



CE Radio Test Report

Project No. : 2401C127A
Equipment : AX1500 Wi-Fi 6 5G NR Router
Brand Name : Tenda
Test Model : 5G01
Series Model : N/A
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Date of Receipt : Jan. 16, 2024
Date of Test : Jan. 17, 2024 ~ Feb. 28, 2024
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Report Version : R00
Test Sample : Engineering Sample No.: DG2024011641 for radiated, DG202401293 for Adaptivity, SSL2024020649 for other conducted.
Standard(s) : ETSI EN 301 893 V2.1.1 (2017-05)

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

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BTL's laboratory quality assurance procedures are in compliance with the ISO/IEC 17025: 2017 requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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REPORT ISSUED HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-ETSP-2-2401C127A	R00	This is a copy report which referencing test data are provided from the original test report (BTL-ETSP-2-2401C127). The product name, brand, model name, applicant and manufacturer information are changed which does not affect the test results. Other are kept the same.	Apr. 09, 2024	Valid

1. RF EMISSIONS MEASUREMENT

1.1 TEST FACILITY

For Radiated Emissions Items:

The test facilities used to collect the test data in this report is **DG-CB15** at the location of No.3, Jinshagang 1st Road, Dalang, Dongguan City, Guangdong People's Republic of China.

For other Items:

The test facilities used to collect the test data in this report is **SSL-TR19/TR08** at the location of Room 108, Building 2, No.1, Yile Road, Songshan Lake Zone, Dongguan City, Guangdong, People's Republic of China.

1.2 MEASUREMENT UNCERTAINTY

The measurement uncertainty figures shall be calculated according the methods described in the ETSI TR 100 028 and shall correspond to an expansion factor (coverage factor) $k=1.96$ or $k=2$ (which provide confidence levels of respectively 95% and 95.45% in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Measurement Uncertainty for a Level of Confidence of 95.45%, $U=2 \times u_c(y)$.

The BTL measurement uncertainty as below table:

Item	Uncertainty
Radio Frequency	2.7 ppm
RF Power, Conducted	1.3 dB
Power Density	1.4 dB
Temperature	0.8 °C
Humidity	2.2 %
Time	10 %
Spurious Emissions, Conducted	1.9 dB
Spurious Emissions, Radiated $f \leq 1\text{GHz}$	3.50 dB
Spurious Emissions, Radiated $1\text{GHz} < f \leq 18\text{GHz}$	3.54 dB
Spurious Emissions, Radiated $18\text{GHz} < f \leq 26.5\text{GHz}$	4.00 dB

1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By
Centre frequencies	Normal & Extreme	66%	DC 12V	Hagan He
Occupied Channel Bandwidth	23.7°C	66%	DC 12V	Hagan He
RF output power	Normal & Extreme	46-48%	DC 12V	Evan Fang
Power Density	23.7°C	66%	DC 12V	Hagan He
Transmitter unwanted emissions outside the 5 GHz RLAN bands	22°C	42%	AC 230V/50Hz	Meers Zhang
Transmitter unwanted emissions within the 5 GHz RLAN bands	23.7°C	66%	DC 12V	Hagan He
Receiver spurious emissions	22°C	42%	AC 230V/50Hz	Meers Zhang
Adaptivity	23.3-24.1°C	47-74%	DC 12V	Hagan He
Receiver Blocking	23.7°C	66%	DC 12V	Hagan He

1.4 TEST CHANNEL

IEEE 802.11a / IEEE 802.11n(HT20) / IEEE 802.11ac(VHT20) / IEEE 802.11ax(HE20)		
Test Channel	EUT Channel	Test Frequency
Low	CH36	5180 MHz

IEEE 802.11n(HT40) / IEEE 802.11ac(VHT40) / IEEE 802.11ax(HE40)		
Test Channel	EUT Channel	Test Frequency
Low	CH38	5190 MHz

IEEE 802.11ac(VHT80) / IEEE 802.11ax(HE80)		
Test Channel	EUT Channel	Test Frequency
Low	CH42	5210 MHz

1.5 TEST METHODOLOGY AND RESULTS


Harmonised Standard ETSI EN 301 893					
Requirement			Requirement Conditionality		Observations
No	Description	Reference: Clause No	U/C	Condition	
1	Carrier frequencies	4.2.1	U	-	Pass
2	Nominal, and occupied channel bandwidth	4.2.2	U	-	Pass
3	RF output power	4.2.3	U	-	Pass
	Transmit Power Control (TPC)	4.2.3	C	1)Not required for channels whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz. 2)Not required for devices that operate at a maximum mean e.i.r.p. of 20 dBm when operating in 5250 MHz to 5350 MHz or 27 dBm when operating in 5470 MHz to 5725 MHz.	Pass
	Power Density	4.2.3	U	-	Pass
4	Transmitter unwanted emissions outside the 5 GHz RLAN bands	4.2.4.1	U	-	Pass
5	Transmitter unwanted emissions within the 5 GHz RLAN bands	4.2.4.2	U	-	Pass
6	Receiver spurious emissions	4.2.5	U	-	Pass
7	Adaptivity	4.2.7	U	-	Pass
8	Receiver Blocking	4.2.8	U	-	Pass
9	User Access Restrictions	4.2.9	U	-	Pass Note 1
10	Geo-location capability	4.2.10	C	Where implemented by the manufacturer.	N/A

Note:

- No related options for DFS functions will be provided in the software interfaces.
DFS functions can be changed only by telnet command. Before the shipment of the product the telnet will be closed so that it will be inaccessible for the end user.
- U/C Indicates whether the requirement is unconditionally applicable (U) or is conditional upon the manufacturer's claimed functionality of the equipment (C).
- "N/A" indicates that it does not apply to this device.

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	AX1500 Wi-Fi 6 5G NR Router
Brand Name	Tenda
Test Model	5G01
Series Model	N/A
Model Difference(s)	N/A
Hardware Version	v1.0
Software Version	V1.0.0.1
Power Source	DC Voltage supplied from AC adapter. 1# Model: BN026-A24012E(EU) 2# Model: BN026-A24012B(UK)
Power Rating	I/P: 100-240V~ 50/60Hz 0.7A O/P: 12.0V  2.0A 24.0W
Operation Frequency Band(s)	5150 MHz ~ 5250 MHz
Modulation Type	IEEE 802.11a/n/ac: OFDM IEEE 802.11ax: OFDMA
Bit Rate of Transmitter	IEEE 802.11a: 54/48/36/24/18/12/9/6 Mbps IEEE 802.11n: up to 300 Mbps IEEE 802.11ac: up to 866.7 Mbps IEEE 802.11ax: up to 1201 Mbps
Max. e.i.r.p. _Non Beamforming	IEEE 802.11a: 20.98 dBm (125.31 mW) IEEE 802.11n(HT20): 20.89 dBm (122.74 mW) IEEE 802.11n(HT40): 22.68 dBm (185.35 mW) IEEE 802.11ac(VHT20): 21.15 dBm (130.32 mW) IEEE 802.11ac(VHT40): 22.96 dBm (197.70 mW) IEEE 802.11ac(VHT80): 22.54 dBm (179.47 mW) IEEE 802.11ax(HE20): 21.58 dBm (143.88 mW) IEEE 802.11ax(HE40): 22.78 dBm (189.67 mW) IEEE 802.11ax(HE80): 22.58 dBm (181.13 mW)
Max. e.i.r.p. _Beamforming	IEEE 802.11n(HT20): 20.66 dBm (116.41 mW) IEEE 802.11n(HT40): 22.14 dBm (163.68 mW) IEEE 802.11ac(VHT20): 20.89 dBm (122.74 mW) IEEE 802.11ac(VHT40): 22.66 dBm (184.50 mW) IEEE 802.11ac(VHT80): 22.15 dBm (164.06 mW) IEEE 802.11ax(HE20): 21.42 dBm (138.68 mW) IEEE 802.11ax(HE40): 22.41 dBm (174.18 mW) IEEE 802.11ax(HE80): 22.13 dBm (163.31 mW)

Note:

- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. Channel List:

IEEE 802.11a IEEE 802.11n(HT20) IEEE 802.11ac(VHT20) IEEE 802.11ax(HE20)		IEEE 802.11n(HT40) IEEE 802.11ac(VHT40) IEEE 802.11ax(HE40)		IEEE 802.11ac(VHT80) IEEE 802.11ax(HE80)	
Band 1		Band 1		Band 1	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	38	5190	42	5210
40	5200	46	5230		
44	5220				
48	5240				

3. Table for Filed Antenna:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	<i>Tenda</i>	N/A	PCB	N/A	3.29
2	<i>Tenda</i>	N/A	PCB	N/A	4.28

Note:

- 1) The EUT supports MIMO(Except IEEE 802.11a mode). Physically, the EUT provides two completed transmitters and receivers (2T2R).
- 2) Beamforming Gain: 3dB.

4. The worst case for 1TX/2TX as follow:

Non Beamforming:

Operating Mode TX Mode	1TX	2TX
IEEE 802.11a	V (Ant. 1)	-
IEEE 802.11n(HT20)	-	V (Ant. 1+Ant. 2)
IEEE 802.11n(HT40)	-	V (Ant. 1+Ant. 2)
IEEE 802.11ac(VHT20)	-	V (Ant. 1+Ant. 2)
IEEE 802.11ac(VHT40)	-	V (Ant. 1+Ant. 2)
IEEE 802.11ac(VHT80)	-	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE20)	-	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE40)	-	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE80)	-	V (Ant. 1+Ant. 2)

Beamforming:

Operating Mode TX Mode	2TX
IEEE 802.11n(HT20)	V (Ant. 1+Ant. 2)
IEEE 802.11n(HT40)	V (Ant. 1+Ant. 2)
IEEE 802.11ac(VHT20)	V (Ant. 1+Ant. 2)
IEEE 802.11ac(VHT40)	V (Ant. 1+Ant. 2)
IEEE 802.11ac(VHT80)	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE20)	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE40)	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE80)	V (Ant. 1+Ant. 2)

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Test	Clause	Test channels	
		Lower sub-band (5150 MHz to 5350 MHz)	
		5150 MHz to 5250 MHz	
Centre frequencies	5.4.2	C7(see note 1)	
Occupied Channel Bandwidth	5.4.3	C7	
Power, power density	5.4.4	C1	
Transmitter unwanted emissions outside the 5 GHz RLAN bands	5.4.5	C7(see note 1)	
Transmitter unwanted emissions within the 5 GHz RLAN bands	5.4.6	C1	
Receiver spurious emissions	5.4.7	C7(see note 1)	
Transmit Power Control (TPC)	5.4.4	N/A(see note 2)	
Adaptivity	5.4.9	C9	
Receiver Blocking	5.4.10	C7	

C1	The lowest declared channel for every declared Nominal Channel Bandwidth within this band. For the Power Density testing, it is sufficient to only perform this test using the lowest Nominal Channel Bandwidth.
C7	One channel out of the declared channels for this sub-band. For Occupied Channel Bandwidth, testing shall be repeated for every declared Nominal Channel Bandwidth within this sub-band.
C9	One channel (in case of single-channel testing) or a group of channels (in case of multi-channel testing) out of the declared channels.

Note :

- (1) In case of more than 1 channel plan has been declared, testing of these specific requirements need only be performed using one of the declared channel plans.
- (2) Testing is not required for nominal channel bandwidths that fall completely within the frequency range 5150 MHz to 5250 MHz.
- (3) The measurements for RF Output Power are tested, the worst case are IEEE 802.11a mode, IEEE 802.11ac(VHT20) mode, IEEE 802.11ac(VHT40) mode, IEEE 802.11ac(VHT80) mode, IEEE 802.11ax(HE20) mode and IEEE 802.11ax(HE40) mode, IEEE 802.11ax(HE80) mode, only the worst cases are documented for other test items except Adaptivity and Receiver Blocking.
- (4) The measurements for RF Output Power are tested, the Non Beamforming and Beamforming are recorded in the report. The worst case is Non Beamforming and only the worst case is documented for other test items.
- (5) For radiated spurious emissions below 1 GHz and receiver spurious emissions above 1 GHz test, the IEEE 802.11ac(VHT40) channel 38 is found to be the worst case and recorded.
- (6) IEEE 802.11ax mode only supports full RU, so only the full RU is evaluated and measured inside report.
- (7) All antennas of IEEE 802.11a mode are evaluated, but only the worst case (Ant.1) is recorded.
- (8) For radiated emission Harmonic 18-26.5GHz test, only tested the worst case and recorded.
- (9) Two adapters only differ in the plug, so tested the EU plug.

2.3 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

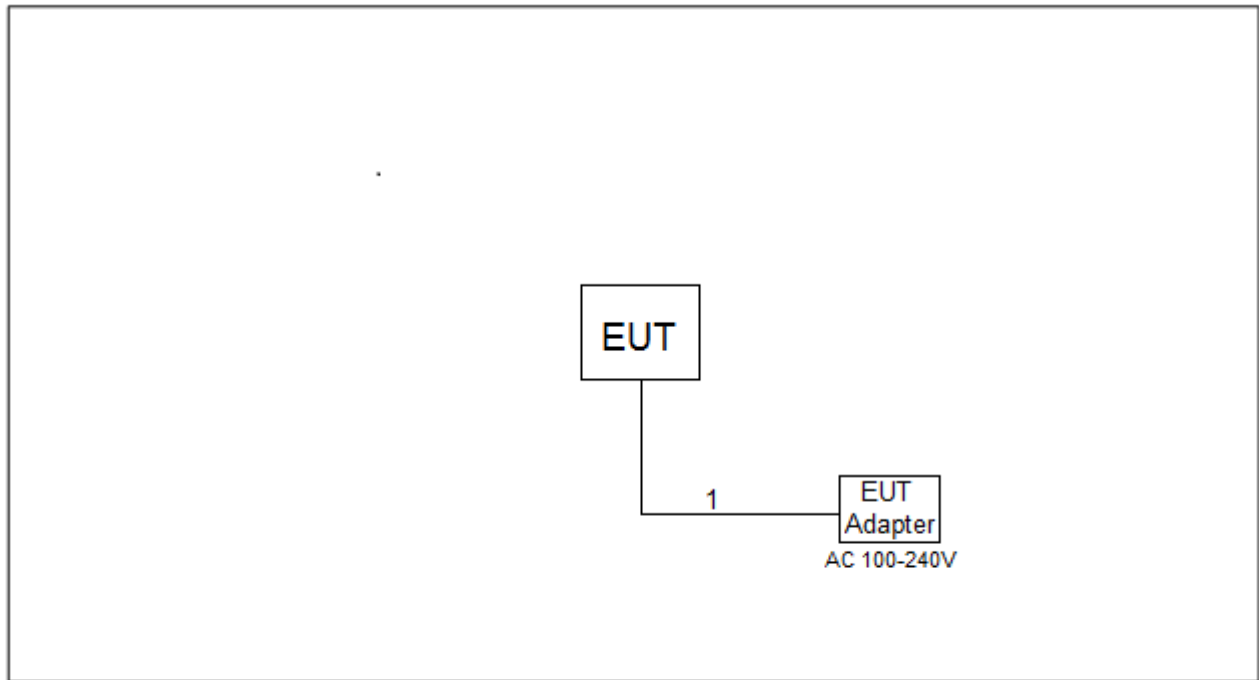
Non Beamforming

Test Software Version	IPOP 4.0
Frequency (MHz)	5180
IEEE 802.11a	1850
IEEE 802.11n(HT20)	1500
IEEE 802.11ac(VHT20)	1550
IEEE 802.11ax(HE20)	1600
Frequency (MHz)	5190
IEEE 802.11n(HT40)	1650
IEEE 802.11ac(VHT40)	1700
IEEE 802.11ax(HE40)	1700
Frequency (MHz)	5210
IEEE 802.11ac(VHT80)	1700
IEEE 802.11ax(HE80)	1700

Beamforming

Test Software Version	IPOP 4.0
Frequency (MHz)	5180
IEEE 802.11n(HT20)	1100
IEEE 802.11ac(VHT20)	1150
IEEE 802.11ax(HE20)	1200
Frequency (MHz)	5190
IEEE 802.11n(HT40)	1250
IEEE 802.11ac(VHT40)	1300
IEEE 802.11ax(HE40)	1300
Frequency (MHz)	5210
IEEE 802.11ac(VHT80)	1300
IEEE 802.11ax(HE80)	1300

2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.5 DESCRIPTION OF SUPPORT UNITS

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

Item	Equipment	Brand	Model No.	Series No.
-	-	-	-	-

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	DC Cable	NO	NO	1.5m

2.6 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

2.7 CUSTOMER INFORMATION DESCRIPTION

- 1) The antenna gain and beamforming gain are provided by the manufacturer.
- 2) Except for radiated spurious emissions, the results of all test items include cable losses. All cable losses are provided by the testing laboratory.

3. CENTRE FREQUENCIES

3.1 LIMIT

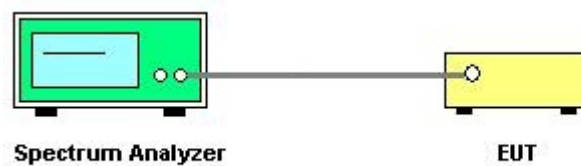
Clause	Test Item	Limit
4.2.1	Centre Frequencies	F(c) \pm 20ppm

3.2 TEST PROCEDURES

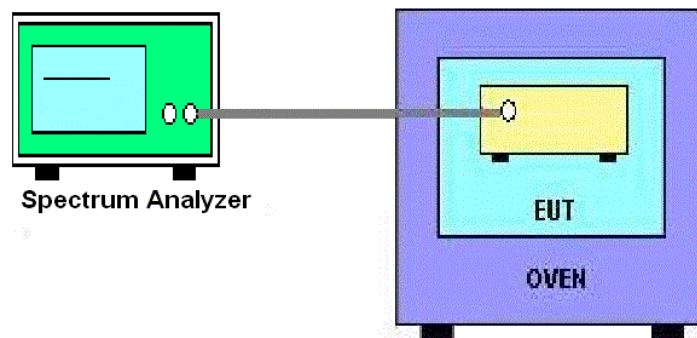
Refer to ETSI EN 301 893, clause 5.4.2.2.1.

3.3 TEST SETUP LAYOUT

Normal Condition



Extreme Condition



3.4 TEST DEVIATION

There is no deviation with the original standard.

3.5 EUT OPERATION DURING TEST

The measurements shall be performed during continuously transmitting.

3.6 TEST RESULTS

Please refer to the Appendix A.

4. NOMINAL / OCCUPIED CHANNEL BANDWIDTH

4.1 LIMIT

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 of EN 301 893 (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.

4.2 TEST PROCEDURES

Refer to ETSI EN 301 893, clause 5.4.3.2.1.

4.3 TEST SETUP LAYOUT



4.4 TEST DEVIATION

There is no deviation with the original standard.

4.5 EUT OPERATION DURING TEST

The measurements shall be performed during continuously transmitting.

4.6 TEST RESULTS

Please refer to the Appendix B.

5. RF OUTPUT POWER

5.1 LIMIT

Mean e.i.r.p. Limits for RF Output Power at the Highest Power Level		
Frequency Range (MHz)	Mean e.i.r.p. Limit for P_H (dBm)	
	With TPC	Without TPC
5150 to 5350	23	20/23 (see note1)

Note:	
(1)	The applicable limit is 20 dBm, except for transmissions whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz, in which case the applicable limit is 23 dBm.

5.2 TEST PROCEDURES

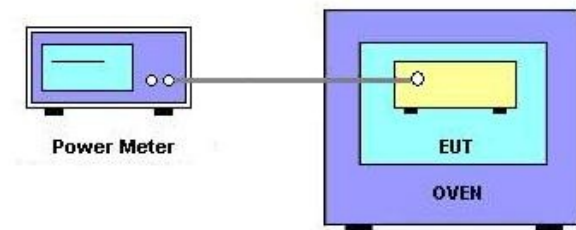
Refer to ETSI EN 301 893, clause 5.4.4.2.1.

5.3 TEST SETUP LAYOUT

Normal Condition



Extreme Condition



5.4 TEST DEVIATION

There is no deviation with the original standard.

5.5 EUT OPERATION DURING TEST

The measurements shall be performed during continuously transmitting.

5.6 TEST RESULTS

Please refer to the Appendix C.

6. POWER DENSITY

6.1 LIMIT

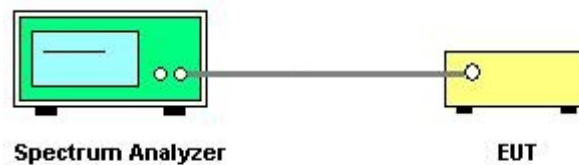
Mean e.i.r.p. Limits for Power Density at the Highest Power Level		
Frequency Range (MHz)	Mean e.i.r.p. Density Limit (dBm/MHz)	
	With TPC	Without TPC
5150 to 5350	10	7/10 (see note1)

Note:	
(1)	The applicable limit is 7 dBm/MHz, except for transmissions whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz, in which case the applicable limit is 10 dBm/MHz.

6.2 TEST PROCEDURES

Refer to ETSI EN 301 893, clause 5.4.4.2.1.

6.3 TEST SETUP LAYOUT



6.4 TEST DEVIATION

There is no deviation with the original standard.

6.5 EUT OPERATION DURING TEST

The measurements shall be performed during continuously transmitting.

6.6 TEST RESULTS

Please refer to the Appendix D.

