HCT CO.,LTD.
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
TEL: +82-31-645-6300 **FAX: +82-31-645-6401**

FCC/ISED UNII REPORT

Certification

Applicant Name:
LG Electronics USA

Address:
1000 Sylvan Avenue Englewood Cliffs, NJ
07632 United States

Date of Issue:
September 18, 2017
Test Site/Location:
HCT CO., LTD., 74,Seoicheon-ro 578beon-gil,Majang-myeo,Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
Report No.: HCT-R-1709-F004
HCT FRN: 0005866421
ISED Registration Number: 5944A-5

FCC ID :	**BEJID7FF**
ISED ID :	**2703H-ID7FF**
APPLICANT :	**LG Electronics USA**

Model: ID7FF

EUT Type: Faceplate RADIO ASM-RECEIVER

Modulation type OFDM

FCC Classification: Unlicensed National Information Infrastructure(UNII)

FCC Rule Part(s): Part 15.407

ISED Rule Part(s): RSS-247 Issue 2(February 2017) , RSS-Gen Issue 4(November 2014)

Band	Mode	Frequency Range (MHz)	Power (dBm)	Power (W)
UNII1	802.11a	5180 – 5240	6.49	0.00446
	802.11n_HT20	5180 – 5240	6.48	0.00444
	802.11n_HT40	5190 - 5230	7.00	0.00501
	802.11ac_VHT20	5180 – 5240	6.44	0.00441
	802.11ac_VHT40	5190 - 5230	6.84	0.00483
	802.11ac_VHT80	5210	5.02	0.00318
UNII3	802.11a	5745 – 5825	10.59	0.01147
	802.11n_HT20	5745 – 5825	10.66	0.01163
	802.11n_HT40	5755 – 5795	7.73	0.00592
	802.11ac_VHT20	5745 – 5825	10.58	0.01142
	802.11ac_VHT40	5755 – 5795	7.56	0.00571
	802.11ac_VHT80	5775	5.05	0.00320

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from thisequipment 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. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC / IC Rules under normal use and maintenance.

Report prepared by : Kyung Soo Kang
Engineer of Telecommunication testing center

Approved by : Jong Seok Lee
Manager of Telecommunication testing center

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1709-F004	September 18, 2017	- First Approval Report

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1. GENERAL INFORMATION

Applicant:	LG Electronics USA
Address:	1000 Sylvan Avenue Englewood Cliffs, NJ 07632 United States
FCC ID:	BEJID7FF
ISED ID:	2703H-ID7FF
EUT Type:	Faceplate RADIO ASM-RECEIVER
Model:	ID7FF
Date(s) of Tests:	July 24, 2017 ~ September 14, 2017
Place of Tests:	HCT Co., Ltd. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

2. EUT DESCRIPTION

Model	ID7FF	
EUT Type	Faceplate RADIO ASM-RECEIVER	
Power Supply	DC 12 V	
Frequency Range	TX_20 MHz BW:	5180 MHz - 5240 MHz (UNII 1)/ 5745 MHz - 5825 MHz (UNII 3)
	40 MHz BW:	5190 MHz - 5230 MHz (UNII 1)/ 5755 MHz - 5795 MHz (UNII 3)
	80 MHz BW:	5210 MHz(UNII 1)/ 5775 MHz (UNII 3)
	RX_20 MHz BW:	5180 MHz - 5240 MHz (UNII 1)/ 5745 MHz - 5825 MHz (UNII 3)
	40 MHz BW:	5190 MHz - 5230 MHz (UNII 1)/ 5755 MHz - 5795 MHz (UNII 3)
	80 MHz BW:	5210 MHz(UNII 1)/ 5775 MHz (UNII 3)
Modulation Type	OFDM(802.11a, 802.11n, 802.11ac)	
Antenna Specification	Manufacturer: Amotech CO.LTD Antenna type: Dielectric Chip Antenna Peak Gain : 3.4 dBi (UNII 1) / 3.9 dBi(UNII 3)	

3. TEST METHODOLOGY

The measurement procedure described in FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04 dated May 2, 2017 entitled “Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part15, Subpart E” and ANSI C63.10(Version : 2013) ‘the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices’ were used in the measurement. For 802.11ac, KDB644545 D03 v01 dated August 14, 2014.

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 / RSS-Gen issue 4, RSS-247 issue 2.

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 6.2 of ANSI C63.10. (Version :2013) 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 below 1GHz. Above 1GHz with 1.5m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3.75 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 8 of ANSI C63.10. (Version: 2013)

Conducted Antenna Terminal

See Section from 8.1 to 8.4.(KDB 789033 D02 v01r04)

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
Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2006).

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 :2014) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 07, 2015 (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, §15.407 / RSS-Gen(Issue 4) Section 8.3

“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, §15.407 / RSS-Gen

7. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70

8. SUMMARY OF TEST RESULTS

8.1 FCC Part

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26dB Bandwidth	§15.407 (for Power Measurement)	N/A	CONDUCTED	PASS
6 dB Bandwidth	§15.407(e)	>500 kHz (5725-5850 MHz)		PASS
Maximum Conducted Output Power	§15.407(a)(1)	< 250 mW (5150-5250 MHz) < 250 mW or 11+10 log log $_{10}$ (BW) dBm (5250-5350 MHz) < 250 mW or 11+10 log log $_{10}$ (BW) dBm (5470-5725 MHz) <1 W (5725-5850 MHz)		PASS
Peak Power Spectral Density	§15.407(a)(1),(5)	<11 dBm/ MHz (5150-5250 MHz) <11 dBm/ MHz (5250-5350 MHz) <11 dBm/ MHz (5470-5725 MHz) <30 dBm/500 kHz(5725-5850 MHz)		PASS
Frequency Stability	§15.407(g)	NA		PASS
AC Conducted Emissions 150 kHz-30 MHz	15.207	<FCC 15.207 limits		PASS
Undesirable Emissions	§15.407(b)	<-27 dBm/MHz EIRP (UNII1, 2A, 2C) <-27 dBm/MHz EIRP(Worst) (UNII 3)	RADIATED	PASS
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	15.205, 15.407(b)(5), (6)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS

8.2 IC Part

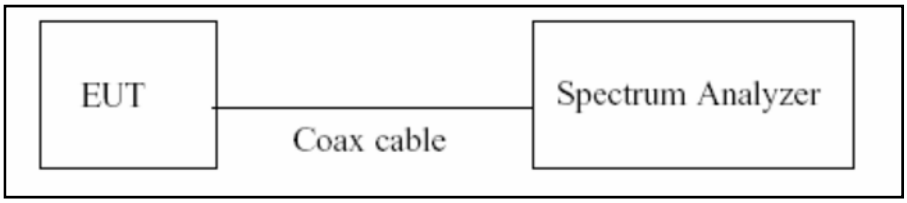
Test Description	IC Part Section(s)	Test Limit	Test Condition	Test Result
99% Bandwidth(IC)	RSS-Gen, 6.6	N/A	CONDUCTED	PASS
6 dB Bandwidth	RSS-247, 6.2.4.1	> 500 kHz (5725~5850 MHz)		PASS
Maximum Conducted Output Power,	RSS-247, 6.2	< 250 mW or 11+10 log $_{10}$ (BW) dBm (5250-5350 MHz) < 250 mW or 11+10 log $_{10}$ (BW) dBm (5470-5600, 5650-5725 MHz) Whichever power is less		PASS
	RSS-247, 6.2.4 1	<1 W (5725-5850 MHz)		
Maximum e.i.r.p	RSS-247, 6.2	< 30 mW or 1.76+10 log $_{10}$ (BW) dBm (5150-5250, 5250-5350 MHz, for devices installed in vehicles) < 1 W or 17+10 log $_{10}$ (BW) dBm (5470-5600, 5650-5725 MHz) Whichever power is less		
Power Spectral Density	RSS-247 6.2	<10 dBm/ MHz(e.i.r.p.) (5150-5250 MHz) <11 dBm/MHz(Conducted) (5250-5350 MHz, 5470-5600 MHz, 5650-5725 MHz)		PASS
	RSS-247, 6.2.4 1	<30 dBm/500 kHz(Conducted) (5725-5850 MHz)		
AC Conducted Emissions 150 kHz-30 MHz	RSS-Gen, 8.8	RSS-Gen section 8.8 table 3		NA
Undesirable Emissions	RSS-247, 6.2.1 2	26 dBc at 5250~5350 MHz (5150~5350 MHz)		PASS
	RSS-247, 6.2	<-27 dBm/ MHz EIRP (5150-5350 MHz, 5470-5725 MHz)	RADIATED	PASS
	RSS-247, 6.2.4 2	<-17 dBm/MHz EIRP within 5715-5725 MHz and 5850-5860 MHz, <-27 dBm/MHz EIRP outside 5715-5860 MHz (5725~5850 MHz)		
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	RSS-Gen, 8.9 RSS-Gen, 8.10	RSS-Gen section 8.9 table 4, 5 section 8.10 table 6		PASS
Receiver Spurious Emissions	RSS-Gen, 5 RSS-Gen, 7.1.2	RSS-Gen section 7.1.2 table 2		PASS

9. TEST RESULT

9.1 DUTY CYCLE

The zero-span mode on a spectrum analyzer or EMI receiver ,if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW ≥ 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 D02 v01r04)
The largest available value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if T ≤ 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 available 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 (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11a	6	2.063	2.188	0.94257722	0.257
	9	1.385	1.499	0.92351611	0.346
	12	1.044	1.160	0.90000000	0.458
	18	0.704	0.810	0.86873431	0.611
	24	0.532	0.639	0.83298495	0.794
	36	0.364	0.471	0.77348066	1.116
	48	0.276	0.382	0.72108844	1.420
	54	0.248	0.355	0.69904336	1.555
Mode	MCS INDEX	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11n_HT20	0	1.924	2.028	0.94871795	0.229
	1	0.979	1.087	0.90080972	0.454
	2	0.669	0.783	0.85393258	0.686
	3	0.507	0.615	0.82577665	0.831
	4	0.352	0.459	0.76688453	1.153
	5	0.272	0.378	0.71957672	1.429
	6	0.248	0.355	0.69892567	1.556
	7	0.228	0.334	0.68250958	1.659
802.11n_HT40	0	0.948	1.054	0.89979123	0.459
	1	0.492	0.598	0.82197025	0.851
	2	0.340	0.447	0.76142189	1.184
	3	0.264	0.370	0.71287193	1.470
	4	0.188	0.294	0.63840213	1.949
	5	0.153	0.258	0.59040309	2.289
	6	0.140	0.246	0.56866461	2.451
	7	0.128	0.244	0.52641670	2.787

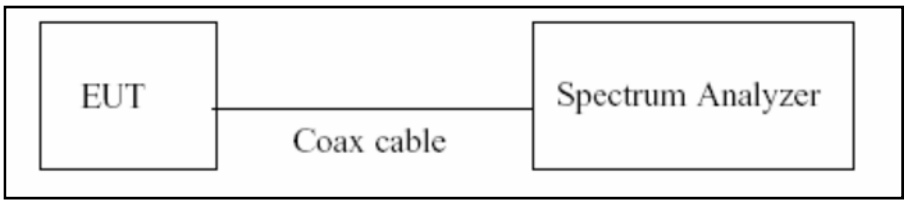
Mode	MCS INDEX	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11ac_VHT20	0	1.935	2.042	0.94789090	0.232
	1	0.988	1.085	0.91047650	0.407
	2	0.672	0.769	0.87431694	0.583
	3	0.516	0.614	0.84042545	0.755
	4	0.356	0.454	0.78395062	1.057
	5	0.280	0.378	0.74074074	1.303
	6	0.252	0.349	0.72192444	1.415
	7	0.233	0.330	0.70503713	1.518
	8	0.200	0.298	0.67131665	1.731
802.11ac_ VHT40	0	0.953	1.058	0.90039315	0.456
	1	0.496	0.592	0.83687943	0.773
	2	0.344	0.442	0.77898551	1.085
	3	0.268	0.365	0.73464912	1.339
	4	0.192	0.290	0.66298343	1.785
	5	0.156	0.254	0.61523211	2.110
	6	0.144	0.250	0.57520337	2.402
	7	0.132	0.230	0.57522289	2.402
	8	0.116	0.213	0.54415175	2.643
	9	0.112	0.209	0.53640699	2.705
802.11ac_ VHT80	0	0.464	0.562	0.82692308	0.825
	1	0.252	0.350	0.72082380	1.422
	2	0.184	0.290	0.63360882	1.982
	3	0.149	0.245	0.60554275	2.179
	4	0.112	0.209	0.53499713	2.716
	5	0.096	0.193	0.49819460	3.026
	6	0.088	0.185	0.47547287	3.229
	7	0.084	0.190	0.44220268	3.544
	8	0.076	0.173	0.43951557	3.570
	9	0.072	0.169	0.42746604	3.691

9.2 EMISSION BANDWIDTH AND MINIMUM EMISSION 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 D02 v01r04, 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 (26dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.
The Spectrum Analyzer is set to(C.1 in KDB 789033 D02 v01r04)

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 %.

Note : We tested 26 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 26 dB.

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

▣ TEST PROCEDURE (for the band 5.725-5.85 GHz, 6 dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to(C.2 in KDB 789033 D02 v01r04)

1. RBW = 100 kHz
2. VBW ≥ 3*RBW
3. Detector = Peak
4. Trace mode = max hold
5. Allow the trace to stabilize
6. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points(upper and lower frequencies) that are attenuated by 6 dB relative to the maximum lever measured in the fundamental emission.

Note : We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

▣ TEST RESULTS for 802.11a

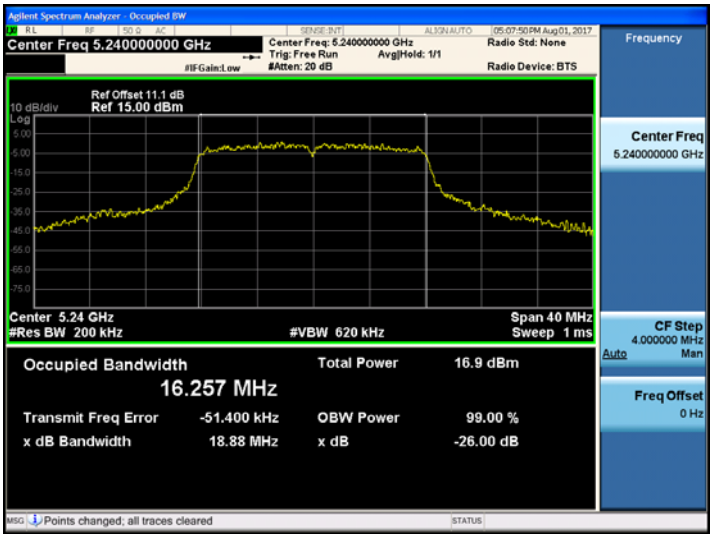
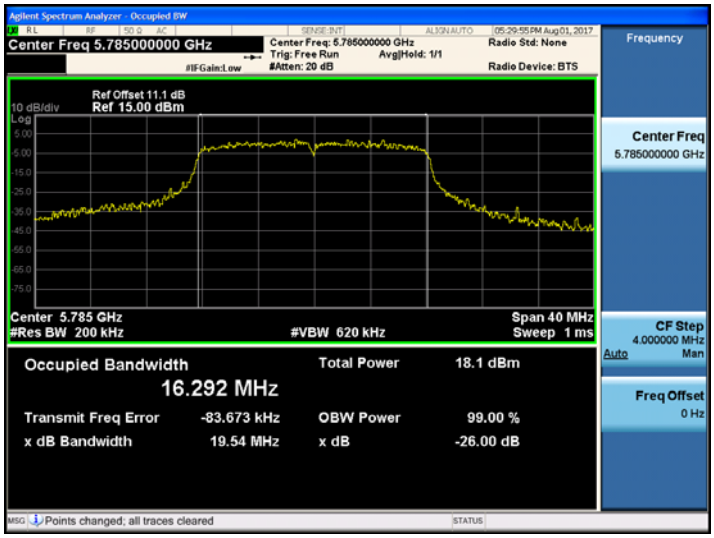
Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	18.78	N/A	Pass
5200	40	18.65	N/A	Pass
5240	48	18.88	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.			
5745	149	19.09	N/A	Pass
5785	157	19.54	N/A	Pass
5825	165	19.03	N/A	Pass

▣ TEST Plot for 802.11a

802.11a UNII 1 BAND 26dB Bandwidth (CH 48)	802.11a UNII 3 BAND 26dB Bandwidth (CH 157)
	

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

▣ TEST RESULTS for 802.11n_HT20

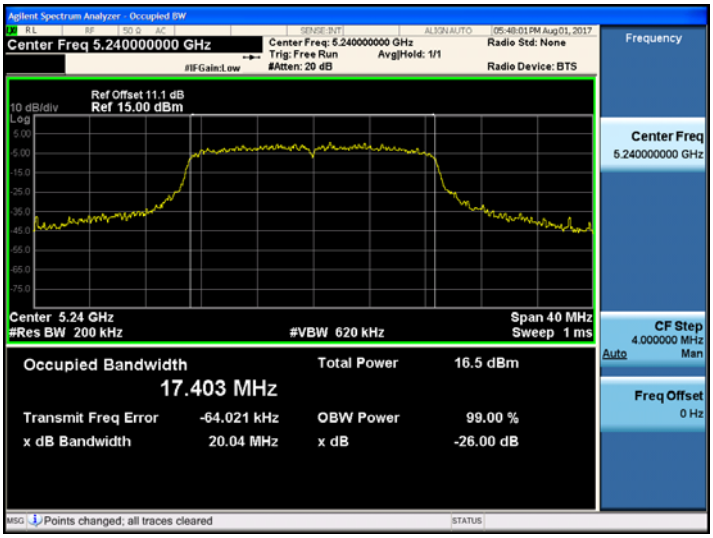
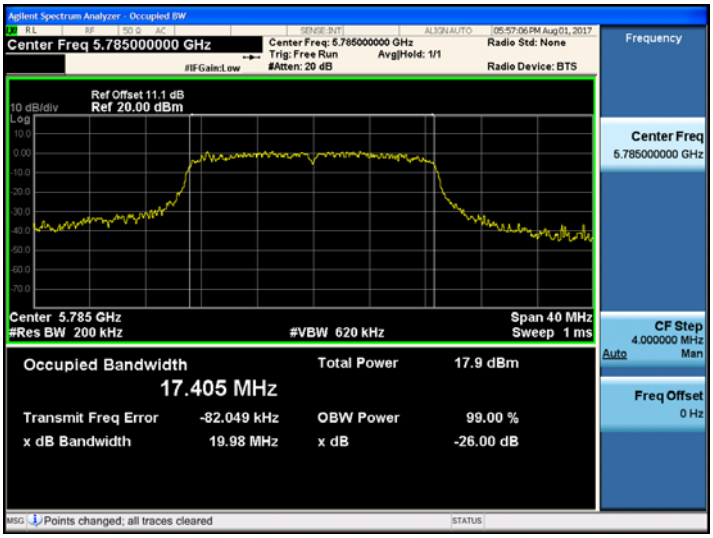
Conducted 26 dB Bandwidth Measurements for 802.11n_HT20

802.11n_HT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	19.84	N/A	Pass
5200	40	20.00	N/A	Pass
5240	48	20.04	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_HT20

802.11n_HT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	19.96	N/A	Pass
5785	157	19.98	N/A	Pass
5825	165	19.44	N/A	Pass

▣ TEST Plot for 802.11n_HT20

802.11n_HT20 UNII 1 BAND 26dB Bandwidth(CH 48)	802.11n_HT20 UNII 3 BAND 26dB Bandwidth(CH 157)
	

