

FCC Test Report

Report No.: AGC05414200701FE05

FCC ID : 2AJFX-MOLAE3

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : DDPai

BRAND NAME : ddpai

MODEL NAME : mola E3

APPLICANT: DDPAI Technology Co., Ltd.

DATE OF ISSUE : Jul. 21, 2020

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	/	Jul. 21, 2020	Valid	Initial Release	

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1. VERIFICATION OF CONFORMITY

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
Applicant	DDPAI Technology Co., Ltd.
Address	Floor 12, Yihua finance building, Nanshan software industry park, Xuefu Rd, Nanshan district, Shenzhen, China
manufacturer	DDPAI Technology Co., Ltd.
Address	Floor 12, Yihua finance building, Nanshan software industry park, Xuefu Rd, Nanshan district, Shenzhen, China
Factory	DDPai vision equipment Co.,Ltd.
Address	Building A, Futai Industrial Park, Qingfeng south Road, Keyuancheng, Tangxia Town, Dongguan city, Guangdong province, China
Product Designation	DDPai
Brand Name	ddpai
Test Model	mola E3
Date of test	Jul. 07, 2020 to Jul. 21, 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	Buch. Forg	
	Erik Yang (Project Engineer)	Jul. 21, 2020
Reviewed By	Max Zhang	
20	Max Zhang (Reviewer)	Jul. 21, 2020
Approved By	Formare	
,C	Forrest Lei (Authorized Officer)	Jul. 21, 2020

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as "DDPai". 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 Frequency	2.412 GHz~2.462GHz		
Output Power(Average)	IEEE 802.11b:12.34dBm; IEEE 802.11g:12.66dBm; IEEE 802.11n(20):9.98dBm; IEEE 802.11n(40):9.36dBm		
Modulation	DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM)		
Number of channels	11		
Hardware Version	V2.0		
Software Version	V7.0.0.1		
Antenna Designation	Integral antenna		
Antenna Gain	2.05dBi		
Power Supply	DC 5V 2A		

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
100	100	2412 MHZ
0 0	2	2417 MHZ
NO GO	3	2422 MHZ
	4	2427 MHZ
C C	5	2432 MHZ
2400~2483.5MHZ	6	2437 MHZ
	7	2442 MHZ
	8	2447 MHZ
100	9	2452 MHZ
· ·	10	2457 MHZ
. C . 0	11	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	Modulation	R	NBPSC	NCI	NCBPS NDBPS rate(Mbps) 800nsGI		NDBPS .		Mbps)
IIIGCX					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>	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: 2AJFX-MOLAE3** 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 uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in measurement" (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission, Uc = ±3.2 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB

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4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX
4	Normal operating

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)

Transmit by 802.11n (40MHz) with Date rate (13.5/27/40.5/54/81/108/121.5/135)

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.
- 3. The test software is the SecureCRT 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	©	AE

5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	DDPai	mola E3	2AJFX-MOLAE3	EUT
2	Smart phone	V8	N/A	AE
3	Battery	N300	N/A	A.E
4	TF card	M203	N/A	A.E
5	Car Charger	N/A	N/A	A.E

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	N/A

Note: The EUT was supplied by car battery.

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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 RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2022
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 12, 2019	Dec. 11, 2020
Power sensor	Aglient	U2021XA	MY54110007	Sep. 10, 2019	Sep. 09, 2020
2.4GHz Fliter	Micro-tronics	087	N/A	Feb. 26, 2020	Feb. 25, 2021
Attenuator	Weinachel Corp	58-30-33	N/A	Sep. 09, 2019	Sep. 08, 2020
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.21, 2019	Sep. 20, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
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	Oct. 15, 2019	Oct. 16, 2020
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

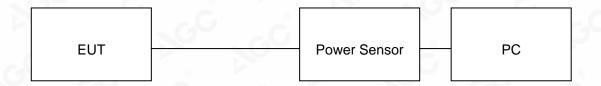
7.1. MEASUREMENT PROCEDURE

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) AVERAGE POWER SETUP



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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)	Applicable Limits (dBm)	Pass or Fail
2.412	12.02	30	Pass
2.437	12.11	30	Pass
2.462	12.34	30	Pass

TEST ITEM	OUTPUT POWER	8	
TEST MODE	802.11g with data rate 6	100	(8)

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	12.28	30	Pass
2.437	12.30	30	Pass
2.462	12.66	30	Pass

