

HCT CO., LTD.

CERTIFICATE OF COMPLIANCE FCC Class II Permissive Change

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
129, Samsung-ro, Yeongtong-gu Suwon-si,
Gyeonggi-do, 443-742 Rep. of Korea

Date of Issue:

December 18, 2013

Test Site/Location:

HCT CO., LTD., 74, Seoicheon-ro 578beon-gil,
Majang-myeon, Icheon-si, Gyeonggi-do, Korea

Report No.: HCTR1312FR14

HCT FRN: 0005866421

FCC ID : A3LWEA303I

APPLICANT : SAMSUNG Electronics Co., Ltd.

FCC Model(s): WEA303i
EUT Type: WLAN Access Point
Monitoring Port 1 Wi-Fi 802.11a (5180~5240) (5.62 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (5.23 dBm)/
Max. RF Output Power: Wi-Fi 802.11n_40 MHz BW(5190~5230) (4.54 dBm)
Monitoring Port 2 Wi-Fi 802.11a (5180~5240) (5.51 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (5.51 dBm)/
Max. RF Output Power: Wi-Fi 802.11n_40 MHz BW(5190~5230) (4.54 dBm)
Service Port 1 Wi-Fi 802.11a (5180~5240) (6.09 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (7.62 dBm)/
Max. RF Output Power: Wi-Fi 802.11n_40 MHz BW(5190~5230) (9.64 dBm)
Service Port 2 Wi-Fi 802.11a (5180~5240) (5.63 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (7.72 dBm)/
Max. RF Output Power: Wi-Fi 802.11n_40 MHz BW(5190~5230) (9.47 dBm)
Service Port 3 Wi-Fi 802.11a (5180~5240) (6.35 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (8.29 dBm)/
Max. RF Output Power: Wi-Fi 802.11n_40 MHz BW(5190~5230) (10.36 dBm)
Frequency Range: 20 MHz BW: 5180 MHz - 5240 MHz (UNII 1)
40 MHz BW: 5190 MHz - 5230 MHz (UNII 1)
Modulation type OFDM
FCC Classification: Unlicensed National Information Infrastructure(UNII)
FCC Rule Part(s): Part 15.407

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998, 21 U.S. C.853(a)



Report prepared by
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Approved by
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Manager of RF Team

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1312FR14	December 18, 2013	- First Approval Report

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1. GENERAL INFORMATION

Applicant: SAMSUNG Electronics Co., Ltd.
Address: 129, Samsung-ro, Yeongtong-gu Suwon-si, Gyeonggi-do, 443-742 Rep. of Korea
FCC ID: A3LWEA303I
EUT Type: WLAN Access Point
Model name(s): WEA303i
Date(s) of Tests: November 03, 2013 ~ December 06, 2013
Place of Tests: HCT Co., Ltd.
 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea.
 (IC Recognition No. : 5944A-3)

2. EUT DESCRIPTION

EUT Type	WLAN Access Point	
FCC Model Name	WEA303i	
Power Supply	Adaptor : 100 V ~ 250 V, POE : 100 V ~ 240 V	
Frequency Range	TX_20 MHz BW: 5180 MHz - 5240 MHz (UNII 1) 40 MHz BW: 5190 MHz - 5230 MHz (UNII 1) RX_20 MHz BW: 5180 MHz - 5240 MHz (UNII 1) 40 MHz BW: 5190 MHz - 5230 MHz (UNII 1)	
Monitoring Port 1 Max. RF Output Power	Wi-Fi 802.11a (5180~5240) (5.62 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (5.23 dBm)/ Wi-Fi 802.11n_40 MHz BW(5190~5230) (4.54 dBm)	
Monitoring Port 2 Max. RF Output Power	Wi-Fi 802.11a (5180~5240) (5.51 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (5.51 dBm)/ Wi-Fi 802.11n_40 MHz BW(5190~5230) (4.54 dBm)	
Service Port 1 Max. RF Output Power	Wi-Fi 802.11a (5180~5240) (6.09 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (7.62 dBm)/ Wi-Fi 802.11n_40 MHz BW(5190~5230) (9.64 dBm)	
Service Port 2 Max. RF Output Power	Wi-Fi 802.11a (5180~5240) (5.63 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (7.72 dBm)/ Wi-Fi 802.11n_40 MHz BW(5190~5230) (9.47 dBm)	
Service Port 3 Max. RF Output Power	Wi-Fi 802.11a (5180~5240) (6.35 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (8.29 dBm)/ Wi-Fi 802.11n_40 MHz BW(5190~5230) (10.36 dBm)	
Modulation Type	OFDM(802.11a, 802.11n)	
Antenna Specification	Manufacturer: ACE Technologyacetchnology Antenna type: Internal Antenna Peak Gain : cf. Section 6	

Note : Max. RF output power is a high value between the adaptor results and POE results.

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3. TEST METHODOLOGY

The measurement procedure described in FCC KDB 789033 D01 General UNII Test Procedures v01r03 dated April 08, 2013 entitled “ Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices, the American National Standard for Testing Unlicensed Wireless Devices(ANSI C63.4-2003) – Part 15, Subpart E” were used in the measurement.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.407 under the FCC Rules Part 15 Subpart E.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4. (Version :2003) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4. (Version: 2003)

Conducted Antenna Terminal

See Section from 8.1 to 8.4.(KDB 789033)

3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low, mid and high with highest data rate (worst case) is chosen for full testing.

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4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2003) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated June 21, 2011 (Registration Number: 90661)

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

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6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 shall be considered sufficient to comply with the provisions of this section.”

* The antennas of this E.U.T are permanently attached.

*The E.U.T Complies with the requirement of §15.203

▣ Directional Gain Calculations

- If any transmit signals are correlated with each other(802.11a),

$$\text{Directional gain} = 10 \cdot \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N] \text{ dBi}$$

- If all transmit signals are completely uncorrelated with each other(802.11n)

$$\text{Directional gain} = 10 \cdot \log[(10^{G1/10} + 10^{G2/10} + \dots + 10^{GN/10}) / N] \text{ dBi}$$

▣ Antenna Gain

Service	Antenna Gain	Ant 1	6 dBi
		Ant 2	6 dBi
		Ant 3	6 dBi
	Directional Antenna Gain	Ant 1 & 2	9.01 dBi(802.11a), 6 dBi(802.11n)
		Ant 1 & 2 & 3	10.77 dBi(802.11a), 6 dBi(802.11n)
Monitor	Antenna Gain	Ant 1	5.5 dBi
		Ant 2	5.5 dBi
	Directional Antenna Gain	Ant 1 & 2	8.51 dBi(802.11a), 5.5 dBi(802.11n)

7. SUMMARY OF TEST RESULTS

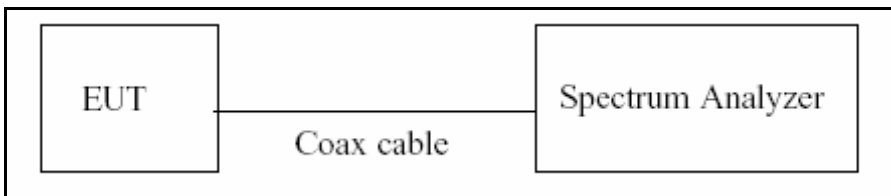
Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
TRANSMITTER MODE(TX)				
26dB Bandwidth	NA	NA	CONDUCTED	PASS
Maximum Conducted Output Power	§15.407(a)(1)	$< 4+10 \log_{10} (BW) \text{ dBm}$ (5150-5250 MHz) $< 11+10 \log_{10} (BW) \text{ dBm}$ (5250-5350 MHz) $< 11+10 \log_{10} (BW) \text{ dBm}$ (5470-5725 MHz)		PASS
Peak Power Spectral Density	§15.407(a)(1), (5)	$< 4 \text{ dBm/ MHz}$ (5150-5250) $< 11 \text{ dBm/ MHz}$ (5250-5350) $< 11 \text{ dBm/ MHz}$ (5470-5725)		PASS
Peak Excursion	§15.407(a)(6)	$< 13 \text{ dB/ MHz}$ maximum difference		PASS
Frequency Stability	§15.407(g)	NA		PASS
Undesirable Emissions	§15.407(b)(1), (2), (3)	$< -27 \text{ dBm/ MHz EIRP}$ (5150-5350 MHz, 5470-5725 MHz)	RADIATED	PASS
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	15.205, 15.407(b)(1), (5), (6)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS
AC Conducted Emissions 150 kHz-30 MHz	15.207	$< \text{FCC 15.207 limits}$	LINE CONDUCTED	PASS

8. TEST RESULT(Adaptor)

8.1 DUTY CYCLE

The zero-span mode on a spectrum analyzer or EMI receiver ,if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW $\geq$ EBW if possible; otherwise, set RBW to the largest available value. Set VBW $\geq$ RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$, where T is defined in section B)1)a), and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.)

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. We tested according to the zero-span measurement method, B)2) in KDB 789033(issued 04/08/2013)

The largest available value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if $T \leq 6.25$ microseconds. ($50/6.25 = 8$)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are $> 50/T$.

1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz ($\geq$ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on} / T_{total} and Duty Cycle Factor = $10 \cdot \log(1/\text{Duty Cycle})$

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■ Duty Cycle Factor

Monitoring Port

Mode	Data Rate	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor
802.11a	6	2.020	2.070	0.97584541	0.106
	9	1.353	1.401	0.96573876	0.151
	12	1.020	1.068	0.95505618	0.200
	18	0.686	0.732	0.93715847	0.282
	24	0.523	0.569	0.91915641	0.366
	36	0.354	0.400	0.88500000	0.531
	48	0.271	0.316	0.85759494	0.667
	54	0.243	0.288	0.84375000	0.738
802.11n_20 MHz BW	6.5	1.885	1.930	0.97668394	0.102
	13	0.962	1.008	0.95436508	0.203
	19.5	0.654	0.700	0.93428571	0.295
	26	0.498	0.544	0.91544118	0.384
	39	0.347	0.392	0.88520408	0.530
	52	0.267	0.312	0.85576923	0.676
	58.5	0.243	0.289	0.84083045	0.753
	65	0.224	0.268	0.83582090	0.779
802.11n_40 MHz BW	13.5	0.926	0.960	0.96458333	0.157
	27	0.482	0.516	0.93410853	0.296
	40.5	0.335	0.368	0.91032609	0.408
	54	0.260	0.292	0.89041096	0.504
	81	0.187	0.220	0.85000000	0.706
	108	0.147	0.180	0.81666667	0.880
	121.5	0.136	0.168	0.80952381	0.918
	135	0.128	0.160	0.80000000	0.969

Service Port

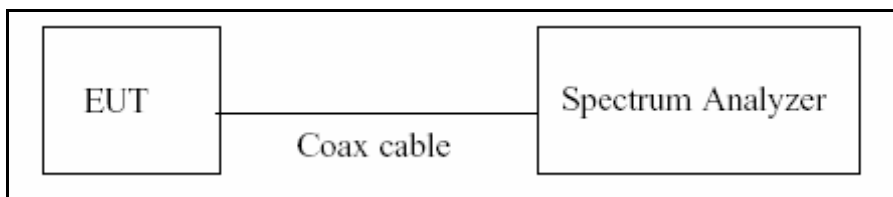
Mode	Data Rate	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor
802.11a	6	1.335	1.405	0.95017794	0.222
	9	0.909	0.957	0.94984326	0.223
	12	0.690	0.735	0.93877551	0.274
	18	0.466	0.512	0.91015625	0.409
	24	0.354	0.400	0.88500000	0.531
	36	0.243	0.288	0.84375000	0.738
	48	0.187	0.232	0.80603448	0.936
	54	0.171	0.216	0.79166667	1.015
802.11n_20 MHz BW	6.5	1.269	1.317	0.96355353	0.161
	13	0.655	0.701	0.93437946	0.295
	19.5	0.446	0.492	0.90650407	0.426
	26	0.348	0.393	0.88549618	0.528
	39	0.244	0.289	0.84429066	0.735
	52	0.192	0.236	0.81355932	0.896
	58.5	0.176	0.220	0.80000000	0.969
	65	0.159	0.204	0.77941176	1.082
802.11n_40 MHz BW	13.5	0.630	0.664	0.94879518	0.228
	27	0.334	0.368	0.90760870	0.421
	40.5	0.236	0.268	0.88059701	0.552
	54	0.188	0.220	0.85454545	0.683
	81	0.135	0.168	0.80357143	0.950
	108	0.112	0.144	0.77777778	1.091
	121.5	0.104	0.136	0.76470588	1.165
	135	0.096	0.128	0.75000000	1.249

8.2 26 dB BANDWIDTH MEASUREMENT

The bandwidth at 26 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum power control level, as defined in KDB 789033(issued 04/08/2013), at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26 dB bandwidth.

The 26 dB bandwidth is used to determine the conducted power limits.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to(Page 3 in KDB 789033, issued 04/08/2013)

1. RBW = approximately 1 % of the emission bandwidth
2. VBW > RBW
3. Detector = Peak
4. Trace mode = max hold
5. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

Monitoring Port Ant.1

TEST RESULTS

20 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	25.31	N/A	Pass
5200	40	26.03	N/A	Pass
5240	48	25.30	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	25.22	N/A	Pass
5200	40	26.42	N/A	Pass
5240	48	25.22	N/A	Pass

40 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	49.98	N/A	Pass
5230	46	49.60	N/A	Pass

Monitoring Port Ant.2

TEST RESULTS

20 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	30.22	N/A	Pass
5200	40	26.78	N/A	Pass
5240	48	24.78	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	32.50	N/A	Pass
5200	40	26.88	N/A	Pass
5240	48	26.97	N/A	Pass

40 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	63.84	N/A	Pass
5230	46	59.23	N/A	Pass

Service Port Ant.1

TEST RESULTS

20 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	22.27	N/A	Pass
5200	40	22.54	N/A	Pass
5240	48	21.74	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	22.90	N/A	Pass
5200	40	23.04	N/A	Pass
5240	48	22.87	N/A	Pass

40 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	45.25	N/A	Pass
5230	46	46.70	N/A	Pass

Service Port Ant.2

TEST RESULTS

20 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	21.63	N/A	Pass
5200	40	21.88	N/A	Pass
5240	48	21.21	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	23.29	N/A	Pass
5200	40	22.82	N/A	Pass
5240	48	23.21	N/A	Pass

40 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	45.55	N/A	Pass
5230	46	45.57	N/A	Pass

Service Port Ant.3

TEST RESULTS

20 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	21.23	N/A	Pass
5200	40	21.50	N/A	Pass
5240	48	21.99	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	22.55	N/A	Pass
5200	40	22.63	N/A	Pass
5240	48	22.35	N/A	Pass

40 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	44.10	N/A	Pass
5230	46	44.69	N/A	Pass

Note :

1. In order to simplify the report, attached plots were only the most wide channel.

Monitoring Port Ant.1

RESULT PLOTS

20 MHz BW

26 dB Bandwidth plot (802.11a-CH 40)



26 dB Bandwidth plot (802.11n-CH 40)



40 MHz BW

26 dB Bandwidth plot (802.11n-CH 38)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Monitoring Port Ant.2

RESULT PLOTS

20 MHz BW

26 dB Bandwidth plot (802.11a-CH 36)



26 dB Bandwidth plot (802.11n-CH 36)



40 MHz BW

26 dB Bandwidth plot (802.11n-CH 38)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Service Port Ant.1

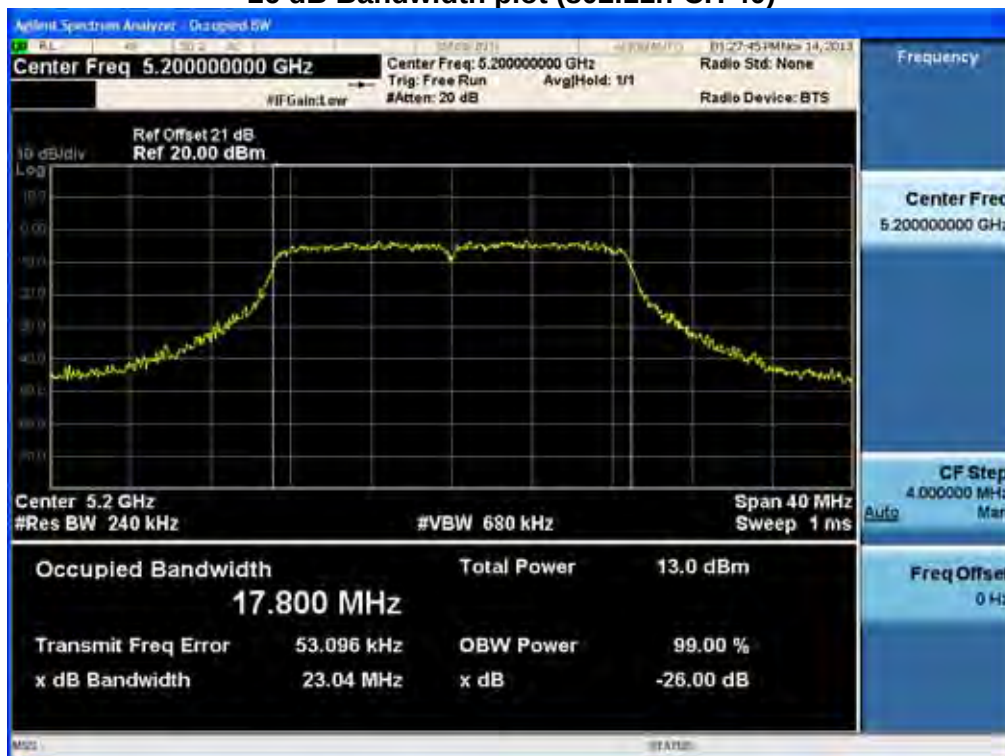
RESULT PLOTS

20 MHz BW

26 dB Bandwidth plot (802.11a-CH 40)

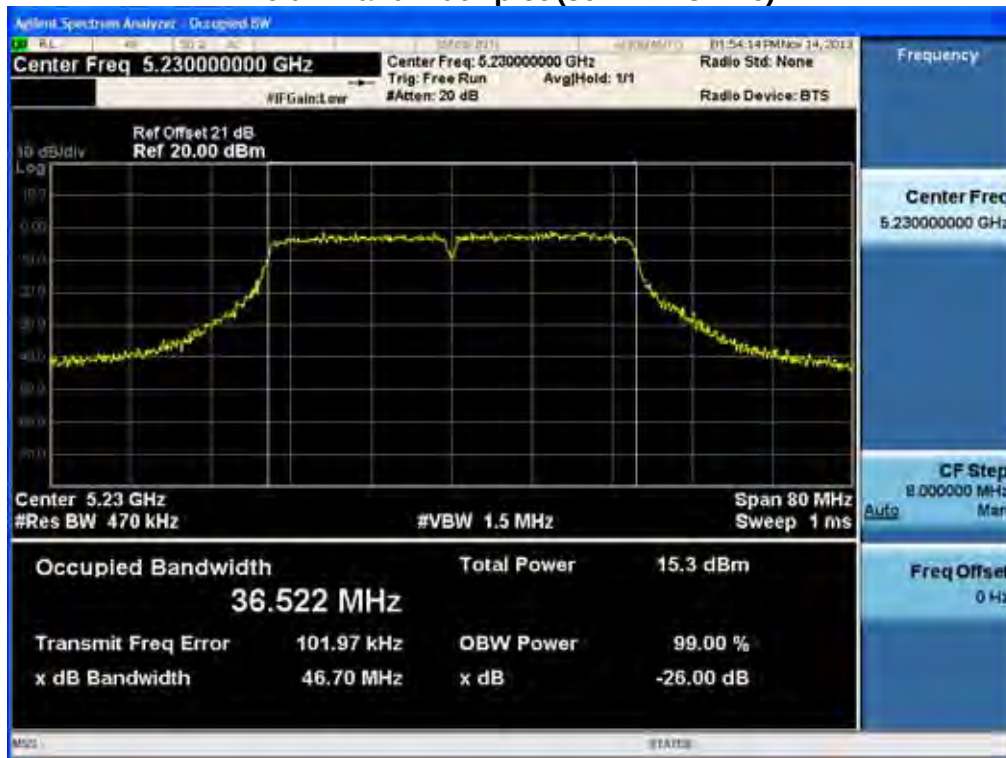


26 dB Bandwidth plot (802.11n-CH 40)



40 MHz BW

26 dB Bandwidth plot (802.11n-CH 46)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Service Port Ant.2

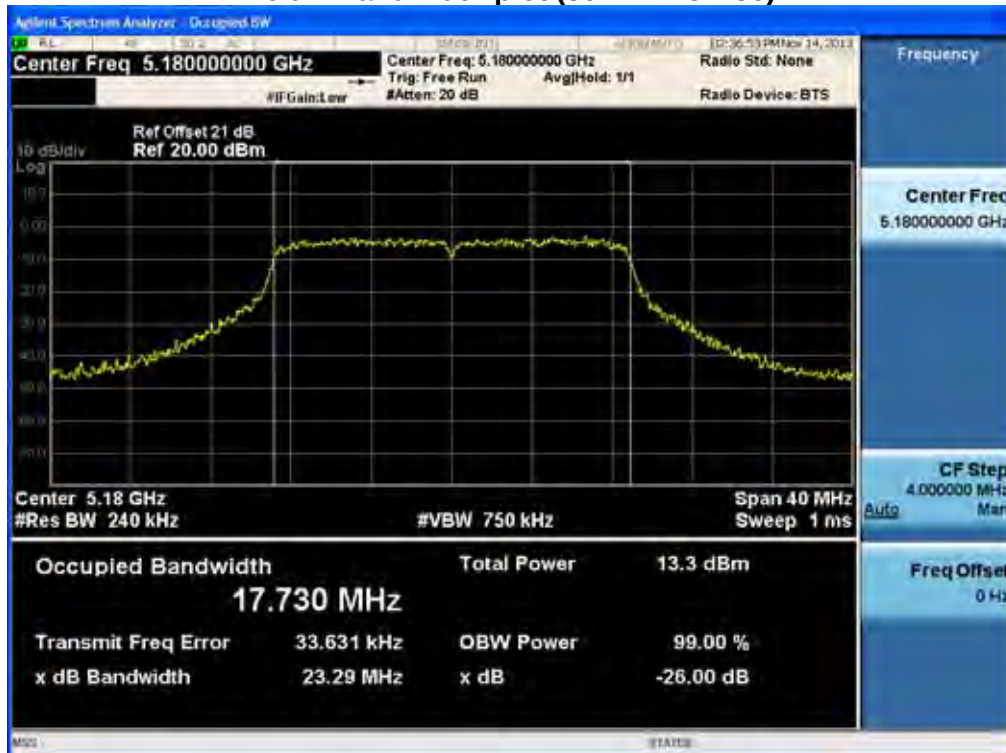
RESULT PLOTS

20 MHz BW

26 dB Bandwidth plot (802.11a-CH 40)



26 dB Bandwidth plot (802.11n-CH 36)



40 MHz BW

26 dB Bandwidth plot (802.11n-CH 46)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Service Port Ant.3

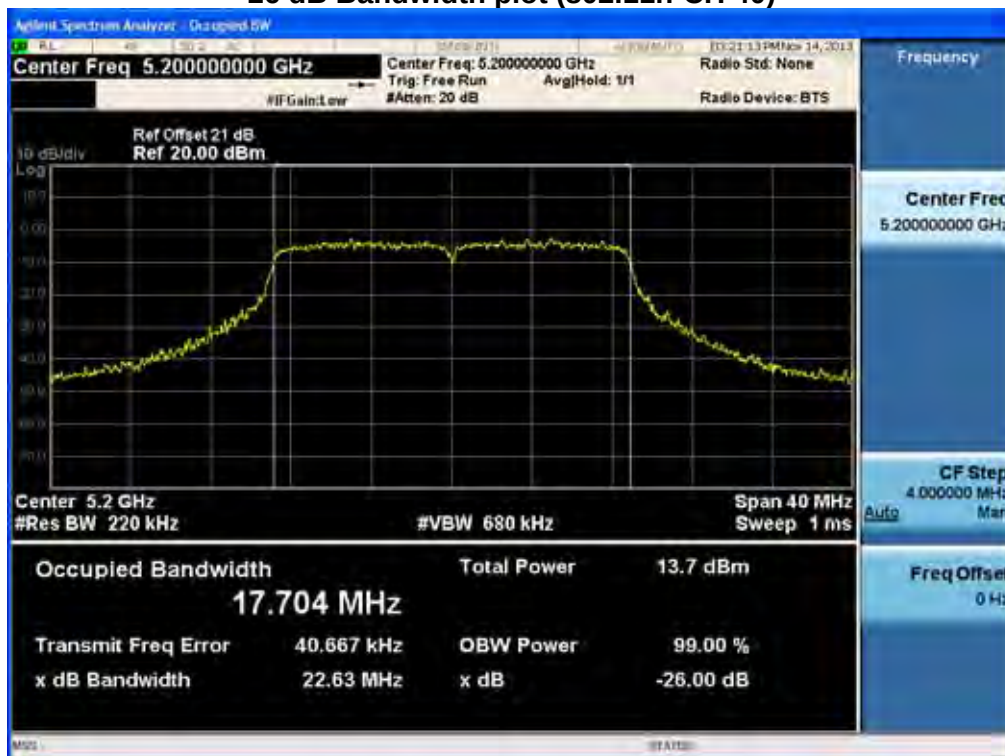
▣ RESULT PLOTS

20 MHz BW

26 dB Bandwidth plot (802.11a-CH 48)



26 dB Bandwidth plot (802.11n-CH 40)



40 MHz BW

26 dB Bandwidth plot (802.11n-CH 46)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

8.3 OUTPUT POWER MEASUREMENT

Test Requirements and limit, §15.407(a)(1)

The transmitter output is connected to the input of a RF power sensor. Measurement is made using a broadband power meter capable of making peak and average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

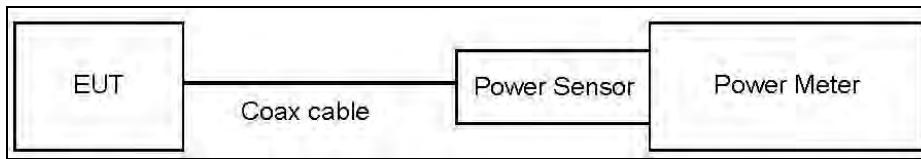
In the 5.15 – 5.25 GHz band, the maximum permissible conducted output power is the lesser of 50 mW ((16.99 dBm) and $4 \text{ dBm} + 10 \log_{10} (26 \text{ dB BW})$

Limit :

Operating Mode	Band	Mode	Ant. Gain(dBi)	Limit(dBm)
SISO : Monitoring	UNII 1	802.11a	5.5	16.99
		802.11n_20 MHz BW		
		802.11n_40 MHz BW		
SISO : Service	UNII 1	802.11a	6	16.99
		802.11n_20 MHz BW		
		802.11n_40 MHz BW		
MIMO(2 TX) : Monitoring	UNII 1	802.11a	8.51	14.48
		802.11n_20 MHz BW	5.5	16.99
		802.11n_40 MHz BW	5.5	16.99
MIMO(2 TX) : Service	UNII 1	802.11a	9.01	13.98
		802.11n_20 MHz BW	6	16.99
		802.11n_40 MHz BW	6	16.99
MIMO(3 TX) : Service	UNII 1	802.11a	10.77	12.22
		802.11n_20 MHz BW	6	16.99
		802.11n_40 MHz BW	6	16.99

Note : Above the limits is calculated according to antenna gain. Because antenna gain is higher than 6 dBi.

■ TEST CONFIGURATION



■ TEST PROCEDURE

We tested according to Method E)3)a) in KDB 789033(issued 04/08/2013).

▪ Average Power

1. Measure the duty cycle.
2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
3. Add $10 \log (1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Note :

1. We apply to the offset in the UNII 1 band that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table. We used the particular cable type that is supported by manufacture.

Band	Loss(dB)
UNII 1	21.0

(Actual value of loss for the attenuator and cable combination)

Monitoring Port

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11a Mode: 5180~5240)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6	5.21	0.106	5.31	16.99
		9	5.45	0.151	5.60	16.99
		12	5.37	0.200	5.57	16.99
		18	5.32	0.282	5.60	16.99
		24	5.25	0.366	5.62	16.99
		36	4.18	0.531	4.71	16.99
		48	2.98	0.667	3.65	16.99
		54	2.03	0.738	2.77	16.99
5200	40	6	5.12	0.106	5.23	16.99
		9	5.07	0.151	5.22	16.99
		12	5.06	0.200	5.26	16.99
		18	4.99	0.282	5.27	16.99
		24	4.92	0.366	5.28	16.99
		36	4.02	0.531	4.55	16.99
		48	2.98	0.667	3.65	16.99
		54	2.19	0.738	2.93	16.99
5240	48	6	5.27	0.106	5.37	16.99
		9	5.10	0.151	5.25	16.99
		12	5.13	0.200	5.33	16.99
		18	5.09	0.282	5.37	16.99
		24	5.06	0.366	5.43	16.99
		36	4.06	0.531	4.59	16.99
		48	3.12	0.667	3.79	16.99
		54	2.68	0.738	3.42	16.99

■ TEST RESULTS_Ant.2

Conducted Output Power Measurements (802.11a Mode: 5180~5240)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6	5.40	0.106	5.51	16.99
		9	5.33	0.151	5.48	16.99
		12	5.22	0.200	5.42	16.99
		18	5.12	0.282	5.40	16.99
		24	5.08	0.366	5.45	16.99
		36	4.02	0.531	4.55	16.99
		48	3.10	0.667	3.77	16.99
		54	2.62	0.738	3.36	16.99
5200	40	6	4.86	0.106	4.97	16.99
		9	4.80	0.151	4.95	16.99
		12	4.75	0.200	4.95	16.99
		18	4.72	0.282	5.00	16.99
		24	4.65	0.366	5.02	16.99
		36	3.65	0.531	4.18	16.99
		48	2.13	0.667	2.80	16.99
		54	1.15	0.738	1.88	16.99
5240	48	6	4.98	0.106	5.09	16.99
		9	5.03	0.151	5.18	16.99
		12	4.96	0.200	5.16	16.99
		18	4.97	0.282	5.26	16.99
		24	4.92	0.366	5.29	16.99
		36	3.95	0.531	4.48	16.99
		48	1.51	0.667	2.17	16.99
		54	1.59	0.738	2.33	16.99

■ TEST RESULTS_Sum Data of Ant.1 and Ant.2

Conducted Output Power Measurements (802.11a Mode: 5180~5240)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5180	36	6	8.42	14.48
		9	8.55	14.48
		12	8.50	14.48
		18	8.51	14.48
		24	8.54	14.48
		36	7.64	14.48
		48	6.72	14.48
		54	6.08	14.48
5200	40	6	8.11	14.48
		9	8.10	14.48
		12	8.12	14.48
		18	8.15	14.48
		24	8.16	14.48
		36	7.38	14.48
		48	6.25	14.48
		54	5.45	14.48
5240	48	6	8.24	14.48
		9	8.22	14.48
		12	8.26	14.48
		18	8.33	14.48
		24	8.37	14.48
		36	7.54	14.48
		48	6.07	14.48
		54	5.92	14.48

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5180~5240)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6.5	4.96	0.102	5.06	16.99
		13	4.03	0.203	4.23	16.99
		19.5	4.02	0.295	4.32	16.99
		26	3.96	0.384	4.34	16.99
		39	3.91	0.530	4.44	16.99
		52	2.68	0.676	3.36	16.99
		58.5	2.54	0.753	3.29	16.99
		65	1.50	0.779	2.28	16.99
5200	40	6.5	4.84	0.102	4.94	16.99
		13	4.01	0.203	4.22	16.99
		19.5	3.94	0.295	4.24	16.99
		26	3.90	0.384	4.28	16.99
		39	3.86	0.530	4.39	16.99
		52	2.96	0.676	3.64	16.99
		58.5	2.92	0.753	3.67	16.99
		65	1.91	0.779	2.69	16.99
5240	48	6.5	5.13	0.102	5.23	16.99
		13	4.26	0.203	4.46	16.99
		19.5	4.25	0.295	4.54	16.99
		26	4.18	0.384	4.56	16.99
		39	3.87	0.530	4.40	16.99
		52	2.68	0.676	3.36	16.99
		58.5	2.64	0.753	3.40	16.99
		65	2.32	0.779	3.09	16.99

■ TEST RESULTS_Ant.2

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5180~5240)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6.5	5.40	0.102	5.51	16.99
		13	4.03	0.203	4.24	16.99
		19.5	4.05	0.295	4.35	16.99
		26	3.90	0.384	4.28	16.99
		39	3.91	0.530	4.44	16.99
		52	2.93	0.676	3.61	16.99
		58.5	2.86	0.753	3.61	16.99
		65	1.78	0.779	2.56	16.99
5200	40	6.5	4.50	0.102	4.60	16.99
		13	3.60	0.203	3.81	16.99
		19.5	3.47	0.295	3.76	16.99
		26	3.48	0.384	3.86	16.99
		39	3.37	0.530	3.90	16.99
		52	2.22	0.676	2.90	16.99
		58.5	2.13	0.753	2.88	16.99
		65	1.23	0.779	2.01	16.99
5240	48	6.5	4.89	0.102	5.00	16.99
		13	4.02	0.203	4.22	16.99
		19.5	3.98	0.295	4.28	16.99
		26	3.95	0.384	4.34	16.99
		39	3.82	0.530	4.35	16.99
		52	2.19	0.676	2.87	16.99
		58.5	2.15	0.753	2.91	16.99
		65	1.64	0.779	2.42	16.99

