



TEST REPORT

ETSI EN 301 893 V2.1.1 (2017-05)

Report Reference No.: TZ240505696-WLAN2

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Date of issue.....: 2024/5/23



Testing Laboratory Name: Shenzhen Tongzhou Testing Co.,Ltd

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Applicant's name: Jiangxi Small Walrus Intelligent Technology Co.,LTD

Address: Factory No. 1, Hengsi Road, Qianping Industrial Zone, Le 'an
Industrial Park, Fuzhou City, Jiangxi Province, China

Test specification

Standard: ETSI EN 301 893 V2.1.1 (2017-05)

TRF Originator: Shenzhen Tongzhou Testing Co.,Ltd

Master TRF: Dated 2024-01

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Test item description: Smart WiFi Dome Camera

Trade Mark



Model/Type reference.....: XHX-PT09-DW

List Model: XHX-PT10-DW, XHX-PT11-DW, XHX-PT12-DW, XHX-PT13-DW,
SC489-DWB2, SC489-DWB3, SC489-DWB4, HHK-5362X, HHK-
5368X, HHK-5369X, HHK-5370X, HHK-5371X, HHK-5350X, HHK-
5320X, HHK-5362Y, HHK-5368XY, HHK-5369Y, HHK-5370Y,
HHK-5371Y, HHK-5350Y, HHK-5320Y, HHK-5362Z, HHK-5368Z,
HHK-5369Z, HHK-5370Z, HHK-5371Z, HHK-5350G, HHK-5320G,
HHK-5562Y, HHK-5568XY, HHK-5569Y, HHK-5570Y, HHK-5571Y,
HHK-5550Y, HHK-5520Y, HHK-5562Z, HHK-5568Z, HHK-5569Z,
HHK-5570Z, HHK-5571Z, HHK-5550Z, HHK-5520Z

Hardware Version.....: V1.0

Software Version: V3.2.1X

Ratings: Input:DC 12V

Result.....: PASS



TEST REPORT

Test Report No. :	TZ240505696-WLAN2	2024/5/23
		Date of issue

Equipment under Test : Smart WiFi Dome Camera

Model /Type : XHX-PT09-DW

Listed Models : XHX-PT10-DW, XHX-PT11-DW, XHX-PT12-DW, XHX-PT13-DW, SC489-DWB2, SC489-DWB3, SC489-DWB4, HHK-5362X, HHK-5368X, HHK-5369X, HHK-5370X, HHK-5371X, HHK-5350X, HHK-5320X, HHK-5362Y, HHK-5368XY, HHK-5369Y, HHK-5370Y, HHK-5371Y, HHK-5350Y, HHK-5320Y, HHK-5362Z, HHK-5368Z, HHK-5369Z, HHK-5370Z, HHK-5371Z, HHK-5350G, HHK-5320G, HHK-5562Y, HHK-5568XY, HHK-5569Y, HHK-5570Y, HHK-5571Y, HHK-5550Y, HHK-5520Y, HHK-5562Z, HHK-5568Z, HHK-5569Z, HHK-5570Z, HHK-5571Z, HHK-5550Z, HHK-5520Z

Applicant : Jiangxi Small Walrus Intelligent Technology Co.,LTD

Address : Factory No. 1, Hengsi Road, Qianping Industrial Zone, Le 'an Industrial Park, Fuzhou City, Jiangxi Province, China

Manufacturer : Jiangxi Small Walrus Intelligent Technology Co.,LTD

Address : Factory No. 1, Hengsi Road, Qianping Industrial Zone, Le 'an Industrial Park, Fuzhou City, Jiangxi Province, China

Test Result:	PASS
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

**** Modified History ****

Revision	Description	Issued Data	Remark
Revision 00	Initial Test Report Release	2024/5/23	Andy Zhang



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1. TEST STANDARDS

The tests were performed according to following standards:

[ETSI EN 301 893 V2.1.1 \(2017-05\)](#)

5 GHz RLAN;

Harmonised Standard covering the essential requirements
of article 3.2 of Directive 2014/53/EU



2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	2024/5/20
Testing commenced on	:	2024/5/20
Testing concluded on	:	2024/5/22

2.2. Product Description

The Jiangxi Small Walrus Intelligent Technology Co.,LTD's Model: XHX-PT09-DW or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

Name of EUT	Smart WiFi Dome Camera
Model(s) Number	XHX-PT09-DW
List Model	XHX-PT10-DW, XHX-PT11-DW, XHX-PT12-DW, XHX-PT13-DW, SC489-DWB2, SC489-DWB3, SC489-DWB4, HHK-5362X, HHK-5368X, HHK-5369X, HHK-5370X, HHK-5371X, HHK-5350X, HHK-5320X, HHK-5362Y, HHK-5368XY, HHK-5369Y, HHK-5370Y, HHK-5371Y, HHK-5350Y, HHK-5320Y, HHK-5362Z, HHK-5368Z, HHK-5369Z, HHK-5370Z, HHK-5371Z, HHK-5350G, HHK-5320G, HHK-5562Y, HHK-5568XY, HHK-5569Y, HHK-5570Y, HHK-5571Y, HHK-5550Y, HHK-5520Y, HHK-5562Z, HHK-5568Z, HHK-5569Z, HHK-5570Z, HHK-5571Z, HHK-5550Z, HHK-5520Z
Difference description	All the same except for the model name.
Hardware version	V1.0
Software version	V3.2.1X

2.3. Wireless Function Tested in this report

Wireless Type	Working Frequency	Modulation Type
WLAN(5G)	5180MHz to 5240MHz	IEEE 802.11n :OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11a:OFDM (64QAM, 16QAM, QPSK,BPSK)

2.4. Equipment Under Test

Power supply system utilised

Power supply voltage	:	☐ 120V / 60 Hz	☐ 115V / 60Hz
		☐ 12 V DC	☐ 24 V DC
		☒ Other (specified in blank below)	

Input:DC 12V

**Support band(s)**

Frequency Band(MHz)	5150-5250	5250-5350	5470-5725	5725-5850
802.11a	✓	—	—	✓
802.11b	—	—	—	—
802.11g	—	—	—	—
802.11n HT20	✓	—	—	✓
802.11n HT40	✓	—	—	✓

Description of the test mode**For 5.18GHz – 5.32GHz Band**

4 channels are provided for 802.11a/802.11n HT20/802.11ac VHT20

Channel	Frequency(MHz)	Channel	Frequency(MHz)
36	5180	44	5220
40	5200	48	5240

2 channels are provided for 802.11n HT40/802.11ac VHT40

Channel	Frequency(MHz)	Channel	Frequency(MHz)
38	5190	46	5230

1 channel are provided for 802.11ac VHT80

Channel	Frequency(MHz)
42	5210

Test Frequency List

Modulation Type	Test Frequency					
	Lowest		Middle		Highest	
	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
802.11a	36	5180	40	5200	48	5240
802.11n HT20	36	5180	40	5200	48	5240
802.11n HT40	38	5200	40	5200	46	5230



2.5. EUT Classification:

Type of equipment:	☒	stand alone equipment	
	☐	plug in radio equipment	
	☐	combined equipment	
Modulation types:	☒	Wide Band Modulation (None Hopping – e.g. DSSS, OFDM)	
	☐	Frequency Hopping Spread Spectrum (FHSS)	
Adaptive equipment:	☒	Yes, LBT-based	☐ Frame Based Equipment ☒ Load Based Equipment
	☐	Yes, non-LBT-based	
	☐	Yes (but can be disabled)	
	☐	No	
	☒	q value	16
	☐	COT value	
	☒	CCA value	34µs
Antennas and transmit operating modes:	☒	Operating mode 1 (single antenna) Equipment with 1 antenna, Equipment with 2 diversity antennas operating in switched diversity mode by which at any moment in time only 1 antenna is used, Smart antenna system with 2 or more transmit/receive chains, but operating in a mode where only 1 transmit/receive chain is used)	
	☐	Operating mode 2 (multiple antennas, no beamforming) Equipment operating in this mode contains a smart antenna system using two or more transmit/receive chains simultaneously but without beamforming.	
	☐	Operating mode 3 (multiple antennas, with beamforming) Equipment operating in this mode contains a smart antenna system using two or more transmit/receive chains simultaneously with beamforming. In addition to the antenna assembly gain (G), the beamforming gain (Y) may have to be taken into account when performing the measurements.	

2.6. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

/	/	/	/
/	/	/	/
/	/	/	/

2.7. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt	Type of Test
TZ240505696-1#	N/A	V1.0	V3.2.1X	2024/5/20	Radio
TZ240505696-2#	N/A	V1.0	V3.2.1X	2024/5/20	SAR (EMF)
TZ240505696-3#	N/A	V1.0	V3.2.1X	2024/5/20	EMC

2.8. Modifications

No modifications were implemented to meet testing criteria.



3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Tongzhou Testing Co.,Ltd

1th Floor, Building 1, Haomai High-tech Park, Huating Road 387, Dalang Street, Longhua, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2014) and CISPR Publication 22.

3.2. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature: 25 °C

High Temperature/HT: 40°C

Low Temperature/LT: -10°C

Normal Voltage: DC 12V

High Voltage/HV: DC 13.2V

Low Voltage/LV: DC 10.8V

Relative Humidity: 55 %

Air Pressure: 989 hPa

3.3. Test Description

3.3.1 Main Terms

Verdict

Verdict of each test cases.

Test Case

Test cases identification number and description in 3GPP test specification and ETSI specification.

3.3.2 Terms used in Condition column

NTC	Normal voltage, Normal Temperature
HV	High voltage, Normal Temperature
LV	Low voltage, Normal Temperature
HT	High Temperature, Normal voltage
LT	Low Temperature, Normal voltage
HTHV	High voltage, High Temperature
LTHV	High voltage, Low Temperature
HTLV	Low voltage, High Temperature
LTLV	Low voltage, Low Temperature
Vib	Vibration

**3.3.3 Terms used in Verdict column**

Pass	This test cases has been tested, and EUT is conformant to the applied standards in the given frequency band.
Fail	This test cases has been tested, but EUT is not conformant to the applied standards in the given frequency band.
N/A	This test case is either not required/not applicable in the specified band or is not applicable according to the specific PICS/PIXIT for the EUT.
Inc	Test case result is ambiguous in the given frequency band.
Decl	Declaration is received from the client to demonstrate the conformity to the relevant specification in the given frequency band.
BR	This test cases is not tested in the given frequency band, but this testcases was tested with pass result for the initial model in the given frequency band.

