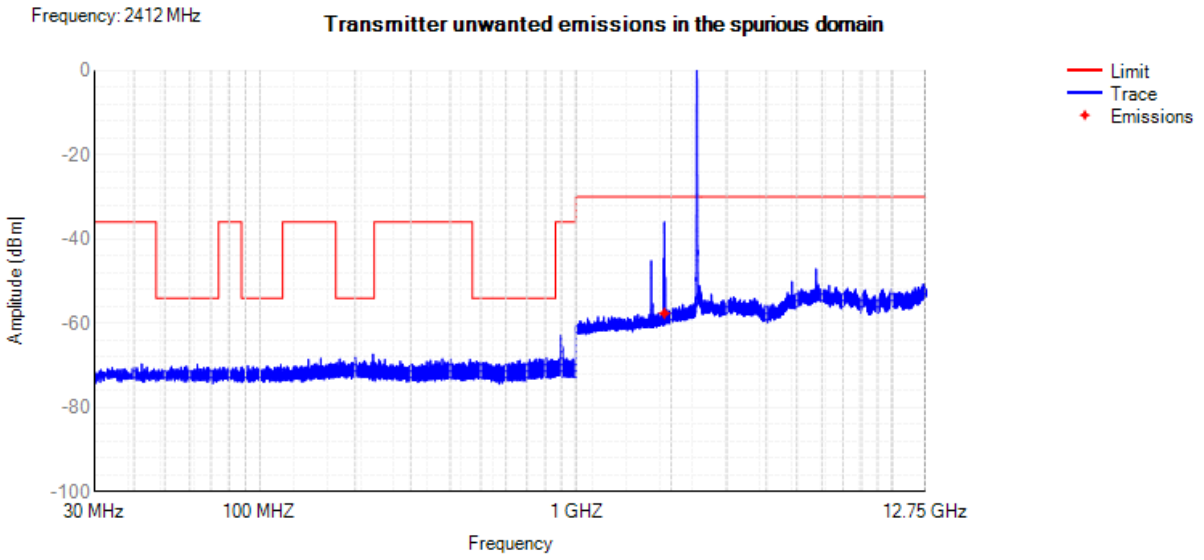
5.4.9 Transmitter unwanted emissions in the spurious domain

Test Mode	:	Mode 1: Transmit by 802.11b (Worst case) (Radiated Measurement)

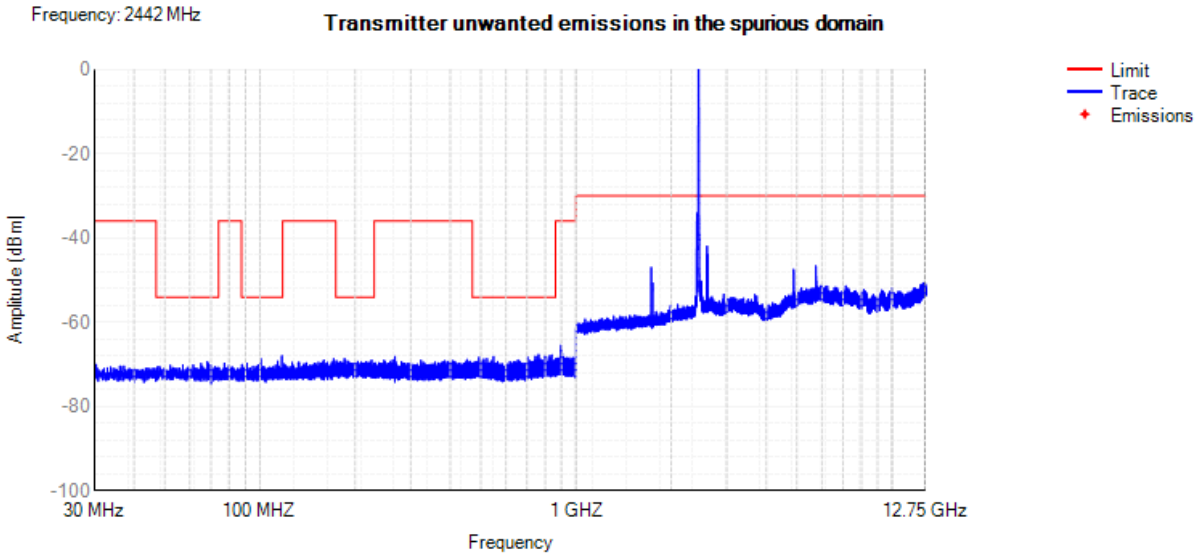
Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 1 (2412MHz)					
127.12	H	-45.50	-36.00	-9.50	PK
77.82	V	-43.08	-36.00	-7.08	PK
405.21	H	-49.11	-36.00	-13.11	PK
603.41	V	-64.60	-54.00	-10.60	PK
4826.81	H	-40.76	-30.00	-10.76	PK
4827.12	V	-44.16	-30.00	-14.16	PK
7239.07	H	-43.90	-30.00	-13.90	PK
7237.74	V	-42.84	-30.00	-12.84	PK
Channel 13 (2472MHz)					
150.37	H	-37.33	-36.00	-1.33	PK
136.88	V	-46.49	-36.00	-10.49	PK
335.70	H	-39.08	-36.00	-3.08	PK
959.98	V	-38.15	-36.00	-2.15	PK
4947.03	H	-41.43	-30.00	-11.43	PK
4947.51	V	-38.19	-30.00	-8.19	PK
7418.47	H	-41.38	-30.00	-11.38	PK
7418.19	V	-36.94	-30.00	-6.94	PK

