FCC 47 CFR PART 15 SUBPART E

for

Smart POS

Model: B9S3, B9S*(*=0-9)

Brand: N/A

Test Report Number:

C161010Z04-RP1-4

Issued Date: November 7, 2016

Issued for

Shenzhen TongFang Information Technologies CO., LTD

Floor3, Building D, TongFang Information Harbour, LangShan Road, NanShan，ShenZhen, 518058, China

Issued by:

Compliance Certification Services (Shenzhen) Inc.

No.10-1 Mingkeda Logistics park, No.18, Huanguan South Rd.,

Guan Lan Town, Baoan District, Shenzhen, China

TEL: 86-755-28055000

FAX: 86-755-28055221

E-Mail: service@ccssz.com

ACCREDITED

TESTING CERT #2861.01

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	November 7, 2016	Initial Issue	ALL	Nancy Fu

TABLE OF CONTENTS

1. TEST CERTIFICATION

Product	Smart POS
Model	B9S3, B9S*(*=0-9)
Brand	N/A
Tested	October 10~ November 7, 2016
Applicant	**Shenzhen TongFang Information Technologies CO., LTD** Floor3, Building D, TongFang Information Harbour, LangShan Road, NanShan， ShenZhen, 518058, China
Manufacturer	**Shenzhen TongFang Information Technologies CO., LTD** Floor3, Building D, TongFang Information Harbour, LangShan Road, NanShan， ShenZhen, 518058, 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:

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

Reviewed by:

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

2. EUT DESCRIPTION

Product	Smart POS
Model Number	B9S3, B9S*(*=0-9)
Brand	N/A
Model Discrepancy	All models are identical to each other except their model names.
Serial Number	C161010Z04-RP1-1
Received Date	October 25, 2016
Power Supply	DC 5V supplied by the adapter or DC3.7V supplied by the battery
Adapter Manufacturer / Model No.	LY036SPS-050400U I/P: 100-240Vac~ 50/60Hz, 1A O/P: 5Vdc, 4A DC output Cable: Unshielded, 1.50m (with a core)
Frequency Range	UNII Band I: IEEE 802.11a, 802.11n HT20 : 5180MHz ~ 5240MHz; IEEE 802.11n HT40: 5190MHz ~ 5230MHz IEEE 802.11ac 80: 5210MHz
Transmit Power	UNII Band I: IEEE 802.11a: 8.65dBm IEEE 802.11n HT 20 MHz mode: 6.69dBm IEEE 802.11n HT 40 MHz mode: 6.80dBm IEEE 802.11ac 80: 6.71dBm
Modulation Technique	OFDM (QPSK, BPSK, 16-QAM, 64-QAM)
Number of Channels	UNII Band I: IEEE 802.11a, 802.11n HT20 : 4 Channels IEEE 802.11n HT40 : 2 Channels IEEE 802.11ac 80: 1 Channel
Antenna Specification	PCB Antenna with 2dBi gain (Max)
Channels Spacing	IEEE 802.11a, 802.11n HT20 : 20MHz IEEE 802.11n HT40: 40MHz IEEE 802.11ac 80: 80MHz
Temperature Range	0°C ~ +40°C
Hardware Version	thtfit-eng 6.0.1 MMB29M 20161028 test-keys
Software Version	V1.0

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**
36	5180
38	5190
40	5200
42	5210
44	5220
46	5230
48	5240

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: **2ABKZ-UC197999** 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 (below 1GHz) /1.5m (Above 1GHz) 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:** Charge	☒
Radiated Emission	**Mode 1:** TX	☒

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.

UNII Band I:

IEEE 802.11a for 5180 ~ 5240MHz:
Channel Low (5180MHz), Channel Mid (5200MHz) and Channel High (5240MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT 20 MHz for 5180 ~ 5240MHz:
Channel Low (5180MHz), Channel Mid (5200MHz) and Channel High (5240MHz) with 6.5Mbps data rate were chosen for full testing.

IEEE 802.11n HT 40 MHz for 5190 ~ 5230MHz:
Channel Low (5190MHz) and Channel High (5230MHz) with 13.5Mbps data rate were chosen for full testing.

IEEE 802.11ac 80 for 5210MHz:
Channel Low (5210MHz) with 13.5Mbps 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	Hard disk	N/A	N/A	N/A	WD	N/A	Unshielded, 0.80m
2	Mouse	N/A	N/A	N/A	DELL	N/A	Unshielded, 1.20m
3	TF card	N/A	N/A	N/A	N/A	N/A	N/A

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

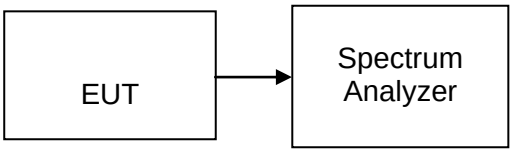
According to §15.403(c), for purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated 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



6.1.4TEST 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 / 5180 ~ 5240MHz

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)
Low	5180	21.41
Mid	5200	21.29
High	5240	21.22

Test mode: IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)
Low	5180	21.92
Mid	5200	22.08
High	5240	21.53

Test mode: IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)
Low	5190	44.29
High	5230	44.86

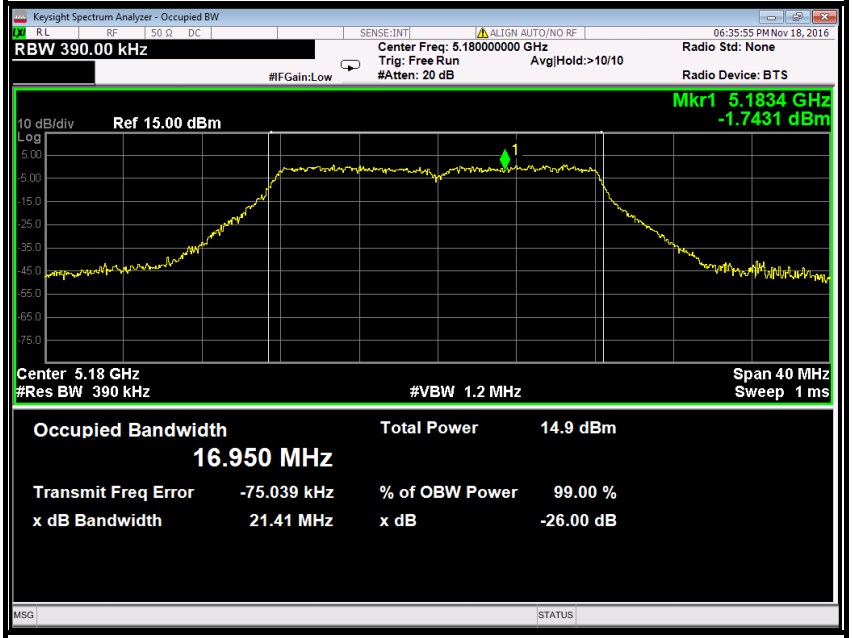
Test mode: IEEE 802.11ac 80 mode / 5210MHz

Channel	Frequency (MHz)	Bandwidth(B) (MHz)
	5210	82.59

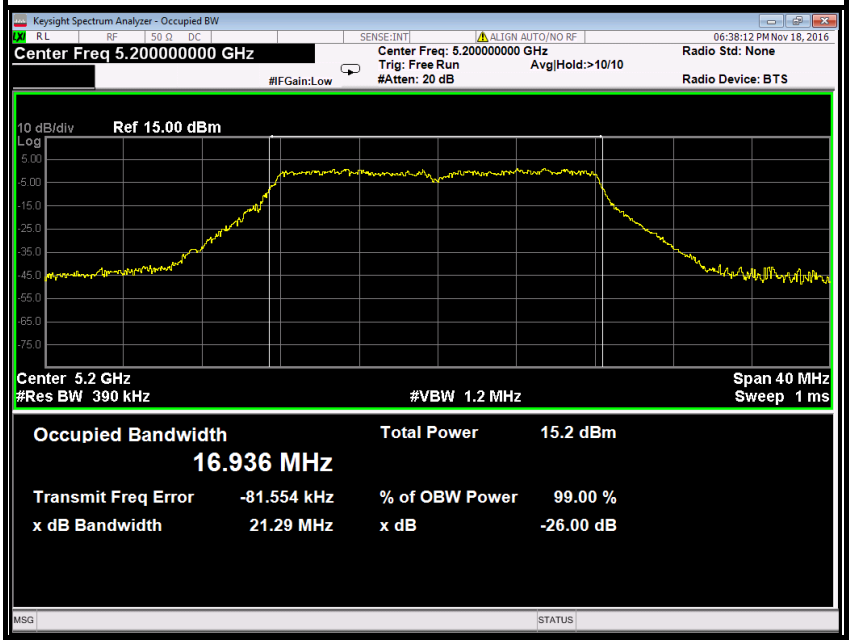
Test Plot

IEEE 802.11a mode / 5180 ~ 5240MHz

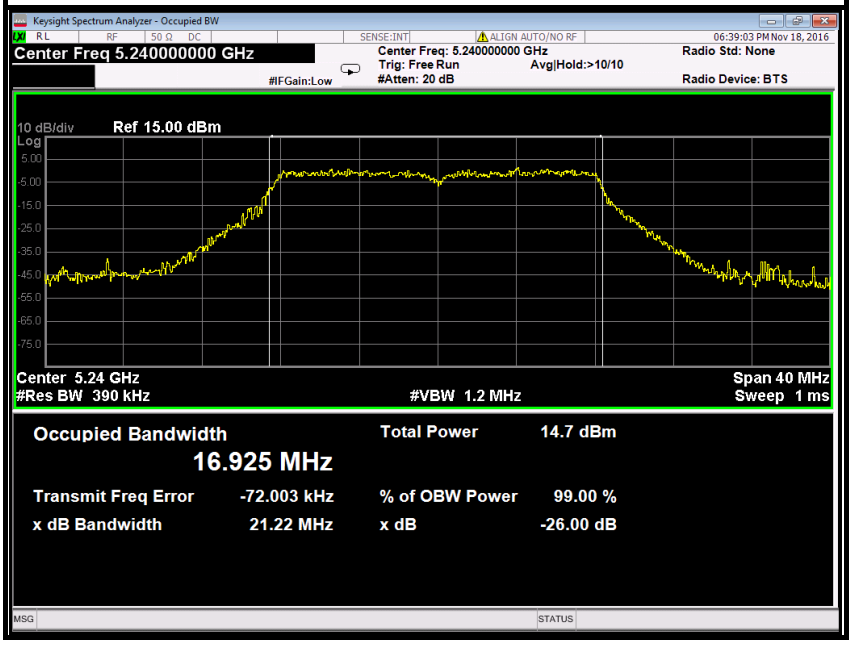
26dB Bandwidth (CH Low)



26dB Bandwidth (CH Mid)

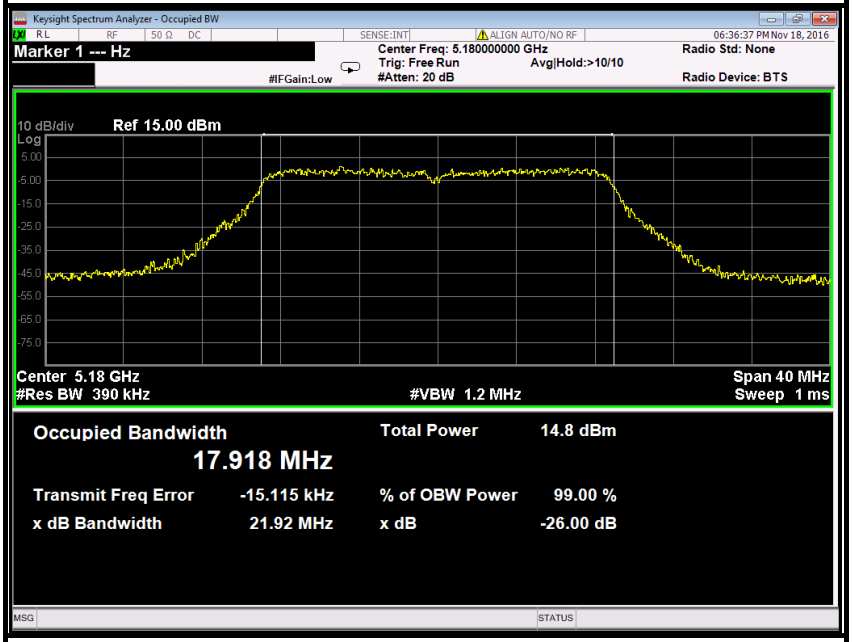


26dB Bandwidth (CH High)

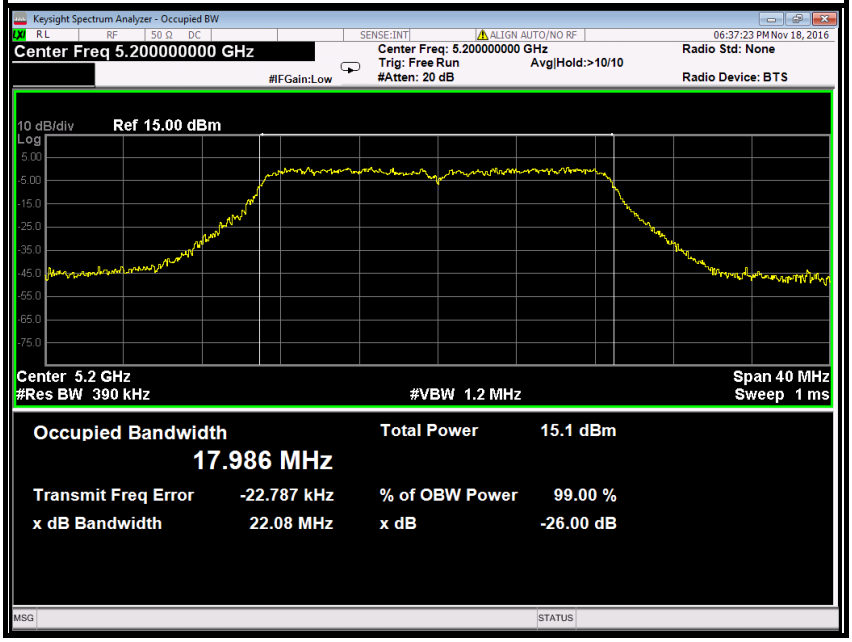


IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz

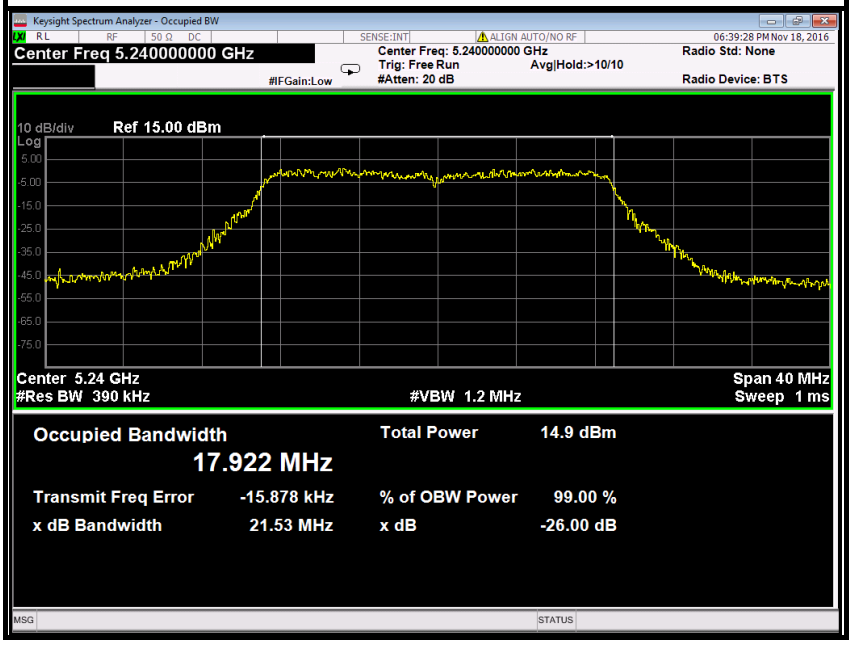
26dB Bandwidth (CH Low)



