



FCC 47 CFR PART 15 SUBPART C

for

802.11n VDSL2 Gateway

Model: SR512nm

Brand: SmartRG

Test Report Number:

C160323Z01-RP1

Issued Date: April 13, 2016

Issued for

SmartRG Inc

501 SE Columbia Shores Boulevard, Suite 500 Vancouver, Washington 98661

Issued by:

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TESTING CERT #2861.01

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	April 13, 2016	Initial Issue	ALL	Nancy Fu



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1 TEST CERTIFICATION

Product	802.11n VDSL2 Gateway
Model	SR512nm
Brand	SmartRG
Tested	March 23~ April 13, 2016
Applicant	SmartRG Inc 501 SE Columbia Shores Boulevard, Suite 500 Vancouver, Washington 98661
Manufacturer	SmartRG Inc 501 SE Columbia Shores Boulevard, Suite 500 Vancouver, Washington 98661

APPLICABLE STANDARDS

Standard	Test Type	Standard	Test Type
15.207(a)	Power Line Conducted Emissions	15.247(d) 15.209(a)	● Spurious Emissions ● Conducted Measurement ● Radiated Emissions
15.247(a)(2)	6dB Bandwidth Measurement	15.247(b)(3) 15.247(b)(4)	Peak Power Measurement
15.247(d)	Band Edges Measurement	15.247(e)	Peak Power Spectral Density

We hereby certify that:

The above equipment was tested by Compliance Certification Services (Shenzhen) Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in **ANSI C63.10: 2013** and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT 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 TEST RESULT SUMMARY

APPLICABLE STANDARDS			
Standard	Test Type	Result	Remark
15.247(a)(2)	6dB Bandwidth Measurement	Pass	Meet the requirement of limit.
15.247(b)(3) 15.247(b)(4)	Peak Power Measurement	Pass	Meet the requirement of limit.
15.247(d)	Band Edges Measurement	Pass	Meet the requirement of limit.
15.247(e)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.247(d) 15.209(a)	● Spurious Emissions ● Conducted Measurement ● Radiated Emissions	Pass	Meet the requirement of limit.
15.207(a)	Power line Conducted Emissions	Pass	Meet the requirement of limit.

Note: 1. The statements of test result on the above are decided by the request of test standard only; the measurement uncertainties are not factored into this compliance determination.
2. The information of measurement uncertainty is available upon the customer's request.



3 EUT DESCRIPTION

Product	802.11n VDSL2 Gateway
Model Number	SR512nm
Brand	SmartRG
Model Discrepancy	N/A
Identify Number	C160323Z01-RP1
Received Date	March 23, 2016
Power Supply	DC 12V supplied by the adapter
Adapter Manufacturer /Model No.	Shenzhen Gongjin Electronics Co., Ltd. / S24B72-120A200-C4 I/P: 100-240Vac, 50/60Hz, Max 0.8A O/P: 12Vdc, 2A DC Output Cable: Unshielded, 1.50m
Transmit Power	IEEE 802.11b mode: 15.86dBm (Antenna 0) IEEE 802.11b mode: 17.19dBm (Antenna 1) IEEE 802.11g mode: 19.30dBm (Antenna 0) IEEE 802.11g mode: 19.72dBm (Antenna 1) IEEE 802.11n HT20 MHz mode: 23.76dBm(Combine with Antenna 0 and Antenna 1) IEEE 802.11n HT40 MHz mode: 21.27dBm(Combine with Antenna 0 and Antenna 1)
Modulation Technique	IEEE 802.11b mode: DSSS(CCK,QPSK, BPSK) IEEE 802.11g mode: OFDM (BPSK/QPSK/16QAM/64QAM) IEEE 802.11n HT20 MHz mode: OFDM (BPSK/QPSK/16QAM/64QAM) IEEE 802.11n HT40 MHz mode: OFDM (BPSK/QPSK/16QAM/64QAM)
Transmit Data Rate	IEEE 802.11b: 11Mbps(CCK) with fall back rates of 5.5/2/1Mbps IEEE 802.11g: 54Mbps with fall back rates of 48/36/24/18/12/9 /6Mbps IEEE 802.11n HT20: 130Mbps with fall back rates of 130/117/104/78/52/39/26/13Mbps IEEE 802.11n HT40: 270Mbps with fall back rates of 270/243/216/162/108/81/54/27Mbps
Number of Channels	IEEE 802.11b mode: 11 Channels IEEE 802.11g mode: 11 Channels IEEE 802.11n HT20 MHz mode: 11 Channels IEEE 802.11n HT40 MHz mode: 7 Channels
Antenna Specification	PCB Antenna with 2.5dBi gain (Max)
Channels Spacing	IEEE 802.11b/g ,802.11n HT20/HT40 : 5MHz
Temperature Range	0°C ~ +40°C
Hardware Version	VDSL-BCM3W-0015 REV1.0
Software Version	2.6.0.20160307120230

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

2. This submittal(s) (test report) is intended for FCC ID: **VW7SR512NM** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



4 TEST METHODOLOGY

4.1. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

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

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

IEEE802.11b mode: Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 1Mbps data rate were chosen for full testing.

IEEE802.11g mode: Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT20 MHz mode: Channel Low (2412MHz), Channel Mid(2437MHz) and Channel High (2462MHz) with 13Mbps data rate were chosen for full testing.

IEEE 802.11n HT40 MHz mode: Channel Low (2422MHz), Channel Mid (2437MHz) and Channel High (2452MHz) with 27Mbps data rate were chosen for full testing.



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.

No.	Equipment	Model No.	Serial No.	FCC ID	Brand	Data Cable	Power Cord
1	Notebook#1	B475	WB04861612	DoC	LENOVO	Shielded 2.00m	Unshielded 1.50m (AC Cable) Unshielded 1.80m (DC Cable)
2	Notebook #2	E335	R9-WN1EF	DoC	Thinkpad	Unshielded, 2.00m	Unshielded 1.50m (AC Cable) Unshielded 1.80m (DC Cable)
3	IPOD #1	A1285	YM91545C3QY	DoC	APPLE	Shielded, 1.00m	N/A
4	IPOD #2	A1285	YM914GTH3RO	DoC	APPLE	Shielded, 1.00m	N/A
5	VDSL	9806H	N/A	DoC	ZTE	Unshielded 2.00m	Unshielded 1.70m
6	Phone	HCD6238P/T SDL	23B HCD6238P/ TSDL	DoC	CHINOE	Unshielded 1.20m	N/A

Note:

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

5.2. CONFIGURATION OF SYSTEM UNDER TEST

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



6 FACILITIES AND ACCREDITATIONS

6.1. 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."

6.2. 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-4815, R-4320, T-2317, G-10624)
Canada	INDUSTRY CANADA

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

6.3. 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.



7 FCC PART 15.247 REQUIREMENTS

7.1. POWER LINE CONDUCTED EMISSIONS MEASUREMENT

7.1.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

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

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.

7.1.2. TEST INSTRUMENTS

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

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

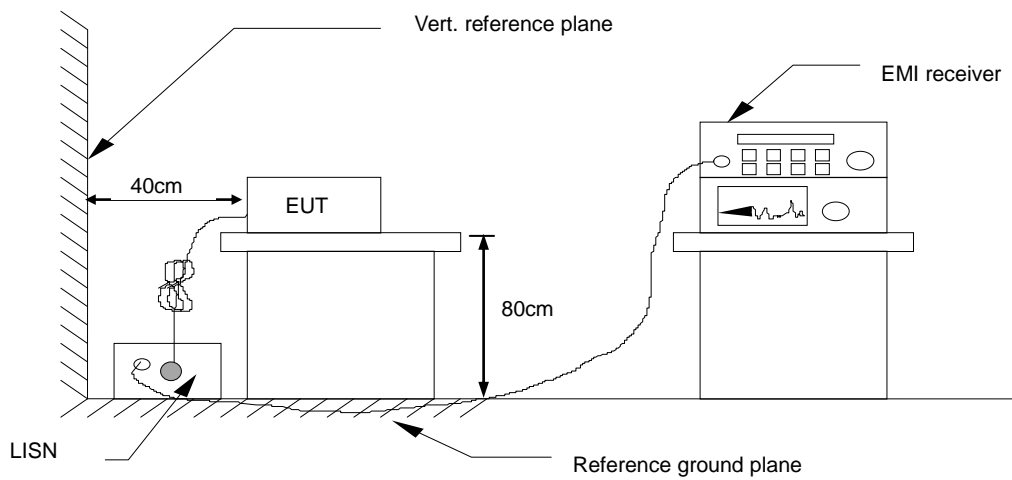


7.1.3. TEST PROCEDURES (please refer to measurement standard)

- 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.

7.1.5. DATA SAMPLE

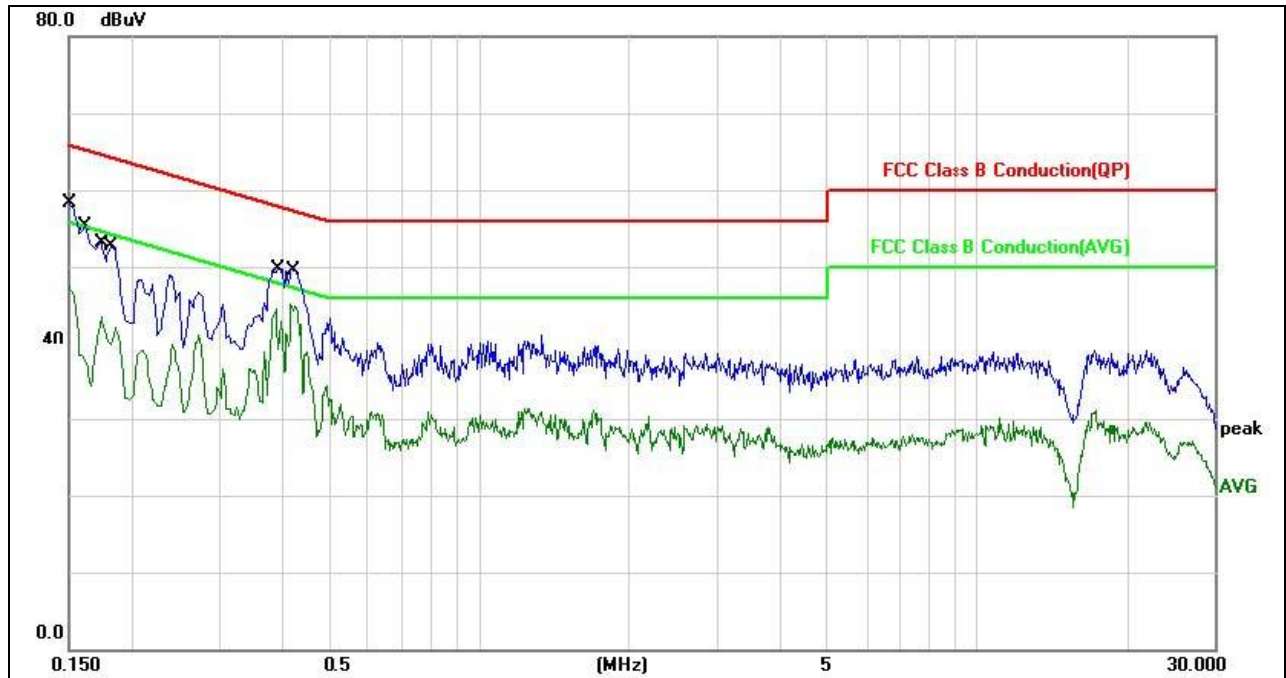
Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XXXX	32.69	25.65	11.52	44.21	37.17	65.78	55.79	-21.57	-18.62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



7.1.6. TEST RESULTS

Model No.	SR512nm	RBW,VBW	9 kHz
Environmental Conditions	22°C, 45% RH	Test Mode	Mode 1
Tested by	AD Gan	Line	L1
Test Date	2016/04/11		

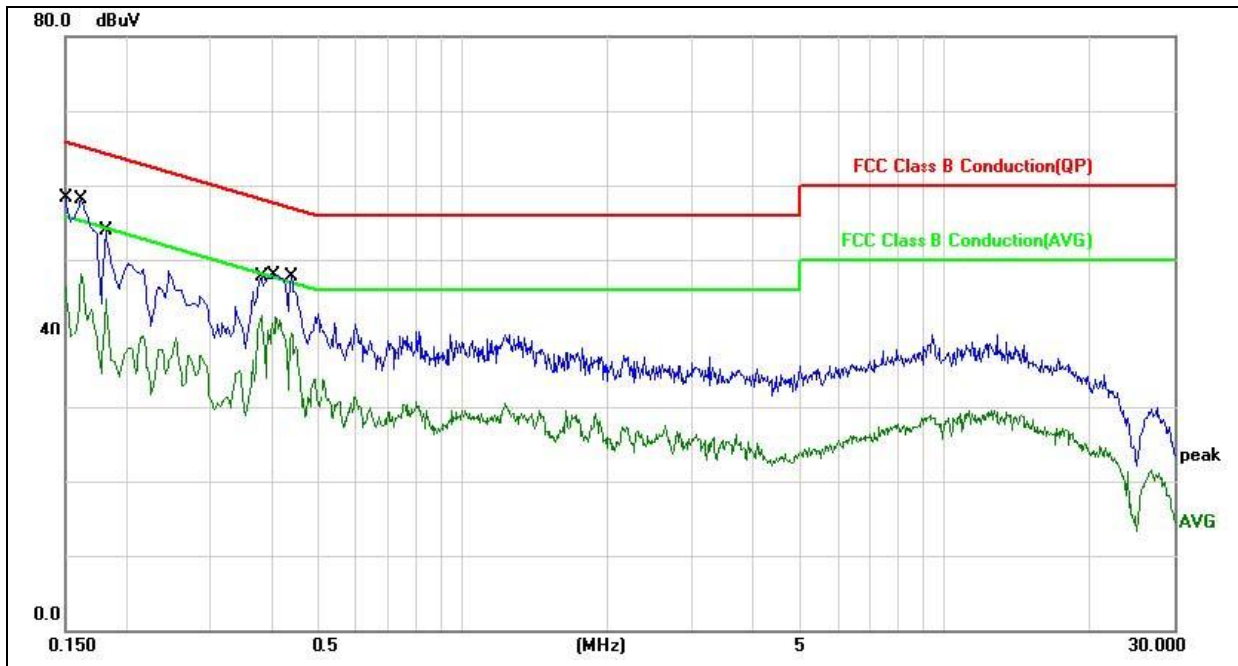


Frequency (MHz)	QuasiPeak Reading (dBμV)	Average Reading (dBμV)	Correction Factor (dB)	QuasiPeak Result (dBμV)	Average Result (dBμV)	QuasiPeak Limit (dBμV)	Average Limit (dBμV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
0.1500	43.45	33.26	13.11	56.56	46.37	65.99	55.99	-9.43	-9.62	Pass
0.1620	38.02	25.59	12.60	50.62	38.19	65.36	55.36	-14.74	-17.17	Pass
0.1740	39.12	29.38	12.08	51.20	41.46	64.76	54.76	-13.56	-13.30	Pass
0.1819	34.82	24.38	11.73	46.55	36.11	64.39	54.39	-17.84	-18.28	Pass
0.3940	35.88	29.25	10.56	46.44	39.81	57.98	47.98	-11.54	-8.17	Pass
0.4260	35.62	30.31	10.49	46.11	40.80	57.33	47.33	-11.22	-6.53	Pass

REMARKS: L1 = Line One (Live Line)



Model No.	SR512nm	RBW,VBW	9 kHz
Environmental Conditions	22°C, 45% RH	Test Mode	Mode 1
Tested by	AD Gan	Line	L1
Test Date	2016/04/11		



Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
0.1500	43.91	33.41	13.55	57.46	49.96	65.99	55.99	-8.53	-9.03	Pass
0.1620	38.27	26.14	12.93	51.20	39.07	65.36	55.36	-14.16	-16.29	Pass
0.1819	36.17	25.41	11.90	48.07	37.31	64.39	54.39	-16.32	-17.08	Pass
0.3820	33.06	27.60	10.59	43.65	38.19	58.23	48.23	-14.58	-10.04	Pass
0.4060	35.42	31.12	10.54	45.96	41.66	57.73	47.73	-11.77	-6.07	Pass
0.4460	31.91	27.28	10.46	42.37	37.74	56.95	46.95	-14.58	-9.21	Pass

REMARKS: L2 = Line Two (Neutral Line)



7.2. SPURIOUS EMISSIONS MEASUREMENT

7.2.1. CONDUCTED EMISSIONS MEASUREMENT

7.2.1.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

§15.247(d) specifies that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to 15.247(b)(3) requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.

If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to 15.247(b)(3) requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.

In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

7.2.1.2. TEST INSTRUMENTS

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

7.2.1.3. TEST PROCEDURE (please refer to measurement standard)

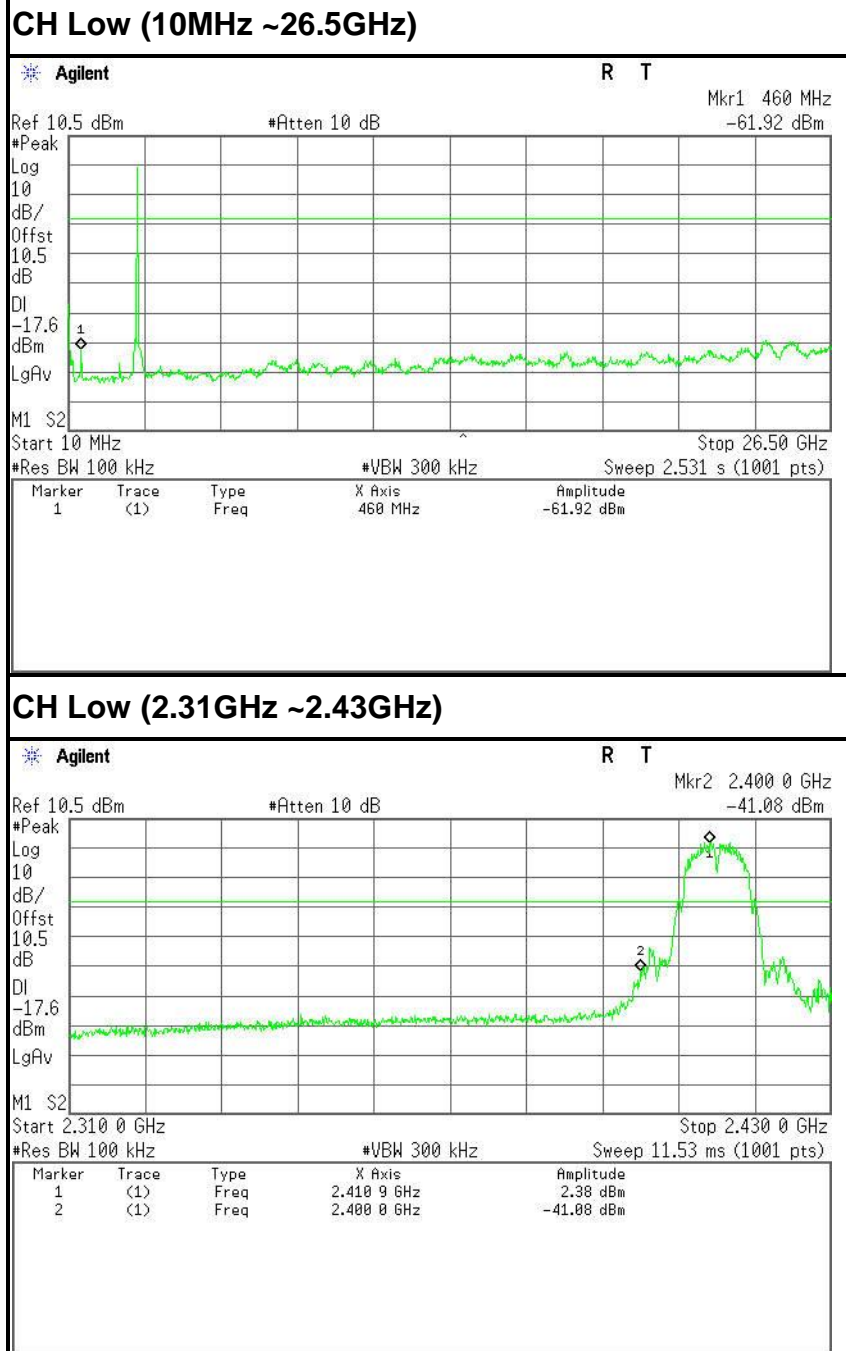
Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

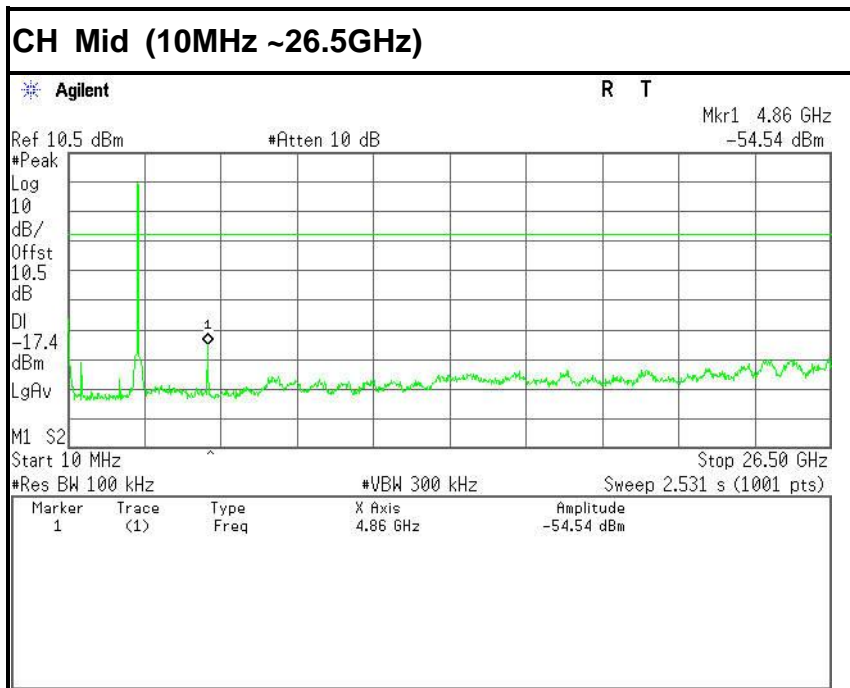
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

Measurements are made over the 10MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels. No emission found between lowest internal used/generated frequency to 10MHz, it is only recorded 10MHz to 26GHz.



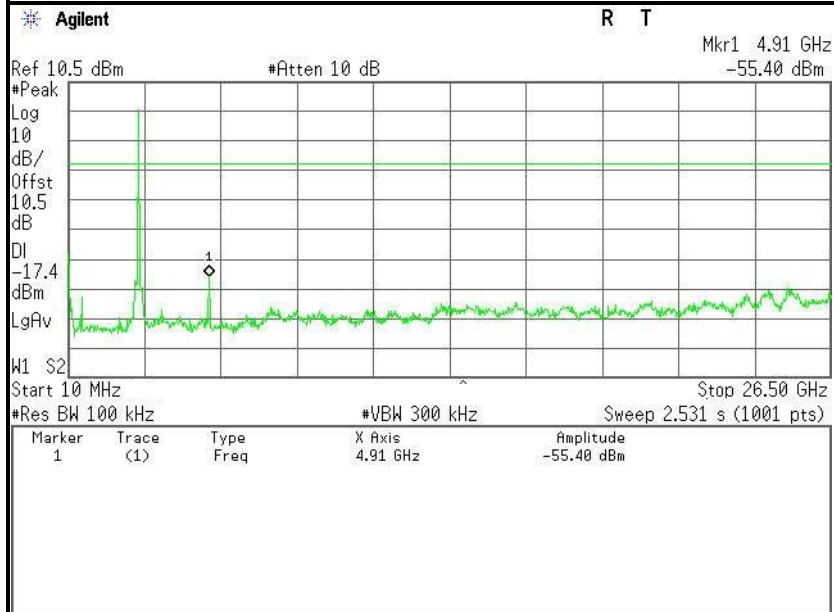
7.2.1.4. TEST RESULTS

Test PlotIEEE 802.11b mode (Antenna 0)

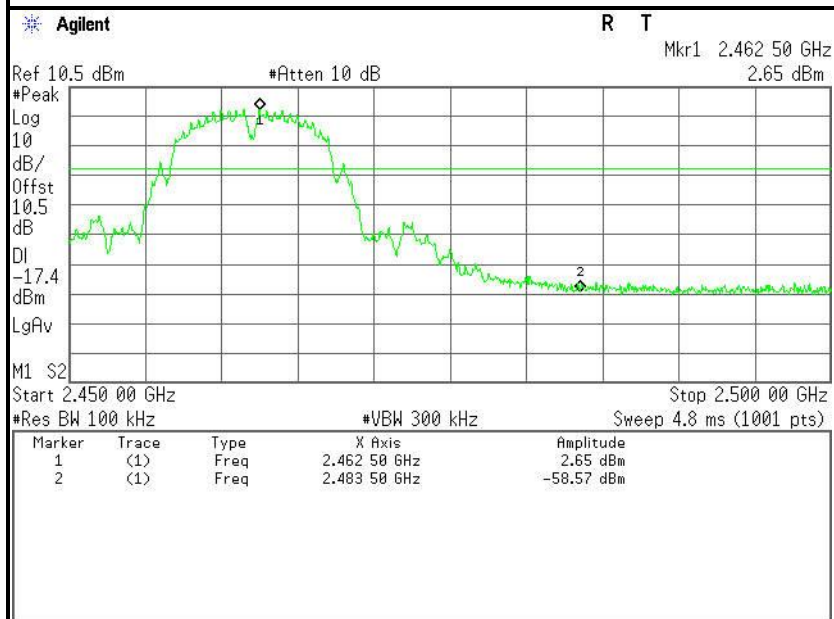




CH High (10MHz ~26.5GHz)

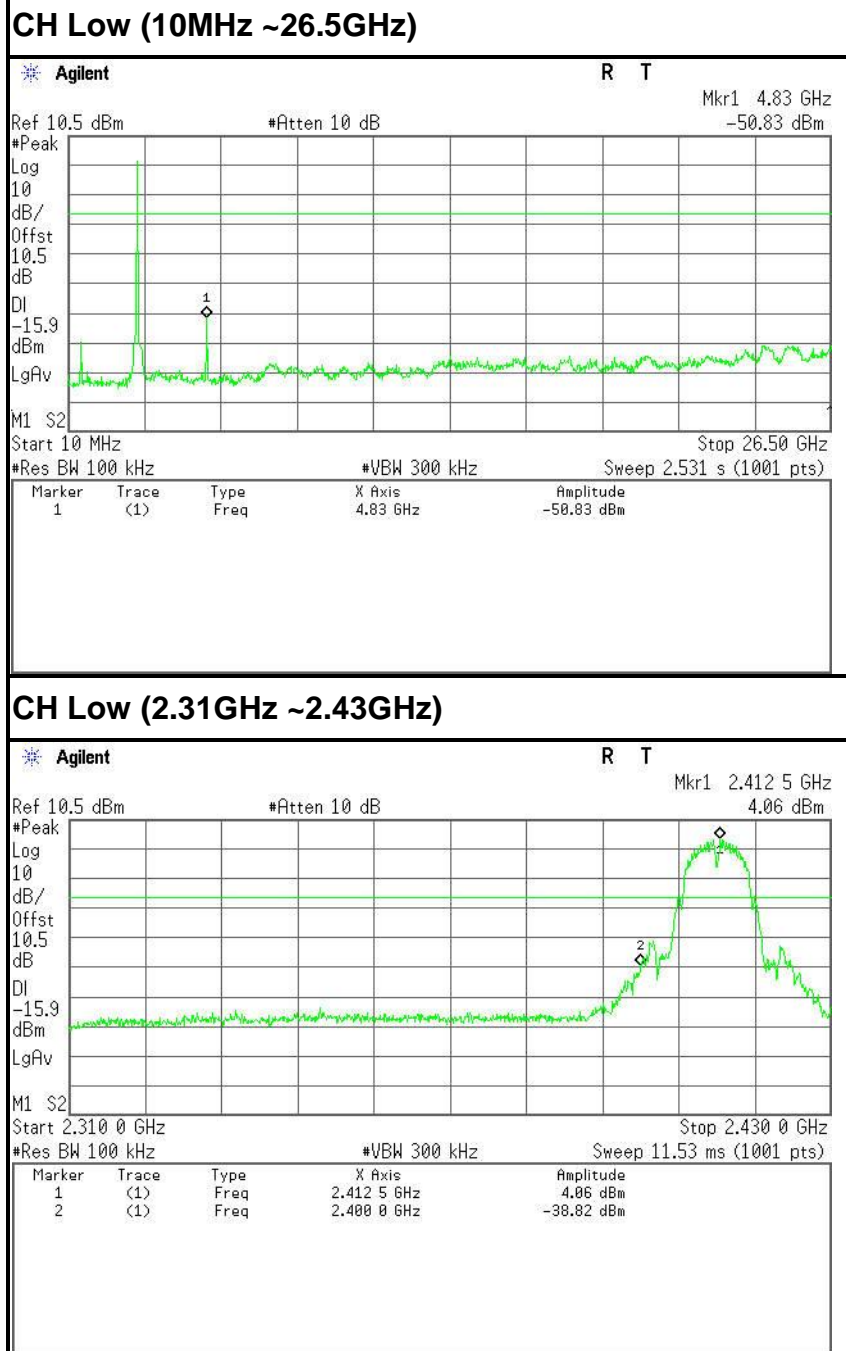


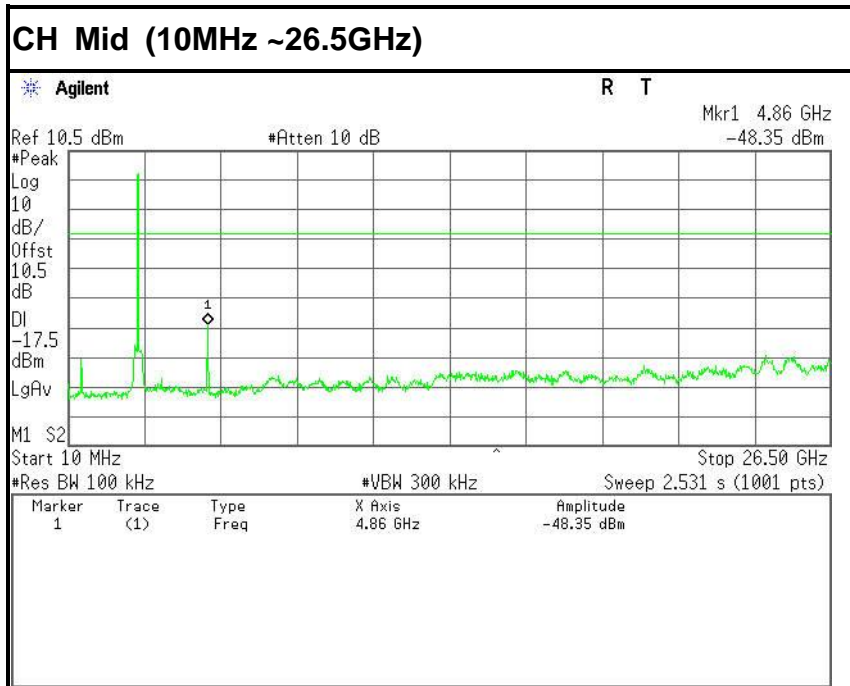
CH High (2.45GHz ~2.5GHz)





