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检测
TESTING
CNAS L6478

TEST REPORT

Reference No.	:	WTF24F07159996W001
Applicant	:	Mid Ocean Brands B.V.
Address	:	7/F., Kings Tower, 111 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong
Manufacturer	:	114320
Address	:	---
Product Name	:	WIFI foldable drone
Model No.	:	MO9379
Test specification	:	ETSI EN 300 440 V2.2.1 (2018-07)
Date of Receipt sample	:	2024-07-15
Date of Test	:	2024-08-17
Date of Issue	:	2024-08-21
Test Report Form No.	:	WEW-300440A-01B
Test Result	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of approver.

Prepared By:
Waltek Testing Group (Foshan) Co., Ltd.
Address: 1/F., Building 19, Sunlink Machinery City, Xingye 4 Road,
Guanglong Industrial Park, Chihua Neighborhood Committee, Chencun Town,
Shunde District, Foshan, Guangdong, China
Tel:+86-757-23811398 Fax:+86-757-23811381 E-mail:info@waltek.com.cn

Tested by:

Roy Hong

Approved by:

Danny Zhou

1 Test Summary

Radio Spectrum			
Test	Test Requirement	Limit / Severity	Result
Equivalent isotropically radiated power (e.i.r.p.)	ETSI EN 300 440 V2.2.1	10 mW e.i.r.p.	Pass
Permitted range of operating frequencies	ETSI EN 300 440 V2.2.1	fL > 2400 fH < 2483.5	Pass
Duty cycle	ETSI EN 300 440 V2.2.1	Table 4	Pass
Unwanted emissions in the spurious domain	ETSI EN 300 440 V2.2.1	Table 3	Pass
Adjacent channel selectivity	ETSI EN 300 440 V2.2.1	Clause 4.3.3.4	N/A*
Blocking or desensitization	ETSI EN 300 440 V2.2.1	Clause 4.3.4.4	Pass
Receiver spurious radiations	ETSI EN 300 440 V2.2.1	25MHz to 1GHz: ≤2nW 1GHz: ≤20nW	Pass

Remark:

Pass	The EUT complies with the essential requirements in the standard
Fail	The EUT does not comply with the essential requirements in the standard
N/A	Not Applicable
*	This requirement applies to channelized Category 1 receivers. The EUT is channelized Category 3 receiver.

2 Contents

3 General Information

3.1 General Description of E.U.T.

Product Name ..... : WIFI foldable drone

Model No. ..... : MO9379

Remark ..... : ---

Rating ..... : **For Quadcopter:**
Input: DC 5V
Battery: 3.7V, 300mAh
For Remote Controller:
Battery: 4.5V (3*1.5V AAA)

Battery Capacity ..... : ---

Adapter Model..... : ---

3.2 Technical Specification

Frequency Bands ..... : 2400-2483.5MHz

Operating Frequency ..... : 2476MHz

Quantity of Channels ..... : 1

Maximum RF Output Power ..... : 0.974 dBm (EIRP)

Type of Modulation ..... : GFSK

Antenna Type..... : Internal Antenna

Antenna Gain ..... : 0dBi

Receiver Category..... : 3

Receiver category	Description
1	Highly reliable SRD communication media; e.g. serving human life inherent systems (may result in a physical risk to a person).
2	Medium reliability SRD communication media e.g. causing inconvenience to persons, which cannot simply be overcome by other means.
3	Standard reliability SRD communication media and radiodetermination devices. E.g. Inconvenience to persons, which can simply be overcome by other means (e.g. manual).

3.3 Standards Applicable for Testing

The tests were performed according to following standards:

ETSI EN 300 440 V2.2.1 (2018-07)	Short Range Devices (SRD); Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Harmonised Standard for access to radio spectrum

3.4 Test Facility

The test facility has a test site registered with the following organizations:

- **ISED – Registration No.: 21895**

Waltek Testing Group (Foshan) Co., Ltd. has been registered and fully described in a report filed with the Innovation, Science an Economic Development Canada(ISED). The acceptance letter from the ISED is maintained in our files. Registration ISED number:21895, March 12, 2019

- **FCC – Registration No.: 820106**

Waltek Testing Group (Foshan) Co., Ltd. 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 820106, August 16, 2018

- **NVLAP – Lab Code: 600191-0**

Waltek Testing Group (Foshan) Co., Ltd. EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 600191-0.
This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

3.5 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test items: ---

Lab information: ---

3.6 Abnormalities from Standard Conditions

None.

3.7 Disclaimer

The antenna gain information is provided by the customer. The laboratory is not responsible for the accuracy of the antenna gain information.

4 Equipment Used during Test

4.1 Equipment List

☒3m Semi-anechoic Chamber for Spurious Emission						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	3m Semi-anechoic Chamber	CHANGCHUANG	9m×6m×6m	-	2024-01-05	2025-01-04
2	EMI TEST RECEIVER	RS	ESR7	101566	2024-01-06	2025-01-05
3	Spectrum Analyzer	Agilent	N9020A	MY48011796	2024-01-04	2025-01-03
4	Trilog Broadband Antenna	SCHWARZBECK	VULB9162	9162-117	2024-01-05	2025-01-04
5	Coaxial Cable (below 1GHz)	H+S	CBL3-NN-12+3 m	214NN320	2024-01-06	2025-01-05
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	01561	2024-01-05	2025-01-04
7	Broadband Preamplifier (Above 1GHz)	Lunar E M	LNA1G18-40	20160501002	2024-01-04	2025-01-03
8	Coaxial Cable (above 1GHz)	Times-Micorwave	CBL5-NN	-	2024-01-04	2025-01-03
9	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	01119	2024-01-05	2025-01-04
☒RF Conducted test						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	Environmental Chamber	KSON	THS-D4C-100	5244K	2024-01-17	2025-01-16
2	Spectrum Analyzer	Agilent	N9020A	MY48011796	2024-01-04	2025-01-03
3	EXG Analog Signal Generator	Agilent	N5181A	MY48180720	2024-01-04	2025-01-03
4	RF Control Unit	CHANGCHUANG	JS0806-2	-	2024-01-04	2025-01-03
5	Wideband radio communication tester	Rohde&Schwarz	CMW500	1201.0002K50-158178-Qf	2024-01-04	2025-01-03
6	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY56510008	2024-01-04	2025-01-03

☐: ***Not Used***

☒: ***Used***

4.2 Software List

Description	Manufacturer	Model	Version
EMI Test Software (Radiated Emission)	FARATRONIC	EZ-EMC	RA-03A1-1
RF Conducted Test	TONSCEND	JS1120-2	2.6

4.3 Special Accessories and Auxiliary Equipment

Item	Equipment	Technical Data	Manufacturer	Model No.	Serial No.
1.	/	/	/	/	/

4.4 Measurement Uncertainty

Parameter	Uncertainty	Note
RF Output Power	±2.2dB	(1)
Occupied Bandwidth	±1.5%	(1)
Transmitter Spurious Emission	±3.8dB (for 25MHz-1GHz)	(1)
	±5.0dB (for 1GHz-18GHz)	(1)

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.5 Decision Rule

Compliance or non-compliance with a disturbance limit shall be determined in the following manner.

If U_{LAB} is less than or equal to U_{cispr}, then

-Compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;

-Non-compliance is deemed to occur is any measured disturbance level exceeds the disturbance limt.

If U_{LAB} is greater than U_{cispr}, then

-Compliance is deemed to occur if no measured disturbance level, increased by (U_{LAB}-U_{cispr}) , exceeds the disturbance limit;

-Non-compliance is deemed to occur if any measured disturbance level, increased by (U_{LAB}-U_{cispr}) , exceeds the disturbance limit.

5 Test Conditions and Test mode

The equipment under test (EUT) was configured to measure its highest possible emission/immunity level. The test modes were adapted according to the operation manual for use, the EUT was operated in the continuous transmitting mode that was for the purpose of the measurements, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	Transmitting	2476MHz
TM2	Receiving	2476MHz

Test Conditions					
	Normal	LTLV	LTHV	HTHV	HTLV
Temperature (°C)	20	-20	-20	55	55
Voltage (Vdc)-TX	4.5	4.05	4.95	4.95	4.05
Voltage (Vdc)-RX	3.7	/	/	/	/
Relative Humidity:	45 %				
ATM Pressure:	101.2kPa				

6 Equivalent isotropically radiated power (e.i.r.p.)

6.1 Standard Applicable

The transmitter maximum e.i.r.p. measurements shall be performed as described in clause 4.2.2.3 and not exceed the limits in clause 4.2.2.4. The values and measurement method utilized shall be stated in the test report.

The transmitter maximum e.i.r.p. under normal and extreme test conditions is provided in table 2.

Table 2: Maximum radiated power (e.i.r.p.)

Entry	Frequency Bands	Power	Application	Notes
1	2 400 MHz to 2 483,5 MHz	10 mW e.i.r.p.	Non-specific short range devices	
2	2 400 MHz to 2 483,5 MHz	25 mW e.i.r.p.	Radiodetermination devices	
3	(a) 2 446 MHz to 2 454 MHz	500 mW e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and Annex G
4	(b) 2 446 MHz to 2 454 MHz	4 W e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and Annex G
5	5 725 MHz to 5 875 MHz	25 mW e.i.r.p.	Non-specific short range devices	
6	9 200 MHz to 9 500 MHz	25 mW e.i.r.p.	Radiodetermination devices	
7	9 500 MHz to 9 975 MHz	25 mW e.i.r.p.	Radiodetermination devices	
8	10,5 GHz to 10,6 GHz	500 mW e.i.r.p.	Radiodetermination devices	
9	13,4 GHz to 14,0 GHz	25 mW e.i.r.p.	Radiodetermination devices	
10	17,1 GHz to 17,3 GHz	400 mW e.i.r.p.	Radiodetermination devices	See Annex H
11	24,00 GHz to 24,25 GHz	100 mW e.i.r.p.	Non-specific short range devices and radiodetermination devices	
NOTE: The spectrum ranges in some entries are not harmonised throughout all EU territory, specifically entries 4, 9, and 11 have been identified as such. Implementers are cautioned to refer to CEPT/ERC Recommendation 70-03 [i.2] as well as current National Radio plans to verify acceptance within intended regions of use.				

6.2 Test Procedure

Reference to ETSI EN 300 440 V2.2.1 clause 4.2.2.3

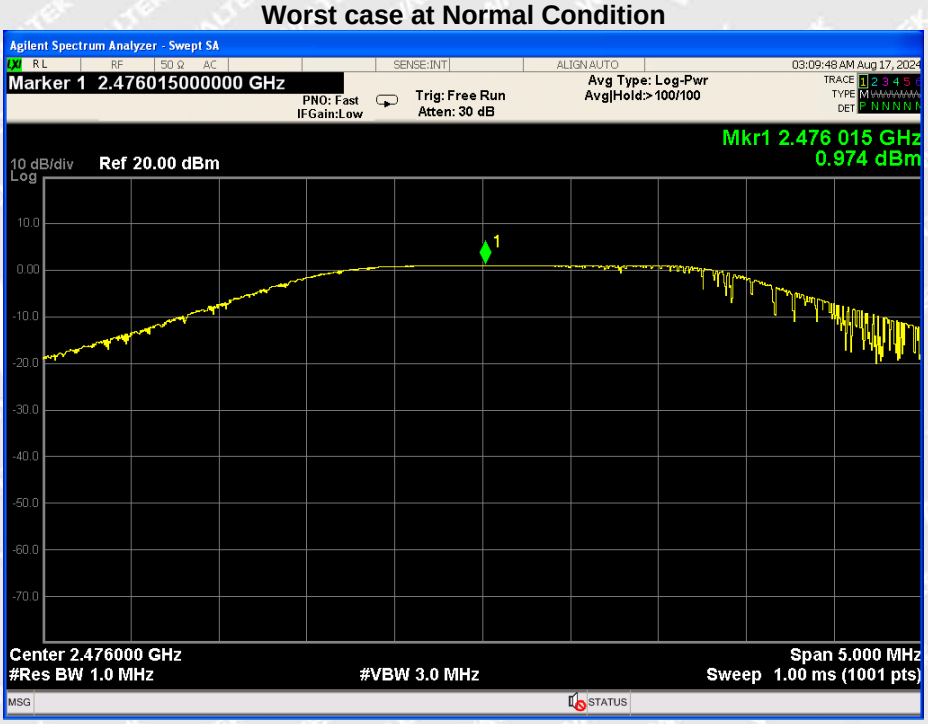
6.3 Test Result

Test Channel	Test Condition	Equivalent isotropic radiated power (dBm)	Limit	Verdict
2476MHz	Normal	0.974	10mW(10dBm)	Pass
	LTLV	0.968	10mW(10dBm)	Pass
	LTHV	0.950	10mW(10dBm)	Pass
	HTLV	0.865	10mW(10dBm)	Pass
	HTHV	0.962	10mW(10dBm)	Pass
Max. E.I.R.P		**0.974**		

Note:
1. The cable loss and antenna is taken into account in results.
2. P=A(RMS power)+G+Y, Antenna gain (G): 0dBi

Test plot:

Worst case at Normal Condition



7 Permitted range of operating frequencies

7.1 Standard Applicable

The width of the power spectrum envelope is fH -fL for a given operating frequency. In equipment that allows adjustment or selection of different operating frequencies, the power envelope takes up different positions in the allowed band. The frequency range is determined by the lowest value of fL and the highest value of fH resulting from the adjustment of the equipment to the lowest and highest operating frequencies.

The occupied bandwidth (i.e. the bandwidth in which 99 % of the wanted emission is contained) of the transmitter shall fall within the assigned frequency band.

For all equipment the frequency range shall lie within the frequency band given by clause 4.2.2.4, table 2. For non-harmonized frequency bands the available frequency range may differ between national administrations.

7.2 Test Procedure

Reference to ETSI EN 300 440 V2.2.1 Clause 4.2.3.3.

7.3 Test Result

Test Conditions	Frequency range measure in a 30KHz bandwidth			
	f_L at Low Channel (MHz)		f_H at High Channel (MHz)	
	Measure result	Limit	Measure result	Limit
Normal	2475.289	f_L > 2400	2477.095	f_H < 2483.5
LTLV	2475.283	f_L > 2400	2477.092	f_H < 2483.5
LTHV	2475.286	f_L > 2400	2477.086	f_H < 2483.5
HTLV	2475.283	f_L > 2400	2477.089	f_H < 2483.5
HTHV	2475.283	f_L > 2400	2477.092	f_H < 2483.5

8 Duty Cycle

8.1 Standard Applicable

Duty Cycle (DC) shall apply to all transmitting equipment except those which utilize Listen Before Talk (LBT)clause 4.4.2,or Detect And Avoid (DAA)clause 4.4.3.

RFID transmitters operating in the 2 446 MHz to 2 454 MHz frequency band that transmit at a maximum radiated peak power level of less than 500 mW e.i.r.p. are also excluded.

For equipment utilizing table B.1 bands C or E, with a radiated power of less than 100 uW e.i.r.p, no duty cycle is specified.

Table 4: Duty cycle limits

Frequency Band	Duty cycle	Application	Notes
2 400 MHz to 2 483,5 MHz	No Restriction	Generic use	
2 400 MHz to 2 483,5 MHz	No Restriction	Radiodetermination	
(a) 2 446 MHz to 2 454 MHz	No Restriction	RFID	Limits shown in Annex G shall apply
(b) 2 446 MHz to 2 454 MHz	≤ 15 %	RFID	Limits shown in Annex G shall apply
5 725 MHz to 5 875 MHz	No Restriction	Generic use	
9 200 MHz to 9 500 MHz	No Restriction	Radiodetermination	
9 500 MHz to 9 975 MHz	No Restriction	Radiodetermination	
10,5 GHz to 10,6 GHz	No Restriction	Radiodetermination	
13,4 GHz to 14,0 GHz	No Restriction	Radiodetermination	
17,1 GHz to 17,3 GHz	DAA or equivalent techniques	Radiodetermination, limited to GBSAR detecting and movement and alert applications	Limits shown in Annex I shall apply
24,00 GHz to 24,25 GHz	No Restriction	Generic use and for radiodetermination	
NOTE: The spectrum ranges in some entries are not harmonised throughout all EU territory, specifically entries 4, 9, and 11 have been identified as such. Implementers are cautioned to refer to CEPT/ERC Recommendation 70-03 [i.2] as well as current National Radio plans to verify acceptance within intended regions of use.			

For devices with a 100 % duty cycle transmitting an unmodulated carrier most of the time, a time-out shut-off facility shall be implemented in order to improve the efficient use of spectrum.

8.2 Test Procedure

Reference to ETSI EN 300 440 V2.2.1 Clause 4.2.5.3.

8.3 Test Result

The EUT was manual operation for remote controller, it's declared by the manufacturer as a duty cycle ratio of more than 10% and up to 100%.

9 Unwanted emissions in the spurious domain

9.1 Standard Applicable

The level of unwanted emissions in the spurious domain shall be measured as described in clause 4.2.4.3 and not exceed the limits in clause 4.2.4.4.

The maximum power limits of any unwanted emissions in the spurious domain are given in table 3.

