



INDUSTRY CANADA RSS-247

TEST REPORT

for

WiFi Everywhere Powerline 1200 AV2 Access Point

MODEL: TEW-430AP/A

Brand: TRENDnet Inc.

Test Report Number:

C170525Z01-RC1-2

Issued Date: July 6, 2017

Issued for

TRENDnet, Inc.

20675 Manhattan Place, Torrance, CA 90501

Issued by:

Compliance Certification Services (Shenzhen) Inc.

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Certificate Number: 2861.01

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	July 6, 2017	Initial Issue	ALL	Sabrina Wang



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1 TEST CERTIFICATION

Product	WiFi Everywhere Powerline 1200 AV2 Access Point
Model	TEW-430AP/A
Brand	TRENDnet Inc.
Tested	May 25~ July 6, 2017
Applicant	TRENDnet, Inc. 20675 Manhattan Place, Torrance, CA 90501
Manufacturer	TRENDnet, Inc. 20675 Manhattan Place, Torrance, CA 90501

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
IC RSS-247 ISSUE 2 with amendment February 2017	No non-compliance noted

We hereby certify that:

Compliance Certification Services (Shenzhen) Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The test results of this report relate only to the tested sample identified in this report.

Approved by:

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

Reviewed by:

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



2 EUT DESCRIPTION

Product	WiFi Everywhere Powerline 1200 AV2 Access Point
Model Number	TEW-430AP/A
Brand	TRENDnet Inc.
Model Discrepancy	N/A
Serial Number	C170525Z01-RC1-2
Received Date	May 25, 2017
Power Supply	Input: AC100-240V ~ 50/60Hz, 0.2A
Frequency Range	UNII Band I: IEEE 802.11a, 802.11n HT20 : 5180MHz ~ 5240MHz; IEEE 802.11n HT40: 5190MHz ~ 5230MHz IEEE 802.11ac 80: 5210MHz
Transmit Power	UNII Band I: IEEE 802.11a: 21.68dBm (Antenna 0) 21.30dBm (Antenna 1) IEEE 802.11n HT 20 MHz mode: 19.20dBm (Combine with Antenna 0 and Antenna 1) IEEE 802.11n HT 40 MHz mode: 22.59dBm (Combine with Antenna 0 and Antenna 1) IEEE 802.11ac 80: 22.43dBm (Combine with Antenna 0 and Antenna 1)
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 IEEE802.11n HT40MHz mode(800ns GI): 27,54,81,108,162,216,243,270Mbps IEEE802.11ac 80 mode(800ns GI): 58.6,117,175.6,234,351,468,526.6, 585,702,780Mbps
Number of Channels	UNII Band I: IEEE 802.11a, 802.11n HT20 : 4 Channels IEEE 802.11n HT40 : 2 Channels IEEE 802.11ac 80: 1 Channel
Antenna Specification	Dipole Antenna 0 with 3dBi gain (Max) Dipole Antenna 1 with 3dBi gain (Max)
Channels Spacing	IEEE 802.11a, 802.11n HT20 : 20MHz IEEE 802.11n HT40: 40MHz IEEE 802.11ac 80: 80MHz
Temperature Range	0°C ~ +45°C
Hardware Version	1.0.0
Software Version	1.0.0

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



Operation Frequency:

UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)	
CHANNEL	MHz
36	5180
38	5190
40	5200
42	5210
44	5220
46	5230
48	5240

Remark:

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



3 TEST METHODOLOGY

The tests documented in this report were performed in accordance with IC RSS-247, IC RSS-Gen, and ANSI C63.10.

This submittal(s) (test report) is intended for IC Certification No: 6337A-TPL430AP filing to comply with Industry CANADA RSS247.

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

3.1. RSS-247 RESTRICTED BANDS OF OPERATIONS

Restricted bands, identified in Table 3 of RSS-Gen.

Table 3: Restricted Frequency Bands ^(Note)

MHz	MHz	MHz	GHz
0.090-0.110	12.57675-12.57725	960-1427	9.0-9.2
2.1735-2.1905	13.36-13.41	1435-1626.5	9.3-9.5
3.020-3.026	16.42-16.423	1645.5-1646.5	10.6-12.7
4.125-4.128	16.69475-16.69525	1660-1710	13.25-13.4
4.17725-4.17775	16.80425-16.80475	1718.8-1722.2	14.47-14.5
4.20725-4.20775	25.5-25.67	2200-2300	15.35-16.2
5.677-5.683	37.5-38.25	2310-2390	17.7-21.4
6.215-6.218	73-74.6	2655-2900	22.01-23.12
6.26775-6.26825	74.8-75.2	3260-3267	23.6-24.0
6.31175-6.31225	108-138	3332-3339	31.2-31.8
8.291-8.294	156.52475-156.52525	3345.8-3358	36.43-36.5
8.362-8.366	156.7-156.9	3500-4400	Above 38.6
8.37625-8.38675	240-285	4500-5150	
8.41425-8.41475	322-335.4	5350-5460	
12.29-12.293	399.9-410	7250-7750	
12.51975-12.52025	608-614	8025-8500	

Note: Certain frequency bands listed in Table 3 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in the 200– and 300– series RSSs, such as RSS-247 and RSS-310, which contain the requirements that apply to licence-exempt radio apparatus.



3.2. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Use Certification Tool 1.26 to control the EUT for staying in continuous transmitting mode was programmed.

Test Item	Test mode	Worse mode
Conducted Emission	Mode 1: 1000Mbps 20%(AC120V/60Hz)	<input checked="" type="checkbox"/>
	Mode 2: 1000Mbps 20%(AC240V/50Hz)	<input checked="" type="checkbox"/>
	Mode 3: Stand by(AC120V/60Hz)	<input type="checkbox"/>
	Mode 4: Stand by(AC240V/50Hz)	<input type="checkbox"/>
Radiated Emission	Mode 1: Continuously Transmitting	<input checked="" type="checkbox"/>

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only, and power line conducted emission below 30MHz, which worst case was in normal link mode.



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

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

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.

IEEE 802.11n HT 40 MHz Channel for 5190 ~ 5230MHz:

Channel Low (5190MHz) and Channel High (5230MHz) with 27Mbps data rate were chosen for full testing.

IEEE 802.11ac 80 Channel for 5210MHz:

Channel Low (5210MHz) with 27Mbps data rate were chosen for full testing.



4 FACILITIES AND ACCREDITATIONS

4.1. 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. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

4.2. 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>

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Parameter	Uncertainty
Radiated Emission, 30 to 200 MHz Test Site : 966(2)	+/-3.6880dB
Radiated Emission, 200 to 1000 MHz Test Site : 966(2)	+/-3.6695dB
Radiated Emission, 1 to 8 GHz	+/-5.1782dB
Radiated Emission, 8 to 18 GHz	+/-5.2173dB
Conducted Emissions	+/-3.6836dB
Band Width	178kHz
Peak Output Power MU	+/-1.906dB
Band Edge MU	+/-0.182dB
Channel Separation MU	416.178Hz
Duty Cycle MU	0.054ms
Frequency Stability MU	226Hz

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

The measured result is above (below) the specification limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95% level of confidence. However, the result indicates that compliance (non-compliance) is more probable than non-compliance) with the specification limit.



5 SETUP OF EQUIPMENT UNDER TEST

5.1. 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.

5.2. SUPPORT EQUIPMENT

No.	Equipment	Model No.	Serial No.	FCC ID	Brand	Data Cable	Power Cord
1	Notebook 1	Thinkpad	N/A	DoC	LENOVO	Unshielded 2.00m	Shielded 1.70m (AC Cable) Unshielded 1.80m (DC Cable)
2	Notebook 2	Probook 5310M	N/A	DoC	HP	Unshielded 2.00m	Shielded 1.70m (AC Cable) Unshielded 1.80m (DC Cable)
3	Powerline 1200 AV2 Adapter	TPL-421E	N/A	DoC	TRENDnet Inc.	Unshielded 2.00m	N/A

Note:

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



6 RSS 247 REQUIREMENTS

6.1. 99% BANDWIDTH

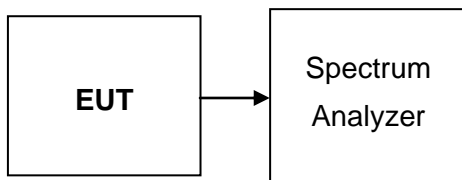
The test of the item was performed in accordance with the standards RSS-Gen 4.6.1.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2017	02/20/2018
Cable	Huber Suhner	SUCOFLEX104PEA	N/A	N/A	N/A

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

TEST CONFIGURATION



TEST PROCEDURE

The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold.



TEST RESULTS

Test Data

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

Channel	Frequency (MHz)	Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
Low	5180	16.491	16.471
Mid	5200	16.482	16.472
High	5240	16.484	16.480

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

Channel	Frequency (MHz)	Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
Low	5180	17.693	17.673
Mid	5200	17.670	17.666
High	5240	17.698	17.694

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

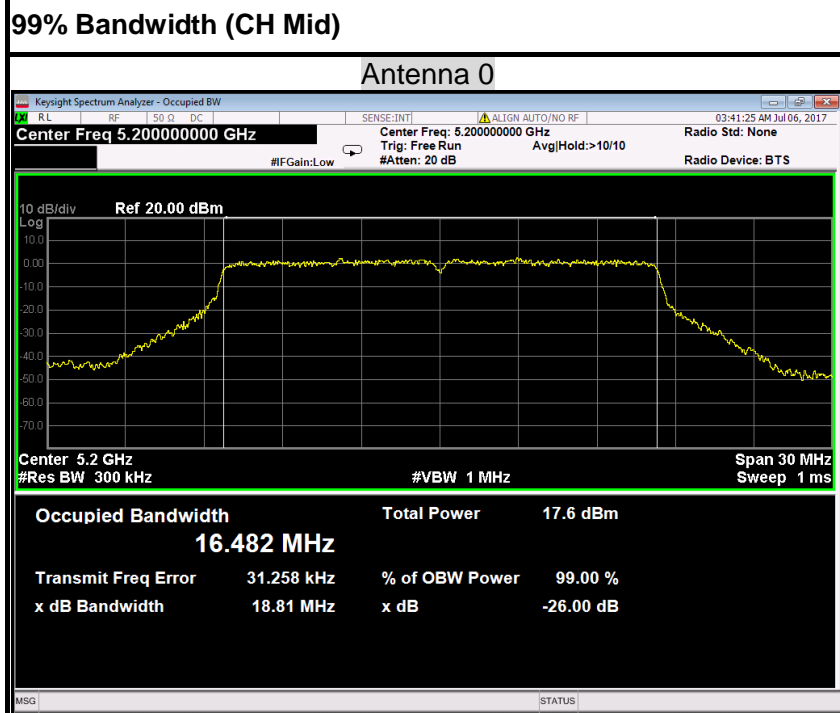
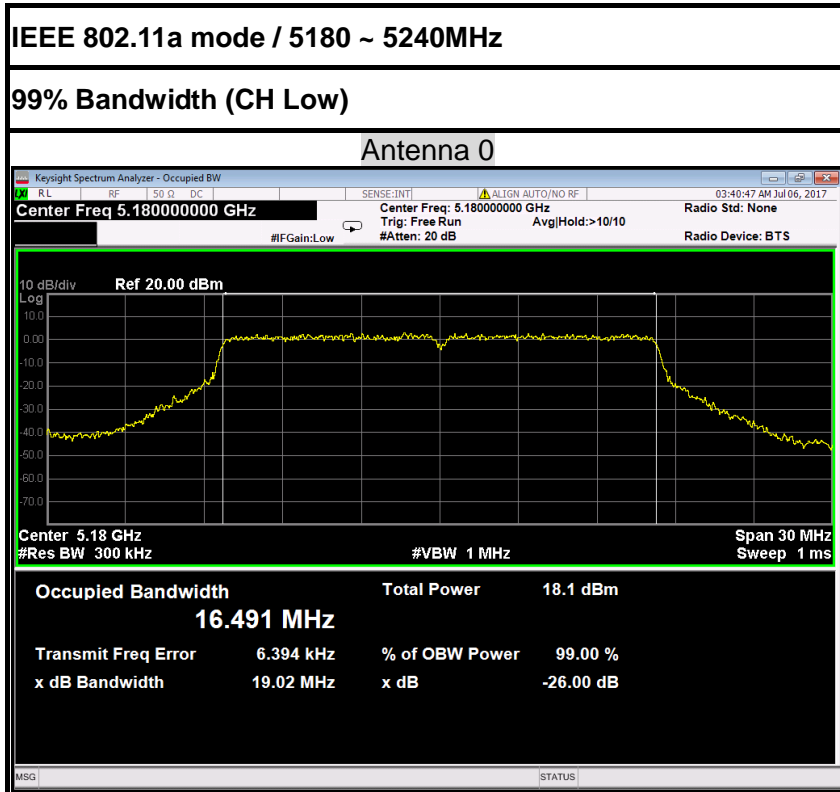
Channel	Frequency (MHz)	Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
Low	5190	36.027	36.101
High	5230	36.041	36.068

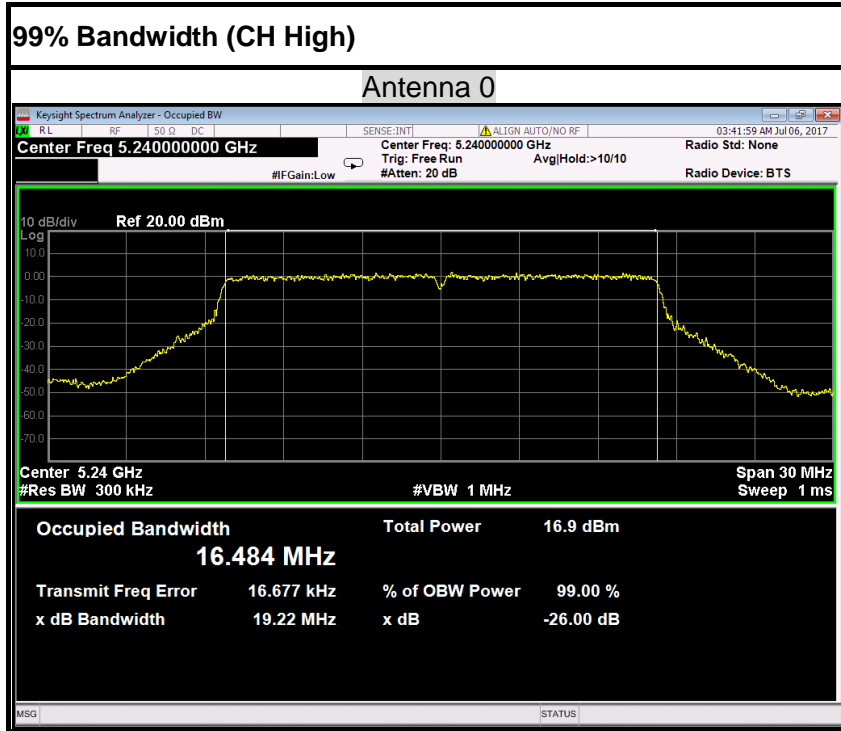
Test mode: IEEE 802.11ac 80 mode / 5210MHz

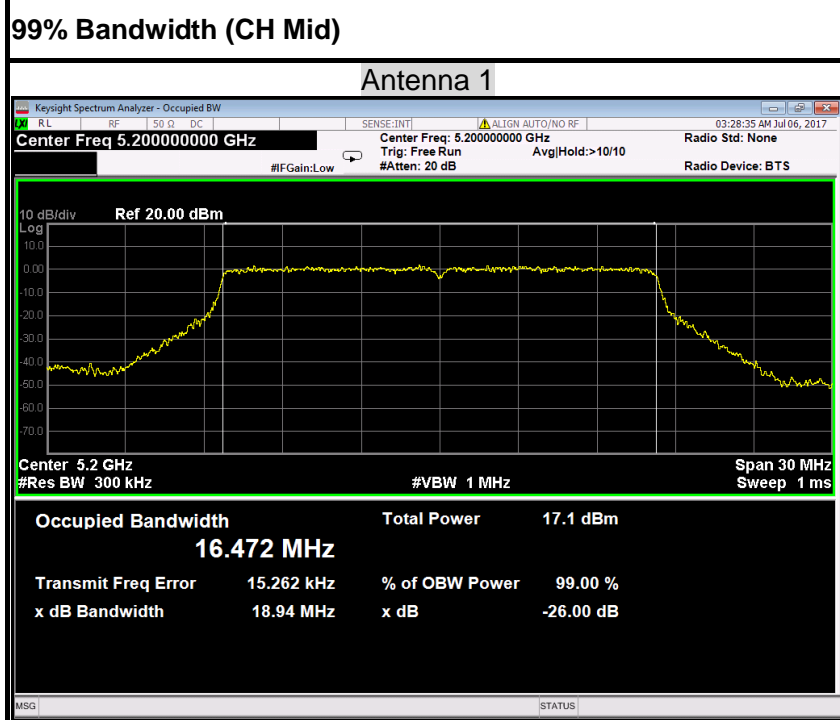
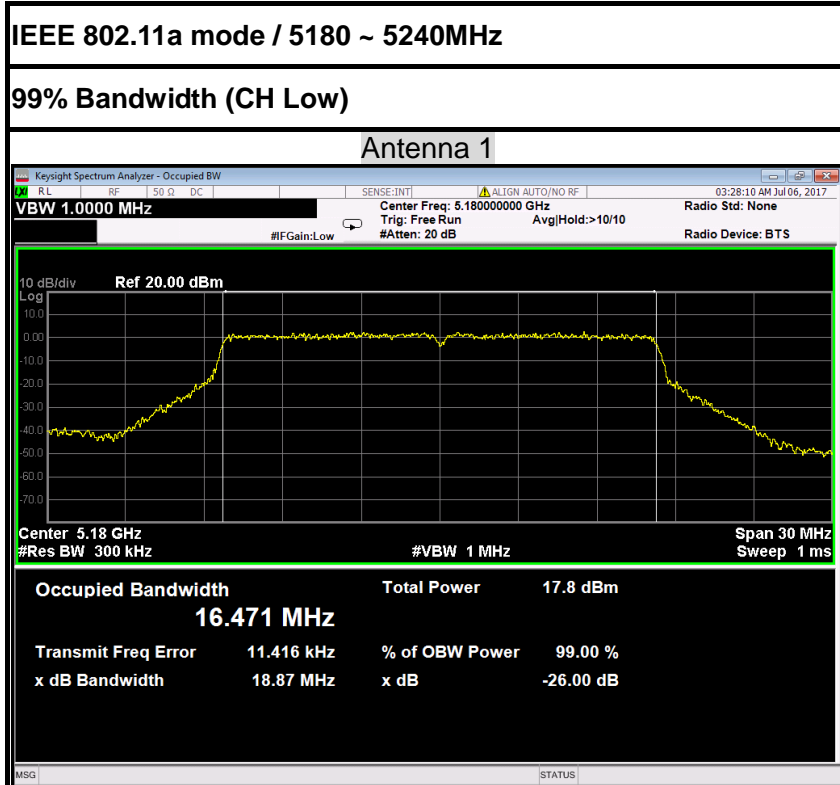
Channel	Frequency (MHz)	Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
	5210	75.969	75.845

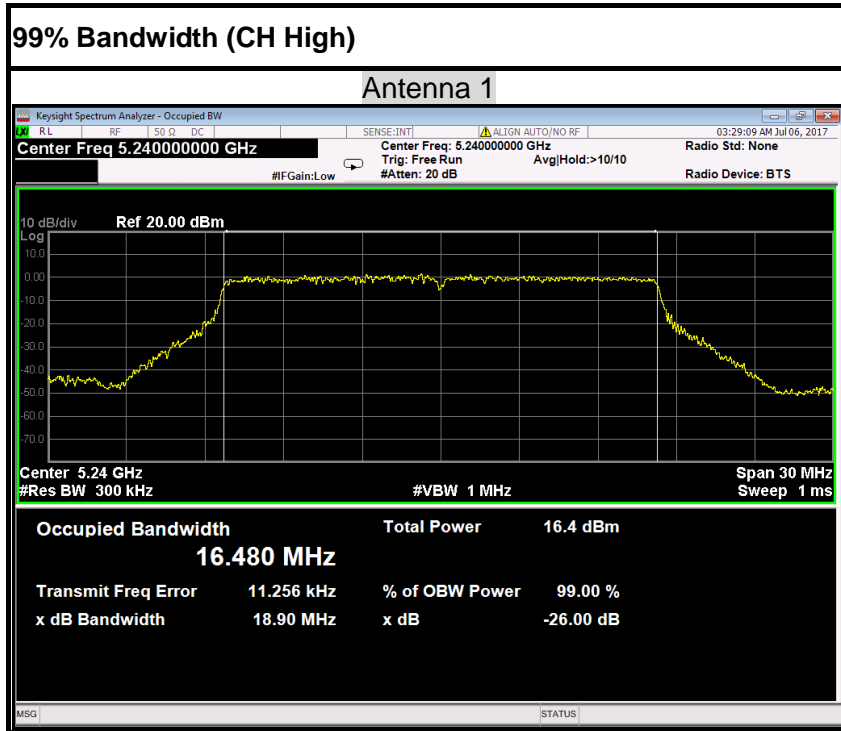


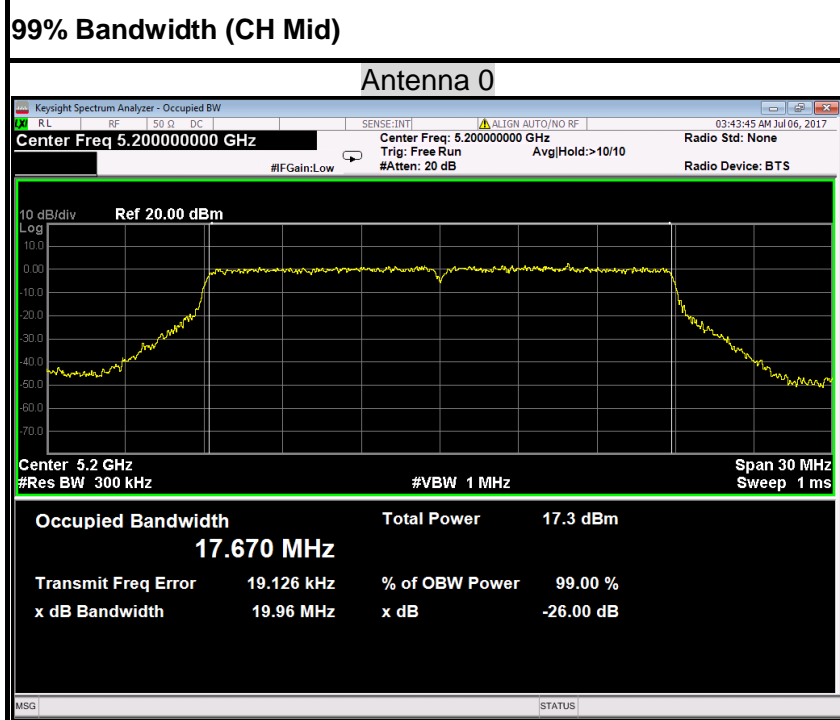
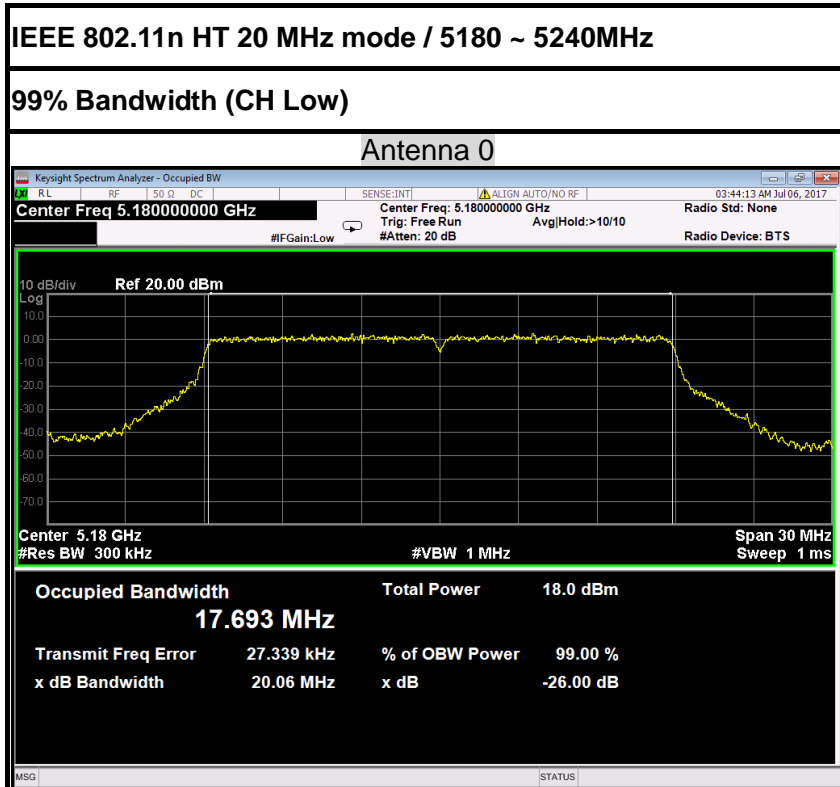
Test Plot

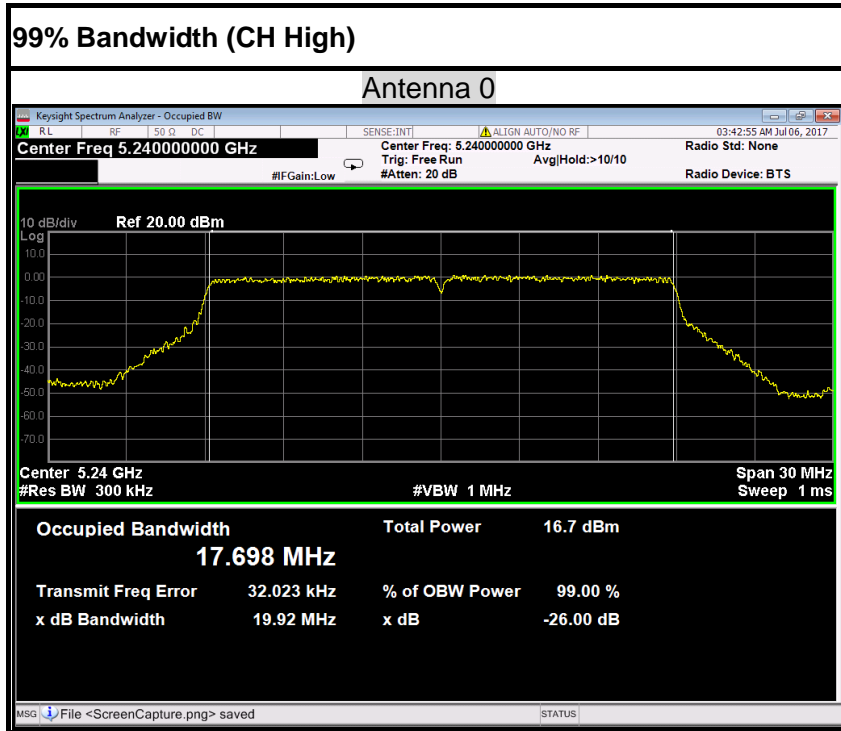


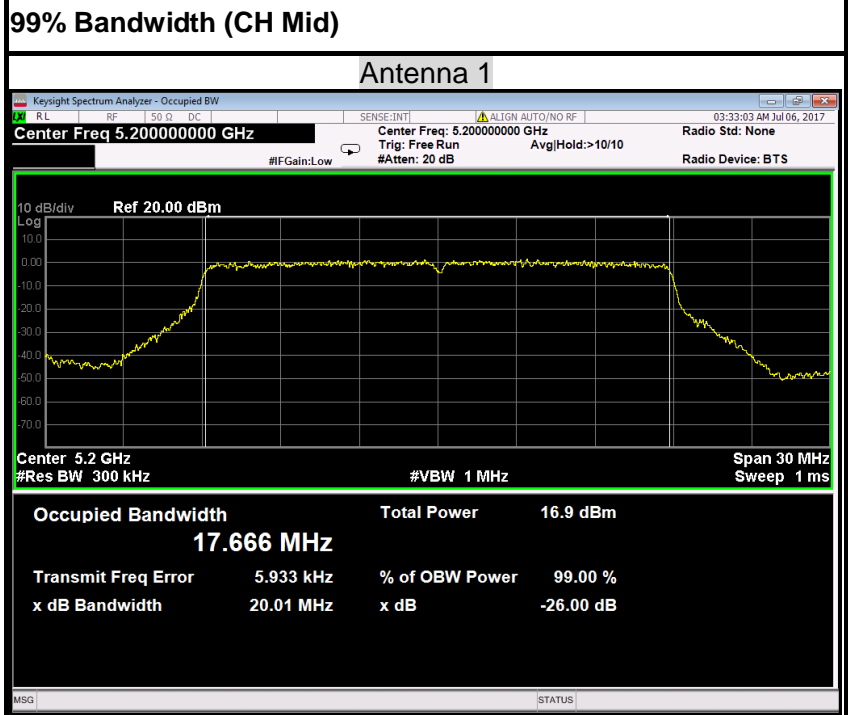
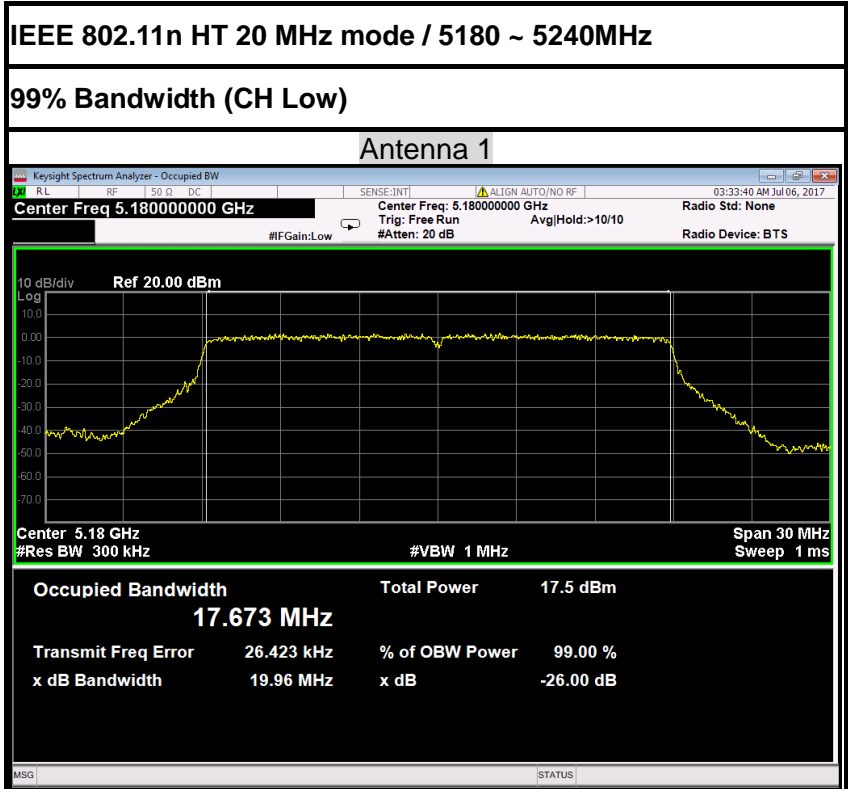


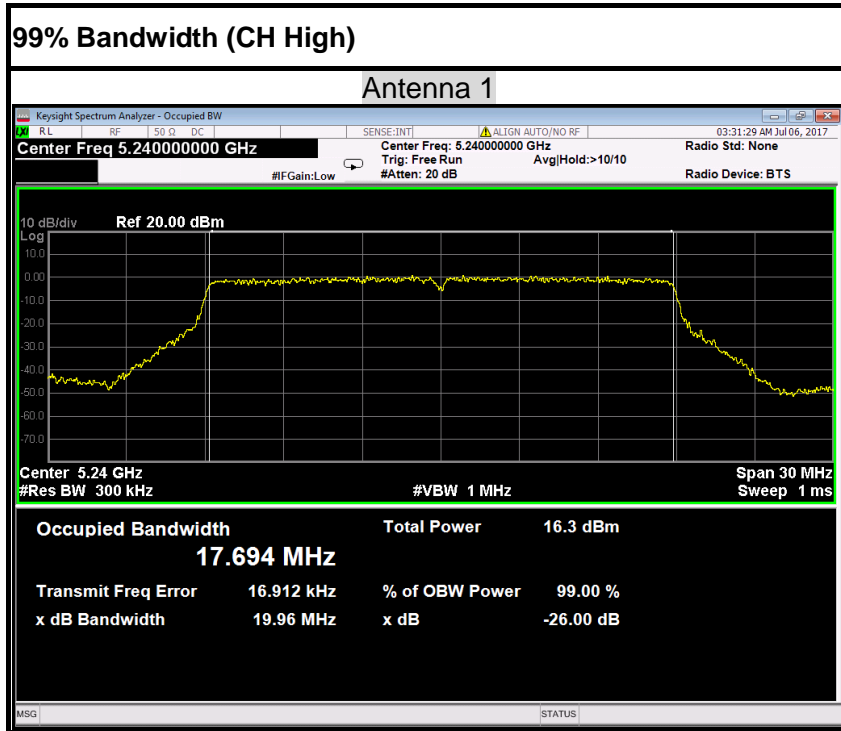


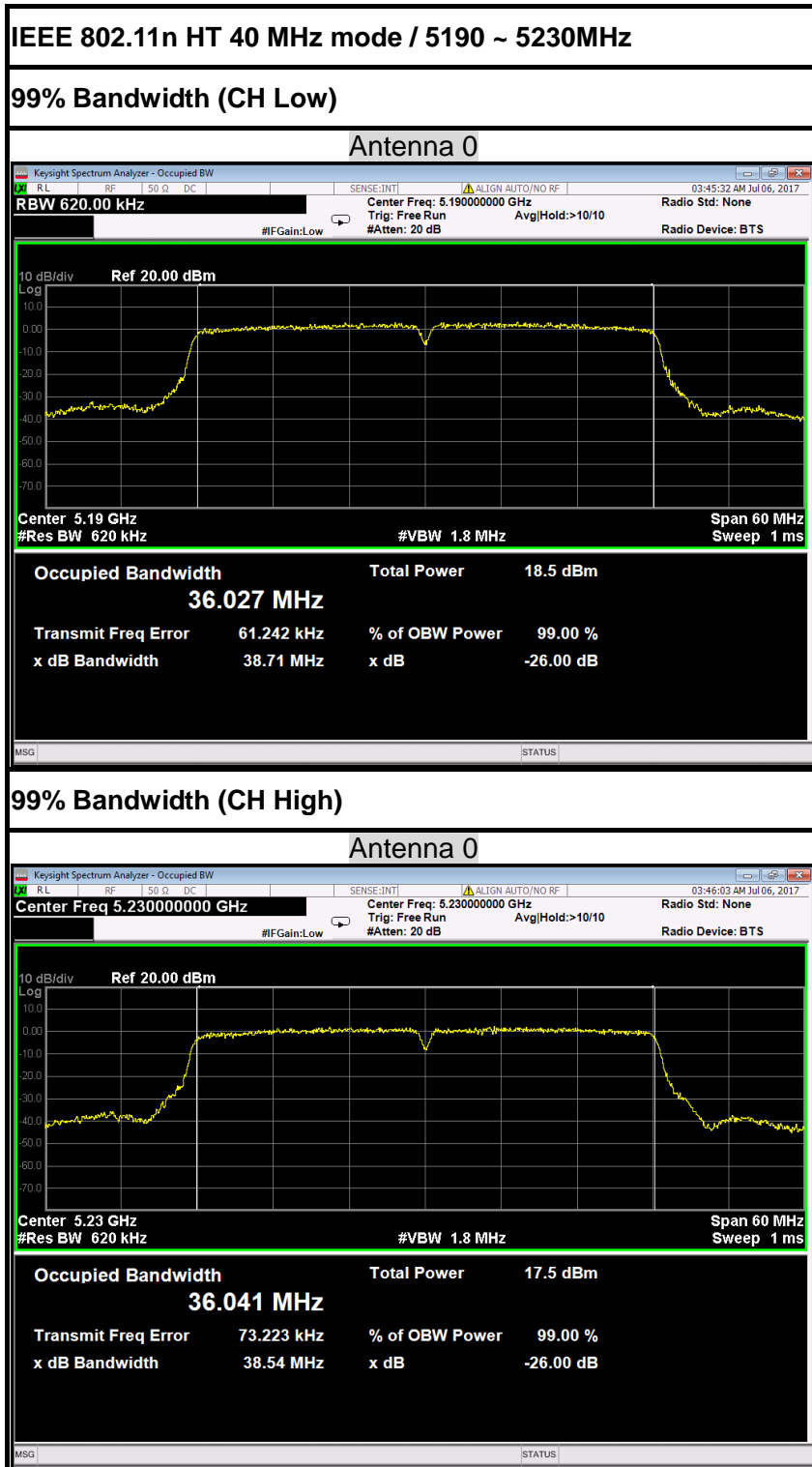


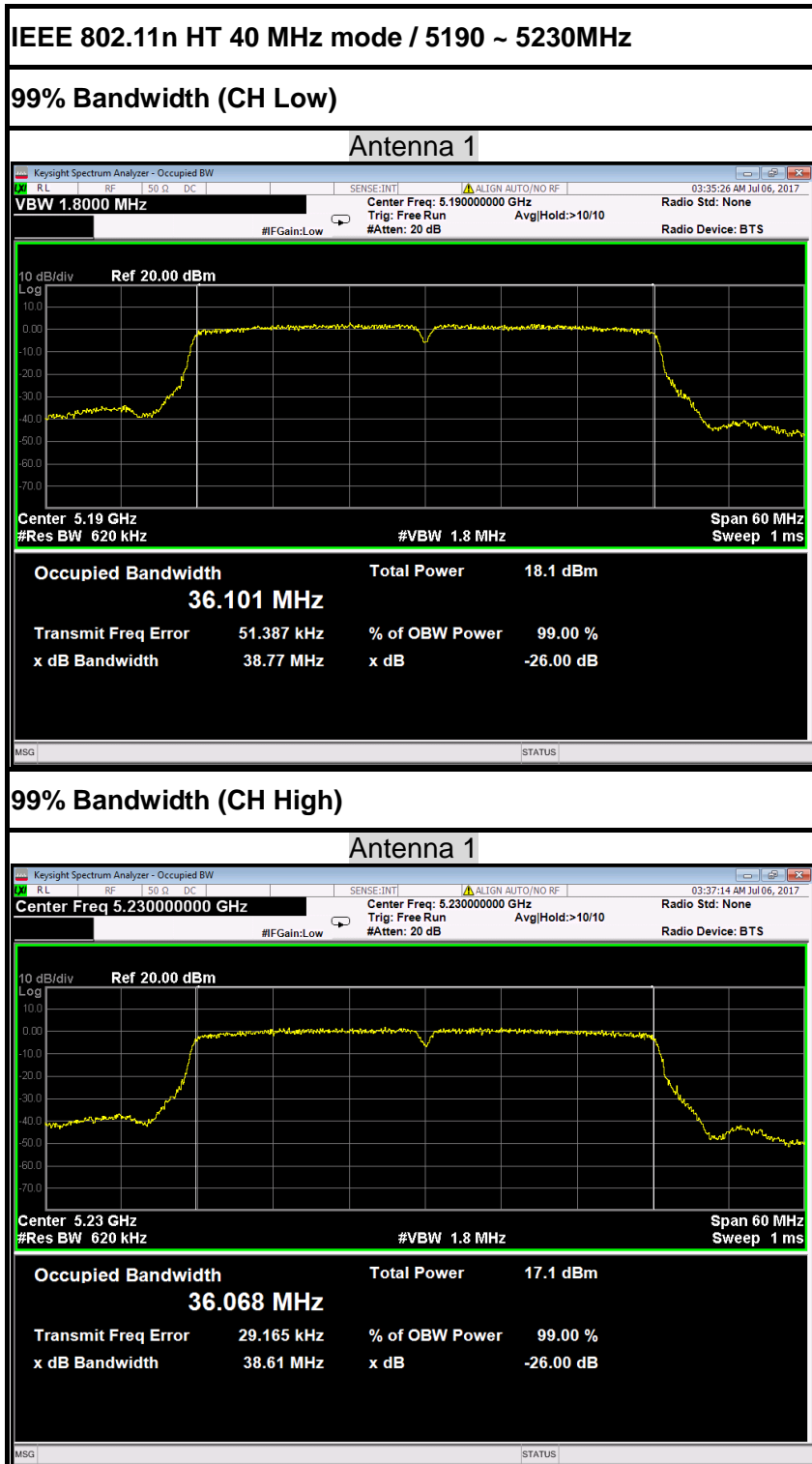


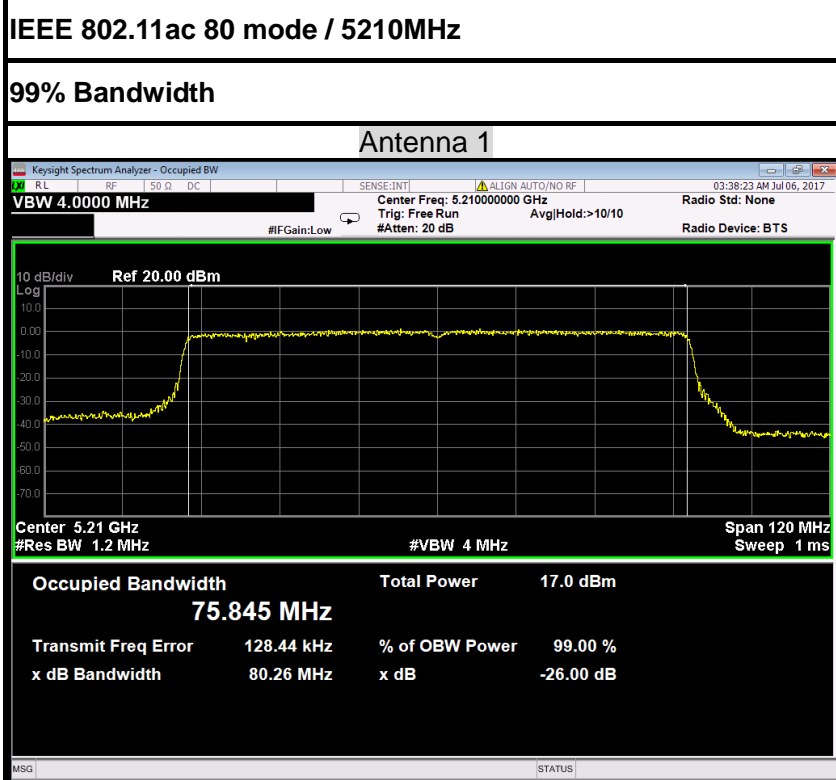
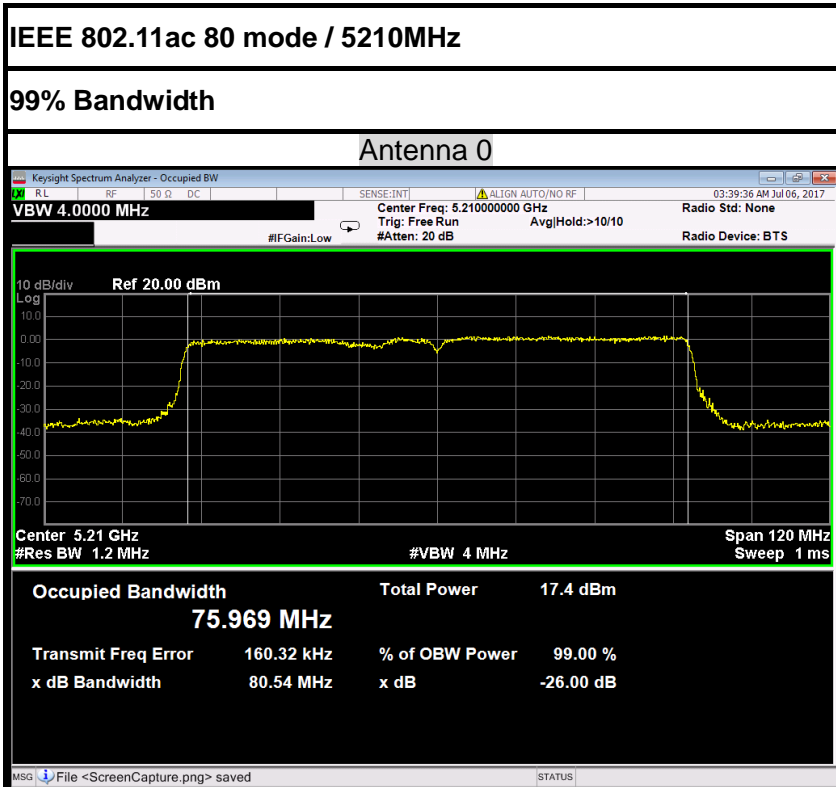