3.3.4 Sumarry of measurement results

No deviations from the technical specifications were ascertained
There were deviations from the technical specifications ascertained

Test Specification Clause	Test Case	Test Condition	Mode	Pass	Fail	N/A	NP	Remark
5.4.2	Centre frequencies	NTC	☒ 802.11a ☒ 802.11n ☐ 802.11ac	☒	☐	☐	☐	1
		HVLT		☐	☐	☐	☐	1
		HVHT		☐	☐	☐	☐	1
		LVLT		☐	☐	☐	☐	1
		LVHT		☐	☐	☐	☐	1
5.4.3	Nominal Channel Bandwidth and Occupied Channel Bandwidth	NTC	☒ 802.11a ☒ 802.11n ☐ 802.11ac	☒	☐	☐	☐	1
5.4.4	RF output power, Transmit Power Control (TPC) and power density	NTC	☒ 802.11a ☒ 802.11n ☐ 802.11ac	☒	☐	☐	☐	1
		HVLT		☐	☐	☐	☐	1
		HVHT		☐	☐	☐	☐	1
		LVLT		☐	☐	☐	☐	1
		LVHT		☐	☐	☐	☐	1
5.4.5	Transmitter unwanted emissions outside the 5 GHz RLAN bands	NTC	☒ 802.11a ☒ 802.11n ☐ 802.11ac	☒	☐	☒	☐	1
5.4.6	Transmitter unwanted emissions within the 5 GHz RLAN bands	NTC	☒ 802.11a ☒ 802.11n ☐ 802.11ac	☒	☐	☐	☐	1
5.4.7	Receiver spurious emissions	NTC	☒ 802.11a ☒ 802.11n ☐ 802.11ac	☒	☐	☐	☐	1
5.4.8	Dynamic Frequency Selection (DFS)	NTC	☒ 802.11a ☒ 802.11n ☐ 802.11ac	☐	☐	☒	☐	1
5.4.9	Adaptivity (channel access mechanism)	NTC	☒ 802.11a ☒ 802.11n ☐ 802.11ac	☒	☐	☐	☐	1
5.4.10	Receiver Blocking	NTC	☒ 802.11a ☒ 802.11n ☐ 802.11ac	☒	☐	☐	☐	1



Test Specification Clause	Test Case	Test Condition	Mode	Pass	Fail	N/A	NP	Remark
--	User Access Restrictions	--	--	☒	☐	☐	☐	1,2
--	Geo-location capability	--	--	☐	☐	☒	☐	1,3

Remark:

1. The measurement uncertainty is not included in the test result.
2. Users can not modify the Pivotal system software and hardware of the EUT, meet the User Access Restrictions requirements
3. The EUT does not support Geo-location capability. This test case does not apply this kind of EUT

3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics;Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics;Part 2" and is documented in the Shenzhen Tongzhou Testing Co.,Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Tongzhou Testing Co.,Ltd is reported:

Test Items	Measurement Uncertainty	Notes
Frequency error	5.2 ppm	(1)
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	4.30 dB	(1)
Conducted spurious emission	1.60 dB	(1)
Radiated spurious emission	4.30 dB	(1)
Humidity	2.0 %	(1)
Temperature	0.3 °C	(1)
Time	2.0 %	(1)

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.



3.5. Equipments Used during the Test

Conducted Method						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	MXA Signal Analyzer	Keysight	N9020A	MY52091623	2024/1/4	2025/1/3
2	Signal Generator	Keysight	N5182A	MY4620709	2024/1/4	2025/1/3
3	Signal Generator	R&S	SML03	102924/0013	2024/1/4	2025/1/3
4	Power Sensor	Agilent	U2021XA	MY5365004	2024/1/4	2025/1/3
5	Power Meter	Agilent	U2531A	TW53323507	2024/1/4	2025/1/3
6	Climate Chamber	KRUOMR	KRM-1000	KRM16072901	2024/1/4	2025/1/3
7	Wideband Radio Communication Tester	R&S	CMW500	101855	2024/1/4	2025/1/3
8	Test Software	Tonscend	JS1120-3	V3.2.22	--	--

Radiated Method						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	Wideband Antenna	schwarzbeck	VULB 9163	958	2022/11/13	2025/11/12
2	Horn Antenna	schwarzbeck	BBHA 9120D	01989	2022/11/13	2025/11/12
3	EMI Test Receiver	R&S	ESCI	100849/003	2024/1/4	2025/1/3
4	Controller	MF	MF7802	N/A	N/A	N/A
5	Amplifier	schwarzbeck	BBV 9743	209	2024/1/4	2025/1/3
6	Amplifier	Tonscend	TSAMP-0518SE	--	2024/1/4	2025/1/3
7	RF Cable	HUBER+SUHNER	RG214	N/A	2024/1/4	2025/1/3
8	MXA Signal Analyzer	Keysight	N9020A	MY52091623	2024/1/4	2025/1/3
9	Horn Antenna	ETS	3117	00218874	2022/11/13	2025/11/12
10	Wideband Antenna	Sunol	JB3	A020115	2022/7/3	2025/7/2
11	Test Software	Tonscend	JS36-RSE	V5.0.0.0	--	--



4. TEST CONDITIONS AND RESULTS

4.1. ETSI EN 301 893 REQUIREMENTS

4.1.1. Nominal Centre frequencies

LIMIT

ETSI EN 301 893 (V2.1.1) Sub-clause 4.2.1.3

The actual centre frequency for any given channel declared by the manufacturer shall be maintained within the range $f_c \pm 20$ ppm.

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN 301 893 (V2.1.1) §5.4.2.2.1

☒ Equipment operating without modulation

This test method requires that the UUT can be operated in an unmodulated test mode.

The UUT shall be connected to a suitable frequency measuring device (e.g. a frequency counter or a spectrum analyser) and operated in an unmodulated mode.

The result shall be recorded.

☐ Equipment operating with modulation

This method is an alternative to the above method in case the UUT cannot be operated in an un-modulated mode.

The UUT shall be connected to spectrum analyser.

Max Hold shall be selected and the centre frequency adjusted to that of the UUT.

The peak value of the power envelope shall be measured and noted. The span shall be reduced and the marker moved in a positive frequency increment until the upper, (relative to the centre frequency), -10 dBc point is reached. This value shall be noted as f1.

The marker shall then be moved in a negative frequency increment until the lower, (relative to the centre frequency), -10 dBc point is reached. This value shall be noted as f2.

The centre frequency is calculated as $(f1 + f2) / 2$.

**TEST RESULTS**

Temperature:	22.8° C
Humidity:	56%
Test Engineer:	Allen.Lai

Low Channel fo =5180 MHz					
Temperature (°C)	Power Supplied (V)	Reading (MHz)	Tolerance (MHz)	Result (ppm)	Limit (ppm)
-10	DC 12V	5180.012008	0.012007739	0.41	± 20
25	DC 12V	5180.022762	0.022761924	-3.11	± 20
40	DC 12V	5179.989369	-0.010631403	1.67	± 20

Middle Channel fo =5200 MHz					
Temperature (°C)	Power Supplied (V)	Reading (MHz)	Tolerance (MHz)	Result (ppm)	Limit (ppm)
-10	DC 12V	5200.011859	0.011858537	2.28	± 20
25	DC 12V	5199.981934	-0.018066067	-3.47	± 20
40	DC 12V	5200.019909	0.019908998	3.83	± 20

High Channel fo =5240 MHz					
Temperature (°C)	Power Supplied (V)	Reading (MHz)	Tolerance (MHz)	Result (ppm)	Limit (ppm)
-10	DC 12V	5239.994383	-0.005616672	-1.07	± 20
25	DC 12V	5239.983718	-0.016281552	-3.11	± 20
40	DC 12V	5240.0125	0.012500377	2.39	± 20



Low Channel fo =5190 MHz					
Temperature (°C)	Power Supplied (V)	Reading (MHz)	Tolerance (MHz)	Result (ppm)	Limit (ppm)
-10	DC 12V	5179.984	-0.0159548	-3.08	± 20
25	DC 12V	5180.0094	0.0094028	1.82	± 20
40	DC 12V	5179.9854	-0.0145581	-2.81	± 20

Low Channel fo =5230 MHz					
Temperature (°C)	Power Supplied (V)	Reading (MHz)	Tolerance (MHz)	Result (ppm)	Limit (ppm)
-10	DC 12V	5200.0135	0.0134894	2.59	± 20
25	DC 12V	5199.9886	-0.0114066	-2.19	± 20
40	DC 12V	5200.0245	0.0245033	4.71	± 20



4.1.2. Occupied Channel Bandwidth

LIMIT

ETSI EN 301 893 (V2.1.1) Sub-clause 4.2.2.2

The Nominal Channel Bandwidth for a single Operating Channel shall be 20 MHz.

Alternatively, equipment may implement a lower Nominal Channel Bandwidth with a minimum of 5 MHz, providing they still comply with the Nominal Centre Frequencies defined in clause 4.2.1 (20 MHz raster).

The Occupied Channel Bandwidth shall be between 80 % and 100 % of the Nominal Channel Bandwidth. In case of smart antenna systems (devices with multiple transmit chains) each of the transmit chains shall meet this requirement.

The Occupied Channel Bandwidth might change with time/payload.

During a Channel Occupancy Time (COT), equipment may operate temporarily with an Occupied Channel Bandwidth of less than 80 % of its Nominal Channel Bandwidth with a minimum of 2 MHz.

TEST PROCEDURE

According to ETSI EN 301 893 V2.1.1 (2017-05) clause 5.4.3.2.1, conducted method.

The test 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 Bandwidth: 100 kHz
- Video Bandwidth: 300 kHz
- Frequency Span: $2 \times$ Nominal Bandwidth (e.g. 40 MHz for a 20 MHz channel)
- Sweep time: > 1 s; for larger Nominal Bandwidths, the sweep time may be increased until a value where the sweep time has no impact on the RMS value of the signal
- Detector Mode: RMS
- Trace Mode: Max Hold

Step 2:

- Wait for the trace to stabilize.

