

Page 1 of 86

# **FCC Test Report**

Report No.: AGC11477201102FE05

FCC ID	: 2AU63-BEBIRDR3
APPLICATION PURPOSE	: Original Equipment
PRODUCT DESIGNATION	: Smart visual ear-clean Rod
BRAND NAME	: bebird
MODEL NAME	: See Page 5
APPLICANT	: Heifeng Zhizao(Shenzhen)Technology Co., Ltd
DATE OF ISSUE	: Nov. 20, 2020
STANDARD(S) TEST PROCEDURE(S)	: FCC Part 15.247
REPORT VERSION	: V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

Compliance



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## **REPORT REVISE RECORD**

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	. /	Nov. 20, 2020	Valid	Initial Release

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## **1. VERIFICATION OF CONFORMITY**

Applicant	Heifeng Zhizao(Shenzhen)Technology Co.,Ltd		
Address	Room 1205, Tongfang Center Building, Haoxiang Road, Xin'er Community, Xinqiao Subdistrict, Bao'an District, Shenzhen, China		
manufacturer	Heifeng Zhizao(Shenzhen)Technology Co.,Ltd		
Address	Room 1205, Tongfang Center Building, Haoxiang Road, Xin'er Community, Xingiao Subdistrict, Bao'an District, Shenzhen, China		
Factory	Shenzhen Huaxin Communication Co., Ltd.		
	Floor 5, Building B5, Xujingchang Industrial Park, No. 39, Haoye Road, Fuyong Fuhai Street, Baoan District, Shenzhen		
Product Designation	Smart visual ear-clean Rod		
Brand Name	bebird		
Test Model	bebird R3		
Series Model	R3, R3Pro, R3s ,R3 Plus, bebird R3Pro, bebird R3s, bebird R3 Plus		
Difference Description	All the same except for the model name.		
Date of test	Nov. 09, 2020 to Nov. 19, 2020		
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
 John Zeng John Zeng (Project Engineer)
 Nov. 19, 2020

 Reviewed By
 Max Zhang (Reviewer)
 Nov. 20, 2020

 Approved By
 Forward Line

> Forrest Lei (Authorized Officer)

Nov. 20, 2020

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# 2. GENERAL INFORMATION

## 2.1. PRODUCT DESCRIPTION

The EUT is designed as "Smart visual ear-clean Rod". 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

<b>Operation Frequency</b>	2.412 GHz ~ 2.462GHz
Output Power(Average)	IEEE 802.11b:9.16dBm; IEEE 802.11g:9.33dBm;
	IEEE 802.11n(20):9.38dBm; IEEE 802.11n(40):7.80dBm
Output Power(Peak)	IEEE 802.11b:12.30dBm; IEEE 802.11g:17.34dBm;
	IEEE 802.11n(20):17.24dBm; IEEE 802.11n(40):15.39dBm
Modulation	DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM)
Number of channels	11
Hardware Version	REV:1.0
Software Version	Andriod 5.6.6
Software Version	IOS4.3.2
Antenna Designation	Integral antenna(Comply with requirements of the FCC part 15.203)
Antenna Gain	1.94dBi
Power Supply	DC 3.7V by battery

## 2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency	
c.C		2412 MHZ	
	2	2417 MHZ	
0	3	2422 MHZ	
G <sup>C</sup>	4	2427 MHZ	
	5	2432 MHZ	
2400~2483.5MHZ	6	2437 MHZ	
	7	2442 MHZ	
	8	2447 MHZ	
	9	2452 MHZ	
	10	2457 MHZ	
	<u> </u>	2462 MHZ	

Note: For 20MHz bandwidth system use Channel 1 to Channel 11. For 40MHz bandwidth system use Channel 3 to Channel 9

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#### 2.3. IEEE 802.11N MODULATION SCHEME

MCS Index	Nss	Nss Modulation	R	NBPSC	NCBPS		NDBPS		Data rate(Mbps) 800nsGI	
muex					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	<sup>©</sup> 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:2AU63-BEBIRDR3 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 transmissio n 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**

Test	Measurement Uncertainty	Notes
Transmitter power conducted	±0.57 dB	(1)
Transmitter power Radiated	±2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	±2.20 dB	(1)
Occupied Bandwidth	±0.01ppm	(1)
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)
Conducted Disturbance0.15~30MHz	±3.20dB	(1)

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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## 4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel TX(2412/2422MHz)
2	Middle channel TX(2437MHz)
3	High channel TX(2452/2462MHz)
Transm Transm	it by 802.11b with Date rate (1/2/5.5/11) it by 802.11g with Date rate (6/9/12/18/24/36/48/54) it by 802.11n (20MHz) with Date rate (6.5/13/19.5/26/39/52/58.5/65) it by 802.11n (40MHz) with Date rate (13.5/27/40.5/54/81/108/121.5/135)

#### Note:

- 1. 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.
- 3. The test software is the Wifi Test Tool V1.4.1 which can set the EUT into the individual test modes.

