

TEST REPORT

Report No. : CQASZ20191201316E-05
Applicant: SHENZHEN HUBSAN TECHNOLOGY CO., LTD
Address of Applicant: 13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan District, Shenzhen, China 518054
Equipment Under Test (EUT):
EUT Name: HUBSAN ZINO 2
Model No.: ZINO 2
Brand Name: HUBSAN
Standards: EN 301 893 V2.1.1 (2017-05)
Date of Receipt: 2019-12-16
Date of Test: 2019-12-16 to 2020-01-03
Date of Issue: 2020-01-03
Test Result : **PASS***
***In the configuration tested, the EUT complied with the standards specified above**

Tested By: Tom Chen.
(Tom chen)

Reviewed By: Aaron Ma
(Aaron Ma)

Approved By: Jack Ai
(Jack Ai)



1 Version

Revision History of Report

Report No.	Version	Description	Issue Date
CQASZ20191201316E-05	Rev.01	Initial report	2020-01-03

2 Test Summary

Test Item	Test Requirement	Test Method	Limit	Result
Carrier frequencies	EN 301 893 V2.1.1 Clause 4.2.1	EN 301 893 V2.1.1 Clause 5.4.2	Clause 4.2.1.3	PASS
Nominal Channel Bandwidth and Occupied Channel Bandwidth	EN 301 893 V2.1.1 Clause 4.2.2	EN 301 893 V2.1.1 Clause 5.4.3	Clause 4.2.2.2	PASS
RF output power, Transmit Power Control (TPC) and power density	EN 301 893 V2.1.1 Clause 4.2.3	EN 301 893 V2.1.1 Clause 5.4.4	Clause 4.2.3.2	PASS
Transmitter unwanted emissions outside the 5 GHz RLAN bands	EN 301 893 V2.1.1 Clause 4.2.4.1	EN 301 893 V2.1.1 Clause 5.4.5	Clause 4.2.4.1.2	PASS
Transmitter unwanted emissions within the 5 GHz RLAN bands	EN 301 893 V2.1.1 Clause 4.2.4.2	EN 301 893 V2.1.1 Clause 5.4.6	Clause 4.2.4.2.2	PASS
Receiver spurious emissions	EN 301 893 V2.1.1 Clause 4.2.5	EN 301 893 V2.1.1 Clause 5.4.7	Clause 4.2.5.2	PASS
Dynamic Frequency Selection (DFS)	EN 301 893 V2.1.1 Clause 4.2.6	EN 301 893 V2.1.1 Clause 5.4.8	Clause 4.2.6.2	N/A ²
Adaptivity (channel access mechanism)	EN 301 893 V2.1.1 Clause 4.2.7	EN 301 893 V2.1.1 Clause 5.4.9	Clause 4.2.7.2	PASS
Receiver Blocking	EN 301 893 V2.1.1 Clause 4.2.8	EN 301 893 V2.1.1 Clause 5.4.10	Clause 4.2.8.4	PASS
User Access Restrictions	EN 301 893 V2.1.1 Clause 4.2.9	EN 301 893 V2.1.1 Clause 4.2.9.2	Clause 4.2.9.2	PASS ¹
Geo-location capability	EN 301 893 V2.1.1 Clause 4.2.10	EN 301 893 V2.1.1 Clause 4.2.10.3	Clause 4.2.10.3	N/A ¹

Remark:

PASS¹ Because this test product has user access restrictions.

N/A¹ Because these requirements apply to equipment with geo-location capability.

N/A² Because this test product does not come with DFS.

The tested sample(s) and the sample information are provided by the client.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radiated Frequency.

CH: In this whole report CH means channel.

Volt: In this whole report Volt means Voltage.

Temp: In this whole report Temp means Temperature.

Humid: In this whole report Humid means humidity.

Press: In this whole report Press means Pressure.

N/A: In this whole report not application

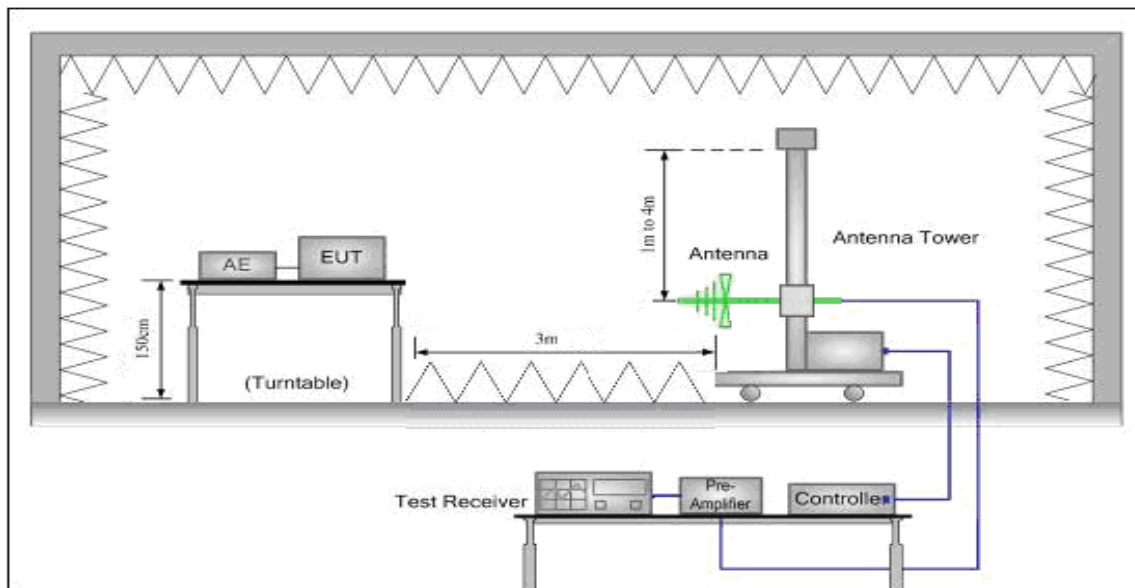
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4 Test Requirement