6.2. 26dB EMISSION BANDWIDTH

LIMIT

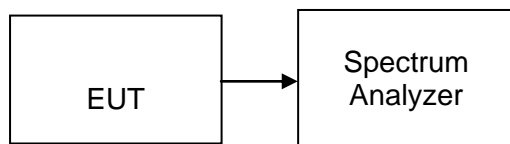
No Limit.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2017	02/20/2018
Cable	Huber Suhner	SUCOFLEX104PEA	N/A	N/A	N/A

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

TEST CONFIGURATION



TEST PROCEDURE

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



TEST RESULTS

No non-compliance noted

Test Plot

The test plots please refer to 6.1 for detail.

Test Data

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

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
Low	5180	19.02	18.87
Mid	5200	18.81	18.94
High	5240	19.22	18.90

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

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
Low	5180	20.06	19.96
Mid	5200	19.96	20.01
High	5240	19.92	19.96

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

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
Low	5190	38.71	38.77
High	5230	38.54	38.61

Test mode: IEEE 802.11ac 80 mode / 5210MHz

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
	5210	80.54	80.26



6.3. 6dB BANDWIDTH

LIMIT

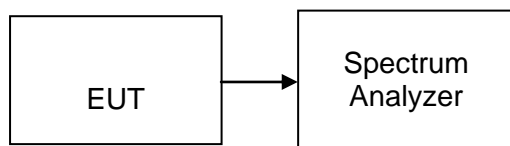
According to RSS-247 §6.2.4, for equipment operating in the band 5725-5850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2017	02/20/2018
Cable	HuberSuhner	SUCOFLEX104PEA	N/A	N/A	N/A

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

TEST CONFIGURATION



TEST PROCEDURE

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.

TEST RESULTS

No non-compliance noted

Not applicable, Since the EUT only has Band I.



6.4. 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 UNII devices, the IEEE 802.11a 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

Antenna 0

IEEE 802.11a mode / 5180 ~ 5240MHz

T_{nom}	V_{nom}	Lowest channel 5180MHz	Highest channel 5240MHz
Conducted power [dBm] Measured with OFDM modulation		6.51	5.49
Radiated power [dBm] Measured with OFDM modulation		8.97	8.27
Gain [dBi] Calculated		2.46	2.78
Measurement uncertainty		± 1.5 dB (cond.) / ± 3 dB (rad.)	

Antenna 1

IEEE 802.11a mode / 5180 ~ 5240MHz

T_{nom}	V_{nom}	Lowest channel 5180MHz	Highest channel 5240MHz
Conducted power [dBm] Measured with OFDM modulation		6.13	5.10
Radiated power [dBm] Measured with OFDM modulation		8.79	7.96
Gain [dBi] Calculated		2.66	2.86
Measurement uncertainty		± 1.5 dB (cond.) / ± 3 dB (rad.)	



6.5. OUTPUT POWER

LIMIT

According to RSS-247 §6.2,

1. For the band 5150-5250 MHz, the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log_{10} B$, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.
2. For the band 5250-5350 MHz, the maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
3. For the band 5470-5600 MHz and 5650-5725 MHz, the maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
4. For the band 5725-5850 MHz, The maximum conducted output power shall not exceed 1 W. The 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 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 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-multipoint3 systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.



Specified Limit of the Output Power

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

Channel	Frequency (MHz)	26 dB Bandwidth (B) (MHz)		10*Log(B) (dB)		10 + 10*Log(B) (dBm)		Maximum Conducted Output Power Limit (dBm)	
		Antenna 0	Antenna 1	Antenna 0	Antenna 1	Antenna 0	Antenna 1	Antenna 0	Antenna 1
Low	5180	19.02	18.87	12.79	12.76	22.79	22.76	22.79	22.76
Mid	5200	18.81	18.94	12.74	12.77	22.74	22.77	22.74	22.77
High	5240	19.22	18.90	12.84	12.76	22.84	22.76	22.84	22.76

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

Channel	Frequency (MHz)	26 dB Bandwidth (B) (MHz)		10*Log(B) (dB)		10 + 10*Log(B) (dBm)		Maximum Conducted Output Power Limit (dBm)	
		Antenna 0	Antenna 1	Antenna 0	Antenna 1	Antenna 0	Antenna 1	Antenna 0	Antenna 1
Low	5180	20.06	19.96	13.02	13.00	23.02	23.00	23.00	23.00
Mid	5200	19.96	20.01	13.00	13.01	23.00	23.01	23.00	23.00
High	5240	19.92	19.96	12.99	13.00	22.99	23.00	23.00	23.00

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

Channel	Frequency (MHz)	26 dB Bandwidth (B) (MHz)		10*Log(B) (dB)		10 + 10*Log(B) (dBm)		Maximum Conducted Output Power Limit (dBm)	
		Antenna 0	Antenna 1	Antenna 0	Antenna 1	Antenna 0	Antenna 1	Antenna 0	Antenna 1
Low	5190	38.71	38.77	15.88	15.88	25.88	25.88	23.00	23.00
High	5230	38.54	38.61	15.86	15.87	25.86	25.87	23.00	23.00

IEEE 802.11ac 80 mode / 5210MHz

Channel	Frequency (MHz)	26 dB Bandwidth (B) (MHz)		10*Log(B) (dB)		10 + 10*Log(B) (dBm)		Maximum Conducted Output Power Limit (dBm)	
		Antenna 0	Antenna 1	Antenna 0	Antenna 1	Antenna 0	Antenna 1	Antenna 0	Antenna 1
	5210	80.54	80.26	16.00	19.04	29.06	30.04	23.00	23.00

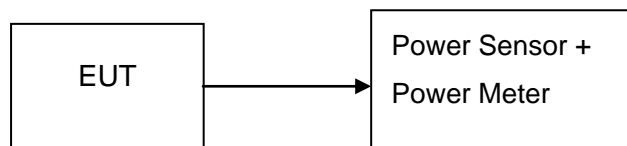


MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Power Meter	Anritsu	ML2495A	1204003	02/21/2017	02/20/2018
Power Sensor	Anritsu	MA2411B	1126150	02/21/2017	02/20/2018
Cable	HuberSuhner	SUCOFLEX104PEA	N/A	N/A	N/A

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

TEST CONFIGURATIONS



TEST PROCEDURE

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

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

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



TEST RESULTS

No non-compliance noted

Test Data

IEEE 802.11a mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	AVG Output Power (dBm)		G _{ant} (dBi)	AVG Output Power (W)		Maximum e.i.r.p (W)		Limit (dBm)	Result
		Antenna 0	Antenna 1		Antenna 0	Antenna 1	Antenna 0	Antenna 1		
Low	5180	18.68	18.30	3.00	21.68	21.30	0.14723	0.13490	22.74	PASS
Mid	5200	18.10	17.70		21.10	20.70	0.12882	0.11749		PASS
High	5240	17.66	17.27		20.66	20.27	0.11641	0.10641		PASS

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

Channel	Frequency (MHz)	AVG Output Power (dBm)		G _{ant} (dBi)	10log(N _{ant})	Total (dBm)	Maximum e.i.r.p (W)	Limit (dBm)	Result
		Antenna 0	Antenna 1						
Low	5180	13.42	12.95	3.00	3.01	22.21	0.16640	22.99	PASS
Mid	5200	12.79	12.56			21.70	0.14780		PASS
High	5240	12.53	12.36			21.47	0.14016		PASS

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

Channel	Frequency (MHz)	AVG Output Power (dBm)		G _{ant} (dBi)	10log(N _{ant})	Total (dBm)	Maximum e.i.r.p (W)	Limit (dBm)	Result
		Antenna 0	Antenna 1						
Low	5190	13.85	13.27	3.00	3.01	22.59	0.18155	22.99	PASS
High	5230	13.47	13.54			22.53	0.17887		PASS

IEEE 802.11ac 80 mode / 5210MHz

Channel	Frequency (MHz)	AVG Output Power (dBm)		G _{ant} (dBi)	10log(N _{ant})	Total (dBm)	Maximum e.i.r.p (W)	Limit (dBm)	Result
		Antenna 0	Antenna 1						
	5190	13.24	13.58	3.00	3.01	22.43	0.17513	22.99	PASS

Remark:

Directional Gain= G_{ant} + 10log (N_{ant}) dBi

G_{ant}: Gain of Individual Antennas (Same for Each Antenna)

N_{ant}: Number of Transmit Antennas



6.6. BAND EDGES MEASUREMENT

LIMIT

According to RSS-247 §5.5, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

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	02/21/2017	02/20/2018
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	02/21/2017	02/20/2018
Amplifier	EMEC	EM330	060661	03/18/2017	03/17/2018
High Noise Amplifier	Agilent	8449B	3008A01838	02/21/2017	02/20/2018
Loop Antenna	COM-POWER	AL-130	121044	09/25/2016	09/24/2017
Bilog Antenna	SCHAFFNER	CBL6143	5082	02/21/2017	02/20/2018
Horn Antenna	SCHWARZBECK	BBHA9120	D286	02/27/2017	02/27/2018
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	02/27/2017	02/27/2018
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	02/21/2017	02/20/2018
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

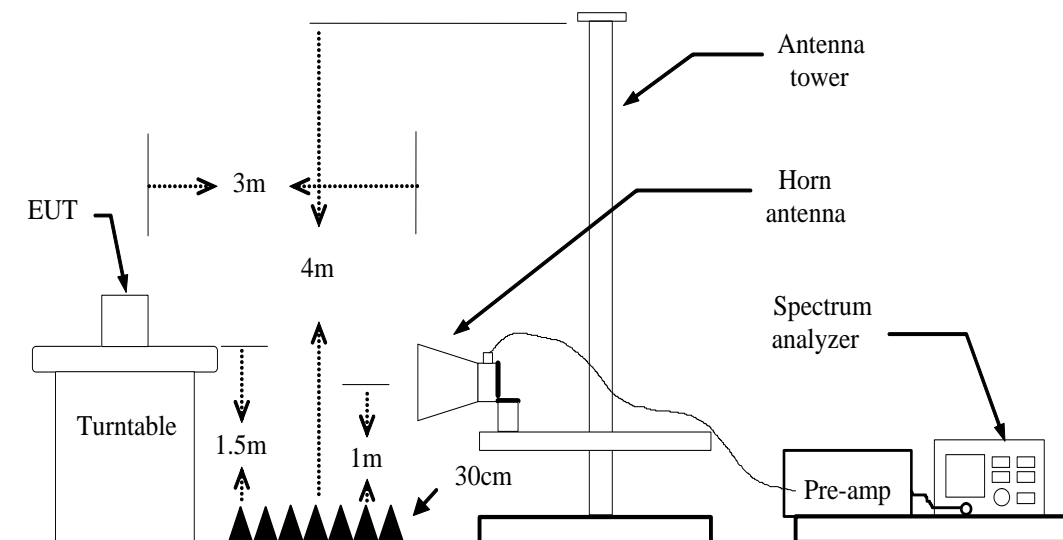
NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The FCC Site Registration number is 101879.

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

6.6.4. TEST PROCEDURES (please refer to measurement standard)

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=1MHz / VBW=3MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO / Detector=Peak
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

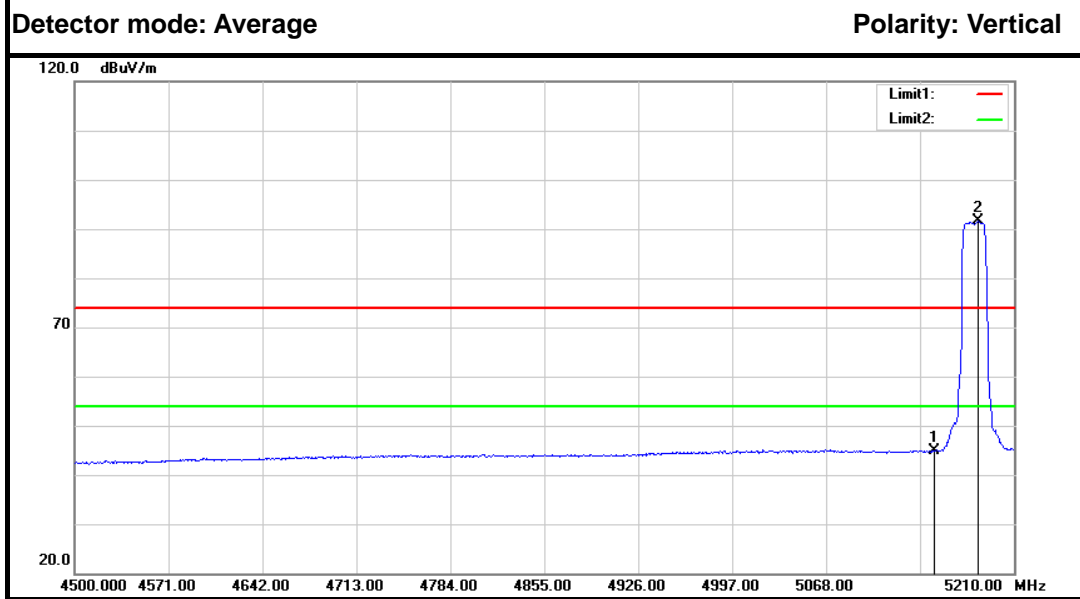
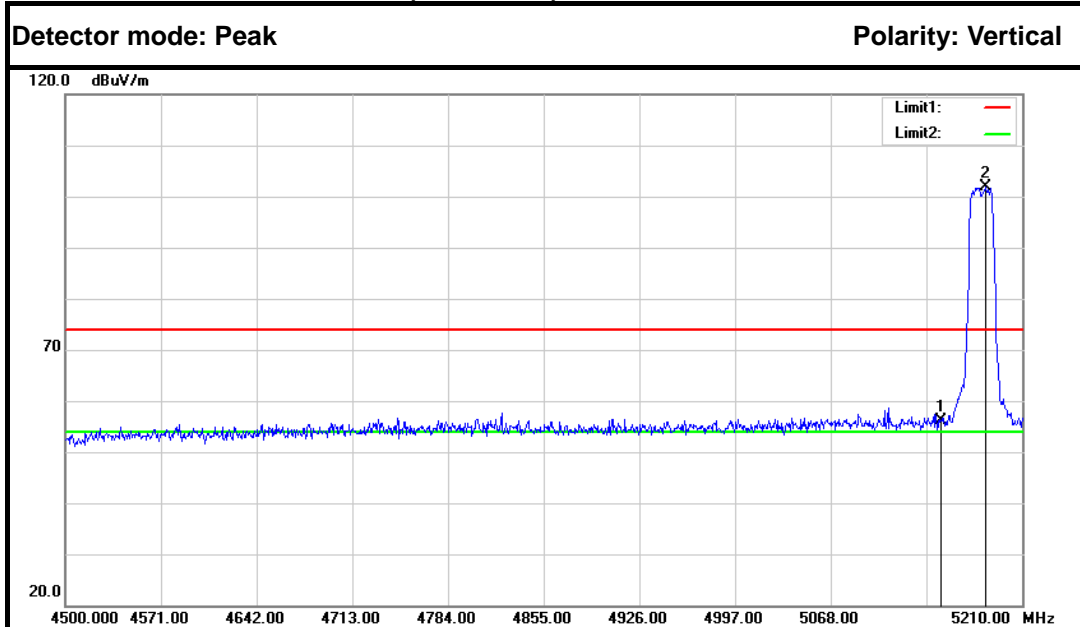
6.6.5. TEST SETUP



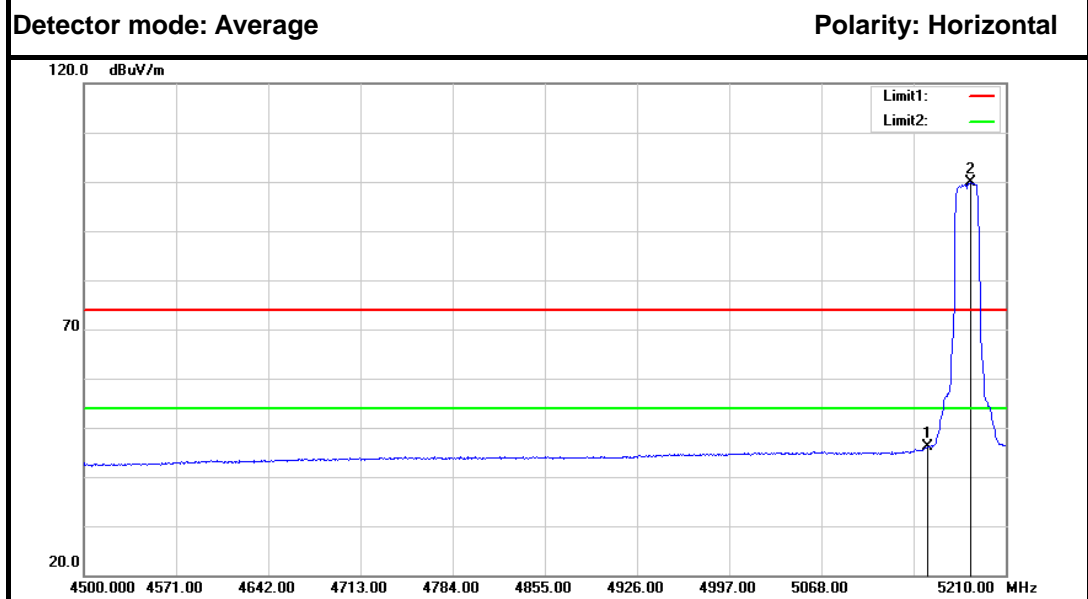
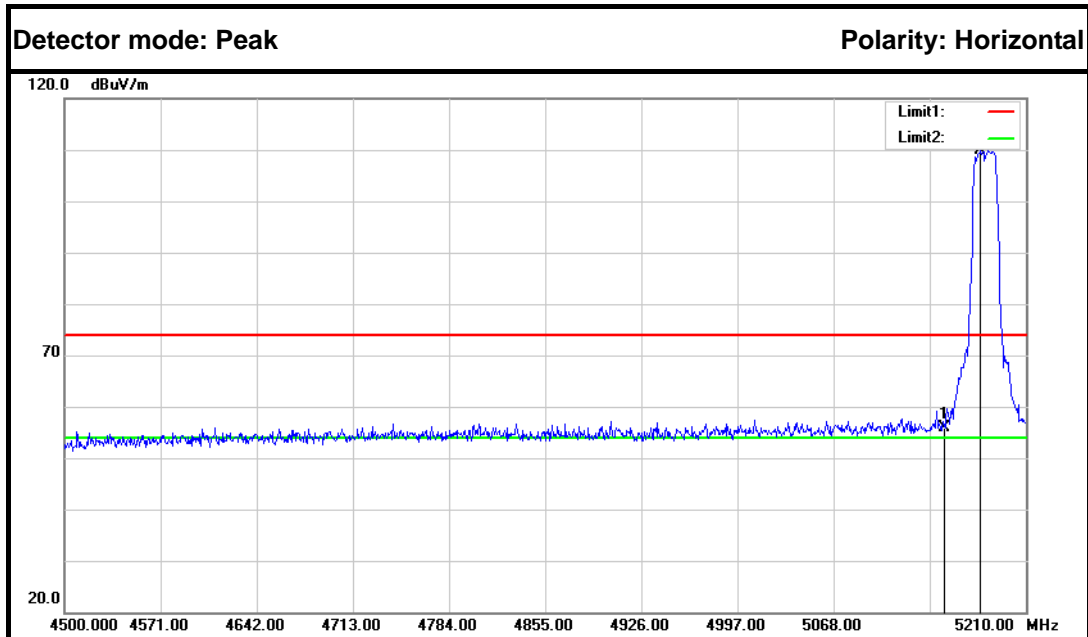
6.6.6. TEST RESULTS

Test Plot

IEEE 802.11a mode / 5180MHz (Antenna 0)



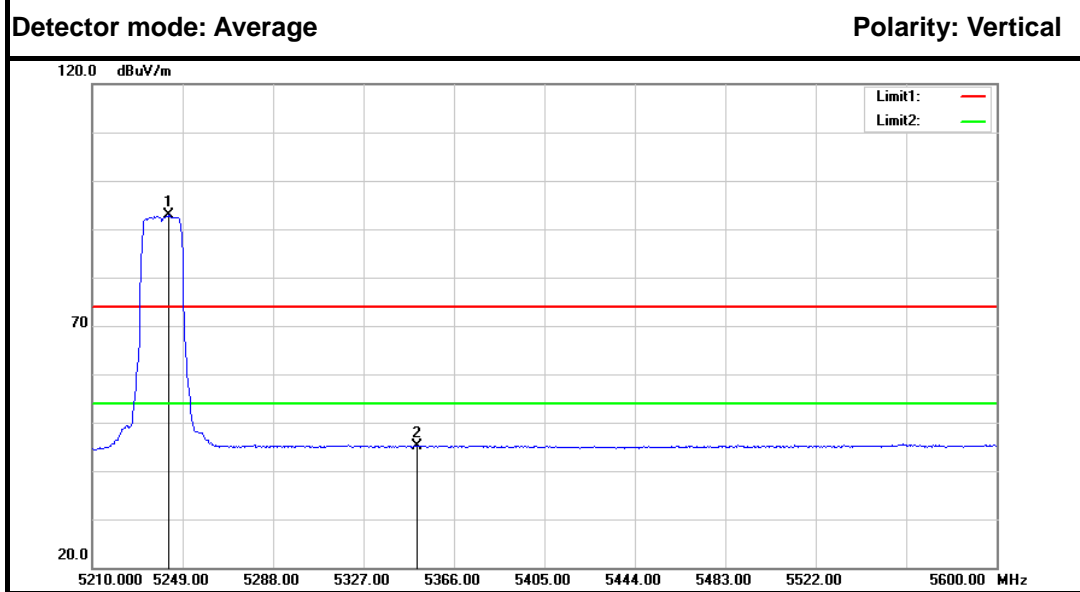
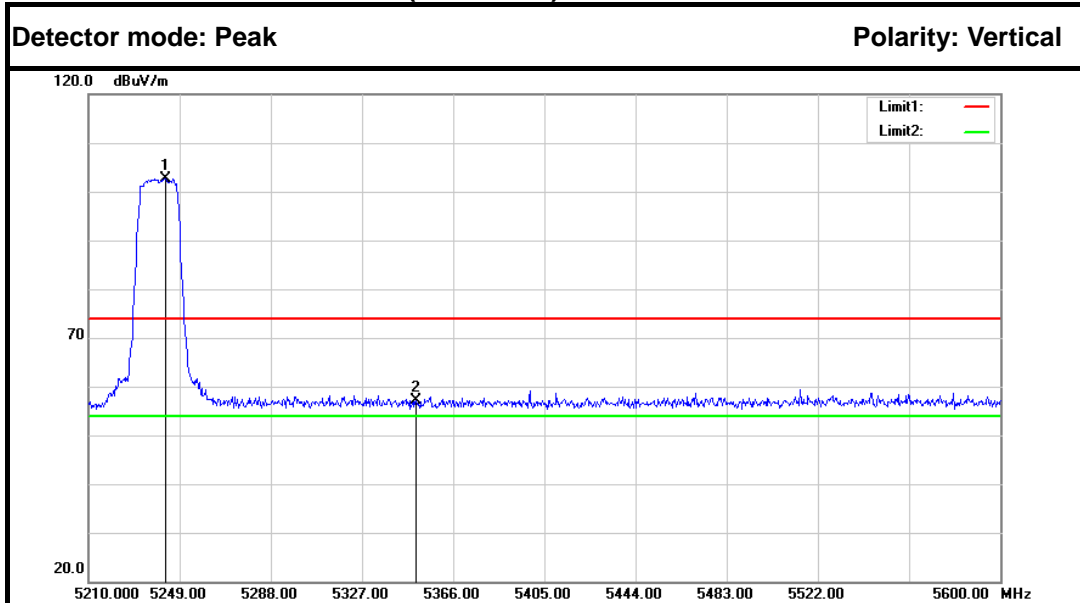
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5150.000	50.95	5.25	56.20	74.00	-17.80	Peak	Vertical
2	5183.020	96.48	5.31	101.79	---	---	Peak	Vertical
1	5150.000	39.52	5.25	44.77	54.00	-9.23	Average	Vertical
2	5183.020	86.34	5.31	91.65	---	---	Average	Vertical



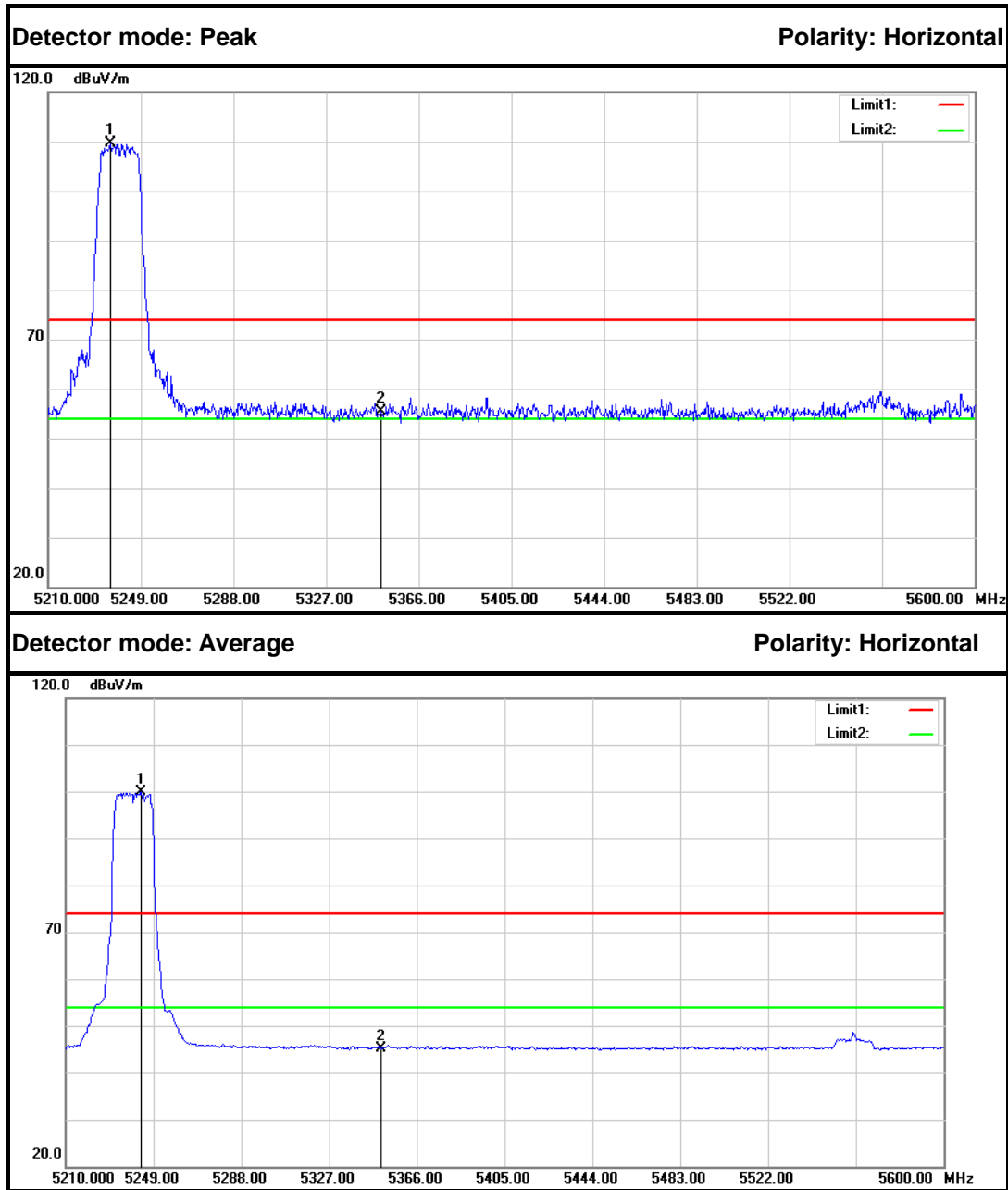
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5150.000	50.71	5.25	55.96	74.00	-18.04	Peak	Horizontal
2	5176.630	104.55	5.29	109.84	---	---	Peak	Horizontal
1	5150.000	40.91	5.25	46.16	54.00	-7.84	Average	Horizontal
2	5183.020	94.61	5.31	99.92	---	---	Average	Horizontal



IEEE 802.11a mode / 5240MHz (Antenna 0)



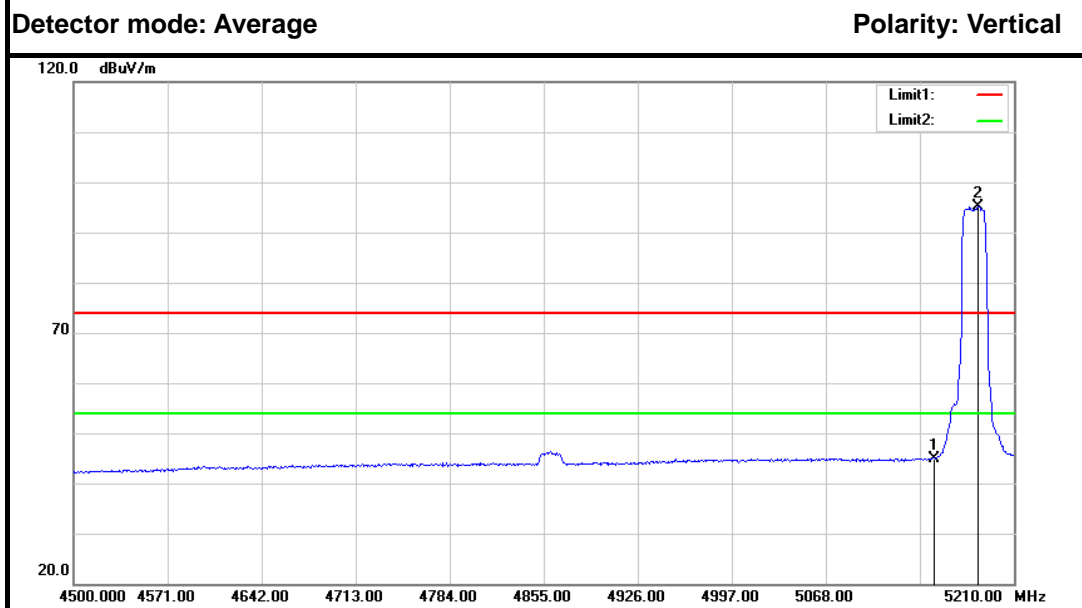
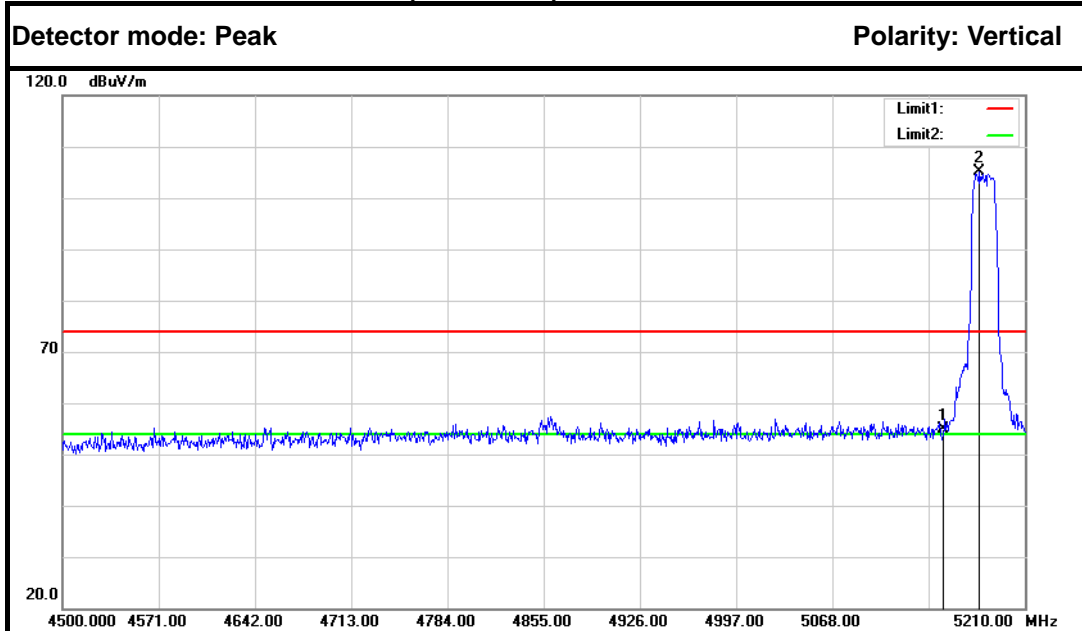
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5243.150	97.33	5.41	102.74	---	---	Peak	Vertical
2	5350.000	51.49	5.60	57.09	74.00	-16.91	Peak	Vertical
1	5243.150	87.40	5.41	92.81	---	---	Average	Vertical
2	5350.000	39.48	5.60	45.08	54.00	-8.92	Average	Vertical



