HCT CO.,LTD
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea
TEL: +82-31-645-6300 FAX: +82-31-645-6401

REPORT

FCC Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

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

Date of Issue:
January 29, 2015
Test Site/Location:
HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea.
Report No.: HCT-R-1501-F052-1
HCT FRN: 0005866421

FCC ID : A3LSMA700F

APPLICANT : SAMSUNG Electronics Co., Ltd.

FCC Model(s):	SM-A700F	
EUT Type:	Mobile Phone	
Max. RF Output Power:	Wi-Fi 802.11a (5180~5240) (11.44 dBm)/ Wi-Fi 802.11a (5260~5320) (11.48 dBm)/ Wi-Fi 802.11a (5500~5700) (11.93 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (11.40 dBm)/ Wi-Fi 802.11n_20 MHz BW(5260~5320)(11.35dBm)/ Wi-Fi 802.11n_20 MHz BW(5500~5700)(11.81 dBm)/ Wi-Fi 802.11n_40 MHz BW(5190~5230) (10.84 dBm)/ Wi-Fi 802.11n_40 MHz BW (5270~5310) (10.74 dBm)/ Wi-Fi 802.11n_40 MHz BW (5510~5670) (11.20 dBm)	
Frequency Range:	20 MHz BW:	5180 MHz - 5240 MHz (UNII 1)/ 5260 MHz - 5320 MHz (UNII 2A)/ 5500 MHz - 5700 MHz (UNII 2C)
	40 MHz BW:	5190 MHz - 5230 MHz (UNII 1)/ 5270 MHz - 5310 MHz (UNII 2A)/ 5510 MHz - 5670 MHz (UNII 2C)
Modulation type	OFDM	
FCC Classification:	Unlicensed National Information Infrastructure(UNII)	
FCC Rule Part(s):	Part 15.407	

Engineering Statement:

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

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

Report prepared by	**Approved by**
: Kyung Soo Kang	**: Sang Jun Lee**
Test engineer of RF Team	**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.

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1501-F052	January 26, 2015	- First Approval Report
HCT-R-1501-F052-1	January 29, 2015	- Revised the peak antenna gain

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1. GENERAL INFORMATION

Applicant:	SAMSUNG Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu Suwon-si, Gyeonggi-do, 443-742 Rep. of Korea
FCC ID:	A3LSMA700F
EUT Type:	Mobile Phone
FCC Model(s):	SM-A700F
Date(s) of Tests:	January 09, 2015 ~ January 22, 2015
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	Mobile Phone	
FCC Model Name	SM-A700F	
Power Supply	DC 3.8 V	
Frequency Range	TX_20 MHz BW: 40 MHz BW: RX_20 MHz BW: 40 MHz BW:	5180 MHz - 5240 MHz (UNII 1)/ 5260 MHz - 5320 MHz (UNII 2A)/ 5500 MHz - 5700 MHz (UNII 2C) where) Not supported 5600 MHz – 5640 MHz 5190 MHz - 5230 MHz (UNII 1)/ 5270 MHz - 5310 MHz (UNII 2A)/ 5510 MHz - 5670 MHz (UNII 2C) where) Not supported 5590 MHz – 5630 MHz 5180 MHz - 5240 MHz (UNII 1)/ 5260 MHz - 5320 MHz (UNII 2A)/ 5500 MHz - 5700 MHz (UNII 2C) where) Not supported 5600 MHz – 5640 MHz 5190 MHz - 5230 MHz (UNII 1)/ 5270 MHz - 5310 MHz (UNII 2A)/ 5510 MHz - 5670 MHz (UNII 2C) where) Not supported 5590 MHz – 5630 MHz
Max. RF Output Power:	Wi-Fi 802.11a (5180~5240) (11.44 dBm)/ Wi-Fi 802.11a (5260~5320) (11.48 dBm)/ Wi-Fi 802.11a (5500~5700) (11.93 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (11.40 dBm)/ Wi-Fi 802.11n_20 MHz BW(5260~5320)(11.35dBm)/ Wi-Fi 802.11n_20 MHz BW(5500~5700)(11.81 dBm)/ Wi-Fi 802.11n_40 MHz BW(5190~5230) (10.84 dBm)/ Wi-Fi 802.11n_40 MHz BW (5270~5310) (10.74 dBm)/ Wi-Fi 802.11n_40 MHz BW (5510~5670) (11.20 dBm)	
Modulation Type	OFDM(802.11a, 802.11n_20 MHz, 802.11n_40 MHz)	
Antenna Specification	Manufacturer: TE Connectivity Antenna type: Internal Antenna Peak Gain : -3.66 dBi	

3. TEST METHODOLOGY

The measurement procedure described in FCC KDB 789033 D01 General UNII Test Procedures Old Rules v01 dated June 06, 2014 entitled " Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part15, Subpart E" and the American National Standard for Testing Unlicensed Wireless Devices(ANSI C63.4-2003) were used in the measurement.

3.1 EUT CONFIGURATION

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

3.2 EUT EXERCISE

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

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

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

Radiated Emissions

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

Conducted Antenna Terminal

See Section from 8.1 to 8.4.(KDB 789033)

3.4 DESCRIPTION OF TEST MODES

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

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

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 February 28, 2014 (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.”

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

7. SUMMARY OF TEST RESULTS

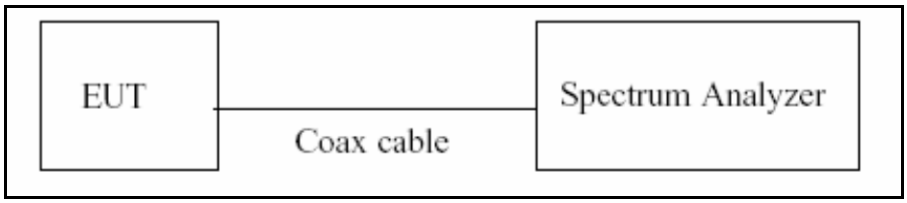
Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
TRANSMITTER MODE(TX)			CONDUCTED	
26dB Bandwidth	NA	NA		PASS
Maximum Conducted Output Power	§15.407(a)(1)	< 4+10 log $_{10}$ (BW) dBm (5150-5250 MHz) < 11+10 log $_{10}$ (BW) dBm (5250-5350 MHz) < 11+10 log $_{10}$ (BW) dBm (5470-5725 MHz)		PASS
Peak Power Spectral Density	§15.407(a)(1), (5)	<4 dBm/ MHz (5150-5250) <11 dBm/ MHz (5250-5350) <11 dBm/ MHz (5470-5725)		PASS
Peak Excursion	§15.407(a)(6)	<13 dB/ MHz maximum difference		PASS
Frequency Stability	§15.407(g)	NA		PASS
Undesirable Emissions	§15.407(b)(1), (2), (3)	<-27 dBm/ MHz EIRP (5150-5350 MHz, 5470-5725 MHz)	RADIATED	PASS
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	15.205, 5.407(b)(1), (5), (6)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS
AC Conducted Emissions 150 kHz-30 MHz	15.207	<FCC 15.207 limits	LINE CONDUCTED	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 ≥ EBW if possible; otherwise, set RBW to the largest available value. Set VBW ≥ 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* ≤ 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 D01, issued 06/06/2014)
The largest availble 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 ≤ 6.25 microseconds. (50/6.25 = 8)
The zero-span method was used becaure all measured T data are > 6.25 microseconds and both RBW and VBW are > 50/*T*.

1. RBW = 8 MHz (the largest availble value)
2. VBW = 8 MHz (≥ 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*log(1/Duty Cycle)

▣ Duty Cycle Factor

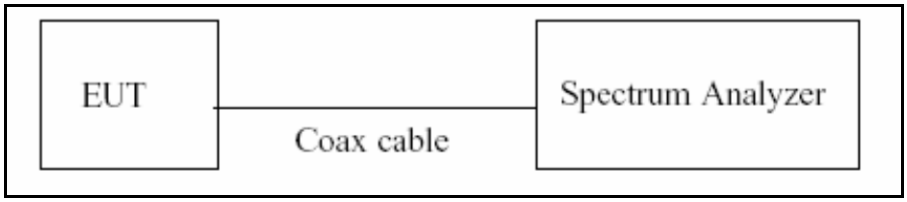
Mode	Data Rate	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor
802.11a Mode	6	1.420	1.525	0.93114754	0.310
	9	0.955	1.060	0.90094340	0.453
	12	0.722	0.822	0.87834550	0.563
	18	0.490	0.592	0.82770270	0.821
	24	0.372	0.472	0.78813559	1.034
	36	0.255	0.355	0.71830986	1.437
	48	0.195	0.296	0.65878378	1.813
	54	0.178	0.280	0.63571429	1.967
802.11n Mode 20 MHz BW	6.5	1.332	1.437	0.92693111	0.330
	13	0.684	0.789	0.86692015	0.620
	19.5	0.469	0.572	0.81993007	0.862
	26	0.362	0.465	0.77849462	1.087
	39	0.255	0.355	0.71830986	1.437
	52	0.199	0.300	0.66333333	1.783
	58.5	0.183	0.284	0.64436620	1.909
	65	0.167	0.267	0.62546816	2.038
802.11n Mode 40 MHz BW	13.5	0.662	0.762	0.86876640	0.611
	27	0.349	0.449	0.77728285	1.094
	40.5	0.247	0.345	0.71594203	1.451
	54	0.194	0.293	0.66211604	1.791
	81	0.142	0.241	0.58921162	2.297
	108	0.115	0.213	0.53990610	2.677
	121.5	0.107	0.206	0.51941748	2.845
	135	0.099	0.198	0.50000000	3.010

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 D01(issued 06/06/2014), 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(C.1 in KDB 789033 D01, issued 06/06/2014)

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 maximum 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 %.

▣ 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	18.735	N/A	Pass
5200	40	18.597	N/A	Pass
5240	48	18.752	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	18.683	N/A	Pass
5300	60	18.560	N/A	Pass
5320	64	18.740	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	18.743	N/A	Pass
5580	116	18.641	N/A	Pass
5700	140	18.701	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	19.069	N/A	Pass
5200	40	18.993	N/A	Pass
5240	48	19.007	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	19.105	N/A	Pass
5300	60	19.027	N/A	Pass
5320	64	19.044	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	18.991	N/A	Pass
5580	116	18.993	N/A	Pass
5700	140	19.013	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	42.720	N/A	Pass
5230	46	42.842	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5270	54	42.425	N/A	Pass
5310	62	42.740	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5510	102	44.296	N/A	Pass
5550	110	42.367	N/A	Pass
5670	134	43.768	N/A	Pass

Note :

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

2. DFS test channels should be defined. So, We performed the OBW test to prove that no part of the fundamental emissions of any channels belong to UNII1 Band for DFS.

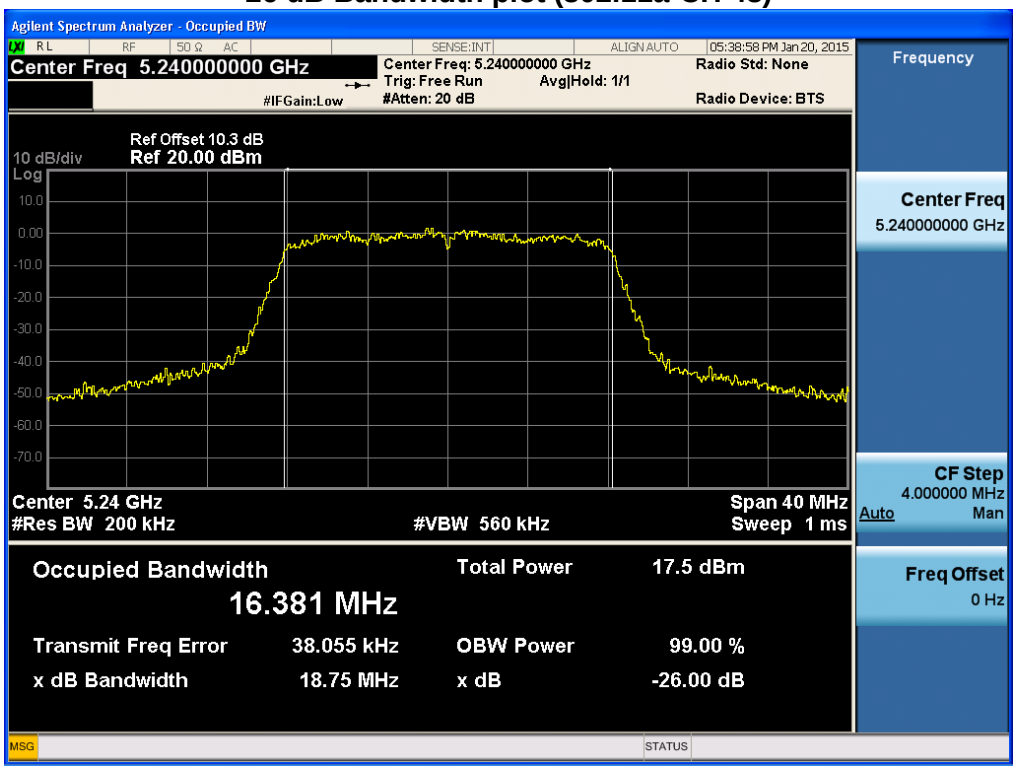
3. We performed the OBW test to prove that no part of the fundamental emissions of any channels belong to UNII 2 Band for using indoor.

4. We performed the OBW test to prove that no part of the fundamental emissions of number of 132 channel and 134 channel for TDWR Band.

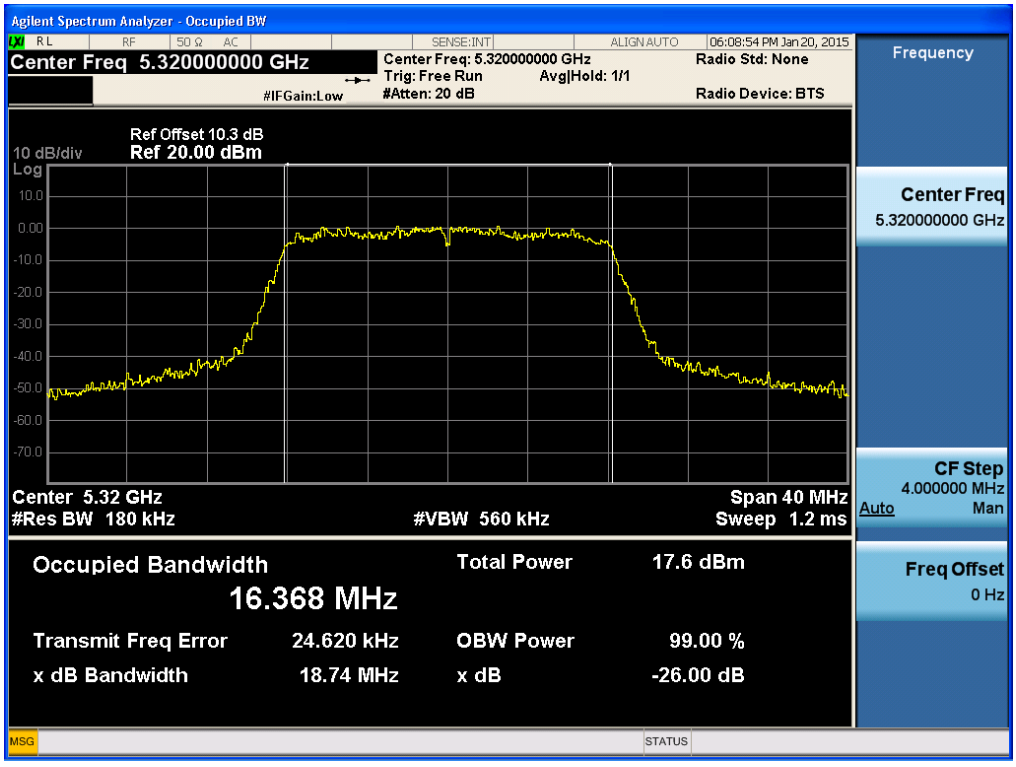
▣ RESULT PLOTS

20MHz BW

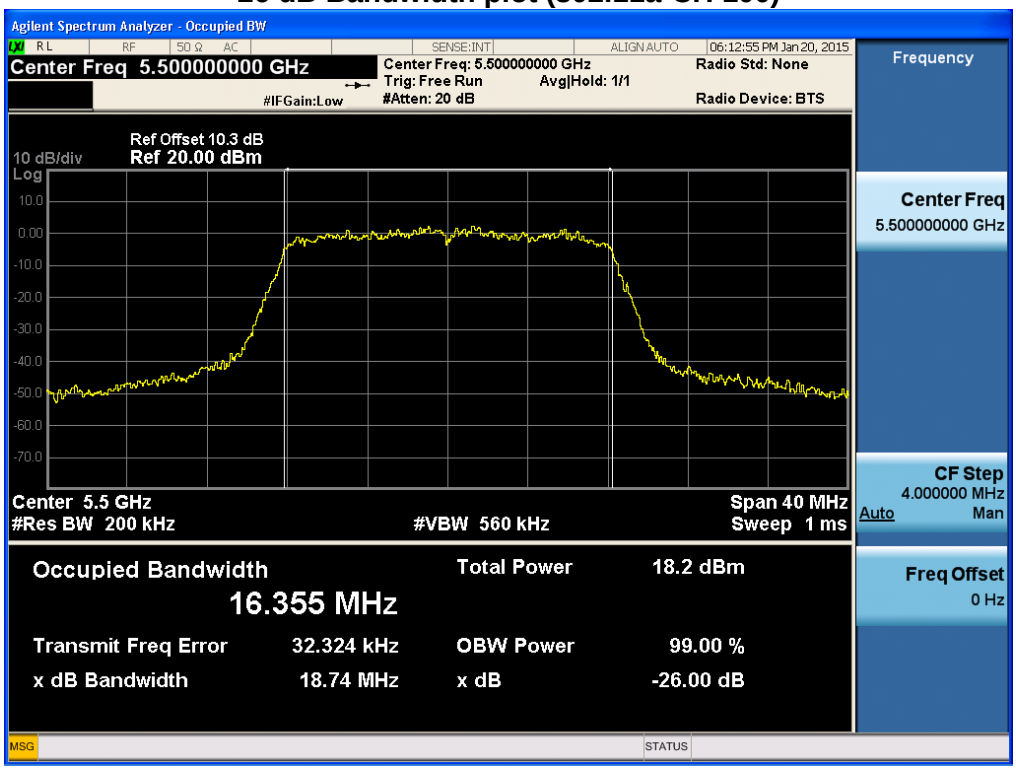
26 dB Bandwidth plot (802.11a-CH 48)



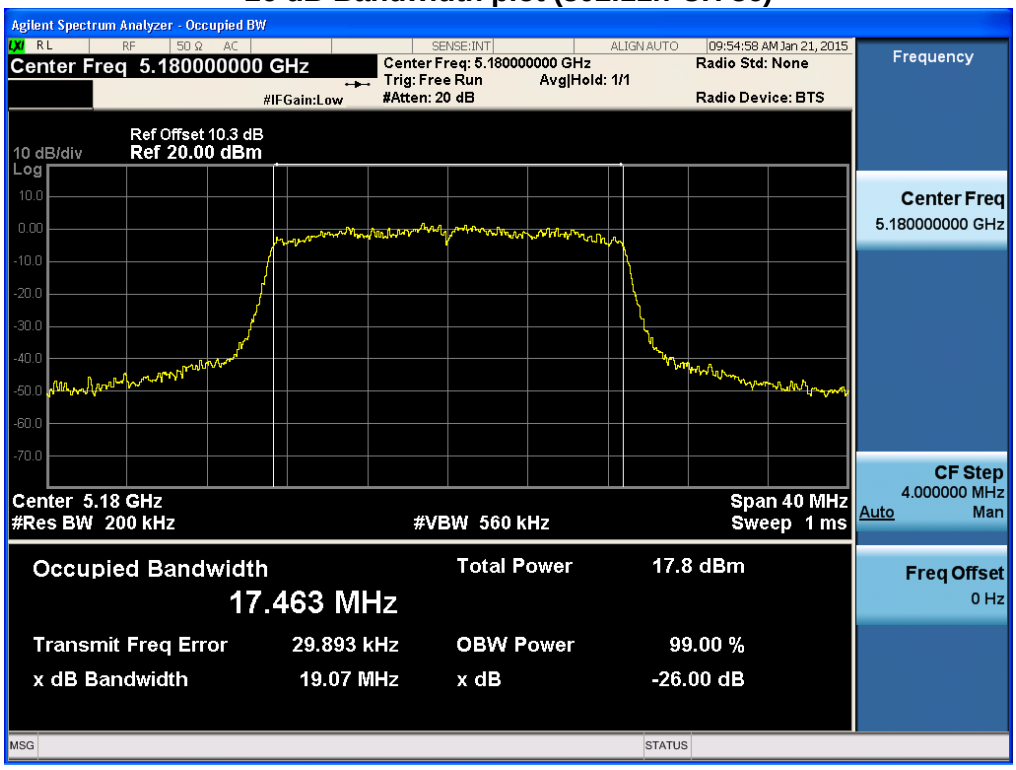
26 dB Bandwidth plot (802.11a-CH 64)



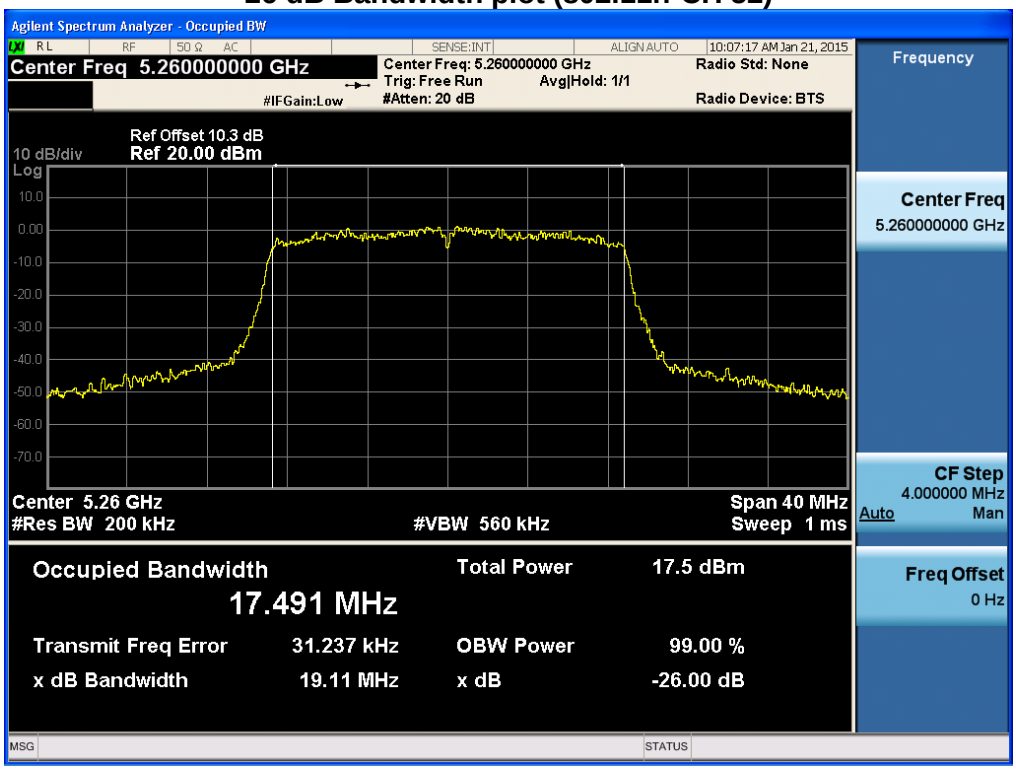
26 dB Bandwidth plot (802.11a-CH 100)



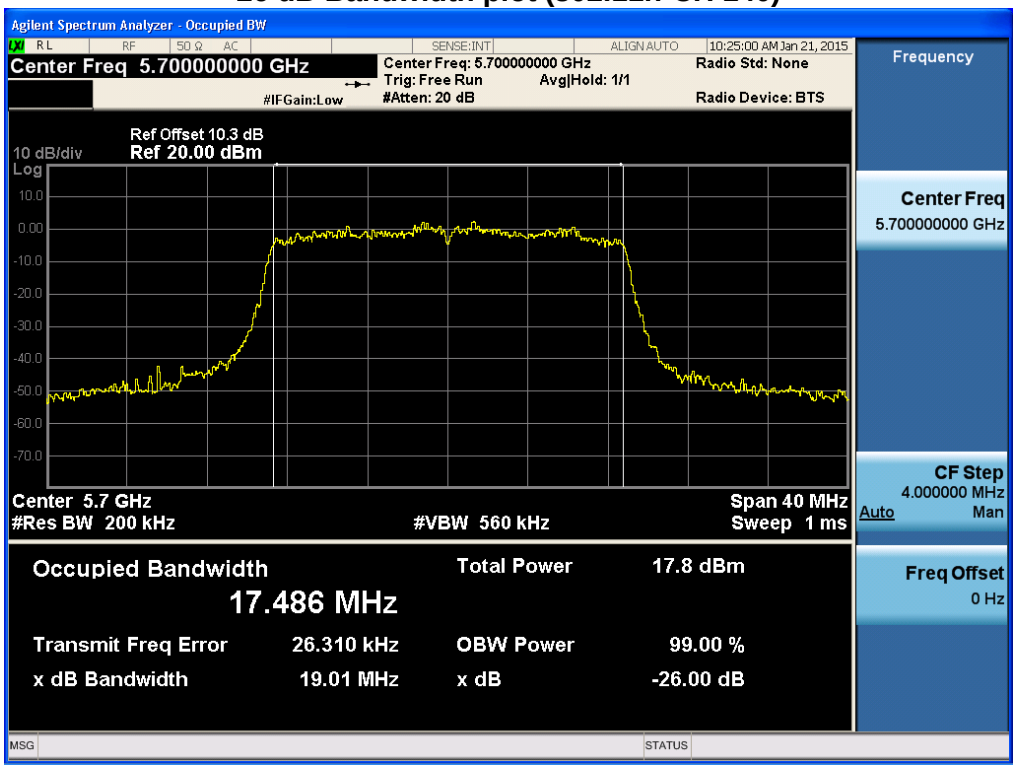
26 dB Bandwidth plot (802.11n-CH 36)



