RADIO TEST REPORT

for

Dongguan Meiloon Acoustic Equipments Co., Ltd.

Integrated Music System

Model Number: R410

Prepared for	:	Dongguan Meiloon Acoustic Equipments Co., Ltd.
Address	:	80, Yuanlin Road Fenghuanggang Ind, Estate, Tangxia Town, 523727 Dongguan City, Guangdong Province, PEOPLE'S REPUBLIC OF CHINA.
Prepared by	:	Keyway Testing Technology (Guangdong) Co., Ltd.
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Report No.	:	TR23040454-E-004
Date of Test	:	Aug.10 ~ Sep. 28, 2023
Date of Report	:	Oct. 10, 2023

Keyway Testing Technology (Guangdong) Co., Ltd.

Applicant: **Address:**	Dongguan Meiloon Acoustic Equipments Co., Ltd. 80, Yuanlin Road Fenghuanggang Ind, Estate, Tangxia Town, 523727 Dongguan City, Guangdong Province, PEOPLE'S REPUBLIC OF CHINA.		
Manufacturer: **Address:**	Ruark Audio Limited 59 Tailors Court,Temple Farm Industrial Estate, Southend on Sea, Essex, SS2 5TH, United Kingdom		
E.U.T:	Integrated Music System		
Model Number:	R410		
Trade Name:	ruark audio	**Sample Number:**	230811003
Date of Receipt:	Aug. 10, 2023	**Date of Test:**	Aug.10 ~ Sep. 28, 2023
Test Specification:	ETSI EN 300 328 V2.2.2 (2019-07)		
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied. **Issue Date: Oct. 10, 2023**		

Tested by:	Reviewed by:	Approved by:
Jacob Ouyang / Engineer	Billy Zeng / Supervisor	Andy Gao / Manager

Other Aspects:

None.

Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested

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1. Summary Of Test Results

Test procedures according to the technical standards:

The following essential requirements and test specifications refer to ETSI EN 300 328 V2.2.2 (2019-07)			
No	Test Parameter	Clause No	Results
Transmitter Parameters			
1	RF output power	4.3.2.2	PASS
2	Power Spectral Density	4.3.2.3	PASS
3	Duty Cycle, Tx-sequence, Tx-gap	4.3.2.4	N/A
4	Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	4.3.1.4	N/A
5	Hopping Frequency Separation	4.3.1.5	N/A
6	Medium Utilisation (MU) factor	4.3.2.5	N/A
7	Adaptivity (adaptive equipment using modulations other than FHSS)	4.3.2.6	PASS
8	Occupied Channel Bandwidth	4.3.2.7	PASS
9	Transmitter unwanted emissions in the out-of-band domain	4.3.2.8	PASS
10	Transmitter unwanted emissions in the spurious domain	4.3.2.9	PASS
Receiver Parameters			
11	Receiver spurious emissions	4.3.2.10	PASS
12	Receiver Blocking	4.3.2.11	PASS
Note: N/A is an abbreviation for Not Applicable and means this test item is not applicable for this device according to the technology characteristic of device.			

1.1. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● CNAS —Registration No.: CNAS L5783

Keyway Testing Technology (Guangdong) Co., Ltd., EMC Laboratory has been registered and fuly described in a report filed with the Certificated by CNAS China.

Registration No.: CNAS L5783.

Date of registration: August 8, 2012

● Industry Canada (IC)

The 3m Semi-anechoic chamber of Keyway Testing Technology (Guangdong) Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9868A -1.

1.2. Measurement Uncertainty

Measurement Uncertainty for a Level of Confidence of 95 %, U=2xUc(y)

RF frequency	1×10^{-7}
RF power, conducted	± 1.0 dB
Conducted emission of receivers	± 1 dB
Radiated emission of transmitter	± 6 dB
Radiated emission of receiver	± 6 dB
Temperature	±1 degree
Humidity	± 5 %

2. General Information

2.1. General Description Of EUT

Product Name:	Integrated Music System
Test Model No.:	R410
Series Model:	N/A
Operation Frequency:	802.11b/g/n(20): 2412MHz~2472MHz
Channel Numbers:	802.11b/g/802.11n(HT20):13
Modulation Technology:	802.11b: Direct Sequence Spread Spectrum (DSSS) 802.11g/n: Orthogonal Frequency Division Multiplexing (OFDM)
Antenna Type:	Internal Antenna
Antenna Gain:	ANT 0:3.1dBi, ANT 1:3.1dBi
Power Input:	AC100V-240V 50/60Hz

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2.

Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	05	2432	09	2452	13	2472
02	2417	06	2437	10	2457		
03	2422	07	2442	11	2462		
04	2427	08	2447	12	2467		

3. Annex E

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:

The value q as referred to in clause 4.3.2.5.2.2.2

☐ 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.): 12.08dBm

The maximum (corresponding) Duty Cycle:

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

802.11 b

• Power Spectral Density

802.11 b

• Duty cycle, Tx-Sequence, Tx-gap

N/A

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

N/A

• Hopping Frequency Separation (only for FHSS equipment)

N/A

• Medium Utilisation

N/A

• Adaptivity & Receiver Blocking

N/A

• Occupied Channel Bandwidth

802.11 n

• Transmitter unwanted emissions in the OOB domain

802.11 g

• Transmitter unwanted emissions in the spurious domain

802.11 b

• Receiver spurious emissions

802.11 b

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.

h) In case of Smart Antenna Systems:

• The number of Receive chains:2

• The number of Transmit chains: 2

☐ 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 : 2412 MHz to 2472 MHz

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

j) Occupied Channel Bandwidth(s):

Occupied Channel Bandwidth 1: 17.78MHz

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: 0° C to 45° C

Operating voltage: ☒ 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

☒ Internal Antenna

Antenna Gain: 3.39dBi

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

☐ 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:

Power Level 2:

Power Level 3:

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 : AC 230V/50Hz

☐ DC State DC voltage :

In case of DC, indicate the type of power source

☒ Internal Power Supply

☐ External Power Supply or AC/DC adapter

☐ Battery

☐ Other: .....

o) Describe the test modes available which can facilitate testing:

N/A

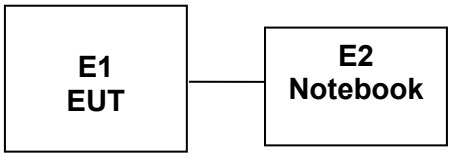
p) The equipment type (e.g. Bluetooth®, IEEE 802.11™ [i.3], proprietary, etc.):

WiFi

2.2. Description Of Test Conditions

(1) EUT was tested in normal configuration (Please See following Block diagram)

1. Block diagram of EUT configuration



2.3. Test Conditions and Channel

	Normal Test Conditions	Extreme Test Conditions
Temperature	15°C - 35°C	0°C ~ 45°C Note: (1)
Relative Humidity	20% - 75%	N/A
Supply Voltage	AC 230V/50Hz	N/A

802.11b/11g/11n(20)		
Test Channel	EUT Channel	Test Frequency (MHz)
lowest	CH01	2412
middle	CH07	2442
highest	CH13	2472

802.11n(40)		
Test Channel	EUT Channel	Test Frequency (MHz)
lowest	CH03	2422
middle	CH07	2442
highest	CH11	2462

Note:

(1) The HT 45°C and LT 0°C was declared by manufacturer, The EUT couldn't be operate normally with higher or lower temperature.

(2) The measurements are performed at the highest, middle, lowest available channels.

2.4. Description Of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Integrated Music System	ruark audio	R410	N/A	EUT
E-2	Notebook	Lenovo	300-15SK	GB14477457	AE

Item	Shielded Type	Ferrite Core	Length	Note

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in m in 『Length』 column.

2.5. Equipments List For All Test Items

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
MXG Signal Analyzer	Keysight	N9020A	MY56070279	Apr 10,23	Apr 09,24
MIMO4TX-1	Keysight	MIMO4TX	TW5451101,TW5451102,TW5451103,TW5451104	Apr 11,22	Apr 10,24
MXG Vector Signal Generator	Agilent	N5182A	MY50143410	Apr 10,23	Apr 09,24
MXG Analog Signal Generator	Agilent	N5181B	MY53050432	Apr 10,23	Apr 09,24
Comprehensive tester	R&S	CMW500	106288	Apr 11,22	Apr 10,24
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr 12,22	Apr 11,24
TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00829	Apr 12,22	Apr 11,24
3m Semi-anechoic Chamber	ETS-LINDGREN	966	170326	Apr 11,22	Apr 10,24
RF Cable	Junkosha	MWX322-2m	1305G007	Apr 11,22	Apr 10,24
RF Cable	Junkosha	MWX322-8m	1305G008	Apr 11,22	Apr 10,24
MULTI-DEVICE Controller	ETS-LINDGREN	2090	126913	N/A	N/A
Antenna Holder	ETS-LINDGREN	2070B	00109601	N/A	N/A
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr 11,22	Apr 10,23
Horn Antenna	DAZE	ZN30701	11003	Apr 11,22	Apr 10,24
Spectrum Analyzer	Keysight	N9020A	MY56070279	Apr 11,22	Apr 10,24
3m anechoic Chamber	ETS-LINDGREN	966	170326	Apr 12,22	Apr 11,24
Signal Amplifier	ZHINAN	ZN3380C	11001	Apr 10,23	Apr 09,24
RF Cable	Junkosha	MWX322-1m	1305G006	Apr 11,22	Apr 10,24
RF Cable	Junkosha	MWX322-2m	1305G007	Apr 11,22	Apr 10,24
RF Cable	Junkosha	MWX322-8m	1305G008	Apr 11,22	Apr 10,24
MULTI-DEVICE Controller	ETS-LINDGREN	2090	126913	N/A	N/A
Antenna Holder	ETS-LINDGREN	2070B	00109601	N/A	N/A

3. RF output power

3.1. Limit

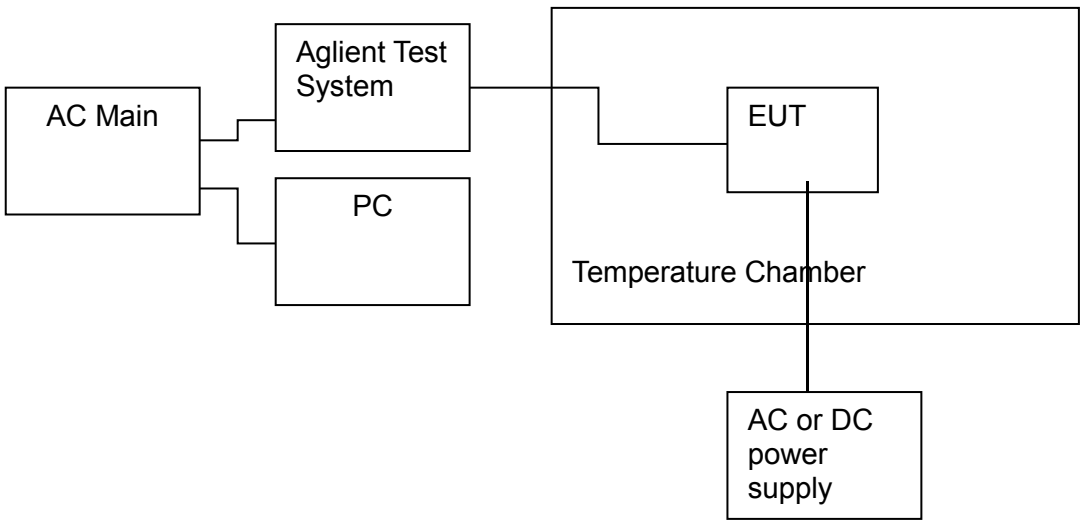
For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm.

The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. See clause 5.3.1 m). 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.

Limit
20dBm

3.2. Test Setup



3.3. Test Procedure

Refer to ETSI EN 300 328 V2.2.2 Clause 5.4.2
The conformance tests for this requirement are defined in clause 5.4.2 and specifically in clause 5.4.2.2.1.2.

