FCC Test Report (Class II Permissive Change)

Product Name	Access Point	
Model No	NBE-M5AC-500, PBE-5AC-500, PBE-5AC-620	
FCC ID	SWX-NBEM5AC	

Applicant	ant Ubiquiti Networks.,Inc	
Address	12F, No. 105, Song Ren Rd., Sin Yi District, Taipei 110, Taiwan	

Date of Receipt	July 30, 2014
Issued Date	Aug. 25, 2014
Report No.	1480067R-RFUSP42V00
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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Test Report

Issued Date: Aug. 25, 2014 Report No.: 1480067R-RFUSP42V00



Product Name	Access Point	
Applicant	Ubiquiti Networks.,Inc	
Address	12F, No. 105, Song Ren Rd., Sin Yi District, Taipei 110, Taiwan	
Manufacturer	Ubiquiti Networks.,Inc	
Model No.	NBE-M5AC-500, PBE-5AC-500, PBE-5AC-620	
FCC ID.	SWX-NBEM5AC	
EUT Rated Voltage	DC 24V (Power by POE)	
EUT Test Voltage	AC 120V/60Hz	
Trade Name	UBIQUITI	
Applicable Standard	FCC CFR Title 47 Part 15 Subpart E: 2014	
	ANSI C63.10: 2009	
	KDB 789033 D02 General UNII Test Procedures v01	
Test Result	Complied	

Documented By :

:

:

Genie Chang

(Senior Adm. Specialist / Genie Chang)

Tested By

Hsu Jack

(Engineer / Jack Hsu)

Approved By

(Director / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Access Point	
Trade Name	UBIQUITI	
FCC ID.	SWX-NBEM5AC	
Model No.	NBE-M5AC-500, PBE-5AC-500, PBE-5AC-620	
Frequency Range	802.11a/n-20MHz/ac-20MHz:5745-5825MHz	
	802.11n-40MHz/ac-40MHz:5755-5795MHz	
	802.11ac-80MHz: 5775MHz	
Number of Channels	802.11a/n-20MHz/ac-20MHz: 5, n-40MHz/ac-40MHz: 2, ac-80MHz: 1	
Data Rate	802.11a/g: 6-54Mbps, 802.11n: up to 300Mbps	
	802.11ac: up to 866.7Mbps	
Channel Control	Auto	
Type of Modulation	802.11a/n/ac:OFDM, BPSK, QPSK, 16QAM, 64QAM, 256QAM	
Antenna type	Dish Antenna	
Antenna Gain	Refer to the table "Antenna List"	
Power Adapter (POE)	MFR: UBIQUITI, M/N: GP-A240-050G	
	Input: AC 100-240V~50/60Hz MAX0.3A	
	Output: DC 24V, 0.5A	

Antenna List

No.	Manufacturer	Antenna type	Peak Gain
1.	UBIQUITI	Dish Antenna	31dBi for 5.725~5.85GHz
2.	UBIQUITI	Dish Antenna	29dBi for 5.725~5.85GHz

Note: 1. The antenna of EUT is conform to FCC 15.203.

2. Only the higher gain antenna was tested and recorded in this report.

802.11a/n-20MHz/ac-20MHz Center Working Frequency of Each Channel:

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

 802.11n-40MHz/ac-40MHz Center Working Frequency of Each Channel: Channel Frequency Channel Frequency
 Channel 151: 5755 MHz
 Channel 159: 5795 MHz

802.11ac-80MHz Center Working Frequency of Each Channel:

ChannelFrequencyChannel 155:5775 MHz

Note:

- 1. This device is a Fixed Point-to-point Access Point including an IEEE 802.11 a/n/ac WLAN transceiver.
- 2. The EUT is including three models for different marketing requirement.
- 3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
- 4. At result of pretests, module supports dual-channel transmission, only the worst case is shown in the report. (802.11a is Chain A, 802.11n/ac is Chain A+ Chain B)
- Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11a is 6Mbps, 802.11n-20BW is 14.4Mbps, 802.11n-40BW is 30Mbps, 802.11ac-80BW is 65Mbps)
- 6. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart E for Unlicensed National Information Infrastructure devices.
- 7. This is to request a Class II permissive change for FCC ID: SWX-NBEM5AC, originally granted on 03/05/2014 The major change filed under this application is:

Change #1:Addition two new antennas, the antennas type is same, the antennas gain is great than the original application. (Antenna type: Dish, Gain=31dBi)

Test Mode	Mode 1: Transmit (802.11a-6Mbps)
	Mode 2: Transmit (802.11n-20BW-14.4Mbps)
	Mode 3: Transmit (802.11n-40BW-30Mbps)
	Mode 4: Transmit (802.11ac-20BW-7.2Mbps)
	Mode 5: Transmit (802.11ac-40BW-15Mbps)
	Mode 6: Transmit (802.11ac-80BW-65Mbps)

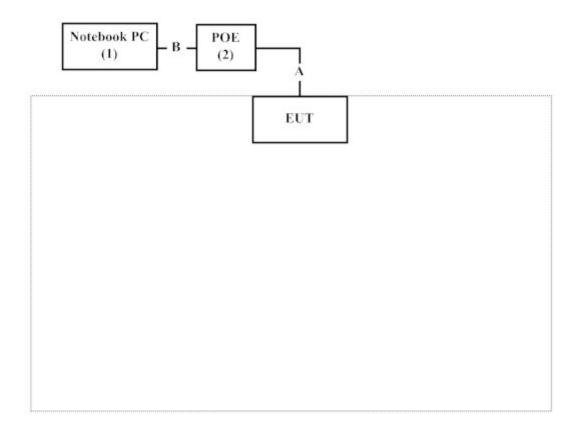
1.3. Tested System Datails

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Proc	duct	Manufacturer	Model No.	Serial No.	Power Cord
(1)	Notebook PC	DELL	РРТ	N/A	Non-Shielded, 0.8m

Signal Cable Type		Signal cable Description
А	LAN Cable	Shielded, 1.8m
В	LAN Cable	Shielded, 1.8m

1.4. Configuration of tested System



1.5. EUT Exercise Software

- (1) Setup the EUT and peripherals as shown in section 1.4.
- (2) Execute "Art2-GUI V2.3" program on the Notebook PC.
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Start the continuous transmission.
- (5) Verify that the EUT works properly.

1.6. Test Facility

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site : <u>http://tw.quietek.com/modules/myalbum/</u>

The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : <u>http://www.quietek.com/</u>

Site Description: File on Federal Communications Commission FCC Engineering Laboratory 7435 Oakland Mills Road Columbia, MD 21046 Registration Number: 92195

Site Name:	Quietek Corporation
Site Address:	No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,
	Lin-Kou Shiang, Taipei,
	Taiwan, R.O.C.
	TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
	E-Mail : <u>service@quietek.com</u>

FCC Accreditation Number: TW1014

2. Conducted Emission

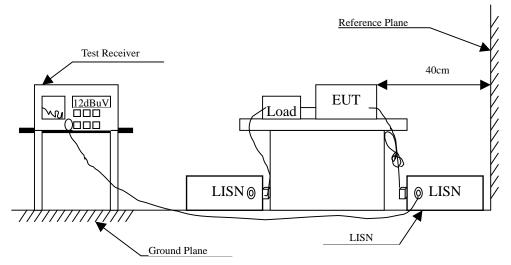
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
Х	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2013	
Х	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2014	Peripherals
Х	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2014	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2014	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2014	
	No.1 Shielded Room				

Note:

- 1. All equipments are calibrated every one year.
- 2. The test instruments marked by "X" are used to measure the final test results.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit							
Frequency	Limits						
MHz	QP	AV					
0.15 - 0.50	66-56	56-46					
0.50-5.0	56	46					
5.0 - 30	60	50					

Remarks : In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

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 C63.10:2009 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.10, 2009; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Product	:	Access Point
Test Item	:	Conducted Emission Test
Power Line	:	Line 1
Test Mode	:	Mode 6: Transmit (802.11ac-80BW-65Mbps) (5775MHz)

Frequency	Correct	Reading	eading Measurement		Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 1					
Quasi-Peak					
0.177	9.653	37.880	47.533	-17.696	65.229
0.576	9.671	32.890	42.561	-13.439	56.000
1.084	9.699	25.140	34.839	-21.161	56.000
2.068	9.772	22.400	32.172	-23.828	56.000
7.119	9.917	28.150	38.067	-21.933	60.000
15.552	10.091	45.250	55.341	-4.659	60.000
Average					
0.177	9.653	26.920	36.573	-18.656	55.229
0.576	9.671	25.790	35.461	-10.539	46.000
1.084	9.699	21.640	31.339	-14.661	46.000
2.068	9.772	17.650	27.422	-18.578	46.000
7.119	9.917	23.120	33.037	-16.963	50.000
15.552	10.091	38.020	48.111	-1.889	50.000

- 1. All Reading Levels are Quasi-Peak and average value.
- 2. "means the worst emission level.
- 3. Measurement Level = Reading Level + Correct Factor

Product	: Access	: Access Point								
Test Item	: Conducted Emission Test									
Power Line	: Line 2									
Test Mode	: Mode 6	: Mode 6: Transmit (802.11ac-80BW-65Mbps) (5775MHz)								
Frequency	Correct	Reading	Measurement	Margin	Limit					
	Factor	Level	Level							
MHz	dB	dBuV	dBuV	dB	dBuV					
LINE 2										
Quasi-Peak										
0.177	9.659	37.700	47.359	-17.870	65.229					
0.361	9.659	31.910	41.569	-18.402	59.971					
0.568	9.670	33.470	43.140	-12.860	56.000					
2.709	9.791	23.190	32.981	-23.019	56.000					
4.228	9.836	25.070	34.906	-21.094	56.000					
15.974	10.125	45.460	55.585	-4.415	60.000					
Average										
0.177	9.659	26.920	36.579	-18.650	55.229					
0.361	9.659	30.840	40.499	-9.472	49.971					
0.568	9.670	28.430	38.100	-7.900	46.000					
2.709	9.791	18.340	28.131	-17.869	46.000					

29.986

48.335

-16.014

-1.665

46.000

50.000

Note:

4.228

15.974

1. All Reading Levels are Quasi-Peak and average value.

20.150

38.210

2. "means the worst emission level.

9.836

10.125

3. Measurement Level = Reading Level + Correct Factor

3. Maximun conducted output power

3.1. Test Equipment

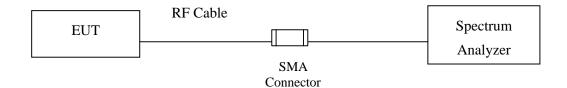
_	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Х	Power Meter	Anritsu	ML2495A/6K00003357	May, 2014
Х	Power Sensor	Anritsu	MA2411B/0738448	Jun, 2014
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014
Note	e:			

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

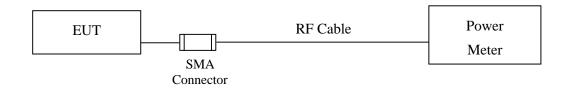
2. The test instruments marked with "X" are used to measure the final test results.

3.2. Test Setup

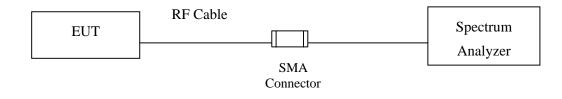
26dBc Occupied Bandwidth



Conduction Power Measurement (for 802.11an)



Conduction Power Measurement (for 802.11ac)



3.3. Limits

(1) For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-topoint U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

- (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any

corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

3.4. Test Procedur

As an alternative to FCC KDB-789033, the EUT maximum conducted output power was measured with an average power meter employing a video bandwidth greater than 6dB BW of the emission under test. Maximum conducted output power was read directly from the meter across all data rates, and across three channels within each sub-band. Special care was used to make sure that the EUT was transmitting in continuous mode. This method exceeds the limitations of FCC KDB-789033, and provides more accurate measurements.

802.11an (BW \leq 40MHz) Maximum conducted output power using KDB 789033 section E)3)b) Method PM-G (Measurement using a gated RF average power meter) <u>Note: the power meter have a video bandwidth that is greater than or equal to the measurement</u> <u>bandwidth, (Anritsu/MA2411B video bandwidth: 65MHz)</u>

802.11ac (BW=80MHz) Maximum conducted output power using KDB 789033 section E)2)b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep).

When transmitted signals consist of two or more non-contiguous spectrum segments (e.g., 80+80 MHz mode) or when a single spectrum segment of a transmission crosses the boundary between two adjacent U-NII bands, KDB 644545 D01 section F) procedure is used for measurements.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Maximum conducted output power

Product	:	Access Point
Test Item	:	Maximum conducted output power
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps)

CHAIN A

Cable	loss=1dB	Maximum conducted output power								
			Data Rate (Mbps)							
Channel No.	Frequency (MHz)	6	9	12	18	24	36	48	54	Required Limit
			Measurement Level (dBm)							
149	5745	18.45								<30dBm
157	5785	16.58	16.44	16.31	16.17	16.04	15.90	15.77	15.63	<30dBm
165	5825	15.99								<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

CHAIN B

Cable	e loss=1dB	Maximum conducted output power								
				Γ	Data Rat	e (Mbps	5)			
Channel No.	Frequency (MHz)	6	9	12	18	24	36	48	54	Required Limit
			Measurement Level (dBm)							
149	5745	18.61								<30dBm
157	5785	16.80	16.69	16.53	16.40	16.27	16.13	16.00	15.86	<30dBm
165	5825	16.01								<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

QuieTer

Product	:	Access Point
Test Item	:	Maximum conducted output power
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit (802.11n-20BW-14.4Mbps)

CHAIN A

Cable	Maximum conducted output power									
Channel No.	Frequency (MHz)	14.4	28.9	43.3	57.8	86.7	115.6	130	144.4	Required Limit
149	5745	16.61								<30dBm
157	5785	16.35	16.26	16.12	16.013	15.90	15.78	15.668	15.55	<30dBm
165	5825	15.54								<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

CHAIN B

Cable loss=1dB		Maximum conducted output power									
Channel No.	Frequency (MHz)	14.4	28.9	43.3	57.8	86.7	115.6	130	144.4	Required Limit	
149	5745	17.39								<30dBm	
157	5785	16.91	16.80	16.73	16.633	16.54	16.45	16.36	16.27	<30dBm	
165	5825	15.71								<30dBm	

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

(CHAIN A+ B)

Channel	Frequency	Chain A	Chain B	Output	Output Power
Number		Power	Power	Power	Limit
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
149	5745	16.61	17.39	20.03	30
157	5785	16.35	16.91	19.65	30
165	5825	15.54	15.71	18.64	30

- 1. Power Output Value =Reading value on average power meter + cable loss
- 2. Output Power (dBm) = 10LOG (Chain A Power (mW)+ Chain B Power (mW))