TEST ITEM	OUTPUT POWER	0		
TEST MODE	802.11n 20 with data rate 6.5	GC	8	8

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	9.98	30	Pass
2.437	9.34	30	Pass
2.462	9.07	30	Pass

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TEST ITEM	OUTPUT POWER	r.C	8		
TEST MODE	802.11n 40 with data rate 13.5		C	CO	

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.422	9.36	30	Pass
2.437	9.15	30	Pass
2.452	9.11	30	Pass

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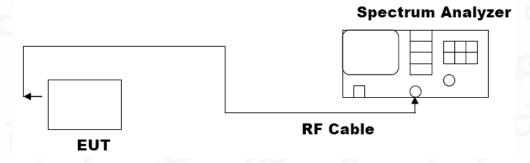
8. 6 DB BANDWIDTH

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	-6	®	
TEST MODE	802.11b with data rate 11		CO	

LIMITS AND MEASUREMENT RESULT					
Applicable Limits					
Applicable Limits	Test Data (MHz) Criter				
	Low Channel	10.05	PASS		
>500KHZ	Middle Channel	10.05	PASS		
	High Channel	10.05	PASS		

TEST ITEM	6DB BANDWIDTH	0		
TEST MODE	802.11g with data rate 54		<i>c.</i> C	8

LIMITS AND MEASUREMENT RESULT					
Appliaable Limite	Applicable Limits				
Applicable Limits	Test Data (MHz) Criteria				
GC C	Low Channel	16.37	PASS		
>500KHZ	Middle Channel	16.37	PASS		
0	High Channel	16.38	PASS		

TEST ITEM	6DB BANDWIDTH	100	- GC
TEST MODE	802.11n 20 with data rate 65	8	

LIMITS AND MEASUREMENT RESULT					
Applicable Limits					
Applicable Limits	Test Data (MHz)		Criteria		
0	Low Channel	17.61	PASS		
>500KHZ	Middle Channel	17.61	PASS		
	High Channel	17.61	PASS		

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TEST ITEM	6DB BANDWIDTH	G	8	(8)	
TEST MODE	802.11n 40 with data rate 135		G	C ₁ C	

LIMITS AND MEASUREMENT RESULT					
Applicable Limits					
Applicable Limits	Test Data	a (MHz)	Criteria		
GO GO	Low Channel	36.37	PASS		
>500KHZ	Middle Channel	36.38	PASS		
	High Channel	36.37	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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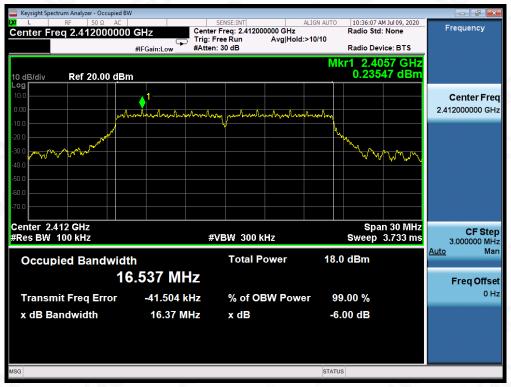


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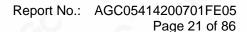
TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



802.11g TEST RESULTTEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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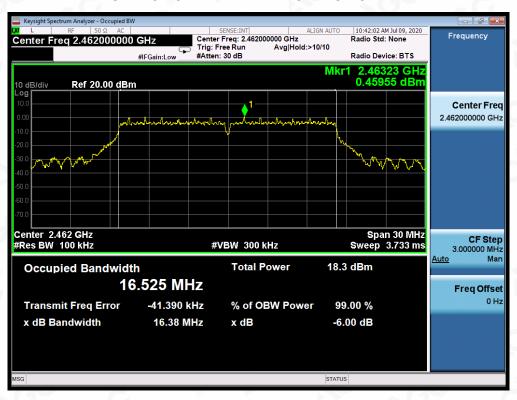




TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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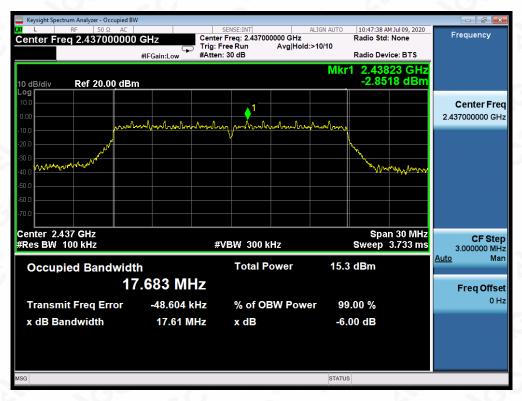