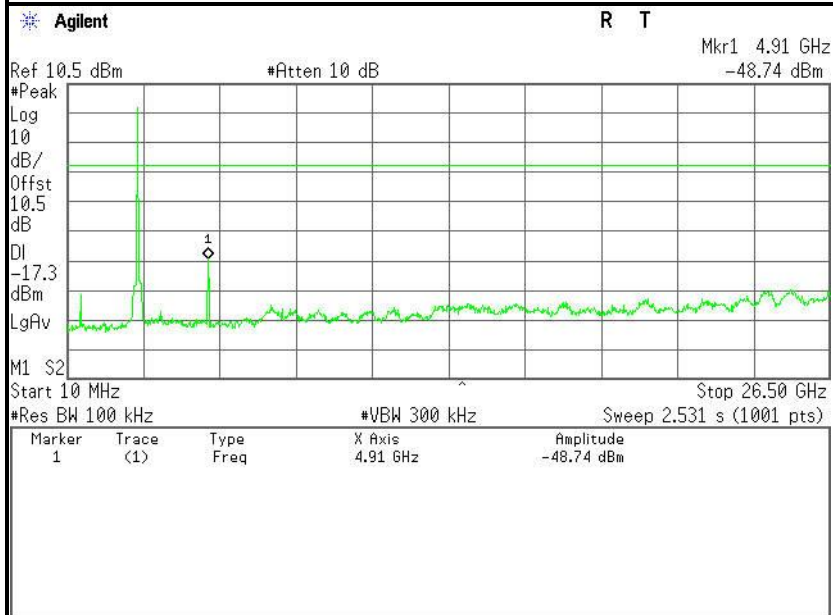
IEEE 802.11b mode (Antenna 1)



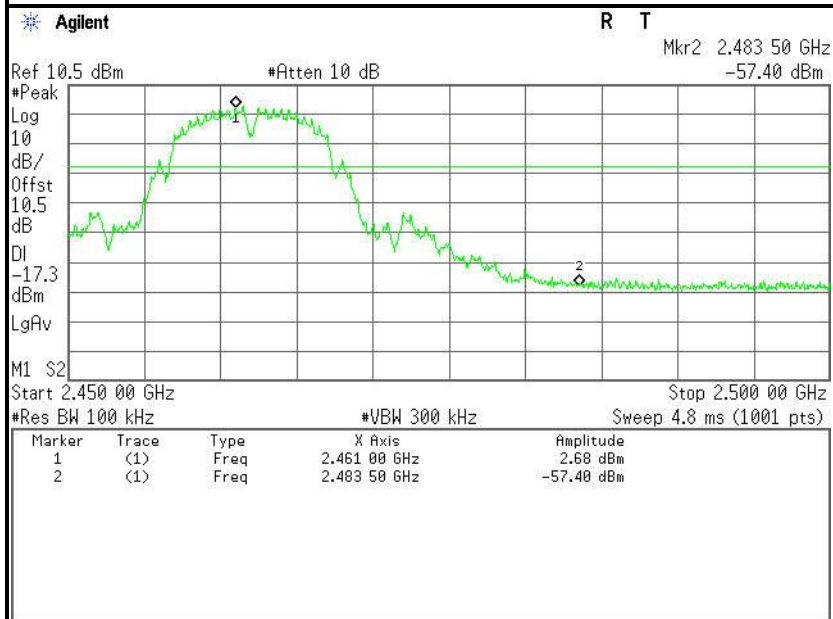


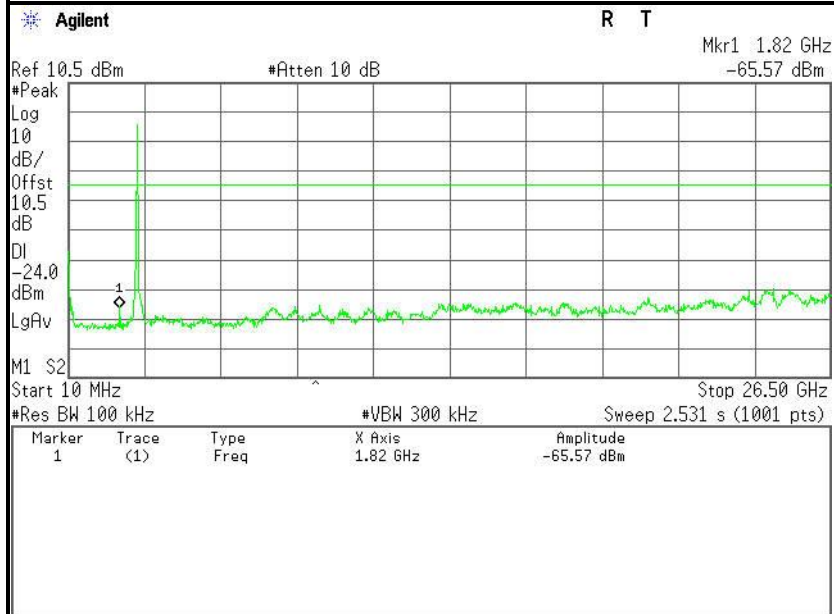
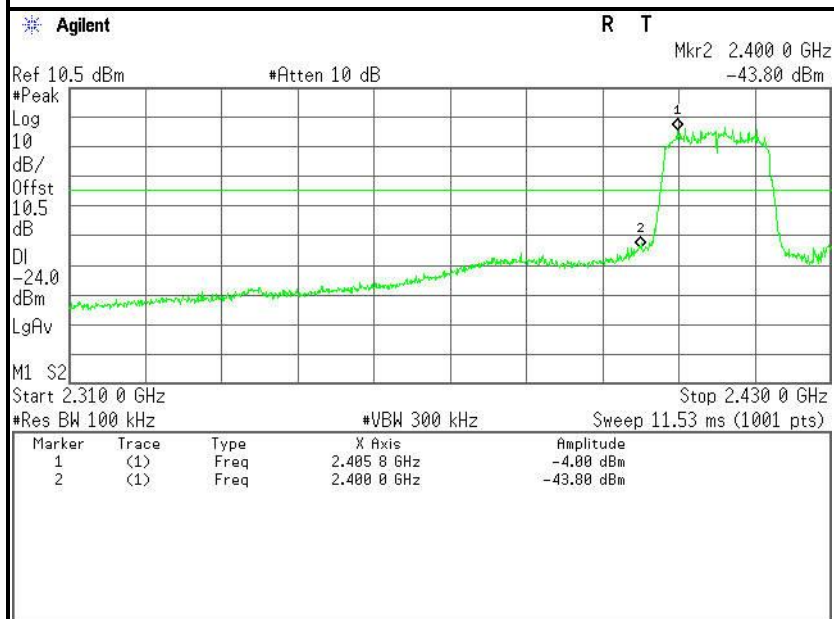


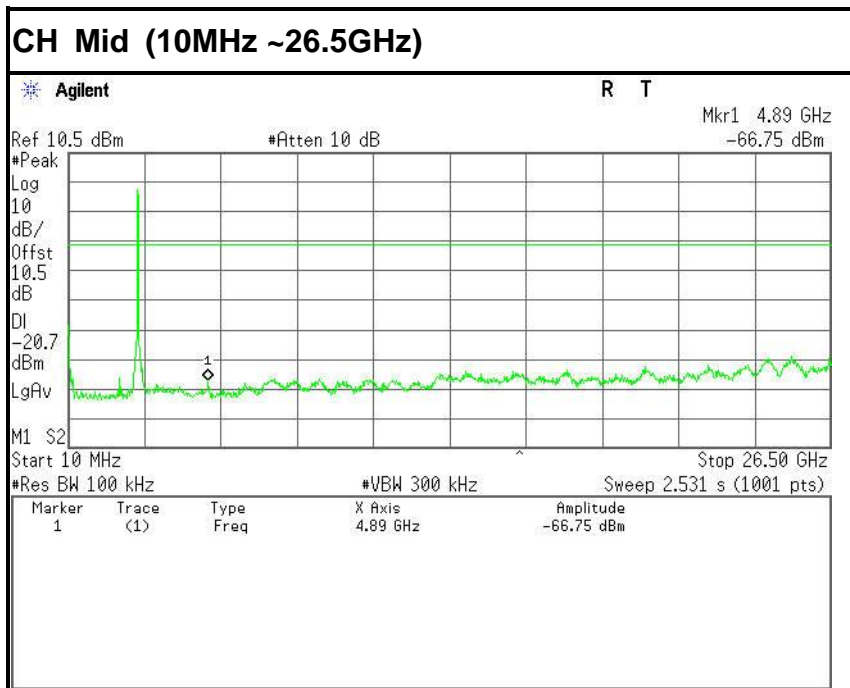
CH High (10MHz ~26.5GHz)



CH High (2.45GHz ~2.5GHz)

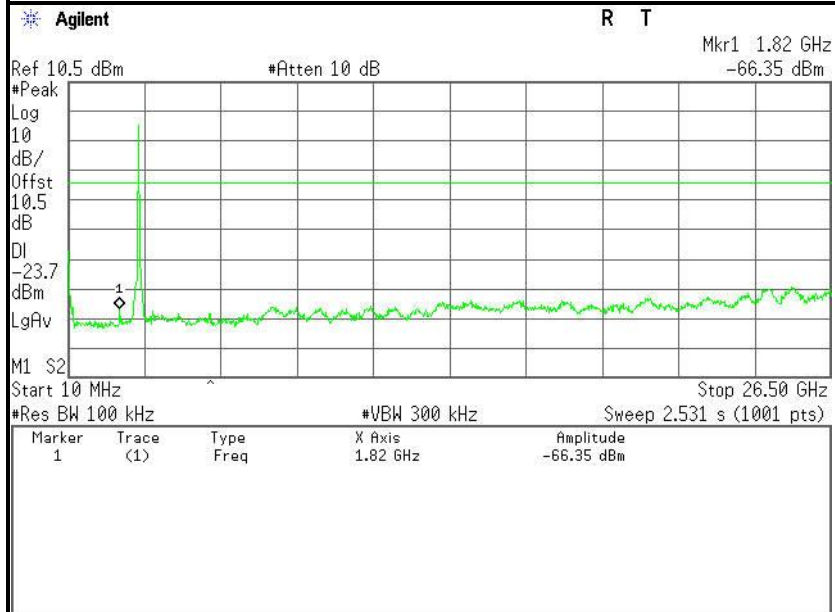


**IEEE 802.11g mode (Antenna 0)****CH Low (10MHz ~26.5GHz)****CH Low (2.31GHz ~2.43GHz)**

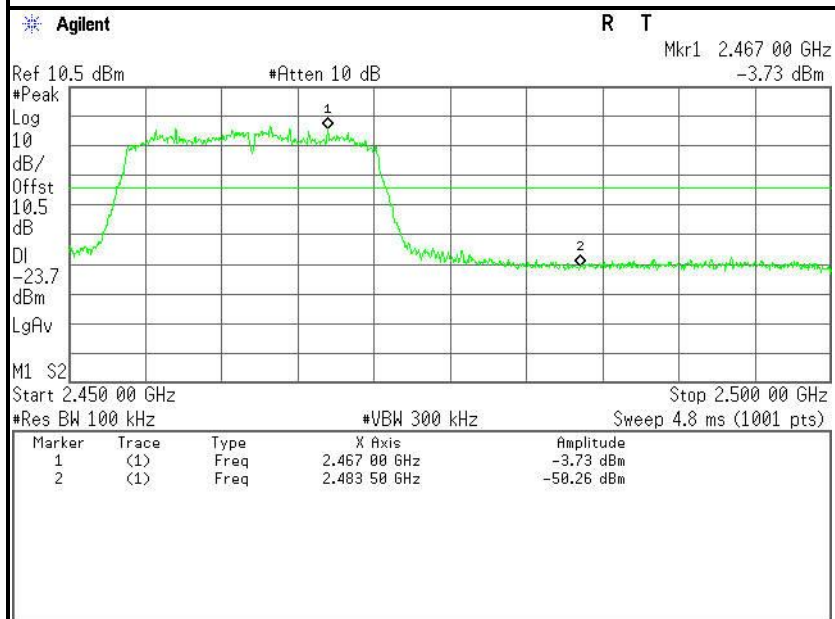




CH High (10MHz ~26.5GHz)

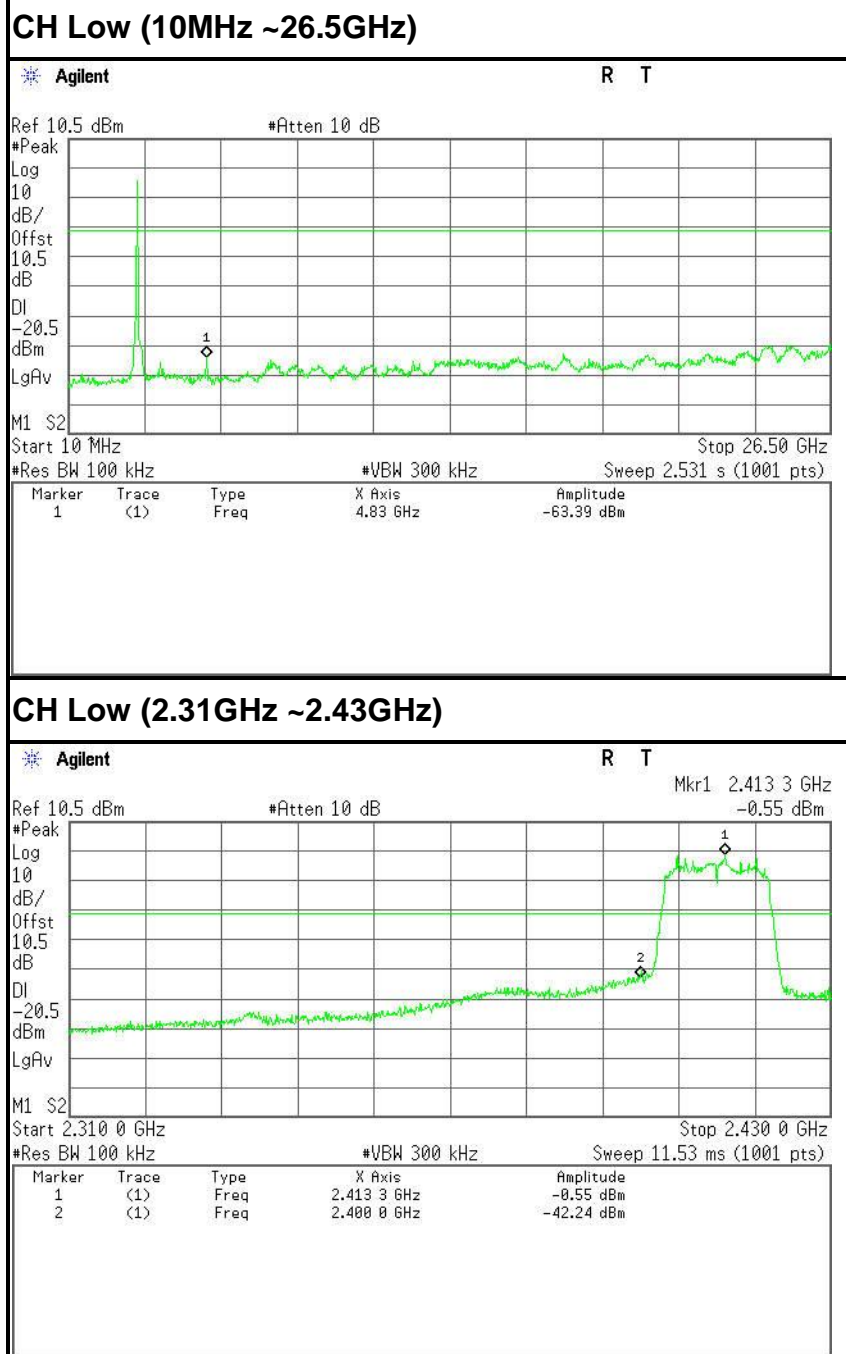


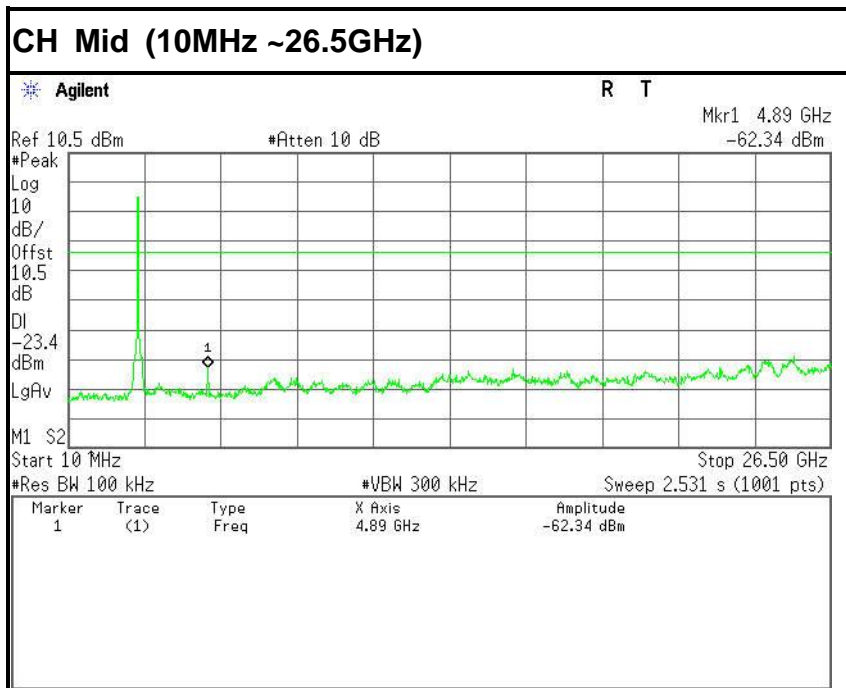
CH High (2.45GHz ~2.5GHz)





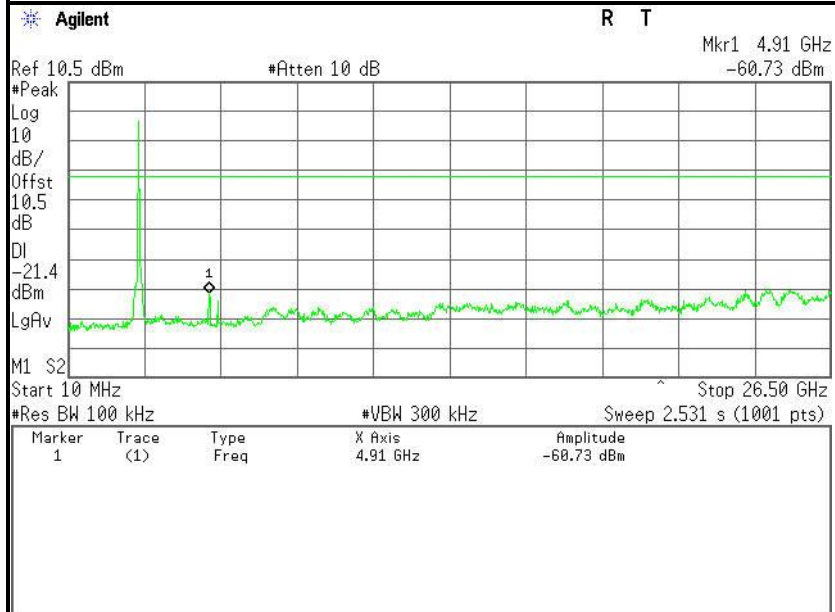
IEEE 802.11g mode (Antenna 1)



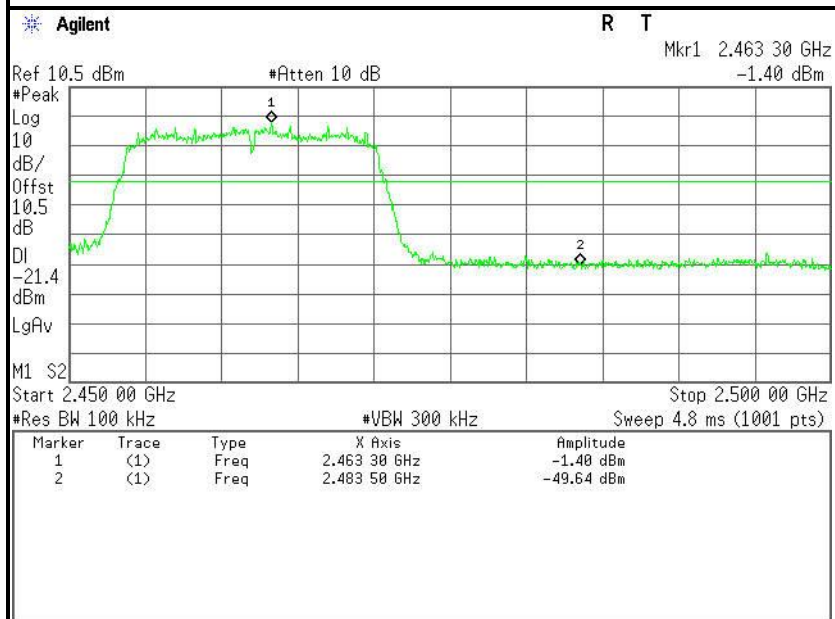




CH High (10MHz ~26.5GHz)

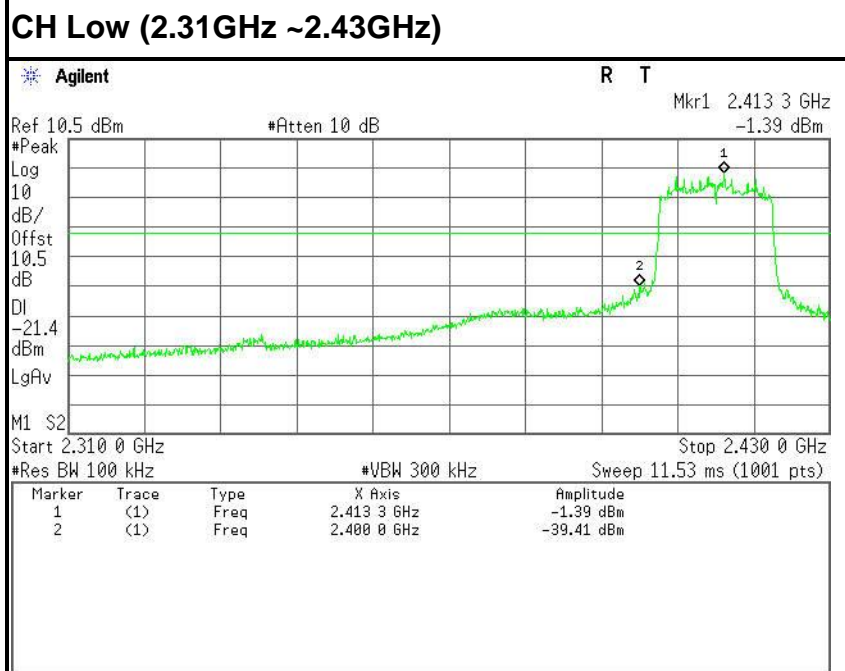
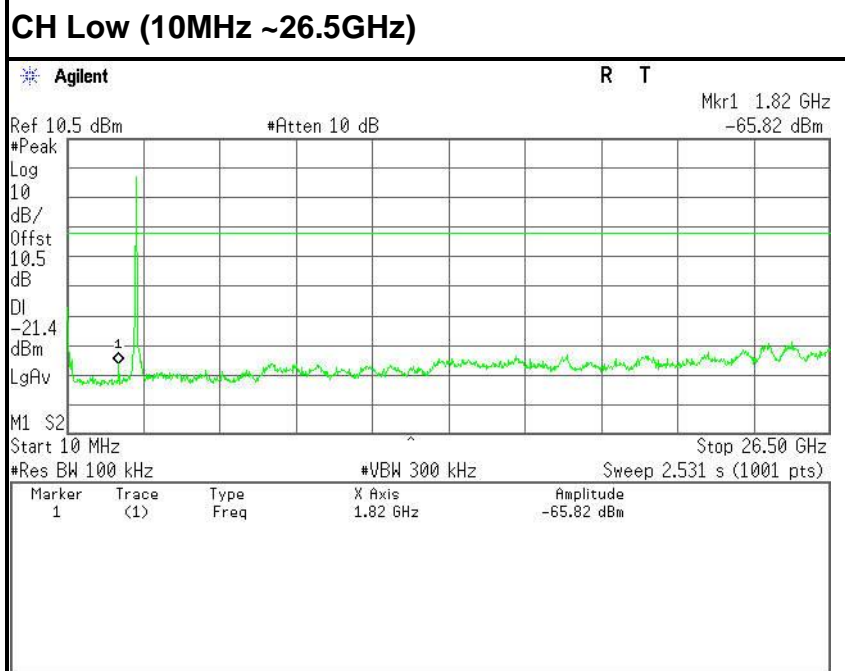


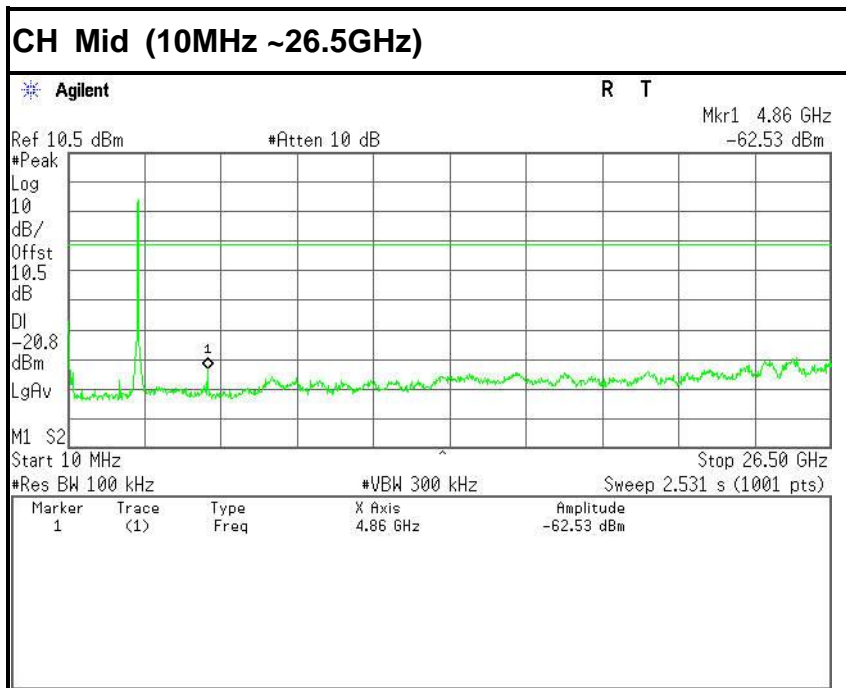
CH High (2.45GHz ~2.5GHz)





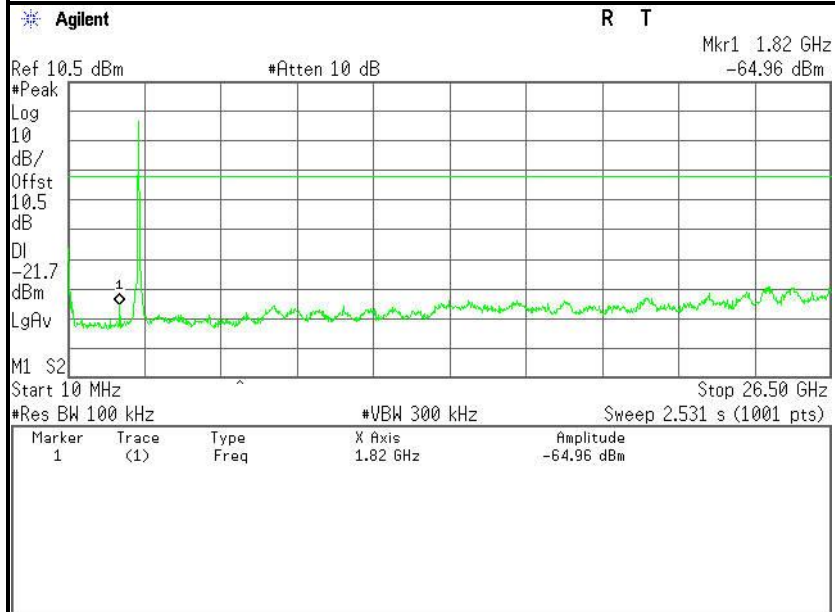
IEEE 802.11n HT20 MHz mode (Antenna 0)



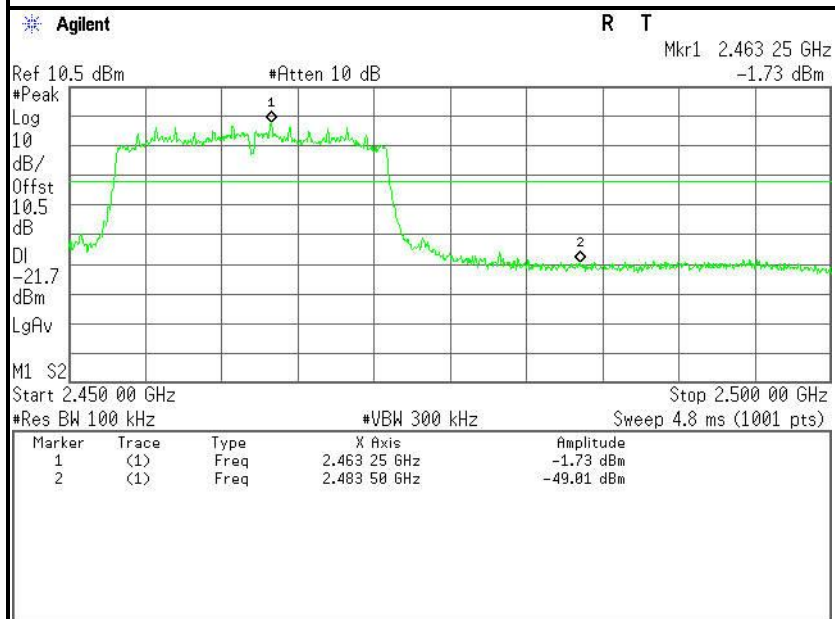


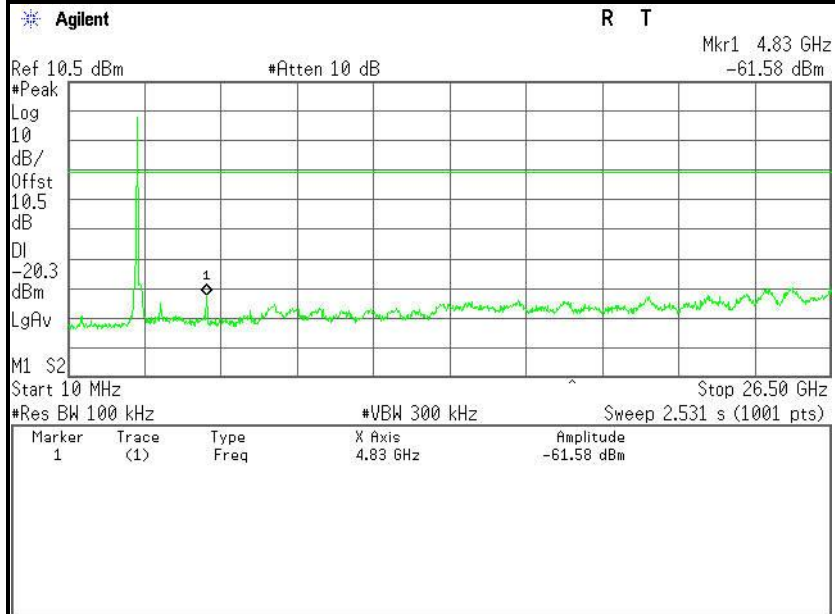
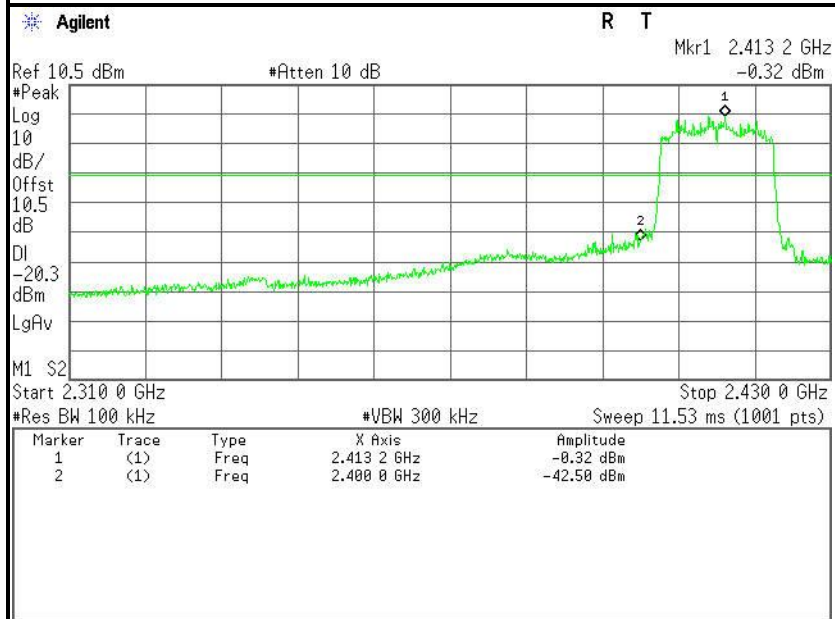