Step 3:

- Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.
- Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

The measurement described in step 1 to step 3 above shall be repeated in case of simultaneous transmissions in non-adjacent channels

TEST RESULTS

Temperature:	22.8° C
Humidity:	56%
Test Engineer:	Allen.Lai

TestMode	Antenna	Channel	OCB[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	16.343	16 to 20	PASS
11N20SISO	Ant1	5180	17.565	16 to 20	PASS
11N40SISO	Ant1	5190	36.050	32 to 40	PASS



4.1.3. RF Output Power, Transmit Power Control (TPC) and Power Density

LIMIT

According to ETSI EN 301 893 V2.1.1 (2017-05) clause 4.2.3.2

-Limits for RF output power and power density at the highest power level

TPC is not required for channels whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz.

For devices with TPC, the RF output power and the Power Density when configured to operate at the highest stated power level (P_H) of the TPC range shall not exceed the levels given in table 2.

Devices are allowed to operate without TPC. See table 2 for the applicable limits that shall apply in this case.

Table 1: Mean e.i.r.p. limits for RF output power and power density at the highest power level

Table 2: Mean e.i.r.p. limits for RF output power and Power Density at the highest power level (P_H)

Frequency range (MHz)	Mean e.i.r.p. limit for P_H (dBm)		Mean e.i.r.p. density limit (dBm/MHz)	
	with TPC	without TPC	with TPC	without TPC
5 150 to 5 350	23	20/23 (see note 1)	10	7/10 (see note 2)
5 470 to 5 725	30 (see note 3)	27 (see note 3)	17 (see note 3)	14 (see note 3)
NOTE 1: The applicable limit is 20 dBm, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 23 dBm.				
NOTE 2: The applicable limit is 7 dBm/MHz, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 10 dBm/MHz.				
NOTE 3: Slave devices without a <i>Radar Interference Detection</i> function shall comply with the limits for the frequency range 5 250 MHz to 5 350 MHz.				

According to ETSI EN 301 893 V2.1.1 (2017-05) clause 4.2.3.2.3

-Limit for RF output power at the lowest power level of the TPC range

For devices using TPC, the *RF Output Power* during a transmission burst when configured to operate at the lowest stated power level (P_L) of the TPC range shall not exceed the levels given in table 3. For devices without TPC, the limits in table 3 do not apply.

Table 3: Mean e.i.r.p. limits for RF Output Power at the lowest power level of the TPC range

Frequency range	Mean e.i.r.p. (dBm) limit for P_L
5 250 MHz to 5 350 MHz	17
5 470 MHz to 5 725 MHz	24 (see note)
NOTE: Slave devices without a <i>Radar Interference Detection</i> function shall comply with the limits for the band 5 250 MHz to 5 350 MHz.	

TEST PROCEDURE

Please refer to ETSI EN 301 893 (V2.1.1) Sub-clause 5.3.4

TEST RESULTS

Temperature:	22.8° C
Humidity:	56%
Test Engineer:	Allen.Lai

**Power**

Test Condition	TestMode	Antenna	Channel	TPC	EIRP [dBm]	Limit [dBm]	Verdict
NTNV	11A	Ant1	5180	NA	13.25	23	PASS
	11N20SISO	Ant1	5180	NA	12.95	23	PASS
	11N40SISO	Ant1	5190	NA	15.68	23	PASS
LTV	11A	Ant1	5180	NA	13.33	23	PASS
	11N20SISO	Ant1	5180	NA	12.99	23	PASS
	11N40SISO	Ant1	5190	NA	15.40	23	PASS
HTNV	11A	Ant1	5180	NA	13.12	23	PASS
	11N20SISO	Ant1	5180	NA	13.13	23	PASS
	11N40SISO	Ant1	5190	NA	15.51	23	PASS

Power Density:

TestMode	Antenna	Channel	PSD [dBm/MHz]	Limit [dBm/MHz]	Verdict
11A	Ant1	5180	0.27	10	PASS
11N20SISO	Ant1	5180	0.17	10	PASS
11N40SISO	Ant1	5190	-0.44	10	PASS



4.1.4. Transmitter Unwanted Emissions Outside the 5 GHz RLAN Bands

LIMIT

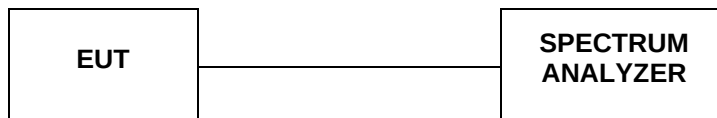
ETSI EN 301 893 (V2.1.1) Sub-clause 4.5.1.2

The level of unwanted emission shall not exceed the limits given in table 3.

Transmitter unwanted emission limits outside the 5 GHz RLAN bands

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 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 5,15 GHz	-30 dBm	1 MHz
5,35 GHz to 5,47 GHz	-30 dBm	1 MHz
5,725 GHz to 26 GHz	-30 dBm	1 MHz

TEST CONFIGURATION



TEST PROCEDURE

- ☒ According to ETSI EN 301 893 V2.1.1 (2017-05) clause 5.4.5.2.1 Conducted measurement
- ☒ According to ETSI EN 301 893 V2.1.1 (2017-05) clause 5.4.5.2.2 Radiated measurement

TEST RESULTS

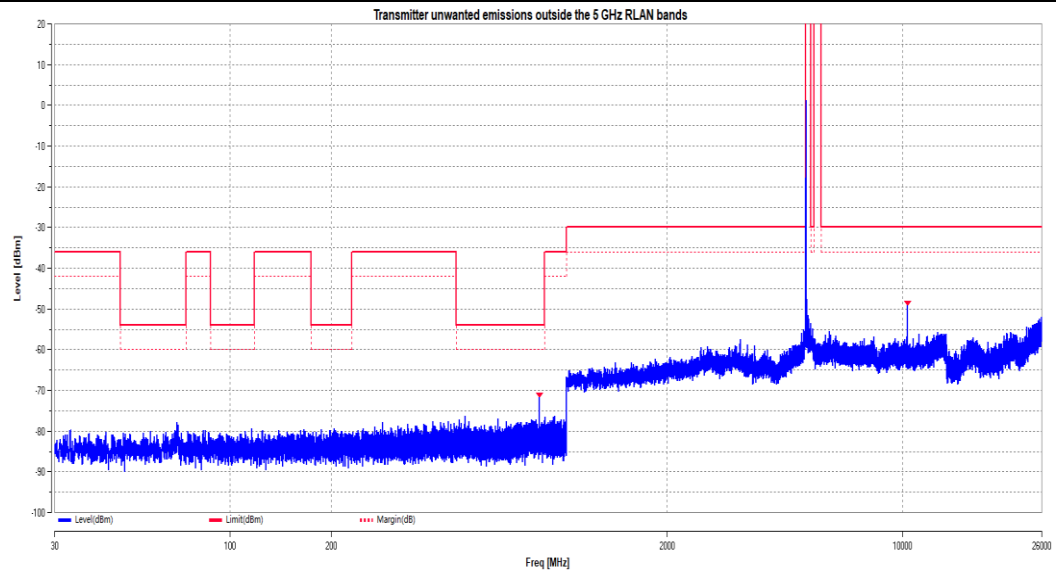
Remark: We test all modulation type, and recorded the worst case.

Temperature:	22.8° C
Humidity:	56%
Test Engineer:	Tony Luo

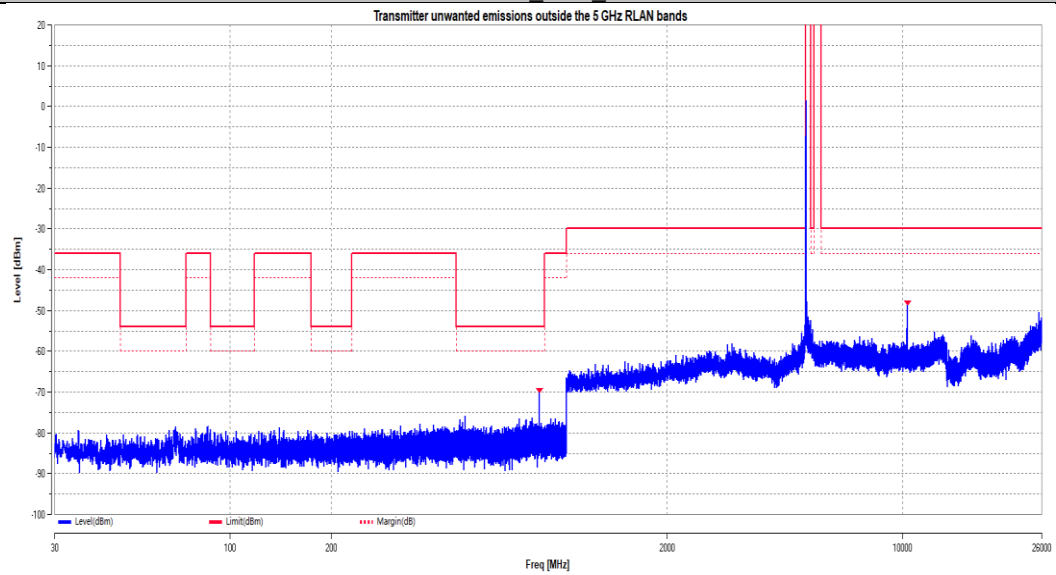
TestMode	Antenna	Channel	Freq. [MHz]	Level[dBm]	Limit[dBm]	Verdict
11A	Ant1	5180	833.35	-71.8	-54	PASS
			10355.31	-49.19	-30	PASS
11N20SISO	Ant1	5180	833.35	-70.31	-54	PASS
			10357.81	-48.82	-30	PASS
11N40SISO	Ant1	5190	833.32	-72.43	-54	PASS
			5147.64	-42.29	-30	PASS



