TEST REPORT

Report No.:	TWN2607542-02E
Applicant:	Eastern Times Technology Co.,Ltd
Product:	3-MODE CONNECTION WIRELESS LIGHT-WEIGHT MOUSE
Trademark:	REDRAGON
Model No.:	M919-ULT, M919W-ULT, M919OB-ULT, DS-4004, M933-ULT, M933BM-ULT, M933TF-ULT, M933CW-ULT, M933OM-ULT, DS-4205
Test Standards:	ETSI EN 300 328 v2.2.2 (2019-07)
Test Result:	The RF Spectrum testing has been performed on the submitted samples and found in compliance with council Radio Equipment Directive (RED) 2014/53/EU

Approved By

Terry Tang

Terry Tang

EMC Manager

Dated: July 17, 2026

Results appearing herein relate only to the sample tested
The technical reports is issued errors and omissions exempt and is subject to withdrawal at

SHENZHEN TIMEWAY TESTING LABORATORIES

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Special Statement:

FCC-Registration No.: 744189

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 744189.

ISED—Registration No.:5205A

The EMC Laboratory has been registered by Certification and Engineering Bureau of ISED for radio equipment testing with Registration No.: 5205A.

A2LA (Certification Number:5013.01)

The EMC Laboratory has been accredited by the American Association for Laboratory Accreditation (A2LA). Certification Number:5013.01

CAB identifier: CN0033

FCC Designation Number: CN1251

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Test Report Conclusion

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1. General Information

1.1 Notes

The test results of this report relate exclusively to the test item specified in 1.5. The TIMEWAY Lab does not assume Responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the TIMEWAY Lab.

1.2 Testing Laboratory

SHENZHEN TIMEWAY TESTING LABORATORIES.
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Site on File With the Federal Communications and Commission – United States
Registration Number: 744189
For 3m Anechoic Chamber

Site Listed with ISED of Ottawa, Canada
Registration Number: IC: 5205A
For 3m Anechoic Chamber

1.3 Test Data

Date of Receipt of Application: May 18, 2026
Date of Receipt of Test Item: May 18, 2026
Date of Test: May 18, 2026 ~ July 17, 2026

Note: This report is a supplementary testing report based on the original report TWN2605544-02E. Some models have been added, but the samples remain unchanged.

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1.4 Description of EUT

EUT Type……:	3-MODE CONNECTION WIRELESS LIGHT-WEIGHT	
Applicant……:	Eastern Times Technology Co.,Ltd Building D, Nan An Industrial Area, Youganpu Village, Fenggang Town, Dongguan City, Guangdong, China.	
Manufacturer……..:	Eastern Times Technology Co.,Ltd Building D, Nan An Industrial Area, Youganpu Village, Fenggang Town, Dongguan City, Guangdong, China.	
Equipment type……....:	Bluetooth 2.4G	
Modulation Type (Technology)…….:	GFSK	
Operating Frequency Range……..:	2.402GHz - 2.480GHz	
Modulation used by the equipment:	Other than FHSS	
Maximum e.r.i.p…….....:	6.43dBm	
Maximum OCB …….....:	GFSK	1050kHz
Adaptive Mode……..:	Adaptive/non-adaptive equipment:	Adaptive Equipment without the possibility to switch to a non-adaptive mode
	LBT Base DAA:	Yes
	Non-LBT Base DAA:	No
	Number of transmit chain:	1
	Number of receive chain:	1
Antenna Gain……:	Antenna Type:	PCB Antenna
	Antenna Gain:	2.34dBi (declared by applicant)
Operating voltage…….……..…….:	Normal:	DC3.7V
	Lowest:	DC3.3V
	Highest:	DC4.2V
Operating temperature……...:	Normal:	25℃
	Lowest:	-20℃
	Highest:	40℃

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1.5 Setting of test system

Setting	Value	
EUT type:	Bluetooth 2.4G	
Test Mode:	Mode	Modulation Type
	BLE	GFSK
EUT frequency configurable:	Yes	
Test channel-Low:	2402MHz	
Test channel-Middle:	2440MHz	
Test channel-High:	2480MHz	
Adaptive:	Yes	
With TPC function:	No	
Number of the antenna:	1	
Number of transmission chains:	1	
Beam forming:	No	
Operating frequency range:	2400MHz~2483.5MHz	
Maximum beam forming gain:	N. A	
Antenna gain:	2.34dBi	

1.6 Test Standards

ETSI EN 300 328 v 2.2.2 (2019-07)

Wideband transmission systems;

Data transmission equipment operating in the 2,4 GHz band;

Harmonised Standard for access to radio spectrum

Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

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1.7 Configuration of The EUT

The EUT was configured according to **CISPR16.** All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

A. EUT

Device	Manufacturer	Model
3-MODE CONNECTION WIRELESS LIGHT-WEIGHT MOUSE	**Eastern Times Technology Co.,Ltd**	**M919-ULT, M919W-ULT, M919OB-ULT, DS-4004, M933-ULT, M933BM-ULT, M933TF-ULT, M933CW-ULT, M933OM-ULT, DS-4205**

B. Internal Devices

Device	Manufacturer	Model
N/A		

C. Peripherals

Device	Manufacturer	Model	Cable
N/A			

D. EUT Exercise

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

1.8 EUT Modifications

No modification by SHENZHEN TIMEWAY TESTING LABORATORIES.

1.9 Tests or Witness Test Engineering

Test By: Andy Xing

Printing Name: Andy Xing

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2. Technical Test

2.1 Summary of Test Results

No deviations from the technical specification(s) were ascertained in the course of the tests Performed	
Final Verdict: (Only “Passed” if all Measurements are “Passed”)	**Pass**

2.2 Test Report

Test Report Reference

List of Measurements		
Parameter to be measured	**Clause**	**Result**
Transmitter Parameters		
Maximum Transmit Power	Clause 4.3.2.2	Pass
Power spectral density	Clause 4.3.2.3	Pass
Duty Cycle, Tx-sequence, Tx-gap	Clause 4.3.2.4	N/A
Medium Utilisation (MU) factor	Clause 4.3.2.5	N/A
Adaptivity (non-FHSS)	Clause 4.3.2.6	N/A
Occupied Channel Bandwidth	Clause 4.3.2.7	Pass
Transmitter unwanted emissions in the out-of-band domain	Clause 4.3.2.8	Pass
Transmitter unwanted emissions in the spurious domain	Clause 4.3.2.9	Pass
Receiver Parameters		
Receiver spurious emissions	Clause 4.3.2.10	Pass
Receiving Blocking	Clause 4.3.2.11	Pass
Geo-location capability	Clause 4.3.2.12	N/A

Note: The clause numbers are referenced to ETSI EN 300 328 v2.2.2 (2019-07)

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Transmitter Parameters

Clause 4.3.2.2 RF Output Power

Definition

The RF output power is defined as the mean equivalent isotropic radiated power (e.i.r.p.) of the equipment during a transmission burst.

Limits

The RF output power for non-FHSS equipment shall be equal to or less than 20 dBm.

NOTE: For Non-adaptive FHSS equipment, the manufacturer may have declared a reduced RF Output Power (see clause 5.4.1 m)) and associated Duty Cycle (see clause 5.4.1 e)) that will ensure that the equipment meets the requirement for the Medium Utilization (MU) factor further described in clause 4.3.2.5. This is verified by the conformance test referred to in clause 4.3.2.5.4.

For non-adaptive non-FHSS equipment, where the manufacturer has declared an RF output power of less than 20 dBm e.i.r.p., the RF output power shall be equal to or less than that declared value.

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

Test condition

See EN300328 v2.2.2 clause 5.1 for the test conditions. Apart from the RF output power, these measurements need only to be performed at normal environmental conditions. The measurements for RF output power shall be performed at both normal environmental conditions and at the extremes of the operating temperature range.
In the case of equipment intended for use with an integral antenna and where no external (temporary) antenna connectors are provided, a test fixture as described in clause B.4 may be used to perform relative measurements at the extremes of the operating temperature range.
The equipment shall be operated under its worse case configuration (modulation, bandwidth, power, etc.) with respect to the requirement being tested. Measurement of multiple data sets may be required.
For systems using FHSS modulation, the measurements shall be performed during normal operation (hopping).
For systems using wide band modulations other than FHSS, the measurement shall be performed at the lowest, the middle, and the highest channel on which the equipment can operate. These frequencies shall be recorded.

Test procedures

The test procedure shall be as follows:

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Step 1:

Use a fast power sensor with a minimum sensitivity of -40 dBm and capable of minimum 1 MS/s.

Use the following settings:

- Sample speed 1 MS/s or faster.
- The samples must represent the RMS power of the signal.
- Measurement duration: For non-adaptive equipment: equal to the observation period defined in clauses 4.3.1.3.2 or 4.3.2.4.2. For adaptive equipment, the measurement duration shall be long enough to ensure a minimum number of bursts (at least 10) are captured.