Table 3: Spurious emissions

Frequency ranges **State**	**47 MHz to 74 MHz** **87,5 MHz to 108 MHz** **174 MHz to 230 MHz** **470 MHz to 862 MHz**	**Other frequencies** **≤ 1 000 MHz**	**Frequencies** **> 1 000 MHz**
Operating	4nW	250 nW	1 µW
Standby	2nW	2nW	20 nW

9.2 Test Procedure

Reference to ETSI EN 300 440 V2.2.1 Clause 4.2.4.3.

9.3 Test Result

Frequency (MHz)	Receiver Reading (dBµV)	Turn table Angle (°)	RX Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable (dB)	Antenna Gain (dB)			
TX mode										
475.65	30.16	145	1.0	H	-70.78	0.16	0.00	-70.62	-54	-16.62
475.65	27.48	318	1.6	V	-74.69	0.16	0.00	-74.53	-54	-20.53
2499.28	45.25	121	1.6	H	-48.41	0.43	10.60	-58.58	-30	-28.58
2499.28	44.28	223	1.3	V	-45.66	0.43	10.60	-55.83	-30	-25.83
3139.81	45.92	185	1.6	H	-46.48	2.08	11.50	-55.90	-30	-25.90
3139.81	41.73	160	1.7	V	-48.68	2.08	11.50	-58.10	-30	-28.10

Frequency (MHz)	Receiver Reading (dBµV)	Turn table Angle (°)	RX Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable (dB)	Antenna Gain (dB)			
Standby mode										
927.59	23.13	190	1.3	H	-72.23	0.22	0.00	-72.01	-57	-15.01
927.59	23.32	295	1.0	V	-71.75	0.22	0.00	-71.53	-57	-14.53
4280.75	44.31	186	1.0	H	-47.03	2.53	12.60	-57.10	-47	-10.10
4280.75	43.79	243	1.1	V	-46.16	2.53	12.60	-56.23	-47	-9.23
4555.06	44.88	161	1.2	H	-46.02	2.57	12.70	-56.15	-47	-9.15
4555.06	43.48	293	1.3	V	-46.12	2.57	12.70	-56.25	-47	-9.25

10 Receiver Spurious radiations

10.1 Standard Applicable

The spurious radiations measurements shall be performed as described in clause 4.3.5.3 and not exceed the limits in clause 4.3.5.4. The values and measurement method utilized shall be stated in the test report.

The power of any spurious emission shall not exceed 2 nW in the range 25 MHz to 1 GHz and shall not exceed 20 nW on frequencies above 1 GHz.

10.2 Test Procedure

Reference to ETSI EN 300 440 V2.2.1 Clause 4.3.5.3.

10.3 Test Result

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle (°)	RX Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable (dB)	Antenna Gain (dB)			
RX mode										
398.08	31.86	199	2.0	H	-72.23	0.16	0.00	-72.07	-57	-15.07
398.08	31.71	117	1.4	V	-72.65	0.16	0.00	-72.49	-57	-15.49
3849.60	41.19	245	1.9	H	-49.30	2.42	12.60	-59.48	-47	-12.48
3849.60	43.04	275	1.5	V	-45.91	2.42	12.60	-56.09	-47	-9.09
6772.16	39.35	223	1.4	H	-49.05	2.98	13.00	-59.07	-47	-12.07
6772.16	39.06	196	1.6	V	-48.98	2.98	13.00	-59.00	-47	-12.00

11 Blocking or desensitization

11.1 Standard Applicable

he blocking or desensitization measurements shall be performed as described in clause 4.3.4.3 and not exceed the

limits in clause 4.3.4.4. The values and measurement method utilized shall be stated in the test report.

The blocking level, for any frequency within the specified ranges, shall not be less than the values given in table 6, except at frequencies on which spurious responses are found.

Table 6: Limits for blocking or desensitization

Receiver category	Limit
1	-30 dBm + k
2	-45 dBm + k
3	-60 dBm + k

The correction factor, k, is as follows:

$$k = -20\log f - 10\log BW$$

Where:

- f is the frequency in GHz;
- BW is the occupied bandwidth in MHz.

The factor k is limited within the following:

- -40 dB < k < 0 dB.

The measured blocking level shall be stated in the test report.

11.2 Test Procedure

This measurement shall be conducted under normal conditions.

Two signal generators A and B shall be connected to the receiver via a combining network to the receiver, either:

a) via a test fixture or a test antenna to the receiver integrated, dedicated or test antenna; or

b) directly to the receiver permanent or temporary antenna connector.

The method of coupling to the receiver shall be stated in the test report.

Signal generator A shall be at the nominal frequency of the receiver, with normal modulation of the wanted signal. Signal generator B shall be unmodulated and shall be adjusted to a test frequency at approximately 10 times, 20 times and 50 times of the occupied bandwidth above upper band edge of occupied bandwidth.

Initially signal generator B shall be switched off and using signal generator A the level which still gives sufficient response shall be established. The output level of generator A shall then be increased by 3 dB.

Signal generator B is then switched on and adjusted until the wanted criteria are met. This level shall be recorded.

The measurement shall be repeated with the test frequency for signal generator B at 10 times, 20 times and 50 times of the occupied bandwidth below the lower band edge of the occupied bandwidth.

The blocking or desensitization shall be recorded as the level in dBm of lowest level of the unwanted signal (generator B).

For tagging systems (e.g. RF identification, anti-theft, access control, location and similar systems) signal

generator A may be replaced by a physical tag positioned at 70 % of the measured system range in metres. In this case, the blocking or desensitization shall be recorded as the ratio in dB of lowest level of the unwanted signal (generator B) resulting in a non-read of the tag. to the declared sensitivity of the receiver +3 dB.

11.3 Test Result

Frequency (MHz)	SA Level (dBm)		SB			Occupied bandwidth (MHz)	k factor (dB)	Limit (dBm)
	P_{min}	P_{min+3}	Blocking signal frequency (MHz)		Blocking power (dBm)			
2476	-58	-55	Upper band edge +10 times OBW	2493.473	-15	1.6492	-10.03	≥-70.03
			Lower band edge - 10 times OBW	2458.833	-16			
			Upper band edge +20 times OBW	2509.965	-17			
			Lower band edge - 20 times OBW	2442.341	-18			
			Upper band edge +50 times OBW	2559.441	-20			
			Lower band edge - 50 times OBW	2392.865	-17			

12 Photographs – Test Setup

12.1 Photograph – Spurious Emissions Test Setup For Transmitter

Below 1GHz

Above 1GHz

12.2 Photograph – Spurious Emissions Test Setup For Receiver

Below 1GHz

Above 1GHz

13 Photographs – EUT Constructional Details

Please refer to “ANNEX”.

======End of Report======

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TEST REPORT

Reference No.	:	WTF24F07159996W002
Applicant	:	Mid Ocean Brands B.V.
Address	:	7/F., Kings Tower, 111 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong
Manufacturer	:	114320
Address	:	---
Product Name	:	WIFI foldable drone
Model No.	:	MO9379
Test specification	:	ETSI EN 300 328 V2.2.2 (2019-07)
Date of Receipt sample	:	2024-07-15
Date of Test	:	2024-07-17
Date of Issue	:	2024-08-21
Test Report Form No.	:	WEW-300328A-01B
Test Result	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of approver.

Prepared By:
Waltek Testing Group (Foshan) Co., Ltd.
Address: 1/F., Building 19, Sunlink Machinery City, Xingye 4 Road,
Guanglong Industrial Park, Chihua Neighborhood Committee, Chencun Town,
Shunde District, Foshan, Guangdong, China
Tel:+86-757-23811398 Fax:+86-757-23811381 E-mail:info@waltek.com.cn

Tested by:

Roy Hong

Approved by:

Danny Zhou

1 Test Summary

Test	Test Requirement	Limit / Severity	Result
RF output power	ETSI EN 300 328 V2.2.2	≤20dBm	Pass
Power Spectral Density	ETSI EN 300 328 V2.2.2	≤10dBm/MHz	Pass
Duty Cycle, Tx-sequence, Tx-gap	ETSI EN 300 328 V2.2.2	Duty Cycle≤manufacturer declare value Tx-sequence:3.5~10ms Tx-gap:3.5~10ms	N/A
Medium Utilization	ETSI EN 300 328 V2.2.2	≤10%	N/A
Adaptivity	ETSI EN 300 328 V2.2.2	Clause 4.3.1.7	Pass
Occupied Channel Bandwidth	ETSI EN 300 328 V2.2.2	Within the band 2400-2483.5MHz	Pass
Transmitter unwanted in the OOB domain	ETSI EN 300 328 V2.2.2	Figure 3	Pass
Transmitter unwanted emissions in the spurious domain	ETSI EN 300 328 V2.2.2	Table 12	Pass
Receiver spurious emissions	ETSI EN 300 328 V2.2.2	Table 14/15/16	Pass
Receiver Blocking	ETSI EN 300 328 V2.2.2	Clause 4.3.2.11.4.2	Pass

Remark:

Pass Test item meets the requirement

N/A Not Applicable

2 Contents

3 General Information

3.1 General Description of E.U.T.

Product Name ..... : WIFI foldable drone

Model No. ..... : MO9379

Remark ..... : ---

Rating ..... : **For Quadcopter:**
Input: DC 5V
Battery: 3.7V, 300mAh
For Remote Controller:
Battery: 4.5V (3*1.5V AAA)

Battery Capacity ..... : ---

Adapter Model..... : ---

3.2 Technical Specification

Frequency Range ..... : 2412~2472MHz for 802.11b/g/n(HT20)

Maximum RF Output Power ..... : 4.89 dBm (EIRP)

Type of Modulation ..... : DSSS, OFDM

Quantity of Channels ..... : 13

Channel Separation..... : 5MHz

Antenna Type..... : Internal Antenna

Antenna Gain ..... : 0dBi

Receiver Category..... : 1

Receiver Category	Description
1	Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p.
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 equipment (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.
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.

3.3 Standards Applicable for Testing

The tests were performed according to following standards:

ETSI EN 300 328 V2.2.2 (2019-07)	Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering essential requirements under article 3.2 of the RED Directive.

3.4 Test Facility

The test facility has a test site registered with the following organizations:

- **ISED – Registration No.: 21895**

Waltek Testing Group (Foshan) Co., Ltd. has been registered and fully described in a report filed with the Innovation, Science an Economic Development Canada(ISED). The acceptance letter from the ISED is maintained in our files. Registration ISED number:21895, March 12, 2019

- **FCC – Registration No.: 820106**

Waltek Testing Group (Foshan) Co., Ltd. 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 820106, August 16, 2018

- **NVLAP – Lab Code: 600191-0**

Waltek Testing Group (Foshan) Co., Ltd. EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 600191-0.

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

3.5 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test items:---

Lab information:---

3.6 Abnormalities from Standard Conditions

None.

3.7 Disclaimer

The antenna gain information is provided by the customer. The laboratory is not responsible for the accuracy of the antenna gain information.

4 Equipment Used during Test

4.1 Equipment List

☒3m Semi-anechoic Chamber for Spurious Emission						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	3m Semi-anechoic Chamber	CHANGCHUANG	9m×6m×6m	-	2024-01-05	2025-01-04
2	EMI TEST RECEIVER	RS	ESR7	101566	2024-01-06	2025-01-05
3	Spectrum Analyzer	Agilent	N9020A	MY48011796	2024-01-04	2025-01-03
4	Trilog Broadband Antenna	SCHWARZBECK	VULB9162	9162-117	2024-01-05	2025-01-04
5	Coaxial Cable (below 1GHz)	H+S	CBL3-NN-12+3 m	214NN320	2024-01-06	2025-01-05
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	01561	2024-01-05	2025-01-04
7	Broadband Preamplifier (Above 1GHz)	Lunar E M	LNA1G18-40	20160501002	2024-01-04	2025-01-03
8	Coaxial Cable (above 1GHz)	Times-Micorwave	CBL5-NN	-	2024-01-04	2025-01-03
☒RF Conducted test						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	Environmental Chamber	KSON	THS-D4C-100	5244K	2024-01-17	2025-01-16
2	Spectrum Analyzer	Agilent	N9020A	MY48011796	2024-01-04	2025-01-03
3	EXG Analog Signal Generator	Agilent	N5181A	MY48180720	2024-01-04	2025-01-03
4	RF Control Unit	CHANGCHUANG	JS0806-2	-	2024-01-04	2025-01-03
5	Wideband radio communication tester	Rohde&Schwarz	CMW500	1201.0002K50-158178-Qf	2024-01-04	2025-01-03
6	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY56510008	2024-01-04	2025-01-03

☐: ***Not Used***

☒: ***Used***

4.2 Software List

Description	Manufacturer	Model	Version
EMI Test Software (Radiated Emission)	FARATRONIC	EZ-EMC	RA-03A1-1
RF Conducted Test	TONSCEND	JS1120-2	2.6

4.3 Special Accessories and Auxiliary Equipment

Item	Equipment	Technical Data	Manufacturer	Model No.	Serial No.
1.	/	/	/	/	/

4.4 Measurement Uncertainty

Parameter	Uncertainty	Note
RF Output Power	±2.2dB	(1)
Occupied Bandwidth	±1.5%	(1)
Transmitter Spurious Emission	±3.8dB (for 25MHz-1GHz)	(1)
	±5.0dB (for 1GHz-18GHz)	(1)

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.5 Decision Rule

Compliance or non-compliance with a disturbance limit shall be determined in the following manner.

If U_{LAB} is less than or equal to U_{cispr}, then

-Compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;

-Non-compliance is deemed to occur is any measured disturbance level exceeds the disturbance limt.

If U_{LAB} is greater than U_{cispr}, then

-Compliance is deemed to occur if no measured disturbance level, increased by (U_{LAB}-U_{cispr}) , exceeds the disturbance limit;

-Non-compliance is deemed to occur if any measured disturbance level, increased by (U_{LAB}-U_{cispr}) , exceeds the disturbance limit.

5 Test Conditions and Test mode

The equipment under test (EUT) was configured to measure its highest possible emission/immunity level. The test modes were adapted according to the operation manual for use, the EUT was operated in the continuous transmitting mode that was for the purpose of the measurements, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	802.11b	Low: 2412MHz, Middle:2442MHz, High:2472MHz
TM2	802.11g	Low: 2412MHz, Middle:2442MHz, High:2472MHz
TM3	802.11n(HT20)	Low: 2412MHz, Middle:2442MHz, High:2472MHz

Test Conditions			
	Normal	LTNV	HTNV
Temperature (°C)	22	-10	+50
Voltage (Vdc)	3.7		
Relative Humidity:	45 %		
ATM Pressure:	101.2kPa		

6 RF Requirements

6.1 RF Output power

6.1.1 Standard Applicable

According to Section 4.3.1.2.3, The maximum RF output power for adaptive Frequency Hopping equipment shall be equal to or less than 20 dBm. The maximum RF output power for non-adaptive Frequency Hopping equipment, shall be declared by the supplier. The maximum RF output power for this equipment shall be equal to or less than the value declared by the supplier. This declared value shall be equal to or less than 20 dBm.

According to Section 4.3.2.2.3, For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm. The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. For non-adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be equal to or less than the value declared by the supplier.

6.1.2 Test Procedure

According to section 5.4.2.2.1.2 of the standard EN 300328, the test procedure shall be as follows:

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 shall represent the RMS power of the signal.

- Measurement duration: For non-adaptive equipment: equal to the observation period defined in clause 4.3.1.3.2 or clause 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) is captured.

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 500 ns.

- For each individual sampling point (time domain), sum the coincident power samples of all ports and store them. Use these summed samples as the new stored data set.

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 Pburst 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 Pburst values (value A in dBm) will be used for maximum e.i.r.p. calculations.

