

FCC Test Report

Report No.: AGC11034210704FE06

FCC ID : 2AYHE-2103A

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION: WiFi IP Camera

BRAND NAME : Reolink

MODEL NAME : Reolink Argus PT Pro

APPLICANT: Reolink Innovation Limited

DATE OF ISSUE : Sep. 10, 2021

STANDARD(S) FCC Part 15.407

TEST PROCEDURE(S) KDB 789033 D02 v02r01

REPORT VERSION : V1.0

Attestation of Global & Co., Ltd



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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Sep. 10, 2021	Valid	Initial Release

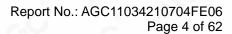
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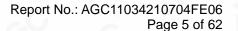
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1. VERIFICATION OF CONFORMITY

Applicant	Reolink Innovation Limited	
Address	FLAT/RM 705 7/F FA YUEN COMMERCIAL BUILDING 75-77 FA YUEN STREET MONG KOK KL HONG KONG	
Manufacturer	Reolink Innovation Limited	
Address	FLAT/RM 705 7/F FA YUEN COMMERCIAL BUILDING 75-77 FA YUEN STREET MONG KOK KL HONG KONG	
Factory	Shenzhen Reolink Technology Co., Ltd.	
Address	2-4th Floor, Building 2, YuanLing Industrial Park, ShangWu, Shiyan Street, Bao'an District, Shenzhen, China	
Product Designation	WiFi IP Camera	
Brand Name	Reolink	
Test Model	Reolink Argus PT Pro	
Date of test	Aug. 12, 2021 to Sep. 10, 2021	
Deviation	No any deviation from the test method	
Condition of Test Sample	Normal	
Test Result	Pass	
Report Template	AGCRT-US-BGN/RF	

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with requirement of FCC Part 15 Rules requirement.

Prepared By	Bibo zhang	
	Bibo Zhang (Project Engineer)	Sep. 10, 2021
Reviewed By	Max Zhang	
CC	Max Zhang (Reviewer)	Sep. 10, 2021
Approved By	Formaties	
^{3C} \GC	Forrest Lei (Authorized Officer)	Sep. 10, 2021

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as "WiFi IP Camera". It is designed by way of utilizing the OFDM technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	5150 MHz~5250MHz; 5725 MHz~5850MHz		
Test Frequency Range: For 802.11a/n-HT20: 5180~5240MHz, 5745~5825MHz			
Output Power	IEEE 802.11a20:14.58dBm; IEEE 802.11n(20):14.26dBm		
Modulation	BPSK, QPSK, 16QAM, 64QAM, 128QAM, 256QAM, OFDM		
Data Rate	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps		
Number of channels	4 channels of U-NII-1 Band 5 channels of U-NII-3 Band		
Hardware Version	V100		
Software Version	.469_21071700		
Antenna Designation	omnidirectional antenna (Comply with requirements of the FCC part 15.203)		
Antenna Gain	2.55dBi		
Power Supply	DC 9V by battery or DC 5V by adapter		

Note:

- 1. The EUT is designed as client devices operating without radar detection.
- 2. The device do not support TPC.

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2.2. TABLE OF CARRIER FREQUENCYS

For 5180~5240MHz:

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

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

For 5745~5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz		2 G 2

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2.3. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID**: **2AYHE-2103A** filing to comply with the FCC Part 15 requirements.

2.4. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

Others testing (listed at item 5.3) was performed according to the procedures in FCC Part 15.407 rules KDB 789033 D02

2.5. SPECIAL ACCESSORIES

Refer to section 5.2.

2.6. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2.7. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

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3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%

Item	Measurement Uncertainty	
Uncertainty of Conducted Emission for AC Port	$U_c = \pm 3.1 \text{ dB}$	
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 4.0 \text{ dB}$	
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.8 \text{ dB}$	
Uncertainty of total RF power, conducted	$U_c = \pm 0.8 \text{ dB}$	
Uncertainty of RF power density, conducted	$U_c = \pm 2.6 \text{ dB}$	
Uncertainty of spurious emissions, conducted	U _c = ±2 %	
Uncertainty of Occupied Channel Bandwidth	U _c = ±2 %	

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/Inspection

The test results

he test report.

