FCC Part 15E
Measurement and Test Report

For

Starry Inc.

38 Chauncy St Ste 200, Boston, MA 02111

FCC ID: 2AGZ3S00911

FCC Rule(s):	FCC Part 15E
Product Description:	Starry Launch
Tested Model:	S00911
Report No.:	STR18058007I
Sample Receipt Date:	2018-05-02
Tested Date:	2018-05-03 to 2018-07-02
Issued Date:	2018-07-04
Tested By:	Jong Wang / Engineer
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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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History of this report		
Version	**Description**	**Date**
1.0	First Edition	2018-05-23
Rev1	Second Edition	2018-07-16

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Starry Inc.
Address of applicant:	38 Chauncy St Ste 200, Boston, MA 02111
Manufacturer:	ShenZhen Spacetek Technology Co., Ltd
Address of manufacturer:	3F, NO.2Huafeng first science&technology Park, SanWei, Baoan District ShenZhen, China

General Description of EUT	
Product Name:	Starry Launch
Trade Name:	/
Model No.:	S00911
Adding Model(s):	L36104HPWD
Rated Voltage:	Adapter DC 12V
Battery capacity:	/
Power Adapter Model:	MKS-1201000S INPUT:100-240V-50/60Hz 0.3A OUTPUT:12V 1000mA
Note: The test data is gathered from a production sample provided by the manufacturer.	

Technical Characteristics of EUT	
Wi-Fi(5G/5.8G)	
Support Standards:	802.11a, 802.11n(HT20/40), 802.11ac-HT80
Frequency Range:	5150-5250MHz, 5725-5850MHz
RF Output Power:	Antenna 1: 20.84dBm (Conducted) Antenna 2: 20.58dBm (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:	Antenna 1: 5.0dBi; Antenna 2: 5.0dBi

1.2 Test Standards

The following report is prepared on behalf of the Starry Inc. 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 v02r01 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

The test utility software used during testing was “RPTA1-71W.M4300.01.GD.2015Sep1”. 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								20	20	20
802.11n-HT20 MCS0	16	16	16								20	20	20

Mode	NCB: 40MHz									
	5190	5230	5270	5310	5510	5550	5670	5710	5755	5795
802.11n-HT40 MCS0	17	17							20	20

Mode	NCB: 80MHz					
	5210	5290	5530	5610	5690	5775
802.11ac-HT80 MCS0/Nss2	20					20

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 WIN XP 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, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	802.11a	5180MHz,5200MHz,5240MHz,5745MHz, 5785MHz,5825MHz
TM2	802.11n-HT20	5180MHz,5200MHz,5240MHz,5745MHz, 5785MHz,5825MHz
TM3	802.11n-HT40	5190MHz,5230MHz,5755MHz,5795MHz
TM4	802.11ac-HT80	5210MHZ; 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
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/

1.8 Measurement Uncertainty

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

1.9 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2018-05-22	2019-05-21
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2018-05-22	2019-05-21
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2018-05-22	2019-05-21
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2018-05-22	2019-05-21
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2018-05-22	2019-05-21
SEMT-1011	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2017-06-08	2020-06-07
SEMT-1042	Horn Antenna	ETS	3117	00086197	2017-06-08	2020-06-07
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2017-06-08	2020-06-07
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2017-06-08	2020-06-07
SEMT-1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2018-05-22	2019-05-21
SEMT-1003	L.I.S.N	Schwarz beck	NSLK8126	8126-224	2018-05-22	2019-05-21
SEMT-1002	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2018-05-22	2019-05-21
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	2018-05-22	2019-05-21
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2018-05-22	2019-05-21
SEMT-1170	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2018-05-22	2019-05-21

SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2018-05-22	2019-05-21
SEMT-1048	RF Limiter	ATTEN	AT-BSF-2400~2500	/	2018-05-22	2019-05-21
SEMT-1076	RF Switcher	Top Precision	RCS03-A2	/	2018-05-22	2019-05-21
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	2018-03-19	2019-03-18
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	2018-03-19	2019-03-18
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	2018-03-19	2019-03-18
SEMT-C004	Cable	Zheng DI	2M0RFC	/	2018-03-19	2019-03-18
SEMT-C005	Cable	Zheng DI	1M0RFC	/	2018-03-19	2019-03-18
SEMT-C006	Cable	Zheng DI	1M0RFC	/	2018-03-19	2019-03-18

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
§ 15.205; § 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 mobile transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the RF Exposure 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 external fixed antenna, fulfill the requirement of this section.

5. Power Spectral Density

5.1 Standard Applicable

Section 15.407(a) Power limits:

(1) For the band 5.15-5.25 GHz.
(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

(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.

5.2 Test Procedure

According to 789033 D02 v02r01 section F, 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 MHz, or < 500 kHz) and

integrated over 1 MHz, or 500 KHz bandwidth, the following adjustments to the procedures apply:

a) Set RBW ≥ 1/T, where T is defined in section II.B.l.a).
b) Set VBW ≥ 3 RBW.
c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 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 10log(1MHz/RBW) to the measured result, whereas RBW (< 1 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 KHZ is available on nearly all spectrum analyzers.

5.3 Environmental Conditions

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

5.4 Summary of Test Results/Plots

5150-5250MHz

Test Mode	Test Channel MHz	Power Spectral Density dBm/MHz			Limit dBm/MHz
		Chain 1	Chain 2	Total	
802.11a	5180	14.08	13.94	/	17
	5200	13.88	13.65	/	17
	5240	14.03	13.53	/	17
802.11n-HT20	5180	13.27	13.31	16.30	17
	5200	13.15	13.26	16.22	17
	5240	13.11	13.10	16.12	17
802.11n-HT40	5190	12.64	12.25	15.46	17
	5230	12.28	12.02	15.16	17
802.11ac-HT80	5210	11.15	11.07	14.12	17

5725-5850MHz

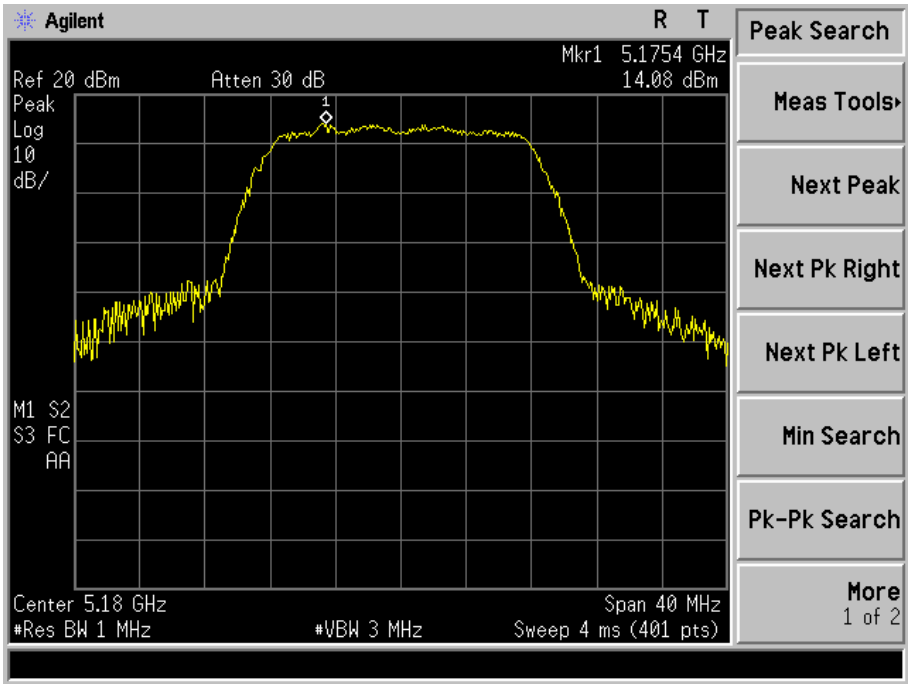
Test Mode	Test Channel MHz	Power Spectral Density dBm/500kHz			Limit (dBm/500kHz)
		Chain 1	Chain 2	Total	
802.11a	5745	16.059	15.971	/	30
	5785	15.130	14.544	/	30
	5805	14.272	15.074	/	30
802.11n-HT20	5745	15.985	15.169	18.61	30
	5785	14.628	14.186	17.42	30
	5805	14.322	14.000	17.17	30
802.11n-HT40	5755	12.015	11.942	14.99	30
	5795	11.468	11.675	14.58	30
802.11ac-HT80	5775	9.578	9.544	12.57	30

Note: If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

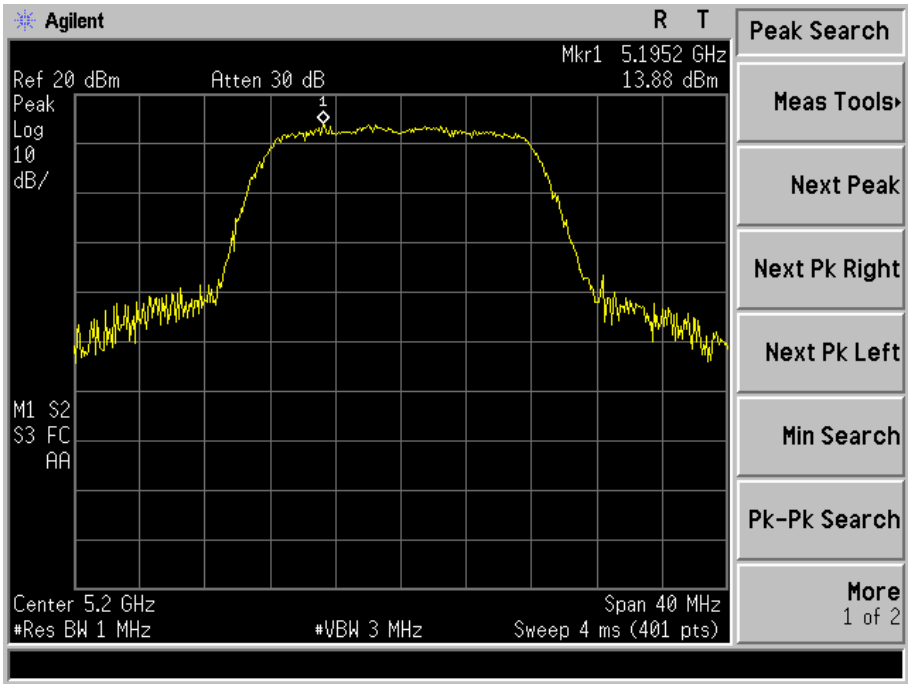
Antenna 1:

Test Mode: 802.11a

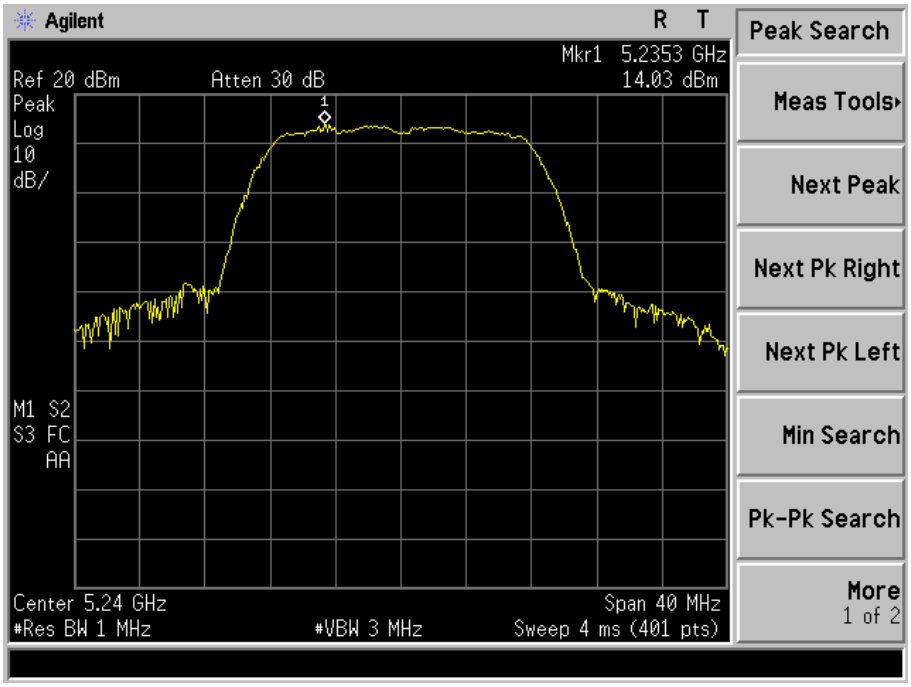
5180MHz



5200MHz



5240MHz



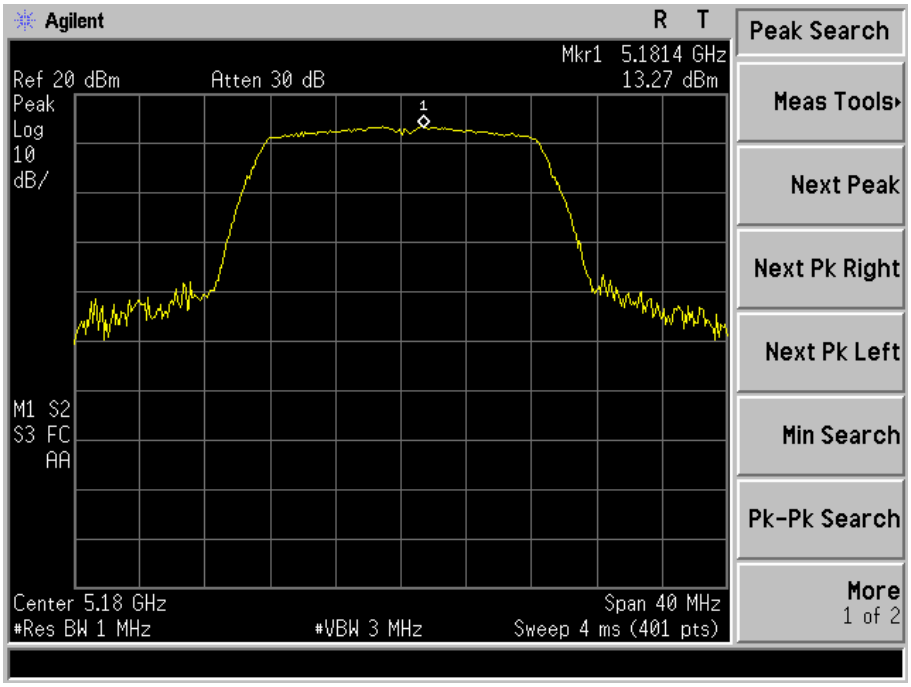
5745MHz

5785MHz

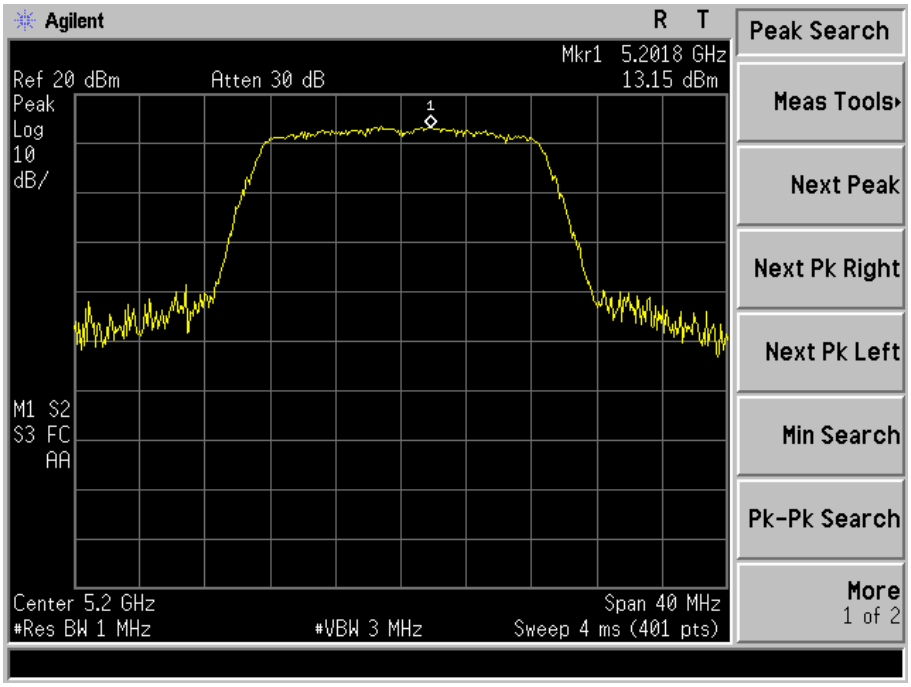
5825MHz

Test Mode: 802.11n-HT20

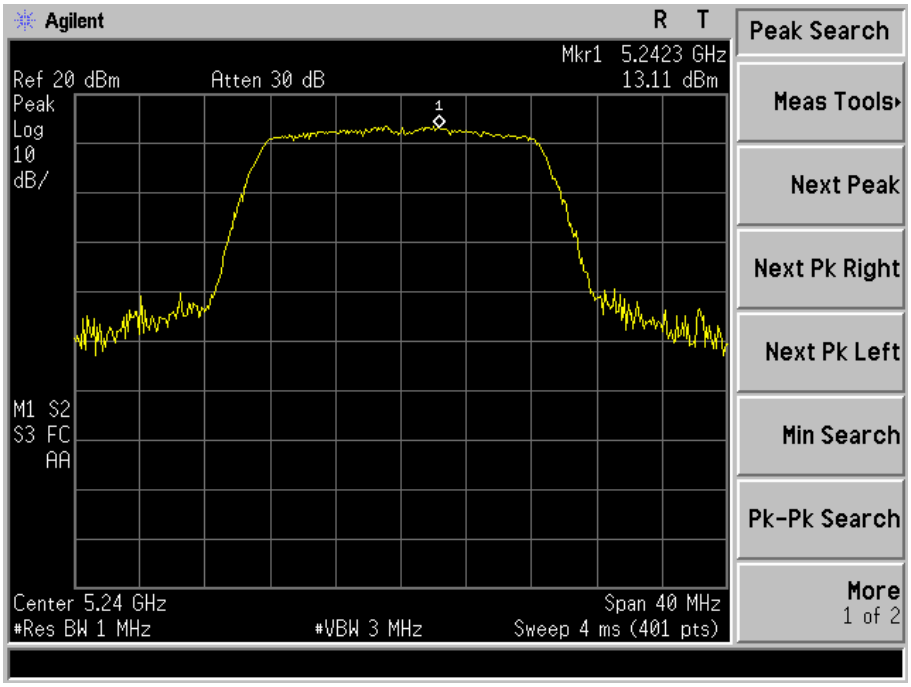
5180MHz



5200MHz



5240MHz



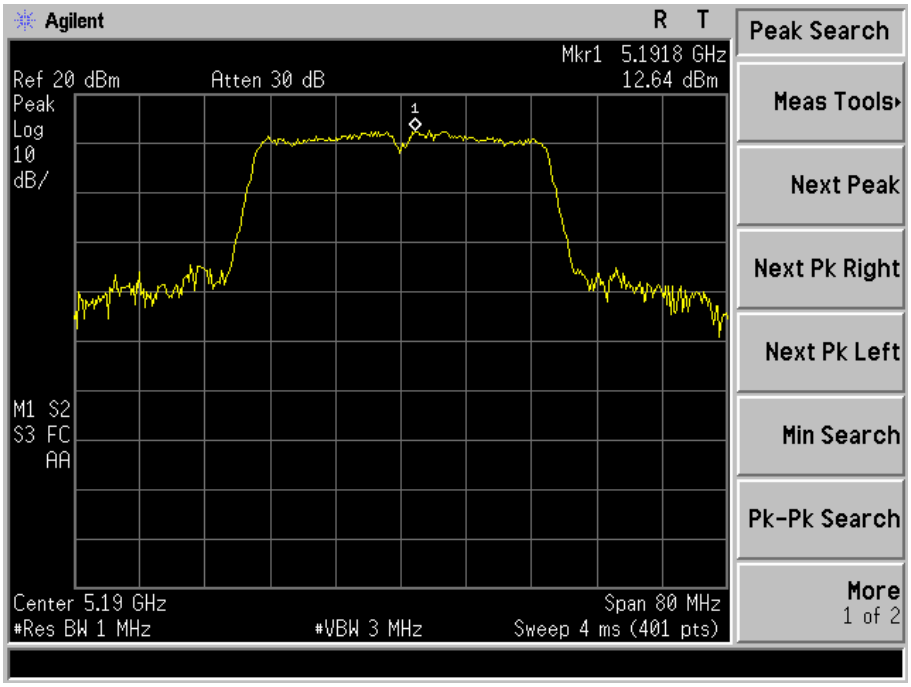
5745MHz

5785MHz

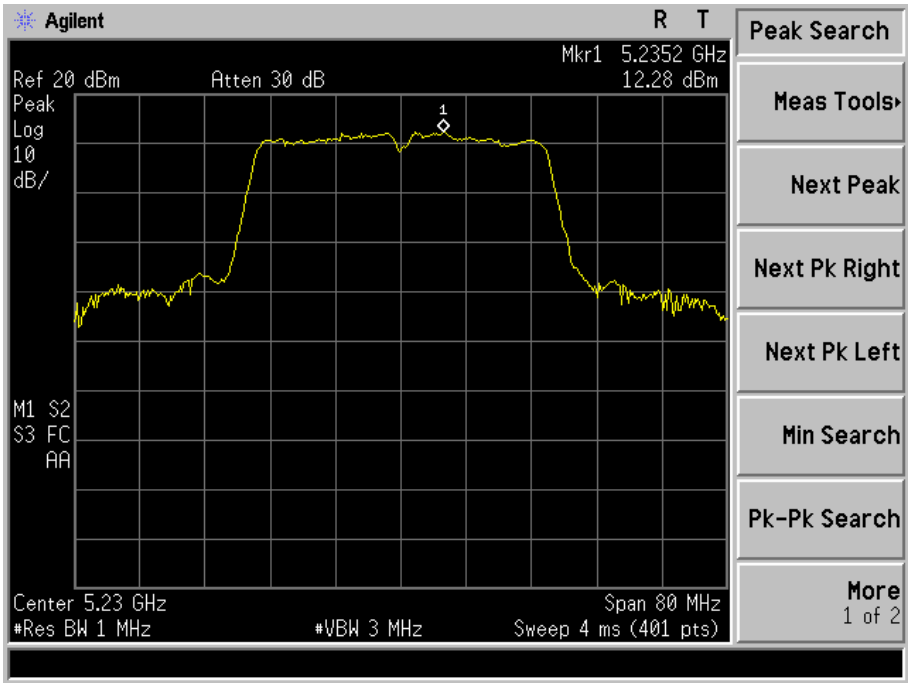
5825MHz

Test Mode: 802.11n-HT40

5190MHz



5230MHz

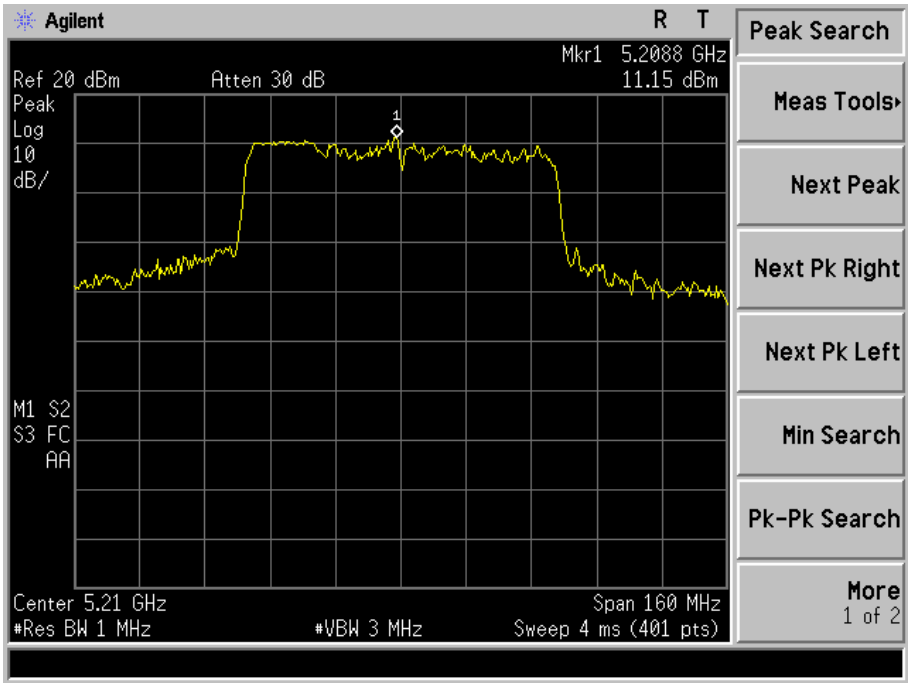


5755MHz

5795MHz

Test Mode: 802.11ac-HT80

5210MHz

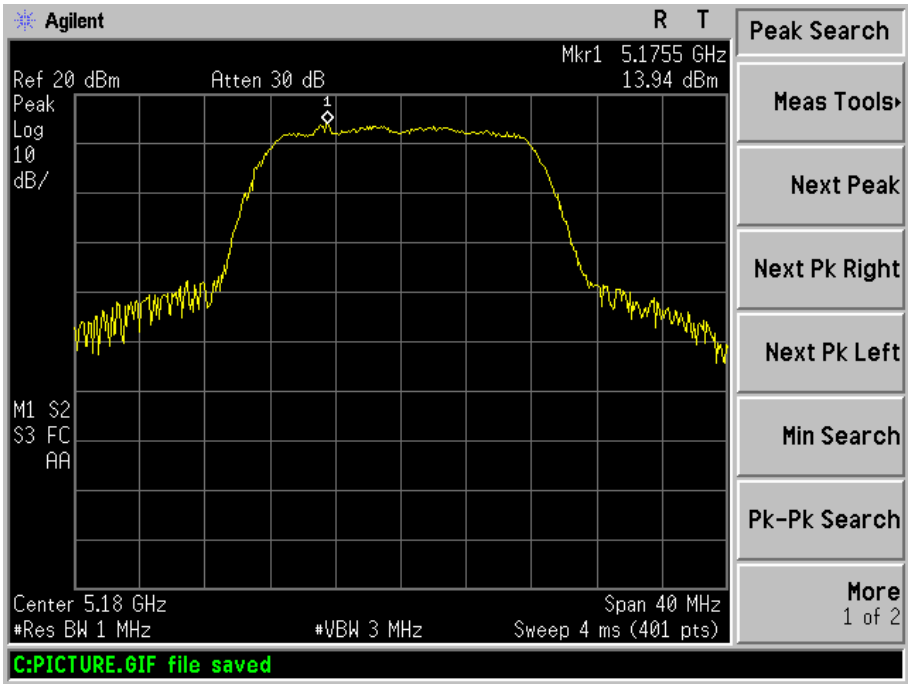


5755MHz

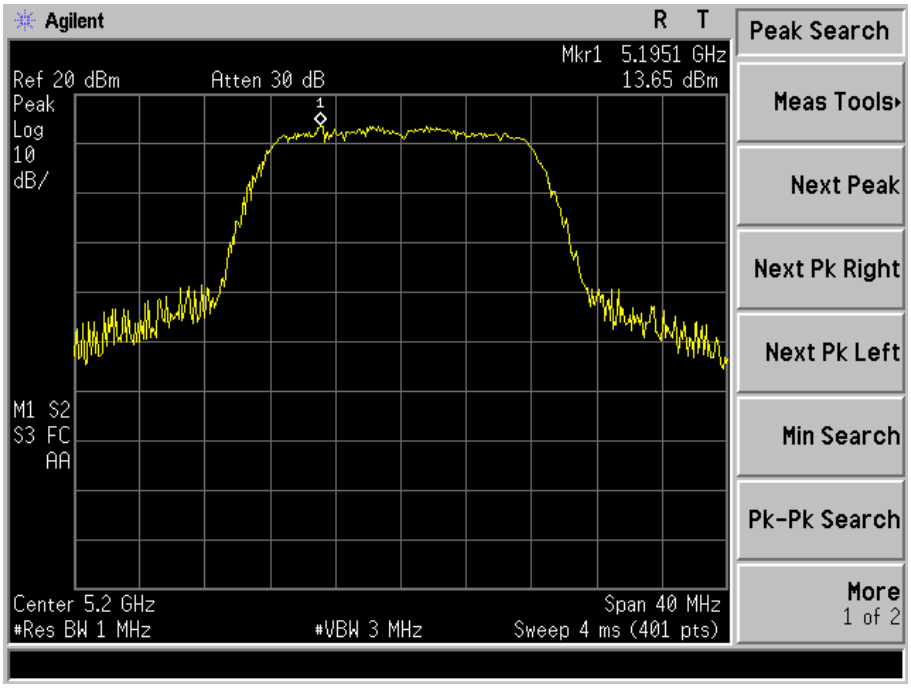
Antenna 2:

Test Mode: 802.11a

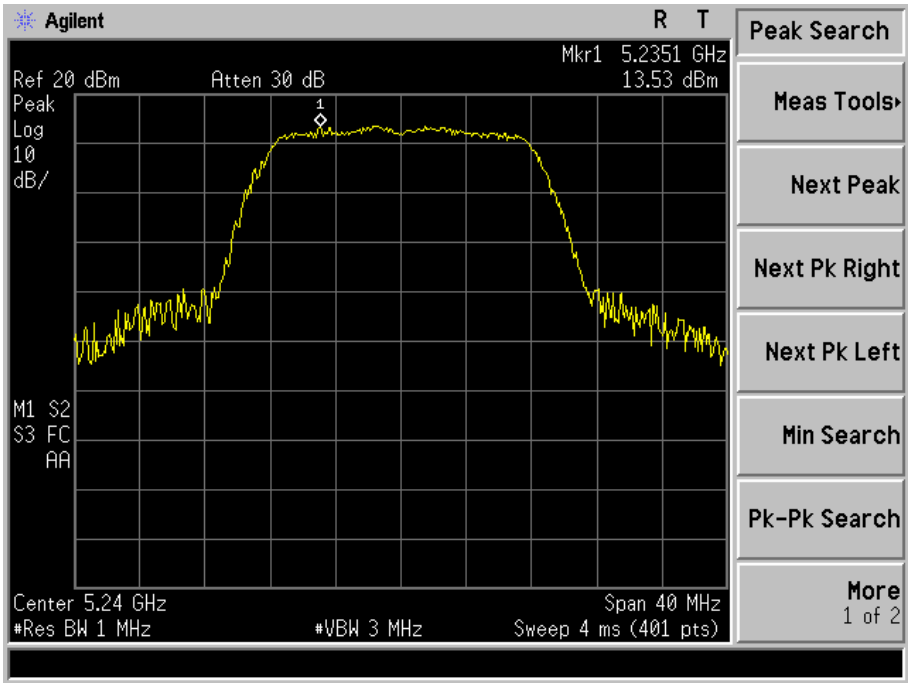
5180MHz



5200MHz



5240MHz



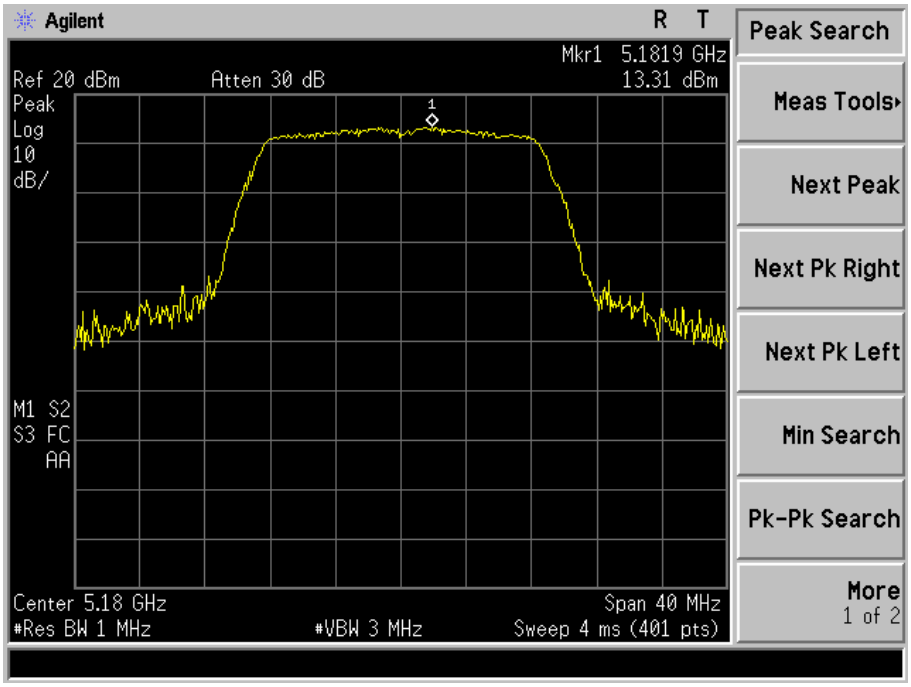
5745MHz

5785MHz

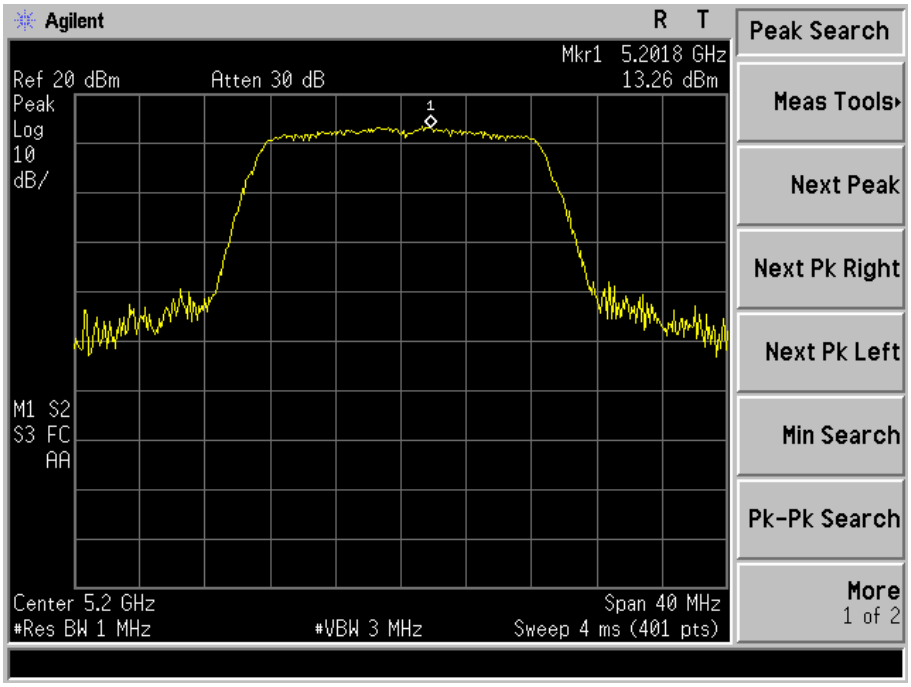
5825MHz

Test Mode: 802.11n-HT20

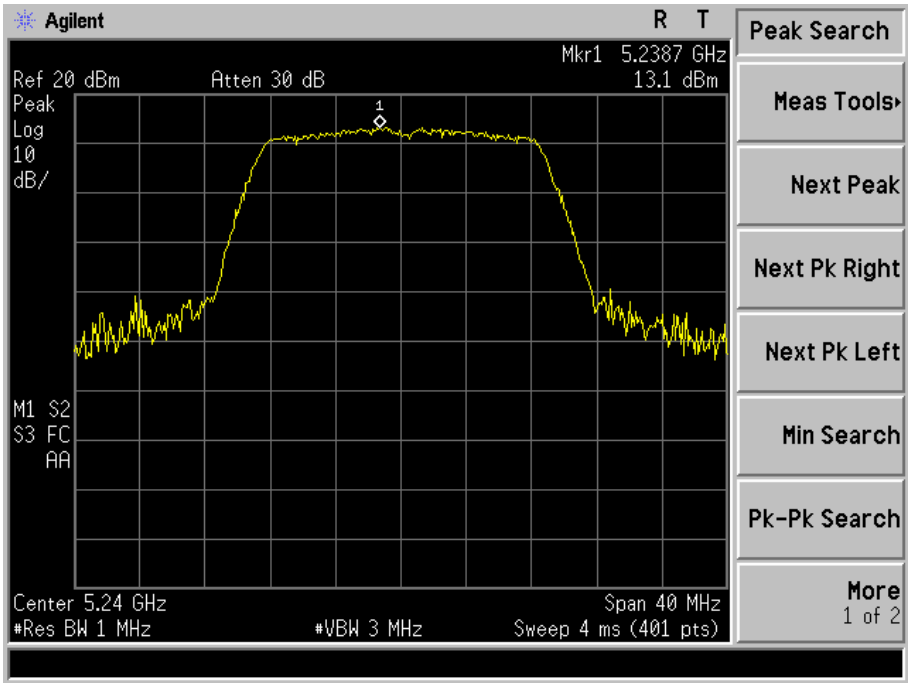
5180MHz



5200MHz



5240MHz



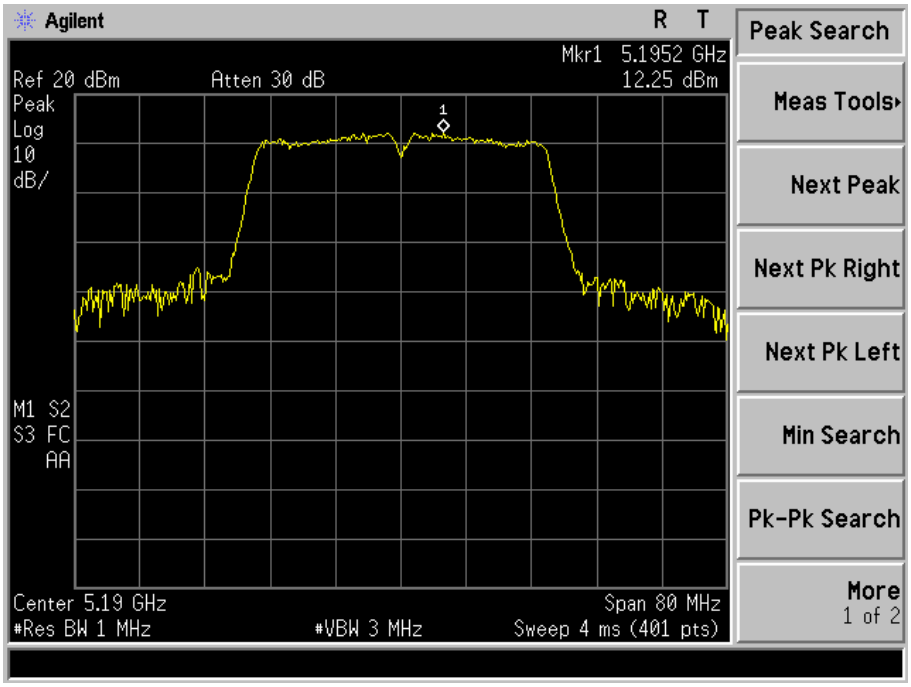
5745MHz

5785MHz

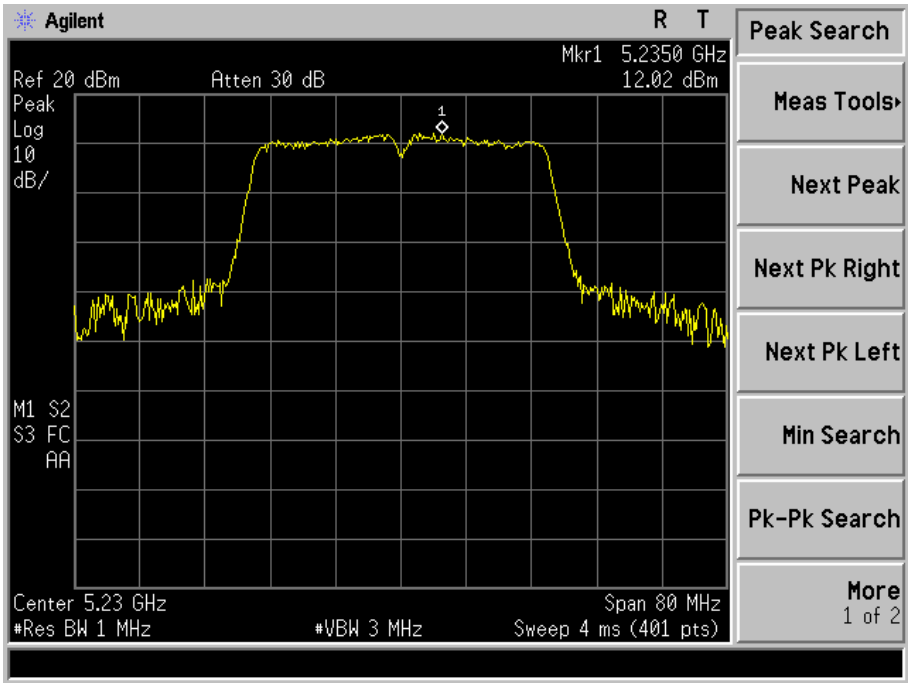
5825MHz

Test Mode: 802.11n-HT40

5190MHz



5230MHz

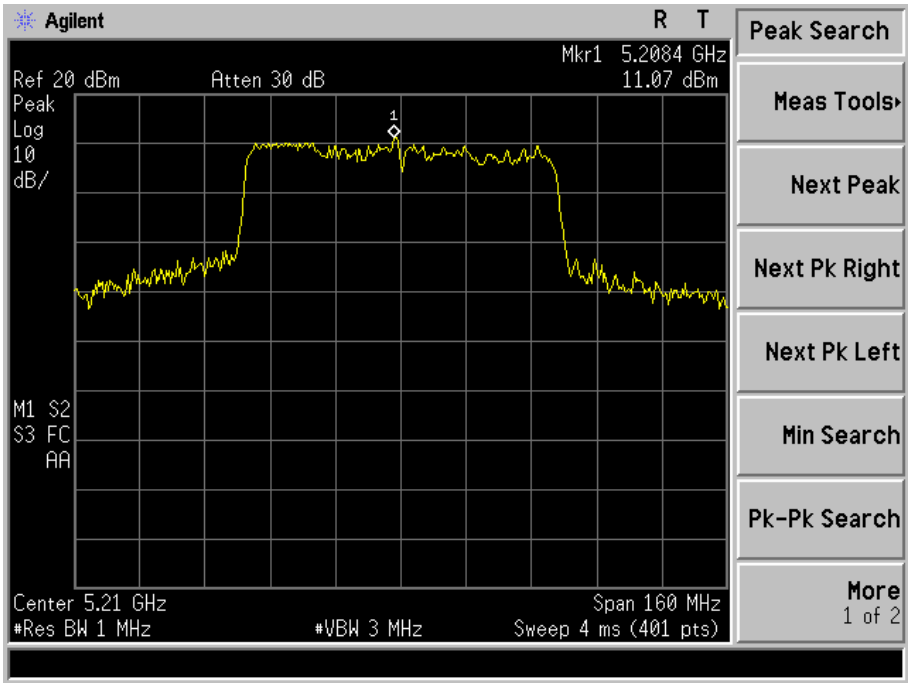


5755MHz

5795MHz

Test Mode: 802.11ac-HT80

5210MHz



5775MHz

6. Emission Bandwidth and Occupied Bandwidth

6.1 Standard Applicable

According to 15.407 (a) and (e)

(1) For the band 5.15-5.25 GHz.
(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

(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.

6.2 Test Procedure

According to 789033 D02 v02r01 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) ⩾ 3 × 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 v02r01 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 ⩾ 3 • 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.

6.3 Environmental Conditions

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

6.4 Summary of Test Results/Plots

Antenna 1:

5150-5250MHz

Test Mode	Test Channel MHz	26 dB Bandwidth MHz	99% Bandwidth MHz	Limit MHz
802.11a	5180	20.042	17.5589	Pass
	5200	19.952	17.5252	Pass
	5240	20.023	17.5391	Pass
802.11n-HT20	5180	19.980	17.5223	Pass
	5200	20.109	17.5439	Pass
	5240	20.009	17.5312	Pass
802.11n-HT40	5190	41.608	36.4284	Pass
	5230	41.745	36.4275	Pass
802.11ac-HT80	5210	81.082	74.8009	Pass

5725-5850MHz

Test Mode	Test Channel MHz	6 dB Bandwidth MHz	99% Bandwidth MHz	Limit MHz
802.11a	5745	17.40	17.537	≥500
	5785	17.44	17.568	≥500
	5825	17.40	17.555	≥500
802.11n-HT20	5745	17.41	17.521	≥500
	5785	17.55	17.569	≥500
	5825	17.58	17.532	≥500
802.11n-HT40	5755	36.41	36.207	≥500
	5795	36.22	36.124	≥500
802.11ac-HT80	5775	74.89	74.869	≥500

Antenna 2:

5150-5250MHz

Test Mode	Test Channel MHz	26 dB Bandwidth MHz	99% Bandwidth MHz	Limit MHz
802.11a	5180	19.543	16.5753	Pass
	5200	19.501	16.5473	Pass
	5240	19.519	16.5307	Pass
802.11n-HT20	5180	20.170	17.5293	Pass
	5200	19.946	17.4972	Pass
	5240	20.173	17.5113	Pass
802.11n-HT40	5190	41.394	36.3551	Pass
	5230	41.379	36.3973	Pass
802.11n-HT80	5210	81.054	74.8349	Pass

5725-5850MHz

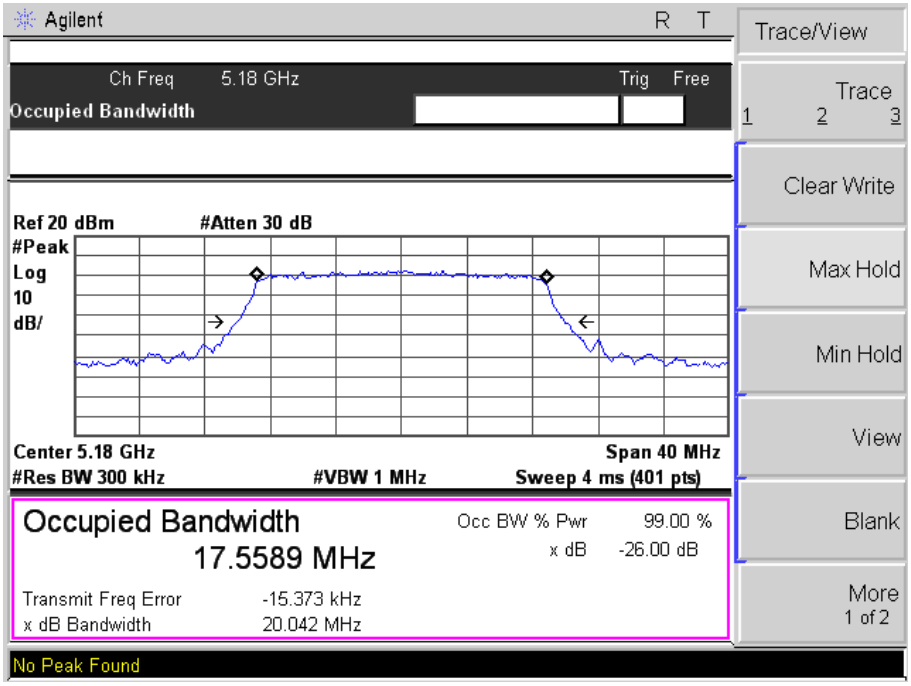
Test Mode	Test Channel MHz	6 dB Bandwidth MHz	99% Bandwidth MHz	Limit MHz
802.11a	5745	17.41	17.531	≥500
	5785	17.37	17.519	≥500
	5825	17.35	17.541	≥500
802.11n-HT20	5745	17.39	17.526	≥500
	5785	17.28	17.515	≥500
	5825	17.40	17.523	≥500
802.11n-HT40	5755	36.04	36.186	≥500
	5795	36.09	36.169	≥500
802.11n-HT80	5775	74.87	74.810	≥500

Antenna 1:

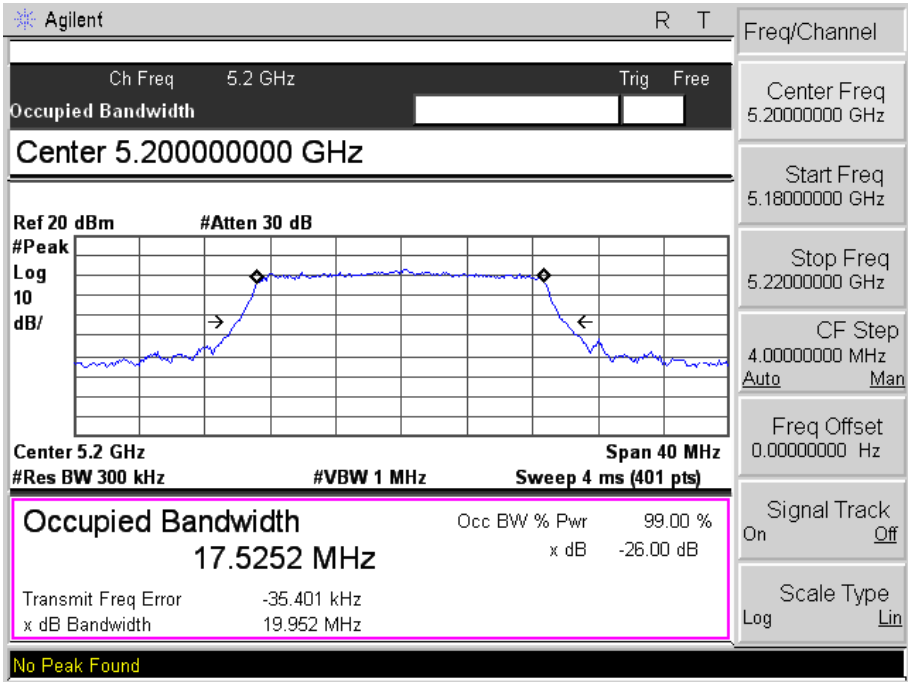
5150-5250MHz

Test mode：802.11a

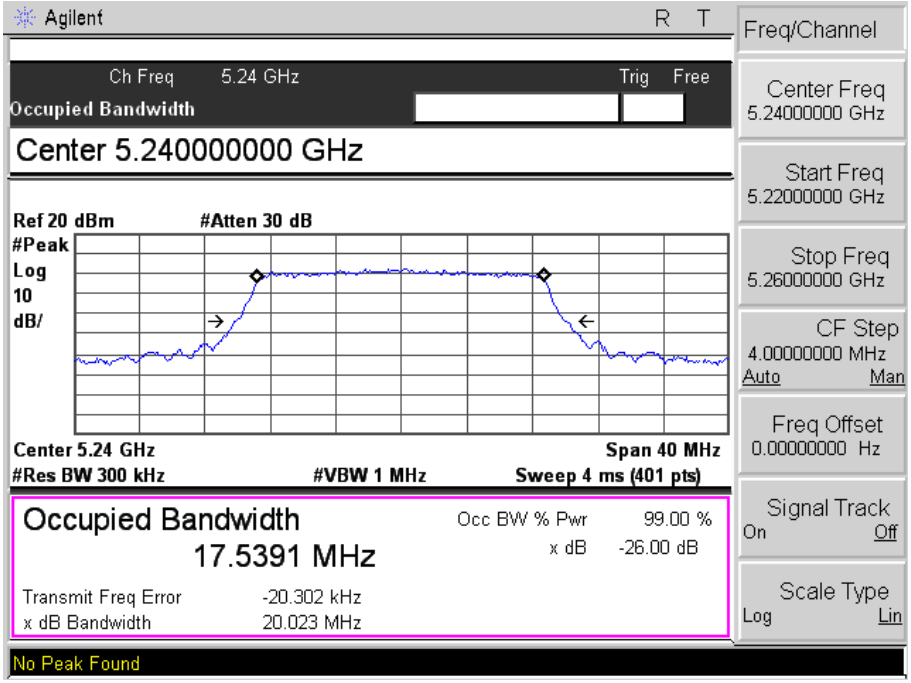
5180MHz



5200MHz

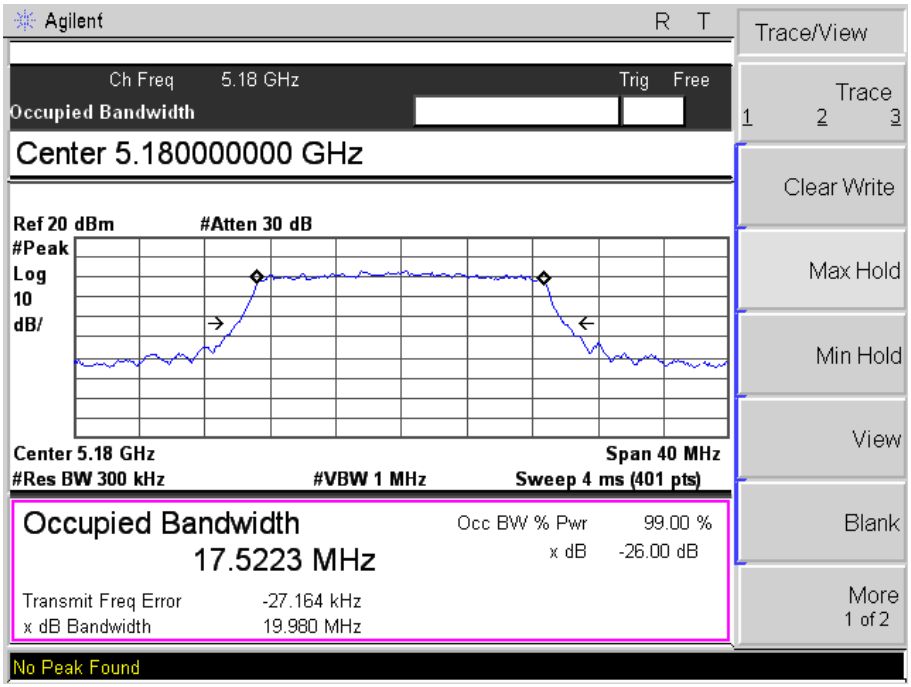


5240MHz

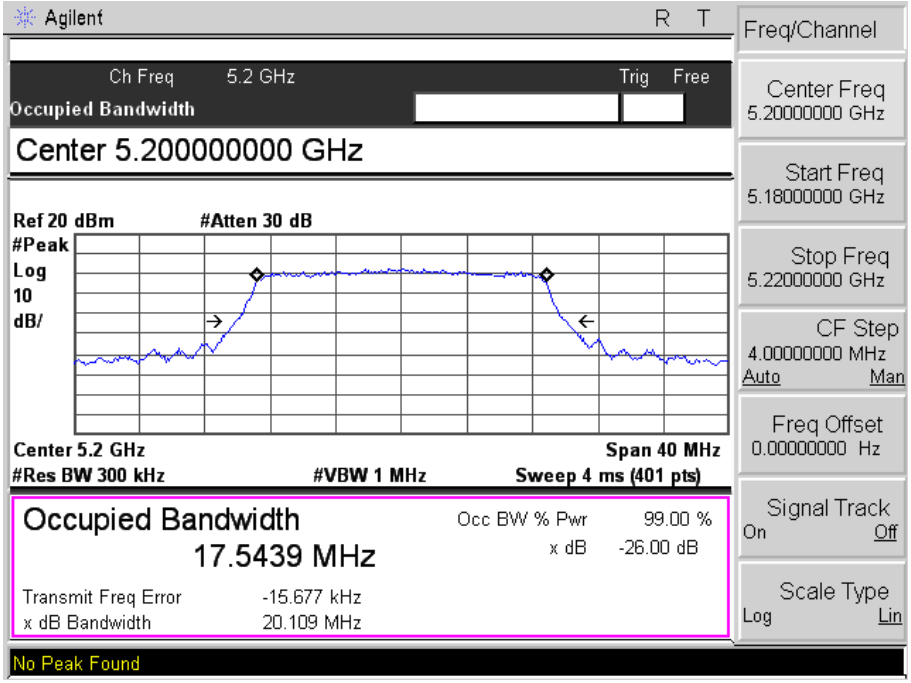


Test mode：802.11n-HT20

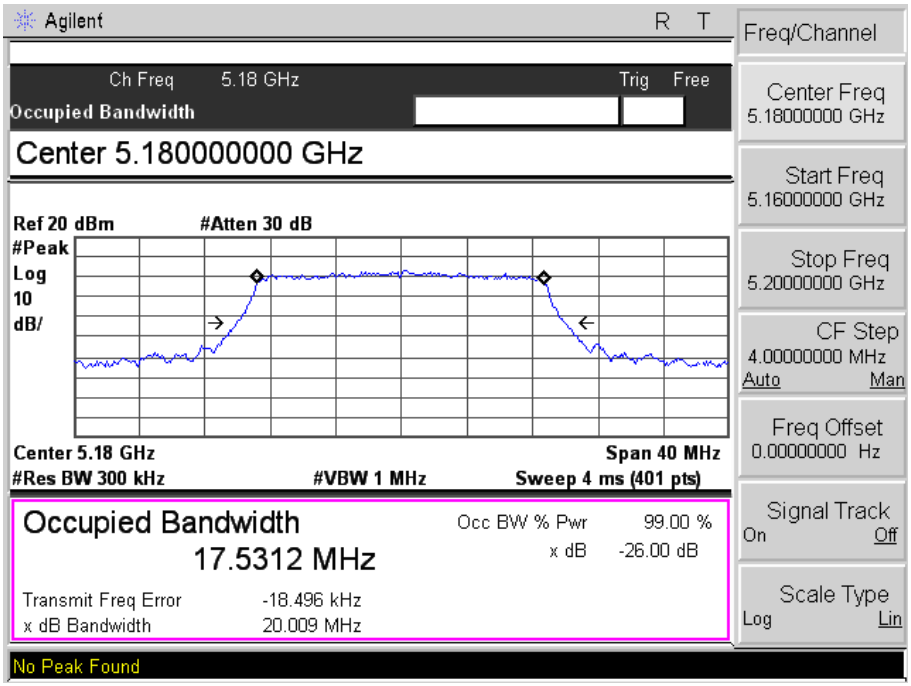
5180MHz



5200MHz

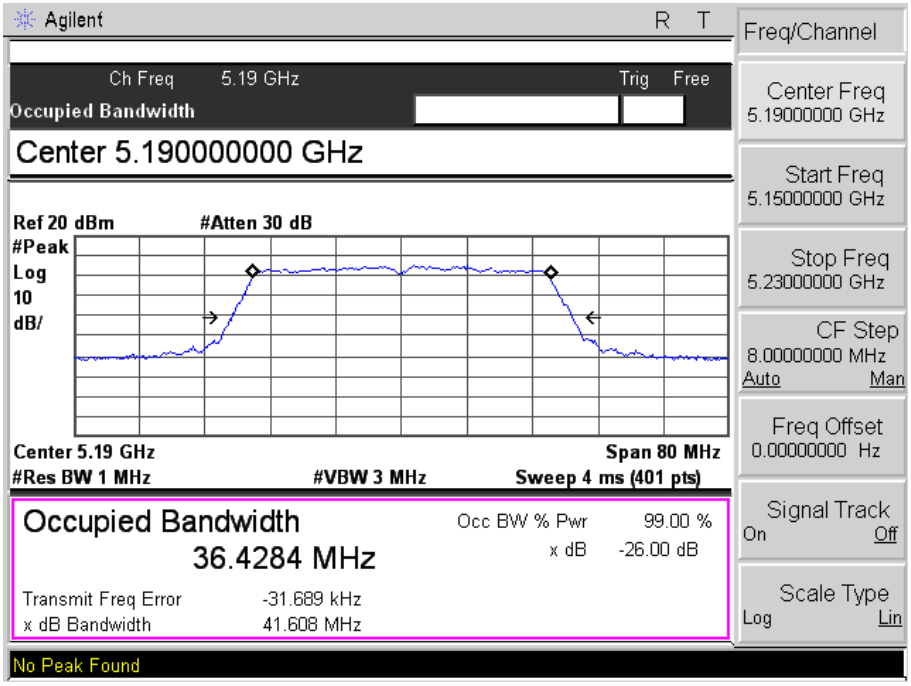


5240MHz

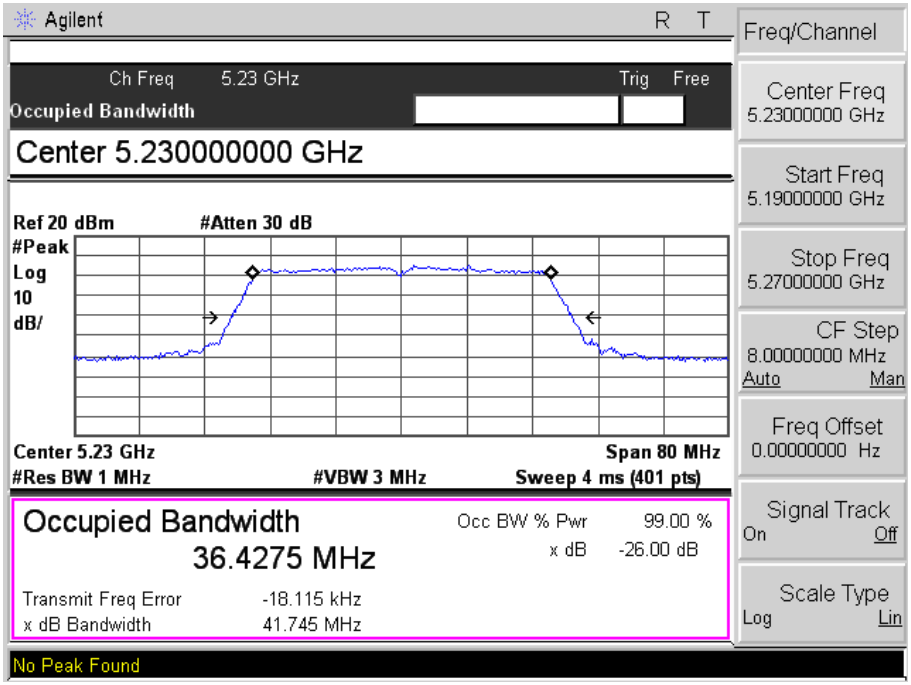


Test mode：802.11n-HT40

5190MHz

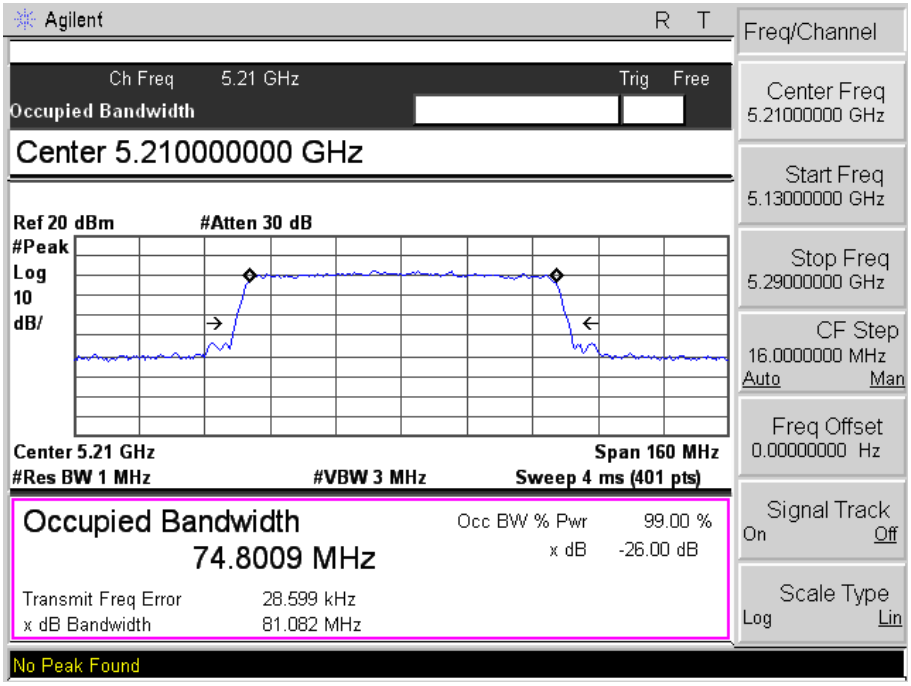


5230MHz



Test mode：802.11ac-HT80

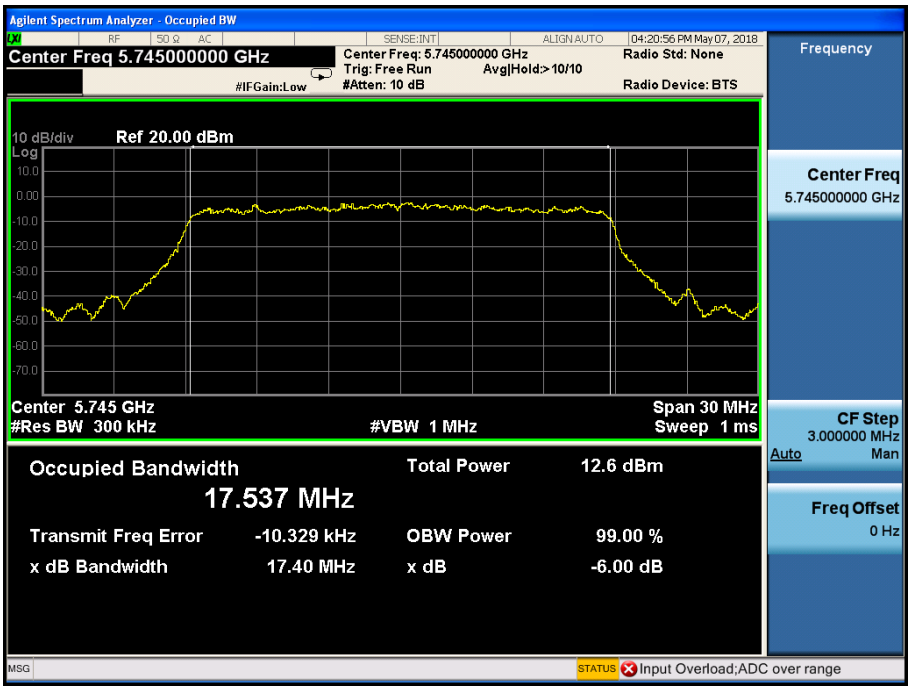
5210MHz



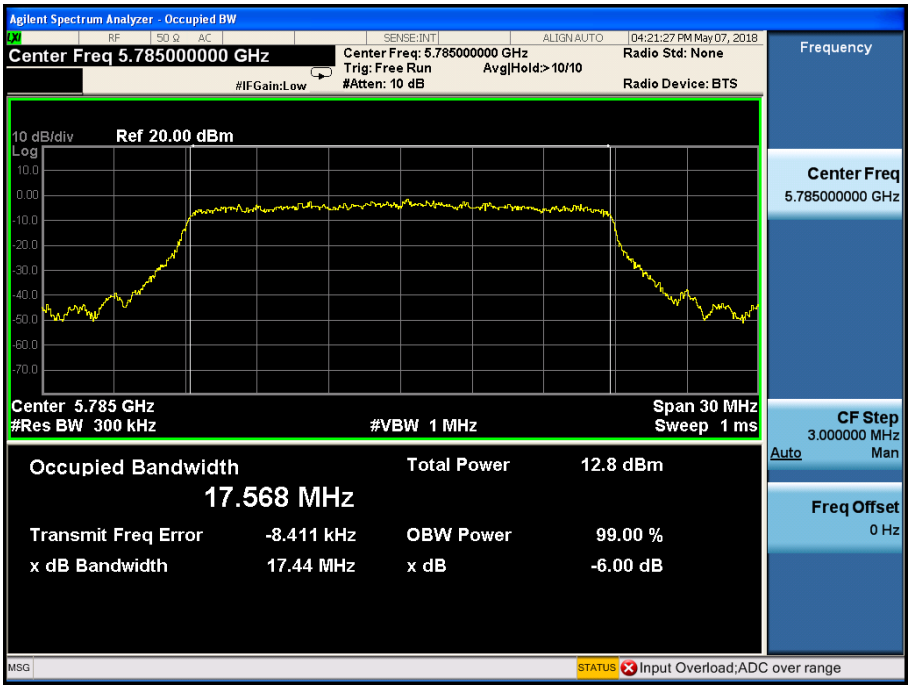
5725-5850MHz

Test mode：802.11a

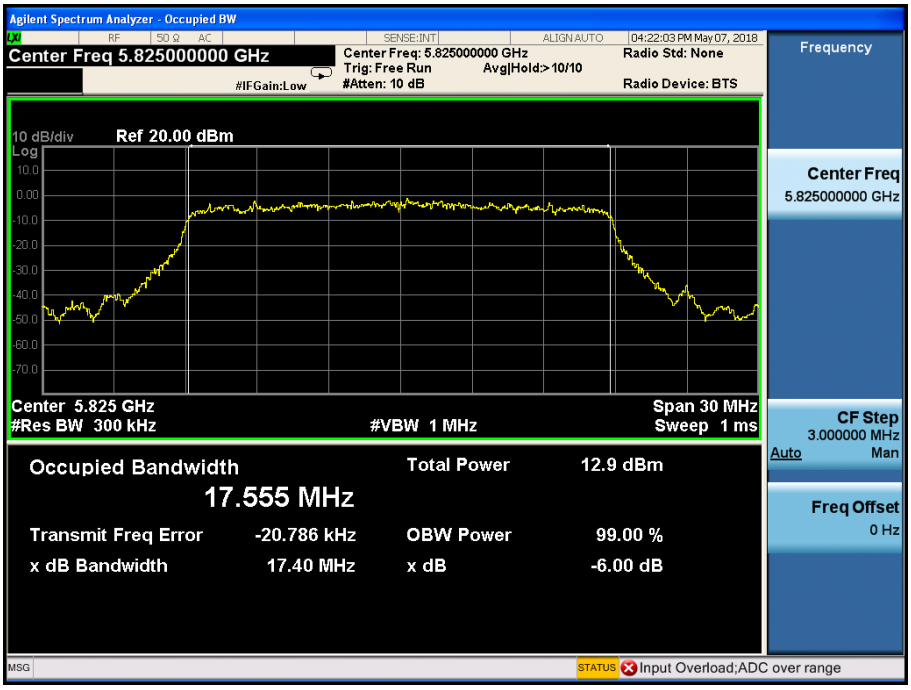
5745MHz



5785MHz

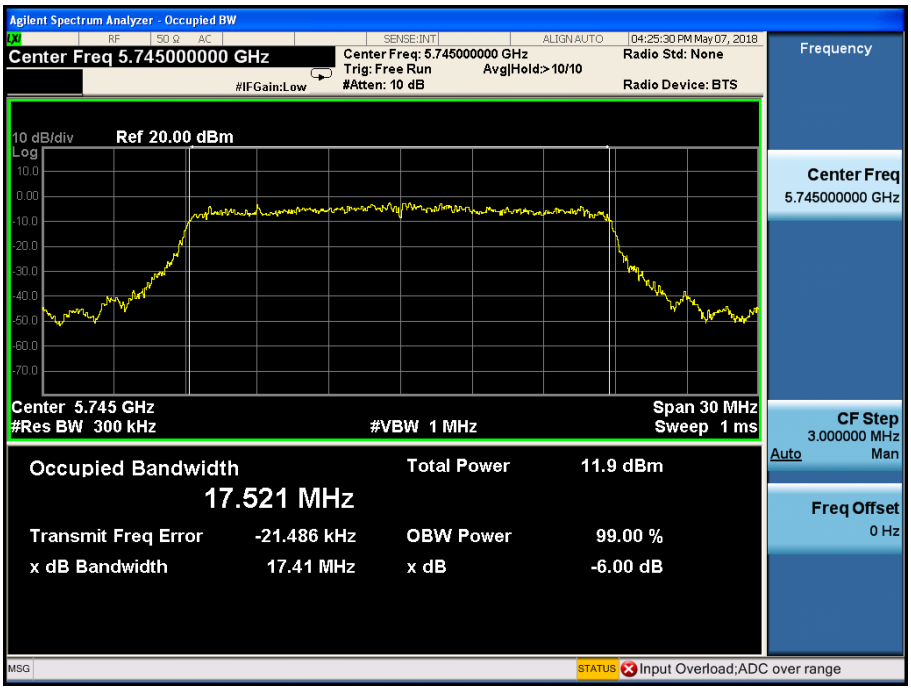


5825MHz

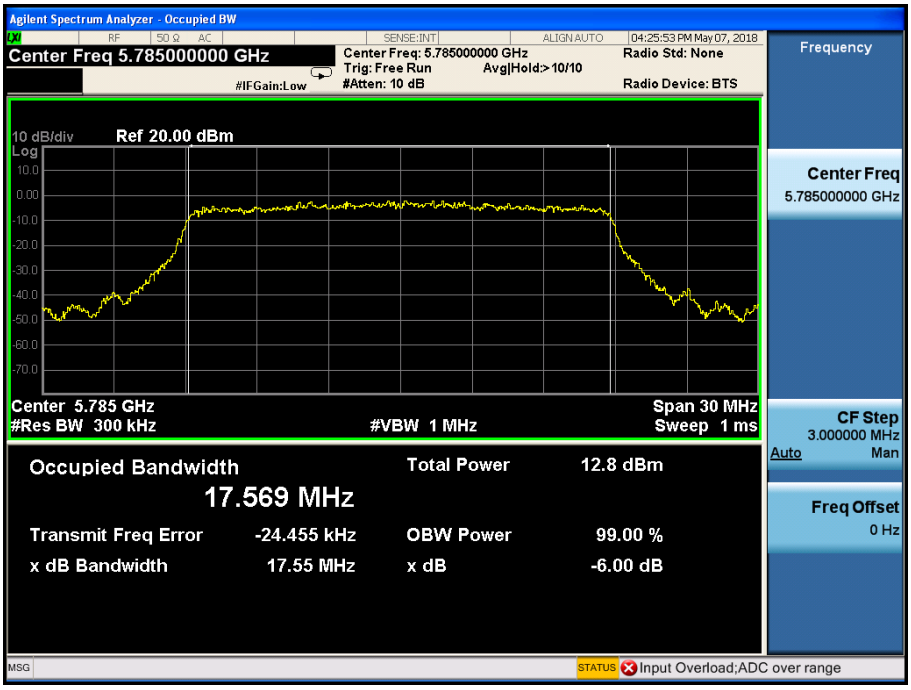


Test mode：802.11-HT20

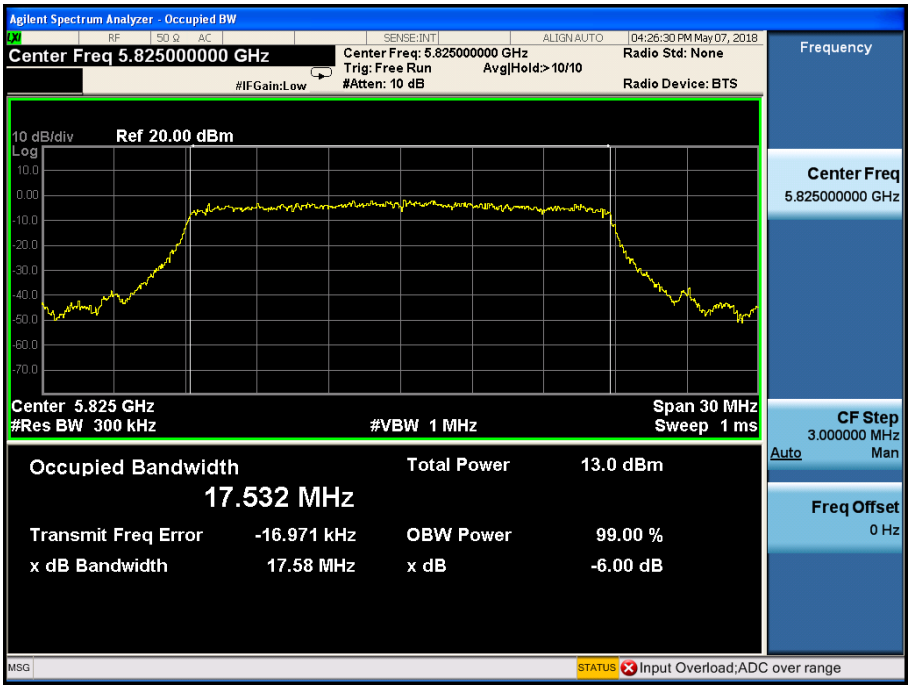
5745MHz



5785MHz

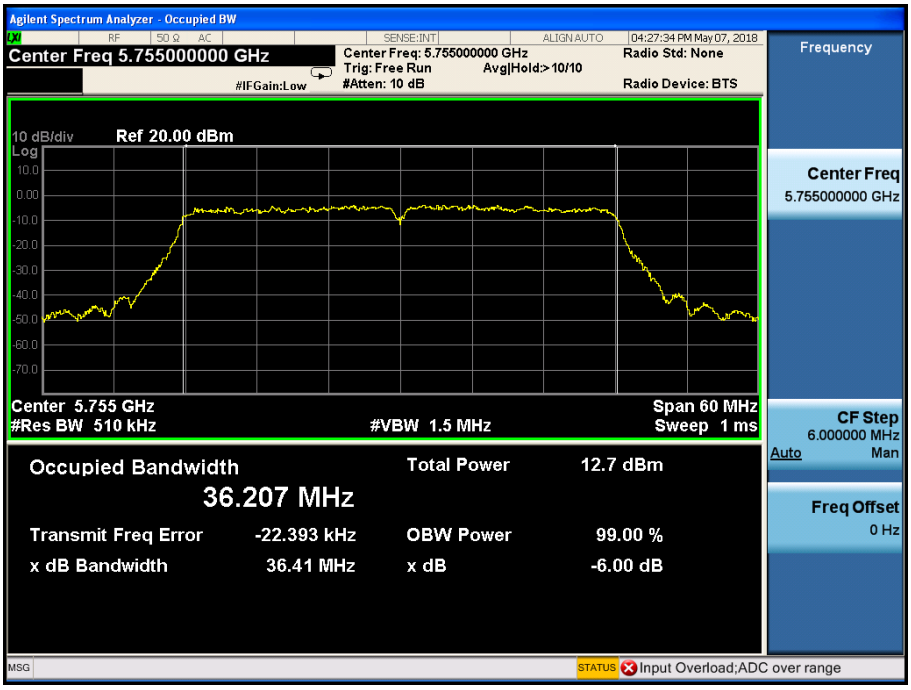


5825MHz

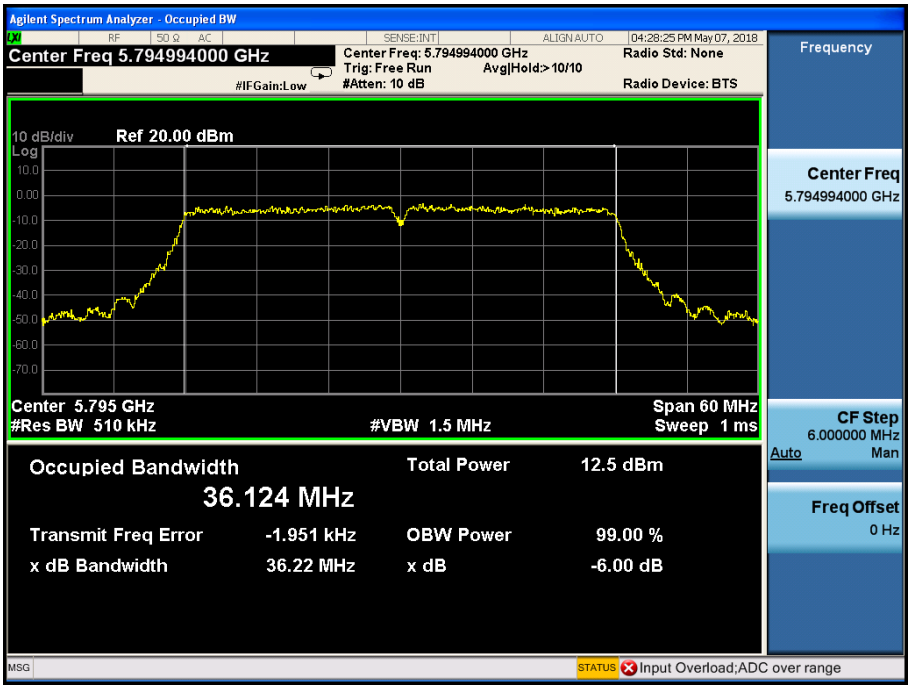


Test mode：802.11-HT40

5755MHz

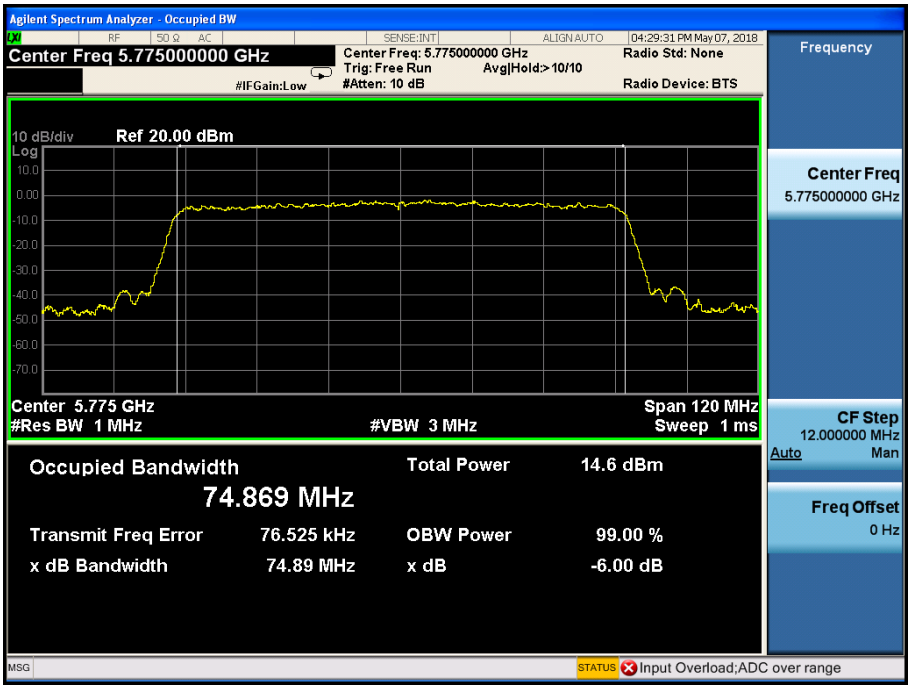


5785MHz



Test mode：802.11ac-HT80

5775MHz

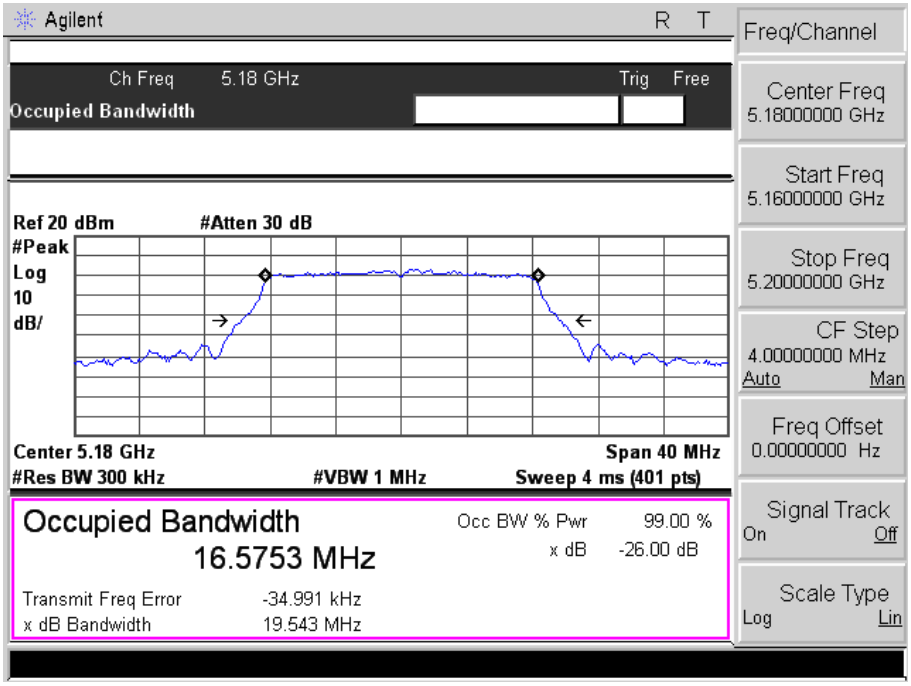


Antenna 2:

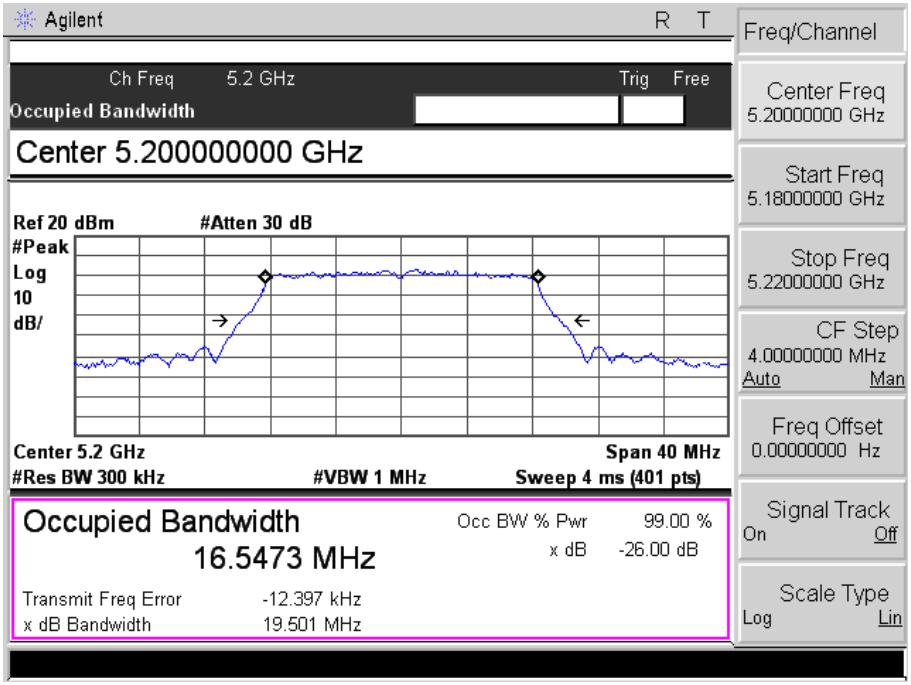
5150-5250MHz

Test mode：802.11a

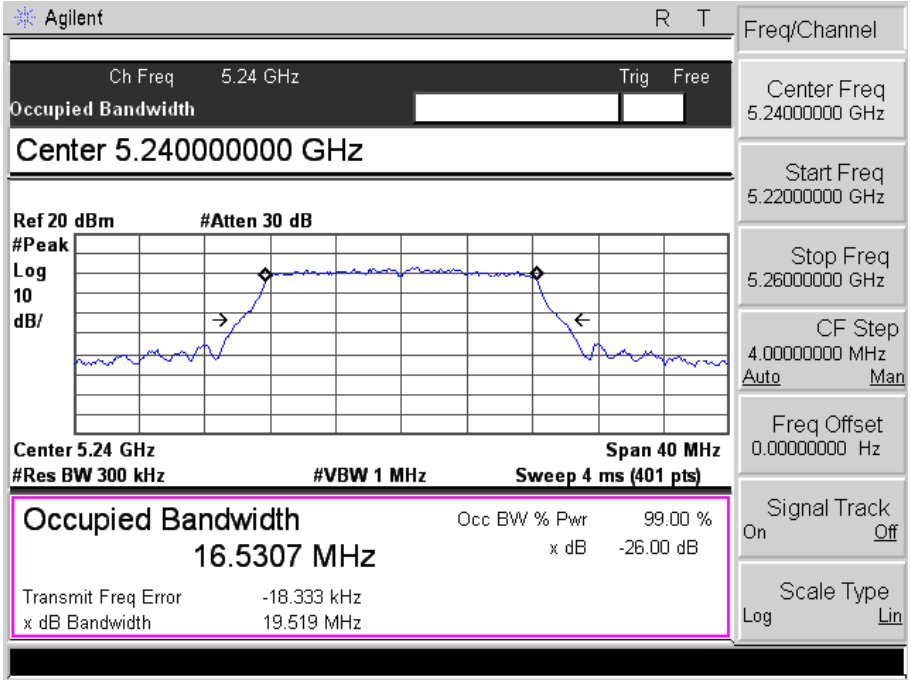
5180MHz



5200MHz

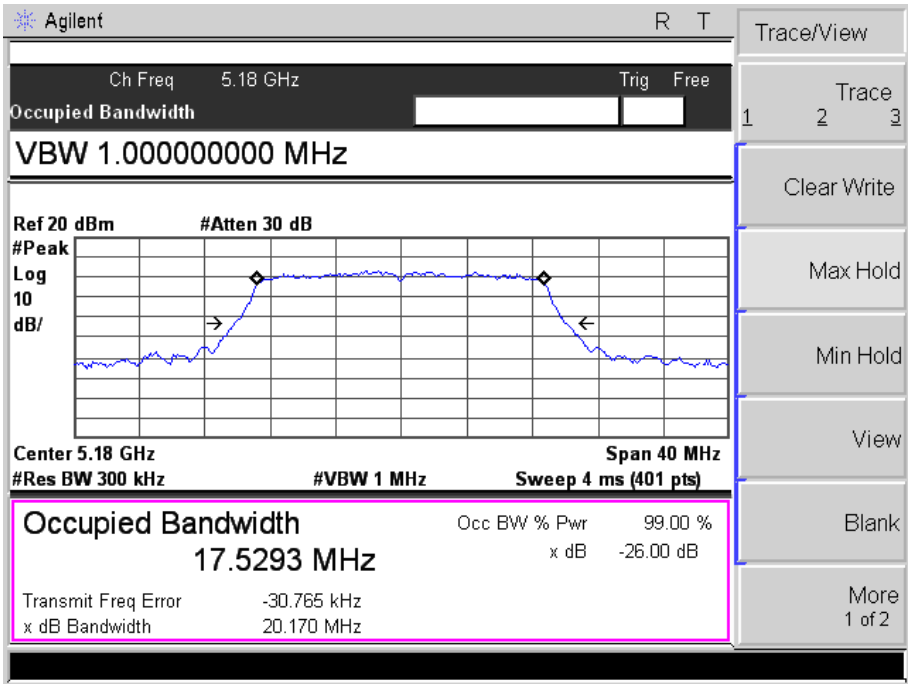


5240MHz

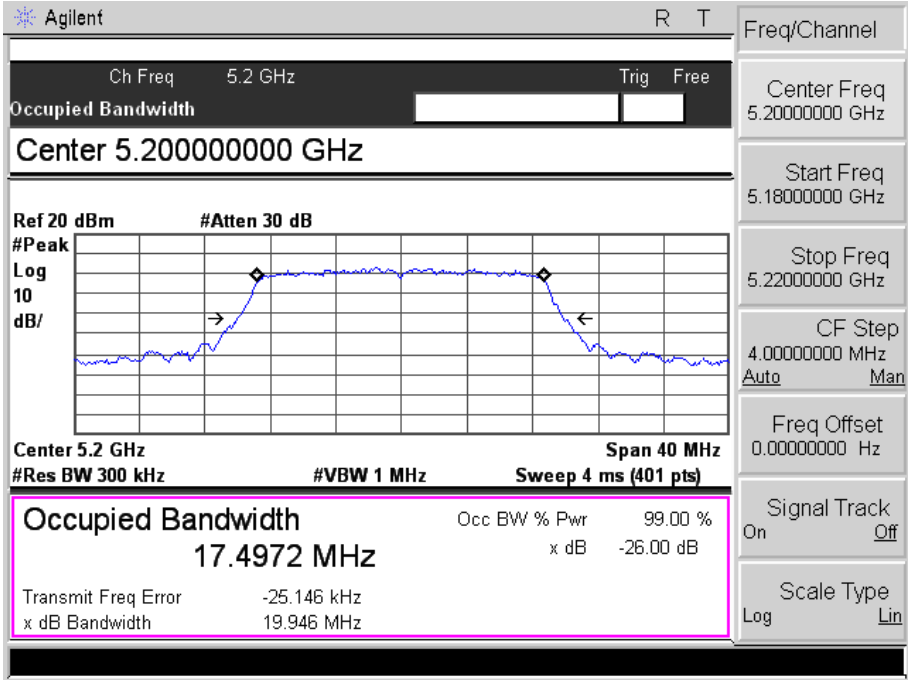


Test mode：802.11n-HT20

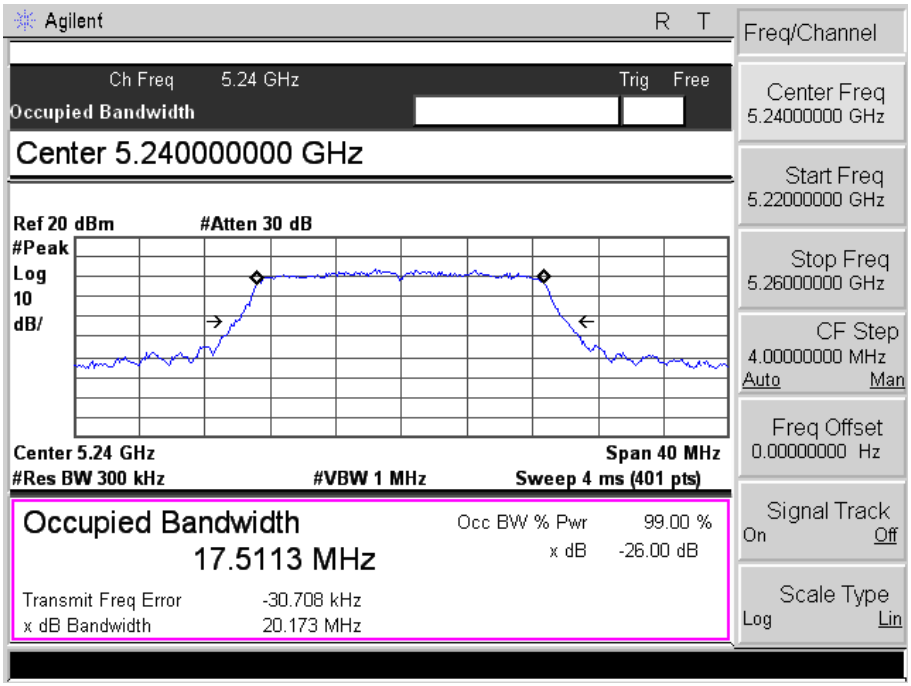
5180MHz



5200MHz

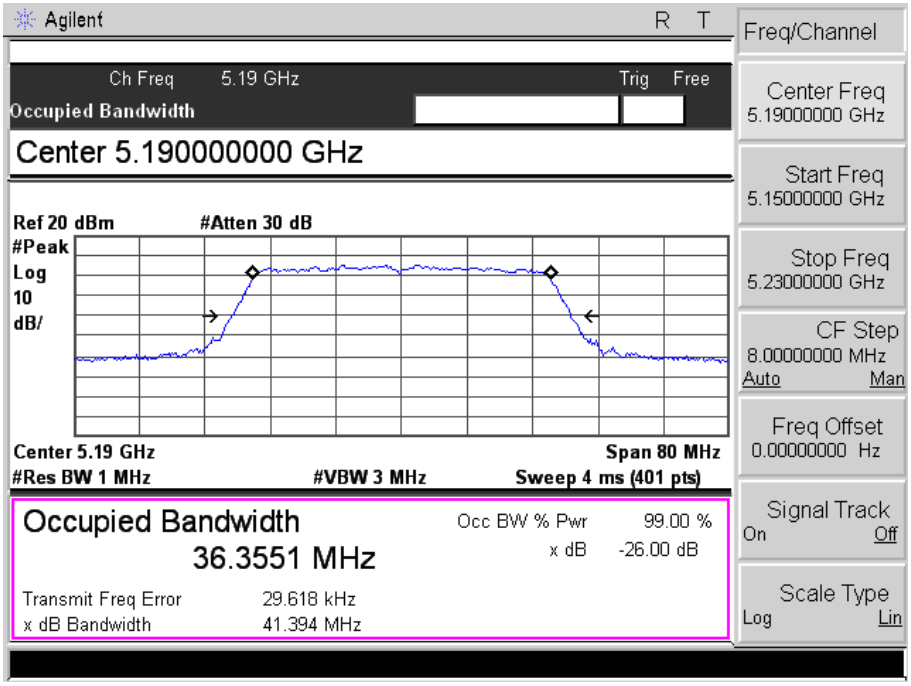


5240MHz

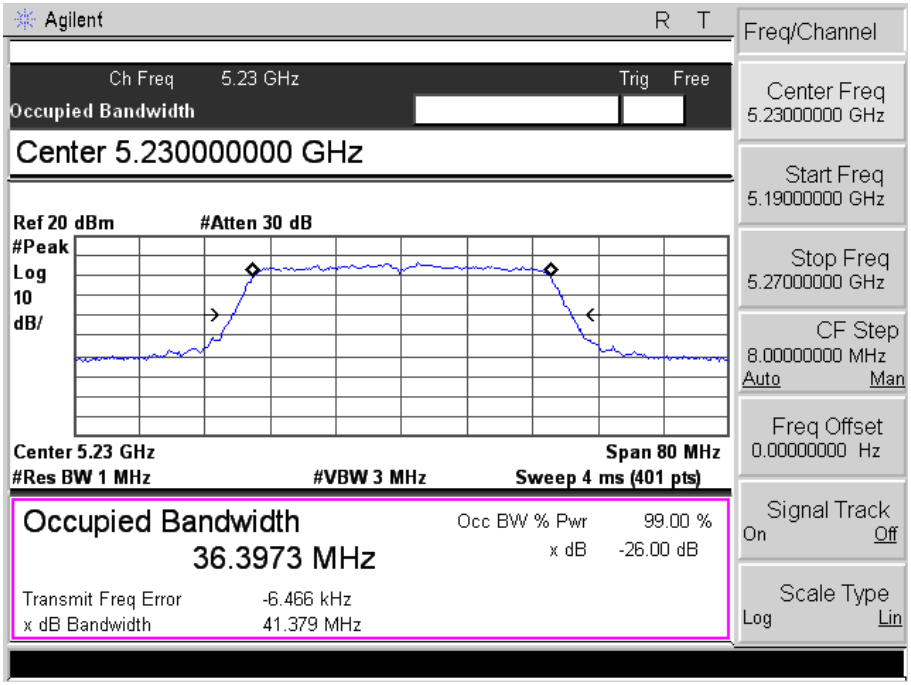


Test mode：802.11n-HT40

5190MHz

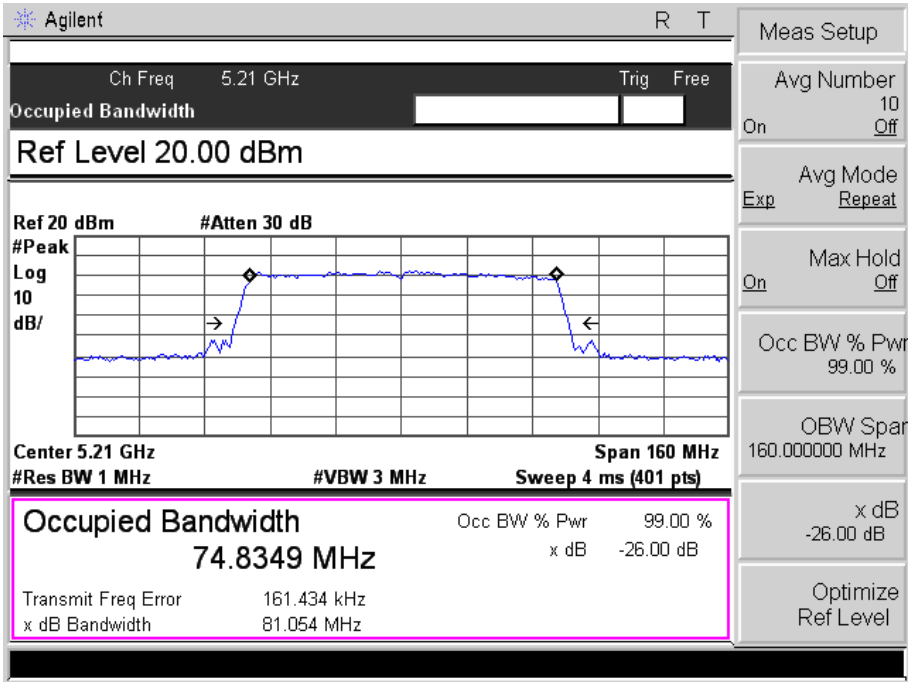


5230MHz



Test mode：802.11ac-HT80

5210MHz



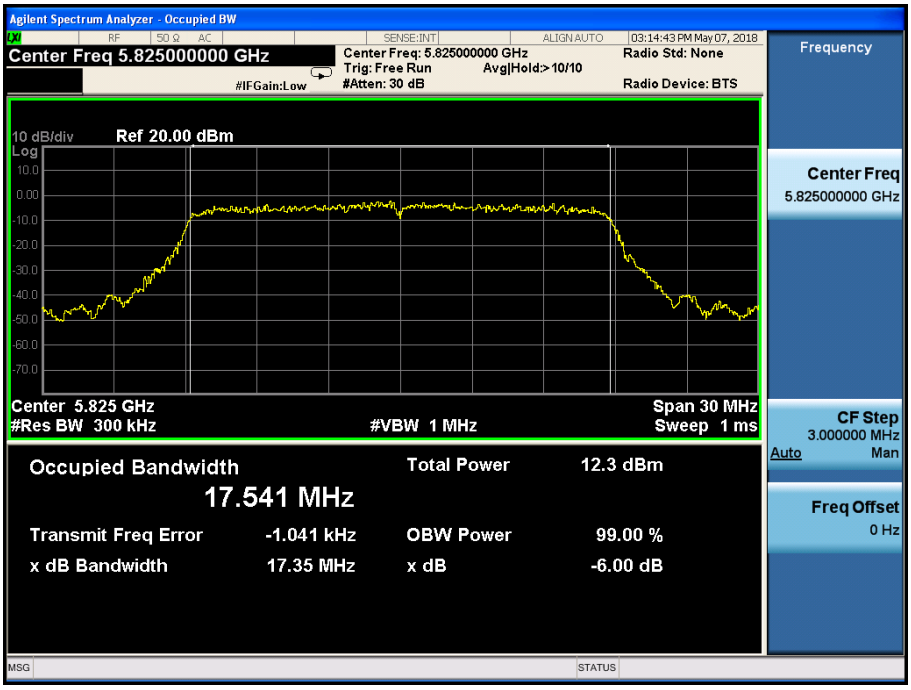
5725-5850MHz

Test mode：802.11a

5745MHz

5785MHz

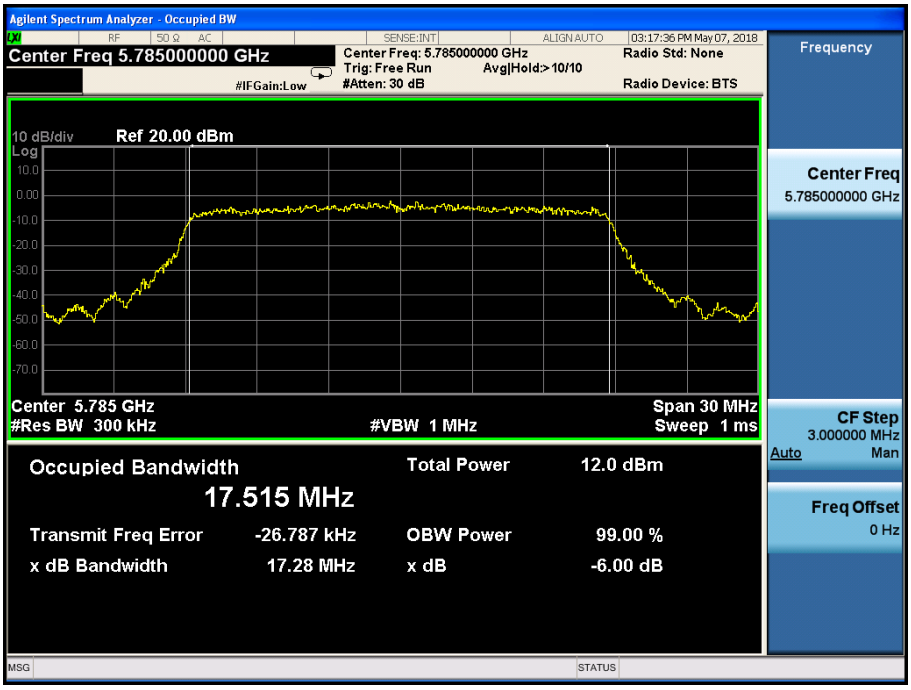
5825MHz



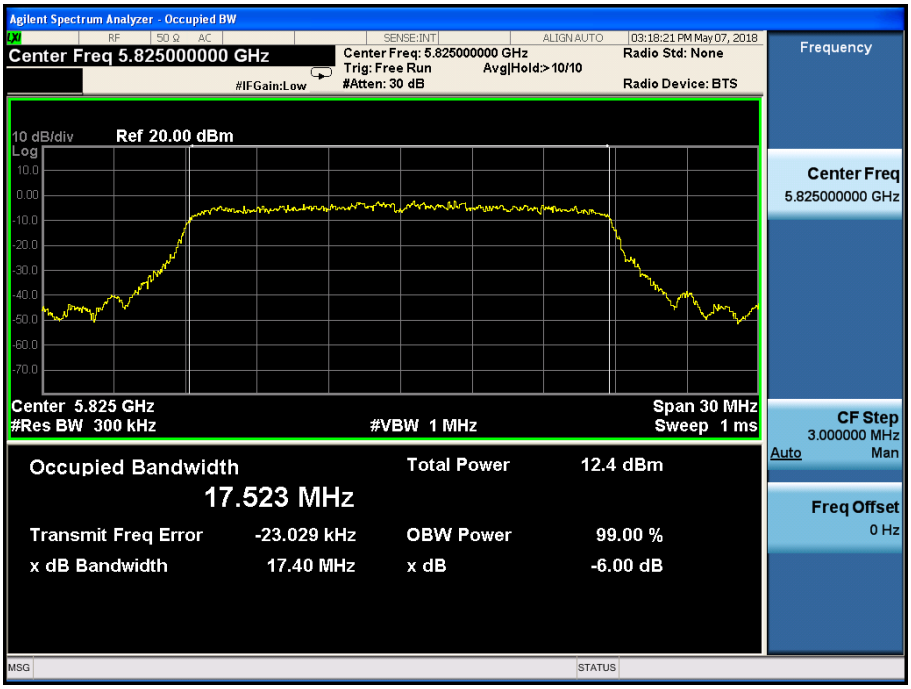
Test mode：802.11-HT20

5745MHz

5785MHz

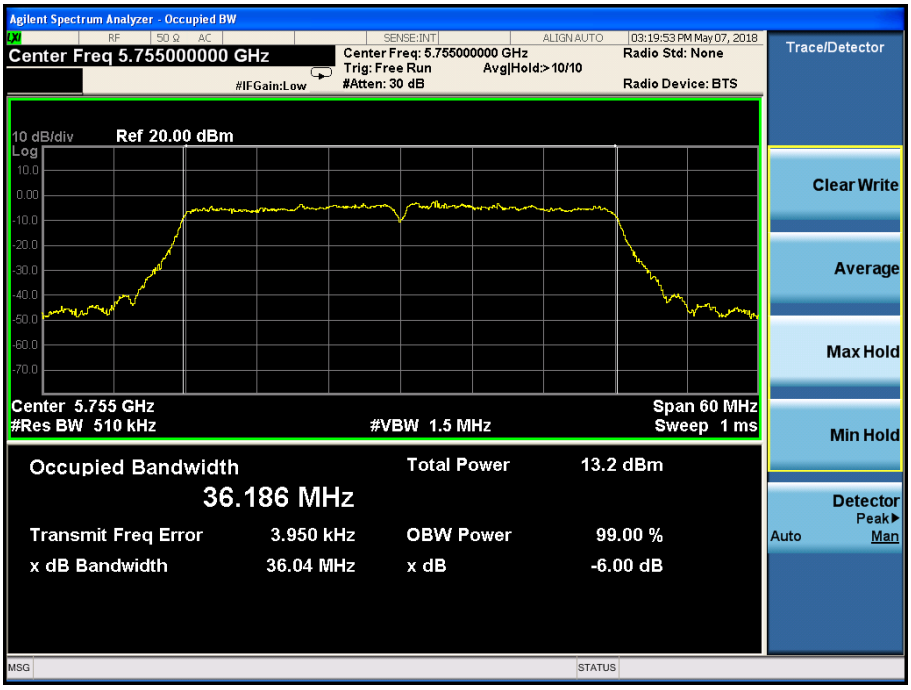


5825MHz

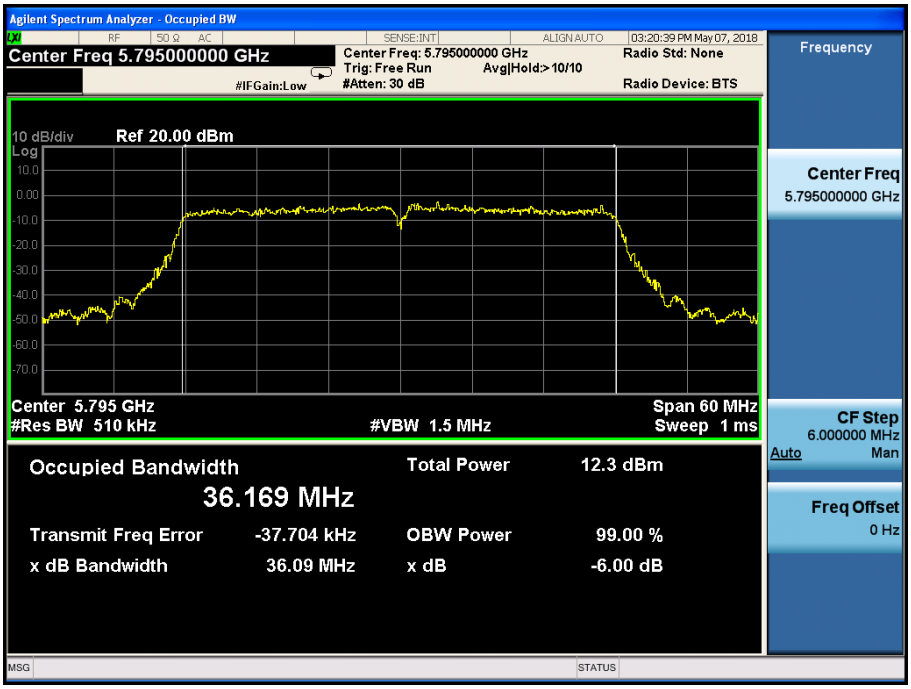


Test mode：802.11-HT40

5755MHz

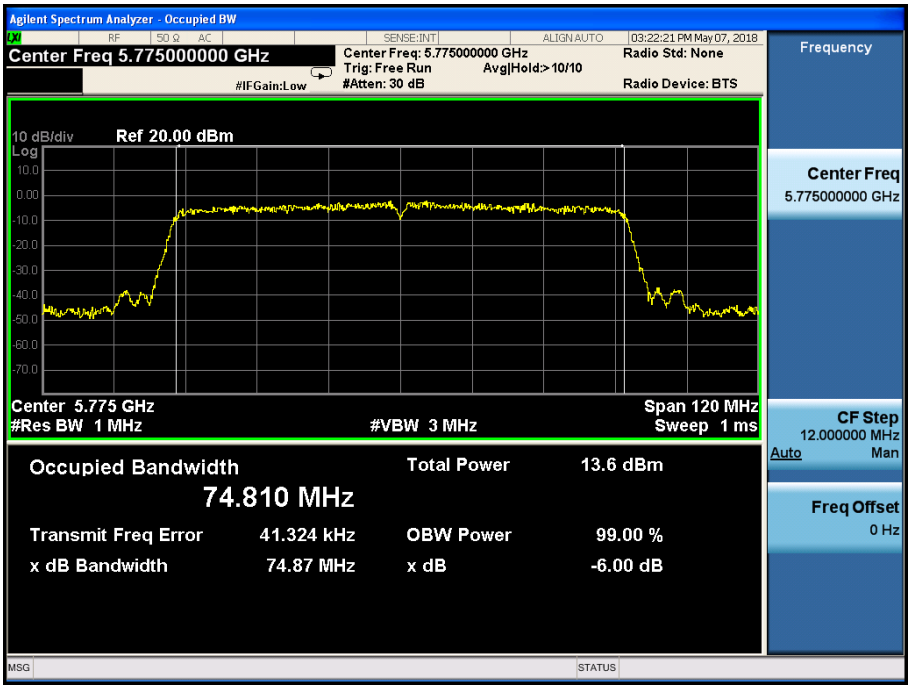


5785MHz



Test mode：802.11ac-HT80

5775MHz



7. Maximum Conducted Output Power

7.1 Standard Applicable

According to 15.407(a) Power limits:

(1) For the band 5.15-5.25 GHz.
(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

(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.