26 dB Bandwidth plot (802.11n-CH 52)

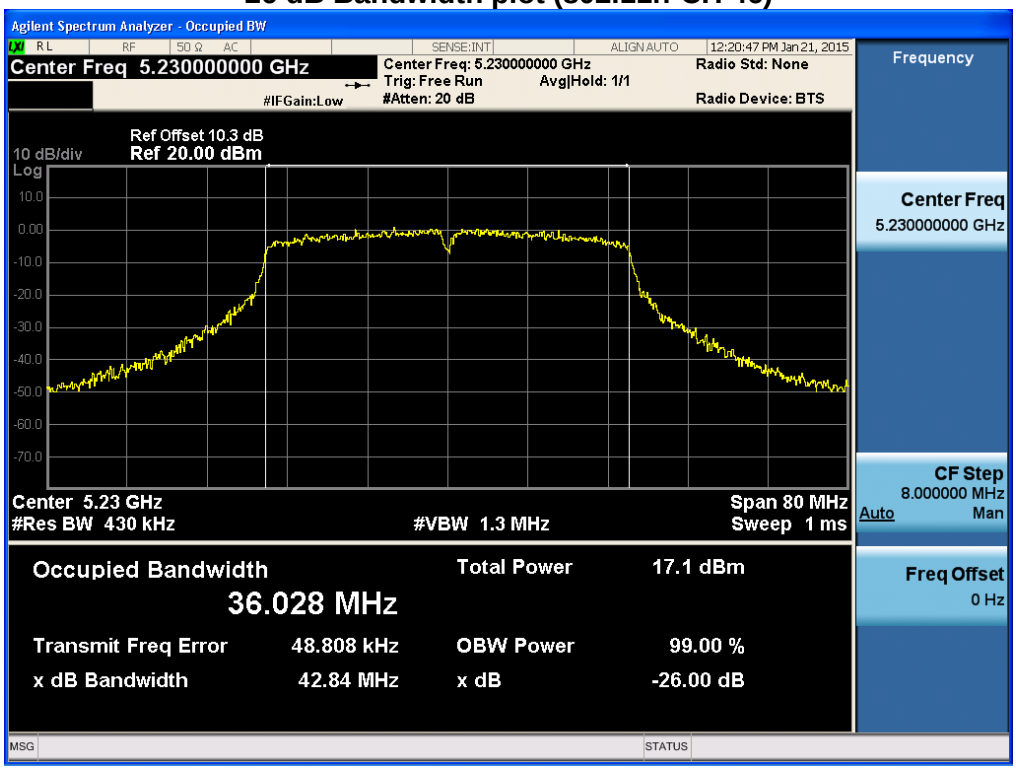


26 dB Bandwidth plot (802.11n-CH 140)

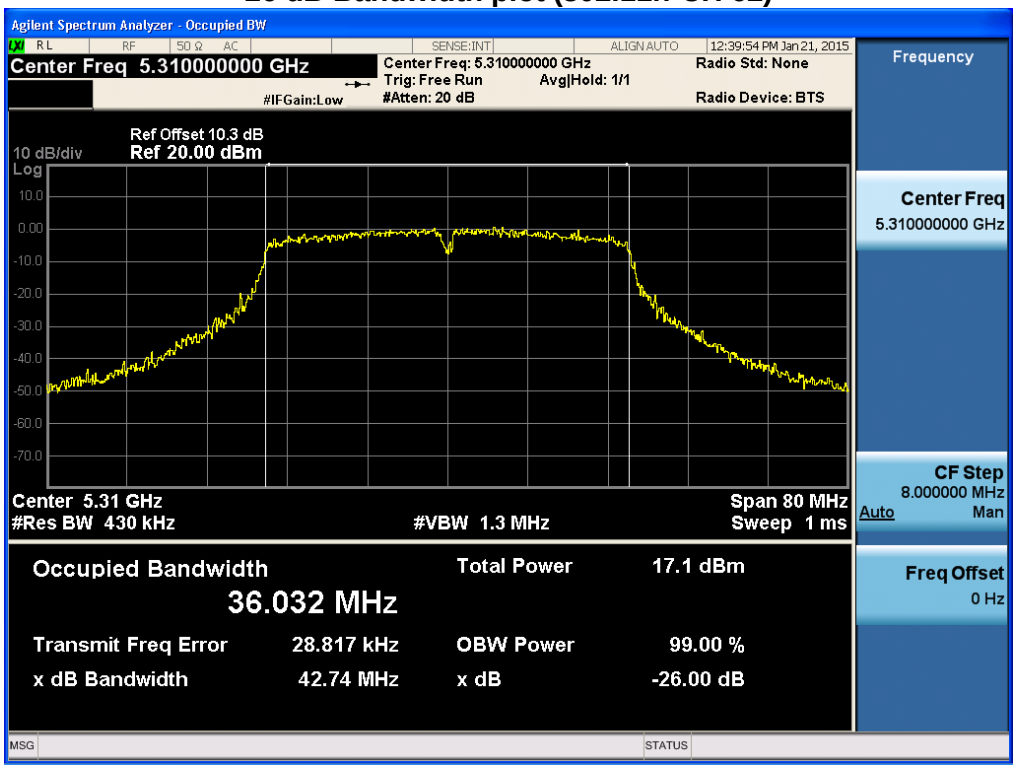


40 MHz BW

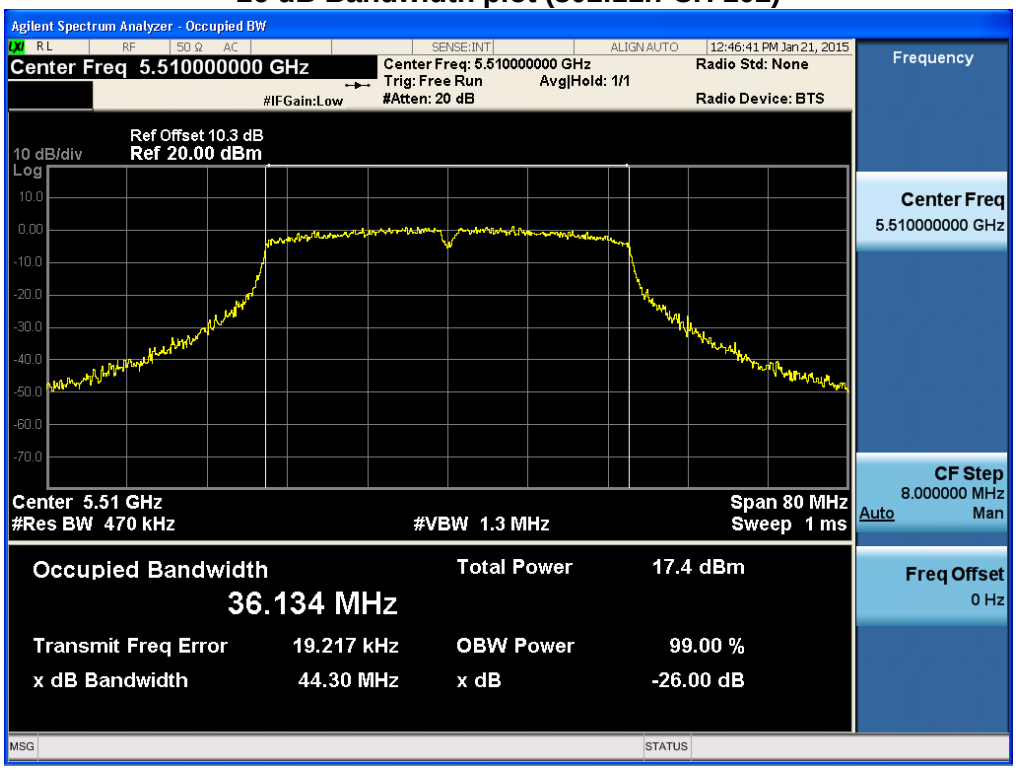
26 dB Bandwidth plot (802.11n-CH 46)



26 dB Bandwidth plot (802.11n-CH 62)

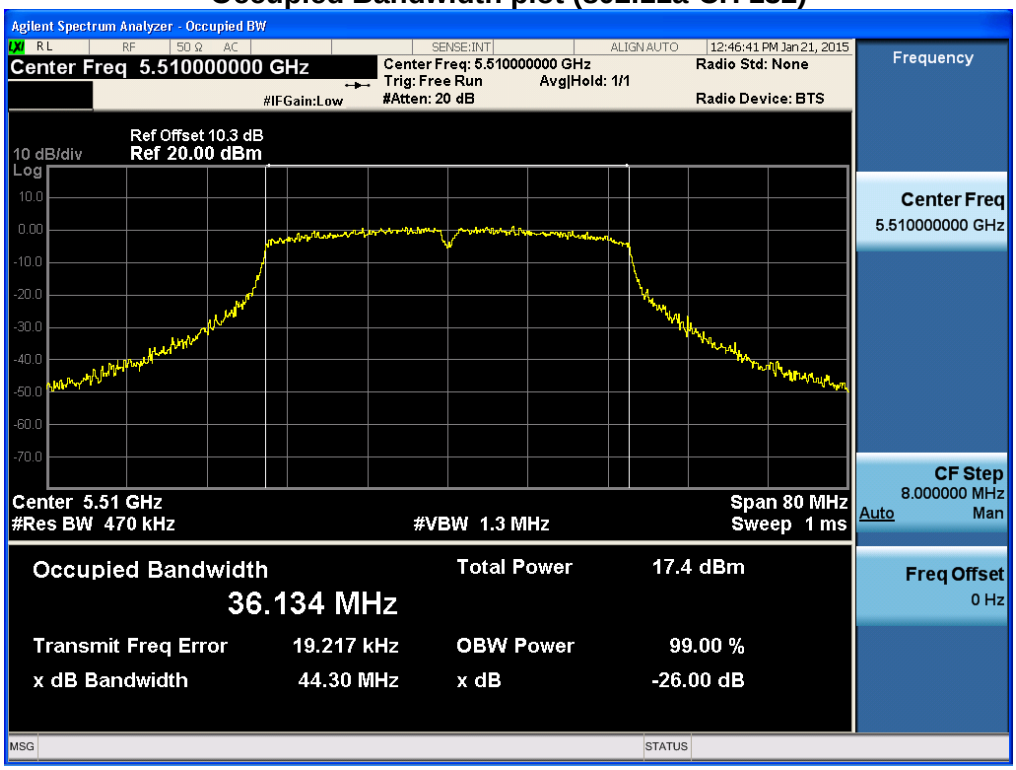


26 dB Bandwidth plot (802.11n-CH 102)

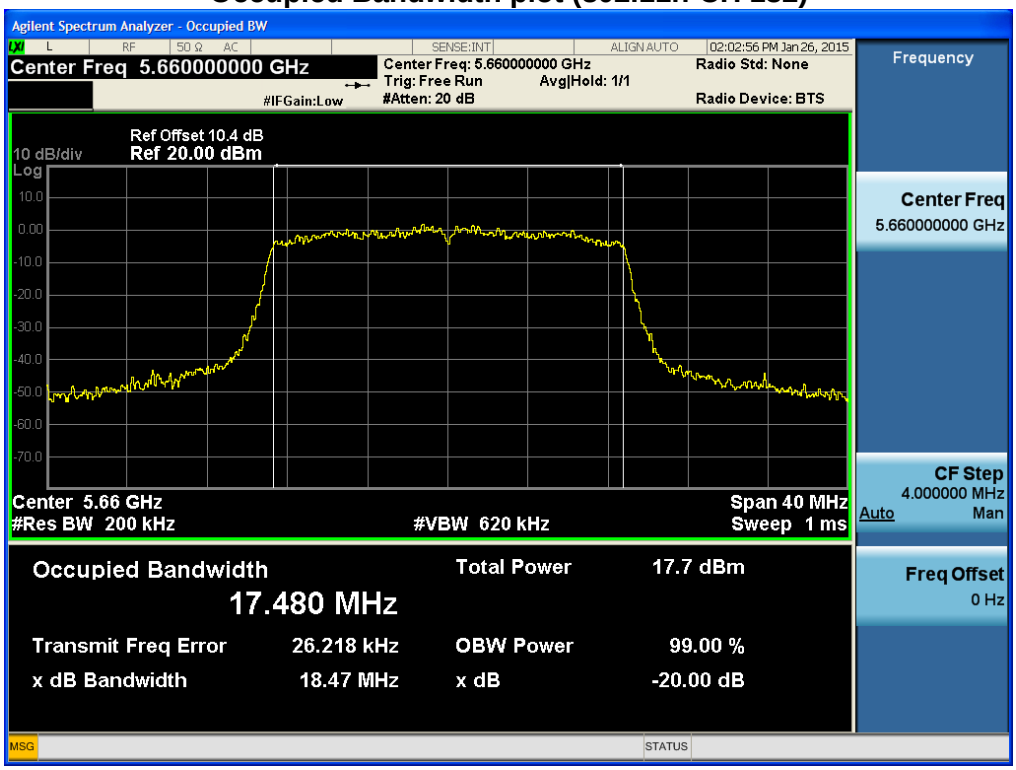


▣ RESULT PLOTS(OBW)

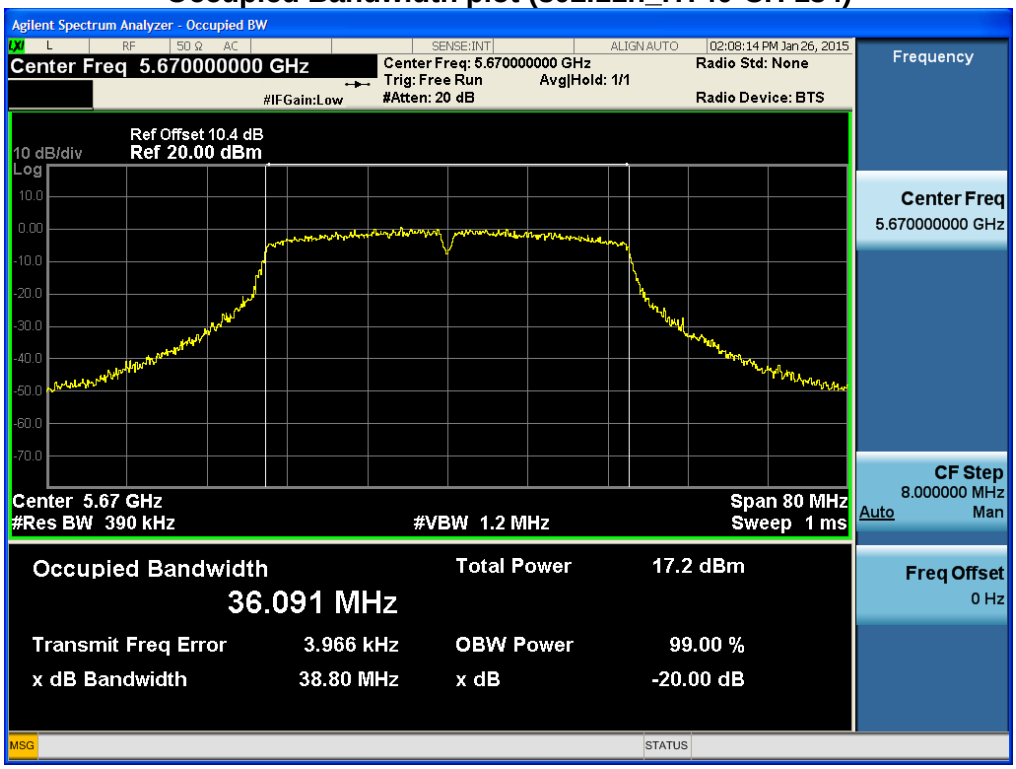
Occupied Bandwidth plot (802.11a-CH 132)



Occupied Bandwidth plot (802.11n-CH 132)



Occupied Bandwidth plot (802.11n_HT40-CH 134)



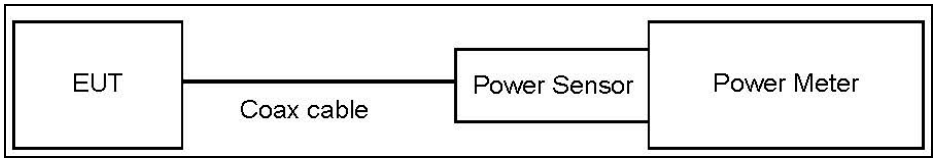
8.3 OUTPUT POWER MEASUREMENT

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 dBm + 10 $\log_{10}$ (26 dB BW)
frequencies. In the 5.25 – 5.35 GHz band, the maximum permissible conducted output power is the lesser of 250 mW (23.98 dBm) and 11 dBm + 10 $\log_{10}$ (26 dB BW)
frequencies. In the 5.47 – 5.725 GHz band, the maximum permissible conducted output power is the lesser of 250 mW (23.98 dBm) and 11 dBm + 10 $\log_{10}$ (26 dB BW)

Limit : 802.11a_UNII-1 = 16.99 dBm
802.11n_UNII-1_20 MHz BW = 16.99 dBm
802.11n_UNII-1_40 MHz BW = 16.99 dBm
802.11a_UNII-2 = 23.98 dBm
802.11n_UNII-2_20 MHz BW = 23.98dBm
802.11n_UNII-2_40 MHz BW = 23.98 dBm
802.11a_UNII-2e = 23.98dBm
802.11n_UNII-2e_20 MHz BW = 23.98 dBm
802.11n_UNII-2e_40 MHz BW = 23.98 dBm

▣ TEST CONFIGURATION(20 MHz BW)



▣ TEST PROCEDURE(20 MHz BW)

We tested according to Method E)3)a) in KDB 789033(issued 06/06/2014).

▪ 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.

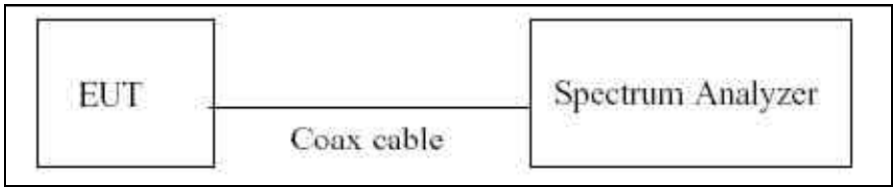
Note :

1. We apply to the offset in the 5.2 GHz, 5.3 GHz and 5.6 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	10.30
	5190	10.29
	5200	10.28
	5230	10.29
	5240	10.34
UNII 2	5260	10.37
	5270	10.38
	5300	10.40
	5310	10.39
	5320	10.39
UNII 2e	5500	10.35
	5510	10.36
	5550	10.41
	5580	10.43
	5670	10.43

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

▣ TEST CONFIGURATION(40 MHz BW)



▣ TEST PROCEDURE(40 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 06/06/2014).

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.
3. RBW = 1 MHz.
4. VBW ≥ 3 MHz.

5. Number of points in sweep ≥ 2*span/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 10log(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 + 10 dB + 0.8 dB + 0.21 dB = 21.01 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, 5.3 GHz and 5.6 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	10.30
	5190	10.29
	5200	10.28
	5230	10.29
	5240	10.34
UNII 2	5260	10.37
	5270	10.38
	5300	10.40
	5310	10.39
	5320	10.39
UNII 2e	5500	10.35
	5510	10.36
	5550	10.41
	5580	10.43
	5670	10.43

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

▣ TEST RESULTS

20 MHz BW

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	10.84	0.310	11.15	16.99
		9	10.77	0.453	11.22	16.99
		12	10.63	0.563	11.19	16.99
		18	10.42	0.821	11.24	16.99
		24	10.19	1.034	11.22	16.99
		36	9.84	1.437	11.27	16.99
		48	9.52	1.813	11.33	16.99
		54	9.42	1.967	11.39	16.99
5200	40	6	10.92	0.310	11.23	16.99
		9	10.86	0.453	11.31	16.99
		12	10.81	0.563	11.37	16.99
		18	10.53	0.821	11.35	16.99
		24	10.31	1.034	11.34	16.99
		36	9.91	1.437	11.35	16.99
		48	9.60	1.813	11.42	16.99
		54	9.48	1.967	11.44	16.99
5240	48	6	10.91	0.310	11.22	16.99
		9	10.82	0.453	11.27	16.99
		12	10.71	0.563	11.27	16.99
		18	10.58	0.821	11.40	16.99
		24	10.26	1.034	11.30	16.99
		36	9.92	1.437	11.36	16.99
		48	9.58	1.813	11.40	16.99
		54	9.46	1.967	11.43	16.99

Conducted Output Power Measurements (802.11a Mode: 5260~5320)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5260	52	6	10.99	0.310	11.30	23.98
		9	10.92	0.453	11.37	23.98
		12	10.67	0.563	11.23	23.98
		18	10.48	0.821	11.30	23.98
		24	10.23	1.034	11.26	23.98
		36	9.83	1.437	11.27	23.98
		48	9.61	1.813	11.42	23.98
		54	9.51	1.967	11.48	23.98
5300	60	6	10.93	0.310	11.24	23.98
		9	10.78	0.453	11.24	23.98
		12	10.79	0.563	11.36	23.98
		18	10.52	0.821	11.34	23.98
		24	10.28	1.034	11.32	23.98
		36	9.82	1.437	11.26	23.98
		48	9.59	1.813	11.41	23.98
		54	9.45	1.967	11.42	23.98
5320	64	6	10.93	0.310	11.24	23.98
		9	10.82	0.453	11.27	23.98
		12	10.76	0.563	11.32	23.98
		18	10.48	0.821	11.30	23.98
		24	10.25	1.034	11.28	23.98
		36	9.92	1.437	11.36	23.98
		48	9.63	1.813	11.44	23.98
		54	9.48	1.967	11.45	23.98

Conducted Output Power Measurements (802.11a Mode: 5500~5700)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5500	100	6	11.38	0.310	11.69	23.98
		9	11.27	0.453	11.72	23.98
		12	11.18	0.563	11.75	23.98
		18	10.99	0.821	11.81	23.98
		24	10.76	1.034	11.80	23.98
		36	10.39	1.437	11.83	23.98
		48	10.05	1.813	11.86	23.98
		54	9.96	1.967	11.93	23.98
5580	116	6	11.13	0.310	11.44	23.98
		9	11.08	0.453	11.54	23.98
		12	10.98	0.563	11.54	23.98
		18	10.75	0.821	11.57	23.98
		24	10.53	1.034	11.56	23.98
		36	10.21	1.437	11.65	23.98
		48	9.83	1.813	11.65	23.98
		54	9.71	1.967	11.68	23.98
5700	140	6	10.93	0.310	11.24	23.98
		9	10.73	0.453	11.19	23.98
		12	10.72	0.563	11.28	23.98
		18	10.44	0.821	11.26	23.98
		24	10.27	1.034	11.30	23.98
		36	9.87	1.437	11.31	23.98
		48	9.53	1.813	11.34	23.98
		54	9.45	1.967	11.41	23.98

Conducted Output Power Measurements (802.11n 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	10.80	0.330	11.13	16.99
		13	10.63	0.620	11.25	16.99
		19.5	10.41	0.862	11.28	16.99
		26	10.22	1.087	11.30	16.99
		39	9.89	1.437	11.33	16.99
		52	9.62	1.783	11.40	16.99
		58.5	9.49	1.909	11.40	16.99
		65	9.30	2.038	11.34	16.99
5200	40	6.5	10.83	0.330	11.16	16.99
		13	10.63	0.620	11.25	16.99
		19.5	10.45	0.862	11.31	16.99
		26	10.23	1.087	11.31	16.99
		39	9.89	1.437	11.33	16.99
		52	9.54	1.783	11.32	16.99
		58.5	9.48	1.909	11.39	16.99
		65	9.35	2.038	11.39	16.99
5240	48	6.5	10.75	0.330	11.08	16.99
		13	10.56	0.620	11.18	16.99
		19.5	10.36	0.862	11.23	16.99
		26	10.18	1.087	11.27	16.99
		39	9.82	1.437	11.26	16.99
		52	9.48	1.783	11.27	16.99
		58.5	9.41	1.909	11.32	16.99
		65	9.30	2.038	11.33	16.99

Conducted Output Power Measurements (802.11n Mode: 5260~5320)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5260	52	6.5	10.69	0.330	11.02	23.98
		13	10.51	0.620	11.13	23.98
		19.5	10.28	0.862	11.14	23.98
		26	10.14	1.087	11.22	23.98
		39	9.76	1.437	11.20	23.98
		52	9.44	1.783	11.22	23.98
		58.5	9.37	1.909	11.28	23.98
		65	9.24	2.038	11.28	23.98
5300	60	6.5	10.76	0.330	11.09	23.98
		13	10.48	0.620	11.10	23.98
		19.5	10.25	0.862	11.11	23.98
		26	10.09	1.087	11.18	23.98
		39	9.75	1.437	11.19	23.98
		52	9.34	1.783	11.12	23.98
		58.5	9.35	1.909	11.26	23.98
		65	9.15	2.038	11.19	23.98
5320	64	6.5	10.69	0.330	11.02	23.98
		13	10.49	0.620	11.11	23.98
		19.5	10.27	0.862	11.13	23.98
		26	10.09	1.087	11.18	23.98
		39	9.80	1.437	11.23	23.98
		52	9.45	1.783	11.23	23.98
		58.5	9.43	1.909	11.34	23.98
		65	9.31	2.038	11.35	23.98