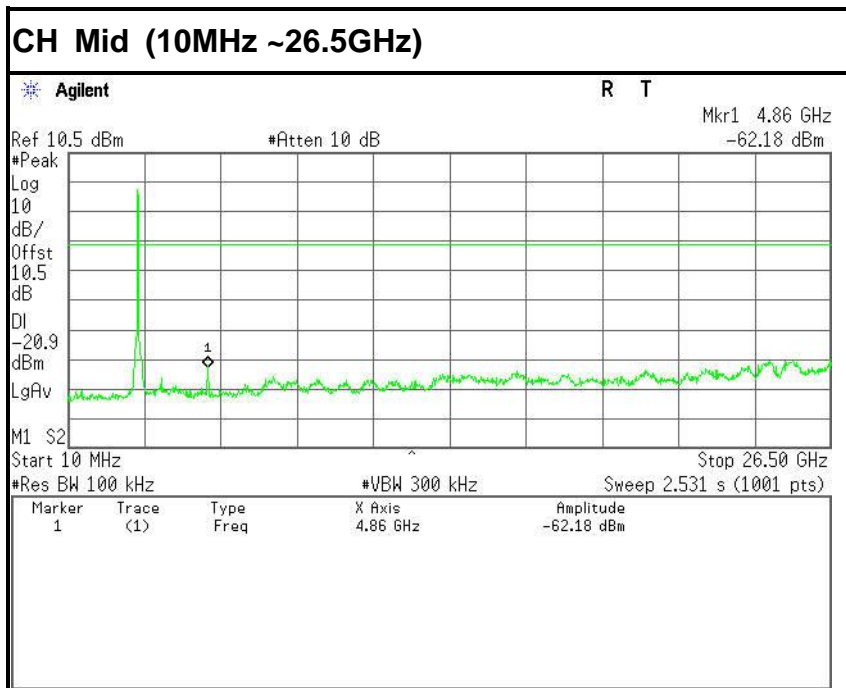
CH High (10MHz ~26.5GHz)

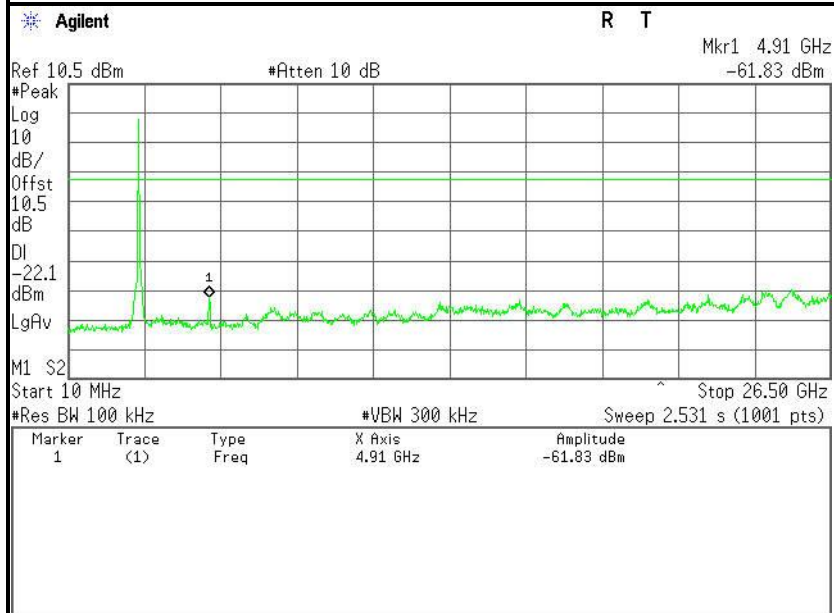
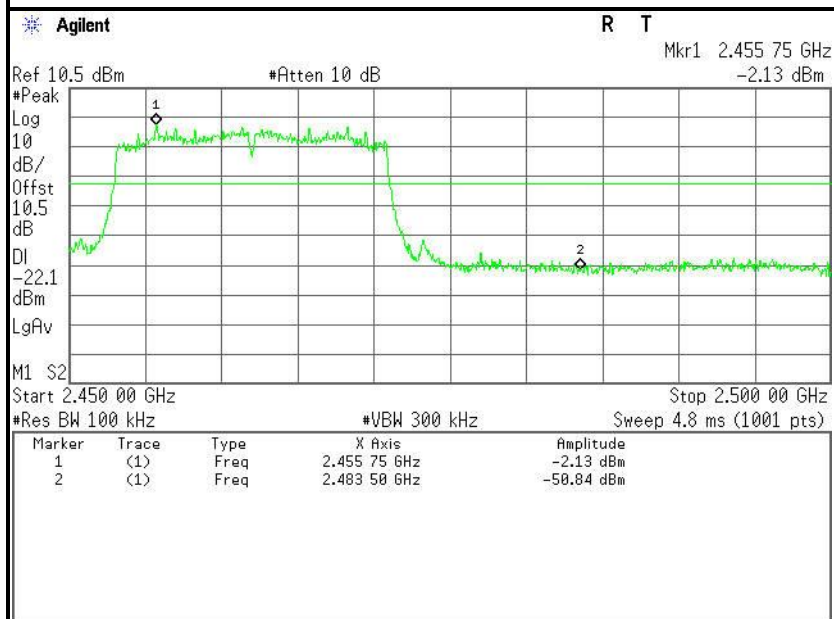


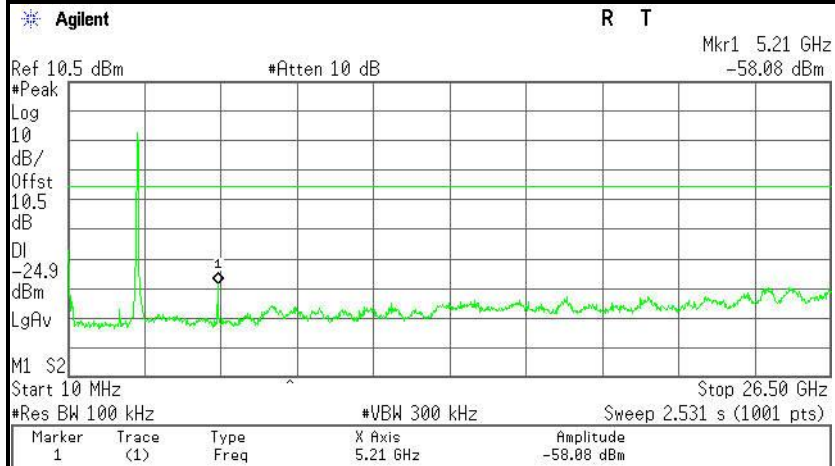
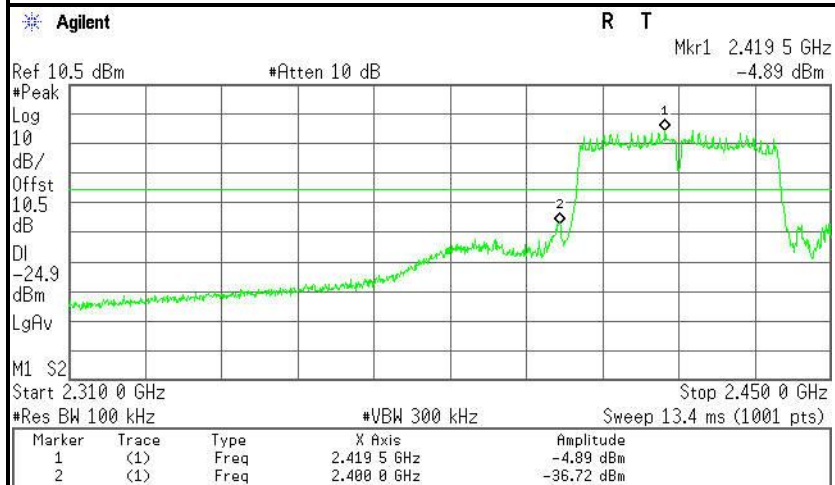
CH High (2.45GHz ~2.5GHz)

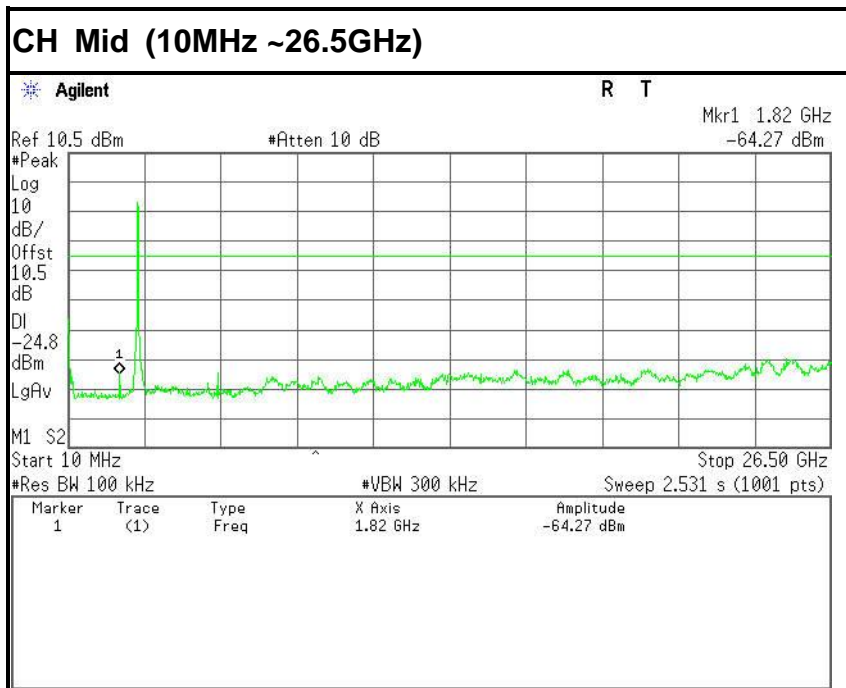


**IEEE 802.11n HT20 MHz mode (Antenna 1)****CH Low (10MHz ~26.5GHz)****CH Low (2.31GHz ~2.43GHz)**



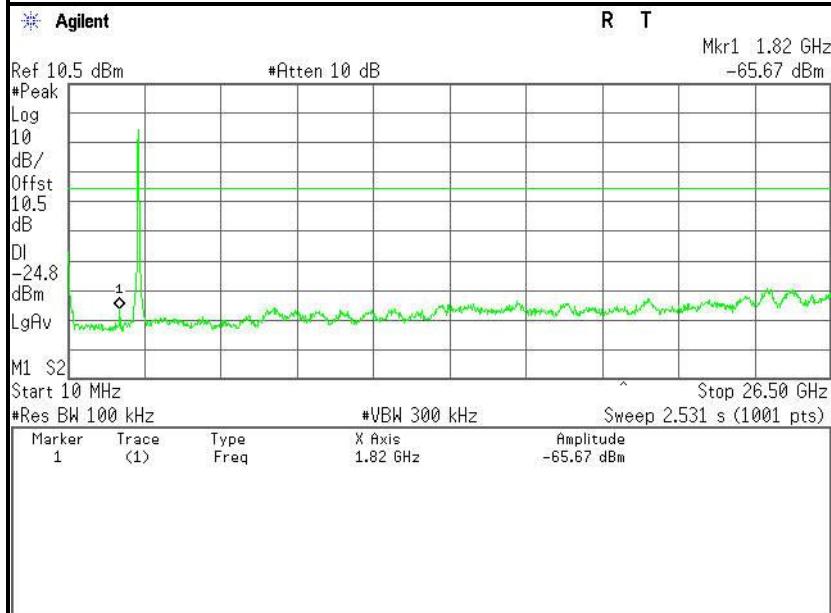
**CH High (10MHz ~26.5GHz)****CH High (2.45GHz ~2.5GHz)**

**IEEE 802.11n HT40 MHz mode (Antenna 0)****CH Low (10MHz ~26.5GHz)****CH Low (2.31GHz ~2.43GHz)**

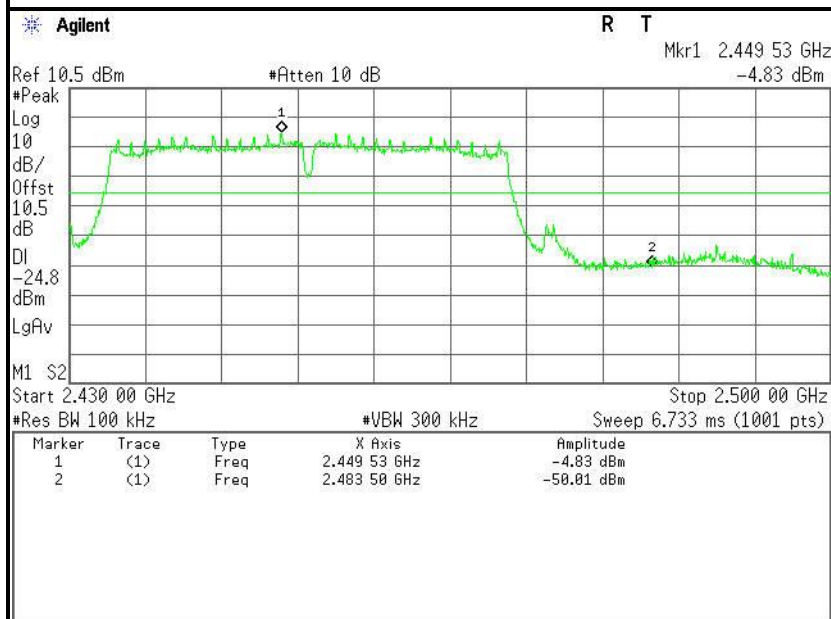




CH High (10MHz ~26.5GHz)

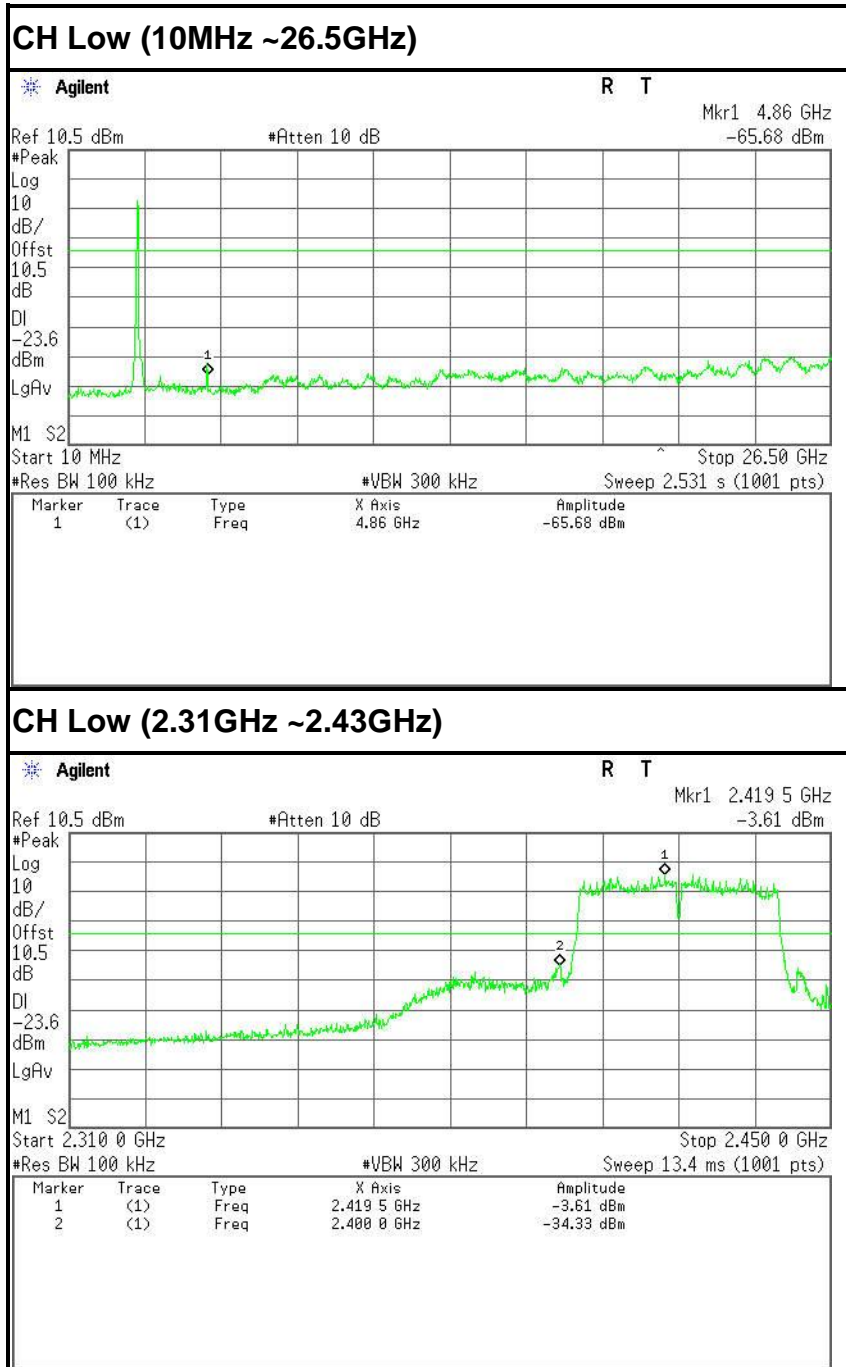


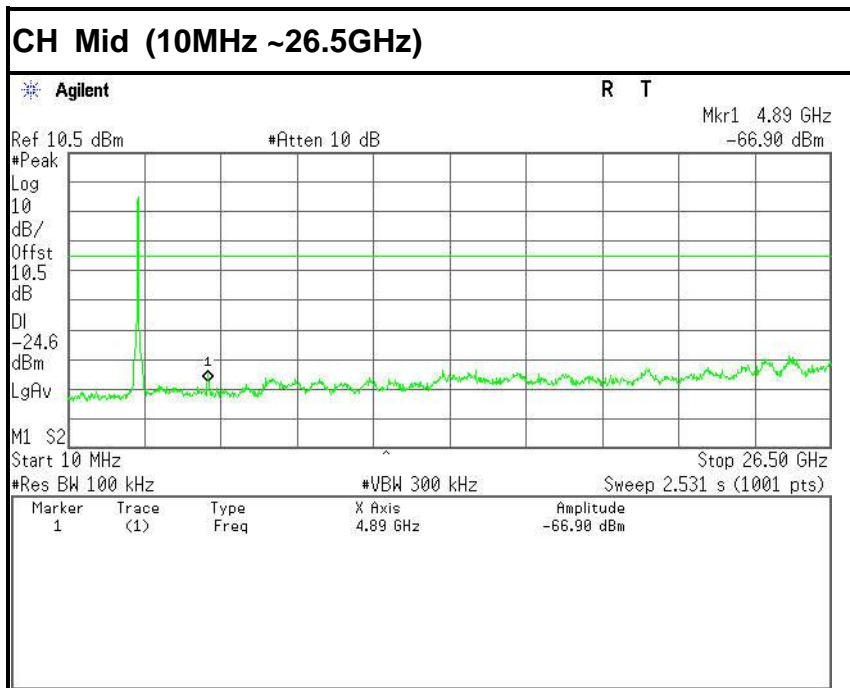
CH High (2.43GHz ~2.5GHz)





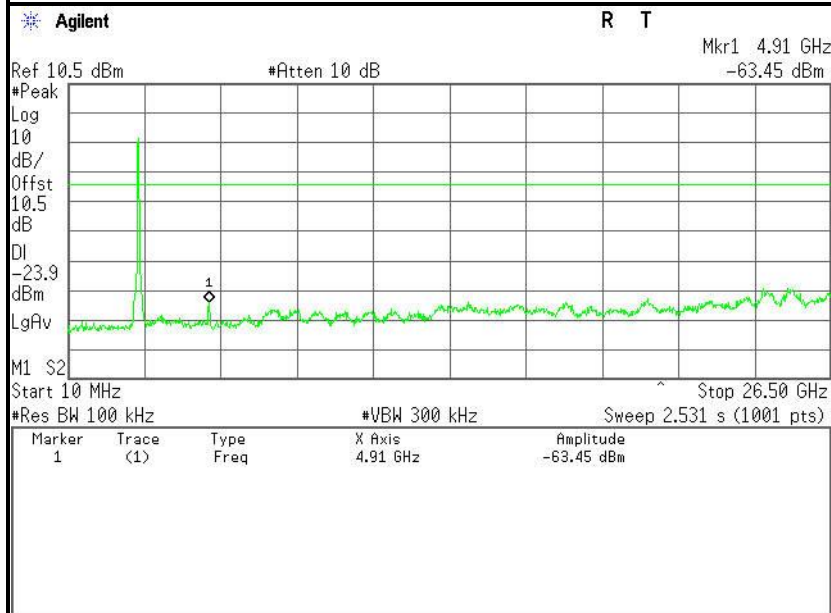
IEEE 802.11n HT40 MHz mode (Antenna 1)



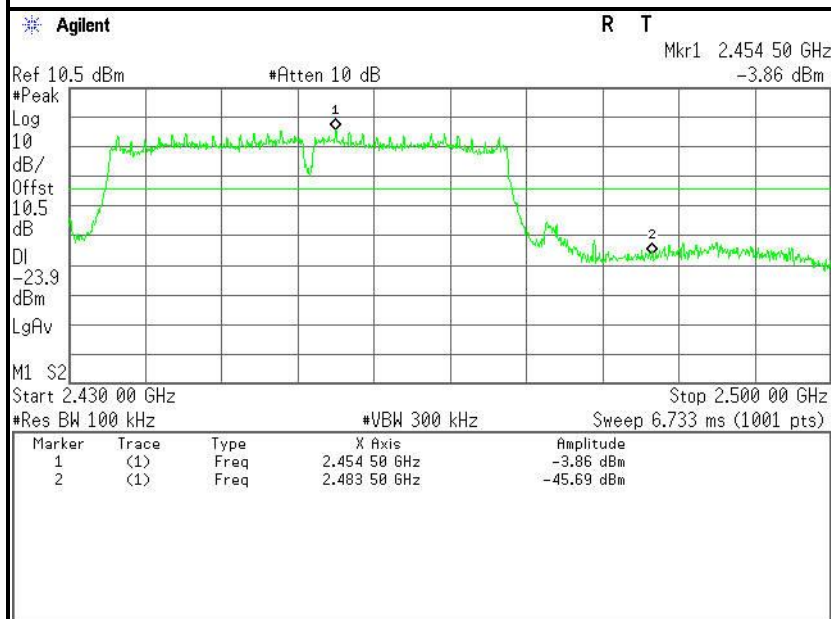




CH High (10MHz ~26.5GHz)



CH High (2.43GHz ~2.5GHz)





7.2.2. RADIATED EMISSIONS MEASUREMENT

7.2.2.1. LIMITS OF RADIATED EMISSIONS MEASUREMENT

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

Frequency (MHz)	Field Strength (mV/m)	Measurement Distance (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

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

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

Frequency (MHz)	Field Strength ($\mu\text{V/m}$ at 3-meter)	Field Strength ($\text{dB}\mu\text{V/m}$ 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 ($\text{dB}\mu\text{V/m}$) = $20 \log$ Emission level ($\mu\text{V/m}$).

**7.2.2.2. 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	E4446A	US44300399	02/21/2016	02/20/2017
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	02/21/2016	02/20/2017
Amplifier	MITEQ	AM-1604-3000	1123808	02/21/2016	02/20/2017
High Noise Amplifier	Agilent	8449B	3008A01838	02/21/2016	02/20/2017
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	02/21/2016	02/20/2017
Bilog Antenna	SCHAFFNER	CBL6143	5082	02/21/2016	02/20/2017
Horn Antenna	SCHWARZBECK	BBHA9120	D286	02/21/2016	02/20/2017
Loop Antenna	COM-POWER	AL-130	121044	02/21/2016	02/20/2017
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/21/2016	02/20/2017
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

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.



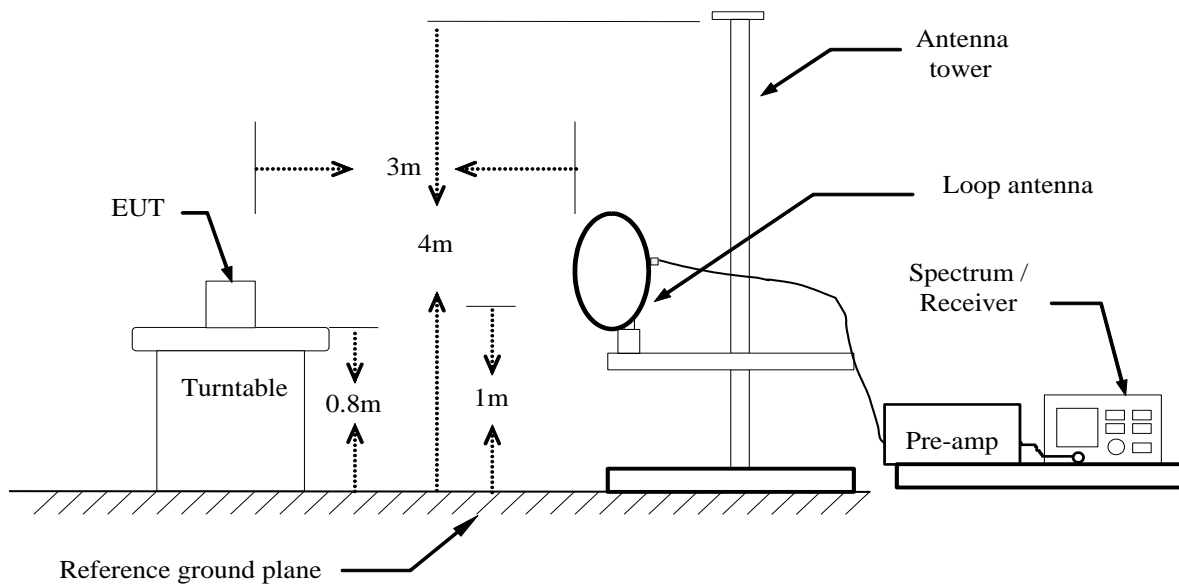
7.2.2.3. TEST PROCEDURE (please refer to measurement standard)

1. The EUT is placed on a turntable, which is 0.8m or 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:
Below 1GHz:
RBW=100kHz / VBW=300kHz / Sweep=AUTO
Above 1GHz:
(a) PEAK: RBW=1MHz,VBW=3MHz / Sweep=AUTO
(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO / Detector=Peak
7. Repeat above procedures until the measurements for all frequencies are complete.

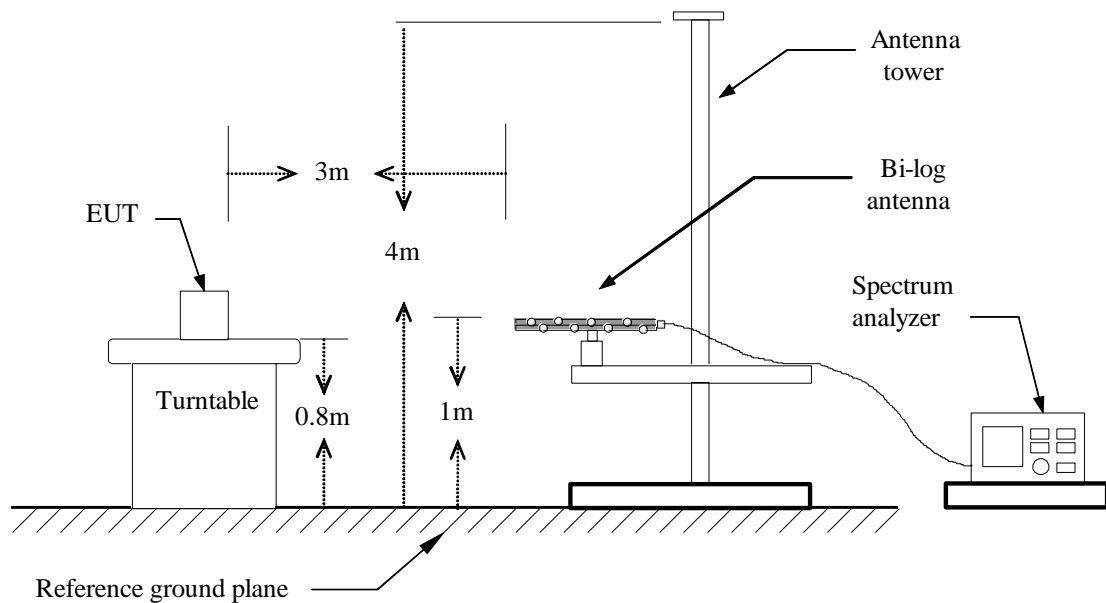


7.2.2.4. TEST SETUP

Below 30MHz

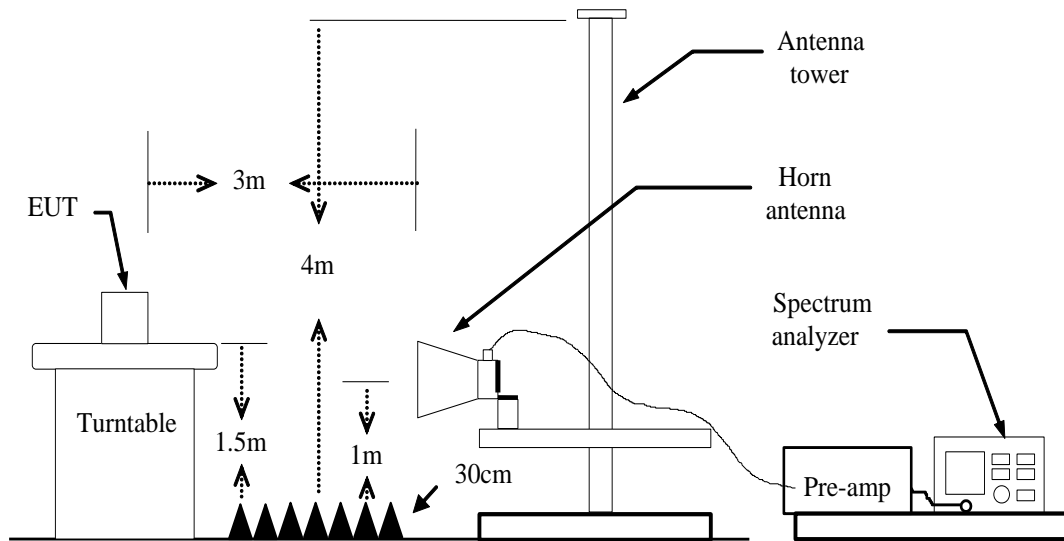


Below 1 GHz





Above 1 GHz



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

**7.2.2.5. 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

**7.2.2.6. TEST RESULTS****Below 1 GHz****Test Mode:** TX**Tested by:** AD Gan**Ambient temperature:** 24°C **Relative humidity:** 52% RH**Date:** April 12, 2016

