FCC 47 CFR PART 15 SUBPART E

for

EO2

Model: EO2

Brand: N/A

Test Report Number:
C161010Z03-RP1-4

Issued Date: November 7, 2016

Issued for

Electric Objects Inc

95 Avenue B, 2nd Floor, New York, NY 10009, United States

Issued by:

Compliance Certification Services (Shenzhen) Inc.
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TESTING CERT #2861.01

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Revision History

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

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1. TEST CERTIFICATION

Product	EO2
Model	EO2
Brand	N/A
Tested	October 10~ November 7, 2016
Applicant	**Electric Objects Inc** 95 Avenue B, 2nd Floor, New York, NY 10009, United States
Manufacturer	**Electric Objects Inc** 95 Avenue B, 2nd Floor, New York, NY 10009, United States

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.

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2. EUT DESCRIPTION

Product	EO2
Model Number	EO2
Brand	N/A
Model Discrepancy	N/A
Serial Number	C161010Z03-RP1-4
Received Date	October 10, 2016
Power Supply	DC 12V supplied by adapter
Adapter Manufacturer / Model No.	HUAXU ELECTRONICS FACTORY / HX36-1203000-E2 Input: 100-240V ~ 50/60Hz 1.0A Max Output: DC12V 3.0A Max. AC Input Cable: Unshielded 1.25m DC Output Cable: Unshielded 1.8m
Frequency Range	UNII Band I: IEEE 802.11a, 802.11n HT20 : 5180MHz ~ 5240MHz; UNII Band IV IEEE 802.11a, 802.11n HT20 : 5745MHz ~ 5825MHz
Transmit Power	UNII Band I: IEEE 802.11a: 8.78dBm IEEE 802.11n HT 20 MHz mode: 7.58dBm UNII Band IV IEEE 802.11a: 13.82dBm IEEE 802.11n HT 20 MHz mode: 12.49dBm
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(800ns GI): 13,26,39,52,78,104,117,130Mbps
Number of Channels	UNII Band I: IEEE 802.11a, 802.11n HT20 : 4 Channels UNII Band IV IEEE 802.11a, 802.11n HT20 : 5 Channels
Antenna Specification	FPC Antenna with 3dBi gain (Max)
Channels Spacing	IEEE 802.11a, 802.11n HT20 : 20MHz
Temperature Range	0°C ~ +40°C
Hardware Version	RMF0602
Software Version	V1

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

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Operation Frequency:

UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)	
CHANNEL	**MHz**
36	5180
40	5200
44	5220
48	5240
149	5745
153	5765
157	5785
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: **2AJPW-10D2AE** filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules and FCC 14-30.

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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.

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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.

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3.5 DESCRIPTION OF TEST MODES

The EUT is a 1x1 configuration spatial (1TX & 1RX) 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:** Play Video	**Mode 1**
Radiated Emission	**Mode 1:** TX	**Mode 1**

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 13Mbps data rate were chosen for full testing.

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 13Mbps data rate were chosen for full testing.

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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	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.

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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-3478, R-3135, T-652, G-10624)**
Canada	**INDUSTRY CANADA**

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

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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.*

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6. FCC PART 15 REQUIREMENTS

6.1 26dB EMISSION BANDWIDTH

6.1.1 LIMIT

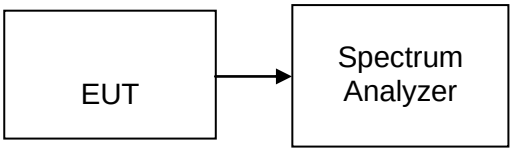
According to §15.403(c), for purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated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

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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	19.05
Mid	5200	18.93
High	5240	18.89

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

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)
Low	5180	19.21
Mid	5200	19.22
High	5240	19.12

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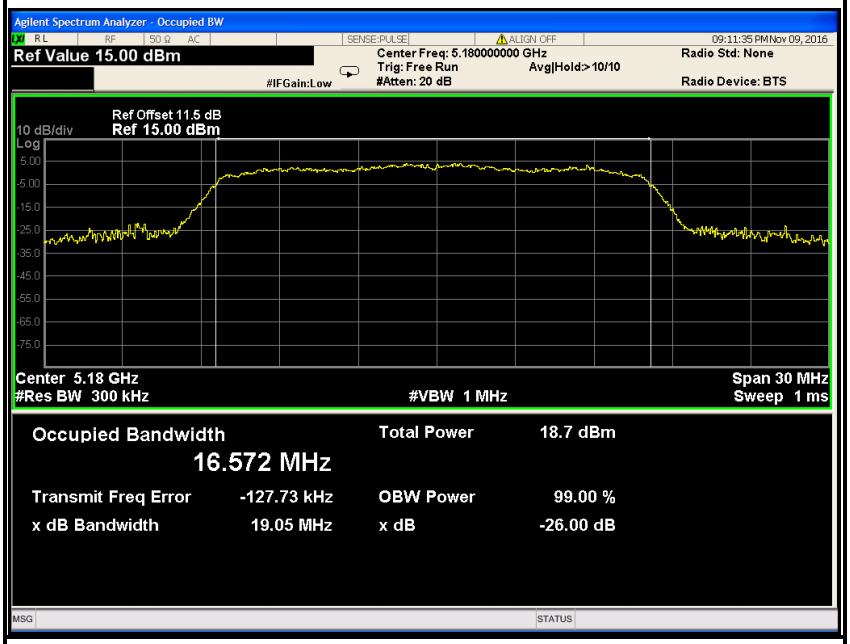
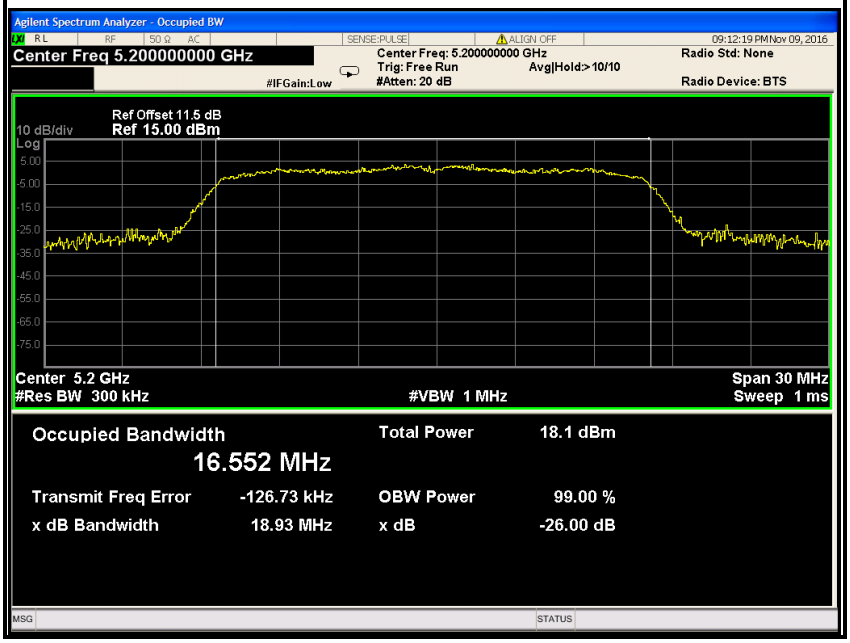
Test Plot

IEEE 802.11a mode / 5180 ~ 5240MHz

26dB Bandwidth (CH Low)



26dB Bandwidth (CH Mid)



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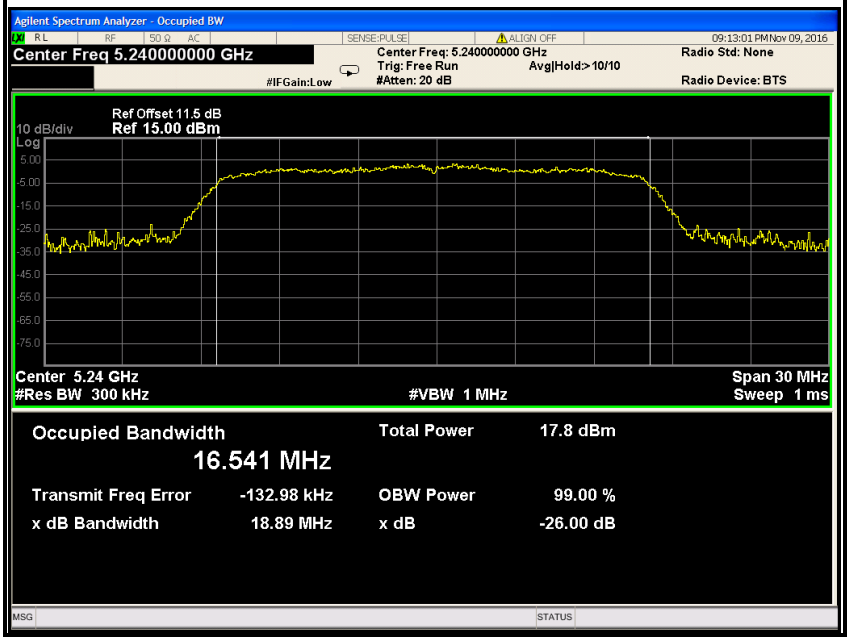
26dB Bandwidth (CH High)



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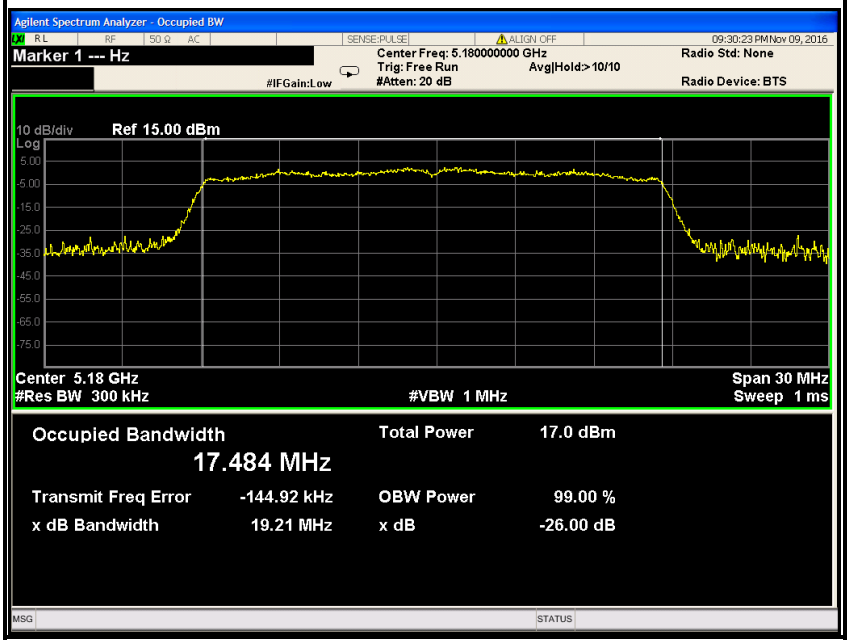
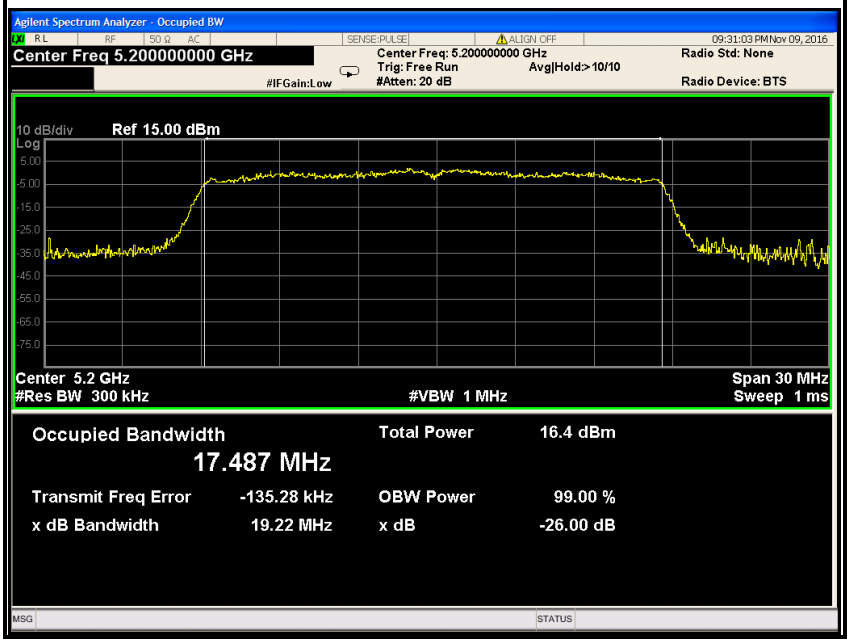
IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz

26dB Bandwidth (CH Low)



26dB Bandwidth (CH Mid)



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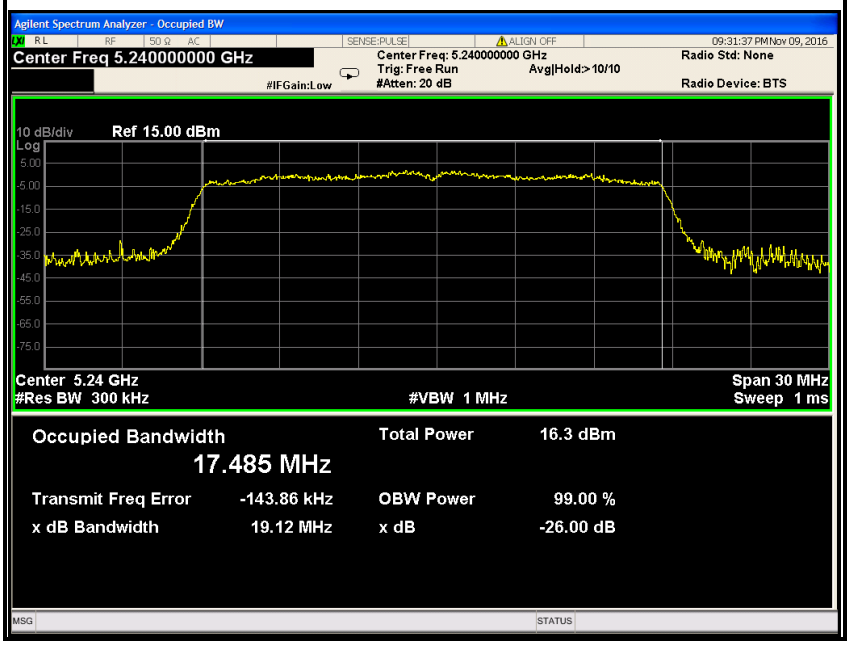
26dB Bandwidth (CH High)



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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

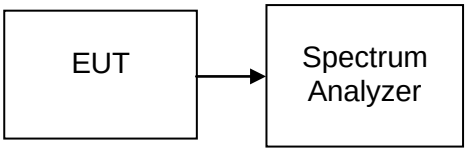
Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2016	02/20/2017

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



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6.2.5 TEST RESULTS

No non-compliance noted

Test Data

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

Channel	Frequency (MHz)	6dB Bandwidth(B) (MHz)	Limit (kHz)	Test Result
Low	5745	15.10	>500	PASS
Mid	5785	15.12		PASS
High	5825	15.11		PASS

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

Channel	Frequency (MHz)	6dB Bandwidth(B) (MHz)	Limit (kHz)	Test Result
Low	5745	15.11	>500	PASS
Mid	5785	15.93		PASS
High	5825	15.11		PASS

