

FCC Part 15E Measurement and Test Report

For

ATID Co., Ltd.

(Gasan-dong, #1210 Byuksan/Kyungin Digitalvalley II),184,Gasandigital2-ro,

Geumcheon-gu, Seoul, Korea

FCC ID: VUJAT911N

FCC Rule(s): FCC Part 15E

Product Description: WCDMA wireless data terminal

Tested Model: AT911N

Report No.: STR16038164I-5

Tested Date: 2016-03-26 to 2016-04-05

Issued Date: 2016-04-06

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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM.Test Technology Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: ATID Co., Ltd.
Address of applicant: (Gasandigital2-ro, Geumcheon-gu, Seoul, Korea)

Manufacturer: ATID Co., Ltd.
Address of manufacturer: (Gasandigital2-ro, Geumcheon-gu, Seoul, Korea)

General Description of EUT	
Product Name:	WCDMA wireless data terminal
Trade Name:	
Model No.:	AT911N
Adding Model:	/
Hardware Version:	AT911N MAIN PCB
Software Version:	STD0110P4MXGC
IMEI:	358625050875212
Rated Voltage:	DC 3.7V
Battery capacity:	Main Battery:2200mAh Gun Battery :5200mAh
Power Adapter Model:	GT-46180-1505
	Input: 100-240V~50/60Hz 0.6A; Output: DC5V /3.0A
Note: The test data is gathered from a production sample provided by the manufacturer.	

Technical Characteristics of EUT	
Support Standards:	802.11a, 802.11n(HT20)
Frequency Range:	5150-5250MHz, 5725-5850MHz
RF Output Power:	14.63dBm (Conducted)
Type of Modulation:	QPSK, 16QAM, 64QAM
Data Rate:	6-54Mbps, up to 150Mbps
Quantity of Channels:	15
Channel Separation:	20MHz
Type of Antenna:	Integral
Antenna Gain:	0dBi
Lowest Internal Frequency	32.768kHz

1.2 Test Standards

The following report is prepared on behalf of the ATID Co., Ltd. in accordance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices, and ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. The measurement guide KDB 789033 D02 v01r02 for Unlicensed National Information Infrastructure (U-NII) Devices shall be performed also.

1.4 Test Facility

FCC – Registration No.: 934118

Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 934118.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

CNAS Registration No.: L4062

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101).

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	802.11a	5180MHz, 5200, 5240MHz, 5745MHz, 5785MHz, 5805MHz
TM2	802.11n-HT20	5180MHz, 5200, 5240MHz, 5745MHz, 5785MHz, 5805MHz

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Core
Adapter Cable	1.5	Shielded	With Core
USB Cable	1.0	Shielded	Without Core

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
Earphone	1.2	Shielded	Without Ferrite

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	E10	LR-63C8R

1.6 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Agilent	E4407B	MY41440400	2015-06-17	2016-06-16
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2015-06-17	2016-06-16
Amplifier	Agilent	8447F	3113A06717	2015-06-17	2016-06-16
Amplifier	C&D	PAP-1G18	2002	2015-06-17	2016-06-16
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2015-06-17	2016-06-16
Horn Antenna	ETS	3117	00086197	2015-06-17	2016-06-16
Horn Antenna	ETS	3116B	00088203	2015-06-17	2016-06-16
Loop Antenna	Schwarz beck	FMZB 1516	9773	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2015-06-17	2016-06-16
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2015-06-17	2016-06-16
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2015-06-17	2016-06-16

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 15.203; § 15.405	Antenna Requirement	Compliant
§ 15.207; § 15.407(b)(6)	Conducted Emission	Compliant
§ 15.407(a)(1),(2)	Power Spectral Density	Compliant
§ 15.407(e)	Emission Bandwidth and Occupied Bandwidth	Compliant
§ 15.407(a)(1),(2)	Maximum Conducted Output Power	Compliant
§ 15.407(b)(1),(2),(3)	Conducted Spurious Emission	Compliant
§ 15.205; § 15.407(b)(1),(2),(3)	Radiated Emission	Compliant
§ 15.407(g)	Frequency Stability	Compliant
§ 15.407(h)	Dynamic Frequency Selection (DFS)	N/A

N/A: not applicable

3. RF Exposure

3.1 Standard Applicable

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the SAR Report.

4. Antenna Requirement

4.1 Standard Applicable

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

4.2 Evaluation Information

This product has an integral antenna, fulfill the requirement of this section.

5. Conducted Emissions

5.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.88 dB.

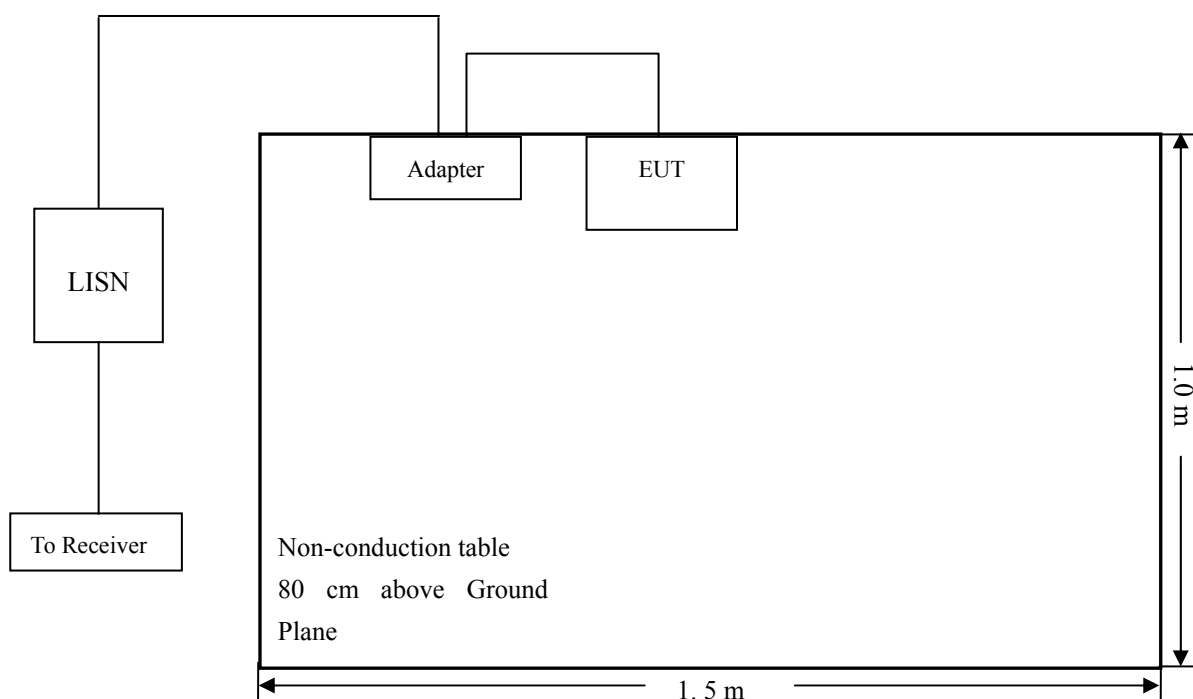
5.2 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.207 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

5.3 Basic Test Setup Block Diagram



5.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

5.5 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency 150 kHz
Stop Frequency..... 30 MHz
Sweep Speed Auto
IF Bandwidth..... 10 kHz
Quasi-Peak Adapter Bandwidth 9 kHz
Quasi-Peak Adapter Mode Normal

5.6 Summary of Test Results/Plots

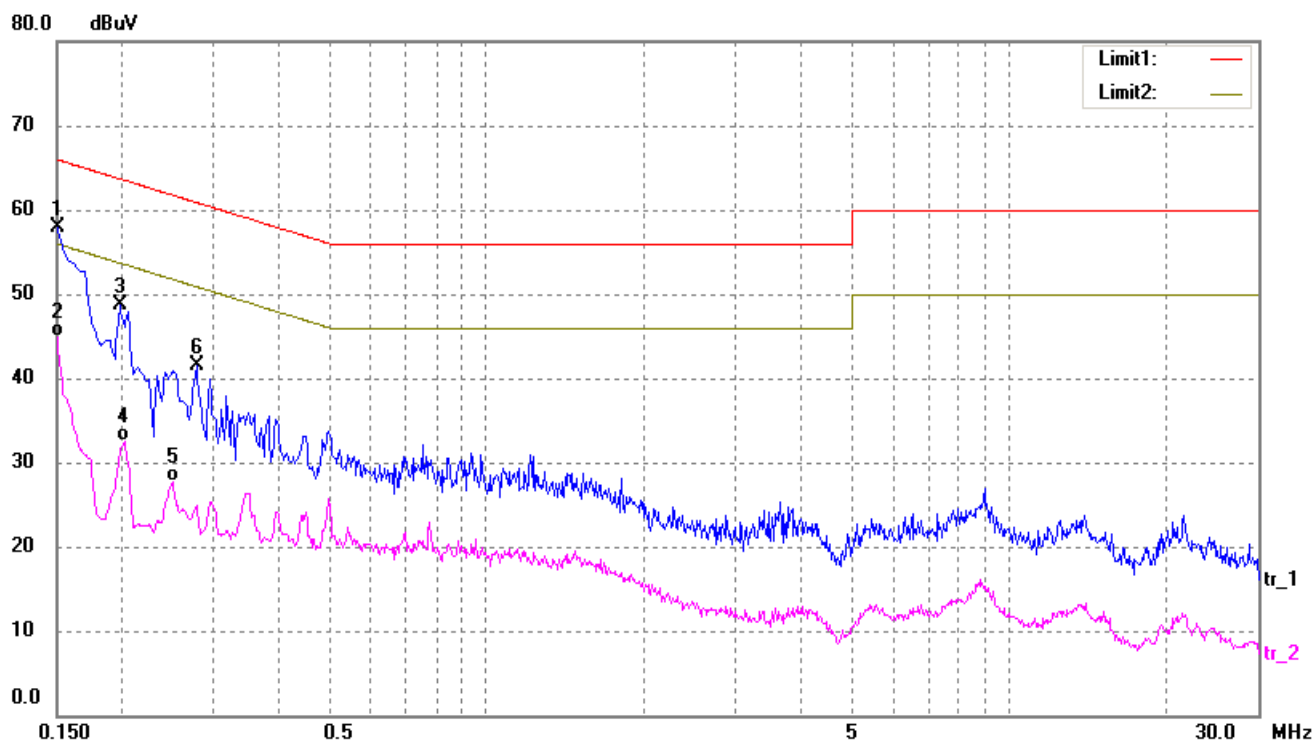
According to the data in section 3.8, the EUT complied with the FCC Part 15.207 Conducted margin for a Class B device, with the *worst* margin reading of:

-8.01 dB at 0.1500 MHz in the **Neutral, Peak** detector, 0.15-30MHz

5.7 Conducted Emissions Test Data

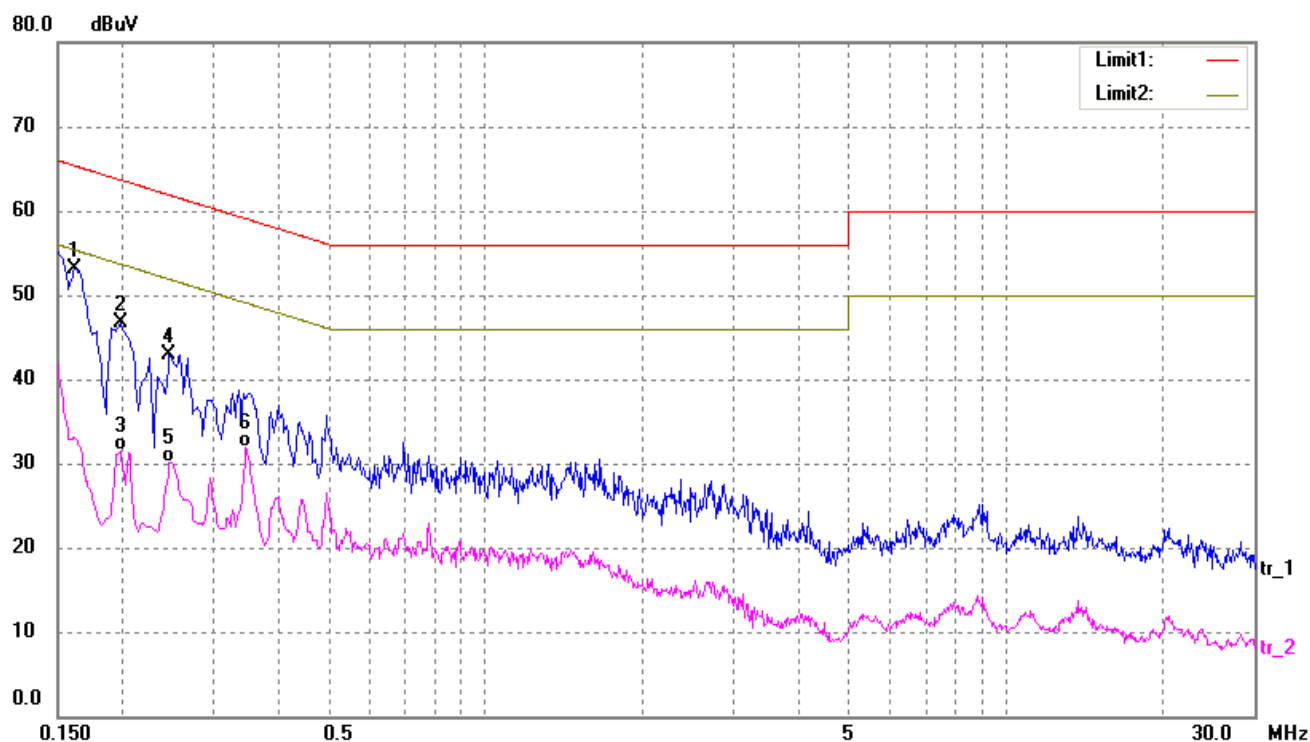
Plot of Conducted Emissions Test Data

EUT: WCDMA wireless data terminal
 Tested Model: AT911N
 Operating Condition: Transmitting
 Comment: AC 120V/60Hz; Adapter DC 5V
 Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.1500	48.49	9.50	57.99	66.00	-8.01	peak
2	0.1500	35.38	9.50	44.88	56.00	-11.12	AVG
3	0.1980	39.12	9.50	48.62	63.69	-15.07	peak
4	0.2020	22.99	9.50	32.49	53.53	-21.04	AVG
5	0.2500	18.22	9.50	27.72	51.76	-24.04	AVG
6	0.2780	31.94	9.50	41.44	60.88	-19.44	peak

Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.1620	43.64	9.50	53.14	65.36	-12.22	peak
2	0.1980	37.14	9.50	46.64	63.69	-17.05	peak
3	0.1980	21.91	9.50	31.41	53.69	-22.28	AVG
4	0.2460	33.46	9.50	42.96	61.89	-18.93	peak
5	0.2460	20.69	9.50	30.19	51.89	-21.70	AVG
6	0.3460	22.34	9.50	31.84	49.06	-17.22	AVG

6. Power Spectral Density

6.1 Standard Applicable

Section 15.407(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

6.2 Test Procedure

According to 789033 D02 v01r02 General UNII Test Procedures New Rules v01, the following is the measurement procedure.

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth ($< 1 \text{ MHz}$, or $< 500 \text{ kHz}$) and integrated over 1 MHz, or 500 KHz bandwidth, the following adjustments to the procedures apply:

- a) Set $RBW \geq 1/T$, where T is defined in section II.B.1.a).
- b) Set $VBW \geq 3 RBW$.
- c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10\log(500\text{kHz}/RBW)$ to the measured result, whereas $RBW (< 500 \text{ KHz})$ is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
- d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add $10\log(1\text{MHz}/RBW)$ to the measured result, whereas $RBW (< 1 \text{ MHz})$ is the reduced resolution bandwidth of spectrum analyzer set during measurement.
- e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 KHz for the sections 5.c) and 5.d) above, since $RBW=100 \text{ KHz}$ is available on nearly all spectrum analyzers.

6.3 Environmental Conditions

Temperature:	20° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

6.4 Summary of Test Results/Plots

5150-5250MHz

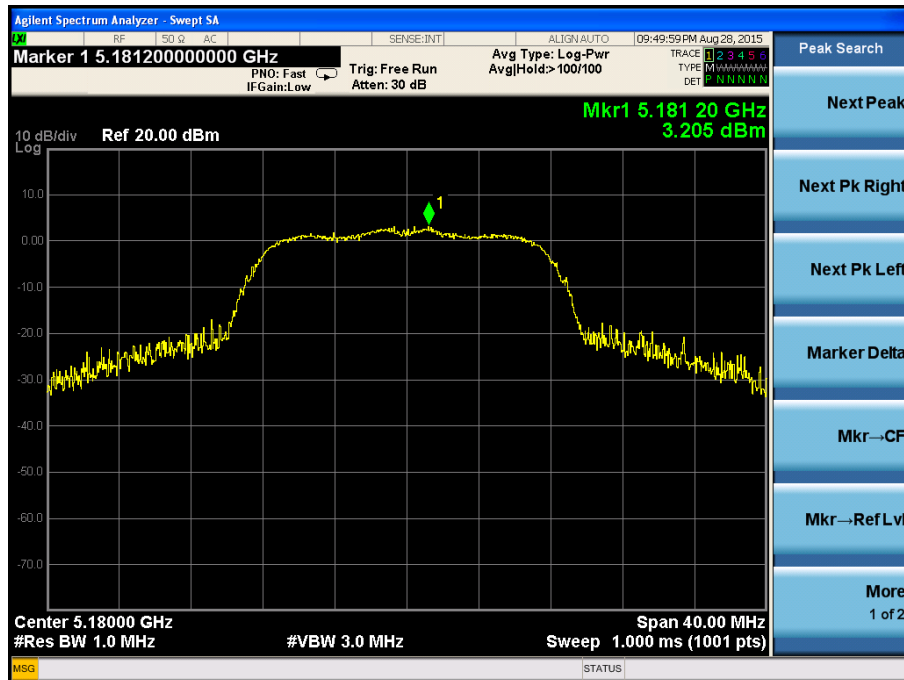
Operating mode	Test Channel	Power Spectral Density dBm/MHz	Limit (dBm/MHz)
802.11a	5180	3.205	11
	5200	2.428	11
	5240	1.908	11
802.11n-HT20	5180	3.052	11
	5200	2.271	11
	5240	1.409	11

5725-5850MHz

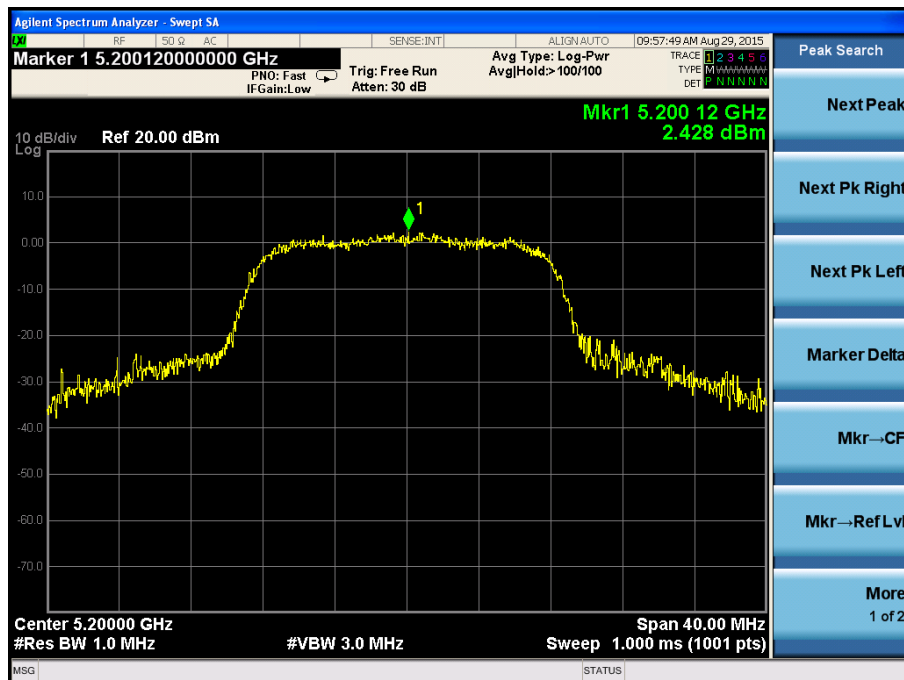
Operating mode	Test Channel	Power Spectral Density dBm/500kHz	Limit (dBm/500kHz)
802.11a	5745	-1.851	30
	5785	-1.952	30
	5805	-1.590	30
802.11n-HT20	5745	-1.241	30
	5785	-1.485	30
	5805	-1.380	30