3.4. Test Result

Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V/50Hz

ANT 0

Test Mode: 802.11b					
TEST CONDITIONS			Total e.i.r.p (dBm)		
			CH01	CH07	CH13
Normal voltage	T nom (°C)	25.00	9.30	9.94	10.59
	T min (°C)	0.00	9.10	9.76	10.33
	T max (°C)	45.00	8.86	9.51	10.14
Max RF Power			**10.59**		
Limits			20dBm		
Result			**Complies**		

Test Mode: 802.11g					
TEST CONDITIONS			Total e.i.r.p (dBm)		
			CH01	CH07	CH13
Normal voltage	T nom (°C)	25.00	7.93	8.23	8.62
	T min (°C)	0.00	7.68	8.01	8.53
	T max (°C)	45.00	7.43	7.86	8.23
Max RF Power			**8.62**		
Limits			20dBm		
Result			**Complies**		

Test Mode: 802.11n(20M)					
TEST CONDITIONS			Total e.i.r.p (dBm)		
			CH01	CH07	CH13
Normal voltage	T nom (°C)	25.00	8.62	9.08	9.40
	T min (°C)	0.00	8.53	8.87	9.23
	T max (°C)	45.00	8.23	8.47	9.02
Max RF Power			**9.40**		
Limits			20dBm		
Result			**Complies**		

ANT 1

Test Mode: 802.11b					
TEST CONDITIONS			Total e.i.r.p (dBm)		
			CH01	CH07	CH13
Normal voltage	T nom (°C)	25.00	8.40	8.49	9.06
	T min (°C)	0.00	8.25	8.27	8.91
	T max (°C)	45.00	8.02	8.06	8.73
Max RF Power			**9.06**		
Limits			20dBm		
Result			**Complies**		

Test Mode: 802.11g					
TEST CONDITIONS			Total e.i.r.p (dBm)		
			CH01	CH07	CH13
Normal voltage	T nom (°C)	25.00	8.35	8.48	8.97
	T min (°C)	0.00	8.13	8.21	8.67
	T max (°C)	45.00	7.96	9.03	8.43
Max RF Power			**8.97**		
Limits			20dBm		
Result			**Complies**		

Test Mode: 802.11n(20M)					
TEST CONDITIONS			Total e.i.r.p (dBm)		
			CH01	CH07	CH13
Normal voltage	T nom (°C)	25.00	8.21	8.36	8.72
	T min (°C)	0.00	8.02	8.11	8.57
	T max (°C)	45.00	7.86	7.91	8.34
Max RF Power			**8.72**		
Limits			20dBm		
Result			**Complies**		

ANT 0+ANT 1

Test Mode: 802.11n(20M)					
TEST CONDITIONS			Total e.i.r.p (dBm)		
			CH01	CH07	CH13
Normal voltage	T nom (°C)	25.00	11.43	11.75	12.08
	T min (°C)	0.00	11.29	11.52	11.92
	T max (°C)	50.00	11.06	11.21	11.70
Max RF Power			**12.08**		
Limits			20dBm		
Result			**Complies**		

Note:1. 802.11b, 802.11g mode: the ANT 0 and ANT 1 can not TX and RX at the same time;
2. 802.11n(20): the ANT 0 and ANT 1 can TX and RX at the same time;
3. For power test the duty cycle is 100% in continous transmitting mode.
4.TX means Transmitter; RX means Receive.

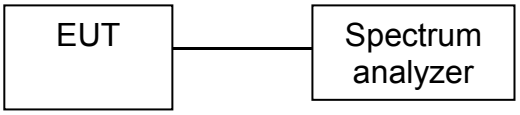
4. Power Spectral Density

4.1. Limit

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

Limit
10dBm/MHz

4.2. Test Setup



4.3. Test Procedure

Refer to ETSI EN 300 328 V2.2.2 Clause 5.4.3

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

Frequency range	2400MHz-2483.5MHz
RBW/VBW	10KHz/30KHz
Sweep points/time	>8350 / 10S
Detector	RMS
Trace	Max hold

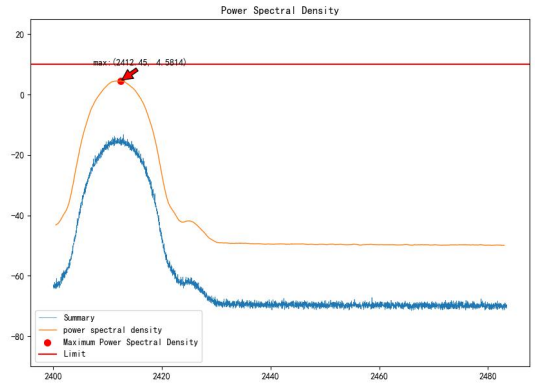
4.4. Test Result

Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V/50Hz

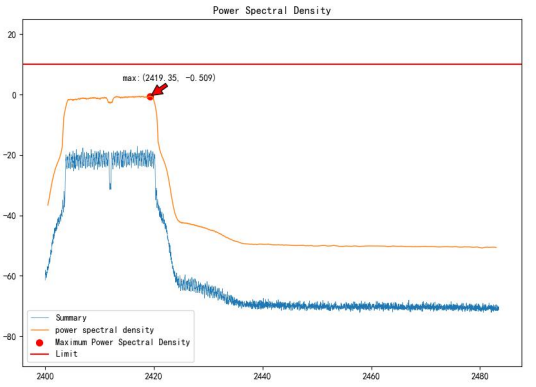
ANT 0

Mode	Channel	PSD (dBm/MHz)	Limit (dBm/MHz)	Result
IEEE 802.11b	1	4.58	10	PASS
	7	5.15		PASS
	13	5.87		PASS
IEEE 802.11g	1	-0.51		PASS
	7	-0.1		PASS
	13	-2.37		PASS
IEEE 802.11n_20	1	1.11		PASS
	7	1.56		PASS
	13	1.91		PASS

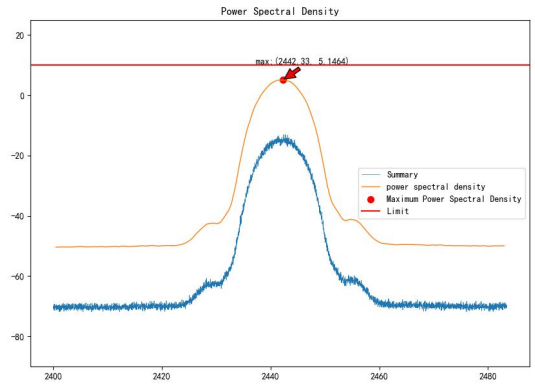
Test Graphs



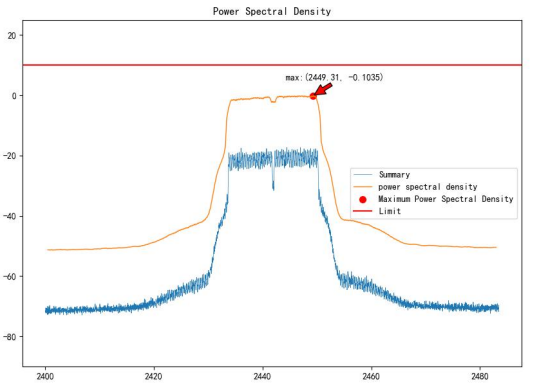
Antenna 0_IEEE 802.11b_20MHz_Channel 1



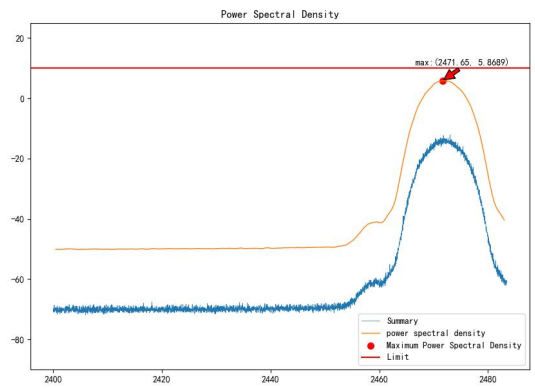
Antenna 0_IEEE 802.11g_20MHz_Channel 1



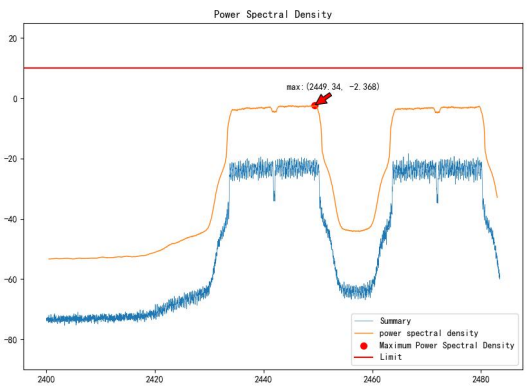
Antenna 0_IEEE 802.11b_20MHz_Channel 7



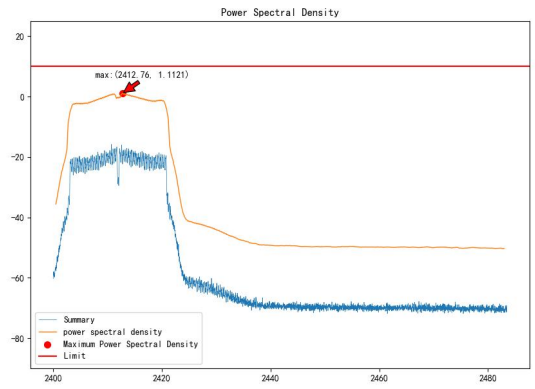
Antenna 0_IEEE 802.11g_20MHz_Channel 7



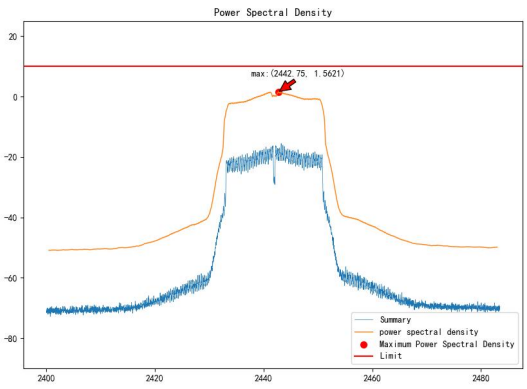
Antenna 0_IEEE 802.11b_20MHz_Channel 13



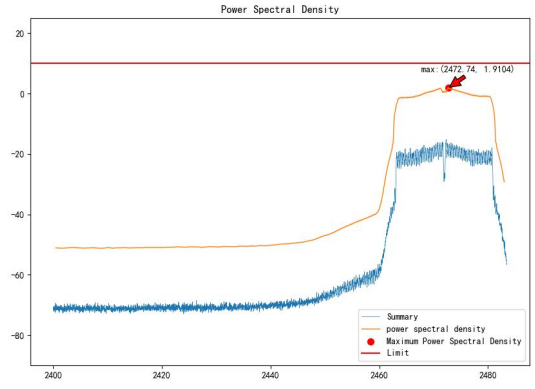
Antenna 0_IEEE 802.11g_20MHz_Channel 13



Antenna 0_IEEE 802.11n_20MHz_Channel 1



Antenna 0_IEEE 802.11n_20MHz_Channel 7

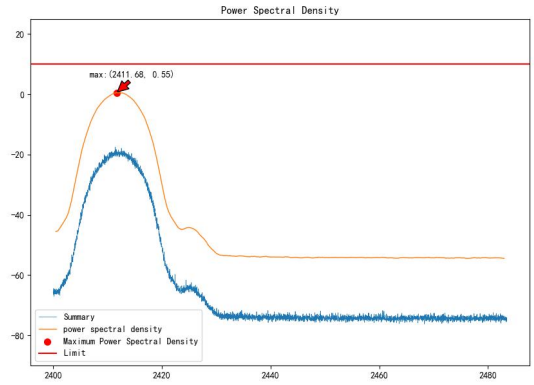


Antenna 0_IEEE 802.11n_20MHz_Channel 13

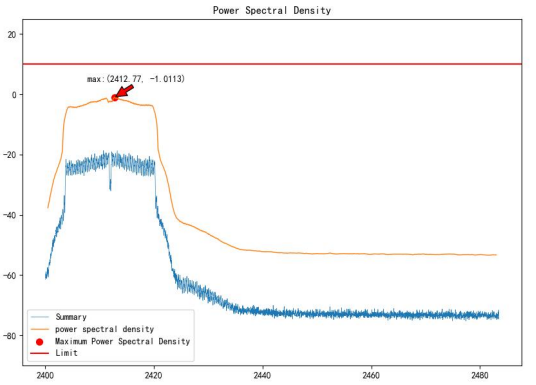
Void

ANT 1

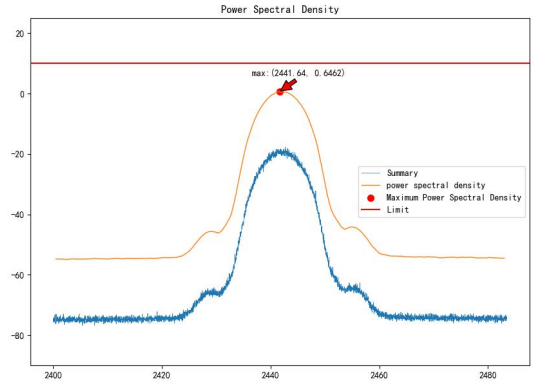
Mode	Channel	PSD (dBm/MHz)	Limit (dBm/MHz)	Result
IEEE 802.11b	1	0.55	10	PASS
	7	0.65		PASS
	13	1.19		PASS
IEEE 802.11g	1	-1.01		PASS
	7	-3.01		PASS
	13	-2.8		PASS
IEEE 802.11n_20	1	-1.41		PASS
	7	-1.2		PASS
	13	-0.87		PASS