7. TRANSMITTER UNWANTED EMISSIONS (OUTSIDE THE 5 GHZ RLAN BANDS)

7.1 LIMIT

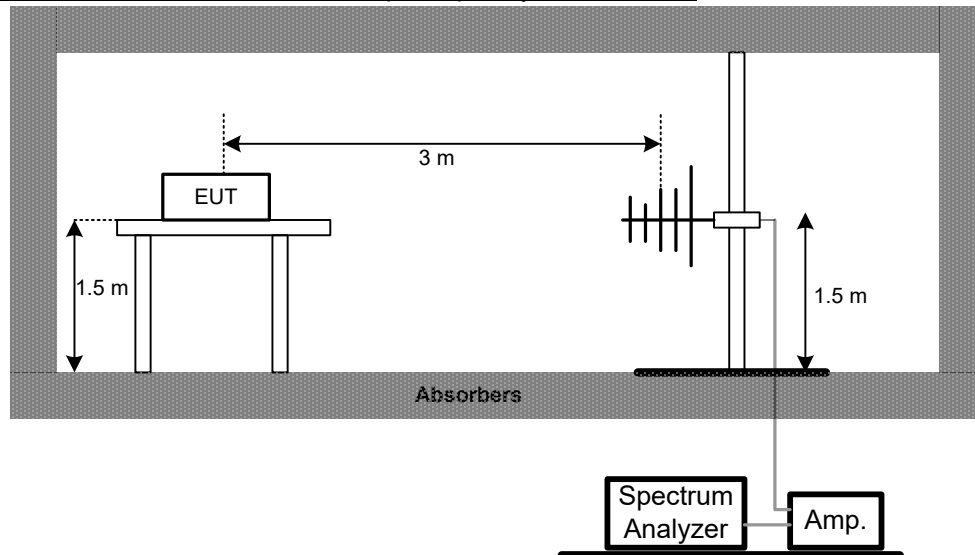
Clause	Test Item	Frequency(MHz)	Limit (dBm)
4.2.4.1	Transmitter Unwanted Emissions (Outside The 5 GHz RLAN Bands)	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	-54
		Other frequencies Below 1GHz	-36
		1GHz~26.5 GHz (Outside frequency ranges)	-30

7.2 TEST PROCEDURES

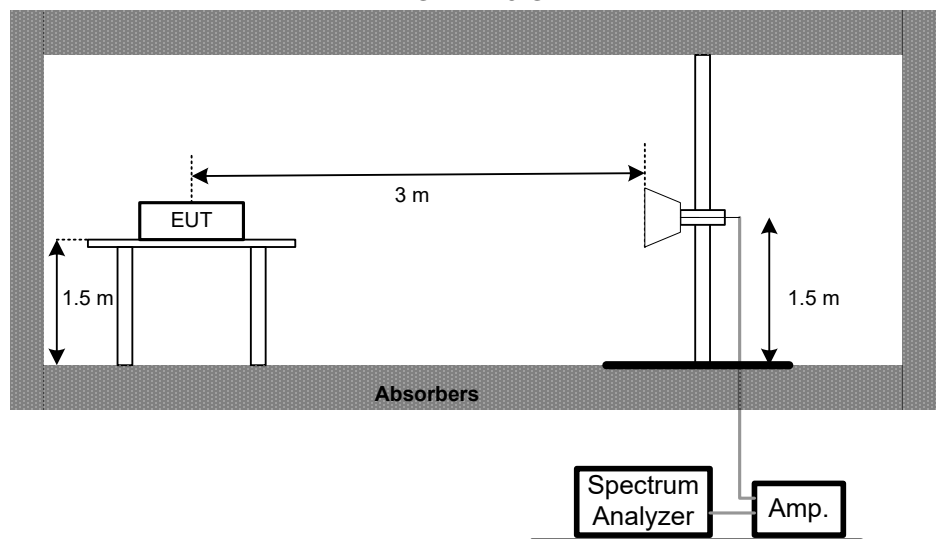
Refer to ETSI EN 301 893, clause 5.4.5.2.2.

7.3 TEST SETUP LAYOUT

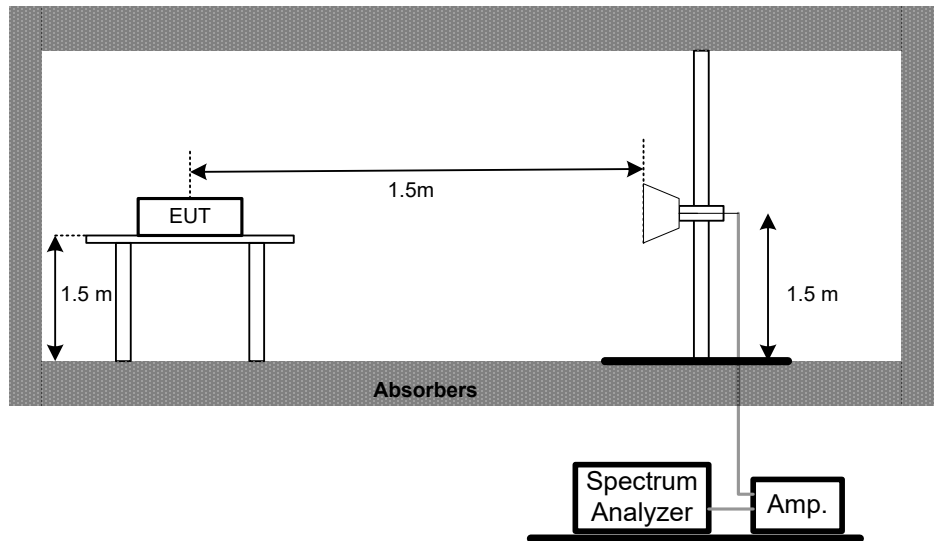
Emission Radiated Measurement Test Set-Up Frequency Below 1 GHz



Emission Radiated Measurement Test Set-Up Frequency Above 1 GHz 1 GHz - 18 GHz



18 GHz - 26.5 GHz



7.4 TEST DEVIATION

There is no deviation with the original standard.

7.5 EUT OPERATION DURING TEST

The measurements shall be performed during continuously transmitting.

7.6 TEST RESULTS (30MHZ TO 1000MHZ)

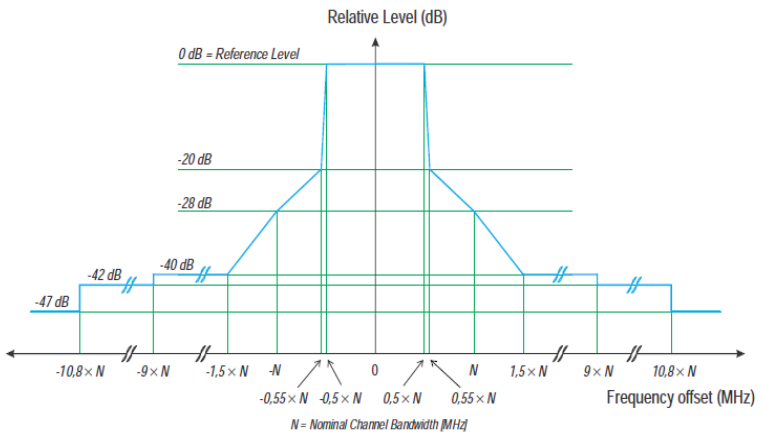
Please refer to the Appendix E.

7.7 TEST RESULTS (ABOVE 1000MHZ)

Please refer to the Appendix F.

8. TRANSMITTER UNWANTED EMISSIONS(WITHIN THE 5 GHZ RLAN BANDS)

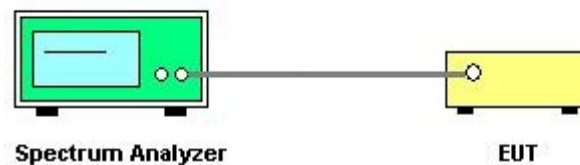
8.1 LIMIT

Clause	Test Item	Limit
4.2.4.2	Transmitter Unwanted Emissions (Within the 5 GHz RLAN bands)	 <p>Relative Level (dB)</p> <p>0 dB = Reference Level</p> <p>-20 dB</p> <p>-28 dB</p> <p>-42 dB</p> <p>-40 dB</p> <p>-47 dB</p> <p>Frequency offset (MHz)</p> <p>$-10.8 \times N$ $-9 \times N$ $-1.5 \times N$ $-N$ $-0.55 \times N$ $-0.5 \times N$ 0 $0.5 \times N$ $0.55 \times N$ N $1.5 \times N$ $9 \times N$ $10.8 \times N$</p> <p>N = Nominal Channel Bandwidth [MHz]</p>

8.2 TEST PROCEDURES

Refer to ETSI EN 301 893, clause 5.4.6.2.1.

8.3 TEST SETUP LAYOUT



8.4 TEST DEVIATION

There is no deviation with the original standard.

8.5 EUT OPERATION DURING TEST

The measurements shall be performed during continuously transmitting.

8.6 TEST RESULTS

Please refer to the Appendix G.

9. RECEIVER SPURIOUS EMISSIONS

9.1 LIMIT

Clause	Test Item	Frequency(MHz)	Limit
4.2.5	Receiver spurious emissions	30-1000	-57dBm
		1000~26500	-47dBm

9.2 TEST PROCEDURES

Refer to ETSI EN 301 893, clause 5.4.7.2.2.

9.3 TEST SETUP LAYOUT

Please refer to clause 7.3.

9.4 TEST DEVIATION

There is no deviation with the original standard.

9.5 EUT OPERATION DURING TEST

The measurements shall be performed during continuously receiving.

9.6 TEST RESULTS (30 MHZ TO 1000 MHZ)

Please refer to the Appendix H.

9.7 TEST RESULTS (ABOVE 1000 MHZ)

Please refer to the Appendix I.

10. ADAPTIVITY (CHANNEL ACCESS MECHANISM)

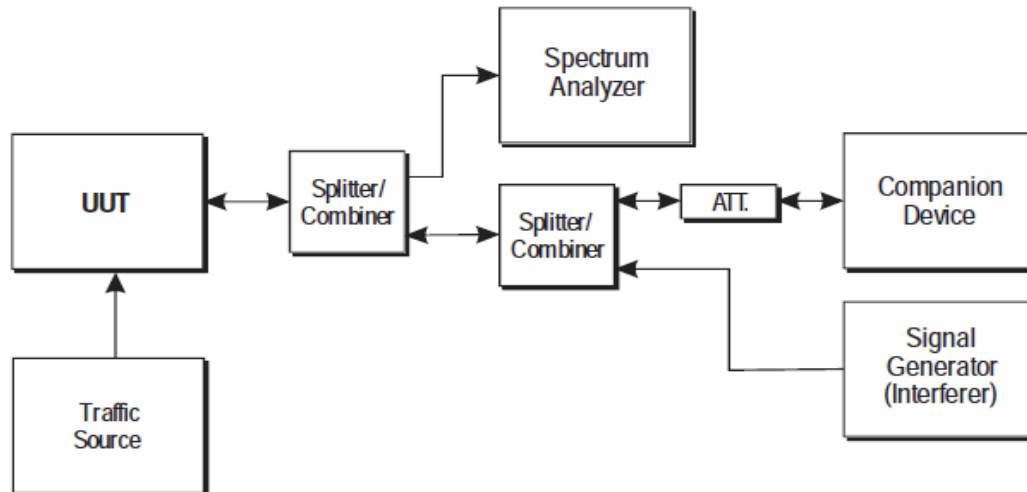
10.1 LIMIT

Refer to ETSI EN 301 893, clause 4.2.7

10.2 TEST PROCEDURES

Refer to ETSI EN 301 893, clause 5.4.9.3.2.

10.3 TEST SETUP



10.4 TEST DEVIATION

There is no deviation with the original standard.

10.5 EUT OPERATION DURING TEST

The measurements shall be performed during normal operation.

10.6 TEST RESULTS

Please refer to the Appendix J.

11. RECEIVER BLOCKING

11.1 LIMIT

The minimum performance criterion shall be a PER of less than or equal to 10 %.

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

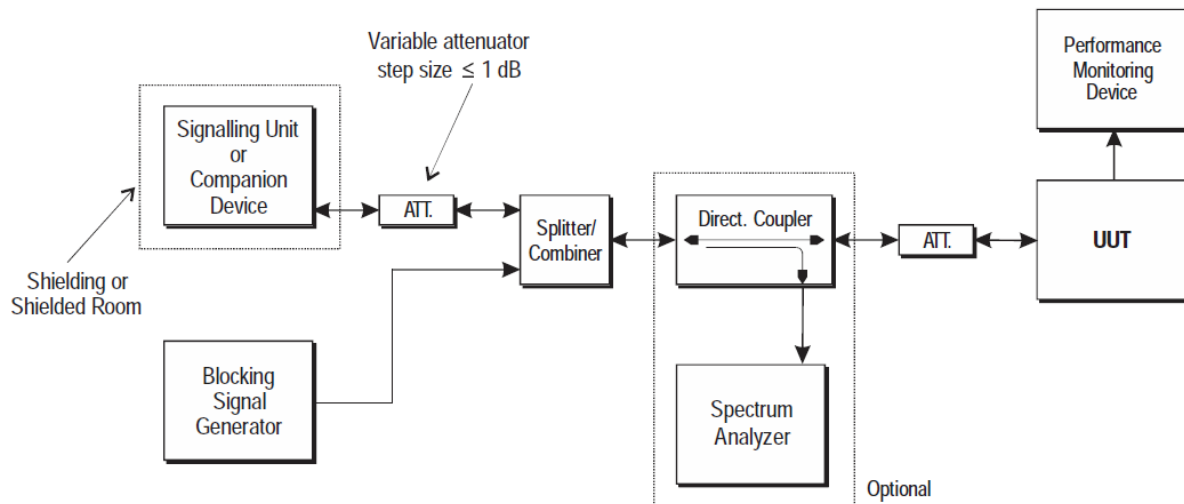
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined clause 4.2.8.3 in the absence of any blocking signal.

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.

11.2 TEST PROCEDURES

Refer to ETSI EN 301 893, clause 5.4.10.2.1.

11.3 TEST SETUP



11.4 TEST DEVIATION

There is no deviation with the original standard.

11.5 EUT OPERATION DURING TEST

The measurements shall be performed during normal receiving.

11.6 TEST RESULTS

Please refer to the Appendix K.

12. MEASUREMENT INSTRUMENTS LIST

Centre Frequency					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	CE TestSystem	BTL	CE TestSoftware	N/A	N/A
2	MXA Signal Analyzer	Keysight	N9020A	MY49100060	Jul. 07, 2024
3	Temperature Chamber	ESPEC CORP	SU-242	93018736	Jul. 07, 2024
4	Cable	RegalWay	RWP50-402-SMSM -2M	N/A	Aug. 27, 2024
5	Attenuator	RegalWay	RWA-201-S-10	N/A	Sep. 26, 2024
6	Attenuator	RegalWay	RWA-201-S-6	N/A	Sep. 26, 2024

Nominal / Occupied Channel Bandwidth & Power Density & Transmitter Unwanted Emissions Within The 5 GHz RLAN Bands					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	CE TestSystem	BTL	CE TestSoftware	N/A	N/A
2	MXA Signal Analyzer	Keysight	N9020A	MY49100060	Jul. 07, 2024
3	Cable	RegalWay	RWP50-402-SMSM -1.5M	N/A	Aug. 27, 2024
4	Attenuator	RegalWay	RWA-201-S-10	N/A	Sep. 26, 2024
5	Attenuator	RegalWay	RWA-201-S-6	N/A	Sep. 26, 2024

RF Output Power					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	CE TestSystem	BTL	CE TestSoftware	N/A	N/A
2	X-series USB Peak and Average Power Sensor	Keysight	U2021XA	MY55190003	Jun. 17, 2024
3	X-series USB Peak and Average Power Sensor	Keysight	U2021XA	MY55190006	Jun. 17, 2024
4	Attenuator	RegalWay	RWA-201-S-10	NA	Sep. 26, 2024
5	Attenuator	RegalWay	RWA-201-S-10	NA	Sep. 26, 2024
6	Temperature Chamber	ESPEC CORP	SU-242	93018736	Jul. 07, 2024
7	Cable	RegalWay	SMA-SMA-1M	NA	Aug. 15, 2024
8	Cable	RegalWay	RWP50-402-SMSM -1M	NA	Aug. 27, 2024

Adaptivity					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	MXG Vector Signal Generator	Keysight	N5182B	MY57300318	Jan. 19, 2025
2	MXA Signal Analyzer	Keysight	N9010A	MY56480543	Mar. 17, 2024
3	date Acquisition Unit	Keysight	AD211	TW54033508	NA
4	Cable	RegalWay	RWP50-402-SMSM-1M	NA	Aug. 27, 2024
5	Cable	RegalWay	RWP50-402-SMSM-1M	NA	Aug. 27, 2024
6	Cable	RegalWay	RWP50-402-SMSM-1.5M	NA	Aug. 27, 2024
7	Cable	RegalWay	RWP50-402-SMSM-1.5M	NA	Aug. 27, 2024
8	Cable	RegalWay	RWP50-402-SMSM-2M	N/A	Aug. 27, 2024
9	Power Divider	RegalWay	RW-PD2-0118SF30	NA	Sep. 26, 2024
10	Power Divider	RegalWay	RW-PD2-0118SF30	NA	Sep. 26, 2024
11	Power Divider	RegalWay	RW-PD2-0118SF30	N/A	Sep. 26, 2024
12	Power Divider	RegalWay	RWPD2-DC27-S	NA	Sep. 26, 2024
13	CE TestSystem	BTL	CE TestSoftware	N/A	N/A
14	Attenuator	RegalWay	RWPA-6000-110-M A	N/A	Aug. 27, 2024
15	Attenuator	RegalWay	RWA-201-S-20	N/A	Sep. 26, 2024
16	Notebook	Lenovo	ThinkBook14/16	N/A	N/A

Receiver Blocking					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Wideband Radio Communication tester	R&S	CMW500	168838	Jul. 07, 2024
2	MXG Vector Signal Generator	Keysight	N5182B	MY57300318	Jan. 19, 2025
3	Power Divider	RegalWay	RW-PD2-0118SF30	N/A	Sep. 26, 2024
4	Power Divider	RegalWay	RW-PD2-0118SF30	N/A	Sep. 26, 2024
5	Cable	RegalWay	RWP50-402-SMSM-1M	N/A	Aug. 27, 2024
6	Cable	RegalWay	RWP50-402-SMSM-1.5M	N/A	Aug. 27, 2024
7	Cable	RegalWay	RWP50-402-SMSM-1.5M	N/A	Aug. 27, 2024

Transmitter and Receiver Spurious Emission (Radiated Measurement)_Below 1GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Preamplifier	EMC INSTRUMENT	EMC001330	980986	Nov. 17, 2024
2	EXA Signal Analyzer	Keysight	N9010A	MY56480488	Dec. 22, 2024
3	Trilog-Broadband Antenna	Schwarzbeck	VULB9160	9160-3232	Feb. 23, 2024
4	Cable	Talent microwave	L6-NMNM-10M	N/A	N/A
5	Cable	RegalWay	LMR400-NMRANM-0.8M	N/A	N/A
6	Controller	Innco Systems Gmbh	CO3000-4port	CO3000/1155/4 5430119/P	N/A
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Transmitter and Receiver Spurious Emission (Radiated Measurement)_Above 1GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
2	EXA Signal Analyzer	Keysight	N9010A	MY56480488	Dec. 22, 2024
3	Controller	Innco Systems Gmbh	CO3000-4port	CO3000/1155/4 5430119/P	N/A
4	DRG Horn Antenna	ETS	3117-PA	221576	Jul. 07, 2024
5	Preamplifier	ETS	3117-PA	221576	Jul. 12, 2024
6	Cable	Talent microwave	A81-SMAMSMAM-12.5M	N/A	N/A
7	Filter	STI	STI15-9912	N/A	Jun. 16, 2024
8	Cable	RegalWay	RWLP50-4.0A-SMR ANMRA-2M	N/A	N/A
9	Pre-Amplifier	EMC INSTRUMENT	EMC184045SE	980409	Dec. 22, 2024
10	DRG Horn Antenna	ETS	3116C	218942	Mar. 01, 2024
11	Filter	STI	STI15-9939	N/A	Jun. 16, 2024
12	Filter	STI	STI15-9940	N/A	Jun. 16, 2024
13	Cable	Tonscend	HF160-KMKM-5.00 M	N/A	N/A
14	Cable	Tonscend	HF160-KMKM-0.5M	N/A	N/A

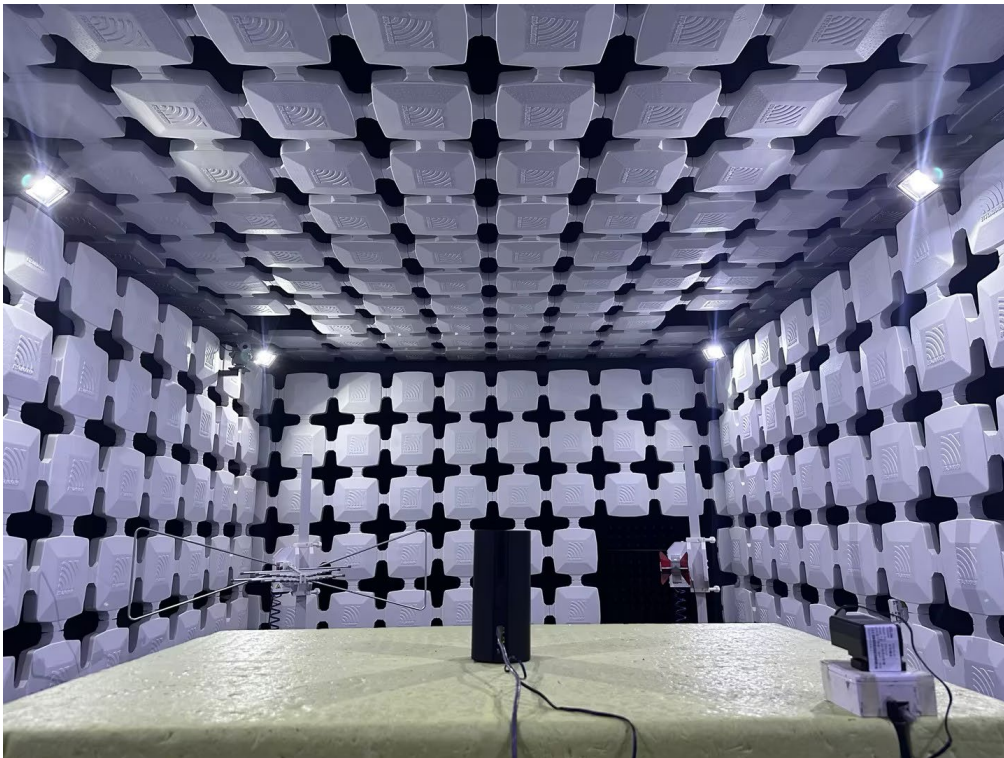
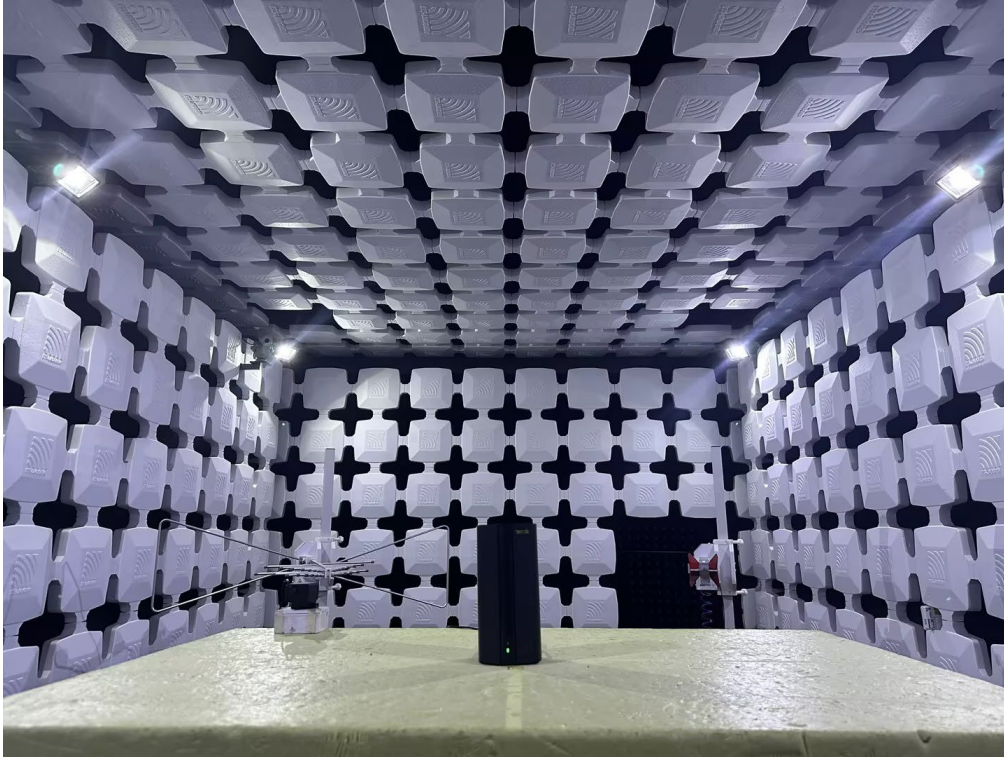
Remark: "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