26dB Bandwidth (CH Mid)

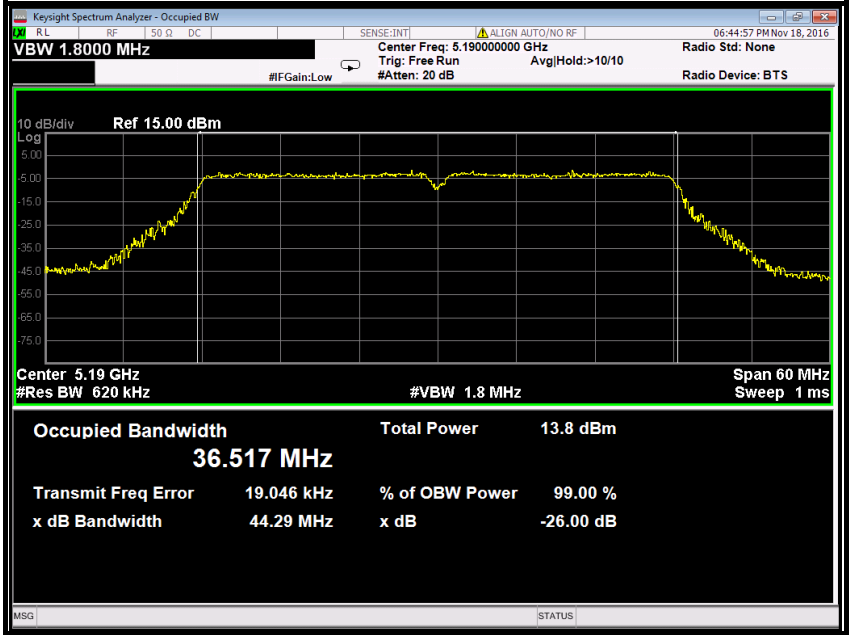


26dB Bandwidth (CH High)

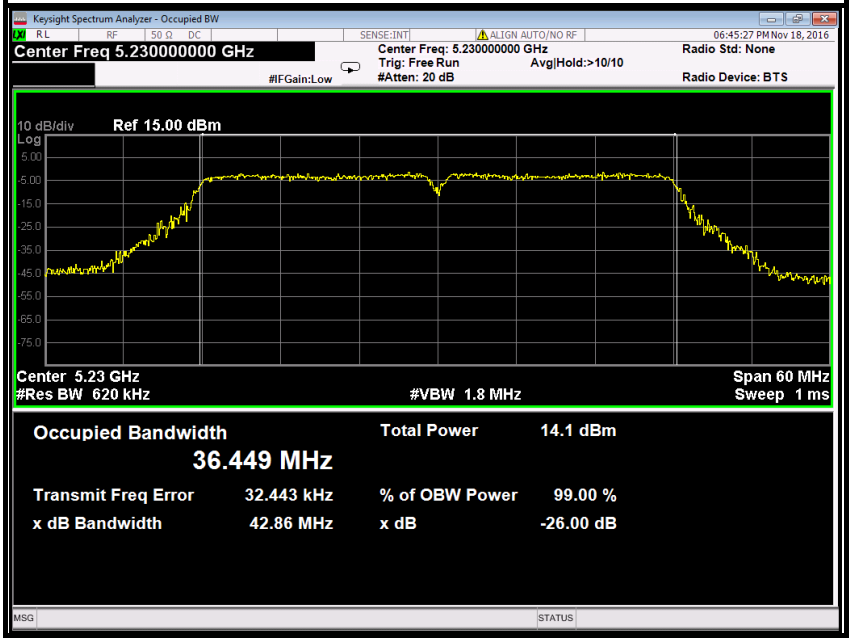


IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz

26dB Bandwidth (CH Low)

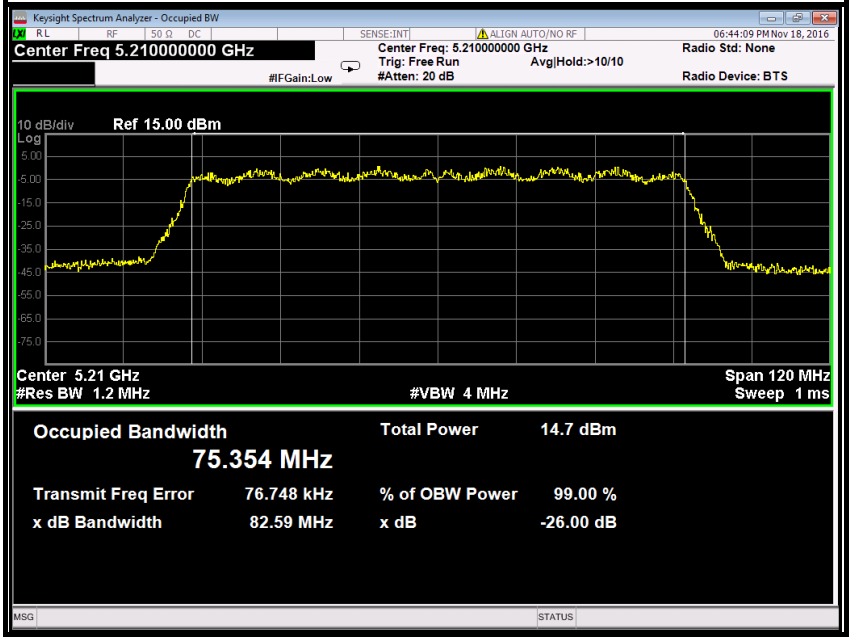


26dB Bandwidth (CH High)



IEEE 802.11ac 80 mode / 5210MHz

26dB Bandwidth



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

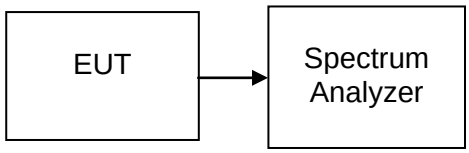
Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2016	02/20/2017

6.2.3 TEST PROCEDURES (please refer to measurement standard)

8.1 Option 2:

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW ⩾ 3 RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ⩾ 6 dB.

6.2.4 TEST SETUP



6.2.5 TEST RESULTS

Not applicable, since the EUT only have band I.

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

T_{nom}	V_{nom}	5180MHz
Conducted power [dBm] Measured with OFDM modulation		5.17
Radiated power [dBm] Measured with OFDM modulation		6.03
Gain [dBi] Calculated		0.86
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) For the band 5.15-5.25 GHz.

(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.

(iii) For fixed point-to-point access points 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. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. 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.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. 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.

(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 30 dBm 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 Output Power

Not applicable, since the EUT only have band I.

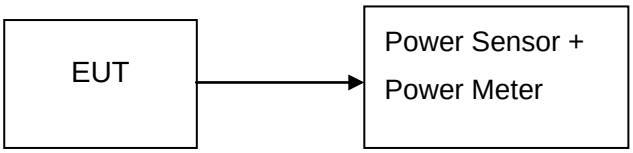
6.4.2 MEASUREMENT EQUIPMENT USED

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 Power Meter 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 / 5180 ~ 5240MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (dBm)	Result
Low	5180	8.65	0.00733	24.00	PASS
Mid	5200	8.40	0.00692		PASS
High	5240	7.73	0.00593		PASS

IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (dBm)	Result
Low	5180	6.68	0.00466	24.00	PASS
Mid	5200	6.69	0.00467		PASS
High	5240	6.15	0.00412		PASS

IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (dBm)	Result
Low	5190	6.80	0.00479	24.00	PASS
High	5230	6.44	0.00441		PASS

IEEE 802.11ac 80 mode / 5210MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (dBm)	Result
	5210	6.71	0.00469	24.00	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

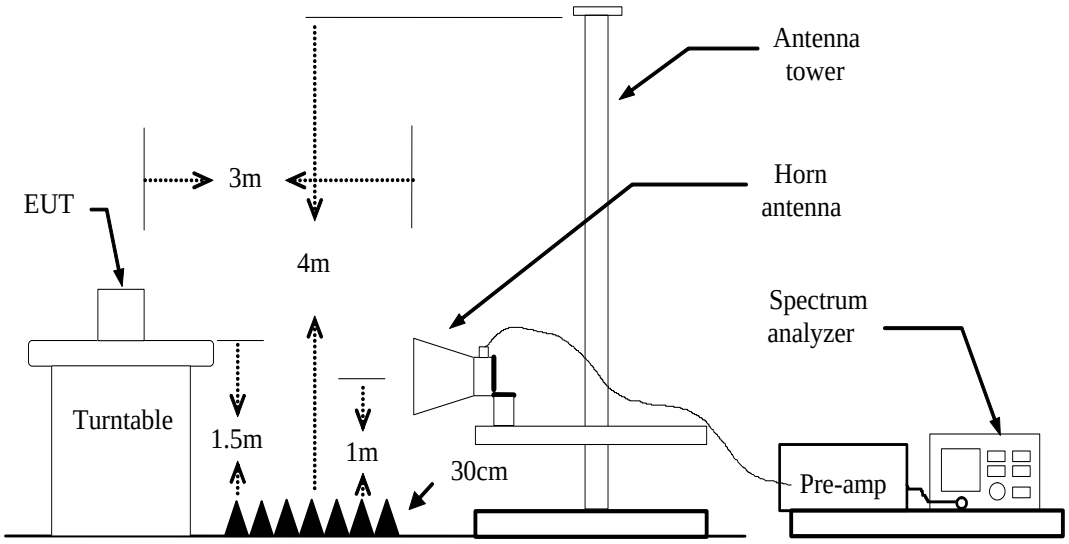
Radiated Emission Test Site 966(2)					
Name of Equipment	**Manufacturer**	**Model Number**	**Serial Number**	**Last Calibration**	**Due Calibration**
PSA Series Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2016	02/20/2017
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	02/21/2016	02/20/2017
Amplifier	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	09/25/2016	09/24/2017
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=10Hz / Sweep=AUTO / Detector=Peak
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

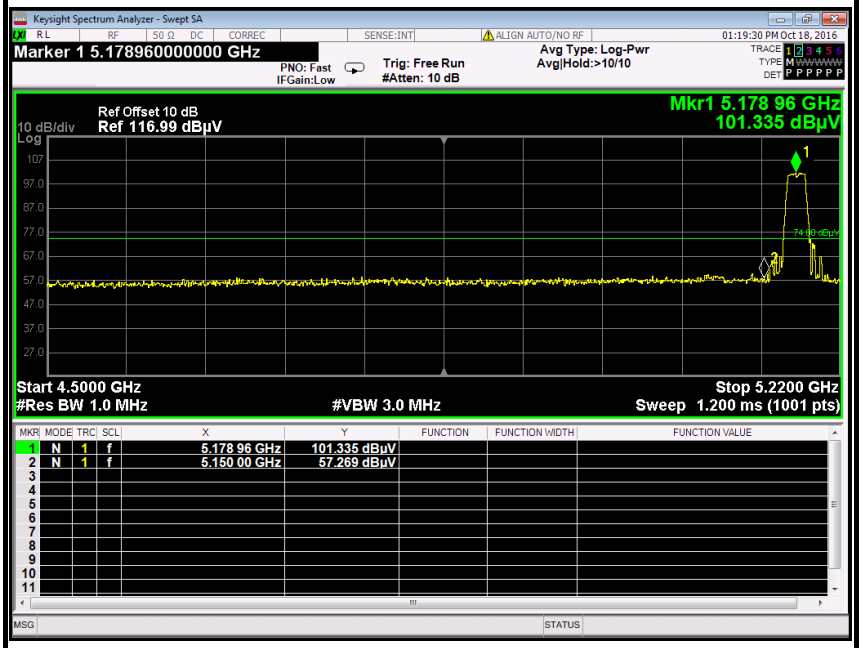
6.5.5 TEST RESULT

Not applicable, since the EUT only have band I.