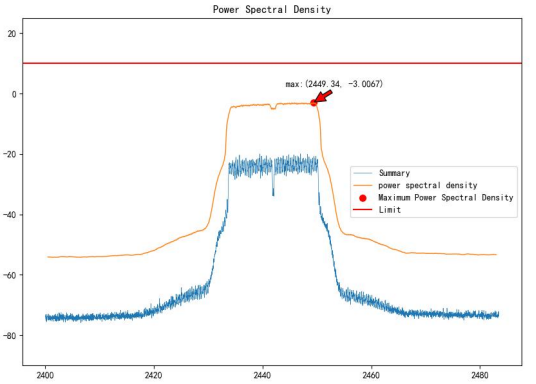
Antenna 1_IEEE 802.11b_20MHz_Channel 1



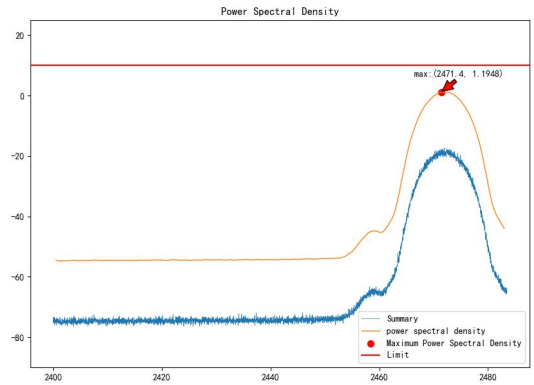
Antenna 1_IEEE 802.11g_20MHz_Channel 1



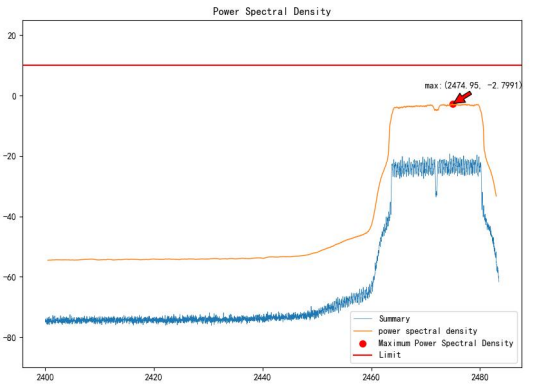
Antenna 1_IEEE 802.11b_20MHz_Channel 7



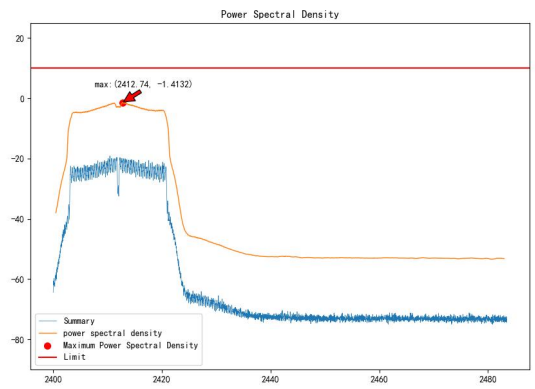
Antenna 1_IEEE 802.11g_20MHz_Channel 7



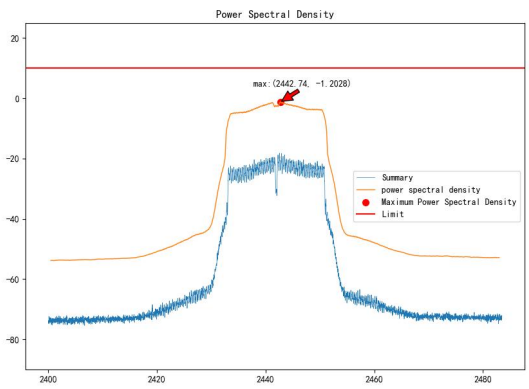
Antenna 1_IEEE 802.11b_20MHz_Channel 13



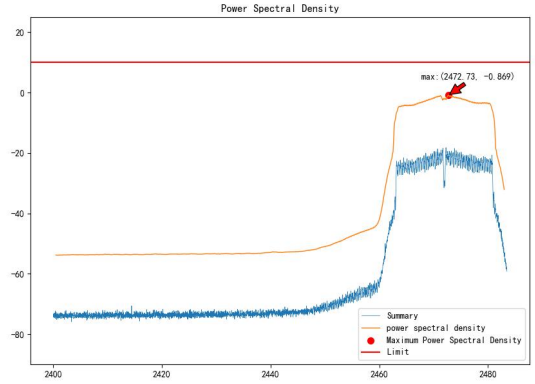
Antenna 1_IEEE 802.11g_20MHz_Channel 13



Antenna 1_IEEE 802.11n_20MHz_Channel 1



Antenna 1_IEEE 802.11n_20MHz_Channel 7



Antenna 1_IEEE 802.11n_20MHz_Channel 13

Void

ANT 0+ANT 1

Test Mode: 802.11n(20M)			
Channel Frequency (MHz)	Power Density (dBm/MHz)	Limit (dBm/1 MHz) (E.I.R.P)	PASS/FAIL
2412	3.04	10	PASS
2442	3.41	10	PASS
2472	3.75	10	PASS

5. Adaptivity

5.1. Limit

Adaptive non-FHSS equipment using DAA shall comply with the following minimum set of requirements:

1) During normal operation, the equipment shall evaluate the presence of a signal on its current operating channel(s). If it is determined that a signal is present with a level above the detection threshold defined in step 5 that channel shall be marked as 'unavailable'.
2) The channel(s) shall remain unavailable for a minimum time equal to 1 s after which the channel may be considered again as an 'available' channel
3) The total time during which an equipment has transmissions on a given channel without re-evaluating the availability of that channel, is defined as the Channel Occupancy Time. The Channel Occupancy Time shall be less than 40 ms. Each such transmission sequence shall be followed by an Idle Period (no transmissions) of minimum 5 % of the Channel Occupancy Time with a minimum of 100 µs. After this, the procedure as in step 1 needs to be repeated.
4) The detection threshold shall be proportional to the transmit power of the transmitter: for a 20 dBm e.i.r.p. transmitter the detection threshold level (TL) shall be equal to or less than -70 dBm/MHz at the input to the receiver assuming a 0 dBi (receive) antenna assembly. This threshold level (TL) may be corrected for the (receive) antenna assembly gain (G); however, beamforming gain (Y) shall not be taken into account. For power levels less than 20 dBm e.i.r.p., the detection threshold level may be relaxed to:

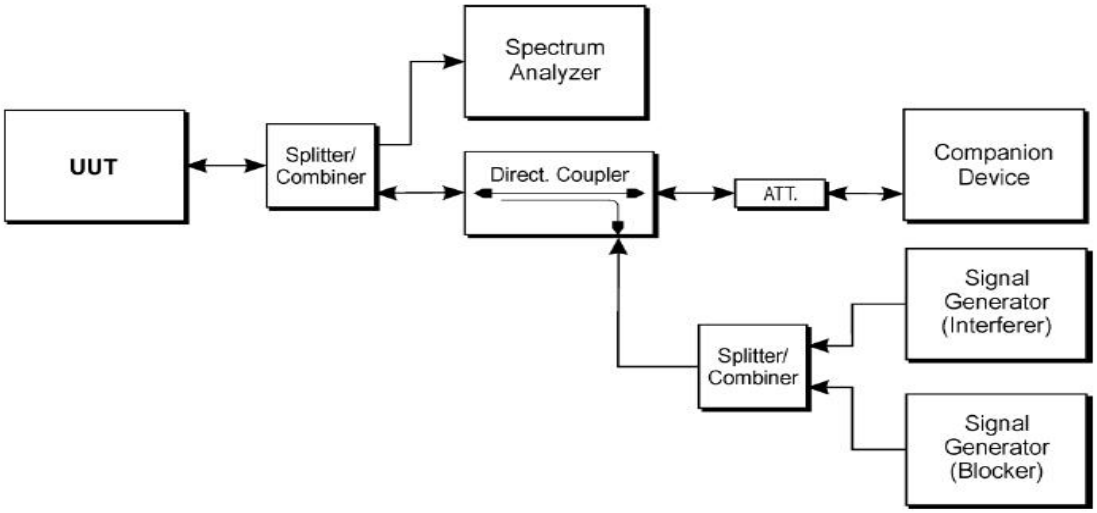
$$TL = -70 \text{ dBm/MHz} + 10 \times \log10 (100 \text{ mW} / P_{out}) \quad (P_{out} \text{ in mW e.i.r.p.})$$

5) The equipment shall comply with the requirements defined in step 1 to step 4 of the present clause in the presence of an unwanted CW signal as defined in table 9.

Table 9: Unwanted Signal parameters

Wanted signal mean power from companion device (dBm)	Unwanted signal frequency (MHz)	Unwanted CW signal power (dBm)
-30 (see note 2)	2 395 or 2 488,5 (see note 1)	-35 (see note 2)
NOTE 1: The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. See clause 5.4.6.1.		
NOTE 2: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density in front of the UUT antenna.		

5.2. Test Setup

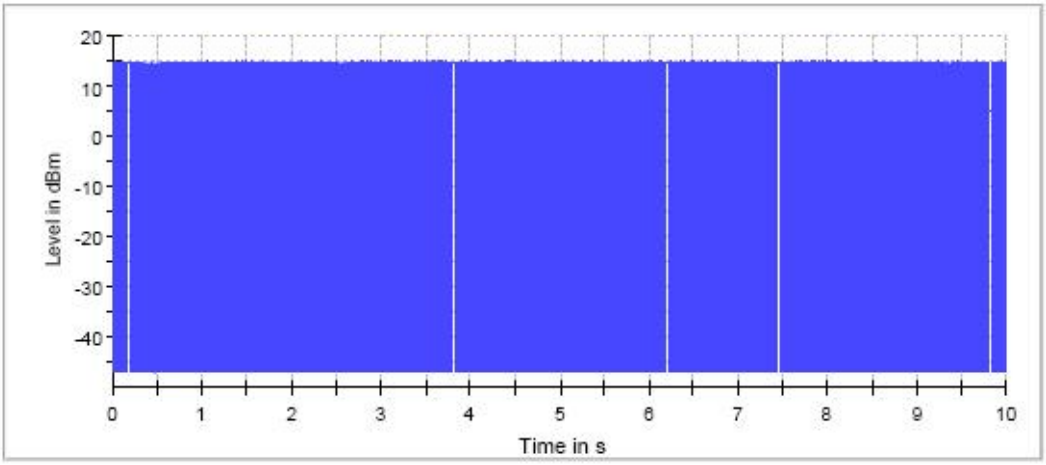


5.3. Test Procedure

Refer to ETSI EN 300 328 V2.2.2 Clause 5.4.6.

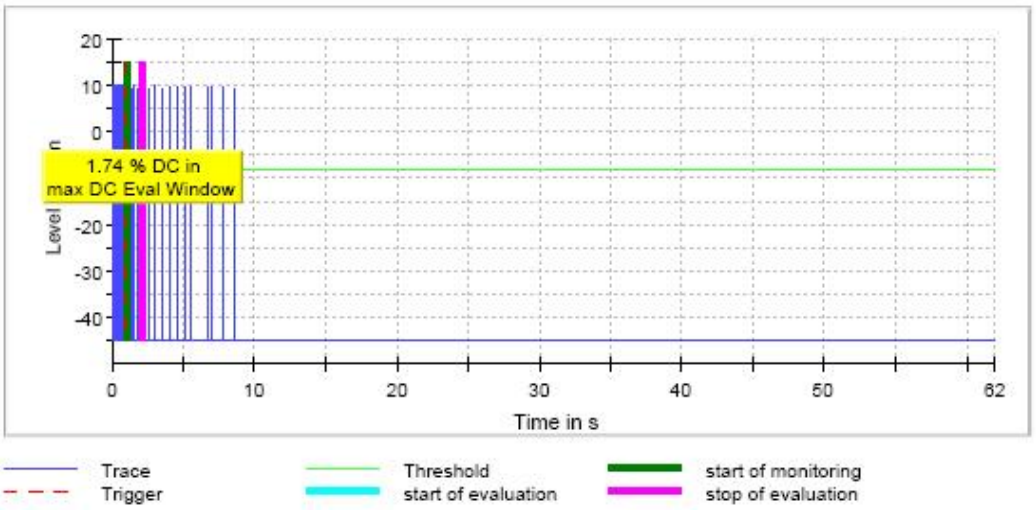
5.4. Test Result

Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V/50Hz



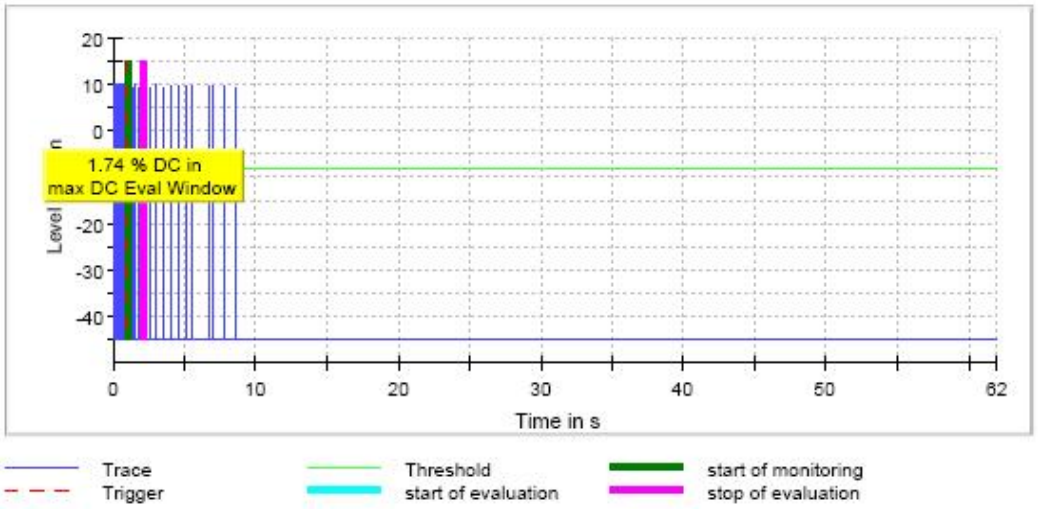
Maximun Channel Occupancy Time: 1.936ms
Related limit: <13ms
Result: PASS