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

▣ TEST RESULTS for 802.11ac_VHT20

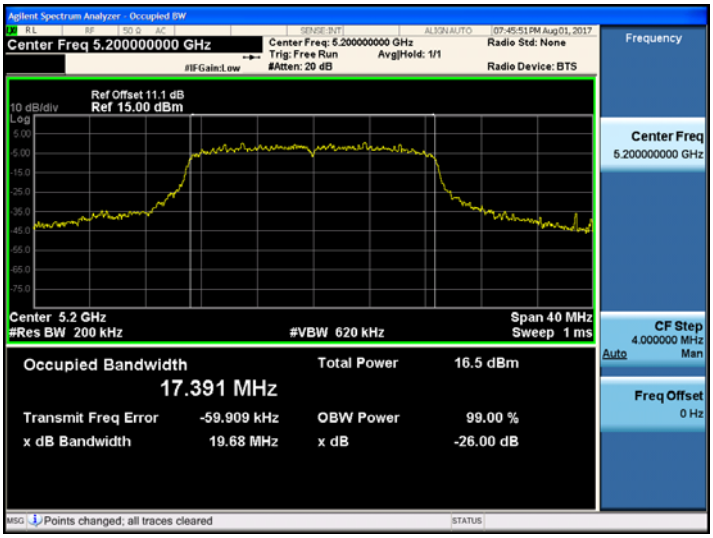
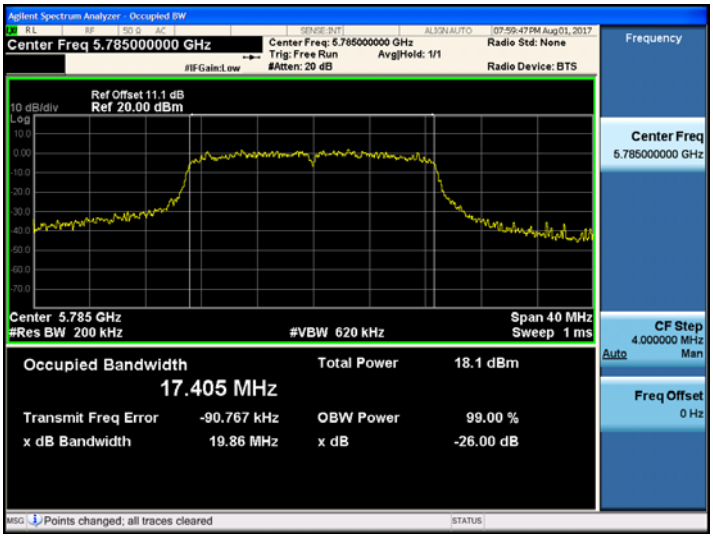
Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT20

802.11ac_VHT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	19.67	N/A	Pass
5200	40	19.68	N/A	Pass
5240	48	19.58	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT20

802.11ac_VHT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	19.70	N/A	Pass
5785	157	19.86	N/A	Pass
5825	165	19.66	N/A	Pass

▣ TEST Plot for 802.11ac_VHT20

802.11ac_VHT20 UNII 1 BAND 26dB Bandwidth(CH 40)	802.11ac_VHT20 UNII 3 BAND 26dB Bandwidth(CH 157)
	

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

▣ TEST RESULTS for 802.11n_HT40

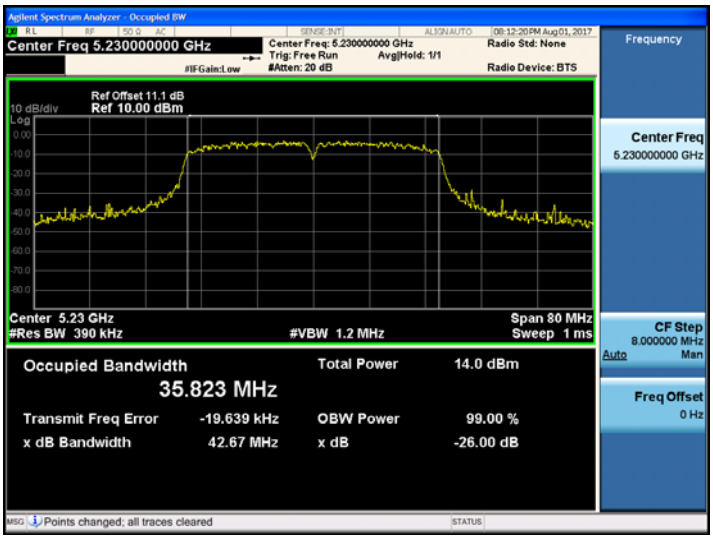
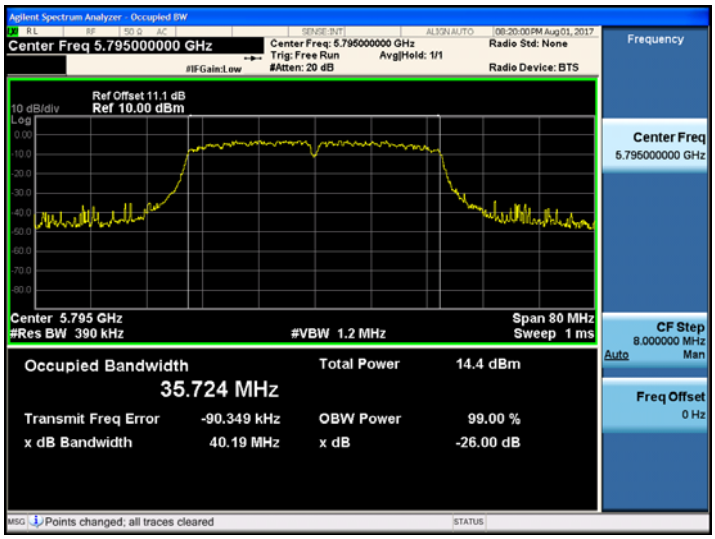
Conducted 26 dB Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	40.43	N/A	Pass
5230	46	42.67	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	39.88	N/A	Pass
5795	159	40.19	N/A	Pass

▣ TEST Plot for 802.11n_HT40

802.11n_HT40 UNII 1 BAND 26dB Bandwidth(CH 46)	802.11n_HT40 UNII 3 BAND 26dB Bandwidth (CH 159)
	

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

▣ TEST RESULTS for 802.11ac_VHT40

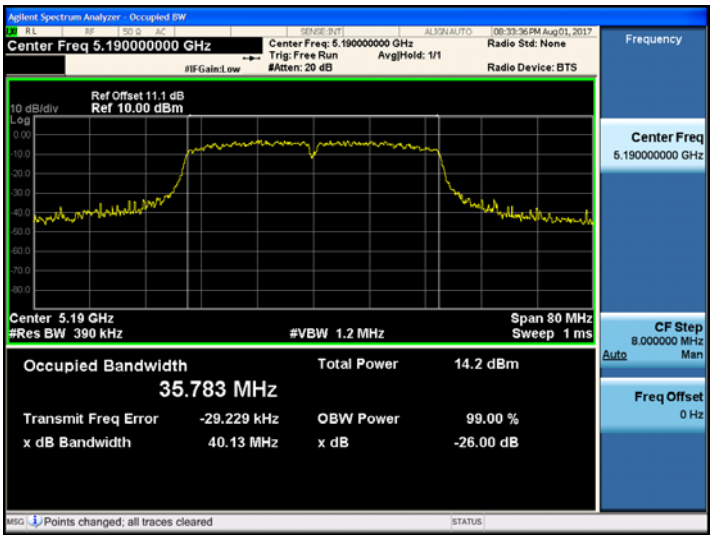
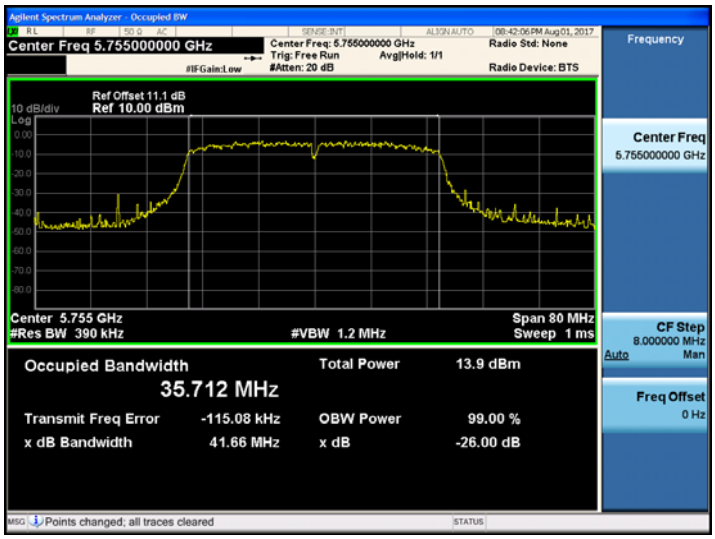
Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT40

802.11ac_VHT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	40.13	N/A	Pass
5230	46	39.96	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT40

802.11ac_VHT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	41.66	N/A	Pass
5795	159	39.60	N/A	Pass

▣ TEST Plot for 802.11ac_VHT40

802.11ac_VHT40 UNII 1 BAND 26dB Bandwidth(CH 38)	802.11ac_VHT40 UNII 3 BAND 26dB Bandwidth (CH 151)
	

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

▣ TEST RESULTS for 802.11ac_VHT80

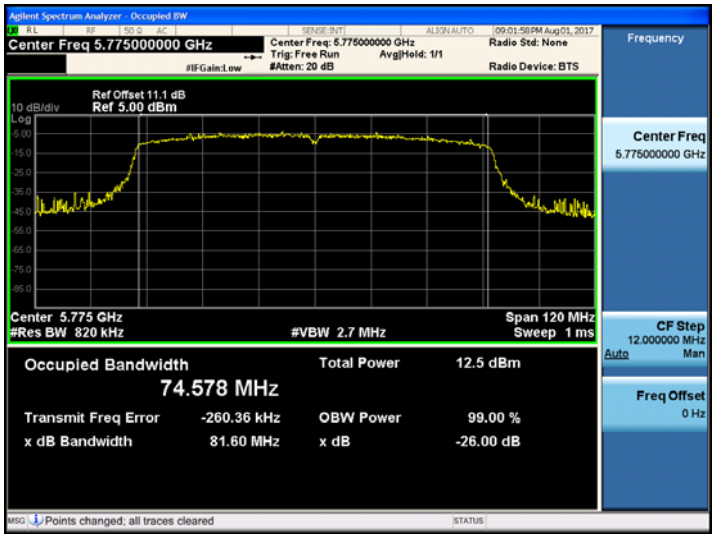
Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT80

802.11ac_VHT80 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5210	42	80.24	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT80

802.11ac_VHT80 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	81.60	N/A	Pass

▣ TEST Plot for 802.11ac_VHT80

802.11ac_VHT80 UNII 1 BAND 26dB Bandwidth(CH 42)	802.11ac_VHT80 UNII 3 BAND 26dB Bandwidth(CH 155)
	

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

▣ TEST RESULTS for 802.11a/n_HT20/ac_VHT20

Conducted 6 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	14.47	0.5	Pass
5785	157	14.70	0.5	Pass
5825	165	14.12	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 802.11n_HT20

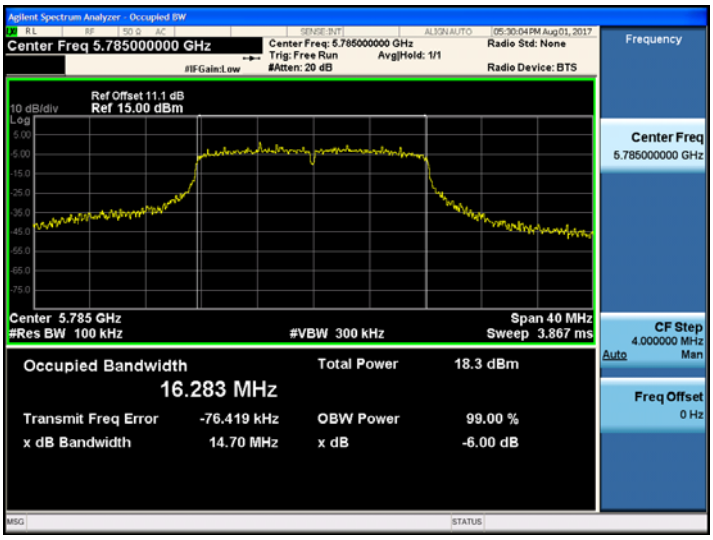
802.11n_HT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	15.42	0.5	Pass
5785	157	15.74	0.5	Pass
5825	165	14.56	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 802.11ac_VHT20

802.11ac_VHT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	15.46	0.5	Pass
5785	157	15.17	0.5	Pass
5825	165	15.42	0.5	Pass

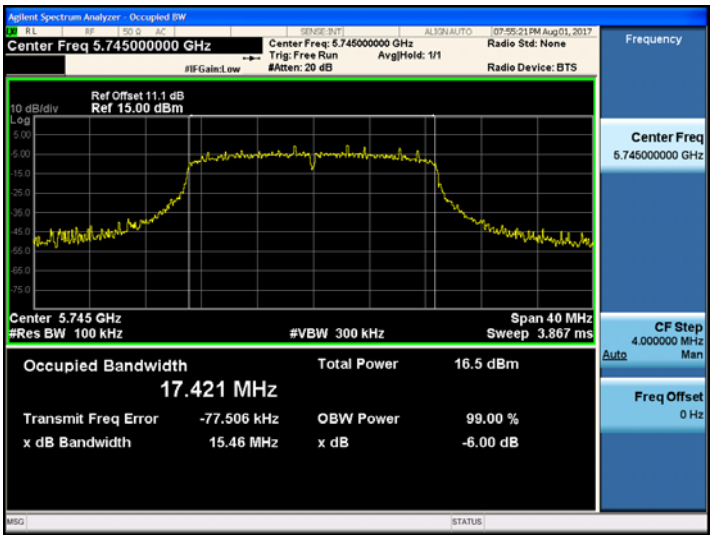
▣ TEST Plot for 802.11a/n_HT20/ac_VHT20

802.11a UNII 3 BAND 6dB Bandwidth (CH.157)



802.11n_HT20 UNII 3 BAND 6dB Bandwidth(CH.157)

802.11ac_VHT20 UNII 3 BAND 6dB Bandwidth(CH.149)



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

▣ TEST RESULTS for 802.11n_HT40/ac_VHT40

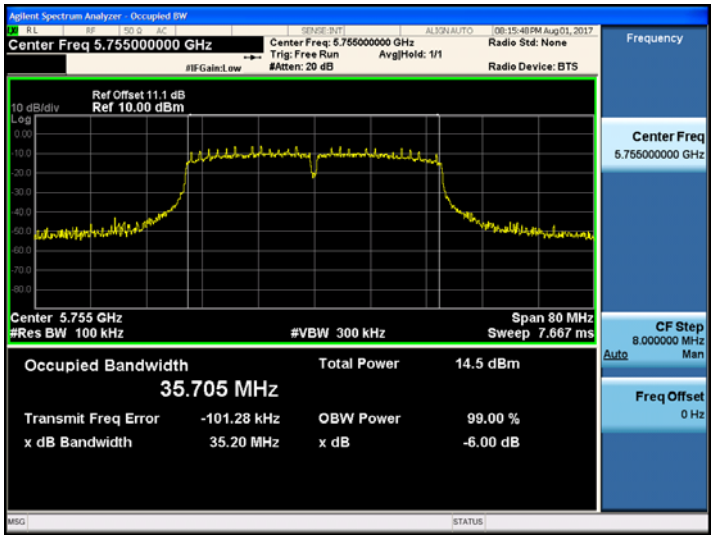
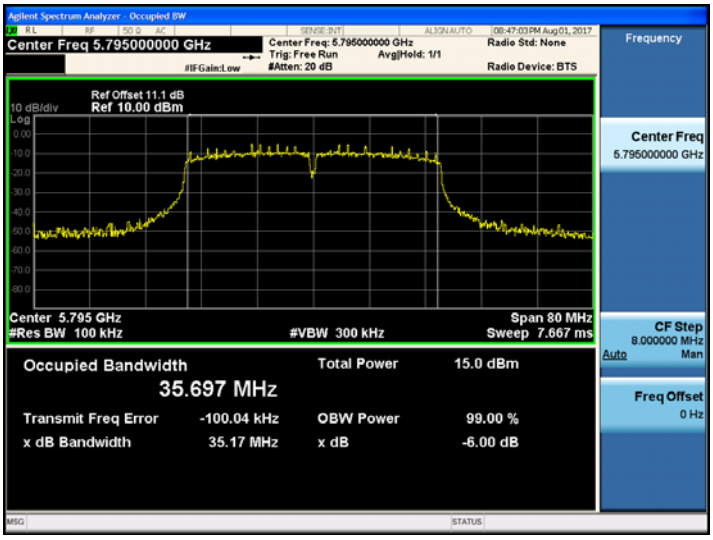
Conducted 6 dB Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.20	0.5	Pass
5795	159	33.93	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 802.11ac_VHT40

802.11ac_VHT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	32.67	0.5	Pass
5795	159	35.17	0.5	Pass

▣ TEST Plot for 802.11n_HT40/ac_VHT40

802.11n_HT40 UNII 3 BAND 6dB Bandwidth(CH.151)	802.11ac_VHT40 UNII 3 BAND 6dB Bandwidth(CH.159)
	

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

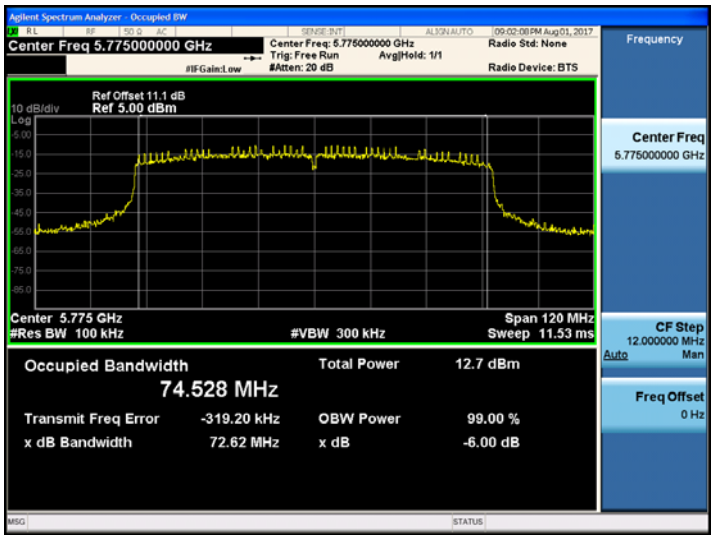
▣ TEST RESULTS for 802.11ac_VHT80

Conducted 6 dB Bandwidth Measurements for 802.11ac_VHT80

802.11ac_VHT80 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	72.62	0.5	Pass

▣ TEST Plot for 802.11ac_VHT80

802.11ac_VHT80 UNII 3 BAND 6dB Bandwidth (CH.155)



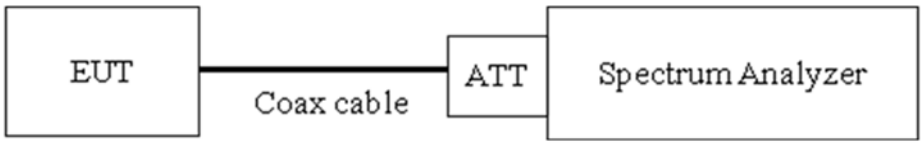
Note : In order to simplify the report, attached plots were only the most wide channel.

9.3 99% BANDWIDTH MEASUREMENT

None; for IC reporting purposes only

The 99 % bandwidth is used to determine the conducted power limits(for IC).