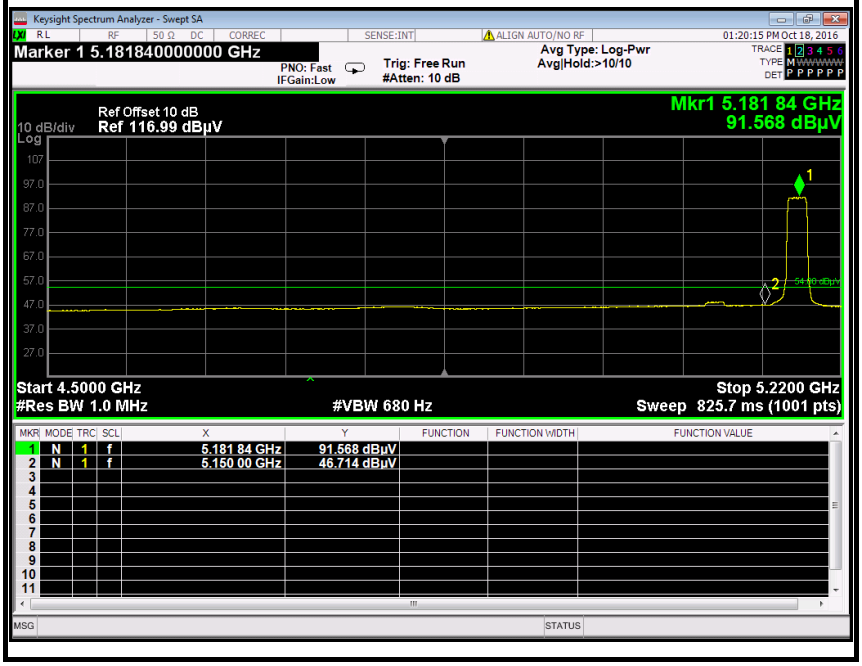
Test Plot

IEEE 802.11a mode / 5180MHz

Detector mode: Peak **Polarity: Vertical**

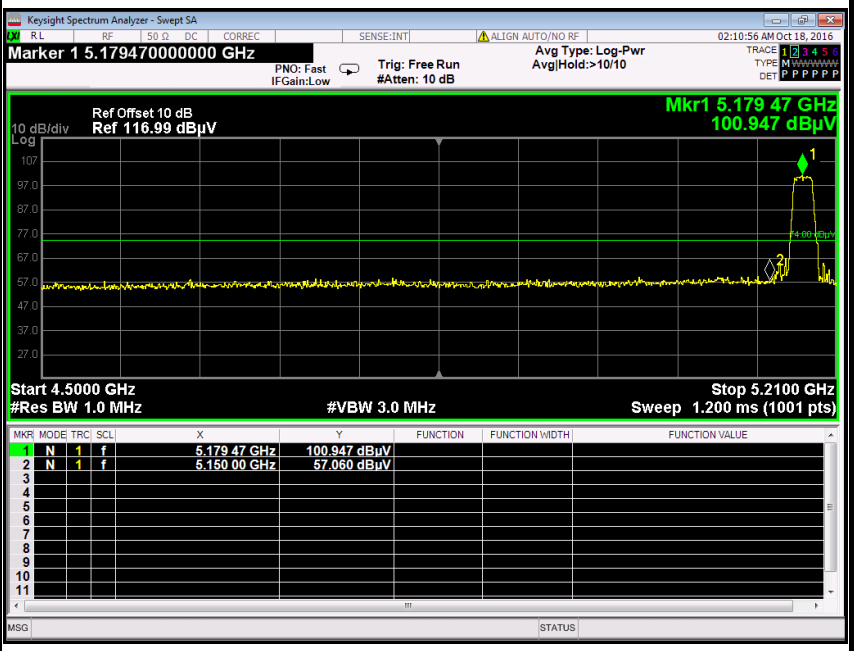


Detector mode: Average **Polarity: Vertical**

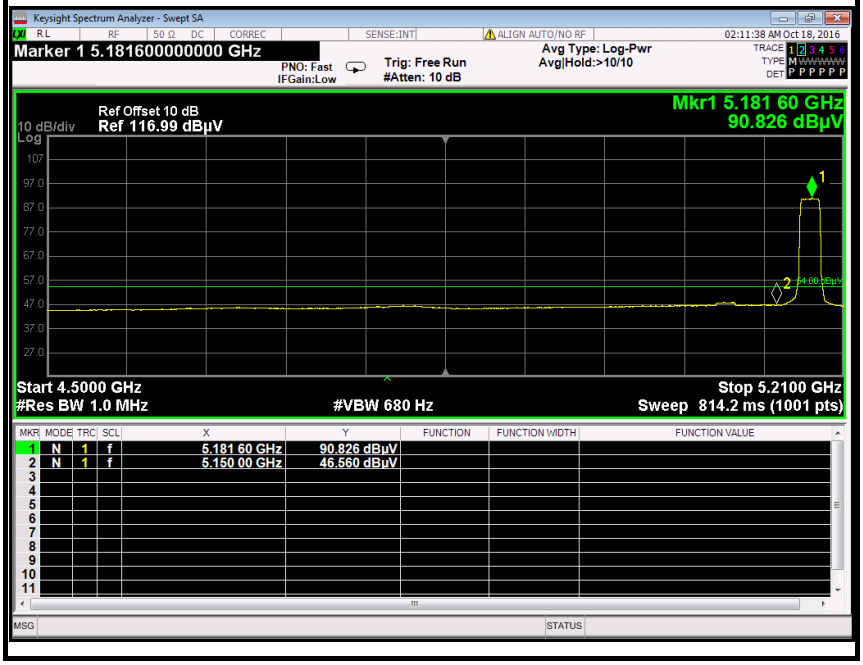


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	5150.0000	62.87	5.60	57.27	74.00	-16.73	Peak	Horizontal
2	5150.0000	52.31	5.60	46.71	54.00	-7.29	Average	Horizontal

Detector mode: Peak **Polarity: Horizontal**



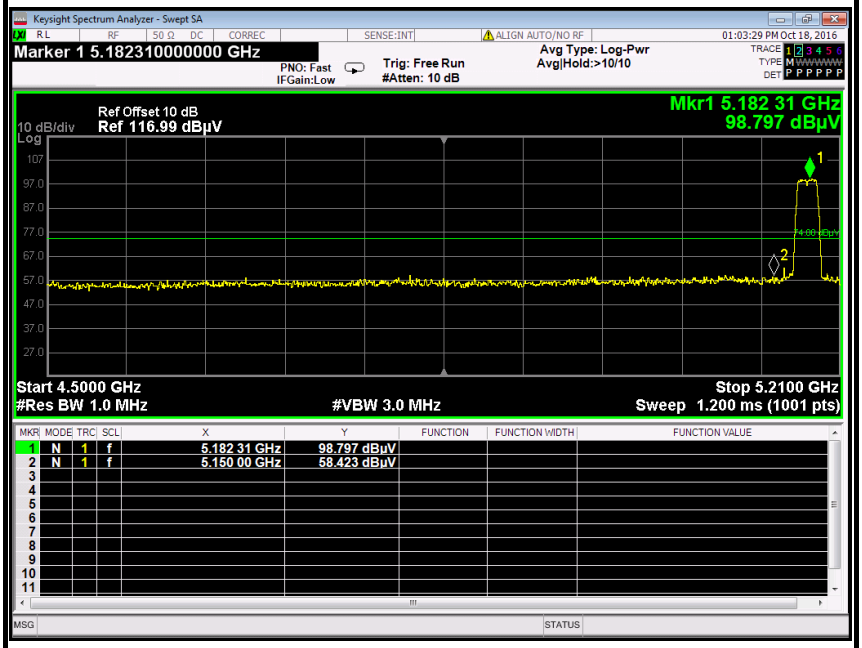
Detector mode: Average **Polarity: Horizontal**



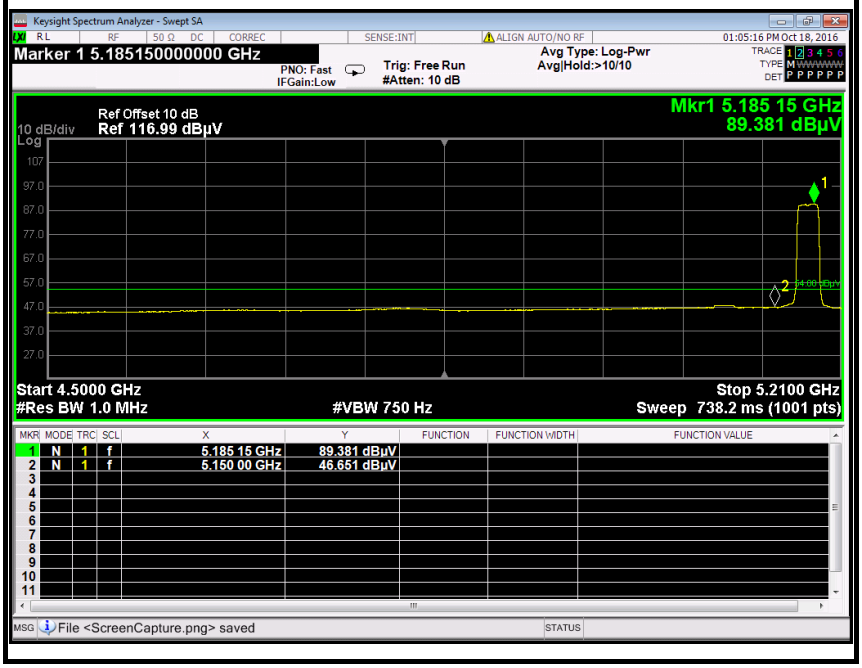
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	5150.0000	62.66	5.60	57.06	74.00	-16.94	Peak	Vertical
2	5150.0000	52.16	5.60	46.56	54.00	-7.44	Average	Vertical

IEEE 802.11n HT 20 MHz mode / 5180 MHz

Detector mode: Peak **Polarity: Vertical**

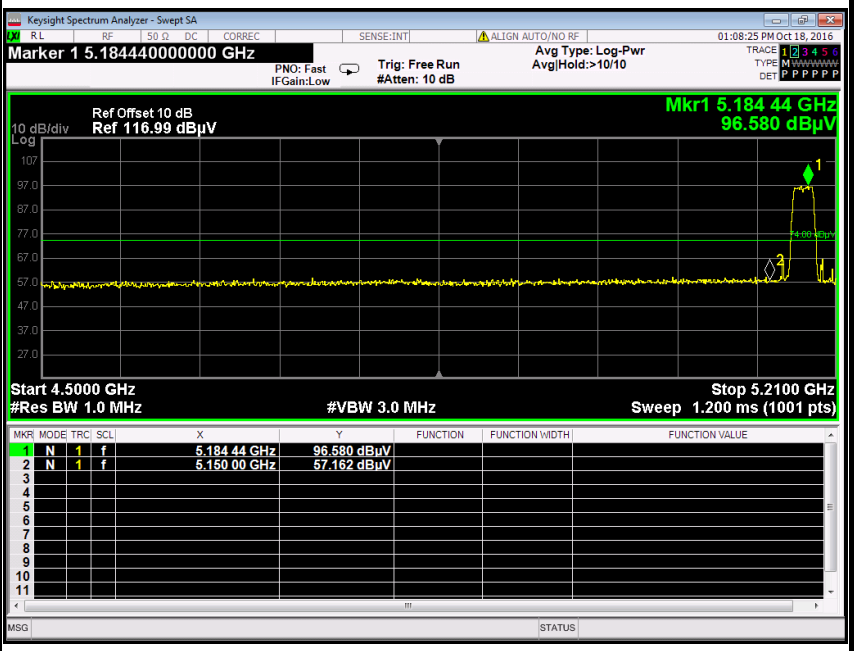


Detector mode: Average **Polarity: Vertical**

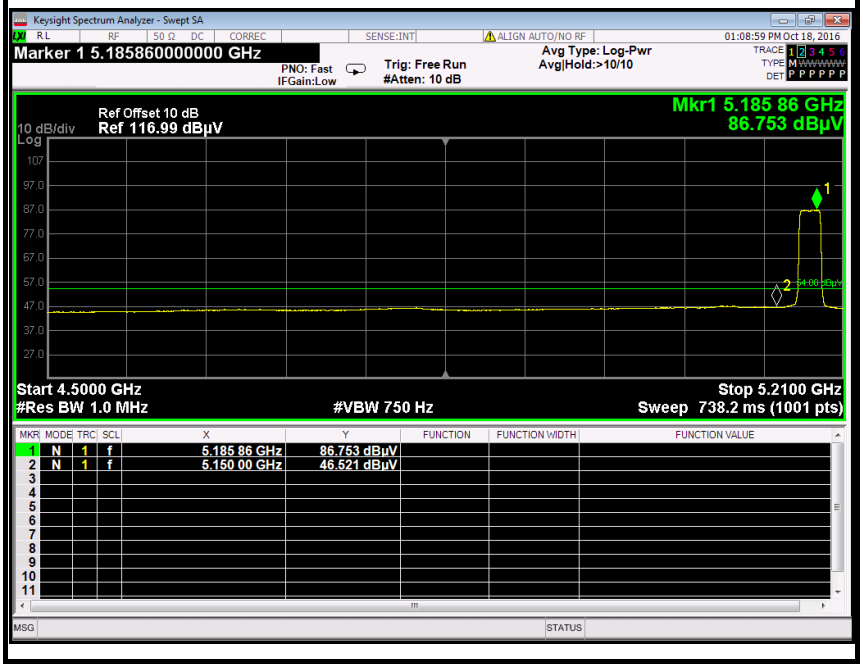


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	5150.0000	64.02	5.60	58.42	74.00	-15.58	Peak	Vertical
2	5150.0000	52.25	5.60	46.65	54.00	-7.35	Average	Vertical

Detector mode: Peak **Polarity: Horizontal**



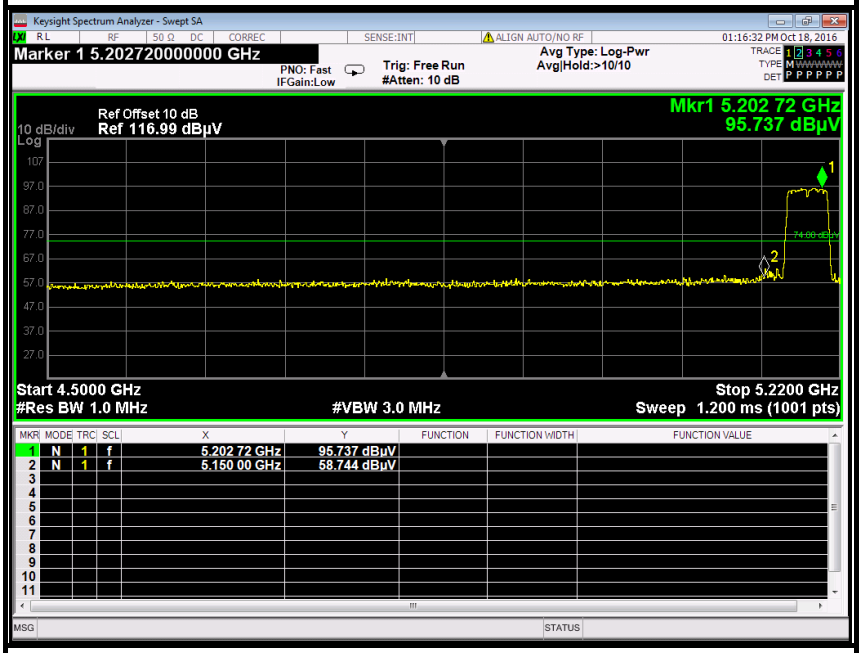
Detector mode: Average **Polarity: Horizontal**



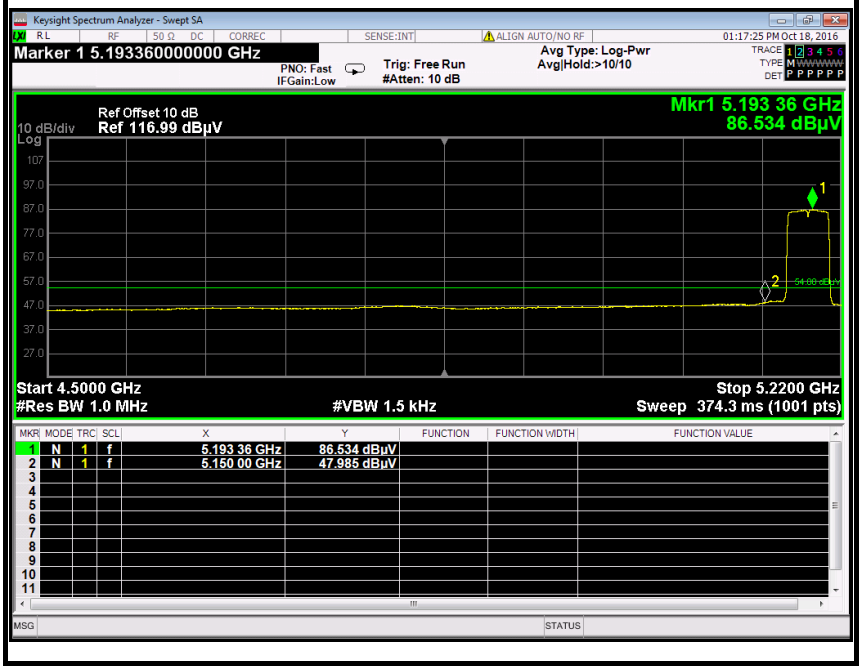
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	5150.0000	62.76	5.60	57.16	74.00	-16.84	Peak	Horizontal
2	5150.0000	52.12	5.60	46.52	54.00	-7.48	Average	Horizontal