QuieTer

Product	:	Access Point
Test Item	:	Maximum conducted output power
Test Site	:	No.3 OATS
Test Mode	:	Mode 3: Transmit (802.11n-40BW-30Mbps)

CHAIN A

Cable loss=1dB		Maximum conducted output power								
Frequency (MHz)	30	60	90	120	180	240	270	300	Required Limit	
5755	18.04								<30dBm	
5795	17.75	17.63	17.50	17.377	17.25	17.13	17.002	16.88	<30dBm	
	Frequency (MHz) 5755	Frequency (MHz) 30 5755 18.04	Frequency (MHz) 30 60 5755 18.04	Frequency (MHz) 30 60 90 5755 18.04	Frequency (MHz) 30 60 90 120 Measurement 5755 18.04	Data Rate (Mbps) Frequency (MHz) 30 60 90 120 180 Measurement Level (5755 18.04	Balance Frequency (MHz) 30 60 90 120 180 240 Measurement Level (dBm) 5755 18.04	Tota Rate (Mbps) Frequency (MHz) 30 60 90 120 180 240 270 Measurement Level (dBm) 5755 18.04	Data Rate (Mbps) Frequency (MHz) 30 60 90 120 180 240 270 300 Measurement Level (dBm) 5755 18.04	

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

CHAIN B

Cable loss=1dB		Maximum conducted output power									
Channel No.	Frequency (MHz)	30	60	90	120	180	240	270	300	Required Limit	
151	5755	18.71								<30dBm	
159	5795	18.36	18.22	18.10	17.967	17.84	17.71	17.577	17.45	<30dBm	

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

(CHAIN A+ B)

Channel	Frequency	Chain A	Chain B	Output	Output Power
Number		Power	Power	Power	Limit
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
151	5755	18.04	18.71	21.40	30
159	5795	17.75	18.36	21.08	30

- 1. Power Output Value =Reading value on average power meter + cable loss
- 2. Output Power (dBm) = 10LOG (Chain A Power (mW)+ Chain B Power (mW))

Product	:	Access Point
Test Item	:	Maximum conducted output power
Test Site	:	No.3 OATS
Test Mode	:	Mode 4: Transmit (802.11ac-20BW-7.2Mbps)

CHAIN A

Cable lo	ss=1dB		Maximum conducted output power								
Channel	Frequency		Data Rate (Mbps)								
No	(MHz)	VTH0	VTH1	VTH2	VTH3	VTH4	VTH5	VTH6	VTH7	VTH8	Limit
149	5745	18.56	18.42	18.30	18.17	18.04	17.91	17.78	17.65	17.52	<30dBm
157	5785	16.71									<30dBm
165	5825	14.47	14.33	14.17	14.02	13.87	13.72	13.57	13.42	13.27	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

CHAIN B

Cable lo	ss=1dB		Maximum conducted output power								
Channel	Frequency		Data Rate (Mbps)								
No	(MHz)	VTH0	VTH1	VTH2	VTH3	VTH4	VTH5	VTH6	VTH7	VTH8	Limit
149	5745	18.90	18.79	18.64	18.52	18.39	18.26	18.13	18.00	17.87	<30dBm
157	5785	17.02									<30dBm
165	5825	15.61	15.46	15.33	15.19	15.05	14.91	14.77	14.63	14.49	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

(CHAIN A+ B)

Channel Number	Frequency	Chain A Power	Chain B Power	Output Power	Output Power Limit
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
149	5745	18.56	18.90	21.74	30
157	5785	16.71	17.02	19.88	30
165	5825	14.47	15.61	18.09	30

- 1. Power Output Value =Reading value on average power meter + cable loss
- 2. Output Power (dBm) = 10LOG (Chain A Power (mW)+ Chain B Power (mW))

Product	:	Access Point
Test Item	:	Maximum conducted output power
Test Site	:	No.3 OATS
Test Mode	:	Mode 5: Transmit (802.11ac-40BW-15Mbps)

CHAIN A

Cable	loss=1dB				Ma	ximum c	conducte	ed output	t power			
Channe	l Frequency				Ι	Data Rat	e (Mbps)				Required
No	(MHz)	VTH0	VTH1	VTH2	VTH3	VTH4	VTH5	VTH6	VTH7	VTH8	VTH9	Limit
151	5755	18.07								-		<30dBm
159	5795	17.35	17.21	17.05	16.90	16.75	16.60	16.45	16.30	16.15	16.00	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

CHAIN B

Cable lo	ss=1dB				Max	ximum c	conducte	d output	t power			
Channel	Frequency				Ι	Data Rat	e (Mbps)				Required
No	(MHz)	VTH0	VTH1	VTH2	VTH3	VTH4	VTH5	VTH6	VTH7	VTH8	VTH9	Limit
151	5755	18.32										<30dBm
159	5795	18.03	17.91	17.77	17.64	17.51	17.38	17.25	17.12	16.99	16.86	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

(CHAIN A+ B)

Channel	Frequency	Chain A	Chain B	Output	Output Power
Number		Power	Power	Power	Limit
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
151	5755	18.07	18.32	21.21	30
159	5795	17.35	18.03	20.71	30

Note:

1. Power Output Value =Reading value on average power meter + cable loss

2. Output Power (dBm) = 10LOG (Chain A Power (mW)+ Chain B Power (mW))

Product	:	Access Point
Test Item	:	Maximum conducted output power
Test Site	:	No.3 OATS
Test Mode	:	Mode 6: Transmit (802.11ac-80BW-65Mbps)

CHAIN A

Cable lo	oss=1dB				М	aximum	conduc	ted outp	ut powe	r		
Classing 1 Ma	Frequency				Ι	Data Rat	e (Mbps)				Required
Channel No	(MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	Limit
155	5775	12.14	12.02	11.91	11.79	11.68	11.56	11.45	11.33	11.22	11.10	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

CHAIN B

Cable lo	ss=1dB		Maximum conducted output power									
Channel Ne	Frequency					Required						
Channel No	(MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	Limit
155	5775	12.60	12.49	12.24	12.08	11.90	11.72	11.54	11.36	11.18	11.00	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

(CHAIN A+ B)

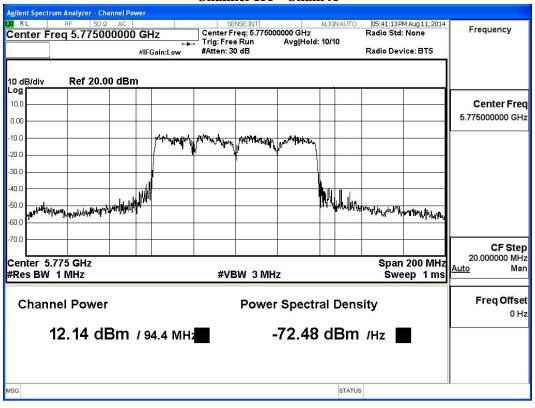
Channel	Frequency	Chain A	Chain B	Output	Output Power
Number		Power	Power	Power	Limit
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
155	5775	12.14	12.60	15.39	30

Note:

1. Power Output Value =Reading value on average power meter + cable loss

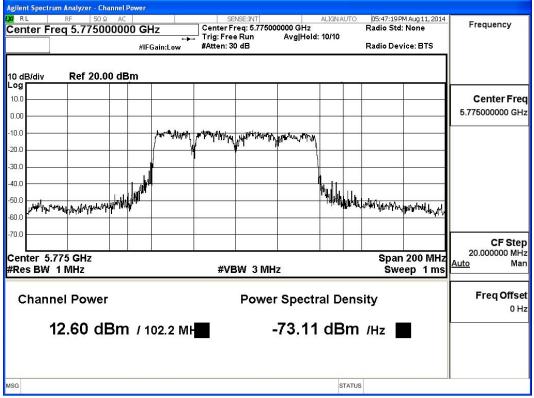
2. Output Power (dBm) = 10LOG (Chain A Power (mW)+ Chain B Power (mW))





Maximum conducted output power: Channel 155– Chain A

Channel 155– Chain B



4. Peak Power Spectral Density

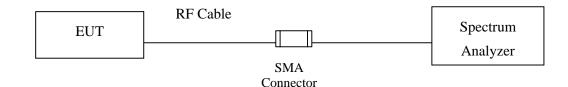
4.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2014
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
Х	Spectrum Analyzer	Agilent	N9010A/MY48030495	Apr, 2014

Note:

- 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
- 2. The test instruments marked with "X" are used to measure the final test results.