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

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

RBW = 1% of the total span
VBW ≥ 3 x RBW
Detector = Peak
Trace mode = max hold
Sweep = auto couple
Allow the trace to stabilize

▣ TEST RESULTS for 802.11a

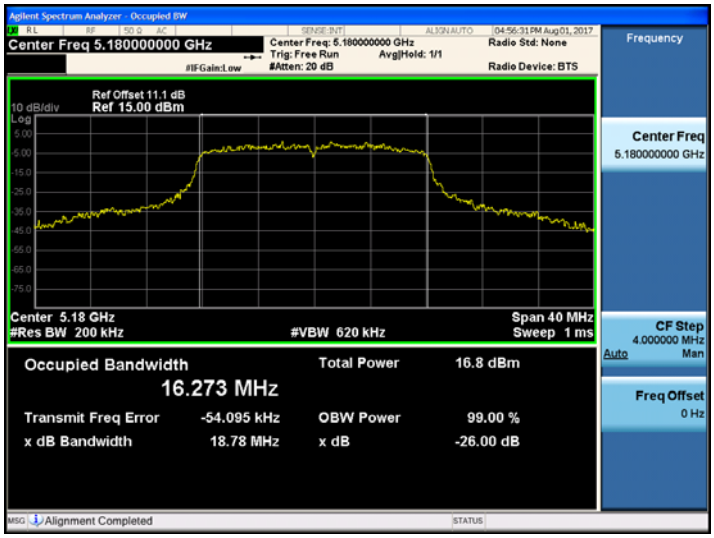
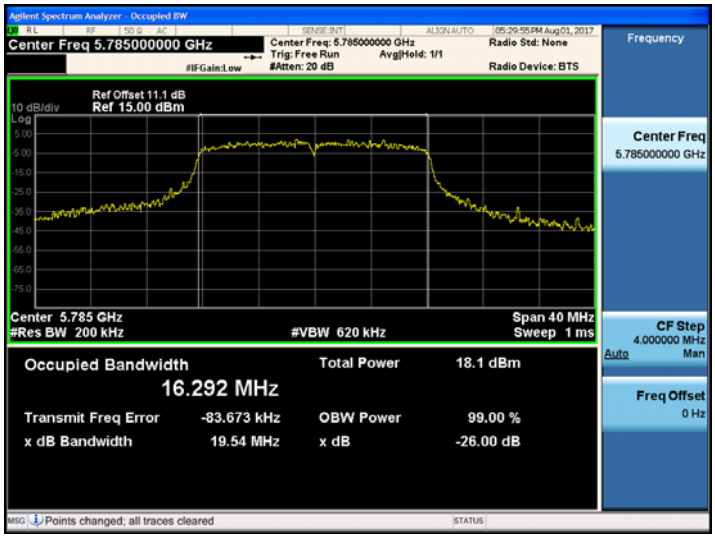
99% Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	16.273
5200	40	16.241
5240	48	16.257

99% Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5745	149	16.256
5785	157	16.292
5825	165	16.258

▣ TEST Plot for 802.11a

802.11a UNII 1 BAND 99% Bandwidth (CH 36)	802.11a UNII 3 BAND 99% Bandwidth (CH 157)
	

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

▣ TEST RESULTS for 802.11n_HT20

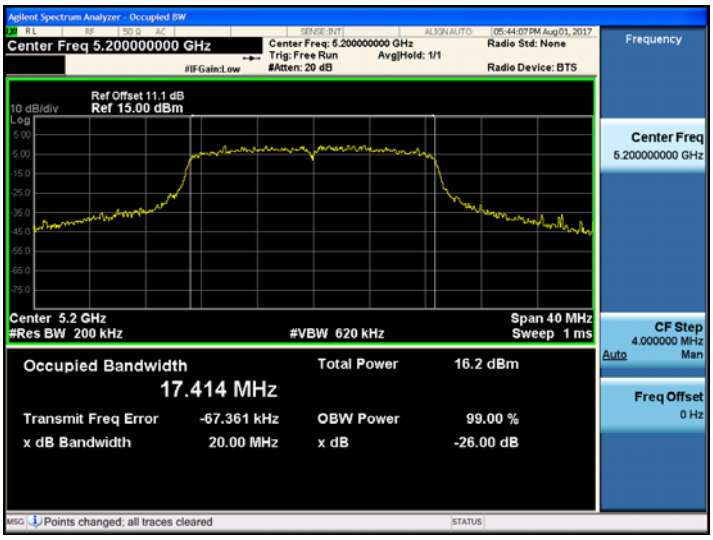
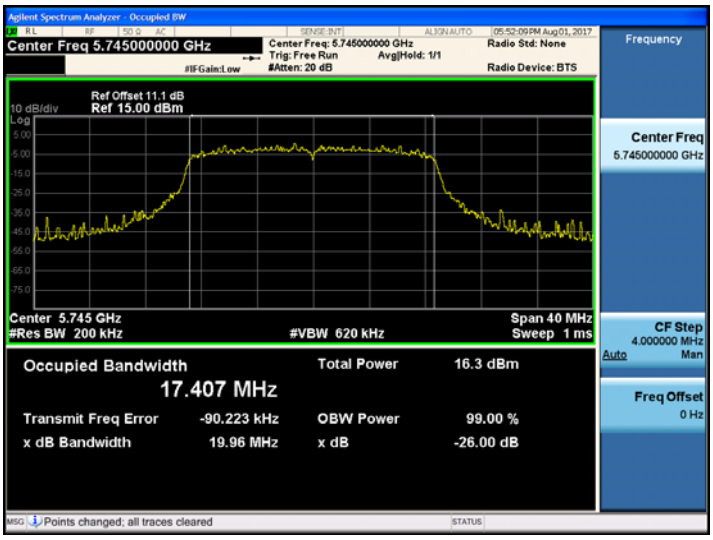
99% Bandwidth Measurements for 802.11n_HT20

802.11n_HT20 Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	17.398
5200	40	17.414
5240	48	17.403

99% Bandwidth Measurements for 802.11n_HT20

802.11n_HT20 Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5745	149	17.407
5785	157	17.405
5825	165	17.401

▣ TEST Plot for 802.11n_HT20

802.11n_HT20 UNII 1 BAND 99% Bandwidth(CH 40)	802.11n_HT20 UNII 3 BAND 99% Bandwidth(CH 149)
	

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

▣ TEST RESULTS for 802.11ac_VHT20

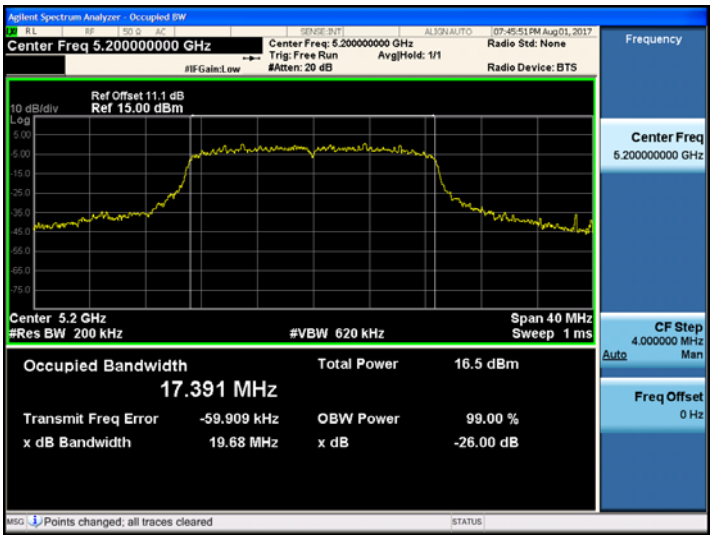
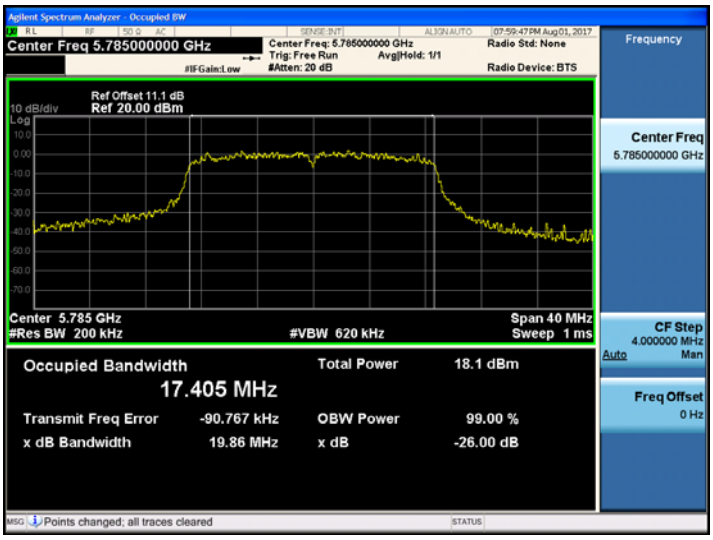
99% Bandwidth Measurements for 802.11ac_VHT20

802.11ac_VHT20 Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	17.390
5200	40	17.391
5240	48	17.384

99% Bandwidth Measurements for 802.11ac_VHT20

802.11ac_VHT20 Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5745	149	17.390
5785	157	17.405
5825	165	17.393

▣ TEST Plot for 802.11ac_VHT20

802.11ac_VHT20 UNII 1 BAND 99% Bandwidth(CH 40)	802.11ac_VHT20 UNII 3 BAND 99% Bandwidth(CH 157)
	

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

▣ TEST RESULTS for 802.11n_HT40

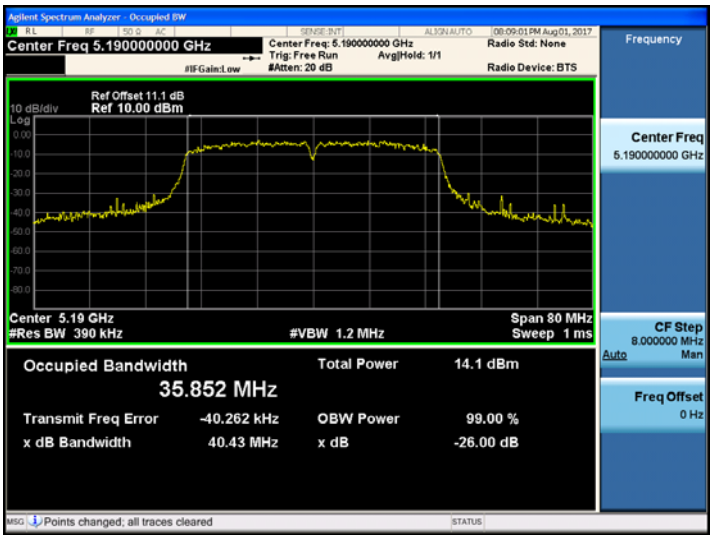
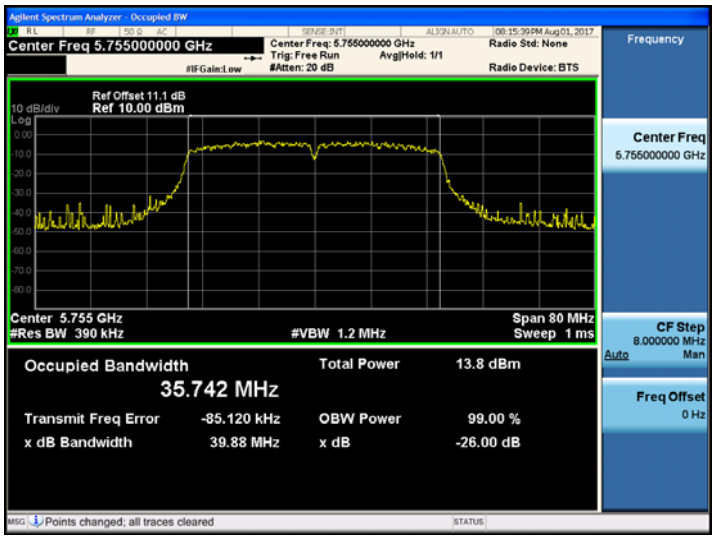
99% Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5190	38	35.852
5230	46	35.823

99% Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5755	151	35.742
5795	159	35.724

▣ TEST Plot for 802.11n_HT40

802.11n_HT40 UNII 1 BAND 99% Bandwidth(CH 38)	802.11n_HT40 UNII 3 BAND 99% Bandwidth (CH 151)
	

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

▣ TEST RESULTS for 802.11ac_VHT40

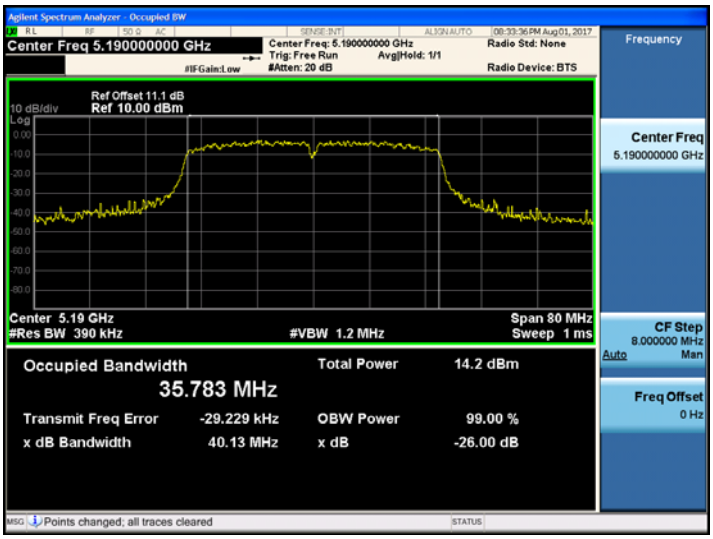
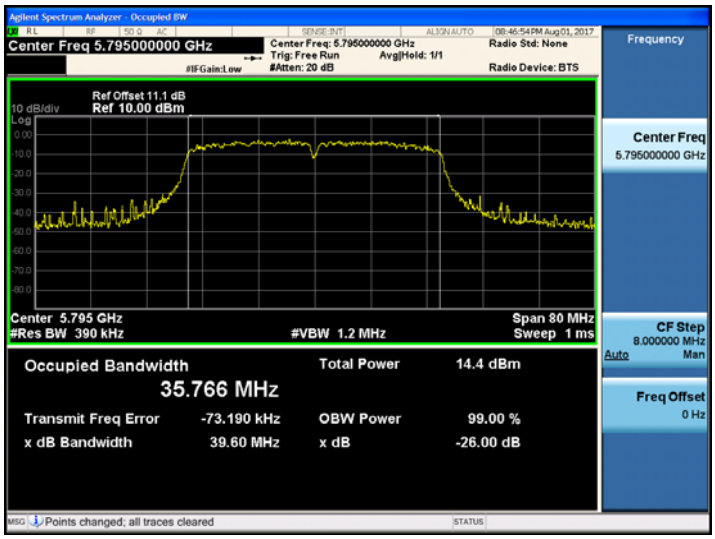
99% Bandwidth Measurements for 802.11ac_VHT40

802.11ac_VHT40 Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5190	38	35.783
5230	46	35.777

99% Bandwidth Measurements for 802.11ac_VHT40

802.11ac_VHT40 Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5755	151	35.712
5795	159	35.766

▣ TEST Plot for 802.11ac_VHT40

802.11ac_VHT40 UNII 1 BAND 99% Bandwidth(CH 38)	802.11ac_VHT40 UNII 3 BAND 99% Bandwidth (CH 159)
	

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

▣ TEST RESULTS for 802.11ac_VHT80

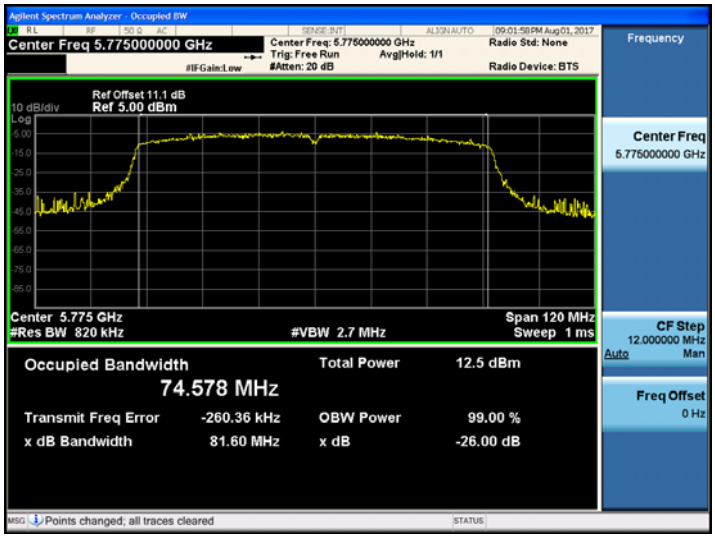
99% Bandwidth Measurements for 802.11ac_VHT80

802.11ac_VHT80 Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5210	42	74.691

99% Bandwidth Measurements for 802.11ac_VHT80

802.11ac_VHT80 Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5775	155	74.578

▣ TEST Plot for 802.11ac_VHT80

802.11ac_VHT80 UNII 1 BAND 99% Bandwidth(CH 42)	802.11ac_VHT80 UNII 3 BAND 99% Bandwidth(CH 155)
	

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

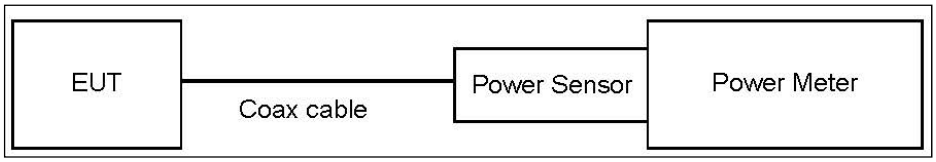
9.4 OUTPUT POWER MEASUREMENT

A transmitter antenna terminal of EUT is connected to the input of a Power meter or Spectrum Analyzer .Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies.

▣ LIMIT

Band	Mode	Limit (dBm)
UNII 1	802.11a, n, ac	23.98
UNII 3	802.11a, n, ac	30.00

▣ TEST CONFIGURATION(20 MHz BW)



▣ TEST PROCEDURE(20 MHz BW)

▪ Average Power (Procedure E.3.a in KDB 789033 D02 v01r04).

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.

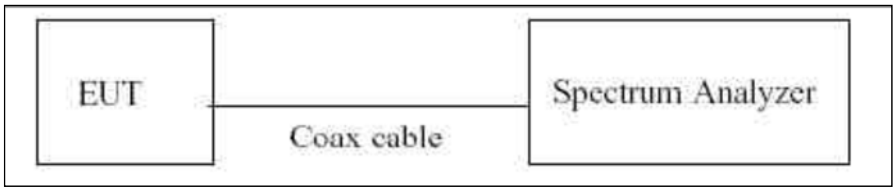
Note :

1. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1, 3	12.1

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

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



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

▪ Average Power

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 D02 v01r04.