Test Mode: 802.11a

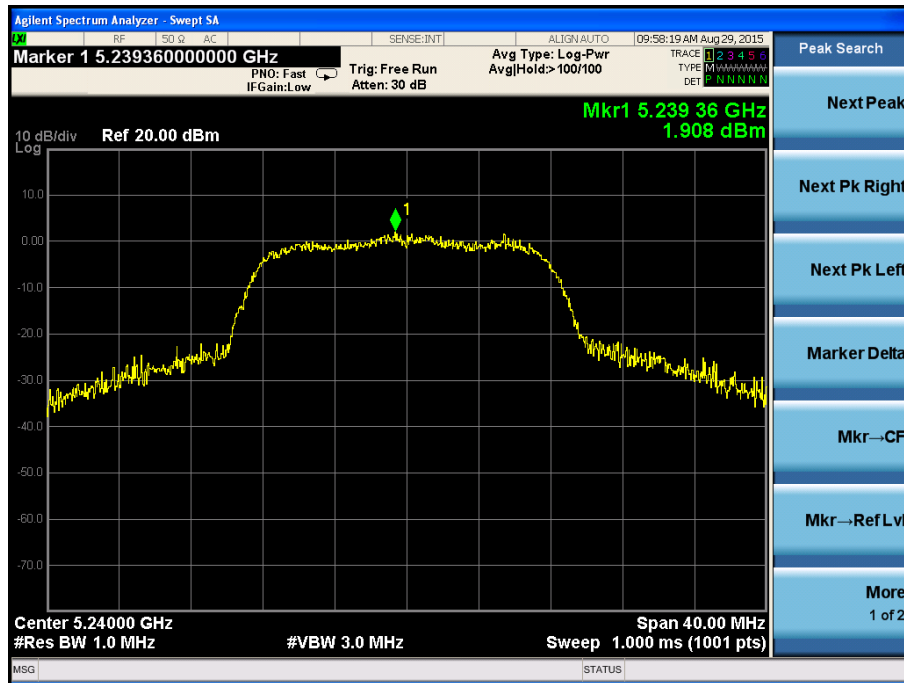
5180MHz



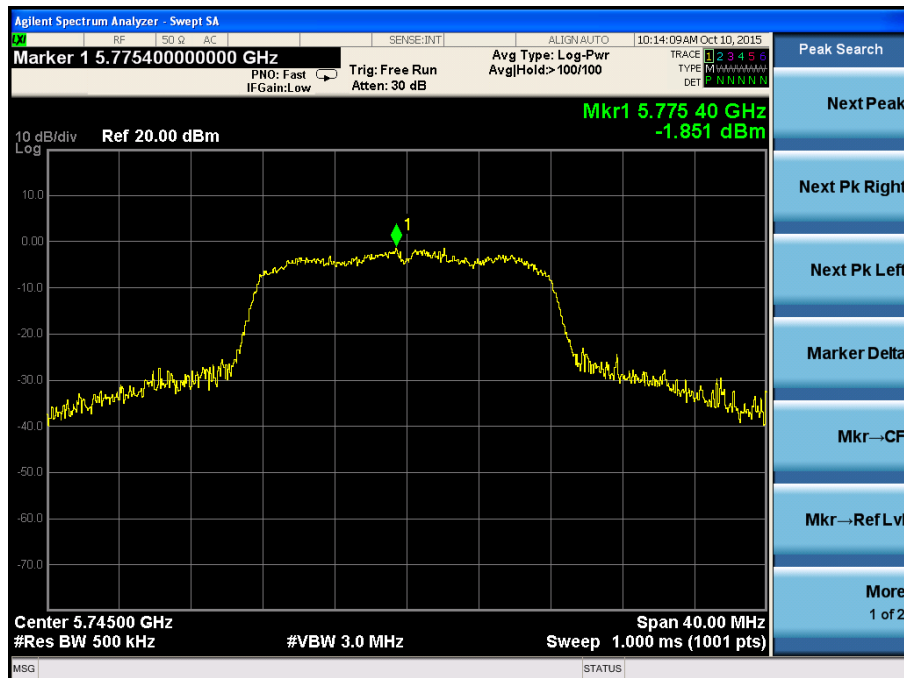
5200MHz



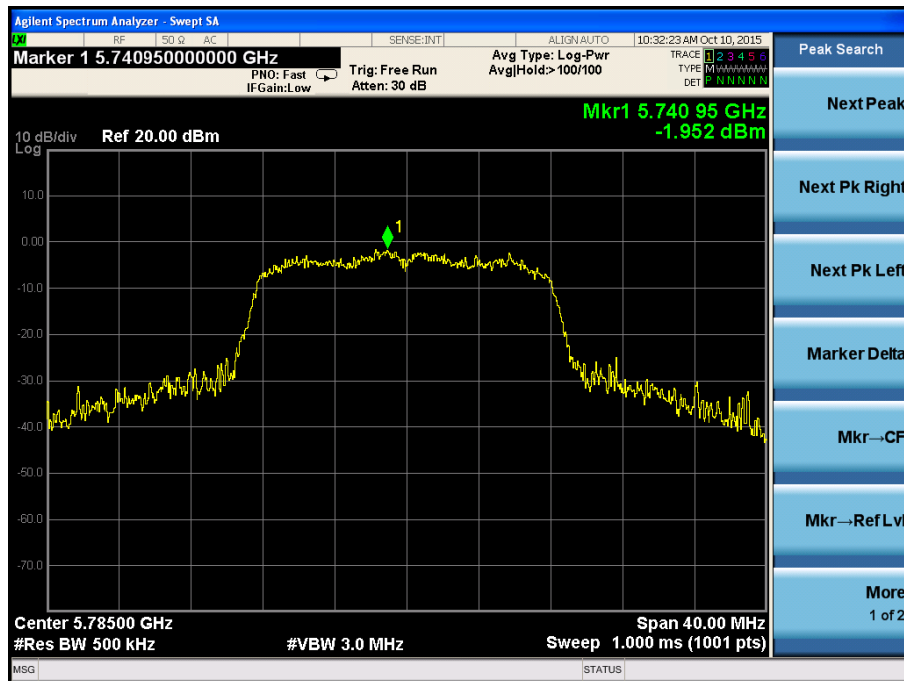
5240MHz



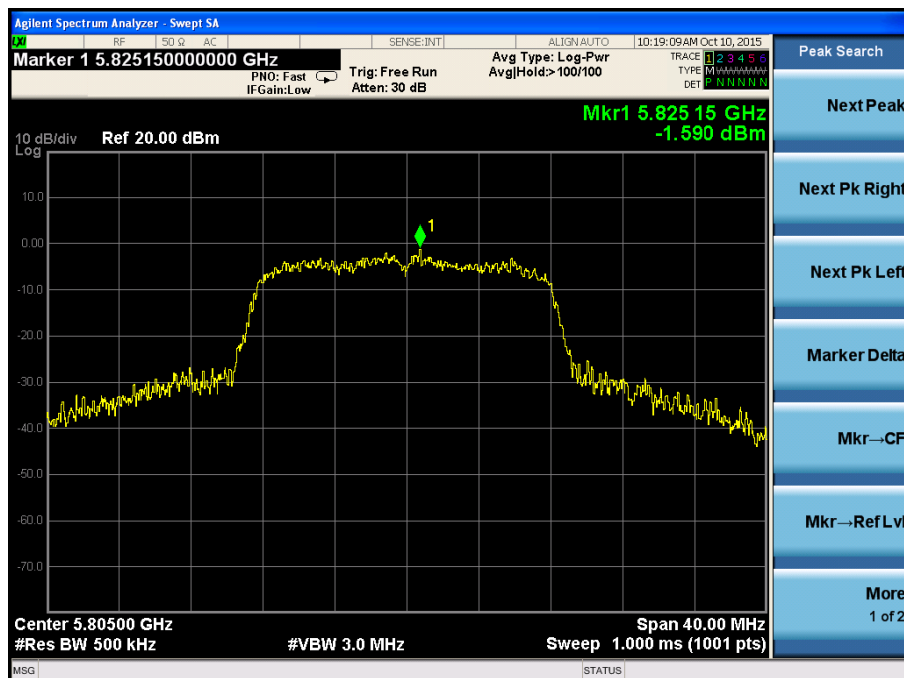
5745MHz



5785MHz

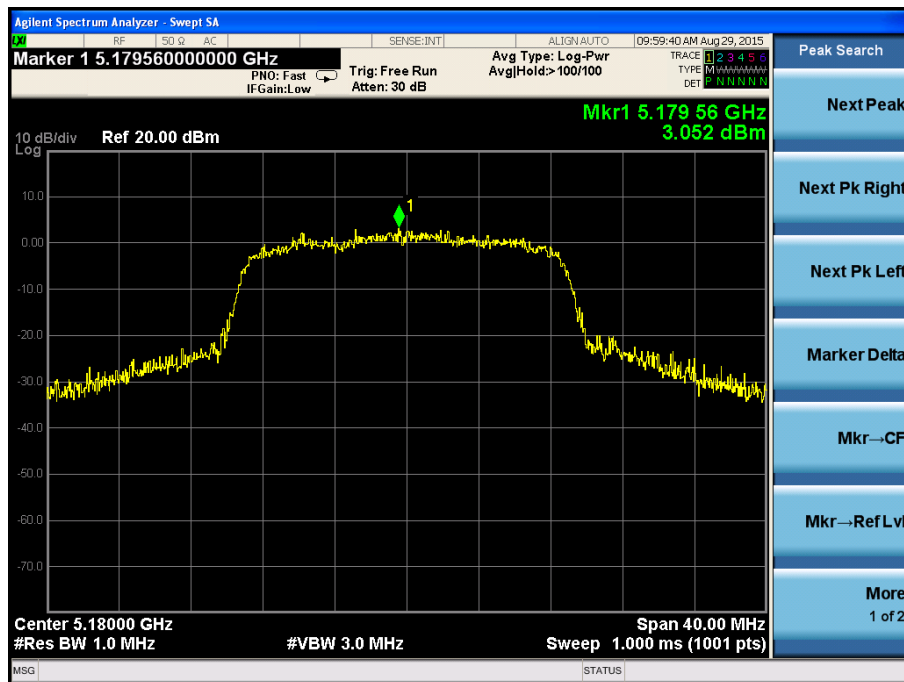


5805MHz

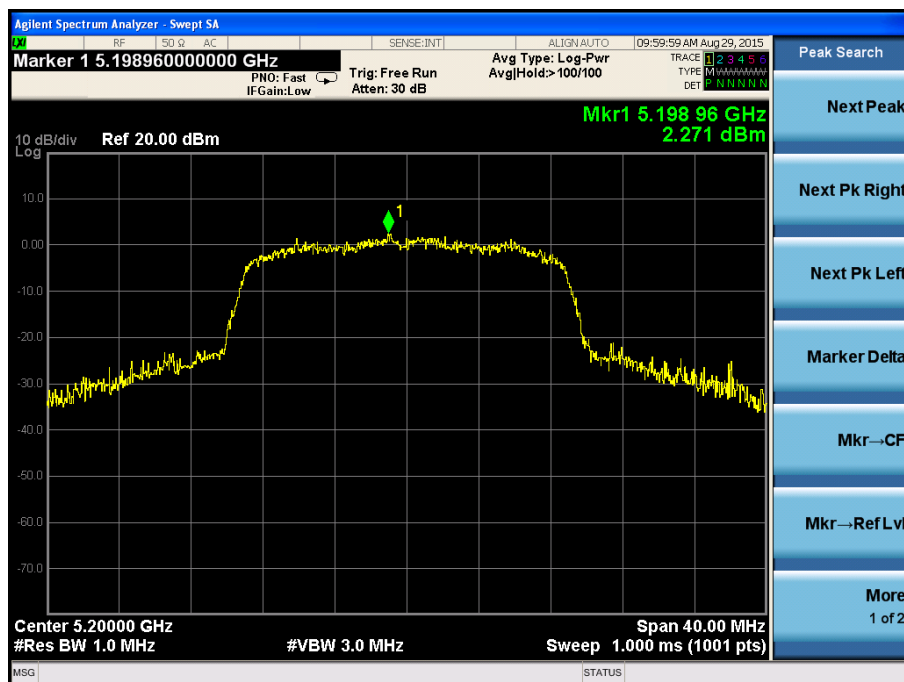


Test Mode: 802.11n-HT20

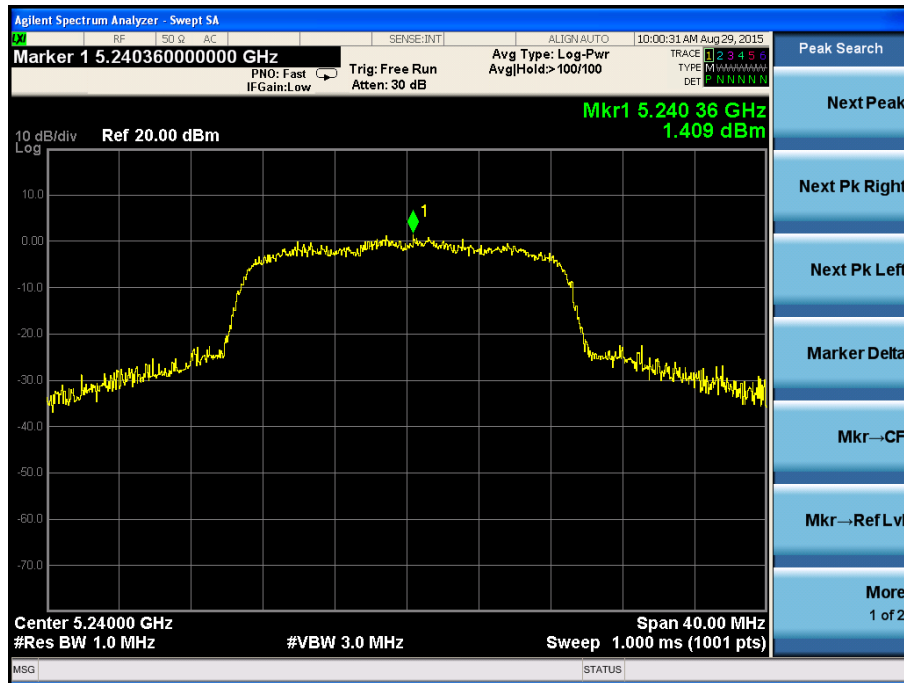
5180MHz



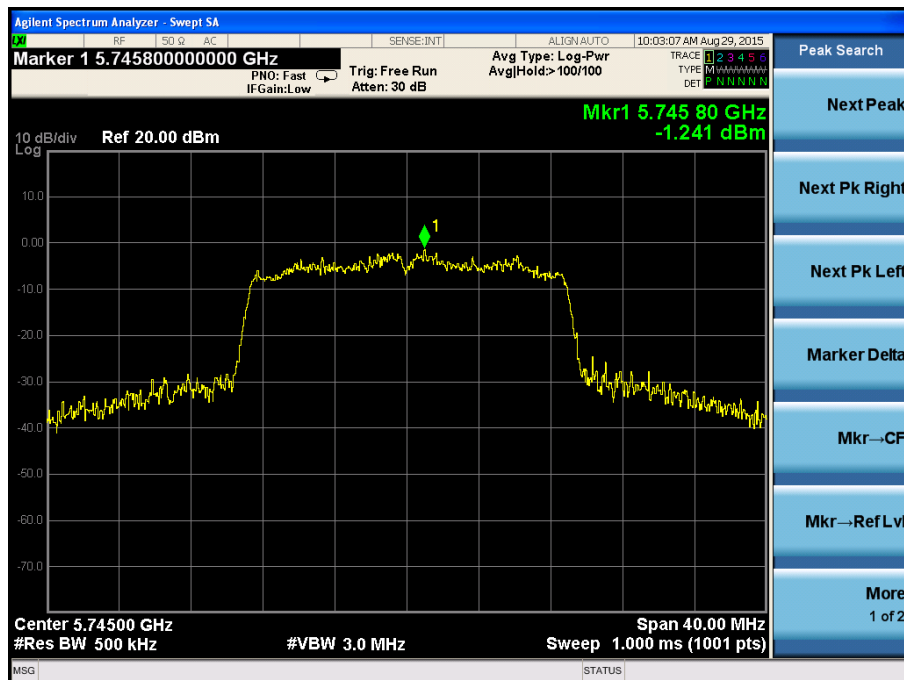
5200MHz



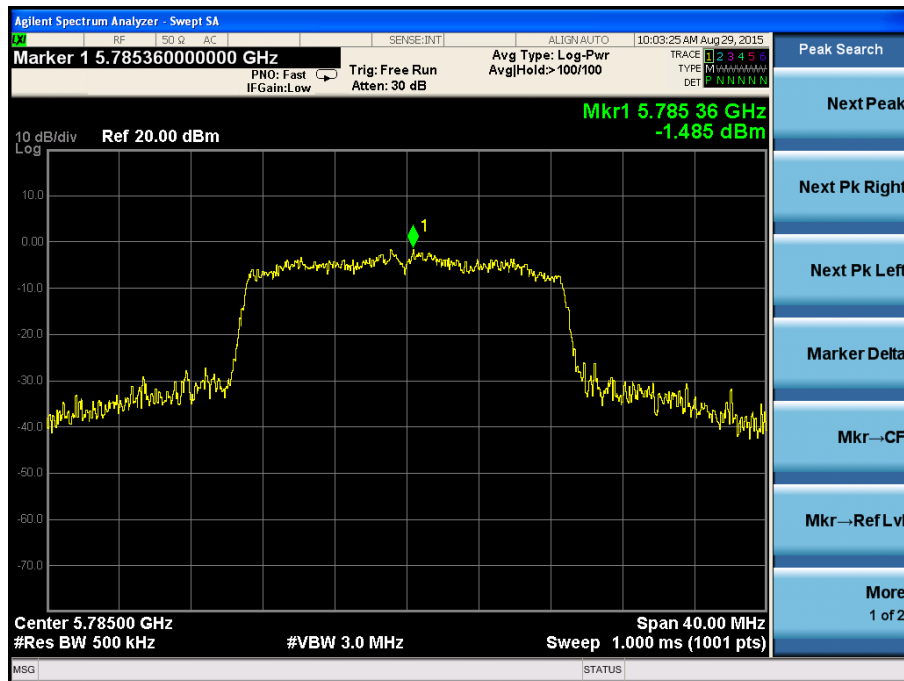
5240MHz



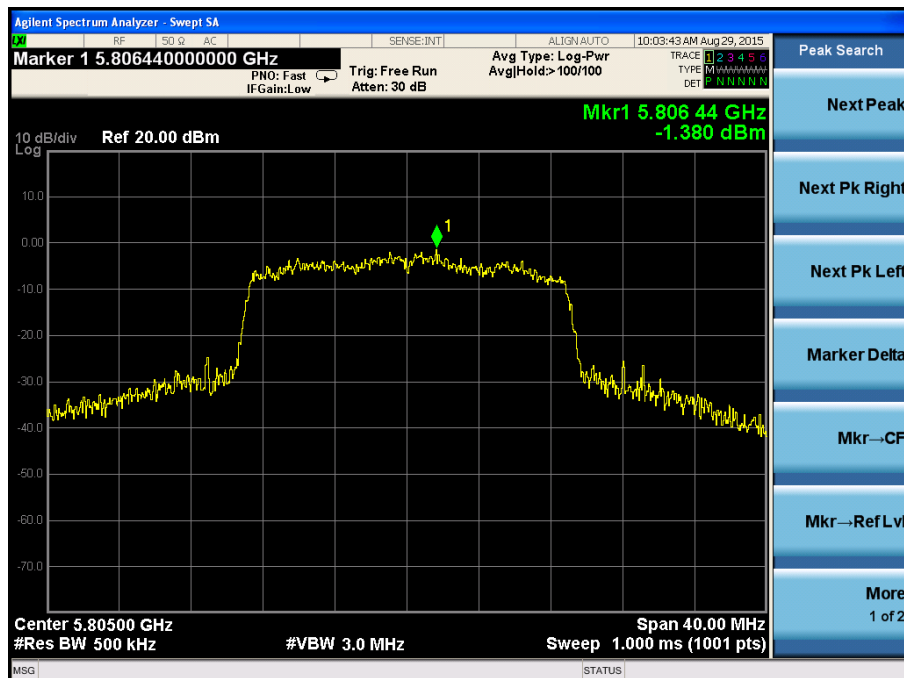
5745MHz



5785MHz



5805MHz



7. Emission Bandwidth and Occupied Bandwidth

7.1 Standard Applicable

According to 15.407 (a) and (e)

(1) For the band 5.15-5.25 GHz.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

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

7.2 Test Procedure

According to 789033 D02 v01r02 section C&D, the following is the measurement procedure.

1. Emission Bandwidth (EBW)

a) Set RBW = approximately 1% of the emission bandwidth.

b) Set the VBW > RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare

this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

2. Minimum Emission Bandwidth for the band 5.725-5.85 GHz

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times \text{RBW}$.
- 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.

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

D. 99 Percent Occupied Bandwidth

The 99-percent occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 % of the total mean power of the given emission. Measurement of the 99-percent occupied bandwidth is required only as a condition for using the optional band-edge measurement techniques described in section II.G.3.d). Measurements of 99-percent occupied bandwidth may also optionally be used in lieu of the EBW to 789033 D02 v01r02 General UNII Test Procedures New Rules v01 define the minimum frequency range over which the spectrum is integrated when measuring maximum conducted output power as described in section II.E. However, the EBW must be measured to determine bandwidth dependent limits on maximum conducted output power in accordance with 15.407(a).

The following procedure shall be used for measuring (99 %) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW $\geq 3 \cdot \text{RBW}$
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

7.3 Environmental Conditions

Temperature:	24° C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

7.4 Summary of Test Results/Plots

5150-5250MHz

Test Mode	Test Channel MHz	26 dB Bandwidth MHz	99% Bandwidth MHz	Limit MHz
802.11a	5180	22.28	16.528	Pass
	5200	22.24	16.553	Pass
	5240	23.27	16.573	Pass
802.11n-HT20	5180	24.10	17.530	Pass
	5200	21.44	17.546	Pass
	5240	21.57	17.570	Pass

5725-5850MHz

Test Mode	Test Channel MHz	26 dB Bandwidth MHz	6 dB Bandwidth MHz	99% Bandwidth MHz	Limit MHz
802.11a	5745	22.40	15.71	16.558	≥500
	5785	23.06	15.09	16.516	≥500
	5805	24.47	15.03	16.522	≥500
802.11n-HT20	5745	22.82	15.30	17.554	≥500
	5785	23.84	15.94	17.548	≥500
	5805	21.57	14.40	17.541	≥500

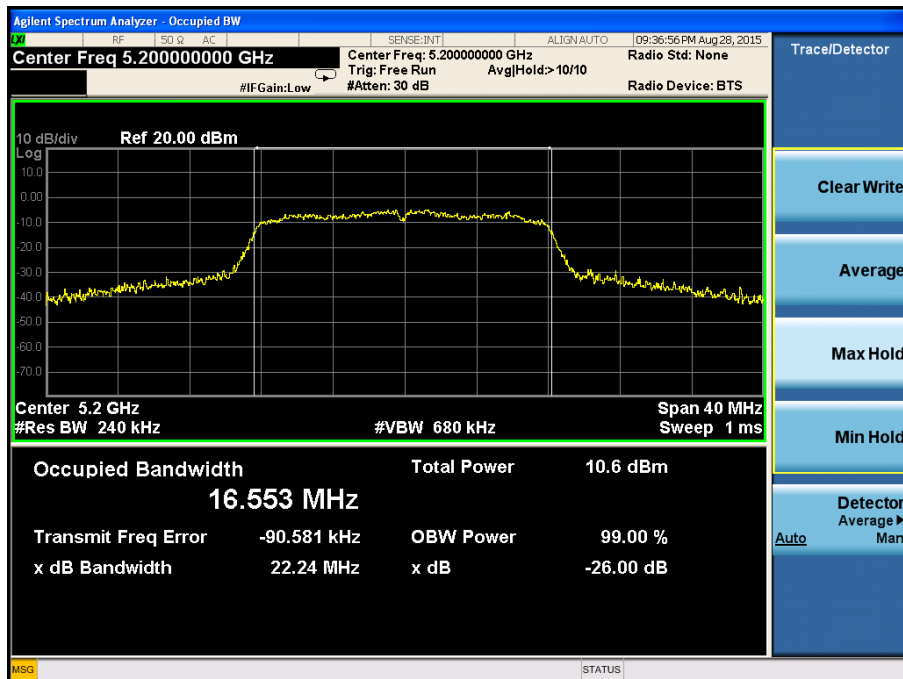
5150-5250MHz

Test mode: 802.11a

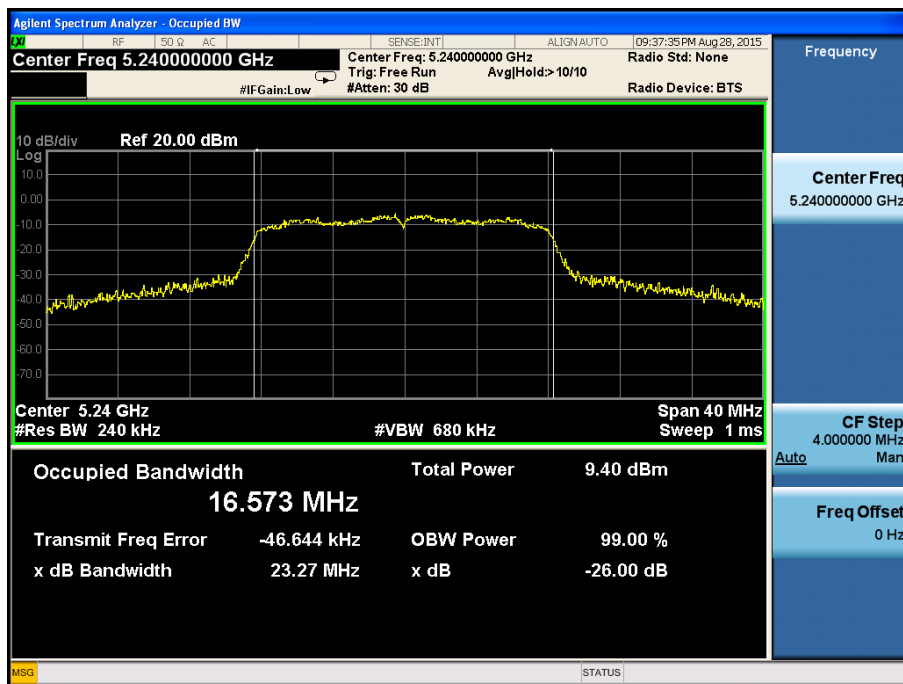
5180MHz



5200MHz

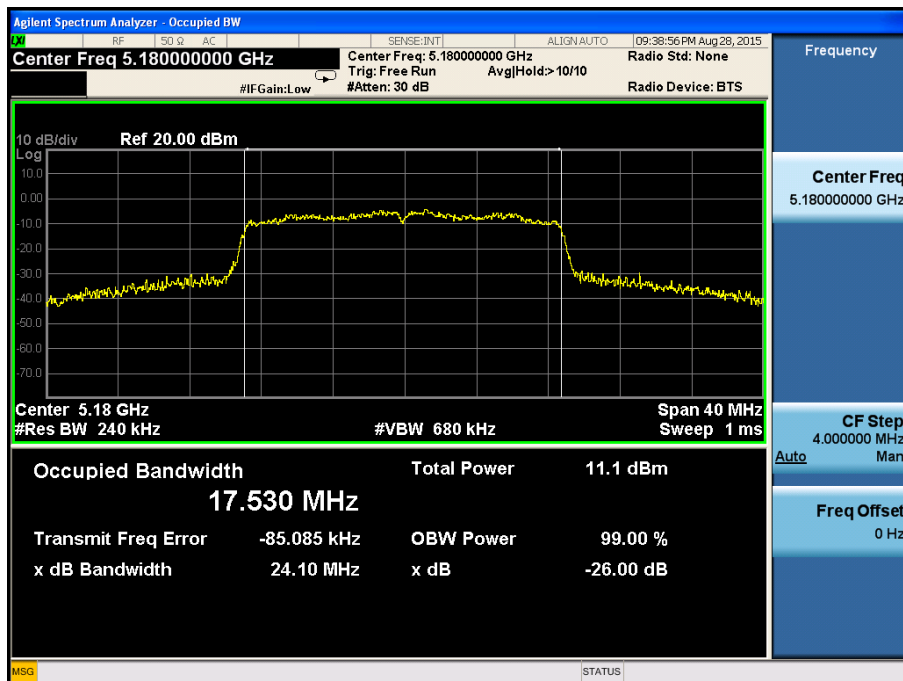


5240MHz

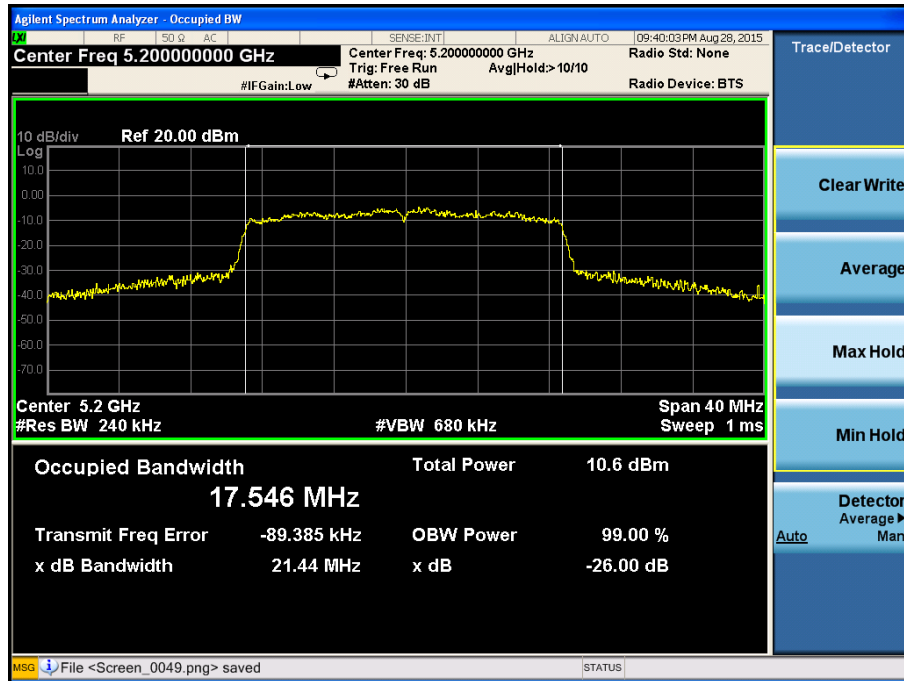


Test mode: 802.11n-HT20

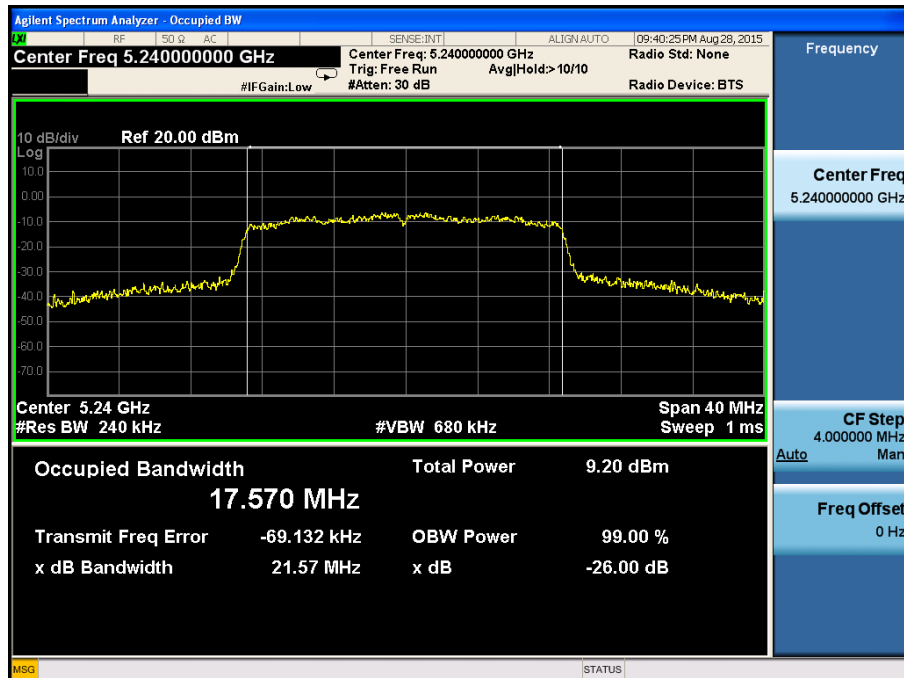
5180MHz



5200MHz



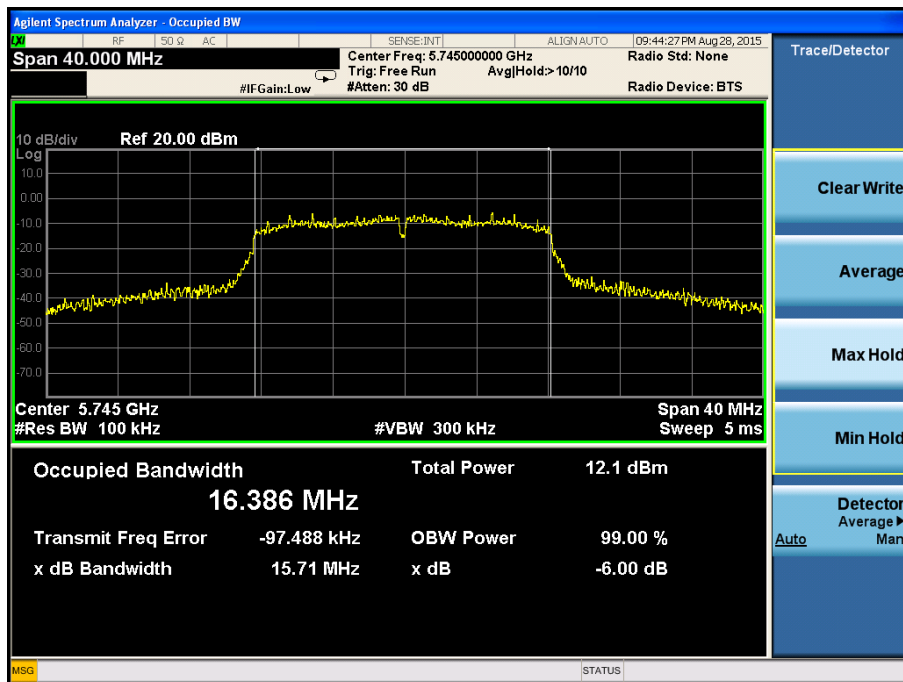
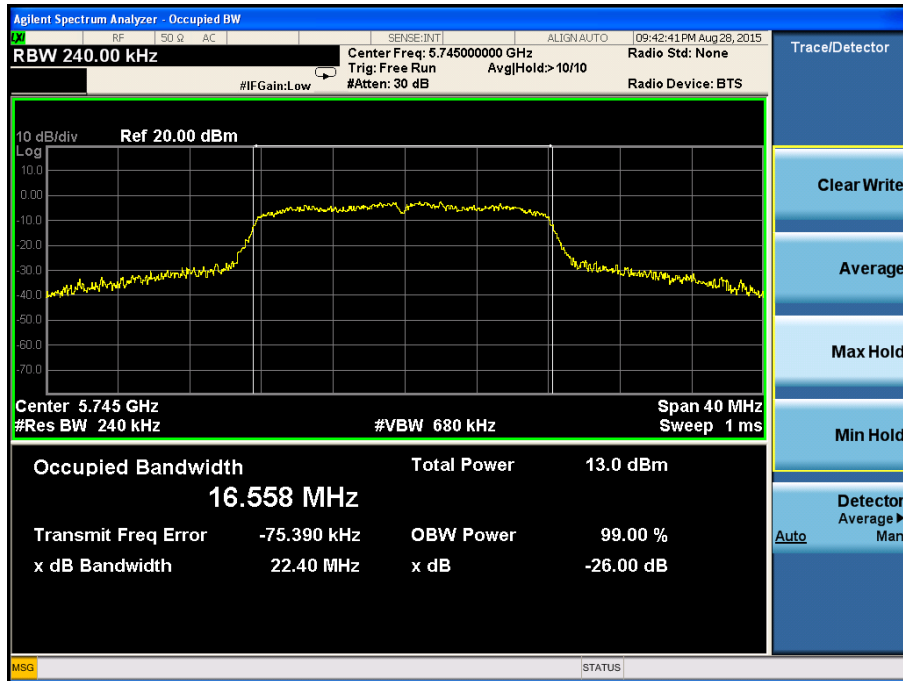
5240MHz



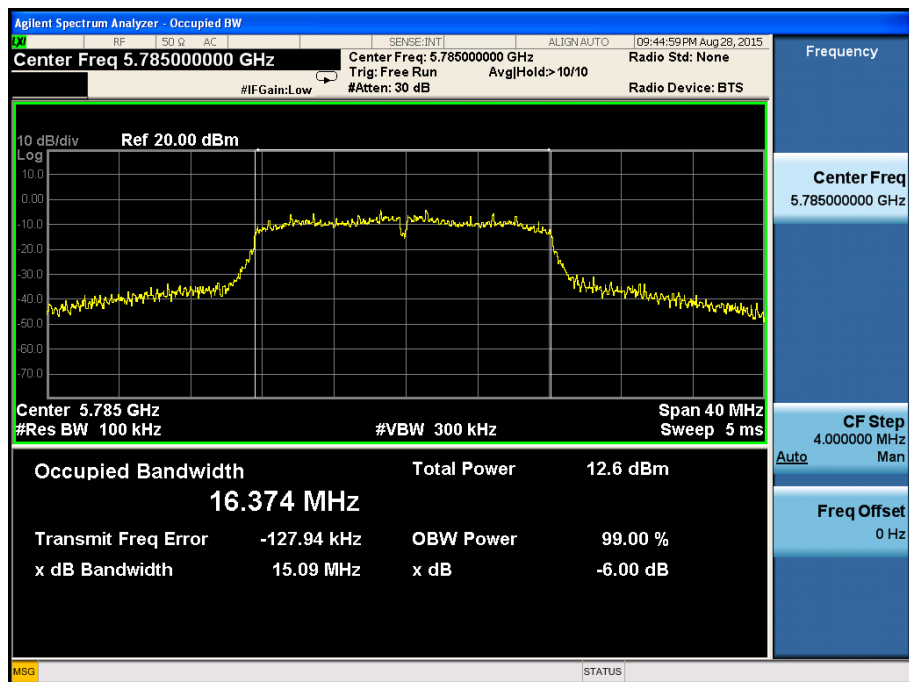
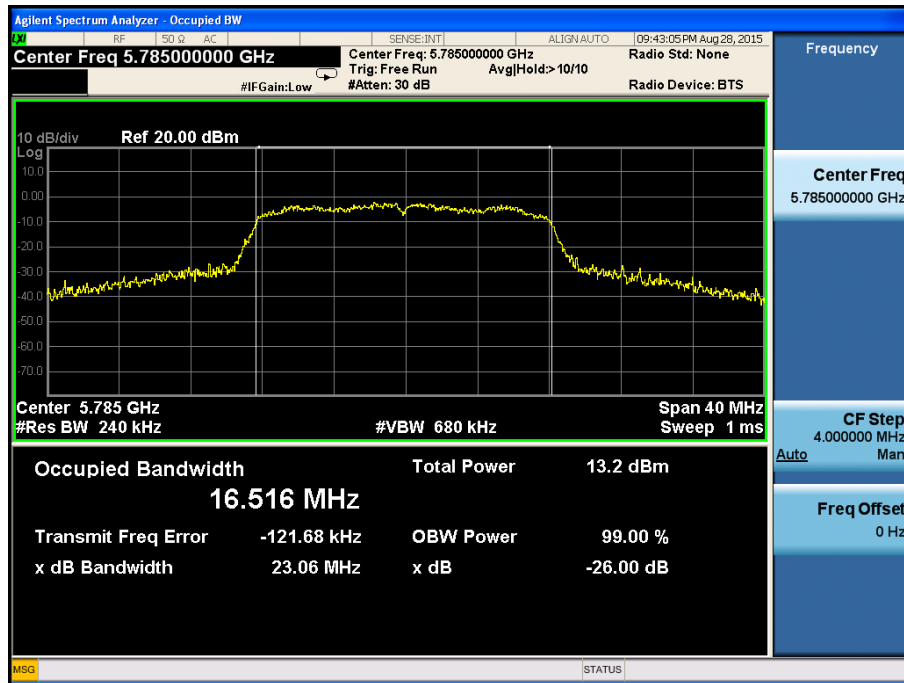
5725-5850MHz

Test mode: 802.11a

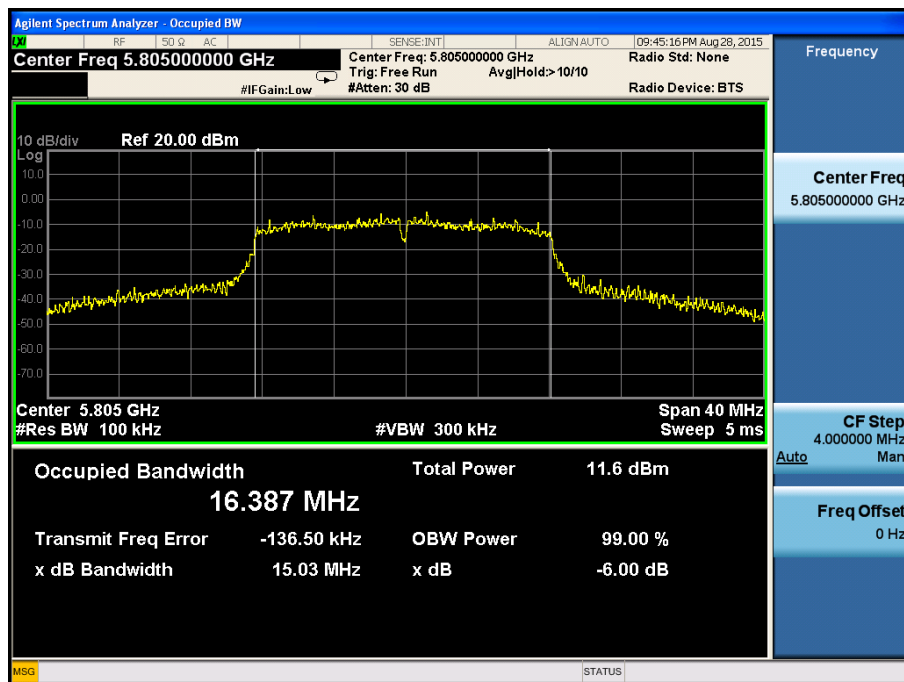
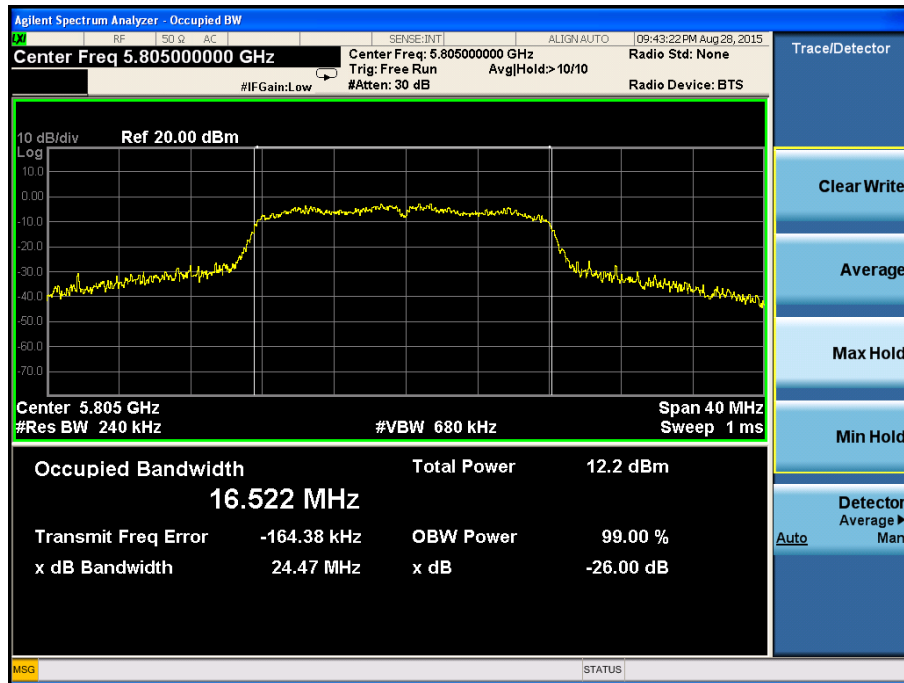
5745MHz



5785MHz

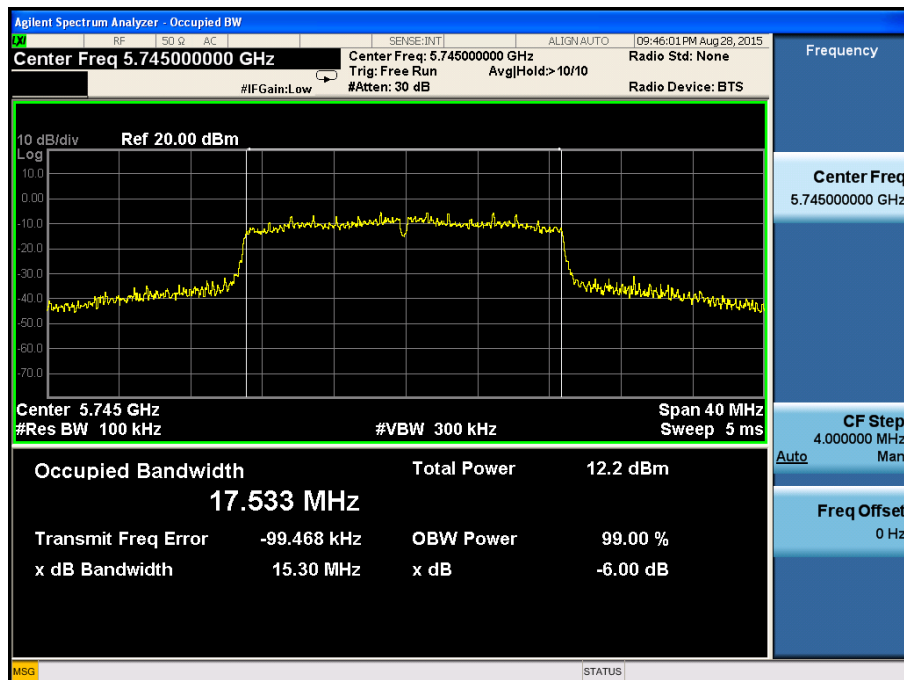
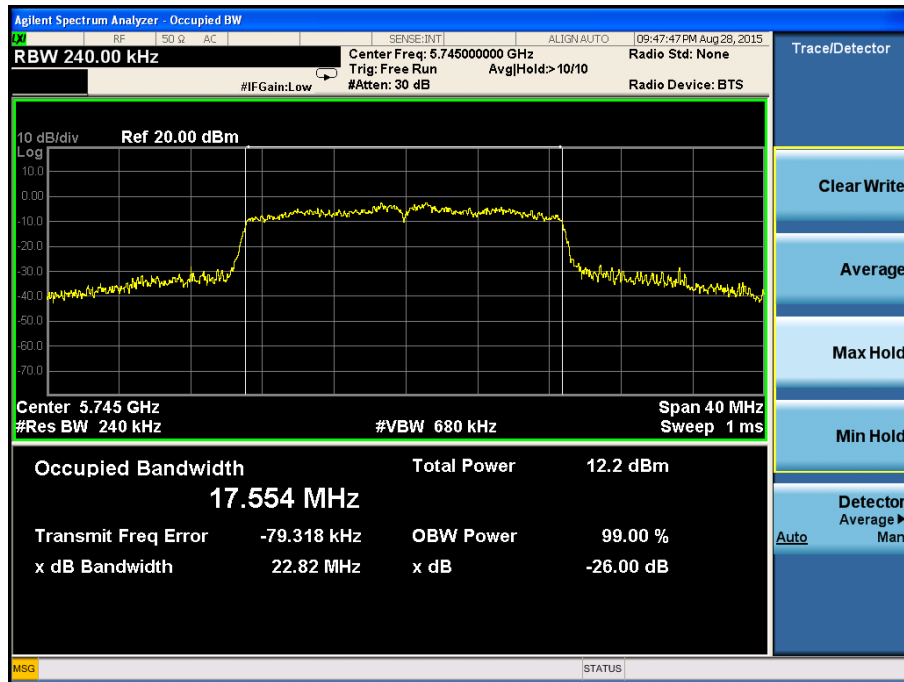