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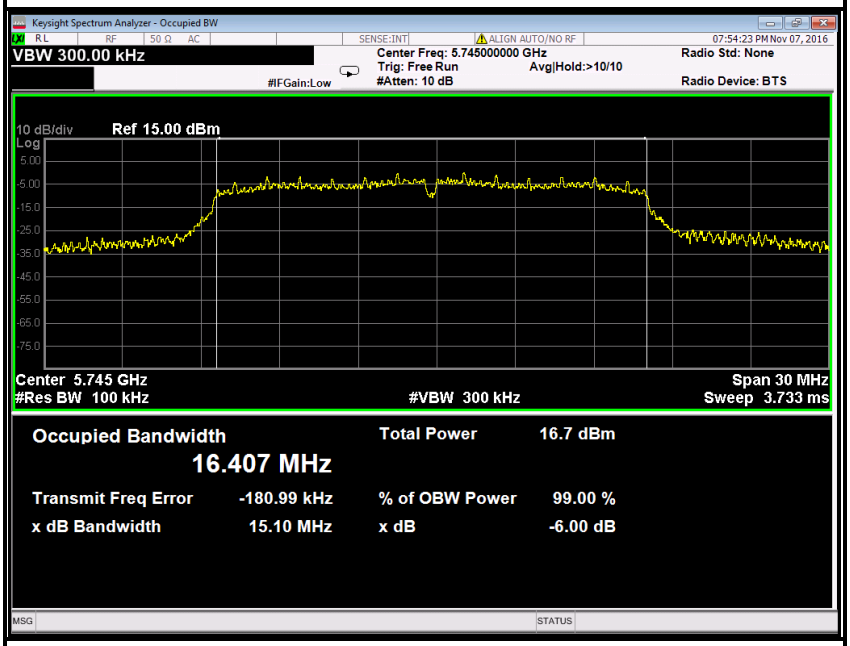
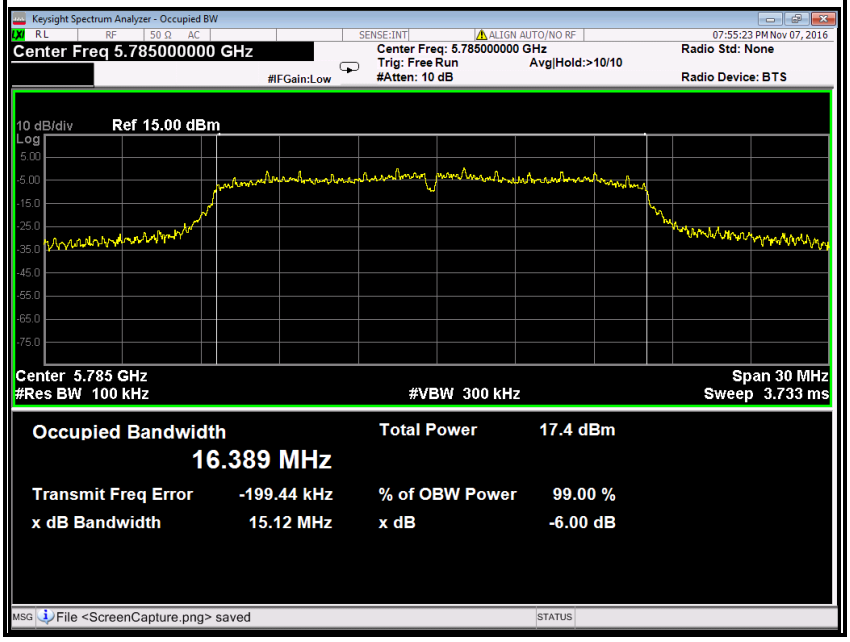
Test Plot

IEEE 802.11a mode / 5745 ~ 5825MHz

6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)



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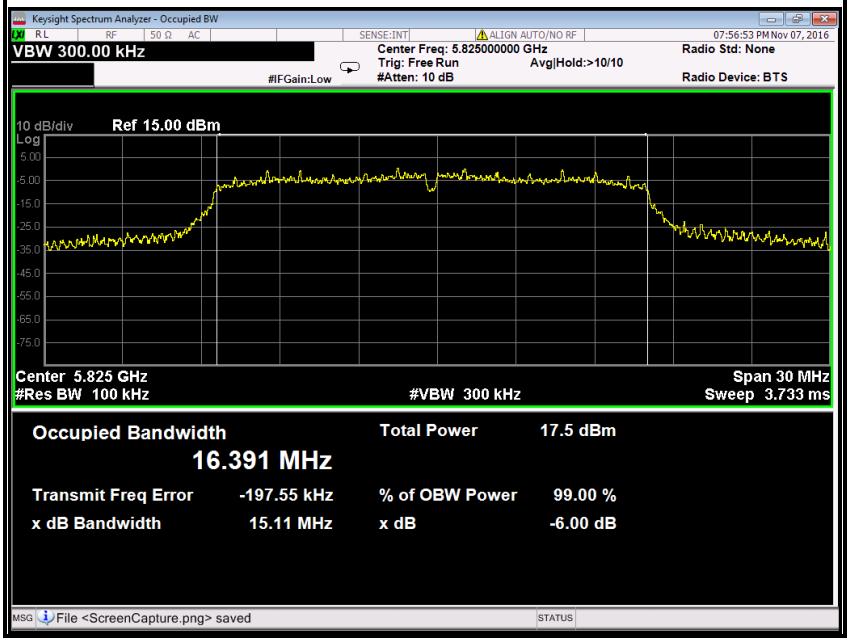
6dB Bandwidth (CH High)



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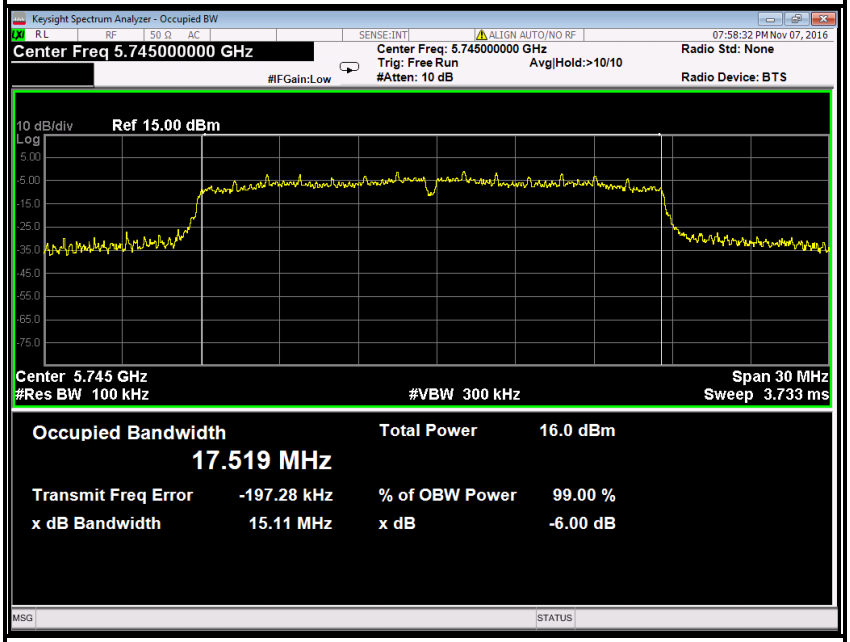
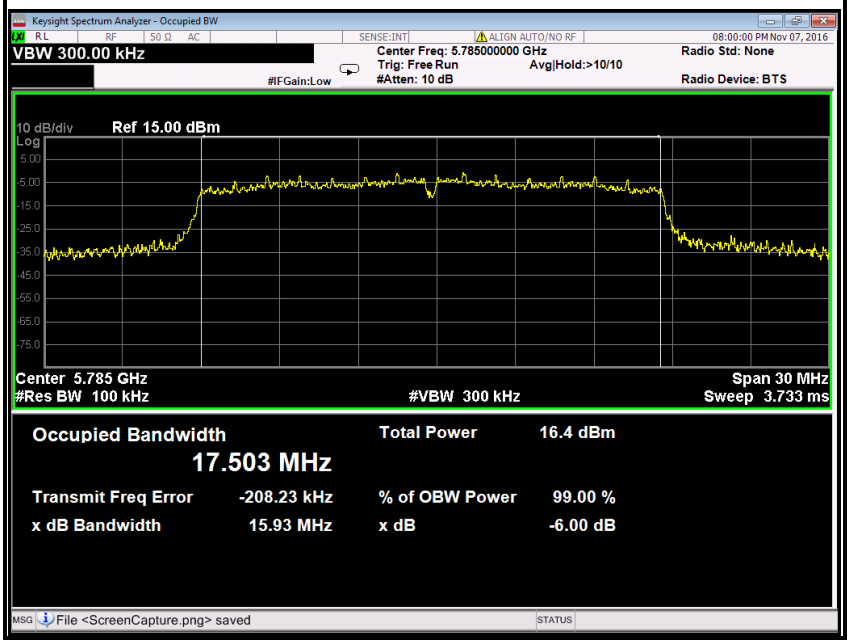
IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz

6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)



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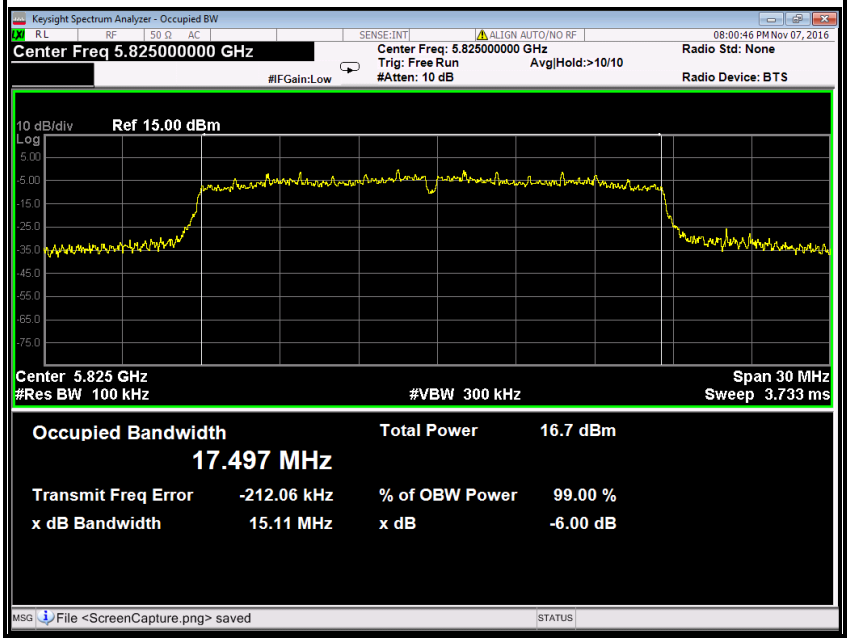
6dB Bandwidth (CH High)



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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}	Lowest channel 5180MHz	Highest channel 5240MHz
Conducted power [dBm] Measured with OFDM modulation		8.78	7.88
Radiated power [dBm] Measured with OFDM modulation		11.53	10.84
Gain [dBi] Calculated		2.75	2.96
Measurement uncertainty		± 1.5 dB (cond.) / ± 3 dB (rad.)	

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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.

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(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.

Specified Limit of the Output Power

Not applicable, Since the EUT without the band II and band III.

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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

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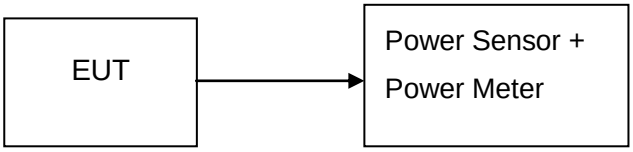

6.4.4 TEST PROCEDURE

The EUT was connected to a Power Meter through a 50Ω RF cable.

6.4.5 TEST RESULTS

No non-compliance noted

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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	8.78	0.00755	24.00	PASS
Mid	5200	8.67	0.00736		PASS
High	5240	7.88	0.00614		PASS

IEEE 802.11a mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (dBm)	Result
Low	5745	11.24	0.01330	30.00	PASS
Mid	5785	13.82	0.02410		PASS
High	5825	13.33	0.02153		PASS

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

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (dBm)	Result
Low	5180	7.58	0.00573	24.00	PASS
Mid	5200	7.45	0.00556		PASS
High	5240	6.47	0.00444		PASS

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

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (dBm)	Result
Low	5745	13.13	0.02056	30.00	PASS
Mid	5785	13.03	0.02009		PASS
High	5825	12.49	0.01774		PASS

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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.

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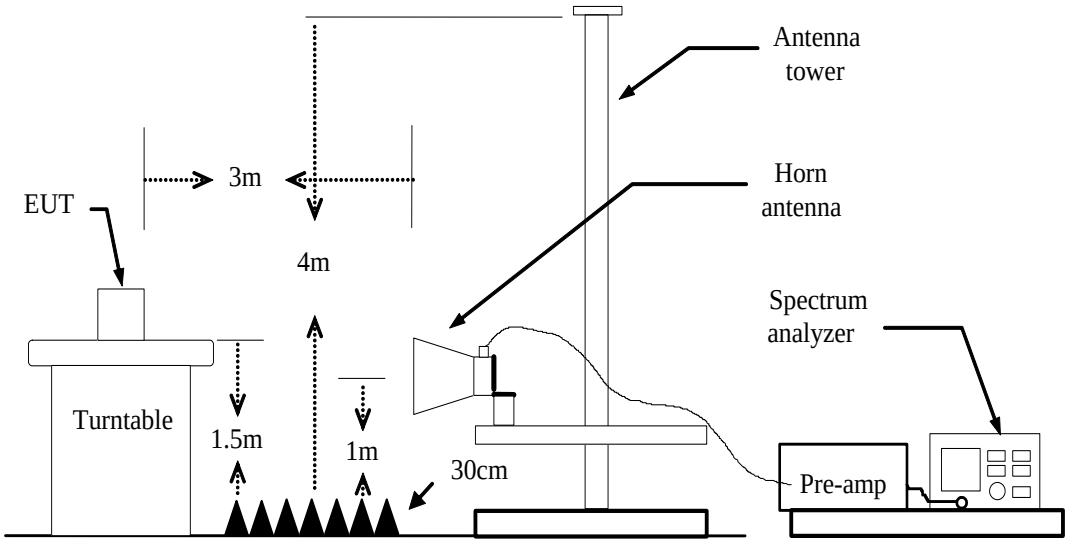
6.5.3 TEST CONFIGURATION



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=680Hz / Sweep=AUTO / Detector=Peak
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

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6.5.5 TEST RESULT

IEEE 802.11a mode / 5745 ~ 5825MHz

1. Operating Frequency: 5745-5825MHz
2. CH Low: 5745MHz, CH High: 5825MHz
3. 26dB bandwidth: CH Low: 25.37MHz, CH High: 29.12MHz
4. Frequency Range: 5732.3150MHz, 5839.5600MHz

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

1. Operating Frequency: 5745-5825MHz
2. CH Low: 5745MHz, CH High: 5825MHz
3. 26dB bandwidth: CH Low: 24.10MHz, CH High: 28.85MHz
4. Frequency Range: 5732.9500MHz, 5839.4250MHz

Because the mentioned conditions, the test is not applicable.

