



FCC 47 CFR PART 15 SUBPART E

for

Wireless Router

**Model: AC1220GW,AC1200GW,AC1500GW,
AC1750GW,AC1900GW**

Brand: UTT

Test Report Number:

C160415Z11-RP1-2

Issued Date: June 7, 2016

Issued for

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TESTING CERT #2861.01

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	June 7, 2016	Initial Issue	ALL	Sinphy Xie



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1. TEST CERTIFICATION

Product	Wireless Router
Model	AC1220GW, AC1200GW, AC1500GW, AC1750GW, AC1900GW
Brand	UTT
Tested	April 15~June 6, 2016
Applicant	SHANGHAI UTT TECHNOLOGIES CO., LTD. Room 301, Building 9, No.518 Xinzhan Road, Caohejing Songjiang Hi-Tech Park, shanghai, P.R.China
Manufacturer	SHANGHAI UTT TECHNOLOGIES CO., LTD. Room 301, Building 9, No.518 Xinzhan Road, Caohejing Songjiang Hi-Tech Park, shanghai, P.R.China

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart E	No non-compliance noted

We hereby certify that:

Compliance Certification Services (Shenzhen) Inc. tested the above equipment. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in **ANSI C63.10: 2013** and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.407、FCC 14-30.

The TEST RESULTS of this report relate only to the tested sample identified in this report.

Approved by:

Reviewed by:

Sunday Hu
Supervisor of EMC Dept.
Compliance Certification Services (Shenzhen) Inc.

Ruby Zhang
Supervisor of Report Dept.
Compliance Certification Services (Shenzhen) Inc.



2. EUT DESCRIPTION

Product	Wireless Router
Model Number	AC1220GW, AC1200GW, AC1500GW, AC1750GW, AC1900GW
Brand	UTT
Model Discrepancy	They are identical to each other except for market designation for marketing purpose.
Serial Number	C160415Z11-RP1-2
Received Date	April 15, 2016
Power Supply	DC12V supplied by the adapter
Adapter Manufacturer /Model No.	SHENZHEN FUJIA APPLIANCE CO., LTD. / FJ-SW1202000N I/P: 100-240Vac, 50/60Hz, 0.6A max O/P: 12Vdc, 2000mA DC Output Cable: Unshielded 1.50m
Frequency Range	UNII Band IV: IEEE 802.11a, 802.11n HT20 : 5745MHz ~ 5825MHz IEEE 802.11n HT40: 5755MHz ~ 5795MHz IEEE 802.11ac 80: 5775MHz
Transmit Power	UNII Band IV: IEEE 802.11a: 20.91dBm (Antenna 1) 22.73dBm (Antenna 2) IEEE 802.11n HT 20 MHz mode: 24.68dBm (Combine with Antenna 1 and Antenna 2) IEEE 802.11n HT 40 MHz mode: 24.58dBm (Combine with Antenna 1 and Antenna 2) IEEE 802.11ac 80: 24.82dBm (Combine with Antenna 1 and Antenna 2)
Modulation Technique	OFDM (QPSK, BPSK, 16-QAM, 64-QAM)
Transmit Data Rate	IEEE 802.11a mode: 48, 36, 24, 18, 12, 9, 6Mbps IEEE802.11n HT20MHz mode: 13,26,39,52,78,104,117,130Mbps IEEE802.11n HT40MHz mode: 27,54,81,108,162,216,243,270Mbps IEEE802.11ac VHT80MHz mode: 58.6,117,175.6,234,351,468,526.6, 585,702,780Mbps
Number of Channels	UNII Band IV IEEE 802.11a, 802.11n HT20 : 5 Channels IEEE 802.11n HT 40 MHz mode: 2 Channels IEEE 802.11ac 80: 1 Channel
Antenna Specification	External antenna with 5dBi gain (Max)
Channels Spacing	IEEE 802.11a, 802.11n HT20 : 20MHz IEEE 802.11n HT40: 40MHz IEEE 802.11ac 80: 80MHz
Temperature Range	-10°C ~ +50°C
Hardware Version	MT7621-F
Software Version	AC1220GWv1.7.5-160201.bin

Note: 1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.

**Operation Frequency:**

UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)	
CHANNEL	MHz
149	5745
151	5755
153	5765
155	5775
157	5785
159	5795
161	5805
165	5825

Remark:

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: XPF-REG07-UTT filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules and FCC 14-30.



3. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10. Radiated testing was performed at an antenna to EUT distance 3 meters. The tests documented in this report were performed in accordance with ANSI C63.10: 2013 and FCC CFR 47 Part 15.207, 15.209, 15.407 and FCC 14-30.

Radio testing was performed according to KDB DA 02-2138、KDB 789033 D02、KDB 905462 D06;

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed for RF field strength measurement to meet the Commissions requirement, and is operated in a manner intended to generate the maximum emission in a continuous normal application.

3.2 EUT EXERCISE

The EUT is operated in the engineering mode to fix the TX frequency for the purposes of measurement.

According to its specifications, the EUT must comply with the requirements of Section 15.407 under the FCC Rules Part 15 Subpart E.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is positioned at 0.8 m above the ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.10, the conducted emission from the EUT is measured in the frequency range between 0.15 MHz and 30MHz, using the CISPR Quasi-Peak detector mode.

Radiated Emissions

The EUT is placed on the turntable, which is 0.8 m above the ground plane. The turntable is then rotated for 360 degrees to determine the proper orientation for the maximum emission level. The EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission level. And, each emission is to be maximized by changing the horizontal and vertical polarization of the receiving antenna. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.10.



3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



3.5 DESCRIPTION OF TEST MODES

The EUT is a 2x2 configuration spatial MIMO (2TX & 2RX) without beam forming function.

Software used to control the EUT for staying in continuous transmitting mode was programmed.

Test Item	Test mode	Worse mode
Conducted Emission	Mode 1: TX	<input checked="" type="checkbox"/>
Radiated Emission	Mode 1: TX	<input checked="" type="checkbox"/>

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X axis). The worst emission was found in lie-down position (Z axis) and the worst case was recorded.

UNII Band IV:

IEEE 802.11a for 5745 ~ 5825MHz:

Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT 20 MHz for 5745 ~ 5825MHz:

Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with 27Mbps data rate were chosen for full testing.

IEEE 802.11n HT 40 MHz Channel for 5755~ 5795MHz:

Channel Low (5755MHz) and Channel High (5795MHz) with 27Mbps data rate were chosen for full testing.

IEEE 802.11ac 80 Channel for 5775MHz:

Channel Low (5775MHz) with 27Mbps data rate were chosen for full testing.



4. SETUP OF EQUIPMENT UNDER TEST

4.1 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model No.	Serial No.	FCC ID	Brand	Data Cable	Power Cord
1	Notebook	E335	N/A	DOC	Thinkpad	Shielded 1.50m	Unshielded 2.00m

Note:

Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.2 CONFIGURATION OF SYSTEM UNDER TEST

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



5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at
**No.10-1 Mingkeda Logistics park, No.18, Huanguan South Rd., Guan Lan Town,
Baoan District, Shenzhen, China**

The sites are constructed in conformance with the requirements of ANSI C63.10, ANSI C63.7 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, 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."

5.3 ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

USA	A2LA
China	CNAS

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

USA	FCC
Japan	VCCI (C-4815,R-4320,T-2317, G-10624)
Canada	INDUSTRY CANADA

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccssz.com>



5.4 MEASUREMENT UNCERTAINTY

Parameter	Uncertainty
RF frequency	+/- 1 * 10 ⁻⁵
RF power conducted	+/- 1,5 dB
RF power radiated	+/- 6 dB
Spurious emissions, conducted	+/- 3 dB
Spurious emissions, radiated	+/- 6 dB
Humidity	+/- 5 %
Temperature	+/- 1°C
Time	+/-10 %

Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



6. FCC PART 15 REQUIREMENTS

6.1 26dB EMISSION BANDWIDTH

6.1.1 LIMIT

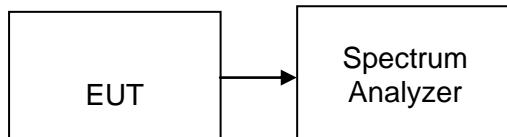
According to §15.303(c), for purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Compliance with the emissions limits is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

6.1.2 MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2016	02/20/2017

Remark: Each piece of equipment is scheduled for calibration once a year.

6.1.3 TEST CONFIGURATION



6.1.4 TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low-loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW > 1%EBW, VBW > RBW, Span >26dB bandwidth, Detector = Peak, and Sweep = auto.
4. Mark the peak frequency and -26dB (upper and lower) frequency.
5. Repeat until all the rest channels were investigated.



6.1.5 TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11a mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	Bandwidth(B) (MHz)	
		Antenna 1	Antenna 2
Low	5745	19.78	19.37
Mid	5785	19.58	19.37
High	5825	19.27	19.26

Test mode: IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	Bandwidth(B) (MHz)	
		Antenna 1	Antenna 2
Low	5745	19.80	19.77
Mid	5785	19.64	19.86
High	5825	19.63	19.86

Test mode: IEEE 802.11n HT 40 MHz mode / 5755 ~ 5795MHz

Channel	Frequency (MHz)	Bandwidth(B) (MHz)	
		Antenna 1	Antenna 2
Low	5755	38.75	39.19
High	5795	38.80	39.08

Test mode: IEEE 802.11ac 80 mode / 5775MHz

Channel	Frequency (MHz)	Bandwidth(B) (MHz)	
		Antenna 1	Antenna 2
	5775	78.56	78.58

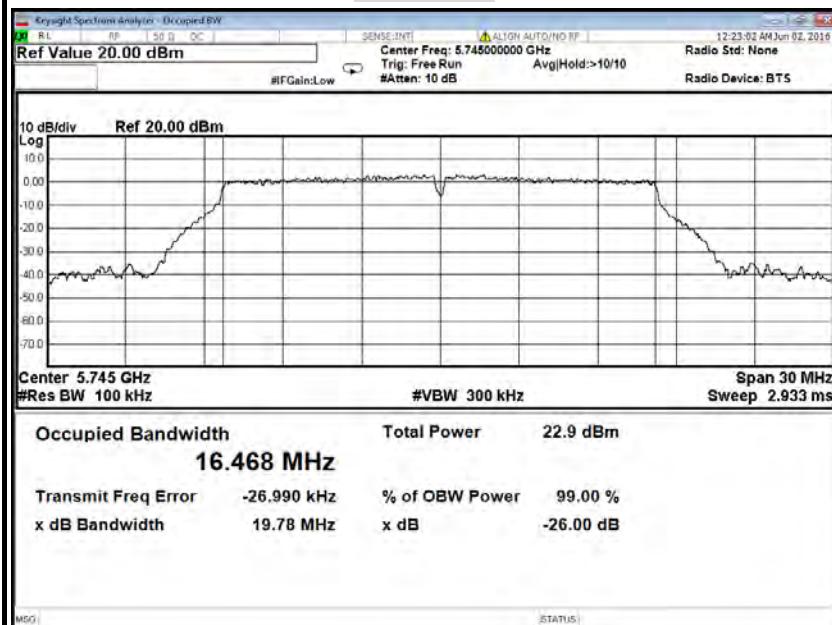


Test Plot

IEEE 802.11a mode / 5745 ~ 5825MHz

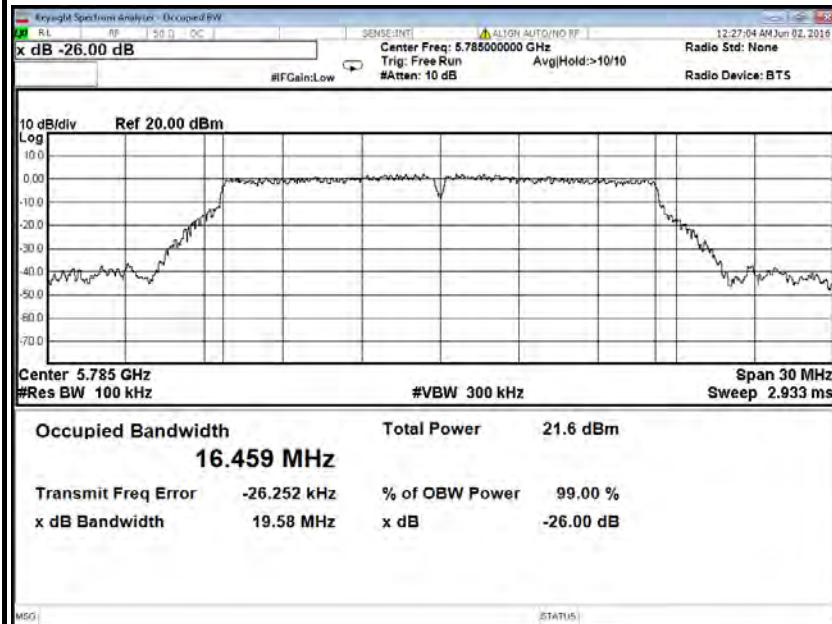
26dB Bandwidth (CH Low)

Antenna 1



26dB Bandwidth (CH Mid)

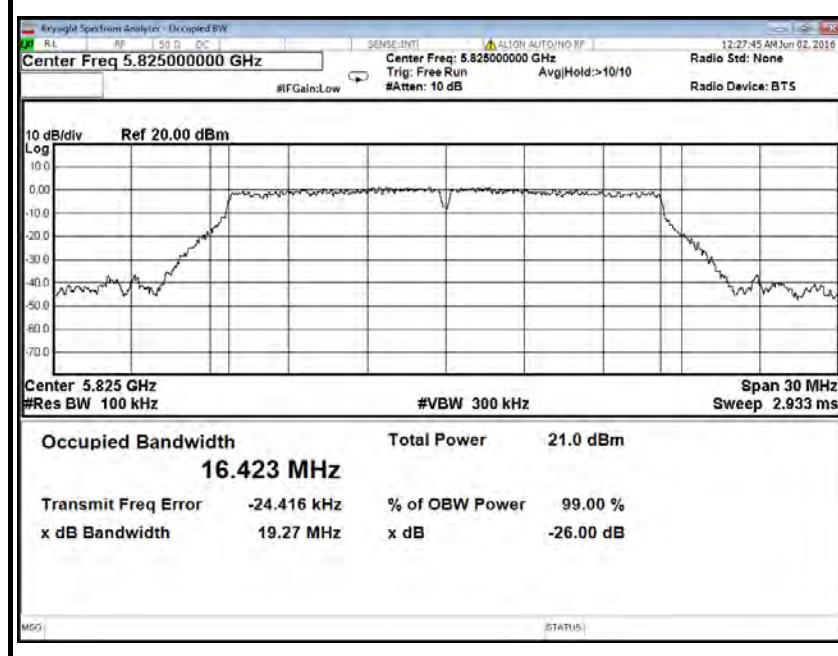
Antenna 1





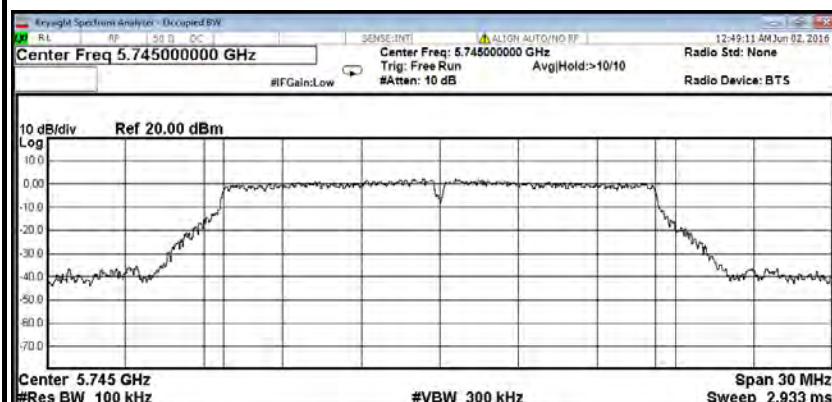
26dB Bandwidth (CH High)

Antenna 1

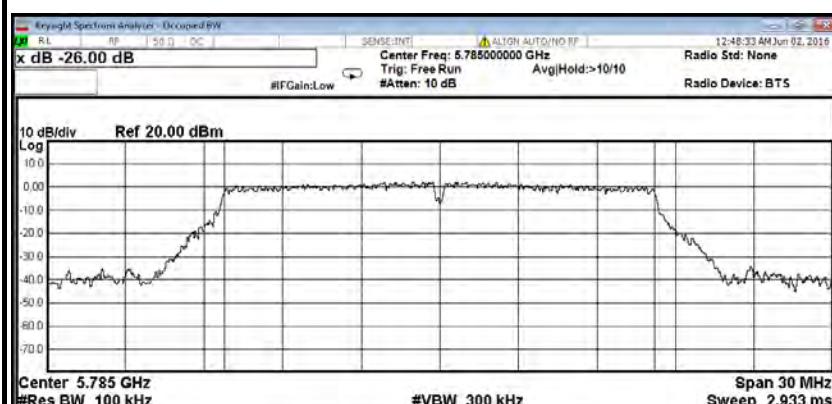


**IEEE 802.11a mode / 5745 ~ 5825MHz****26dB Bandwidth (CH Low)**

Antenna 2

**26dB Bandwidth (CH Mid)**

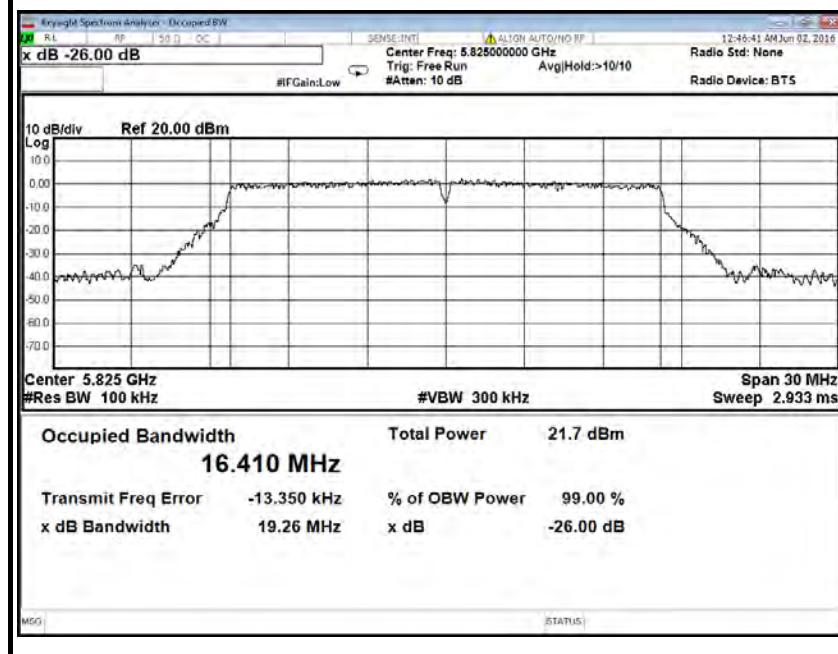
Antenna 2





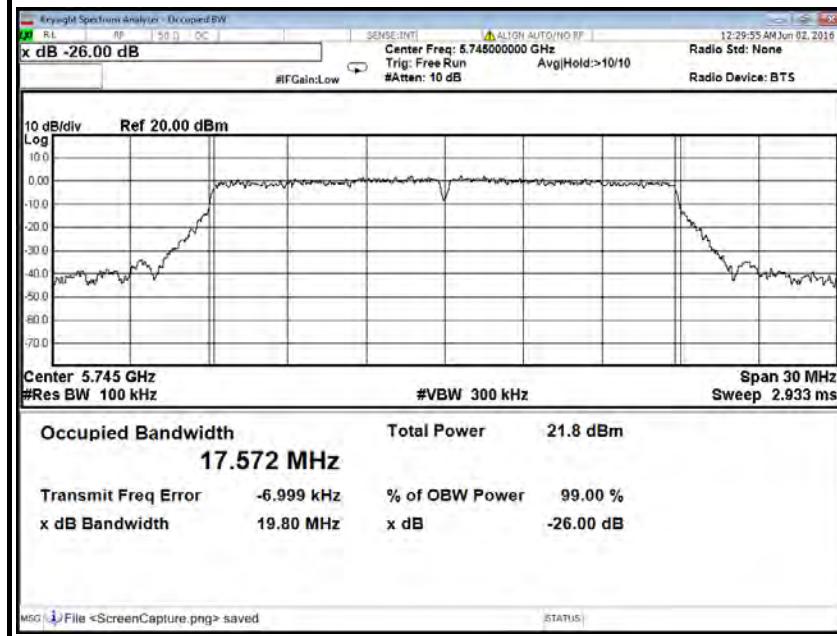
26dB Bandwidth (CH High)

Antenna 2

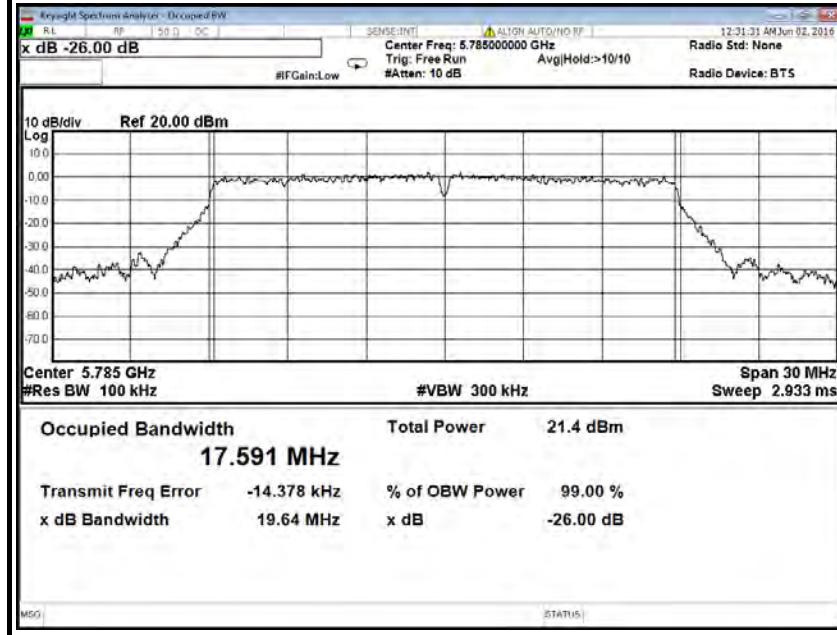


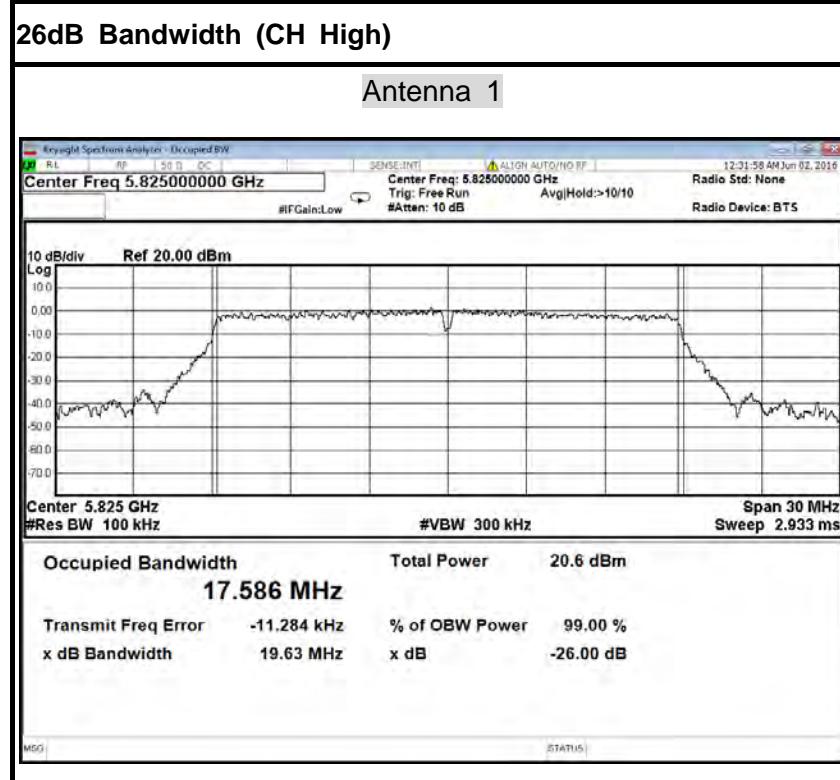
**IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz****26dB Bandwidth (CH Low)**

