

FCC Test Report

Report No.: AGC11034210704FE05

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. 15, 2021

STANDARD(S)

TEST PROCEDURE(S)

: FCC Part 15.247

REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	1	Sep. 15, 2021	Valid	Initial Release

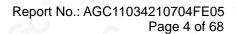
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1. VERIFICATION OF CONFORMITY

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. 15, 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 radiated emission limits of FCC Rules Part 15.247.

Prepared By	Bibo zhang	
Page /	Bibo Zhang (Project Engineer)	Sep. 15, 2021
Reviewed By	Max Zhang	حث أ
	Max Zhang (Reviewer)	Sep. 15, 2021
Approved By	Formerles	
NGC	Forrest Lei (Authorized Officer)	Sep. 15, 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 DSSS and OFDM technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Francisco 2 442 CHz 2 462 CHz			
Operation Frequency	2.412 GHz~2.462GHz		
Output Power (Average)	IEEE 802.11b:15.18dBm; IEEE 802.11g:14.19dBm;		
Output Fower (Average)	IEEE 802.11n(20):13.90dBm		
Outroot Bosses (Book)	IEEE 802.11b:17.67dBm; IEEE 802.11g:21.78dBm;		
Output Power (Peak)	IEEE 802.11n(20):21.57dBm		
Modulation	DSSS(DBPSK/DQPSK/CCK); OFDM(BPSK/QPSK/16-QAM/64-QAM)		
Number of channels	11		
Hardware Version	V100		
Software Version	.469_21071700		
Antenna Designation	omnidirectional antenna (Comply with requirements of the FCC part 15.203)		
Antenna Gain	2.89dBi		
Power Supply	DC 9V by battery or DC 5V by adapter		

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
60 6	. 1	2412 MHZ
	2	2417 MHZ
0	3	2422 MHZ
GO CO	4	2427 MHZ
	5	2432 MHZ
2400~2483.5MHZ	6	2437 MHZ
- CO	7	2442 MHZ
	8	2447 MHZ
	9	2452 MHZ
10° CC	10	2457 MHZ
	11,	2462 MHZ

Note: For 20MHZ bandwidth system use Channel 1 to Channel 11.

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2.3. IEEE 802.11N MODULATION SCHEME

MCS Index	Nss Modulatio		ulation R	R NBPSC	NCBPS		NDBPS		Data rate(Mbps) 800nsGl	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5
1 💿	1	QPSK	1/2	2	104	216	52	108	13.0	27.0
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0
6	1	64-QAM	3/4	6	312	648	234	489	58.5	121.5
7	<u></u> 1	64-QAM	5/6	6	312	648	260	540	65.0	135.0

Symbol	Explanation	
NSS	Number of spatial streams	
R	Code rate	
NBPSC	Number of coded bits per single carrier	
NCBPS	Number of coded bits per symbol	
NDBPS	Number of data bits per symbol	
GI	Guard interval	

2.4. 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.

2.5. TEST METHODOLOGY

KDB 558074 D01 15.247 Meas Guidance v05: Guidance for compliance measurements on Digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules

ANSI C63.10:2013: American National Standard for Testing Unlicensed Wireless Devices

2.6. SPECIAL ACCESSORIES

Refer to section 5.2.

2.7. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

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2.8. 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	$U_c = \pm 2 \%$		
Uncertainty of Occupied Channel Bandwidth	U _c = ±2 %		

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4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel transmitting (TX)
2	Middle channel transmitting (TX)
3	High channel transmitting (TX)
Note:	

Transmit by 802.11b with Date rate (1/2/5.5/11)

Transmit by 802.11g with Date rate (6/9/12/18/24/36/48/54)

Transmit by 802.11n (20MHz) with Date rate (6.5/13/19.5/26/39/52/58.5/65)

The test channel for 20MHZ bandwidth system is channel 1, 6 and 11.

Note:

- The EUT has been set to operate continuously on the lowest, middle and highest operation frequency 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.