Step 6:

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

•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 (Pout) shall be calculated using the formula below: P_{out} = A + G + Y

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

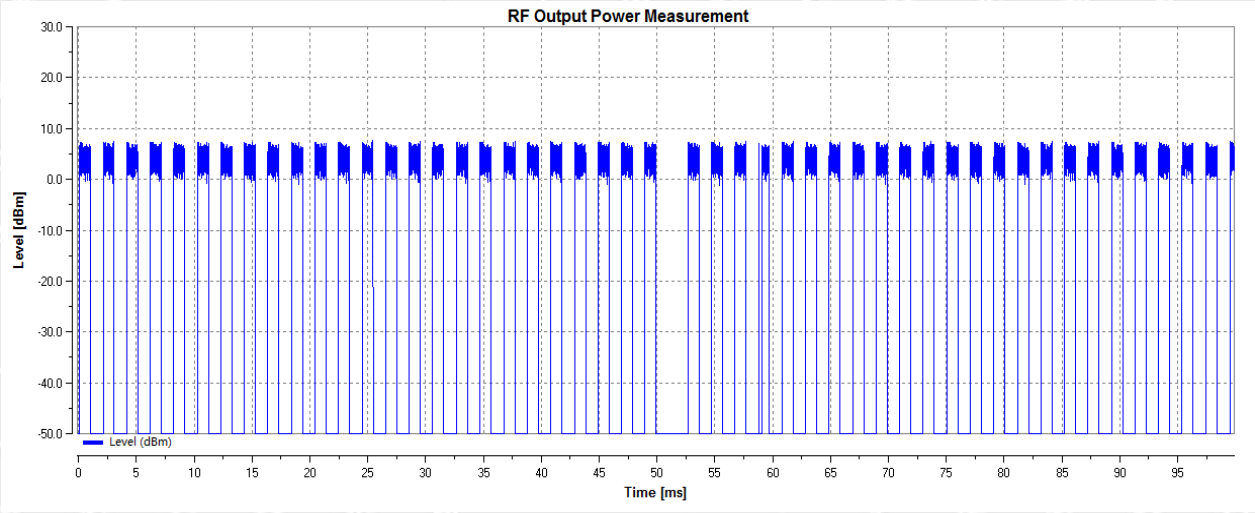
6.1.3 Test Result

Test Condition	Test Mode	Test Channel (MHz)	EIRP (dBm)	Limit (dBm)	Verdict
TLVN	11b	2412	4.78	<=20	Pass
TNVN	11b	2412	4.89	<=20	Pass
THVN	11b	2412	4.37	<=20	Pass
TLVN	11b	2442	4.03	<=20	Pass
TNVN	11b	2442	4.03	<=20	Pass
THVN	11b	2442	2.66	<=20	Pass
TLVN	11b	2472	2.98	<=20	Pass
TNVN	11b	2472	2.66	<=20	Pass
THVN	11b	2472	2.32	<=20	Pass
TLVN	11g	2412	1.88	<=20	Pass
TNVN	11g	2412	1.87	<=20	Pass
THVN	11g	2412	3.79	<=20	Pass
TLVN	11g	2442	4.08	<=20	Pass
TNVN	11g	2442	3.96	<=20	Pass
THVN	11g	2442	3.15	<=20	Pass
TLVN	11g	2472	3.24	<=20	Pass
TNVN	11g	2472	3.37	<=20	Pass
THVN	11g	2472	3.22	<=20	Pass
TLVN	11n(HT20)	2412	3.89	<=20	Pass
TNVN	11n(HT20)	2412	3.17	<=20	Pass
THVN	11n(HT20)	2412	2.36	<=20	Pass
TLVN	11n(HT20)	2442	2.21	<=20	Pass
TNVN	11n(HT20)	2442	2.1	<=20	Pass
THVN	11n(HT20)	2442	1.17	<=20	Pass
TLVN	11n(HT20)	2472	3.7	<=20	Pass
TNVN	11n(HT20)	2472	1.67	<=20	Pass
THVN	11n(HT20)	2472	1.6	<=20	Pass

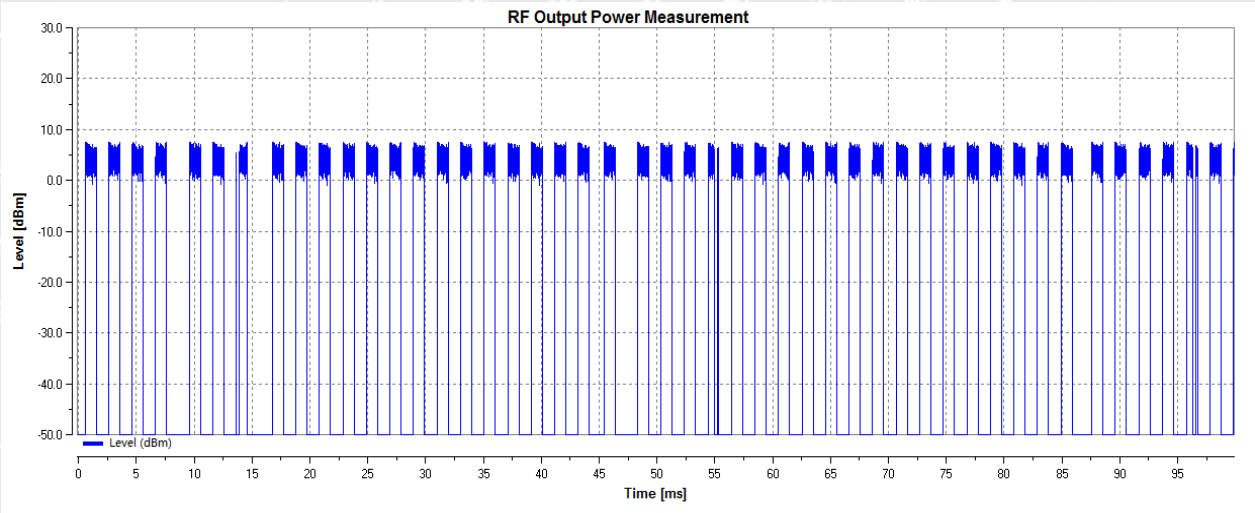
Remark: EIRP=Conducted power+ ANT gain

Test Graphs:

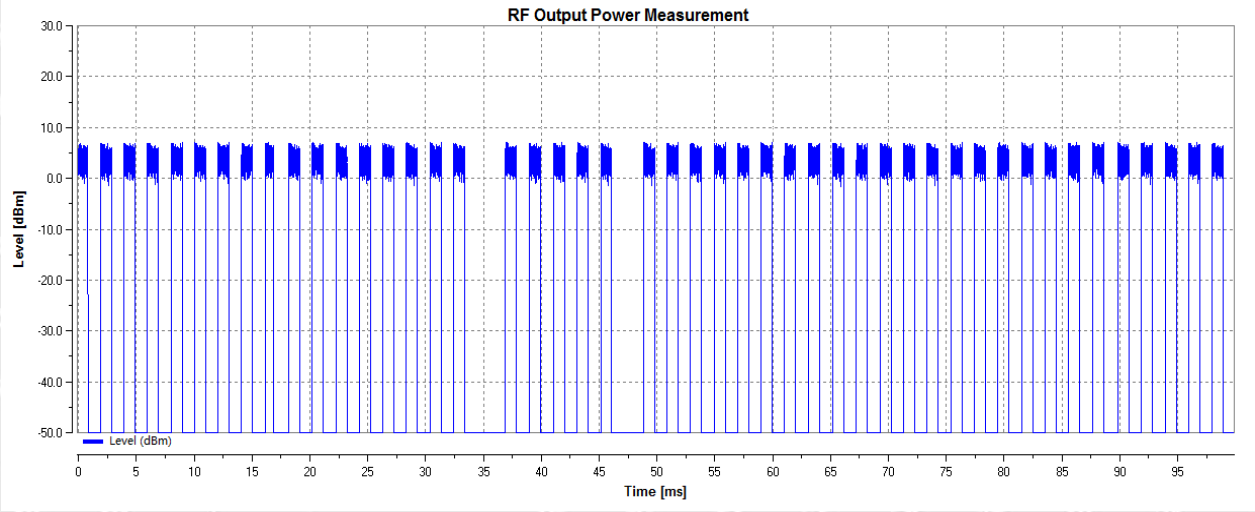
RF Output Power_TLVN_11b_2412



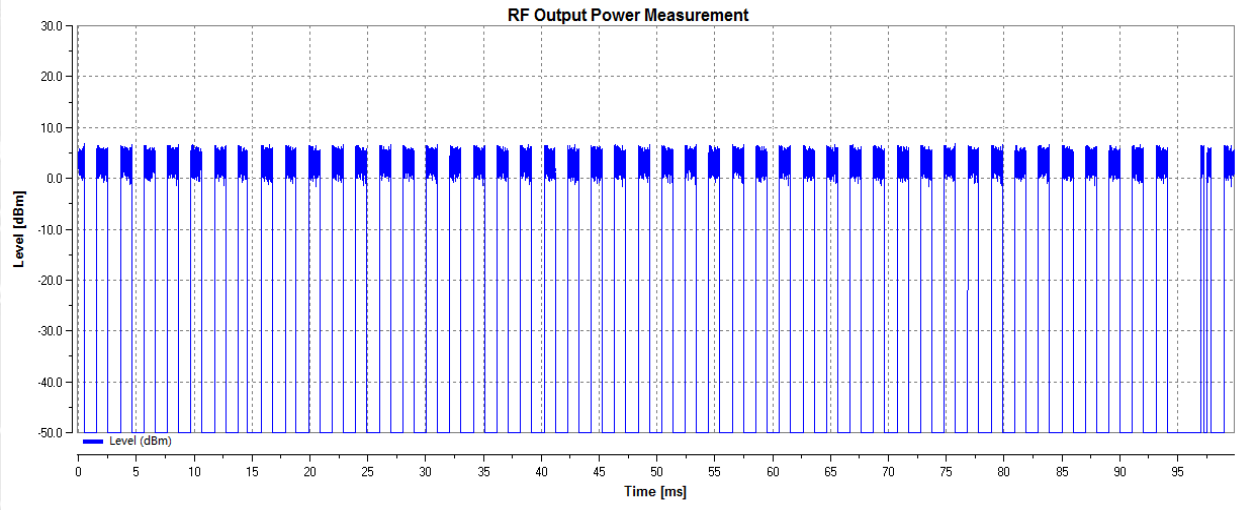
RF Output Power_TNVN_11b_2412



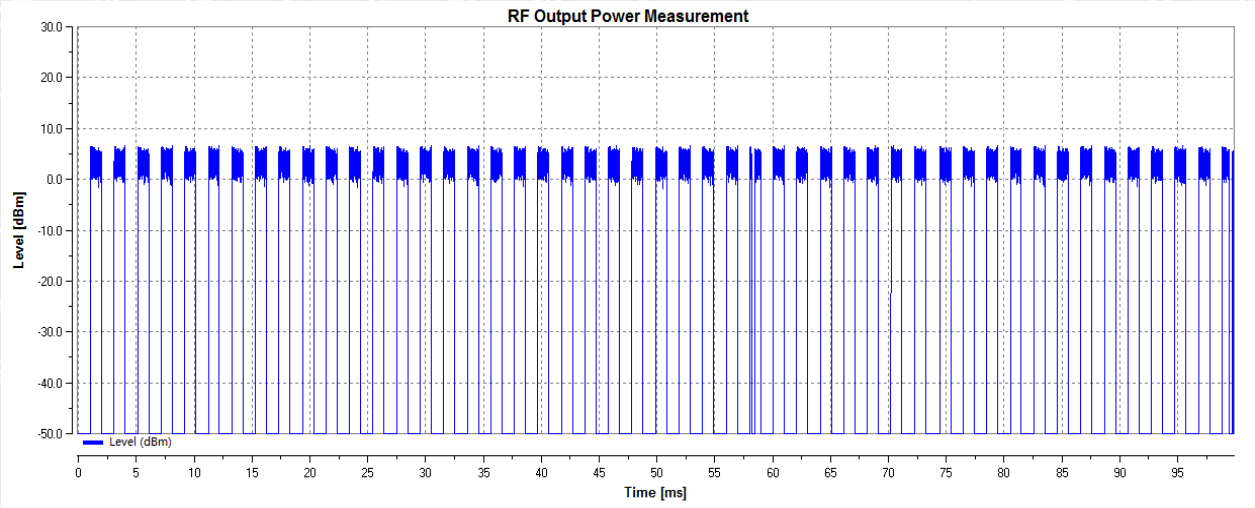
RF Output Power_THVN_11b_2412



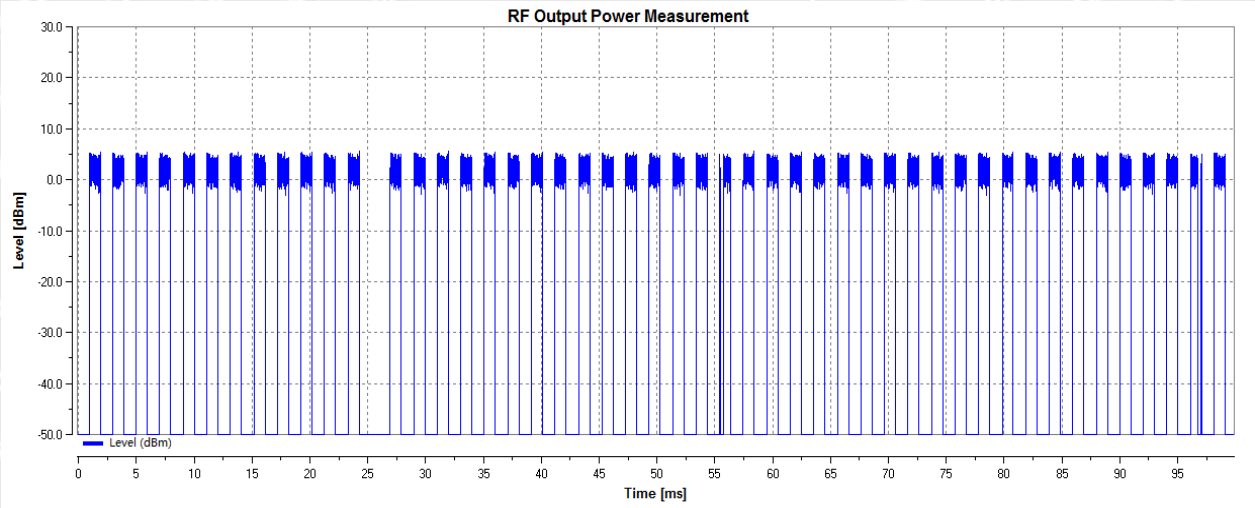
RF Output Power_TLVN_11b_2442



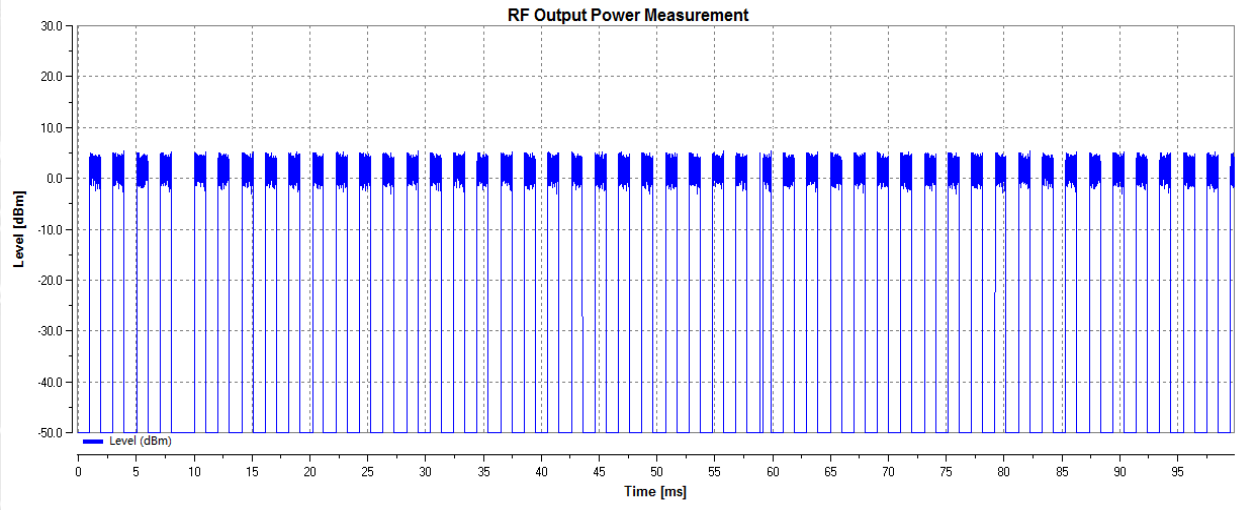
RF Output Power_TNVN_11b_2442



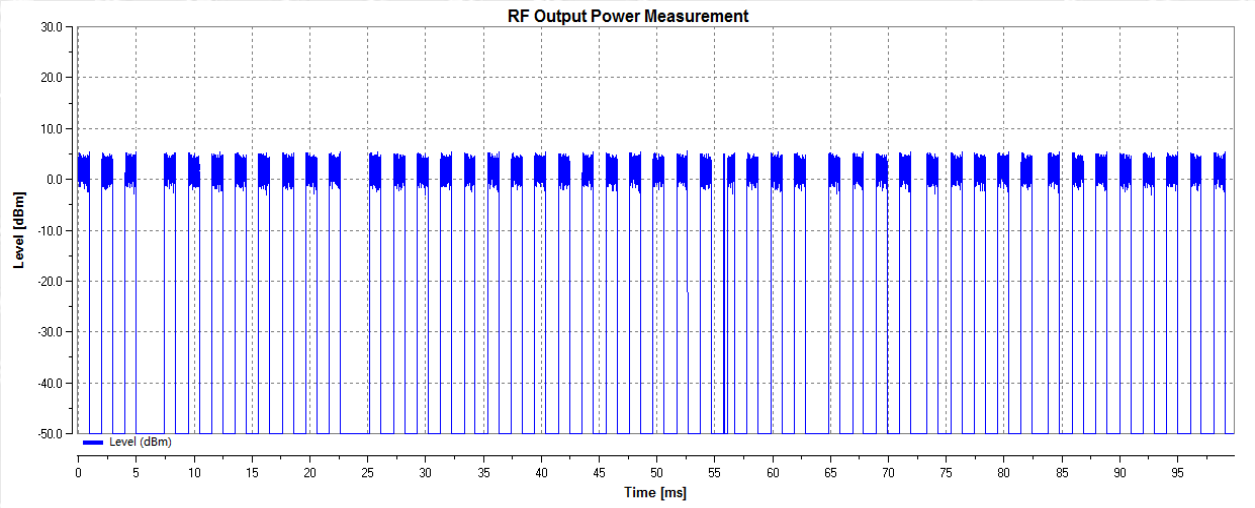
RF Output Power_THVN_11b_2442



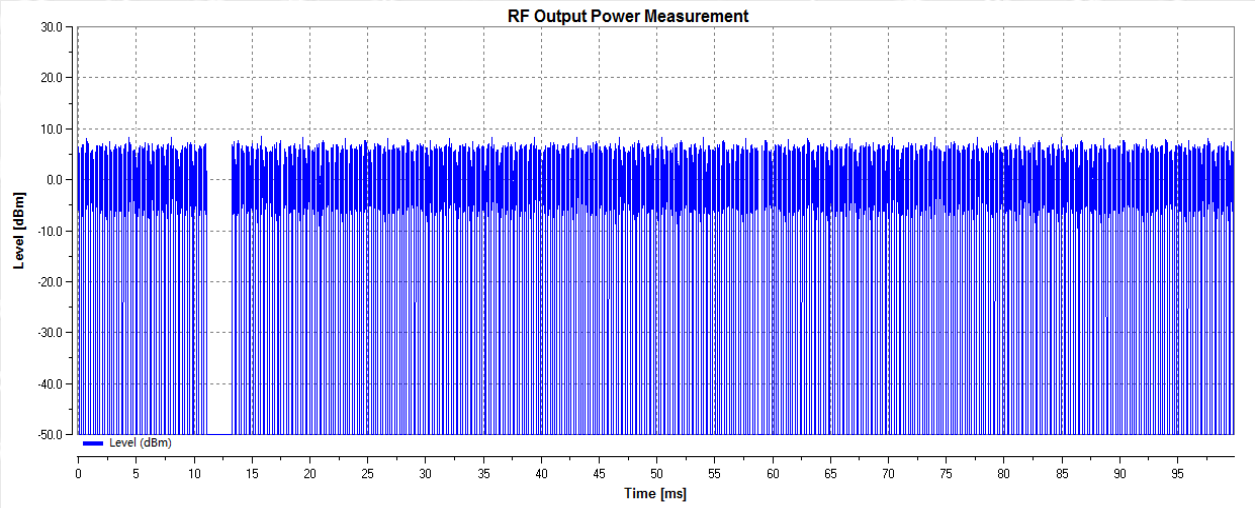
RF Output Power_TLVN_11b_2472



RF Output Power_TNVN_11b_2472



RF Output Power_THVN_11b_2472



Remark:
1) Only the worst case result plot was recorded.
2) The antenna gain is not considered in the result plot.

6.2 Power Spectral Density

6.2.1 Standard Applicable

According to Section 4.3.2.3.3, For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to 10 dBm per MHz.

6.2.2 Test Procedure

According to section 5.4.3.2.1 of the standard EN 300328, the test procedure shall be as follows:

Step 1:

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

• Start Frequency: 2 400 MHz

• Stop Frequency: 2 483,5 MHz

• Resolution BW: 10 kHz

• Video BW: 30 kHz

• Sweep Points: > 8 350; for spectrum analysers not supporting this number of sweep points, the frequency band may be segmented

• Detector: RMS

• Trace Mode: Max Hold

• Sweep time:

For non-continuous transmissions: 2 × Channel Occupancy Time × number of sweep points.

For non-adaptive equipment use the maximum TX-sequence time in the formula above instead of the Channel Occupancy Time.

For continuous transmissions: 10 s; the sweep time may be increased further until a value where the sweep time has no further impact anymore on the RMS value of the signal.

For non-continuous signals, wait for the trace to stabilize.

Save the data (trace data) set to a file.

Step 2:

For conducted measurements on smart antenna systems using either operating mode 2 or operating mode 3 (see clause 5.3.2.2), repeat the measurement for each of the transmit ports. For each sampling point (frequency domain), add up the coincident power values (in mW) for the different transmit chains and use this as the new data set.

Step 3:

Add up the values for power for all the samples in the file using the formula below.

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

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

Step 4:
Normalize the individual values for power (in dBm) so that the sum is equal to the RF Output Power (e.i.r.p.) measured in clause 5.4.2 and save the corrected data. The following formulas can be used:

$$C_{Corr} = P_{Sum} - P_{e.i.r.p.}$$

$$P_{Samplecorr}(n) = P_{Sample}(n) - C_{Corr}$$

with 'n' being the actual sample number

Step 5:
Starting from the first sample PSamplecorr(n) (lowest frequency), add up the power (in mW) of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to sample #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.

Step 6:
Shift the start point of the samples added up in step 5 by one sample and repeat the procedure in step 5 (i.e. sample #2 to sample #101).

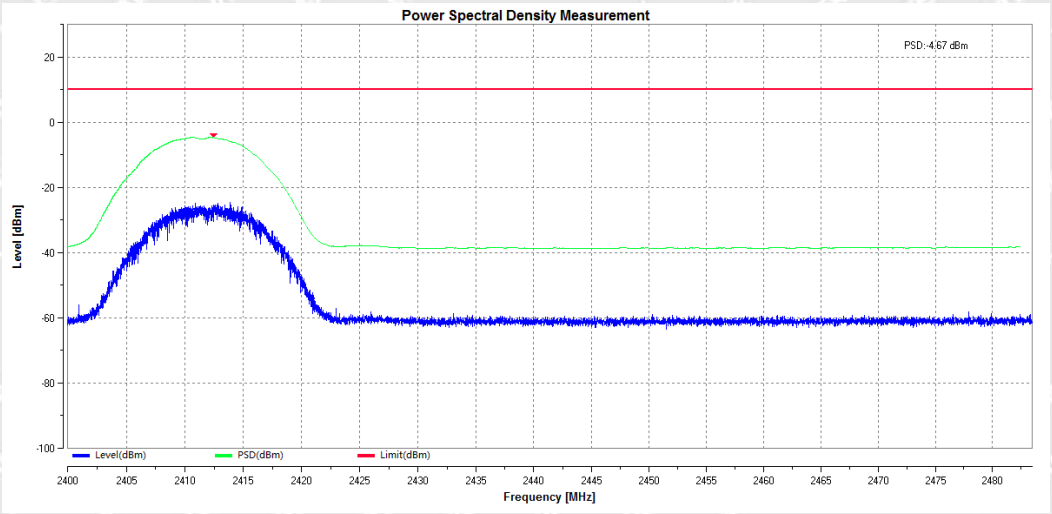
Step 7:
Repeat step 6 until the end of the data set and record the Power Spectral Density values for each of the 1 MHz segments.
From all the recorded results, the highest value is the maximum Power Spectral Density (PSD) for the UUT. This value, which shall comply with the limit given in clause 4.3.2.3.3, shall be recorded in the test report.
RBW/VBW=10/30 kHz

6.2.3 Test Result

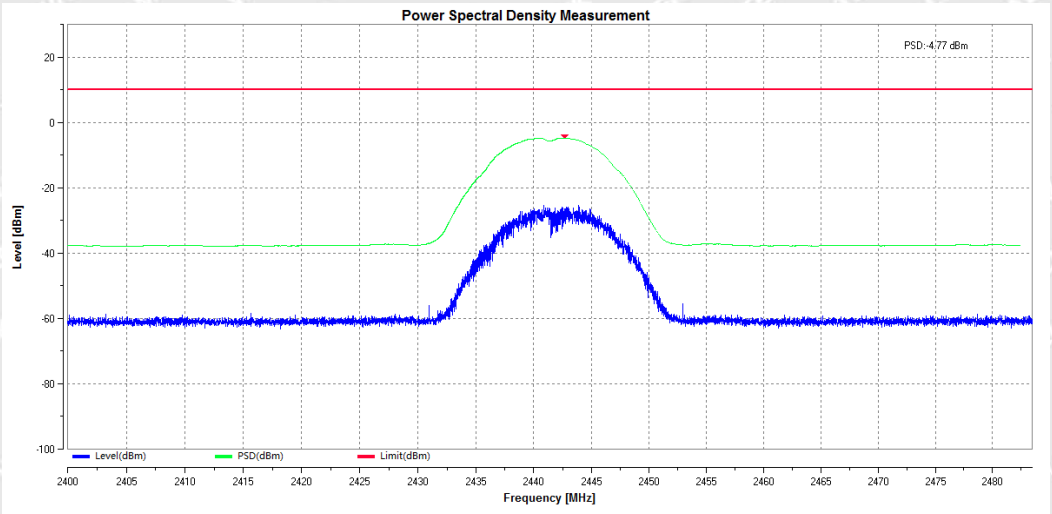
Test Condition	Test Mode	Test Channel (MHz)	PSD (dBm)	Limit (dBm)	Verdict
TNVN	11b	2412	-4.67	<=10	Pass
TNVN	11b	2442	-4.77	<=10	Pass
TNVN	11b	2472	-4.59	<=10	Pass
TNVN	11g	2412	-8.46	<=10	Pass
TNVN	11g	2442	-8.56	<=10	Pass
TNVN	11g	2472	-8.61	<=10	Pass
TNVN	11n(HT20)	2412	-8.85	<=10	Pass
TNVN	11n(HT20)	2442	-9.84	<=10	Pass
TNVN	11n(HT20)	2472	-9.84	<=10	Pass

Test Graphs:

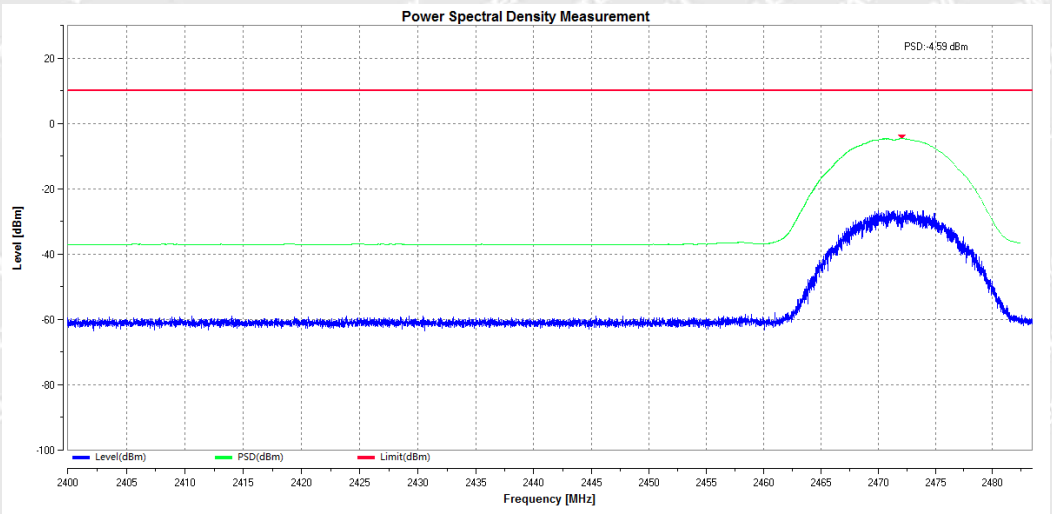
Power Spectral Density_TNVN_11b_2412



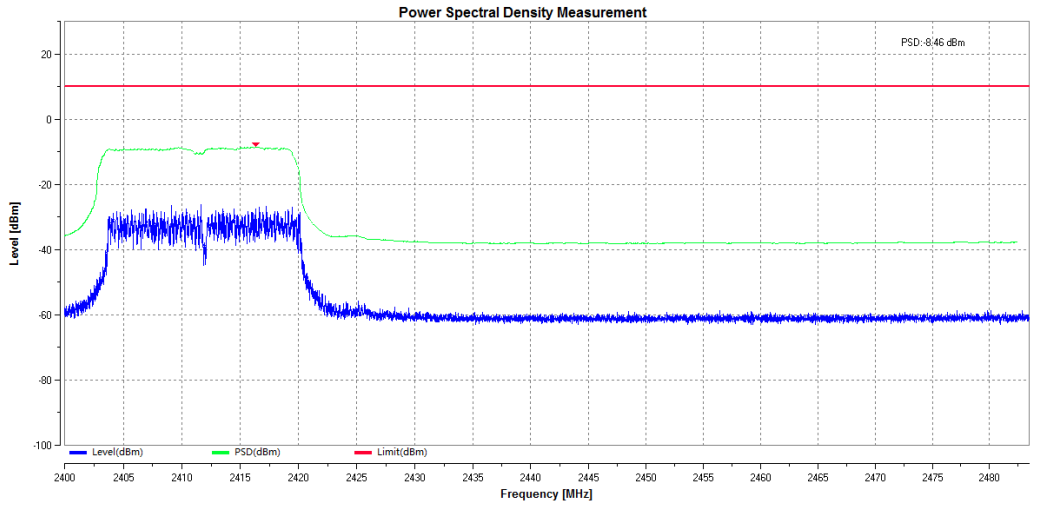
Power Spectral Density_TNVN_11b_2442



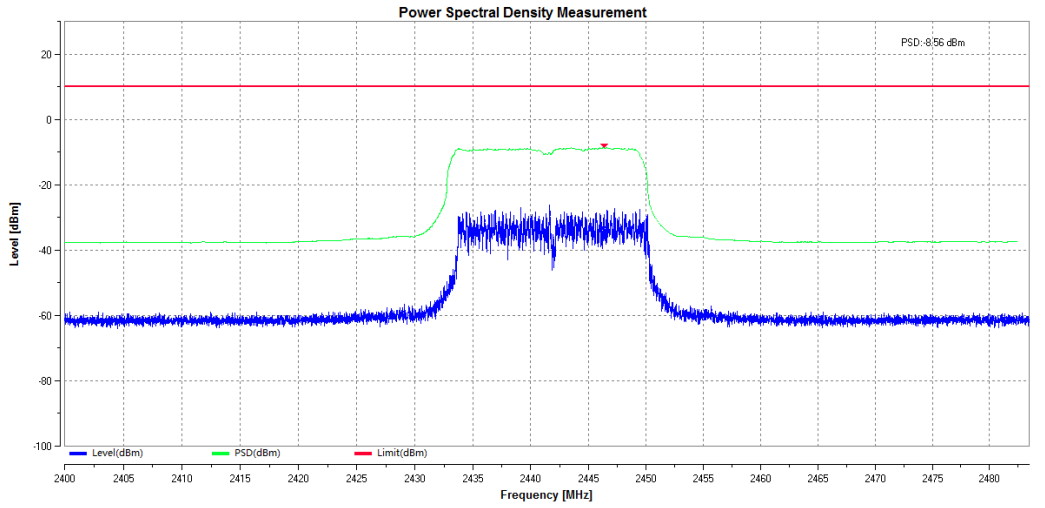
Power Spectral Density_TNVN_11b_2472



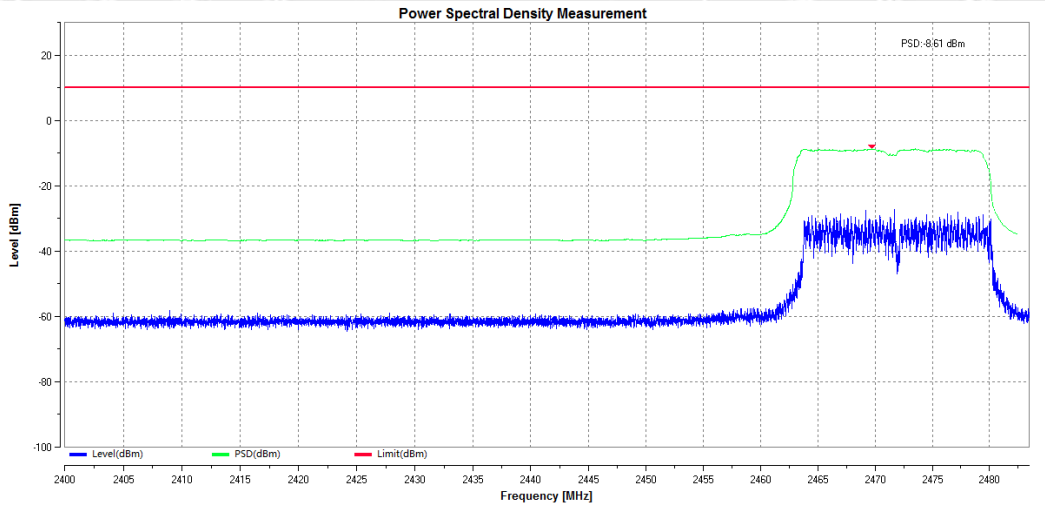
Power Spectral Density_TNVN_11g_2412



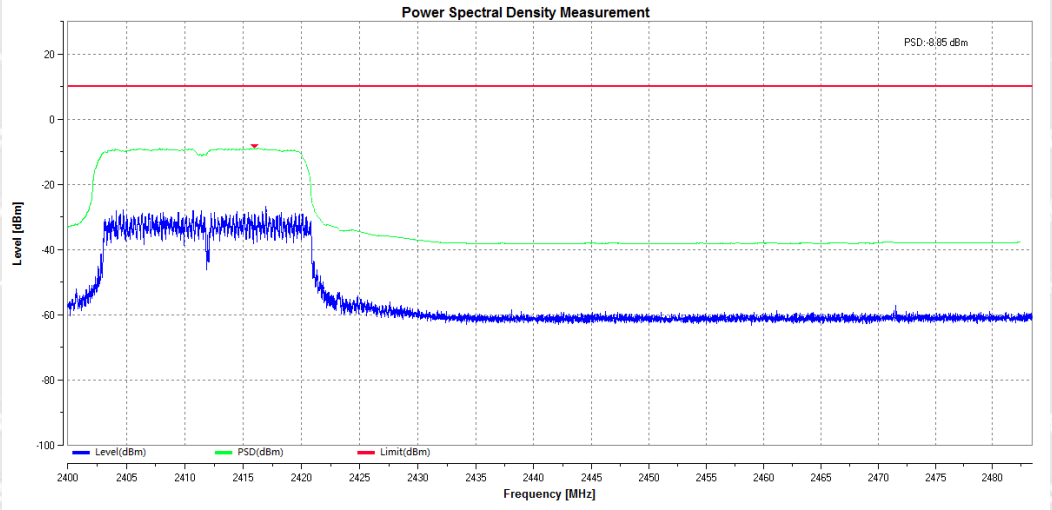
Power Spectral Density_TNVN_11g_2442



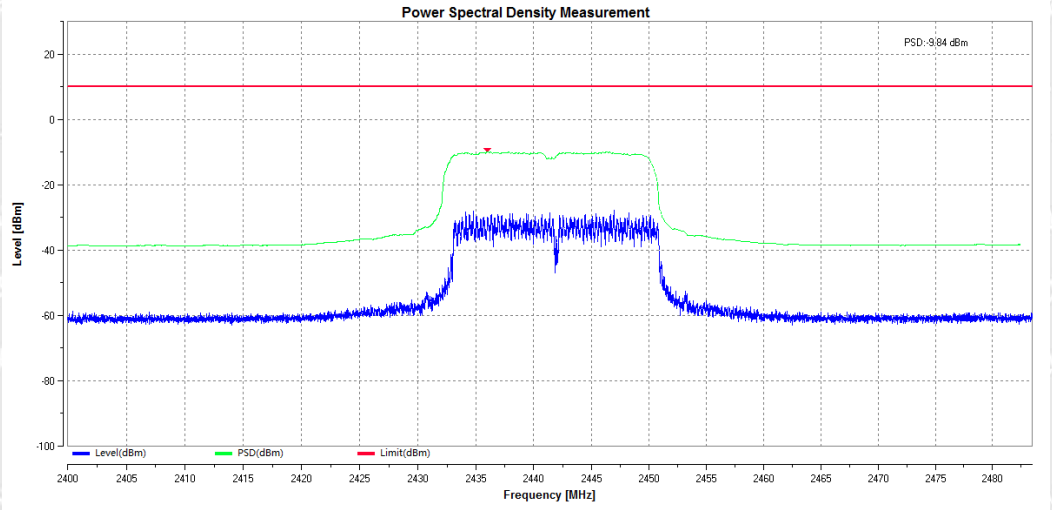
Power Spectral Density_TNVN_11g_2472



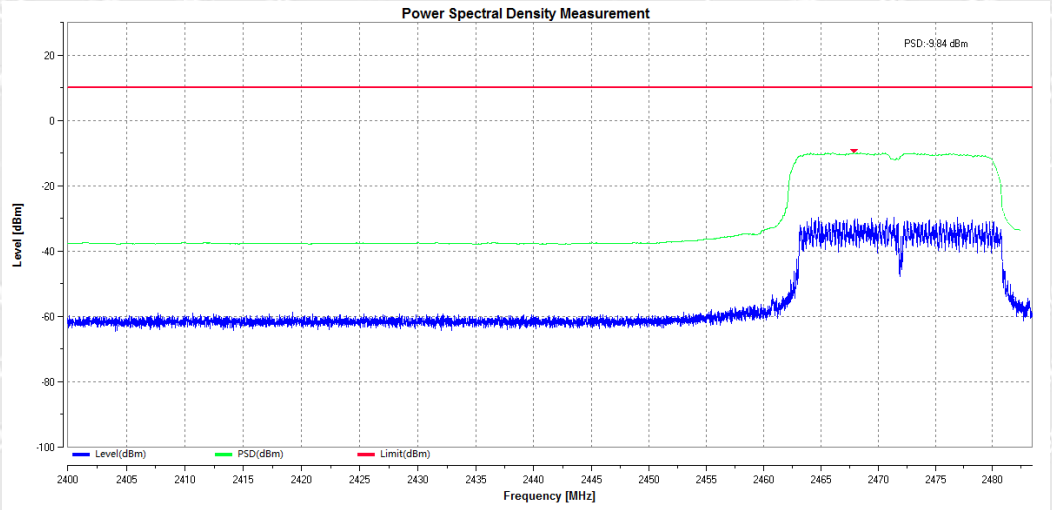
Power Spectral Density_TNVN_11n(HT20)_2412



Power Spectral Density_TNVN_11n(HT20)_2442



Power Spectral Density_TNVN_11n(HT20)_2472



6.3 Occupied Channel Bandwidth

6.3.1 Standard Applicable

According to section 4.3.1.8.3. The Occupied Channel Bandwidth for each hopping frequency shall fall completely within the band given in clause 1.
For non-adaptive Frequency Hopping equipment with e.i.r.p greater than 10 dBm, the Occupied Channel Bandwidth for every occupied hopping frequency shall be equal to or less than the value declared by the supplier.
This declared value shall not be greater than 5 MHz.

According to section 4.3.2.7.3. The Occupied Channel Bandwidth shall fall completely within the band given in clause 1. 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.

6.3.2 Test Procedure

According to the section 5.4.7.2.1, the measurement procedure shall be as follows:

Step 1:

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

• Centre Frequency: The centre frequency of the channel under test
• Resolution BW: ~ 1 % of the span without going below 1 %
• Video BW: 3 × RBW
• Frequency Span: 2 × Nominal Channel Bandwidth
• Detector Mode: RMS
• Trace Mode: Max Hold
•Sweep time: 1 s

Step 2:

Wait for the trace to stabilize.
Find the peak value of the trace and place the analyser marker on this peak.

Step 3:

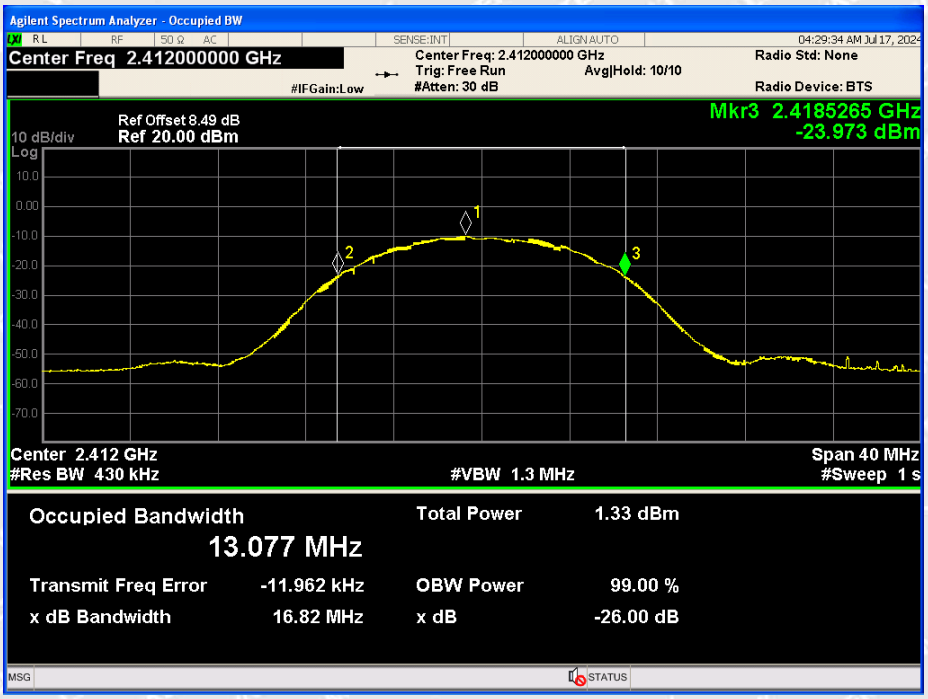
Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

6.3.3 Test Result

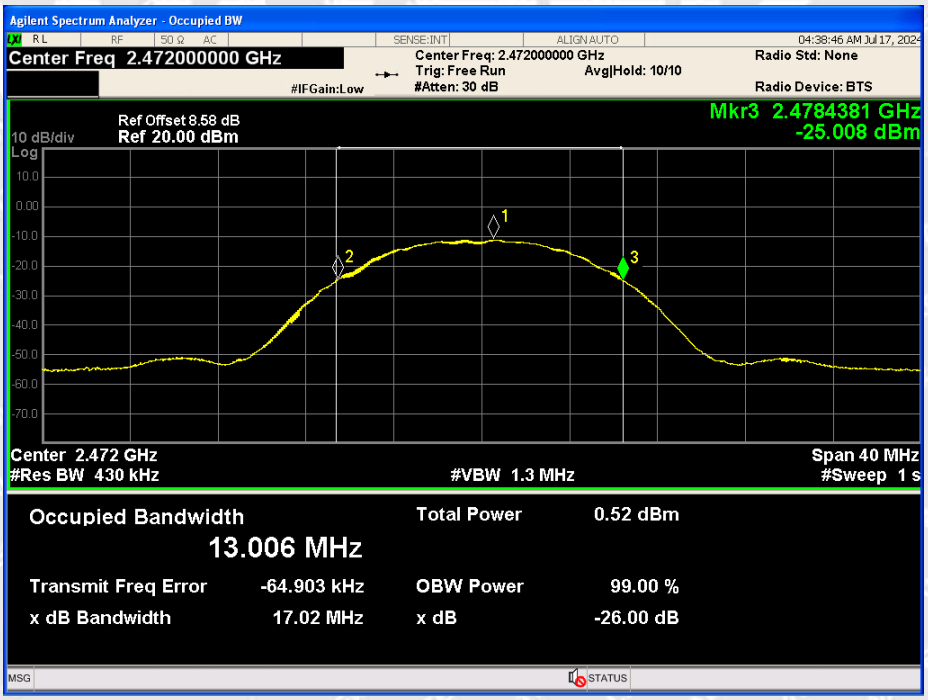
Test Condition	Test Mode	Test Channel (MHz)	OCB (MHz)	Measured Frequency (MHz)		Limit (MHz)	Verdict
				Low	High		
TNVN	11b	2412	13.077	2405.45	2418.53	2400 to 2483.5	Pass
TNVN	11b	2472	13.006	2465.43	2478.44	2400 to 2483.5	Pass
TNVN	11g	2412	16.613	2403.64	2420.25	2400 to 2483.5	Pass
TNVN	11g	2472	16.607	2463.62	2480.23	2400 to 2483.5	Pass
TNVN	11n(HT20)	2412	17.824	2403.04	2420.87	2400 to 2483.5	Pass
TNVN	11n(HT20)	2472	17.81	2463.03	2480.84	2400 to 2483.5	Pass

Test Graphs:

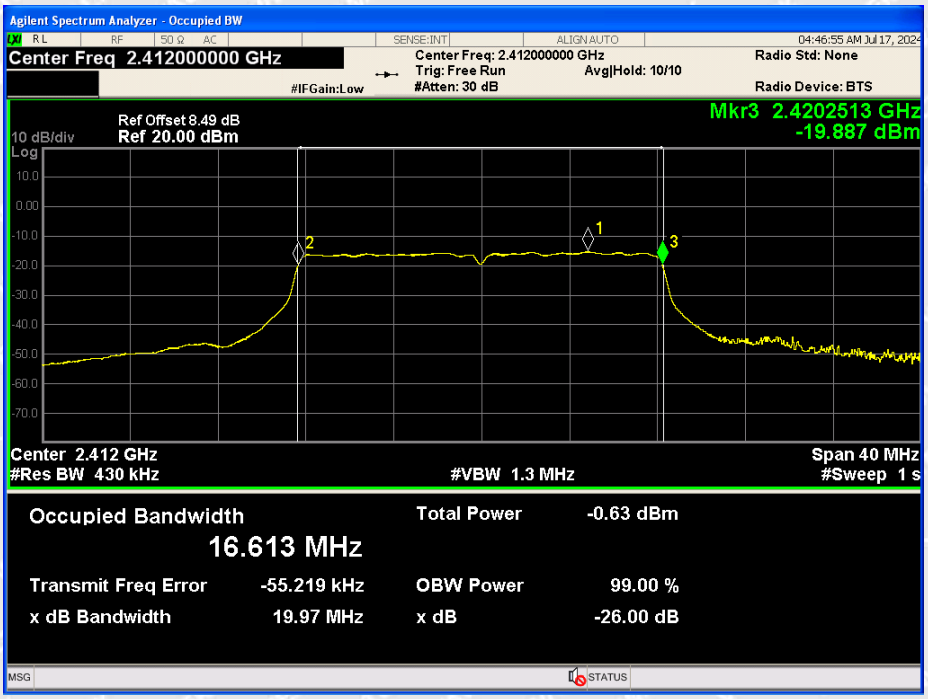
Occupied Channel Bandwidth_TNVN_11b_2412



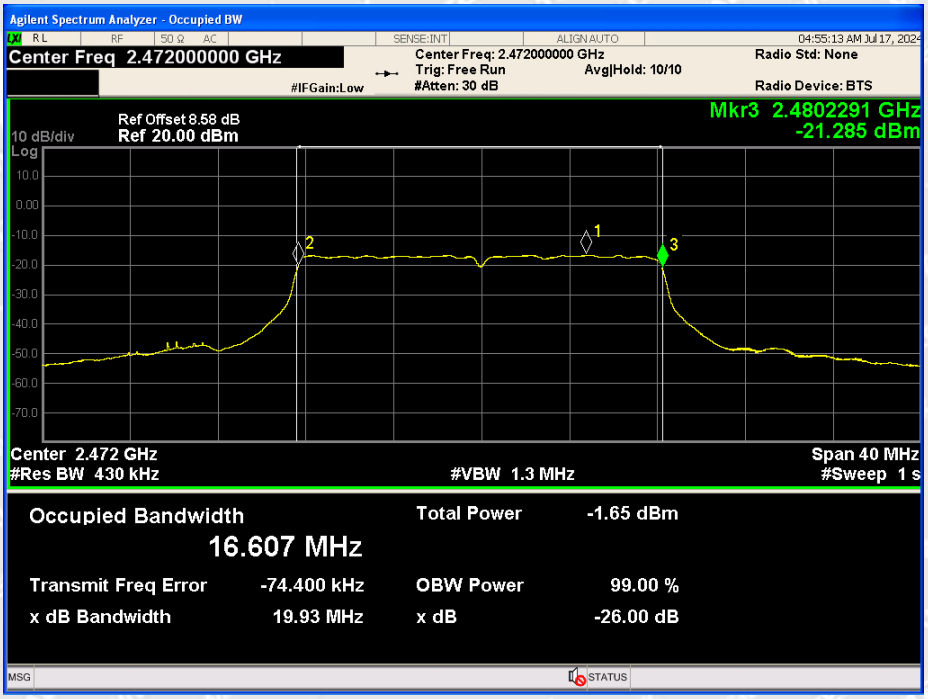
Occupied Channel Bandwidth_TNVN_11b_2472



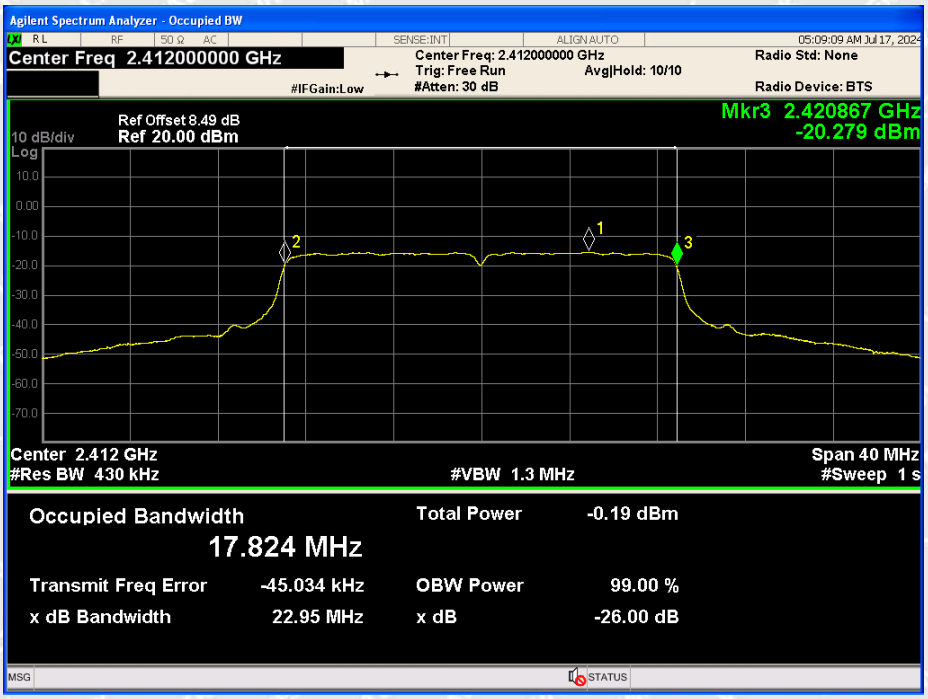
Occupied Channel Bandwidth_TNVN_11g_2412