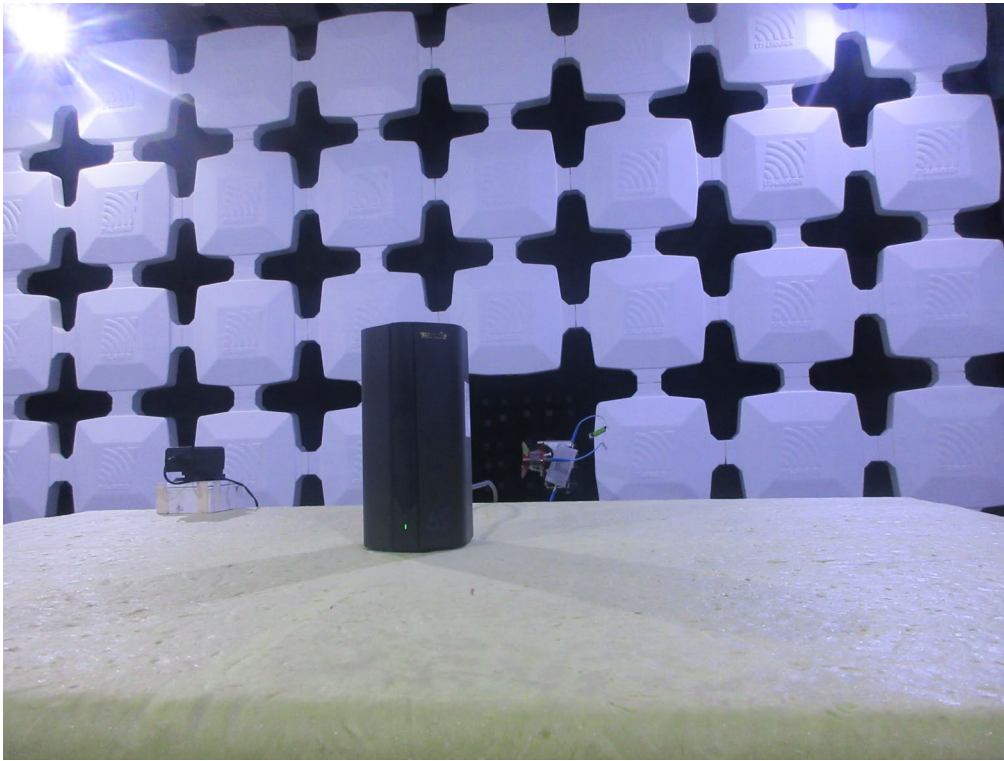
13. EUT TEST PHOTO

Radiated Emissions Test Photos

30MHz~18GHz



Above 18GHz



APPENDIX A - CENTRE FREQUENCIES

Test Mode: IEEE 802.11a Mode

Test Conditions		Measurement Frequency (MHz)
		5180MHz
T nom(°C)	23.7	5179.9720
T min(°C)	0	5179.9840
T max(°C)	40	5179.9620
Max. Deviation Frequency		-0.0380
Max. Frequency Error (ppm)		-7.34
Limit (ppm)		±20.00
Result		Pass

Test Mode: IEEE 802.11ac(VHT40) Mode

Test Conditions		Measurement Frequency (MHz)
		5190MHz
T nom(°C)	23.7	5189.9880
T min(°C)	0	5189.9960
T max(°C)	40	5189.9680
Max. Deviation Frequency		-0.0320
Max. Frequency Error (ppm)		-6.17
Limit (ppm)		±20.00
Result		Pass

Test Mode: IEEE 802.11ax(HE80) Mode

Test Conditions		Measurement Frequency (MHz)
		5210MHz
T nom(°C)	23.7	5210.0720
T min(°C)	0	5210.0000
T max(°C)	40	5210.0000
Max. Deviation Frequency		0.0720
Max. Frequency Error (ppm)		13.82
Limit (ppm)		±20.00
Result		Pass

APPENDIX B - NOMINAL / OCCUPIED CHANNEL BANDWIDTH

Test Mode: IEEE 802.11a Mode		
Test Conditions		Occupied Channel Bandwidth (MHz)
		5180MHz
T nom (°C)	23.7	16.27
Limits		16~20
Result		Pass

Test Mode: IEEE 802.11ac(VHT20) Mode		
Test Conditions		Occupied Channel Bandwidth (MHz)
		5180MHz
T nom (°C)	23.7	17.46
Limits		16~20
Result		Pass

Test Mode: IEEE 802.11ac(VHT40) Mode		
Test Conditions		Occupied Channel Bandwidth (MHz)
		5190MHz
T nom (°C)	23.7	35.85
Limits		32~40
Result		Pass

Test Mode: IEEE 802.11ac(VHT80) Mode		
Test Conditions		Occupied Channel Bandwidth (MHz)
		5210MHz
T nom (°C)	23.7	75.00
Limits		64~80
Result		Pass

Test Mode: IEEE 802.11ax(HE20) Mode		
Test Conditions		Occupied Channel Bandwidth (MHz)
		5180MHz
T nom (°C)	23.7	18.71
Limits		16~20
Result		Pass

Test Mode: IEEE 802.11ax(HE40) Mode		
Test Conditions		Occupied Channel Bandwidth (MHz)
		5190MHz
T nom (°C)	23.7	37.39
Limits		32~40
Result		Pass

Test Mode: IEEE 802.11ax(HE80) Mode		
Test Conditions		Occupied Channel Bandwidth (MHz)
		5210MHz
T nom (°C)	23.7	76.45
Limits		64~80
Result		Pass

APPENDIX C - RF OUTPUT POWER

Non Beamforming

Test Mode: IEEE 802.11a Mode_Ant.1 at the Highest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5180MHz
T nom (°C)	25	20.75
T min (°C)	0	20.98
T max (°C)	40	20.29
Max. e.i.r.p.		20.98
Limits		23
Result		Pass

Test Mode: IEEE 802.11n(HT20) Mode_Total at the Highest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5180MHz
T nom (°C)	25	20.61
T min (°C)	0	20.89
T max (°C)	40	20.43
Max. e.i.r.p.		20.89
Limits		23
Result		Pass

Test Mode: IEEE 802.11n(HT40) Mode_Total at the Highest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5190MHz
T nom (°C)	25	22.17
T min (°C)	0	22.68
T max (°C)	40	21.89
Max. e.i.r.p.		22.68
Limits		23
Result		Pass

Test Mode: IEEE 802.11ac(VHT20) Mode_Total at the Highest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5180MHz
T nom (°C)	25	20.98
T min (°C)	0	21.15
T max (°C)	40	20.79
Max. e.i.r.p.		21.15
Limits		23
Result		Pass

Test Mode: IEEE 802.11ac(VHT40) Mode_Total at the Highest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5190MHz
T nom (°C)	25	22.65
T min (°C)	0	22.96
T max (°C)	40	22.46
Max. e.i.r.p.		22.96
Limits		23
Result		Pass

Test Mode: IEEE 802.11ac(VHT80) Mode_Total at the Highest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5210MHz
T nom (°C)	25	22.35
T min (°C)	0	22.54
T max (°C)	40	22.06
Max. e.i.r.p.		22.54
Limits		23
Result		Pass

Test Mode: IEEE 802.11ac(VHT80) Mode_Total at the Lowest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5210MHz
T nom (°C)	25	16.35
T min (°C)	0	16.54
T max (°C)	40	16.06
Max. e.i.r.p.		16.54
Limits		17
Result		Pass

Test Mode: IEEE 802.11ax(HE20) Mode_Total at the Highest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5180MHz
T nom (°C)	25	21.41
T min (°C)	0	21.58
T max (°C)	40	21.17
Max. e.i.r.p.		21.58
Limits		23
Result		Pass

Test Mode: IEEE 802.11ax(HE40) Mode_Total at the Highest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5190MHz
T nom (°C)	25	22.68
T min (°C)	0	22.78
T max (°C)	40	22.49
Max. e.i.r.p.		22.78
Limits		23
Result		Pass

Test Mode: IEEE 802.11ax(HE80) Mode_Total at the Highest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5210MHz
T nom (°C)	25	22.31
T min (°C)	0	22.58
T max (°C)	40	22.10
Max. e.i.r.p.		22.58
Limits		23
Result		Pass

Test Mode: IEEE 802.11ax(HE80) Mode_Total at the Lowest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5210MHz
T nom (°C)	25	16.31
T min (°C)	0	16.58
T max (°C)	40	16.10
Max. e.i.r.p.		16.58
Limits		17
Result		Pass

Note:

- 1) e.i.r.p. = Conducted output power + G (Ant Gain)
- 2) Conducted output power = Measure result + Cable loss

Beamforming

Test Mode: IEEE 802.11n(HT20) Mode_Total at the Highest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5180MHz
T nom (°C)	25	20.35
T min (°C)	0	20.66
T max (°C)	40	20.24
Max. e.i.r.p.		20.66
Limits		23
Result		Pass

Test Mode: IEEE 802.11n(HT40) Mode_Total at the Highest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5190MHz
T nom (°C)	25	21.79
T min (°C)	0	22.14
T max (°C)	40	21.48
Max. e.i.r.p.		22.14
Limits		23
Result		Pass

Test Mode: IEEE 802.11ac(VHT20) Mode_Total at the Highest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5180MHz
T nom (°C)	25	20.74
T min (°C)	0	20.89
T max (°C)	40	20.54
Max. e.i.r.p.		20.89
Limits		23
Result		Pass

Test Mode: IEEE 802.11ac(VHT40) Mode_Total at the Highest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5190MHz
T nom (°C)	25	22.23
T min (°C)	0	22.66
T max (°C)	40	21.99
Max. e.i.r.p.		22.66
Limits		23
Result		Pass

Test Mode: IEEE 802.11ac(VHT80) Mode_Total at the Highest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5210MHz
T nom (°C)	25	21.99
T min (°C)	0	22.15
T max (°C)	40	21.80
Max. e.i.r.p.		22.15
Limits		23
Result		Pass

Test Mode: IEEE 802.11ac(VHT80) Mode_Total at the Lowest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5210MHz
T nom (°C)	25	15.99
T min (°C)	0	16.15
T max (°C)	40	15.80
Max. e.i.r.p.		16.15
Limits		17
Result		Pass

Test Mode: IEEE 802.11ax(HE20) Mode_Total at the Highest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5180MHz
T nom (°C)	25	21.08
T min (°C)	0	21.42
T max (°C)	40	20.84
Max. e.i.r.p.		21.42
Limits		23
Result		Pass

Test Mode: IEEE 802.11ax(HE40) Mode_Total at the Highest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5190MHz
T nom (°C)	25	22.18
T min (°C)	0	22.41
T max (°C)	40	21.86
Max. e.i.r.p.		22.41
Limits		23
Result		Pass

Test Mode: IEEE 802.11ax(HE80) Mode_Total at the Highest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5210MHz
T nom (°C)	25	21.90
T min (°C)	0	22.13
T max (°C)	40	21.69
Max. e.i.r.p.		22.13
Limits		23
Result		Pass

Test Mode: IEEE 802.11ax(HE80) Mode_Total at the Lowest Power Level		
Test Conditions		e.i.r.p. (dBm)
		5210MHz
T nom (°C)	25	15.90
T min (°C)	0	16.13
T max (°C)	40	15.69
Max. e.i.r.p.		16.13
Limits		17
Result		Pass

Note:

- 1) e.i.r.p. = Conducted output power + G (Ant Gain) + Y (Beamforming Gain)
- 2) Conducted output power = Measure result + Cable loss

APPENDIX D - POWER DENSITY

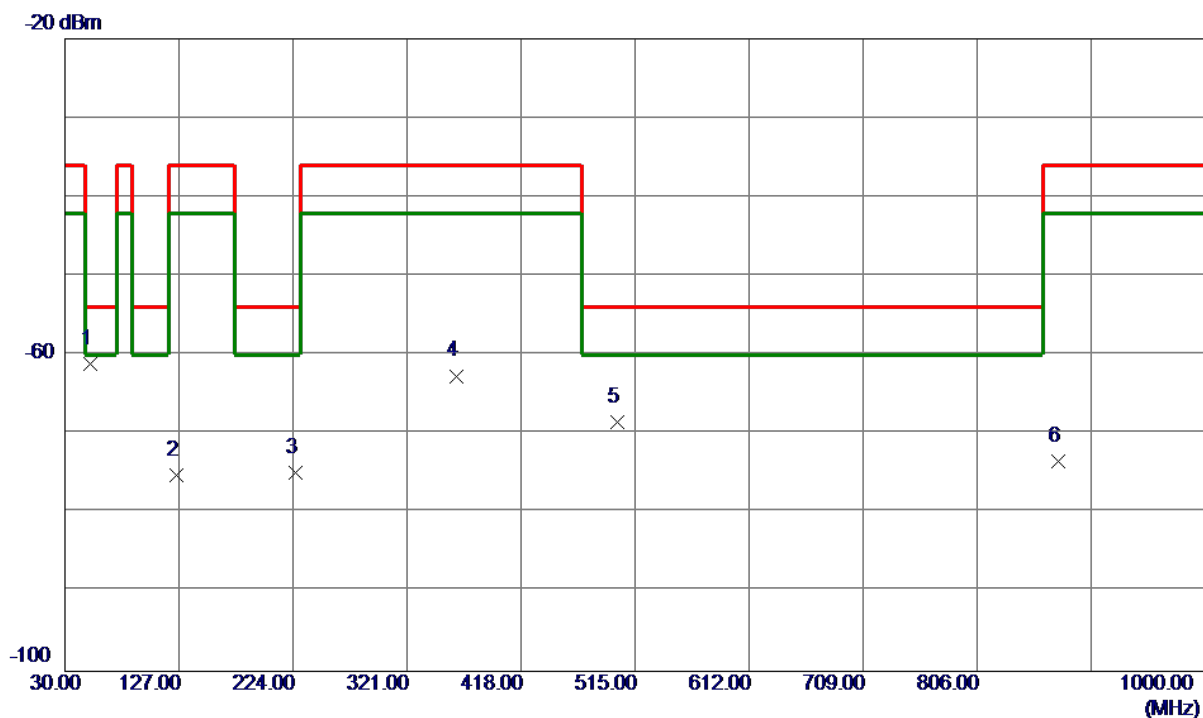
Test Mode: IEEE 802.11a Mode		
Test Conditions		Spectral Power Density e.i.r.p. (dBm / MHz)
		5180MHz
T nom (°C)	23.7	9.98
Limits		10
Result		Pass

Test Mode: IEEE 802.11ac(VHT20) Mode		
Test Conditions		Spectral Power Density e.i.r.p. (dBm / MHz)
		5180MHz
T nom (°C)	23.7	9.83
Limits		10
Result		Pass

Test Mode: IEEE 802.11ax(HE20) Mode		
Test Conditions		Spectral Power Density e.i.r.p. (dBm / MHz)
		5180MHz
T nom (°C)	23.7	9.94
Limits		10
Result		Pass

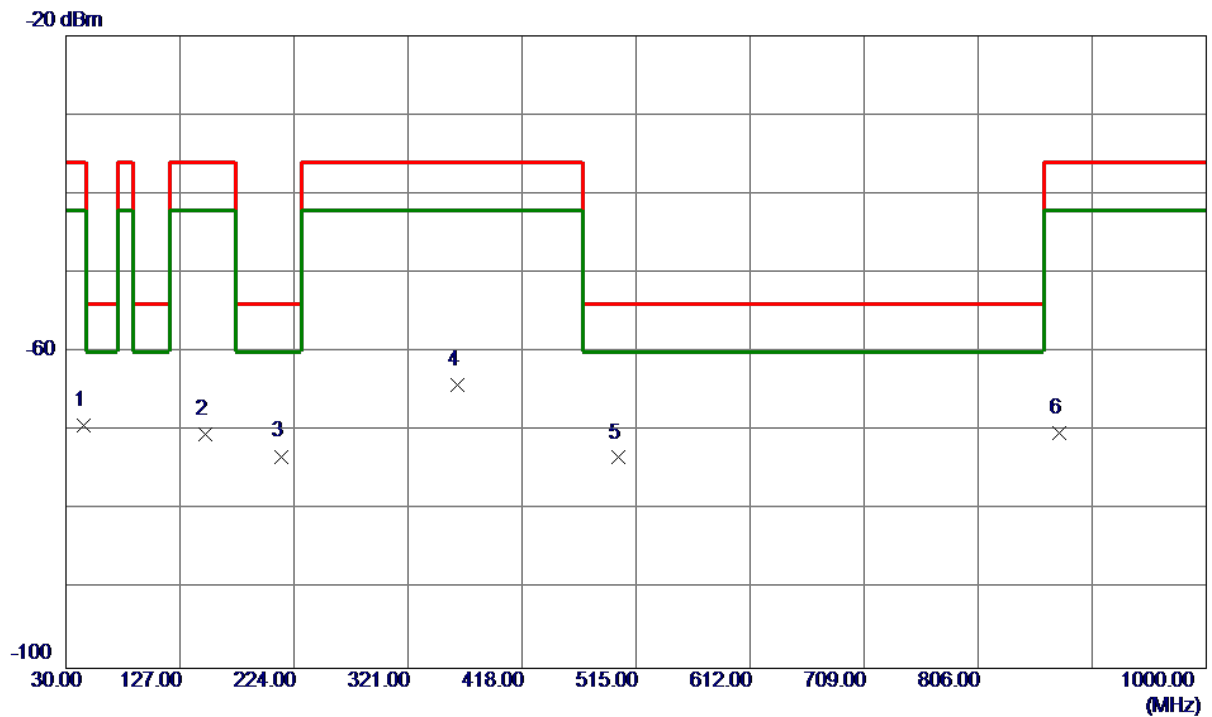
APPENDIX E - TRANSMITTER UNWANTED EMISSIONS OUTSIDE THE 5 GHZ RLAN BANDS (30MHZ TO 1000MHZ)

Test Mode	TX Mode IEEE 802.11ac(VHT40)_5190MHz	Polarization	Vertical
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No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1 *	52.0190	-55.26	-5.79	-61.05	-54.00	-7.05	RMS	
2	124.9630	-67.30	-7.91	-75.21	-36.00	-39.21	RMS	
3	225.9400	-66.66	-8.29	-74.95	-54.00	-20.95	RMS	
4	363.2920	-56.72	-5.92	-62.64	-36.00	-26.64	RMS	
5	499.9650	-64.92	-3.53	-68.45	-54.00	-14.45	RMS	
6	874.9670	-74.93	1.42	-73.51	-36.00	-37.51	RMS	