■ TEST RESULTS_Sum Data of Ant.1 and Ant.2

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5180~5240)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5180	36	6.5	8.30	16.99
		13	7.24	16.99
		19.5	7.34	16.99
		26	7.32	16.99
		39	7.45	16.99
		52	6.49	16.99
		58.5	6.47	16.99
		65	5.43	16.99
5200	40	6.5	7.78	16.99
		13	7.03	16.99
		19.5	7.02	16.99
		26	7.09	16.99
		39	7.16	16.99
		52	6.30	16.99
		58.5	6.31	16.99
		65	5.37	16.99
5240	48	6.5	8.13	16.99
		13	7.35	16.99
		19.5	7.42	16.99
		26	7.46	16.99
		39	7.39	16.99
		52	6.13	16.99
		58.5	6.17	16.99
		65	5.78	16.99

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5190~5230)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	13.5	4.38	0.157	4.54	16.99
		27	3.49	0.296	3.79	16.99
		40.5	3.41	0.408	3.82	16.99
		54	3.35	0.504	3.86	16.99
		81	3.27	0.706	3.98	16.99
		108	1.83	0.880	2.71	16.99
		121.5	1.75	0.918	2.66	16.99
		135	0.89	0.969	1.86	16.99
5230	46	13.5	4.16	0.157	4.32	16.99
		27	3.07	0.296	3.36	16.99
		40.5	2.67	0.408	3.08	16.99
		54	2.65	0.504	3.15	16.99
		81	2.48	0.706	3.18	16.99
		108	1.73	0.880	2.61	16.99
		121.5	1.65	0.918	2.56	16.99
		135	0.62	0.969	1.59	16.99

■ TEST RESULTS_Ant.2

Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5190~5230)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	13.5	4.38	0.157	4.54	16.99
		27	3.48	0.296	3.78	16.99
		40.5	3.37	0.408	3.78	16.99
		54	3.10	0.504	3.60	16.99
		81	2.82	0.706	3.52	16.99
		108	1.57	0.880	2.45	16.99
		121.5	1.49	0.918	2.41	16.99
		135	0.55	0.969	1.52	16.99
5230	46	13.5	3.86	0.157	4.02	16.99
		27	2.35	0.296	2.64	16.99
		40.5	2.13	0.408	2.54	16.99
		54	2.05	0.504	2.56	16.99
		81	1.96	0.706	2.66	16.99
		108	1.13	0.880	2.01	16.99
		121.5	0.86	0.918	1.77	16.99
		135	-0.15	0.969	0.82	16.99

■ TEST RESULTS_Sum Data of Ant.1 and Ant.2

Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5190~5230)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5190	38	13.5	7.55	16.99
		27	6.79	16.99
		40.5	6.81	16.99
		54	6.74	16.99
		81	6.77	16.99
		108	5.59	16.99
		121.5	5.55	16.99
		135	4.70	16.99
5230	46	13.5	7.18	16.99
		27	6.03	16.99
		40.5	5.83	16.99
		54	5.88	16.99
		81	5.94	16.99
		108	5.33	16.99
		121.5	5.20	16.99
		135	4.23	16.99

Service Port

TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11a Mode: 5180~5240)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6	4.89	0.222	5.11	16.99
		9	4.80	0.223	5.02	16.99
		12	4.64	0.274	4.91	16.99
		18	4.57	0.409	4.98	16.99
		24	4.44	0.531	4.97	16.99
		36	4.18	0.738	4.92	16.99
		48	4.05	0.936	4.99	16.99
		54	4.01	1.015	5.03	16.99
5200	40	6	5.13	0.222	5.35	16.99
		9	5.13	0.223	5.35	16.99
		12	5.01	0.274	5.28	16.99
		18	4.97	0.409	5.38	16.99
		24	4.72	0.531	5.25	16.99
		36	4.52	0.738	5.26	16.99
		48	4.28	0.936	5.22	16.99
		54	4.22	1.015	5.24	16.99
5240	48	6	5.87	0.222	6.09	16.99
		9	5.76	0.223	5.98	16.99
		12	5.71	0.274	5.98	16.99
		18	5.62	0.409	6.03	16.99
		24	5.43	0.531	5.96	16.99
		36	5.29	0.738	6.03	16.99
		48	5.12	0.936	6.06	16.99
		54	5.06	1.015	6.08	16.99

■ TEST RESULTS_Ant.2

Conducted Output Power Measurements (802.11a Mode: 5180~5240)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6	4.94	0.222	5.16	16.99
		9	5.09	0.223	5.31	16.99
		12	5.23	0.274	5.50	16.99
		18	5.11	0.409	5.52	16.99
		24	4.96	0.531	5.49	16.99
		36	4.74	0.738	5.48	16.99
		48	4.59	0.936	5.53	16.99
		54	4.48	1.015	5.50	16.99
5200	40	6	4.99	0.222	5.21	16.99
		9	4.99	0.223	5.21	16.99
		12	4.95	0.274	5.22	16.99
		18	4.84	0.409	5.25	16.99
		24	4.71	0.531	5.24	16.99
		36	4.47	0.738	5.21	16.99
		48	4.30	0.936	5.24	16.99
		54	4.20	1.015	5.22	16.99
5240	48	6	5.23	0.222	5.45	16.99
		9	5.26	0.223	5.48	16.99
		12	5.17	0.274	5.44	16.99
		18	4.99	0.409	5.40	16.99
		24	4.95	0.531	5.48	16.99
		36	4.83	0.738	5.57	16.99
		48	4.64	0.936	5.58	16.99
		54	4.47	1.015	5.49	16.99

■ TEST RESULTS_Ant.3

Conducted Output Power Measurements (802.11a Mode: 5180~5240)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6	5.53	0.222	5.75	16.99
		9	5.57	0.223	5.79	16.99
		12	5.57	0.274	5.84	16.99
		18	5.46	0.409	5.87	16.99
		24	5.29	0.531	5.82	16.99
		36	5.07	0.738	5.81	16.99
		48	4.98	0.936	5.92	16.99
		54	4.92	1.015	5.94	16.99
5200	40	6	6.11	0.222	6.33	16.99
		9	6.02	0.223	6.24	16.99
		12	5.98	0.274	6.25	16.99
		18	5.86	0.409	6.27	16.99
		24	5.73	0.531	6.26	16.99
		36	5.40	0.738	6.14	16.99
		48	5.08	0.936	6.02	16.99
		54	4.98	1.015	6.00	16.99
5240	48	6	6.11	0.222	6.33	16.99
		9	6.10	0.223	6.32	16.99
		12	5.98	0.274	6.25	16.99
		18	5.94	0.409	6.35	16.99
		24	5.69	0.531	6.22	16.99
		36	5.37	0.738	6.11	16.99
		48	5.15	0.936	6.09	16.99
		54	5.03	1.015	6.05	16.99

■ TEST RESULTS_Sum Data of Ant.1 and Ant.2

Conducted Output Power Measurements (802.11a Mode: 5180~5240)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5180	36	6	8.15	13.98
		9	8.18	13.98
		12	8.23	13.98
		18	8.27	13.98
		24	8.25	13.98
		36	8.22	13.98
		48	8.28	13.98
		54	8.28	13.98
5200	40	6	8.29	13.98
		9	8.29	13.98
		12	8.26	13.98
		18	8.33	13.98
		24	8.26	13.98
		36	8.25	13.98
		48	8.24	13.98
		54	8.24	13.98
5240	48	6	8.79	13.98
		9	8.75	13.98
		12	8.73	13.98
		18	8.74	13.98
		24	8.74	13.98
		36	8.82	13.98
		48	8.84	13.98
		54	8.81	13.98

▣ TEST RESULTS_Sum Data of Ant.1, Ant.2 and Ant 3

Conducted Output Power Measurements (802.11a Mode: 5180~5240)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5180	36	6	10.12	12.22
		9	10.16	12.22
		12	10.20	12.22
		18	10.24	12.22
		24	10.21	12.22
		36	10.19	12.22
		48	10.27	12.22
		54	10.28	12.22
5200	40	6	10.43	12.22
		9	10.40	12.22
		12	10.38	12.22
		18	10.43	12.22
		24	10.38	12.22
		36	10.33	12.22
		48	10.28	12.22
		54	10.27	12.22
5240	48	6	10.74	12.22
		9	10.71	12.22
		12	10.67	12.22
		18	10.72	12.22
		24	10.67	12.22
		36	10.68	12.22
		48	10.69	12.22
		54	10.65	12.22

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5180~5240)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6.5	6.71	0.161	6.87	16.99
		13	6.72	0.295	7.01	16.99
		19.5	6.63	0.426	7.06	16.99
		26	6.48	0.528	7.00	16.99
		39	6.27	0.735	7.00	16.99
		52	6.01	0.896	6.91	16.99
		58.5	5.98	0.969	6.95	16.99
		65	5.89	1.082	6.97	16.99
5200	40	6.5	7.11	0.161	7.27	16.99
		13	7.00	0.295	7.29	16.99
		19.5	6.92	0.426	7.35	16.99
		26	6.75	0.528	7.28	16.99
		39	6.58	0.735	7.31	16.99
		52	6.40	0.896	7.30	16.99
		58.5	6.33	0.969	7.30	16.99
		65	6.34	1.082	7.43	16.99
5240	48	6.5	7.42	0.161	7.58	16.99
		13	7.27	0.295	7.57	16.99
		19.5	7.18	0.426	7.60	16.99
		26	7.09	0.528	7.62	16.99
		39	6.82	0.735	7.56	16.99
		52	6.64	0.896	7.54	16.99
		58.5	6.54	0.969	7.51	16.99
		65	6.52	1.082	7.60	16.99

■ TEST RESULTS_Ant.2

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5180~5240)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6.5	7.34	0.161	7.50	16.99
		13	7.25	0.295	7.55	16.99
		19.5	7.07	0.426	7.49	16.99
		26	6.99	0.528	7.52	16.99
		39	6.71	0.735	7.45	16.99
		52	6.43	0.896	7.33	16.99
		58.5	6.27	0.969	7.24	16.99
		65	6.30	1.082	7.38	16.99
5200	40	6.5	7.46	0.161	7.62	16.99
		13	7.37	0.295	7.67	16.99
		19.5	7.29	0.426	7.72	16.99
		26	7.08	0.528	7.61	16.99
		39	6.98	0.735	7.71	16.99
		52	6.70	0.896	7.59	16.99
		58.5	6.59	0.969	7.56	16.99
		65	6.43	1.082	7.52	16.99
5240	48	6.5	7.42	0.161	7.58	16.99
		13	7.29	0.295	7.58	16.99
		19.5	7.15	0.426	7.58	16.99
		26	7.14	0.528	7.66	16.99
		39	6.90	0.735	7.64	16.99
		52	6.56	0.896	7.45	16.99
		58.5	6.43	0.969	7.40	16.99
		65	6.25	1.082	7.33	16.99

■ TEST RESULTS_Ant.3

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5180~5240)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6.5	7.67	0.161	7.83	16.99
		13	7.56	0.295	7.85	16.99
		19.5	7.42	0.426	7.84	16.99
		26	7.31	0.528	7.84	16.99
		39	7.12	0.735	7.86	16.99
		52	7.06	0.896	7.95	16.99
		58.5	6.95	0.969	7.92	16.99
		65	6.91	1.082	7.99	16.99
5200	40	6.5	7.67	0.161	7.83	16.99
		13	7.56	0.295	7.86	16.99
		19.5	7.50	0.426	7.93	16.99
		26	7.40	0.528	7.92	16.99
		39	7.13	0.735	7.87	16.99
		52	7.04	0.896	7.94	16.99
		58.5	7.05	0.969	8.02	16.99
		65	6.93	1.082	8.01	16.99
5240	48	6.5	7.94	0.161	8.10	16.99
		13	7.76	0.295	8.06	16.99
		19.5	7.49	0.426	7.92	16.99
		26	7.43	0.528	7.96	16.99
		39	7.21	0.735	7.94	16.99
		52	7.11	0.896	8.01	16.99
		58.5	7.07	0.969	8.04	16.99
		65	7.02	1.082	8.11	16.99

■ TEST RESULTS_Sum Data of Ant.1 and Ant.2

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5180~5240)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5180	36	6.5	10.21	16.99
		13	10.30	16.99
		19.5	10.29	16.99
		26	10.28	16.99
		39	10.24	16.99
		52	10.13	16.99
		58.5	10.11	16.99
		65	10.19	16.99
5200	40	6.5	10.46	16.99
		13	10.49	16.99
		19.5	10.55	16.99
		26	10.46	16.99
		39	10.53	16.99
		52	10.46	16.99
		58.5	10.44	16.99
		65	10.48	16.99
5240	48	6.5	10.59	16.99
		13	10.58	16.99
		19.5	10.60	16.99
		26	10.65	16.99
		39	10.61	16.99
		52	10.51	16.99
		58.5	10.47	16.99
		65	10.48	16.99

■ TEST RESULTS_Sum Data of Ant.1, Ant.2 and Ant 3

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5180~5240)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5180	36	6.5	12.19	16.99
		13	12.26	16.99
		19.5	12.25	16.99
		26	12.24	16.99
		39	12.22	16.99
		52	12.19	16.99
		58.5	12.16	16.99
		65	12.24	16.99
5200	40	6.5	12.35	16.99
		13	12.38	16.99
		19.5	12.44	16.99
		26	12.38	16.99
		39	12.41	16.99
		52	12.39	16.99
		58.5	12.41	16.99
		65	12.43	16.99
5240	48	6.5	12.53	16.99
		13	12.51	16.99
		19.5	12.47	16.99
		26	12.52	16.99
		39	12.49	16.99
		52	12.44	16.99
		58.5	12.43	16.99
		65	12.46	16.99

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5190~5230)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	13.5	6.50	0.228	6.73	16.99
		27	6.31	0.421	6.73	16.99
		40.5	6.17	0.552	6.72	16.99
		54	6.05	0.683	6.73	16.99
		81	5.81	0.950	6.76	16.99
		108	5.65	1.091	6.74	16.99
		121.5	5.45	1.165	6.62	16.99
		135	5.39	1.249	6.64	16.99
5230	46	13.5	9.24	0.228	9.47	16.99
		27	9.10	0.421	9.52	16.99
		40.5	8.96	0.552	9.51	16.99
		54	8.86	0.683	9.54	16.99
		81	8.69	0.950	9.64	16.99
		108	8.44	1.091	9.53	16.99
		121.5	8.43	1.165	9.60	16.99
		135	8.37	1.249	9.62	16.99

■ TEST RESULTS_Ant.2

Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5190~5230)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	13.5	6.57	0.228	6.80	16.99
		27	6.42	0.421	6.84	16.99
		40.5	6.11	0.552	6.66	16.99
		54	6.09	0.683	6.77	16.99
		81	5.97	0.950	6.92	16.99
		108	5.78	1.091	6.87	16.99
		121.5	5.68	1.165	6.84	16.99
		135	5.60	1.249	6.85	16.99
5230	46	13.5	9.20	0.228	9.42	16.99
		27	8.94	0.421	9.36	16.99
		40.5	8.76	0.552	9.31	16.99
		54	8.53	0.683	9.21	16.99
		81	8.35	0.950	9.30	16.99
		108	8.03	1.091	9.12	16.99
		121.5	8.09	1.165	9.25	16.99
		135	7.92	1.249	9.16	16.99

■ TEST RESULTS_Ant.3

Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5190~5230)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	13.5	7.09	0.228	7.31	16.99
		27	6.82	0.421	7.24	16.99
		40.5	6.57	0.552	7.12	16.99
		54	6.49	0.683	7.18	16.99
		81	6.23	0.950	7.18	16.99
		108	6.08	1.091	7.17	16.99
		121.5	5.99	1.165	7.15	16.99
		135	6.04	1.249	7.29	16.99
5230	46	13.5	9.97	0.228	10.20	16.99
		27	9.48	0.421	9.90	16.99
		40.5	9.46	0.552	10.01	16.99
		54	9.33	0.683	10.01	16.99
		81	9.02	0.950	9.97	16.99
		108	8.75	1.091	9.84	16.99
		121.5	8.70	1.165	9.86	16.99
		135	8.63	1.249	9.88	16.99

■ TEST RESULTS_Sum Data of Ant.1 and Ant.2

Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5190~5230)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5190	38	13.5	9.78	16.99
		27	9.79	16.99
		40.5	9.70	16.99
		54	9.76	16.99
		81	9.85	16.99
		108	9.81	16.99
		121.5	9.74	16.99
		135	9.76	16.99
5230	46	13.5	12.46	16.99
		27	12.45	16.99
		40.5	12.42	16.99
		54	12.39	16.99
		81	12.48	16.99
		108	12.34	16.99
		121.5	12.44	16.99
		135	12.41	16.99

■ TEST RESULTS_Sum Data of Ant.1, Ant.2 Ant 3

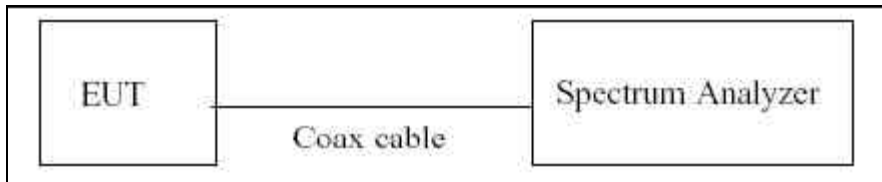
Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5190~5230)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5190	38	13.5	11.73	16.99
		27	11.71	16.99
		40.5	11.61	16.99
		54	11.67	16.99
		81	11.73	16.99
		108	11.70	16.99
		121.5	11.65	16.99
		135	11.70	16.99
5230	46	13.5	14.48	16.99
		27	14.37	16.99
		40.5	14.39	16.99
		54	14.37	16.99
		81	14.42	16.99
		108	14.28	16.99
		121.5	14.35	16.99
		135	14.34	16.99

8.4 POWER SPECTRAL DENSITY

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies. The maximum permissible peak power spectral density is 4 dBm/ MHz in the 5.15 GHz – 5.25 GHz band.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

We tested according to Method in KDB 789033(issued 04/08/2013).

The spectrum analyzer is set to :

1. Set span to encompass the entire emission bandwidth(EBW) of the signal.
2. RBW = 1 MHz.
3. VBW $\geq$ 3 MHz.
4. Number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$.
5. Sweep time = auto.
6. Detector = RMS(i.e., power averaging), if available. Otherwise, use sample detector mode.
7. Do not use sweep triggering. Allow the sweep to “free run”.
8. Trace average at least 100 traces in power averaging(RMS) mode
9. Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
10. If Method SA-2 was used, add $10 \log(1/x)$, where x is the duty cycle, to the peak of the spectrum.



■ Sample Calculation

PSD = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor

Output Power = -5 dBm + 10 dB + 0.8 dB + 0.21 dB = 16.01 dBm

Note :

1. Spectrum reading values are not plot data. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the UNII 1 band that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table. We used the particular cable type that is supported by manufacture.

Band	Loss(dB)
UNII 1	21.0

(Actual value of loss for the attenuator and cable combination)

FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Monitoring Port Ant.1

■ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11a	-7.096	0.366	-6.730	4	Pass
5200	40		-7.196	0.366	-6.830		Pass
5240	48		-6.838	0.366	-6.472		Pass
5180	36	802.11n	-7.490	0.102	-7.388		Pass
5200	40	20MHz BW	-7.485	0.102	-7.383		Pass
5240	48		-6.697	0.102	-6.595		Pass
5190	38	802.11n	-11.075	0.157	-10.918		Pass
5230	46	40MHz BW	-10.854	0.157	-10.697		Pass

Note : In order to simplify the report, attached plots were only the highest PSD channel.

Monitoring Port Ant.2

■ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11a	-6.536	0.106	-6.430	4	Pass
5200	40		-7.425	0.366	-7.059		Pass
5240	48		-6.896	0.366	-6.530		Pass
5180	36	802.11n	-6.880	0.102	-6.778		Pass
5200	40	20MHz BW	-7.625	0.102	-7.523		Pass
5240	48		-7.156	0.102	-7.054		Pass
5190	38	802.11n	-10.745	0.157	-10.588		Pass
5230	46	40MHz BW	-11.167	0.157	-11.010		Pass

Note : In order to simplify the report, attached plots were only the highest PSD channel.

Sum Data of Monitoring Port Ant.1 and Ant.2

TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result		
			Power Density (dBm)	Limit (dBm)	Pass/Fail
5180	36	802.11a	-3.57	1.49	Pass
5200	40		-3.93		Pass
5240	48		-3.49		Pass
5180	36	802.11n 20MHz BW	-4.06	4	Pass
5200	40		-4.44		Pass
5240	48		-3.81		Pass
5190	38	802.11n	-7.74		Pass
5230	46	40MHz BW	-7.84		Pass

Note :

1. Limit is 1.49 dBm for 802.11a. Because directional antenna gain is 8.51 dBi for 802.11a.
2. Sample Calculation

$$4 \text{ dBm} - (8.51 \text{ dB} - 6 \text{ dB}) = 1.49 \text{ dBm}$$

Service Port Ant.1

■ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11a	-6.547	0.222	-4.677	4	Pass
5200	40		-6.617	0.409	-4.218		Pass
5240	48		-6.319	0.222	-4.011		Pass
5180	36	802.11n 20MHz BW	-5.078	0.426	-4.652		Pass
5200	40		-5.033	1.082	-3.951		Pass
5240	48		-4.346	0.528	-3.818		Pass
5190	38	802.11n 40MHz BW	-8.677	0.950	-7.727		Pass
5230	46		-6.168	0.950	-5.218		Pass

Note : In order to simplify the report, attached plots were only the highest PSD channel.

Service Port Ant.2

■ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11a	-7.024	0.936	-3.866	4	Pass
5200	40		-6.682	0.409	-4.033		Pass
5240	48		-6.578	0.936	-3.726		Pass
5180	36	802.11n 20MHz BW	-4.576	0.295	-4.281		Pass
5200	40		-4.313	0.426	-3.887		Pass
5240	48		-4.374	0.528	-3.846		Pass
5190	38	802.11n 40MHz BW	-8.572	0.950	-7.622		Pass
5230	46		-5.250	0.228	-5.022		Pass

Note : In order to simplify the report, attached plots were only the highest PSD channel.

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11a	-7.234	1.015	-3.362	4	Pass
5200	40		-6.019	0.222	-3.497		Pass
5240	48		-6.166	0.409	-3.316		Pass
5180	36	802.11n 20MHz BW	-4.602	1.082	-3.520		Pass
5200	40		-4.199	0.969	-3.230		Pass
5240	48		-4.389	1.082	-3.307		Pass
5190	38	802.11n 40MHz BW	-7.781	0.228	-7.553		Pass
5230	46		-4.407	0.228	-4.179		Pass

Note : In order to simplify the report, attached plots were only the highest PSD channel.

Sum Data of Service Port Ant.1 and Ant.2

■ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result		
			Power Density (dBm)	Limit (dBm)	Pass/Fail
5180	36	802.11a	-3.19	0.99	Pass
5200	40		-3.23		Pass
5240	48		-2.85		Pass
5180	36	802.11n 20MHz BW	-1.45	4	Pass
5200	40		-0.91		Pass
5240	48		-0.82		Pass
5190	38	802.11n 40MHz BW	-4.66		Pass
5230	46		-2.11		Pass

Note :

1. Limit is 0.99 dBm for 802.11a. Because directional antenna gain is 9.01 dBi for 802.11a.
2. Sample Calculation
 $4 \text{ dBm} - (9.01 \text{ dB} - 6 \text{ dB}) = 0.99 \text{ dBm}$

Sum Data of Service Port Ant.1, Ant.2 and Ant.3

■ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result		
			Power Density (dBm)	Limit (dBm)	Pass/Fail
5180	36	802.11a	-1.44	-0.77	Pass
5200	40		-1.32		Pass
5240	48		-1.06		Pass
5180	36	802.11n 20MHz BW	0.65	4	Pass
5200	40		1.09		Pass
5240	48		1.12		Pass
5190	38	802.11n 40MHz BW	-2.86		Pass
5230	46		-0.01		Pass

Note :

1. Limit is -0.77 dBm. Because directional antenna gain is 10.77 dBi for 802.11a.
2. Sample Calculation
 $4 \text{ dBm} - (10.77 \text{ dB} - 6 \text{ dB}) = -0.77 \text{ dBm}$

Monitoring Port Ant.1

RESULT PLOTS

20 MHz BW

Power Spectral Density (802.11a-CH 48)



Power Spectral Density (802.11n-CH 48)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
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40 MHz BW

Power Spectral Density (802.11n-CH 46)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Monitoring Port Ant.2

RESULT PLOTS

20 MHz BW

Power Spectral Density (802.11a-CH 36)



Power Spectral Density (802.11n-CH 36)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
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Power Spectral Density (802.11n-CH 38)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
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Service Port Ant.1

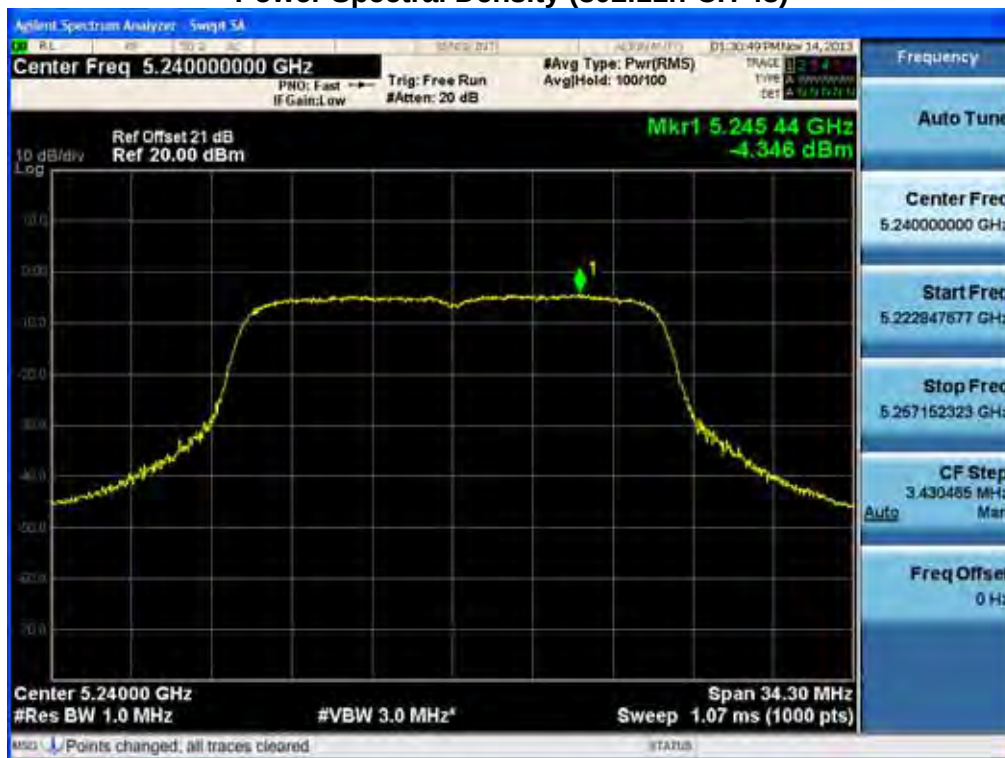
RESULT PLOTS

20 MHz BW

Power Spectral Density (802.11a-CH 48)



Power Spectral Density (802.11n-CH 48)



40 MHz BW

Power Spectral Density (802.11n-CH 46)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
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Service Port Ant.2

RESULT PLOTS

20 MHz BW

Power Spectral Density (802.11a-CH 48)



Power Spectral Density (802.11n-CH 48)



40 MHz BW

Power Spectral Density (802.11n-CH 46)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
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Service Port Ant.3

RESULT PLOTS

20 MHz BW

Power Spectral Density (802.11a-CH 48)



Power Spectral Density (802.11n-CH 40)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Power Spectral Density (802.11n-CH 46)

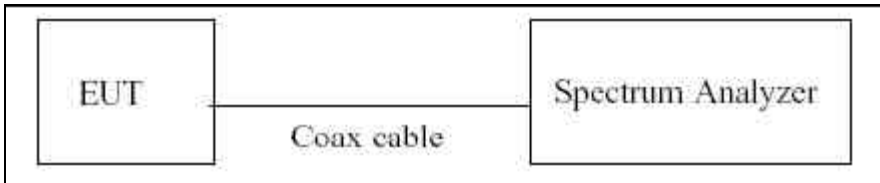


FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

8.5 PEAK EXCURSION RATIO

The spectrum analyzer was connected to the antenna terminal while the EUT was operating in the continuous transmission mode at the appropriate center frequencies. The largest permissible difference between the modulation envelope(measured using a peak hold function) and the maximum conducted output power 13 dB/MHz.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

We tested according to KDB 789033(issued 04/08/2013).

The spectrum analyzer is set to :

1. Span = Set the span to view the entire emission bandwidth.
2. RBW = 1 MHz
3. VBW $\geq$ 3 MHz
4. Detector Mode = Peak
5. Trace Mode = Max hold
6. Allow the sweeps to continue until the trace stabilizes.
7. Use the peak search function to find the peak of the spectrum.
8. Use the procedure to measure the PPSD
9. Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

Note :

1. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the UNII 1 band that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table. We used the particular cable type that is supported by manufacture.