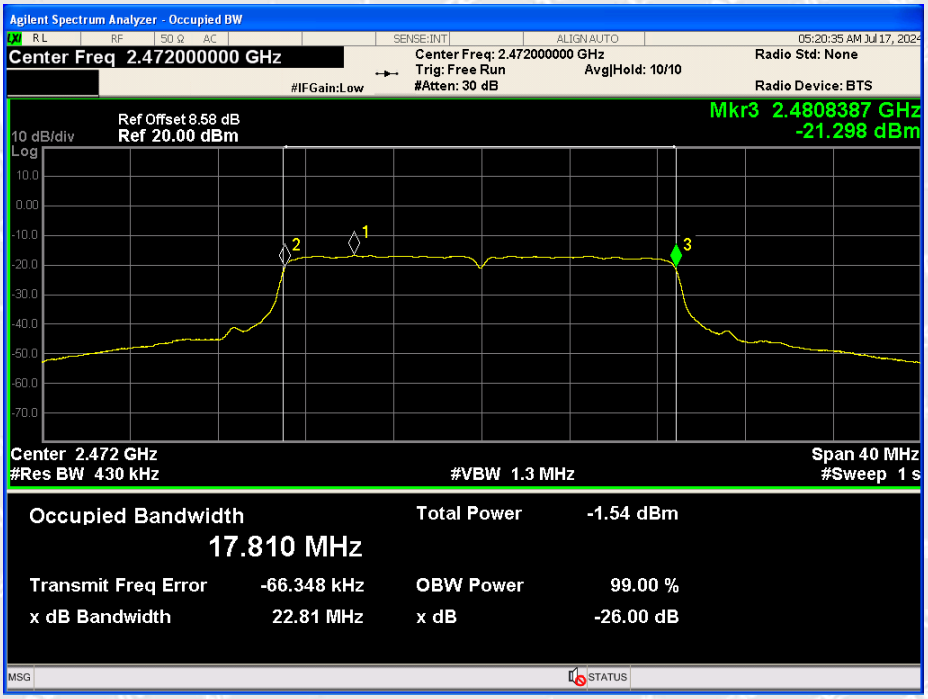
Occupied Channel Bandwidth_TNVN_11g_2472



Occupied Channel Bandwidth_TNVN_11n(HT20)_2412



Occupied Channel Bandwidth_TNVN_11n(HT20)_2472



6.4 Adaptivity (non-FHSS)

6.4.1 Standard Applicable

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.

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.

•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:

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

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.

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.

•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 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:

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

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.		

6.4.2 Test Procedure

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 Mode: RMS

- Centre Frequency: Equal to the centre frequency of the operating channel

- Span: 0 Hz

- 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, only transmissions from the UUT shall be considered.

• 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, only transmissions from the UUT shall be considered.

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 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.

6.4.3 Test Result

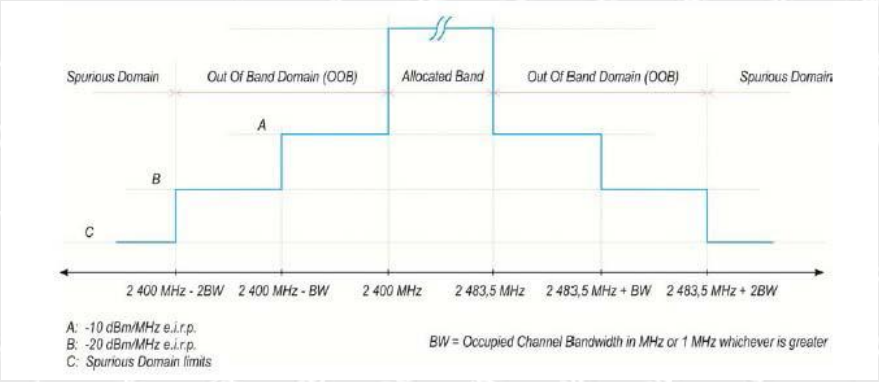
Test Mode	Channel	Max.COT (ms)	Limit(ms)	Min.Idle Time (ms)	Limit (ms)	Verdict
11b	2412	0.320	<=13	0.060	>0.018	Pass
	2472	0.860	<=13	0.090	>0.018	Pass
11g	2412	0.950	<=13	0.080	>0.018	Pass
	2472	0.370	<=13	0.060	>0.018	Pass
11n(HT20)	2412	0.380	<=13	0.030	>0.018	Pass
	2472	0.270	<=13	0.080	>0.018	Pass

Test Mode	Channel	Add Signal Type	Add Signal Time(ms)	Add Signal Level (dBm)	Max. Short Time (%)	Limit (%)	Verdict
11b	2412	AWGN	2114	-66.00	0.00	10	Pass
		CW	62152	-33.00	0.00	10	Pass
	2472	AWGN	2114	-66.00	0.00	10	Pass
		CW	62152	-33.00	0.00	10	Pass
11g	2412	AWGN	2114	-66.00	0.00	10	Pass
		CW	62152	-33.00	0.00	10	Pass
	2472	AWGN	2114	-66.00	0.00	10	Pass
		CW	62152	-33.00	0.00	10	Pass
11n(HT20)	2412	AWGN	2114	-66.00	0.00	10	Pass
		CW	62152	-33.00	0.00	10	Pass
	2472	AWGN	2114	-66.00	0.00	10	Pass
		CW	62152	-33.00	0.00	10	Pass

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

6.5.1 Standard Applicable

According to section 4.3.1.9.3&4.3.2.8.3, 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 below



Within the 2 400 MHz to 2 483,5 MHz band, the Out-of-band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement

6.5.2 Test Procedure

According to the section 5.4.8.2.1, the measurement procedure shall be as follows:
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:

- Measurement Mode: Time Domain Power
- Centre Frequency: 2 484 MHz
- Span: Zero Span
- 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 30 000
- Trigger Mode: Video
- Sweep Time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power

Step 2 (segment 2 483,5 MHz to 2 483,5 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.

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

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

• 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 2 400 MHz - BW to 2 400 MHz):

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

Step 5 (segment 2 400 MHz - 2 BW 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 figure 1 or figure 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.

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

- Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain Y in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figure 1 or figure 3.
- Option 2: the limits provided by the mask given in figure 1 or figure 3 shall be reduced by 10 × log10(Ach) and the additional beamforming gain Y in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

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

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

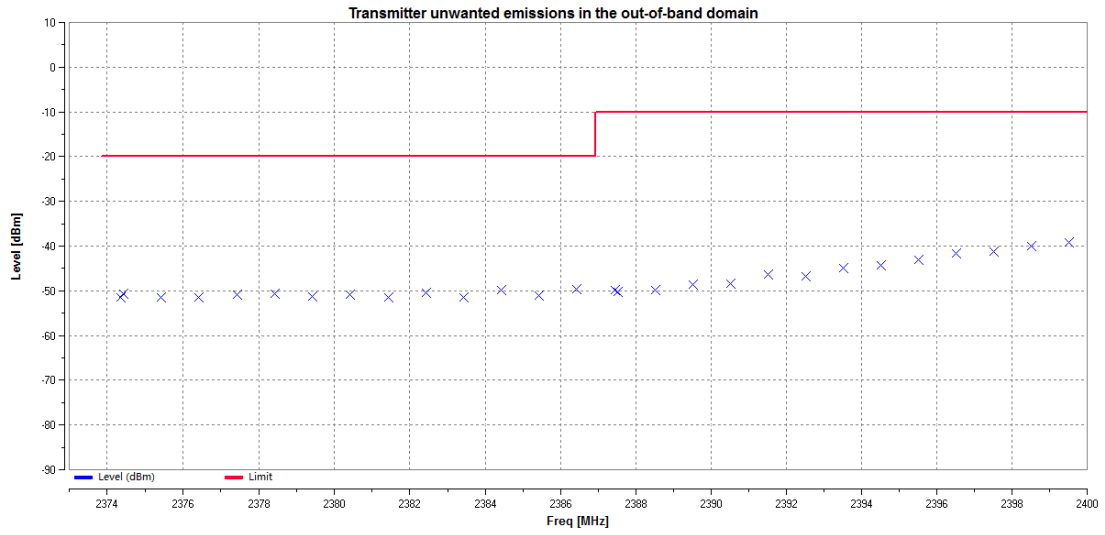
RBW=1MHz VBW=3MHz

6.5.3 Test Result

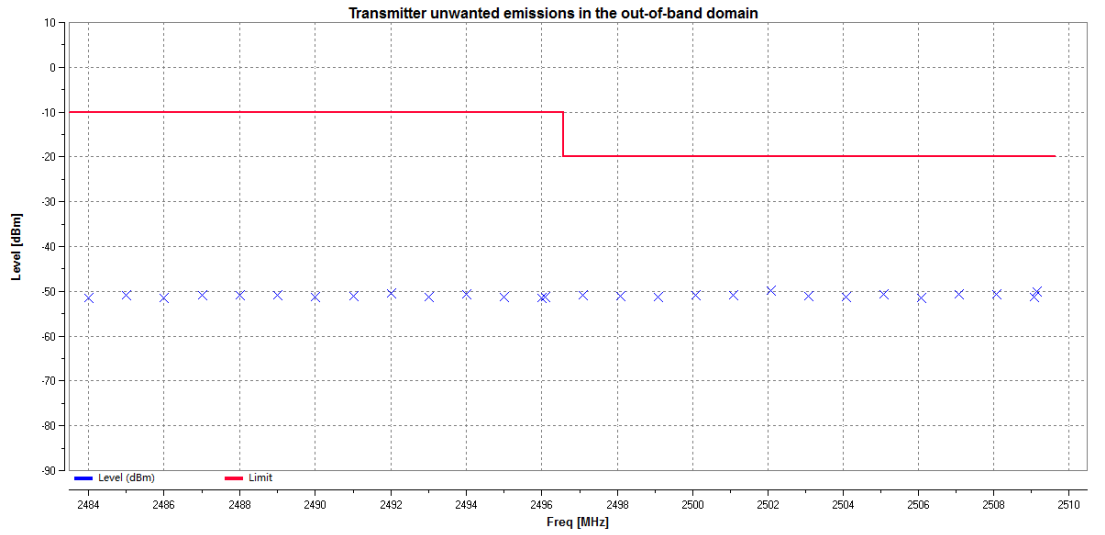
Test Mode	Test Channel	Test Segment (MHz)	Max. Emissions Reading (dBm)	Limit (dBm)	Verdict
11b	Low	2400-2BW to 2400-BW	-49.66	<=-20	Pass
		2400-BW to 2400	-39.10	<=-10	Pass
		2483.5 to 2483.5+BW	-50.42	<=-10	Pass
		2483.5+BW to 2483.5+2BW	-49.93	<=-20	Pass
	High	2400-2BW to 2400-BW	-50.94	<=-20	Pass
		2400-BW to 2400	-50.58	<=-10	Pass
		2483.5 to 2483.5+BW	-35.01	<=-10	Pass
		2483.5+BW to 2483.5+2BW	-45.96	<=-20	Pass
11g	Low	2400-2BW to 2400-BW	-48.43	<=-20	Pass
		2400-BW to 2400	-31.10	<=-10	Pass
		2483.5 to 2483.5+BW	-28.89	<=-10	Pass
		2483.5+BW to 2483.5+2BW	-49.89	<=-20	Pass
	High	2400-2BW to 2400-BW	-50.92	<=-20	Pass
		2400-BW to 2400	-50.07	<=-10	Pass
		2483.5 to 2483.5+BW	-30.59	<=-10	Pass
		2483.5+BW to 2483.5+2BW	-49.13	<=-20	Pass
11n(HT20)	Low	2400-2BW to 2400-BW	-45.53	<=-20	Pass
		2400-BW to 2400	-26.10	<=-10	Pass
		2483.5 to 2483.5+BW	-50.05	<=-10	Pass
		2483.5+BW to 2483.5+2BW	-50.23	<=-20	Pass
	High	2400-2BW to 2400-BW	-50.00	<=-20	Pass
		2400-BW to 2400	-50.19	<=-10	Pass
		2483.5 to 2483.5+BW	-27.96	<=-10	Pass
		2483.5+BW to 2483.5+2BW	-49.88	<=-20	Pass
Note 1: BW please refer to section 6.3 Note 2: the data just list the worst cases					

Test Graphs:

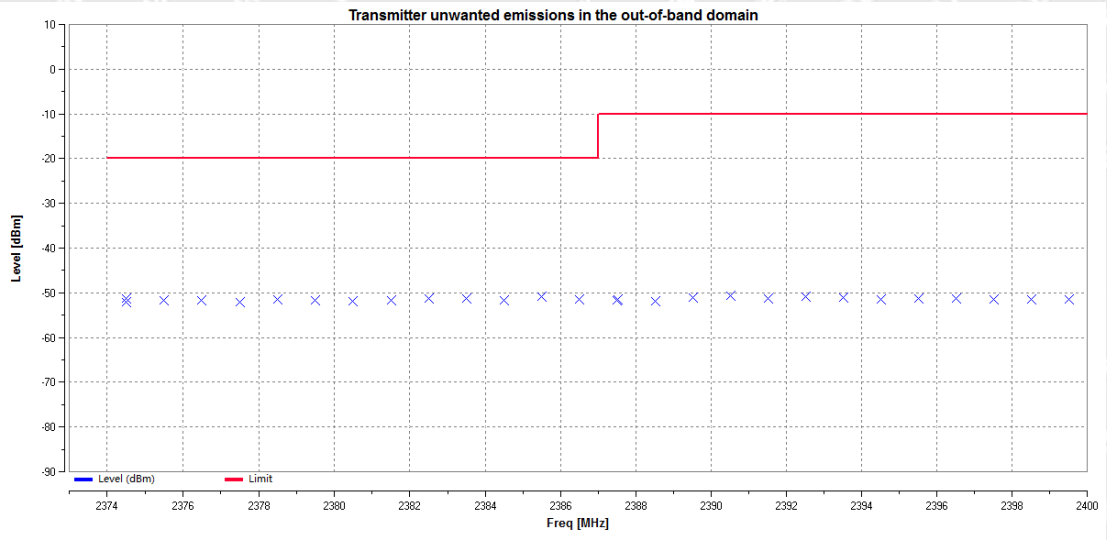
OOB_TNVN_11b_2412_2400MHz-2BW to 2400MHz



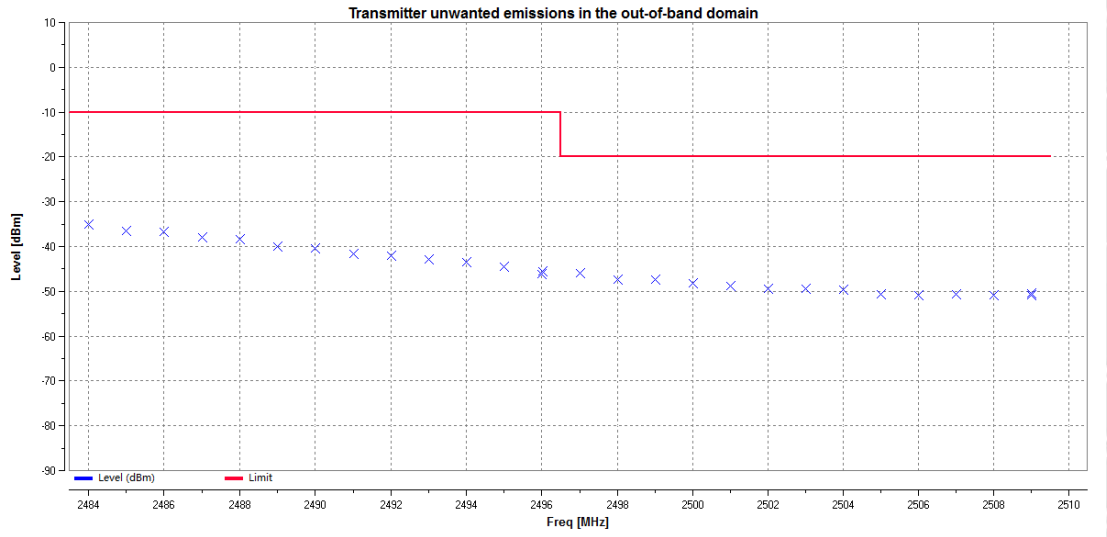
OOB_TNVN_11b_2412_2483.5MHz to 2483.5MHz+2BW