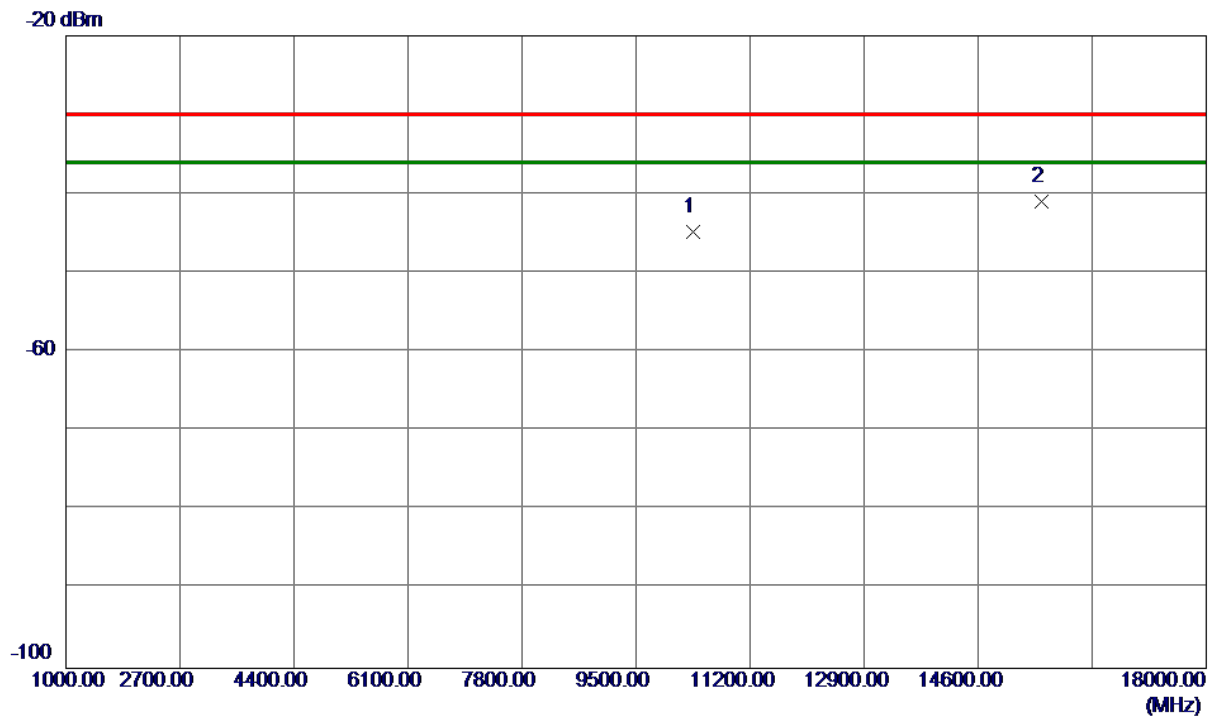
Test Mode	TX Mode IEEE 802.11ac(VHT40)_5190MHz	Polarization	Horizontal
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No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1	45.0350	-62.19	-7.08	-69.27	-36.00	-33.27	RMS	
2	148.2429	-64.74	-5.64	-70.38	-36.00	-34.38	RMS	
3 *	213.2330	-64.31	-8.89	-73.20	-54.00	-19.20	RMS	
4	363.0010	-58.32	-5.89	-64.21	-36.00	-28.21	RMS	
5	499.9650	-69.63	-3.73	-73.36	-54.00	-19.36	RMS	
6	874.9670	-71.79	1.48	-70.31	-36.00	-34.31	RMS	

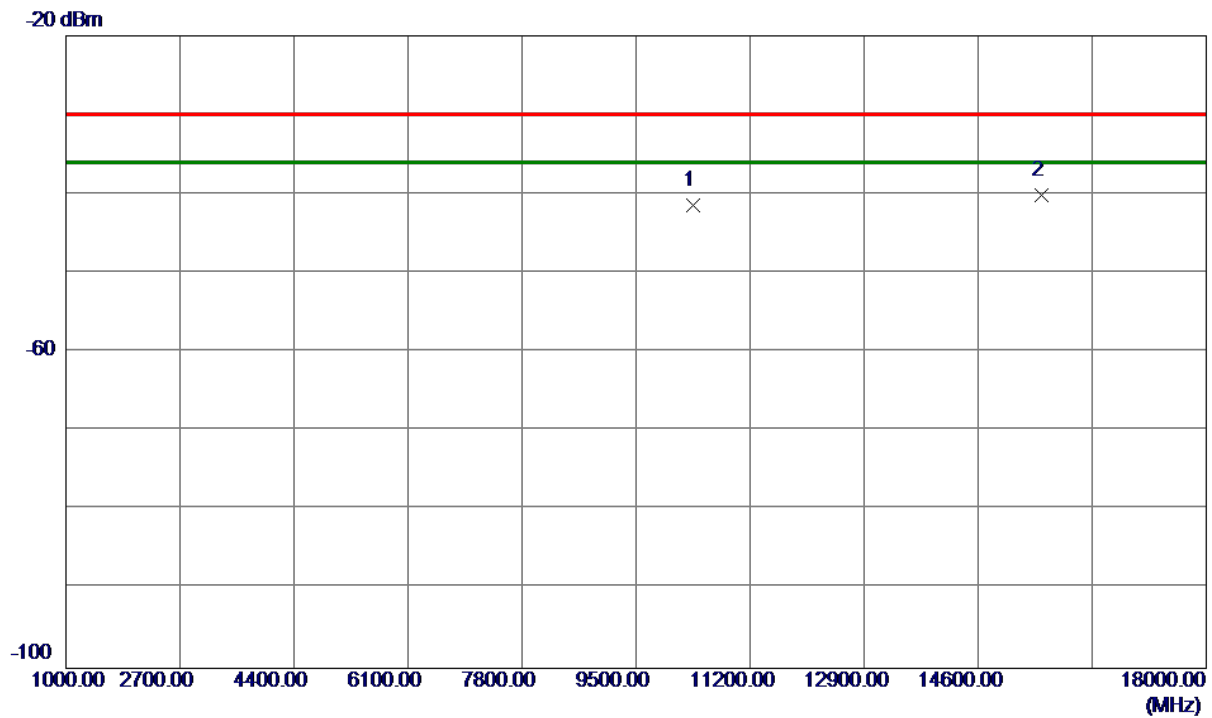
APPENDIX F - TRANSMITTER UNWANTED EMISSIONS OUTSIDE THE 5 GHZ RLAN BANDS (ABOVE 1000MHZ)

Test Mode	TX Mode IEEE 802.11a_5180MHz	Polarization	Vertical
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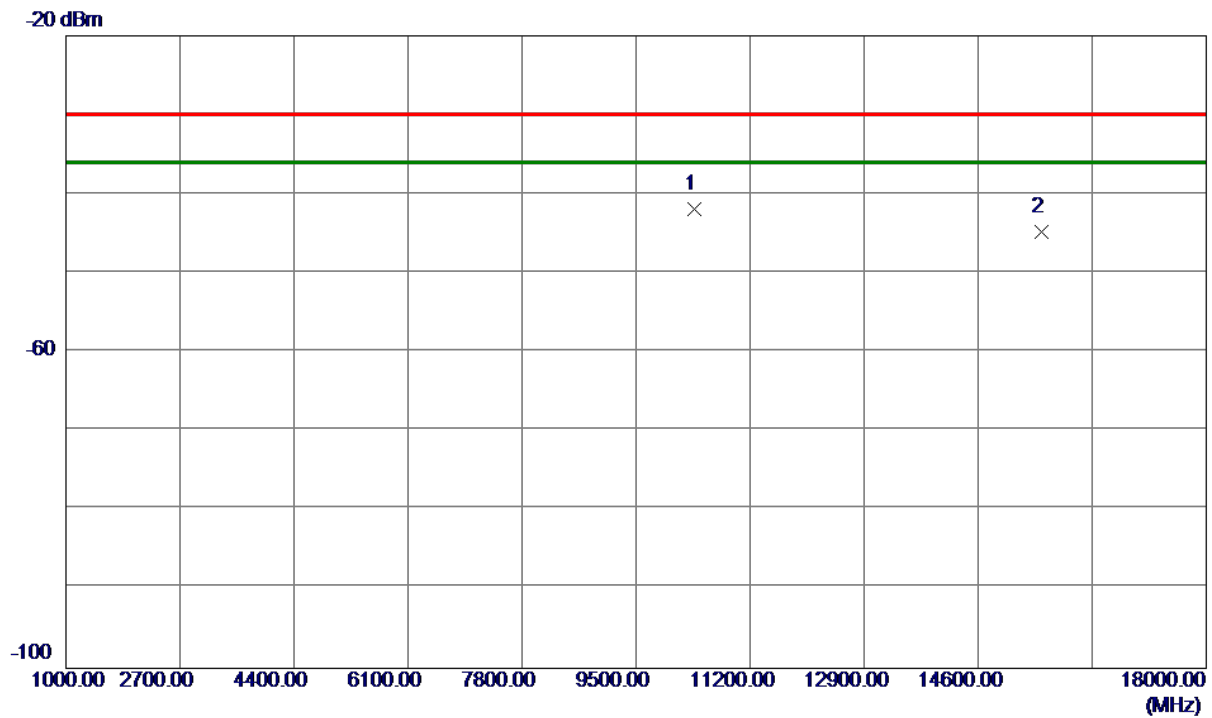
No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1	10358.5000	-51.70	6.93	-44.77	-30.00	-14.77	RMS	
2 *	15542.6500	-57.41	16.45	-40.96	-30.00	-10.96	RMS	

Test Mode	TX Mode IEEE 802.11a_5180MHz	Polarization	Horizontal
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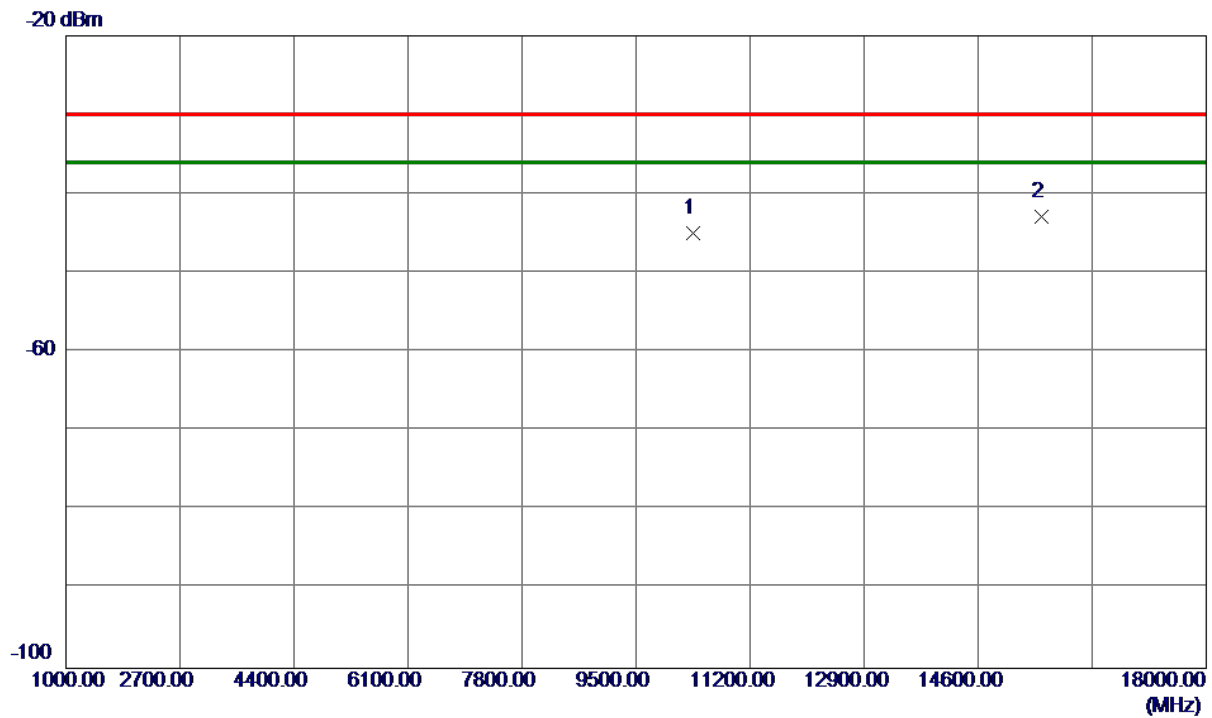
No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1	10359.3500	-48.50	7.11	-41.39	-30.00	-11.39	RMS	
2 *	15541.8000	-56.76	16.67	-40.09	-30.00	-10.09	RMS	

Test Mode	TX Mode IEEE 802.11ac(VHT20)_5180MHz	Polarization	Vertical
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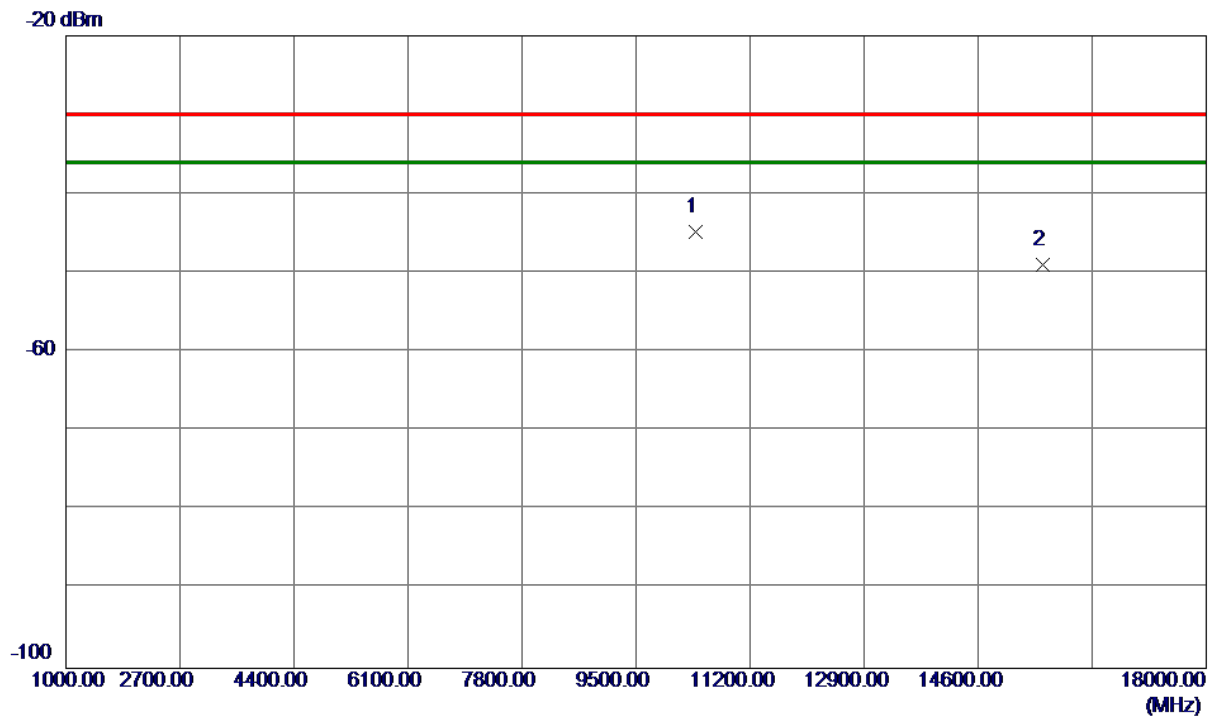
No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1 *	10362.7500	-48.87	6.93	-41.94	-30.00	-11.94	RMS	
2	15542.6500	-61.32	16.45	-44.87	-30.00	-14.87	RMS	

Test Mode	TX Mode IEEE 802.11ac(VHT20)_5180MHz	Polarization	Horizontal
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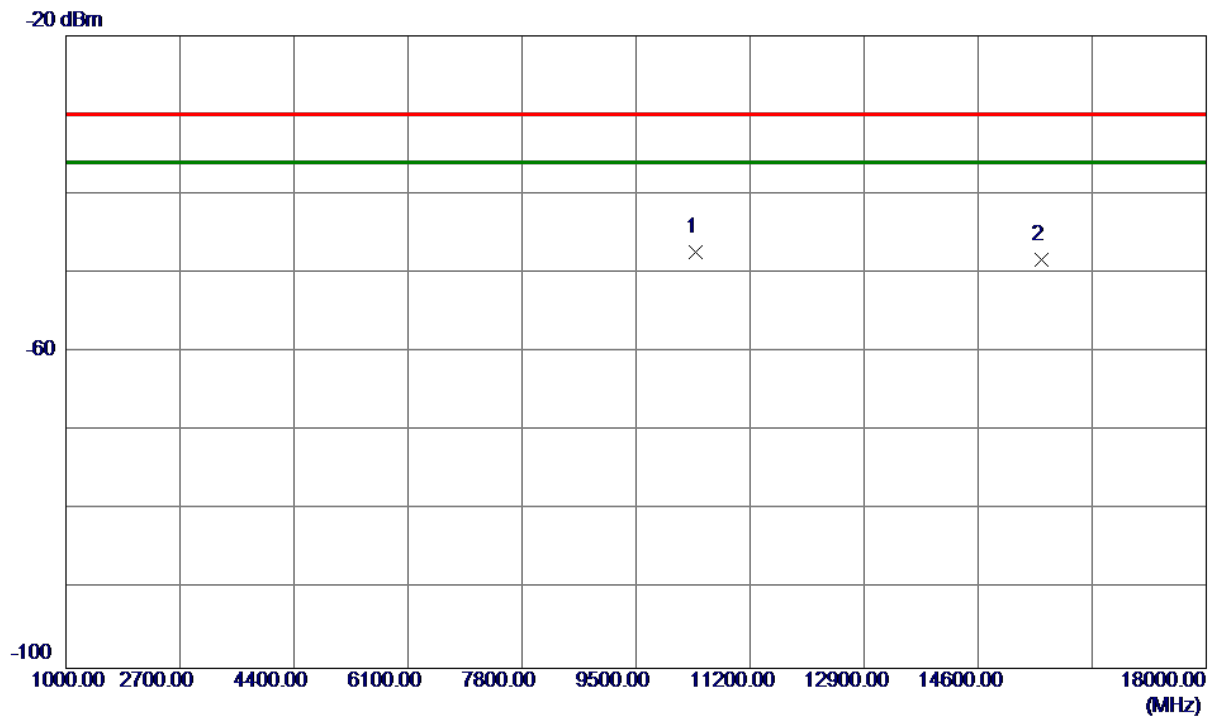
No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1	10357.6500	-52.06	7.11	-44.95	-30.00	-14.95	RMS	
2 *	15538.4000	-59.54	16.65	-42.89	-30.00	-12.89	RMS	

Test Mode	TX Mode IEEE 802.11ac(VHT40)_5190MHz	Polarization	Vertical
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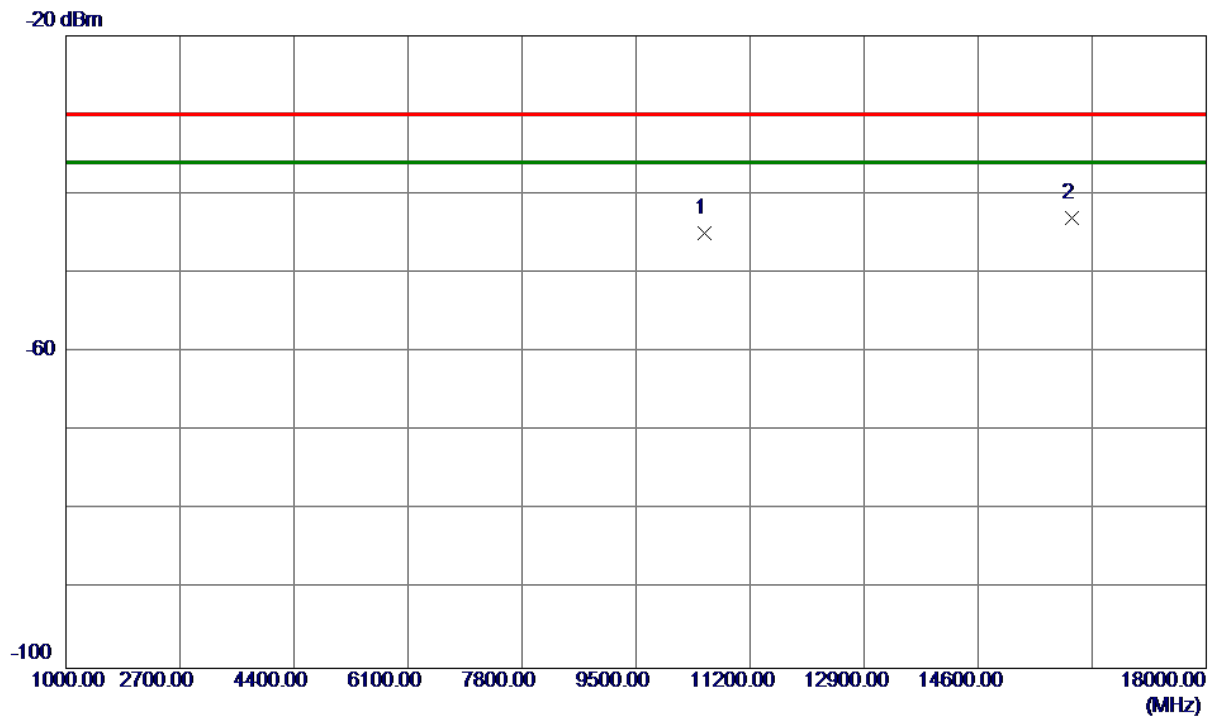
No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1 *	10378.9000	-51.81	6.94	-44.87	-30.00	-14.87	RMS	
2	15558.8000	-65.52	16.54	-48.98	-30.00	-18.98	RMS	

Test Mode	TX Mode IEEE 802.11ac(VHT40)_5190MHz	Polarization	Horizontal
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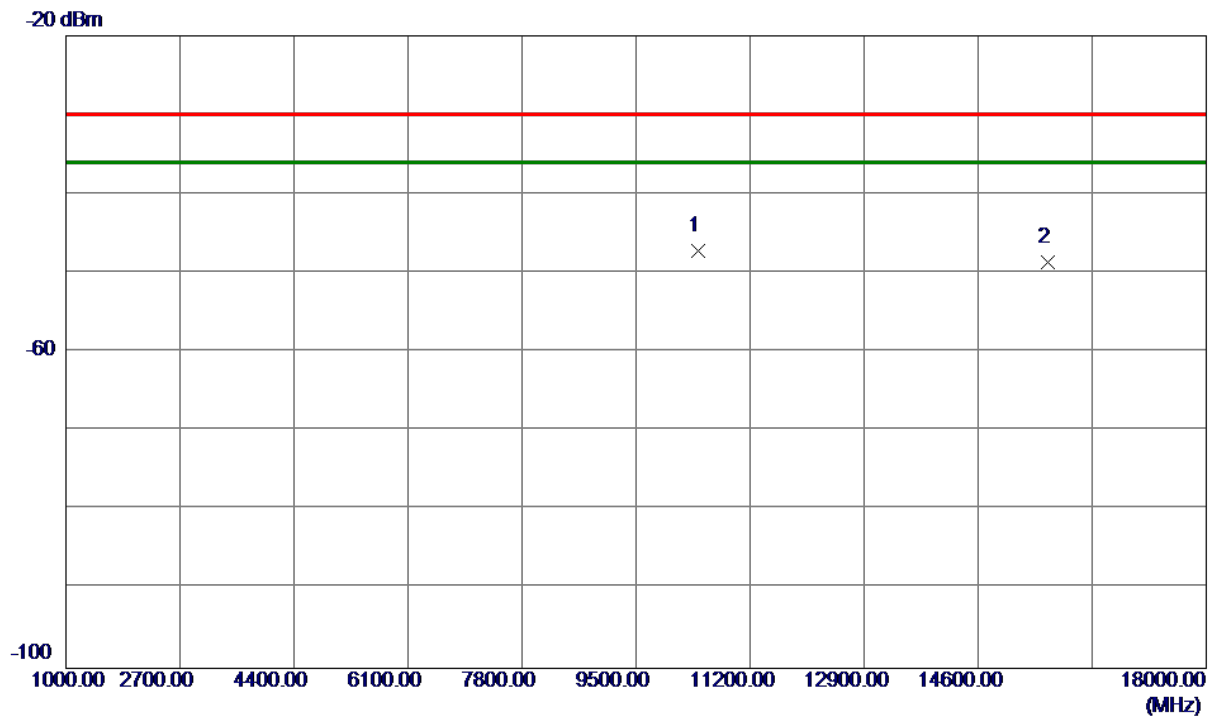
No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1 *	10391.6500	-54.41	7.12	-47.29	-30.00	-17.29	RMS	
2	15546.0500	-64.98	16.69	-48.29	-30.00	-18.29	RMS	