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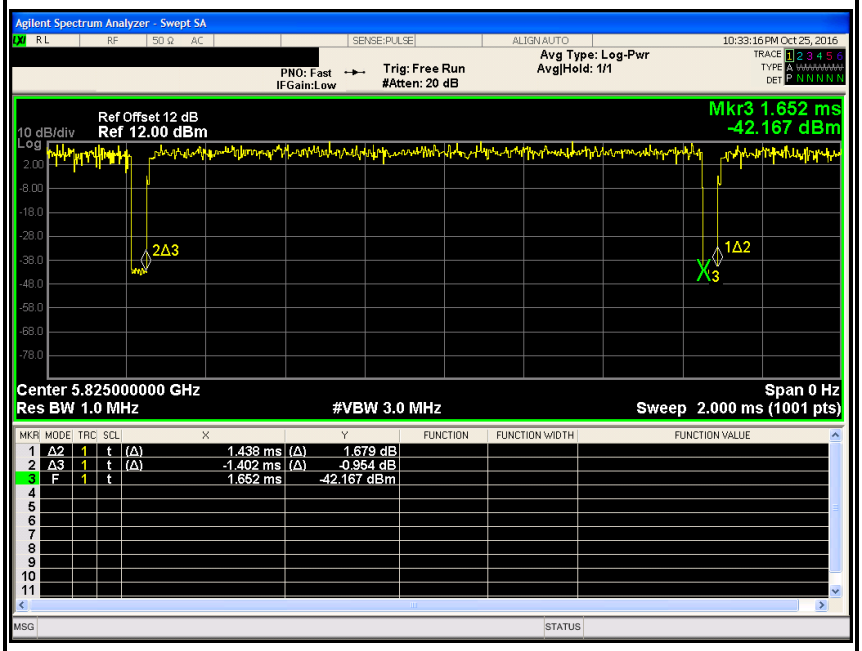
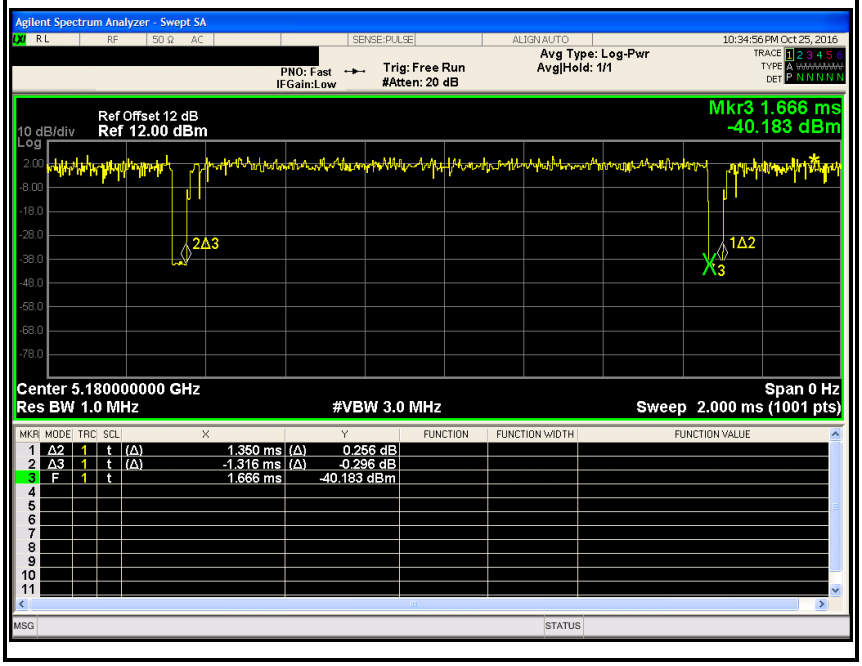
Duty Cycle Test Plot

IEEE 802.11a mode



IEEE 802.11n HT20 mode



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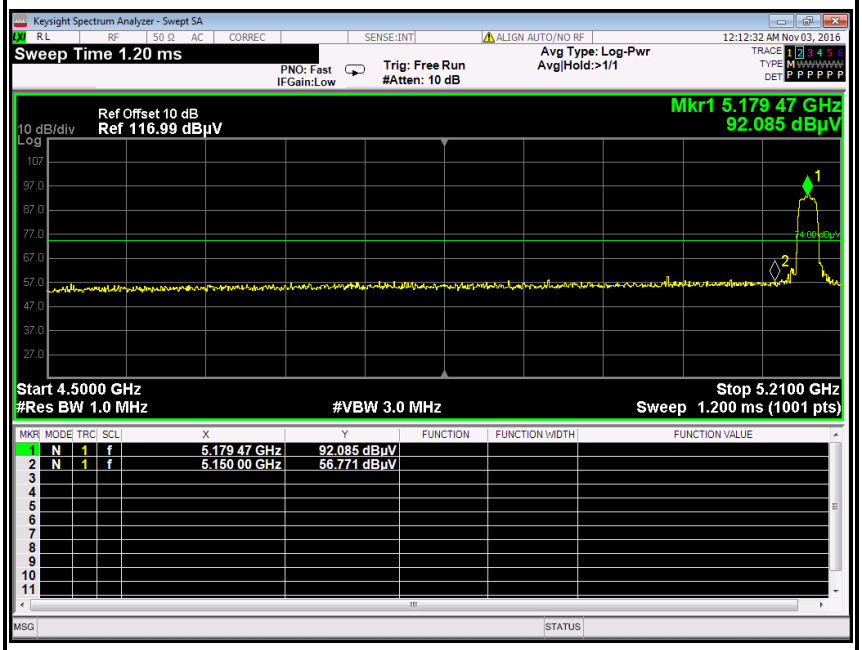
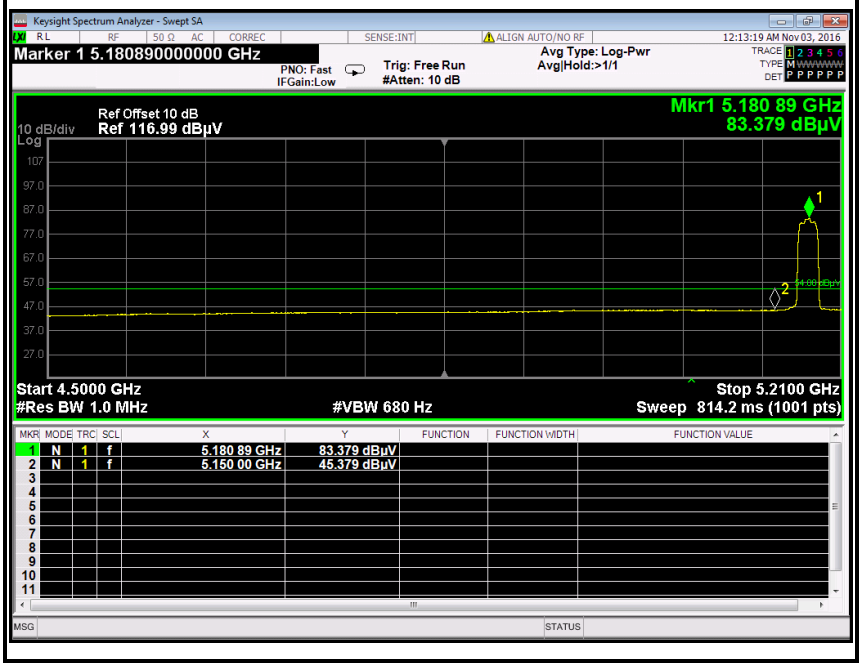
Test Plot

IEEE 802.11a mode / 5180MHz

Detector mode: Peak **Polarity: Vertical**



Detector mode: Average **Polarity: Vertical**



No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	5150.0000	62.37	5.60	56.77	74.00	-17.23	Peak	Vertical
2	5150.0000	50.98	5.60	45.38	54.00	-8.62	Average	Vertical

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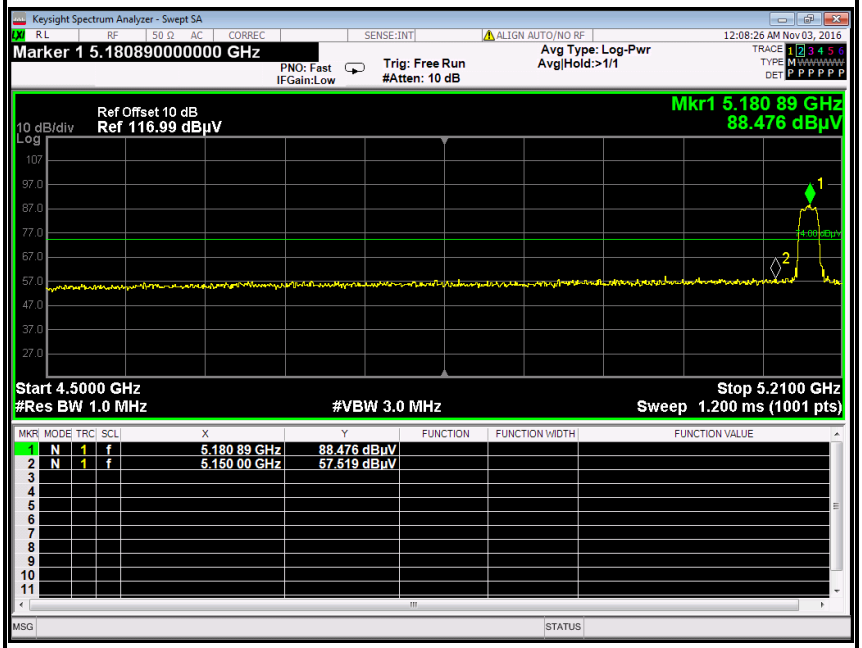
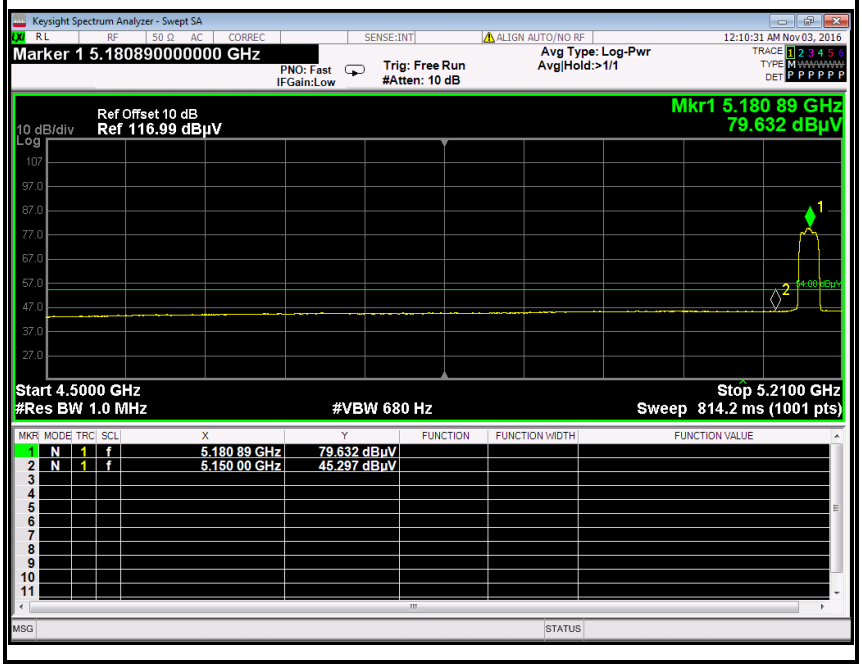
Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**



No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	5150.0000	63.12	5.60	57.52	74.00	-16.48	Peak	Horizontal
2	5150.0000	50.90	5.60	45.30	54.00	-8.70	Average	Horizontal

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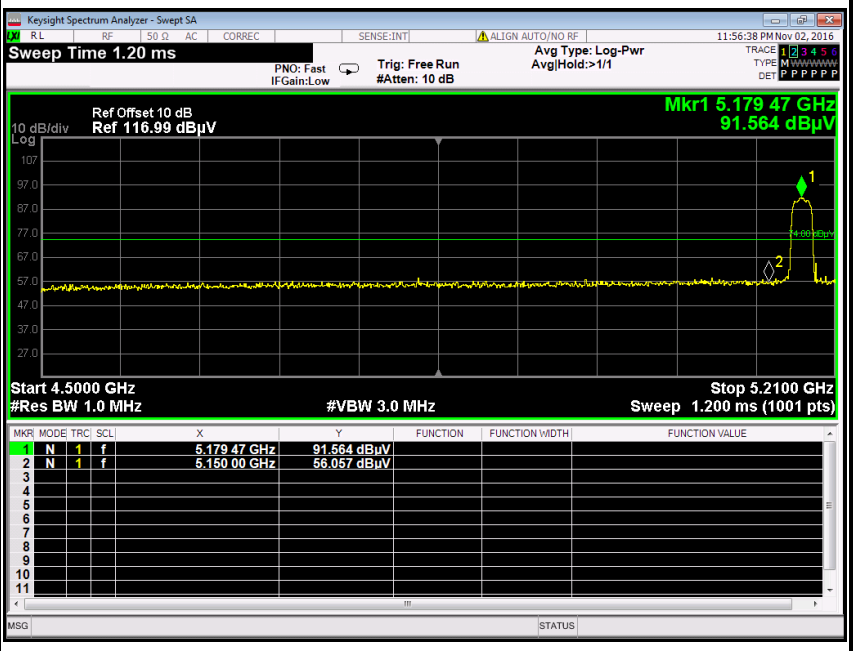
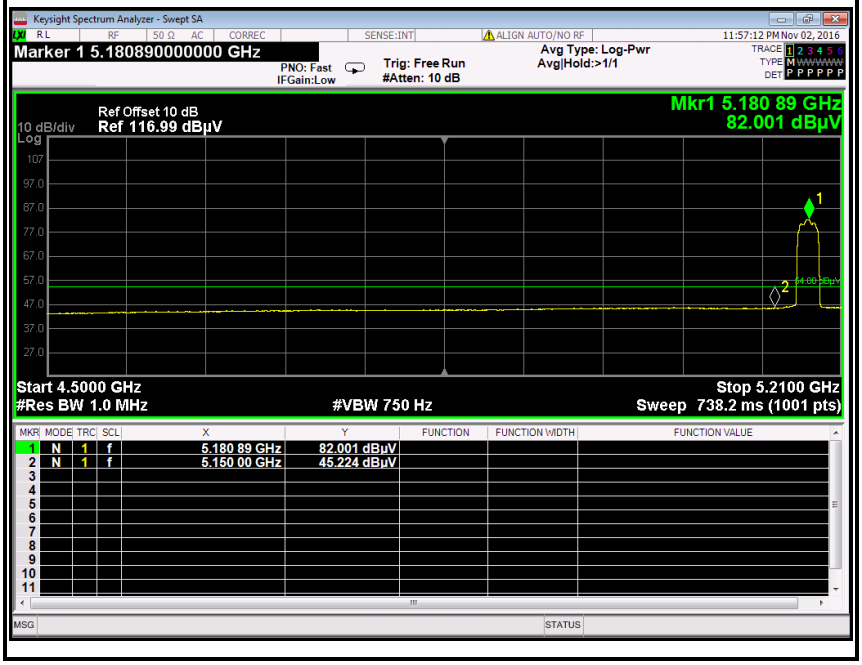
IEEE 802.11n HT 20 MHz mode / 5180 MHz

Detector mode: Peak **Polarity: Vertical**



Detector mode: Average **Polarity: Vertical**



No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	5150.0000	61.66	5.60	56.06	74.00	-17.94	Peak	Vertical
2	5150.0000	50.82	5.60	45.22	54.00	-8.78	Average	Vertical