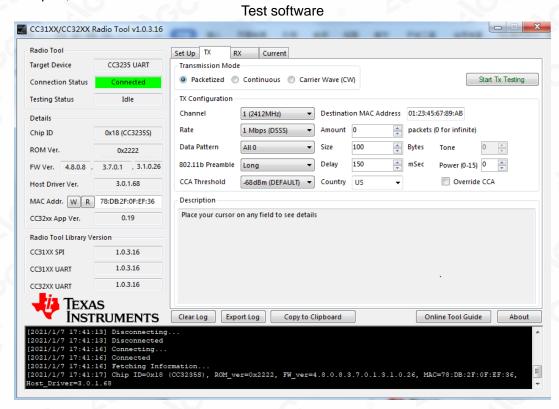


4. DESCRIPTION OF TEST MODES

Mode	Available channel	Tested channel	Modulation	Date rate (Mbps)
802.11a/n20	36,40,44,48, 149,153,157,161,165	36,40,48, 149,157,165	OFDM	6Mbps/MCS0

Note:

- The EUT has been set to operate continuously on tested channel individually, and the EUT is operating at its maximum duty cycle>or equal 98%.
- 2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.



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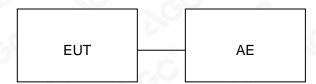


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5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure 1:



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	WiFi IP Camera	Reolink Argus PT Pro	2AYHE-2103A	EUT
2	Adapter	ZL-PCB0100020502000	N/A	AE
3	TF card	M203	N/A	AE

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.407	6dB Bandwidth	Compliant
§15.407	Emission Bandwidth	Compliant
§15.407	Maximum conducted output power	Compliant
§15.407	Conducted Spurious Emission	Compliant
§15.407	Maximum Conducted Output Power Density	Compliant
§15.209	Radiated Emission	Compliant
§15.407	Band Edges	Compliant
§15.207	Line Conduction Emission	Compliant

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6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd				
Location	I-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China				
Designation Number	CN1259				
FCC Test Firm Registration Number	975832				
A2LA Cert. No.	5054.02				
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA				

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	May 15, 2021	May 14, 2022
LISN	R&S	ESH2-Z5	100086	Jun. 09, 2021	Jun. 08, 2022
Test software	R&S	ES-K1 (Ver V1.71)	N/A	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2021	May 14, 2022
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 07, 2020	Dec. 06, 2021
Power sensor	Aglient	U2021XA	MY54110007	Mar. 23, 2020	Mar. 22, 2022
5GHz Fliter	EM Electronics	5150-5880MHz	N/A	Sep. 03, 2020	Sep. 02, 2022
Attenuator	ZHINAN	E-002	N/A	Sep.21, 2019	Sep. 20, 2021
Horn antenna	SCHWARZBECK	BBHA 9170	#768	May 22, 2020	May 21, 2022
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Apr. 23, 2021	Apr. 22, 2022
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	Sep. 03, 2020	Sep. 02, 2022
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 20, 2019	Sep. 19, 2021
ANTENNA	SCHWARZBECK	VULB9168	494	Sep. 20, 2019	Sep. 19, 2021
Test software	FARA	EZ-EMC (Ver RA-03A)	N/A	N/A	N/A

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7. MAXIMUM CONDUCTED OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

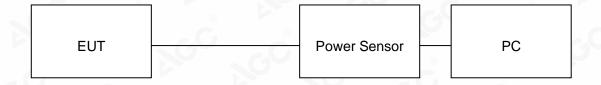
For average power test:

- 1. Connect EUT RF output port to power sensor through an RF attenuator.
- 2. Connect the power sensor to the PC.
- 3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 4. Record the maximum power from the software.

Note: The EUT was tested according to KDB 789033 for compliance to FCC 47CFR 15.407 requirements.

7.2. TEST SET-UP

AVERAGE POWER SETUP



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7.3. LIMITS AND MEASUREMENT RESULT

	Test Data of Conducted Output Power for band 5.15-5.25 GHz						
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail			
-0	5180	13.86	23.98	Pass			
802.11a	5200	14.45	23.98	Pass			
	5240	13.94	23.98	Pass			
	5180	13.42	23.98	Pass			
802.11n20	5200	13.83	23.98	Pass			
	5240	13.72	23.98	Pass			

	Test Data of Conducted Output Power for band 5.725-5.85 GHz						
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail			
802.11a	5745	14.58	30	Pass			
	5785	14.17	30	Pass			
100	5825	14.00	30	Pass			
©	5745	14.26	30	Pass			
802.11n20	5785	13.81	30	Pass			
	5825	11.63	30	Pass			

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8. BANDWIDTH

8.1. MEASUREMENT PROCEDURE

-6dB bandwidth (DTS bandwidth):

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on operation frequency individually.
- 3. Set RBW = 100kHz.
- 4. Set the VBW ≥3*RBW. Detector = Peak. Trace mode = max hold.
- 5. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.

