

HCT CO., LTD.

CERTIFICATE OF COMPLIANCE

FCC Certification

Applicant Name:
LG Electronics Inc.

Address:
19-1 Cheongho-ri, Jinwi-myeon, Pyeongteak-si,
Gyeonggi-do, 451-713, Korea

Date of Issue:

December 12, 2013

Test Site/Location:

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

Report No.: HCTR1312FR12-1

HCT FRN: 0005866421

IC Recognition No.: 5944A-3

FCC ID : BEJLGSWF41
IC : 2703H-LGSWF41
APPLICANT : LG Electronics Inc.

FCC/ IC Model(s): LGSWF41

EUT Type: WIFI Module

Max. RF Output Power:

Ant.0: Wi-Fi 802.11a (5180~5240) (11.91 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (11.92 dBm)/
Wi-Fi 802.11n_40 MHz BW(5190~5230) (13.95 dBm)/
Wi-Fi 802.11ac (5180~5240) (11.89 dBm)/ Wi-Fi 802.11ac (5190~5230) (13.49 dBm/
Wi-Fi 802.11ac (5210) (10.14 dBm)

Ant.1: Wi-Fi 802.11a (5180~5240) (11.29 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (11.92 dBm)/
Wi-Fi 802.11n_40 MHz BW(5190~5230) (13.68 dBm)/
Wi-Fi 802.11ac (5180~5240) (11.45 dBm)/ Wi-Fi 802.11ac (5190~5230) (13.20 dBm/
Wi-Fi 802.11ac (5210) (9.35 dBm)

Frequency Range: 20 MHz BW: 5180 MHz - 5240 MHz (UNII 1)

40 MHz BW: 5190 MHz - 5230 MHz (UNII 1)

80 MHz BW: 5210 MHz(UNII 1)

Modulation type OFDM

FCC Classification: Unlicensed National Information Infrastructure(UNII)

FCC Rule Part(s): Part 15.407

IC Rule : RSS-210 , RSS-GEN

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
: Jong Seok Lee
Test engineer of RF Team



Approved by
: Chang Seok Choi
Manager of RF Team

This report only responds to the tested sample and may not be reproduced, except in full, without written approval of the HCT Co., Ltd.

FCC PT.15.407 TEST REPORT		FCC & IC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1312FR12	December 11, 2013	- First Approval Report
HCTR1312FR12-1	December 12, 2013	-Revision page 7 sector 6. Antenna requirements (combine antenna is calculated)

Table of Contents

1. GENERAL INFORMATION	4
2. EUT DESCRIPTION	4
3. TEST METHODOLOGY	5
3.1 EUT CONFIGURATION	5
3.2 EUT EXERCISE	5
3.3 GENERAL TEST PROCEDURES	5
3.4 DESCRIPTION OF TEST MODES	5
4. INSTRUMENT CALIBRATION.....	6
5. FACILITIES AND ACCREDITATIONS	6
5.1 FACILITIES	6
5.2 EQUIPMENT	6
6. ANTENNA REQUIREMENTS	7
7. SUMMARY OF TEST RESULTS	8
8. TEST RESULT	9
8.1 DUTY CYCLE.....	9
8.2 26 dB BANDWIDTH MEASUREMENT	12
8.3 99% BANDWIDTH MEASUREMENT.....	23
8.4 OUTPUT POWER MEASUREMENT.....	34
8.5 POWER SPECTRAL DENSITY	64
8.6 PEAK EXCURSION RATIO.....	75
8.7 FREQUENCY STABILITY.	91
8.8 RADIATED MEASUREMENT.....	97
8.8.1 RADIATED SPURIOUS EMISSIONS.....	97
8.8.2 RECEIVER SPURIOUS EMISSIONS.....	117
8.8.3 RADIATED RESTRICTED BAND EDGE MEASUREMENTS	118
8.9 POWERLINE CONDUCTED EMISSIONS	121
9. LIST OF TEST EQUIPMENT	126

1. GENERAL INFORMATION

Applicant: LG Electronics Inc.
Address: 19-1 Cheongho-ri, Jinwi-myeon, Pyeongteak-si, Gyeonggi-do, 451-713, Korea
FCC ID: BEJLGSWF41
IC 2703H-LGSWF41
EUT Type: WIFI Module
FCC/ IC Model name(s): LGSWF41
Date(s) of Tests: November 29, 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	WIFI Module	
FCC/ IC Model Name	LGSWF41	
Power Supply	DC 3.3 V	
Frequency Range	TX_20 MHz BW:	5180 MHz - 5240 MHz (UNII 1)
	40 MHz BW:	5190 MHz - 5230 MHz (UNII 1)
	80 MHz BW:	5210 MHz(UNII 1)
	RX_20 MHz BW:	5180 MHz - 5240 MHz (UNII 1)
	40 MHz BW:	5190 MHz - 5230 MHz (UNII 1)
	80 MHz BW:	5210 MHz(UNII 1)
Max. RF Output Power:	Ant.0:	Wi-Fi 802.11a (5180~5240) (11.91 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (11.92 dBm)/ Wi-Fi 802.11n_40 MHz BW(5190~5230) (13.95 dBm)/ Wi-Fi 802.11ac (5180~5240) (11.89 dBm)/ Wi-Fi 802.11ac (5190~5230) (13.49 dBm)/ Wi-Fi 802.11ac (5210) (10.14 dBm)
	Ant.1:	Wi-Fi 802.11a (5180~5240) (11.29 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (11.92 dBm)/ Wi-Fi 802.11n_40 MHz BW(5190~5230) (13.68 dBm)/ Wi-Fi 802.11ac (5180~5240) (11.45 dBm)/ Wi-Fi 802.11ac (5190~5230) (13.20 dBm)/ Wi-Fi 802.11ac (5210) (9.35 dBm)
Modulation Type	OFDM(802.11a, 802.11n, 802.11ac)	
Antenna Specification	Ant.0:	Manufacturer: LG Innotek Antenna type: PCB Antenna Peak Gain : 2.93 dBi
	Ant.1:	Manufacturer: LG Innotek Antenna type: PCB Antenna Peak Gain : 2.49 dBi
	Directional Antenna Gain	5.723 dBi(802.11a_5.2 GHz) 2.716 dBi(802.11n/ac_5.2 GHz)

Note : The EUT incorporates a MIMO function with 802.11a, 802.11n and 802.11ac.

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. For 802.11ac, KDB644545 D01 v01r01 dated April 08, 2013.

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.

FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

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 March 02, 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."

FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

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)

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

FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

7. SUMMARY OF TEST RESULTS

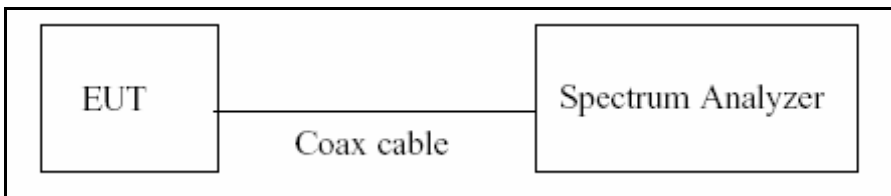
Test Description	IC Part Section(s)	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26dB Bandwidth(FCC) Occupied Bandwidth(IC)	RSS-210 [A9.2]	NA	NA	CONDUCTED	NA
Maximum Conducted Output Power	RSS-210 [A9.2]	§15.407(a)(1)	$< 4+10 \log_{10} (BW) \text{ dBm}$ (5150-5250 MHz)(FCC) $< 10+10 \log_{10} (BW) \text{ dBm}$ (5150-5250 MHz)(IC)		PASS
Peak Power Spectral Density	RSS-210 [A9.2]	§15.407(a)(1), (5)	$< 4 \text{ dBm/ MHz}$ (5150-5250)(FCC) $< 4 \text{ dBm/ MHz}$ (5150-5250)(IC)		PASS
Peak Excursion	NA	§15.407(a)(6)	$< 13 \text{ dB/ MHz}$ maximum difference		PASS
Frequency Stability	NA	§15.407(g)	NA		NA
AC Conducted Emissions 150 kHz-30 MHz	RSS-GEN, Section 7.2.2	15.207	$< \text{FCC 15.207 limits}$		NA
Undesirable Emissions	RSS-210 [A8.5]	§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)	RSS-GEN, Section 7.2.3	15.205, 5.407(b)(1), (5), (6)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS
Receiver Spurious Emissions	RSS-GEN, Section 7.2.3	§15.109	cf. Section 8.5.3		PASS

8. TEST RESULT

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 = $10 \cdot \log(1/\text{Duty Cycle})$

FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

▣ Duty Cycle Factor_Ant.0 and Ant.1

Mode	Data Rate	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor
802.11a Mode	6	2.060	2.170	0.94930876	0.226
	9	1.375	1.450	0.94827586	0.231
	12	1.040	1.095	0.94977169	0.224
	18	0.702	0.736	0.95380435	0.205
	24	0.530	0.558	0.94982079	0.224
	36	0.363	0.386	0.94041451	0.267
	48	0.275	0.298	0.92281879	0.349
	54	0.248	0.270	0.91851852	0.369
802.11n Mode 20 MHz BW	6.5	1.915	2.015	0.95037221	0.221
	13	0.975	1.026	0.95029240	0.221
	19.5	0.662	0.696	0.95114943	0.218
	26	0.507	0.530	0.95660377	0.193
	39	0.351	0.374	0.93850267	0.276
	52	0.272	0.295	0.92203390	0.353
	58.5	0.247	0.270	0.91481481	0.387
	65	0.228	0.250	0.91200000	0.400
802.11n Mode 40 MHz BW	13.5	0.942	1.041	0.90489914	0.434
	27	0.491	0.540	0.90925926	0.413
	40.5	0.339	0.372	0.91129032	0.403
	54	0.264	0.286	0.92307692	0.348
	81	0.187	0.210	0.89047619	0.504
	108	0.151	0.174	0.86781609	0.616
	121.5	0.140	0.162	0.86419753	0.634
	135	0.127	0.150	0.84666667	0.723

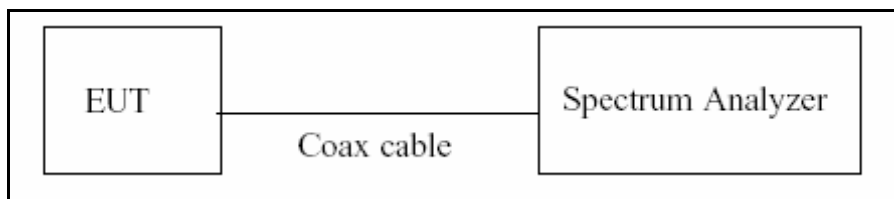
Mode	Data Rate	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11ac_20 MHz BW	6.5	1.925	1.955	0.98465473	0.067
	13	0.980	1.010	0.97029703	0.131
	19.5	0.670	0.698	0.95988539	0.178
	26	0.510	0.538	0.94795539	0.232
	39	0.356	0.383	0.92950392	0.317
	52	0.275	0.303	0.90759076	0.421
	58.5	0.251	0.279	0.89964158	0.459
	65	0.231	0.259	0.89189189	0.497
	78	0.198	0.227	0.87224670	0.594
802.11ac_40 MHz BW	13.5	0.947	0.978	0.96830266	0.140
	27	0.493	0.523	0.94263862	0.257
	40.5	0.342	0.371	0.92183288	0.353
	54	0.267	0.295	0.90508475	0.433
	81	0.191	0.219	0.87214612	0.594
	108	0.156	0.183	0.85245902	0.693
	121.5	0.143	0.171	0.83625731	0.777
	135	0.131	0.159	0.82389937	0.841
	162	0.115	0.143	0.80419580	0.946
	180	0.111	0.139	0.79856115	0.977
802.11ac_80 MHz BW	29.3	0.458	0.764	0.59947644	2.222
	58.5	0.251	0.425	0.59058824	2.287
	87.8	0.179	0.303	0.59075908	2.286
	117	0.147	0.251	0.58565737	2.324
	175.5	0.112	0.195	0.57435897	2.408
	234	0.095	0.169	0.56213018	2.502
	263.3	0.087	0.115	0.75652174	1.212
	292.5	0.084	0.111	0.75675676	1.210
	351	0.076	0.103	0.73786408	1.320
	390	0.072	0.099	0.72727273	1.383

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 %.

Ant.0

■ TEST RESULTS

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	19.88	N/A	Pass
5200	40	20.08	N/A	Pass
5240	48	19.94	N/A	Pass

■ TEST RESULTS

20 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.			
5180	36	20.23	N/A	Pass
5200	40	20.16	N/A	Pass
5240	48	20.10	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	39.68	N/A	Pass
5230	46	39.60	N/A	Pass

TEST RESULTS

20 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11ac

802.11ac Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	20.18	N/A	Pass
5200	40	20.31	N/A	Pass
5240	48	20.14	N/A	Pass

40 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11ac

802.11ac Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	39.54	N/A	Pass
5230	46	39.68	N/A	Pass

80 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11ac

802.11ac Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5210	42	82.56	N/A	Pass

Note :

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

Ant.1

■ TEST RESULTS

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	19.82	N/A	Pass
5200	40	19.93	N/A	Pass
5240	48	20.05	N/A	Pass

■ TEST RESULTS

20 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.			
5180	36	20.32	N/A	Pass
5200	40	20.21	N/A	Pass
5240	48	20.35	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	39.58	N/A	Pass
5230	46	39.83	N/A	Pass

■ TEST RESULTS

20 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11ac

802.11ac Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	20.27	N/A	Pass
5200	40	20.29	N/A	Pass
5240	48	20.26	N/A	Pass

40 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11ac

802.11ac Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	39.84	N/A	Pass
5230	46	39.75	N/A	Pass

80 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11ac

802.11ac Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5210	42	82.29	N/A	Pass

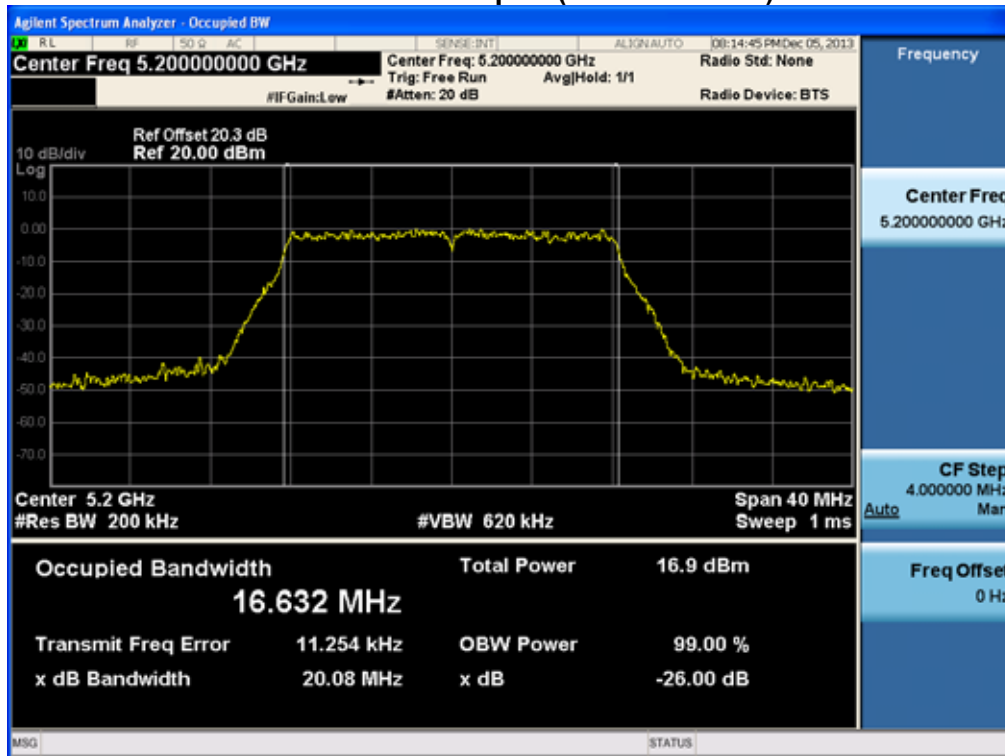
Note :

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

Ant.0

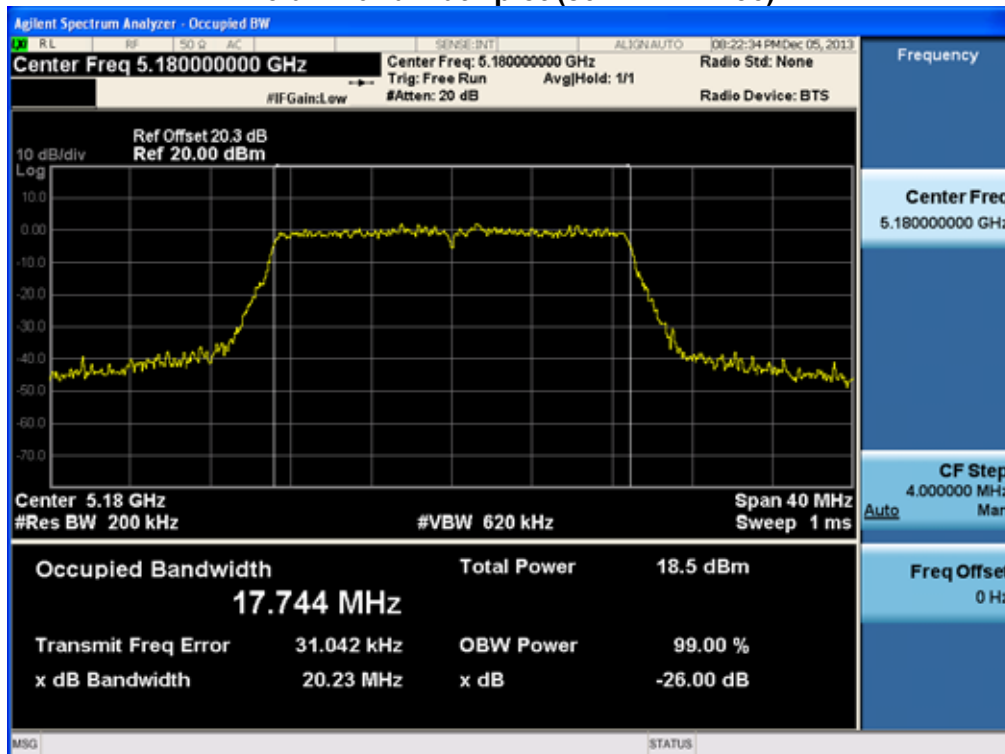
RESULT PLOTS

26 dB Bandwidth plot (802.11a-CH 40)



20 MHz BW

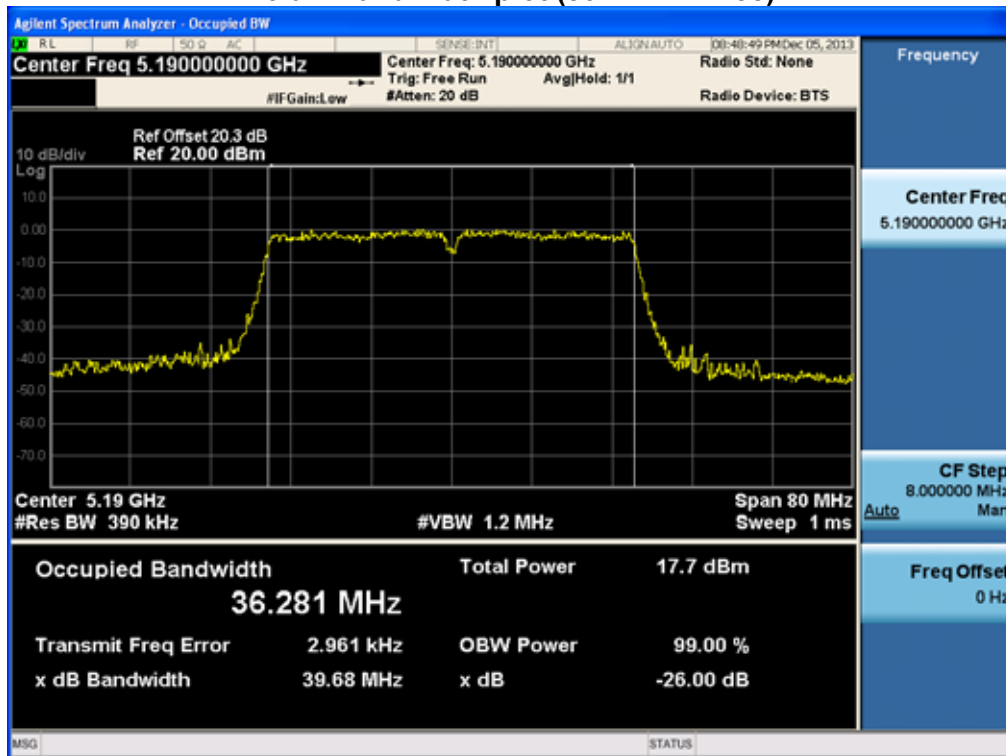
26 dB Bandwidth plot (802.11n-CH 36)



FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

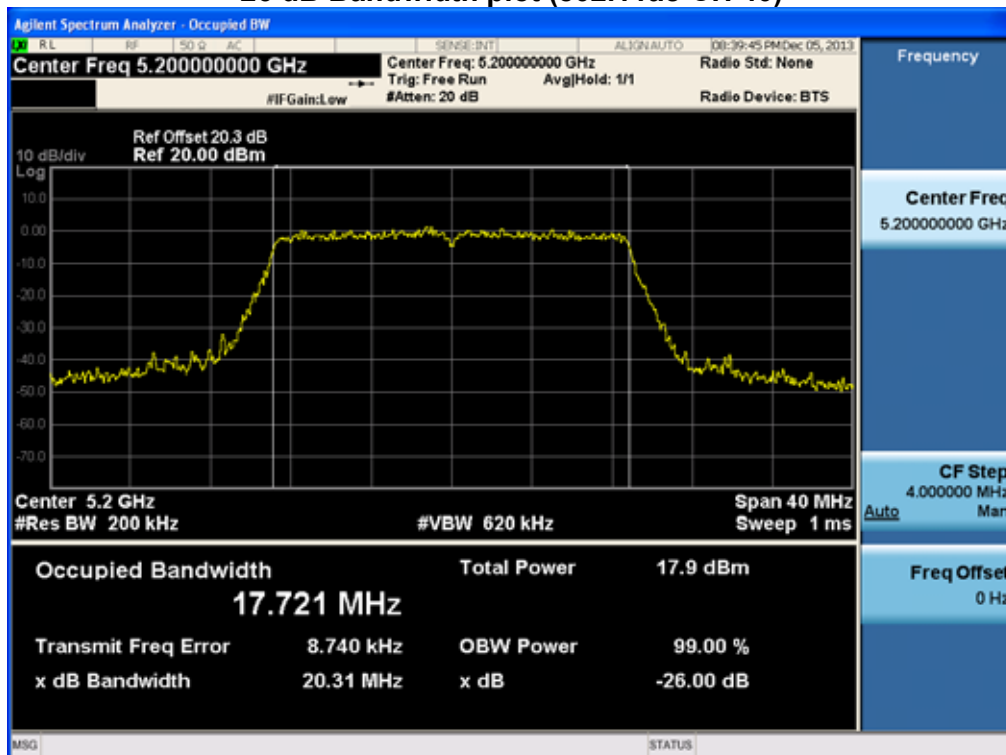
40 MHz BW

26 dB Bandwidth plot (802.11n-CH 38)



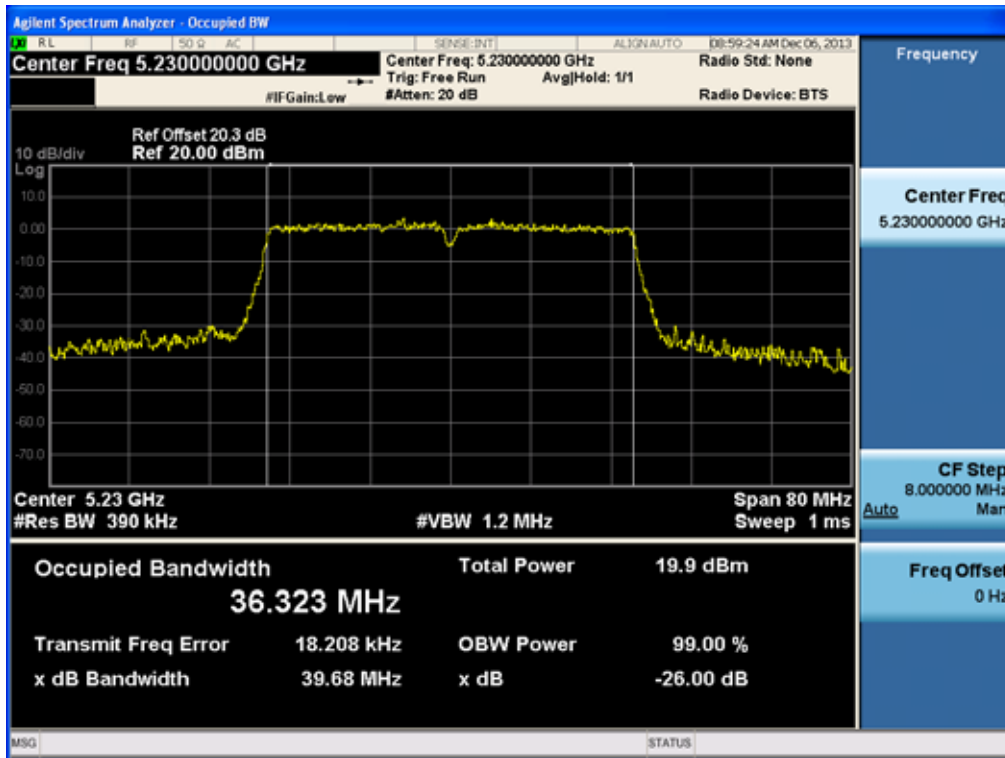
20 MHz BW

26 dB Bandwidth plot (802.11ac-CH 40)