Conducted Output Power Measurements (802.11n Mode: 5500~5700)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5500	100	6.5	11.29	0.330	11.62	23.98
		13	11.12	0.620	11.74	23.98
		19.5	10.85	0.862	11.71	23.98
		26	10.67	1.087	11.75	23.98
		39	10.30	1.437	11.73	23.98
		52	10.02	1.783	11.81	23.98
		58.5	9.89	1.909	11.79	23.98
		65	9.77	2.038	11.81	23.98
5580	116	6.5	11.19	0.330	11.52	23.98
		13	11.03	0.620	11.65	23.98
		19.5	10.73	0.862	11.59	23.98
		26	10.51	1.087	11.59	23.98
		39	10.23	1.437	11.67	23.98
		52	9.88	1.783	11.66	23.98
		58.5	9.86	1.909	11.77	23.98
		65	9.63	2.038	11.67	23.98
5700	140	6.5	10.93	0.330	11.26	23.98
		13	10.63	0.620	11.25	23.98
		19.5	10.42	0.862	11.28	23.98
		26	10.23	1.087	11.32	23.98
		39	9.94	1.437	11.38	23.98
		52	9.60	1.783	11.38	23.98
		58.5	9.44	1.909	11.35	23.98
		65	9.38	2.038	11.41	23.98

40 MHz BW

Conducted Output Power Measurements (802.11n 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	10.01	0.611	10.62	16.99
		27	9.64	1.094	10.74	16.99
		40.5	9.33	1.451	10.78	16.99
		54	9.04	1.791	10.84	16.99
		81	8.47	2.297	10.77	16.99
		108	8.12	2.677	10.79	16.99
		121.5	7.99	2.845	10.84	16.99
		135	7.79	3.010	10.80	16.99
5230	46	13.5	10.08	0.611	10.69	16.99
		27	9.65	1.094	10.75	16.99
		40.5	9.31	1.451	10.76	16.99
		54	8.94	1.791	10.73	16.99
		81	8.51	2.297	10.81	16.99
		108	8.07	2.677	10.74	16.99
		121.5	7.90	2.845	10.75	16.99
		135	7.76	3.010	10.77	16.99

Conducted Output Power Measurements (802.11n Mode: 5270~5310)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5270	54	13.5	9.89	0.611	10.50	23.98
		27	9.47	1.094	10.57	23.98
		40.5	9.14	1.451	10.59	23.98
		54	8.89	1.791	10.68	23.98
		81	8.41	2.297	10.71	23.98
		108	7.96	2.677	10.64	23.98
		121.5	7.88	2.845	10.73	23.98
		135	7.65	3.010	10.66	23.98
5310	62	13.5	10.00	0.611	10.61	23.98
		27	9.60	1.094	10.69	23.98
		40.5	9.23	1.451	10.68	23.98
		54	8.88	1.791	10.67	23.98
		81	8.40	2.297	10.70	23.98
		108	7.99	2.677	10.66	23.98
		121.5	7.90	2.845	10.74	23.98
		135	7.72	3.010	10.73	23.98

Conducted Output Power Measurements (802.11n Mode: 5510~5670)

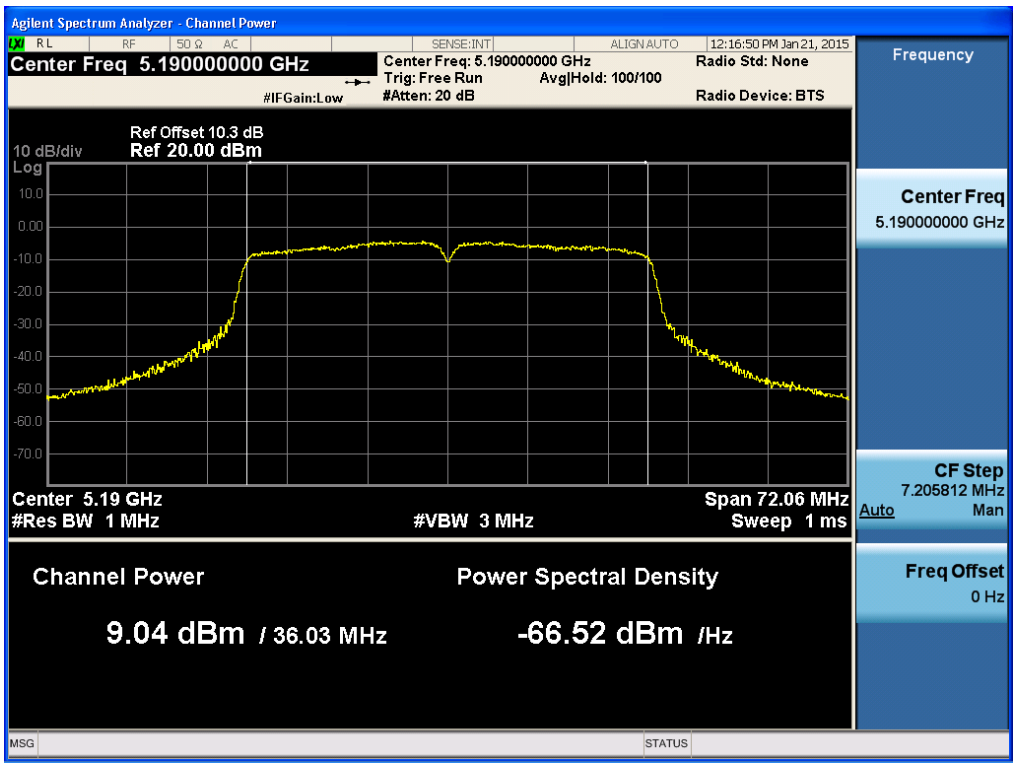
802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5510	102	13.5	10.44	0.611	11.05	23.98
		27	10.03	1.094	11.13	23.98
		40.5	9.69	1.451	11.14	23.98
		54	9.36	1.791	11.15	23.98
		81	8.86	2.297	11.16	23.98
		108	8.49	2.677	11.17	23.98
		121.5	8.34	2.845	11.18	23.98
		135	8.19	3.010	11.20	23.98
5550	110	13.5	10.44	0.611	11.05	23.98
		27	9.96	1.094	11.05	23.98
		40.5	9.63	1.451	11.08	23.98
		54	9.30	1.791	11.09	23.98
		81	8.86	2.297	11.15	23.98
		108	8.44	2.677	11.11	23.98
		121.5	8.29	2.845	11.13	23.98
		135	8.12	3.010	11.13	23.98
5670	134	13.5	10.08	0.611	10.69	23.98
		27	9.72	1.094	10.81	23.98
		40.5	9.36	1.451	10.81	23.98
		54	9.09	1.791	10.88	23.98
		81	8.55	2.297	10.85	23.98
		108	8.15	2.677	10.82	23.98
		121.5	8.03	2.845	10.87	23.98
		135	7.85	3.010	10.86	23.98

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

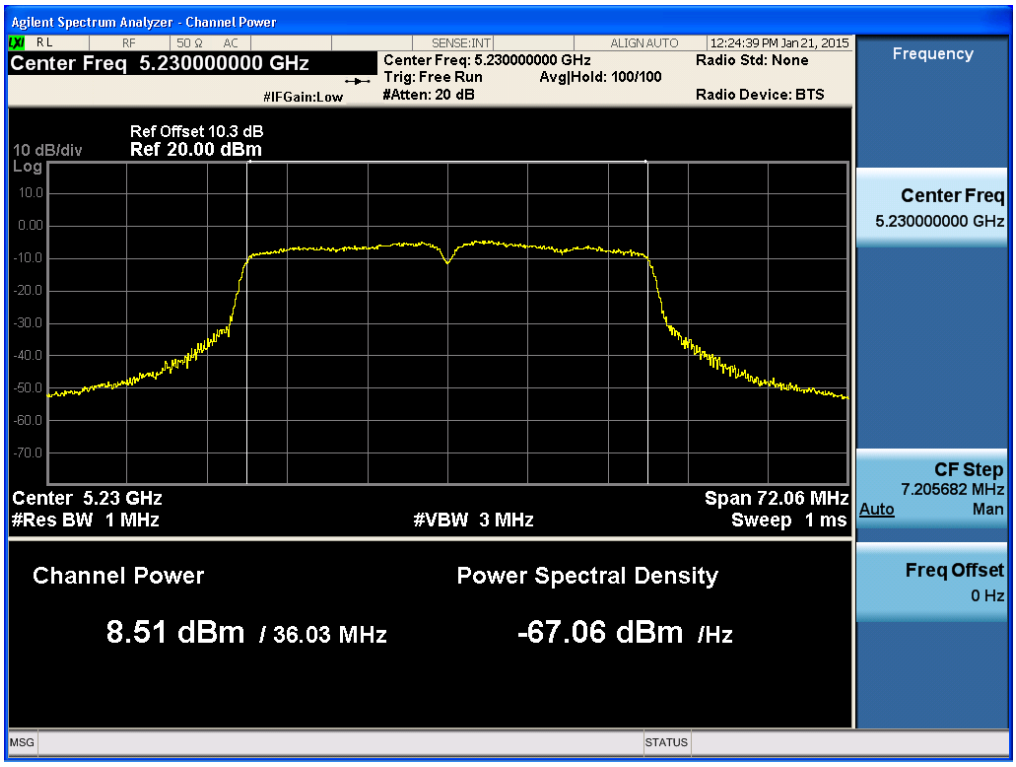
▣ RESULT PLOTS 40 MHz BW

(5190 MHz ~5230 MHz)

Conducted Output Power (802. 11n-CH 38) 54 Mbps

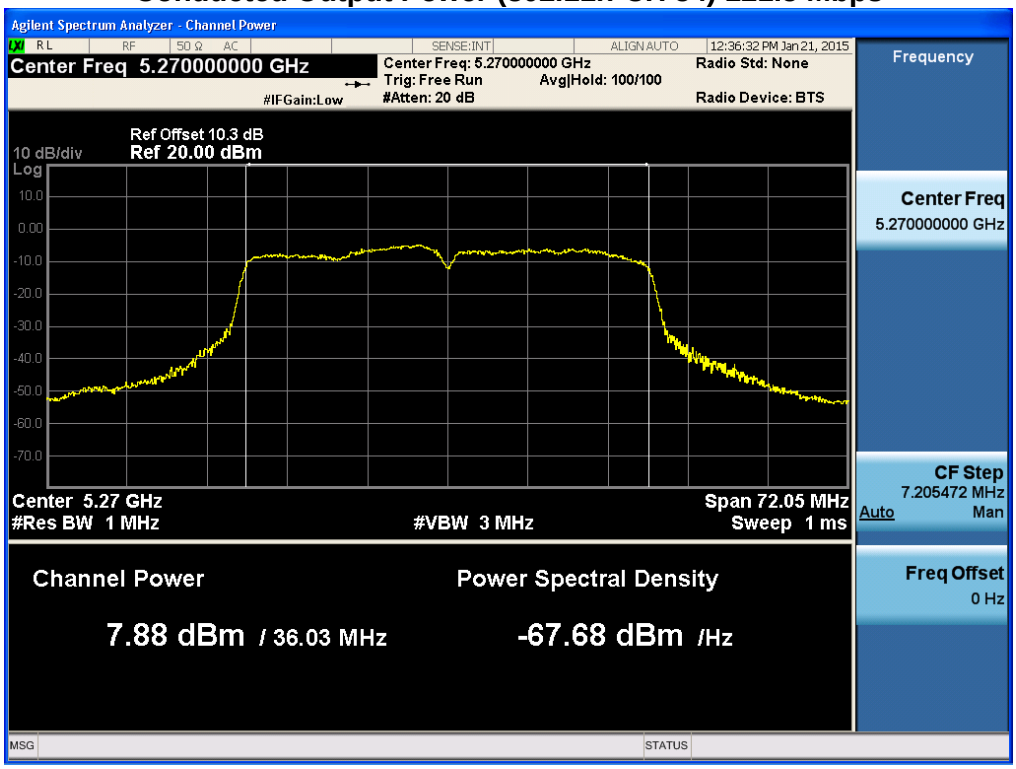


Conducted Output Power (802.11n-CH 46) 81 Mbps

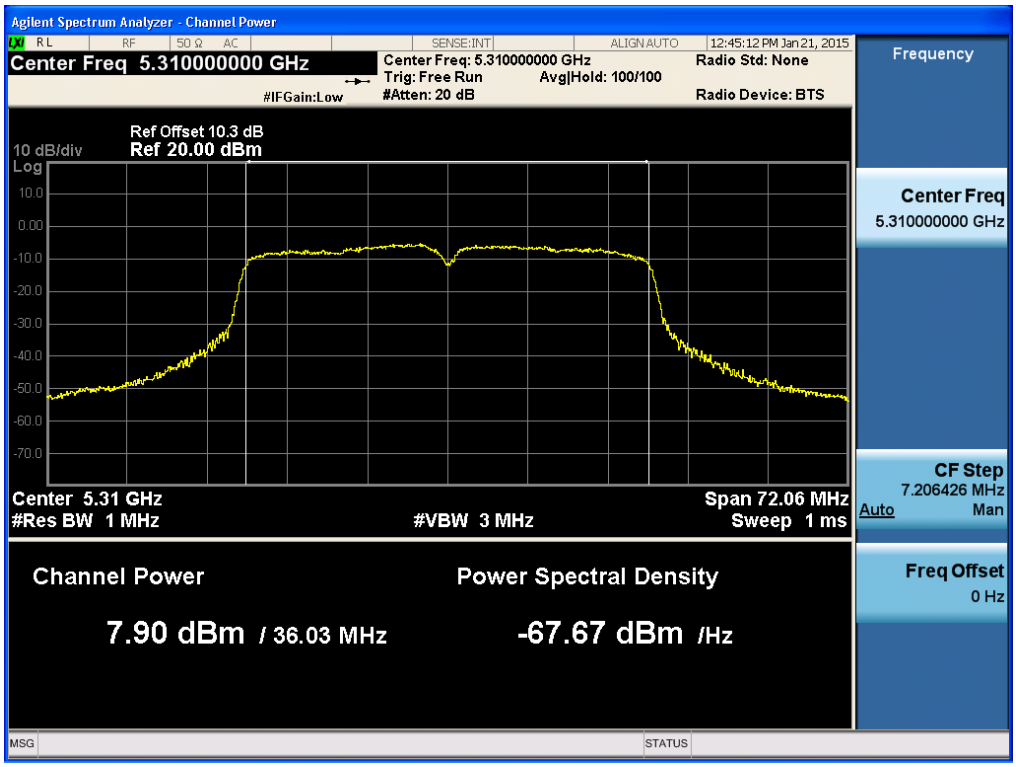


(5270 MHz ~5310 MHz)

Conducted Output Power (802.11n-CH 54) 121.5 Mbps

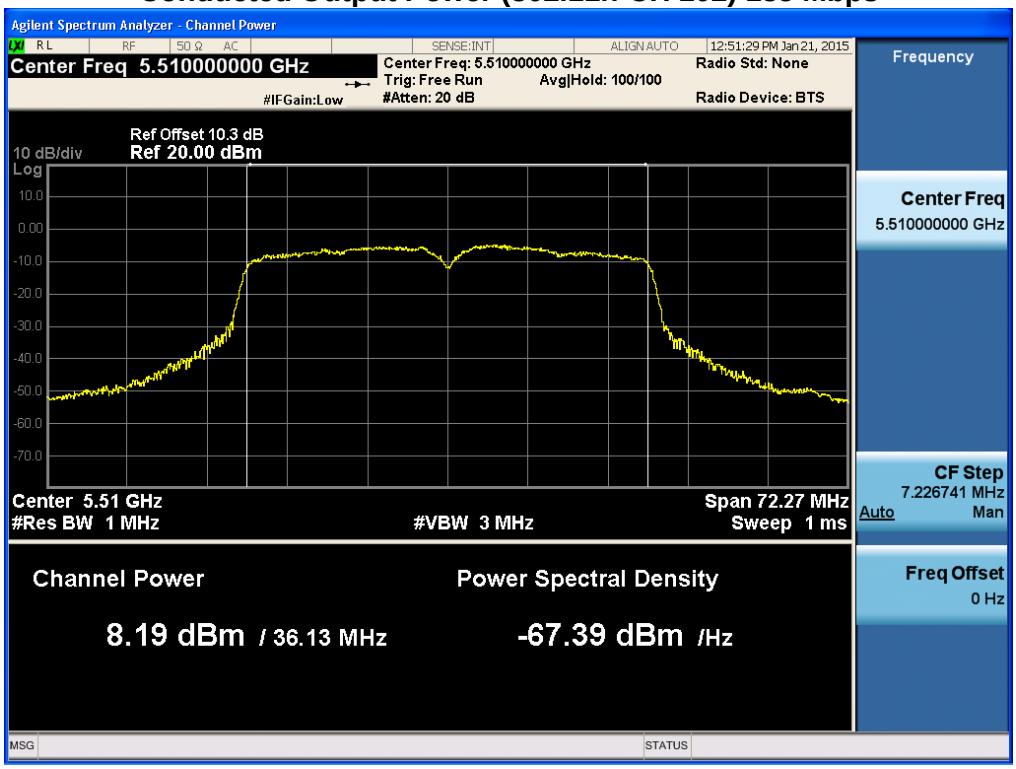


Conducted Output Power (802.11n-CH 62) 121.5 Mbps

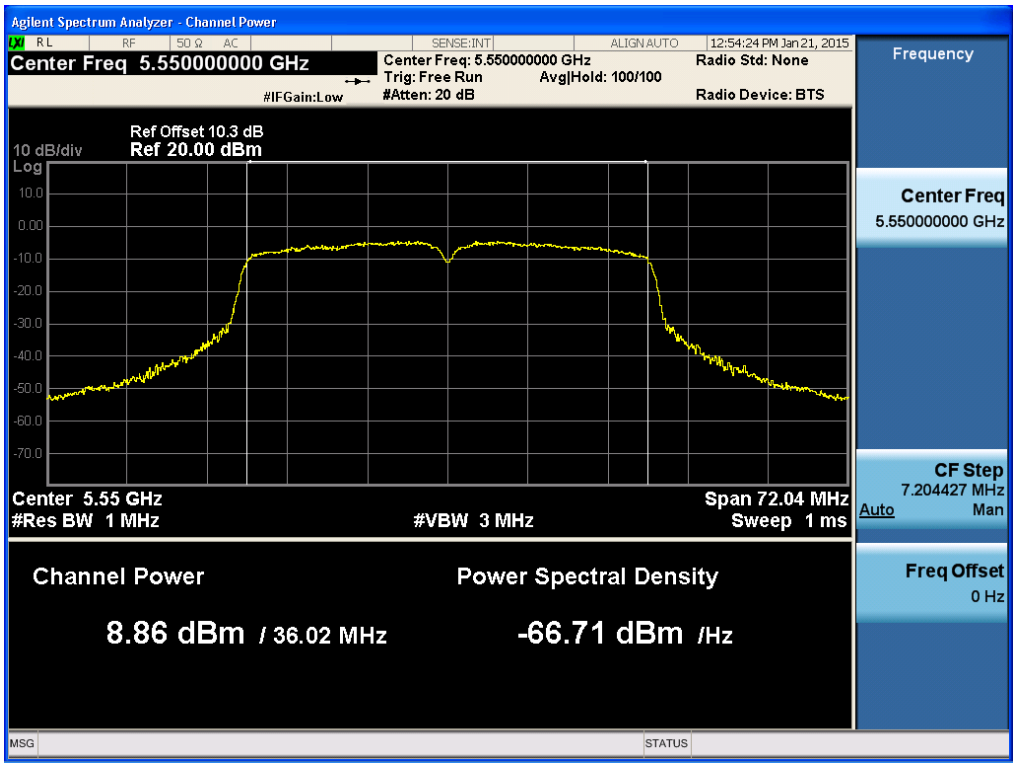


(5510 MHz ~5670 MHz)

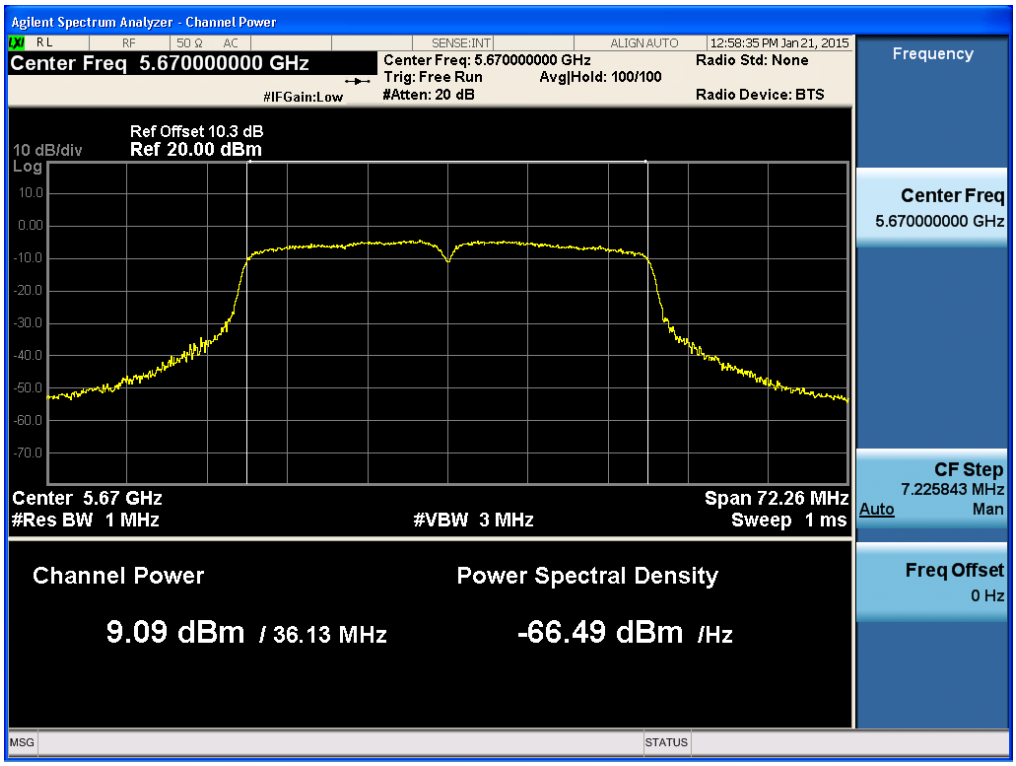
Conducted Output Power (802.11n-CH 102) 135 Mbps



Conducted Output Power (802.11n-CH 110) 81 Mbps



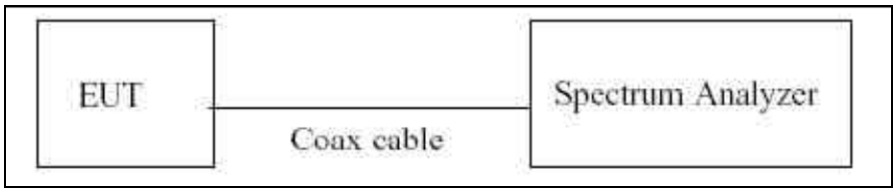
Conducted Output Power (802.11n-CH 134) 54 Mbps



8.4 POWER SPECTRAL DENSITY

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies. The maximum permissible peak power spectral density is 4 dBm/ MHz in the 5.15 GHz – 5.25 GHz band and 11 dBm/ MHz in the 5.25 GHz – 5.35 GHz and 5.47 GHz – 5.725 GHz bands

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

We tested according to Method in KDB 789033(issued 06/06/2014).