Transmitter spurious emissions (Conducted Measurement)

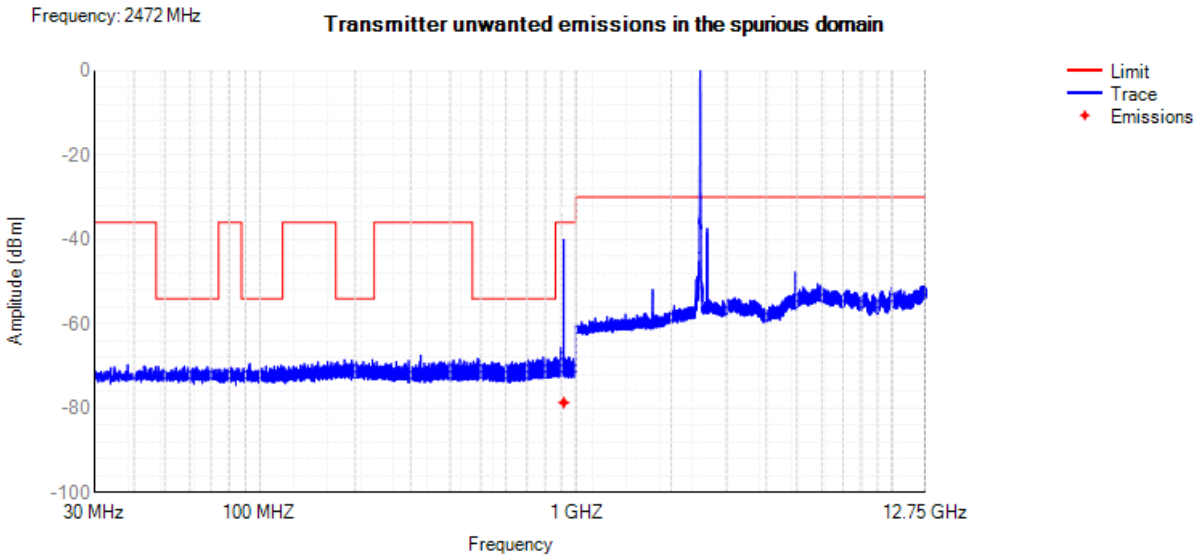
Tx. Spurious NVNT b 2412MHz



Tx. Spurious NVNT b 2442MHz



Tx. Spurious NVNT b 2472MHz



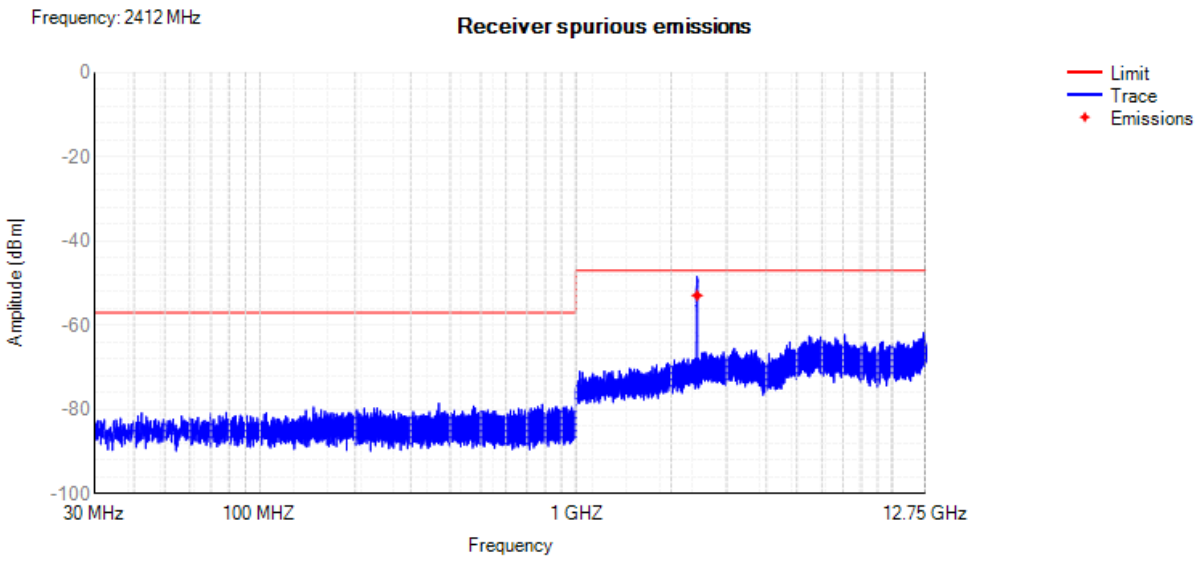
5.4.10 Receiver spurious emissions

Test Mode	:	Mode 4: Receive by 802.11b (Worst case) (Radiated Measurement)

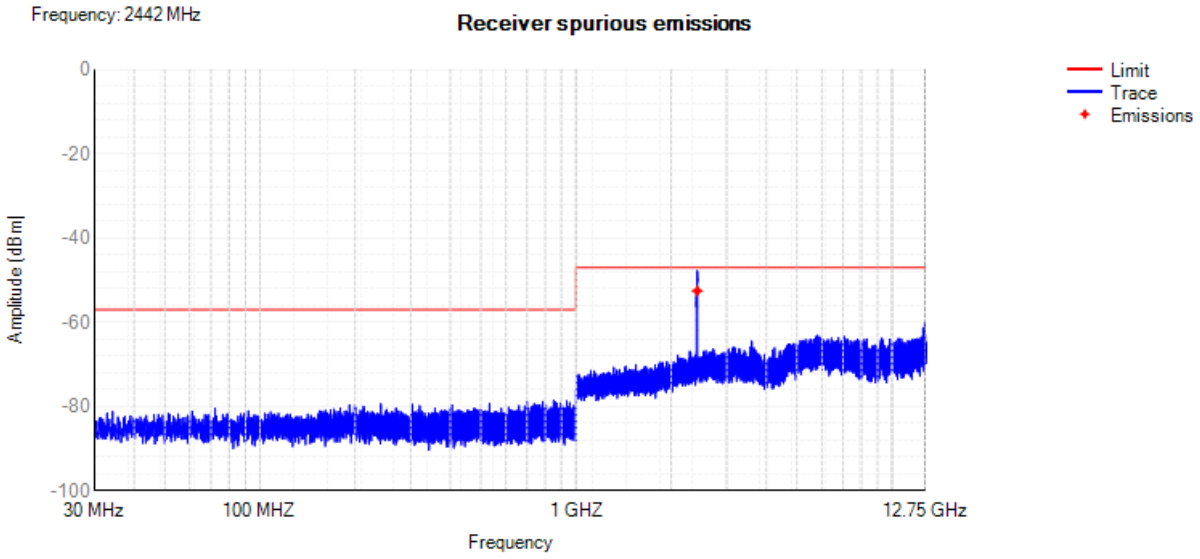
Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 1 (2412MHz)					
132.75	H	-65.67	-57.00	-8.67	PK
183.71	V	-74.57	-57.00	-17.57	PK
972.17	H	-64.99	-57.00	-7.99	PK
834.09	V	-60.29	-57.00	-3.29	PK
1080.35	H	-67.01	-47.00	-20.01	PK
1748.59	V	-58.42	-47.00	-11.42	PK
2142.82	H	-71.45	-47.00	-24.45	PK
2232.59	V	-56.32	-47.00	-9.32	PK
Channel 13 (2472MHz)					
387.05	H	-64.66	-57.00	-7.66	PK
263.33	V	-67.85	-57.00	-10.85	PK
603.30	H	-68.16	-57.00	-11.16	PK
545.74	V	-72.76	-57.00	-15.76	PK
1027.52	H	-65.11	-47.00	-18.11	PK
1033.52	V	-62.87	-47.00	-15.87	PK
2859.11	H	-68.17	-47.00	-21.17	PK
2953.69	V	-69.36	-47.00	-22.36	PK