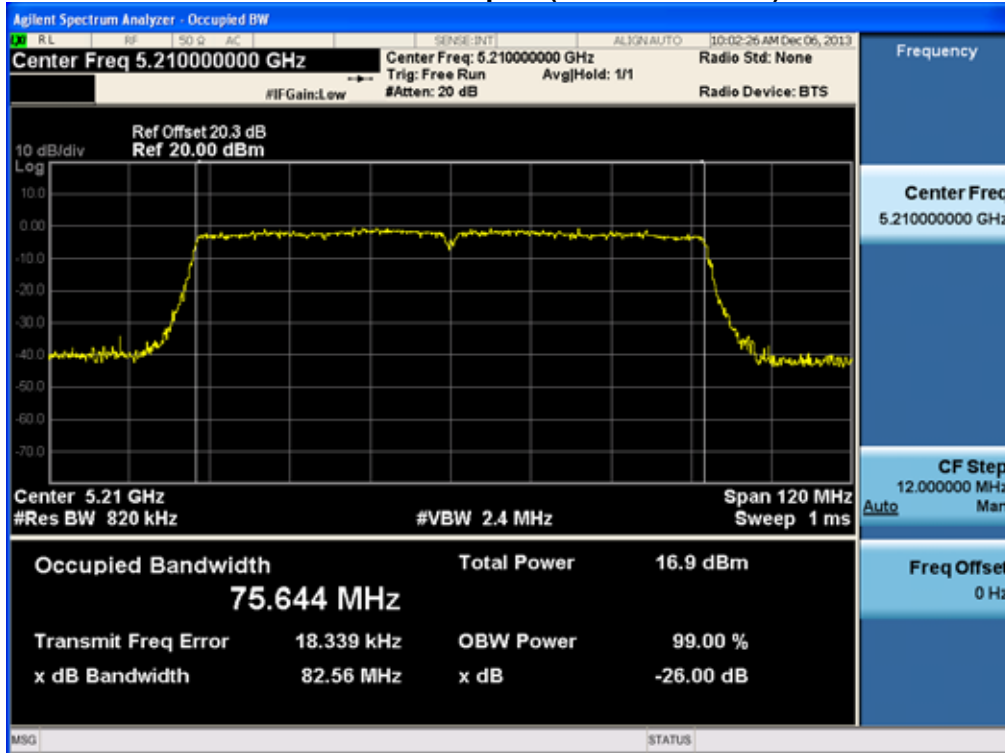
40 MHz BW

26 dB Bandwidth plot (802.11ac-CH 46)



80 MHz BW

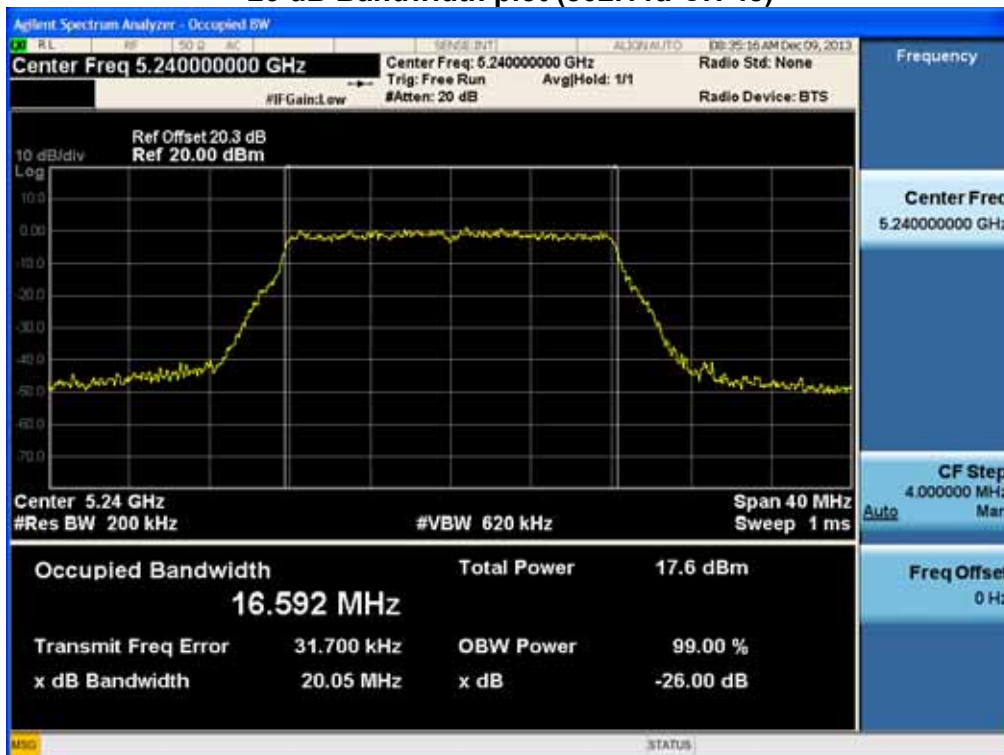
26 dB Bandwidth plot (802.11ac-CH 42)



Ant.1

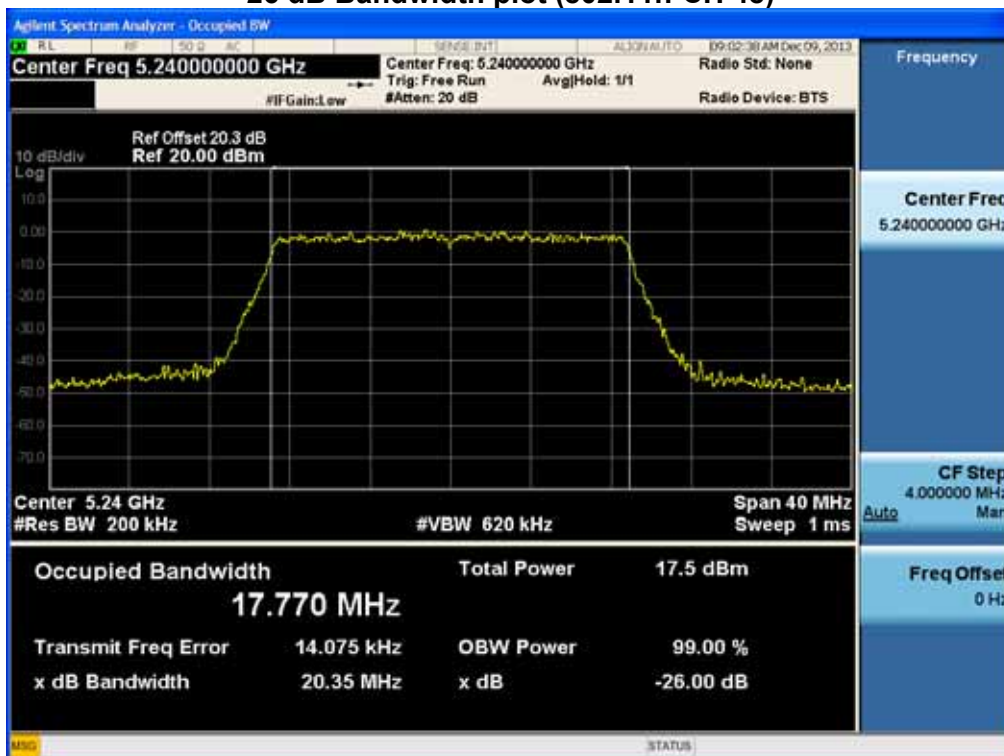
RESULT PLOTS

26 dB Bandwidth plot (802.11a-CH 48)



20 MHz BW

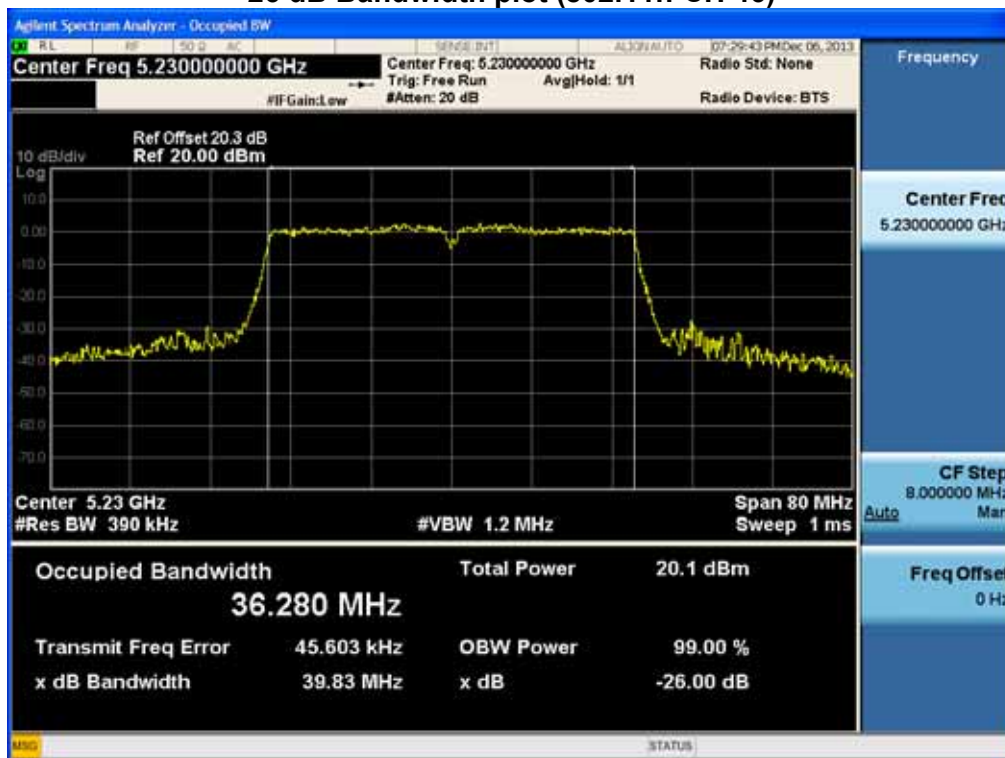
26 dB Bandwidth plot (802.11n-CH 48)



FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

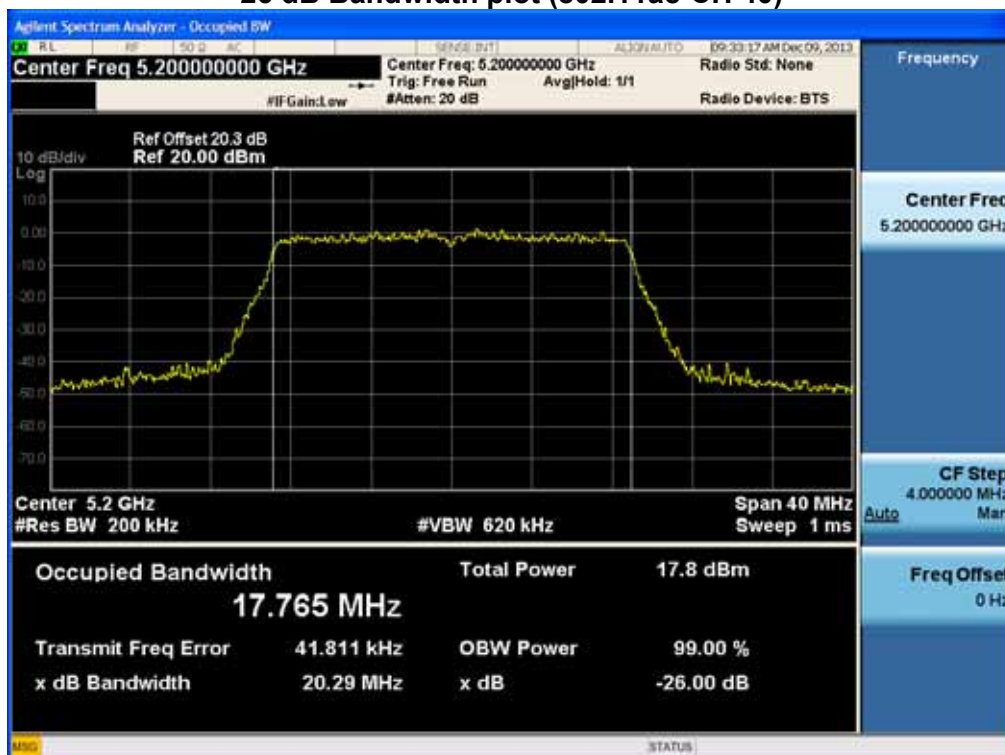
40 MHz BW

26 dB Bandwidth plot (802.11n-CH 46)



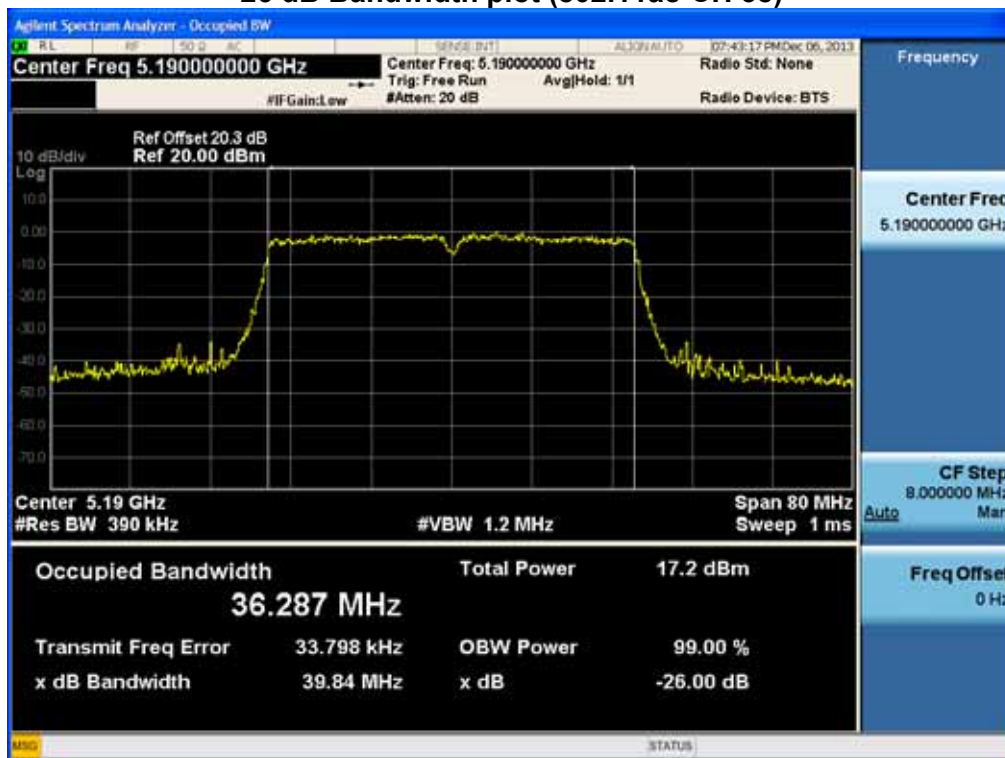
20 MHz BW

26 dB Bandwidth plot (802.11ac-CH 40)



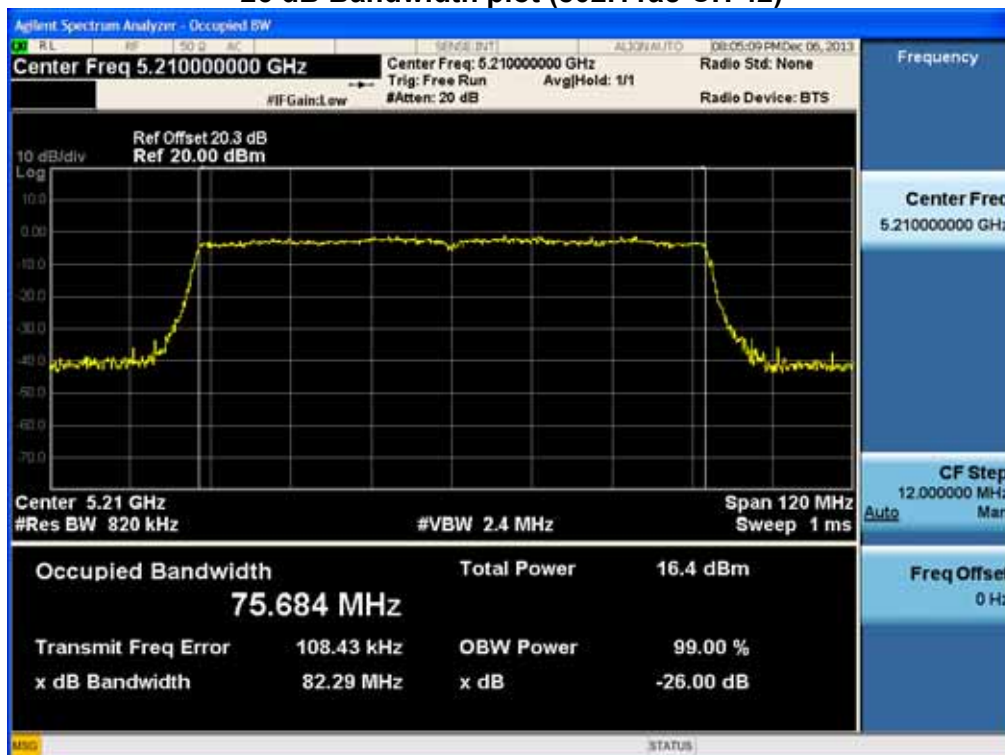
40 MHz BW

26 dB Bandwidth plot (802.11ac-CH 38)



80 MHz BW

26 dB Bandwidth plot (802.11ac-CH 42)

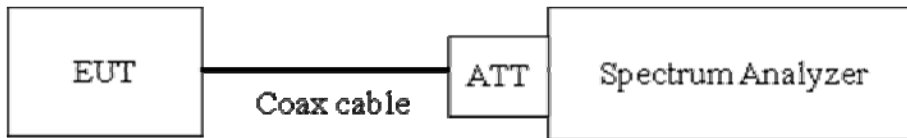


8.3 99% BANDWIDTH MEASUREMENT

limit

None; for reporting purposes only

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RBW = 1% to 3% of the total span

VBW $\geq 3 \times$ RBW

Detector = Peak

Trace mode = max hold

Sweep = auto couple

Allow the trace to stabilize

▣ TEST RESULTS_Ant.0

Conducted 99% Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	16.805
5200	40	16.847
5240	48	16.834

Conducted 99% Bandwidth Measurements for 802.11n_20 MHz BW

802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	17.882
5200	40	17.882
5240	48	17.885

Conducted 99% Bandwidth Measurements for 802.11n_40 MHz BW

802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5190	38	36.510
5230	46	36.504

Conducted 99% Bandwidth Measurements for 802.11ac_20 MHz BW

802.11a Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	17.902
5200	40	17.862
5240	48	17.889

Conducted 99% Bandwidth Measurements for 802.11ac_40 MHz BW

802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5190	38	36.455
5230	46	36.526

Conducted 99% Bandwidth Measurements for 802.11ac_80 MHz BW

802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5210	42	75.646

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

■ TEST RESULTS_Ant.1

Conducted 99% Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	16.819
5200	40	16.811
5240	48	16.838

Conducted 99% Bandwidth Measurements for 802.11n_20 MHz BW

802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	17.863
5200	40	17.862
5240	48	17.871

Conducted 99% Bandwidth Measurements for 802.11n_40 MHz BW

802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5190	38	36.483
5230	46	36.502

Conducted 99% Bandwidth Measurements for 802.11ac_20 MHz BW

802.11a Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	17.867
5200	40	17.834
5240	48	17.889

Conducted 99% Bandwidth Measurements for 802.11ac_40 MHz BW

802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5190	38	36.438
5230	46	36.486

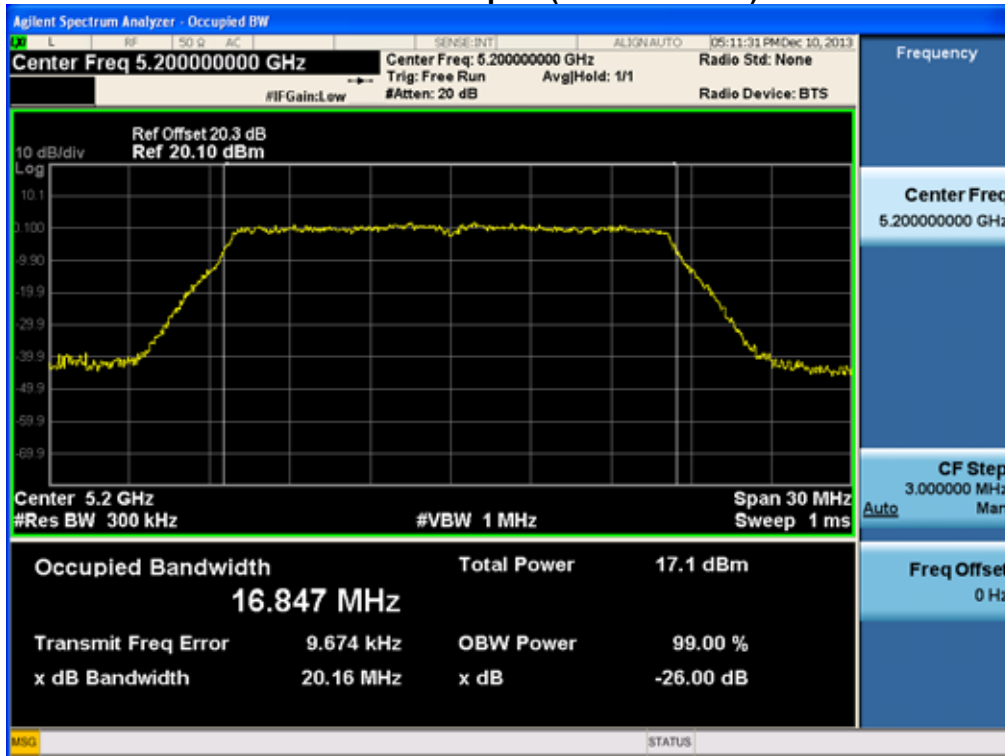
Conducted 99% Bandwidth Measurements for 802.11ac_80 MHz BW

802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5210	42	75.642

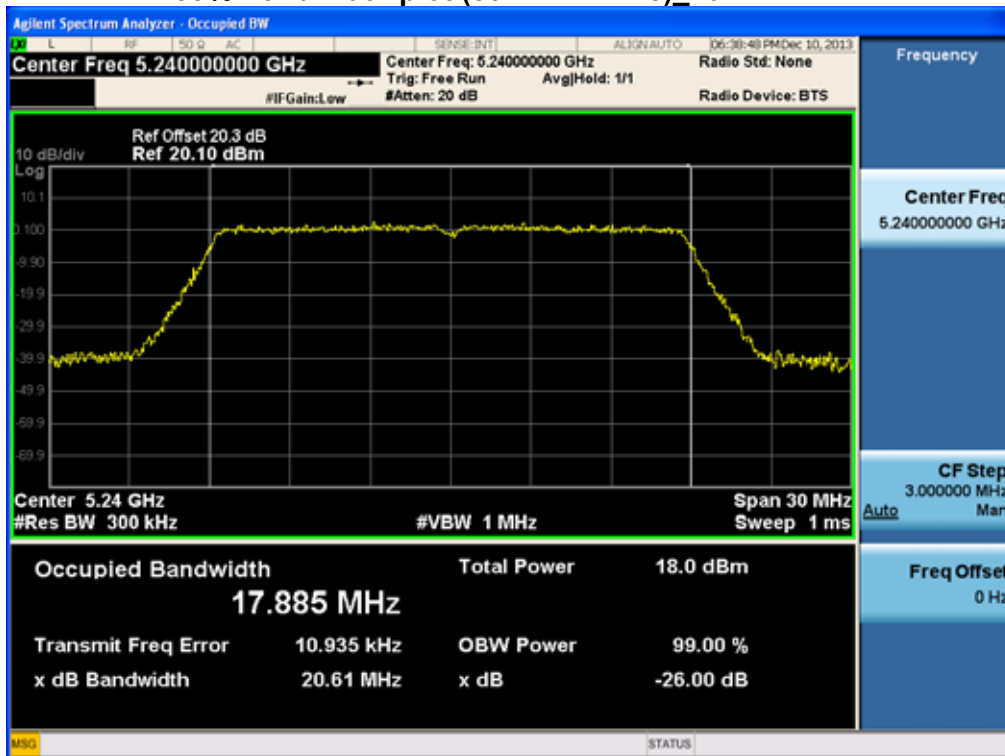
Note : In order to simplify the report, attached plots were only the most wide channel.