Minimun Idel Period: 24us
Related limit: >18us
Result: PASS



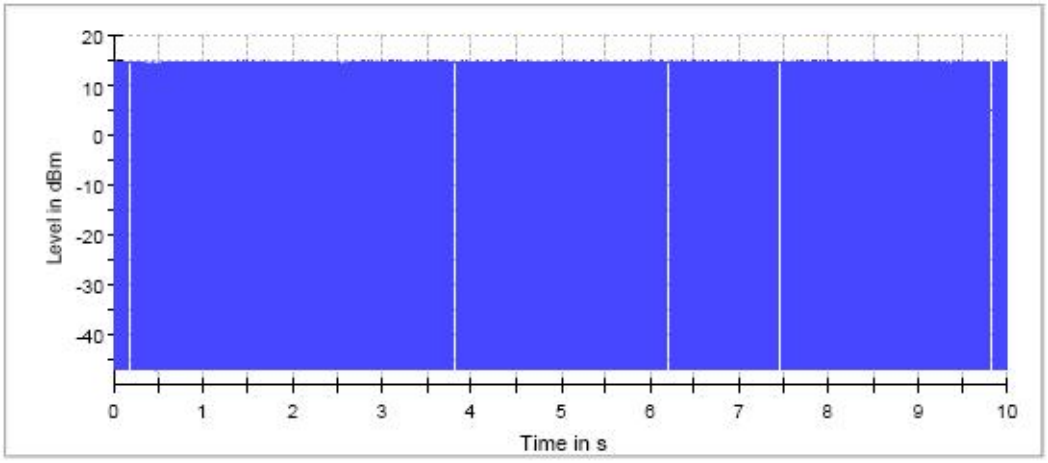
Adding the Interference Signal
Related limit: Stop transmissions response time <Maximun Channel Occupancy Time
Result:PASS

Adding the Unwanted Signal
Unwanted signal added: 2488.5MHz/-35dBm/CW
Verified: The UUT does not resume any normal transmissions
Result: PASS



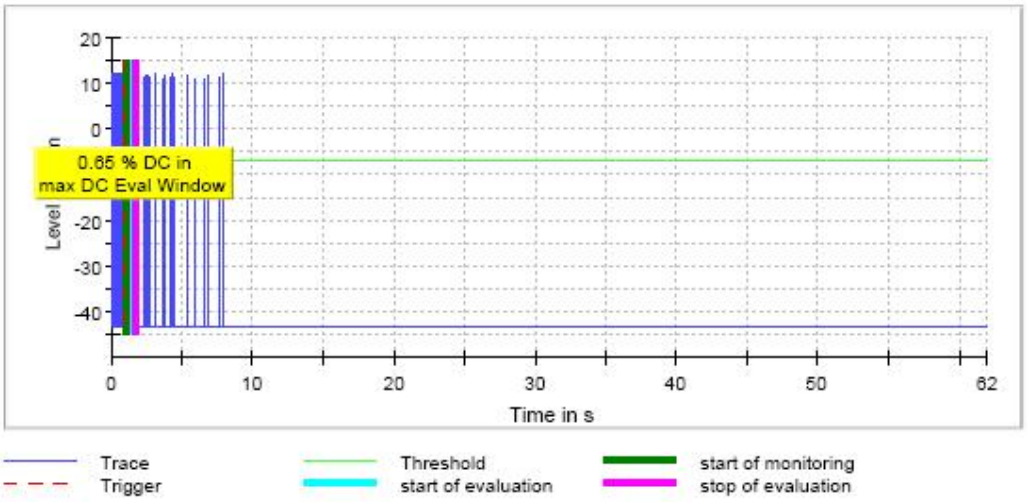
Short Control Signaling transmissions: 2.64%
Related limit: <10%
Result: PASS

Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V/50Hz



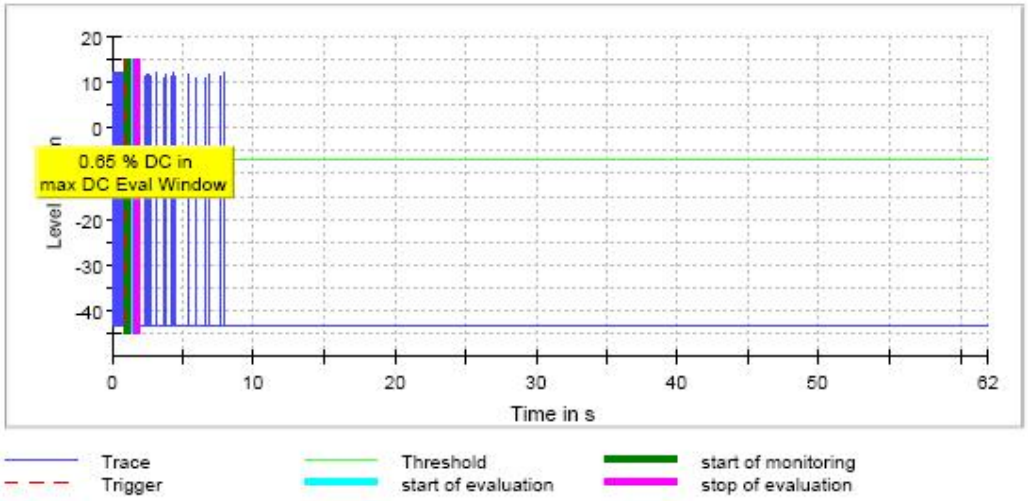
Maximun Channel Occupancy Time: 2.570ms
Related limit: <13ms
Result: PASS

Minimun Idel Period: 25us
Related limit: >18us
Result: PASS



Adding the Interference Signal
Related limit: Stop transmissions response time <Maximun Channel Occupancy Time
Result: PASS

Adding the Unwanted Signal
Unwanted signal added: 2395MHz/-35dBm/CW
Verified: The UUT does not resume any normal transmissions
Result: PASS



Short Control Signaling transmissions: 1.73%
Related limit: <10%
Result:PASS

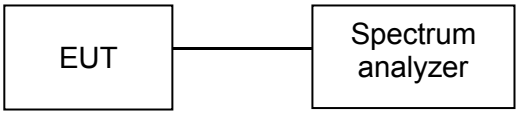
6. Occupied Channel Bandwidth

6.1. 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.

6.2. Test Setup



6.3. Test Procedure

Refer to ETSI EN 300 328 V2.2.2 Clause 5.4.7.

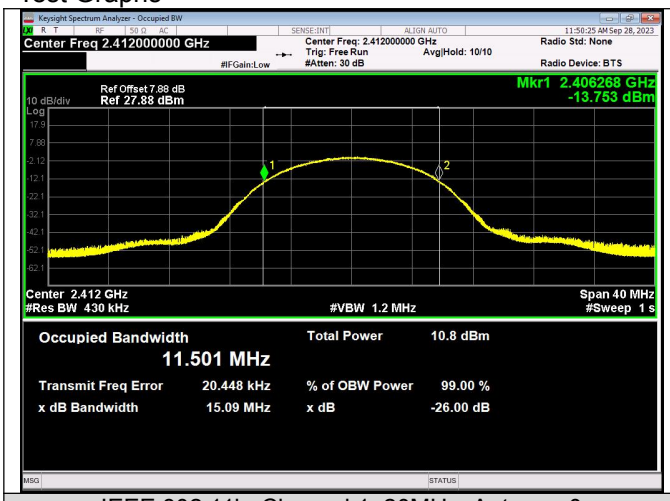
Connect the UUT to the spectrum analyzer and use the following settings:

Centre Frequency	The centre frequency of the channel under test
Frequency Span	2 × Occupied Channel Bandwidth (e.g. 40 MHz for a 20 MHz channel)
RBW	~ 1 % of the span without going below 1 %
VBW	3 × RBW
Detector	RMS
Trace	Max hold
Sweep time	1s

6.4. Test Result

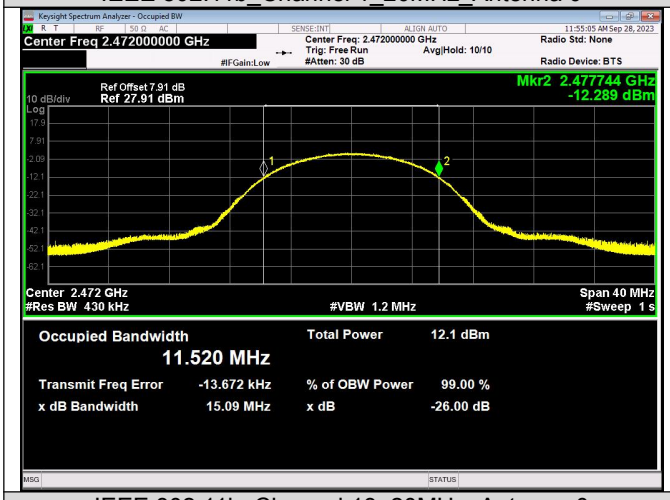
Mode	Channel	Ant.	Frequency (MHz)	Occupied Bandwidth (MHz)	FL (MHz)	FH (MHz)	Limit	Result
IEEE 802.11b	1	0	2412	11.501	2406.268	2417.768	2400 MHz to 2483.5 MHz	PASS
	7		2442	11.501	2436.28	2447.78		PASS
	13		2472	11.520	2466.224	2477.744		PASS
IEEE 802.11g	1		2412	16.670	2403.668	2420.34		PASS
	7		2442	16.660	2433.68	2450.34		PASS
	13		2472	16.667	2463.66	2480.324		PASS
IEEE 802.11n_20	1		2412	17.778	2403.12	2420.896		PASS
	7		2442	17.768	2433.132	2450.9		PASS
	13		2472	17.771	2463.108	2480.88		PASS