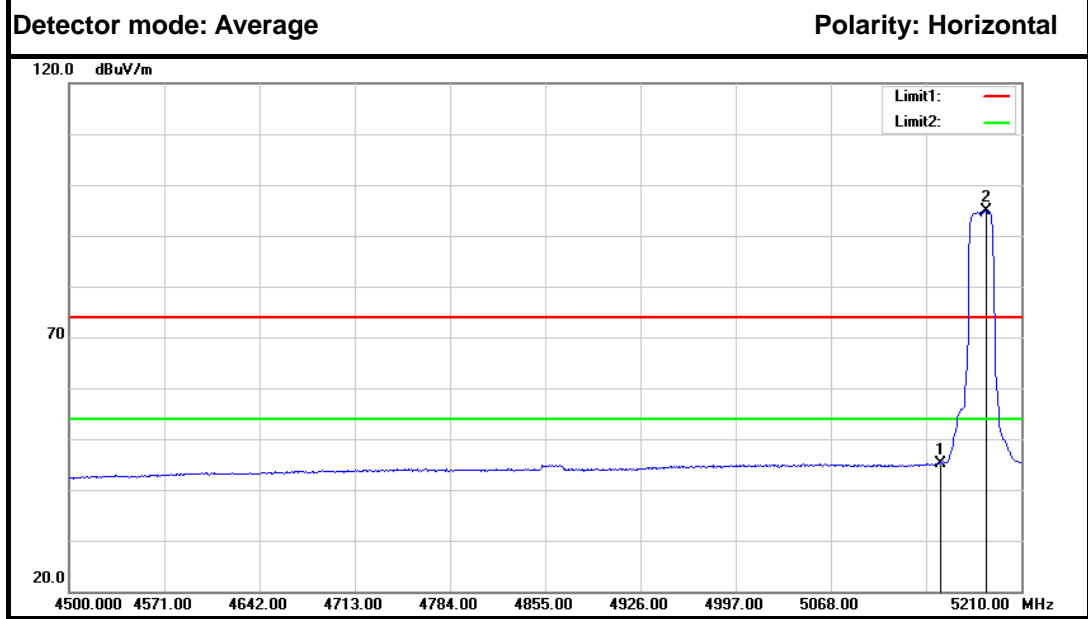
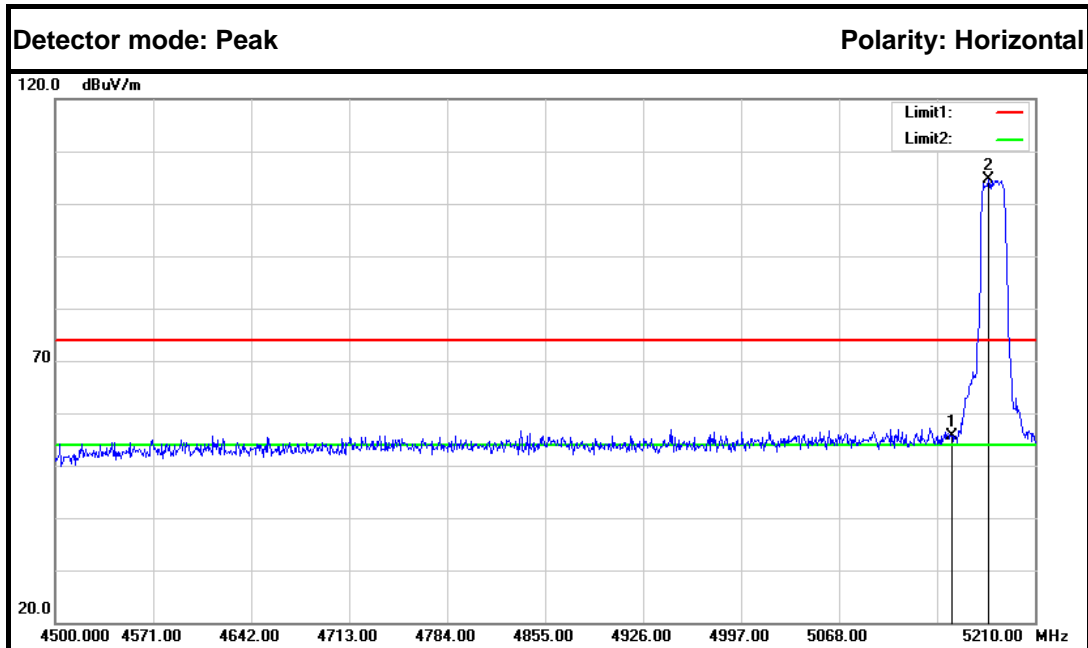
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5236.130	104.21	5.40	109.61	---	---	Peak	Horizontal
2	5350.000	49.83	5.60	55.43	74.00	-18.57	Peak	Horizontal
1	5243.540	94.51	5.41	99.92	---	---	Average	Horizontal
2	5350.000	39.49	5.60	45.09	54.00	-8.91	Average	Horizontal



IEEE 802.11a mode / 5180MHz (Antenna 1)



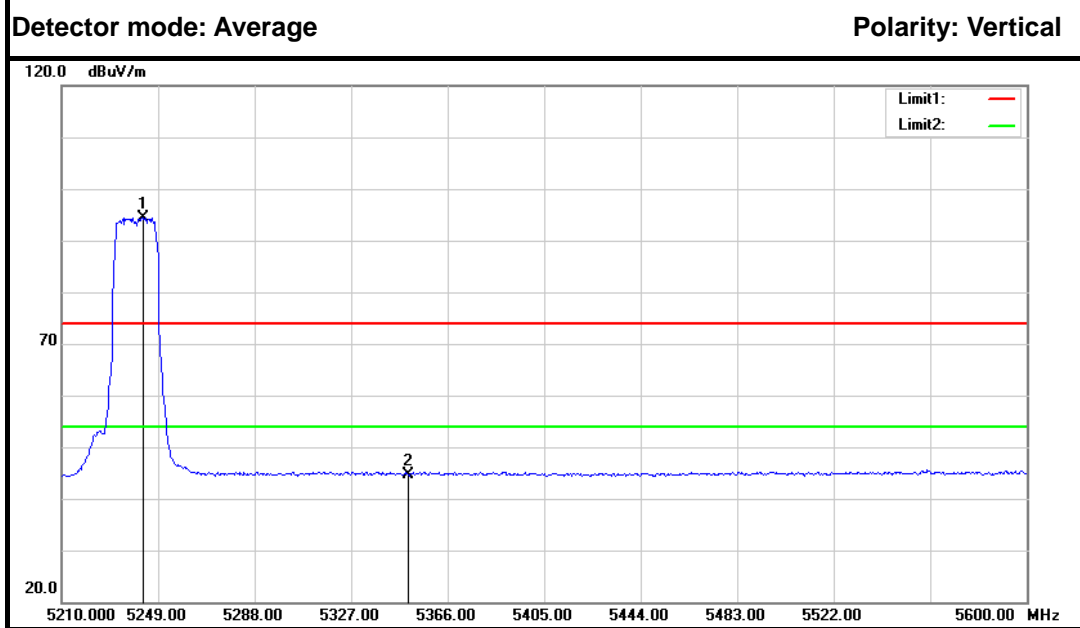
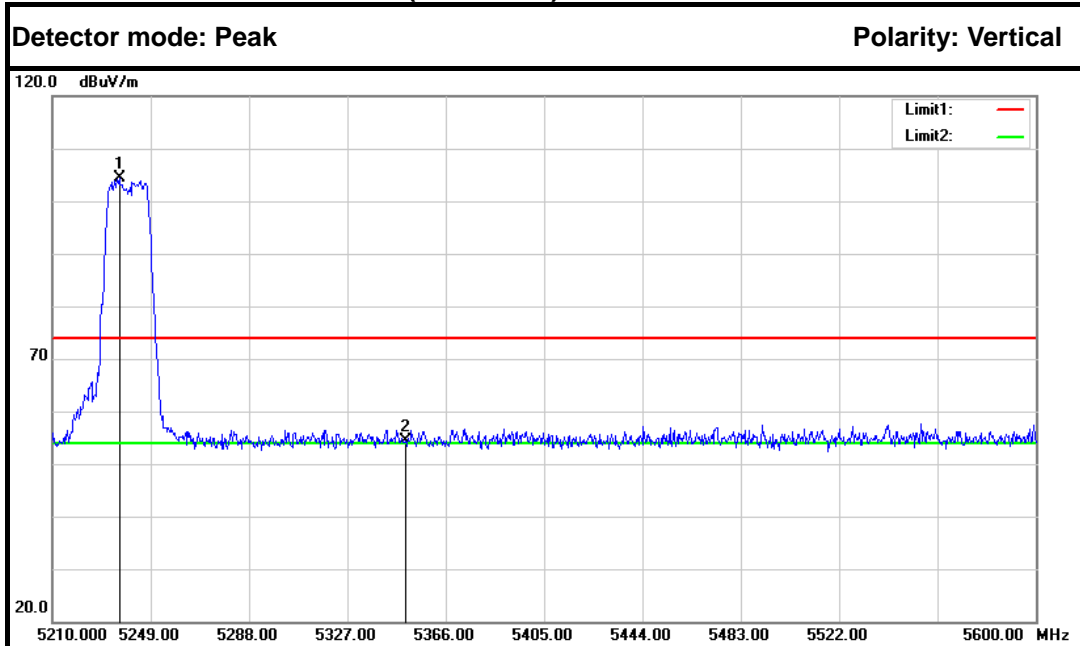
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5150.000	49.72	5.25	54.97	74.00	-19.03	Peak	Vertical
2	5176.630	99.93	5.29	105.22	---	---	Peak	Vertical
1	5150.000	39.74	5.25	44.99	54.00	-9.01	Average	Vertical
2	5183.020	89.83	5.31	95.14	---	---	Average	Vertical



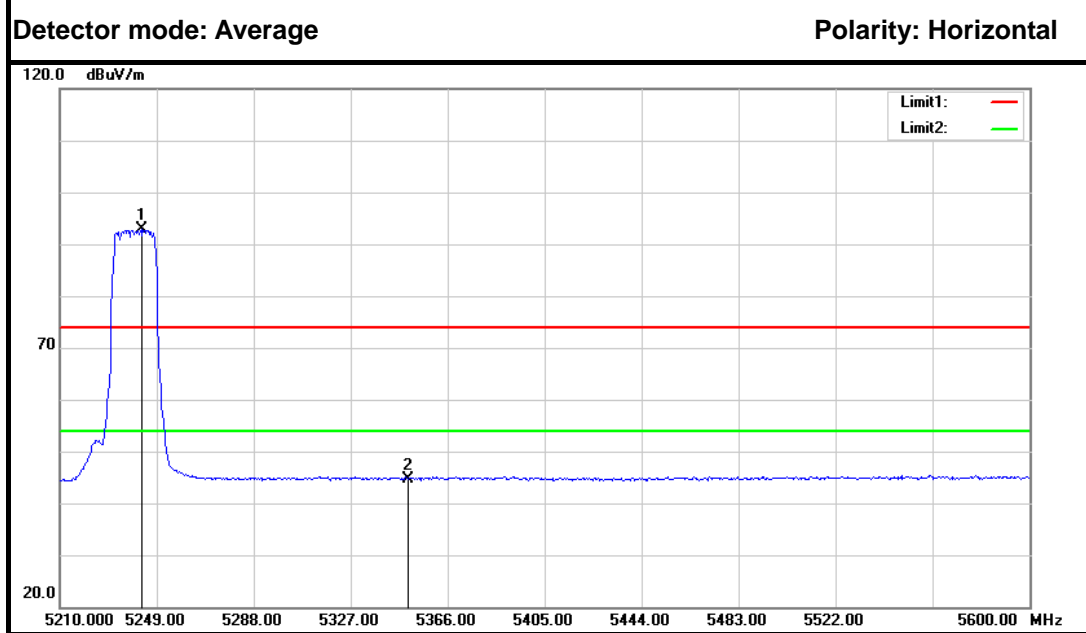
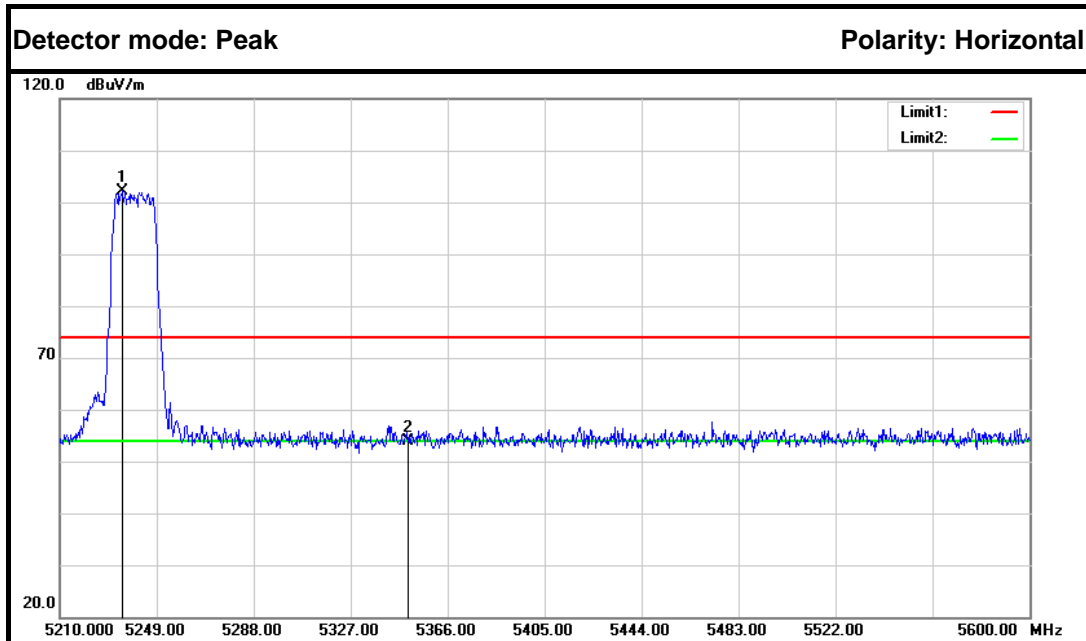
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5150.000	50.39	5.25	55.64	74.00	-18.36	Peak	Horizontal
2	5176.630	99.33	5.29	104.62	---	---	Peak	Horizontal
1	5150.000	39.92	5.25	45.17	54.00	-8.83	Average	Horizontal
2	5183.730	89.49	5.31	94.80	---	---	Average	Horizontal



IEEE 802.11a mode / 5240MHz (Antenna 1)



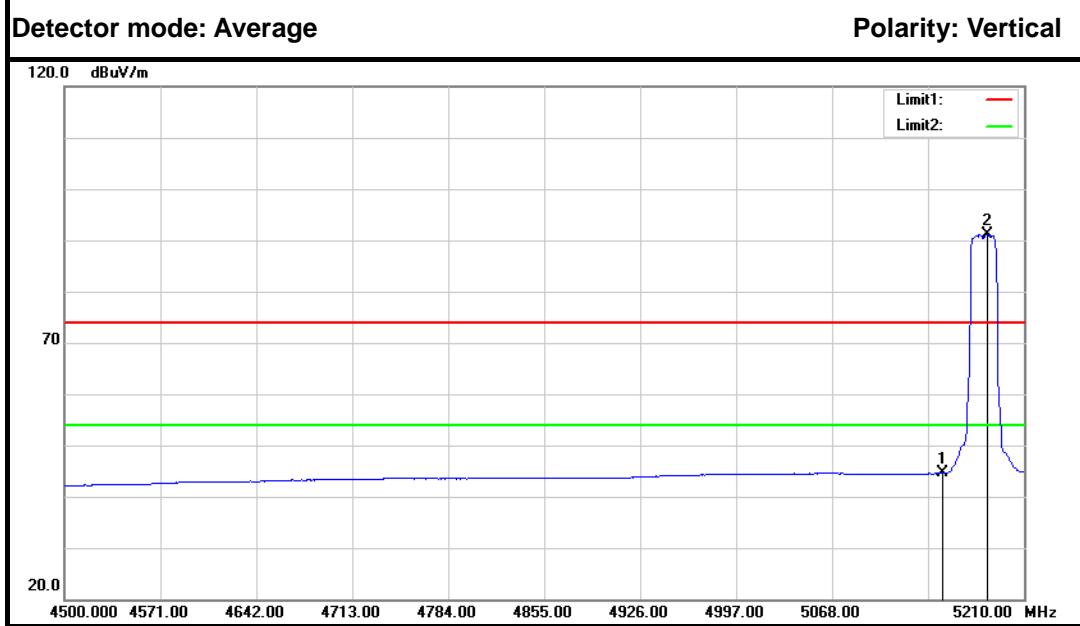
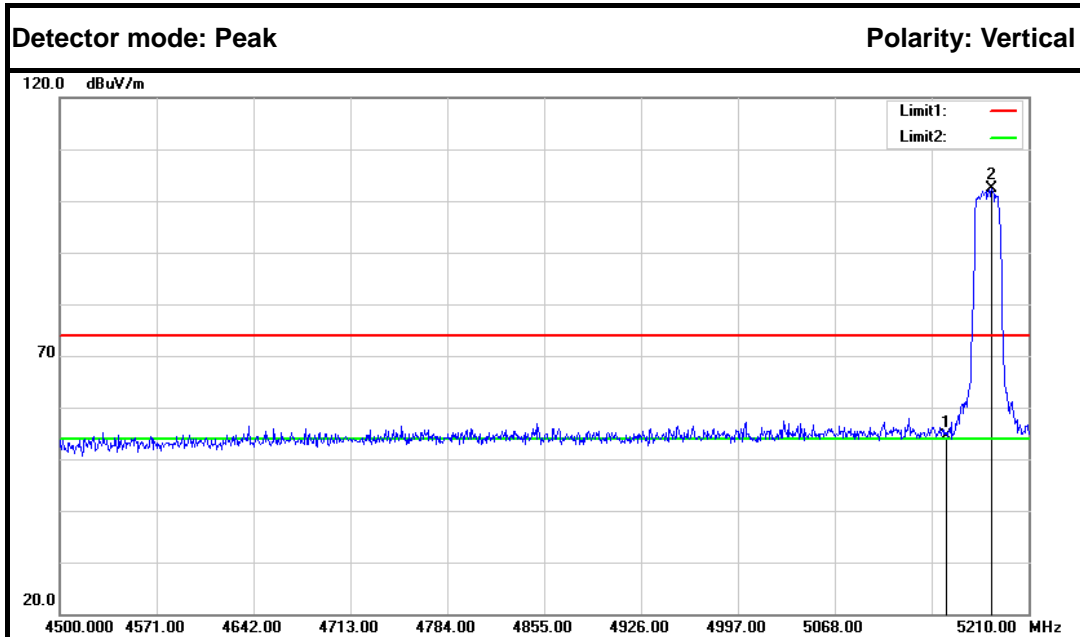
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5236.520	98.97	5.40	104.37	---	---	Peak	Vertical
2	5350.000	48.83	5.60	54.43	74.00	-19.57	Peak	Vertical
1	5242.760	89.05	5.41	94.46	---	---	Average	Vertical
2	5350.000	39.08	5.60	44.68	54.00	-9.32	Average	Vertical



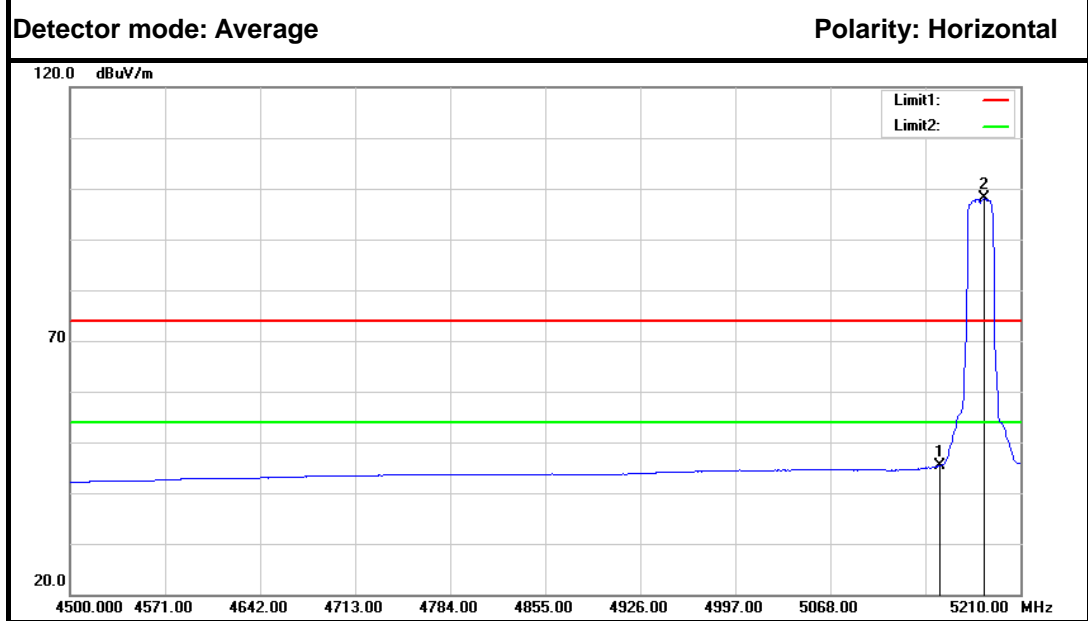
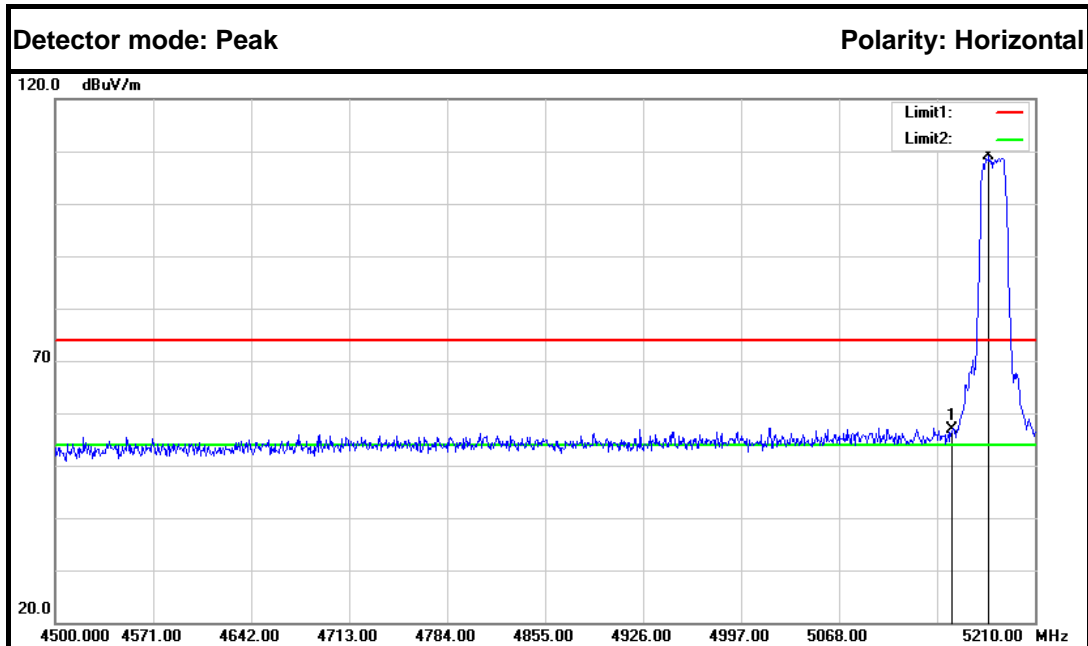
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5235.350	96.83	5.40	102.23	---	---	Peak	Horizontal
2	5350.000	48.28	5.60	53.88	74.00	-20.12	Peak	Horizontal
1	5242.760	87.42	5.41	92.83	---	---	Average	Horizontal
2	5350.000	39.10	5.60	44.70	54.00	-9.30	Average	Horizontal



Combine with Antenna 0 and Antenna 1
IEEE 802.11n HT 20 MHz mode / 5180 MHz



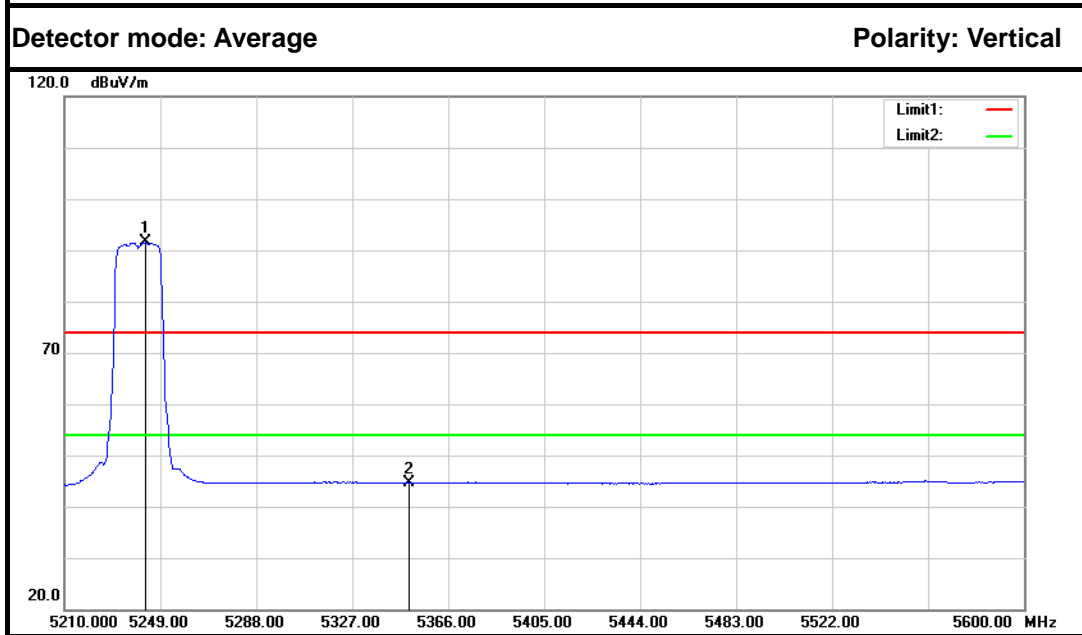
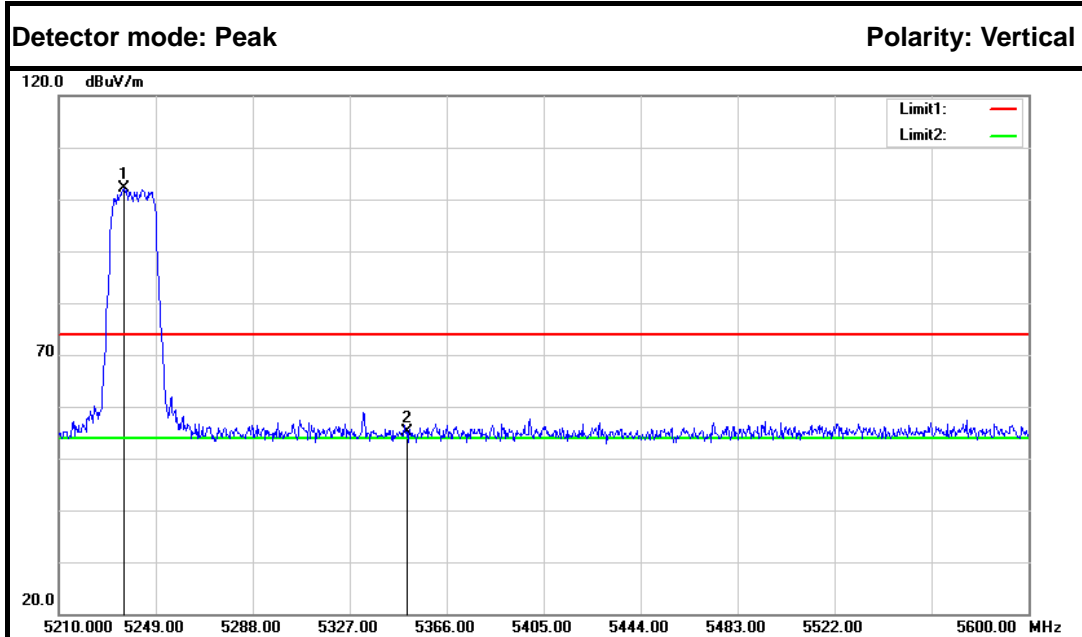
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5150.000	49.10	5.25	54.35	74.00	-19.65	Peak	Vertical
2	5183.020	97.09	5.31	102.40	---	---	Peak	Vertical
1	5150.000	39.34	5.25	44.59	54.00	-9.41	Average	Vertical
2	5183.020	85.83	5.31	91.14	---	---	Average	Vertical



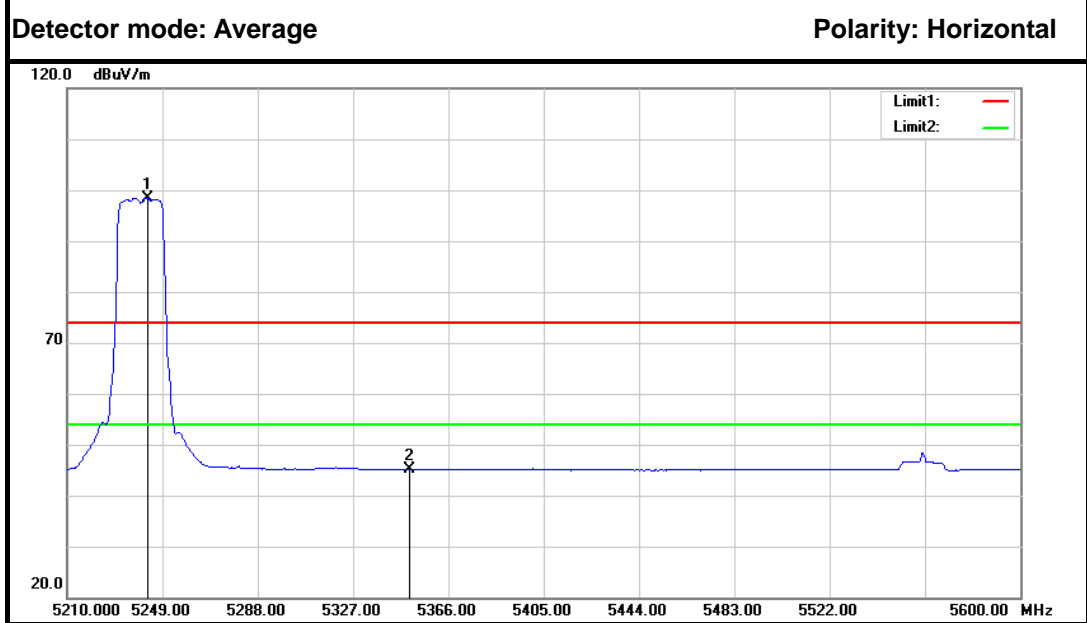
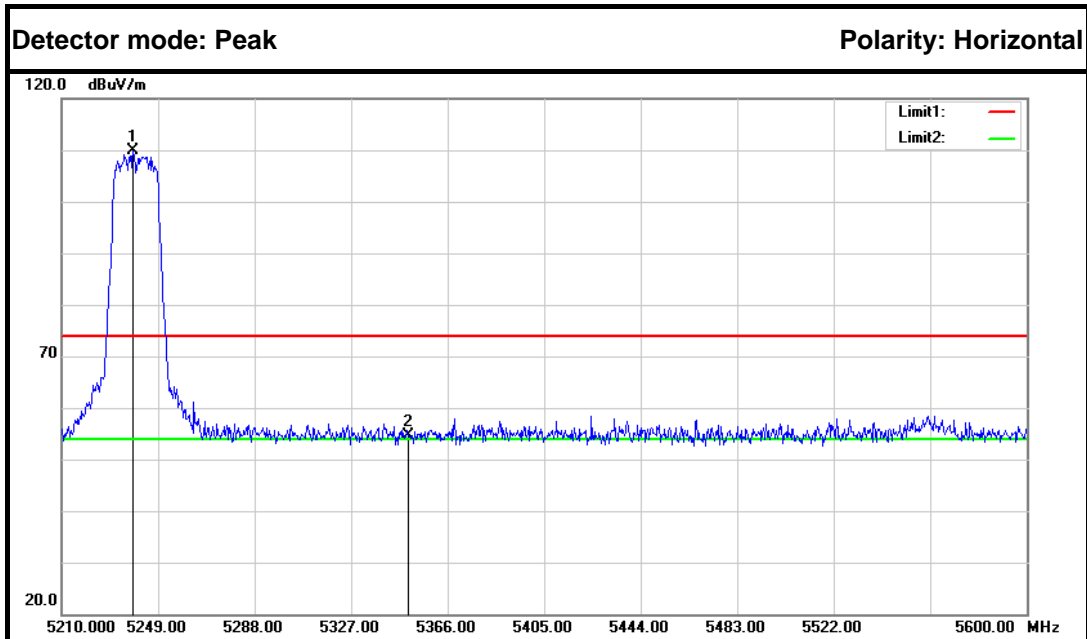
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5150.000	51.52	5.25	56.77	74.00	-17.23	Peak	Horizontal
2	5176.630	103.93	5.29	109.22	---	---	Peak	Horizontal
1	5150.000	40.15	5.25	45.40	54.00	-8.60	Average	Horizontal
2	5183.020	92.75	5.31	98.06	---	---	Average	Horizontal



IEEE 802.11n HT 20 MHz mode / 5240 MHz



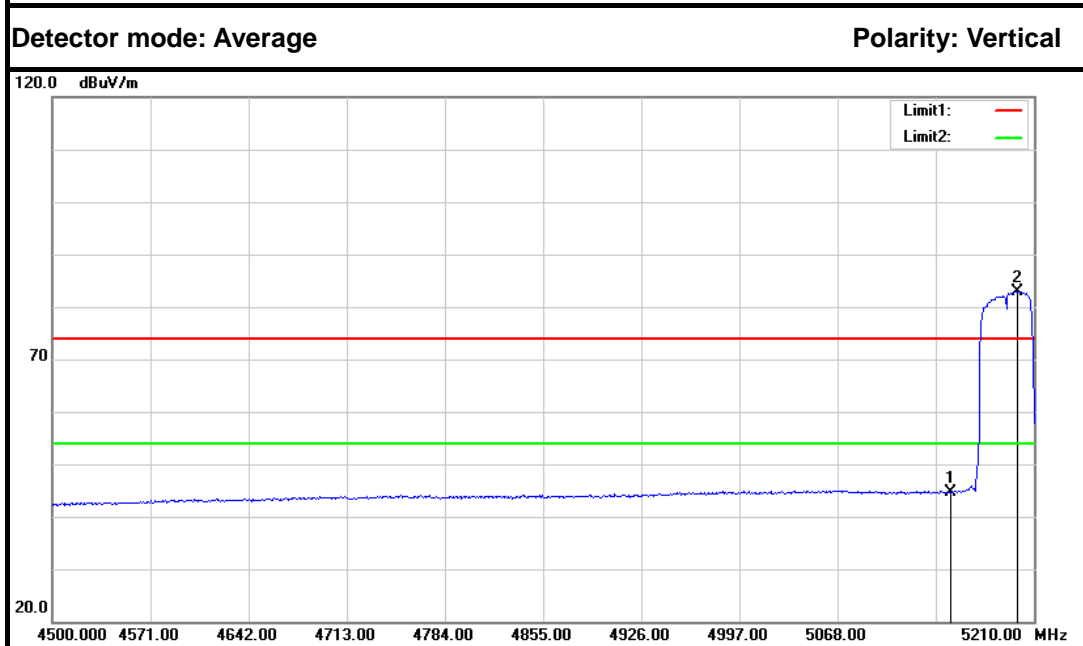
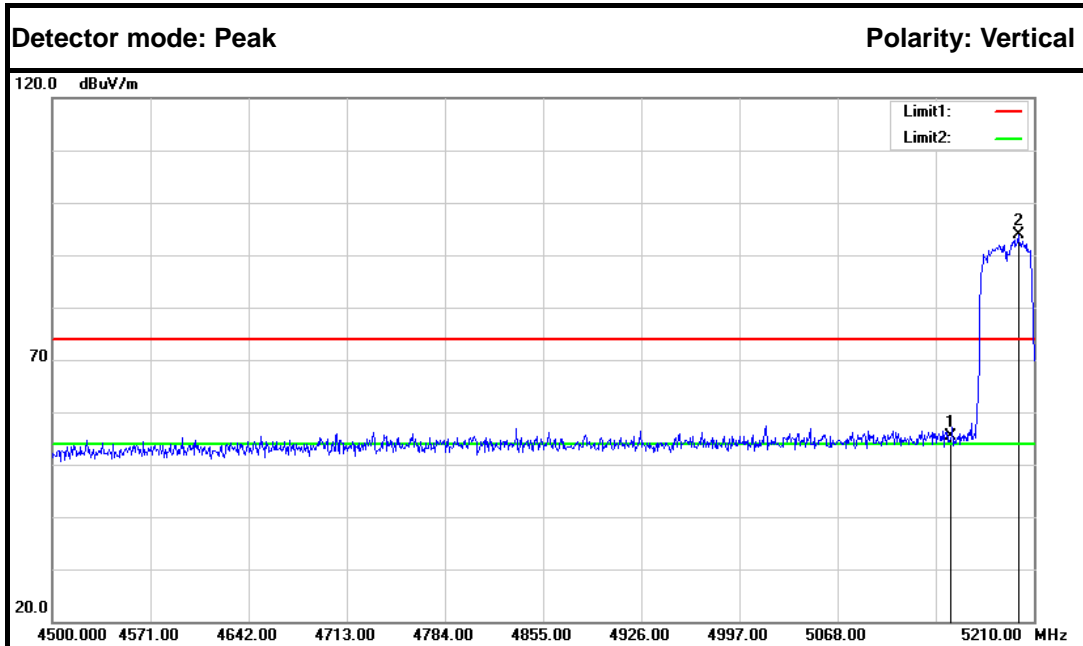
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5236.130	96.66	5.40	102.06	---	---	Peak	Vertical
2	5350.000	49.46	5.60	55.06	74.00	-18.94	Peak	Vertical
1	5243.150	86.14	5.41	91.55	---	---	Average	Vertical
2	5350.000	39.10	5.60	44.70	54.00	-9.30	Average	Vertical



