

FCC Part 15E Measurement and Test Report

For

Guangzhou Shangke Information Technology Co., LTD

Room 1205-1212, R&F To-Win Building, No.30 Huaxia Road, Tianhe District,

Guangzhou, Guangdong Province, China

FCC ID: 2ACGT-TA10

FCC Rule(s): FCC Part 15E

Product Description: Tablet PC

Tested Model: TA10

Report No.: STR18028114I-4

Sample Receipt Date: 2018-02-27

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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: Guangzhou Shangke Information Technology Co., LTD

Address of applicant: Room 1205-1212, R&F To-Win Building, No.30
Huaxia Road, Tianhe District, Guangzhou,
Guangdong Province, China

Manufacturer: Guangzhou Shangke Information Technology Co., LTD

Address of manufacturer: Room 1205-1212, R&F To-Win Building, No.30
Huaxia Road, Tianhe District, Guangzhou,
Guangdong Province, China

General Description of EUT	
Product Name:	Tablet PC
Brand Name:	TECLAST
Model No.:	TA10
Adding Model(s):	T10, T8, TA08, A10S, P80 Pro, M89, TLC011, T8Pro, T20, X3Pro, A10H, M10, P80h, TLG0012, TLC005, TLA001, P20 4G, 98 4G, P10 Octa Core, M8, TC01, P80 S, TLB010, TD16, A10H, TLH001, TD10, M20, TLD001, TC10, TLH008, M10, T10 Pro, TLG007, TLG018
Rated Voltage:	Battery DC 3.8V
Battery Capacity:	2700mAh
Software Version:	V1.03_20171127
Hardware Version:	W100-V1.0
<i>Note: The test data is gathered from a production sample, provided by the manufacturer. The appearance of others models listed in the report is different from main-test model TA10 but the circuit and the electronic construction do not change, declared by the manufacturer.</i>	

Technical Characteristics of EUT	
Support Standards:	802.11a, 802.11n(HT20) , 802.11n-HT40, 802.11ac-VH80
Frequency Range:	5725-5850MHz
RF Output Power:	5.56dBm (Conducted)
Type of Modulation:	QPSK, 16QAM, 64QAM
Data Rate:	6-54Mbps, up to 200Mbps
Quantity of Channels:	15
Type of Antenna:	Integral
Antenna Gain:	1.31dBi
Lowest Internal Frequency	32.768kHz

1.2 Test Standards

The following report is prepared on behalf of the Guangzhou Shangke Information Technology Co., LTD. in accordance with FCC Part 15, Subpart C&E, and section 15.203, 15.205, 15.207, 15.209 and 15.407 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C&E, and section 15.203, 15.205, 15.207, 15.209 and 15.407 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 C63.4-2014, 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 and KDB 662911 D01 Multiple Transmitter Output v02r01 shall be performed also.

1.4 Table for parameters of Test Software setting

Enter “3646631+=” into the calculator to enter the engineer mode, you can start to test. During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Mode	Test Frequency (MHz)												
	NCB: 20MHz												
	5180	5200	5240	5260	5300	5320	5500	5580	5700	5720	5745	5785	5825
802.11a 6Mbps	/	/	/	/	/	/	/	/	/	/	15	15	15
802.11n-HT20 MCS0	/	/	/	/	/	/	/	/	/	/	15	15	15

Mode	NCB: 40MHz									
	5190	5230	5270	5310	5510	5550	5670	5710	5755	5795
802.11n-HT40 MCS0	/	/	/	/	/	/	/	/	15	15
Mode	NCB: 80MHz									
	5210		5290		5530		5610		5690	
802.11ac-VH80 MCS0/Nss2	/		/		/		/		/	
									15	

1.5 EUT Operating during test

EUT was programmed to be in continuously transmitting mode. During the test, EUT operation to normal function and programs under Android were executed.

1.6 Test Facility

FCC – Registration No.: 125990

Shenzhen SEM Test Technology Co., Ltd. Laboratory has been recognized to perform compliance testing on equipment subject to the Commissions Declaration Of Conformity (DOC). The Designation Number is CN5010, and Test Firm Registration Number is 125990.

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.

1.7 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, with a duty cycle equal to 100%, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	802.11a	5745MHz, 5785MHz,5825MHz
TM2	802.11n-HT20	5745MHz, 5785MHz,5825MHz
TM3	802.11n-HT40	5755MHz,5795MHz
TM4	802.11ac-VH80	5775MHz
Note: All test modes (different data rate and different modulation) are performed, but only the worst case is recorded in this report.		

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

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
Mini-HDMI Cable	0.8	Shielded	With Core
USB Cable	1.0	Shielded	Without Core

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Displayer	Samsung	B2230H	/
Computer	Lenovo	ThinkPad Edge E445	/
Adapter	TECLAST	APS-KI018W-S	/

1.8 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	$\pm 0.42\text{dB}$
Occupied Bandwidth	Conducted	$\pm 1.5\%$
Power Spectral Density	Conducted	$\pm 1.8\text{dB}$
Conducted Spurious Emission	Conducted	$\pm 2.17\text{dB}$
Conducted Emissions	Conducted	9-150kHz $\pm 3.74\text{dB}$
		0.15-30MHz $\pm 3.34\text{dB}$
Transmitter Spurious Emissions	Radiated	30-200MHz $\pm 4.52\text{dB}$
		0.2-1GHz $\pm 5.56\text{dB}$
		1-6GHz $\pm 3.84\text{dB}$
		6-18GHz $\pm 3.92\text{dB}$

1.9 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2017-06-12	2018-06-11
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2017-06-12	2018-06-11
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2017-06-12	2018-06-11
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2017-06-12	2018-06-11
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2017-06-12	2018-06-11
SEMT-1011	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2017-06-08	2018-06-07
SEMT-1042	Horn Antenna	ETS	3117	00086197	2017-06-08	2018-06-07
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2017-06-08	2018-06-07
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2017-06-08	2018-06-07
SEMT-1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2017-06-12	2018-06-11
SEMT-1003	L.I.S.N	Schwarz beck	NSLK8126	8126-224	2017-06-12	2018-06-11
SEMT-1002	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2017-06-12	2018-06-11
SEMT-1168	Pre-amplifier	Direction Systems Inc.	PAP-0126	14141-12838	2017-08-15	2018-08-14
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2017-08-15	2018-08-14
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2017-06-12	2018-06-11
SEMT-1170	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2017-03-09	2018-03-08

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.

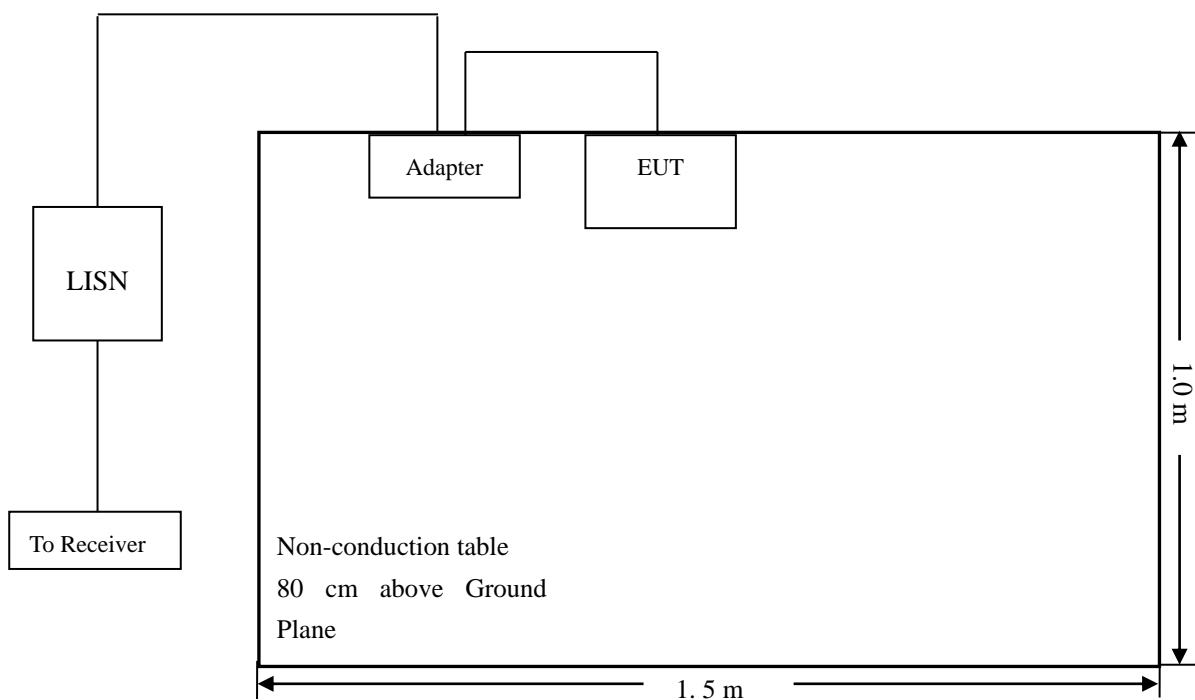
5. Conducted Emissions

5.1 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 5.7, the EUT complied with the FCC Part 15.207 Conducted margin for a Class B device, with the *worst* margin reading of:

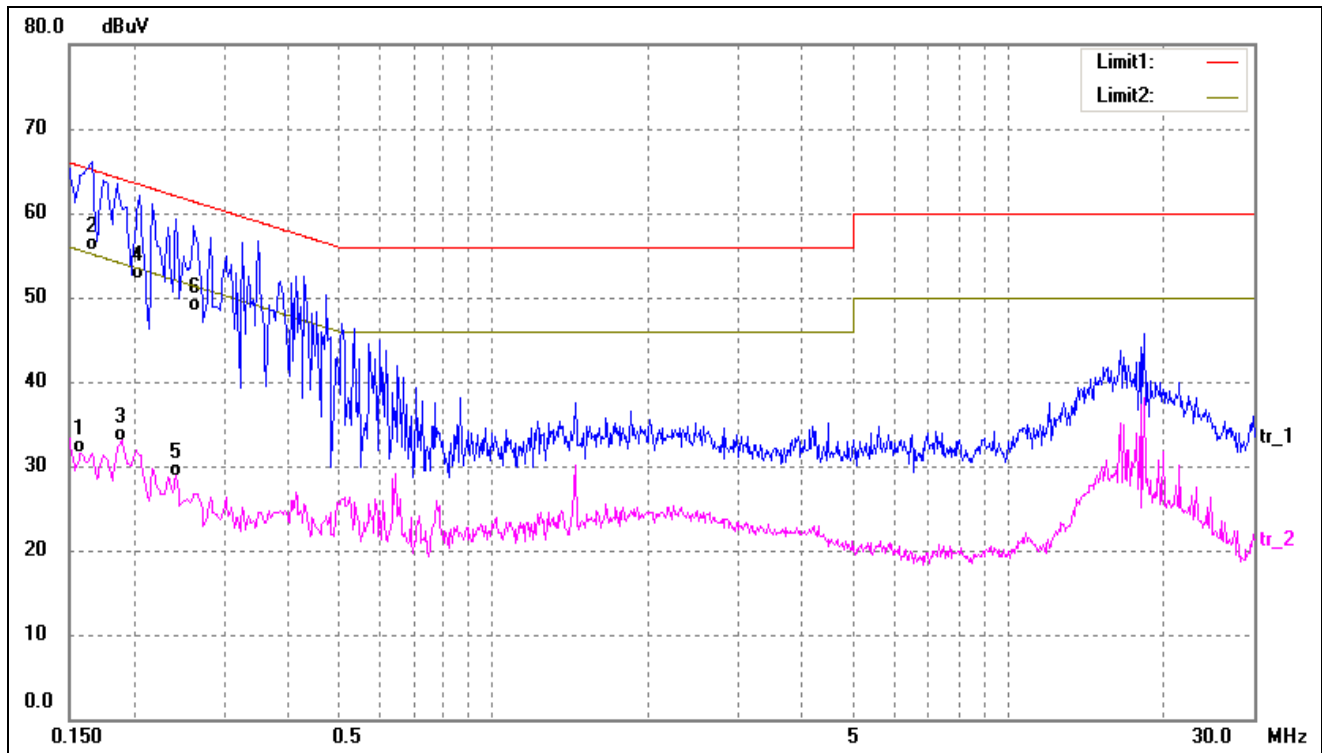
-9.10 dB at 0.1660 MHz in the Line, QP detector, 0.15-30MHz

5.7 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

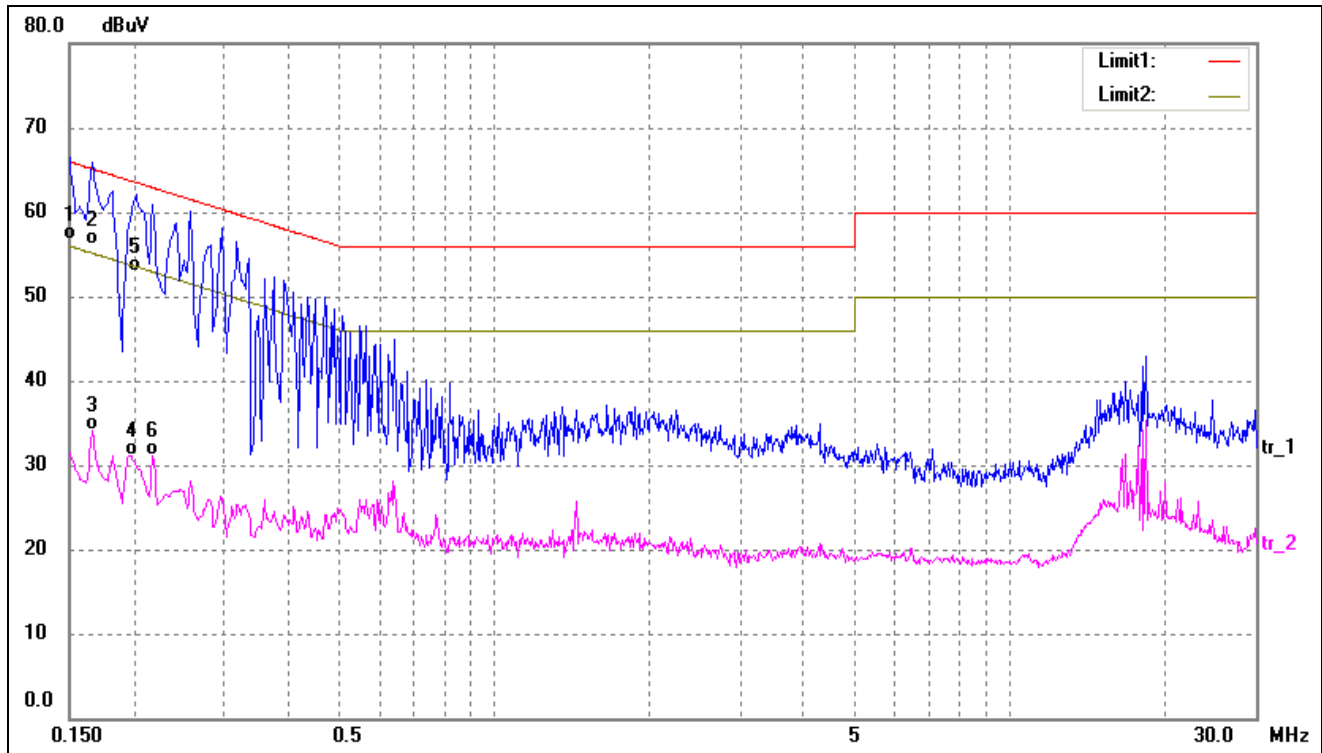
EUT: Tablet PC
 Tested Model: TA10
 Operating Condition: Transmitting
 Comment: AC 120V/60Hz

Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1580	21.76	9.84	31.60	55.57	-23.97	AVG
2*	0.1660	45.75	9.83	55.58	65.16	-9.58	QP
3	0.1900	23.19	9.81	33.00	54.04	-21.04	AVG
4	0.2060	42.38	9.80	52.18	63.37	-11.19	QP
5	0.2420	19.00	9.80	28.80	52.03	-23.23	AVG
6	0.2620	38.48	9.80	48.28	61.37	-13.09	QP

Test Specification: Line



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.1500	46.77	9.85	56.62	66.00	-9.38	QP
2*	0.1660	46.23	9.83	56.06	65.16	-9.10	QP
3	0.1660	24.30	9.83	34.13	55.16	-21.03	AVG
4	0.1980	21.39	9.80	31.19	53.69	-22.50	AVG
5	0.2020	43.14	9.80	52.94	63.53	-10.59	QP
6	0.2180	21.34	9.80	31.14	52.89	-21.75	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 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

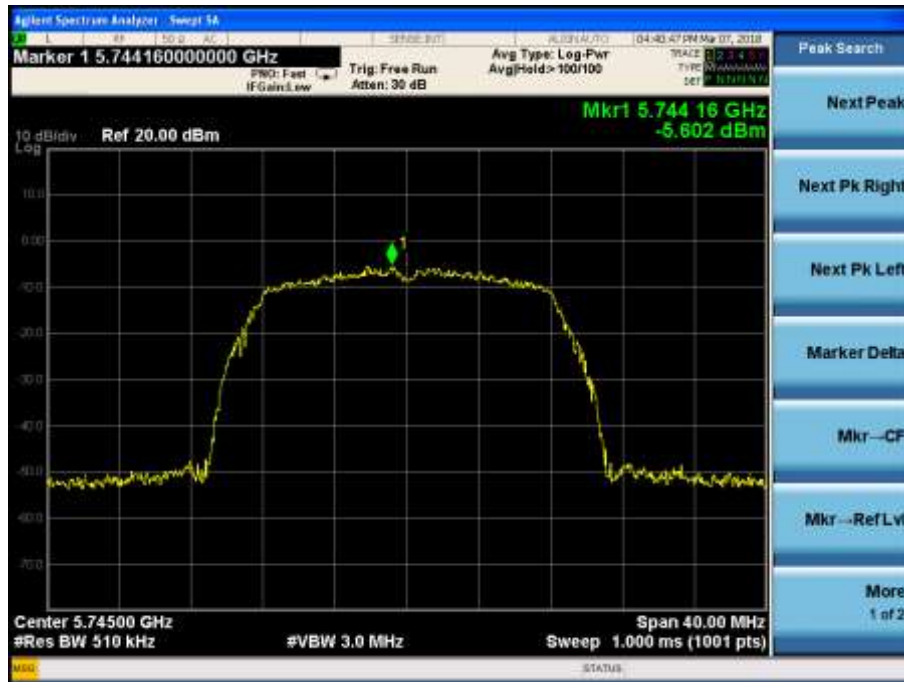
Temperature:	20° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

6.4 Summary of Test Results/Plots

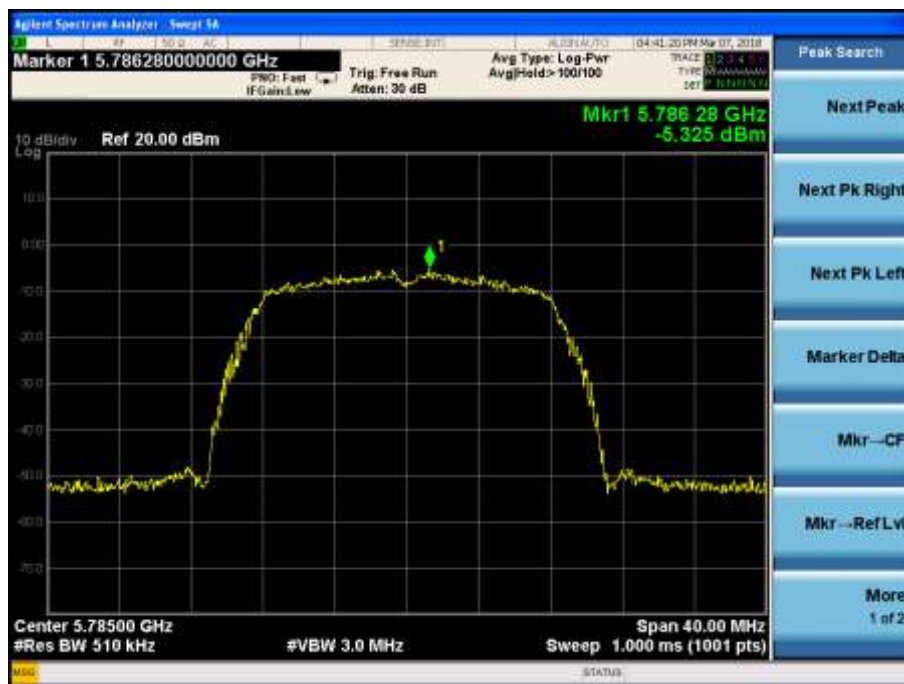
5725-5850MHz

Operating mode	Test Channel	Power Spectral Density dBm/510kHz	Power Spectral Density* dBm/500kHz	Limit dBm/500kHz
802.11a	5745	-5.602	-2.602	30
	5785	-5.325	-2.325	30
	5825	-6.323	-3.323	30
802.11n-HT20	5745	-5.390	-2.390	30
	5785	-5.804	-2.804	30
	5825	-7.046	-4.046	30
802.11n HT40	5755	-8.524	-5.524	30
	5795	-9.024	-6.024	30
802.11ac VH80	5775	-12.486	-9.486	30
*Note: Maximum PSD=PSD(dBm/510kHz)+10log(1MHz/510kHz)=3				

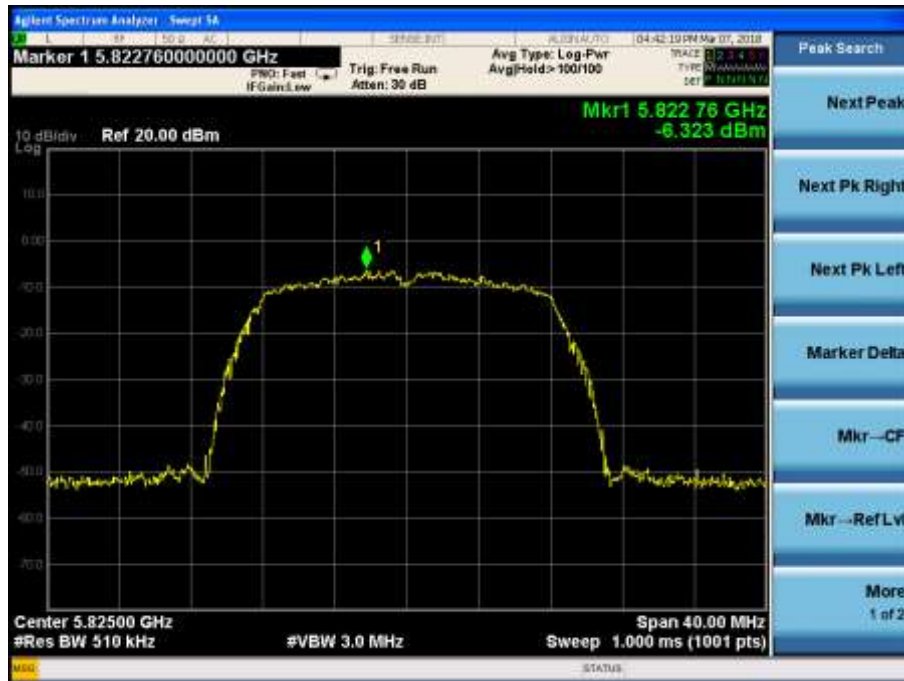
Test Mode: 802.11a
5745MHz



5785MHz

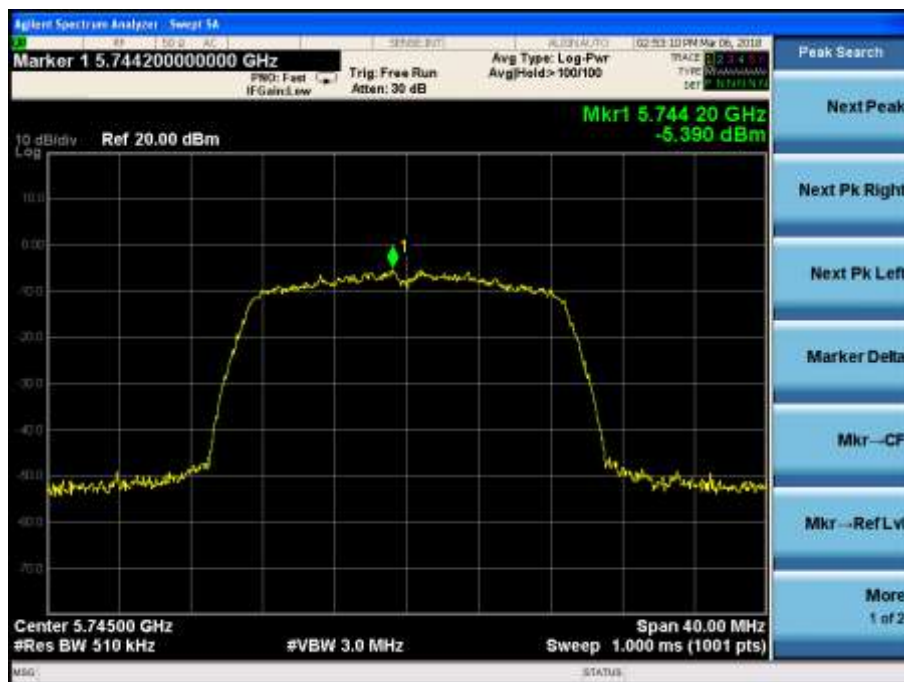


5825MHz

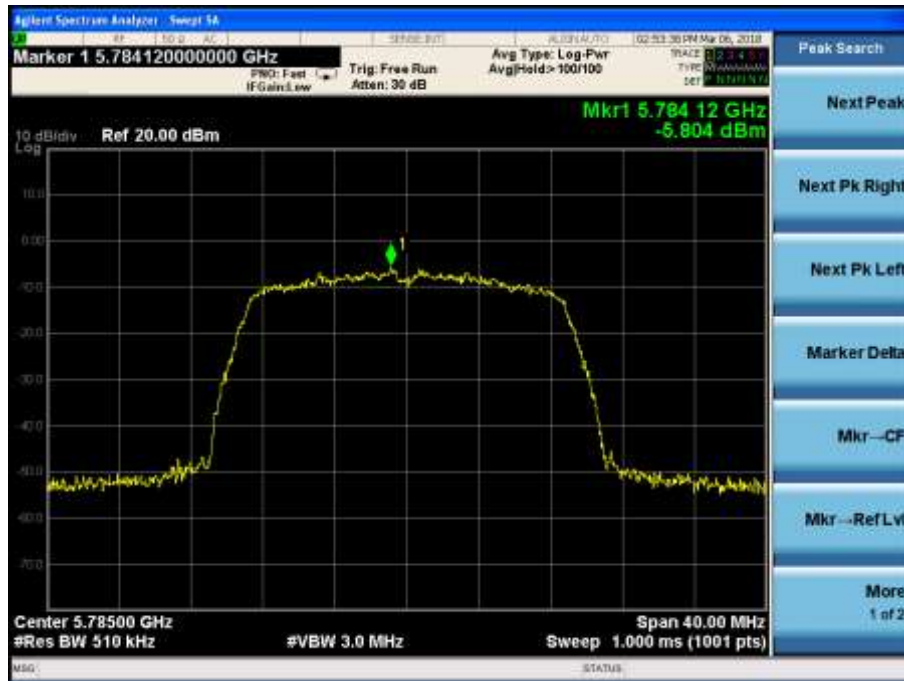


Test Mode: 802.11n-HT20

5745MHz



5785MHz



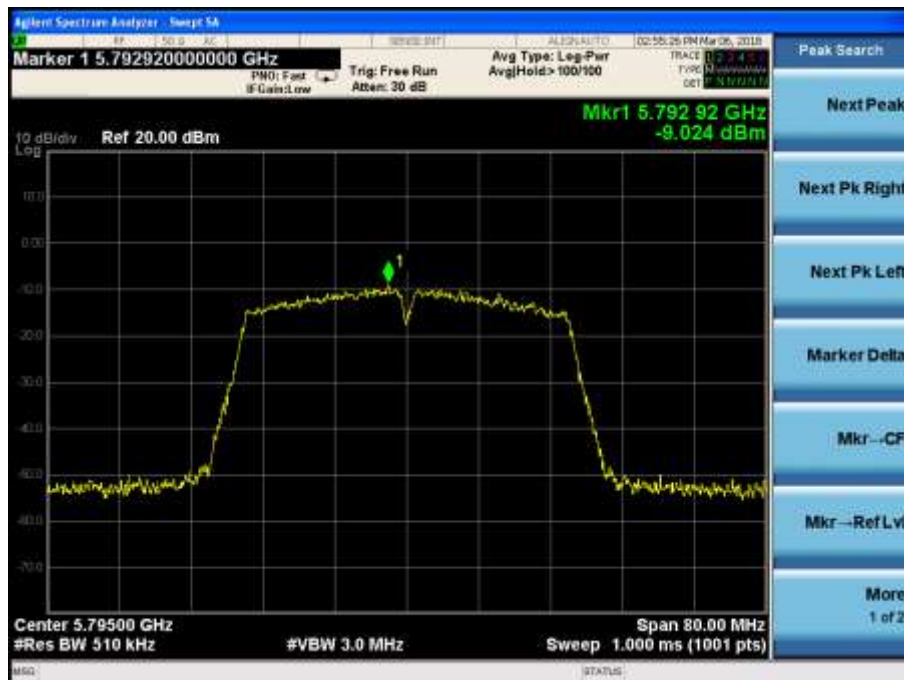
5825MHz



Test Mode: 802.11n-HT40
5755 MHz



5795 MHz



Test Mode: 802.11ac VH80
5775 MHz



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

5725-5850MHz

Test Mode	Test Channel MHz	6 dB Bandwidth MHz	99% Bandwidth MHz	Limit MHz
802.11a	5745	15.68	16.469	≥500
	5785	15.73	16.420	≥500
	5825	15.88	16.586	≥500
802.11n-HT20	5745	17.15	17.562	≥500
	5785	16.40	17.557	≥500
	5825	16.90	17.562	≥500
802.11n-HT40	5755	35.42	35.879	≥500
	5795	35.48	35.849	≥500
802.11ac VH80	5775	74.25	75.251	≥500