CC31XX/CC32XX Radio Tool v1.0.3.16 Set Up TX CC3235 UART Target Device Transmission Mode Packetized Continuous Carrier Wave (CW) Start Tx Testing Connection Status Testing Status TX Configuration Destination MAC Address 01:23:45:67:89:AB Details packets (0 for infinite) Rate 1 Mbps (DSSS) Chip ID 0x18 (CC3235S) Data Pattern Bytes ROM Ver. 0x2222 3.7.0.1 . 3.1.0.26 802.11b Preamble Delay FW Ver. 4.8.0.8 CCA Threshold -68dBm (DEFAULT) ▼ Country US 3.0.1.68 78:DB:2F:0F:EF:36 MAC Addr. W R Place your cursor on any field to see details CC31XX SPI 1.0.3.16 1.0.3.16 CC31XX UART 1.0.3.16 Texas Clear Log Export Log Copy to Clipboard Online Tool Guide INSTRUMENTS ID=0x18 (CC3235S), ROM_ver=0x2222, FW_ver=4.8.0.8.3.7.0.1.3.1.0.26, MAC=78:DB:2F:0F:EF:36,

Test software

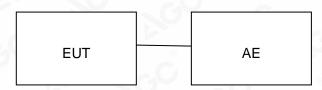
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5. SYSTEM TEST CONFIGURATION 5.1. CONFIGURATION OF EUT SYSTEM

Configure:



5.2. EQUIPMENT USED IN EUT SYSTEM

ItemEquipment1WiFi IP Camera		Model No.	ID or Specification	Remark
		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	
§15.247	Output Power	Compliant	
§15.247	6 dB Bandwidth	Compliant	
§15.247	Conducted Spurious Emission	Compliant	
§15.247	Maximum Conducted Output Power Spectral Density	Compliant	
§15.209	Radiated Emission	Compliant	
§15.247	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	1-2/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
2.4GHz Fliter	Micro-tronics	087	N/A	Mar. 23, 2020	Mar. 22, 2022
Attenuator	Weinachel Corp	58-30-33	N/A	Sep. 03, 2020	Sep. 02, 2022
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.21, 2019	Sep. 20, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	00034609	May 22, 2020	May 21, 2022
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	Apr. 23, 2021	Apr. 22, 2022
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 03, 2020	Sep. 02, 2022
ANTENNA	SCHWARZBECK	VULB9168	D69250	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. OUTPUT POWER

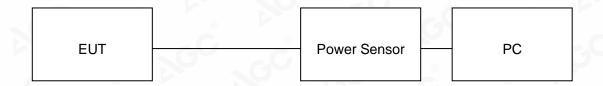
7.1. MEASUREMENT PROCEDURE

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 ANSI C63.10 (2013) for compliance to FCC 47CFR 15.247 requirements.

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



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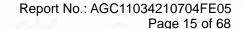


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7.3. LIMITS AND MEASUREMENT RESULT

Test Data of Conducted Output Power					
Test Mode	Test Channel (MHz)	Average Power (dBm)	Peak Power (dBm)	Limits (dBm)	Pass or Fail
a.C	2412	15.18	17.67	≤30	Pass
802.11b	2437	14.94	17.57	≤30	Pass
	2462	13.76	16.25	≤30	Pass
802.11g	2412	14.19	21.78	≤30	Pass
	2437	13.95	21.72	≤30	Pass
	2462	13.51	21.25	≤30	Pass
802.11n20	2412	13.81	21.51	≤30	Pass
	2437	13.90	21.57	≤30	Pass
	2462	13.04	20.80	≤30	Pass

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8. BANDWIDTH

8.1. MEASUREMENT PROCEDURE

6dB bandwidth:

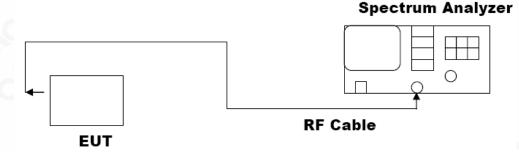
- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 kHz, VBW≥3×RBW.
- 4. Set SPA Trace 1 Max hold, then View.