The Spectrum Analyzer is set to

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 (Conducted)

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

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. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1, 3	12.1

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

802.11a (UNII 1)

▣ TEST RESULTS

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

802.11a Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6	5.84	0.26	6.10	23.98
		9	5.71	0.35	6.06	23.98
		12	5.61	0.46	6.07	23.98
		18	5.59	0.61	6.20	23.98
		24	5.68	0.79	6.48	23.98
		36	5.34	1.12	6.45	23.98
		48	5.07	1.42	6.49	23.98
		54	4.92	1.55	6.48	23.98
5200	40	6	5.79	0.26	6.04	23.98
		9	5.63	0.35	5.97	23.98
		12	5.49	0.46	5.95	23.98
		18	5.40	0.61	6.01	23.98
		24	5.54	0.79	6.34	23.98
		36	5.17	1.12	6.29	23.98
		48	4.96	1.42	6.38	23.98
		54	4.85	1.55	6.41	23.98
5240	48	6	5.50	0.26	5.76	23.98
		9	5.42	0.35	5.76	23.98
		12	5.25	0.46	5.71	23.98
		18	5.28	0.61	5.89	23.98
		24	5.33	0.79	6.13	23.98
		36	4.94	1.12	6.06	23.98
		48	4.73	1.42	6.15	23.98
		54	4.61	1.55	6.17	23.98

802.11a (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11a Mode: 5745~5825)

802.11a Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5745	149	6	9.43	0.26	9.69	30
		9	9.34	0.35	9.69	30
		12	9.19	0.46	9.65	30
		18	9.16	0.61	9.77	30
		24	9.23	0.79	10.03	30
		36	8.85	1.12	9.96	30
		48	8.56	1.42	9.98	30
		54	8.50	1.55	10.05	30
5785	157	6	9.77	0.26	10.03	30
		9	9.76	0.35	10.10	30
		12	9.60	0.46	10.06	30
		18	9.53	0.61	10.14	30
		24	9.80	0.79	10.59	30
		36	9.40	1.12	10.52	30
		48	9.13	1.42	10.55	30
		54	8.93	1.55	10.49	30
5825	165	6	9.98	0.26	10.24	30
		9	9.85	0.35	10.19	30
		12	9.78	0.46	10.24	30
		18	9.69	0.61	10.30	30
		24	9.73	0.79	10.52	30
		36	9.33	1.12	10.45	30
		48	9.16	1.42	10.58	30
		54	9.02	1.55	10.57	30

802.11n_HT20 (UNII 1)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11n_HT20 Mode: 5180~5240)

802.11n_HT20 Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	0	5.31	0.23	5.54	23.98
		1	4.15	0.45	4.61	23.98
		2	2.75	0.69	3.43	23.98
		3	4.97	0.83	5.80	23.98
		4	4.70	1.15	5.85	23.98
		5	2.23	1.43	3.66	23.98
		6	4.59	1.56	6.14	23.98
		7	3.53	1.66	5.19	23.98
5200	40	0	5.48	0.23	5.70	23.98
		1	5.19	0.45	5.65	23.98
		2	5.22	0.69	5.91	23.98
		3	5.55	0.83	6.38	23.98
		4	5.23	1.15	6.38	23.98
		5	4.95	1.43	6.38	23.98
		6	4.92	1.56	6.48	23.98
		7	4.74	1.66	6.40	23.98
5240	48	0	5.29	0.23	5.52	23.98
		1	4.92	0.45	5.38	23.98
		2	4.97	0.69	5.66	23.98
		3	5.20	0.83	6.04	23.98
		4	5.03	1.15	6.18	23.98
		5	4.65	1.43	6.08	23.98
		6	4.64	1.56	6.19	23.98
		7	4.47	1.66	6.13	23.98

802.11n_HT20 (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11n_HT20 Mode: 5745~5825)

802.11n_HT20 Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5745	149	0	9.22	0.23	9.45	30
		1	8.92	0.45	9.38	30
		2	8.90	0.69	9.59	30
		3	9.18	0.83	10.01	30
		4	8.87	1.15	10.03	30
		5	8.57	1.43	10.00	30
		6	8.51	1.56	10.06	30
		7	8.36	1.66	10.02	30
5785	157	0	9.72	0.23	9.95	30
		1	9.35	0.45	9.81	30
		2	9.34	0.69	10.03	30
		3	9.83	0.83	10.66	30
		4	9.44	1.15	10.59	30
		5	9.15	1.43	10.58	30
		6	9.04	1.56	10.60	30
		7	8.99	1.66	10.65	30
5825	165	0	9.76	0.23	9.98	30
		1	9.41	0.45	9.87	30
		2	9.41	0.69	10.10	30
		3	9.75	0.83	10.58	30
		4	9.40	1.15	10.56	30
		5	9.08	1.43	10.51	30
		6	9.06	1.56	10.61	30
		7	8.90	1.66	10.56	30

802.11ac_VHT20 (UNII 1)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11ac_VHT20 Mode: 5180~5240)

802.11ac_VHT20 Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	0	5.60	0.23	5.83	23.98
		1	5.34	0.41	5.75	23.98
		2	5.27	0.58	5.85	23.98
		3	5.51	0.76	6.27	23.98
		4	5.31	1.06	6.37	23.98
		5	5.13	1.30	6.43	23.98
		6	4.98	1.42	6.39	23.98
		7	4.79	1.52	6.31	23.98
		8	4.71	1.73	6.44	23.98
5200	40	0	5.52	0.23	5.75	23.98
		1	5.21	0.41	5.62	23.98
		2	5.26	0.58	5.84	23.98
		3	5.56	0.76	6.31	23.98
		4	5.23	1.06	6.29	23.98
		5	4.99	1.30	6.30	23.98
		6	4.90	1.42	6.32	23.98
		7	4.83	1.52	6.35	23.98
		8	4.54	1.73	6.28	23.98
5240	48	0	5.25	0.23	5.48	23.98
		1	5.01	0.41	5.41	23.98
		2	4.92	0.58	5.50	23.98
		3	5.25	0.76	6.00	23.98
		4	5.01	1.06	6.07	23.98
		5	4.76	1.30	6.07	23.98
		6	4.67	1.42	6.09	23.98
		7	4.52	1.52	6.04	23.98
		8	4.34	1.73	6.07	23.98

802.11ac_VHT20 (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11ac_VHT20 Mode: 5745~5825)

802.11ac_VHT20 Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5745	149	0	9.28	0.23	9.51	30
		1	8.93	0.41	9.33	30
		2	8.96	0.58	9.55	30
		3	9.23	0.76	9.98	30
		4	8.90	1.06	9.96	30
		5	8.62	1.30	9.92	30
		6	8.57	1.42	9.99	30
		7	8.42	1.52	9.94	30
		8	8.33	1.73	10.06	30
5785	157	0	9.74	0.23	9.98	30
		1	9.38	0.41	9.78	30
		2	9.34	0.58	9.92	30
		3	9.82	0.76	10.58	30
		4	9.44	1.06	10.50	30
		5	9.19	1.30	10.50	30
		6	9.09	1.42	10.51	30
		7	9.03	1.52	10.55	30
		8	8.83	1.73	10.56	30
5825	165	0	9.74	0.23	9.97	30
		1	9.41	0.41	9.82	30
		2	9.48	0.58	10.07	30
		3	9.69	0.76	10.45	30
		4	9.43	1.06	10.49	30
		5	9.17	1.30	10.48	30
		6	9.00	1.42	10.42	30
		7	8.99	1.52	10.51	30
		8	8.80	1.73	10.53	30

802.11n_HT40 (UNII 1)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11n_HT40 Mode: 5190~5230)

802.11n_HT40 Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	0	6.20	0.46	6.66	23.98
		1	5.93	0.85	6.78	23.98
		2	5.61	1.18	6.80	23.98
		3	5.24	1.47	6.71	23.98
		4	4.83	1.95	6.78	23.98
		5	4.52	2.29	6.81	23.98
		6	4.31	2.45	6.76	23.98
		7	4.21	2.79	7.00	23.98
5230	46	0	6.13	0.46	6.59	23.98
		1	5.79	0.85	6.64	23.98
		2	5.53	1.18	6.72	23.98
		3	5.21	1.47	6.68	23.98
		4	4.88	1.95	6.83	23.98
		5	4.46	2.29	6.74	23.98
		6	4.31	2.45	6.76	23.98
		7	4.11	2.79	6.89	23.98

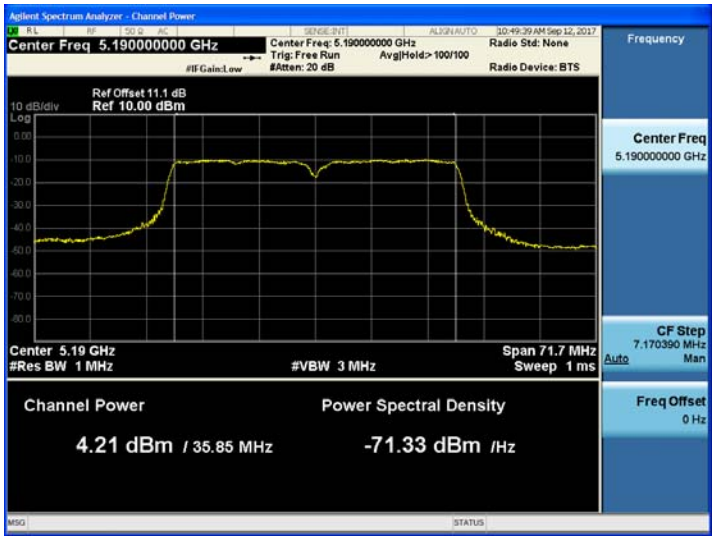
802.11n_HT40 (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11n_HT40 Mode: 5755~5795)

802.11n_HT40 Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5755	151	0	6.44	0.46	6.90	30
		1	6.15	0.85	7.00	30
		2	5.79	1.18	6.98	30
		3	5.49	1.47	6.96	30
		4	5.13	1.95	7.07	30
		5	4.80	2.29	7.09	30
		6	4.69	2.45	7.14	30
		7	4.48	2.79	7.27	30
5795	159	0	6.89	0.46	7.35	30
		1	6.55	0.85	7.40	30
		2	6.21	1.18	7.40	30
		3	5.91	1.47	7.38	30
		4	5.61	1.95	7.56	30
		5	5.22	2.29	7.51	30
		6	5.12	2.45	7.57	30
		7	4.94	2.79	7.73	30

▣ TEST Plot _802.11n_HT40

802.11n_HT40 UNII 1 BAND Average Power (5190 MHz ~5230 MHz) CH 38 MCS7	802.11n_HT40 UNII 3 BAND Average Power (5755 MHz ~5795 MHz) CH 159 MCS7
	

802.11ac_VHT40 (UNII 1)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11ac_VHT40 Mode: 5190~5230)

802.11ac_VHT40 Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	0	6.21	0.46	6.66	23.98
		1	5.87	0.77	6.64	23.98
		2	5.57	1.08	6.65	23.98
		3	5.25	1.34	6.59	23.98
		4	4.89	1.78	6.67	23.98
		5	4.52	2.11	6.63	23.98
		6	4.43	2.40	6.84	23.98
		7	4.24	2.40	6.64	23.98
		8	3.96	2.64	6.61	23.98
		9	3.93	2.71	6.64	23.98
5230	46	0	6.21	0.46	6.67	23.98
		1	5.86	0.77	6.64	23.98
		2	5.56	1.08	6.65	23.98
		3	5.31	1.34	6.65	23.98
		4	4.87	1.78	6.65	23.98
		5	4.52	2.11	6.63	23.98
		6	4.39	2.40	6.79	23.98
		7	4.20	2.40	6.60	23.98
		8	3.93	2.64	6.57	23.98
		9	3.89	2.71	6.60	23.98

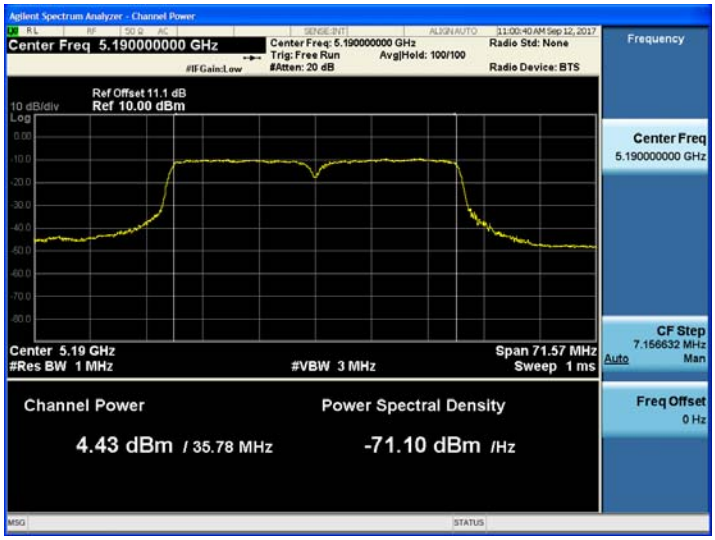
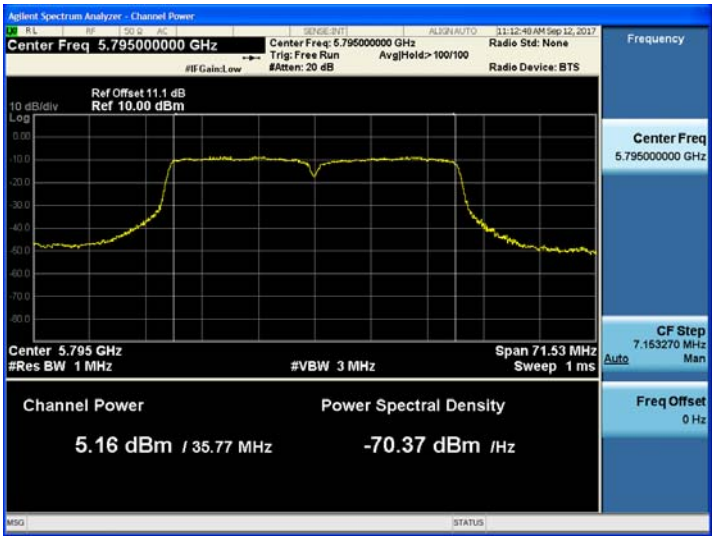
802.11ac_VHT40 (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11ac_VHT40 Mode: 5755~5795)

802.11ac_VHT40 Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5755	151	0	6.38	0.46	6.84	30
		1	6.14	0.77	6.91	30
		2	5.74	1.08	6.83	30
		3	5.51	1.34	6.85	30
		4	5.06	1.78	6.84	30
		5	4.84	2.11	6.95	30
		6	4.71	2.40	7.12	30
		7	4.51	2.40	6.91	30
		8	4.28	2.64	6.92	30
		9	4.18	2.71	6.88	30
5795	159	0	6.89	0.46	7.34	30
		1	6.57	0.77	7.34	30
		2	6.17	1.08	7.26	30
		3	5.88	1.34	7.22	30
		4	5.58	1.78	7.36	30
		5	5.25	2.11	7.36	30
		6	5.16	2.40	7.56	30
		7	4.96	2.40	7.36	30
		8	4.81	2.64	7.45	30
		9	4.59	2.71	7.30	30

▣ TEST Plot _802.11ac_VHT40

802.11ac_VHT40 UNII 1 BAND Average Power (5190 MHz ~5230 MHz) CH 38 MCS6	802.11ac_VHT40 UNII 3 BAND Average Power (5755 MHz ~5795 MHz) CH 159 MCS6
	

802.11ac_VHT80 (UNII 1)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11ac_VHT80 Mode: 5210)

802.11ac_VHT80 Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5210	42	0	3.79	0.83	4.61	23.98
		1	3.15	1.42	4.57	23.98
		2	2.77	1.98	4.75	23.98
		3	2.54	2.18	4.72	23.98
		4	2.01	2.72	4.73	23.98
		5	1.77	3.03	4.79	23.98
		6	1.55	3.23	4.78	23.98
		7	1.48	3.54	5.02	23.98
		8	1.15	3.57	4.72	23.98
		9	1.02	3.69	4.71	23.98

802.11ac_VHT80 (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11ac_VHT80 Mode: 5775 MHz)

802.11ac_VHT80 Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5775	155	0	3.59	0.83	4.41	30
		1	3.06	1.42	4.48	30
		2	2.68	1.98	4.66	30
		3	2.53	2.18	4.70	30
		4	2.03	2.72	4.75	30
		5	1.64	3.03	4.67	30
		6	1.47	3.23	4.70	30
		7	1.50	3.54	5.05	30
		8	1.18	3.57	4.75	30
		9	1.07	3.69	4.76	30

▣ TEST Plot for 802.11ac_VHT80

802.11ac_VHT80 UNII 1 BAND Average Power (5210 MHz) CH 42 MCS7	802.11ac_VHT80 UNII 3 BAND Average Power (5775 MHz) CH 155 MCS7
	

9.5 POWER SPECTRAL DENSITY

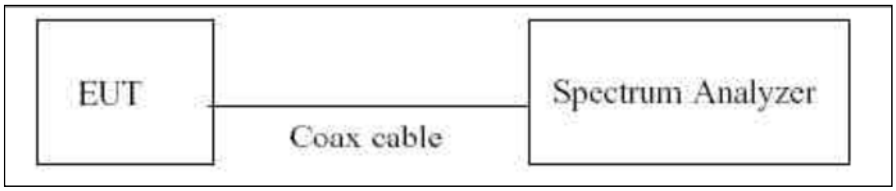
The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies. The maximum permissible peak power spectral density is 11 dBm/ MHz for UNII 1 and 30 dBm/500 kHz for UNII 3.

▣ LIMIT

Power Spectral Density

Band	Mode	Limit
UNII 1	802.11a, n, ac	11 dBm/MHz
UNII 3	802.11a, n, ac	30 dBm/500 kHz

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

We tested according to Method in KDB 789033 D02 v01r04.

The spectrum analyzer is set to :

1. Set span to encompass the entire emission bandwidth(EBW) of the signal.
2. RBW = 1 MHz(510 kHz for UNII 3)
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	Loss(dB)
UNII 1, 3	12.1

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

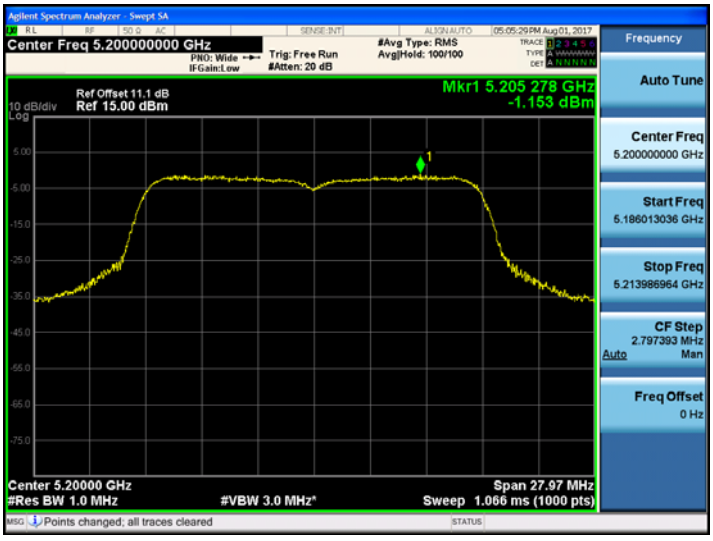
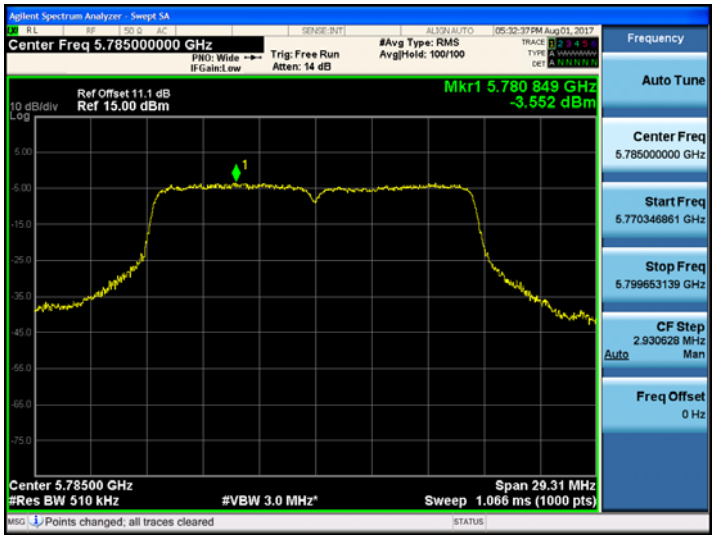
▣ 802.11a

▣ 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	-1.337	1.420	0.083	11	Pass
5200	40		-1.153	1.420	0.267		Pass
5240	48		-1.770	1.420	-0.350		Pass
5745	149		-4.124	0.794	-3.330	30	Pass
5785	157		-3.552	1.420	-2.132		Pass
5825	165		-3.752	1.420	-2.332		Pass