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 ≥ 3 MHz.
4. Number of points in sweep ≥ 2*span/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, 5.3 GHz and 5.6 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	10.30
	5190	10.29
	5200	10.28
	5230	10.29
	5240	10.34
UNII 2	5260	10.37
	5270	10.38
	5300	10.40
	5310	10.39
	5320	10.39
UNII 2e	5500	10.35
	5510	10.36
	5550	10.41
	5580	10.43
	5670	10.43
	5700	10.30

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

▣ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11a	-4.574	-0.210	1.96738	4	Pass
5200	40		-5.114	-0.087	1.96738	4	Pass
5240	48		-4.178	-0.204	1.96738	4	Pass
5260	52		-4.551	-0.186	1.96738	11	Pass
5300	60		-4.045	0.056	1.96738	11	Pass
5320	64		-4.782	-0.003	1.96738	11	Pass
5500	100		-4.798	0.449	1.96738	11	Pass
5580	116		-4.685	-0.169	1.96738	11	Pass
5700	140		-3.917	-0.248	1.96738	11	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	802.11n 20MHz BW	-0.648	1.90867	1.261	4	Pass
5200	40		-0.579	2.03795	1.459	4	Pass
5240	48		-0.186	2.03795	1.852	4	Pass
5260	52		-0.579	1.90867	1.330	11	Pass
5300	60		-0.216	1.90867	1.693	11	Pass
5320	64		-0.683	2.03795	1.355	11	Pass
5500	100		-0.063	2.03795	1.975	11	Pass
5580	116		0.045	1.90867	1.954	11	Pass
5700	140		-0.269	2.03795	1.769	11	Pass

Conducted Power Density Measurements

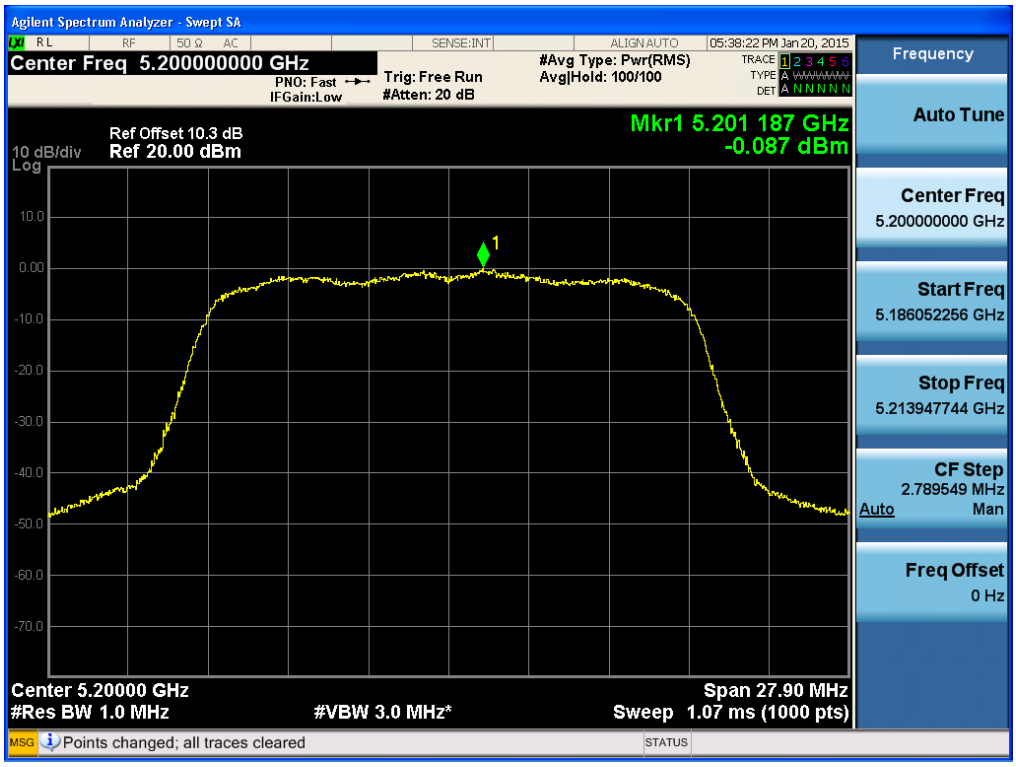
Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5190	38	802.11n 40MHz BW	-4.599	2.84483	-1.754	4	Pass
5230	46		-4.386	2.29729	-2.089	4	Pass
5270	54		-4.995	2.84483	-2.150	11	Pass
5310	62		-4.871	2.84483	-2.026	11	Pass
5510	102		-4.356	3.0103	-1.346	11	Pass
5550	110		-4.327	2.29729	-2.030	11	Pass
5670	134		-4.153	1.79066	-2.362	11	Pass

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

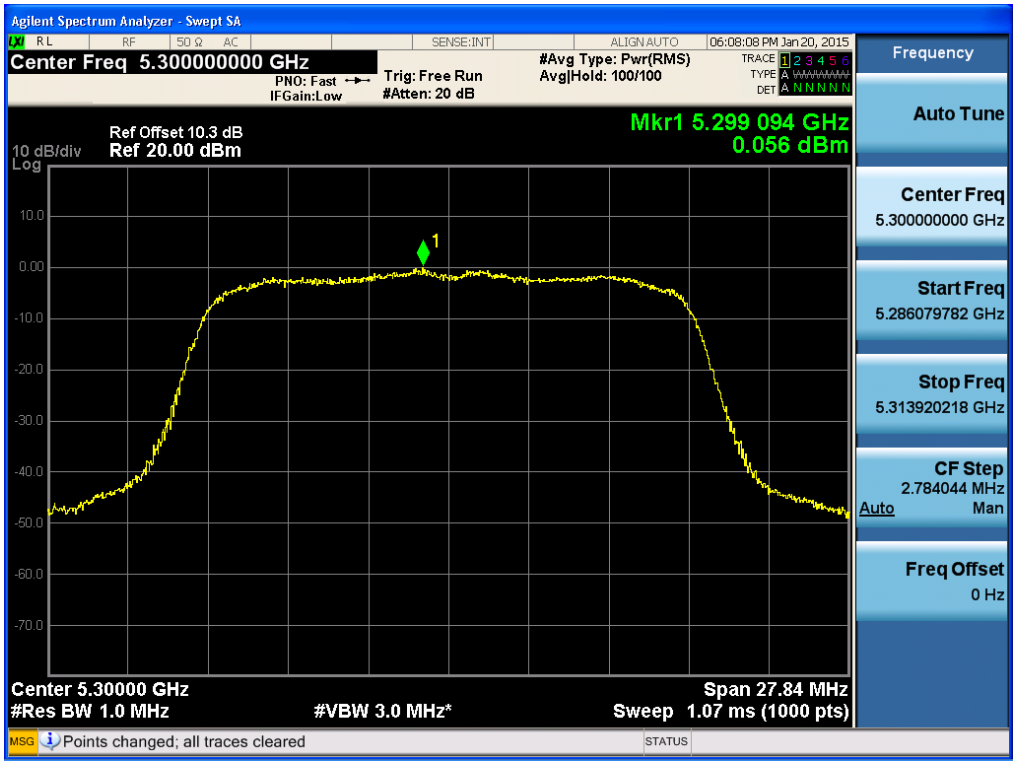
▣ RESULT PLOTS

20 MHz BW

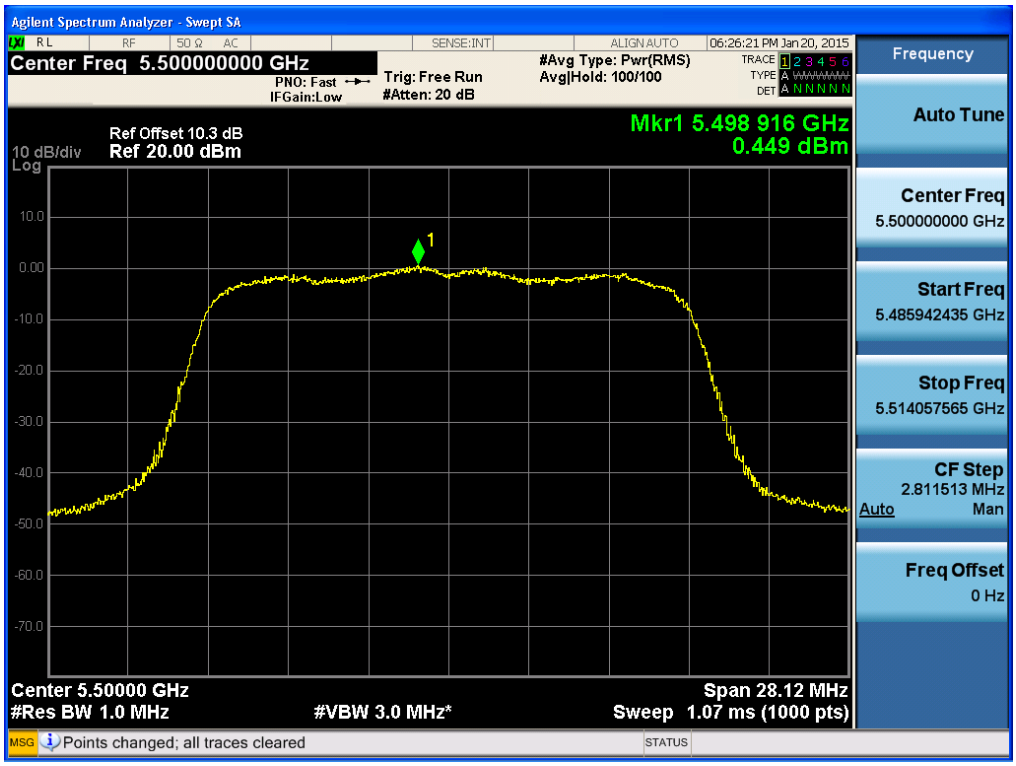
Power Spectral Density (802.11a-CH 40)



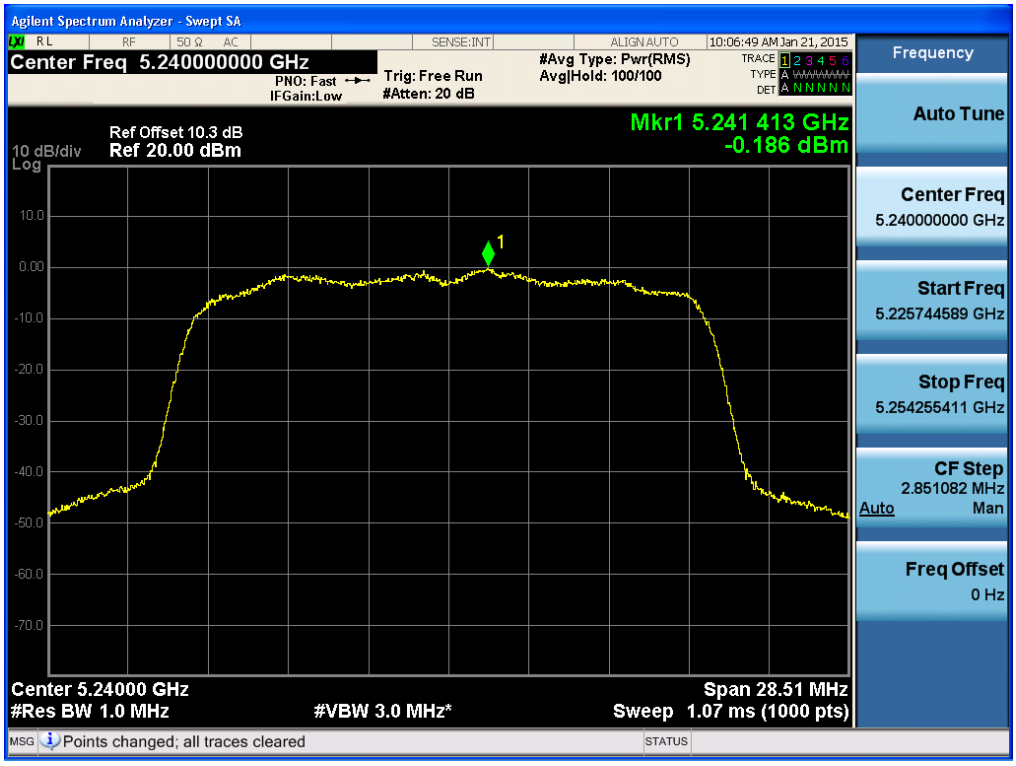
Power Spectral Density (802.11a-CH 60)



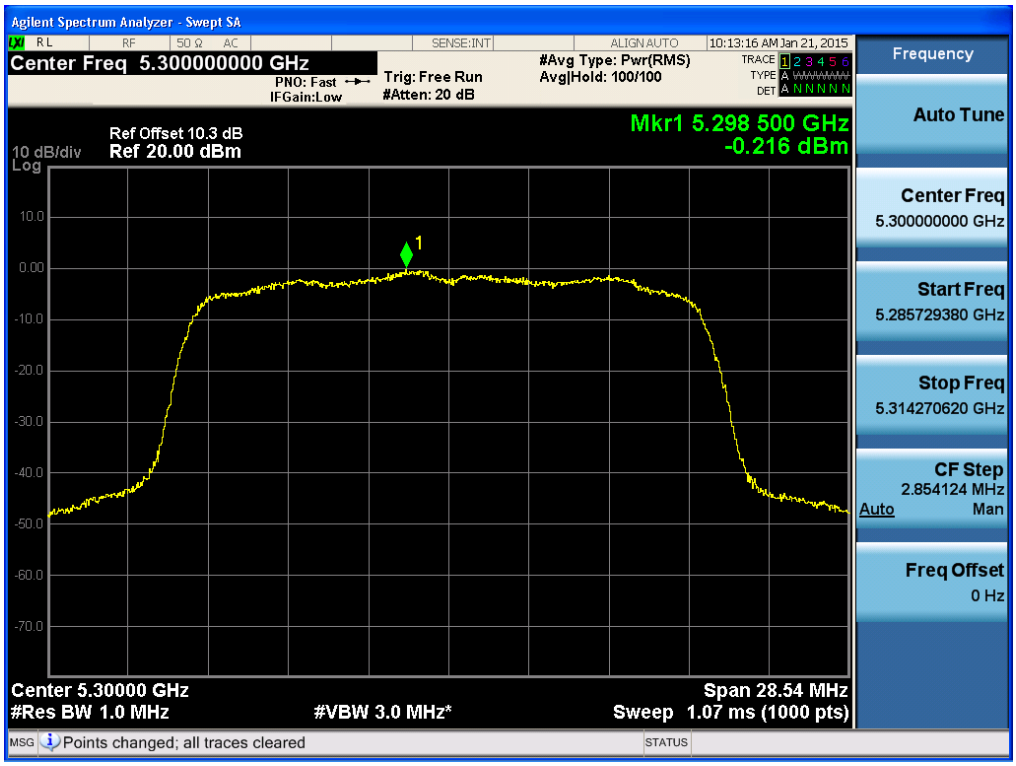
Power Spectral Density (802.11a-CH 100)



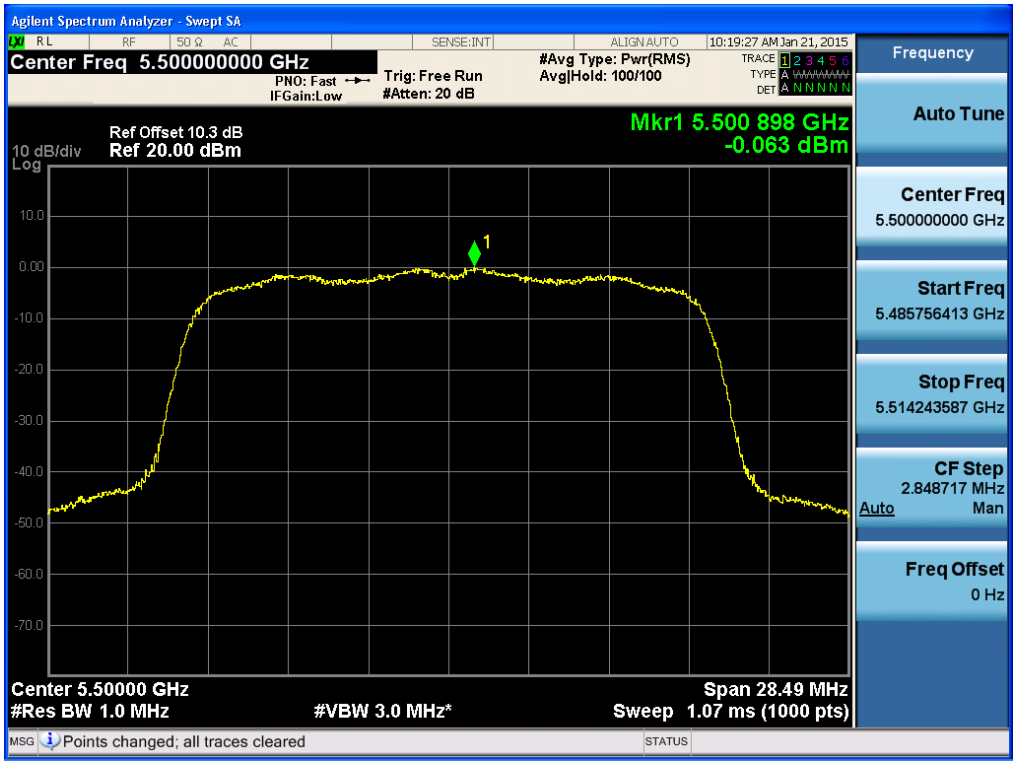
Power Spectral Density (802.11n-CH 48)



Power Spectral Density (802.11n-CH 60)

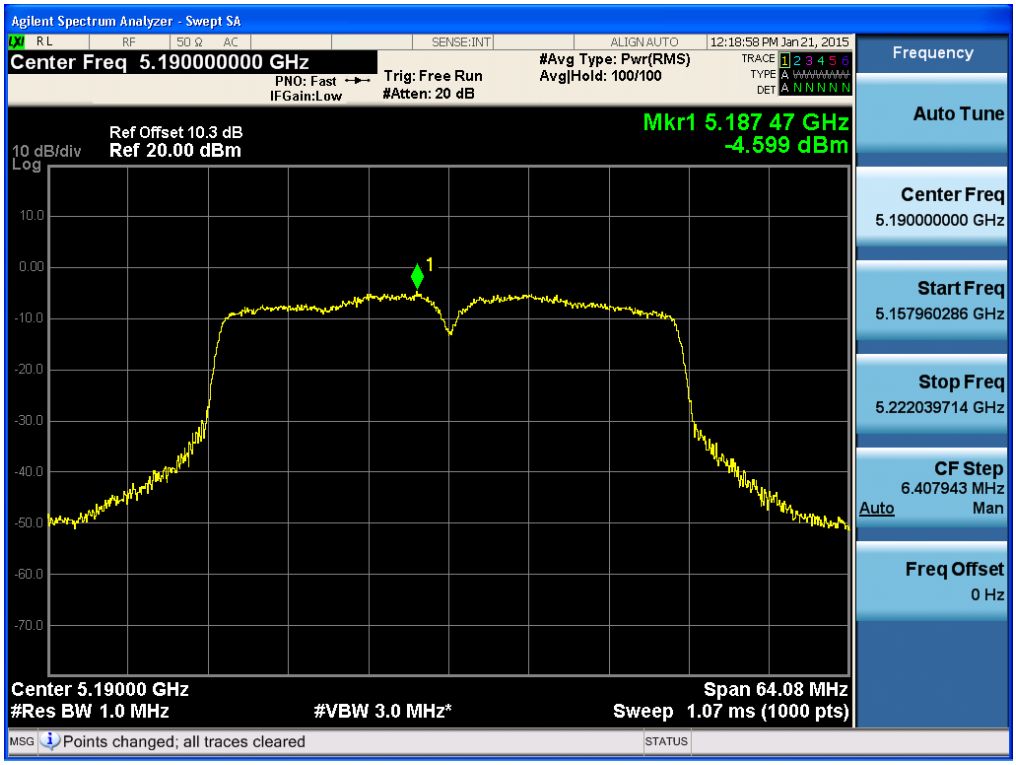


Power Spectral Density (802.11n-CH 100)

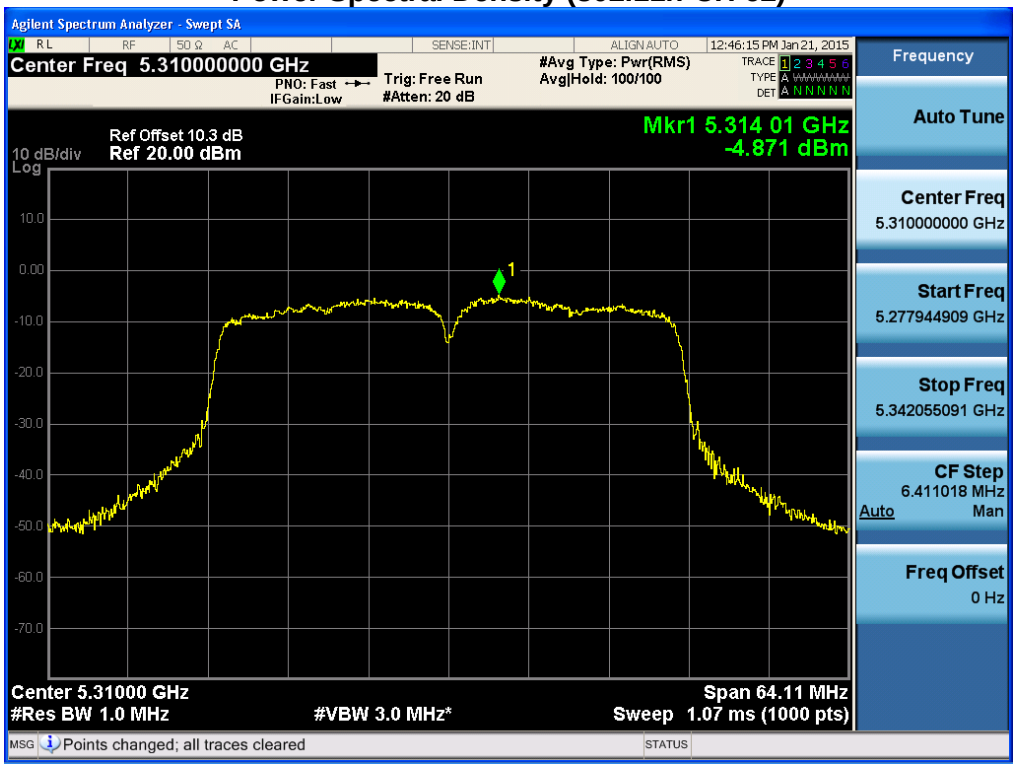


40 MHz BW

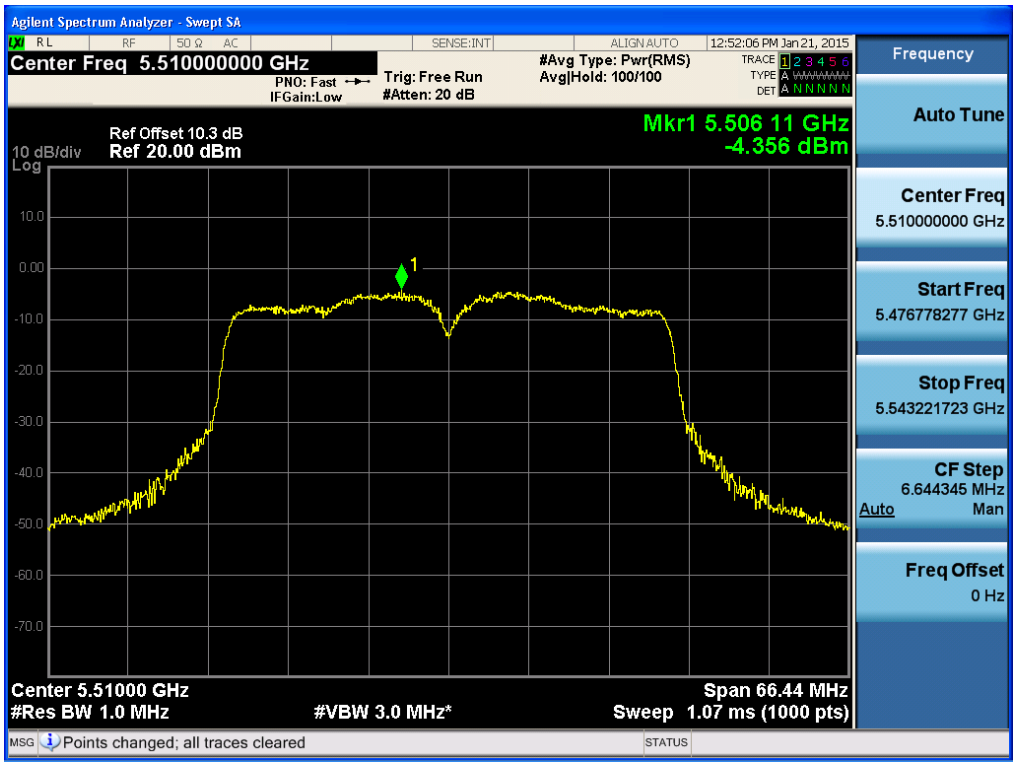
Power Spectral Density (802.11n-CH 38)



Power Spectral Density (802.11n-CH 62)



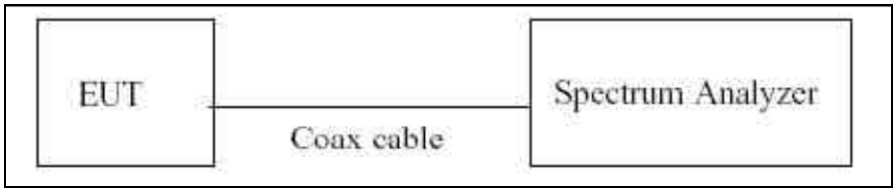
Power Spectral Density (802.11n-CH 102)



8.5 PEAK EXCURSION RATIO

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

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

We tested according to KDB 789033(issued 06/06/2014).

The spectrum analyzer is set to :

1. Span = Set the span to view the entire emission bandwidth.
2. RBW = 1 MHz
3. VBW ≥ 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 :

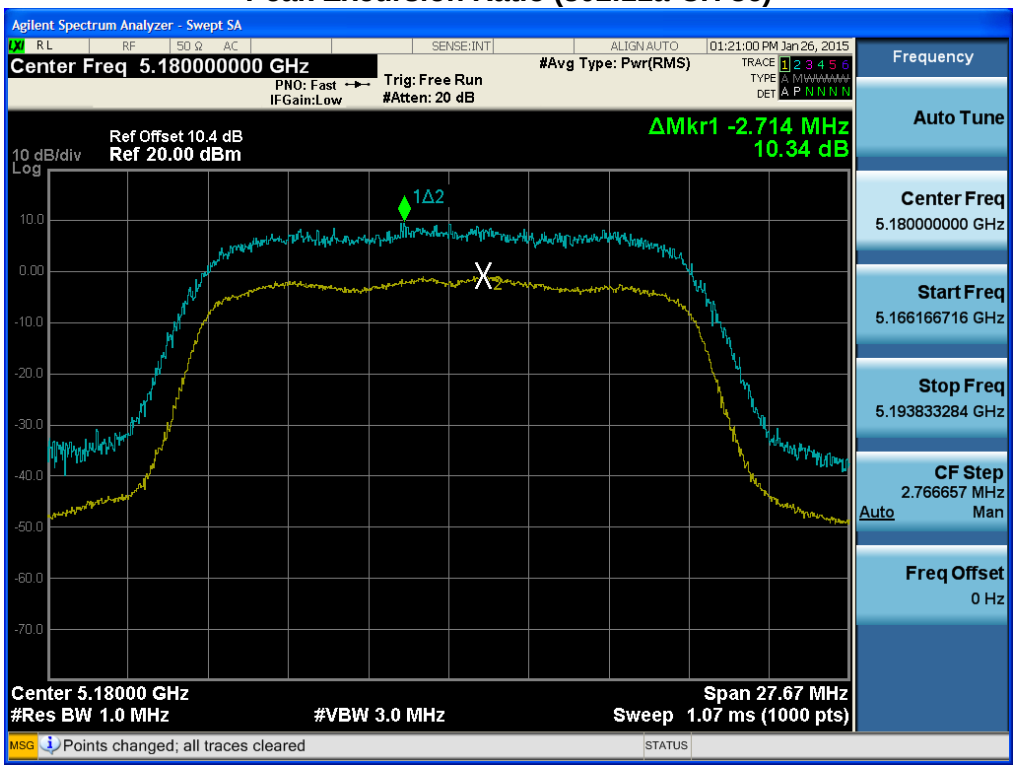
1. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 5.2 GHz, 5.3 GHz and 5.6 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table.