IEEE 802.11n HT 40 MHz mode / 5190 MHz

Detector mode: Peak **Polarity: Vertical**

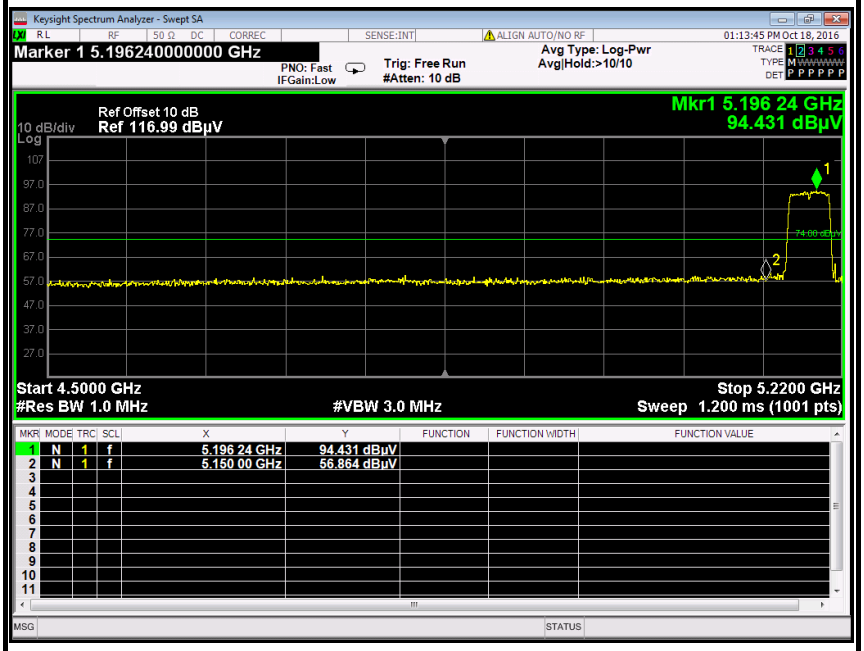


Detector mode: Average **Polarity: Vertical**

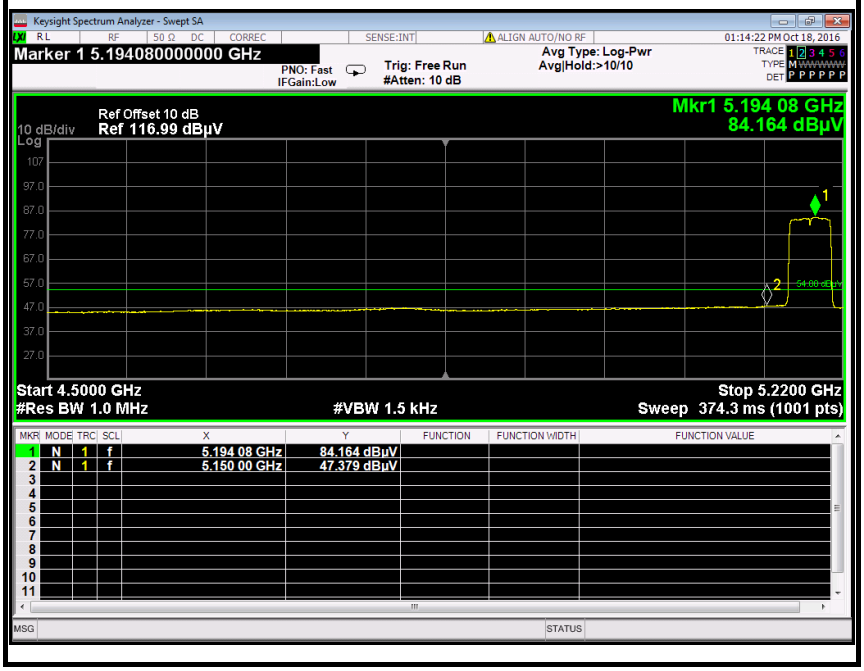


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	5150.0000	64.34	5.60	58.74	74.00	-15.26	Peak	Vertical
2	5150.0000	53.59	5.60	47.99	54.00	-6.02	Average	Vertical

Detector mode: Peak **Polarity: Horizontal**



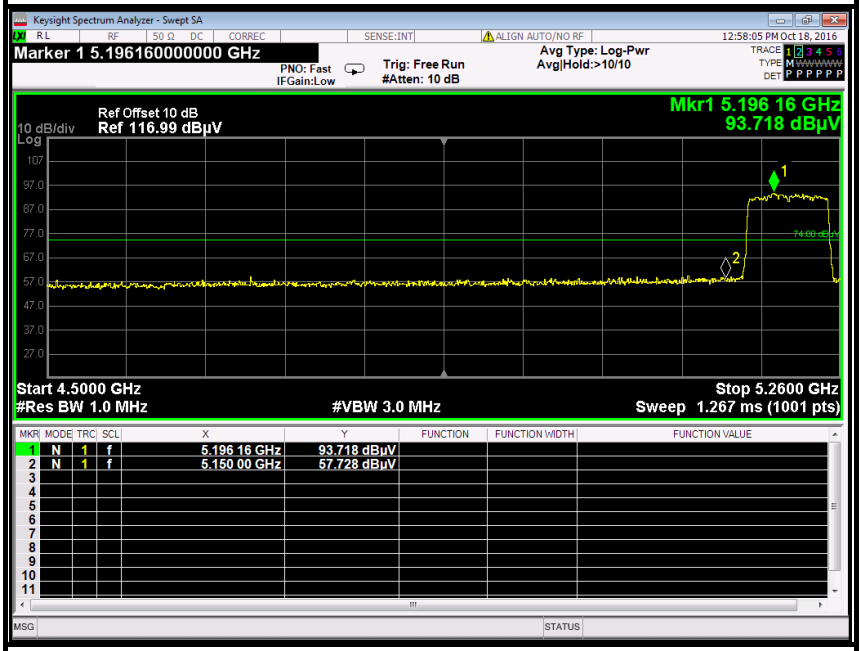
Detector mode: Average **Polarity: Horizontal**



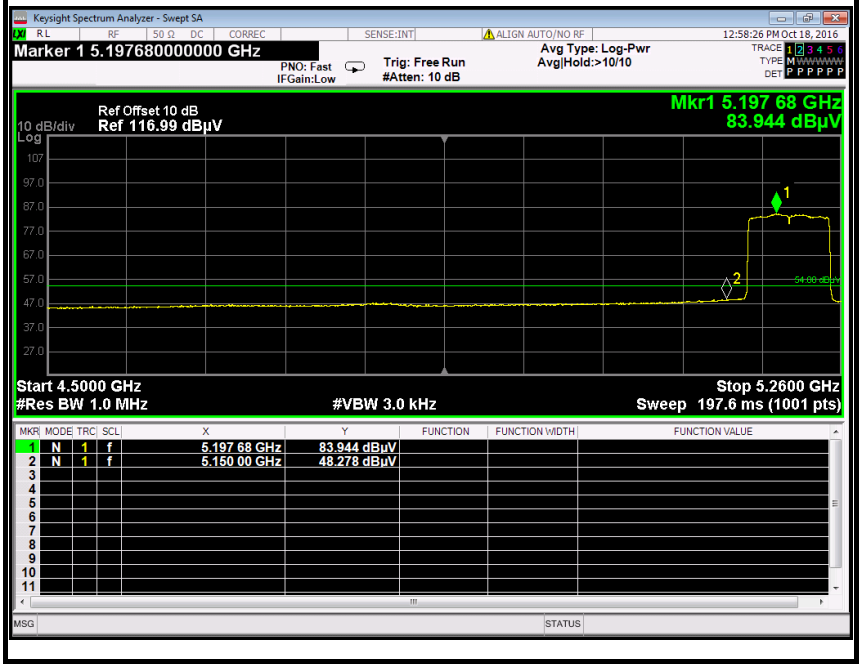
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	5150.0000	62.46	5.60	56.86	74.00	-17.14	Peak	Horizontal
2	5150.0000	52.98	5.60	47.38	54.00	-6.62	Average	Horizontal

IEEE 802.11ac 80 mode / 5210 MHz

Detector mode: Peak **Polarity: Vertical**

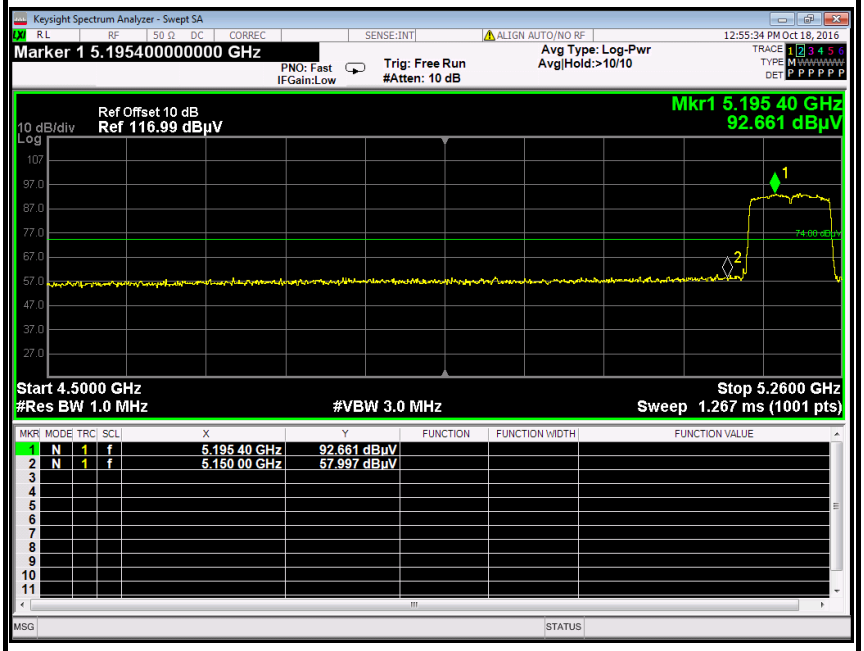


Detector mode: Average **Polarity: Vertical**

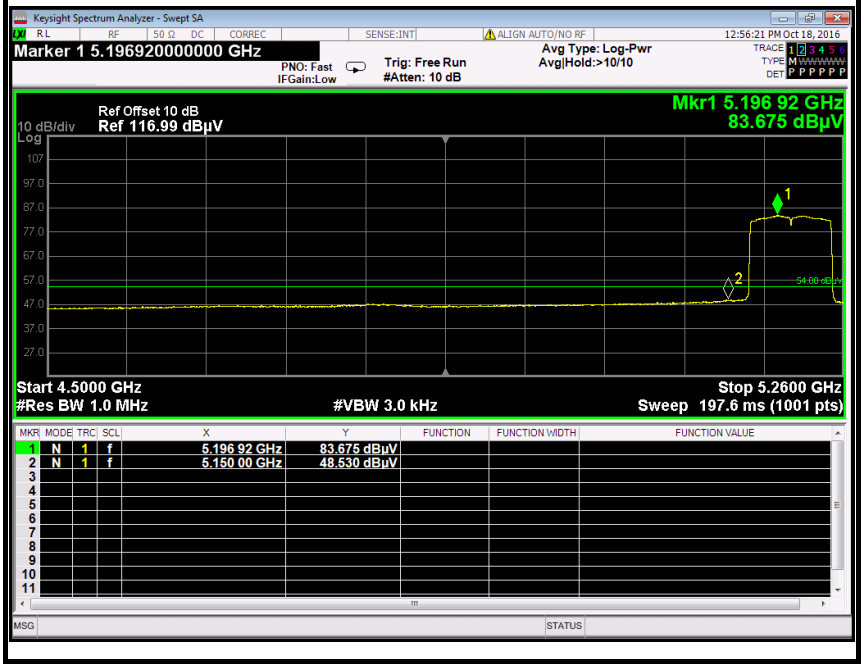


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	5150.0000	51.13	-6.60	57.73	74.00	-16.27	Peak	Vertical
2	5150.0000	41.68	-6.60	48.28	54.00	-5.72	Average	Vertical

Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**



No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	5150.0000	51.40	-6.60	58.00	74.00	-16.00	Peak	Horizontal
2	5150.0000	41.93	-6.60	48.53	54.00	-5.47	Average	Horizontal

6.6 PEAK POWER SPECTAL DENSITY

6.6.1 LIMIT

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

(1) For the band 5.15-5.25 GHz.

(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.

(iii) For fixed point-to-point access points 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. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. 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.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. 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.

(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 30 dBm 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.

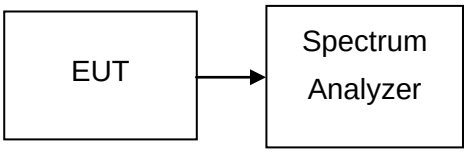
Note to paragraph (a)(3): The Commission strongly recommends that parties employing U-NII devices to provide critical communications services should determine if there are any nearby Government radar systems that could affect their operation.

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=1ms
3. For devices operating in the bands 5.725-5.85 GHz,Set the spectrum analyzer as RBW =1MHz, VBW = 3MHz, Span = 30MHz, Sweep=1ms
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

Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margain	Result
Low	5180	-4.950	11	-15.950	PASS
Mid	5200	-5.044		-16.044	PASS
High	5240	-7.107		-18.107	PASS

Test mode: IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margain	Result
Low	5180	-7.406	11	-18.406	PASS
Mid	5200	-8.194		-19.194	PASS
High	5240	-8.949		-19.949	PASS

Test mode: IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margain	Result
Low	5190	-10.589	11	-21.589	PASS
High	5230	-11.252		-22.252	PASS

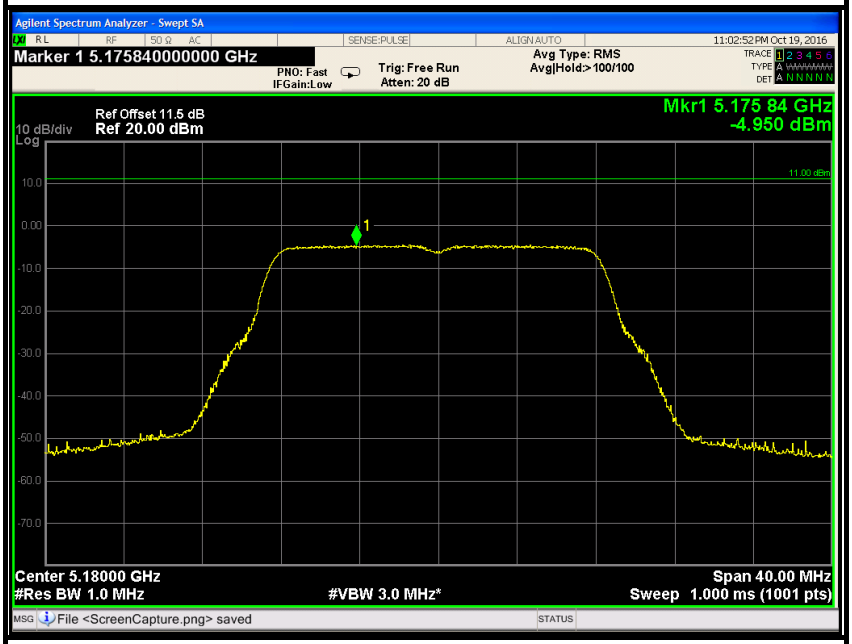
IEEE 802.11ac 80 mode / 5210MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margain	Result
	5210	-13.628	11	-24.628	PASS