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# 5. SYSTEM TEST CONFIGURATION

**5.1. CONFIGURATION OF EUT SYSTEM** 

Configure :

		-
EUT	®	A

E

## 5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment Model No.		ID or Specification	Remark
1	Smart visual ear-clean Rod	bebird R3	2AU63-BEBIRDR3	EUT
2	Adapter	TY0500100E1MN	N/A	AE
3	Charger line	N/A	0.5m unshielded	AE
4	Control board	N/A	USB_TTL	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, 2020	May 14, 2021
LISN	R&S	ESH2-Z5	100086	Jul. 03,2020	Jul. 02,2021
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, 2020	May 14, 2021
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 12, 2019	Dec. 11, 2020
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. 17, 2019	May. 16, 2021
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May. 17, 2019	May. 16, 2021
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

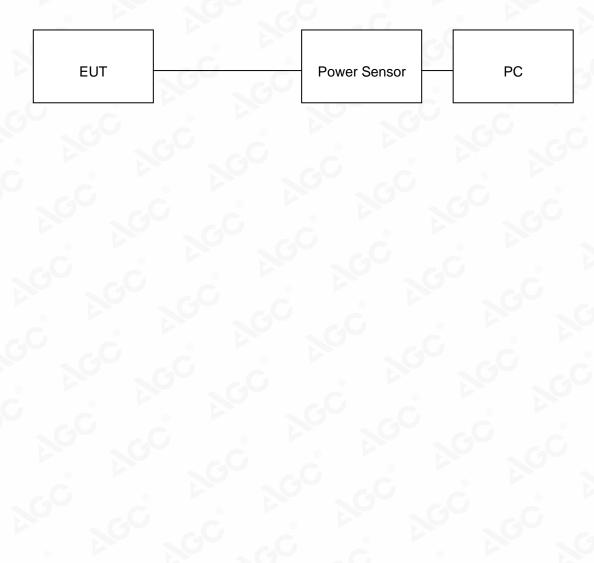
## 7.1. MEASUREMENT PROCEDURE

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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## 7.3. LIMITS AND MEASUREMENT RESULT

TEST ITEM	OUTPUT POWER
TEST MODE	802.11b with data rate 1

Frequency (GHz)	Average Power (dBm)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	7.67	10.77	30	Pass
2.437	8.36	11.58	30	Pass
2.462	9.16	12.30	30	Pass

TEST ITEM	OUTPUT POWER
TEST MODE	802.11g with data rate 6

Frequency (GHz)	Average Power (dBm)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	7.32	15.11	30	Pass
2.437	8.74	16.60	30	Pass
2.462	9.33	17.34	30	Pass

TEST ITEM	OUTPUT POWER
TEST MODE	802.11n 20 with data rate 6.5

Frequency (GHz)	Average Power (dBm)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	7.06	15.03	30	Pass
2.437	8.50	16.07	30	Pass
2.462	9.38	17.24	30	Pass

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TEST ITEM     OUTPUT POWER						
TEST MODE	802.11n 40 with data ra	802.11n 40 with data rate 13.5				
6		<i>c.</i> C	0			
Frequency (GHz)	Average Power (dBm)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail		
2.422	6.75	14.26	30	Pass		
2.437	7.37	15.02	30	Pass		
2.452	7.80	15.39	30	Pass		

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## 8.6 DB BANDWIDTH

#### **8.1. MEASUREMENT PROCEDURE**

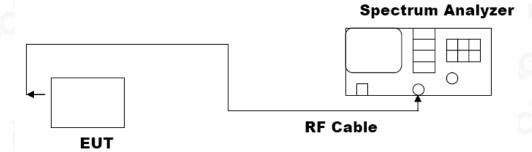
1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator

2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.

- 3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW ≥×RBW.
- 4. 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.