RESULT PLOTS_Ant.0

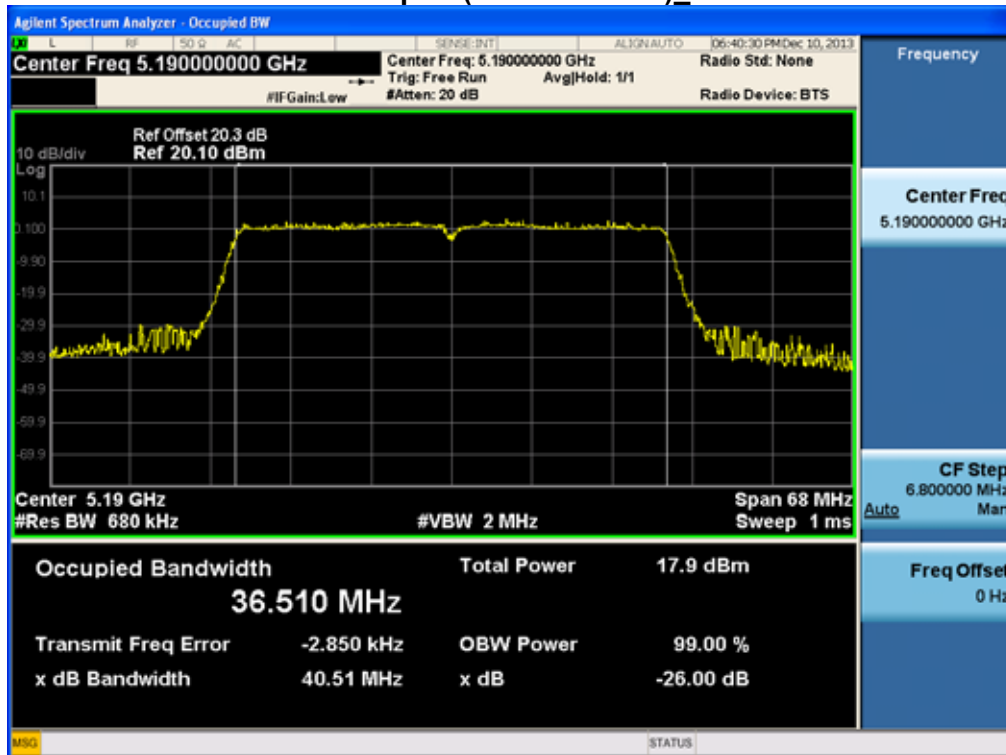
99% Bandwidth plot (802.11a-CH40)



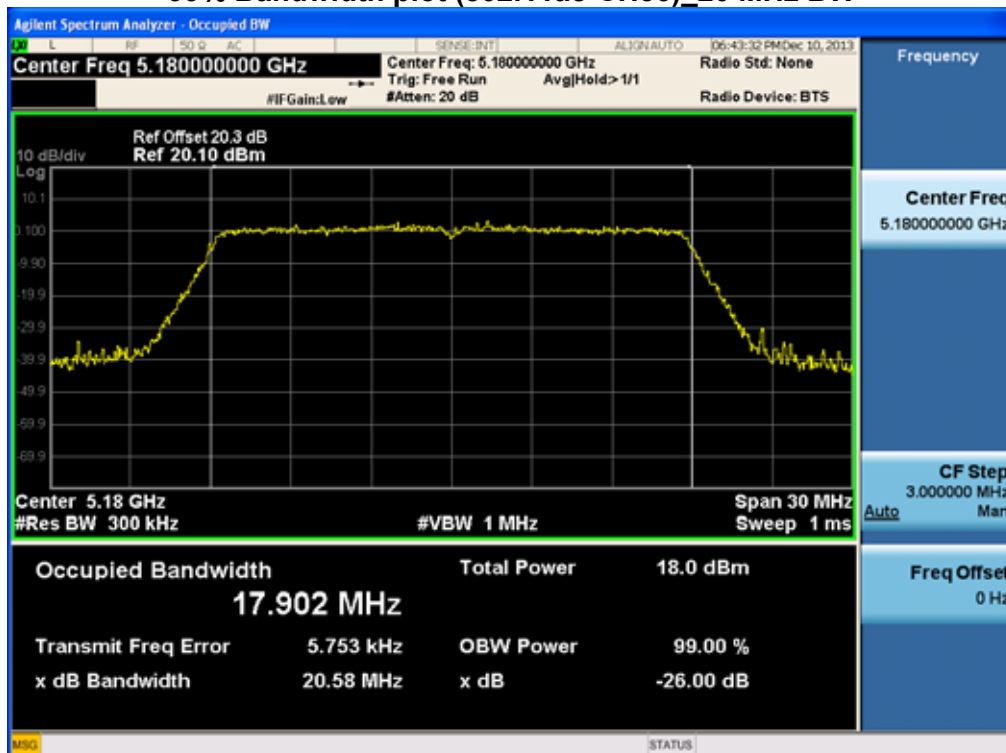
99% Bandwidth plot (802.11n-CH48)_20 MHz BW



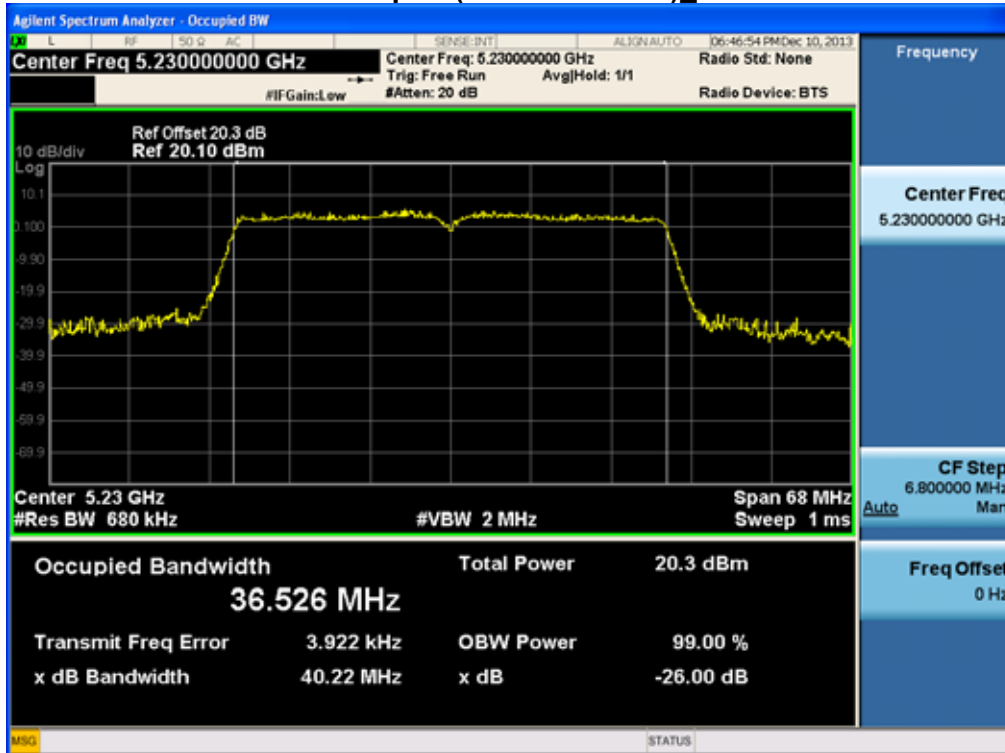
99% Bandwidth plot (802.11n-CH38)_40 MHz BW



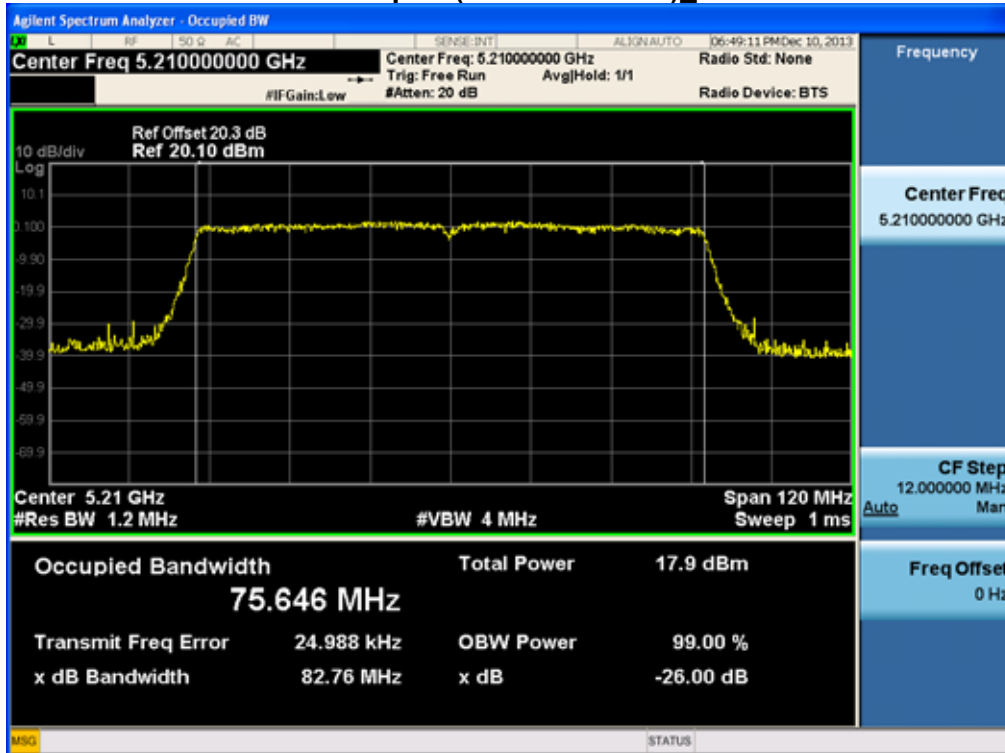
99% Bandwidth plot (802.11ac-CH36)_20 MHz BW



99% Bandwidth plot (802.11ac-CH46)_40 MHz BW

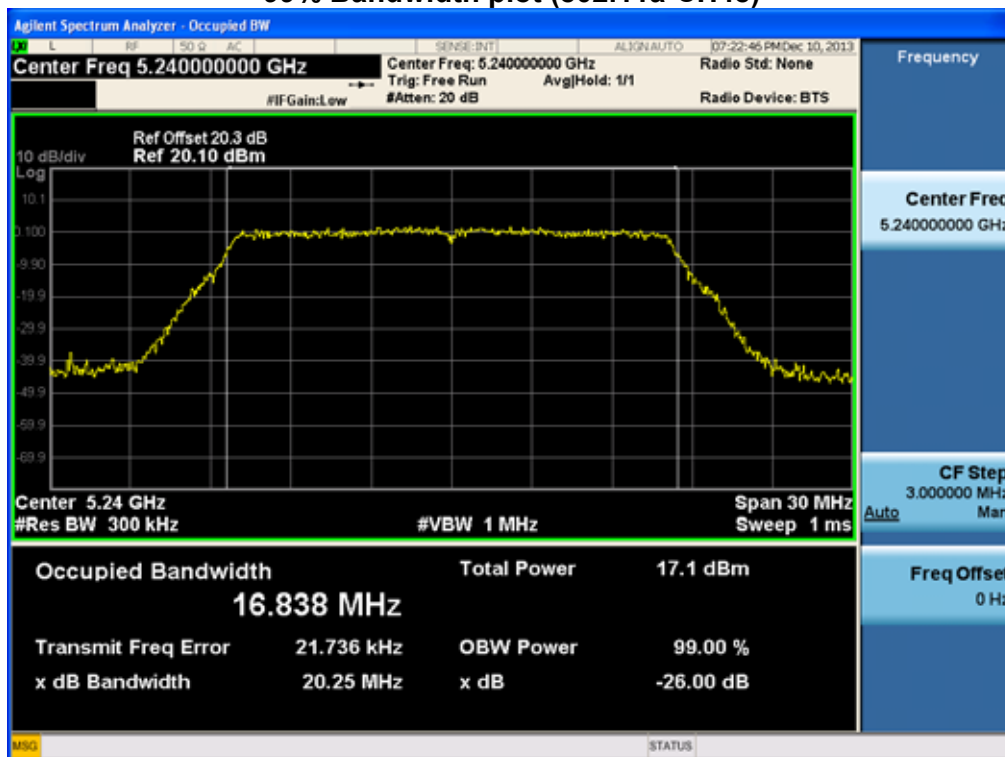


99% Bandwidth plot (802.11ac-CH42)_80 MHz BW

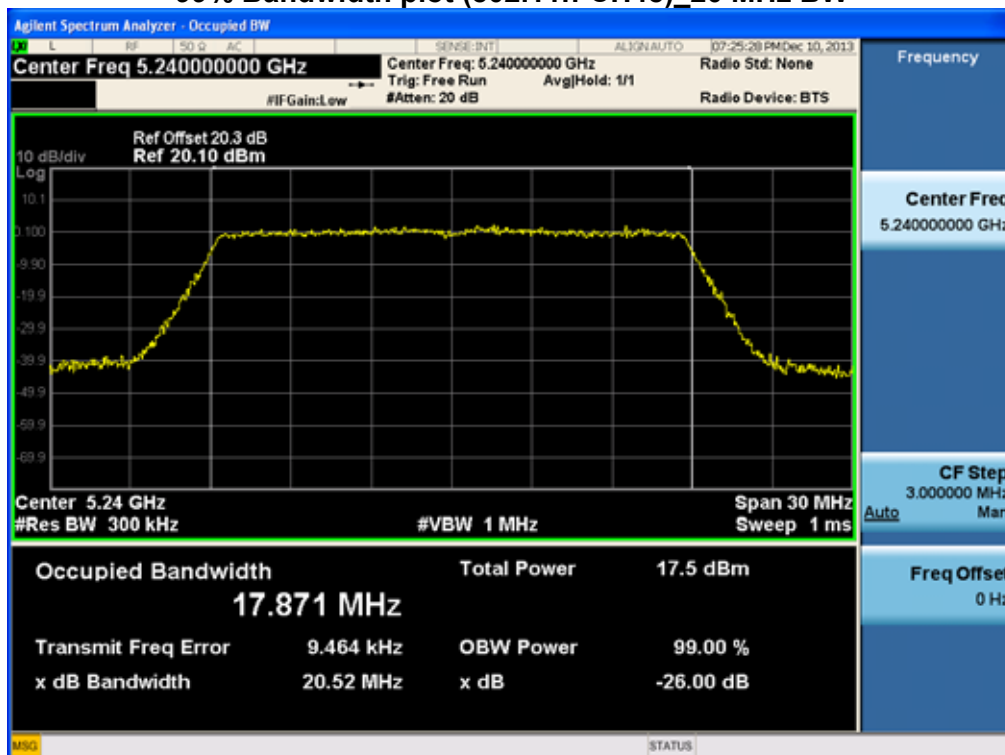


RESULT PLOTS_Ant.1

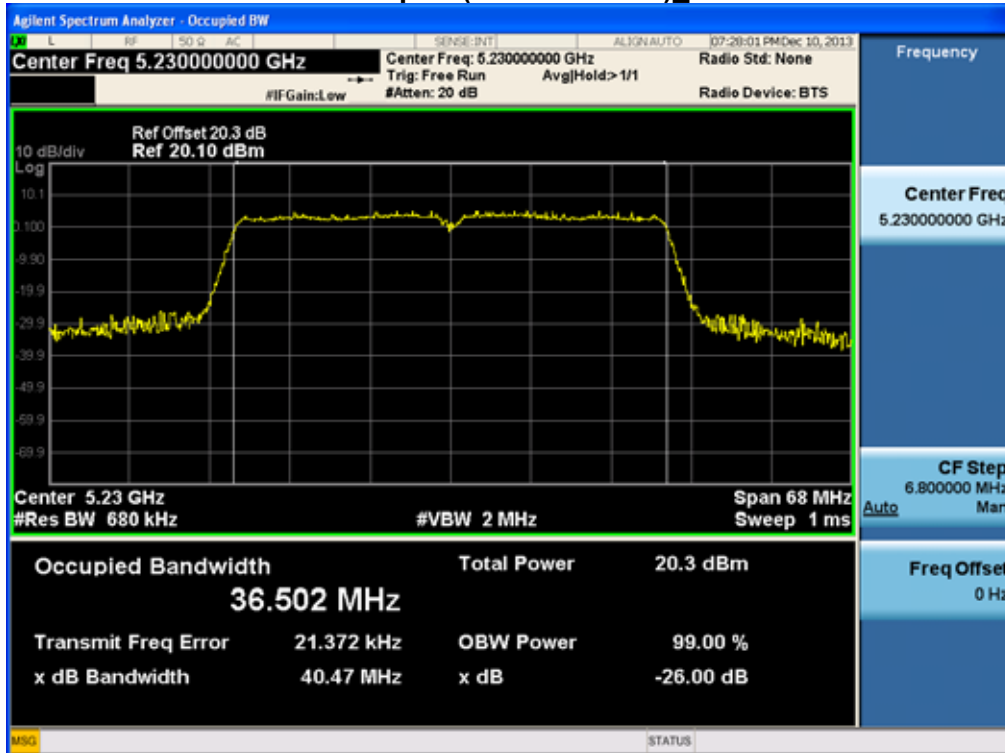
99% Bandwidth plot (802.11a-CH48)



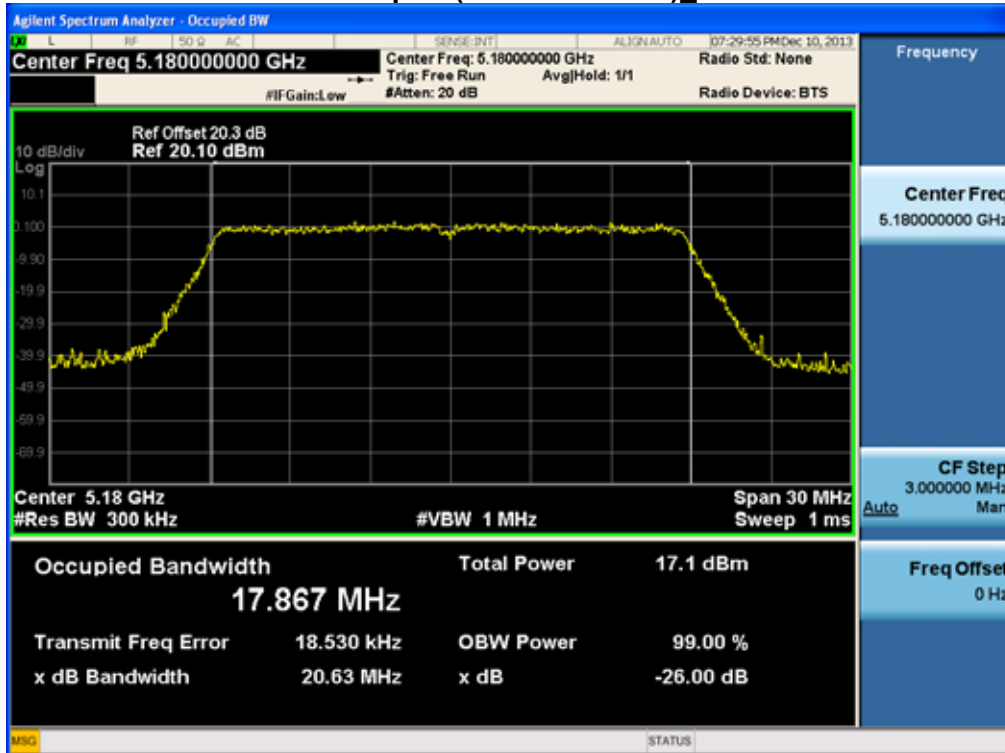
99% Bandwidth plot (802.11n-CH48)_20 MHz BW



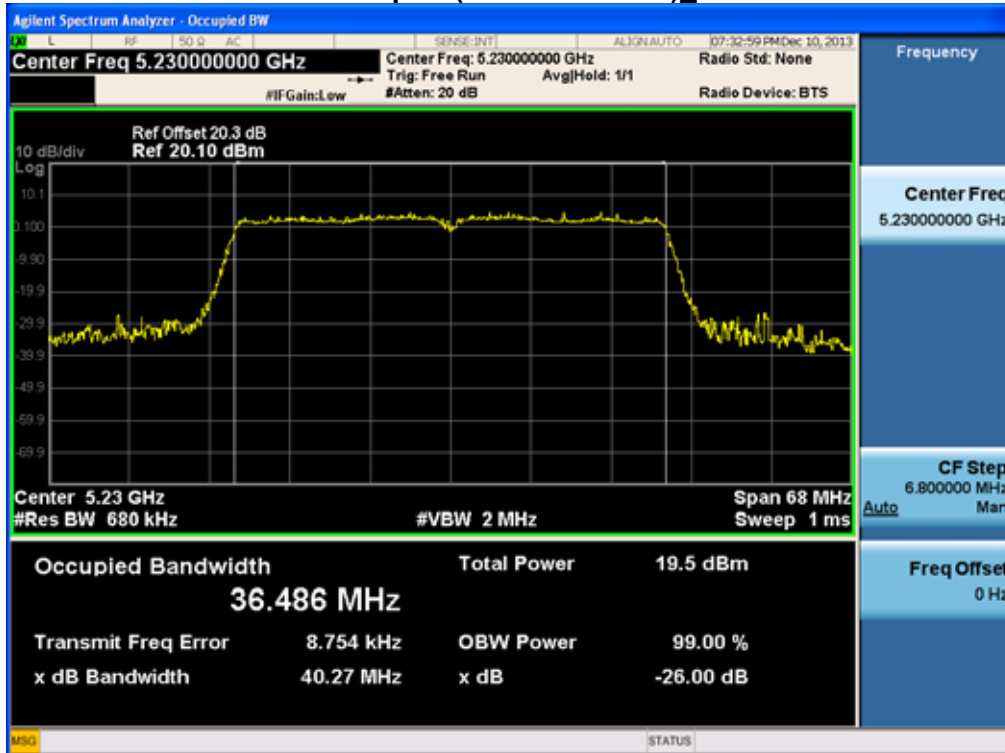
99% Bandwidth plot (802.11n-CH46)_40 MHz BW



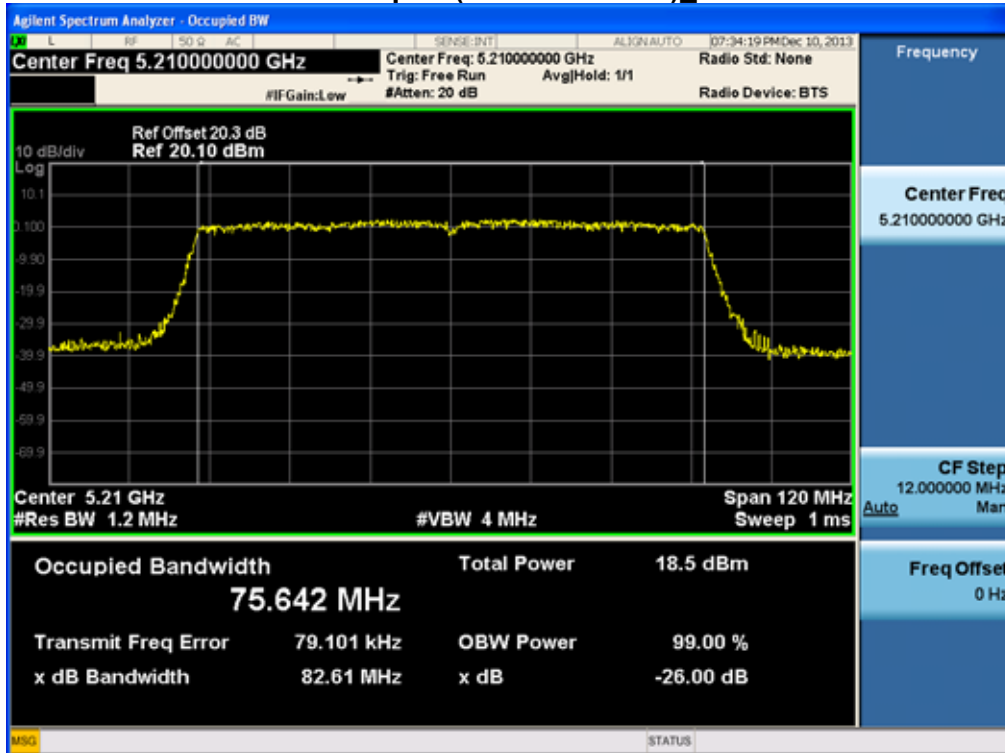
99% Bandwidth plot (802.11ac-CH36)_20 MHz BW



99% Bandwidth plot (802.11ac-CH46)_40 MHz BW



99% Bandwidth plot (802.11ac-CH42)_80 MHz BW



8.4 OUTPUT POWER MEASUREMENT

Test Requirements and limit,

§15.247(b)(3)

A transmitter antenna terminal of EUT is connected to the input of a Spectrum Analyzer. Measurement is made while the EUT is operating in transmission mode 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 $4 \text{ dBm} + 10 \log_{10} (26 \text{ dB BW})$ frequencies.

Limit : 802.11a_UNII-1 = 16.97 dBm

802.11n_UNII-1_20 MHz BW = 16.99 dBm

802.11n_UNII-1_40 MHz BW = 16.99 dBm

802.11ac_UNII-1_20 MHz BW = 16.99 dBm

802.11ac_UNII-1_40 MHz BW = 16.99 dBm

802.11ac_UNII-1_80 MHz BW = 16.99 dBm

RSS-210 [A9.2]

For band 5150-5250 MHz, the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log_{10} B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

Limit : 802.11a_UNII-1 = 22.25 dBm(e.i.r.p.)

802.11n_UNII-1_20 MHz BW = 22.52 dBm(e.i.r.p.)