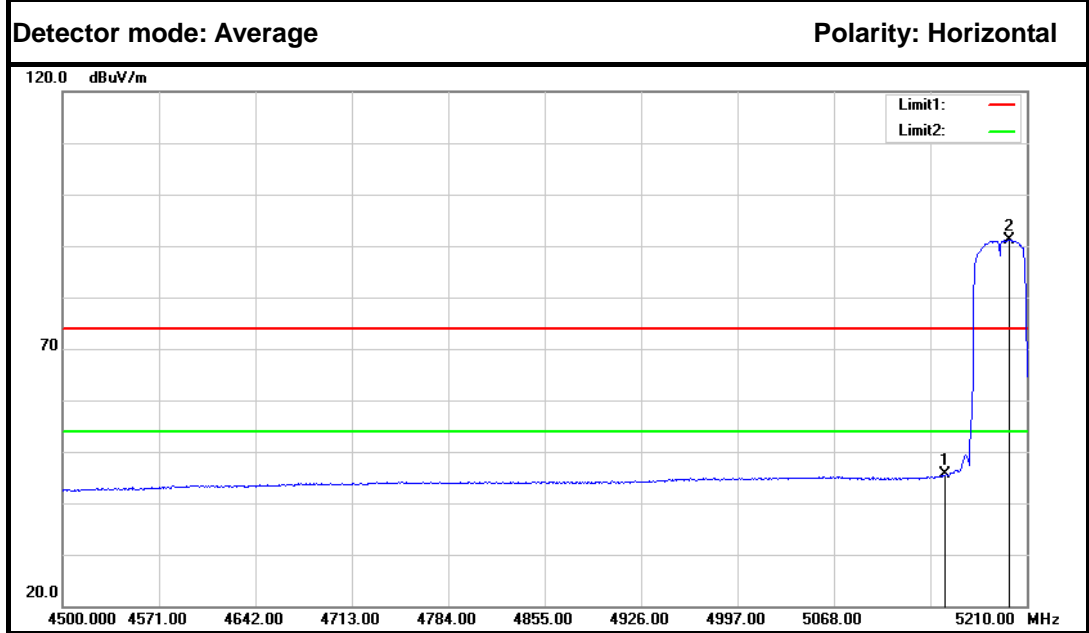
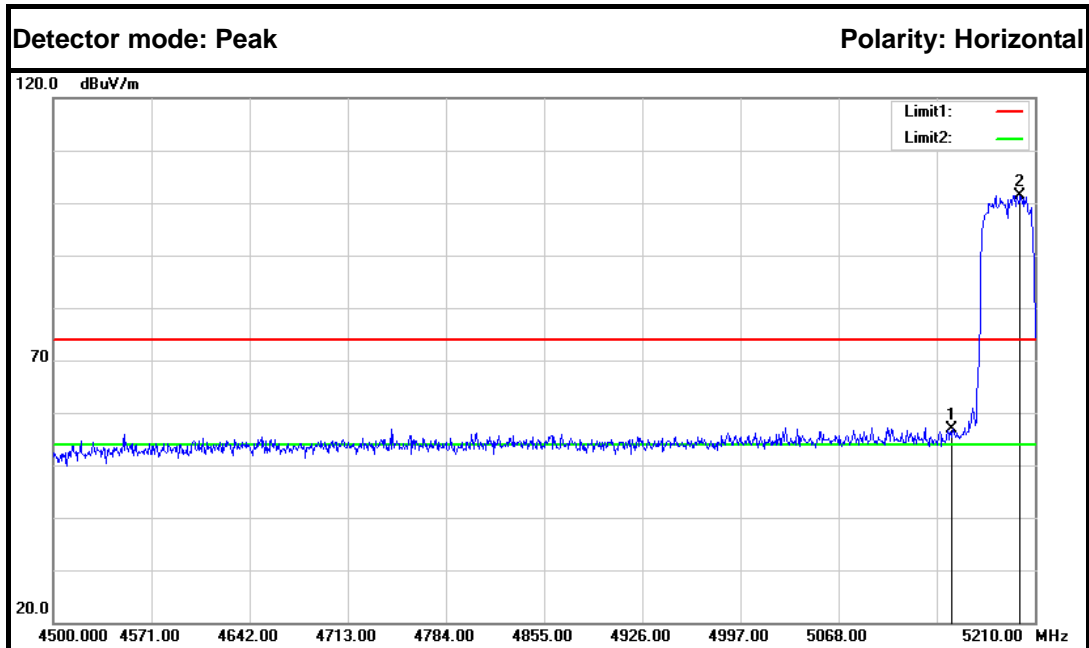
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5238.860	104.43	5.41	109.84	---	---	Peak	Horizontal
2	5350.000	49.09	5.60	54.69	74.00	-19.31	Peak	Horizontal
1	5243.150	92.99	5.41	98.40	---	---	Average	Horizontal
2	5350.000	39.57	5.60	45.17	54.00	-8.83	Average	Horizontal



IEEE 802.11n HT 40 MHz mode / 5190 MHz



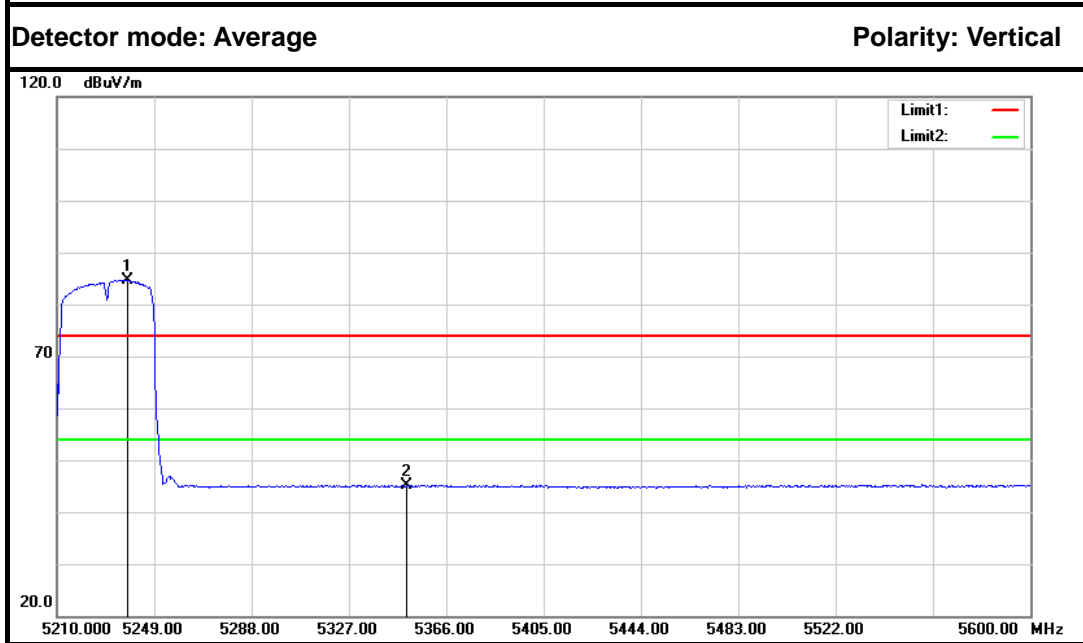
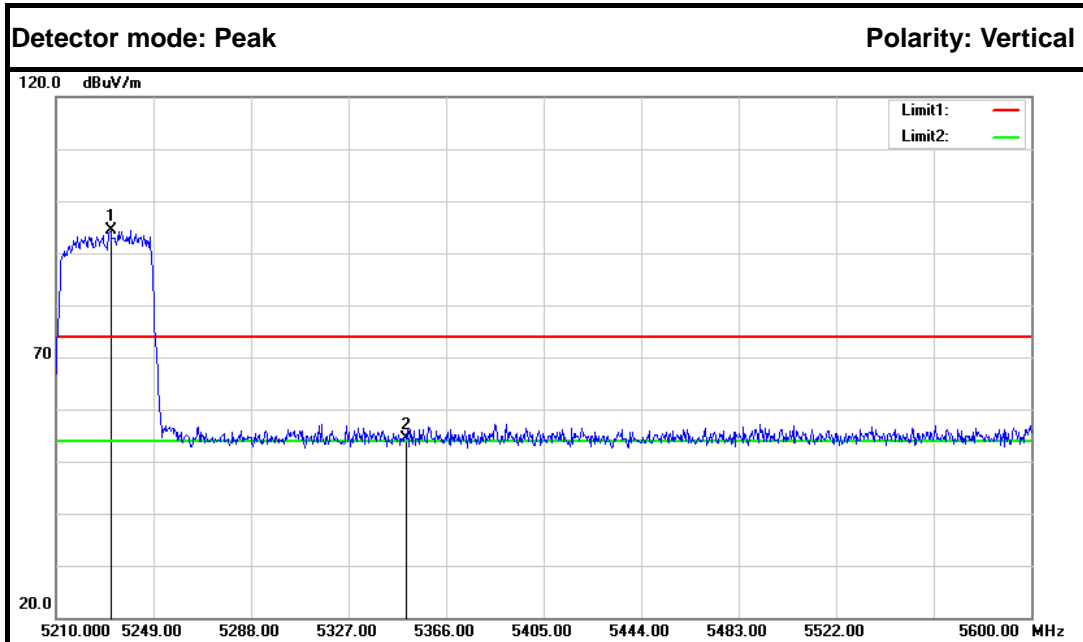
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5150.000	50.02	5.25	55.27	74.00	-18.73	Peak	Vertical
2	5198.640	88.57	5.33	93.90	---	---	Peak	Vertical
1	5150.000	39.35	5.25	44.60	54.00	-9.40	Average	Vertical
2	5197.930	77.64	5.33	82.97	---	---	Average	Vertical



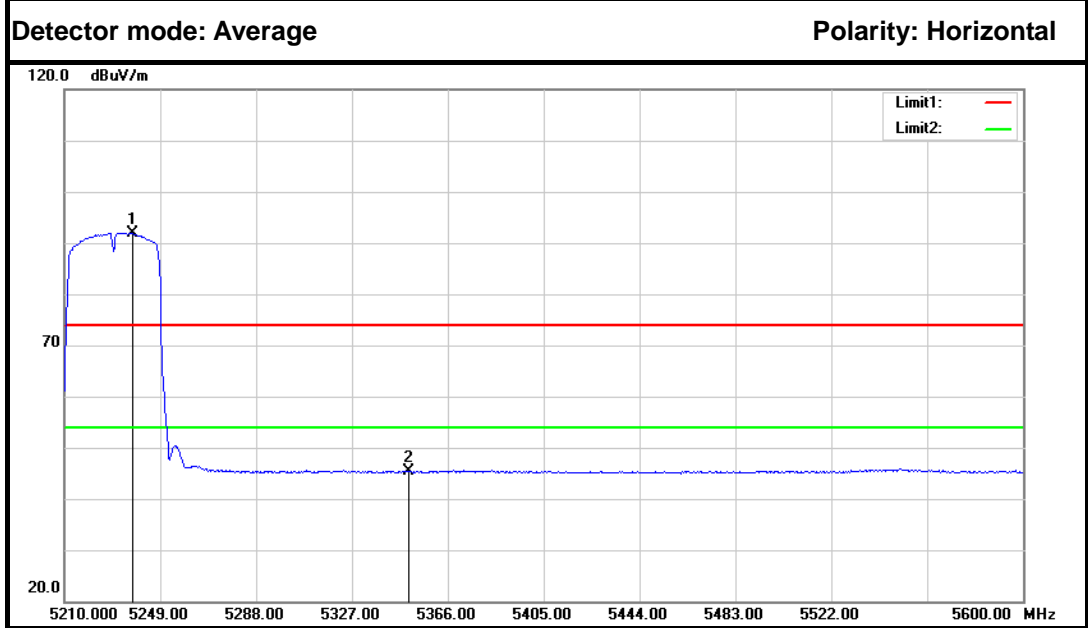
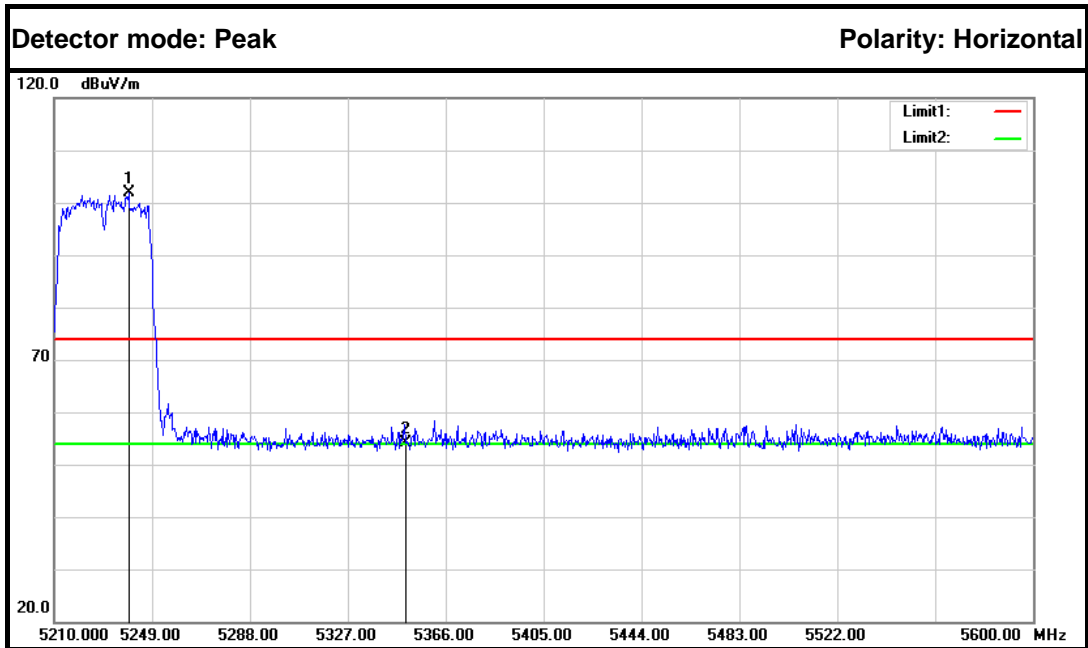
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5150.000	51.53	5.25	56.78	74.00	-17.22	Peak	Horizontal
2	5199.350	96.12	5.33	101.45	---	---	Peak	Horizontal
1	5150.000	40.27	5.25	45.52	54.00	-8.48	Average	Horizontal
2	5197.220	85.82	5.33	91.15	---	---	Average	Horizontal



IEEE 802.11n HT 40 MHz mode / 5230 MHz



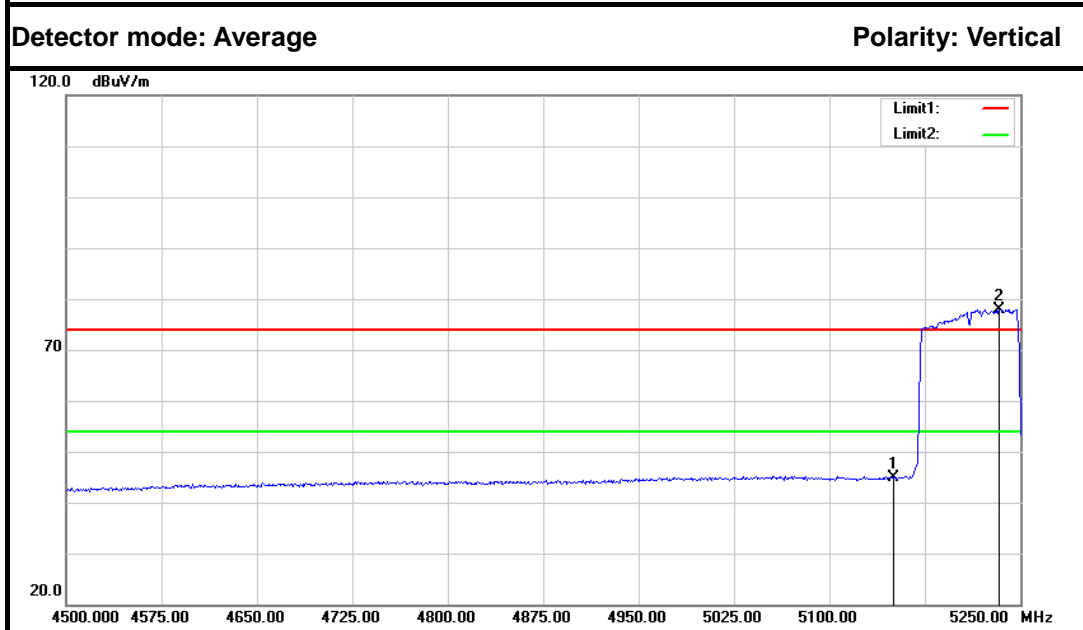
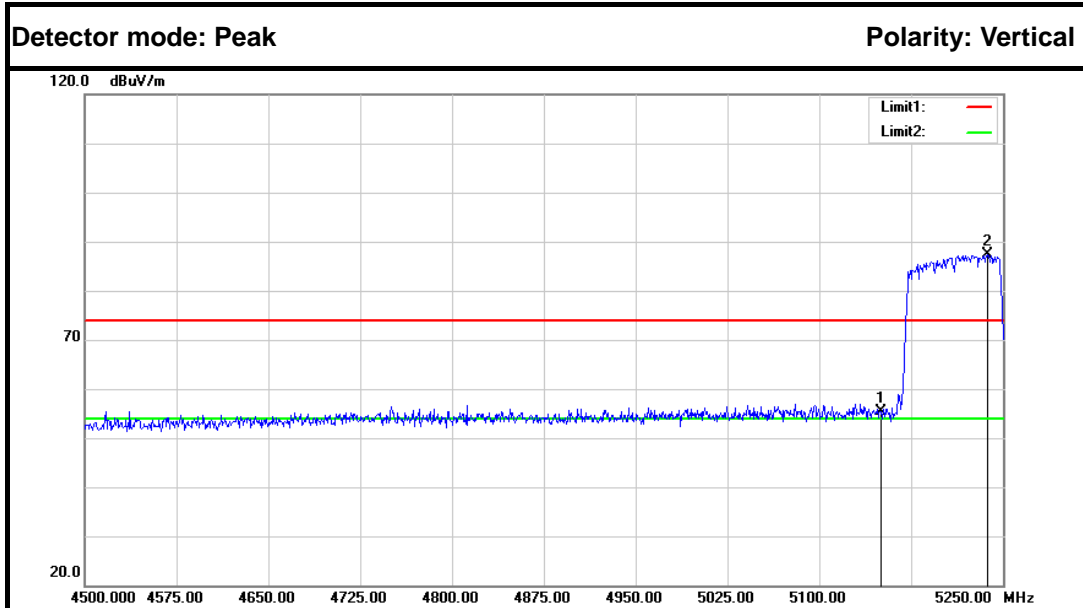
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5231.840	88.96	5.39	94.35	---	---	Peak	Vertical
2	5350.000	48.71	5.60	54.31	74.00	-19.69	Peak	Vertical
1	5238.080	79.30	5.40	84.70	---	---	Average	Vertical
2	5350.000	39.44	5.60	45.04	54.00	-8.96	Average	Vertical



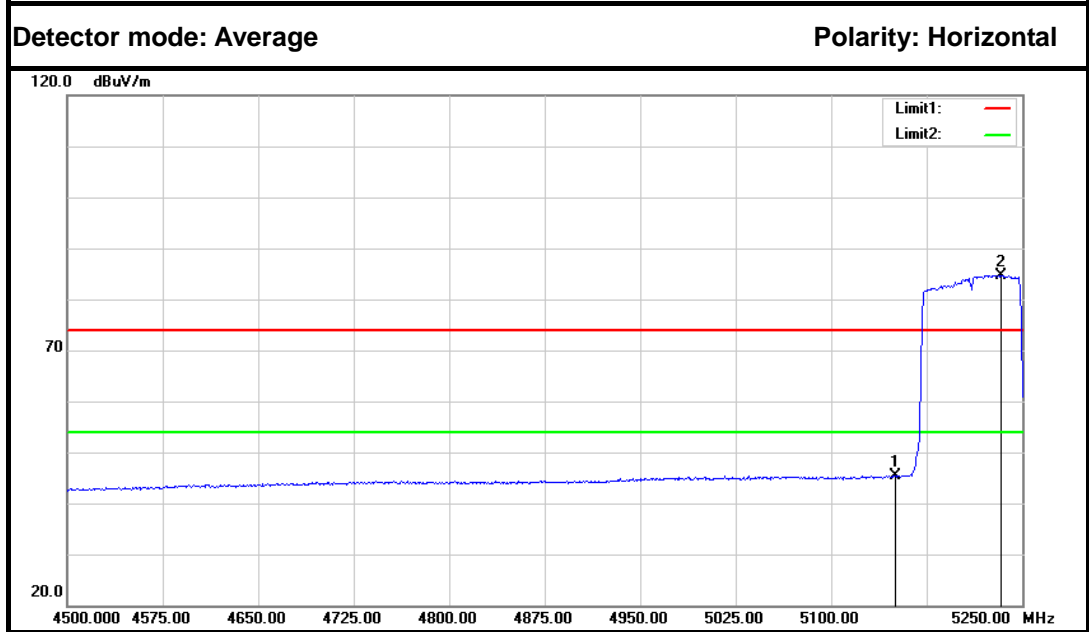
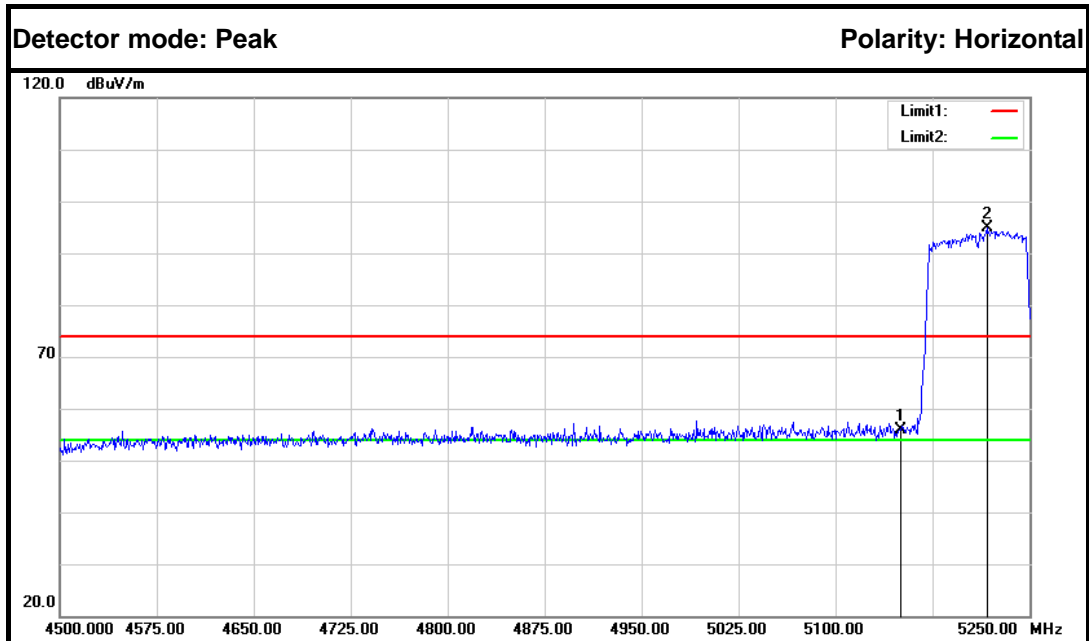
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5239.640	96.44	5.41	101.85	---	---	Peak	Horizontal
2	5350.000	48.43	5.60	54.03	74.00	-19.97	Peak	Horizontal
1	5237.690	86.50	5.40	91.90	---	---	Average	Horizontal
2	5350.000	39.78	5.60	45.38	54.00	-8.62	Average	Horizontal



IEEE 802.11ac 80 mode / 5210 MHz



No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5150.000	50.12	5.25	55.37	74.00	-18.63	Peak	Vertical
2	5237.250	81.99	5.40	87.39	---	---	Peak	Vertical
1	5150.000	39.73	5.25	44.98	54.00	-9.02	Average	Vertical
2	5233.500	72.57	5.40	77.97	---	---	Average	Vertical



No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5150.000	50.57	5.25	55.82	74.00	-18.18	Peak	Horizontal
2	5217.000	89.49	5.37	94.86	---	---	Peak	Horizontal
1	5150.000	40.04	5.25	45.29	54.00	-8.71	Average	Horizontal
2	5233.500	79.34	5.40	84.74	---	---	Average	Horizontal



6.7. PEAK POWER SPECTRAL DENSITY

LIMIT

According to RSS-247 §6.2,

- (1) For the band 5150-5250 MHz, the e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.
- (2) For the band 5250-5350 MHz and 5470-5725 MHz, the power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
- (3) For the band 5725-5850 MHz, the power spectral density shall not exceed 30 dBm in any 500 kHz band.

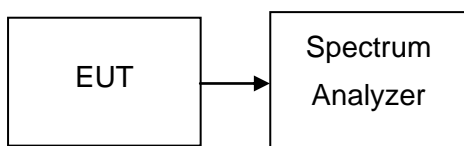
If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmits power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2017	02/20/2018
Cable	HuberSuhner	SUCOFLEX104PEA	N/A	N/A	N/A

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

TEST CONFIGURATION



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 >26dB bandwidth, Sweep=1ms
3. For devices operating in the bands 5.725-5.85 GHz, Set the spectrum analyzer as RBW = 1MHz, VBW = 3MHz, Span >26dB bandwidth, Sweep=1ms
4. Record the max. reading.
5. Repeat the above procedure until the measurements for all frequencies are completed



TEST RESULTS

No non-compliance noted

Test Data

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

Channel	Frequency (MHz)	PPSD (dBm)		Antenna Gain (dBi)		PPSD (dBm)		Limit (dBm)	Margin		Result
		Antenna 0	Antenna 1	1	2	Antenna 0	Antenna 1		Antenna 0	Antenna 1	
Low	5180	6.661	6.528	3.00	3.00	9.661	9.528	10	-0.339	-0.472	PASS
Mid	5200	5.816	5.854			8.816	8.854		-1.184	-1.146	PASS
High	5240	5.018	5.277			8.018	8.277		-1.982	-1.723	PASS

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

Channel	Frequency (MHz)	PPSD (dBm)		Antenna Gain (dBi)		Array Antenna Gain(dBi)	Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 0	Antenna 1	0	1					
Low	5180	0.095	0.132	3.00	3.00	3.00	9.124	10.00	-0.876	PASS
Mid	5200	0.331	0.053				9.205		-0.795	PASS
High	5240	0.053	0.359				9.219		-0.781	PASS

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

Channel	Frequency (MHz)	PPSD (dBm)		Antenna Gain (dBi)		Array Antenna Gain(dBi)	Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 0	Antenna 1	0	1					
Low	5190	0.270	-0.122	3.00	3.00	3.00	9.089	10.00	-0.911	PASS
High	5230	0.250	-0.250				9.017		-0.983	PASS

Test mode: IEEE 802.11ac 80 mode / 5210MHz

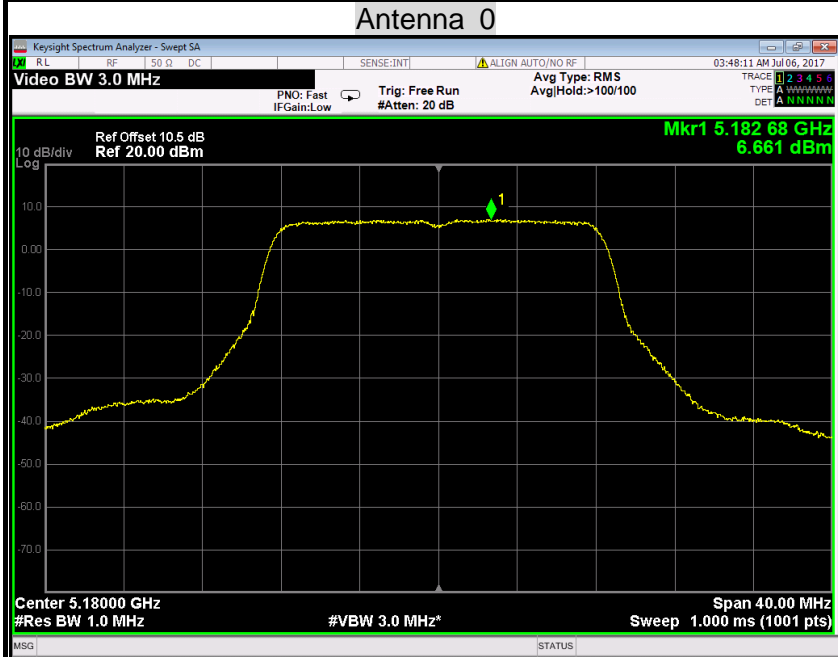
Channel	Frequency (MHz)	PPSD (dBm)		Antenna Gain (dBi)		Array Antenna Gain(dBi)	Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 0	Antenna 1	0	1					
	5210	0.102	-0.926	3.00	3.00	3.00	8.629	10.00	-1.371	PASS



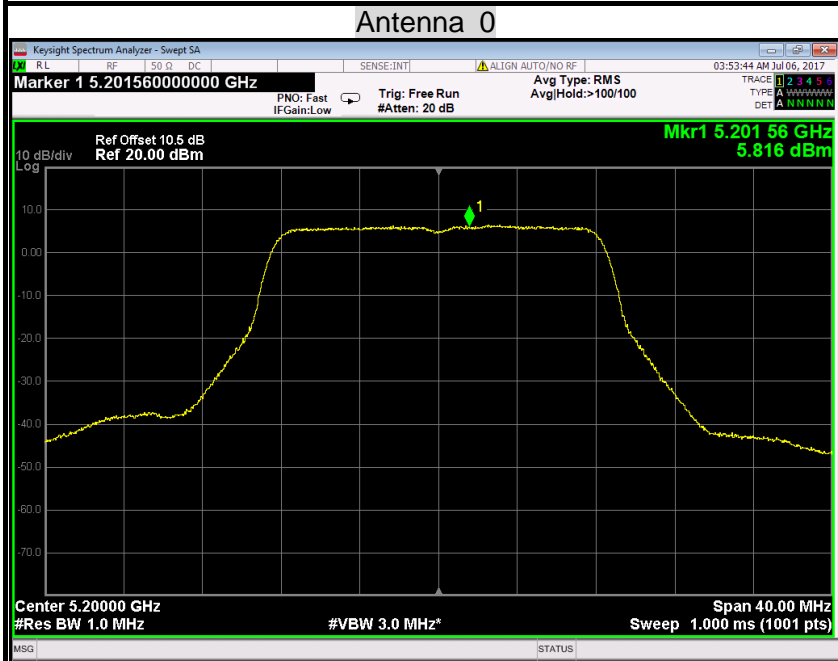
Test Plot

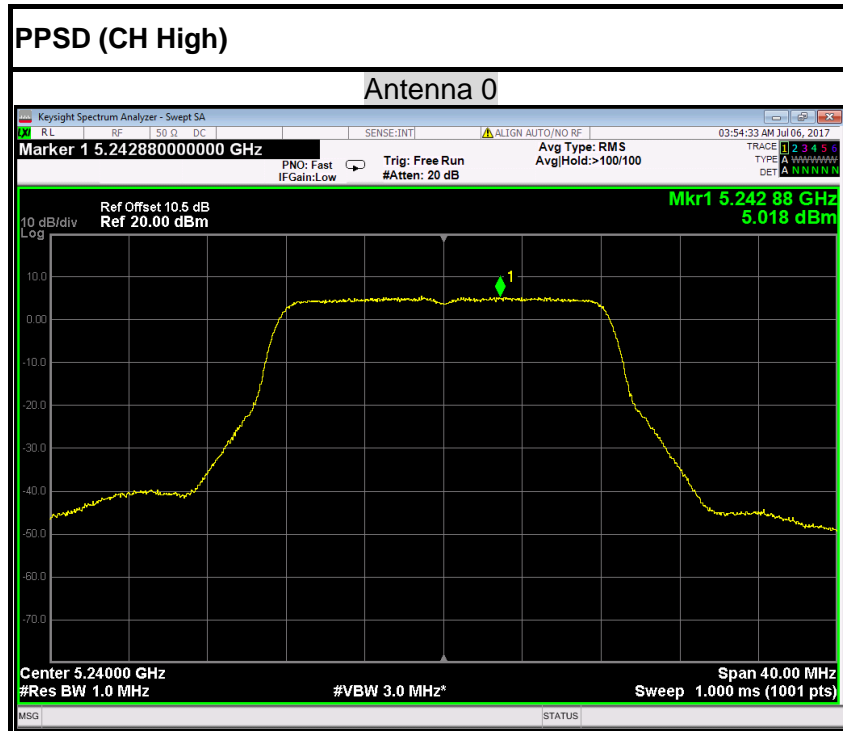
IEEE 802.11a mode / 5180 ~ 5240MHz

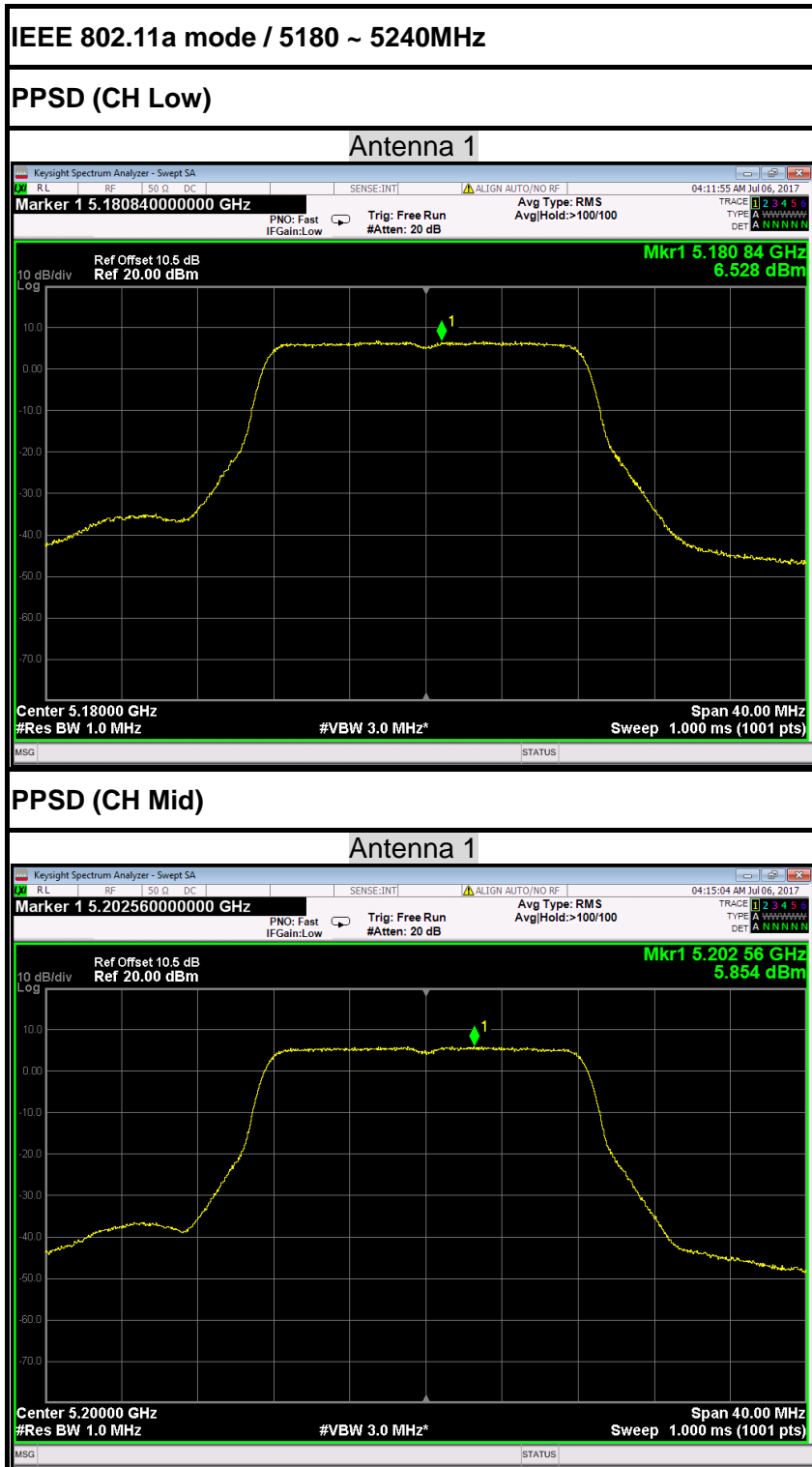
PPSD (CH Low)

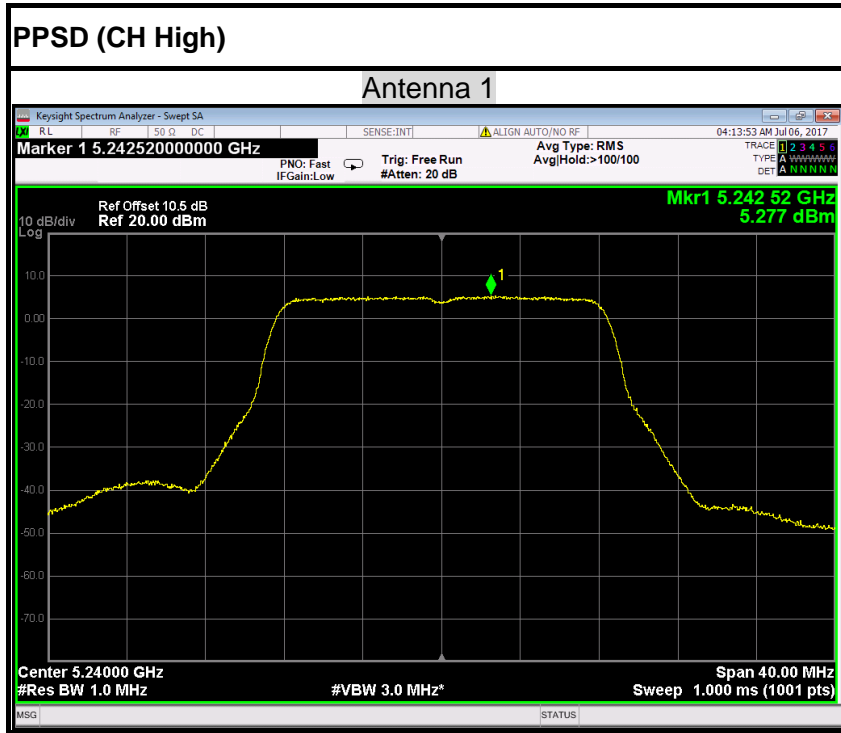


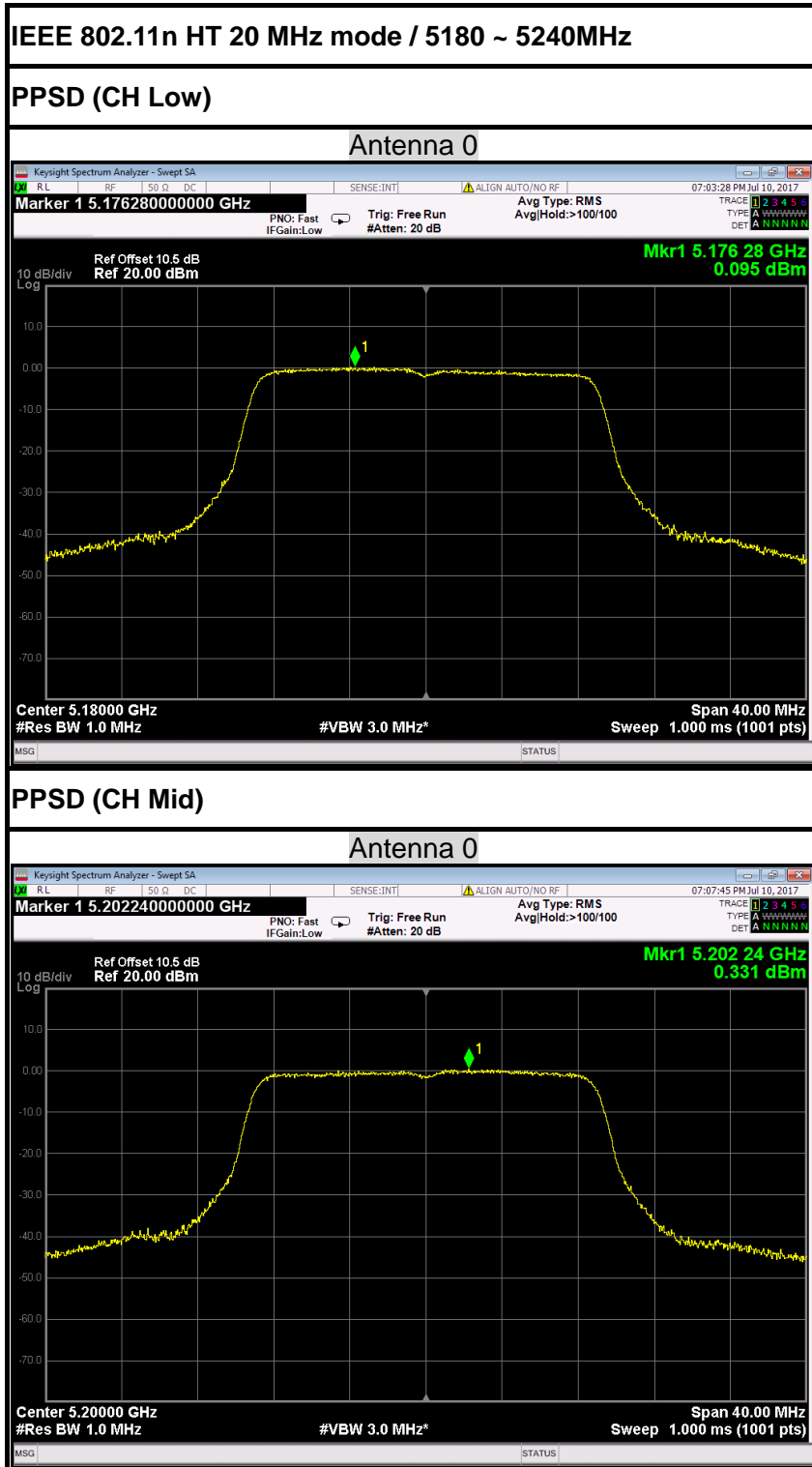
PPSD (CH Mid)