7.2 Test Procedure

According to KDB789033 D02 v02r01 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 ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ 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.

7.3 Environmental Conditions

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

7.4 Summary of Test Results/Plots

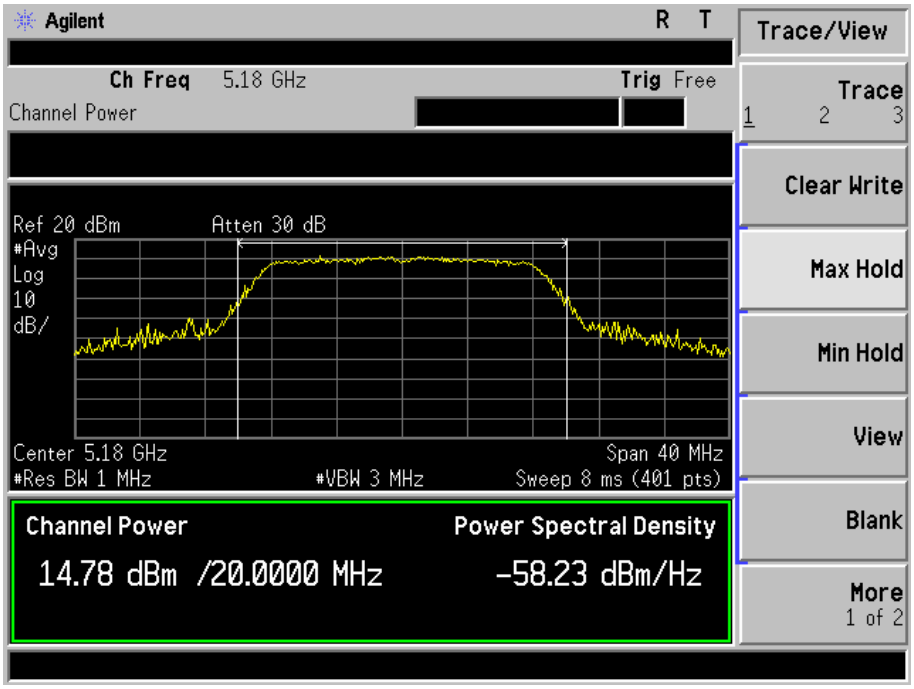
For the frequency band 5.15-5.25GHz, 5725-5850GHz

Test mode	Frequency MHz	Power 1 dBm	Power 2 dBm	Total Power dBm	Output Power mW	Limit mW
802.11a	5180	14.78	15.64	/	/	1000
	5200	14.33	14.82	/	/	1000
	5240	14.31	14.48	/	/	1000
	5745	19.82	19.59	/	/	1000
	5785	19.60	19.98	/	/	1000
	5825	20.54	20.18	/	/	1000
802.11n-HT20	5180	15.45	14.30	17.92	61.991	1000
	5200	15.37	15.03	18.21	66.277	1000
	5240	15.86	14.35	18.18	65.775	1000
	5745	19.65	19.60	22.64	183.458	1000
	5785	20.25	19.66	22.98	198.395	1000
	5825	19.93	20.07	23.01	200.026	1000
802.11n-HT40	5190	16.71	17.17	19.96	99.001	1000
	5230	17.37	17.12	20.26	106.099	1000
	5755	19.11	19.39	22.26	168.366	1000
	5795	19.64	19.60	22.63	183.246	1000
802.11ac-HT80	5210	19.80	19.46	22.64	183.807	1000
	5775	20.84	20.58	23.72	235.627	1000

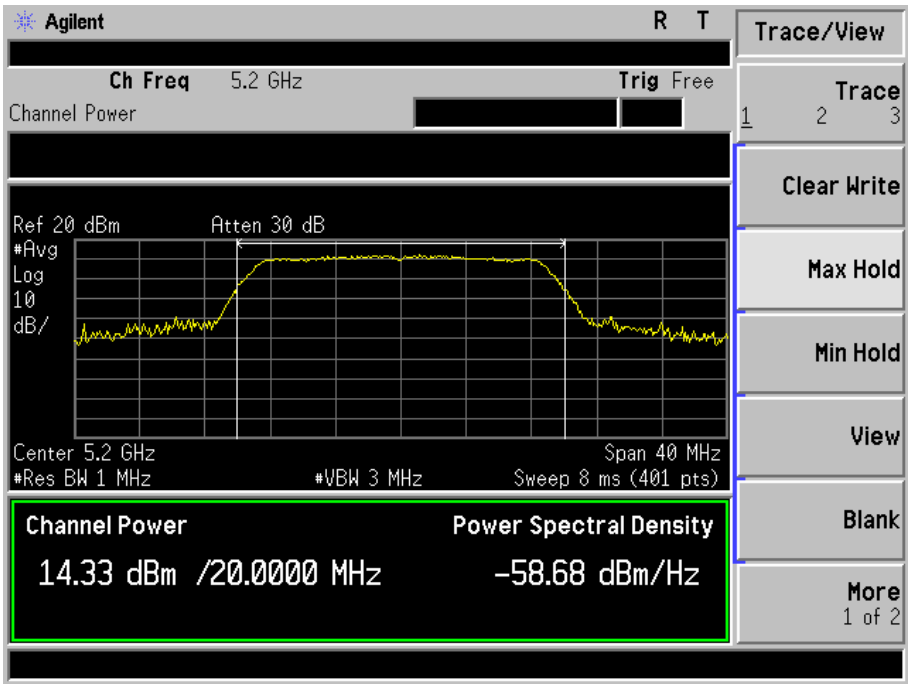
Antenna 1:

Test Mode: 802.11a

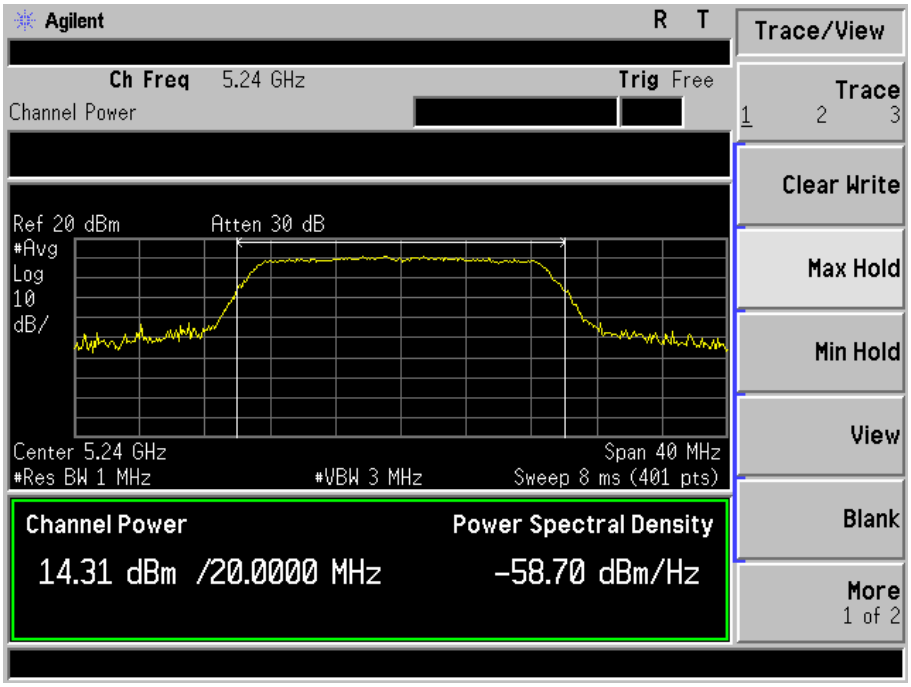
5180MHz



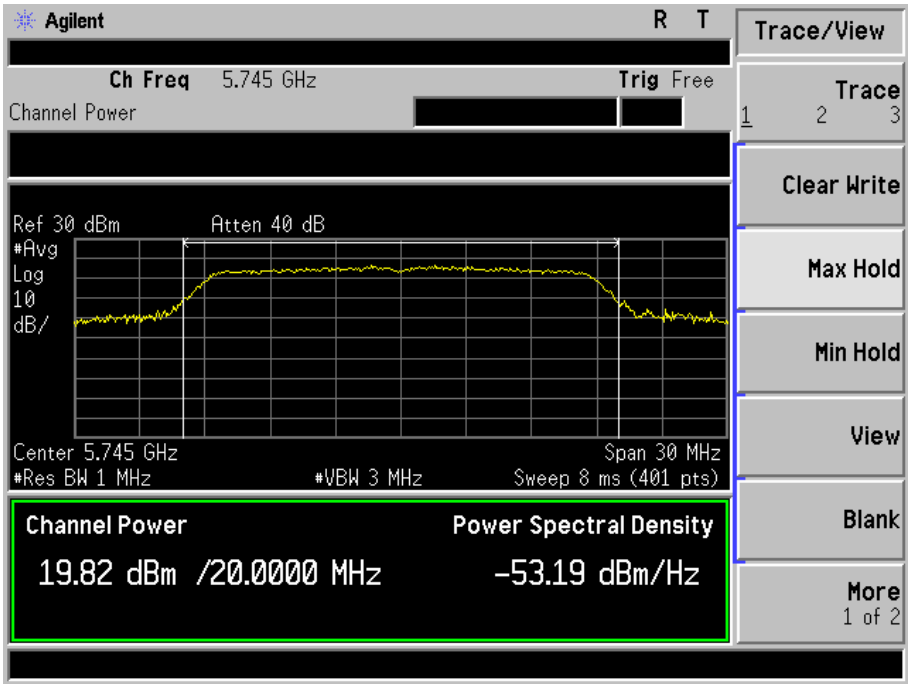
5200MHz



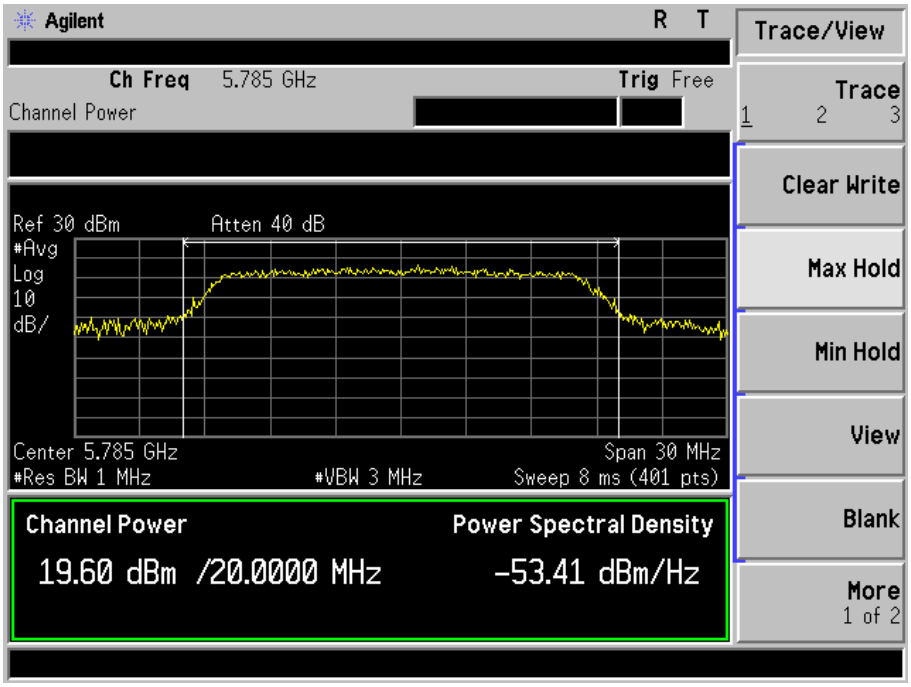
5240MHz



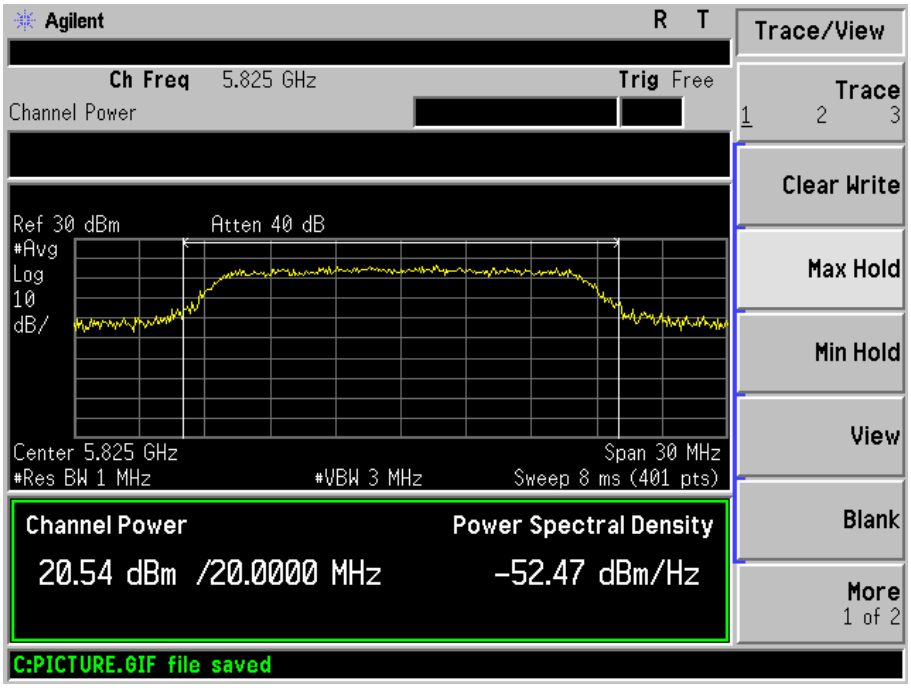
5745MHz



5785MHz

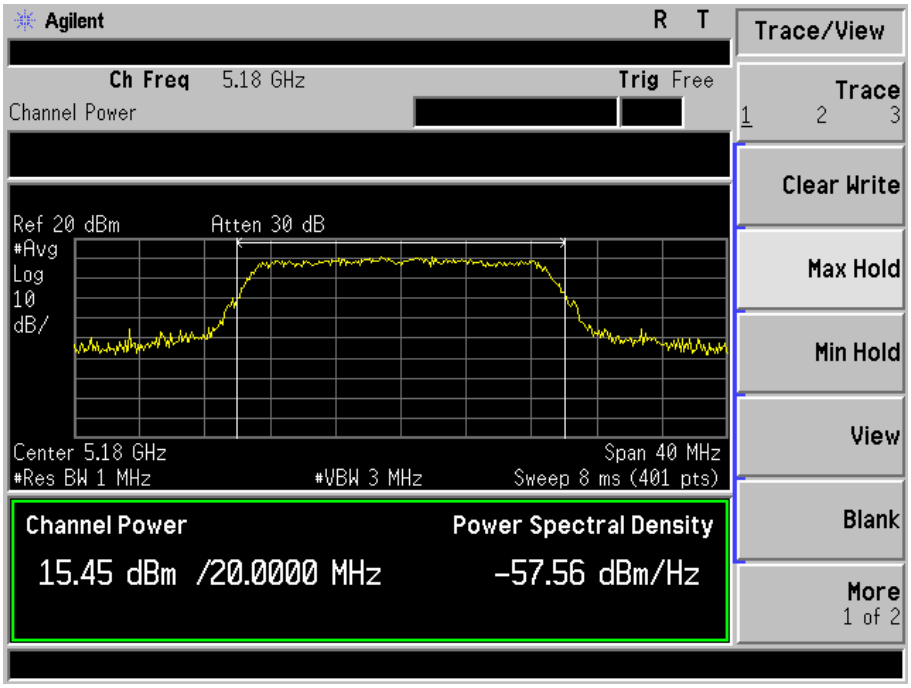


5825MHz

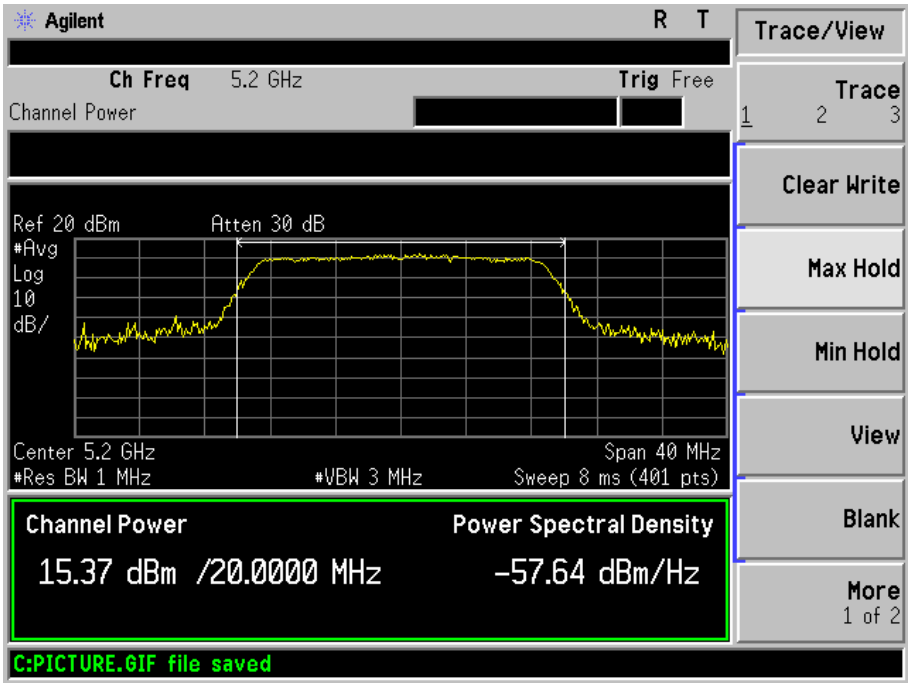


Test Mode: 802.11n-HT20

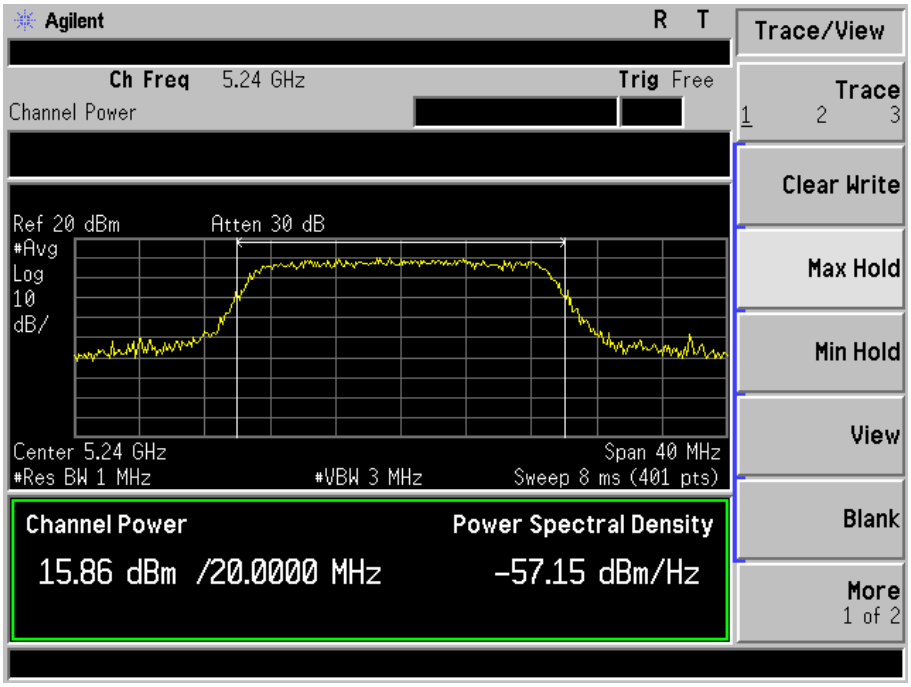
5180MHz



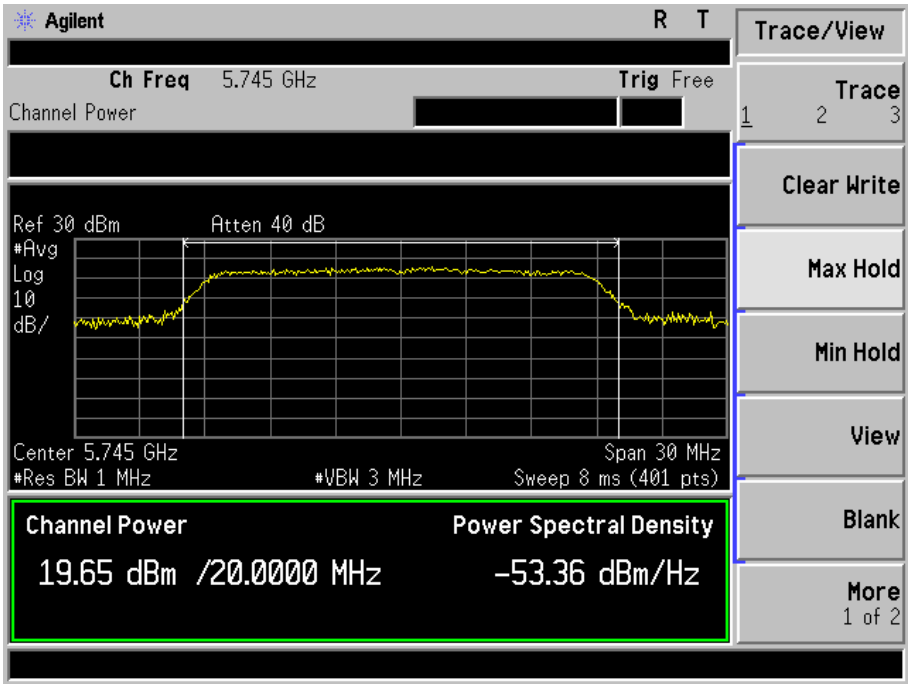
5200MHz



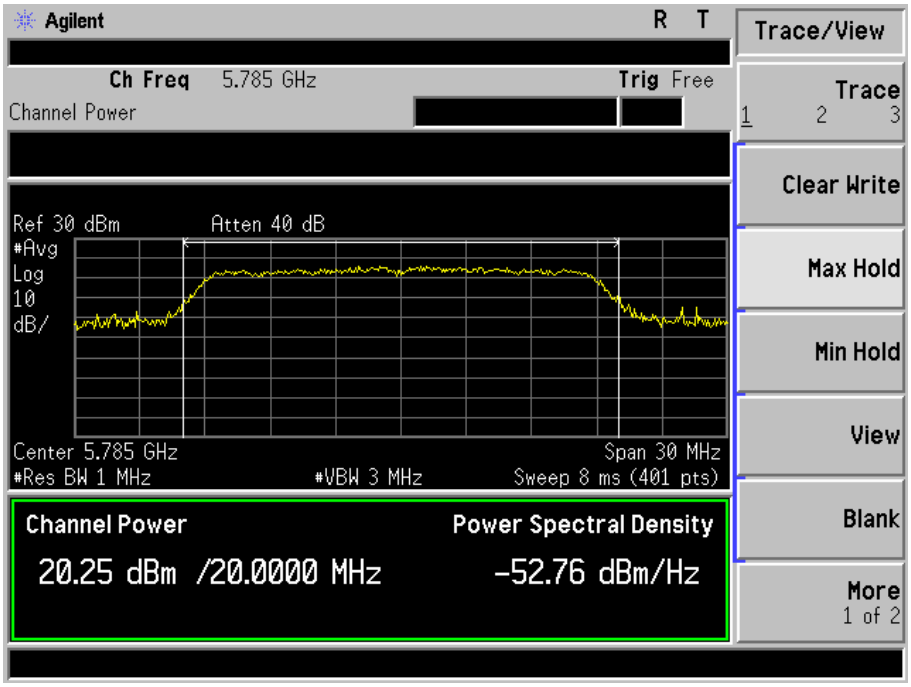
5240MHz



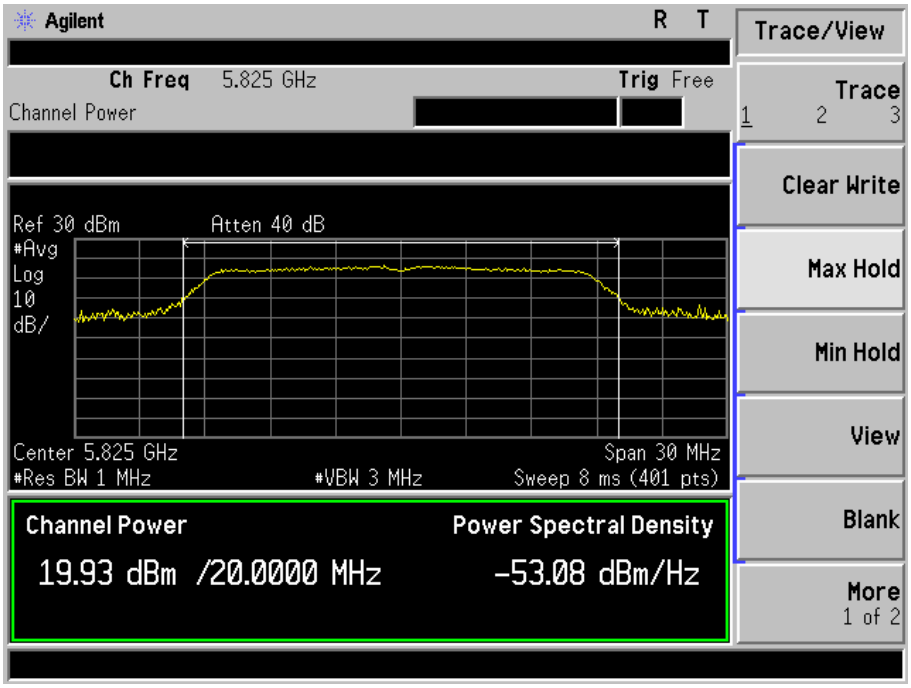
5745MHz



5785MHz

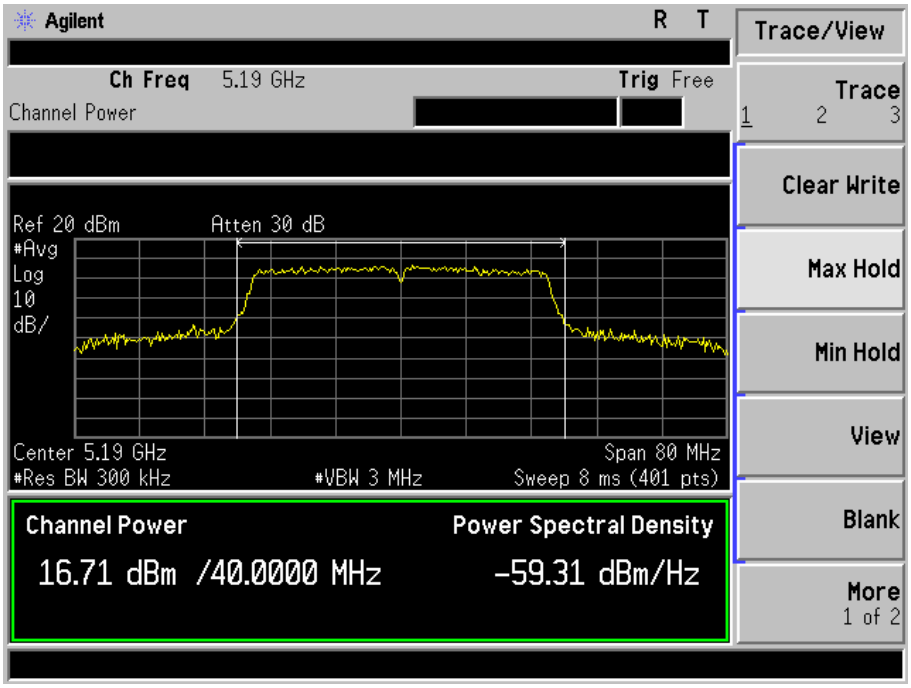


5825MHz

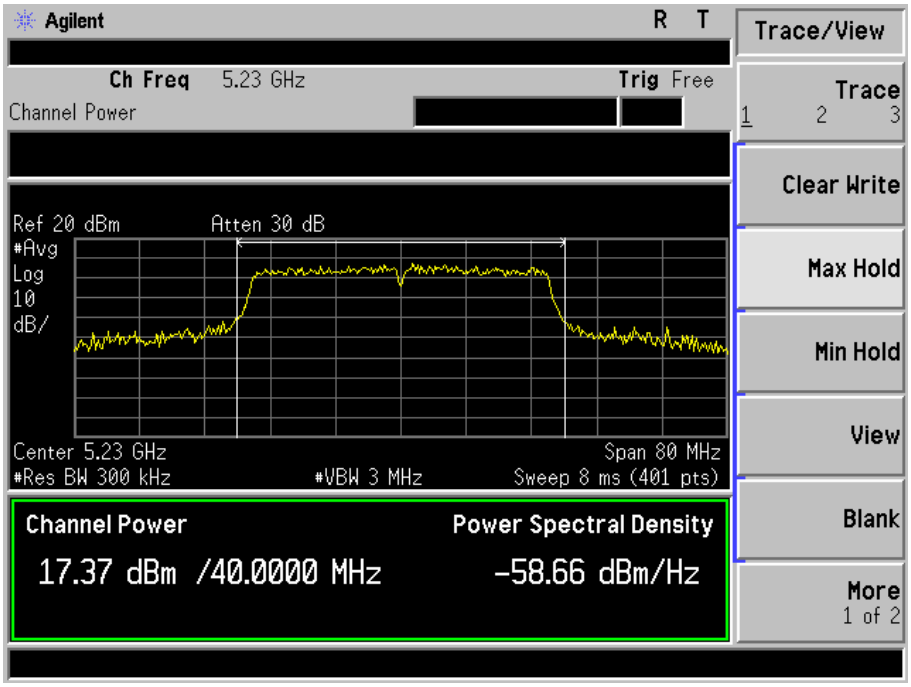


Test Mode: 802.11n-HT40

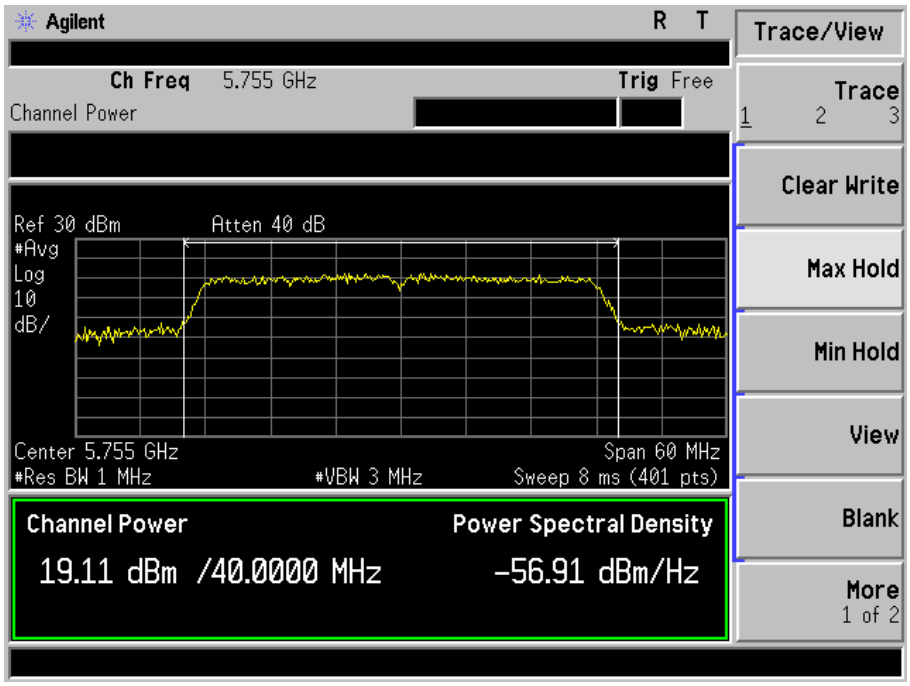
5190MHz



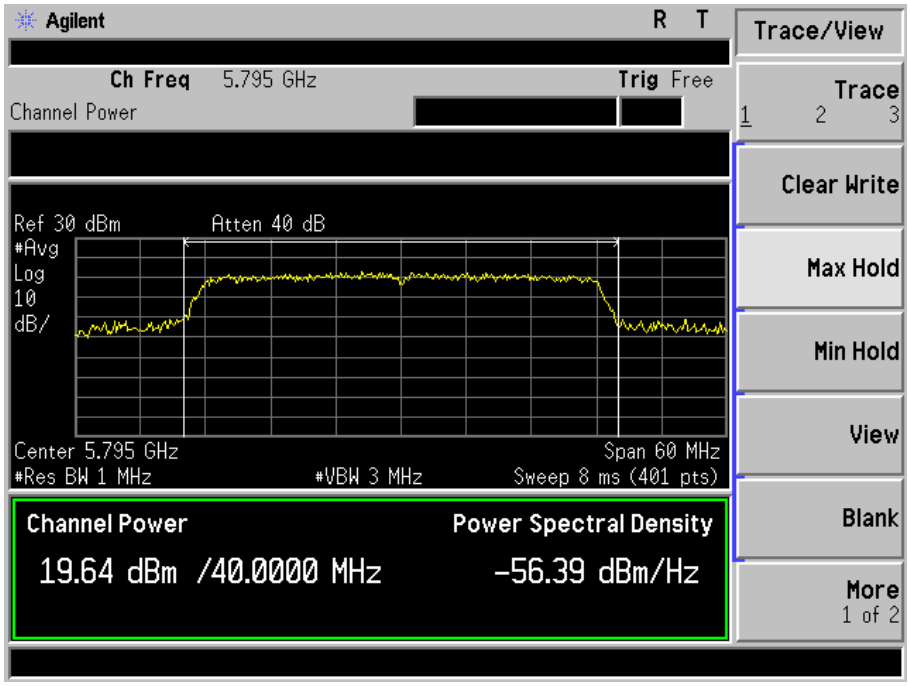
5230MHz



5755MHz

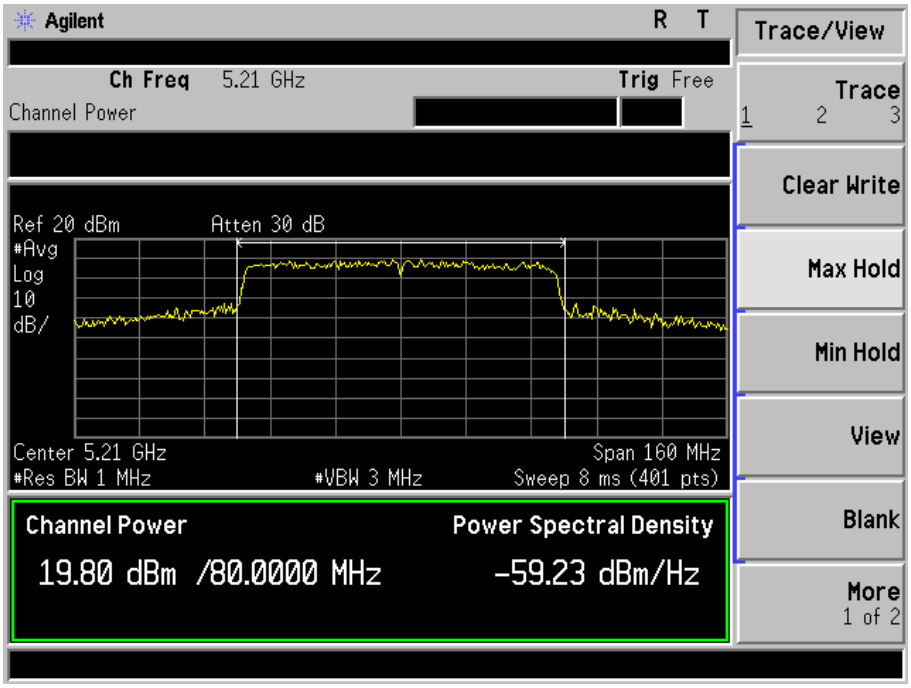


5795MHz

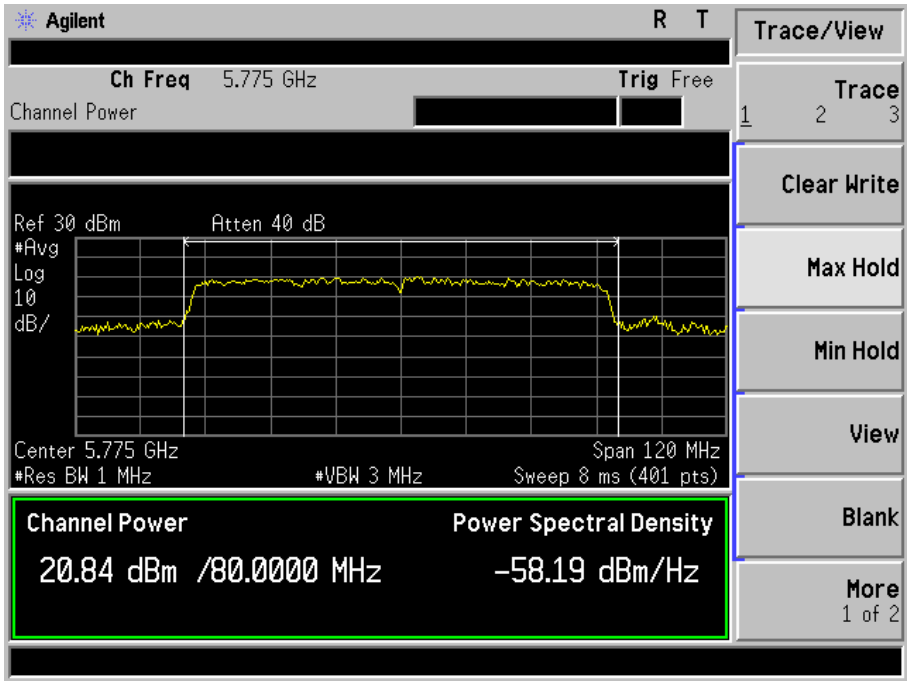


Test Mode: 802.11ac-HT80

5210MHz



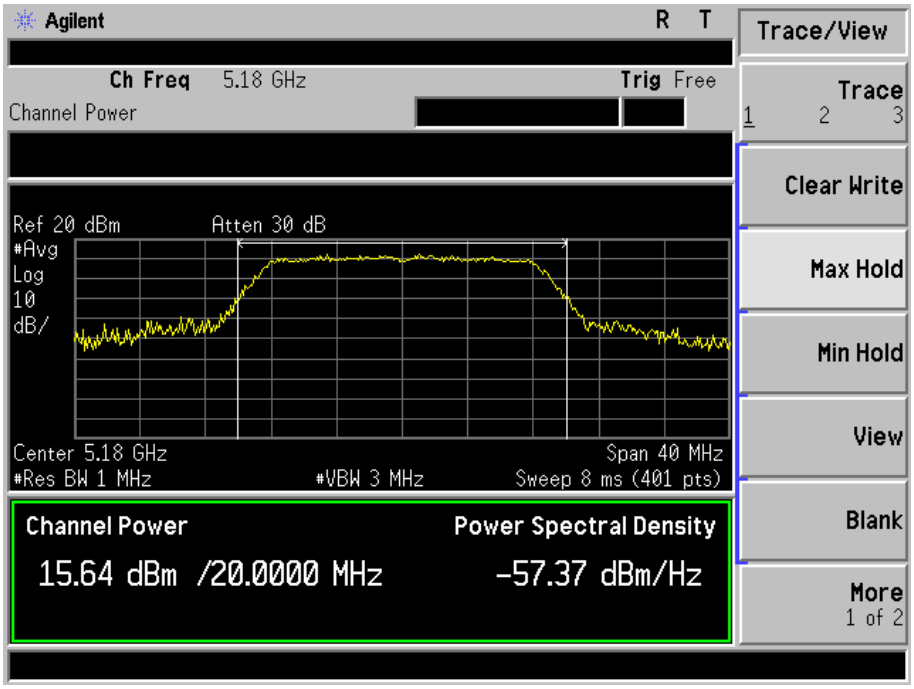
5775MHz



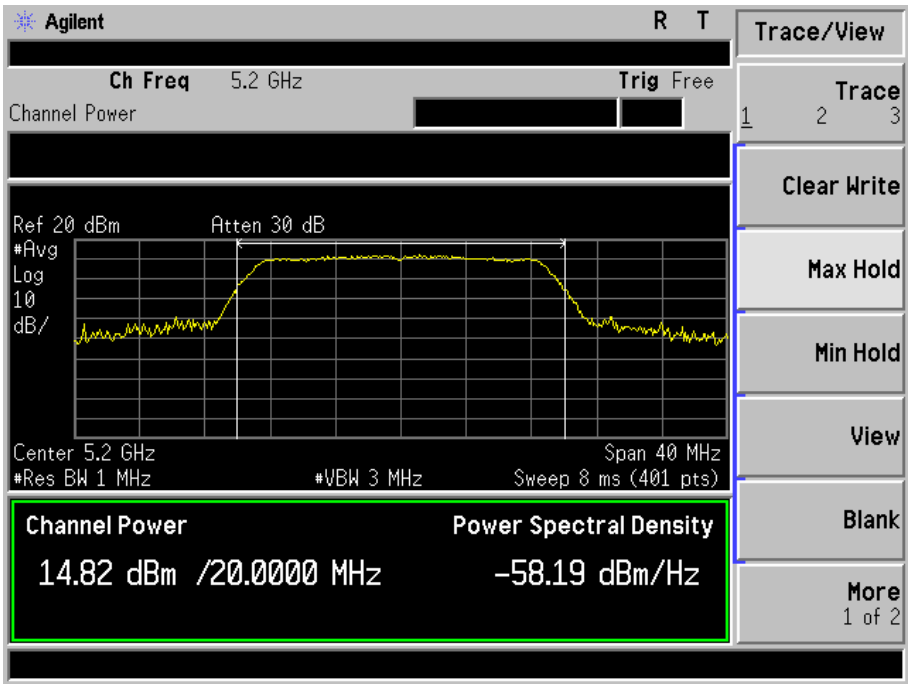
Antenna 2:

Test Mode: 802.11a

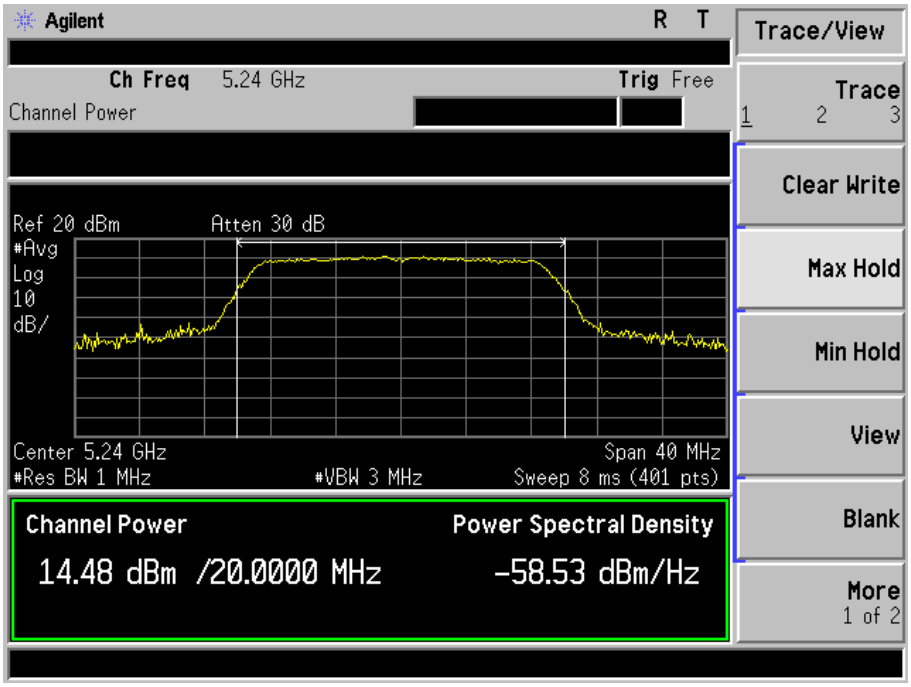
5180MHz



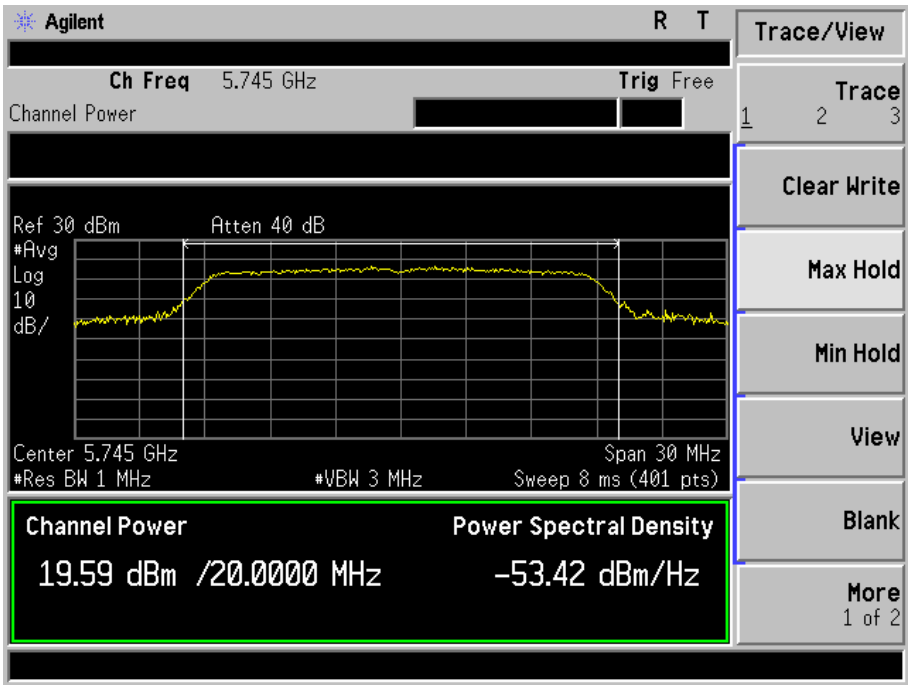
5200MHz



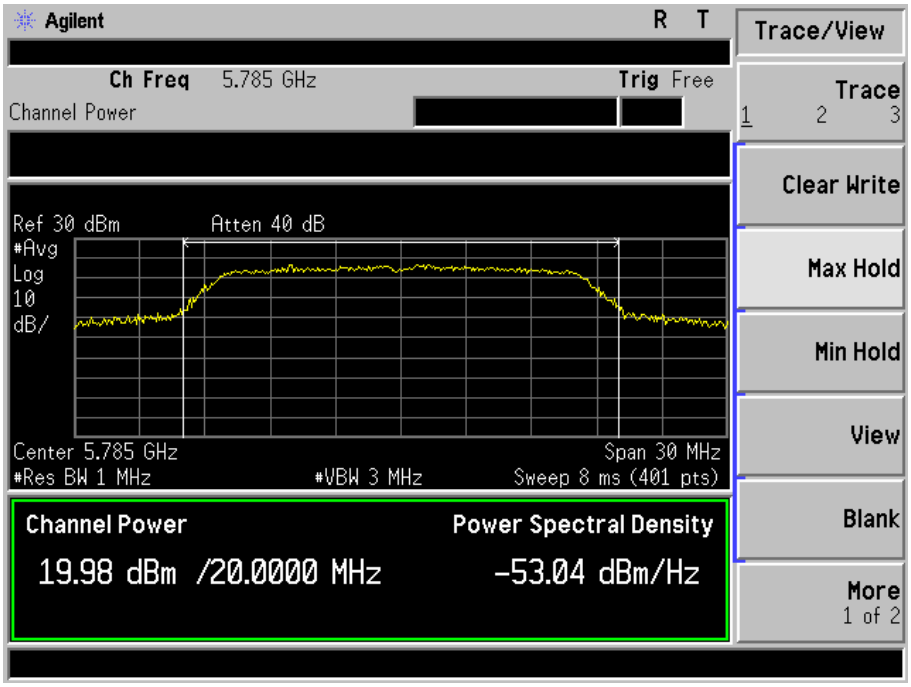
5240MHz



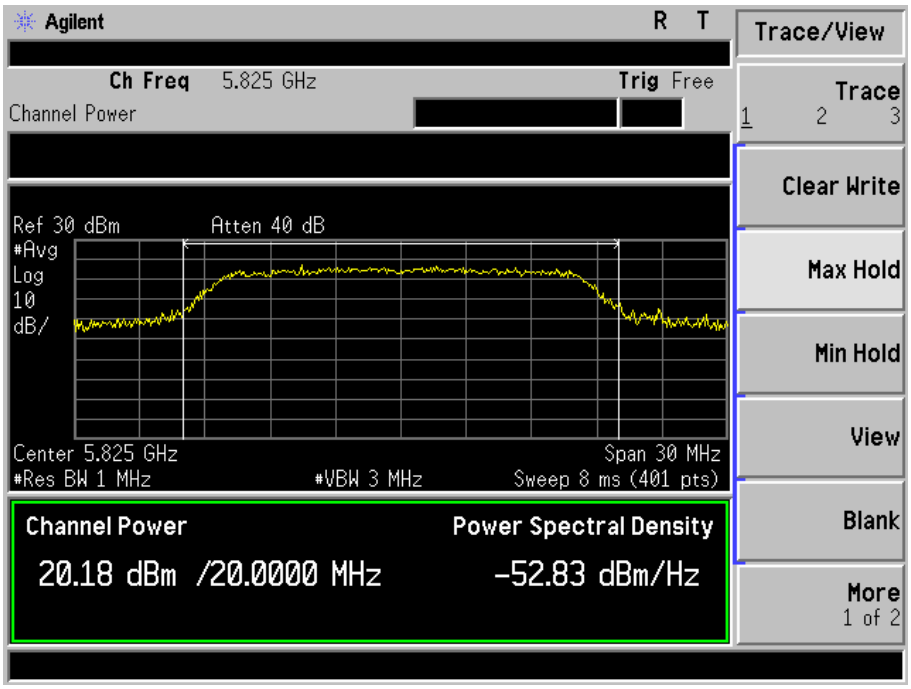
5745MHz



5785MHz

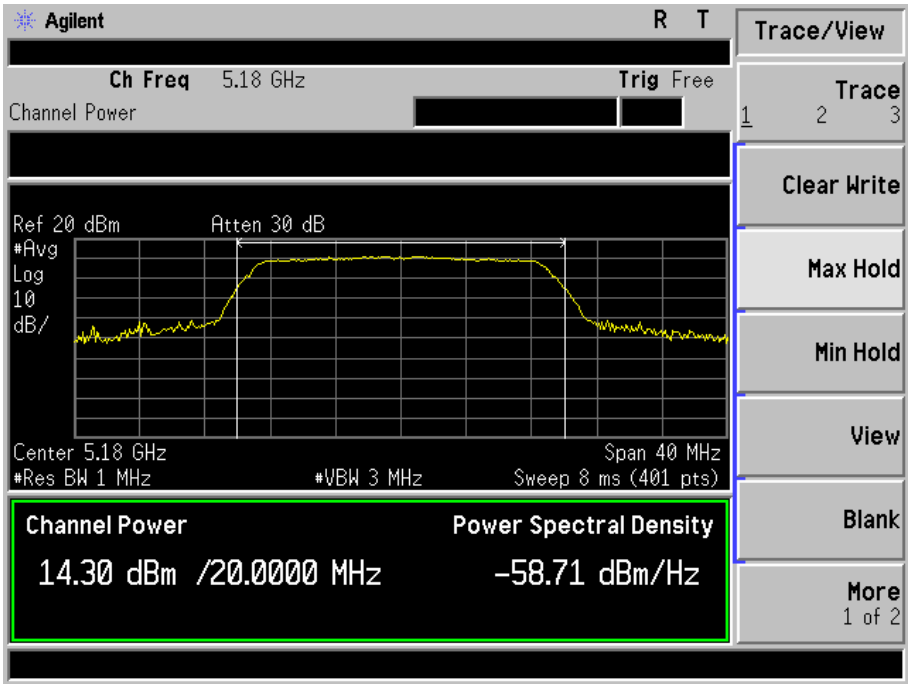


5825MHz

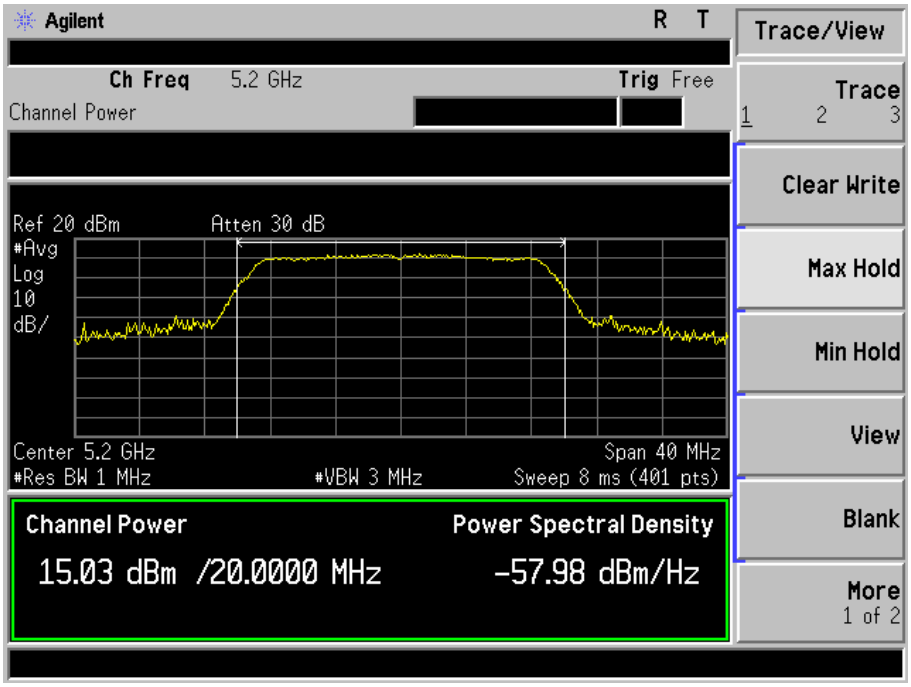


Test Mode: 802.11n-HT20

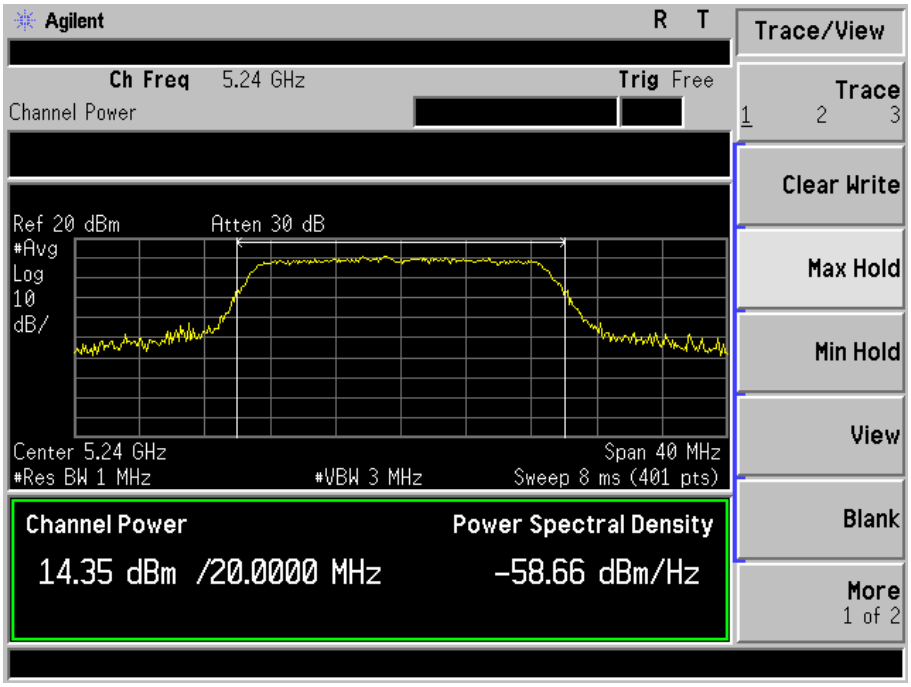
5180MHz



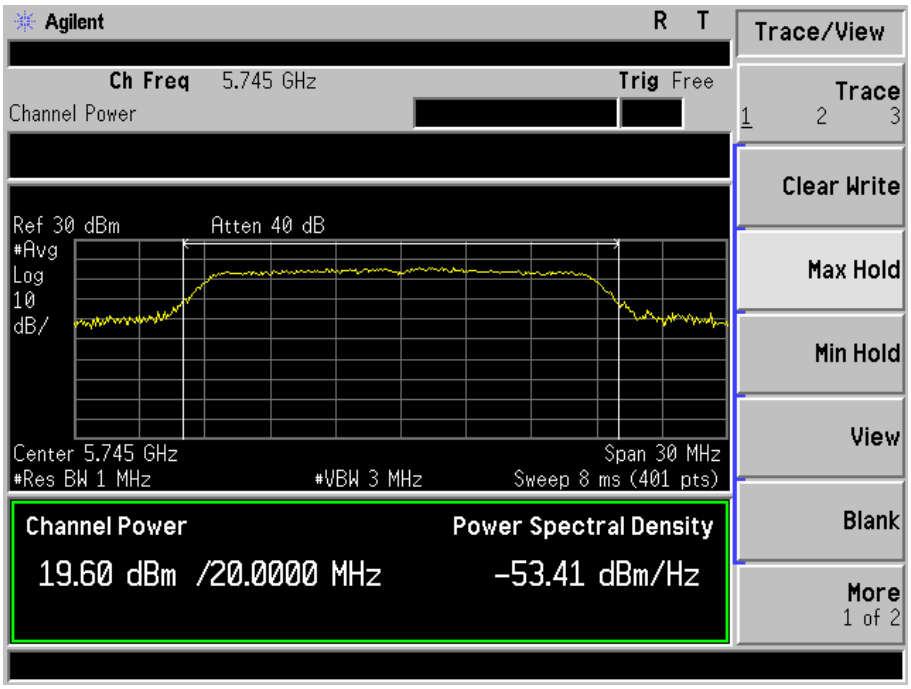
5200MHz



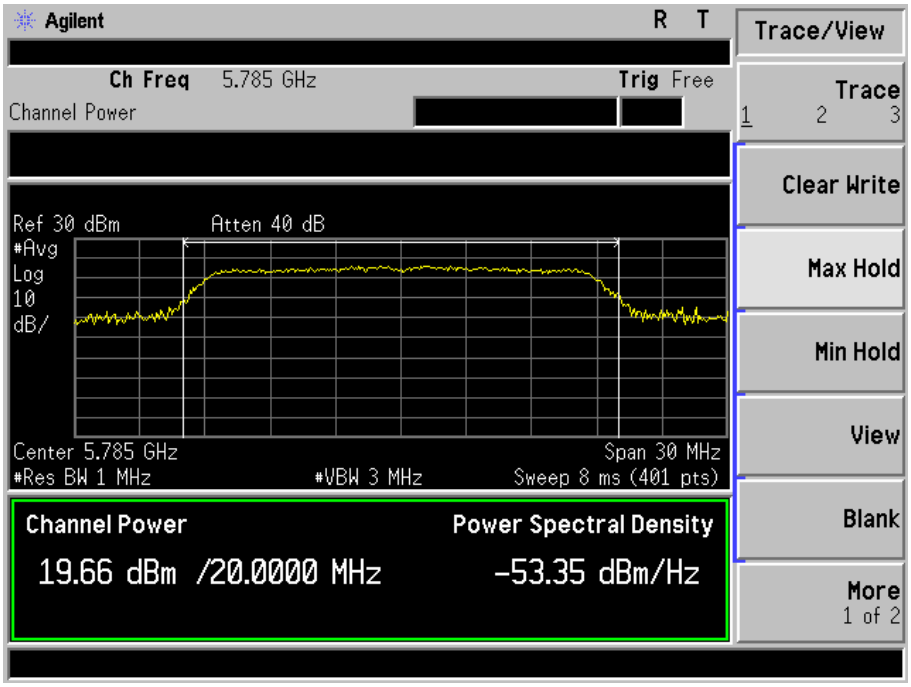
5240MHz



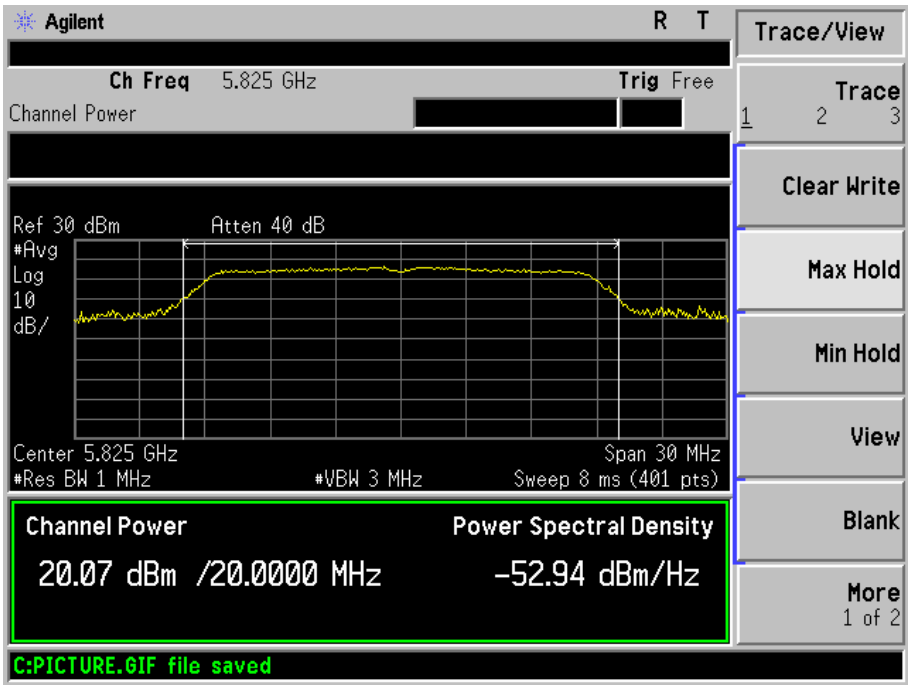
5745MHz



5785MHz

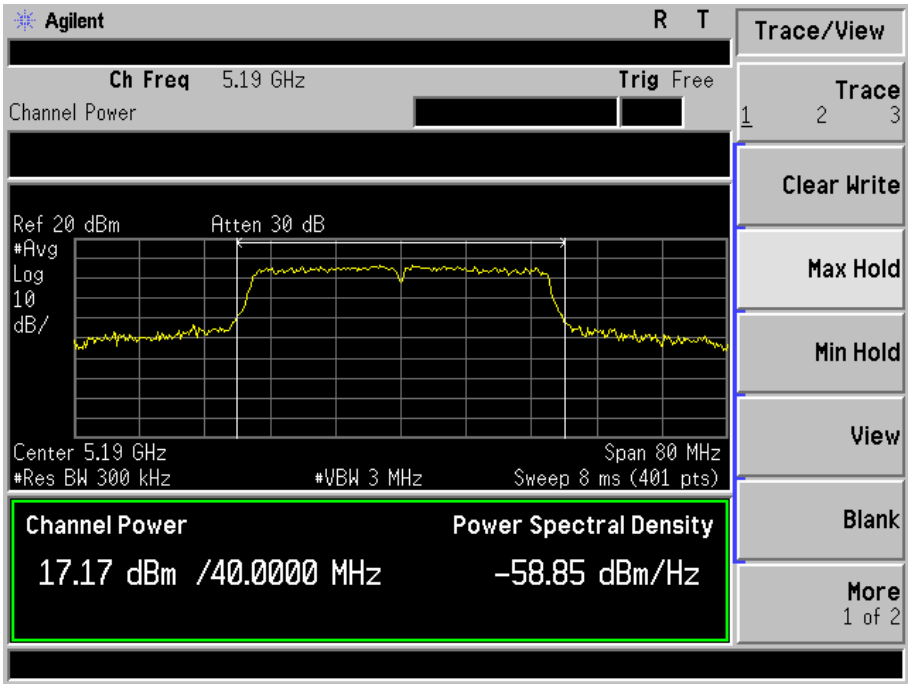


5825MHz

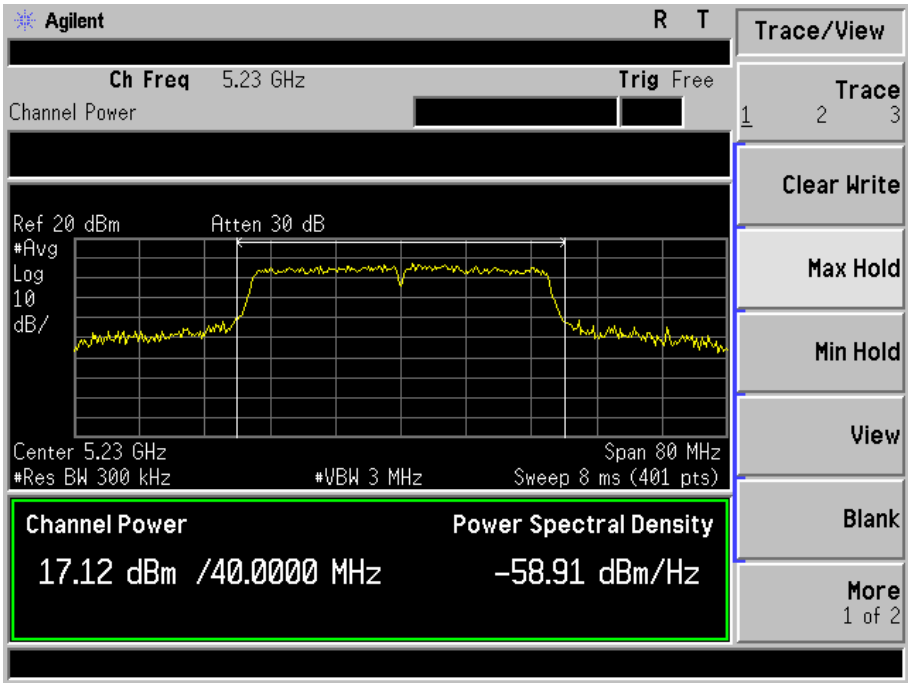


Test Mode: 802.11n-HT40

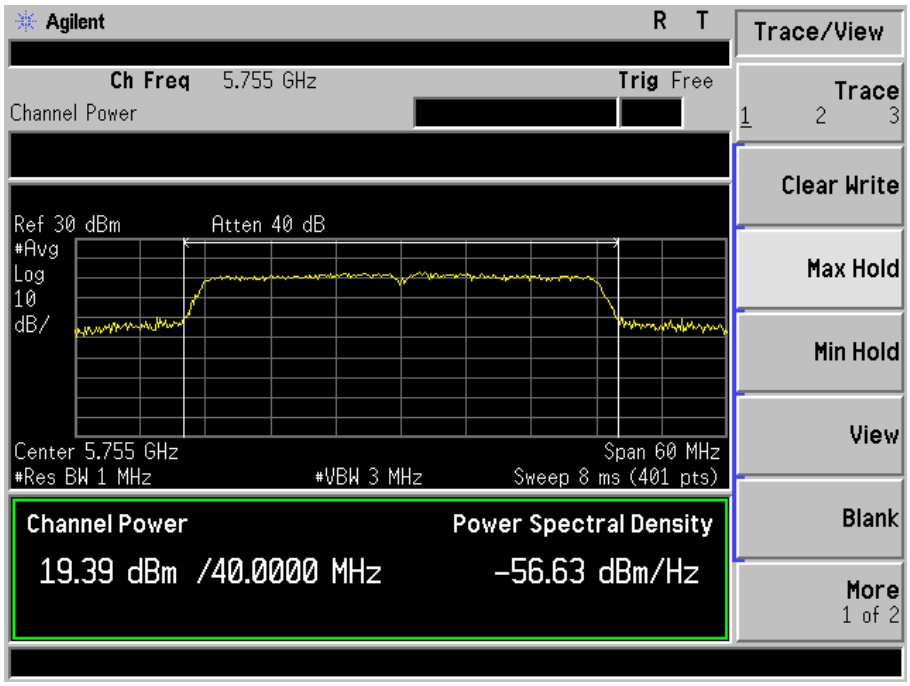
5190MHz



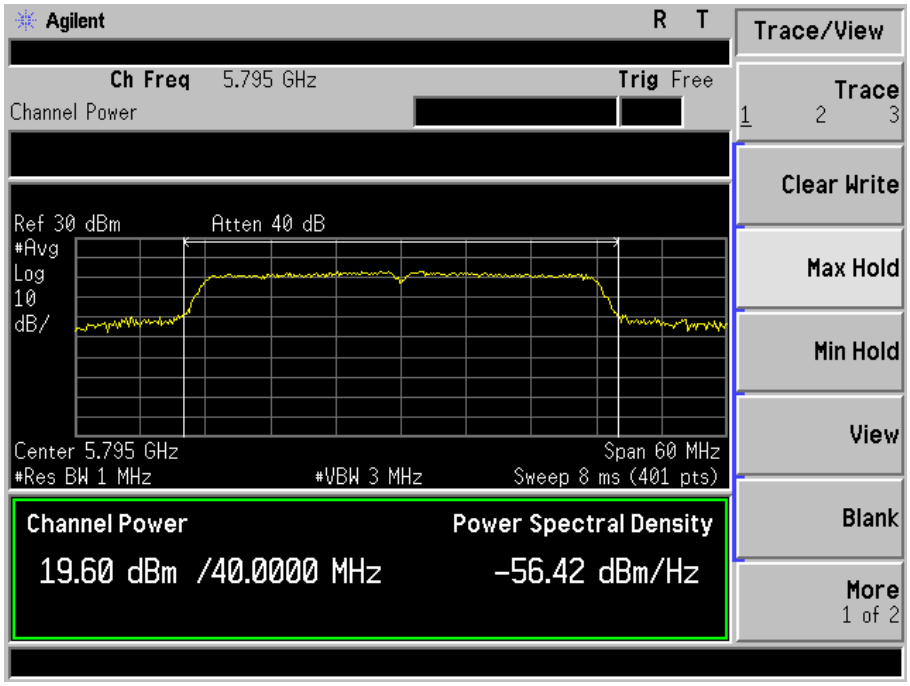
5230MHz



5755MHz

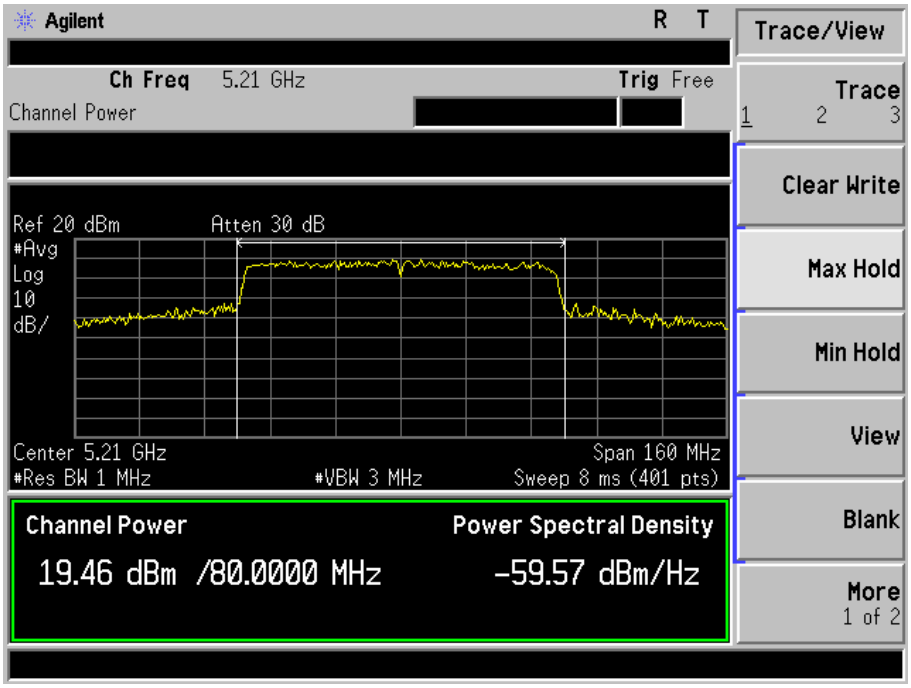


5795MHz

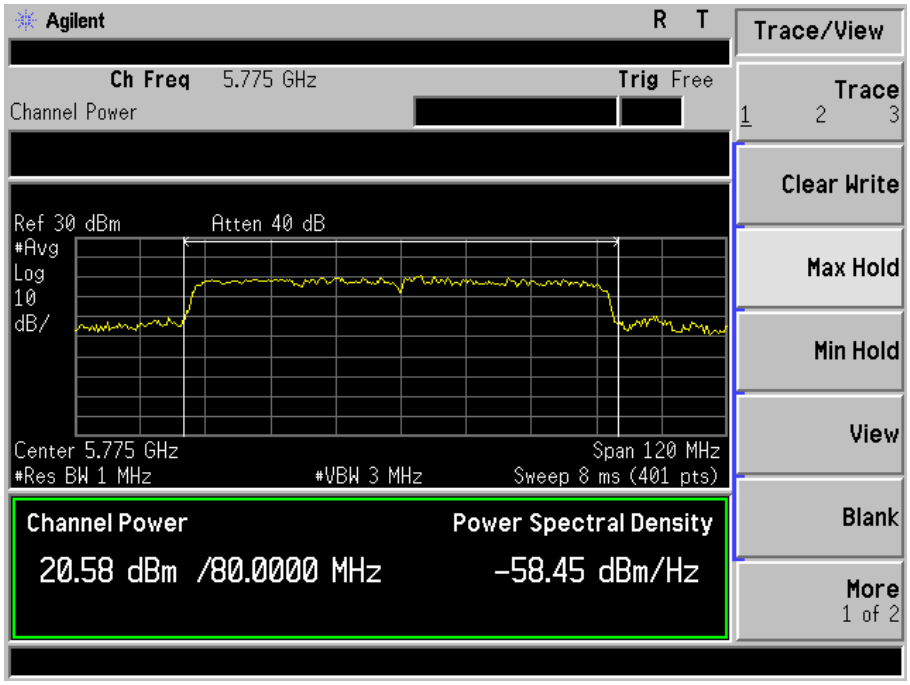


Test Mode: 802.11ac-HT80

5210MHz



5775MHz



8. Radiated Spurious Emissions

8.1 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.

8.2 Standard Applicable

According to §15.407(b)(6), Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
According to §15.407(b)(7), The provisions of §15.205 apply to intentional radiators operating under this section.
789033 D02 v02r01 General UNII Test Procedures New Rules v01
If radiated measurements are performed, field strength is then converted to EIRP as follows:

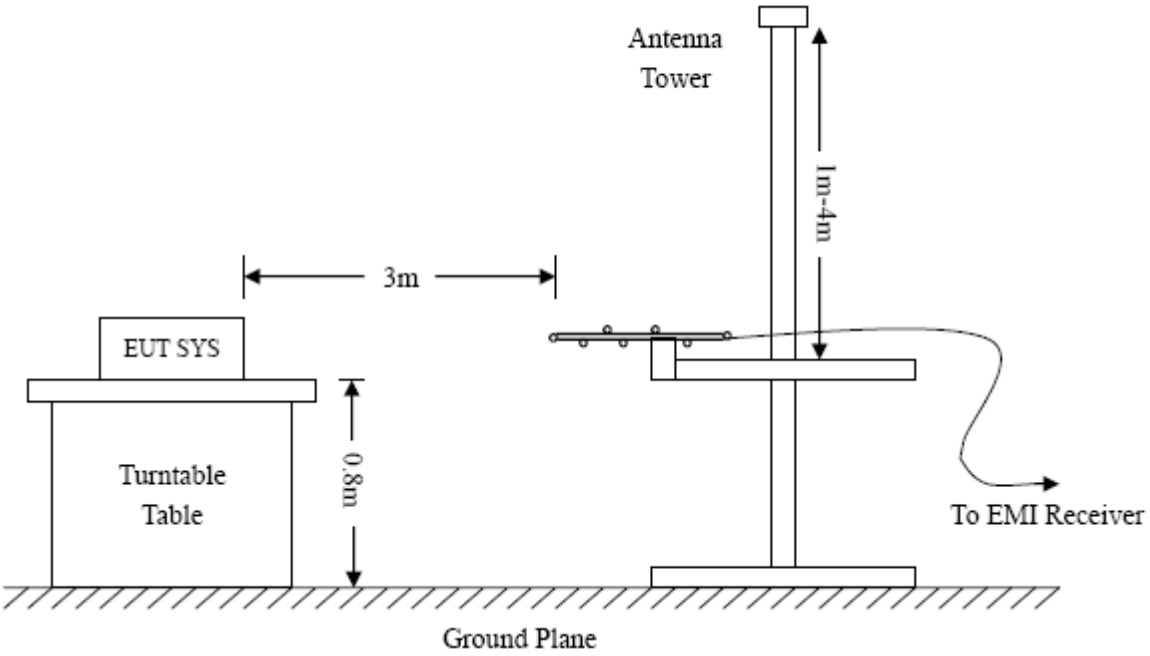
EIRP = ((E*d)^2) / 30

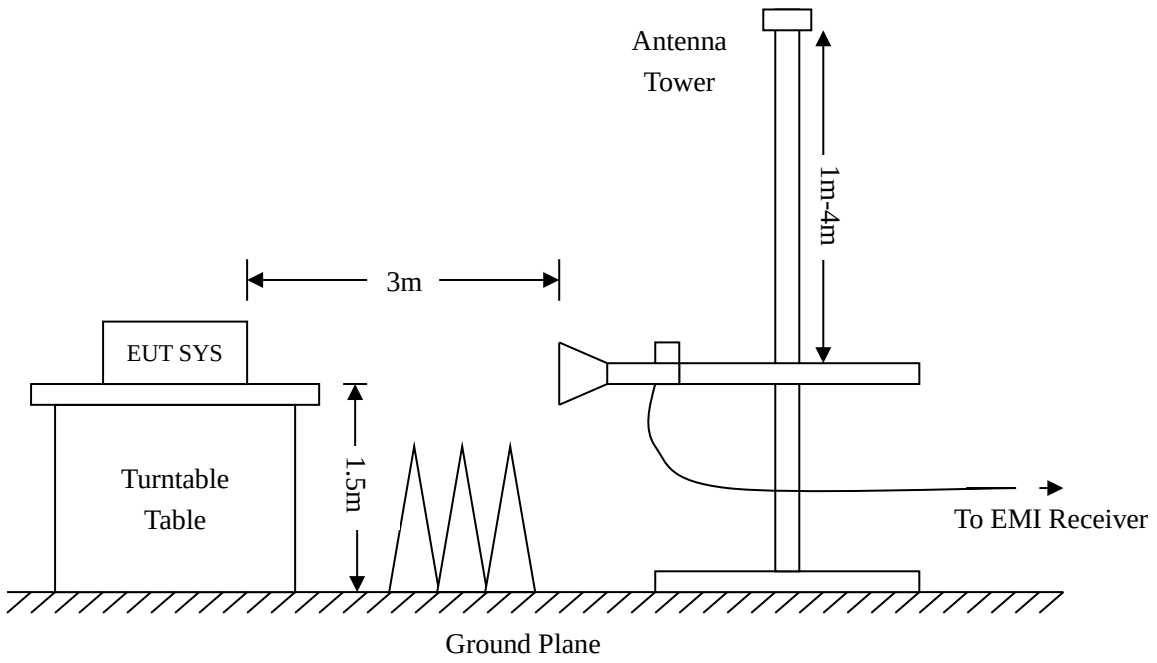
where:

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

8.3 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.





8.4 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

8.5 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:

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss – Ampl. Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – FCC Part 15 Limit

8.6 Environmental Conditions

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

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

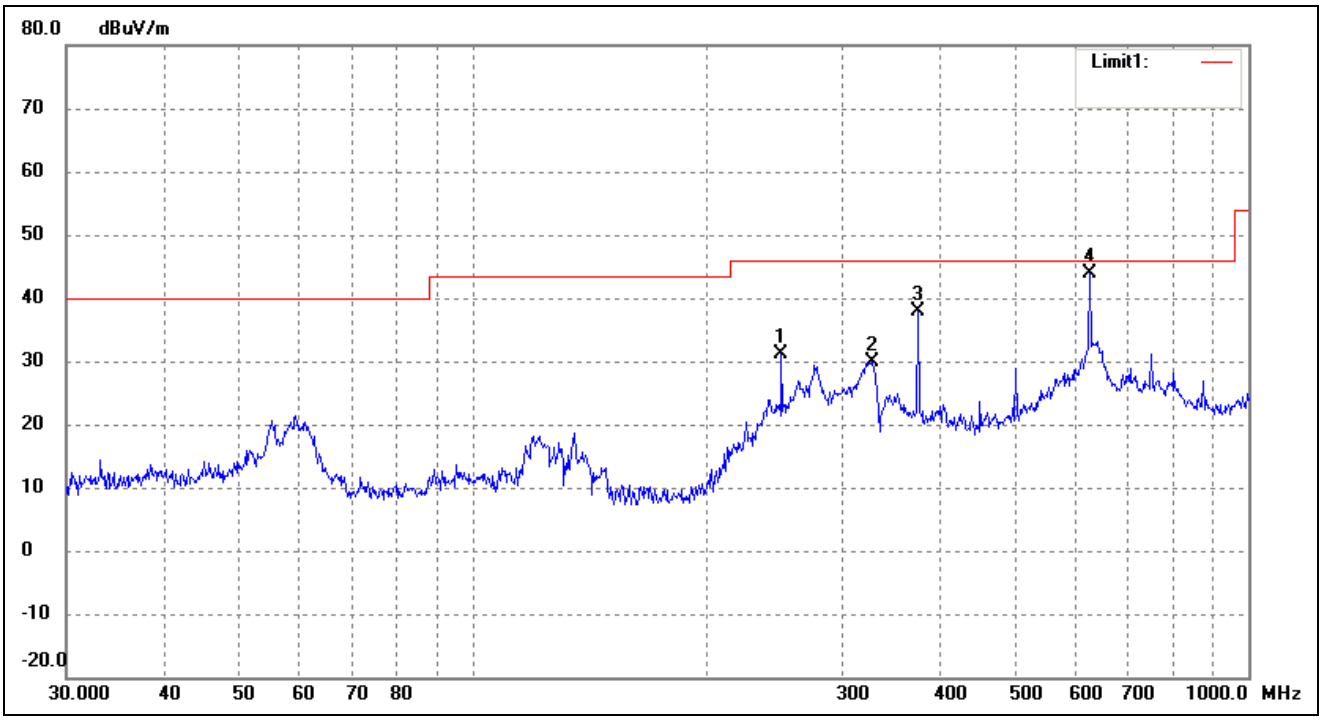
2. Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be recorded in the test report.

For 802.11a

Spurious Emission From 30 MHz to 1 GHz

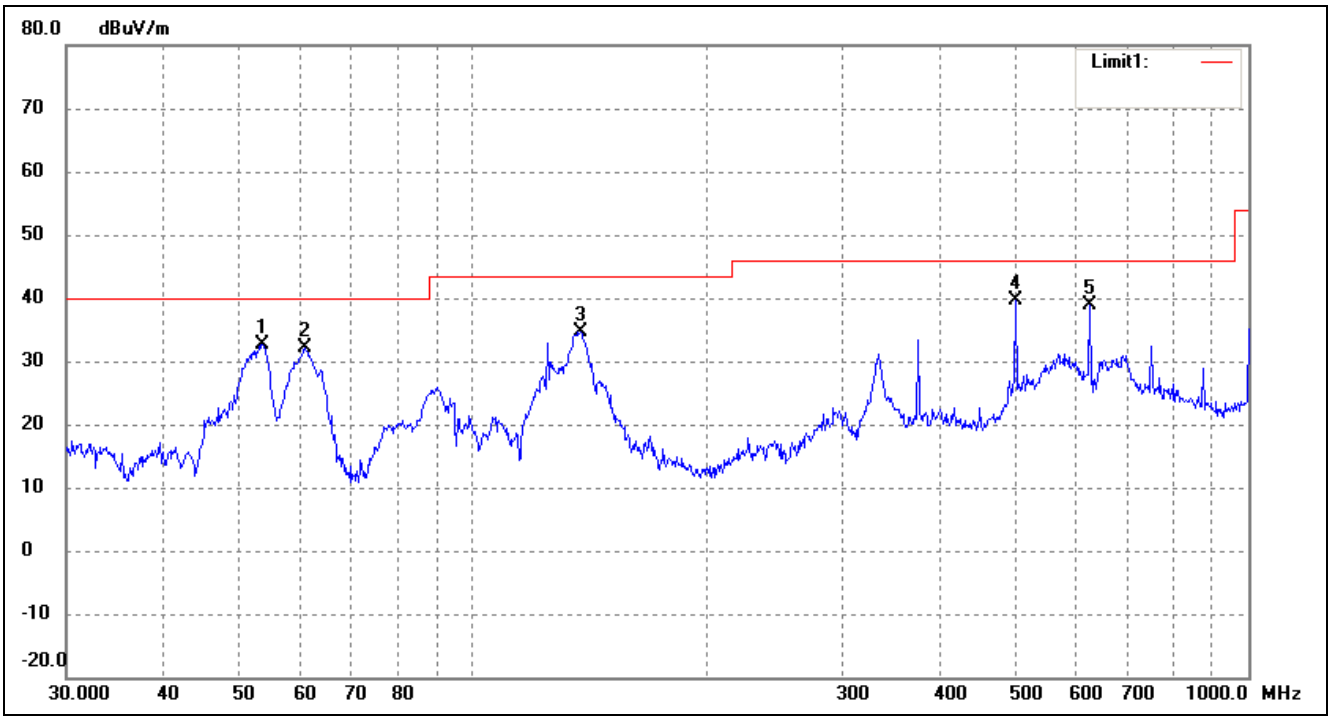
Test mode: Transmitting Channel 5180MHz

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(*)	(cm)	
1	250.3012	43.17	-12.13	31.04	46.00	-14.96	273	100	peak
2	327.8873	39.30	-9.49	29.81	46.00	-16.19	95	100	peak
3	375.9385	46.82	-8.88	37.94	46.00	-8.06	102	100	peak
4	625.0780	45.48	-1.51	43.97	46.00	-2.03	101	100	peak

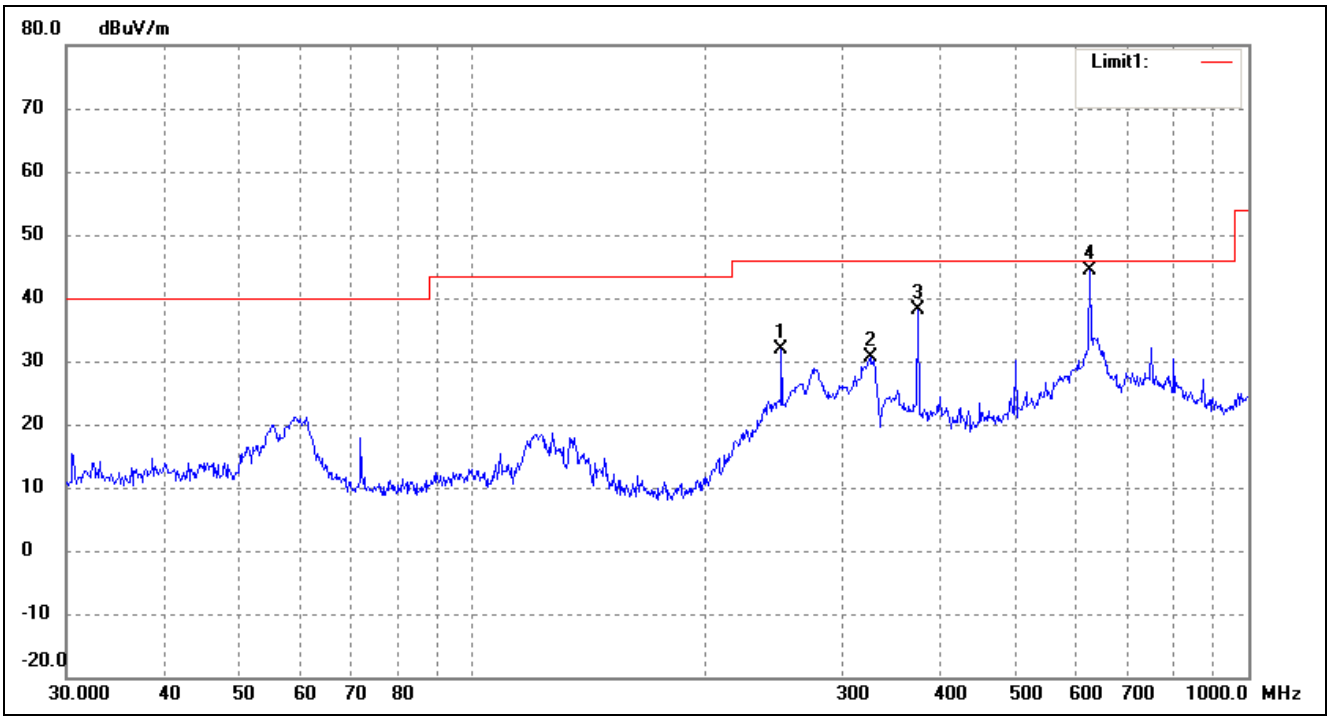
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	53.6932	49.22	-16.49	32.73	40.00	-7.27	267	100	peak
2	60.9176	48.84	-16.70	32.14	40.00	-7.86	92	100	peak
3	137.9029	52.78	-18.16	34.62	43.50	-8.88	309	100	peak
4	501.1790	45.30	-5.78	39.52	46.00	-6.48	108	100	peak
5	625.0780	40.27	-1.51	38.76	46.00	-7.24	267	100	peak

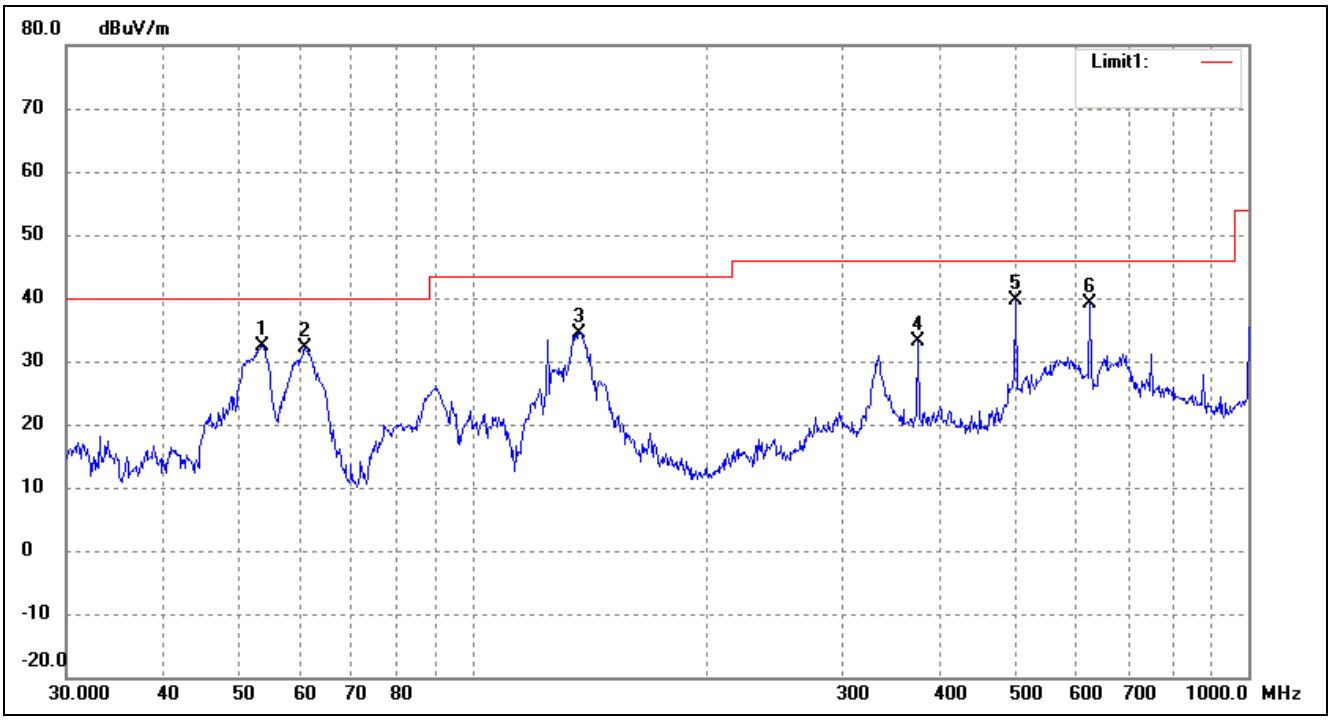
Test mode: Transmitting Channel 5200MHz

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	250.3012	44.12	-12.13	31.99	46.00	-14.01	276	100	peak
2	326.7395	40.08	-9.47	30.61	46.00	-15.39	180	100	peak
3	375.9385	46.94	-8.88	38.06	46.00	-7.94	63	100	peak
4	625.0780	45.81	-1.51	44.30	46.00	-1.70	338	100	peak

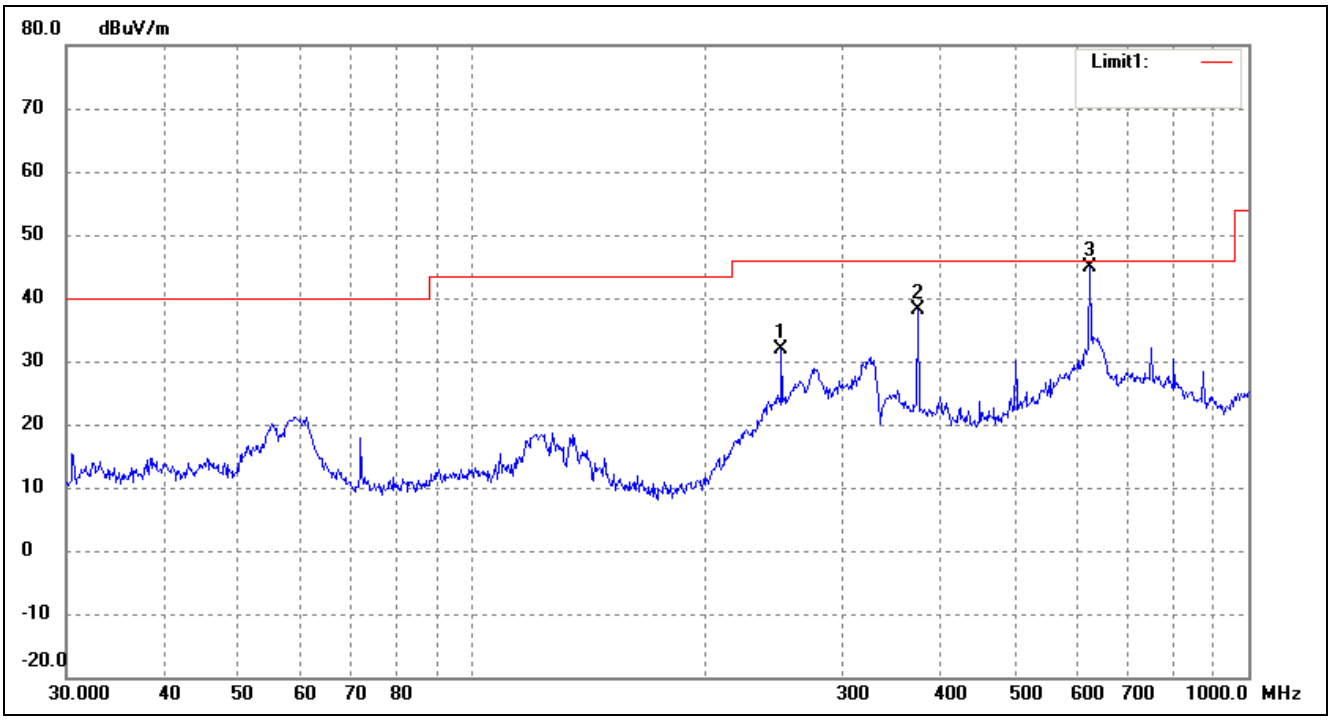
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	53.6932	48.86	-16.49	32.37	40.00	-7.63	201	100	peak
2	60.9176	48.85	-16.70	32.15	40.00	-7.85	288	100	peak
3	137.4202	52.52	-18.12	34.40	43.50	-9.10	95	100	peak
4	374.6226	41.95	-8.87	33.08	46.00	-12.92	345	100	peak
5	501.1790	45.50	-5.78	39.72	46.00	-6.28	69	100	peak
6	625.0780	40.68	-1.51	39.17	46.00	-6.83	201	100	peak

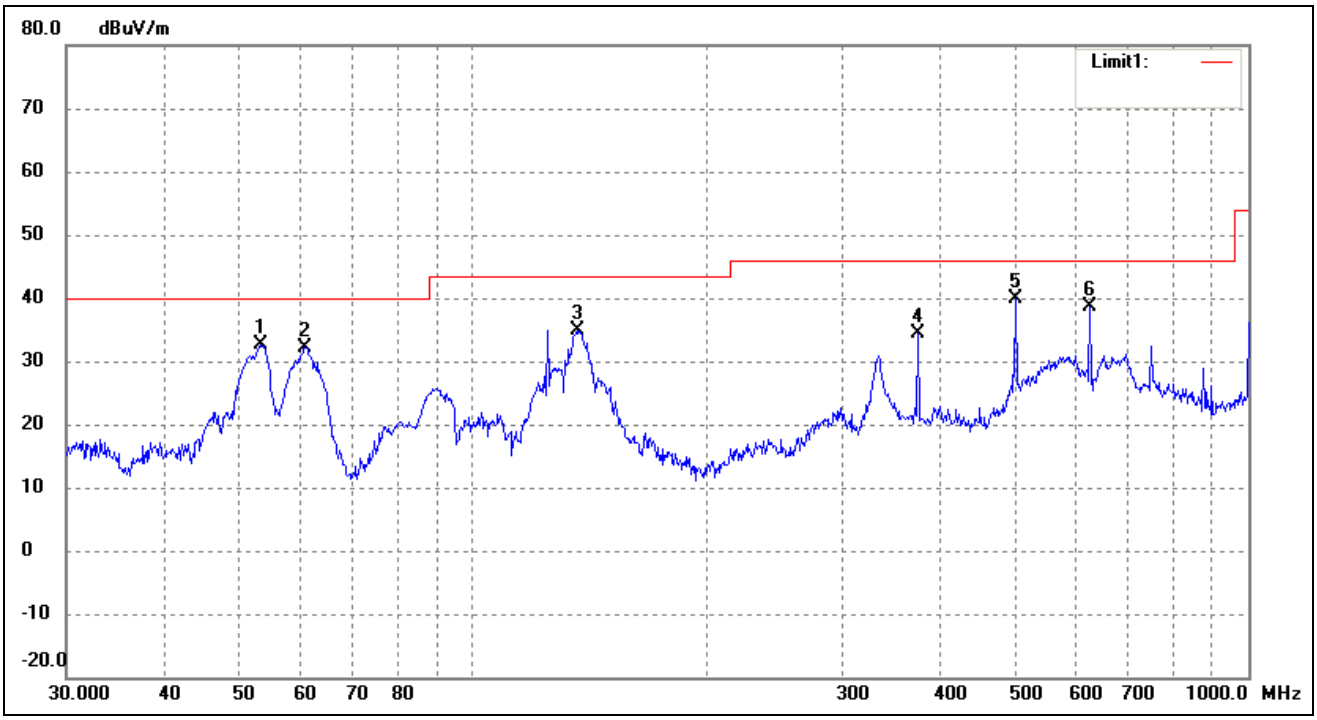
Test mode: Transmitting Channel 5240MHz

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	250.3012	44.12	-12.13	31.99	46.00	-14.01	85	100	peak
2	375.9385	46.94	-8.88	38.06	46.00	-7.94	116	100	peak
3	625.0780	46.32	-1.51	44.81	46.00	-1.19	126	100	peak

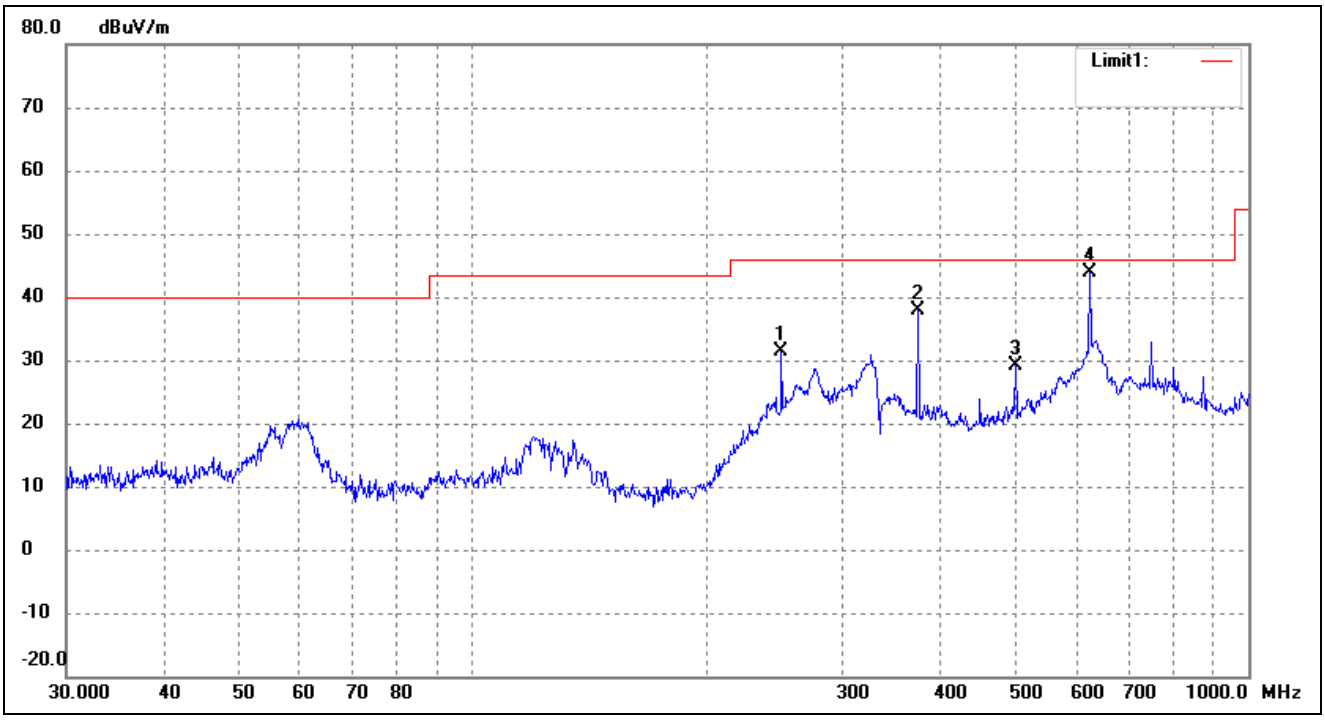
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	53.5052	48.99	-16.48	32.51	40.00	-7.49	68	100	peak
2	60.9176	48.90	-16.70	32.20	40.00	-7.80	148	100	peak
3	136.4598	52.84	-18.05	34.79	43.50	-8.71	144	100	peak
4	375.9385	43.17	-8.88	34.29	46.00	-11.71	176	100	peak
5	501.1790	45.61	-5.78	39.83	46.00	-6.17	68	100	peak
6	625.0780	40.13	-1.51	38.62	46.00	-7.38	148	100	peak