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 2 to 5 times the 20 dB bandwidth, centered on a hoping 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.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

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



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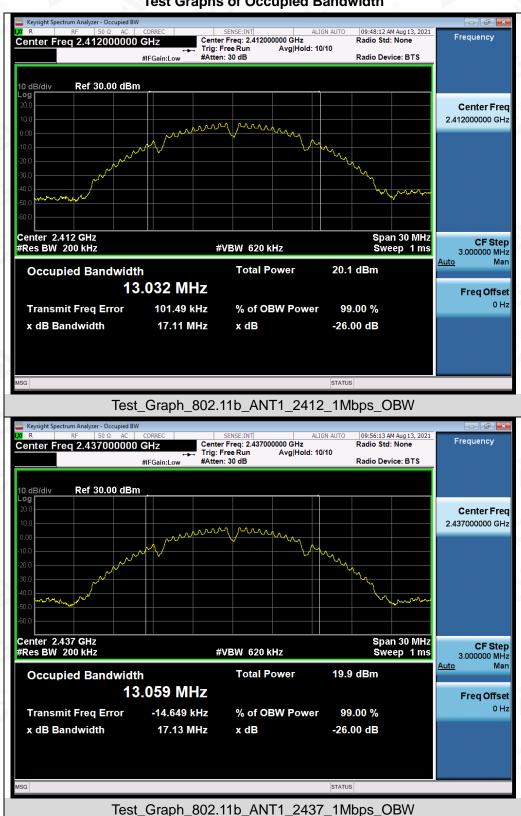
8.3. LIMITS AND MEASUREMENT RESULTS

	Test Data of Occupied Bandwidth and DTS Bandwidth						
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-6dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail		
-0	2412	13.032	8.064	≥0.5	Pass		
802.11b	2437	13.059	8.060	≥0.5	Pass		
	2462	13.077	8.060	≥0.5	Pass		
- 6	2412	16.208	15.33	≥0.5	Pass		
802.11g	2437	16.415	15.28	≥0.5	Pass		
	2462	16.442	15.13	≥0.5	Pass		
802.11n20	2412	17.341	15.13	≥0.5	Pass		
	2437	17.337	15.13	≥0.5	Pass		
	2462	17.338	15.43	≥0.5	Pass		

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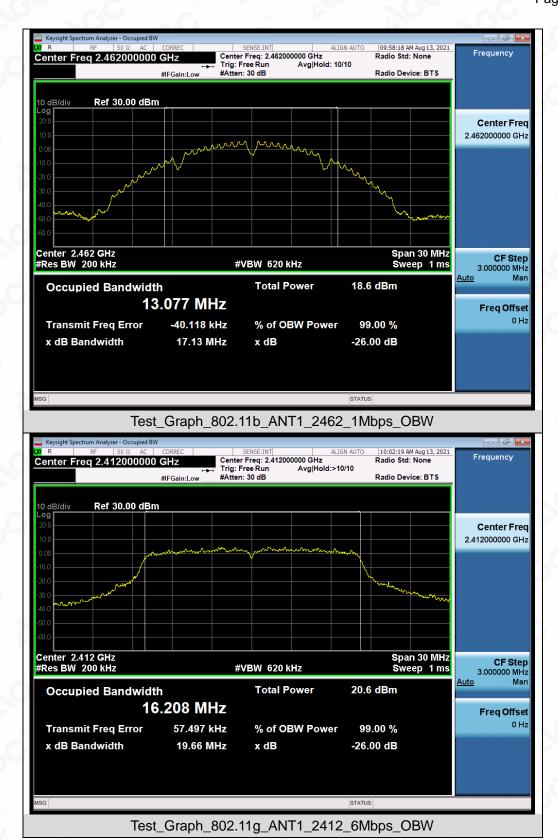