4.1 Test setup

4.1.1 For Conducted test setup



4.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

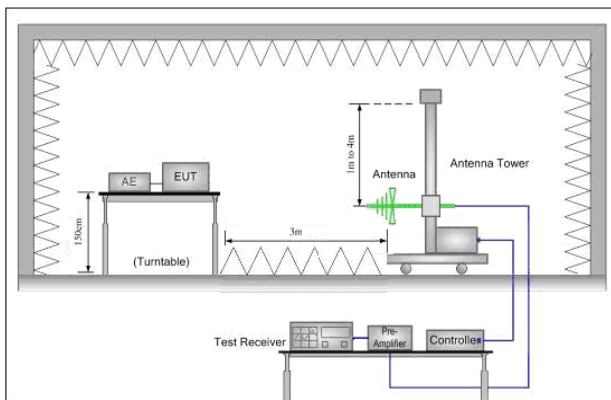


Figure 1. 30MHz to 1GHz

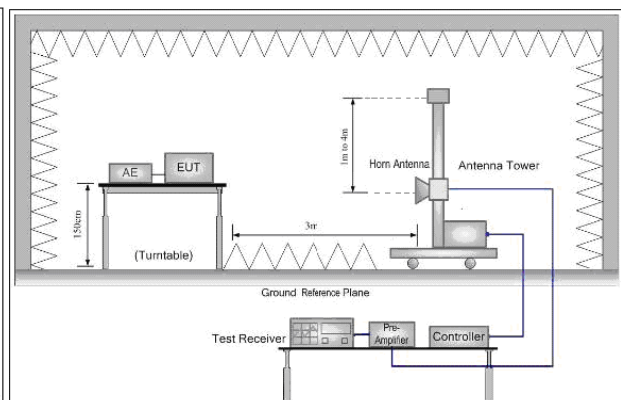


Figure 2. Above 1GHz

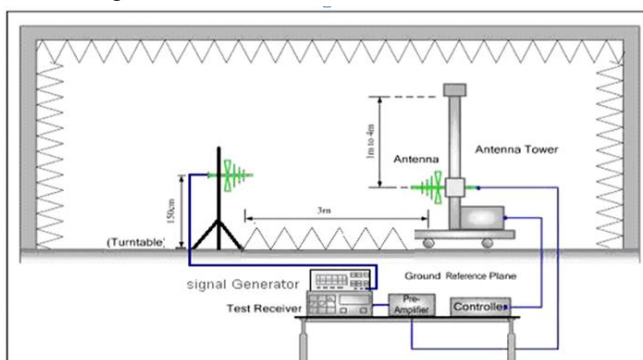


Figure 1. 30MHz to 1GHz

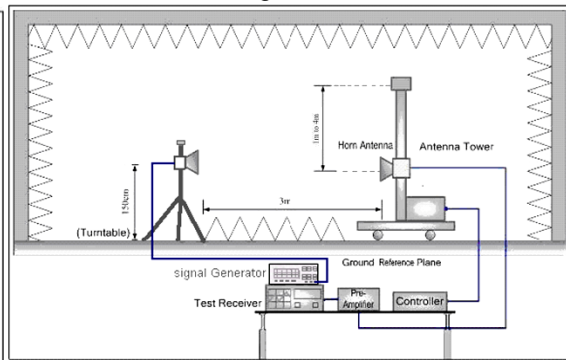


Figure 2. Above 1GHz

4.2 Test Environment

Environment Parameter	Selected Values During Tests		
Test condition	Ambient		
	Temperature(°C)	Voltage(V)	Humidity
TN/VN	24.5	3.6	56%
TL/VN	-10	3.6	56%
TH/VN	55	3.6	56%

Note:

- 1) The EUT just work in such extreme temperature of -25°C~+55°C and the voltage of 3.6V, so here the EUT is tested in the temperature of -25°C~+55°C and the voltage of 3.6V.
- 2) VN: Normal Voltage TN:Normal Temperature
TL: Low Extreme Test Temperature TH: High Extreme Test Temperature

4.3 Test Condition

Test Mode	Tx/Rx	RF Channel		
802.11a/n(HT20)	5150MHz ~5250 MHz	Channel 36	Channel 44	Channel 48
		5180MHz	5220MHz	5240MHz

Through Pre-scan, 6Mbps of rate the power is the worst case of 802.11a(HT20) for 5150MHz ~5250 MHz.

5 General Information

5.1 Client Information

Applicant:	SHENZHEN HUBSAN TECHNOLOGY CO., LTD
Address of Applicant:	13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan District, Shenzhen, China 518054
Manufacturer:	SHENZHEN HUBSAN TECHNOLOGY CO., LTD
Address of Manufacturer:	13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan District, Shenzhen, China 518054

5.2 General Description of EUT

Product Name:	HUBSAN ZINO 2	
Model No.:	ZINO 2	
Trade mark:	HUBSAN	
EUT Supports Radios application	5G WIFI: 5150MHz~5250 MHz, 5725MHz~5850 MHz	
Power Supply:	remote-control unit	Battery: 3.6V 3350 mAh Li-Po
	plane unit	Battery: 15.2 V 3800 mAh Li-Po Power Supply: MODEL: P173D3000 INPUT: 100-240V~50/60Hz 1.2A OUTPUT: 17.3V 3000mA

5.3 Product Specification subjective to this standard

Modulation Technique	802.11a OFDM
Type of Modulation:	IEEE for 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)
Operating Frequency / Channel Number:	IEEE 802.11a: 5150MHz ~5250 MHz/ 4 channel
Operating Temperature:	-25°C to +55°C / 0°C to +35°C
Hardware version:	EA04058034-04
Software version:	V0.1.1
Sample Type:	Portable production
Test Software of EUT:	Atheros Radio test 2(manufacturer declare)
Antenna Type:	Integral antenna
Antenna Gain:	ANT1: 3.0dBi ANT2: 3.0dBi
Test voltage:	DC3.6V

Operation Frequency each of channel

For 802.11a/n(HT20) Operation in the 5150MHz ~5250 MHz band							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180MHz	40	5200MHz	44	5220MHz	48	5240MHz

5.4 Description of Support Units

The EUT has been tested with associated equipment below.

1) Support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
/	/	/	/	/

2) Cable

Cable No.	Description	Manufacturer	Cable Type/Length	Supplied by
/	/	/	/	/

5.5 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

No tests were sub-contracted.

5.6 Deviation from Standards

None.