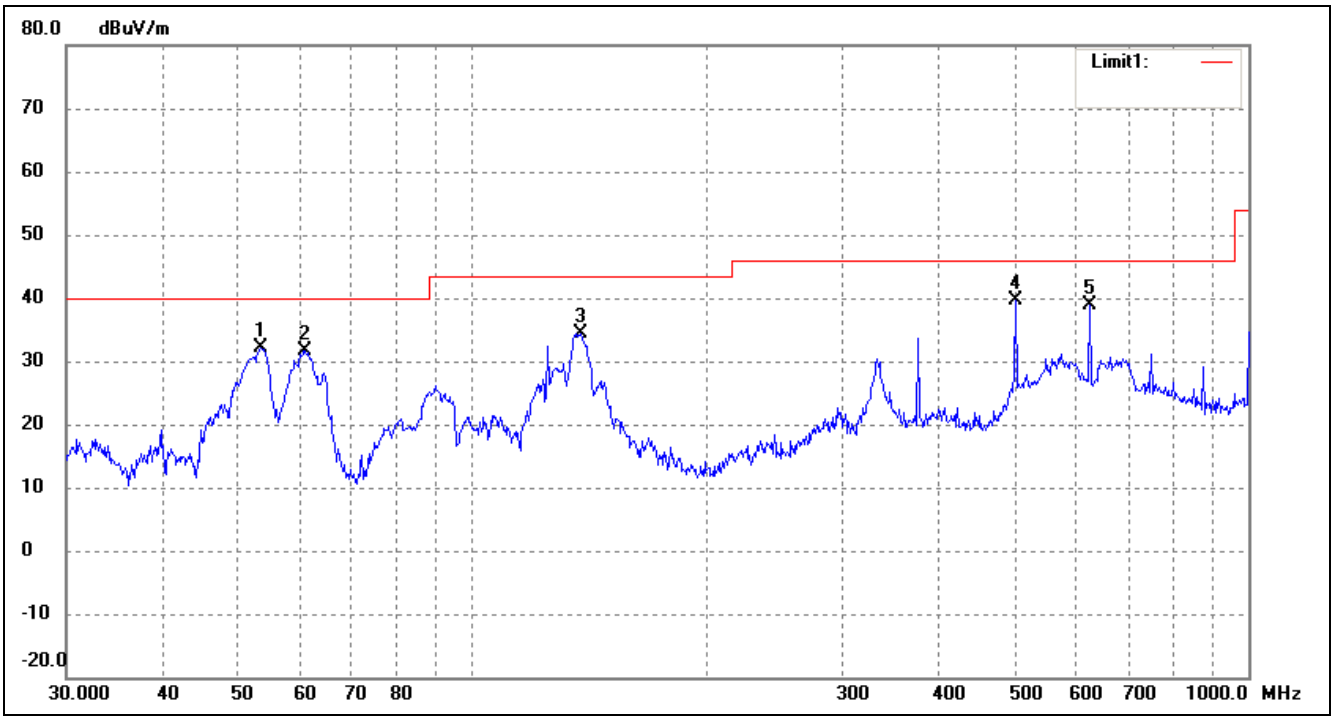
Test mode: Transmitting Channel 5745MHz

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	250.3012	43.48	-12.13	31.35	46.00	-14.65	177	100	peak
2	375.9385	46.77	-8.88	37.89	46.00	-8.11	90	100	peak
3	501.1790	34.81	-5.78	29.03	46.00	-16.97	336	100	peak
4	625.0780	45.39	-1.51	43.88	46.00	-2.12	360	100	peak

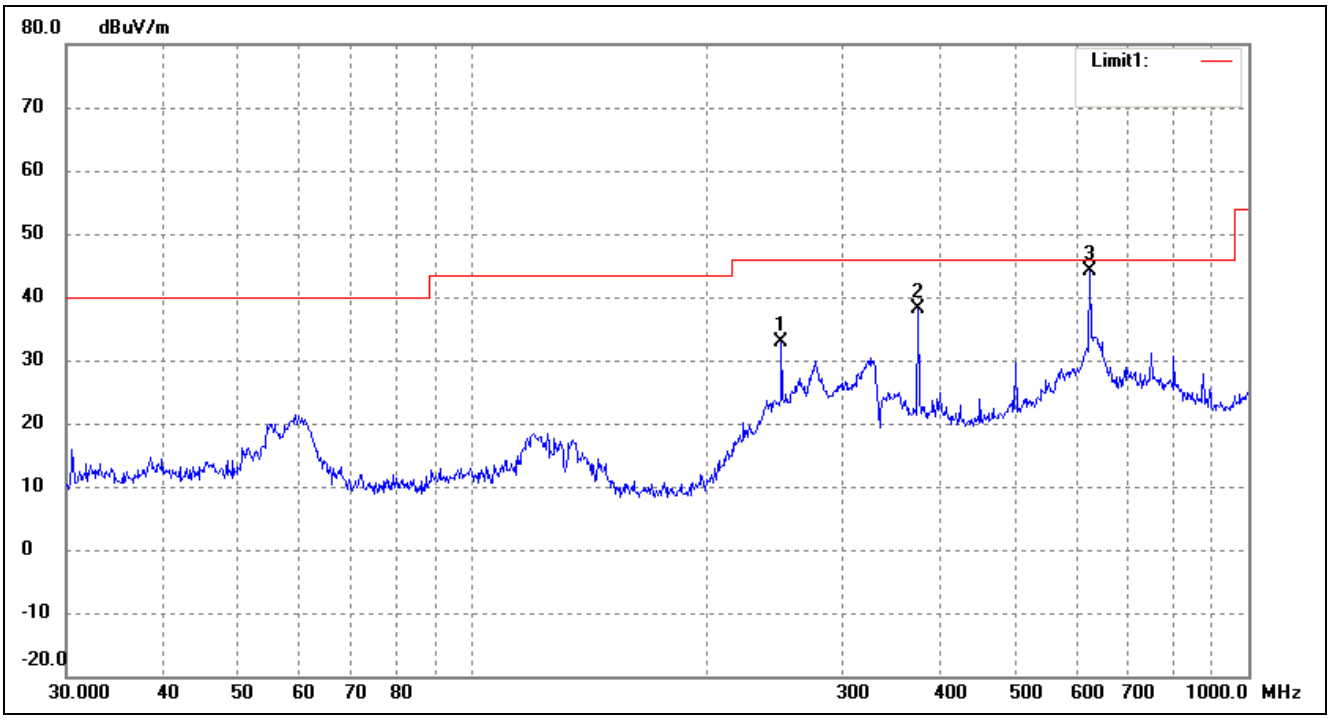
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	53.3179	48.69	-16.49	32.20	40.00	-7.80	226	100	peak
2	60.9176	48.40	-16.70	31.70	40.00	-8.30	98	100	peak
3	137.9029	52.51	-18.16	34.35	43.50	-9.15	140	100	peak
4	501.1790	45.41	-5.78	39.63	46.00	-6.37	104	100	peak
5	625.0780	40.43	-1.51	38.92	46.00	-7.08	305	100	peak

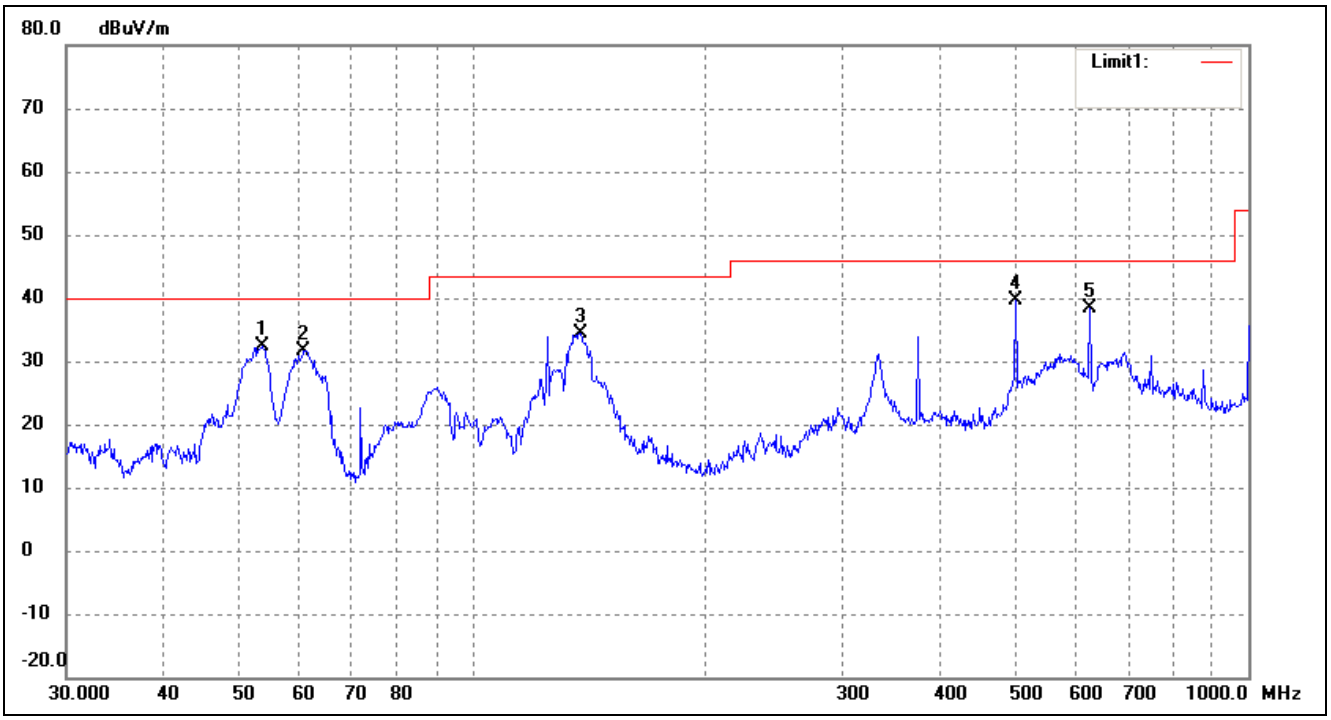
Test mode: Transmitting Channel 5785MHz

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	250.3012	44.90	-12.13	32.77	46.00	-13.23	254	100	peak
2	375.9385	47.11	-8.88	38.23	46.00	-7.77	119	100	peak
3	625.0780	45.69	-1.51	44.18	46.00	-1.82	67	100	peak

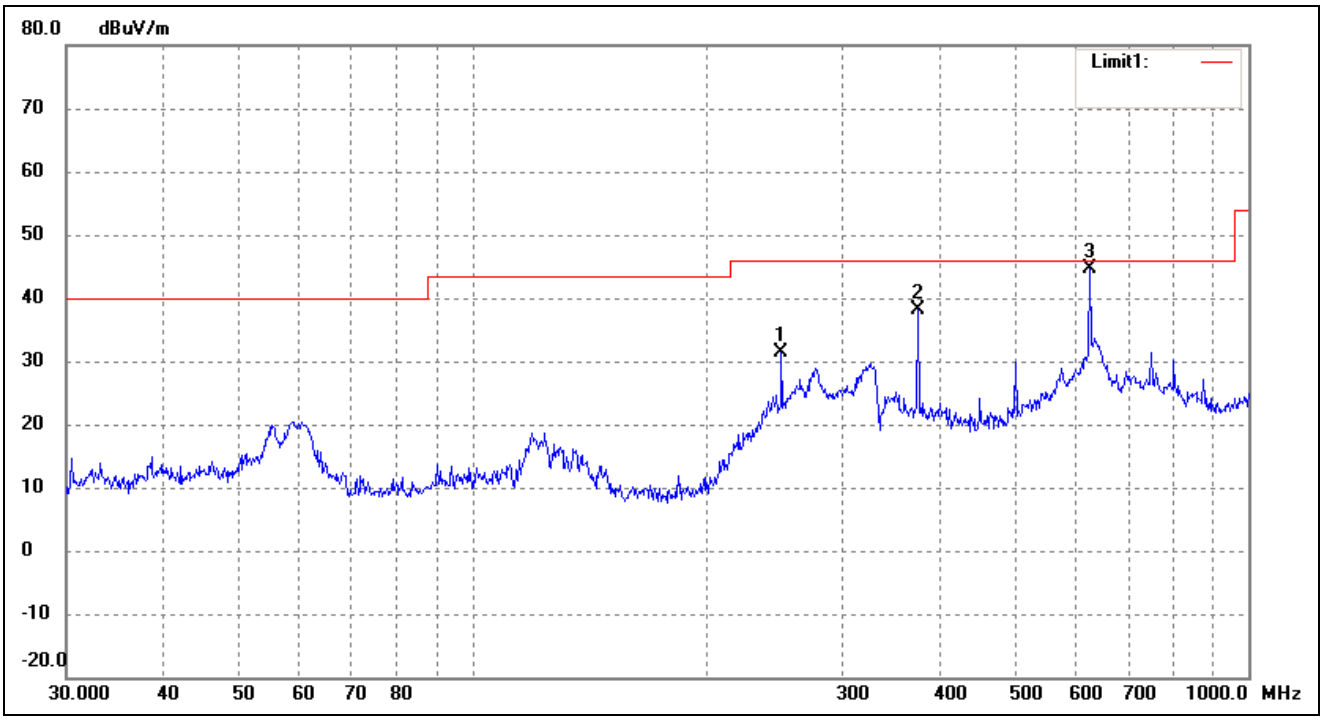
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	53.6932	48.78	-16.49	32.29	40.00	-7.71	270	100	peak
2	60.7044	48.37	-16.64	31.73	40.00	-8.27	79	100	peak
3	137.9029	52.64	-18.16	34.48	43.50	-9.02	119	100	peak
4	501.1790	45.52	-5.78	39.74	46.00	-6.26	78	100	peak
5	625.0780	39.92	-1.51	38.41	46.00	-7.59	178	100	peak

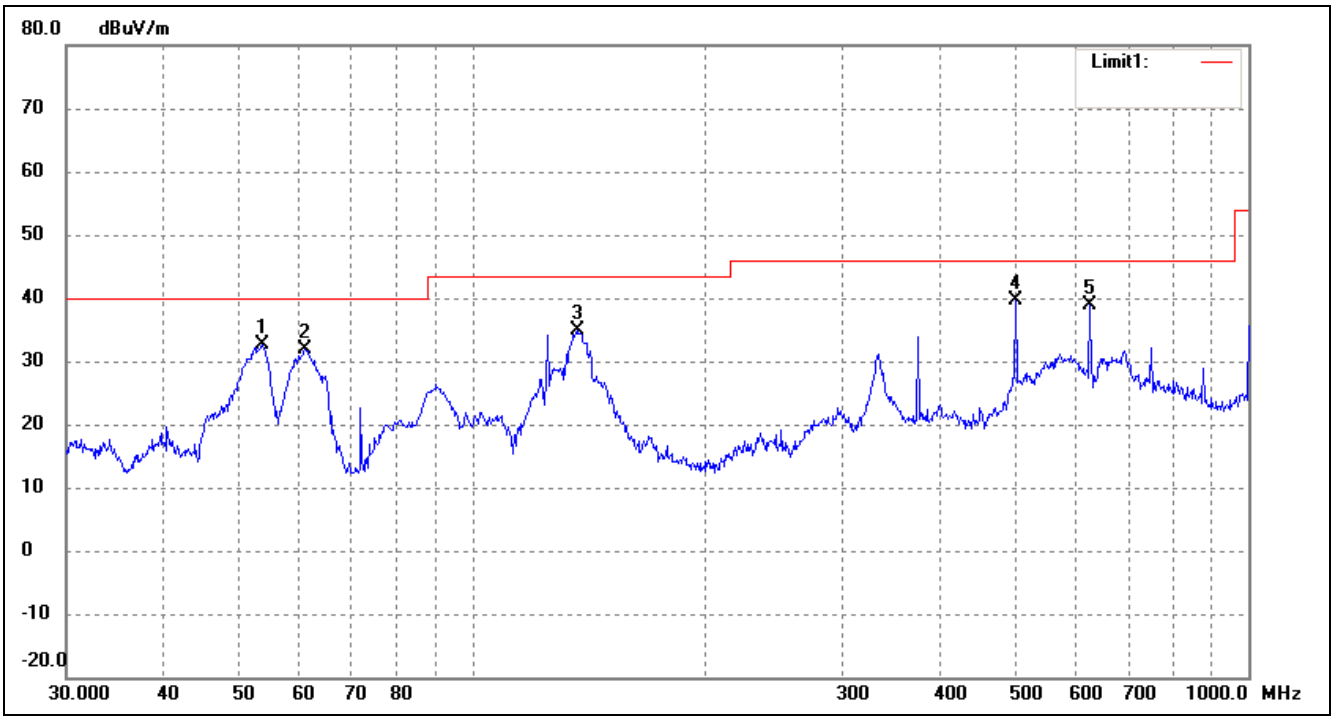
Test mode: Transmitting Channel 5825MHz

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	250.3012	43.61	-12.13	31.48	46.00	-14.52	68	100	peak
2	375.9385	46.97	-8.88	38.09	46.00	-7.91	92	100	peak
3	625.0780	46.07	-1.51	44.56	46.00	-1.44	63	100	peak

Test Specification: *Vertical*

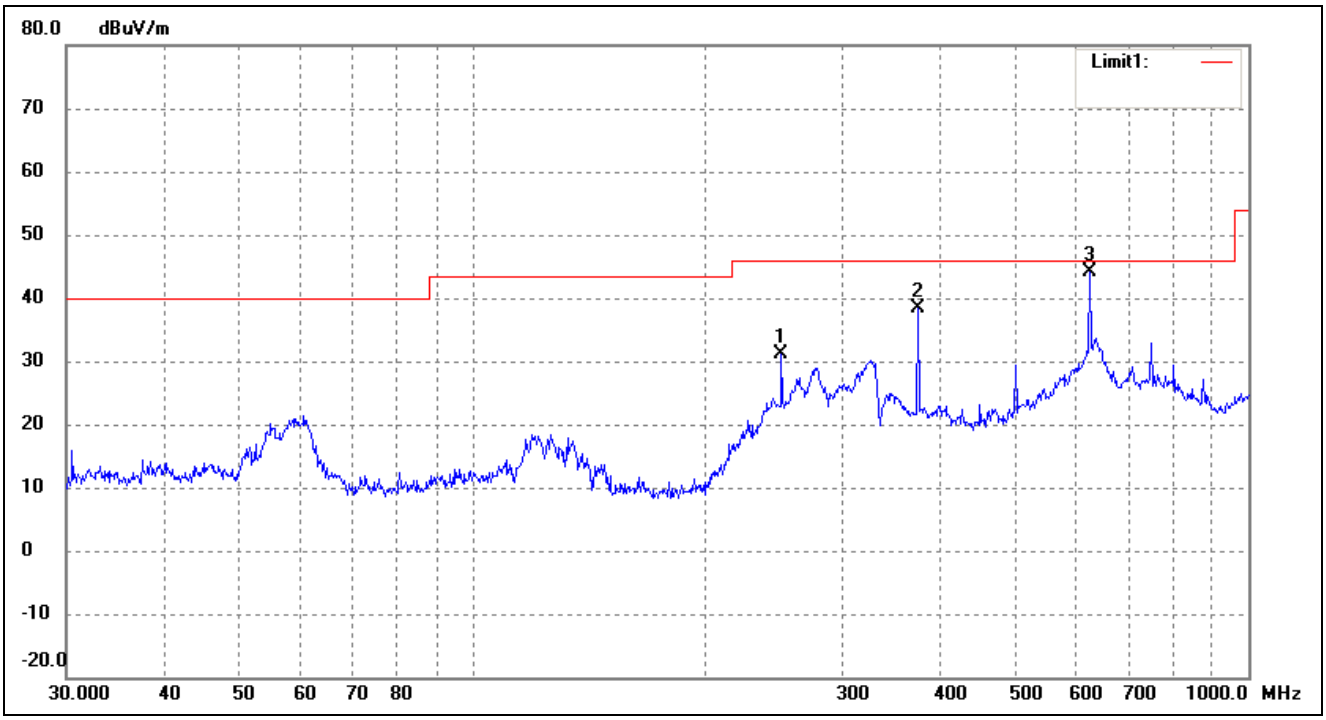


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	53.6932	49.02	-16.49	32.53	40.00	-7.47	260	100	peak
2	60.9176	48.46	-16.70	31.76	40.00	-8.24	140	100	peak
3	136.4598	52.83	-18.05	34.78	43.50	-8.72	104	100	peak
4	501.1790	45.52	-5.78	39.74	46.00	-6.26	305	100	peak
5	625.0780	40.39	-1.51	38.88	46.00	-7.12	200	100	peak

For 802.11n-HT20

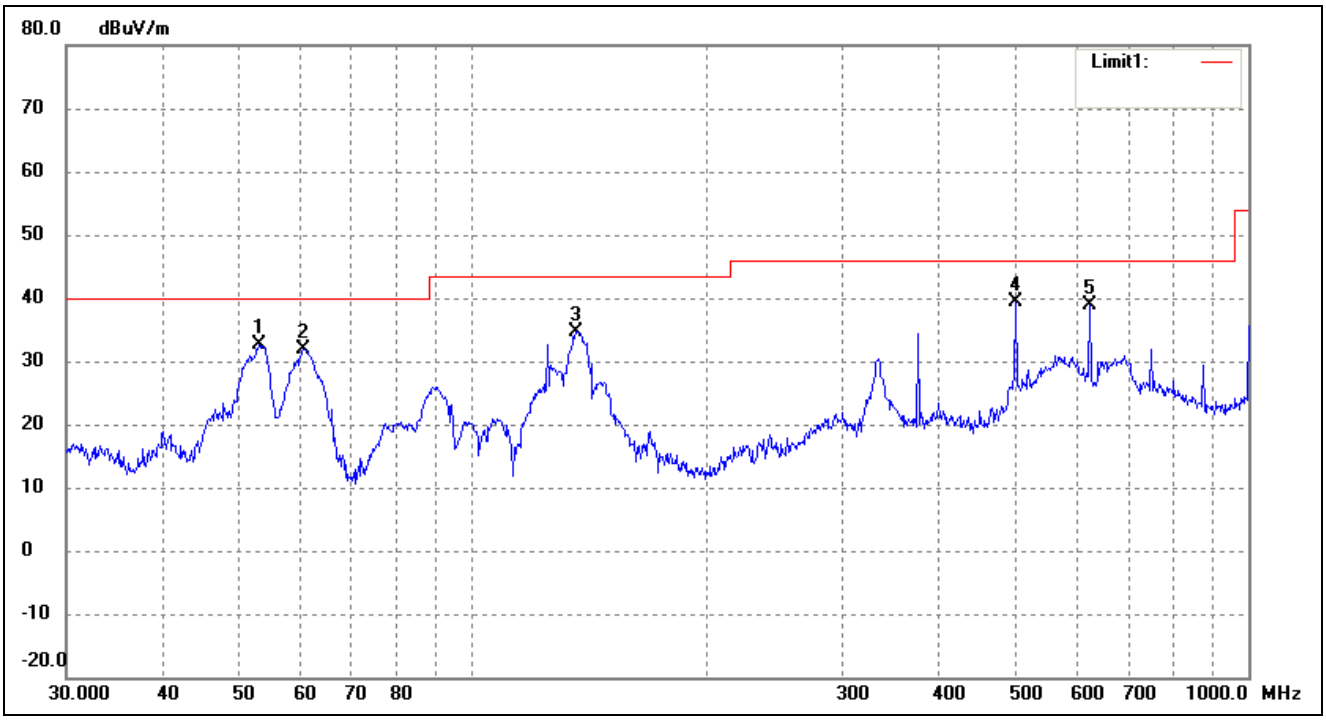
Test mode: Transmitting Channel 5180MHz

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	250.3012	43.23	-12.13	31.10	46.00	-14.90	93	100	peak
2	375.9385	47.22	-8.88	38.34	46.00	-7.66	254	100	peak
3	625.0780	45.63	-1.51	44.12	46.00	-1.88	119	100	peak

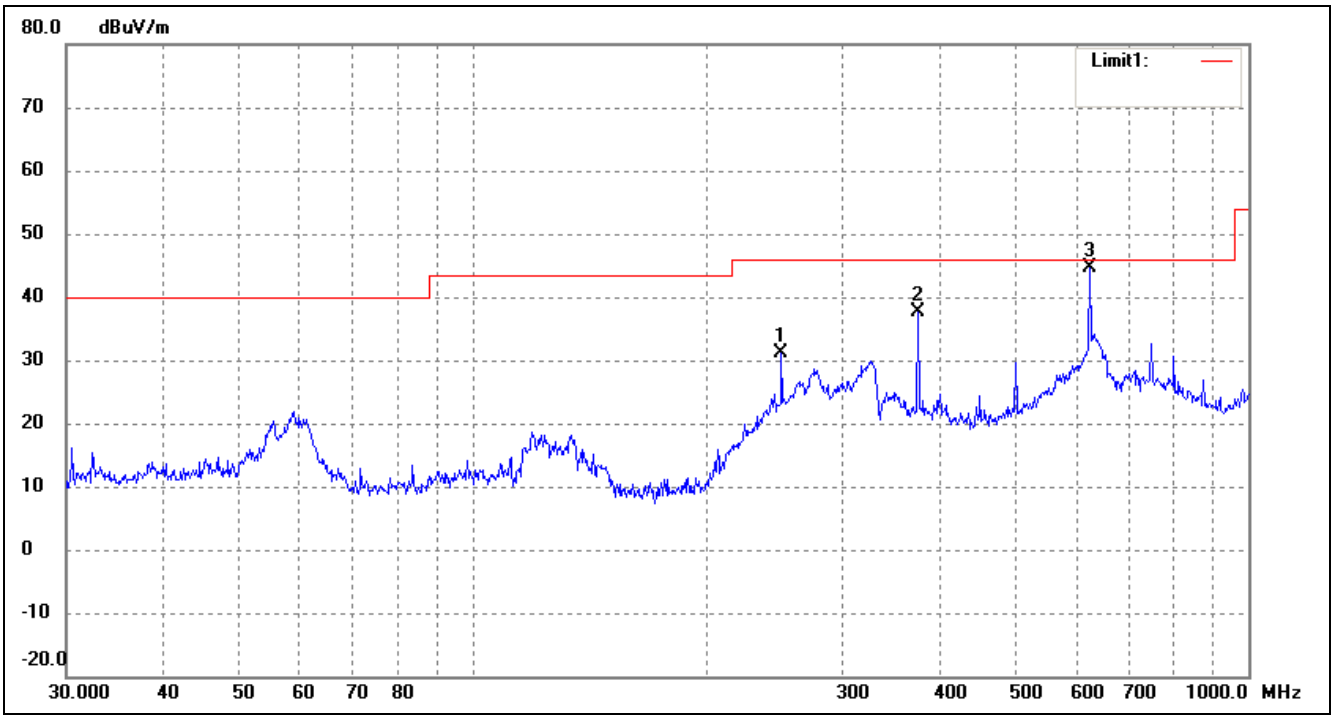
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	53.1313	49.07	-16.48	32.59	40.00	-7.41	299	100	peak
2	60.7044	48.43	-16.64	31.79	40.00	-8.21	95	100	peak
3	135.9822	52.73	-18.01	34.72	43.50	-8.78	219	100	peak
4	501.1790	45.20	-5.78	39.42	46.00	-6.58	99	100	peak
5	625.0780	40.38	-1.51	38.87	46.00	-7.13	289	100	peak

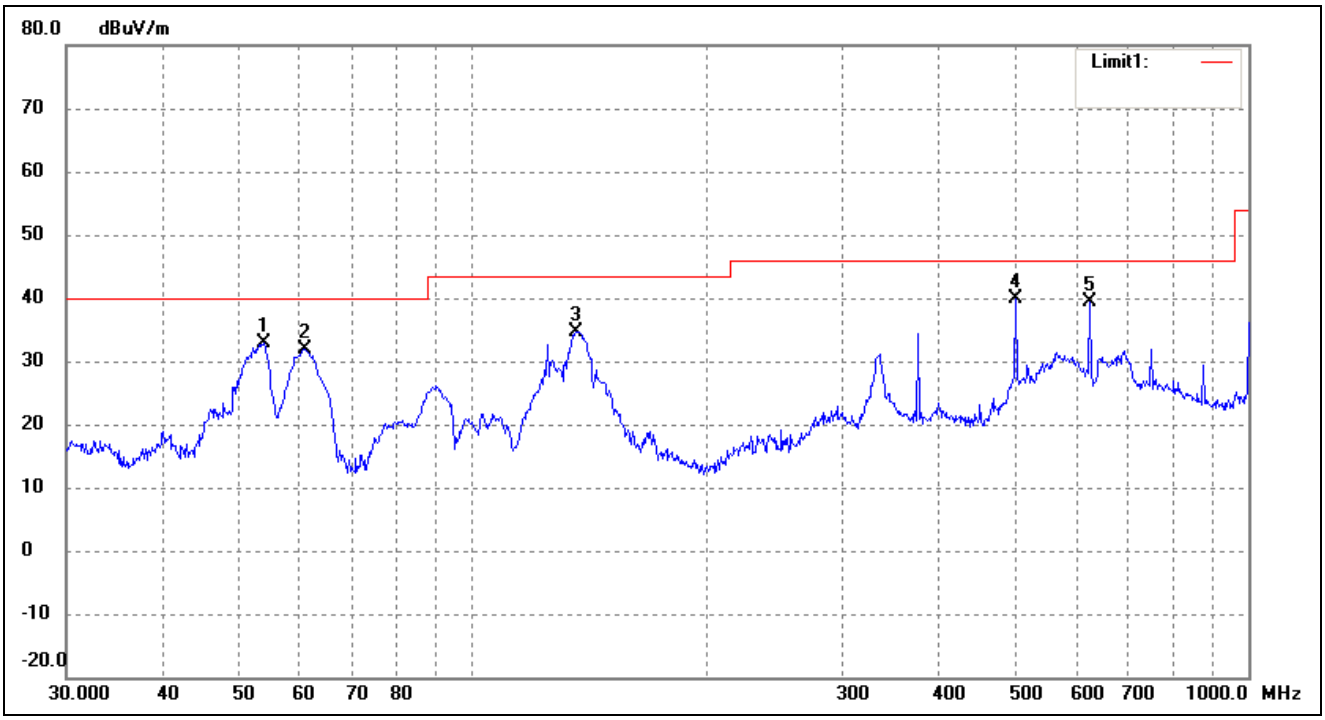
Test mode: Transmitting Channel 5200MHz

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	250.3012	43.34	-12.13	31.21	46.00	-14.79	264	100	peak
2	375.9385	46.58	-8.88	37.70	46.00	-8.30	227	100	peak
3	625.0780	46.08	-1.51	44.57	46.00	-1.43	286	100	peak

Test Specification: *Vertical*



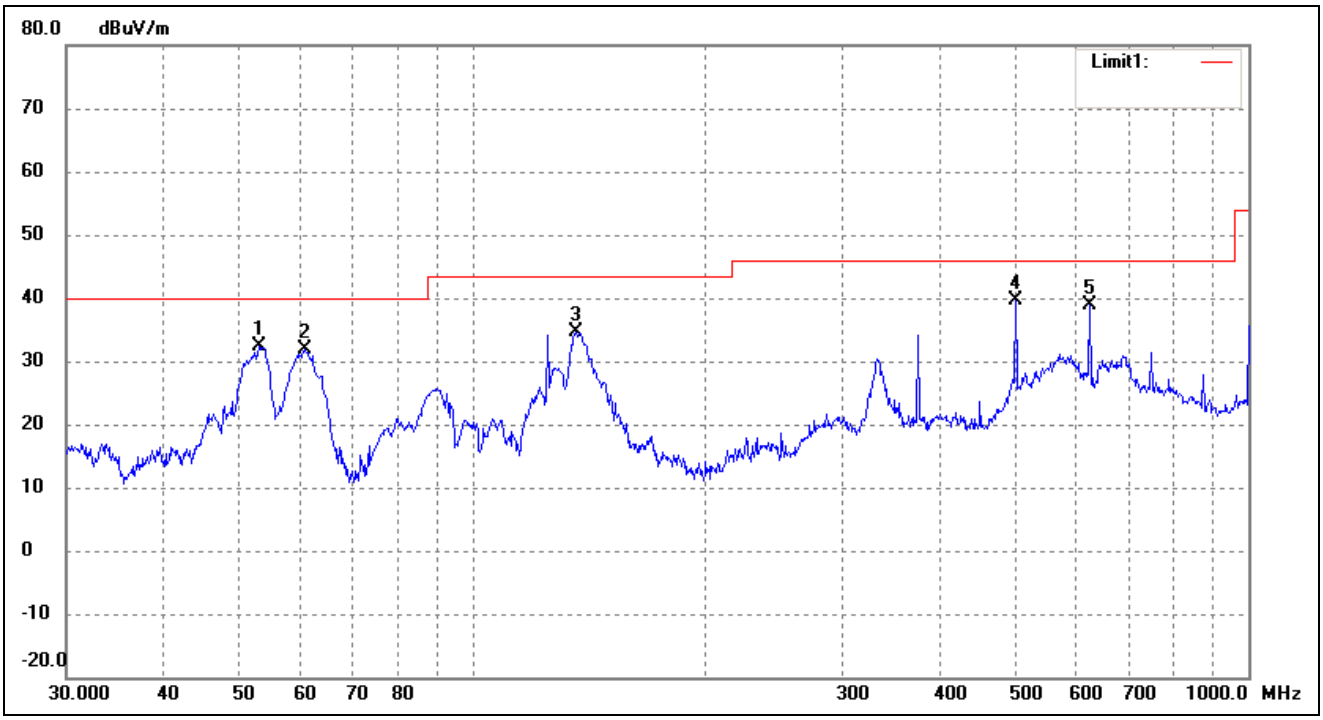
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	53.8818	49.33	-16.49	32.84	40.00	-7.16	227	100	peak
2	60.9176	48.67	-16.70	31.97	40.00	-8.03	286	100	peak
3	135.9822	52.73	-18.01	34.72	43.50	-8.78	51	100	peak
4	501.1790	45.58	-5.78	39.80	46.00	-6.20	159	100	peak
5	625.0780	40.90	-1.51	39.39	46.00	-6.61	242	100	peak

Test mode: Transmitting Channel 5240MHz

Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	250.3012	43.41	-12.13	31.28	46.00	-14.72	267	100	peak
2	375.9385	47.00	-8.88	38.12	46.00	-7.88	116	100	peak
3	625.0780	45.85	-1.51	44.34	46.00	-1.66	360	100	peak