Test Graphs of Occupied Bandwidth



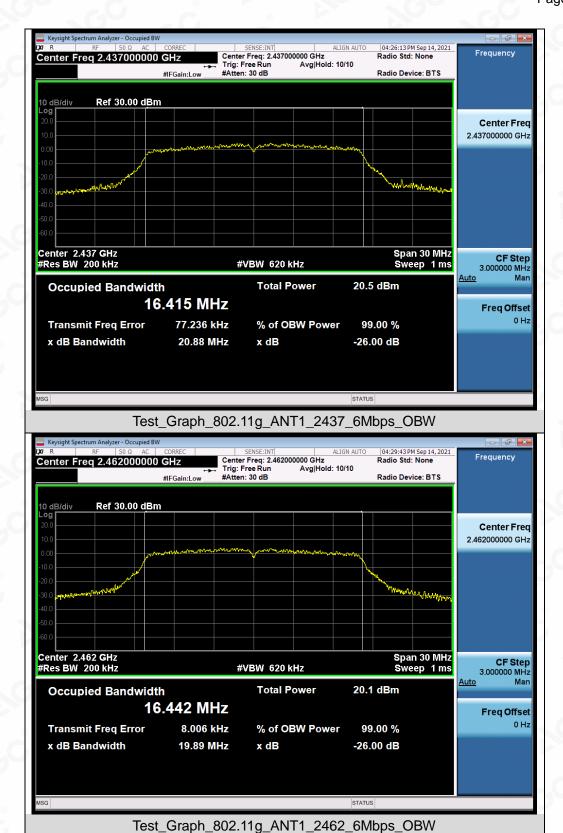
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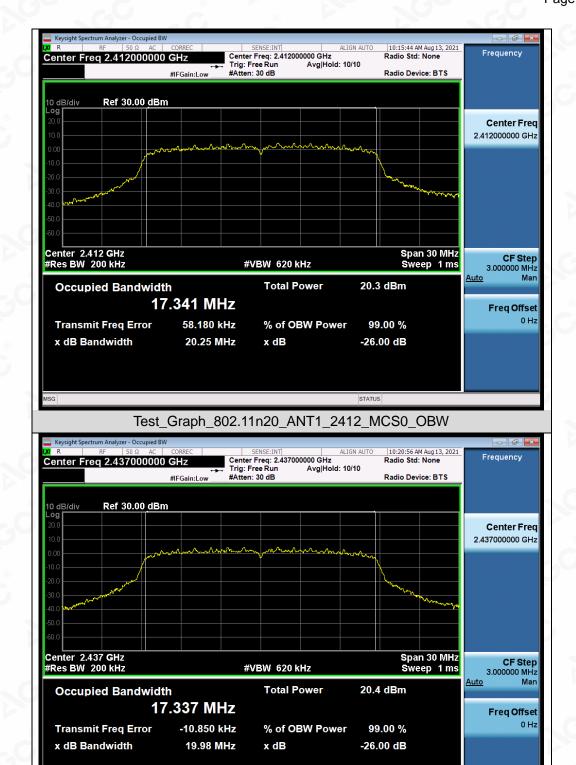
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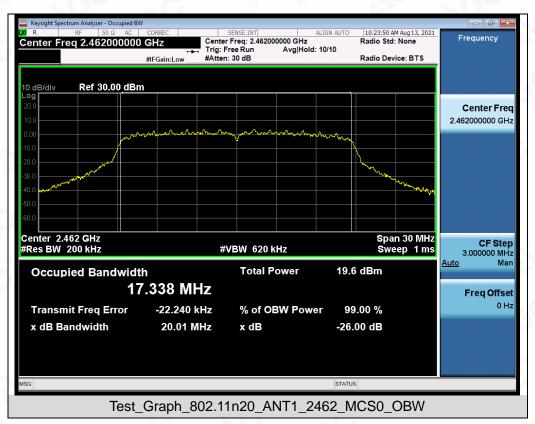




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Test_Graph_802.11n20_ANT1_2437_MCS0_OBW