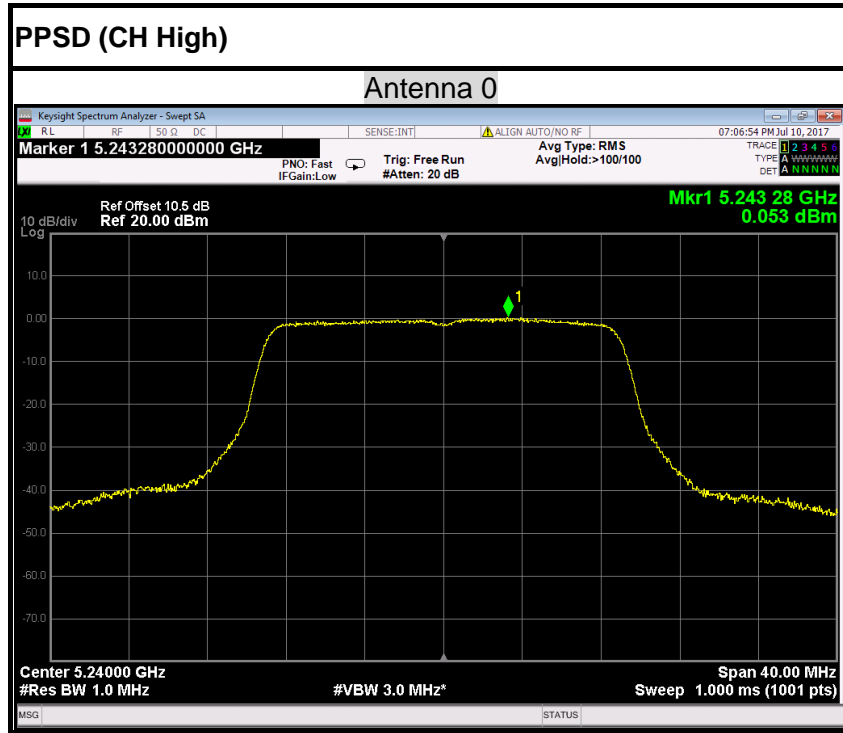


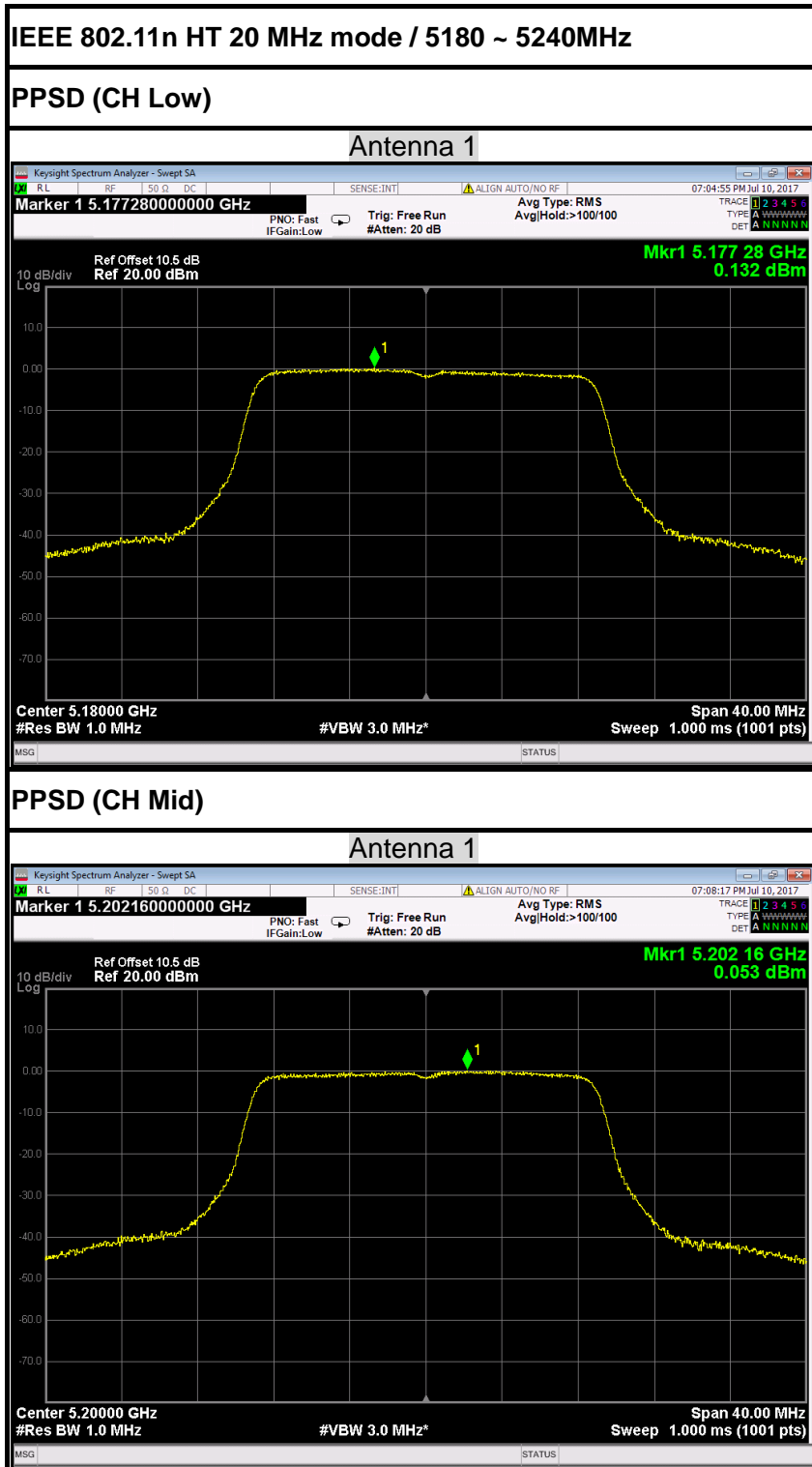


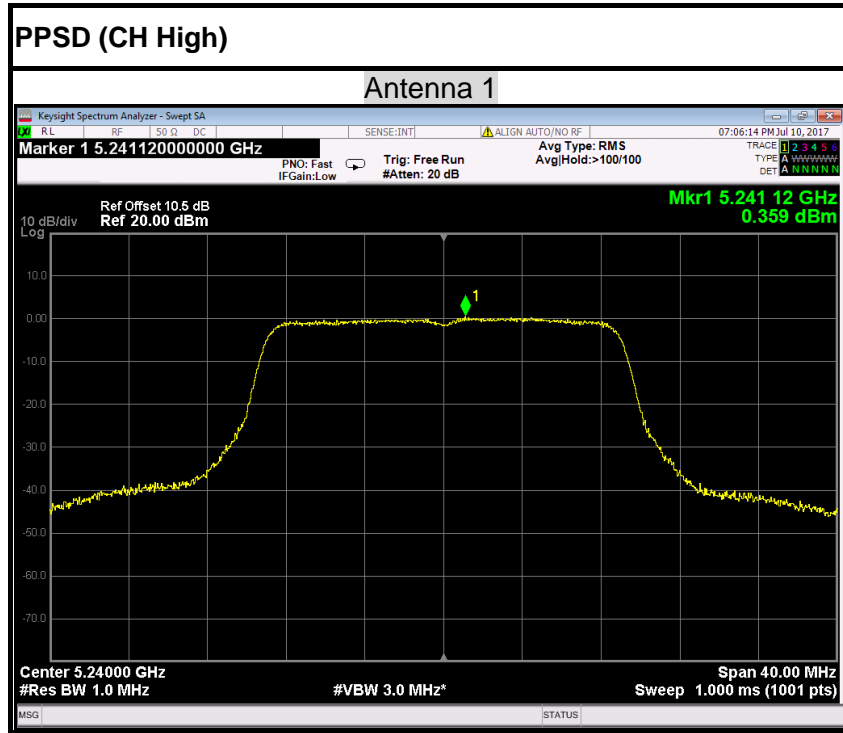


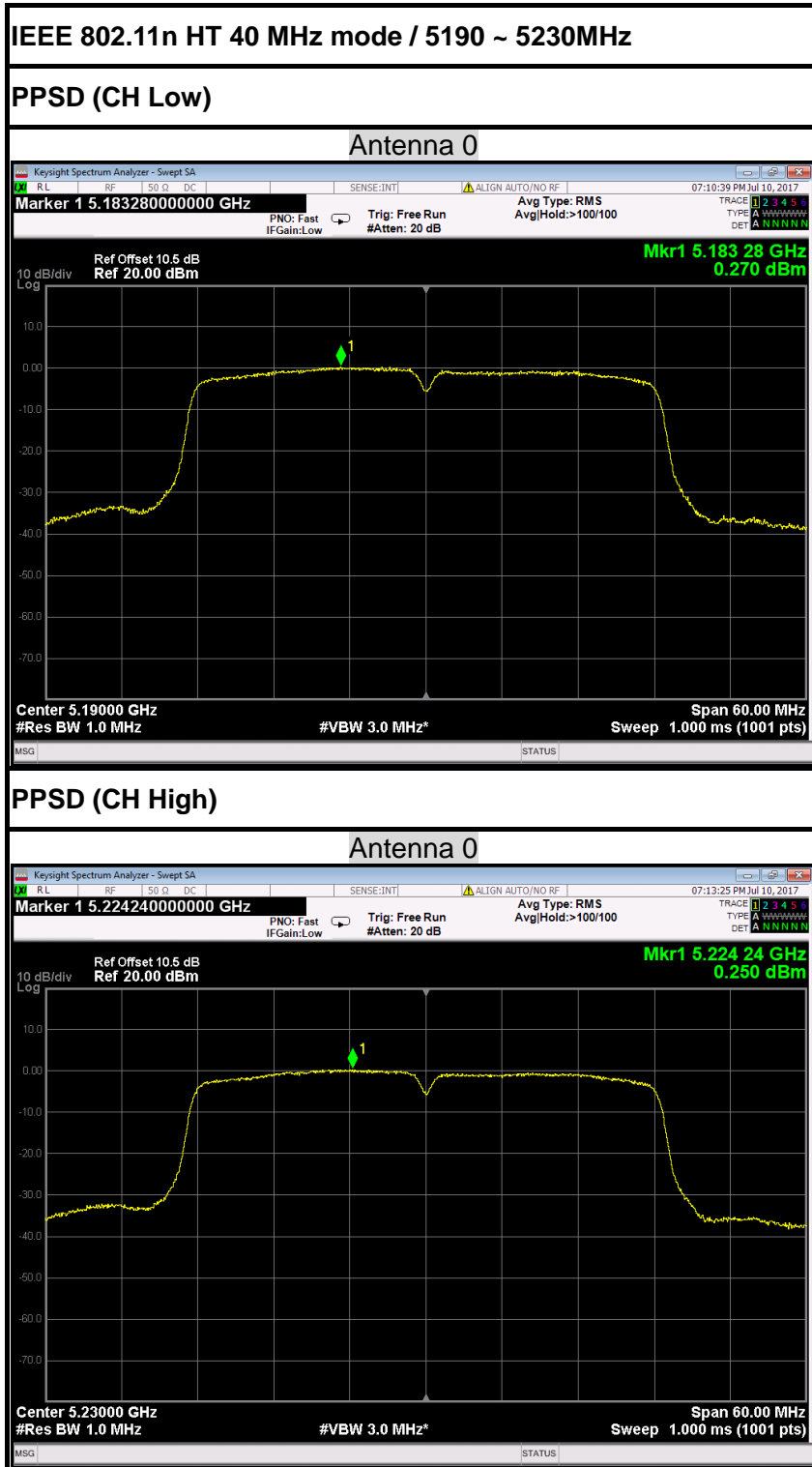


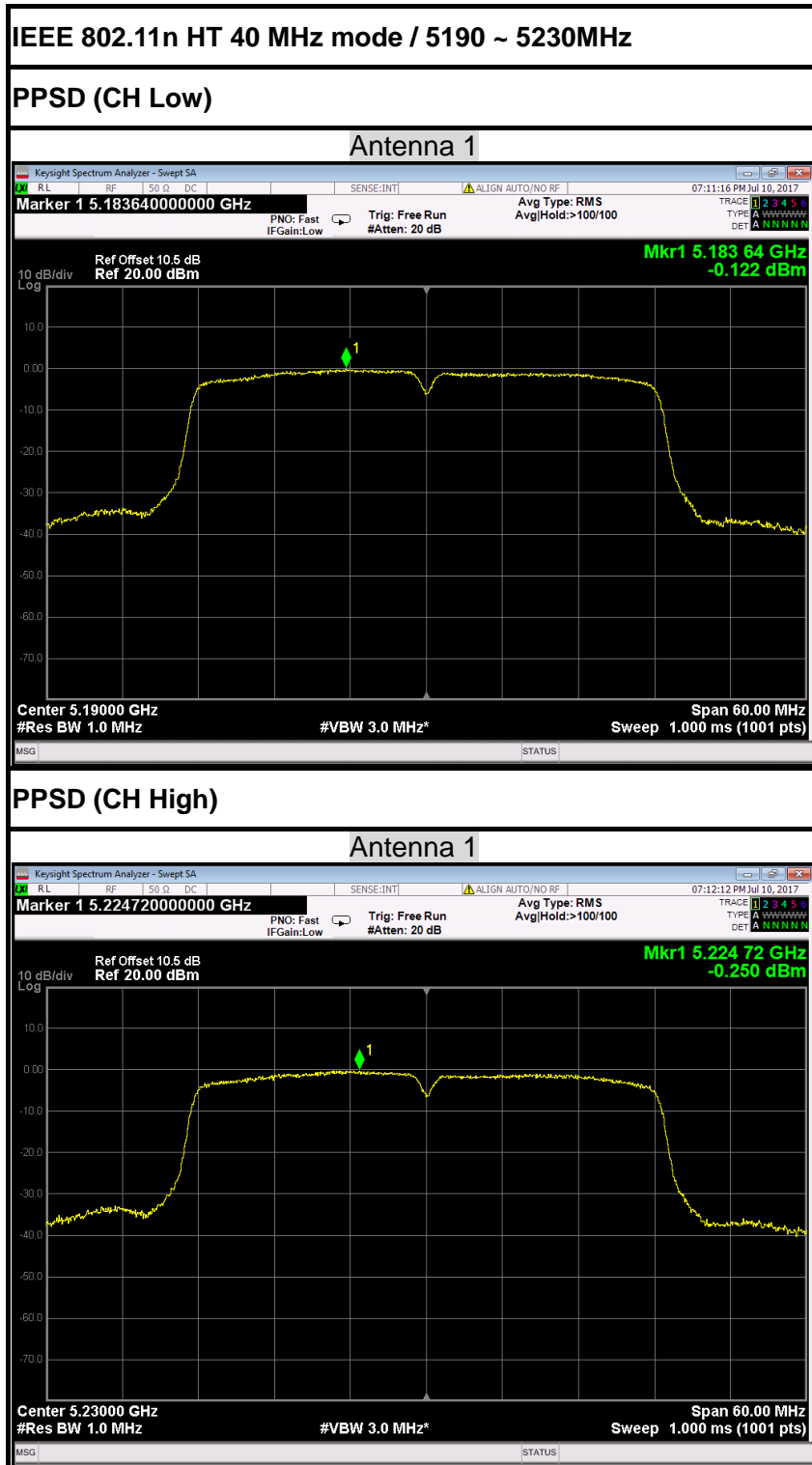


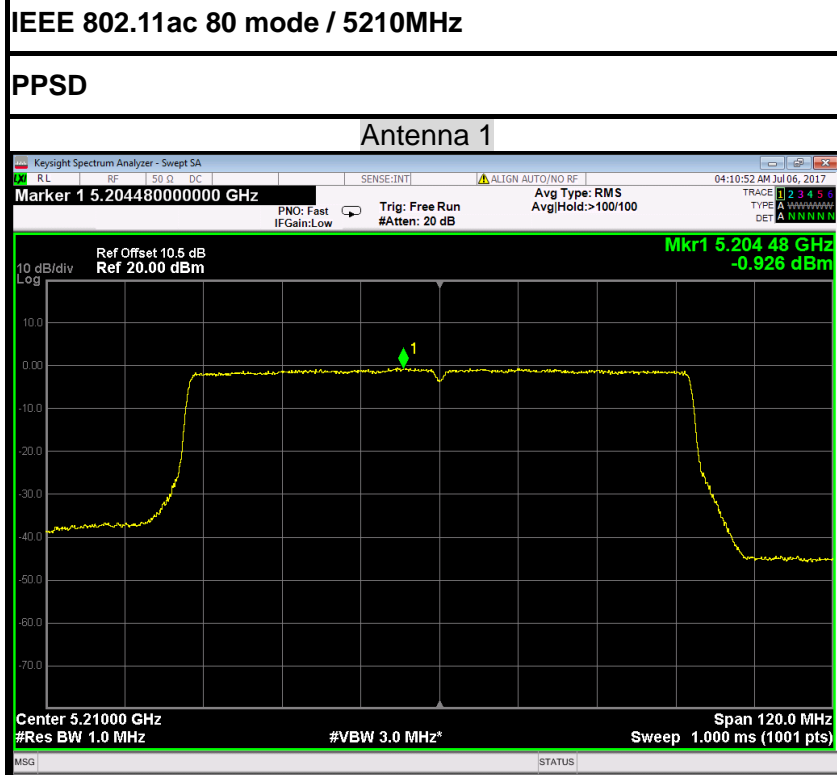
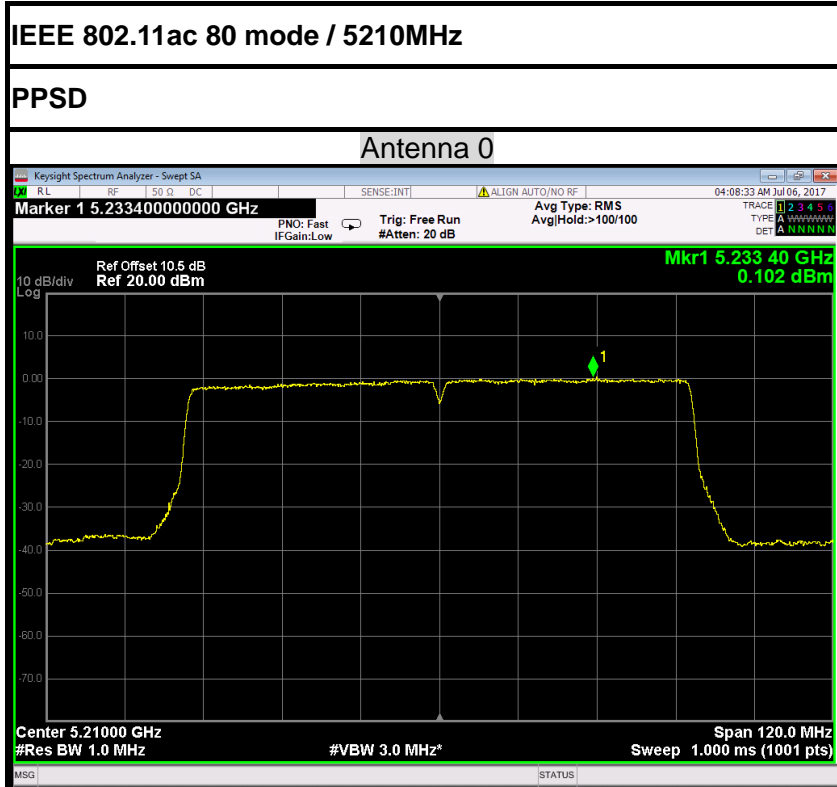














6.8. SPURIOUS EMISSIONS MEASUREMENT

6.8.1. CONDUCTED EMISSIONS MEASUREMENT

6.8.1.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

According to RSS-247 §5.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

6.8.1.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2017	02/20/2018
Cable	HuberSuhner	SUCOFLEX104PEA	N/A	N/A	N/A

6.8.1.3. TEST PROCEDURE (please refer to measurement standard)

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 1MHz. The video bandwidth is set to 3MHz.

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

6.8.1.4. TEST RESULTS

No non-compliance noted

Not applicable, since the EUT only has Band I.



6.8.2. RADIATED EMISSIONS MEASUREMENT

6.8.2.1. LIMITS OF RADIATED EMISSIONS MEASUREMENT

All spurious emissions shall comply with the limits of RSS-Gen Table 2&5&6.
Table 2: Radiated Limits of Receiver Spurious Emissions

Frequency (MHz)	Field Strength (microvolts/m at 3 meters)*
30-88	100
88-216	150
216-960	200
Above 960	500

Note: *Measurements for compliance with limits in the above table may be performed at distances other than 3 metres, in accordance with Section 7.2.7

Table 5: General Field Strength Limits for Transmitters at Frequencies Above 30 MHz

Frequency (MHz)	Field Strength (microvolts/m at 3 meters)*
30-88	100
88-216	150
216-960	200
Above 960	500

Note: Transmitting devices are not permitted in restricted frequency bands or, unless stated otherwise, in TV bands (54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz and 614-806 MHz)

Table 6: General Field Strength Limits for Transmitters at Frequencies Below 30 MHz (Transmit)

Frequency (MHz)	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
0.009-0.490	2,400/F (F in kHz)	2,400/377F (F in kHz)	300
0.490-1.705	24,000/F (F in kHz)	24,000/377F (F in kHz)	30
1.705-30.0	30	N/A	30

Note: The emission limits for the bands 9-90 kHz and 110-490 kHz are based on measurements employing an average detector.



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

Frequency (MHz)	Field Strength ($\mu\text{V}/\text{m}$ at 3-meter)	Field Strength ($\text{dB}\mu\text{V}/\text{m}$ at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

- NOTE:** (1) The lower limit shall apply at the transition frequencies.
(2) Emission level ($\text{dB}\mu\text{V}/\text{m}$) = $20 \log$ Emission level ($\mu\text{V}/\text{m}$).



6.8.2.2. 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	N9010A	MY52221469	02/21/2017	02/20/2018
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	02/21/2017	02/20/2018
Amplifier	EMEC	EM330	060661	03/18/2017	03/17/2018
High Noise Amplifier	Agilent	8449B	3008A01838	02/21/2017	02/20/2018
Loop Antenna	COM-POWER	AL-130	121044	09/25/2016	09/24/2017
Bilog Antenna	SCHAFFNER	CBL6143	5082	02/21/2017	02/20/2018
Horn Antenna	SCHWARZBECK	BBHA9120	D286	02/27/2017	02/27/2018
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	02/27/2017	02/27/2018
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	02/21/2017	02/20/2018
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The FCC Site Registration number is 101879.
3. N.C.R = No Calibration Required.



6.8.2.3. 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

6.8.2.4. TEST PROCEDURE (please refer to measurement standard)

1) Sequence of testing 9 kHz to 30 MHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.
- If the EUT is a floor standing device, it is placed on the ground.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Pre measurement:

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 0.8 meter.
- At each turntable position the analyzer sweeps with peak detection to find the



maximum of all emissions

Final measurement:

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

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

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

2) Sequence of testing 30 MHz to 1 GHz

Setup:

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

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

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

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

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

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Pre measurement:

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

--- The antenna is polarized vertical and horizontal.

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

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



Final measurement:

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ($\pm 45^\circ$) and antenna movement between 1 and 4 meter.
- The final measurement will be done with QP detector with an EMI receiver.
- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing 1 GHz to 18 GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Pre measurement:

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 2.5 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.



Final measurement:

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

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

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

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

4) Sequence of testing above 18 GHz

Setup:

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

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

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

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

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

--- The measurement distance is 1 meter.

--- The EUT was set into operation.

Pre measurement:

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

Final measurement:

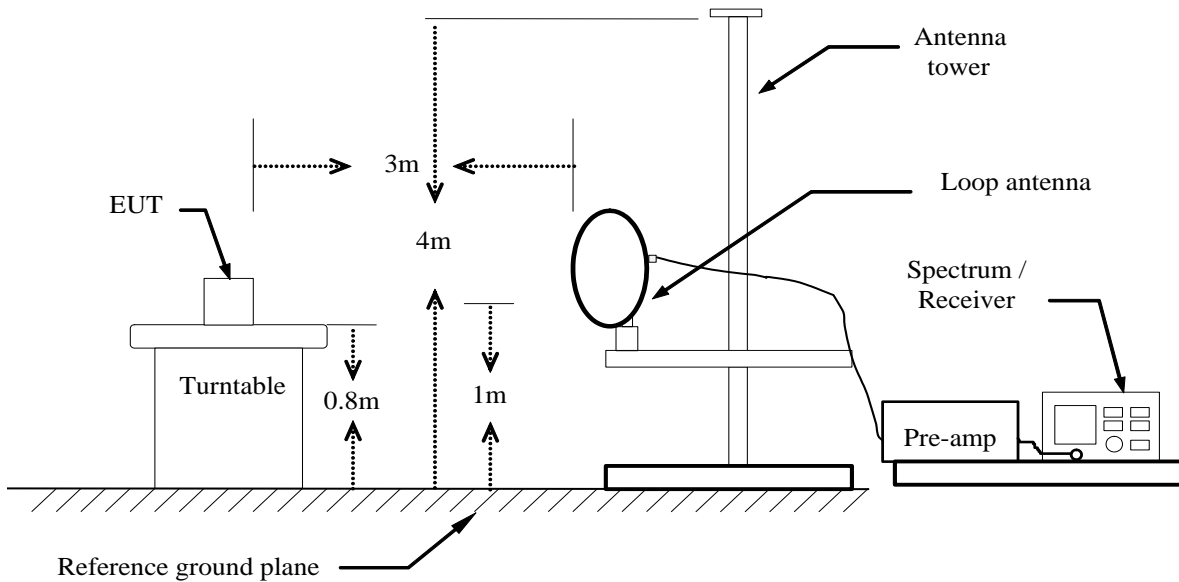
--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.

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

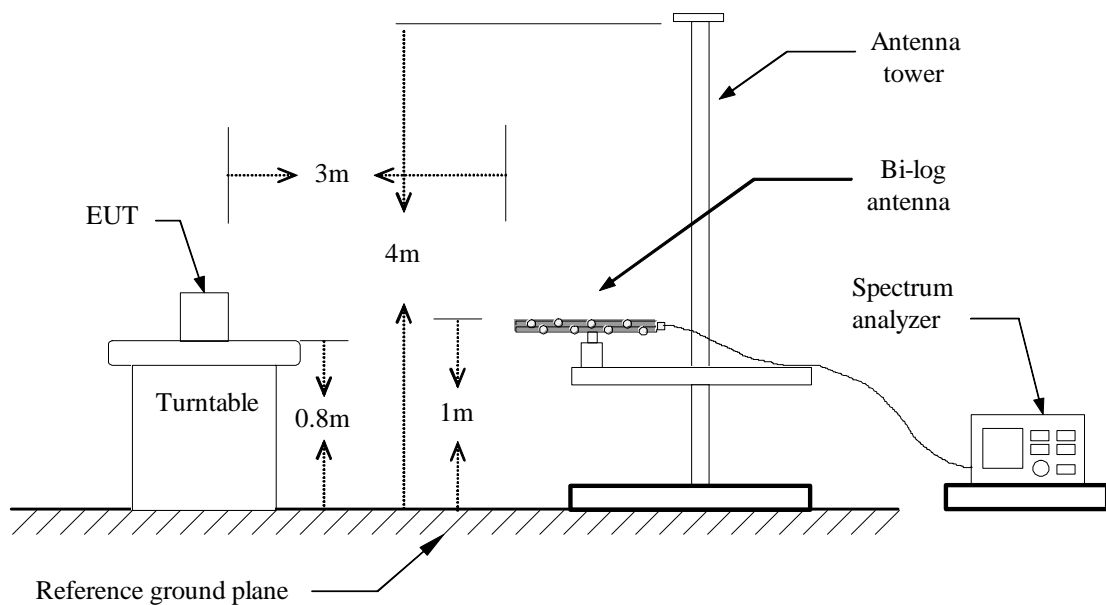


6.8.2.5. TEST SETUP

Below 30MHz

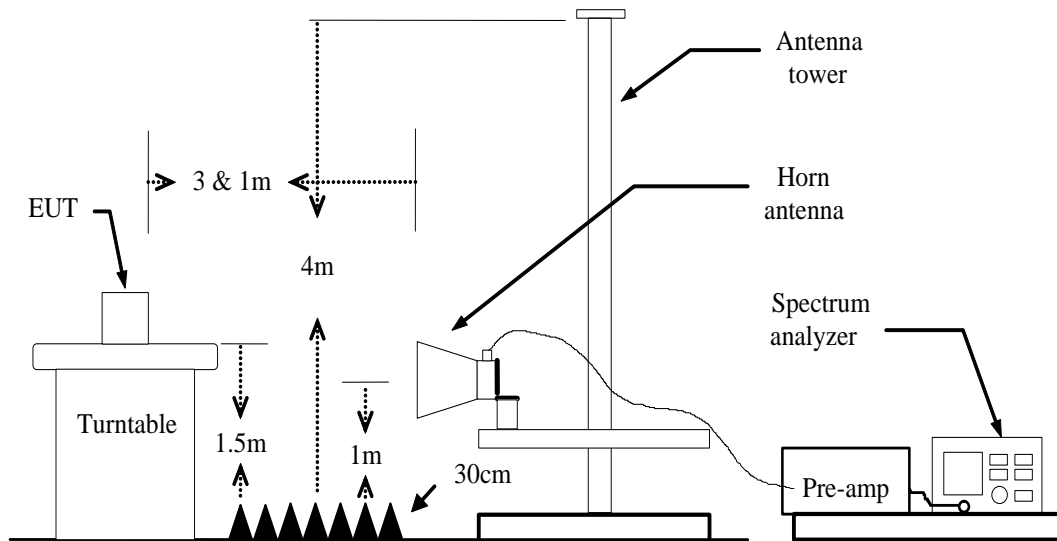


Below 1 GHz





Above 1 GHz



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



6.8.2.6. 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

**6.8.2.7. TEST RESULTS****Below 1 GHz****Test Mode:** TX / IEEE 802.11a / 5180MHz /(CH Low)**Tested by:** Fade Zhong**Ambient temperature:** 24°C **Relative humidity:** 52% RH**Date:** June 19, 2017

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
37.7600	56.52	-20.04	36.48	40.00	-3.52	V	QP
80.4400	52.27	-15.97	36.30	40.00	-3.70	V	QP
197.8100	44.31	-10.29	34.02	43.50	-9.48	V	QP
248.2500	42.49	-9.13	33.36	46.00	-12.64	V	QP
325.8500	40.62	-8.15	32.47	46.00	-13.53	V	QP
434.4900	42.95	-5.55	37.40	46.00	-8.60	V	QP
78.5000	51.13	-16.12	35.01	40.00	-4.99	H	QP
97.9000	52.35	-15.42	36.93	43.50	-6.57	H	QP
197.8100	46.18	-10.29	35.89	43.50	-7.61	H	QP
288.9900	43.17	-8.40	34.77	46.00	-11.23	H	QP
325.8500	41.61	-8.15	33.46	46.00	-12.54	H	QP
376.2900	38.48	-7.25	31.23	46.00	-14.77	H	QP

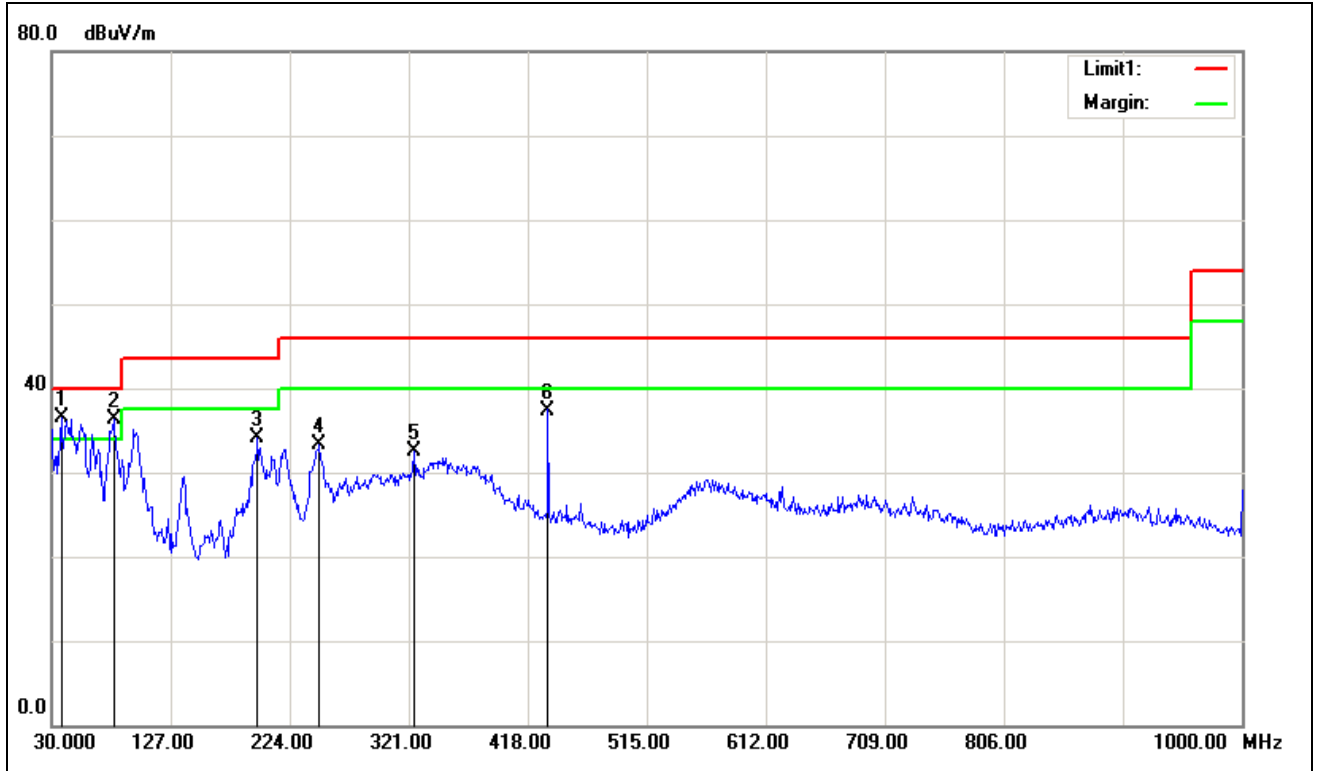
Pre-scan all mode and recorded the worst case results in this report (802.11a (Low Mid)).

Remark:

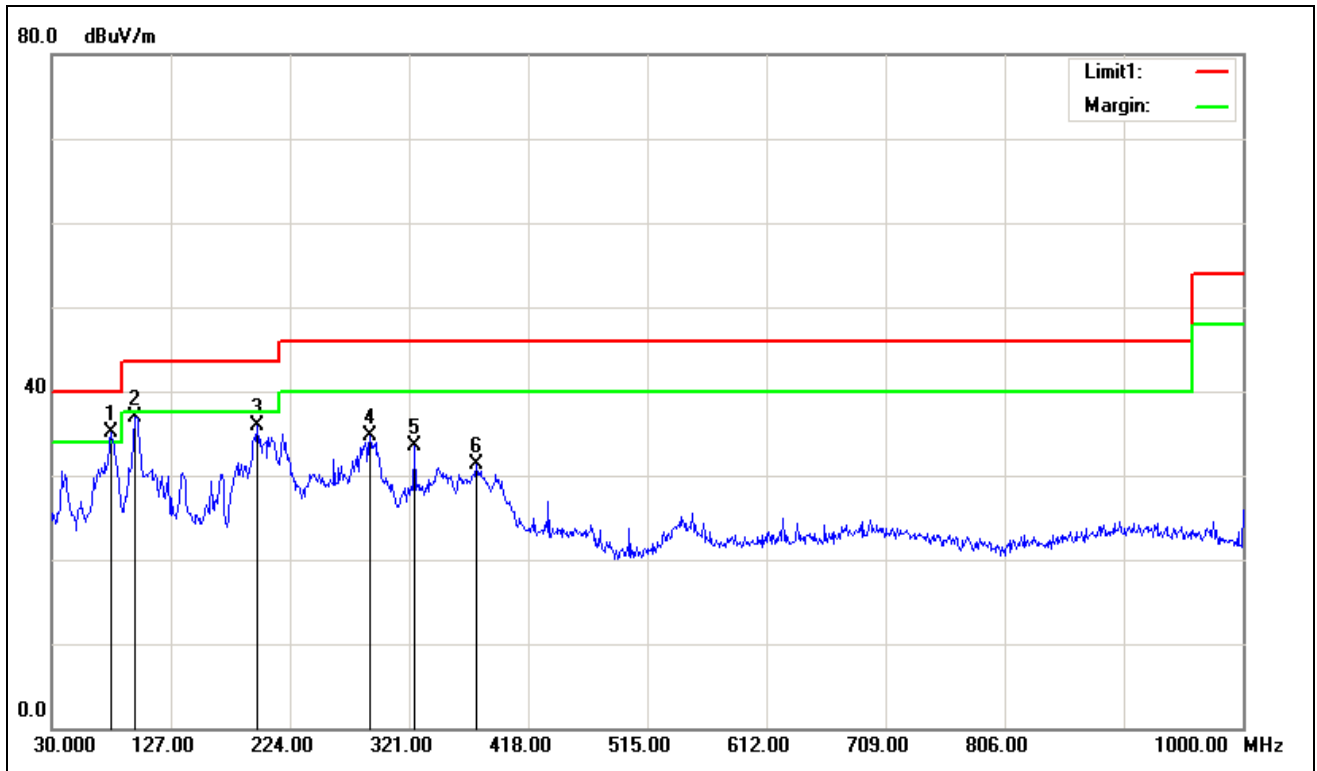
- No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)
- Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
- Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit.
- 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.
- 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.
- Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).