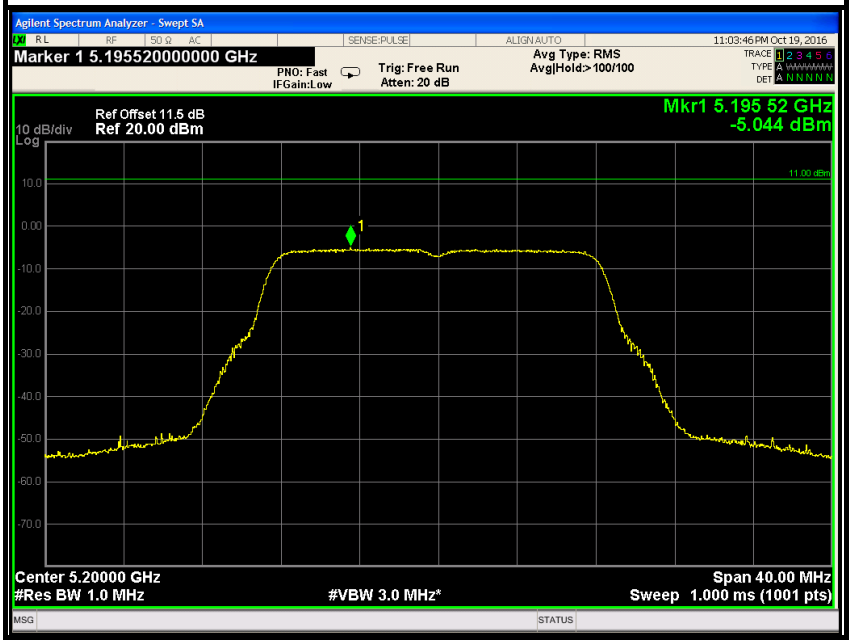
Test Plot

IEEE 802.11a mode / 5180 ~ 5240MHz

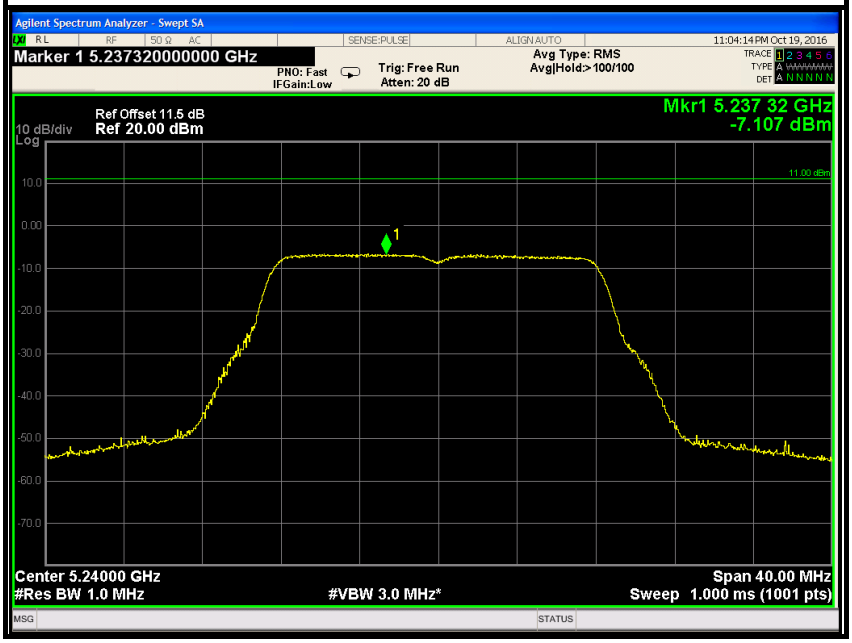
PPSD (CH Low)



PPSD (CH Mid)

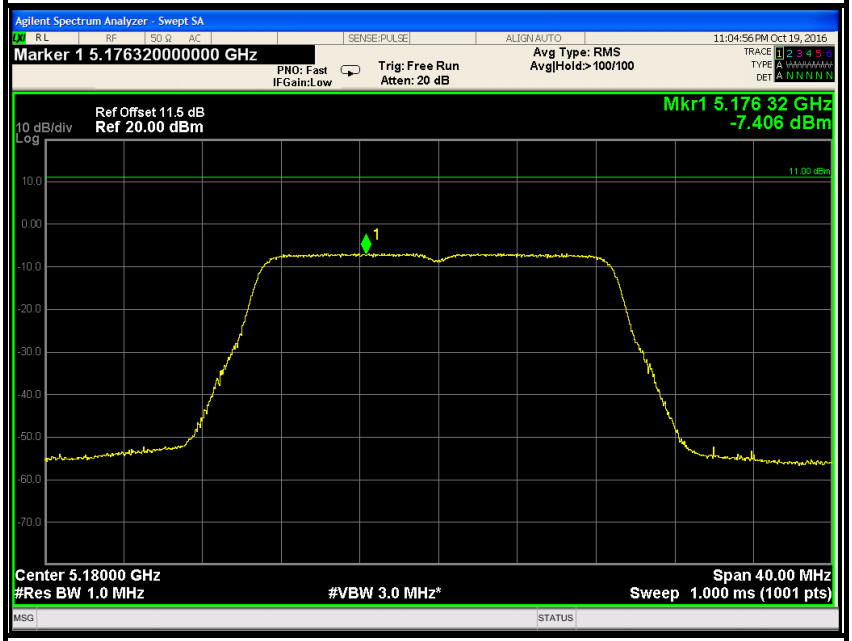


PPSD (CH High)

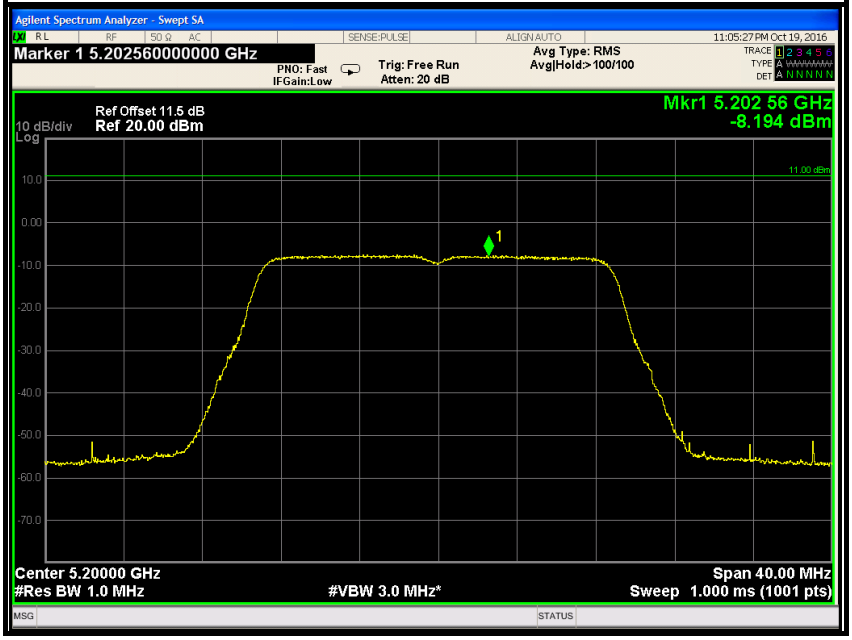


IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz

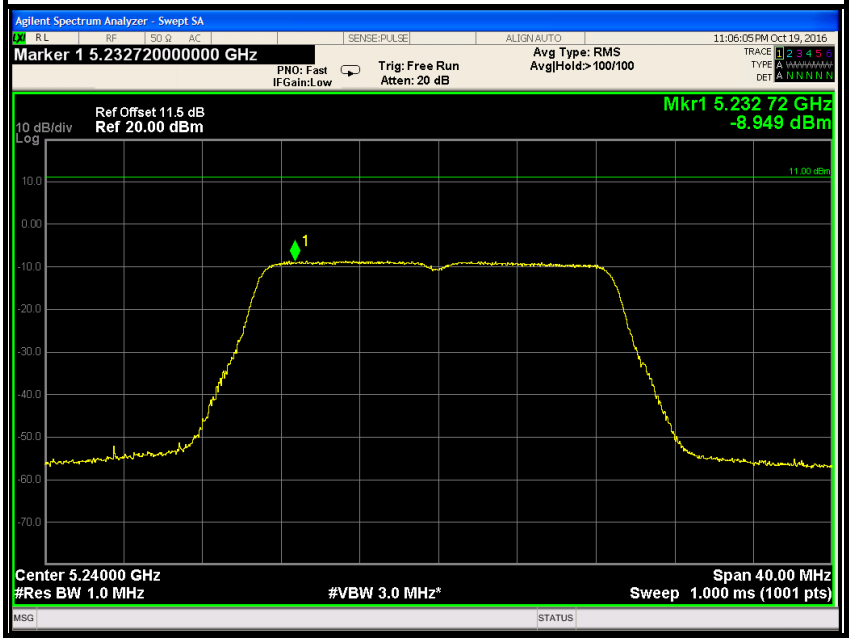
PPSD (CH Low)



PPSD (CH Mid)

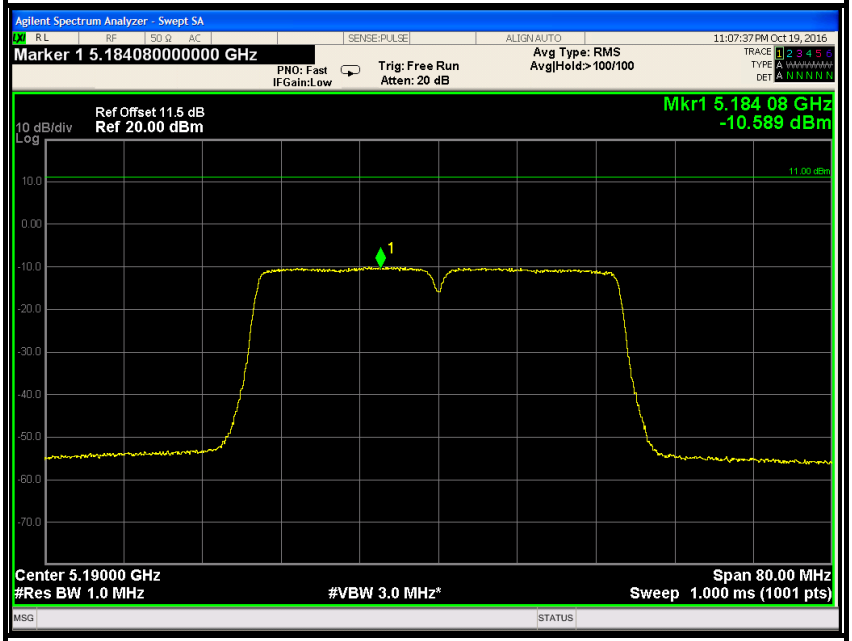


PPSD (CH High)

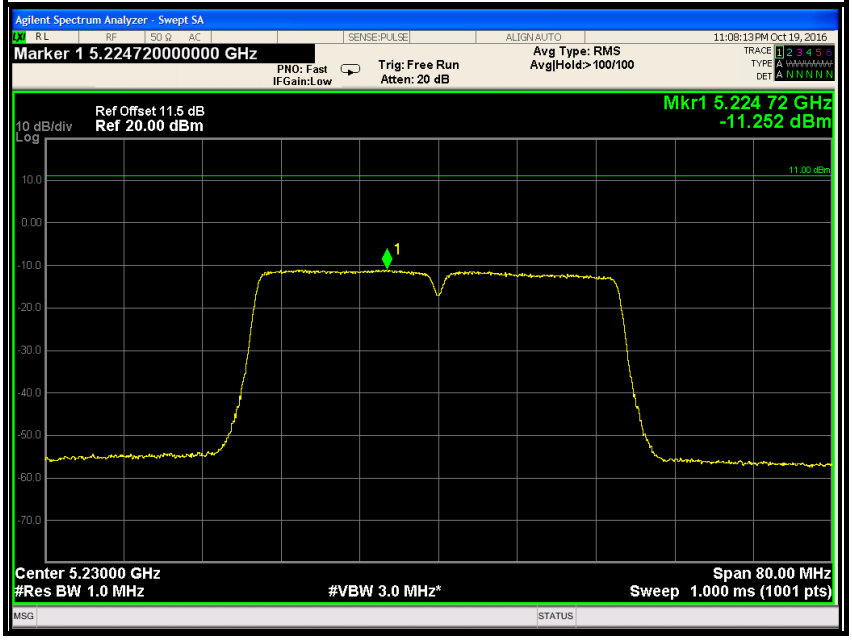


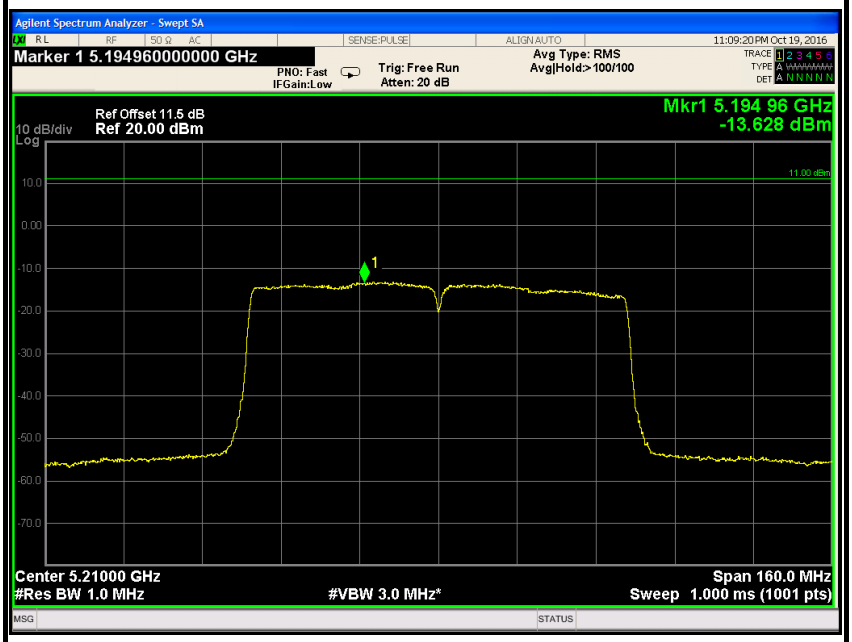
IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz

PPSD (CH Low)



PPSD (CH High)



IEEE 802.11ac 80 mode / 5210MHz
PPSD


6.7 RADIATED UNDESIABLE EMISSION

6.7.1 LIMIT

1. 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 (μV/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.*

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

Frequency (MHz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/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
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	02/28/2016	02/27/2017
Bilog Antenna	SCHAFFNER	CBL6143	5082	02/21/2016	02/20/2017
Horn Antenna	SCHWARZBECK	BBHA9120	D286	02/28/2016	02/27/2017
Loop Antenna	COM-POWER	AL-130	121044	09/25/2015	09/24/2016
Turn Table	N/A	N/A	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
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

6.7.3 Measuring Instruments and Setting

The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz /10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB 100kHz for QP

6.7.4 TEST PROCEDURE (please refer to measurement standard)

1) Sequence of testing 9 kHz to 30 MHz
Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Pre measurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna height is 0.8 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

--- Identified emissions during the pre measurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement and the limit will be stored.

2) Sequence of testing 30 MHz to 1 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Pre measurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing 1 GHz to 18 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Pre measurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.
--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement with marked maximum final measurements and the limit will be stored.

4) Sequence of testing above 18 GHz
Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 1 meter.

--- The EUT was set into operation.

Pre measurement:

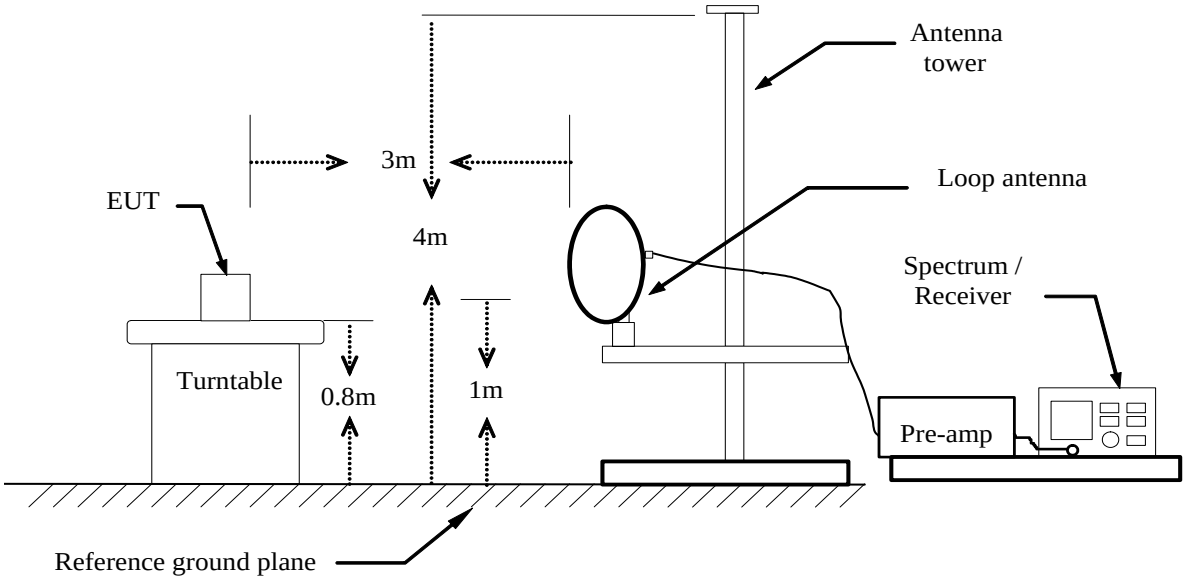
--- The antenna is moved spherical over the EUT in different polarisations of the antenna.