Band	Loss(dB)
UNII 1	21.0

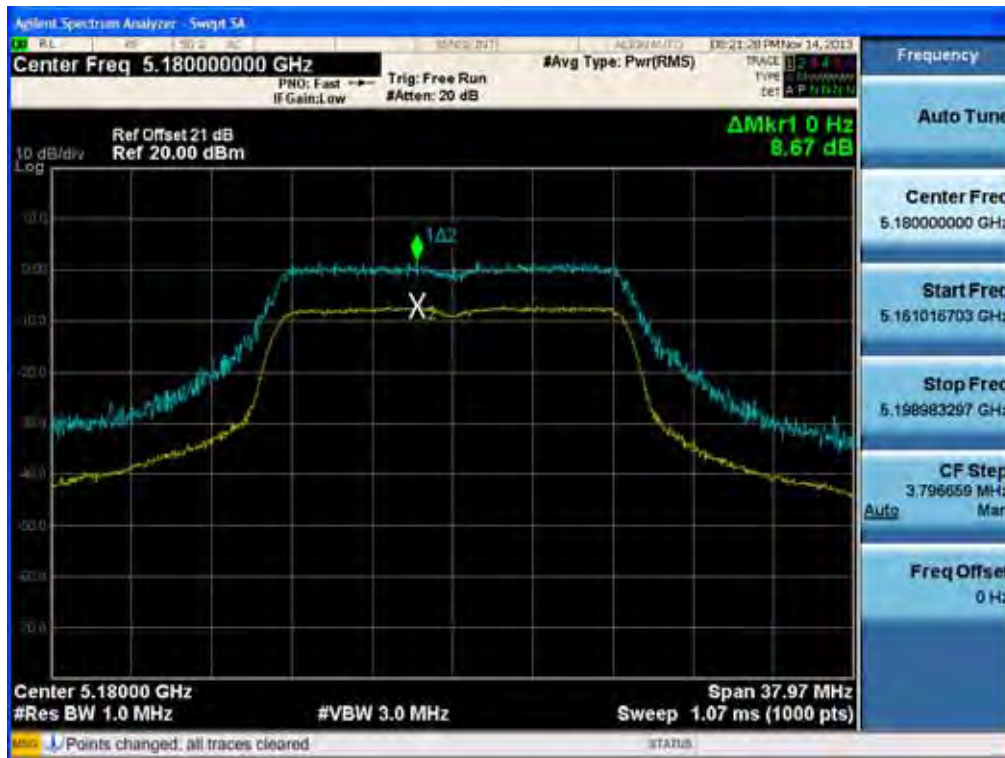
(Actual value of loss for the attenuator and cable combination)

Monitoring Port Ant.1

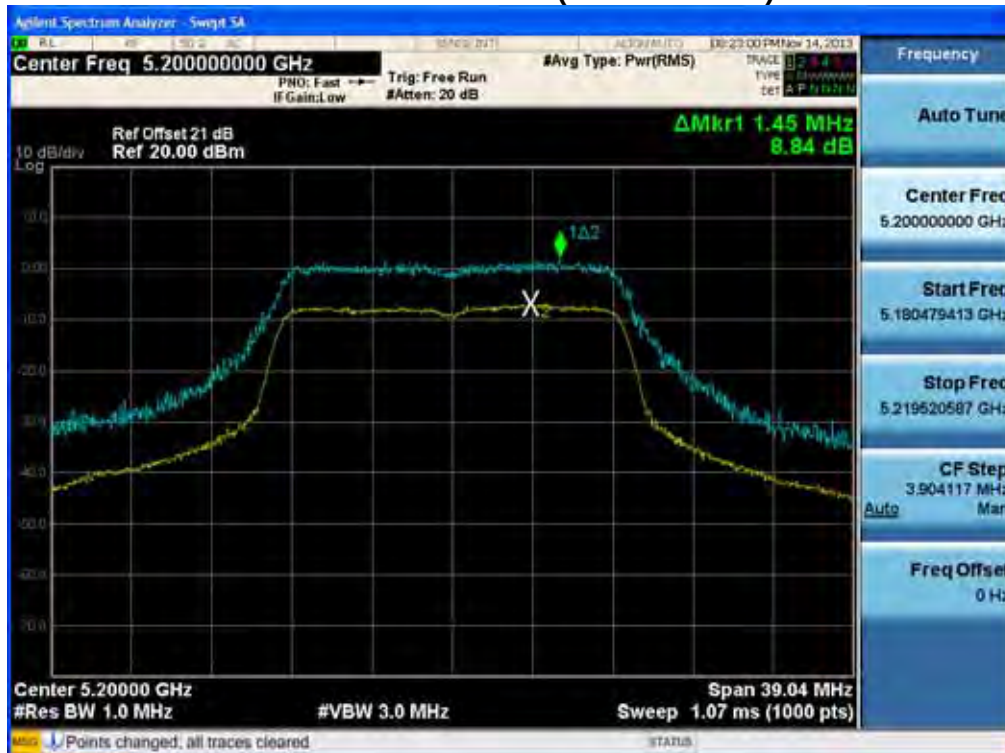
RESULT PLOTS

20 MHz BW

Peak Excursion Ratio (802.11a-CH 36)



Peak Excursion Ratio (802.11a-CH 40)

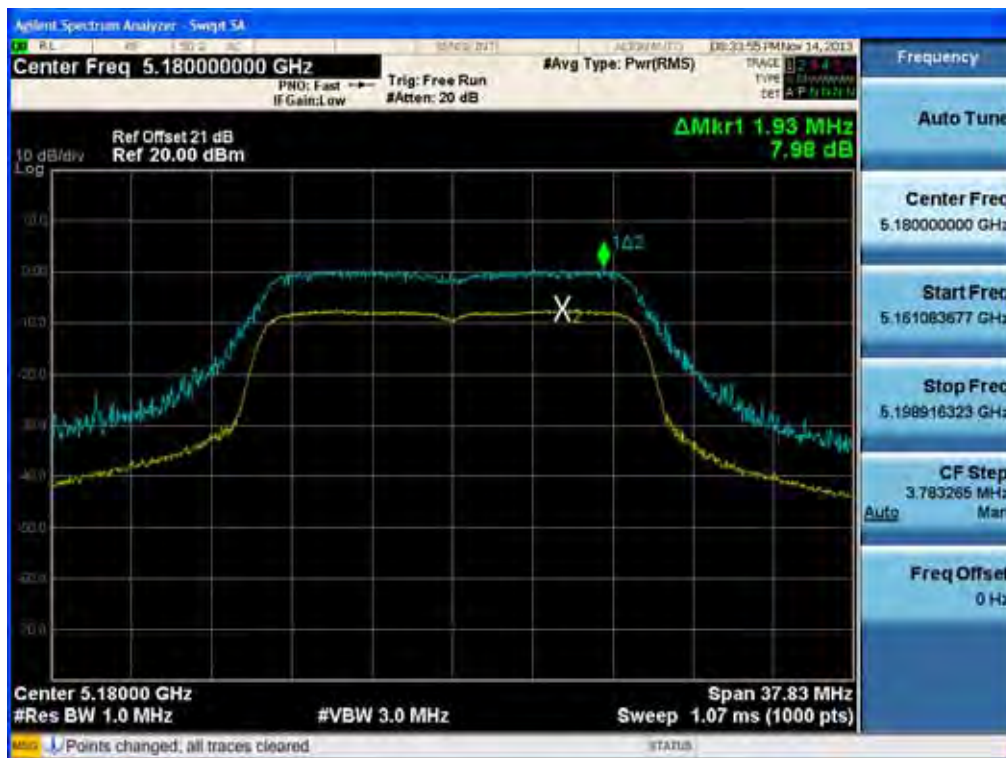


FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
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Peak Excursion Ratio (802.11a-CH 48)

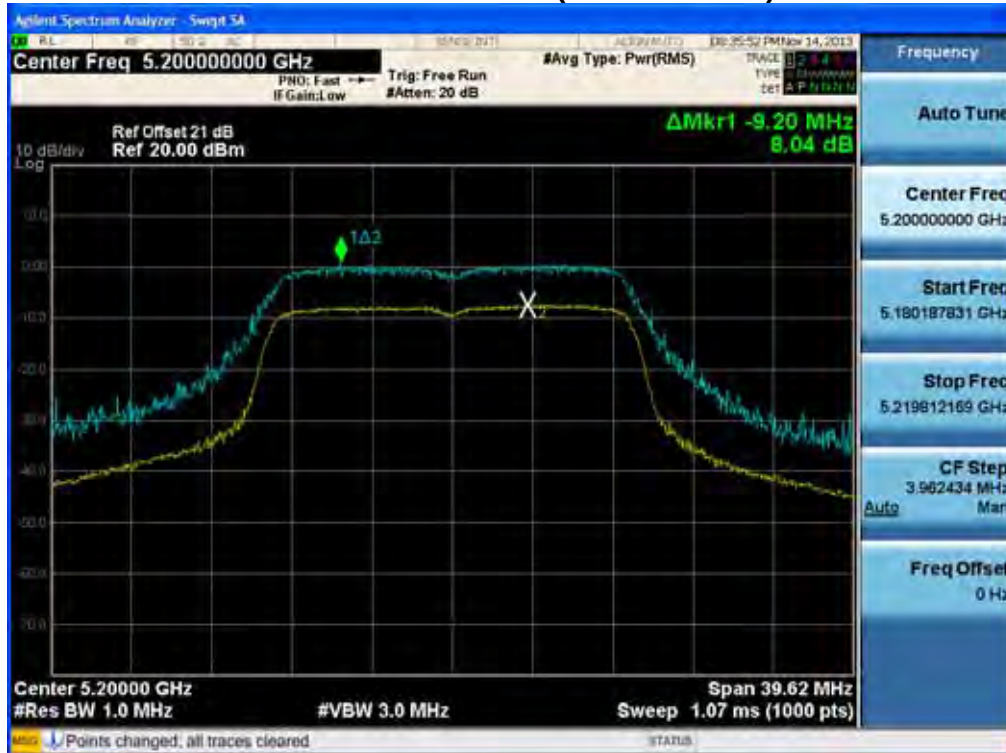


Peak Excursion Ratio (802.11n-CH 36)

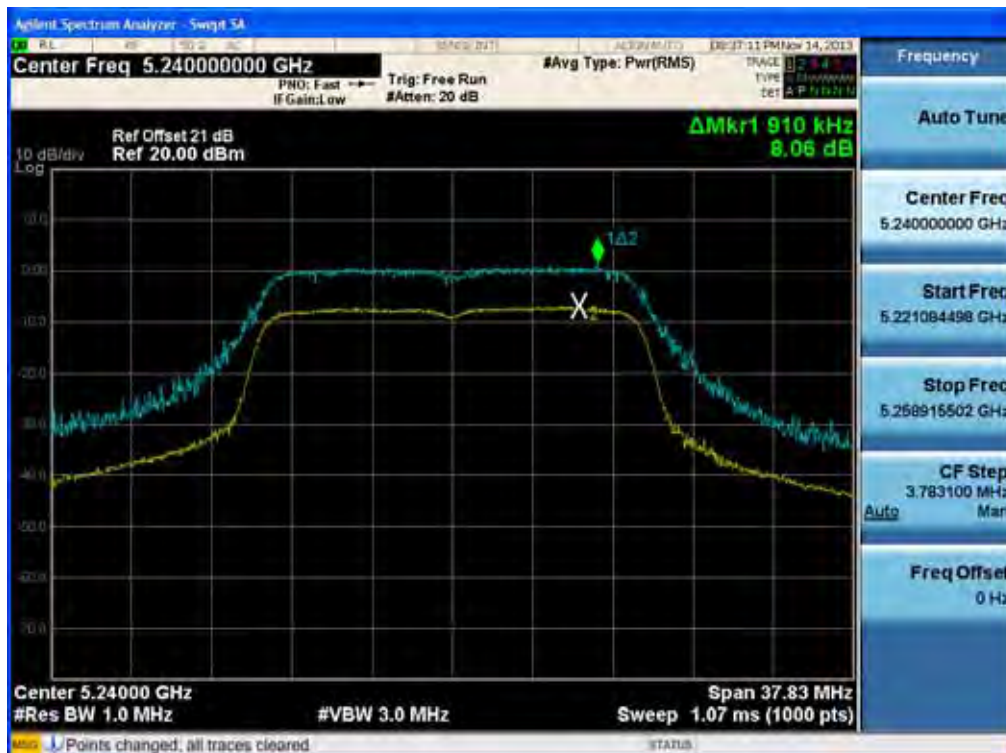


FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
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Peak Excursion Ratio (802.11n-CH 40)



Peak Excursion Ratio (802.11n-CH 48)



40MHz BW

Peak Excursion Ratio (802.11n-CH 38)



Peak Excursion Ratio (802.11n-CH 46)

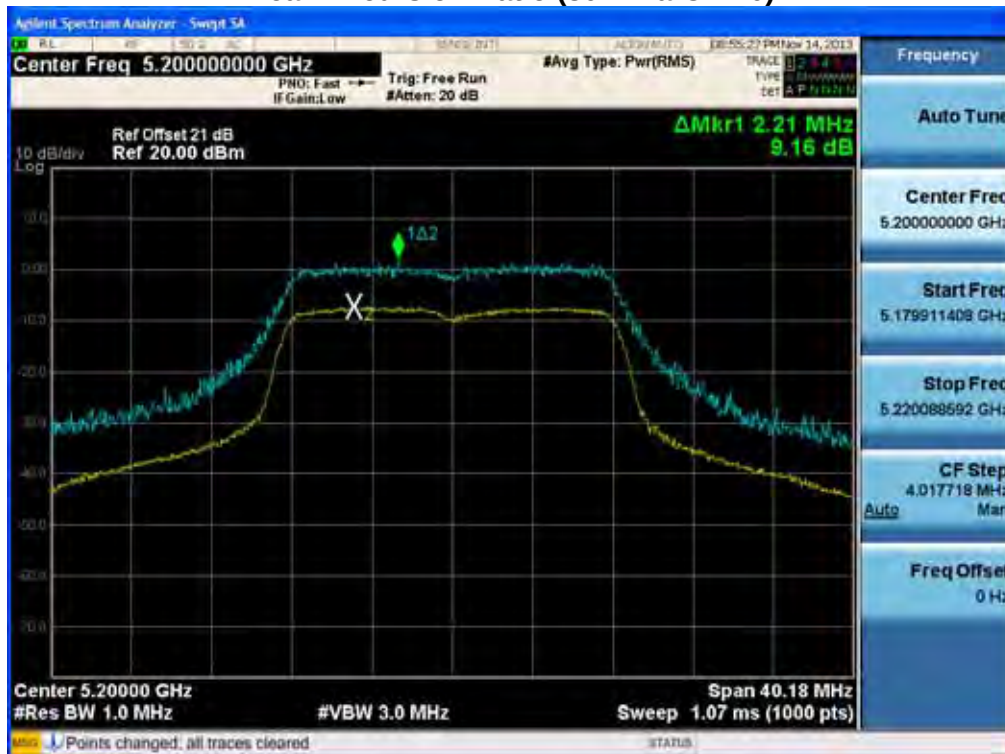


Monitoring Port Ant.2

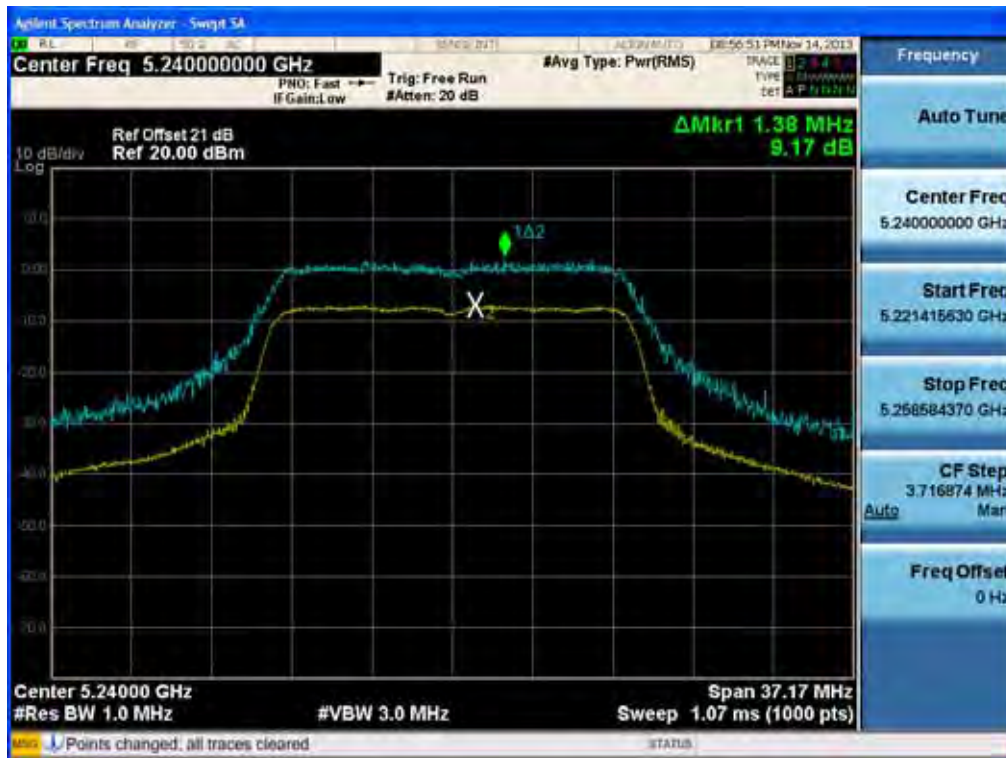
Peak Excursion Ratio (802.11a-CH 36)



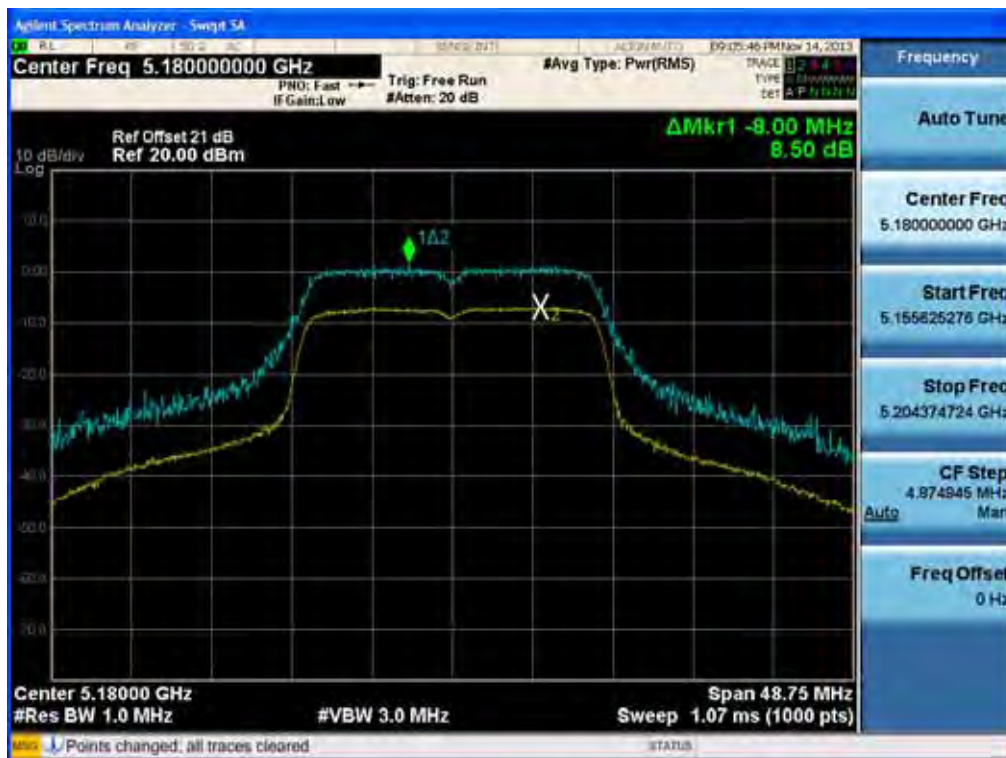
Peak Excursion Ratio (802.11a-CH 40)



Peak Excursion Ratio (802.11a-CH 48)



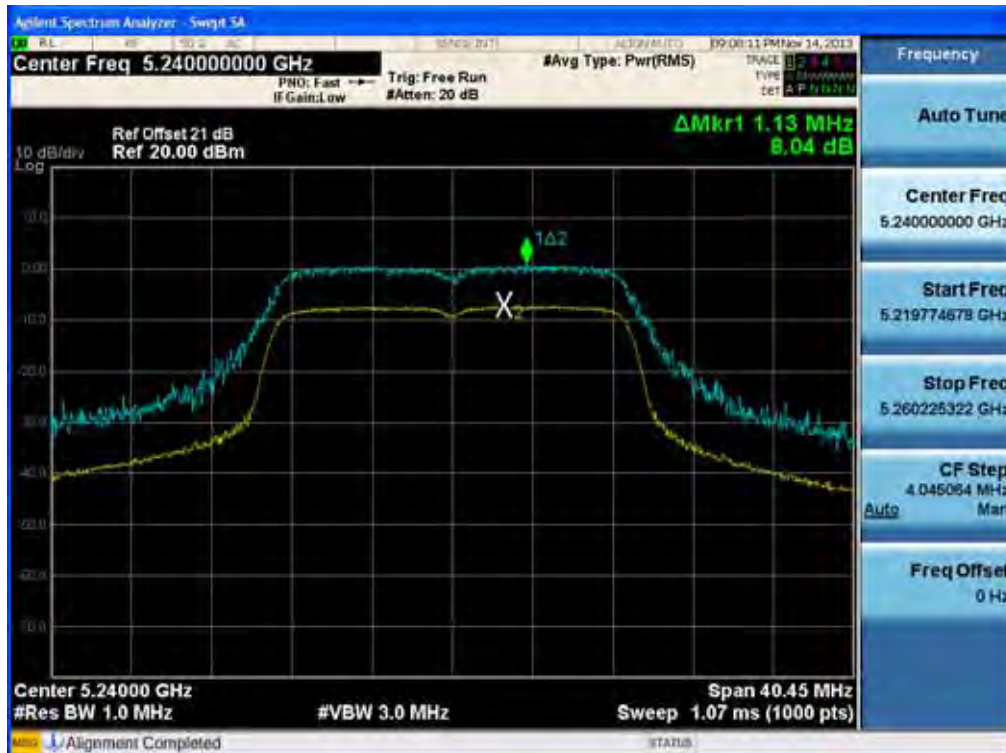
Peak Excursion Ratio (802.11n-CH 36)



Peak Excursion Ratio (802.11n-CH 40)



Peak Excursion Ratio (802.11n-CH 48)



40MHz BW

Peak Excursion Ratio (802.11n-CH 38)



Peak Excursion Ratio (802.11n-CH 46)

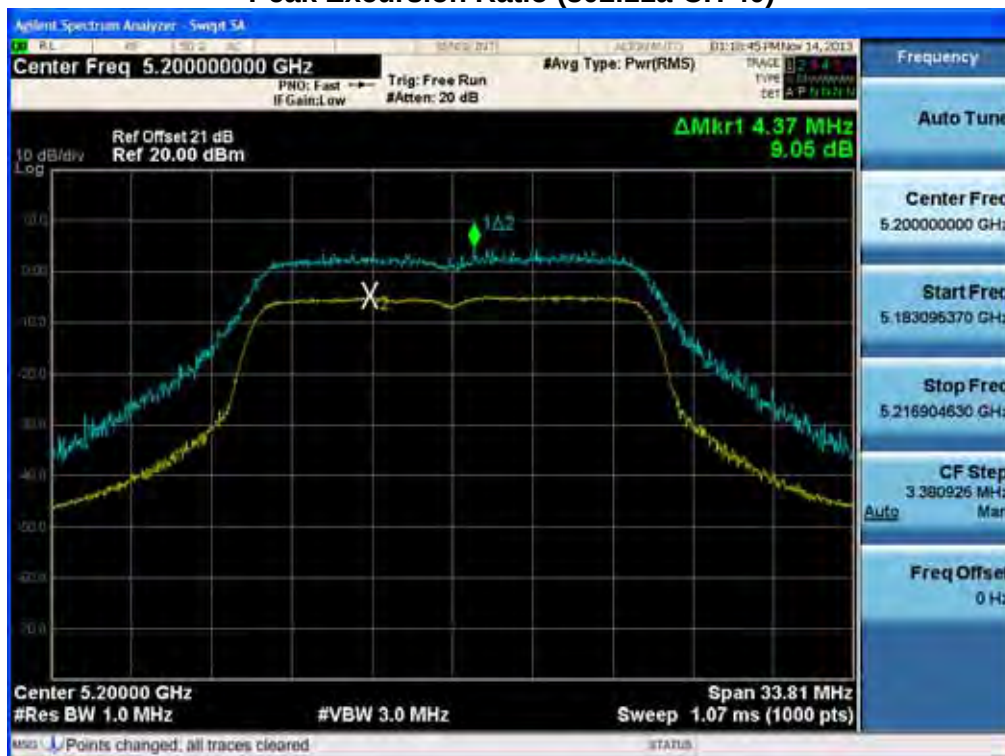


Service Port Ant.1

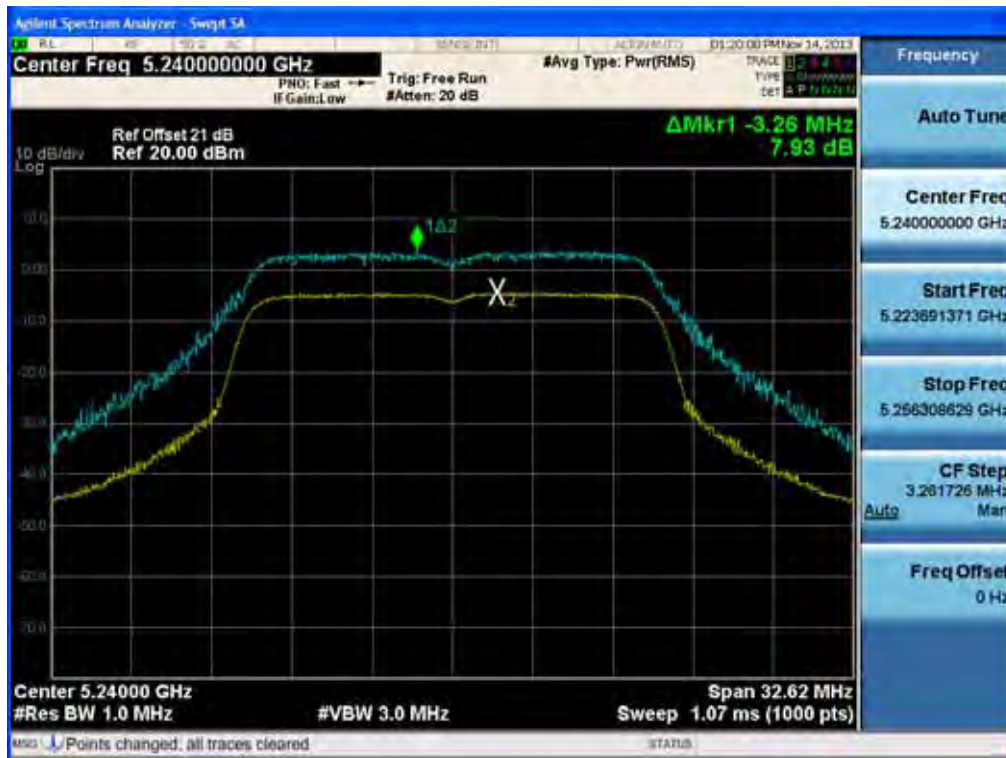
Peak Excursion Ratio (802.11a-CH 36)



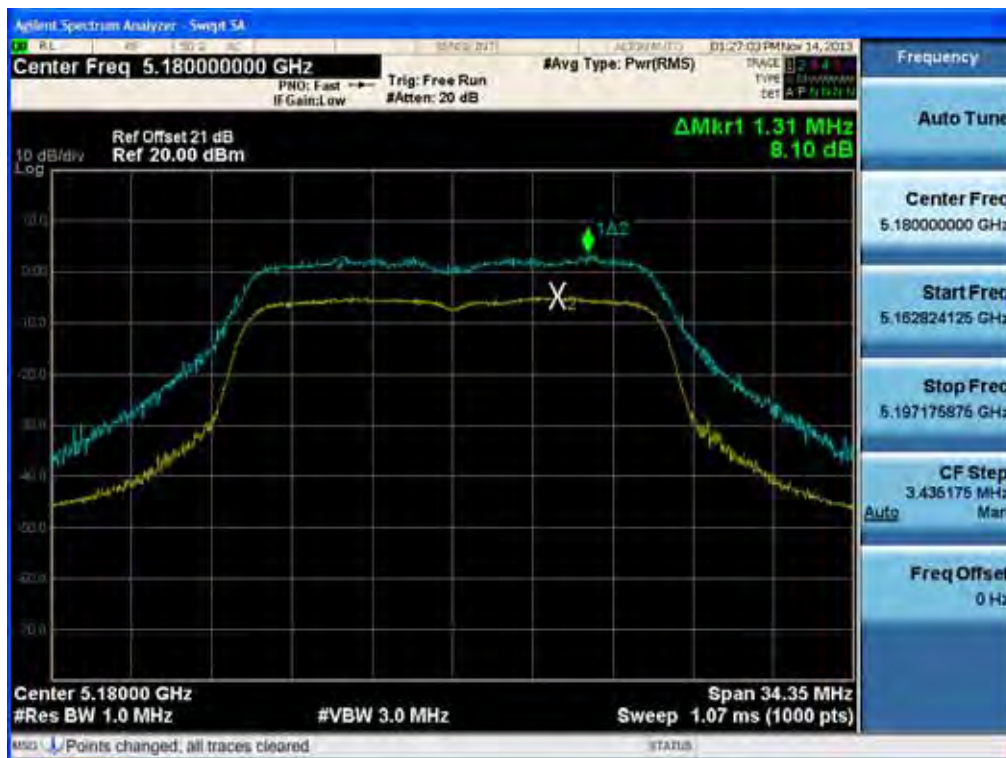
Peak Excursion Ratio (802.11a-CH 40)



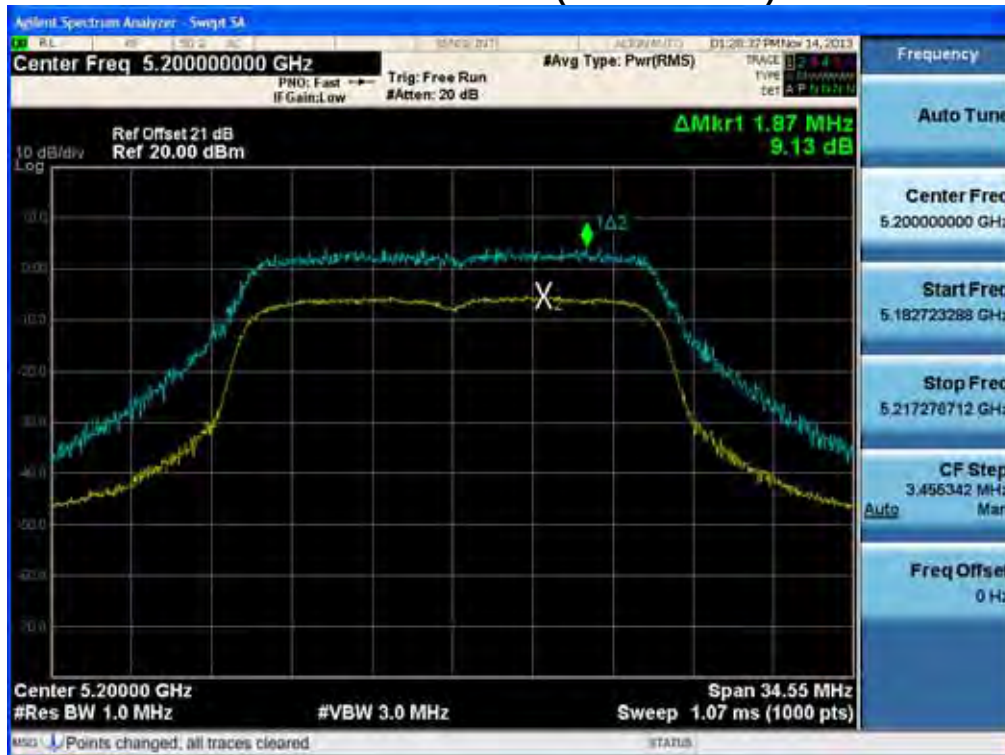
Peak Excursion Ratio (802.11a-CH 48)



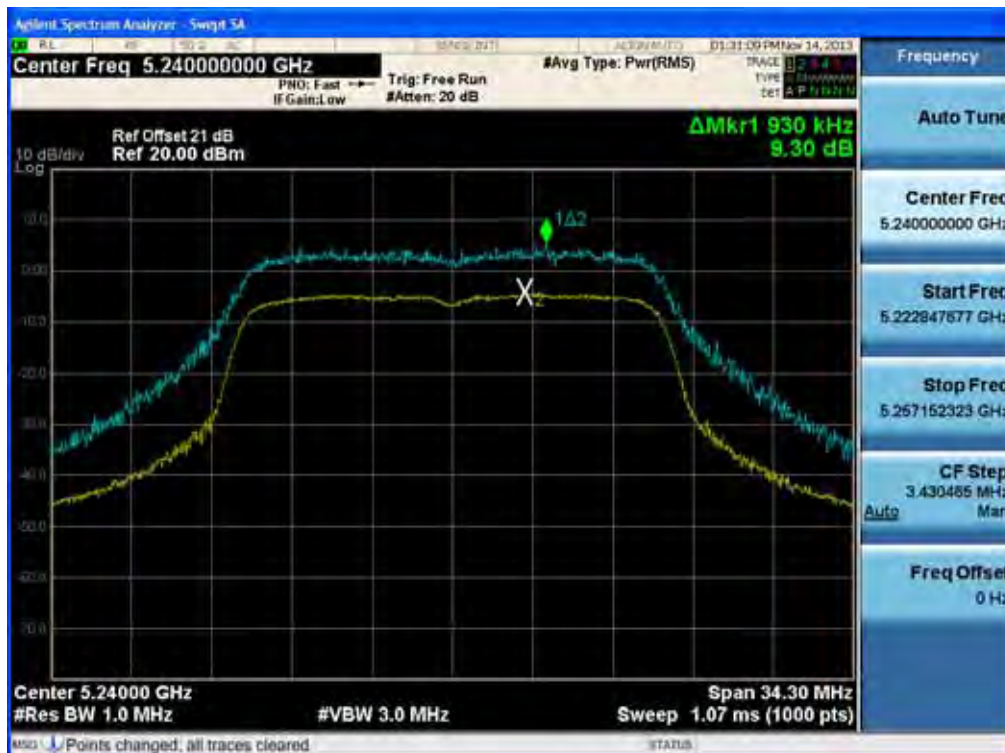
Peak Excursion Ratio (802.11n-CH 36)



Peak Excursion Ratio (802.11n-CH 40)

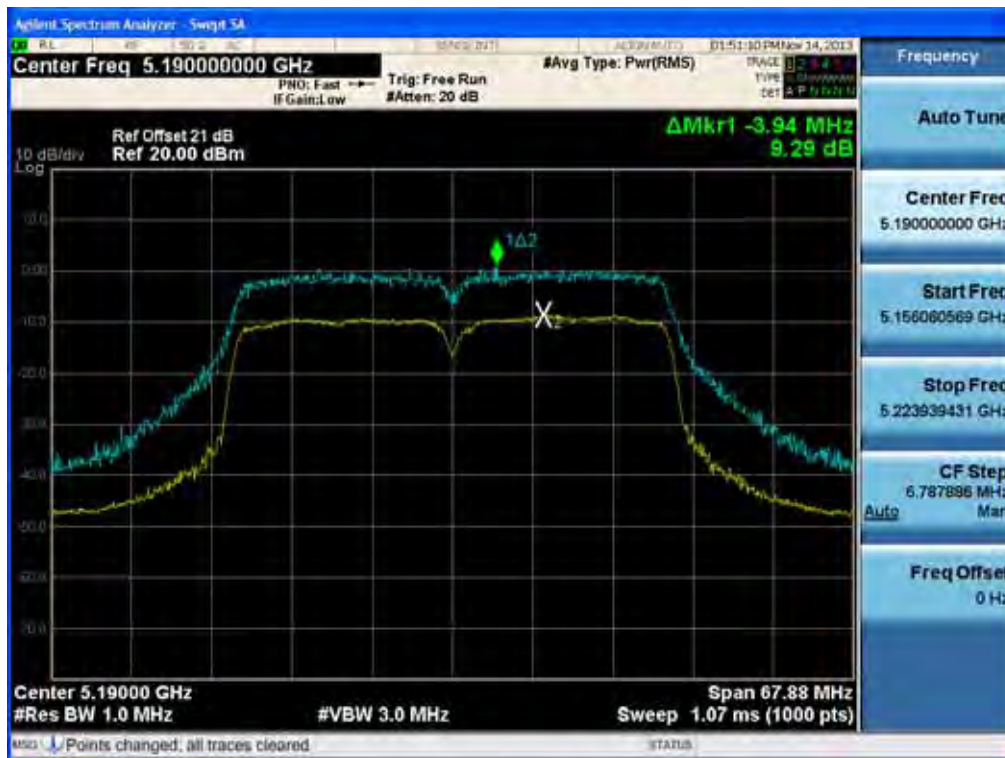


Peak Excursion Ratio (802.11n-CH 48)



40MHz BW

Peak Excursion Ratio (802.11n-CH 38)



Peak Excursion Ratio (802.11n-CH 46)



Service Port Ant.2

Peak Excursion Ratio (802.11a-CH 36)



Peak Excursion Ratio (802.11a-CH 40)

