

FCC REPORT

(UNII)

Applicant: NINGBO PLUS AND POPSCREENS ELECTRONIC TECHNOLOGY CO., LTD.

Address of Applicant: #7 HONGDA ROAD, HONG TANG INDUSTRIAL ZONE A, JIANGBEI DISTRICT, NINGBO, ZHEJIANG PROVINCE, CHINA

Equipment Under Test (EUT)

Product Name: ANDROID TOUCH PLAYER INDUSTRIAL GRADE

Model No.: MB4KM

FCC ID: 2AFI3MB4KM

Applicable standards: FCC CFR Title 47 Part 15 Subpart E Section 15.407

Date of sample receipt: 24 Nov., 2016

Date of Test: 24 Nov., 2016 to 18 Jan., 2017

Date of report issued: 18 Jan., 2017

Test Result: PASS*

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

2 Version

Version No.	Date	Description
00	18 Jan., 2017	Original

Tested by:

M. Liang

Date:

18 Jan., 2017

Test Engineer

Reviewed by:

Ryan. Lee

Date:

18 Jan., 2017

Project Engineer

3 Contents

	Page
1 COVER PAGE.....	1
2 VERSION	2
3 CONTENTS	3
4 TEST SUMMARY	4
5 GENERAL INFORMATION.....	5
5.1 CLIENT INFORMATION.....	5
5.2 GENERAL DESCRIPTION OF E.U.T.....	5
5.3 TEST ENVIRONMENT ANDMODE	7
5.4 MEASUREMENT UNCERTAINTY.....	7
5.5 LABORATORY FACILITY.....	7
5.6 LABORATORY LOCATION	7
5.7 TEST INSTRUMENTS LIST.....	8
6 TEST RESULTS ANDMEASUREMENT DATA	9
6.1 ANTENNA REQUIREMENT	9
6.2 CONDUCTED EMISSION	10
6.3 CONDUCTED OUTPUT POWER	13
6.4 OCCUPY BANDWIDTH	19
6.5 POWER SPECTRAL DENSITY	31
6.6 BAND EDGE	37
6.7 SPURIOUS EMISSION.....	42
6.7.1 Unwanted Emissions outside of the oprating band.....	42
6.8 FREQUENCY STABILITY	53
7 TEST SETUP PHOTO	55
8 EUT CONSTRUCTIONAL DETAILS	57

4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203/15.407 (g)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.407 (a)	Pass
26dB Occupied Bandwidth	15.407 (a)	Pass
6dB Emission Bandwidth	15.407(e)	Pass
Power Spectral Density	15.407 (a)	Pass
Band Edge	15.407(b)	Pass
Spurious Emission	15.205/15.209	Pass
Frequency Stability	15.407(g)	Pass

Pass: The EUT complies with the essential requirements in the standard.

5 General Information

5.1 Client Information

Applicant:	NINGBO PLUS AND POPSCREENS ELECTRONIC TECHNOLOGY CO., LTD.
Address of Applicant:	#7 HONGDA ROAD, HONG TANG INDUSTRIAL ZONE A, JIANGBEI DISTRICT, NINGBO, ZHEJIANG PROVINCE, CHINA
Manufacturer:	NINGBO PLUS AND POPSCREENS ELECTRONIC TECHNOLOGY CO., LTD.
Address of Manufacturer:	#7 HONGDA ROAD, HONG TANG INDUSTRIAL ZONE A, JIANGBEI DISTRICT, NINGBO, ZHEJIANG PROVINCE, CHINA

5.2 General Description of E.U.T.

Product Name:	ANDROID TOUCH PLAYER INDUSTRIAL GRADE
Model No.:	MB4KM
Operation Frequency:	Band 1: 5180MHz-5240MHz Band 4: 5745MHz-5825MHz
Channel numbers:	Band 1: 802.11a/802.11n20: 4 Band 4: 802.11a/802.11n20: 5
Channel separation:	802.11a/802.11n20:20MHz
Modulation technology: (IEEE 802.11a)	BPSK,QPSK,16-QAM,64-QAM
Modulation technology: (IEEE 802.11n)	BPSK,QPSK,16-QAM,64-QAM
Data speed(IEEE 802.11a)	6Mbps, 9Mbps,12Mbps,18Mbps,24Mbps,36Mbps,48Mbps,54Mbps
Data speed (IEEE 802.11n20):	MCS0: 6.5Mbps,MCS1:13Mbps,MCS2:19.5Mbps,MCS3:26Mbps, MCS4:39Mbps,MCS5:52Mbps,MCS6:58.5Mbps,MCS7:65Mbps
Antenna Type:	Internal Antenna
Antenna gain:	Band 1: 2dBi Band 4: 2dBi
AC adapter:	Model: KPL-040F-VI Input: AC100-240V 50/60Hz 1.7A Output: DC 12.0V, 3.33A
Power supply:	DC12 V

Operation Frequency each of channel

Band 1		Band 4	
802.11a/802.11n20		802.11a/802.11n20	
Channel	Frequency	Channel	Frequency
36	5180MHz	149	5745MHz
40	5200MHz	153	5765MHz
44	5220MHz	157	5785MHz
48	5240MHz	161	5805MHz
		165	5825MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Band 1		Band 4	
802.11a/802.11n20		802.11a/802.11n20	
Channel	Frequency	Channel	Frequency
The lowest channel	5180MHz	The lowest channel	5745MHz
The middle channel	5200MHz	The middle channel	5785MHz
The highest channel	5240MHz	The highest channel	5825MHz

5.3 Test environment and mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test mode:	
Continuously transmitting mode	Keep the EUT in 100% duty cycle transmitting with modulation.
We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:	
Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.	
Mode	Data rate
802.11a	6Mbps
802.11n20	6.5Mbps
Final Test Mode:	
According to ANSI C63.4 standards, the test results are both the “worst case” and “worst setup” 6Mbps for 802.11a, 6.5 Mbps for 802.11n20. All test items for 802.11a and 802.11n were performed with duty cycle above 98%, meet the requirements of KDB789033.	

5.4 Measurement Uncertainty

Items	Expanded Uncertainty (Confidence of 95%)
Conducted Emission (9kHz ~ 30MHz)	2.14 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	4.24 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	4.35 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	4.44 dB (k=2)
Radiated Emission (18GHz ~ 26.5GHz)	4.56 dB (k=2)

5.5 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC- Registration No.: 817957**

Shenzhen ZhongjianNanfang Testing Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 817957, February 27, 2012.

● **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen ZhongjianNanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

● **CNAS - Registration No.: CNAS L6048**

Shenzhen ZhongjianNanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

5.6 Laboratory Location

Shenzhen ZhongjianNanfang Testing Co., Ltd.
Address: No.B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282
Fax: +86-755-23116366

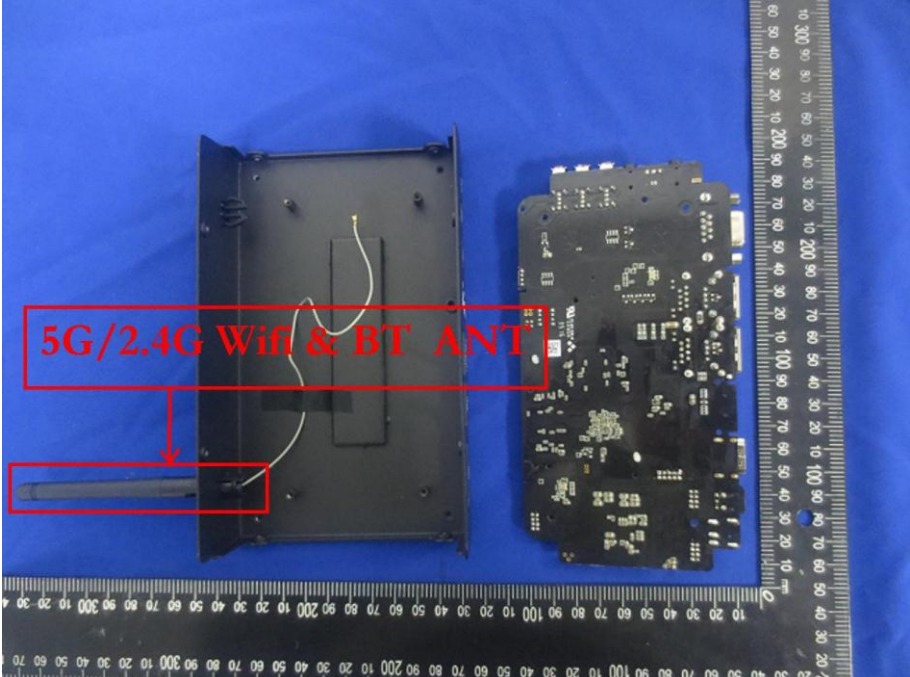
5.7 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
1	3m SAC	SAEMC	9(L)*6(W)* 6(H)	CCIS0001	08-23-2014	08-22-2017
2	BiConiLog Antenna	SCHWARZBECK	VULB9163	CCIS0005	03-25-2016	03-25-2017
3	Horn Antenna	SCHWARZBECK	BBHA9120D	CCIS0006	03-25-2016	03-25-2017
4	Pre-amplifier (10kHz-1.3GHz)	HP	8447D	CCIS0003	04-01-2016	03-31-2017
5	Pre-amplifier (1GHz-18GHz)	Compliance Direction Systems Inc.	PAP-1G18	CCIS0011	04-01-2016	03-31-2017
6	Pre-amplifier (18-40GHz)	A.H System	PAM-1840	GTS219	04-01-2016	03-31-2017
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	04-01-2016	03-31-2017
8	Spectrum analyzer 9k-30GHz	Rohde & Schwarz	FSP30	CCIS0023	03-28-2016	03-28-2017
9	EMI Test Receiver	Rohde & Schwarz	ESRP7	CCIS0167	03-28-2016	03-28-2017
10	Loop antenna	Laplace instrument	RF300	EMC0701	04-01-2016	03-31-2017
11	Spectrum Analyzer	HP	8564E	CCIS0150	03-28-2016	03-28-2017
12	Coaxial Cable	N/A	N/A	CCIS0018	04-01-2016	03-31-2017
13	Coaxial Cable	N/A	N/A	CCIS0020	04-01-2016	03-31-2017

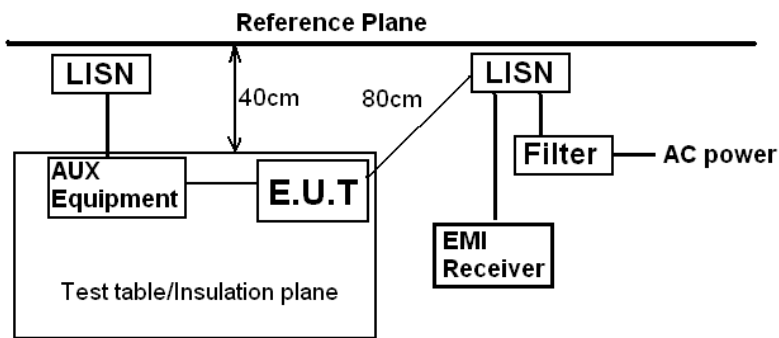
Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
1	Shielding Room	ZhongShuo Electron	11.0(L)x4.0(W)x3.0(H)	CCIS0061	08-23-2014	08-22-2017
2	EMI Test Receiver	Rohde & Schwarz	ESCI	CCIS0002	03-24-2016	03-24-2017
3	LISN	CHASE	MN2050D	CCIS0074	03-26-2016	03-26-2017
4	Coaxial Cable	CCIS	N/A	CCIS0086	04-01-2016	03-31-2017
5	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

6 Test results and Measurement Data

6.1 Antenna requirement

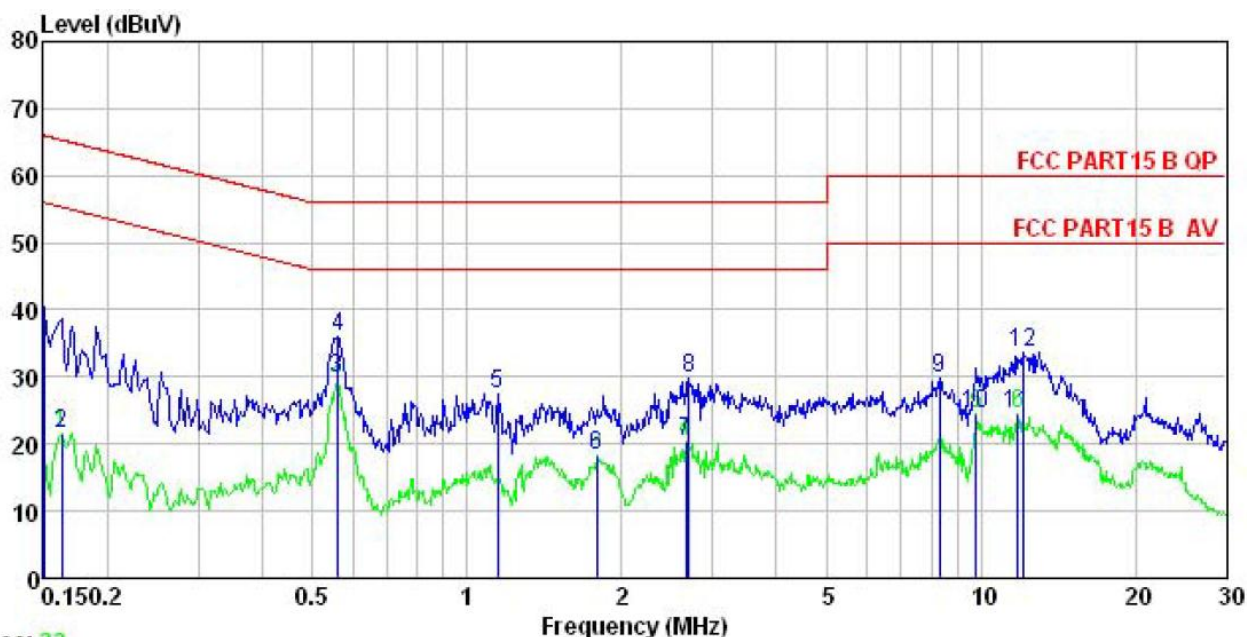
Standard requirement:	FCC Part15 E Section 15.203 /407(a)
<p>15.203 requirement:</p> <p><i>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</i></p> <p><i>This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.</i></p>	
E.U.T Antenna:	
<p>The WiFi antenna is an internal antenna which cannot replace by end-user, the best case gain of the antenna is 2dBi.</p> 	