Antenna 1

**26dB Bandwidth (CH Mid)**

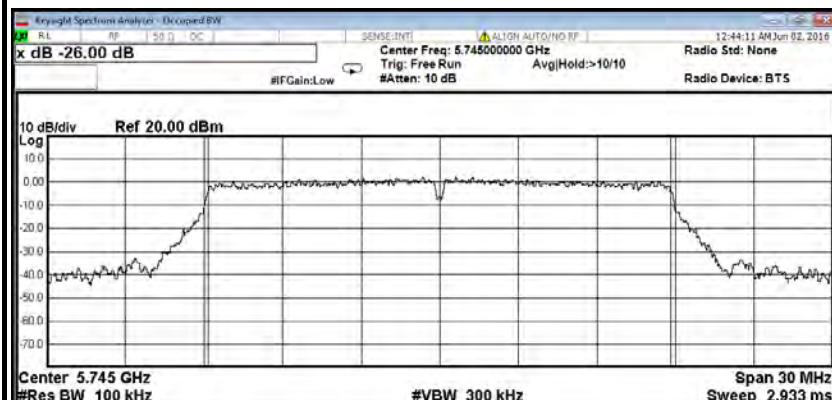
Antenna 1





**IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz****26dB Bandwidth (CH Low)**

Antenna 2

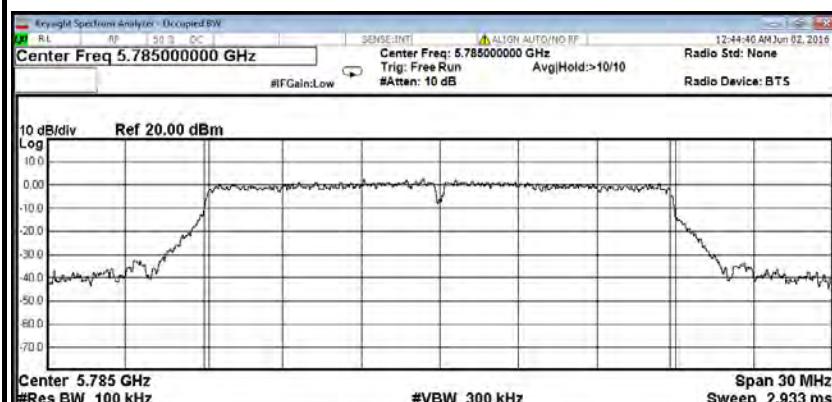


Occupied Bandwidth	Total Power	
17.583 MHz	21.6 dBm	

Transmit Freq Error	2.564 kHz	% of OBW Power	99.00 %
x dB Bandwidth	19.77 MHz	x dB	-26.00 dB

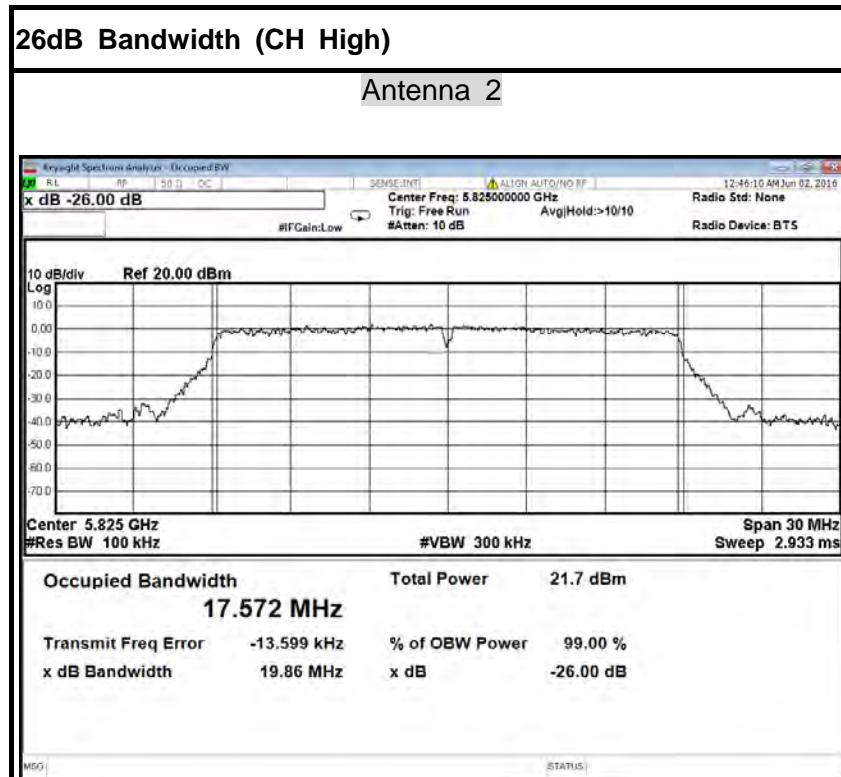
26dB Bandwidth (CH Mid)

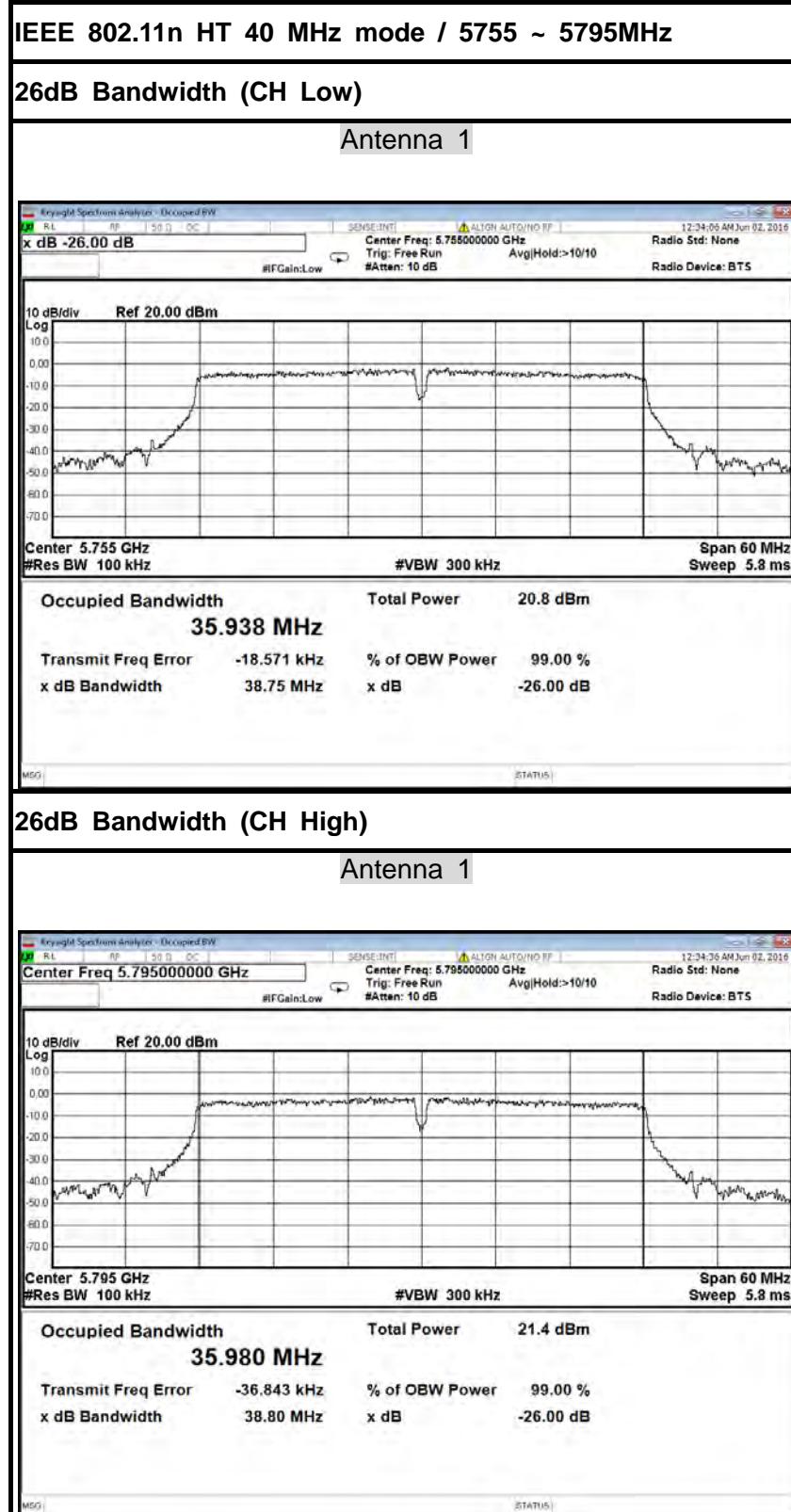
Antenna 2

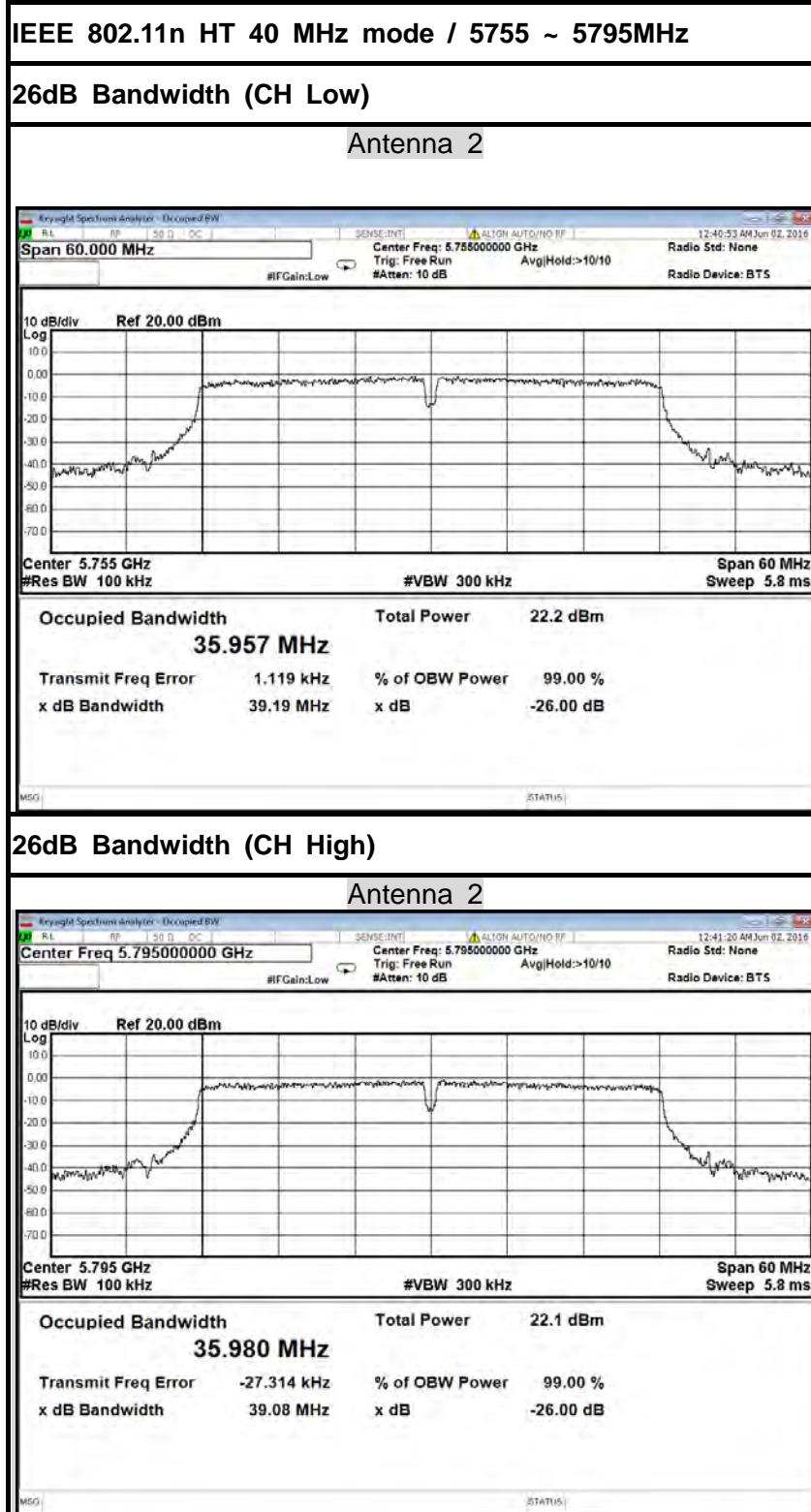


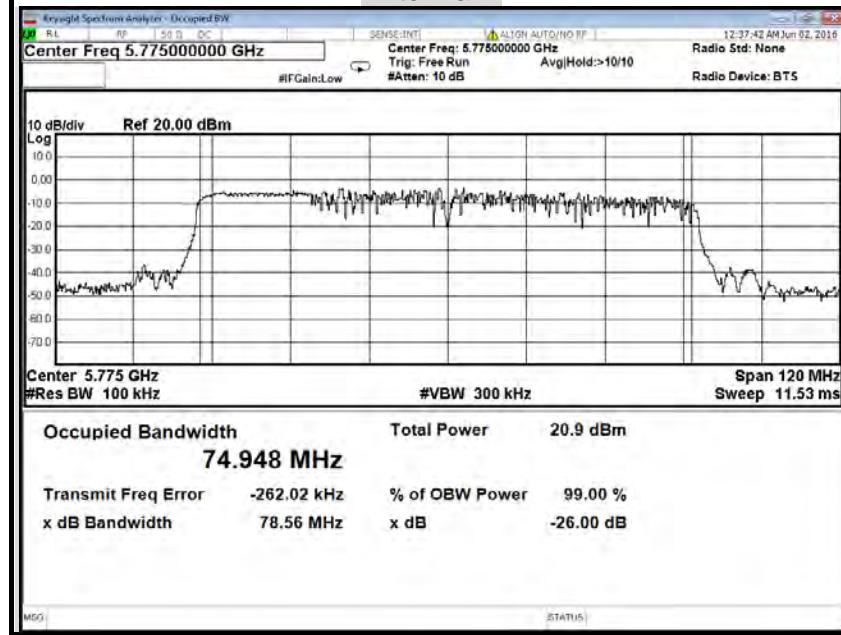
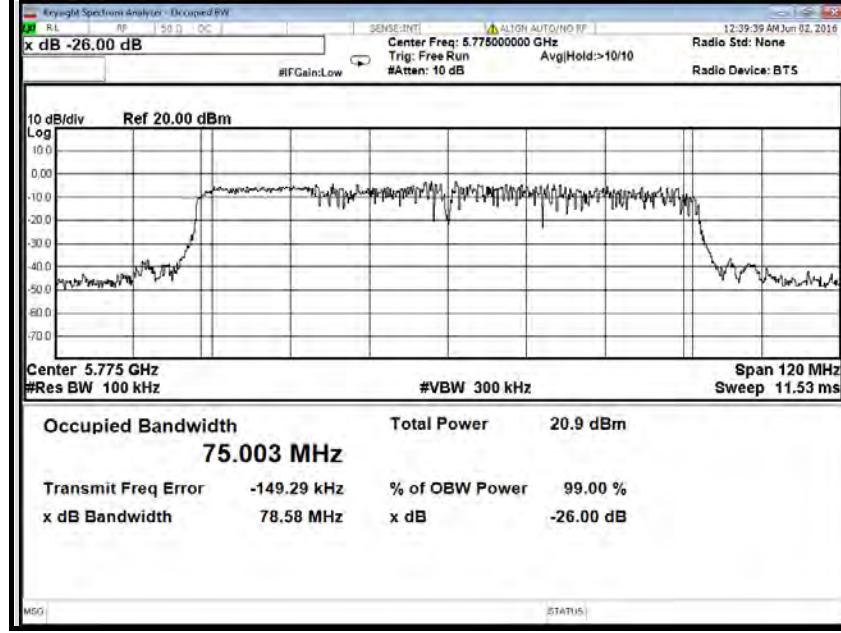
Occupied Bandwidth	Total Power	
17.581 MHz	21.8 dBm	

Transmit Freq Error	-9.210 kHz	% of OBW Power	99.00 %
x dB Bandwidth	19.86 MHz	x dB	-26.00 dB







**IEEE 802.11ac 80 mode / 5775MHz****26dB Bandwidth****Antenna 1****IEEE 802.11ac 80 mode / 5775MHz****26dB Bandwidth****Antenna 2**



6.2 6dB BANDWIDTH MEASUREMENT

6.2.1 LIMITS

According to §15.407(e), Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

6.2.2 TEST INSTRUMENTS

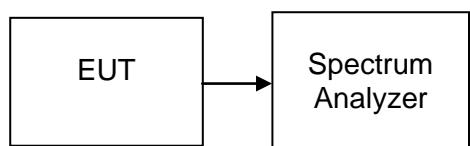
Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2016	02/20/2017

6.2.3 TEST PROCEDURES (please refer to measurement standard)

8.1 Option 1:

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) 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 level measured in the fundamental emission.

6.2.4 TEST SETUP





6.2.5 TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11a mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	Bandwidth(B) (MHz)	
		Antenna 1	Antenna 2
Low	5745	16.52	16.53
Mid	5785	16.45	16.46
High	5825	16.52	16.52

Test mode: IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	Bandwidth(B) (MHz)	
		Antenna 1	Antenna 2
Low	5745	17.65	17.65
Mid	5785	17.70	17.67
High	5825	17.65	17.65

Test mode: IEEE 802.11n HT 40 MHz mode / 5755 ~ 5795MHz

Channel	Frequency (MHz)	Bandwidth(B) (MHz)	
		Antenna 1	Antenna 2
Low	5755	36.11	36.38
High	5795	36.44	36.43

Test mode: IEEE 802.11ac 80 mode / 5775MHz

Channel	Frequency (MHz)	Bandwidth(B) (MHz)	
		Antenna 1	Antenna 2
	5775	73.84	73.96

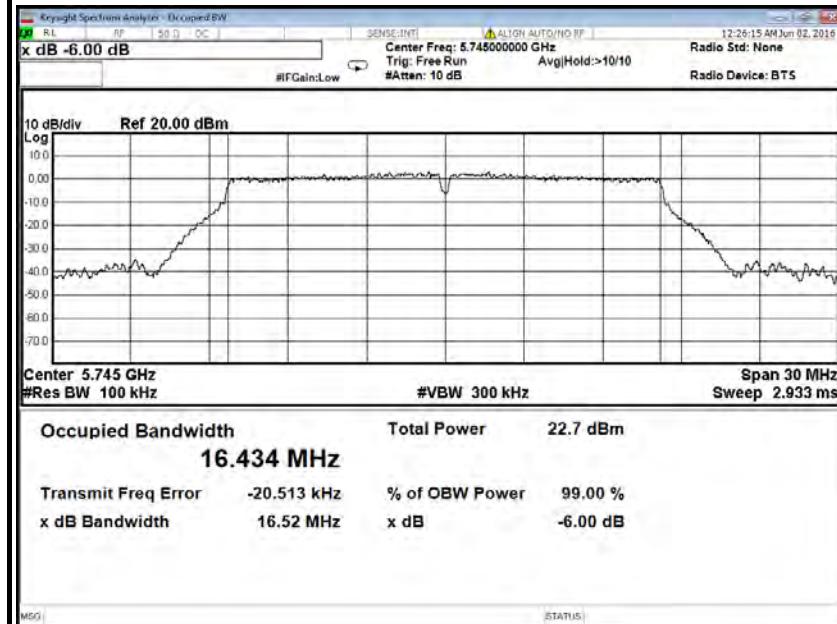


Test Plot

IEEE 802.11a mode / 5745 ~ 5825MHz

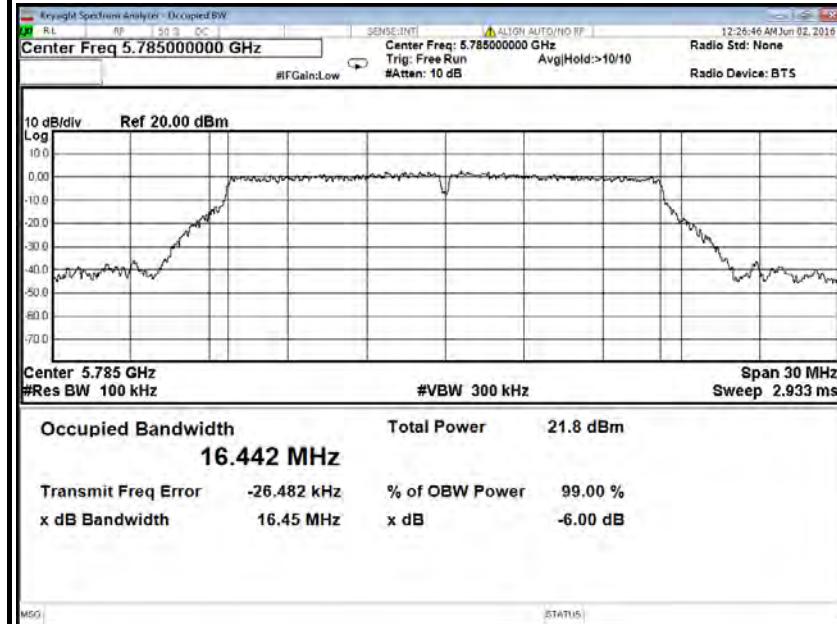
6dB Bandwidth (CH Low)

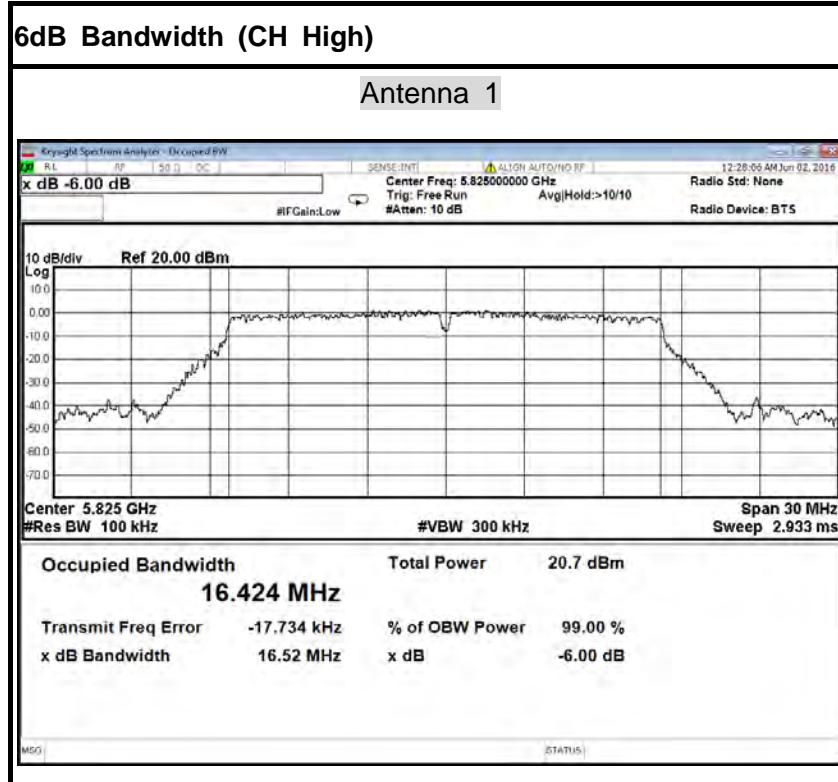
Antenna 1



6dB Bandwidth (CH Mid)