Final measurement:

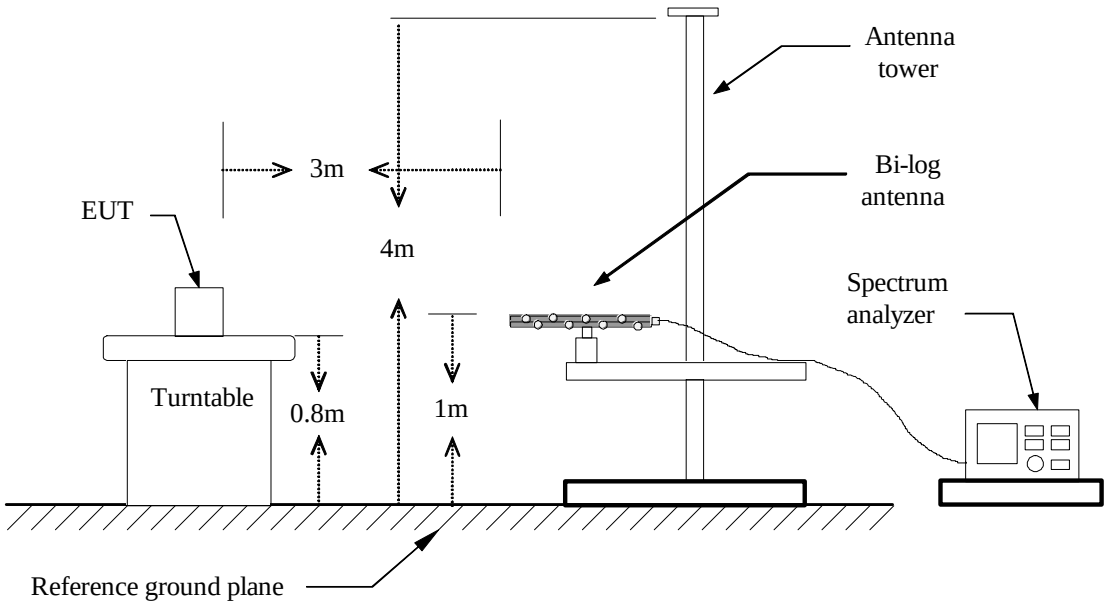
--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.
--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

6.7.5 TEST CONFIGURATION

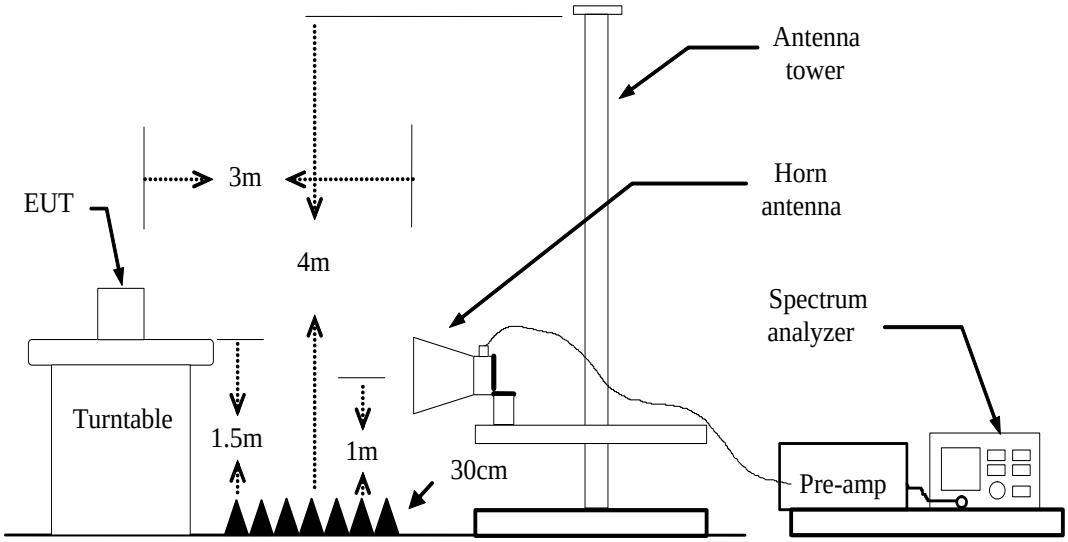
Below 30MHz



Below 1 GHz



Above 1 GHz



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration..

6.7.6 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

6.7.7 TEST RESULTS

Below 1 GHz

Test Mode: TX **Tested by:** Saber Huang

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** October 31, 2016

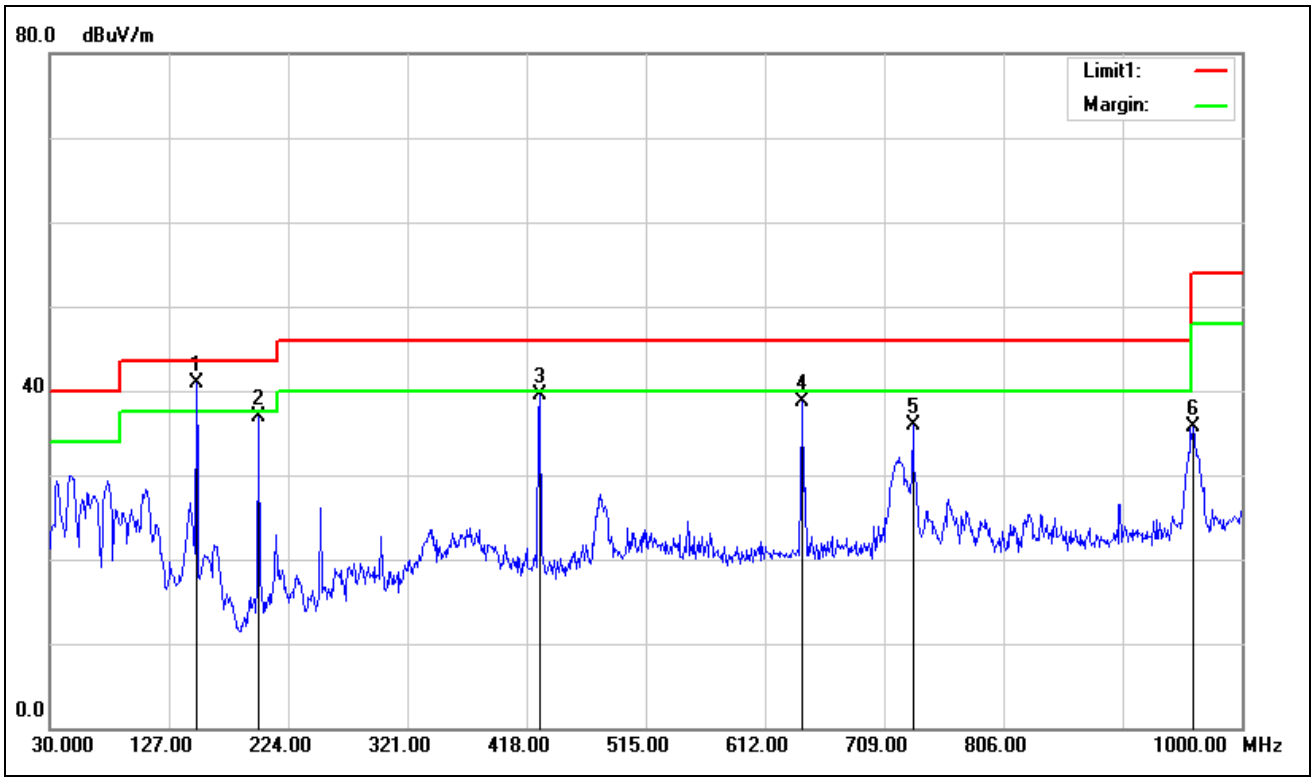
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
149.3100	52.86	-11.87	40.99	43.50	-2.51	V	QP
199.7500	49.10	-12.20	36.90	43.50	-6.60	V	QP
428.6700	48.53	-8.98	39.55	46.00	-6.45	V	QP
642.0700	44.01	-5.38	38.63	46.00	-7.37	V	QP
732.2800	39.71	-3.81	35.90	46.00	-10.10	V	QP
960.2300	36.62	-0.83	35.79	54.00	-18.21	V	QP
33.8800	44.02	-11.40	32.62	40.00	-7.38	H	QP
149.3100	50.70	-11.87	38.83	43.50	-4.67	H	QP
214.3000	47.73	-11.20	36.53	43.50	-6.97	H	QP
428.6700	45.38	-8.98	36.40	46.00	-9.60	H	QP
642.0700	44.23	-5.38	38.85	46.00	-7.15	H	QP
732.2800	45.08	-3.81	41.27	46.00	-4.73	H	QP

Pre-scan all mode and recorded the worst case results in this report (802.11a (Low Mid)).

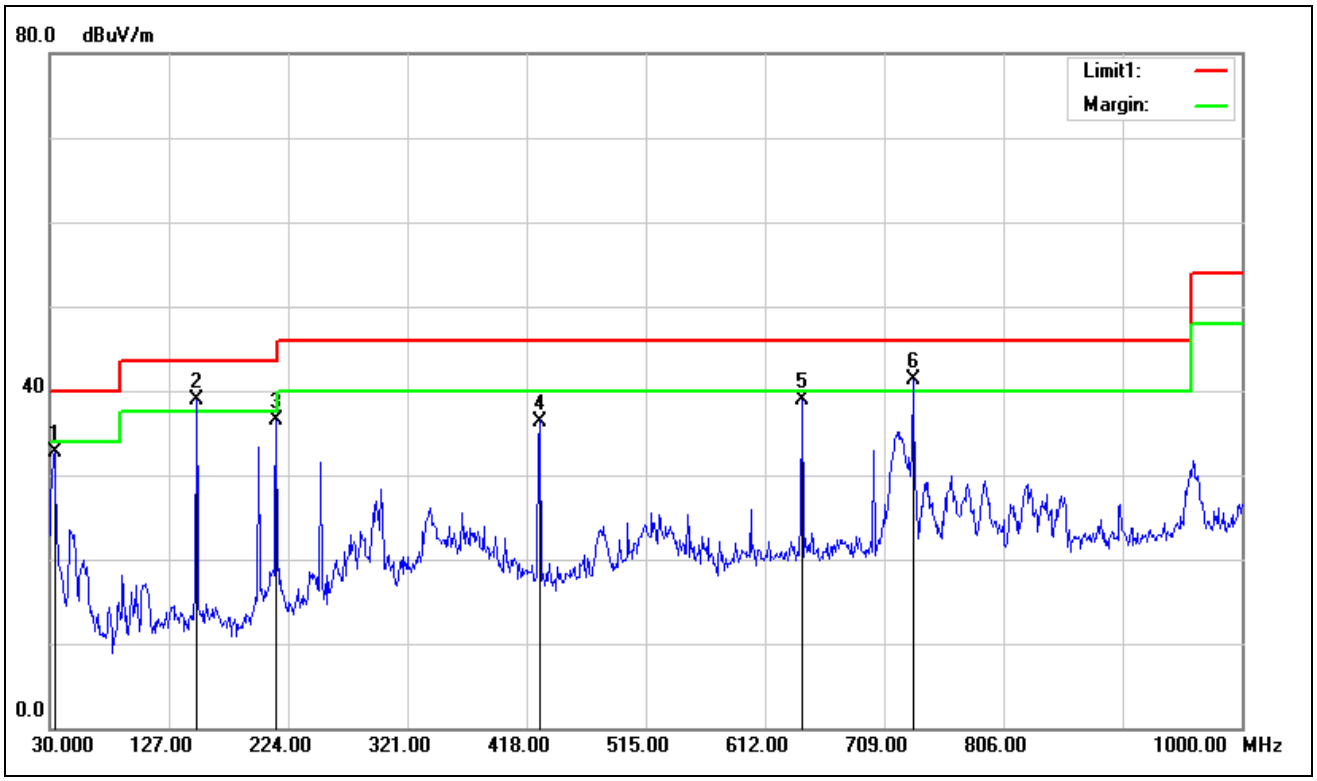
Remark:

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).*

Vertical



Horizontal



Above 1 GHz

1GHz~6GHz

Test Mode: TX **Tested by:** Saber Huang

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** October 17, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1190.000	56.55	-7.83	48.72	74.00	-25.28	V	peak
1260.000	56.93	-7.57	49.36	74.00	-24.64	V	peak
1710.000	53.31	-6.46	46.85	74.00	-27.15	V	peak
1855.000	59.02	-5.92	53.10	74.00	-20.90	V	peak
1855.000	54.02	-5.92	48.10	54.00	-5.90	V	AVG
2565.000	52.21	-2.14	50.07	74.00	-23.93	V	peak
4825.000	44.51	4.41	48.92	74.00	-25.08	V	peak
1190.000	53.36	-7.83	45.53	74.00	-28.47	H	Peak
1635.000	51.78	-6.62	45.16	74.00	-28.84	H	Peak
1930.000	51.48	-5.44	46.04	74.00	-27.96	H	Peak
2565.000	48.09	-2.14	45.95	74.00	-28.05	H	peak
3620.000	43.12	-0.01	43.11	74.00	-30.89	H	peak
4825.000	45.38	4.41	49.79	74.00	-24.21	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 / 5180MHz /(CH Low) **Tested by:** Saber Huang

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** October 17, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6552.000	32.39	6.97	39.36	74.00	-34.64	V	peak
8100.000	31.26	9.60	40.86	74.00	-33.14	V	peak
9396.000	30.59	10.24	40.83	74.00	-33.17	V	peak
10896.000	28.50	14.76	43.26	74.00	-30.74	V	peak
13116.000	27.62	18.26	45.88	74.00	-28.12	V	peak
14028.000	28.15	20.60	48.75	74.00	-25.25	V	peak
6600.000	31.70	7.05	38.75	74.00	-35.25	H	Peak
7080.000	31.88	7.86	39.74	74.00	-34.26	H	Peak
8232.000	31.68	9.52	41.20	74.00	-32.80	H	Peak
9408.000	30.19	10.28	40.47	74.00	-33.53	H	peak
10536.000	28.58	13.64	42.22	74.00	-31.78	H	peak
11268.000	29.70	14.96	44.66	74.00	-29.34	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 / 5200MHz /(CH Mid) **Tested by:** Saber Huang