NOTE 1: For adaptive equipment, to increase the measurement accuracy, a higher number of bursts may be used.

Step 2:

For conducted measurements on devices with one transmit chain:

- 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.

For conducted measurements on devices with multiple transmit chains:

- Connect one power sensor to each transmit port for a synchronous measurement on all transmit ports.
- Trigger the power sensors so that they start sampling at the same time. Make sure the time difference between the samples of all sensors is less than half the time between two samples.
- For each instant in time, sum the power of the individual samples of all ports and store them. Use these stored samples in all following steps.

Step 3:

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

The start and stop times are defined as the points where the power is at least 30 dB below the highest value of the stored samples in step 2.

In case of insufficient sensitivity of the power sensor (e.g. in case of radiated measurements), the value of 30 dB may need to be reduced appropriately.

Step 4:

Between the start and stop times of each individual burst calculate the RMS power over the burst using the formula below. The start and stop points shall be included. Save these P_{burst} values, as well as the start and stop times for each burst.

$$P_{burst} = \frac{1}{k}\sum_{n=1}^{k} P_{sample}(n)$$

with k being the total number of samples and n the actual sample number.

Step 5:

The highest of all P_{burst} values (value "A" in dBm) will be used for maximum e.i.r.p. calculations.

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Step 6:

Add the (stated) antenna assembly gain "G" in dBi of the individual antenna.

• In case of smart antenna systems operating in mode with beamforming (see clause 5.3.2.2.4), add the additional beamforming gain Y in dB.

• If more than one antenna assembly is intended for this power setting, the maximum overall antenna gain (G or G + Y) shall be used.

• The RF Output Power (P_{out}) shall be calculated using the formula below: $P_{out} = A + G + Y$

• This value, which shall comply with the limit given in clauses 4.3.1.2.3 or 4.3.2.2.3, shall be recorded in the test report.

Test Result:

Test Condition		EIRP (dBm)			Result
		Channel 1 2402MHz	Channel 20 2440MHz	Channel 40 2480MHz	
25°C	DC3.7V	6.35	6.23	6.12	Pass
-20°C	DC4.2V	6.39	6.28	6.16	Pass
	DC3.3V	6.31	6.19	6.08	Pass
40°C	DC4.2V	6.43	6.32	6.19	Pass
	DC3.3V	6.27	6.15	6.03	Pass

Notes:

(1) Conducted measurement method was used.

(2) The path loss as the factor is calibrated to correct the reading.

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Clause 4.3.2.3 Power Spectral Density

Definition

The Power Spectral Density (PSD) is the mean equivalent isotropically radiated power (e.i.r.p.) spectral density in a 1 MHz bandwidth during a transmission burst.

Limits

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

Test condition

See EN300328 v2.2.2 clause 5.1 for the test conditions. These measurements shall only be performed at normal test conditions.

The measurement shall be repeated for the equipment being configured to operate at the lowest, the middle, and the highest frequency of the stated frequency range. These frequencies shall be recorded.

Test procedures (Option2 used)

This option is for equipment that can be configured to operate in a continuous transmit mode (100 % DC).

Step 1:

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

• Centre Frequency: The centre frequency of the channel under test
• Resolution BW: 1MHz
• Video BW: 3MHz
• Frequency Span: 2 × Nominal Bandwidth
• Detector: Peak
• Trace Mode: Max Hold

Step 2:

When the trace is complete, find the peak value of the power envelope and record the frequency.

Step 3:

Make the following changes to the settings of the spectrum analyser:

• Centre Frequency: Equal to the frequency recorded in step 2
• Resolution BW: 1MHz
• Video BW: 3MHz
• Sweep Time: 60s
• Frequency Span: 3MHz
• Detector: RMS
• Trace Mode: Max Hold

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Step 4:

• When the trace is complete, the trace shall be captured using the "Hold" or "View" option on the spectrum analyser.

• Find the peak value of the trace and place the analyser marker on this peak. This level is recorded as the highest mean power (power spectral density) D in a 1 MHz band.

• Alternatively, where a spectrum analyser is equipped with a function to measure power spectral density, this function may be used to display the power spectral density D in dBm / MHz.

• In case of conducted measurements on smart antenna systems operating in a mode with multiple transmit chains active simultaneously, the power spectral density of each transmit chain shall be measured separately to calculate the total power spectral density (value D in dBm / MHz) for the UUT.

Step 5:

• The maximum Power Spectral Density (PSD) e.i.r.p. is calculated from the above measured power spectral density D, the applicable antenna assembly gain G in dBi and if applicable the beamforming gain Y in dB, according to the formula below. This value shall be recorded in the test report. If more than one antenna assembly is intended for this power setting, the gain of the antenna assembly with the highest gain shall be used.

PSD = D + G + Y (dBm / MHz)

Test Result:

Test Mode	PSD (dBm/MHz)			Result
	Channel 1 2402MHz	Channel 20 2440MHz	Channel 40 2480MHz	
BLE	2.79	2.70	2.69	Pass

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Clause 4.3.2.4 Duty Cycle, Tx-Sequence, Tx-gap

Applicability

These requirements apply to non-adaptive equipment or to adaptive equipment when operating in a non-adaptive mode. The equipment is using wide band modulations other than FHSS.

These requirements do not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

Definition

Duty Cycle is defined as the ratio of the total transmitter 'on'-time to a 1 second observation period.

Tx-sequence is defined as a period in time during which a single or multiple transmissions may occur and which shall be followed by a Tx-gap.

Tx-gap is defined as a period in time during which no transmissions occur.

Limits

Non-FHSS equipment shall comply with the following:

- The Duty Cycle shall be equal to or less than the maximum value declared by the supplier.
- The Tx-sequence time shall be equal to or less than 10 ms.
- The minimum Tx-gap time following a Tx-sequence shall be equal to the duration of that proceeding Tx-sequence with a minimum of 3,5 ms.

NOTE: For Non-adaptive FHSS equipment, the manufacturer may have declared a reduced RF Output Power (see clause 5.4.1 m)) and associated Duty Cycle (see clause 5.4.1 e)) that will ensure that the equipment meets the requirement for the Medium Utilization (MU) factor further described in clause 4.3.2.5. This is verified by the conformance test referred to in clause 4.3.2.5.4.

Test condition and test procedures

Refer chapters §5.4.2.1 and §5.4.2.2.1.3 of ETSI EN300328 v2.2.2

Result

This test case does not apply this kind of EUT

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Clause 4.3.2.5 Medium Utilisation (MU) factor

Applicability

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 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

NOTE: Although this requirement does not apply to non-FHSS equipment with an RF Output power level of less than 10 dBm e.i.r.p. the actual value the Medium Utilization factor even for equipment operating at an RF Output power level of less than 10 dBm may be used elsewhere in the present document e.g. for defining the applicable receiver category in clause 4.2.3.2.

Definition

The Medium Utilization (MU) factor is a measure to quantify the amount of resources (Power and Time) used by non-adaptive equipment. The Medium Utilization factor is defined by the formula:

$$MU = (P_{out}/100\ mW) \times DC$$

where: MU is Medium Utilization.

P_{out} is the RF output power as defined in clause 4.3.2.2.2 expressed in mW.

DC is the Duty Cycle as defined in clause 4.3.2.4.2 expressed in %.

Limits

The maximum Medium Utilization factor for non-adaptive non-FHSS equipment shall be 10 %.

Test condition and test procedures

Refer chapters§ 5.4.2.1 and §5.4.2.2.1.4 of ETSI EN300328 v2.2.2

Result

This test case does not apply this kind of EUT.

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Clause 4.3.2.6 Adaptivity (non-FHSS)

Applicability

This requirement does not apply to non-adaptive non-FHSS equipment or adaptive non-FHSS equipment operating in a non-adaptive mode.

In addition, this requirement does not apply for non-FHSS equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for non-FHSS equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

Adaptive non-FHSS equipment uses a mechanism by which it can adapt to its radio environment by identifying other transmissions present within its Occupied Channel Bandwidth.

Adaptive non-FHSS equipment shall implement either of the mechanisms provided in clause 4.3.2.6.2 or clause 4.3.2.6.3.

Adaptive non-FHSS equipment is allowed to switch dynamically between different adaptive modes.

Limit

Adaptive non-FHSS using DAA

Definition

Adaptive non-FHSS using DAA is a mechanism for non-FHSS equipment by which a given channel is made 'unavailable' because an interfering signal was reported after the transmission in that channel.

Requirements & Limits

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.

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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:

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

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.		

Conformance

The conformance tests for this requirement are defined in clause 5.4.6 and specifically in clause 5.4.6.2.1.3.

Adaptive non-FHSS using LBT

Definition

Adaptive non-FHSS using LBT is a mechanism by which non-FHSS adaptive equipment avoids transmissions in a channel in the presence of an interfering signal in that channel. This mechanism shall operate as intended in the presence of an unwanted signal on frequencies other than those of the operating band.