6.2 Conducted Emission

Test Requirement:	FCC Part15 C Section 15.207		
Test Method:	ANSI C63.4: 2014		
TestFrequencyRange:	150kHz to 30MHz		
Class / Severity:	Class B		
Receiver setup:	RBW=9kHz, VBW=30kHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test procedure	<ol style="list-style-type: none"> 1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). It provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement. 		
Test setup:	 <p><i>Remark:</i> E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>		
Test Instruments:	Refer to section 5.6 for details		
Test mode:	Refer to section 5.3 for details.		
Test results:	Passed		

Measurement Data

Line:

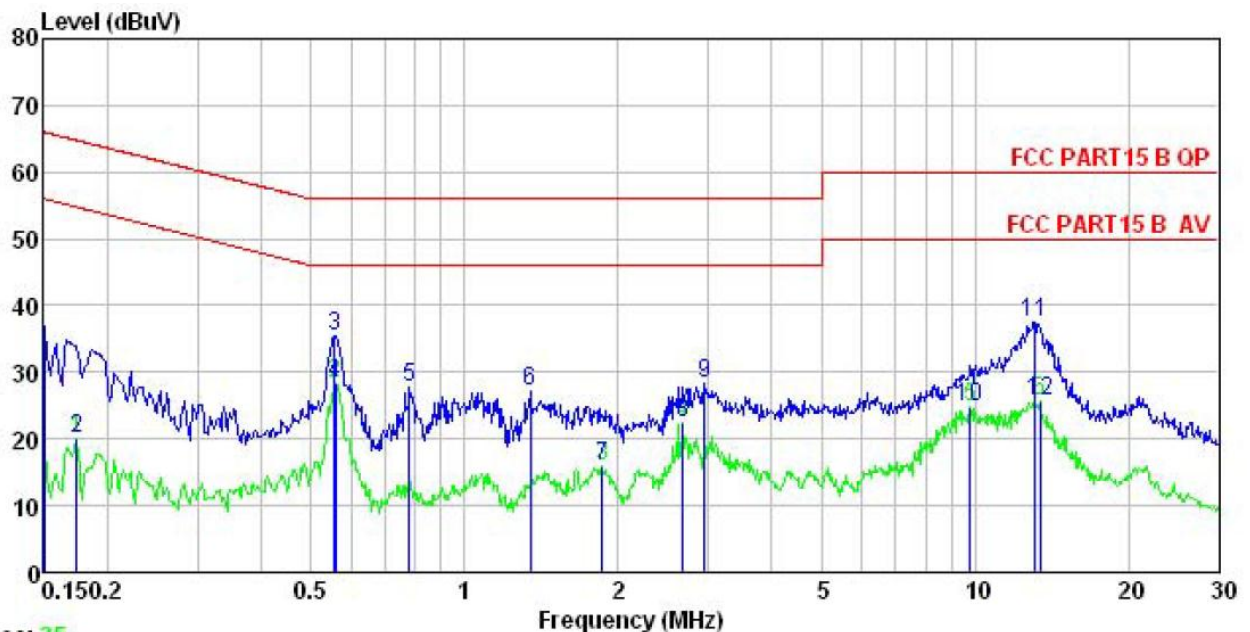


Trace: 33

Site : CCIS Shielding Room
 Condition : FCC PART15 B QP LISN LINE
 EUT : ANDROID TOUCH PLAYER INDUSTRIAL GRADE
 Model : MB4KM
 Test Mode : 5G-Wifi mode
 Power Rating : AC120/60Hz
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa
 Test Engineer: MT
 Remark :

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.150	29.45	0.14	10.78	40.37	66.00	-25.63	QP
2	0.162	10.60	0.14	10.77	21.51	55.34	-33.83	Average
3	0.558	18.75	0.27	10.77	29.79	46.00	-16.21	Average
4	0.561	24.91	0.27	10.77	35.95	56.00	-20.05	QP
5	1.147	16.20	0.27	10.89	27.36	56.00	-28.64	QP
6	1.790	6.93	0.31	10.95	18.19	46.00	-27.81	Average
7	2.664	9.16	0.33	10.93	20.42	46.00	-25.58	Average
8	2.707	18.70	0.33	10.93	29.96	56.00	-26.04	QP
9	8.323	18.51	0.33	10.87	29.71	60.00	-30.29	QP
10	9.809	13.22	0.30	10.93	24.45	50.00	-25.55	Average
11	11.807	13.39	0.28	10.92	24.59	50.00	-25.41	Average
12	12.124	22.41	0.28	10.92	33.61	60.00	-26.39	QP

Neutral:



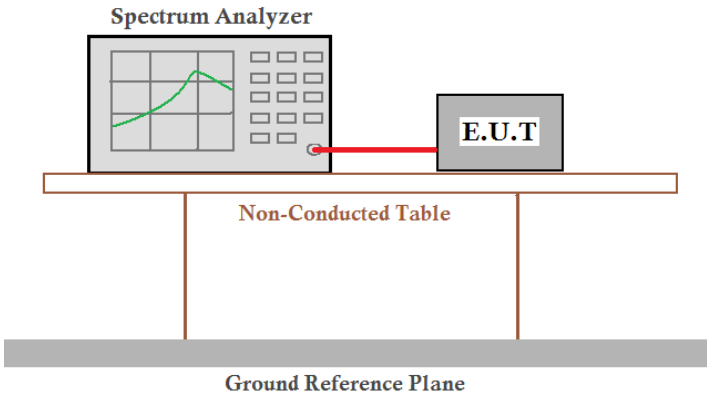
Site : CCIS Shielding Room
 Condition : FCC PART15 B QP LISN NEUTRAL
 EUT : ANDROID TOUCH PLAYER INDUSTRIAL GRADE
 Model : MB4KM
 Test Mode : 5G-Wifi mode
 Power Rating : AC120/60Hz
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa
 Test Engineer: MT
 Remark :

	Freq	Read	LISN	Cable	Level	Limit	Over	
	MHz	Level	Factor	Loss	dBuV	Line	Limit	Remark
		dBuV	dB	dB	dBuV	dBuV	dB	
1	0.150	26.04	0.12	10.78	36.94	66.00	-29.06	QP
2	0.174	9.24	0.14	10.77	20.15	54.77	-34.62	Average
3	0.555	24.29	0.27	10.77	35.33	56.00	-20.67	QP
4	0.558	17.30	0.27	10.77	28.34	46.00	-17.66	Average
5	0.779	16.61	0.31	10.80	27.72	56.00	-28.28	QP
6	1.345	15.95	0.26	10.91	27.12	56.00	-28.88	QP
7	1.858	4.84	0.26	10.95	16.05	46.00	-29.95	Average
8	2.678	11.09	0.29	10.93	22.31	46.00	-23.69	Average
9	2.946	17.10	0.30	10.92	28.32	56.00	-27.68	QP
10	9.809	13.70	0.25	10.93	24.88	50.00	-25.12	Average
11	13.057	26.33	0.25	10.91	37.49	60.00	-22.51	QP
12	13.408	14.61	0.25	10.91	25.77	50.00	-24.23	Average

Notes:

1. An initial pre-scan was performed on the live and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss

6.3 Conducted Output Power

Test Requirement:	FCC Part15 E Section 15.407 (a) (1) (ii) & (a) (3)
Test Method:	ANSI C63.10: 2013, KDB789033
Limit:	Band 1: 24dBm Band 4: 30dBm.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by two vertical legs and sits on a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.6 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data

Band 1

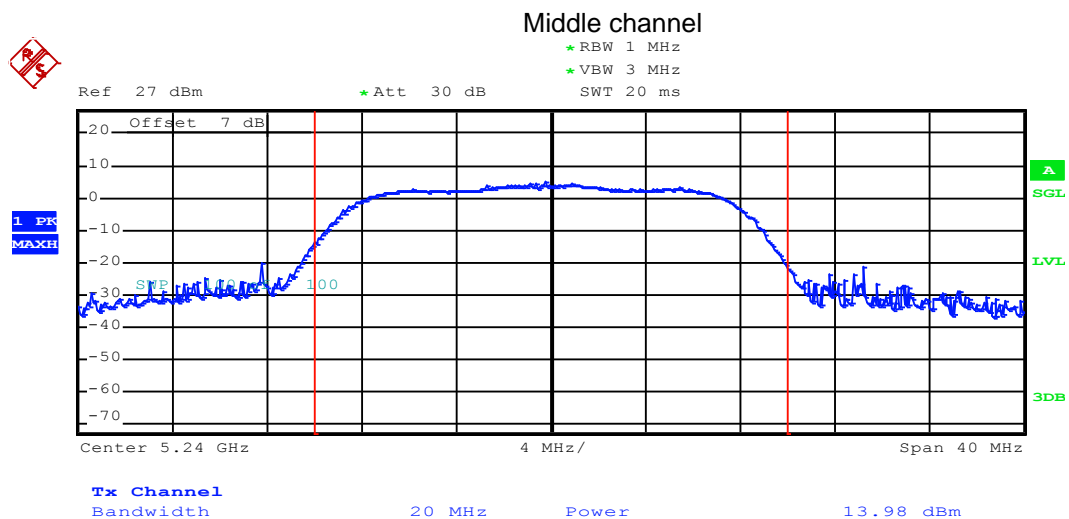
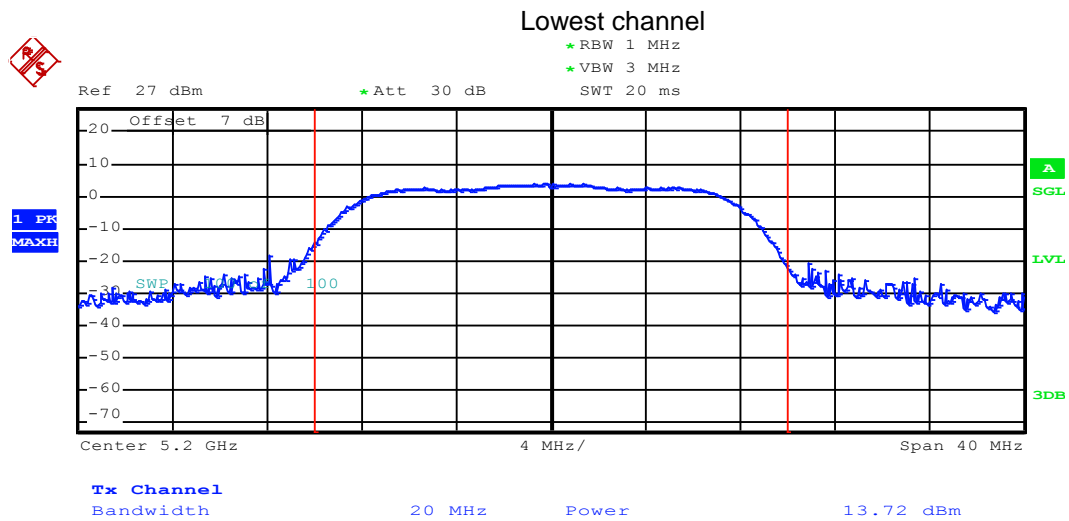
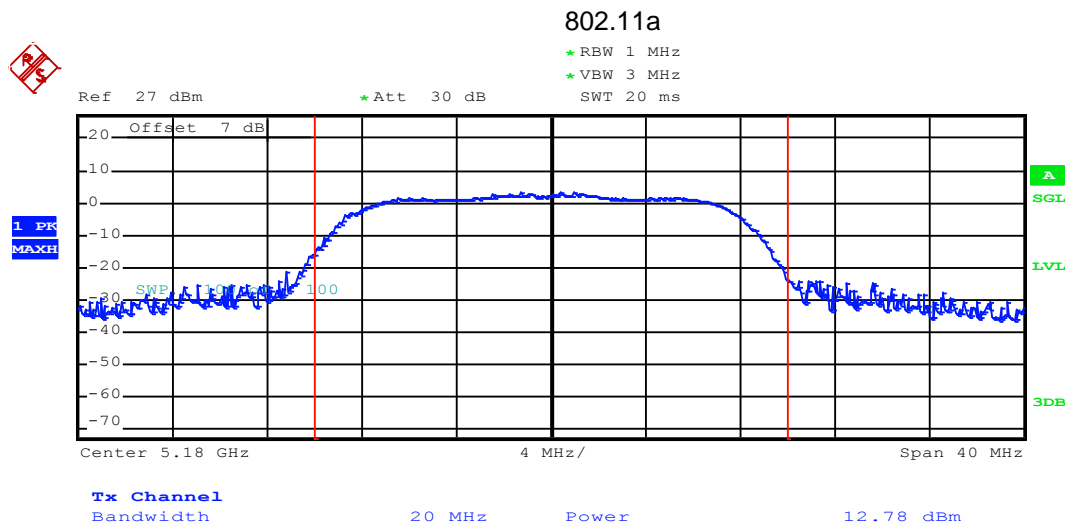
Mode	Test CH	Conducted Output power (dBm)	Limit (dBm)	Result
802.11a	Lowest	12.78	24.00	Pass
	Middle	13.72	24.00	Pass
	Highest	13.98	24.00	Pass
802.11n20	Lowest	12.12	24.00	Pass
	Middle	12.92	24.00	Pass
	Highest	13.87	24.00	Pass

Band 4

Mode	Test CH	Conducted Output power (dBm)	Limit (dBm)	Result
802.11a	Lowest	13.73	30.00	Pass
	Middle	14.36	30.00	Pass
	Highest	14.02	30.00	Pass
802.11n20	Lowest	14.16	30.00	Pass
	Middle	13.83	30.00	Pass
	Highest	13.95	30.00	Pass

Test plot as follows:

Band 1



Highest channel

802.11n20

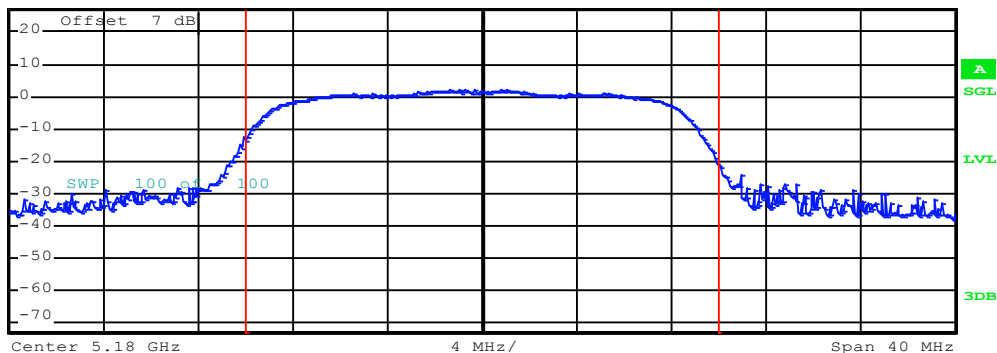


Ref 27 dBm

*Att 30 dB

*RBW 1 MHz
*VBW 3 MHz
SWT 20 ms

1 PK
MAXH



Tx Channel

Bandwidth

20 MHz

Power

12.12 dBm

Lowest channel

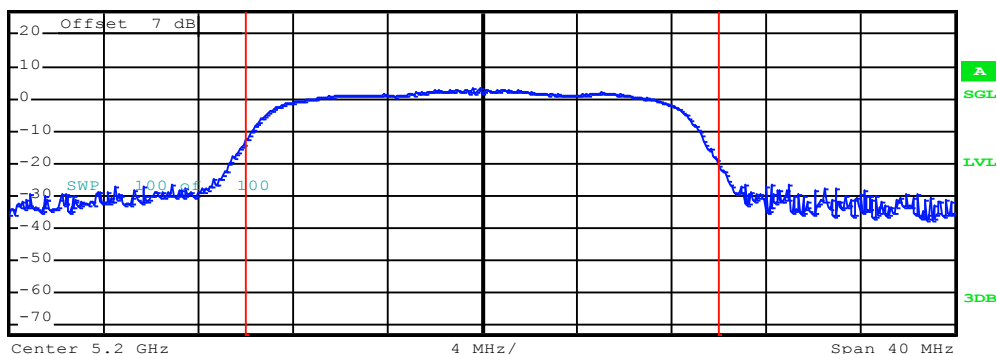


Ref 27 dBm

*Att 30 dB

*RBW 1 MHz
*VBW 3 MHz
SWT 20 ms

1 PK
MAXH



Tx Channel

Bandwidth

20 MHz

Power

12.92 dBm

Middle channel

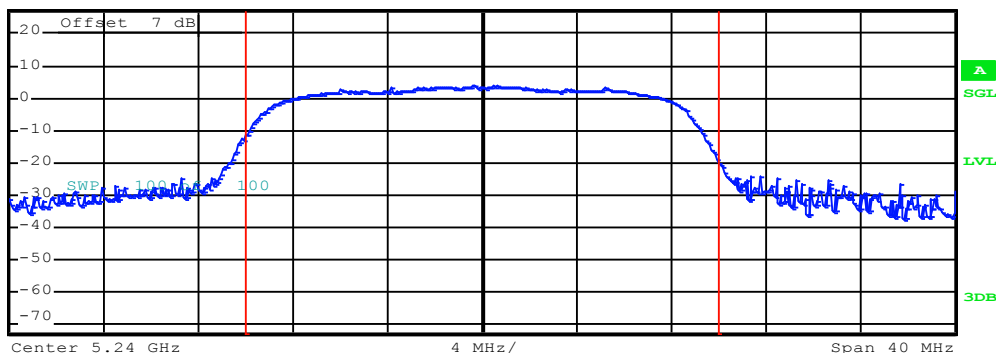


Ref 27 dBm

*Att 30 dB

*RBW 1 MHz
*VBW 3 MHz
SWT 20 ms

1 PK
MAXH



Tx Channel

Bandwidth

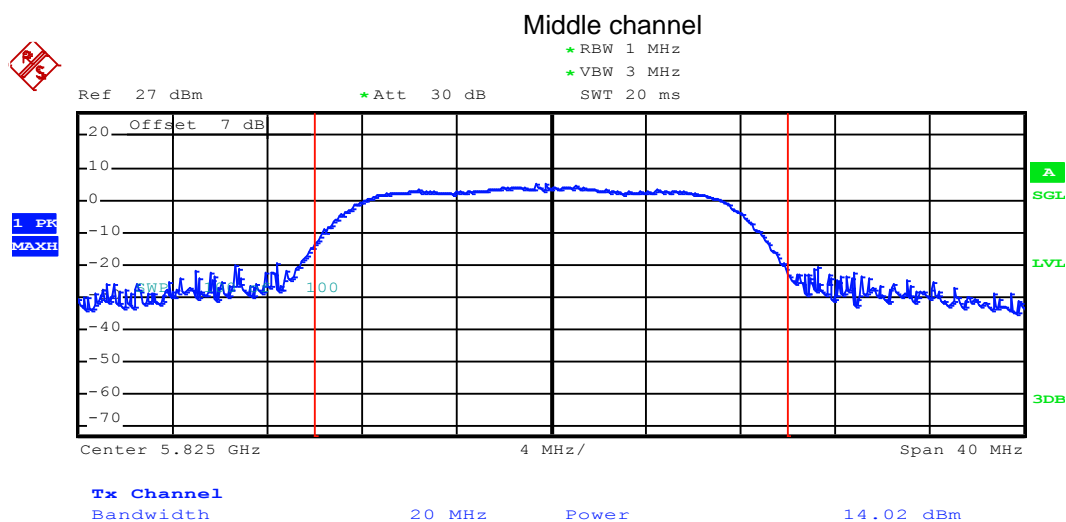
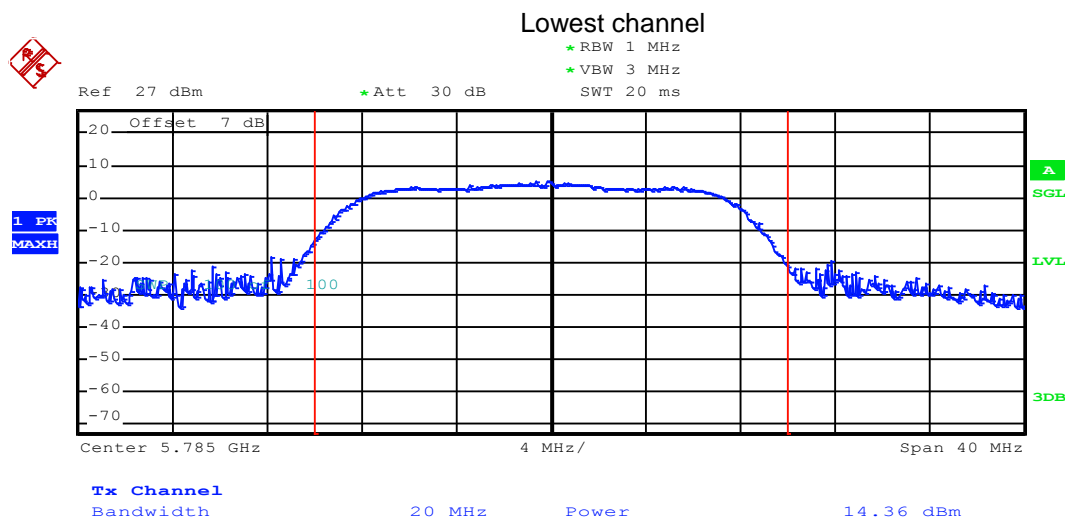
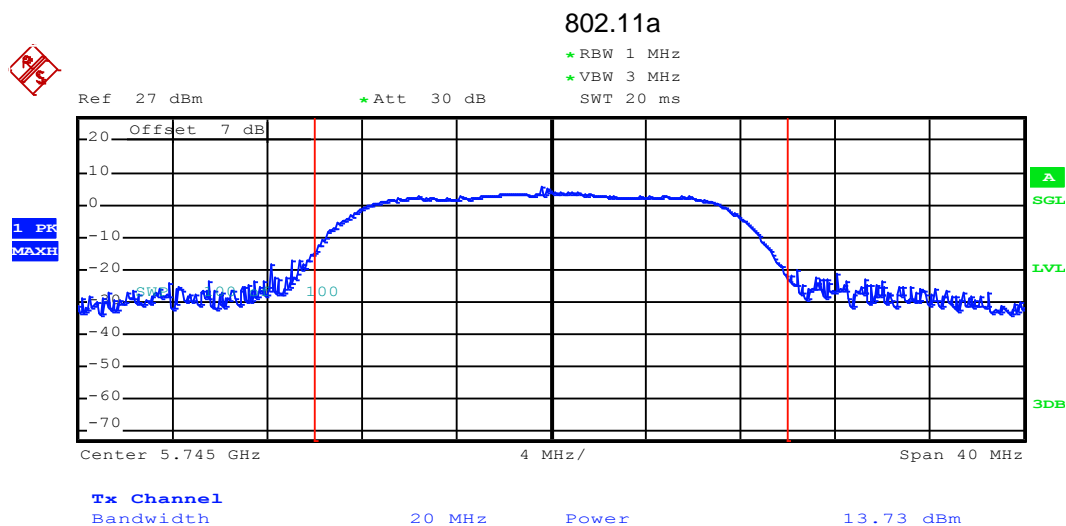
20 MHz

Power

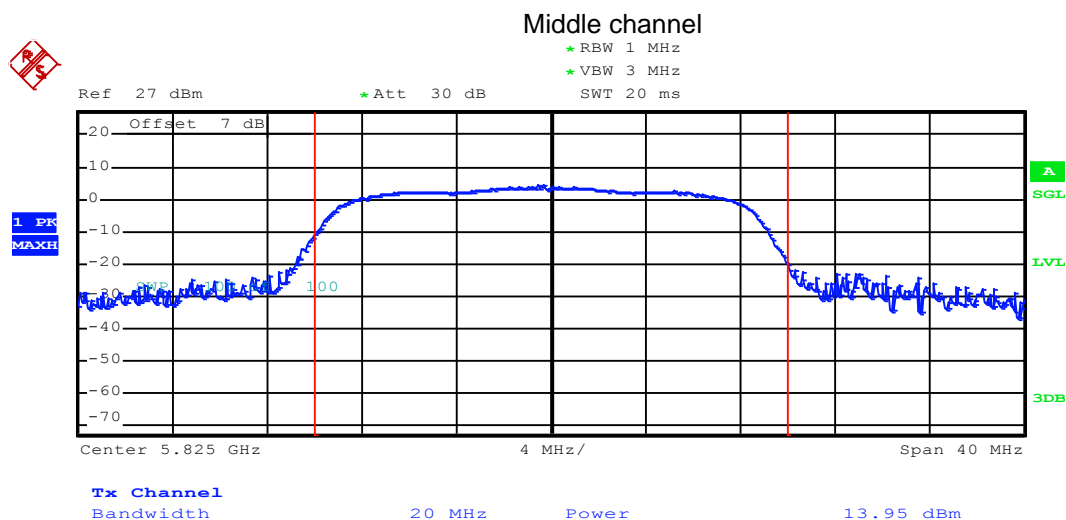
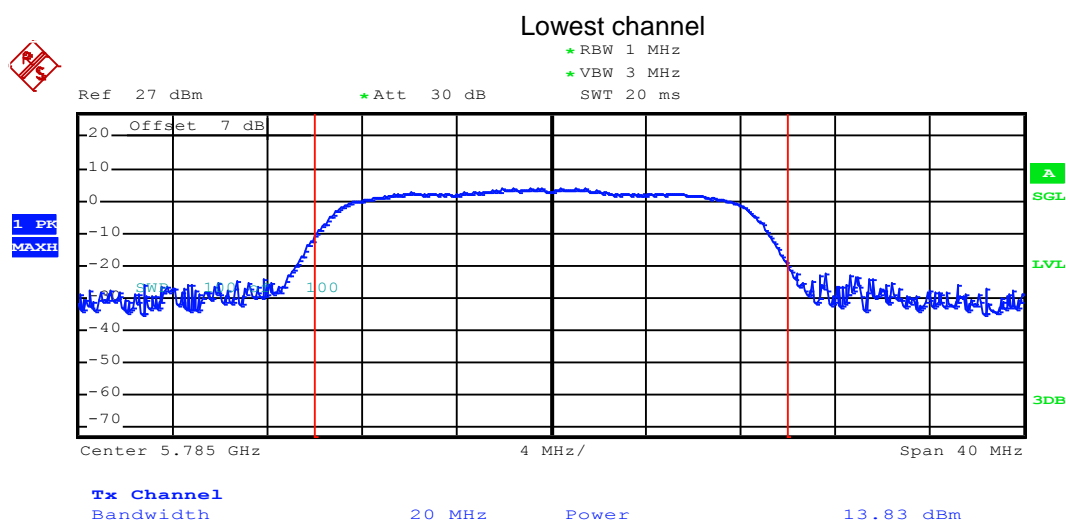
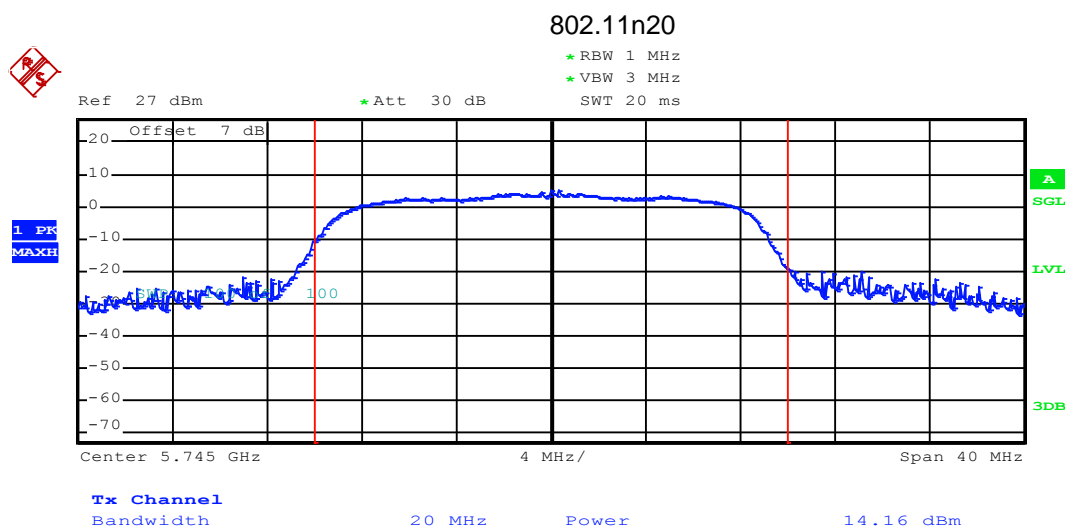
13.87 dBm