5805MHz

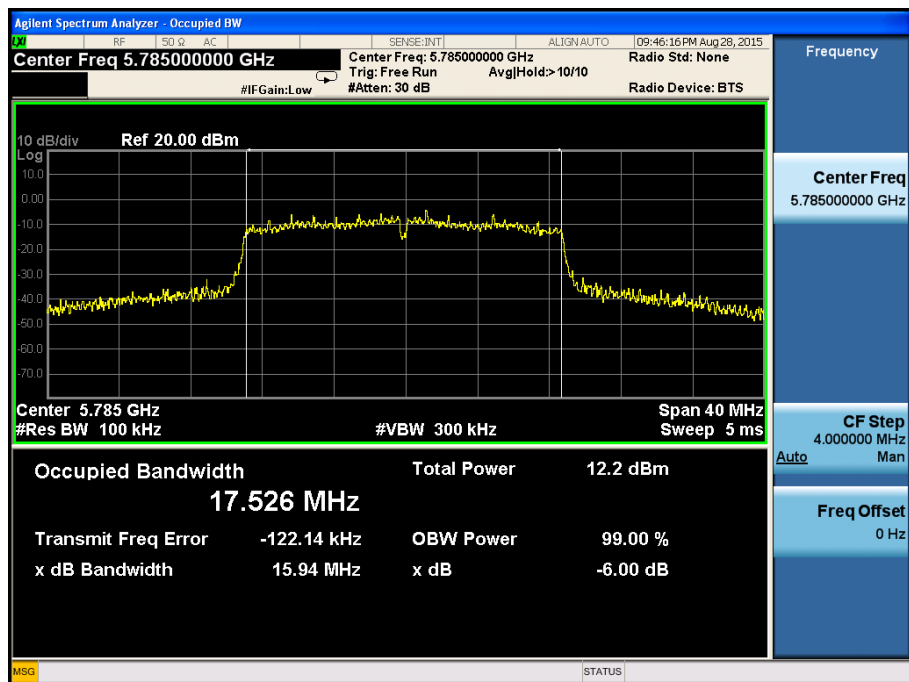
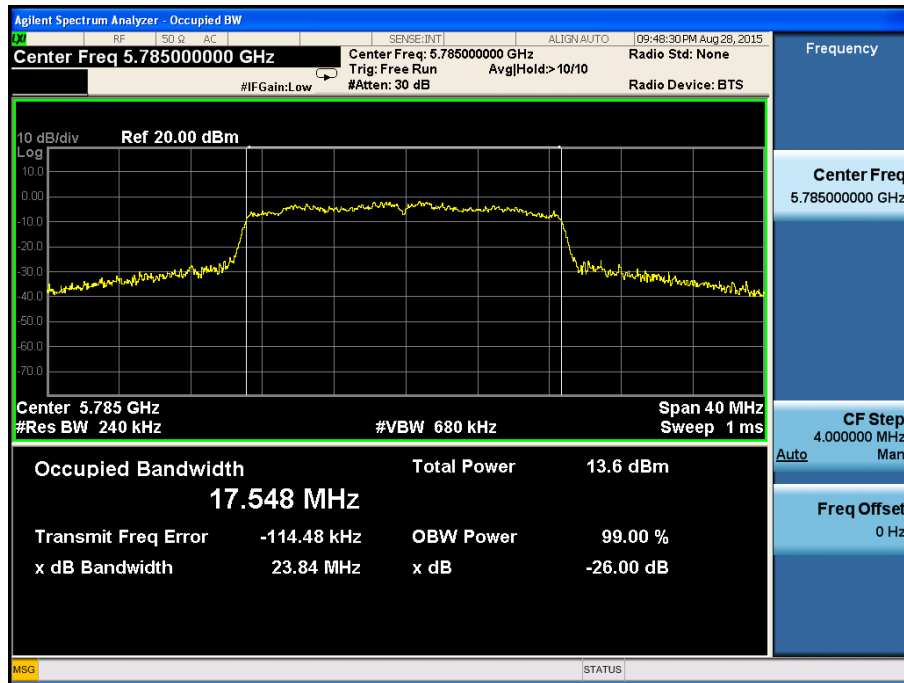


Test mode: 802.11-HT20

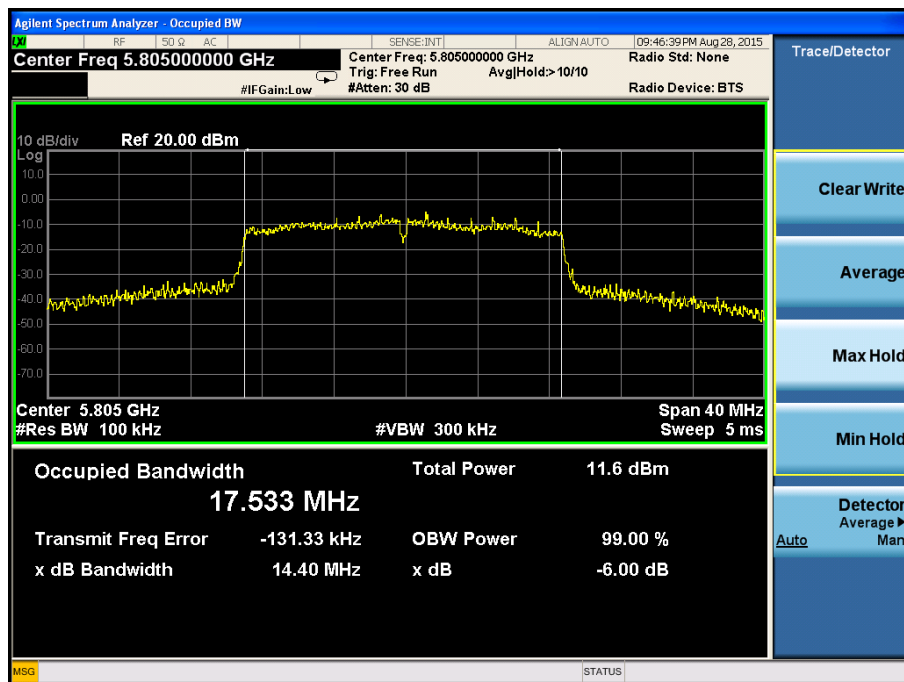
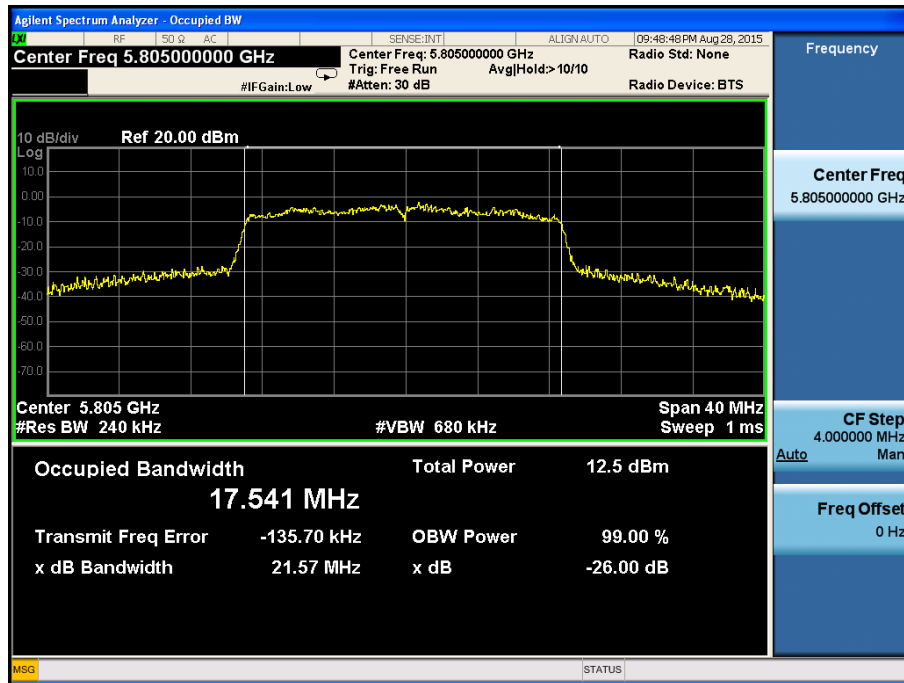
5745MHz



5785MHz



5805MHz



8. Maximum Conducted Output Power

8.1 Standard Applicable

Section 15.407(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

8.2 Test Procedure

According to KDB789033 D02 v01r02 section E, the following is the measurement procedure.

- (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- (ii) Set RBW = 1 MHz.
- (iii) Set VBW ≥ 3 MHz.
- (iv) Number of points in sweep $\geq 2 \text{ Span} / \text{RBW}$. (This ensures that bin-to-bin spacing is $\leq \text{RBW}/2$, so that narrowband signals are not lost between frequency bins.)
- (v) Sweep time = auto.

- (vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- (vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle $\geq$ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run”.
- (viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
- (ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

8.3 Environmental Conditions

Temperature:	26° C
Relative Humidity:	65%
ATM Pressure:	1011 mbar

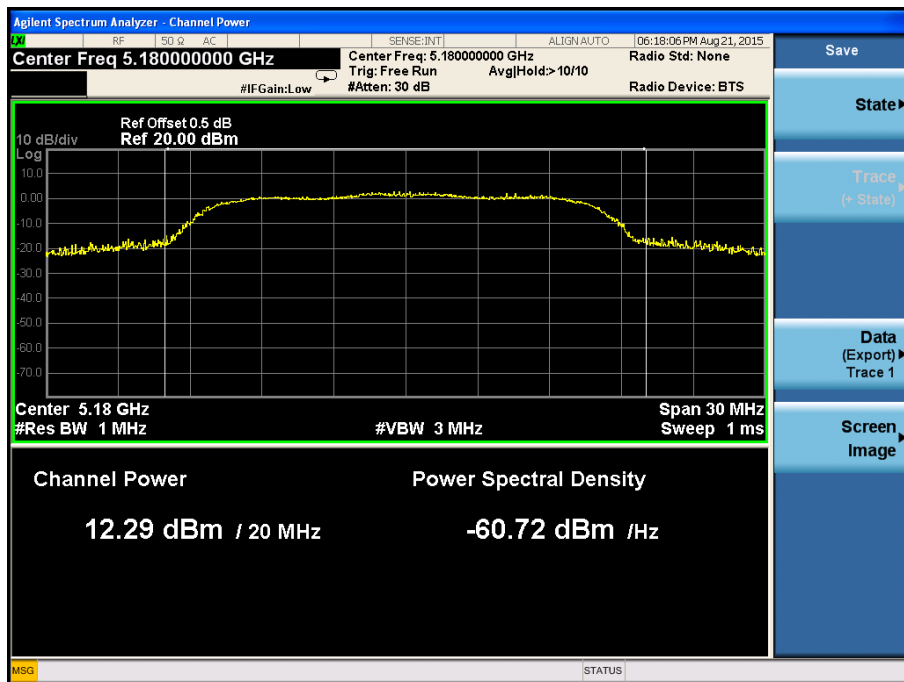
8.4 Summary of Test Results/Plots

For the frequency band 5.15-5.25GHz, 5725-5850GHz

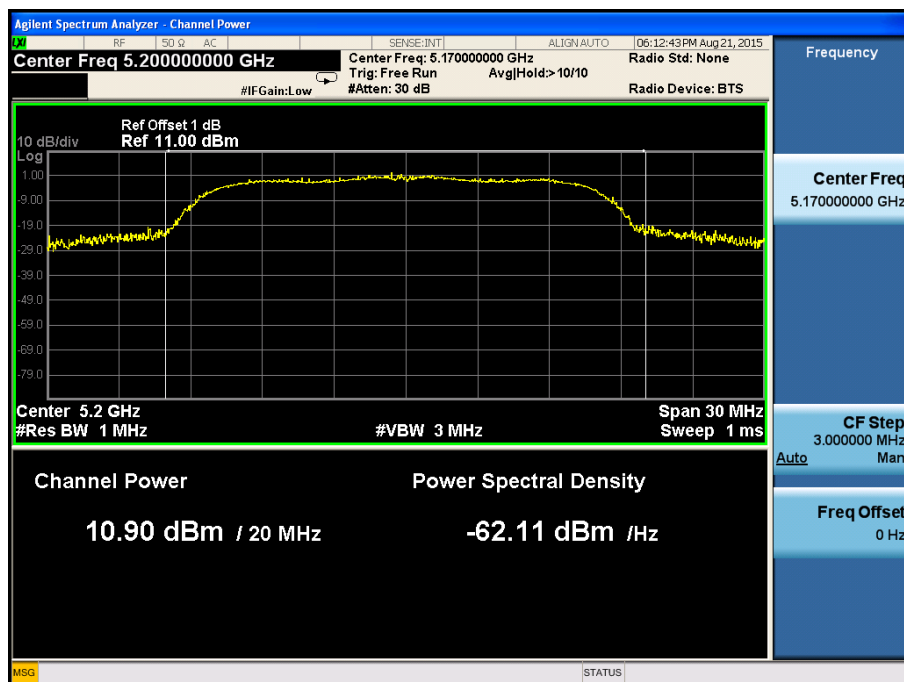
Test mode	Frequency MHz	Output Power dBm	Output Power mW	Limit mW
802.11a	5180	12.29	16.94	250
	5200	10.90	12.30	250
	5240	11.24	13.30	250
	5745	13.37	21.73	1000
	5785	13.67	23.28	1000
	5805	13.67	23.28	1000
802.11n-HT20	5180	11.94	15.63	250
	5200	11.71	14.83	250
	5240	10.79	11.99	250
	5745	14.28	26.79	1000
	5785	14.63	29.04	1000
	5805	14.37	27.35	1000

Test Mode: 802.11a

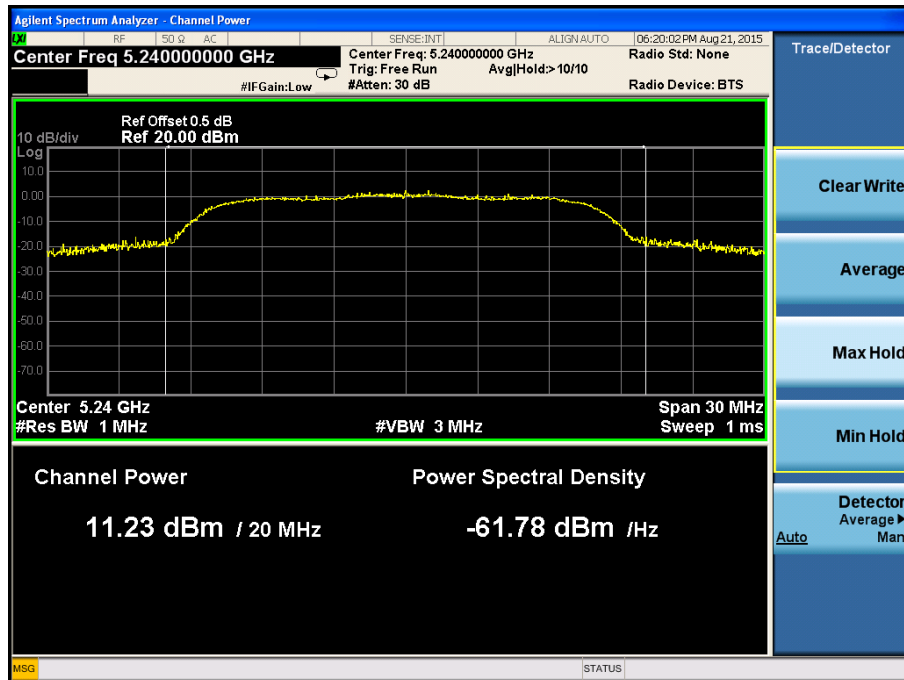
5180MHz



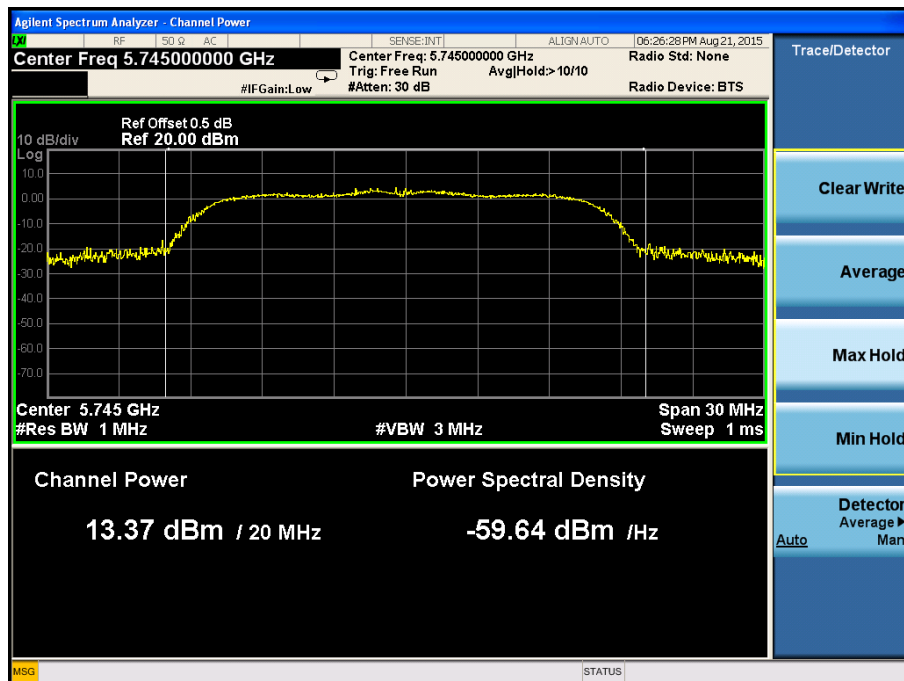
5200MHz



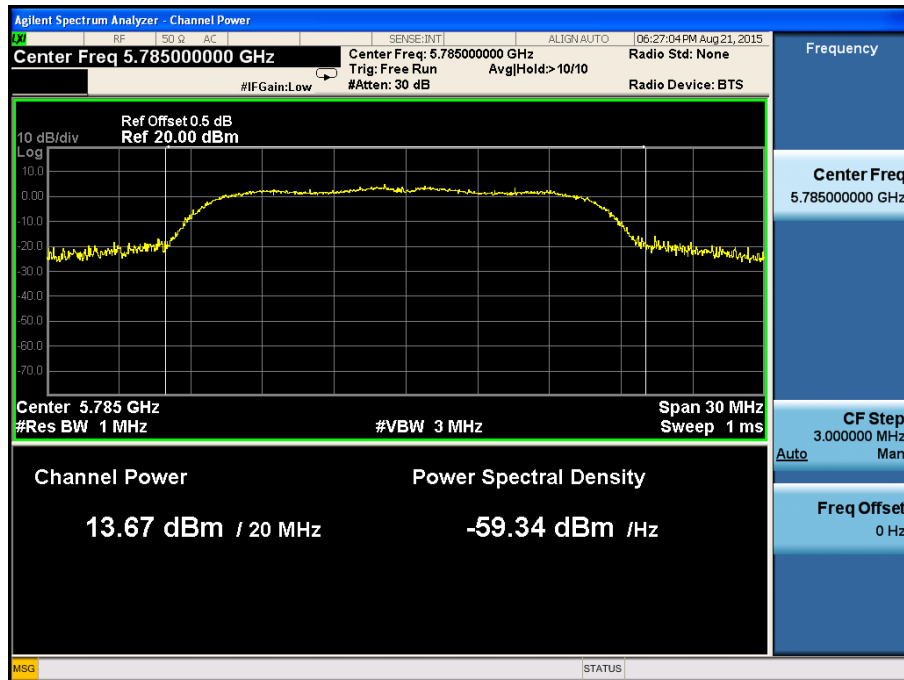
5240MHz



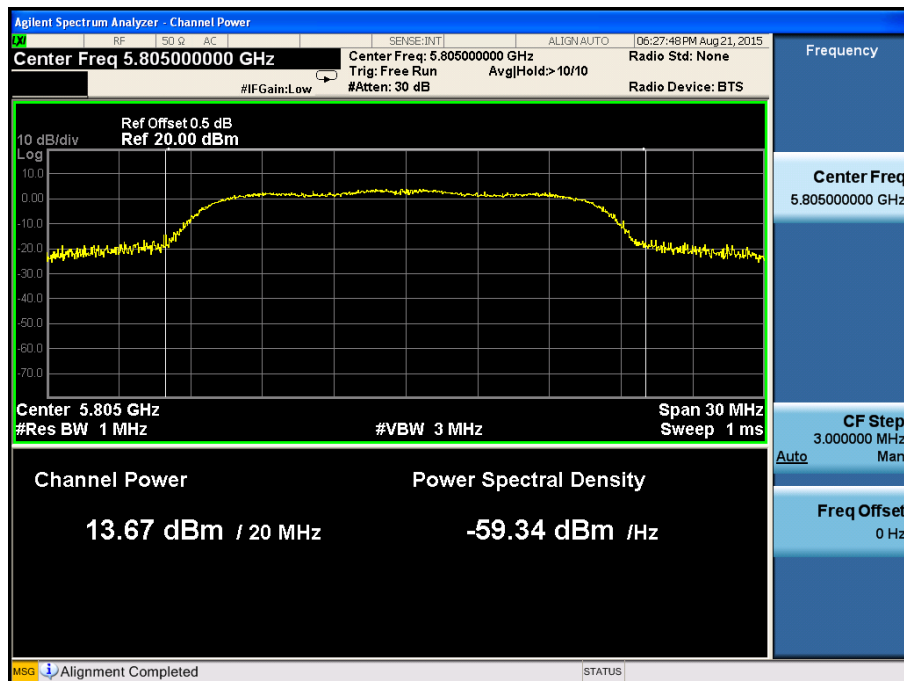
5745MHz



5785MHz

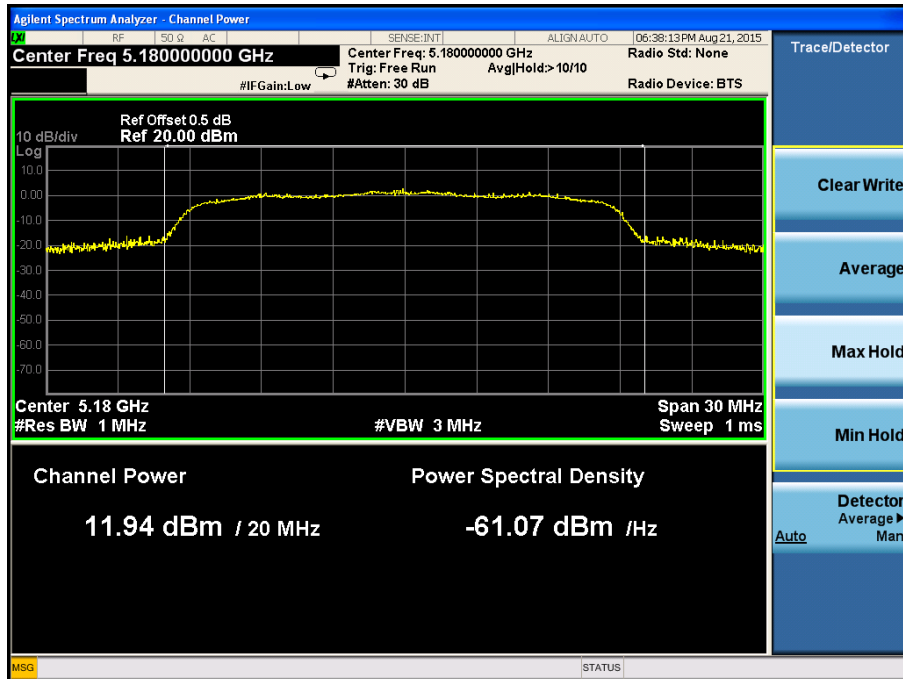


5805MHz

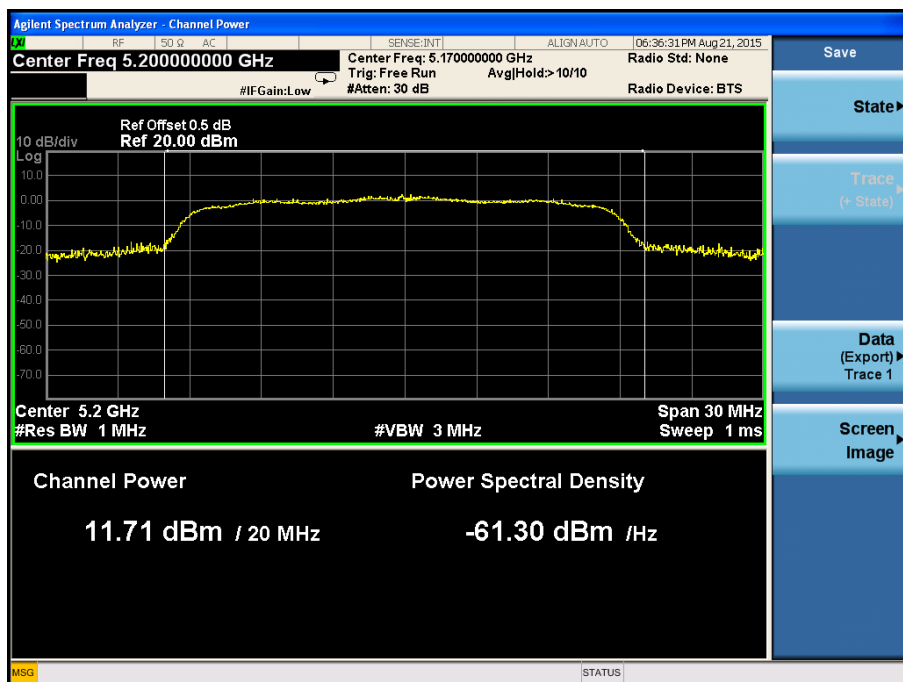


Test Mode: 802.11n-HT20

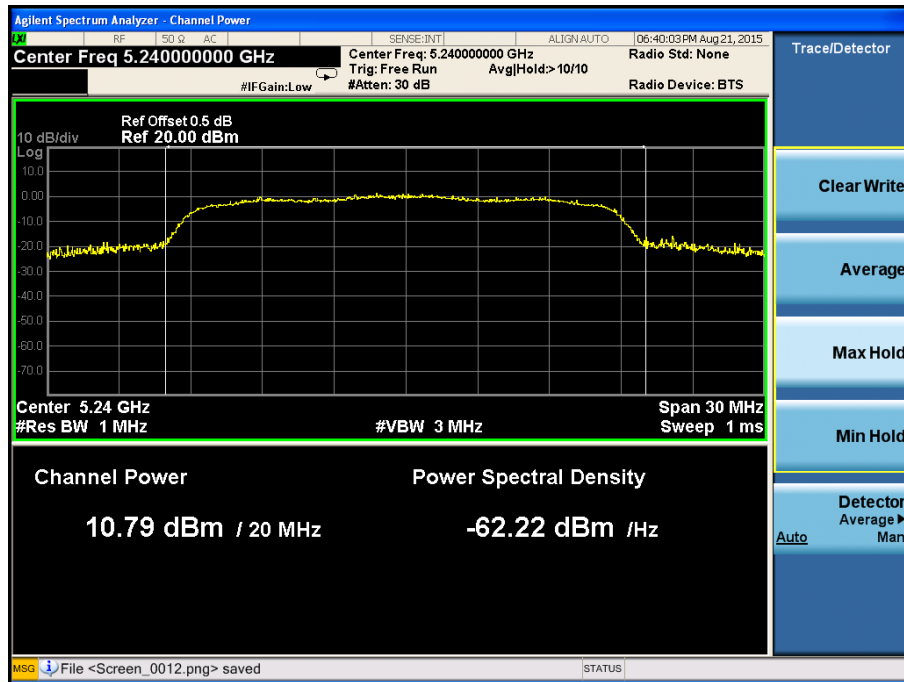
5180MHz



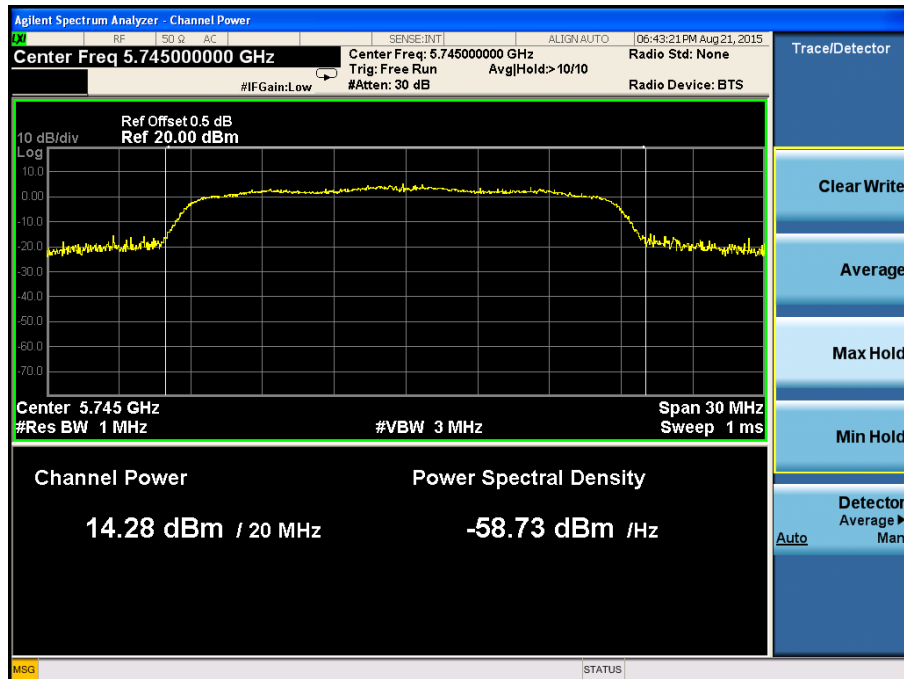
5200MHz



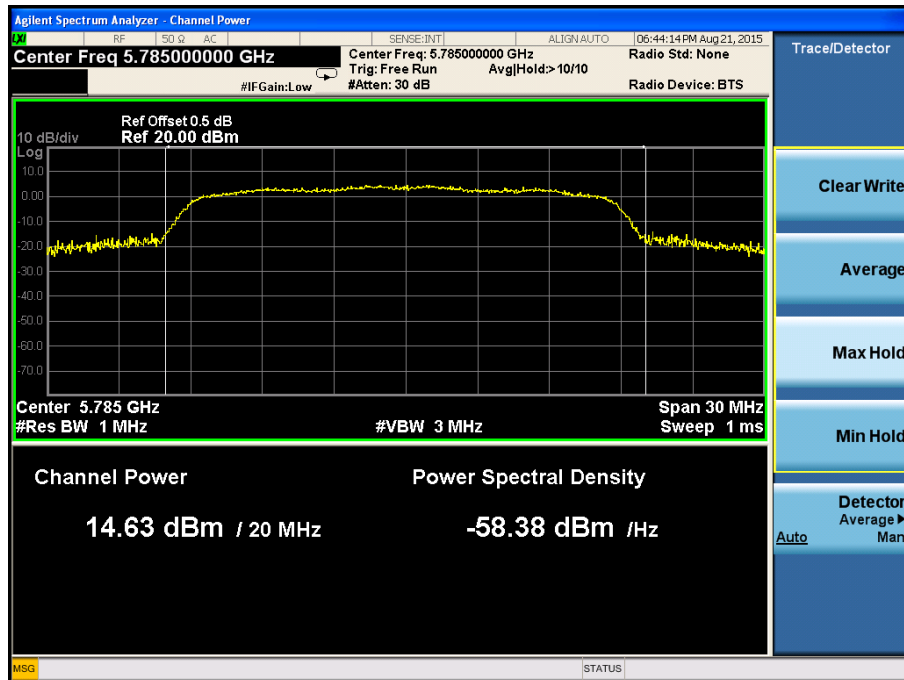
5240MHz



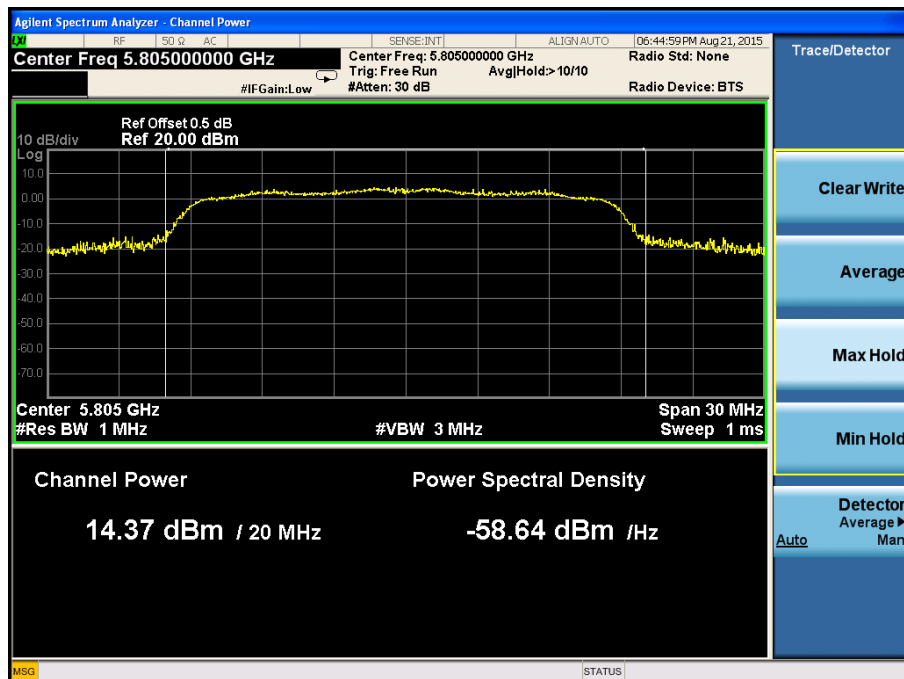
5745MHz



5785MHz



5825MHz



9. Conducted Spurious Emissions

9.1 Standard Applicable

According to §15.407 (b) (b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

9.2 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer via a RF combiner.
2. Set the spectrum analyzer as RBW = 100kHz/1MHz, VBW=300kHz/3MHz, Sweep = auto
3. Set the Lowest, Middle and Highest Transmitting Channel, observed the outside band of 30MHz to 40GHz, then mark the higher-level emission for comparing with the FCC rules.