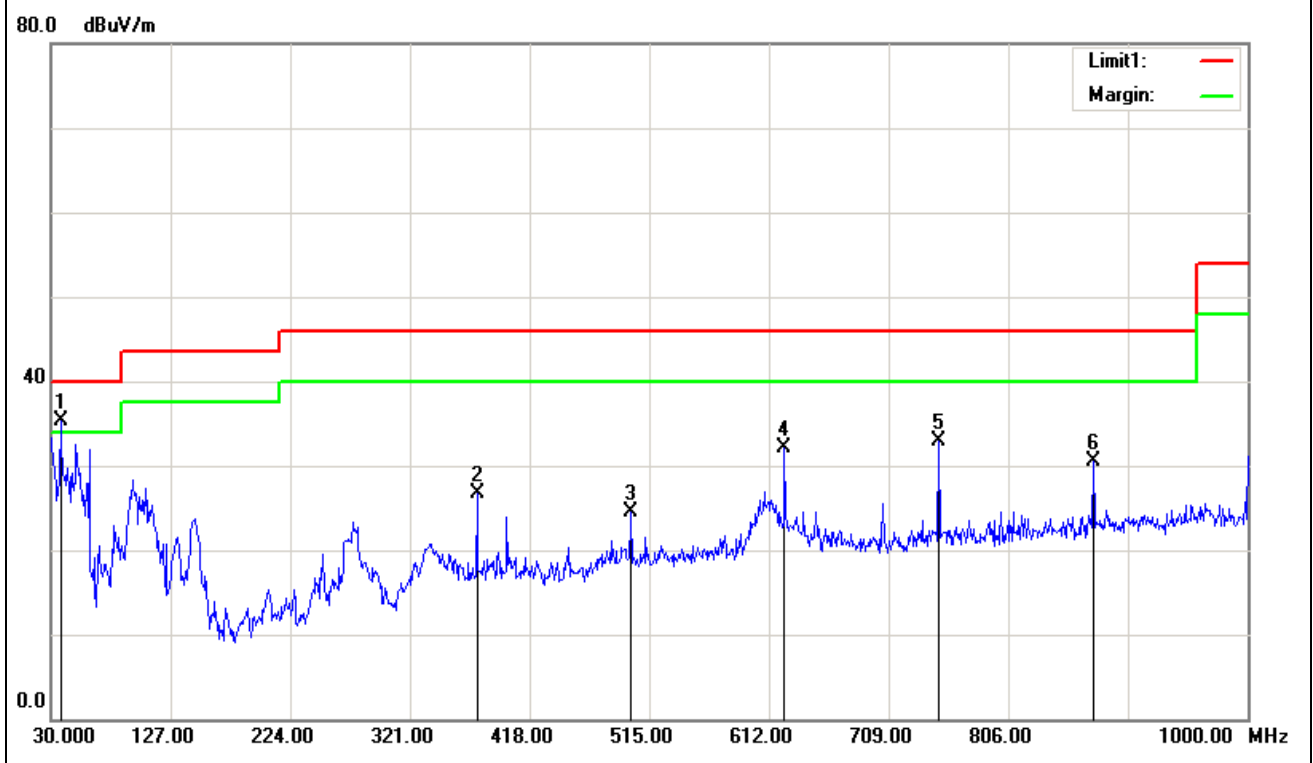
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
37.7600	50.75	-15.48	35.27	40.00	-4.73	V	QP
375.3200	43.44	-16.82	26.62	46.00	-19.38	V	QP
500.4500	38.92	-14.35	24.57	46.00	-21.43	V	QP
624.6100	44.88	-12.73	32.15	46.00	-13.85	V	QP
749.7400	44.10	-11.19	32.91	46.00	-13.09	V	QP
874.8700	40.73	-10.14	30.59	46.00	-15.41	V	QP
37.7600	52.72	-15.48	37.24	40.00	-2.76	H	QP
148.3400	53.21	-21.68	31.53	43.50	-11.97	H	QP
375.3200	51.90	-16.82	35.08	46.00	-10.92	H	QP
624.6100	48.27	-12.73	35.54	46.00	-10.46	H	QP
749.7400	44.14	-11.19	32.95	46.00	-13.05	H	QP
874.8700	45.36	-10.14	35.22	46.00	-10.78	H	QP

****Remark:** No emission found between lowest internal used/generated frequency to 30MHz.**Notes:**

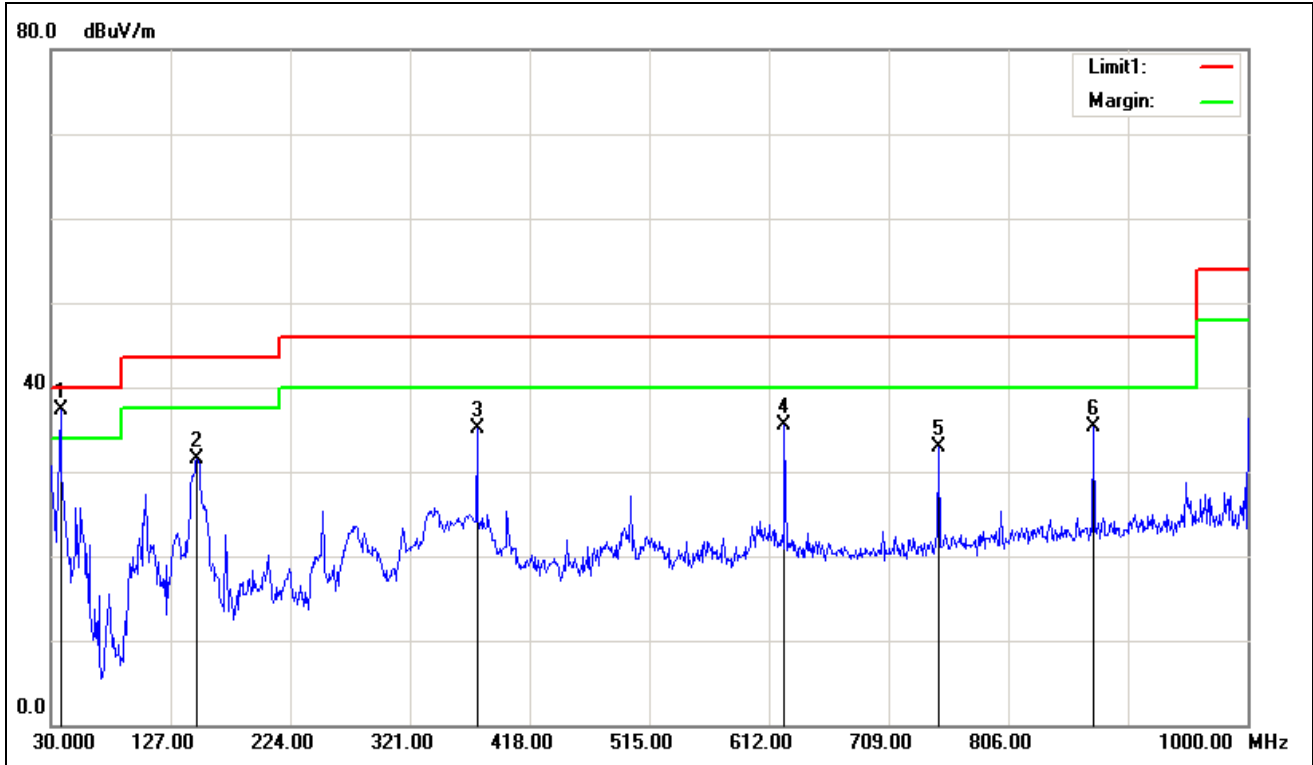
1. Radiated emissions measured in frequency range from 9kHz to 1GHz were made with an instrument using Quasi-peak detector mode.
2. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
3. The IF bandwidth of Receiver between 30MHz to 1GHz was 120kHz.
4. Frequency (MHz). = Emission frequency in MHz
 Reading (dBuV/m) = Receiver reading
 Correction Factor (dB) = Antenna factor + Cable loss – Amplifier gain
 Limit (dBuV/m) = Limit stated in standard
 Margin (dB) = Measured (dBuV/m) – Limits (dBuV/m)
 Antenna Pol e(H/V) = Current carrying line of reading



Vertical



Horizontal



**Above 1 GHz****Antenna 0****Test Mode:** TX / IEEE 802.11b(CH Low)**Tested by:** AD Gan**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** April 5, 2016

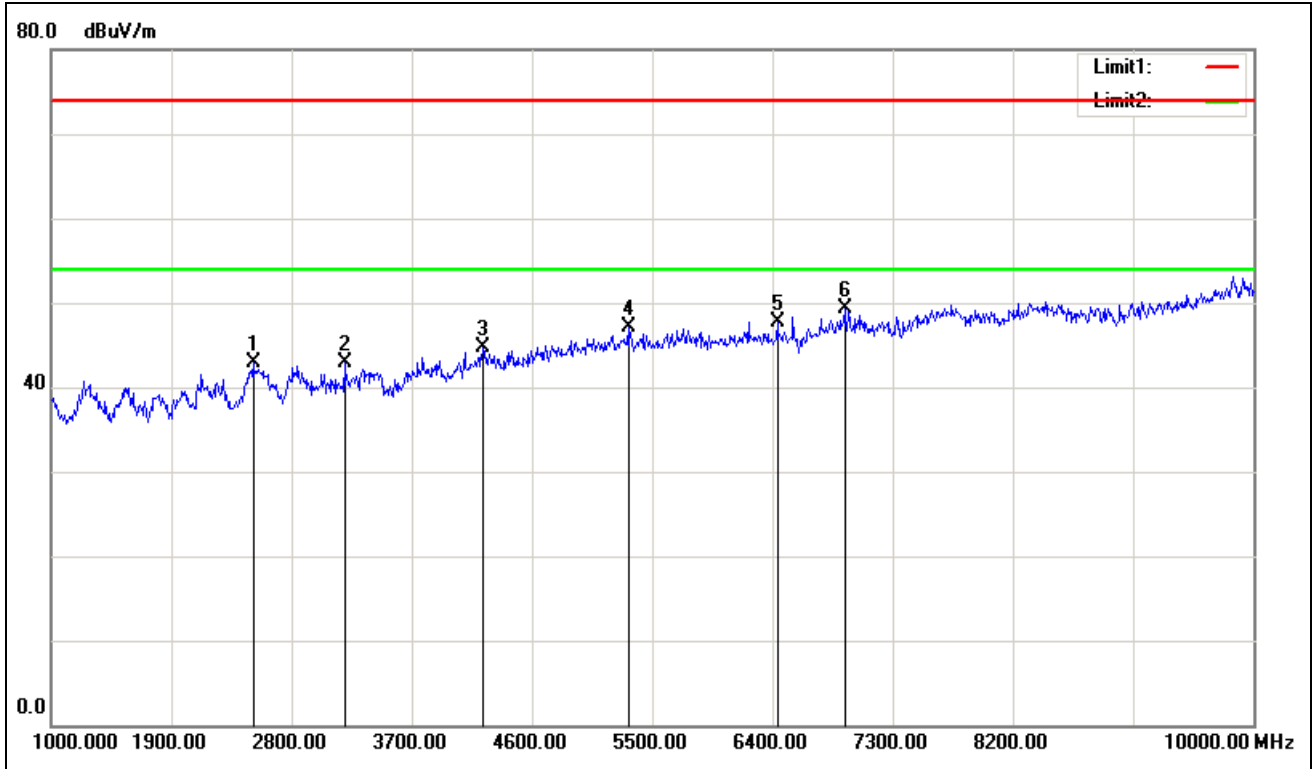
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2512.000	45.23	-2.24	42.99	74.00	-31.01	V	peak
3196.000	43.87	-1.03	42.84	74.00	-31.16	V	peak
4231.000	42.36	2.40	44.76	74.00	-29.24	V	peak
5320.000	41.55	5.55	47.10	74.00	-26.90	V	peak
6436.000	40.91	6.79	47.70	74.00	-26.30	V	peak
6940.000	41.78	7.60	49.38	74.00	-24.62	V	peak
1531.000	46.68	-6.82	39.86	74.00	-34.14	H	Peak
2116.000	45.32	-4.36	40.96	74.00	-33.04	H	Peak
2557.000	45.05	-2.16	42.89	74.00	-31.11	H	Peak
3214.000	45.33	-1.00	44.33	74.00	-29.67	H	peak
4825.000	44.77	4.41	49.18	74.00	-24.82	H	peak
7237.000	41.70	8.16	49.86	74.00	-24.14	H	peak

REMARKS:

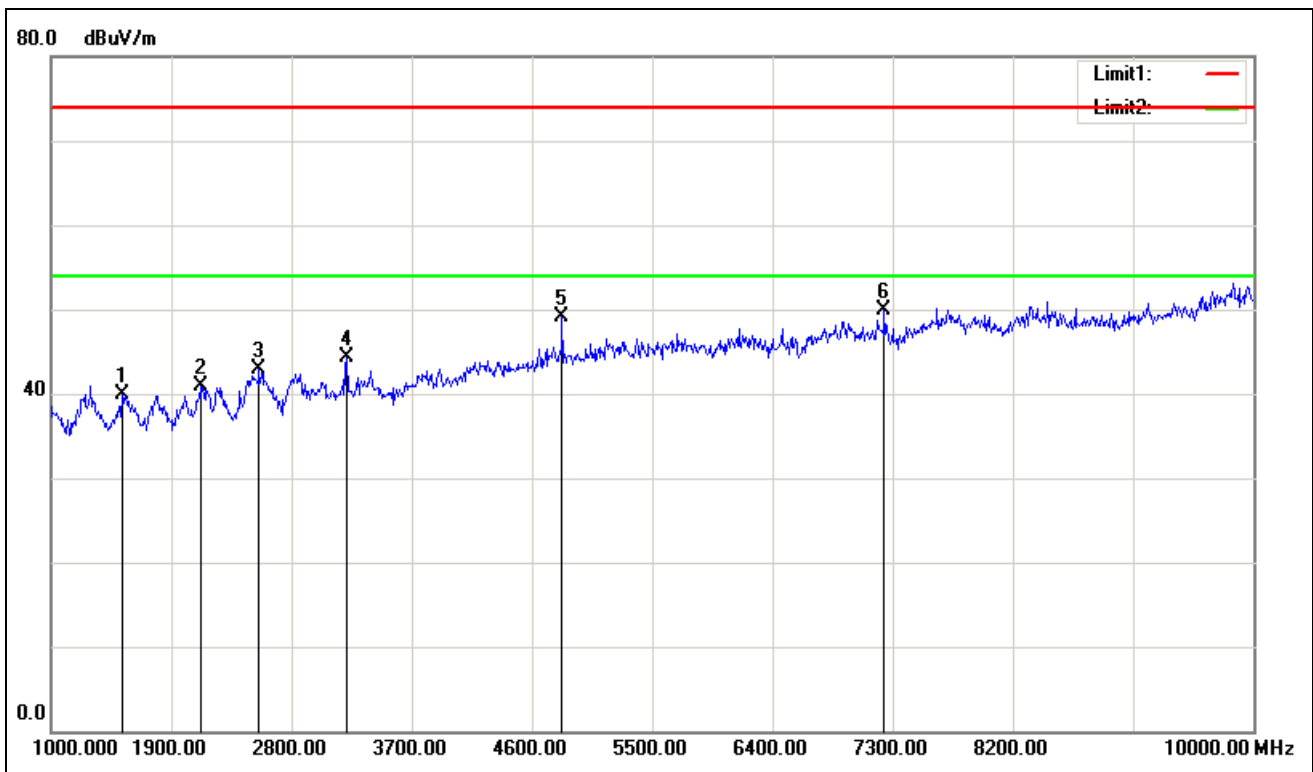
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
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 802.11b (CH Mid)**Tested by:** AD Gan**Ambient temperature:** 24°C **Relative humidity:** 52% RH**Date:** April 5, 2016

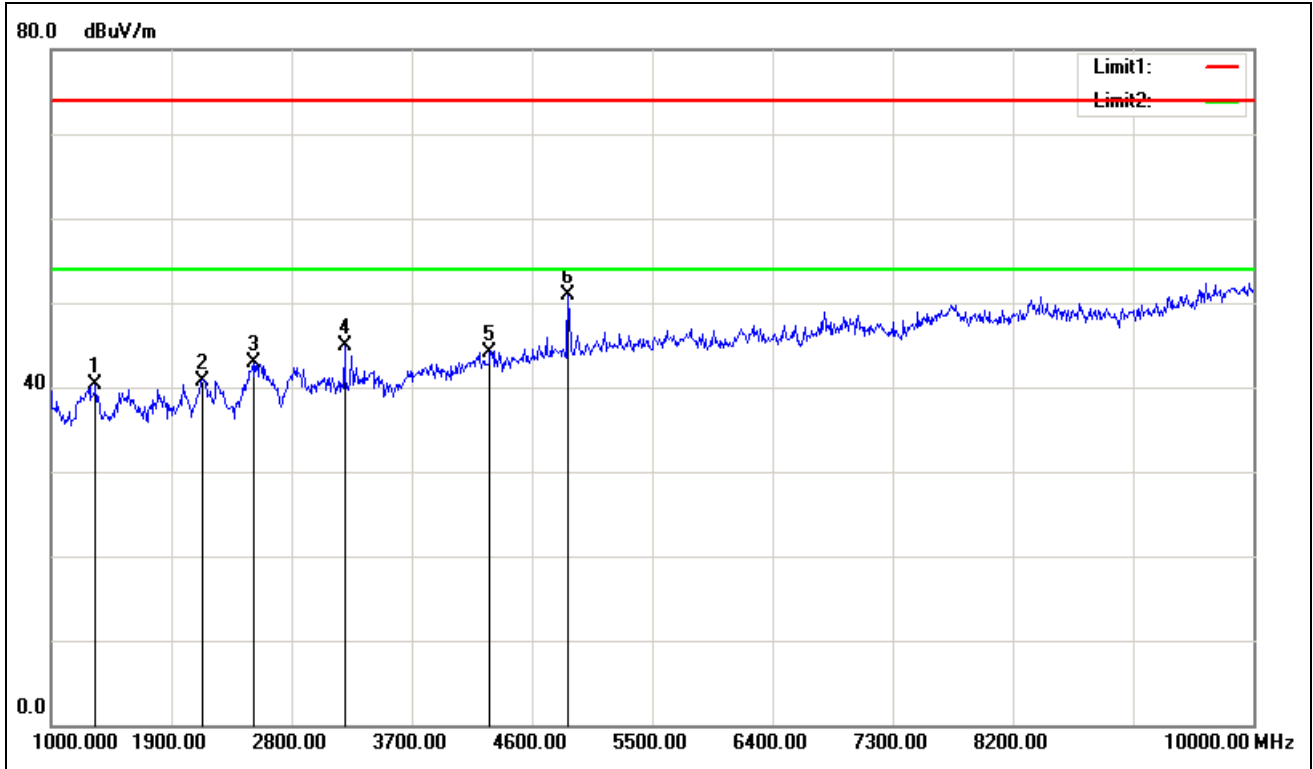
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1333.000	47.63	-7.30	40.33	74.00	-33.67	V	Peak
2134.000	45.07	-4.27	40.80	74.00	-33.20	V	Peak
2512.000	45.13	-2.24	42.89	74.00	-31.11	V	Peak
3196.000	45.99	-1.03	44.96	74.00	-29.04	V	Peak
4285.000	41.46	2.59	44.05	74.00	-29.95	V	Peak
4870.000	46.39	4.56	50.95	74.00	-23.05	V	Peak
2521.000	45.23	-2.22	43.01	74.00	-30.99	H	Peak
3250.000	44.17	-0.94	43.23	74.00	-30.77	H	Peak
3754.000	43.15	0.55	43.70	74.00	-30.30	H	Peak
4870.000	47.47	4.56	52.03	74.00	-21.97	H	Peak
4870.000	45.23	4.56	49.79	54.00	-4.21	H	AVG
5203.000	44.44	5.34	49.78	74.00	-24.22	H	Peak
7309.000	41.03	8.30	49.33	74.00	-24.67	H	Peak

REMARKS:

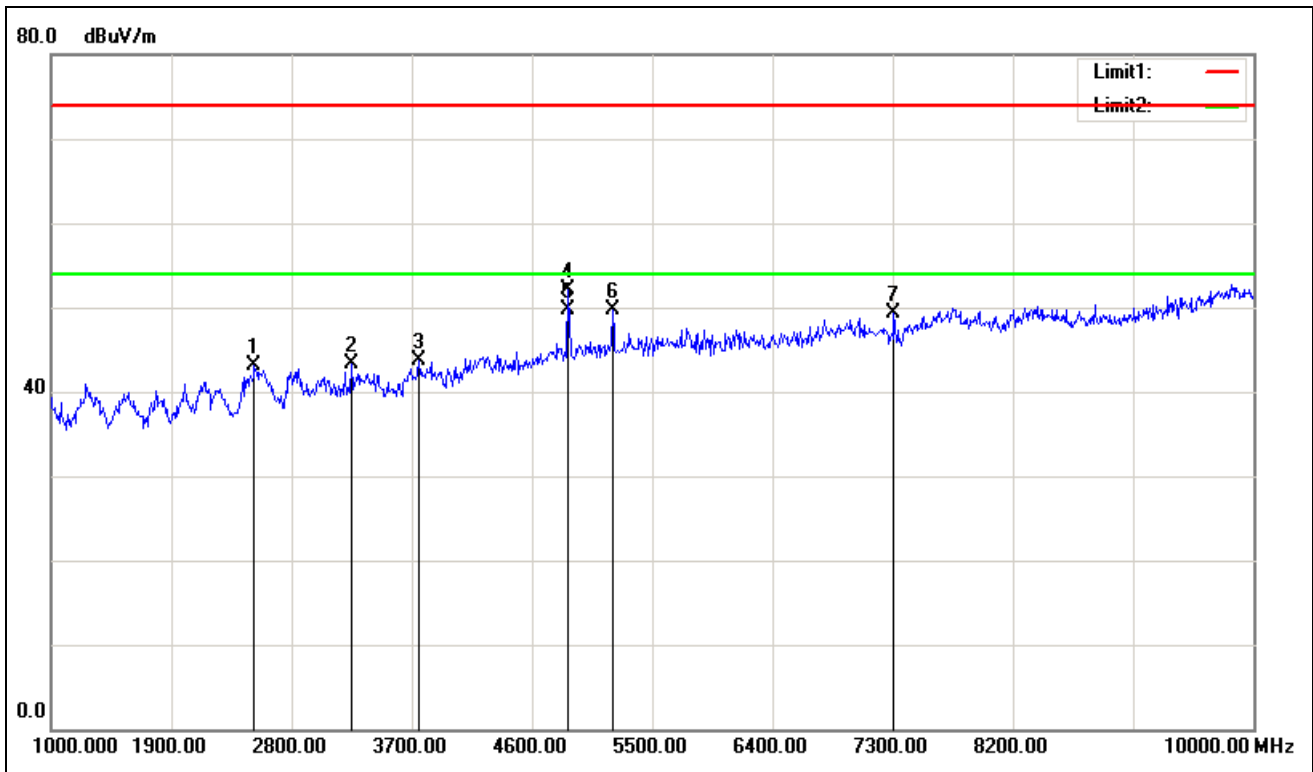
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
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 802.11b (CH High)**Tested by:** AD Gan**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** April 5, 2016

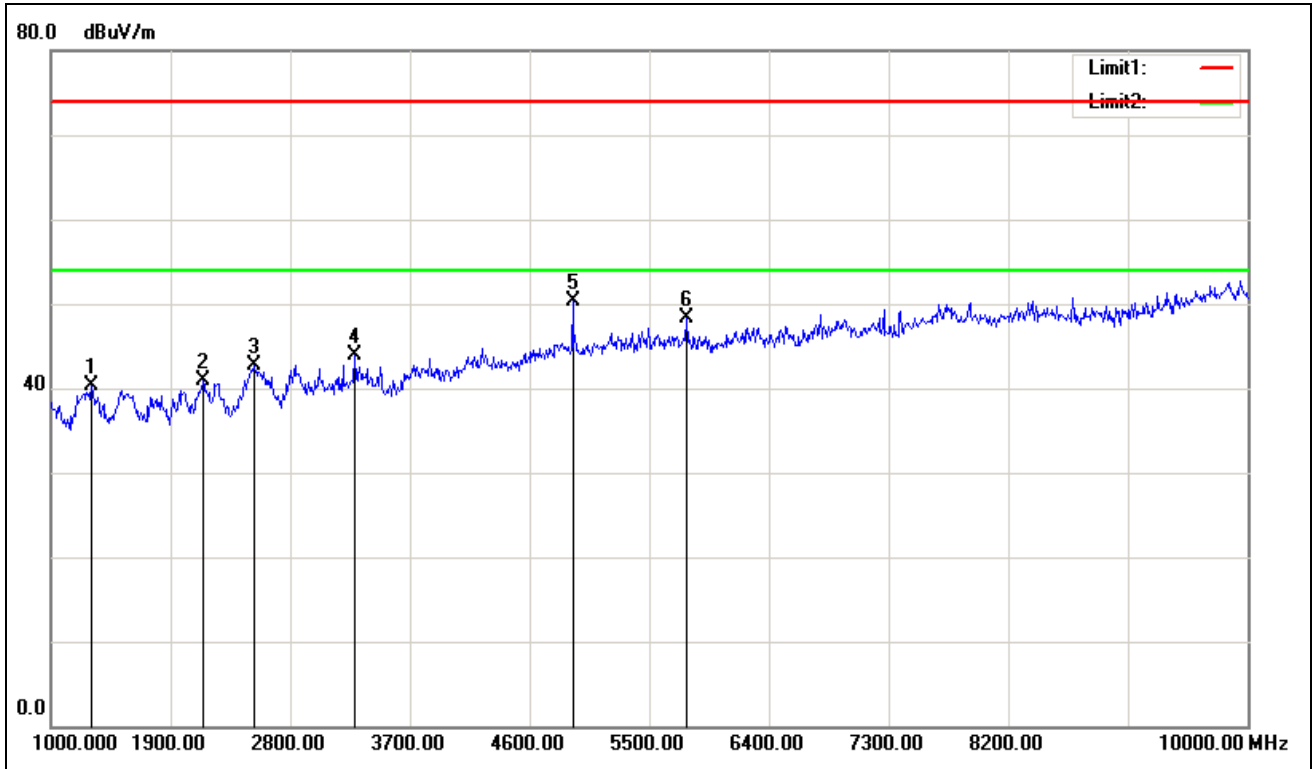
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1306.000	47.77	-7.40	40.37	74.00	-33.63	V	Peak
2143.000	45.21	-4.22	40.99	74.00	-33.01	V	Peak
2530.000	44.83	-2.21	42.62	74.00	-31.38	V	Peak
3286.000	44.83	-0.88	43.95	74.00	-30.05	V	Peak
4924.000	45.65	4.73	50.38	74.00	-23.62	V	Peak
5779.000	42.34	5.99	48.33	74.00	-25.67	V	Peak
1252.000	48.02	-7.60	40.42	74.00	-33.58	H	Peak
1576.000	47.16	-6.74	40.42	74.00	-33.58	H	Peak
2152.000	45.45	-4.17	41.28	74.00	-32.72	H	Peak
2530.000	45.04	-2.21	42.83	74.00	-31.17	H	Peak
3286.000	44.74	-0.88	43.86	74.00	-30.14	H	Peak
5590.000	41.72	5.91	47.63	74.00	-26.37	H	Peak

REMARKS:

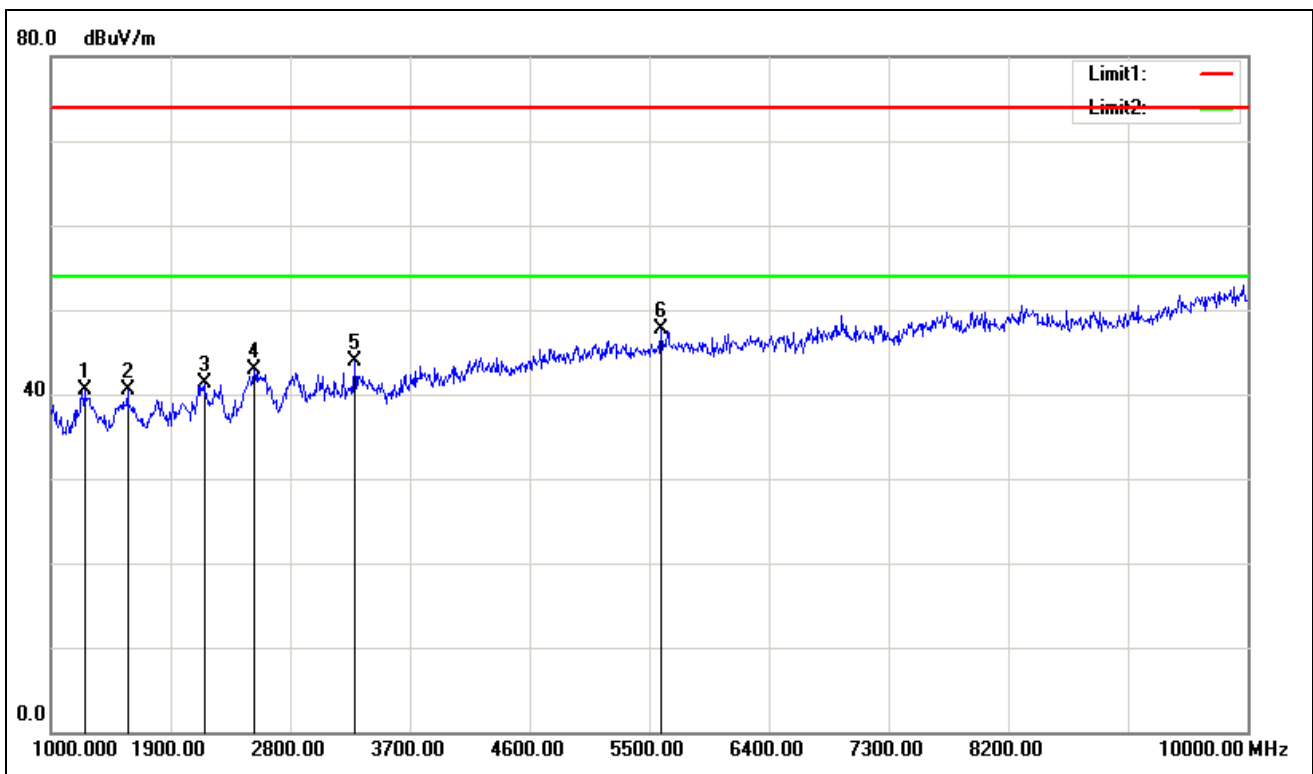
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
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 802.11b(CH Low)**Tested by:** AD Gan**Ambient temperature:** 24°C **Relative humidity:** 52% RH**Date:** April 5, 2016

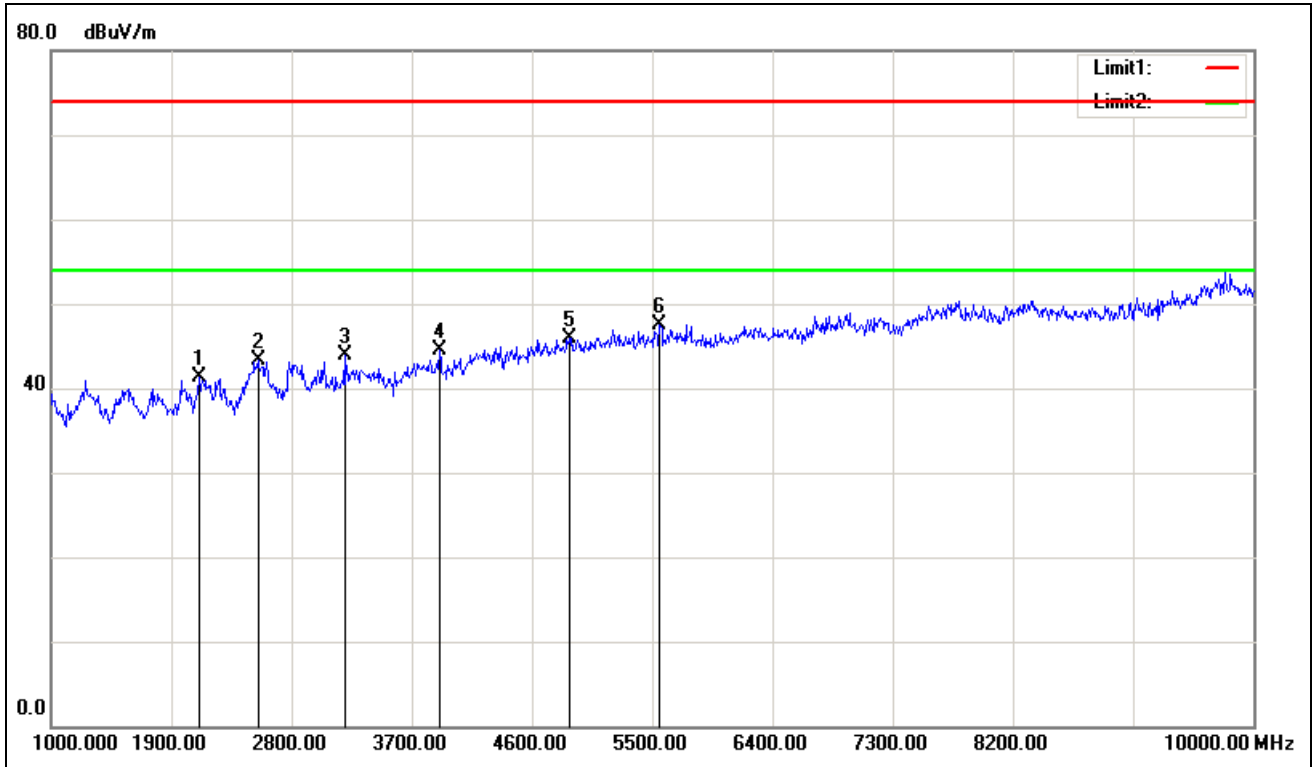
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2107.000	45.71	-4.41	41.30	74.00	-32.70	V	peak
2548.000	45.53	-2.17	43.36	74.00	-30.64	V	peak
3196.000	44.87	-1.03	43.84	74.00	-30.16	V	peak
3907.000	43.33	1.20	44.53	74.00	-29.47	V	peak
4879.000	41.26	4.59	45.85	74.00	-28.15	V	peak
5554.000	41.66	5.89	47.55	74.00	-26.45	V	peak
1783.000	47.55	-6.31	41.24	74.00	-32.76	H	Peak
2566.000	44.98	-2.14	42.84	74.00	-31.16	H	Peak
2827.000	44.59	-1.67	42.92	74.00	-31.08	H	Peak
3214.000	44.55	-1.00	43.55	74.00	-30.45	H	peak
4285.000	42.24	2.59	44.83	74.00	-29.17	H	peak
4825.000	49.40	4.41	53.81	74.00	-20.19	H	peak
4825.000	47.51	4.41	51.92	54.00	-2.08	H	AVG