99% occupied bandwidth:

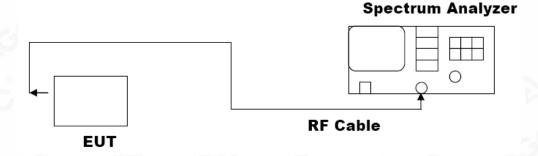
- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set Span = approximately 1.5 to 5 times the OBW, centered on a nominal channel
 The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video
 bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
- 4. Set SPA Trace 1 Max hold, then View.

-26dB Bandwidth:

- 1. Set RBW = approximately 1% of the emission bandwidth.
- 2. Set the VBW > RBW.
- 3. Detector = Peak.
- 4. Trace mode = max hold.
- 5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Note: The EUT was tested according to KDB 789033 for compliance to FCC 47CFR 15.407 requirements.

8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



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8.3. LIMITS AND MEASUREMENT RESULTS

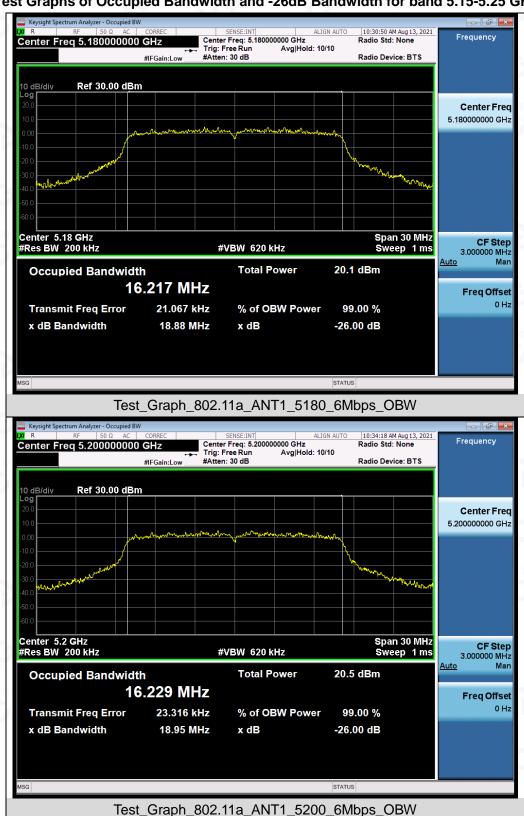
Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz							
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail		
802.11a	5180	16.217	18.88	N/A	Pass		
	5200	16.229	18.95	N/A	Pass		
	5240	16.233	18.84	N/A	Pass		
802.11n20	5180	17.374	20.11	N/A	Pass		
	5200	17.353	19.68	N/A	Pass		
	5240	17.350	19.68	N/A	Pass		

Test	Test Data of Occupied Bandwidth and DTS Bandwidth for band 5.725-5.85 GHz						
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	DTS Bandwidth (MHz)	Limits (MHz)	Pass or Fail		
802.11a	5745	16.232	15.14	0.5	Pass		
	5785	16.226	15.08	0.5	Pass		
100	5825	16.233	15.31	0.5	Pass		
802.11n20	5745	17.356	15.12	0.5	Pass		
	5785	17.353	15.12	0.5	Pass		
	5825	17.377	15.12	0.5	Pass		

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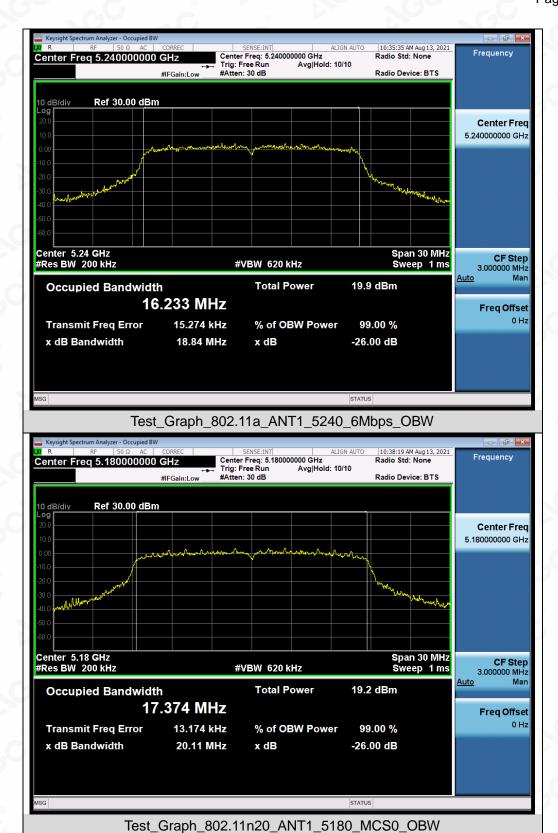
Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz



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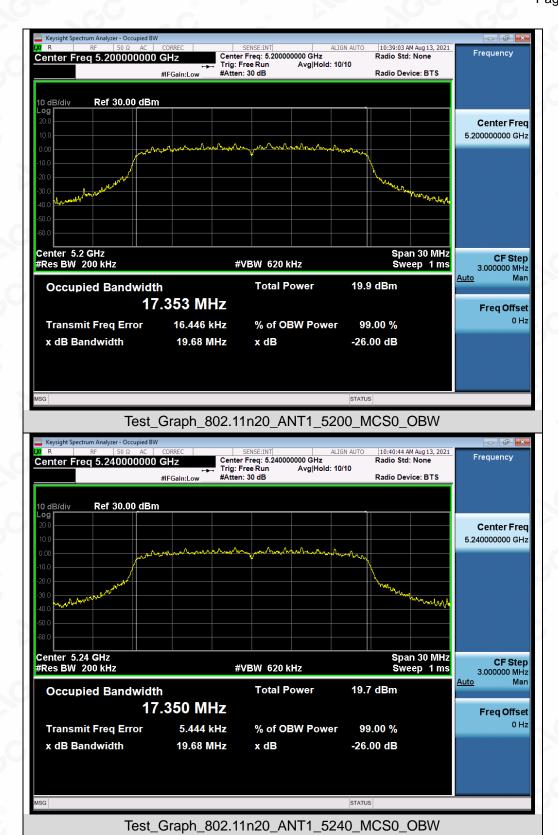
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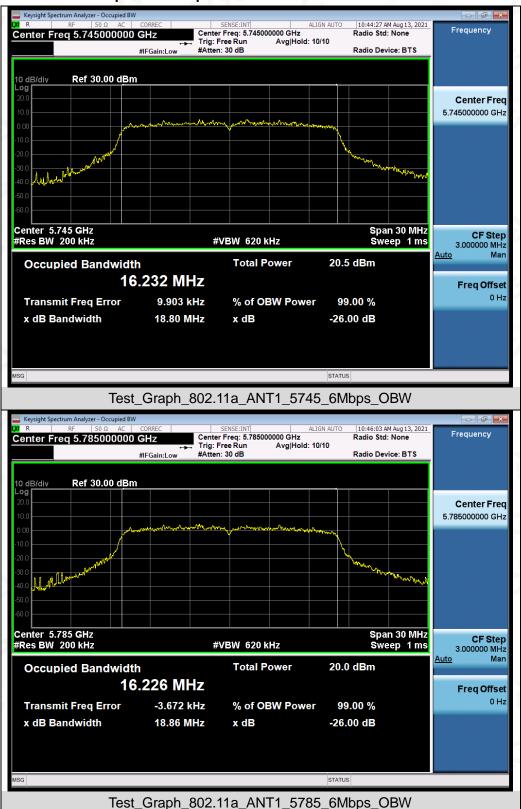




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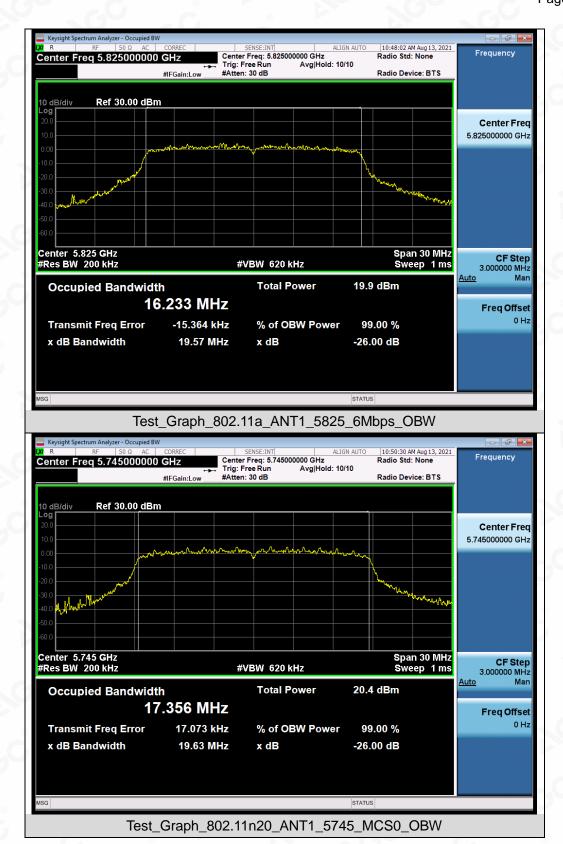