9.3 Environmental Conditions

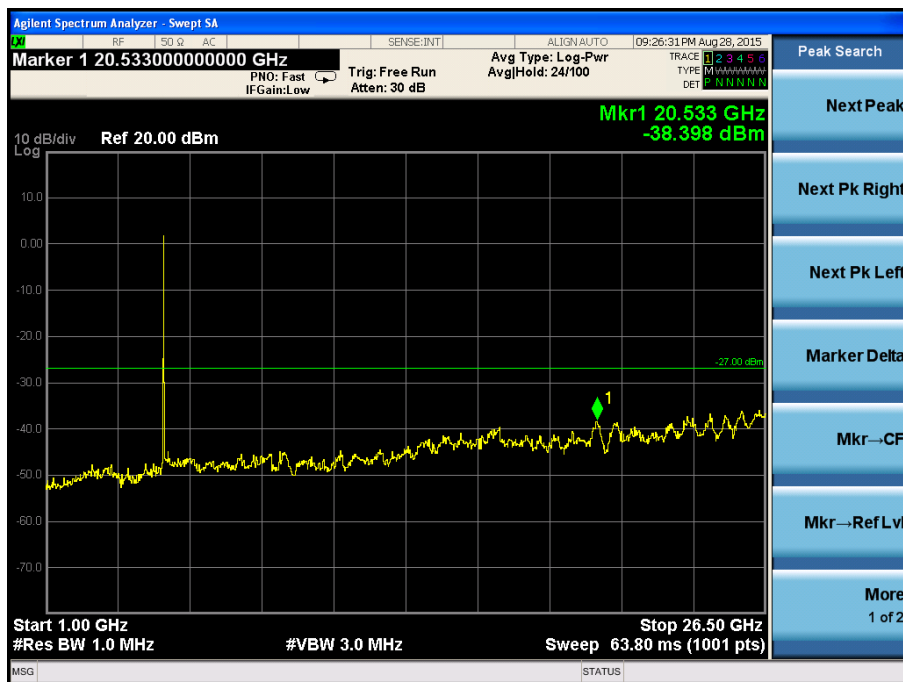
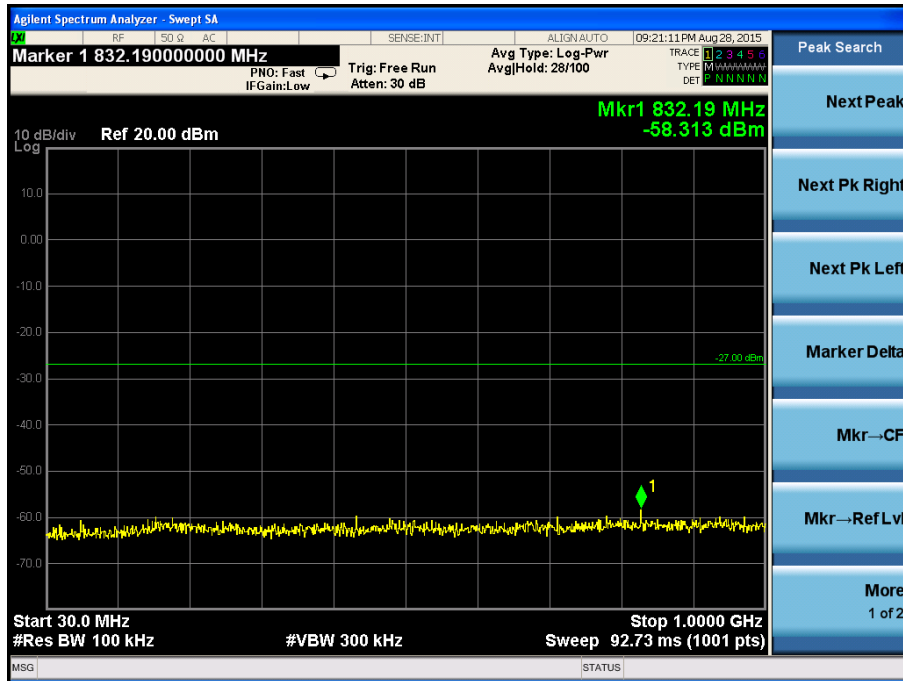
Temperature:	21° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

10.4 Summary of Test Results/Plots

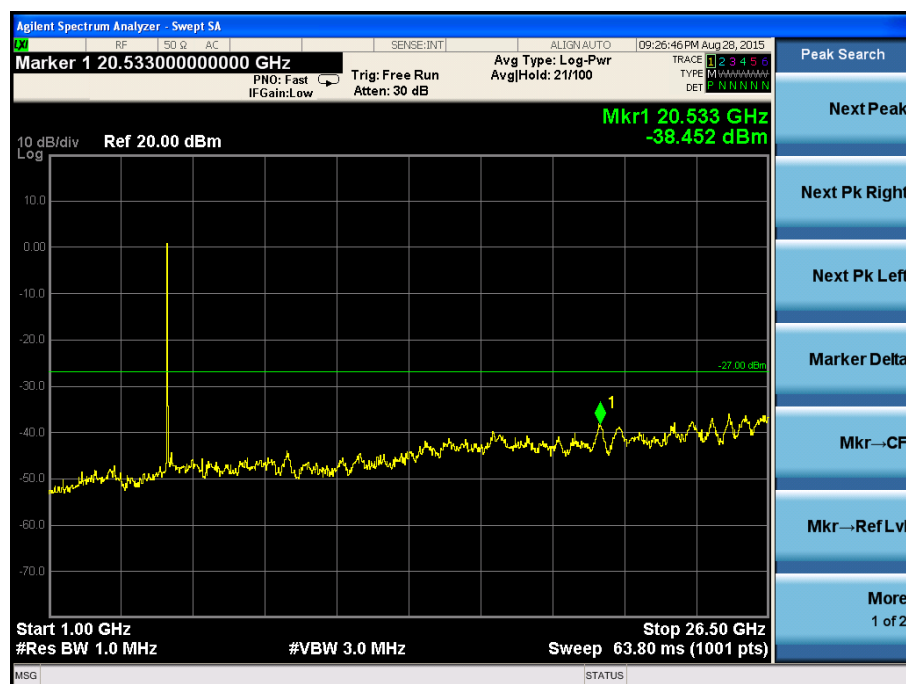
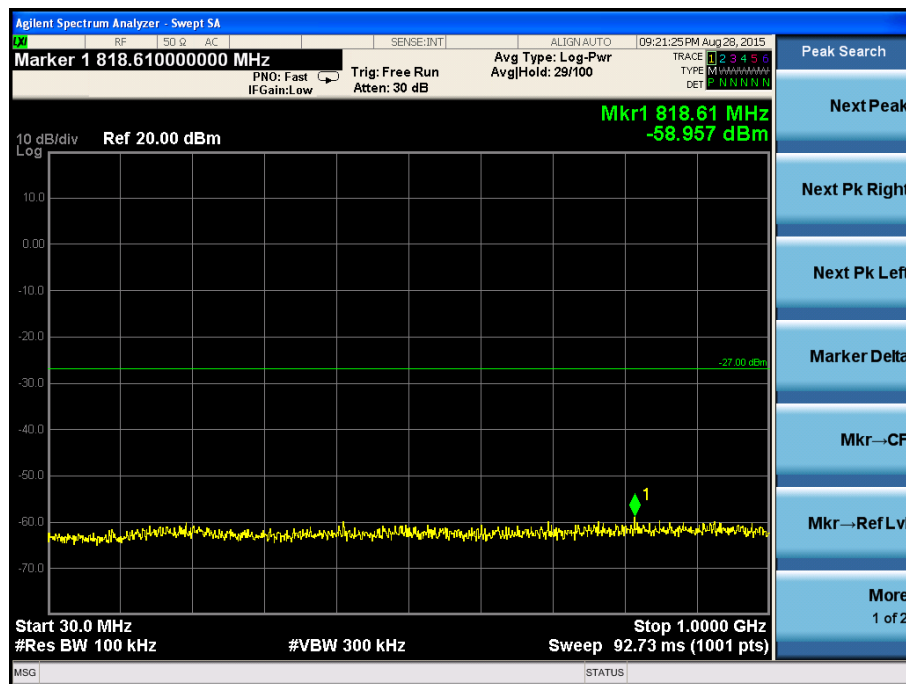
Emissions above 26.5GHz are attenuated more than 20dB below the permissible limits and test data are not reported.

802.11a

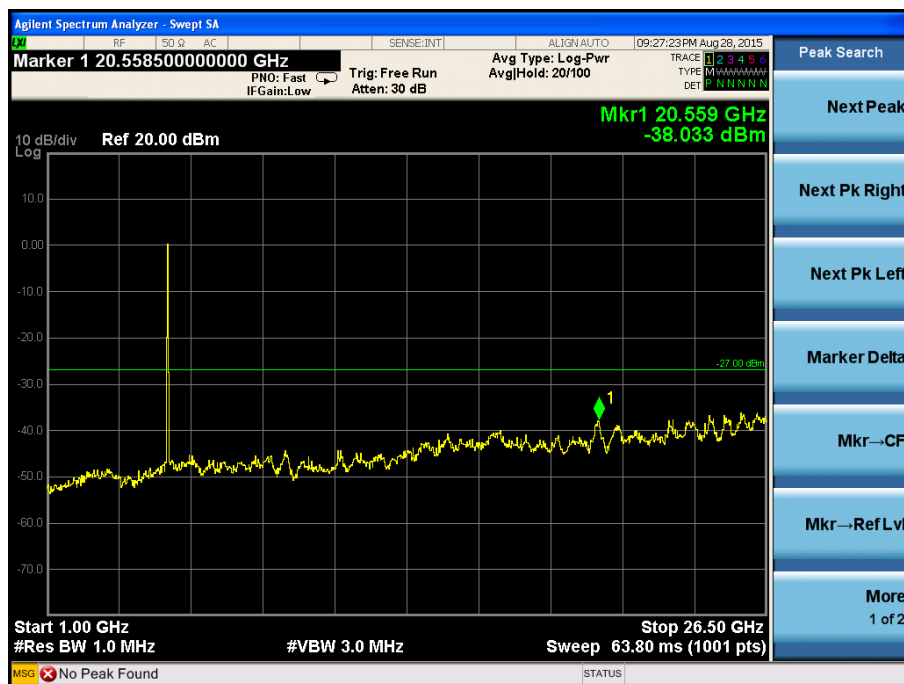
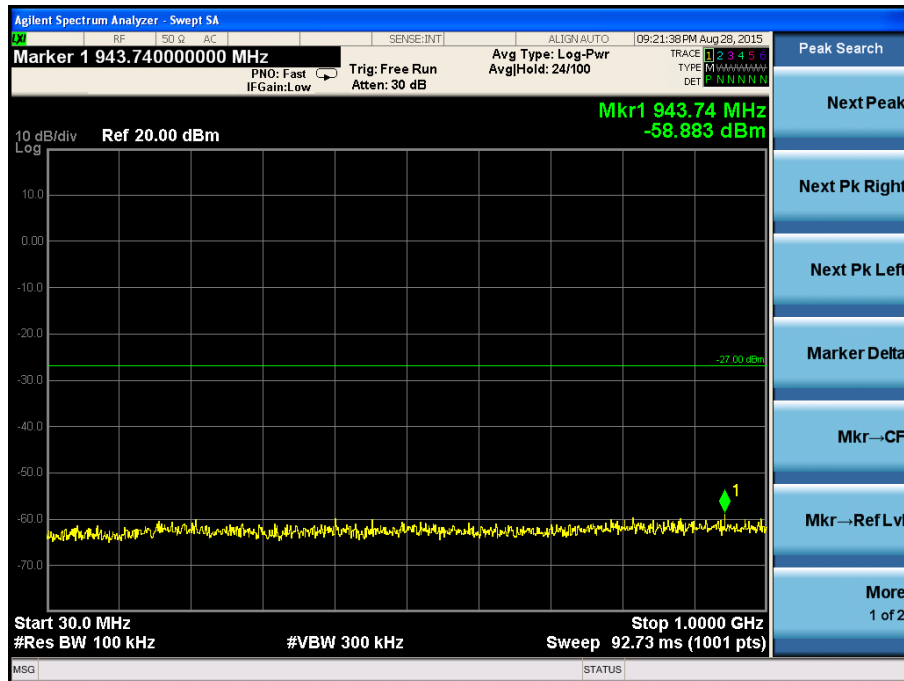
5180MHz



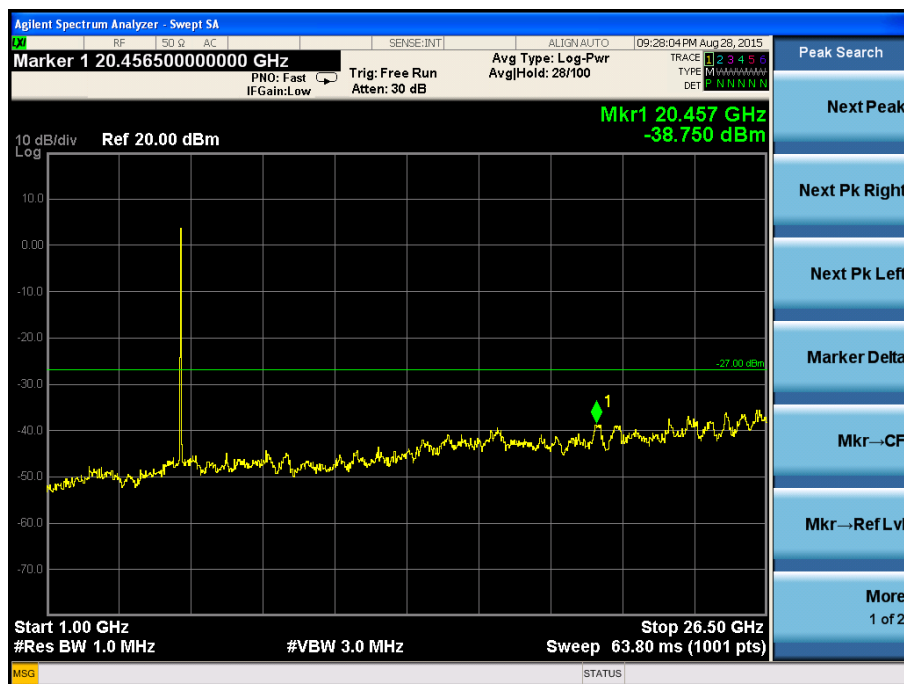
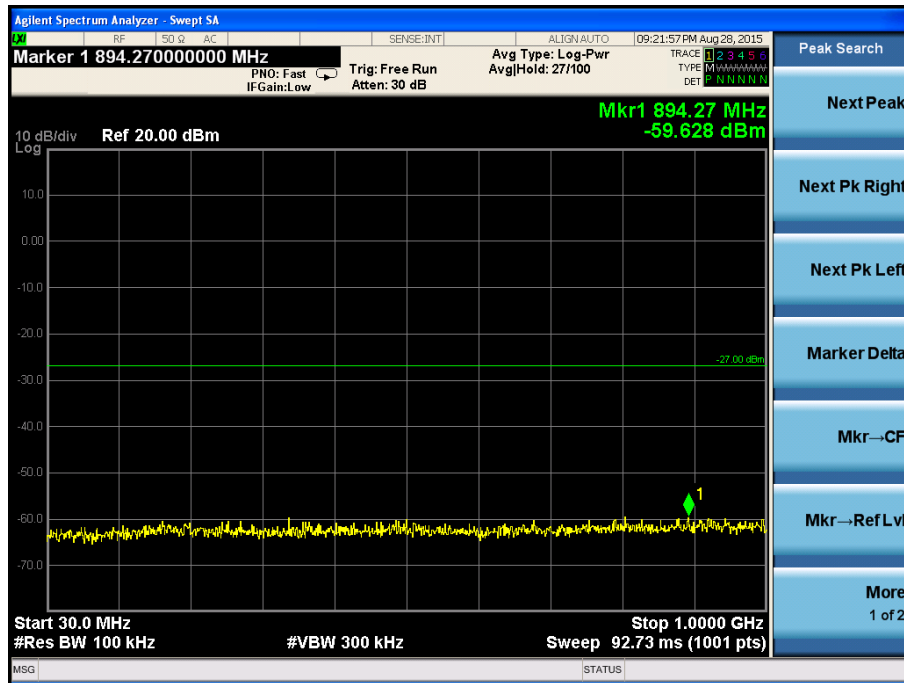
5200MHz



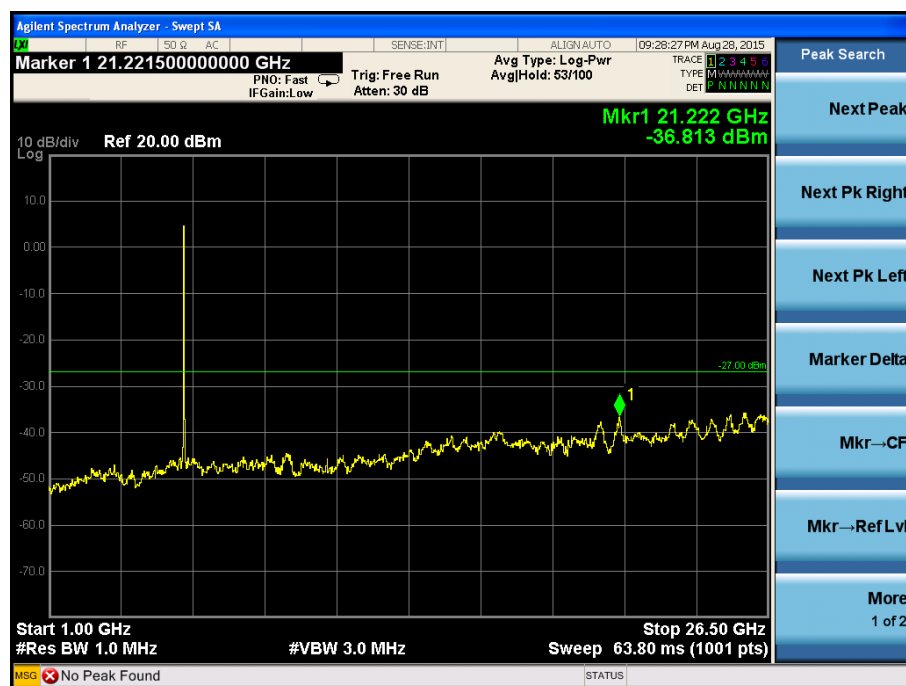
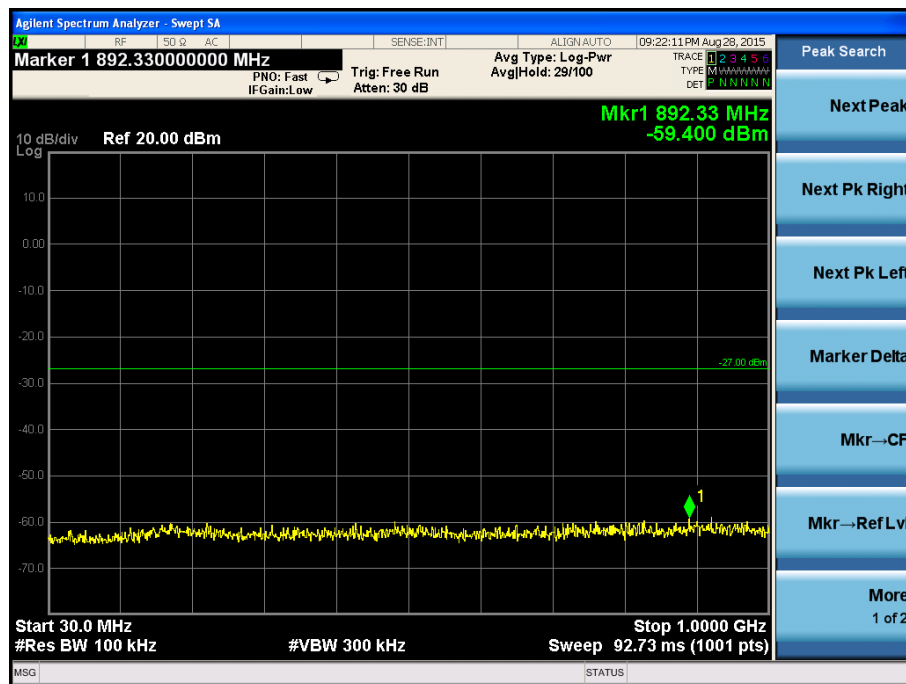
5240MHz



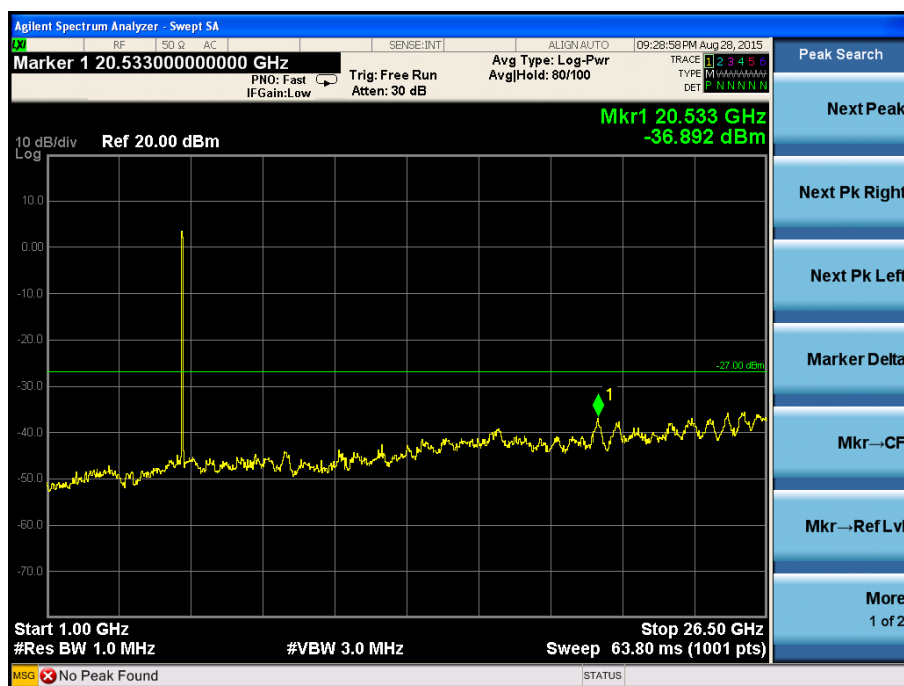
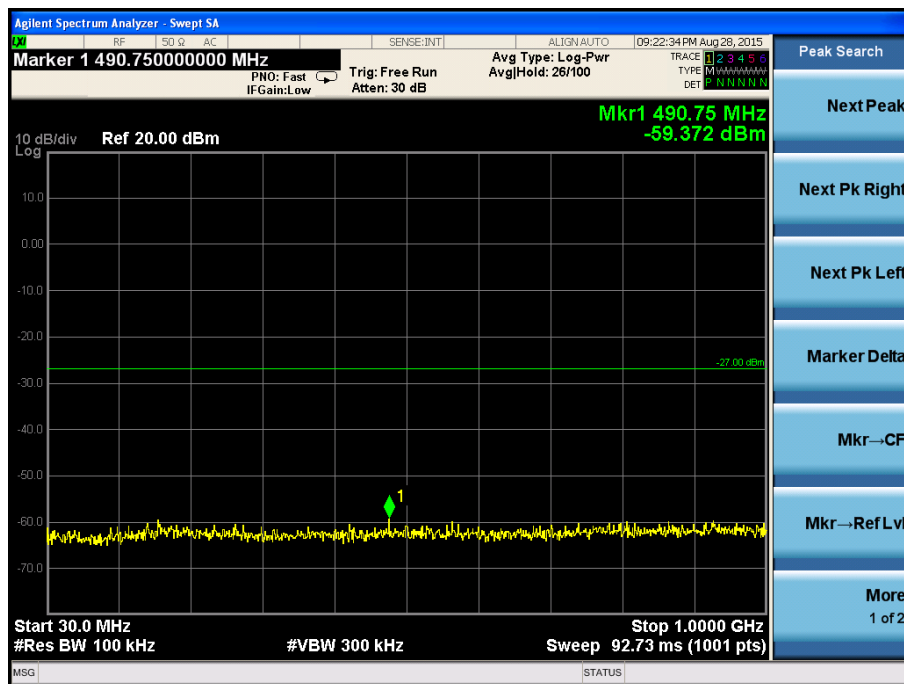
5745MHz



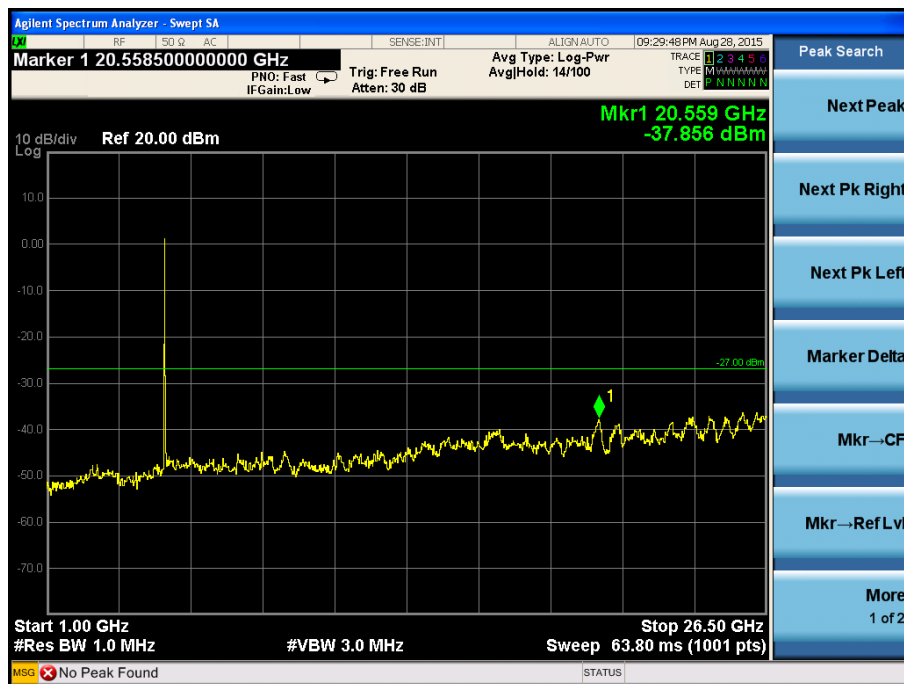
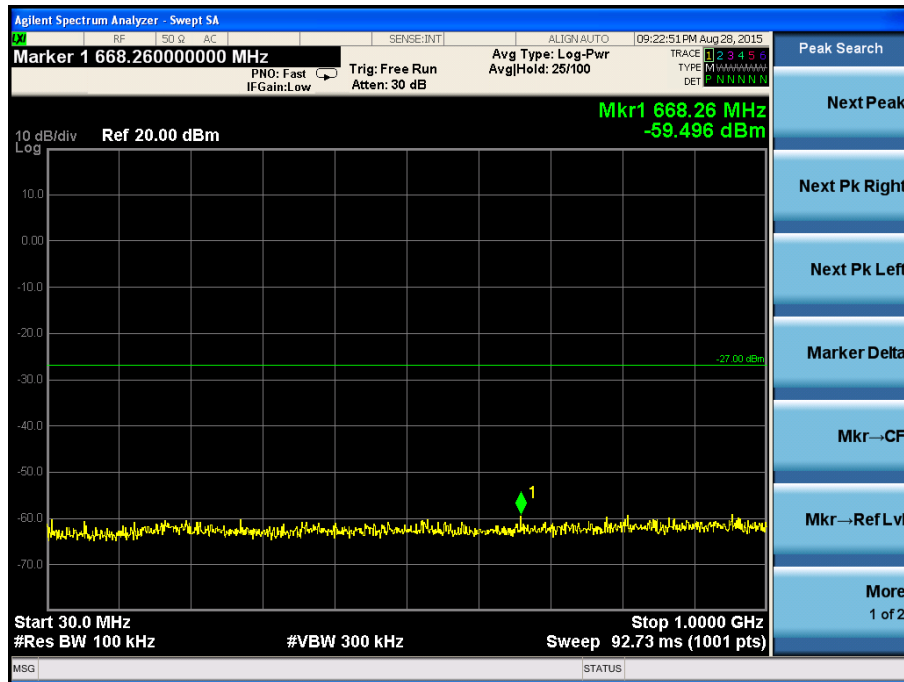
5785MHz



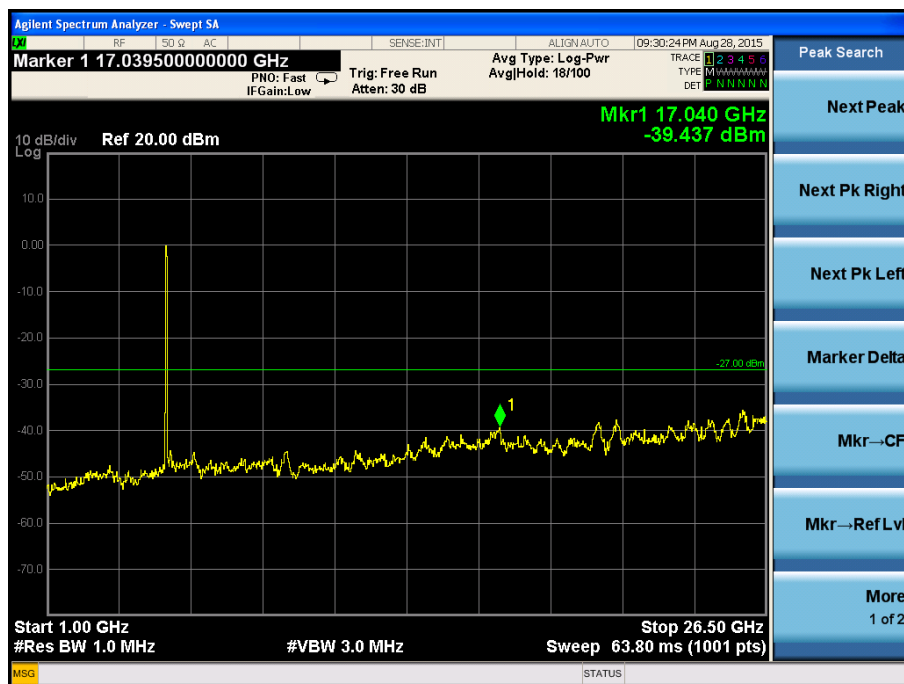
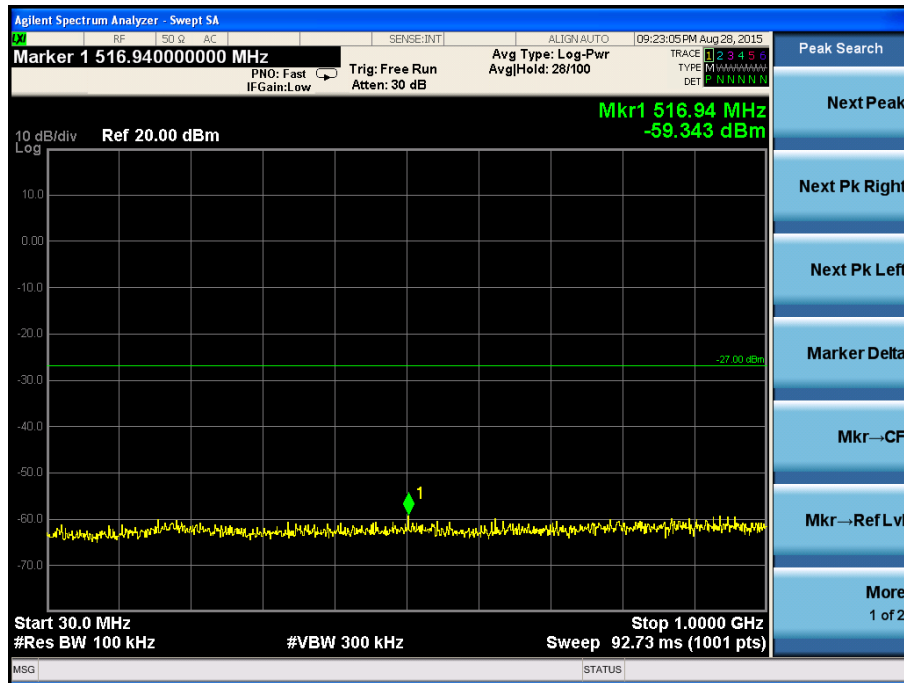
5805MHz



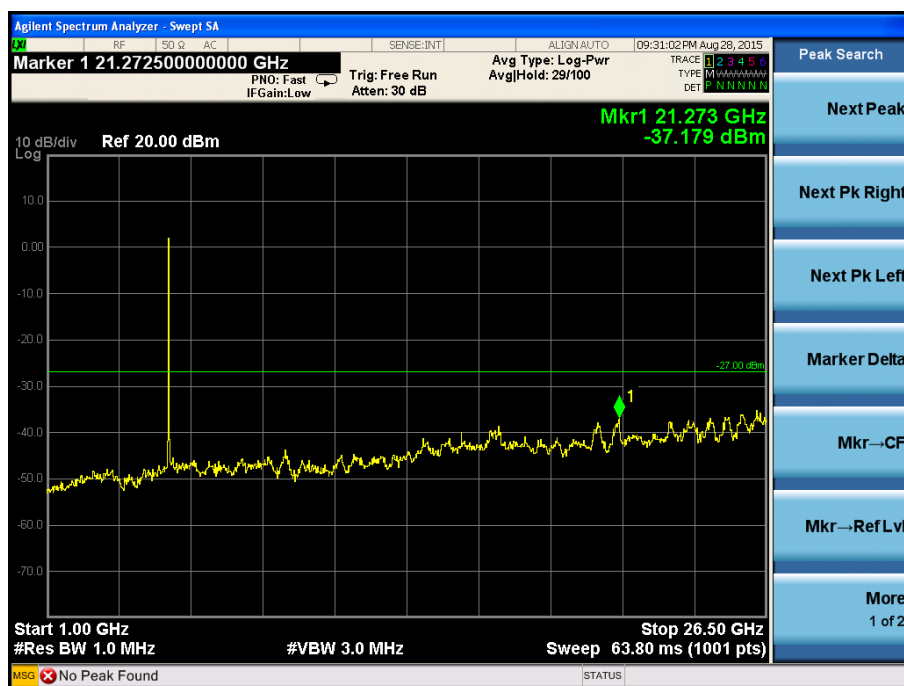
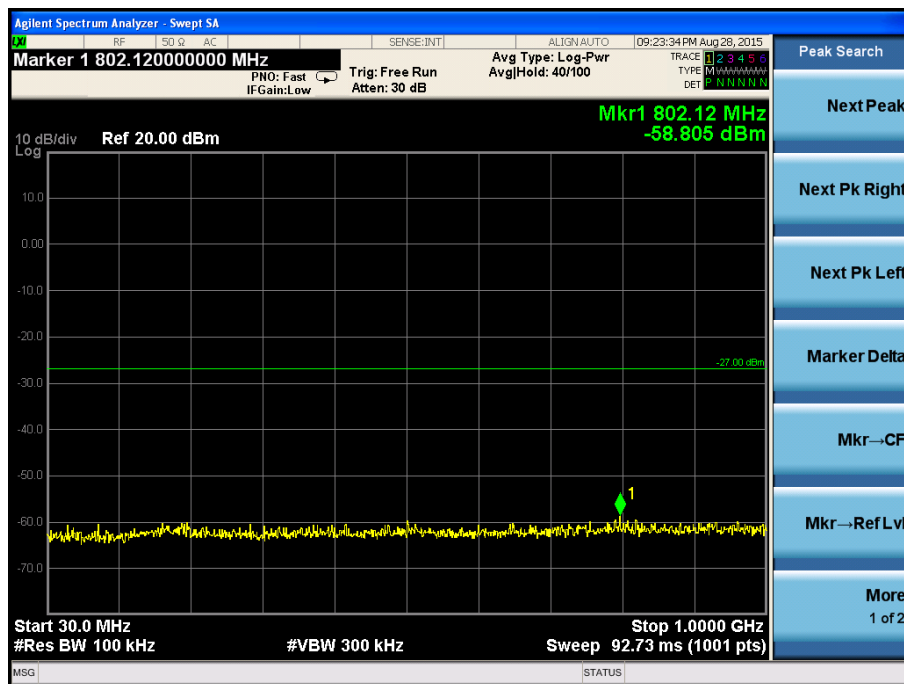
802.11n HT20 5180MHz