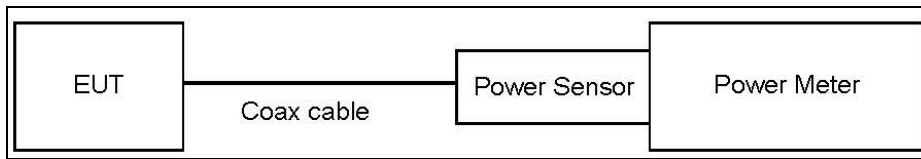
802.11n_UNII-1_40 MHz BW = 23.01 dBm(e.i.r.p.)

802.11ac_UNII-1_20 MHz BW = 22.51 dBm(e.i.r.p.)

802.11ac_UNII-1_40 MHz BW = 23.01 dBm(e.i.r.p.)

802.11ac_UNII-1_80 MHz BW = 23.01 dBm(e.i.r.p.)

■ TEST CONFIGURATION(20 MHz BW)



■ TEST PROCEDURE(20 MHz BW)

We tested according to Method E)3a) 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.

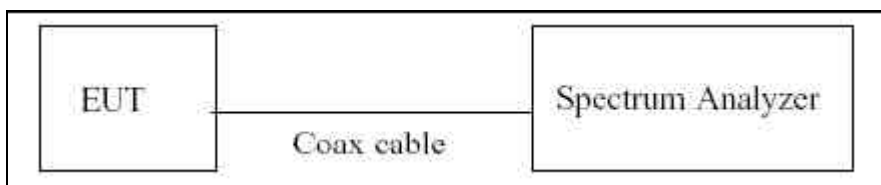
Note :

1. We apply to the offset in the 5.2 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table.

Band	Frequency(MHz)	Loss(dB)
UNII 1	5180	20.30
	5190	20.29
	5200	20.28
	5230	20.29
	5240	20.34

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

■ TEST CONFIGURATION(40 MHz BW & 80 MHz BW)



■ TEST PROCEDURE(40 MHz BW & 80 MHz BW)

The transmitter output is connected to the Spectrum Analyzer. We use the spectrum analyzer's integrated band power measurement function. We tested according to Method SA-2 in KDB 789033(issued 04/08/2013).

The Spectrum Analyzer is set to

▪ Average Power

1. Measure the duty cycle.
2. Set span to encompass the 26 dB EBW of the signal.

FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

3. RBW = 1 MHz.
4. VBW $\geq$ 3 MHz.
5. Number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$.
6. Sweep time = auto.
7. Detector = RMS.
8. Do not use sweep triggering. Allow the sweep to "free run".
9. Trace average at least 100 traces in power averaging(RMS) mode
10. Integrated bandwidth = OBW
11. 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.

▣ Sample Calculation

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

Output Power = 10 dBm + 20 dB + 0.8 dB + 0.21 dB = 31.01 dBm

Note :

1. Spectrum reading values are not plot data. The power 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 5.2 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table.

Band	Frequency(MHz)	Loss(dB)
UNII 1	5180	20.30
	5190	20.29
	5200	20.28
	5230	20.29
	5240	20.34

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

■ TEST RESULTS_Ant.0

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	10.87	0.226	11.10	16.97
		9	10.76	0.231	10.99	16.97
		12	10.78	0.224	11.01	16.97
		18	10.66	0.205	10.86	16.97
		24	10.75	0.224	10.98	16.97
		36	10.65	0.267	10.91	16.97
		48	10.66	0.349	11.01	16.97
		54	10.56	0.369	10.92	16.97
5200	40	6	10.60	0.226	10.82	16.97
		9	10.75	0.231	10.98	16.97
		12	10.74	0.224	10.96	16.97
		18	10.56	0.205	10.76	16.97
		24	10.59	0.224	10.81	16.97
		36	10.56	0.267	10.82	16.97
		48	10.55	0.349	10.89	16.97
		54	10.49	0.369	10.86	16.97
5240	48	6	11.68	0.226	11.91	16.97
		9	11.31	0.231	11.54	16.97
		12	11.52	0.224	11.75	16.97
		18	11.50	0.205	11.70	16.97
		24	11.45	0.224	11.67	16.97
		36	11.37	0.267	11.64	16.97
		48	11.53	0.349	11.88	16.97
		54	11.25	0.369	11.62	16.97

■ 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	10.01	0.226	10.24	16.97
		9	10.12	0.231	10.35	16.97
		12	10.06	0.224	10.29	16.97
		18	10.08	0.205	10.29	16.97
		24	10.06	0.224	10.29	16.97
		36	10.02	0.267	10.29	16.97
		48	10.05	0.349	10.40	16.97
		54	9.89	0.369	10.26	16.97
5200	40	6	10.06	0.226	10.28	16.97
		9	10.03	0.231	10.26	16.97
		12	10.01	0.224	10.23	16.97
		18	10.04	0.205	10.24	16.97
		24	9.92	0.224	10.15	16.97
		36	9.89	0.267	10.16	16.97
		48	10.03	0.349	10.38	16.97
		54	9.90	0.369	10.27	16.97
5240	48	6	10.99	0.226	11.22	16.97
		9	10.92	0.231	11.15	16.97
		12	11.03	0.224	11.26	16.97
		18	11.03	0.205	11.23	16.97
		24	10.99	0.224	11.21	16.97
		36	11.03	0.267	11.29	16.97
		48	10.79	0.349	11.14	16.97
		54	10.85	0.369	11.22	16.97

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

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	13.70	16.97
		9	13.69	16.97
		12	13.67	16.97
		18	13.60	16.97
		24	13.66	16.97
		36	13.62	16.97
		48	13.73	16.97
		54	13.62	16.97
5200	40	6	13.57	16.97
		9	13.64	16.97
		12	13.62	16.97
		18	13.52	16.97
		24	13.50	16.97
		36	13.51	16.97
		48	13.65	16.97
		54	13.59	16.97
5240	48	6	14.59	16.97
		9	14.36	16.97
		12	14.52	16.97
		18	14.49	16.97
		24	14.46	16.97
		36	14.48	16.97
		48	14.54	16.97
		54	14.43	16.97

■ TEST RESULTS_Ant.0

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	11.70	0.221	11.92	16.99
		13	11.46	0.221	11.68	16.99
		19.5	11.53	0.218	11.74	16.99
		26	11.42	0.193	11.61	16.99
		39	11.50	0.276	11.78	16.99
		52	11.48	0.353	11.84	16.99
		58.5	11.43	0.387	11.81	16.99
		65	11.35	0.400	11.75	16.99
5200	40	6.5	11.52	0.221	11.74	16.99
		13	11.51	0.221	11.73	16.99
		19.5	11.48	0.218	11.70	16.99
		26	11.44	0.193	11.64	16.99
		39	11.46	0.276	11.74	16.99
		52	11.37	0.353	11.73	16.99
		58.5	11.47	0.387	11.86	16.99
		65	11.29	0.400	11.69	16.99
5240	48	6.5	11.63	0.221	11.85	16.99
		13	11.62	0.221	11.84	16.99
		19.5	11.57	0.218	11.78	16.99
		26	11.45	0.193	11.64	16.99
		39	11.43	0.276	11.71	16.99
		52	11.40	0.353	11.75	16.99
		58.5	11.37	0.387	11.75	16.99
		65	11.22	0.400	11.62	16.99

■ 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	11.41	0.221	11.64	16.99
		13	11.64	0.221	11.86	16.99
		19.5	11.54	0.218	11.76	16.99
		26	11.60	0.193	11.80	16.99
		39	11.55	0.276	11.82	16.99
		52	11.46	0.353	11.81	16.99
		58.5	11.47	0.387	11.86	16.99
		65	11.52	0.400	11.92	16.99
5200	40	6.5	11.11	0.221	11.33	16.99
		13	11.30	0.221	11.52	16.99
		19.5	11.03	0.218	11.24	16.99
		26	11.14	0.193	11.33	16.99
		39	10.95	0.276	11.23	16.99
		52	11.06	0.353	11.41	16.99
		58.5	11.02	0.387	11.41	16.99
		65	10.96	0.400	11.36	16.99
5240	48	6.5	10.86	0.221	11.08	16.99
		13	10.97	0.221	11.20	16.99
		19.5	11.04	0.218	11.26	16.99
		26	11.06	0.193	11.25	16.99
		39	10.93	0.276	11.21	16.99
		52	10.89	0.353	11.24	16.99
		58.5	10.75	0.387	11.14	16.99
		65	10.83	0.400	11.23	16.99

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

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	14.79	16.99
		13	14.78	16.99
		19.5	14.76	16.99
		26	14.72	16.99
		39	14.81	16.99
		52	14.83	16.99
		58.5	14.85	16.99
		65	14.85	16.99
5200	40	6.5	14.55	16.99
		13	14.64	16.99
		19.5	14.49	16.99
		26	14.50	16.99
		39	14.50	16.99
		52	14.58	16.99
		58.5	14.65	16.99
		65	14.54	16.99
5240	48	6.5	14.49	16.99
		13	14.54	16.99
		19.5	14.54	16.99
		26	14.46	16.99
		39	14.48	16.99
		52	14.51	16.99
		58.5	14.47	16.99
		65	14.44	16.99

■ TEST RESULTS_Ant.0

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	10.85	0.434	11.28	16.99
		27	10.86	0.413	11.27	16.99
		40.5	10.65	0.403	11.05	16.99
		54	10.69	0.348	11.03	16.99
		81	10.81	0.504	11.32	16.99
		108	10.48	0.616	11.10	16.99
		121.5	10.66	0.634	11.29	16.99
		135	10.55	0.723	11.27	16.99
5230	46	13.5	13.35	0.434	13.78	16.99
		27	13.43	0.413	13.84	16.99
		40.5	13.42	0.403	13.82	16.99
		54	13.46	0.348	13.81	16.99
		81	13.41	0.504	13.91	16.99
		108	13.28	0.616	13.90	16.99
		121.5	13.25	0.634	13.89	16.99
		135	13.23	0.723	13.95	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	9.92	0.434	10.35	16.99
		27	10.15	0.413	10.56	16.99
		40.5	10.22	0.403	10.62	16.99
		54	10.14	0.348	10.48	16.99
		81	10.12	0.504	10.62	16.99
		108	10.01	0.616	10.62	16.99
		121.5	10.05	0.634	10.68	16.99
		135	9.85	0.723	10.57	16.99
5230	46	13.5	13.25	0.434	13.68	16.99
		27	13.22	0.413	13.63	16.99
		40.5	13.00	0.403	13.40	16.99
		54	13.23	0.348	13.57	16.99
		81	13.08	0.504	13.59	16.99
		108	12.99	0.616	13.60	16.99
		121.5	12.95	0.634	13.58	16.99
		135	12.91	0.723	13.64	16.99

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

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	13.85	16.99
		27	13.94	16.99
		40.5	13.85	16.99
		54	13.78	16.99
		81	13.99	16.99
		108	13.88	16.99
		121.5	14.01	16.99
		135	13.94	16.99
5230	46	13.5	16.74	16.99
		27	16.75	16.99
		40.5	16.63	16.99
		54	16.70	16.99
		81	16.76	16.99
		108	16.76	16.99
		121.5	16.75	16.99
		135	16.81	16.99

■ TEST RESULTS_Ant.0

Conducted Output Power Measurements (802.11ac _20 MHz BW Mode: 5180~5240)

802.11ac 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	11.63	0.067	11.70	16.99
		13	11.51	0.131	11.65	16.99
		19.5	11.55	0.178	11.73	16.99
		26	11.38	0.232	11.61	16.99
		39	11.35	0.317	11.66	16.99
		52	11.39	0.421	11.81	16.99
		58.5	11.23	0.459	11.69	16.99
		65	11.37	0.497	11.87	16.99
		78	11.27	0.594	11.87	16.99
5200	40	6.5	11.53	0.067	11.60	16.99
		13	11.55	0.131	11.68	16.99
		19.5	11.41	0.178	11.59	16.99
		26	11.61	0.232	11.84	16.99
		39	11.48	0.317	11.79	16.99
		52	11.30	0.421	11.72	16.99
		58.5	11.43	0.459	11.89	16.99
		65	11.20	0.497	11.70	16.99
		78	11.20	0.594	11.79	16.99
5240	48	6.5	11.51	0.067	11.58	16.99
		13	11.41	0.131	11.54	16.99
		19.5	11.55	0.178	11.73	16.99
		26	11.32	0.232	11.56	16.99
		39	11.46	0.317	11.78	16.99
		52	11.34	0.421	11.76	16.99
		58.5	11.29	0.459	11.75	16.99
		65	11.18	0.497	11.68	16.99
		78	11.03	0.594	11.62	16.99

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11ac _20 MHz BW Mode: 5180~5240)

802.11ac 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	11.17	0.067	11.23	16.99
		13	11.21	0.131	11.34	16.99
		19.5	11.03	0.178	11.20	16.99
		26	11.04	0.232	11.27	16.99
		39	11.01	0.317	11.33	16.99
		52	10.98	0.421	11.40	16.99
		58.5	10.96	0.459	11.42	16.99
		65	10.91	0.497	11.41	16.99
		78	10.86	0.594	11.45	16.99
5200	40	6.5	11.08	0.067	11.15	16.99
		13	11.09	0.131	11.22	16.99
		19.5	11.06	0.178	11.23	16.99
		26	11.07	0.232	11.30	16.99
		39	10.75	0.317	11.07	16.99
		52	10.73	0.421	11.15	16.99
		58.5	10.83	0.459	11.29	16.99
		65	10.76	0.497	11.26	16.99
		78	10.71	0.594	11.30	16.99
5240	48	6.5	11.12	0.067	11.18	16.99
		13	11.09	0.131	11.22	16.99
		19.5	10.95	0.178	11.13	16.99
		26	10.95	0.232	11.19	16.99
		39	10.93	0.317	11.25	16.99
		52	10.74	0.421	11.17	16.99
		58.5	10.77	0.459	11.23	16.99
		65	10.80	0.497	11.30	16.99
		78	10.63	0.594	11.22	16.99

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Conducted Output Power Measurements (802.11ac _20 MHz BW Mode: 5180~5240)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5180	36	6.5	14.48	16.99
		13	14.51	16.99
		19.5	14.49	16.99
		26	14.46	16.99
		39	14.51	16.99
		52	14.62	16.99
		58.5	14.57	16.99
		65	14.65	16.99
		78	14.68	16.99
5200	40	6.5	14.39	16.99
		13	14.47	16.99
		19.5	14.43	16.99
		26	14.59	16.99
		39	14.46	16.99
		52	14.46	16.99
		58.5	14.61	16.99
		65	14.49	16.99
		78	14.57	16.99
5240	48	6.5	14.39	16.99
		13	14.40	16.99
		19.5	14.45	16.99
		26	14.39	16.99
		39	14.53	16.99
		52	14.49	16.99
		58.5	14.51	16.99
		65	14.50	16.99
		78	14.44	16.99

■ TEST RESULTS_Ant.0

Conducted Output Power Measurements (802.11ac_40 MHz BW Mode: 5190~5230)

802.11ac 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	10.95	0.140	11.09	16.99
		27	10.88	0.257	11.14	16.99
		40.5	10.82	0.353	11.18	16.99
		54	10.76	0.433	11.19	16.99
		81	10.62	0.594	11.22	16.99
		108	10.50	0.693	11.19	16.99
		121.5	10.45	0.777	11.23	16.99
		135	10.40	0.841	11.25	16.99
		162	10.34	0.946	11.29	16.99
		180	10.19	0.977	11.17	16.99
5230	46	13.5	13.20	0.140	13.34	16.99
		27	13.22	0.257	13.48	16.99
		40.5	13.09	0.353	13.44	16.99
		54	12.99	0.433	13.43	16.99
		81	12.79	0.594	13.38	16.99
		108	12.76	0.693	13.45	16.99
		121.5	12.67	0.777	13.45	16.99
		135	12.62	0.841	13.46	16.99
		162	12.46	0.946	13.41	16.99
		180	12.51	0.977	13.49	16.99

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11ac_40 MHz BW Mode: 5190~5230)

802.11ac 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	10.46	0.140	10.60	16.99
		27	10.19	0.257	10.45	16.99
		40.5	10.10	0.353	10.46	16.99
		54	10.18	0.433	10.61	16.99
		81	10.03	0.594	10.63	16.99
		108	9.93	0.693	10.63	16.99
		121.5	9.77	0.777	10.54	16.99
		135	9.75	0.841	10.59	16.99
		162	9.63	0.946	10.58	16.99
		180	9.69	0.977	10.67	16.99
5230	46	13.5	12.81	0.140	12.95	16.99
		27	12.75	0.257	13.01	16.99
		40.5	12.68	0.353	13.03	16.99
		54	12.60	0.433	13.03	16.99
		81	12.47	0.594	13.06	16.99
		108	12.35	0.693	13.04	16.99
		121.5	12.34	0.777	13.11	16.99
		135	12.30	0.841	13.14	16.99
		162	11.96	0.946	12.90	16.99
		180	12.22	0.977	13.20	16.99

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Conducted Output Power Measurements (802.11ac_40 MHz BW Mode: 5190~5230)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5190	38	13.5	13.86	16.99
		27	13.82	16.99
		40.5	13.84	16.99
		54	13.92	16.99
		81	13.94	16.99
		108	13.93	16.99
		121.5	13.91	16.99
		135	13.94	16.99
		162	13.96	16.99
		180	13.94	16.99
5230	46	13.5	16.16	16.99
		27	16.26	16.99
		40.5	16.25	16.99
		54	16.24	16.99
		81	16.24	16.99
		108	16.26	16.99
		121.5	16.30	16.99
		135	16.31	16.99
		162	16.17	16.99
		180	16.35	16.99

■ TEST RESULTS_Ant.0

Conducted Output Power Measurements (802.11ac_80 MHz BW Mode: 5210)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5210	42	29.3	7.86	2.222	10.08	16.99
		58.5	7.74	2.287	10.02	16.99
		87.8	7.65	2.286	9.93	16.99
		117	7.82	2.324	10.14	16.99
		175.5	7.53	2.408	9.94	16.99
		234	7.53	2.502	10.03	16.99
		263.3	8.83	1.212	10.04	16.99
		292.5	8.73	1.210	9.94	16.99
		351	8.64	1.320	9.96	16.99
		390	8.61	1.383	9.99	16.99

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11ac_80 MHz BW Mode: 5210)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5210	42	29.3	7.11	2.222	9.33	16.99
		58.5	7.04	2.287	9.33	16.99
		87.8	6.99	2.286	9.28	16.99
		117	7.01	2.324	9.34	16.99
		175.5	6.84	2.408	9.25	16.99
		234	6.82	2.502	9.32	16.99
		263.3	8.12	1.212	9.34	16.99
		292.5	8.12	1.210	9.33	16.99
		351	7.99	1.320	9.31	16.99
		390	7.97	1.383	9.35	16.99

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Conducted Output Power Measurements (802.11ac_80 MHz BW Mode: 5210)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5210	42	29.3	12.73	16.99
		58.5	12.70	16.99
		87.8	12.63	16.99
		117	12.77	16.99
		175.5	12.62	16.99
		234	12.70	16.99
		263.3	12.71	16.99
		292.5	12.65	16.99
		351	12.66	16.99
		390	12.69	16.99

Note :

1. In order to simplify the report, attached plots were only the highest conducted power channel and data rate.

■ TEST RESULTS_Ant.0

Maximum e.i.r.p Measurements (802.11a Mode)

802.11a Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6	11.10	2.93	14.03	22.25
5200	40	9	10.98		13.91	22.25
5240	48	6	11.91		14.84	22.25

■ TEST RESULTS_Ant.1

Maximum e.i.r.p Measurements (802.11a Mode)

802.11a Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	48	10.40	2.49	12.89	22.25
5200	40	48	10.38		12.87	22.25
5240	48	36	11.29		13.78	22.25

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Maximum e.i.r.p Measurements (802.11a Mode)

802.11a Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	48	13.73	5.723	19.453	22.25
5200	40	48	13.65		19.373	22.25
5240	48	6	14.59		20.313	22.25

■ TEST RESULTS_Ant.0

Maximum e.i.r.p Measurements (802.11n Mode_20 MHz BW)

802.11n Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6.5	11.92	2.93	14.85	22.52
5200	40	58.5	11.86		14.79	22.52
5240	48	6.5	11.85		14.78	22.52

■ TEST RESULTS_Ant.1

Maximum e.i.r.p Measurements (802.11n Mode_20 MHz BW)

802.11n Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	65	11.92	2.49	14.41	22.52
5200	40	13	11.52		14.01	22.52
5240	48	19.5	11.26		13.75	22.52

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Maximum e.i.r.p Measurements (802.11n Mode_20 MHz BW)

802.11n Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	58.5	14.85	2.716	17.566	22.52
5200	40	58.5	14.65		17.366	22.52
5240	48	13	14.54		17.256	22.52

■ TEST RESULTS_Ant.0

Maximum e.i.r.p Measurements (802.11n Mode_40 MHz BW)

802.11n_40M Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	81	11.32	2.93	14.25	23.01
5230	46	135	13.95		16.88	23.01

■ TEST RESULTS_Ant.1

Maximum e.i.r.p Measurements (802.11n Mode_40 MHz BW)

802.11n_40M Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	121.5	10.68	2.49	13.17	23.01
5230	46	13.5	13.68		16.17	23.01

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Maximum e.i.r.p Measurements (802.11n Mode_40 MHz BW)

802.11n_40M Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	121.5	14.01	2.716	16.726	23.01
5230	46	135	16.81		19.526	23.01

■ TEST RESULTS_Ant.0

Maximum e.i.r.p Measurements (802.11ac Mode_20 MHz BW)

802.11ac Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	65	11.87	2.93	14.80	22.51
5200	40	58.5	11.89		14.82	22.51
5240	48	39	11.78		14.71	22.51

■ TEST RESULTS_Ant.1

Maximum e.i.r.p Measurements (802.11ac Mode_20 MHz BW)

802.11ac Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	78	11.45	2.49	13.94	22.51
5200	40	26	11.30		13.79	22.51
5240	48	65	11.30		13.79	22.51

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Maximum e.i.r.p Measurements (802.11ac Mode_20 MHz BW)

802.11ac Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	78	14.68	2.716	17.396	22.51
5200	40	58.5	14.61		17.326	22.51
5240	48	39	14.53		17.246	22.51

■ TEST RESULTS_Ant.0

Maximum e.i.r.p Measurements (802.11ac Mode_40 MHz BW)

802.11ac_40M Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	162	11.29	2.93	14.22	23.01
5230	46	180	13.49		16.42	23.01

■ TEST RESULTS_Ant.1

Maximum e.i.r.p Measurements (802.11ac Mode_40 MHz BW)

802.11ac_40M Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	180	10.67	2.49	13.16	23.01
5230	46	180	13.20		15.69	23.01

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Maximum e.i.r.p Measurements (802.11ac Mode_40 MHz BW)

802.11ac_40M Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	162	13.96	2.716	16.676	23.01
5230	46	180	16.35		19.066	23.01

■ TEST RESULTS_Ant.0

Maximum e.i.r.p Measurements (802.11ac Mode_80 MHz BW)

802.11ac_80M Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5210	42	117	10.14	2.93	13.07	23.01

■ TEST RESULTS_Ant.1

Maximum e.i.r.p Measurements (802.11ac Mode_80 MHz BW)

802.11ac_80M Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5210	42	390	9.35	2.49	11.84	23.01

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Maximum e.i.r.p Measurements (802.11ac Mode_80 MHz BW)

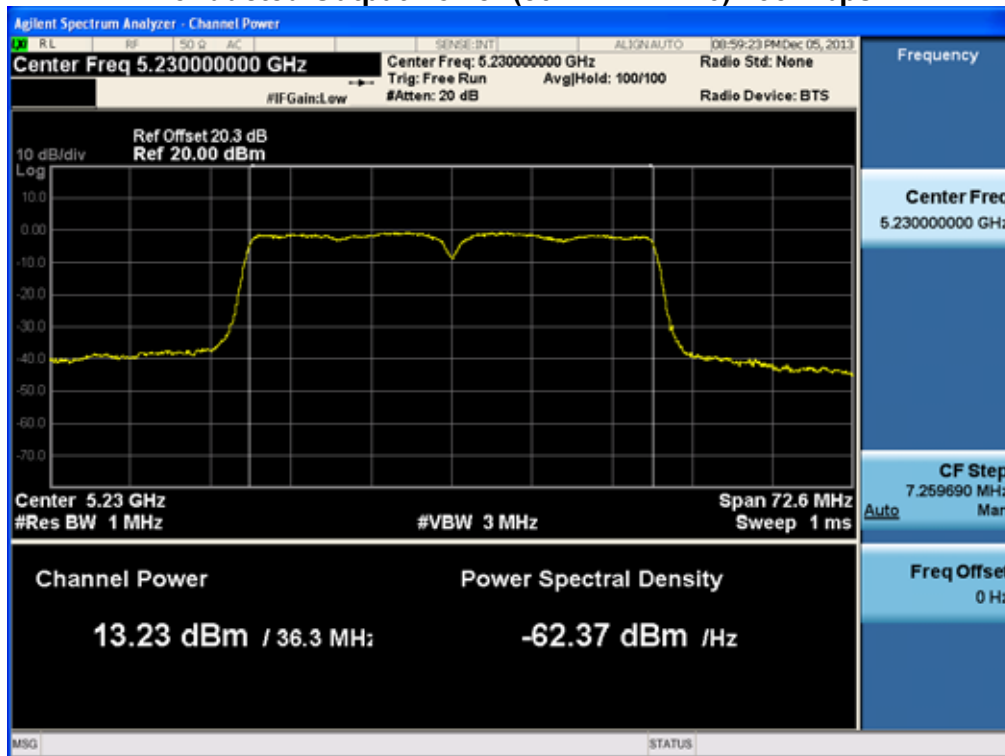
802.11ac_80M Mode		Rate (Mbps)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)
Frequency [MHz]	Channel No.					
5210	42	117	12.77	2.716	15.486	23.01