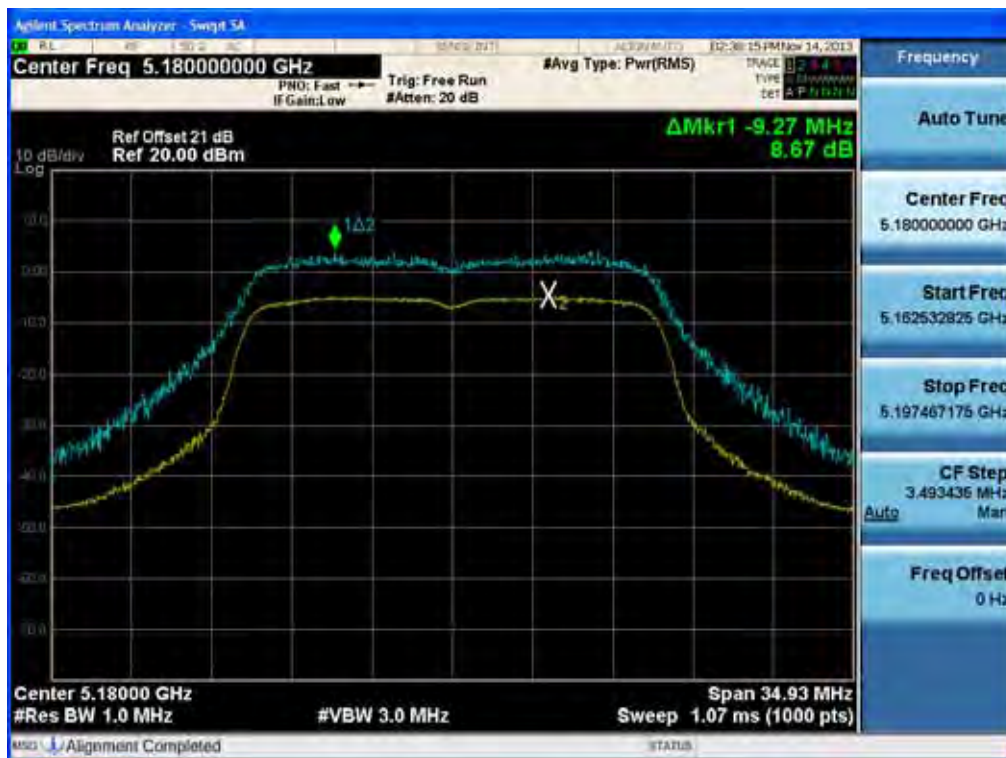


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Peak Excursion Ratio (802.11a-CH 48)



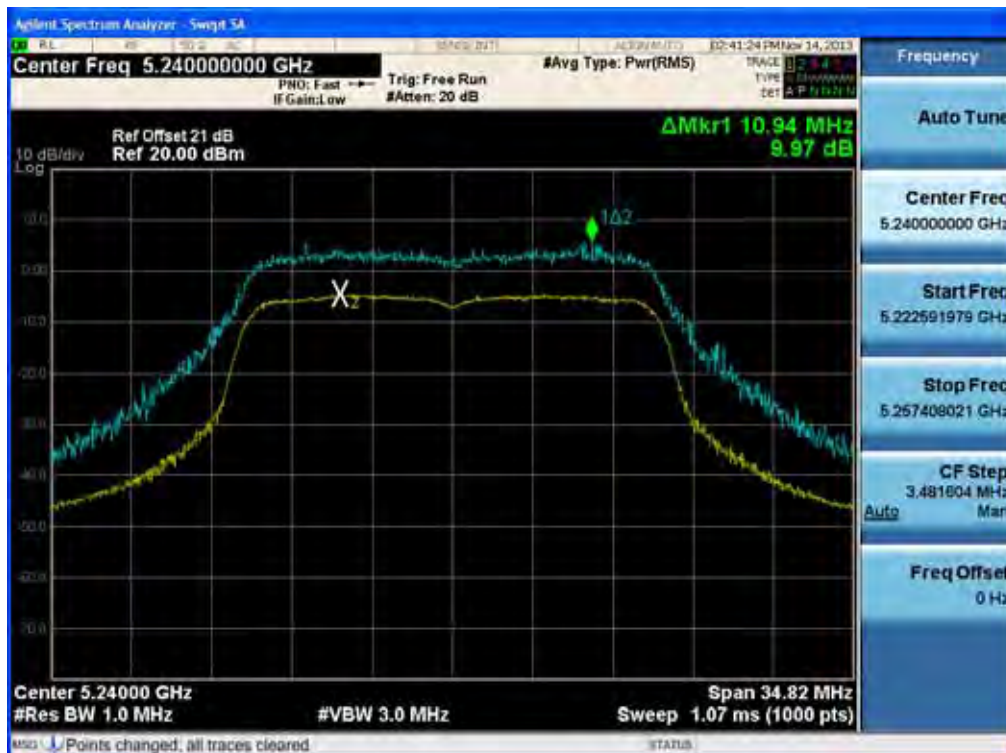
Peak Excursion Ratio (802.11n-CH 36)



Peak Excursion Ratio (802.11n-CH 40)



Peak Excursion Ratio (802.11n-CH 48)



40MHz BW

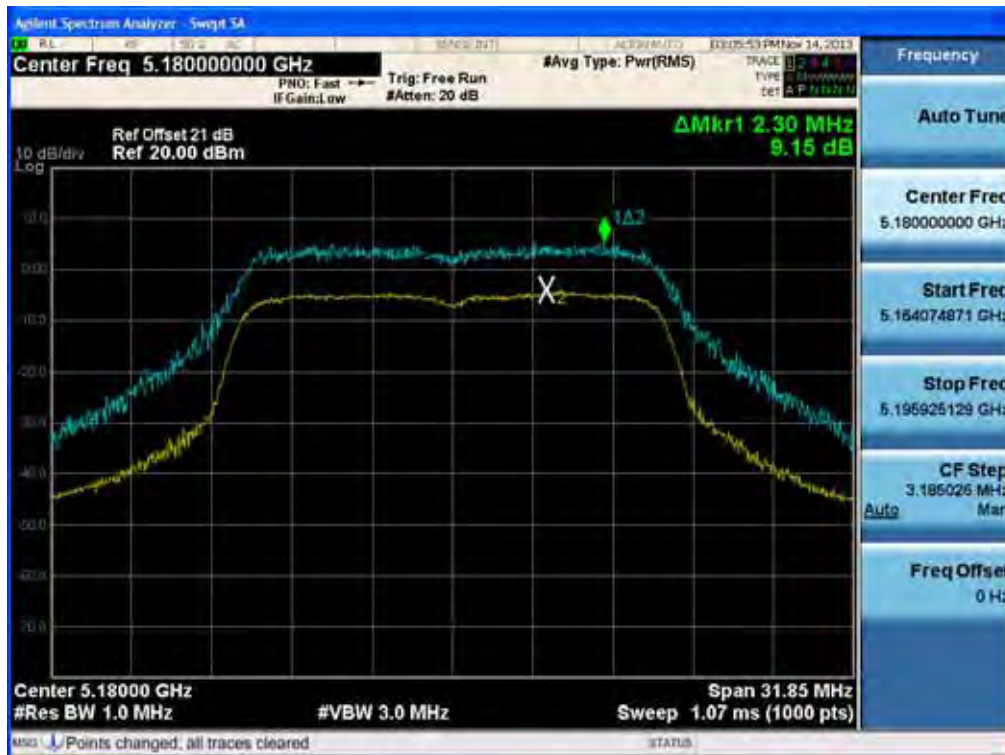
Peak Excursion Ratio (802.11n-CH 38)



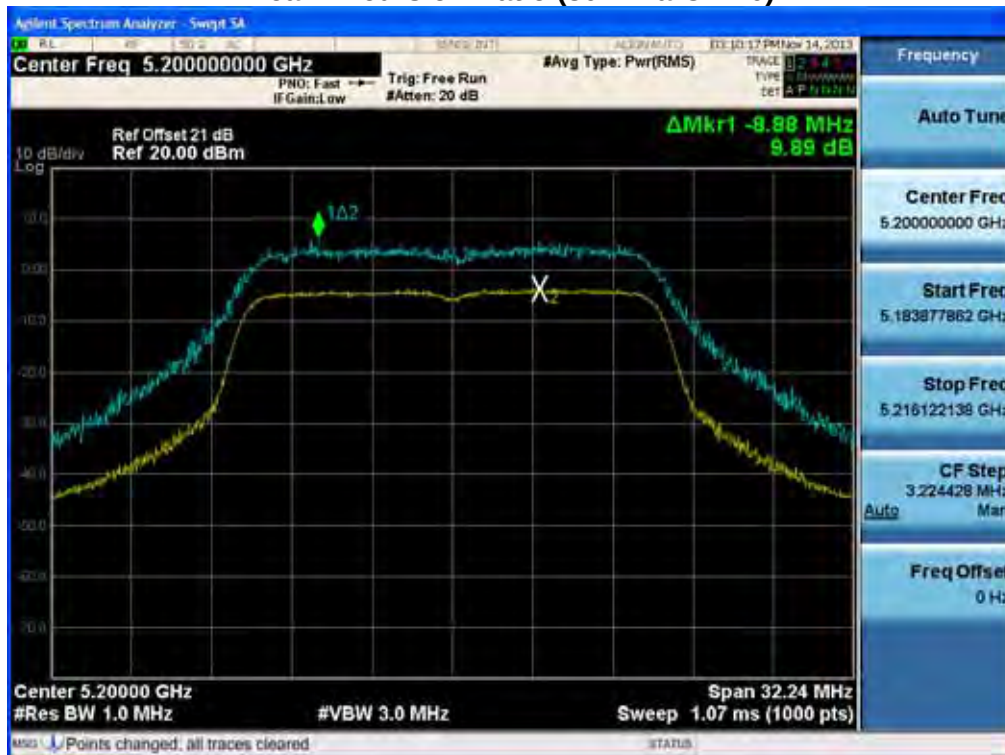
Peak Excursion Ratio (802.11n-CH 46)



Peak Excursion Ratio (802.11a-CH 36)



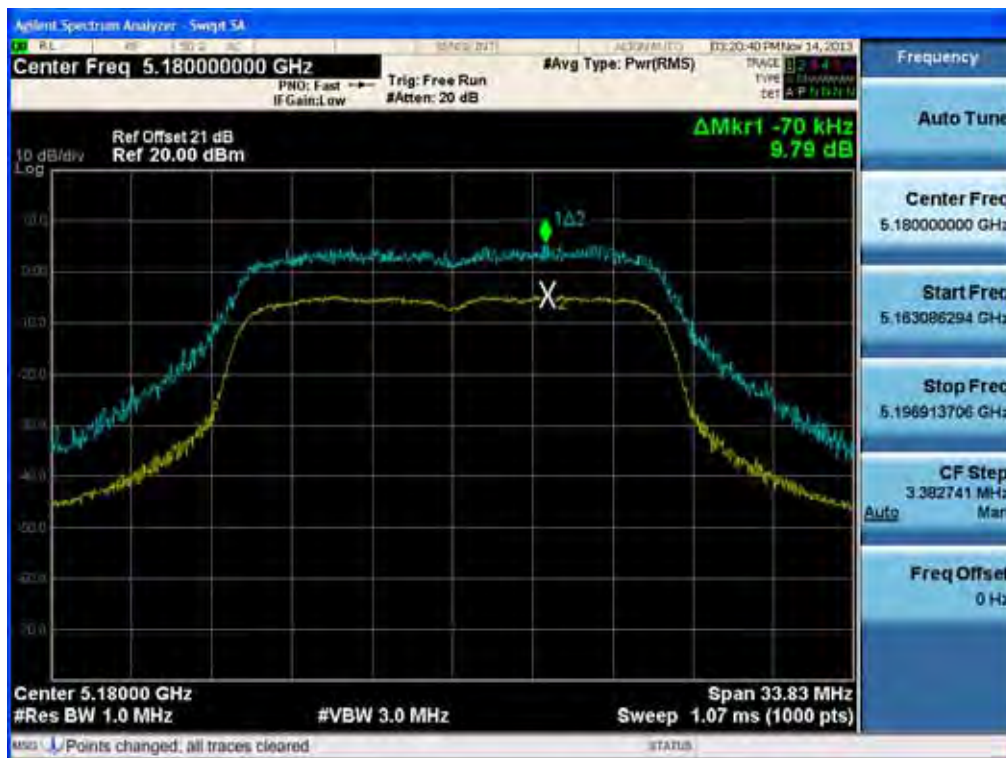
Peak Excursion Ratio (802.11a-CH 40)



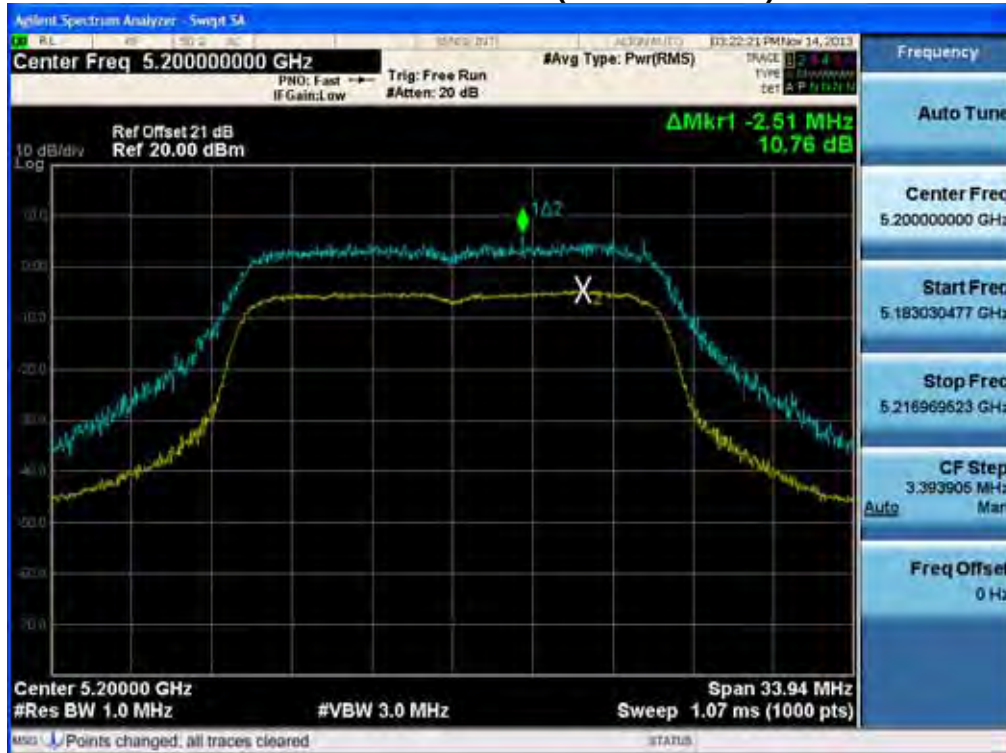
Peak Excursion Ratio (802.11a-CH 48)



Peak Excursion Ratio (802.11n-CH 36)



Peak Excursion Ratio (802.11n-CH 40)



Peak Excursion Ratio (802.11n-CH 48)



40MHz BW

Peak Excursion Ratio (802.11n-CH 38)



Peak Excursion Ratio (802.11n-CH 46)



8.6 FREQUENCY STABILITY.

The EUT was placed inside an environmental chamber as the temperature in the chamber was varied between -30 °C and 50 °C. The temperature was incremented by 10 °C intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

Service Port

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,180,000,000 Hz
CHANNEL:	36
REFERENCE VOLTAGE:	220 VAC

Voltage (%)	Power (VAC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100	220	+20(Ref)	5 180 017	17.39
100		-30	5 180 009	9.30
100		-20	5 180 007	6.79
100		-10	5 180 007	7.46
100		0	5 180 005	5.14
100		+10	5 180 013	12.98
100		+30	5 180 015	15.45
100		+40	5 180 015	14.79
100		+50	5 180 010	10.03
115	253	+20	5 180 017	17.01
85	187	+20	5 180 017	16.52

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

Monitoring Port

OPERATING BAND: UNII Band 1
 OPERATING FREQUENCY: 5,180,000,000 Hz
 CHANNEL: 36
 REFERENCE VOLTAGE: 220 VAC

Voltage (%)	Power (VAC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100	220	+20(Ref)	5 179 984	-15.78
100		-30	5 179 985	-15.49
100		-20	5 179 982	-17.82
100		-10	5 179 981	-19.02
100		0	5 179 979	-21.40
100		+10	5 179 977	-23.10
100		+30	5 179 974	-25.78
100		+40	5 179 979	-21.50
100		+50	5 179 978	-22.04
115	253	+20	5 179 976	-24.10
85	187	+20	5 179 977	-22.79

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

8.7 RADIATED MEASUREMENT.

8.7.1 RADIATED SPURIOUS EMISSIONS.

Test Requirements and limit, §15.205, §15.209, §15.407

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
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

■ §15.407, KDB 789033

All harmonics that do not lie in a restricted band are subject to a peak limit of -27 dBm/MHz. At a distance of 3 meters the field strength limit in dBµV/m can be determined by adding a “conversion” factor of 95.2 dB to the EIRP limit of -27 dBm/MHz to obtain the limit for out of band spurious emissions of 68.2 dBµV/m.

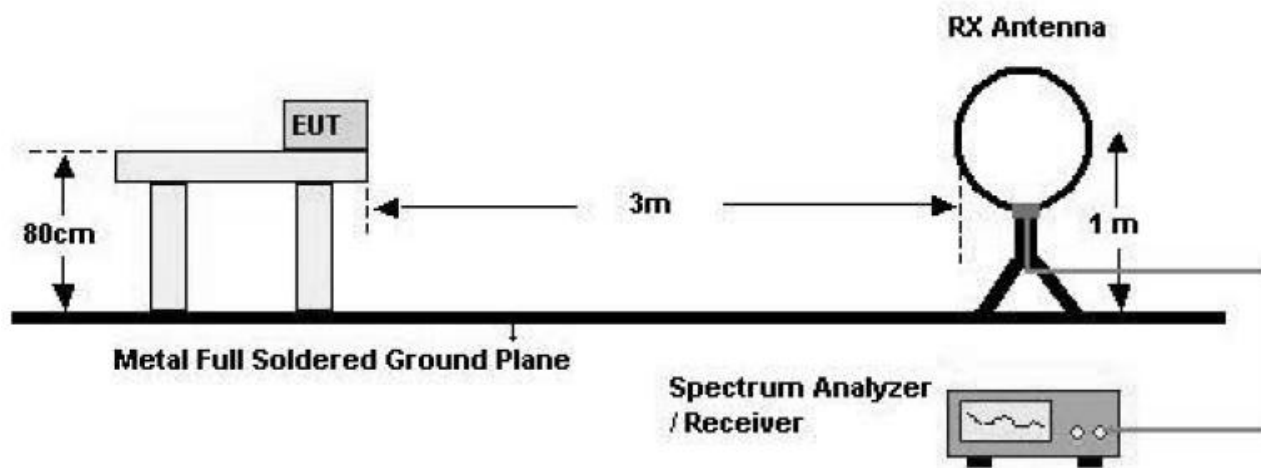
■ Test case

Monitoring	SISO	Ant 1
		Ant 2
	MIMO	Ant 1 & 2
Service	SISO	Ant 1
		Ant 2
		Ant 3
	MIMO	Ant 1 & 2
		Ant 1 & 2 & 3

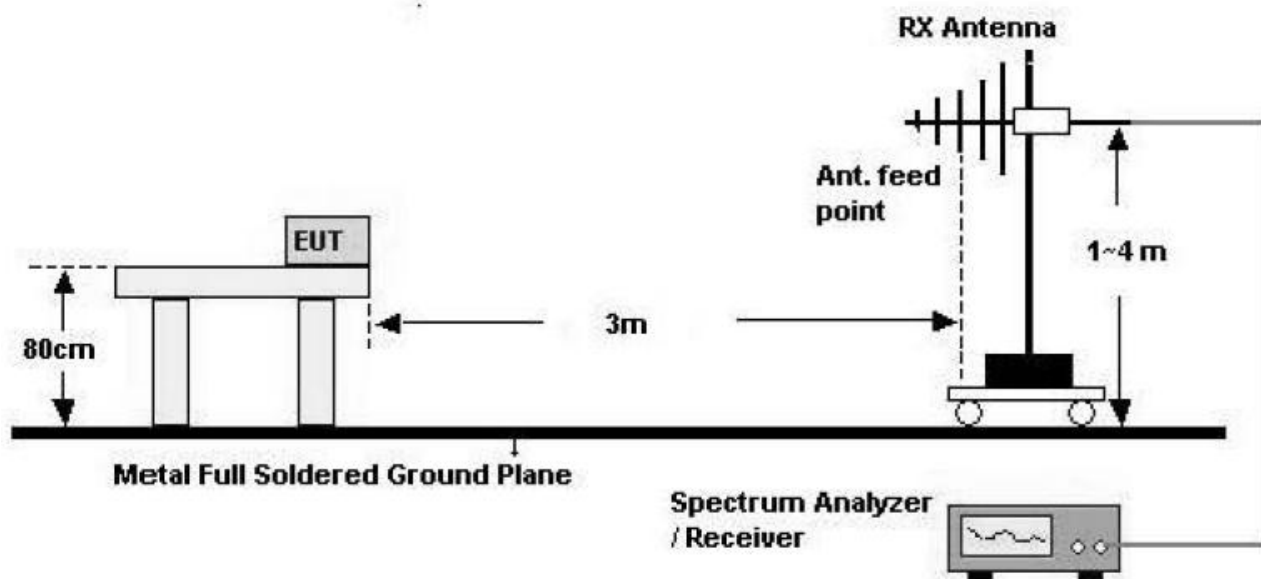
Note : We have done all test case. Worst case is Ant 1 & 2 for monitoring and Ant 1 & 2 & 3 for service. So, we attached the results of only worst case.

Test Configuration

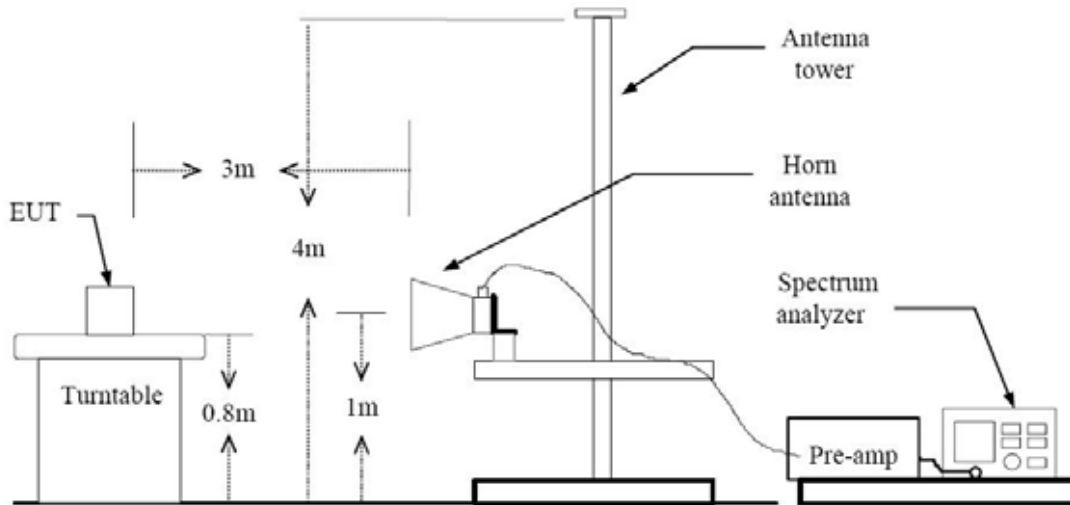
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



TEST PROCEDURE USED

ANSI C63.4(2003)

Method H)5) in KDB 789033, issued 04/08/2013 (Peak)

Method H)6)d) in KDB 789033, issued 04/08/2013 (Average)

. Spectrum setting:

- Peak.

1. RBW = 1 MHz

2. VBW $\geq$ 3 MHz

3. Detector = Peak

4. Sweep Time = auto

5. Trace mode = max hold

6. Allow sweeps to continue until the trace stabilizes.

7. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately $1/x$, where x is the duty cycle.

- Average (Method VB :Averaging using reduced video bandwidth)

1. RBW = 1 MHz

2. VBW

2.1. If the EUT is configured to transmit with duty cycle $\geq$ 98 percent, set $VBW \leq RBW/100$ (i.e., 10 kHz) but not less than 10 Hz.

2.2. If the EUT duty cycle is $<$ 98 percent, set $VBW \geq 1/T$, where T is the minimum transmission duration.

3. The analyzer is set to linear detector mode.

4. Detector = Peak.

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5. Sweep time = auto.
6. Trace mode = max hold.
7. Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 percent duty cycle. For lower duty cycles, increase the minimum number of traces by a factor of $1/x$, where x is the duty cycle.

Note :

1. We used the case 2 for 802.11a/n_20/n_40 to perform the average field strength measurements for RSE and radiated band edge test.
2. The actual setting value of VBW for 802.11a/n_20/n_40.

Monitoring

Mode	Worst Data rate (Mbps)	T _{on} (ms)	T _{total} (ms)	Duty Cycle (%)	VBW(1/T) (Hz)	The actual setting value of VBW (Hz)
a	6	2.020	2.070	97.6	495.0	1000
n_20	6.5	1.885	1.930	97.7	530.5	1000
n_40	13.5	0.926	0.960	96.5	1079.9	3000

Service

Mode	Worst Data rate (Mbps)	T _{on} (ms)	T _{total} (ms)	Duty Cycle (%)	VBW(1/T) (Hz)	The actual setting value of VBW (Hz)
a	6	1.335	1.405	95.0	749.1	1000
n_20	6.5	1.269	1.317	96.4	788.0	1000
n_40	13.5	0.630	0.664	94.9	1587.3	3000

TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB /m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 9 kHz to the 30MHz.
2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
3. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
4. Limit line = specific Limits (dB μ V) + Distance extrapolation factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

TEST RESULTS

Below 1 GHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB /m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 30 MHz to the 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Above 1 GHz

Monitoring MIMO (Ant 1 & 2)

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10360	51.27	9.33	V	60.60	68.20	7.60	PK
15540	45.66	14.61	V	60.27	73.98	13.71	PK
15540	31.85	14.61	V	46.46	53.98	7.52	AV
10360	50.04	9.33	H	59.37	68.20	8.83	PK
15540	45.23	14.61	H	59.84	73.98	14.14	PK
15540	31.77	14.61	H	46.38	53.98	7.60	AV

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5200 MHz
Channel No.	40 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10400	49.95	10.13	V	60.08	68.20	8.12	PK
15600	45.11	14.60	V	59.71	73.98	14.27	PK
15600	31.68	14.60	V	46.28	53.98	7.70	AV
10400	48.25	10.13	H	58.38	68.20	9.82	PK
15600	45.51	14.60	H	60.11	73.98	13.87	PK
15600	31.84	14.60	H	46.44	53.98	7.54	AV

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10480	53.43	10.20	V	63.63	68.20	4.57	PK
15720	46.47	13.47	V	59.94	73.98	14.04	PK
15720	33.06	13.47	V	46.53	53.98	7.45	AV
10480	51.49	10.20	H	61.69	68.20	6.51	PK
15720	46.18	13.47	H	59.65	73.98	14.33	PK
15720	33.01	13.47	H	46.48	53.98	7.50	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11a. Worst case is 6 Mbps in 802.11a.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Band : UNII 1

Operation Mode: 802.11 n_20 MHz BW

Transfer Rate: 6.5 Mbps

Operating Frequency 5180 MHz

Channel No. 36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10360	51.00	9.33	V	60.33	68.20	7.87	PK
15540	45.21	14.61	V	59.82	73.98	14.16	PK
15540	31.82	14.61	V	46.43	53.98	7.55	AV
10360	49.87	9.33	H	59.20	68.20	9.00	PK
15540	45.06	14.61	H	59.67	73.98	14.31	PK
15540	31.79	14.61	H	46.40	53.98	7.58	AV

Band : UNII 1

Operation Mode: 802.11 n_20 MHz BW

Transfer Rate: 6.5 Mbps

Operating Frequency 5200 MHz

Channel No. 40 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10400	50.55	10.13	V	60.68	68.20	7.52	PK
15600	45.61	14.60	V	60.21	73.98	13.77	PK
15600	31.94	14.60	V	46.54	53.98	7.44	AV
10400	49.88	10.13	H	60.01	68.20	8.19	PK
15600	45.36	14.60	H	59.96	73.98	14.02	PK
15600	31.79	14.60	H	46.39	53.98	7.59	AV

Band :	UNII 1
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10480	52.86	10.20	V	63.06	68.20	5.14	PK
15720	46.80	13.47	V	60.27	73.98	13.71	PK
15720	32.96	13.47	V	46.43	53.98	7.55	AV
10480	51.04	10.20	H	61.24	68.20	6.96	PK
15720	46.51	13.47	H	59.98	73.98	14.00	PK
15720	32.99	13.47	H	46.46	53.98	7.52	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11n_20 MHz BW. Worst case is 6.5 Mbps in 802.11n_20 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Band :	UNII 1
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10380	48.00	9.70	V	57.70	68.20	10.50	PK
15570	45.41	14.62	V	60.03	73.98	13.95	PK
15570	33.05	14.62	V	47.67	53.98	6.31	AV
10380	46.73	9.70	H	56.43	68.20	11.77	PK
15570	45.58	14.62	H	60.20	73.98	13.78	PK
15570	33.11	14.62	H	47.73	53.98	6.25	AV

Band :	UNII 1
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5230 MHz
Channel No.	46 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10460	47.99	10.26	V	58.25	68.20	9.95	PK
15690	46.11	14.33	V	60.44	73.98	13.54	PK
15690	33.37	14.33	V	47.70	53.98	6.28	AV
10460	46.84	10.26	H	57.10	68.20	11.10	PK
15690	46.25	14.33	H	60.58	73.98	13.40	PK
15690	33.42	14.33	H	47.75	53.98	6.23	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown

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in Actual FS column.

4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain

5. We have done all data rate in 802.11n_40 MHz BW. Worst case is 13.5 Mbps in 802.11n_40 MHz BW.

6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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Service MIMO (Ant 1 & 2 & 3)

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10360	55.43	9.33	V	64.76	68.20	3.44	PK
15540	44.91	14.61	V	59.52	73.98	14.46	PK
15540	31.54	14.61	V	46.15	53.98	7.83	AV
10360	52.87	9.33	H	62.20	68.20	6.00	PK
15540	45.03	14.61	H	59.64	73.98	14.34	PK
15540	31.49	14.61	H	46.10	53.98	7.88	AV

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5200 MHz
Channel No.	40 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10400	54.52	10.13	V	64.65	68.20	3.55	PK
15600	45.15	14.60	V	59.75	73.98	14.23	PK
15600	31.94	14.60	V	46.54	53.98	7.44	AV
10400	52.06	10.13	H	62.19	68.20	6.01	PK
15600	44.79	14.60	H	59.39	73.98	14.59	PK
15600	31.86	14.60	H	46.46	53.98	7.52	AV

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10480	55.00	10.20	V	65.20	68.20	3.00	PK
15720	46.26	13.47	V	59.73	73.98	14.25	PK
15720	32.81	13.47	V	46.28	53.98	7.70	AV
10480	52.41	10.20	H	62.61	68.20	5.59	PK
15720	46.62	13.47	H	60.09	73.98	13.89	PK
15720	32.90	13.47	H	46.37	53.98	7.61	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11a. Worst case is 6 Mbps in 802.11a.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Band :	UNII 1
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10360	54.89	9.33	V	64.22	68.20	3.98	PK
15540	45.32	14.61	V	59.93	73.98	14.05	PK
15540	31.51	14.61	V	46.12	53.98	7.86	AV
10360	52.63	9.33	H	61.96	68.20	6.24	PK
15540	45.44	14.61	H	60.05	73.98	13.93	PK
15540	31.52	14.61	H	46.13	53.98	7.85	AV

Band :	UNII 1
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5200 MHz
Channel No.	40 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10400	52.89	10.13	V	63.02	68.20	5.18	PK
15600	45.09	14.60	V	59.69	73.98	14.29	PK
15600	31.90	14.60	V	46.50	53.98	7.48	AV
10400	50.43	10.13	H	60.56	68.20	7.64	PK
15600	45.77	14.60	H	60.37	73.98	13.61	PK
15600	31.96	14.60	H	46.56	53.98	7.42	AV

Band :	UNII 1
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10480	53.96	10.20	V	64.16	68.20	4.04	PK
15720	46.77	13.47	V	60.24	73.98	13.74	PK
15720	33.01	13.47	V	46.48	53.98	7.50	AV
10480	51.28	10.20	H	61.48	68.20	6.72	PK
15720	46.56	13.47	H	60.03	73.98	13.95	PK
15720	32.93	13.47	H	46.40	53.98	7.58	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11n_20 MHz BW. Worst case is 6.5 Mbps in 802.11n_20 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Band :	UNII 1
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10380	55.35	9.70	V	65.05	68.20	3.15	PK
15570	45.27	14.62	V	59.89	73.98	14.09	PK
15570	32.37	14.62	V	46.99	53.98	6.99	AV
10380	52.79	9.70	H	62.49	68.20	5.71	PK
15570	44.97	14.62	H	59.59	73.98	14.39	PK
15570	32.20	14.62	H	46.82	53.98	7.16	AV

Band :	UNII 1
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5230 MHz
Channel No.	46 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10460	54.87	10.26	V	65.13	68.20	3.07	PK
15690	46.72	14.33	V	61.05	73.98	12.93	PK
15690	33.31	14.33	V	47.64	53.98	6.34	AV
10460	51.99	10.26	H	62.25	68.20	5.95	PK
15690	46.46	14.33	H	60.79	73.98	13.19	PK
15690	33.40	14.33	H	47.73	53.98	6.25	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.