4.2. Test Setup



4.3. Limits

(1) For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-topoint U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated

transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations. (**iv**) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.+

- (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (3) For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

4.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to DTS test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

The Peak Power Spectral Density using KDB 789033 section F) procedure, Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer.

SA-1 method is selected to run the test.

Scale the observed power level to an equivalent value in 500 kHz by adjusting (increase) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log (500 \text{ kHz}/100 \text{ kHz} = 6.98 \text{ dB})$.

4.5. Uncertainty

± 1.27 dB

4.6. Test Result of Peak Power Spectral Density

Product	:	Access Point
Test Item	:	Peak Power Spectral Density
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps)

Channel Number	Frequency (MHz)	Data Rata (Mbps)	PPSD/MHz (dBm)	BWCF (dB)	Total PPSD/MHz (dBm)	Required Limit (dBm)	Result
149	5745	6	5.57	6.98	12.55	<30	Pass
157	5785	6	4.43	6.98	11.41	<30	Pass
165	5825	6	3.80	6.98	10.78	<30	Pass

						Swept SA	trum Analyzer - Sv	Agilent Spect
Frequency	11:26:18 PM Aug 08, 2014	ALIGN AUTO		SENSE:INT			RF 50 9	KI RL
Frequency	TRACE 123456 TYPE MWWWWW DET PNNNNN	: Log-Pwr	Avg Type	Free Run n: 30 dB	<mark>1Z</mark> NO: Fast ♀ Trig: Fre Gain:Low #Atten: 3		Freq 5.7450	Center F
Auto Tun	5.737 523 GHz 5.57 dBm	Mkr1					Ref 20.00	10 dB/div
Center Fre 5.745000000 G⊦		0				11		10.0
Start Fre 5.732662500 G⊦	h.	Losalvagn	hayan har a c	and rangementer	northe month and a so	, nh and maa	Jur -	0.00
Stop Fre 5.757337500 G⊦	Wind marked and						POPPIN Y	20.0 ///w/1 30.0
CF Ste 2.467500 MH <u>Auto</u> Ma								40.0
Freq Offs 0 F			-					60.0
				_				70.0
	Span 24.68 MHz 2.40 ms (1001 pts)	Sweep	1	Hz	#VBW 300 kH:	:	.74500 GHz / 100 kHz	
	1	STATUS						ISG

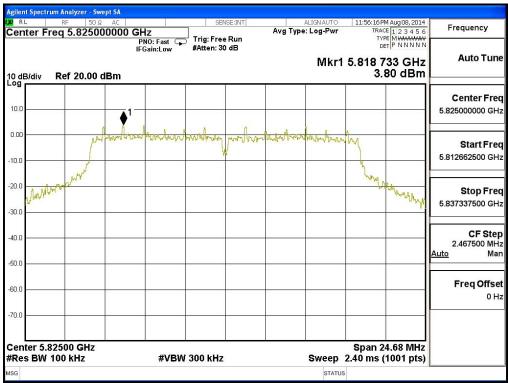
Channel 149:



		Chun	u 157.				
gilent Spectrum Analyzer - Swej							
RL RF 50 Ω Center Freq 5.78500	AC 0000 GHz	SENSE			ALIGN AUTO : Log-Pwr	11:43:36 PM Aug 08, 201 TRACE 1 2 3 4 5	Frequency
	PNO: Fast G	Trig: Free F #Atten: 30 c			_		N
0 dB/div Ref 20.00 d	Bm				Mkr1 5	.778 751 6 GH: 4.43 dBn	
og							Center Free
10.0	• ¹						5.785000000 GH
.00	www.apapentaria	mar Arong	and have a	and May Cana	for the party	why	Start Fre
0.0		Y					5.772700000 GH
0.0						Nor water and the and the	Oton Ero
1 mm						a harder	Stop Free 5.797300000 GH
							CF Ster
0.0							2.460000 MH <u>Auto</u> Ma
5.0							Freq Offse
D.O.							он
0.0							
enter 5.78500 GHz	1					Span 24.60 MH	z
Res BW 100 kHz	#VBW	300 kHz			Sweep	2.40 ms (1001 pts)
SG					STATUS	5	

Channel 157:

Channel 165:



Product	:	Access Point
Test Item	:	Peak Power Spectral Density
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit (802.11n-20BW-14.4Mbps)

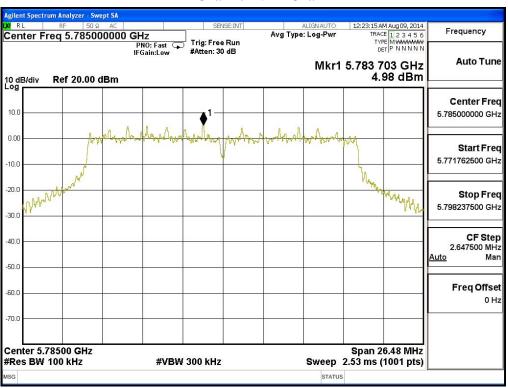
Channel Number	Frequency (MHz)	Chain	PPSD/MHz (dBm)	BWCF (dB)	Total PPSD/MHz (dBm)1	Required Limit (dBm)	Result
140	5745	А	4.98	6.98	14.97	<30	Pass
149	5745	В	4.91	6.98	14.90	<30	Pass
157	5705	А	4.98	6.98	14.97	<30	Pass
157	5785	В	4.93	6.98	14.92	<30	Pass
1.65	5925	А	4.02	6.98	14.01	<30	Pass
165	5825	В	4.01	6.98	14.00	<30	Pass

Note 1: The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

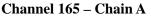
	rum Analyzer - Swe									
Center F	RF 50 Ω req 5.74500		7		ISE:INT		ALIGN AUTO : Log-Pwr	TRAC	M Aug 09, 2014	Frequency
Centerr	1eq 5.74500	PN	0: Fast 🕞	Trig: Free #Atten: 30				TY		1 10 1004
		IFG	ain:Low	#Atten: 30) a 🗅		Mkr1	5.743 6	99 GHz	Auto Tune
10 dB/div	Ref 20.00 d	lBm						4.	98 dBm	
										Center Freq
10.0				▲ 1-		-				5.745000000 GHz
0.00		Ma Ann	In when	n. An	A. A.	. A. A	A . 1			
0.00	100 K	An a AMan No.	an a	And And	LANA LAND	Ban Adree	na arda a	Mary		Start Freq
-10.0					Y			0		5.731725000 GHz
								N.		
-20.0	frank							M	Mar.	Stop Freq
-30.0									14 MM	5.758275000 GHz
-30.0										
-40.0										CF Step 2.655000 MHz
										Auto Man
-50.0			·							
-60.0										Freq Offset
00.0										0 Hz
-70.0										
Center 5.	74500 GHz	1			1	1	1	Span 2	6.55 MHz	
#Res BW	100 kHz		#VBW	300 kHz			Sweep		(1001 pts)	
MSG							STATU	S		