Highest channel

Band 4:

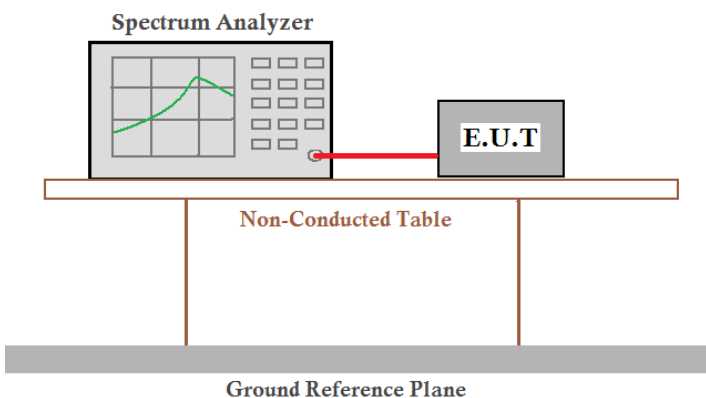


Highest channel



Highest channel

6.4 Occupy Bandwidth

Test Requirement:	FCC Part15 E Section 15.407 (a) (5) and Section 15.407 (e)
Test Method:	ANSI C63.10:2013 and KDB 789033
Limit:	Band 1: N/A(26dB Emission Bandwidth and 99% Occupy Bandwidth) Band 4: N/A(26dB Emission Bandwidth and 99% Occupy Bandwidth) Band 4: >500kHz(6dB Bandwidth)
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by two vertical legs. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.6 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data

Band 1:

Test Channel	26dB Emission Bandwidth (MHz)		Limit	Result
	802.11a	802.11n20		
Lowest	19.12	19.52	N/A	N/A
Middle	19.20	19.52		
Highest	19.20	19.44		

Test Channel	99% Occupy Bandwidth (MHz)		Limit	Result
	802.11a	802.11n20		
Lowest	16.72	17.60	N/A	N/A
Middle	16.72	17.68		
Highest	16.64	17.60		

Band 4:

Test Channel	26dB Emission Bandwidth (MHz)		Limit	Result
	802.11a	802.11n20		
Lowest	19.28	19.60	N/A	N/A
Middle	19.20	19.44		
Highest	19.28	19.44		

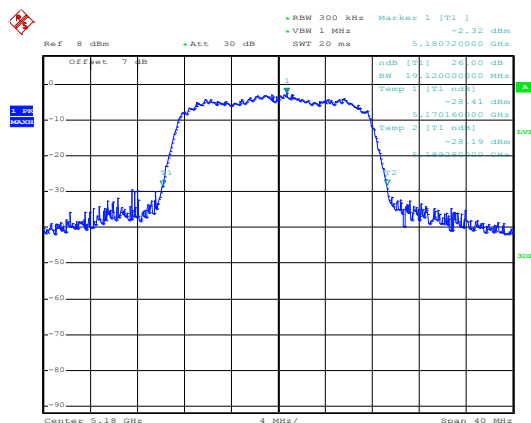
Test Channel	99% Occupy Bandwidth (MHz)		Limit	Result
	802.11a	802.11n20		
Lowest	16.72	17.60	N/A	N/A
Middle	16.72	17.60		
Highest	16.72	17.60		

Test Channel	6dB Emission Bandwidth (MHz)		Limit	Result
	802.11a	802.11n20		
Lowest	15.44	16.16	>500kHz	N/A
Middle	15.36	15.36		
Highest	15.36	15.36		

Test plot as follows:

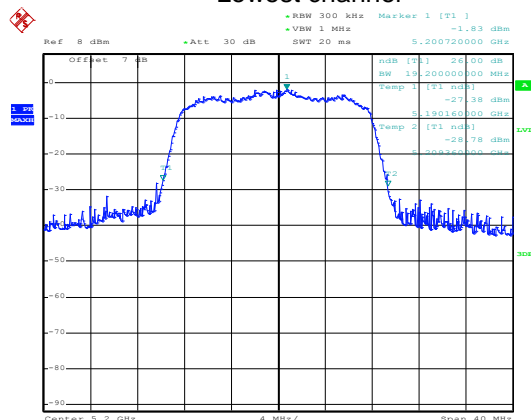
Band 1:

26 dB EBW - 802.11a



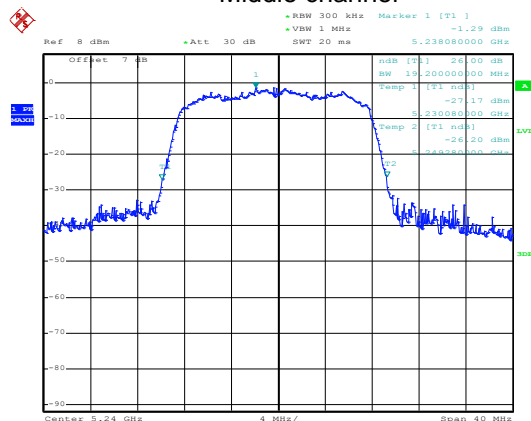
Date: 2.DEC.2016 10:18:18

Lowest channel



Date: 2.DEC.2016 10:19:07

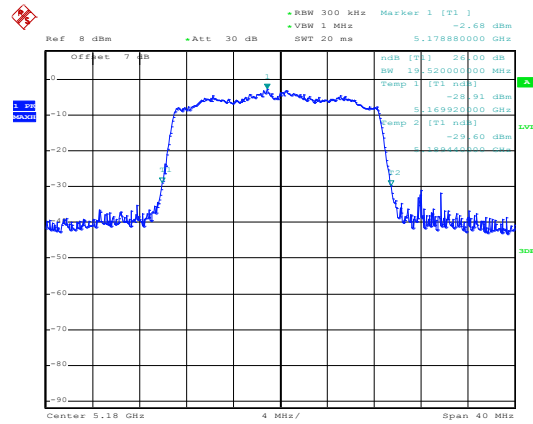
Middle channel



Date: 2.DEC.2016 10:19:28

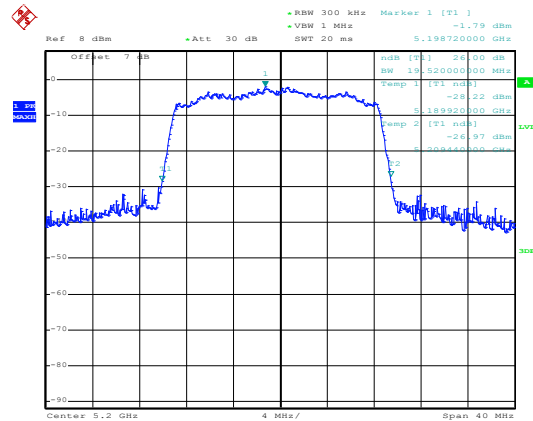
Highest channel

802.11n20



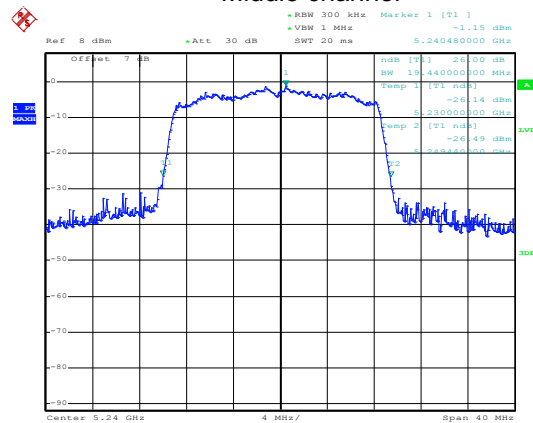
Date: 2.DEC.2016 10:21:12

Lowest channel



Date: 2.DEC.2016 10:21:42

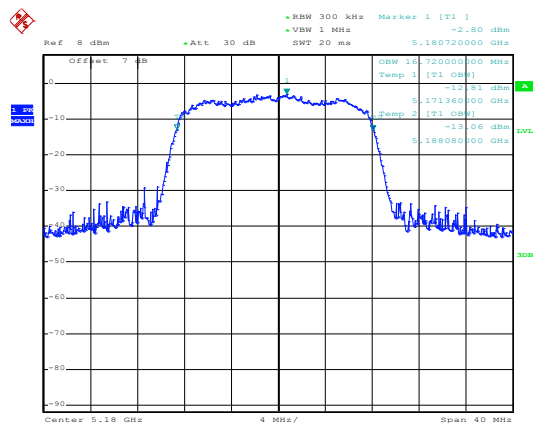
Middle channel



Date: 2.DEC.2016 10:22:40

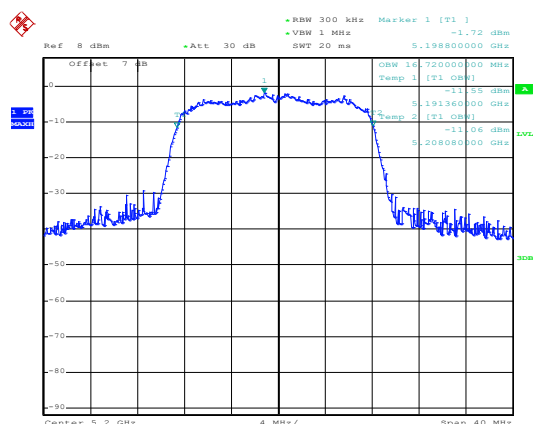
Highest channel

99% OBW - 802.11a



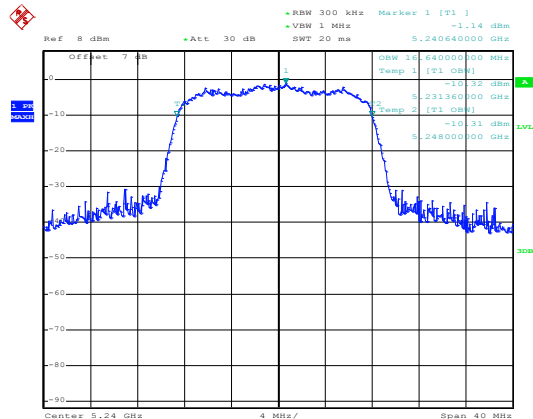
Date: 2.DEC.2016 10:18:32

Lowest channel



Date: 2.DEC.2016 10:18:54

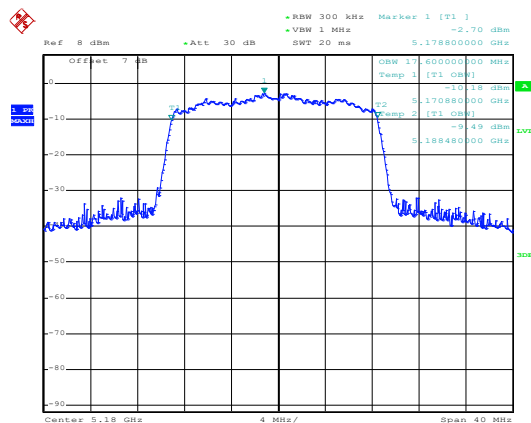
Middle channel



Date: 2.DEC.2016 10:19:41

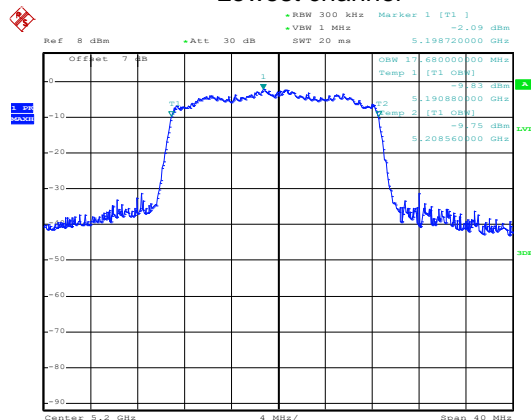
Highest channel

802.11n20



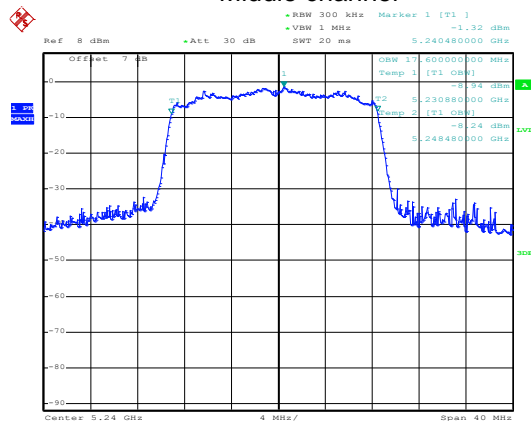
Date: 2.DEC.2016 10:21:00

Lowest channel



Date: 2.DEC.2016 10:22:00

Middle channel

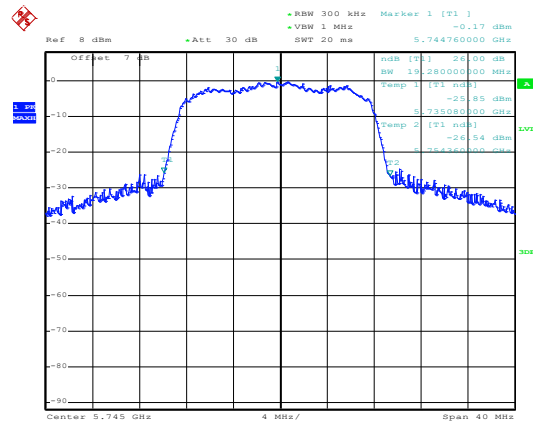


Date: 2.DEC.2016 10:22:24

Highest channel

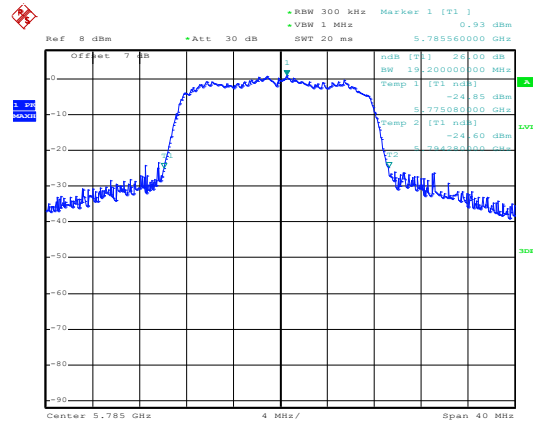
Band 4:

26 dB EBW - 802.11a



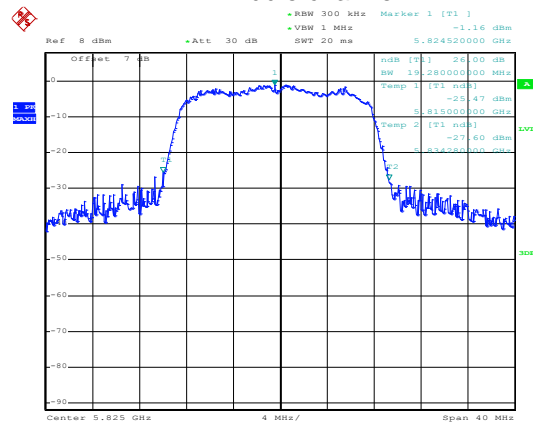
Date: 2.DEC.2016 10:31:47

Lowest channel



Date: 2.DEC.2016 10:32:17

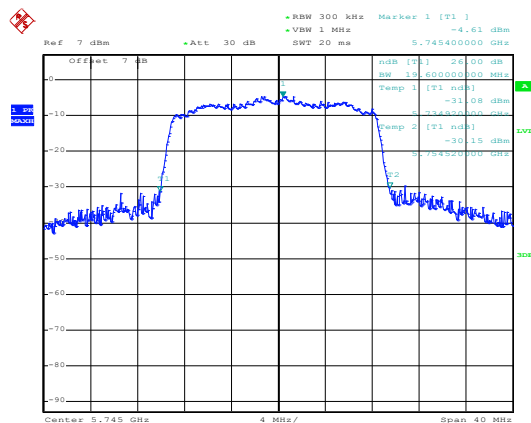
Middle channel



Date: 2.DEC.2016 10:35:34

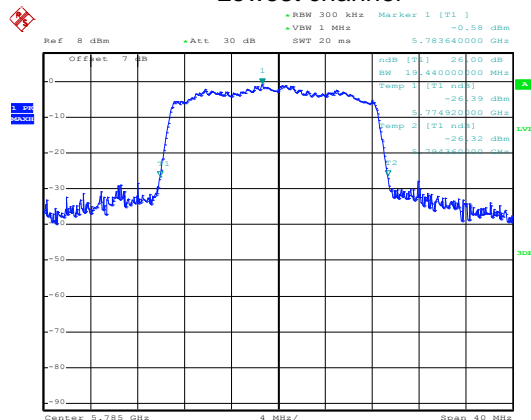
Highest channel

802.11n20



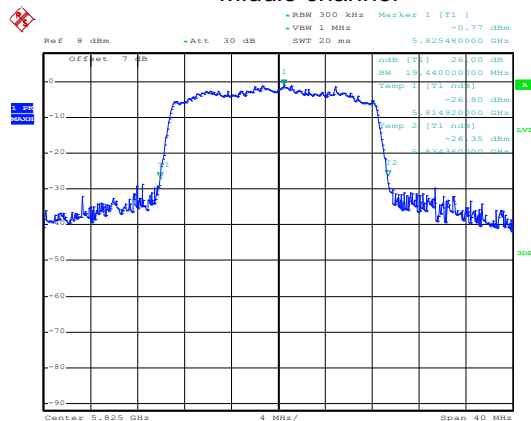
Date: 2.DEC.2016 14:06:17

Lowest channel



Date: 2.DEC.2016 10:36:28

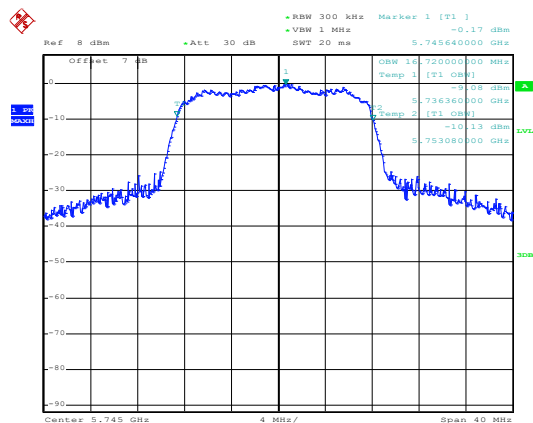
Middle channel



Date: 2.DEC.2016 10:37:34

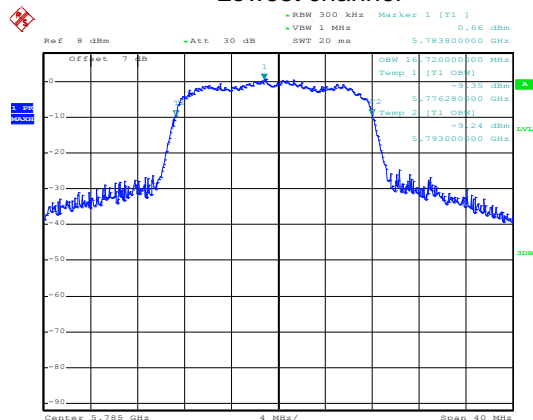
Highest channel

99% OBW - 802.11a



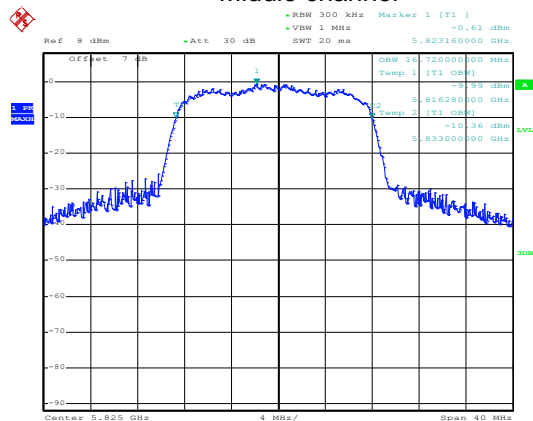
Date: 2.DEC.2016 10:31:23

Lowest channel



Date: 2.DEC.2016 10:32:29

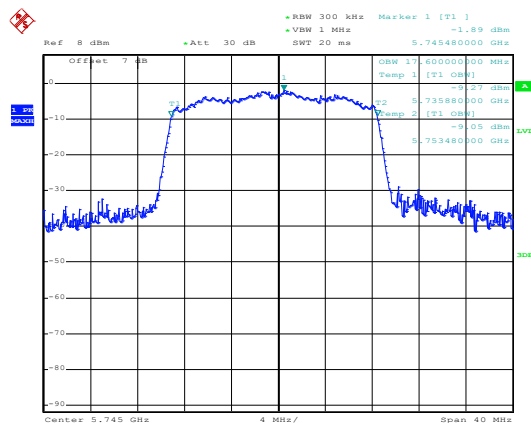
Middle channel



Date: 2.DEC.2016 10:35:22

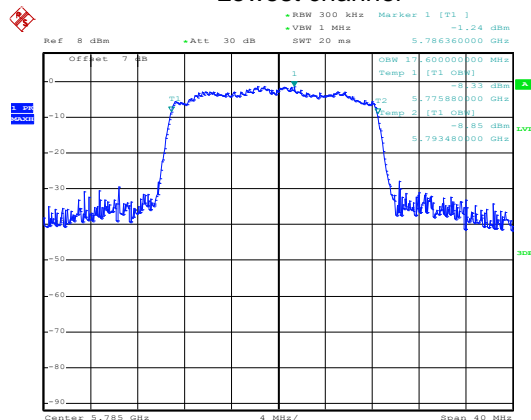
Highest channel

802.11n20



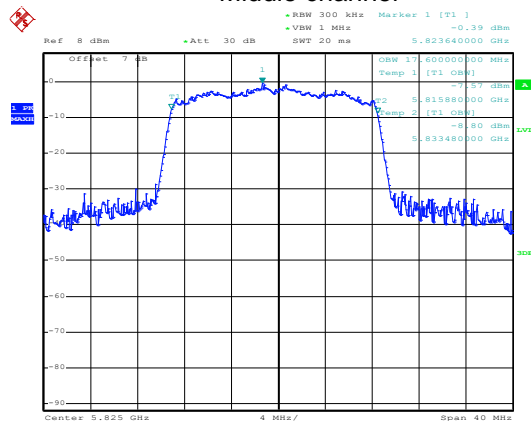
Date: 2.DEC.2016 10:50:05

Lowest channel



Date: 2.DEC.2016 10:36:41

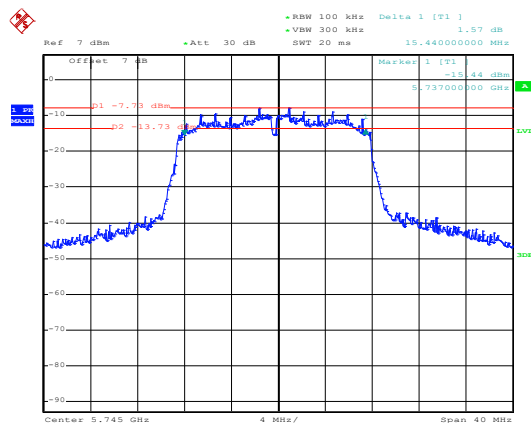
Middle channel



Date: 2.DEC.2016 10:37:10

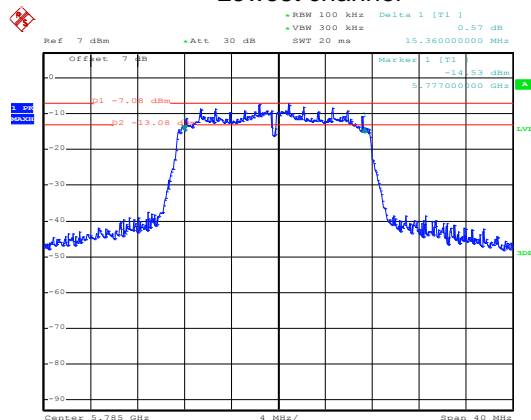
Highest channel

6 dB BW - 802.11a



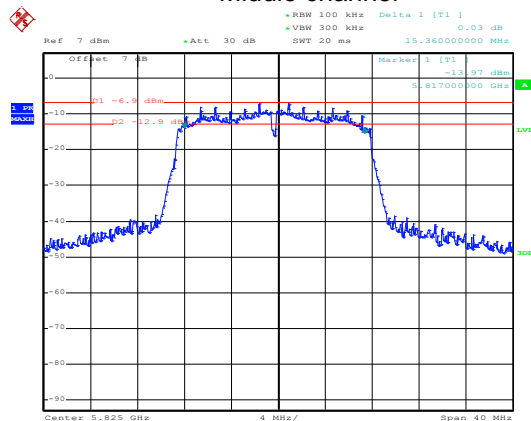
Date: 2.DEC.2016 13:56:31

Lowest channel



Date: 2.DEC.2016 13:57:58

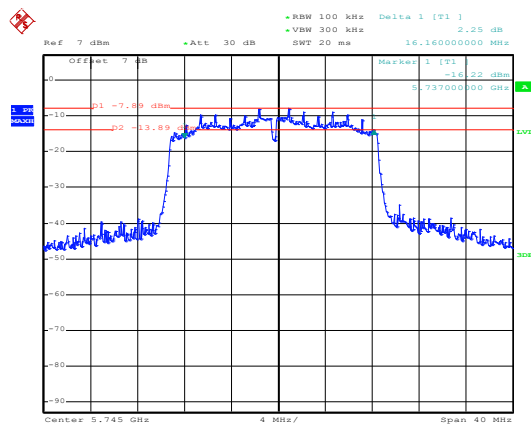
Middle channel



Date: 2.DEC.2016 14:00:03

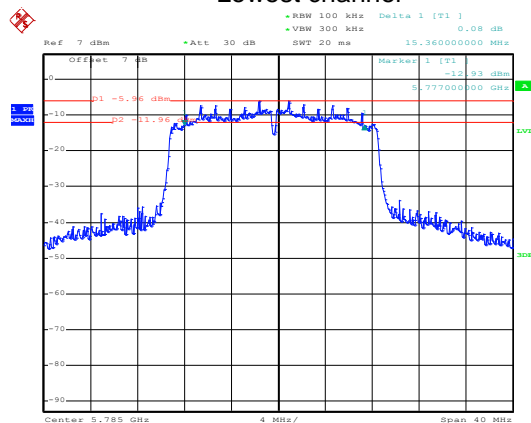
Highest channel

802.11n20



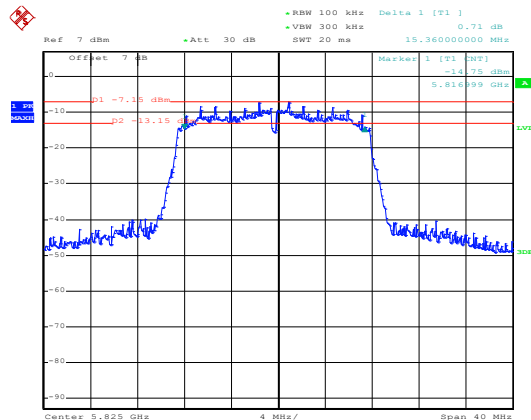
Date: 2.DEC.2016 14:01:24

Lowest channel



Date: 2.DEC.2016 14:02:56

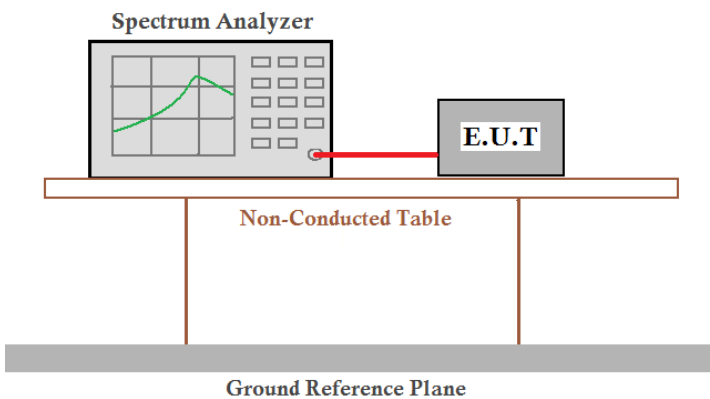
Middle channel



Date: 2.DEC.2016 14:04:03

Highest channel

6.5 Power Spectral Density

Test Requirement:	FCC Part15 E Section 15.407 (a) (1) (ii) &(a) (3)
Test Method:	ANSI C63.10:2013, KDB 789033
Limit:	Band 1: 11 dBm/MHz Band 4: 30dBm/500kHz
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer, shown with a green trace on its screen, is connected to an E.U.T (Equipment Under Test) box by a red cable. Both the Spectrum Analyzer and the E.U.T are positioned on a 'Non-Conducted Table'. This table is supported by two vertical legs, which rest on a 'Ground Reference Plane' represented by a thick grey bar at the bottom.</p>
Test Instruments:	Refer to section 5.6 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data