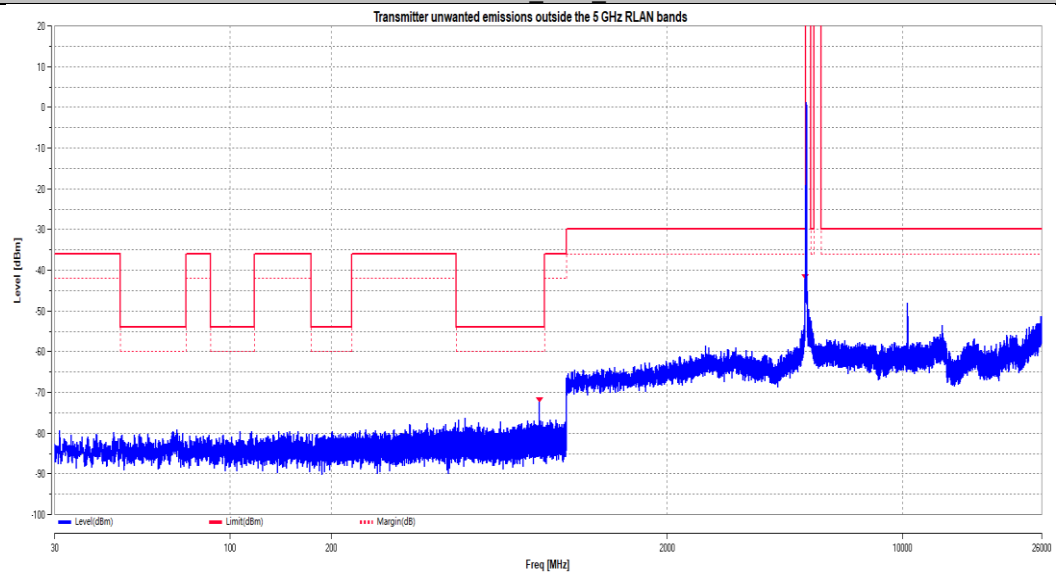
11A Ant1 5180



11N20SISO Ant1 5180



11N40SISO Ant1 5180





Temperature:	22.8° C
Humidity:	56%
Test Engineer:	Tony Luo

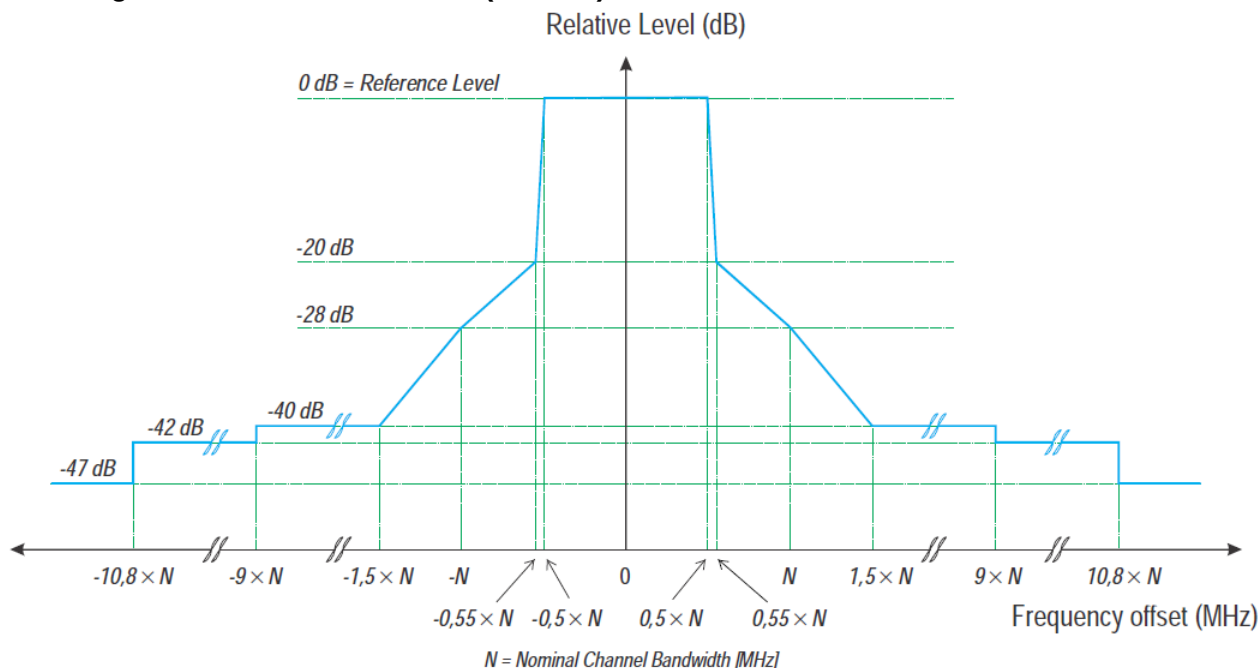
Note: This test was performed with EUT in X, Y, Z position and the worst case was found when EUT in X position.

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit (dBm)	Margin (dB)	Conclusion
Below 1GHz:					
559.39	V	-59.51	-54	5.51	PASS
563.96	H	-61.95	-54	7.95	PASS
Above 1GHz:					
Test Mode: Low Channel					
10360	H	-45.93	-30	15.93	PASS
10360	V	-46.98	-30	16.98	PASS
15540	H	-49.92	-30	19.92	PASS
15540	V	-46.44	-30	16.44	PASS
20720	H	-48.09	-30	18.09	PASS
20720	V	-47.32	-30	17.32	PASS
Test Mode: High Channel					
10480	H	-41.95	-30	11.95	PASS
10480	V	-42.84	-30	12.84	PASS
15720	H	-43.76	-30	13.76	PASS
15720	V	-42.63	-30	12.63	PASS
20960	H	-45.54	-30	15.54	PASS
20960	V	-49.16	-30	19.16	PASS
Note:					
1. Cable loss and antenna gain was combined in the calculated result.					
2. No record for margin above 20dB.					

4.1.5. Transmitter Unwanted Emissions Within the 5 GHz RLAN Bands

LIMIT

According to ETSI EN 301 893 V2.1.1 (2017-05) clause 4.2.4.2.2



NOTE: dBc is the spectral density relative to the maximum spectral power density of the transmitted signal.

TEST PROCEDURE

According to ETSI EN 301 893 V2.1.1 (2017-05) § 5.3.6.2.1 Conducted measurement

Step 1: Determination of the reference average power level.

Spectrum analyser settings:

- Resolution bandwidth: 1 MHz
- Video bandwidth: 30 kHz
- Detector mode: RMS
- Trace mode: Max Hold
- Sweep Time: 60000ms
- Centre Frequency: Centre frequency of the channel being tested
- Span: $2 \times \text{Nominal Channel Bandwidth}$

Use the marker to find the highest average power level of the power envelope of the UUT. This level shall be used as the reference level for the relative measurements.

Step 2: Determination of the relative average power levels.

Adjust the frequency range of the spectrum analyser to allow the measurement to be performed within the sub-bands 5 150 MHz to 5 350 MHz and 5 470 MHz to 5 725 MHz. No other parameter of the spectrum analyser should be changed.

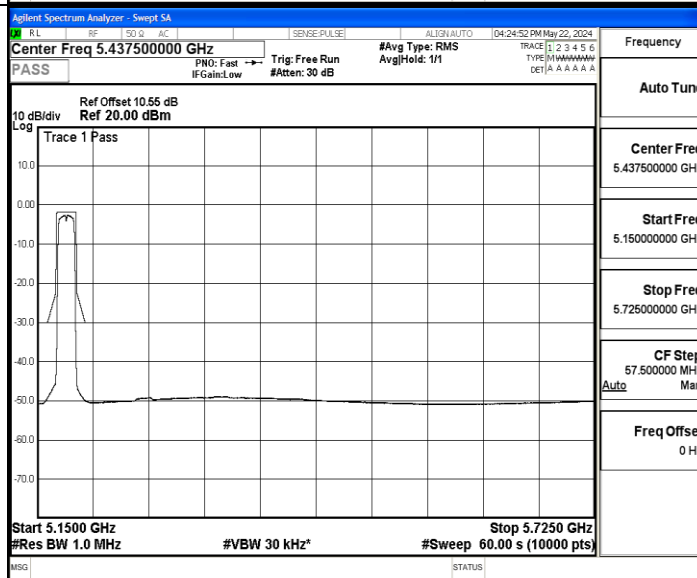
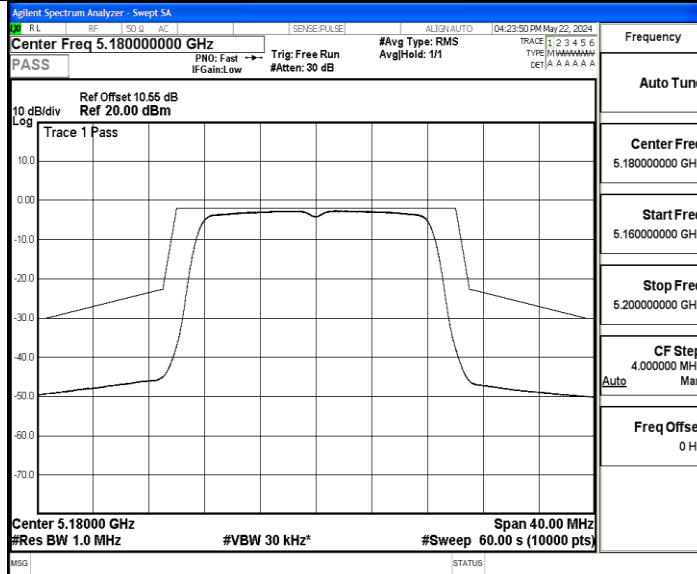
Compare the relative power envelope of the UUT with the limits defined in clause 4.2.4.2.2.