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802.11n (20) TEST RESULT TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

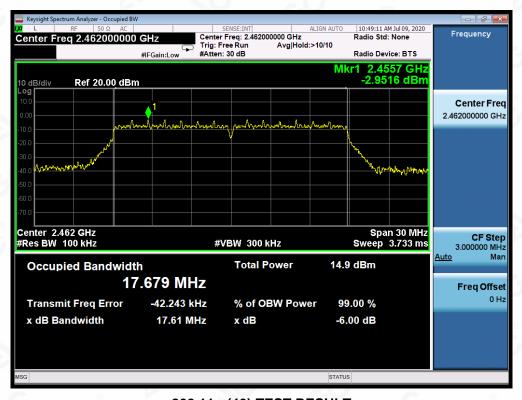


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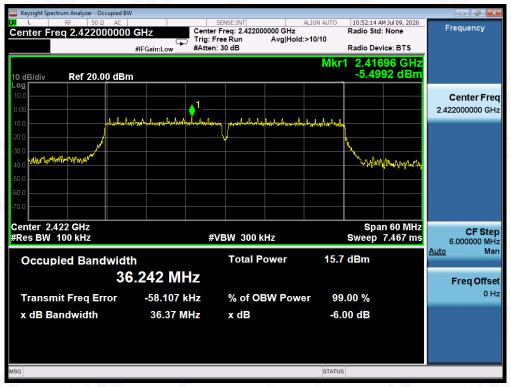


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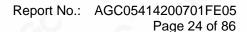
TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



802.11n (40) TEST RESULT
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

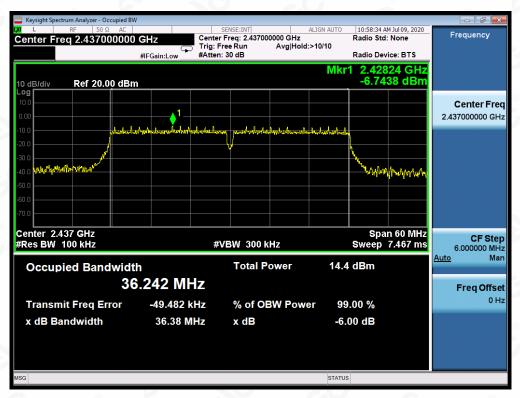


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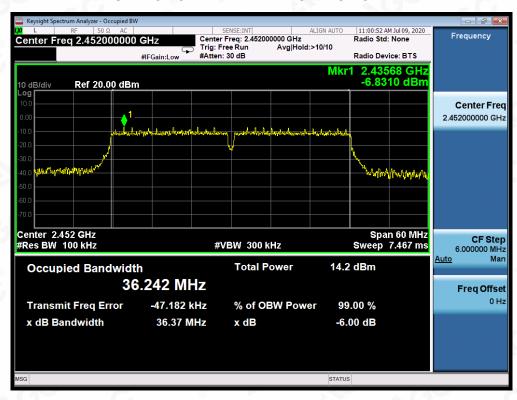




TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



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

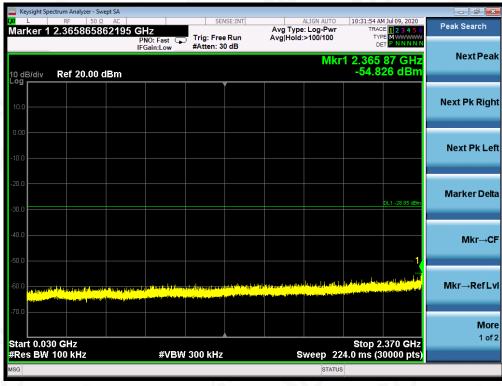
LIMITS AND MEASUREMENT RESULT					
Annilla abila il insita	Measurement Result				
Applicable Limits	Test Data	Criteria			
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum	At least -30dBc than the limit Specified on the BOTTOM Channel	PASS			
intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 30 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 -30dBc than the limit Specified on the TOP Channel	PASS			

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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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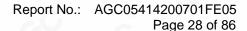




TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11b FOR MODULATION IN MIDDLE CHANNEL