Requirements & Limits

The present document defines two types of adaptive non-FHSS equipment that uses an LBT mechanism: Frame Based Equipment and Load Based Equipment.

Adaptive non-FHSS equipment which is capable of operating as either Load Based Equipment or as Frame Based Equipment is allowed to switch dynamically between these types of operation.

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Frame Based Equipment

Frame Based Equipment shall comply with the following requirements:

1) Before transmission, the equipment shall perform a Clear Channel Assessment (CCA) check using energy detect. The equipment shall observe the operating channel for the duration of the CCA observation time which shall be not less than 18 µs. The channel shall be considered occupied if the energy level in the channel exceeds the threshold given in step 5 below. If the equipment finds the channel to be clear, it may transmit immediately. See figure 2.

2) If the equipment finds the channel occupied, it shall not transmit on this channel during the next Frame Period. The equipment is allowed to switch to a non-adaptive mode and to continue transmissions on this channel providing it complies with the requirements applicable to non-adaptive equipment. See clause 4.3.2.6.1. Alternatively, the equipment is also allowed to continue Short Control Signalling Transmissions on this channel providing it complies with the requirements given in clause 4.3.2.6.4.

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 in the range 1 ms to 10 ms followed by an Idle Period of at least 5 % of the Channel Occupancy Time used in the equipment for the current Frame Period. See figure 2.

4) An equipment, upon correct reception of a transmission which was intended for this equipment can skip CCA and immediately (see also next paragraph) proceed with the transmission of management and control frames. A consecutive sequence of such transmissions by the equipment without a new CCA shall not exceed the maximum Channel Occupancy Time.

For the purpose of multi-cast, the ACK transmissions (associated with the same data packet) of the individual devices are allowed to take place in a sequence.

5) The energy detection threshold for the CCA shall be proportional to the transmit power of the transmitter: for a 20 dBm e.i.r.p. transmitter the CCA 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 CCA threshold level may be relaxed to:

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

6) The equipment shall comply with the requirements defined in step 1 to step 4 in the present clause in the presence of an unwanted CW signal as defined in table 10.

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Table 10: Unwanted Signal parameters

Wanted signal mean power from companion device	Unwanted signal frequency (MHz)	Unwanted signal power (dBm)
sufficient to maintain the link (see note 2)	2 395 or 2 488,5 (see note 1)	-35 (see note 3)

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: A typical conducted value which can be used in most cases is -50 dBm/MHz.
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 in front of the UUT antenna.

An example of the timing for Frame Based Equipment is provided in figure 2.

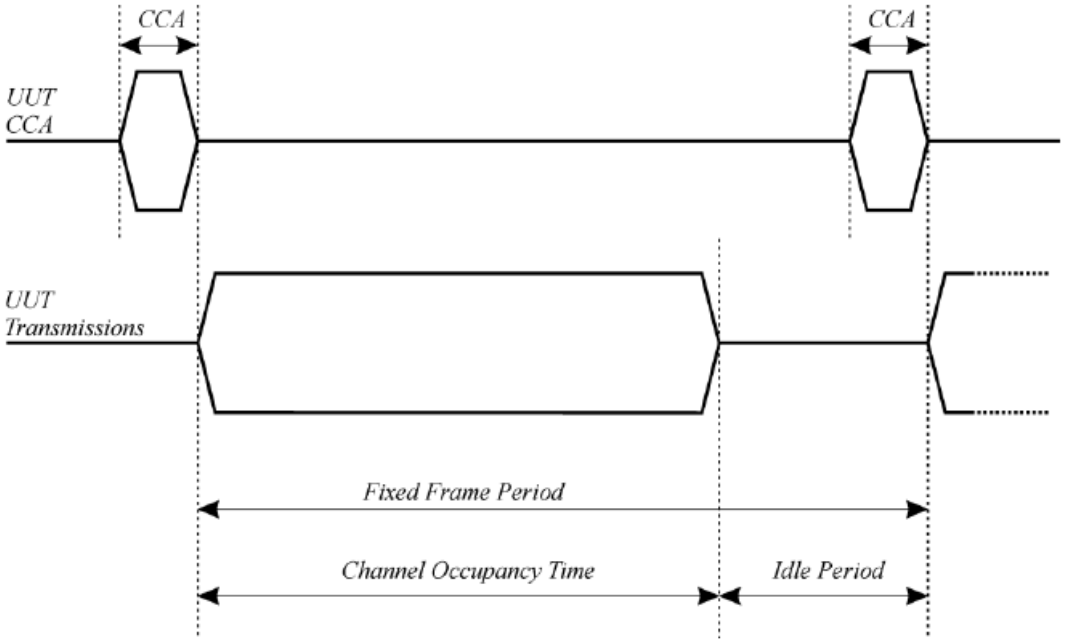


Figure 2: Example of timing for Frame Based Equipment

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Load Based Equipment

Load Based Equipment may implement an LBT based spectrum sharing mechanism based on the Clear Channel Assessment (CCA) mode using energy detect as described in IEEE 802.11™ [i.3], clause 10 clause 11, clause 15, clause 16, clause 18 and clause 19, or in IEEE 802.15.4™ [i.4], clause 5, clause 6 and clause 10 providing the equipment complies with the conformance requirements referred to in clause 4.3.2.6.3.4. Load Based Equipment not using any of the mechanisms referenced above shall comply with the following minimum set of requirements:

1) Before a transmission or a burst of transmissions, the equipment shall perform a Clear Channel Assessment (CCA) check using energy detect. The equipment shall observe the operating channel for the duration of the CCA observation time which shall be not less than 18 µs. The channel shall be considered occupied if the energy level in the channel exceeds the threshold given in step 5 below. If the equipment finds the channel to be clear, it may transmit immediately.
2) If the equipment finds the channel occupied, it shall not transmit on this channel (see also the next paragraph). The equipment shall perform an Extended CCA check in which the channel is observed for a random duration in the range between 18 µs and at least 160 µs. If the extended CCA check has determined the channel to be no longer occupied, the equipment may resume transmissions on this channel. If the Extended CCA time has determined the channel still to be occupied, it shall perform new Extended CCA checks until the channel is no longer occupied.

NOTE: The Idle Period in between transmissions is considered to be the CCA or the Extended CCA check as there are no transmissions during this period.

The equipment is allowed to switch to a non-adaptive mode and to continue transmissions on this channel providing it complies with the requirements applicable to non-adaptive equipment. Alternatively, the equipment is also allowed to continue Short Control Signalling Transmissions on this channel providing it complies with the requirements given in clause 4.3.2.6.4.

3) The total time that an equipment makes use of a RF channel is defined as the Channel Occupancy Time. This Channel Occupancy Time shall be less than 13 ms, after which the device shall perform a new CCA as described in step 1 above.

4) The equipment, upon correct reception of a transmission which was intended for this equipment can skip CCA and immediately (see also next paragraph) proceed with the transmission of management and control frames. A consecutive sequence of transmissions by the equipment without a new CCA shall not exceed the maximum channel occupancy time as defined in step 3 above. For the purpose of multi-cast, the ACK transmissions (associated with the same data packet) of the individual devices are allowed to take place in a sequence.

5) The energy detection threshold for the CCA shall be proportional to the transmit power of the transmitter: for

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a 20 dBm e.i.r.p. transmitter the CCA 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 CCA threshold level may be relaxed to:

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

6) 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 11.

Table 11: Unwanted Signal parameters

Wanted signal mean power from companion device	Unwanted signal frequency (MHz)	Unwanted signal power (dBm)
sufficient to maintain the link (see note 2)	2 395 or 2 488,5 (see note 1)	-35 (see note 3)
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: A typical conducted value which can be used in most cases is -50 dBm/MHz.		
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.		

Conformance

The conformance tests for this requirement are defined in clause 5.4.6 and specifically in clause 5.4.6.2.1.4.

Short Control Signalling Transmissions

Definition

Short Control Signalling Transmissions are transmissions used by adaptive non-FHSS equipment to send control and management signals without sensing the operating channel for the presence of other signals.

Adaptive equipment may have Short Control Signalling Transmissions.

Limits

If implemented, Short Control Signalling Transmissions of adaptive non-FHSS equipment shall have a maximum TxOn / (TxOn + TxOff) ratio of 10 % within any observation period of 50 ms.

Conformance

The conformance tests for this requirement are defined in clause 5.4.6.2.1.3 (for DAA based adaptive non-FHSS equipment) or clause 5.4.6.2.1.4 (for LBT based adaptive non-FHSS equipment).

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Test condition

See clause 5.1 for the test conditions. These measurements shall only be performed at normal test conditions.
This test shall be performed on the lowest and the highest operating (hopping) frequency. For adaptive frequency hopping equipment, the equipment shall be in a normal operating (hopping) mode.
For equipment which can operate in an adaptive and a non-adaptive mode, it shall be verified that prior to the test, the equipment is operating in the adaptive mode.