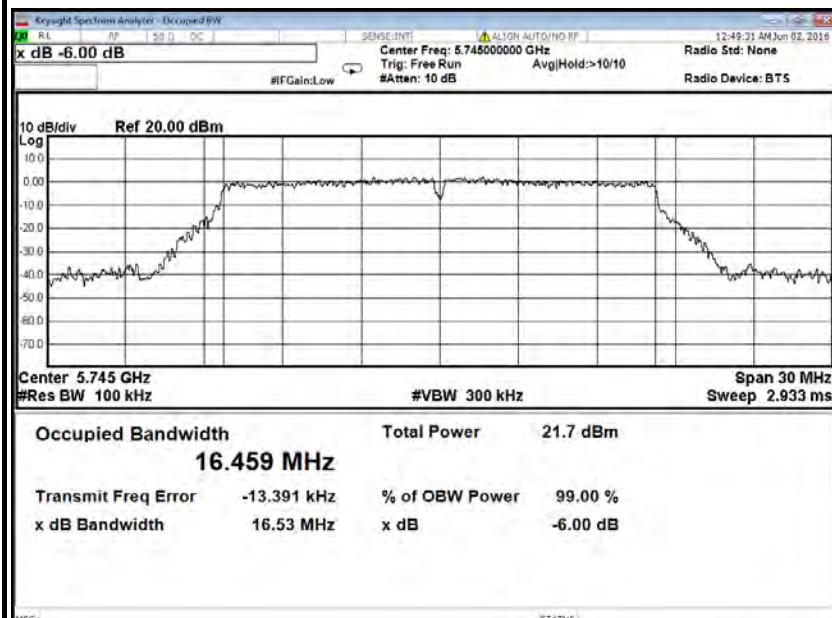
Antenna 1



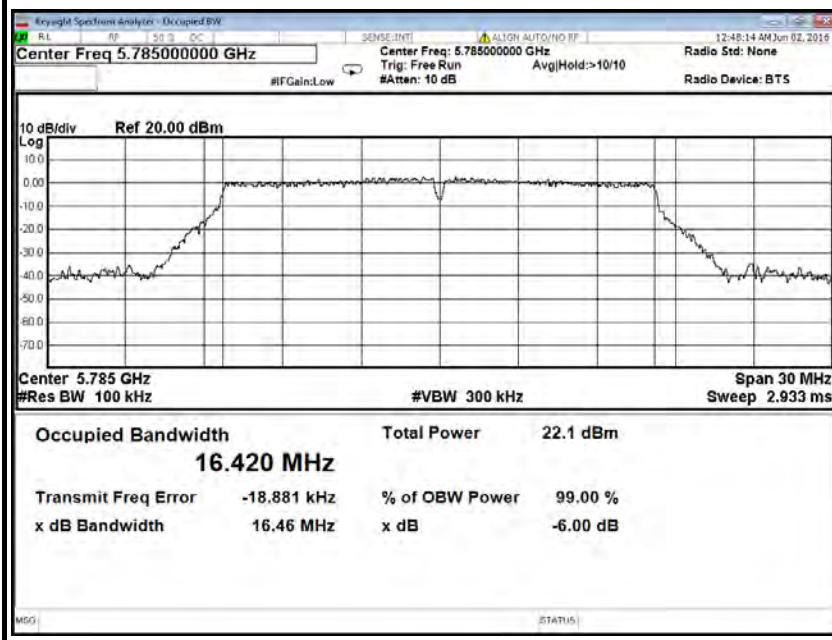


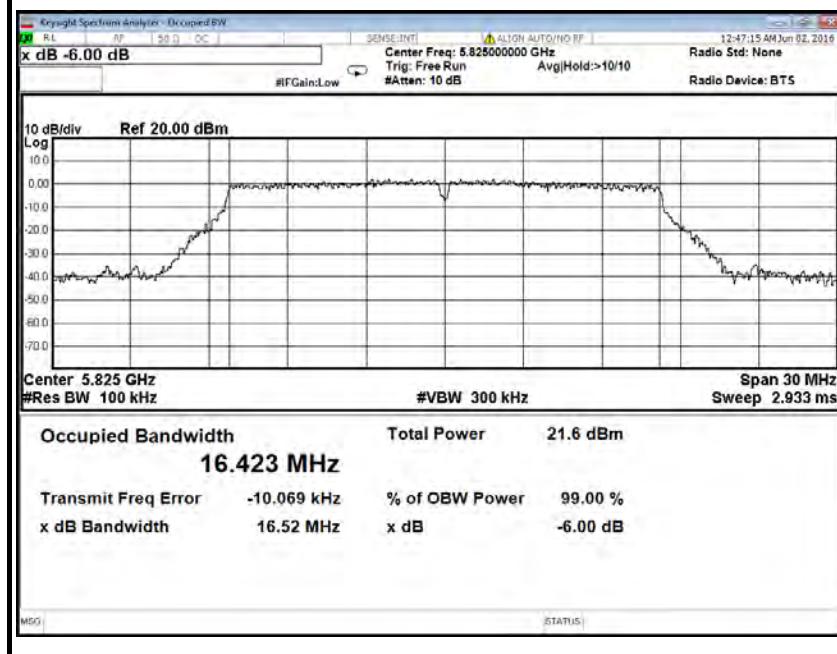
**IEEE 802.11a mode / 5745 ~ 5825MHz****6dB Bandwidth (CH Low)**

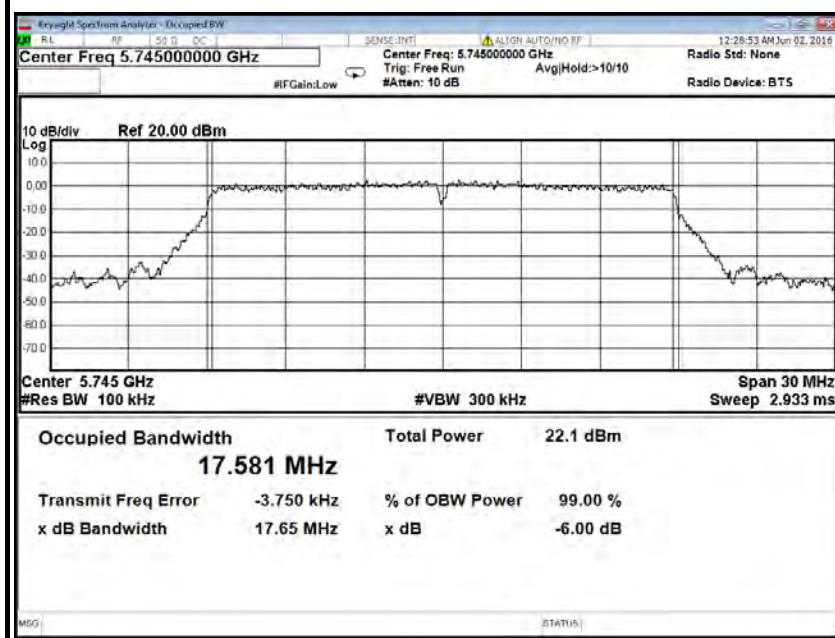
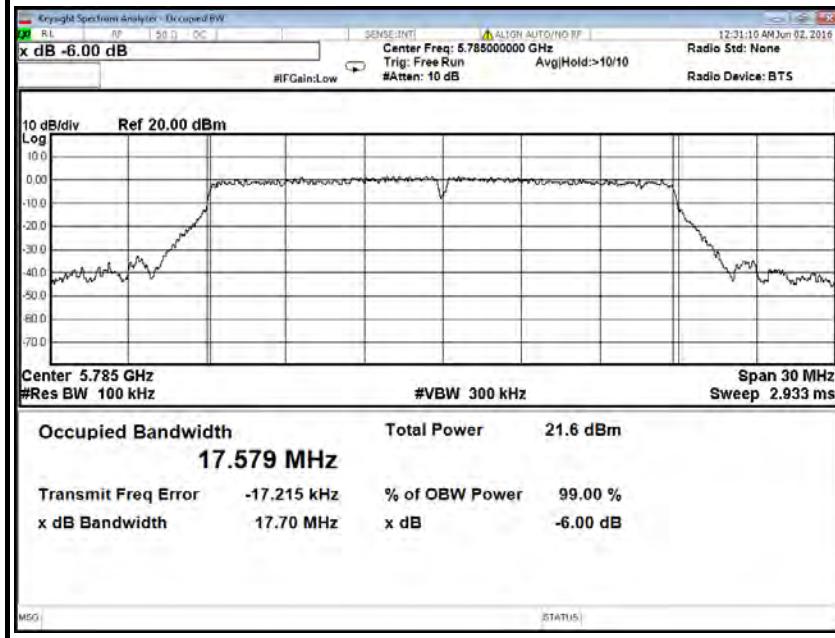
Antenna 2

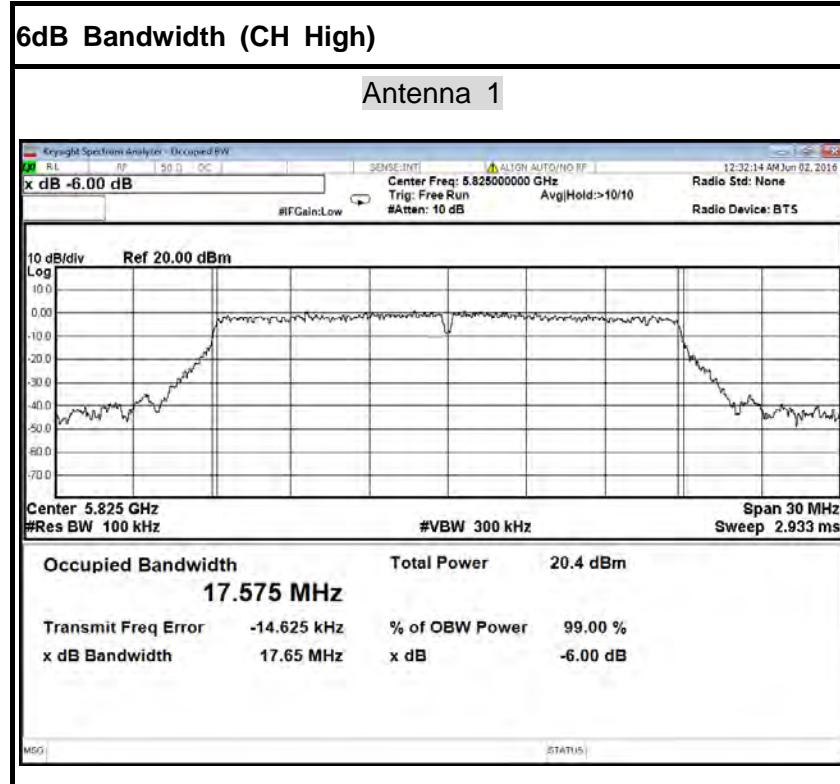
**6dB Bandwidth (CH Mid)**

Antenna 2



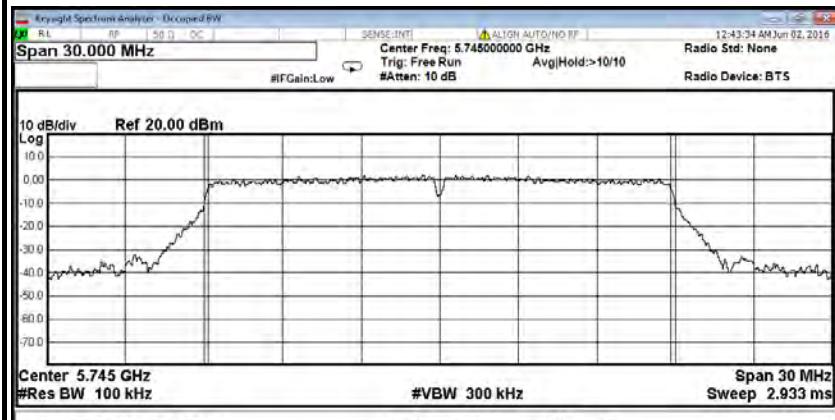
**6dB Bandwidth (CH High)****Antenna 2**

**IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz****6dB Bandwidth (CH Low)****Antenna 1****6dB Bandwidth (CH Mid)****Antenna 1**

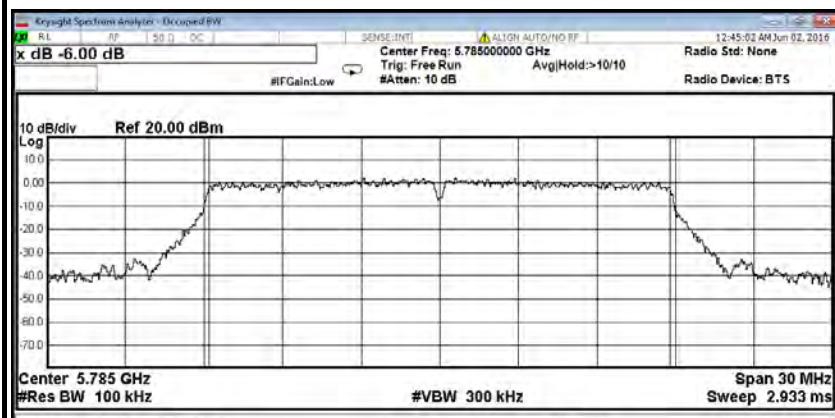


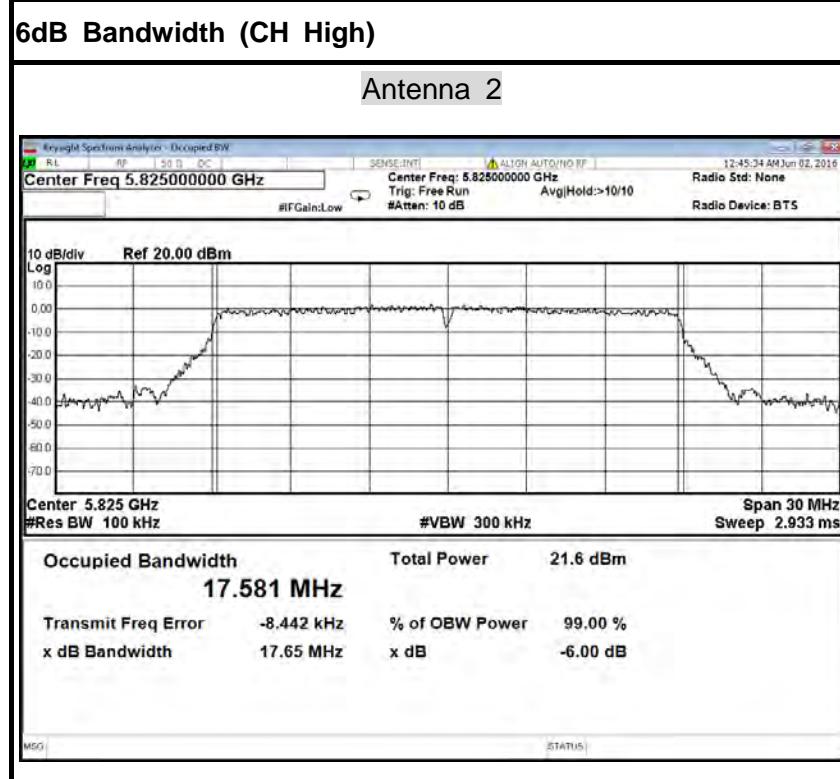
**IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz****6dB Bandwidth (CH Low)**

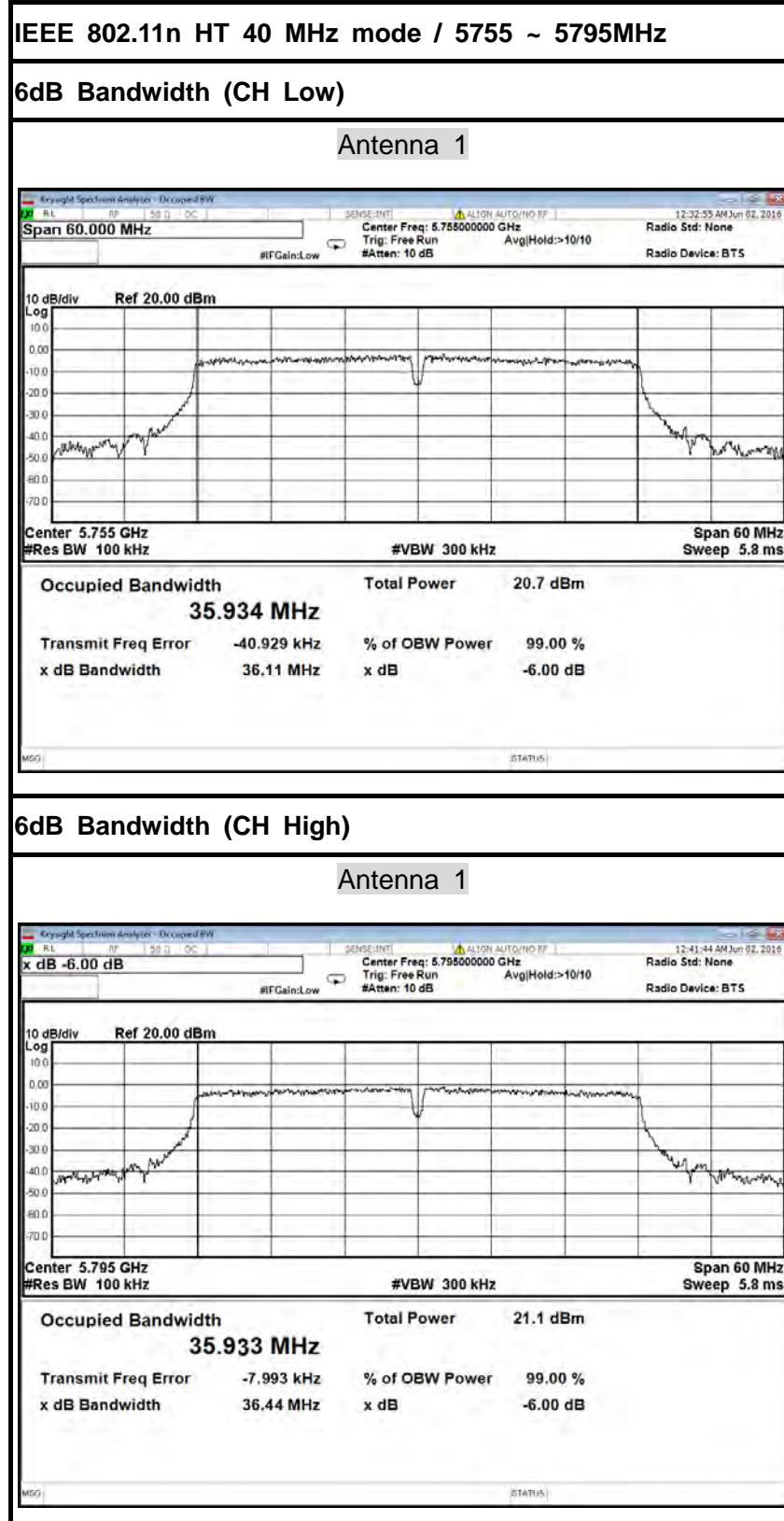
Antenna 2

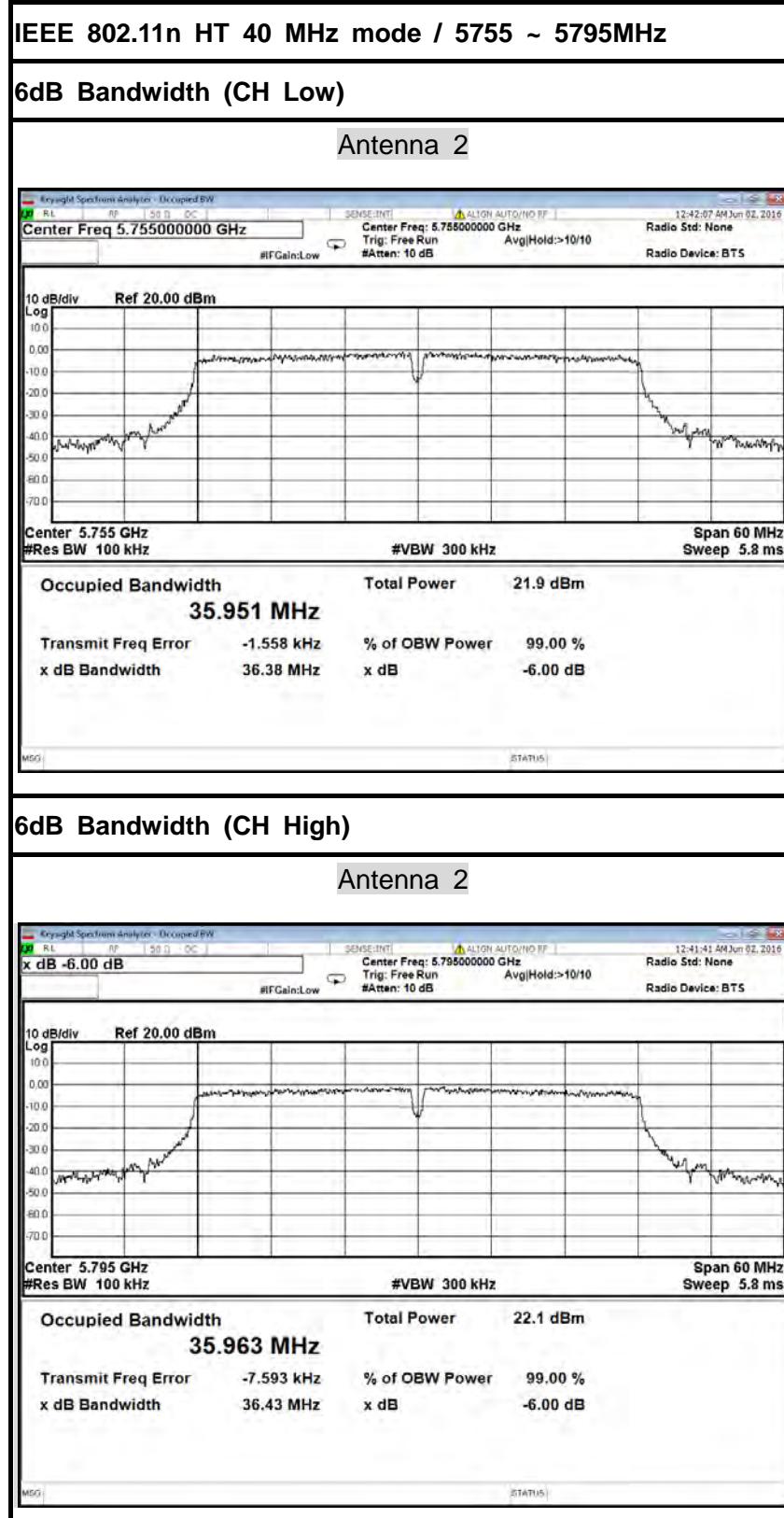
**6dB Bandwidth (CH Mid)**

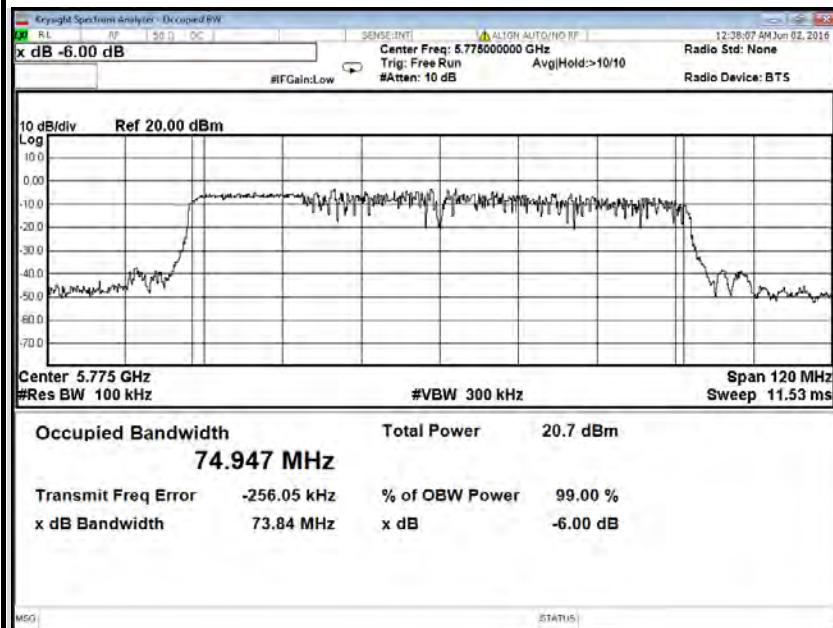
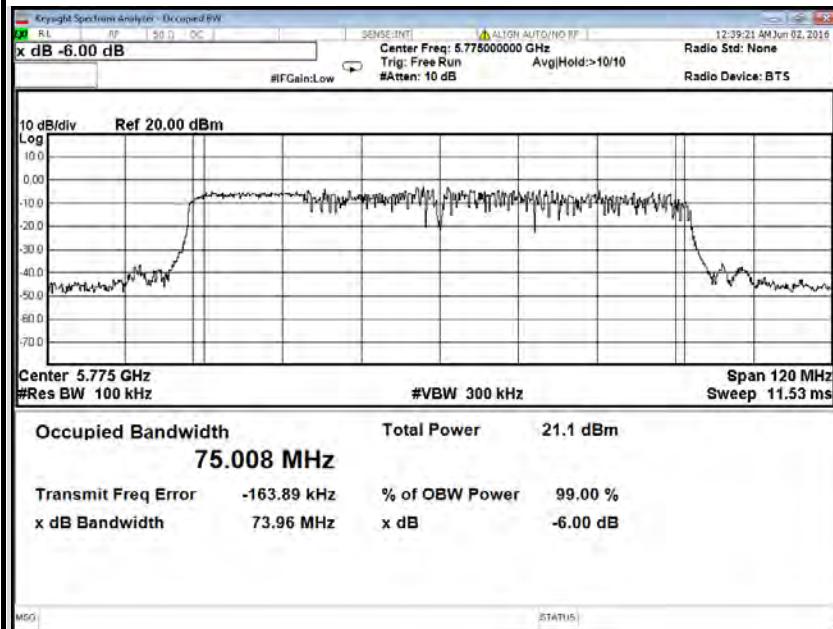
Antenna 2









**IEEE 802.11ac 80 mode / 5775MHz****6dB Bandwidth****Antenna 1****IEEE 802.11ac 80 mode / 5775MHz****6dB Bandwidth****Antenna 2**



6.3 ANTENNA GAIN

MEASUREMENT

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module. For normal WLAN devices, the OFDM mode is used.