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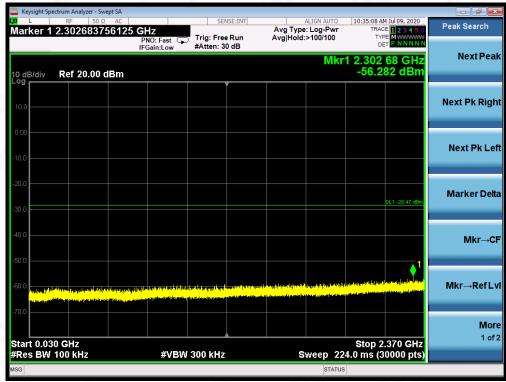


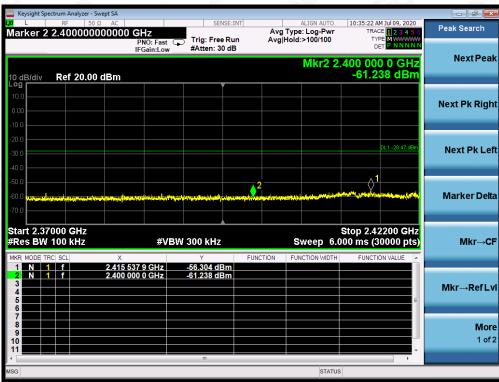
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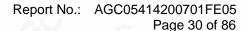
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TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11b FOR MODULATION IN HIGH CHANNEL





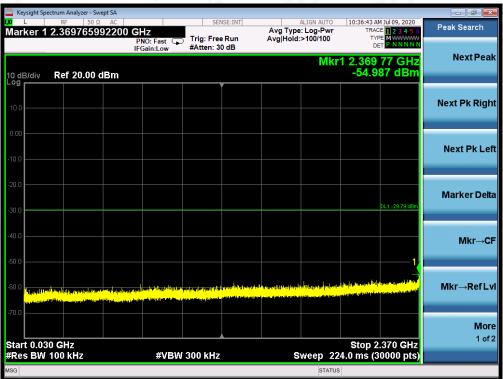
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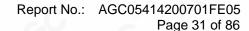




TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE
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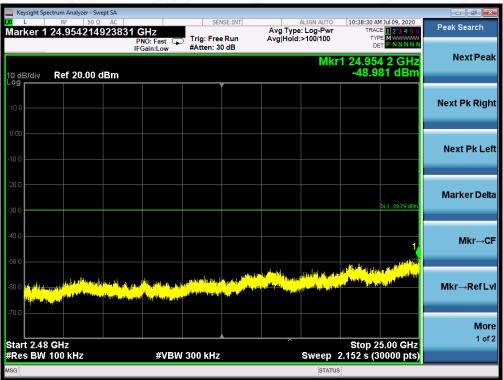


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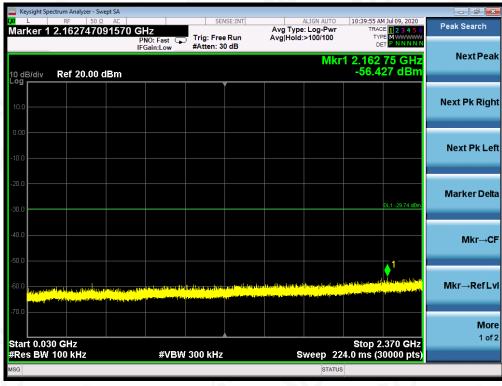


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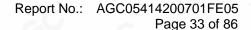
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TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11g FOR MODULATION IN MIDDLE CHANNEL





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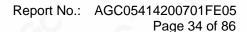




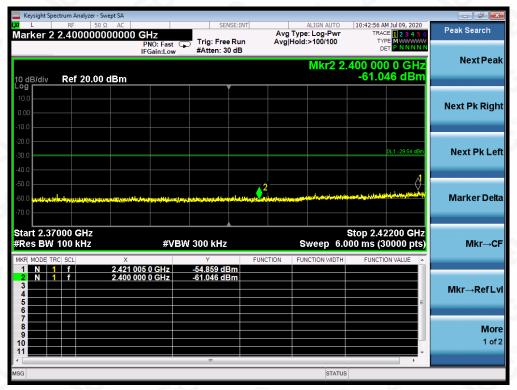
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11g FOR MODULATION IN HIGH CHANNEL