Band 1

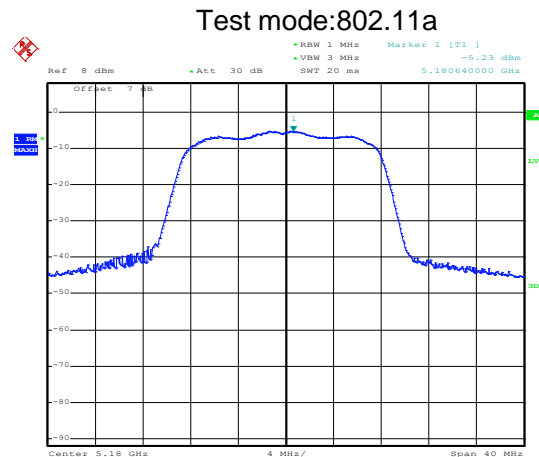
Mode	Test CH	PSD (dBm)	Limit (dBm)	Result
802.11a	Lowest	-5.23	11.00	Pass
	Middle	-4.62	11.00	Pass
	Highest	-3.59	11.00	Pass
802.11n20	Lowest	-5.53	11.00	Pass
	Middle	-4.76	11.00	Pass
	Highest	-3.95	11.00	Pass

Band 4

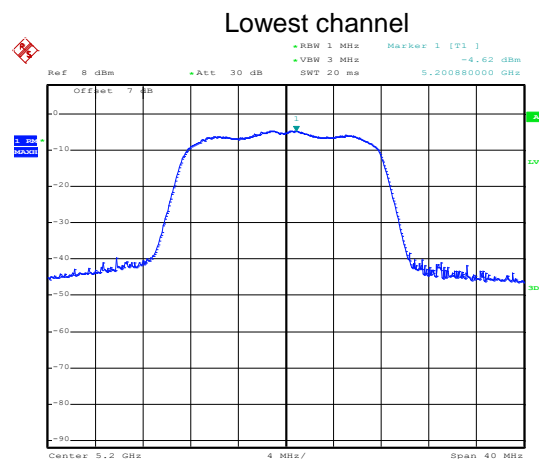
Mode	Test CH	PSD (dBm)	Limit (dBm)	Result
802.11a	Lowest	0.68	30.00	Pass
	Middle	0.26	30.00	Pass
	Highest	0.05	3.000	Pass
802.11n20	Lowest	-0.91	30.00	Pass
	Middle	-0.09	30.00	Pass
	Highest	0.55	30.00	Pass

Test plot as follows:

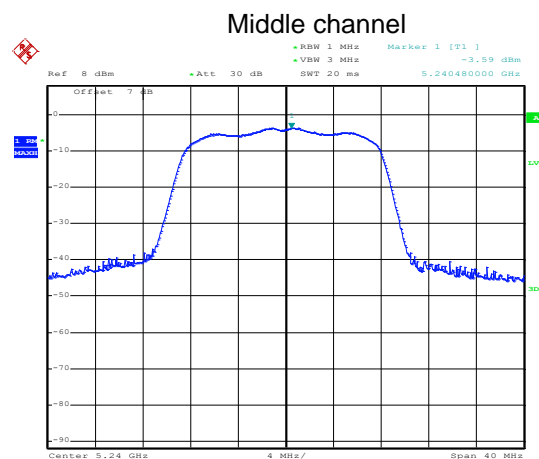
Band 1:



Date: 2.DEC.2016 10:53:51



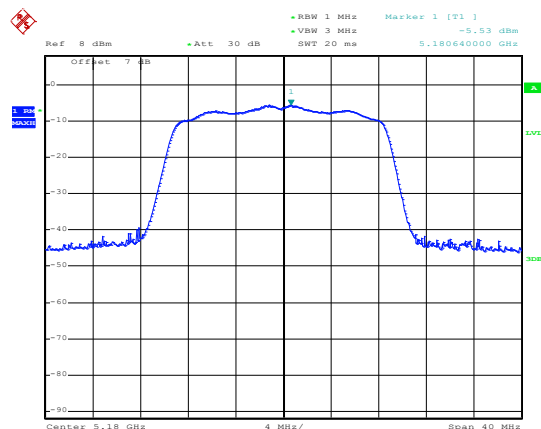
Date: 2.DEC.2016 10:54:17



Date: 2.DEC.2016 10:55:01

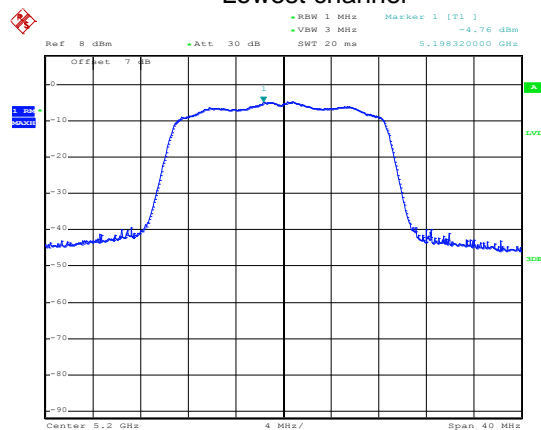
Highest channel

Test mode:802.11n20



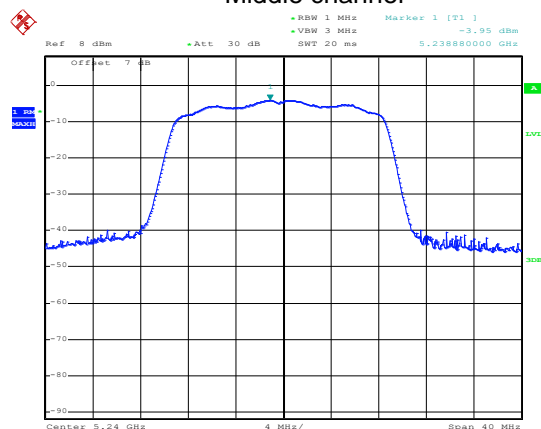
Date: 2.DEC.2016 10:56:45

Lowest channel



Date: 2.DEC.2016 10:56:16

Middle channel

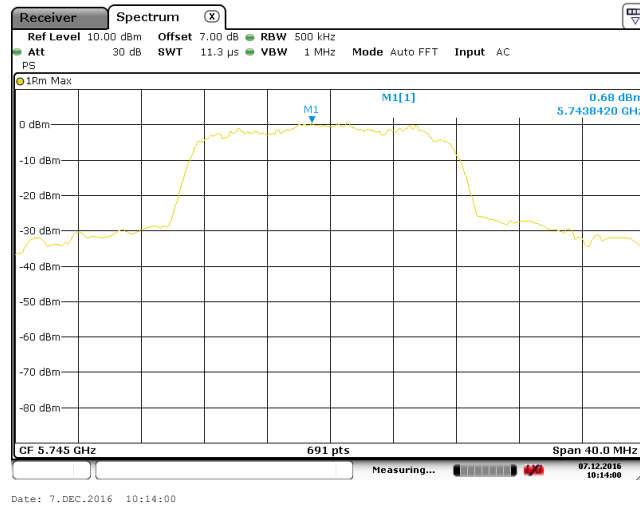


Date: 2.DEC.2016 10:55:35

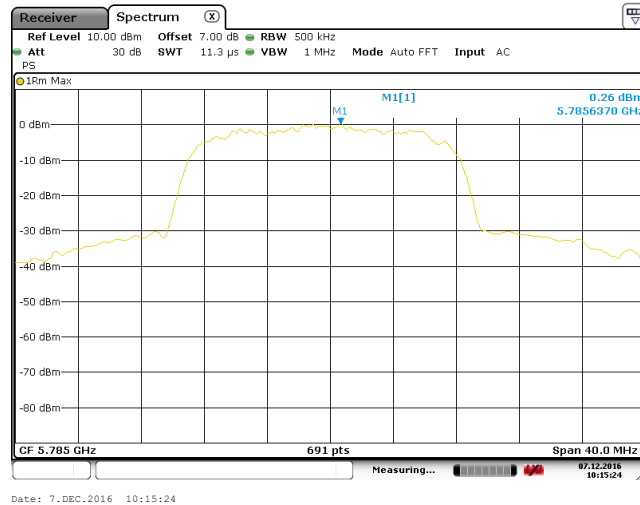
Highest channel

Band 4:

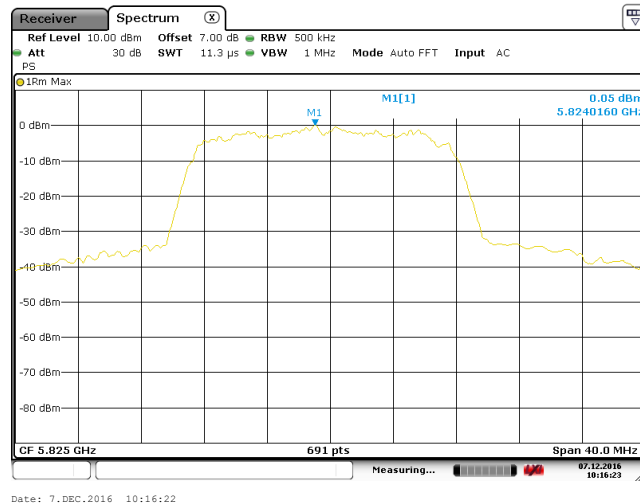
Test mode:802.11a



Lowest channel

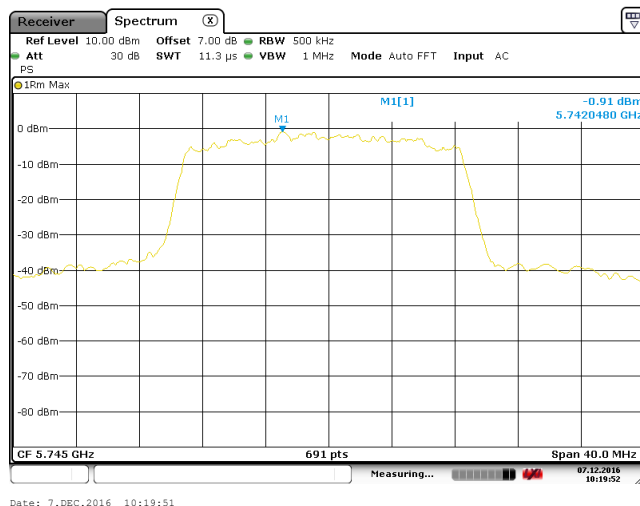


Middle channel

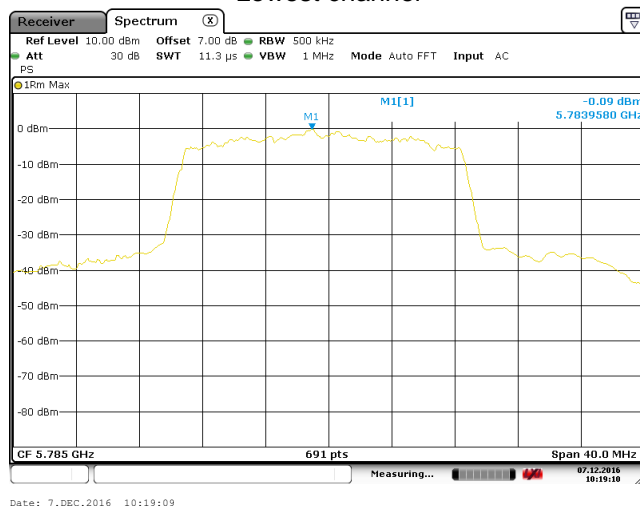


Highest channel

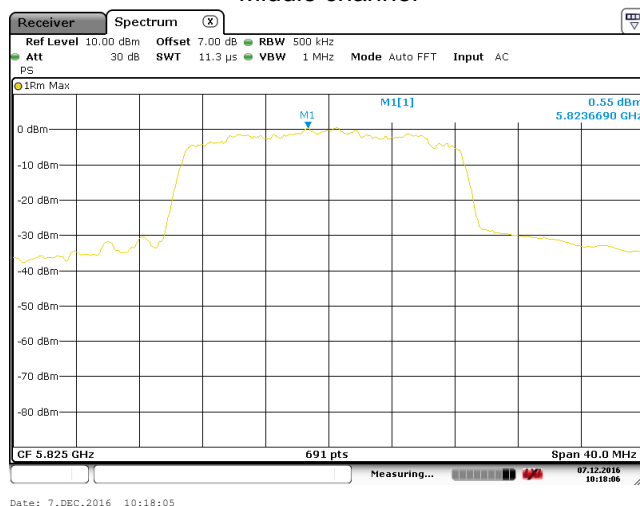
Test mode:802.11n20



Lowest channel

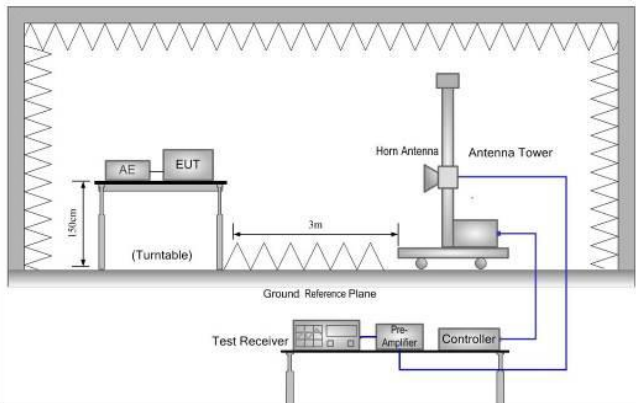


Middle channel



Highest channel

6.6 Band Edge

Test Requirement:	FCC Part15 E Section 15.407 (b)			
Test Method:	ANSI C63.10:2013 , KDB 789033			
Receiver setup:	Detector	RBW	VBW	Remark
	Peak	1MHz	3MHz	Peak Value
	RMS	1MHz	3MHz	Average Value
Limit:	Band	Limit (dBuV/m @3m)		Remark
	Band 1	68.20		Peak Value
		54.00		Average Value
	Band 4	78.20		Peak Value
		54.00		Average Value
	Remark: 1. Band 1 limit: E[dBμV/m] = EIRP[dBm] + 95.2=68.2 dBuV/m,for EIPR[dBm]=-27dBm. 2. Band 4 limit: E[dBμV/m] = EIRP[dBm] + 95.2=78.2 dBuV/m,for EIPR[dBm]=-17dBm.			
Test Procedure:	<div>1. The EUT was placed on the top of a rotating table 1.5 meters above the groundat a 3 meter camber. The table was rotated 360 degrees todetermine the position of the highest radiation.</div> <div>2. The EUT was set 3 meters away from the interference-receiving antenna, whichwas mounted on the top of a variable-height antenna tower.</div> <div>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</div> <div>4. For each suspected emission, the EUT was arranged to its worst case and thenthe antenna was tuned to heights from 1 meter to 4 meters and the rotatablewas turned from 0 degrees to 360 degrees to find the maximum reading.</div> <div>5. The test-receiver system was set to Peak Detect Function and SpecifiedBandwidth with Maximum Hold Mode.</div> <div>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</div>			
Test setup:	<div></div>			
Test Instruments:	Refer to section 5.6 for details			
Test mode:	Refer to section 5.3 for details			
Test results:	Passed			