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



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#### **8.3. LIMITS AND MEASUREMENT RESULTS**

TEST ITEM	6DB BANDWIDTH
TEST MODE	802.11b with data rate 11

#### LIMITS AND MEASUREMENT RESULT

Applicable Limite		Applicable Limits	
Applicable Limits	Test Data (MHz)		Criteria
	Low Channel	9.098	PASS
>500KHZ	Middle Channel	9.084	PASS
	High Channel	9.096	PASS

TEST ITEM	6DB BANDWIDTH	0	
TEST MODE	802.11g with data rate 54		8

LIMITS AND MEASUREMENT RESULT			
	Applicable Limits		
Applicable Limits	Test Data	Criteria	
>500KHZ	Low Channel	15.33	PASS
	Middle Channel	15.45	PASS
	High Channel	15.45	PASS

TEST ITEM	6DB BANDWIDTH			1
TEST MODE	802.11n 20 with data rate 65	e C	6	

	LIMITS AND MEASU	REMENT RESULT	
		Applicable Limits	
Applicable Limits	Test Data (MHz)		Criteria
>500KHZ	Low Channel	15.96	PASS
	Middle Channel	15.12	PASS
	High Channel	15.46	PASS

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TEST ITEM	6DB BANDWIDTH		
TEST MODE	802.11n 40 with data rate 135		

Annlinghin Limite	Applicable Limits		
Applicable Limits	Test Dat	a (MHz)	Criteria
>500KHZ	Low Channel	35.70	PASS
	Middle Channel	35.48	PASS
	High Channel	35.46	PASS

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# 802.11b TEST RESULT TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



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#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

## 802.11g TEST RESULT





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#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



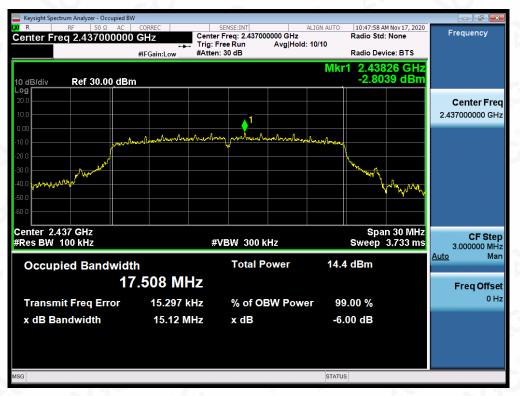
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## 802.11n (20) TEST RESULT TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



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#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

# 802.11n (40) TEST RESULT

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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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.

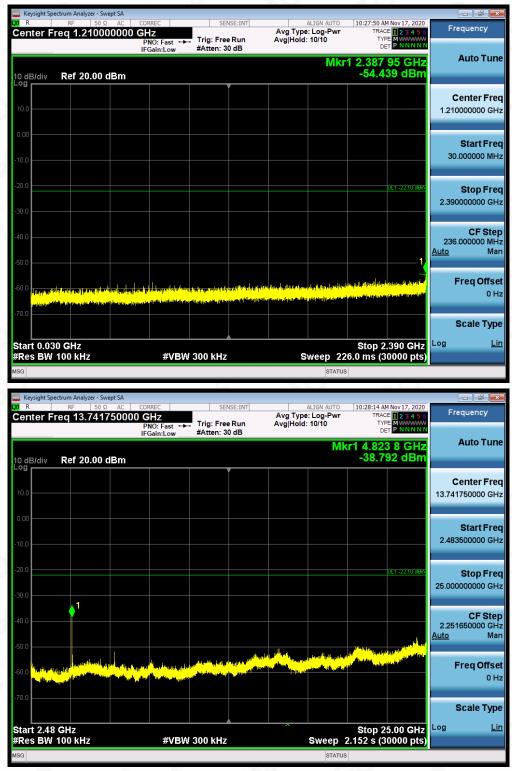
## 9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT				
Angliaghta Limita	Measurement Result			
Applicable Limits	Test Data	Criteria		
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS		
intentional radiator is operating, the radio frequency 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.

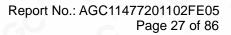
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#### TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 802.11b FOR MODULATION IN LOW CHANNEL