Receiver spurious emissions (Conducted Measurement)

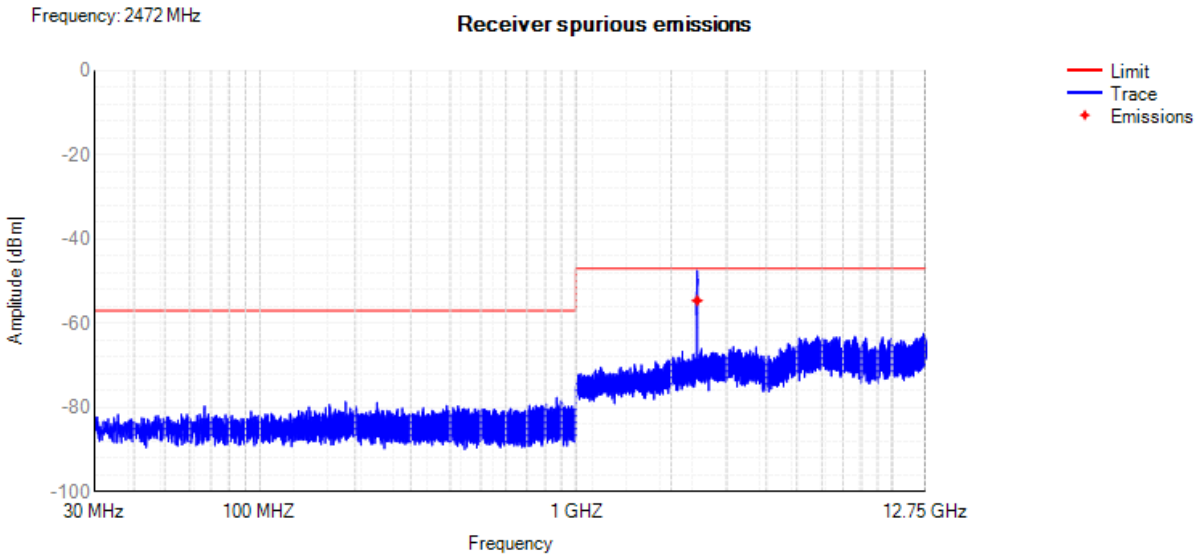
Rx. Spurious NVNT b 2412MHz



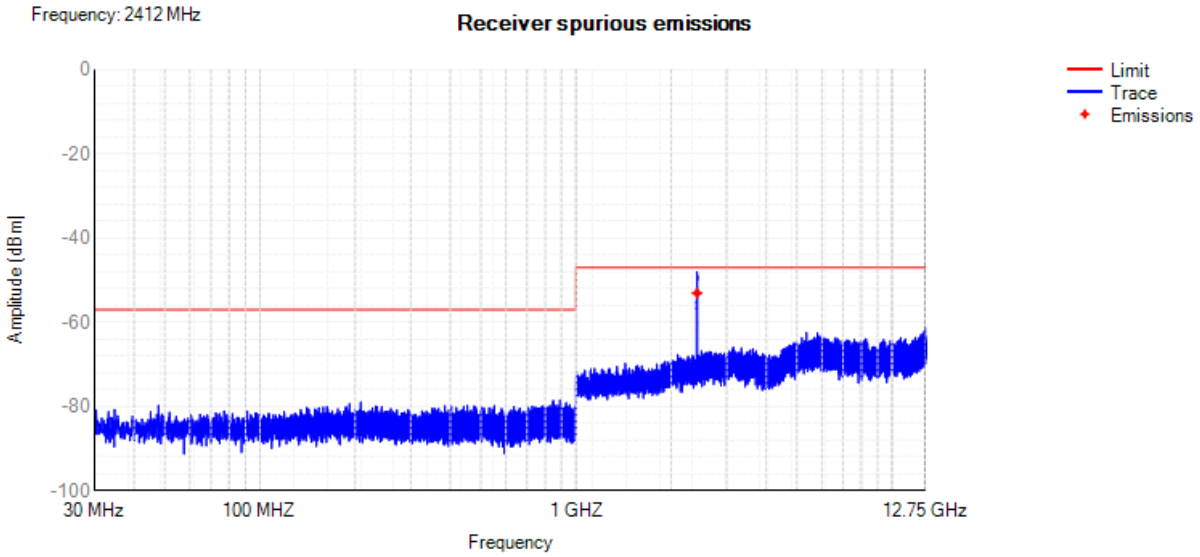
Rx. Spurious NVNT b 2442MHz



Rx. Spurious NVNT b 2472MHz



Rx. Spurious NVNT g 2412MHz



5.4.11 Receiver Blocking

Wanted Signal Mean Power from Companion Device (dBm)	Test Mode	Test Channel (MHz)	Blocking Signal Frequency (MHz)	Pmin	Blocking Signal Power (dBm)		Type of Blocking Signal	PER(%		Test Result
					Test Value	Limit		Test Value	Limit	
Pmin + 6 dB	802.11b	2412	2380	-85	-29	≥-53	CW	4.14	10	Pass
			2503.5	-86	-23	≥-53	CW	5.87	10	Pass
			2300	-82	-23	≥-47	CW	3.35	10	Pass
			2330	-85	-20	≥-47	CW	5.29	10	Pass