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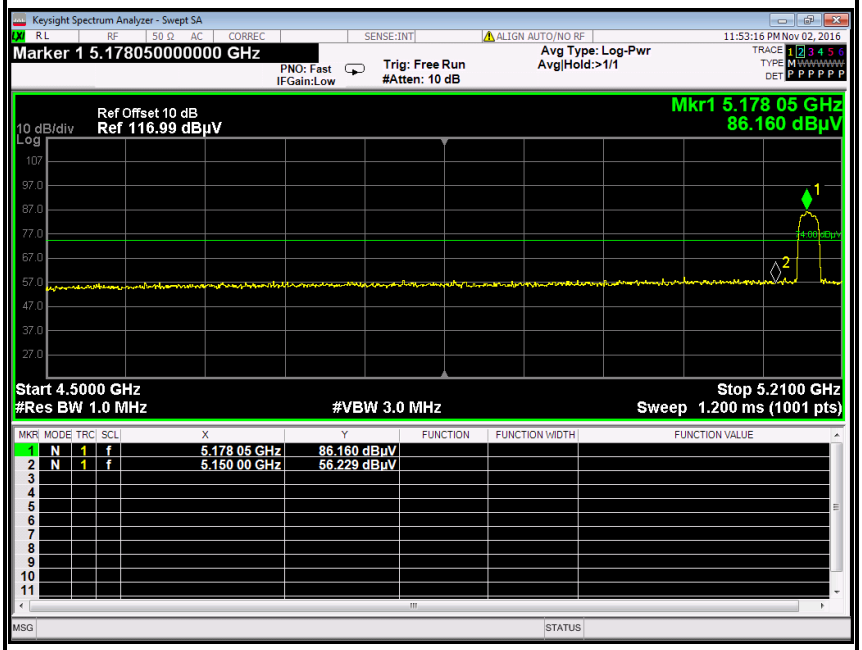
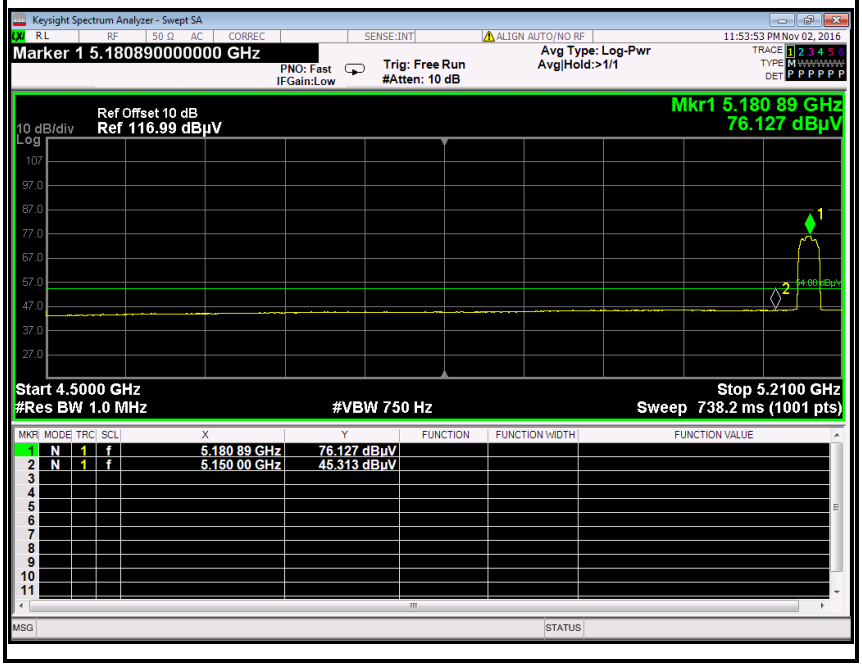
Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**



No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	5150.0000	61.83	5.60	56.23	74.00	-17.77	Peak	Horizontal
2	5150.0000	50.91	5.60	45.31	54.00	-8.69	Average	Horizontal

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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.

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(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.

6.6.2MEASUREMENT 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.*

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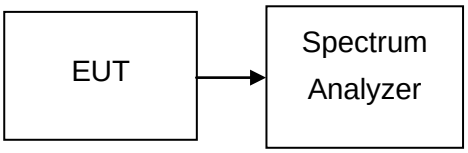
6.6.3 TEST CONFIGURATION



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 = 500kHz, VBW = 1.5MHz, Span = 30MHz, Sweep=1ms
4. Record the max. reading.
5. Repeat the above procedure until the measurements for all frequencies are completed

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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	2.021	11	-8.979	PASS
Mid	5200	1.360		-9.640	PASS
High	5240	0.974		-10.026	PASS

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

Channel	Frequency (MHz)	PPSD (dBm)	factor	Limit (dBm)	Margain
Low	5745	-0.817	-3.01	30	-33.827
Mid	5785	3.465			-29.545
High	5825	3.770			-29.240

Remark: factor =10*log10(500/RBW)

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

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margain	Result
Low	5180	0.198	11	-10.802	PASS
Mid	5200	-0.206		-11.206	PASS
High	5240	-0.426		-11.426	PASS

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

Channel	Frequency (MHz)	PPSD (dBm)	factor	Limit (dBm)	Margain
Low	5745	2.195	-3.01	30	-30.815
Mid	5785	2.338			-30.672
High	5825	3.093			-29.917

Remark: factor =10*log10(500/RBW)

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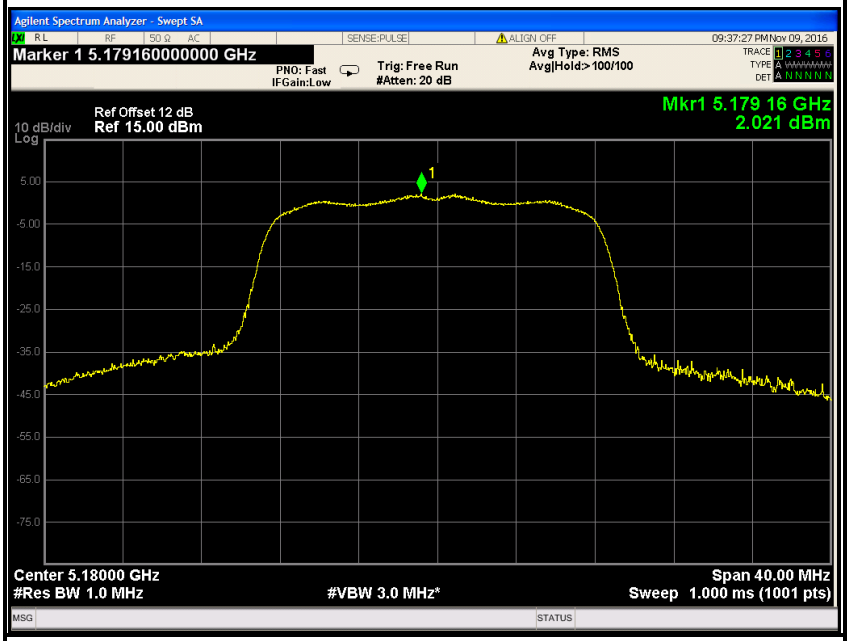
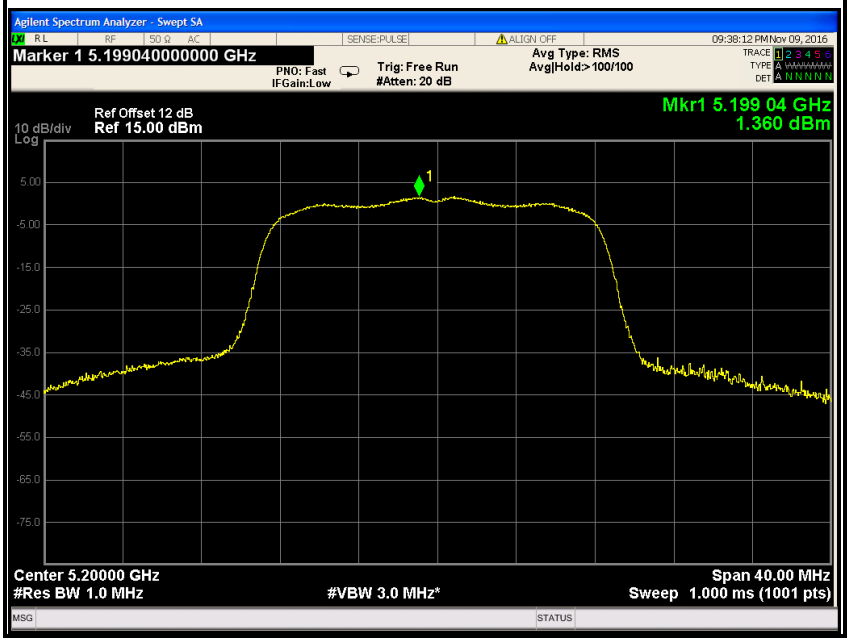
Test Plot

IEEE 802.11a mode / 5180 ~ 5240MHz

PPSD (CH Low)



PPSD (CH Mid)



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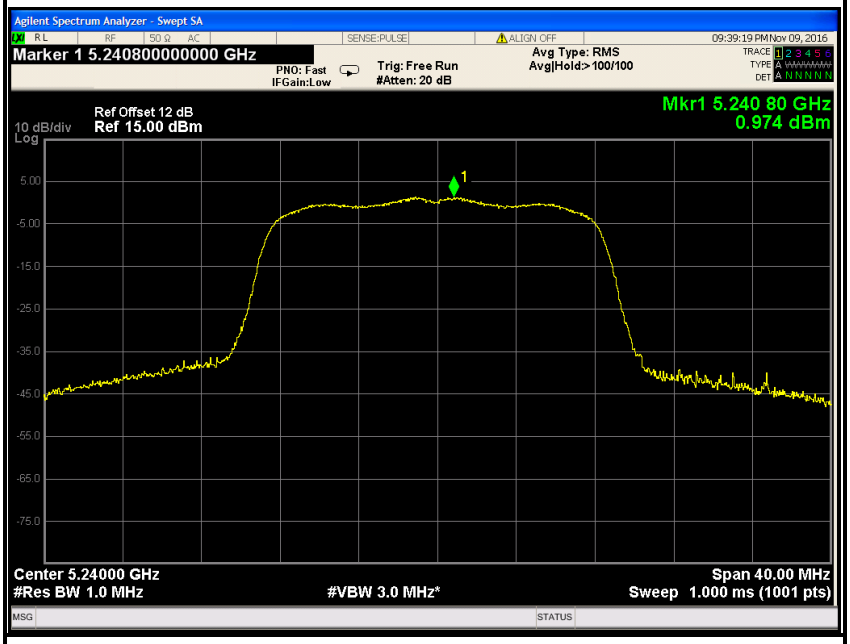
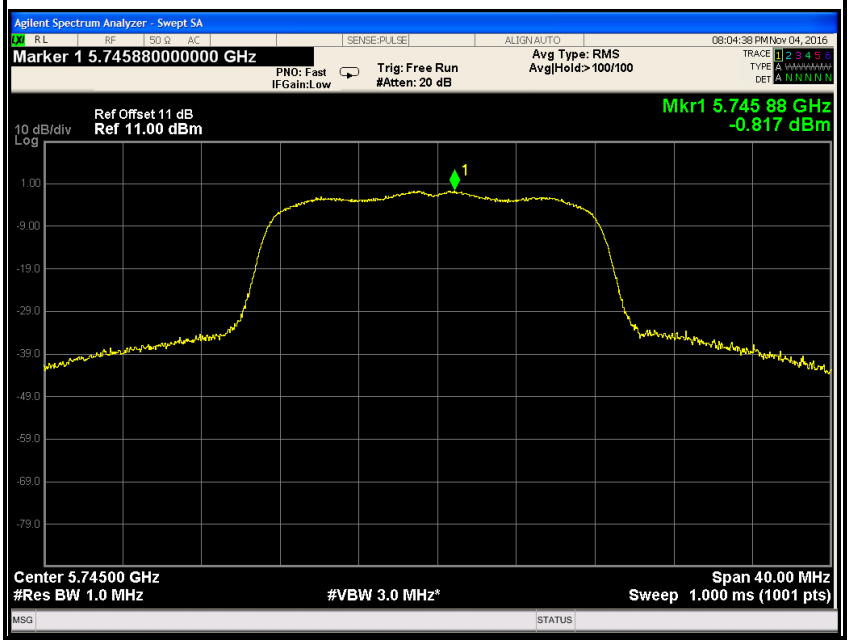
PPSD (CH High)



IEEE 802.11a mode / 5745 ~ 5825MHz

PPSD (CH Low)



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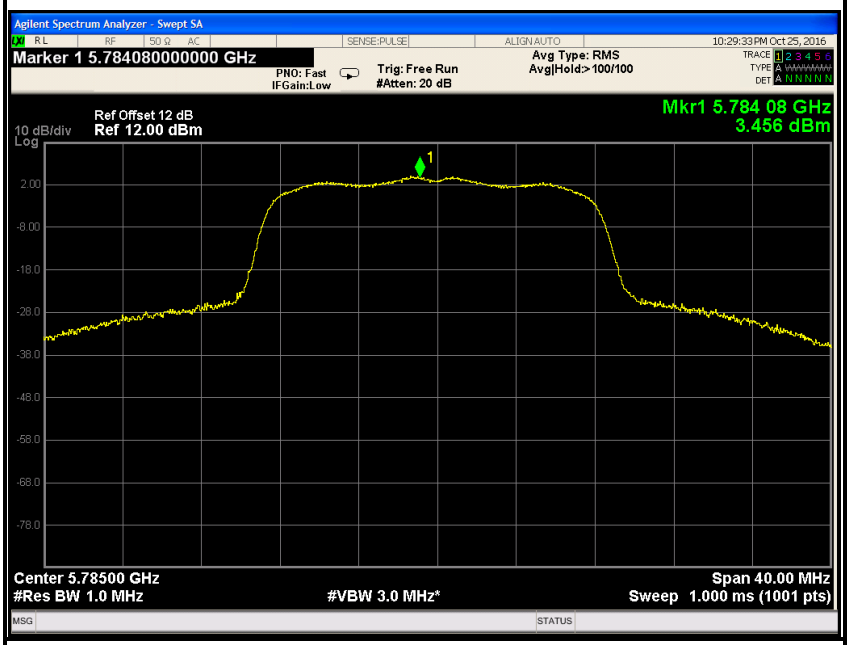
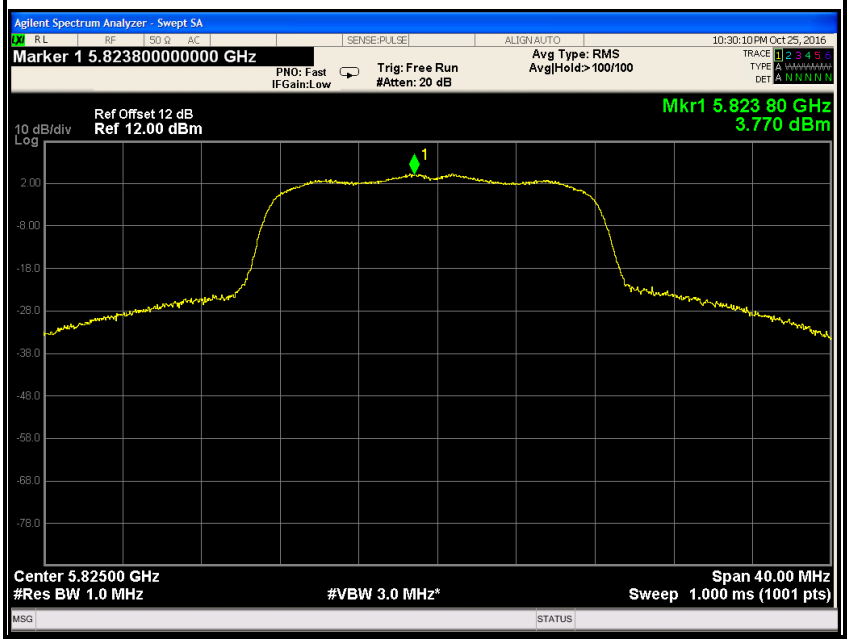
PPSD (CH Mid)



PPSD (CH High)