Test procedures

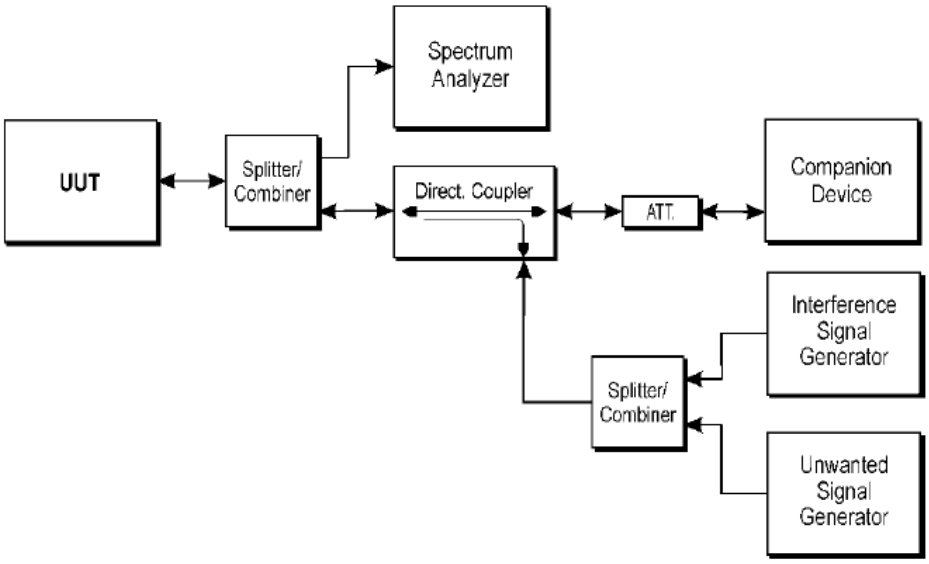


Figure 5: Test set-up for verifying the adaptivity of an equipment

Non-FHSS equipment using DAA

The different steps below define the procedure to verify the efficiency of the DAA based adaptive mechanism of non-FHSS equipment.
For systems using multiple receive chains only one chain (antenna port) need to be tested. All other receiver inputs shall be terminated.

Step 1:

• The UUT shall connect to a companion device during the test. The interference signal generator, the unwanted signal generator, the spectrum analyser, the UUT and the companion device are connected using a set-up equivalent to the example given by figure 5 although the interference and unwanted signal generator do not generate any signals at this point in time. The spectrum analyser is used to monitor the transmissions of both the

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UUT and the companion device and it should be possible to distinguish between either transmission. In addition, the spectrum analyser is used to monitor the transmissions of the UUT in response to the interfering and the unwanted signals.

• Adjust the received signal level (wanted signal from the companion device) at the UUT to the value defined in table 9 (clause 4.3.2.6.2.2).

• The analyser shall be set as follows:

-RBW	≥ Occupied Channel Bandwidth (if the analyser does not support this setting, the highest available setting shall be used)
-VBW	3 × RBW (if the analyser does not support this setting, the highest available setting shall be used)
-Detector	RMS
-Centre Frequency	Equal to the centre frequency of the operating channel
-Span	0Hz
-Sweep Time	> Channel Occupancy Time of the UUT
-Trace mode	Clear/Write
-Trigger Mode	Video

Step 2:

• Configure the UUT for normal transmissions with a sufficiently high payload resulting in a minimum transmitter activity ratio (TxOn / (TxOn + TxOff)) of 0,3. Where this is not possible, the UUT shall be configured to the maximum payload possible.

• Using the procedure defined in clause 5.4.6.2.1.5, it shall be verified that the UUT complies with the maximum Channel Occupancy Time and minimum Idle Period defined in clause 4.3.2.6.2.2. When measuring the Idle Period of the UUT, it shall not include the transmission time of the companion device.

Step 3: Adding the interference signal

• An interference signal as defined in clause B.7 is injected on the current operating channel of the UUT. The power spectral density level (at the input of the UUT) of this interference signal shall be equal to the detection threshold defined in clause 4.3.2.6.2.2, step 5.

Step 4: Verification of reaction to the interference signal

• The spectrum analyser shall be used to monitor the transmissions of the UUT on the selected operating channel with the interfering signal injected. This may require the spectrum analyser sweep to be triggered by the start of the interfering signal.

• Using the procedure defined in clause 5.4.6.2.1.5, it shall be verified that:

i) The UUT shall stop transmissions on the current operating channel being tested.
The UUT is assumed to stop transmissions within a period equal to the maximum Channel Occupancy Time defined in clause 4.3.2.6.2.2, step 4.

ii) Apart from Short Control Signalling Transmissions (see iii) below), there shall be no subsequent transmissions on this operating channel for a (silent) period defined in clause 4.3.2.6.2.2, step 2. After that, the UUT may have normal transmissions again for the duration of a single Channel Occupancy Time period. Because the interference signal is still present, another silent period as defined in clause 4.3.2.6.2.2, step 2 needs to be included. This

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sequence is repeated as long as the interfering signal is present.

To verify that the UUT is not resuming normal transmissions as long as the interference signal is present, the monitoring time may need to be 60 s or more.

iii) The UUT may continue to have Short Control Signalling Transmissions on the operating channel while the interference signal is present. These transmissions shall comply with the limits defined in clause 4.3.2.6.4.2.

The verification of the Short Control Signalling transmissions may require the analyser settings to be changed (e.g. sweep time).

iv) Alternatively, the equipment may switch to a non-adaptive mode.

Step 5: Adding the unwanted signal

• With the interfering signal present, a 100 % duty cycle CW signal is inserted as the unwanted signal. The frequency and the level are provided in table 9 of clause 4.3.2.6.2.2.

• The spectrum analyser shall be used to monitor the transmissions of the UUT on the selected operating channel. This may require the spectrum analyser sweep to be triggered by the start of the unwanted signal.

• Using the procedure defined in clause 5.4.6.2.1.5, it shall be verified that:

i) The UUT shall not resume normal transmissions on the current operating channel as long as both the interference and unwanted signals remain present.

To verify that the UUT is not resuming normal transmissions as long as the interference and unwanted signals are present, the monitoring time may need to be 60 s or more.

ii) The UUT may continue to have Short Control Signalling Transmissions on the operating channel while the interference and unwanted signals are present. These transmissions shall comply with the limits defined in clause 4.3.2.6.4.2.

The verification of the Short Control Signalling transmissions may require the analyser settings to be changed (e.g. sweep time).

Step 6: Removing the interference and unwanted signal

• On removal of the interference and unwanted signal the UUT is allowed to start normal transmissions again on this channel however, it shall be verified that this shall only be done after the period defined in clause 4.3.2.6.2.2, step 2.

Step 7:

• Step 2 to step 6 shall be repeated for each of the frequencies to be tested.

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Non-FHSS equipment using LBT

Step 1 to step 7 below define the procedure to verify the efficiency of the LBT based adaptive mechanism of equipment using wide band modulations other than FHSS. This method can be applied on Load Based Equipment and Frame Based Equipment.
For systems using multiple receive chains only one chain (antenna port) need to be tested. All other receiver inputs shall be terminated.

Step 1:

• The UUT shall connect to a companion device during the test. The interference signal generator, the unwanted signal generator, the spectrum analyser, the UUT and the companion device are connected using a set-up equivalent to the example given by figure 5 although the interference and unwanted signal generator do not generate any signals at this point in time. The spectrum analyser is used to monitor the transmissions of both the UUT and the companion device and it should be possible to distinguish between either transmission. In addition, the spectrum analyser is used to monitor the transmissions of the UUT in response to the interfering and the unwanted signals.

• Adjust the received signal level (wanted signal from the companion device) at the UUT to the value defined in table 10 (clause 4.3.2.6.3.2.2) for Frame Based Equipment or in table 11 (clause 4.3.2.6.3.2.3) for Load Based Equipment.
Testing of Unidirectional equipment does not require a link to be established with a companion device.

• The analyser shall be set as follows:

-RBW	⩾ Occupied Channel Bandwidth (if the analyser does not support this setting, the highest available setting shall be used)
-VBW	3 × RBW (if the analyser does not support this setting, the highest available setting shall be used)
-Detector	RMS
-Centre Frequency	Equal to the centre frequency of the operating channel
-Span	0Hz
-Sweep Time	> maximum Channel Occupancy Time
-Trace mode	Clear/Write
-Trigger Mode	Video

Step 2:

• Configure the UUT for normal transmissions with a sufficiently high payload resulting in a minimum transmitter activity ratio (TxOn / (TxOn + TxOff)) of 0,3. Where this is not possible, the UUT shall be configured to the maximum payload possible.