5.7 Abnormalities from Standard Conditions

None.

5.8 Other Information Requested by the Customer

None.

5.9 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radiated Emission (Below 1GHz)	5.12dB
2	Radiated Emission (Above 1GHz)	4.60dB
3	Conducted Disturbance (0.15~30MHz)	3.34dB
4	Radio Frequency	3×10^{-8}
5	Duty cycle	0.6 %.
6	Occupied Bandwidth	1.1%
7	RF conducted power	0.86dB
8	RF power density	0.74
9	Conducted Spurious emissions	0.86dB
10	Temperature test	0.8°C
11	Humidity test	2.0%
12	Supply voltages	0.5 %.

13	time	0.6 %.
14	Frequency Error	5.5 Hz

6 Equipment List

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Horn Antenna	R&S	HF906	CQA-012	2019/9/26	2020/9/25
Bilog Antenna	R&S	HL562	CQA-011	2019/9/26	2020/9/25
EMI Test Receiver	R&S	ESR7	CQA-005	2019/10/25	2020/10/24
Spectrum analyzer	R&S	FSU26	CQA-038	2019/10/25	2020/10/24
Spectrum analyzer	R&S	FSV40	CQA-075	2019/6/11	2020/6/10
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	4012339	2019/10/25	2020/10/24
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2019/10/25	2020/10/24
Preamplifier	EMCI	EMC184055SE	CQA-089	2019/9/25	2020/9/24
Universal Radio Communication Tester	Rohde & Schwarz	CMW500	CQA-022	2019/9/25	2020/9/24
high-low temperature chamber	Auchno	OJN-9606	CQA-S003	2019/9/25	2020/9/24
Signal generator	R&S	SME06	CQA-024	2019/9/26	2020/9/25
Vector signal generator	R&S	SMBV100A	CQA-039	2019/9/25	2020/9/24
DC power	KEYSIGHT	E3631A	CQA-028	2019/9/26	2020/9/25
RF Control Unit	Tonsced	JS0806-2	CQA-057	2019/9/26	2020/9/25
Coaxial Cable (Above 1GHz)	CQA	N/A	C007	2019/9/26	2020/9/25
Coaxial Cable (Below 1GHz)	CQA	N/A	C013	2019/9/26	2020/9/25
RF Cable (9KHz~40GHz)	CQA	N/A	C005	2019/9/26	2020/9/25

7 Radio Technical Requirements Specification

Reference documents for testing:

No.	Identity	Document Title
1	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

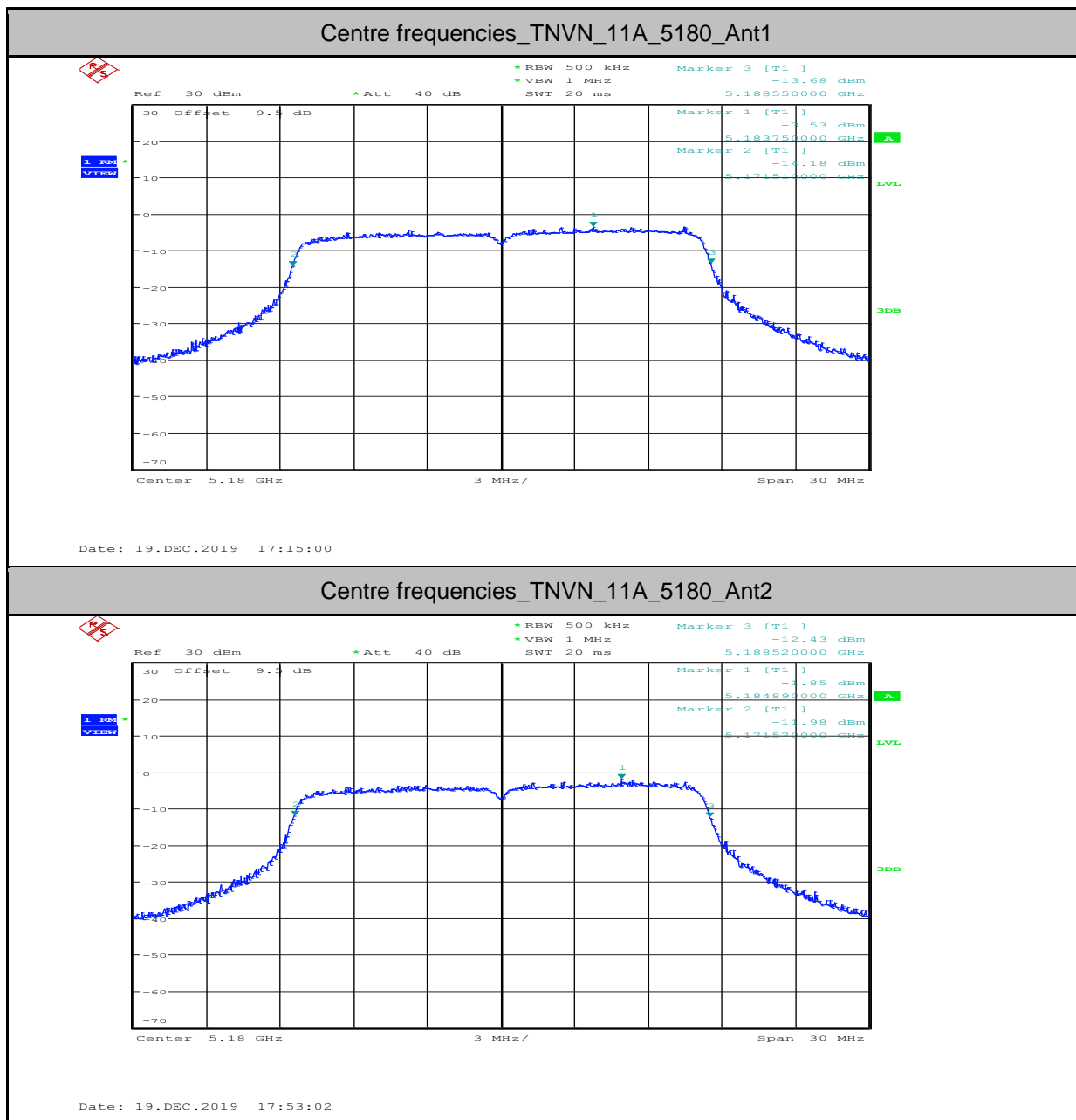
Test Results List:

EN 301 893 V2.1.1		Test Descriptions & Test Conditions	Verdict	Note
Test Requirement	Test Method			
Clause 4.2.1	Clause 5.4.2	Center frequencies		Appendix A)
		TN/VN	PASS	
		TL/VN	PASS	
		TH/VN	PASS	
Clause 4.2.2	Clause 5.4.3	Nominal Channel Bandwidth and Occupied Channel Bandwidth.		Appendix A)
		TN/VN	PASS	
Clause 4.2.3	Clause 5.4.4	RF output power, Transmit Power Control (TPC)		Appendix A)
		TN/VN	PASS	
		TL/VN	PASS	
		TH/VN	PASS	
Clause 4.2.3	Clause 5.4.4	Power density		Appendix A)
		TN/VN	PASS	
Clause 4.2.6	Clause 5.4.8	Dynamic Frequency Selection (DFS)		N/A
		TN/VN	PASS	
Clause 4.2.7	Clause 5.4.9	Adaptivity (channel access mechanism)		Appendix A)
		TN/VN	PASS	
Clause 4.2.7	Clause 5.4.10	Receiver Blocking		Appendix A)
		TN/VN	PASS	
Clause 4.2.4.2	Clause 5.4.6	Transmitter unwanted emissions within the 5 GHz RLAN bands		Appendix A)
		TN/VN	PASS	
Clause 4.2.4.1	Clause 5.4.5	Transmitter unwanted emissions outside the 5 GHz RLAN bands		Appendix B)
		TN/VN	PASS	
Clause 4.2.8	Clause 5.4.7	Receiver spurious emissions		Appendix B)
		TN/VN	PASS	
Clause 4.2.10	Clause 4.2.10.3	Geo-location capability		N/A
		TN/VN	N/A	

Appendix A:

1. Centre frequencies

Test Condition	Test Mode	Test Channel	Ant	Result [ppm]	Limit [ppm]	Verdict
TNVN	11A	5180	Ant1	5.79151	<=20	PASS
TNVN	11A	5180	Ant2	8.68726	<=20	PASS



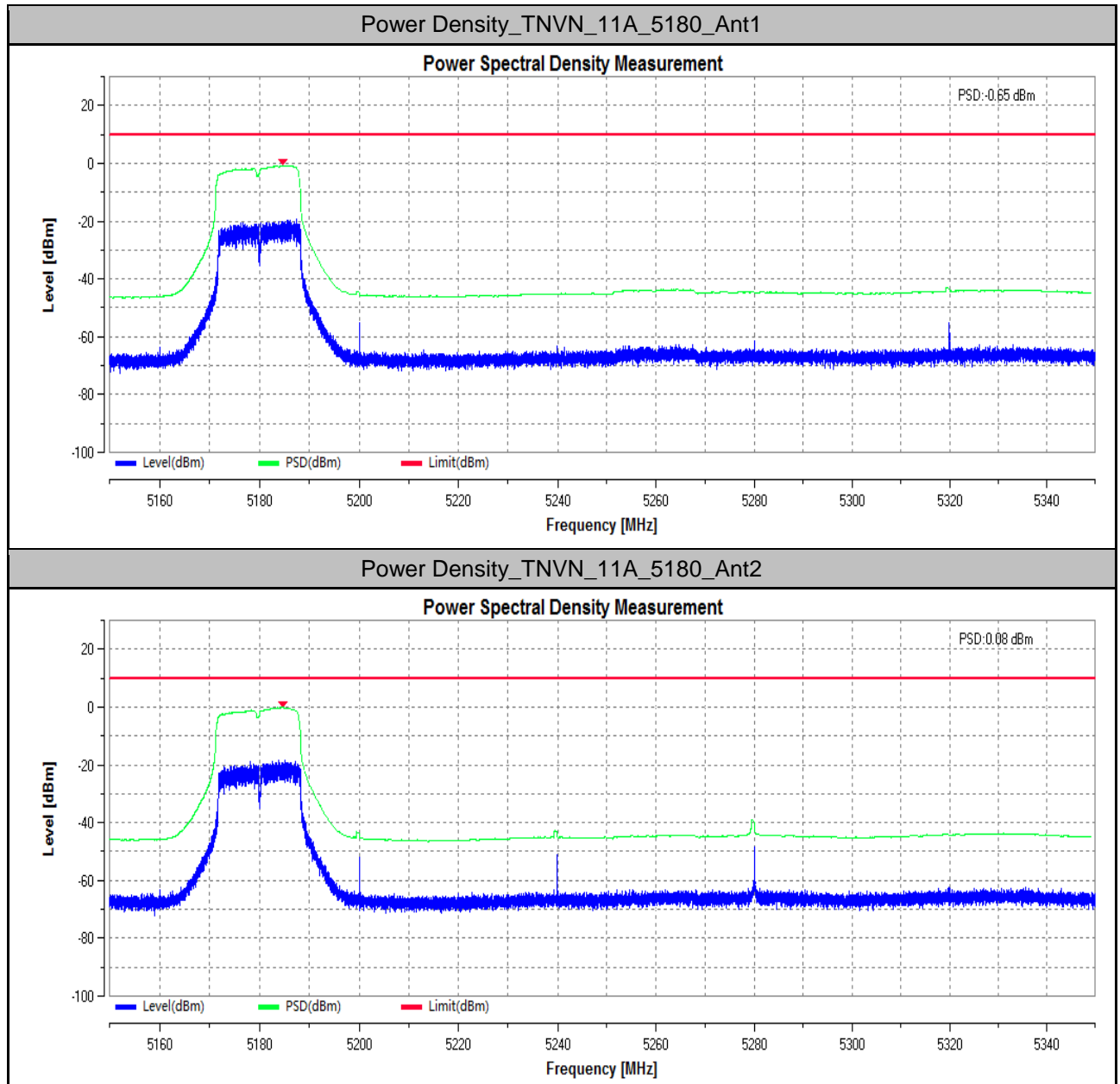
2.RF Output Power

Test Condition	Test Mode	Test Channel	Ant	Power [dBm]	EIRP [dBm]	Limit [dBm]	Verdict
TNVN	11A	5180	Ant1	7.82	10.82	<23	PASS