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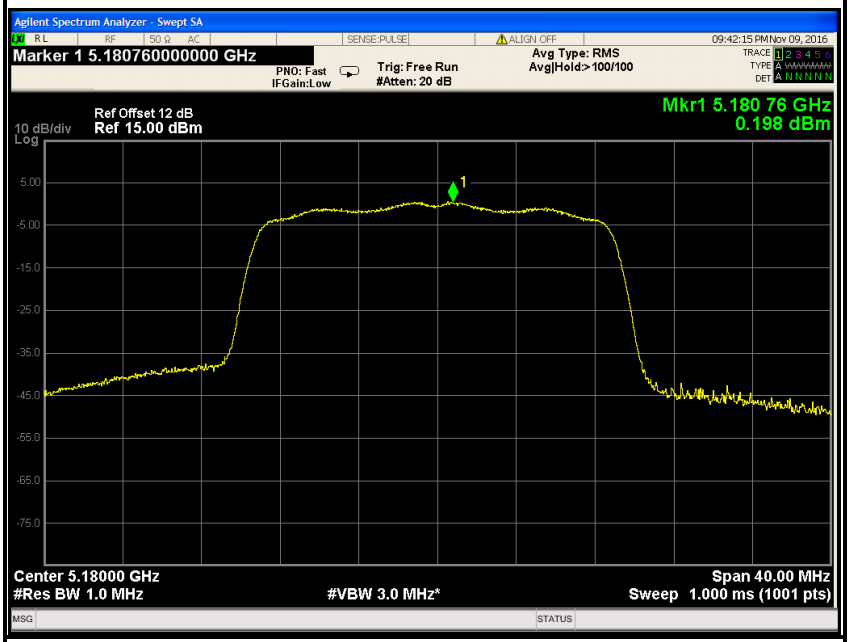
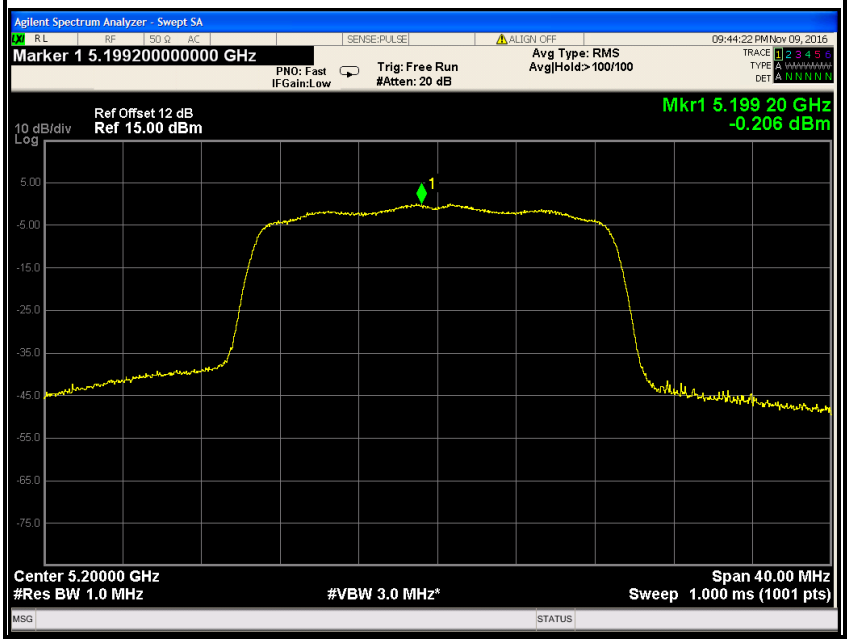
IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz

PPSD (CH Low)



PPSD (CH Mid)



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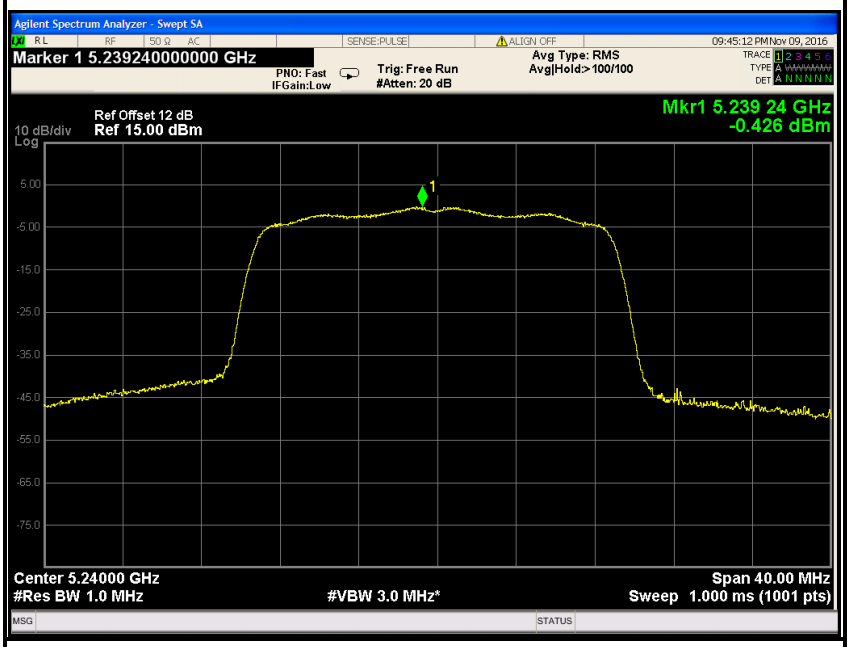
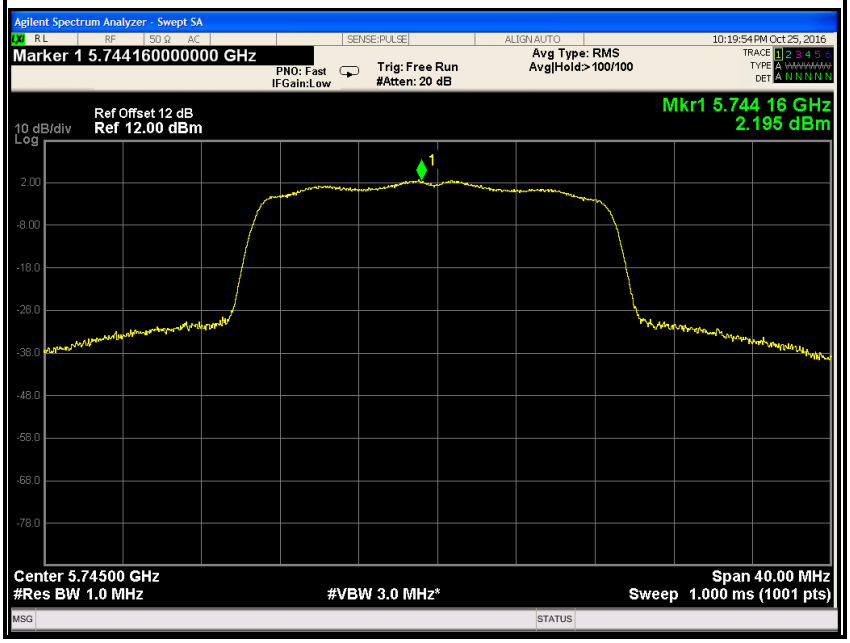
PPSD (CH High)



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

PPSD (CH Low)



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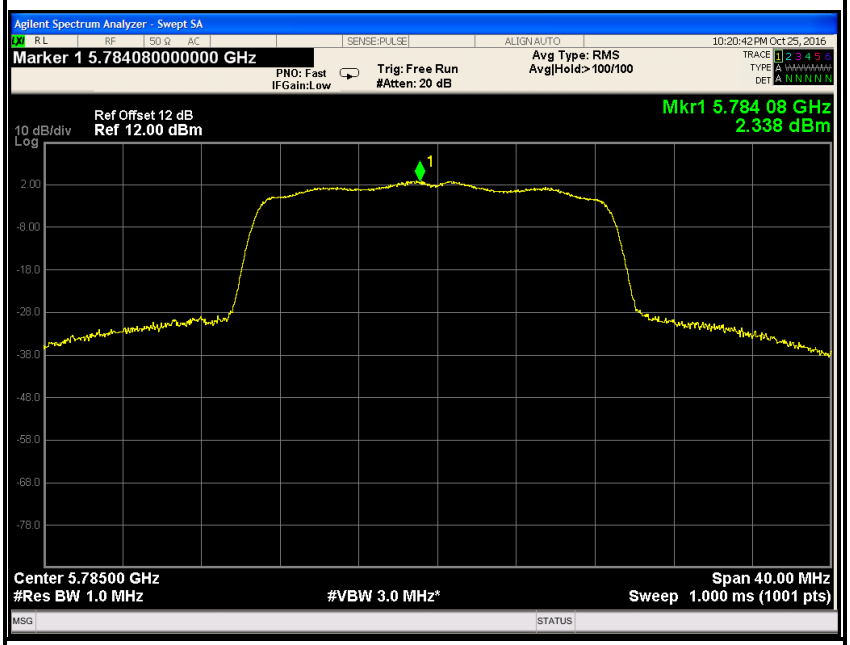
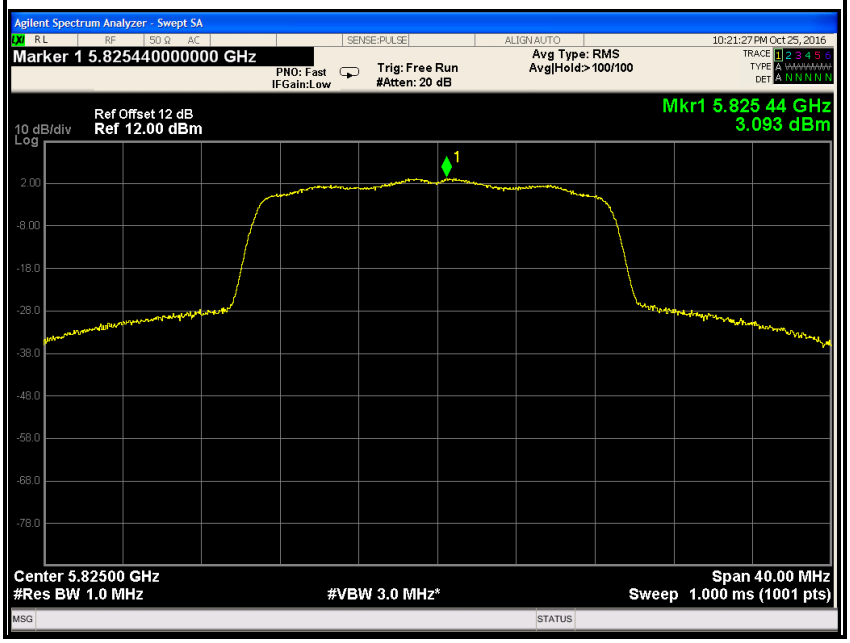
PPSD (CH Mid)



PPSD (CH High)



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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

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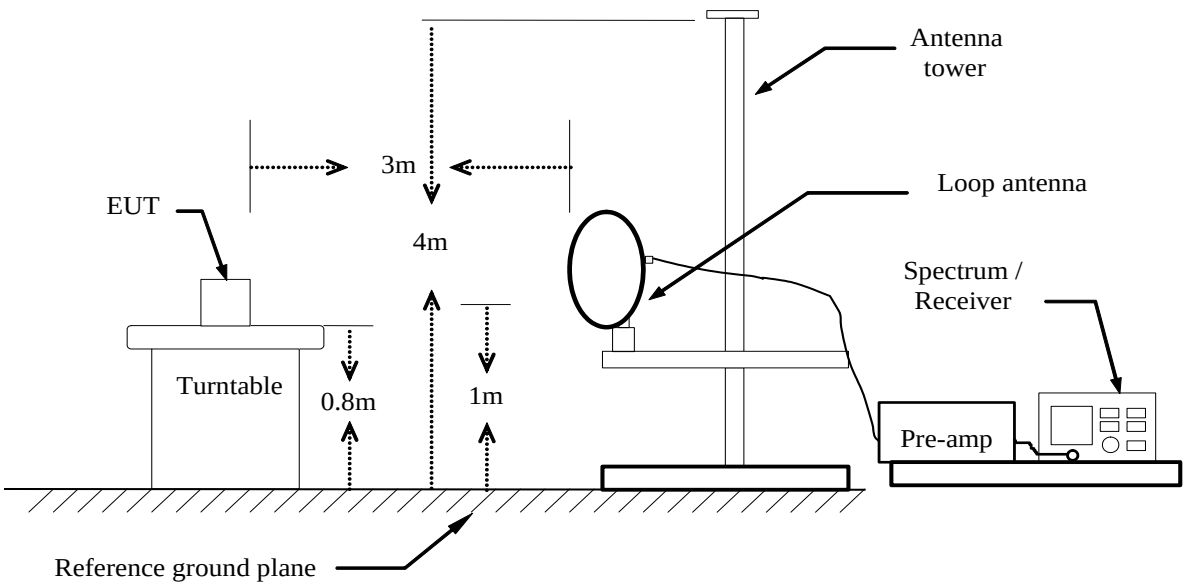
6.7.2 TEST INSTRUMENTS

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	09/25/2016	09/24/2017
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 TEST CONFIGURATION

Below 30MHz



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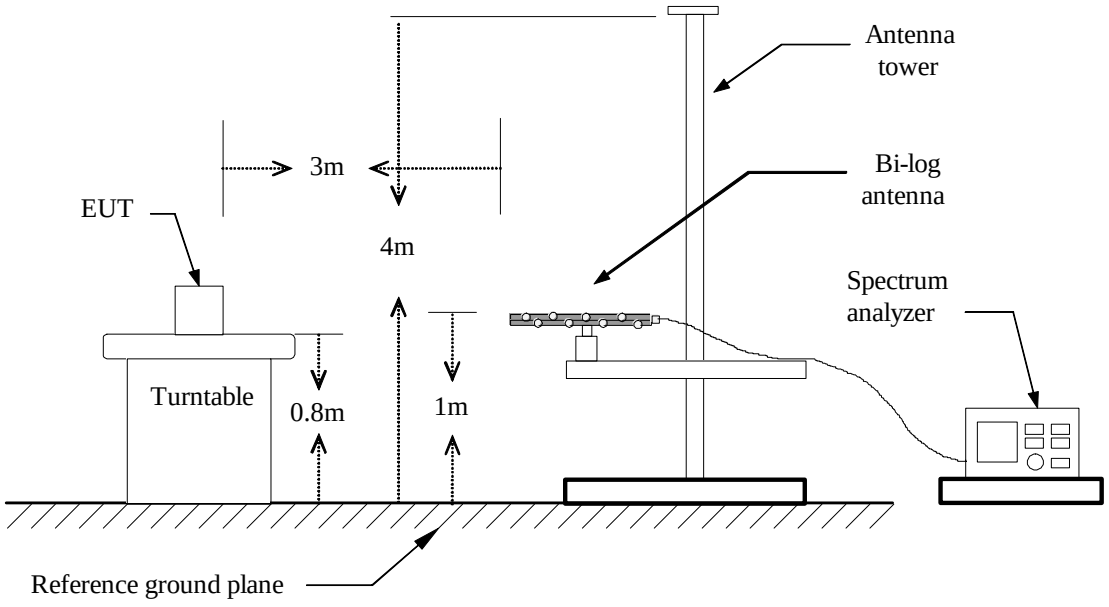
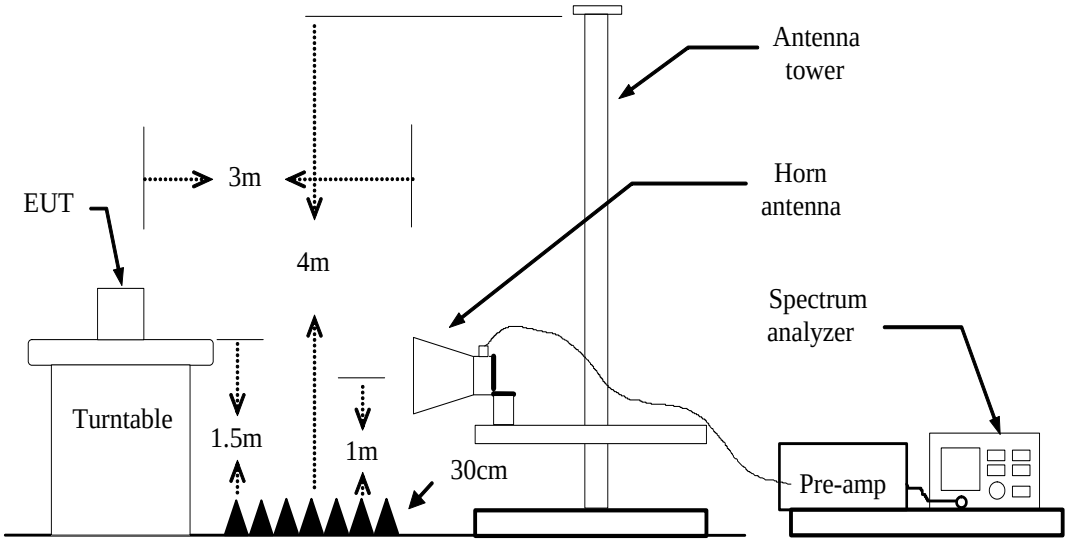
Below 1 GHz



Above 1 GHz



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

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6.7.4 MEASURING 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

6.7.5TEST PROCEDURE

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.