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** October 17, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6468.000	31.86	6.84	38.70	74.00	-35.30	V	peak
7884.000	31.16	9.42	40.58	74.00	-33.42	V	peak
8304.000	31.79	9.48	41.27	74.00	-32.73	V	peak
9312.000	30.36	10.00	40.36	74.00	-33.64	V	peak
10236.000	29.44	12.71	42.15	74.00	-31.85	V	peak
10908.000	28.90	14.79	43.69	74.00	-30.31	V	peak
6432.000	32.34	6.78	39.12	74.00	-34.88	H	Peak
7056.000	31.63	7.81	39.44	74.00	-34.56	H	Peak
8088.000	31.39	9.60	40.99	74.00	-33.01	H	Peak
9012.000	31.36	9.13	40.49	74.00	-33.51	H	peak
10032.000	29.89	12.08	41.97	74.00	-32.03	H	peak
10992.000	28.26	15.06	43.32	74.00	-30.68	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 / 5240MHz /(CH High) **Tested by:** Saber Huang

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** October 17, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6984.000	31.94	7.67	39.61	74.00	-34.39	V	peak
8160.000	31.85	9.56	41.41	74.00	-32.59	V	peak
9384.000	30.36	10.21	40.57	74.00	-33.43	V	peak
10668.000	28.75	14.05	42.80	74.00	-31.20	V	peak
11184.000	30.21	15.00	45.21	74.00	-28.79	V	peak
12780.000	28.06	17.22	45.28	74.00	-28.72	V	peak
6768.000	32.03	7.32	39.35	74.00	-34.65	H	Peak
7044.000	31.93	7.79	39.72	74.00	-34.28	H	Peak
8424.000	31.65	9.42	41.07	74.00	-32.93	H	Peak
9360.000	30.54	10.14	40.68	74.00	-33.32	H	peak
10788.000	28.79	14.42	43.21	74.00	-30.79	H	peak
12432.000	28.79	16.07	44.86	74.00	-29.14	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 / 5180MHz /(CH Low) **Tested by:** Saber Huang

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** October 17, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
7428.000	31.39	8.53	39.92	74.00	-34.08	V	peak
8424.000	31.65	9.42	41.07	74.00	-32.93	V	peak
9636.000	30.06	10.93	40.99	74.00	-33.01	V	peak
11208.000	29.70	14.99	44.69	74.00	-29.31	V	peak
12576.000	29.07	16.55	45.62	74.00	-28.38	V	peak
14340.000	28.89	20.78	49.67	74.00	-24.33	V	peak
6924.000	31.62	7.58	39.20	74.00	-34.80	H	Peak
7776.000	31.33	9.21	40.54	74.00	-33.46	H	Peak
7944.000	31.40	9.54	40.94	74.00	-33.06	H	Peak
9864.000	29.36	11.59	40.95	74.00	-33.05	H	peak
10464.000	28.99	13.42	42.41	74.00	-31.59	H	peak
11376.000	30.15	14.91	45.06	74.00	-28.94	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 / 5200MHz /(CH Mid) **Tested by:** Saber Huang

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** October 17, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
7224.000	31.63	8.14	39.77	74.00	-34.23	V	peak
8172.000	31.91	9.56	41.47	74.00	-32.53	V	peak
9900.000	29.58	11.69	41.27	74.00	-32.73	V	peak
11328.000	30.07	14.94	45.01	74.00	-28.99	V	peak
12696.000	28.67	16.94	45.61	74.00	-28.39	V	peak
13596.000	27.96	19.52	47.48	74.00	-26.52	V	peak
7044.000	31.82	7.79	39.61	74.00	-34.39	H	Peak
8076.000	31.44	9.61	41.05	74.00	-32.95	H	Peak
10032.000	29.27	12.08	41.35	74.00	-32.65	H	Peak
10524.000	28.27	13.60	41.87	74.00	-32.13	H	peak
12204.000	29.05	15.32	44.37	74.00	-29.63	H	peak
13632.000	28.81	19.61	48.42	74.00	-25.58	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 / 5240MHz /(CH High) **Tested by:** Saber Huang

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** October 17, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
7440.000	32.01	8.56	40.57	74.00	-33.43	V	peak
8112.000	31.76	9.59	41.35	74.00	-32.65	V	peak
9384.000	30.61	10.21	40.82	74.00	-33.18	V	peak
10068.000	29.31	12.19	41.50	74.00	-32.50	V	peak
11196.000	30.08	14.99	45.07	74.00	-28.93	V	peak
12420.000	28.64	16.03	44.67	74.00	-29.33	V	peak
7416.000	31.40	8.51	39.91	74.00	-34.09	H	Peak
7992.000	31.39	9.63	41.02	74.00	-32.98	H	Peak
9564.000	29.83	10.72	40.55	74.00	-33.45	H	Peak
10056.000	29.65	12.15	41.80	74.00	-32.20	H	peak
11412.000	29.67	14.90	44.57	74.00	-29.43	H	peak
12996.000	27.46	17.94	45.40	74.00	-28.60	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 / 5190MHz /(CH Low) **Tested by:** Saber Huang

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** October 17, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6960.000	30.95	7.64	38.59	74.00	-35.41	V	peak
7932.000	31.06	9.52	40.58	74.00	-33.42	V	peak
8256.000	31.55	9.51	41.06	74.00	-32.94	V	peak
10008.000	29.05	12.00	41.05	74.00	-32.95	V	peak
10560.000	28.54	13.72	42.26	74.00	-31.74	V	peak
11220.000	29.45	14.98	44.43	74.00	-29.57	V	peak
7308.000	31.29	8.30	39.59	74.00	-34.41	H	Peak
9564.000	29.83	10.72	40.55	74.00	-33.45	H	Peak
10800.000	28.97	14.46	43.43	74.00	-30.57	H	Peak
11208.000	29.79	14.99	44.78	74.00	-29.22	H	peak
13608.000	28.65	19.55	48.20	74.00	-25.80	H	peak
14844.000	28.77	21.07	49.84	74.00	-24.16	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 / 5230MHz /(CH Low) **Tested by:** Saber Huang

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** October 17, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6732.000	31.59	7.27	38.86	74.00	-35.14	V	peak
7752.000	31.45	9.17	40.62	74.00	-33.38	V	peak
8208.000	31.47	9.54	41.01	74.00	-32.99	V	peak
9324.000	30.23	10.03	40.26	74.00	-33.74	V	peak
9804.000	29.02	11.42	40.44	74.00	-33.56	V	peak
11148.000	28.94	15.01	43.95	74.00	-30.05	V	peak
6396.000	31.56	6.72	38.28	74.00	-35.72	H	Peak
6660.000	31.64	7.15	38.79	74.00	-35.21	H	Peak
7692.000	30.57	9.05	39.62	74.00	-34.38	H	Peak
8136.000	31.30	9.58	40.88	74.00	-33.12	H	peak
9948.000	29.51	11.83	41.34	74.00	-32.66	H	peak
12312.000	28.76	15.67	44.43	74.00	-29.57	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 802.11ac 80 / 5210MHz **Tested by:** Saber Huang

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** October 17, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6492.000	31.11	6.88	37.99	74.00	-36.01	V	peak
7980.000	30.85	9.61	40.46	74.00	-33.54	V	peak
9576.000	28.81	10.76	39.57	74.00	-34.43	V	peak
10032.000	29.10	12.08	41.18	74.00	-32.82	V	peak
10224.000	28.57	12.67	41.24	74.00	-32.76	V	peak
11436.000	29.67	14.89	44.56	74.00	-29.44	V	peak
7308.000	31.58	8.30	39.88	74.00	-34.12	H	Peak
8004.000	32.21	9.65	41.86	74.00	-32.14	H	Peak
9876.000	30.23	11.62	41.85	74.00	-32.15	H	Peak
10512.000	29.07	13.57	42.64	74.00	-31.36	H	peak
11484.000	29.83	14.87	44.70	74.00	-29.30	H	peak
13608.000	28.71	19.55	48.26	74.00	-25.74	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.

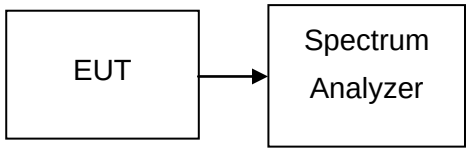
(3) The provisions of §15.205 apply to intentional radiators operating under this section.

6.8.2 MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	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.

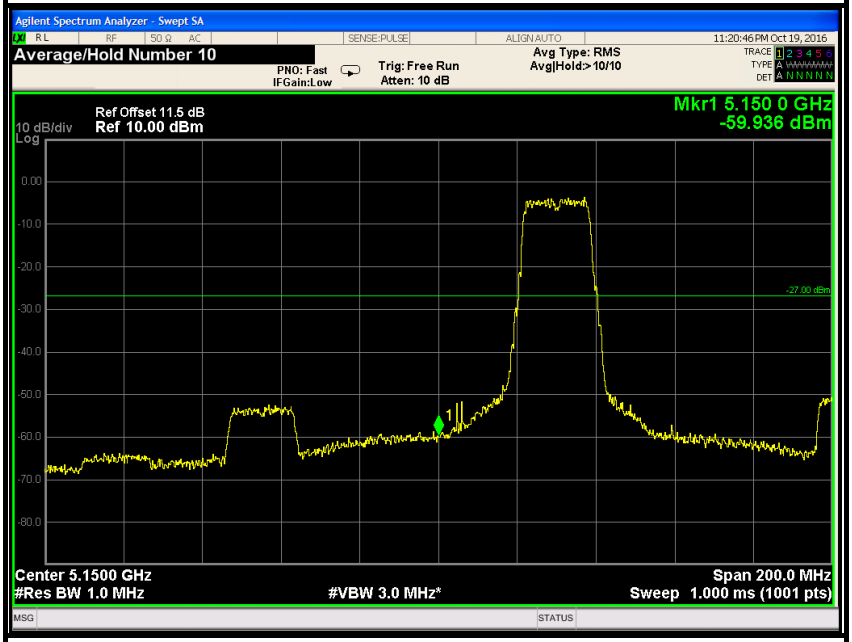
6.8.5 TEST RESULTS

No non-compliance noted

Test Plot

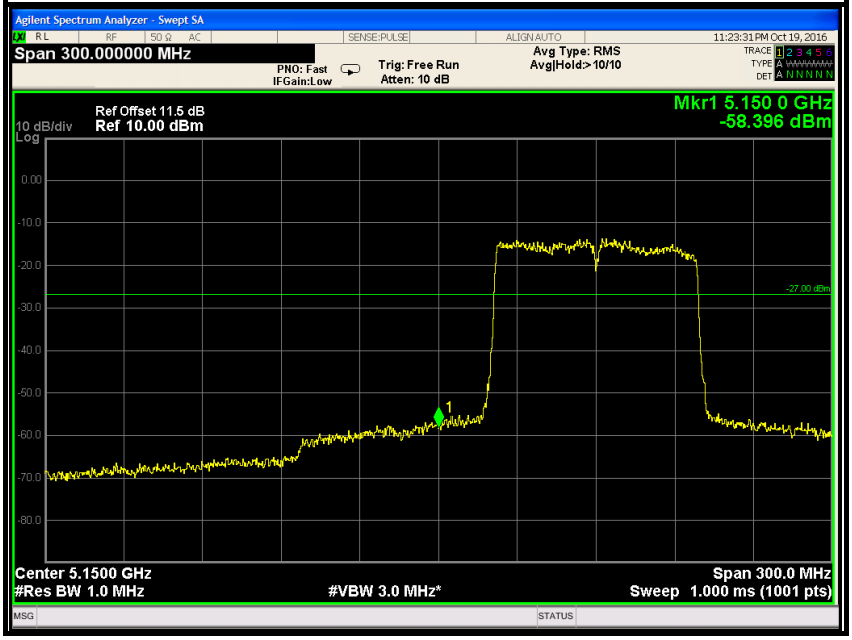
IEEE 802.11a mode / 5180 ~ 5240MHz

CH Low



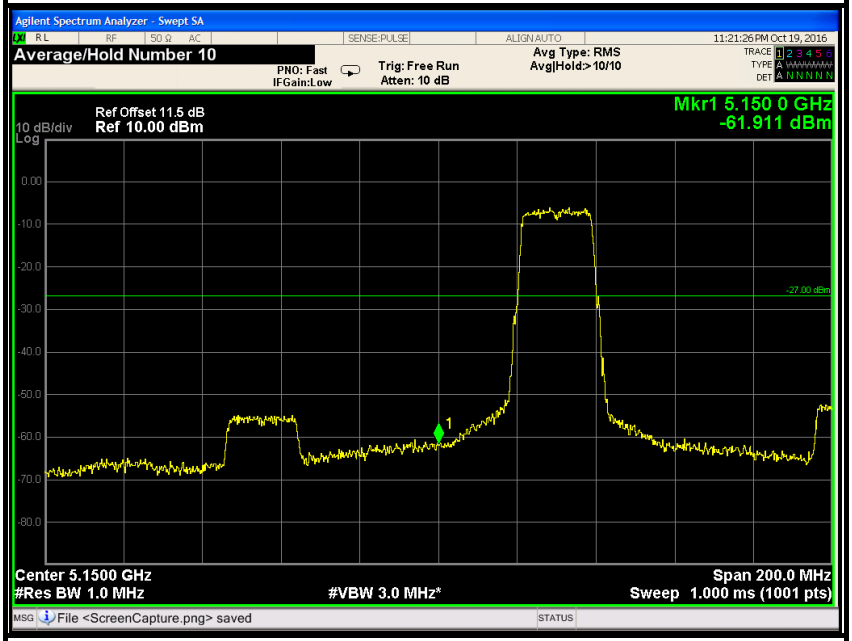
IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz

CH Low

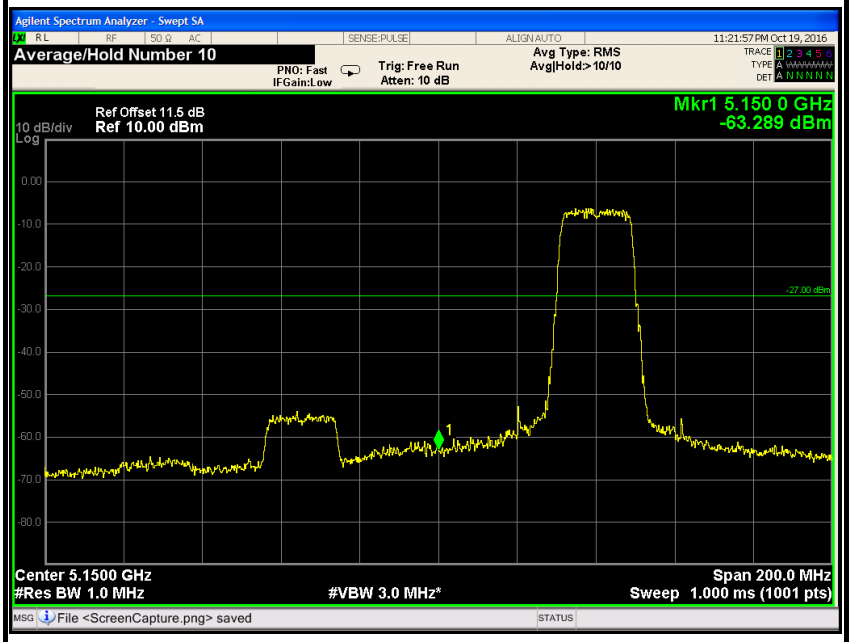


IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz

CH Low



IEEE 802.11ac 80 mode / 5210MHz



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 (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

** Decreases with the logarithm of the frequency.*

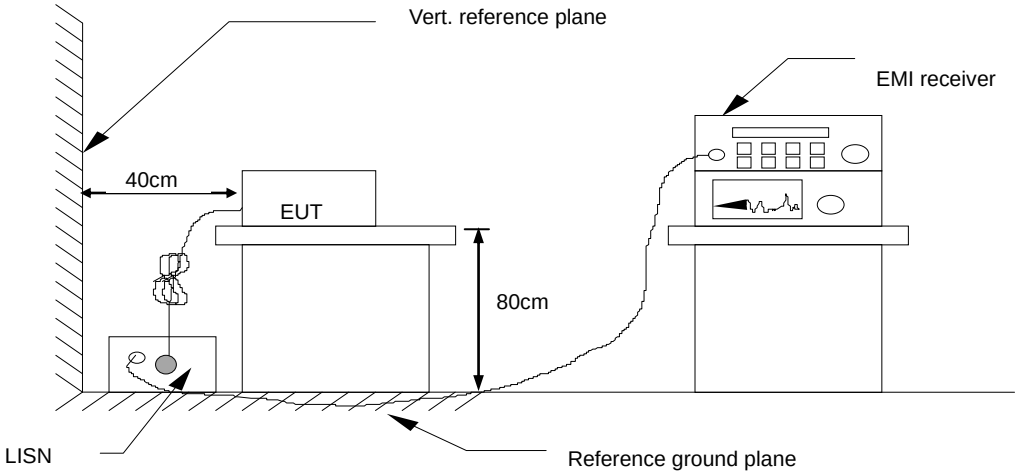
6.9.2 TEST INSTRUMENTS

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.