Band	Frequency(MHz)	Loss(dB)
UNII 1	5180	10.30
	5190	10.29
	5200	10.28
	5230	10.29
	5240	10.34
UNII 2	5260	10.37
	5270	10.38
	5300	10.40
	5310	10.39
	5320	10.39
UNII 2e	5500	10.35
	5510	10.36
	5550	10.41
	5580	10.43
	5670	10.43
	5700	10.30

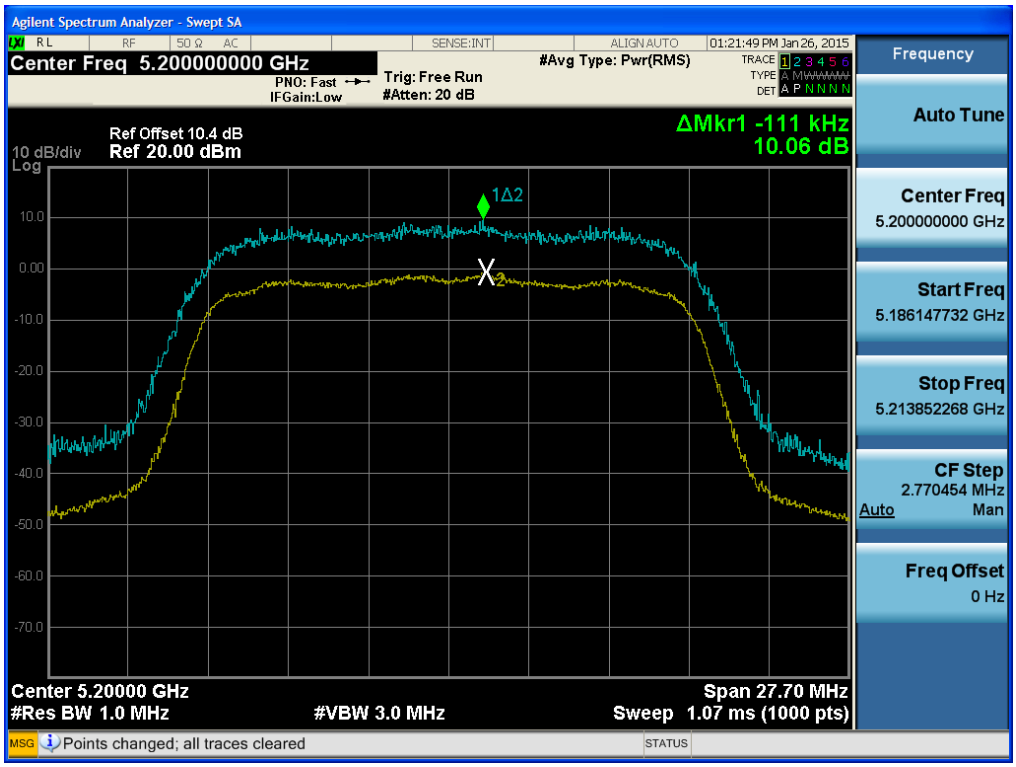
(Actual value of loss for the attenuator and cable combination)

▣ RESULT PLOTS

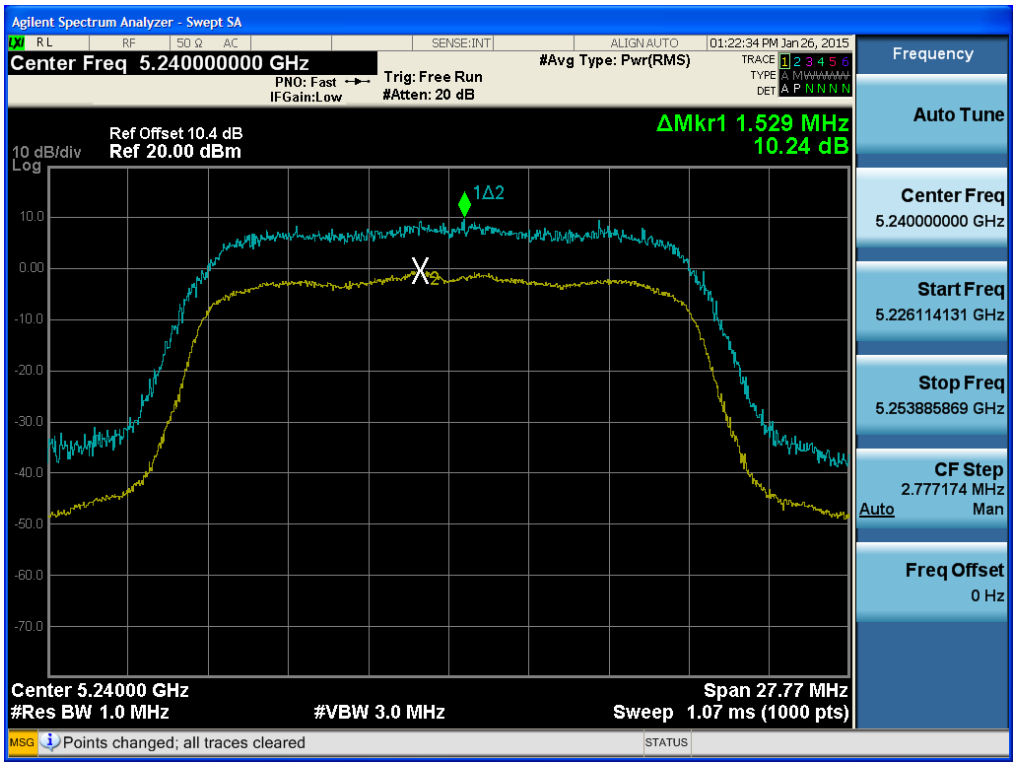
Peak Excursion Ratio (802.11a-CH 36)



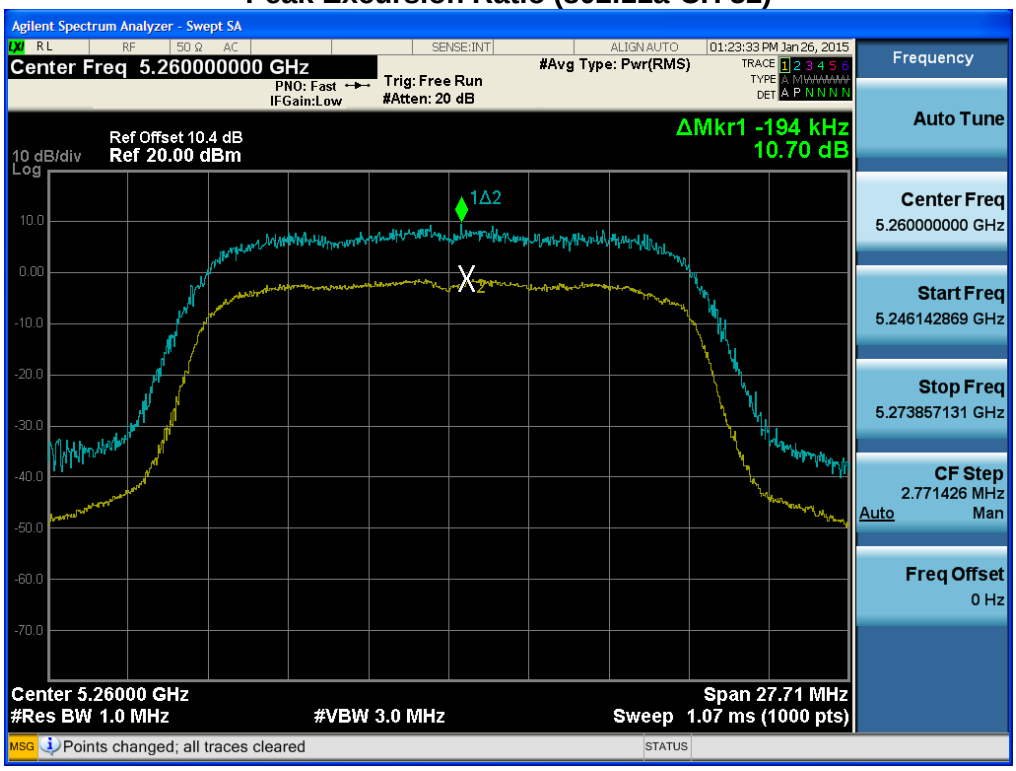
Peak Excursion Ratio (802.11a-CH 40)



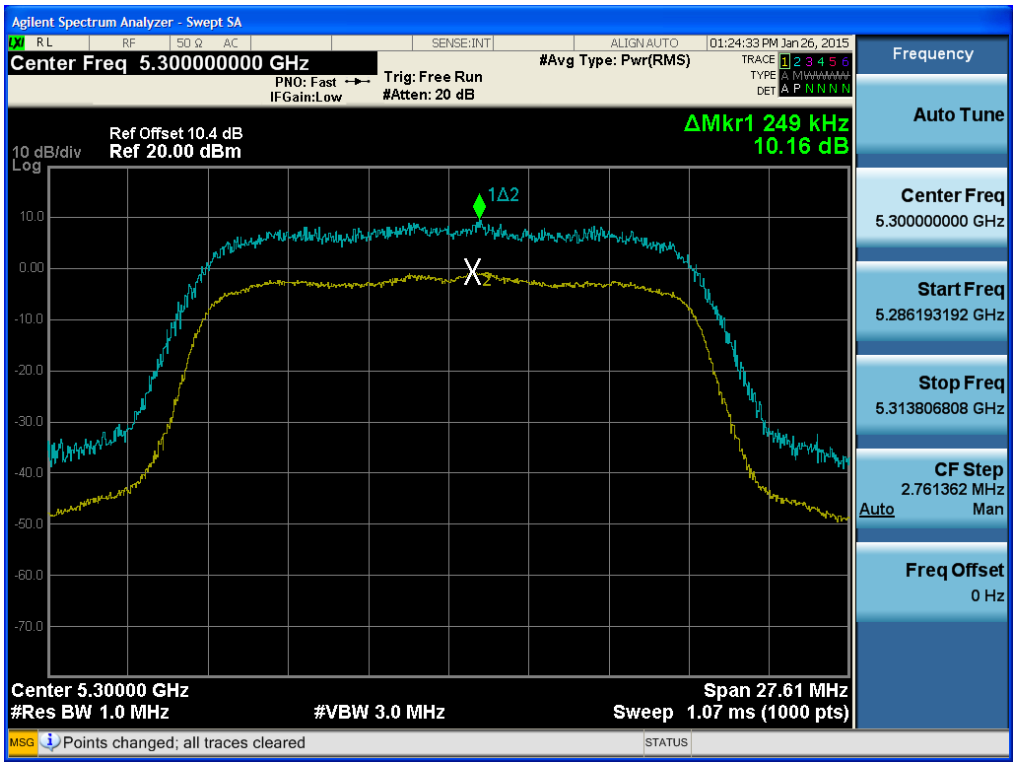
Peak Excursion Ratio (802.11a-CH 48)



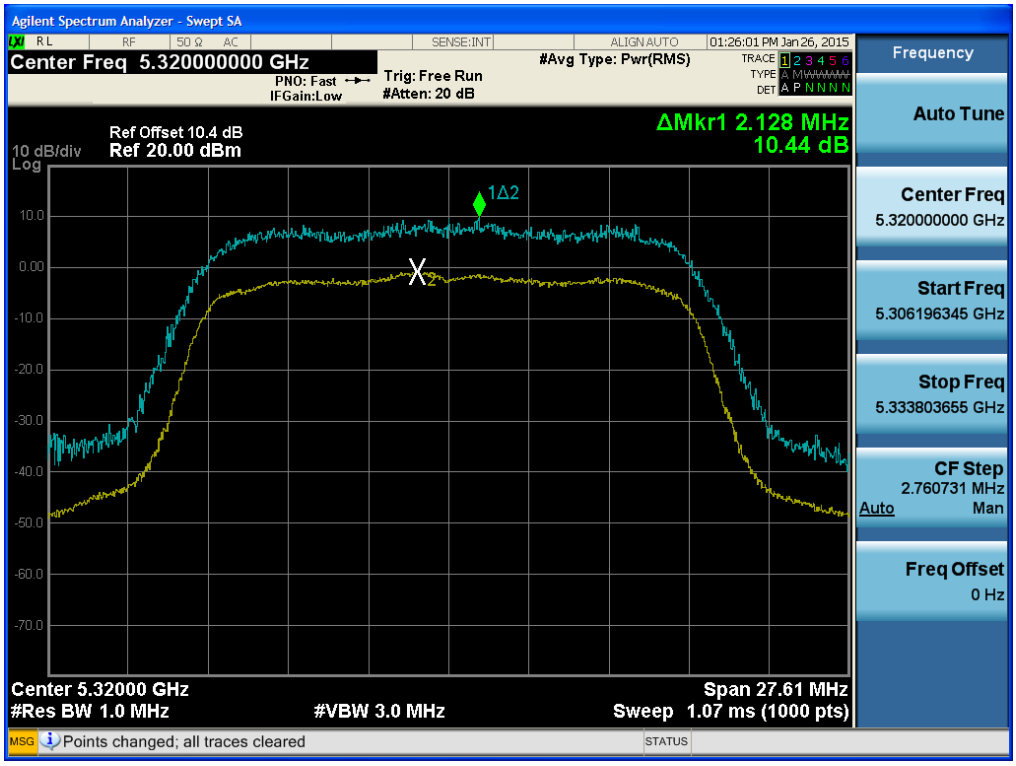
Peak Excursion Ratio (802.11a-CH 52)



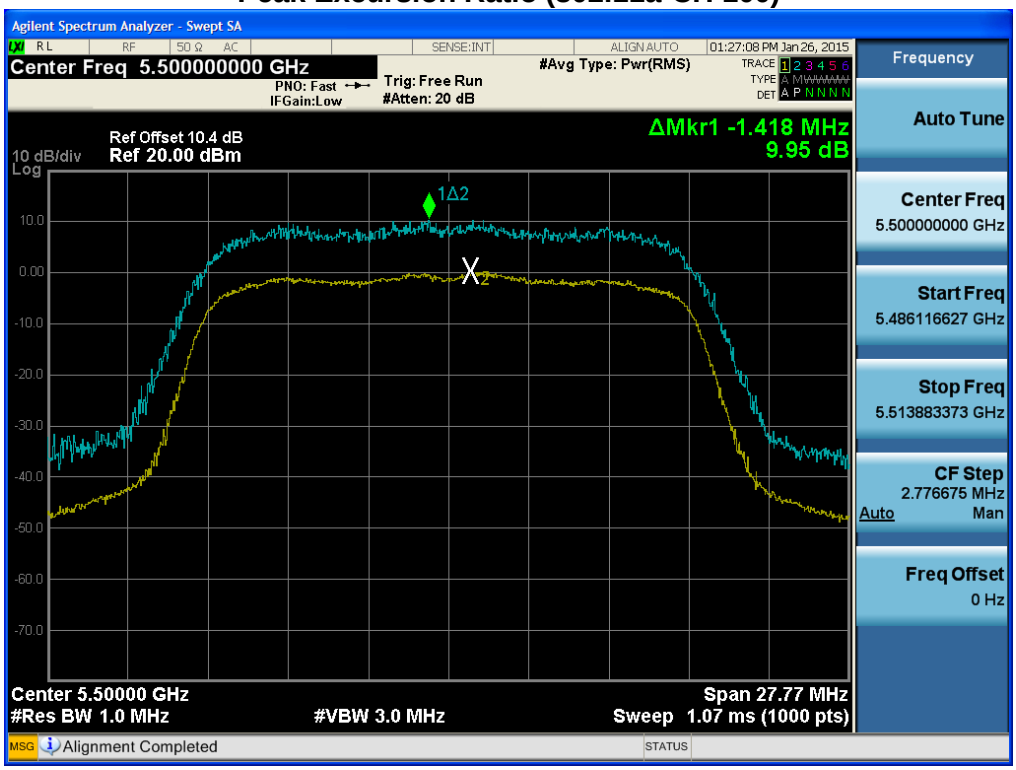
Peak Excursion Ratio (802.11a-CH 60)



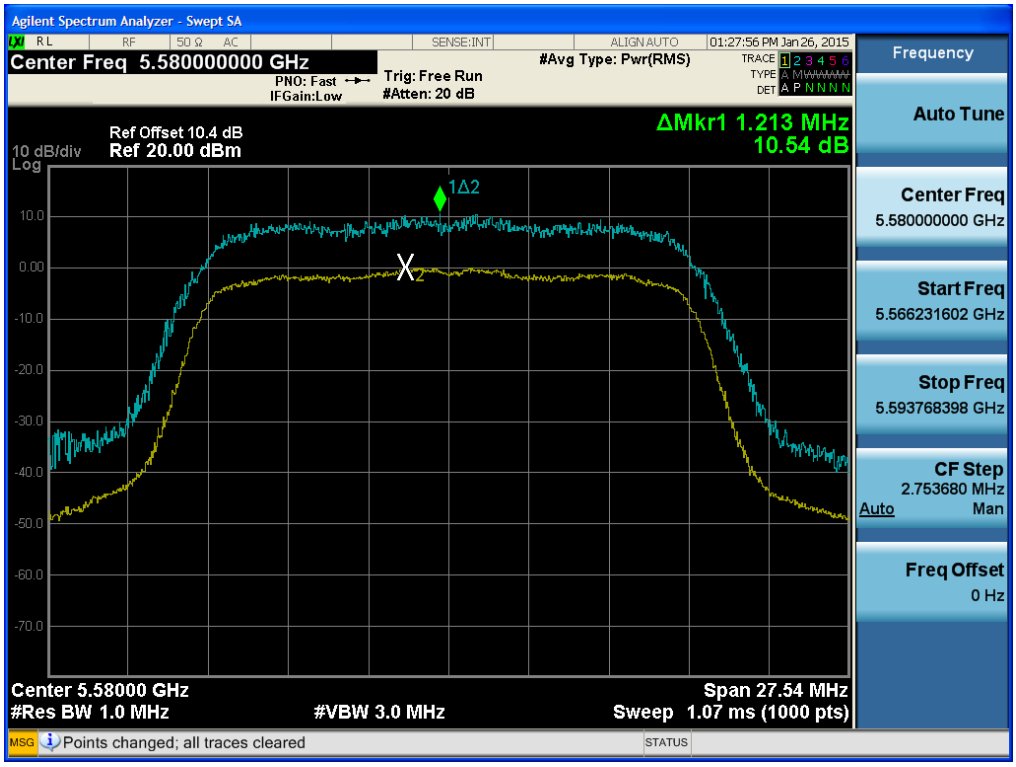
Peak Excursion Ratio (802.11a-CH 64)



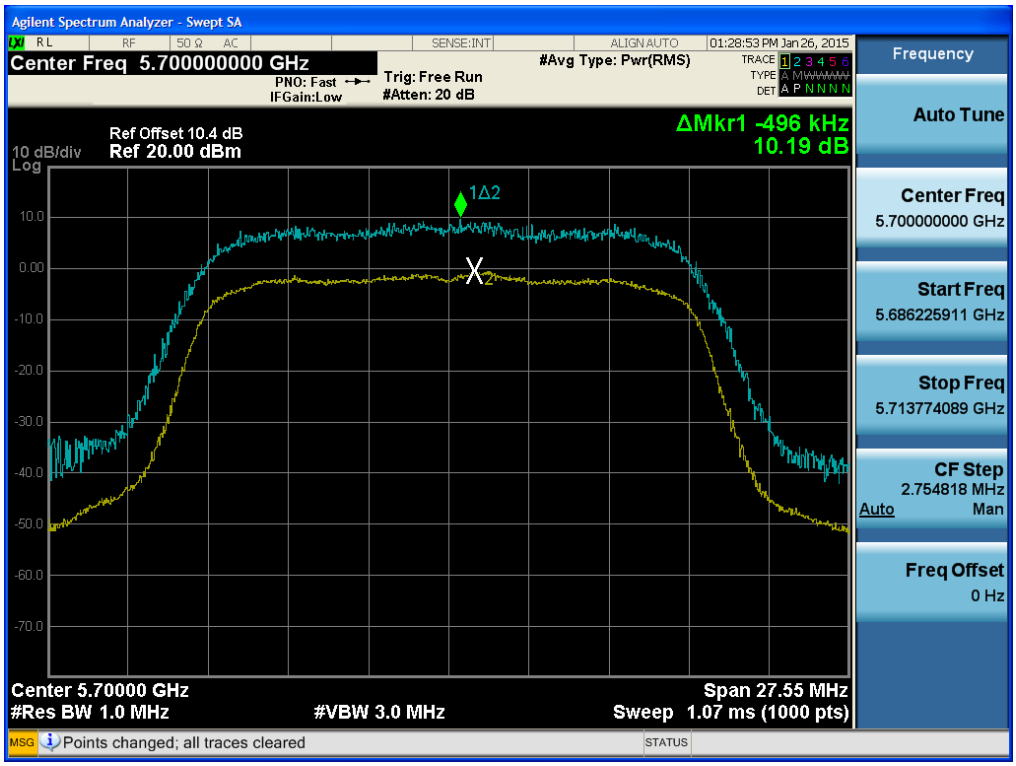
Peak Excursion Ratio (802.11a-CH 100)



Peak Excursion Ratio (802.11a-CH 116)

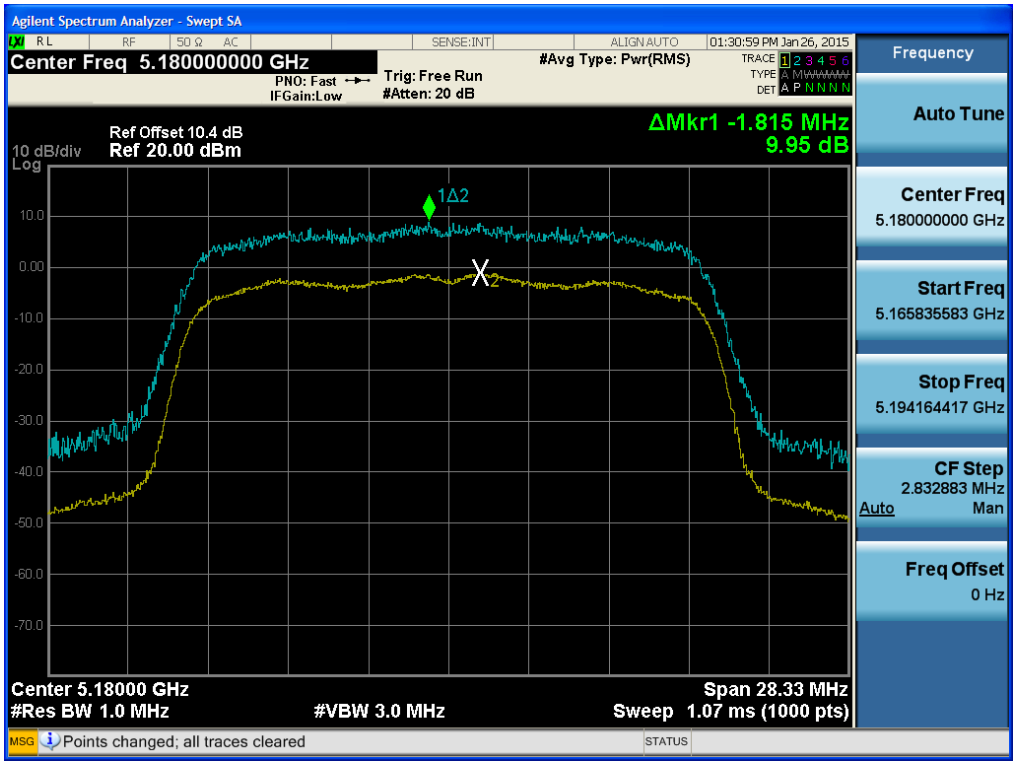


Peak Excursion Ratio (802.11a-CH 140)