			2360	-84	-16	≥-47	CW	4.57	10	Pass
			2523.5	-88	-27	≥-47	CW	5.97	10	Pass
			2553.5	-83	-24	≥-47	CW	5.75	10	Pass
			2583.5	-85	-18	≥-47	CW	5.53	10	Pass
			2613.5	-92	-17	≥-47	CW	4.18	10	Pass
			2643.5	-84	-16	≥-47	CW	5.11	10	Pass
			2673.5	-86	-19	≥-47	CW	4.03	10	Pass
		2472	2380	-82	-31	≥-53	CW	5.70	10	Pass
			2503.5	-85	-24	≥-53	CW	6.27	10	Pass
			2300	-93	-19	≥-47	CW	5.70	10	Pass
			2330	-95	-17	≥-47	CW	6.53	10	Pass
			2360	-88	-23	≥-47	CW	5.80	10	Pass
			2523.5	-86	-21	≥-47	CW	4.31	10	Pass
			2553.5	-95	-25	≥-47	CW	5.21	10	Pass
			2583.5	-92	-18	≥-47	CW	3.10	10	Pass
			2613.5	-83	-22	≥-47	CW	4.24	10	Pass
			2643.5	-96	-20	≥-47	CW	6.17	10	Pass
			2673.5	-85	-21	≥-47	CW	5.85	10	Pass