5725-5850MHz

Test mode: 802.11a

5745MHz



5785MHz



5825MHz



Test mode: 802.11-HT20

5745MHz



5785MHz



5825MHz



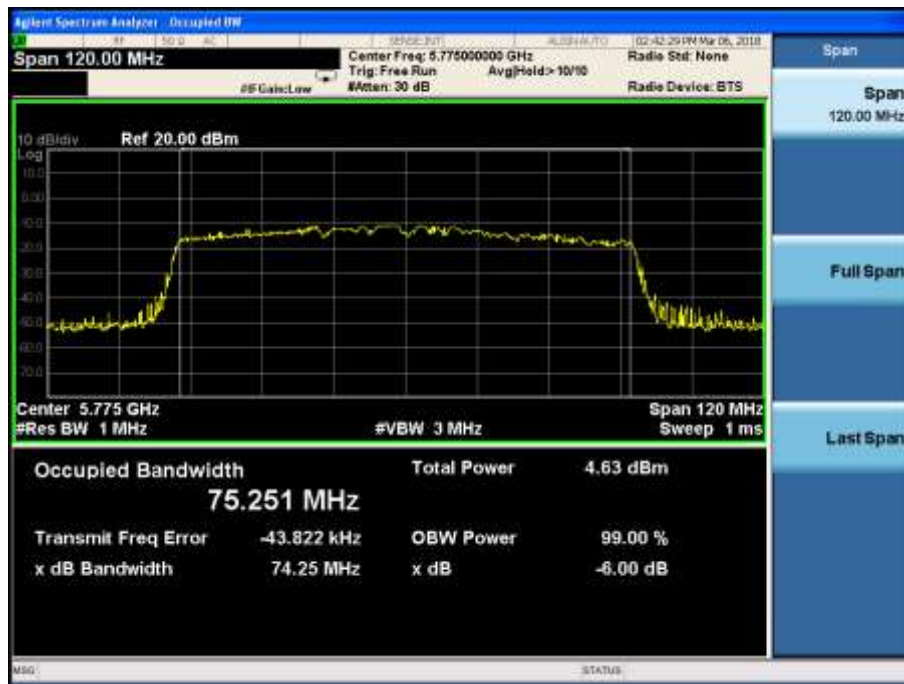
802.11n-HT40
5755 MHz



5795 MHz



802.11ac VH80
5775 MHz



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 ≥ 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.

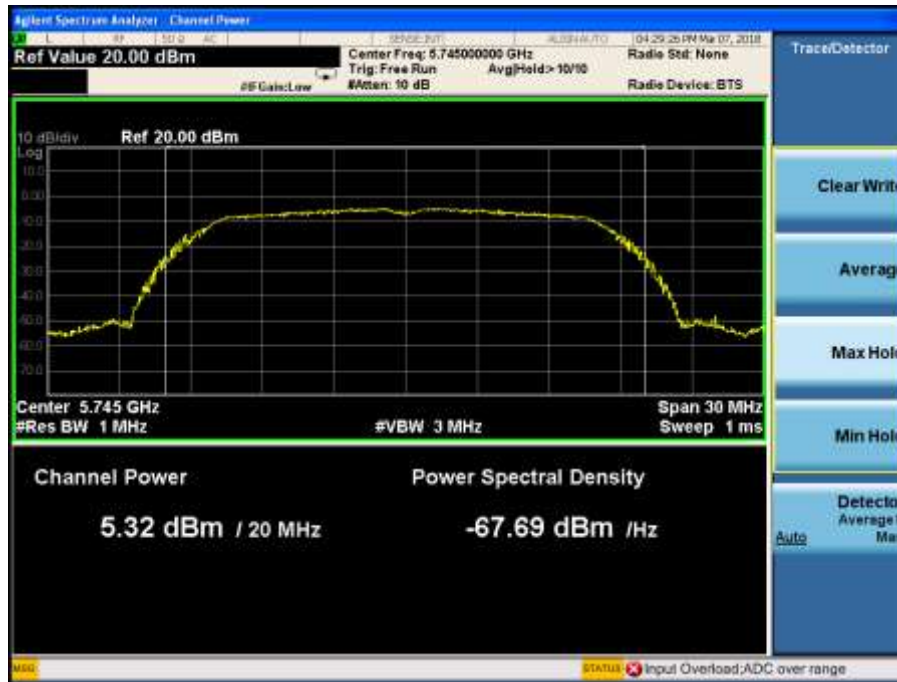
8.3 Environmental Conditions

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

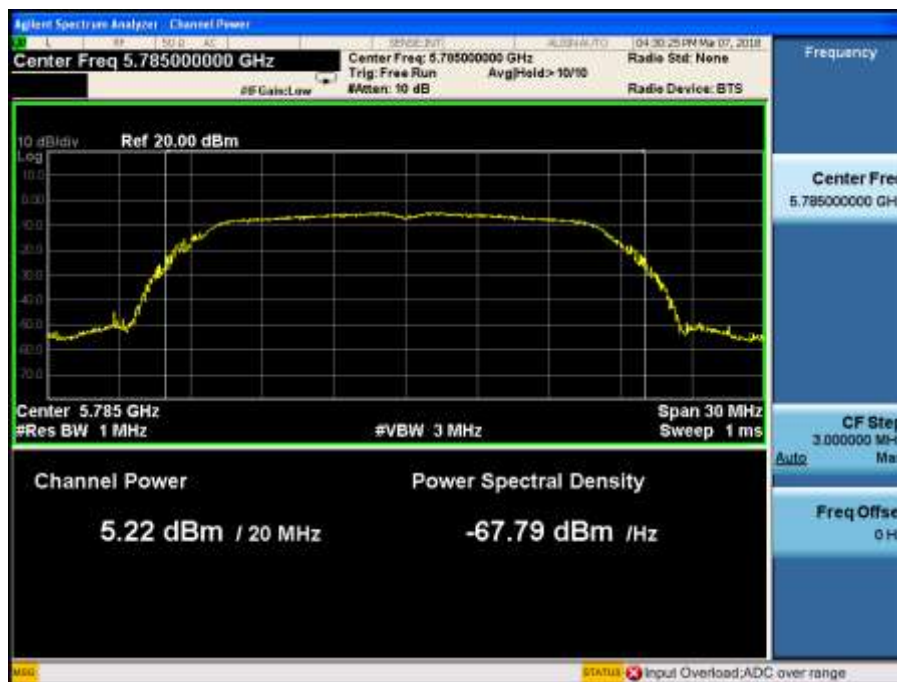
8.4 Summary of Test Results/Plots

Test mode	Frequency MHz	Output Power dBm	Output Power mW	Limit mW
802.11a	5745	5.32	3.40	1000
	5785	5.22	3.33	1000
	5825	5.02	3.18	1000
802.11n-HT20	5745	5.56	3.60	1000
	5785	5.26	3.36	1000
	5825	5.15	3.27	1000
802.11n-HT40	5755	4.11	2.58	1000
	5795	4.90	3.09	1000
802.11ac VH80	5775	4.66	2.92	1000