Test Graphs of Occupied Bandwidth for band 5.725-5.85 GHz



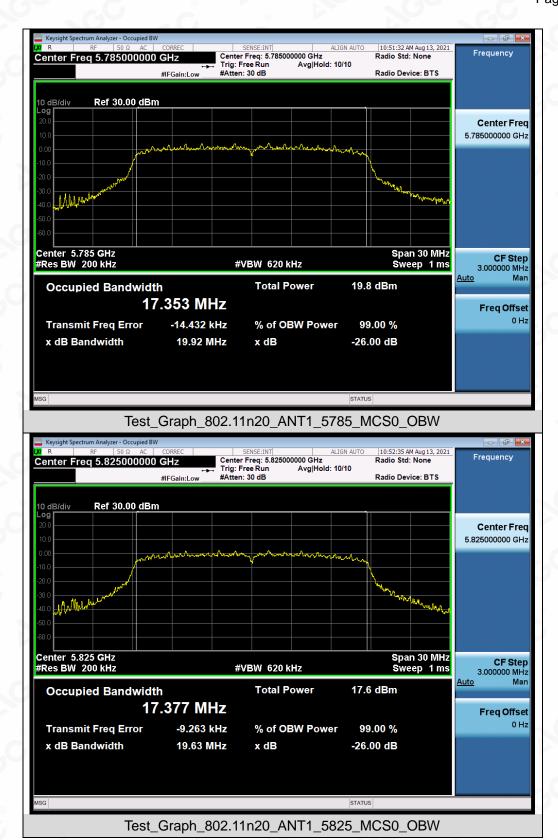
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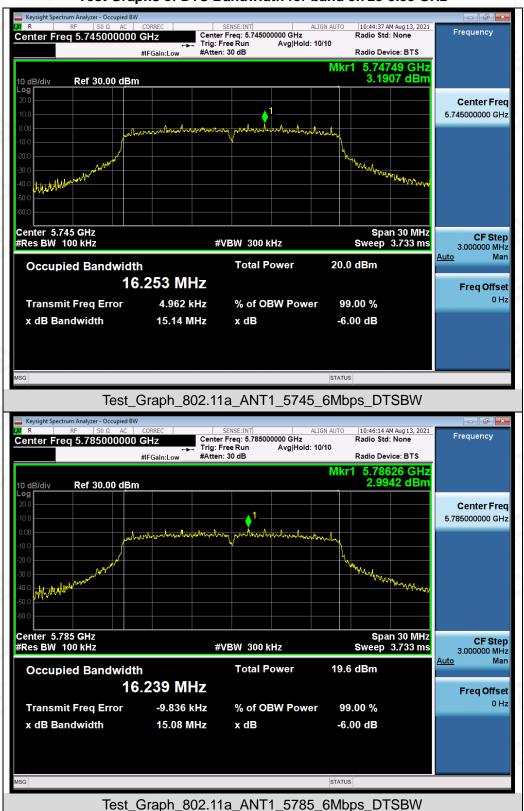




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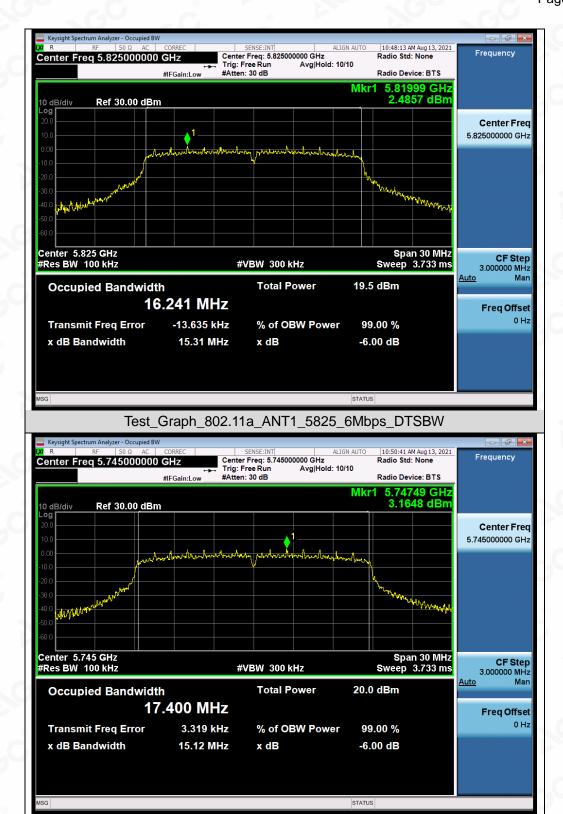


Test Graphs of DTS Bandwidth for band 5.725-5.85 GHz



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Test_Graph_802.11n20_ANT1_5745_MCS0_DTSBW





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Test_Graph_802.11n20_ANT1_5825_MCS0_DTSBW



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9. MAXIMUM CONDUCTED OUTPUT AVERAGE POWER SPECTRAL DENSITY

9.1. MEASUREMENT PROCEDURE

Refer to KDB 789033 section F

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer to Section 8.2.