TEST RESULTS

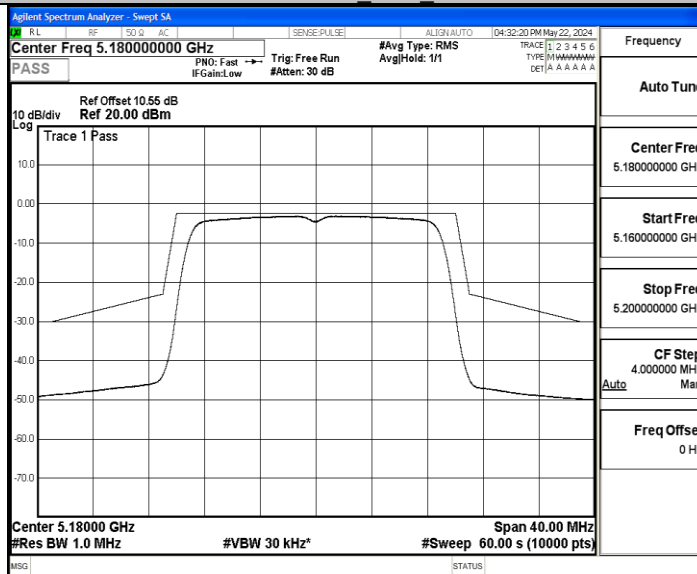
Temperature:	22.8° C
Humidity:	56%
Test Engineer:	Anna Hu

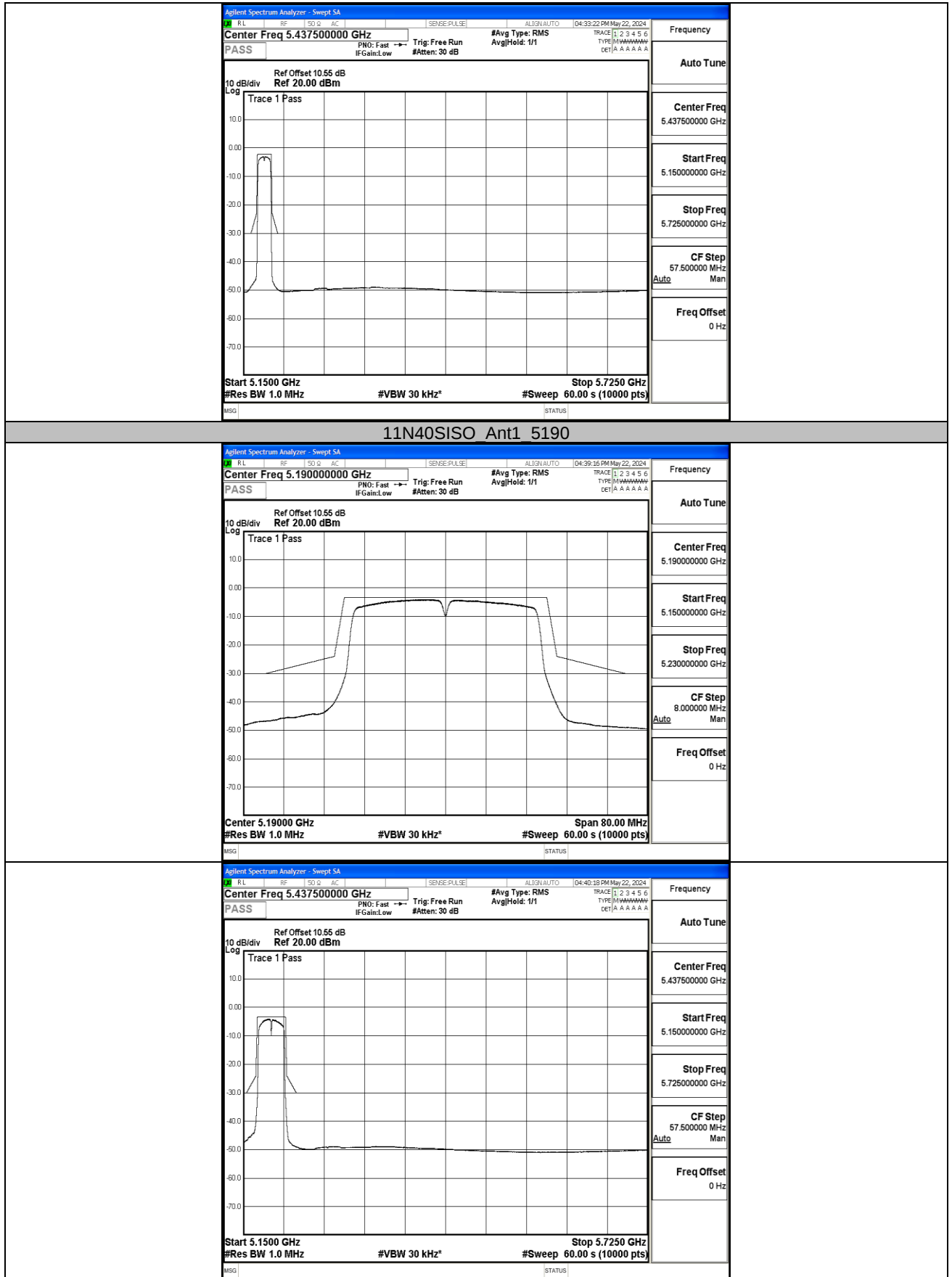


11A Ant1 5180



11N20SISO Ant1 5180







4.1.6. Receiver Spurious Emissions

LIMIT

ETSI EN 301 893 (V2.1.1) Sub-clause 4.6.2

The spurious emissions of the receiver shall not exceed the limits given in table 4.

Table 4: Spurious radiated emission limits

Frequency range	Maximum power	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 26 GHz	-47 dBm	1 MHz

TEST PROCEDURE

Please refer to ETSI EN 301 893 (V2.1.1) Sub-clause 5.4.6

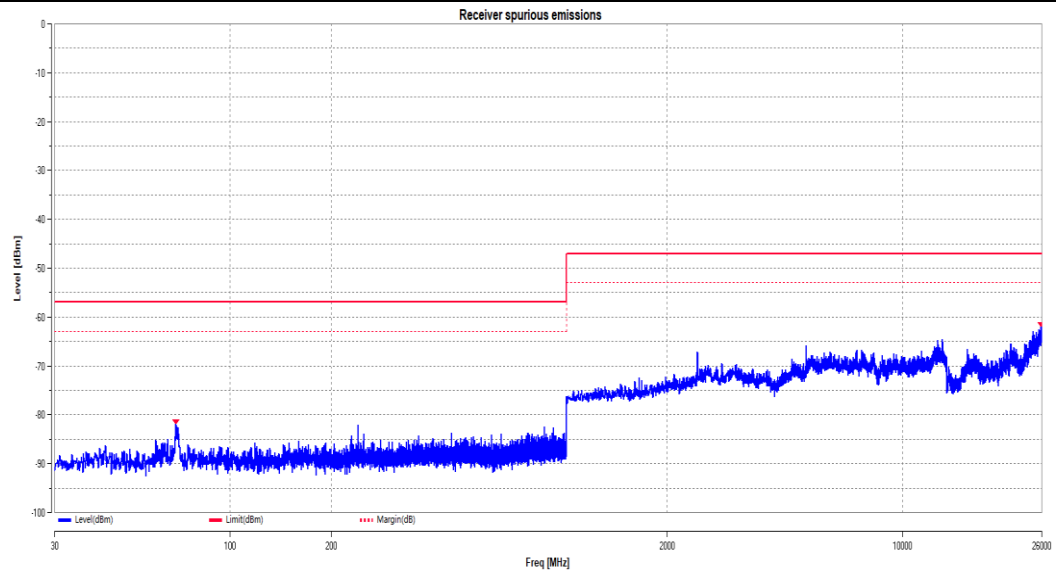
TEST RESULTS

Temperature:	22.8°C
Humidity:	56%
Test Engineer:	Tony Luo

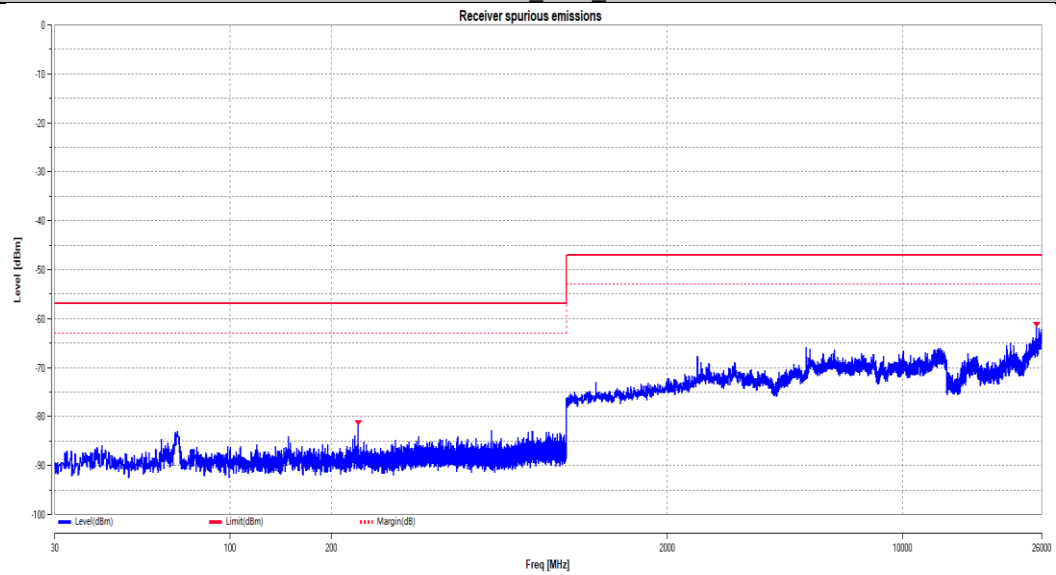
TestMode	Antenna	Channel	Freq. [MHz]	Level[dBm]	Limit[dBm]	Verdict
11A	Ant1	5180	68.92	-82	-57.00	PASS
			25940.63	-62.07	-47.00	PASS
11N20SISO	Ant1	5180	240.01	-81.83	-57.00	PASS
			25053.13	-61.66	-47.00	PASS
11N40SISO	Ant1	5190	240.01	-81.09	-57.00	PASS
			25962.5	-61.94	-47.00	PASS



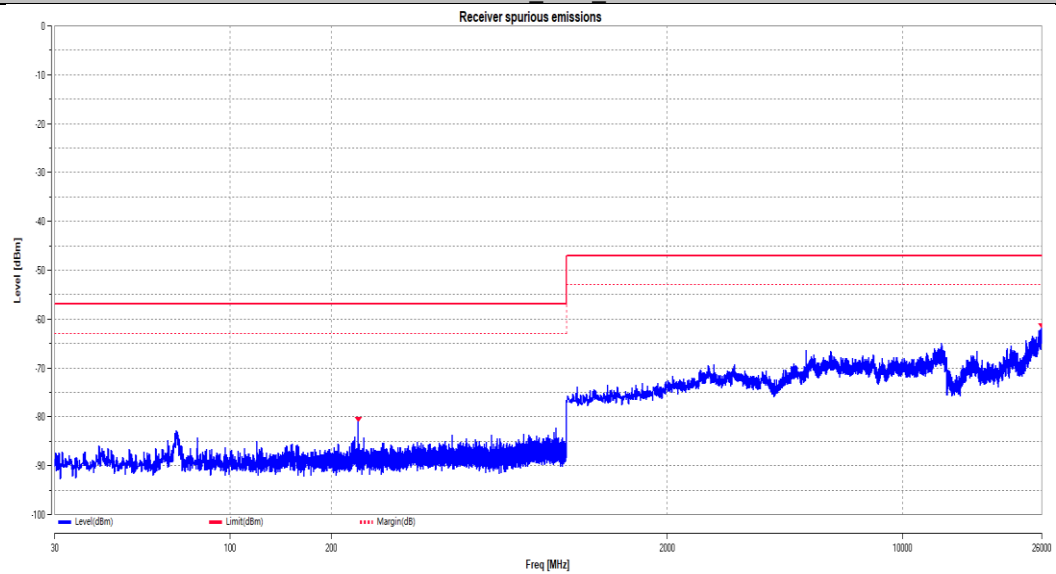
11A Ant1 5180



11N20SISO Ant1 5180



11N40SISO Ant1 5190





Temperature:	22.8°C
Humidity:	56%
Test Engineer:	Tony Luo

Note: This test was performed with EUT in X, Y, Z position and the worst case was found when EUT in X position.