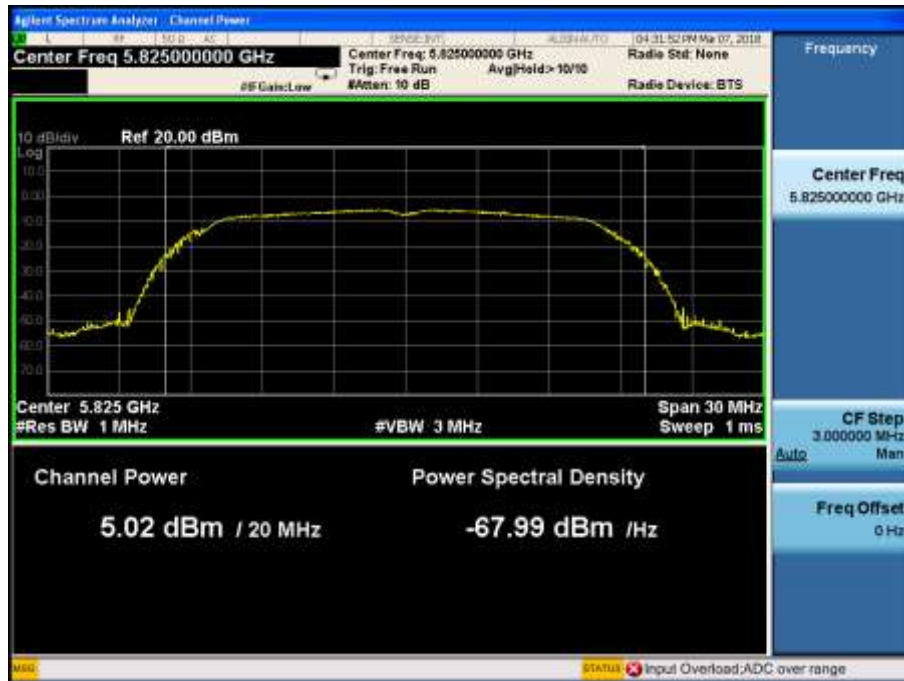
Test Mode: 802.11a
5745MHz



5785MHz

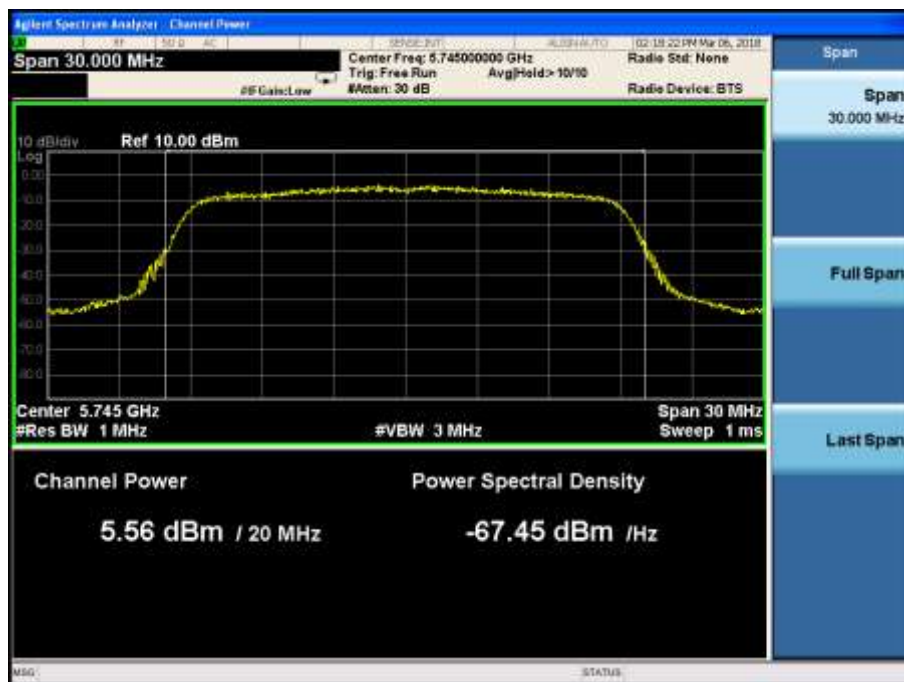


5825MHz

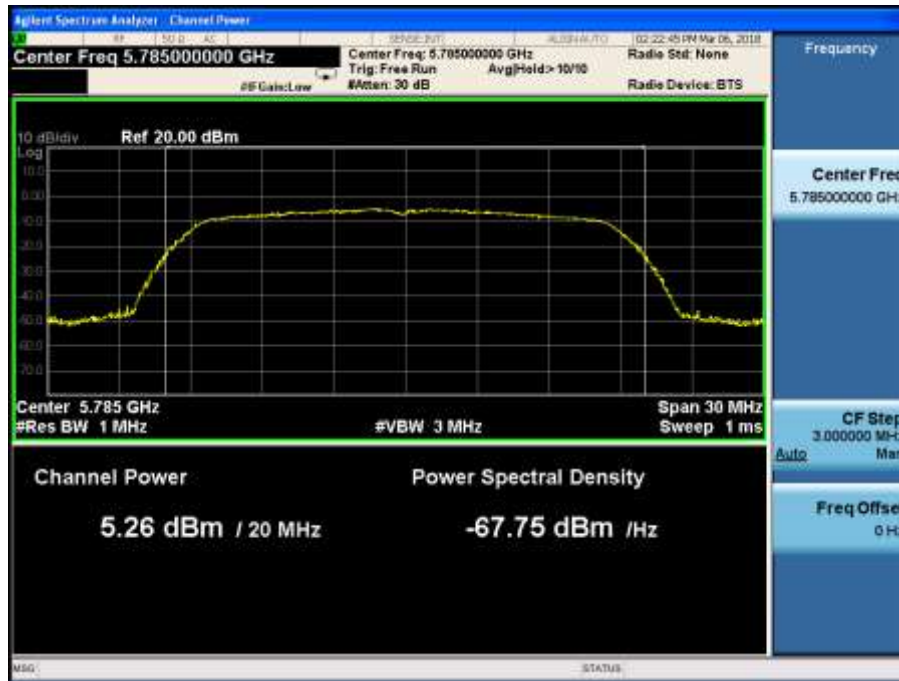


Test Mode: 802.11n-HT20

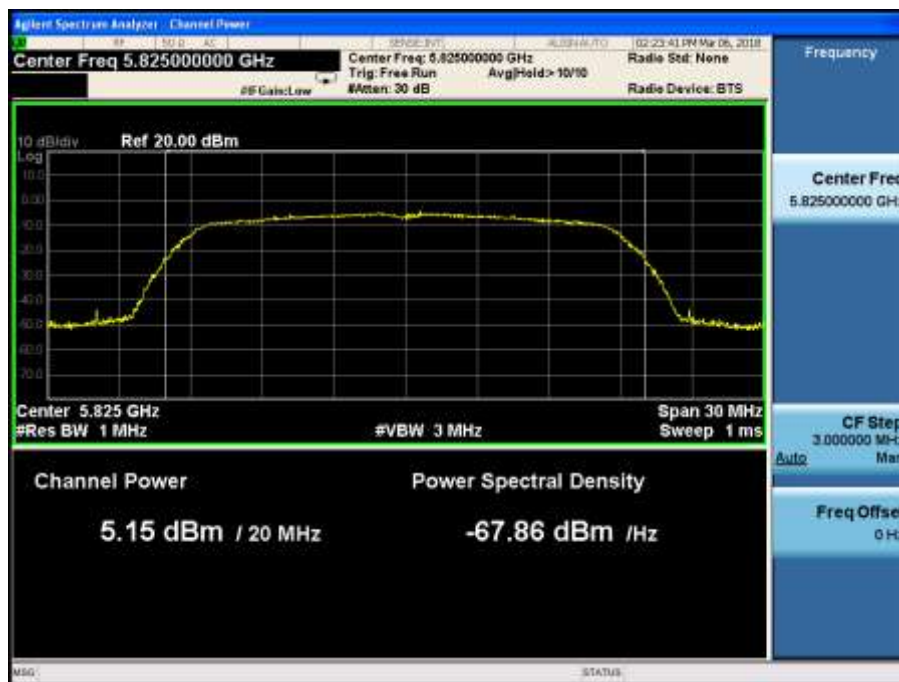
5745MHz



5785MHz

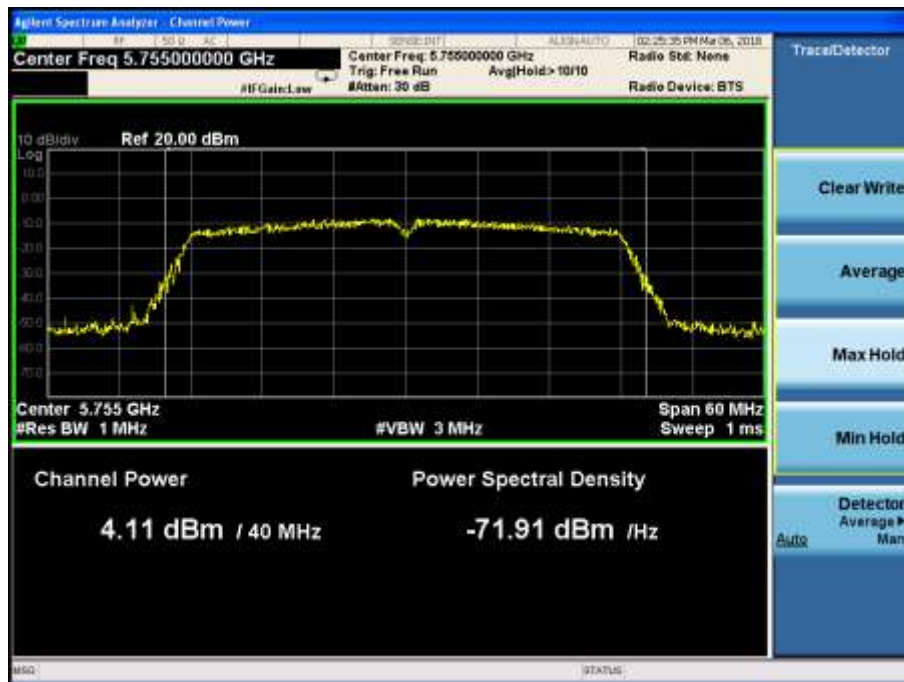


5825MHz

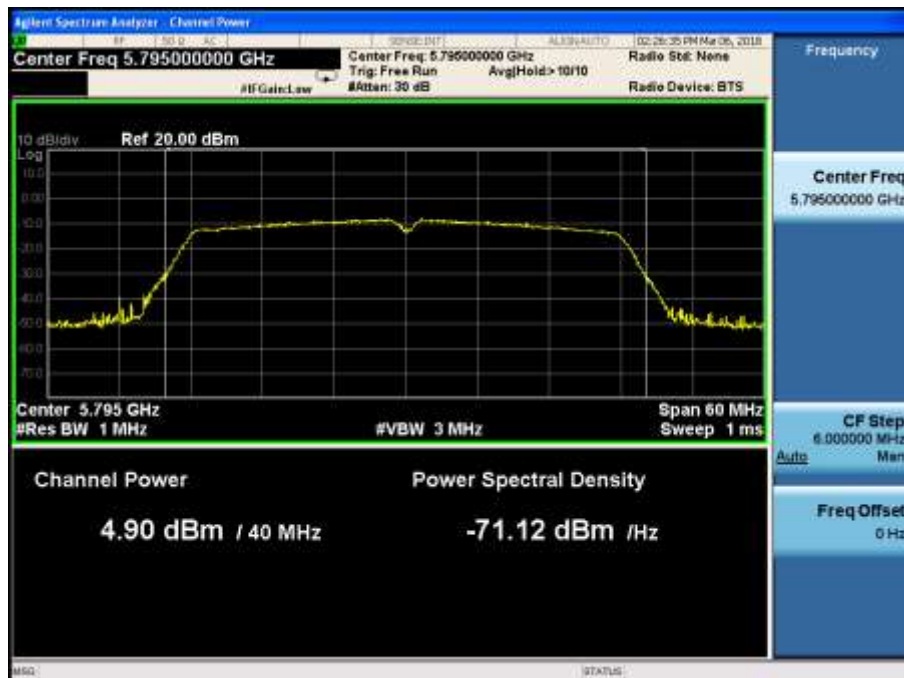


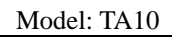
Test Mode: 802.11n-HT40

5755 MHz



5795 MHz





The screenshot displays the Agilent Spectrum Analyzer interface. At the top, the title bar reads "Agilent Spectrum Analyzer - Channel Power". The main display area shows a signal trace in a log scale, with a reference level of 20.00 dBm. The trace shows a signal centered at 5.775 GHz with a bandwidth of 3 MHz. The signal level is approximately -74.37 dBm/Hz. The interface includes various control panels on the right side, such as "Trace/Detector", "Clear Write", "Average", "Max Hold", "Min Hold", "Detector", "Average", and "Manual". The bottom status bar shows "MSG" and "STATUS".

Center Freq 5.775000000 GHz
 #IF Gate: Low
 Center Freq: 5.775000000 GHz
 Trig: Free Run
 #Atten: 30 dB
 Avg(Hold): 10/10
 Radio Stk: None
 Radio Device: BTS

10 dB/div
 Ref 20.00 dBm
 Log
 Center 5.775 GHz
 #Res BW 1 MHz
 #VBW 3 MHz
 Span 120 MHz
 Sweep 1 ms

Channel Power
 4.66 dBm / 80 MHz

Power Spectral Density
 -74.37 dBm / Hz

Trace/Detector
 Clear Write
 Average
 Max Hold
 Min Hold
 Detector
 Average
 Manual
 Auto

MSG STATUS

9. Radiated Spurious Emissions

9.1 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:

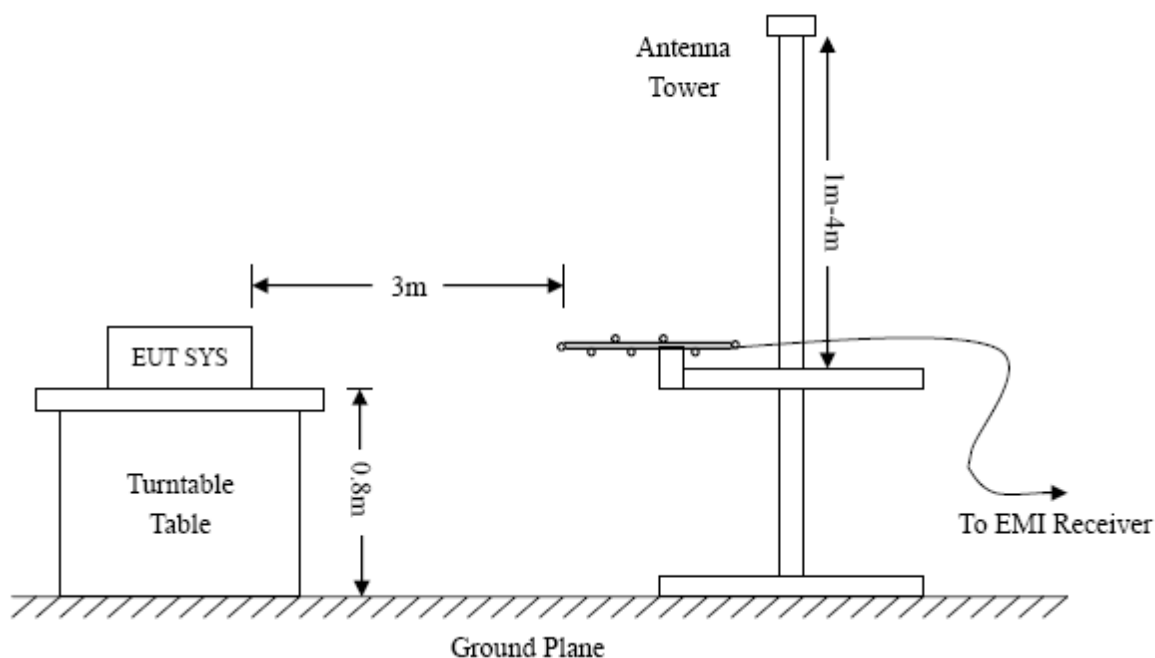
- E is the field strength in V/m;
- d is the measurement distance in meters;
- EIRP is the equivalent isotropically radiated power in watts.

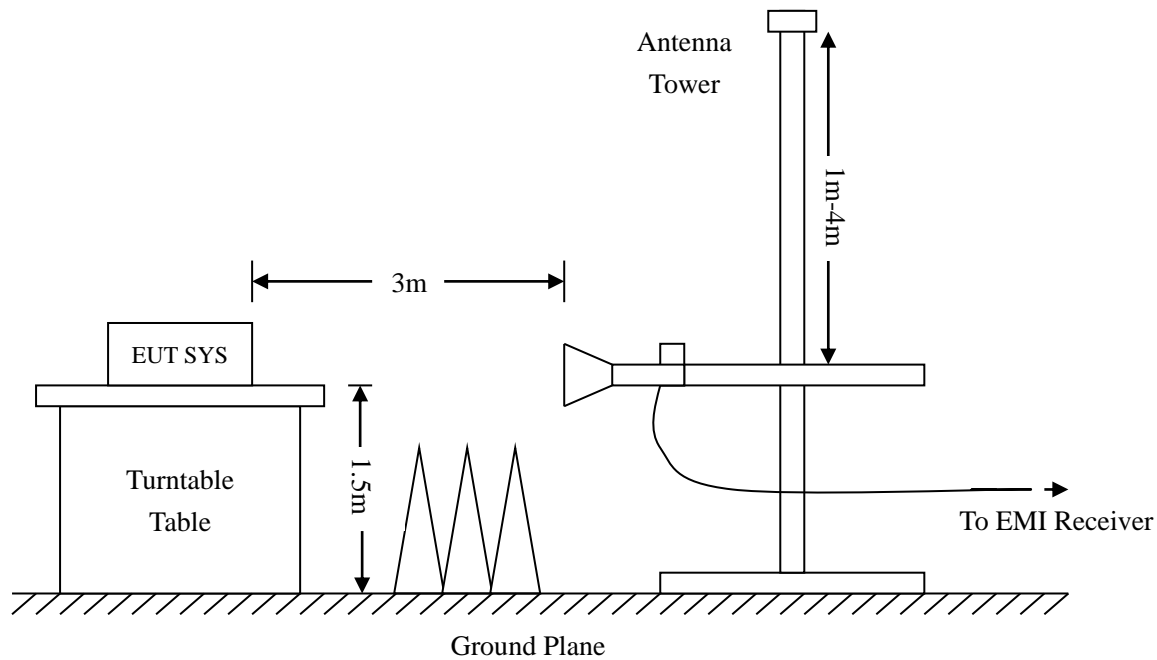
9.2 Test Procedure

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.