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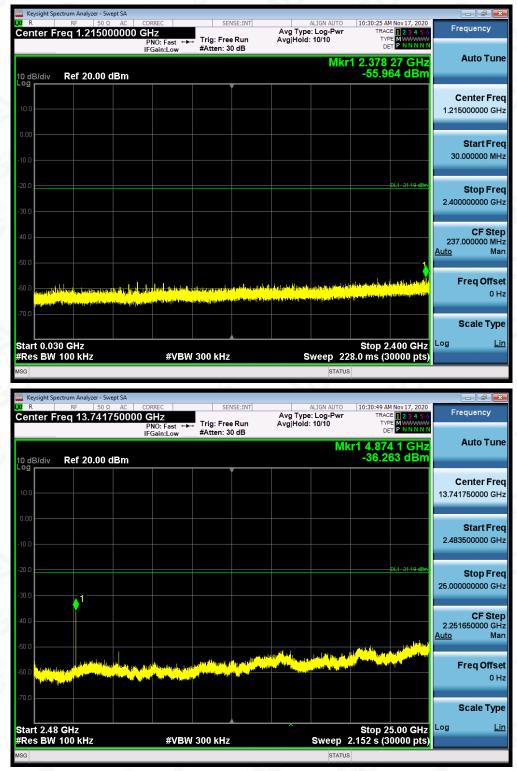
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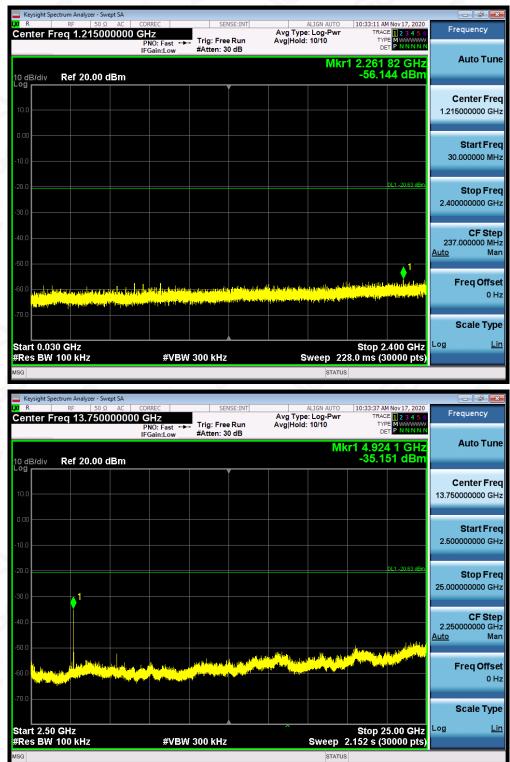




## TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11b FOR MODULATION IN MIDDLE CHANNEL

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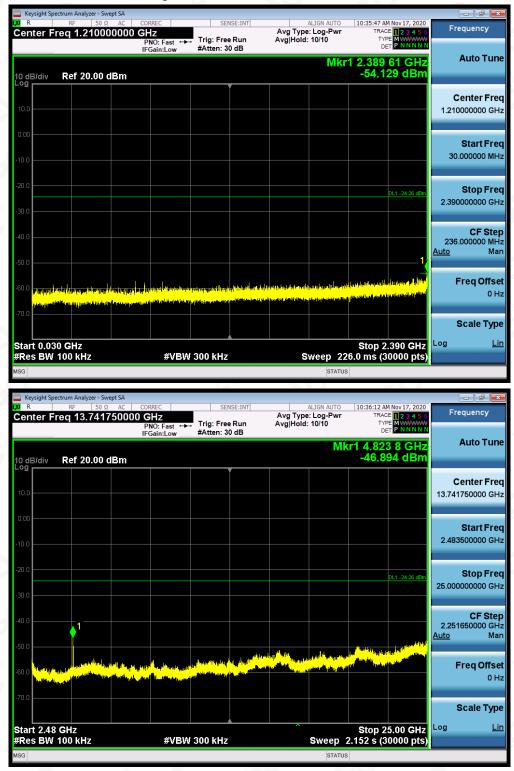




# TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11b FOR MODULATION IN HIGH CHANNEL

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## TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 802.11g FOR MODULATION IN LOW CHANNEL

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#### Report No.: AGC11477201102FE05 Page 31 of 86





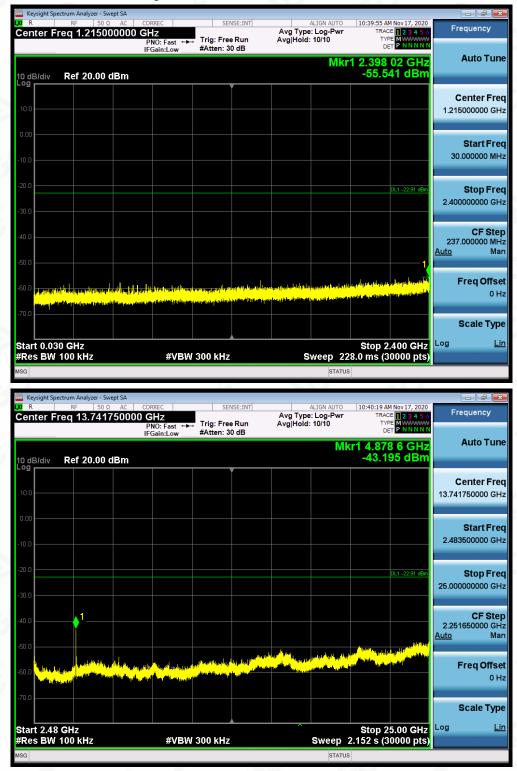
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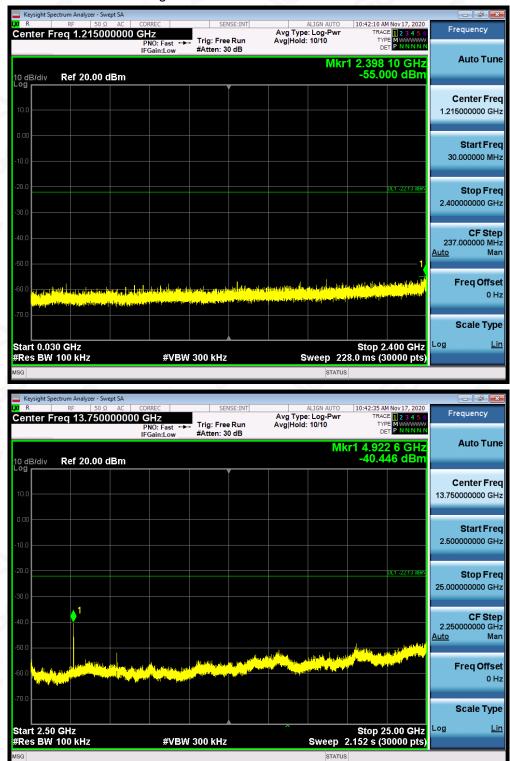




## TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11g FOR MODULATION IN MIDDLE CHANNEL

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## TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11g FOR MODULATION IN HIGH CHANNEL

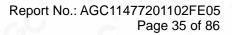
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#### TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 802.11n20 FOR MODULATION IN LOW CHANNEL

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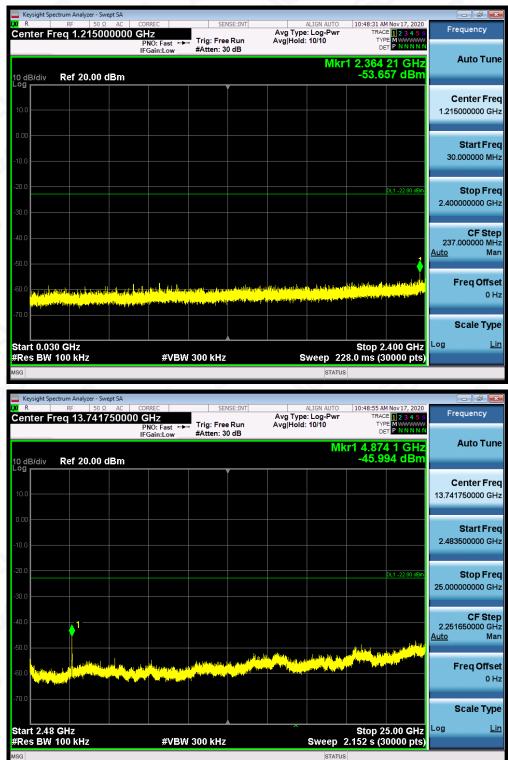
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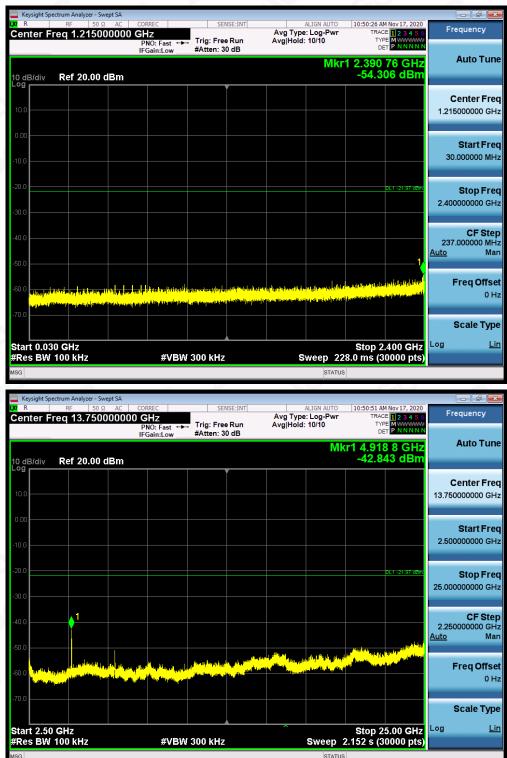




## TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11n20 FOR MODULATION IN MIDDLE CHANNEL

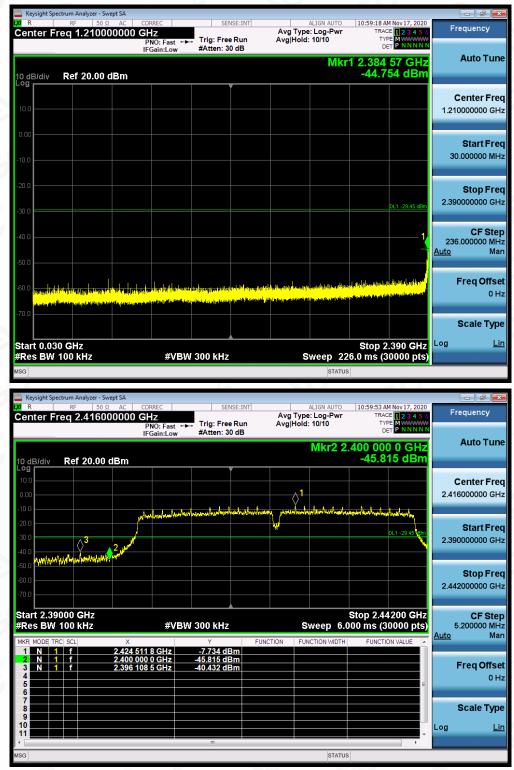
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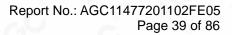
### TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11n20 FOR MODULATION IN HIGH CHANNEL





### TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 802.11n40 FOR MODULATION IN LOW CHANNEL

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			l	PNO: Fast ↔ FGain:Low	, Trig: Free #Atten: 3		Avg Hold		□ 1 24.98	3 5 GHz 62 dBm		Auto Tune
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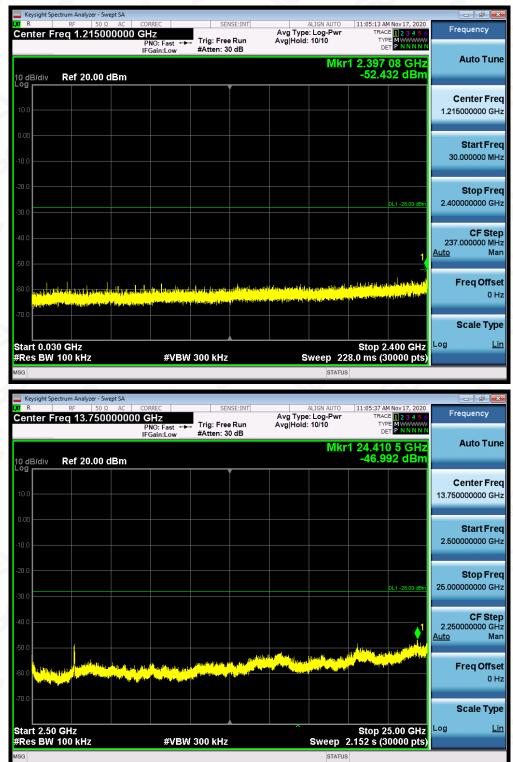
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Keysight Spectrum Analyzer - Swept SA						15,0000		×
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MSG Keysight Spectrum Analyzer - Swept SA Keysight Spectrum Analyzer - Swept SA Center Freq 13.74175000 10 dB/div Ref 20.00 dBm 10 0 0.00 -10 0 -20 0	CORREC 10 GHz PN0: Fast ↔ Tr	ig: Free Run	Avg Type: Lo	GN AUTO og-Pwr 1/10	TRACE TYPE DET 24,026 -47.75	D 2 3 4 5 6 P NNNN P NNNN 5 5 GHz 58 dBm DL1 -28 51 dBm	Frequency Auto Tu Center Fr 13.741750000 C Start Fr 2.483500000 C Stop Fr 25.00000000 C	ine req 3Hz req 3Hz req 3Hz
Keysight Spectrum Analyzer - Swept SA           W         R         RF         50 Ω         AC         AC           Center Freq 13.74175000           10 dB/div         Ref 20.00 dBm           00 dB/div         Ref 20.00 dBm           00 dB/div         Ref 20.00 dBm           0.00	CORREC 10 GHz PN0: Fast ↔ Tr	ig: Free Run	Avg Type: Lo	GN AUTO og-Pwr 1/10	TRACE TYPE DET 24,026 -47.75	D 23 4 5 6 P NNNNN 5 5 GHz 58 dBm	Frequency Auto Tu Center Fr 13.741750000 G Start Fr 2.483500000 G Stop Fr 25.00000000 G	Ine req 3Hz req 3Hz req 3Hz tep
MSG Keysight Spectrum Analyzer - Swept SA QC R RF 50 Q AC C Center Freq 13.74175000 10 0 0.00 -10 0 -20 0 -30 0 -40 0 -50 0	CORREC 10 GHz PRO: Fast Tr IFGain:Low	ig: Free Run	Avg Type: Lo	GN AUTO og-Pwr 1/10	TRACE TYPE DET 24,026 -47.75	D 2 3 4 5 6 P NNNN P NNNN 5 5 GHz 58 dBm DL1 -28 51 dBm	Frequency Auto Tu Center Fr 13.741750000 G Start Fr 2.483500000 G Stop Fr 25.00000000 G	Ine req 3Hz req 3Hz req 3Hz tep
Keysight Spectrum Analyzer - Swept SA           W         R         RF         50 Ω         AC         AC           Center Freq 13.74175000           10 dB/div         Ref 20.00 dBm           00 dB/div         Ref 20.00 dBm           00 dB/div         Ref 20.00 dBm           0.00	CORREC 10 GHz PRO: Fast Tr IFGain:Low	ig: Free Run	Avg Type: Lo Avg Hold: 10/	GN AUTO og-Pwr 1/10	TRACE TYPE DET 24,026 -47.75	D 2 3 4 5 6 P NNNN P NNNN 5 5 GHz 58 dBm DL1 -28 51 dBm	Start Fr           2.483500000 G           Start Fr           2.483500000 G           Stop Fr           25.00000000 G           Auto           CF St           2.251650000 G           Auto           Creating           Stop Fr           2.251650000 G           Auto           Stop Fr	req GHz req GHz req GHz SHz Man set
MSG         MSG           Image: Second Se	CORREC 10 GHz PRO: Fast Tr IFGain:Low	ig: Free Run tten: 30 dB	Avg Type: Lo Avg Hold: 10/	SN AUTO og-Pwr /10 Mkr1	TRACE TYPE DET 24,026 -47.75	D 2 3 4 5 6 P NNNN P NNNN 5 5 GHz 58 dBm DL1 -28 51 dBm	Start Fr           2.483500000 G           Start Fr           2.483500000 G           Stop Fr           25.00000000 G           Auto           CF St           2.251650000 G           Auto           Creating           Stop Fr           2.251650000 G           Auto           Stop Fr	req GHz req GHz req GHz SHz Man set
MSG         MSG           Image: Second Se	CORREC 10 GHz PRO: Fast Tr IFGain:Low	ig: Free Run tten: 30 dB	Avg Type: Lo Avg Hold: 10/	SN AUTO og-Pwr /10 Mkr1	TRACE TYPE DET 24,026 -47.75	D 2 3 4 5 6 P NNNN P NNNN 5 5 GHz 58 dBm DL1 -28 51 dBm	Frequency Auto Tu Center Fr 13.741750000 G Start Fr 2.483500000 G Stop Fr 25.00000000 G CF St 2.251650000 G Auto M Freq Off 0	req GHz req GHz GHz GHz Man SHz Man
MSG         Keysight Spectrum Analyzer - Swept SA           IX         R         RF         50.0         AC           Center Freq 13.74175000	CORREC 10 GHz PRO: Fast Tr IFGain:Low	ig: Free Run tten: 30 dB	Avg Type: Lo Avg Hold: 10/	SN AUTO og-Pwr /10 Mkr1	TRACE TYPE Deli 24.026 -47.75	D 2 3 4 5 6 M MWWWW P NNNN 5 5 GHz 58 dBm 0L1 2851 dBm	Start Fr           2.483500000 G           Start Fr           2.483500000 G           Stop Fr           2.251650000 G           Auto           Freq Off           0           Scale Ty	Ine req 3Hz req 3Hz 3Hz Man set 1Hz ype
MSG         Keysight Spectrum Analyzer - Swept SA           IM         R         RF         50.0         AC           Center Freq 13.74175000         Image: Solid Stress of the	CORREC 10 GHz PRO: Fast Tr IFGain:Low	ig: Free Run Itten: 30 dB	Avg Type: Lo Avg Hold: 10/	SN AUTO og-Pwr /10 Mkr1	TRACE TYPE 24.026 -47.75	D 2 3 4 5 6 M WWWWW P NNNN 5 5 GHz 58 dBm 0L1 28.51 dBm	Start Fr           2.483500000 G           Start Fr           2.483500000 G           Stop Fr           2.251650000 G           Auto           Freq Off           0           Scale Ty	req GHz req GHz req GHz SHz Man Set

## TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11n40 FOR MODULATION IN MIDDLE CHANNEL





### TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11n40 FOR MODULATION IN HIGH CHANNEL

### Note: Emissions from 2483.5-2500MHz which fall in the restricted bands had been considered with the radiated

#### emission limits specified.

Compliance Pesting/Inspection Any report having not been signed by authorized approver, or having been altered without authorization, or having not been signed by authorization of AGC. The test results Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written approved on AGC. The test results stamp a submitted to AGC within 15day after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc@agc-cert.com.