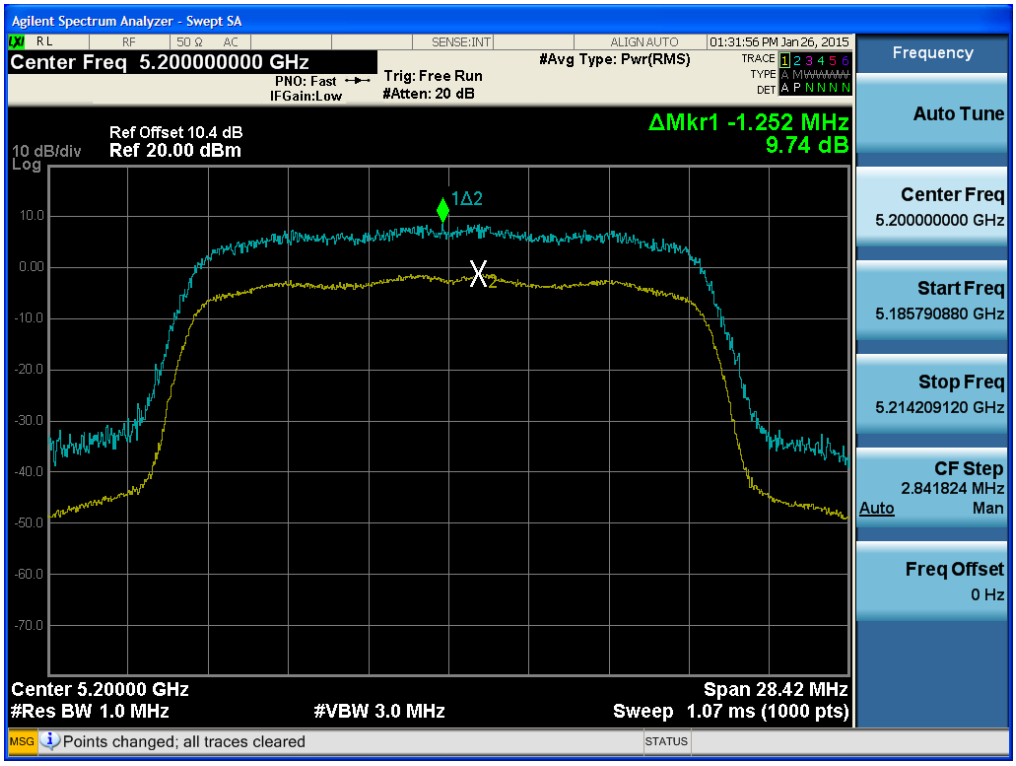


20 MHz BW

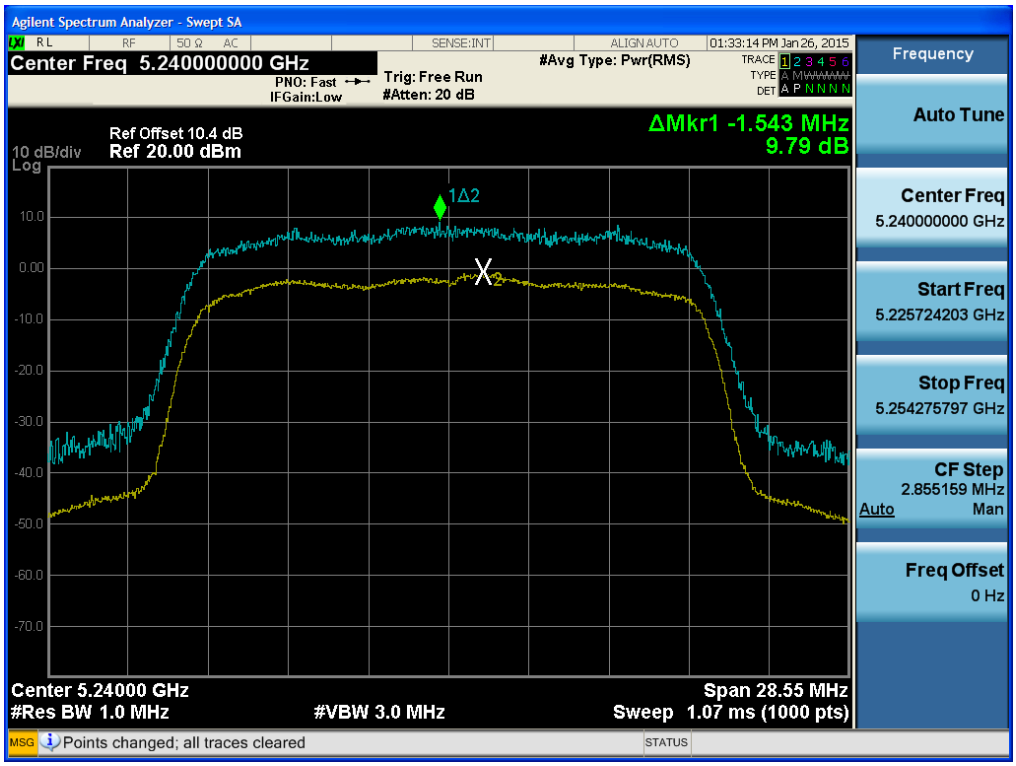
Peak Excursion Ratio (802.11n-CH 36)



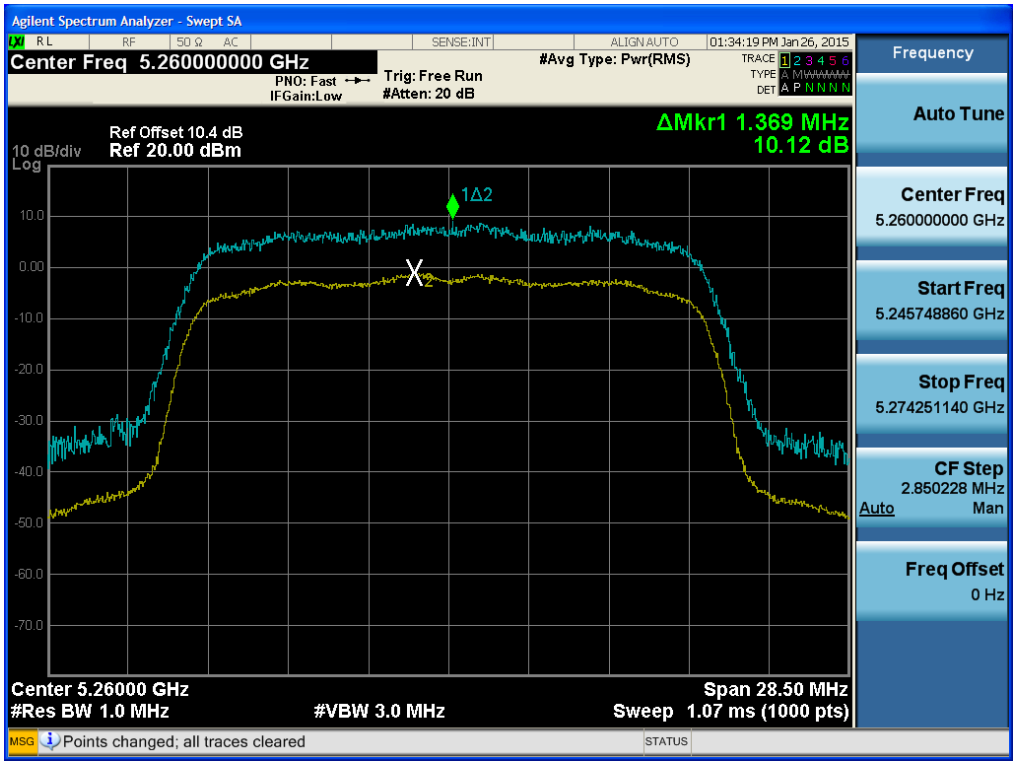
Peak Excursion Ratio (802.11n-CH 40)



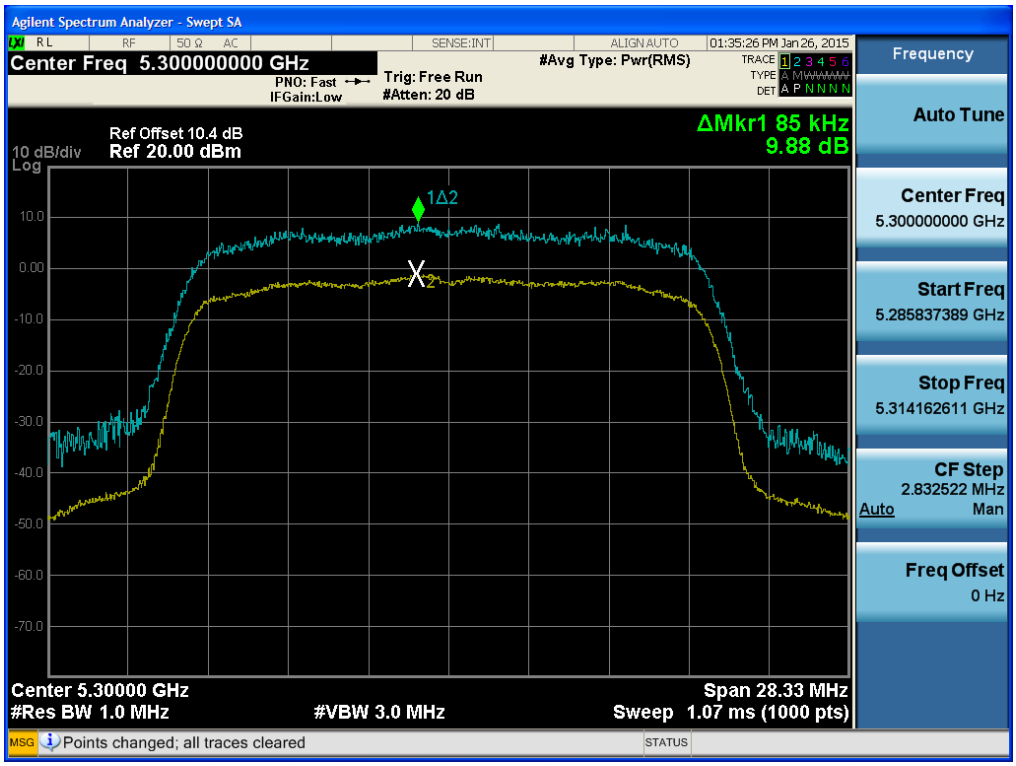
Peak Excursion Ratio (802.11n-CH 48)



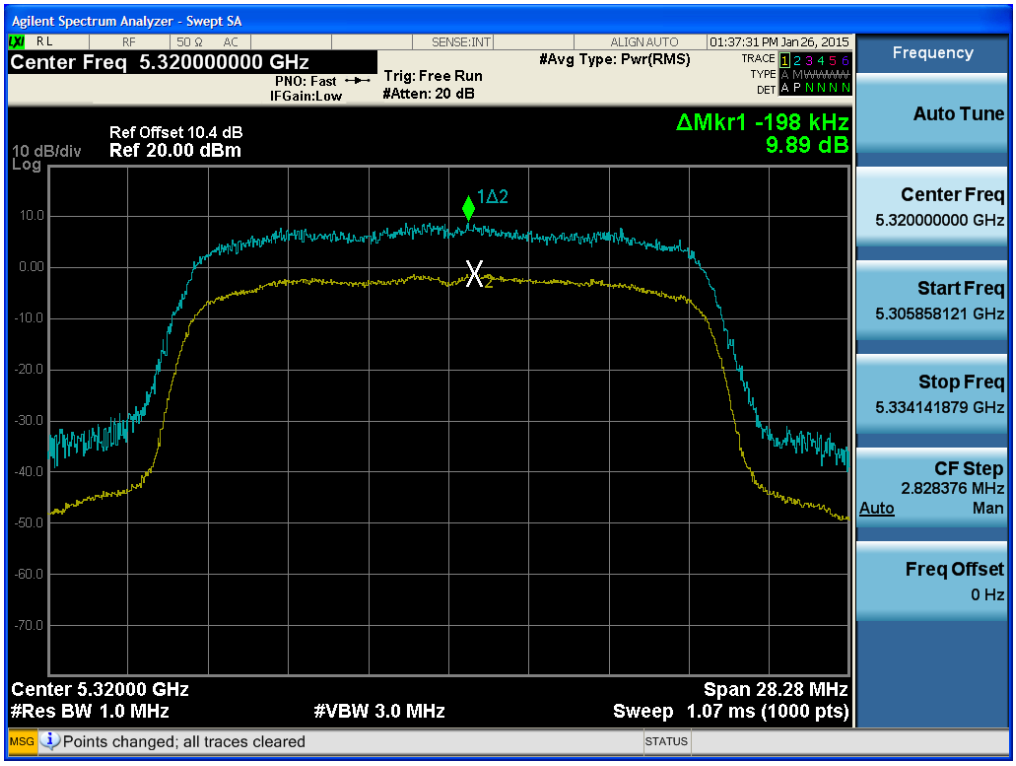
Peak Excursion Ratio (802.11n-CH 52)



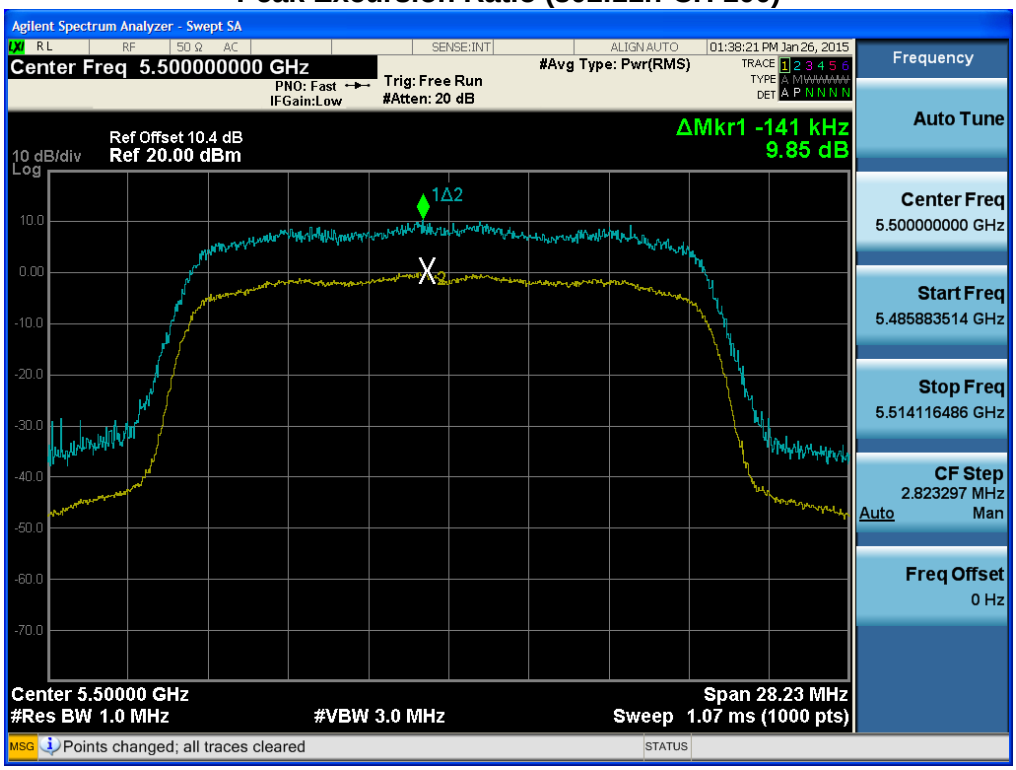
Peak Excursion Ratio (802.11n-CH 60)



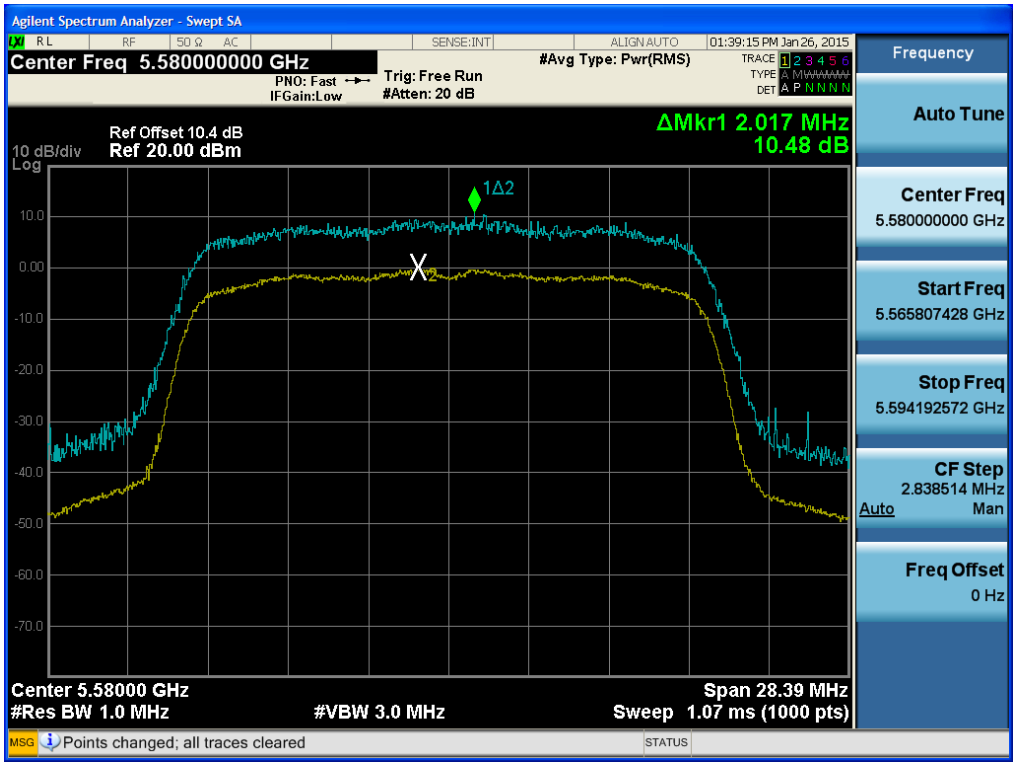
Peak Excursion Ratio (802.11n-CH 64)



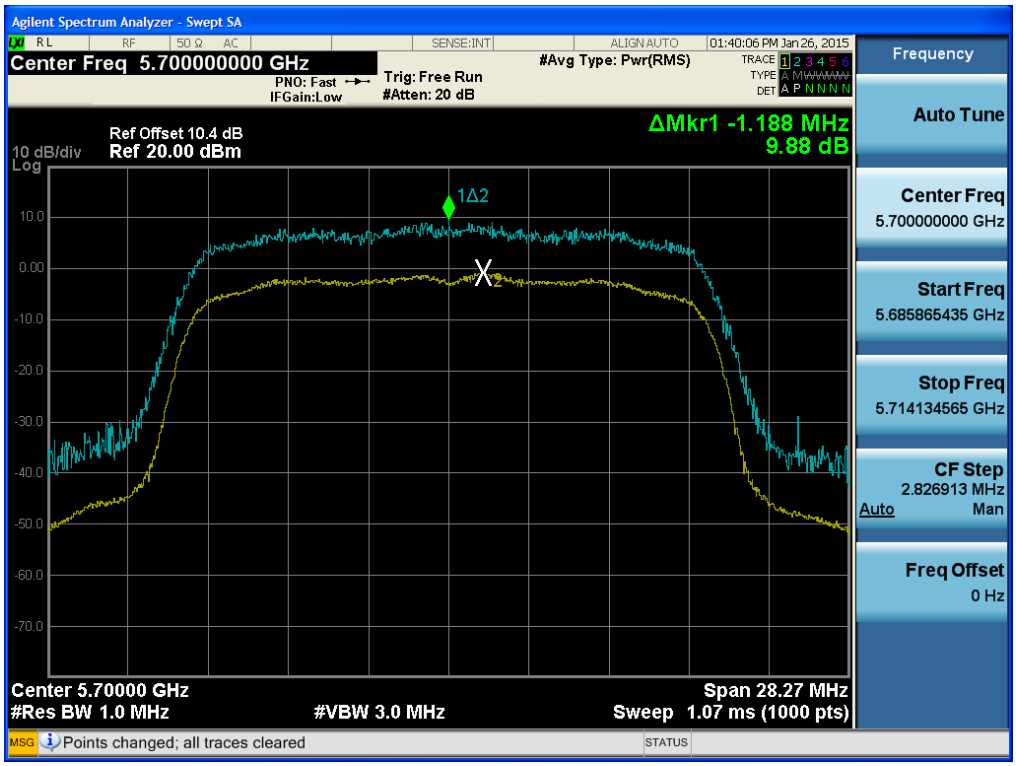
Peak Excursion Ratio (802.11n-CH 100)



Peak Excursion Ratio (802.11n-CH 116)

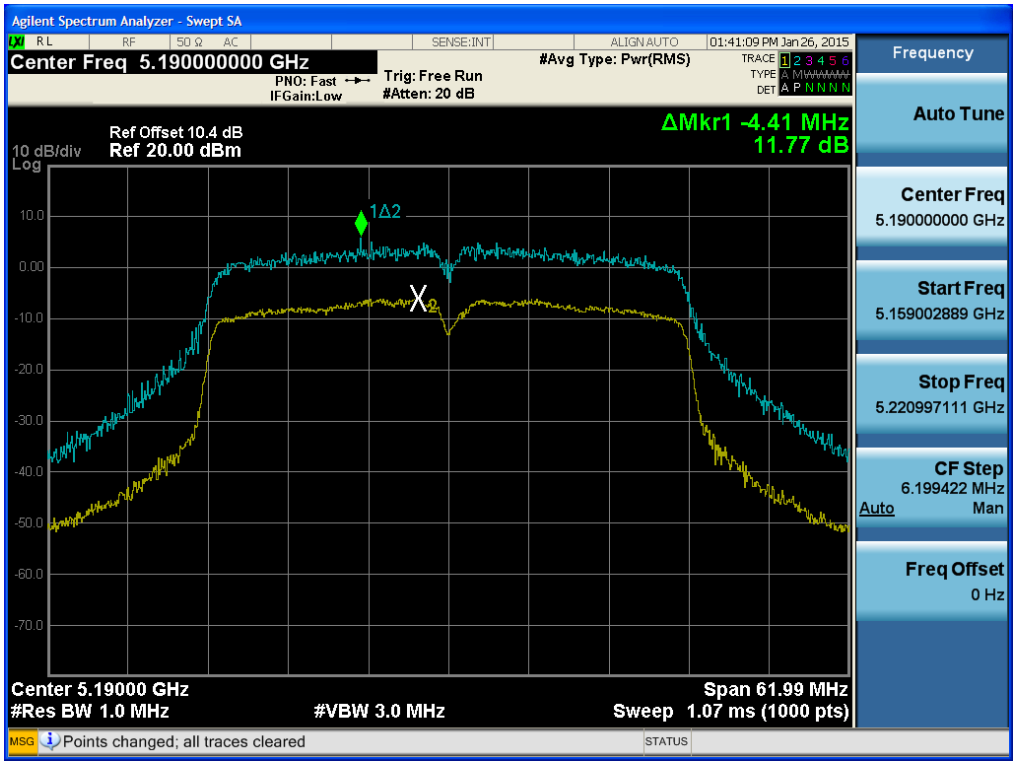


Peak Excursion Ratio (802.11n-CH 140)

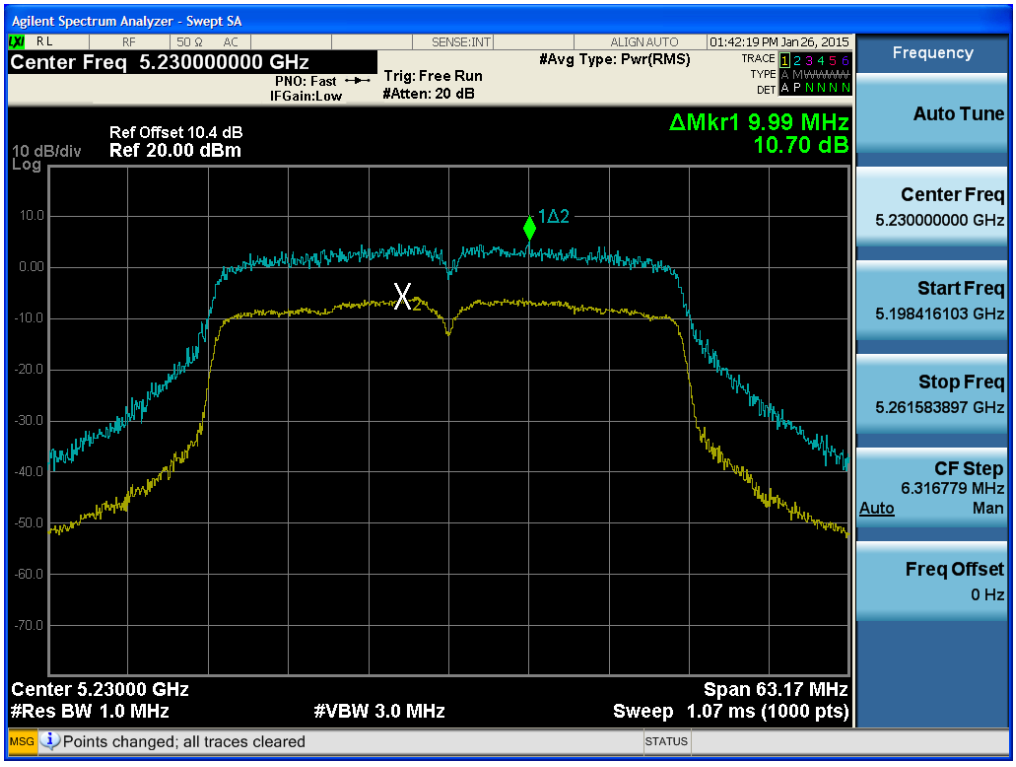


40 MHz BW

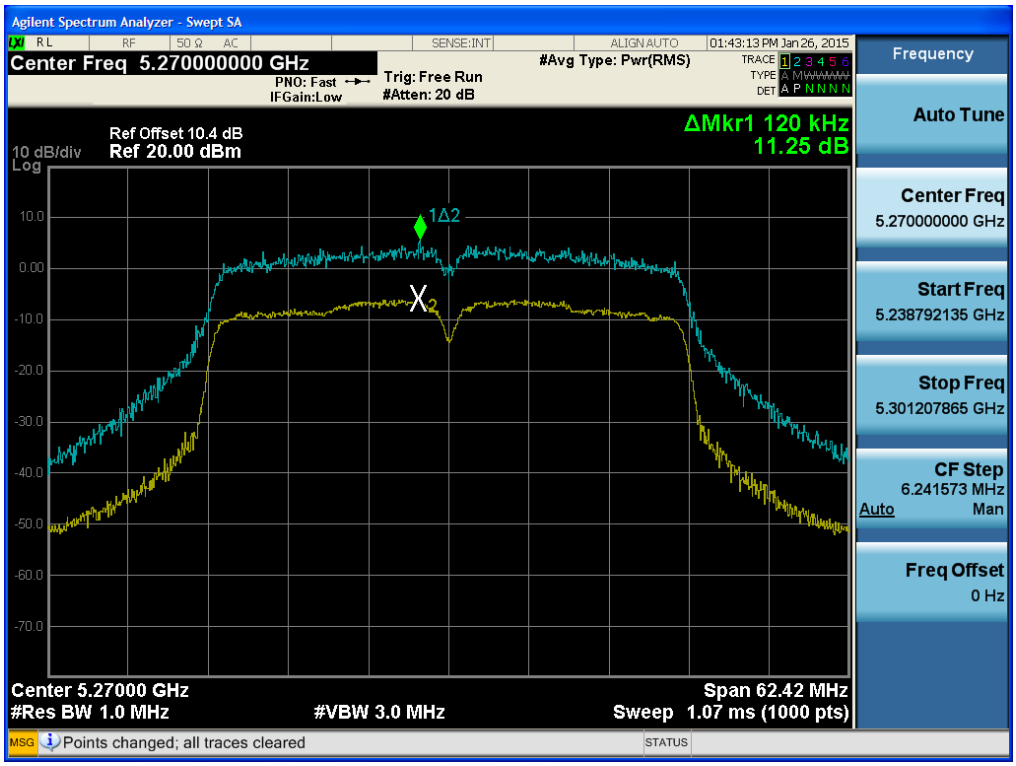
Peak Excursion Ratio (802.11n-CH 38)