TNVN	11A	5180	Ant2	6.54	9.54	<23	PASS
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3.Power Density

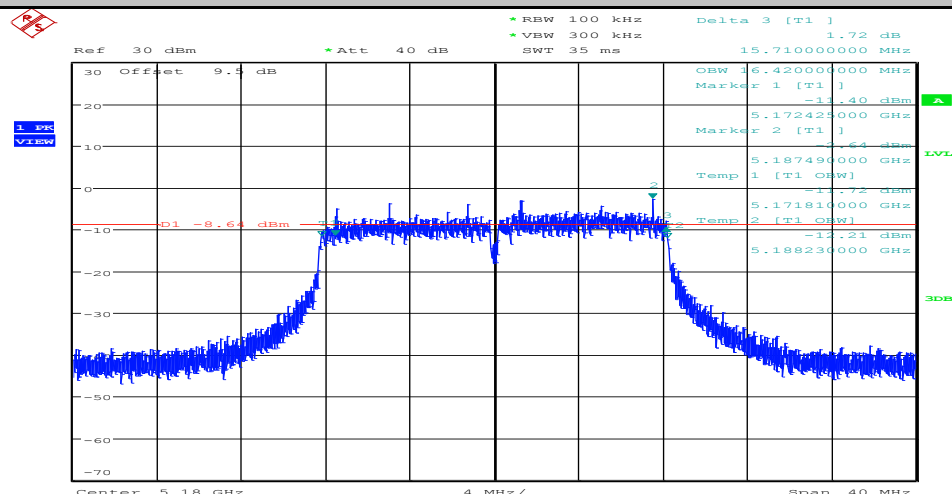
Test Condition	Test Mode	Test Channel	Ant	PSD [dBm]	Limit [dBm]	Verdict
TNVN	11A	5180	Ant1	-0.65	<10	PASS
TNVN	11A	5180	Ant2	0.08	<10	PASS



4.Occupied Channel Bandwidth

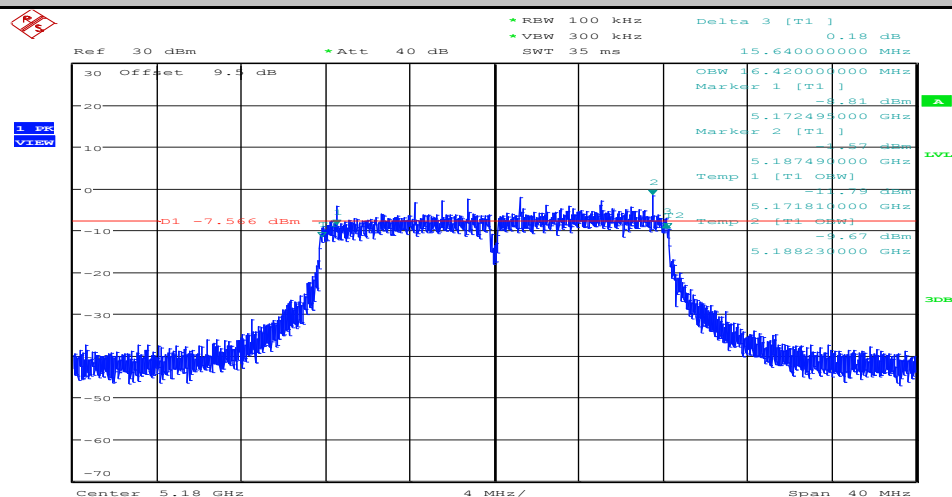
Test Condition	Test Mode	Test Channel	Ant	OBW [MHz]	Verdict
TNVN	11A	5180	Ant1	16.420	PASS
TNVN	11A	5180	Ant2	16.420	PASS