Vertical



Horizontal



**Above 1 GHz****1GHz~6GHz****Test Mode:** TX / IEEE 802.11a / 5180MHz / (CH Low)**Tested by:** Fade Zhong**Ambient temperature:** 24°C **Relative humidity:** 52% RH**Date:** June 19, 2017

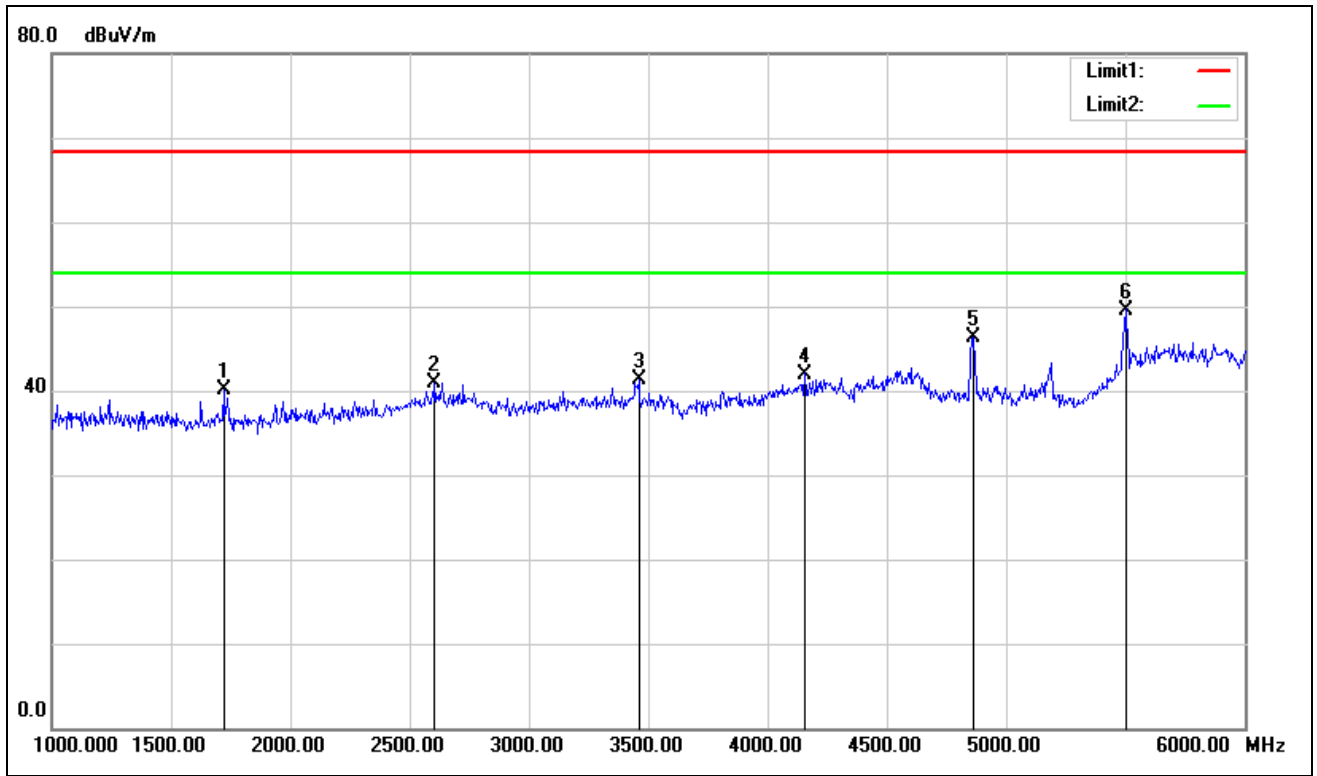
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1720.000	46.56	-6.44	40.12	68.23	-28.11	V	peak
2605.000	43.02	-2.07	40.95	68.23	-27.28	V	peak
3460.000	41.87	-0.59	41.28	68.23	-26.95	V	peak
4155.000	39.86	2.14	42.00	68.23	-26.23	V	peak
4860.000	41.80	4.52	46.32	68.23	-21.91	V	peak
5500.000	43.73	5.87	49.60	68.23	-18.63	V	peak
1305.000	47.32	-7.41	39.91	68.23	-28.32	H	Peak
1725.000	46.22	-6.43	39.79	68.23	-28.44	H	Peak
2395.000	42.73	-2.84	39.89	68.23	-28.34	H	Peak
2825.000	41.34	-1.67	39.67	68.23	-28.56	H	peak
3460.000	40.82	-0.59	40.23	68.23	-28.00	H	peak
4010.000	37.60	1.63	39.23	68.23	-29.00	H	peak

Remark:

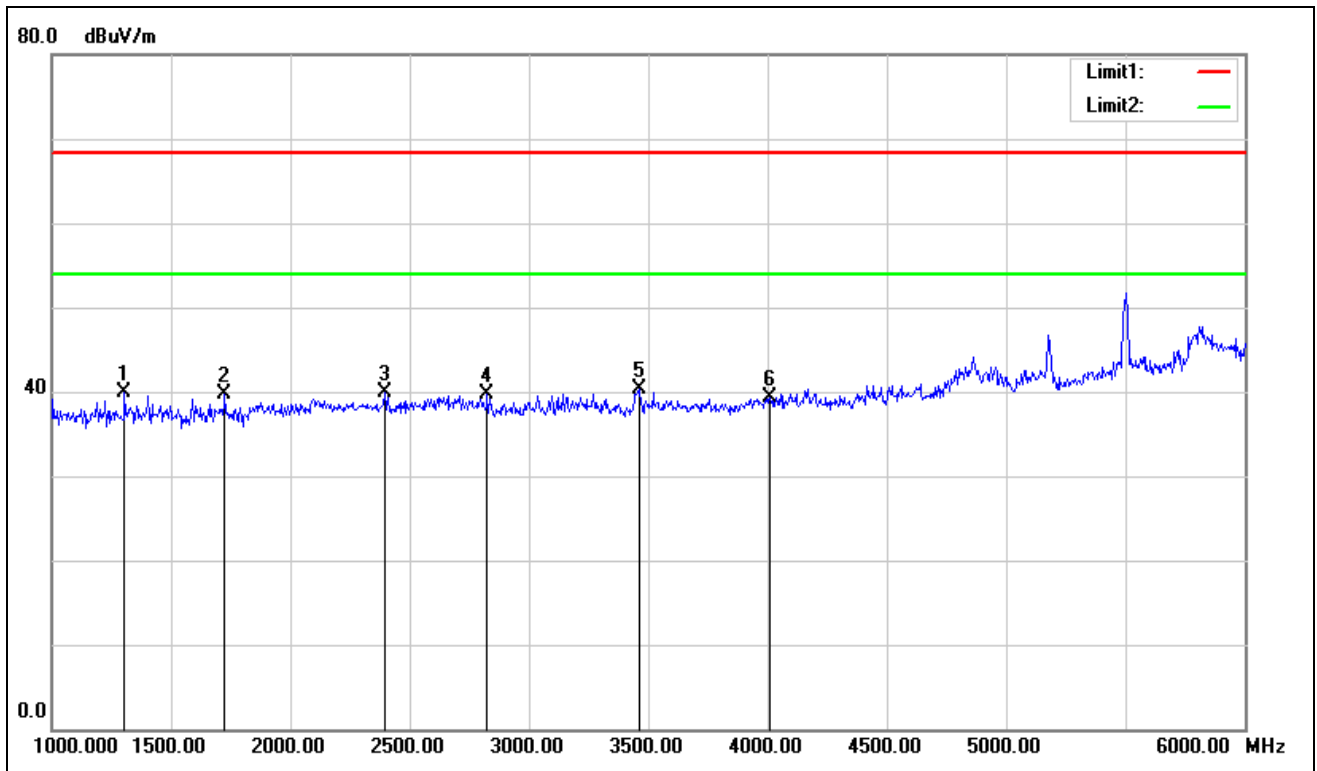
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
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).



Vertical



Horizontal



**Above 6GHz****Antenna 0**

Test Mode: TX / IEEE 802.11a / 5180MHz /(CH Low)

Tested by: Fade Zhong

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

Date: June 19, 2017

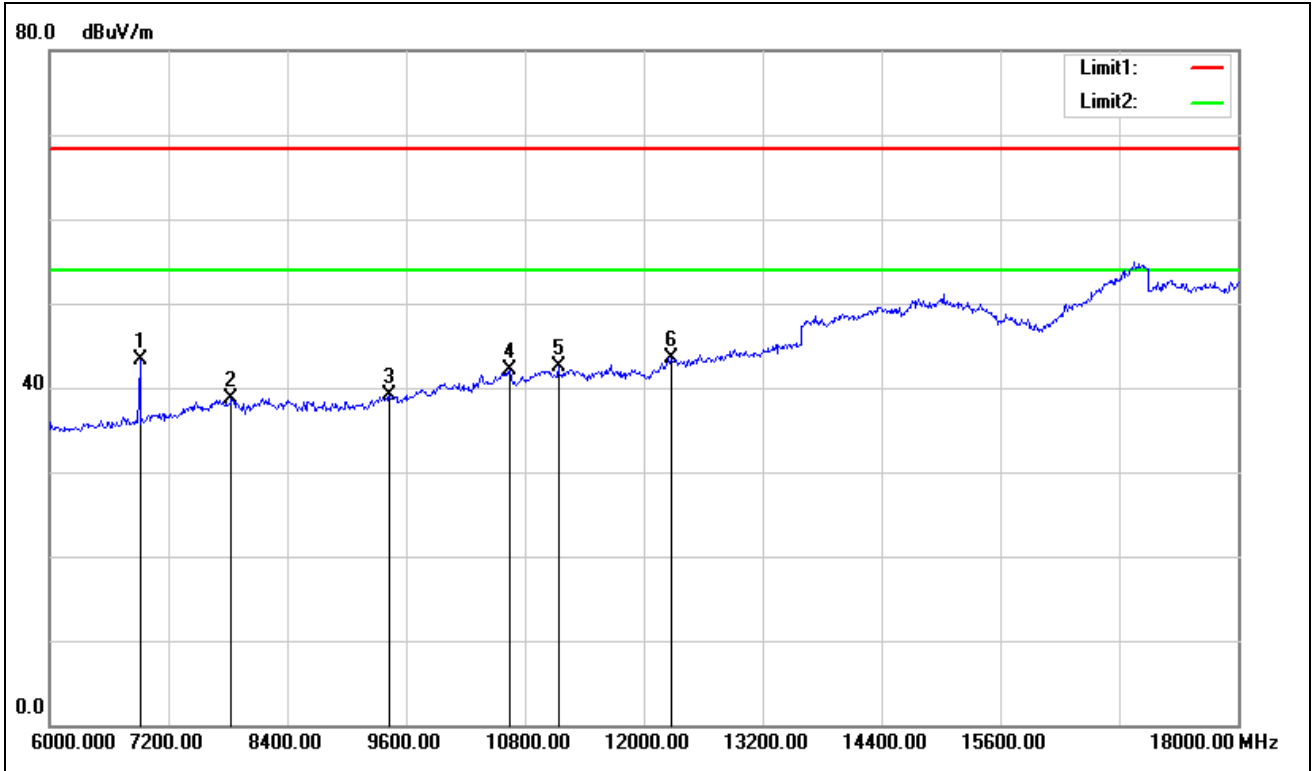
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6912.000	35.73	7.56	43.29	68.23	-24.94	V	peak
7836.000	29.45	9.33	38.78	68.23	-29.45	V	peak
9432.000	28.85	10.34	39.19	68.23	-29.04	V	peak
10644.000	28.03	13.98	42.01	68.23	-26.22	V	peak
11136.000	27.54	15.02	42.56	68.23	-25.67	V	peak
12276.000	27.96	15.55	43.51	68.23	-24.72	V	peak
6912.000	43.51	7.56	51.07	68.23	-17.16	H	Peak
7860.000	29.85	9.38	39.23	68.23	-29.00	H	Peak
9768.000	29.10	11.31	40.41	68.23	-27.82	H	Peak
11148.000	28.04	15.01	43.05	68.23	-25.18	H	peak
12912.000	26.97	17.66	44.63	68.23	-23.60	H	peak
13716.000	28.40	19.83	48.23	68.23	-20.00	H	peak

Remark:

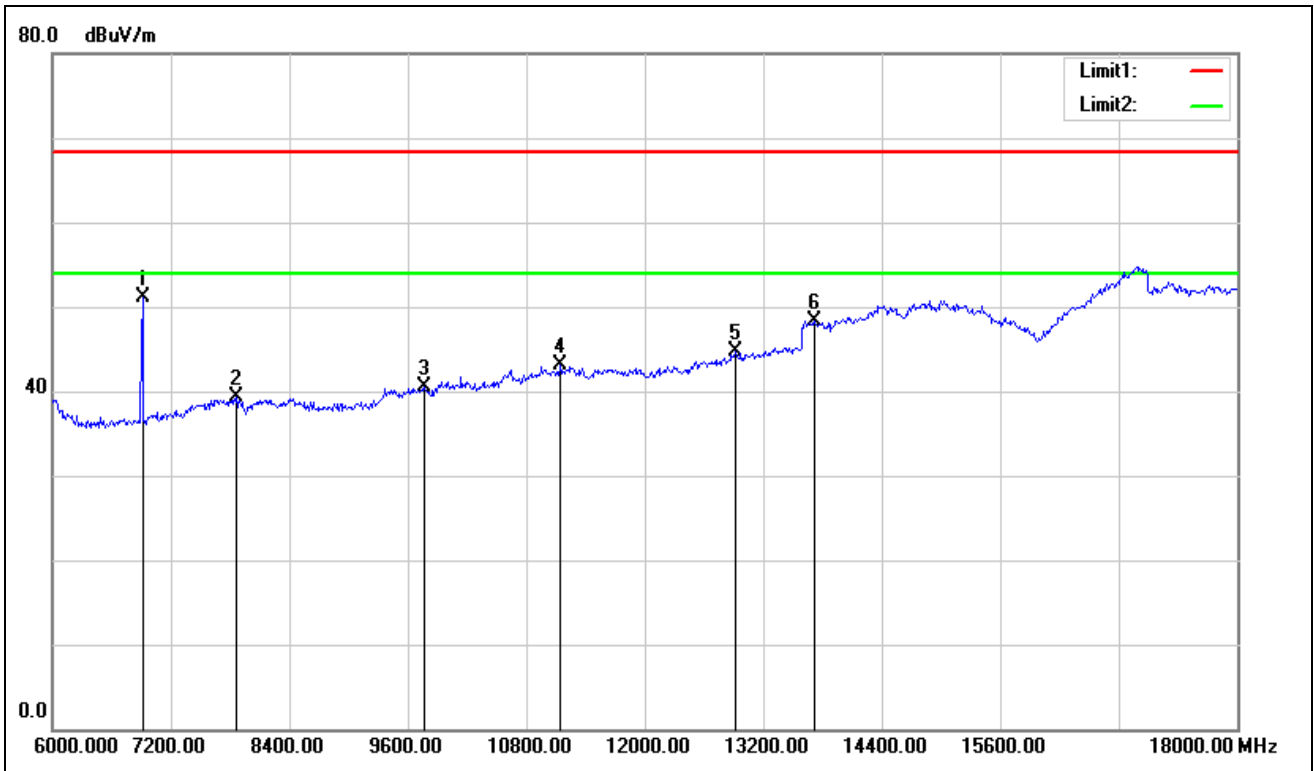
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
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).



Vertical



Horizontal





Test Mode: TX / IEEE 802.11a / 5200MHz /(CH Mid)

Tested by: Fade Zhong

Ambient temperature: 24°C

Relative humidity: 52% RH

Date: June 19, 2017

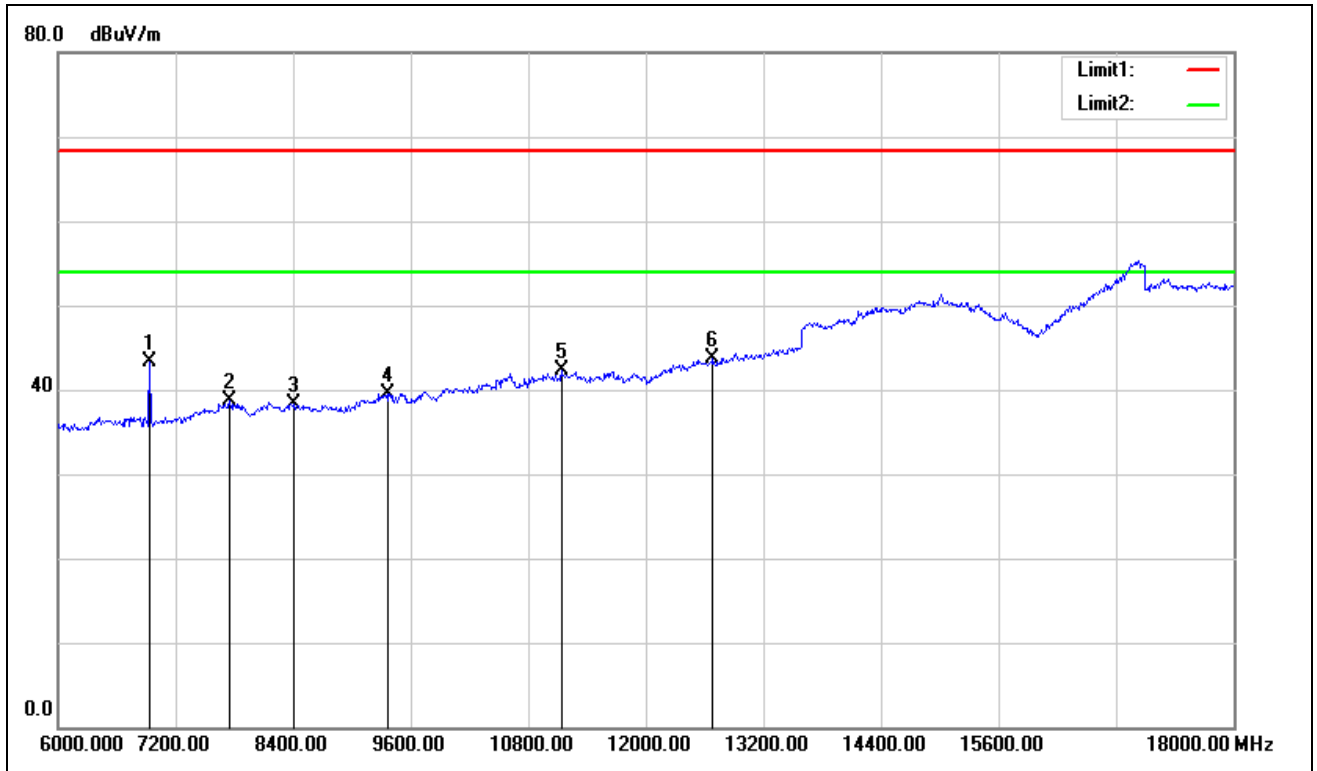
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6936.000	35.80	7.60	43.40	68.23	-24.83	V	peak
7752.000	29.56	9.17	38.73	68.23	-29.50	V	peak
8400.000	28.83	9.43	38.26	68.23	-29.97	V	peak
9360.000	29.35	10.14	39.49	68.23	-28.74	V	peak
11136.000	27.32	15.02	42.34	68.23	-25.89	V	peak
12684.000	26.75	16.90	43.65	68.23	-24.58	V	peak
6936.000	44.03	7.60	51.63	68.23	-16.60	H	Peak
7716.000	30.53	9.10	39.63	68.23	-28.60	H	Peak
9120.000	30.85	9.45	40.30	68.23	-27.93	H	Peak
9948.000	29.87	11.83	41.70	68.23	-26.53	H	peak
11688.000	28.70	14.78	43.48	68.23	-24.75	H	peak
13176.000	26.19	18.41	44.60	68.23	-23.63	H	peak

Remark:

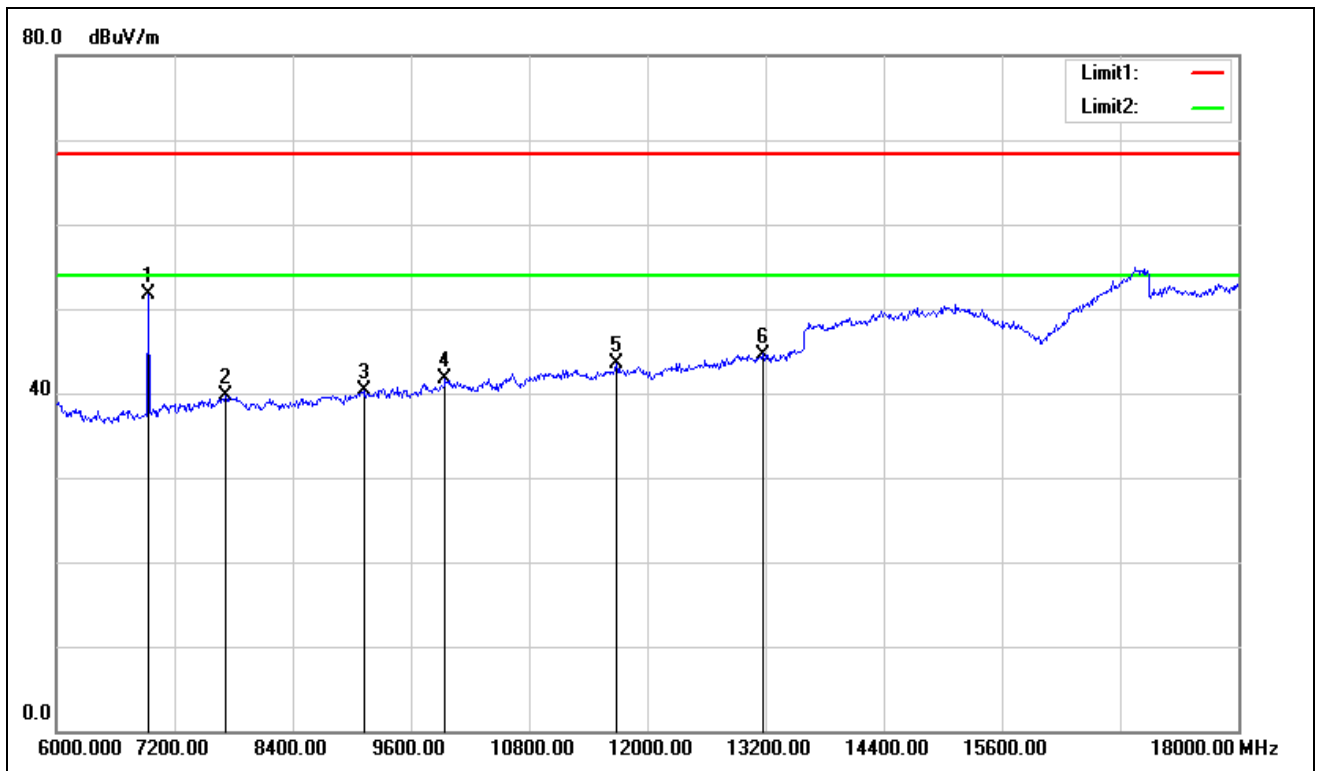
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
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).



Vertical



Horizontal





Test Mode: TX / IEEE 802.11a / 5240MHz /(CH High)

Tested by: Fade Zhong

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

Date: June 19, 2017

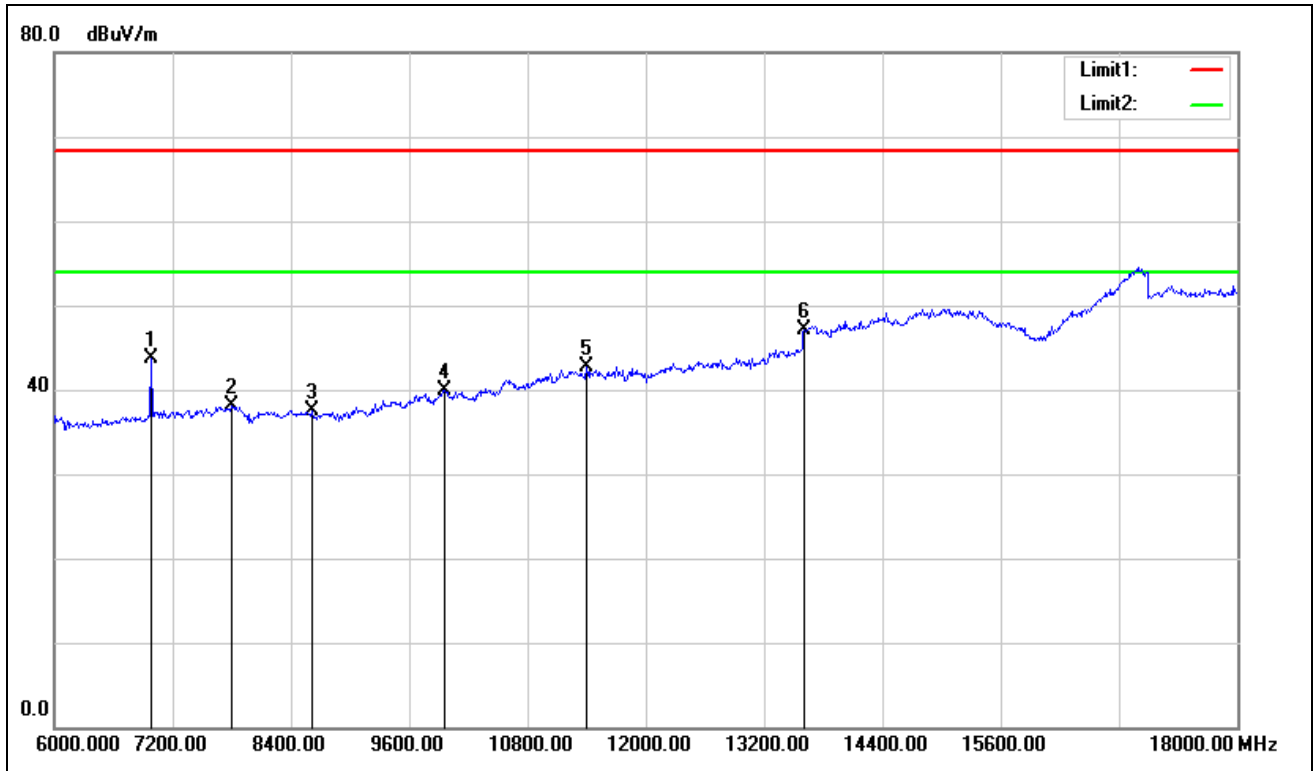
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6984.000	36.09	7.67	43.76	68.23	-24.47	V	peak
7800.000	28.75	9.26	38.01	68.23	-30.22	V	peak
8616.000	28.27	9.31	37.58	68.23	-30.65	V	peak
9960.000	28.13	11.86	39.99	68.23	-28.24	V	peak
11400.000	27.88	14.90	42.78	68.23	-25.45	V	peak
13608.000	27.60	19.55	47.15	68.23	-21.08	V	peak
6984.000	43.02	7.67	50.69	68.23	-17.54	H	Peak
8424.000	29.28	9.42	38.70	68.23	-29.53	H	Peak
10044.000	28.23	12.12	40.35	68.23	-27.88	H	Peak
11604.000	29.41	14.81	44.22	68.23	-24.01	H	peak
13440.000	27.63	19.11	46.74	68.23	-21.49	H	peak
14424.000	29.83	20.83	50.66	68.23	-17.57	H	peak

Remark:

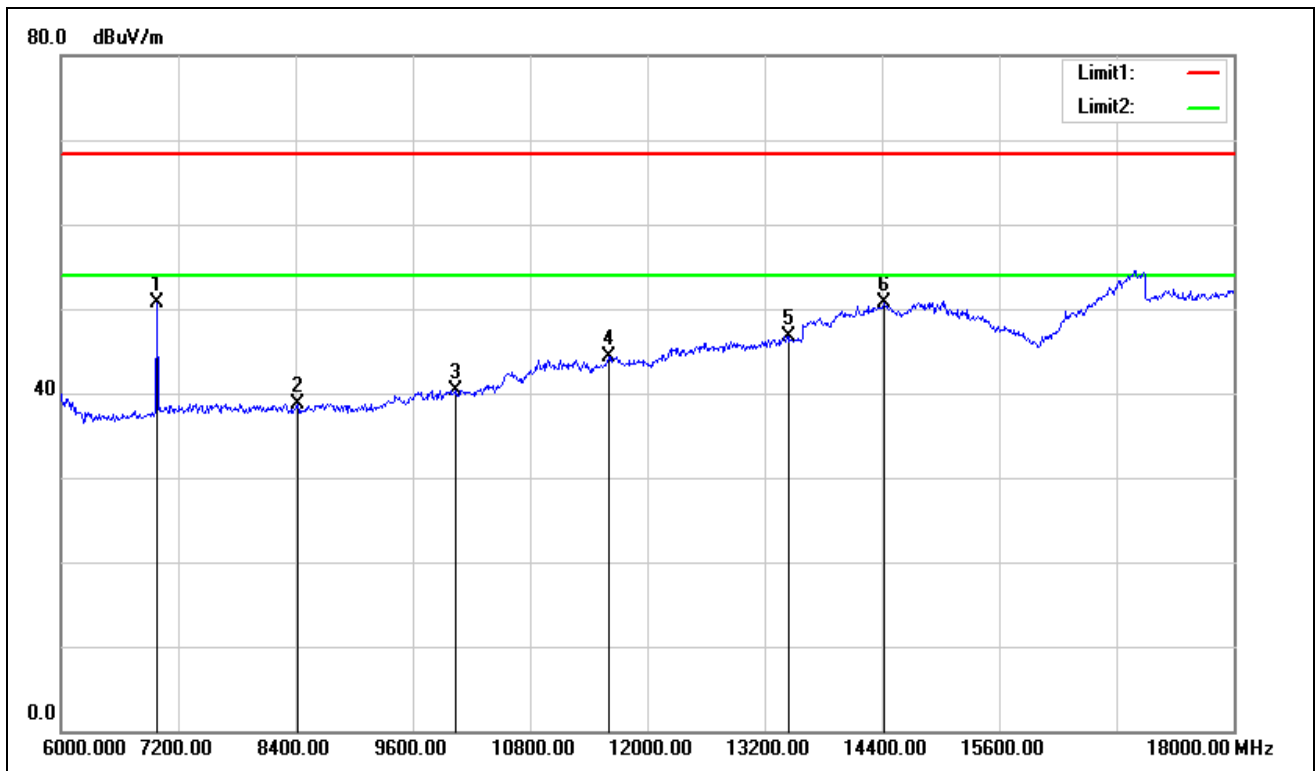
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.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



Vertical



Horizontal



**Antenna 1**

Test Mode: TX / IEEE 802.11a / 5180MHz /(CH Low)

Tested by: Fade Zhong

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

Date: June 19, 2017

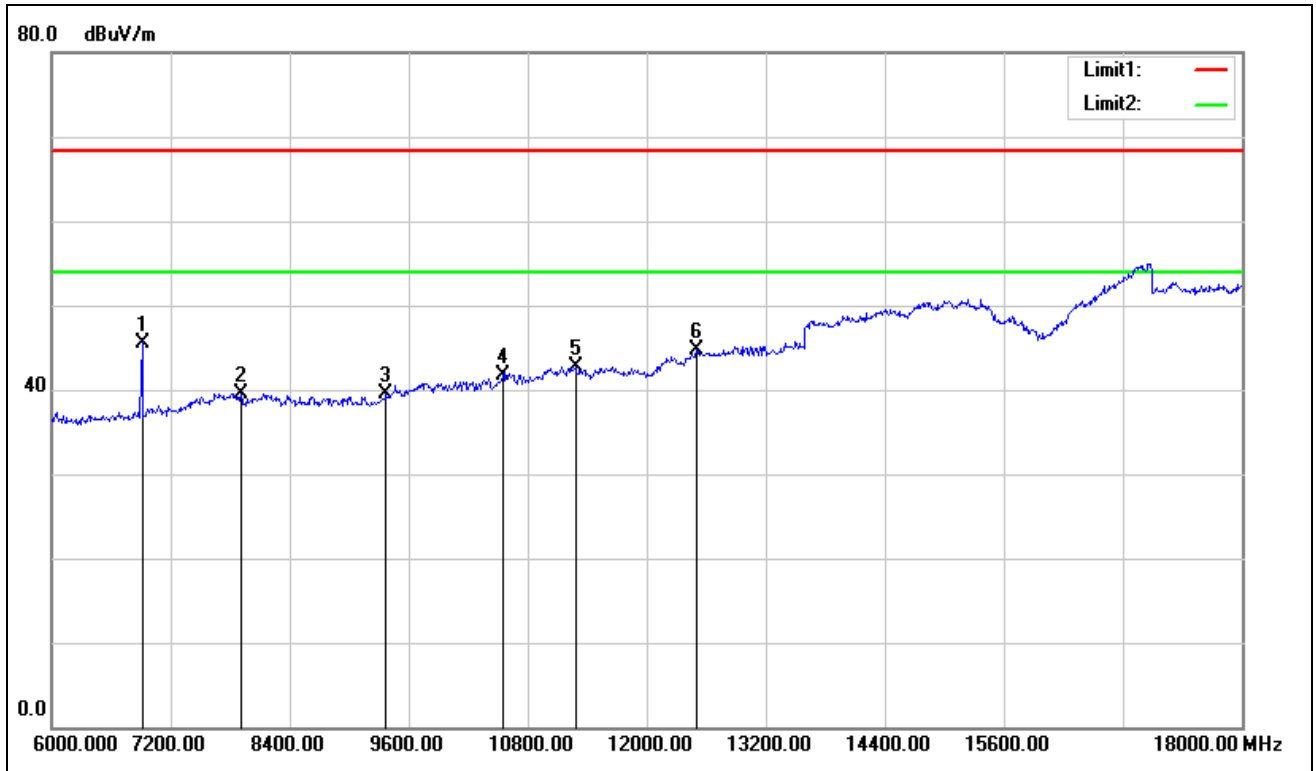
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6912.000	38.04	7.56	45.60	68.23	-22.63	V	peak
7908.000	30.04	9.47	39.51	68.23	-28.72	V	peak
9372.000	29.28	10.17	39.45	68.23	-28.78	V	peak
10548.000	27.94	13.68	41.62	68.23	-26.61	V	peak
11280.000	27.70	14.96	42.66	68.23	-25.57	V	peak
12504.000	28.35	16.31	44.66	68.23	-23.57	V	peak
6912.000	31.61	7.56	39.17	68.23	-29.06	H	Peak
8172.000	30.33	9.56	39.89	68.23	-28.34	H	Peak
9600.000	30.25	10.83	41.08	68.23	-27.15	H	Peak
11112.000	29.81	15.03	44.84	68.23	-23.39	H	peak
12228.000	30.00	15.39	45.39	68.23	-22.84	H	peak
13284.000	28.25	18.70	46.95	68.23	-21.28	H	peak

Remark:

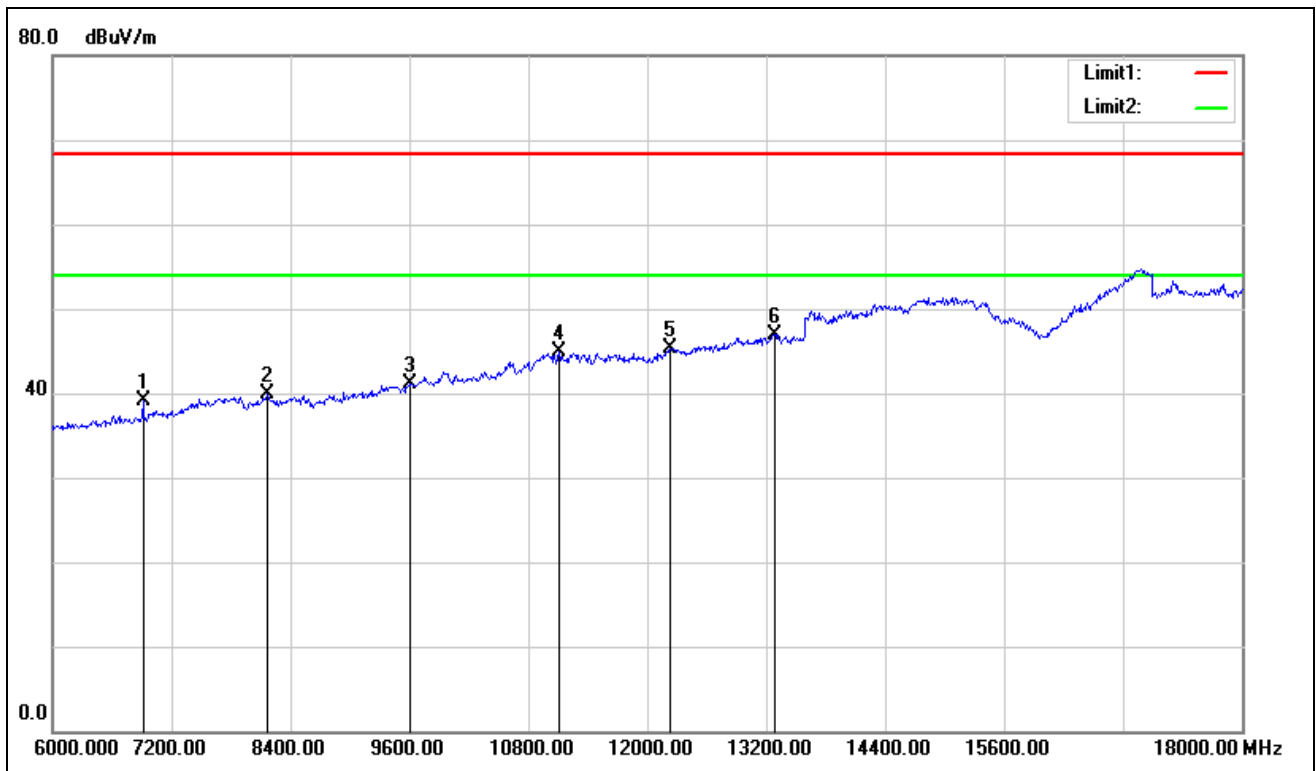
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
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).