Band 1:

802.11a								
Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5150.00	42.11	36.23	7.05	41.93	43.46	68.20	-24.74	Horizontal
5150.00	41.65	36.23	7.05	41.93	43.00	68.20	-25.20	Vertical
802.11a								
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5150.00	32.58	36.23	7.05	41.93	33.93	54.00	-20.07	Horizontal
5150.00	31.36	36.23	7.05	41.93	32.71	54.00	-21.29	Vertical
802.11a								
Test channel		Highest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	41.52	35.37	7.11	41.89	42.11	68.20	-26.09	Horizontal
5350.00	42.78	35.37	7.11	41.89	43.37	68.20	-24.83	Vertical
802.11a								
Test channel		Highest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	31.32	35.37	7.11	41.89	31.91	54.00	-22.09	Horizontal
5350.00	32.49	35.37	7.11	41.89	33.08	54.00	-20.92	Vertical

802.11n-HT20								
Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5150.00	42.05	36.23	7.05	41.93	43.40	68.20	-24.80	Horizontal
5150.00	41.11	36.23	7.05	41.93	42.46	68.20	-25.74	Vertical
802.11n-HT20								
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5150.00	32.78	36.23	7.05	41.93	34.13	54.00	-19.87	Horizontal
5150.00	31.69	36.23	7.05	41.93	33.04	54.00	-20.96	Vertical
802.11n-HT20								
Test channel		Highest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	42.25	35.37	7.11	41.89	42.84	68.20	-25.36	Horizontal
5350.00	41.36	35.37	7.11	41.89	41.95	68.20	-26.25	Vertical
802.11n-HT20								
Test channel		Highest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	32.81	35.37	7.11	41.89	33.40	54.00	-20.60	Horizontal
5350.00	31.27	35.37	7.11	41.89	31.86	54.00	-22.14	Vertical

Band 4:

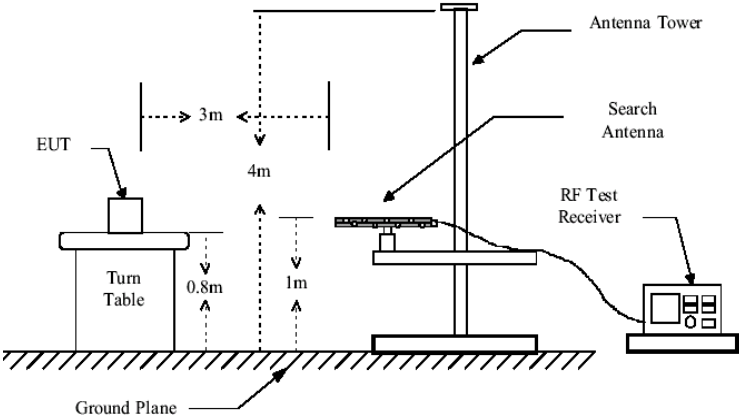
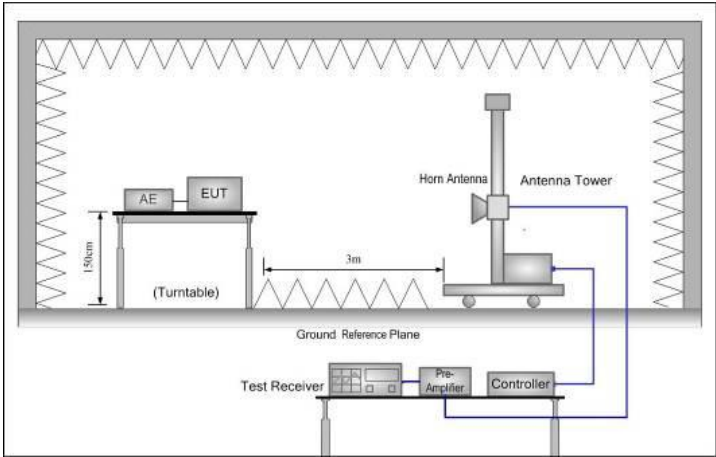
802.11a								
Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	41.23	34.65	7.69	41.94	41.63	68.20	-26.57	Horizontal
5725.00	42.52	34.65	7.69	41.94	42.92	68.20	-25.28	Vertical
802.11a								
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	31.38	34.65	7.69	41.94	31.78	54.00	-22.22	Horizontal
5725.00	32.47	34.65	7.69	41.94	32.87	54.00	-21.13	Vertical
802.11a								
Test channel		Highest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	41.69	34.63	7.90	42.03	42.19	68.20	-26.01	Horizontal
5850.00	40.52	34.63	7.90	42.03	41.02	68.20	-27.18	Vertical
802.11a								
Test channel		Highest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	31.74	34.63	7.90	42.03	32.24	54.00	-21.76	Horizontal
5850.00	30.85	34.63	7.90	42.03	31.35	54.00	-22.65	Vertical

802.11n-HT20								
Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	42.58	34.65	7.69	41.94	42.98	68.20	-25.22	Horizontal
5725.00	41.62	34.65	7.69	41.94	42.02	68.20	-26.18	Vertical
802.11n-HT20								
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	32.60	34.65	7.69	41.94	33.00	54.00	-21.00	Horizontal
5725.00	31.37	34.65	7.69	41.94	31.77	54.00	-22.23	Vertical
802.11n-HT20								
Test channel		Highest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	42.11	34.63	7.90	42.03	42.61	68.20	-25.59	Horizontal
5850.00	41.35	34.63	7.90	42.03	41.85	68.20	-26.35	Vertical
802.11n-HT20								
Test channel		Highest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	33.02	34.63	7.90	42.03	33.52	54.00	-20.48	Horizontal
5850.00	31.25	34.63	7.90	42.03	31.75	54.00	-22.25	Vertical

6.7 Spurious Emission

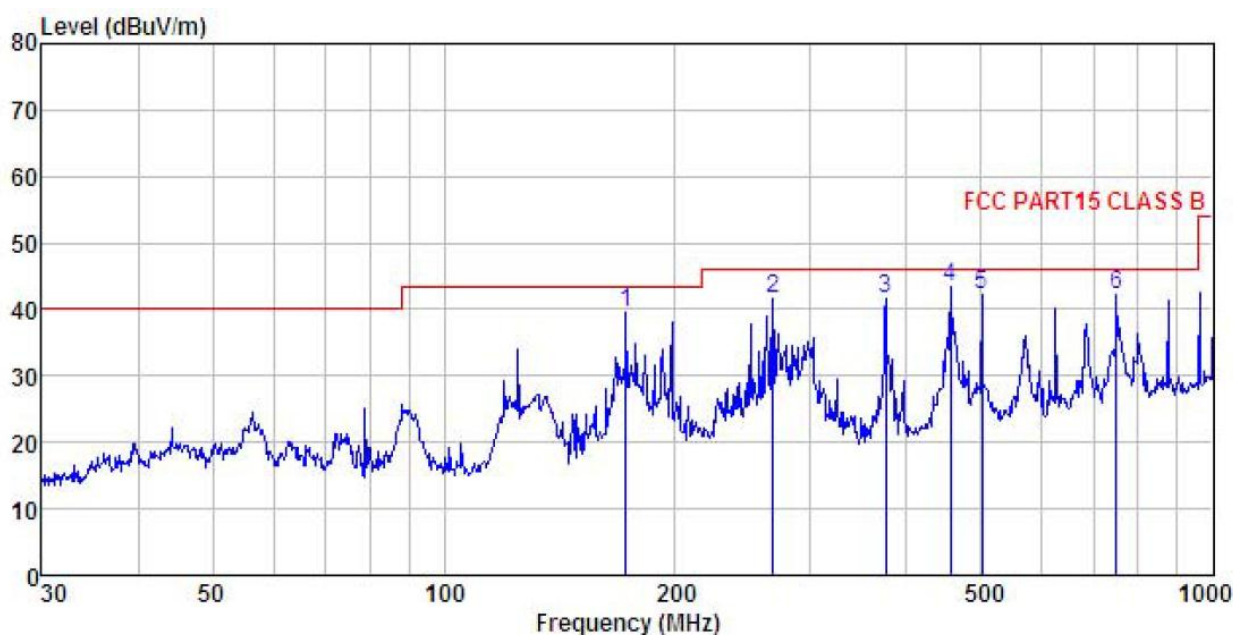
6.7.1 Unwanted Emissions outside of the operating band

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.10:2013				
TestFrequencyRange:	30MHz to 40GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		RMS	1MHz	3MHz	Average Value
Limit:	Frequency		Limit (dBuV/m @3m)		Remark
	30MHz-88MHz		40.0		Quasi-peak Value
	88MHz-216MHz		43.5		Quasi-peak Value
	216MHz-960MHz		46.0		Quasi-peak Value
	960MHz-1GHz		54.0		Quasi-peak Value
	Frequency		Limit (dBm/MHz)		Remark
	Above 1GHz	68.20		Peak Value	
		54.00		Average Value	
	Remark:				
	1. Above 1GHz limit: E[dBμV/m] = EIRP[dBm] + 95.2=68.2 dBuV/m,for EIPR[dBm]=-27dBm.				
	Restricted band:				
	Frequency		Limit (dBm/MHz)		Remark
	Above 1GHz	74		Peak Value	
		54		Average Value	
Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8m(below 1GHz) /1.5m(above 1GHz) above the groundat a 3 meter camber. The table was rotated 360 degrees todetermine the position of the highest radiation.				
	2. The EUT was set 3 meters away from the interference-receiving antenna, whichwas mounted on the top of a variable-height antenna tower.				
	3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.				
	4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatablewas turned from 0 degrees to 360 degrees to find the maximum reading.				
	5. The test-receiver system was set to Peak Detect Function and SpecifiedBandwidth with Maximum Hold Mode.				
	6. If the emission level of the EUT in peak mode was 10dB lower than the limitspecified, then testing could be stopped and the peak values of the EUT wouldbe reported. Otherwise the emissions that did not have 10dB margin would bere-tested one by one using peak, quasi-peak or average method as specified andthen reported in a data sheet.				

<p>Test setup:</p>	<p>Below 1GHz</p>  <p>Above 1GHz</p> 
<p>Test Instruments:</p>	<p>Refer to section 5.6 for details</p>
<p>Test mode:</p>	<p>Refer to section 5.3 for details</p>
<p>Test results:</p>	<p>Passed</p>

Below 1GHz

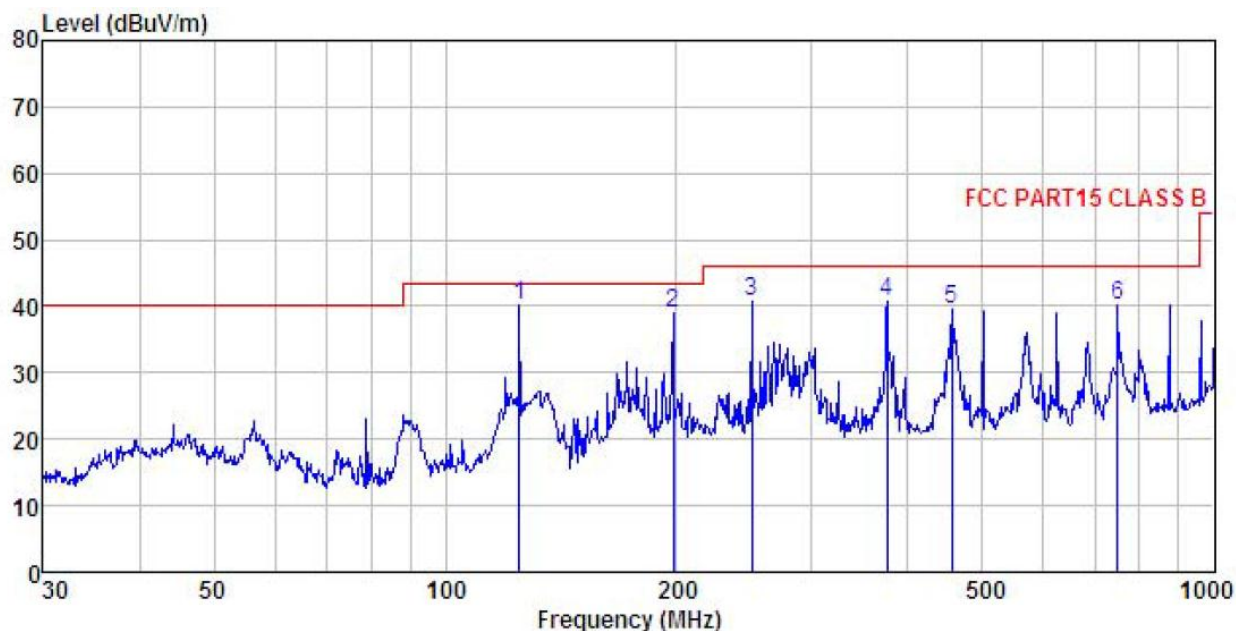
Horizontal:



Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m VULB9163(30M3G) HORIZONTAL
 EUT : ANDROID TOUCH PLAYER INDUSTRIAL GRADE
 Model : MB4KM
 Test mode : 5G-Wifi mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55% 101KPa
 Test Engineer: MT
 REMARK :

	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamplifier Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	172.599	56.29	9.65	2.68	29.03	39.59	43.50	-3.91	QP
2	267.546	55.27	12.00	2.86	28.51	41.62	46.00	-4.38	QP
3	375.939	52.26	15.09	3.09	28.68	41.76	46.00	-4.24	QP
4	455.906	52.79	16.28	3.25	28.88	43.44	46.00	-2.56	QP
5	501.179	50.76	16.80	3.63	28.96	42.23	46.00	-3.77	QP
6	750.108	45.99	20.40	4.36	28.48	42.27	46.00	-3.73	QP

Vertical:



Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m VULB9163(30M3G) VERTICAL
 EUT : ANDROID TOUCH PLAYER INDUSTRIAL GRADE
 Model : MB4KM
 Test mode : 5G-Wifi mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55% 101KPa
 Test Engineer: MT
 REMARK :

	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	125.007	55.14	12.06	2.22	29.36	40.06	43.50	-3.44	QP
2	197.893	54.87	10.11	2.86	28.84	39.00	43.50	-4.50	QP
3	250.301	54.61	11.88	2.81	28.54	40.76	46.00	-5.24	QP
4	375.939	51.26	15.09	3.09	28.68	40.76	46.00	-5.24	QP
5	455.906	48.79	16.28	3.25	28.88	39.44	46.00	-6.56	QP
6	750.108	43.99	20.40	4.36	28.48	40.27	46.00	-5.73	QP

Above 1GHz:**Band 1:**

802.11a mode Lowest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.00	49.58	40.10	9.82	41.97	57.53	68.20	-10.67	Vertical
10360.00	48.63	40.10	9.82	41.97	56.58	68.20	-11.62	Horizontal
802.11a mode Lowest channel (AverageValue)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.00	40.07	40.10	9.82	41.97	48.02	54.00	-5.98	Vertical
10360.00	39.51	40.10	9.82	41.97	47.46	54.00	-6.54	Horizontal

802.11a mode Middle channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10400.00	50.13	40.00	9.85	41.95	58.03	68.20	-10.17	Vertical
10400.00	50.06	40.00	9.85	41.95	57.96	68.20	-10.24	Horizontal
802.11a mode Middle channel (AverageValue)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10400.00	40.07	40.00	9.85	41.95	47.97	54.00	-6.03	Vertical
10400.00	39.92	40.00	9.85	41.95	47.82	54.00	-6.18	Horizontal

802.11a mode Highest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10480.00	50.18	39.70	9.96	41.88	57.96	68.20	-10.24	Vertical
10480.00	50.03	39.70	9.96	41.88	57.81	68.20	-10.39	Horizontal
802.11a mode Highest channel (AverageValue)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10480.00	40.74	39.70	9.96	41.88	48.52	54.00	-5.48	Vertical
10480.00	40.36	39.70	9.96	41.88	48.14	54.00	-5.86	Horizontal

Remark:

1. Final Level=Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

802.11n20 mode Lowest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.00	48.59	40.10	9.82	41.97	56.54	68.20	-11.66	Vertical
10360.00	49.26	40.10	9.82	41.97	57.21	68.20	-10.99	Horizontal
802.11n20 mode Lowest channel (AverageValue)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.00	39.14	40.10	9.82	41.97	47.09	54.00	-6.91	Vertical
10360.00	40.25	40.10	9.82	41.97	48.20	54.00	-5.80	Horizontal

802.11n20 mode Middle channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10400.00	50.01	40.00	9.85	41.95	57.91	68.20	-10.29	Vertical
10400.00	49.63	40.00	9.85	41.95	57.53	68.20	-10.67	Horizontal
802.11n20 mode Middle channel (AverageValue)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10400.00	41.12	40.00	9.85	41.95	49.02	54.00	-4.98	Vertical
10400.00	40.06	40.00	9.85	41.95	47.96	54.00	-6.04	Horizontal

802.11n20 mode Highest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10480.00	50.11	39.70	9.96	41.88	57.89	68.20	-10.31	Vertical
10480.00	50.06	39.70	9.96	41.88	57.84	68.20	-10.36	Horizontal
802.11n20 mode Highest channel (AverageValue)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10480.00	41.12	39.70	9.96	41.88	48.90	54.00	-5.10	Vertical
10480.00	40.27	39.70	9.96	41.88	48.05	54.00	-5.95	Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

**Restricted band:
802.11a**

Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4500.00	43.21	34.50	6.80	42.05	42.46	74.00	-31.54	Horizontal
4500.00	42.18	34.50	6.80	42.05	41.43	74.00	-32.57	Vertical
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4500.00	32.59	34.50	6.80	42.05	31.84	54.00	-22.16	Horizontal
4500.00	31.07	34.50	6.80	42.05	30.32	54.00	-23.68	Vertical
Test channel		Highest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5460.00	41.39	34.90	7.18	41.85	41.62	74.00	-32.38	Horizontal
5460.00	42.54	34.90	7.18	41.85	42.77	74.00	-31.23	Vertical
Test channel		Highest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5460.00	31.39	34.90	7.18	41.85	31.62	54.00	-22.38	Horizontal
5460.00	32.58	34.90	7.18	41.85	32.81	54.00	-21.19	Vertical

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

802.11n-HT20

Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4500.00	41.74	34.50	6.80	42.05	40.99	74.00	-33.01	Horizontal
4500.00	42.25	34.50	6.80	42.05	41.50	74.00	-32.50	Vertical
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4500.00	31.25	34.50	6.80	42.05	30.50	54.00	-23.50	Horizontal
4500.00	32.76	34.50	6.80	42.05	32.01	54.00	-21.99	Vertical
Test channel		Highest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5460.00	41.69	34.90	7.18	41.85	41.92	74.00	-32.08	Horizontal
5460.00	42.25	34.90	7.18	41.85	42.48	74.00	-31.52	Vertical
Test channel		Highest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5460.00	31.25	34.90	7.18	41.85	31.48	54.00	-22.52	Horizontal
5460.00	32.77	34.90	7.18	41.85	33.00	54.00	-21.00	Vertical

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Band 4:**Harmonic spurious and restricted band:**

802.11a mode Lowest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11490.00	47.36	41.50	10.81	42.29	57.38	74.00	-16.62	Vertical
11490.00	46.59	41.50	10.81	42.29	56.61	74.00	-17.39	Horizontal
802.11a mode Lowest channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11490.00	36.25	41.50	10.81	42.29	46.27	54.00	-7.73	Vertical
11490.00	37.15	41.50	10.81	42.29	47.17	54.00	-6.83	Horizontal

802.11a mode Middle channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11570.00	45.58	41.38	10.78	42.27	55.47	74.00	-18.53	Vertical
11570.00	46.31	41.38	10.78	42.27	56.20	74.00	-17.80	Horizontal
802.11a mode Middle channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11570.00	36.03	41.38	10.78	42.27	45.92	54.00	-8.08	Vertical
11570.00	35.58	41.38	10.78	42.27	45.47	54.00	-8.53	Horizontal

802.11a mode Highest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11650.00	46.12	41.26	10.76	42.26	55.88	74.00	-18.12	Vertical
11650.00	46.27	41.26	10.76	42.26	56.03	74.00	-17.97	Horizontal
802.11a mode Highest channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11650.00	36.69	41.26	10.76	42.26	46.45	54.00	-7.55	Vertical
11650.00	35.81	41.26	10.76	42.26	45.57	54.00	-8.43	Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

802.11n20 mode Lowest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11490.00	47.12	41.50	10.81	42.29	57.14	74.00	-16.86	Vertical
11490.00	47.03	41.50	10.81	42.29	57.05	74.00	-16.95	Horizontal
802.11n20 mode Lowest channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11490.00	36.17	41.50	10.81	42.29	46.19	54.00	-7.81	Vertical
11490.00	37.06	41.50	10.81	42.29	47.08	54.00	-6.92	Horizontal

802.11n20 mode Middle channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11570.00	45.12	41.38	10.78	42.27	55.01	74.00	-18.99	Vertical
11570.00	46.49	41.38	10.78	42.27	56.38	74.00	-17.62	Horizontal
802.11n20 mode Middle channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11570.00	36.12	41.38	10.78	42.27	46.01	54.00	-7.99	Vertical
11570.00	35.58	41.38	10.78	42.27	45.47	54.00	-8.53	Horizontal

802.11n20 mode Highest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11650.00	46.36	41.26	10.76	42.26	56.12	74.00	-17.88	Vertical
11650.00	46.27	41.26	10.76	42.26	56.03	74.00	-17.97	Horizontal
802.11n20 mode Highest channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11650.00	37.06	41.26	10.76	42.26	46.82	54.00	-7.18	Vertical
11650.00	36.12	41.26	10.76	42.26	45.88	54.00	-8.12	Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

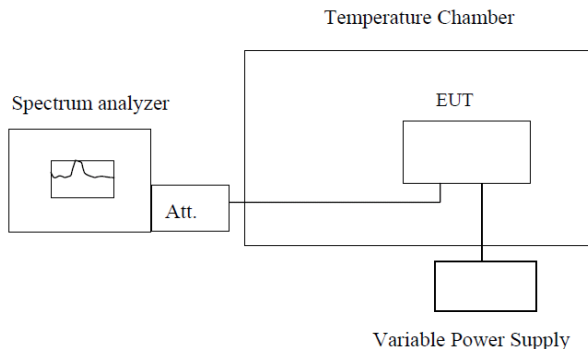
802.11a

Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	42.39	35.37	7.11	41.89	42.98	74.00	-31.02	Horizontal
5350.00	41.74	35.37	7.11	41.89	42.33	74.00	-31.67	Vertical
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	32.03	35.37	7.11	41.89	32.62	54.00	-21.38	Horizontal
5350.00	31.27	35.37	7.11	41.89	31.86	54.00	-22.14	Vertical
Test channel		Highest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5460.00	42.71	34.90	7.18	41.85	42.94	74.00	-31.06	Horizontal
5460.00	41.29	34.90	7.18	41.85	41.52	74.00	-32.48	Vertical
Test channel		Highest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5460.00	33.13	34.90	7.18	41.85	33.36	54.00	-20.64	Horizontal
5460.00	32.18	34.90	7.18	41.85	32.41	54.00	-21.59	Vertical

802.11n-HT20

Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	42.75	35.37	7.11	41.89	43.34	74.00	-30.66	Horizontal
5350.00	41.31	35.37	7.11	41.89	41.90	74.00	-32.10	Vertical
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	32.64	35.37	7.11	41.89	33.23	54.00	-20.77	Horizontal
5350.00	31.23	35.37	7.11	41.89	31.82	54.00	-22.18	Vertical
Test channel		Highest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5460.00	42.25	34.90	7.18	41.85	42.48	74.00	-31.52	Horizontal
5460.00	43.36	34.90	7.18	41.85	43.59	74.00	-30.41	Vertical
Test channel		Highest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5460.00	32.17	34.90	7.18	41.85	32.40	54.00	-21.60	Horizontal
5460.00	32.25	34.90	7.18	41.85	32.48	54.00	-21.52	Vertical

6.8 Frequency stability

Test Requirement:	FCC Part15 E Section 15.407 (g)
Limit:	Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.
Test setup:	 <p>Note : Measurement setup for testing on Antenna connector</p>
Test procedure:	<ol style="list-style-type: none"> 1. The EUT is installed in an environment test chamber with external power source. 2. Set the chamber to operate at 50 centigrade and external power source to output at nominal voltage of EUT. 3. A sufficient stabilization period at each temperature is used prior to each frequency measurement. 4. When temperature is stabled, measure the frequency stability. 5. The test shall be performed under -30 to 50 centigrade and 85 to 115 percent of the nominal voltage. Change setting of chamber and external power source to complete all conditions.
Test Instruments:	Refer to section 5.6 for details
Test mode:	Refer to section 5.3 for details, and all channels have been tested, only shows the worst channel data in this report.
Test results:	Passed

Measurement Data (the worst channel):

Band 1:

Voltage vs. Frequency Stability (Lowest channel=5180MHz)

Test conditions		Frequency(MHz)	Max. Deviation (ppm)
Temp(°C)	Voltage(dc)		
20	13.8V	5179.998412	0.31
	12.0V	5179.979217	4.01
	10.2V	5179.968703	6.04

Temperature vs. Frequency Stability (Lowest channel=5180MHz)

Test conditions		Frequency(MHz)	Max. Deviation (ppm)
Voltage(dc)	Temp(°C)		
12.0V	-20	5179.989631	2.00
	-10	5179.998479	0.29
	0	5179.966384	6.49
	10	5179.989364	2.05
	20	5179.995516	0.87
	30	5179.974893	4.85
	40	5179.966937	6.38
	50	5179.979981	3.86

Band 4:

Voltage vs. Frequency Stability (Lowest channel=5745MHz)

Test conditions		Frequency(MHz)	Max. Deviation (ppm)
Temp(°C)	Voltage(dc)		
20	13.8V	5744.979305	3.60
	12.0V	5744.996570	0.60
	10.2V	5744.997492	0.44

Temperature vs. Frequency Stability (Lowest channel=5745MHz)

Test conditions		Frequency(MHz)	Max. Deviation (ppm)
Voltage(dc)	Temp(°C)		
12.0V	-20	5744.998493	0.26
	-10	5744.994871	0.89
	0	5744.996597	0.59
	10	5744.984481	2.70
	20	5744.996592	0.59
	30	5744.994780	0.91
	40	5744.996091	0.68
	50	5744.994812	0.90