Occupied Channel Bandwidth_TNVN_11A_5180_Ant1



Date: 19.DEC.2019 17:12:11

Occupied Channel Bandwidth_TNVN_11A_5180_Ant2

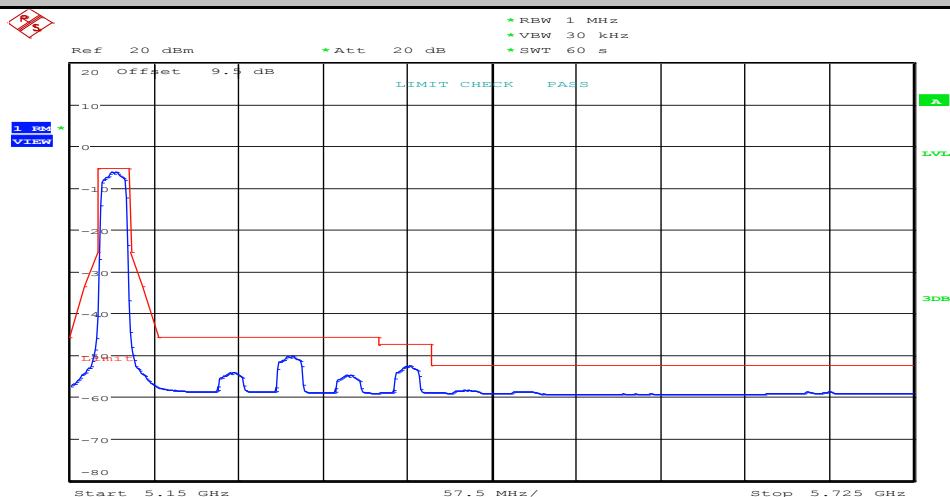


Date: 19.DEC.2019 17:50:14

5.Transmitter unwanted emissions within the5 GHz RLAN bands

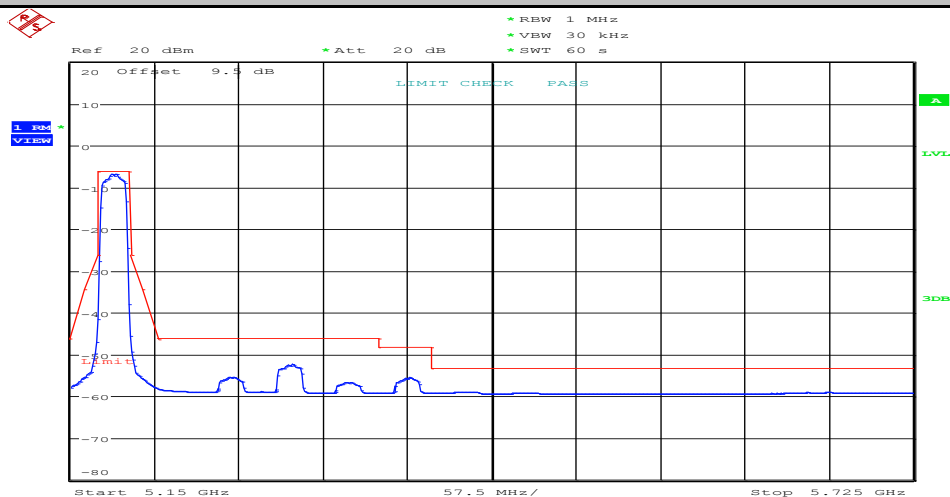
Test Condition	Test Mode	Test Channel	Ant	Result	Verdict
TNVN	11A	5180	Ant1	See test plot	PASS
TNVN	11A	5180	Ant2	See test plot	PASS