MEASUREMENT PARAMETERS

Measurement parameter	
Detector	Peak
Sweep time	Auto
Resolution bandwidth	3 MHz
Video bandwidth	3 MHz
Trace-Mode	Max hold

LIMITS

FCC	IC
Antenna Gain	
6 dBi	



TEST RESULTS

IEEE 802.11a mode (Antenna 1)

T _{nom}	V _{nom}	Lowest channel 5745MHz	Highest channel 5825MHz
Conducted power [dBm] Measured with OFDM modulation		7.42	8.06
Radiated power [dBm] Measured with OFDM modulation		10.65	9.87
Gain [dBi] Calculated		3.23	1.81
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

IEEE 802.11a mode (Antenna 2)

T _{nom}	V _{nom}	Lowest channel 5745MHz	Highest channel 5825MHz
Conducted power [dBm] Measured with OFDM modulation		9.86	8.96
Radiated power [dBm] Measured with OFDM modulation		11.78	12.34
Gain [dBi] Calculated		1.92	3.38
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		



6.4 OUTPUT POWER

6.4.1 LIMIT

According to §15.407(a)& FCC R&O FCC 14 - 30,

- (1) (i) For an outdoor access point operating in the band 5.15 – 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
(ii) For an indoor access point operating in the band 5.15 – 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Specified Limit of the Peak Power

Not applicable, since the EUT only used band IV.



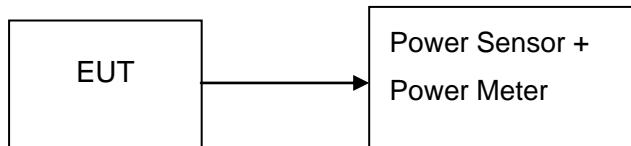
6.4.2 MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Power Meter	Anritsu	ML2495A	1204003	02/21/2016	02/20/2017
Power Sensor	Anritsu	MA2411B	1126150	02/21/2016	02/20/2017

Remark: Each piece of equipment is scheduled for calibration once a year.

6.4.3 TEST CONFIGURATIONS

The EUT was connected to a spectrum analyzer through a 50Ω RF cable.



6.4.4 TEST PROCEDURE

Set span to encompass the entire emission bandwidth (EBW) of the signal.

Set RBW = 1 MHz / Set VBW = 3 MHz.

Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode. Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to “free run”. Trace average 100 traces in power averaging mode. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer’s band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

6.4.5 TEST RESULTS

No non-compliance noted



6.4.6 TEST DATA

IEEE 802.11a mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	Output Power (dBm)		Output Power (W)		Limit (dBm)	Result
		Antenna 1	Antenna 2	Antenna 1	Antenna 2		
Low	5745	20.38	22.73	0.10914	0.18750	30.00	PASS
Mid	5785	20.91	21.81	0.12331	0.15171		PASS
High	5825	20.91	21.81	0.12331	0.15171		PASS

IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	Output Power (dBm)			Output Power (W)	Limit (dBm)	Result
		Antenna 1	Antenna 2	Total			
Low	5745	20.38	22.67	24.68	0.29407	30.00	PASS
Mid	5785	20.39	21.99	24.27	0.26752		PASS
High	5825	20.45	21.64	24.10	0.25680		PASS

IEEE 802.11n HT 40 MHz mode / 5755 ~ 5795MHz

Channel	Frequency (MHz)	Output Power (dBm)			Output Power (W)	Limit (dBm)	Result
		Antenna 1	Antenna 2	Total			
Low	5755	20.39	22.49	24.58	0.28681	30.00	PASS
High	5795	20.44	21.72	24.14	0.25926		PASS

IEEE 802.11ac 80 mode / 5775MHz

Channel	Frequency (MHz)	Output Power (dBm)			Output Power (W)	Limit (dBm)	Result
		Antenna 1	Antenna 2	Total			
	5775	21.15	22.39	24.82	0.30370	30.00	PASS



6.5 BAND EDGES MEASUREMENT

6.5.1 LIMIT

According to §15.407(b)

- (1) The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.
- (2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

6.5.2 MEASUREMENT EQUIPMENT USED

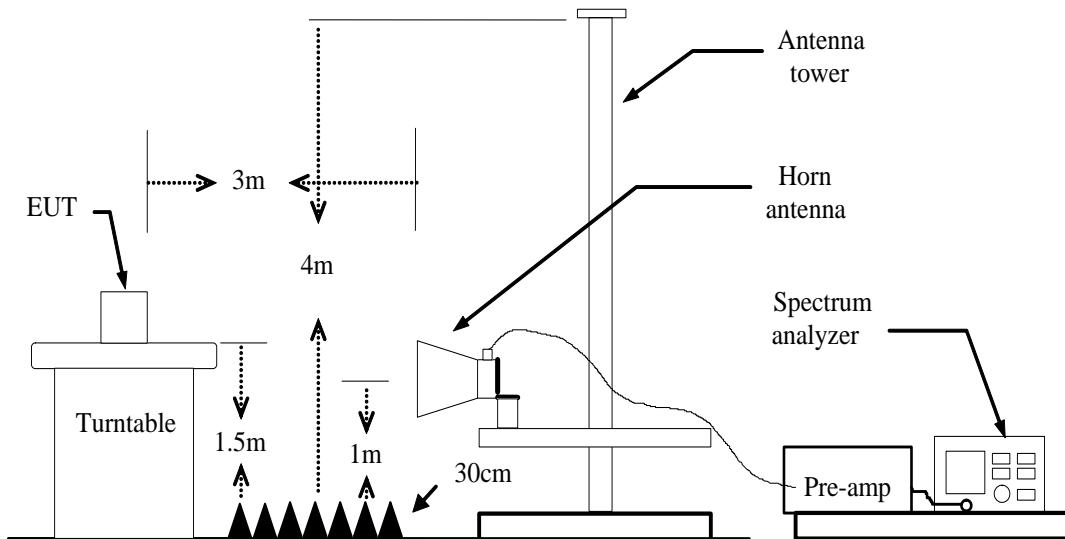
Radiated Emission Test Site 966(2)					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	02/21/2016	02/20/2017
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	02/21/2016	02/20/2017
Amplifier	EMEC	EM330	060661	03/18/2016	03/17/2017
High Noise Amplifier	Agilent	8449B	3008A01838	02/21/2016	02/20/2017
Loop Antenna	COM-POWER	AL-130	121044	09/25/2015	09/24/2016
Bilog Antenna	SCHAFFNER	CBL6143	5082	02/21/2016	02/20/2017
Horn Antenna	SCHWARZBECK	BBHA9120	D286	02/28/2016	02/27/2017
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	02/28/2016	02/27/2017
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/21/2016	02/20/2017
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The FCC Site Registration number is 101879.

3. N.C.R = No Calibration Required.

6.5.3 TEST CONFIGURATION



6.5.4 TEST PROCEDURE

1. The EUT is placed on a turntable, which is 1.5m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=1 / VBW=3MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz / VBW=3MHz / Sweep=AUTO / Detector=RMS
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.



6.5.5 TEST RESULT

IEEE 802.11a mode / 5745 ~ 5825MHz

Antenna 1:

1. Operating Frequency: 5745-5825MHz
2. CH Low: 5745MHz, CH High: 5825MHz
3. 26dB bandwidth: CH Low: 19.78MHz, CH High: 19.27MHz
4. Frequency Range: 5735.110MHz, 5834.635MHz

Antenna 2:

1. Operating Frequency: 5745-5825MHz
2. CH Low: 5745MHz, CH High: 5825MHz
3. 26dB bandwidth: CH Low: 19.37MHz, CH High: 19.26MHz
4. Frequency Range: 5735.315MHz, 5834.630MHz

IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz

Antenna 1:

1. Operating Frequency: 5745-5825MHz
2. CH Low: 5745MHz, CH High: 5825MHz
3. 26dB bandwidth: CH Low: 19.80MHz, CH High: 19.63MHz
4. Frequency Range: 5735.100MHz, 5834.815MHz

Antenna 2:

1. Operating Frequency: 5745-5825MHz
2. CH Low: 5745MHz, CH High: 5825MHz
3. 26dB bandwidth: CH Low: 19.77MHz, CH High: 19.86MHz
4. Frequency Range: 5735.115MHz, 5834.930MHz



IEEE 802.11n HT 40 MHz mode / 5755 ~ 5795MHz

Antenna 1:

1. Operating Frequency: 5755-5795MHz
2. CH Low: 5755MHz, CH High: 5795MHz
3. 26dB bandwidth: CH Low: 38.75MHz, CH High: 38.80MHz
4. Frequency Range: 5735.625MHz, 5814.400MHz

Antenna 2:

1. Operating Frequency: 5755-5795MHz
2. CH Low: 5755MHz, CH High: 5795MHz
3. 26dB bandwidth: CH Low: 39.19MHz, CH High: 39.08MHz
4. Frequency Range: 5735.405MHz, 5814.540MHz

IEEE 802.11ac 80 mode / 5755 ~ 5795MHz

Antenna 1:

1. Operating Frequency: 5775MHz
2. CH: 5775MHz
3. 26dB bandwidth: CH: 78.56MHz
4. Frequency Range: 5735.720MHz, 5814.280MHz

Antenna 2:

1. Operating Frequency: 5775MHz
2. CH: 5775MHz
3. 26dB bandwidth: CH: 78.58MHz
4. Frequency Range: 5735.710MHz, 5814.290MHz

Because the mentioned conditions, the test is not applicable.



6.6 PEAK POWER SPECTRAL DENSITY

6.6.1 LIMIT

According to §15.407(a) & FCC R&O FCC 14-30

- (1) (i) For an outdoor access point operating in the band 5.15 – 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15 – 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

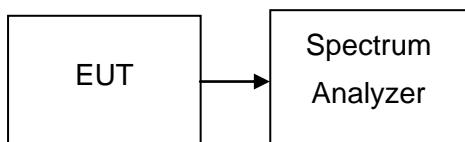


6.6.2 MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2016	02/20/2017

Remark: Each piece of equipment is scheduled for calibration once a year.

6.6.3 TEST CONFIGURATION



6.6.4 TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. For devices operating in the bands 5.15-5.25 GHz, Set the spectrum analyzer as RBW = 1MHz, VBW = 3MHz, Span = 30MHz, Sweep=1.2ms
3. For devices operating in the bands 5.725-5.85 GHz, Set the spectrum analyzer as RBW = 500kHz, VBW = 1.5MHz, Span = 30MHz, Sweep=1.2ms
4. Record the max. reading.
5. Repeat the above procedure until the measurements for all frequencies are completed



6.6.5 TEST RESULTS

Test Data

IEEE 802.11a mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	PPSD (dBm)		factor	Limit (dBm)	Margin		Result
		Antenna 1	Antenna 2			Antenna 1	Antenna 2	
Low	5745	2.528	4.021	-3.01	29	-29.482	-27.989	PASS
Mid	5785	3.667	3.992	-3.01		-28.343	-28.018	PASS
High	5825	2.357	3.954	-3.01		-29.653	-25.046	PASS

Test mode: IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	PPSD (dBm)		factor	Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 1	Antenna 2					
Low	5745	3.625	2.573	-3.01	3.131	29	-25.869	PASS
Mid	5785	3.298	4.364	-3.01	3.864		-25.136	PASS
High	5825	2.835	2.371	-3.01	2.609		-26.391	PASS

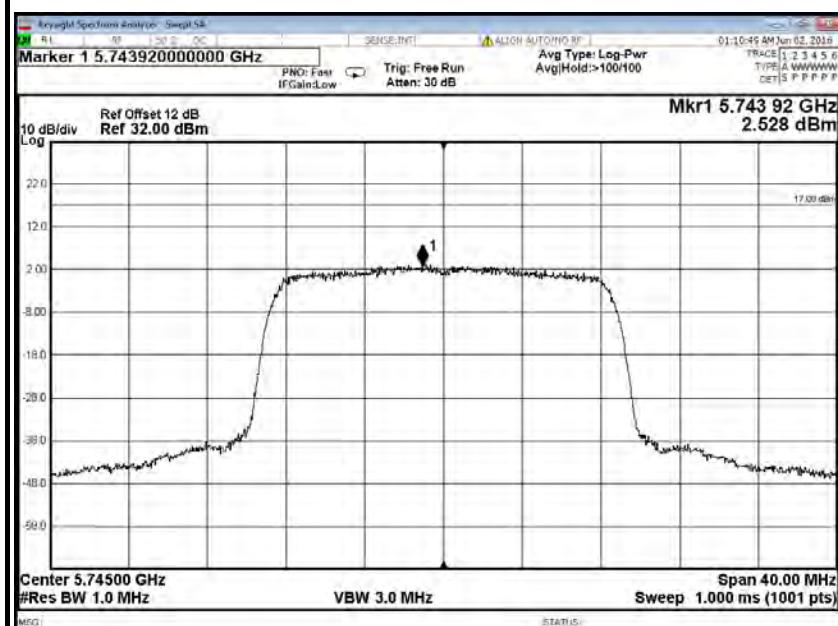
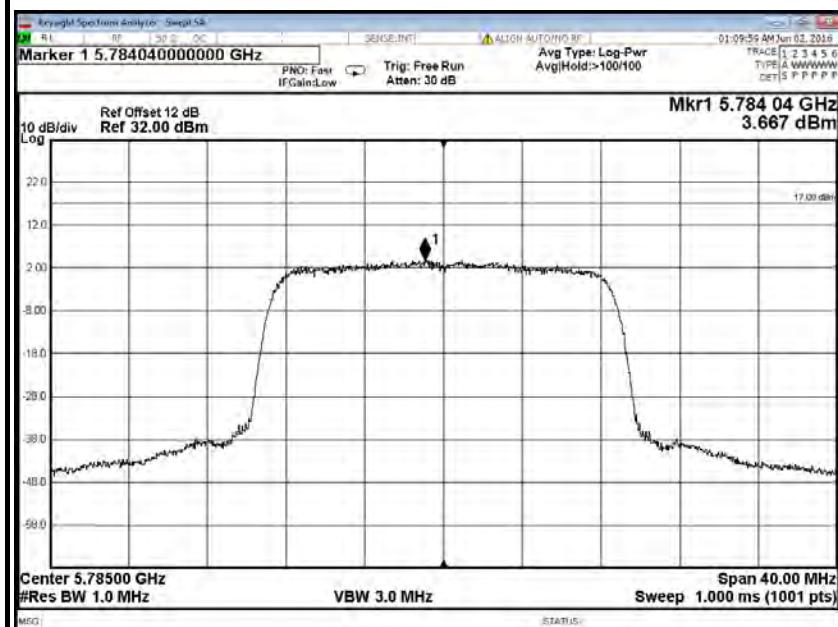
IEEE 802.11n HT 40 MHz mode / 5755 ~ 5795MHz

Channel	Frequency (MHz)	PPSD (dBm)		factor	Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 1	Antenna 2					
Low	5755	0.581	0.442	-3.01	0.512	29	-28.488	PASS
High	5795	-0.100	0.491	-3.01	0.206		-28.794	PASS

IEEE 802.11ac 80 mode / 5775MHz

Channel	Frequency (MHz)	PPSD (dBm)		factor	Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 1	Antenna 2					
	5775	-1.087	-0.890	-3.01	-0.987	29	-29.987	PASS

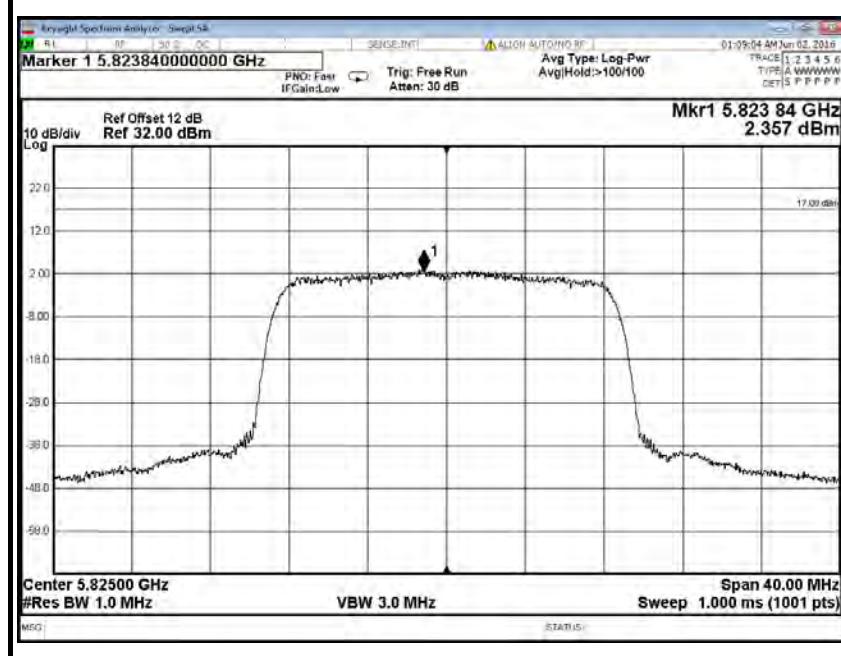
Remark: factor = $10 \cdot \log_{10}(500/\text{RBW})$

**Test Plot****IEEE 802.11a mode / 5745 ~ 5825MHz****PPSD (CH Low)****Antenna 1****PPSD (CH Mid)****Antenna 1**



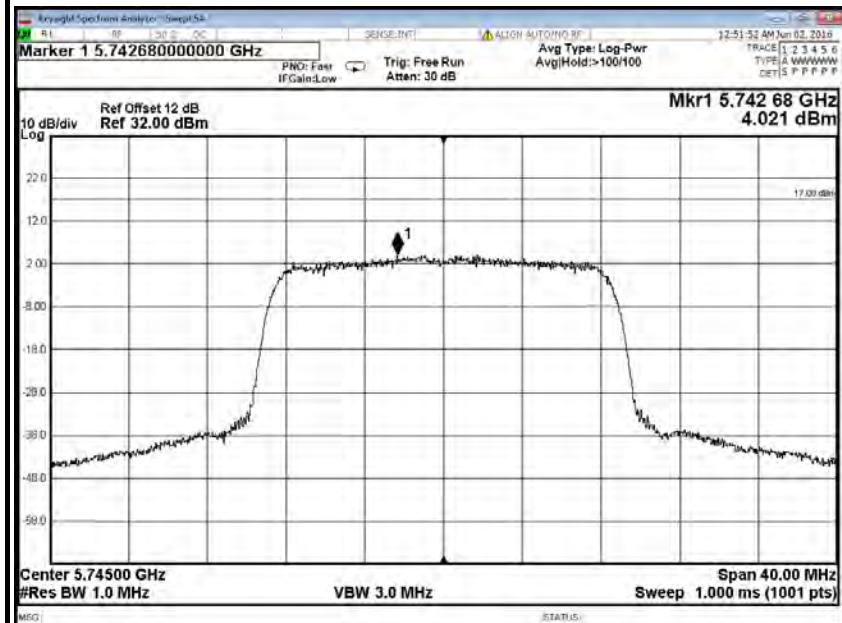
PPSD (CH High)

Antenna 1

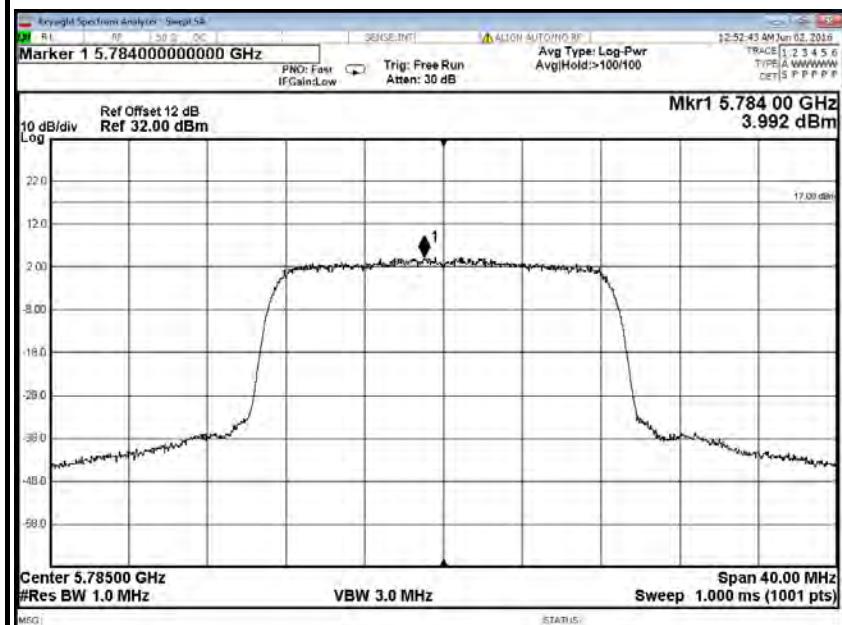


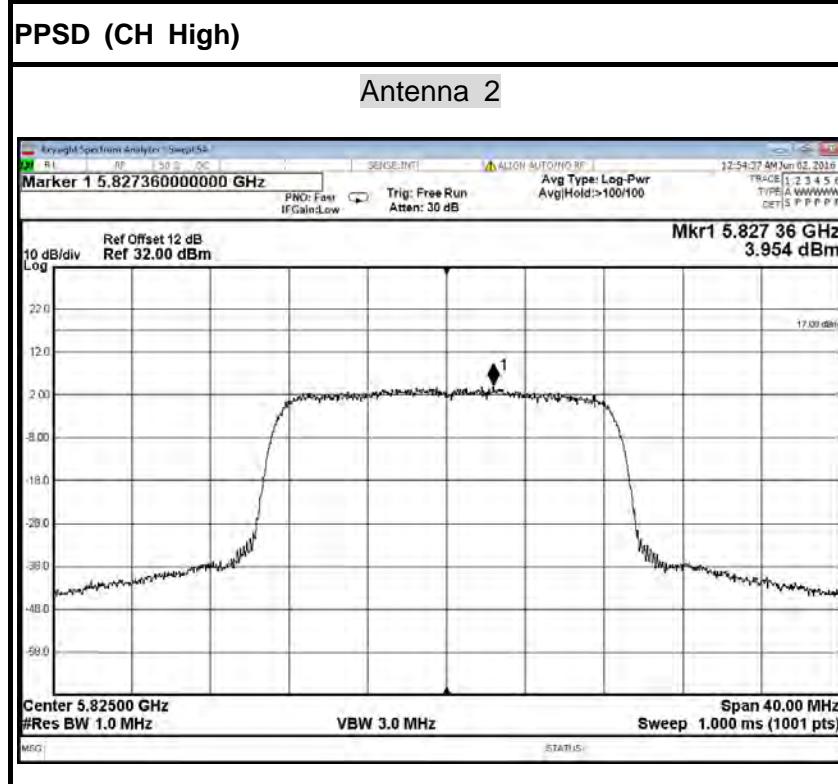
**IEEE 802.11a mode / 5745 ~ 5825MHz****PPSD (CH Low)**