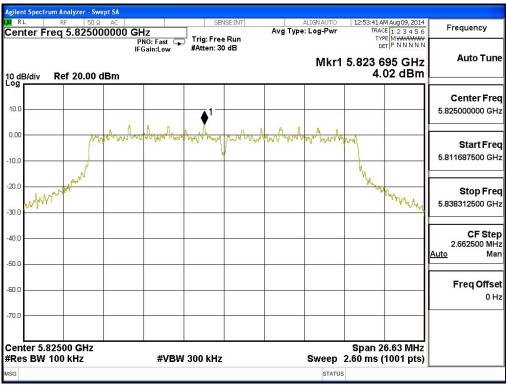
Channel 149 – Chain A

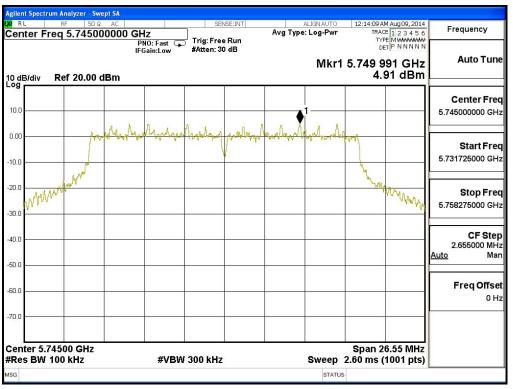




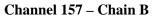
Channel 157 – Chain A

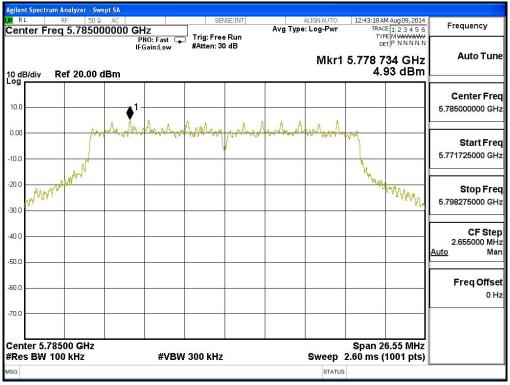






Channel 149 – Chain B





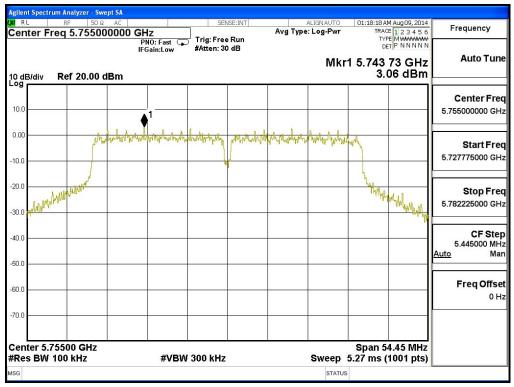
Agilent Spectrum Analyzer - Swep								
🕅 RL RF 50 Ω Center Freq 5.825000	AC 000 GHz	1	GE:INT		ALIGNAUTO : Log-Pwr	TRAC	M Aug 09, 2014 E 1 2 3 4 5 6	Frequency
10 dB/div Ref 20.00 dE	PNO: Fast 🖵 IFGain:Low			IFGain:Low #Atten: 30 dB Mkr1 5.819				Auto Tune
10.0	1							Center Freq 5.825000000 GHz
-10.0	Augurt and and the second s	horabar	martund	where	whink	Num n		Start Freq 5.811687500 GHz
-20.0 -30.0 WWWWWWWW						NU-SAK	WWWWWW	Stop Freq 5.838312500 GHz
-40.0								CF Step 2.662500 MH: Auto Mar
-60.0								Freq Offse 0 H:
-70.0								
Center 5.82500 GHz #Res BW 100 kHz	#VBW	300 kHz			Sweep		6.63 MHz 1001 pts)	
MSG					STATU	5	• *****	L

Channel 165 – Chain B

Product	:	Access Point
Test Item	:	Peak Power Spectral Density
Test Site	:	No.3 OATS
Test Mode	:	Mode 3: Transmit (802.11n-40BW-30Mbps)

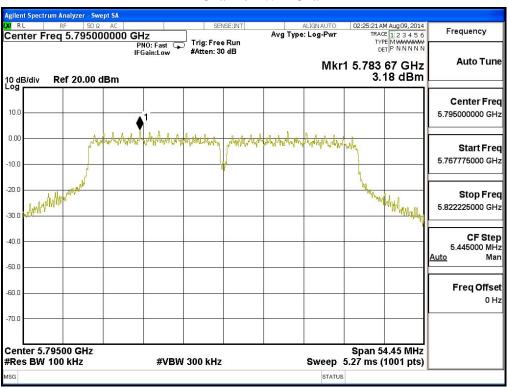
Channel Number	Frequency (MHz)	Chain	PPSD/MHz (dBm) 3.06	BWCF (dB)	Total PPSD/MHz (dBm)1	Required Limit (dBm)	Result
171		А	3.06	6.98	13.05	<30	Pass
151	5755	В	3.39	6.98	13.38	<30	Pass
150	5705	А	3.18	6.98	13.17	<30	Pass
159	5795	В	3.55	6.98	13.54	<30	Pass

Note 1: The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.



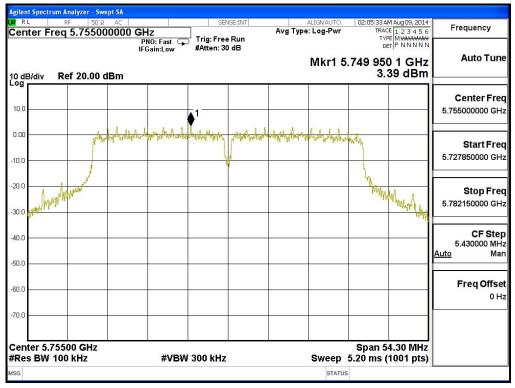
Channel 151 – Chain A





Channel 159 – Chain A

Channel 151 – Chain B





	Channel 159 – Chain B									
Agilent Spectrum	Analyzer - Swept SA									
Center Free	RF 50 Ω AC q 5.79500000) GHz PNO: Fast 😱	SEN	ISE:INT		ALIGN AUTO : Log-Pwr	TRAC	M Aug 09, 2014 CE 1 2 3 4 5 6 PE M WWWWW ET P N N N N N	Frequency	
10 dB/div F	Ref 20.00 dBm	IFGain:Low	#Atten: 30	dB		Mki	1 5.789	96 GHz 55 dBm	Auto Tune	
10.0			● 1			2	×		Center Freq 5.795000000 GHz	
-10.0	- Madagad	and the age of the the set of the	aliter and applying	anahadaan 	_ส ะส่งสูปปรุกษาของ	My Month			Start Freq 5.767625000 GHz	
-20.0 -30.0 Hat WW	him have						IN NOR	Mangel An	Stop Freq 5.822375000 GHz	
-40.0									CF Step 5.475000 MHz <u>Auto</u> Man	
-60.0					~		-		Freq Offset 0 Hz	
-70.0										
Center 5.79 #Res BW 10		#VBW	300 kHz			Sweep		4.75 MHz 1001 pts)		
MSG						STATU	S			