• For Frame Based Equipment, using the procedure defined in clause 5.4.6.2.1.5, it shall be verified that the UUT complies with the maximum Channel Occupancy Time and minimum Idle Period defined in clause 4.3.2.6.3.2.2, step 3. When measuring the Idle Period of the UUT, it shall not include the transmission time of the companion device.

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• For Load Based equipment, using the procedure defined in clause 5.4.6.2.1.5, it shall be verified that the UUT complies with the maximum Channel Occupancy Time and minimum Idle Period defined in clause 4.3.2.6.3.2.3, step 2 and step 3. When measuring the Idle Period of the UUT, it shall not include the transmission time of the companion device.

For the purpose of testing Load Based Equipment referred to in the first paragraph of clause 4.3.2.6.3.2.3 (IEEE 802.11™ [i.3] or IEEE 802.15.4™ [i.4] equipment), the limits to be applied for the minimum Idle Period and the maximum Channel Occupancy Time are the same as defined for other types of Load Based Equipment (see clause 4.3.2.6.3.2.3, step 2 and step 3). The Idle Period is considered to be equal to the CCA or Extended CCA time defined in clause 4.3.2.6.3.2.3, step 1 and step 2.

Step 3: Adding the interference signal

• An interference signal as defined in clause B.7 is injected on the current operating channel of the UUT. The power spectral density level (at the input of the UUT) of this interference signal shall be equal to the detection threshold defined in clause 4.3.2.6.3.2.2, step 5 (frame based equipment) or clause 4.3.2.6.3.2.3, step 5 (load based equipment).

Step 4: Verification of reaction to the interference signal

• The spectrum analyser shall be used to monitor the transmissions of the UUT on the selected operating channel with the interfering signal injected. This may require the spectrum analyser sweep to be triggered by the start of the interfering signal.

• Using the procedure defined in clause 5.4.6.2.1.5, it shall be verified that:

i) The UUT shall stop transmissions on the current operating channel.

The UUT is assumed to stop transmissions within a period equal to the maximum Channel Occupancy Time defined in clause 4.3.2.6.3.2.2 (frame based equipment) or clause 4.3.2.6.3.2.3 (load based equipment).

ii) Apart from Short Control Signalling Transmissions, there shall be no subsequent transmissions while the interfering signal is present.

To verify that the UUT is not resuming normal transmissions as long as the interference signal is present, the monitoring time may need to be 60 s or more.

iii) The UUT may continue to have Short Control Signalling Transmissions on the operating channel while the interfering signal is present. These transmissions shall comply with the limits defined in clause 4.3.2.6.4.2.

The verification of the Short Control Signalling transmissions may require the analyser settings to be changed (e.g. sweep time).

iv) Alternatively, the equipment may switch to a non-adaptive mode.

Step 5: Adding the unwanted signal

• With the interfering signal present, a 100 % duty cycle CW signal is inserted as the unwanted signal. The frequency and the level are provided in table 10 (clause 4.3.2.6.3.2.2) for Frame Based Equipment or in table 11 (clause 4.3.2.6.3.2.3) for Load Based Equipment.

• The spectrum analyser shall be used to monitor the transmissions of the UUT on the selected operating channel. This may require the spectrum analyser sweep to be triggered by the start of the unwanted signal.

• Using the procedure defined in clause 5.4.6.2.1.5, it shall be verified that:

i) The UUT shall not resume normal transmissions on the current operating channel as long as both the

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interference and unwanted signals remain present.

To verify that the UUT is not resuming normal transmissions as long as the interference and unwanted signals are present, the monitoring time may need to be 60 s or more.

ii) The UUT may continue to have Short Control Signalling Transmissions on the operating channel while the interfering and unwanted signals are present. These transmissions shall comply with the limits defined in clause 4.3.2.6.4.2.

The verification of the Short Control Signalling transmissions may require the analyser settings to be changed (e.g. sweep time).

Step 6: Removing the interference and unwanted signal

• On removal of the interference and unwanted signals the UUT is allowed to start transmissions again on this channel; However, this is not a requirement and, therefore, does not require testing.

Step 7:

• Step 2 to step 6 shall be repeated for each of the frequencies to be tested.

Result

This test case does not apply this kind of EUT. Because the EIRP less than 10dBm.

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Clause 4.3.2.7 Occupied Channel Bandwidth

Definition

The Occupied Channel Bandwidth is the bandwidth that contains 99 % of the power of the signal.

Limit

The Occupied Channel Bandwidth shall fall completely within the band given in table 1.

In addition, for non-adaptive equipment 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.

Test condition

See clause 5.1 for the test conditions. These measurements shall only be performed at normal test conditions.

In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains) Measurements need only to be performed on one of the active transmit chains (antenna outputs).

For systems using FHSS modulation and which have overlapping channels, special software might be required to force the UUT to hop or transmit on a single Hopping Frequency.

The measurement shall be performed only on the lowest and the highest frequency within the stated frequency range.

The frequencies on which the test was performed shall be recorded.

If the equipment can operate with different Occupied Channel Bandwidths (e.g. 20 MHz and 40 MHz), than each channel bandwidth shall be tested separately.

Test procedures

Step 1

The measurement procedure shall be as follows::

Connect the UUT to the spectrum analyzer 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 %

• Video BW: 3*RBW

• Frequency Span: 2 × Nominal Channel Bandwidth

• Detector Mode: RMS

• Trace Mode: Max Hold

•Sweep time: 1 s

Step 2:

Wait until the trace is completed.

Find the peak value of the trace and place the analyzer marker on this peak.

Step 3:

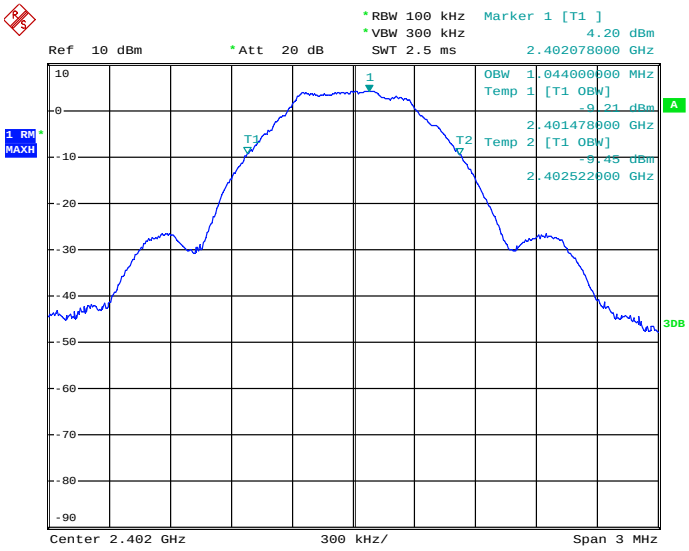
Use the 99 % bandwidth function of the spectrum analyzer to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

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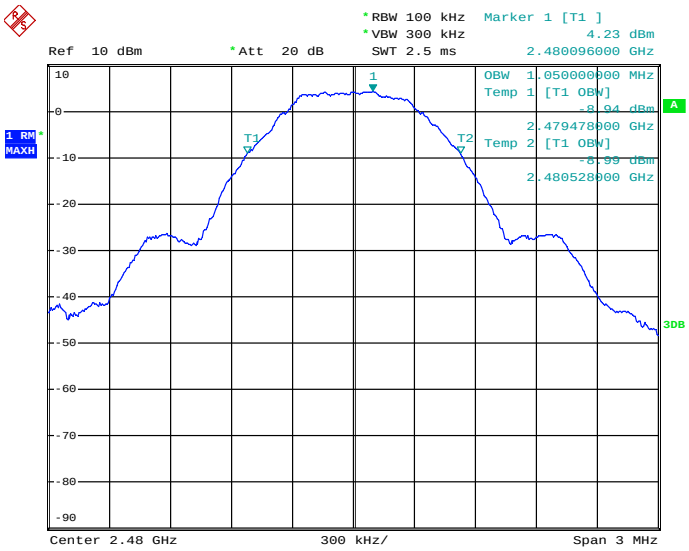
Test Result:

Channel	Frequency (MHz)	Bandwidth	Measure Frequency (MHz)	Limit	Result
1	2402	1.044MHz	2401.48	≥2400	Pass
40	2480	1.050MHz	2480.53	≤2483.5	Pass

Test Plots:



Date: 4.JUN.2026 19:28:31



Date: 4.JUN.2026 19:40:24

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Clause 4.3.2.8 Transmitter unwanted emissions in the OOB domain

Definition

Transmitter unwanted emissions in the out-of-band domain are emissions when the equipment is in Transmit mode, on frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious.