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit (dBm)	Margin (dB)	Conclusion
Below 1GHz:					
32.43	V	-66.35	-57	9.35	PASS
913.02	H	-66.34	-57	9.34	PASS
Above 1GHz:					
Test Mode: Lowest frequency					
5608.37	H	-57.20	-47	10.20	PASS
5608.37	V	-55.21	-47	8.21	PASS
12506.34	H	-56.08	-47	9.08	PASS
12506.34	V	-59.48	-47	12.48	PASS
Test Mode: Highest frequency					
5610.05	H	-58.00	-47	11.00	PASS
5610.05	V	-59.49	-47	12.49	PASS
9780.40	H	-58.94	-47	11.94	PASS
9780.40	V	-55.87	-47	8.87	PASS
Note: 1. Cable loss and antenna gain was combined in the calculated result. 2. No record for margin above 20dB.					

4.1.7. Adaptivity (Channel Access Mechanism)

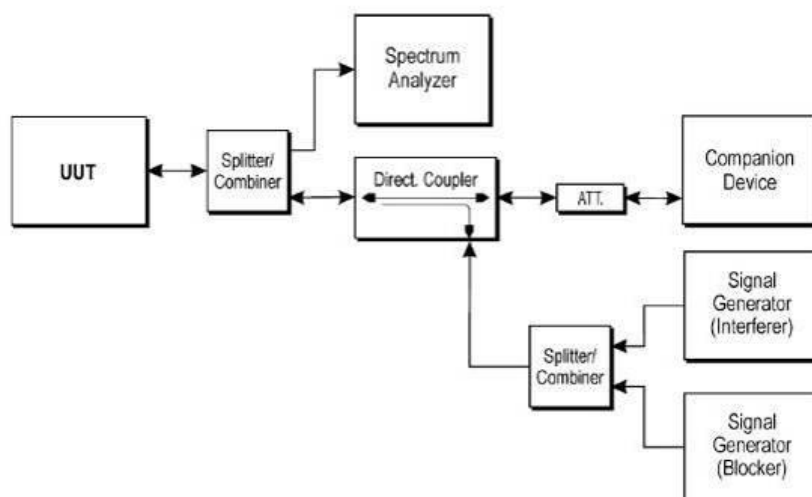
LIMIT

ETSI EN 301 893 (V2.1.1) Sub-clause 4.9.2

Adaptivity Limit

Frame Based Equipment: 1 Minimum Clear Channel Assessment (CCA) time = 20 us; 2 CCA observation time declared by the supplier; 3 COT = 1~10 ms; 4 Idle Period = 5% of COT; 5 TL = -73 dBm/MHz + 23 - PH (assuming a 0 dBi receive antenna and PH specified in dBm e.i.r.p.);
Load Based Equipment: 1 Minimum Clear Channel Assessment (CCA) time = 20 us; 2 CCA declared by the manufacturer; 3 COT ≤ 6ms; 4 R = number of clear idle slots are randomly [1~q]. Every time an Extended CCA is required and the 'R' value stored in a counter; 5 TL = -73 dBm/MHz + 23 - PH (assuming a 0 dBi receive antenna and PH specified in dBm e.i.r.p.);
Short Control Signalling Transmissions: Short Control Signalling Transmissions shall have a maximum duty cycle of 10% within an observation period of 50ms.

TEST BLOCK DIAGRAM



TEST PROCEDURE

Please refer to ETSI EN 301 893 (V2.1.1) Sub-clause 5.3.9

Step 1:

- The UUT may connect to a companion device during the test. The signal generator, spectrum analyser, UUT and the companion device are connected using a Set-up equivalent to the example given by figure 13 although the signal generator does not generate any signals at this point in time. The spectrum analyser is used to monitor the transmissions of the UUT in response to the interference signal.
- The received signal level (wanted signal from the companion device) at the UUT shall be sufficient to maintain a reliable link for the duration of the test.
- 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: > Channel Occupancy Time
 - Trace Mode: Clear/Write
 - Trigger Mode: Video or External

**Step 2:**

- Configure the UUT for normal transmissions with a sufficiently high payload (transmitter activity ratio > 30 %) to allow demonstration of compliance of the adaptive mechanism on the channel being tested.
- For Frame Based Equipment, using the procedure defined in clause 5.3.9.2.2, it shall be verified that the UUT complies with the maximum Channel Occupancy Time and the minimum Idle Period defined in clause 4.9.2.1.
- For Load Based equipment, using the procedure defined in clause 5.3.9.2.2, it shall be verified that the UUT complies with the maximum Channel Occupancy Time defined in clause 4.9.2.2. It shall also be verified (if necessary by repeating the test) that the measured Idle Period varies between CCA and $q \times \text{CCA}$ as defined in clause 4.9.2.2.

NOTE 1: For IEEE 802.11 [9] equipment (see first paragraph of clause 4.9.2.2) the Idle Period and the maximum Channel Occupancy Time are as defined for other types of Load Based Equipment (see clause 4.9.2.2 points 2 and 3). The CCA observation time is declared by the manufacturer (see clause 5.3.1.q)).

Step 3: Adding the interference signal.

- A 100 % duty cycle interference signal is injected on the current operating channel of the UUT. This interference signal shall be a band limited noise signal which has a flat power density (maximum ripple $\pm 1,5$ dB), and shall have a bandwidth of at least 10 MHz. The total power level of this interference signal shall be equal to the power density value defined in clause 4.9.2.1 point 5 or clause 4.9.2.2 point 5, multiplied by the Occupied Channel Bandwidth of the UUT.

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 after the interference signal was injected. This may require the spectrum analyser sweep to be triggered by the start of the interfering signal.

- Using the procedure defined in clause 5.3.9.2.2, it shall be verified that:

i) The UUT stops transmissions on the current operating channel.

NOTE 2: The UUT is assumed to stop transmissions within a period equal to the maximum Channel Occupancy Time defined in clause 4.9.2.1 for Frame Based Equipment or clause 4.9.2.2 for Load Based Equipment. The UUT is allowed to have Short Control Signalling Transmissions on the current operating channel (see ii) and iii).

NOTE 3: For equipment having simultaneous transmissions on multiple (adjacent or non-adjacent) operating channels, the equipment is allowed to continue transmissions on other Operating Channels.

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

iii) The Short Control Signalling Transmissions shall comply with the limits defined in clause 4.9.2.3.

NOTE 4: The verification of the Short Control Signalling transmissions may require the analyser settings to be changed (e.g. sweep time).

NOTE 5: On removal of the interference signal the UUT may start transmissions again on this channel however this is not a requirement and therefore does not require testing.

Step 5:

- The steps 2 to 4 shall be repeated for each of the channels to be tested.