Test Graphs

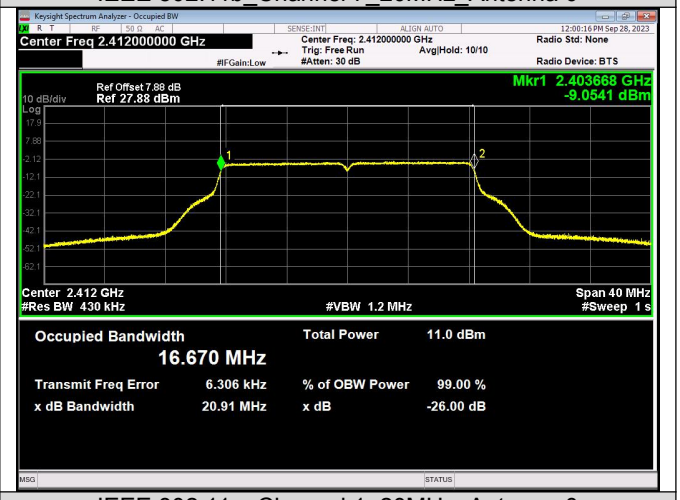


IEEE 802.11b_Channel 1_20MHz_Antenna 0

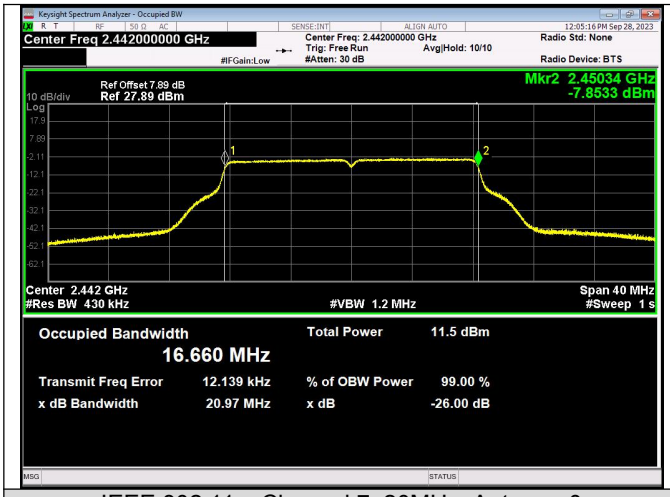
IEEE 802.11b_Channel 7_20MHz_Antenna 0



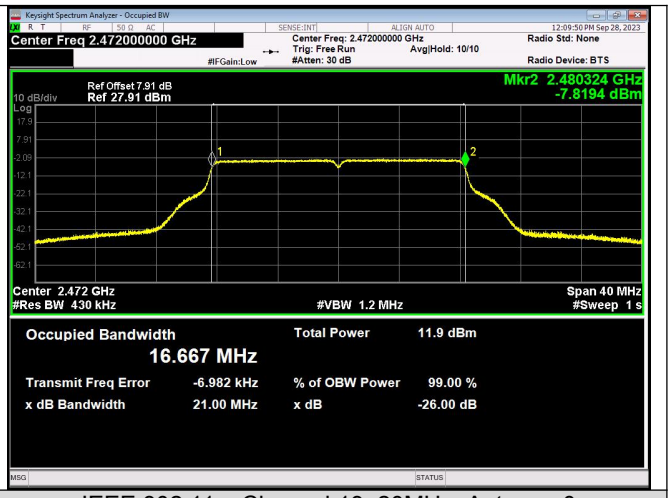
IEEE 802.11b_Channel 13_20MHz_Antenna 0



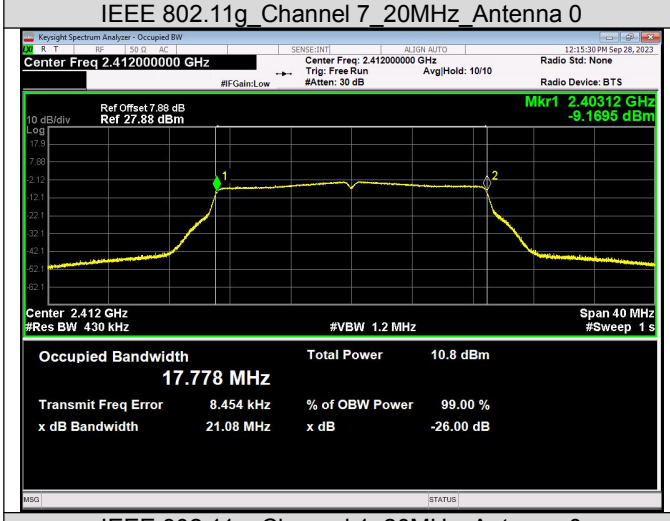
IEEE 802.11g_Channel 1_20MHz_Antenna 0



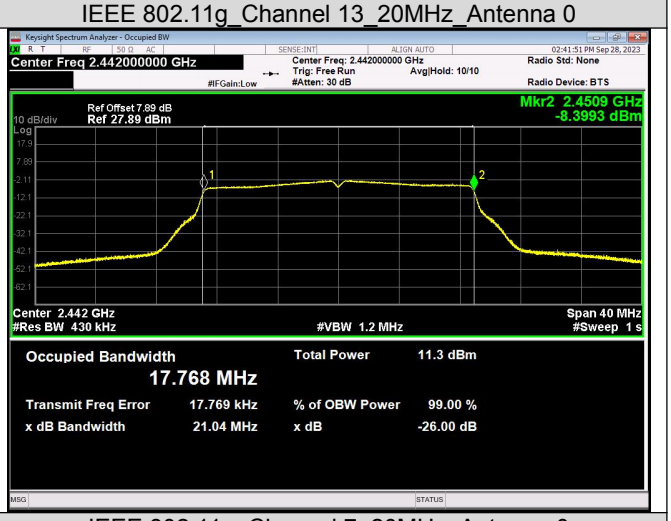
IEEE 802.11g_Channel 7_20MHz_Antenna 0



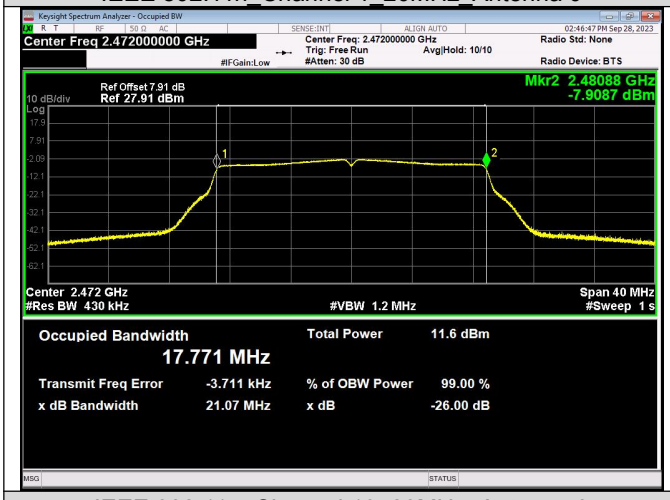
IEEE 802.11g_Channel 13_20MHz_Antenna 0



IEEE 802.11n_Channel 1_20MHz_Antenna 0



IEEE 802.11n_Channel 7_20MHz_Antenna 0

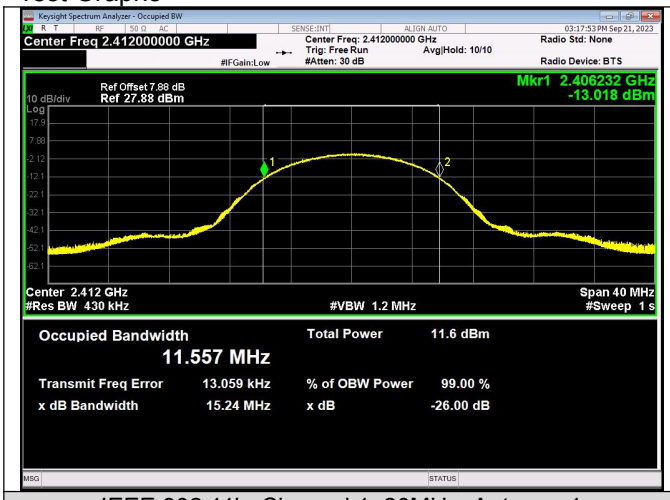


IEEE 802.11n_Channel 13_20MHz_Antenna 0

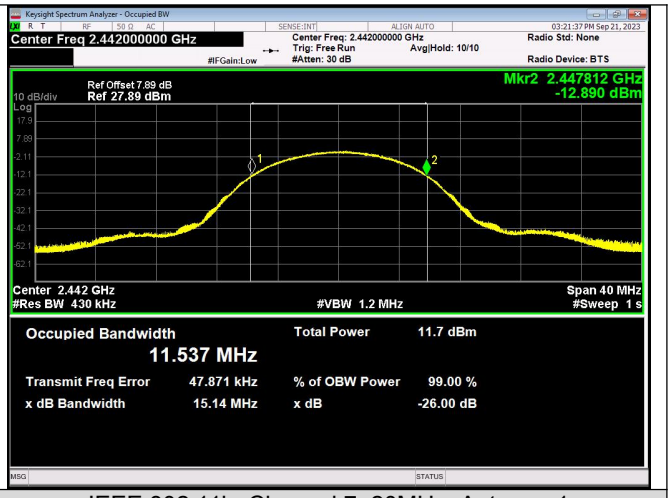
Void

Mode	Channel	Ant.	Frequency (MHz)	Occupied Bandwidth (MHz)	FL (MHz)	FH (MHz)	Limit	Result
IEEE 802.11b	1	1	2412	11.557	2406.232	2417.788	2400 MHz to 2483.5 MHz	PASS
	7		2442	11.537	2436.28	2447.812		PASS
	13		2472	11.545	2466.248	2477.792		PASS
IEEE 802.11g	1		2412	16.578	2403.716	2420.292		PASS
	7		2442	16.665	2433.68	2450.344		PASS
	13		2472	16.660	2463.676	2480.332		PASS
IEEE 802.11n_20	1		2412	17.777	2403.112	2420.888		PASS
	7		2442	17.767	2433.136	2450.9		PASS
	13		2472	17.770	2463.124	2480.892		PASS