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

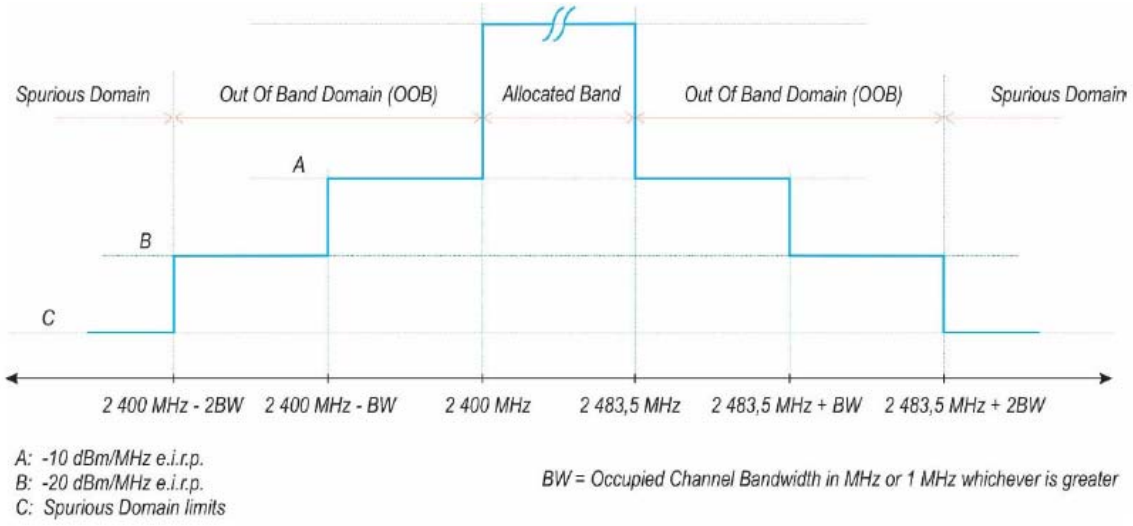


Figure 3: Transmit mask

Test condition

See clause 5.1 for the test conditions.

These measurements shall only be performed at normal test conditions.

For equipment using FHSS modulation, the measurements shall be performed during normal operation (hopping).

For equipment using wide band modulations other than FHSS, the measurement shall be performed at the lowest and the highest channel on which the equipment can operate. These operating channels shall be recorded.

The equipment shall be configured to operate under its worst case situation with respect to output power.

If the equipment can operate with different Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz),

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then each channel bandwidth shall be tested separately.

Test procedures

The applicable mask is defined by the measurement results from the tests performed under clause 5.4.7 (Occupied Channel Bandwidth).
The Out-of-band emissions within the different horizontal segments of the mask provided in figure 1 and figure 3 shall be measured using the procedure in step 1 to step 6 below. This method assumes the spectrum analyser is equipped with the Time Domain Power option.

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: Max Hold

- Sweep Mode: Single Sweep

- Sweep Points: Sweep Time [µs] / (1 µs) with a maximum of 30000

- Trigger Mode: Video trigger;

- Sweep Time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power

Step 2: (segment 2483.5 MHz to 2483.5 MHz + BW)

• The measurement shall be performed and repeated while the trigger level is increased until no triggering takes place.

• For FHSS 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.

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• 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 2483.5 MHz + BW to 2483.5 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 + 2 BW. 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 (which means this may partly overlap with the previous 1 MHz segment).

Step 4: (segment 2400 MHz - BW to 2400 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 - BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

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 - 2 BW 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 - 2 BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

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.

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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 $\log_{10}$(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: Ach refers to the number of active transmit chains.

Test Result

Test Condition		2402MHz (OCB: 1.044MHz)				2480 MHz (OCB:1.050MHz)			
		Out-of-band domain (MHz)				Out-of-band domain (MHz)			
		2398.96	2400.00	2397.91	2398.96	2483.50	2484.55	2484.55	2485.60
25°C	DC3.7V	-55.46		-60.05		-56.88		-62.49	
-20°C	DC4.2V	-55.43		-59.99		-56.80		-62.41	
-20°C	DC3.3V	-55.57		-60.13		-56.91		-62.54	
40°C	DC4.2V	-55.41		-59.98		-56.85		-62.43	
40°C	DC3.3V	-55.52		-60.11		-56.93		-62.58	
Limit (dBm/MHz)		-10		-20		-10		-20	
Result		Pass		Pass		Pass		Pass	

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Clause 4.3.2.9 Transmitter unwanted emissions in the spurious domain

Definition

Transmitter unwanted emissions in the spurious domain are emissions outside the allocated band and outside the Out-of-band Domain as indicated in figure 3 when the equipment is in Transmit mode.

Limit

The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 12.

Table 12: Transmitter limits for spurious emissions

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 as e.i.r.p. for emissions above 1 GHz.

Frequency Range	Maximum Power e.i.r.p(≤1GHz); e.i.r.p(＞1GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100kHz
47 MHz to 74 MHz	-54 dBm	100kHz
74 MHz to 87,5 MHz	-36 dBm	100kHz
87,5 MHz to 118 MHz	-54 dBm	100kHz
118 MHz to 174 MHz	-36 dBm	100kHz
174 MHz to 230 MHz	-54 dBm	100kHz
230 MHz to 470 MHz	-36 dBm	100kHz
470 MHz to 694 MHz	-54 dBm	100kHz
694 MHz to 1 GHz	-36 dBm	100kHz
1 GHz to 12,75 GHz	-30 dBm	1MHz

Test condition

See clause 5.1 for the test conditions. These measurements have to be performed at normal environmental conditions

The level of spurious emissions shall be measured as, either:

a) their power in a specified load (conducted spurious emissions) and their effective radiated power when radiated by the cabinet or structure of the equipment (cabinet radiation); or

b) their effective radiated power when radiated by cabinet and antenna in case of integral antenna equipment with no antenna connectors.

For equipment using FHSS modulation, the measurements may be performed when normal hopping is disabled. In this case measurements need to be performed when operating at the lowest and the highest hopping frequency.

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When this is not possible, the measurement shall be performed during normal operation (hopping).
For equipment using wide band modulations other than FHSS, the measurement shall be performed at the lowest and the highest channel on which the equipment can operate. These operating channels shall be recorded.
The equipment shall be configured to operate under its worst case situation with respect to output power.
If the equipment can operate with different Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz), then the equipment shall be configured to operate under its worst case situation with respect to spurious emissions.

Test procedures

Pre-scan
The procedure in step 1 to step 4 below shall be used to identify potential unwanted emissions of the UUT.
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 4 or 12.
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
•Filter type: 3 dB (Gaussian)
• Detector mode: Peak
• Trace Mode: Max Hold
• Sweep Points: ≥ 19400; for spectrum analysers not supporting this high number of sweep points, the frequency band may 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, on any channel
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.
The above sweep time setting may result in long measuring times in case of FHSS equipment. To avoid such long measuring times, an FFT analyser may be used.
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 4 or 12.
Step 3:
The emissions over the range 1 GHz to 12.75 GHz shall be identified. Spectrum analyzer settings:
• Resolution bandwidth: 1 MHz
• Video bandwidth: 3 MHz
•Filter type: 3 dB (Gaussian)

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• Detector mode: Peak
• Trace Mode: Max Hold
• Sweep Points: ≥ 23500; For spectrum analyzers 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, on any channel.
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.
The above sweep time setting may result in long measuring times in case of frequency hopping equipment. To avoid such long measuring times, an FFT analyser may be used
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 5.4.9.2.1.3 and compared to the limits given in table 4 or table 12.
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 5.4.9.2.1.3.
Step 4:
• In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the steps 2 and 3 need to be repeated for each of the active transmit chains (A_{ch}).The limits used to identify emissions during this pre-scan need to be reduced with $10 \times \log_{10} (A_{ch})$ (number of active transmit chains).

Measurement of the emissions identified during the pre-scan

The procedure in step 1 to step 4 below shall be used to accurately measure the individual unwanted emissions identified during the pre-scan measurements above. This method assumes the spectrum analyser has a Time Domain Power function.

Step 1:

The level of the emissions shall be measured using the following spectrum analyser settings:
• Measurement Mode: Time Domain Power
• Centre Frequency: Frequency of the emission identified during the pre-scan
• Resolution Bandwidth: 100 kHz (< 1 GHz) / 1 MHz (> 1 GHz)
• Video Bandwidth: 300 kHz (< 1 GHz) / 3 MHz (> 1 GHz)
• Frequency Span: Zero Span
• Sweep mode: Single Sweep
• Sweep time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power
• Sweep points: Sweep time [µs] / (1 µs) with a maximum of 30 000

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- Trigger: Video (burst signals) or Manual (continuous signals)
- Detector: RMS

Step 2:

Set a window where the start and stop indicators match the start and end of the burst with the highest level and record the value of the power measured within this window. If the spurious emission to be measured is a continuous transmission, the measurement window shall be set to match the start and stop times of the sweep.

Step 3:

In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 needs to be repeated for each of the active transmit chains (A_{ch}).
Sum the measured power (within the observed window) for each of the active transmit chains.