9.3 Test Receiver Setup

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

For peak detector:

RBW = 1000kHz, VBW = 3000kHz, Sweep Time = Auto

For average detector:

RBW = 1000kHz, VBW = 10Hz, Sweep Time = Auto

9.4 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:

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

9.5 Environmental Conditions

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

9.6 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:

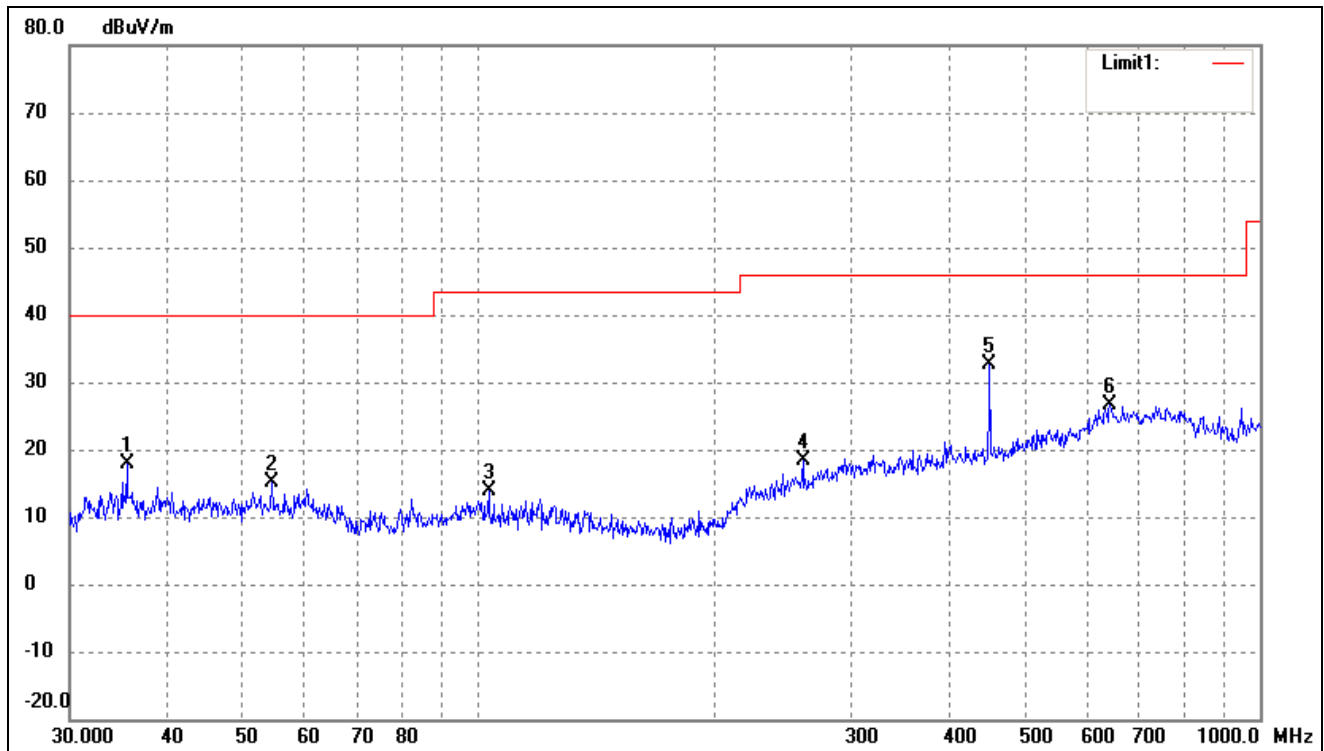
Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

For 802.11a

Spurious Emission From 30 MHz to 1 GHz

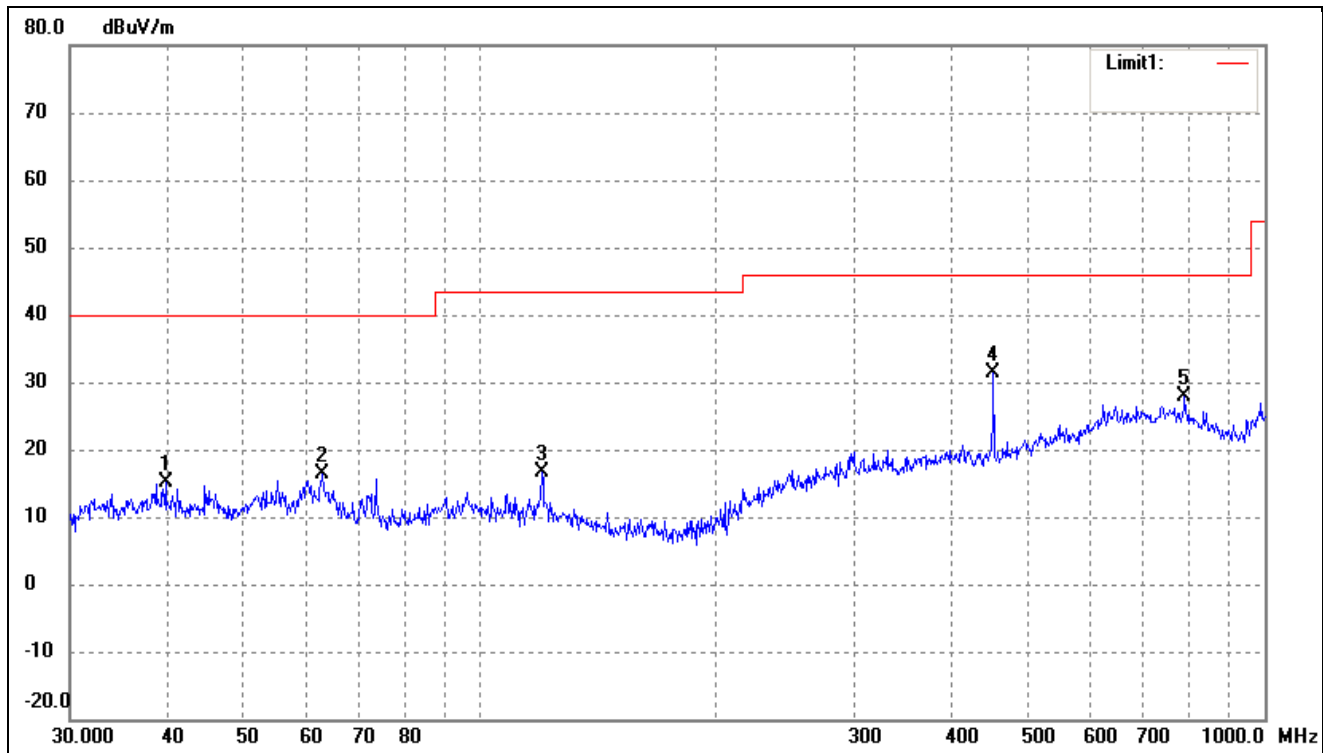
Test mode: Transmitting Channel 5745MHz

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	35.4993	35.08	-17.25	17.83	40.00	-22.17	245	100	peak
2	54.4516	31.56	-16.51	15.05	40.00	-24.95	97	100	peak
3	103.0800	30.53	-16.59	13.94	43.50	-29.56	113	100	peak
4	260.1444	30.21	-11.77	18.44	46.00	-27.56	91	100	peak
5	451.1350	39.74	-7.05	32.69	46.00	-13.31	346	100	peak
6	642.8613	27.61	-1.08	26.53	46.00	-19.47	328	100	peak

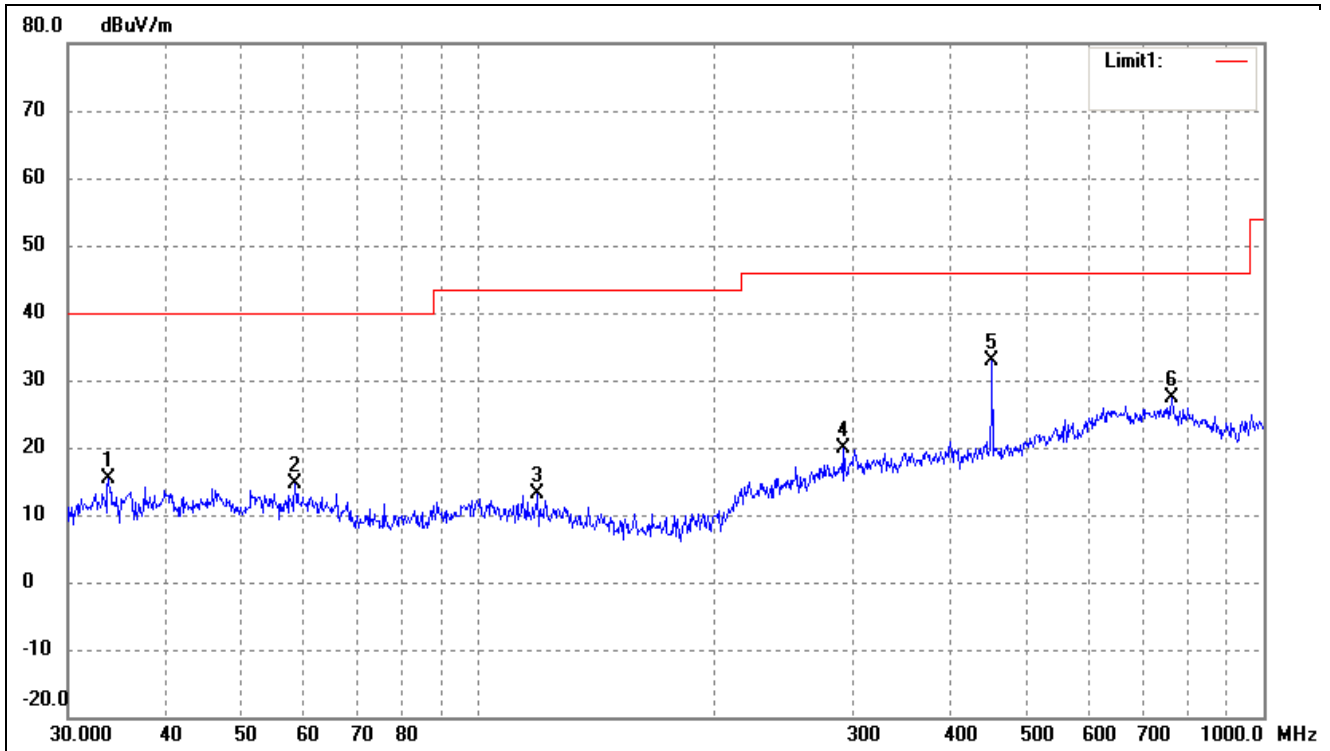
Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	39.7147	31.76	-16.57	15.19	40.00	-24.81	325	100	peak
2	62.8708	33.56	-17.12	16.44	40.00	-23.56	97	100	peak
3	119.8556	33.36	-16.67	16.69	43.50	-26.81	277	100	peak
4	451.1350	38.47	-7.05	31.42	46.00	-14.58	104	100	peak
5	790.6188	30.00	-2.04	27.96	46.00	-18.04	61	100	peak

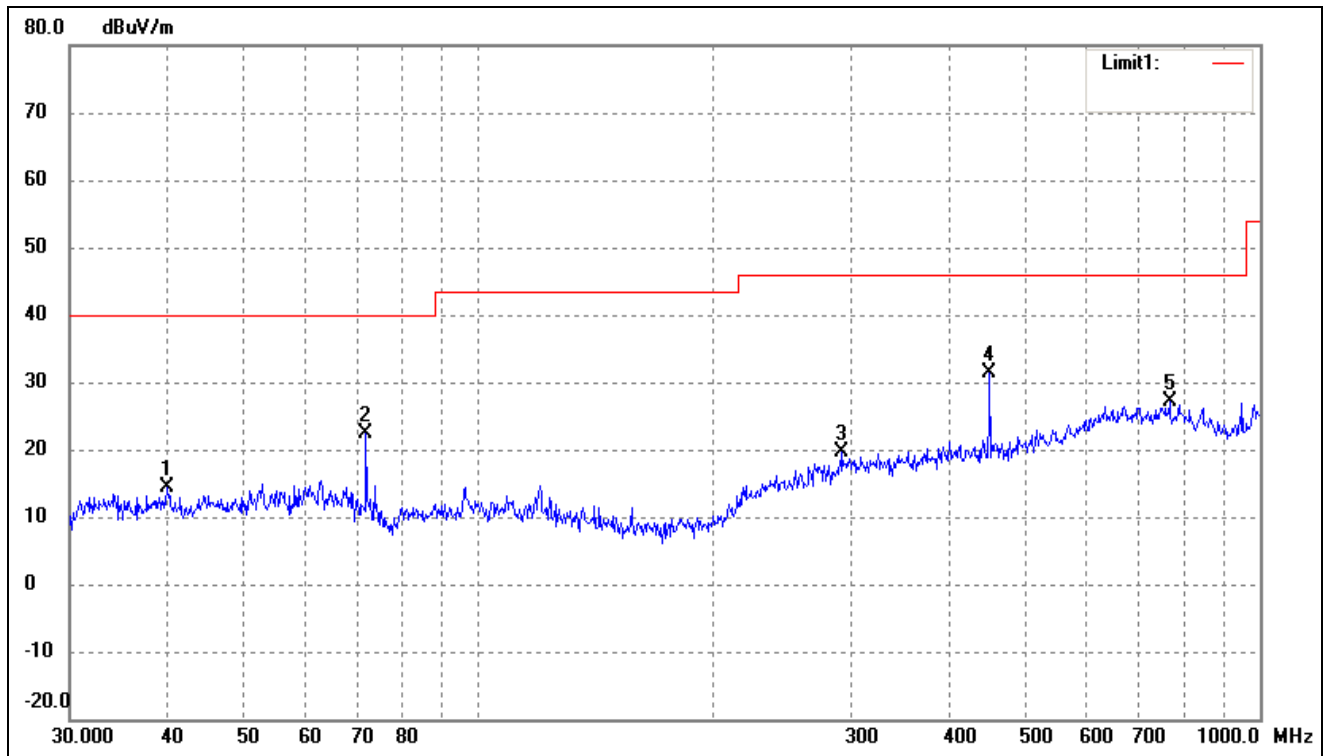
Test mode: Transmitting Channel 5785MHz

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	33.7986	32.93	-17.52	15.41	40.00	-24.59	304	100	peak
2	58.4074	31.27	-16.54	14.73	40.00	-25.27	304	100	peak
3	119.0180	29.87	-16.67	13.20	43.50	-30.30	93	100	peak
4	292.0583	29.67	-9.87	19.80	46.00	-26.20	135	100	peak
5	451.1350	40.04	-7.05	32.99	46.00	-13.01	331	100	peak
6	763.3757	28.13	-0.78	27.35	46.00	-18.65	93	100	peak