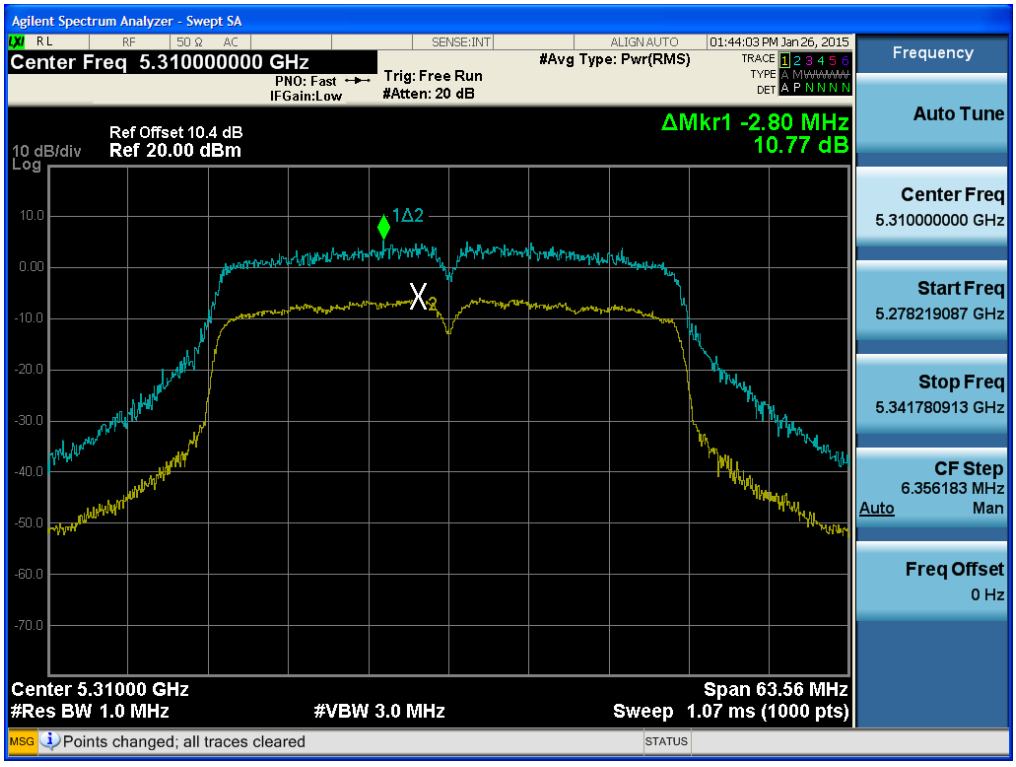
Peak Excursion Ratio (802.11n-CH 46)



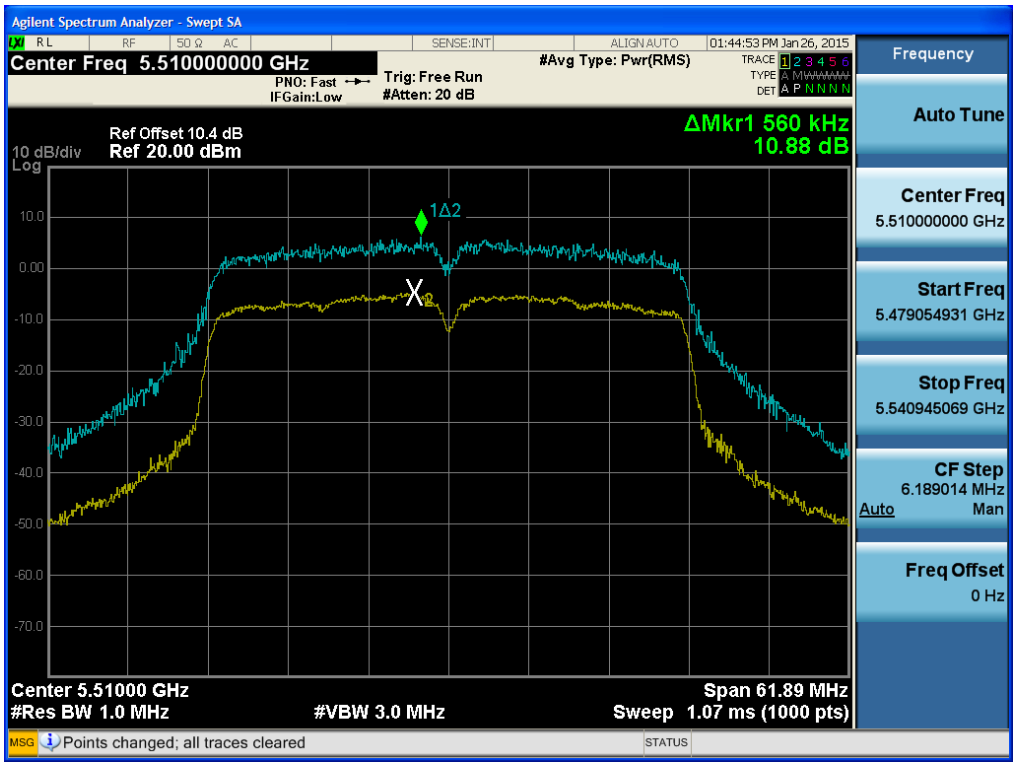
Peak Excursion Ratio (802.11n-CH 54)



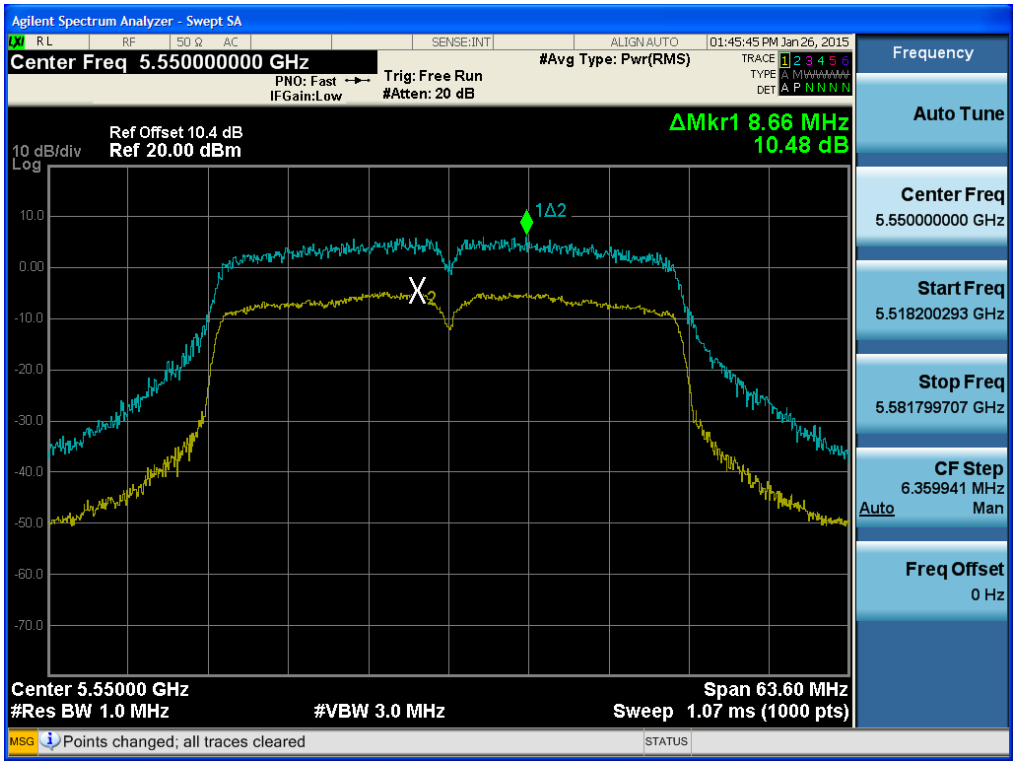
Peak Excursion Ratio (802.11n-CH 62)



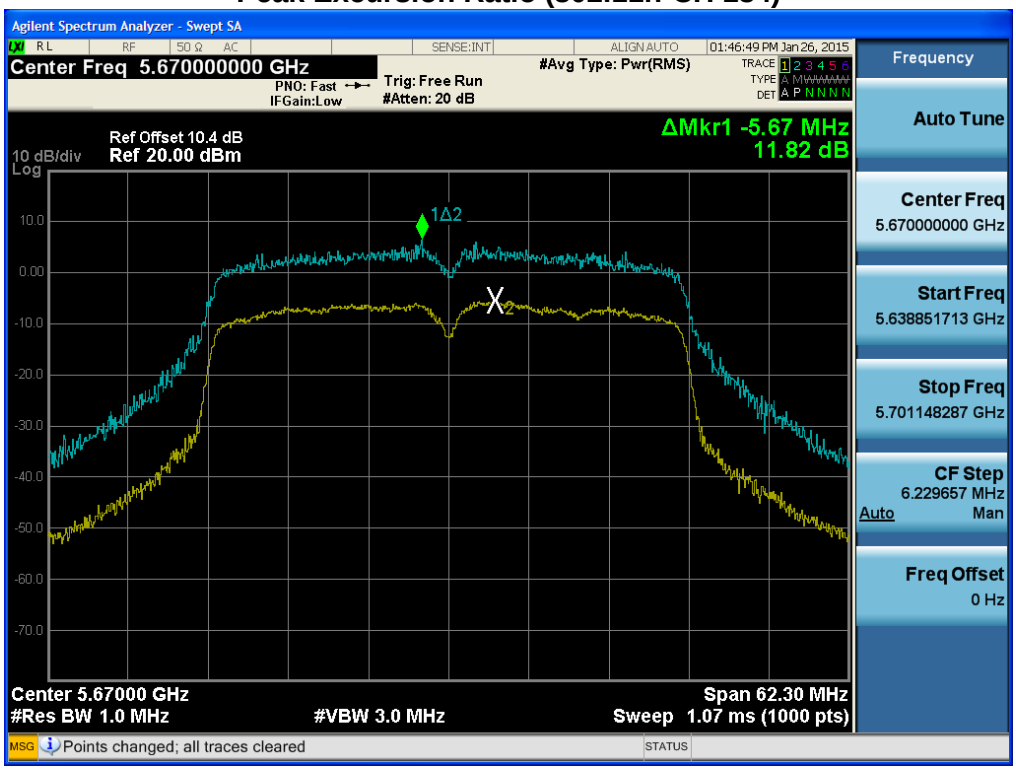
Peak Excursion Ratio (802.11n-CH 102)



Peak Excursion Ratio (802.11n-CH 110)



Peak Excursion Ratio (802.11n-CH 134)



8.6 FREQUENCY STABILITY.

The EUT was placed inside an environmental chamber as the temperature in the chamber was varied between -30 ℃ and 50 ℃. The temperature was incremented by 10 ℃ 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.

20 MHz BW

OPERATING BAND: UNII Band 1
OPERATING FREQUENCY: 5,180,000,000 Hz
CHANNEL: 36
REFERENCE VOLTAGE: 3.8 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.800	+20(Ref)	5180011.70	11.70
100%		-30	5179992.80	-7.20
100%		-20	5179996.50	-3.50
100%		-10	5180000.10	0.10
100%		0	5180003.80	3.80
100%		+10	5180007.50	7.50
100%		+30	5180015.10	15.10
100%		+40	5180018.60	18.60
100%		+50	5180021.30	21.30
Max.	4.350	+20	5180015.00	15.00
Batt. Endpoint	3.500	+20	5180007.50	7.50

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.

OPERATING BAND: UNII Band 2A

OPERATING FREQUENCY: 5,260,000,000 Hz

CHANNEL: 52

REFERENCE VOLTAGE: 3.8 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.800	+20(Ref)	5260011.40	11.40
100%		-30	5260001.50	-4.10
100%		-20	5260004.80	-1.3
100%		-10	5260008.00	1.50
100%		0	5260014.20	4.8
100%		+10	5260017.00	8
100%		+30	5260014.20	14.2
100%		+40	5260017.00	17
100%		+50	5260020.10	20.10
Max.	4.350	+20	5260014.50	14.5
Batt. Endpoint	3.500	+20	5260007.80	7.8

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.

OPERATING BAND: UNII Band 2C

OPERATING FREQUENCY: 5,500,000,000 Hz

CHANNEL: 100

REFERENCE VOLTAGE: 3.8 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.800	+20(Ref)	5500011.80	11.80
100%		-30	5499995.10	-4.90
100%		-20	5499998.40	-1.6
100%		-10	5500002.80	2.8
100%		0	5500005.20	5.2
100%		+10	5500008.50	8.5
100%		+30	5500014.70	14.7
100%		+40	5500018.00	18
100%		+50	5500021.50	21.50
Max.	4.350	+20	5500014.30	14.3
Batt. Endpoint	3.500	+20	5500007.80	7.8

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.

40 MHz BW

OPERATING BAND: UNII Band 1

OPERATING FREQUENCY: 5,190,000,000 Hz

CHANNEL: 38

REFERENCE VOLTAGE: 3.8 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.800	+20(Ref)	5190012.20	12.20
100%		-30	5189996.30	-3.70
100%		-20	5189999.50	-0.50
100%		-10	5190002.80	2.80
100%		0	5190006.10	6.10
100%		+10	5190009.40	9.40
100%		+30	5190015.40	15.40
100%		+40	5190018.60	18.60
100%		+50	5190021.40	21.40
Max.	4.350	+20	5190015.50	15.50
Batt. Endpoint	3.500	+20	5190008.30	8.30

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.

OPERATING BAND: UNII Band 2A

OPERATING FREQUENCY: 5,270,000,000 Hz

CHANNEL: 54

REFERENCE VOLTAGE: 3.8 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.800	+20(Ref)	5270011.90	11.90
100%		-30	5269995.70	-4.30
100%		-20	5269999.00	-1
100%		-10	5270002.50	2.5
100%		0	5270005.40	5.4
100%		+10	5270008.20	8.2
100%		+30	5270015.20	15.2
100%		+40	5270018.50	18.5
100%		+50	5270021.70	21.70
Max.	4.350	+20	5270014.80	14.8
Batt. Endpoint	3.500	+20	5270008.40	8.4

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.

OPERATING BAND: UNII Band 2C

OPERATING FREQUENCY: 5,510,000,000 Hz

CHANNEL: 102

REFERENCE VOLTAGE: 3.8 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.800	+20(Ref)	5510012.50	12.50
100%		-30	5509996.20	-3.80
100%		-20	5510000.10	0.1
100%		-10	5510003.40	3.4
100%		0	5510006.80	6.8
100%		+10	5510009.40	9.4
100%		+30	5510015.20	15.2
100%		+40	5510018.40	18.4
100%		+50	5510021.70	21.70
Max.	4.350	+20	5510015.40	15.4
Batt. Endpoint	3.500	+20	5510008.60	8.6

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.

8.7 RADIATED MEASUREMENT.

8.7.1 RADIATED SPURIOUS EMISSIONS.

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

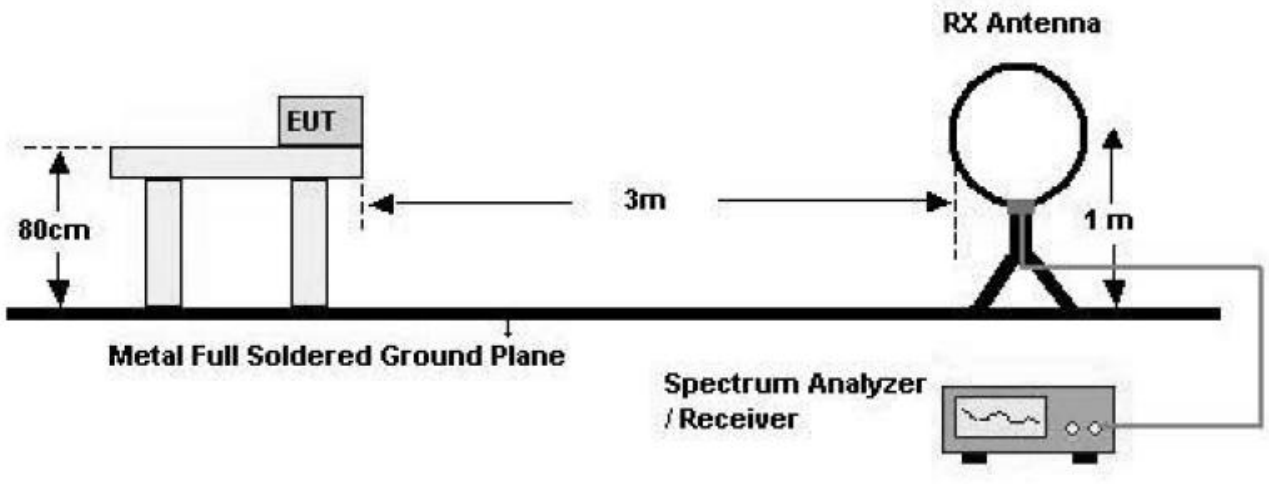
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

▣ §15.407, KDB 789033

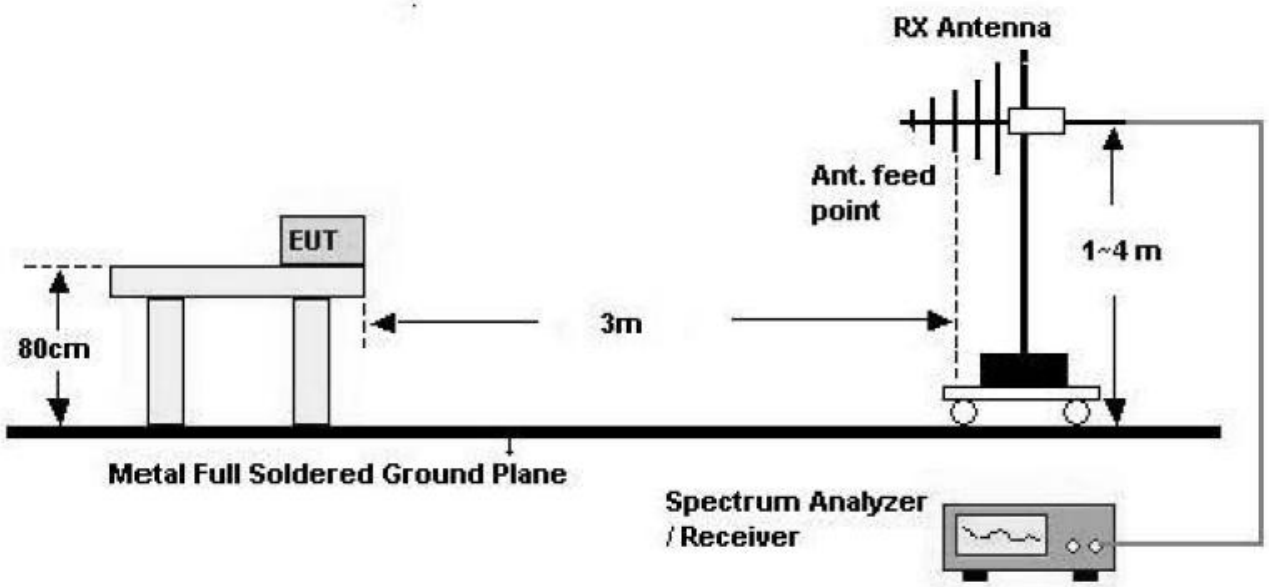
All harmonics that do not lie in a restricted band are subject to a peak limit of -27 dBm/MHz. At a distance of 3 meters the field strength limit in dBµV/m can be determined by adding a “conversion” factor of 95.2 dB to the EIRP limit of -27 dBm/MHz to obtain the limit for out of band spurious emissions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

Test Configuration

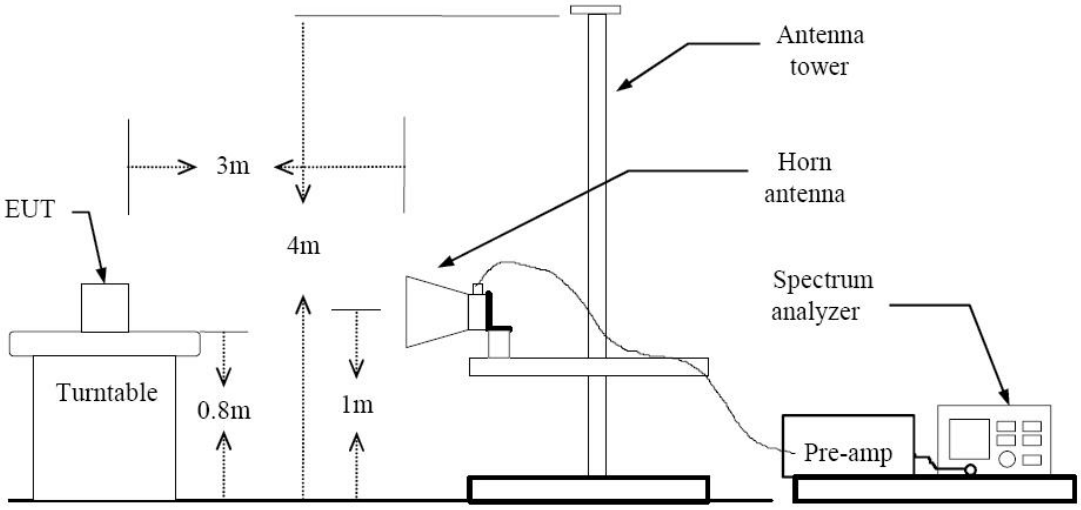
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



TEST PROCEDURE USED

ANSI C63.4(2003)

Method H)5) in KDB 789033, issued 06/06/2013 (Peak)

Method H)6)d) in KDB 789033, issued 06/06/2013 (Average)

. Spectrum setting:

- Peak.

1. RBW = 1 MHz
2. VBW ≥ 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 ≥ 98 percent, set VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
   - 2.2. If the EUT duty cycle is < 98 percent, set VBW ≥ 1/T, where T is the minimum transmission duration.