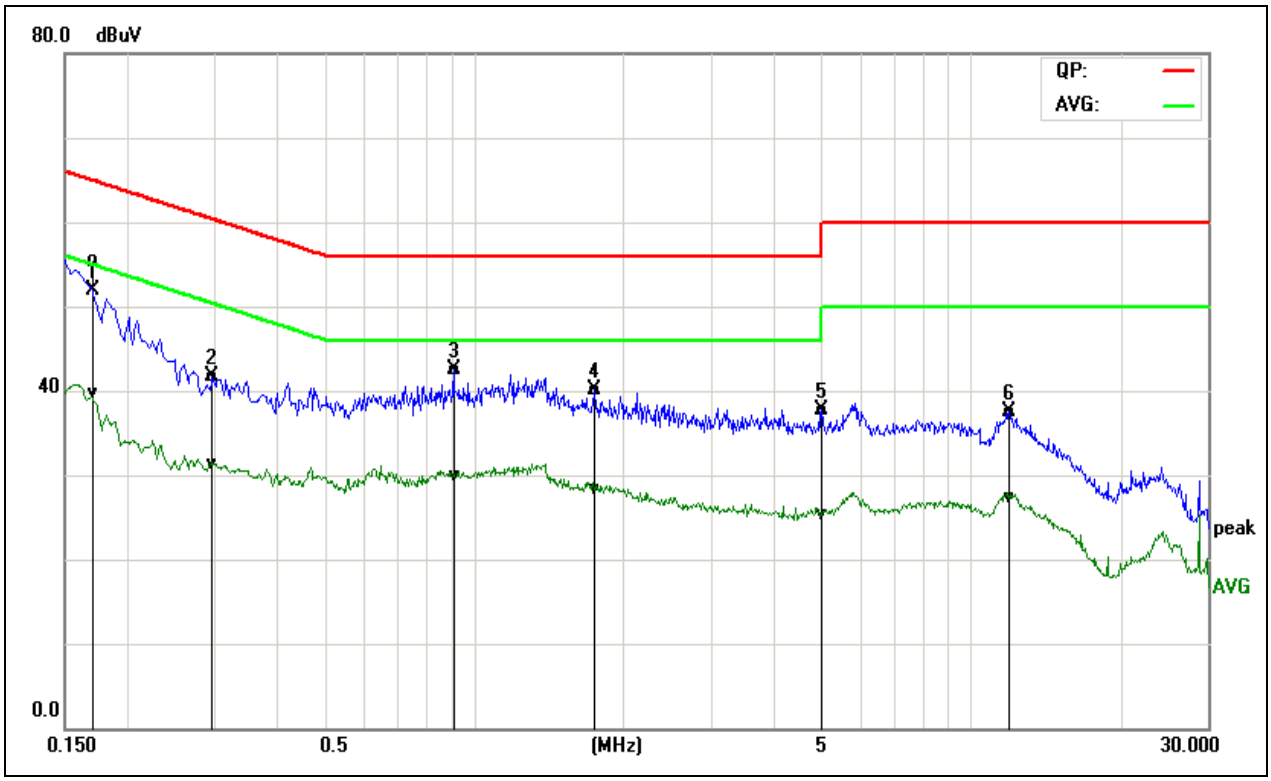
6.9.5 DATA SAMPLE

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

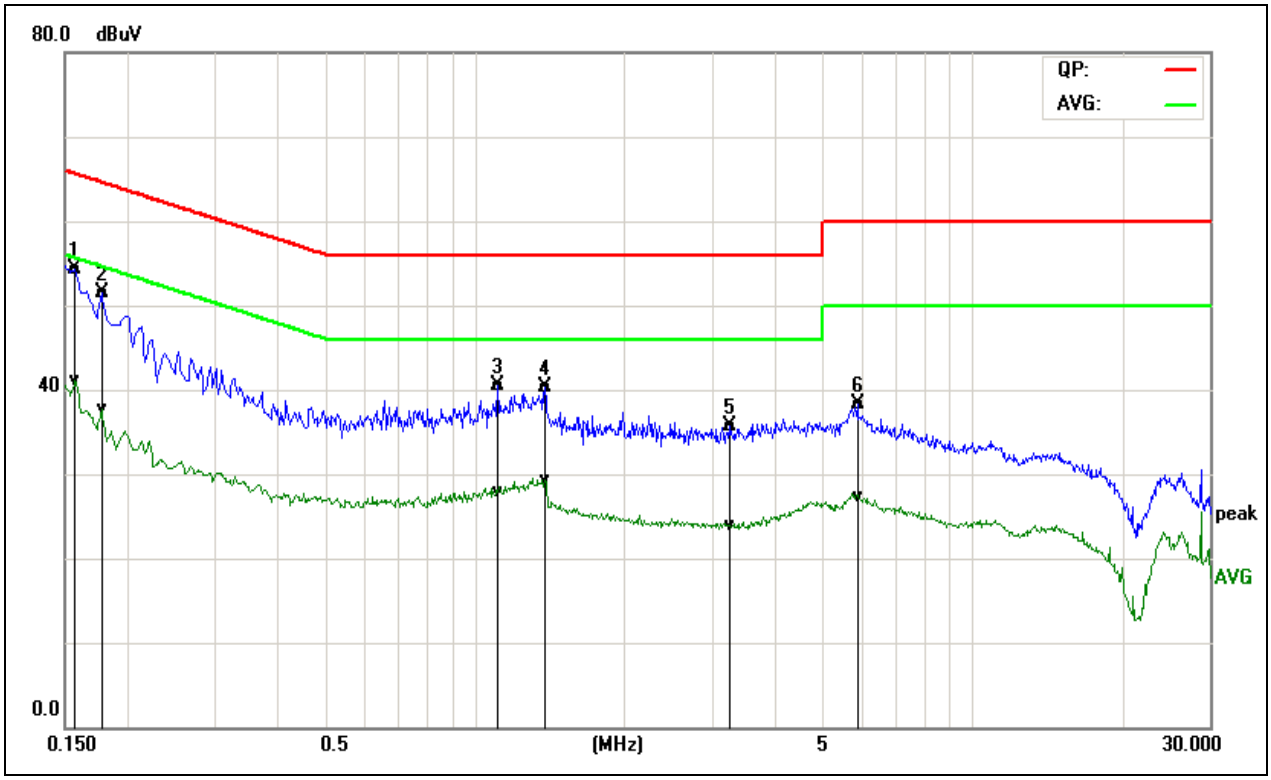
Model No.	B9S3	RBW,VBW	9 kHz
Environmental Conditions	22°C, 45% RH	Test Mode	Mode 1
Tested by	Saber Huang	Line	L1
Test Date	November 3, 2016		



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)
0.1722	35.82	20.07	19.73	55.55	39.80	64.85	54.85	-9.30	-15.05	Pass
0.2980	21.96	11.69	19.71	41.67	31.40	60.30	50.30	-18.63	-18.90	Pass
0.9100	22.68	10.15	19.74	42.42	29.89	56.00	46.00	-13.58	-16.11	Pass
1.7460	20.44	8.49	19.73	40.17	28.22	56.00	46.00	-15.83	-17.78	Pass
5.0100	18.07	5.62	19.73	37.80	25.35	60.00	50.00	-22.20	-24.65	Pass
11.9860	17.51	7.35	19.97	37.48	27.32	60.00	50.00	-22.52	-22.68	Pass

REMARKS: *L1 = Line One (Live Line)*

Model No.	B9S3	**RBW,VBW**	9 kHz
Environmental Conditions	22°C, 45% RH	**Test Mode**	Mode 1
Tested by	Saber Huang	**Line**	L2
Test Date	November 3, 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)
0.1580	34.49	21.35	19.72	54.21	41.07	65.56	55.57	-11.35	-14.50	Pass
0.1780	31.73	17.90	19.73	51.46	37.63	64.57	54.58	-13.11	-16.95	Pass
1.1140	20.66	8.18	19.75	40.41	27.93	56.00	46.00	-15.59	-18.07	Pass
1.3860	20.59	9.49	19.74	40.33	29.23	56.00	46.00	-15.67	-16.77	Pass
3.2460	16.02	4.23	19.72	35.74	23.95	56.00	46.00	-20.26	-22.05	Pass
5.8940	18.59	7.64	19.73	38.32	27.37	60.00	50.00	-21.68	-22.63	Pass

REMARKS: *L2 = Line Two (Neutral Line)*

6.10 FREQUENCY STABILITY

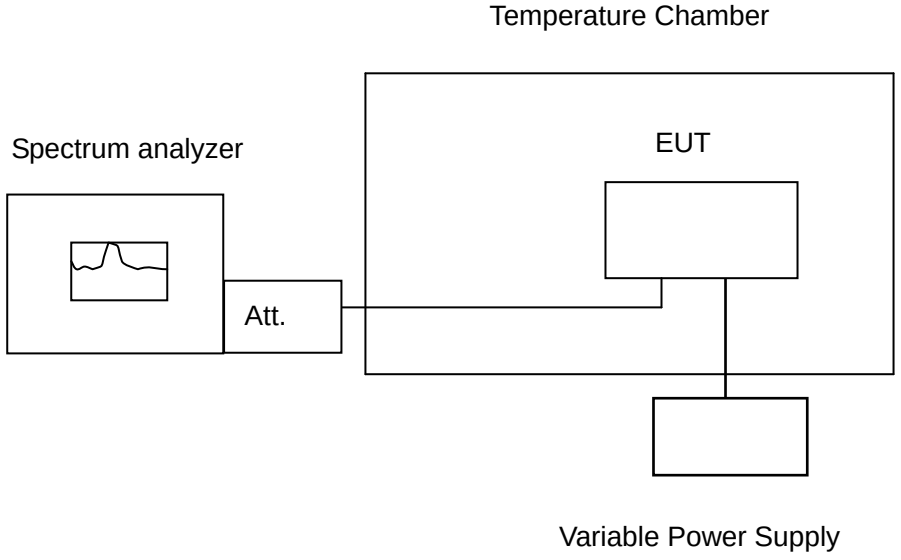
6.10.1 LIMIT

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



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^{o}C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to –20^{o}C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10^{o}C increased per stage until the highest temperature of +50^{o}C reached.

6.10.5 TEST RESULTS

No non-compliance noted.

Test Data

IEEE 802.11a MHz mode / 5180 ~ 5240MHz (Low)

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5179.958345	5150-5250	PASS
40	120	5179.995248	5150-5250	PASS
30	120	5179.961049	5150-5250	PASS
20	120	5179.882100	5150-5250	PASS
10	120	5179.971823	5150-5250	PASS
0	120	5179.980946	5150-5250	PASS
-10	120	5179.991685	5150-5250	PASS
-20	120	5179.999647	5150-5250	PASS

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5179.961325	5150-5250	PASS
	120	5179.882100	5150-5250	PASS
	132	5179.969371	5150-5250	PASS

IEEE 802.11a MHz mode / 5180 ~ 5240MHz (High)

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5239.952331	5150-5250	PASS
40	120	5239.997921	5150-5250	PASS
30	120	5239.967847	5150-5250	PASS
20	120	5239.877300	5150-5250	PASS
10	120	5239.951479	5150-5250	PASS
0	120	5239.976963	5150-5250	PASS
-10	120	5239.973280	5150-5250	PASS
-20	120	5239.969557	5150-5250	PASS

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5239.987782	5150-5250	PASS
	120	5239.877300	5150-5250	PASS
	132	5239.950430	5150-5250	PASS

IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz (Low)

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5179.988748	5150-5250	PASS
40	120	5179.961882	5150-5250	PASS
30	120	5179.969803	5150-5250	PASS
20	120	5179.882100	5150-5250	PASS
10	120	5179.954728	5150-5250	PASS
0	120	5179.997881	5150-5250	PASS
-10	120	5179.995526	5150-5250	PASS
-20	120	5179.966493	5150-5250	PASS

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5179.951652	5150-5250	PASS
	120	5179.882100	5150-5250	PASS
	132	5179.999007	5150-5250	PASS

IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz (High)

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5239.985535	5150-5250	PASS
40	120	5239.964554	5150-5250	PASS
30	120	5239.981978	5150-5250	PASS
20	120	5239.877300	5150-5250	PASS
10	120	5239.971632	5150-5250	PASS
0	120	5239.995694	5150-5250	PASS
-10	120	5239.990200	5150-5250	PASS
-20	120	5239.978721	5150-5250	PASS

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5239.979342	5150-5250	PASS
	120	5239.877300	5150-5250	PASS
	132	5239.951329	5150-5250	PASS

IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz (Low)

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5189.971132	5150-5250	PASS
40	120	5189.954863	5150-5250	PASS
30	120	5189.953766	5150-5250	PASS
20	120	5189.879100	5150-5250	PASS
10	120	5189.986836	5150-5250	PASS
0	120	5189.990611	5150-5250	PASS
-10	120	5189.987495	5150-5250	PASS
-20	120	5189.987640	5150-5250	PASS

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5189.960023	5150-5250	PASS
	120	5189.879100	5150-5250	PASS
	132	5189.956500	5150-5250	PASS

IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz (High)

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5229.955555	5150-5250	PASS
40	120	5229.975945	5150-5250	PASS
30	120	5229.968321	5150-5250	PASS
20	120	5229.879700	5150-5250	PASS
10	120	5229.970166	5150-5250	PASS
0	120	5229.949479	5150-5250	PASS
-10	120	5229.956313	5150-5250	PASS
-20	120	5229.996814	5150-5250	PASS

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5229.966789	5150-5250	PASS
	120	5229.879700	5150-5250	PASS
	132	5229.974982	5150-5250	PASS

IEEE 802.11ac 80 mode / 5210MHz

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5209.991884	5150-5250	PASS
40	120	5209.967199	5150-5250	PASS
30	120	5209.967293	5150-5250	PASS
20	120	5209.879700	5150-5250	PASS
10	120	5209.987411	5150-5250	PASS
0	120	5209.987679	5150-5250	PASS
-10	120	5209.961314	5150-5250	PASS
-20	120	5209.962126	5150-5250	PASS

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5209.975442	5150-5250	PASS
	120	5209.879700	5150-5250	PASS
	132	5209.979546	5150-5250	PASS