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4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11n_40 MHz BW. Worst case is 13.5 Mbps in 802.11n_40 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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8.7.2 RADIATED RESTRICTED BAND EDGE MEASUREMENTS

Test Requirements and limit, §15.407, §15.205, §15.209

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c)).

Monitoring MIMO (Ant 1 & 2)

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	54.25	-0.51	H	53.74	73.98	20.24	PK
5150	40.47	-0.51	H	39.96	53.98	14.02	AV
5150	54.09	-0.51	V	53.58	73.98	20.40	PK
5150	40.19	-0.51	V	39.68	53.98	14.30	AV

Band :	UNII 1
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	53.63	-0.51	H	53.12	73.98	20.86	PK
5150	40.61	-0.51	H	40.1	53.98	13.88	AV
5150	53.28	-0.51	V	52.77	73.98	21.21	PK
5150	40.54	-0.51	V	40.03	53.98	13.95	AV



Band :	UNII 1
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	66.69	-0.51	H	66.18	73.98	7.80	PK
5150	48.27	-0.51	H	47.76	53.98	6.22	AV
5150	66.54	-0.51	V	66.03	73.98	7.95	PK
5150	47.95	-0.51	V	47.44	53.98	6.54	AV

Notes:

1. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + ATT
2. We have done all data rate in 802.11a/n mode test. . Worst case of EUT is lowest data rate in 802.11a/n
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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Service MIMO (Ant 1 & 2 & 3)

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	57.21	-0.51	H	56.70	73.98	17.28	PK
5150	45.24	-0.51	H	44.73	53.98	9.25	AV
5150	55.88	-0.51	V	55.37	73.98	18.61	PK
5150	44.20	-0.51	V	43.69	53.98	10.29	AV

Band :	UNII 1
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	57.18	-0.51	H	56.67	73.98	17.31	PK
5150	45.36	-0.51	H	44.85	53.98	9.13	AV
5150	55.91	-0.51	V	55.4	73.98	18.58	PK
5150	44.47	-0.51	V	43.96	53.98	10.02	AV

Band :	UNII 1
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	68.43	-0.51	H	67.92	73.98	6.06	PK
5150	51.48	-0.51	H	50.97	53.98	3.01	AV
5150	67.59	-0.51	V	67.08	73.98	6.90	PK
5150	50.62	-0.51	V	50.11	53.98	3.87	AV

Notes:

1. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + ATT
2. We have done all data rate in 802.11a/n mode test. . Worst case of EUT is lowest data rate in 802.11a/n
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

8.8 POWERLINE CONDUCTED EMISSIONS

Test Requirements and limit, §15.207

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference groundplane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.
5. We are performed the AC Power Line Conducted Emission test for 135 Mbps, Ch.54 and 802.11n_40 MHz BW mode in UNII 2_3 TX MIMO. Because the mode in UNII 2 is worst case.

RESULT PLOTS

Conducted Emissions (Line 1)

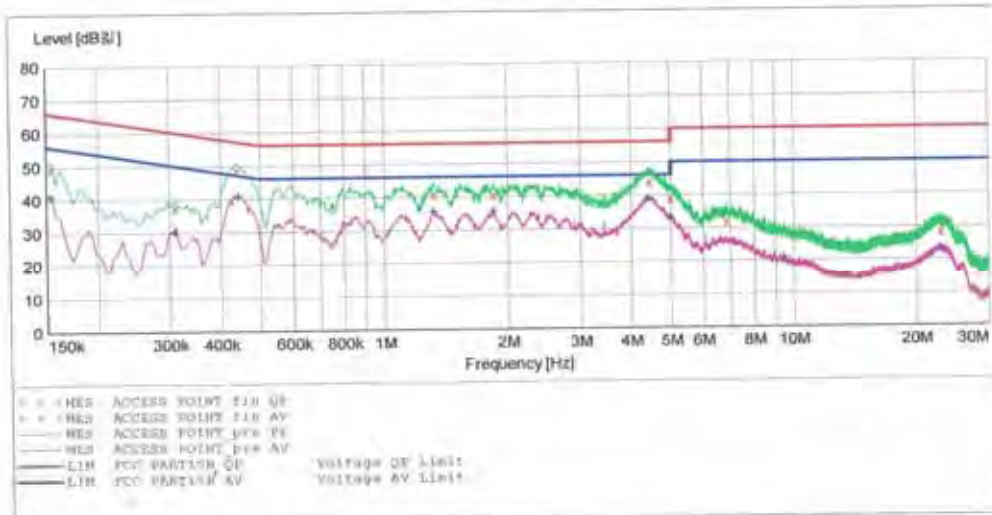
HCT

EMC

EUT: WEA3031
 Manufacturer: SAMSUNG
 Operating Condition: 5GHz WLAN MODE
 Test Site: SHIELD ROOM
 Operator: JS LEE
 Test Specification: FCC PART15 C
 Comment: H

SCAN TABLE: "FCC CLASS B(H)"

Short Description:			KN22 CLASS B			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "ACCESS POINT_fin QP"

2013-11-03 7:59 오후

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.154001	49.10	9.8	66	16.7	---	---
0.310001	37.30	9.8	60	22.7	---	---
0.438001	48.30	9.8	57	8.8	---	---
1.324000	40.70	9.9	56	15.3	---	---
1.848000	40.50	9.9	56	15.5	---	---
4.452000	43.90	10.2	56	12.1	---	---
5.000000	38.90	10.2	56	17.1	---	---
6.856000	31.80	10.3	60	28.2	---	---
22.964000	28.30	11.1	60	31.7	---	---

MEASUREMENT RESULT: "ACCESS POINT_fin AV"

2013-11-03 7:59오.후	Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
	0.154001	40.60	9.8	56	15.2	---	---
	0.310001	29.80	9.8	50	20.2	---	---
	0.442001	40.70	9.8	47	6.3	---	---
	1.320000	35.50	9.9	46	10.5	---	---
	1.848000	35.50	9.9	46	10.5	---	---
	4.408000	38.90	10.2	46	7.1	---	---
	5.000000	33.20	10.2	46	12.8	---	---
	9.468000	20.70	10.4	50	29.3	---	---
	23.056000	23.10	11.1	50	26.9	---	---

Conducted Emissions (Line 2)

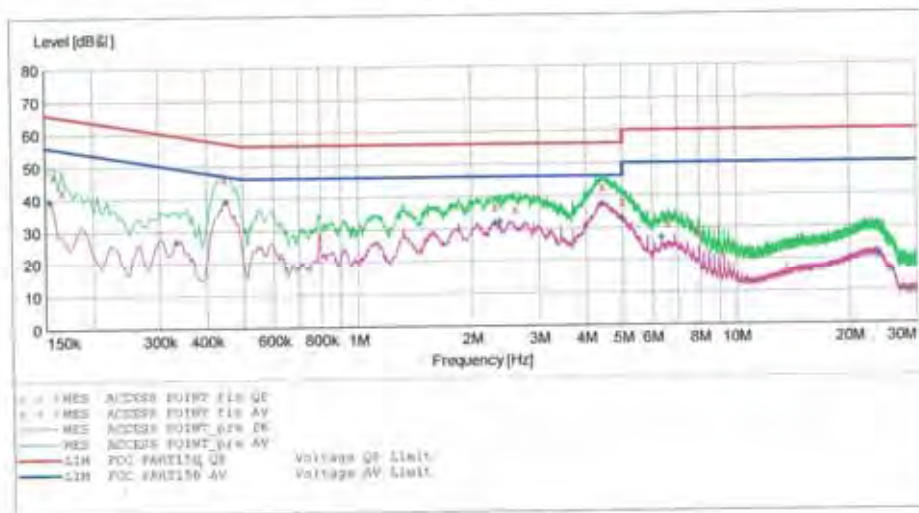
HCT

EMC

EUT: WEA3031
 Manufacturer: SAMSUNG
 Operating Condition: 5GHz WLAN MODE
 Test Site: SHIELD ROOM
 Operator: JS LEE
 Test Specification: FCC PART15 B
 Comment: N

SCAN TABLE: "FCC CLASS B(N)"

Short Description:		KN22 CLASS B					
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer	
Frequency	Frequency	Width					
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				



MEASUREMENT RESULT: "ACCESS POINT_fin QP"

2013-11-03 7:54오.후

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	FE
0.158001	47.50	10.0	66	18.1	---	---
0.166001	42.40	10.0	65	22.8	---	---
0.446001	46.00	10.0	57	11.0	---	---
2.308000	36.70	10.2	56	19.3	---	---
2.604000	36.00	10.2	56	20.0	---	---
4.432000	42.40	10.3	56	13.6	---	---
5.000000	38.00	10.4	56	18.0	---	---
6.608000	31.40	10.5	60	28.6	---	---
7.948000	28.40	10.6	60	31.6	---	---

MEASUREMENT RESULT: "ACCESS POINT_fin AV"

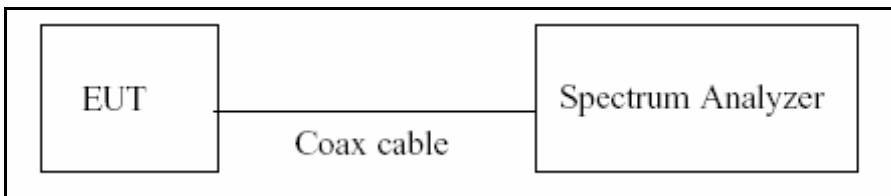
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.154001	39.30	10.0	56	16.5	---	---
0.334001	26.80	10.0	49	22.5	---	---
0.450001	39.00	10.0	47	7.8	---	---
2.308000	31.60	10.2	46	14.4	---	---
2.380000	32.30	10.2	46	13.7	---	---
4.428000	37.30	10.3	46	8.7	---	---
5.000000	32.70	10.4	46	13.3	---	---
6.344000	26.90	10.5	50	23.1	---	---
23.756000	21.70	11.5	50	28.3	---	---

9. TEST RESULT(POE)

9.1 DUTY CYCLE

The zero-span mode on a spectrum analyzer or EMI receiver ,if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW $\geq$ EBW if possible; otherwise, set RBW to the largest available value. Set VBW $\geq$ RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$, where T is defined in section B)1)a), and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.)

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. We tested according to the zero-span measurement method, B)2) in KDB 789033(issued 04/08/2013)

The largest available value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if $T \leq 6.25$ microseconds. ($50/6.25 = 8$)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are $> 50/T$.

1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz ($\geq$ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on} / T_{total} and Duty Cycle Factor = $10 \cdot \log(1/\text{Duty Cycle})$

☐ Duty Cycle Factor

Monitoring Port

Mode	Data Rate	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor
802.11a	6	2.020	2.070	0.97584541	0.106
	9	1.353	1.401	0.96573876	0.151
	12	1.020	1.068	0.95505618	0.200
	18	0.686	0.732	0.93715847	0.282
	24	0.523	0.569	0.91915641	0.366
	36	0.354	0.400	0.88500000	0.531
	48	0.271	0.316	0.85759494	0.667
	54	0.243	0.288	0.84375000	0.738
802.11n_20 MHz BW	6.5	1.885	1.930	0.97668394	0.102
	13	0.962	1.008	0.95436508	0.203
	19.5	0.654	0.700	0.93428571	0.295
	26	0.498	0.544	0.91544118	0.384
	39	0.347	0.392	0.88520408	0.530
	52	0.267	0.312	0.85576923	0.676
	58.5	0.243	0.289	0.84083045	0.753
	65	0.224	0.268	0.83582090	0.779
802.11n_40 MHz BW	13.5	0.926	0.960	0.96458333	0.157
	27	0.482	0.516	0.93410853	0.296
	40.5	0.335	0.368	0.91032609	0.408
	54	0.260	0.292	0.89041096	0.504
	81	0.187	0.220	0.85000000	0.706
	108	0.147	0.180	0.81666667	0.880
	121.5	0.136	0.168	0.80952381	0.918
	135	0.128	0.160	0.80000000	0.969

Service Port

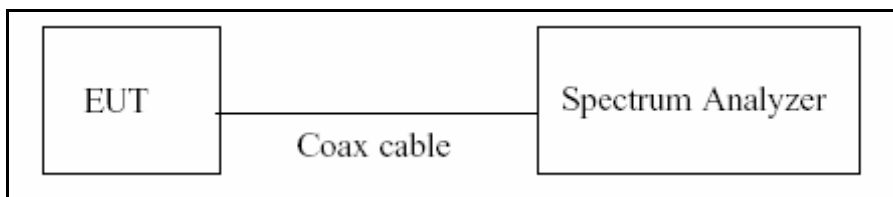
Mode	Data Rate	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor
802.11a	6	1.335	1.405	0.95017794	0.222
	9	0.909	0.957	0.94984326	0.223
	12	0.690	0.735	0.93877551	0.274
	18	0.466	0.512	0.91015625	0.409
	24	0.354	0.400	0.88500000	0.531
	36	0.243	0.288	0.84375000	0.738
	48	0.187	0.232	0.80603448	0.936
	54	0.171	0.216	0.79166667	1.015
802.11n_20 MHz BW	6.5	1.269	1.317	0.96355353	0.161
	13	0.655	0.701	0.93437946	0.295
	19.5	0.446	0.492	0.90650407	0.426
	26	0.348	0.393	0.88549618	0.528
	39	0.244	0.289	0.84429066	0.735
	52	0.192	0.236	0.81355932	0.896
	58.5	0.176	0.220	0.80000000	0.969
	65	0.159	0.204	0.77941176	1.082
802.11n_40 MHz BW	13.5	0.630	0.664	0.94879518	0.228
	27	0.334	0.368	0.90760870	0.421
	40.5	0.236	0.268	0.88059701	0.552
	54	0.188	0.220	0.85454545	0.683
	81	0.135	0.168	0.80357143	0.950
	108	0.112	0.144	0.77777778	1.091
	121.5	0.104	0.136	0.76470588	1.165
	135	0.096	0.128	0.75000000	1.249

9.2 26 dB BANDWIDTH MEASUREMENT

The bandwidth at 26 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum power control level, as defined in KDB 789033(issued 04/08/2013), at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26 dB bandwidth.

The 26 dB bandwidth is used to determine the conducted power limits.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to(Page 3 in KDB 789033, issued 04/08/2013)

1. RBW = approximately 1 % of the emission bandwidth
2. VBW > RBW
3. Detector = Peak
4. Trace mode = max hold
5. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

Monitoring Port Ant.1

TEST RESULTS

20 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	23.27	N/A	Pass
5200	40	24.71	N/A	Pass
5240	48	24.61	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	24.47	N/A	Pass
5200	40	25.08	N/A	Pass
5240	48	25.94	N/A	Pass

40 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	49.21	N/A	Pass
5230	46	50.01	N/A	Pass

Monitoring Port Ant.2

TEST RESULTS

20 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	26.79	N/A	Pass
5200	40	25.10	N/A	Pass
5240	48	24.73	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	29.90	N/A	Pass
5200	40	27.33	N/A	Pass
5240	48	25.51	N/A	Pass

40 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	70.18	N/A	Pass
5230	46	58.04	N/A	Pass

Service Port Ant.1

TEST RESULTS

20 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	22.48	N/A	Pass
5200	40	22.34	N/A	Pass
5240	48	21.59	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	22.53	N/A	Pass
5200	40	22.73	N/A	Pass
5240	48	23.58	N/A	Pass

40 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	46.86	N/A	Pass
5230	46	44.93	N/A	Pass

Service Port Ant.2

TEST RESULTS

20 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	21.54	N/A	Pass
5200	40	21.97	N/A	Pass
5240	48	21.49	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	22.73	N/A	Pass
5200	40	22.20	N/A	Pass
5240	48	22.69	N/A	Pass

40 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	44.93	N/A	Pass
5230	46	45.74	N/A	Pass

Service Port Ant.3

TEST RESULTS

20 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	21.58	N/A	Pass
5200	40	21.40	N/A	Pass
5240	48	21.64	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	22.06	N/A	Pass
5200	40	22.34	N/A	Pass
5240	48	22.38	N/A	Pass

40 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	44.85	N/A	Pass
5230	46	45.55	N/A	Pass

Note :

1. In order to simplify the report, attached plots were only the most wide channel.

Monitoring Port Ant.1

RESULT PLOTS

20 MHz BW

26 dB Bandwidth plot (802.11a-CH 40)



26 dB Bandwidth plot (802.11n-CH 48)



40 MHz BW

26 dB Bandwidth plot (802.11n-CH 46)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Monitoring Port Ant.2

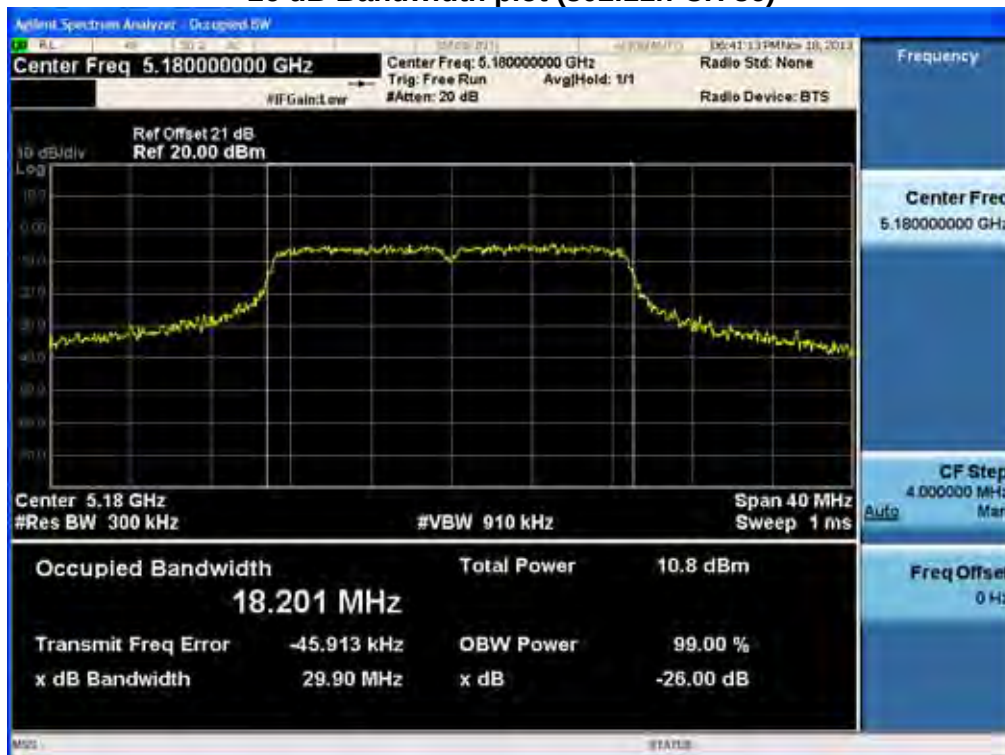
RESULT PLOTS

20 MHz BW

26 dB Bandwidth plot (802.11a-CH 36)



26 dB Bandwidth plot (802.11n-CH 36)



40 MHz BW

26 dB Bandwidth plot (802.11n-CH 38)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Service Port Ant.1

RESULT PLOTS

20 MHz BW

26 dB Bandwidth plot (802.11a-CH 36)

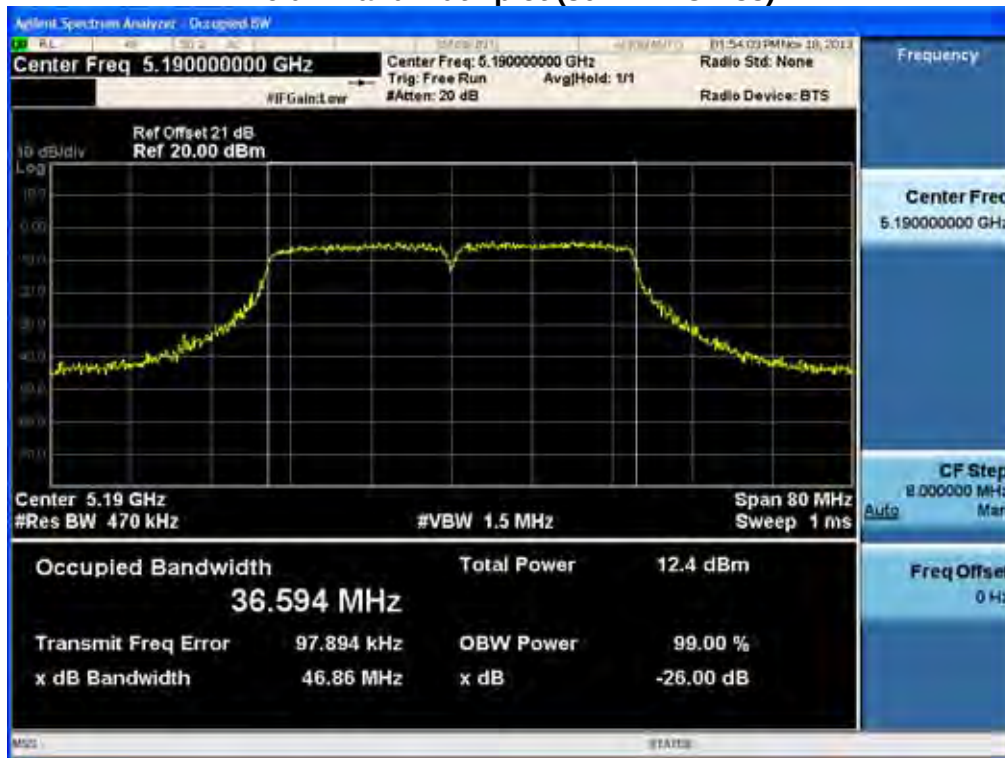


26 dB Bandwidth plot (802.11n-CH 48)



40 MHz BW

26 dB Bandwidth plot (802.11n-CH 38)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Service Port Ant.2

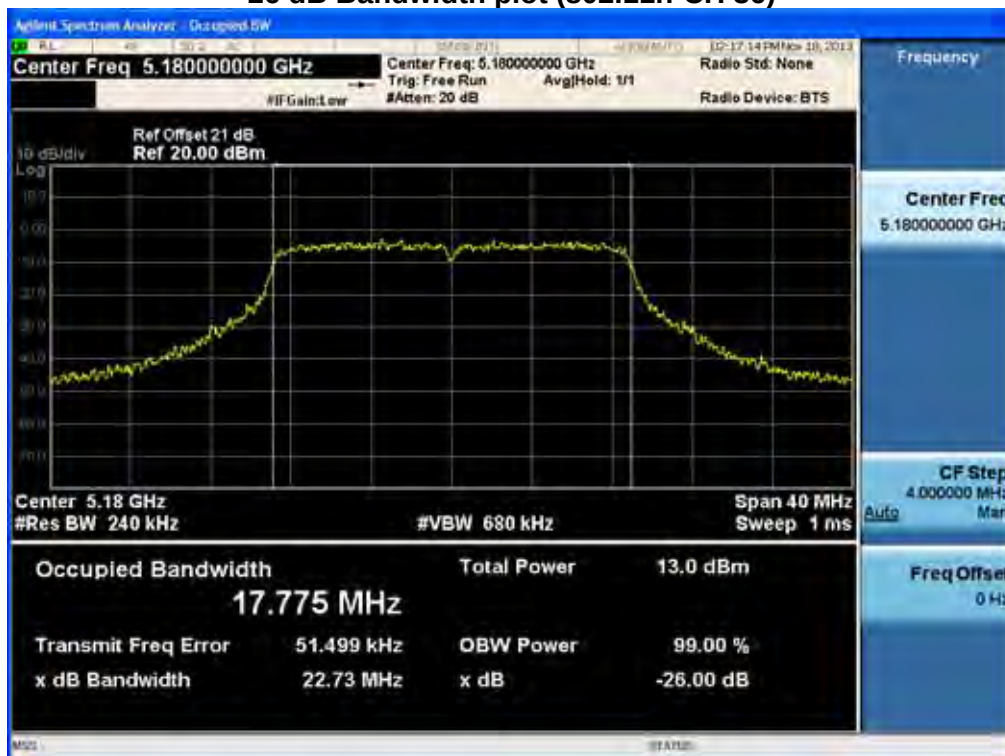
RESULT PLOTS

20 MHz BW

26 dB Bandwidth plot (802.11a-CH 40)



26 dB Bandwidth plot (802.11n-CH 36)



40 MHz BW

26 dB Bandwidth plot (802.11n-CH 46)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Service Port Ant.3

RESULT PLOTS

20 MHz BW

26 dB Bandwidth plot (802.11a-CH 48)



26 dB Bandwidth plot (802.11n-CH 48)



40 MHz BW

26 dB Bandwidth plot (802.11n-CH 46)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

9.3 OUTPUT POWER MEASUREMENT

Test Requirements and limit, §15.407(a)(1)

The transmitter output is connected to the input of a RF power sensor. Measurement is made using a broadband power meter capable of making peak and average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

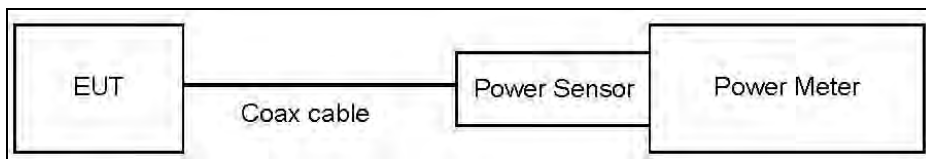
In the 5.15 – 5.25 GHz band, the maximum permissible conducted output power is the lesser of 50 mW ((16.99 dBm) and $4 \text{ dBm} + 10 \log_{10} (26 \text{ dB BW})$

Limit :

Operating Mode	Band	Mode	Ant. Gain(dBi)	Limt(dBm)
SISO : Monitoring	UNII 1	802.11a	5.5	16.99
		802.11n_20 MHz BW		
		802.11n_40 MHz BW		
SISO : Service	UNII 1	802.11a	6	16.99
		802.11n_20 MHz BW		
		802.11n_40 MHz BW		
MIMO(2 TX) : Monitoring	UNII 1	802.11a	8.51	14.48
		802.11n_20 MHz BW	5.5	16.99
		802.11n_40 MHz BW	5.5	16.99
MIMO(2 TX) : Service	UNII 1	802.11a	9.01	13.98
		802.11n_20 MHz BW	6	16.99
		802.11n_40 MHz BW	6	16.99
MIMO(3 TX) : Service	UNII 1	802.11a	10.77	12.22
		802.11n_20 MHz BW	6	16.99
		802.11n_40 MHz BW	6	16.99

Note : Above the limits is calculated according to antenna gain. Because antenna gain is higher than 6 dBi.

■ TEST CONFIGURATION



■ TEST PROCEDURE

We tested according to Method E)3)a) in KDB 789033(issued 04/08/2013).

▪ Average Power

1. Measure the duty cycle.
2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
3. Add $10 \log (1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Note :

1. We apply to the offset in the UNII 1 band that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table. We used the particular cable type that is supported by manufacture.

Band	Loss(dB)
UNII 1	21.0

(Actual value of loss for the attenuator and cable combination)

Monitoring Port

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11a Mode: 5180~5240)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6	4.81	0.106	4.91	17.67
		9	4.66	0.151	4.81	17.67
		12	4.56	0.200	4.76	17.67
		18	4.52	0.282	4.80	17.67
		24	4.44	0.366	4.80	17.67
		36	3.48	0.531	4.01	17.67
		48	2.58	0.667	3.25	17.67
		54	1.66	0.738	2.40	17.67
5200	40	6	4.77	0.106	4.88	17.93
		9	4.77	0.151	4.92	17.93
		12	4.69	0.200	4.89	17.93
		18	4.71	0.282	4.99	17.93
		24	4.59	0.366	4.96	17.93
		36	3.55	0.531	4.08	17.93
		48	2.40	0.667	3.07	17.93
		54	1.29	0.738	2.03	17.93
5240	48	6	4.81	0.106	4.91	17.91
		9	4.82	0.151	4.97	17.91
		12	4.71	0.200	4.91	17.91
		18	4.66	0.282	4.94	17.91
		24	4.46	0.366	4.83	17.91
		36	3.49	0.531	4.02	17.91
		48	2.40	0.667	3.07	17.91
		54	2.01	0.738	2.74	17.91

■ TEST RESULTS_Ant.2

Conducted Output Power Measurements (802.11a Mode: 5180~5240)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6	4.91	0.106	5.02	18.28
		9	4.88	0.151	5.03	18.28
		12	4.78	0.200	4.98	18.28
		18	4.73	0.282	5.01	18.28
		24	4.67	0.366	5.03	18.28
		36	3.65	0.531	4.18	18.28
		48	2.65	0.667	3.32	18.28
		54	1.36	0.738	2.10	18.28
5200	40	6	4.65	0.106	4.76	18.00
		9	4.63	0.151	4.78	18.00
		12	4.60	0.200	4.80	18.00
		18	4.57	0.282	4.85	18.00
		24	4.50	0.366	4.87	18.00
		36	3.16	0.531	3.69	18.00
		48	1.76	0.667	2.43	18.00
		54	0.86	0.738	1.59	18.00
5240	48	6	4.61	0.106	4.71	17.93
		9	4.58	0.151	4.74	17.93
		12	4.55	0.200	4.75	17.93
		18	4.46	0.282	4.74	17.93
		24	4.50	0.366	4.87	17.93
		36	3.17	0.531	3.71	17.93
		48	2.13	0.667	2.80	17.93
		54	1.62	0.738	2.36	17.93

■ TEST RESULTS_Sum Data of Ant.1 and Ant.2

Conducted Output Power Measurements (802.11a Mode: 5180~5240)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5180	36	6	7.98	21.47
		9	7.93	21.47
		12	7.88	21.47
		18	7.92	21.47
		24	7.93	21.47
		36	7.10	21.47
		48	6.29	21.47
		54	5.26	21.47
5200	40	6	7.83	21.47
		9	7.86	21.47
		12	7.85	21.47
		18	7.93	21.47
		24	7.92	21.47
		36	6.90	21.47
		48	5.77	21.47
		54	4.83	21.47
5240	48	6	7.82	21.47
		9	7.87	21.47
		12	7.84	21.47
		18	7.85	21.47
		24	7.86	21.47
		36	6.87	21.47
		48	5.95	21.47
		54	5.56	21.47

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5180~5240)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6.5	4.63	0.102	4.73	17.89
		13	3.56	0.203	3.76	17.89
		19.5	3.57	0.295	3.86	17.89
		26	3.54	0.384	3.92	17.89
		39	3.45	0.530	3.98	17.89
		52	2.42	0.676	3.10	17.89
		58.5	2.28	0.753	3.04	17.89
		65	1.29	0.779	2.07	17.89
5200	40	6.5	4.42	0.102	4.53	17.99
		13	3.52	0.203	3.73	17.99
		19.5	3.49	0.295	3.78	17.99
		26	3.48	0.384	3.86	17.99
		39	3.31	0.530	3.84	17.99
		52	2.49	0.676	3.16	17.99
		58.5	2.44	0.753	3.19	17.99
		65	1.46	0.779	2.24	17.99
5240	48	6.5	4.73	0.102	4.83	18.14
		13	3.86	0.203	4.06	18.14
		19.5	3.76	0.295	4.05	18.14
		26	3.78	0.384	4.16	18.14
		39	3.62	0.530	4.15	18.14
		52	2.25	0.676	2.93	18.14
		58.5	2.21	0.753	2.96	18.14
		65	1.80	0.779	2.58	18.14

■ TEST RESULTS_Ant.2

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5180~5240)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6.5	4.47	0.102	4.58	18.76
		13	3.46	0.203	3.67	18.76
		19.5	3.50	0.295	3.80	18.76
		26	3.46	0.384	3.84	18.76
		39	3.29	0.530	3.82	18.76
		52	1.91	0.676	2.59	18.76
		58.5	1.68	0.753	2.44	18.76
		65	0.98	0.779	1.76	18.76
5200	40	6.5	4.30	0.102	4.40	18.37
		13	3.67	0.203	3.87	18.37
		19.5	3.61	0.295	3.90	18.37
		26	3.54	0.384	3.92	18.37
		39	3.43	0.530	3.96	18.37
		52	2.12	0.676	2.79	18.37
		58.5	1.79	0.753	2.54	18.37
		65	0.82	0.779	1.60	18.37
5240	48	6.5	4.85	0.102	4.95	18.07
		13	3.89	0.203	4.10	18.07
		19.5	3.80	0.295	4.09	18.07
		26	3.61	0.384	3.99	18.07
		39	3.06	0.530	3.58	18.07
		52	1.84	0.676	2.52	18.07
		58.5	1.92	0.753	2.68	18.07
		65	1.40	0.779	2.17	18.07

■ TEST RESULTS_Sum Data of Ant.1 and Ant.2

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5180~5240)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5180	36	6.5	7.67	21.47
		13	6.72	21.47
		19.5	6.84	21.47
		26	6.89	21.47
		39	6.91	21.47
		52	5.86	21.47
		58.5	5.76	21.47
		65	4.93	21.47
5200	40	6.5	7.47	21.47
		13	6.81	21.47
		19.5	6.85	21.47
		26	6.90	21.47
		39	6.91	21.47
		52	5.99	21.47
		58.5	5.89	21.47
		65	4.94	21.47
5240	48	6.5	7.90	21.47
		13	7.09	21.47
		19.5	7.08	21.47
		26	7.09	21.47
		39	6.88	21.47
		52	5.74	21.47
		58.5	5.83	21.47
		65	5.39	21.47