Test Graphs of DTS Bandwidth



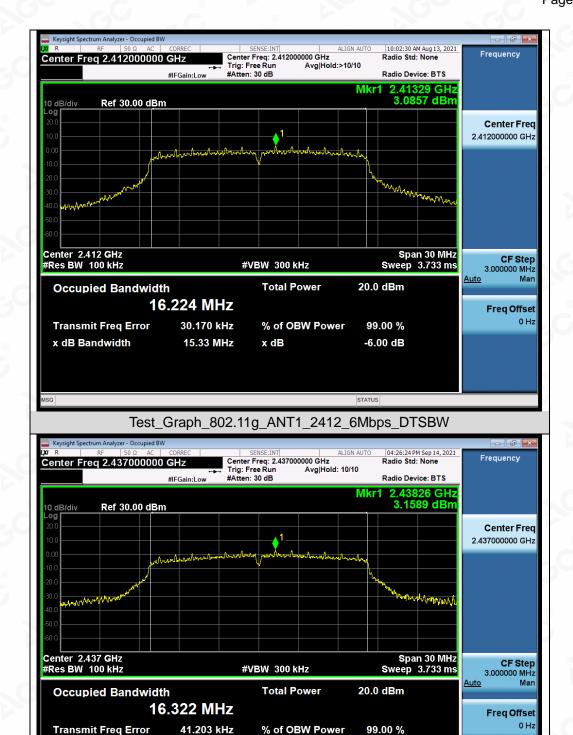
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Test_Graph_802.11g_ANT1_2437_6Mbps_DTSBW