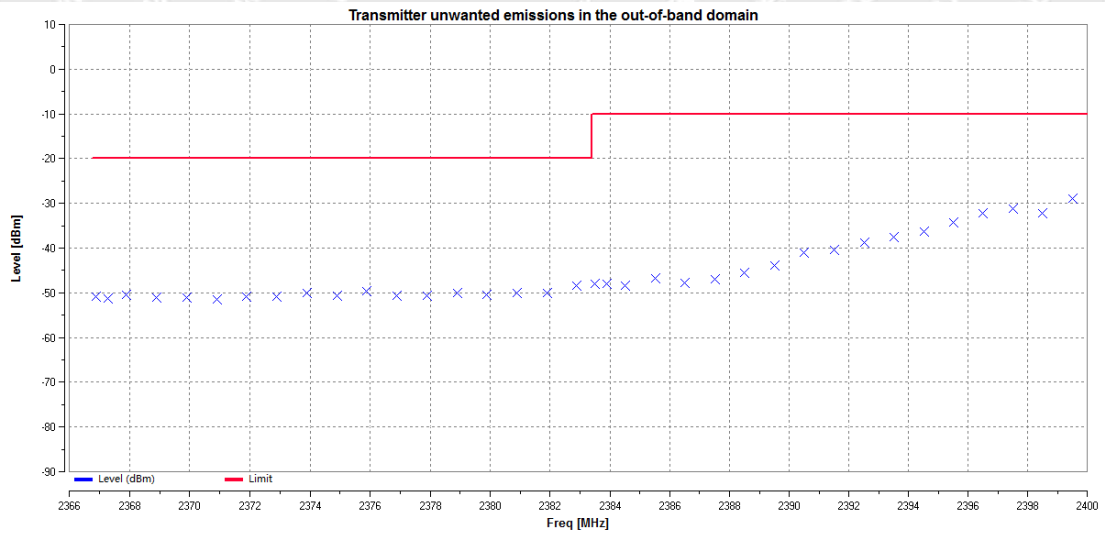
OOB_TNVN_11b_2472_2400MHz-2BW to 2400MHz



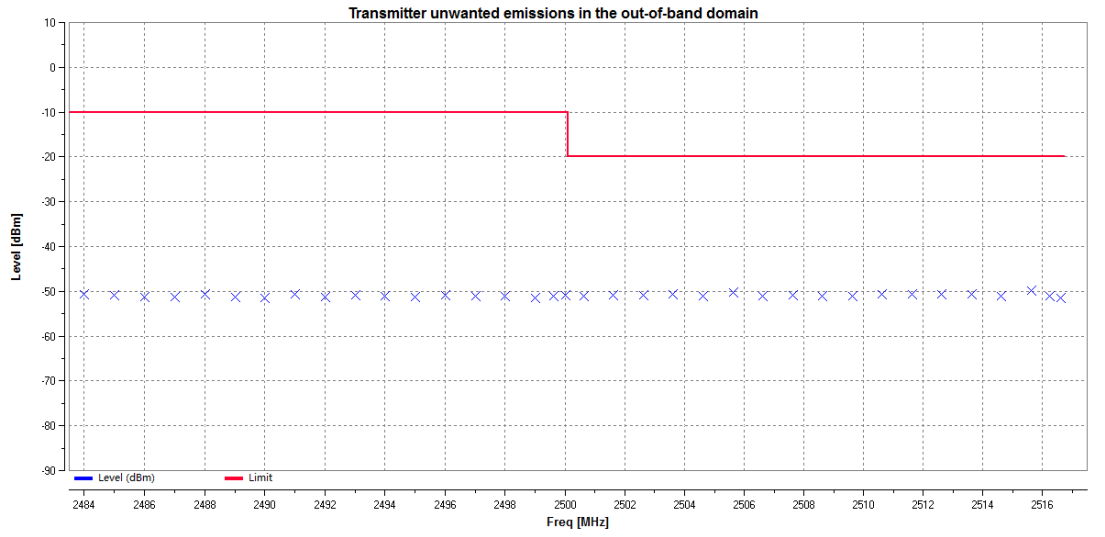
OOB_TNVN_11b_2472_2483.5MHz to 2483.5MHz+2BW



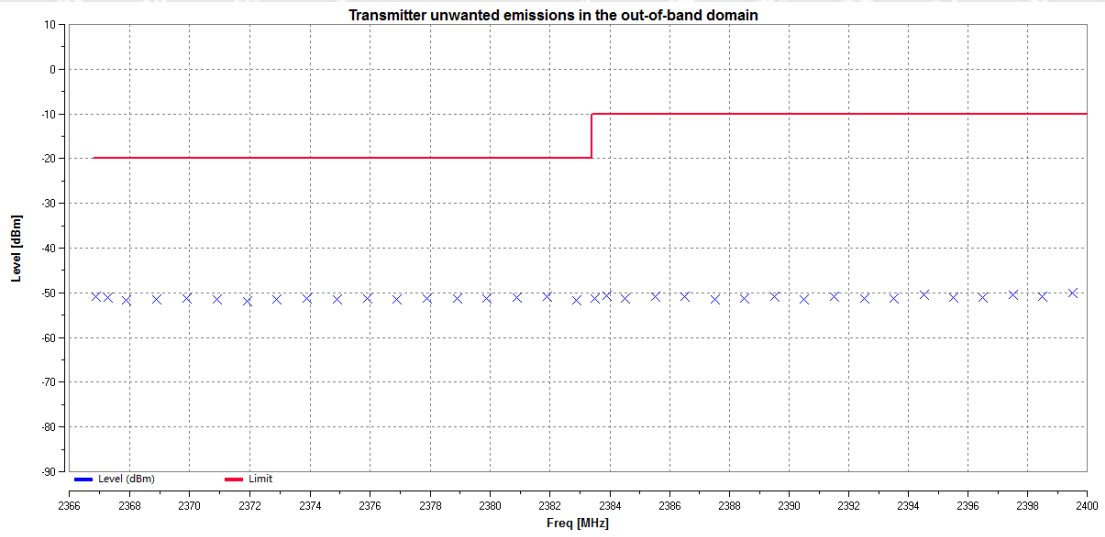
OOB_TNVN_11g_2412_2400MHz-2BW to 2400MHz



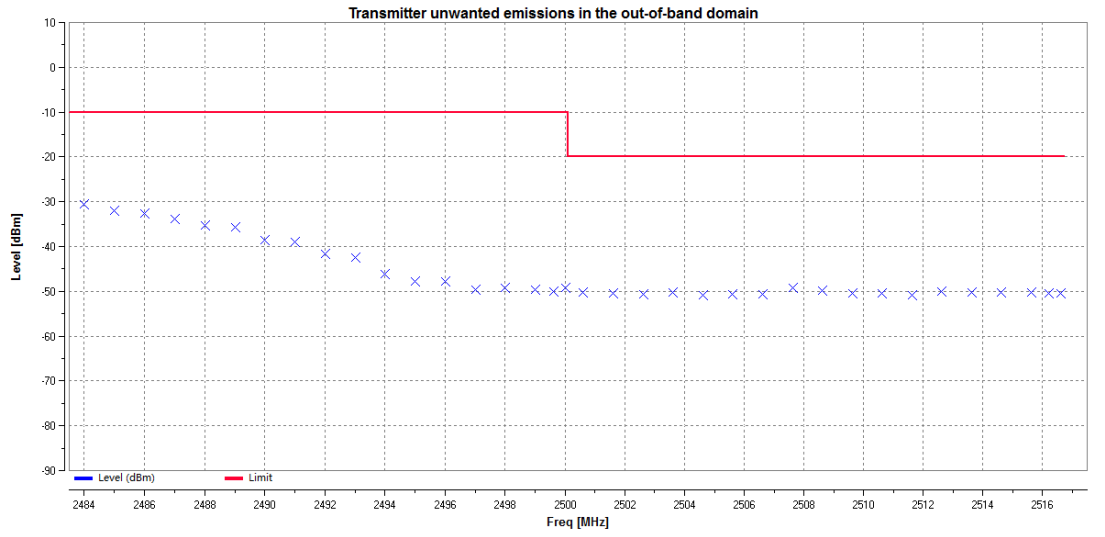
OOB_TNVN_11g_2412_2483.5MHz to 2483.5MHz+2BW



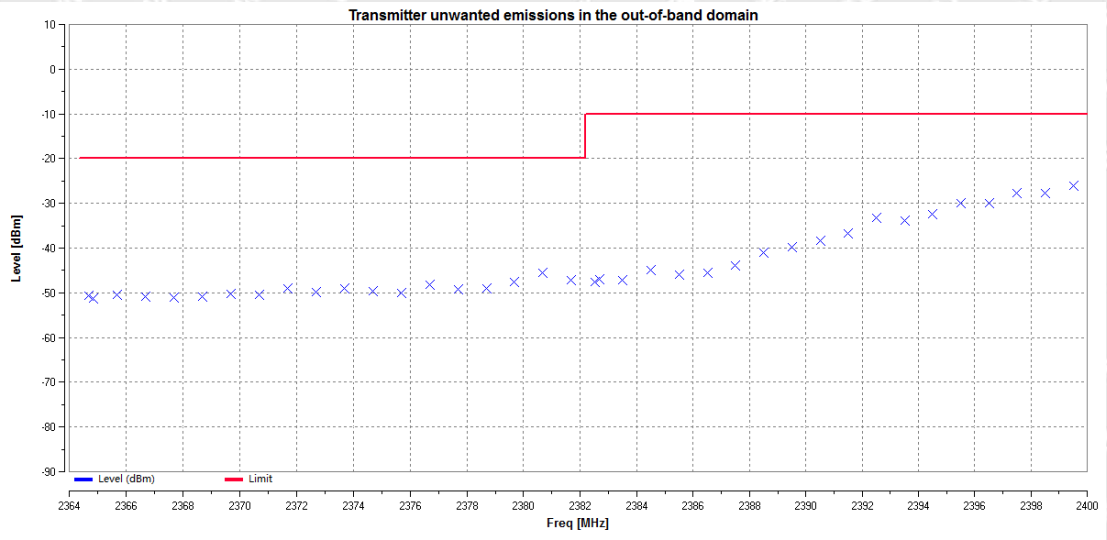
OOB_TNVN_11g_2472_2400MHz-2BW to 2400MHz



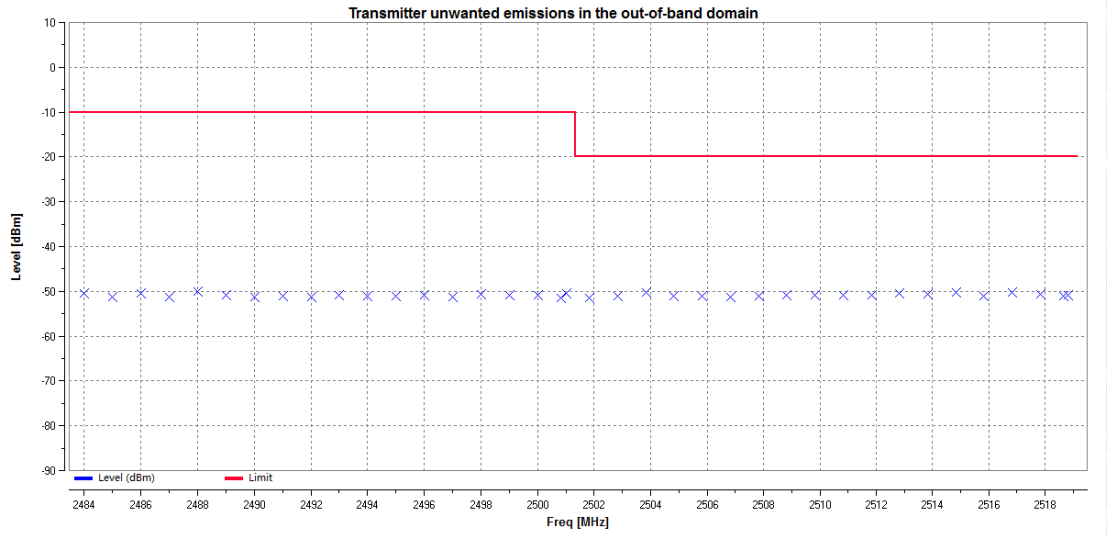
OOB_TNVN_11g_2472_2483.5MHz to 2483.5MHz+2BW



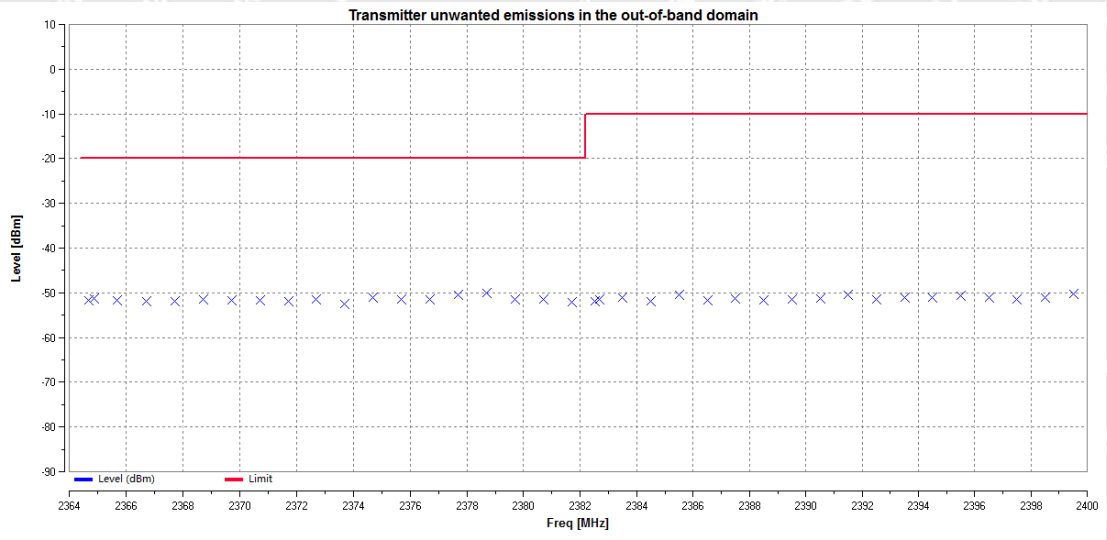
OOB_TNVN_11n(HT20)_2412_2400MHz-2BW to 2400MHz



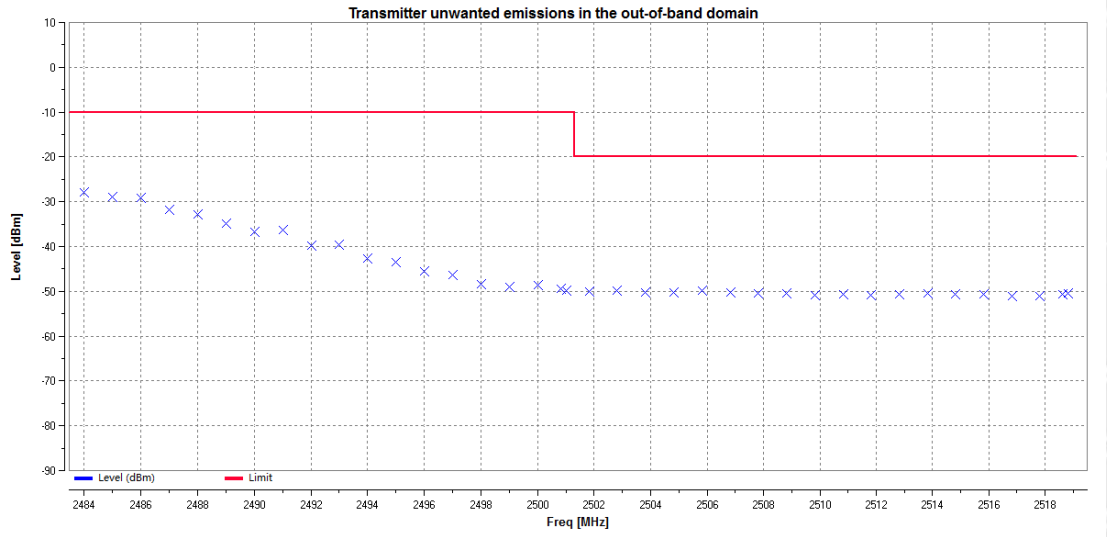
OOB_TNVN_11n(HT20)_2412_2483.5MHz to 2483.5MHz+2BW



OOB_TNVN_11n(HT20)_2472_2400MHz-2BW to 2400MHz



OOB_TNVN_11n(HT20)_2472_2483.5MHz to 2483.5MHz+2BW



6.6 Transmitter unwanted emissions in the spurious domain

6.6.1 Standard Applicable

According to section 4.3.1.10.3& 4.3.2.9.3

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

Frequency Range	Maximum Power	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 694 MHz	-54 dBm	100 kHz
694 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

6.6.2 Test Procedure

The device under test has an integral antenna and the radiated measurement shall apply to the device, using the method of measurement as described in the EN300328 section 5.4.9.2.