Wanted Signal Mean Power from Companion Device (dBm)	Test Mode	Test Channel (MHz)	Blocking Signal Frequency (MHz)	Pmin	Blocking Signal Power (dBm)		Type of Blocking Signal	PER(%		Test Result
					Test Value	Limit		Test Value	Limit	
Pmin + 6 dB	802.11g	2412	2380	-84	-32	≥-53	CW	3.46	10	Pass
			2503.5	-85	-27	≥-53	CW	4.08	10	Pass
			2300	-86	-22	≥-47	CW	6.01	10	Pass
			2330	-85	-23	≥-47	CW	4.37	10	Pass
			2360	-84	-22	≥-47	CW	4.93	10	Pass
			2523.5	-82	-24	≥-47	CW	5.94	10	Pass
			2553.5	-83	-23	≥-47	CW	6.07	10	Pass
			2583.5	-85	-19	≥-47	CW	6.39	10	Pass
			2613.5	-94	-14	≥-47	CW	5.42	10	Pass
			2643.5	-86	-23	≥-47	CW	6.18	10	Pass
			2673.5	-88	-20	≥-47	CW	4.34	10	Pass
		2472	2380	-85	-28	≥-53	CW	4.27	10	Pass
			2503.5	-87	-25	≥-53	CW	4.41	10	Pass
			2300	-86	-23	≥-47	CW	3.51	10	Pass
			2330	-95	-24	≥-47	CW	5.31	10	Pass
			2360	-81	-20	≥-47	CW	4.91	10	Pass
			2523.5	-85	-23	≥-47	CW	4.23	10	Pass
			2553.5	-86	-19	≥-47	CW	4.19	10	Pass
			2583.5	-88	-18	≥-47	CW	4.38	10	Pass
			2613.5	-85	-22	≥-47	CW	3.51	10	Pass
			2643.5	-87	-16	≥-47	CW	5.44	10	Pass
			2673.5	-85	-13	≥-47	CW	5.25	10	Pass

Wanted Signal Mean Power from Companion Device (dBm)	Test Mode	Test Channel (MHz)	Blocking Signal Frequency (MHz)	Pmin	Blocking Signal Power (dBm)		Type of Blocking Signal	PER(%		Test Result
					Test Value	Limit		Test Value	Limit	
Pmin + 6 dB	802.11n20	2412	2380	-82	-34	≥-53	CW	4.01	10	Pass
			2503.5	-83	-31	≥-53	CW	5.01	10	Pass
			2300	-90	-20	≥-47	CW	3.27	10	Pass
			2330	-87	-25	≥-47	CW	5.75	10	Pass
			2360	-86	-19	≥-47	CW	3.26	10	Pass
			2523.5	-84	-30	≥-47	CW	4.36	10	Pass
			2553.5	-85	-21	≥-47	CW	6.38	10	Pass
			2583.5	-83	-21	≥-47	CW	4.01	10	Pass
			2613.5	-87	-22	≥-47	CW	3.32	10	Pass
			2643.5	-86	-16	≥-47	CW	5.49	10	Pass
			2673.5	-88	-20	≥-47	CW	5.19	10	Pass
		2472	2380	-90	-34	≥-53	CW	5.32	10	Pass
			2503.5	-87	-28	≥-53	CW	4.13	10	Pass
			2300	-90	-19	≥-47	CW	3.72	10	Pass
			2330	-82	-17	≥-47	CW	6.13	10	Pass
			2360	-85	-20	≥-47	CW	4.94	10	Pass
			2523.5	-88	-28	≥-47	CW	4.82	10	Pass
			2553.5	-86	-21	≥-47	CW	4.40	10	Pass
			2583.5	-83	-26	≥-47	CW	5.04	10	Pass
			2613.5	-84	-22	≥-47	CW	5.54	10	Pass
			2643.5	-85	-16	≥-47	CW	5.75	10	Pass
			2673.5	-88	-20	≥-47	CW	6.09	10	Pass