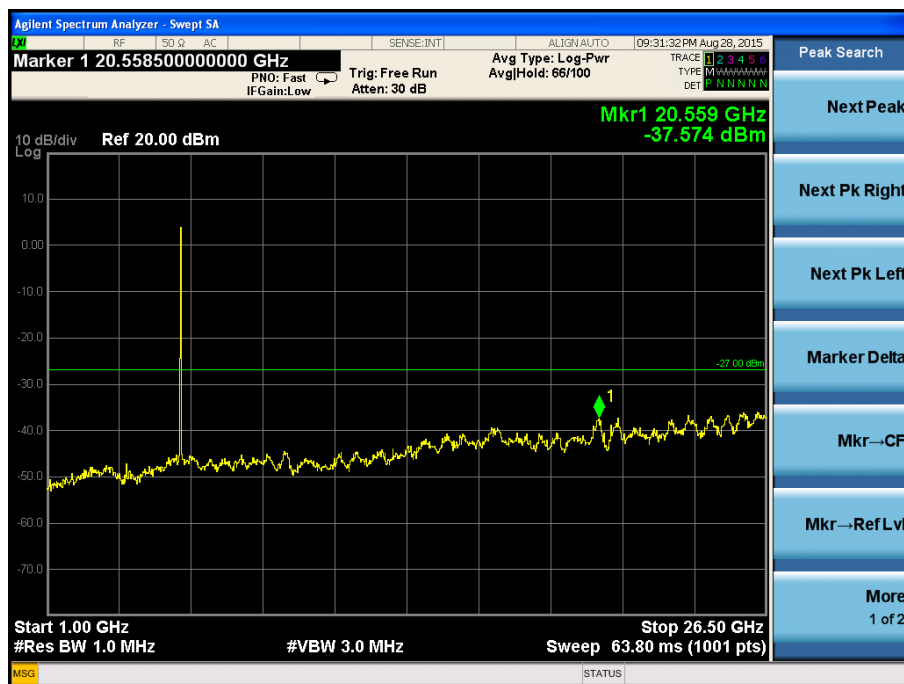
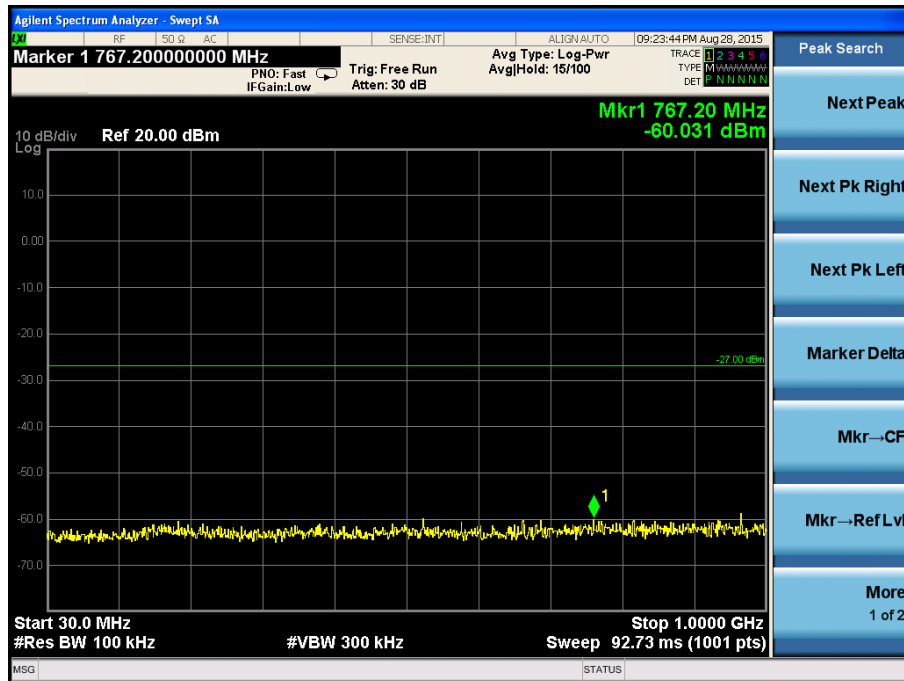
5200MHz



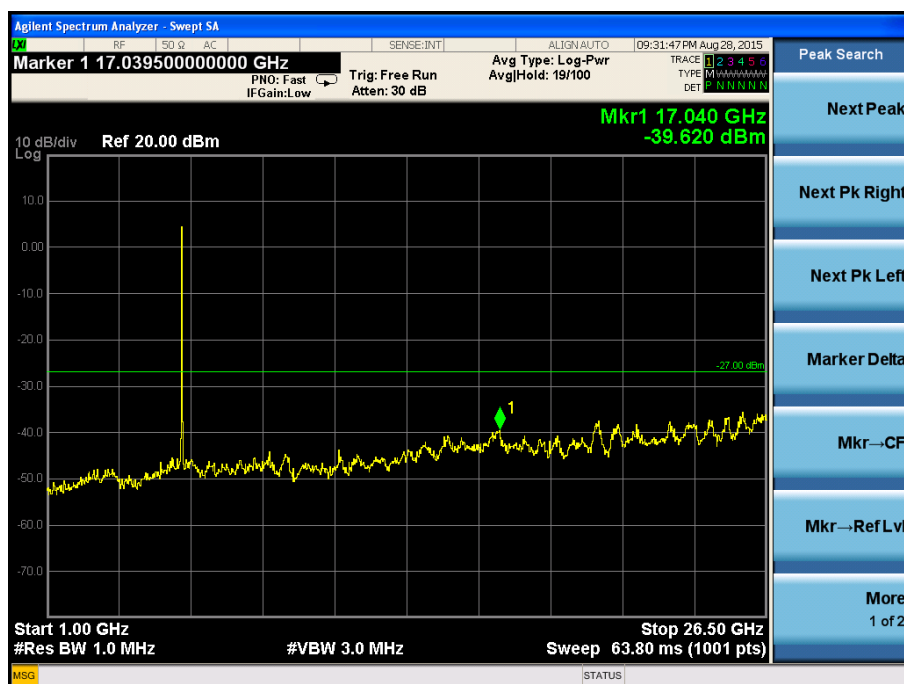
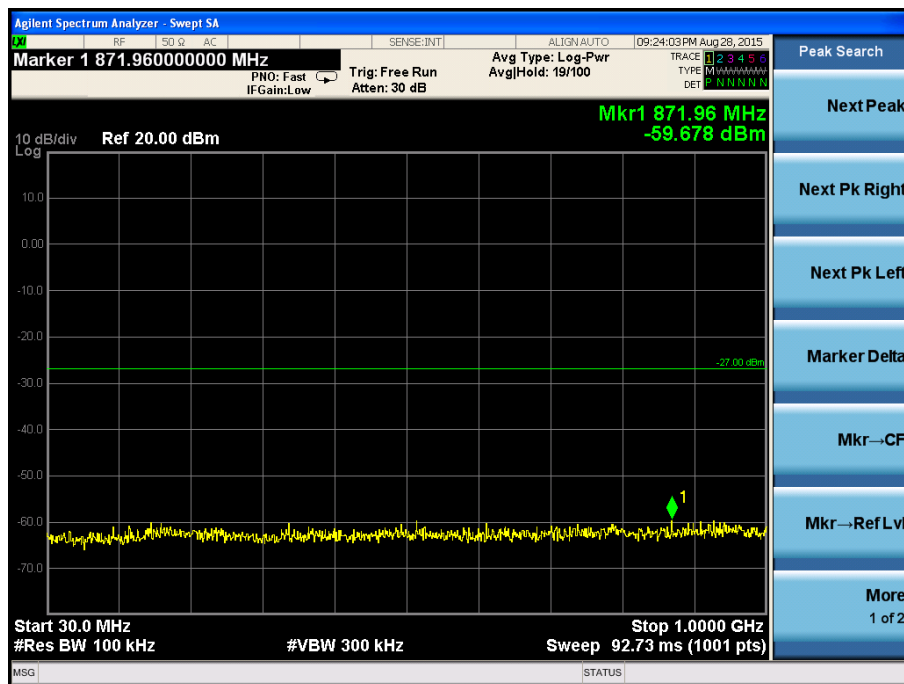
5240MHz



5745MHz



5785MHz



Agilent Spectrum Analyzer - Sweep SA

RF 50 Ω AC SENSE:INT ALIGN: AUTO 09:32:07 PM Aug 28, 2015

Marker 1 20.380000000000 GHz

PNO: Fast IFGain: Low Trig: Free Run Avg Type: Log-Pwr Avg/Hold: 26/100

TRACE 1 2 3 4 5 6 TYPE M N N N N N N DET P N N N N N N

10 dB/div Ref 20.00 dBm

Mkr1 20.380 GHz -38.017 dBm

Start 1.00 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 26.50 GHz Sweep 63.80 ms (1001 pts)

MSG STATUS

Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

Mkr→CF

Mkr→Ref Lvl

More 1 of 2

11. Radiated Spurious Emissions

11.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ± 5.10 dB.

11.2 Standard Applicable

According to §15.407(b)(6), Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209.

According to §15.407(b)(7), The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

789033 D02 v01r02 General UNII Test Procedures New Rules v01

If radiated measurements are performed, field strength is then converted to EIRP as follows:

$$\text{EIRP} = ((E \cdot d)^2) / 30$$

where:

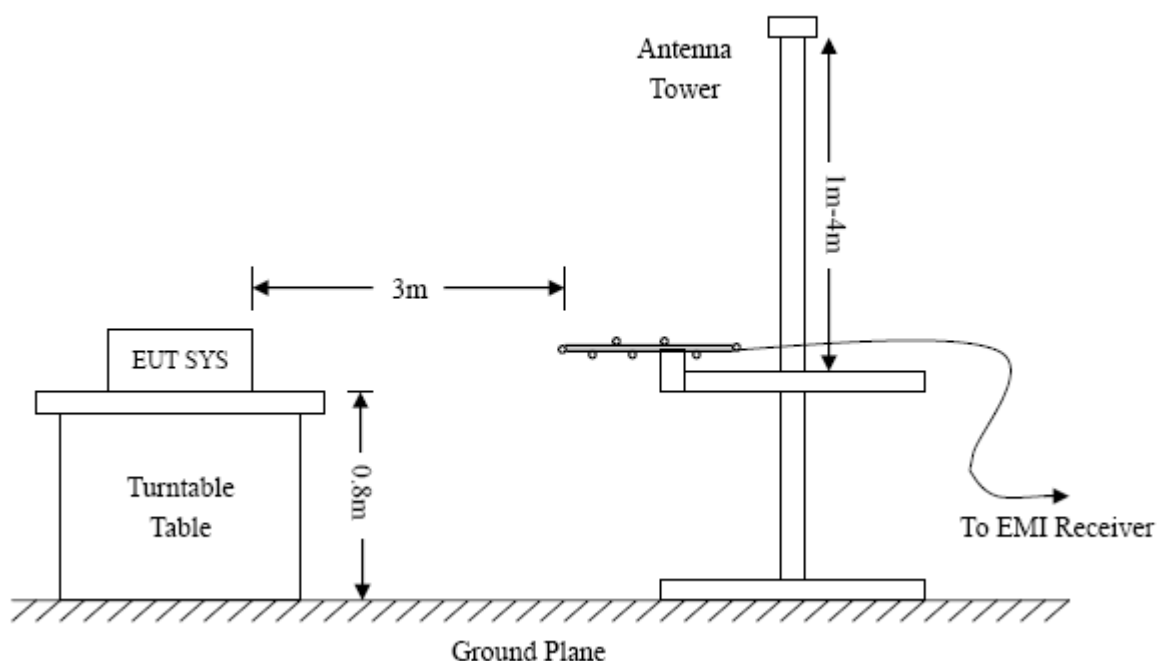
- E is the field strength in V/m;
- d is the measurement distance in meters;
- EIRP is the equivalent isotropically radiated power in watts.

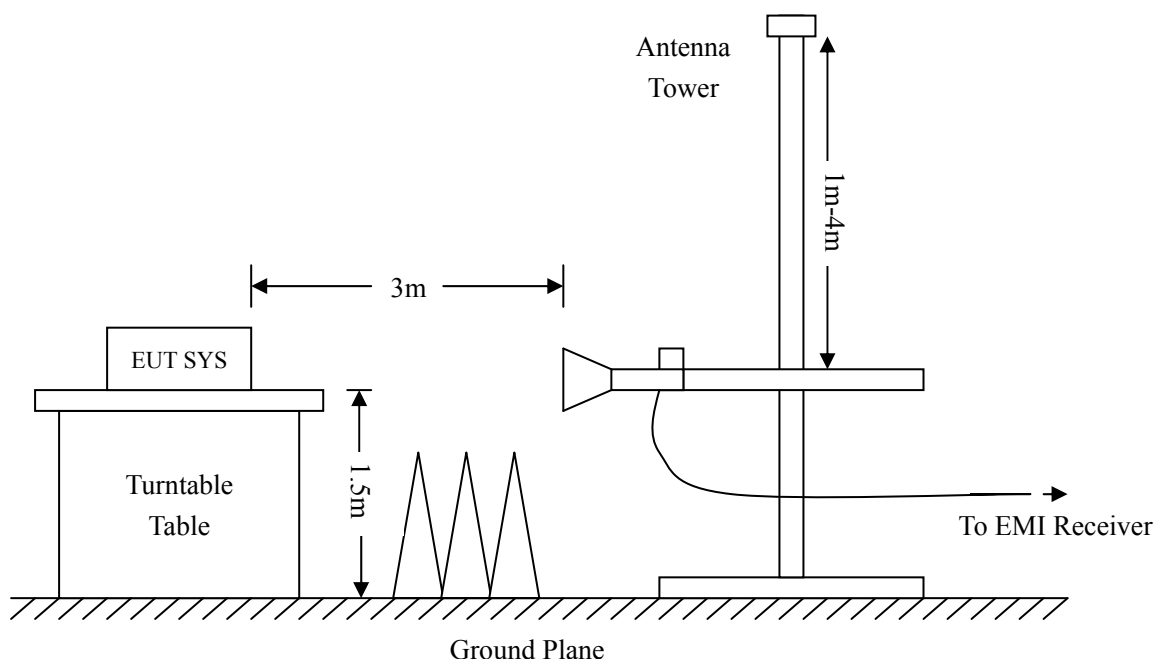
11.3 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.407(b)(6) and FCC Part 15.209 Limit..

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.





11.4 Test Receiver Setup

During the radiated emission test for above 1GHz, the test receiver was set with the following configurations:

Frequency :9kHz-30MHz

RBW=10KHz,

VBW =30KHz

Sweep time= Auto

Trace = max hold

Detector function = peak

Frequency :30MHz-1GHz

RBW=120KHz,

VBW=300KHz

Sweep time= Auto

Trace = max hold

Detector function = peak, QP

Frequency :Above 1GHz

RBW=1MHz,

VBW=3MHz(Peak), 10Hz(AV)

Sweep time= Auto

Trace = max hold

Detector function = peak, AV

11.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB μ V means the emission is 6dB μ V below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

11.6 Environmental Conditions

Temperature:	22° C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

11.7 Summary of Test Results/Plots

According to the data below, the FCC Part 15.205, 15.209 and 15.407(b)(6) standards, and had the worst margin of:

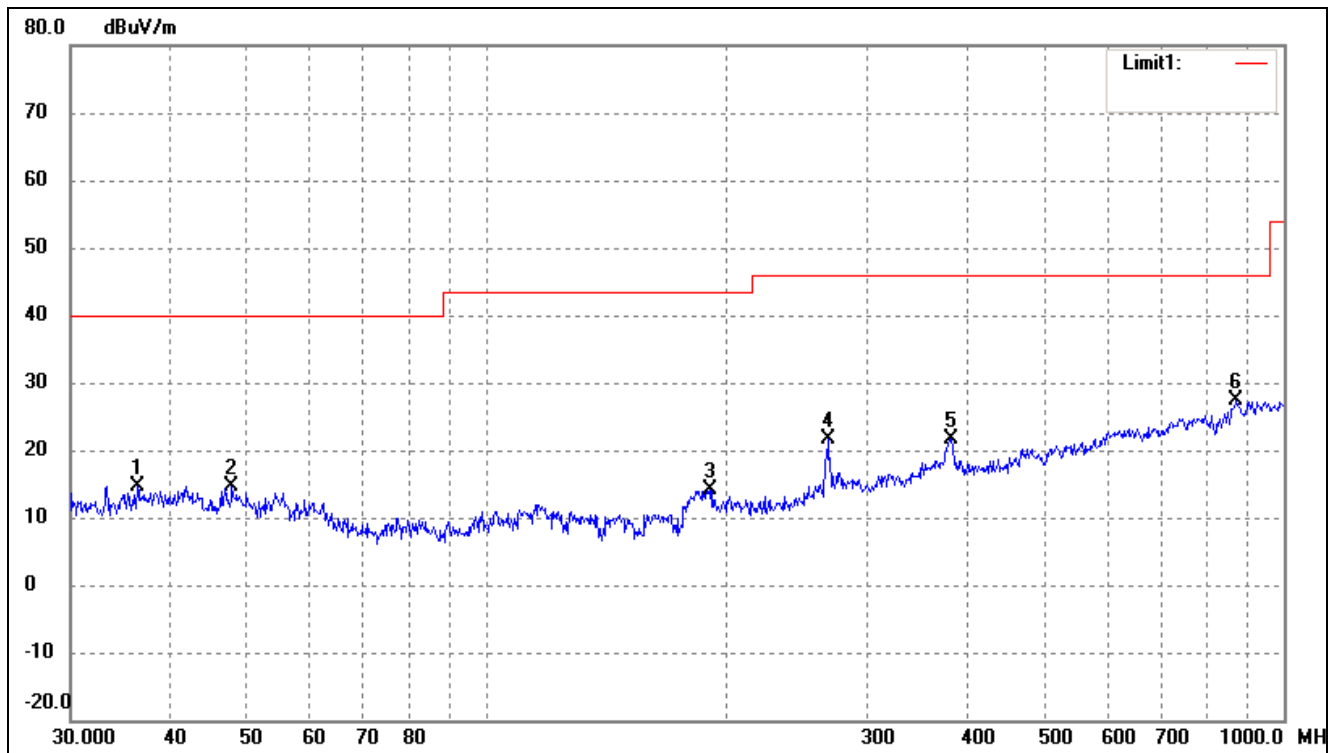
Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

For 802.11a

Spurious Emission From 30 MHz to 1 GHz

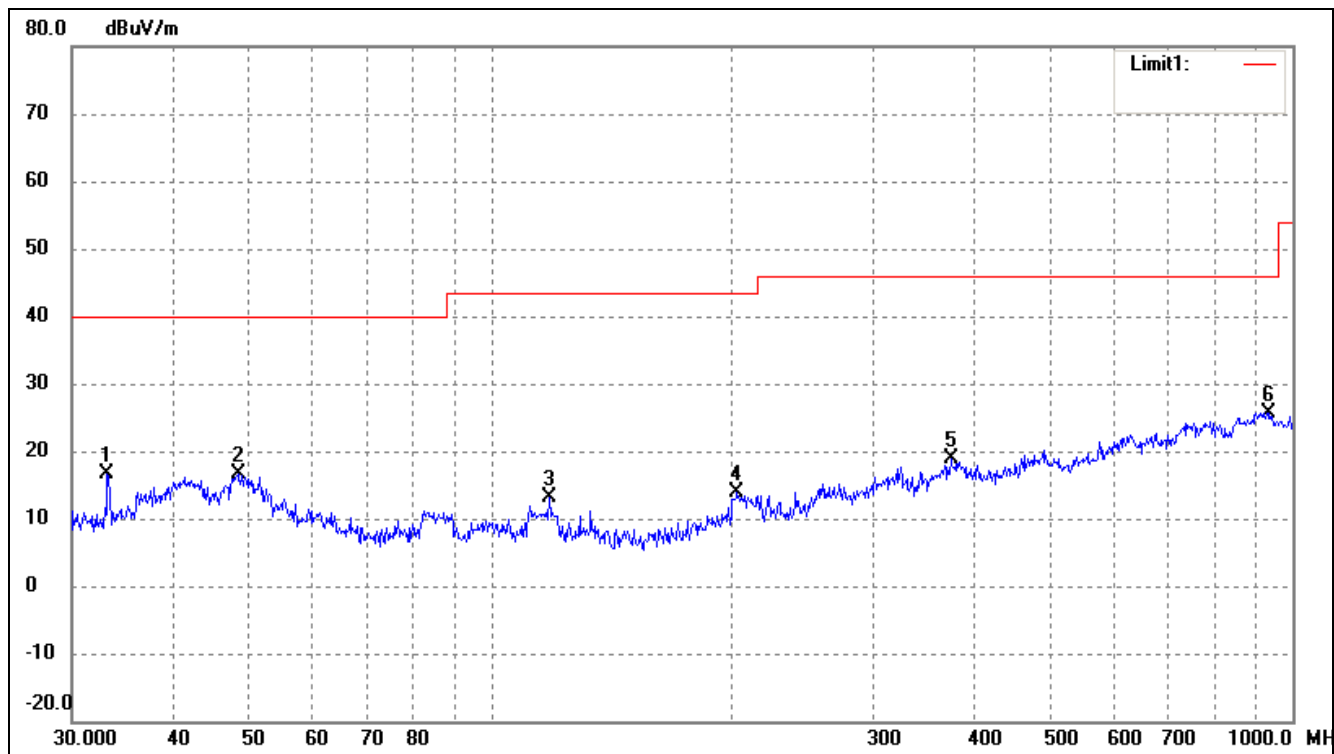
Test mode: Transmitting Channel 5180MHz

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	36.3814	23.36	-8.66	14.70	40.00	-25.30	114	100	peak
2	47.8260	22.92	-8.18	14.74	40.00	-25.26	270	100	peak
3	190.4050	23.97	-9.96	14.01	43.50	-29.49	360	100	peak
4	267.5455	28.23	-6.63	21.60	46.00	-24.40	116	100	peak
5	382.5879	23.97	-2.23	21.74	46.00	-24.26	353	100	peak
6	872.1832	24.34	3.05	27.39	46.00	-18.61	185	100	peak

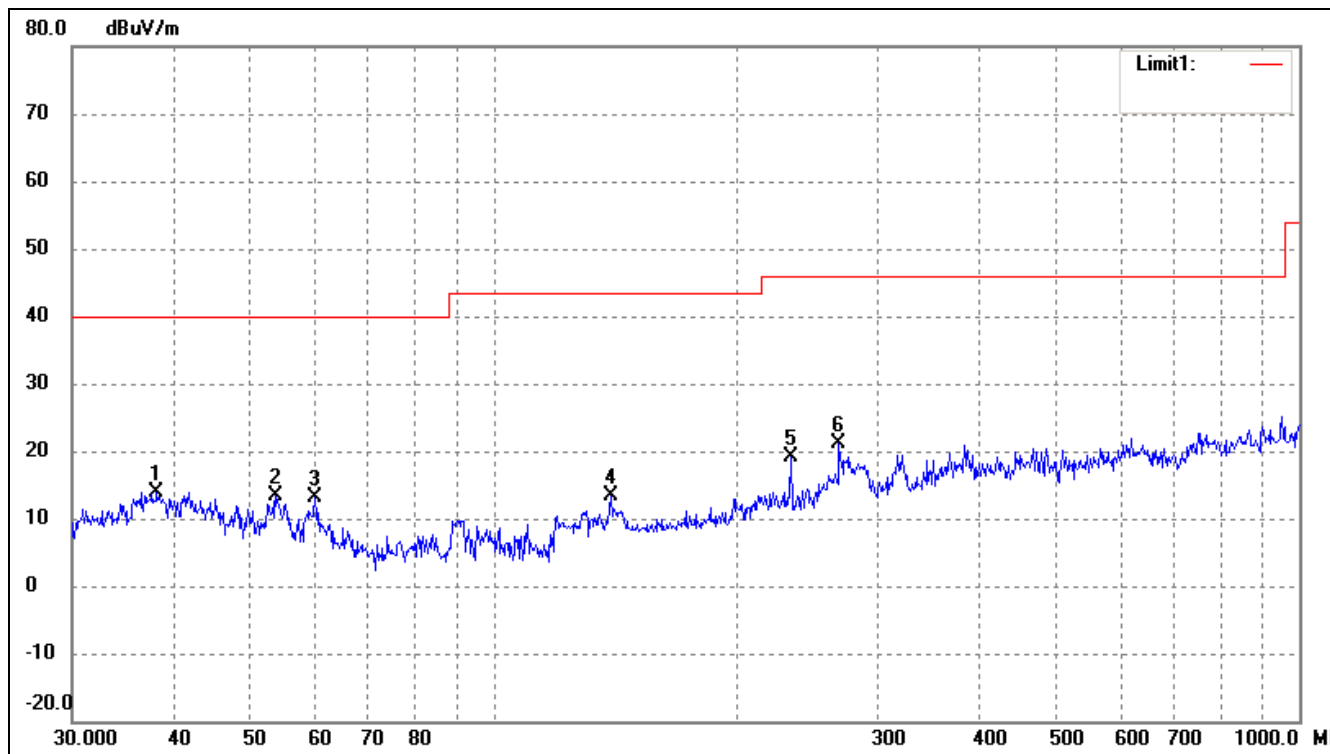
Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	33.2112	26.04	-9.50	16.54	40.00	-23.46	178	100	peak
2	48.3318	24.80	-8.21	16.59	40.00	-23.41	224	100	peak
3	118.1862	24.59	-11.38	13.21	43.50	-30.29	160	100	peak
4	202.8104	22.51	-8.68	13.83	43.50	-29.67	290	100	peak
5	374.6226	21.32	-2.41	18.91	46.00	-27.09	355	100	peak
6	935.5463	21.57	4.13	25.70	46.00	-20.30	182	100	peak

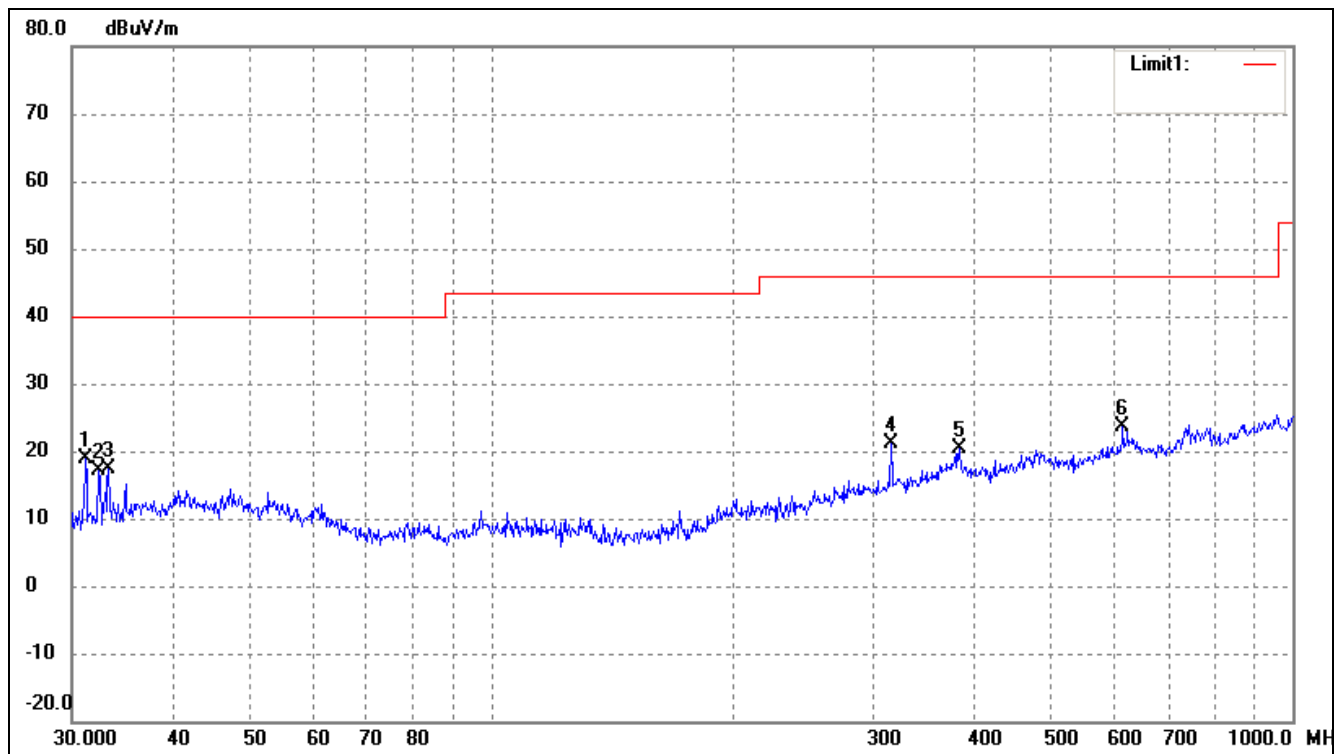
Test mode: Transmitting Channel 5200MHz

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	38.2120	22.15	-8.16	13.99	40.00	-26.01	256	100	peak
2	53.6932	22.07	-8.78	13.29	40.00	-26.71	360	100	peak
3	60.0691	22.72	-9.60	13.12	40.00	-26.88	360	100	peak
4	139.8508	25.87	-12.55	13.32	43.50	-30.18	360	100	peak
5	234.1684	27.52	-8.48	19.04	46.00	-26.96	360	100	peak
6	268.4853	27.78	-6.59	21.19	46.00	-24.81	360	100	peak

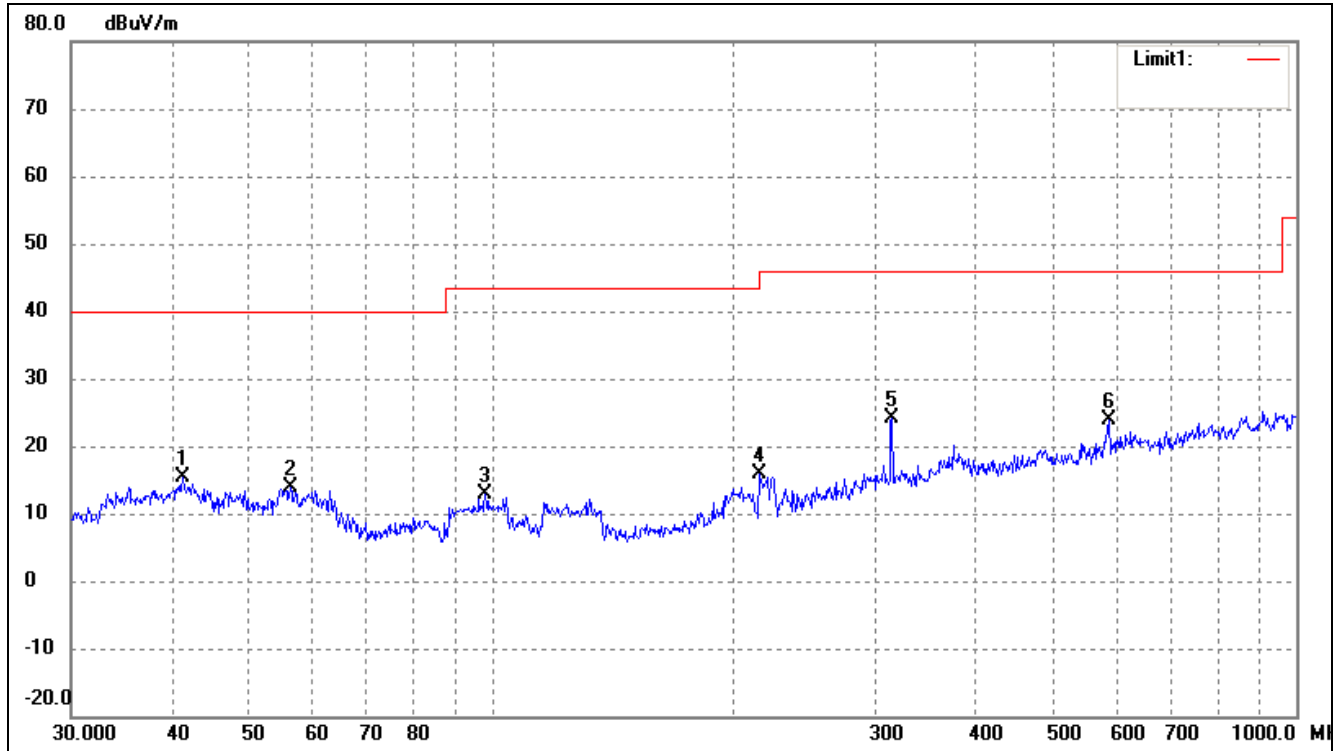
Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	31.1798	28.97	-10.01	18.96	40.00	-21.04	176	100	peak
2	32.4059	26.89	-9.69	17.20	40.00	-22.80	255	100	peak
3	33.3279	26.87	-9.46	17.41	40.00	-22.59	360	100	peak
4	315.4808	26.08	-4.85	21.23	46.00	-24.77	182	100	peak
5	383.9318	22.78	-2.30	20.48	46.00	-25.52	355	100	peak
6	614.2142	22.78	0.83	23.61	46.00	-22.39	352	100	peak