Channel 159 – Chain B

Product	:	Access Point
Test Item	:	Peak Power Spectral Density
Test Site	:	No.3 OATS
Test Mode	:	Mode 4: Transmit (802.11ac-20BW-7.2Mbps)

Channel Number	Frequency (MHz)	Chain	PPSD/MHz (dBm)	BWCF (dB)	Total PPSD/MHz (dBm)1	Required Limit (dBm)	Result
140	5745	А	4.87	6.98	14.86	<30	Pass
149	5745	В	4.91	6.98	14.90	<30	Pass
157	5705	А	4.18	6.98	14.17	<30	Pass
157	5785	В	4.24	6.98	14.23	<30	Pass
165	5925	А	3.34	6.98	13.33	<30	Pass
165	5825	В	2.97	6.98	12.96	<30	Pass

Note 1: The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

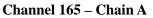
sg	100 1112			000 1112			STATU	1	1001 pt3)	
	74500 GHz 100 kHz		#VBW	300 kHz			Sween	Span 2 2.53 ms (6.10 MHz 1001 pts)	
70.0										
60.0										0 H
										Freq Offse
50.0										Auto Ma
40.0										CF Ste 2.610000 MH
30.0									44 Ly	5.758050000 GH
20.0	V MAMber							ruly.	montral	Stop Fre
10.0	a show of							h.,		5.731950000 GH
0.00	(Lande	di APRICI (CARTER)	. Manada ang	margin barral	-agend to the second	the all have been to	ې لېد ر لور ور لوره	toon		Start Fre
		A. Ann	1	S	A	A . K . Å		a mana ka zime		5.745000000 GIT
10.0						L .	1		s	Center Fre 5.745000000 GH
0 dB/div	Ref 20.00 c	lBm							87 dBm	
			ain:Low	#Atten: 30	dB		Mkr1 5	.749 98	5 1 GHz	Auto Tun
enter F	req 5.74500		Z 0: Fast 😱	Trig: Free		Avg Type	: Log-Pwr	TYP	E 1 2 3 4 5 6 E M WMWW	Frequency
RL	RF 50 Ω	AC		SEI	VSE:INT		ALIGN AUTO		4 Aug 14, 2014	F

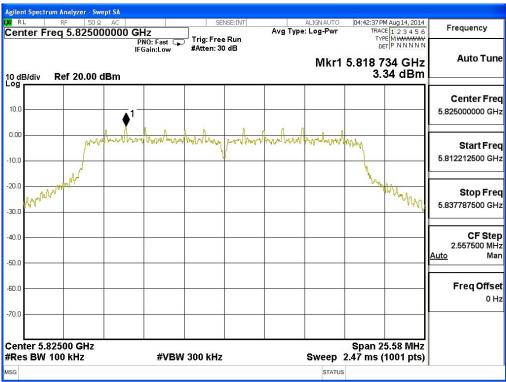
Channel 149 – Chain A

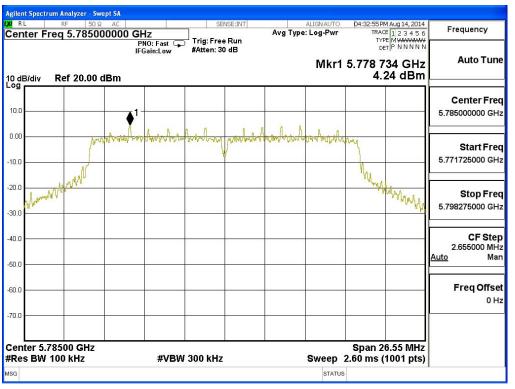


5.785000000 GH			- A - n	1.	ß	n n	٨	Λ Ι		0.0
Start Fre 5.771987500 GF		tyny .	<u>ን</u> የሶሳት የሆኑ	and the production of	- men men	troad man	f Www Walyn	a man	Non Non	0.0
Stop Fre 5.798012500 GF	ann Alla	Mar							NNN	0.0 WWW 0.0
CF Ste 2.602500 MH <u>Auto</u> Ma										0.0
Freq Offs										0.0
0					-					0.0

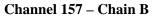
Channel 157 – Chain A

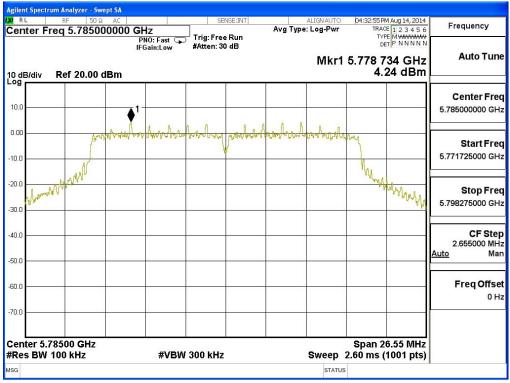






Channel 149 – Chain B







		Unai		15 – CI	Iam D	•		
Agilent Spectrum Analyzer - Swept SA								
RL RF 50 Q AC Center Freq 5.825000000		SEN	Bun		ALIGNAUTO : Log-Pwr	TRAC TYP	Aug 14, 2014 E 1 2 3 4 5 6 E MWWWWWW	Frequency
10 dB/div Ref 20.00 dBm	PNO: Fast 🖵 IFGain:Low	#Atten: 30			Mkr1	DE 5.828 7	T P N N N N N	Auto Tune
10.0				1		~	<u>e</u>	Center Fre 5.825000000 GH
0.00	malmatin	harder	rantund	mann	www.	- Army	~	Start Fre 5.811762500 GH
20.0						- MARC	hunning	Stop Fre 5.838237500 GH
10.0 50.0								CF Ste 2.647500 MH Auto Ma
50.0								Freq Offse
70.0			<u> </u>					
Center 5.82500 GHz #Res BW 100 kHz	#VBW	300 kHz			Sweep	Span 20 2.53 ms (1	6.48 MHz 1001 pts)	
ISG					STATU	s		

Channel 165 – Chain B

Product	:	Access Point
Test Item	:	Peak Power Spectral Density
Test Site	:	No.3 OATS
Test Mode	:	Mode 5: Transmit (802.11ac-40BW-15Mbps)

Channel Number	Frequency (MHz)	Chain	PPSD/MHz (dBm)	BWCF (dB)	Total PPSD/MHz (dBm)1	Required Limit (dBm)	Result
151		А	1.73	6.98	11.72	<30	Pass
151	5755	В	2.52	6.98	12.51	<30	Pass
170	5705	А	2.02	6.98	12.01	<30	Pass
159	5795	В	2.60	6.98	12.59	<30	Pass

Note 1: The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

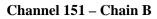
Agilent Spectrum Analyzer - Sw							
₩ RL RF 50 Ω Center Freq 5.75500		SENSE:INT	Avg Type:	LIGNAUTO Log-Pwr	05:13:19 PM Aug TRACE 1 : TYPE M	23456	Frequency
10 dB/div Ref 20.00 (IFGain:Low	#Atten: 30 dB		Mkr1	5.746 24	GHz dBm	Auto Tune
10.0	▲ ¹						Center Frec 5.755000000 GHz
-10.0	and a lar a lar a lar	Industry monthed	Highwhentermy	untwolyalby4	mln		Start Free 5.727625000 GH
-20.0					he was a start was	Lange Contraction of the second se	Stop Free 5.782375000 GH
-40.0							CF Ste j 5.475000 MH <u>Auto</u> Ma
-60.0							Freq Offse 0 H
-70.0							
Center 5.75500 GHz #Res BW 100 kHz	#VBW	300 kHz		Sweep (Span 54.7 5.27 ms (100		
MSG				STATUS			5