3. The analyzer is set to linear detector mode.
4. Detector = Peak.
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 minimym 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/g/n_20/n_40 mode to perform the average filed strength measurements.
2. The actual setting value of VBW for 802.11a/g/n_20/n_40

Mode	Worst Data rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle (%)	VBW(1/T) (Hz)	The actual setting value of VBW (Hz)
a	6	1.420	1.525	93.11	704	1000
n_20	6.5	1.332	1.437	92.69	751	1000
n_40	13.5	0.662	0.762	86.88	1511	3000

TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

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							

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 (dBuV) + 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	dBμV	dB /m	dB	(H/V)	dBμV/m	dBμV/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

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]	Measurement Type
10360	63.69	-6.51	V	57.18	68.20	11.02	PK
15540	63.37	-6.42	V	56.95	73.98	17.03	PK
15540	50.15	-6.42	V	43.73	53.98	10.25	AV
10360	63.95	-6.51	H	57.44	68.20	10.76	PK
15540	63.86	-6.42	H	57.44	73.98	16.54	PK
15540	50.19	-6.42	H	43.77	53.98	10.21	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]	Measurement Type
10400	63.52	-6.49	V	57.03	68.20	11.17	PK
15600	63.41	-7.15	V	56.26	73.98	17.72	PK
15600	49.83	-7.15	V	42.68	53.98	11.30	AV
10400	63.88	-6.49	H	57.39	68.20	10.81	PK
15600	63.92	-7.15	H	56.77	73.98	17.21	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]	Measurement Type
10480	63.38	-6.96	V	56.42	68.20	11.78	PK
15720	63.50	-6.62	V	56.88	73.98	17.10	PK
15720	49.62	-6.62	V	43.00	53.98	10.98	AV
10480	63.65	-6.96	H	56.69	68.20	11.51	PK
15720	63.63	-6.96	H	56.67	73.98	17.31	PK
15720	49.70	-6.62	H	43.08	53.98	10.90	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]	Measurement Type
10360	63.05	-6.51	V	56.54	68.20	11.66	PK
15540	63.59	-6.42	V	57.17	73.98	16.81	PK
15540	50.15	-6.42	V	43.73	53.98	10.25	AV
10360	63.28	-6.51	H	56.77	68.20	11.43	PK
15540	63.97	-6.42	H	57.55	73.98	16.43	PK
15540	50.20	-6.42	H	43.78	53.98	10.20	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]	Measurement Type
10400	63.10	-6.49	V	56.61	68.20	11.59	PK
15600	63.50	-7.15	V	56.35	73.98	17.63	PK
15600	49.82	-7.15	V	42.67	53.98	11.31	AV
10400	63.26	-6.49	H	56.77	68.20	11.43	PK
15600	63.77	-7.15	H	56.62	73.98	17.36	PK
15600	49.92	-7.15	H	42.77	53.98	11.21	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]	Measurement Type
10480	63.30	-6.96	V	56.34	68.20	11.86	PK
15720	63.42	-6.62	V	56.80	73.98	17.18	PK
15720	49.63	-6.62	V	43.01	53.98	10.97	AV
10480	63.37	-6.96	H	56.41	68.20	11.79	PK
15720	63.70	-6.96	H	56.74	73.98	17.24	PK
15720	49.64	-6.62	H	43.02	53.98	10.96	AV

Notes:

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

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

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10380	62.37	-5.38	V	56.99	68.20	11.21	PK
15570	64.19	-6.41	V	57.78	73.98	16.20	PK
15570	50.71	-6.41	V	44.30	53.98	9.68	AV
10380	62.78	-5.38	H	57.40	68.20	10.80	PK
15570	64.49	-6.41	H	58.08	73.98	15.90	PK
15570	50.72	-6.41	H	44.31	53.98	9.67	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]	Measurement Type
10460	63.70	-6.88	V	56.82	68.20	11.38	PK
15690	63.82	-6.64	V	57.18	73.98	16.80	PK
15690	50.86	-6.64	V	44.22	53.98	9.76	AV
10460	63.98	-6.88	H	57.10	68.20	11.10	PK
15690	63.99	-6.64	H	57.35	73.98	16.63	PK
15690	50.88	-6.64	H	44.24	53.98	9.74	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 2
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5260 MHz
Channel No.	52 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10520	62.43	-6.52	V	55.91	68.20	12.29	PK
15780	63.09	-6.67	V	56.42	73.98	17.56	PK
15780	50.04	-6.67	V	43.37	53.98	10.61	AV
10520	63.01	-6.52	H	56.49	68.20	11.71	PK
15780	63.48	-6.67	H	56.81	73.98	17.17	PK
15780	50.05	-6.67	H	43.38	53.98	10.60	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 2
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5300 MHz
Channel No.	60 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10600	63.10	-6.72	V	56.38	73.98	17.60	PK
10600	49.39	-6.72	V	42.67	53.98	11.31	AV
15900	64.05	-7.00	V	57.05	73.98	16.93	PK
15900	50.06	-7.00	V	43.06	53.98	10.92	AV
10600	63.27	-6.72	H	56.55	73.98	17.43	PK
10600	49.40	-6.72	H	42.68	53.98	11.30	AV
15900	64.14	-7.00	H	57.14	73.98	16.84	PK
15900	50.09	-7.00	H	43.09	53.98	10.89	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 2
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5320 MHz
Channel No.	64 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10640	63.41	-6.43	V	56.98	73.98	17.00	PK
10640	49.39	-6.43	V	42.96	53.98	11.02	AV
15960	63.18	-6.93	V	56.25	73.98	17.73	PK
15960	49.43	-6.93	V	42.50	53.98	11.48	AV
10640	63.83	-6.43	H	57.40	73.98	16.58	PK
10640	49.40	-6.43	H	42.97	53.98	11.01	AV
15960	63.56	-6.93	H	56.63	73.98	17.35	PK
15960	49.47	-6.93	H	42.54	53.98	11.44	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 2
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5260 MHz
Channel No.	52 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10520	63.14	-6.52	V	56.62	68.20	11.58	PK
15780	63.33	-6.67	V	56.66	73.98	17.32	PK
15780	50.03	-6.67	V	43.36	53.98	10.62	AV
10520	63.35	-6.52	H	56.83	68.20	11.37	PK
15780	63.62	-6.67	H	56.95	73.98	17.03	PK
15780	50.08	-6.67	H	43.41	53.98	10.57	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
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 2
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5300 MHz
Channel No.	60 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10600	63.04	-6.72	V	56.32	73.98	17.66	PK
10600	49.36	-6.72	V	42.64	53.98	11.34	AV
15900	63.95	-7.00	V	56.95	73.98	17.03	PK
15900	50.09	-7.00	V	43.09	53.98	10.89	AV
10600	63.17	-6.72	H	56.45	73.98	17.53	PK
10600	49.41	-6.72	H	42.69	53.98	11.29	AV
15900	64.12	-7.00	H	57.12	73.98	16.86	PK
15900	50.10	-7.00	H	43.10	53.98	10.88	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 2
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5320 MHz
Channel No.	64 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10640	63.33	-6.43	V	56.90	73.98	17.08	PK
10640	49.38	-6.43	V	42.95	53.98	11.03	AV
15960	63.06	-6.93	V	56.13	73.98	17.85	PK
15960	49.45	-6.93	V	42.52	53.98	11.46	AV
10640	64.03	-6.43	H	57.60	73.98	16.38	PK
10640	49.41	-6.43	H	42.98	53.98	11.00	AV
15960	63.32	-6.93	H	56.39	73.98	17.59	PK
15960	49.46	-6.93	H	42.53	53.98	11.45	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 802.11n_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 2
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5270 MHz
Channel No.	54 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10540	62.93	-5.77	V	57.16	68.20	11.04	PK
15810	63.25	-7.47	V	55.78	73.98	18.20	PK
15810	50.28	-7.47	V	42.81	53.98	11.17	AV
10540	63.18	-5.77	H	57.41	68.20	10.79	PK
15810	63.42	-7.47	H	55.95	73.98	18.03	PK
15810	50.35	-7.47	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_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 2
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5310 MHz
Channel No.	62 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10620	63.78	-6.36	V	57.42	73.98	16.56	PK
10620	50.24	-6.36	V	43.88	53.98	10.10	AV
15930	62.39	-6.77	V	55.62	73.98	18.36	PK
15930	49.87	-6.77	V	43.10	53.98	10.88	AV
10620	63.91	-6.36	H	57.55	73.98	16.43	PK
10620	50.27	-6.36	H	43.91	53.98	10.07	AV
15930	62.86	-6.77	H	56.09	73.98	17.89	PK
15930	49.92	-6.77	H	43.15	53.98	10.83	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 2e
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5500 MHz
Channel No.	100 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11000	63.49	-5.06	V	58.43	73.98	15.55	PK
11000	49.37	-5.06	V	44.31	53.98	9.67	AV
16500	63.52	-4.35	V	59.17	68.20	9.03	PK
11000	63.93	-5.06	H	58.87	73.98	15.11	PK
11000	49.38	-5.06	H	44.32	53.98	9.66	AV
16500	63.76	-4.35	H	59.41	68.20	8.79	PK

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 2e
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5580 MHz
Channel No.	116 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11160	63.45	-5.55	V	57.90	73.98	16.08	PK
11160	49.17	-5.55	V	43.62	53.98	10.36	AV
16740	63.34	-3.73	V	59.61	68.20	8.59	PK
11160	63.85	-5.55	H	58.30	73.98	15.68	PK
11160	49.20	-5.55	H	43.65	53.98	10.33	AV
16740	63.44	-3.73	H	59.71	68.20	8.49	PK

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 2e
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5700 MHz
Channel No.	140 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11400	62.29	-6.08	V	56.21	73.98	17.77	PK
11400	48.82	-6.08	V	42.74	53.98	11.24	AV
17100	62.70	-0.85	V	61.85	68.20	6.35	PK
11400	62.51	-6.08	H	56.43	73.98	17.55	PK
11400	48.85	-6.08	H	42.77	53.98	11.21	AV
17100	63.02	-0.85	H	62.17	68.20	6.03	PK

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 2e
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5500 MHz
Channel No.	100 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11000	63.24	-5.06	V	58.18	73.98	15.80	PK
11000	49.33	-5.06	V	44.27	53.98	9.71	AV
16500	63.27	-4.35	V	58.92	68.20	9.28	PK
11000	63.59	-5.06	H	58.53	73.98	15.45	PK
11000	49.35	-5.06	H	44.29	53.98	9.69	AV
16500	63.61	-4.35	H	59.26	68.20	8.94	PK

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 2e
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5580 MHz
Channel No.	116 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11160	63.39	-5.55	V	57.84	73.98	16.14	PK
11160	49.18	-5.55	V	43.63	53.98	10.35	AV
16740	63.55	-3.73	V	59.82	68.20	8.38	PK
11160	63.53	-5.55	H	57.98	73.98	16.00	PK
11160	49.20	-5.55	H	43.65	53.98	10.33	AV
16740	63.86	-3.73	H	60.13	68.20	8.07	PK

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 2e
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5700 MHz
Channel No.	140 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11400	62.33	-6.08	V	56.25	73.98	17.73	PK
11400	48.77	-6.08	V	42.69	53.98	11.29	AV
17100	62.54	-0.85	V	61.69	68.20	6.51	PK
11400	62.63	-6.08	H	56.55	73.98	17.43	PK
11400	48.82	-6.08	H	42.74	53.98	11.24	AV
17100	62.76	-0.85	H	61.91	68.20	6.29	PK

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 2e
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5510 MHz
Channel No.	102 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11020	63.14	-5.86	V	57.28	73.98	16.70	PK
11020	49.51	-5.86	V	43.65	53.98	10.33	AV
16530	62.74	-3.75	V	58.99	68.20	9.21	PK
11020	63.27	-5.86	H	57.41	73.98	16.57	PK
11020	49.63	-5.86	H	43.77	53.98	10.21	AV
16530	63.02	-3.75	H	59.27	68.20	8.93	PK

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 2e
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5550 MHz
Channel No.	110 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11180	62.86	-6.14	V	56.72	73.98	17.26	PK
11180	49.76	-6.14	V	43.62	53.98	10.36	AV
16770	63.58	-3.11	V	60.47	68.20	7.73	PK
11180	63.05	-6.14	H	56.91	73.98	17.07	PK
11180	49.81	-6.14	H	43.67	53.98	10.31	AV
16770	63.58	-3.11	H	60.47	68.20	7.73	PK

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 2e
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5670 MHz
Channel No.	134 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11340	62.19	-5.10	V	57.09	73.98	16.89	PK
11340	49.56	-5.10	V	44.46	53.98	9.52	AV
17010	62.40	-1.27	V	61.13	68.20	7.07	PK
11340	62.66	-5.10	H	57.56	73.98	16.42	PK
11340	49.57	-5.10	H	44.47	53.98	9.51	AV
17010	62.53	-1.27	H	61.26	68.20	6.94	PK

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.

8.7.2 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)).

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]	Measurement Type
5150	50.70	8.79	H	59.49	73.98	14.49	PK
5150	37.54	8.79	H	46.33	53.98	7.65	AV
5150	50.29	8.79	V	59.08	73.98	14.90	PK
5150	37.43	8.79	V	46.22	53.98	7.76	AV

Band :	UNII 1
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	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]	Measurement Type
5150	50.62	8.79	H	59.41	73.98	14.57	PK
5150	37.26	8.79	H	46.05	53.98	7.93	AV
5150	50.18	8.79	V	58.97	73.98	15.01	PK
5150	37.19	8.79	V	45.98	53.98	8.00	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]	Measurement Type
5150	50.83	8.79	H	59.62	73.98	14.36	PK
5150	37.55	8.79	H	46.34	53.98	7.64	AV
5150	50.40	8.79	V	59.19	73.98	14.79	PK
5150	37.44	8.79	V	46.23	53.98	7.75	AV

Band :	UNII 2
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5320 MHz
Channel No.	64 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5350	50.20	9.28	H	59.48	73.98	14.50	PK
5350	36.32	9.28	H	45.60	53.98	8.38	AV
5350	49.95	9.28	V	59.23	73.98	14.75	PK
5350	36.16	9.28	V	45.44	53.98	8.54	AV

Band :	UNII 2
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6 Mbps
Operating Frequency	5320 MHz
Channel No.	64 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5350	49.37	9.28	H	58.65	73.98	15.33	PK
5350	36.39	9.28	H	45.67	53.98	8.31	AV
5350	48.91	9.28	V	58.19	73.98	15.79	PK
5350	36.23	9.28	V	45.51	53.98	8.47	AV

Band :	UNII 2
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5310 MHz
Channel No.	62 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5350	49.66	9.28	H	58.94	73.98	15.04	PK
5350	37.10	9.28	H	46.38	53.98	7.60	AV
5350	49.49	9.28	V	58.77	73.98	15.21	PK
5350	37.04	9.28	V	46.32	53.98	7.66	AV

Band : UNII 2e
Operation Mode: 802.11 a
Transfer Rate: 6 Mbps
Operating Frequency 5500 MHz
Channel No. 100 Ch

Frequency [MHz]	Reading DBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5460	49.85	10.08	H	59.93	73.98	14.05	PK
5460	35.96	10.08	H	46.04	53.98	7.94	AV
5470	49.48	9.95	H	59.43	68.20	8.77	PK
5460	49.67	10.08	V	59.75	73.98	14.23	PK
5460	35.92	10.08	V	46	53.98	7.98	AV
5470	49.26	9.95	V	59.21	68.20	8.99	PK

Band : UNII 2e
Operation Mode: 802.11 a
Transfer Rate: 6 Mbps
Operating Frequency 5700 MHz
Channel No. 140 Ch

Frequency [MHz]	Reading DBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5725	48.63	11.37	H	60.00	68.20	8.20	PK
5725	48.40	11.37	V	59.77	68.20	8.43	PK

Band : UNII 2e
Operation Mode: 802.11 n_20 MHz BW
Transfer Rate: 6 Mbps
Operating Frequency 5500 MHz
Channel No. 100 Ch

Frequency [MHz]	Reading DBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5460	49.90	10.08	H	59.98	73.98	14.00	PK
5460	36.07	10.08	H	46.15	53.98	7.83	AV
5470	49.77	9.95	H	59.72	68.20	8.48	PK
5460	49.51	10.08	V	59.59	73.98	14.39	PK
5460	35.93	10.08	V	46.01	53.98	7.97	AV
5470	49.58	9.95	V	59.53	68.20	8.67	PK

Band : UNII 2e
Operation Mode: 802.11 n_20 MHz BW
Transfer Rate: 6.5 Mbps
Operating Frequency 5700 MHz
Channel No. 140 Ch

Frequency [MHz]	Reading DBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5725	48.70	11.37	H	60.07	68.20	8.13	PK
5725	48.64	11.37	V	60.01	68.20	8.19	AV

Band :	UNII 2e
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5510 MHz
Channel No.	102 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5460	49.88	10.08	H	59.96	73.98	14.02	PK
5460	37.14	10.08	H	47.22	53.98	6.76	AV
5470	50.59	9.95	H	60.54	68.20	7.66	PK
5460	49.20	10.08	V	59.28	73.98	14.70	PK
5460	37.09	10.08	V	47.17	53.98	6.81	AV
5470	50.47	9.95	V	60.42	68.20	7.78	PK

Band :	UNII 2e
Operation Mode:	802.11 n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5670 MHz
Channel No.	134 Ch

Frequency [MHz]	Reading DBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5725	48.82	11.37	H	60.19	68.20	8.01	PK
5725	48.28	11.37	V	59.65	68.20	8.55	AV

8.8 POWERLINE CONDUCTED EMISSIONS

Test Requirements and limit, §15.207

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

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

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

Test Configuration

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

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference groundplane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.
5. We are performed the AC Power Line Conducted Emission test for 54 Mbps, Ch.100 and 802.11a mode in UNII 2e. Because 802.11a mode in UNII 2e is worst case.

▣ RESULT PLOTS

Conducted Emissions (Line 1)

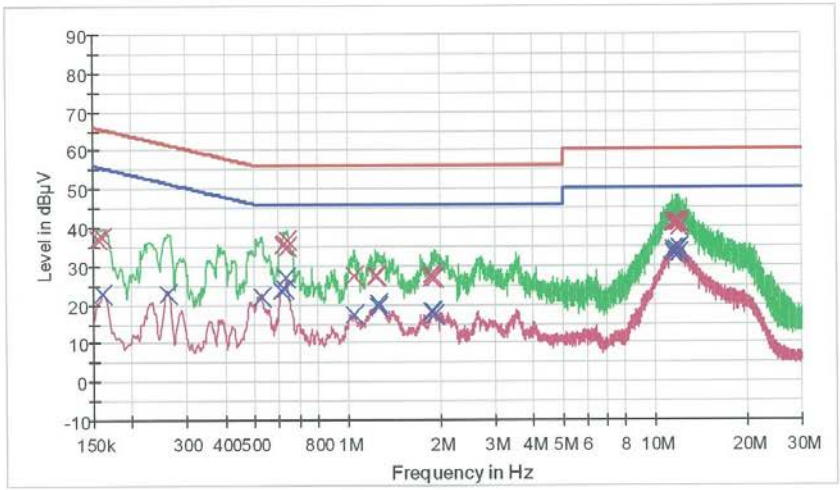
EMI Auto Test(2) 1 / 2

HCT TEST Report

Common Information

EUT:	SM-A700F
Manufacturer:	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions:	WLAN MODE(5G)
Operator Name:	JS LEE

FCC CLASS B



FCC CLASS B_QP
Preview Result 2-AVG
FCC CLASS B_ AV
Final Result 1-QPK
Preview Result 1-PK+
Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.156000	36.9	9.000	Off	L1	9.6	28.8	65.7
0.160000	37.4	9.000	Off	L1	9.6	28.1	65.5
0.620000	35.3	9.000	Off	L1	9.6	20.7	56.0
0.628000	35.8	9.000	Off	L1	9.6	20.2	56.0
0.636000	36.8	9.000	Off	L1	9.7	19.2	56.0
0.642000	35.1	9.000	Off	L1	9.7	20.9	56.0
1.056000	27.4	9.000	Off	L1	9.7	28.6	56.0
1.236000	27.4	9.000	Off	L1	9.7	28.6	56.0
1.252000	27.3	9.000	Off	L1	9.7	28.7	56.0
1.872000	27.6	9.000	Off	L1	9.8	28.4	56.0
1.880000	27.0	9.000	Off	L1	9.8	29.0	56.0
1.926000	26.9	9.000	Off	L1	9.8	29.1	56.0
11.438000	40.9	9.000	Off	L1	10.1	19.1	60.0
11.512000	41.2	9.000	Off	L1	10.1	18.8	60.0
11.788000	41.4	9.000	Off	L1	10.1	18.6	60.0
11.880000	41.4	9.000	Off	L1	10.1	18.6	60.0

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EMI Auto Test(2) 2 / 2

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
11.964000	41.3	9.000	Off	L1	10.1	18.7	60.0
12.002000	40.2	9.000	Off	L1	10.1	19.8	60.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.160000	22.7	9.000	Off	L1	9.6	32.8	55.5
0.262000	22.7	9.000	Off	L1	9.7	28.7	51.4
0.526000	22.0	9.000	Off	L1	9.7	24.0	46.0
0.612000	23.5	9.000	Off	L1	9.6	22.5	46.0
0.622000	23.9	9.000	Off	L1	9.6	22.1	46.0
0.634000	26.9	9.000	Off	L1	9.7	19.1	46.0
1.056000	17.3	9.000	Off	L1	9.7	28.7	46.0
1.254000	19.3	9.000	Off	L1	9.7	26.7	46.0
1.262000	20.1	9.000	Off	L1	9.7	25.9	46.0
1.872000	18.0	9.000	Off	L1	9.8	28.0	46.0
1.884000	18.0	9.000	Off	L1	9.8	28.0	46.0
1.924000	17.2	9.000	Off	L1	9.8	28.8	46.0
11.438000	33.5	9.000	Off	L1	10.1	16.5	50.0
11.494000	34.3	9.000	Off	L1	10.1	15.7	50.0
11.512000	34.2	9.000	Off	L1	10.1	15.8	50.0
11.788000	34.2	9.000	Off	L1	10.1	15.8	50.0
12.002000	33.4	9.000	Off	L1	10.1	16.6	50.0
12.050000	34.4	9.000	Off	L1	10.1	15.6	50.0

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Conducted Emissions (Line 2)

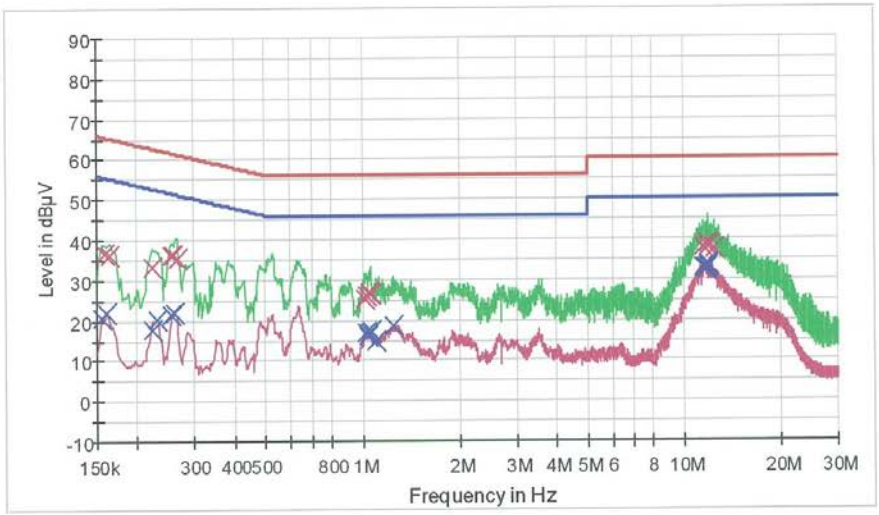
EMI Auto Test(2) 1 / 2

HCT TEST Report

Common Information

EUT:	SM-A700F
Manufacturer:	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions:	WLAN MODE(5G)
Operator Name:	JS LEE

FCC CLASS B



FCC CLASS B_QP
Preview Result 2-AVG
FCC CLASS B_ AV
Final Result 1-QPK
Preview Result 1-PK+
Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	36.6	9.000	Off	N	9.6	29.0	65.6
0.164000	36.2	9.000	Off	N	9.6	29.1	65.3
0.222000	33.3	9.000	Off	N	9.6	29.4	62.7
0.254000	36.2	9.000	Off	N	9.7	25.4	61.6
0.258000	36.4	9.000	Off	N	9.7	25.1	61.5
0.266000	35.4	9.000	Off	N	9.7	25.8	61.2
1.012000	25.2	9.000	Off	N	9.7	30.8	56.0
1.030000	26.0	9.000	Off	N	9.7	30.0	56.0
1.046000	27.1	9.000	Off	N	9.7	29.0	56.0
1.050000	26.5	9.000	Off	N	9.7	29.5	56.0
1.054000	26.9	9.000	Off	N	9.7	29.1	56.0
1.058000	26.6	9.000	Off	N	9.7	29.4	56.0
11.450000	38.0	9.000	Off	N	10.1	22.0	60.0
11.796000	38.9	9.000	Off	N	10.1	21.1	60.0
11.806000	38.8	9.000	Off	N	10.1	21.2	60.0
11.906000	37.9	9.000	Off	N	10.1	22.1	60.0

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EMI Auto Test(2) 2 / 2

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
11.918000	38.5	9.000	Off	N	10.1	21.5	60.0
12.404000	37.4	9.000	Off	N	10.1	22.6	60.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.156000	20.5	9.000	Off	N	9.6	35.2	55.7
0.160000	22.1	9.000	Off	N	9.6	33.4	55.5
0.222000	17.9	9.000	Off	N	9.6	34.8	52.7
0.230000	20.3	9.000	Off	N	9.6	32.1	52.4
0.256000	21.5	9.000	Off	N	9.7	30.1	51.6
0.262000	21.8	9.000	Off	N	9.7	29.6	51.4
1.032000	16.9	9.000	Off	N	9.7	29.1	46.0
1.040000	16.1	9.000	Off	N	9.7	29.9	46.0
1.056000	17.0	9.000	Off	N	9.7	29.0	46.0
1.060000	17.2	9.000	Off	N	9.7	28.8	46.0
1.096000	14.9	9.000	Off	N	9.7	31.1	46.0
1.240000	18.5	9.000	Off	N	9.7	27.5	46.0
11.450000	32.7	9.000	Off	N	10.1	17.3	50.0
11.656000	32.5	9.000	Off	N	10.1	17.5	50.0
11.660000	33.1	9.000	Off	N	10.1	16.9	50.0
11.780000	32.4	9.000	Off	N	10.1	17.6	50.0
11.796000	33.6	9.000	Off	N	10.1	16.4	50.0
11.888000	33.4	9.000	Off	N	10.1	16.6	50.0

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9. LIST OF TEST EQUIPMENT

9.1 LIST OF TEST EQUIPMENT(Conducted Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216/ LISN	01/29/2014	Annual	100073
Agilent	E4440A/ Spectrum Analyzer	04/09/2014	Annual	US45303008
Agilent	N9020A/ SIGNAL ANALYZER	05/23/2014	Annual	MY51110063
Agilent	N1911A/Power Meter	01/24/2014	Annual	MY45100523
Agilent	N1921A /POWER SENSOR	07/09/2014	Annual	MY45241059
Agilent	87300B/Directional Coupler	12/08/2014	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	01/27/2014	Annual	10545
ITECH	IT6720 / DC POWER SUPPLY	11/04/2014	Annual	010002156287001199
TESCOM	TC-3000C / BLUETOOTH TESTER	04/11/2014	Annual	3000C000276
Rohde & Schwarz	CBT / BLUETOOTH TESTER	05/07/2014	Annual	100422
Agilent	8493C / Attenuator(10 dB)	07/21/2014	Annual	76649

9.2 LIST OF TEST EQUIPMENT(Radiated Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Schwarzbeck	VULB 9160/ TRILOG Antenna	10/10/2014	Biennial	3368
Rohde & Schwarz	ESCI / EMI TEST RECEIVER	01/24/2014	Annual	100584
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	09/04/2014	Annual	10094
CERNEX	CBL18265035 / POWER AMP	07/23/2014	Annual	22966
CERNEX	CBL26405040 / POWER AMP	04/04/2014	Annual	19660
Schwarzbeck	BBHA 9120D/ Horn Antenna	07/05/2013	Biennial	1151
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	07/05/2013	Biennial	BBHA9170541
Rohde & Schwarz	FSP / Spectrum Analyzer	01/24/2014	Annual	839117/011
Wainwright Instrument	WHF3.0/18G-10EF / High Pass Filter	02/03/2014	Annual	F6
Wainwright Instrument	WHNX6.0/26.5G-6SS / High Pass Filter	04/09/2014	Annual	1
Wainwright Instrument	WHNX7.0/18G-8SS / High Pass Filter	04/04/2014	Annual	29
Wainwright Instrument	WRCJ2400/2483.5-2370/2520-60/14SS / Band Reject Filter	06/17/2014	Annual	1
TESCOM	TC-3000C / BLUETOOTH TESTER	04/11/2014	Annual	3000C000276
Rohde & Schwarz	CBT / BLUETOOTH TESTER	05/07/2014	Annual	100422
Rohde & Schwarz	LOOP ANTENNA	09/03/2014	Biennial	1513-175
CERNEX	CBL06185030 / POWER AMP	07/21/2014	Annual	22965
CERNEX	CBLU1183540 / POWER AMP	07/21/2014	Annual	22964