Step 4:

The value defined in step 3 shall be compared to the limits defined in table 4 or table 12.

Result

Below is the worst case situation test data:

Channel1 (2402MHz)			Channel 40 (2480MHz)		
Frequency	Polarity	Level (dBm)	Frequency	Polarity	Level (dBm)
4804MHz	Vertical	-52.6	4960MHz	Vertical	-54.9
4804MHz	Horizontal	-46.1	4960MHz	Horizontal	-48.0
Test Result		Pass			

Note:
(1) Radiated measurement method was used. For the radiated method, the antenna polarization was set to vertical and horizontal respectively.
(2) The measurement was performed at the lowest and highest operating frequencies.
(3) The test receiver (spectrum analyzer) was set to Peak detector and 100kHz resolution bandwidth. For measuring emissions that exceed the level of 6 dB below the applicable limit the resolution bandwidth shall be switched to 30 kHz. If the level does not change by more than 2 dB, it is a narrowband emission; the observed value shall be recorded. If the level changes by more than 2 dB, the emission is a wideband emission and its level shall be measured and recorded.

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Receiver Parameters

§4.3.2.10 - Receiver Spurious Emissions

Definition

Receiver spurious emissions are emissions at any frequency when the equipment is in receive mode.

Limit

The spurious emissions of the receiver shall not exceed the values given in table 13.
n case of non-FHSS equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or for 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.

Table 13: Spurious emission limits for receivers

Frequency range	Maximum power e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12,75 GHz	-47 dBm	1 MHz

Test condition

See clause 5.1 for the test conditions. These measurements have to be performed at normal environmental conditions
The level of spurious emissions shall be measured as, either:

a) their power in a specified load (conducted spurious emissions) and their effective radiated power when radiated by the cabinet or structure of the equipment (cabinet radiation); or
b) their effective radiated power when radiated by cabinet and antenna in case of integral antenna equipment with no antenna connectors.

Testing shall be performed when the equipment is in a receive-only mode.
For equipment using wide band modulations other than FHSS, the measurement shall be performed at the lowest and the highest channel on which the equipment can operate. These frequencies shall be recorded.
For equipment using FHSS modulation, the measurements may be performed when normal hopping is disabled. In this case measurements need to be performed when operating at the lowest and the highest hopping frequency. These frequencies shall be recorded. When disabling the normal hopping is not possible, the measurement shall be performed during normal operation (hopping).

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Test procedures

Pre-scan

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 5 or 13.

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

•Filter type: 3 dB (Gaussian)

• Detector mode: Peak

• Trace Mode: Max Hold

• Sweep Points: ≥ 19400

• 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 5.3.10.2.1.3 and compared to the limits given in tables 5 or 13.

Step 3:

The emissions over the range 1 GHz to 12.75 GHz shall be identified. Spectrum analyzer settings:

• Resolution bandwidth: 1 MHz

• Video bandwidth: 3 MHz

•Filter type: 3 dB (Gaussian)

• Detector mode: Peak

• Trace Mode: Max Hold

• Sweep Points: ≥ 23500; For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented.

Sweep time: Auto

Wait for 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 5.4.9.2.1.3 and compared to the limits given in table 5 or table 13.

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 5.4.10.2.1.3.

Step 4:

• In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the steps 2 and 3 need to be repeated for each of the active transmit chains (A_{ch}).The limits used to identify emissions during this pre-scan need to be reduced with $10 \times \log_{10}(A_{ch})$ (number of active transmit chains).

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Measurement of the emissions identified during the pre-scan

The procedure in step 1 to step 4 below shall be used to accurately measure the individual unwanted emissions identified during the pre-scan measurements above. This method assumes the spectrum analyser has a Time Domain Power function.

Step 1:

The level of the emissions shall be measured using the following spectrum analyser settings:

- Measurement Mode: Time Domain Power
- Centre Frequency: Frequency of the emission identified during the pre-scan
- Resolution Bandwidth: 100 kHz (< 1 GHz) / 1 MHz (> 1 GHz)
- Video Bandwidth: 300 kHz (< 1 GHz) / 3 MHz (> 1 GHz)
- Frequency Span: Zero Span
- Sweep mode: Single Sweep
- Sweep time: 30ms
- Sweep points: 30 000
- Trigger: Video (burst signals) or Manual (continuous signals)
- Detector: RMS

Step 2:

Set a window where the start and stop indicators match the start and end of the burst with the highest level and record the value of the power measured within this window. If the spurious emission to be measured is a continuous transmission, the measurement window shall be set to match the start and stop times of the sweep.

Step 3:

In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 needs to be repeated for each of the active transmit chains (A_{ch}).

Sum the measured power (within the observed window) for each of the active receive chains.

Step 4:

The value defined in step 3 shall be compared to the limits defined in table 5 or table 13.

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Results (Radiated Method):

Below is the worst case situation test data:

Channel1 (2402MHz)			Channel 40 (2480MHz)		
Frequency	Polarity	Level (dBm)	Frequency	Polarity	Level (dBm)
200.93MHz	Vertical	-69.1	225.35MHz	Vertical	-68.4
236.38MHz	Horizontal	-68.9	355.76MHz	Horizontal	-69.3
Test Result		Pass			

Notes:

(1) Radiated measurement method was used. For the radiated method, the antenna polarization was set to vertical and horizontal respectively.

(2) The measurement was performed at the lowest and highest operating frequencies.

(3) The test receiver (spectrum analyzer) was set to Peak detector and 100 kHz resolution bandwidth. For measuring emissions that exceed the level of 6 dB below the applicable limit the resolution bandwidth shall be switched to 30 kHz. If the level does not change by more than 2 dB, it is a narrowband emission; the observed value shall be recorded. If the level changes by more than 2 dB, the emission is a wideband emission and its level shall be measured and recorded.

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Clause 4.3.1.12 Receiver Blocking

Definition

Receiver blocking is a measure of the ability of the equipment to receive a wanted signal on its operating channel without exceeding a given degradation due to the presence of an unwanted input signal (blocking signal) at frequencies other than those of the operating band and spurious responses.

Performance Criteria

For equipment that supports a PER or FER test to be performed, the minimum performance criterion shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER test to be performed, the minimum performance criterion shall be no loss of the wireless transmission function needed for the intended use of the equipment.

Limits

While maintaining the minimum performance criteria as defined in clause 4.3.2.11.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table 14, table 15 or table 16.

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Receiver Category 1

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.

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Receiver Category 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.

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Receiver Category 3

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.			

Test Conditions

See clause 5.1 for the environmental test conditions. These measurements shall only be performed at normal test conditions. For non-FHSS equipment, having more than one operating channel, the operating channels on which the testing has to be performed shall be selected as follows:

• For testing blocking frequencies less than 2 400 MHz, the equipment shall operate on the lowest operating channel.

• For testing blocking frequencies greater than 2 500 MHz, the equipment shall operate on the highest operating channel.

Equipment which can change their operating channel automatically (adaptive channel allocation), and where this function cannot be disabled, shall be tested as a FHSS equipment.

If the equipment can be configured to operate with different Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz) and different data rates, then the combination of the smallest channel bandwidth and the lowest data rate for this channel bandwidth which still allows the equipment to operate as intended shall be used. This mode of operation shall be aligned with the performance criteria defined in clause 4.3.1.12.3 or clause 4.3.2.11.3 and shall be described in the test report.