x dB

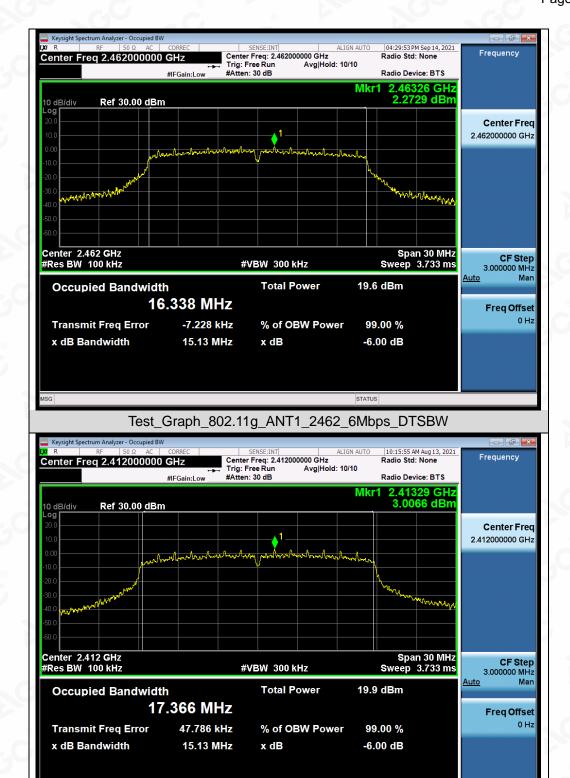
-6.00 dB

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15.28 MHz

x dB Bandwidth

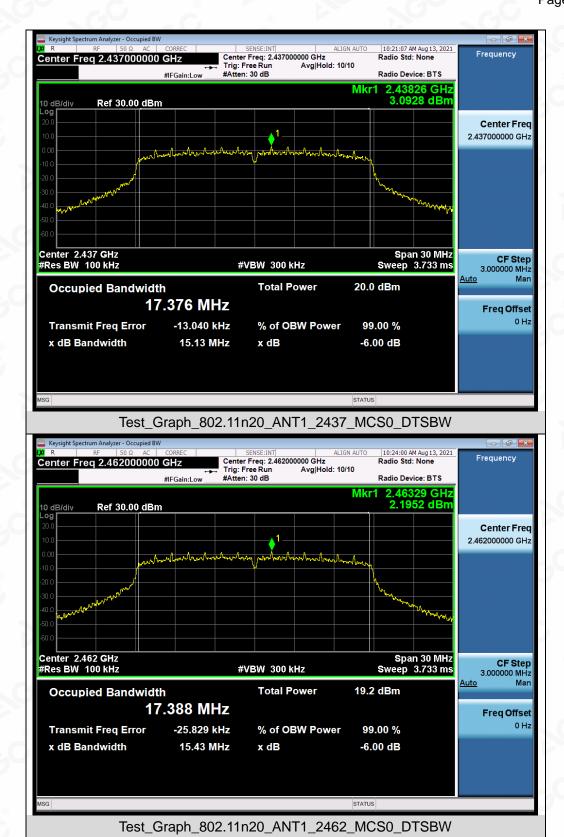




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Test_Graph_802.11n20_ANT1_2412_MCS0_DTSBW





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9. CONDUCTED SPURIOUS EMISSION

9.1. 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 ANSI C63.10 (2013) for compliance to FCC 47CFR 15.247 requirements. Owing to satisfy the requirements of the number of measurement points, we set the RBW=1MHz, VBW>RBW, scan up through 10th harmonic, and consider the tested results as the worst case, if the tested results conform to the requirement, we can deem that the real tested results(set the RBW=100KHz, VBW>RBW) are conform to the requirement.

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

The same as described in section 8.2.

9.3. MEASUREMENT EQUIPMENT USEDJN

The same as described in section 6.

9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT					
Annelia alda I insida	Measurement Result				
Applicable Limits	Test Data	Criteria			
In any 100 KHz Bandwidth Outside the	At least -20dBc than the limit				
frequency band in which the spread spectrum	Specified on the BOTTOM	PASS			
intentional radiator is operating, the radio frequency	Channel	a.C			
power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a))	At least -20dBc than the limit Specified on the TOP Channel	PASS			

Note: The limits reference level is according to the test plot of -6dB bandwidth.

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Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands



Test_Graph_802.11b_ANT1_2412_1Mbps_Lower Band Emissions

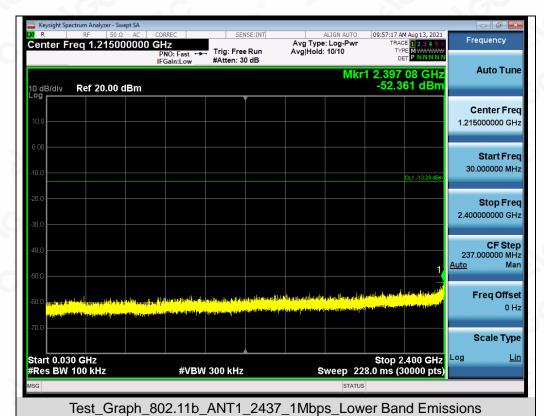


Test_Graph_802.11b_ANT1_2412_1Mbps_Higher Band Emissions

Compliance Best Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the a/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written exchorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15day after the issuence of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc@agc-cert.com.

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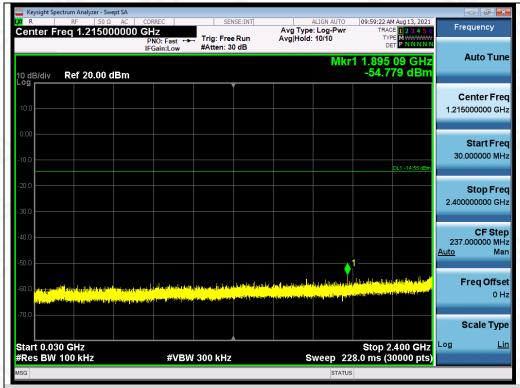