REMARKS:

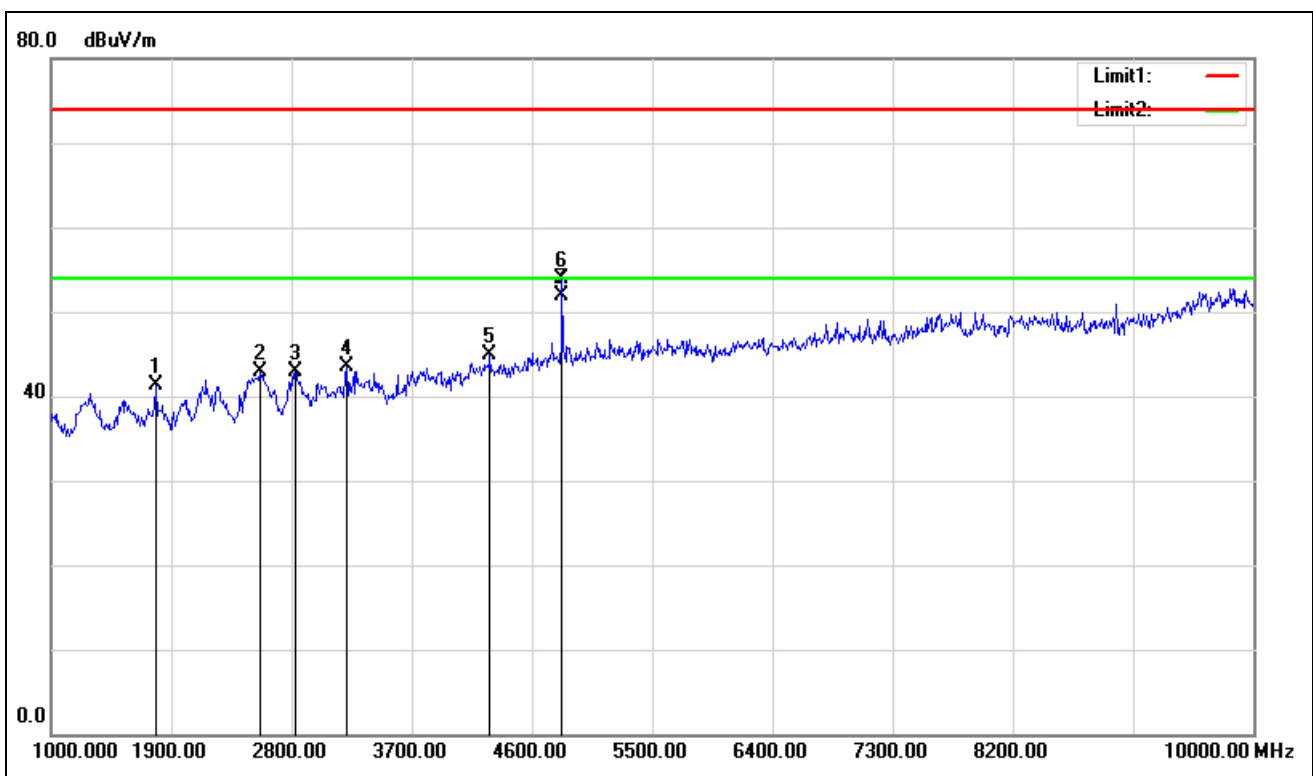
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
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 802.11b (CH Mid)**Tested by:** AD Gan**Ambient temperature:** 24°C **Relative humidity:** 52% RH**Date:** April 5, 2016

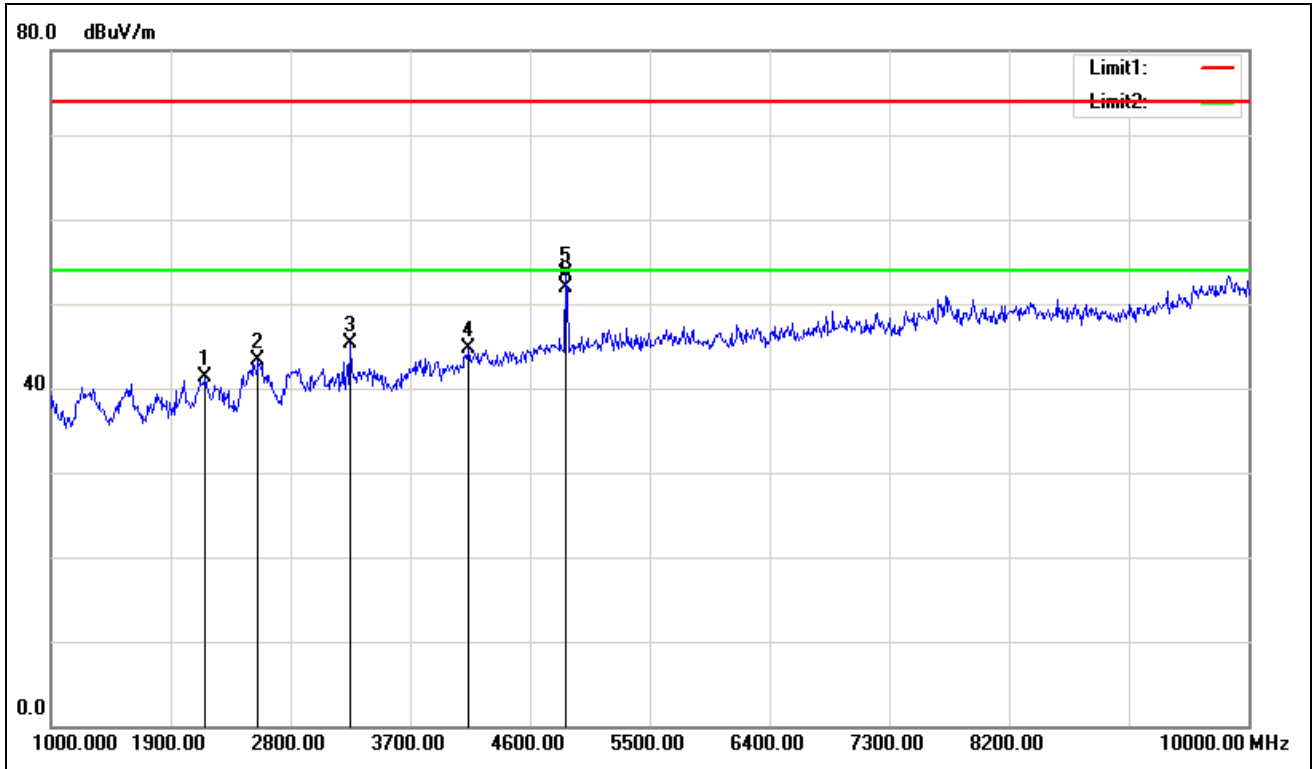
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2161.000	45.50	-4.12	41.38	74.00	-32.62	V	Peak
2557.000	45.38	-2.16	43.22	74.00	-30.78	V	Peak
3250.000	46.22	-0.94	45.28	74.00	-28.72	V	Peak
4141.000	42.70	2.09	44.79	74.00	-29.21	V	Peak
4870.000	49.04	4.56	53.60	74.00	-20.40	V	Peak
4870.000	47.37	4.56	51.93	54.00	-2.07	V	AVG
6877.000	41.51	7.50	49.01	74.00	-24.99	V	Peak
1765.000	49.94	-6.35	43.59	74.00	-30.41	H	Peak
2584.000	44.97	-2.11	42.86	74.00	-31.14	H	Peak
2845.000	43.88	-1.64	42.24	74.00	-31.76	H	Peak
3826.000	43.20	0.86	44.06	74.00	-29.94	H	Peak
4870.000	49.78	4.56	54.34	74.00	-19.66	H	Peak
4870.000	47.15	4.56	51.71	54.00	-2.29	H	AVG
6166.000	41.57	6.35	47.92	74.00	-26.08	H	Peak

REMARKS:

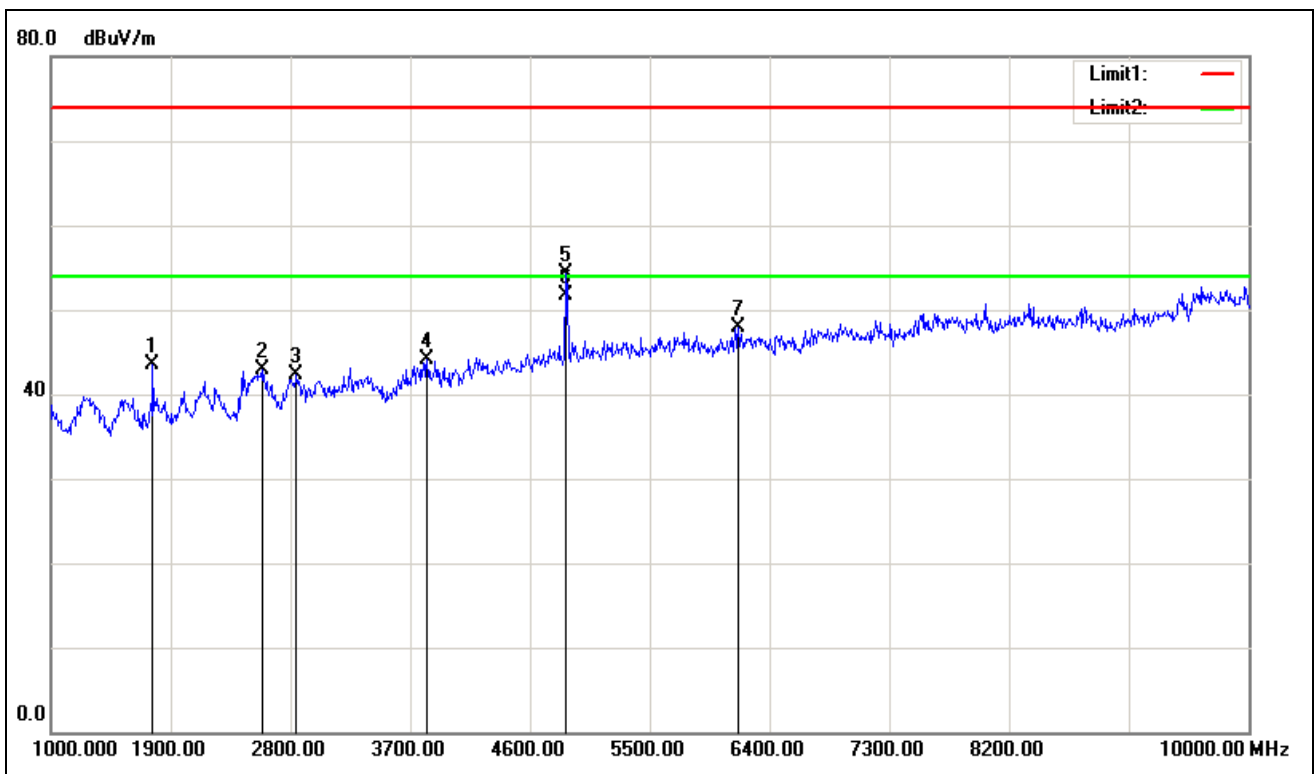
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
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 802.11b (CH High)

Tested by: AD Gan

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

Date: April 5, 2016

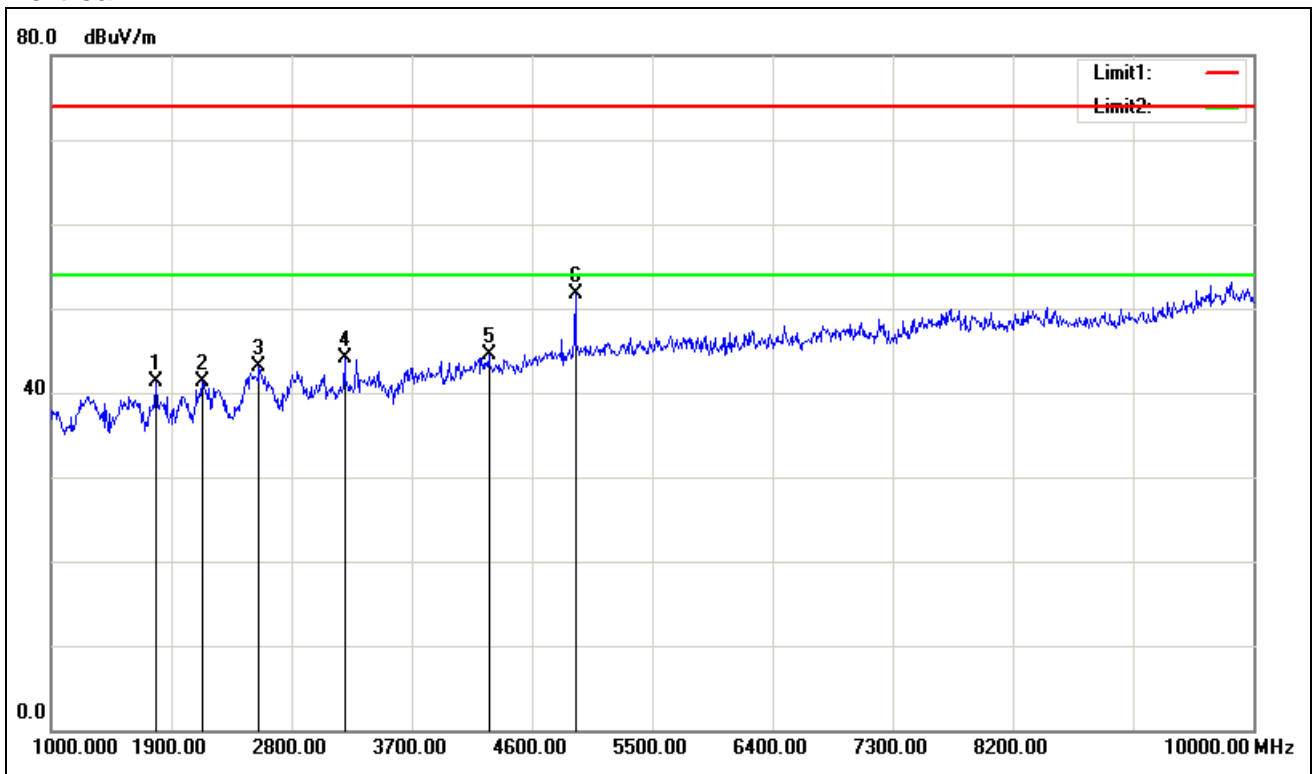
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1783.000	47.54	-6.31	41.23	74.00	-32.77	V	Peak
2134.000	45.53	-4.27	41.26	74.00	-32.74	V	Peak
2557.000	45.35	-2.16	43.19	74.00	-30.81	V	Peak
3196.000	45.09	-1.03	44.06	74.00	-29.94	V	Peak
4276.000	41.91	2.56	44.47	74.00	-29.53	V	Peak
4924.000	46.98	4.73	51.71	74.00	-22.29	V	Peak
2494.000	44.99	-2.29	42.70	74.00	-31.30	H	Peak
3196.000	45.75	-1.03	44.72	74.00	-29.28	H	Peak
3889.000	43.61	1.12	44.73	74.00	-29.27	H	Peak
4924.000	47.71	4.73	52.44	74.00	-21.56	H	Peak
4924.000	45.61	4.73	50.34	54.00	-3.66	H	Peak
6157.000	41.17	6.33	47.50	74.00	-26.50	H	Peak

REMARKS:

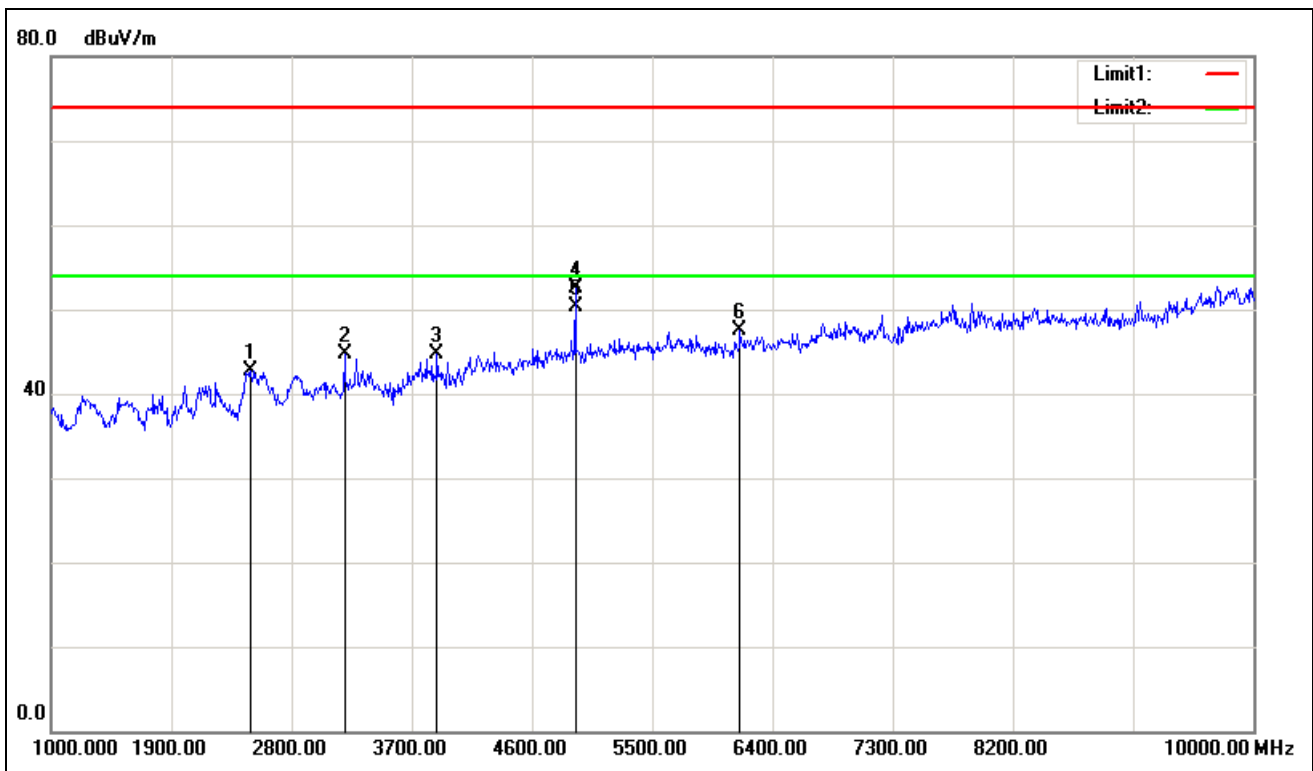
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
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 0****Test Mode:** TX / IEEE 802.11g(CH Low)**Tested by:** AD Gan**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** April 5, 2016

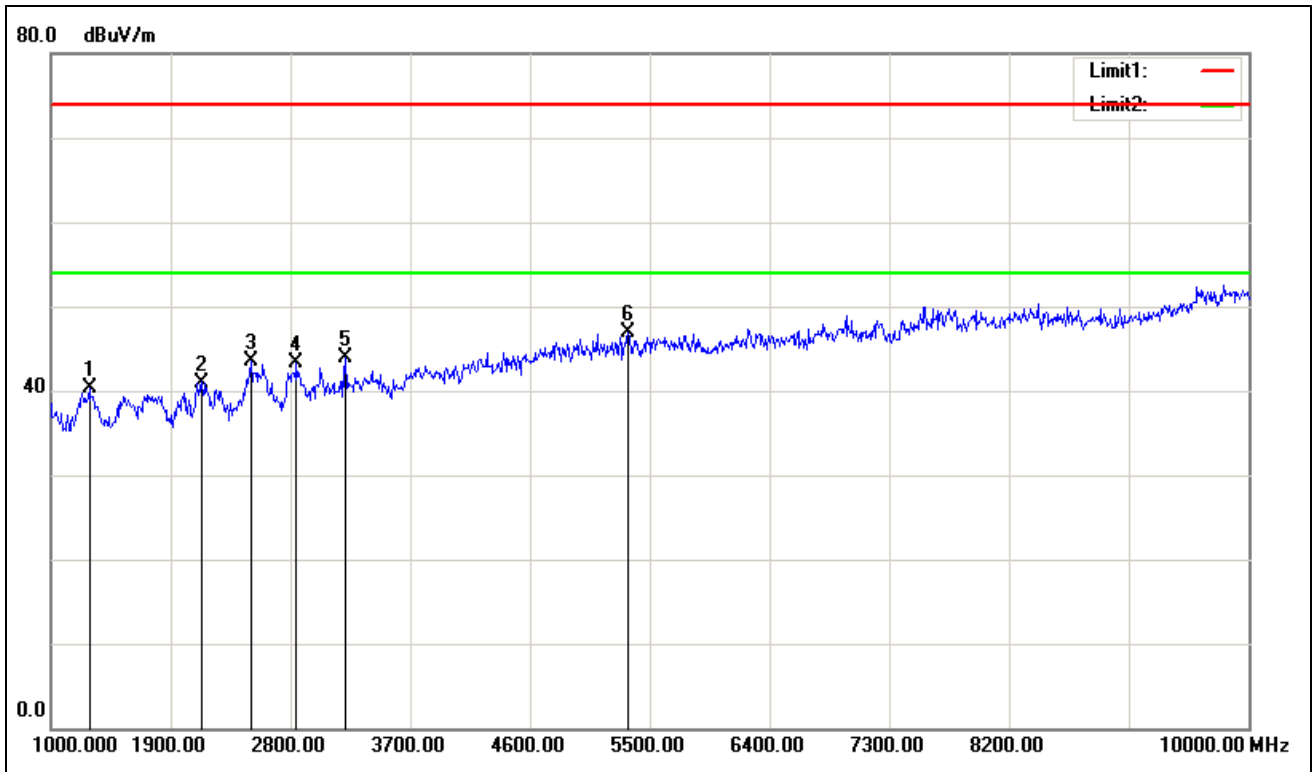
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1288.000	47.75	-7.47	40.28	74.00	-33.72	V	Peak
2134.000	45.27	-4.27	41.00	74.00	-33.00	V	Peak
2503.000	45.79	-2.25	43.54	74.00	-30.46	V	Peak
2845.000	44.86	-1.64	43.22	74.00	-30.78	V	Peak
3214.000	44.88	-1.00	43.88	74.00	-30.12	V	Peak
5338.000	41.33	5.58	46.91	74.00	-27.09	V	Peak
2584.000	44.29	-2.11	42.18	74.00	-31.82	H	Peak
2854.000	44.18	-1.62	42.56	74.00	-31.44	H	Peak
3214.000	44.63	-1.00	43.63	74.00	-30.37	H	Peak
4357.000	42.35	2.85	45.20	74.00	-28.80	H	Peak
4825.000	42.24	4.41	46.65	74.00	-27.35	H	Peak
7237.000	41.97	8.16	50.13	74.00	-23.87	H	Peak

REMARKS:

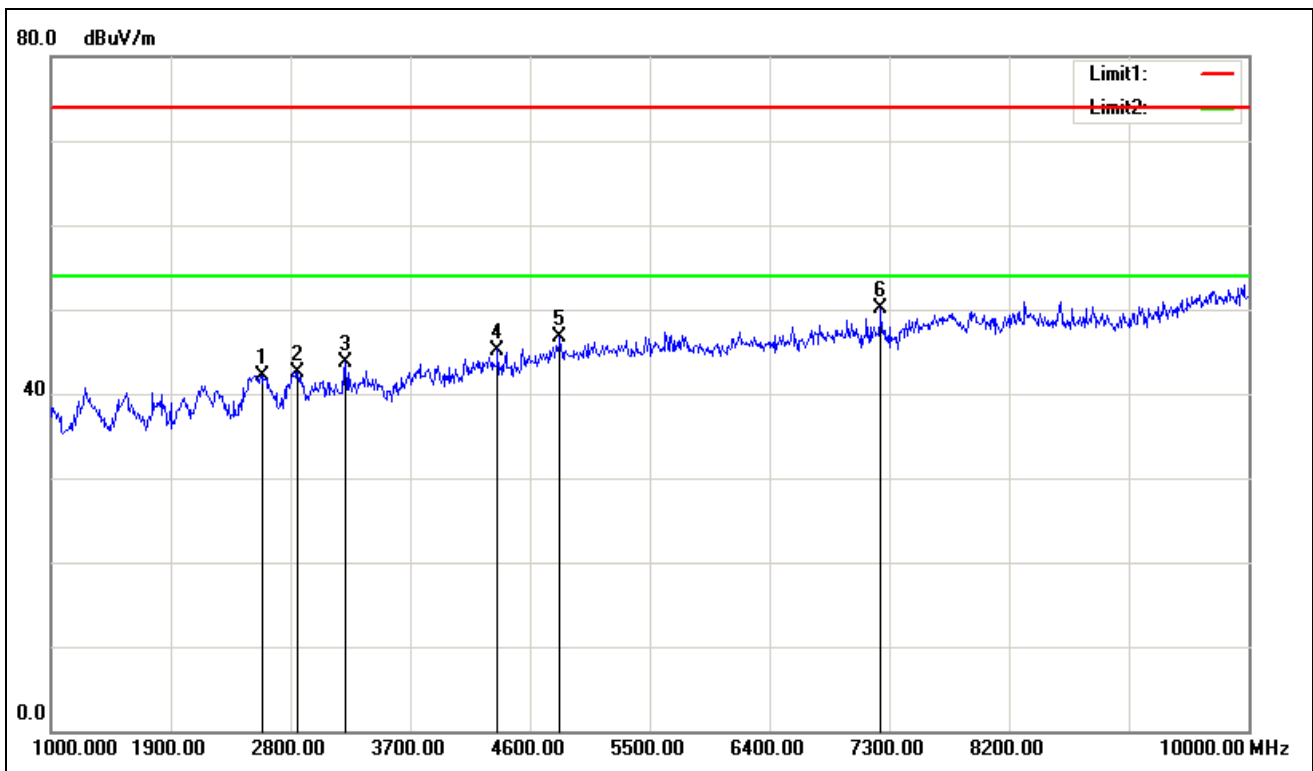
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
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 802.11g (CH Mid)**Tested by:** AD Gan**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** April 5, 2016

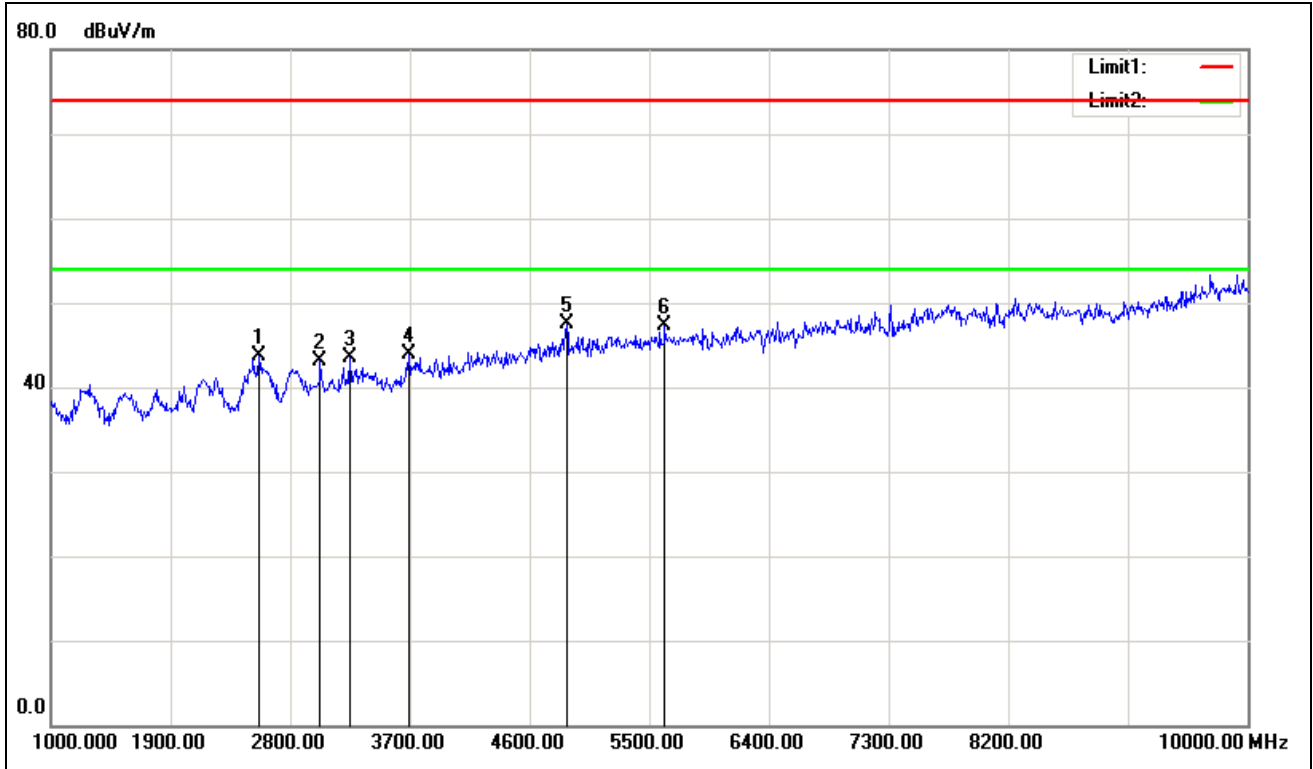
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2566.000	45.91	-2.14	43.77	74.00	-30.23	V	Peak
3025.000	44.33	-1.32	43.01	74.00	-30.99	V	Peak
3250.000	44.48	-0.94	43.54	74.00	-30.46	V	Peak
3691.000	43.70	0.29	43.99	74.00	-30.01	V	Peak
4879.000	42.97	4.59	47.56	74.00	-26.44	V	Peak
5617.000	41.33	5.92	47.25	74.00	-26.75	V	Peak
2251.000	44.54	-3.62	40.92	74.00	-33.08	H	Peak
2503.000	44.63	-2.25	42.38	74.00	-31.62	H	Peak
3196.000	44.84	-1.03	43.81	74.00	-30.19	H	Peak
4159.000	42.72	2.15	44.87	74.00	-29.13	H	Peak
5212.000	42.33	5.36	47.69	74.00	-26.31	H	Peak
8182.000	42.29	9.55	51.84	74.00	-22.16	H	Peak

REMARKS:

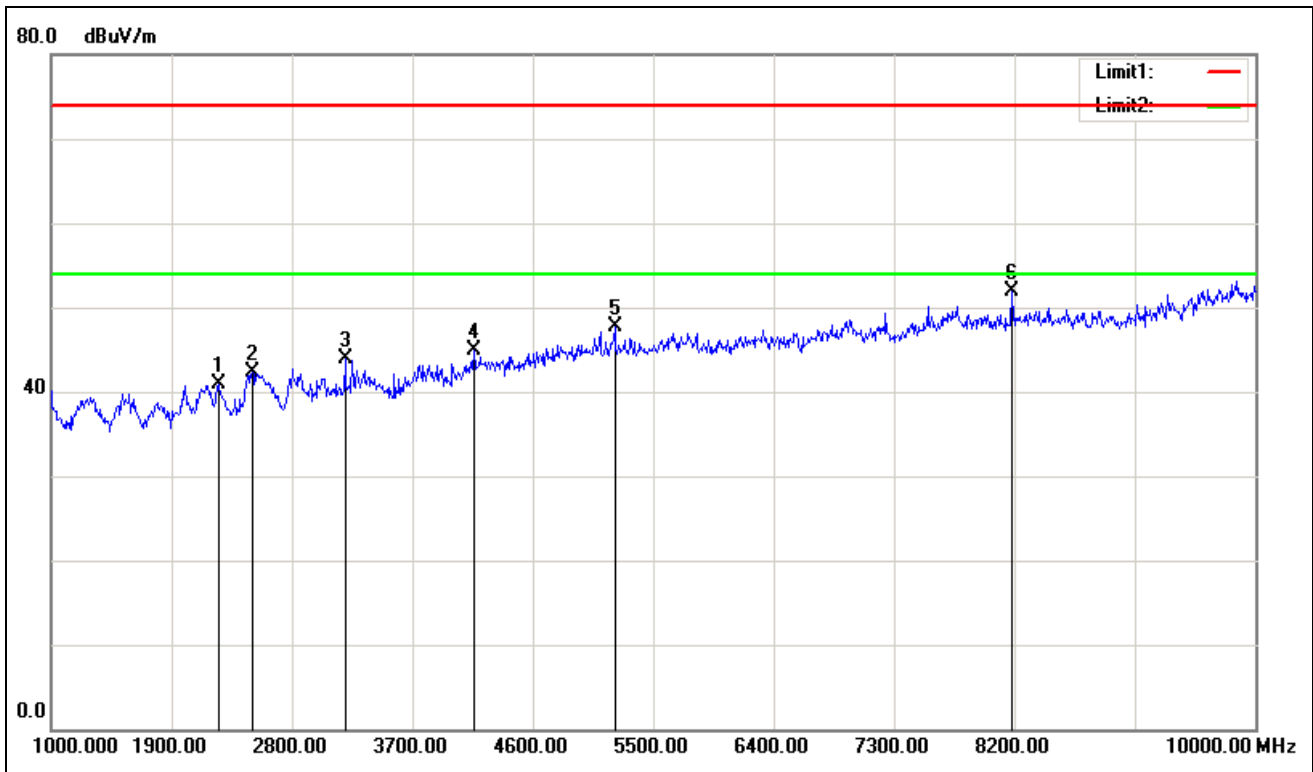
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
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 802.11g (CH High)

Tested by: AD Gan

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

Date: April 5, 2016

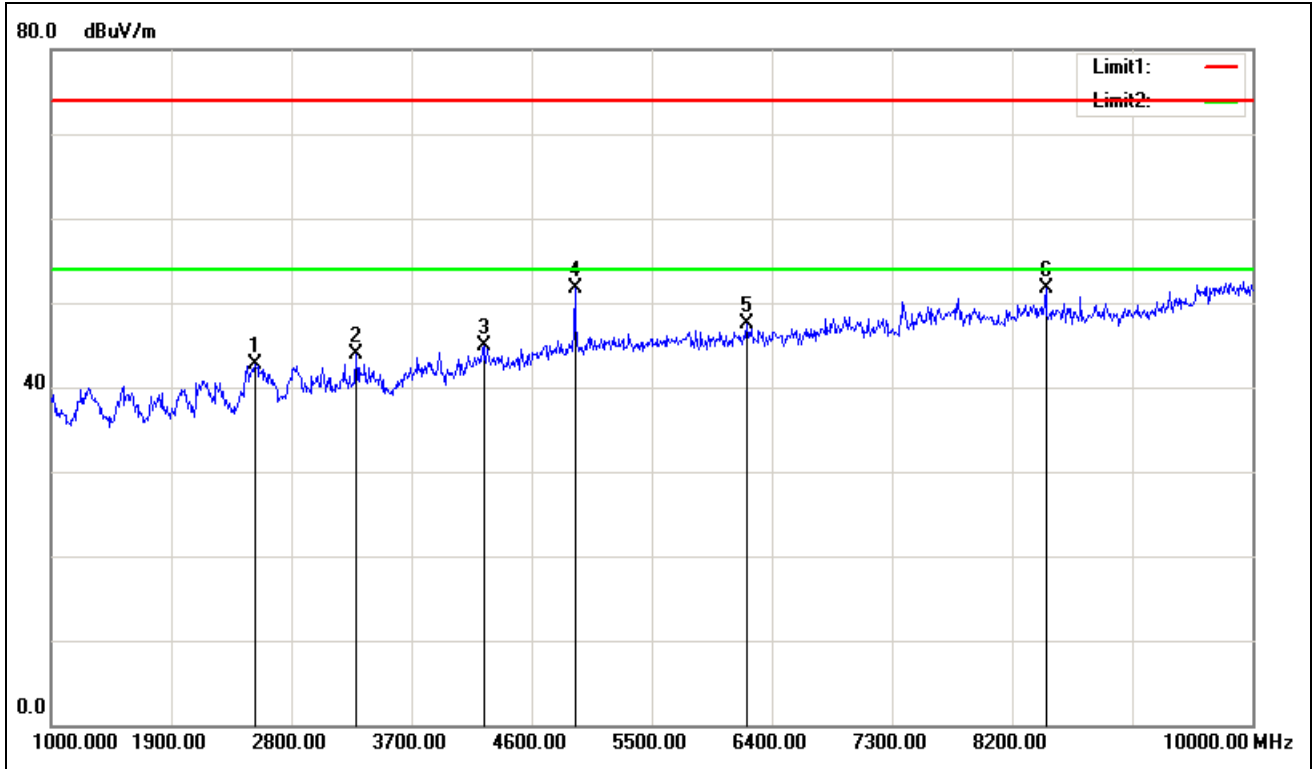
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2530.000	45.01	-2.21	42.80	74.00	-31.20	V	Peak
3286.000	44.86	-0.88	43.98	74.00	-30.02	V	Peak
4240.000	42.38	2.43	44.81	74.00	-29.19	V	Peak
4924.000	46.99	4.73	51.72	74.00	-22.28	V	Peak
6211.000	41.14	6.42	47.56	74.00	-26.44	V	Peak
8452.000	42.30	9.40	51.70	74.00	-22.30	V	Peak
1342.000	47.75	-7.27	40.48	74.00	-33.52	H	Peak
2134.000	45.61	-4.27	41.34	74.00	-32.66	H	Peak
2521.000	45.58	-2.22	43.36	74.00	-30.64	H	Peak
3286.000	45.61	-0.88	44.73	74.00	-29.27	H	Peak
4924.000	46.01	4.73	50.74	74.00	-23.26	H	Peak
5239.000	41.75	5.41	47.16	74.00	-26.84	H	Peak

REMARKS:

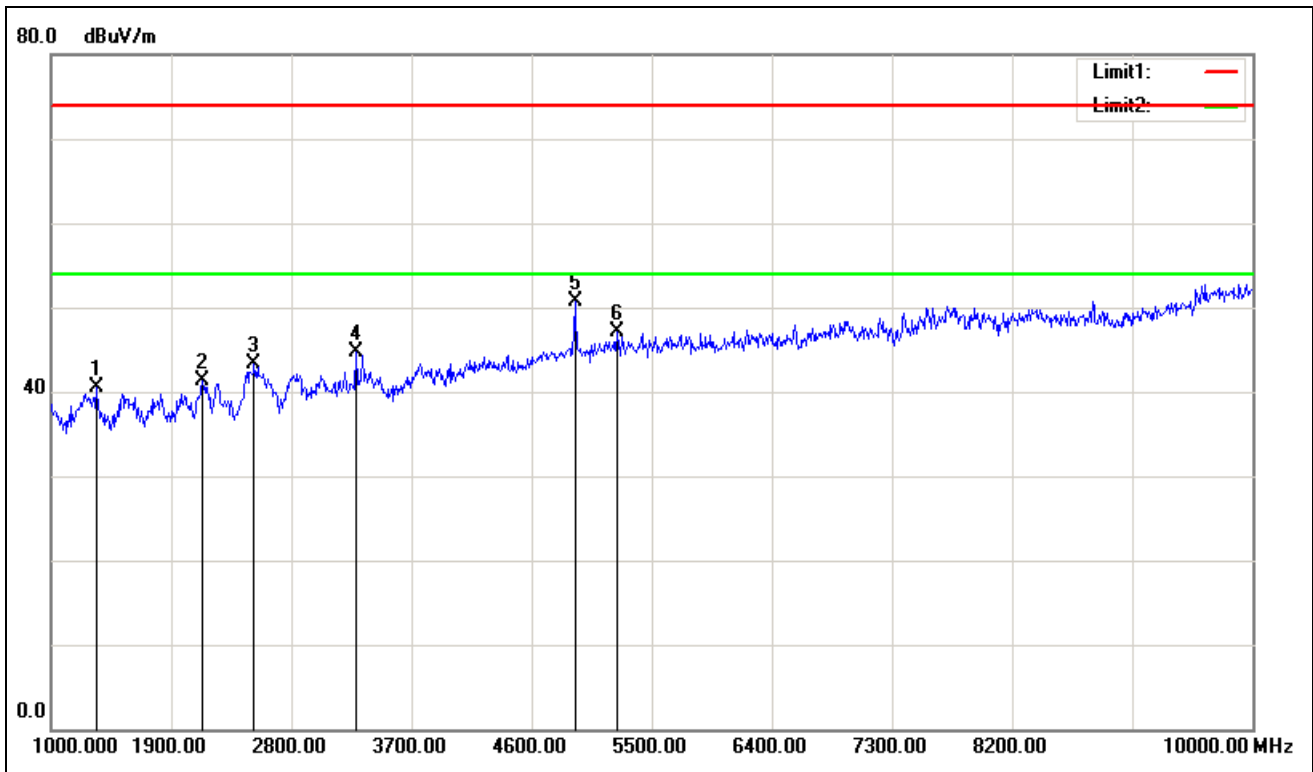
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
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 802.11g(CH Low)**Tested by:** AD Gan**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** April 5, 2016

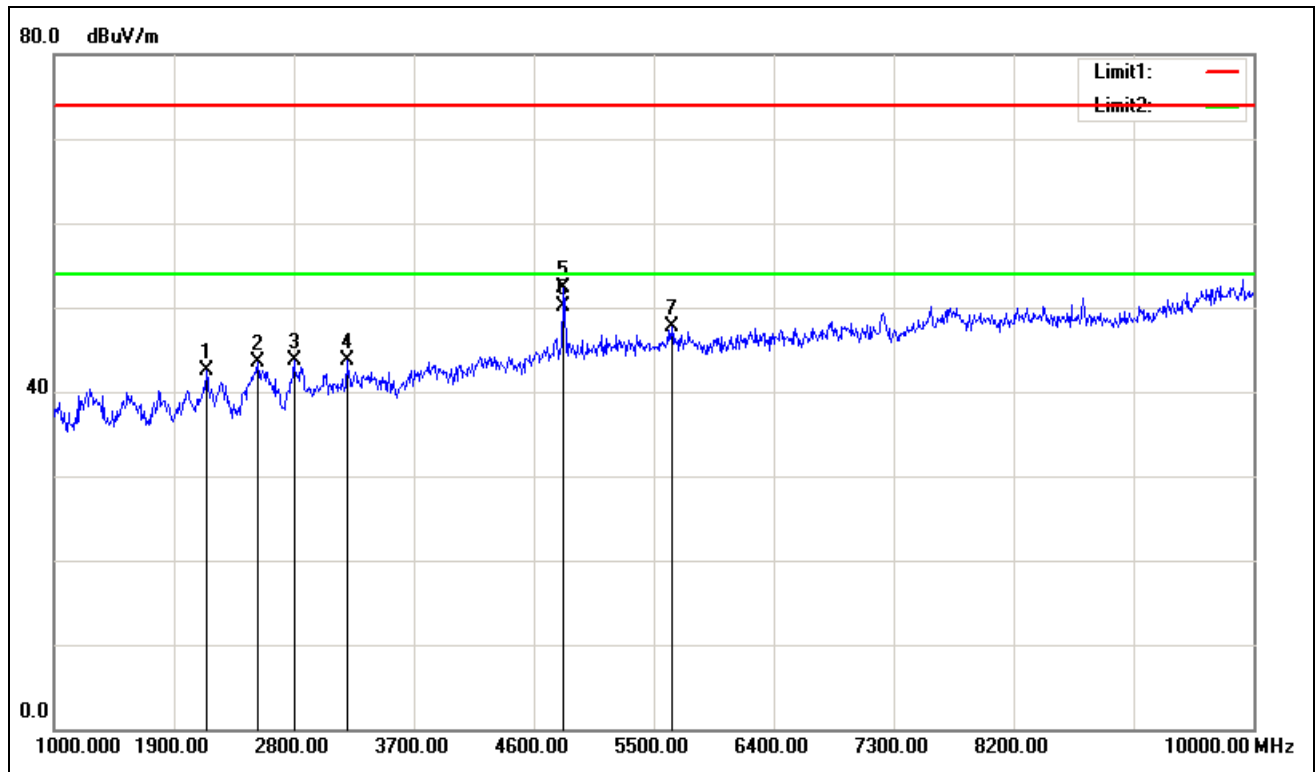
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2143.000	46.82	-4.22	42.60	74.00	-31.40	V	Peak
2530.000	45.79	-2.21	43.58	74.00	-30.42	V	Peak
2800.000	45.50	-1.72	43.78	74.00	-30.22	V	Peak
3196.000	44.77	-1.03	43.74	74.00	-30.26	V	Peak
4825.000	47.93	4.41	52.34	74.00	-21.66	V	Peak
4825.000	45.65	4.41	50.06	54.00	-3.94	V	AVG
5635.000	41.75	5.93	47.68	74.00	-26.32	V	Peak
1765.000	48.82	-6.35	42.47	74.00	-31.53	H	Peak
2512.000	45.22	-2.24	42.98	74.00	-31.02	H	Peak
3196.000	45.35	-1.03	44.32	74.00	-29.68	H	Peak
4834.000	47.67	4.44	52.11	74.00	-21.89	H	Peak
4834.000	45.45	4.44	49.89	54.00	-4.11	H	AVG
5203.000	43.54	5.34	48.88	74.00	-25.12	H	Peak
7246.000	44.60	8.18	52.78	74.00	-21.22	H	AVG
7246.000	41.93	8.18	50.11	54.00	-3.89	H	Peak

REMARKS:

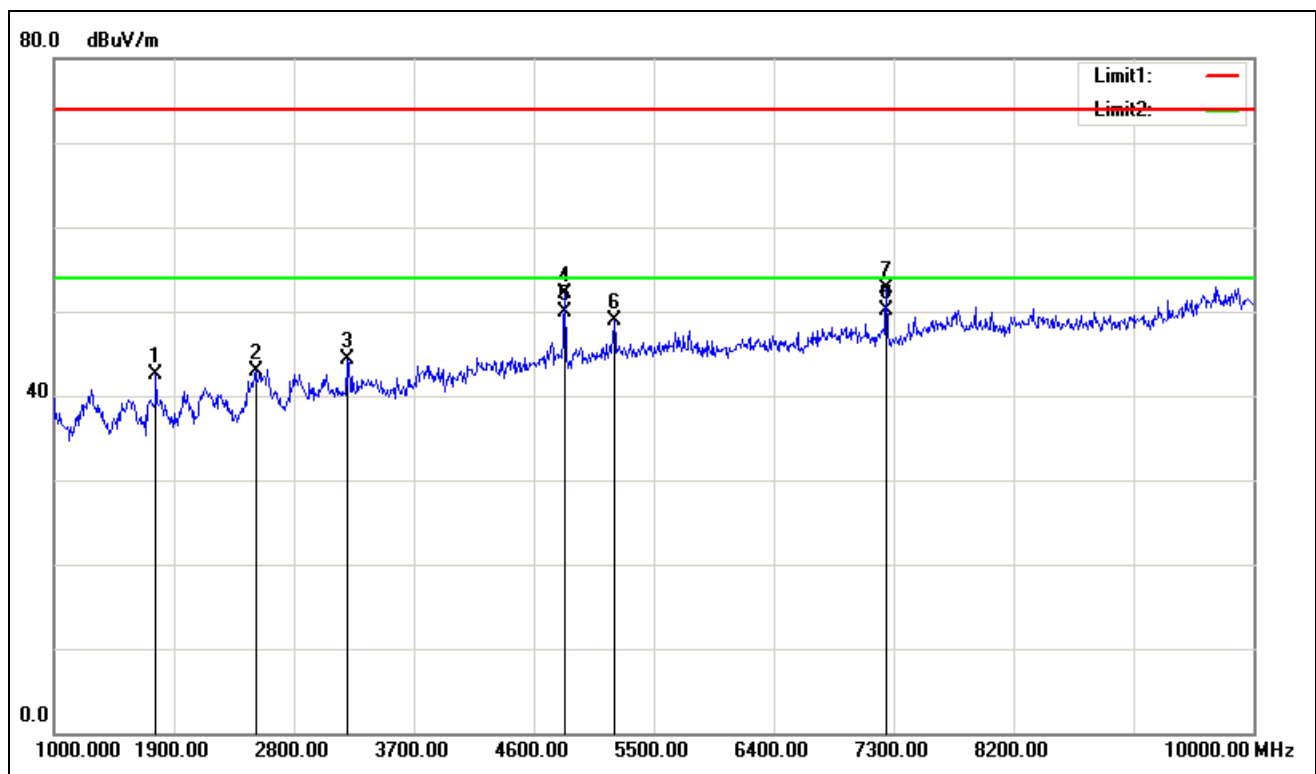
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
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 802.11g (CH Mid)**Tested by:** AD Gan**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** April 5, 2016

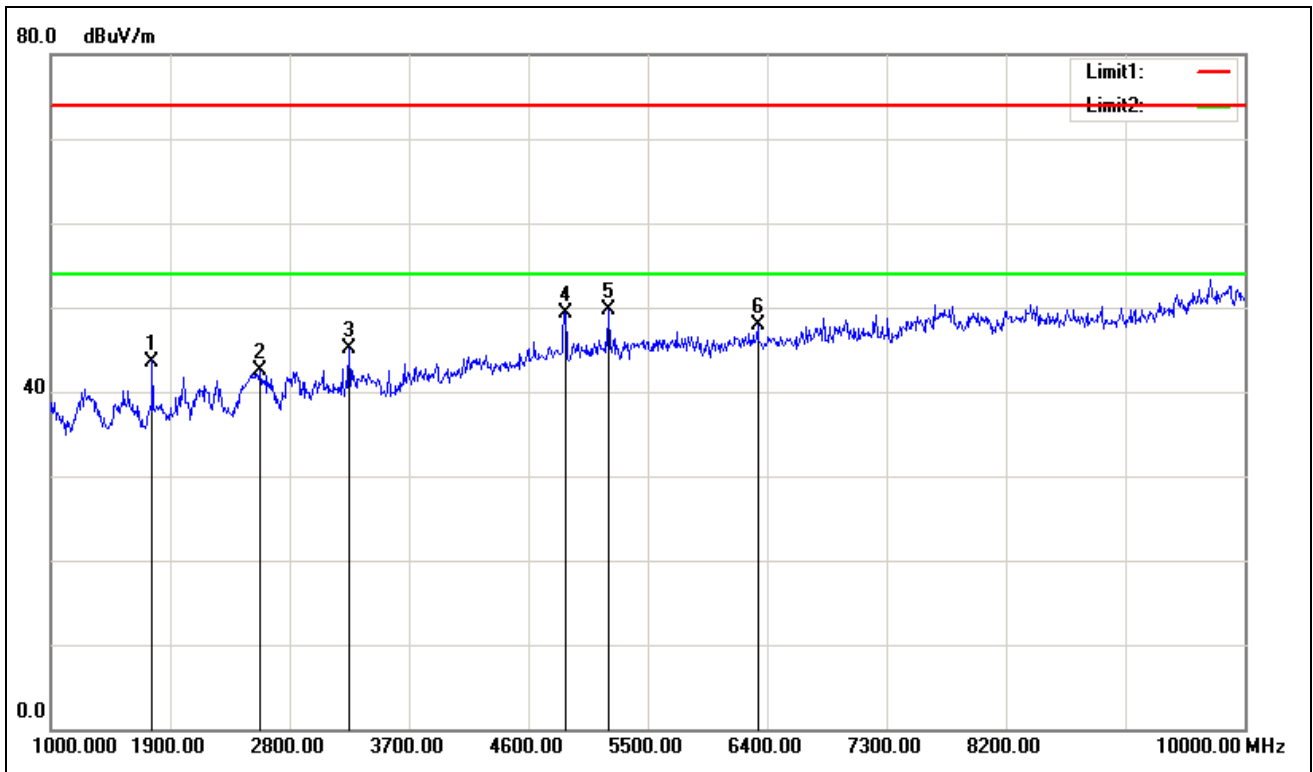
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1765.000	49.95	-6.35	43.60	74.00	-30.40	V	Peak
2575.000	44.68	-2.12	42.56	74.00	-31.44	V	Peak
3250.000	45.98	-0.94	45.04	74.00	-28.96	V	Peak
4879.000	44.78	4.59	49.37	74.00	-24.63	V	Peak
5203.000	44.44	5.34	49.78	74.00	-24.22	V	Peak
6328.000	41.35	6.61	47.96	74.00	-26.04	V	Peak
1252.000	48.69	-7.60	41.09	74.00	-32.91	H	Peak
2548.000	45.14	-2.17	42.97	74.00	-31.03	H	Peak
2845.000	44.97	-1.64	43.33	74.00	-30.67	H	Peak
3367.000	43.69	-0.74	42.95	74.00	-31.05	H	Peak
4879.000	46.68	4.59	51.27	74.00	-22.73	H	Peak
5194.000	42.57	5.33	47.90	74.00	-26.10	H	Peak

REMARKS:

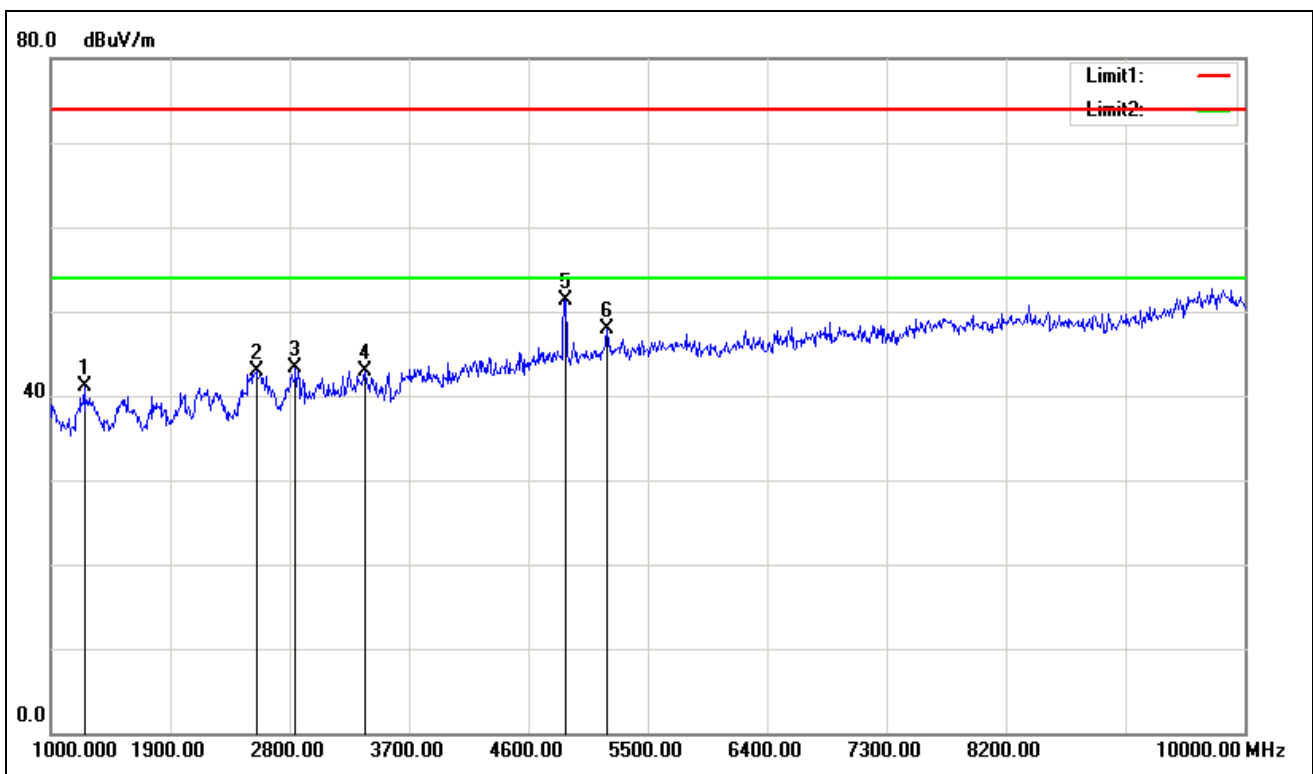
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
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 802.11g (CH High)**Tested by:** AD Gan**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** April 5, 2016

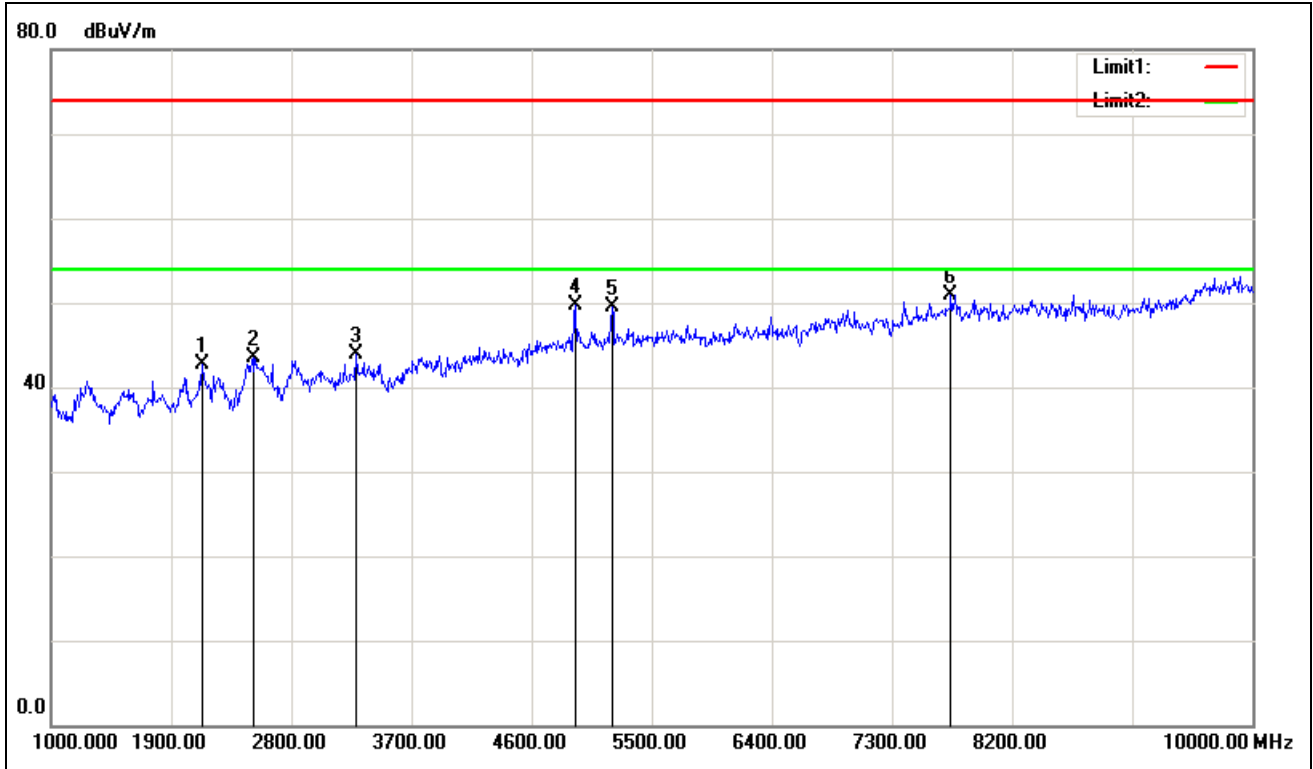
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2134.000	46.92	-4.27	42.65	74.00	-31.35	V	Peak
2512.000	45.83	-2.24	43.59	74.00	-30.41	V	Peak
3286.000	44.77	-0.88	43.89	74.00	-30.11	V	Peak
4924.000	44.98	4.73	49.71	74.00	-24.29	V	Peak
5203.000	44.10	5.34	49.44	74.00	-24.56	V	Peak
7741.000	41.76	9.14	50.90	74.00	-23.10	V	Peak
2584.000	45.23	-2.11	43.12	74.00	-30.88	H	Peak
3196.000	45.85	-1.03	44.82	74.00	-29.18	H	Peak
3673.000	43.80	0.21	44.01	74.00	-29.99	H	Peak
4636.000	41.84	3.79	45.63	74.00	-28.37	H	Peak
4924.000	43.02	4.73	47.75	74.00	-26.25	H	Peak
6391.000	40.90	6.71	47.61	74.00	-26.39	H	Peak

REMARKS:

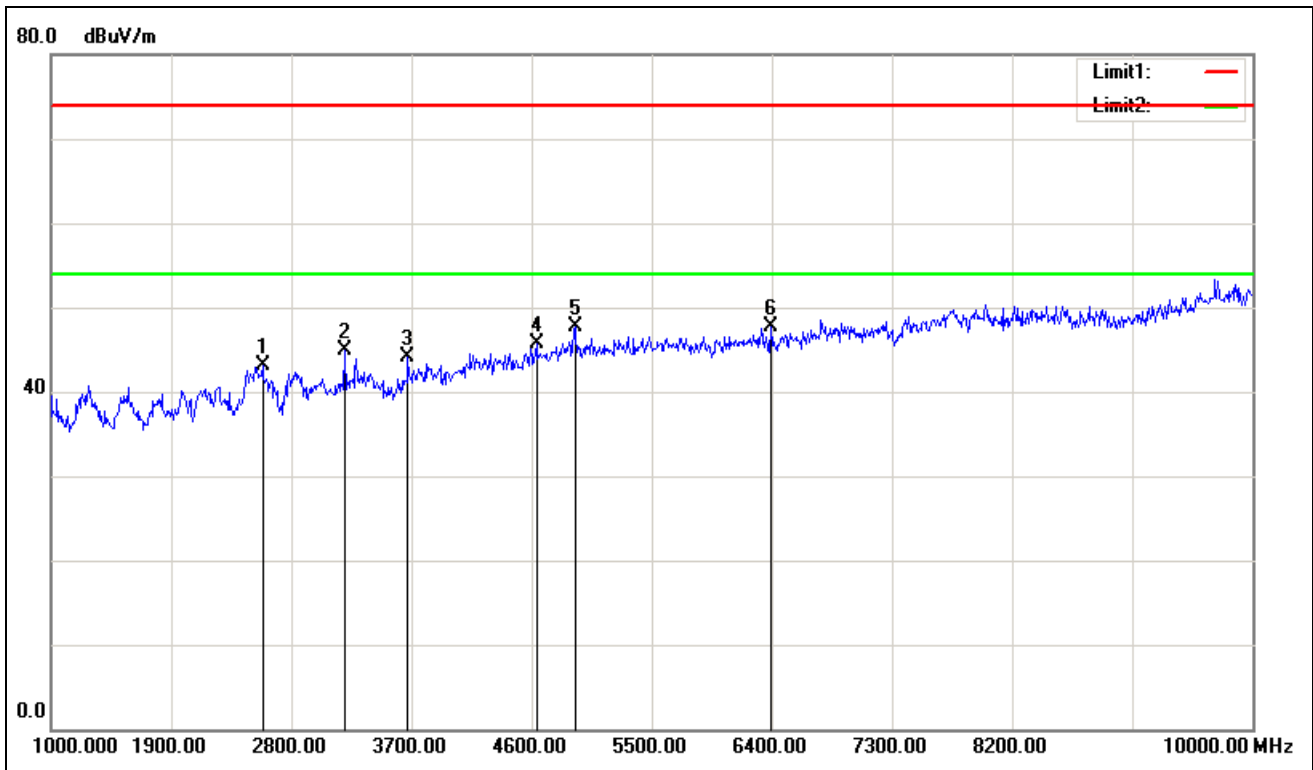
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
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 HT20 MHz (CH Low)**Tested by:** AD Gan**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** April 5, 2016