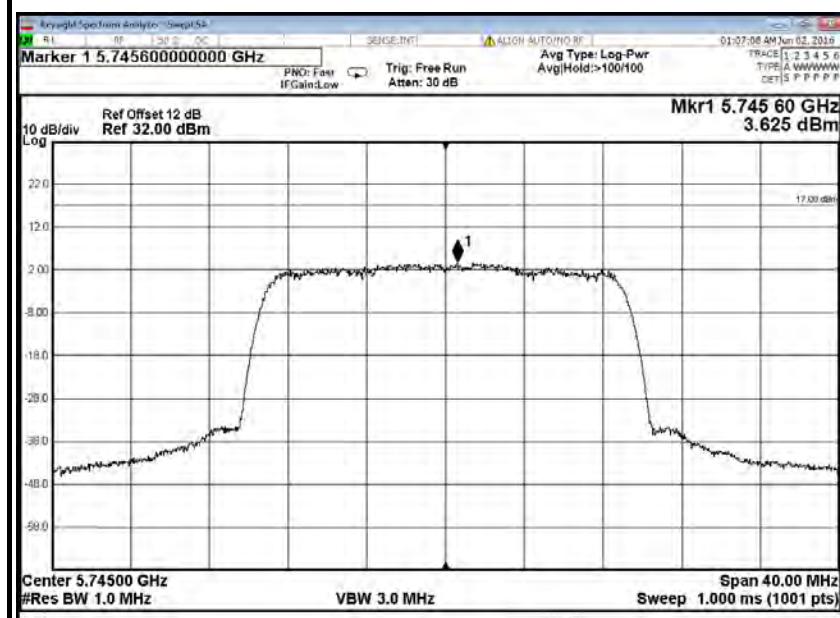
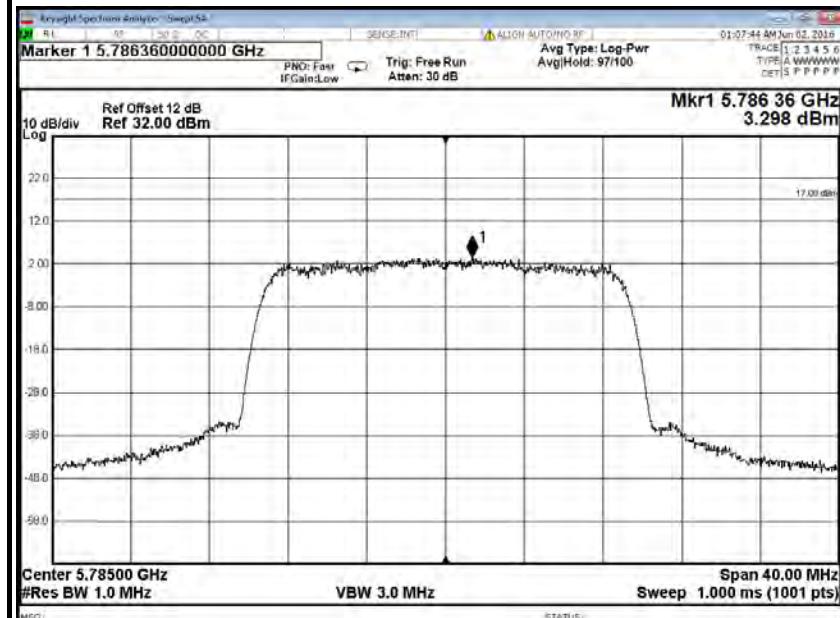
Antenna 2

**PPSD (CH Mid)**

Antenna 2



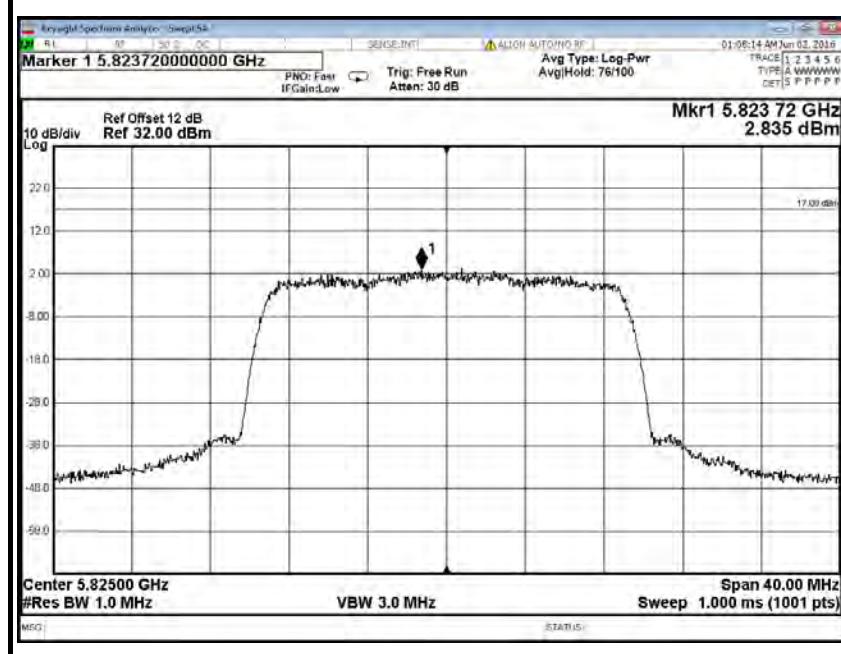


**IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz****PPSD (CH Low)****Antenna 1****PPSD (CH Mid)****Antenna 1**



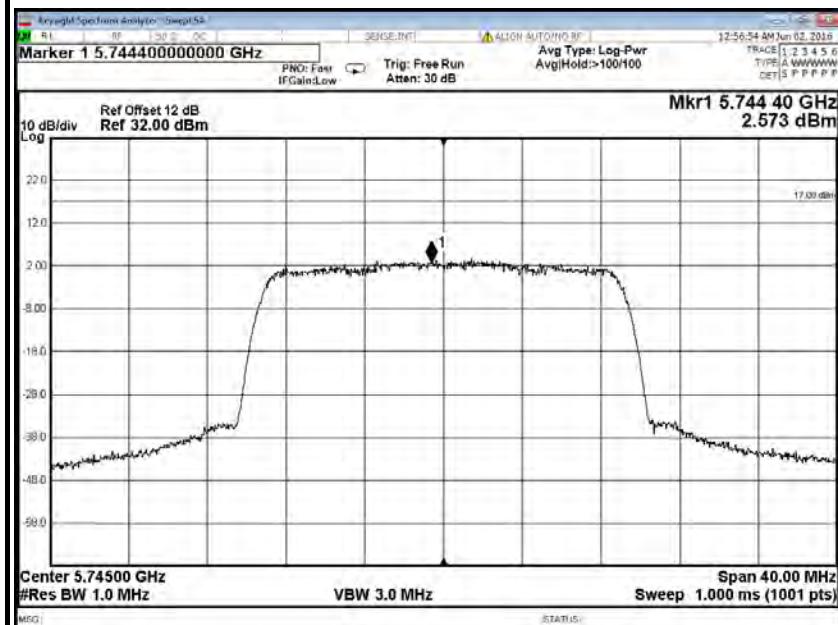
PPSD (CH High)

Antenna 1

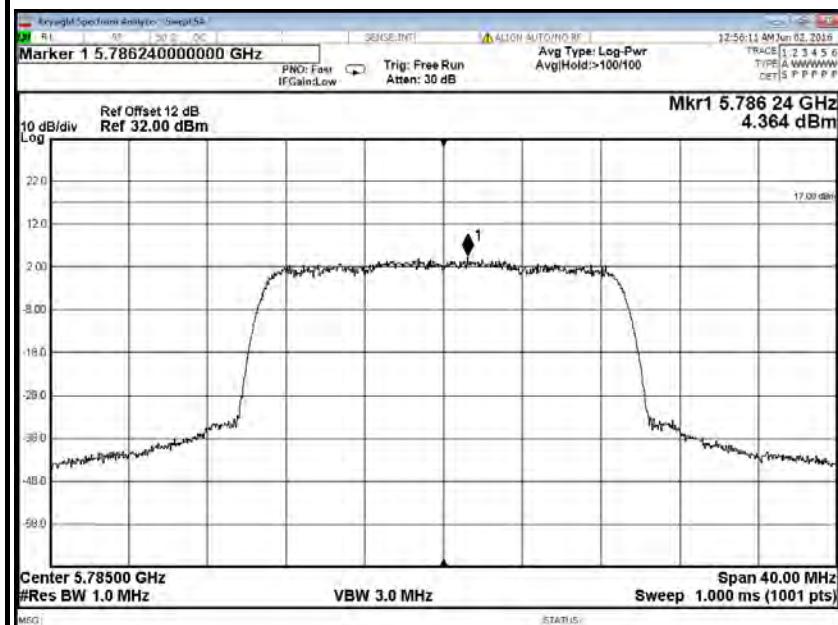


**IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz****PPSD (CH Low)**

Antenna 2

**PPSD (CH Mid)**

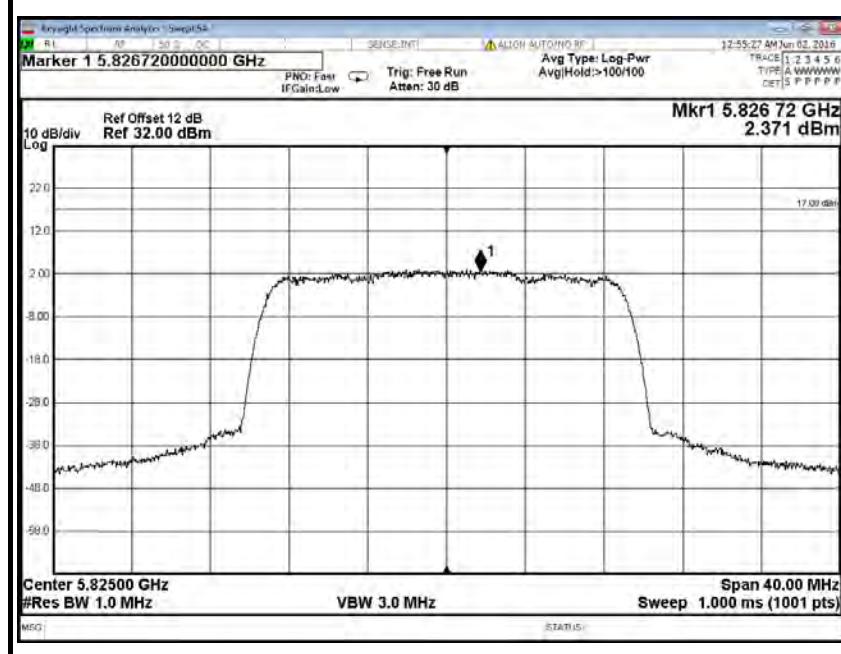
Antenna 2

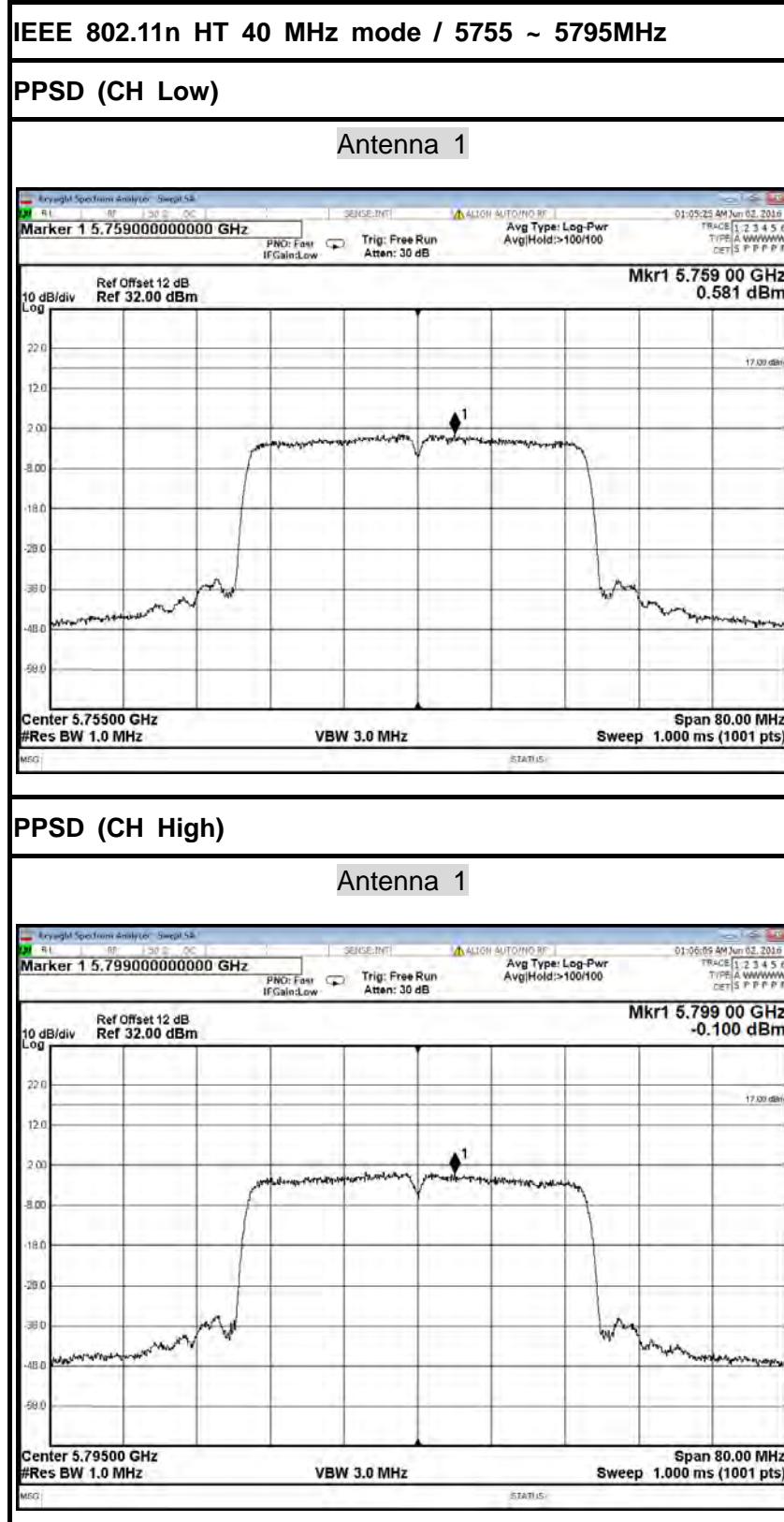




PPSD (CH High)

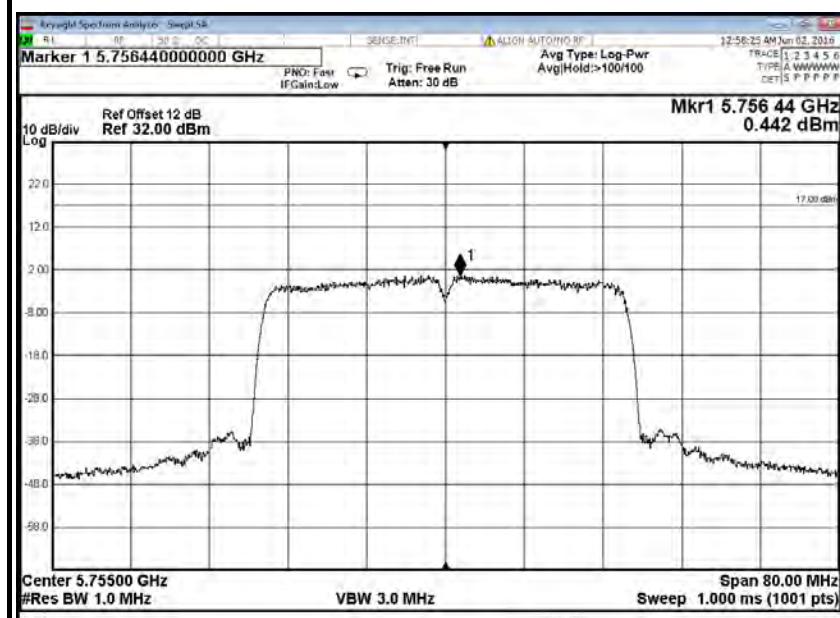
Antenna 2





**IEEE 802.11n HT 40 MHz mode / 5755 ~ 5795MHz****PPSD (CH Low)**

Antenna 2

**26dB Bandwidth (CH High)**

Antenna 2

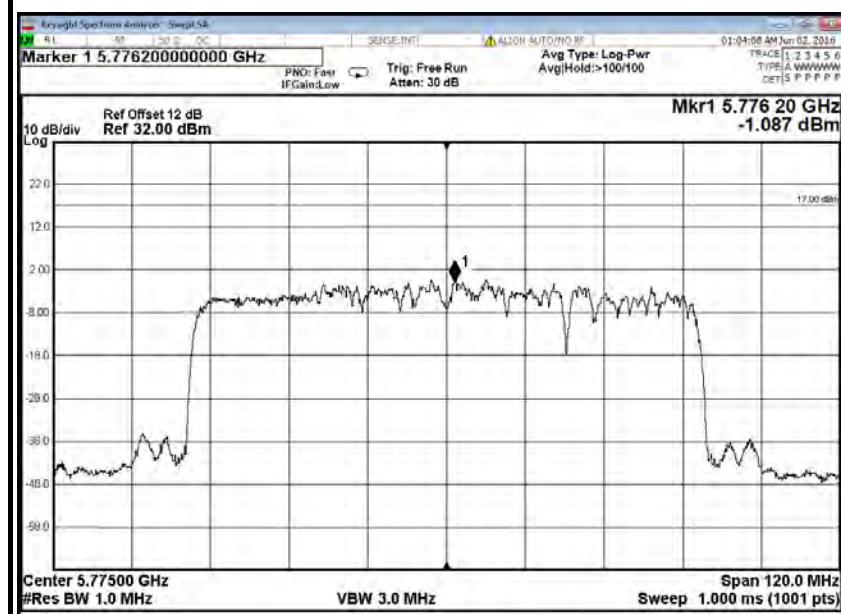




IEEE 802.11ac 80 mode / 5775MHz

PPSD

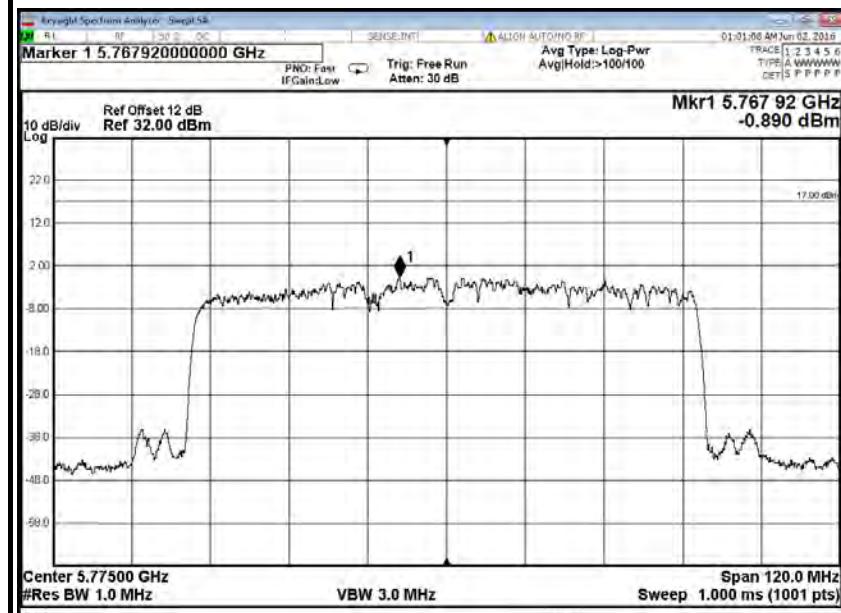
Antenna 1



IEEE 802.11ac 80 mode / 5775MHz

PPSD

Antenna 2





6.7 RADIATED UNDESIRABLE EMISSION

6.7.1 LIMIT

- According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μ V/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

- In the emission table above, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength (μ V/m at 3-meter)	Field Strength (dB μ V/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

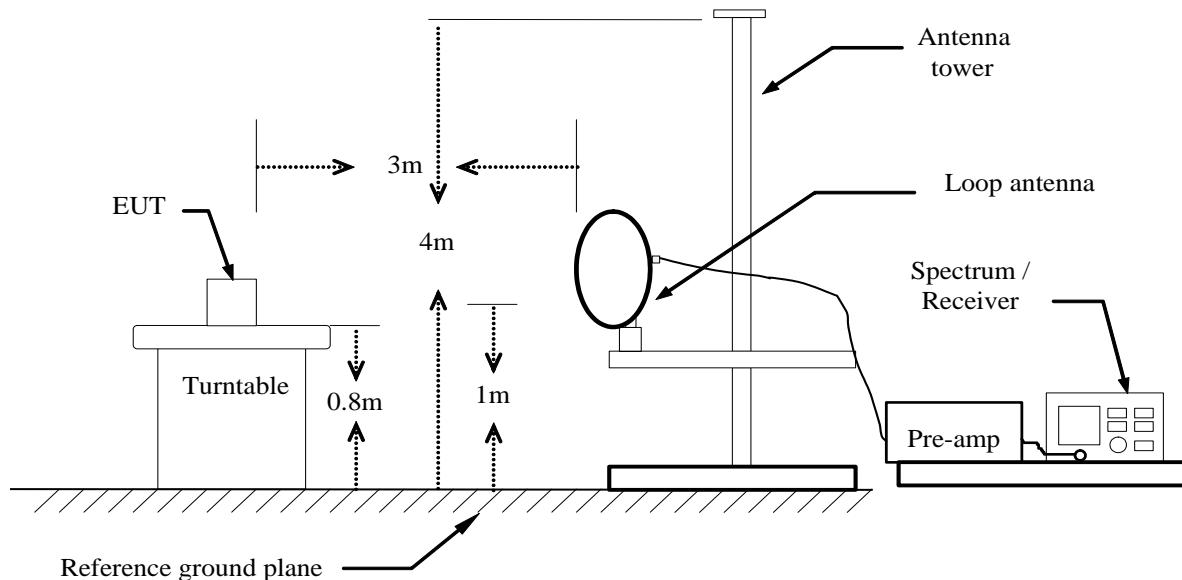


6.7.2 TEST INSTRUMENTS

Radiated Emission Test Site 966(2)					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	02/21/2016	02/20/2017
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	02/21/2016	02/20/2017
Amplifier	EMEC	EM330	060661	03/18/2016	03/17/2017
High Noise Amplifier	Agilent	8449B	3008A01838	02/21/2016	02/20/2017
Loop Antenna	COM-POWER	AL-130	121044	09/25/2015	09/24/2016
Bilog Antenna	SCHAFFNER	CBL6143	5082	02/21/2016	02/20/2017
Horn Antenna	SCHWARZBECK	BBHA9120	D286	02/28/2016	02/27/2017
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	02/28/2016	02/27/2017
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/21/2016	02/20/2017
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