Test Mode	TX Mode IEEE 802.11ac(VHT80)_5210MHz	Polarization	Vertical
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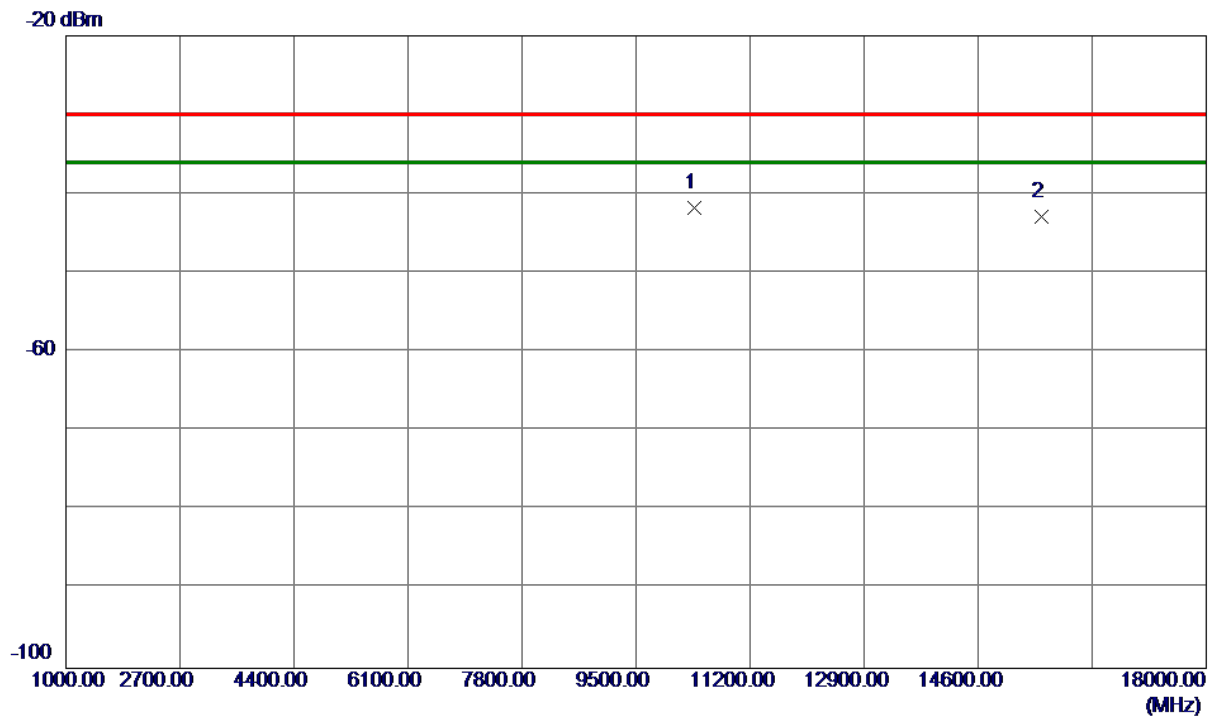
No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1	10522.5500	-51.94	7.02	-44.92	-30.00	-14.92	RMS	
2 *	16002.5000	-62.04	18.96	-43.08	-30.00	-13.08	RMS	

Test Mode	TX Mode IEEE 802.11ac(VHT80)_5210MHz	Polarization	Horizontal
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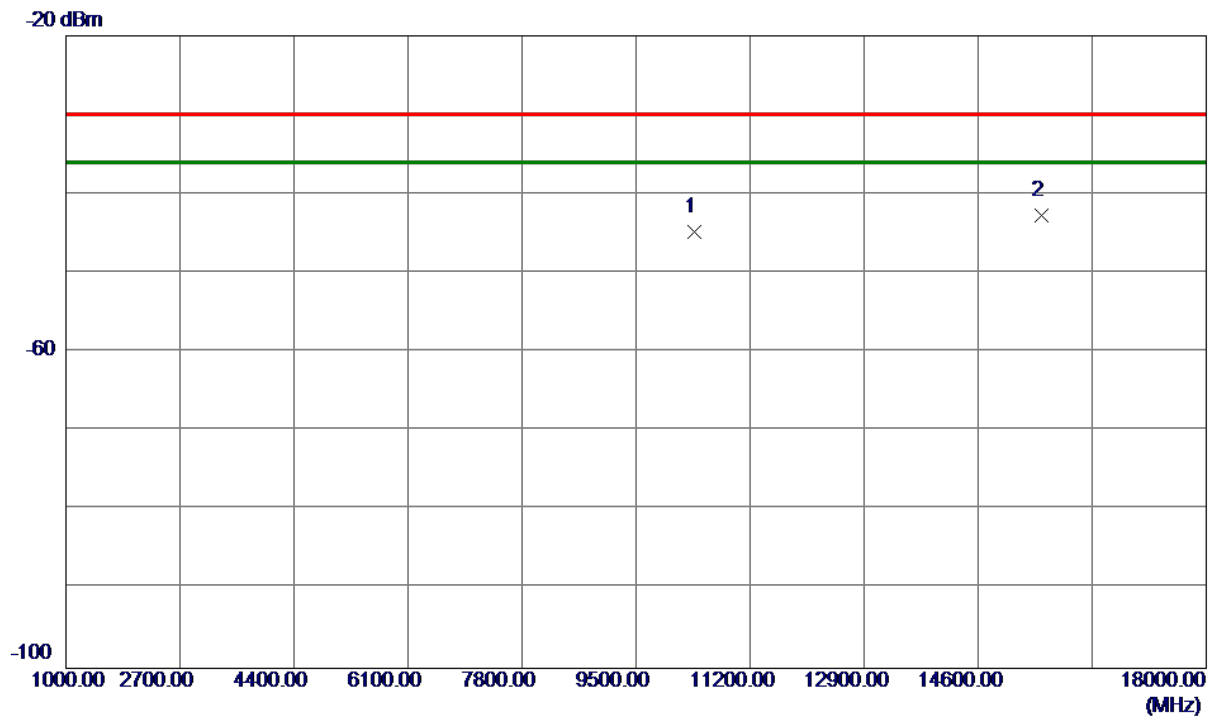
No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1 *	10431.6000	-54.32	7.13	-47.19	-30.00	-17.19	RMS	
2	15641.2500	-65.88	17.19	-48.69	-30.00	-18.69	RMS	

Test Mode	TX Mode IEEE 802.11ax(HE20)_5180MHz	Polarization	Vertical
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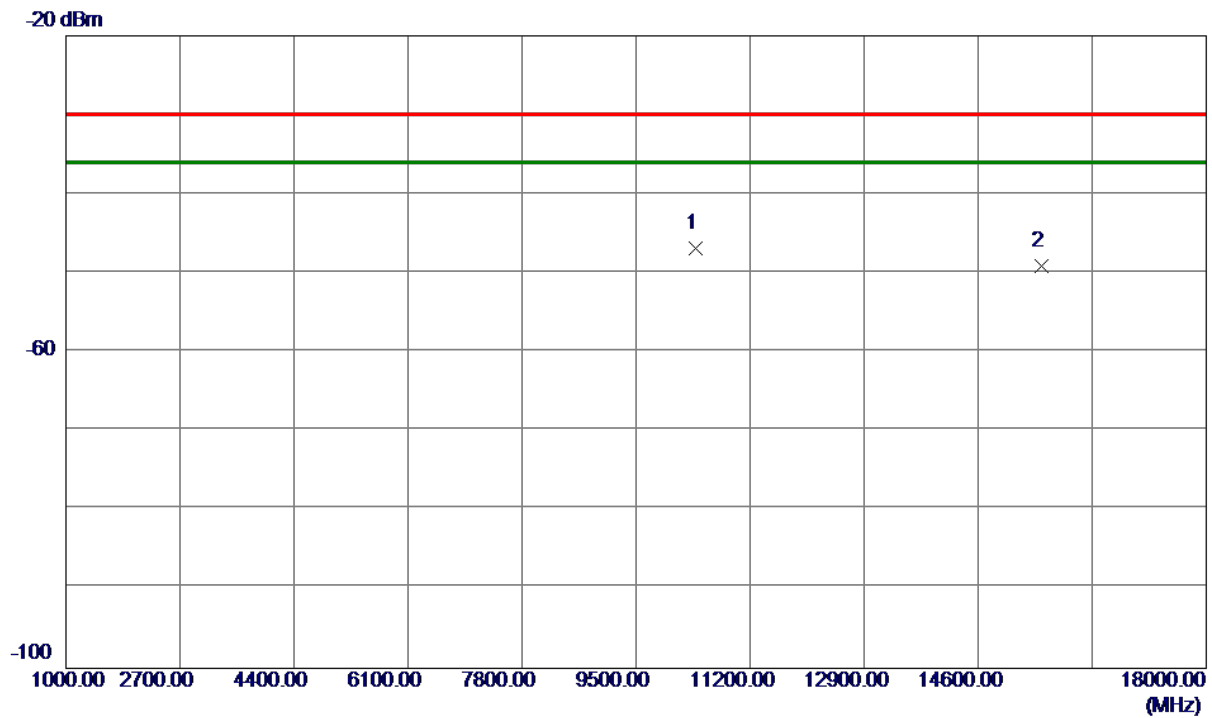
No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1 *	10360.2000	-48.68	6.93	-41.75	-30.00	-11.75	RMS	
2	15540.9500	-59.34	16.45	-42.89	-30.00	-12.89	RMS	

Test Mode	TX Mode IEEE 802.11ax(HE20)_5180MHz	Polarization	Horizontal
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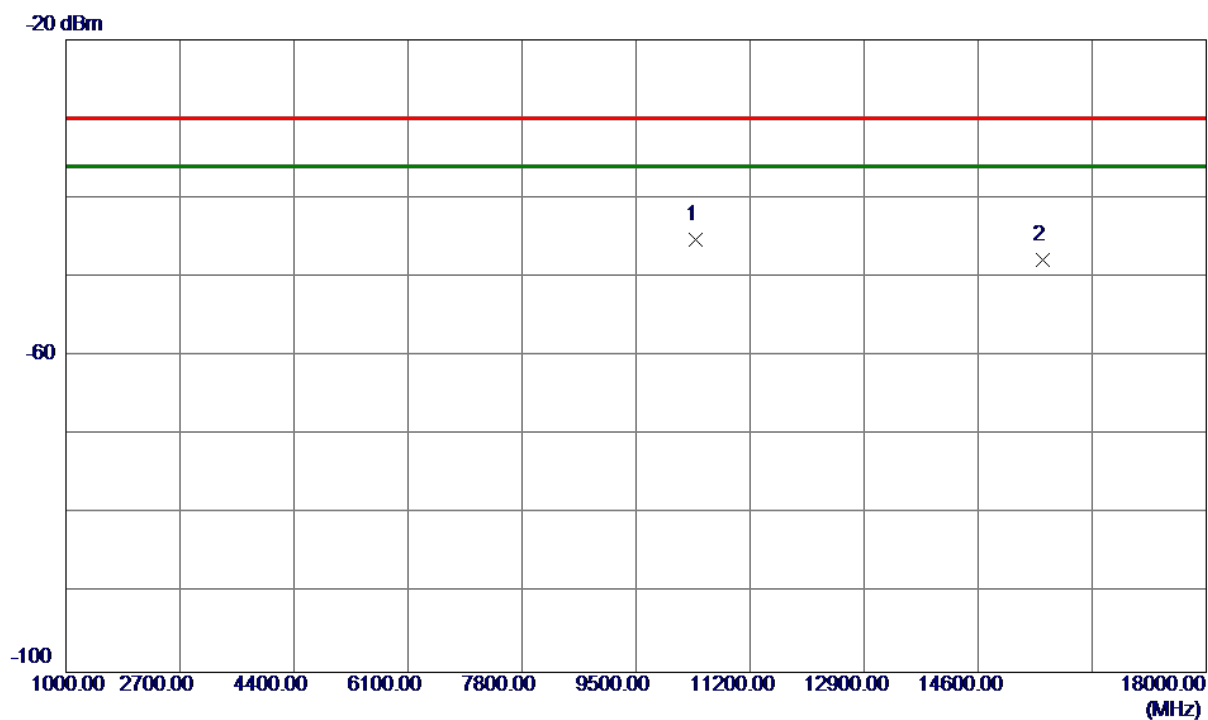
No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1	10360.2000	-51.92	7.11	-44.81	-30.00	-14.81	RMS	
2 *	15542.6500	-59.36	16.67	-42.69	-30.00	-12.69	RMS	

Test Mode	TX Mode IEEE 802.11ax(HE40)_5190MHz	Polarization	Vertical
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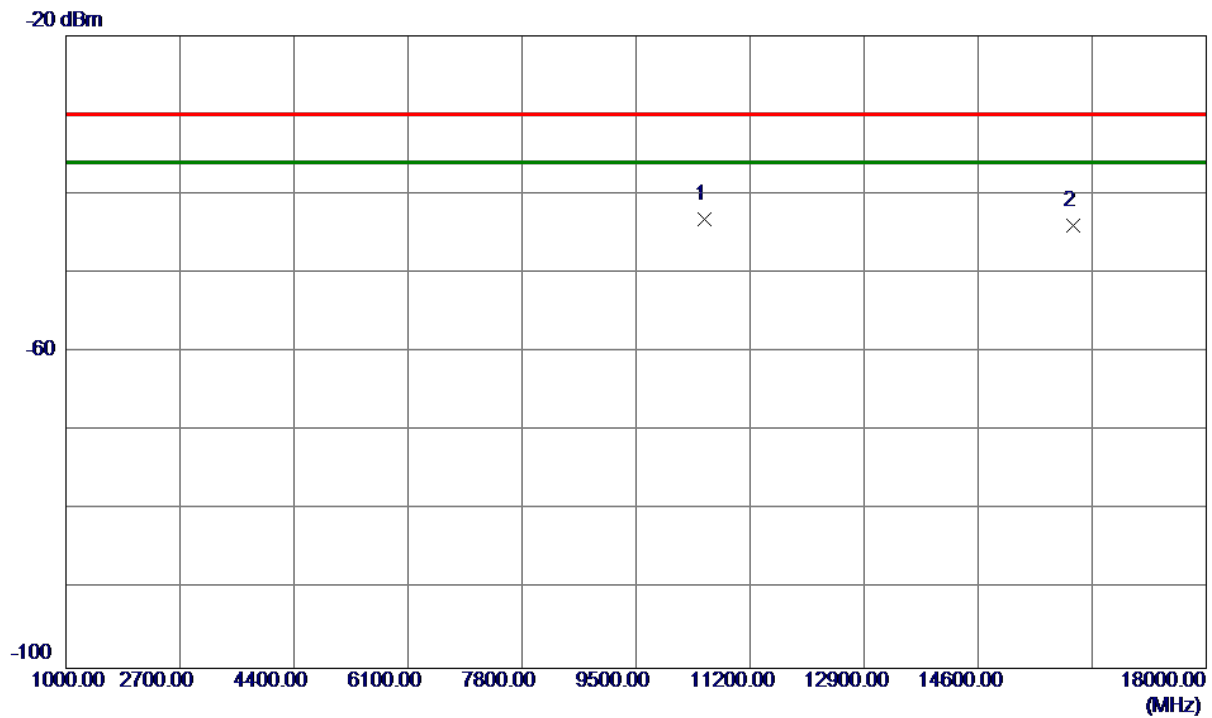
No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1 *	10380.6000	-53.77	6.94	-46.83	-30.00	-16.83	RMS	
2	15552.8500	-65.66	16.51	-49.15	-30.00	-19.15	RMS	

Test Mode	TX Mode IEEE 802.11ax(HE40)_5190MHz	Polarization	Horizontal
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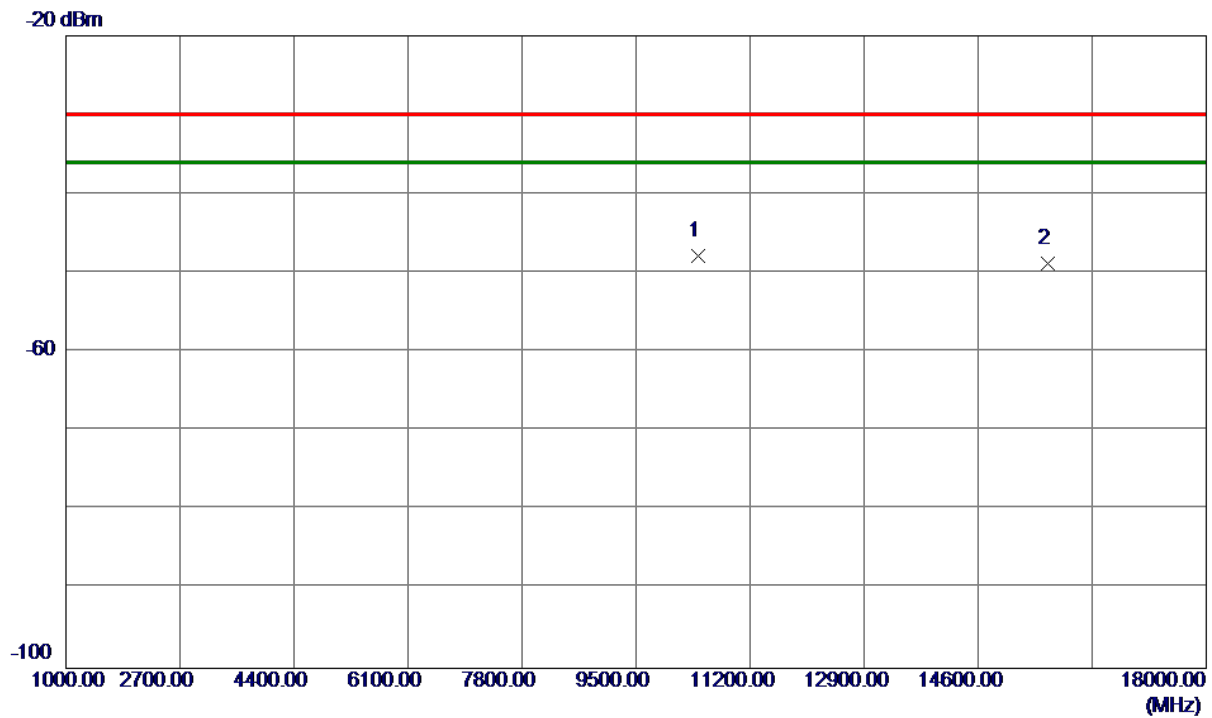
No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1 *	10380.6000	-52.42	7.12	-45.30	-30.00	-15.30	RMS	
2	15555.4000	-64.60	16.74	-47.86	-30.00	-17.86	RMS	

Test Mode	TX Mode IEEE 802.11ax(HE80)_5210MHz	Polarization	Vertical
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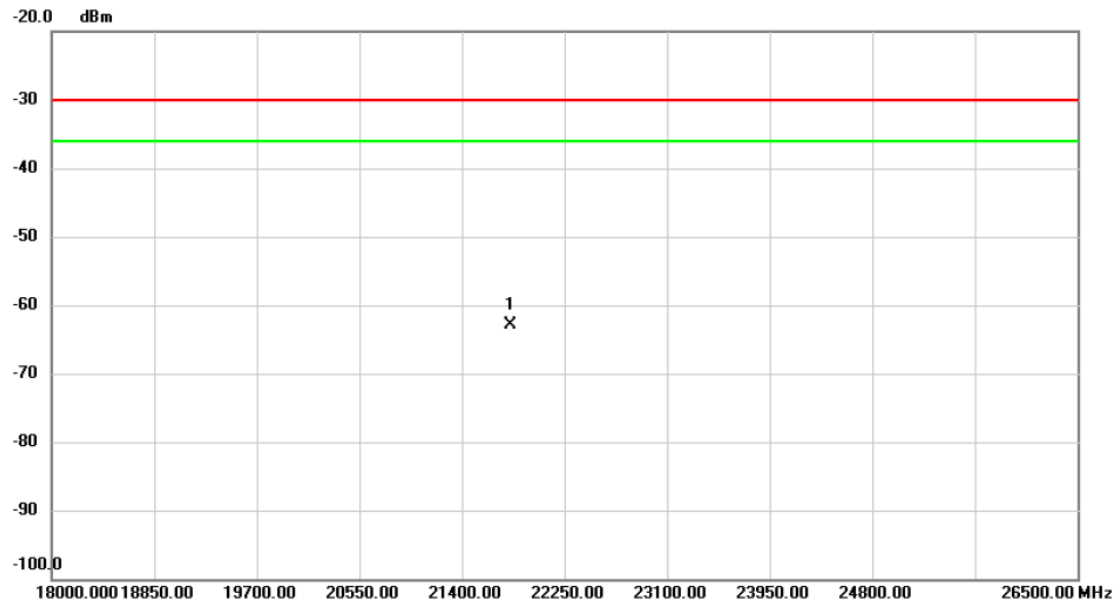
No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1 *	10520.0000	-50.26	7.02	-43.24	-30.00	-13.24	RMS	
2	16013.5500	-62.89	18.92	-43.97	-30.00	-13.97	RMS	