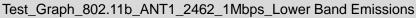




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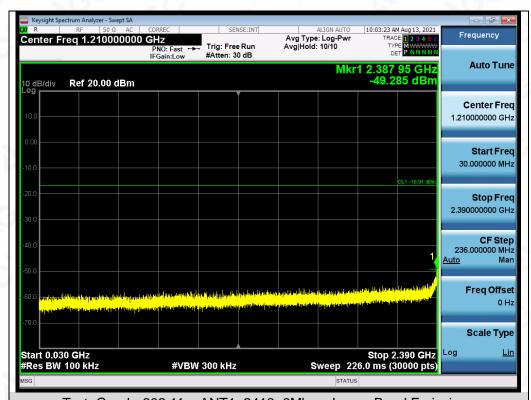






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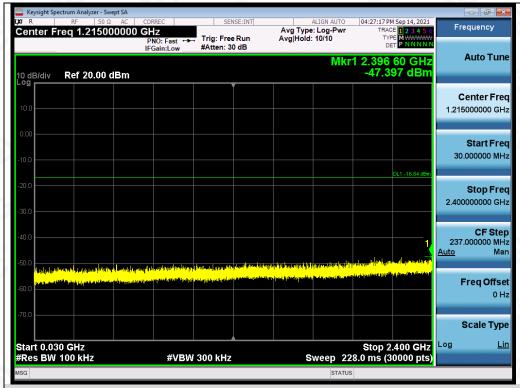


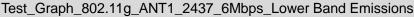


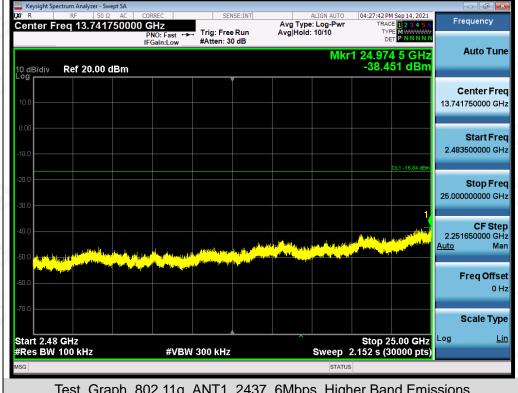
Test_Graph_802.11g_ANT1_2412_6Mbps_Higher Band Emissions

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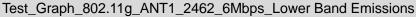


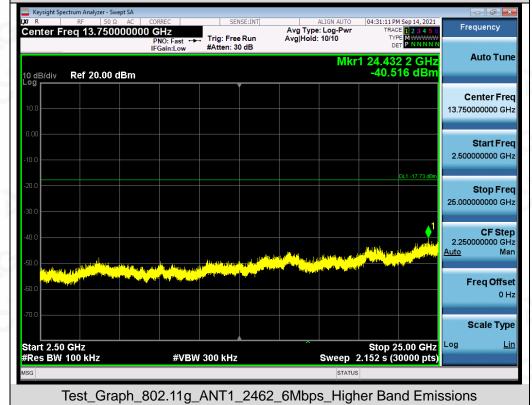
Test_Graph_802.11g_ANT1_2437_6Mbps_Higher Band Emissions

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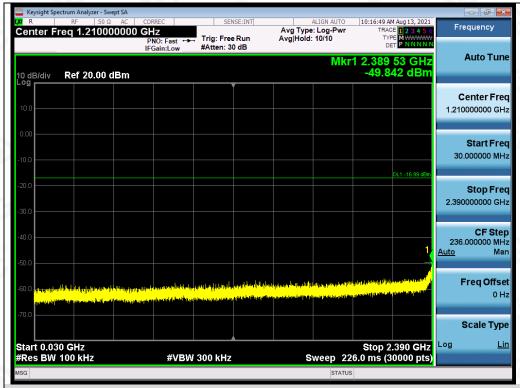