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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.

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--- 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.

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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.

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6.7.6 DATA SAPLE

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

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6.7.7 TEST RESULTS

Below 1 GHz

Test Mode: TX **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** June 29, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
61.0400	50.12	-13.43	36.69	40.00	-3.31	V	QP
109.5400	54.49	-13.59	40.90	43.50	-2.60	V	QP
143.4900	52.78	-11.93	40.85	43.50	-2.65	V	QP
206.5400	45.78	-11.73	34.05	43.50	-9.45	V	QP
519.8500	38.63	-6.74	31.89	46.00	-14.11	V	QP
668.2600	42.22	-4.83	37.39	46.00	-8.61	V	QP
143.4900	48.87	-11.93	36.94	43.50	-6.56	H	QP
296.7500	45.42	-9.96	35.46	46.00	-10.54	H	QP
519.8500	39.41	-6.74	32.67	46.00	-13.33	H	QP
594.5400	42.29	-6.03	36.26	46.00	-9.74	H	QP
668.2600	41.86	-4.83	37.03	46.00	-8.97	H	QP
742.9500	40.96	-3.56	37.40	46.00	-8.60	H	QP

Note: *1. Pre-scan all mode and recorded the worst case results in this report (802.11a (Mid Channel)*

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).*

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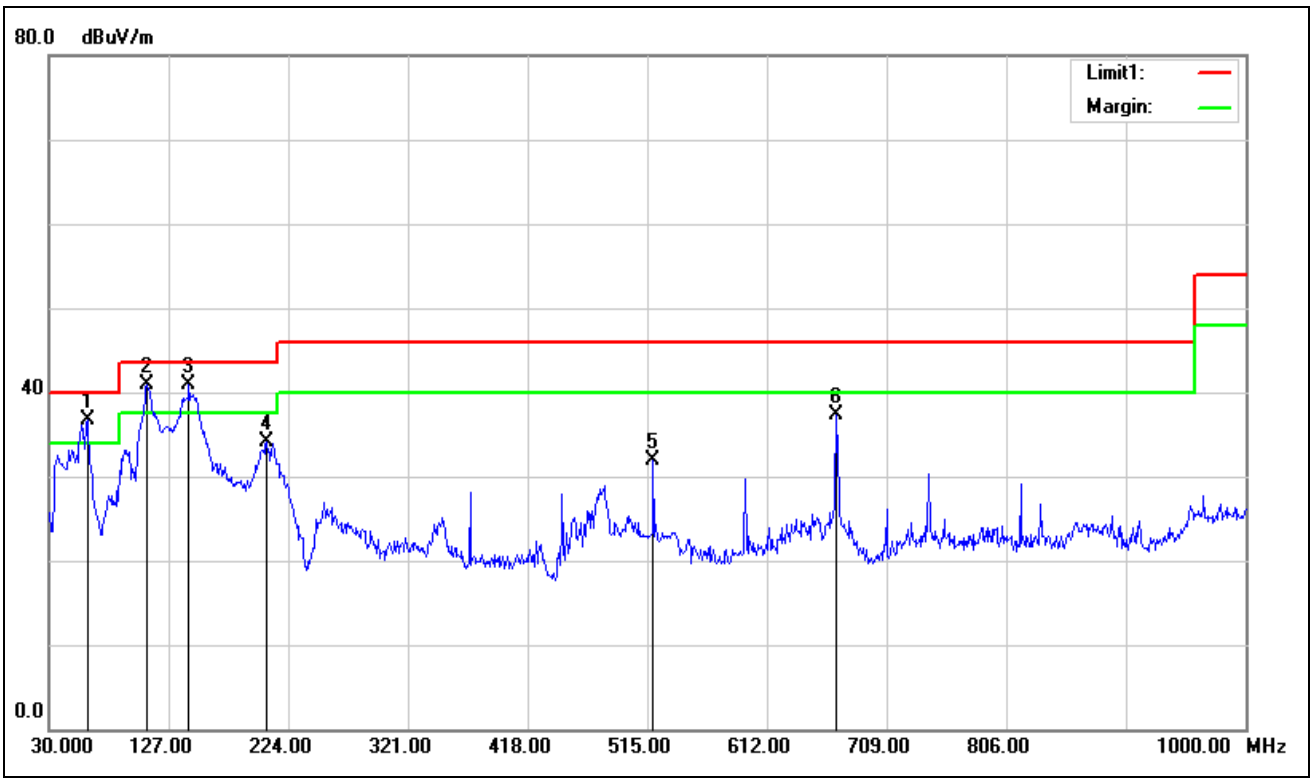
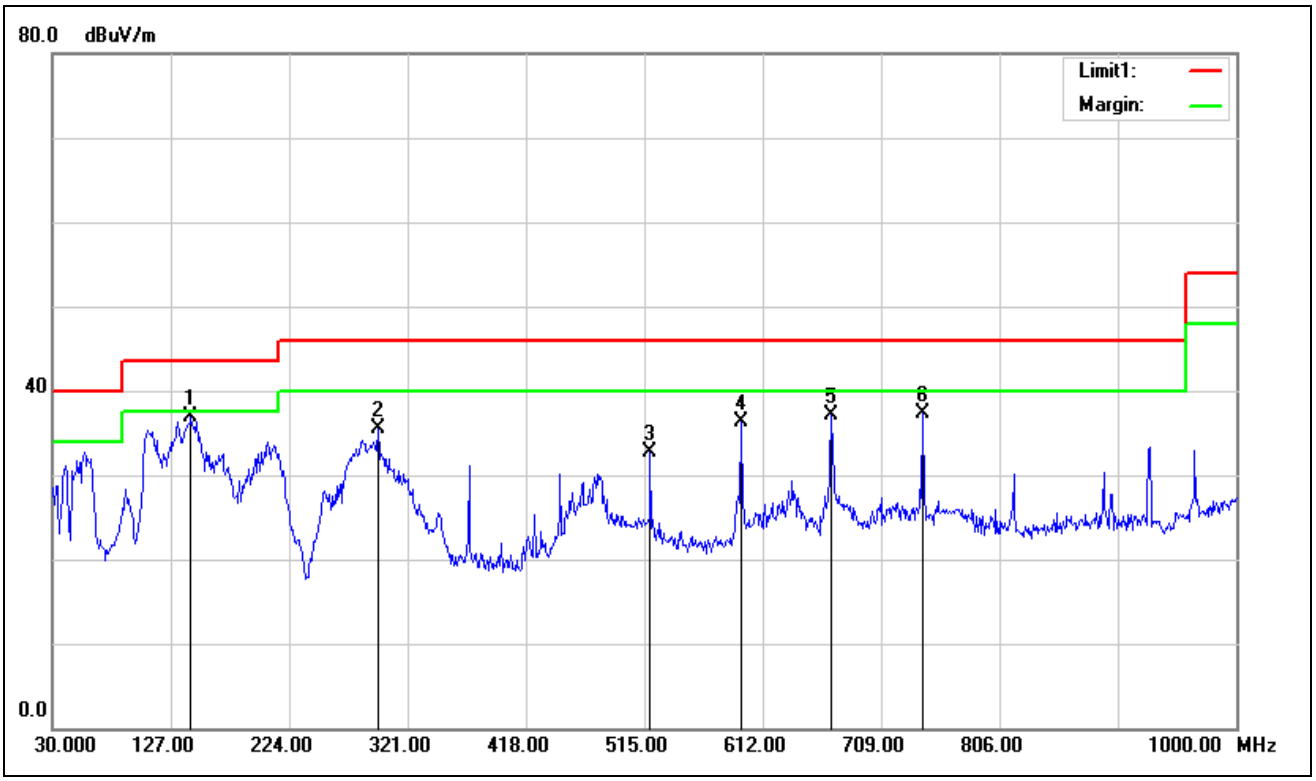
Vertical



Horizontal



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Above 1 GHz

1GHz~6GHz

Test Mode: TX **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 2, 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).*

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Test Mode: TX / IEEE 802.11a / 5180MHz /(CH Low) **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 2, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
7716.000	30.80	9.10	39.90	74.00	-34.10	V	peak
8784.000	30.73	9.22	39.95	74.00	-34.05	V	peak
9372.000	30.85	10.17	41.02	74.00	-32.98	V	peak
10608.000	30.45	13.86	44.31	74.00	-29.69	V	peak
12180.000	30.29	15.24	45.53	74.00	-28.47	V	peak
12900.000	29.42	17.62	47.04	74.00	-26.96	V	peak
7104.000	30.81	7.90	38.71	74.00	-35.29	H	Peak
8160.000	30.88	9.56	40.44	74.00	-33.56	H	Peak
9756.000	30.84	11.28	42.12	74.00	-31.88	H	Peak
11304.000	30.25	14.95	45.20	74.00	-28.80	H	peak
12600.000	29.68	16.63	46.31	74.00	-27.69	H	peak
13176.000	29.01	18.41	47.42	74.00	-26.58	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).*

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Test Mode: TX / IEEE 802.11a / 5200MHz /(CH Mid) **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 2, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
7020.000	30.86	7.74	38.60	74.00	-35.40	V	peak
7740.000	30.78	9.14	39.92	74.00	-34.08	V	peak
9264.000	30.53	9.86	40.39	74.00	-33.61	V	peak
10872.000	29.91	14.68	44.59	74.00	-29.41	V	peak
12204.000	30.29	15.32	45.61	74.00	-28.39	V	peak
13284.000	28.60	18.70	47.30	74.00	-26.70	V	peak
7200.000	30.28	8.09	38.37	74.00	-35.63	H	Peak
8136.000	30.52	9.58	40.10	74.00	-33.90	H	Peak
9480.000	30.86	10.48	41.34	74.00	-32.66	H	Peak
10308.000	30.15	12.93	43.08	74.00	-30.92	H	peak
11508.000	30.21	14.86	45.07	74.00	-28.93	H	peak
13068.000	28.79	18.13	46.92	74.00	-27.08	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).*

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

Test Mode: TX / IEEE 802.11a / 5240MHz /(CH High) **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 2, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
7740.000	30.91	9.14	40.05	74.00	-33.95	V	peak
8460.000	30.87	9.40	40.27	74.00	-33.73	V	peak
10020.000	30.59	12.04	42.63	74.00	-31.37	V	peak
10572.000	30.16	13.75	43.91	74.00	-30.09	V	peak
11148.000	29.80	15.01	44.81	74.00	-29.19	V	peak
12972.000	29.34	17.86	47.20	74.00	-26.80	V	peak
7452.000	30.51	8.58	39.09	74.00	-34.91	H	Peak
8184.000	30.65	9.55	40.20	74.00	-33.80	H	Peak
9108.000	30.81	9.41	40.22	74.00	-33.78	H	Peak
10656.000	30.17	14.01	44.18	74.00	-29.82	H	peak
11676.000	30.37	14.78	45.15	74.00	-28.85	H	peak
12348.000	30.01	15.79	45.80	74.00	-28.20	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).*

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

Test Mode: TX / IEEE 802.11a / 5745MHz /(CH Low) **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 2, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
7752.000	30.68	9.17	39.85	74.00	-34.15	V	peak
9228.000	30.26	9.76	40.02	74.00	-33.98	V	peak
9984.000	30.95	11.93	42.88	74.00	-31.12	V	peak
11016.000	29.74	15.07	44.81	74.00	-29.19	V	peak
11820.000	30.36	14.72	45.08	74.00	-28.92	V	peak
12876.000	29.57	17.54	47.11	74.00	-26.89	V	peak
7128.000	30.52	7.95	38.47	74.00	-35.53	H	Peak
8148.000	30.31	9.57	39.88	74.00	-34.12	H	Peak
9720.000	31.12	11.17	42.29	74.00	-31.71	H	Peak
10608.000	30.22	13.86	44.08	74.00	-29.92	H	peak
11880.000	30.13	14.69	44.82	74.00	-29.18	H	peak
12924.000	29.42	17.70	47.12	74.00	-26.88	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).*

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Test Mode: TX / IEEE 802.11a / 5785MHz /(CH Mid) **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 2, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
7428.000	30.77	8.53	39.30	74.00	-34.70	V	peak
8244.000	30.33	9.52	39.85	74.00	-34.15	V	peak
9396.000	30.26	10.24	40.50	74.00	-33.50	V	peak
10920.000	29.75	14.83	44.58	74.00	-29.42	V	peak
11916.000	30.35	14.68	45.03	74.00	-28.97	V	peak
12936.000	29.07	17.74	46.81	74.00	-27.19	V	peak
6924.000	30.28	7.58	37.86	74.00	-36.14	H	Peak
7668.000	31.09	9.00	40.09	74.00	-33.91	H	Peak
9168.000	30.59	9.58	40.17	74.00	-33.83	H	Peak
10596.000	30.11	13.83	43.94	74.00	-30.06	H	peak
11664.000	30.30	14.79	45.09	74.00	-28.91	H	peak
12936.000	29.15	17.74	46.89	74.00	-27.11	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).*

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Test Mode: TX / IEEE 802.11a / 5825MHz /(CH High) **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 2, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6876.000	30.44	7.50	37.94	74.00	-36.06	V	peak
7776.000	30.98	9.21	40.19	74.00	-33.81	V	peak
9024.000	30.91	9.17	40.08	74.00	-33.92	V	peak
10404.000	30.30	13.23	43.53	74.00	-30.47	V	peak
11652.000	30.74	14.79	45.53	74.00	-28.47	V	peak
13176.000	28.98	18.41	47.39	74.00	-26.61	V	peak
6852.000	30.83	7.46	38.29	74.00	-35.71	H	Peak
8112.000	30.53	9.59	40.12	74.00	-33.88	H	Peak
9780.000	30.78	11.35	42.13	74.00	-31.87	H	Peak
11112.000	30.13	15.03	45.16	74.00	-28.84	H	peak
12216.000	29.71	15.35	45.06	74.00	-28.94	H	peak
12888.000	29.22	17.58	46.80	74.00	-27.20	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).*

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Test Mode: TX / IEEE 802.11n HT 20 MHz / 5180MHz /(CH Low) **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 2, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
7668.000	30.97	9.00	39.97	74.00	-34.03	V	peak
8172.000	30.78	9.56	40.34	74.00	-33.66	V	peak
9312.000	30.93	10.00	40.93	74.00	-33.07	V	peak
10416.000	29.87	13.27	43.14	74.00	-30.86	V	peak
11148.000	29.81	15.01	44.82	74.00	-29.18	V	peak
12900.000	29.16	17.62	46.78	74.00	-27.22	V	peak
7152.000	30.78	8.00	38.78	74.00	-35.22	H	Peak
7872.000	30.63	9.40	40.03	74.00	-33.97	H	Peak
9768.000	30.68	11.31	41.99	74.00	-32.01	H	Peak
10560.000	30.11	13.72	43.83	74.00	-30.17	H	peak
11916.000	30.62	14.68	45.30	74.00	-28.70	H	peak
12888.000	29.29	17.58	46.87	74.00	-27.13	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).*