▣ TEST Plot for 802.11a

802.11a UNII 1 BAND PSD CH 40	802.11a UNII 3 BAND PSD CH 157
	

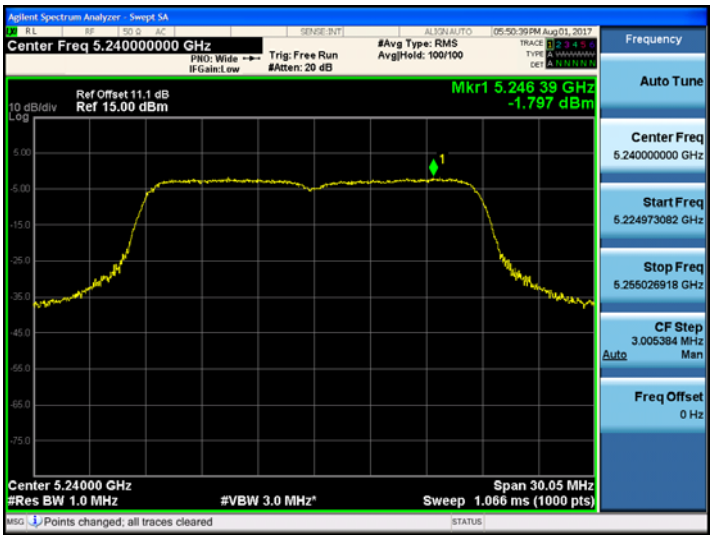
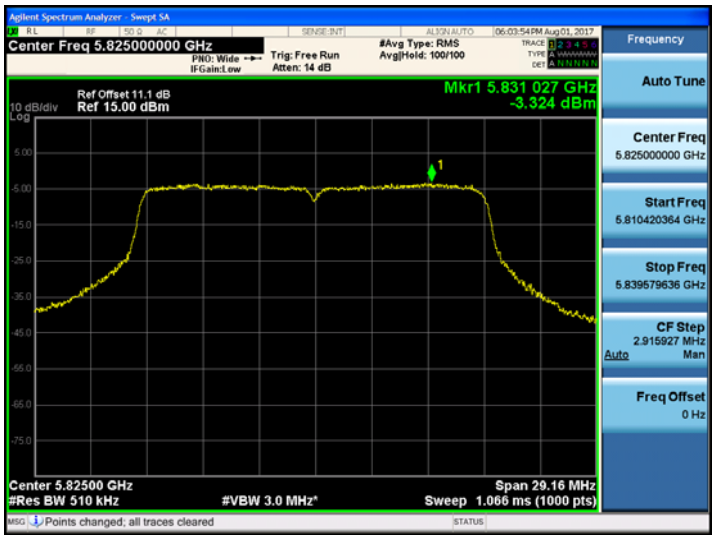
▣802.11n_HT20

▣ 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	802.11n _HT20	-1.878	1.556	-0.322	11	Pass
5200	40		-1.951	1.556	-0.395		Pass
5240	48		-1.797	1.556	-0.241		Pass
5745	149		-4.922	1.659	-3.263	30	Pass
5785	157		-3.879	1.153	-2.726		Pass
5825	165		-3.324	0.831	-2.493		Pass

▣ TEST Plot for 802.11n_HT20

802.11n_HT20 UNII 1 BAND PSD CH 48	802.11n_HT20 UNII 3 BAND PSD CH 165
	

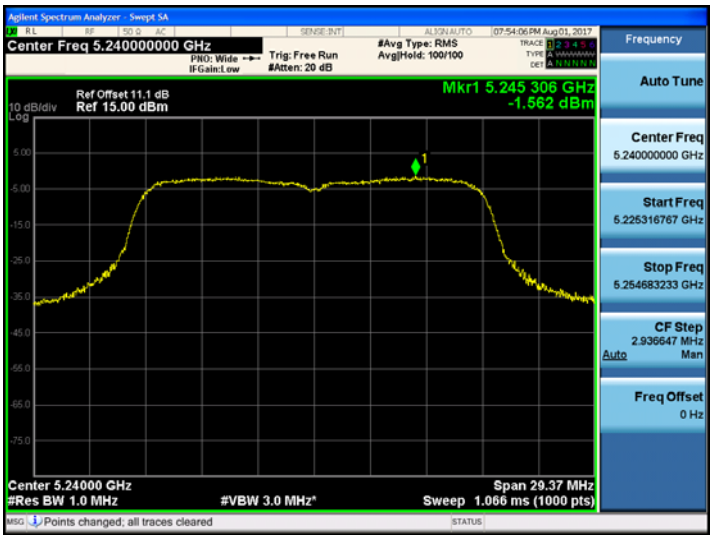
▣802.11ac_VHT20

▣ 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	802.11ac _VHT20	-1.471	1.057	-0.414	11	Pass
5200	40		-1.998	1.415	-0.583		Pass
5240	48		-1.562	1.415	-0.147		Pass
5745	149		-4.226	0.755	-3.471	30	Pass
5785	157		-4.218	1.731	-2.487		Pass
5825	165		-4.127	1.518	-2.609		Pass

▣ TEST Plot for 802.11ac_VHT20

802.11ac_VHT20 UNII 1 BAND PSD CH 48	802.11ac_VHT20 UNII 3 BAND PSD CH 157
	

▣ 802.11n_HT40

▣ 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
5190	38	802.11n _HT40	-8.724	2.787	-5.937	11	Pass
5230	46		-9.046	2.787	-6.259		Pass
5755	151		-11.414	2.787	-8.627	30	Pass
5795	159		-10.777	2.787	-7.990		Pass

▣ TEST Plot for 802.11n_HT40

802.11n_HT40 UNII 1 BAND PSD CH 38	802.11n_HT40 UNII 3 BAND PSD CH 159
	

▣ 802.11ac_VHT40

▣ 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
5190	38	802.11ac _VHT40	-8.051	2.402	-5.649	11	Pass
5230	46		-8.457	2.402	-6.055		Pass
5755	151		-11.260	2.402	-8.858	30	Pass
5795	159		-10.185	2.402	-7.783		Pass

▣ TEST Plot for 802.11ac_VHT40

802.11ac_VHT40 UNII 1 BAND PSD CH 38	802.11ac_VHT40 UNII 3 BAND PSD CH 159
	

▣ 802.11ac_VHT80

▣ 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
5210	42	802.11ac _VHT80	-14.204	3.544	-10.660	11	Pass
5775	155		-16.277	3.544	-12.733	30	Pass

▣ TEST Plot for 802.11ac_VHT80

802.11ac_VHT80 UNII 1 BAND PSD CH 42	802.11ac_VHT80 UNII 3 BAND PSD CH 155
	

9.6 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: 12 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5180023.72	23.72
100%		-30	5179998.14	-1.86
100%		-20	5180004.95	4.95
100%		-10	5180011.12	11.12
100%		0	5180015.63	15.63
100%		+10	5180019.81	19.81
100%		+30	5180031.22	31.22
100%		+40	5180036.19	36.19
100%		+50	5180042.18	42.18
115%	13.80	+20	5180016.34	16.34
Batt. Endpoint	10.20	+20	5180021.49	21.49

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 3

OPERATING FREQUENCY: 5,745,000,000 Hz

CHANNEL: 149

REFERENCE VOLTAGE: 12 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5745040.52	40.52
100%		-30	5744995.35	-4.65
100%		-20	5745001.47	1.47
100%		-10	5745008.63	8.63
100%		0	5745013.65	13.65
100%		+10	5745019.62	19.62
100%		+30	5745032.38	32.38
100%		+40	5745040.24	40.24
100%		+50	5745045.40	45.40
115%	13.80	+20	5745015.01	15.01
Batt. Endpoint	10.20	+20	5745020.98	20.98

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: 12 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5190029.63	29.63
100%		-30	5189994.31	-5.69
100%		-20	5190000.60	0.60
100%		-10	5190007.71	7.71
100%		0	5190012.99	12.99
100%		+10	5190018.00	18.00
100%		+30	5190031.28	31.28
100%		+40	5190036.95	36.95
100%		+50	5190044.33	44.33
115%	13.80	+20	5190012.99	12.99
Batt. Endpoint	10.20	+20	5190020.72	20.72

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 3

OPERATING FREQUENCY: 5,755,000,000 Hz

CHANNEL: 151

REFERENCE VOLTAGE: 12 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5755030.25	30.25
100%		-30	5754994.06	-5.94
100%		-20	5754999.24	-0.76
100%		-10	5755006.12	6.12
100%		0	5755014.10	14.1
100%		+10	5755018.37	18.37
100%		+30	5755031.62	31.62
100%		+40	5755036.20	36.2
100%		+50	5755042.04	42.04
115%	13.80	+20	5755011.74	11.74
Batt. Endpoint	10.20	+20	5755018.02	18.02

Note:

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

80 MHz BW

OPERATING BAND: UNII Band 1

OPERATING FREQUENCY: 5,210,000,000 Hz

CHANNEL: 42

REFERENCE VOLTAGE: 12 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5210025.68	25.68
100%		-30	5209992.49	-7.51
100%		-20	5209999.28	-0.72
100%		-10	5210004.86	4.86
100%		0	5210012.52	12.52
100%		+10	5210018.71	18.71
100%		+30	5210032.37	32.37
100%		+40	5210040.27	40.27
100%		+50	5210047.55	47.55
115%	13.80	+20	5210011.23	11.23
Batt. Endpoint	10.20	+20	5210018.34	18.34

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 3

OPERATING FREQUENCY: 5,775,000,000 Hz

CHANNEL: 155

REFERENCE VOLTAGE: 12 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5775028.26	28.26
100%		-30	5774997.37	-2.63
100%		-20	5775001.62	1.62
100%		-10	5775007.85	7.85
100%		0	5775015.92	15.92
100%		+10	5775021.60	21.6
100%		+30	5775031.23	31.23
100%		+40	5775036.22	36.22
100%		+50	5775040.36	40.36
115%	13.80	+20	5775013.08	13.08
Batt. Endpoint	10.20	+20	5775017.93	17.93

Note:

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

9.7 RADIATED MEASUREMENT

9.7.1 RADIATED SPURIOUS EMISSIONS.

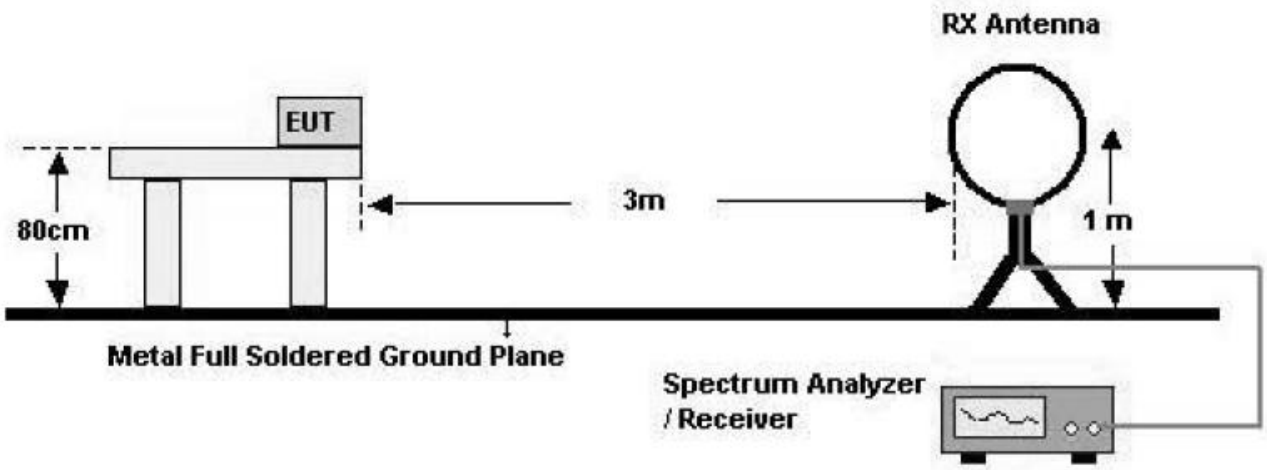
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

▣ §15.407, KDB 789033 D02

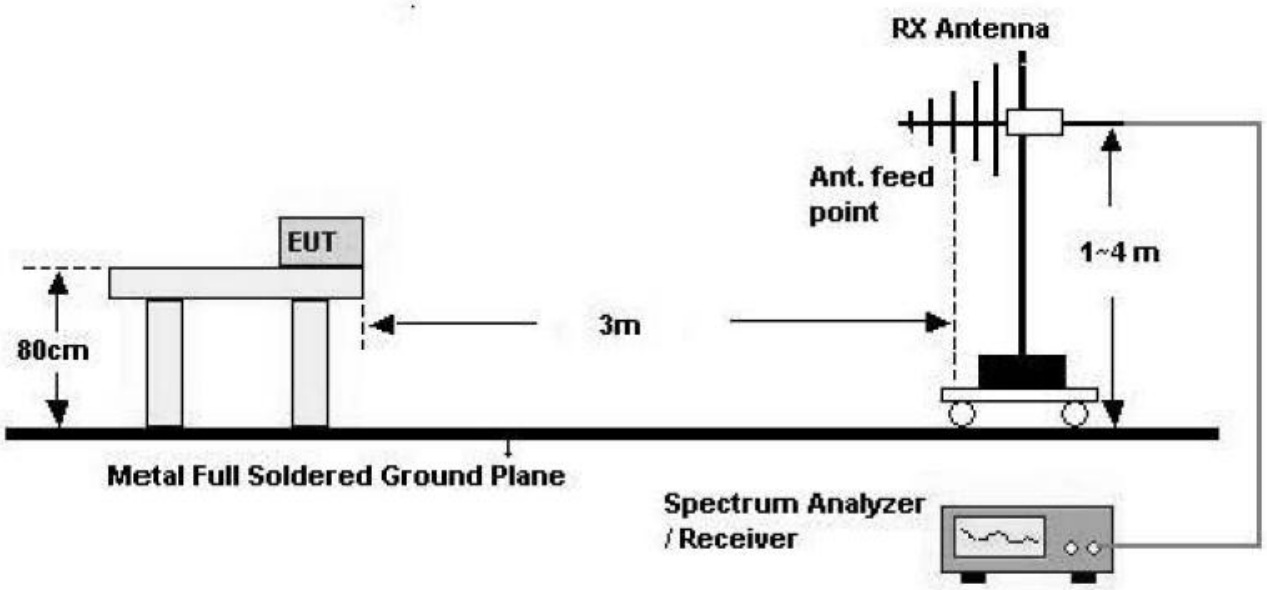
All harmonics that do not lie in a restricted band are subject to a peak limit of -27 dBm/MHz. At a distance of 3 meters the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2 dB to the EIRP limit of -27 dBm/MHz to obtain the limit for out of band spurious emissions of 68.2 dBμV/m. Espectally, for transmitter operating in the 5725 Mhz – 5850 MHz : all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequency 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

TEST CONFIGURATION

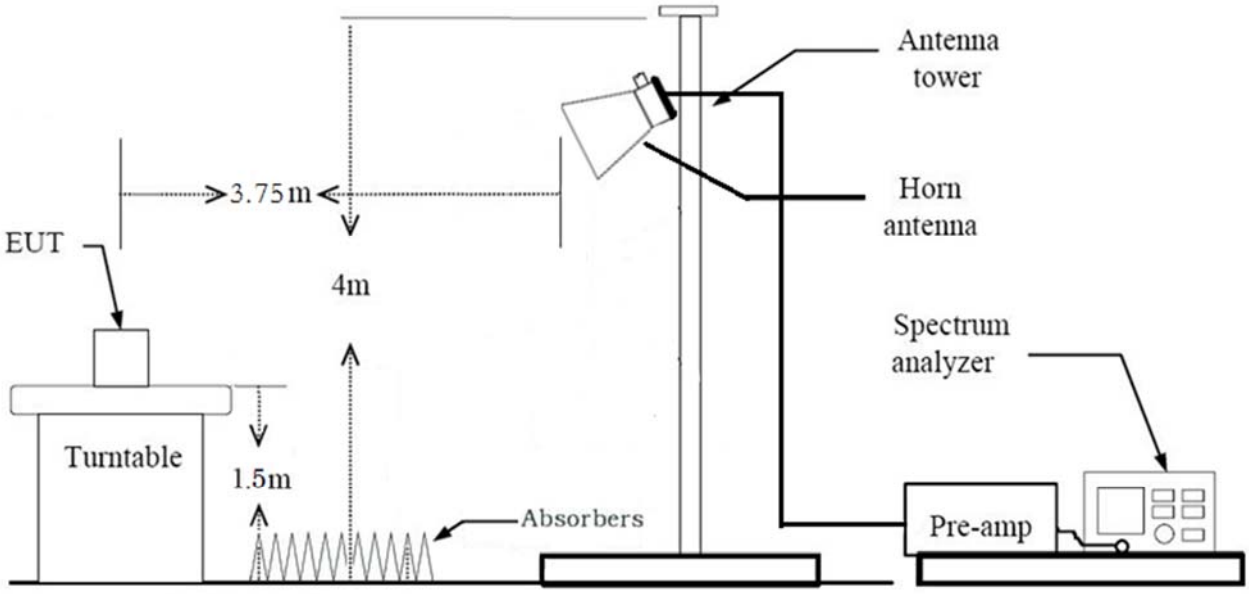
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



TEST PROCEDURE USED

ANSI C63.10:2013

Method G)5) in KDB 789033 D02 v01r04 (Peak)

Method G)6)d) in KDB 789033 D02 v01r04 (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 Method VB for 802.11a/n(HT20, HT40), ac(VHT20, VHT40, VHT80) mode to perform the average filed strength measurements.
2. The actual setting value of VBW for 802.11a/n(HT20, HT40), ac(VHT20, VHT40, VHT80)
3. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor(reference distance : 3 m).
4. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Mode	Worst Data rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle (%)	VBW(1/T) (Hz)	The actual setting value of VBW (Hz)
a	**6**	**2.063**	**2.188**	**94.26**	**485**	**1000**
n_HT20	**MCS 0**	**1.924**	**2.028**	**94.87**	**520**	**1000**
ac_VHT20	**MCS 0**	**1.935**	**2.042**	**94.79**	**517**	**1000**
n_HT40	**MCS 0**	**0.948**	**1.054**	**89.98**	**1055**	**3000**
ac_VHT40	**MCS 0**	**0.953**	**1.058**	**90.04**	**1050**	**3000**
ac_VHT80	**MCS 0**	**0.464**	**0.562**	**82.69**	**2153**	**10000**

TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
㎒	dB㎶	dB /m	dB	(H/V)	dB㎶/m	dB㎶/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.
6. The test results for below 30 MHz is correlated to an open site.
   The result on OATS is about 2 dB higher than semi-anechoic chamber (10 m chamber)

TEST RESULTS

Below 1 GHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
㎒	dB㎶	dB /m	dB	(H/V)	dB㎶/m	dB㎶/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.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10360	58.47	-2.49	V	55.98	68.20	12.22	PK
15540	51.49	-2.80	V	48.69	73.98	25.29	PK
15540	39.11	-2.80	V	36.31	53.98	17.67	AV
10360	60.22	-2.49	H	57.73	68.20	10.47	PK
15540	51.99	-2.80	H	49.19	73.98	24.79	PK
15540	39.32	-2.80	H	36.52	53.98	17.46	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

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.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

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.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10400	59.68	-2.40	V	57.28	68.20	10.92	PK
15600	50.33	-4.04	V	46.29	73.98	27.69	PK
15600	38.52	-4.04	V	34.48	53.98	19.50	AV
10400	60.11	-2.40	H	57.71	68.20	10.49	PK
15600	50.54	-4.04	H	46.50	73.98	27.48	PK
15600	38.72	-4.04	H	34.68	53.98	19.30	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

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.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