RBW=100kHz VBW=300kHz 30MHz-1GHz

RBW=1MHz VBW=3MHz 1GHz-12.75GHz

6.6.3 Test Result

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle (°)	RX Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable (dB)	Antenna Gain (dB)			
TX_TNVN_11b_2412										
427.99	29.76	267	1.8	H	-73.11	0.16	0.00	-72.95	-36	-36.95
427.99	28.84	274	1.1	V	-74.77	0.16	0.00	-74.61	-36	-38.61
2697.70	48.73	101	1.6	H	-44.88	0.45	10.70	-55.13	-30	-25.13
2697.70	44.32	293	1.4	V	-45.37	0.45	10.70	-55.62	-30	-25.62
4819.78	41.64	274	1.9	H	-49.53	2.64	12.70	-59.59	-30	-29.59
4819.78	41.12	250	1.6	V	-47.12	2.64	12.70	-57.18	-30	-27.18
TX_TNVN_11b_2472										
666.74	27.20	236	1.1	H	-72.60	0.20	0.00	-72.40	-54	-18.40
666.74	24.80	132	1.5	V	-74.35	0.20	0.00	-74.15	-54	-20.15
1554.85	47.59	122	2.0	H	-48.87	0.28	8.00	-56.59	-30	-26.59
1554.85	44.97	311	2.0	V	-52.25	0.28	8.00	-59.97	-30	-29.97
3921.29	44.78	124	1.2	H	-46.03	2.42	12.60	-56.21	-30	-26.21
3921.29	42.35	219	1.3	V	-47.01	2.42	12.60	-57.19	-30	-27.19

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle (°)	RX Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable (dB)	Antenna Gain (dB)			
TX_TNVN_11g_2412										
809.54	23.61	136	1.4	H	-71.93	0.22	0.00	-71.71	-36	-35.71
809.54	21.52	254	1.8	V	-74.26	0.22	0.00	-74.04	-36	-38.04
2774.35	45.08	290	1.9	H	-47.93	0.45	10.70	-58.18	-30	-28.18
2774.35	42.70	101	1.2	V	-46.22	0.45	10.70	-56.47	-30	-26.47
4390.37	43.47	206	1.0	H	-47.85	2.53	12.60	-57.92	-30	-27.92
4390.37	41.55	287	1.1	V	-48.06	2.53	12.60	-58.13	-30	-28.13
TX_TNVN_11g_2472										
996.72	21.03	164	1.8	H	-74.30	0.22	0.00	-74.08	-36	-38.08
996.72	22.42	310	2.0	V	-72.25	0.22	0.00	-72.03	-36	-36.03
2207.00	46.12	259	2.0	H	-45.40	0.38	10.50	-55.52	-30	-25.52
2207.00	41.68	291	1.8	V	-47.10	0.38	10.50	-57.22	-30	-27.22
5935.89	41.14	254	1.0	H	-47.33	2.90	12.90	-57.33	-30	-27.33
5935.89	41.66	159	1.9	V	-46.58	2.90	12.90	-56.58	-30	-26.58

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle (°)	RX Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable (dB)	Antenna Gain (dB)			
TX_TNVN_11n(HT20)_2412										
120.85	33.54	240	1.6	H	-74.05	0.15	0.00	-73.90	-36	-37.90
120.85	32.61	200	1.8	V	-74.21	0.15	0.00	-74.06	-36	-38.06
5797.02	43.66	102	1.8	H	-45.63	2.87	12.90	-55.66	-30	-25.66
5797.02	41.29	107	1.4	V	-47.15	2.87	12.90	-57.18	-30	-27.18
5905.00	40.30	214	1.0	H	-48.17	2.90	12.90	-58.17	-30	-28.17
5905.00	42.99	278	1.5	V	-45.25	2.90	12.90	-55.25	-30	-25.25
TX_TNVN_11n(HT20)_2472										
397.59	30.27	286	1.9	H	-73.82	0.16	0.00	-73.66	-36	-37.66
397.59	33.50	268	1.6	V	-70.86	0.16	0.00	-70.70	-36	-34.70
2014.63	43.88	153	1.2	H	-49.49	0.35	10.40	-59.54	-30	-29.54
2014.63	43.66	228	1.9	V	-48.62	0.35	10.40	-58.67	-30	-28.67
3418.13	44.46	198	1.8	H	-48.47	2.34	12.40	-58.53	-30	-28.53
3418.13	42.86	239	1.4	V	-48.17	2.34	12.40	-58.23	-30	-28.23

6.7 Receiver spurious emissions

6.7.1 Standard Applicable

According to section 4.3.1.11.3&4.3.2.10.3, The spurious emissions of the receiver shall not exceed the values given in table below

NOTE: In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted) and to the emissions radiated by the cabinet. In case of integral antenna equipment (without temporary antenna connectors), these limits apply to emissions radiated by the equipment. Spurious emission limits for receivers

Frequency Range	Maximum Power	Bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12,75 GHz	-47 dBm	1 MHz

6.7.2 Test Procedure

The device under test has an integral antenna and the radiated measurement shall apply to the device, using the method of measurement as described in the EN300328 section 5.4.10.2.

RBW=100kHz VBW=300kHz 30MHz-1GHz

RBW=1MHz VBW=3MHz 1GHz-12.75GHz

6.7.3 Test Result

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle (°)	RX Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable (dB)	Antenna Gain (dB)			
RX_TNVN_11b_2412										
710.31	26.05	279	1.5	H	-73.62	0.20	0.00	-73.42	-57	-16.42
710.31	26.22	111	1.5	V	-72.70	0.20	0.00	-72.50	-57	-15.50
4843.98	43.01	291	1.3	H	-48.16	2.64	12.70	-58.22	-47	-11.22
4843.98	40.68	280	1.1	V	-47.56	2.64	12.70	-57.62	-47	-10.62
5934.29	41.15	208	1.8	H	-47.32	2.90	12.90	-57.32	-47	-10.32
5934.29	41.46	177	1.9	V	-46.78	2.90	12.90	-56.78	-47	-9.78
RX_TNVN_11b_2472										
475.36	26.38	297	1.3	H	-74.56	0.16	0.00	-74.40	-57	-17.40
475.36	31.72	205	1.7	V	-70.45	0.16	0.00	-70.29	-57	-13.29
3587.95	43.02	117	1.9	H	-49.50	2.34	12.40	-59.56	-47	-12.56
3587.95	44.91	256	1.2	V	-45.70	2.34	12.40	-55.76	-47	-8.76
5481.50	41.59	302	1.6	H	-48.12	2.85	12.80	-58.07	-47	-11.07
5481.50	40.68	102	1.4	V	-48.30	2.85	12.80	-58.25	-47	-11.25

Remark: only the worst case 802.11b mode is recorded.

6.8 Receiver Blocking

6.8.1 Standard Applicable

According to section 4.3.2.11.2, 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 in the presence of an unwanted signal (blocking signal) at frequencies other than those of the operating band.

Load Based Equipment not using any of the mechanisms referenced above shall comply with the following minimum set of requirements :

The minimum performance criterion shall be a PER less than or equal to 10 %. The manufacturer may declare alternative performance criteria as long as that is appropriate for the intended use of the equipment (see clause 5.4.1.t)).

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 1, 2 and 3 provided in table 14, table 15 or table 16.

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.

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 Pmin + 26 dB where Pmin 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 Pmin + 20 dB where Pmin 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.

Receiver category 2

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

Table 15: Receiver Blocking parameters for 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 Pmin + 26 dB where Pmin 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.			

Receiver category 3

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

Table 16: Receiver Blocking parameters for 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 the test may be performed using a wanted signal up to Pmin + 30 dB where Pmin 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.			

6.8.2 Test Procedure

Step 1: • For non-frequency hopping equipment, the UUT shall be set to the lowest operating channel.

Step 2: • The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3: • With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6. The variable attenuator is set to a value that achieves the minimum performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 with a resolution of at least 1 dB. The resulting level for the wanted signal at the input of the UUT is Pmin. This value shall be measured and recorded in the test report.

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

Step 4: • The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment. It shall be verified and recorded in the test report that the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is met.

Step 5: • Repeat step 4 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.

Step 6: • For non-frequency hopping equipment, repeat step 2 to step 5 with the UUT operating at the highest operating channel.

6.8.3 Test Setup

According to the section 5.4.11.2.1, the test block diagram shall be used.

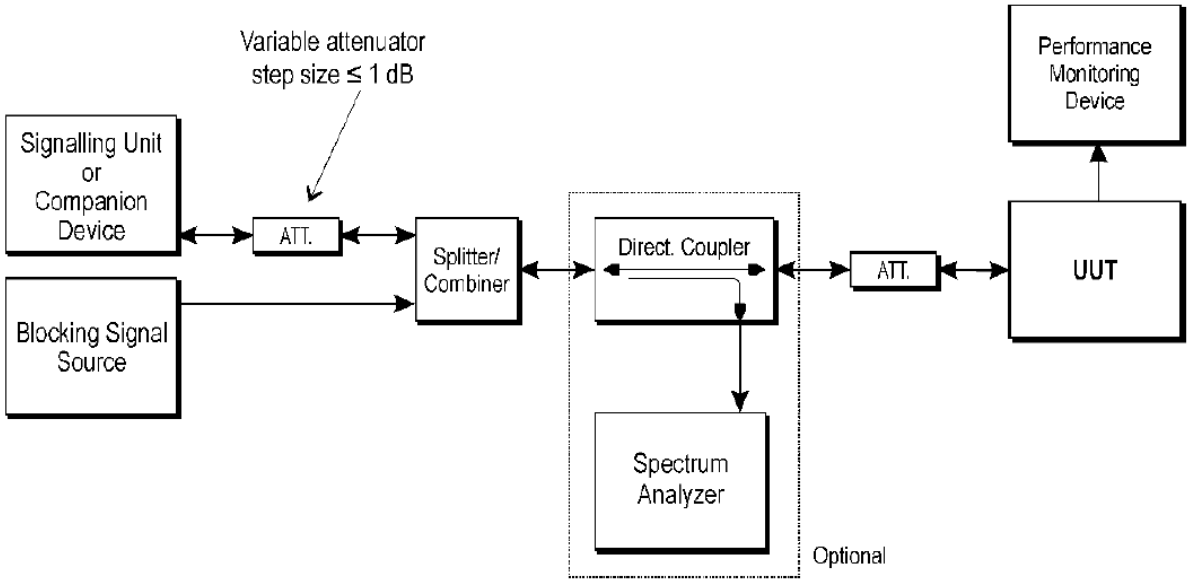


Figure 6: Test Set-up for receiver blocking

All test procedure is carried to the section 5.4.11.2.1

RBW/VBW=8MHz/30MHz

6.8.4 Test Result

802.11g (Receiver Blocking Categories 2)						
Wanted signal meanpower from companion device (dBm)	**OCBW (Hz)**	**Blocking signal frequency (MHz)**	**Blocking signal power(dBm) CW**	**PER(%)**	**Limit**	**Results**
-64.00	13006000	2380	-34	0.6	≤10%	Pass
		2504	-34	3.4		
		2300	-34	2.7		
		2584	-34	2.1		
NOTE 1: 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 %. NOTE 2: 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. NOTE 3: 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.						

802.11g (Receiver Blocking Categories 2)						
Wanted signal meanpower from companion device (dBm)	**OCBW (Hz)**	**Blocking signal frequency (MHz)**	**Blocking signal power(dBm) CW**	**PER(%)**	**Limit**	**Results**
-64.00	16607000	2380	-34	2.3	≤10%	Pass
		2504	-34	6.0		
		2300	-34	2.6		
		2584	-34	6.0		
NOTE 1: 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 %. NOTE 2: 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. NOTE 3: 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.						

802.11g (Receiver Blocking Categories 2)						
Wanted signal meanpower from companion device (dBm)	**OCBW (Hz)**	**Blocking signal frequency (MHz)**	**Blocking signal power(dBm) CW**	**PER(%)**	**Limit**	**Results**
-64.00	17810000	2380	-34	4.1	≤10%	Pass
		2504	-34	1.4		
		2300	-34	5.0		
		2584	-34	3.7		

NOTE 1: 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 %.
NOTE 2: 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.
NOTE 3: 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.

7 Photographs – Test Setup

7.1 Photograph – Spurious Emissions Test Setup

Below 1GHz

Above 1GHz

8 Photographs – EUT Constructional Details

Please refer to “ANNEX”.

======End of Report======

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TESTING
CNAS L6478

TEST REPORT

Reference No.	:	WTF24F07159996W003
Applicant	:	Mid Ocean Brands B.V.
Address	:	7/F., Kings Tower, 111 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong
Manufacturer	:	114320
Address	:	---
Product Name	:	WIFI foldable drone
Model No.	:	MO9379
Test specification	:	EN IEC 62311:2020 EN 50665:2017
Date of Receipt sample	:	2024-07-15
Date of Test	:	2024-07-17 to 2024-08-17
Date of Issue	:	2024-08-21
Test Report Form No.	:	WEW-62311A-01B
Test Result	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of approver.

Prepared By:
Waltek Testing Group (Foshan) Co., Ltd.
Address: 1/F., Building 19, Sunlink Machinery City, Xingye 4 Road,
Guanglong Industrial Park, Chihua Neighborhood Committee, Chencun Town,
Shunde District, Foshan, Guangdong, China
Tel:+86-757-23811398 Fax:+86-757-23811381 E-mail:info@waltek.com.cn

Tested by:

Roy Hong

Approved by:

Danny Zhou

1 Test Summary

HEALTH			
Test	Test Method	Class / Severity	Result
RF Exposure	EN IEC 62311:2020 EN 50665:2017	-	Pass

Remark:

Pass Test item meets the requirement

N/A Not Applicable

2 Contents

3 General Information

3.1 General Description of E.U.T.

Product Name ..... : WIFI foldable drone

Model No. ..... : MO9379

Remark ..... : ---

Rating ..... : **For Quadcopter:**
Input: DC 5V
Battery: 3.7V, 300mAh
For Remote Controller:
Battery: 4.5V (3*1.5V AAA)

Battery Capacity ..... : ---

Adapter Model..... : ---

3.2 Technical Specification

• 2.4GHz SRD

Frequency Bands ..... : 2400-2483.5MHz

Operating Frequency ..... : 2476MHz

Quantity of Channels ..... : 1

Maximum RF Output Power ..... : 0.974 dBm (EIRP)

Type of Modulation ..... : GFSK

Antenna Type..... : Internal Antenna

Antenna Gain ..... : 0dBi

•WiFi

Frequency Range ..... : 2412~2472MHz for 802.11b/g/n(HT20)

Maximum RF Output Power ..... : 4.89 dBm (EIRP)

Type of Modulation ..... : DSSS, OFDM

Quantity of Channels ..... : 13

Channel Separation..... : 5MHz

Antenna Type..... : Internal Antenna

Antenna Gain ..... : 0dBi

3.3 Standards Applicable

The tests were performed according to following standards:

EN IEC 62311:2020	Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)
EN 50665:2017	Generic standard for assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz).

3.4 Disclaimer

The antenna gain information is provided by the customer. The laboratory is not responsible for the accuracy of the antenna gain information.

4 Health Requirements

According to Council Recommendation: the criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation.

Reference levels for electric, magnetic and electromagnetic fields (0Hz to 300GHz, unperturbed RMS values)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density Seq (W/m2)
0-1 Hz	-	3.2×10^4	4×10^4	-
1-8 Hz	10000	$3.2\times10^4/f^2$	$4\times10^4/f^2$	-
8-25 Hz	10000	4000/f	5000/f	-
0.025-0.8 kHz	250/f	4/f	5/f	-
0.8-3 kHz	250/f	5	6.25	-
3-150 kHz	87	5	6.25	-
0.15-1 MHz	87	0.73/f	0.92/f	-
1-10 MHz	$87/f^{1/2}$	0.73/f	0.92/f	-
10-400 MHz	28	0.073	0.095	2
400-2000 MHz	$1.375\ f^{1/2}$	$0.0037\ f^{1/2}$	$0.0046\ f^{1/2}$	f/200
2-300 GHz	61	0.16	0.2	10

Note:

1. f as indicated in the frequency range column.
2. For frequencies between 100 kHz and 10 GHz, Seq, E2, H2 and B2 are to be averaged over any six-minute period.
3. For frequencies exceeding 10 GHz, Seq, E2, H2 and B2 are to be averaged over any 68 / f1.05 minute period (f in GHz).
4. No E-field value is provided for frequencies<1 Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 25 kV/m. Spark discharges causing stress or annoyance should be avoided.

4.1 RF Exposure Evaluations

E= E Field Strength (V/m)

P= Maximum RF Output Power (W) =(10^(dBm/10))/1000

G= Antenna Gain (Numeric)=10^(Antenna gain in dBi/10)

r= Separation Distance Between Radiator and Human Body (m)=0.2m

4.2 RF Exposure test procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

The temperature and related humidity: 22°C and 45% RH.

4.3 Test Result of RF Exposure Evaluation

The antenna of the product, under normal use condition is at least 20 cm away from the body of the user. Warning statement to the user to keeping at least 20 cm separation distance and the prohibition of operating to a person has been printed on the user´s manual. So, this product under normal use is located on electromagnetic far field between the human body.

Test Mode	Antenna Gain (dBi)	Antenna Gain (Numeric)	Maximum Output Power (dBm)	Maximum Output Power (W)	E Field Strength (V/m)	E Field Strength Limit (V/m)	Result
2.4GHz SRD	0	1.00	0.974	0.0013	0.97	61	Pass
WiFi	0	1.00	4.89	0.0031	1.52	61	Pass
Remark: For details of output power please refer to report No. WTF24F07159996W001 and WTF24F07159996W002.							

5 Photographs – EUT Constructional Details

Please refer to “ANNEX”.

======End of Report======