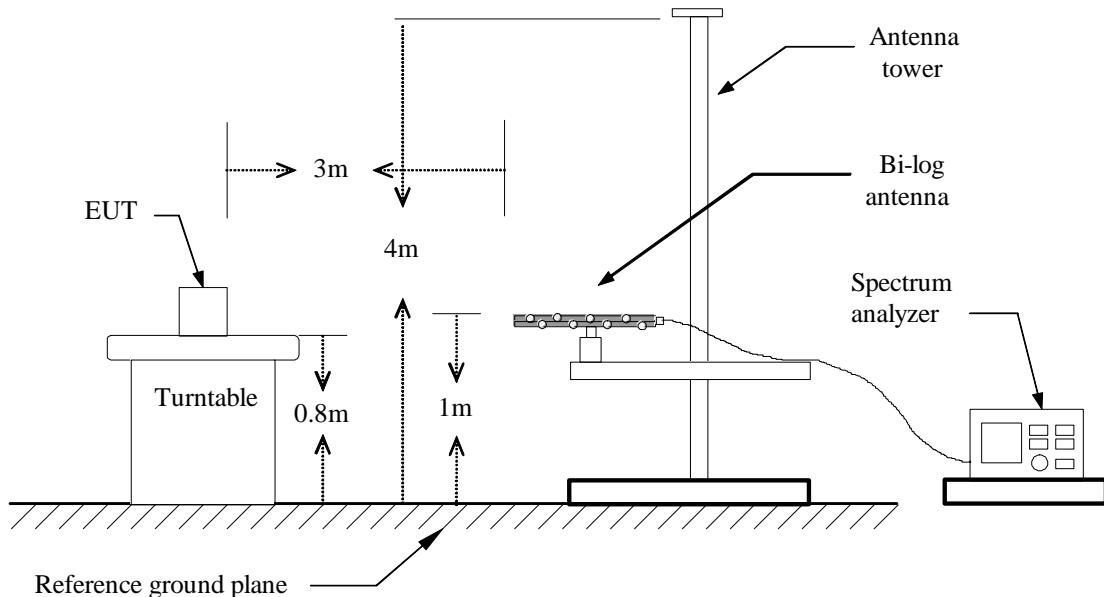
6.7.3 TEST CONFIGURATION

Below 30MHz

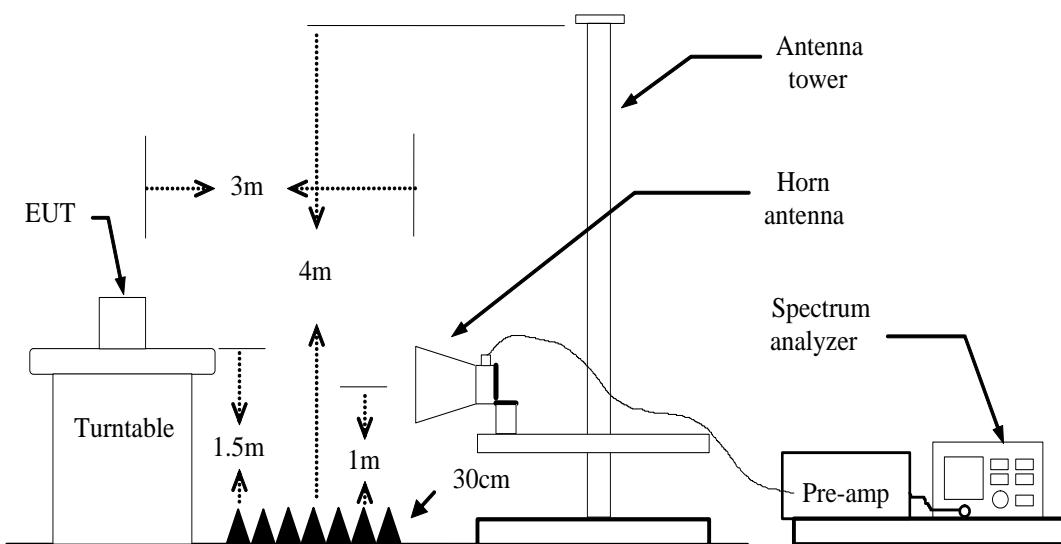




Below 1 GHz



Above 1 GHz



For the actual test configuration, please refer to the related item – Photographs of the TEST CONFIGURATION.



6.7.4 TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m or 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=3MHz / Sweep=AUTO / Detector=RMS

7. Repeat above procedures until the measurements for all frequencies are complete.



6.7.5 DATA SAMPLE

Below 1GHz

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
XXX.XXXX	36.37	-12.20	24.17	40.00	-15.83	V	QP

Frequency (MHz) = Emission frequency in MHz
 Reading (dBuV) = Uncorrected Analyzer / Receiver reading
 Correct Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain
 Result (dBuV/m) = Reading (dBuV) + Corr. Factor (dB/m)
 Limit (dBuV/m) = Limit stated in standard
 Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)
 Q.P. = Quasi-peak Reading

Above 1GHz

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
XXXX.XXXX	62.09	-11.42	50.67	74.00	-23.33	V	Peak
XXXX.XXXX	49.78	-11.42	38.36	54.00	-15.64	V	AVG

Frequency (MHz) = Emission frequency in MHz
 Reading (dBuV) = Uncorrected Analyzer / Receiver reading
 Correction Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain
 Result (dBuV/m) = Reading (dBuV) + Corr. Factor (dB/m)
 Limit (dBuV/m) = Limit stated in standard
 Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)
 Peak = Peak Reading
 AVG = Average Reading

Calculation Formula

Margin (dB) = Result (dBuV/m) – Limits (dBuV/m)
 Result (dBuV/m) = Reading (dBuV) + Correction Factor



6.7.6 TEST RESULTS

Below 1 GHz

Test Mode: TX

Tested by: Jack Chen

Ambient temperature: 24°C Relative humidity: 52% RH

Date: May 20, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
98.8700	61.43	-23.80	37.63	43.50	-5.87	V	QP
233.7000	62.28	-21.72	40.56	46.00	-5.44	V	QP
591.6300	52.87	-13.01	39.86	46.00	-6.14	V	QP
627.5200	53.22	-12.61	40.61	46.00	-5.39	V	QP
823.4600	49.18	-10.46	38.72	46.00	-7.28	V	QP
862.2600	50.60	-10.56	40.04	46.00	-5.96	V	QP
118.2700	58.59	-21.26	37.33	43.50	-6.17	H	QP
251.1600	58.78	-20.94	37.84	46.00	-8.16	H	QP
512.0900	54.67	-14.22	40.45	46.00	-5.55	H	QP
533.4300	53.32	-13.68	39.64	46.00	-6.36	H	QP
719.6700	51.73	-11.86	39.87	46.00	-6.13	H	QP
781.7500	52.61	-11.21	41.40	46.00	-4.60	H	QP

Remark:

1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).

**Above 1 GHz****1GHz~6GHz****Test Mode:** TX / IEEE 802.11a / 5745MHz /(CH Low)**Tested by:** Jack Chen**Ambient temperature:** 24°C **Relative humidity:** 52% RH**Date:** May 20, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1710.000	51.88	-6.46	45.42	74.00	-28.58	V	peak
1945.000	51.92	-5.35	46.57	74.00	-27.43	V	peak
2775.000	44.46	-1.76	42.70	74.00	-31.30	V	peak
4285.000	42.35	2.59	44.94	74.00	-29.06	V	peak
4935.000	41.61	4.77	46.38	74.00	-27.62	V	peak
5600.000	41.61	5.91	47.52	74.00	-26.48	V	peak
2600.000	53.33	-2.08	51.25	74.00	-22.75	H	Peak
3695.000	42.74	0.30	43.04	74.00	-30.96	H	peak
4730.000	42.18	4.10	46.28	74.00	-27.72	H	Peak
5260.000	47.94	5.44	53.38	74.00	-20.62	H	Peak
5260.000	40.76	5.44	46.20	54.00	-7.80	H	AVG
5550.000	43.48	5.89	49.37	74.00	-24.63	H	peak
5740.000	45.30	5.97	51.27	74.00	-22.73	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Antenna 1****Test Mode: TX / IEEE 802.11a / 5745MHz /(CH Low)****Tested by: Jack Chen****Ambient temperature: 24°C Relative humidity: 52% RH****Date: May 20, 2016**

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
9984.000	30.97	11.93	42.90	74.00	-31.10	V	peak
10872.000	30.11	14.68	44.79	74.00	-29.21	V	peak
12456.000	29.89	16.15	46.04	74.00	-27.96	V	peak
12924.000	29.78	17.70	47.48	74.00	-26.52	V	peak
14244.000	28.57	20.72	49.29	74.00	-24.71	V	peak
15264.000	28.54	19.96	48.50	74.00	-25.50	V	peak
9612.000	31.02	10.86	41.88	74.00	-32.12	H	Peak
10524.000	30.36	13.60	43.96	74.00	-30.04	H	Peak
11856.000	30.34	14.70	45.04	74.00	-28.96	H	Peak
12972.000	29.22	17.86	47.08	74.00	-26.92	H	peak
13632.000	27.80	19.61	47.41	74.00	-26.59	H	peak
15000.000	28.55	21.16	49.71	74.00	-24.29	H	peak

Remark:

7. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
8. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
9. Average test would be performed if the peak result were greater than the average limit.
10. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
11. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
12. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Test Mode:** TX / IEEE 802.11a / 5785MHz /(CH Mid)**Tested by:** Jack Chen**Ambient temperature:** 24°C **Relative humidity:** 52% RH**Date:** May 20, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
8364.000	31.58	9.45	41.03	74.00	-32.97	V	peak
10272.000	30.20	12.82	43.02	74.00	-30.98	V	peak
11316.000	30.29	14.94	45.23	74.00	-28.77	V	peak
12828.000	28.72	17.38	46.10	74.00	-27.90	V	peak
14160.000	27.38	20.67	48.05	74.00	-25.95	V	peak
14964.000	28.19	21.14	49.33	74.00	-24.67	V	peak
8292.000	31.66	9.49	41.15	74.00	-32.85	H	Peak
9948.000	30.15	11.83	41.98	74.00	-32.02	H	Peak
11820.000	30.26	14.72	44.98	74.00	-29.02	H	Peak
13008.000	28.71	17.97	46.68	74.00	-27.32	H	peak
14244.000	28.30	20.72	49.02	74.00	-24.98	H	peak
14928.000	28.37	21.12	49.49	74.00	-24.51	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Test Mode:** TX / IEEE 802.11a / 5825MHz /(CH High)**Tested by:** Jack Chen**Ambient temperature:** 24°C **Relative humidity:** 52% RH**Date:** May 20, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
8352.000	32.07	9.46	41.53	74.00	-32.47	V	peak
11016.000	30.04	15.07	45.11	74.00	-28.89	V	peak
12420.000	29.49	16.03	45.52	74.00	-28.48	V	peak
13596.000	27.46	19.52	46.98	74.00	-27.02	V	peak
14412.000	28.11	20.82	48.93	74.00	-25.07	V	peak
15000.000	28.41	21.16	49.57	74.00	-24.43	V	peak
9912.000	30.44	11.73	42.17	74.00	-31.83	H	Peak
10944.000	29.47	14.91	44.38	74.00	-29.62	H	Peak
11652.000	31.06	14.79	45.85	74.00	-28.15	H	Peak
13560.000	27.73	19.42	47.15	74.00	-26.85	H	peak
14460.000	28.33	20.85	49.18	74.00	-24.82	H	peak
15156.000	29.08	20.45	49.53	74.00	-24.47	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Antenna 2****Test Mode: TX / IEEE 802.11a / 5745MHz /(CH Low)****Tested by: Jack Chen****Ambient temperature: 24°C Relative humidity: 52% RH****Date: May 20, 2016**

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
9924.000	30.07	11.76	41.83	74.00	-32.17	V	peak
11484.000	31.76	14.87	46.63	74.00	-27.37	V	peak
12576.000	29.03	16.55	45.58	74.00	-28.42	V	peak
13968.000	28.97	20.50	49.47	74.00	-24.53	V	peak
14448.000	29.59	20.84	50.43	74.00	-23.57	V	peak
15036.000	30.65	21.00	51.65	74.00	-22.35	V	peak
9948.000	30.13	11.83	41.96	74.00	-32.04	H	Peak
11496.000	32.56	14.86	47.42	74.00	-26.58	H	Peak
13668.000	29.74	19.71	49.45	74.00	-24.55	H	Peak
14712.000	30.04	20.99	51.03	74.00	-22.97	H	peak
14988.000	30.48	21.15	51.63	74.00	-22.37	H	peak
15408.000	31.73	19.30	51.03	74.00	-22.97	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Test Mode:** TX / IEEE 802.11a / 5785MHz /(CH Mid)**Tested by:** Jack Chen**Ambient temperature:** 24°C **Relative humidity:** 52% RH**Date:** May 20, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
10824.000	29.65	14.53	44.18	74.00	-29.82	V	peak
11568.000	32.64	14.83	47.47	74.00	-26.53	V	peak
13332.000	27.60	18.82	46.42	74.00	-27.58	V	peak
13752.000	29.51	19.93	49.44	74.00	-24.56	V	peak
14400.000	29.77	20.81	50.58	74.00	-23.42	V	peak
15012.000	30.68	21.11	51.79	74.00	-22.21	V	peak
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11568.000	32.06	14.83	46.89	74.00	-27.11	H	Peak
12504.000	29.38	16.31	45.69	74.00	-28.31	H	Peak
13752.000	29.34	19.93	49.27	74.00	-24.73	H	Peak
14004.000	29.56	20.58	50.14	74.00	-23.86	H	peak
15012.000	30.41	21.11	51.52	74.00	-22.48	H	peak
15396.000	32.08	19.36	51.44	74.00	-22.56	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Test Mode:** TX / IEEE 802.11a / 5825MHz /(CH High)**Tested by:** Jack Chen**Ambient temperature:** 24°C **Relative humidity:** 52% RH**Date:** May 20, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
7824.000	31.01	9.31	40.32	74.00	-33.68	V	peak
10296.000	29.66	12.90	42.56	74.00	-31.44	V	peak
11652.000	32.60	14.79	47.39	74.00	-26.61	V	peak
12780.000	28.25	17.22	45.47	74.00	-28.53	V	peak
14328.000	29.59	20.77	50.36	74.00	-23.64	V	peak
14736.000	29.77	21.01	50.78	74.00	-23.22	V	peak
<hr/>							
9972.000	30.63	11.90	42.53	74.00	-31.47	H	Peak
11016.000	29.19	15.07	44.26	74.00	-29.74	H	Peak
11652.000	34.64	14.79	49.43	74.00	-24.57	H	Peak
13740.000	29.85	19.90	49.75	74.00	-24.25	H	peak
14388.000	29.73	20.81	50.54	74.00	-23.46	H	peak
14784.000	30.10	21.03	51.13	74.00	-22.87	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Combine with Antenna 1 and Antenna 2****Test Mode: TX / IEEE 802.11n HT 20 MHz / 5745MHz /(CH Low)****Tested by: Jack Chen****Ambient temperature: 24°C****Relative humidity: 52% RH****Date: May 20, 2016**

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
8448.000	31.90	9.40	41.30	74.00	-32.70	V	peak
10056.000	30.72	12.15	42.87	74.00	-31.13	V	peak
10920.000	29.66	14.83	44.49	74.00	-29.51	V	peak
11484.000	30.39	14.87	45.26	74.00	-28.74	V	peak
12936.000	28.95	17.74	46.69	74.00	-27.31	V	peak
14316.000	28.05	20.76	48.81	74.00	-25.19	V	peak
10056.000	31.11	12.15	43.26	74.00	-30.74	H	Peak
11088.000	30.24	15.04	45.28	74.00	-28.72	H	Peak
11484.000	32.64	14.87	47.51	74.00	-26.49	H	Peak
13008.000	28.60	17.97	46.57	74.00	-27.43	H	peak
14388.000	28.14	20.81	48.95	74.00	-25.05	H	peak
15000.000	28.13	21.16	49.29	74.00	-24.71	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Test Mode: TX / IEEE 802.11n HT 20 MHz / 5785MHz /(CH Mid)****Tested by: Jack Chen****Ambient temperature: 24°C****Relative humidity: 52% RH****Date: May 20, 2016**

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
8004.000	31.05	9.65	40.70	74.00	-33.30	V	peak
10524.000	29.63	13.60	43.23	74.00	-30.77	V	peak
11568.000	31.54	14.83	46.37	74.00	-27.63	V	peak
12960.000	28.86	17.82	46.68	74.00	-27.32	V	peak
14076.000	27.82	20.62	48.44	74.00	-25.56	V	peak
14976.000	28.77	21.15	49.92	74.00	-24.08	V	peak
10080.000	30.73	12.23	42.96	74.00	-31.04	H	Peak
11052.000	29.69	15.06	44.75	74.00	-29.25	H	Peak
11568.000	32.20	14.83	47.03	74.00	-26.97	H	Peak
12912.000	29.00	17.66	46.66	74.00	-27.34	H	peak
14508.000	28.21	20.87	49.08	74.00	-24.92	H	peak
16392.000	28.56	19.27	47.83	74.00	-26.17	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Test Mode: TX / IEEE 802.11n HT 20 MHz / 5825MHz /(CH High) **Tested by: Jack Chen**
Ambient temperature: 24°C Relative humidity: 52% RH **Date: May 20, 2016**

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
10284.000	30.24	12.86	43.10	74.00	-30.90	V	peak
11016.000	30.33	15.07	45.40	74.00	-28.60	V	peak
11652.000	32.78	14.79	47.57	74.00	-26.43	V	peak
13116.000	28.41	18.26	46.67	74.00	-27.33	V	peak
14400.000	28.27	20.81	49.08	74.00	-24.92	V	peak
14964.000	28.77	21.14	49.91	74.00	-24.09	V	peak
10056.000	30.92	12.15	43.07	74.00	-30.93	H	Peak
10776.000	29.41	14.39	43.80	74.00	-30.20	H	Peak
11652.000	33.11	14.79	47.90	74.00	-26.10	H	Peak
13584.000	27.84	19.49	47.33	74.00	-26.67	H	peak
14484.000	28.03	20.86	48.89	74.00	-25.11	H	peak
14952.000	28.68	21.13	49.81	74.00	-24.19	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Combine with Antenna 1 and Antenna 2****Test Mode:** TX / IEEE 802.11n HT 40 MHz / 5755MHz /(CH Low) **Tested by:** Jack Chen**Ambient temperature:** 24°C **Relative humidity:** 52% RH **Date:** May 20, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
8412.000	30.58	9.42	40.00	74.00	-34.00	V	peak
10368.000	29.64	13.12	42.76	74.00	-31.24	V	peak
11496.000	31.36	14.86	46.22	74.00	-27.78	V	peak
12576.000	29.17	16.55	45.72	74.00	-28.28	V	peak
13692.000	29.77	19.77	49.54	74.00	-24.46	V	peak
15024.000	30.63	21.05	51.68	74.00	-22.32	V	peak
6252.000	33.71	6.49	40.20	74.00	-33.80	H	Peak
10404.000	29.78	13.23	43.01	74.00	-30.99	H	Peak
11508.000	32.04	14.86	46.90	74.00	-27.10	H	Peak
11508.000	32.04	14.86	46.90	74.00	-27.10	H	peak
13704.000	29.79	19.80	49.59	74.00	-24.41	H	peak
14964.000	30.45	21.14	51.59	74.00	-22.41	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Test Mode: TX / IEEE 802.11n HT 40 MHz / 5795MHz /(CH High) **Tested by:** Jack Chen
Ambient temperature: 24°C **Relative humidity: 52% RH** **Date:** May 20, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
9456.000	30.83	10.41	41.24	74.00	-32.76	V	peak
10572.000	29.77	13.75	43.52	74.00	-30.48	V	peak
11592.000	31.79	14.82	46.61	74.00	-27.39	V	peak
13596.000	29.60	19.52	49.12	74.00	-24.88	V	peak
13980.000	29.24	20.53	49.77	74.00	-24.23	V	peak
15024.000	30.71	21.05	51.76	74.00	-22.24	V	peak
6288.000	32.87	6.55	39.42	74.00	-34.58	H	Peak
10092.000	30.18	12.27	42.45	74.00	-31.55	H	Peak
11592.000	31.40	14.82	46.22	74.00	-27.78	H	Peak
13632.000	29.47	19.61	49.08	74.00	-24.92	H	peak
14016.000	29.39	20.59	49.98	74.00	-24.02	H	peak
15024.000	30.63	21.05	51.68	74.00	-22.32	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Combine with antenna 1 and antenna 2****Test Mode: TX / IEEE 802.11ac 80 / 5775MHz****Tested by: Jack Chen****Ambient temperature: 24°C Relative humidity: 52% RH****Date: May 20, 2016**

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
10572.000	29.61	13.75	43.36	74.00	-30.64	V	peak
11556.000	30.88	14.84	45.72	74.00	-28.28	V	peak
13296.000	28.04	18.73	46.77	74.00	-27.23	V	peak
14016.000	29.23	20.59	49.82	74.00	-24.18	V	peak
14724.000	30.35	21.00	51.35	74.00	-22.65	V	peak
15228.000	31.01	20.12	51.13	74.00	-22.87	V	peak
6228.000	37.06	6.45	43.51	74.00	-30.49	H	Peak
9996.000	30.26	11.97	42.23	74.00	-31.77	H	Peak
11544.000	30.66	14.84	45.50	74.00	-28.50	H	Peak
13596.000	28.95	19.52	48.47	74.00	-25.53	H	peak
14232.000	29.03	20.71	49.74	74.00	-24.26	H	peak
14976.000	30.48	21.15	51.63	74.00	-22.37	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



6.8 CONDUCTED UNDESIRABLE EMISSION

6.8.1 LIMIT

According to 15.407(b) ,

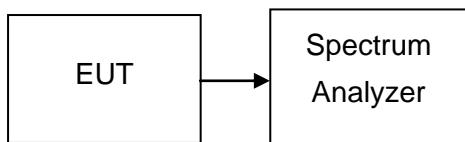
- (1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- (2) For transmitters operating in the 5.725–5.850 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of –17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of –27 dBm/MHz.
- (3) The provisions of §15.205 apply to intentional radiators operating under this section.

6.8.2 MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	E4446A	US44300399	02/21/2016	02/20/2017

Remark: Each piece of equipment is scheduled for calibration once a year.