Ant.0

40 MHz BW

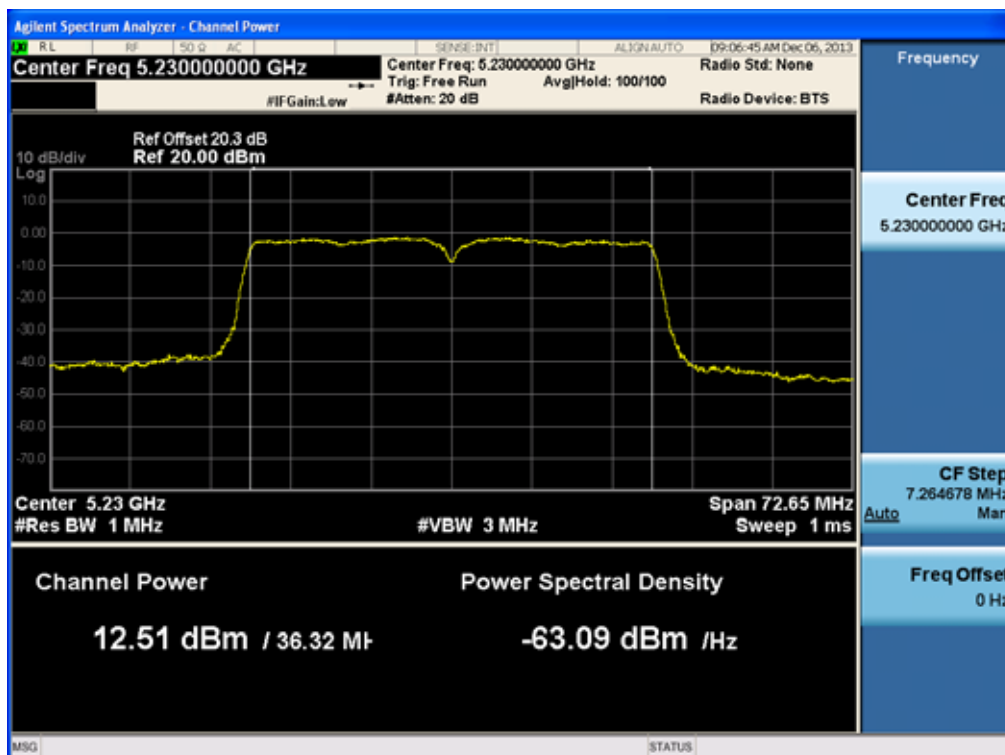
RESULT PLOTS (5190 MHz ~5230 MHz)

Conducted Output Power (802.11n-CH 46) 135 Mbps



RESULT PLOTS (5190 ~ 5230 MHz)

Conducted Output Power (802.11ac-CH 46) 180 Mbps



FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

80 MHz BW

RESULT PLOTS (5210 MHz)

Conducted Output Power (802.11ac-CH 42) 117 Mbps



FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

Ant.1

40 MHz BW

RESULT PLOTS (5190 MHz ~5230 MHz)

Conducted Output Power (802.11n-CH 46) 13.5 Mbps



RESULT PLOTS (5190 ~ 5230 MHz)

Conducted Output Power (802.11ac-CH 46) 180 Mbps



FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

80 MHz BW

RESULT PLOTS (5210 MHz)

Conducted Output Power (802.11ac-CH 42) 390 Mbps

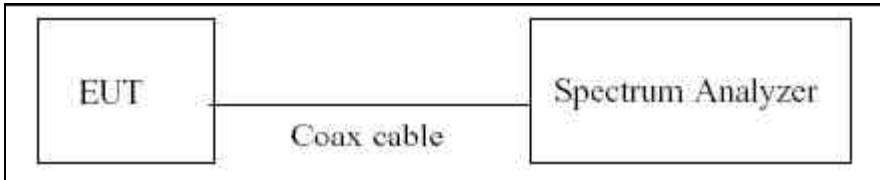


FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

8.5 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 5.2 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table.

FCC PT.15.407 TEST REPORT		FCC & IC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

Band	Frequency(MHz)	Loss(dB)
UNII 1	5180	10.30
	5190	10.29
	5200	10.28
	5230	10.29
	5240	10.34

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

■ TEST RESULTS Ant.0

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	-0.348	0.225925	-0.122	4	Pass
5200	40		-0.412	0.230653	-0.181	4	Pass
5240	48		0.336	0.225925	0.562	4	Pass
5180	36	802.11n 20MHz BW	-0.073	0.221063	0.148	4	Pass
5200	40		0.040	0.386668	0.427	4	Pass
5240	48		-0.085	0.221063	0.136	4	Pass
5190	38	802.11n 40MHz BW	-3.256	0.503777	-2.752	4	Pass
5230	46		-0.633	0.722875	0.090	4	Pass

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	802.11ac 20MHz BW	-0.015	0.496878	0.482	4	Pass
5200	40		0.437	0.459305	0.896	4	Pass
5240	48		-0.010	0.317488	0.307	4	Pass
5190	38	802.11ac 40MHz BW	-3.666	0.946382	-2.720	4	Pass
5230	46		-1.240	0.976918	-0.263	4	Pass
5210	42	802.11ac 80MHz BW	-8.992	2.323564	-6.668	4	Pass

Note :

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

■ TEST RESULTS Ant.1

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	-0.652	0.348836	-0.303	4	Pass
5200	40		-0.597	0.348836	-0.248	4	Pass
5240	48		0.035	0.266807	0.302	4	Pass
5180	36	802.11n 20MHz BW	-0.022	0.400052	0.378	4	Pass
5200	40		-0.183	0.221427	0.038	4	Pass
5240	48		-0.382	0.217513	-0.164	4	Pass
5190	38	802.11n 40MHz BW	-3.553	0.63387	-2.919	4	Pass
5230	46		-0.592	0.433998	-0.158	4	Pass

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	802.11ac 20MHz BW	-0.195	0.593607	0.399	4	5180
5200	40		-0.363	0.593607	0.231	4	5200
5240	48		-0.171	0.496878	0.326	4	5240
5190	38	802.11ac 40MHz BW	-3.701	0.976918	-2.724	4	Pass
5230	46		-1.389	0.976918	-0.412	4	Pass
5210	42	802.11ac 80MHz BW	-8.570	1.383027	-7.187	4	Pass

Note :

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

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result		
			Measured Power Density (dBm)	Limit (dBm)	Pass/Fail
5180	36	802.11a	2.80	4	Pass
5200	40		2.80	4	Pass
5240	48		3.44	4	Pass
5180	36	802.11n	3.27	4	Pass
5200	40	20MHz	3.25	4	Pass
5240	48	BW	3.00	4	Pass
5190	38	802.11n	0.18	4	Pass
5230	46	40MHz BW	2.98	4	Pass

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result		
			Measured Power Density (dBm)	Limit (dBm)	Pass/Fail
5180	36	802.11ac 20MHz BW	3.45	4	Pass
5200	40		3.59	4	Pass
5240	48		3.33	4	Pass
5190	38	802.11ac 40MHz BW	0.29	4	Pass
5230	46		2.67	4	Pass
5210	42	802.11ac 80MHz BW	-3.91	4	Pass

Note :

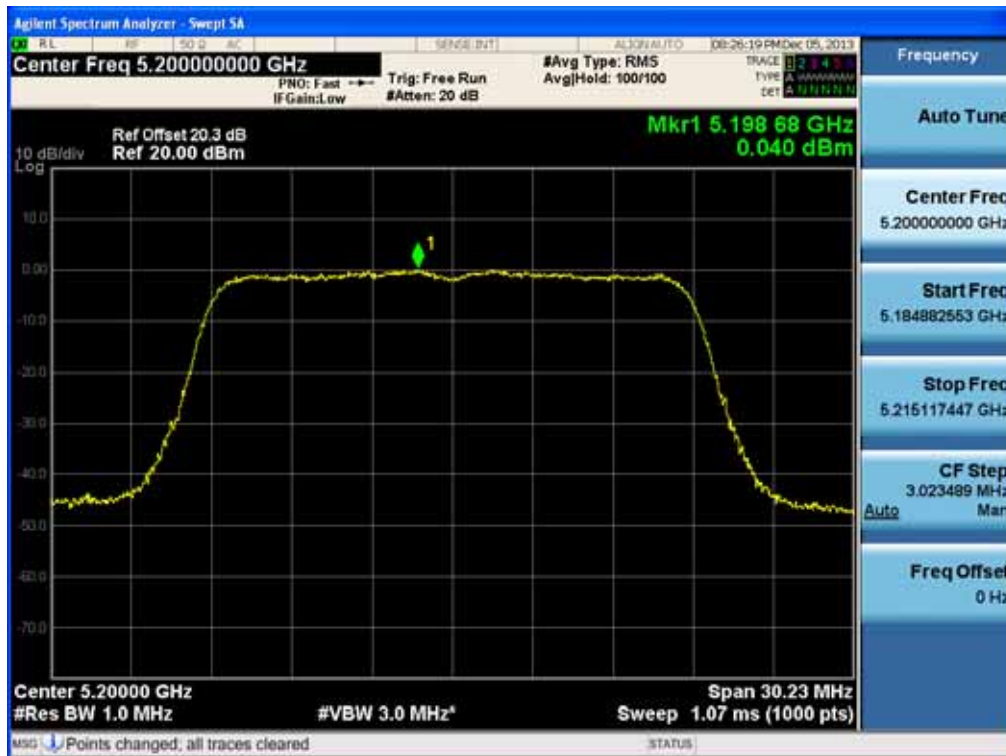
1. In order to simplify the report, attached plots were only the highest PSD channel.

RESULT PLOTS_Ant.0

Power Spectral Density (802.11a-CH 48)



Power Spectral Density (802.11n-CH 40) _20 MHz BW

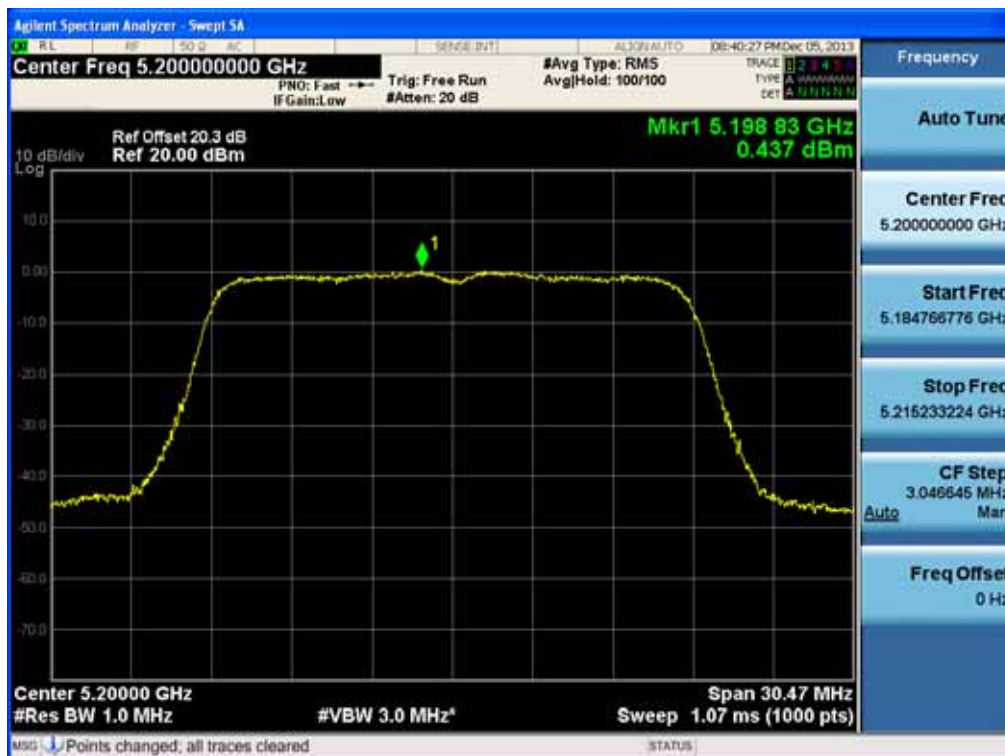


FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

Power Spectral Density (802.11n-CH 46)_40 MHz BW



Power Spectral Density (802.11ac-CH 40)_20 MHz BW

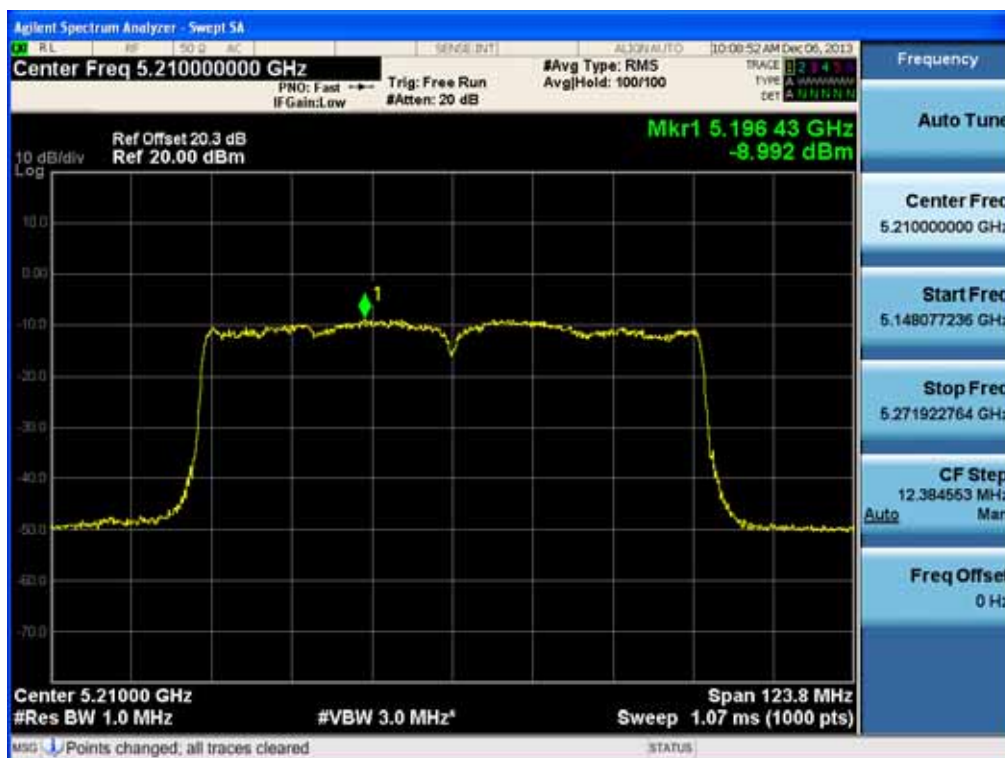


FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

Power Spectral Density (802.11ac-CH 46)_40 MHz BW



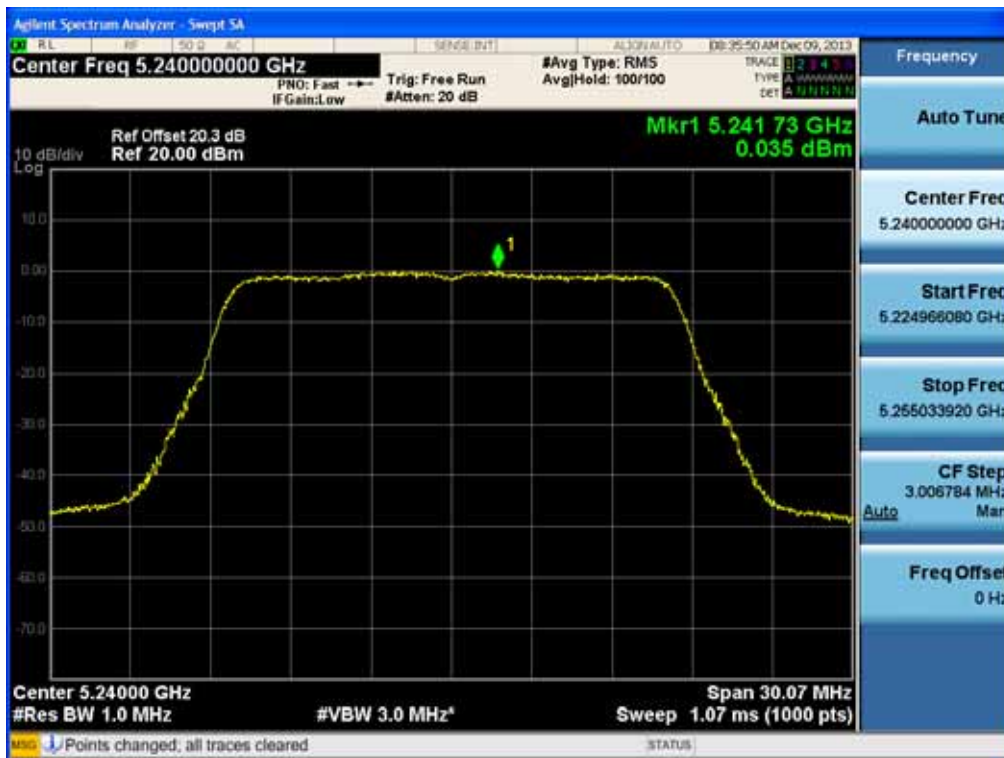
Power Spectral Density (802.11ac-CH 42)_80 MHz BW



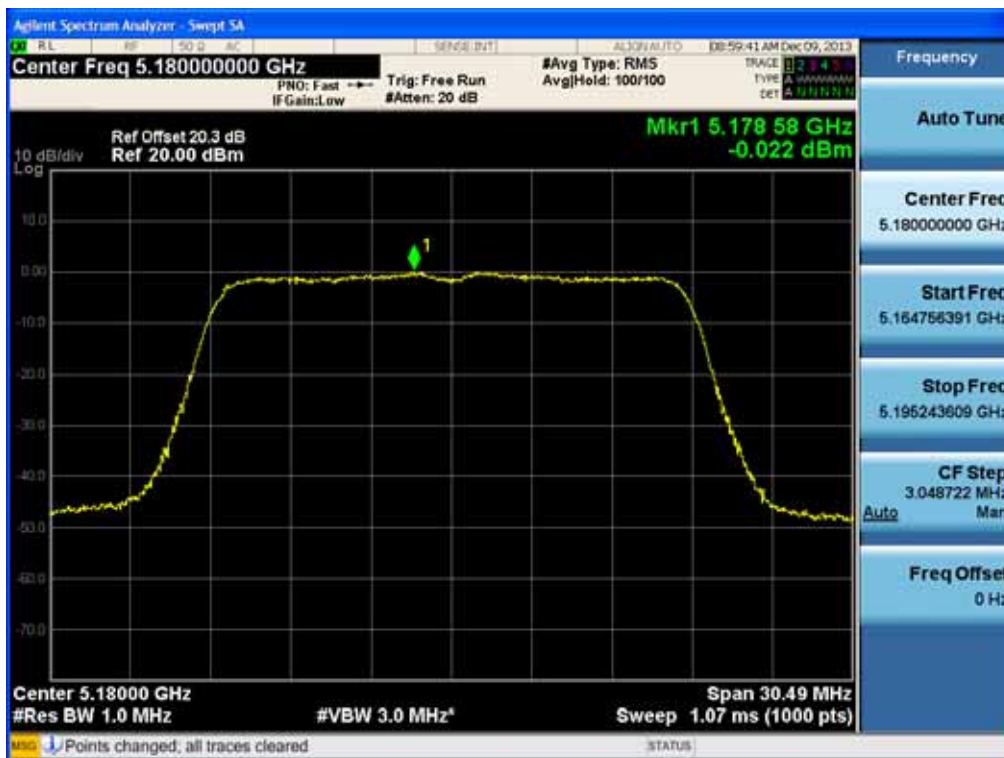
FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

RESULT PLOTS_Ant.1

Power Spectral Density (802.11a-CH 48)



Power Spectral Density (802.11n-CH 36)_20 MHz BW

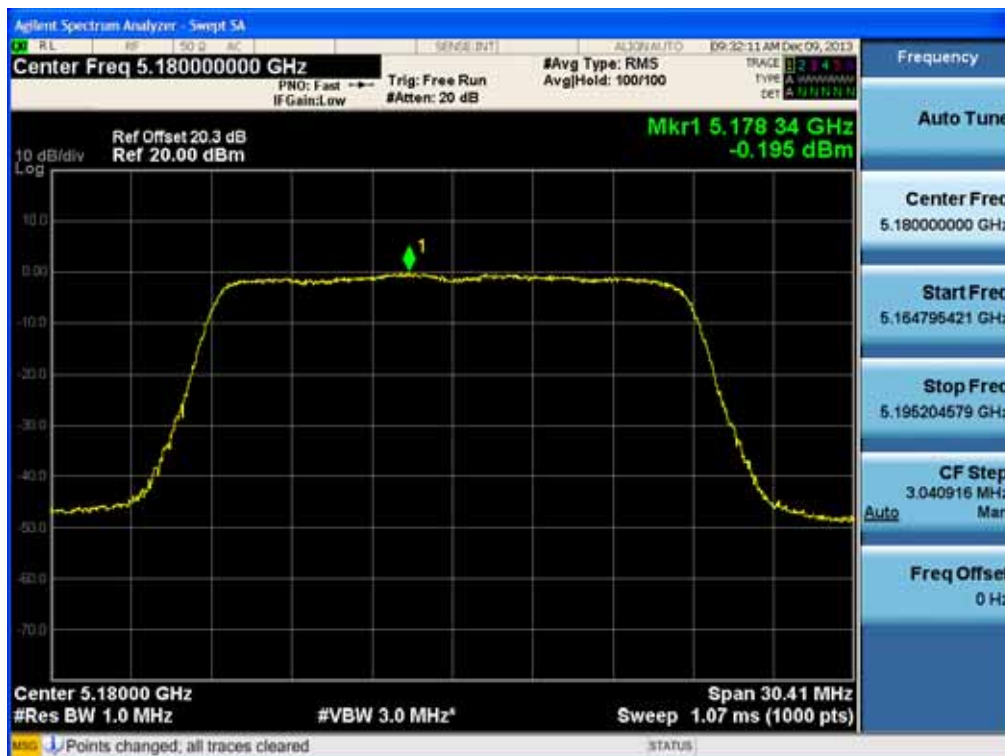


FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

Power Spectral Density (802.11n-CH 46)_40 MHz BW

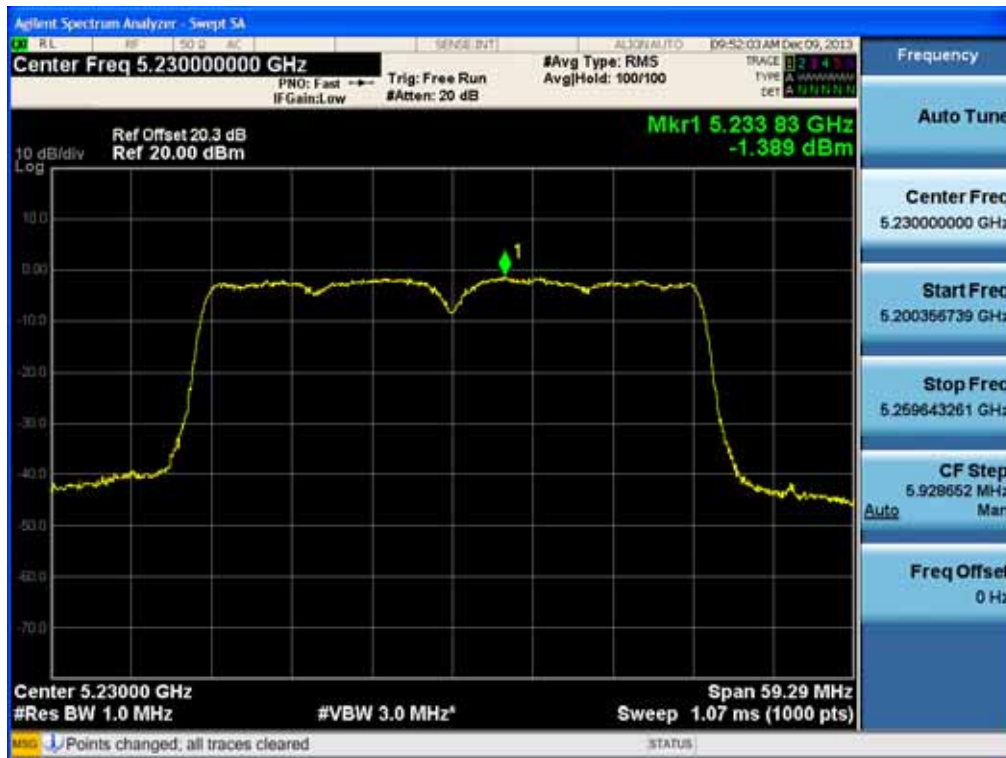


Power Spectral Density (802.11ac-CH 36)_20 MHz BW

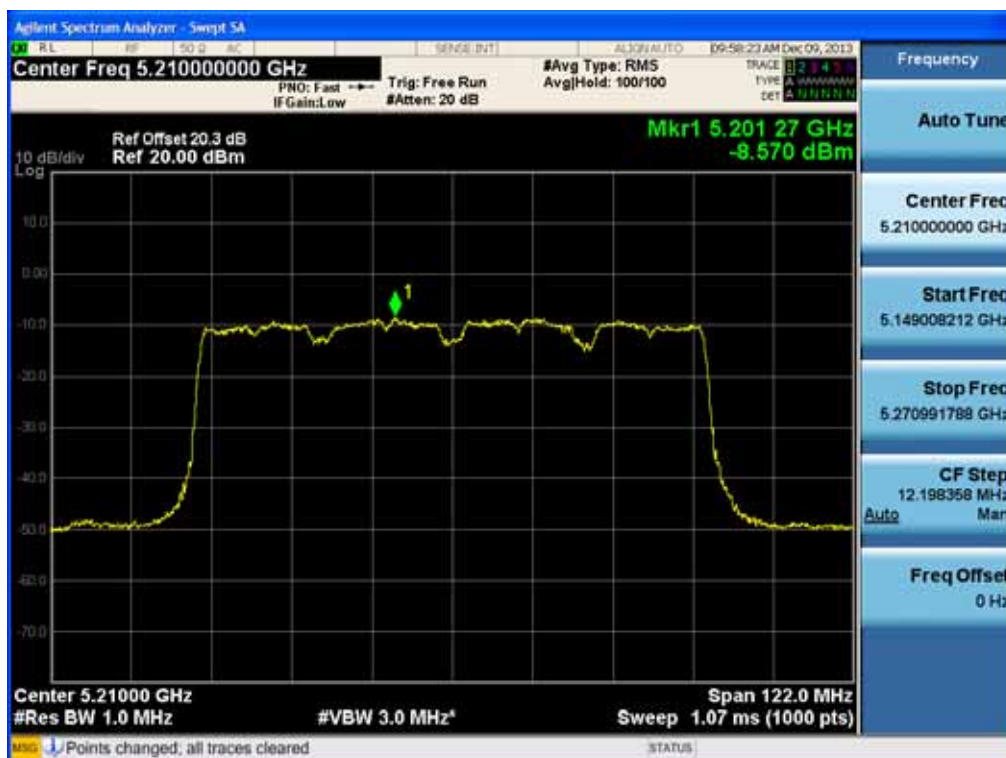


FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

Power Spectral Density (802.11ac-CH 46)_40 MHz BW



Power Spectral Density (802.11ac-CH 42)_80 MHz BW

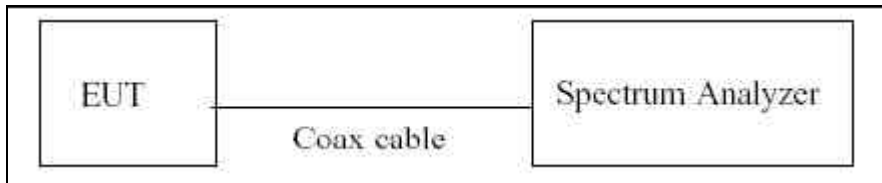


FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

8.6 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 5.2 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table.