# **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 ITEM	POWER SPECTRAL DENSITY
TEST MODE	802.11b with data rate 1

Channel No.	Power density (dBm/20kHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	-6.922	-15.16	8	Pass
Middle Channel	-5.931	-14.17	8	Pass
High Channel	-5.318	-13.56	8	Pass

TEST ITEM	POWER SPECTRAL DENSITY		SC S
TEST MODE	802.11g with data rate 6	©	8

Channel No.	Power density (dBm/20kHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	-9.081	-17.32	8	Pass
Middle Channel	-7.648	-15.89	8	Pass
High Channel	-6.998	-15.24	8	Pass



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TEST ITEM	POWER SPECTRAL DENSITY
TEST MODE	802.11n 20 with data rate 6.5

Channel No.	Power density (dBm/20kHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	-8.387	-16.63	8	Pass
Middle Channel	-7.431	-15.67	8	Pass
High Channel	-6.168	-14.41	8	Pass

TEST ITEM	POWER SPECTRAL DENSITY	
TEST MODE	802.11n 40 with data rate 13.5	- 0

Channel No.	Power density (dBm/20kHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	-13.472	-21.71	8	Pass
Middle Channel	-12.493	-20.73	8	Pass
High Channel	-12.148	-20.39	8	Pass

Note:PSD Standard Measurement = Test Measurement -10Log (20KHz / 3KHz)





# 802.11b TEST RESULT TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL

#### TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



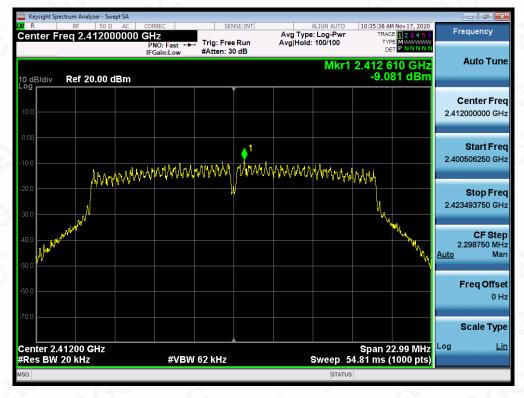




### TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL

802.11g TEST RESULT

TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL

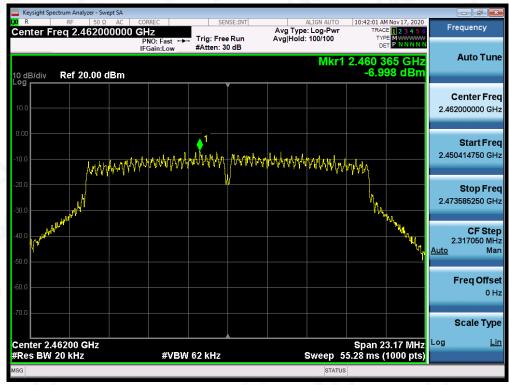


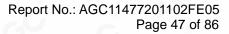




### TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL

### TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL









# 802.11n 20 TEST RESULT TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL

TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



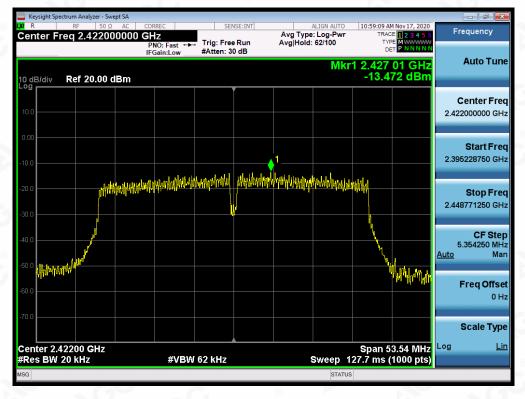




### TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL

802.11n 40 TEST RESULT

TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL







### TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL

#### Avg Type: Log-Pw Avg|Hold: 62/100 Frequency Center Freq 2.452000000 GHz Trig: Free Run PNO: Fast 🔸 IFGai #Atten: 30 dB Auto Tune Mkr1 2.450 75 GHz -12.148 dBm 10 dB/div Ref 20.00 dBm Center Freq 2.452000000 GHz Start Freq 2.425408750 GHz under the stand the second Stop Freq 2.478591250 GHz CF Step 5.318250 M Mar Auto Freq Offset 0 Hz Scale Type Span 53.18 MHz Sweep 126.8 ms (1000 pts) Center 2.45200 GHz #Res BW 20 kHz Lin #VBW 62 kHz STATUS

TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



### **11. RADIATED EMISSION**

### **11.1. MEASUREMENT PROCEDURE**

- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8.If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.