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.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10480	59.07	-3.56	V	55.51	68.20	12.69	PK
15720	50.55	-4.05	V	46.50	73.98	27.48	PK
15720	38.87	-4.05	V	34.82	53.98	19.16	AV
10480	59.48	-3.56	H	55.92	68.20	12.28	PK
15720	50.67	-4.05	H	46.62	73.98	27.36	PK
15720	38.99	-4.05	H	34.94	53.98	19.04	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

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
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 1
Operation Mode:	802.11 n_HT20
Transfer MCS Index:	0
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10360	60.51	-2.49	V	58.02	68.20	10.18	PK
15540	50.92	-2.80	V	48.12	73.98	25.86	PK
15540	39.36	-2.80	V	36.56	53.98	17.42	AV
10360	60.91	-2.49	H	58.42	68.20	9.78	PK
15540	51.08	-2.80	H	48.28	73.98	25.70	PK
15540	39.42	-2.80	H	36.62	53.98	17.36	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

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_HT20. Worst case is MCS0 in 802.11n_HT20.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 1
Operation Mode:	802.11 n_ HT20
Transfer MCS Index:	0
Operating Frequency	5200 MHz
Channel No.	40 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10400	59.87	-2.40	V	57.47	68.20	10.73	PK
15600	50.91	-4.04	V	46.87	73.98	27.11	PK
15600	39.02	-4.04	V	34.98	53.98	19.00	AV
10400	60.22	-2.40	H	57.82	68.20	10.38	PK
15600	51.09	-4.04	H	47.05	73.98	26.93	PK
15600	39.22	-4.04	H	35.18	53.98	18.80	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

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_ HT20. Worst case is MCS0 in 802.11n_ HT20.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 1
Operation Mode:	802.11 n_ HT20
Transfer MCS Index:	0
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10480	59.32	-3.56	V	55.76	68.20	12.44	PK
15720	50.89	-4.05	V	46.84	73.98	27.14	PK
15720	39.03	-4.05	V	34.98	53.98	19.00	AV
10480	59.61	-3.56	H	56.05	68.20	12.15	PK
15720	50.99	-4.05	H	46.94	73.98	27.04	PK
15720	39.17	-4.05	H	35.12	53.98	18.86	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

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_ HT20. Worst case is MCS0 in 802.11n_ HT20.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 1
Operation Mode:	802.11 ac_VHT20
Transfer MCS Index:	0
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10360	60.98	-2.49	V	58.49	68.20	9.71	PK
15540	50.89	-2.80	V	48.09	73.98	25.89	PK
15540	39.33	-2.80	V	36.53	53.98	17.45	AV
10360	61.73	-2.49	H	59.24	68.20	8.96	PK
15540	52.75	-2.80	H	49.95	73.98	24.03	PK
15540	39.50	-2.80	H	36.70	53.98	17.28	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_ VHT20. Worst case is MCS0 in 802.11ac_ VHT20.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 1
Operation Mode:	802.11 ac_ VHT20
Transfer MCS Index:	0
Operating Frequency	5200 MHz
Channel No.	40 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10400	60.22	-2.40	V	57.82	68.20	10.38	PK
15600	50.91	-4.04	V	46.87	73.98	27.11	PK
15600	38.99	-4.04	V	34.95	53.98	19.03	AV
10400	60.60	-2.40	H	58.20	68.20	10.00	PK
15600	51.02	-4.04	H	46.98	73.98	27.00	PK
15600	39.07	-4.04	H	35.03	53.98	18.95	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_ VHT20. Worst case is MCS0 in 802.11ac_ VHT20.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 1
Operation Mode:	802.11 ac_ VHT20
Transfer MCS Index:	0
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10480	59.01	-3.56	V	55.45	68.20	12.75	PK
15720	50.97	-4.05	V	46.92	73.98	27.06	PK
15720	39.02	-4.05	V	34.97	53.98	19.01	AV
10480	59.49	-3.56	H	55.93	68.20	12.27	PK
15720	51.11	-4.05	H	47.06	73.98	26.92	PK
15720	39.17	-4.05	H	35.12	53.98	18.86	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_ VHT20. Worst case is MCS0 in 802.11ac_ VHT20.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 1
Operation Mode:	802.11n_HT40
Transfer MCS Index:	0
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10380	57.14	-2.40	V	54.74	68.20	13.46	PK
15570	51.00	-2.80	V	48.20	73.98	25.78	PK
15570	39.41	-2.80	V	36.61	53.98	17.37	AV
10380	57.57	-2.40	H	55.17	68.20	13.03	PK
15570	51.22	-2.80	H	48.42	73.98	25.56	PK
15570	39.53	-2.80	H	36.73	53.98	17.25	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

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_ HT40. Worst case is MCS0 in 802.11n_ HT40.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 1
Operation Mode:	802.11n_ HT40
Transfer MCS Index:	0
Operating Frequency	5230 MHz
Channel No.	46 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10460	56.22	-2.40	V	53.82	68.20	14.38	PK
15690	50.92	-4.04	V	46.88	73.98	27.10	PK
15690	39.10	-4.04	V	35.06	53.98	18.92	AV
10460	56.71	-2.40	H	54.31	68.20	13.89	PK
15690	51.04	-4.04	H	47.00	73.98	26.98	PK
15690	39.22	-4.04	H	35.18	53.98	18.80	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

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_ HT40. Worst case is MCS0 in 802.11n_ HT40.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 1
Operation Mode:	802.11ac_VHT40
Transfer MCS Index:	0
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10380	56.33	-2.40	V	53.93	68.20	14.27	PK
15570	51.10	-2.80	V	48.30	73.98	25.68	PK
15570	39.08	-2.80	V	36.28	53.98	17.70	AV
10380	56.73	-2.40	H	54.33	68.20	13.87	PK
15570	51.21	-2.80	H	48.41	73.98	25.57	PK
15570	39.17	-2.80	H	36.37	53.98	17.61	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_ VHT40. Worst case is MCS0 in 802.11ac_ VHT40.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 1
Operation Mode:	802.11ac_ VHT40
Transfer MCS Index:	0
Operating Frequency	5230 MHz
Channel No.	46 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10460	56.89	-2.40	V	54.49	68.20	13.71	PK
15690	51.02	-4.04	V	46.98	73.98	27.00	PK
15690	38.81	-4.04	V	34.77	53.98	19.21	AV
10460	57.30	-2.40	H	54.90	68.20	13.30	PK
15690	51.11	-4.04	H	47.07	73.98	26.91	PK
15690	38.99	-4.04	H	34.95	53.98	19.03	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_ VHT40. Worst case is MCS0 in 802.11ac_ VHT40.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 1
Operation Mode:	802.11ac_VHT80
Transfer MCS Index:	0
Operating Frequency	5210 MHz
Channel No.	42 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10420	55.38	-2.40	V	52.98	68.20	15.22	PK
15630	51.24	-4.04	V	47.20	73.98	26.78	PK
15630	39.39	-4.04	V	35.35	53.98	18.63	AV
10420	55.91	-2.40	H	53.51	68.20	14.69	PK
15630	51.57	-4.04	H	47.53	73.98	26.45	PK
15630	39.55	-4.04	H	35.51	53.98	18.47	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_ VHT80. Worst case is MCS0 in 802.11ac_ VHT80.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5745MHz
Channel No.	149 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11490	56.89	-2.31	V	54.58	73.98	19.40	PK
11490	42.94	-2.31	V	40.63	53.98	13.35	AV
17235	52.91	2.26	V	55.17	68.20	13.03	PK
11490	56.49	-2.31	H	54.18	73.98	19.80	PK
11490	42.68	-2.31	H	40.37	53.98	13.61	AV
17235	53.33	2.26	H	55.59	68.20	12.61	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

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.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5785 MHz
Channel No.	157 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11570	57.33	-2.57	V	54.76	73.98	19.22	PK
11570	43.54	-2.57	V	40.97	53.98	13.01	AV
17355	52.93	1.68	V	54.61	68.20	13.59	PK
11570	56.98	-2.57	H	54.41	73.98	19.57	PK
11570	43.19	-2.57	H	40.62	53.98	13.36	AV
17355	53.21	1.68	H	54.89	68.20	13.31	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

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.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5825 MHz
Channel No.	165 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11650	58.34	-2.83	V	55.51	73.98	18.47	PK
11650	45.45	-2.83	V	42.62	53.98	11.36	AV
17475	52.41	4.48	V	56.89	68.20	11.31	PK
11650	55.82	-2.83	H	52.99	73.98	20.99	PK
11650	42.45	-2.83	H	39.62	53.98	14.36	AV
17475	52.99	4.48	H	57.47	68.20	10.73	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

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
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11 n_HT20
Transfer MCS Index:	0
Operating Frequency	5745 MHz
Channel No.	149 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11490	56.63	-2.31	V	54.32	73.98	19.66	PK
11490	42.54	-2.31	V	40.23	53.98	13.75	AV
17235	52.91	2.26	V	55.17	68.20	13.03	PK
11490	56.21	-2.31	H	53.90	73.98	20.08	PK
11490	42.10	-2.31	H	39.79	53.98	14.19	AV
17235	52.80	2.26	H	55.06	68.20	13.14	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

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_ HT20. Worst case is MCS0 in 802.11n_ HT20.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11 n_ HT20
Transfer MCS Index:	0
Operating Frequency	5785 MHz
Channel No.	157 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11570	57.43	-2.57	V	54.86	73.98	19.12	PK
11570	42.94	-2.57	V	40.37	53.98	13.61	AV
17355	52.74	1.68	V	54.42	68.20	13.78	PK
11570	57.00	-2.57	H	54.43	73.98	19.55	PK
11570	42.61	-2.57	H	40.04	53.98	13.94	AV
17355	52.61	1.68	H	54.29	68.20	13.91	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

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_ HT20. Worst case is MCS0 in 802.11n_ HT20.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11 n_ HT20
Transfer MCS Index:	0
Operating Frequency	5825 MHz
Channel No.	165 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11650	59.02	-2.83	V	56.19	73.98	17.79	PK
11650	45.22	-2.83	V	42.39	53.98	11.59	AV
17475	52.88	4.48	V	57.36	68.20	10.84	PK
11650	58.77	-2.83	H	55.94	73.98	18.04	PK
11650	44.83	-2.83	H	42.00	53.98	11.98	AV
17475	52.63	4.48	H	57.11	68.20	11.09	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

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_ HT20. Worst case is MCS0 in 802.11n_ HT20.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11 ac_VHT20
Transfer MCS Index:	0
Operating Frequency	5745 MHz
Channel No.	149 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11490	56.18	-2.31	V	53.87	73.98	20.11	PK
11490	42.48	-2.31	V	40.17	53.98	13.81	AV
17235	52.97	2.26	V	55.23	68.20	12.97	PK
11490	55.69	-2.31	H	53.38	73.98	20.60	PK
11490	42.11	-2.31	H	39.80	53.98	14.18	AV
17235	52.88	2.26	H	55.14	68.20	13.06	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_ VHT20. Worst case is MCS0 in 802.11ac_ VHT20.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11 ac_ VHT20
Transfer MCS Index:	0
Operating Frequency	5785 MHz
Channel No.	157 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11570	56.39	-2.57	V	53.82	73.98	20.16	PK
11570	42.75	-2.57	V	40.18	53.98	13.80	AV
17355	53.12	1.68	V	54.80	68.20	13.40	PK
11570	56.00	-2.57	H	53.43	73.98	20.55	PK
11570	42.38	-2.57	H	39.81	53.98	14.17	AV
17355	53.01	1.68	H	54.69	68.20	13.51	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_ VHT20. Worst case is MCS0 in 802.11ac_ VHT20.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11 ac_ VHT20
Transfer MCS Index:	0
Operating Frequency	5825 MHz
Channel No.	165 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11650	59.00	-2.83	V	56.17	73.98	17.81	PK
11650	45.27	-2.83	V	42.44	53.98	11.54	AV
17475	52.96	4.48	V	57.44	68.20	10.76	PK
11650	58.59	-2.83	H	55.76	73.98	18.22	PK
11650	44.92	-2.83	H	42.09	53.98	11.89	AV
17475	52.68	4.48	H	57.16	68.20	11.04	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_ VHT20. Worst case is MCS0 in 802.11ac_ VHT20.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII3
Operation Mode:	802.11n_ HT40
Transfer MCS Index:	0
Operating Frequency	5755 MHz
Channel No.	151 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11510	55.04	-2.31	V	52.73	73.98	21.25	PK
11510	42.13	-2.31	V	39.82	53.98	14.16	AV
17265	53.22	1.64	V	54.86	68.20	13.34	PK
11510	54.87	-2.31	H	52.56	73.98	21.42	PK
11510	41.99	-2.31	H	39.68	53.98	14.30	AV
17265	53.00	1.64	H	54.64	68.20	13.56	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

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_ HT40. Worst case is MCS0 in 802.11n_ HT40.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11n_ HT40
Transfer MCS Index:	0
Operating Frequency	5795 MHz
Channel No.	159 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11590	55.75	-2.57	V	53.18	73.98	20.80	PK
11590	42.18	-2.57	V	39.61	53.98	14.37	AV
17385	53.18	3.54	V	56.72	68.20	11.48	PK
11590	55.41	-2.57	H	52.84	73.98	21.14	PK
11590	41.84	-2.57	H	39.27	53.98	14.71	AV
17385	53.05	3.54	H	56.59	68.20	11.61	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

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_ HT40. Worst case is MCS0 in 802.11n_ HT40.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11ac_VHT40
Transfer MCS Index:	0
Operating Frequency	5755 MHz
Channel No.	151 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11510	55.78	-2.31	V	53.47	73.98	20.51	PK
11510	42.06	-2.31	V	39.75	53.98	14.23	AV
17265	53.09	1.64	V	54.73	68.20	13.47	PK
11510	55.47	-2.31	H	53.16	73.98	20.82	PK
11510	41.88	-2.31	H	39.57	53.98	14.41	AV
17265	53.01	1.64	H	54.65	68.20	13.55	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_ VHT40. Worst case is MCS0 in 802.11ac_ VHT40.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11ac_ VHT40
Transfer MCS Index:	0
Operating Frequency	5795 MHz
Channel No.	159 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11590	56.15	-2.57	V	53.58	73.98	20.40	PK
11590	42.16	-2.57	V	39.59	53.98	14.39	AV
17385	53.27	3.54	V	56.81	68.20	11.39	PK
11590	54.76	-2.57	H	52.19	73.98	21.79	PK
11590	41.90	-2.57	H	39.33	53.98	14.65	AV
17385	53.12	3.54	H	56.66	68.20	11.54	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_ VHT40. Worst case is MCS0 in 802.11ac_ VHT40.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11ac_VHT80
Transfer MCS Index:	0
Operating Frequency	5775 MHz
Channel No.	155 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11550	55.01	-2.31	V	52.70	73.98	21.28	PK
11550	42.02	-2.31	V	39.71	53.98	14.27	AV
17325	53.00	1.64	V	54.64	68.20	13.56	PK
11550	55.17	-2.31	H	52.86	73.98	21.12	PK
11550	42.35	-2.31	H	40.04	53.98	13.94	AV
17325	54.25	1.64	H	55.89	68.20	12.31	PK

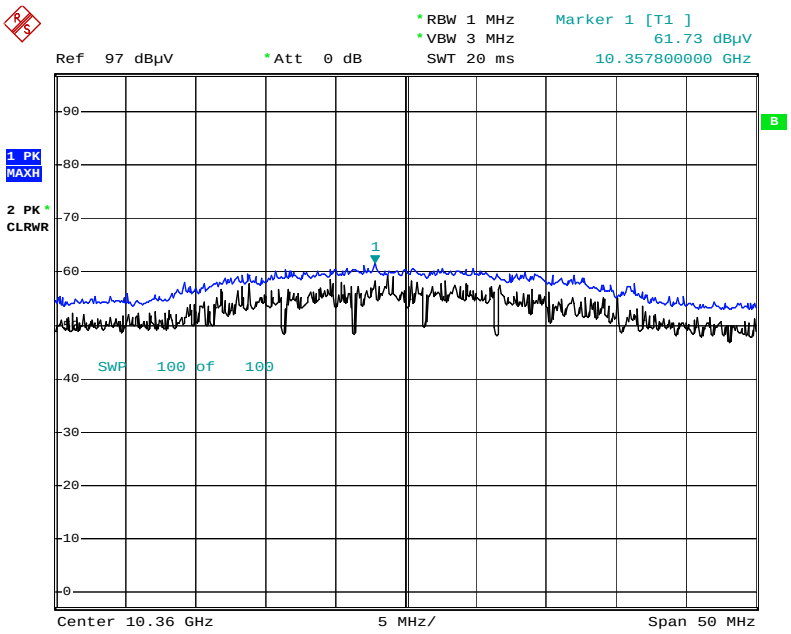
*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_ VHT80. Worst case is MCS0 in 802.11ac_ VHT80.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

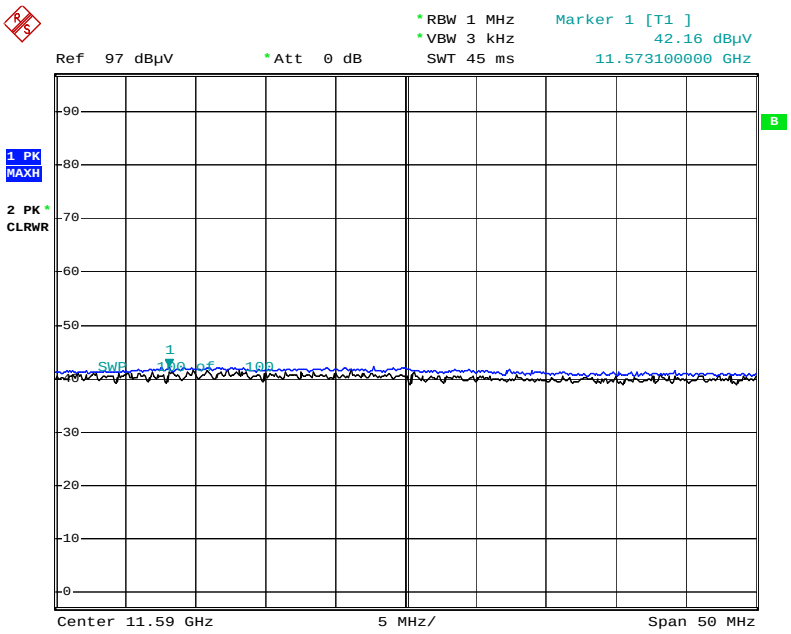
▣ RESULT PLOTS(Worst case : X-H)

Radiated Spurious Emissions plot –Peak Reading (802.11ac_VHT20, Ch.36 2nd Harmonic)



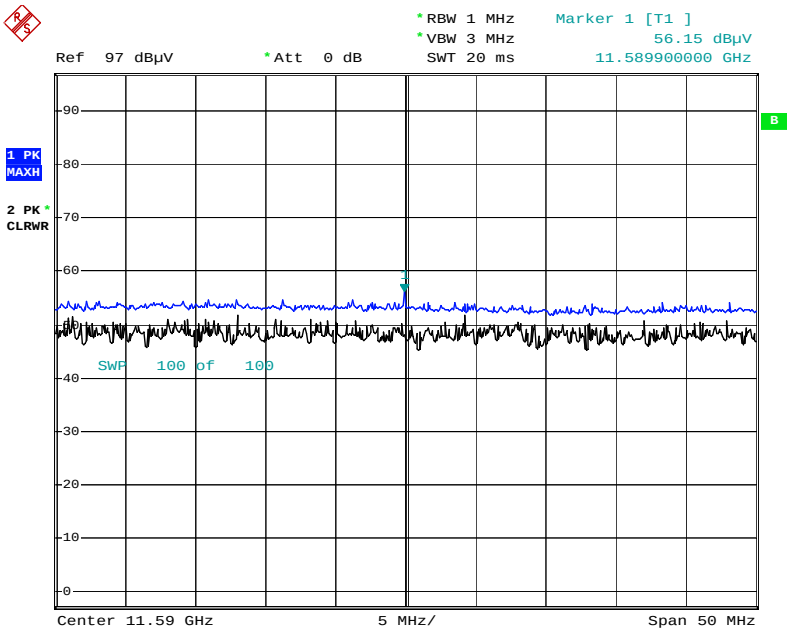
Date: 16.AUG.2017 12:01:34

Radiated Spurious Emissions plot – Average Reading (802.11ac_VHT40, Ch.159 2nd Harmonic)



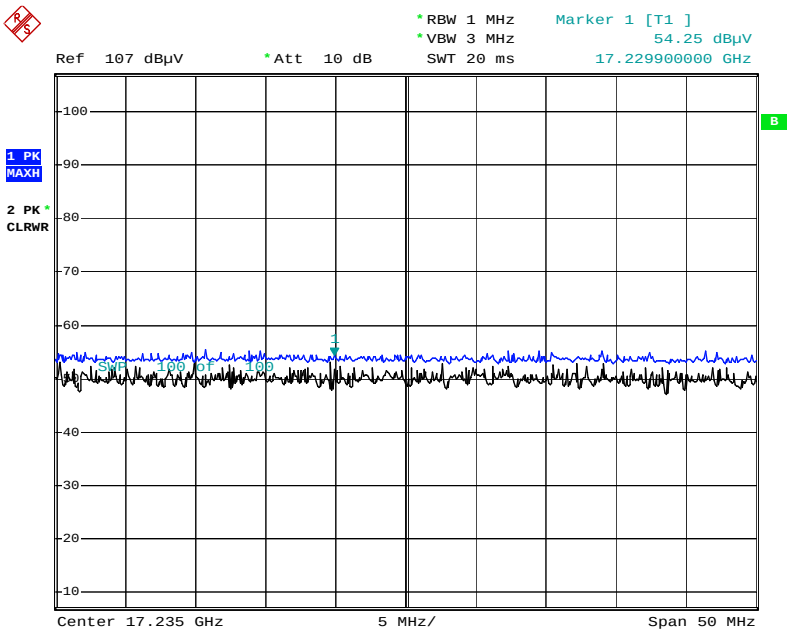
Date: 16.AUG.2017 12:14:32

Radiated Spurious Emissions plot – Peak Reading (802.11ac_VHT40, Ch.159 2nd Harmonic)



Date: 16.AUG.2017 12:11:53

Radiated Spurious Emissions plot –Peak Reading (802.11ac_VHT80, Ch.155 3rd Harmonic)



Date: 16.AUG.2017 16:13:27

Note : Only the worst case plots for Radiated Spurious Emissions.