Vertical



Horizontal





Test Mode: TX / IEEE 802.11a / 5200MHz /(CH Mid)

Tested by: Fade Zhong

Ambient temperature: 24°C

Relative humidity: 52% RH

Date: June 19, 2017

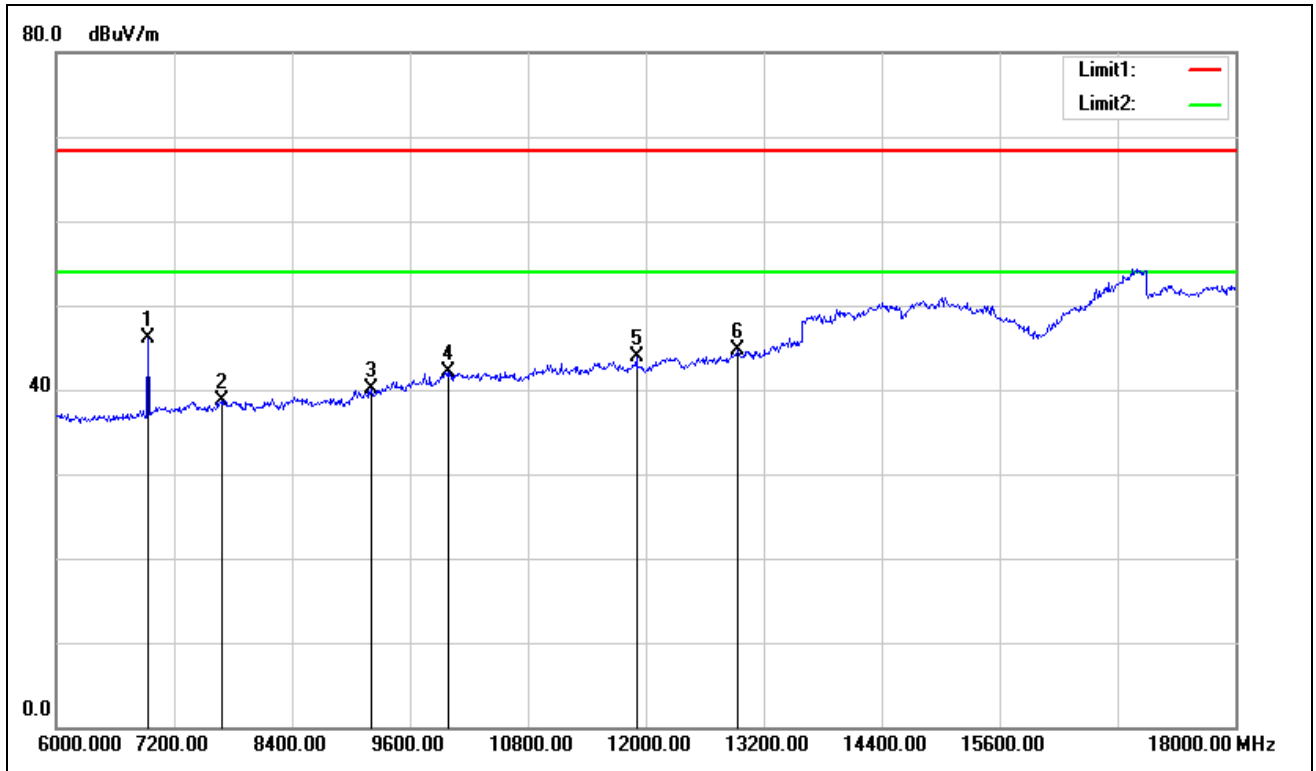
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6936.000	38.45	7.60	46.05	68.23	-22.18	V	peak
7680.000	29.67	9.03	38.70	68.23	-29.53	V	peak
9204.000	30.36	9.69	40.05	68.23	-28.18	V	peak
9984.000	30.13	11.93	42.06	68.23	-26.17	V	peak
11904.000	29.20	14.68	43.88	68.23	-24.35	V	peak
12936.000	26.89	17.74	44.63	68.23	-23.60	V	peak
6936.000	32.63	7.60	40.23	68.23	-28.00	H	Peak
8160.000	30.58	9.56	40.14	68.23	-28.09	H	Peak
9144.000	30.49	9.51	40.00	68.23	-28.23	H	Peak
10248.000	29.32	12.75	42.07	68.23	-26.16	H	peak
11280.000	27.70	14.96	42.66	68.23	-25.57	H	peak
12276.000	28.38	15.55	43.93	68.23	-24.30	H	peak

Remark:

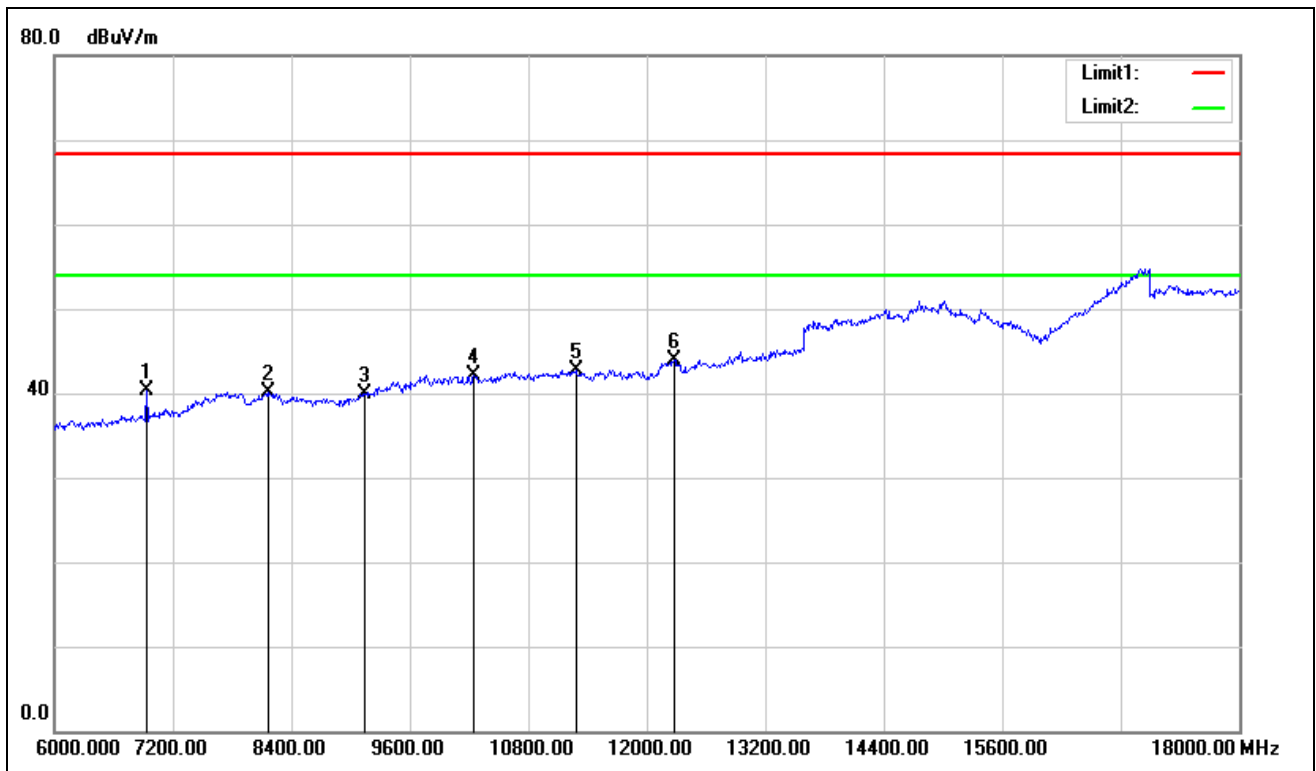
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
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).



Vertical



Horizontal





Test Mode: TX / IEEE 802.11a / 5240MHz /(CH High)

Tested by: Fade Zhong

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

Date: June 19, 2017

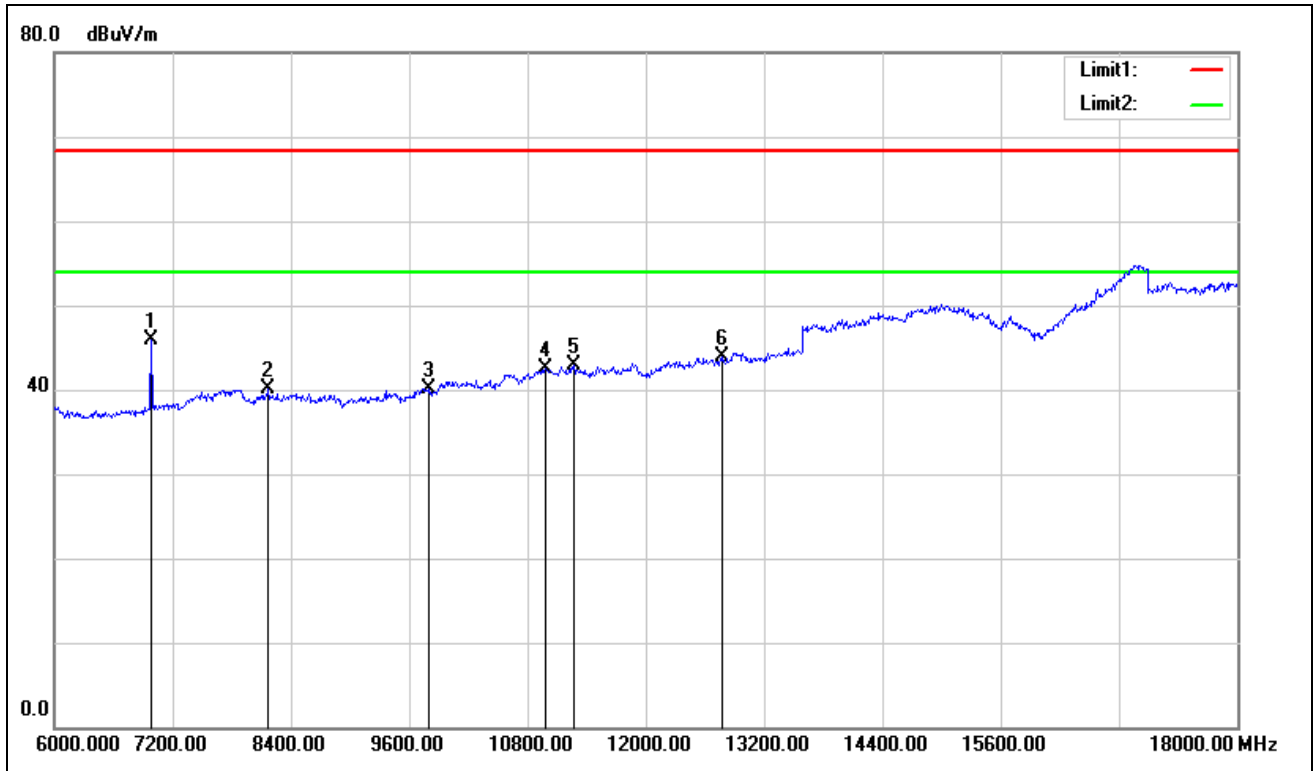
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6984.000	38.21	7.67	45.88	68.23	-22.35	V	peak
8172.000	30.51	9.56	40.07	68.23	-28.16	V	peak
9804.000	28.65	11.42	40.07	68.23	-28.16	V	peak
10980.000	27.39	15.02	42.41	68.23	-25.82	V	peak
11268.000	27.94	14.96	42.90	68.23	-25.33	V	peak
12780.000	26.66	17.22	43.88	68.23	-24.35	V	peak
6984.000	32.89	7.67	40.56	68.23	-27.67	H	Peak
8220.000	31.09	9.53	40.62	68.23	-27.61	H	Peak
9312.000	30.67	10.00	40.67	68.23	-27.56	H	Peak
10608.000	30.26	13.86	44.12	68.23	-24.11	H	peak
11652.000	30.39	14.79	45.18	68.23	-23.05	H	peak
12564.000	29.77	16.51	46.28	68.23	-21.95	H	peak

Remark:

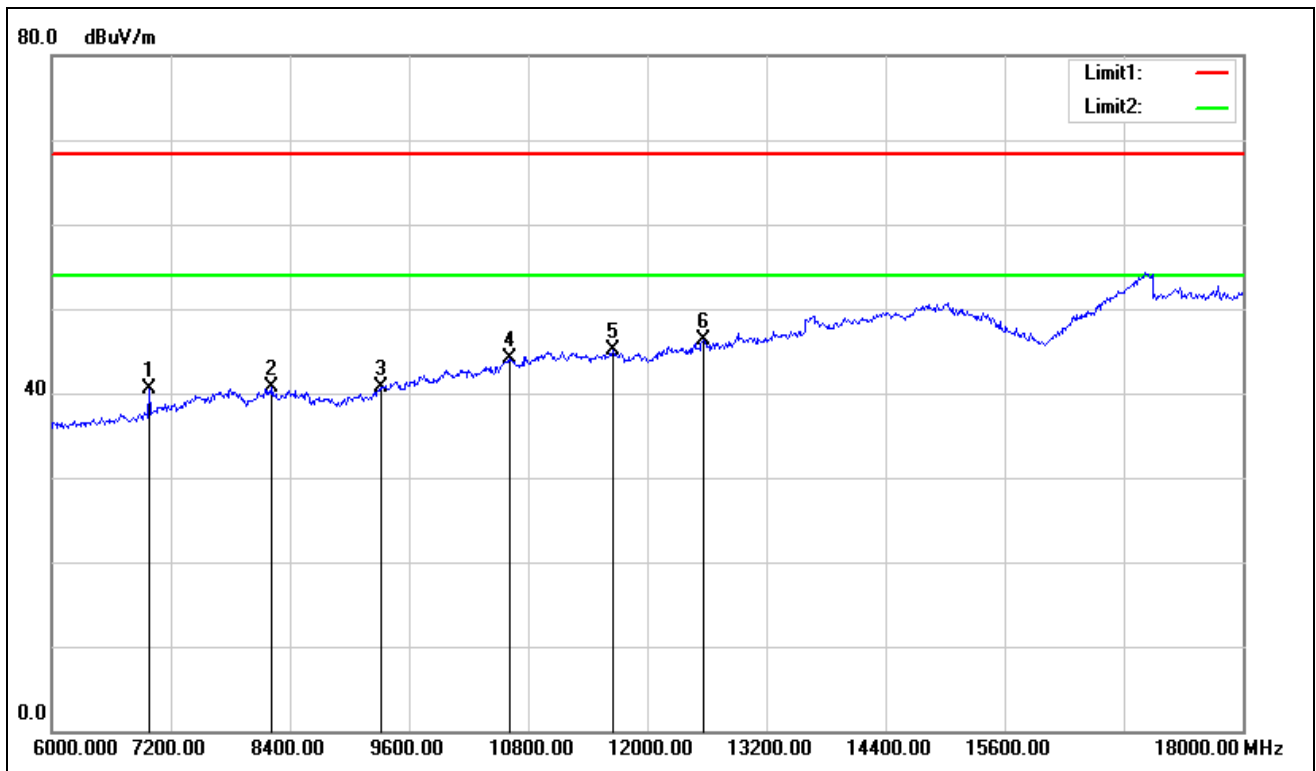
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
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).



Vertical



Horizontal





Combine with Antenna 0 and Antenna 1

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

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** June 19, 2017

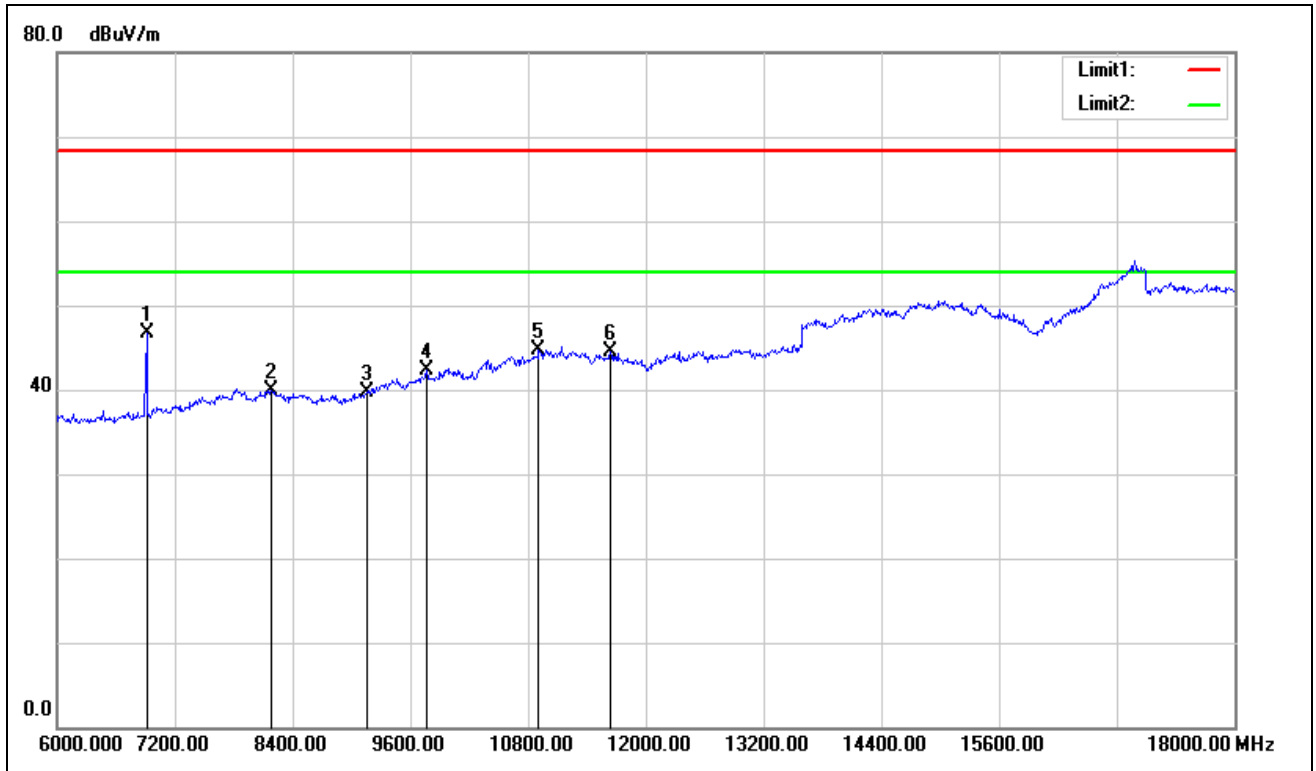
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6912.000	39.14	7.56	46.70	68.23	-21.53	V	peak
8184.000	30.37	9.55	39.92	68.23	-28.31	V	peak
9156.000	30.17	9.55	39.72	68.23	-28.51	V	peak
9768.000	30.96	11.31	42.27	68.23	-25.96	V	peak
10908.000	29.84	14.79	44.63	68.23	-23.60	V	peak
11640.000	29.74	14.80	44.54	68.23	-23.69	V	peak
6912.000	41.45	7.56	49.01	68.23	-19.22	H	Peak
7812.000	31.99	9.28	41.27	68.23	-26.96	H	Peak
9432.000	31.30	10.34	41.64	68.23	-26.59	H	Peak
11196.000	29.30	14.99	44.29	68.23	-23.94	H	peak
11616.000	29.53	14.81	44.34	68.23	-23.89	H	peak
13464.000	26.53	19.17	45.70	68.23	-22.53	H	peak

Remark:

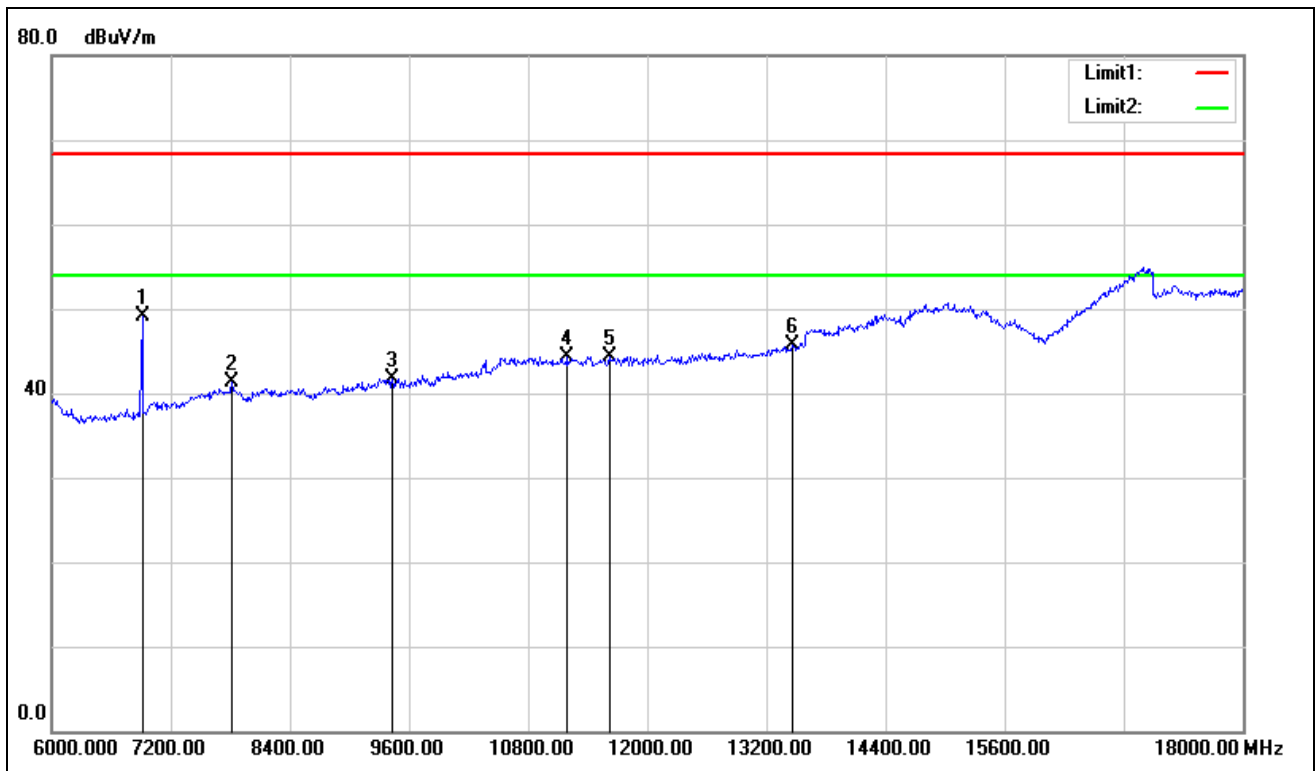
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
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).



Vertical



Horizontal



**Test Mode:** TX / IEEE 802.11n HT 20 MHz / 5200MHz /(CH Mid) **Tested by:** Fade Zhong**Ambient temperature:** 24°C **Relative humidity:** 52% RH **Date:** June 19, 2017

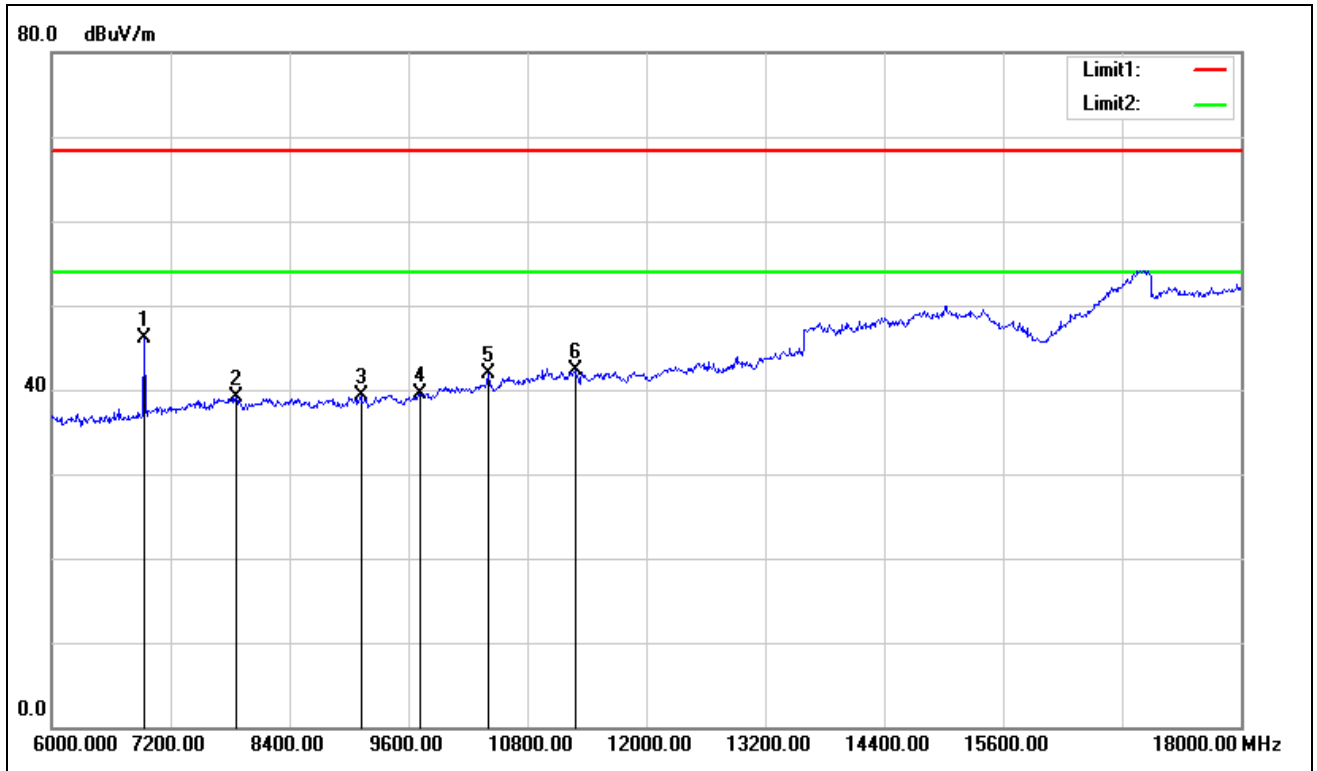
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6936.000	38.57	7.60	46.17	68.23	-22.06	V	peak
7860.000	29.65	9.38	39.03	68.23	-29.20	V	peak
9120.000	29.81	9.45	39.26	68.23	-28.97	V	peak
9720.000	28.42	11.17	39.59	68.23	-28.64	V	peak
10404.000	28.77	13.23	42.00	68.23	-26.23	V	peak
11280.000	27.35	14.96	42.31	68.23	-25.92	V	peak
6936.000	42.69	7.60	50.29	68.23	-17.94	H	Peak
8148.000	30.32	9.57	39.89	68.23	-28.34	H	Peak
9696.000	30.70	11.10	41.80	68.23	-26.43	H	Peak
11256.000	30.04	14.97	45.01	68.23	-23.22	H	peak
12276.000	30.07	15.55	45.62	68.23	-22.61	H	peak
14304.000	28.94	20.76	49.70	68.23	-18.53	H	peak

Remark:

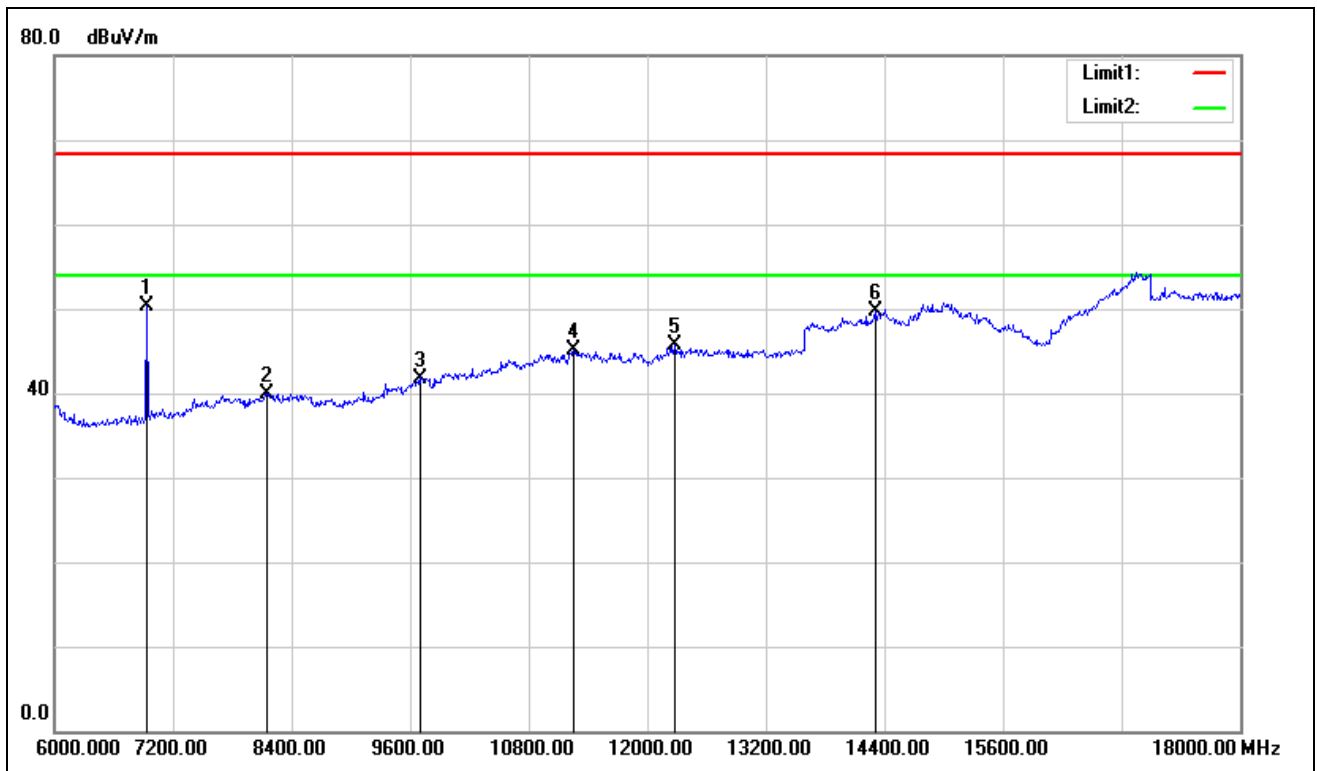
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
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).



Vertical



Horizontal





Test Mode: TX / IEEE 802.11n HT 20 MHz / 5240MHz /(CH High)

Tested by: Ad Gan

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

Date: June 19, 2017

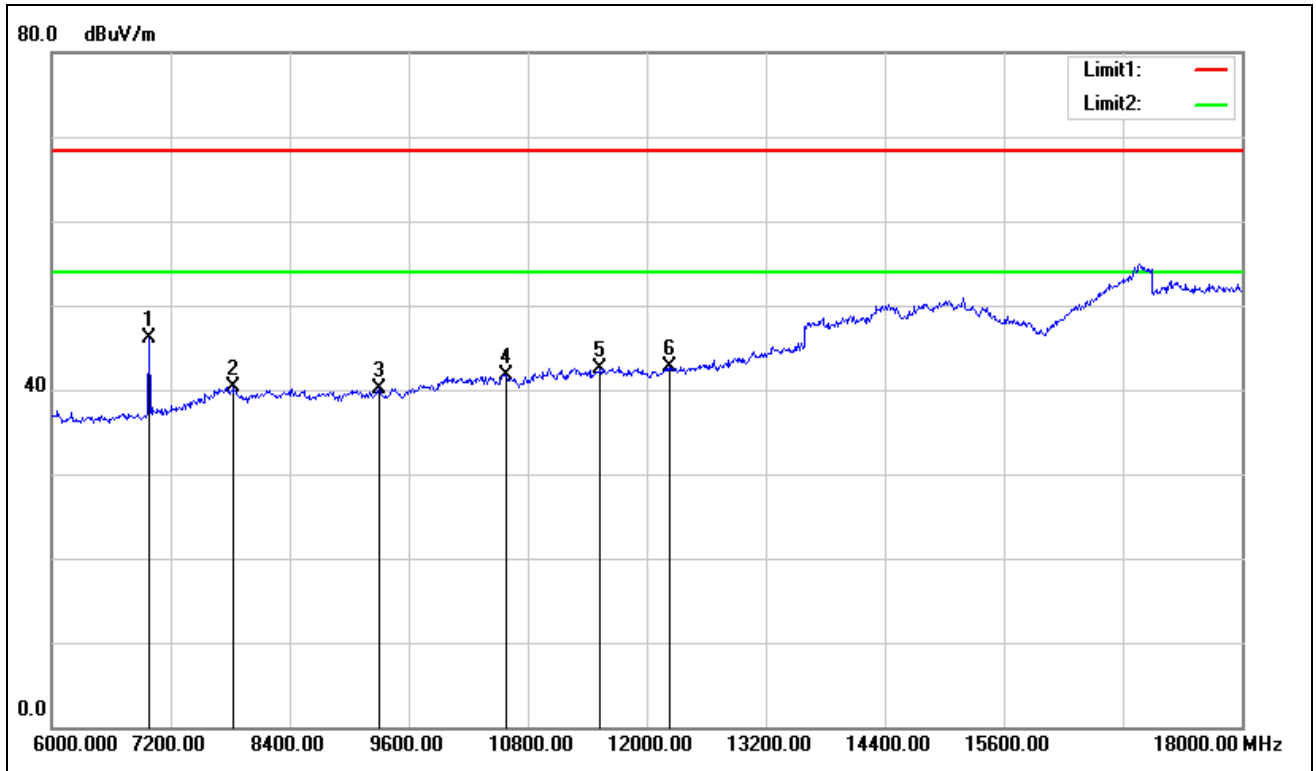
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6984.000	38.37	7.67	46.04	68.23	-22.19	V	peak
7836.000	30.98	9.33	40.31	68.23	-27.92	V	peak
9300.000	30.23	9.96	40.19	68.23	-28.04	V	peak
10584.000	27.97	13.79	41.76	68.23	-26.47	V	peak
11532.000	27.70	14.85	42.55	68.23	-25.68	V	peak
12228.000	27.28	15.39	42.67	68.23	-25.56	V	peak
6984.000	41.85	7.67	49.52	68.23	-18.71	H	Peak
7704.000	30.17	9.07	39.24	68.23	-28.99	H	Peak
9372.000	29.40	10.17	39.57	68.23	-28.66	H	Peak
10644.000	28.83	13.98	42.81	68.23	-25.42	H	peak
11952.000	29.93	14.66	44.59	68.23	-23.64	H	peak
13560.000	27.34	19.42	46.76	68.23	-21.47	H	peak

Remark:

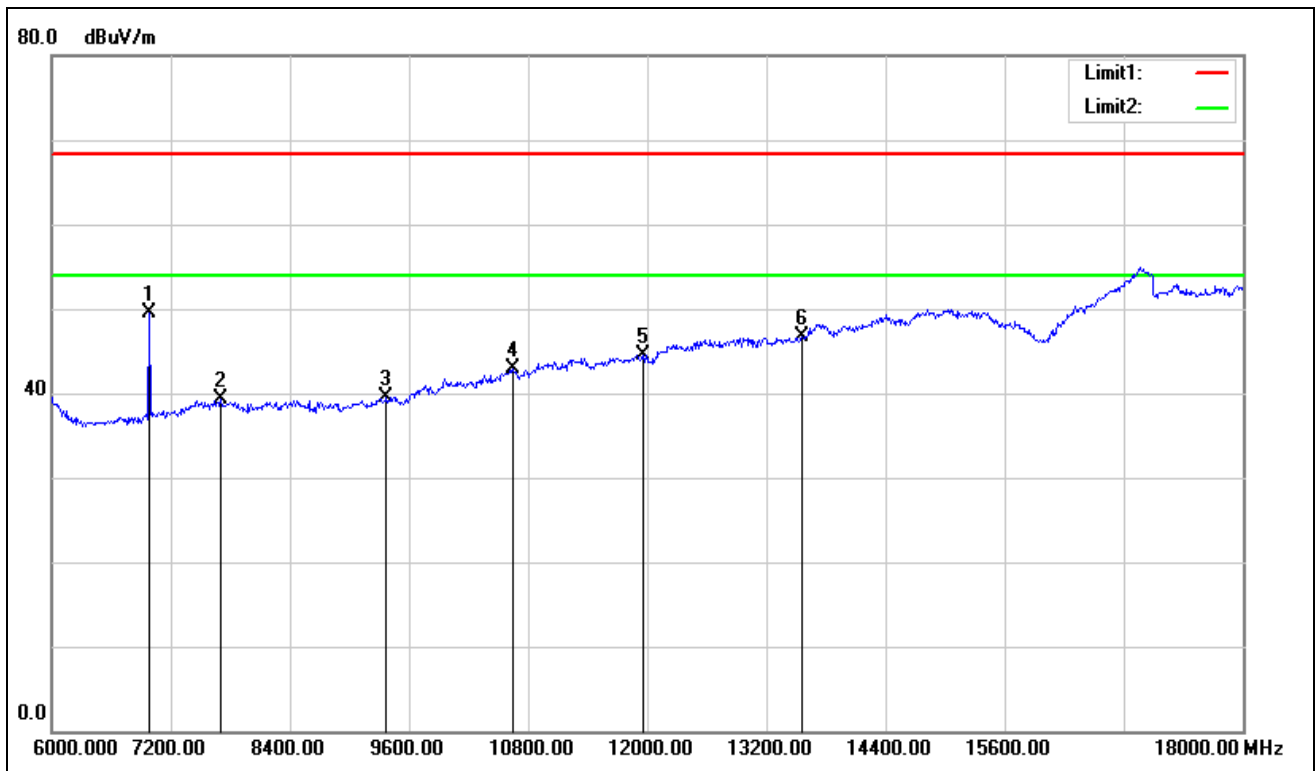
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.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



Vertical



Horizontal





Combine with Antenna 0 and Antenna 1

Test Mode: TX / IEEE 802.11n HT 40 MHz / 5190MHz /(CH Low) **Tested by:** Fade Zhong

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** June 19, 2017

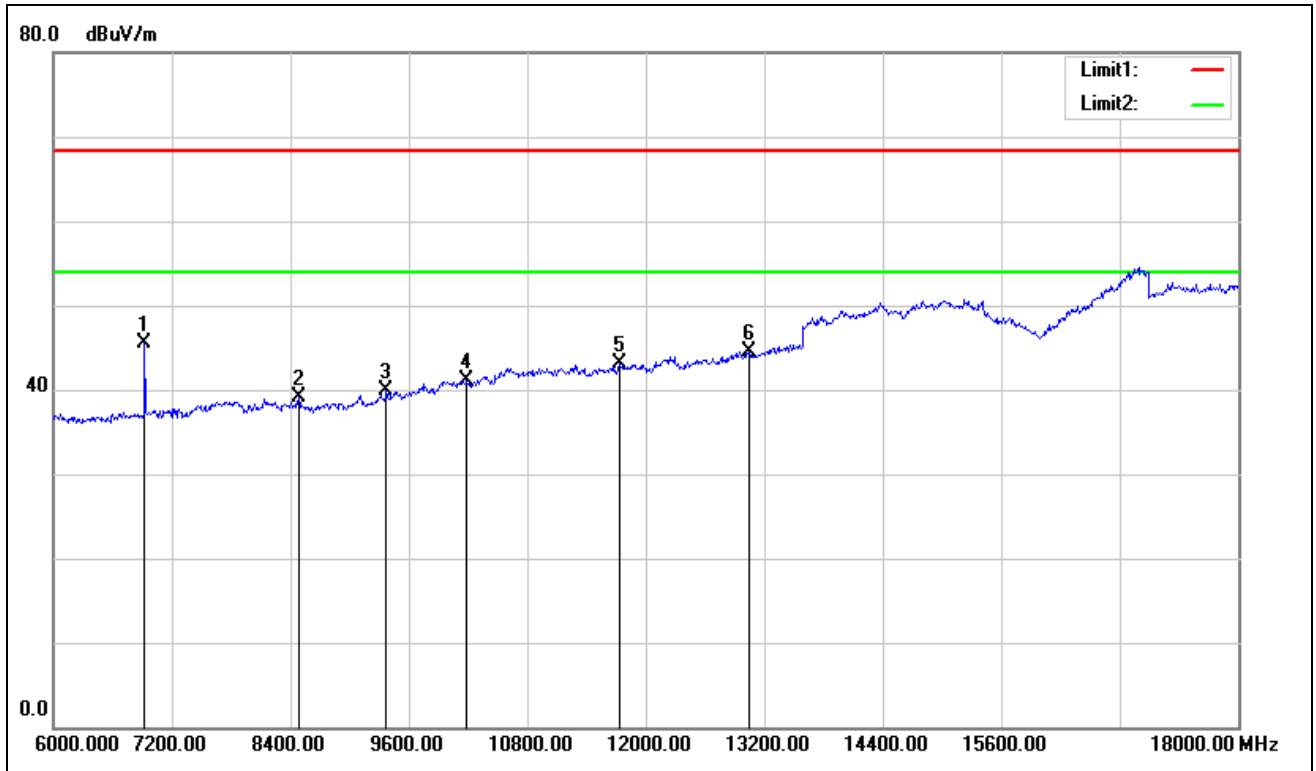
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6924.000	38.01	7.58	45.59	68.23	-22.64	V	peak
8484.000	29.67	9.38	39.05	68.23	-29.18	V	peak
9372.000	29.80	10.17	39.97	68.23	-28.26	V	peak
10188.000	28.60	12.56	41.16	68.23	-27.07	V	peak
11736.000	28.43	14.76	43.19	68.23	-25.04	V	peak
13044.000	26.34	18.07	44.41	68.23	-23.82	V	peak
6924.000	40.70	7.58	48.28	68.23	-19.95	H	Peak
8448.000	29.93	9.40	39.33	68.23	-28.90	H	Peak
11004.000	27.62	15.08	42.70	68.23	-25.53	H	Peak
11928.000	28.00	14.67	42.67	68.23	-25.56	H	peak
12912.000	26.66	17.66	44.32	68.23	-23.91	H	peak
13956.000	27.78	20.46	48.24	68.23	-19.99	H	peak

Remark:

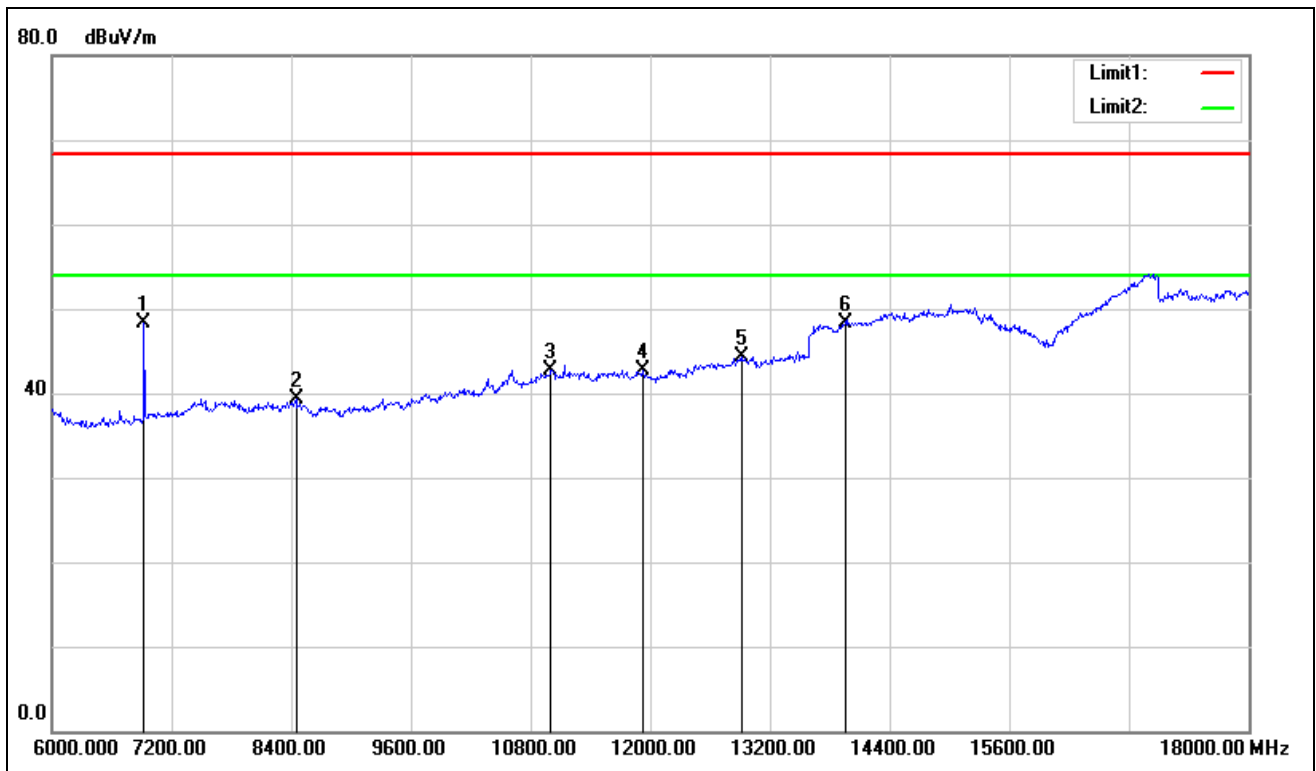
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
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).