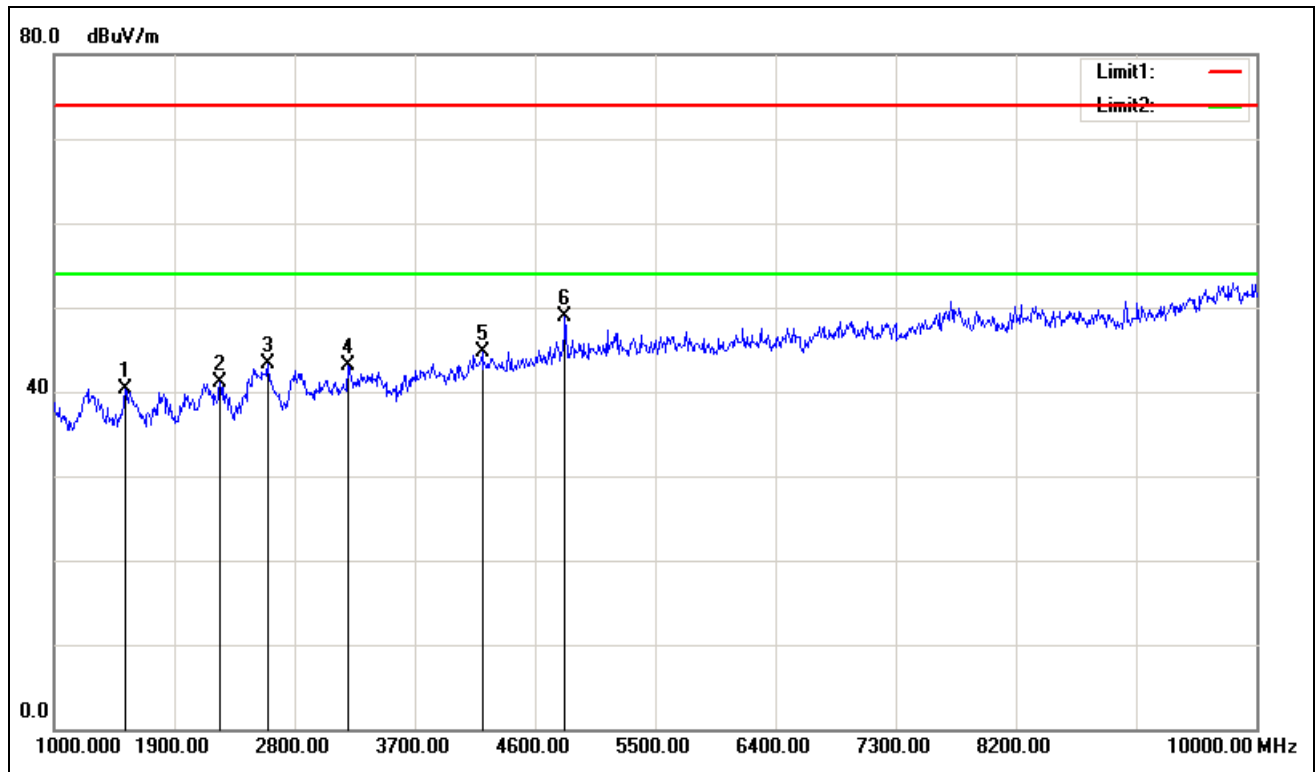
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1531.000	47.06	-6.82	40.24	74.00	-33.76	V	Peak
2242.000	44.78	-3.67	41.11	74.00	-32.89	V	Peak
2602.000	45.38	-2.08	43.30	74.00	-30.70	V	Peak
3196.000	44.20	-1.03	43.17	74.00	-30.83	V	Peak
4204.000	42.34	2.31	44.65	74.00	-29.35	V	Peak
4825.000	44.57	4.41	48.98	74.00	-25.02	V	Peak
2242.000	45.16	-3.67	41.49	74.00	-32.51	H	Peak
2602.000	44.65	-2.08	42.57	74.00	-31.43	H	Peak
3214.000	44.79	-1.00	43.79	74.00	-30.21	H	Peak
3799.000	43.08	0.74	43.82	74.00	-30.18	H	Peak
4825.000	47.82	4.41	52.23	74.00	-21.77	H	Peak
4825.000	45.75	4.41	50.16	54.00	-3.84	H	AVG
7237.000	42.02	8.16	50.18	74.00	-23.82	H	Peak

REMARKS:

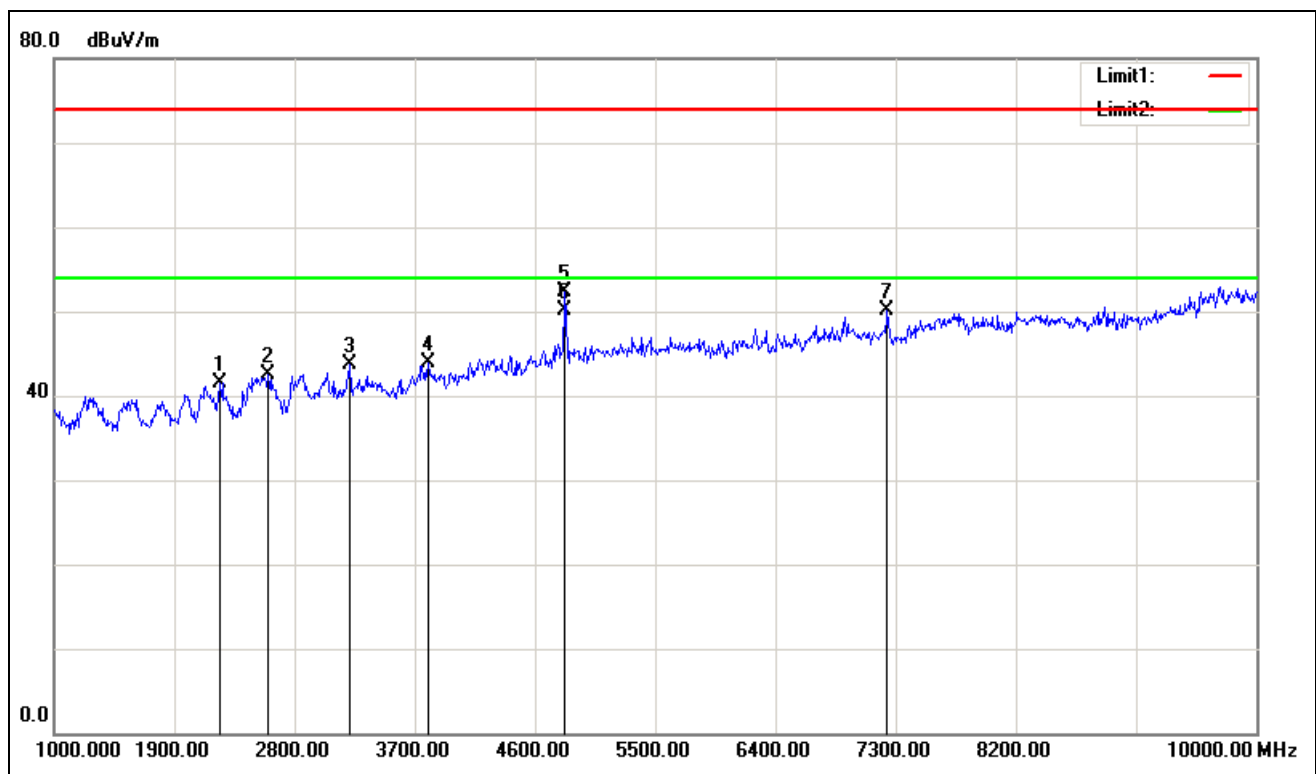
7. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
8. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
9. Average test would be performed if the peak result were greater than the average limit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



Vertical



Horizontal



**Test Mode:** TX / IEEE 802.11n HT20 MHz (CH Mid)**Tested by:** AD Gan**Ambient temperature:** 24°C **Relative humidity:** 52% RH**Date:** April 5, 2016

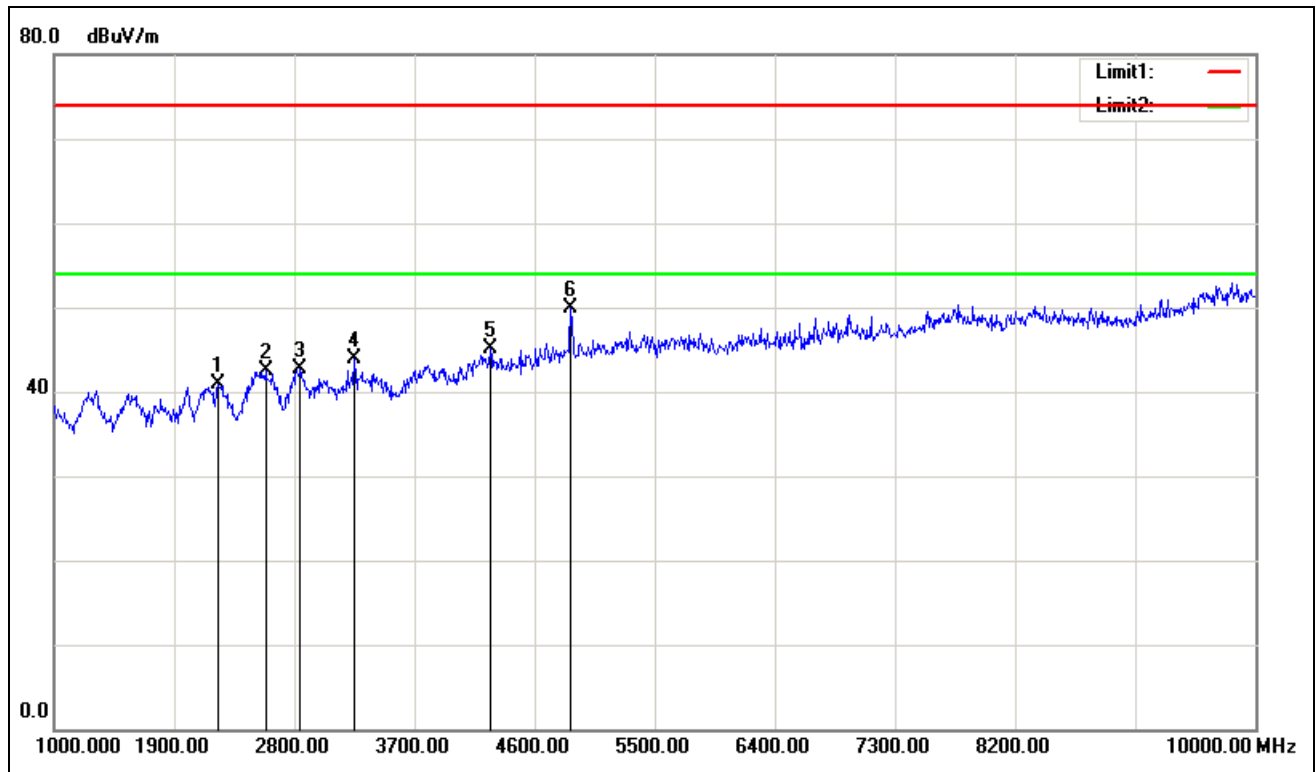
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2224.000	44.69	-3.77	40.92	74.00	-33.08	V	Peak
2584.000	44.70	-2.11	42.59	74.00	-31.41	V	Peak
2845.000	44.37	-1.64	42.73	74.00	-31.27	V	Peak
3250.000	44.91	-0.94	43.97	74.00	-30.03	V	Peak
4267.000	42.50	2.53	45.03	74.00	-28.97	V	Peak
4870.000	45.29	4.56	49.85	74.00	-24.15	V	Peak
1261.000	48.39	-7.57	40.82	74.00	-33.18	H	Peak
2143.000	46.00	-4.22	41.78	74.00	-32.22	H	Peak
2485.000	45.27	-2.34	42.93	74.00	-31.07	H	Peak
3250.000	44.29	-0.94	43.35	74.00	-30.65	H	Peak
3907.000	43.91	1.20	45.11	74.00	-28.89	H	Peak
5626.000	41.87	5.92	47.79	74.00	-26.21	H	Peak

REMARKS:

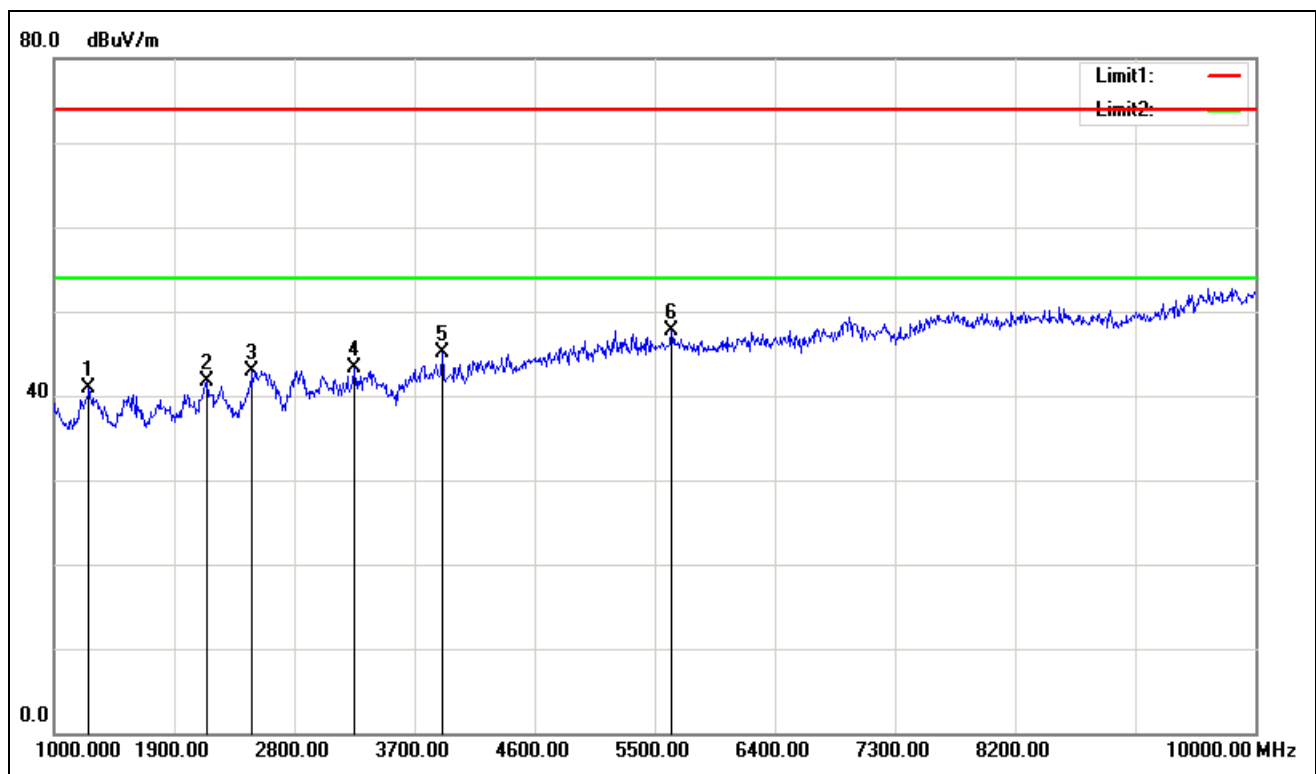
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
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 HT20 MHz (CH High)

Tested by: AD Gan

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

Date: April 5, 2016

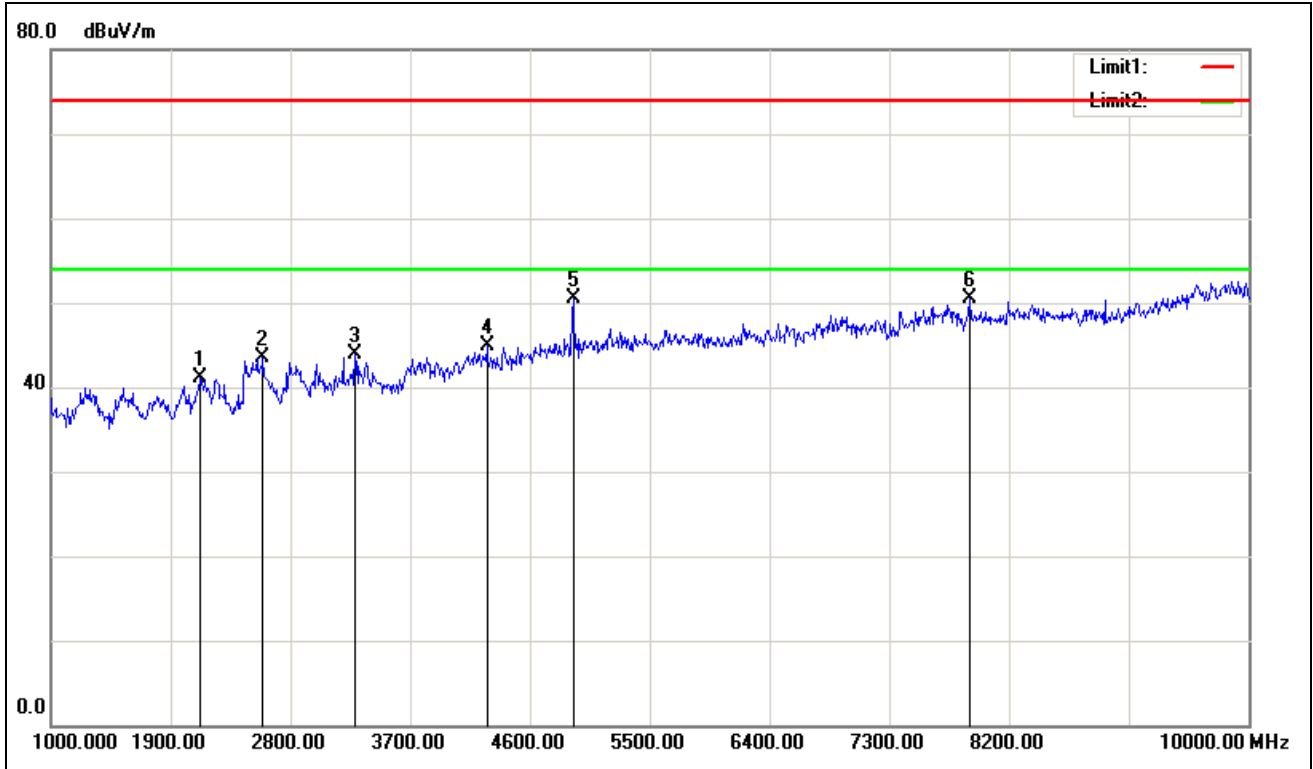
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2125.000	45.51	-4.31	41.20	74.00	-32.80	V	Peak
2593.000	45.67	-2.09	43.58	74.00	-30.42	V	Peak
3286.000	44.76	-0.88	43.88	74.00	-30.12	V	Peak
4276.000	42.32	2.56	44.88	74.00	-29.12	V	Peak
4924.000	45.85	4.73	50.58	74.00	-23.42	V	Peak
7903.000	41.12	9.46	50.58	74.00	-23.42	V	Peak
2134.000	45.93	-4.27	41.66	74.00	-32.34	H	Peak
2458.000	45.72	-2.49	43.23	74.00	-30.77	H	Peak
3286.000	44.14	-0.88	43.26	74.00	-30.74	H	Peak
4933.000	46.66	4.76	51.42	74.00	-22.58	H	Peak
6292.000	41.48	6.55	48.03	74.00	-25.97	H	Peak
9676.000	42.86	11.05	53.91	74.00	-20.09	H	Peak
9676.000	37.17	11.05	48.22	54.00	-5.78	H	AVG

REMARKS:

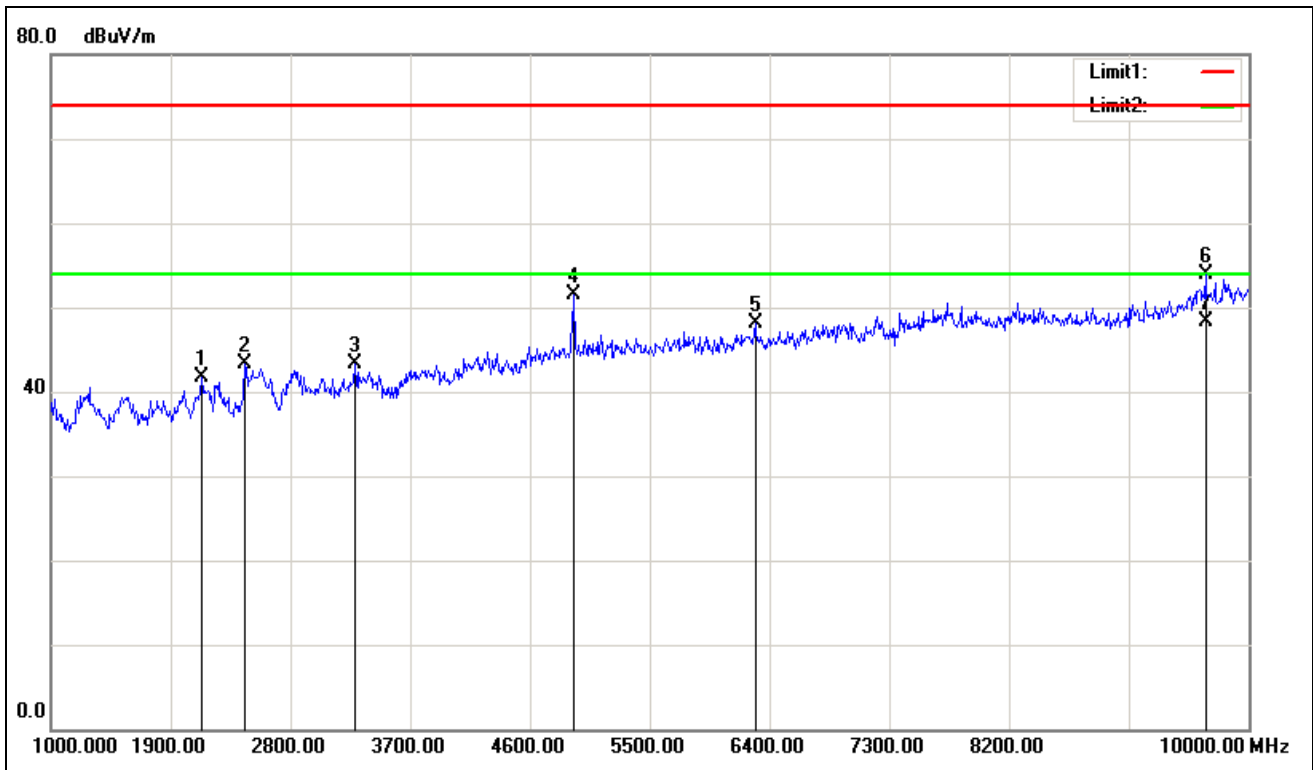
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
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 HT40 MHz (CH Low)**Tested by:** AD Gan**Ambient temperature:** 24°C **Relative humidity:** 52% RH**Date:** April 5, 2016

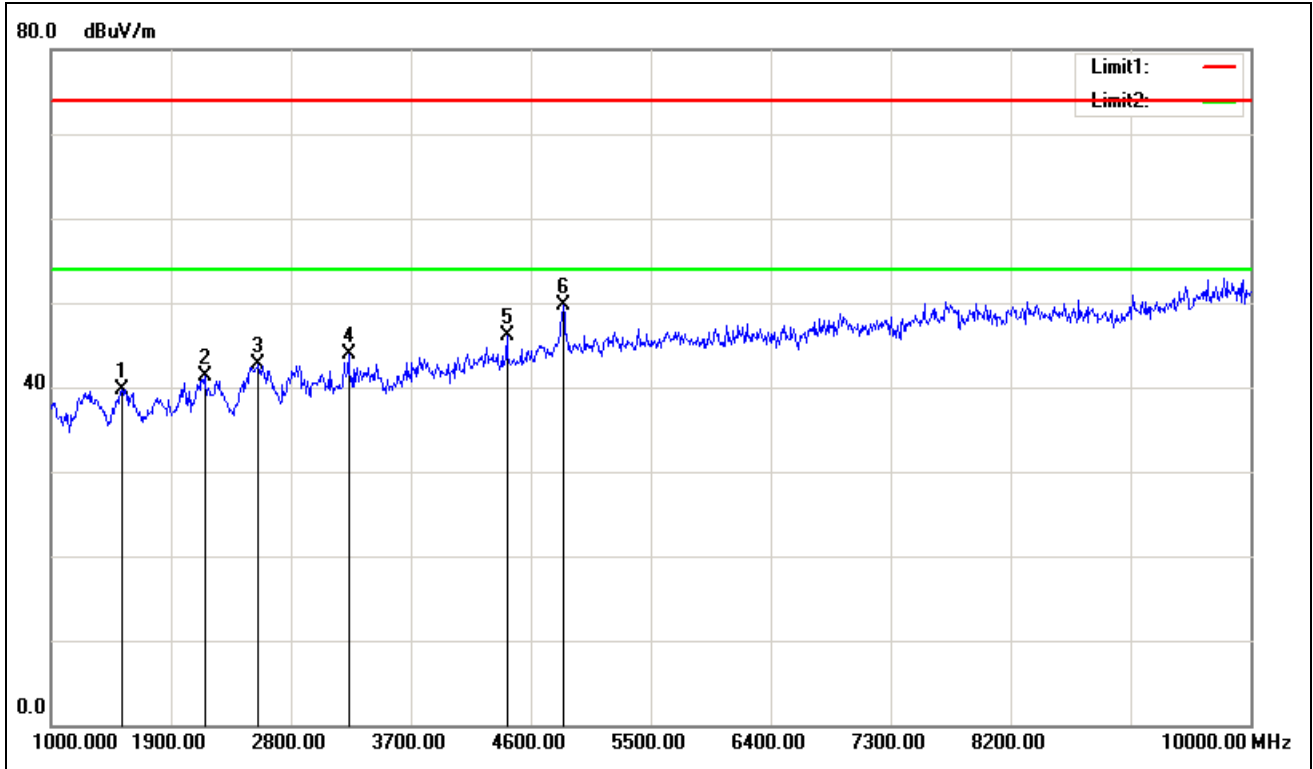
Frequency (MHz)	Reading (dBUV)	Correction Factor (dB/m)	Result (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1531.000	46.50	-6.82	39.68	74.00	-34.32	V	Peak
2152.000	45.54	-4.17	41.37	74.00	-32.63	V	Peak
2557.000	44.89	-2.16	42.73	74.00	-31.27	V	Peak
3232.000	44.94	-0.97	43.97	74.00	-30.03	V	Peak
4420.000	43.04	3.07	46.11	74.00	-27.89	V	Peak
4843.000	45.21	4.47	49.68	74.00	-24.32	V	Peak
1765.000	50.02	-6.35	43.67	74.00	-30.33	H	Peak
2512.000	45.07	-2.24	42.83	74.00	-31.17	H	Peak
3232.000	44.40	-0.97	43.43	74.00	-30.57	H	Peak
3700.000	43.63	0.32	43.95	74.00	-30.05	H	Peak
4843.000	44.63	4.47	49.10	74.00	-24.90	H	Peak
5590.000	41.95	5.91	47.86	74.00	-26.14	H	Peak

REMARKS:

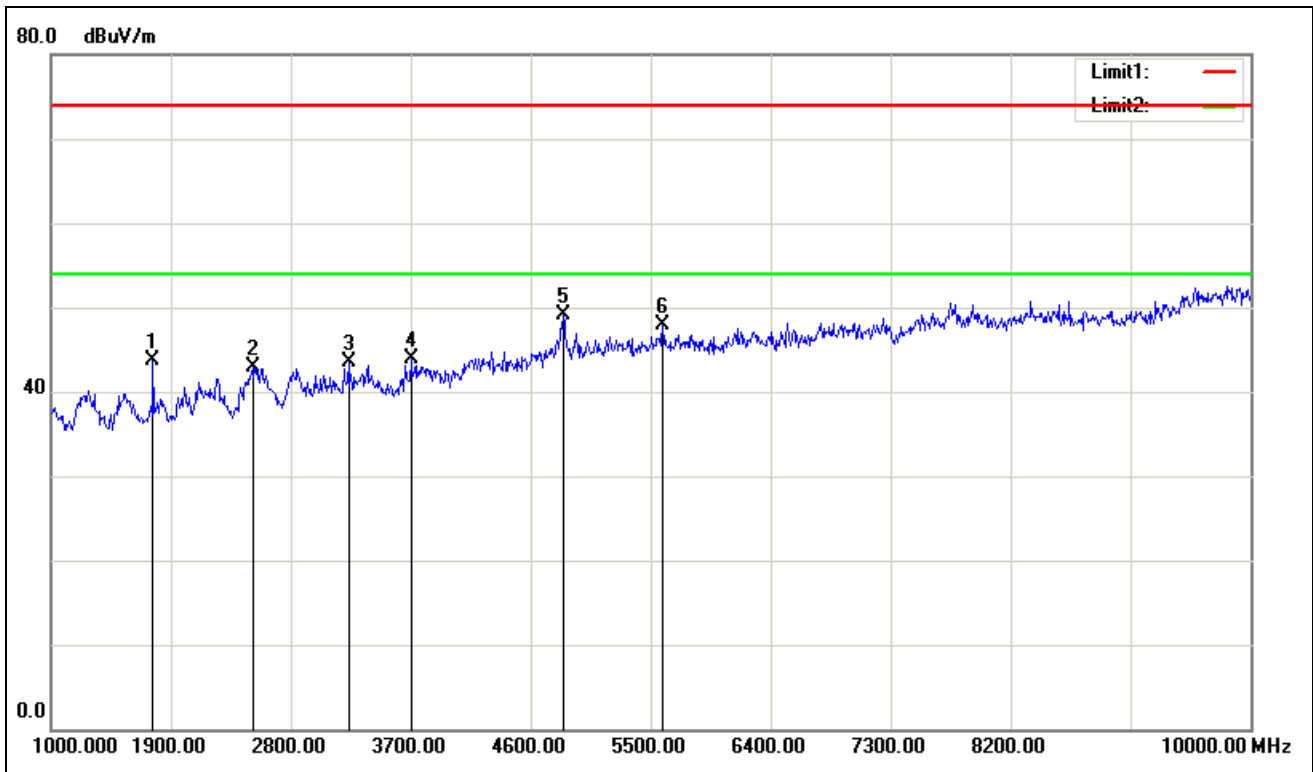
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
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 HT40 MHz (CH Mid)**Tested by:** AD Gan**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** April 5, 2016