Transmitter unwanted emissions within the 5 GHz RLAN bands_TNVN_11A_5180_Ant1



Date: 3.JAN.2020 14:24:50

Transmitter unwanted emissions within the 5 GHz RLAN bands_TNVN_11A_5180_Ant2



Date: 3.JAN.2020 14:43:57

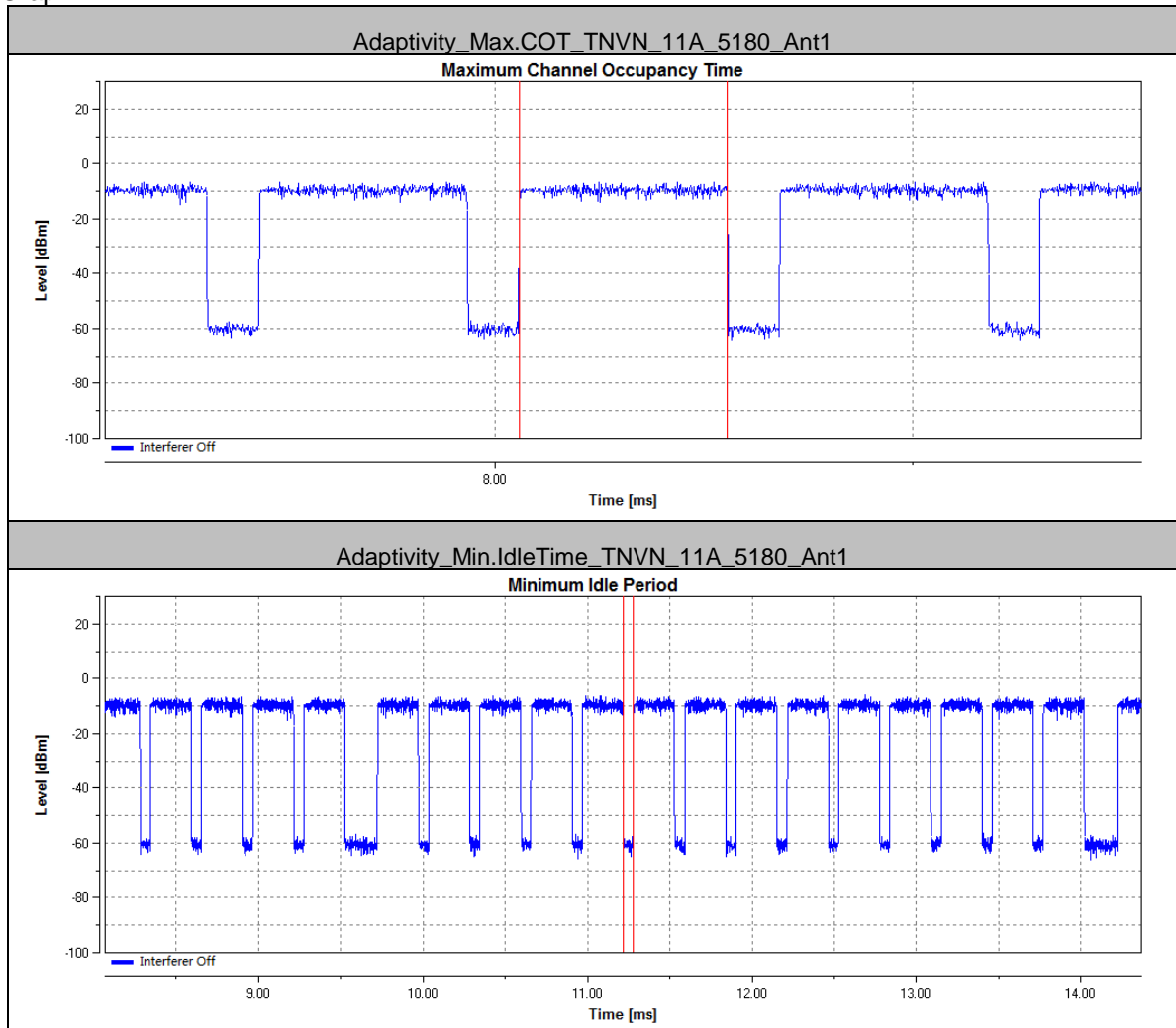
6. Adaptivity

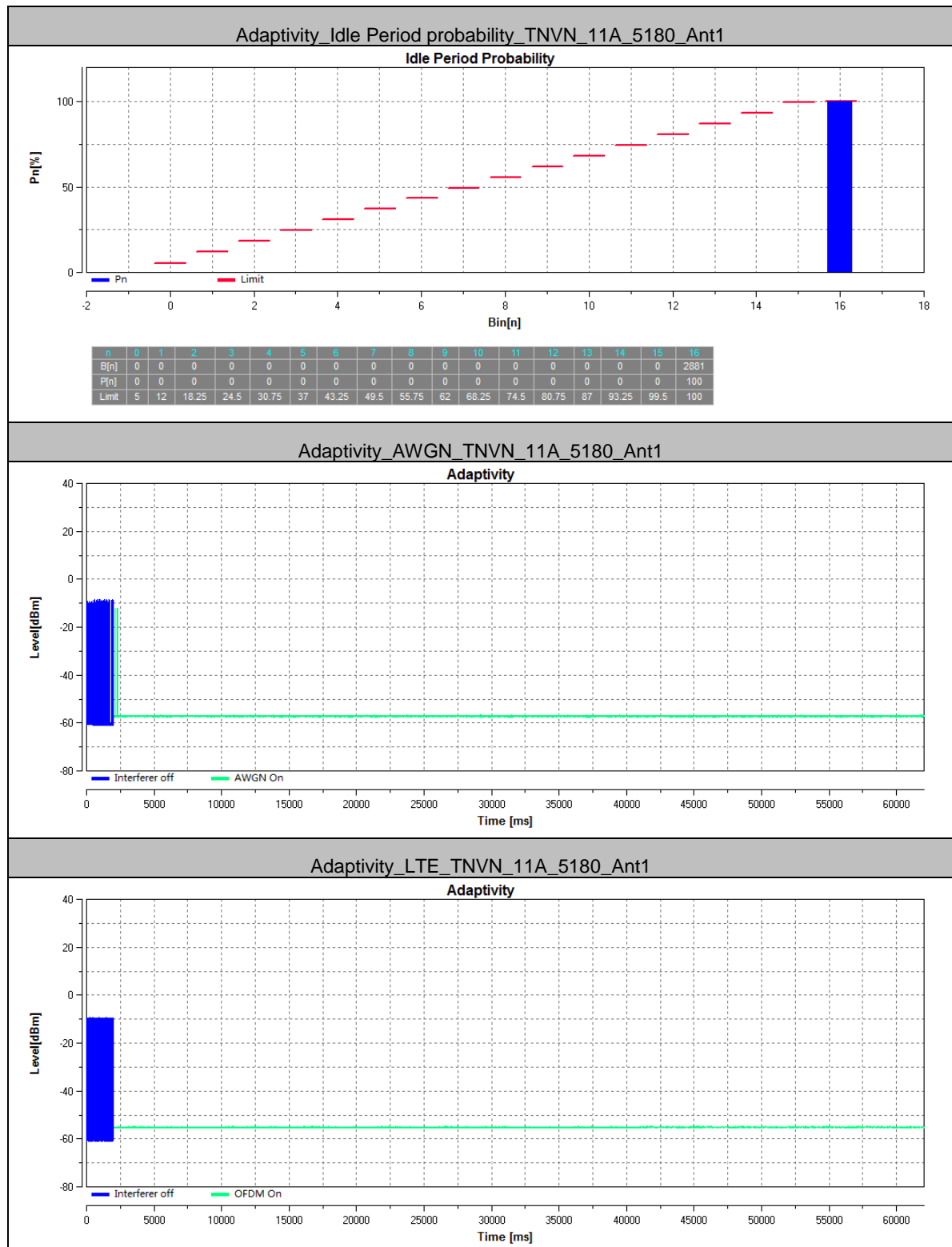
Test Result

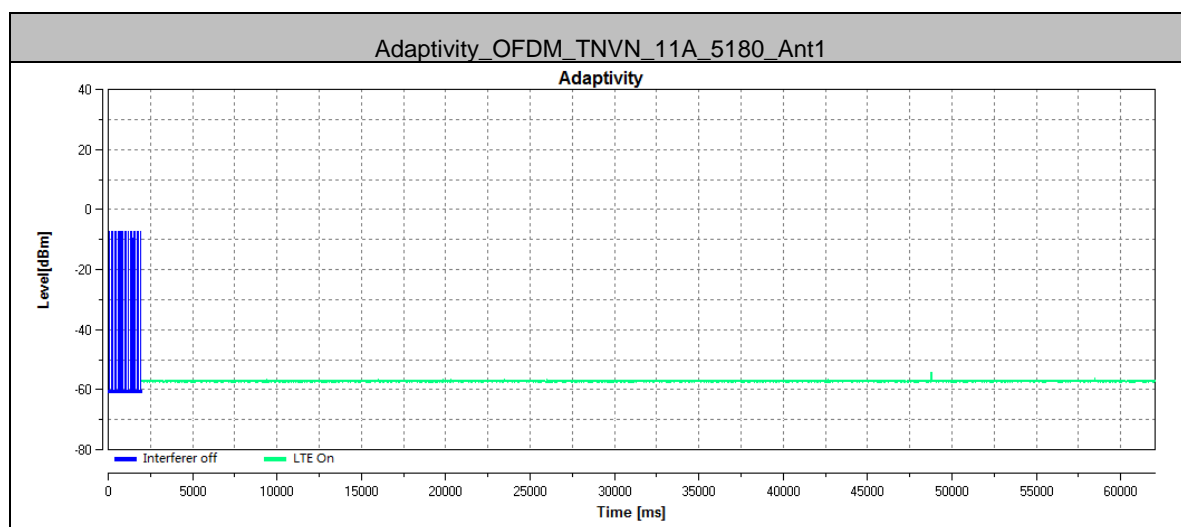
Mode	Antenna	Channel	Priority Class	Max.COT [ms]	Limit [ms]	Min.Idle Time[ms]	Limit [ms]	Idle Period probability	Verdict
11a	Ant1	5180	2	0.248	<=6	0.063	>0.027	See test plot	PASS

Mode	Antenna	Channel	Interfere signal Type	Add Interfere signal Time [ms]	Interfere signal Level [dBm/M Hz]	Max. Short Control number [n]	Limit [n]	Max. Short Control Time [ms]	Limit [ms]	Verdict
11a	Ant1	5180	AWGN	2000	-75	2	<=50	0.2	<2.5	PASS
11a	Ant1	5180	LTE	2000	-75	0	<=50	0	<2.5	PASS
11a	Ant1	5180	OFDM	2000	-75	0	<=50	0	<2.5	PASS

Test Graph







7. Receiver Blocking

Mode	Blocking Signal Frequency(MHz)	Type Of Blocking Signal	PER(%)	Limit(%)
Normal Operation- 20Mhz Bandwidth (802.11a-5180MHz)	5100	CW	4	10
	4900	CW	4	
	5000	CW	5	
	5975	CW	5	