FCC PT.15.407 TEST REPORT		FCC & IC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

Band	Frequency(MHz)	Loss(dB)
UNII 1	5180	10.30
	5190	10.29
	5200	10.28
	5230	10.29
	5240	10.34

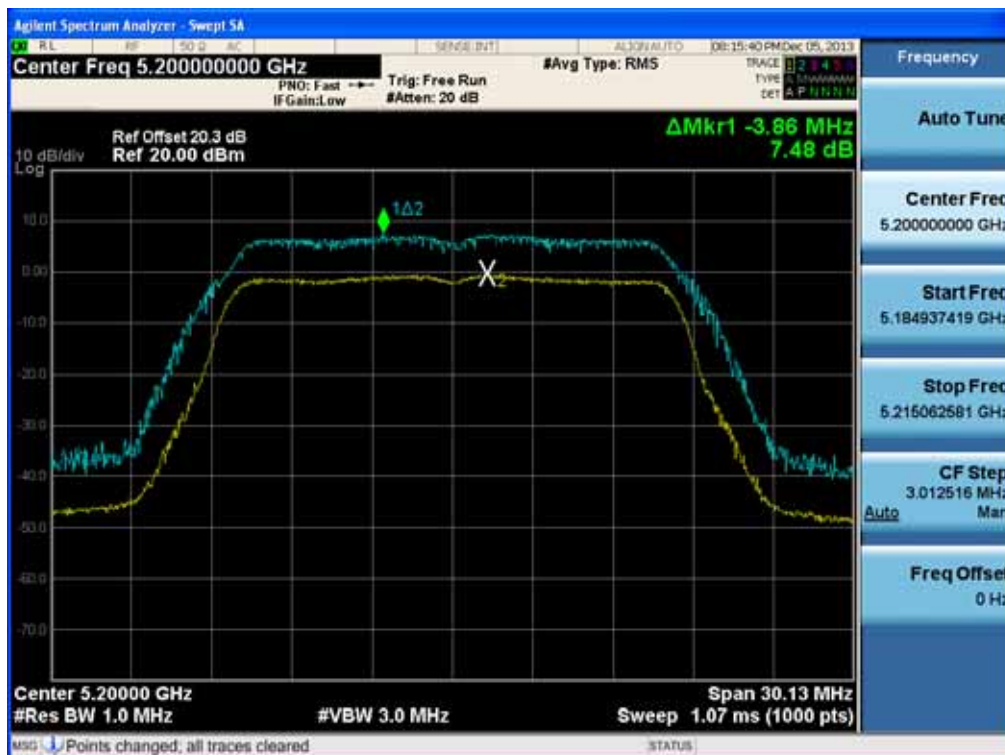
(Actual value of loss for the attenuator and cable combination)

RESULT PLOTS_Ant.0

Peak Excursion Ratio (802.11a-CH 36)

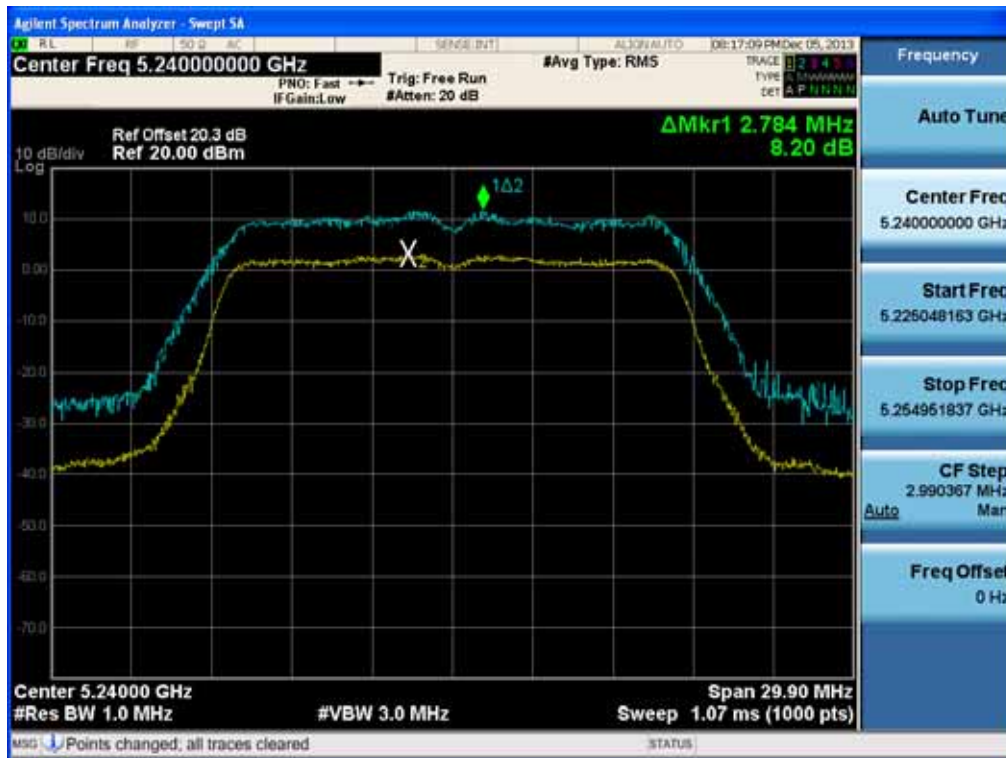


Peak Excursion Ratio (802.11a-CH 40)



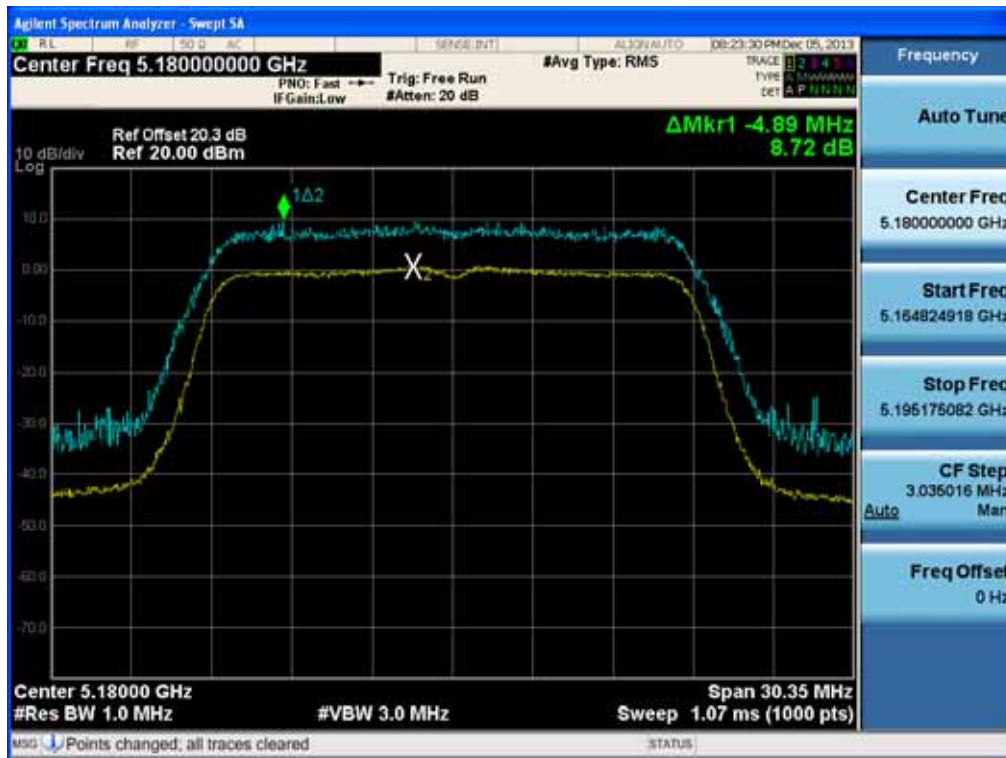
FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

Peak Excursion Ratio (802.11a-CH 48)



20 MHz BW

Peak Excursion Ratio (802.11n-CH 36)

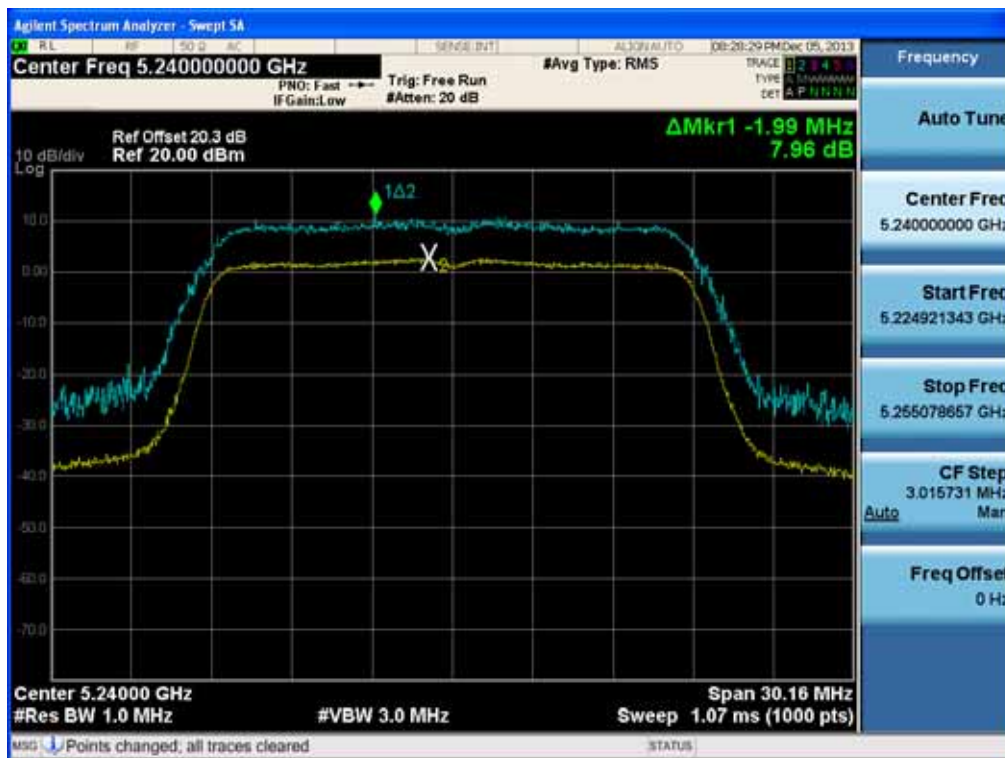


FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

Peak Excursion Ratio (802.11n-CH 40)



Peak Excursion Ratio (802.11n-CH 48)



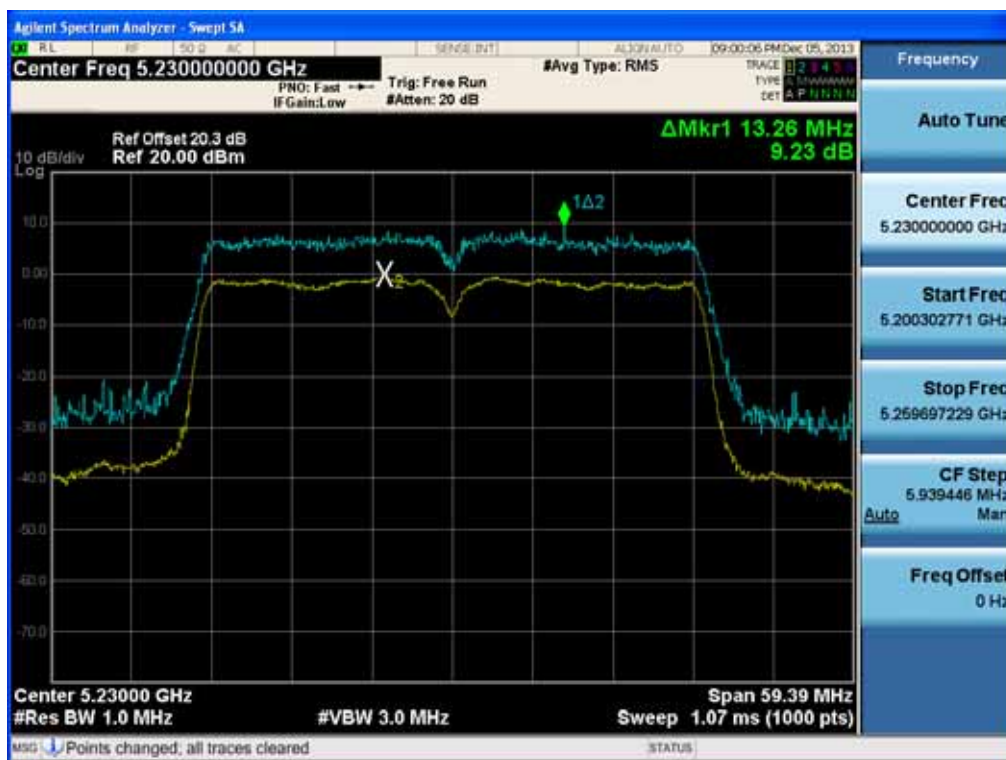
FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

40 MHz BW

Peak Excursion Ratio (802.11n-CH 38)



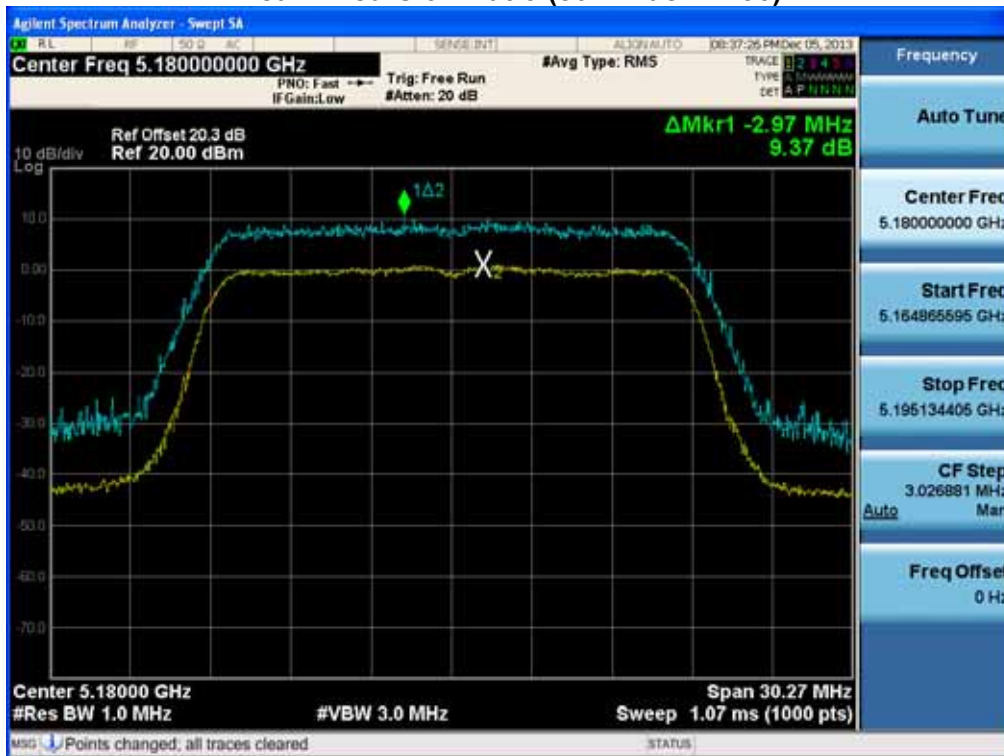
Peak Excursion Ratio (802.11n-CH 46)



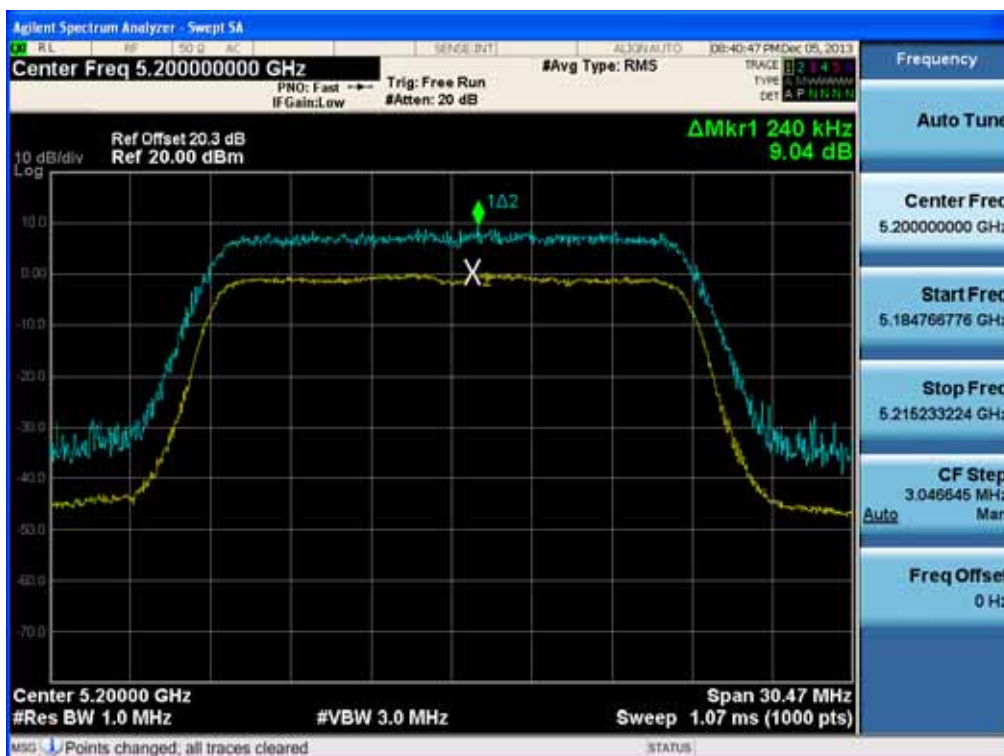
FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

20 MHz BW

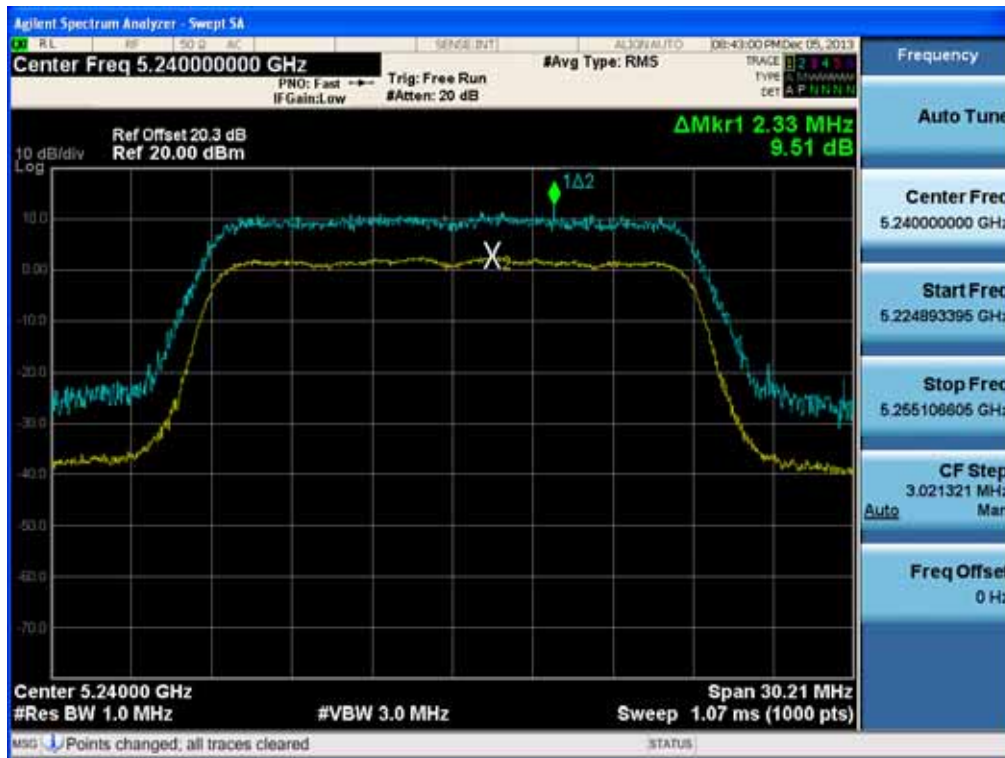
Peak Excursion Ratio (802.11ac-CH 36)



Peak Excursion Ratio (802.11ac-CH 40)



Peak Excursion Ratio (802.11ac-CH 48)



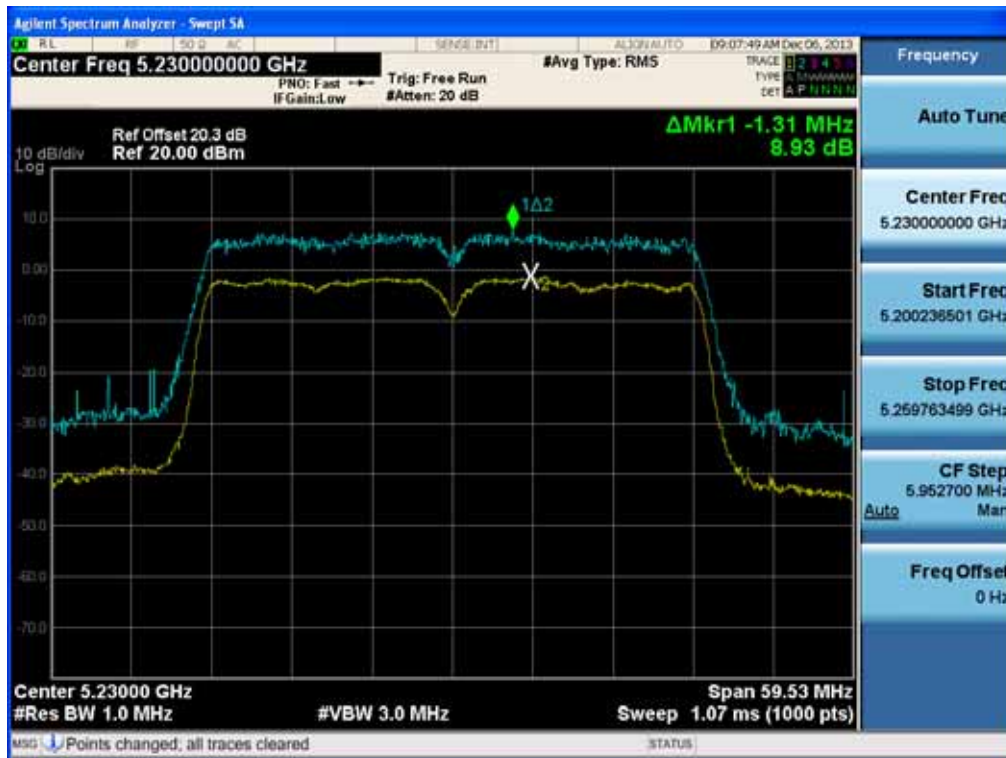
40 MHz BW

Peak Excursion Ratio (802.11ac-CH 38)