Test Mode	TX Mode IEEE 802.11ax(HE80)_5210MHz	Polarization	Horizontal
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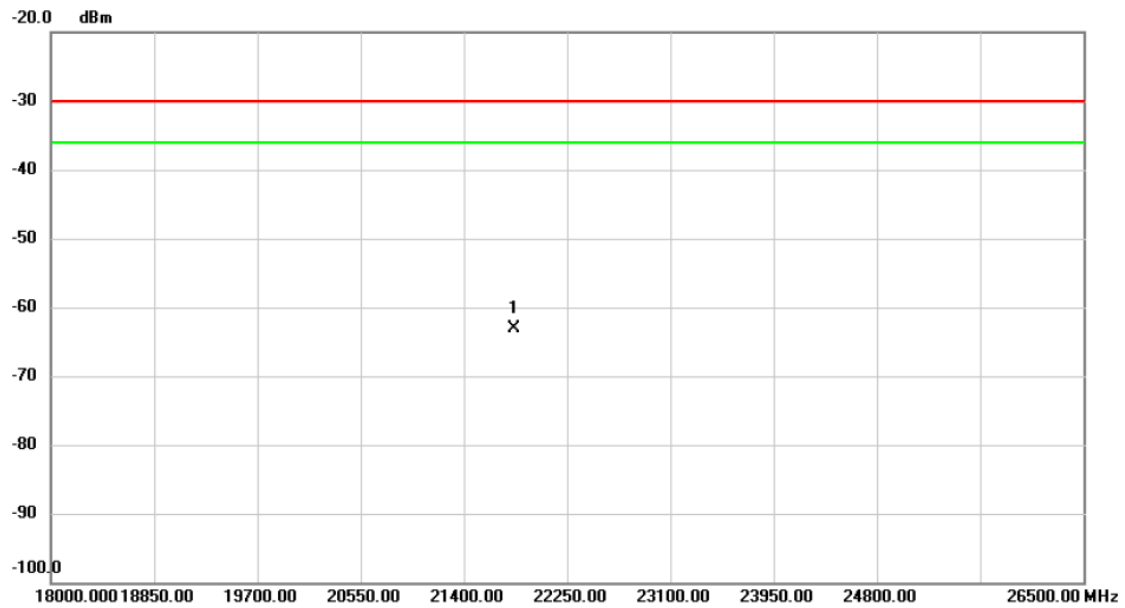
No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1 *	10428.2000	-54.92	7.13	-47.79	-30.00	-17.79	RMS	
2	15640.4000	-65.95	17.18	-48.77	-30.00	-18.77	RMS	

Test Mode	TX Mode IEEE 802.11ac(VHT40)_5190MHz	Polarization	Vertical
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No. Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1 *	21797.375	-66.35	3.36	-62.99	-30.00	-32.99	RMS	

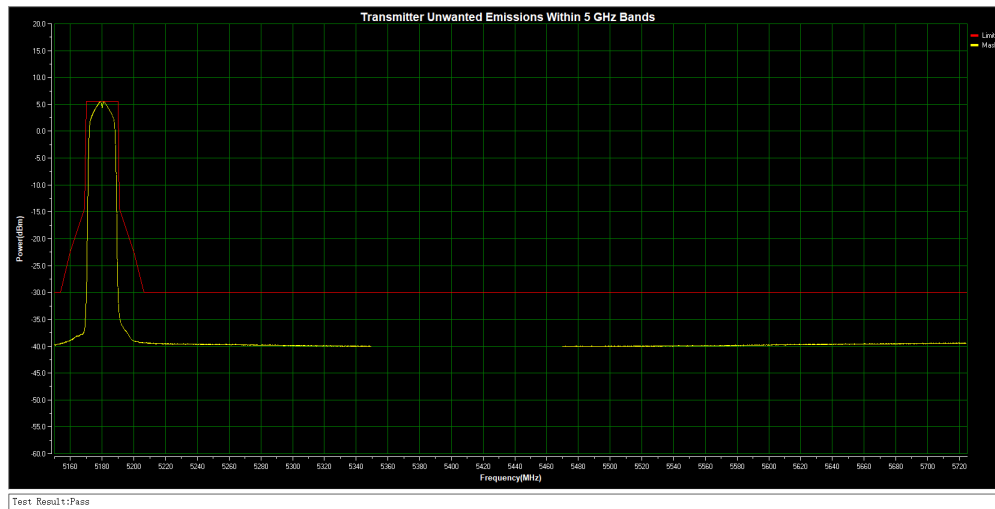
Test Mode	TX Mode IEEE 802.11ac(VHT40)_5190MHz	Polarization	Horizontal
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No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	21811.400	-65.82	2.75	-63.07	-30.00	-33.07	RMS	

APPENDIX G - TRANSMITTER UNWANTED EMISSIONS WITHIN THE 5 GHZ RLAN BANDS

Test Mode :	IEEE 802.11a_5180MHz
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Note:

The MASK is only applicable within the 5150MHz to 5350MHz and 5470MHz to 5725MHz. 5350MHz to 5470MHz is applicable within the Radiation spurious, so the waveform is not displayed in the test data.

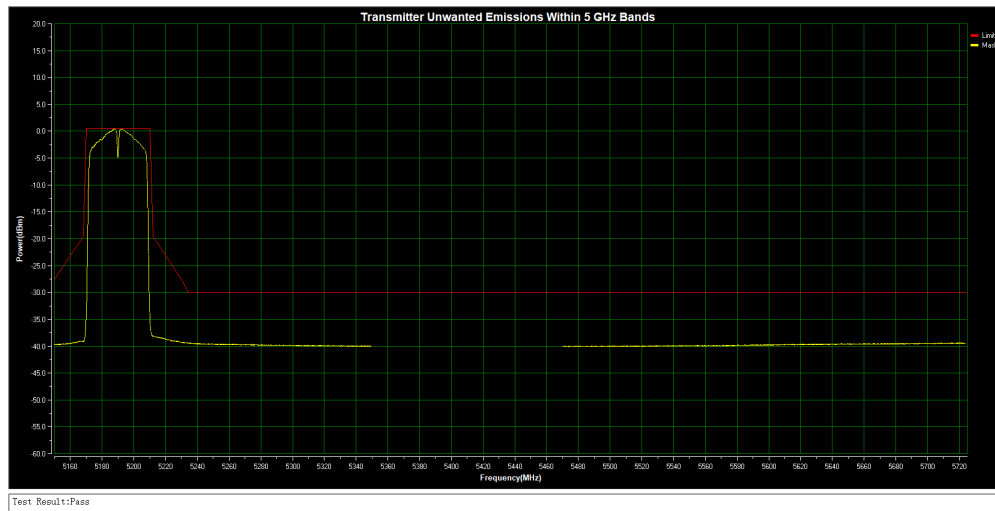
Test Mode :	IEEE 802.11ac(VHT20)_5180MHz
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Note:

The MASK is only applicable within the 5150MHz to 5350MHz and 5470MHz to 5725MHz. 5350MHz to 5470MHz is applicable within the Radiation spurious, so the waveform is not displayed in the test data.

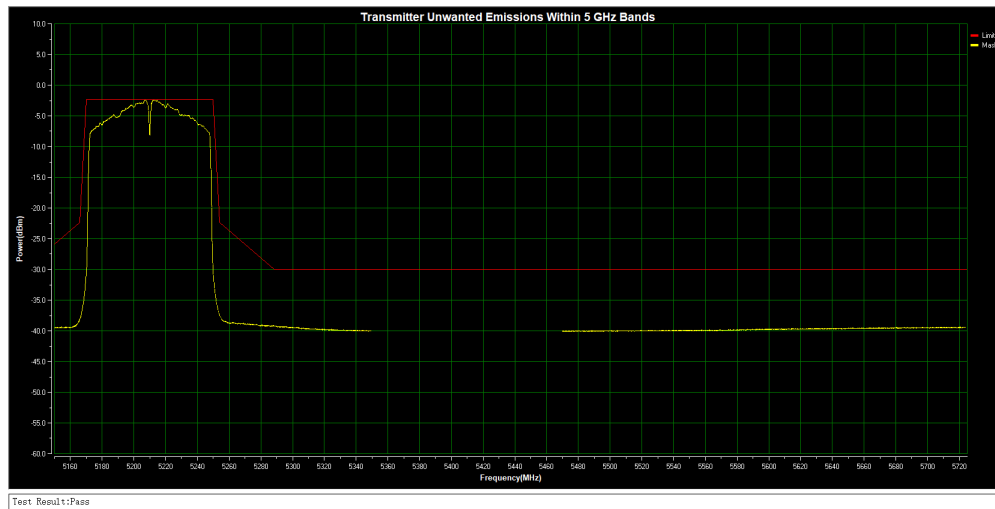
Test Mode :	IEEE 802.11ac(VHT40)_5190MHz
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Note:

The MASK is only applicable within the 5150MHz to 5350MHz and 5470MHz to 5725MHz. 5350MHz to 5470MHz is applicable within the Radiation spurious, so the waveform is not displayed in the test data.

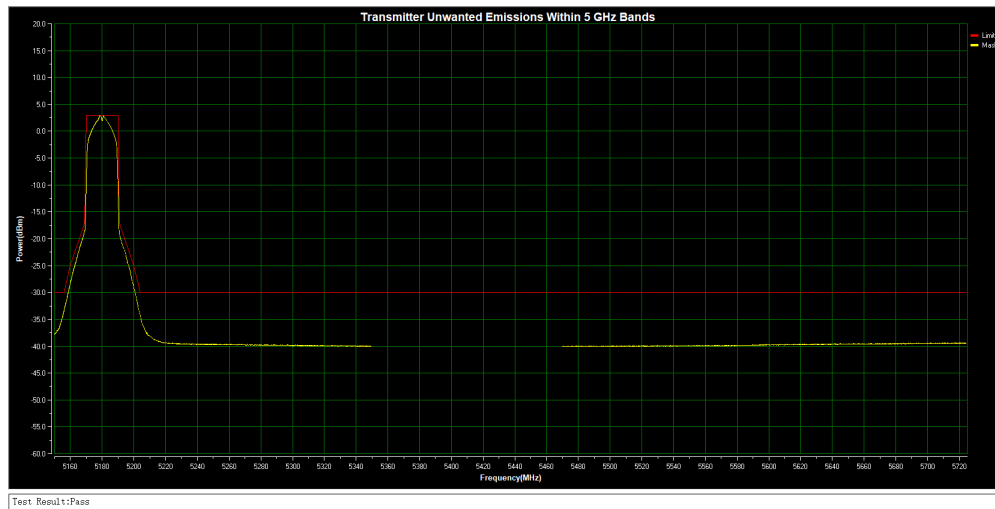
Test Mode :	IEEE 802.11ac(VHT80)_5210MHz
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Note:

The MASK is only applicable within the 5150MHz to 5350MHz and 5470MHz to 5725MHz. 5350MHz to 5470MHz is applicable within the Radiation spurious, so the waveform is not displayed in the test data.

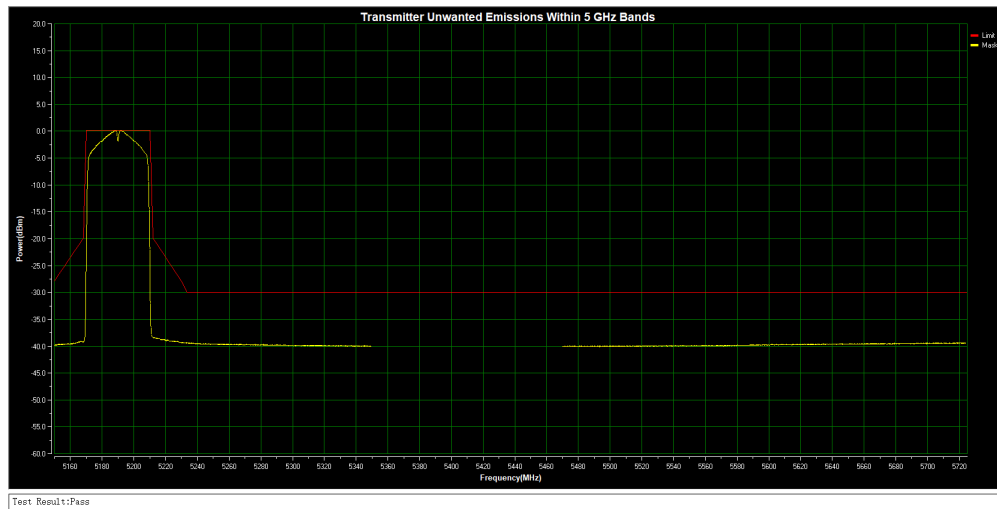
Test Mode :	IEEE 802.11ax(HE20)_5180MHz
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Note:

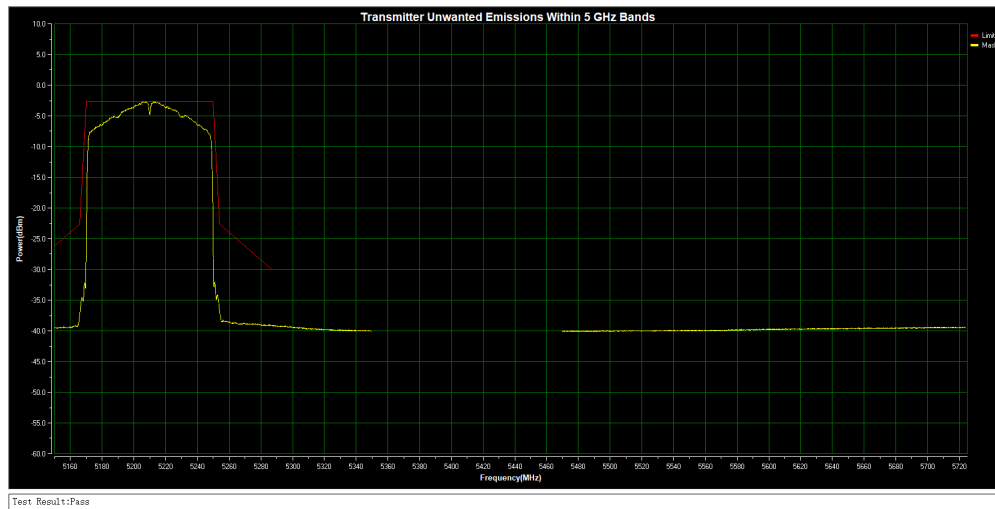
The MASK is only applicable within the 5150MHz to 5350MHz and 5470MHz to 5725MHz. 5350MHz to 5470MHz is applicable within the Radiation spurious, so the waveform is not displayed in the test data.

Test Mode :	IEEE 802.11ax(HE40)_5190MHz
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Note:
The MASK is only applicable within the 5150MHz to 5350MHz and 5470MHz to 5725MHz.
5350MHz to 5470MHz is applicable within the Radiation spurious,so the waveform is not displayed in the test data.

Test Mode :	IEEE 802.11ax(HE80)_5210MHz
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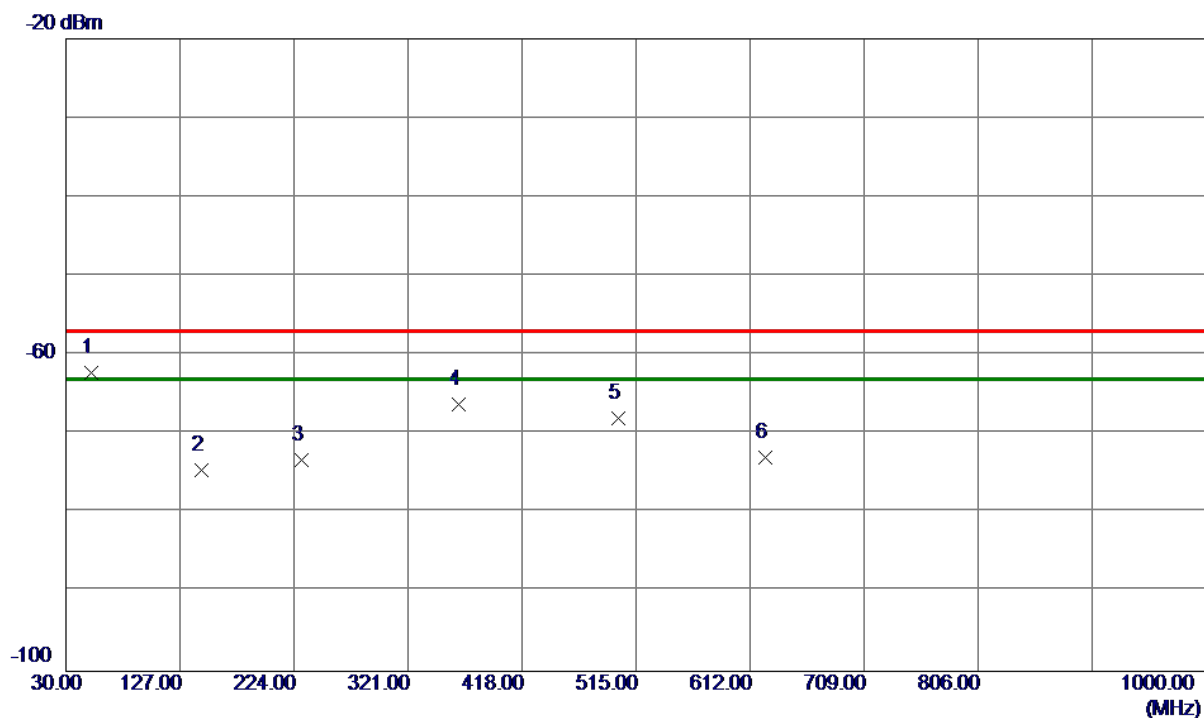


Note:

The MASK is only applicable within the 5150MHz to 5350MHz and 5470MHz to 5725MHz. 5350MHz to 5470MHz is applicable within the Radiation spurious, so the waveform is not displayed in the test data.

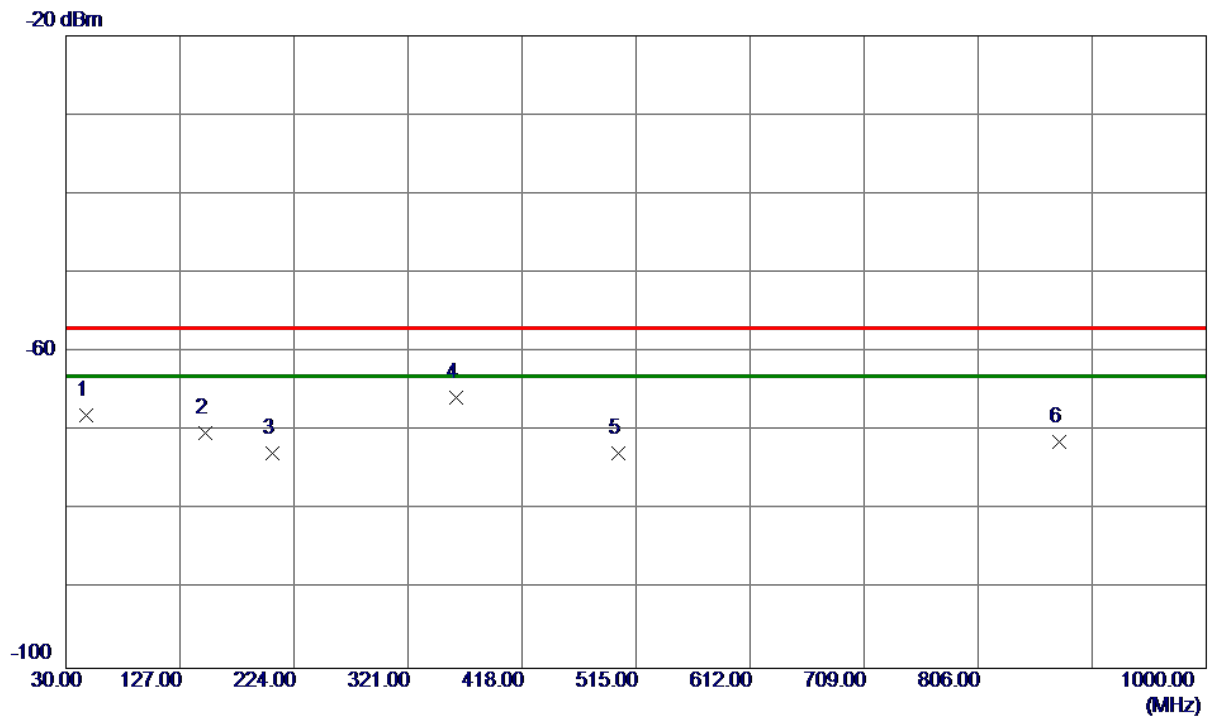
APPENDIX H - RECEIVER SPURIOUS EMISSIONS (30MHZ TO 1000MHZ)

Test Mode	RX Mode IEEE 802.11ac(VHT40)_5190MHz	Polarization	Vertical
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No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1 *	51.6309	-56.43	-5.76	-62.19	-57.00	-5.19	RMS	
2	145.2360	-69.35	-5.28	-74.63	-57.00	-17.63	RMS	
3	230.4990	-65.50	-7.71	-73.21	-57.00	-16.21	RMS	
4	363.7770	-60.32	-5.90	-66.22	-57.00	-9.22	RMS	
5	499.9650	-64.40	-3.53	-67.93	-57.00	-10.93	RMS	
6	624.9980	-71.57	-1.42	-72.99	-57.00	-15.99	RMS	