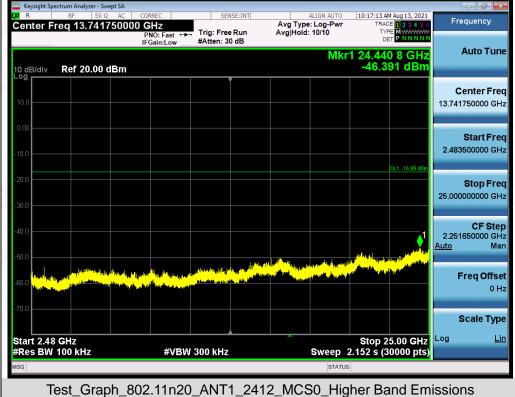


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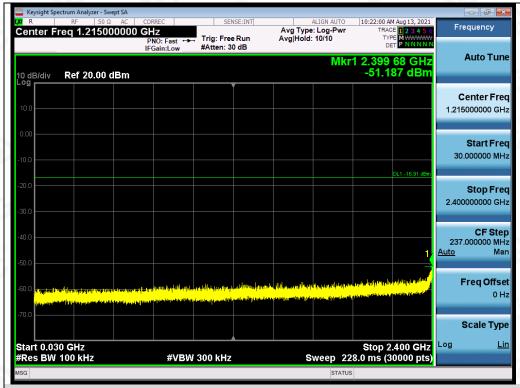






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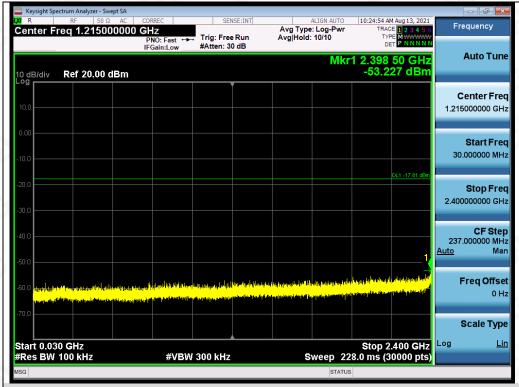


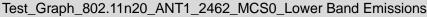




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g/Inspection

The test results



Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands



Test_Graph_802.11b_ANT1_2412_1Mbps_Lower Band Edge Emissions



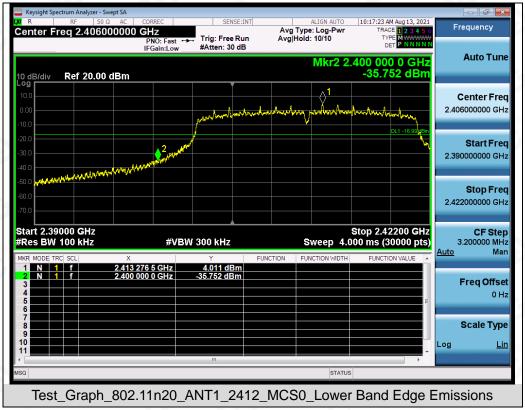
Test_Graph_802.11g_ANT1_2412_6Mbps_Lower Band Edge Emissions

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g/Inspection
The test results
the test report.





Note: Emissions from 2483.5-2500MHz which fall in the restricted bands had been considered with the radiated emission limits specified.

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10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

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 method of PKPSD in the ANSI C63.10 (2013) item 11.10 was used in this testing.

10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer to Section 8.2.

10.3 MEASUREMENT EQUIPMENT USED

Refer to Section 6.

10.4 LIMITS AND MEASUREMENT RESULT

	Test Data of Conducted Output Power Spectral Density						
Test Mode	Test Channel (MHz)	Power density (dBm/20kHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail		
	2412	7.312	-0.927	≪8	Pass		
802.11b	2437	7.136	-1.103	≤8	Pass		
	2462	5.912	-2.327	≤8	Pass		
100	2412	-3.446	-11.685	≤8	Pass		
802.11g	2437	-2.055	-10.294	≤8	Pass		
	2462	-1.901	-10.140	≤8	Pass		
802.11n20	2412	-3.722	-11.961	≤8	Pass		
	2437	-3.269	-11.508	≤8	Pass		
	2462	-4.286	-12.525	≤8	Pass		

Note: Power density(dBm/3kHz) = Power density(dBm/20kHz) - 10*log(20/3).

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