Test Specification: Vertical

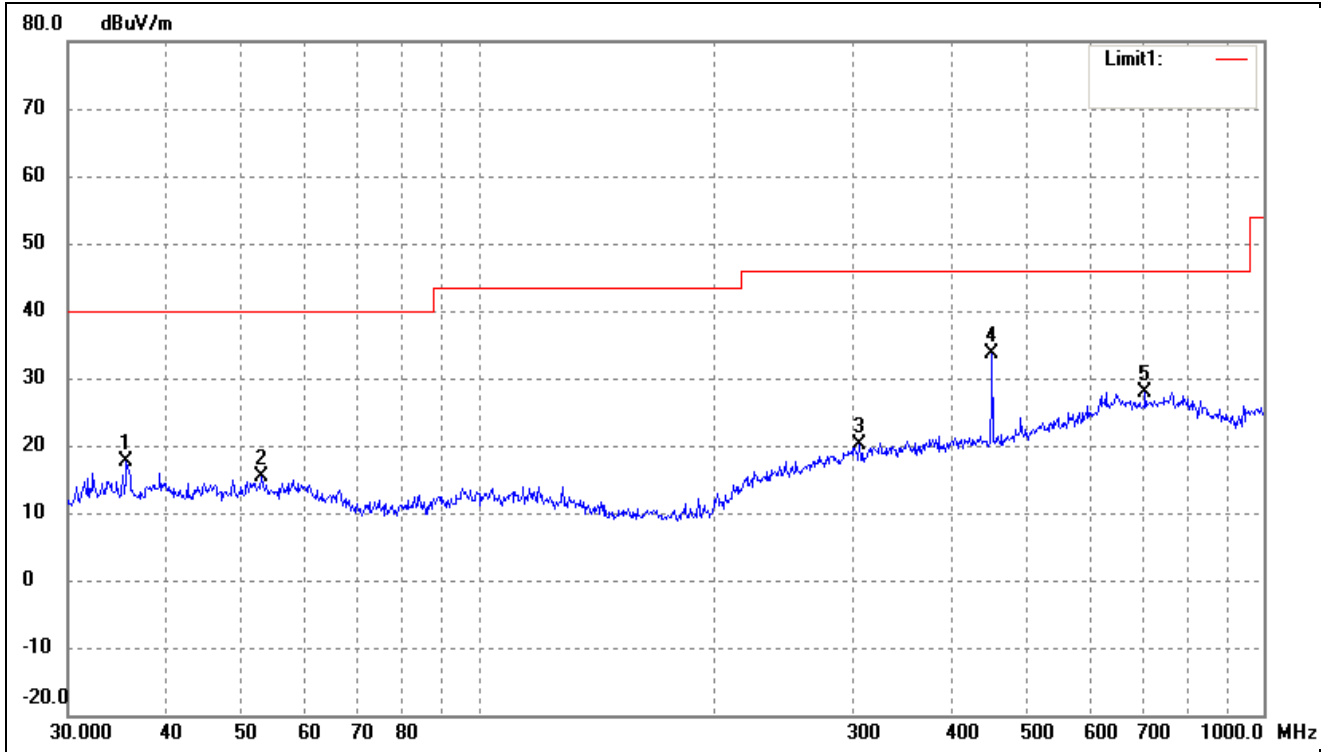


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	39.9942	30.89	-16.53	14.36	40.00	-25.64	187	100	peak
2	71.8320	41.29	-18.94	22.35	40.00	-17.65	316	100	peak
3	292.0583	29.61	-9.87	19.74	46.00	-26.26	85	100	peak
4	451.1350	38.32	-7.05	31.27	46.00	-14.73	192	100	peak
5	766.0572	28.18	-0.93	27.25	46.00	-18.75	70	100	peak

For 802.11n-HT20

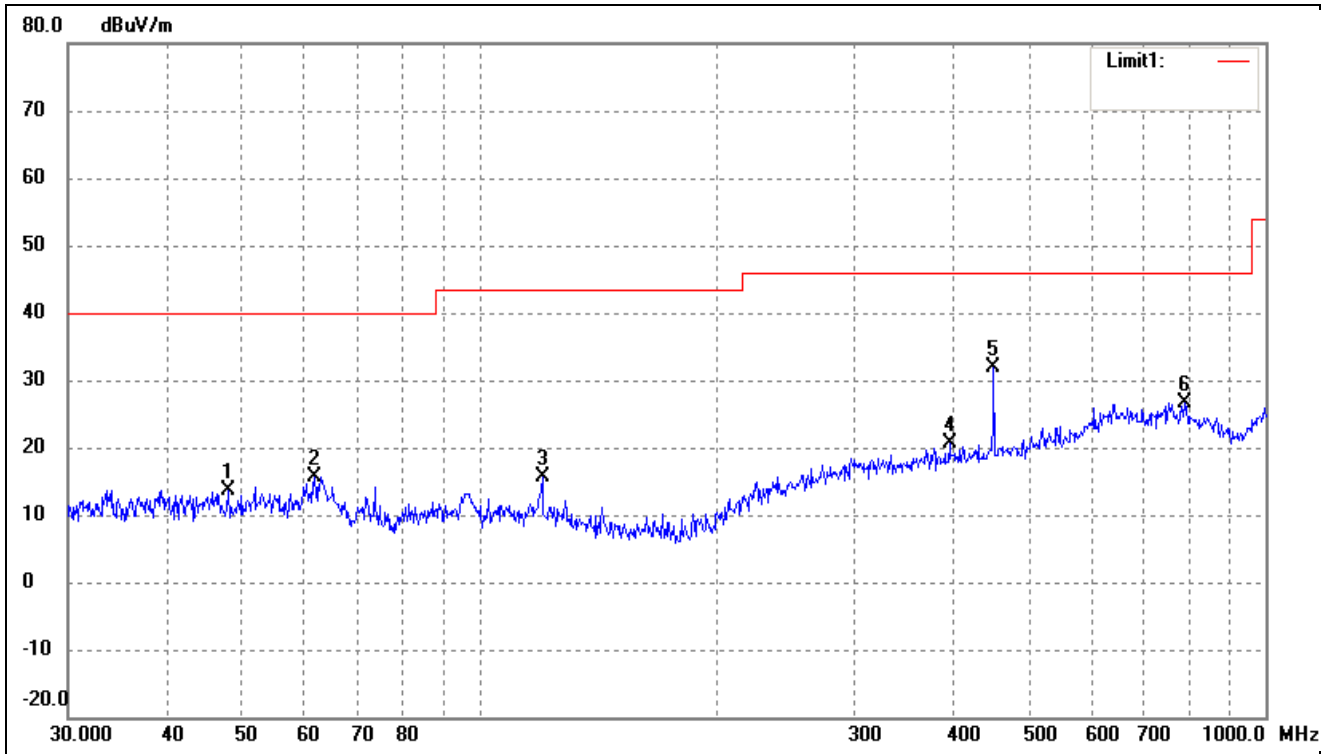
Test mode: Transmitting Channel 5745MHz

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	35.6240	34.76	-17.22	17.54	40.00	-22.46	175	100	peak
2	52.9453	31.91	-16.48	15.43	40.00	-24.57	132	100	peak
3	305.6800	29.55	-9.53	20.02	46.00	-25.98	92	100	peak
4	451.1350	40.58	-7.05	33.53	46.00	-12.47	132	100	peak
5	706.6999	29.57	-1.59	27.98	46.00	-18.02	300	100	peak

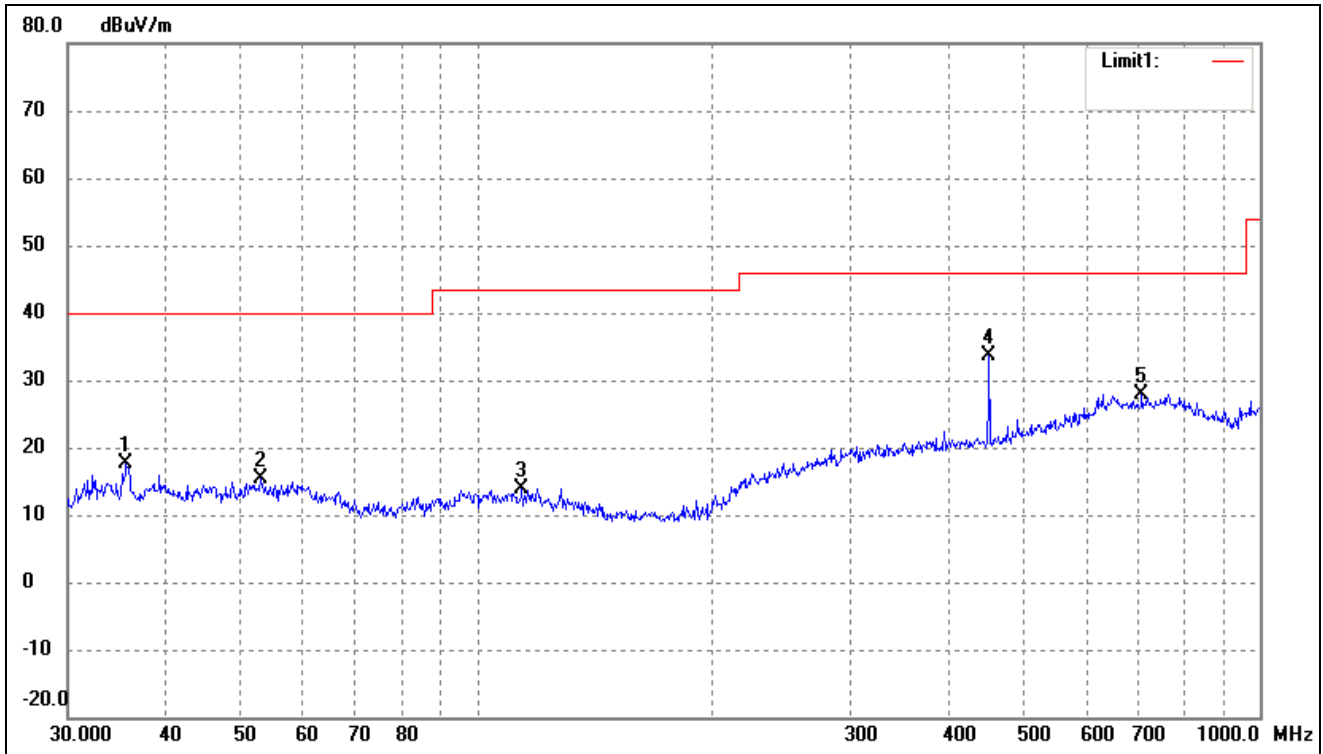
Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	47.9940	30.24	-16.53	13.71	40.00	-26.29	83	100	peak
2	61.7781	32.61	-16.88	15.73	40.00	-24.27	92	100	peak
3	120.2766	32.30	-16.69	15.61	43.50	-27.89	90	100	peak
4	396.2415	28.54	-8.00	20.54	46.00	-25.46	144	100	peak
5	451.1350	39.03	-7.05	31.98	46.00	-14.02	92	100	peak
6	787.8513	28.71	-1.99	26.72	46.00	-19.28	212	100	peak

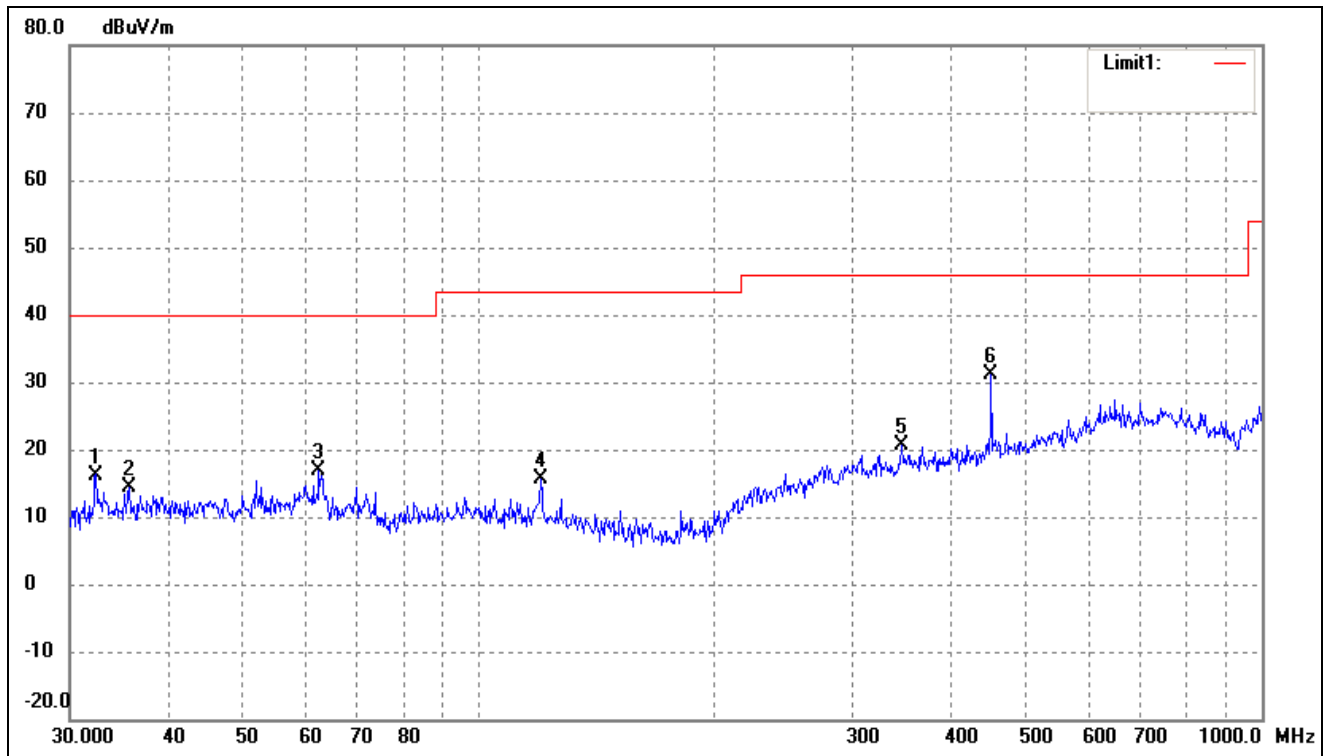
Test mode: Transmitting Channel 5785MHz

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	35.6240	34.76	-17.22	17.54	40.00	-22.46	253	100	peak
2	52.9453	31.91	-16.48	15.43	40.00	-24.57	207	100	peak
3	114.1138	30.50	-16.63	13.87	43.50	-29.63	56	100	peak
4	451.1350	40.67	-7.05	33.62	46.00	-12.38	156	100	peak
5	706.6999	29.57	-1.59	27.98	46.00	-18.02	78	100	peak