9.3. MEASUREMENT EQUIPMENT USED

Refer to Section 6.

9.4. LIMITS AND MEASUREMENT RESULT

Test Data of Conducted Output Power Density for band 5.15-5.25 GHz						
Test Mode	Test Channel (MHz)	Average Power Density (dBm/MHz)	Limits (dBm/MHz)	Pass or Fail		
	5180	3.242	11	Pass		
802.11a	5200	3.863	11	Pass		
	5240	3.127	11	Pass		
	5180	2.539	11	Pass		
802.11n20	5200	3.013	11	Pass		
	5240	2.860	11	Pass		

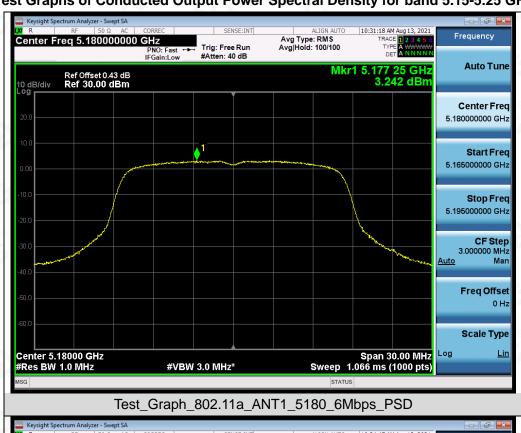
	Test Data of Conducted Output Power Density for band 5.725-5.85 GHz								
Test Mode	Test Channel (MHz)	Average Power Density (dBm/100kHz)	Average Power Density (dBm/500kHz)	Limits (dBm/500kHz)	Pass or Fail				
	5745	-4.811	2.179	30	Pass				
802.11a	5785	-5.363	1.627	30	Pass				
- GO	5825	-5.688	1.302	30	Pass				
	5745	-5.546	1.444	30	Pass				
802.11n20	5785	-6.147	0.843	30	Pass				
	5825	-8.053	-1.063	30	Pass				

Note:1. Power density(dBm/500kHz) = Power density(dBm/100kHz) +10*log(500/100).

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Test Graphs of Conducted Output Power Spectral Density for band 5.15-5.25 GHz

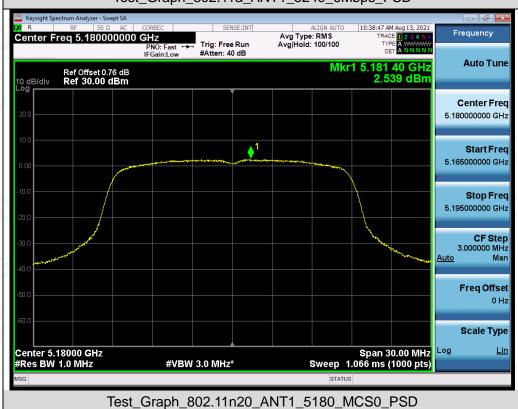




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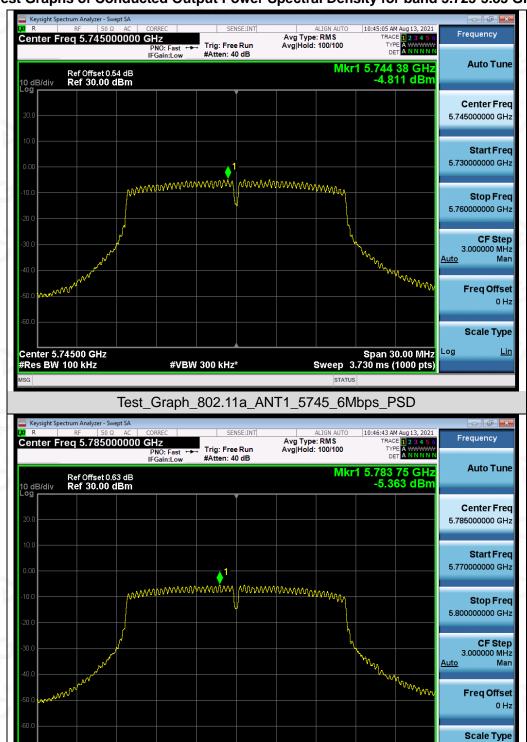
<u>Lin</u>