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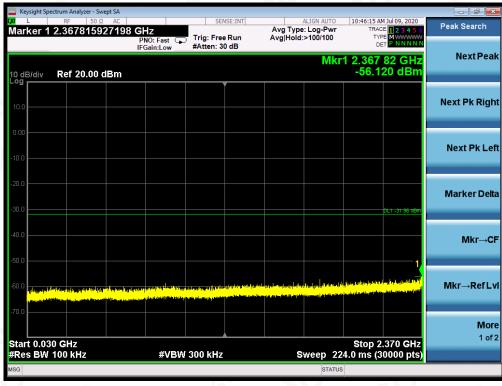


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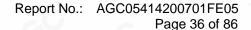
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TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 802.11n20 FOR MODULATION IN LOW CHANNEL





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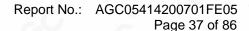




TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11n20 FOR MODULATION IN MIDDLE CHANNEL



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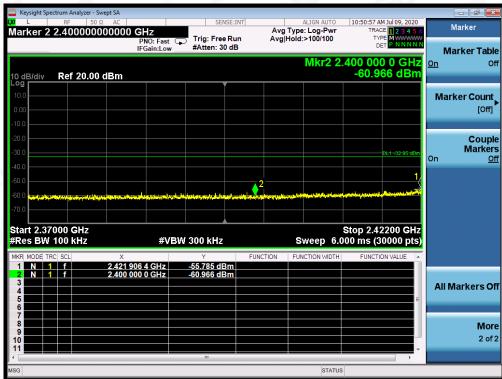
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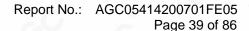
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TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11n20 FOR MODULATION IN HIGH CHANNEL





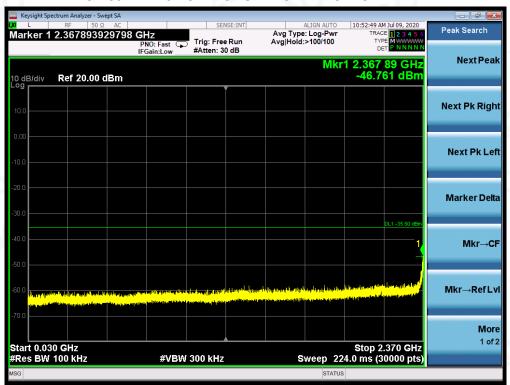
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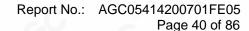




TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE
OF 802.11n40 FOR MODULATION IN LOW CHANNEL



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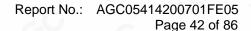
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TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11n40 FOR MODULATION IN MIDDLE CHANNEL





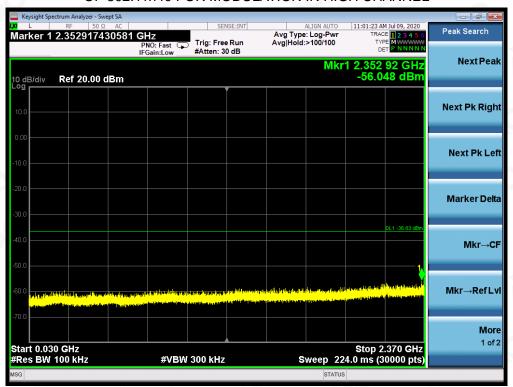
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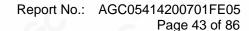




TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11n40 FOR MODULATION IN HIGH CHANNEL



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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 AVGPSD-1 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)	Limit (dBm/3kHz)	Result
Low Channel	-5.474	8	Pass
Middle Channel	-6.312	8	Pass
High Channel	-6.469	8	Pass

TEST ITEM	POWER SPECTRAL DENSITY			S
TEST MODE	802.11g with data rate 6	C ₁ C	8	(3)

Channel No.	Power density (dBm/20kHz)	Limit (dBm/3kHz)	Result
Low Channel	-8.163	8	Pass
Middle Channel	-8.367	8	Pass
High Channel	-8.706	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)	Limit (dBm/3kHz)	Result
Low Channel	-8.397	8	Pass
Middle Channel	-8.587	8	Pass
High Channel	-9.050	8	Pass

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

Channel No.	Power density (dBm/20kHz)	Limit (dBm/3kHz)	Result
Low Channel	-9.978	8	Pass
Middle Channel	-10.882	8	Pass
High Channel	-11.415	8	Pass

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



TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



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