Test Specification: Vertical

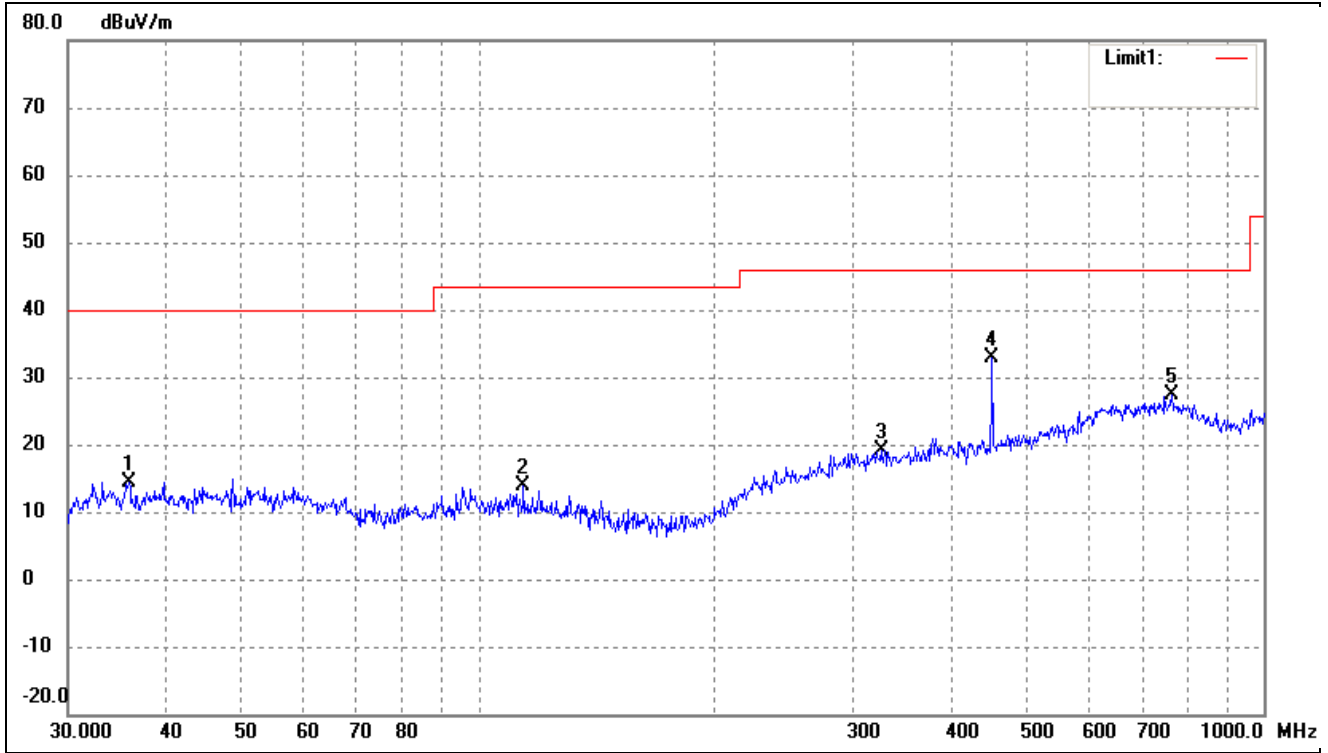


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	32.4059	34.02	-17.77	16.25	40.00	-23.75	46	100	peak
2	35.7491	31.50	-17.20	14.30	40.00	-25.70	159	100	peak
3	62.4314	33.95	-17.01	16.94	40.00	-23.06	73	100	peak
4	119.8556	32.31	-16.67	15.64	43.50	-27.86	248	100	peak
5	346.8092	30.08	-9.40	20.68	46.00	-25.32	302	100	peak
6	451.1350	38.06	-7.05	31.01	46.00	-14.99	304	100	peak

For 802.11n-HT40

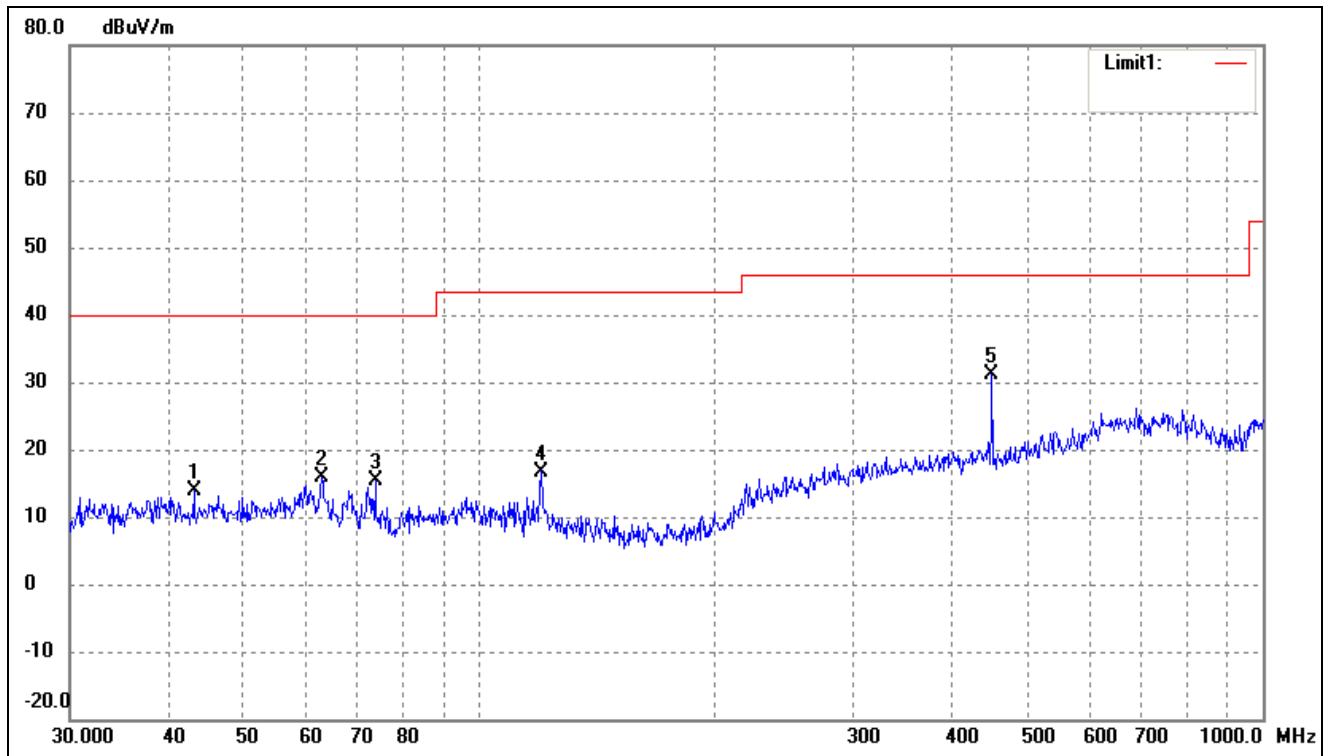
Test mode: Transmitting Channel 5755MHz

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	35.8747	31.59	-17.18	14.41	40.00	-25.59	98	100	peak
2	114.1138	30.50	-16.63	13.87	43.50	-29.63	34	100	peak
3	325.5958	28.67	-9.45	19.22	46.00	-26.78	180	100	peak
4	451.1350	39.96	-7.05	32.91	46.00	-13.09	190	100	peak
5	763.3757	28.11	-0.78	27.33	46.00	-18.67	170	100	peak

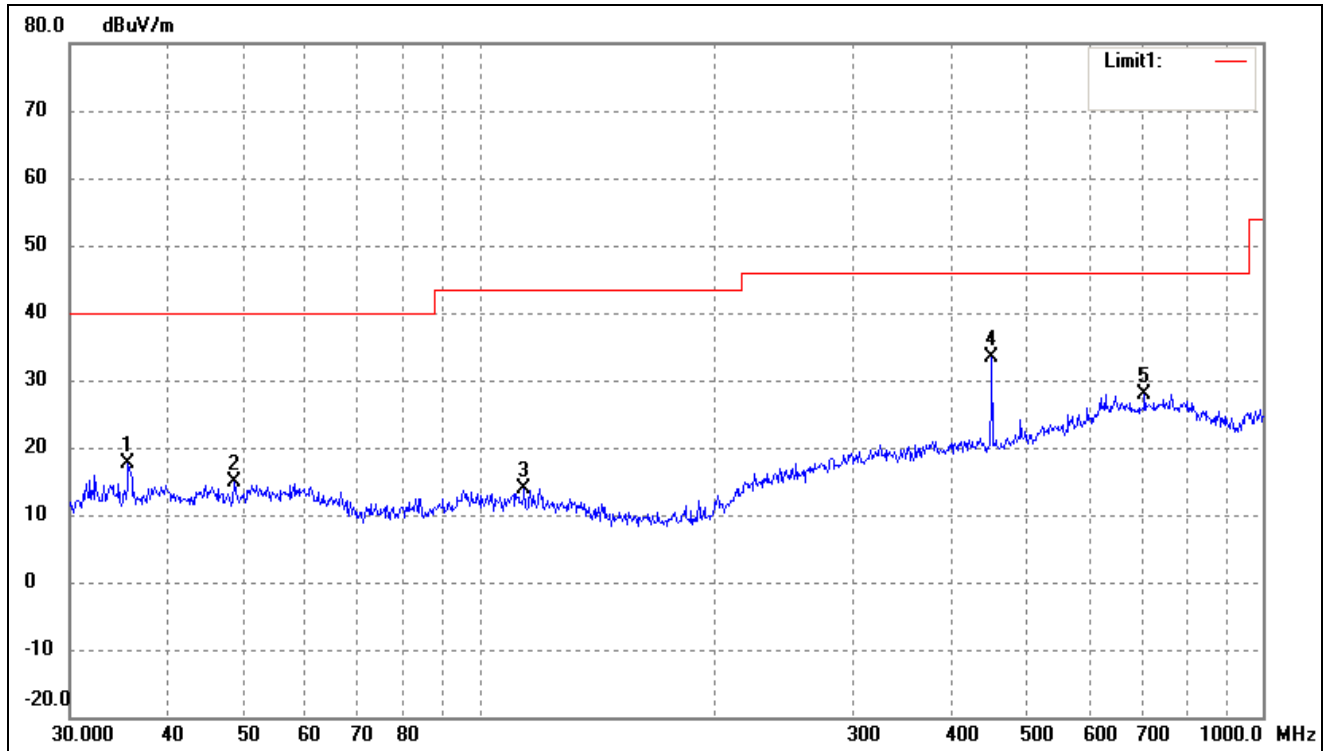
Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	43.2017	30.28	-16.49	13.79	40.00	-26.21	79	100	peak
2	62.8708	32.94	-17.12	15.82	40.00	-24.18	88	100	peak
3	73.6170	34.44	-19.13	15.31	40.00	-24.69	98	100	peak
4	119.8556	33.42	-16.67	16.75	43.50	-26.75	228	100	peak
5	451.1350	38.09	-7.05	31.04	46.00	-14.96	117	100	peak

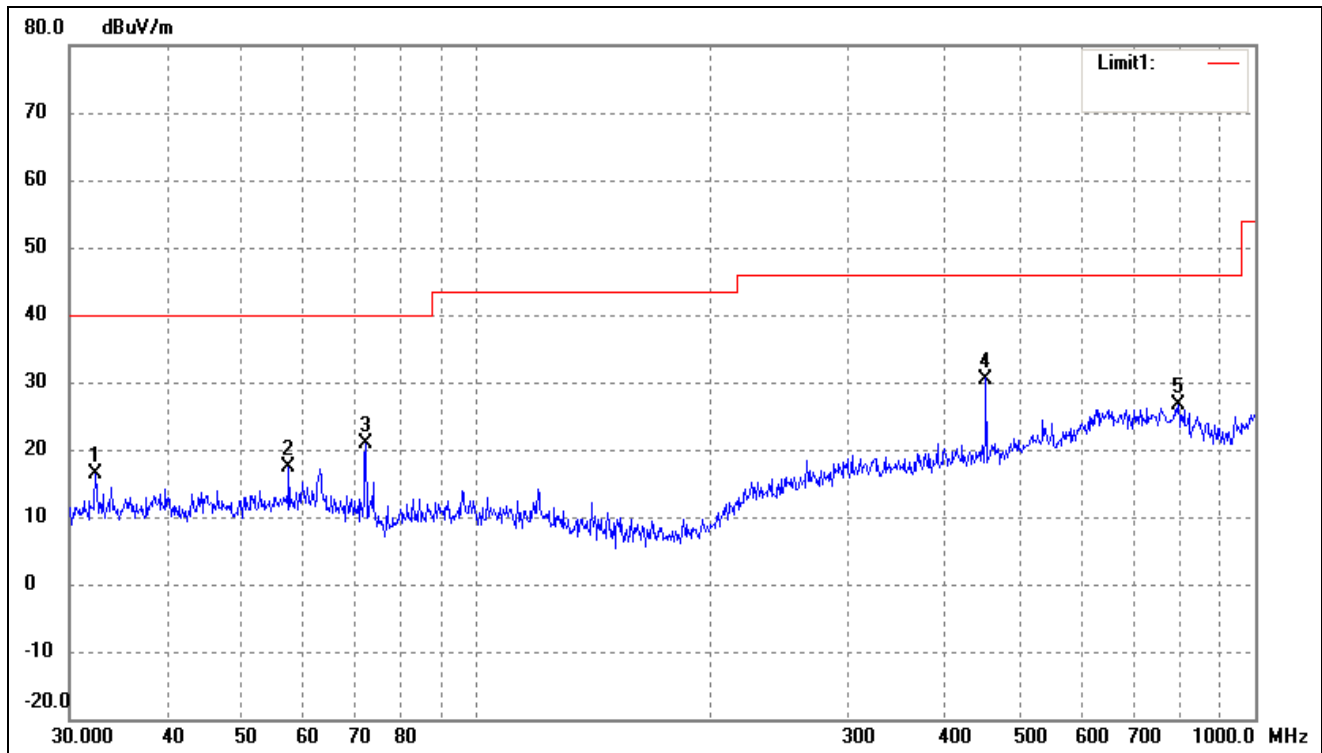
Test mode: Transmitting Channel 5795MHz

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	35.6240	34.76	-17.22	17.54	40.00	-22.46	132	100	peak
2	48.6719	31.44	-16.53	14.91	40.00	-25.09	92	100	peak
3	114.1138	30.50	-16.63	13.87	43.50	-29.63	132	100	peak
4	451.1350	40.39	-7.05	33.34	46.00	-12.66	300	100	peak
5	706.6999	29.57	-1.59	27.98	46.00	-18.02	160	100	peak