Appendix B: Spurious emissions

Test Procedure:				
1. Scan from 30MHz to 26GHz; find the maximum radiation frequency to measure.				
2. The technique used to find the Spurious Emissions of the transmitter was the antenna substitution method. Substitution method was performed to determine the actual ERP/EIRP emission levels of the EUT.				
Test procedure as below:				
1) The EUT was powered ON and placed on a 1.5m high table at a 3 meter fully Anechoic Chamber. The antenna of the transmitter was extended to its maximum length. Modulation mode and the measuring receiver shall be tuned to the frequency of the transmitter under test.				
2) The EUT was set 3 meters (above 18GHz the distance is 1 meter) away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.				
3) The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.				
4) Steps 1) to 3) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.				
5) The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.				
6) A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 3) is obtained for this set of conditions.				
7) The output power into the substitution antenna was then measured.				
8) Steps 6) and 7) were repeated with both antennas polarized.				
9) Calculate power in dBm by the following formula:				
ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd)				
EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)				
EIRP=ERP+2.15dB				
where:				
Pg is the generator output power into the substitution antenna.				
10) Test the EUT in the lowest channel , the Highest channel				
Repeat above procedures until all frequencies measured was complete.				
Limit:		Frequency range	Maximum power,	Bandwidth
		30 MHz to 47 MHz	-36dBm	100 kHz
		47 MHz to 74 MHz	-54 dBm	100 kHz
		74 MHz to 87,5 MHz	-36dBm	100 kHz
		87,5 MHz to 118 MHz	-54 dBm	100 kHz
		118 MHz to 174 MHz	-36dBm	100 kHz
		174 MHz to 230 MHz	-54 dBm	100 kHz
		230 MHz to 470 MHz	-36dBm	100 kHz
		470 MHz to 862 MHz	-54 dBm	100 kHz
		862 MHz to 1 GHz	-36dBm	100 kHz
		1 GHz to 5.15 GHz	-30dBm	1MHz
		5.35GHz to 5.47GHz	-30dBm	1MHz
		5.725GHz to 26GHz	-30dBm	1MHz
Transmitter limits for spurious emissions				
Frequency range		Maximum power	bandwidth	
30MHz to 1GHz		-57dBm	100kHz	
1GHz to 26GHz		-47dBm	1MHz	
Spurious emission limits for receivers				

Radiated Spurious Emissions test Data:**1) Transmitter unwanted emissions outside the 5 GHz RLAN bands****For 802.11a (HT20) Operation in the 5150MHz ~5250 MHz band, TX max power is L channel**

Transmitting with modulation Mode at lowest channel(5180MHz)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
10360	159	174	-44.03	-30	-14.03	Pass	H
10360	177	297	-43.43	-30	-13.43	Pass	V
15540	125	357	-43.43	-30	-13.43	Pass	H
15540	149	241	-44.69	-30	-14.69	Pass	V
20720	144	128	-44.79	-30	-14.79	Pass	H
20720	150	354	-42.21	-30	-12.21	Pass	V
Remark: 1. The disturbance below 1GHz was very low, and the above harmonics were the highest point could be found when testing, so only the aboveharmonics had been displayed.							

Receiver spurious emissions test data:**For 802.11a Operation in the 5150MHz ~5250 MHz band****Receiver Mode at lowest channel(5180MHz)**

Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
4803.96	142	271	-55.42	-47	-8.42	Pass	H
4808.22	164	95	-56.19	-47	-9.19	Pass	V
7201.84	196	349	-57.69	-47	-10.69	Pass	H
7211.34	173	267	-56.60	-47	-9.60	Pass	V
9616.41	150	29	-56.94	-47	-9.94	Pass	H
9619.78	165	330	-56.40	-47	-9.40	Pass	V
Remark: 1. The disturbance below 1GHz was very low, and the above harmonics were the highest point could be found when testing, so only the aboveharmonics had been displayed.							

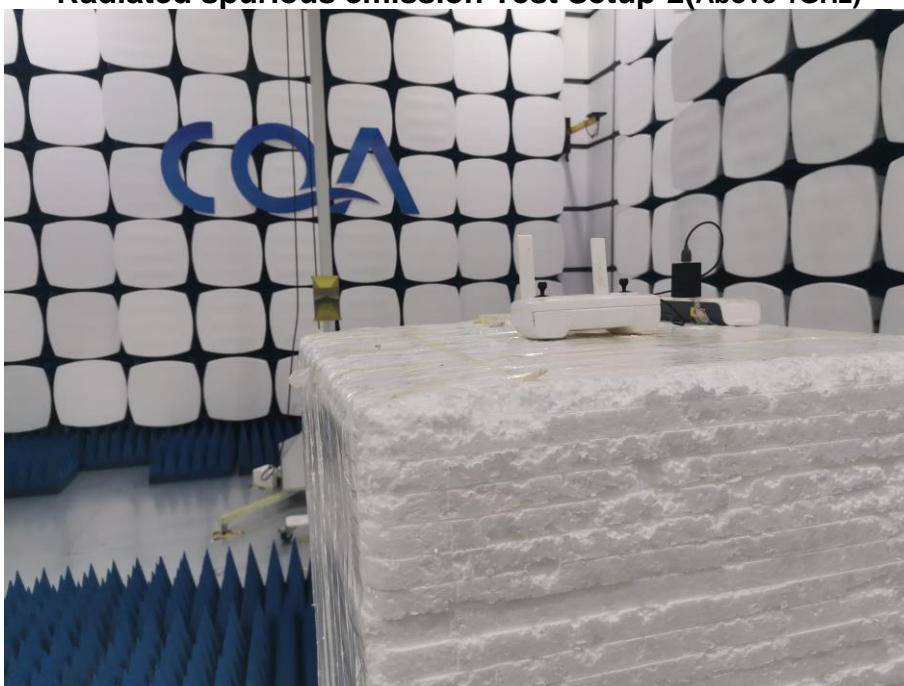
APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

Test Model No.: ZINO 2

Radiated spurious emission Test Setup-1 (Below 1GHz)



Radiated spurious emission Test Setup-2(Above 1GHz)



PHOTOGRAPHS OF EUT Constructional Details

Refer to APPENDIX 2 PHOTOGRAPHS OF EUT for CQASZ20191201316E-01.

*** End of Report ***