9.7.2 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. +D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	67.87	2.63	H	70.50	73.98	3.48	PK
5150	42.32	2.63	H	44.95	53.98	9.03	AV
5150	66.28	2.63	V	68.91	73.98	5.07	PK
5150	41.32	2.63	V	43.95	53.98	10.03	AV

Band :	UNII 1
Operation Mode:	802.11 n_HT20
Transfer MCS Index:	0
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL+AMP+ATT. +D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	67.97	2.63	H	70.60	73.98	3.38	PK
5150	42.38	2.63	H	45.01	53.98	8.97	AV
5150	67.45	2.63	V	70.08	73.98	3.90	PK
5150	41.97	2.63	V	44.6	53.98	9.38	AV

Band :	UNII 1
Operation Mode:	802.11 ac_VHT20
Transfer MCS Index:	0
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL+AMP+ATT. +D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	67.92	2.63	H	70.55	73.98	3.43	PK
5150	42.82	2.63	H	45.45	53.98	8.53	AV
5150	67.45	2.63	V	70.08	73.98	3.90	PK
5150	42.38	2.63	V	45.01	53.98	8.97	AV

Band :	UNII 1
Operation Mode:	802.11 n_HT40
Transfer MCS Index:	0
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL+AMP+ATT. +D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	66.86	2.63	H	69.49	73.98	4.49	PK
5150	47.93	2.63	H	50.56	53.98	3.42	AV
5150	66.38	2.63	V	69.01	73.98	4.97	PK
5150	47.51	2.63	V	50.14	53.98	3.84	AV

Band :	UNII 1
Operation Mode:	802.11 ac_VHT40
Transfer MCS Index:	0
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL+AMP+ATT. +D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	66.07	2.81	H	68.88	73.98	5.10	PK
5150	47.79	2.81	H	50.6	53.98	3.38	AV
5150	65.73	2.81	V	68.54	73.98	5.44	PK
5150	47.44	2.81	V	50.25	53.98	3.73	AV

Band :	UNII 1
Operation Mode:	802.11 ac_VHT80
Transfer MCS Index:	0
Operating Frequency	5210 MHz
Channel No.	42 Ch

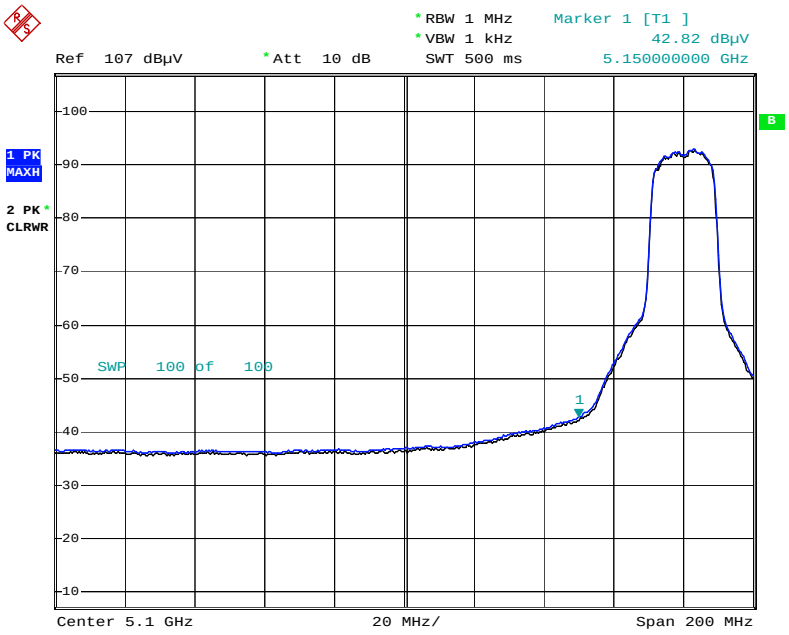
Frequency [MHz]	Reading [dBuV]	AN.+CL+AMP+ATT. +D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	61.04	2.81	H	63.85	73.98	10.13	PK
5150	46.92	2.81	H	49.73	53.98	4.25	AV
5150	60.77	2.81	V	63.58	73.98	10.40	PK
5150	46.47	2.81	V	49.28	53.98	4.70	AV

Notes:

1. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + ATT + D.F.
2. We have done all data rate in 802.11a/n/ac mode test. . Worst case of EUT is lowest data rate in 802.11a/n/ac.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. '*' is radiated band edge test frequency.(not restricted band emissions)
5. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
6. The worst limit for UNII 3 according to 15.407(4)(i) is -27 dBm(68.2 dBuV/m).
   The band edge results at 5850 MHz comply to the worst limit.

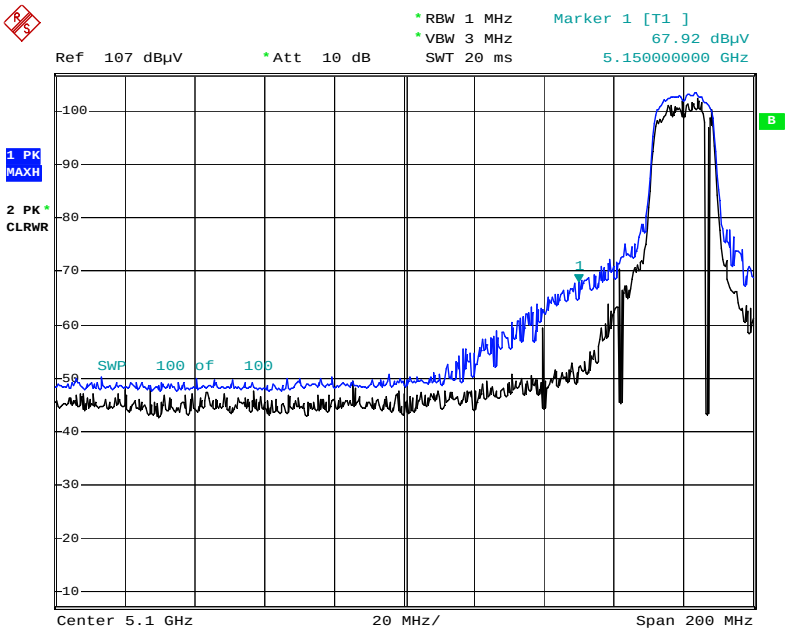
▣ RESULT PLOTS(Worst case : X-H)

Radiated Restricted Band Edges plot –Average Reading (802.11ac_VHT20, Ch.36)



Date: 31.JUL.2017 22:07:34

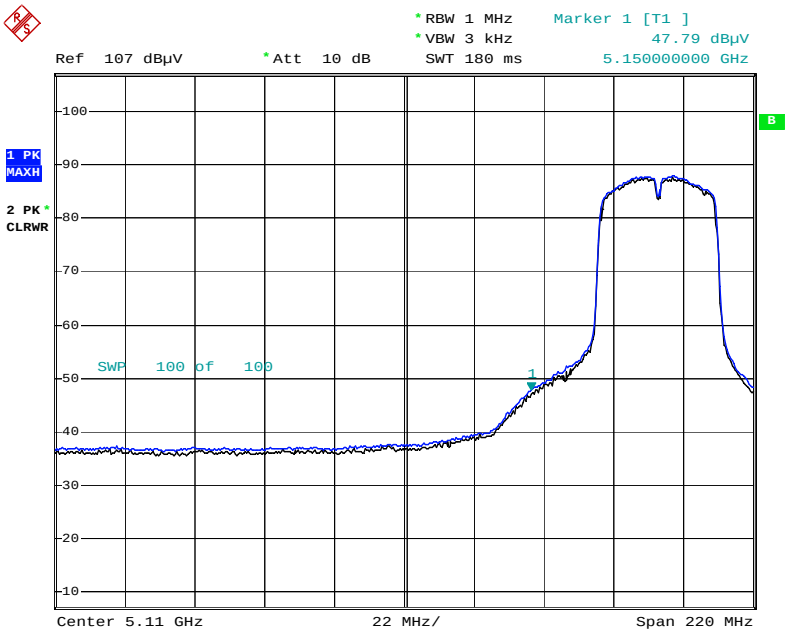
Radiated Restricted Band Edges plot – Peak Reading (802. 11ac_VHT20, Ch.36)



Date: 31.JUL.2017 22:04:58

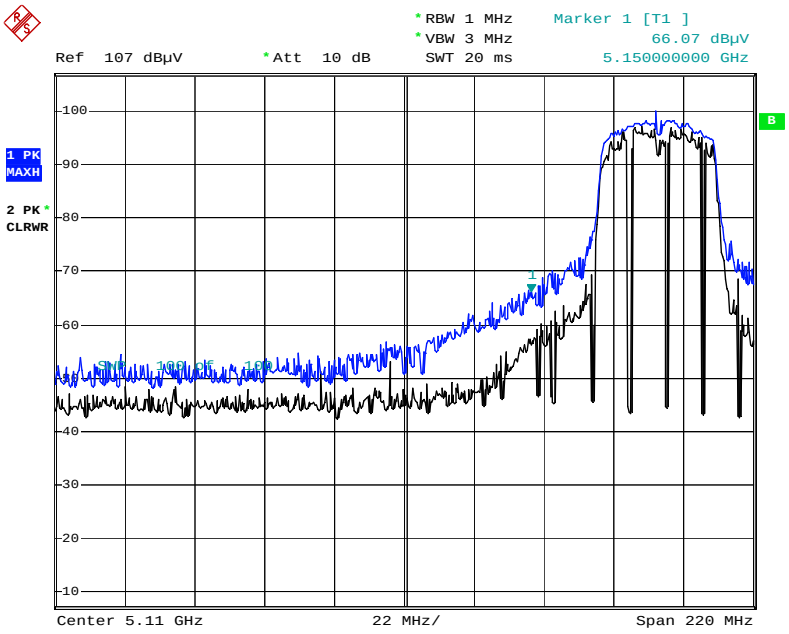
Note : Only the worst case plots for Radiated Restricted Band Edges.

Radiated Restricted Band Edges plot –Average Reading (802.11ac_VHT40, Ch.38)



Date: 31.JUL.2017 22:21:28

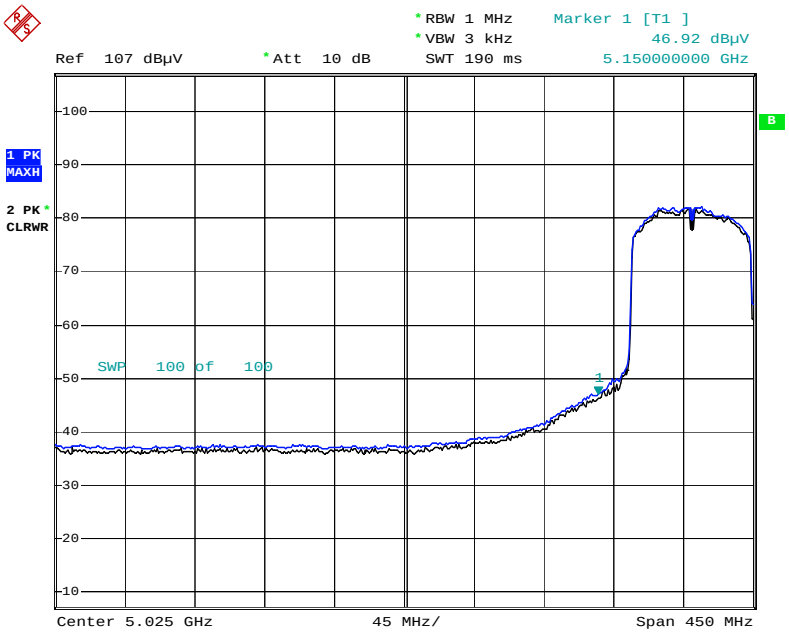
Radiated Restricted Band Edges plot – Peak Reading (802. 11ac_VHT40, Ch.38)



Date: 31.JUL.2017 22:22:32

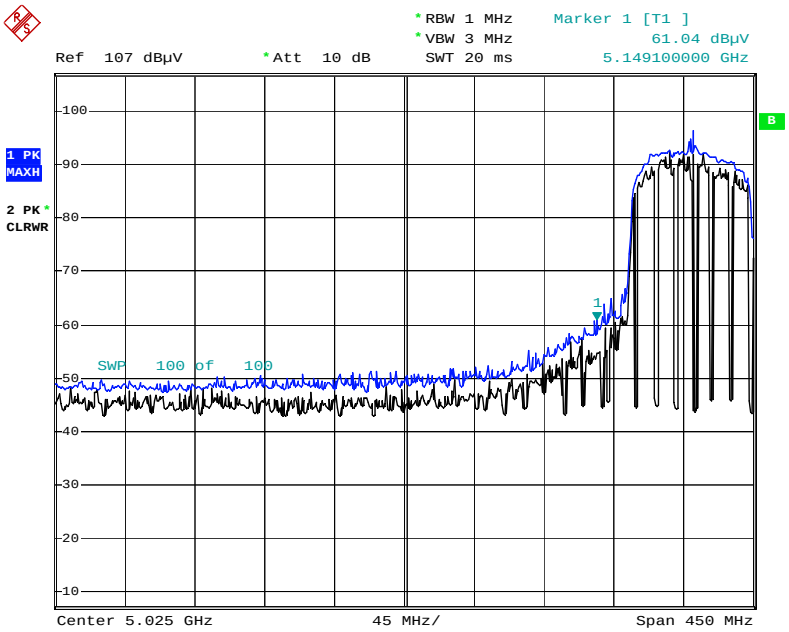
Note : Only the worst case plots for Radiated Restricted Band Edges.

Radiated Restricted Band Edges plot –Average Reading (802.11ac_VHT80, Ch.42)



Date: 31.JUL.2017 22:27:48

Radiated Restricted Band Edges plot – Peak Reading (802. 11ac_VHT80, Ch.42)

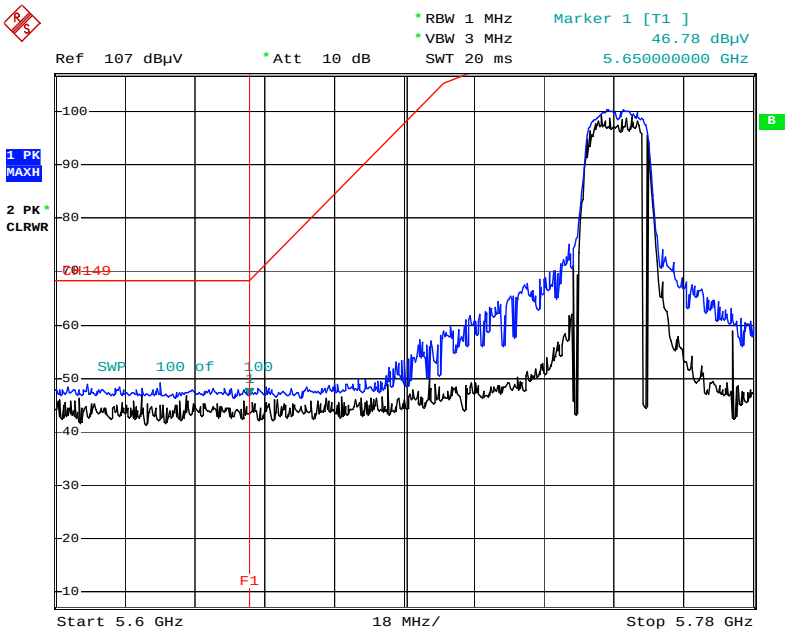


Date: 31.JUL.2017 22:28:33

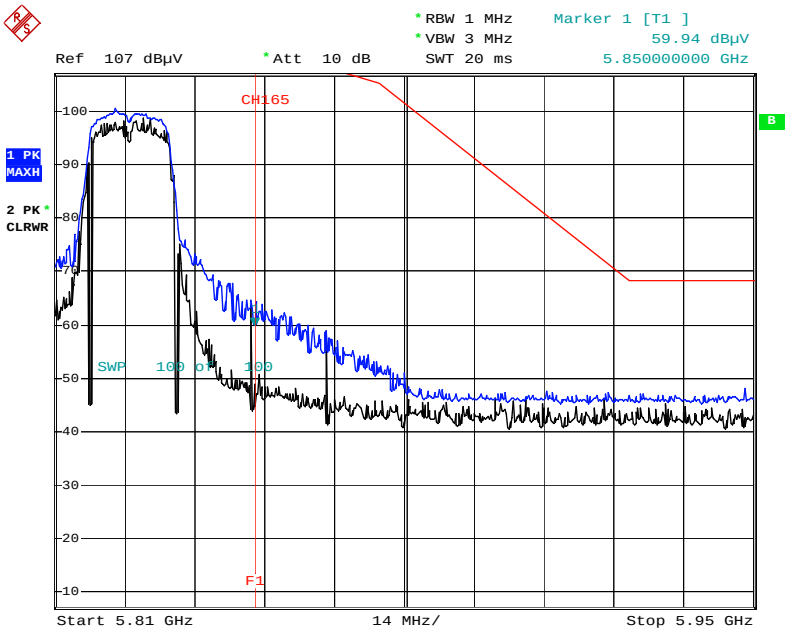
Note : Only the worst case plots for Radiated Restricted Band Edges.