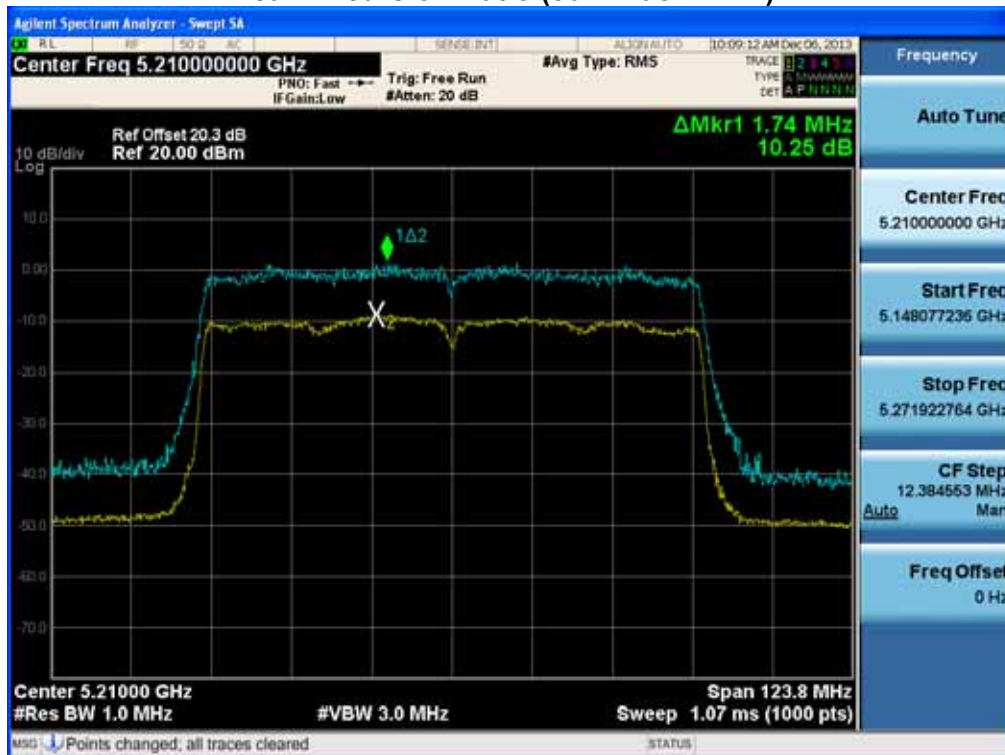
FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

Peak Excursion Ratio (802.11ac-CH 46)



80 MHz BW

Peak Excursion Ratio (802.11ac-CH 42)



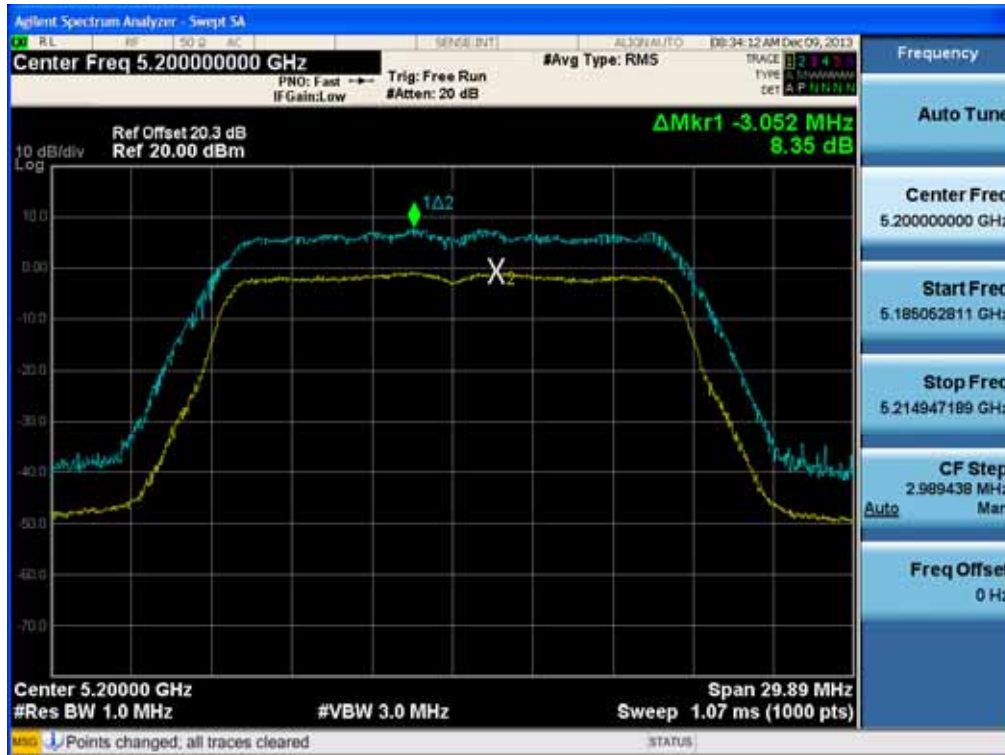
FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

RESULT PLOTS_Ant.1

Peak Excursion Ratio (802.11a-CH 36)



Peak Excursion Ratio (802.11a-CH 40)



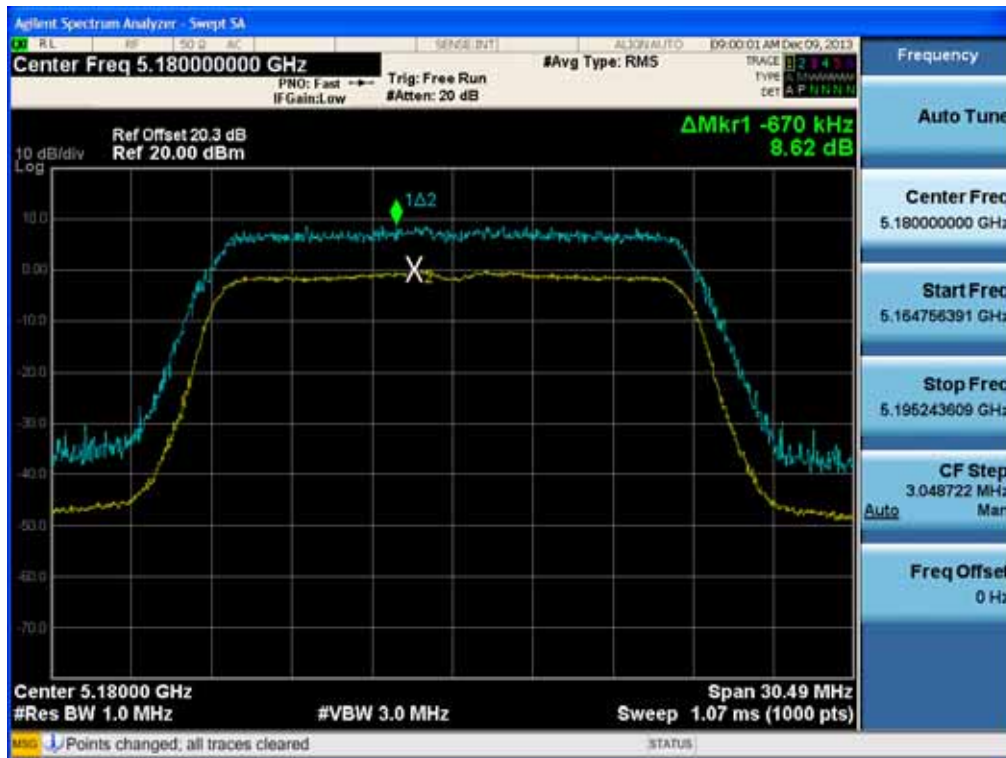
FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

Peak Excursion Ratio (802.11a-CH 48)



20 MHz BW

Peak Excursion Ratio (802.11n-CH 36)

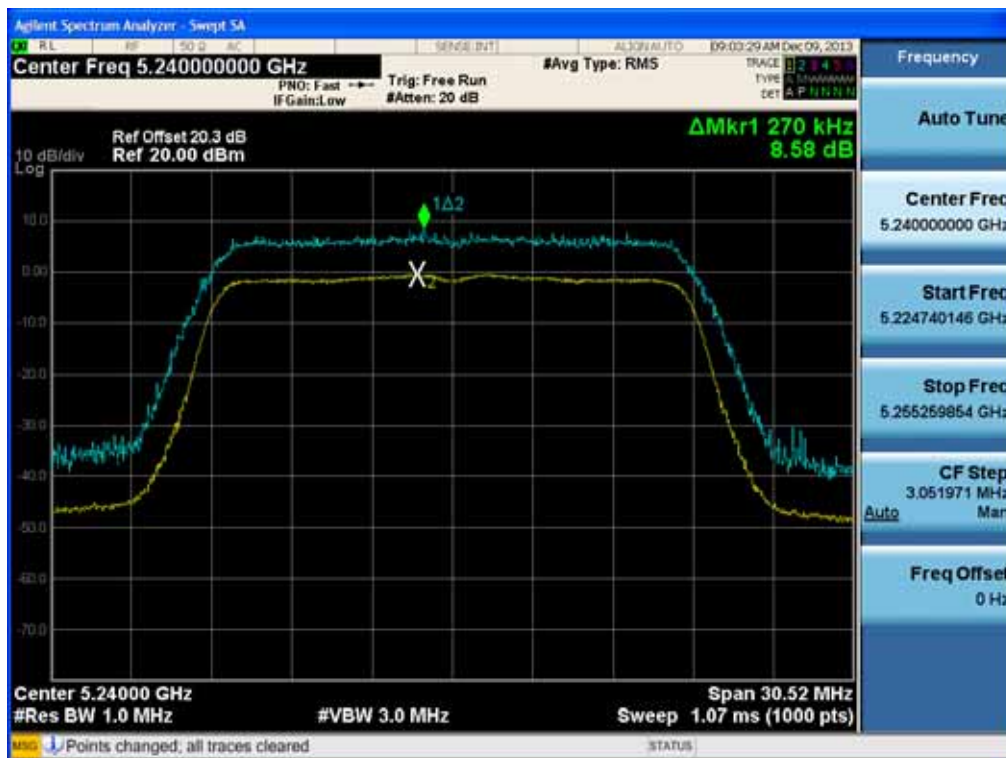


FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

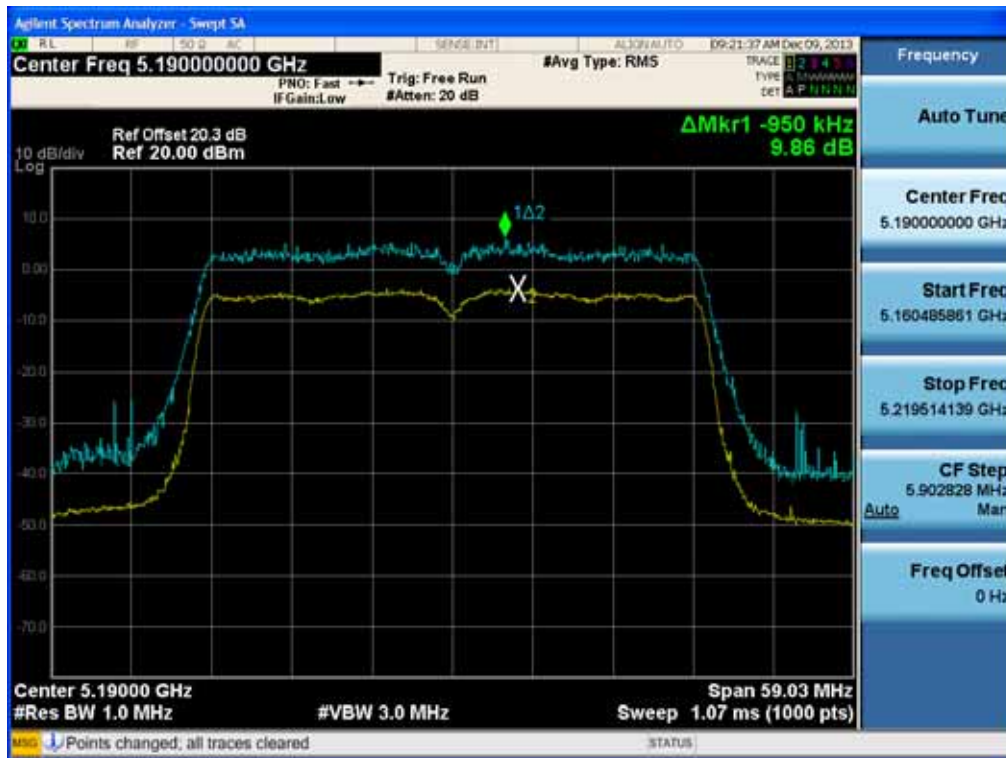
Peak Excursion Ratio (802.11n-CH 40)



Peak Excursion Ratio (802.11n-CH 48)



Peak Excursion Ratio (802.11n-CH 38)



Peak Excursion Ratio (802.11n-CH 46)

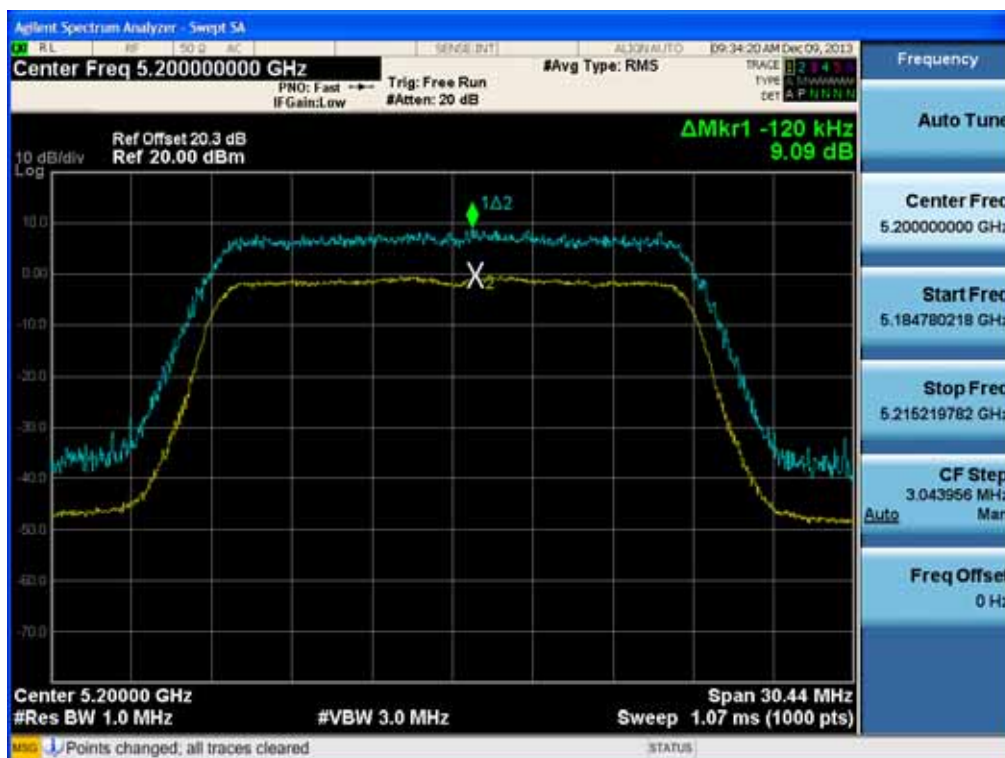


20 MHz BW

Peak Excursion Ratio (802.11ac-CH 36)

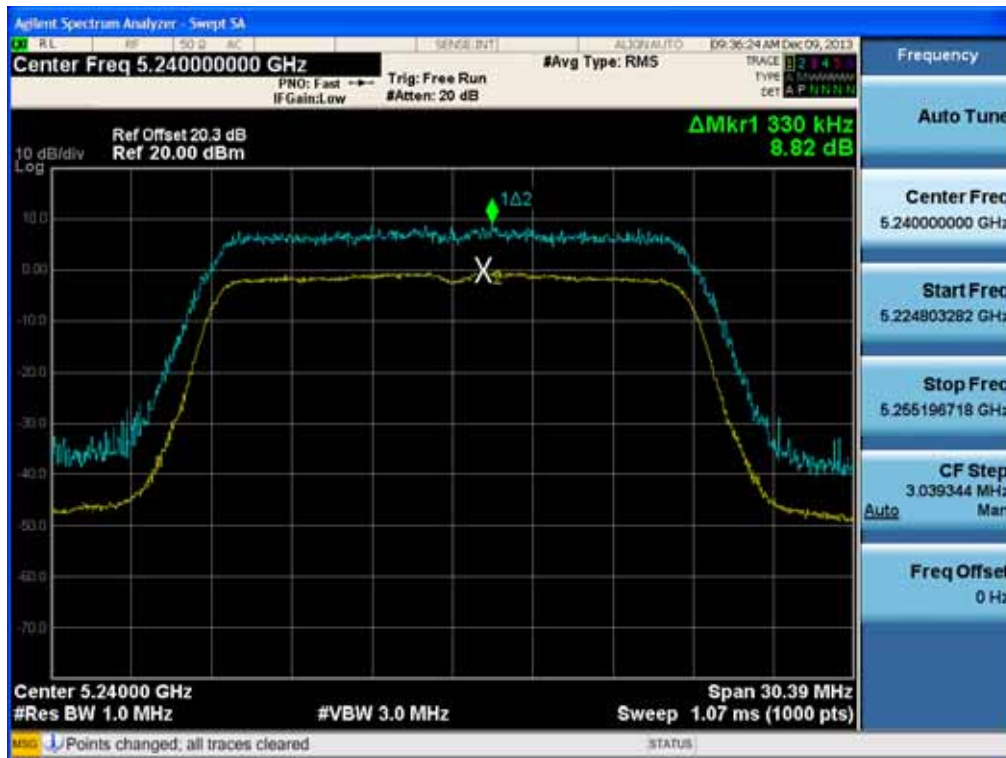


Peak Excursion Ratio (802.11ac-CH 40)



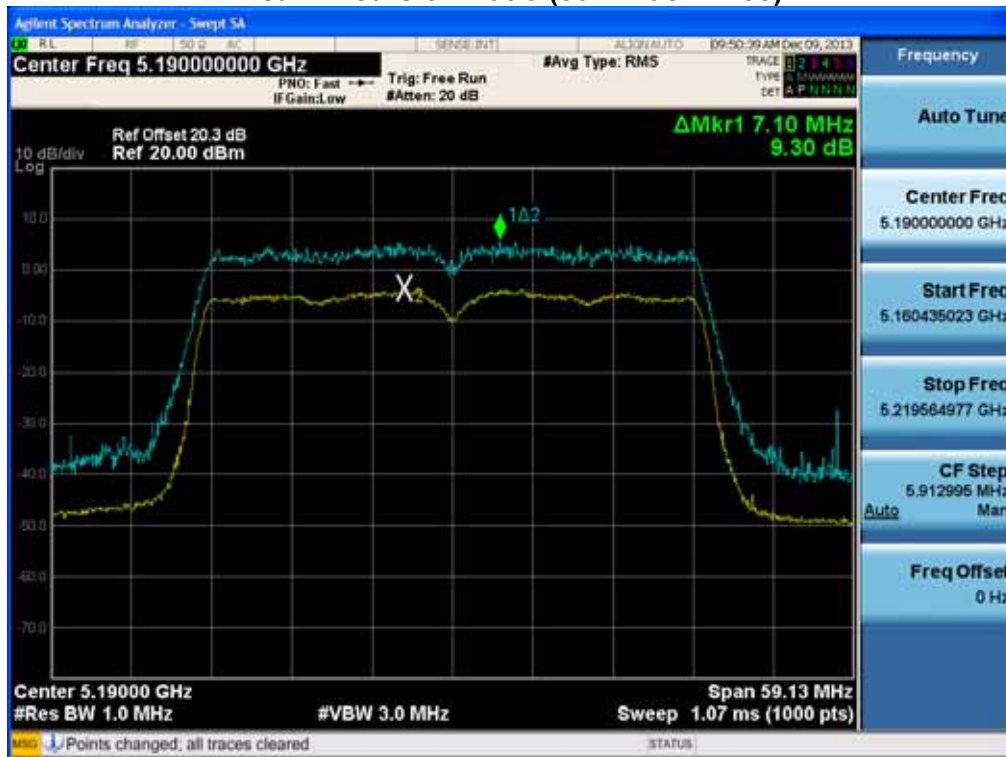
FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

Peak Excursion Ratio (802.11ac-CH 48)



40 MHz BW

Peak Excursion Ratio (802.11ac-CH 38)



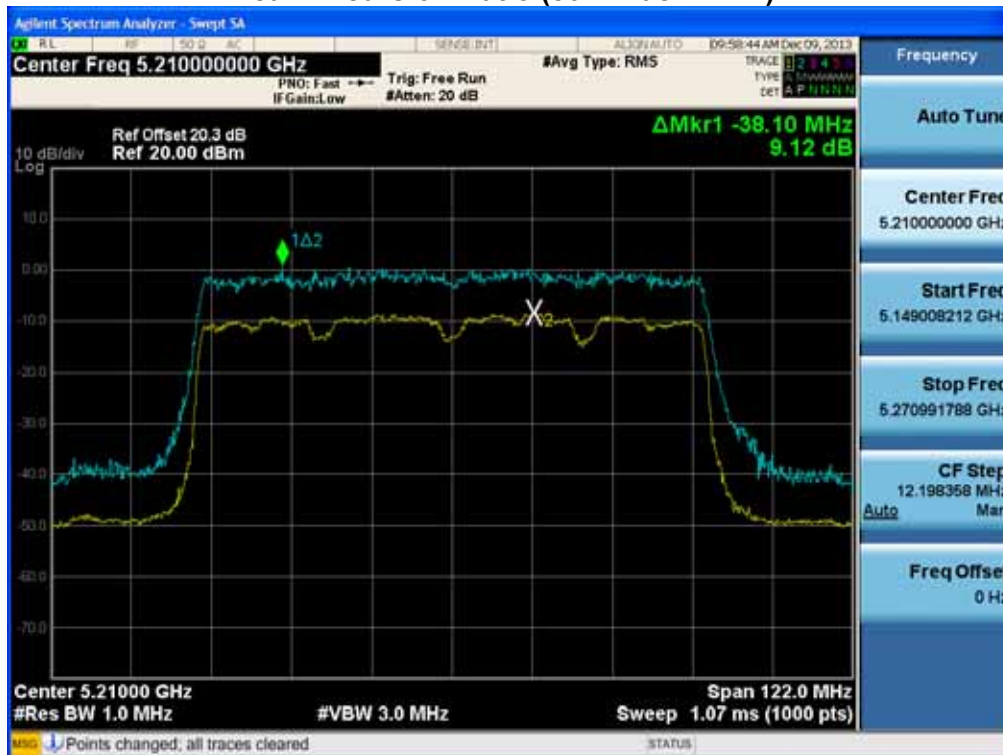
FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

Peak Excursion Ratio (802.11ac-CH 46)



80 MHz BW

Peak Excursion Ratio (802.11ac-CH 42)



FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

8.7 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.

Ant.0

20 MHz BW

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,180,000,000 Hz
CHANNEL:	36
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.300	+20(Ref)	5 180 032	32.1
100%		-30	5 180 063	63.3
100%		-20	5 180 060	60.1
100%		-10	5 180 057	56.9
100%		0	5 180 050	50.3
100%		10	5 180 046	45.9
100%		30	5 180 039	38.5
100%		40	5 180 040	40.2
100%		50	5 180 044	44.1
115%	3.795	20	5 180 033	32.5
Batt. Endpoint	3.135	20	5 180 032	32.3

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.

40 MHz BW

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,190,000,000 Hz
CHANNEL:	38
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.300	+20(Ref)	5 190 033	32.6
100%		-30	5 190 065	64.5
100%		-20	5 190 062	61.8
100%		-10	5 190 058	58.3
100%		0	5 190 055	55.1
100%		+10	5 190 046	45.9
100%		+30	5 190 033	33.4
100%		+40	5 190 040	39.6
100%		+50	5 190 041	40.8
115%	3.795	+20	5 190 032	32.1
Batt. Endpoint	3.135	+20	5 190 032	32.2

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.

80 MHz BW

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.300	+20(Ref)	5 210 033	33.0
100%		-30	5 210 065	64.7
100%		-20	5 210 060	59.9
100%		-10	5 210 054	54.3
100%		0	5 210 050	50.1
100%		+10	5 210 045	44.9
100%		+30	5 210 040	39.6
100%		+40	5 210 040	40.1
100%		+50	5 210 041	40.9
115%	3.795	+20	5 210 033	33.2
Batt. Endpoint	3.135	+20	5 210 033	33.2

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.