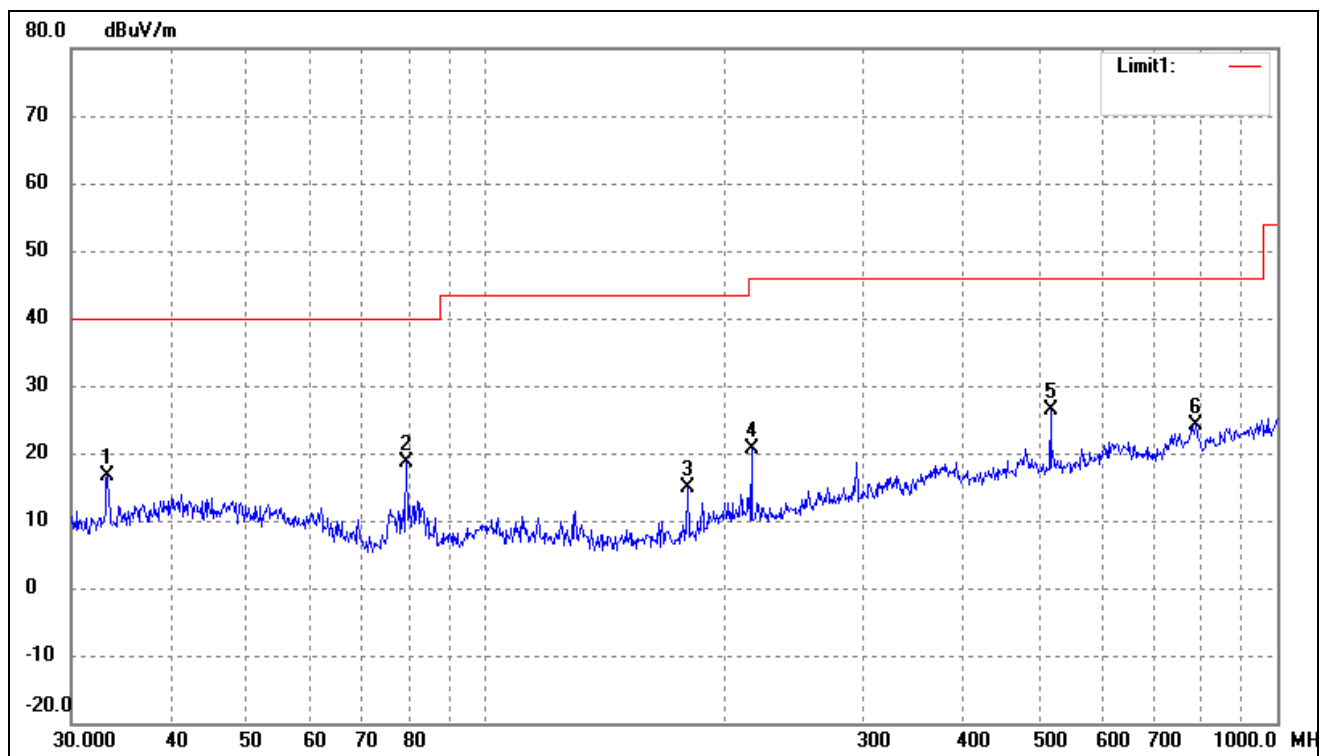
Test mode: Transmitting Channel 5240MHz

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	41.2765	23.20	-7.75	15.45	40.00	-24.55	360	100	peak
2	56.1974	22.86	-9.10	13.76	40.00	-26.24	225	100	peak
3	98.1419	24.14	-11.28	12.86	43.50	-30.64	160	100	peak
4	215.2678	24.74	-8.79	15.95	43.50	-27.55	352	100	peak
5	314.3765	29.04	-4.92	24.12	46.00	-21.88	211	100	peak
6	584.7895	24.60	-0.77	23.83	46.00	-22.17	180	100	peak

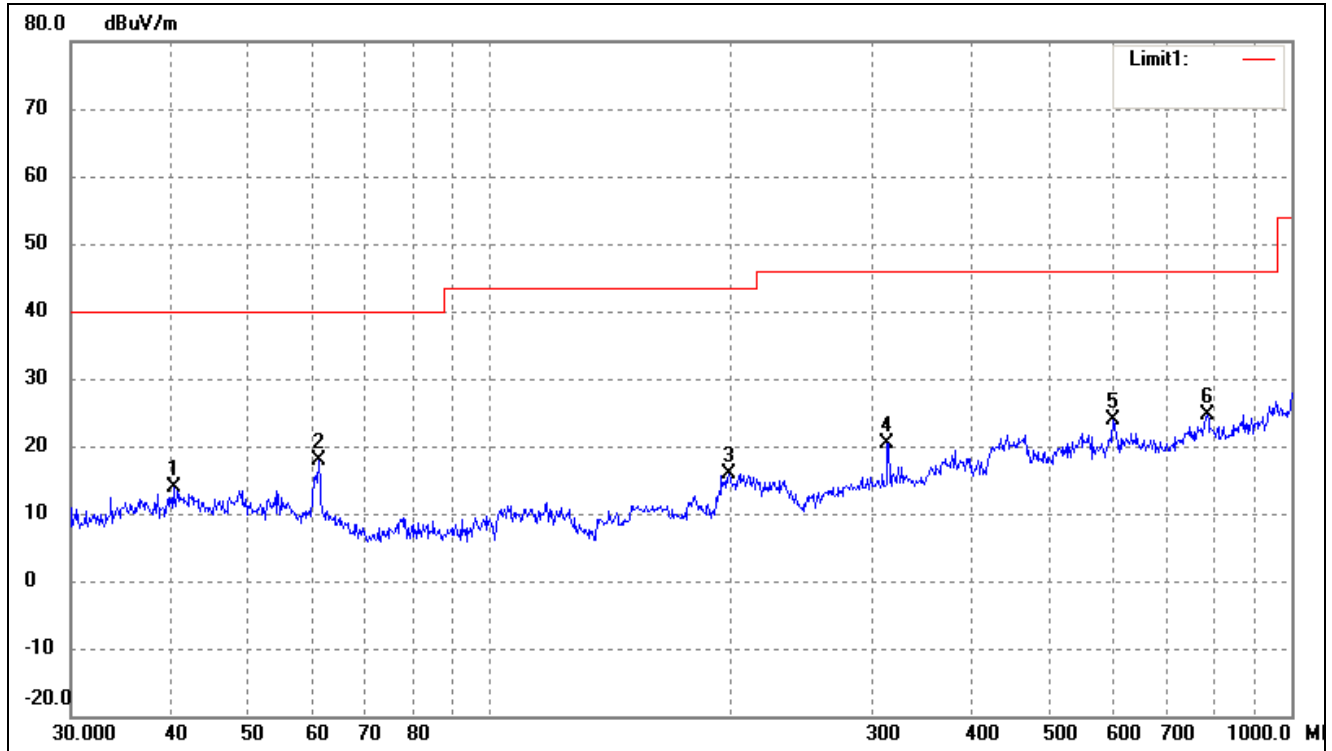
Test Specification: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	33.3279	26.18	-9.46	16.72	40.00	-23.28	174	100	peak
2	79.5209	30.62	-12.03	18.59	40.00	-21.41	160	100	peak
3	180.0165	26.14	-11.36	14.78	43.50	-28.72	320	100	peak
4	216.7828	29.40	-8.81	20.59	46.00	-25.41	182	100	peak
5	517.2480	28.21	-1.94	26.27	46.00	-19.73	180	100	peak
6	790.6188	21.88	2.37	24.25	46.00	-21.75	355	100	peak

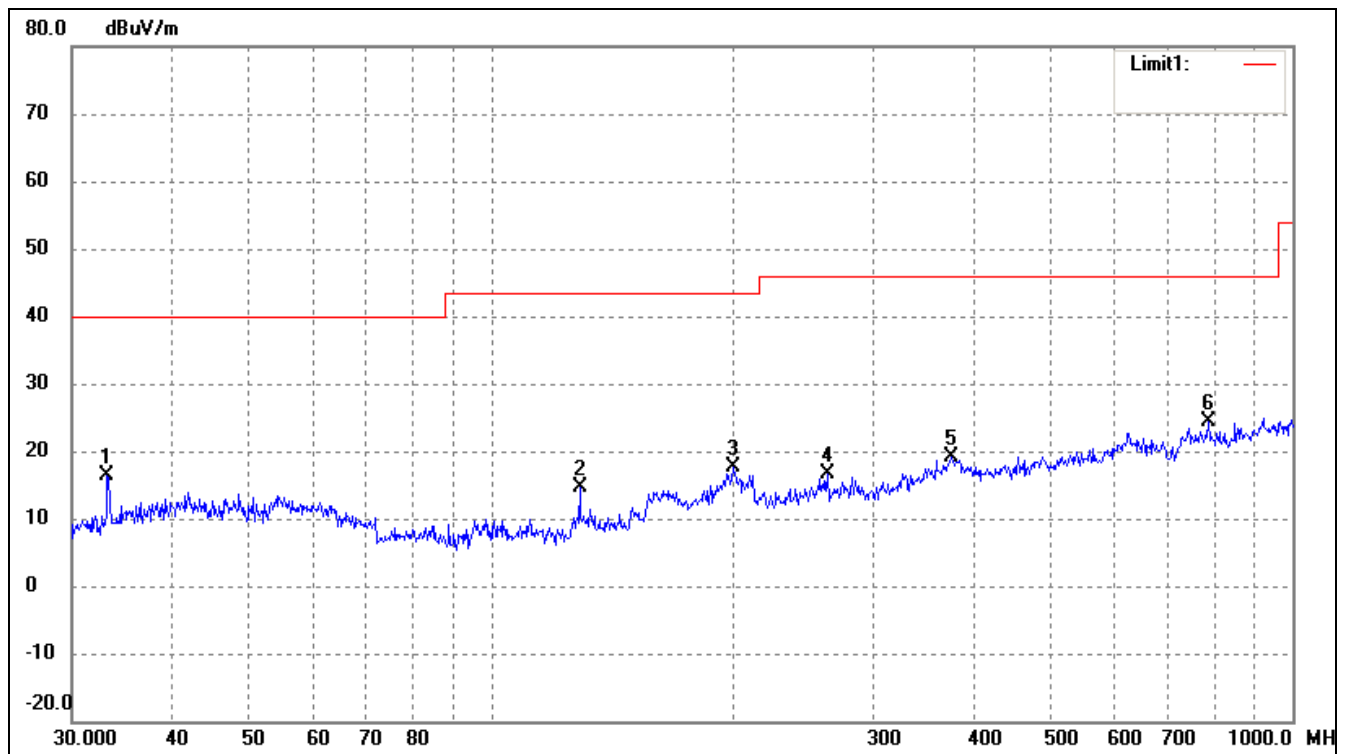
Test mode: Transmitting Channel 5745MHz

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	40.2757	21.51	-7.69	13.82	40.00	-26.18	177	100	peak
2	61.1316	27.77	-9.94	17.83	40.00	-22.17	90	100	peak
3	198.5880	24.81	-8.85	15.96	43.50	-27.54	336	100	peak
4	313.2760	25.31	-4.97	20.34	46.00	-25.66	360	100	peak
5	599.3213	23.98	-0.17	23.81	46.00	-22.19	350	100	peak
6	785.0935	21.98	2.65	24.63	46.00	-21.37	355	100	peak

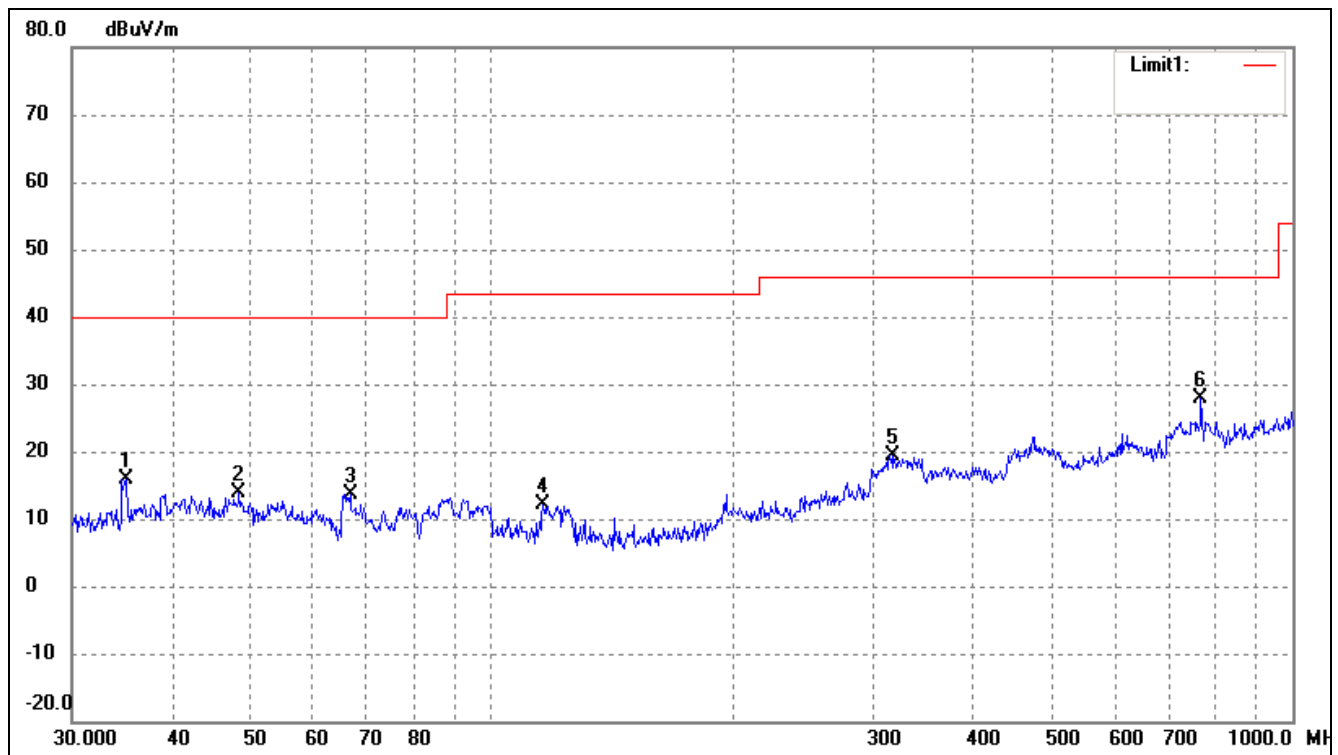
Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	33.2112	25.90	-9.50	16.40	40.00	-23.60	270	100	peak
2	129.0146	26.67	-11.94	14.73	43.50	-28.77	164	100	peak
3	200.6881	26.19	-8.66	17.53	43.50	-25.97	228	200	peak
4	262.8955	23.34	-6.83	16.51	46.00	-29.49	185	100	peak
5	374.6226	21.49	-2.41	19.08	46.00	-26.92	182	100	peak
6	785.0935	21.76	2.65	24.41	46.00	-21.59	335	200	peak

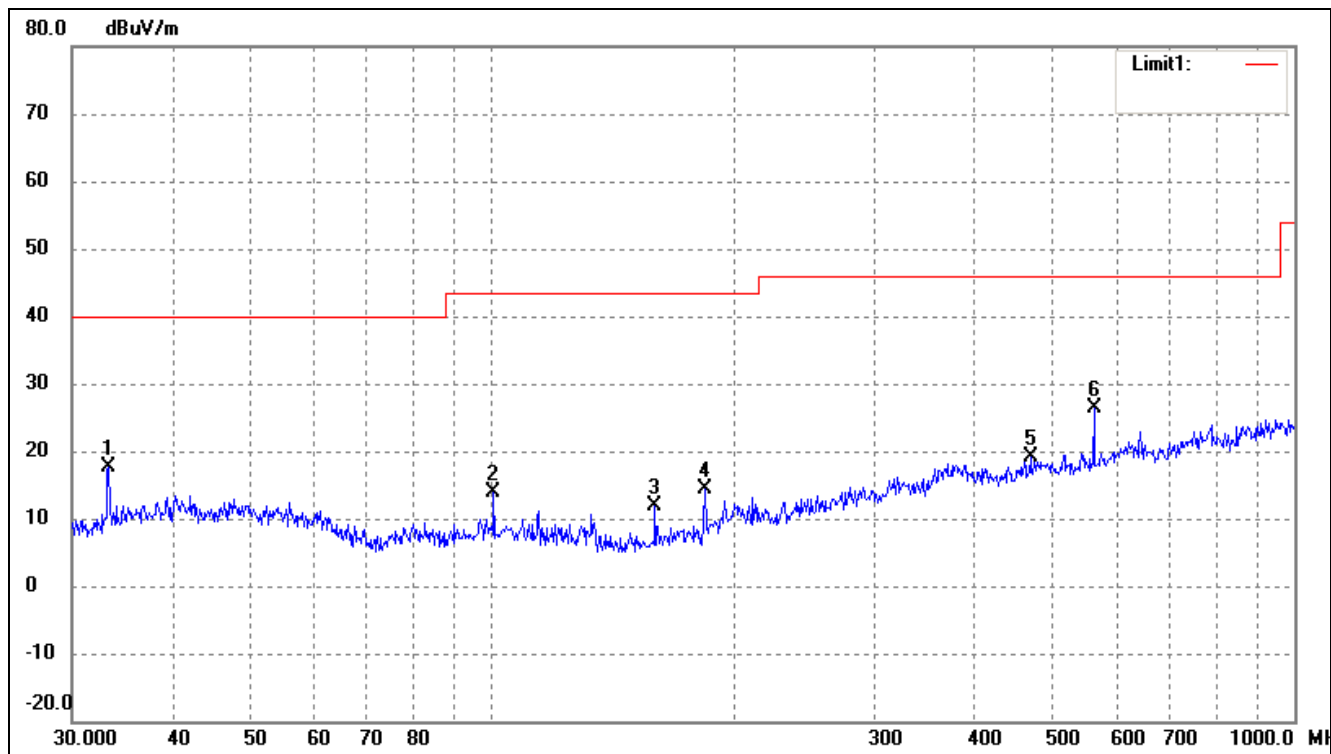
Test mode: Transmitting Channel 5785MHz

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	35.1278	24.96	-9.01	15.95	40.00	-24.05	360	100	peak
2	48.5016	22.09	-8.22	13.87	40.00	-26.13	255	100	peak
3	66.7325	25.34	-11.77	13.57	40.00	-26.43	270	100	peak
4	116.1321	23.54	-11.33	12.21	43.50	-31.29	355	100	peak
5	317.7011	24.18	-4.74	19.44	46.00	-26.56	356	100	peak
6	768.7482	25.64	2.28	27.92	46.00	-18.08	182	100	peak

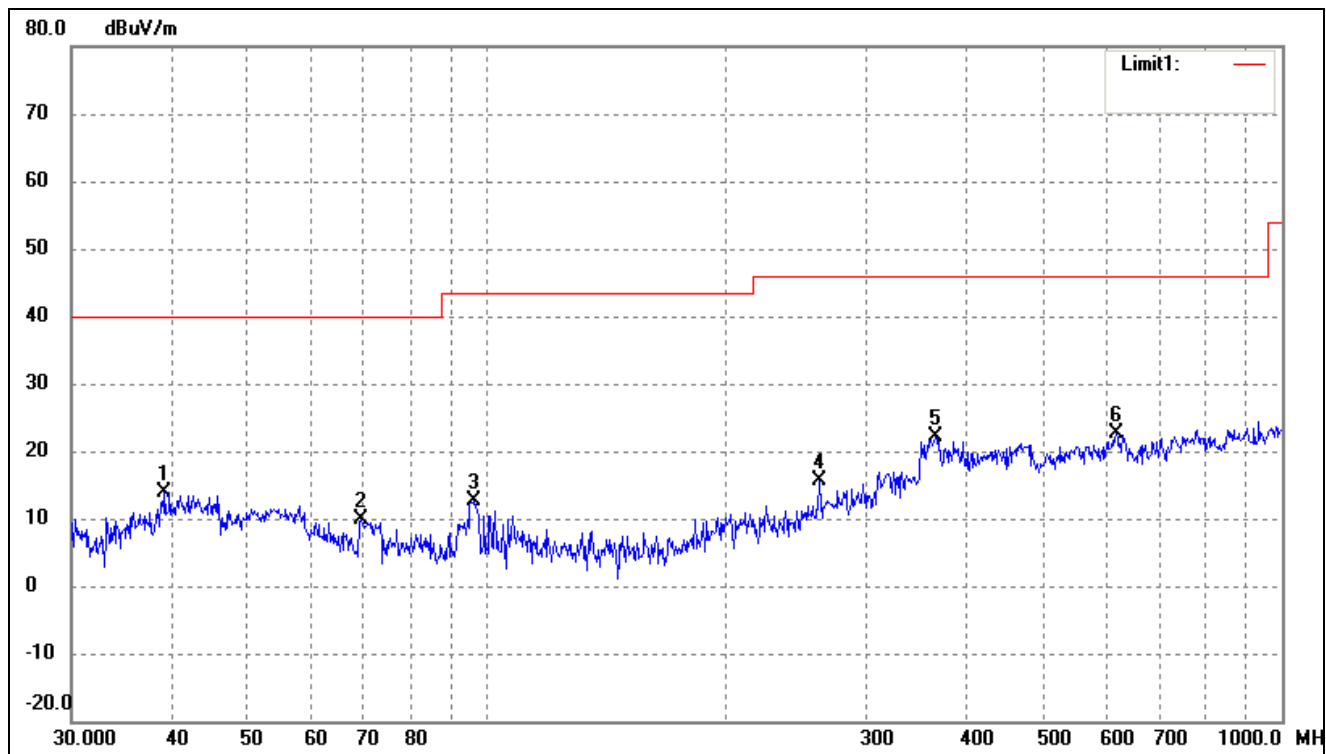
Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	33.3279	27.07	-9.46	17.61	40.00	-22.39	270	100	peak
2	100.5806	24.77	-10.92	13.85	43.50	-29.65	51	200	peak
3	159.7844	24.05	-12.27	11.78	43.50	-31.72	360	200	peak
4	184.4898	25.07	-10.75	14.32	43.50	-29.18	360	100	peak
5	468.8762	21.08	-1.96	19.12	46.00	-26.88	355	200	peak
6	562.6624	27.69	-1.33	26.36	46.00	-19.64	182	100	peak

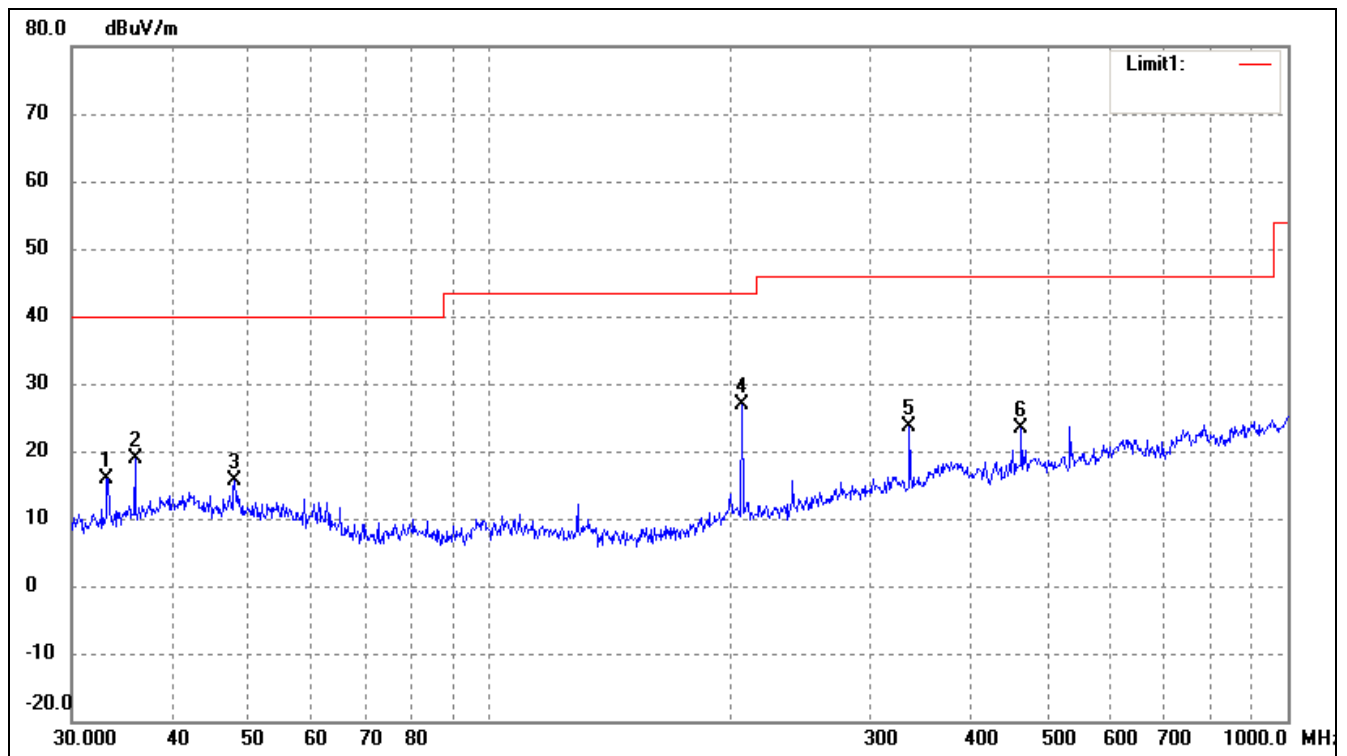
Test mode: Transmitting Channel 5805MHz

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	39.2991	21.69	-7.85	13.84	40.00	-26.16	360	100	peak
2	69.3568	22.52	-12.62	9.90	40.00	-30.10	180	100	peak
3	96.0986	24.24	-11.70	12.54	43.50	-30.96	225	100	peak
4	261.9753	22.42	-6.87	15.55	46.00	-30.45	355	100	peak
5	366.8231	24.87	-2.86	22.01	46.00	-23.99	180	100	peak
6	618.5369	21.37	1.14	22.51	46.00	-23.49	212	100	peak

Test Specification: Vertical

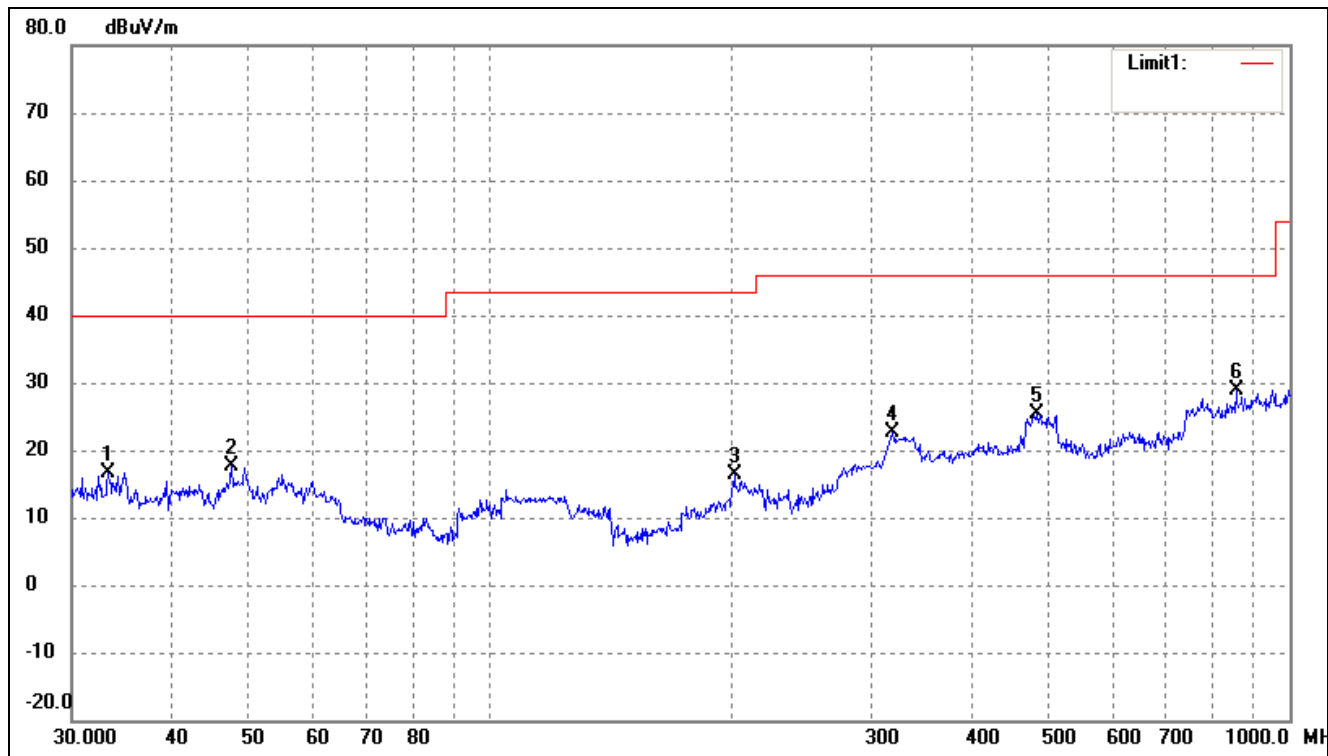


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	33.2112	25.37	-9.50	15.87	40.00	-24.13	260	100	peak
2	36.0007	27.53	-8.76	18.77	40.00	-21.23	131	200	peak
3	47.9940	23.87	-8.19	15.68	40.00	-24.32	285	200	peak
4	207.1226	35.60	-8.72	26.88	43.50	-16.62	224	100	peak
5	336.0352	28.66	-4.91	23.75	46.00	-22.25	185	200	peak
6	463.9696	25.70	-2.36	23.34	46.00	-22.66	25	100	peak

For 802.11n-HT20

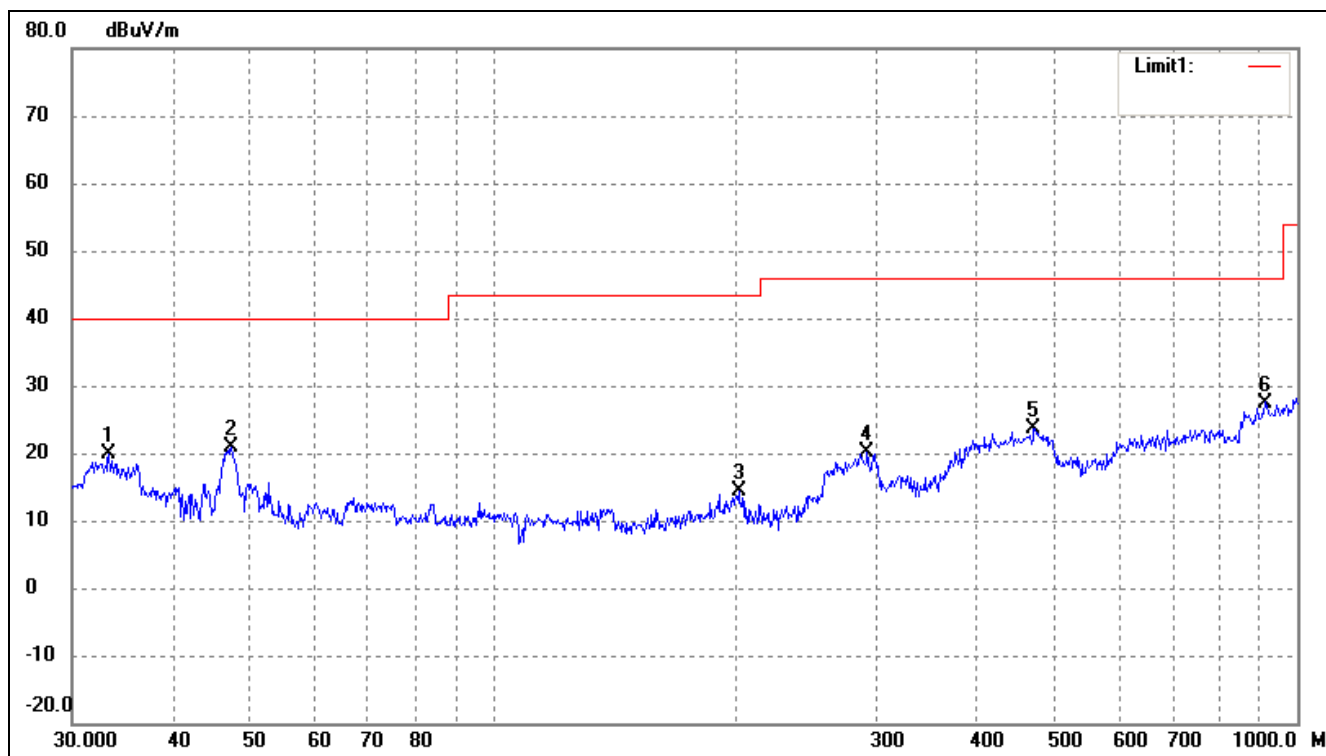
Test mode: Transmitting Channel 5180MHz

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	33.3279	26.21	-9.46	16.75	40.00	-23.25	155	100	peak
2	47.4918	25.91	-8.16	17.75	40.00	-22.25	197	100	peak
3	202.1005	24.98	-8.66	16.32	43.50	-27.18	310	100	peak
4	318.8170	27.40	-4.68	22.72	46.00	-23.28	182	100	peak
5	482.2156	26.48	-1.17	25.31	46.00	-20.69	187	100	peak
6	857.0247	26.04	2.78	28.82	46.00	-17.18	355	100	peak