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5190~5230)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	13.5	3.86	0.157	4.02	20.92
		27	2.95	0.296	3.25	20.92
		40.5	2.91	0.408	3.32	20.92
		54	2.78	0.504	3.28	20.92
		81	2.71	0.706	3.42	20.92
		108	1.59	0.880	2.47	20.92
		121.5	1.40	0.918	2.32	20.92
		135	0.41	0.969	1.38	20.92
5230	46	13.5	3.68	0.157	3.83	20.99
		27	2.74	0.296	3.04	20.99
		40.5	2.60	0.408	3.01	20.99
		54	2.63	0.504	3.14	20.99
		81	2.24	0.706	2.95	20.99
		108	1.23	0.880	2.11	20.99
		121.5	1.19	0.918	2.11	20.99
		135	0.19	0.969	1.16	20.99

■ TEST RESULTS_Ant.2

Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5190~5230)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	13.5	4.28	0.157	4.44	22.46
		27	3.28	0.296	3.57	22.46
		40.5	3.18	0.408	3.59	22.46
		54	3.04	0.504	3.54	22.46
		81	2.70	0.706	3.40	22.46
		108	1.32	0.880	2.20	22.46
		121.5	1.28	0.918	2.20	22.46
		135	0.34	0.969	1.31	22.46
5230	46	13.5	3.67	0.157	3.82	21.64
		27	2.37	0.296	2.66	21.64
		40.5	2.21	0.408	2.62	21.64
		54	1.99	0.504	2.49	21.64
		81	1.73	0.706	2.43	21.64
		108	1.08	0.880	1.96	21.64
		121.5	0.98	0.918	1.90	21.64
		135	-0.01	0.969	0.96	21.64

■ TEST RESULTS_Sum Data of Ant.1 and Ant.2

Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5190~5230)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5190	38	13.5	7.25	21.47
		27	6.42	21.47
		40.5	6.47	21.47
		54	6.43	21.47
		81	6.42	21.47
		108	5.34	21.47
		121.5	5.27	21.47
		135	4.35	21.47
5230	46	13.5	6.84	21.47
		27	5.87	21.47
		40.5	5.83	21.47
		54	5.84	21.47
		81	5.71	21.47
		108	5.05	21.47
		121.5	5.02	21.47
		135	4.07	21.47

Service Port

TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11a Mode: 5180~5240)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6	4.57	0.222	4.79	17.52
		9	4.54	0.223	4.76	17.52
		12	4.47	0.274	4.74	17.52
		18	4.39	0.409	4.80	17.52
		24	4.31	0.531	4.84	17.52
		36	4.10	0.738	4.84	17.52
		48	3.92	0.936	4.86	17.52
		54	3.88	1.015	4.90	17.52
5200	40	6	4.94	0.222	5.16	17.49
		9	4.86	0.223	5.08	17.49
		12	4.55	0.274	4.82	17.49
		18	4.56	0.409	4.97	17.49
		24	4.44	0.531	4.97	17.49
		36	4.22	0.738	4.96	17.49
		48	4.06	0.936	5.00	17.49
		54	4.02	1.015	5.04	17.49
5240	48	6	5.32	0.222	5.54	17.34
		9	5.24	0.223	5.46	17.34
		12	5.21	0.274	5.48	17.34
		18	5.17	0.409	5.58	17.34
		24	5.01	0.531	5.54	17.34
		36	4.78	0.738	5.52	17.34
		48	4.49	0.936	5.43	17.34
		54	4.53	1.015	5.55	17.34

■ TEST RESULTS_Ant.2

Conducted Output Power Measurements (802.11a Mode: 5180~5240)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6	5.13	0.222	5.35	17.33
		9	5.06	0.223	5.28	17.33
		12	5.16	0.274	5.43	17.33
		18	4.97	0.409	5.38	17.33
		24	4.86	0.531	5.39	17.33
		36	4.59	0.738	5.33	17.33
		48	4.33	0.936	5.27	17.33
		54	4.31	1.015	5.33	17.33
5200	40	6	5.41	0.222	5.63	17.42
		9	5.28	0.223	5.50	17.42
		12	5.23	0.274	5.50	17.42
		18	5.15	0.409	5.56	17.42
		24	5.08	0.531	5.61	17.42
		36	4.70	0.738	5.44	17.42
		48	4.60	0.936	5.54	17.42
		54	4.36	1.015	5.38	17.42
5240	48	6	5.21	0.222	5.43	17.32
		9	5.15	0.223	5.37	17.32
		12	5.11	0.274	5.38	17.32
		18	5.06	0.409	5.47	17.32
		24	4.89	0.531	5.42	17.32
		36	4.66	0.738	5.40	17.32
		48	4.54	0.936	5.48	17.32
		54	4.52	1.015	5.54	17.32

■ TEST RESULTS_Ant.3

Conducted Output Power Measurements (802.11a Mode: 5180~5240)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6	5.53	0.222	5.75	17.34
		9	5.45	0.223	5.67	17.34
		12	5.34	0.274	5.61	17.34
		18	5.25	0.409	5.66	17.34
		24	5.13	0.531	5.66	17.34
		36	4.85	0.738	5.59	17.34
		48	4.71	0.936	5.65	17.34
		54	4.68	1.015	5.70	17.34
5200	40	6	5.75	0.222	5.97	17.30
		9	5.74	0.223	5.96	17.30
		12	5.63	0.274	5.90	17.30
		18	5.57	0.409	5.98	17.30
		24	5.41	0.531	5.94	17.30
		36	5.25	0.738	5.99	17.30
		48	5.10	0.936	6.04	17.30
		54	5.00	1.015	6.02	17.30
5240	48	6	5.90	0.222	6.12	17.35
		9	5.85	0.223	6.07	17.35
		12	5.63	0.274	5.90	17.35
		18	5.65	0.409	6.06	17.35
		24	5.60	0.531	6.13	17.35
		36	5.42	0.738	6.16	17.35
		48	5.18	0.936	6.12	17.35
		54	5.08	1.015	6.10	17.35

■ TEST RESULTS_Sum Data of Ant.1 and Ant.2

Conducted Output Power Measurements (802.11a Mode: 5180~5240)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5180	36	6	8.09	21.47
		9	8.04	21.47
		12	8.11	21.47
		18	8.11	21.47
		24	8.13	21.47
		36	8.10	21.47
		48	8.08	21.47
		54	8.13	21.47
5200	40	6	8.41	21.47
		9	8.31	21.47
		12	8.18	21.47
		18	8.29	21.47
		24	8.31	21.47
		36	8.22	21.47
		48	8.29	21.47
		54	8.22	21.47
5240	48	6	8.50	21.47
		9	8.43	21.47
		12	8.44	21.47
		18	8.54	21.47
		24	8.49	21.47
		36	8.47	21.47
		48	8.47	21.47
		54	8.56	21.47

■ TEST RESULTS_Sum Data of Ant.1, Ant.2 and Ant 3

Conducted Output Power Measurements (802.11a Mode: 5180~5240)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5180	36	6	10.09	21.47
		9	10.02	21.47
		12	10.05	21.47
		18	10.07	21.47
		24	10.08	21.47
		36	10.04	21.47
		48	10.04	21.47
		54	10.09	21.47
5200	40	6	10.37	21.47
		9	10.30	21.47
		12	10.20	21.47
		18	10.29	21.47
		24	10.30	21.47
		36	10.25	21.47
		48	10.32	21.47
		54	10.27	21.47
5240	48	6	10.48	21.47
		9	10.42	21.47
		12	10.36	21.47
		18	10.48	21.47
		24	10.48	21.47
		36	10.48	21.47
		48	10.46	21.47
		54	10.51	21.47

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5180~5240)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6.5	6.86	0.161	7.02	17.53
		13	6.81	0.295	7.10	17.53
		19.5	6.66	0.426	7.08	17.53
		26	6.63	0.528	7.16	17.53
		39	6.32	0.735	7.06	17.53
		52	6.11	0.896	7.00	17.53
		58.5	5.98	0.969	6.95	17.53
		65	5.81	1.082	6.90	17.53
5200	40	6.5	6.83	0.161	6.99	17.57
		13	6.69	0.295	6.99	17.57
		19.5	6.63	0.426	7.05	17.57
		26	6.56	0.528	7.09	17.57
		39	6.37	0.735	7.11	17.57
		52	6.24	0.896	7.13	17.57
		58.5	6.17	0.969	7.14	17.57
		65	6.10	1.082	7.19	17.57
5240	48	6.5	7.01	0.161	7.17	17.73
		13	6.91	0.295	7.21	17.73
		19.5	6.82	0.426	7.25	17.73
		26	6.80	0.528	7.33	17.73
		39	6.56	0.735	7.30	17.73
		52	6.42	0.896	7.31	17.73
		58.5	6.36	0.969	7.33	17.73
		65	6.37	1.082	7.46	17.73

■ TEST RESULTS_Ant.2

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5180~5240)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6.5	7.25	0.161	7.42	17.57
		13	7.10	0.295	7.40	17.57
		19.5	6.97	0.426	7.40	17.57
		26	6.81	0.528	7.34	17.57
		39	6.67	0.735	7.40	17.57
		52	6.53	0.896	7.43	17.57
		58.5	6.44	0.969	7.40	17.57
		65	6.38	1.082	7.47	17.57
5200	40	6.5	7.02	0.161	7.18	17.46
		13	6.85	0.295	7.14	17.46
		19.5	6.72	0.426	7.15	17.46
		26	6.59	0.528	7.12	17.46
		39	6.45	0.735	7.19	17.46
		52	6.23	0.896	7.13	17.46
		58.5	6.22	0.969	7.19	17.46
		65	6.15	1.082	7.23	17.46
5240	48	6.5	7.14	0.161	7.30	17.56
		13	7.09	0.295	7.38	17.56
		19.5	6.92	0.426	7.35	17.56
		26	6.84	0.528	7.37	17.56
		39	6.74	0.735	7.48	17.56
		52	6.57	0.896	7.46	17.56
		58.5	6.47	0.969	7.44	17.56
		65	6.47	1.082	7.55	17.56

■ TEST RESULTS_Ant.3

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5180~5240)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6.5	7.40	0.161	7.57	17.44
		13	7.25	0.295	7.54	17.44
		19.5	7.13	0.426	7.56	17.44
		26	7.09	0.528	7.62	17.44
		39	6.87	0.735	7.61	17.44
		52	6.73	0.896	7.63	17.44
		58.5	6.66	0.969	7.63	17.44
		65	6.61	1.082	7.69	17.44
5200	40	6.5	7.59	0.161	7.76	17.49
		13	7.43	0.295	7.73	17.49
		19.5	7.29	0.426	7.71	17.49
		26	7.24	0.528	7.77	17.49
		39	6.93	0.735	7.66	17.49
		52	6.80	0.896	7.69	17.49
		58.5	6.74	0.969	7.71	17.49
		65	6.67	1.082	7.75	17.49
5240	48	6.5	8.00	0.161	8.16	17.50
		13	7.84	0.295	8.13	17.50
		19.5	7.73	0.426	8.16	17.50
		26	7.73	0.528	8.26	17.50
		39	7.55	0.735	8.29	17.50
		52	7.35	0.896	8.25	17.50
		58.5	7.30	0.969	8.27	17.50
		65	7.16	1.082	8.24	17.50

■ TEST RESULTS_Sum Data of Ant.1 and Ant.2

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5180~5240)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5180	36	6.5	10.23	21.47
		13	10.26	21.47
		19.5	10.25	21.47
		26	10.26	21.47
		39	10.24	21.47
		52	10.23	21.47
		58.5	10.19	21.47
		65	10.20	21.47
5200	40	6.5	10.10	21.47
		13	10.08	21.47
		19.5	10.11	21.47
		26	10.12	21.47
		39	10.16	21.47
		52	10.14	21.47
		58.5	10.17	21.47
		65	10.22	21.47
5240	48	6.5	10.25	21.47
		13	10.31	21.47
		19.5	10.31	21.47
		26	10.36	21.47
		39	10.40	21.47
		52	10.40	21.47
		58.5	10.39	21.47
		65	10.52	21.47

■ TEST RESULTS_Sum Data of Ant.1, Ant.2 and Ant 3

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5180~5240)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5180	36	6.5	12.11	21.47
		13	12.12	21.47
		19.5	12.12	21.47
		26	12.15	21.47
		39	12.13	21.47
		52	12.13	21.47
		58.5	12.11	21.47
		65	12.13	21.47
5200	40	6.5	12.09	21.47
		13	12.07	21.47
		19.5	12.09	21.47
		26	12.11	21.47
		39	12.10	21.47
		52	12.10	21.47
		58.5	12.13	21.47
		65	12.17	21.47
5240	48	6.5	12.34	21.47
		13	12.36	21.47
		19.5	12.38	21.47
		26	12.44	21.47
		39	12.48	21.47
		52	12.47	21.47
		58.5	12.47	21.47
		65	12.54	21.47

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5190~5230)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	13.5	6.07	0.228	6.30	20.71
		27	5.89	0.421	6.32	20.71
		40.5	5.64	0.552	6.19	20.71
		54	5.57	0.683	6.26	20.71
		81	5.30	0.950	6.25	20.71
		108	5.15	1.091	6.24	20.71
		121.5	5.07	1.165	6.23	20.71
		135	4.97	1.249	6.22	20.71
5230	46	13.5	8.88	0.228	9.10	20.53
		27	8.75	0.421	9.17	20.53
		40.5	8.61	0.552	9.16	20.53
		54	8.48	0.683	9.17	20.53
		81	8.29	0.950	9.24	20.53
		108	8.08	1.091	9.17	20.53
		121.5	8.12	1.165	9.28	20.53
		135	7.90	1.249	9.15	20.53

■ TEST RESULTS_Ant.2

Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5190~5230)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	13.5	6.73	0.228	6.96	20.53
		27	6.57	0.421	6.99	20.53
		40.5	6.36	0.552	6.91	20.53
		54	6.11	0.683	6.79	20.53
		81	5.83	0.950	6.78	20.53
		108	5.64	1.091	6.73	20.53
		121.5	5.38	1.165	6.55	20.53
		135	5.39	1.249	6.64	20.53
5230	46	13.5	9.15	0.228	9.38	20.60
		27	9.00	0.421	9.42	20.60
		40.5	8.80	0.552	9.35	20.60
		54	8.68	0.683	9.36	20.60
		81	8.52	0.950	9.47	20.60
		108	8.34	1.091	9.43	20.60
		121.5	8.22	1.165	9.38	20.60
		135	7.96	1.249	9.21	20.60

■ TEST RESULTS_Ant.3

Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5190~5230)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	13.5	7.00	0.228	7.23	20.52
		27	6.89	0.421	7.31	20.52
		40.5	6.73	0.552	7.29	20.52
		54	6.67	0.683	7.36	20.52
		81	6.47	0.950	7.42	20.52
		108	6.23	1.091	7.32	20.52
		121.5	6.10	1.165	7.27	20.52
		135	5.99	1.249	7.24	20.52
5230	46	13.5	9.94	0.228	10.17	20.58
		27	9.75	0.421	10.17	20.58
		40.5	9.62	0.552	10.17	20.58
		54	9.50	0.683	10.19	20.58
		81	9.34	0.950	10.29	20.58
		108	9.18	1.091	10.27	20.58
		121.5	9.13	1.165	10.29	20.58
		135	9.11	1.249	10.36	20.58

■ TEST RESULTS_Sum Data of Ant.1 and Ant.2

Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5190~5230)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5190	38	13.5	9.65	21.47
		27	9.68	21.47
		40.5	9.58	21.47
		54	9.54	21.47
		81	9.53	21.47
		108	9.50	21.47
		121.5	9.40	21.47
		135	9.45	21.47
5230	46	13.5	12.25	21.47
		27	12.31	21.47
		40.5	12.27	21.47
		54	12.28	21.47
		81	12.37	21.47
		108	12.31	21.47
		121.5	12.34	21.47
		135	12.19	21.47

■ TEST RESULTS_Sum Data of Ant.1, Ant.2 Ant 3

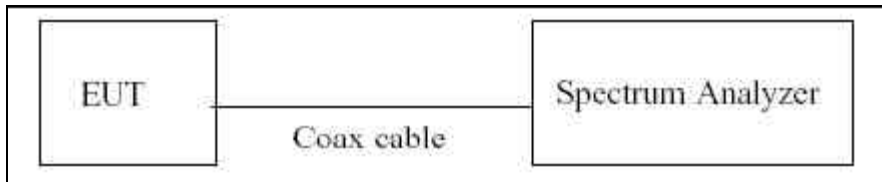
Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5190~5230)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5190	38	13.5	11.62	21.47
		27	11.66	21.47
		40.5	11.59	21.47
		54	11.59	21.47
		81	11.61	21.47
		108	11.56	21.47
		121.5	11.48	21.47
		135	11.49	21.47
5230	46	13.5	14.34	21.47
		27	14.38	21.47
		40.5	14.36	21.47
		54	14.37	21.47
		81	14.46	21.47
		108	14.42	21.47
		121.5	14.45	21.47
		135	14.38	21.47

9.4 POWER SPECTRAL DENSITY

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies. The maximum permissible peak power spectral density is 4 dBm/ MHz in the 5.15 GHz – 5.25 GHz band.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

We tested according to Method in KDB 789033(issued 04/08/2013).

The spectrum analyzer is set to :

1. Set span to encompass the entire emission bandwidth(EBW) of the signal.
2. RBW = 1 MHz.
3. VBW $\geq$ 3 MHz.
4. Number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$.
5. Sweep time = auto.
6. Detector = RMS(i.e., power averaging), if available. Otherwise, use sample detector mode.
7. Do not use sweep triggering. Allow the sweep to “free run”.
8. Trace average at least 100 traces in power averaging(RMS) mode
9. Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
10. If Method SA-2 was used, add $10 \log(1/x)$, where x is the duty cycle, to the peak of the spectrum.



▣ Sample Calculation

PSD = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor

Output Power = -5 dBm + 10 dB + 0.8 dB + 0.21 dB = 16.01 dBm

Note :

1. Spectrum reading values are not plot data. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the UNII 1 band that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table. We used the particular cable type that is supported by manufacture.

Band	Loss(dB)
UNII 1	21.0

(Actual value of loss for the attenuator and cable combination)

FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Monitoring Port Ant.1

■ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11a	-7.164	0.106	-7.058	4	Pass
5200	40		-7.005	0.282	-6.723		Pass
5240	48		-6.922	0.151	-6.771		Pass
5180	36	802.11n 20MHz BW	-7.717	0.102	-7.615		Pass
5200	40		-7.794	0.102	-7.692		Pass
5240	48		-7.022	0.102	-6.920		Pass
5190	38	802.11n 40MHz BW	-10.957	0.157	-10.800		Pass
5230	46		-10.984	0.157	-10.827		Pass

Note : In order to simplify the report, attached plots were only the highest PSD channel.

Monitoring Port Ant.2

■ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11a	-7.092	0.366	-6.726	4	Pass
5200	40		-7.482	0.366	-7.116		Pass
5240	48		-7.186	0.366	-6.820		Pass
5180	36	802.11n 20MHz BW	-7.212	0.102	-7.110		Pass
5200	40		-7.900	0.102	-7.798		Pass
5240	48		-7.467	0.102	-7.365		Pass
5190	38	802.11n 40MHz BW	-11.130	0.157	-10.973		Pass
5230	46		-11.396	0.157	-11.239		Pass

Note : In order to simplify the report, attached plots were only the highest PSD channel.

Sum Data of Monitoring Port Ant.1 and Ant.2

TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result		
			Power Density (dBm)	Limit (dBm)	Pass/Fail
5180	36	802.11a	-3.88	1.49	Pass
5200	40		-3.90		Pass
5240	48		-3.79		Pass
5180	36	802.11n 20MHz BW	-4.34		Pass
5200	40		-4.73		Pass
5240	48		-4.13		Pass
5190	38	802.11n 40MHz BW	-7.88		Pass
5230	46		-8.02		Pass

Note :

1. Limit is 1.49 dBm for 802.11a. Because directional antenna gain is 8.51 dBi for 802.11a.
2. Sample Calculation

$$4 \text{ dBm} - (8.51 \text{ dB} - 6 \text{ dB}) = 1.49 \text{ dBm}$$

Service Port Ant.1

■ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11a	-7.287	1.015	-6.272	4	Pass
5200	40		-6.485	0.222	-6.263		Pass
5240	48		-6.571	0.409	-6.162		Pass
5180	36	802.11n 20MHz BW	-5.465	0.528	-4.937		Pass
5200	40		-5.440	1.082	-4.358		Pass
5240	48		-5.160	1.082	-4.078		Pass
5190	38	802.11n 40MHz BW	-8.322	0.421	-7.901		Pass
5230	46		-6.108	1.165	-4.943		Pass

Note : In order to simplify the report, attached plots were only the highest PSD channel.

Service Port Ant.2

■ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11a	-6.708	0.247	-6.461	4	Pass
5200	40		-6.818	0.222	-6.596		Pass
5240	48		-7.055	1.015	-6.040		Pass
5180	36	802.11n 20MHz BW	-5.465	1.082	-4.383		Pass
5200	40		-5.440	1.082	-4.358		Pass
5240	48		-5.160	1.082	-4.078		Pass
5190	38	802.11n 40MHz BW	-8.322	0.421	-7.901		Pass
5230	46		-6.108	0.950	-5.158		Pass

Note : In order to simplify the report, attached plots were only the highest PSD channel.

■ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11a	-6.732	0.222	-6.510	4	Pass
5200	40		-6.981	0.936	-6.045		Pass
5240	48		-6.697	0.738	-5.959		Pass
5180	36	802.11n 20MHz BW	-4.674	1.082	-3.592		Pass
5200	40		-4.298	0.528	-3.770		Pass
5240	48		-4.441	0.735	-3.706		Pass
5190	38	802.11n 40MHz BW	-8.342	0.950	-7.392		Pass
5230	46		-5.924	1.249	-4.675		Pass

Note : In order to simplify the report, attached plots were only the highest PSD channel.

Sum Data of Service Port Ant.1 and Ant.2

TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result		
			Power Density (dBm)	Limit (dBm)	Pass/Fail
5180	36	802.11a	-3.36	0.99	Pass
5200	40		-3.42		Pass
5240	48		-3.09		Pass
5180	36	802.11n 20MHz BW	-1.64	4	Pass
5200	40		-1.35		Pass
5240	48		-1.07		Pass
5190	38	802.11n 40MHz BW	-4.89		Pass
5230	46		-2.04		Pass

Note :

- Limit is 0.99 dBm for 802.11a. Because directional antenna gain is 9.01 dBi for 802.11a.
- Sample Calculation
 $4 \text{ dBm} - (9.01 \text{ dB} - 6 \text{ dB}) = 0.99 \text{ dBm}$

Sum Data of Service Port Ant.1, Ant.2 and Ant.3

TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result		
			Power Density (dBm)	Limit (dBm)	Pass/Fail
5180	36	802.11a	-1.64	-0.77	Pass
5200	40		-1.52		Pass
5240	48		-1.28		Pass
5180	36	802.11n 20MHz BW	0.50	4	Pass
5200	40		0.62		Pass
5240	48		0.82		Pass
5190	38	802.11n 40MHz BW	-2.95		Pass
5230	46		-0.15		Pass

Note :

- Limit is -0.77 dBm. Because directional antenna gain is 10.77 dBi for 802.11a.
- Sample Calculation
 $4 \text{ dBm} - (10.77 \text{ dB} - 6 \text{ dB}) = -0.77 \text{ dBm}$

Monitoring Port Ant.1

RESULT PLOTS

20 MHz BW

Power Spectral Density (802.11a-CH 40)



Power Spectral Density (802.11n-CH 48)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

40 MHz BW

Power Spectral Density (802.11n-CH 46)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Monitoring Port Ant.2

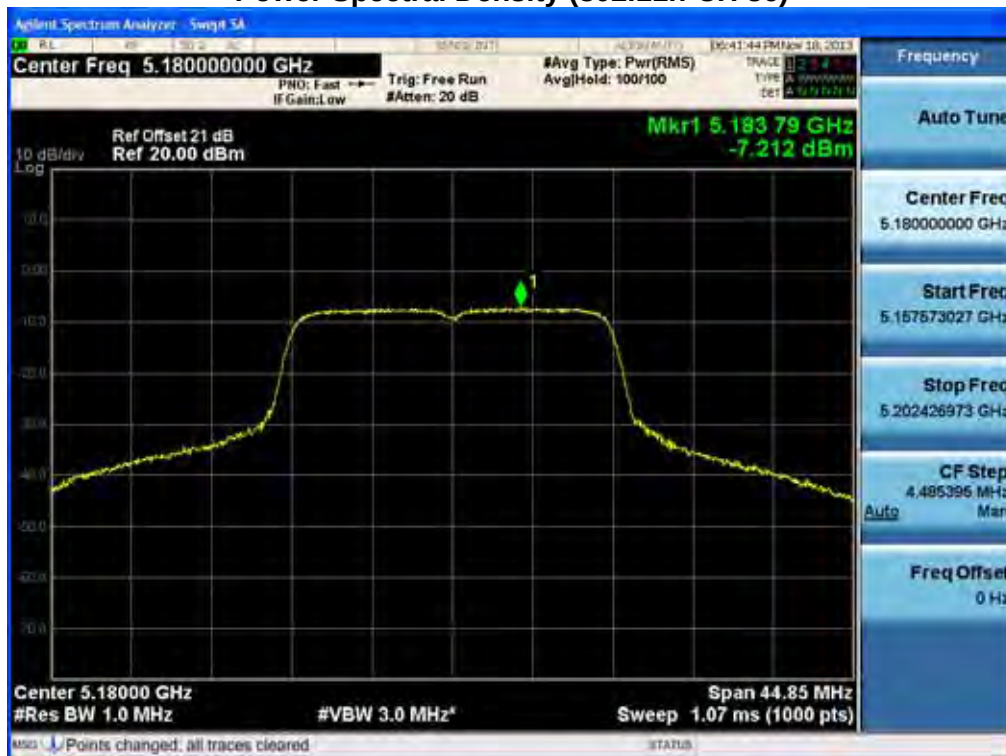
RESULT PLOTS

20 MHz BW

Power Spectral Density (802.11a-CH 36)



Power Spectral Density (802.11n-CH 36)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Power Spectral Density (802.11n-CH 38)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Service Port Ant.1

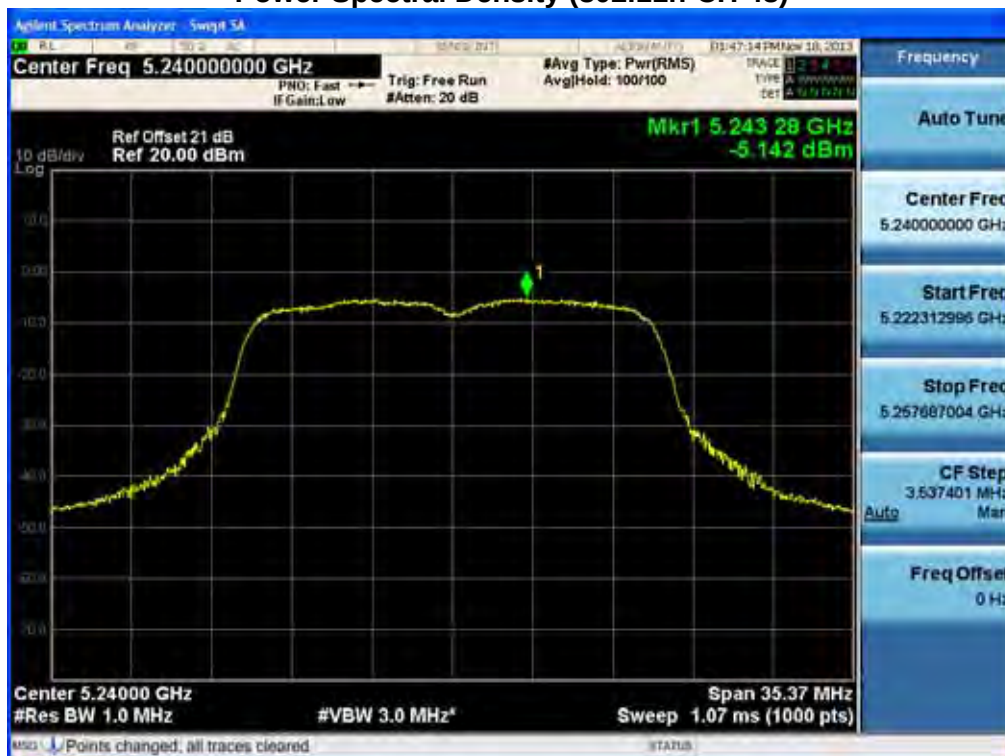
RESULT PLOTS

20 MHz BW

Power Spectral Density (802.11a-CH 48)



Power Spectral Density (802.11n-CH 48)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Power Spectral Density (802.11n-CH 46)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Service Port Ant.2

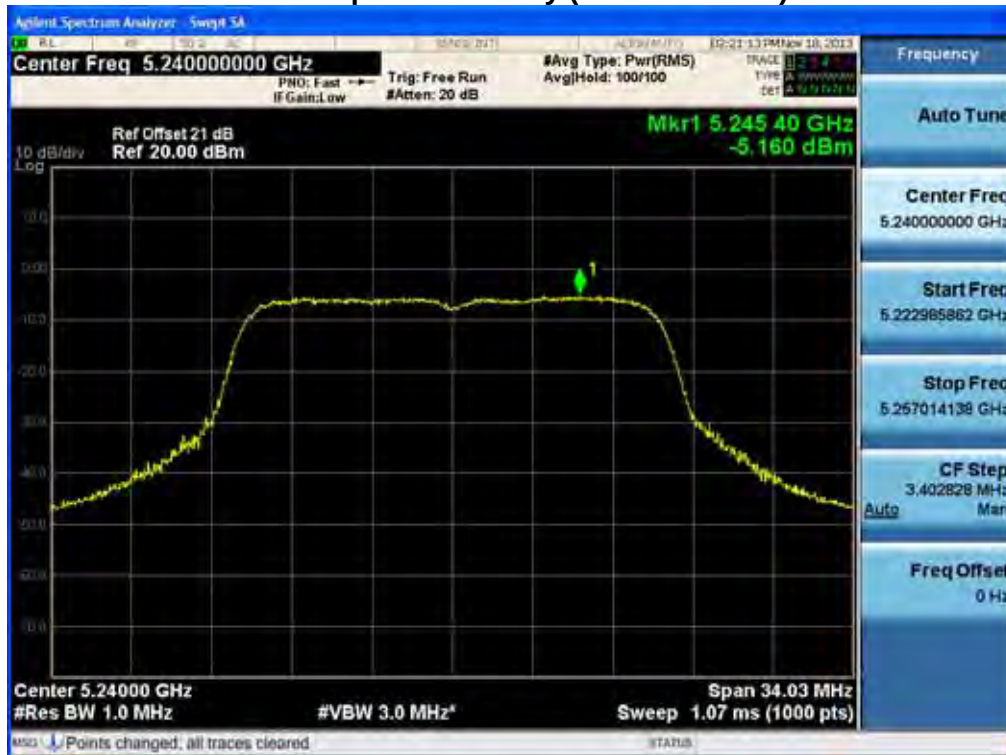
RESULT PLOTS

20 MHz BW

Power Spectral Density (802.11a-CH 48)



Power Spectral Density (802.11n-CH 48)



Power Spectral Density (802.11n-CH 46)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Service Port Ant.3

RESULT PLOTS

20 MHz BW

Power Spectral Density (802.11a-CH 48)



Power Spectral Density (802.11n-CH 36)



FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Power Spectral Density (802.11n-CH 46)

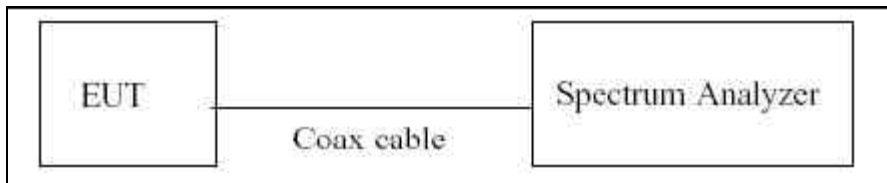


FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

9.5 PEAK EXCURSION RATIO

The spectrum analyzer was connected to the antenna terminal while the EUT was operating in the continuous transmission mode at the appropriate center frequencies. The largest permissible difference between the modulation envelope(measured using a peak hold function) and the maximum conducted output power 13 dB/MHz.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

We tested according to KDB 789033(issued 04/08/2013).

The spectrum analyzer is set to :

1. Span = Set the span to view the entire emission bandwidth.
2. RBW = 1 MHz
3. VBW $\geq$ 3 MHz
4. Detector Mode = Peak
5. Trace Mode = Max hold
6. Allow the sweeps to continue until the trace stabilizes.
7. Use the peak search function to find the peak of the spectrum.
8. Use the procedure to measure the PPSD
9. Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

Note :

1. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the UNII 1 band that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table. We used the particular cable type that is supported by manufacture.