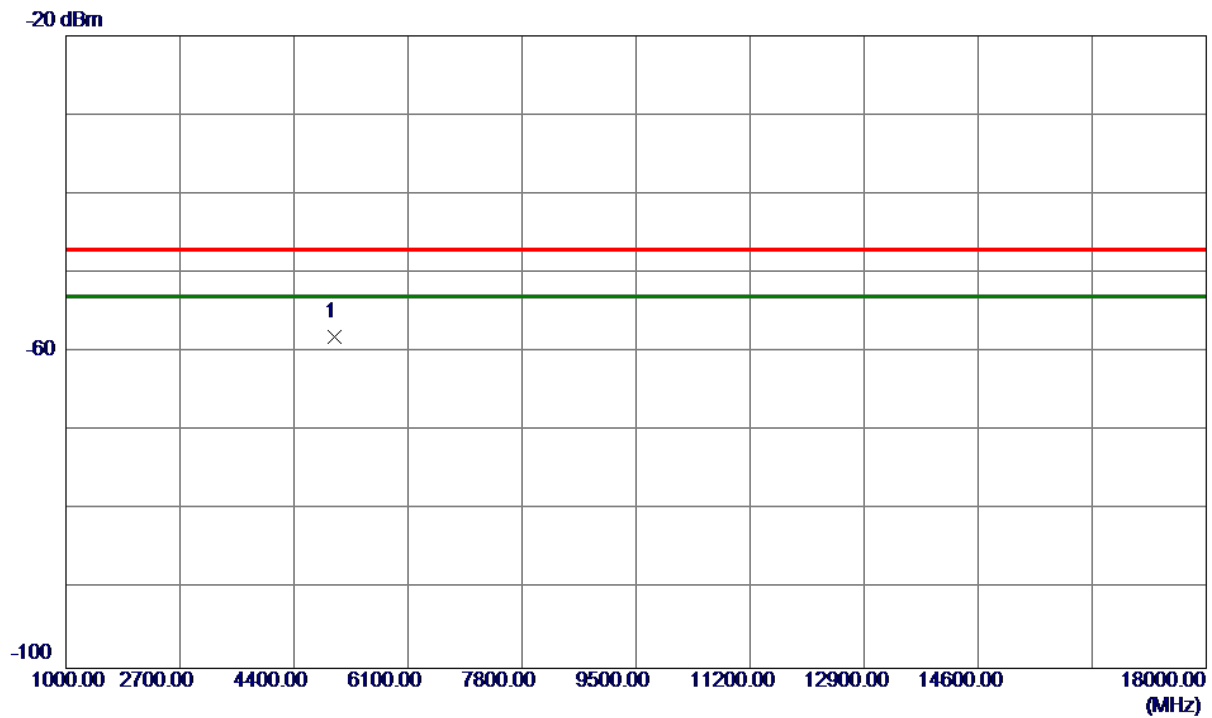
Test Mode	RX Mode IEEE 802.11ac(VHT40)_5190MHz	Polarization	Horizontal
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No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1	47.0720	-60.65	-7.39	-68.04	-57.00	-11.04	RMS	
2	148.6310	-64.66	-5.64	-70.30	-57.00	-13.30	RMS	
3	206.1520	-63.64	-9.20	-72.84	-57.00	-15.84	RMS	
4 *	362.4190	-59.93	-5.91	-65.84	-57.00	-8.84	RMS	
5	499.9650	-69.11	-3.73	-72.84	-57.00	-15.84	RMS	
6	874.9670	-72.91	1.48	-71.43	-57.00	-14.43	RMS	

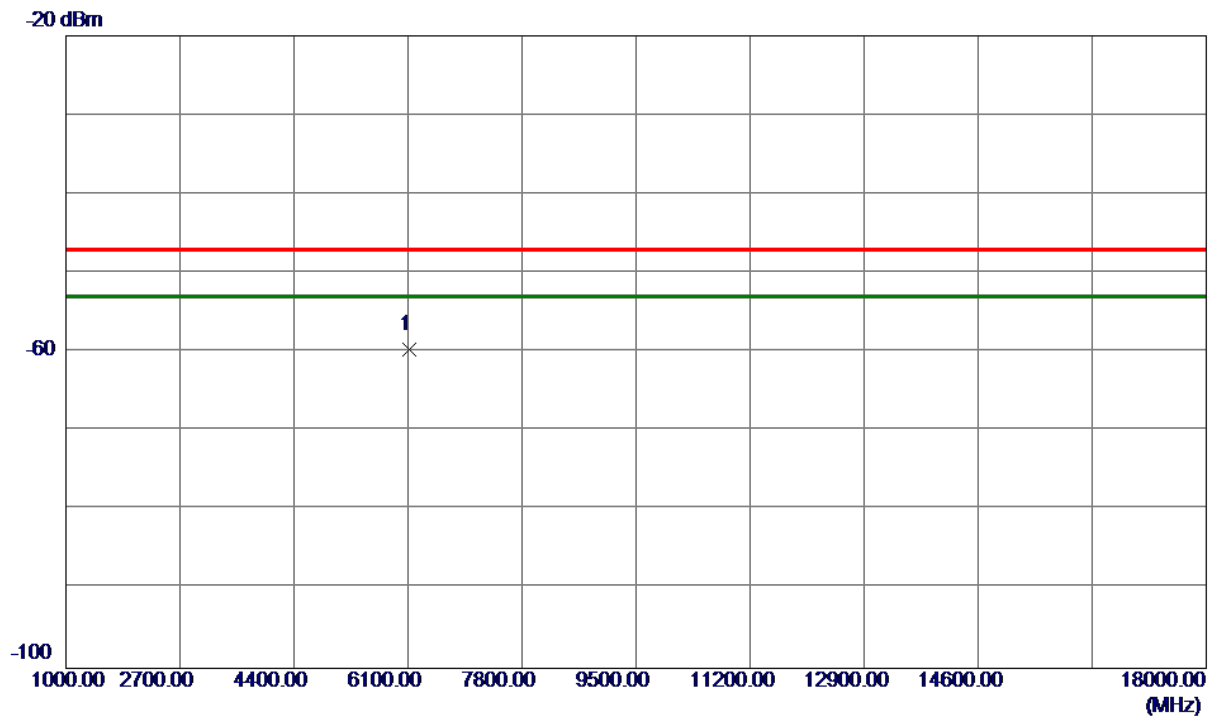
APPENDIX I - RECEIVER SPURIOUS EMISSIONS (ABOVE 1000MHZ)

Test Mode	RX Mode IEEE 802.11ac(VHT40)_5190MHz	Polarization	Vertical
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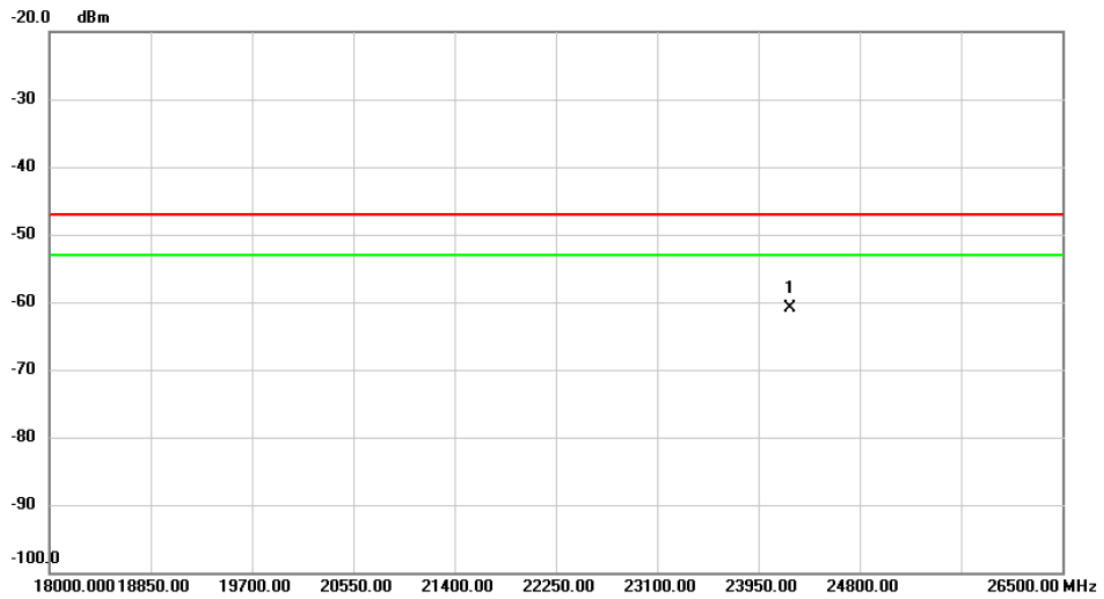
No.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
	MHz	dBm	dB	dBm	dBm	dB		
1 *	5000.1000	-59.11	1.02	-58.09	-47.00	-11.09	RMS	

Test Mode	RX Mode IEEE 802.11ac(VHT40)_5190MHz	Polarization	Horizontal
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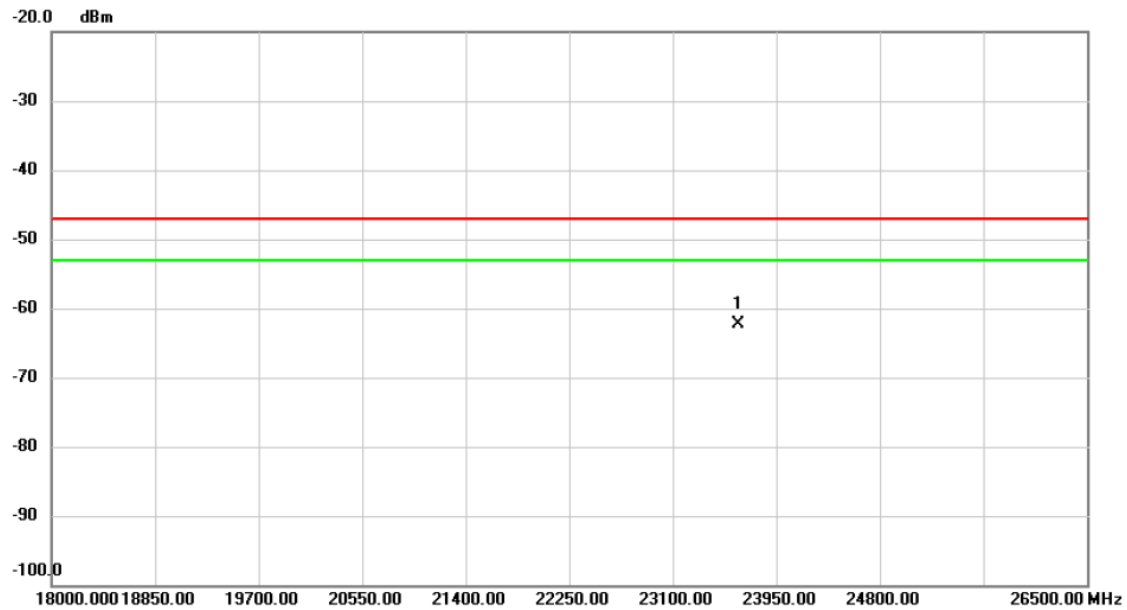
No.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure ment dBm	Limit dBm	Margin dB	Detector	Comment
1 *	6125.5000	-62.92	3.19	-59.73	-47.00	-12.73	RMS	

Test Mode	RX Mode IEEE 802.11ac(VHT40)_5190MHz	Polarization	Vertical
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No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1	*	24211.800	-66.54	5.65	-60.89	-47.00	-13.89	RMS	

Test Mode	RX Mode IEEE 802.11ac(VHT40)_5190MHz	Polarization	Horizontal
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No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	23635.925	-66.94	4.65	-62.29	-47.00	-15.29	RMS	

APPENDIX J - ADAPTIVITY

EUT Operational Mode	Frame Based Equipment	
	Load Based Equipment (CCA using 'energy detect')	√
	Load Based Equipment (CCA not using any of the mechanisms referenced)	

Clause	Test Parameter	Remark	Pass/Fail
4.2.7.3.1	Adaptive (Frame Based Equipment)	Not Applicable	N/A
4.2.7.3.2	Adaptive (Load Based Equipment)	Applicable	Pass
4.2.7.3.3	Short Control Signalling Transmissions	Applicable	Pass

Test Mode:	TX Mode_ IEEE 802.11ac(VHT20)_5180MHz,IEEE 802.11ax(HE40)_5190MHz
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Channel Occupancy Time and Priority Class Measured Results		
Freq.(MHz)	Channel Occupancy Time (ms)	Priority Class
5180	5.678	2
5190	5.401	2

Adaptivity Results				
Detection Threshold Level			-71.71 dBm/MHz	
Interference Signal	Freq.(MHz)		Short Control Signalling Transmissions (ms)	Number of Short Control Signalling Transmissions
AWGN	AC20	5180	0	0
OFDM		5180	0	0
LTE		5180	0	0
AWGN	AX40	5180	0	0
		5200	0	0
Limit			2.5	≤ 50
Result			Pass	

Note:

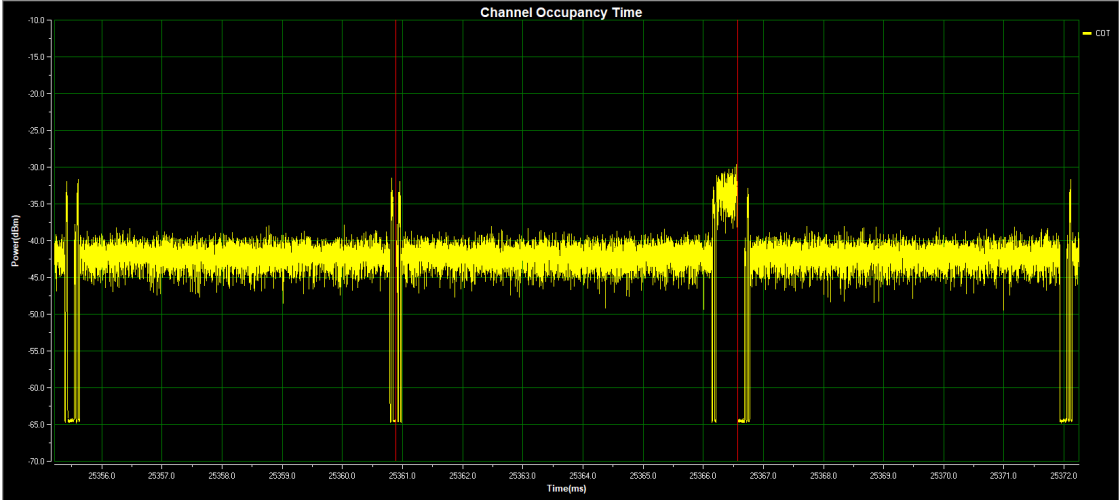
- For an EUT with a non-zero dBi antenna gain, the final interference detection threshold level T_L at the port of the radio module in a conducted test setup shall be adjusted by the gain of the bypassed antenna and is calculated using below formulas:

Threshold Level = -75 dBm/MHz + EUT Antenna Gain.

- Short Control Signalling Transmissions = 50 (ms) * Duty cycle (%)

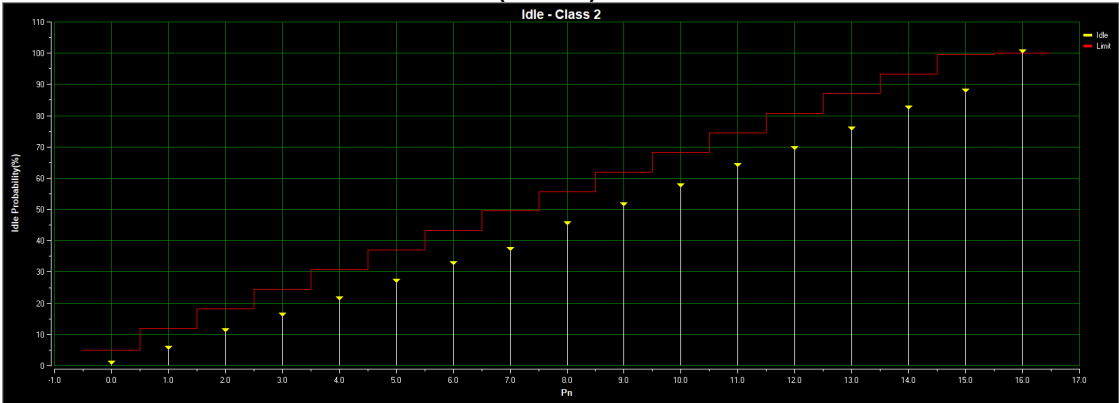
Single Channel device test results

IEEE 802.11ac(VHT20) Mode 5180 MHz



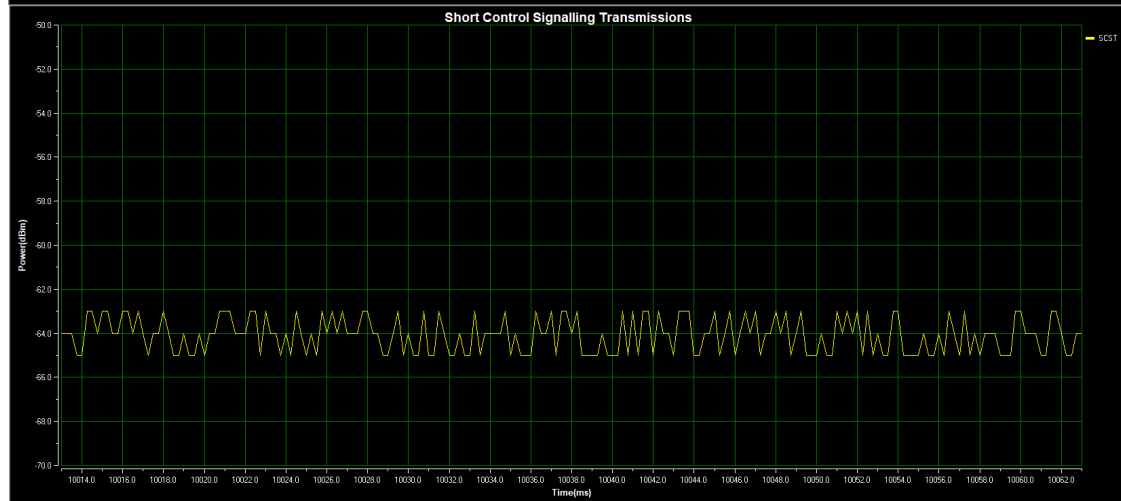
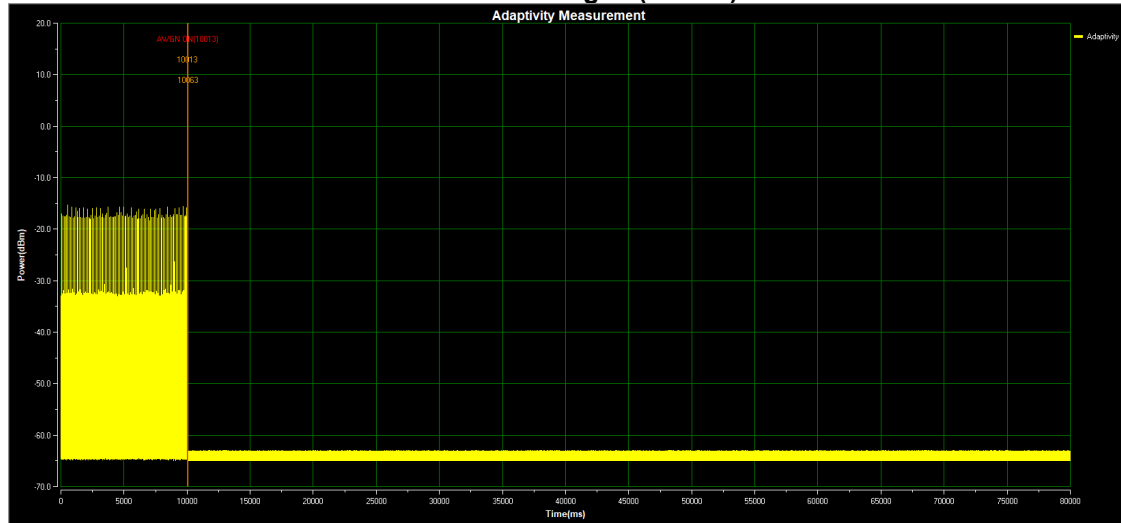
COT Number:10013 Idle Number:9765
Maximum COT (ms):5.678 Minimum Idle Time (us):27

IEEE 802.11ac(VHT20) Mode 5180 MHz



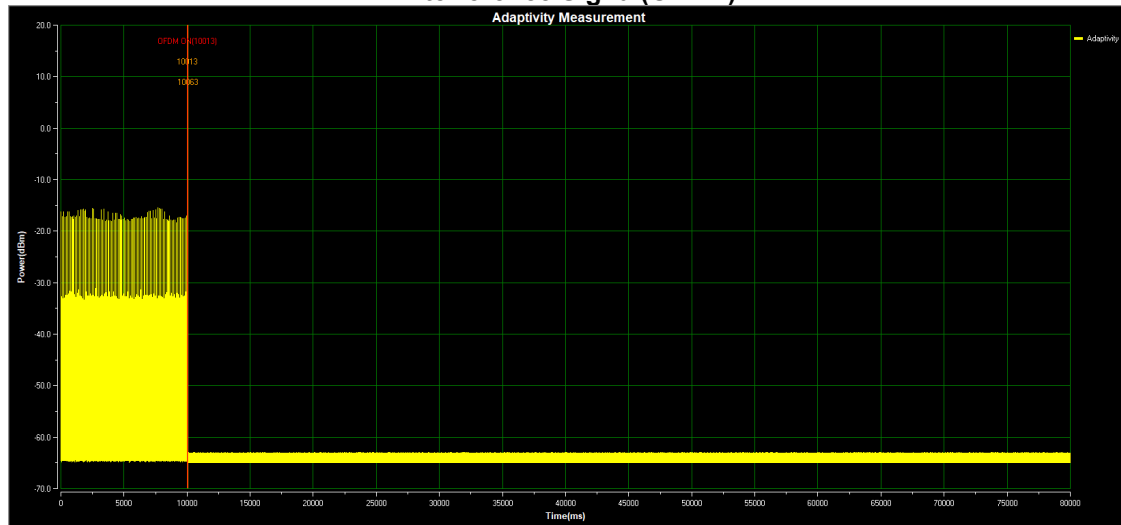
Pn	Idle Num	Result (%)	Limit (%)	Status
0	37	0.379	5	Pass
1	477	5.264	12	Pass
2	550	10.896	18.25	Pass
3	496	15.873	24.5	Pass
4	510	21.096	30.75	Pass
5	551	26.738	37	Pass
6	532	32.186	43.25	Pass
7	457	36.866	49.5	Pass
8	807	45.131	55.75	Pass
9	578	51.05	62	Pass
10	606	57.256	68.25	Pass
11	620	63.605	74.5	Pass
12	544	69.176	80.75	Pass
13	698	75.402	87	Pass
14	645	82.007	93.25	Pass
15	539	87.527	99.5	Pass
16	1218	100	100	Pass

IEEE 802.11ac(VHT20) Mode 5180 MHz Interference Signal(AWGN)