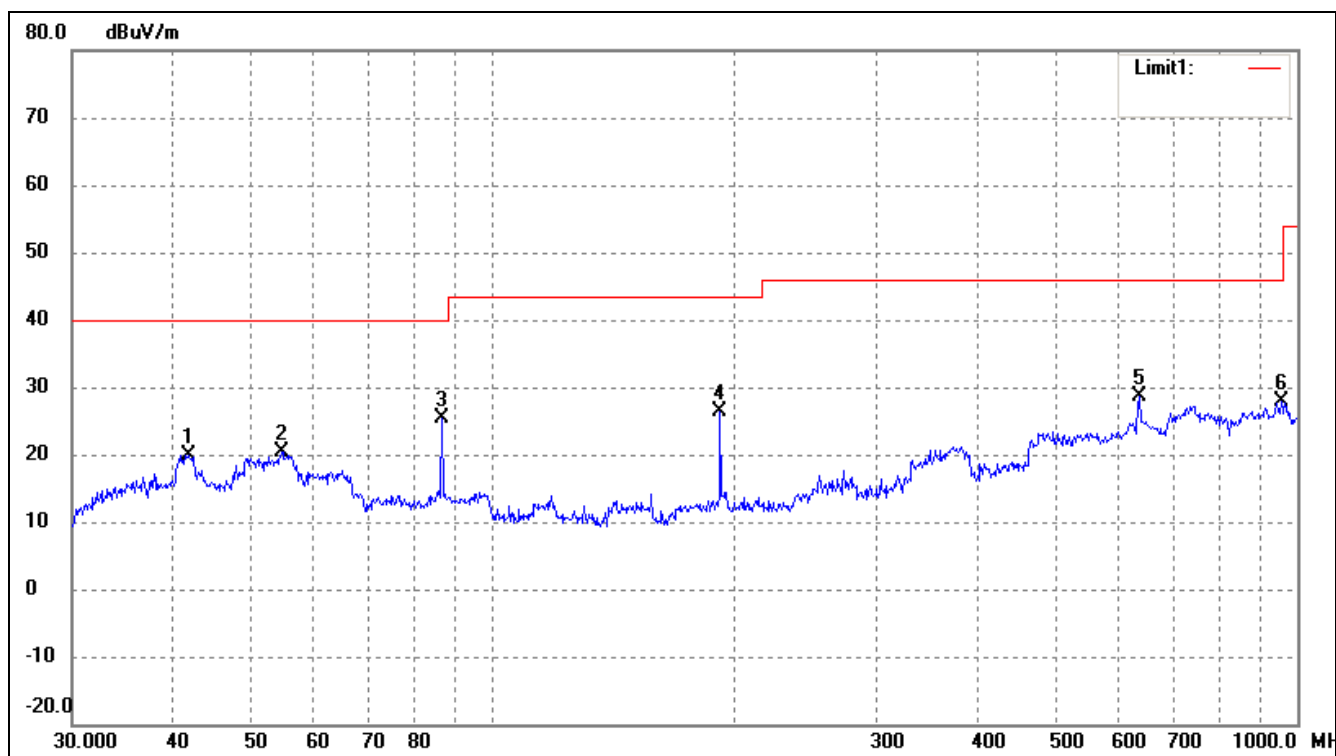
Test Specification: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	33.3279	29.45	-9.46	19.99	40.00	-20.01	274	100	peak
2	47.3255	28.91	-8.15	20.76	40.00	-19.24	116	100	peak
3	202.1005	23.05	-8.66	14.39	43.50	-29.11	82	100	peak
4	292.0583	25.85	-5.83	20.02	46.00	-25.98	352	100	peak
5	470.5232	25.57	-1.82	23.75	46.00	-22.25	182	100	peak
6	912.8620	24.01	3.49	27.50	46.00	-18.50	15	100	peak

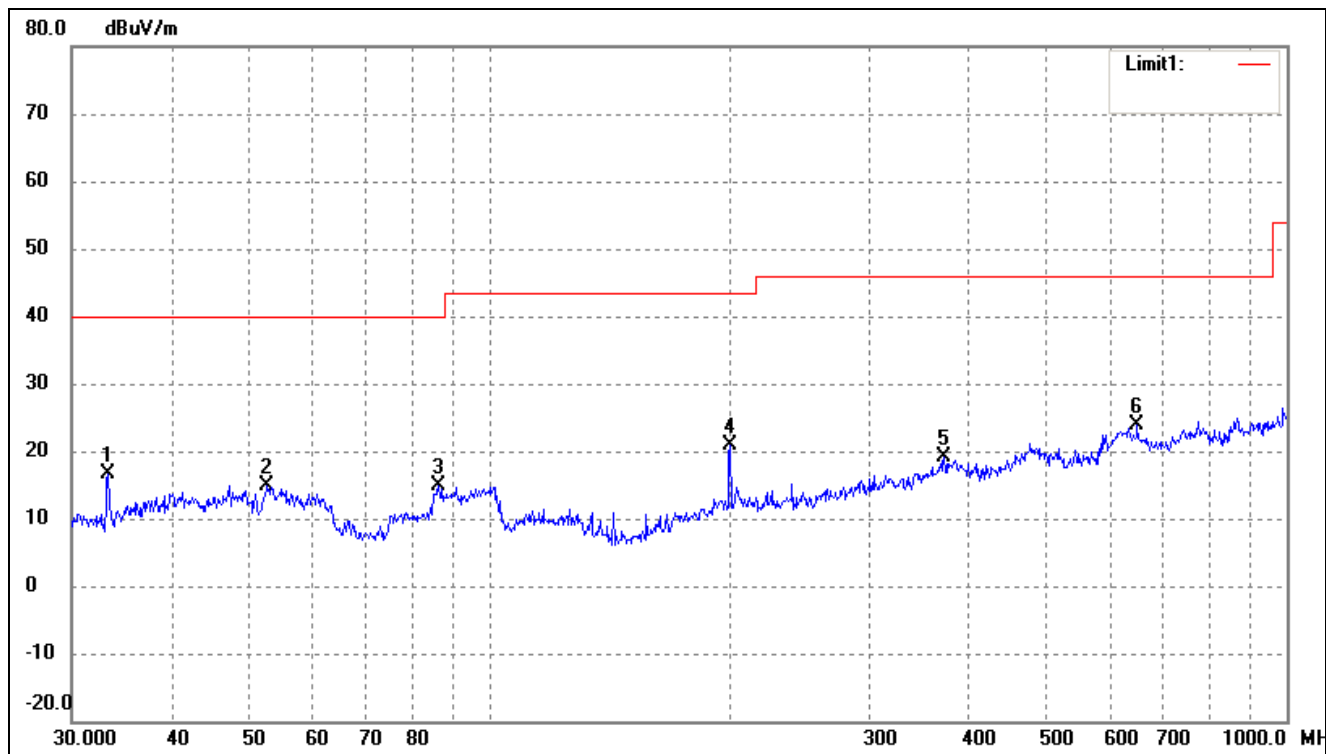
Test mode: Transmitting Channel 5200MHz

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	41.8596	27.63	-7.79	19.84	40.00	-20.16	264	100	peak
2	54.6429	29.33	-8.91	20.42	40.00	-19.58	110	100	peak
3	86.5029	38.03	-12.62	25.41	40.00	-14.59	136	100	peak
4	191.7450	36.04	-9.77	26.27	43.50	-17.23	185	100	peak
5	636.1340	27.82	0.82	28.64	46.00	-17.36	181	100	peak
6	955.4381	24.09	3.73	27.82	46.00	-18.18	175	100	peak

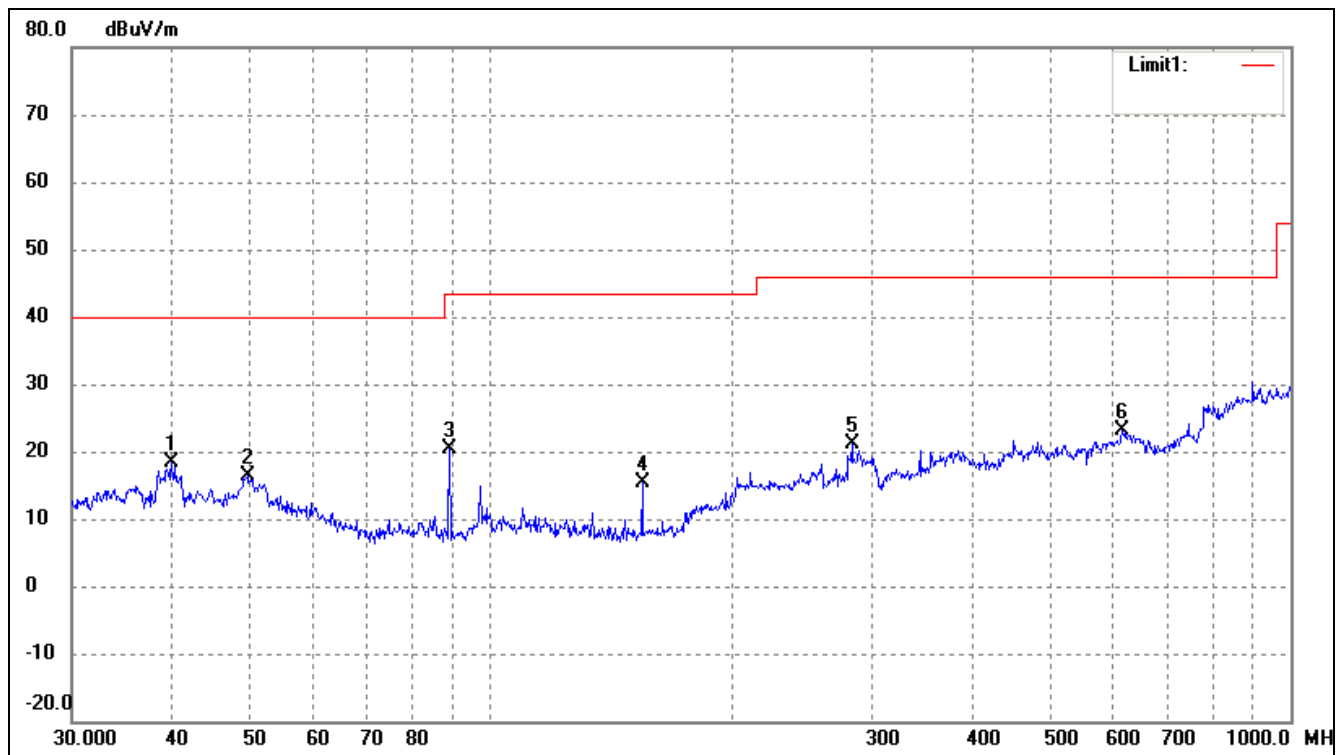
Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	33.3279	26.05	-9.46	16.59	40.00	-23.41	360	100	peak
2	52.7600	23.50	-8.67	14.83	40.00	-25.17	112	100	peak
3	86.5029	27.49	-12.62	14.87	40.00	-25.13	180	200	peak
4	200.6881	29.57	-8.66	20.91	43.50	-22.59	352	100	peak
5	372.0045	21.81	-2.56	19.25	46.00	-26.75	181	100	peak
6	649.6597	23.35	0.52	23.87	46.00	-22.13	183	200	peak

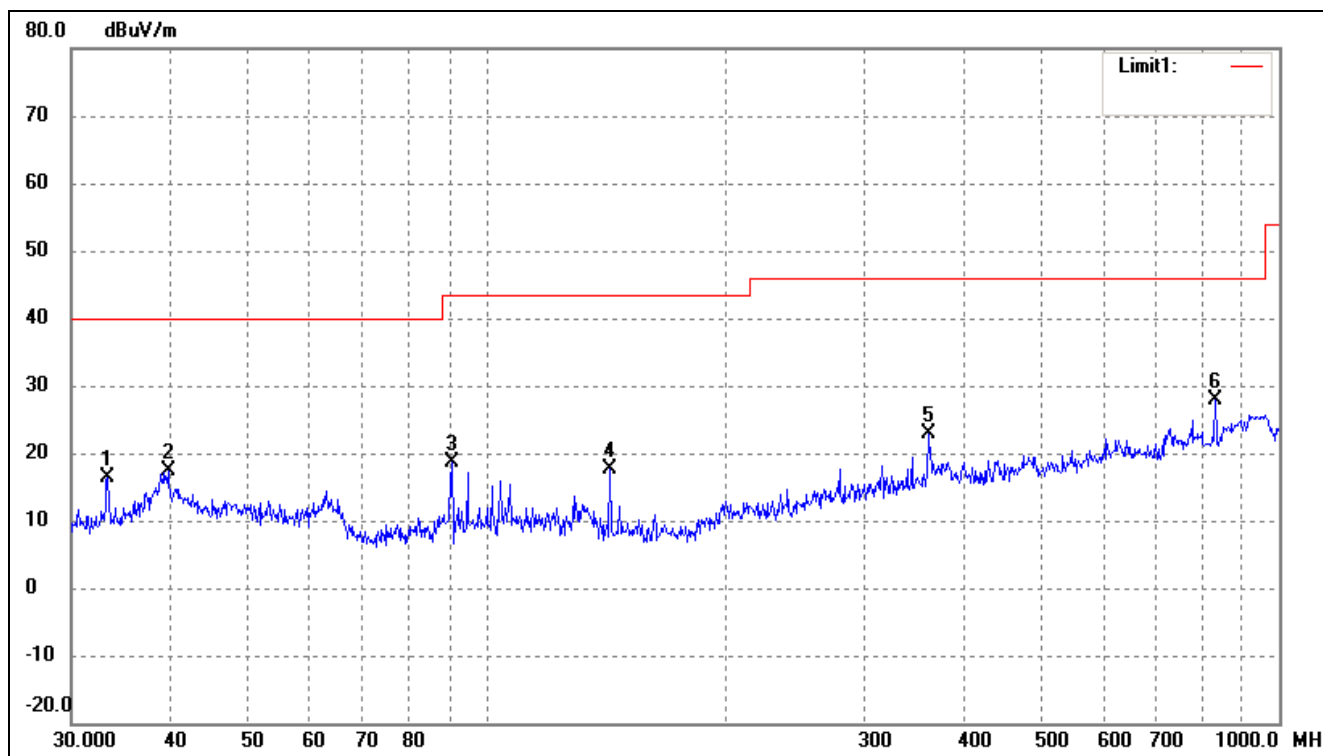
Test mode: Transmitting Channel 5240MHz

Horizontal



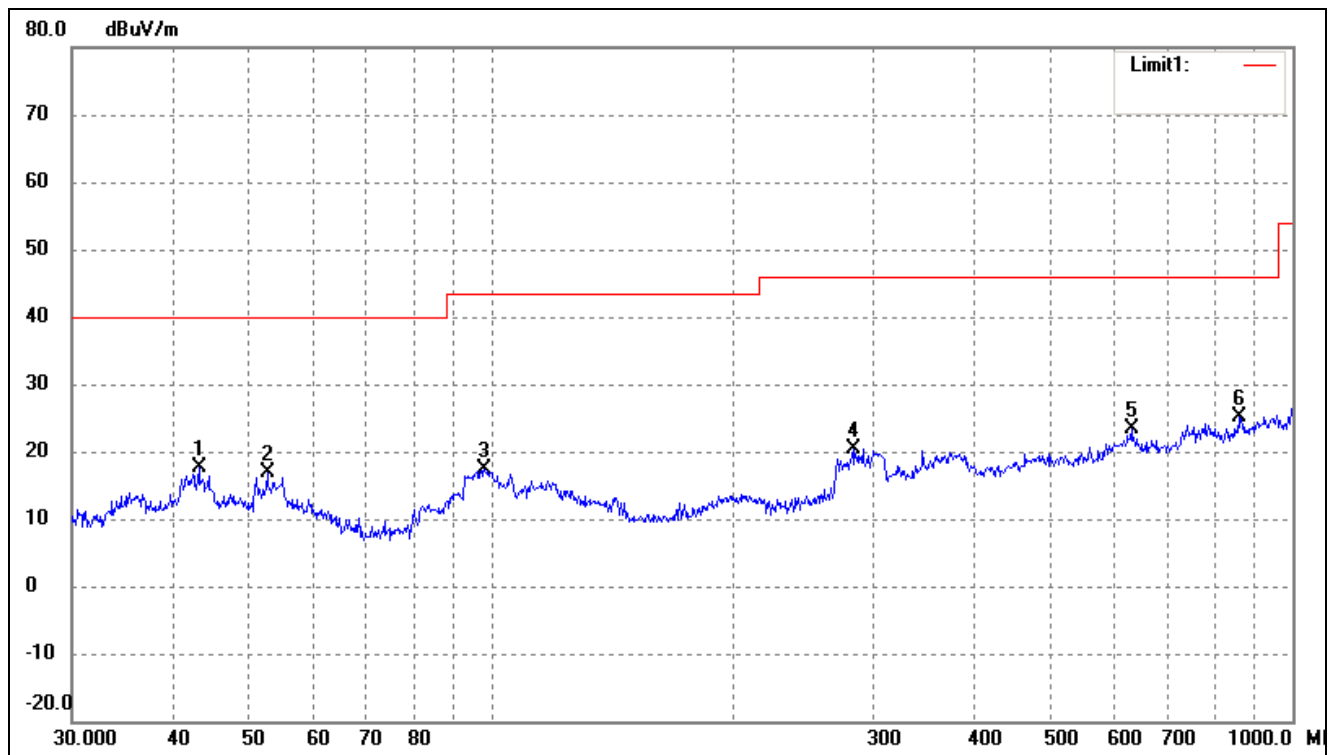
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	39.9942	25.94	-7.67	18.27	40.00	-21.73	267	100	peak
2	49.7068	24.72	-8.30	16.42	40.00	-23.58	116	100	peak
3	88.9639	33.21	-12.85	20.36	43.50	-23.14	360	100	peak
4	154.8205	27.80	-12.35	15.45	43.50	-28.05	352	100	peak
5	282.9852	27.12	-6.04	21.08	46.00	-24.92	185	100	peak
6	616.3718	22.03	0.99	23.02	46.00	-22.98	353	100	peak

Test Specification: Vertical



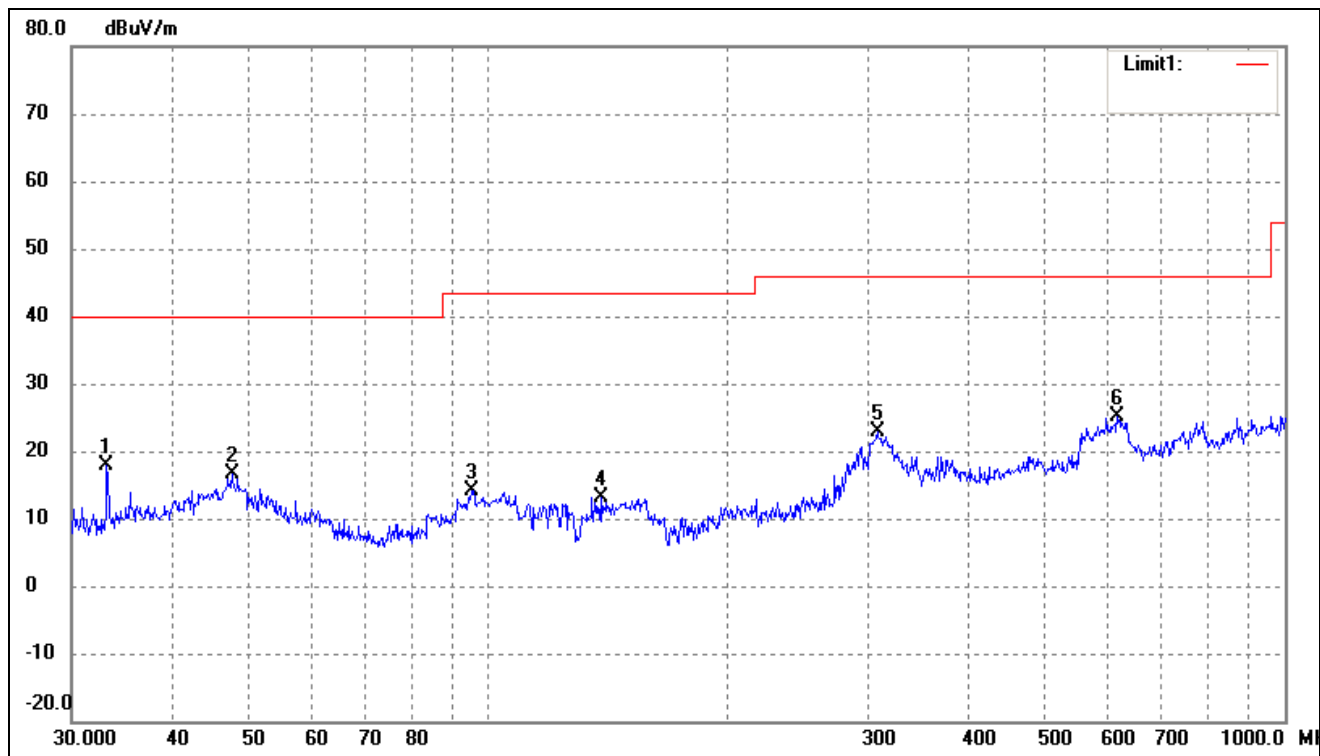
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	33.3279	25.76	-9.46	16.30	40.00	-23.70	267	100	peak
2	39.7147	25.24	-7.75	17.49	40.00	-22.51	114	200	peak
3	90.5374	31.54	-12.84	18.70	43.50	-24.80	35	200	peak
4	143.3261	30.19	-12.51	17.68	43.50	-25.82	352	100	peak
5	361.7139	26.04	-3.15	22.89	46.00	-23.11	14	200	peak
6	830.4002	26.26	1.73	27.99	46.00	-18.01	25	200	peak

Test mode: Transmitting Channel 5745MHz
Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	43.2017	25.57	-7.87	17.70	40.00	-22.30	177	100	peak
2	52.5753	25.44	-8.65	16.79	40.00	-23.21	90	100	peak
3	98.1419	28.54	-11.28	17.26	43.50	-26.24	336	100	peak
4	282.9852	26.45	-6.04	20.41	46.00	-25.59	360	100	peak
5	629.4772	22.29	0.99	23.28	46.00	-22.72	325	100	peak
6	857.0247	22.41	2.78	25.19	46.00	-20.81	320	100	peak

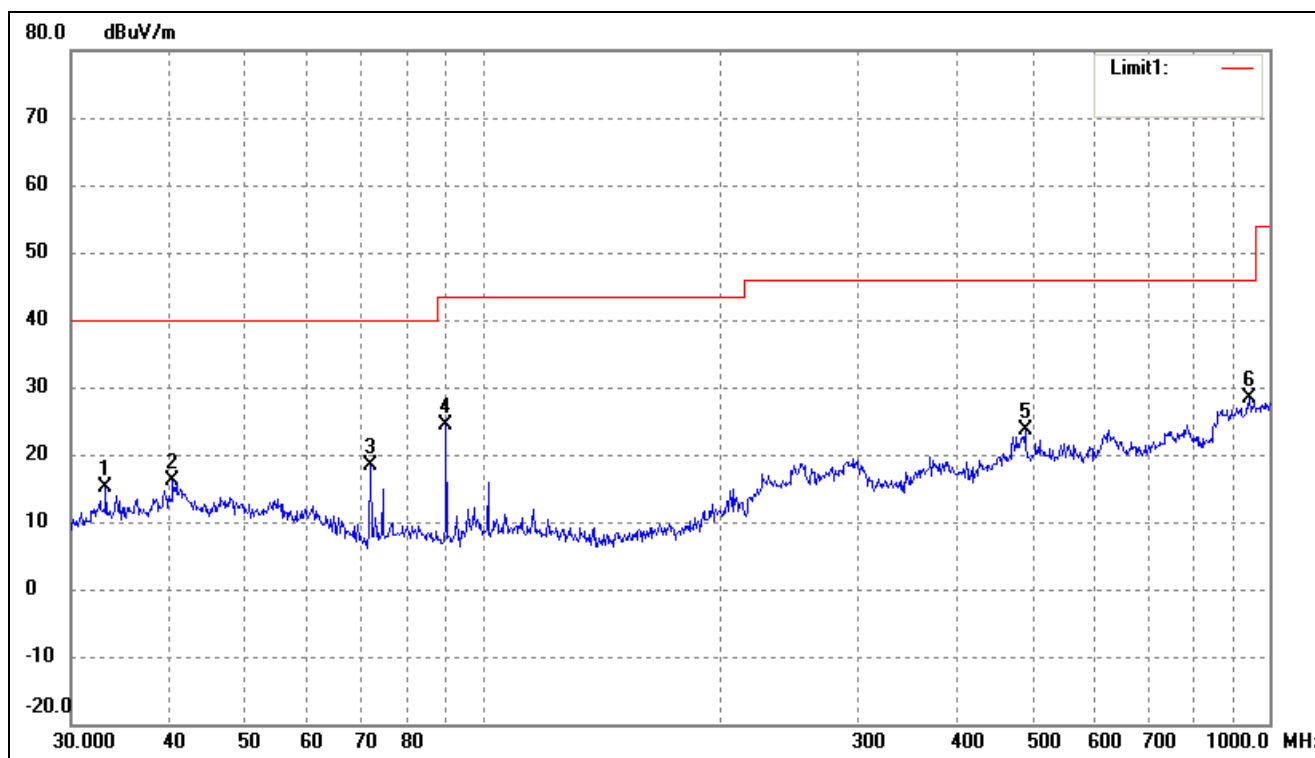
Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	33.2112	27.34	-9.50	17.84	40.00	-22.16	270	100	peak
2	47.6586	24.77	-8.17	16.60	40.00	-23.40	164	100	peak
3	95.4270	25.99	-11.83	14.16	43.50	-29.34	228	200	peak
4	138.3873	25.61	-12.46	13.15	43.50	-30.35	182	100	peak
5	307.8313	28.01	-5.24	22.77	46.00	-23.23	173	100	peak
6	616.3718	24.03	0.99	25.02	46.00	-20.98	352	200	peak

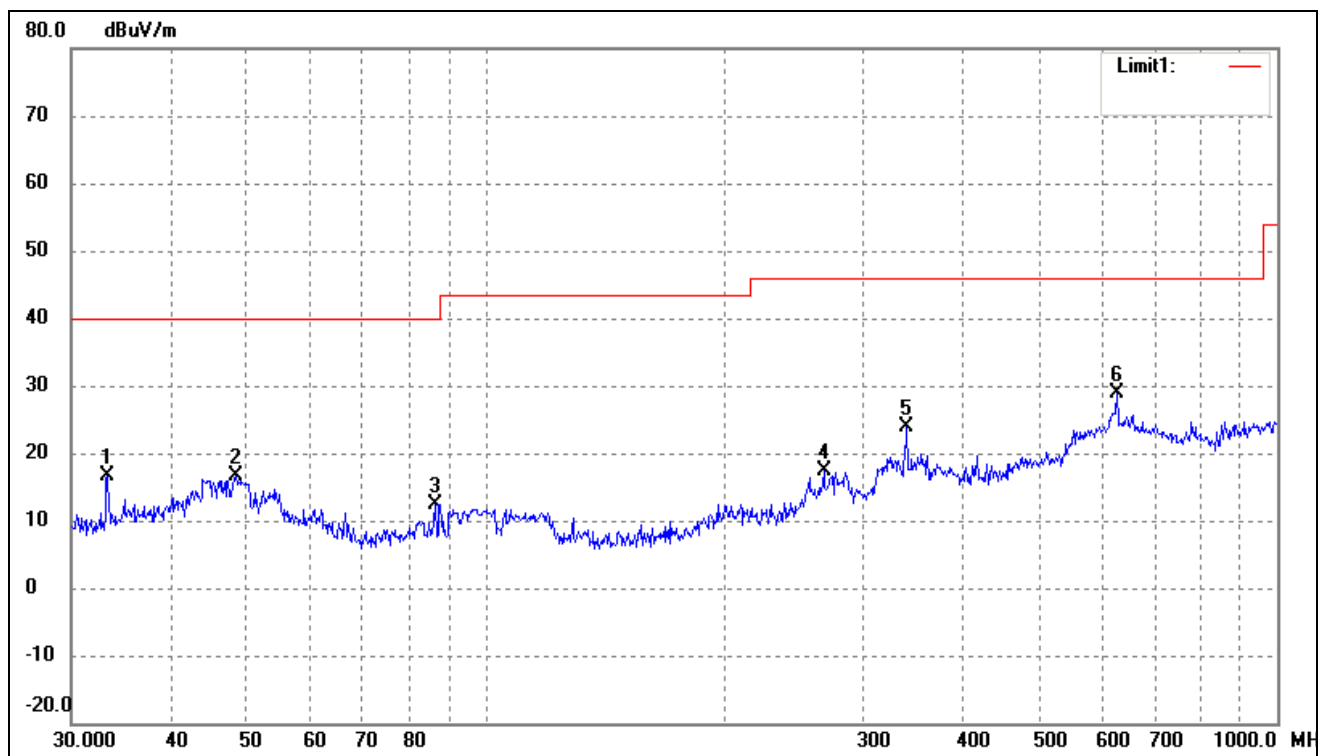
Test mode: Transmitting Channel 5785MHz

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	33.2112	24.53	-9.50	15.03	40.00	-24.97	360	100	peak
2	40.4172	23.78	-7.70	16.08	40.00	-23.92	255	100	peak
3	72.0843	31.01	-12.65	18.36	40.00	-21.64	270	100	peak
4	89.9047	37.40	-12.93	24.47	43.50	-19.03	350	100	peak
5	489.0269	25.28	-1.56	23.72	46.00	-22.28	250	100	peak
6	942.1305	24.13	4.19	28.32	46.00	-17.68	182	100	peak

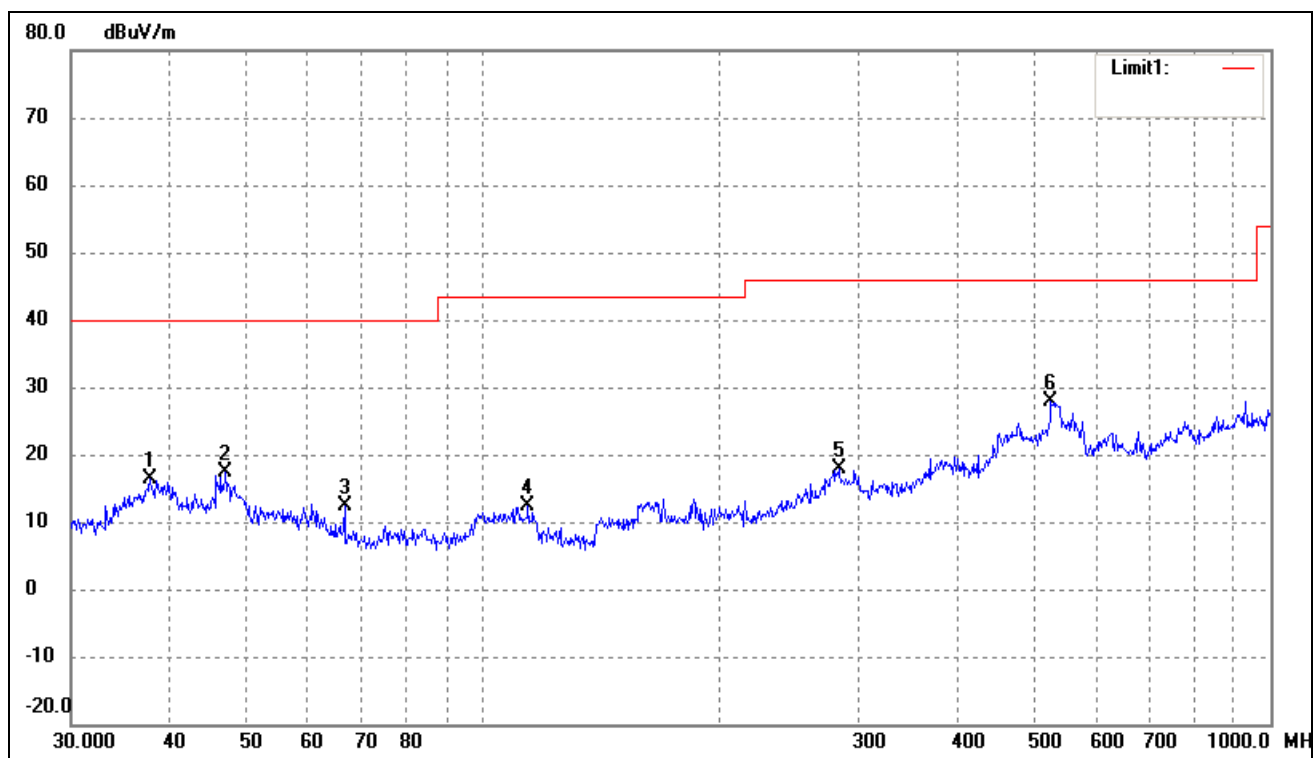
Test Specification: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	33.3279	26.12	-9.46	16.66	40.00	-23.34	270	100	peak
2	48.5016	24.95	-8.22	16.73	40.00	-23.27	51	200	peak
3	86.5029	25.04	-12.62	12.42	40.00	-27.58	360	200	peak
4	267.5455	23.90	-6.63	17.27	46.00	-28.73	360	100	peak
5	340.7817	28.86	-4.93	23.93	46.00	-22.07	360	200	peak
6	627.2738	27.87	1.05	28.92	46.00	-17.08	360	100	peak

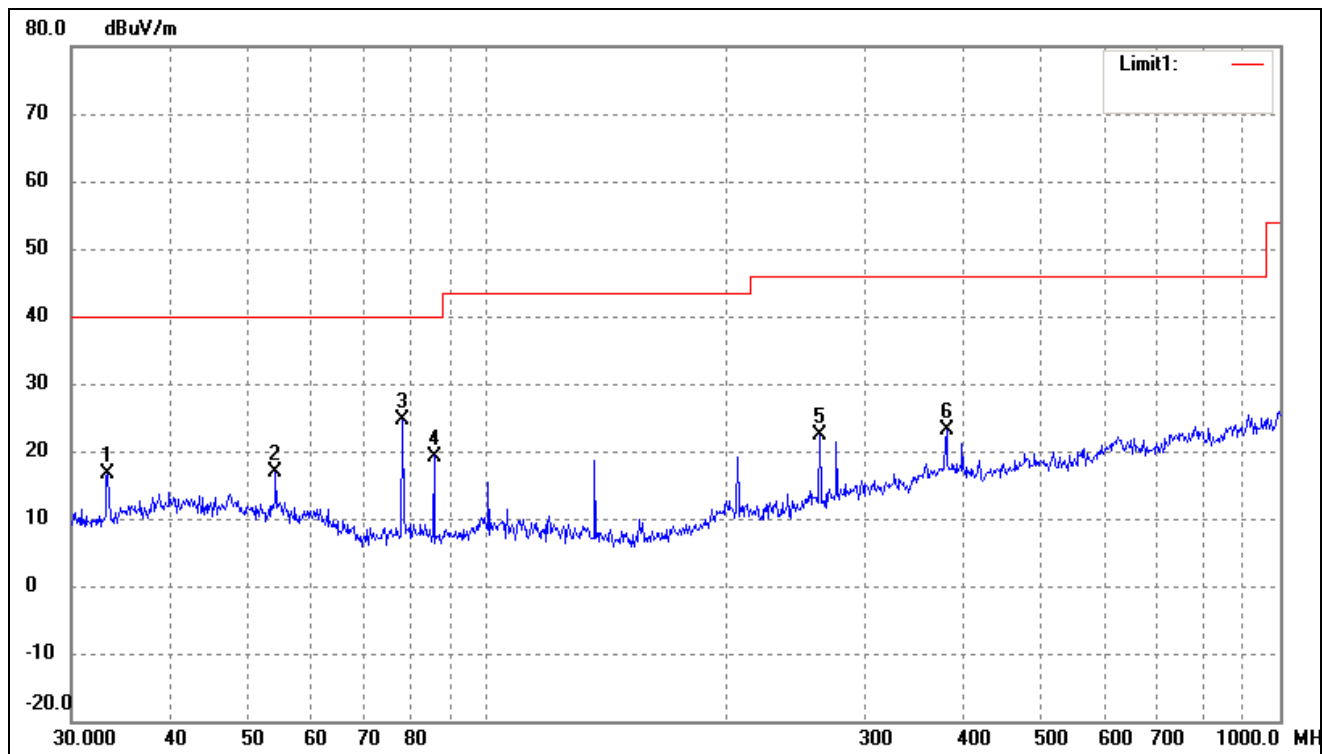
Test mode: Transmitting Channel 5805MHz

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	37.8121	24.57	-8.26	16.31	40.00	-23.69	360	100	peak
2	47.1599	25.56	-8.14	17.42	40.00	-22.58	180	100	peak
3	66.7325	24.22	-11.77	12.45	40.00	-27.55	225	100	peak
4	114.1138	23.57	-11.28	12.29	43.50	-31.21	352	100	peak
5	282.9852	23.85	-6.04	17.81	46.00	-28.19	180	100	peak
6	526.3967	29.84	-1.86	27.98	46.00	-18.02	227	100	peak