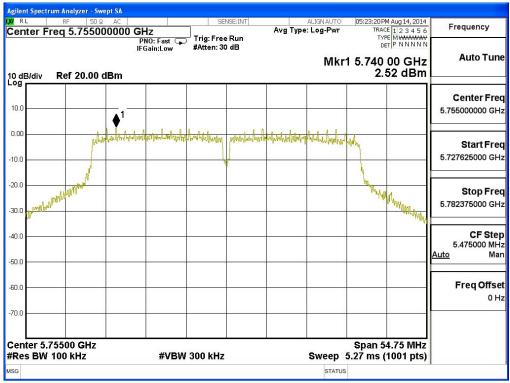
Channel 151 – Chain A



		Chamier	137 - Chant A		
gilent Spectrum Analyzer - Sw					
RL RF 50 Ω enter Freq 5.79500		SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	05:32:07 PM Aug 14, 2014 TRACE 1 2 3 4 5 6 TYPE MWWWWW	Frequency
0 dB/div Ref 20.00 (IFGain:Low	#Atten: 30 dB	Mkr	DET P NNNNN 1 5.789 96 GHz 2.02 dBm	Auto Tun
0.0		1			Center Fre 5.795000000 GH
0.0	เป็นปีกมใจปละเป็นทางใปปลายไห	louturn worker	allevilant when a har and a for	hhy	Start Fre 5.767625000 Gł
D.0 million line line line line line line line lin				www.www.www.www.www.www.www.www.www.ww	Stop Fre 5.822375000 GF
0.0					CF Ste 5.475000 M Auto M
0.0					Freq Offs 0
.0					
enter 5.79500 GHz Res BW 100 kHz	#VBW	300 kHz	Sweep	Span 54.75 MHz 5.27 ms (1001 pts)	
#Res BW 100 kHz	#VBW	300 KHZ	Sweep : STATUS		

Channel 159 – Chain A







	Channel	159 – Chain D		
Agilent Spectrum Analyzer - Swept SA				
2 RL RF 50Ω AC Center Freq 5.795000000 GHz	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	05:43:11PM Aug 14, 2014 TRACE 1 2 3 4 5 6 TYPE MWARMAW	Frequency
IFGain: 10 dB/div Ref 20.00 dBm		Mkr1	5.789 978 GHz 2.60 dBm	Auto Tune
00 00 00 00 00 00 00 00 00 00 00 00 00	1			Center Freq 5.795000000 GHz
0.00	ปหการใจไปจริงการแก่งอาการ การแม่นหรือ	^ป ัดประวั <i>ด</i> ข้างสุดใจไม่ไม _่ สุดป	alwh la	Start Free 5.768000000 GHz
20.0			Mary Mary Mary Mary	Stop Fred 5.822000000 GHz
10.0 50.0				CF Step 5.400000 MH <u>Auto</u> Mar
50.0				Freq Offse 0 H
70.0				
Center 5.79500 GHz #Res BW 100 kHz	#VBW 300 kHz	Sweep	Span 54.00 MHz 5.20 ms (1001 pts)	
ISG		STATU	s	

Channel 159 – Chain B

Product	:	Access Point
Test Item	:	Peak Power Spectral Density
Test Site	:	No.3 OATS
Test Mode	:	Mode 6: Transmit (802.11ac-80BW-65Mbps)

Channel Number	Frequency (MHz)	Chain	PPSD/MHz (dBm)	BWCF (dB)	Total PPSD/MHz (dBm)1	Required Limit (dBm)	Result
1.5.5		А	-5.82	6.98	4.17	<30	Pass
155	5775	В	-5.41	6.98	4.58	<30	Pass

Note 1: The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

	um Analyzer - Swe	ept SA						-		
Center Fr	RF 50 Ω eq 5.77500		17	SE	NSE:INT	Ava Tvp	ALIGNAUTO e: Log-Pwr	TRAC	M Aug 19, 2014 E 1 2 3 4 5 6	Frequency
10 dB/div	Ref 20.00 c	PI IFC	NO: Fast 😱 Gain:Low	Trig: Free #Atten: 30				۲۷ ۱ r1 5.758	71 GHz 82 dBm	Auto Tune
10.0										Center Free 5.775000000 GH:
-10.0	mithe	بتهرابا بلبل ارا		- John de la	profilidation the		-	Anahang		Start Free 5.719950000 GH
-20.0	adir addition							- Mill		Stop Free 5.830050000 GH
-40.0									White Marked County	CF Ste 11.010000 MH <u>Auto</u> Ma
60.0										Freq Offse 0 ⊦
-70.0										
Center 5.7 #Res BW	7500 GHz 100 kHz		#VBW	300 kHz			Sweep	Span 1 10.5 ms (10.1 MHz 1001 pts)	
MSG							STATU	s		

Channel 155: CHAIN A



		/munne	.1 133.				
Agilent Spectrum Analyzer - Swe							
RL RF 50 Ω Center Freq 5.77500		SEN Trig: Free	ISE:INT	Avg Type	ALIGNAUTO : Log-Pwr	10:04:07 PM Aug 19, 2014 TRACE 1 2 3 4 5 6 TYPE MWWWWW	Frequency
10 dB/div Ref 20.00 c	IFGain:Low	#Atten: 30			Mki	^{Det P NNNNN} 1 5.769 98 GHz -5.41 dBm	Auto Tune
10.0							Center Free 5.775000000 GH
10.0	and the second states and the second states of the		William	Halathira	htelesen	lader-valy	Start Fre 5.719275000 GH
20.0 30.0			<u>.</u>			MINIANI	Stop Fre 5.830725000 GH
10.0 10.0						Andres war and a second	CF Ste 11.145000 MH Auto Ma
50.0							Freq Offse 0 ⊢
70.0							
Center 5.77500 GHz #Res BW 100 kHz	#VBW	300 kHz			Sweep	Span 111.5 MHz 10.7 ms (1001 pts)	
MSG					STATU	s	

Channel 155: CHAIN B

5. Radiated Emission

5.1. Test Equipment

The following test equipments are used during the radiated emission test:

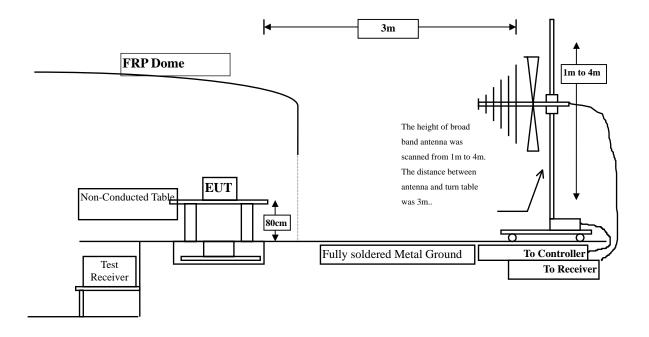
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 3	Х	Loop Antenna	Teseq	HLA6120 / 26739	Jul., 2014
	Х	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2013
	Х	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2013
	Х	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2014
	Х	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2014
	Х	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2013
	Х	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2014
	Х	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2014
	Х	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2013
	Х	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2014
	Х	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	Х	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

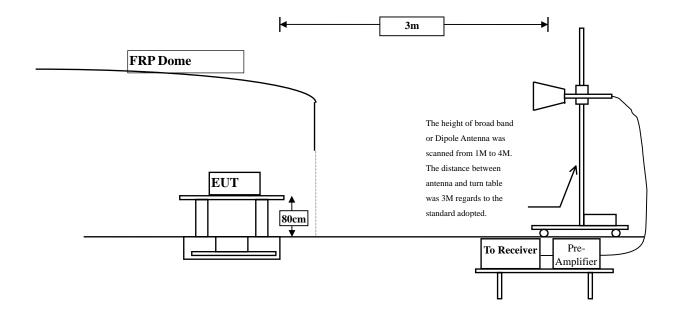
2. The test instruments marked with "X" are used to measure the final test results.