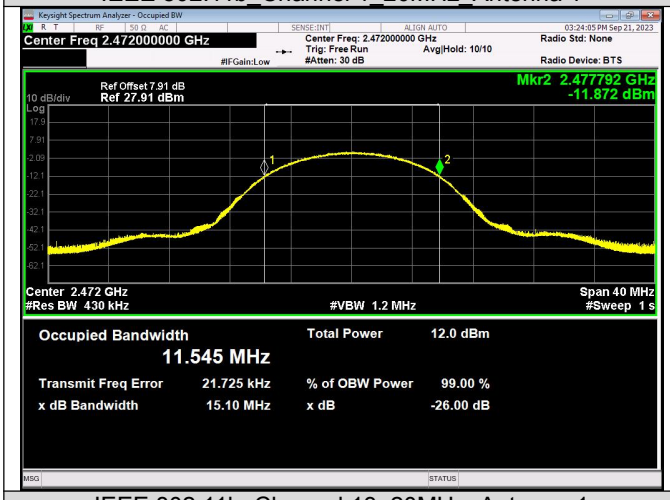
Test Graphs



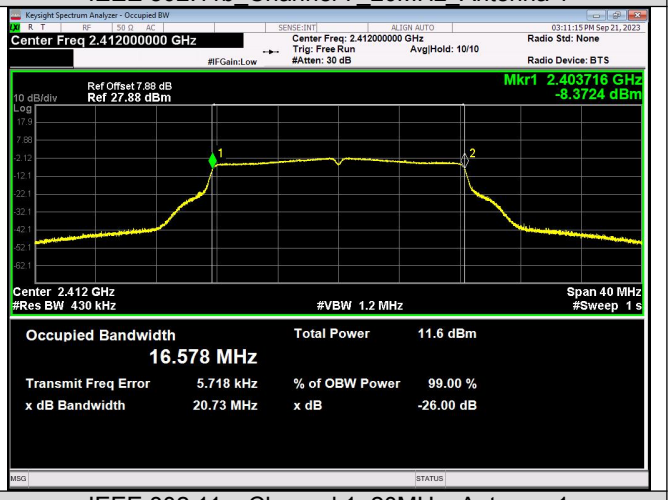
IEEE 802.11b_Channel 1_20MHz_Antenna 1



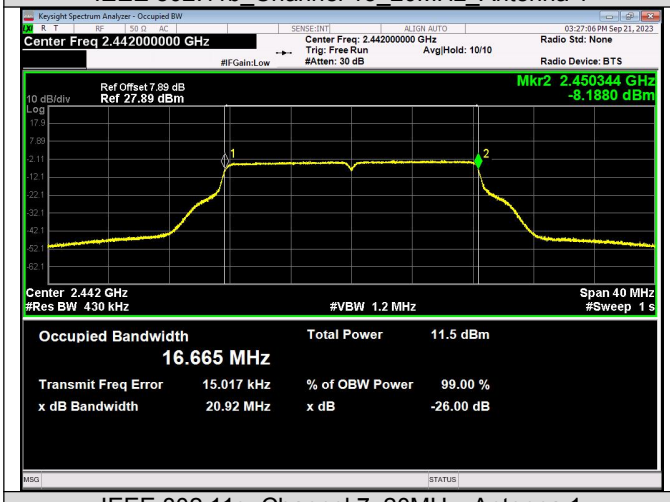
IEEE 802.11b_Channel 7_20MHz_Antenna 1



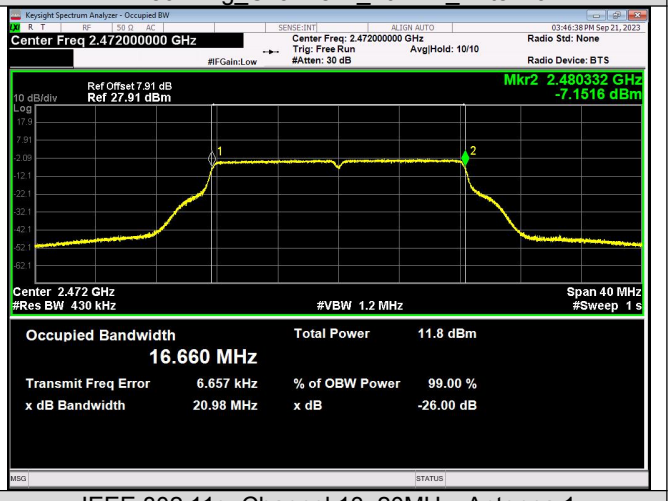
IEEE 802.11b_Channel 13_20MHz_Antenna 1



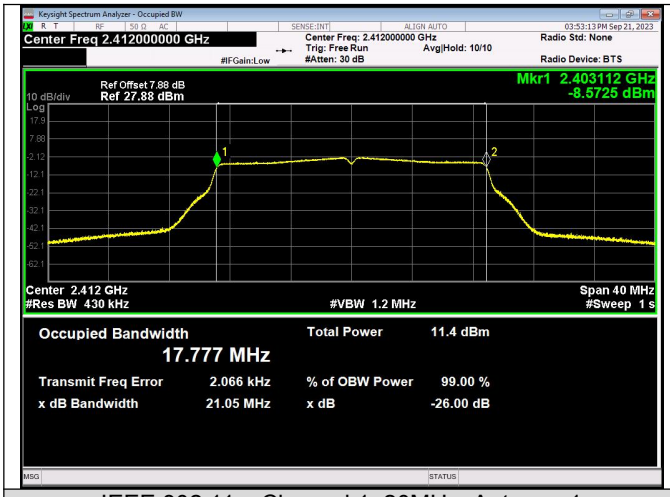
IEEE 802.11g_Channel 1_20MHz_Antenna 1



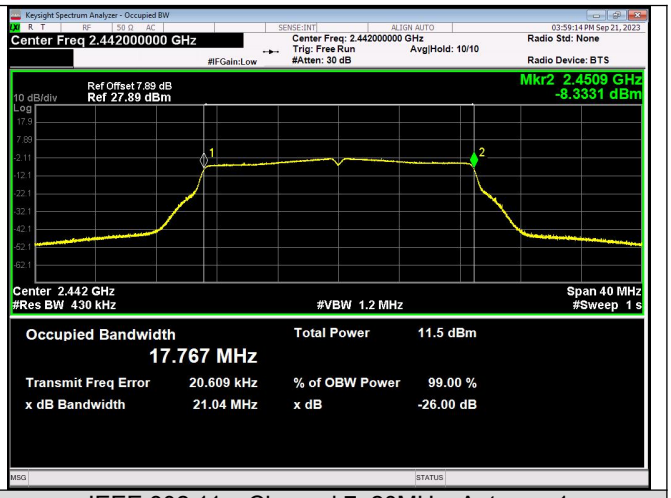
IEEE 802.11g_Channel 7_20MHz_Antenna 1



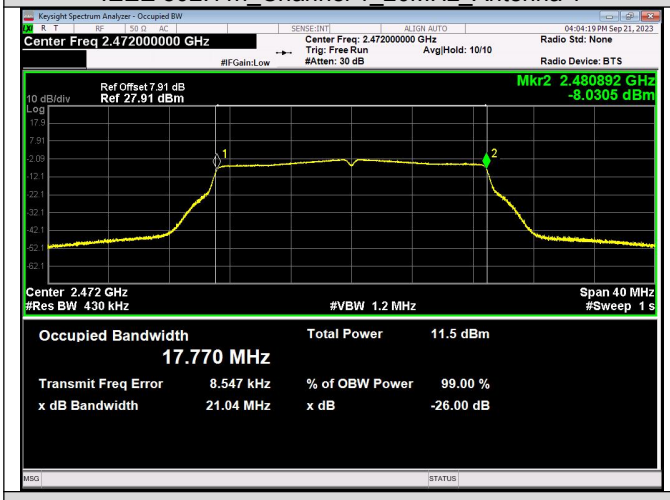
IEEE 802.11g_Channel 13_20MHz_Antenna 1



IEEE 802.11n_Channel 1_20MHz_Antenna 1



IEEE 802.11n_Channel 7_20MHz_Antenna 1



IEEE 802.11n_Channel 13_20MHz_Antenna 1

Void

7. Transmitter unwanted emissions in the out-of-band domain

7.1. 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.

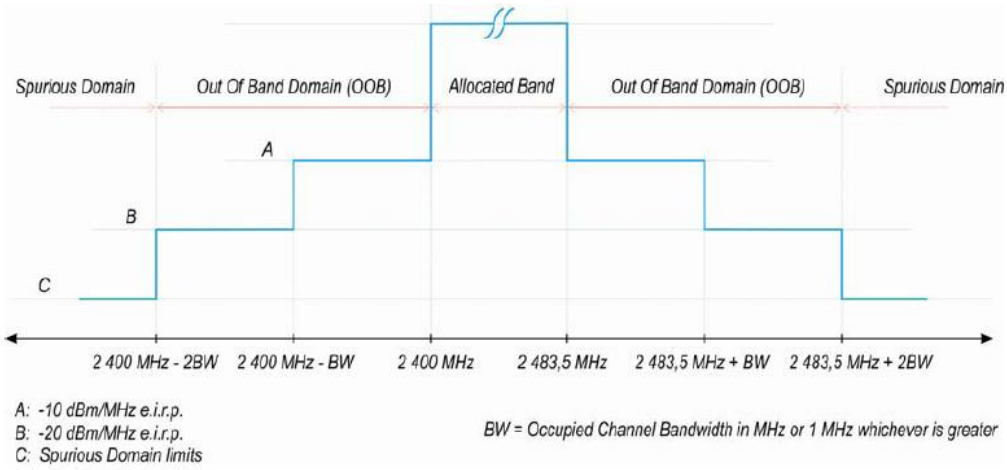


Figure 3: Transmit mask

7.2. Test Setup

The measurements were performed at normal environmental conditions. The measurement was performed at the lowest and the highest channel on which the equipment can operate.
The equipment was configured to operate under its worst case situation with respect to output power. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator. The frequency has to be recorded for the right and left end above threshold of highest and lowest channel respectively.

7.3. Test Procedure

Refer to ETSI EN 300 328 V2.2.2 Clause 5.4.8.

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

RBW/ VBW	1MHz/3MHz
Span	0Hz
Filter mode	Channel filter
Sweep mode	Continuous
Sweep Points	5000
Detector	RMS
Trace mode	Clear / Write
Trigger Mode	Video trigger

7.4. Test Result

Mode	Channel	Ant.	Test Freq. (MHz)	OOB Emission (dBm)	Segments	Limit (dBm)	Margin (dB)	Result
IEEE 802.11b	1	0	2398.5	-23.007	2 400 MHz - BW to 2 400 MHz	-10	-13.01	PASS
IEEE 802.11b			2386.9993	-29.152	2 400 MHz - 2 BW to 2 400 MHz - BW	-20	-9.15	PASS
IEEE 802.11b			2487	-31.418	2 483,5 MHz to 2 483,5 MHz + BW	-10	-21.42	PASS
IEEE 802.11b			2505.5007	-36.747	2 483,5 MHz + BW to 2 483,5 MHz + 2 BW	-20	-16.75	PASS
IEEE 802.11b	13		2399.5	-36.619	2 400 MHz - BW to 2 400 MHz	-10	-26.62	PASS
IEEE 802.11b			2387.9802	-40.565	2 400 MHz - 2 BW to 2 400 MHz - BW	-20	-20.56	PASS
IEEE 802.11b			2484	-21.558	2 483,5 MHz to 2 483,5 MHz + BW	-10	-11.56	PASS
IEEE 802.11b			2506.5198	-25.704	2 483,5 MHz + BW to 2 483,5 MHz + 2 BW	-20	-5.7	PASS
IEEE 802.11g	1		2399.5	-27.949	2 400 MHz - BW to 2 400 MHz	-10	-17.95	PASS
IEEE 802.11g			2382.8296	-39.093	2 400 MHz - 2 BW to 2 400 MHz - BW	-20	-19.09	PASS
IEEE 802.11g			2485	-48.127	2 483,5 MHz to 2 483,5 MHz + BW	-10	-38.13	PASS
IEEE 802.11g			2501.6704	-49.739	2 483,5 MHz + BW to 2 483,5 MHz + 2 BW	-20	-29.74	PASS
IEEE 802.11g	13		2391.5	-50.672	2 400 MHz - BW to 2 400 MHz	-10	-40.67	PASS
IEEE 802.11g			2366.8331	-51.788	2 400 MHz - 2 BW to 2 400 MHz - BW	-20	-31.79	PASS
IEEE 802.11g			2484	-23.217	2 483,5 MHz to 2 483,5 MHz + BW	-10	-13.22	PASS
IEEE 802.11g			2501.6669	-39.213	2 483,5 MHz + BW to 2 483,5 MHz + 2 BW	-20	-19.21	PASS
IEEE	1		2399.5	-25.688	2 400 MHz	-10	-15.69	PASS

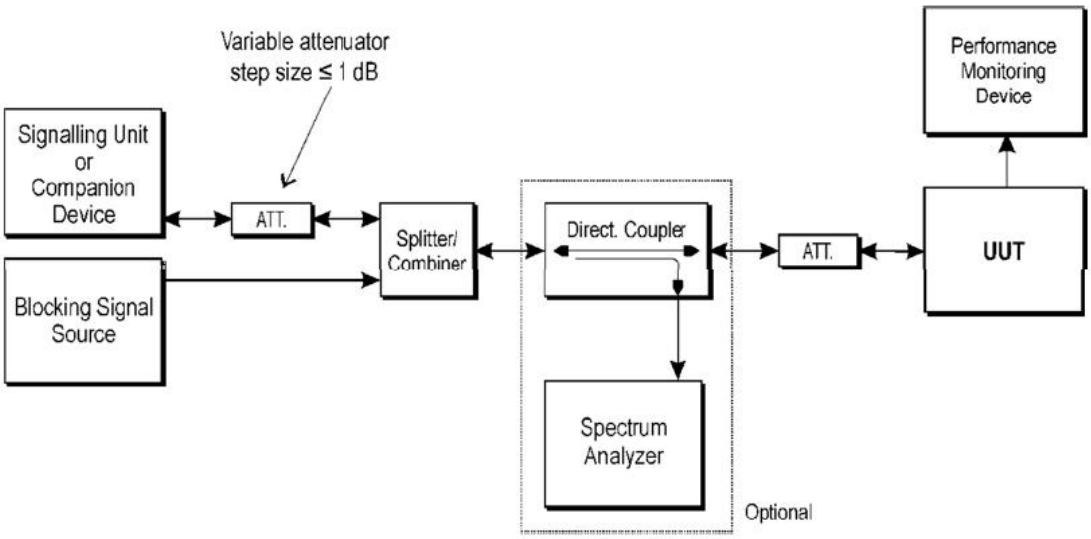
802.11n_20					- BW to 2 400 MHz			
IEEE 802.11n_20			2380.7216	-41.01	2 400 MHz - 2 BW to 2 400 MHz - BW	-20	-21.01	PASS
IEEE 802.11n_20			2488	-47.466	2 483,5 MHz to 2 483,5 MHz + BW	-10	-37.47	PASS
IEEE 802.11n_20			2502.7784	-50.408	2 483,5 MHz + BW to 2 483,5 MHz + 2 BW	-20	-30.41	PASS
IEEE 802.11n_20	13		2396.5	-50.377	2 400 MHz - BW to 2 400 MHz	-10	-40.38	PASS
IEEE 802.11n_20			2368.7289	-51.503	2 400 MHz - 2 BW to 2 400 MHz - BW	-20	-31.5	PASS
IEEE 802.11n_20			2484	-22.643	2 483,5 MHz to 2 483,5 MHz + BW	-10	-12.64	PASS
IEEE 802.11n_20			2501.7711	-38.168	2 483,5 MHz + BW to 2 483,5 MHz + 2 BW	-20	-18.17	PASS

Mode	Channel	Ant.	Test Freq. (MHz)	OOB Emission (dBm)	Segments	Limit (dBm)	Margin (dB)	Result
IEEE 802.11b	1	1	2398.5	-24.899	2 400 MHz - BW to 2 400 MHz	-10	-14.9	PASS
IEEE 802.11b			2385.5725	-29.361	2 400 MHz - 2 BW to 2 400 MHz - BW	-20	-9.36	PASS
IEEE 802.11b			2484	-30.088	2 483,5 MHz to 2 483,5 MHz + BW	-10	-20.09	PASS
IEEE 802.11b			2503.9275	-32.68	2 483,5 MHz + BW to 2 483,5 MHz + 2 BW	-20	-12.68	PASS
IEEE 802.11b	13		2391.5	-42.745	2 400 MHz - BW to 2 400 MHz	-10	-32.74	PASS
IEEE 802.11b			2378.6037	-46.062	2 400 MHz - 2 BW to 2 400 MHz - BW	-20	-26.06	PASS
IEEE 802.11b			2484	-27.773	2 483,5 MHz to 2 483,5 MHz + BW	-10	-17.77	PASS
IEEE 802.11b			2505.8963	-28.949	2 483,5 MHz + BW to 2 483,5 MHz + 2 BW	-20	-8.95	PASS
IEEE 802.11g	1		2399.5	-24.551	2 400 MHz - BW to 2 400 MHz	-10	-14.55	PASS

IEEE 802.11g			2381.9221	-39.672	2 400 MHz - 2 BW to 2 400 MHz - BW	-20	-19.67	PASS
IEEE 802.11g			2484	-48.009	2 483,5 MHz to 2 483,5 MHz + BW	-10	-38.01	PASS
IEEE 802.11g			2510.5779	-50.587	2 483,5 MHz + BW to 2 483,5 MHz + 2 BW	-20	-30.59	PASS
IEEE 802.11g	13		2385.5	-50.767	2 400 MHz - BW to 2 400 MHz	-10	-40.77	PASS
IEEE 802.11g			2377.84	-51.73	2 400 MHz - 2 BW to 2 400 MHz - BW	-20	-31.73	PASS
IEEE 802.11g			2484	-25.457	2 483,5 MHz to 2 483,5 MHz + BW	-10	-15.46	PASS
IEEE 802.11g			2500.66	-43.673	2 483,5 MHz + BW to 2 483,5 MHz + 2 BW	-20	-23.67	PASS
IEEE 802.11n_20	1		2399.5	-24.506	2 400 MHz - BW to 2 400 MHz	-10	-14.51	PASS
IEEE 802.11n_20			2381.7231	-44.289	2 400 MHz - 2 BW to 2 400 MHz - BW	-20	-24.29	PASS
IEEE 802.11n_20			2493	-48.002	2 483,5 MHz to 2 483,5 MHz + BW	-10	-38.0	PASS
IEEE 802.11n_20			2504.7769	-49.93	2 483,5 MHz + BW to 2 483,5 MHz + 2 BW	-20	-29.93	PASS
IEEE 802.11n_20	13		2386.5	-50.834	2 400 MHz - BW to 2 400 MHz	-10	-40.83	PASS
IEEE 802.11n_20			2366.7303	-51.181	2 400 MHz - 2 BW to 2 400 MHz - BW	-20	-31.18	PASS
IEEE 802.11n_20			2484	-24.42	2 483,5 MHz to 2 483,5 MHz + BW	-10	-14.42	PASS
IEEE 802.11n_20			2502.7697	-43.889	2 483,5 MHz + BW to 2 483,5 MHz + 2 BW	-20	-23.89	PASS

8. Receiver Blocking

8.1. Test Setup



8.2. Test Procedure

Refer to ETSI EN 300 328 V2.2.2 Clause 5.4.11.