Band	Loss(dB)
UNII 1	21.0

(Actual value of loss for the attenuator and cable combination)

Monitoring Port Ant.1

RESULT PLOTS

20 MHz BW

Peak Excursion Ratio (802.11a-CH 36)

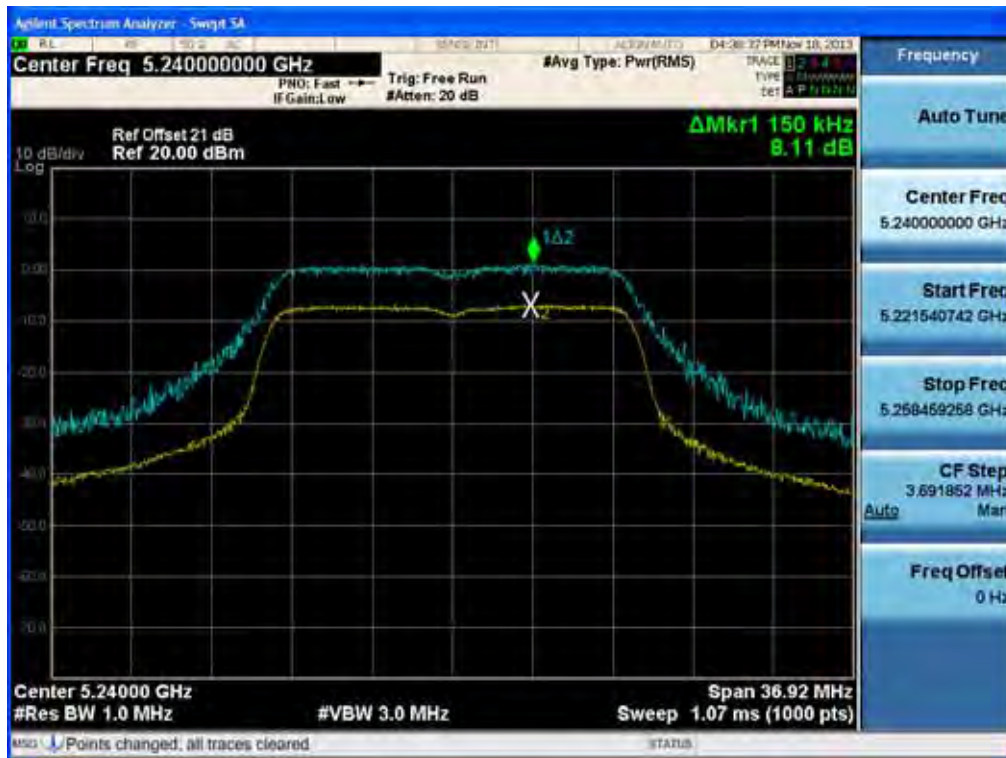


Peak Excursion Ratio (802.11a-CH 40)

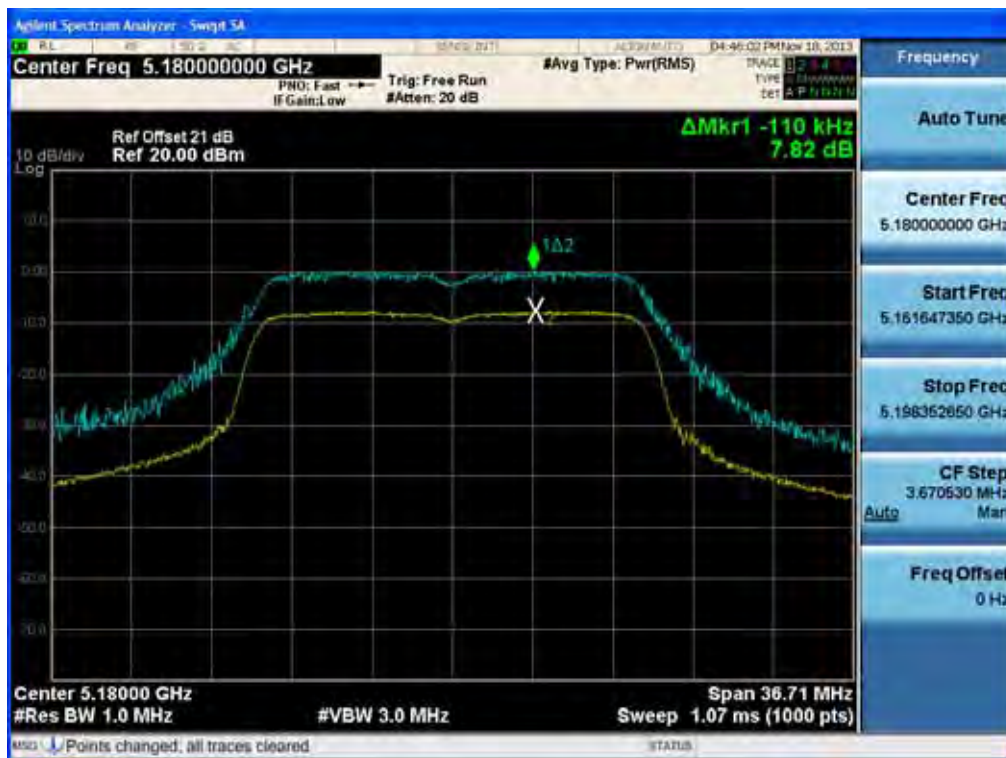


FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

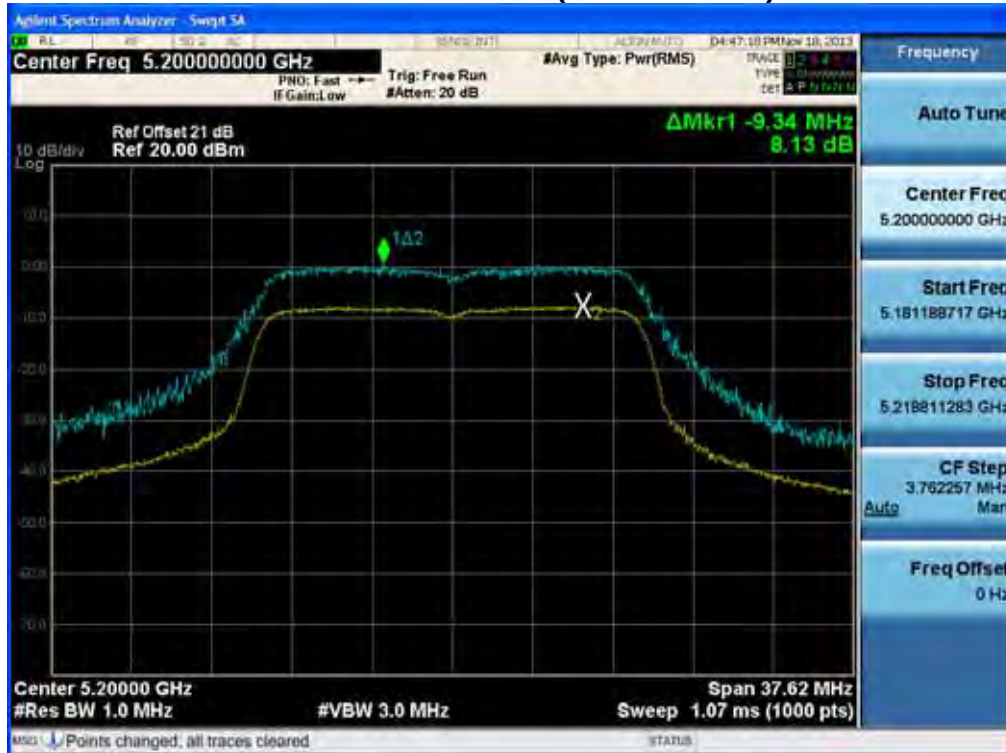
Peak Excursion Ratio (802.11a-CH 48)



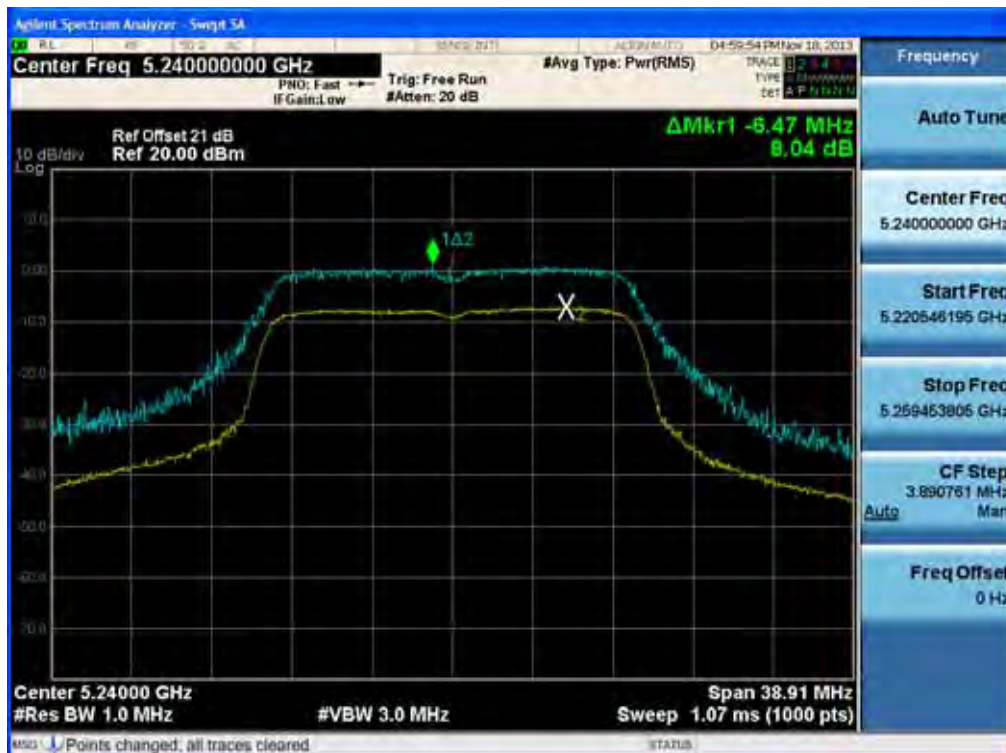
Peak Excursion Ratio (802.11n-CH 36)



Peak Excursion Ratio (802.11n-CH 40)



Peak Excursion Ratio (802.11n-CH 48)



40MHz BW

Peak Excursion Ratio (802.11n-CH 38)



Peak Excursion Ratio (802.11n-CH 46)



Monitoring Port Ant.2

Peak Excursion Ratio (802.11a-CH 36)



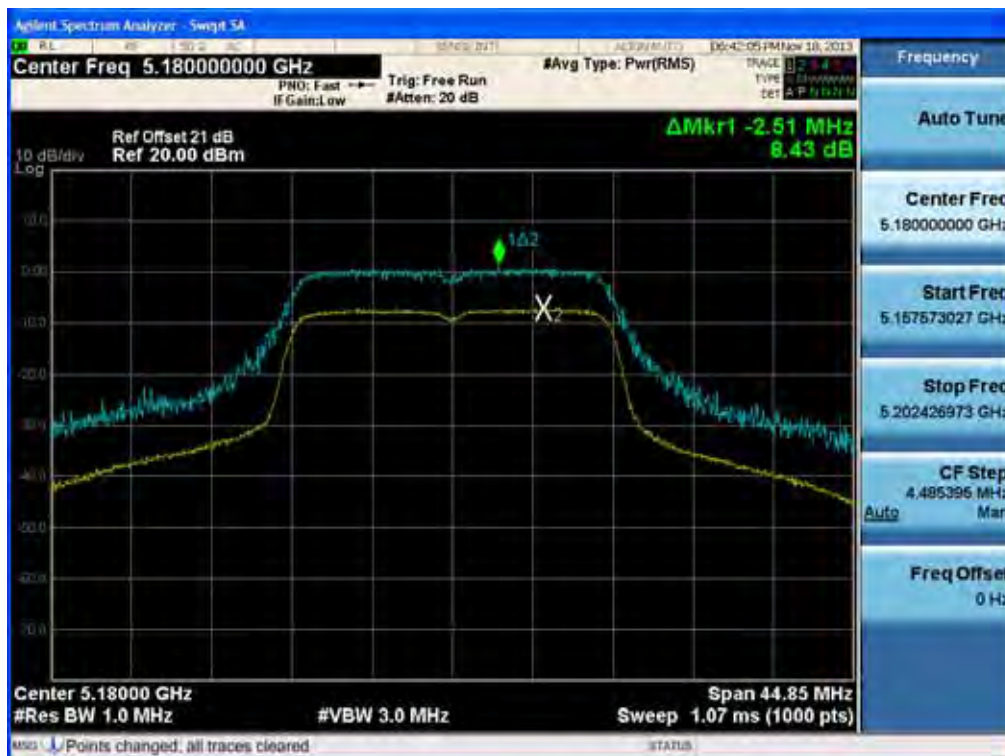
Peak Excursion Ratio (802.11a-CH 40)



Peak Excursion Ratio (802.11a-CH 48)



Peak Excursion Ratio (802.11n-CH 36)



Peak Excursion Ratio (802.11n-CH 40)



Peak Excursion Ratio (802.11n-CH 48)



40MHz BW

Peak Excursion Ratio (802.11n-CH 38)



Peak Excursion Ratio (802.11n-CH 46)

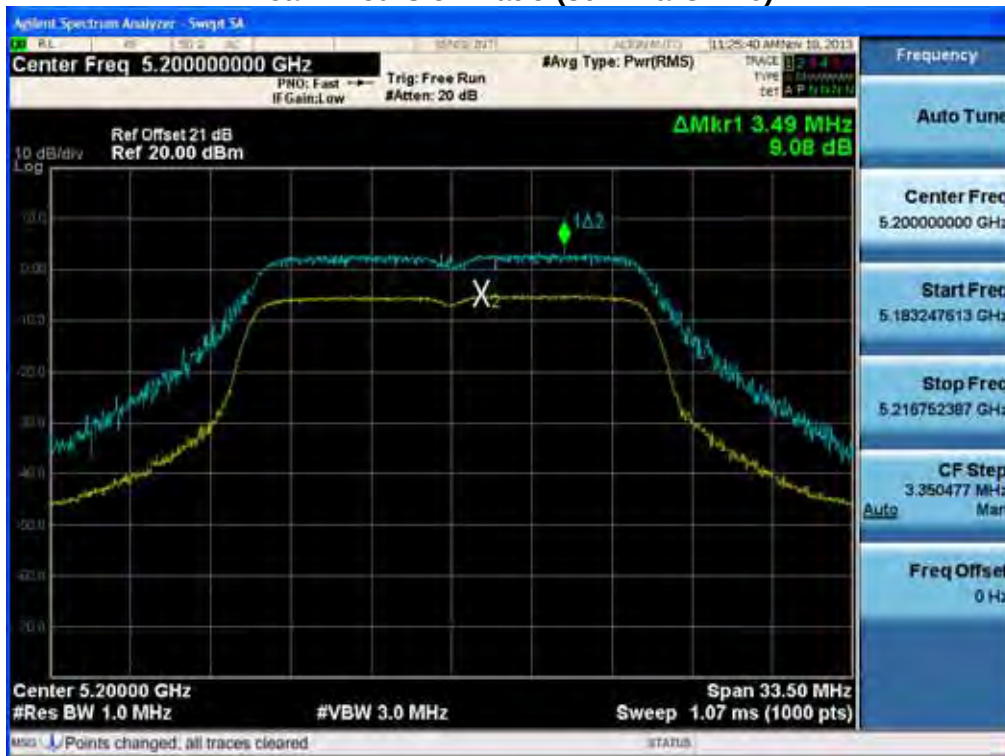


Service Port Ant.1

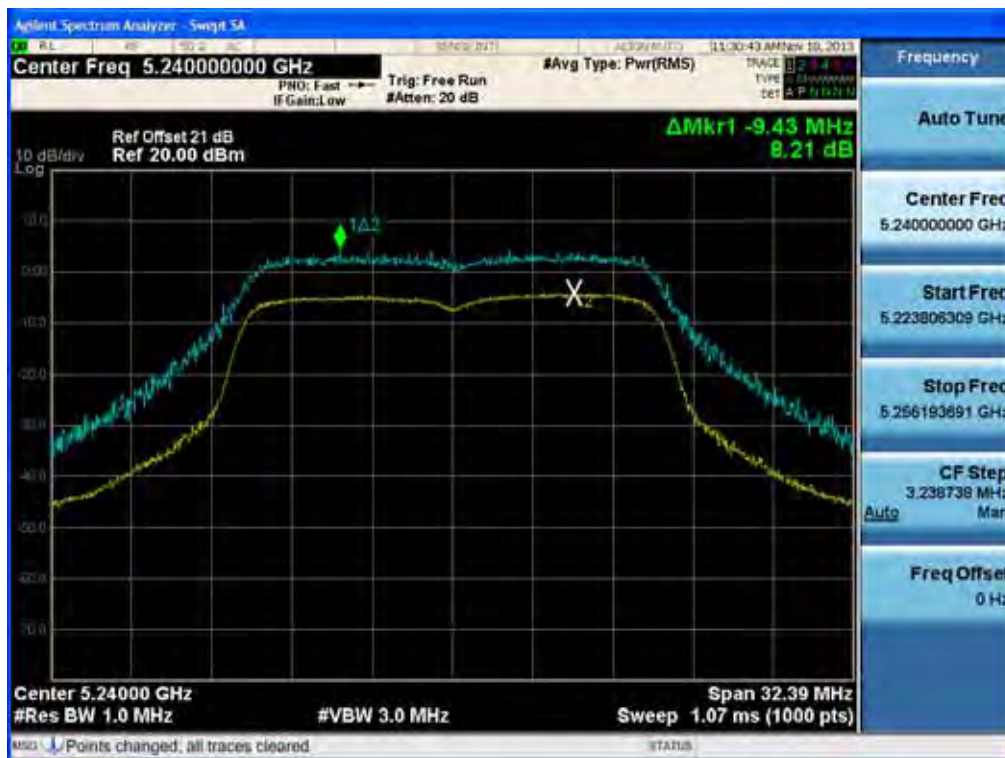
Peak Excursion Ratio (802.11a-CH 36)



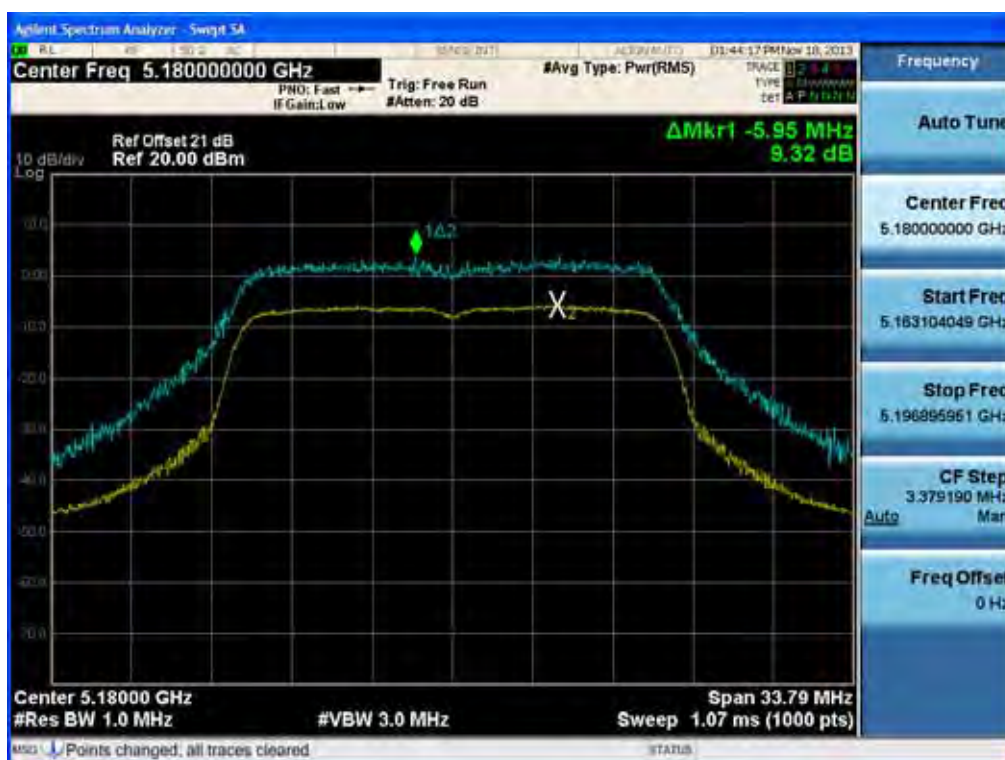
Peak Excursion Ratio (802.11a-CH 40)



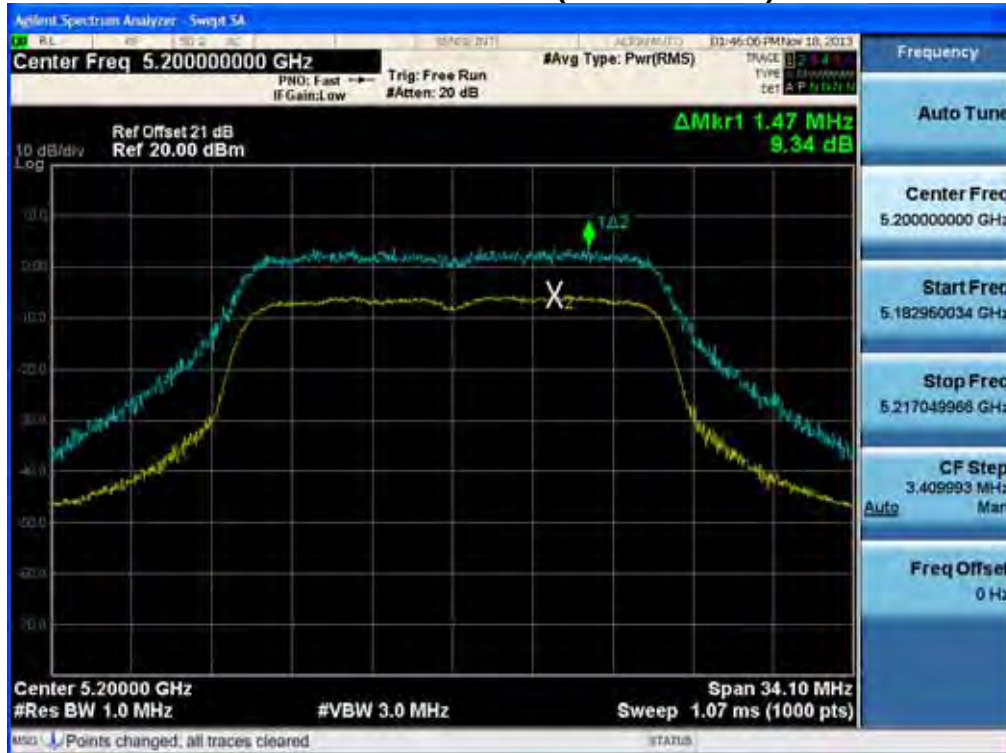
Peak Excursion Ratio (802.11a-CH 48)



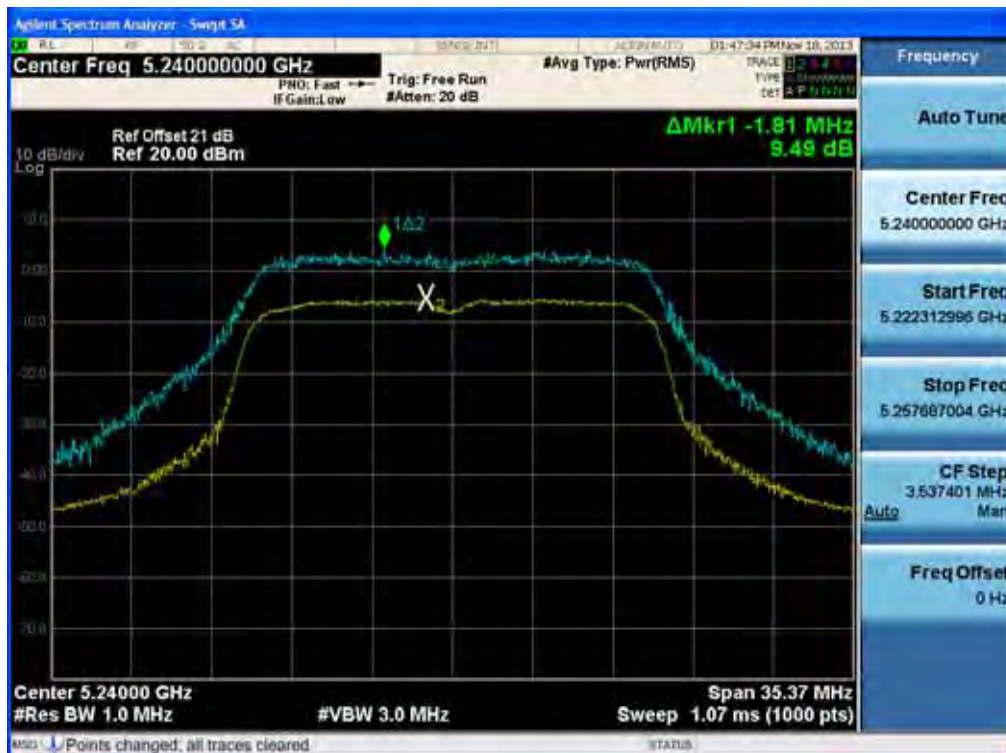
Peak Excursion Ratio (802.11n-CH 36)



Peak Excursion Ratio (802.11n-CH 40)



Peak Excursion Ratio (802.11n-CH 48)



40MHz BW

Peak Excursion Ratio (802.11n-CH 38)



Peak Excursion Ratio (802.11n-CH 46)



Service Port Ant.2

Peak Excursion Ratio (802.11a-CH 36)



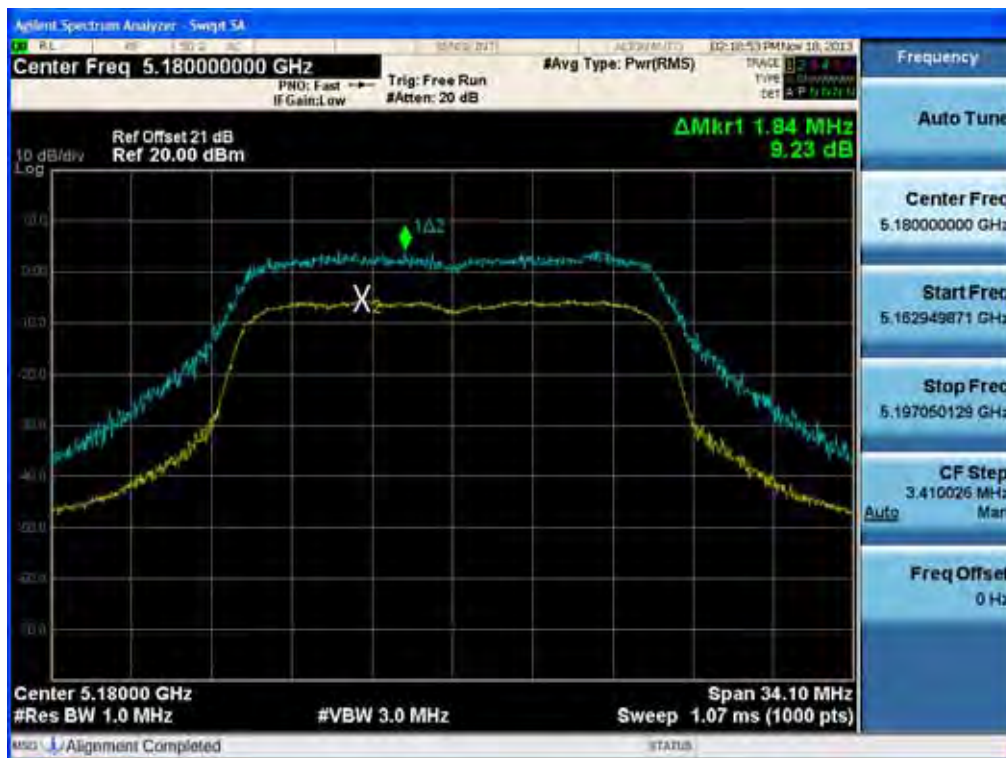
Peak Excursion Ratio (802.11a-CH 40)



Peak Excursion Ratio (802.11a-CH 48)



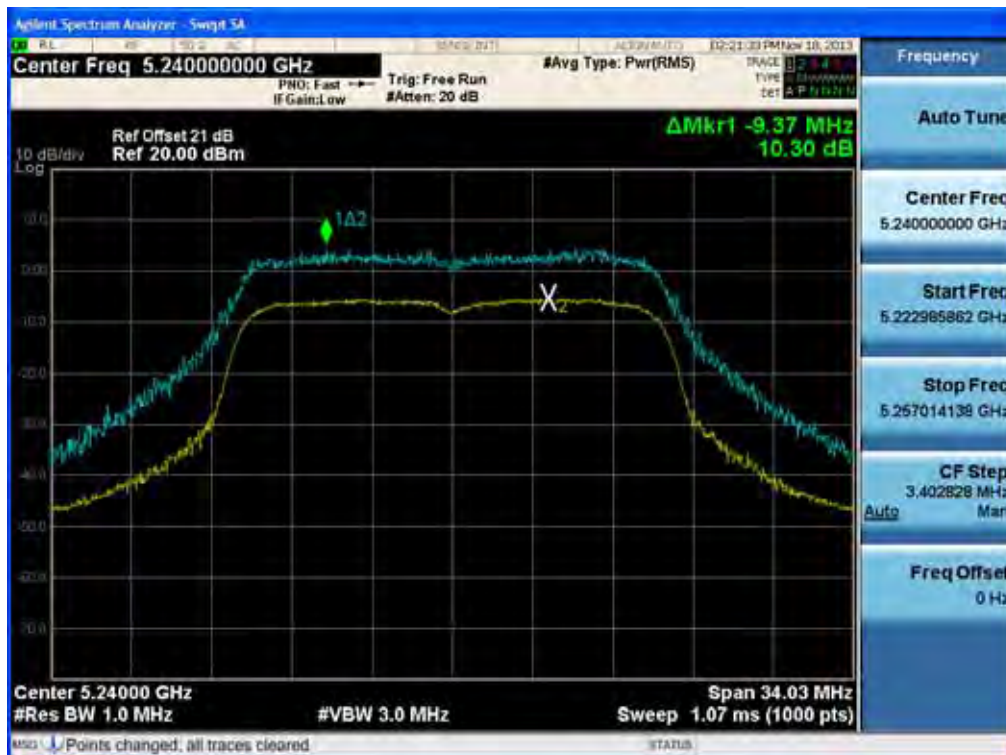
Peak Excursion Ratio (802.11n-CH 36)



Peak Excursion Ratio (802.11n-CH 40)



Peak Excursion Ratio (802.11n-CH 48)



40MHz BW

Peak Excursion Ratio (802.11n-CH 38)



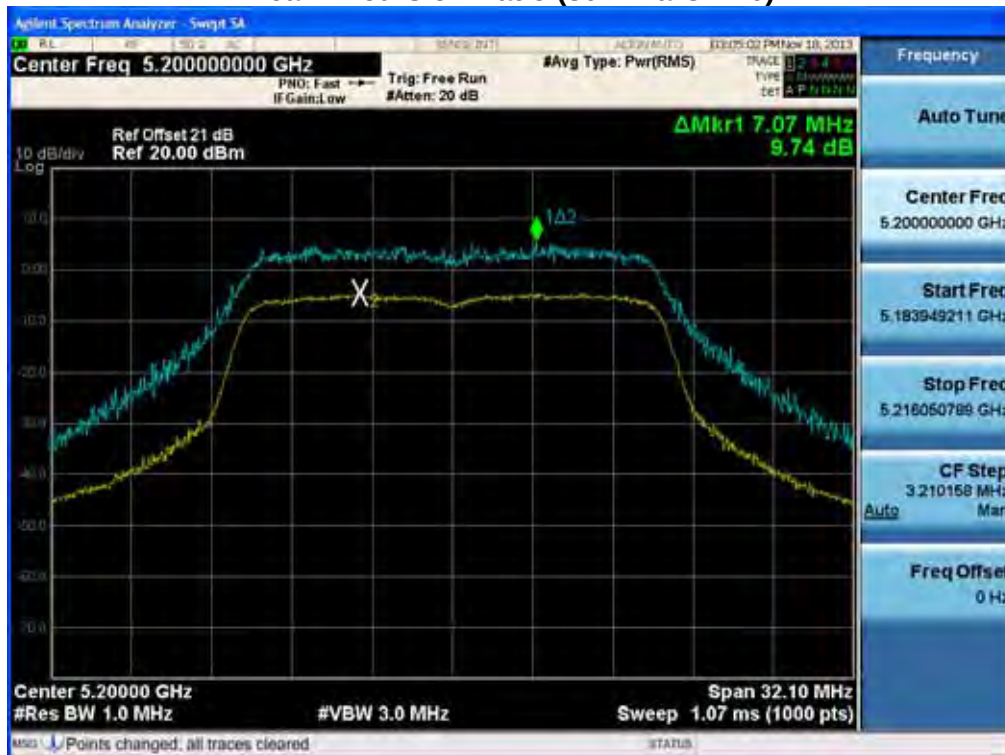
Peak Excursion Ratio (802.11n-CH 46)



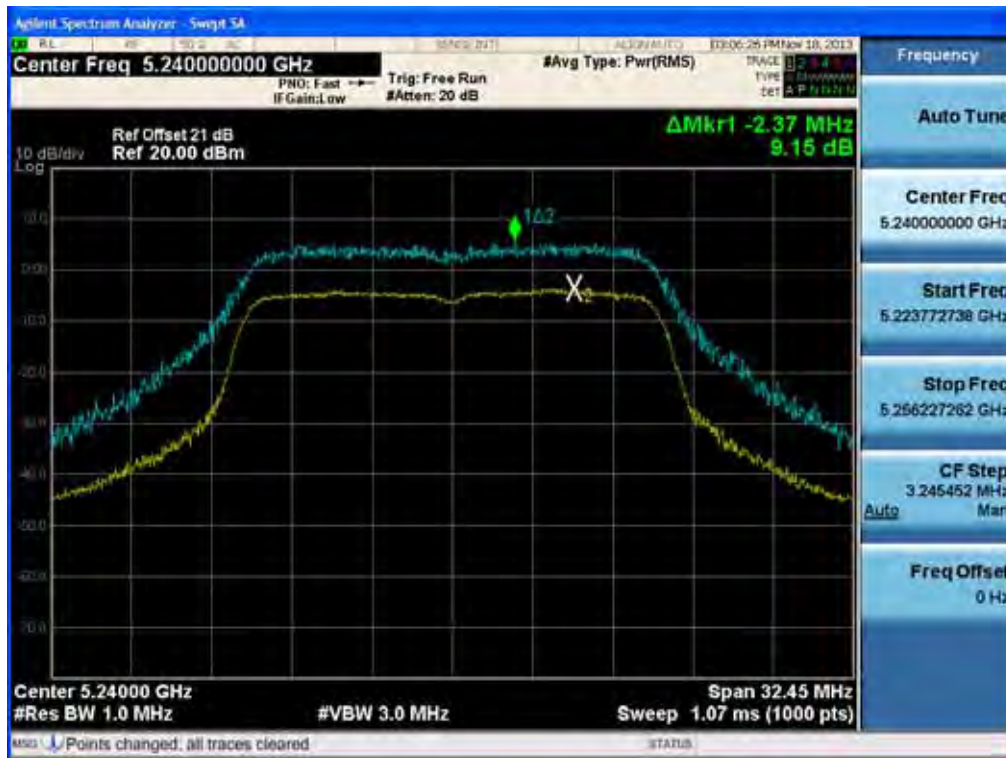
Peak Excursion Ratio (802.11a-CH 36)