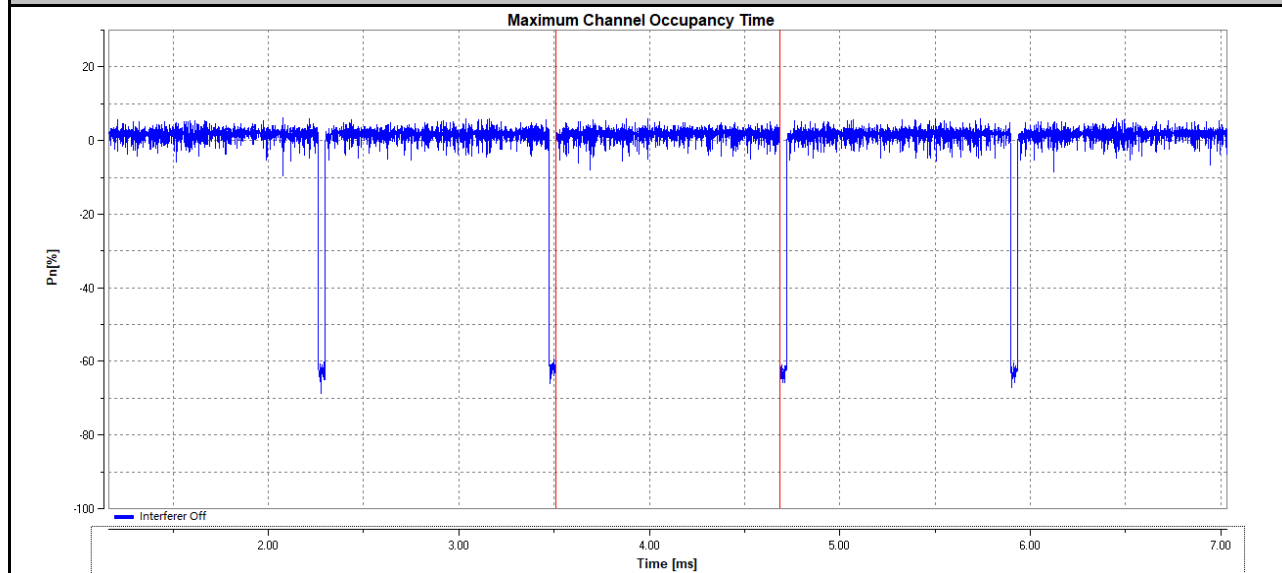
TEST RESULTS

Temperature:	22.8° C
Humidity:	56%
Test Engineer:	Allen.Lai

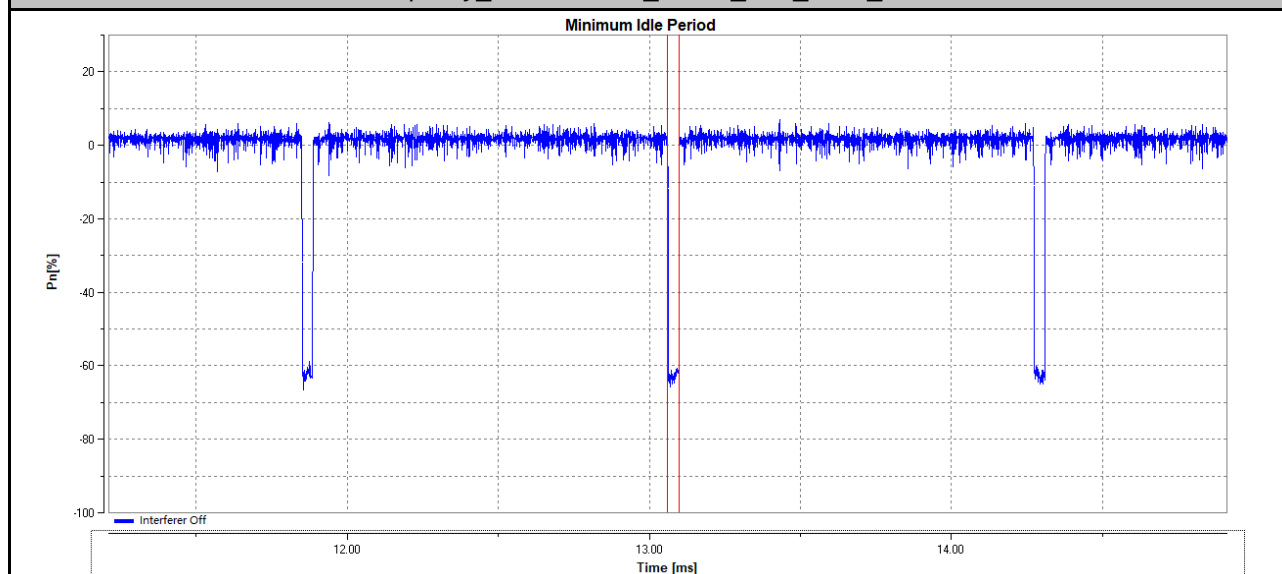


Test Condition	Test Mode	Test Channel	Ant	Priority Class	COT Num[n]	Max. COT [ms]	Limit [ms]	Min. Idle Time [ms]	Limit [ms]	Idle Period probability	Verdict
TNVN	11A	5180	Ant1	2	871	1.189	<=6	0.034	>0.022	See test plot	PASS

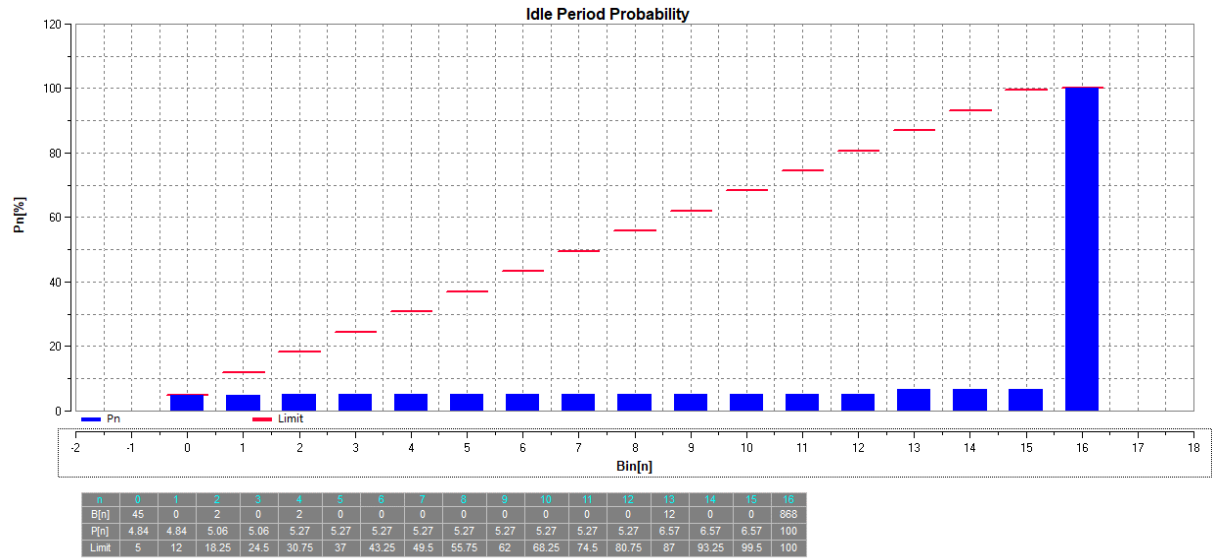
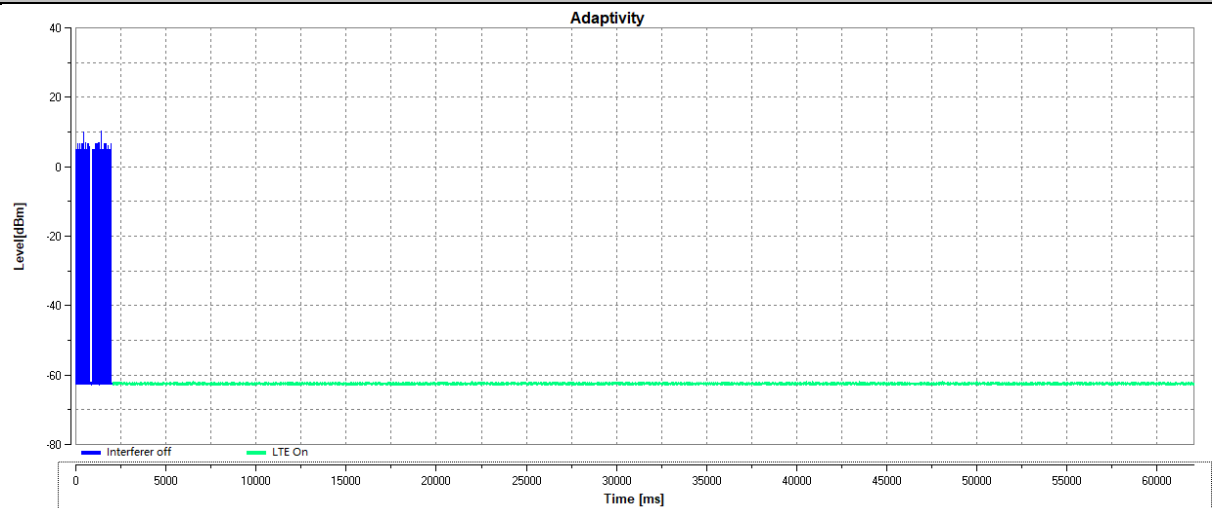
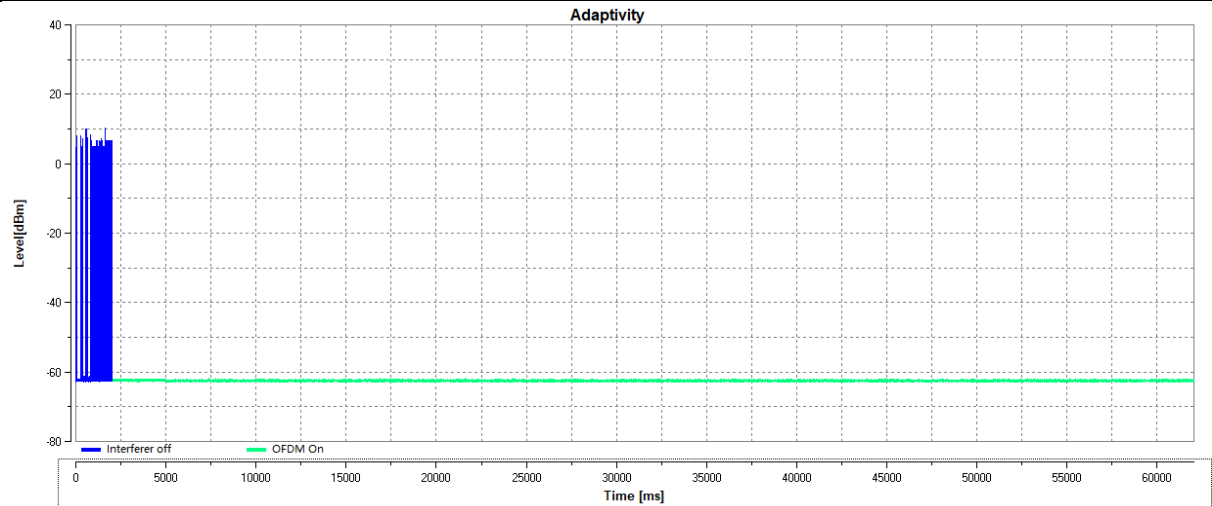
Adaptivity_Max.COT_TNVN_11A_5180_Ant1



Adaptivity_Min.IdleTime_TNVN_11A_5180_Ant1

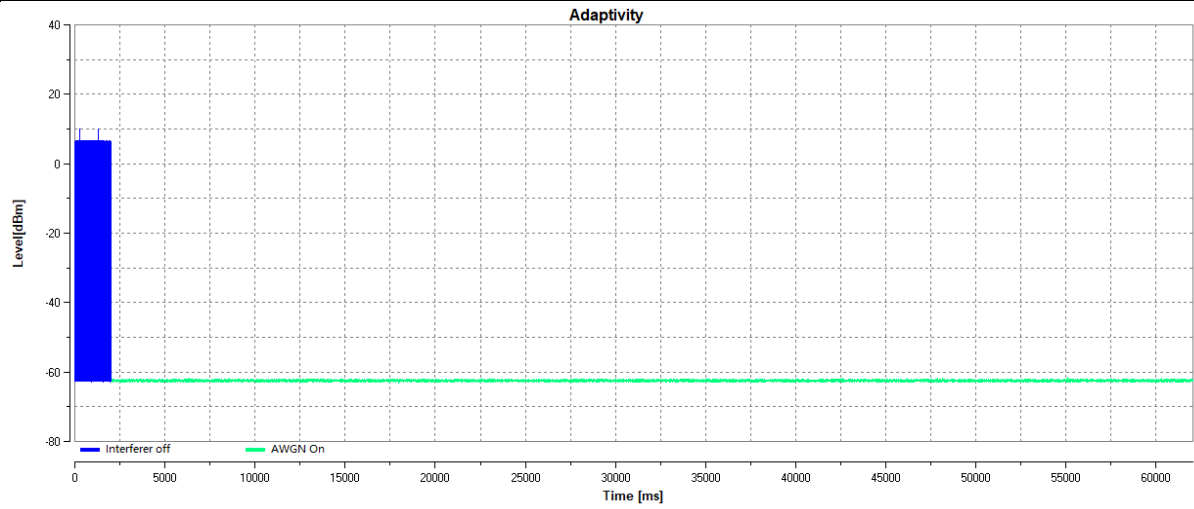


Adaptivity_Idle Period probability_TNVN_11A_5180_Ant1

**TEST PLOT****Adaptivity_LTE_TNVN_11A_5180_Ant1****Adaptivity_OFDM_TNVN_11A_5180_Ant1**



Adaptivity_AWGN_TNVN_11A_5180_Ant1



4.1.8. Receiver Blocking

LIMIT

According to ETSI EN 301 893 V2.1.1 (2017-05) §4.2.8.4

While maintaining the minimum performance criteria as defined in clause 4.2.8.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined in table 9.