Span 30.00 MHz

Sweep 3.730 ms (1000 pts)



Test Graphs of Conducted Output Power Spectral Density for band 5.725-5.85 GHz



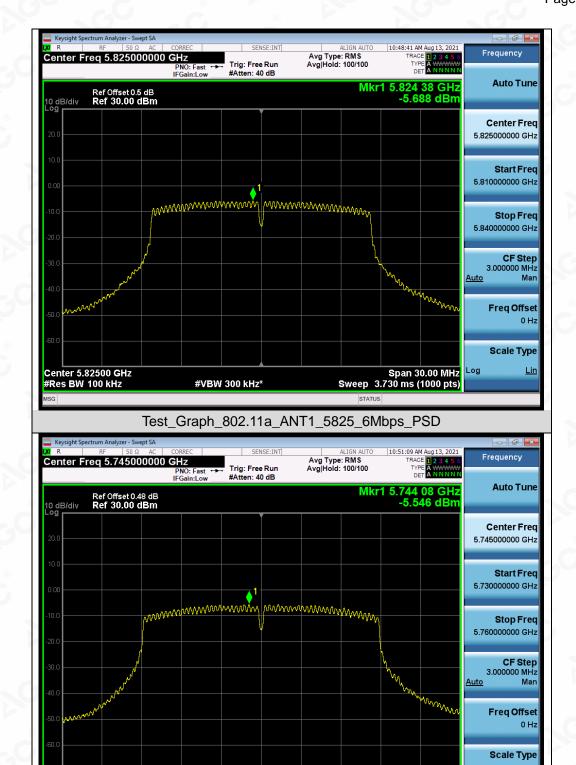
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Test_Graph_802.11a_ANT1_5785_6Mbps_PSD

#VBW 300 kHz*

Center 5.78500 GHz #Res BW 100 kHz





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Test_Graph_802.11n20_ANT1_5745_MCS0_PSD

#VBW 300 kHz*

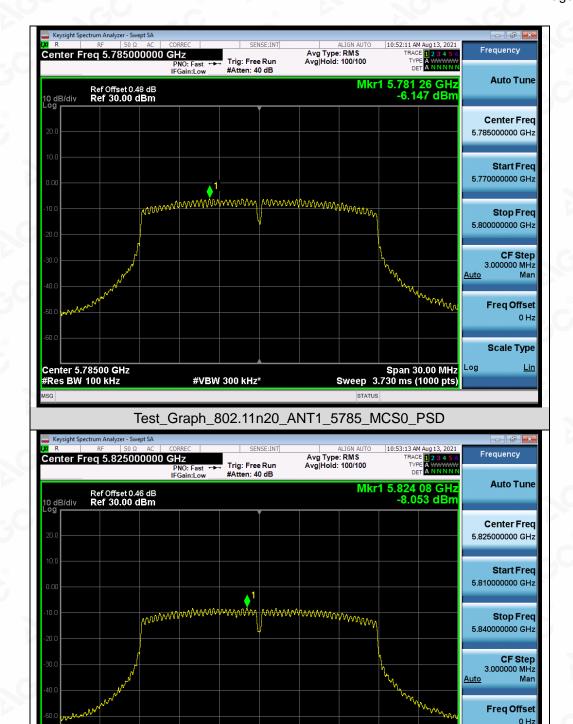
Span 30.00 MHz Sweep 3.730 ms (1000 pts)

Center 5.74500 GHz #Res BW 100 kHz

Scale Type

Span 30.00 MHz Sweep 3.730 ms (1000 pts)





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Test_Graph_802.11n20_ANT1_5825_MCS0_PSD

#VBW 300 kHz*

Center 5.82500 GHz #Res BW 100 kHz



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10. CONDUCTED SPURIOUS EMISSION

10.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to KDB 789033 for compliance to FCC 47CFR 15.407 requirements.

10.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2.