8.3. Categorization

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 % (irrespective of the maximum RF output power); or quipment (adaptive or non-adaptive) with a maximum RF output power greater than 0 dBm e.i.r.p. and less than or equal to 10 dBm e.i.r.p.

Receiver category 3
Non-adaptive equipment with a maximum Medium Utilization (MU) factor of 1 % (irrespective of the maximum RF output power); or equipment (adaptive or non-adaptive) with a maximum RF output power of 0 dBm e.i.r.p.

8.4. Limit

Table 14 contains the Receiver Blocking parameters for Receiver Category 1 equipment.

Table 14: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-133 dBm + 10 × $\log_{10}$(OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × $\log_{10}$(OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674		
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 20 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

Table 15 contains the Receiver Blocking parameters for Receiver Category 2 equipment.

Table 15: Receiver Blocking parameters receiver Category 2 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × $\log_{10}$(OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

Table 16 contains the Receiver Blocking parameters for Receiver Category 3 equipment.

Table 16: Receiver Blocking parameters receiver Category 3 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × $\log_{10}$(OCBW) + 20 dB) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW

NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 30 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

8.5. Test Result

Test Mode	802.11b Low Channel					
Wanted signal Mean power From companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal Power (dBm)	Type of blocking signal	PER (%)	PER (%) Limit	Result
-59.29	2380	-34	CW	0.63	≦10	Pass
	2504			0.27		Pass
-65.29	2300			0.51		Pass
	2330			0.29		Pass
	2360			0.37		Pass
	2524			0.14		Pass
	2584			0.83		Pass
	2674			0.68		Pass

Test Mode	802.11b High Channel					
Wanted signal Mean power From companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal Power (dBm)	Type of blocking signal	PER (%)	PER (%) Limit	Result
-59.29	2380	-34	CW	0.29	≦10	Pass
	2504			1.03		Pass
-65.29	2300			0.74		Pass
	2330			0.83		Pass
	2360			1.22		Pass
	2524			0.53		Pass
	2584			0.33		Pass
	2674			1.41		Pass

Note: 802.11b mode is the worst data of ANT 0 test, which has been recorded in this report.

9. Transmitter unwanted emissions in the spurious domain

9.1. Applied procedures / limit

Frequency range	Maximum power	Bandwidth
30MHz-47MHz	-36dBm	100kHz
47MHz-74MHz	-54dBm	100kHz
74MHz-87.5MHz	-36dBm	100kHz
87.5MHz-118MHz	-54dBm	100kHz
118MHz-174MHz	-36dBm	100kHz
174MHz-230MHz	-54dBm	100kHz
230MHz-470MHz	-36dBm	100kHz
470MHz-694MHz	-54dBm	100kHz
694MHz-1GHz	-36dBm	100kHz
1GHz -12.75GHz	-30dBm	1MHz

9.2. Measuring Instruments and Setting

The following table is the setting of the Spectrum Analyzer.

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

Spectrum Analyzer	Setting
Start Frequency	30 MHz
Stop Frequency	1000 MHz
Detector Mode	Peak
Trace Mode	Max Hold
Filter type	3 dB (Gaussian)
RBW / VBW	100 kHz / 300 kHz
Sweep Points	≥ 19 400

The emissions over the range 1 GHz to 12.75 GHz shall be identified.

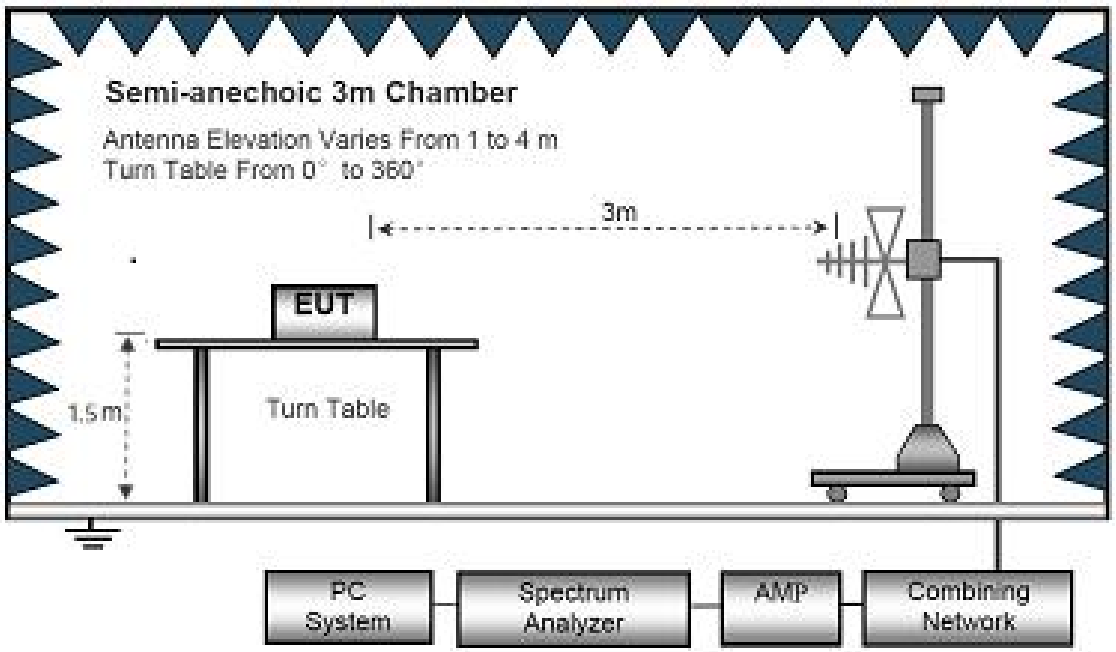
Spectrum Analyzer	Setting
Start Frequency	1 GHz
Stop Frequency	12.75 GHz
Detector Mode	Peak
Trace Mode	Max Hold
Filter type	3 dB (Gaussian)
RBW / VBW	1 MHz / 3 MHz
Sweep Points	≥ 23 500

9.3. Test Procedures

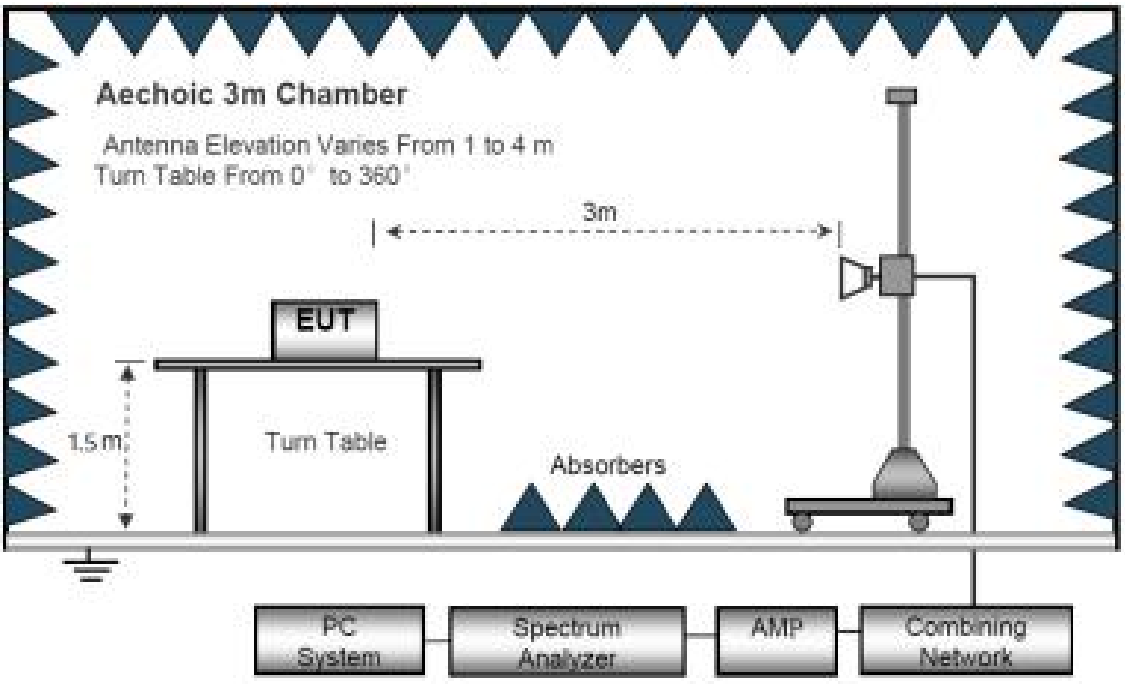
Refer to EN 300 328 V2.2.2 Clause 5.4.9.

9.4. Test Setup

Below 1GHz



Above 1GHz



9.5. Test Results

Below 1GHz

Test Mode: 802.11b mode-CH01			
Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V/50Hz

Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Polarization
136.5412	-53.02	2.36	-50.66	-36	-14.66	peak	Horizontal
335.0142	-54.16	3.55	-50.61	-36	-14.61	peak	Horizontal
368.5412	-53.26	3.64	-49.62	-36	-13.62	peak	Horizontal
543.1026	-67.94	4.05	-63.89	-54	-9.89	peak	Horizontal
623.0125	-68.51	4.65	-63.86	-54	-9.86	peak	Horizontal
676.4102	-69.32	5.58	-63.74	-54	-9.74	peak	Horizontal
132.6415	-66.95	2.21	-64.74	-54	-10.74	peak	Vertical
263.0152	-52.34	3.55	-48.79	-36	-12.79	peak	Vertical
436.0135	-52.39	3.64	-48.75	-36	-12.75	peak	Vertical
543.0122	-67.94	4.05	-63.89	-54	-9.89	peak	Vertical
623.0136	-67.94	4.65	-63.29	-54	-9.29	peak	Vertical
674.0123	-68.43	5.58	-62.85	-54	-8.85	peak	Vertical

Test Mode: 802.11b mode-CH13			
Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V/50Hz

Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Polarization
133.0251	-50.23	2.36	-47.87	-36	-11.87	peak	Horizontal
254.1063	-51.36	3.55	-47.81	-36	-11.81	peak	Horizontal
341.0125	-52.30	3.64	-48.66	-36	-12.66	peak	Horizontal
551.0236	-70.21	4.05	-66.16	-54	-12.16	peak	Horizontal
596.3626	-71.24	4.65	-66.59	-54	-12.59	peak	Horizontal
653.2014	-70.03	5.58	-64.45	-54	-10.45	peak	Horizontal
142.0356	-66.39	2.21	-64.18	-54	-10.18	peak	Vertical
254.1063	-50.24	3.55	-46.69	-36	-10.69	peak	Vertical
453.2063	-52.13	3.64	-48.49	-36	-12.49	peak	Vertical
539.5462	-68.57	4.05	-64.52	-54	-10.52	peak	Vertical
582.0163	-68.54	4.65	-63.89	-54	-9.89	peak	Vertical
653.2698	-69.33	5.58	-63.75	-54	-9.75	peak	Vertical

Note:
1. The emission behaviour belongs to narrowband spurious emission.
2. Calculation of result is: Result (dBm)= Reading (dBm)+ Correct Factor (dB).
3. Recored the worst data 802.11b mode for ANT 0 in report.