Table 9: Receiver Blocking parameters

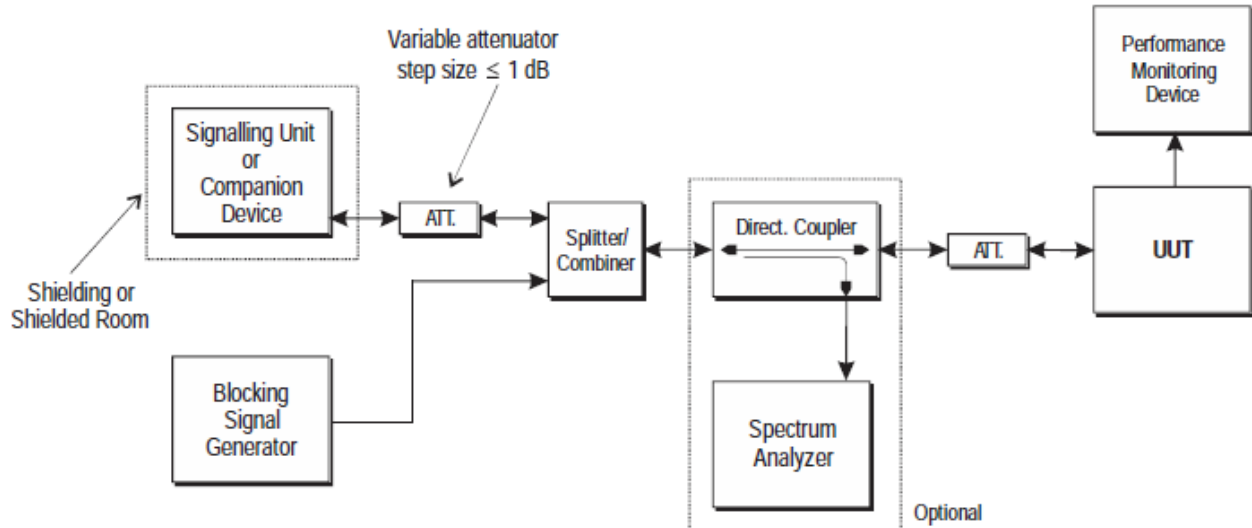
Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)		Type of blocking signal
		Master or Slave with radar detection (see table D.2, note 2)	Slave without radar detection (see table D.2, note 2)	
P _{min} + 6 dB	5 100	-53	-59	Continuous Wave
P _{min} + 6 dB	4 900 5 000 5 975	-47	-53	Continuous Wave

NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined clause 4.2.8.3 in the absence of any blocking signal.

NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the same levels should be used at the antenna connector irrespective of antenna gain.

The minimum performance criterion shall be a PER of 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,item t)).

TEST CONFIGURATION



MEASUREMENT DESCRIPTION

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.10.2.1, Conducted measurements

**TEST RESULTS**

Temperature:	22.8° C
Humidity:	56%
Test Engineer:	Allen.Lai

Record 802.11a. 1mbps for this test item

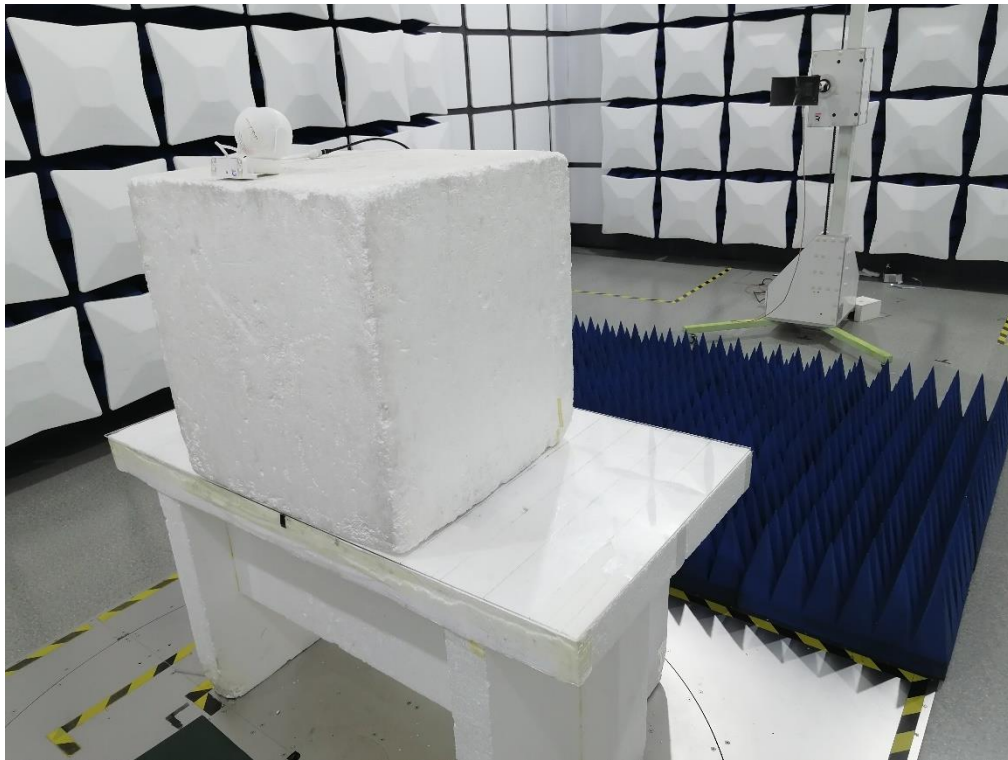
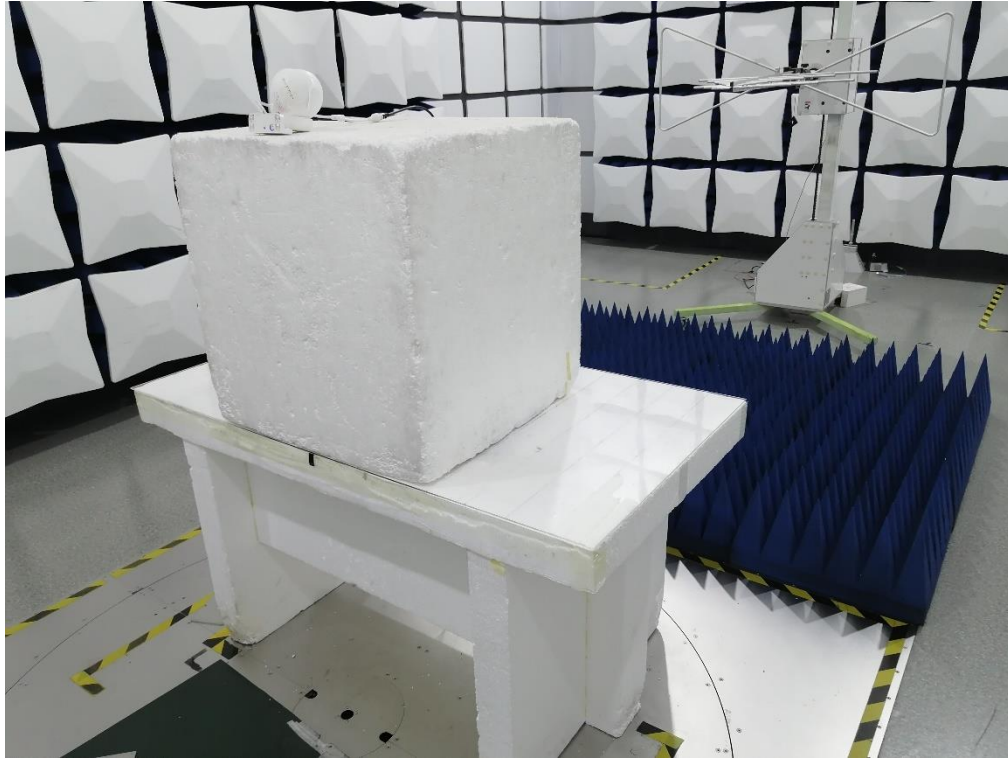
802.11a 5180MHz

Wanted signal mean power form Companion device(dBm)	Blocking signal frequency(MHz)	Blocking signal power(dBm)	PER (%)	Limit (%)	Result
-81	5100	-59	0.04	10	Pass
-81	4900	-53	1.88	10	Pass
-81	5000	-53	0.89	10	Pass
-81	5975	-53	0.62	10	Pass
P_{min} = -87 dBm					

802.11a 5240MHz

Wanted signal mean power form Companion device(dBm)	Blocking signal frequency(MHz)	Blocking signal power(dBm)	PER (%)	Limit (%)	Result
-81	5100	-59	1.92	10	Pass
-81	4900	-53	1.75	10	Pass
-81	5000	-53	0.49	10	Pass
-81	5975	-53	1.57	10	Pass
P_{min} = -87 dBm					

5. Test Setup Photos of the EUT





6. External and Internal Photos of the EUT

Reference to the test report No. TZ240505696-RE

.....End of Report.....