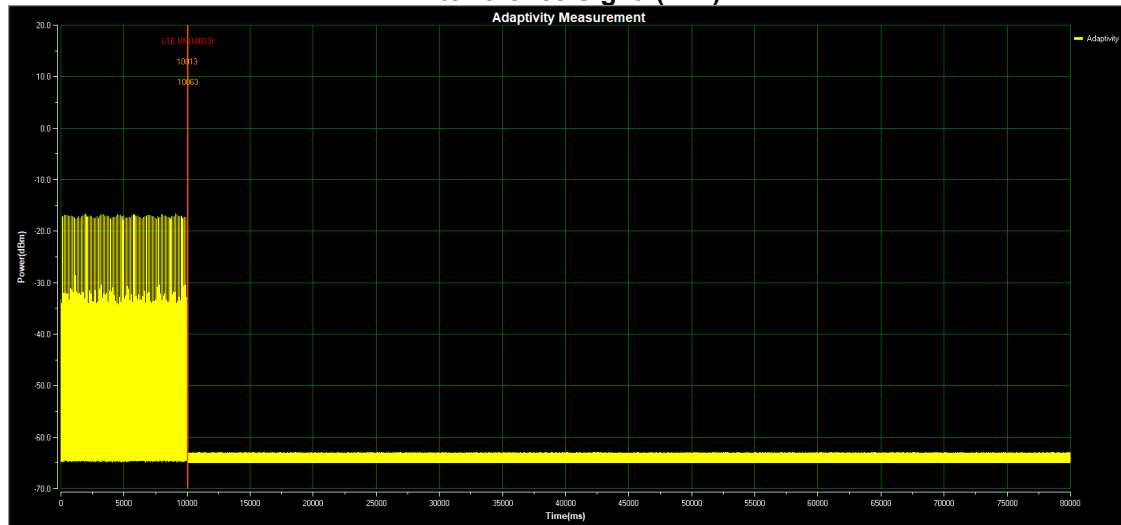
Duty Cycle(%):0.00 Short Control Signalling Transmissions Time(ms):0.00
Test Result:Pass

IEEE 802.11ac(VHT20) Mode 5180 MHz Interference Signal(OFDM)



Duty Cycle(%):0.00 Short Control Signalling Transmissions Time(ms):0.00
Test Result:Pass

IEEE 802.11ac(VHT20) Mode 5180 MHz Interference Signal(LTE)



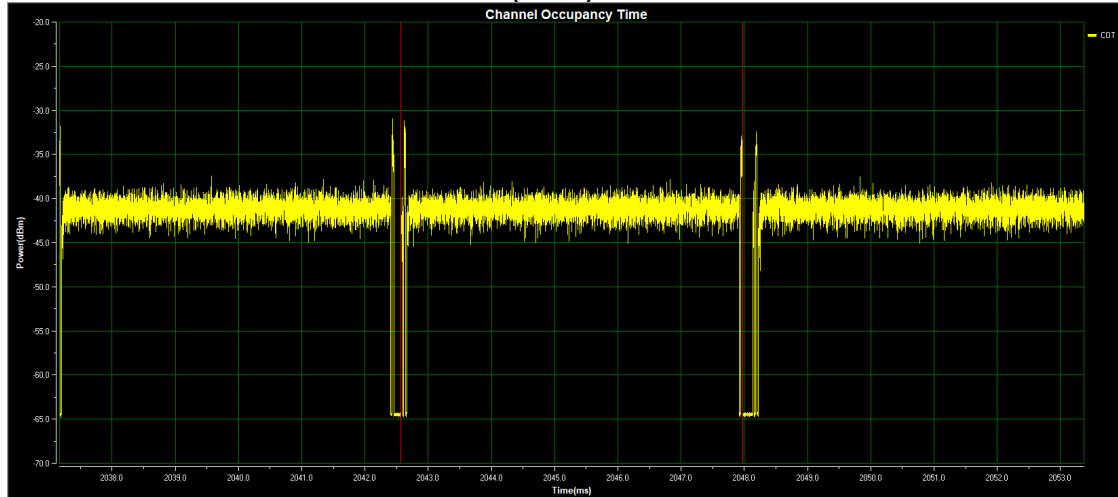
Duty Cycle(%):0.00 Short Control Signalling Transmissions Time(ms):0.00
Test Result:Pass

Multi-Channel device test results

Option 2:

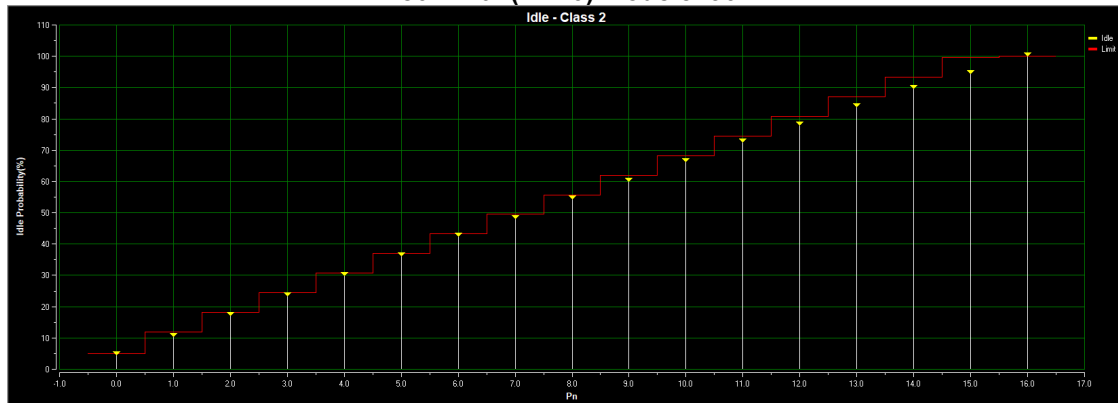
The EUT is set to a channel bandwidth of 40MHz with the primary operating channel 5180MHz. One additional adjacent 20MHz operating channel that constructs the full 40 MHz channel bandwidth is located at 5200 MHz. Data traffic is started and then an interfering signal is injected into the EUT at 5200 MHz.

IEEE 802.11ax(HE40) Mode 5190 MHz



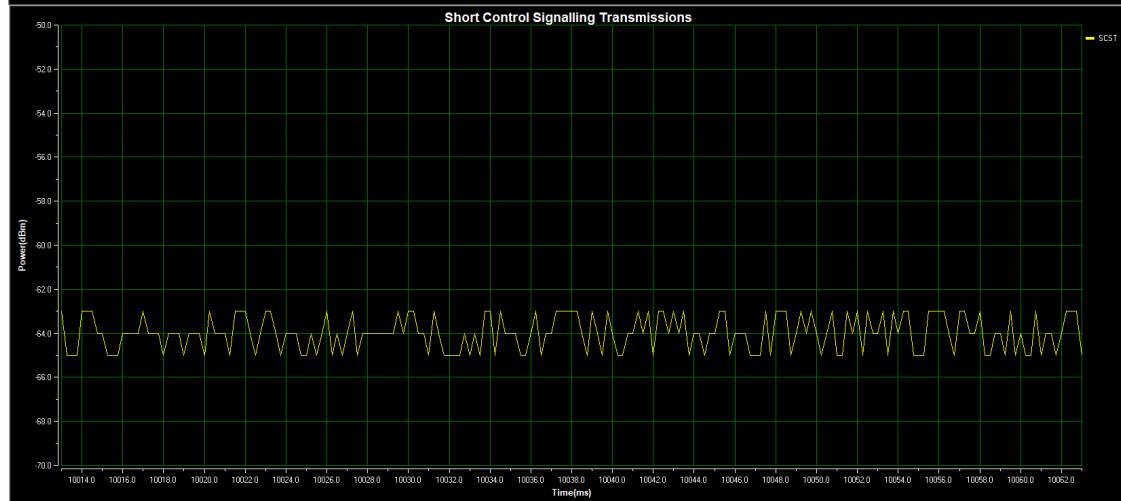
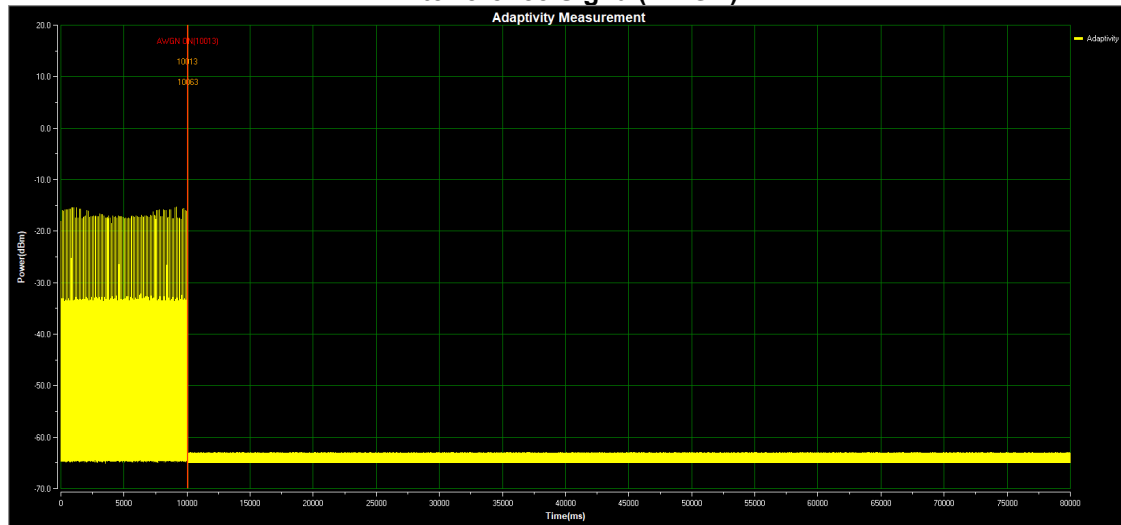
COT Number:10039 Idle Number:9798
Maximum COT(ms):5.401 Minimum Idle Time(us):28

IEEE 802.11ax(HE40) Mode 5190 MHz



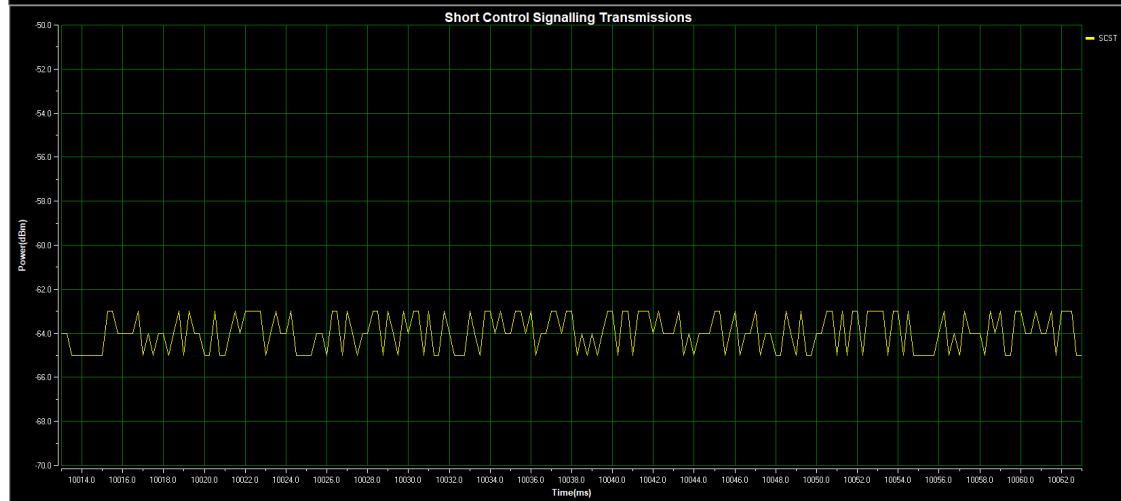
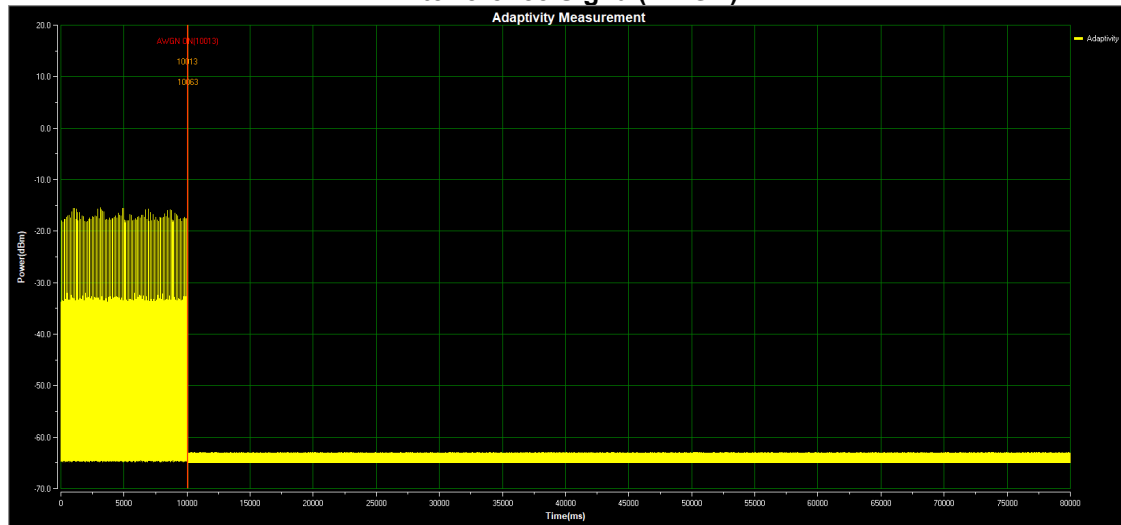
Pn	Idle Num	Result(%)	Limit(%)	Status
0	455	4.644	5	Pass
1	561	10.369	12	Pass
2	667	17.177	18.25	Pass
3	610	23.403	24.5	Pass
4	638	29.914	30.75	Pass
5	614	36.181	37	Pass
6	610	42.407	43.25	Pass
7	557	48.091	49.5	Pass
8	616	54.378	55.75	Pass
9	550	59.992	62	Pass
10	620	66.32	68.25	Pass
11	611	72.556	74.5	Pass
12	529	77.955	80.75	Pass
13	570	83.772	87	Pass
14	565	89.539	93.25	Pass
15	494	94.478	99.5	Pass
16	541	100	100	Pass

IEEE 802.11ax(HE40) Mode 5180 MHz Interference Signal(AWGN)



Duty Cycle(%):0.00 Short Control Signalling Transmissions Time(ms):0.00
Test Result:Pass

IEEE 802.11ax(HE40) Mode 5200 MHz Interference Signal(AWGN)



Duty Cycle(%):0.00 Short Control Signalling Transmissions Time(ms):0.00
Test Result:Pass

APPENDIX K - RECEIVER BLOCKING

Receiver Blocking Result						
P _{min} (dBm)	-88					
Modulation Mode	Operation Freq. (MHz)	Wanted Signal Mean Power from Companion Device (dBm) P _{min} + 6 dB	Blocking Signal Freq. (MHz)	Receiver Blocking Power (dBm)	PER (%)	Blocking Signal Level at which the Performance Criteria is no longer met(dBm) (See Note)
IEEE 802.11a 6 Mbps	5180	-82	5100	-53	0.00	-36
			4900	-47	1.60	-22
			5000	-47	0.00	-21
			5975	-47	0.00	-25
Limit	PER(Packet Error Rate) ≤ 10%					N/A
Result	Pass					Record Only

Note:

The performance criteria had been met, the level of the blocking signal at the UUT were further increased in steps of 1 dB until the level whereby the performance criteria were no longer met.

APPENDIX L - INFORMATION AS REQUIRED BY EN 301 893 V2.1.1, CLAUSE 5.4.1

In accordance with ETSI EN 301 893, clause 5.4.1, the following information is provided by the manufacturer.

a) The Nominal Channel Bandwidth(s):

Nominal Channel Bandwidth 1: 20 MHz

Nominal Channel Bandwidth 2: 40 MHz

Nominal Channel Bandwidth 3: 80 MHz

The associated centre frequencies: in clause 1.4 of the test report.

b) For Load Based Equipment that supports multi-channel operation:

☐ The LBE equipment supports Option 1 as described in clause 4.2.7.3.2.3

☒ The LBE equipment supports Option 2 as described in clause 4.2.7.3.2.3

• The (maximum) number of channels used for multi-channel operation: 4

• These channels are adjacent channels: ☒ Yes ☐ No

• In case of non-adjacent channels, whether or not these channels are in different sub-bands:

☐ Yes ☐ No

• for LBE equipment implementing option 1 (see clause 4.2.7.3.2.3), the number of channels used for multi-channel operation when performing the test described in clause 5.4.9.3.2.3.1: N/A

In case of multi-channel operation, further information defining the channels used for these simultaneous transmissions may be required.

c) The different transmit operating modes (see clause 5.3.3.2) (tick all that apply):

☐ **Operating mode 1:** Single Antenna Equipment

☐ a) Equipment with only 1 antenna

☐ b) Equipment with diversity antennas but only 1 antenna active at any moment in time

☐ c) Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1 antenna is used.

☐ **Operating mode 2:** Smart Antenna Systems - Multiple Antennas without beamforming

☐ a) Single spatial stream/Standard throughput

☐ b) High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 1

☐ c) High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 2

☐ d) High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 3

☐ e) High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 4

☒ **Operating mode 3:** Smart Antenna Systems - Multiple Antennas with beamforming

☒ a) Single spatial stream/Standard throughput

☒ b) High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 1

☒ c) High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 2

☒ d) High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 3

☐ e) High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 4

d) In case of Smart Antenna Systems or multiple antenna systems:

- The number of Receive chains: 2
- The number of Transmit chains: 2
- Equal power distribution among the transmit chains: ☒ Yes ☐ No
- In case of beamforming, the maximum (additional) beamforming gain: 3 dB

NOTE: Beamforming gain does not include the basic gain of a single antenna (assembly).

e) TPC feature available: ☒ Yes ☐ No

h) The DFS related operating mode(s) of the equipment: N/A

- ☐ Master
- ☐ Slave with radar detection
- ☐ Slave without radar detection

i) User access restrictions (please check box below to confirm):

☒ the equipment is constructed to comply with the requirements contained in clause 4.2.9 in ETSI EN 301 893 V2.1.1.

j) For equipment with Off-Channel CAC functionality:

The equipment has an "Off-Channel CAC" function: ☐ Yes ☒ No

If yes, specify the "Off-Channel CAC Time"

- For channels outside the 5 600 MHz to 5 650 MHz range: _____ hours
- If applicable, for channels (partially) within the 5 600 MHz to 5 650 MHz range: _____ hours

k) The equipment can operate in ad-hoc mode:

- ☒ no ad-hoc operation
- ☐ ad-hoc operation in the frequency range 5 150 MHz to 5 250 MHz without DFS
- ☐ ad-hoc operation with DFS

l) Operating Frequency Range(s):

Range 1: ☐ 5 150 MHz to 5 350 MHz and 5 470 MHz to 5 725 MHz

Range 2: ☐ 5 470 MHz to 5 725 MHz

Range 3: ☐ 5 150 MHz to 5 250 MHz (ad-hoc without DFS)

Range 4: ☒ other, please specify: _____

If the equipment has more than one Operating Frequency Range, tick all that apply.

m) The extreme operating temperature and supply voltage range that apply to the equipment:

☐ -20 °C to +55 °C (Outdoor & Indoor usage)

☐ 0 °C to +35 °C (Indoor usage only)

☒ Other: 0 °C to 40 °C.

The supply voltages of the stand-alone radio equipment or the supply voltages of the combined (host) equipment or test jig in case of plug-in devices:

Details provided are for the:

☒ stand-alone equipment

☐ combined (or host) equipment

☐ test jig

Supply Voltage ☒ AC mains State AC voltage: Minimum: 100V Nominal: 230V Maximum: 240V

☐ DC State DC voltage: Minimum: ... Nominal: ... Maximum: ...

In case of DC, indicate the type of power source:

☐ Internal Power Supply

☐ External Power Supply or AC/DC adapter

☐ Battery ☐ Nickel Cadmium

☐ Alkaline

☐ Nickel-Metal Hydride

☐ Lithium-Ion

☐ Lead acid (Vehicle regulated)

☐ Other

☐ Other _____

n) The test sequence/test software used (see also ETSI EN 301 893 (V2.1.1), clause 5.3.1.2):

IPOP 4.0

o) Type of Equipment:

☒ Stand-alone

☐ Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)

☐ Plug-in radio device (Equipment intended for a variety of host systems)

☐ Other _____

p) Adaptivity (Channel Access Mechanism):

☐ Frame Based Equipment

☒ Load Based Equipment

r) With regards to Adaptivity for Load Based Equipment:

- ☒ The Load Based Equipment operates as a Supervising Device
- ☐ The Load Based Equipment operates as a Supervised Device
- ☐ The Load Based Equipment can operate as a Supervising and as a Supervised Device
- ☐ The Load Based Equipment makes use of note 1 in table 7 or note 1 in table 8 of ETSI EN 301 893 V2.1.1

The Priority Classes implemented by the Load Based Equipment

- When operating as a Supervising Device

- ☐ Priority Class 4 (Highest priority)
- ☐ Priority Class 3
- ☒ Priority Class 2
- ☐ Priority Class 1 (Lowest priority)

- When operating as a Supervised Device

- ☐ Priority Class 4 (Highest priority)
- ☐ Priority Class 3
- ☐ Priority Class 2
- ☐ Priority Class 1 (Lowest priority)

- ☒ The Load Based Equipment operates as an Initiating Device
- ☐ The Load Based Equipment operates as an Responding Device
- ☐ The Load Based Equipment can operate as an Initiating Device and as a Responding Device

With regard to Energy Detection Threshold, the Load Based Equipment has implemented either option 1 of clause 4.2.7.3.2.5 of ETSI EN 301 893 V2.1.1 or option 2 of clause 4.2.7.3.2.5 of ETSI EN 301 893 V2.1.1:

- ☒ Option 1
- ☐ Option 2

Specify which protocol has been implemented:

- ☒ IEEE 802.11™
- ☐ Other: _____

s) The equipment supports a geo-location capability as defined in clause 4.2.10 of ETSI EN 301 893 V2.1.1:

- ☐ Yes
- ☒ No

End of Test Report