Above 1GHz

Test Mode: 802.11b mode-CH01			
Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V/50Hz

Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Polarization
4824.036	-53.26	12.35	-40.91	-30	-10.91	peak	Horizontal
7238.546	-58.64	18.21	-40.43	-30	-10.43	peak	Horizontal
7635.204	-59.63	18.87	-40.76	-30	-10.76	peak	Horizontal
9485.106	-60.24	20.25	-39.99	-30	-9.99	peak	Horizontal
10236.521	-61.33	21.65	-39.68	-30	-9.68	peak	Horizontal
11532.011	-61.98	23.67	-38.31	-30	-8.31	peak	Horizontal
4824.014	-52.36	12.35	-40.01	-30	-10.01	peak	Vertical
7238.415	-59.16	18.21	-40.95	-30	-10.95	peak	Vertical
7832.102	-60.23	18.87	-41.36	-30	-11.36	peak	Vertical
9546.352	-59.03	20.25	-38.78	-30	-8.78	peak	Vertical
10324.026	-60.54	21.65	-38.89	-30	-8.89	peak	Vertical
12135.263	-62.35	23.67	-38.68	-30	-8.68	peak	Vertical

Test Mode: 802.11b mode-CH13			
Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V/50Hz

Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Polarization
4944.153	-53.02	12.38	-40.64	-30	-10.64	peak	Horizontal
7420.365	-59.64	18.55	-41.09	-30	-11.09	peak	Horizontal
7841.026	-58.37	18.89	-39.48	-30	-9.48	peak	Horizontal
9823.041	-60.24	20.25	-39.99	-30	-9.99	peak	Horizontal
10532.625	-60.23	21.64	-38.59	-30	-8.59	peak	Horizontal
11402.365	-61.43	23.65	-37.78	-30	-7.78	peak	Horizontal
4944.053	-51.27	12.38	-38.89	-30	-8.89	peak	Vertical
7435.216	-58.32	18.55	-39.77	-30	-9.77	peak	Vertical
7824.103	-60.32	18.89	-41.43	-30	-11.43	peak	Vertical
9853.024	-61.78	20.25	-41.53	-30	-11.53	peak	Vertical
10256.241	-60.35	21.64	-38.71	-30	-8.71	peak	Vertical
11236.246	-61.43	23.65	-37.78	-30	-7.78	peak	Vertical

Note:
1. The emission behaviour belongs to narrowband spurious emission.
2. Calculation of result is: Result (dBm)= Reading (dBm)+ Correct Factor (dB).
3. Recored the worst data 802.11b mode for ANT 0 in report.

10. Receiver spurious emissions

10.1. Applied procedures / limit

The spurious emissions of the receiver shall not exceed the values given in the following table. In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz.

Clause	Frequency range	Maximum power	Bandwidth
4.3.1.11.3	30MHz-1GHz	-57dBm	100kHz
	1GHz -12.75GHz	-47dBm	1MHz

10.2. Measuring Instruments and Setting

The following table is the setting of the Spectrum Analyzer.

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

Spectrum Analyzer	Setting
Start Frequency	30 MHz
Stop Frequency	1000 MHz
Detector Mode	Peak
Trace Mode	Max Hold
Filter type	3 dB (Gaussian)
RBW / VBW	100 kHz / 300 kHz
Sweep Points	≥ 19 400

The emissions over the range 1 GHz to 12.75 GHz shall be identified.

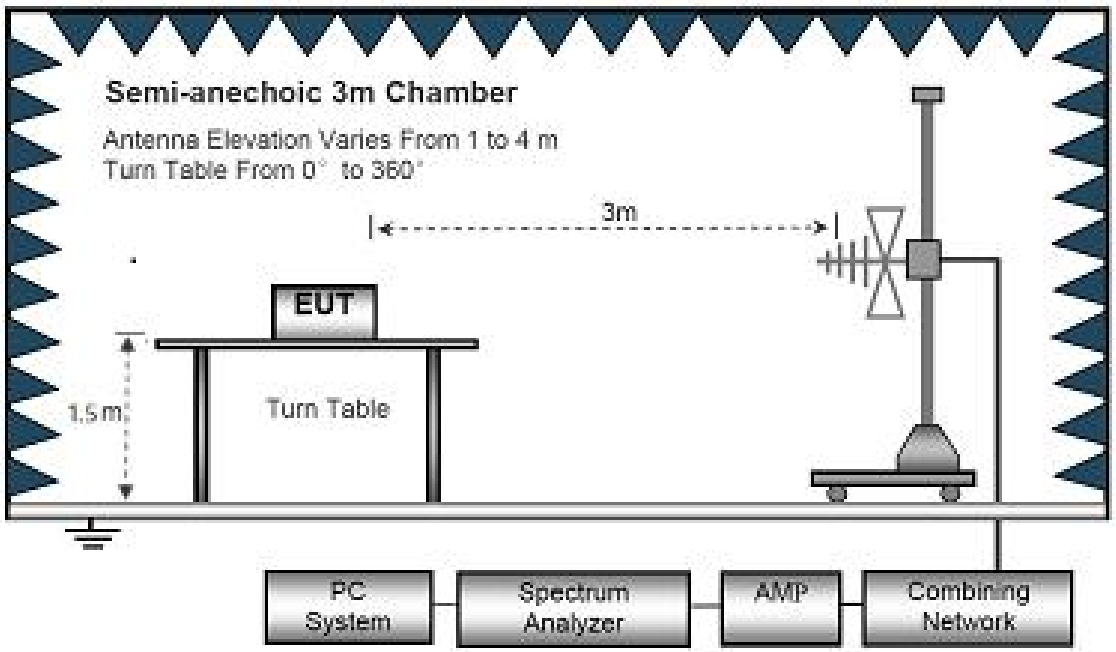
Spectrum Analyzer	Setting
Start Frequency	1 GHz
Stop Frequency	12.75 GHz
Detector Mode	Peak
Trace Mode	Max Hold
Filter type	3 dB (Gaussian)
RBW / VBW	1 MHz / 3 MHz
Sweep Points	≥ 23 500

10.3. Test Procedures

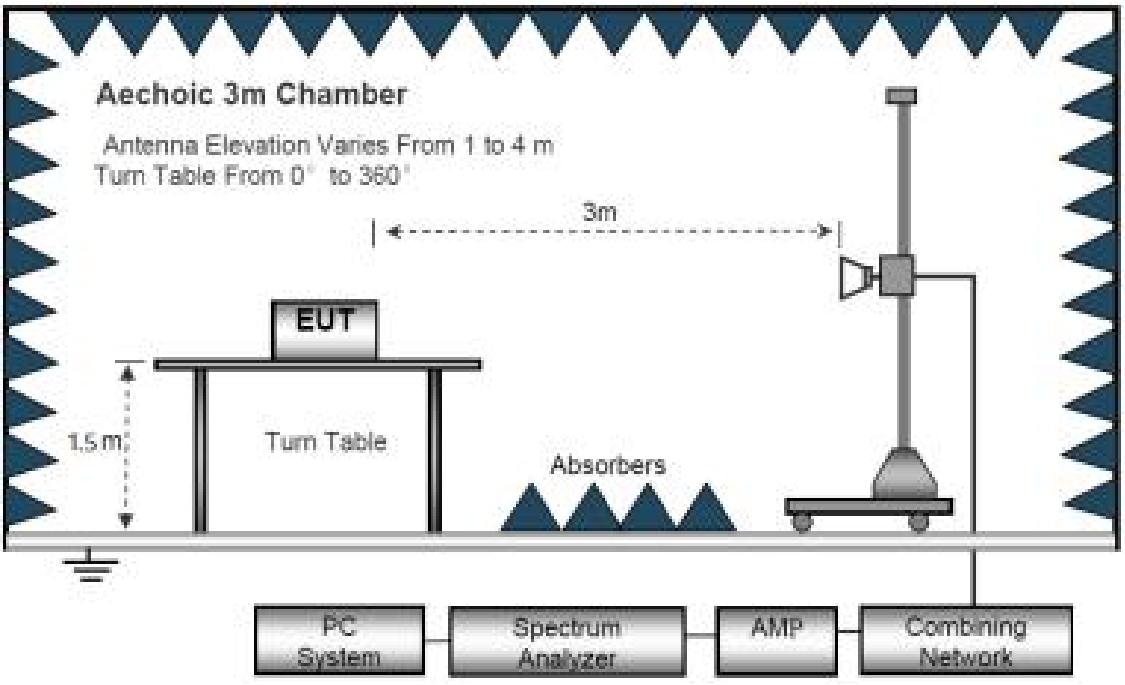
Refer to EN 300 328 V2.2.2 Clause 5.4.10.

10.4. Test Setup

Below 1GHz



Above 1GHz



10.5. Test Results

Below 1GHz

Test Mode: 802.11b mode-CH01			
Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V/50Hz

Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Polarization
143.0265	-67.53	2.34	-65.19	-57	-8.19	peak	Horizontal
253.0451	-68.35	3.55	-64.8	-57	-7.8	peak	Horizontal
513.0265	-69.32	3.65	-65.67	-57	-8.67	peak	Horizontal
635.5412	-68.49	4.01	-64.48	-57	-7.48	peak	Horizontal
796.5412	-69.53	4.76	-64.77	-57	-7.77	peak	Horizontal
902.3144	-70.32	5.68	-64.64	-57	-7.64	peak	Horizontal
136.0254	-69.52	2.21	-67.31	-57	-10.31	peak	Vertical
263.5145	-69.02	3.56	-65.46	-57	-8.46	peak	Vertical
546.1023	-70.32	3.65	-66.67	-57	-9.67	peak	Vertical
653.0214	-70.24	4.01	-66.23	-57	-9.23	peak	Vertical
814.0526	-70.43	4.72	-65.71	-57	-8.71	peak	Vertical
875.2036	-71.11	5.62	-65.49	-57	-8.49	peak	Vertical

Test Mode: 802.11b mode-CH13			
Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V/50Hz

Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Polarization
233.0541	-70.23	3.36	-66.87	-57	-9.87	peak	Horizontal
386.5416	-70.24	3.58	-66.66	-57	-9.66	peak	Horizontal
596.3642	-70.41	3.85	-66.56	-57	-9.56	peak	Horizontal
684.0124	-70.53	3.94	-66.59	-57	-9.59	peak	Horizontal
823.0144	-70.12	4.51	-65.61	-57	-8.61	peak	Horizontal
918.5203	-70.14	5.51	-64.63	-57	-7.63	peak	Horizontal
146.5203	-70.23	3.21	-67.02	-57	-10.02	peak	Vertical
253.0314	-70.24	3.52	-66.72	-57	-9.72	peak	Vertical
436.2106	-70.13	3.74	-66.39	-57	-9.39	peak	Vertical
541.0236	-70.02	3.84	-66.18	-57	-9.18	peak	Vertical
712.0356	-70.32	4.59	-65.73	-57	-8.73	peak	Vertical
876.4953	-71.23	5.58	-65.65	-57	-8.65	peak	Vertical

Note:
1. The emission behaviour belongs to narrowband spurious emission.
2. Calculation of result is: Result (dBm)= Reading (dBm)+ Correct Factor (dB).
3. Recored the worst data 802.11b mode for ANT 0 in report.

Above 1GHz

Test Mode: 802.11b mode-CH01			
Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V/50Hz

Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Polarization
3251.036	-69.53	12.04	-57.49	-47	-10.49	peak	Horizontal
4125.032	-68.53	12.31	-56.22	-47	-9.22	peak	Horizontal
5326.014	-73.24	17.98	-55.26	-47	-8.26	peak	Horizontal
6158.024	-74.53	18.55	-55.98	-47	-8.98	peak	Horizontal
8201.356	-74.16	19.54	-54.62	-47	-7.62	peak	Horizontal
9365.024	-77.43	21.69	-55.74	-47	-8.74	peak	Horizontal
3415.102	-68.53	12.14	-56.39	-47	-9.39	peak	Vertical
4626.013	-68.74	12.33	-56.41	-47	-9.41	peak	Vertical
5543.106	-74.16	17.99	-56.17	-47	-9.17	peak	Vertical
6693.521	-75.03	18.67	-56.36	-47	-9.36	peak	Vertical
8124.0253	-74.65	19.56	-55.09	-47	-8.09	peak	Vertical
9102.356	-75.93	21.58	-54.35	-47	-7.35	peak	Vertical

Test Mode: 802.11b mode-CH13			
Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V/50Hz

Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Polarization
3325.106	-68.53	12.05	-56.48	-47	-9.48	peak	Horizontal
4851.013	-68.49	12.32	-56.17	-47	-9.17	peak	Horizontal
5563.216	-73.65	17.99	-55.66	-47	-8.66	peak	Horizontal
6593.021	-74.01	18.56	-55.45	-47	-8.45	peak	Horizontal
8142.105	-74.69	19.55	-55.14	-47	-8.14	peak	Horizontal
9456.326	-77.16	21.71	-55.45	-47	-8.45	peak	Horizontal
3584.106	-69.35	12.15	-57.2	-47	-10.2	peak	Vertical
4635.21	-68.53	12.34	-56.19	-47	-9.19	peak	Vertical
5369.542	-72.36	18.02	-54.34	-47	-7.34	peak	Vertical
6685.243	-74.16	18.68	-55.48	-47	-8.48	peak	Vertical
8102.354	-75.03	19.58	-55.45	-47	-8.45	peak	Vertical
9168.536	-77.42	21.62	-55.8	-47	-8.8	peak	Vertical

Note:
1. The emission behaviour belongs to narrowband spurious emission.
2. Calculation of result is: Result (dBm)= Reading (dBm)+ Correct Factor (dB).
3. Recored the worst data 802.11b mode for ANT 0 in report.

11. Test Photograph

Spurious Emission Test

Spurious Emission Test (Horn)

12. EUT Constructional Details

Reference to the test report No. TR23040454-E-002.

*** the end of report ***