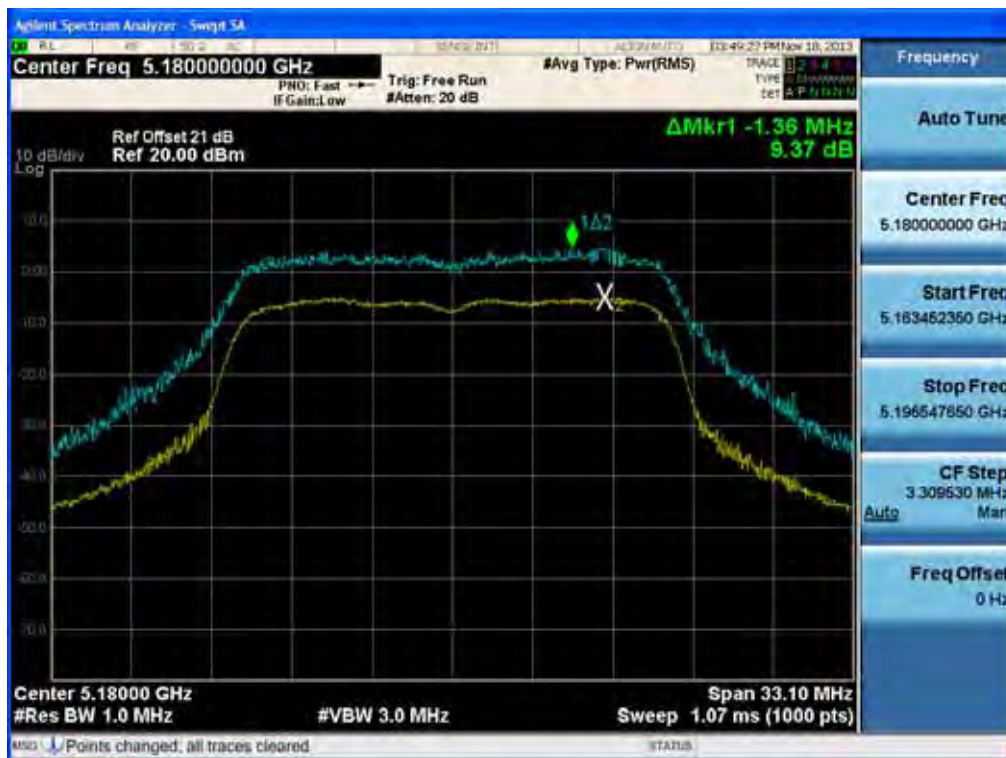
Peak Excursion Ratio (802.11a-CH 40)



Peak Excursion Ratio (802.11a-CH 48)



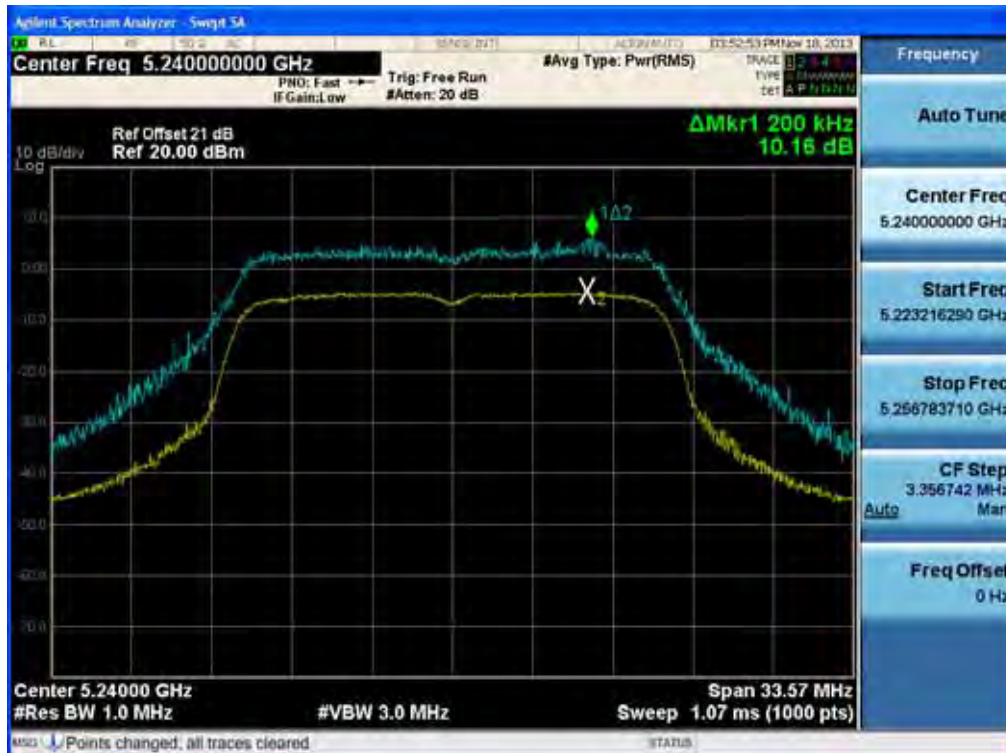
Peak Excursion Ratio (802.11n-CH 36)



Peak Excursion Ratio (802.11n-CH 40)



Peak Excursion Ratio (802.11n-CH 48)

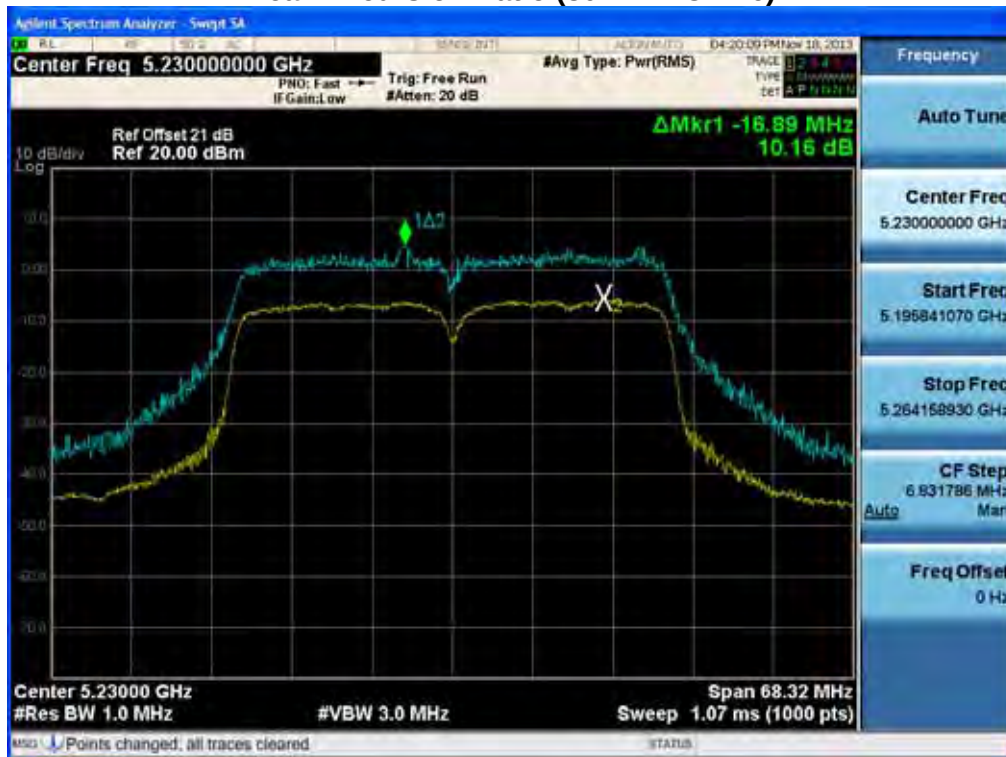


40MHz BW

Peak Excursion Ratio (802.11n-CH 38)



Peak Excursion Ratio (802.11n-CH 46)



9.6 FREQUENCY STABILITY.

The EUT was placed inside an environmental chamber as the temperature in the chamber was varied between -30 °C and 50 °C. The temperature was incremented by 10 °C intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

Service Port

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,180,000,000 Hz
CHANNEL:	36
REFERENCE VOLTAGE:	220 VAC

Voltage (%)	Power (VAC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100	220	+20(Ref)	5 180 018	17.85
100		-30	5 180 009	9.01
100		-20	5 180 007	6.95
100		-10	5 180 008	7.62
100		0	5 180 005	5.32
100		+10	5 180 013	13.04
100		+30	5 180 016	15.60
100		+40	5 180 015	14.94
100		+50	5 180 010	10.00
115	253	+20	5 180 017	16.75
85	187	+20	5 180 017	17.32

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

Monitoring Port

OPERATING BAND: UNII Band 1
 OPERATING FREQUENCY: 5,180,000,000 Hz
 CHANNEL: 36
 REFERENCE VOLTAGE: AC 220 V

Voltage (%)	Power (VAC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100	220	+20(Ref)	5 179 975	-25.49
100		-30	5 179 984	-16.25
100		-20	5 179 982	-17.58
100		-10	5 179 981	-18.92
100		0	5 179 979	-21.08
100		+10	5 179 976	-23.62
100		+30	5 179 975	-25.05
100		+40	5 179 978	-21.94
100		+50	5 180 022	22.00
115	253	+20	5 179 975	-24.63
85	187	+20	5 179 977	-22.62

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

9.7 RADIATED MEASUREMENT.

9.7.1 RADIATED SPURIOUS EMISSIONS.

Test Requirements and limit, §15.205, §15.209, §15.407

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
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

■ §15.407, KDB 789033

All harmonics that do not lie in a restricted band are subject to a peak limit of -27 dBm/MHz. At a distance of 3 meters the field strength limit in dBµV/m can be determined by adding a “conversion” factor of 95.2 dB to the EIRP limit of -27 dBm/MHz to obtain the limit for out of band spurious emissions of 68.2 dBµV/m.

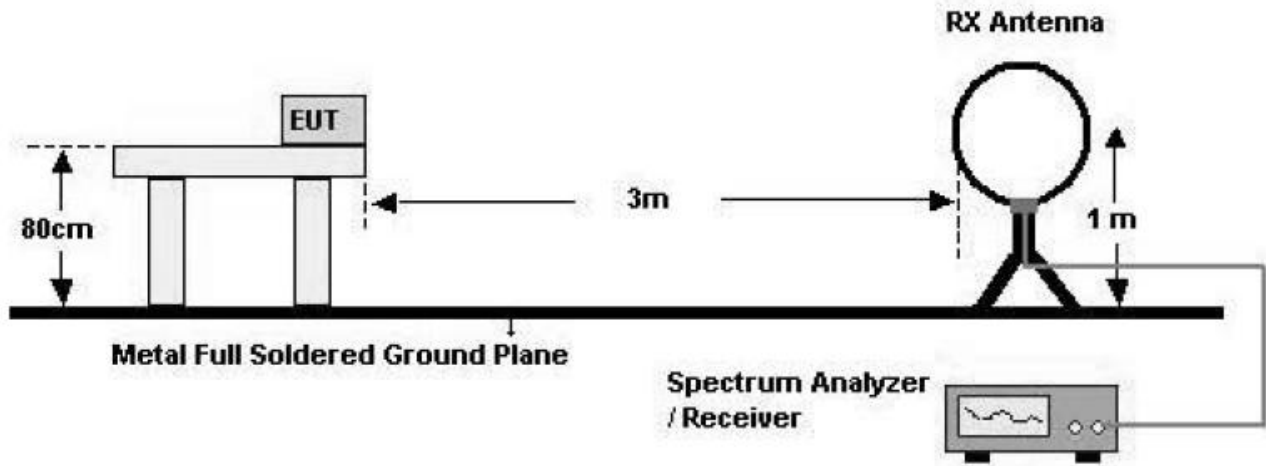
■ Test case

Monitoring	SISO	Ant 1
		Ant 2
	MIMO	Ant 1 & 2
Service	SISO	Ant 1
		Ant 2
		Ant 3
	MIMO	Ant 1 & 2
		Ant 1 & 2 & 3

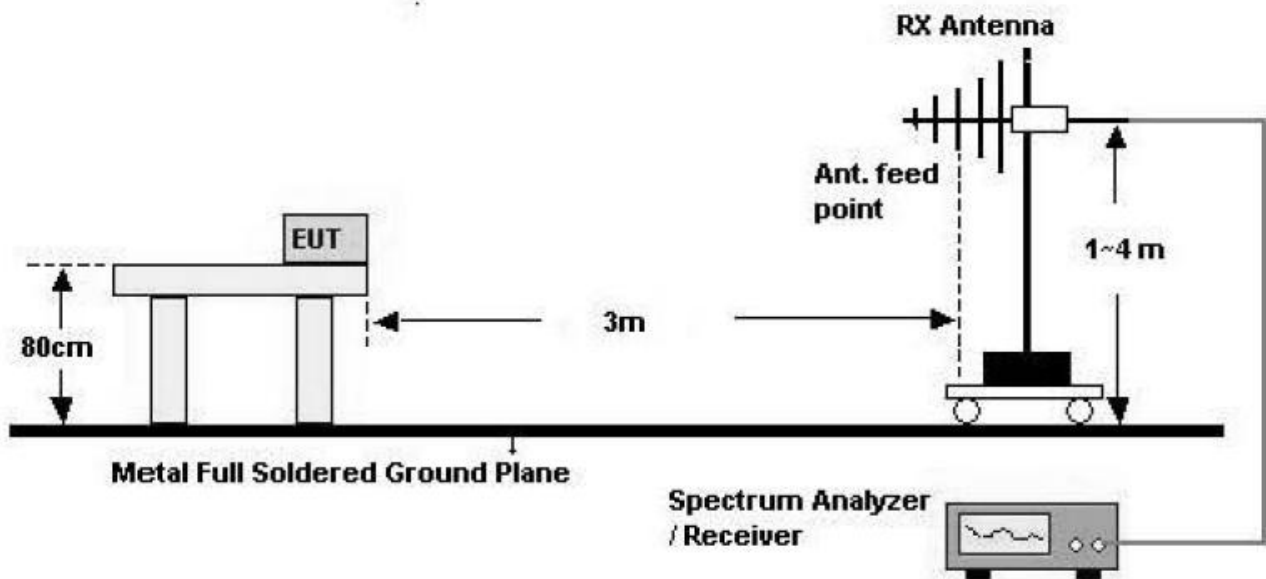
Note : We have done all test case. Worst case is Ant 1 & 2 for monitoring and Ant 1 & 2 & 3 for service. So, we attached the results of only worst case.

Test Configuration

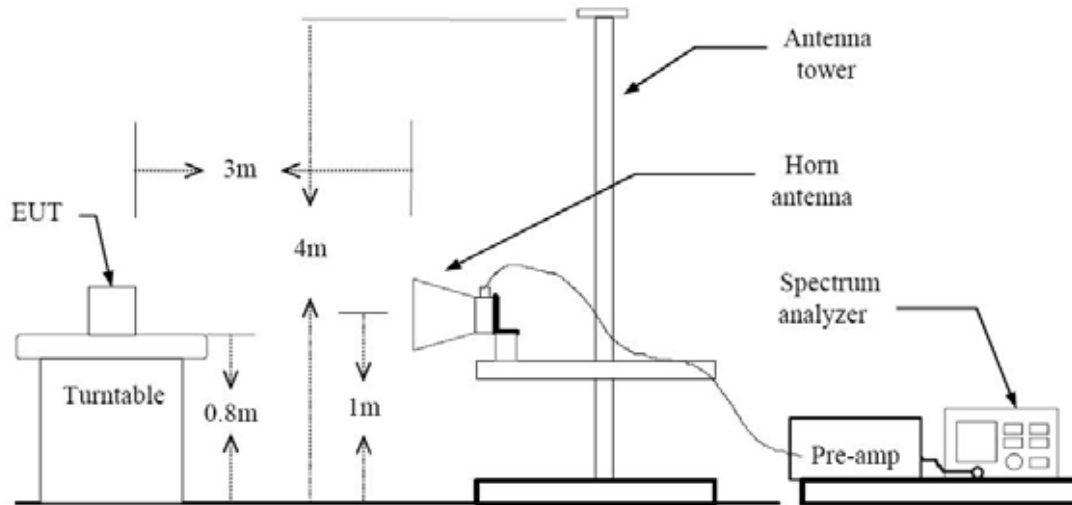
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



TEST PROCEDURE USED

ANSI C63.4(2003)

Method H)5) in KDB 789033, issued 04/08/2013 (Peak)

Method H)6)d) in KDB 789033, issued 04/08/2013 (Average)

. Spectrum setting:

- Peak.

1. RBW = 1 MHz

2. VBW $\geq$ 3 MHz

3. Detector = Peak

4. Sweep Time = auto

5. Trace mode = max hold

6. Allow sweeps to continue until the trace stabilizes.

7. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately $1/x$, where x is the duty cycle.

- Average (Method VB :Averaging using reduced video bandwidth)

1. RBW = 1 MHz

2. VBW

2.1. If the EUT is configured to transmit with duty cycle $\geq$ 98 percent, set $VBW \leq RBW/100$ (i.e., 10 kHz) but not less than 10 Hz.

2.2. If the EUT duty cycle is $<$ 98 percent, set $VBW \geq 1/T$, where T is the minimum transmission duration.

3. The analyzer is set to linear detector mode.

4. Detector = Peak.

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5. Sweep time = auto.
6. Trace mode = max hold.
7. Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 percent duty cycle. For lower duty cycles, increase the minimum number of traces by a factor of $1/x$, where x is the duty cycle.

Note :

1. We used the case 2 for 802.11a/n_20/n_40 to perform the average filed strength measurements for RSE and radiated band edge test.
2. The actual setting value of VBW for 802.11a/n_20/n_40.

Monitoring

Mode	Worst Data rate (Mbps)	T _{on} (ms)	T _{total} (ms)	Duty Cycle (%)	VBW(1/T) (Hz)	The actual setting value of VBW (Hz)
a	6	2.020	2.070	97.6	495.0	1000
n_20	6.5	1.885	1.930	97.7	530.5	1000
n_40	13.5	0.926	0.960	96.5	1079.9	3000

Service

Mode	Worst Data rate (Mbps)	T _{on} (ms)	T _{total} (ms)	Duty Cycle (%)	VBW(1/T) (Hz)	The actual setting value of VBW (Hz)
a	6	1.335	1.405	95.0	749.1	1000
n_20	6.5	1.269	1.317	96.4	788.0	1000
n_40	13.5	0.630	0.664	94.9	1587.3	3000

TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB /m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 9 kHz to the 30MHz.
2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
3. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
4. Limit line = specific Limits (dB μ V) + Distance extrapolation factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

TEST RESULTS

Below 1 GHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB /m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 30 MHz to the 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Above 1 GHz

Monitoring MIMO (Ant 1 & 2)

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10360	51.54	9.33	V	60.87	68.20	7.33	PK
15540	45.44	14.61	V	60.05	73.98	13.93	PK
15540	31.52	14.61	V	46.13	53.98	7.85	AV
10360	50.24	9.33	H	59.57	68.20	8.63	PK
15540	45.56	14.61	H	60.17	73.98	13.81	PK
15540	31.49	14.61	H	46.10	53.98	7.88	AV

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5200 MHz
Channel No.	40 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10400	49.52	10.13	V	59.65	68.20	8.55	PK
15600	45.45	14.60	V	60.05	73.98	13.93	PK
15600	31.25	14.60	V	45.85	53.98	8.13	AV
10400	48.43	10.13	H	58.56	68.20	9.64	PK
15600	45.44	14.60	H	60.04	73.98	13.94	PK
15600	32.79	14.60	H	47.39	53.98	6.59	AV

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10480	53.43	10.20	V	63.63	68.20	4.57	PK
15720	46.48	13.47	V	59.95	73.98	14.03	PK
15720	33.31	13.47	V	46.78	53.98	7.20	AV
10480	51.65	10.20	H	61.85	68.20	6.35	PK
15720	46.52	13.47	H	59.99	73.98	13.99	PK
15720	33.54	13.47	H	47.01	53.98	6.97	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11a. Worst case is 6 Mbps in 802.11a.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Band : UNII 1

Operation Mode: 802.11 n_20 MHz BW

Transfer Rate: 6.5 Mbps

Operating Frequency 5180 MHz

Channel No. 36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10360	51.25	9.33	V	60.58	68.20	7.62	PK
15540	45.04	14.61	V	59.65	73.98	14.33	PK
15540	31.80	14.61	V	46.41	53.98	7.57	AV
10360	49.64	9.33	H	58.97	68.20	9.23	PK
15540	45.26	14.61	H	59.87	73.98	14.11	PK
15540	31.04	14.61	H	45.65	53.98	8.33	AV

Band : UNII 1

Operation Mode: 802.11 n_20 MHz BW

Transfer Rate: 6.5 Mbps

Operating Frequency 5200 MHz

Channel No. 40 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10400	50.75	10.13	V	60.88	68.20	7.32	PK
15600	45.28	14.60	V	59.88	73.98	14.10	PK
15600	31.50	14.60	V	46.10	53.98	7.88	AV
10400	48.24	10.13	H	58.37	68.20	9.83	PK
15600	45.14	14.60	H	59.74	73.98	14.24	PK
15600	31.62	14.60	H	46.22	53.98	7.76	AV

Band :	UNII 1
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10480	52.84	10.20	V	63.04	68.20	5.16	PK
15720	46.68	13.47	V	60.15	73.98	13.83	PK
15720	32.72	13.47	V	46.19	53.98	7.79	AV
10480	50.72	10.20	H	60.92	68.20	7.28	PK
15720	46.43	13.47	H	59.90	73.98	14.08	PK
15720	32.24	13.47	H	45.71	53.98	8.27	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11n_20 MHz BW. Worst case is 6.5 Mbps in 802.11n_20 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Band :	UNII 1
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10380	47.49	9.70	V	57.19	68.20	11.01	PK
15570	45.25	14.62	V	59.87	73.98	14.11	PK
15570	33.24	14.62	V	47.86	53.98	6.12	AV
10380	46.05	9.70	H	55.75	68.20	12.45	PK
15570	45.17	14.62	H	59.79	73.98	14.19	PK
15570	33.04	14.62	H	47.66	53.98	6.32	AV

Band :	UNII 1
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5230 MHz
Channel No.	46 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10460	47.04	10.26	V	57.30	68.20	10.90	PK
15690	46.44	14.33	V	60.77	73.98	13.21	PK
15690	33.42	14.33	V	47.75	53.98	6.23	AV
10460	46.08	10.26	H	56.34	68.20	11.86	PK
15690	46.05	14.33	H	60.38	73.98	13.60	PK
15690	33.08	14.33	H	47.41	53.98	6.57	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.

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4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11n_40 MHz BW. Worst case is 13.5 Mbps in 802.11n_40 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

Service MIMO (Ant 1 & 2 & 3)

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10360	55.24	9.33	V	64.57	68.20	3.63	PK
15540	44.15	14.61	V	58.76	73.98	15.22	PK
15540	31.14	14.61	V	45.75	53.98	8.23	AV
10360	52.23	9.33	H	61.56	68.20	6.64	PK
15540	45.26	14.61	H	59.87	73.98	14.11	PK
15540	31.74	14.61	H	46.35	53.98	7.63	AV

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5200 MHz
Channel No.	40 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10400	54.64	10.13	V	64.77	68.20	3.43	PK
15600	45.23	14.60	V	59.83	73.98	14.15	PK
15600	31.14	14.60	V	45.74	53.98	8.24	AV
10400	52.24	10.13	H	62.37	68.20	5.83	PK
15600	44.62	14.60	H	59.22	73.98	14.76	PK
15600	31.48	14.60	H	46.08	53.98	7.90	AV

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10480	54.87	10.20	V	65.07	68.20	3.13	PK
15720	46.75	13.47	V	60.22	73.98	13.76	PK
15720	32.24	13.47	V	45.71	53.98	8.27	AV
10480	52.64	10.20	H	62.84	68.20	5.36	PK
15720	46.36	13.47	H	59.83	73.98	14.15	PK
15720	32.43	13.47	H	45.90	53.98	8.08	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11a. Worst case is 6 Mbps in 802.11a.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Band : UNII 1

Operation Mode: 802.11 n_20 MHz BW

Transfer Rate: 6.5 Mbps

Operating Frequency 5180 MHz

Channel No. 36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10360	54.64	9.33	V	63.97	68.20	4.23	PK
15540	45.62	14.61	V	60.23	73.98	13.75	PK
15540	31.54	14.61	V	46.15	53.98	7.83	AV
10360	52.23	9.33	H	61.56	68.20	6.64	PK
15540	45.82	14.61	H	60.43	73.98	13.55	PK
15540	31.24	14.61	H	45.85	53.98	8.13	AV

Band : UNII 1

Operation Mode: 802.11 n_20 MHz BW

Transfer Rate: 6.5 Mbps

Operating Frequency 5200 MHz

Channel No. 40 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10400	52.84	10.13	V	62.97	68.20	5.23	PK
15600	45.56	14.60	V	60.16	73.98	13.82	PK
15600	31.62	14.60	V	46.22	53.98	7.76	AV
10400	50.92	10.13	H	61.05	68.20	7.15	PK
15600	45.15	14.60	H	59.75	73.98	14.23	PK
15600	31.44	14.60	H	46.04	53.98	7.94	AV

Band :	UNII 1
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10480	53.68	10.20	V	63.88	68.20	4.32	PK
15720	46.42	13.47	V	59.89	73.98	14.09	PK
15720	33.22	13.47	V	46.69	53.98	7.29	AV
10480	51.14	10.20	H	61.34	68.20	6.86	PK
15720	46.55	13.47	H	60.02	73.98	13.96	PK
15720	32.53	13.47	H	46.00	53.98	7.98	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11n_20 MHz BW. Worst case is 6.5 Mbps in 802.11n_20 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Band :	UNII 1
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10380	55.48	9.70	V	65.18	68.20	3.02	PK
15570	45.43	14.62	V	60.05	73.98	13.93	PK
15570	32.24	14.62	V	46.86	53.98	7.12	AV
10380	52.82	9.70	H	62.52	68.20	5.68	PK
15570	44.87	14.62	H	59.49	73.98	14.49	PK
15570	32.29	14.62	H	46.91	53.98	7.07	AV

Band :	UNII 1
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5230 MHz
Channel No.	46 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10460	54.68	10.26	V	64.94	68.20	3.26	PK
15690	46.52	14.33	V	60.85	73.98	13.13	PK
15690	33.27	14.33	V	47.60	53.98	6.38	AV
10460	51.74	10.26	H	62.00	68.20	6.20	PK
15690	46.24	14.33	H	60.57	73.98	13.41	PK
15690	33.52	14.33	H	47.85	53.98	6.13	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.

FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I



4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11n_40 MHz BW. Worst case is 13.5 Mbps in 802.11n_40 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC PT.15.407 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1312FR14	Date of Issue: December 18, 2013	EUT Type: WLAN Access Point	FCC ID: A3LWEA303I

8.7.2 RADIATED RESTRICTED BAND EDGE MEASUREMENTS

Test Requirements and limit, §15.407, §15.205, §15.209

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c)).

Monitoring MIMO (Ant 1 & 2)

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	54.65	-0.51	H	54.14	73.98	19.84	PK
5150	40.27	-0.51	H	39.76	53.98	14.22	AV
5150	54.34	-0.51	V	53.83	73.98	20.15	PK
5150	40.13	-0.51	V	39.62	53.98	14.36	AV

Band :	UNII 1
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	53.65	-0.51	H	53.14	73.98	20.84	PK
5150	40.24	-0.51	H	39.73	53.98	14.25	AV
5150	53.65	-0.51	V	53.14	73.98	20.84	PK
5150	40.57	-0.51	V	40.06	53.98	13.92	AV

Band :	UNII 1
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	66.65	-0.51	H	66.14	73.98	7.84	PK
5150	49.72	-0.51	H	49.21	53.98	4.77	AV
5150	66.35	-0.51	V	65.84	73.98	8.14	PK
5150	47.64	-0.51	V	47.13	53.98	6.85	AV

Notes:

1. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + ATT
2. We have done all data rate in 802.11a/n mode test. . Worst case of EUT is lowest data rate in 802.11a/n
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Service MIMO (Ant 1 & 2 & 3)

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	57.55	-0.51	H	57.04	73.98	16.94	PK
5150	45.79	-0.51	H	45.28	53.98	8.70	AV
5150	55.68	-0.51	V	55.17	73.98	18.81	PK
5150	44.25	-0.51	V	43.74	53.98	10.24	AV

Band :	UNII 1
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	57.84	-0.51	H	57.33	73.98	16.65	PK
5150	45.34	-0.51	H	44.83	53.98	9.15	AV
5150	55.24	-0.51	V	54.73	73.98	19.25	PK
5150	44.76	-0.51	V	44.25	53.98	9.73	AV

Band :	UNII 1
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	68.26	-0.51	H	67.75	73.98	6.23	PK
5150	51.34	-0.51	H	50.83	53.98	3.15	AV
5150	66.62	-0.51	V	66.11	73.98	7.87	PK
5150	50.24	-0.51	V	49.73	53.98	4.25	AV

Notes:

1. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + ATT
2. We have done all data rate in 802.11a/n mode test. . Worst case of EUT is lowest data rate in 802.11a/n
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

9.8 POWERLINE CONDUCTED EMISSIONS

Test Requirements and limit, §15.207

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference groundplane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

Note : We don't perform powerline conducted emission test. Because the manufacturer does not sell the POE.

10. LIST OF TEST EQUIPMENT

Manufacturer	Model / Equipment	Calibration Interval	Calibration Due	Serial No.
Rohde & Schwarz	ENV216/ LISN	Annual	02/06/2014	100073
Schwarzbeck	VULB 9160/ TRILOG Antenna	Biennial	12/17/2014	3150
Rohde & Schwarz	ESI 40 / EMI TEST RECEIVER	Annual	04/16/2014	831564103
Agilent	E4440A/ Spectrum Analyzer	Annual	04/25/2014	US45303008
Agilent	N9020A/ SIGNAL ANALYZER	Annual	05/14/2014	MY51110063
HD	MA240/ Antenna Position Tower	N/A	N/A	556
EMCO	1050/ Turn Table	N/A	N/A	114
HD GmbH	HD 100/ Controller	N/A	N/A	13
HD GmbH	KMS 560/ SlideBar	N/A	N/A	12
Rohde & Schwarz	SCU-18/ Signal Conditioning Unit	Annual	09/10/2014	10094
MITEQ	AMF-6B-180265-35-10P / POWER AMP	Annual	04/16/2014	667624
CERNEX	CBL26405040 / POWER AMP	Annual	04/16/2014	19660
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	07/05/2015	1151
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	Biennial	10/30/2014	BBHA9170124
Rohde & Schwarz	FSP / Spectrum Analyzer	Annual	02/08/2014	839117/011
Agilent	N1911A /Power Meter	Annual	01/22/2014	MY45100523
Agilent	N1921A /POWER SENSOR	Annual	07/11/2014	MY45241059
Wainwright Instrument	WHF3.0/18G-10EF / High Pass Filter	Annual	02/08/2014	F6
Wainwright Instrument	WHNX6.0/26.5G-6SS / High Pass Filter	Annual	04/16/2014	1
Wainwright Instrument	WHNX7.0/18G-8SS / High Pass Filter	Annual	04/16/2014	29
Wainwright Instrument	WRCJ2400/2483.5-2370/2520-60/14SS / Band Reject Filter	Annual	03/19/2014	1
Hewlett Packard	11636B/Power Divider	Annual	10/22/2014	11377
Agilent	87300B/Directional Coupler	Annual	12/24/2013	3116A03621
Hewlett Packard	11667B / Power Splitter	Annual	05/29/2014	05001
DIGITAL	EP-3010 /DC POWER SUPPLY	Annual	10/29/2014	3110117
ITECH	IT6720 / DC POWER SUPPLY	Annual	11/05/2014	010002156287001199
TESCOM	TC-3000C / BLUETOOTH TESTER	Annual	04/24/2014	3000C000276
Rohde & Schwarz	CBT / BLUETOOTH TESTER	Annual	04/25/2014	100422
EMCO	6502.LOOP ANTENNA	Biennial	01/11/2014	9009-2536
CERNEX	CBLU1183540 / POWER AMP	Annual	07/24/2014	21691
Agilent	8493C / Attenuator(10 dB)	Annual	07/24/2014	76649
WEINSCHL	2-3 / Attenuator(3 dB)	Annual	10/28/2014	BR0617