10.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

10.4. LIMITS AND MEASUREMENT RESULT

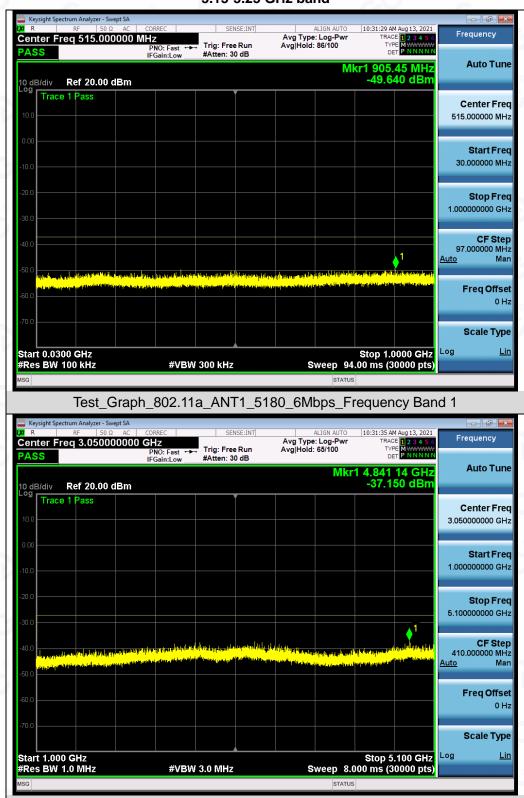
LIMITS AND MEASUREMENT RESULT						
	Measurement R	esult				
Applicable Limits	Test channel	Criteri a				
-27dBm/MHz	5150MHz-5250MH z	PASS				
All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.	5725MHz-5850MH z	PASS				

Note: All the 20MHz bandwidth modulation had been tested, the 802.11a20 was the worst case and record in his test report. All the 40MHz bandwidth modulation had been tested, the 802.11N40 was the worst case and record in his test report. All the 80MHz bandwidth modulation had been tested, the 802.11AC80 was the worst case and record in his test report.

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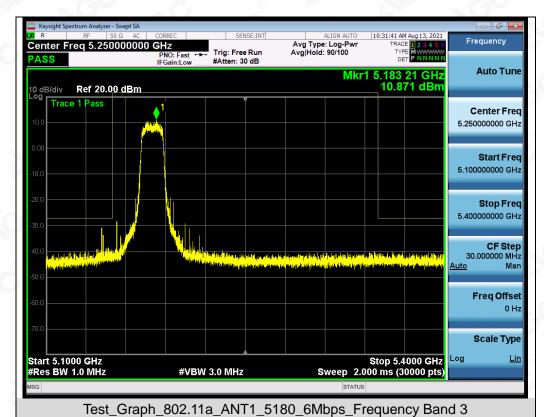
Test Graphs of Spurious Emissions outside of the 5.15-5.35 GHz band for transmitters operating in the 5.15-5.25 GHz band



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Test_Graph_802.11a_ANT1_5180_6Mbps_Frequency Band 2



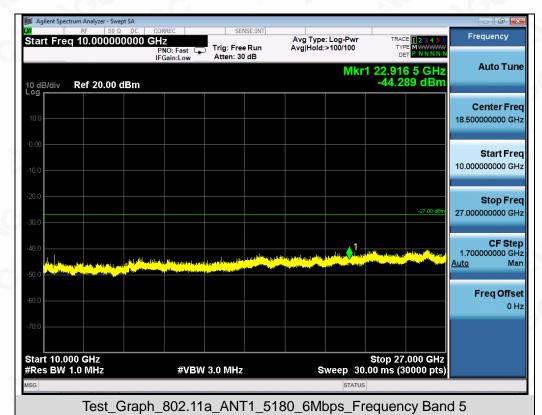




Test_Graph_802.11a_ANT1_5180_6Mbps_Frequency Band 4

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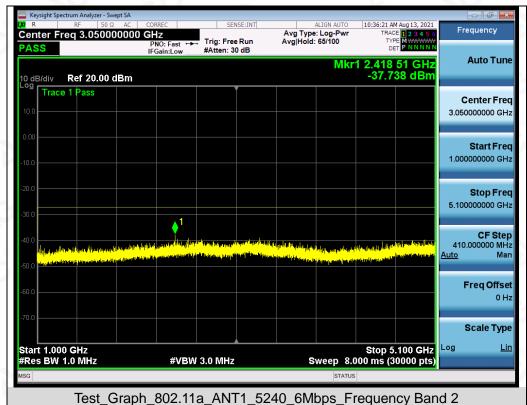


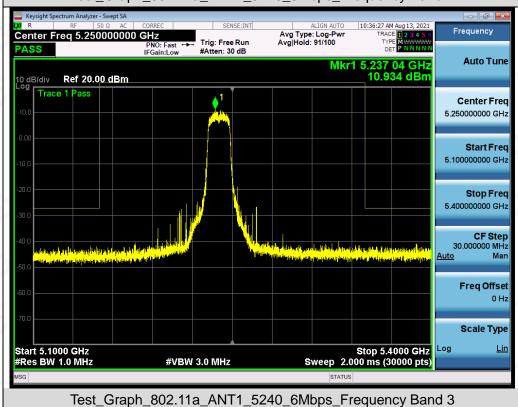


Test_Graph_802.11a_ANT1_5240_6Mbps_Frequency Band 1

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