6.8.3 TEST CONFIGURATION



6.8.4 TEST PROCEDURE

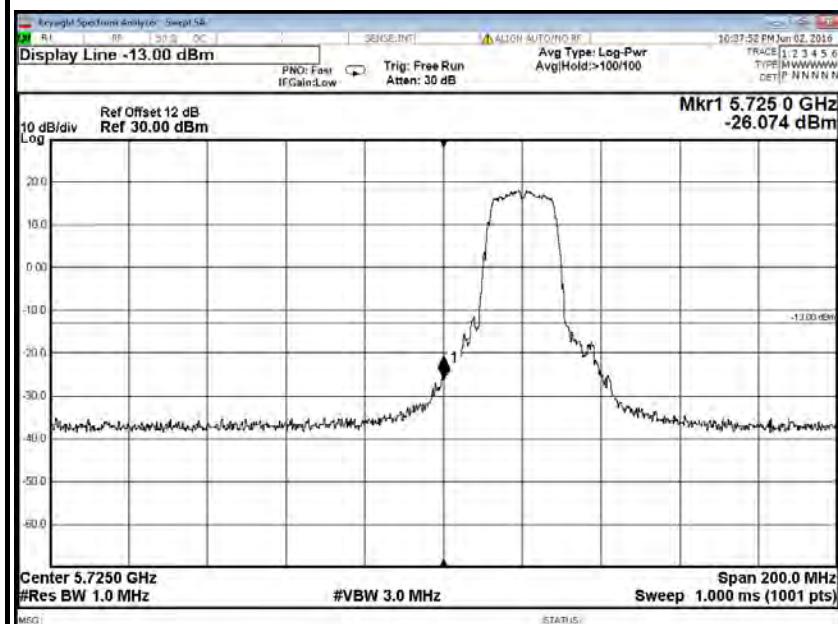
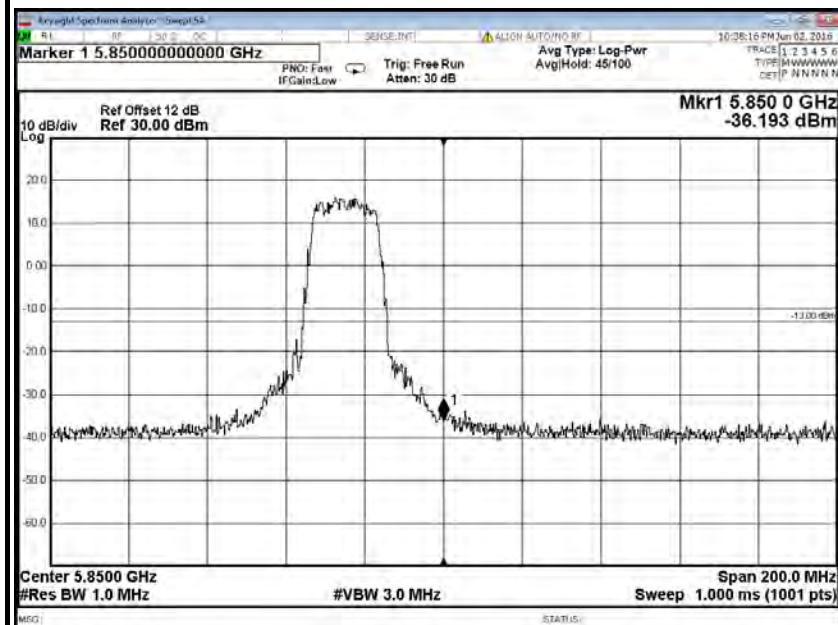
Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

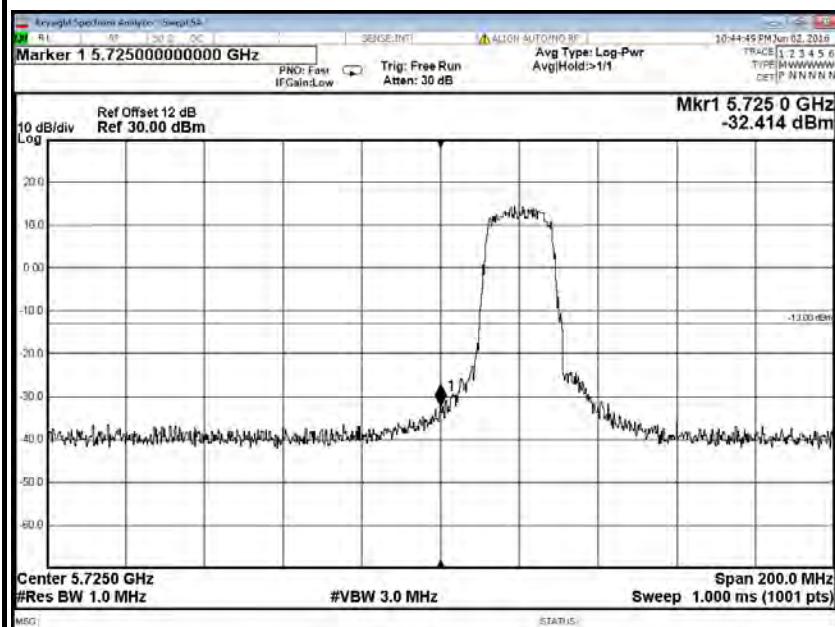
6.8.5 TEST RESULTS

No non-compliance noted

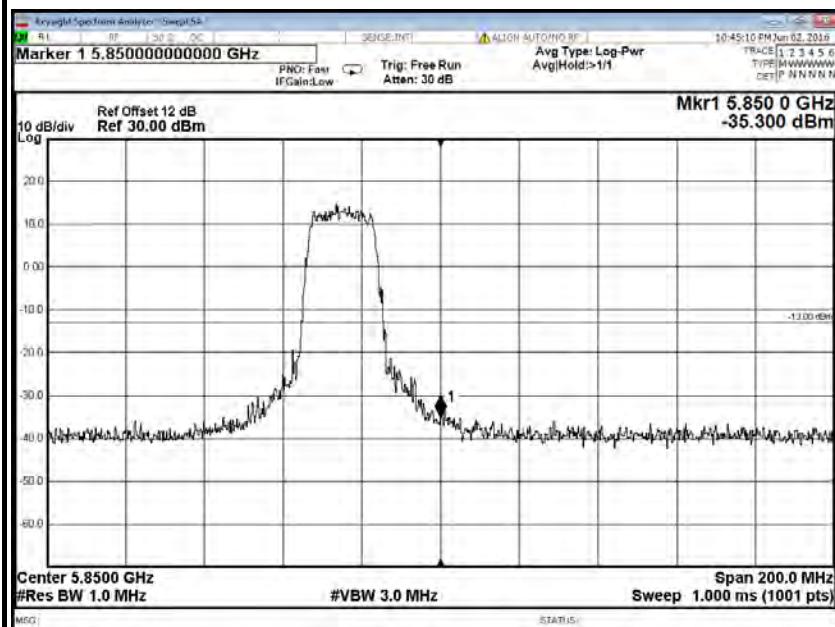
**Test Plot****IEEE 802.11a mode / 5745 ~ 5825MHz****CH Low****Antenna 1****CH High****Antenna 1**

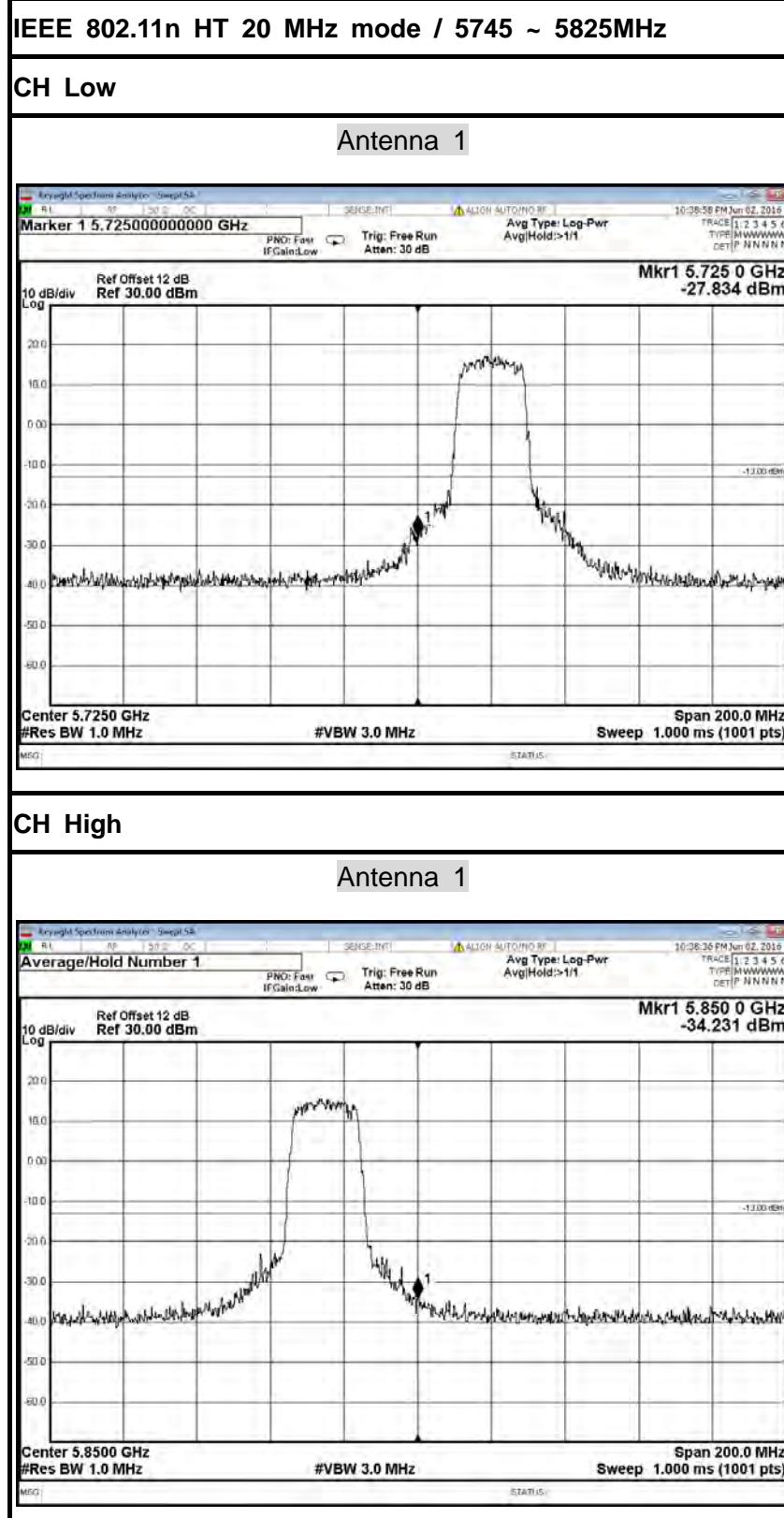
**IEEE 802.11a mode / 5745 ~ 5825MHz****CH Low**

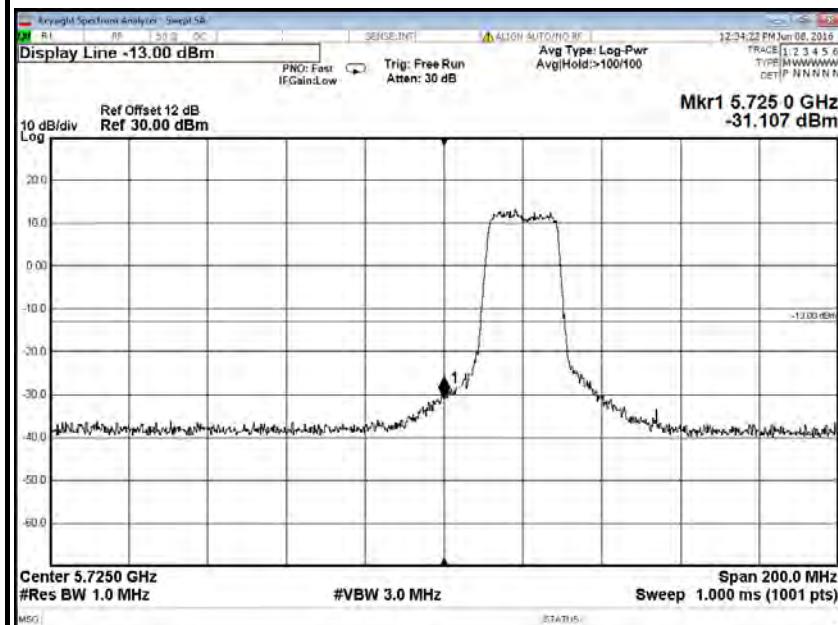
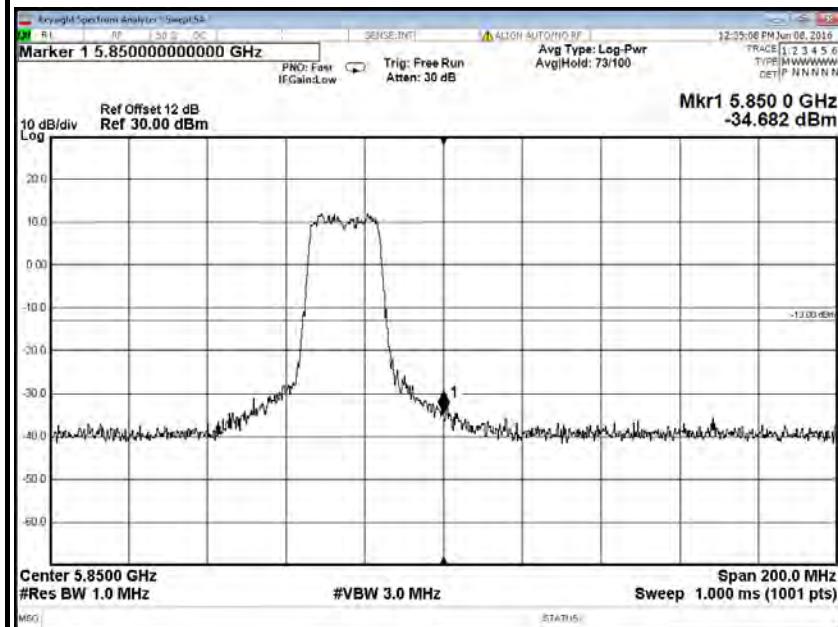
Antenna 2

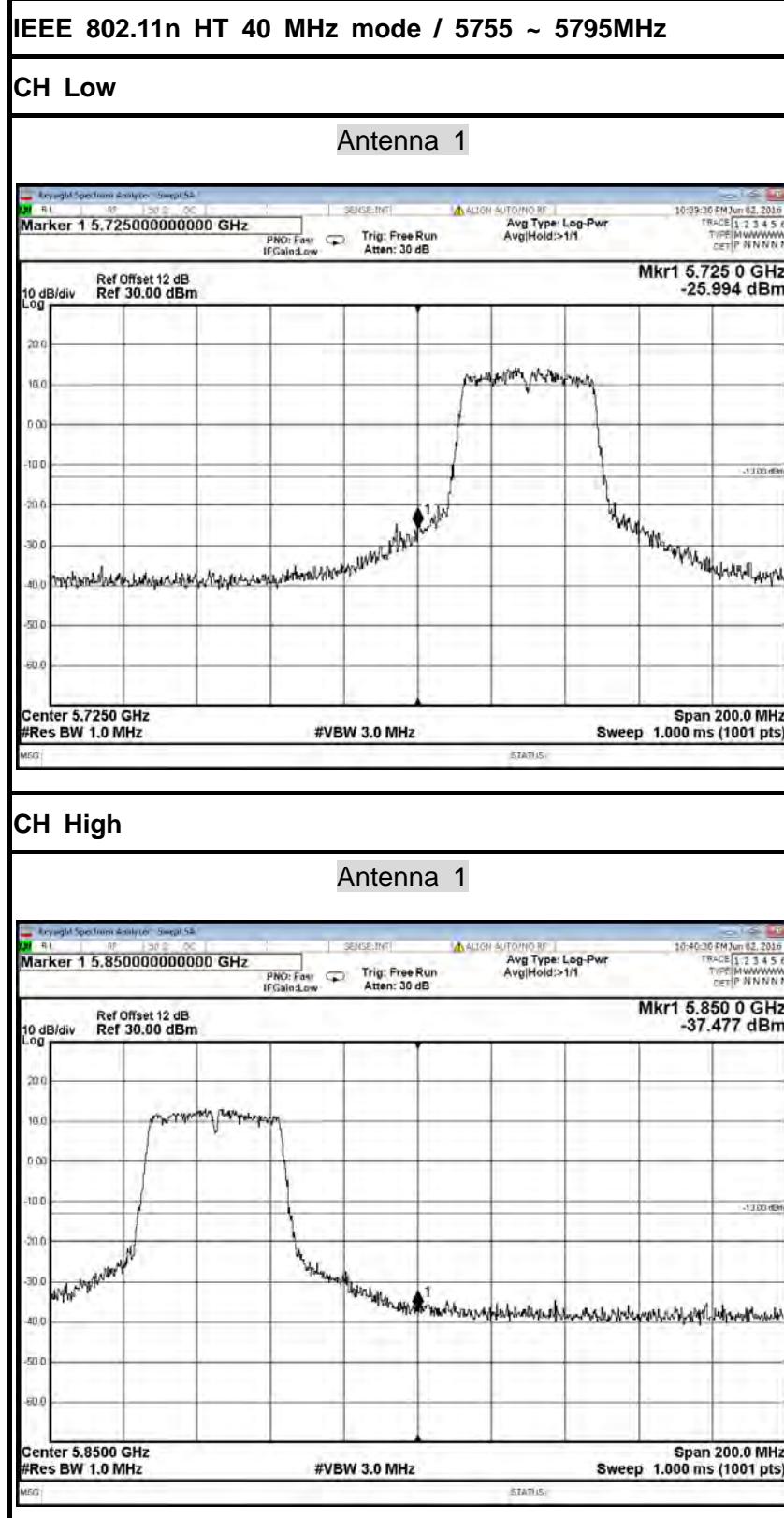
**CH High**

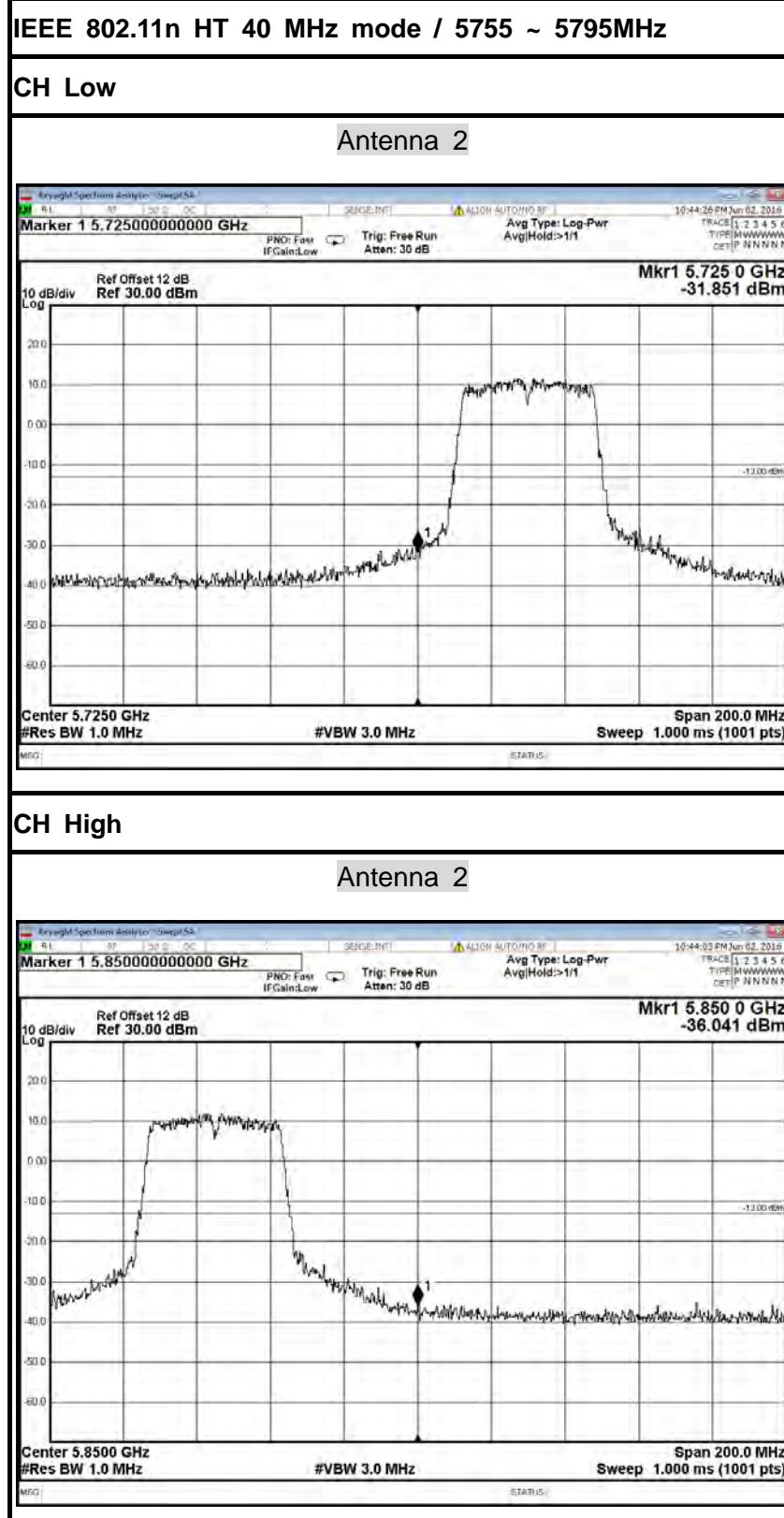
Antenna 2





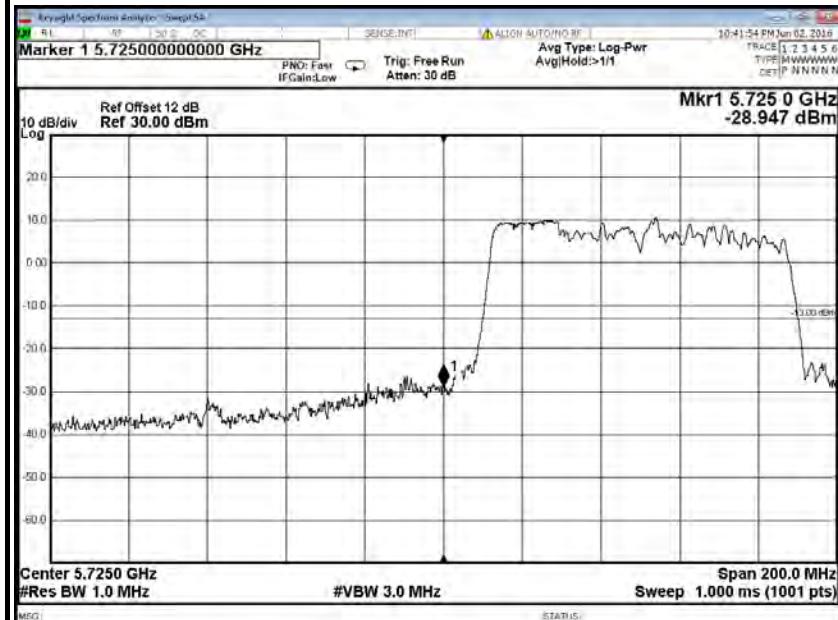
**IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz****CH Low****Antenna 2****CH High****Antenna 2**



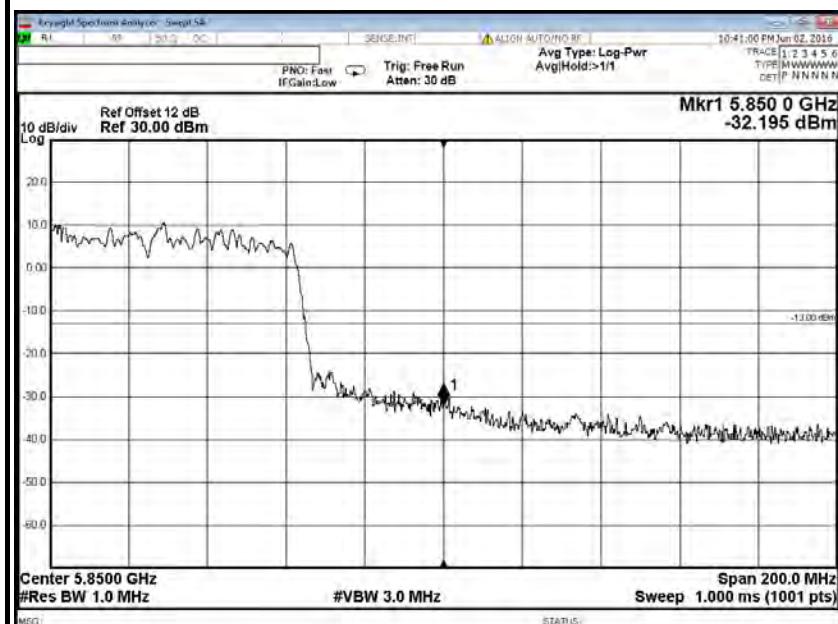


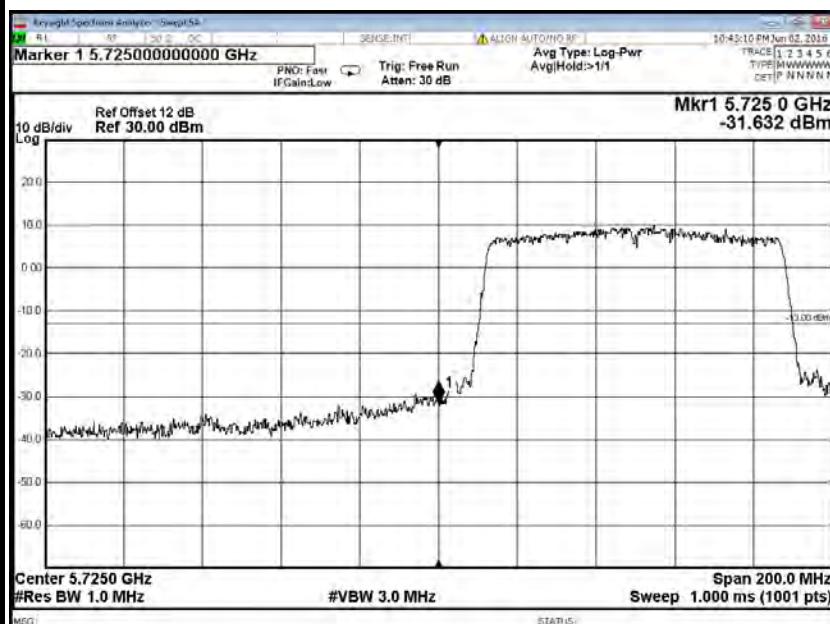
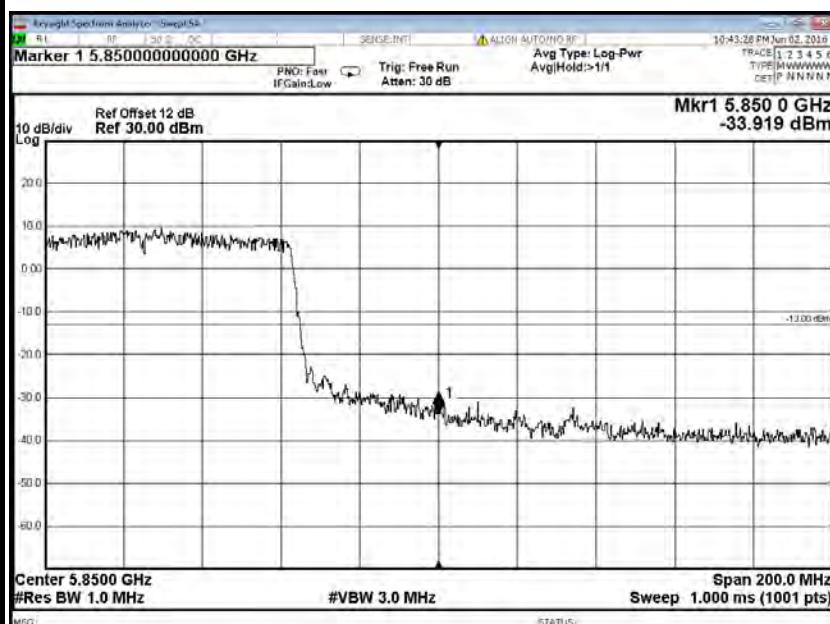
**IEEE 802.11ac 80 mode / 5725MHz**

Antenna 1

**IEEE 802.11ac 80 mode / 5850MHz**

Antenna 1



**IEEE 802.11ac 80 mode / 5725MHz****Antenna 2****IEEE 802.11ac 80 mode / 5850MHz****Antenna 2**



6.9 POWERLINE CONDUCTED EMISSIONS

6.9.1 LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that 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 the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB μ V)	
	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

* Decreases with the logarithm of the frequency.