5.2. Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



5.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15	FCC Part 15 Subpart C Paragraph 15.209(a) Limits						
Frequency MHz	Field strength	Measurement distance					
	(microvolts/meter)	(meter)					
0.009-0.490	2400/F(kHz)	300					
0.490-1.705	24000/F(kHz)	30					
1.705-30	30	30					
30-88	100	3					
88-216	150	3					
216-960	200	3					
Above 960	500	3					

Remarks: E field strength (dBuV/m) = $20 \log E$ field strength (uV/m)

5.4. Test Procedure

The EUT was setup according to ANSI C63.10, 2009 and tested according to FCC KDB-789033 test procedure for compliance to FCC 47CFR 15. 407 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10, 2009 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas. The measurement is divided into the Preliminary Measurement and the Final Measurement. The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna. The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

5.5. Uncertainty

- ± 3.8 dB below 1GHz
- ± 3.9 dB above 1GHz

5.6. Test Result of Radiated Emission

Product	:	Access Point
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5745MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11490.000	14.326	51.660	65.985	-8.015	74.000
17235.000	*	*	*	*	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
31080.000	*	*	*	*	74.000
36260.000	*	*	*	*	74.000
Average					
Detector:					
11490.000	14.326	37.310	51.635	-2.365	54.000
Vertical					
Peak Detector:					
11490.000	15.842	53.970	69.811	-4.189	74.000
17235.000	*	*	*	*	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
31080.000	*	*	*	*	74.000
36260.000	*	*	*	*	74.000
Average					
Detector:					
11490.000	15.842	37.100	52.941	-1.059	54.000
Note					

Note:

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	: Access Point						
Test Item	: Harmonic Radiated Emission Data						
Test Site	 No.3 OATS Mode 1: Transmit (802.11a-6Mbps) (5785MHz) 						
Test Mode							
Frequency	Correct	Reading	Measurement	Margin	Limit		
Trequency	Factor	Level	Level	mangin			
MHz	dB	dBuV	dBuV/m	dB	dBuV/m		
Horizontal							
Peak Detector:							
11570.000	14.849	55.050	69.899	-4.101	74.000		
17355.000	*	*	*	*	74.000		
20800.000	*	*	*	*	74.000		
26000.000	*	*	*	*	74.000		
31200.000	*	*	*	*	74.000		
36400.000	*	*	*	*	74.000		
Average							
Detector:							
11570.000	14.849	38.060	52.909	-1.091	54.000		
Vertical							
Peak Detector:							
11570.000	16.215	51.920	68.134	-5.866	74.000		
17355.000	*	*	*	*	74.000		
20800.000	*	*	*	*	74.000		
26000.000	*	*	*	*	74.000		
31200.000	*	*	*	*	74.000		
36400.000	*	*	*	*	74.000		
Average							
Detector:							
11570.000	16.215	36.600	52.814	-1.186	54.000		

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.

- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.

7. The emission levels of other frequencies are very lower than the limit and not show in test report.

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Product Test Item	 Access Point Harmonic Radiated Emission Data 					
Test Site	: No.3 OATS					
Test Mode	: Mode 1: Transmit (802.11a-6Mbps) (5825MHz)					
Frequency	Correct	Reading	Measurement	Margin	Limit	
	Factor	Level	Level			
MHz	dB	dBuV	dBuV/m	dB	dBuV/m	
Horizontal						
Peak Detector:						
11650.000	13.179	46.600	59.779	-14.221	74.000	
17475.000	*	*	*	*	74.000	
20960.000	*	*	*	*	74.000	
26200.000	*	*	*	*	74.000	
31440000	*	*	*	*	74.000	
36680.000	*	*	*	*	74.000	
Average						
Detector:						
11650.000	13.179	32.310	45.489	-8.511	54.000	
Vertical						
Peak Detector:						
11650.000	14.634	48.270	62.904	-11.096	74.000	
17475.000	*	*	*	*	74.000	
20960.000	*	*	*	*	74.000	
26200.000	*	*	*	*	74.000	
31440000	*	*	*	*	74.000	
36680.000	*	*	*	*	74.000	
Average						
Detector:						
11650.000	14.634	33.340	47.974	-6.026	54.000	

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.

- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.

6. The average measurement was not performed when the peak measured data under the limit of average detection.

7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product Test Item	 Access Point Harmonic Radiated Emission Data 						
Test Site	: No.3 OATS						
Test Mode							
Frequency	Correct	Reading	Measurement	Margin	Limit		
	Factor	Level	Level				
MHz	dB	dBuV	dBuV/m	dB	dBuV/m		
Horizontal							
Peak Detector:							
11490.000	14.326	50.330	64.655	-9.345	74.000		
17235.000	*	*	*	*	74.000		
20720.000	*	*	*	*	74.000		
25900.000	*	*	*	*	74.000		
31080.000	*	*	*	*	74.000		
36260.000	*	*	*	*	74.000		
Average							
Detector:							
11490.000	14.326	34.770	49.095	-4.905	54.000		
Vertical							
Peak Detector:							
11490.000	15.842	49.240	65.081	-8.919	74.000		
17235.000	*	*	*	*	74.000		
20720.000	*	*	*	*	74.000		
25900.000	*	*	*	*	74.000		
31080.000	*	*	*	*	74.000		
36260.000	*	*	*	*	74.000		
Average							
Detector:							
11490.000	15.842	35.100	50.941	-3.059	54.000		

Note:

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product Test Item Test Site	 Access Point Harmonic Radiated Emission Data No.3 OATS 						
Test Mode	: Mole 2: Transmit (802.11n-20BW-14.4Mbps) (5785MHz)						
				()			
Frequency	Correct	Reading	Measurement	Margin	Limit		
	Factor	Level	Level				
MHz	dB	dBuV	dBuV/m	dB	dBuV/m		
Horizontal							
Peak Detector:							
11570.000	14.849	49.620	64.469	-9.531	74.000		
17355.000	*	*	*	*	74.000		
20880.000	*	*	*	*	74.000		
26100.000	*	*	*	*	74.000		
31320.000	*	*	*	*	74.000		
36540.000	*	*	*	*	74.000		
Average							
Detector:							
11570.000	14.849	34.100	48.949	-5.051	54.000		
Vertical							
Peak Detector:							
11570.000	16.215	48.750	64.964	-9.036	74.000		
17355.000	*	*	*	*	74.000		
20880.000	*	*	*	*	74.000		
26100.000	*	*	*	*	74.000		
31320.000	*	*	*	*	74.000		
36540.000	*	*	*	*	74.000		
Average							
Detector:							
11570.000	16.215	33.620	49.834	-4.166	54.000		

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.

- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.

7. The emission levels of other frequencies are very lower than the limit and not show in test report.