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Test Mode: TX / IEEE 802.11n HT 20 MHz / 5200MHz /(CH Mid) **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 2, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
7668.000	30.85	9.00	39.85	74.00	-34.15	V	peak
8412.000	31.00	9.42	40.42	74.00	-33.58	V	peak
9756.000	30.47	11.28	41.75	74.00	-32.25	V	peak
11016.000	29.75	15.07	44.82	74.00	-29.18	V	peak
11640.000	30.67	14.80	45.47	74.00	-28.53	V	peak
13092.000	28.81	18.19	47.00	74.00	-27.00	V	peak
7092.000	30.48	7.88	38.36	74.00	-35.64	H	Peak
7752.000	30.81	9.17	39.98	74.00	-34.02	H	Peak
9756.000	30.54	11.28	41.82	74.00	-32.18	H	Peak
10908.000	29.55	14.79	44.34	74.00	-29.66	H	peak
11652.000	30.28	14.79	45.07	74.00	-28.93	H	peak
13176.000	28.76	18.41	47.17	74.00	-26.83	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).*

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Test Mode: TX / IEEE 802.11n HT 20 MHz / 5240MHz /(CH High) **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 2, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
7356.000	30.43	8.39	38.82	74.00	-35.18	V	peak
8160.000	30.54	9.56	40.10	74.00	-33.90	V	peak
9744.000	30.87	11.24	42.11	74.00	-31.89	V	peak
11280.000	29.90	14.96	44.86	74.00	-29.14	V	peak
12912.000	29.17	17.66	46.83	74.00	-27.17	V	peak
13320.000	28.43	18.79	47.22	74.00	-26.78	V	peak
7608.000	31.07	8.89	39.96	74.00	-34.04	H	Peak
8340.000	30.67	9.46	40.13	74.00	-33.87	H	Peak
9936.000	30.88	11.80	42.68	74.00	-31.32	H	Peak
10980.000	30.03	15.02	45.05	74.00	-28.95	H	peak
12312.000	30.34	15.67	46.01	74.00	-27.99	H	peak
13356.000	28.39	18.89	47.28	74.00	-26.72	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).*

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

Test Mode: TX / IEEE 802.11n HT 20 MHz / 5745MHz /(CH Low) **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 2, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6696.000	30.78	7.21	37.99	74.00	-36.01	V	peak
7860.000	30.60	9.38	39.98	74.00	-34.02	V	peak
9336.000	30.68	10.07	40.75	74.00	-33.25	V	peak
10584.000	30.55	13.79	44.34	74.00	-29.66	V	peak
11292.000	30.31	14.95	45.26	74.00	-28.74	V	peak
13236.000	28.49	18.57	47.06	74.00	-26.94	V	peak
7044.000	30.95	7.79	38.74	74.00	-35.26	H	Peak
8148.000	30.84	9.57	40.41	74.00	-33.59	H	Peak
9456.000	31.06	10.41	41.47	74.00	-32.53	H	Peak
10656.000	30.35	14.01	44.36	74.00	-29.64	H	peak
11676.000	30.69	14.78	45.47	74.00	-28.53	H	peak
13284.000	28.54	18.70	47.24	74.00	-26.76	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).*

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

Test Mode: TX / IEEE 802.11n HT 20 MHz / 5785MHz /(CH Mid) **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 2, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
7008.000	30.63	7.72	38.35	74.00	-35.65	V	peak
8172.000	30.57	9.56	40.13	74.00	-33.87	V	peak
9072.000	30.69	9.31	40.00	74.00	-34.00	V	peak
10308.000	30.11	12.93	43.04	74.00	-30.96	V	peak
11892.000	30.25	14.69	44.94	74.00	-29.06	V	peak
13308.000	28.30	18.76	47.06	74.00	-26.94	V	peak
7104.000	30.57	7.90	38.47	74.00	-35.53	H	Peak
8196.000	30.73	9.54	40.27	74.00	-33.73	H	Peak
9048.000	31.19	9.24	40.43	74.00	-33.57	H	Peak
10656.000	30.35	14.01	44.36	74.00	-29.64	H	peak
11652.000	30.42	14.79	45.21	74.00	-28.79	H	peak
12912.000	29.65	17.66	47.31	74.00	-26.69	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).*

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

Test Mode: TX / IEEE 802.11n HT 20 MHz / 5825MHz /(CH High) **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 2, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6456.000	30.84	6.82	37.66	74.00	-36.34	V	peak
7824.000	30.83	9.31	40.14	74.00	-33.86	V	peak
9432.000	30.62	10.34	40.96	74.00	-33.04	V	peak
10572.000	29.85	13.75	43.60	74.00	-30.40	V	peak
11268.000	30.23	14.96	45.19	74.00	-28.81	V	peak
12912.000	29.40	17.66	47.06	74.00	-26.94	V	peak
7332.000	30.14	8.35	38.49	74.00	-35.51	H	Peak
8400.000	30.65	9.43	40.08	74.00	-33.92	H	Peak
9576.000	30.49	10.76	41.25	74.00	-32.75	H	Peak
10920.000	29.81	14.83	44.64	74.00	-29.36	H	peak
12156.000	30.07	15.16	45.23	74.00	-28.77	H	peak
12912.000	29.29	17.66	46.95	74.00	-27.05	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).*

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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) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

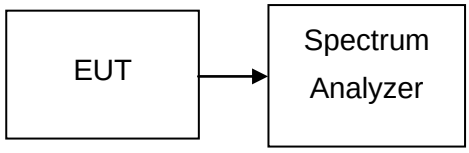
(3) The provisions of §15.205 apply to intentional radiators operating under this section.

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.

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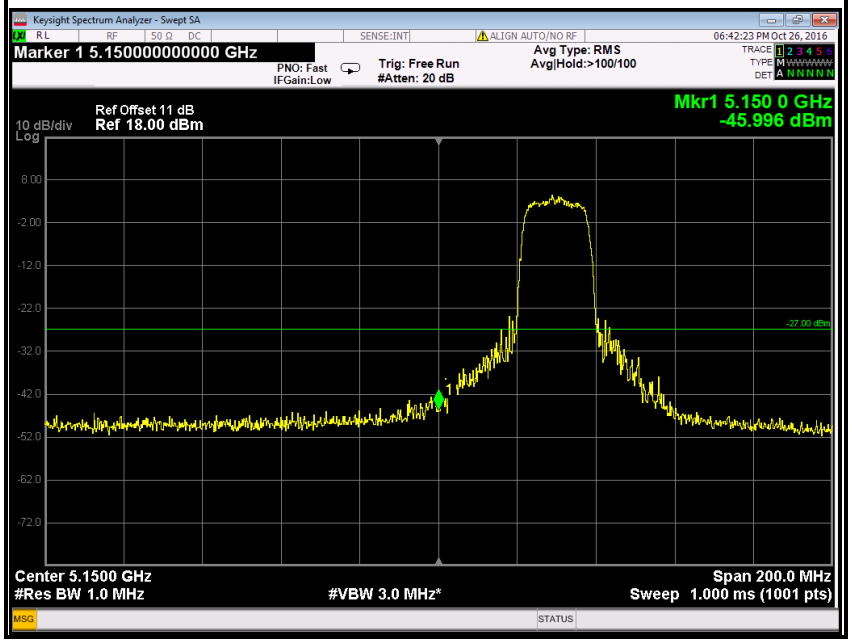
6.8.5 TEST RESULTS

No non-compliance noted

Test Plot

IEEE 802.11a mode / 5180 ~ 5240MHz
CH Low


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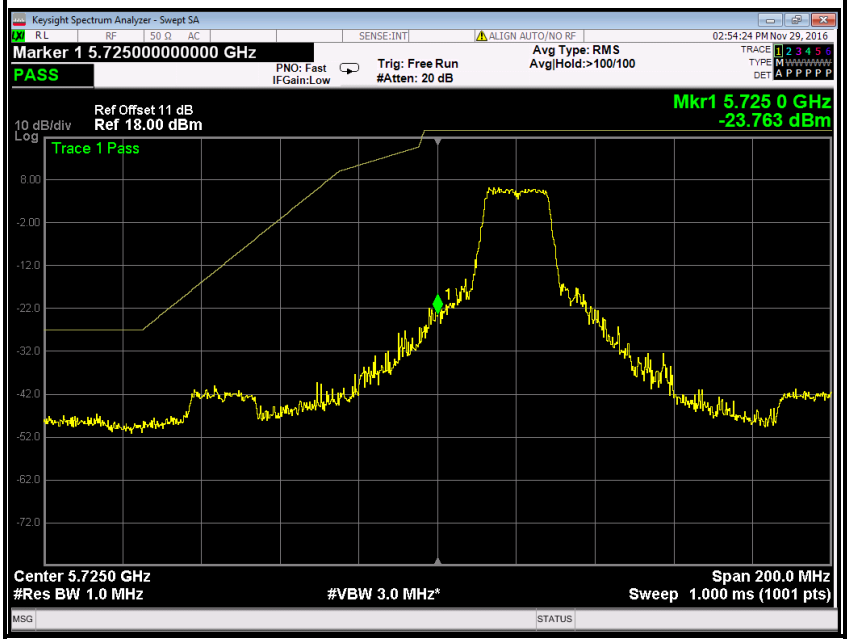
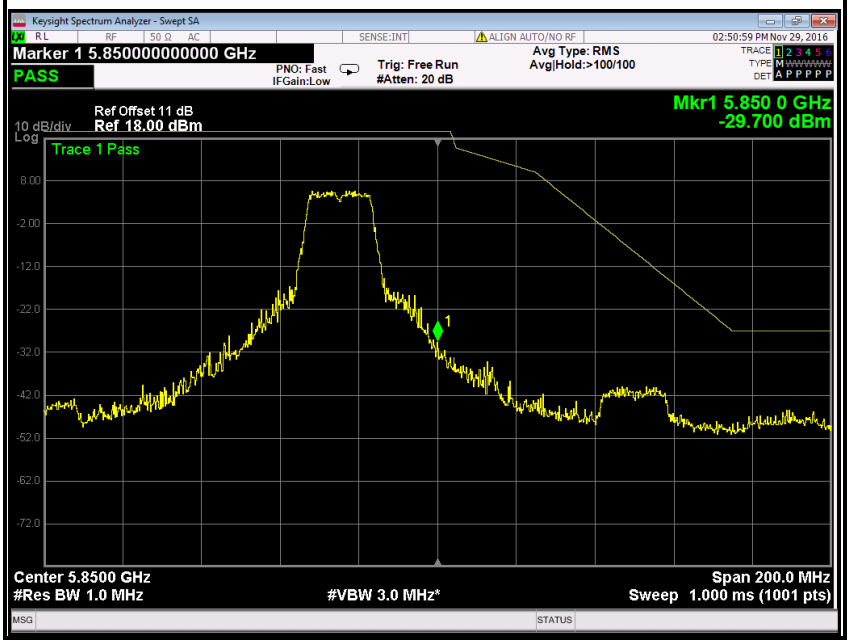
IEEE 802.11a mode / 5745 ~ 5825MHz

CH Low



CH High



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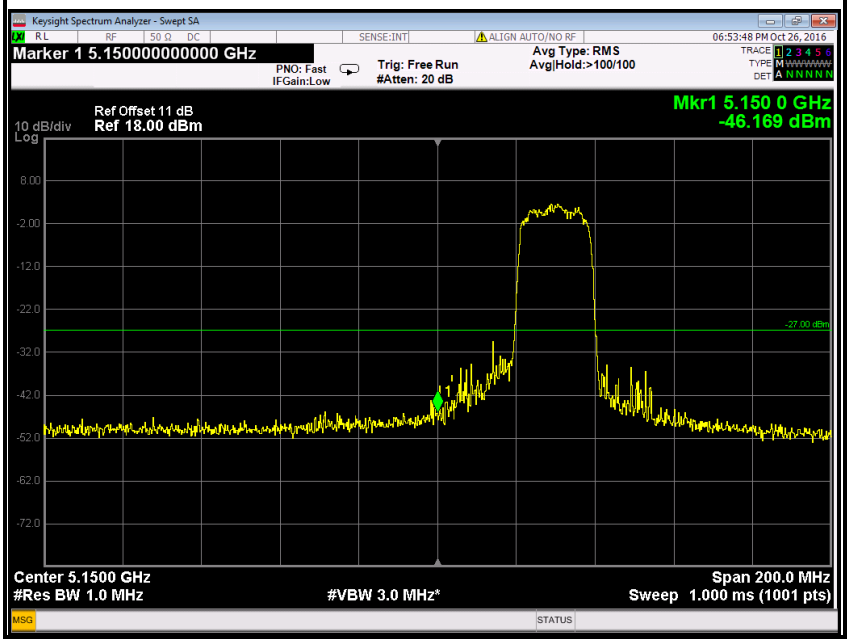
IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz

CH Low



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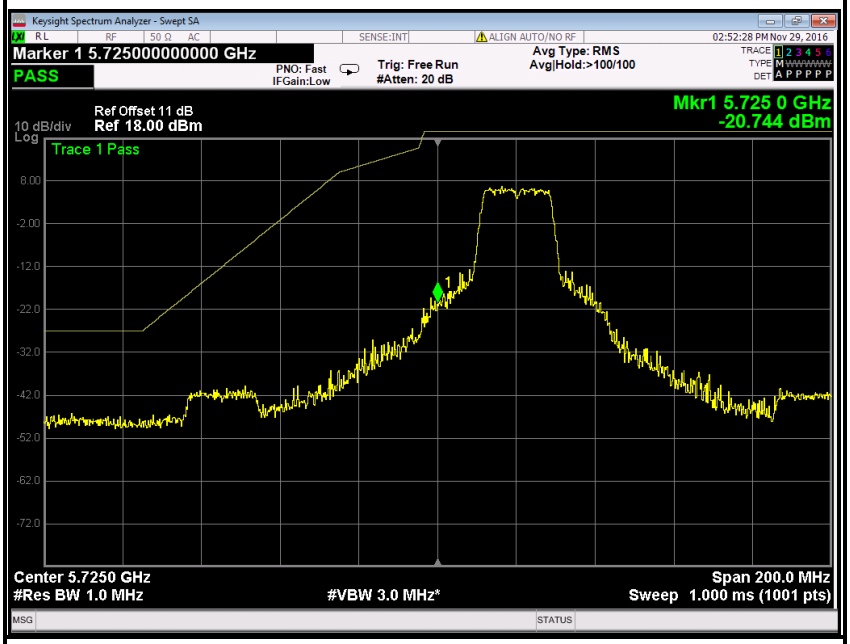
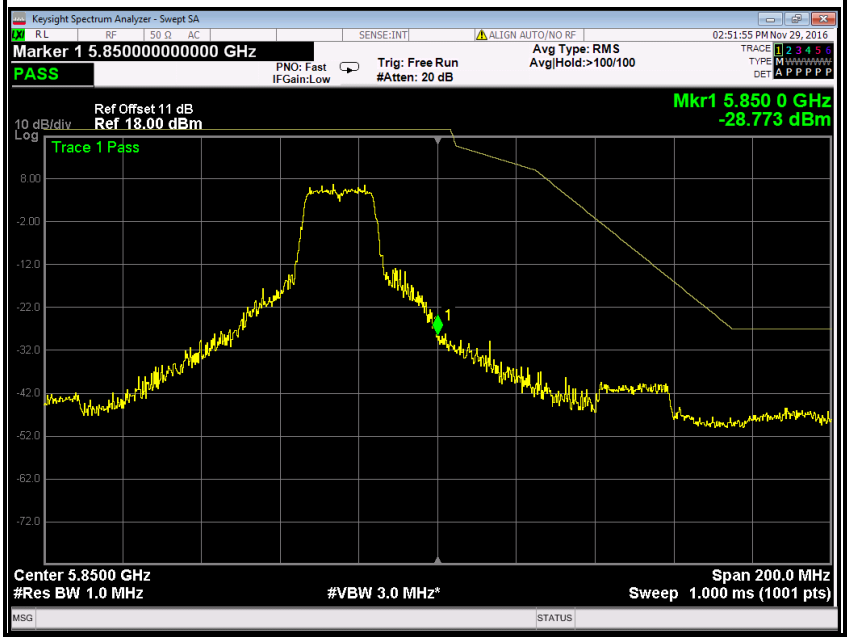
IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz

CH Low



CH High



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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.