Vertical



Horizontal





Test Mode: TX / IEEE 802.11n HT 40 MHz / 5230MHz /(CH High) **Tested by:** Fade Zhong

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** June 19, 2017

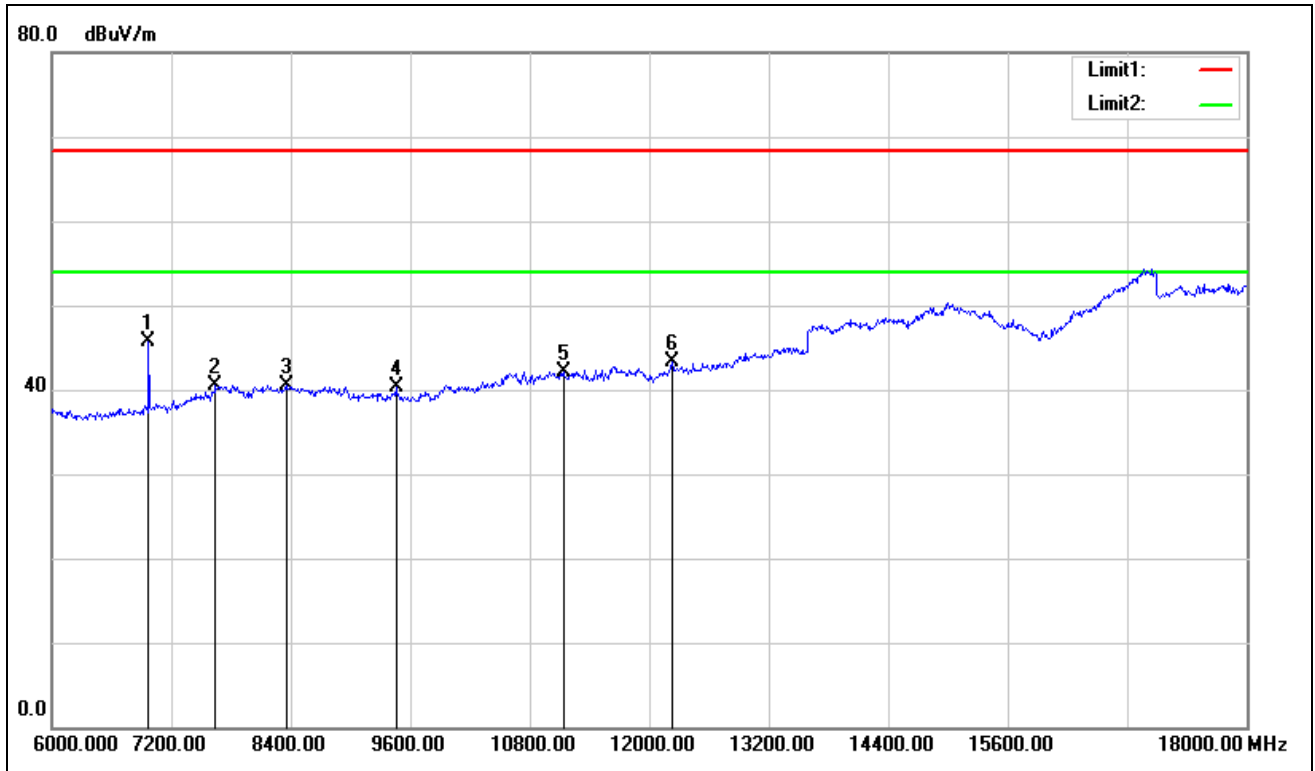
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6972.000	38.01	7.65	45.66	68.23	-22.57	V	peak
7644.000	31.57	8.96	40.53	68.23	-27.70	V	peak
8352.000	30.99	9.46	40.45	68.23	-27.78	V	peak
9456.000	29.85	10.41	40.26	68.23	-27.97	V	peak
11136.000	27.15	15.02	42.17	68.23	-26.06	V	peak
12228.000	27.82	15.39	43.21	68.23	-25.02	V	peak
6972.000	40.89	7.65	48.54	68.23	-19.69	H	Peak
8064.000	29.06	9.61	38.67	68.23	-29.56	H	Peak
9444.000	29.22	10.38	39.60	68.23	-28.63	H	Peak
10668.000	27.98	14.05	42.03	68.23	-26.20	H	peak
11628.000	27.78	14.80	42.58	68.23	-25.65	H	peak
13620.000	28.15	19.58	47.73	68.23	-20.50	H	peak

Remark:

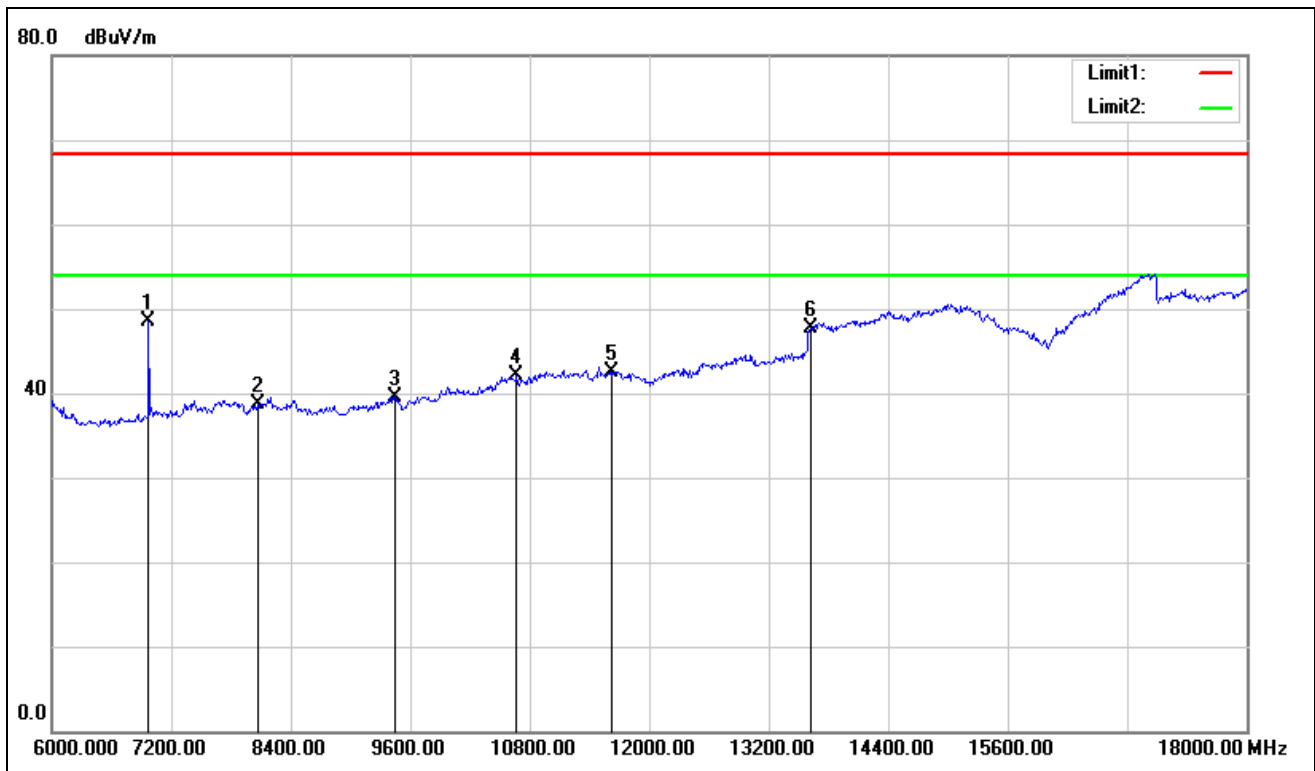
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
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).



Vertical



Horizontal





Combine with Antenna 0 and Antenna 1

Test Mode: TX / IEEE 802. 11ac 80 / 5210MHz /(CH Low)

Tested by: Fade Zhong

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

Date: June 19, 2017

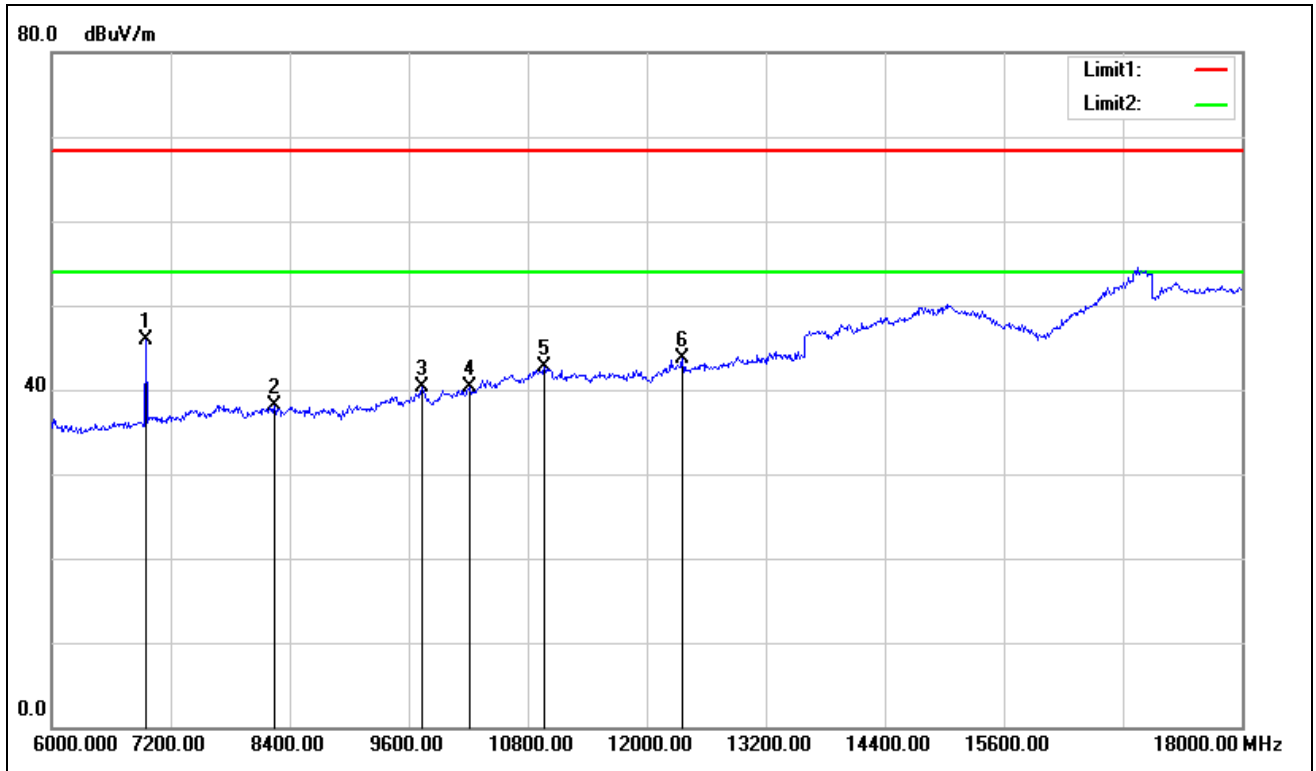
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
6948.000	38.26	7.62	45.88	68.23	-22.35	V	peak
8244.000	28.56	9.52	38.08	68.23	-30.15	V	peak
9732.000	29.05	11.21	40.26	68.23	-27.97	V	peak
10212.000	27.71	12.64	40.35	68.23	-27.88	V	peak
10968.000	27.65	14.98	42.63	68.23	-25.60	V	peak
12360.000	27.82	15.83	43.65	68.23	-24.58	V	peak
6948.000	40.37	7.62	47.99	68.23	-20.24	H	Peak
7788.000	29.96	9.24	39.20	68.23	-29.03	H	Peak
9780.000	28.50	11.35	39.85	68.23	-28.38	H	Peak
11256.000	27.25	14.97	42.22	68.23	-26.01	H	peak
13032.000	25.53	18.03	43.56	68.23	-24.67	H	peak
13692.000	27.87	19.77	47.64	68.23	-20.59	H	peak

Remark:

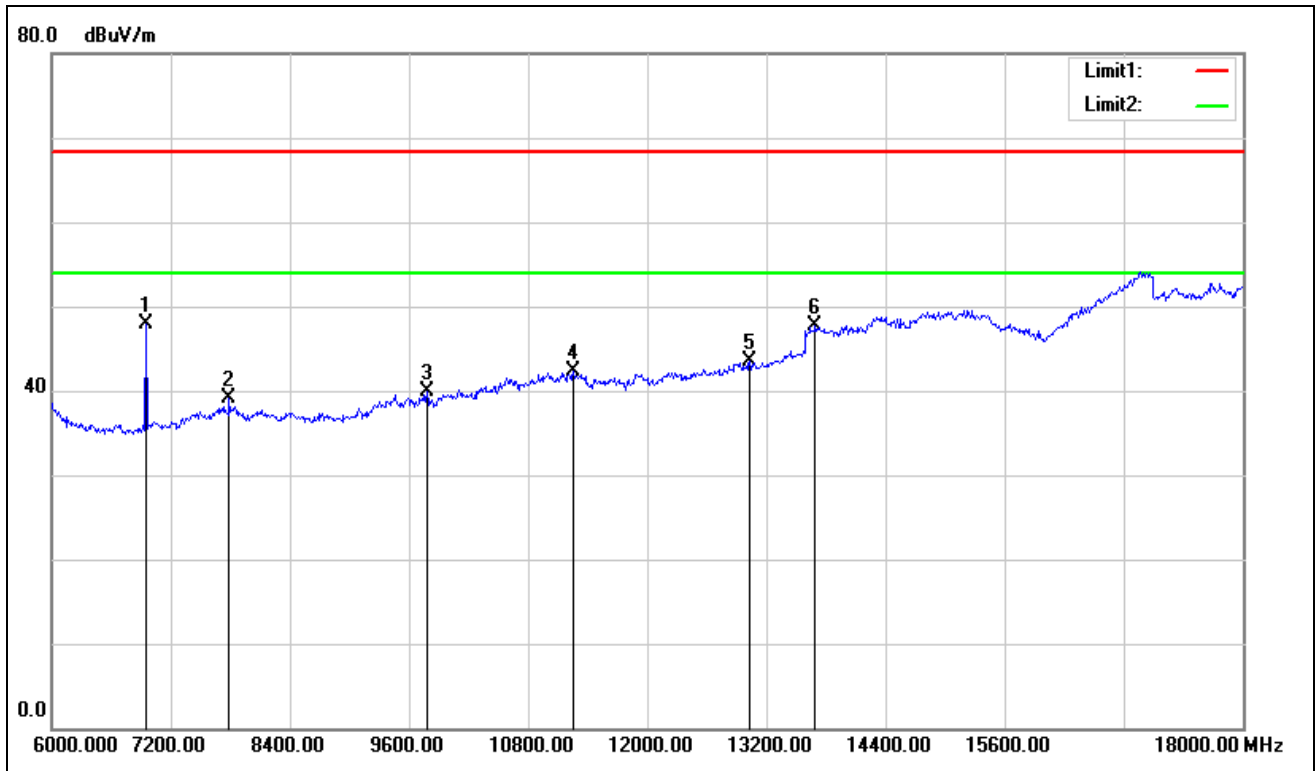
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
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).



Vertical



Horizontal





7 POWERLINE CONDUCTED EMISSION

7.1.1. LIMIT

According to RSS-Gen §7.2.2, except when the requirements applicable to a given device state

otherwise, for any licence-exempt radio communication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 2. The tighter limit applies at the frequency range boundaries. The conducted emissions shall be measured with a 50 ohm/50 microhenry line impedance stabilization network. A description of the method of measurement that is acceptable to Industry Canada is found in RSS-212.

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

NOTE:

- (1) The lower limit shall apply at the transition frequencies.
- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

7.3.2. 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	02/21/2017	02/20/2018
LISN(EUT)	ROHDE&SCHWARZ	ENV216	101543-WX	02/21/2017	02/20/2018
LISN	EMCO	3825/2	8901-1459	02/21/2017	02/20/2018
Temp. / Humidity Meter	VICTOR	HTC-1	N/A	02/21/2017	02/20/2018
Cable	HuberSuhner	SUCOFLEX104PEA	N/A	N/A	N/A
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.

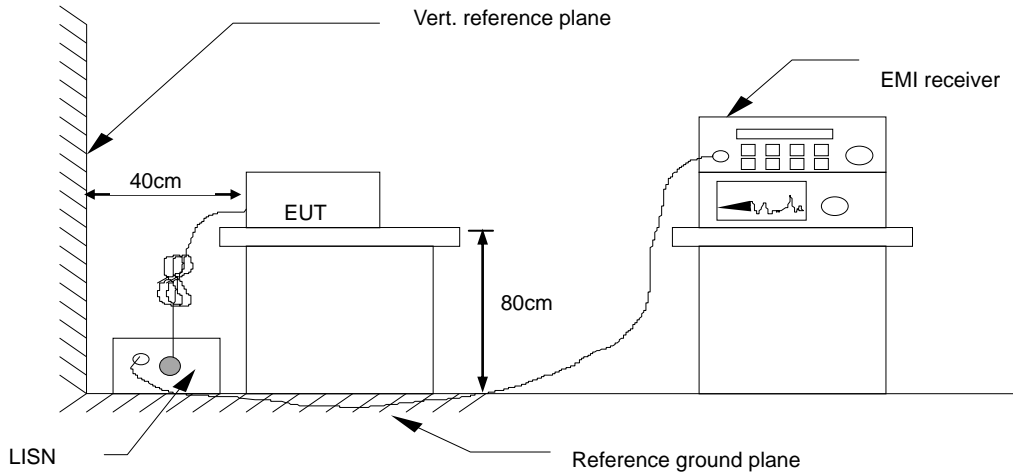


7.1.3. TEST PROCEDURES (please refer to measurement standard)

- The EUT and Support equipment, if needed, was placed on a non-conducted table, which is 0.8m above the ground plane and 0.4m away from the conducted wall.
- The test equipment EUT installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane. All support equipment power received from a second LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The frequency range from 150 kHz to 30 MHz was searched. The test data of the worst-case condition(s) was recorded. Emission levels under limit 20dB were not recorded.



7.1.4. TEST SETUP



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

7.3.5. DATA SAMPLE

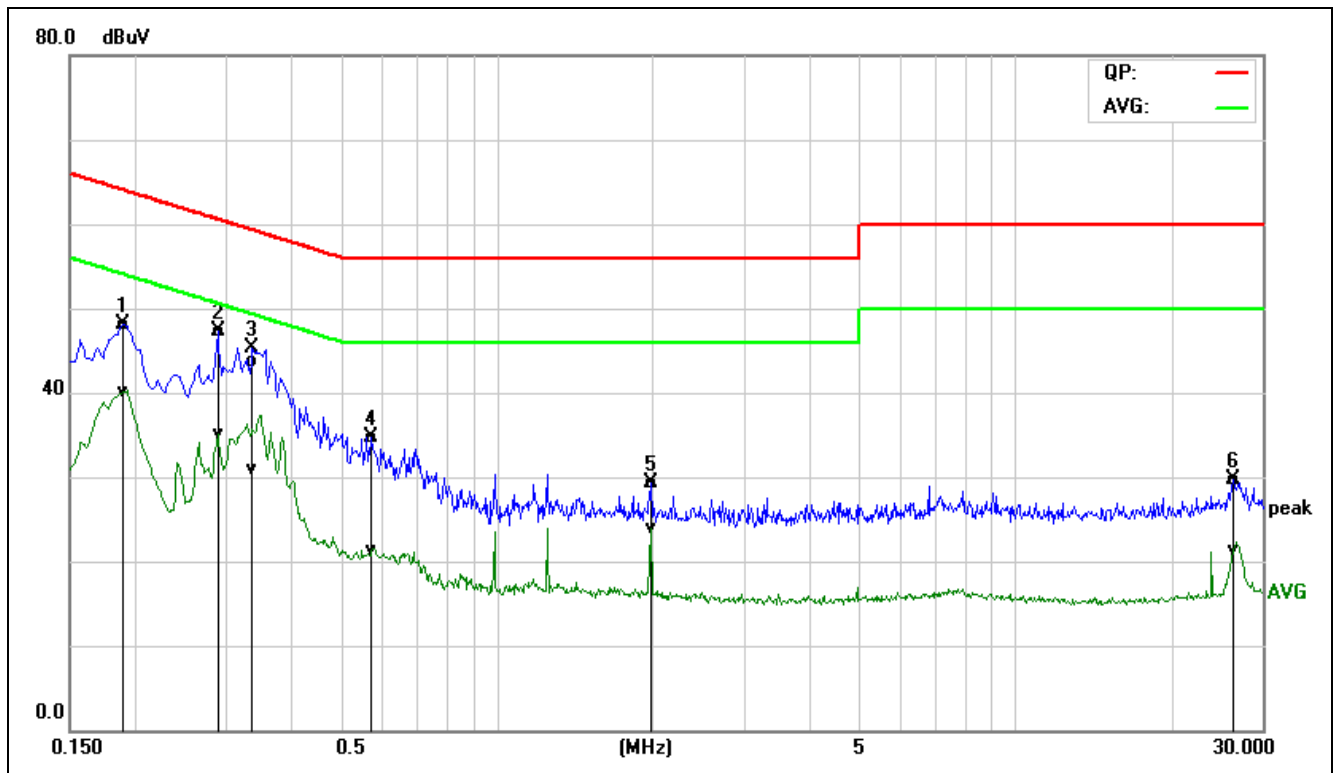
Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XXXX	32.69	25.65	11.52	44.21	37.17	65.78	55.79	-21.57	-18.62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



7.3.6. TEST RESULTS

Model No.	TEW-430AP/A	RBW,VBW	9 kHz
Environmental Conditions	22°C, 45% RH	Test Mode	Mode 1
Tested by	Fade Zhong	Line	L1
Test Date	June 30, 2017	Test Voltage	AC120V/60Hz

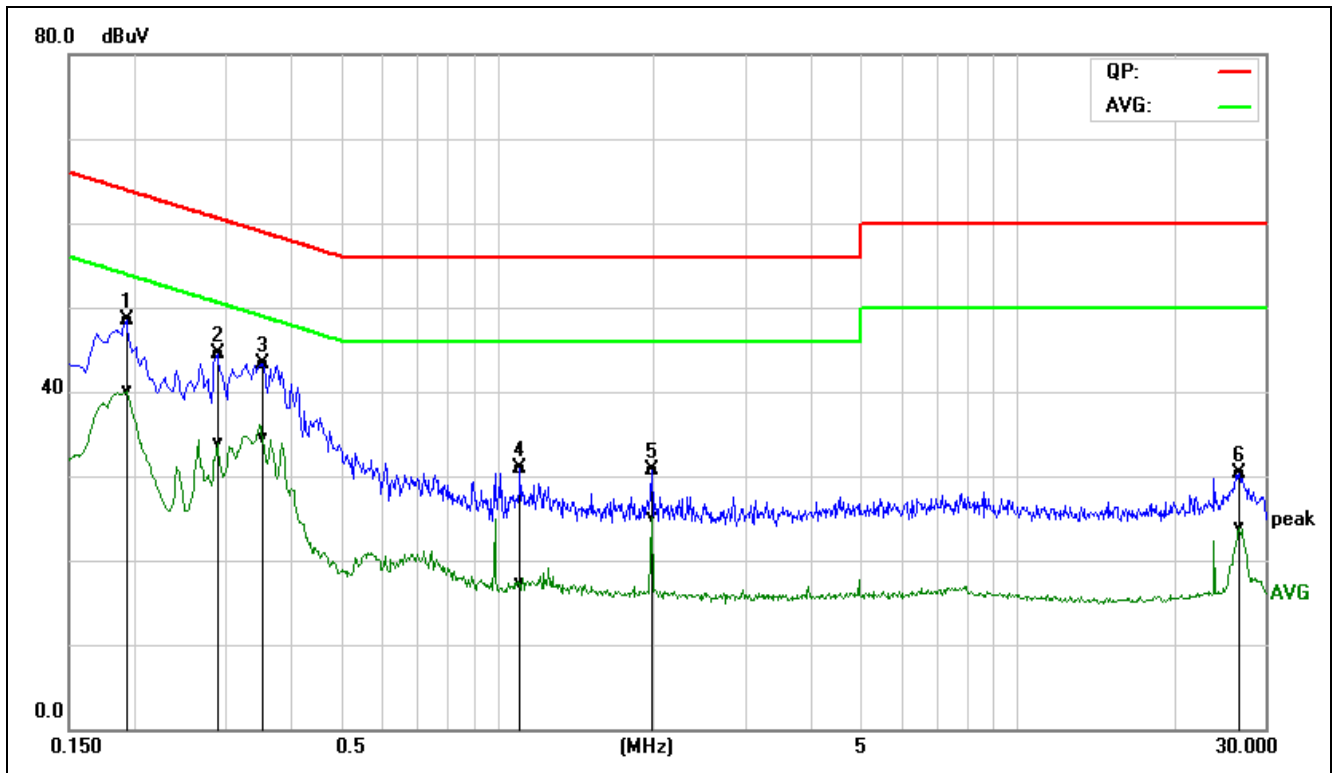


Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)	Line (L1/L2)
0.1900	28.47	20.38	19.64	48.11	40.02	64.03	54.04	-15.92	-14.02	Pass	L1
0.2900	27.70	15.54	19.61	47.31	35.15	60.52	50.52	-13.21	-15.37	Pass	L1
0.3379	24.10	11.36	19.59	43.69	30.95	59.25	49.25	-15.56	-18.30	Pass	L1
0.5740	15.13	1.80	19.56	34.69	21.36	56.00	46.00	-21.31	-24.64	Pass	L1
1.9820	9.62	4.23	19.72	29.34	23.95	56.00	46.00	-26.66	-22.05	Pass	L1
26.4100	9.21	0.77	20.46	29.67	21.23	60.00	50.00	-30.33	-28.77	Pass	L1

REMARKS: L1 = Line One (Live Line)



Model No.	TEW-430AP/A	RBW,VBW	9 kHz
Environmental Conditions	22°C, 45% RH	Test Mode	Mode 1
Tested by	Fade Zhong	Line	L2
Test Date	June 30, 2017	Test Voltage	AC120V/60Hz

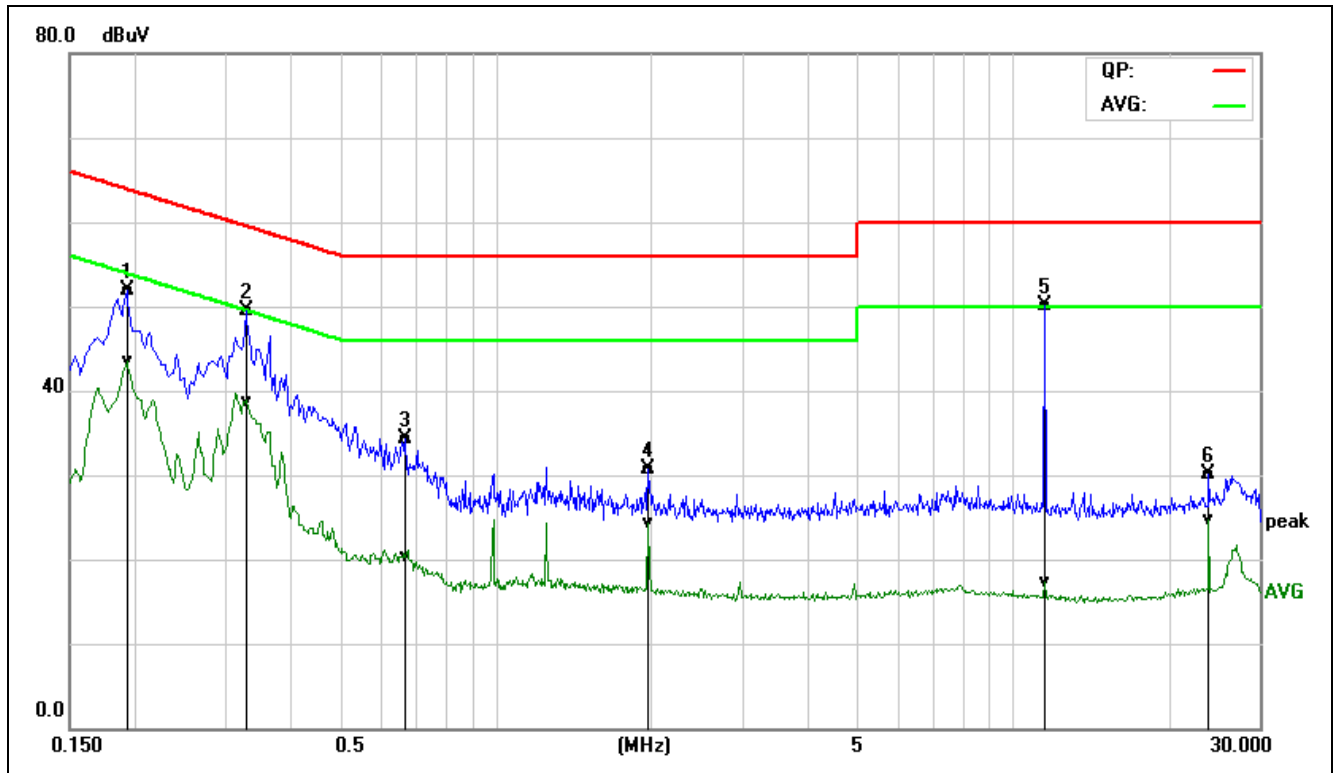


Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)	Line (L1/L2)
0.1940	28.97	20.65	19.54	48.51	40.19	63.86	53.86	-15.35	-13.67	Pass	L2
0.2900	25.02	14.31	19.54	44.56	33.85	60.52	50.52	-15.96	-16.67	Pass	L2
0.3540	23.87	14.99	19.53	43.40	34.52	58.87	48.87	-15.47	-14.35	Pass	L2
1.1060	11.38	-2.20	19.57	30.95	17.37	56.00	46.00	-25.05	-28.63	Pass	L2
1.9820	10.98	5.33	19.72	30.70	25.05	56.00	46.00	-25.30	-20.95	Pass	L2
26.8380	9.77	3.19	20.62	30.39	23.81	60.00	50.00	-29.61	-26.19	Pass	L2

REMARKS: L2 = Line Two (Neutral Line)



Model No.	TEW-430AP/A	RBW,VBW	9 kHz
Environmental Conditions	22°C, 45% RH	Test Mode	Mode 2
Tested by	Fade Zhong	Line	L1
Test Date	June 30, 2017	Test Voltage	AC240V/50Hz

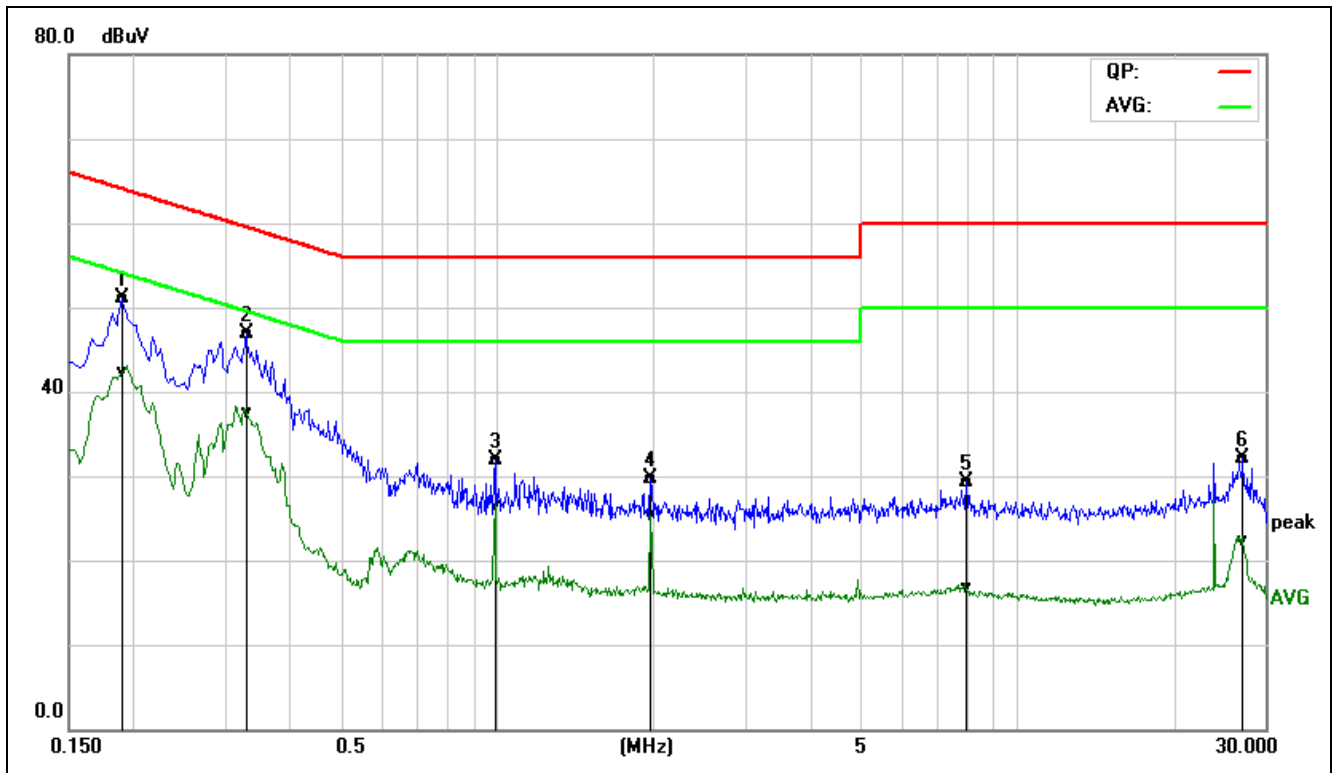


Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)	Line (L1/L2)
0.1940	32.34	23.78	19.64	51.98	43.42	63.86	53.86	-11.88	-10.44	Pass	L1
0.3300	29.94	19.20	19.60	49.54	38.80	59.45	49.45	-9.91	-10.65	Pass	L1
0.6700	14.76	0.66	19.60	34.36	20.26	56.00	46.00	-21.64	-25.74	Pass	L1
1.9780	10.93	4.52	19.72	30.65	24.24	56.00	46.00	-25.35	-21.76	Pass	L1
11.5140	30.08	-2.81	20.11	50.19	17.30	60.00	50.00	-9.81	-32.70	Pass	L1
23.9980	9.69	4.33	20.42	30.11	24.75	60.00	50.00	-29.89	-25.25	Pass	L1

REMARKS: L1 = Line One (Live Line)



Model No.	TEW-430AP/A	RBW,VBW	9 kHz
Environmental Conditions	22°C, 45% RH	Test Mode	Mode 2
Tested by	Fade Zhong	Line	L2
Test Date	June 30, 2017	Test Voltage	AC240V/50Hz



Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)	Line (L1/L2)
0.1900	31.45	22.68	19.64	51.09	42.32	64.03	54.04	-12.94	-11.72	Pass	L2
0.3300	27.22	17.87	19.60	46.82	37.47	59.45	49.45	-12.63	-11.98	Pass	L2
0.9900	12.27	7.05	19.55	31.82	26.60	56.00	46.00	-24.18	-19.40	Pass	L2
1.9780	10.01	5.51	19.72	29.73	25.23	56.00	46.00	-26.27	-20.77	Pass	L2
7.9900	9.30	-3.26	19.94	29.24	16.68	60.00	50.00	-30.76	-33.32	Pass	L2
27.2060	11.73	1.81	20.47	32.20	22.28	60.00	50.00	-27.80	-27.72	Pass	L2

REMARKS: L2 = Line Two (Neutral Line)