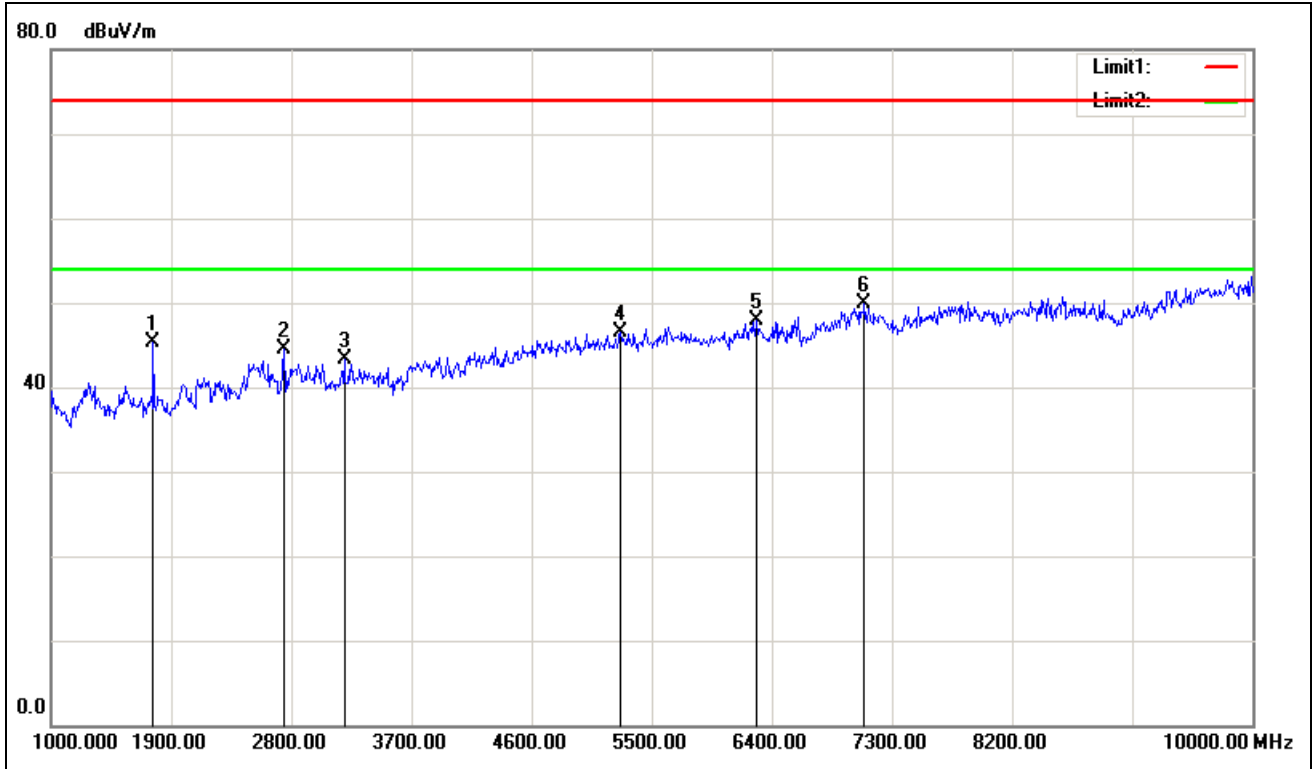
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1765.000	51.68	-6.35	45.33	74.00	-28.67	V	Peak
2746.000	46.33	-1.82	44.51	74.00	-29.49	V	Peak
3196.000	44.40	-1.03	43.37	74.00	-30.63	V	Peak
5266.000	41.03	5.45	46.48	74.00	-27.52	V	Peak
6283.000	41.34	6.54	47.88	74.00	-26.12	V	Peak
7093.000	42.10	7.88	49.98	74.00	-24.02	V	Peak
1999.000	46.09	-5.01	41.08	74.00	-32.92	H	Peak
2557.000	44.72	-2.16	42.56	74.00	-31.44	H	Peak
4285.000	41.96	2.59	44.55	74.00	-29.45	H	Peak
5131.000	41.14	5.21	46.35	74.00	-27.65	H	Peak
6148.000	41.05	6.32	47.37	74.00	-26.63	H	Peak
7093.000	41.38	7.88	49.26	74.00	-24.74	H	Peak

REMARKS:

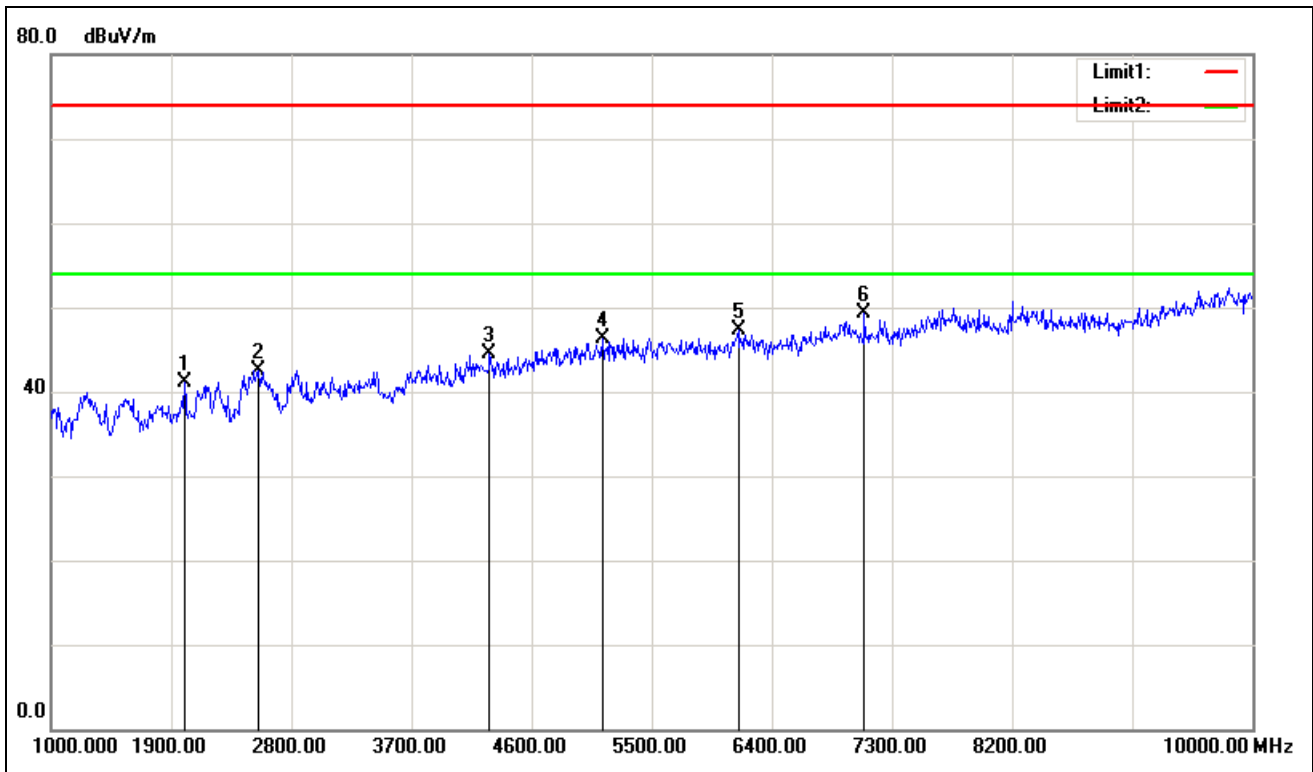
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
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 / EEE 802.11n HT40 MHz (CH High)Tested by: AD GanAmbient temperature: 24°C Relative humidity: 52% RHDate: April 5, 2016

Frequency (MHz)	Reading (dBUV)	Correction Factor (dB/m)	Result (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1765.000	51.84	-6.35	45.49	74.00	-28.51	V	Peak
2872.000	44.75	-1.59	43.16	74.00	-30.84	V	Peak
3277.000	44.62	-0.89	43.73	74.00	-30.27	V	Peak
4906.000	44.22	4.67	48.89	74.00	-25.11	V	Peak
5302.000	41.48	5.52	47.00	74.00	-27.00	V	Peak
6814.000	41.82	7.40	49.22	74.00	-24.78	V	Peak
1765.000	49.98	-6.35	43.63	74.00	-30.37	H	Peak
2539.000	45.22	-2.19	43.03	74.00	-30.97	H	Peak
3277.000	44.50	-0.89	43.61	74.00	-30.39	H	Peak
4231.000	42.88	2.40	45.28	74.00	-28.72	H	Peak
4915.000	45.10	4.70	49.80	74.00	-24.20	H	Peak
5689.000	41.98	5.95	47.93	74.00	-26.07	H	Peak

REMARKS:

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 or as required by the applicant.
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).



7.3. 6dB BANDWIDTH MEASUREMENT

7.3.1. LIMITS

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz. The minimum 6 dB bandwidth shall be at least 500 kHz.

7.3.2. TEST INSTRUMENTS

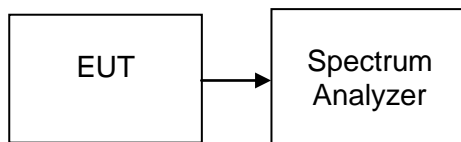
Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	02/21/2016	02/20/2017

7.3.3. TEST PROCEDURES (please refer to measurement standard)

8.1 Option 1:

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.3.4. TEST SETUP





7.3.5. TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11b (Antenna 0)

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	8112	>500	PASS
Mid	2437	8102		PASS
High	2462	8070		PASS

Test mode: IEEE 802.11b (Antenna 1)

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	8101	>500	PASS
Mid	2437	8105		PASS
High	2462	8107		PASS

Test mode: IEEE 802.11g (Antenna 0)

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	13595	>500	PASS
Mid	2437	12170		PASS
High	2462	14733		PASS

Test mode: IEEE 802.11g (Antenna 1)

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	15129	>500	PASS
Mid	2437	13547		PASS
High	2462	15116		PASS

**Test mode: IEEE 802.11n HT20 MHz (Antenna 0)**

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	15133	>500	PASS
Mid	2437	15040		PASS
High	2462	15115		PASS

Test mode: IEEE 802.11n HT20 MHz (Antenna 1)

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	15124	>500	PASS
Mid	2437	15120		PASS
High	2462	15128		PASS

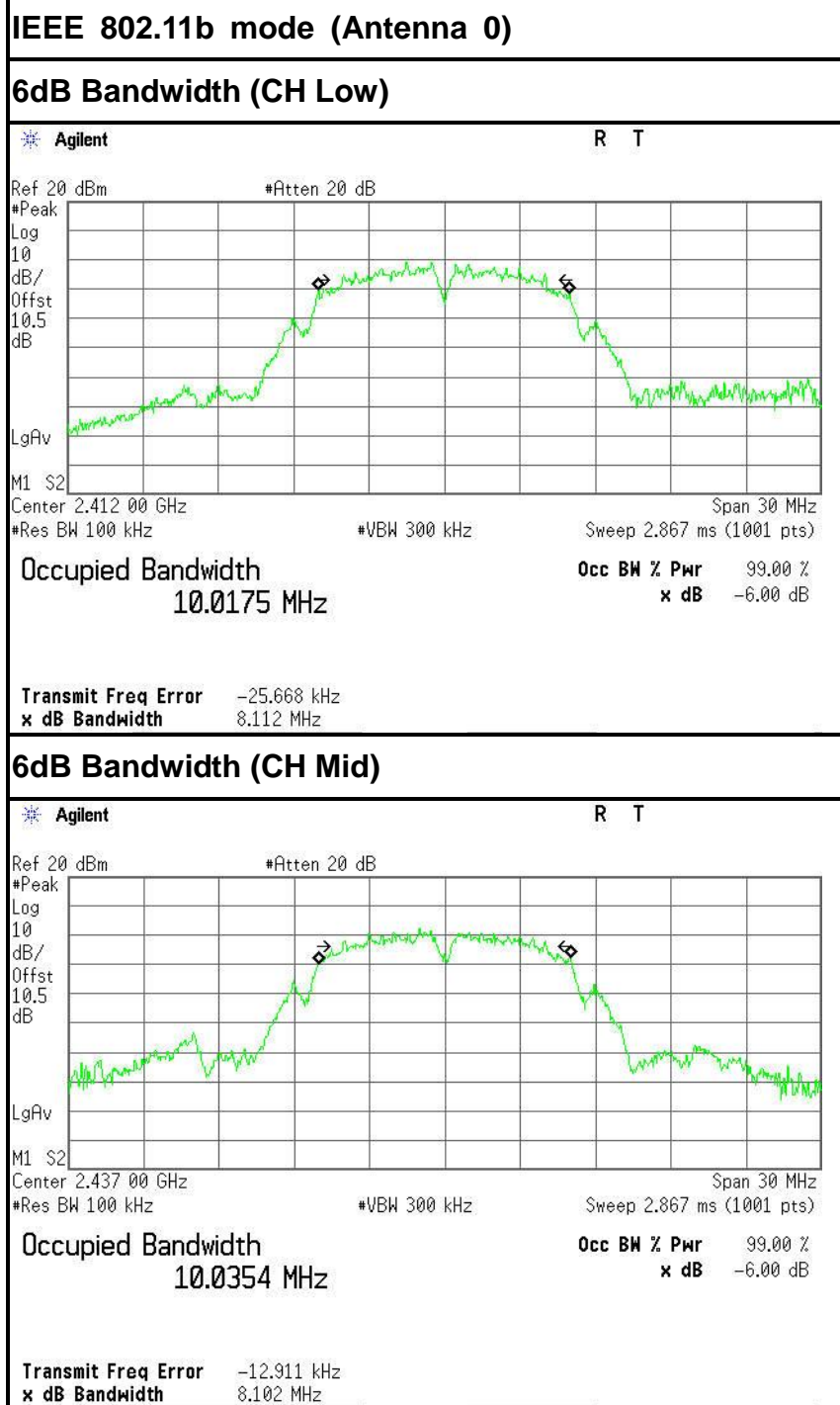
Test mode: IEEE 802.11n HT40 MHz (Antenna 0)

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2422	35975	>500	PASS
Mid	2437	35807		PASS
High	2452	35803		PASS

Test mode: IEEE 802.11n HT40 MHz (Antenna 1)

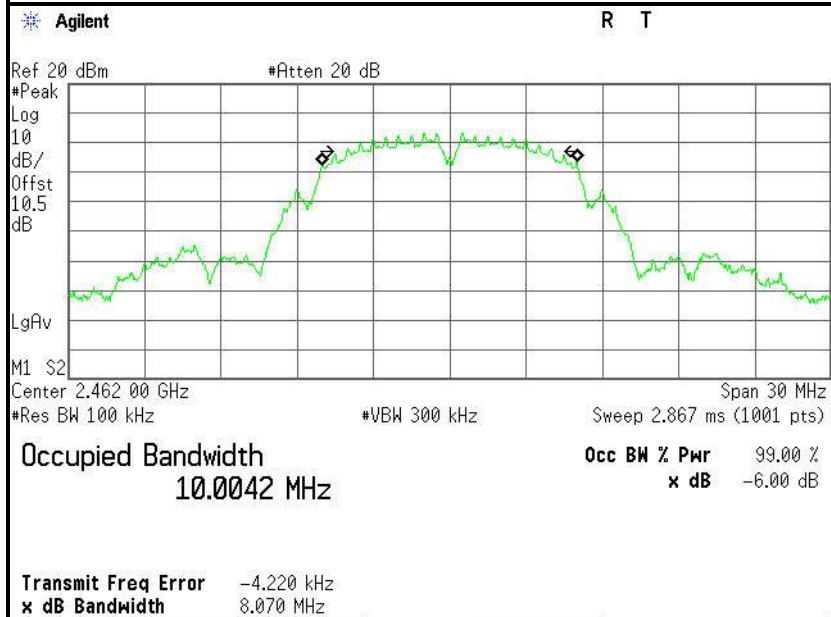
Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2422	36325	>500	PASS
Mid	2437	32878		PASS
High	2452	36343		PASS

Test Plot



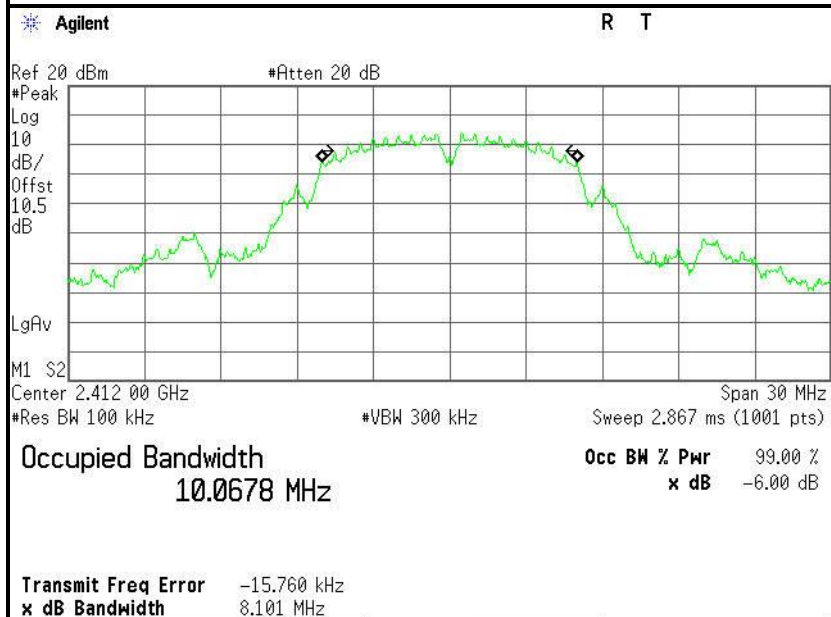


6dB Bandwidth (CH High)



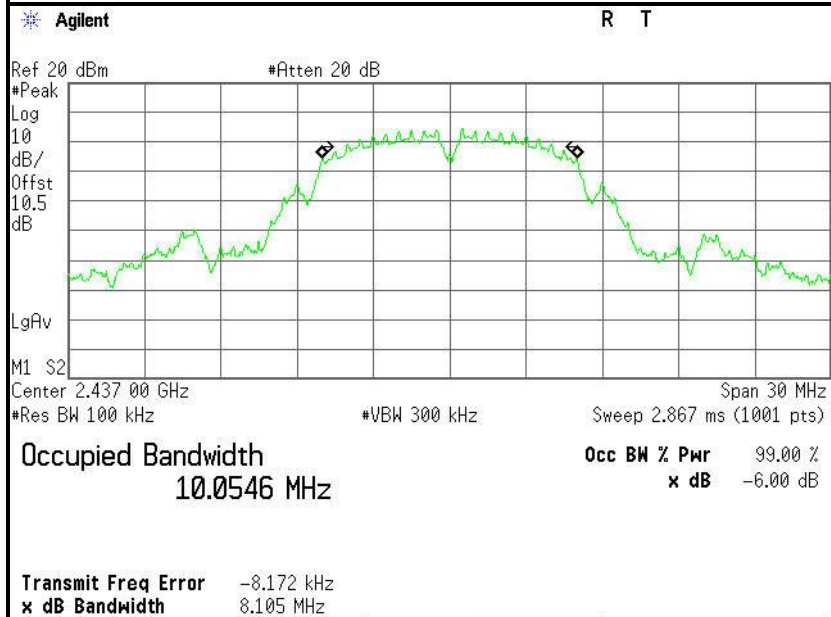
IEEE 802.11b mode (Antenna 1)

6dB Bandwidth (CH Low)

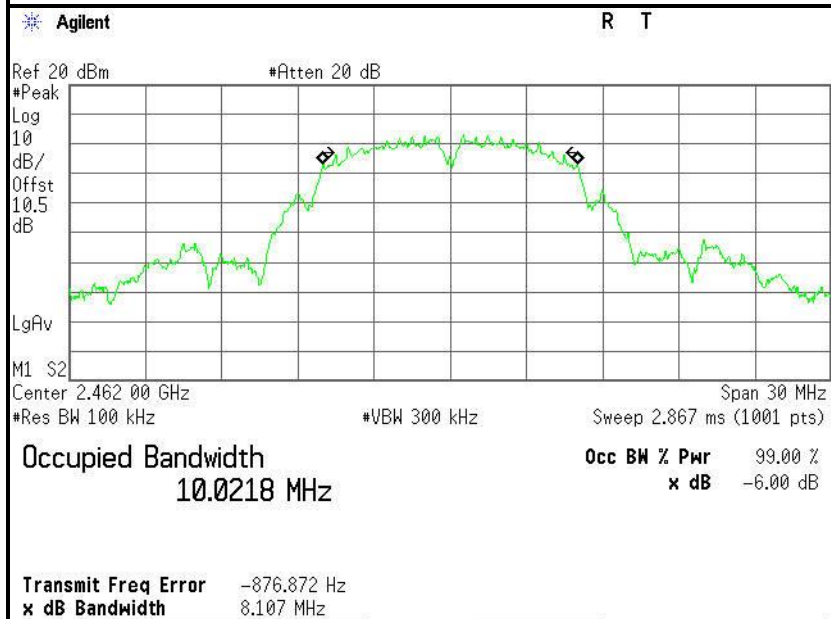




6dB Bandwidth (CH Mid)



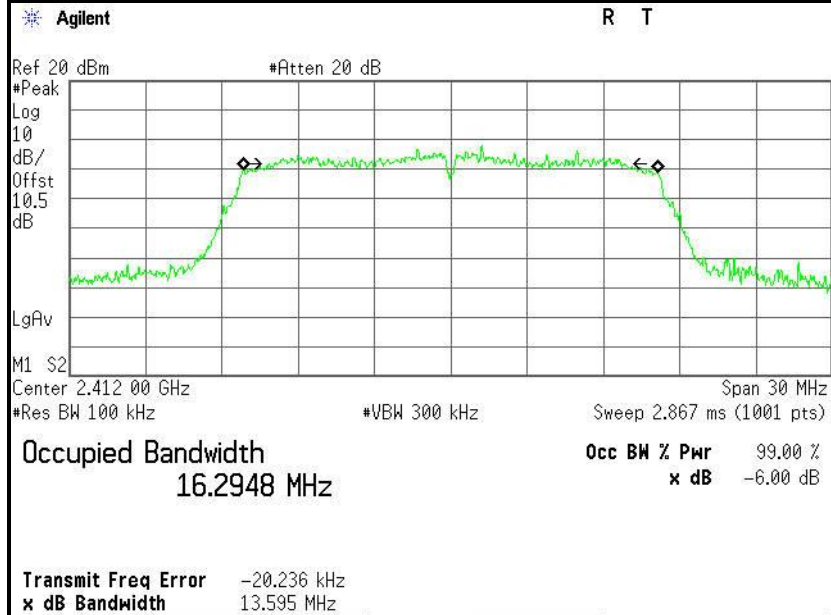
6dB Bandwidth (CH High)



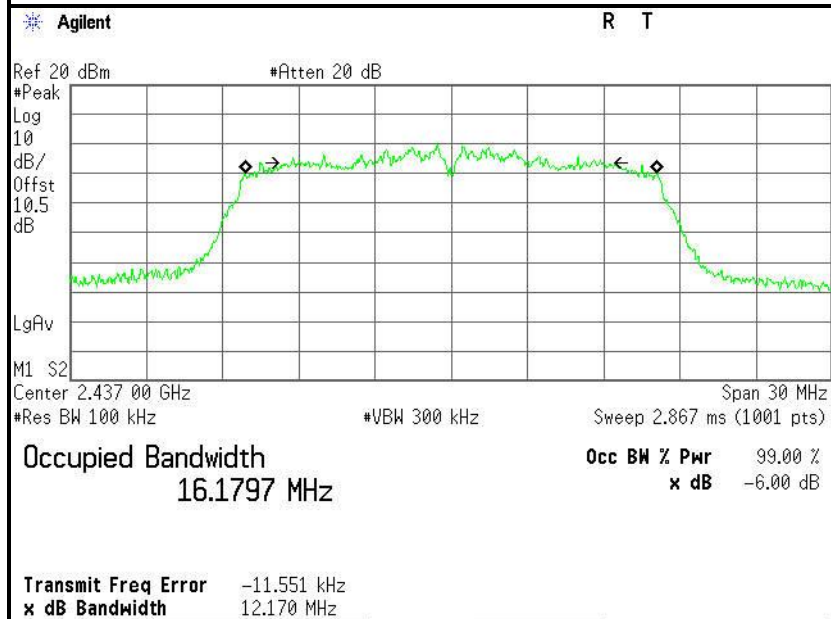


IEEE 802.11g mode (Antenna 0)

6dB Bandwidth (CH Low)

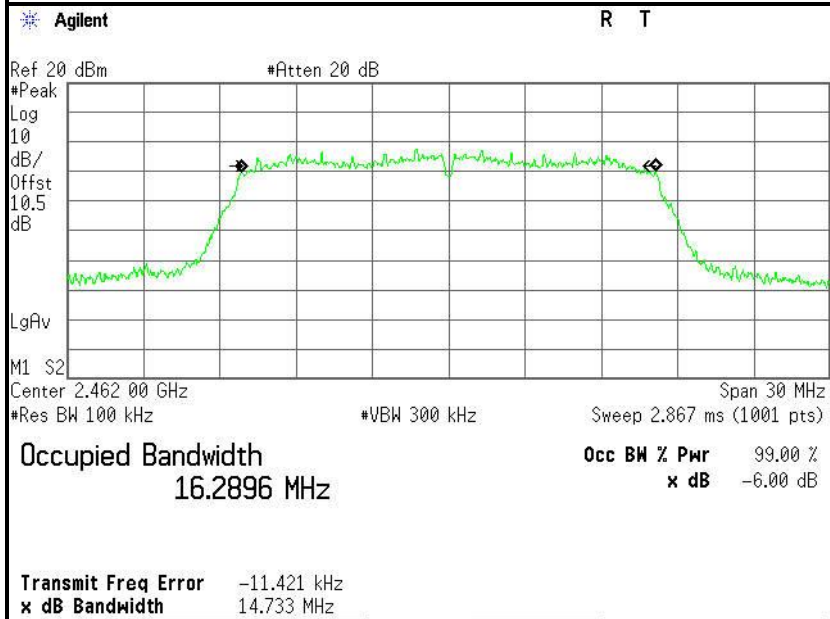


6dB Bandwidth (CH Mid)



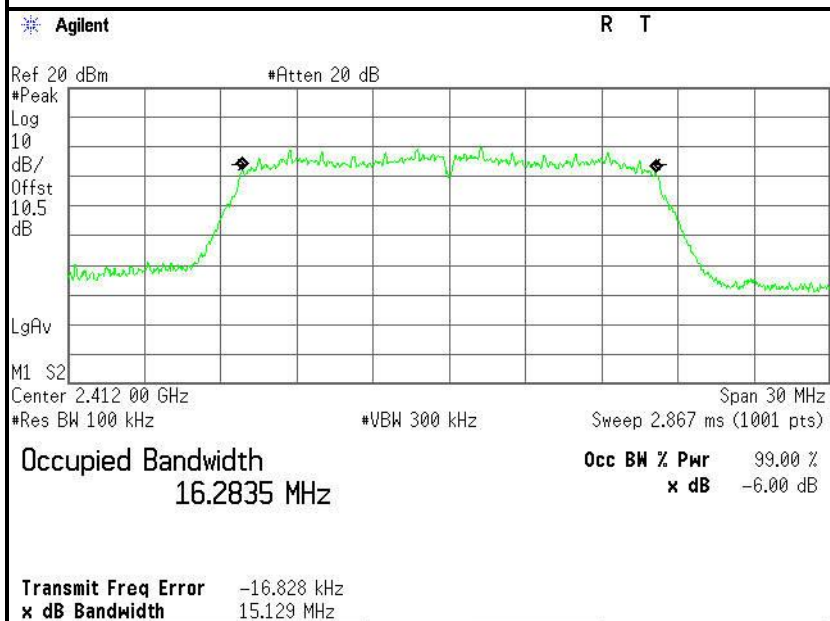


6dB Bandwidth (CH High)



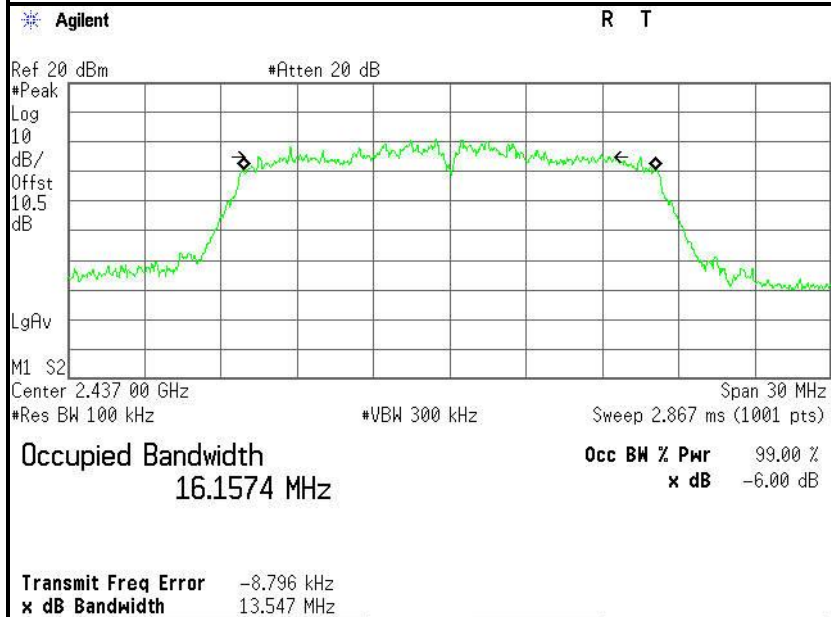
IEEE 802.11g mode (Antenna 1)

6dB Bandwidth (CH Low)

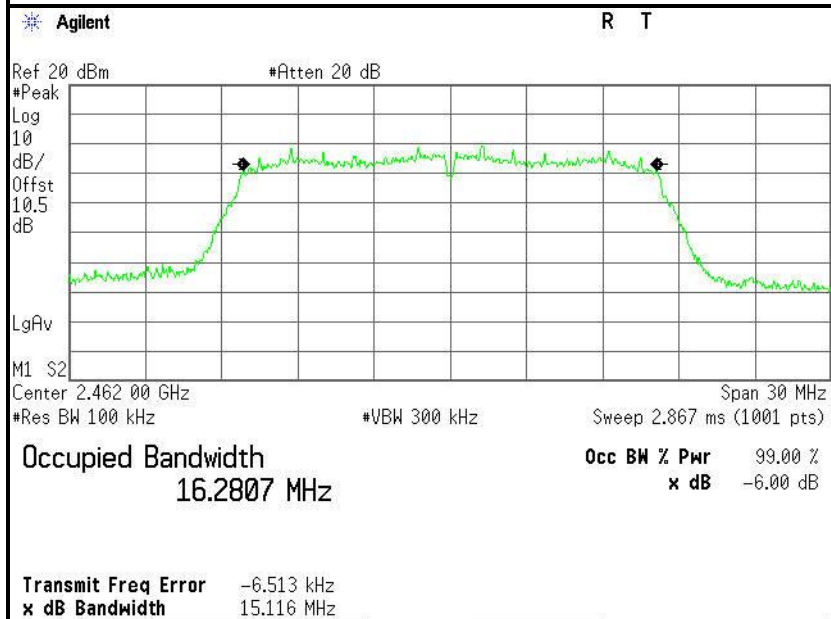




6dB Bandwidth (CH Mid)



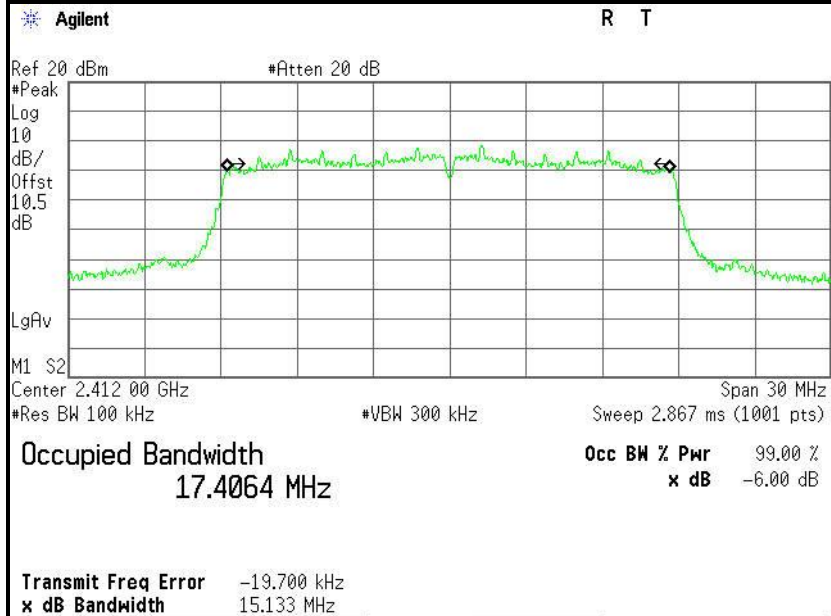
6dB Bandwidth (CH High)





IEEE 802.11n HT20 MHz mode (Antenna 0)

6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