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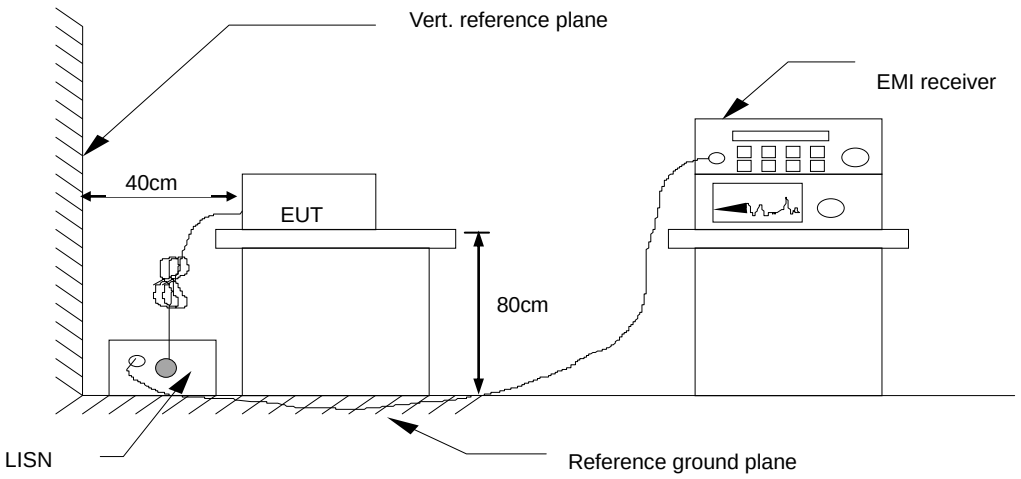
6.9.3 TEST CONFIGURATION



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)

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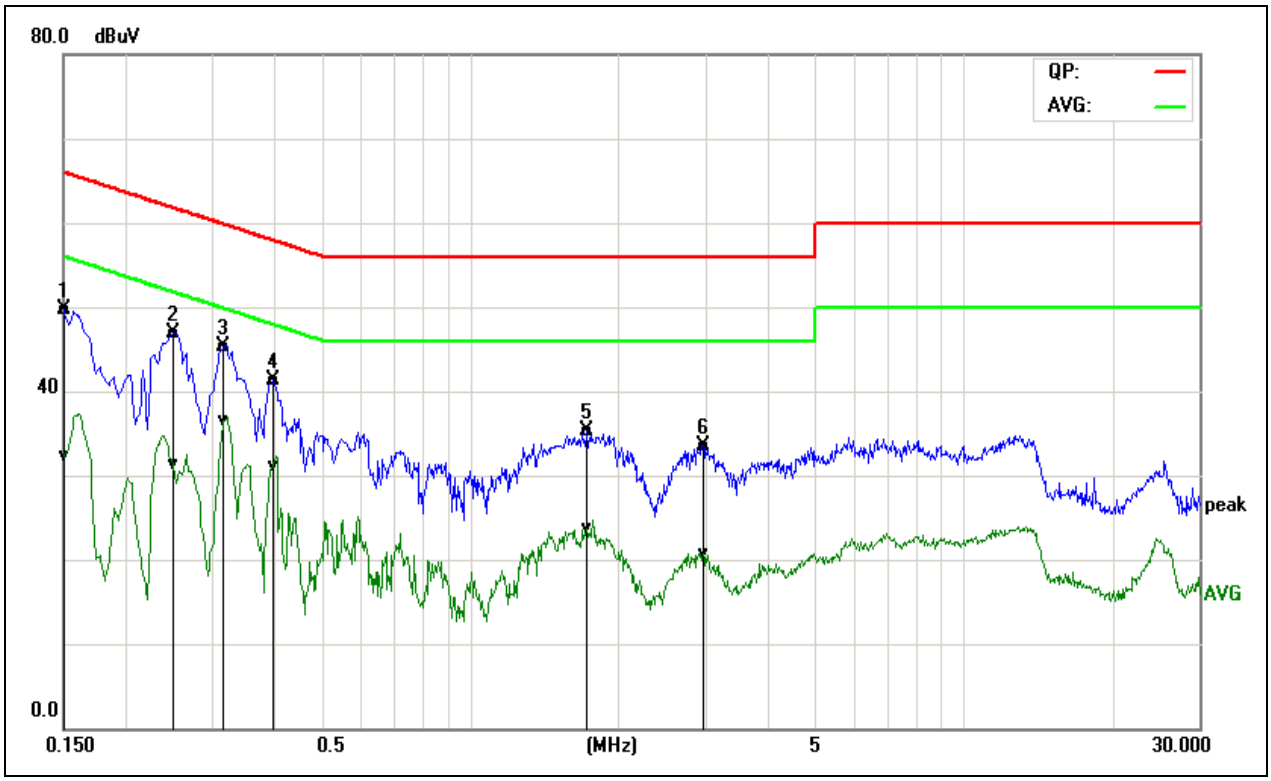
6.9.6 TEST RESULTS

Model No.	EO2	**RBW,VBW**	9 kHz
Environmental Conditions	22°C, 45% RH	**Test Mode**	Mode 1
Tested by	Jacksan Luo	**Line**	L1
Test Date	October 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)
0.1500	39.75	22.35	9.88	49.63	32.23	65.99	56.00	-16.36	-23.77	Pass
0.2500	36.96	21.40	9.91	46.87	31.31	61.75	51.76	-14.88	-20.45	Pass
0.3180	35.30	26.54	9.93	45.23	36.47	59.76	49.76	-14.53	-13.29	Pass
0.3980	31.38	21.16	9.95	41.33	31.11	57.89	47.90	-16.56	-16.79	Pass
1.7260	25.27	13.67	10.02	35.29	23.69	56.00	46.00	-20.71	-22.31	Pass
2.9700	23.48	10.57	10.11	33.59	20.68	56.00	46.00	-22.41	-25.32	Pass

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

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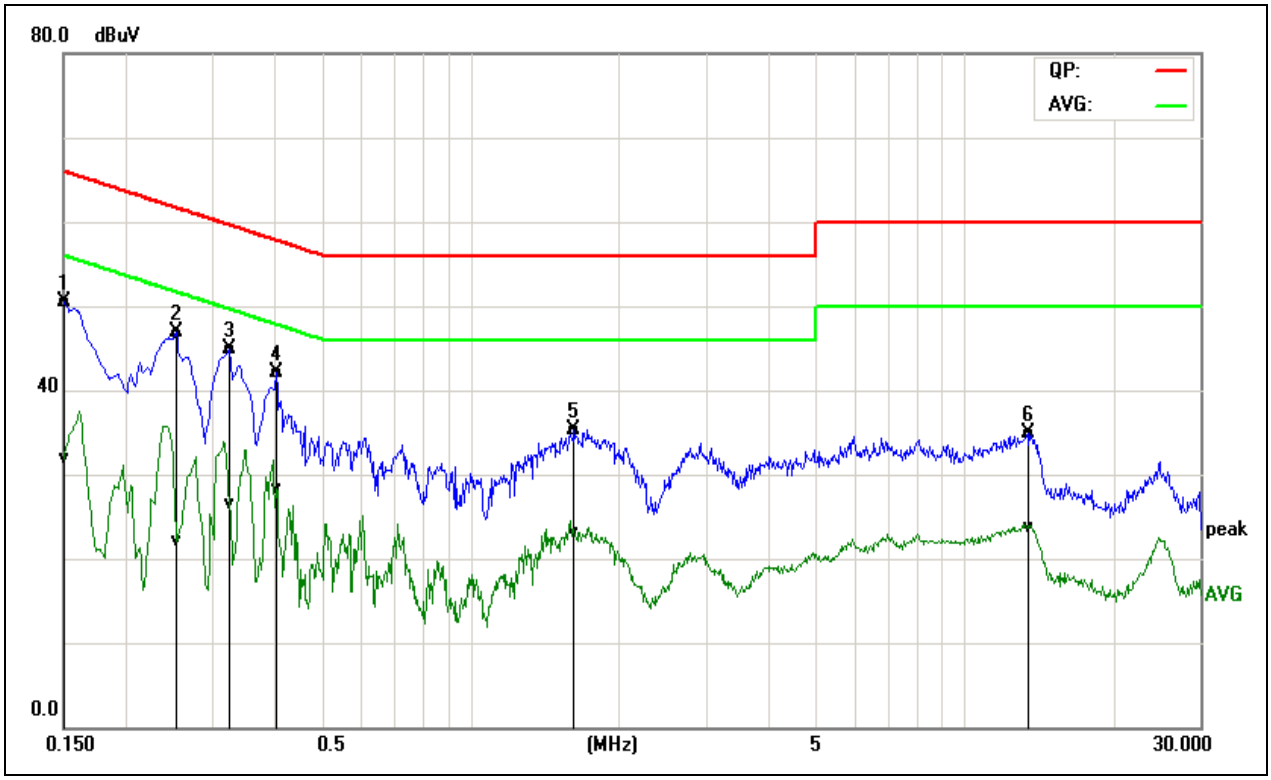
Model No.	EO2	**RBW,VBW**	9 kHz
Environmental Conditions	22°C, 45% RH	**Test Mode**	Mode 1
Tested by	Jacksan Luo	**Line**	L2
Test Date	October 20, 2016		



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)
0.1500	40.55	21.97	9.98	50.53	31.95	65.99	56.00	-15.46	-24.05	Pass
0.2540	36.81	12.20	9.99	46.80	22.19	61.62	51.63	-14.82	-29.44	Pass
0.3260	34.98	16.53	9.99	44.97	26.52	59.55	49.55	-14.58	-23.03	Pass
0.4060	32.07	18.24	9.98	42.05	28.22	57.73	47.73	-15.68	-19.51	Pass
1.6220	25.28	13.03	10.02	35.30	23.05	56.00	46.00	-20.70	-22.95	Pass
13.4340	24.62	13.45	10.30	34.92	23.75	60.00	50.00	-25.08	-26.25	Pass

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

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6.10 FREQUENCY STABILITY

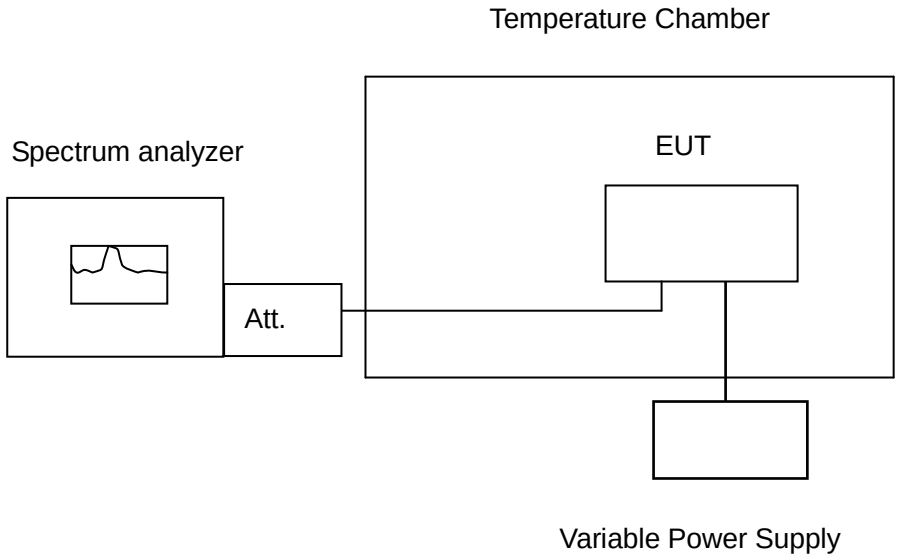
6.10.1 LIMIT

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*

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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.

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Test Data

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

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5179.958469	5150-5250	PASS
40	120	5179.971599	5150-5250	PASS
30	120	5179.974594	5150-5250	PASS
20	120	5179.821000	5150-5250	PASS
10	120	5179.951156	5150-5250	PASS
0	120	5179.997297	5150-5250	PASS
-10	120	5179.988673	5150-5250	PASS
-20	120	5179.964080	5150-5250	PASS

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5179.994155	5150-5250	PASS
	120	5179.821000	5150-5250	PASS
	132	5179.983923	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	5239.965341	5150-5250	PASS
40	120	5239.992326	5150-5250	PASS
30	120	5239.965821	5150-5250	PASS
20	120	5239.819000	5150-5250	PASS
10	120	5239.995494	5150-5250	PASS
0	120	5239.953921	5150-5250	PASS
-10	120	5239.966939	5150-5250	PASS
-20	120	5239.975320	5150-5250	PASS

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5239.952883	5150-5250	PASS
	120	5239.819000	5150-5250	PASS
	132	5239.990705	5150-5250	PASS

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

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5744.992495	5725-5850	PASS
40	120	5744.960033	5725-5850	PASS
30	120	5744.969374	5725-5850	PASS
20	120	5744.803000	5725-5850	PASS
10	120	5744.971531	5725-5850	PASS
0	120	5744.984970	5725-5850	PASS
-10	120	5744.974339	5725-5850	PASS
-20	120	5744.960508	5725-5850	PASS

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5744.971275	5725-5850	PASS
	120	5744.803000	5725-5850	PASS
	132	5744.983924	5725-5850	PASS

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

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5824.993907	5725-5850	PASS
40	120	5824.986564	5725-5850	PASS
30	120	5824.977107	5725-5850	PASS
20	120	5824.800500	5725-5850	PASS
10	120	5824.991178	5725-5850	PASS
0	120	5824.957526	5725-5850	PASS
-10	120	5824.954157	5725-5850	PASS
-20	120	5824.957948	5725-5850	PASS

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5824.991847	5725-5850	PASS
	120	5824.800500	5725-5850	PASS
	132	5824.979154	5725-5850	PASS

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

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5179.977360	5150-5250	PASS
40	120	5179.964819	5150-5250	PASS
30	120	5179.976796	5150-5250	PASS
20	120	5179.834000	5150-5250	PASS
10	120	5179.985246	5150-5250	PASS
0	120	5179.990871	5150-5250	PASS
-10	120	5179.986154	5150-5250	PASS
-20	120	5179.953081	5150-5250	PASS

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5179.951994	5150-5250	PASS
	120	5179.834000	5150-5250	PASS
	132	5179.972524	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	5239.961442	5150-5250	PASS
40	120	5239.970656	5150-5250	PASS
30	120	5239.970242	5150-5250	PASS
20	120	5239.836000	5150-5250	PASS
10	120	5239.978803	5150-5250	PASS
0	120	5239.967881	5150-5250	PASS
-10	120	5239.951642	5150-5250	PASS
-20	120	5239.985712	5150-5250	PASS

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5239.961940	5150-5250	PASS
	120	5239.836000	5150-5250	PASS
	132	5239.967555	5150-5250	PASS

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

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5744.987962	5725-5850	PASS
40	120	5744.991783	5725-5850	PASS
30	120	5744.991036	5725-5850	PASS
20	120	5744.823000	5725-5850	PASS
10	120	5744.969479	5725-5850	PASS
0	120	5744.987569	5725-5850	PASS
-10	120	5744.967329	5725-5850	PASS
-20	120	5744.978933	5725-5850	PASS

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5744.971644	5725-5850	PASS
	120	5744.823000	5725-5850	PASS
	132	5744.950125	5725-5850	PASS

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

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
50	120	5824.975520	5725-5850	PASS
40	120	5824.966949	5725-5850	PASS
30	120	5824.949032	5725-5850	PASS
20	120	5824.812400	5725-5850	PASS
10	120	5824.967812	5725-5850	PASS
0	120	5824.950530	5725-5850	PASS
-10	120	5824.958474	5725-5850	PASS
-20	120	5824.979578	5725-5850	PASS

Environment Temperature (°C)	Volage (V)	Measured Frequency (MHz)	limit Range	Test Result
20	108	5824.967296	5725-5850	PASS
	120	5824.812400	5725-5850	PASS
	132	5824.986454	5725-5850	PASS

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