Ant.1

20 MHz BW

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,180,000,000 Hz
CHANNEL:	36
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.300	+20(Ref)	5 180 033	32.9
100%		-30	5 180 064	63.8
100%		-20	5 180 060	60.4
100%		-10	5 180 056	56.0
100%		0	5 180 051	50.5
100%		10	5 180 046	46.2
100%		30	5 180 039	38.9
100%		40	5 180 040	40.4
100%		50	5 180 045	44.8
115%	3.795	20	5 180 033	32.5
Batt. Endpoint	3.135	20	5 180 033	32.6

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.

40 MHz BW

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,190,000,000 Hz
CHANNEL:	38
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.300	+20(Ref)	5 190 033	33.3
100%		-30	5 190 065	64.9
100%		-20	5 190 062	61.7
100%		-10	5 190 059	58.7
100%		0	5 190 055	55.4
100%		+10	5 190 046	45.8
100%		+30	5 190 034	33.5
100%		+40	5 190 040	39.9
100%		+50	5 190 040	40.1
115%	3.795	+20	5 190 033	33.4
Batt. Endpoint	3.135	+20	5 190 034	33.8

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.

80 MHz BW

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.300	+20(Ref)	5 210 034	33.8
100%		-30	5 210 065	64.8
100%		-20	5 210 060	59.7
100%		-10	5 210 055	54.5
100%		0	5 210 050	50.4
100%		+10	5 210 045	44.8
100%		+30	5 210 039	39.3
100%		+40	5 210 040	40.4
100%		+50	5 210 041	40.8
115%	3.795	+20	5 210 034	33.6
Batt. Endpoint	3.135	+20	5 210 034	33.6

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.

8.8 RADIATED MEASUREMENT.

8.8.1 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

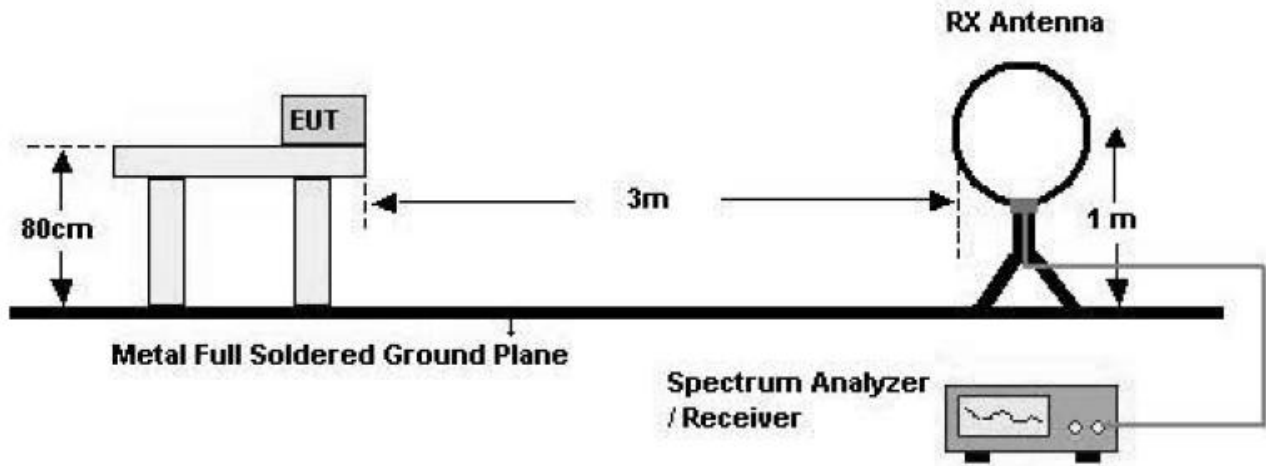
SISO	Ant 0	-
	Ant 1	-
MIMO	Ant 0 & 1	Worst Case

Note : We have done all test case. Worst case is Ant 0 & 1.

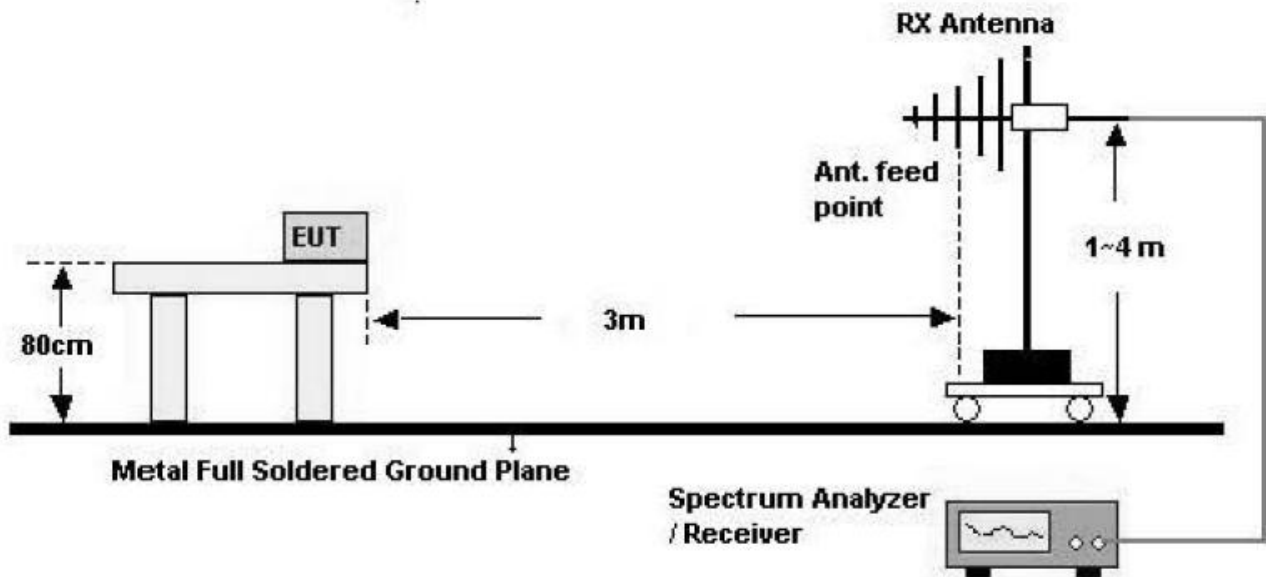
So, we attached the results of only worst case.

Test Configuration

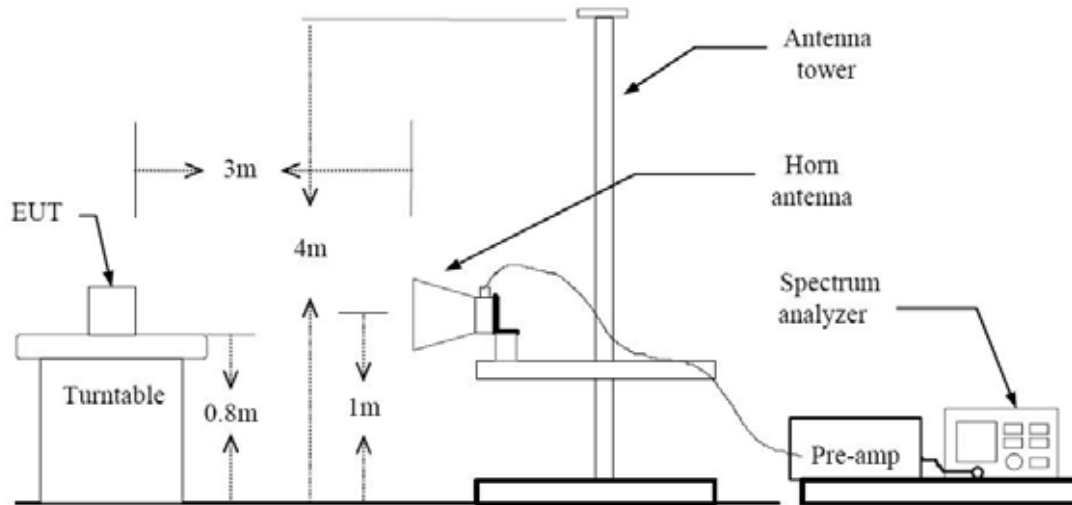
Below 30 MHz



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.

FCC PT.15.407 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1312FR12-1	Date of Issue: December 12, 2013	EUT Type: WIFI Module	FCC ID: BEJLGSWF41	IC : 2703H-LGSWF41

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/ac_20/ac_40/ac_80 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/ac_20/ac_40/ac_80.

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	2.060	2.170	94.93	485.4	1000
n_20	6.5	1.915	2.015	95.04	522.2	1000
n_40	13.5	0.942	1.041	90.49	1061.6	3000
ac_20	6.5	1.925	1.955	98.47	519.5	1000
ac_40	13.5	0.947	0.978	96.83	1056.0	3000
ac_80	29.3	0.458	0.764	59.95	2183.4	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

MIMO

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	72.32	-6.51	V	65.81	68.20	2.39	PK
15540	63.22	-6.42	V	56.80	73.98	17.18	PK
15540	49.66	-6.42	V	43.24	53.98	10.74	AV
10360	72.12	-6.51	H	65.61	68.20	2.59	PK
15540	63.15	-6.42	H	56.73	73.98	17.25	PK
15540	49.87	-6.42	H	43.45	53.98	10.53	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 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	72.41	-6.49	V	65.92	68.20	2.28	PK
15600	63.89	-7.15	V	56.74	73.98	17.24	PK
15600	49.96	-7.15	V	42.81	53.98	11.17	AV
10400	72.19	-6.49	H	65.70	68.20	2.50	PK
15600	63.54	-7.15	H	56.39	73.98	17.59	PK
15600	49.86	-7.15	H	42.71	53.98	11.27	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 802.11a. 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 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	71.99	-6.96	V	65.03	68.20	3.17	PK
15720	63.50	-6.62	V	56.88	73.98	17.10	PK
15720	50.17	-6.62	V	43.55	53.98	10.43	AV
10480	71.64	-6.96	H	64.68	68.20	3.52	PK
15720	63.56	-6.96	H	56.60	73.98	17.38	PK
15720	50.18	-6.62	H	43.56	53.98	10.42	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	71.96	-6.51	V	65.45	68.20	2.75	PK
15540	62.83	-6.42	V	56.41	73.98	17.57	PK
15540	49.81	-6.42	V	43.39	53.98	10.59	AV
10360	71.89	-6.51	H	65.38	68.20	2.82	PK
15540	63.15	-6.42	H	56.73	73.98	17.25	PK
15540	49.99	-6.42	H	43.57	53.98	10.41	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:	802.11 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	72.67	-6.49	V	66.18	68.20	2.02	PK
15600	64.19	-7.15	V	57.04	73.98	16.94	PK
15600	50.22	-7.15	V	43.07	53.98	10.91	AV
10400	72.51	-6.49	H	66.02	68.20	2.18	PK
15600	63.66	-7.15	H	56.51	73.98	17.47	PK
15600	50.03	-7.15	H	42.88	53.98	11.10	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:	802.11 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	71.11	-6.96	V	64.15	68.20	4.05	PK
15720	64.73	-6.62	V	58.11	73.98	15.87	PK
15720	50.21	-6.62	V	43.59	53.98	10.39	AV
10480	70.96	-6.96	H	64.00	68.20	4.20	PK
15720	63.94	-6.96	H	56.98	73.98	17.00	PK
15720	50.18	-6.62	H	43.56	53.98	10.42	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:	802.11 ac_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	72.39	-6.51	V	65.88	68.20	2.32	PK
15540	63.36	-6.42	V	56.94	73.98	17.04	PK
15540	49.83	-6.42	V	43.41	53.98	10.57	AV
10360	71.99	-6.51	H	65.48	68.20	2.72	PK
15540	63.41	-6.42	H	56.99	73.98	16.99	PK
15540	49.97	-6.42	H	43.55	53.98	10.43	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 802.11ac_20 MHz BW. Worst case is 6.5 Mbps in 802.11ac_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:	802.11 ac_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	72.59	-6.49	V	66.10	68.20	2.10	PK
15600	63.91	-7.15	V	56.76	73.98	17.22	PK
15600	50.11	-7.15	V	42.96	53.98	11.02	AV
10400	72.18	-6.49	H	65.69	68.20	2.51	PK
15600	63.54	-7.15	H	56.39	73.98	17.59	PK
15600	50.04	-7.15	H	42.89	53.98	11.09	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 802.11ac_20 MHz BW. Worst case is 6.5 Mbps in 802.11ac_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:	802.11 ac_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	70.71	-6.96	V	63.75	68.20	4.45	PK
15720	64.99	-6.62	V	58.37	73.98	15.61	PK
15720	50.35	-6.62	V	43.73	53.98	10.25	AV
10480	70.31	-6.96	H	63.35	68.20	4.85	PK
15720	63.94	-6.96	H	56.98	73.98	17.00	PK
15720	50.21	-6.62	H	43.59	53.98	10.39	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 802.11ac_20 MHz BW. Worst case is 6.5 Mbps in 802.11ac_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	70.55	-5.38	V	65.17	68.20	3.03	PK
15570	63.61	-6.41	V	57.20	73.98	16.78	PK
15570	50.75	-6.41	V	44.34	53.98	9.64	AV
10380	70.44	-5.38	H	65.06	68.20	3.14	PK
15570	63.31	-6.41	H	56.90	73.98	17.08	PK
15570	50.61	-6.41	H	44.20	53.98	9.78	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_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.

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	69.53	-6.88	V	62.65	68.20	5.55	PK
15690	62.99	-6.64	V	56.35	73.98	17.63	PK
15690	50.50	-6.64	V	43.86	53.98	10.12	AV
10460	69.33	-6.88	H	62.45	68.20	5.75	PK
15690	63.45	-6.64	H	56.81	73.98	17.17	PK
15690	50.53	-6.64	H	43.89	53.98	10.09	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_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.

Band :	UNII 1
Operation Mode:	802.11ac_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	70.53	-5.38	V	65.15	68.20	3.05	PK
15570	63.40	-6.41	V	56.99	73.98	16.99	PK
15570	49.73	-6.41	V	43.32	53.98	10.66	AV
10380	69.78	-5.38	H	64.40	68.20	3.80	PK
15570	63.17	-6.41	H	56.76	73.98	17.22	PK
15570	49.88	-6.41	H	43.47	53.98	10.51	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 802.11ac_40 MHz BW. Worst case is 13.5 Mbps in 802.11ac_40 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:	802.11ac_40 MHz BW
Transfer Rate:	6.5 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	69.04	-6.88	V	62.16	68.20	6.04	PK
15690	62.78	-6.64	V	56.14	73.98	17.84	PK
15690	50.41	-6.64	V	43.77	53.98	10.21	AV
10460	68.74	-6.88	H	61.86	68.20	6.34	PK
15690	63.21	-6.64	H	56.57	73.98	17.41	PK
15690	50.48	-6.64	H	43.84	53.98	10.14	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 802.11ac_40 MHz BW. Worst case is 13.5 Mbps in 802.11ac_40 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:	802.11ac_80 MHz BW
Transfer Rate:	29.3 Mbps
Operating Frequency	5210 MHz
Channel No.	42 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10420	67.55	-6.32	V	61.23	68.20	6.97	PK
15630	63.80	-7.14	V	56.66	73.98	17.32	PK
15630	50.80	-7.14	V	43.66	53.98	10.32	AV
10420	67.49	-6.32	H	61.17	68.20	7.03	PK
15630	63.74	-7.14	H	56.60	73.98	17.38	PK
15630	50.67	-7.14	H	43.53	53.98	10.45	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 802.11ac_80 MHz BW. Worst case is 29.3 Mbps in 802.11ac_80 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

8.8.2 RECEIVER SPURIOUS EMISSIONS

FCC Rule(s)	§15.109 (see Table Below)
Test Requirements:	Emission Level shall not exceed §15.109 limits
Operating conditions:	Under normal test conditions
Method of testing:	Radiated

S/A. Settings:	F < 1 GHz: RBW: 120 kHz, VBW: 300 kHz (Quasi Peak)
	F > 1 GHz: RBW: 1 MHz, VBW: 1 MHz (Peak)
Mode of operation:	Receive

Frequency (MHz)	Field Strength (mV/m)	Measurement Distance (m)
30 – 88	100 (40 dBuV)	3
88 - 216	150 (43.5 dBuV))	3
216 – 960	200 (46 dBuV)	3
Above 960	500 (54 dBuV)	3

Operation Mode: Receive:

30 MHz ~ 1 GHz

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

Above 1 GHz

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

8.8.3 RADIATED RESTRICTED BAND EDGE MEASUREMENTS

Test Requirements and limit, §15.247(d) §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)).

MIMO

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	55.59	8.79	H	64.38	73.98	9.60	PK
5150	42.97	8.79	H	51.76	53.98	2.22	AV
5150	55.01	8.79	V	63.8	73.98	10.18	PK
5150	42.40	8.79	V	51.19	53.98	2.79	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	53.93	8.79	H	62.72	73.98	11.26	PK
5150	43.00	8.79	H	51.79	53.98	2.19	AV
5150	53.54	8.79	V	62.33	73.98	11.65	PK
5150	42.67	8.79	V	51.46	53.98	2.52	AV

Band : UNII 1

Operation Mode: 802.11 ac_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	54.12	8.79	H	62.91	73.98	11.07	PK
5150	43.17	8.79	H	51.96	53.98	2.02	AV
5150	53.87	8.79	V	62.66	73.98	11.32	PK
5150	42.88	8.79	V	51.67	53.98	2.31	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	60.93	8.79	H	69.72	73.98	4.26	PK
5150	42.85	8.79	H	51.64	53.98	2.34	AV
5150	58.88	8.79	V	67.67	73.98	6.31	PK
5150	42.31	8.79	V	51.1	53.98	2.88	AV

Band :	UNII 1
Operation Mode:	802.11 ac_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	59.08	8.79	H	67.87	73.98	6.11	PK
5150	42.81	8.79	H	51.6	53.98	2.38	AV
5150	58.04	8.79	V	66.83	73.98	7.15	PK
5150	42.27	8.79	V	51.06	53.98	2.92	AV

Band :	UNII 1
Operation Mode:	802.11 ac_80 MHz BW
Transfer Rate:	29.3 Mbps
Operating Frequency	5210 MHz
Channel No.	42 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	60.70	8.79	H	69.49	73.98	4.49	PK
5150	42.76	8.79	H	51.55	53.98	2.43	AV
5150	60.18	8.79	V	68.97	73.98	5.01	PK
5150	42.51	8.79	V	51.3	53.98	2.68	AV

Notes:

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

8.9 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 MIMO, 135 Mbps, Ch.46 in 802.11n_HT40 mode in UNII 1. Because 802.11n_HT40 mode in UNII 1 is worst case.

RESULT PLOTS

Conducted Emissions (Line 1)

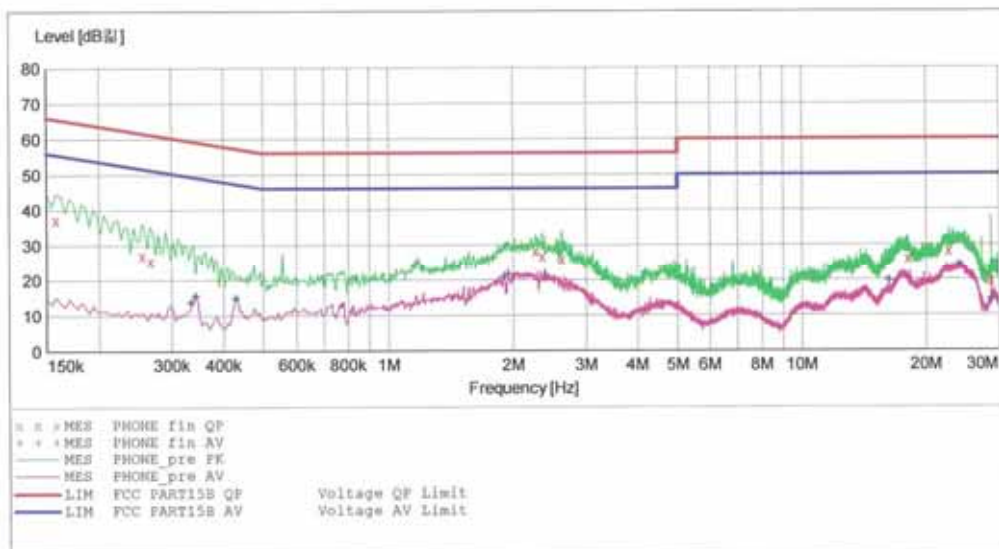
HCT

EMC

EUT: LGSWF41
 Manufacturer: LG
 Operating Condition: WLAN MODE(UNII)
 Test Site: SHIELD ROOM
 Operator: JS LEE
 Test Specification: FCC PART15B
 Comment: H
 Start of Test: 2013-12-11 / 11:10:36오전

SCAN TABLE: "FCC CLASS B(H)"

Short Description:			FCC CLASS B(H)			
Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
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: "PHONE_fin QP"

2013-12-11 11:13오전

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.158001	37.20	9.8	66	28.4	---	---
0.254001	27.10	9.8	62	34.5	---	---
0.266001	25.50	9.8	61	35.8	---	---
2.268000	28.30	10.0	56	27.7	---	---
2.352000	26.80	10.0	56	29.2	---	---
2.624000	26.00	10.0	56	30.0	---	---
18.060000	26.10	10.9	60	33.9	---	---
22.664000	28.20	11.0	60	31.8	---	---
28.756000	19.70	11.3	60	40.3	---	---

MEASUREMENT RESULT: "PHONE_fin AV"

2013-12-11 11:13오전

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.334001	13.70	9.8	49	35.7	---	---
0.342001	15.60	9.8	49	33.5	---	---
0.430001	14.90	9.8	47	32.3	---	---
1.904000	20.90	9.9	46	25.1	---	---
1.944000	21.70	9.9	46	24.3	---	---
2.384000	21.40	10.0	46	24.6	---	---
16.228000	19.80	10.8	50	30.2	---	---
24.052000	24.10	11.1	50	25.9	---	---
28.756000	14.40	11.3	50	35.6	---	---

Conducted Emissions (Line 2)

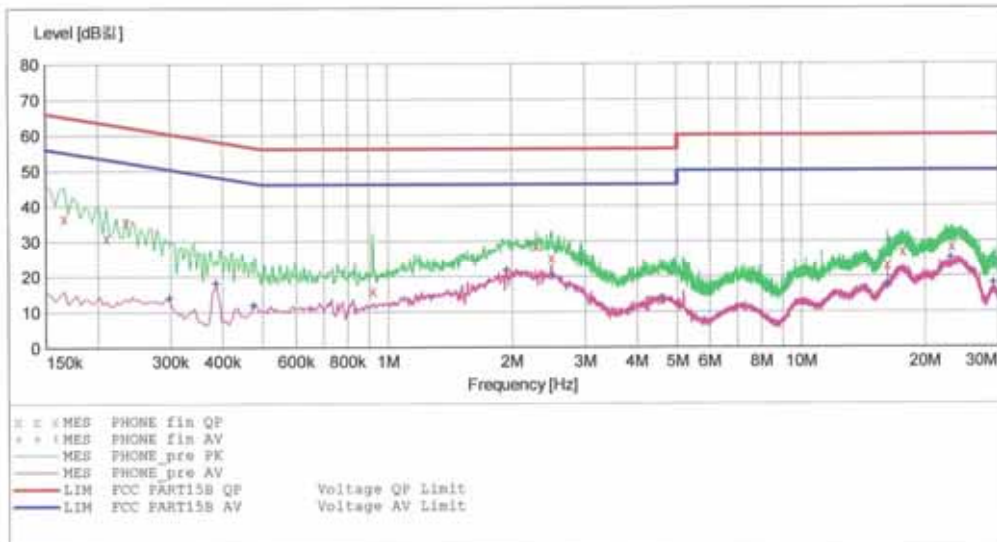
HCT

EMC

EUT: LGSWF41
 Manufacturer: LG
 Operating Condition: WLAN MODE(UNII)
 Test Site: SHIELD ROOM
 Operator: JS LEE
 Test Specification: FCC PART15B
 Comment: N
 Start of Test: 2013-12-11 / 11:06:40오전

SCAN TABLE: "FCC CLASS B(N)"

Short Description:			FCC CLASS B(N)			
Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
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: "PHONE_fin QP"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.166001	36.60	10.0	65	28.5	---	---
0.210001	31.10	10.0	63	32.1	---	---
0.234001	35.70	10.0	62	26.6	---	---
0.920000	16.00	10.0	56	40.0	---	---
2.292000	28.70	10.2	56	27.3	---	---
2.496000	25.20	10.2	56	30.8	---	---
16.180000	23.30	11.1	60	36.7	---	---
17.660000	27.10	11.1	60	32.9	---	---
23.256000	28.40	11.4	60	31.6	---	---

MEASUREMENT RESULT: "PHONE_fin AV"

2013-12-11 11:09오전

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.298001	14.00	10.0	50	36.3	---	---
0.386001	18.10	10.0	48	30.0	---	---
0.474001	11.90	10.0	46	34.6	---	---
1.948000	21.80	10.1	46	24.2	---	---
2.496000	20.00	10.2	46	26.0	---	---
4.636000	14.00	10.4	46	32.0	---	---
16.180000	17.60	11.1	50	32.4	---	---
23.128000	25.10	11.4	50	24.9	---	---
29.236000	18.00	11.8	50	32.0	---	---

9. 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	E4416A /Power Meter	Annual	10/16/2014	GB41291412
Agilent	E9327A /POWER SENSOR	Annual	04/16/2014	MY4442009
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