Test Specification: Vertical



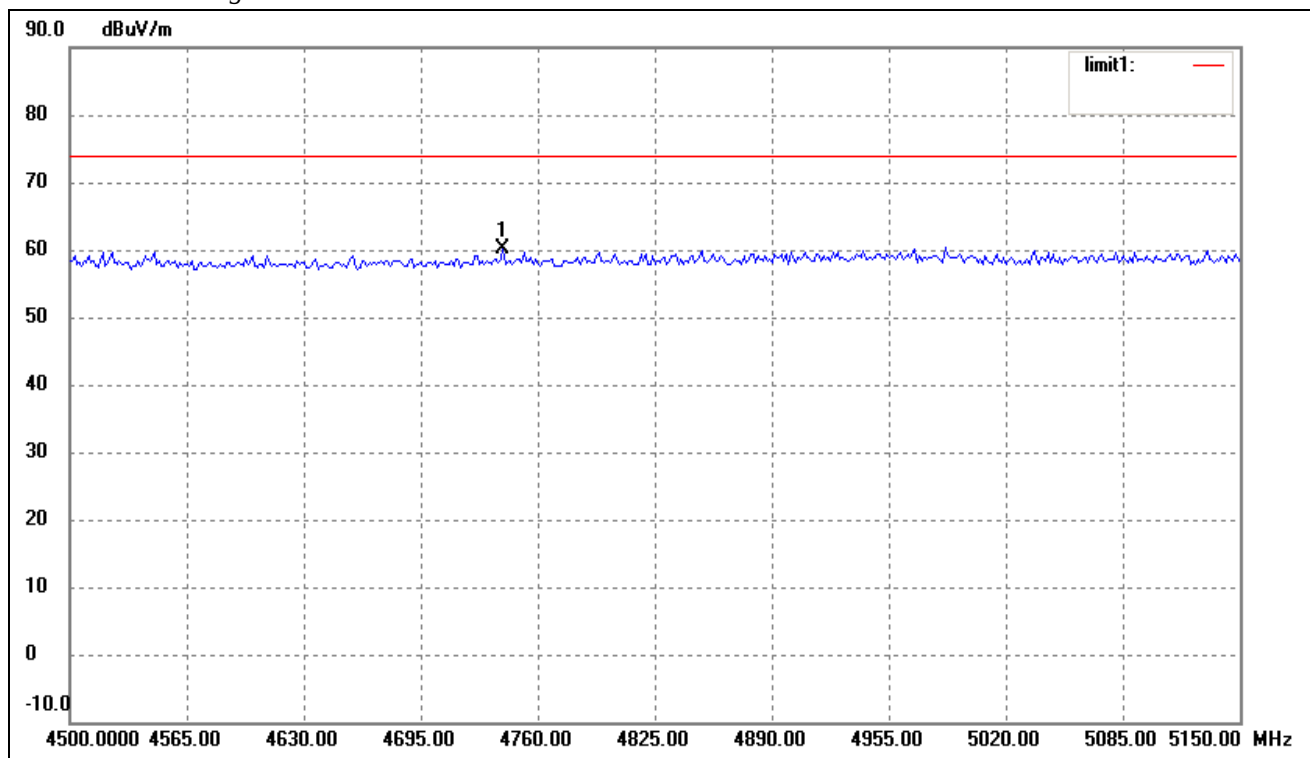
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	33.3279	26.04	-9.46	16.58	40.00	-23.42	260	100	peak
2	54.2610	25.71	-8.86	16.85	40.00	-23.15	131	200	peak
3	78.4134	36.69	-12.12	24.57	40.00	-15.43	285	200	peak
4	85.8984	31.80	-12.55	19.25	40.00	-20.75	224	100	peak
5	262.8955	29.29	-6.83	22.46	46.00	-23.54	182	200	peak
6	379.9141	25.16	-2.11	23.05	46.00	-22.95	353	100	peak

For 802.11a

Spurious Emission above 1GHz

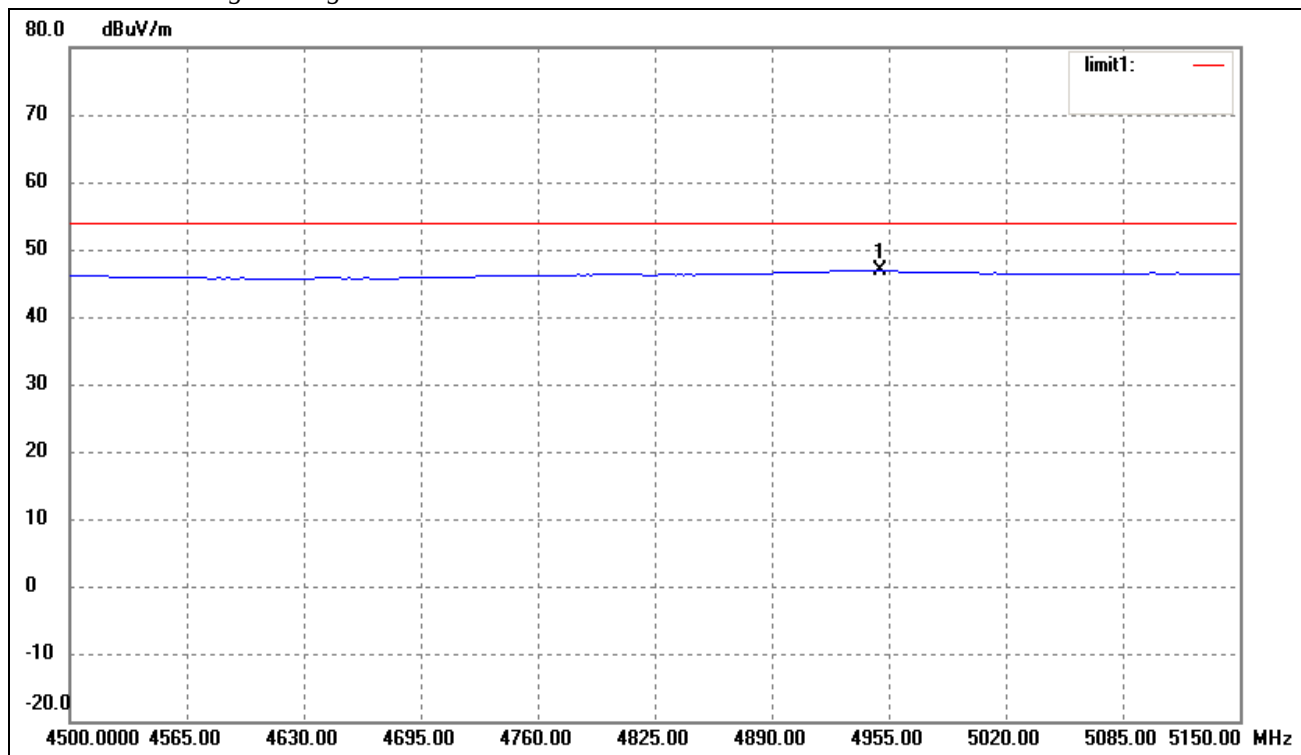
For the frequency band 5.18-5.24GHz(802.11a)

Restricted Bandedge Peak



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	4740.500	29.65	30.41	60.06	74.00	-13.94	360	100	peak

Restricted Bandedge Average



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	4949.800	16.13	30.71	46.84	54.00	-7.16	360	100	Ave

Note: this EUT was tested in the low, high channel and the worst case position data was reported.

Harmonics And Spurious Emissions

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (5180MHz)										
15540	PK	53.26	360	V	40.7	10.9	39.6	65.26	74	-8.74
15540	PK	50.19	360	H	40.7	10.9	39.6	62.19	74	-11.81
15540	AV	34.27	360	V	40.7	10.9	39.6	46.27	54	-7.73
15540	AV	36.16	360	H	40.7	10.9	39.6	48.16	54	-5.84
High Channel (5240MHz)										
15720	PK	53.65	360	V	40.7	10.9	39.6	65.65	74	-8.35
15720	PK	52.79	360	H	40.7	10.9	39.6	64.79	74	-9.21
15720	AV	36.26	360	V	40.7	10.9	39.6	48.26	54	-5.74
15720	AV	35.17	360	H	40.7	10.9	39.6	47.17	54	-6.83

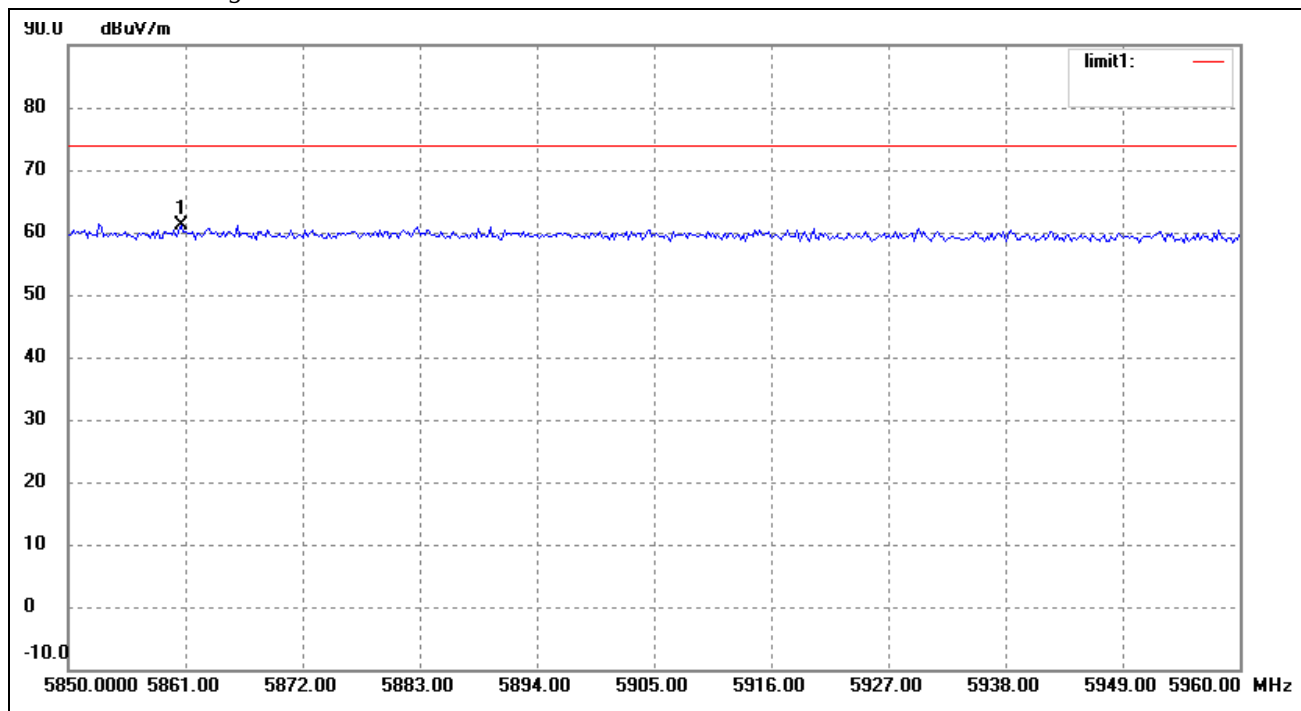
Out of Band edge

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-42.46	-27
Highest	Above 5350	-43.39	-27

Note: the data just list the worst cases

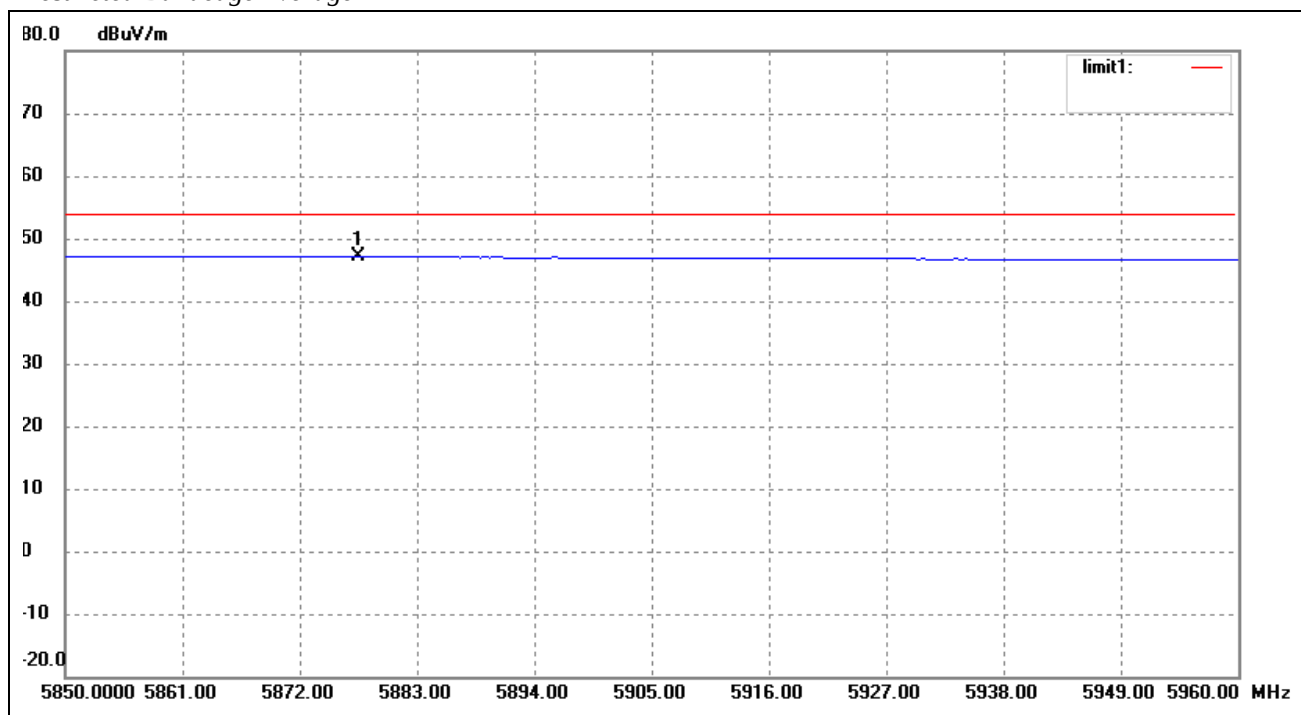
For the frequency band 5.745-5.825GHz (802.11a)

Restricted Bandedge Peak



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	5859.660	30.88	31.23	62.11	74	-11.89	360	100	peak

Restricted Bandedge Average



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	5876.500	16.92	31.25	48.17	54	-5.83	360	100	Ave

Note: this EUT was tested in the low, high channel and the worst case position data was reported.

Harmonics And Spurious Emissions

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (574MHz)										
11490	PK	56.17	360	V	38.9	9.8	40.1	64.77	74	-9.23
11490	PK	55.39	360	H	38.9	9.8	40.1	63.99	74	-10.01
11490	AV	35.27	360	V	38.9	9.8	40.1	43.87	54	-10.13
11490	AV	36.84	360	H	38.9	9.8	40.1	45.44	54	-8.56
High Channel (5825MHz)										
11610	PK	56.96	360	V	38.9	9.8	40.1	65.56	74	-8.44
11610	PK	56.07	360	H	38.9	9.8	40.1	64.67	74	-9.33
11610	AV	38.16	360	V	38.9	9.8	40.1	46.76	54	-7.24
11610	AV	37.25	360	H	38.9	9.8	40.1	45.85	54	-8.15

Out of Band edge

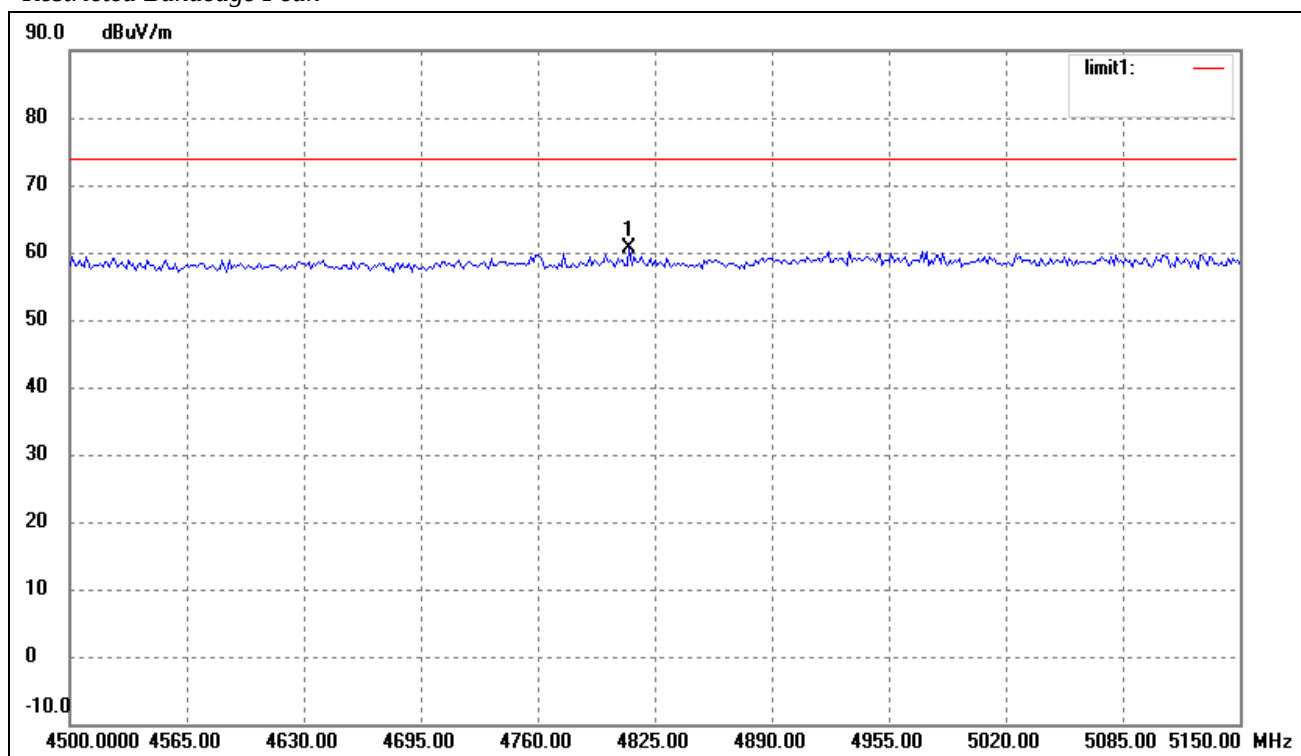
Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5715	-45.16	-27
	5715 to 5725	-46.33	-17
Highest	5850 to 5860	-45.35	-17
	Above 5860	-46.64	-27

Note: the data just list the worst cases

802.11n HT20

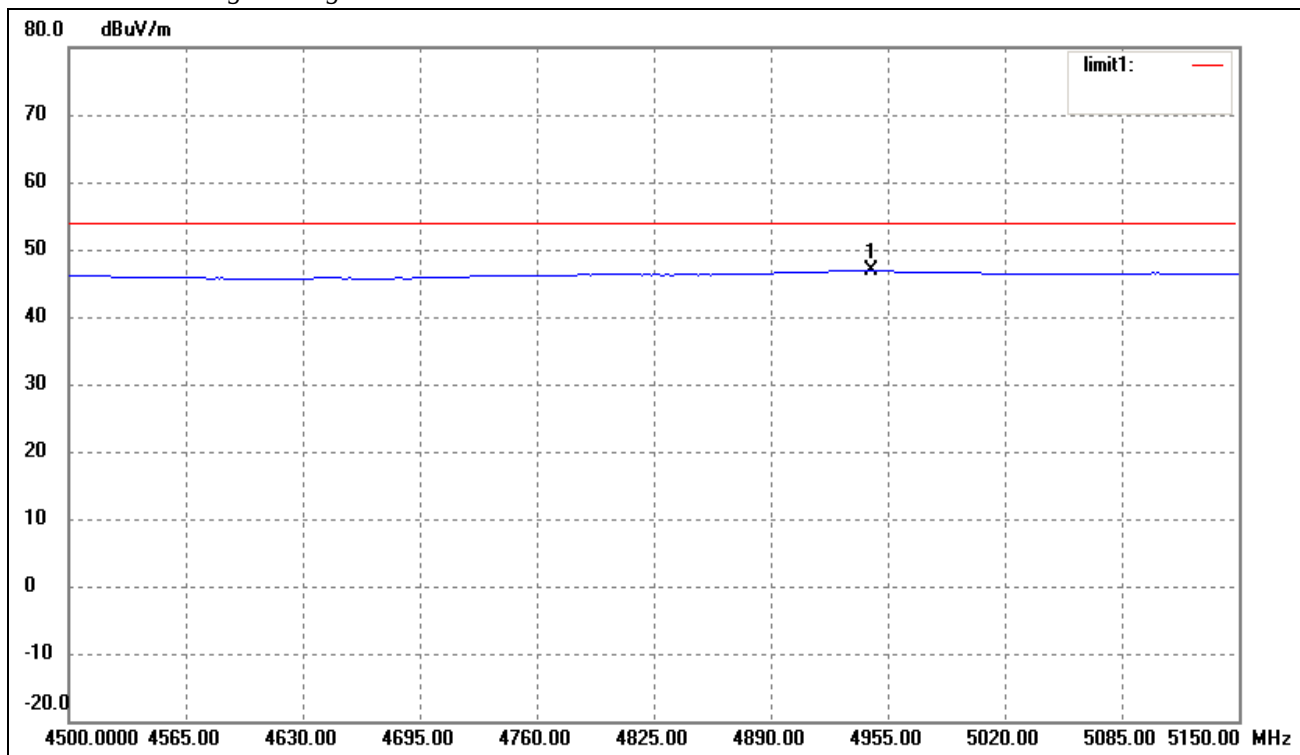
For the frequency band 5.18-5.24GHz(802.11n HT20)

Restricted Bandedge Peak



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	4810.700	30.04	30.52	60.56	74.00	-13.44	360	100	peak

Restricted Bandedge Average



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	4945.900	16.13	30.71	46.84	54.00	-7.16	360	100	Ave

Note: this EUT was tested in the low, high channel and the worst case position data was reported.

Harmonics And Spurious Emissions

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (5180MHz)										
15540	PK	52.85	360	V	40.7	10.9	39.6	64.85	74	-9.15
15540	PK	50.96	360	H	40.7	10.9	39.6	62.96	74	-11.04
15540	AV	35.67	360	V	40.7	10.9	39.6	47.67	54	-6.33
15540	AV	36.82	360	H	40.7	10.9	39.6	48.82	54	-5.18
High Channel (5240MHz)										
15720	PK	52.63	360	V	40.7	10.9	39.6	64.63	74	-9.37
15720	PK	50.75	360	H	40.7	10.9	39.6	62.75	74	-11.25
15720	AV	36.27	360	V	40.7	10.9	39.6	48.27	54	-5.73
15720	AV	35.96	360	H	40.7	10.9	39.6	47.96	54	-6.04

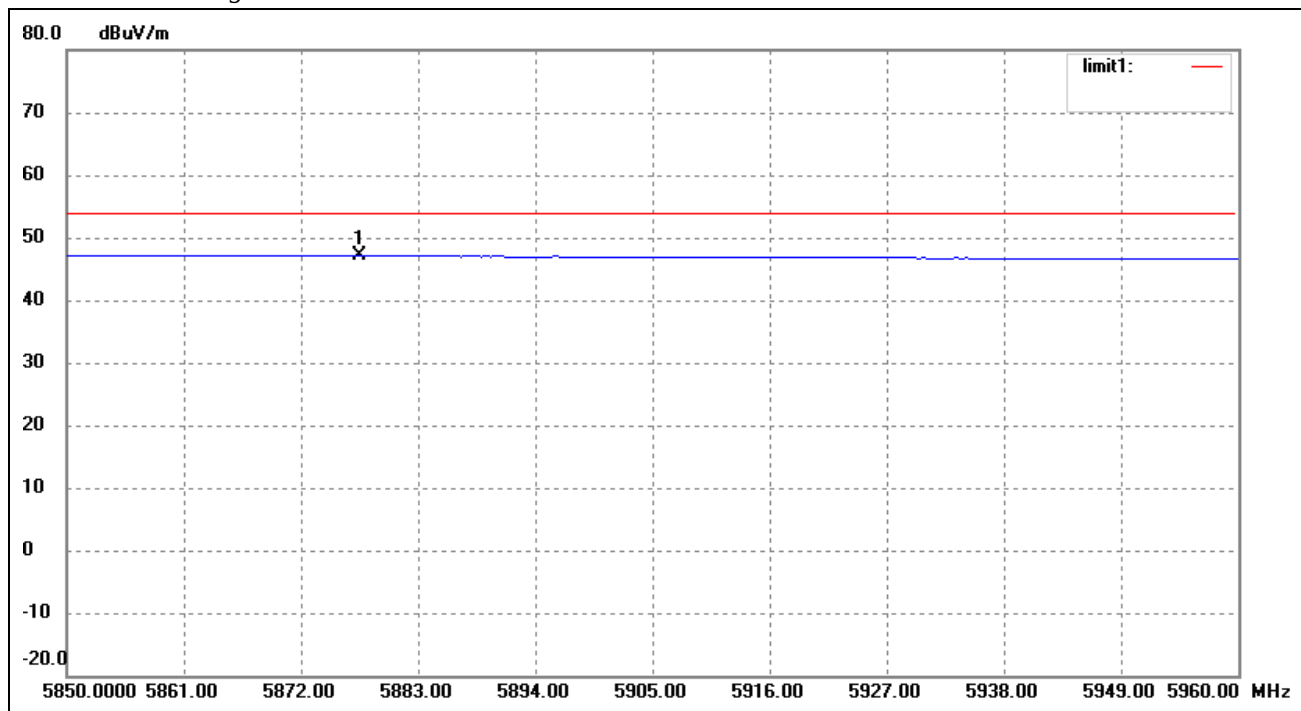
Out of Band edge

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-43.41	-27
Highest	Above 5350	-42.86	-27

Note: the data just list the worst cases

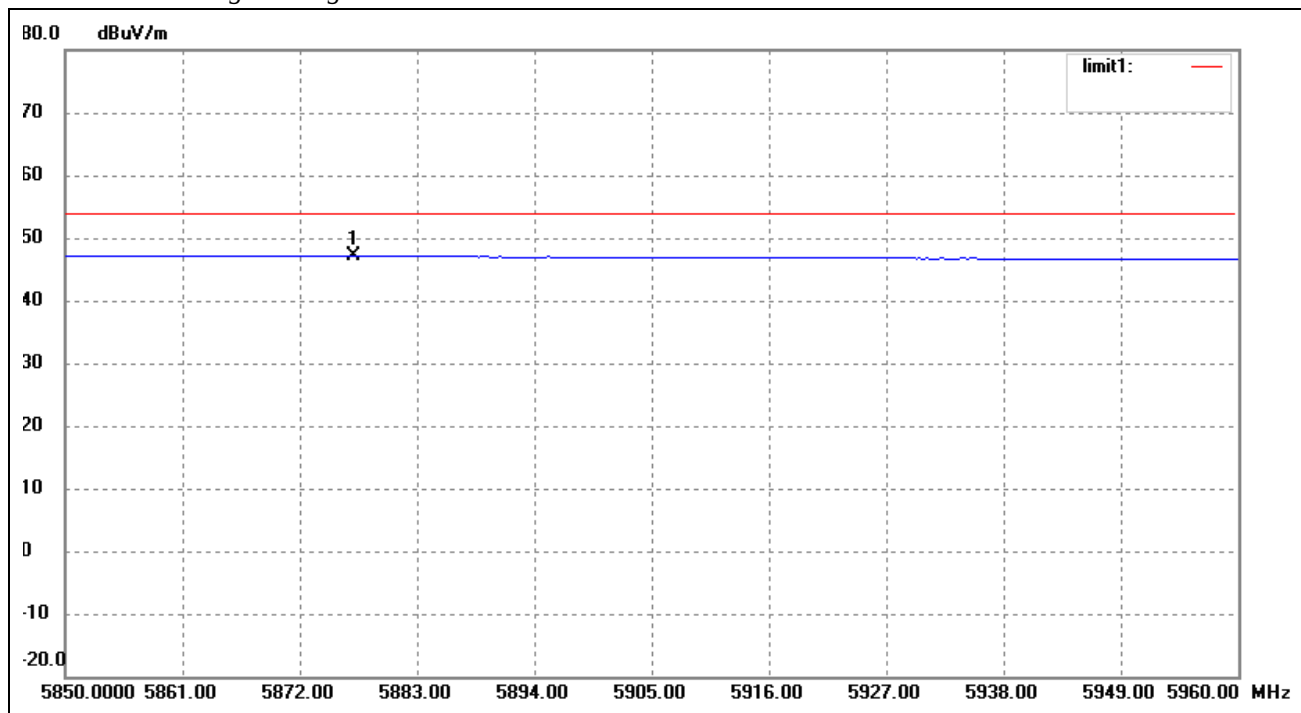
For the frequency band 5.745-5.825GHz (802.11n HT20)

Restricted Bandedge Peak



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	5888.480	30.94	31.25	62.19	74	-11.81	360	100	peak

Restricted Bandedge Average



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	5878.040	16.92	31.25	48.17	54	-5.83	360	100	Ave

Note: this EUT was tested in the low, high channel and the worst case position data was reported.

Harmonics And Spurious Emissions

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (5725MHz)										
11490	PK	56.57	360	V	38.9	9.8	40.1	65.17	74	-8.83
11490	PK	55.63	360	H	38.9	9.8	40.1	64.23	74	-9.77
11490	AV	36.87	360	V	38.9	9.8	40.1	45.47	54	-8.53
11490	AV	38.51	360	H	38.9	9.8	40.1	47.11	54	-6.89
High Channel (5825MHz)										
11610	PK	54.83	360	V	38.9	9.8	40.1	63.43	74	-10.57
11610	PK	56.87	360	H	38.9	9.8	40.1	65.47	74	-8.53
11610	AV	36.55	360	V	38.9	9.8	40.1	45.15	54	-8.85
11610	AV	35.87	360	H	38.9	9.8	40.1	44.47	54	-9.53

Out of Band edge

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5715	-47.28	-27
	5715 to 5725	-45.39	-17
Highest	5850 to 5860	-43.80	-17
	Above 5860	-46.53	-27

Note: the data just list the worst cases

12. Frequency Stability

12.1 Standard Applicable

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

12.2 Test Procedure

According to §2.1055, the following test procedure was performed.

The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value.

The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode

Temperature:	Supply Voltage
20°C	85-115% of declared nominal voltage
-30°C to +50°C	Normal

12.3 Environmental Conditions

Temperature:	20°C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

12.4 Summary of Test Results/Plots

5150-5250MHz

802.11a_20MHz

Reference Frequency(Middle Channel): 5200 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	121	0.0231
40	3.7	118	0.0225
30	3.7	116	0.0221
20	3.7	124	0.0237
10	3.7	136	0.0260
0	3.7	141	0.0269
-10	3.7	133	0.0254
-20	3.7	128	0.0244
-30	3.7	144	0.0275

802.11n_HT20

Reference Frequency(Middle Channel): 5200 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	141	0.0269
40	3.7	128	0.0244
30	3.7	124	0.0237
20	3.7	154	0.0294
10	3.7	114	0.0218
0	3.7	134	0.0256
-10	3.7	147	0.0281
-20	3.7	118	0.0225
-30	3.7	126	0.0240

5725-5850MHz

802.11a_HT20

Reference Frequency(Middle Channel): 5785 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	118	0.0208
40	3.7	124	0.0219
30	3.7	134	0.0237
20	3.7	125	0.0221
10	3.7	116	0.0205
0	3.7	147	0.0260
-10	3.7	157	0.0277
-20	3.7	184	0.0325
-30	3.7	164	0.0290

802.11n_HT20

Reference Frequency(Middle Channel): 5785MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	117	0.0207
40	3.7	127	0.0224
30	3.7	145	0.0256
20	3.7	154	0.0272
10	3.7	165	0.0292
0	3.7	185	0.0327
-10	3.7	154	0.0272
-20	3.7	181	0.0320
-30	3.7	157	0.0277

So, Frequency Stability Versus Input Voltage is:

5150-5250MHz

802.11a_HT20

Reference Frequency(Middle Channel): 5200 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	139	0.0265
	3.7	124	0.0237
	4.2	133	0.0254

802.11n_HT20

Reference Frequency(Middle Channel): 5200 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	145	0.0277
	3.7	154	0.0294
	4.2	152	0.0290

5725-5850MHz

802.11a_HT20

Reference Frequency(Middle Channel): 5785 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	147	0.0260
	3.7	125	0.0221
	4.2	186	0.0357

802.11n_HT20

Reference Frequency(Middle Channel): 5785 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	184	0.0325
	3.7	154	0.0272
	4.2	158	0.0303

***** END OF REPORT *****