▣ RESULT PLOTS (UNII 3)

Radiated Restricted Band Edges plot – Peak Reading (802.11a)

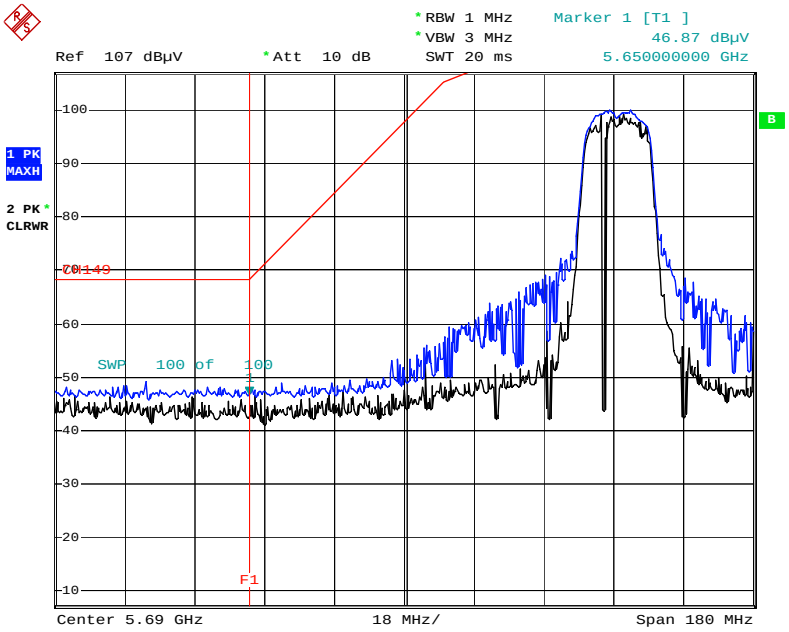


Date: 31.JUL.2017 21:21:06

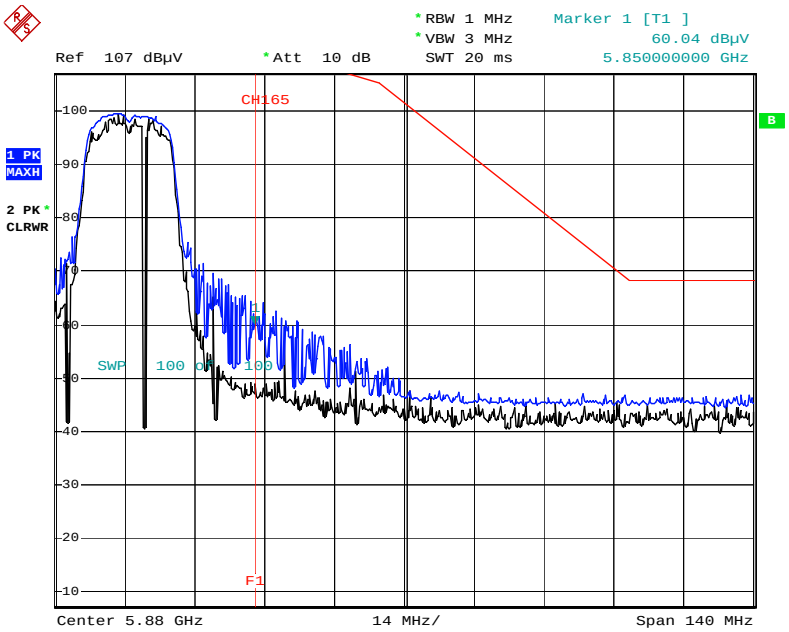


Date: 31.JUL.2017 21:32:05

Radiated Restricted Band Edges plot – Peak Reading (802.11n_HT20)

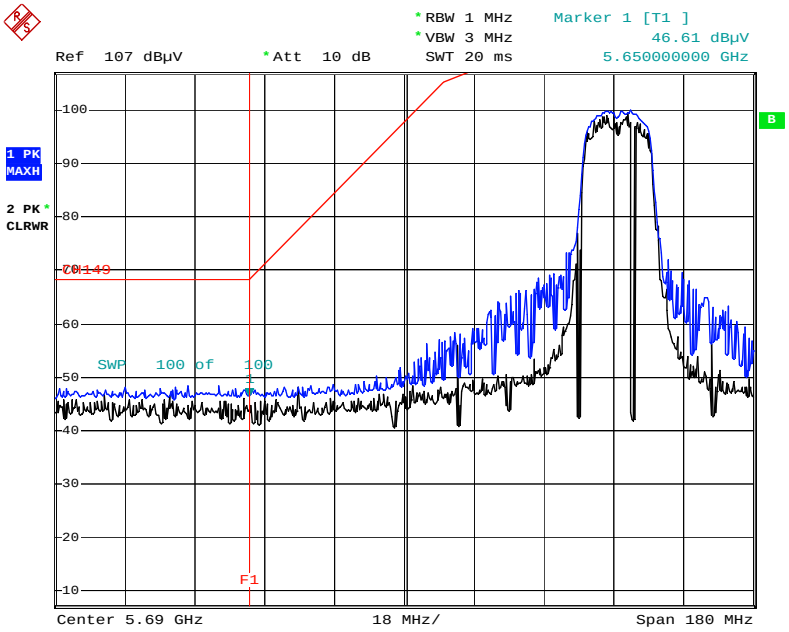


Date: 31.JUL.2017 21:22:51

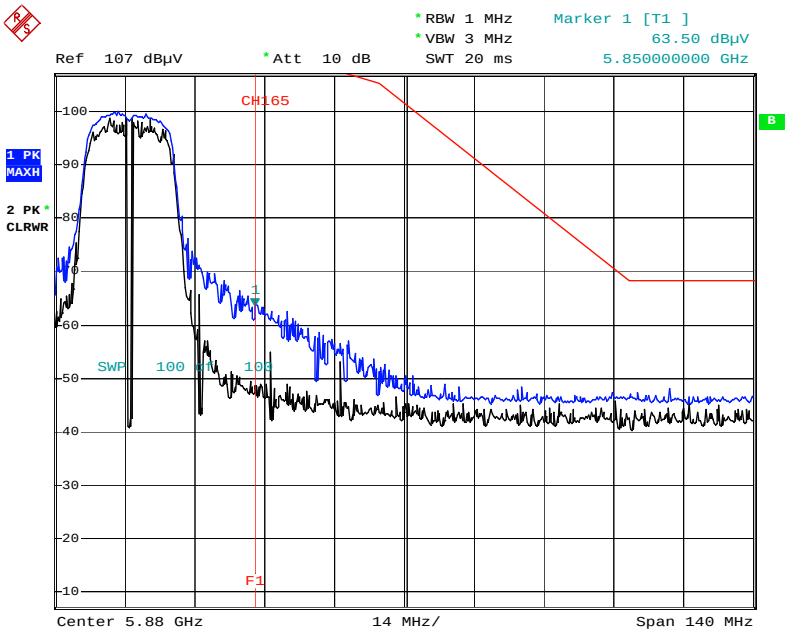


Date: 31.JUL.2017 21:34:08

Radiated Restricted Band Edges plot – Peak Reading (802.11ac_VHT20)

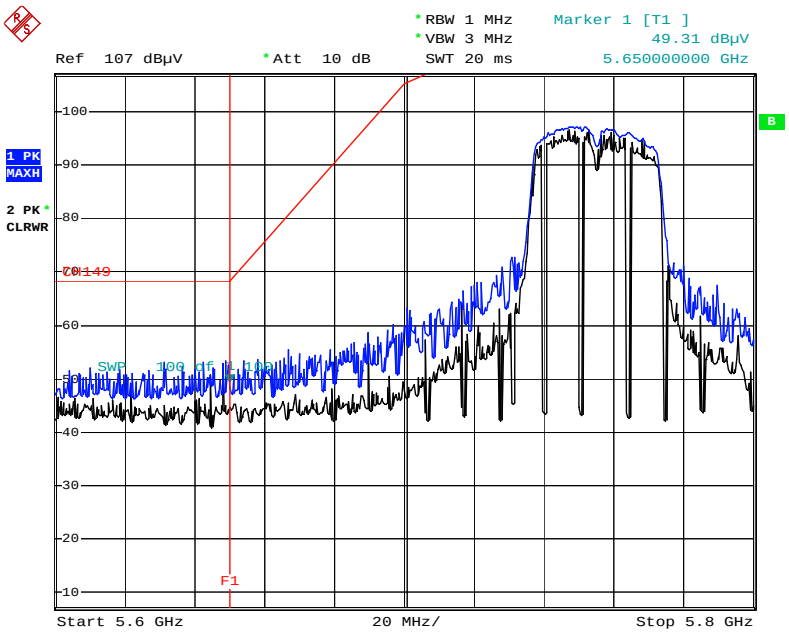


Date: 31.JUL.2017 21:25:25

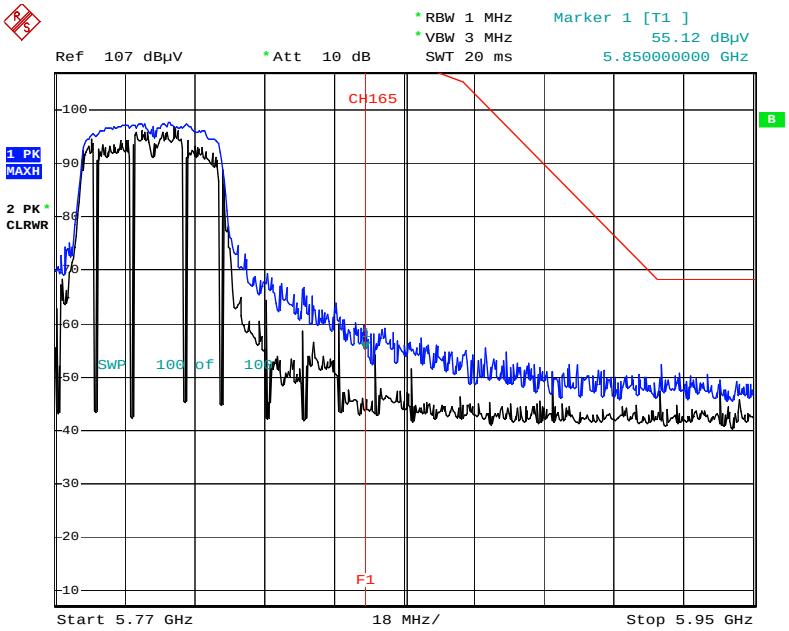


Date: 31.JUL.2017 21:35:53

Radiated Restricted Band Edges plot – Peak Reading (802.11n_HT40)

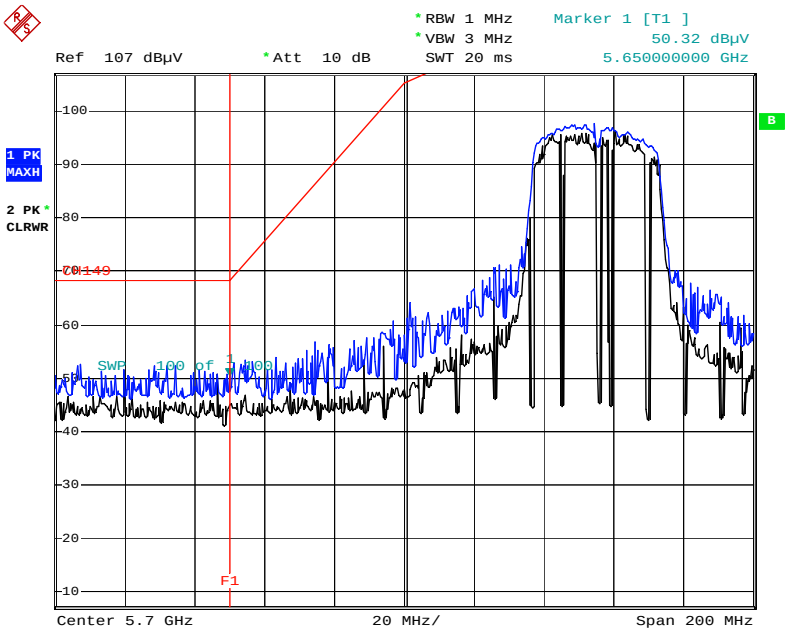


Date: 31.JUL.2017 21:26:49

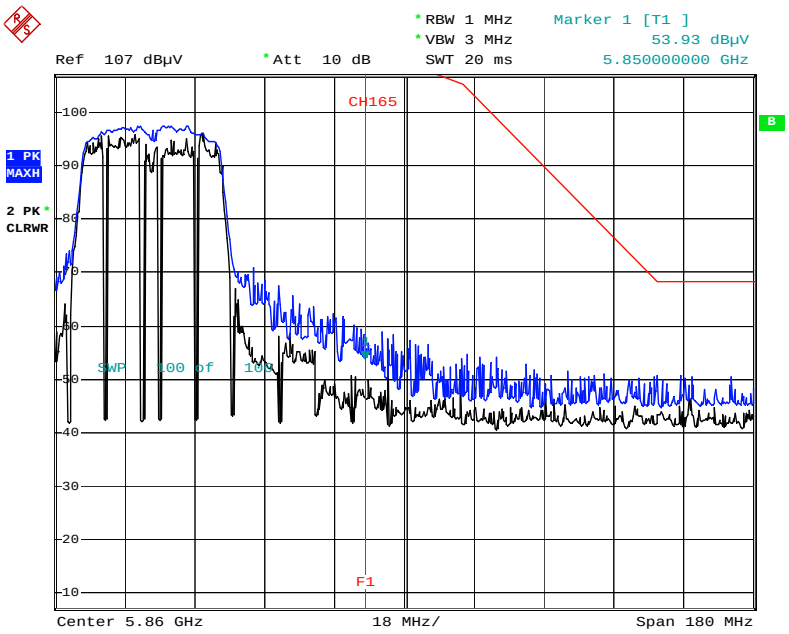


Date: 31.JUL.2017 21:37:46

Radiated Restricted Band Edges plot – Peak Reading (802.11ac_VHT40)

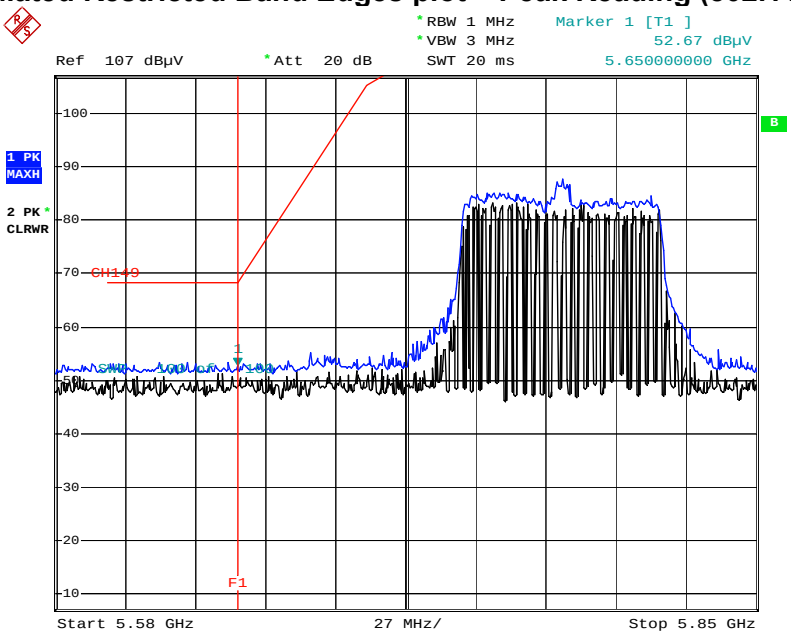


Date: 31.JUL.2017 21:27:57

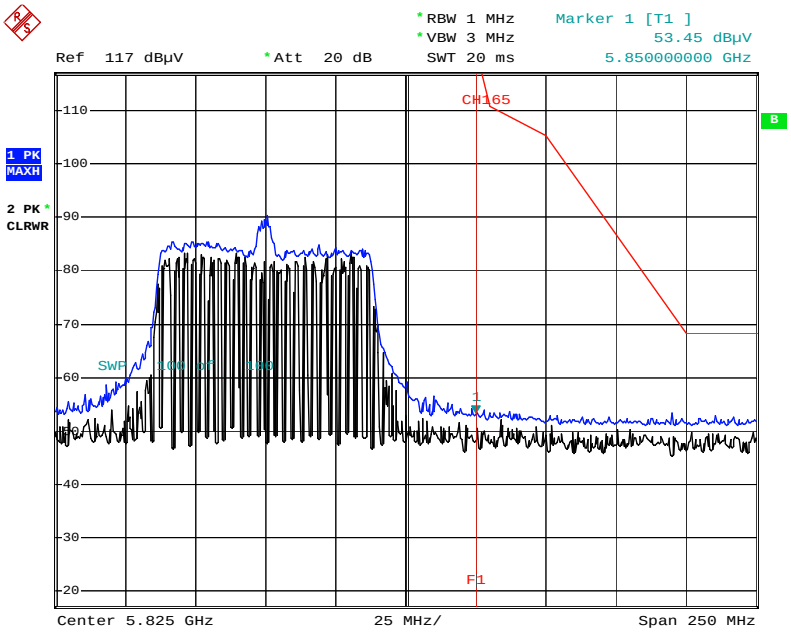


Date: 31.JUL.2017 21:39:30

Radiated Restricted Band Edges plot – Peak Reading (802.11ac_VHT80)



Date: 16.AUG.2017 10:48:35



Date: 16.AUG.2017 10:44:24

9.8 POWERLINE CONDUCTED EMISSIONS

Test Requirements and limit, §15.207

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

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

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

TEST CONFIGURATION

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

TEST PROCEDURE

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

SAMPLE CALCULATION

Quasi-peak(Final Result) = Reading Value + Correction Factor

Note : We don’t perform powerline conducted emission test. Because this EUT is used with vehicle.

10. LIST OF TEST EQUIPMENT

10.1 LIST OF TEST EQUIPMENT(Conducted Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	12/23/2016	Annual	100073
Rohde & Schwarz	ESCI / Test Receiver	12/23/2016	Annual	100584
Agilent	N9020A / Signal Analyzer	06/13/2017	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	11/30/2016	Annual	MY49431210
Agilent	N1911A / Power Meter	04/17/2017	Annual	MY45100523
Agilent	N1921A / Power Sensor	04/17/2017	Annual	MY52260025
Agilent	87300B / Directional Coupler	11/23/2016	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	06/12/2017	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	06/30/2017	Annual	KR75303960
Agilent	8493C / Attenuator(10 dB)	07/10/2017	Annual	07560
Rohde & Schwarz	EMC32 / Software	-	-	-

10.2 LIST OF TEST EQUIPMENT(Radiated Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Audix	AM4000 / Antenna Position Tower	N/A	N/A	N/A
Audix	Turn Table	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Rohde & Schwarz	Loop Antenna	04/19/2017	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	04/06/2017	Biennial	760
Schwarzbeck	BBHA 9120D / Horn Antenna	08/25/2016	Biennial	9120D-1300
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	04/25/2017	Biennial	BBHA9170541
Rohde & Schwarz	FSP(9 kHz ~ 30 GHz) / Spectrum Analyzer	09/06/2017	Annual	100688
Rohde & Schwarz	FSP(9 kHz ~ 40 GHz) / Spectrum Analyzer	07/27/2017	Annual	100843
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	06/12/2017	Annual	8
Wainwright Instruments	WHFX7.0/18G-8SS / High Pass Filter	05/15/2017	Annual	29
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	06/30/2017	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	01/24/2017	Annual	2
Api tech.	18B-03 / Attenuator (3 dB)	06/12/2017	Annual	1
Agilent	8493C-10 / Attenuator(10 dB)	07/19/2017	Annual	08285
CERNEX	CBLU1183540 / Power Amplifier	07/11/2017	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	07/11/2017	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	01/23/2017	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	06/30/2017	Annual	25956