Test Specification: Vertical

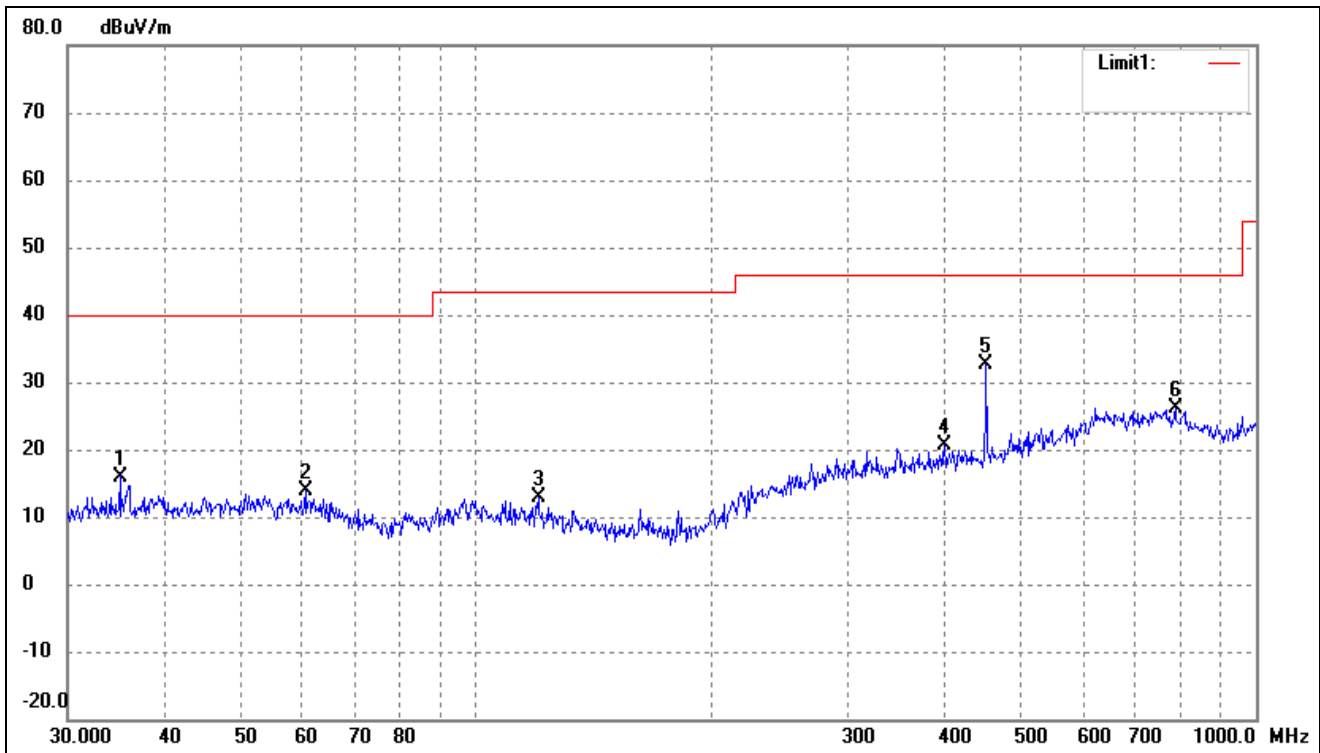


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	32.4059	34.03	-17.77	16.26	40.00	-23.74	85	100	peak
2	57.3923	33.85	-16.54	17.31	40.00	-22.69	192	100	peak
3	72.0843	39.92	-18.97	20.95	40.00	-19.05	70	100	peak
4	451.1350	37.55	-7.05	30.50	46.00	-15.50	195	100	peak
5	796.1830	28.65	-2.13	26.52	46.00	-19.48	85	100	peak

For 802.11ac VH80

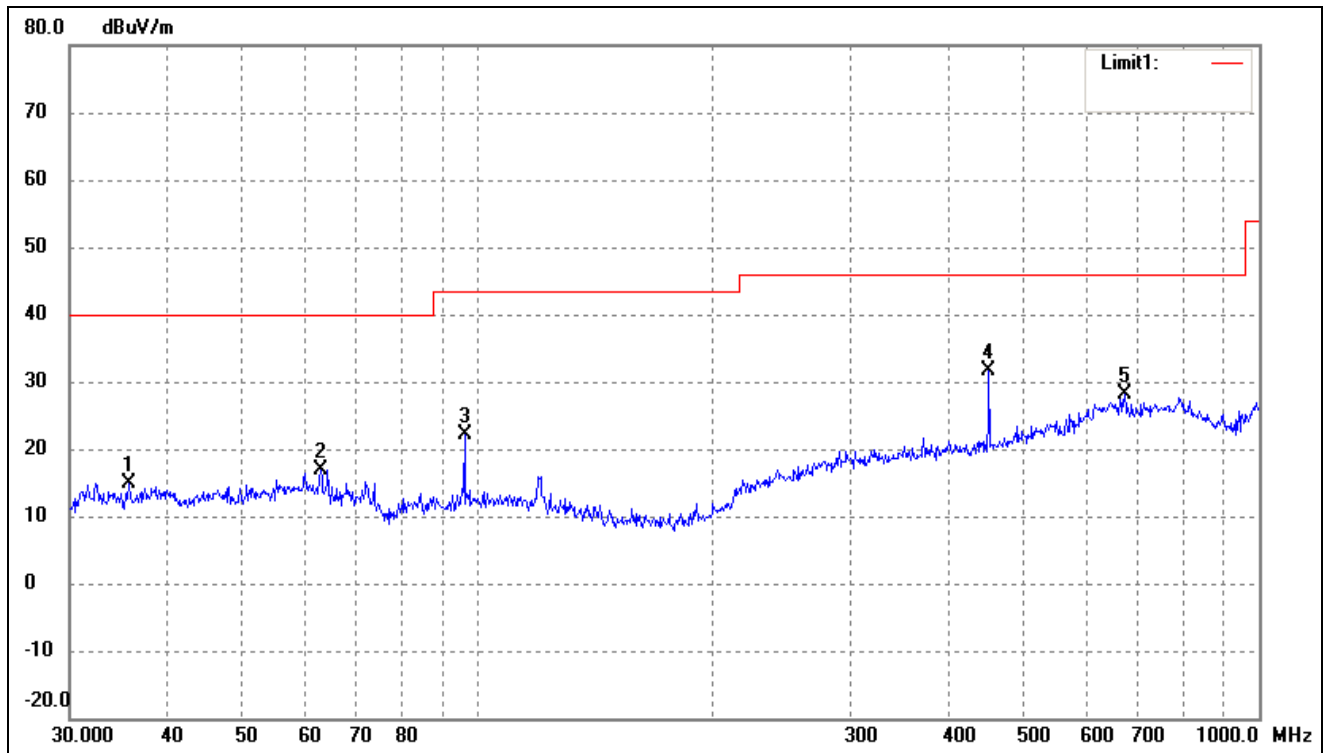
Test mode: Transmitting Channel 5775MHz

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	35.0048	33.32	-17.32	16.00	40.00	-24.00	79	100	peak
2	60.4919	30.45	-16.61	13.84	40.00	-26.16	88	100	peak
3	120.2766	29.58	-16.69	12.89	43.50	-30.61	98	100	peak
4	399.0302	28.36	-7.84	20.52	46.00	-25.48	228	100	peak
5	451.1350	39.73	-7.05	32.68	46.00	-13.32	117	100	peak
6	787.8513	28.21	-1.99	26.22	46.00	-19.78	45	100	peak

Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	35.7491	32.19	-17.20	14.99	40.00	-25.01	159	100	peak
2	62.8708	34.03	-17.12	16.91	40.00	-23.09	73	100	peak
3	96.0986	39.29	-17.14	22.15	43.50	-21.35	248	100	peak
4	451.1350	38.65	-7.05	31.60	46.00	-14.40	302	100	peak
5	672.8445	28.85	-0.77	28.08	46.00	-17.92	304	100	peak

For the frequency band 5.725-5.850GHz (802.11a)

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	55.6	360	V	38.9	9.8	40.1	63.1	74	-10.9
11490	PK	57.1	360	H	38.9	9.8	40.1	64.3	74	-9.7
11490	AV	35.6	360	V	38.9	9.8	40.1	44.1	54	-9.9
11490	AV	38.6	360	H	38.9	9.8	40.1	48.5	54	-5.5
High Channel (5825MHz)										
11610	PK	55.4	360	V	38.9	9.8	40.1	64.5	74	-9.5
11610	PK	55.3	360	H	38.9	9.8	40.1	64.9	74	-9.1
11610	AV	37.6	360	V	38.9	9.8	40.1	45.5	54	-8.5
11610	AV	37.9	360	H	38.9	9.8	40.1	47.0	54	-7.0

Out of Band edge

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5715	-39.40	-27
	5715 to 5725	-27.53	-17
Highest	5850 to 5860	-29.39	-17
	Above 5860	-35.24	-27
Note: the data just list the worst cases			

For the frequency band 5.725-5.850GHz (802.11n HT20)

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	54.7	360	V	38.9	9.8	40.1	62.5	74	-11.5
11490	PK	55.9	360	H	38.9	9.8	40.1	64.4	74	-9.6
11490	AV	36.8	360	V	38.9	9.8	40.1	43.9	54	-10.1
11490	AV	37.5	360	H	38.9	9.8	40.1	45.4	54	-8.6
High Channel (5825MHz)										
11610	PK	55.0	360	V	38.9	9.8	40.1	62.4	74	-11.6
11610	PK	55.5	360	H	38.9	9.8	40.1	63.1	74	-10.9
11610	AV	37.7	360	V	38.9	9.8	40.1	47.7	54	-6.3
11610	AV	37.5	360	H	38.9	9.8	40.1	45.8	54	-8.2

Out of Band edge

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5715	-38.92	-27
	5715 to 5725	-26.65	-17
Highest	5850 to 5860	-27.39	-17
	Above 5860	-34.30	-27
Note: the data just list the worst cases			

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

For the frequency band 5.725-5.850GHz (802.11n HT40)

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 (5755MHz)										
11510	PK	49.2	155	V	38.9	9.8	40.1	59.1	74	-14.9
11510	PK	51.1	171	H	38.9	9.8	40.1	60.9	74	-13.1
11510	AV	37.1	151	V	38.9	9.8	40.1	44.8	54	-9.2
11510	AV	38.0	216	H	38.9	9.8	40.1	45.2	54	-8.8
High Channel (5795MHz)										
11590	PK	48.8	158	V	38.9	9.8	40.1	57.8	74	-16.2
11590	PK	49.8	308	H	38.9	9.8	40.1	57.1	74	-16.9
11590	AV	37.0	285	V	38.9	9.8	40.1	46.3	54	-7.7
11590	AV	39.5	246	H	38.9	9.8	40.1	47.7	54	-6.3

Out of Band edge

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5715	-40.31	-27
	5715 to 5725	-28.50	-17
Highest	5850 to 5860	-28.02	-17
	Above 5860	-35.07	-27
Note: the data just list the worst cases			

For the frequency band 5.725-5.850GHz (802.11ac VH80)

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
Channel (5775MHz)										
11550	PK	49.9	155	V	38.9	9.8	40.1	59.7	74	-14.3
11550	PK	51.0	171	H	38.9	9.8	40.1	60.7	74	-13.3
11550	AV	38.1	151	V	38.9	9.8	40.1	46.5	54	-7.5
11550	AV	38.1	216	H	38.9	9.8	40.1	45.6	54	-8.4

Out of Band edge

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5715	-38.32	-27
	5715 to 5725	-28.91	-17
Highest	5850 to 5860	-26.59	-17
	Above 5860	-33.85	-27
Note: the data just list the worst cases			

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

10. Frequency Stability

10.1 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.

10.2 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	DC 3.5-4.3V of declared nominal voltage
-30°C to +50°C	Normal

10.3 Environmental Conditions

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

10.4 Summary of Test Results/Plots

5725-5850MHz

802.11a

Reference Frequency(Middle Channel): 5785 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.8	128	0.0221
40	3.8	108	0.0187
30	3.8	93	0.0161
20	3.8	103	0.0178
10	3.8	172	0.0297
0	3.8	146	0.0252
-10	3.8	154	0.0266
-20	3.8	87	0.0150
-30	3.8	119	0.0206

802.11n_HT20

Reference Frequency(Middle Channel): 5785 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.8	148	0.0256
40	3.8	134	0.0232
30	3.8	153	0.0264
20	3.8	138	0.0239
10	3.8	111	0.0192
0	3.8	101	0.0175
-10	3.8	149	0.0258
-20	3.8	105	0.0182
-30	3.8	183	0.0316

802.11n_HT40

Reference Frequency(Middle Channel): 5755 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.8	118	0.0205
40	3.8	124	0.0215
30	3.8	134	0.0233
20	3.8	125	0.0217
10	3.8	116	0.0202
0	3.8	147	0.0255
-10	3.8	157	0.0273
-20	3.8	184	0.0320
-30	3.8	164	0.0285

802.11ac_VH80

Reference Frequency(Middle Channel): 5775MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.8	152	0.0263
40	3.8	106	0.0184
30	3.8	102	0.0177
20	3.8	116	0.0201
10	3.8	190	0.0329
0	3.8	146	0.0253
-10	3.8	115	0.0199
-20	3.8	166	0.0287
-30	3.8	131	0.0227

So, Frequency Stability Versus Input Voltage is:

5725-5850MHz

802.11a

Reference Frequency(Middle Channel): 5785 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.5	173	0.0299
	3.8	103	0.0178
	4.35	148	0.0256

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	3.5	156	0.0270
	3.8	138	0.0239
	4.35	161	0.0278

802.11n_HT40

Reference Frequency(Middle Channel): 5775 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.5	129	0.0224
	3.8	125	0.0217
	4.35	139	0.0242

802.11ac_VH80

Reference Frequency(Middle Channel): 5775 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.5	120	0.0208
	3.8	116	0.0201
	4.35	129	0.0223

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