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Test Configuration

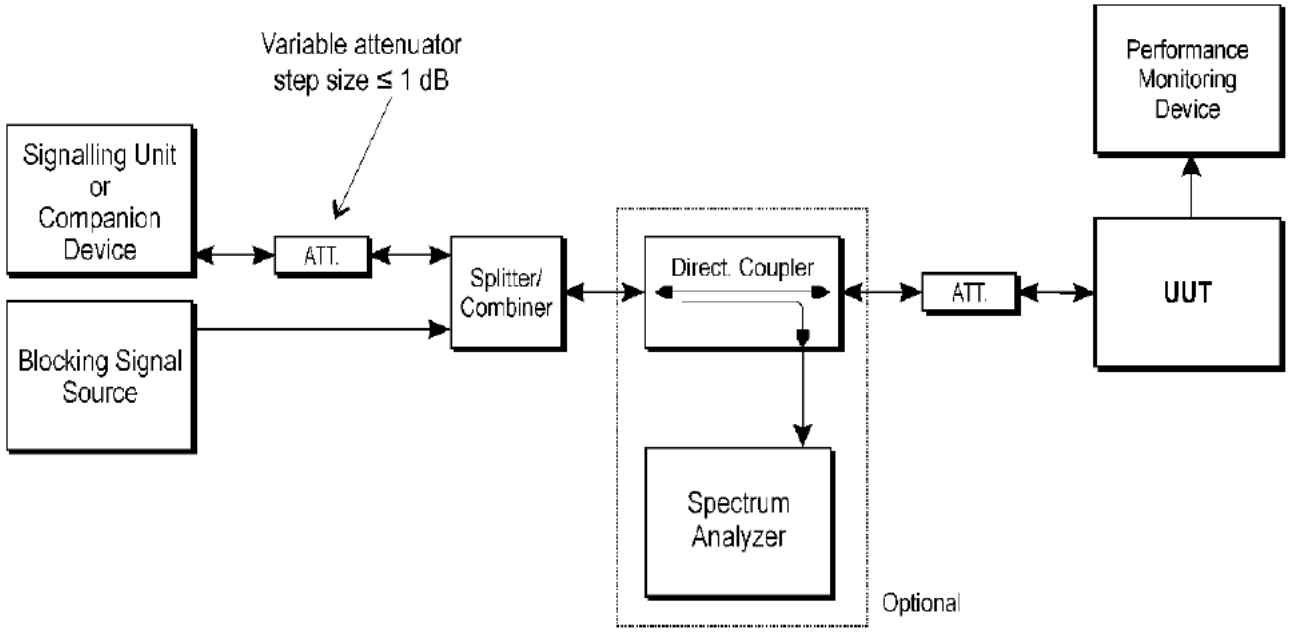


Figure 6: Test Set-up for receiver blocking

Test Method

For systems using multiple receive chains only one chain (antenna port) need to be tested. All other receiver inputs shall be terminated.
The procedure in step 1 to step 6 below shall be used to verify the receiver blocking requirement as described in clause 4.3.1.12 or clause 4.3.2.11. The performance monitoring device is capable of verifying the performance criteria as defined in clause 4.3.1.12.3 or clause 4.3.2.11.3.

Table 6, table 7 and table 8 in clause 4.3.1.12.4 contain the applicable blocking frequencies and blocking levels for each of the receiver categories for testing Receiver Blocking on FHSS equipment.

Table 14, table 15 and table 16 in clause 4.3.2.11.4 contain the applicable blocking frequencies and blocking levels for each of the receiver categories for testing Receiver Blocking on non-FHSS equipment.

Step1:

• For non-FHSS equipment, the UUT shall be set to the lowest operating channel on which the blocking test has to be performed (see clause 5.4.11.1).

Step 2:

• The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to

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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.

• Unless the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the level of the wanted signal shall be set to the value provided in the table corresponding to the receiver category and type of equipment. The test procedure defined in clause 5.4.2, and more in particular clause 5.4.2.2.1.2, can be used to measure the (conducted) level of the wanted signal however no correction shall be made for antenna gain of the companion device (step 6 in clause 5.4.2.2.1.2 shall be ignored). This level may be measured directly at the output of the companion device and a correction is made for the coupling loss into the UUT. The actual level for the wanted signal shall be recorded in the test report.

• When the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, 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 note 2 of the applicable 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.

• If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 are met then proceed to step 6.

Step 5:

• If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been increased with a value equal to the Occupied Channel Bandwidth except:

- For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB.

- For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.

• If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been decreased with a value equal to the Occupied Channel Bandwidth except:

- For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.

- For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB.

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• If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, the UUT fails to comply with the Receiver Blocking requirement and step 6 and step 7 are no longer required.
• It shall be recorded in the test report whether the shift of blocking frequencies as described in the present step was used.

Step 6:
• Repeat step 4 and step 5 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 7:
• For non-FHSS equipment, repeat step 2 to step 6 with the UUT operating at the highest operating channel on which the blocking test has to be performed (see clause 5.4.11.1).

Step 8:
• It shall be assessed and recorded in the test report whether the UUT complies with the Receiver Blocking requirement.

Test Result

The EUT is regarded as category 2 Receiver

Low Channel

Wanted signal mean power from companion device(dBm)	Blocking signal frequency (MHz)	Blocking signal power(dBm)	PER	Result
-68.81dBm	2380	-31.66	0.0%	Pass
-68.81dBm	2300	-31.66	0.0%	Pass

High Channel

Wanted signal mean power from companion device(dBm)	Blocking signal frequency (MHz)	Blocking signal power(dBm)	PER	Result
-68.79dBm	2504	-31.66	0.0%	Pass
-68.79dBm	2584	-31.66	0.0%	Pass

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§4.3.2.12 Geo-location capability

Geo-location capability is a feature of the equipment to determine its geographical location with the purpose to configure itself according to the regulatory requirements applicable at the geographical location where it operates.

The geo-location capability may be present in the equipment or in an external device (temporary) associated with the equipment operating at the same geographical location during the initial power up of the equipment. The geographical location may also be available in equipment already installed and operating at the same geographical location.

Result: Not applicable. EUT without with geo-location capability

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3.0 Product Labelling

CE Mark label specification

Text of the mark is black or white in color and is left justified. Labels are printed in indelible ink on permanent adhesive backing and shall be affixed at a conspicuous location on the EUT or silk-screened onto the EUT.



Mark Location: Rear enclosure

The report refers only to the sample tested and does not apply to the bulk.
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4. 0 Photographs – Test Setup

Spurious Radiated emission test view





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5.0 Photographs – EUT

Please refer test report TWN2607542-01E

6.0 Test Equipment					
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	R&S	ESPI 3	100379	2026-07-08	2027-07-07
TWO Line-V-NETW	R&S	EZH3-Z5	100294	2026-07-08	2027-07-07
TWO Line-V-NETW	R&S	EZH3-Z5	100253	2026-07-08	2027-07-07
Ultra Broadband ANT	R&S	HL562	100157	2026-07-08	2027-07-07
ESVB Test Receiver	R&S	ESVB	826156/011	2026-07-08	2027-07-07
Impuls-Begrenzer	R&S	ESH3-Z2	100281	2026-07-08	2027-07-07
5K VA AC Power Source	California Instruments	5001iX	56060	2026-07-08	2027-07-07
CDN	EM TEST	CDN M2/M3	-	2026-07-08	2027-07-07
Attenuation	EM TEST	ATT6/75	-	2026-07-08	2027-07-07
Resistance	EM TEST	R100	-	2026-07-08	2027-07-07
Electromagnetic Injection Clamp	LITTHI	EM101	35708	2026-07-08	2027-07-07
Inductive Components	EM TEST	MC2630	-	2026-07-08	2027-07-07
Antenna	EM TEST	MS100	-	2026-07-08	2027-07-07
Signal Generator	R&S	SMT03	100029	2026-07-08	2027-07-07
Power Amplifier	AR	150W1000	300999	2026-07-08	2027-07-07
Field probe	Holaday	HI-6005	105152	2026-07-08	2027-07-07
Bilog Antenna	Chase	CBL6111C	2576	2025-07-17	2028-07-16
Loop Antenna	EMCO	6507	00078608	2025-07-17	2028-07-16
Test Receiver	R&S	ESI26	838786/013	2026-07-08	2027-07-07
966 Chamber	YIHENG	--	N/A	2025-07-11	2028-07-10
Vector Signal Generator	AGILENT	E4438C	MY49070163	2026-01-09	2027-01-08
Splitter	Mini-Circuits	ZAP-50W	NN256400424	2026-01-09	2027-01-08
Directional Coupler	AGILENT	87300C	MY44300299	2026-01-09	2027-01-08
vector Signal Generator	AGILENT	E4438C	US44271917	2026-01-09	2027-01-08
4 Ch.Simultaneous Sampling 14 Bits 2 MS/s	AGILENT	U2531A	TW54063507	2026-01-09	2027-01-08
4 Ch.Simultaneous Sampling 14 Bits 2 MS/s	AGILENT	U2531A	TW54063513	2026-01-09	2027-01-08
Splitter	Mini	PS3-7	4463	2026-01-09	2027-01-08

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Spectrum Analyzer	AGILENT	E7405A	US44210471	2026-01-09	2027-01-08
Attenuator	Resnet	20dB	(n.a)	2026-01-09	2027-01-08
Signal Analyzer	AGILENT	N9010A	MY48030494	2026-01-09	2027-01-08
ESD Simulator	NoiseKen	ESS-2002	ESS06Y6394	2026-07-08	2027-07-07
Continuous Wave Simulator	EM TEST	CWS 500N	0704-05	2026-07-08	2027-07-07
Ultra Compact Simulator	EM TEST	UCS 500 M4	0304-42	2026-07-08	2027-07-07
Pre-Amplifier	HP	8447B	--	2026-07-08	2027-07-07
Horn Antenna	SchwarzBeck	BBHA9120D	01919	2026-07-08	2027-07-07
BiConiLog Antenna	SchwarzBeck	9163	1139	2026-07-08	2027-07-07
Pre-Amplifier	SchwarzBeck	BBV 9743	#218	2026-07-08	2027-07-07
6dB Attenuator	Anritsu	MP721B	--	2026-07-08	2027-07-07

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7.0 Measurement Uncertainty

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

End of the Report

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