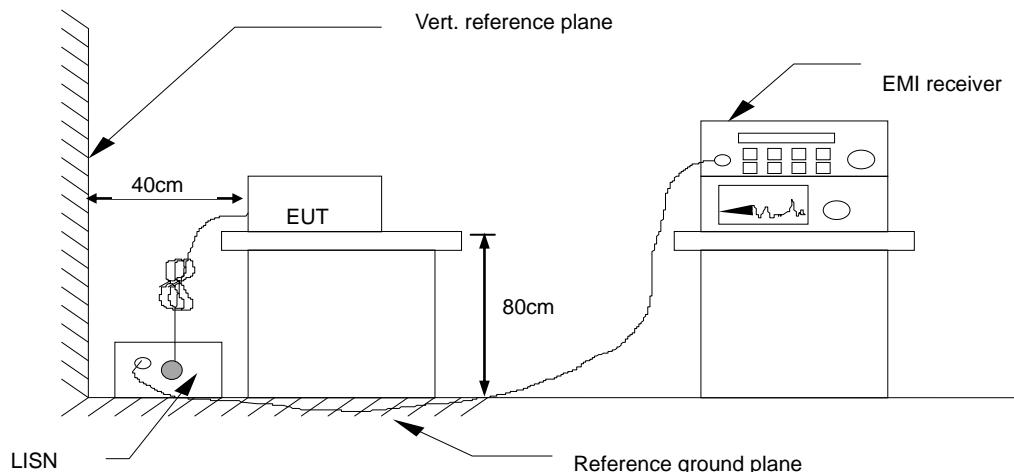
6.9.2 TEST INSTRUMENTS

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	02/21/2016	02/20/2017
LISN(EUT)	ROHDE&SCHWARZ	ENV216	101543-WX	02/21/2016	02/20/2017
LISN	EMCO	3825/2	8901-1459	02/21/2016	02/20/2017
Temp. / Humidity Meter	VICTOR	HTC-1	N/A	02/21/2016	02/20/2017
Test S/W	FARAD	EZ-EMC/ CCS-3A1-CE			

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R = No Calibration Request.



6.9.3 TEST CONFIGURATION



6.9.4 TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

6.9.5 DATA SAMPLE

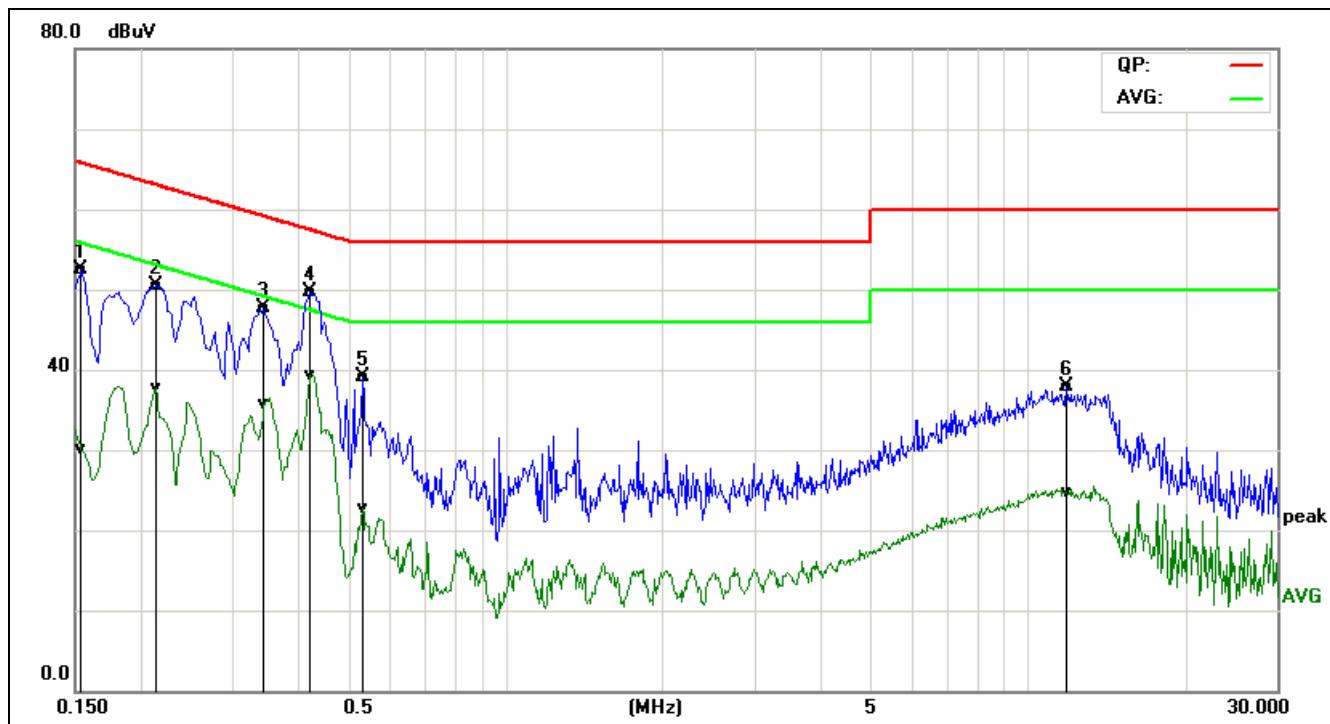
Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XXXX	32.69	25.65	11.52	44.21	37.17	65.78	55.79	-21.57	-18.62	Pass

Factor = Insertion loss of LISN + Cable Loss
Result = Quasi-peak Reading/ Average Reading + Factor
Limit = Limit stated in standard
Margin = Result (dBuV) – Limit (dBuV)



6.9.6 TEST RESULTS

Model No.	AC1220GW	RBW,VBW	9 kHz
Environmental Conditions	26°C, 60% RH	Test Mode	Mode 1
Tested by	Jack Chen	Line	L1
Test Date	April 20, 2016		

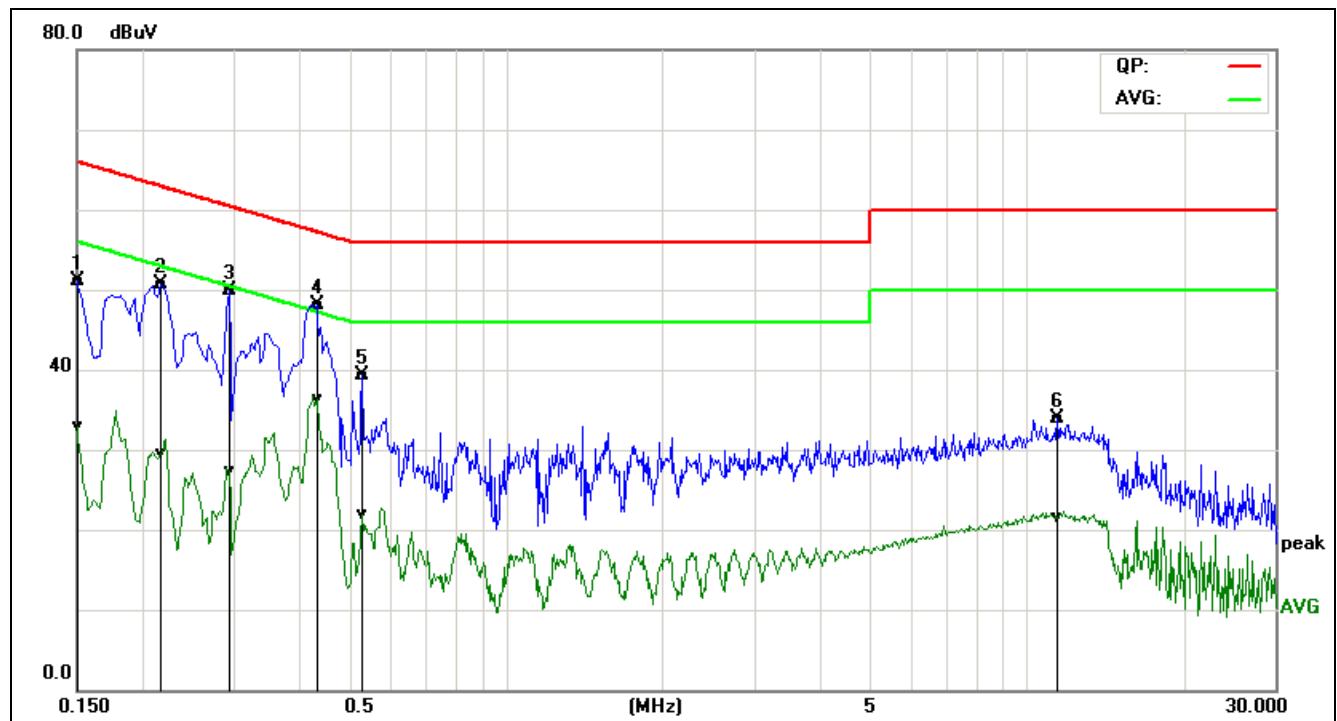


Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)	Line (L1/L2)
0.1539	42.71	20.32	9.78	52.49	30.10	65.78	55.79	-13.29	-25.69	Pass	L1
0.2140	40.72	27.98	9.79	50.51	37.77	63.04	53.05	-12.53	-15.28	Pass	L1
0.3460	37.78	25.79	9.84	47.62	35.63	59.06	49.06	-11.44	-13.43	Pass	L1
0.4220	39.88	29.42	9.85	49.73	39.27	57.41	47.41	-7.68	-8.14	Pass	L1
0.5340	29.23	12.88	9.88	39.11	22.76	56.00	46.00	-16.89	-23.24	Pass	L1
11.8100	27.84	14.57	10.08	37.92	24.65	60.00	50.00	-22.08	-25.35	Pass	L1

REMARKS: L1 = Line One (Live Line)



Model No.	AC1220GW	RBW,VBW	9 kHz
Environmental Conditions	26°C, 60% RH	Test Mode	Mode 1
Tested by	Jack Chen	Line	L2
Test Date	April 20, 2016		



Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)	Line (L1/L2)
0.1500	41.19	23.02	9.88	51.07	32.90	65.99	56.00	-14.92	-23.10	Pass	L2
0.2180	40.87	19.57	9.89	50.76	29.46	62.89	52.89	-12.13	-23.43	Pass	L2
0.2940	39.95	17.45	9.89	49.84	27.34	60.41	50.41	-10.57	-23.07	Pass	L2
0.4340	38.29	26.45	9.88	48.17	36.33	57.18	47.18	-9.01	-10.85	Pass	L2
0.5299	29.48	12.09	9.88	39.36	21.97	56.00	46.00	-16.64	-24.03	Pass	L2
11.4660	23.91	11.47	10.08	33.99	21.55	60.00	50.00	-26.01	-28.45	Pass	L2

REMARKS: L2 = Line Two (Neutral Line)



6.10 FREQUENCY STABILITY

6.10.1 LIMIT

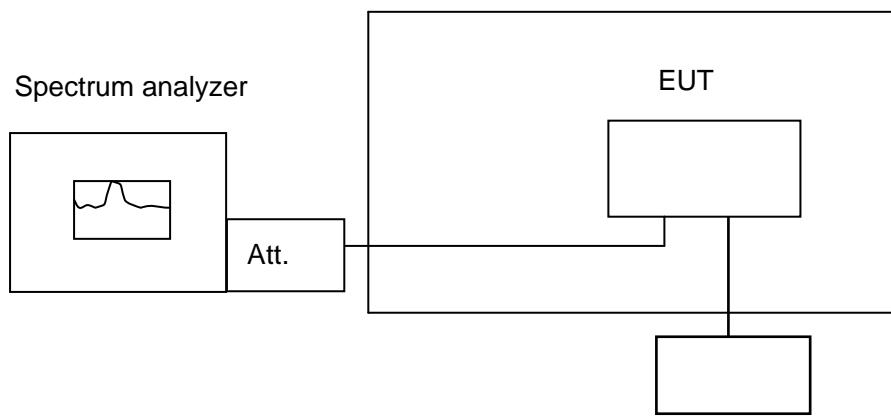
According to §15.407(g), manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the operational description.

6.10.2 TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2016	02/20/2017
DC Power Supply	DAZHENG	PS-605D	20018978	N.C.R	N.C.R
AC POWER SOUCE	UMART	HPA1010	N/A	N.C.R	N.C.R
Power Meter	Anritsu	ML2495A	1204003	02/21/2016	02/20/2017
Power Sensor	Anritsu	MA2411B	1126150	02/21/2016	02/20/2017
Temperature Chamber	TERCHY	MHG-800N	E21104	11/18/2015	11/17/2016
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/21/2016	02/20/2017

6.10.3 TEST CONFIGURATION

Temperature Chamber



Variable Power Supply

Remark: Measurement setup for testing on Antenna connector



6.10.4 TEST PROCEDURE

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

6.10.5 TEST RESULTS

No non-compliance noted.

**Test Data****Antenna 1****IEEE 802.11a mode / 5745 ~ 5825MHz****(Low)**

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5744.996166	5725-5850	PASS
40	120	5744.980704	5725-5850	PASS
30	120	5744.955868	5725-5850	PASS
20	120	5744.987050	5725-5850	PASS
10	120	5744.988252	5725-5850	PASS
0	120	5744.990535	5725-5850	PASS
-10	120	5744.961838	5725-5850	PASS
-20	120	5744.970329	5725-5850	PASS

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5744.958279	5725-5850	PASS
	120	5744.987050	5725-5850	PASS
	132	5744.953581	5725-5850	PASS

IEEE 802.11a mode / 5745 ~ 5825MHz**(High)**

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5824.950418	5725-5850	PASS
40	120	5824.991404	5725-5850	PASS
30	120	5824.967969	5725-5850	PASS
20	120	5824.986550	5725-5850	PASS
10	120	5824.977511	5725-5850	PASS
0	120	5824.949235	5725-5850	PASS
-10	120	5824.950206	5725-5850	PASS
-20	120	5824.965566	5725-5850	PASS

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5824.979835	5725-5850	PASS
	120	5824.986550	5725-5850	PASS
	132	5824.971745	5725-5850	PASS

**Antenna 2****IEEE 802.11a mode / 5745 ~ 5825MHz****(Low)**

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5744.997429	5725-5850	PASS
40	120	5744.963387	5725-5850	PASS
30	120	5744.956820	5725-5850	PASS
20	120	5744.987750	5725-5850	PASS
10	120	5744.993591	5725-5850	PASS
0	120	5744.988639	5725-5850	PASS
-10	120	5744.981869	5725-5850	PASS
-20	120	5744.960163	5725-5850	PASS

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5744.990566	5725-5850	PASS
	120	5744.987750	5725-5850	PASS
	132	5744.972569	5725-5850	PASS

IEEE 802.11a mode / 5745 ~ 5825MHz**(High)**

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5824.957745	5725-5850	PASS
40	120	5824.993313	5725-5850	PASS
30	120	5824.992116	5725-5850	PASS
20	120	5824.987450	5725-5850	PASS
10	120	5824.953430	5725-5850	PASS
0	120	5824.953308	5725-5850	PASS
-10	120	5824.974731	5725-5850	PASS
-20	120	5824.955647	5725-5850	PASS

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5824.962003	5725-5850	PASS
	120	5824.987450	5725-5850	PASS
	132	5824.997317	5725-5850	PASS

**Antenna 1****IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz (Low)**

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5744.990956	5725-5850	PASS
40	120	5744.983390	5725-5850	PASS
30	120	5744.953591	5725-5850	PASS
20	120	5744.987050	5725-5850	PASS
10	120	5744.968355	5725-5850	PASS
0	120	5744.952266	5725-5850	PASS
-10	120	5744.976658	5725-5850	PASS
-20	120	5744.951439	5725-5850	PASS

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5744.974506	5725-5850	PASS
	120	5744.987050	5725-5850	PASS
	132	5744.976276	5725-5850	PASS

IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz (High)

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5824.971085	5725-5850	PASS
40	120	5824.981954	5725-5850	PASS
30	120	5824.954195	5725-5850	PASS
20	120	5824.986550	5725-5850	PASS
10	120	5824.962494	5725-5850	PASS
0	120	5824.982624	5725-5850	PASS
-10	120	5824.984157	5725-5850	PASS
-20	120	5824.950513	5725-5850	PASS

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5824.984698	5725-5850	PASS
	120	5824.986550	5725-5850	PASS
	132	5824.971571	5725-5850	PASS

**Antenna 2****IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz (Low)**

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5744.975610	5725-5850	PASS
40	120	5744.980861	5725-5850	PASS
30	120	5744.973330	5725-5850	PASS
20	120	5744.987300	5725-5850	PASS
10	120	5744.951852	5725-5850	PASS
0	120	5744.985731	5725-5850	PASS
-10	120	5744.960149	5725-5850	PASS
-20	120	5744.983040	5725-5850	PASS

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5744.966270	5725-5850	PASS
	120	5744.987300	5725-5850	PASS
	132	5744.989946	5725-5850	PASS

IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz (High)

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5824.978780	5725-5850	PASS
40	120	5824.990240	5725-5850	PASS
30	120	5824.999929	5725-5850	PASS
20	120	5824.987350	5725-5850	PASS
10	120	5824.951561	5725-5850	PASS
0	120	5824.977416	5725-5850	PASS
-10	120	5824.959056	5725-5850	PASS
-20	120	5824.976531	5725-5850	PASS

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5824.994191	5725-5850	PASS
	120	5824.987350	5725-5850	PASS
	132	5824.994840	5725-5850	PASS

**Antenna 1****IEEE 802.11n HT 40 MHz mode / 5755 ~ 5795MHz (Low)**

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5754.986737	5725-5850	PASS
40	120	5754.980981	5725-5850	PASS
30	120	5754.999746	5725-5850	PASS
20	120	5754.986700	5725-5850	PASS
10	120	5754.986799	5725-5850	PASS
0	120	5754.989256	5725-5850	PASS
-10	120	5754.960840	5725-5850	PASS
-20	120	5754.954804	5725-5850	PASS

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5754.961303	5725-5850	PASS
	120	5754.986700	5725-5850	PASS
	132	5754.967459	5725-5850	PASS

IEEE 802.11n HT 40 MHz mode / 5755 ~ 5795MHz (High)

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5794.969284	5725-5850	PASS
40	120	5794.984519	5725-5850	PASS
30	120	5794.990952	5725-5850	PASS
20	120	5794.986600	5725-5850	PASS
10	120	5794.959833	5725-5850	PASS
0	120	5794.978812	5725-5850	PASS
-10	120	5794.990158	5725-5850	PASS
-20	120	5794.974286	5725-5850	PASS

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5794.991227	5725-5850	PASS
	120	5794.986600	5725-5850	PASS
	132	5794.992350	5725-5850	PASS

**Antenna 2****IEEE 802.11n HT 40 MHz mode / 5755 ~ 5795MHz (Low)**

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5754.966413	5725-5850	PASS
40	120	5754.975131	5725-5850	PASS
30	120	5754.960954	5725-5850	PASS
20	120	5754.986950	5725-5850	PASS
10	120	5754.978121	5725-5850	PASS
0	120	5754.982333	5725-5850	PASS
-10	120	5754.970464	5725-5850	PASS
-20	120	5754.966527	5725-5850	PASS

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5754.959649	5725-5850	PASS
	120	5824.987350	5725-5850	PASS
	132	5754.971428	5725-5850	PASS

IEEE 802.11n HT 40 MHz mode / 5755 ~ 5795MHz (High)

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5794.973747	5725-5850	PASS
40	120	5794.986537	5725-5850	PASS
30	120	5794.959883	5725-5850	PASS
20	120	5795.017000	5725-5850	PASS
10	120	5794.993611	5725-5850	PASS
0	120	5794.985530	5725-5850	PASS
-10	120	5794.998356	5725-5850	PASS
-20	120	5794.992463	5725-5850	PASS

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5794.990704	5725-5850	PASS
	120	5794.987100	5725-5850	PASS
	132	5794.956976	5725-5850	PASS

**Antenna 1****IEEE 802.11ac 80 mode / 5775MHz**

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5774.992599	5725-5850	PASS
40	120	5774.986689	5725-5850	PASS
30	120	5774.961531	5725-5850	PASS
20	120	5774.986750	5725-5850	PASS
10	120	5774.986273	5725-5850	PASS
0	120	5774.977753	5725-5850	PASS
-10	120	5774.995440	5725-5850	PASS
-20	120	5774.967986	5725-5850	PASS

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5774.970262	5725-5850	PASS
	120	5774.986750	5725-5850	PASS
	132	5774.950963	5725-5850	PASS

Antenna 2**IEEE 802.11ac 80 mode / 5775MHz**

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5774.972528	5725-5850	PASS
40	120	5774.980274	5725-5850	PASS
30	120	5774.973255	5725-5850	PASS
20	120	5774.986850	5725-5850	PASS
10	120	5774.959001	5725-5850	PASS
0	120	5774.969795	5725-5850	PASS
-10	120	5774.977501	5725-5850	PASS
-20	120	5774.983653	5725-5850	PASS

Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5774.997762	5725-5850	PASS
	120	5774.986850	5725-5850	PASS
	132	5774.949014	5725-5850	PASS