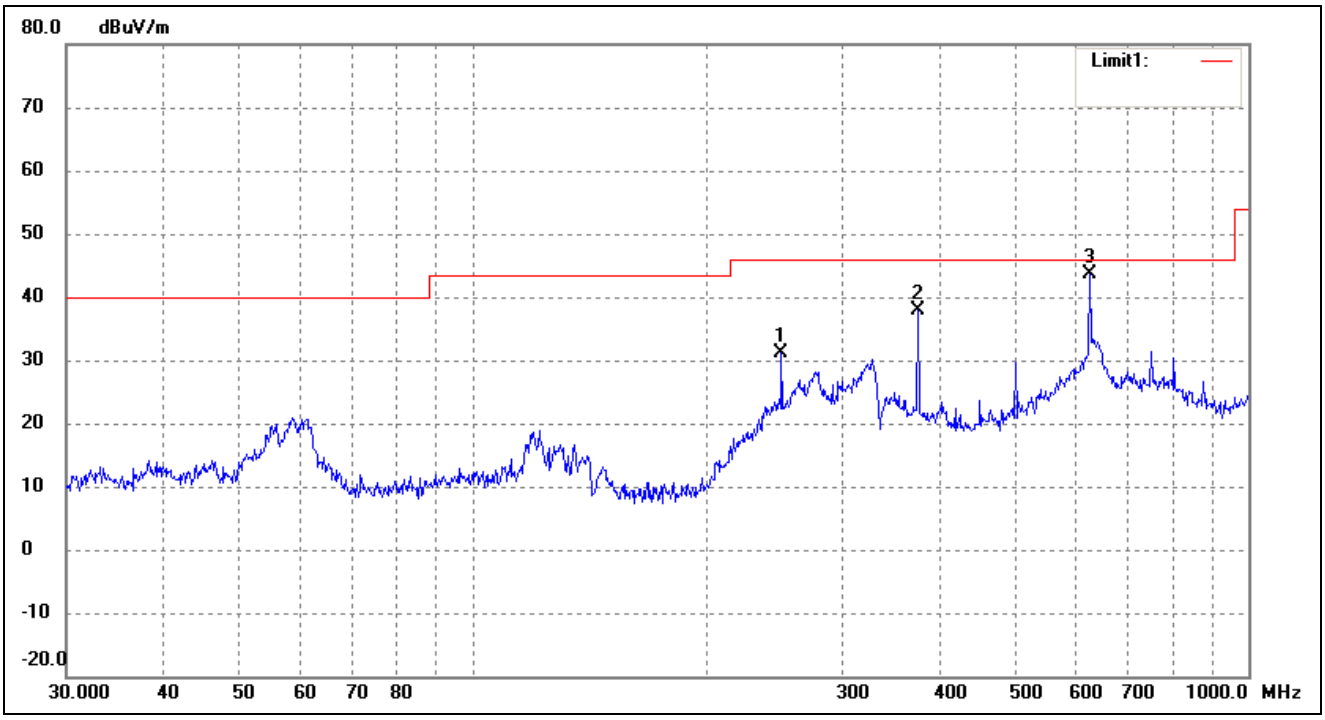
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	53.1313	48.76	-16.48	32.28	40.00	-7.72	339	100	peak
2	60.9176	48.54	-16.70	31.84	40.00	-8.16	144	100	peak
3	135.9822	52.52	-18.01	34.51	43.50	-8.99	54	100	peak
4	501.1790	45.51	-5.78	39.73	46.00	-6.27	168	100	peak
5	625.0780	40.45	-1.51	38.94	46.00	-7.06	64	100	peak

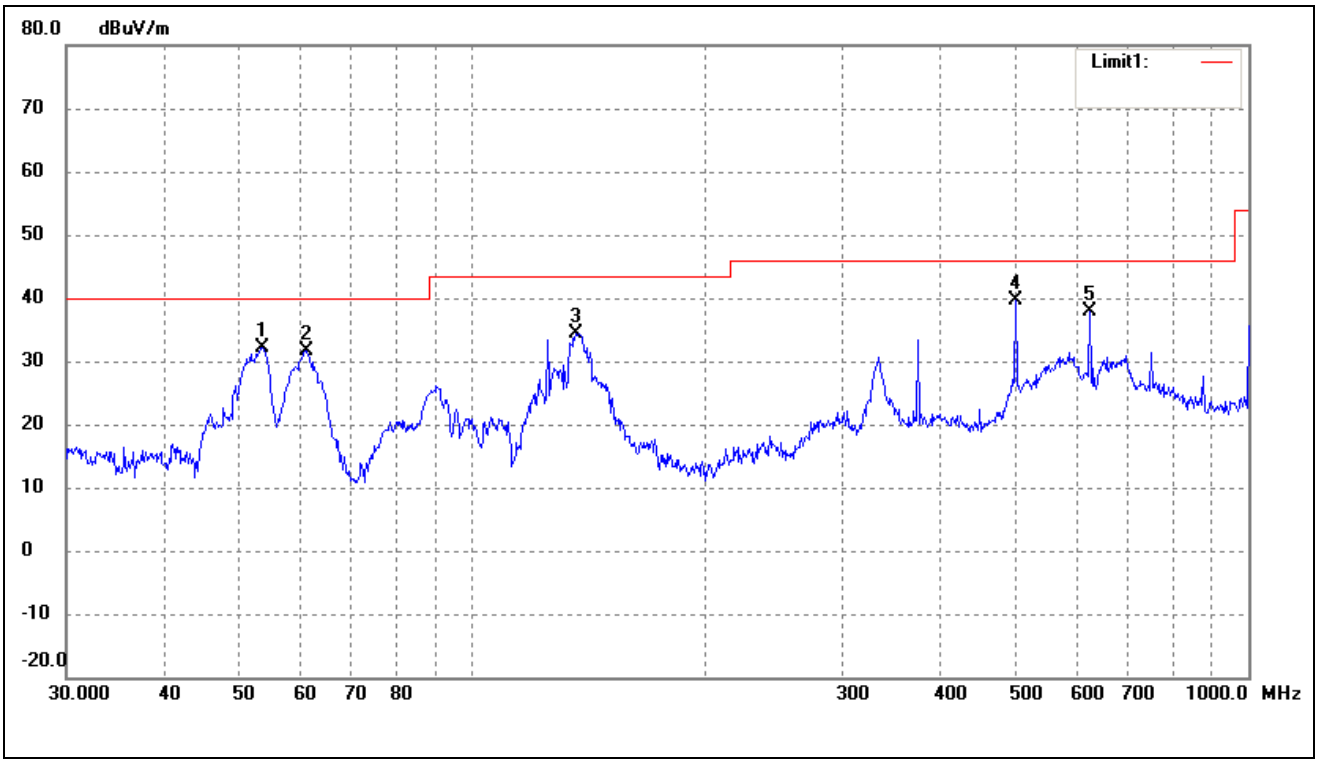
Test mode: Transmitting Channel 5745MHz

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	250.3012	43.27	-12.13	31.14	46.00	-14.86	83	100	peak
2	375.9385	46.74	-8.88	37.86	46.00	-8.14	98	100	peak
3	625.0780	45.19	-1.51	43.68	46.00	-2.32	93	100	peak

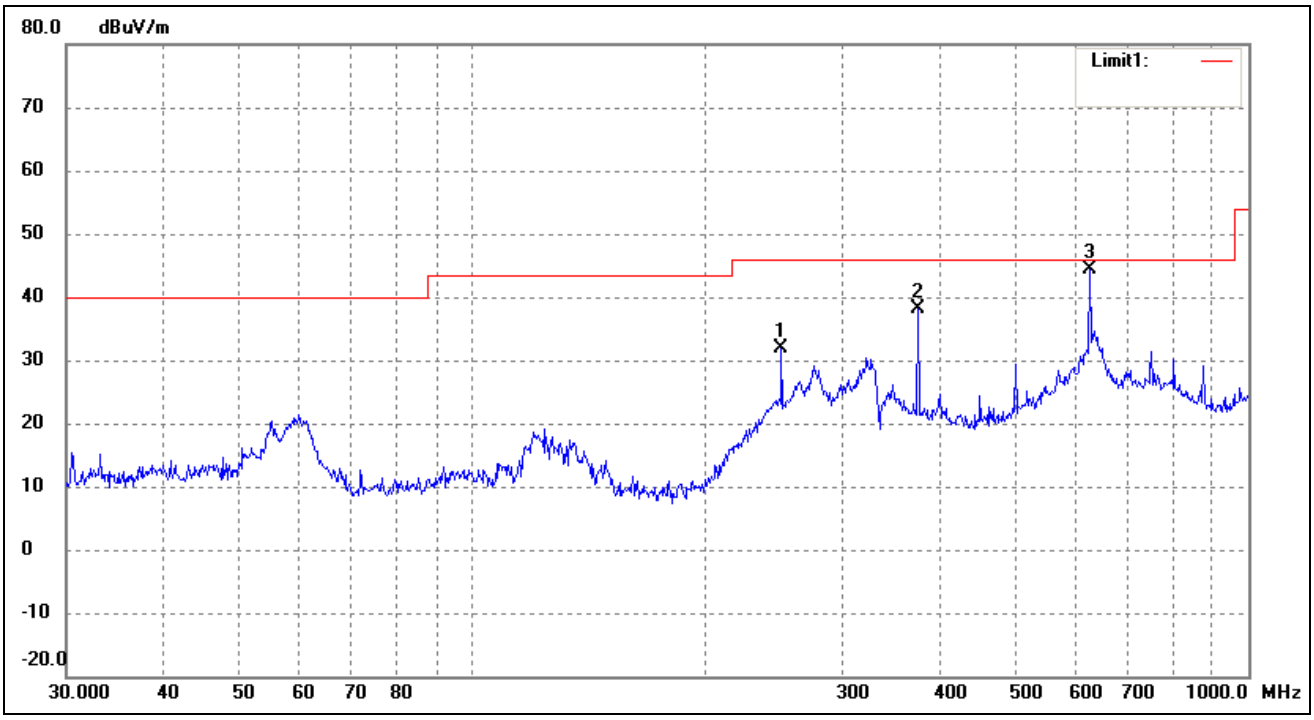
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	53.6932	48.73	-16.49	32.24	40.00	-7.76	270	100	peak
2	61.1316	48.40	-16.75	31.65	40.00	-8.35	164	100	peak
3	135.9822	52.42	-18.01	34.41	43.50	-9.09	228	200	peak
4	501.1790	45.43	-5.78	39.65	46.00	-6.35	83	100	peak
5	625.0780	39.42	-1.51	37.91	46.00	-8.09	98	100	peak

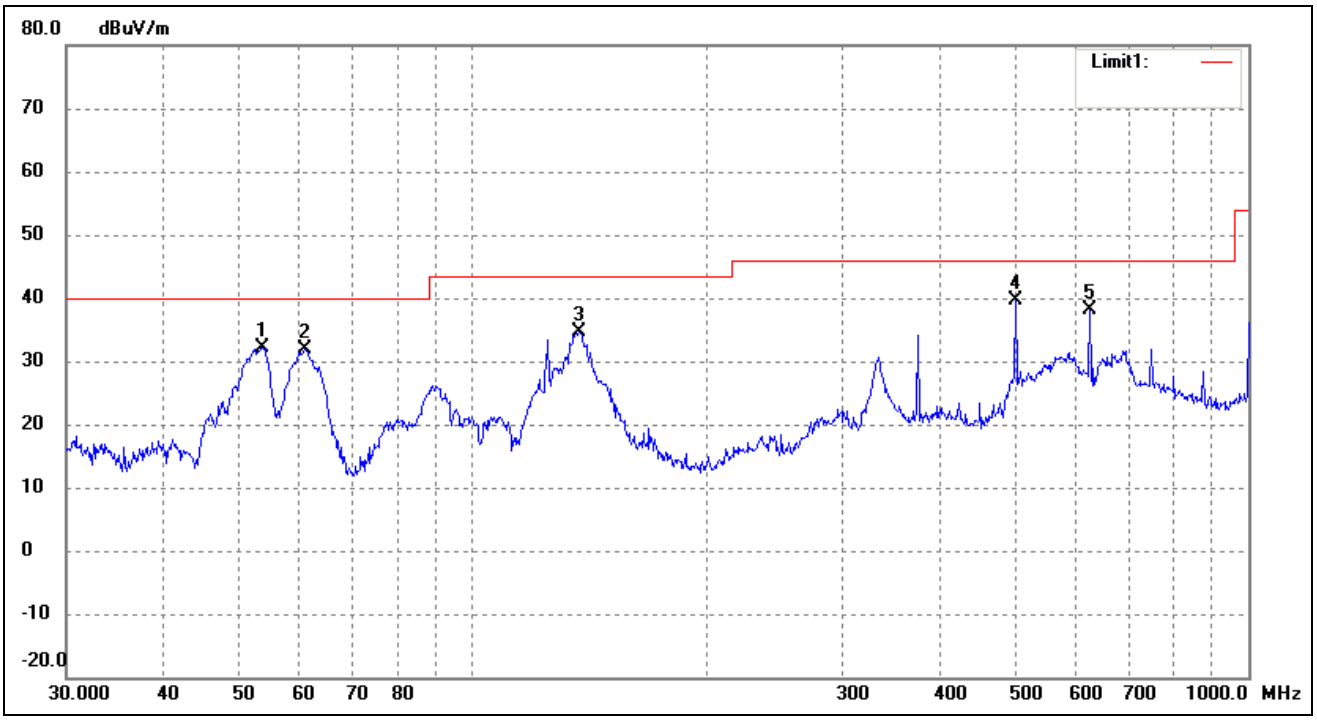
Test mode: Transmitting Channel 5785MHz

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	250.3012	43.97	-12.13	31.84	46.00	-14.16	51	100	peak
2	375.9385	47.04	-8.88	38.16	46.00	-7.84	164	100	peak
3	625.0780	45.93	-1.51	44.42	46.00	-1.58	109	100	peak

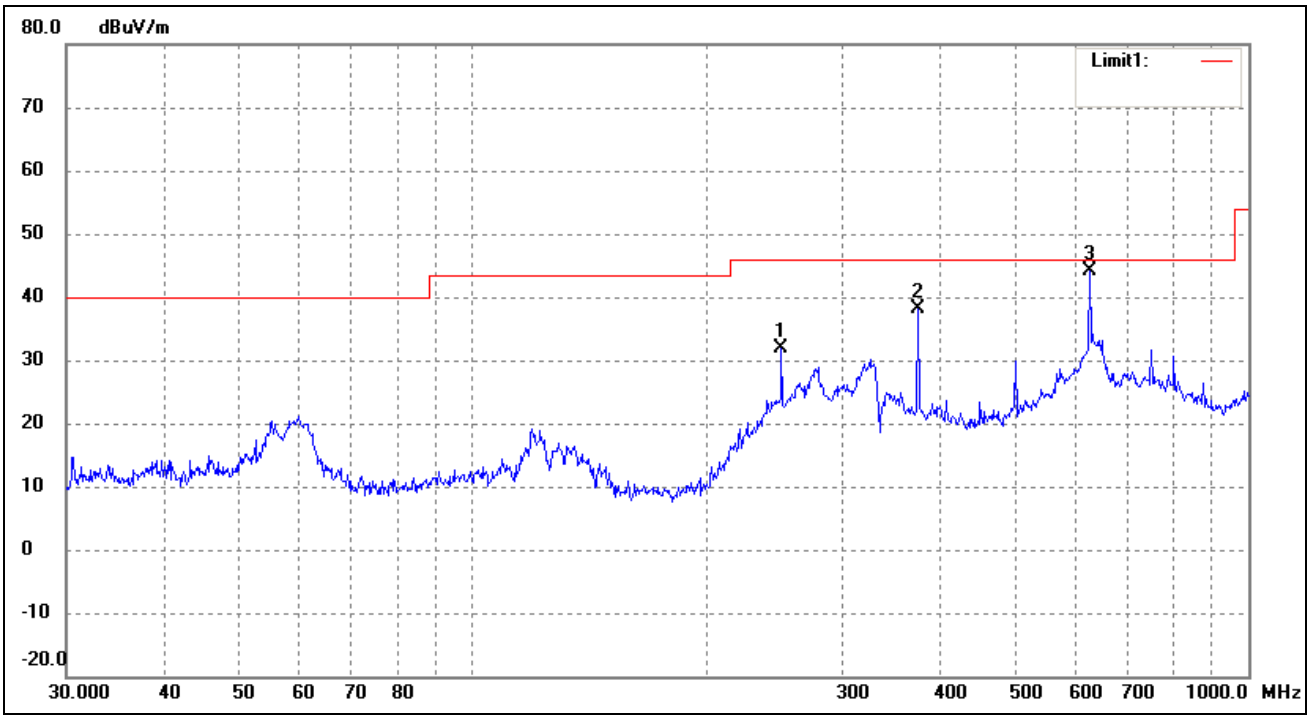
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	53.6932	48.73	-16.49	32.24	40.00	-7.76	270	100	peak
2	60.9176	48.62	-16.70	31.92	40.00	-8.08	51	200	peak
3	137.4202	52.64	-18.12	34.52	43.50	-8.98	360	200	peak
4	501.1790	45.43	-5.78	39.65	46.00	-6.35	360	100	peak
5	625.0780	39.72	-1.51	38.21	46.00	-7.79	51	100	peak

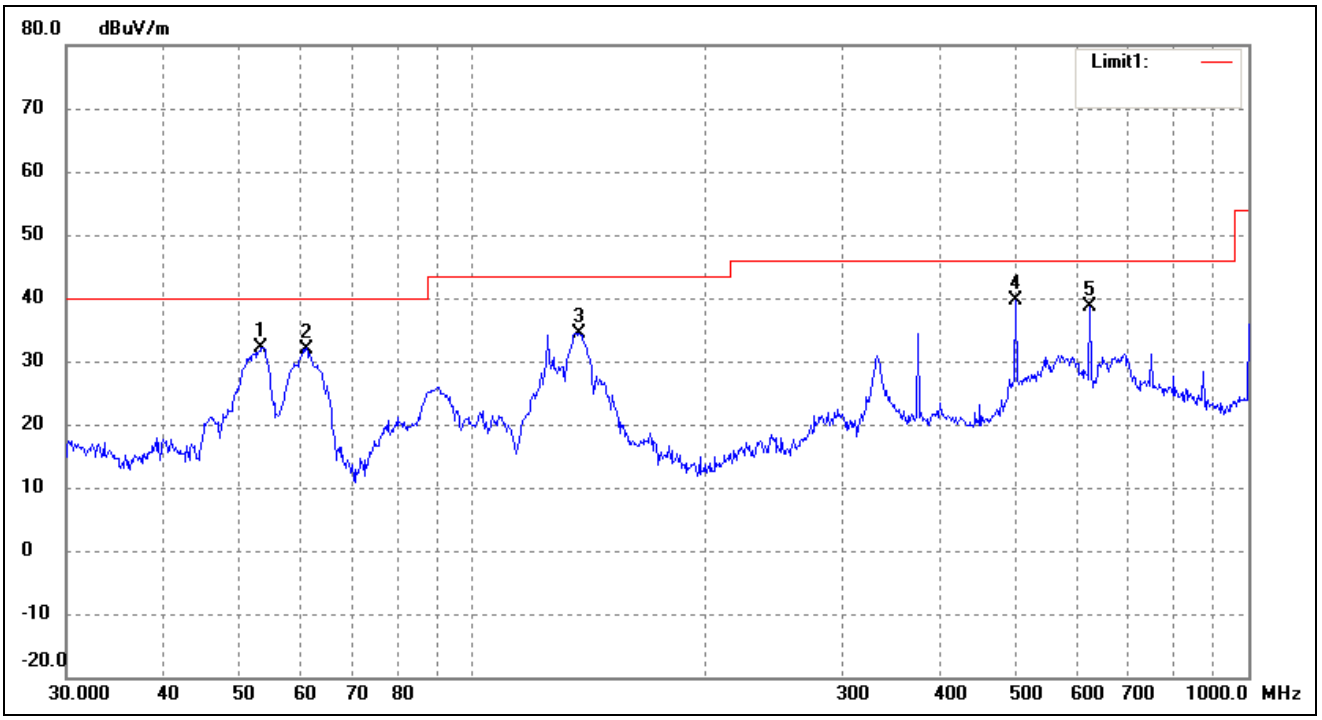
Test mode: Transmitting Channel 5825MHz

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	250.3012	44.10	-12.13	31.97	46.00	-14.03	227	100	peak
2	375.9385	46.93	-8.88	38.05	46.00	-7.95	286	100	peak
3	625.0780	45.74	-1.51	44.23	46.00	-1.77	51	100	peak

Test Specification: *Vertical*

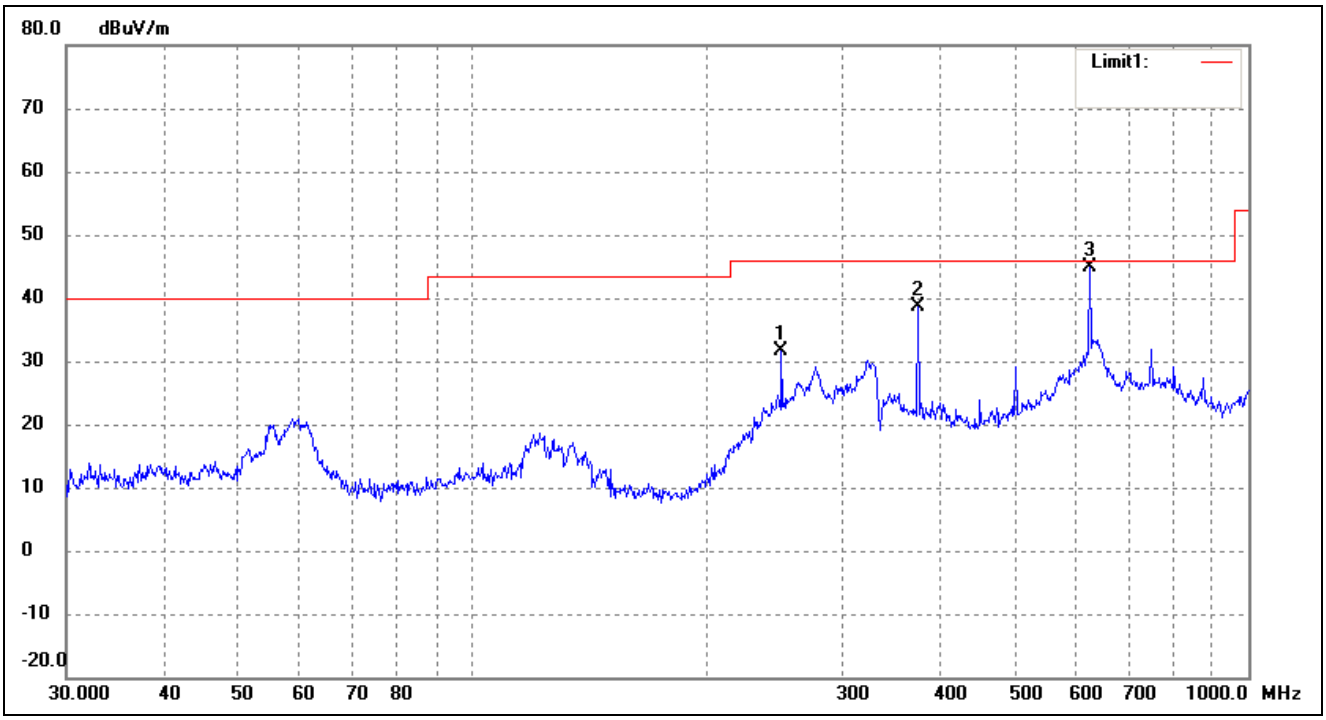


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	53.5052	48.70	-16.48	32.22	40.00	-7.78	247	100	peak
2	61.1316	48.75	-16.75	32.00	40.00	-8.00	100	100	peak
3	137.4202	52.59	-18.12	34.47	43.50	-9.03	184	100	peak
4	501.1790	45.30	-5.78	39.52	46.00	-6.48	118	100	peak
5	625.0780	40.06	-1.51	38.55	46.00	-7.45	260	100	peak

For 802.11n-HT40

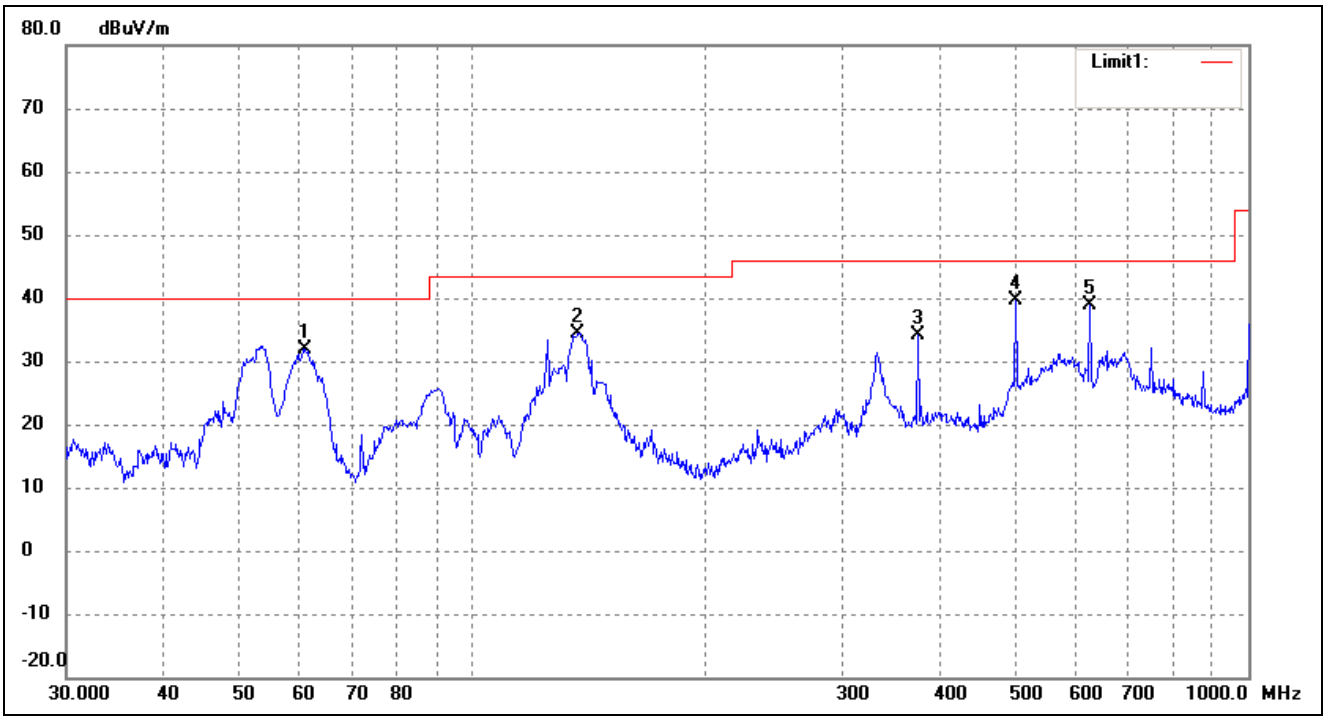
Test mode: Transmitting Channel 5190MHz

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	250.3012	43.88	-12.13	31.75	46.00	-14.25	265	100	peak
2	375.9385	47.58	-8.88	38.70	46.00	-7.30	77	100	peak
3	625.0780	46.40	-1.51	44.89	46.00	-1.11	316	100	peak

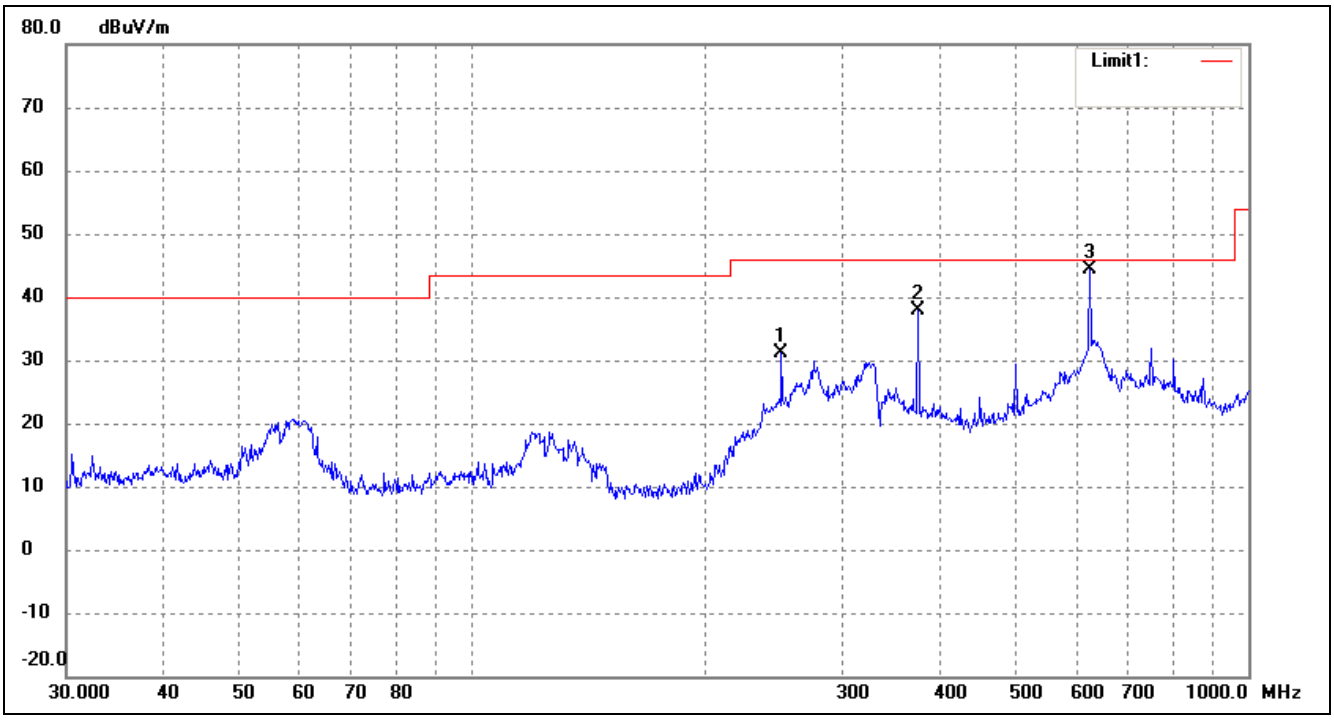
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	60.9176	48.60	-16.70	31.90	40.00	-8.10	274	100	peak
2	136.9392	52.52	-18.08	34.44	43.50	-9.06	28	100	peak
3	375.9385	42.93	-8.88	34.05	46.00	-11.95	164	100	peak
4	501.1790	45.32	-5.78	39.54	46.00	-6.46	121	100	peak
5	625.0780	40.36	-1.51	38.85	46.00	-7.15	91	100	peak

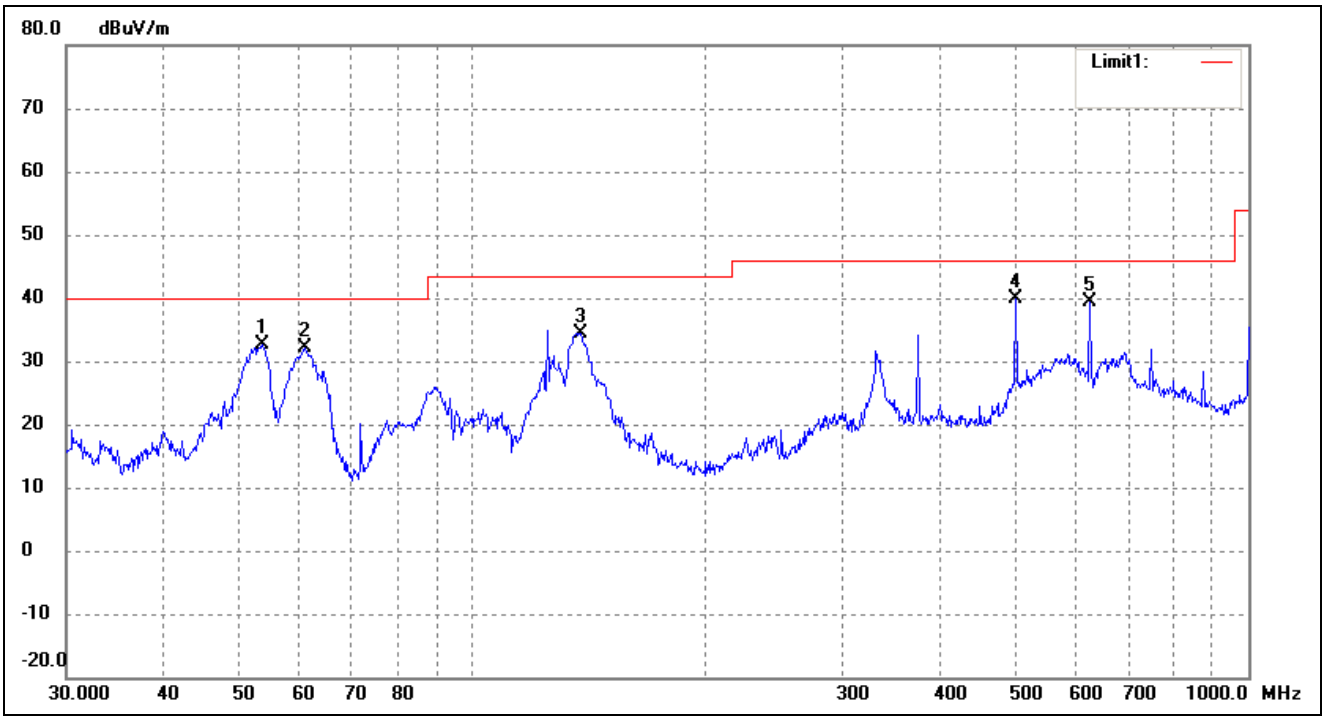
Test mode: Transmitting Channel 5230MHz

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	250.3012	43.26	-12.13	31.13	46.00	-14.87	288	100	peak
2	375.9385	46.85	-8.88	37.97	46.00	-8.03	324	100	peak
3	625.0780	45.81	-1.51	44.30	46.00	-1.70	96	100	peak

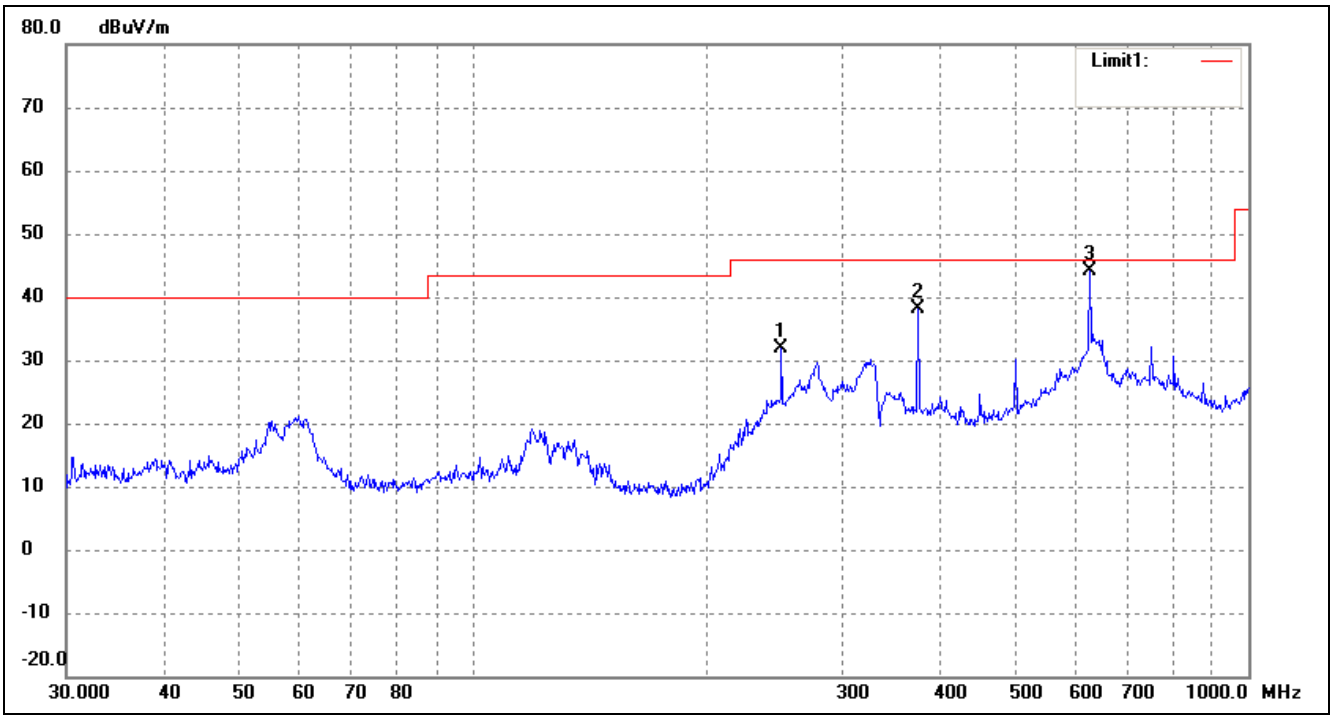
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	53.6932	49.16	-16.49	32.67	40.00	-7.33	360	100	peak
2	60.9176	48.76	-16.70	32.06	40.00	-7.94	132	100	peak
3	137.9029	52.64	-18.16	34.48	43.50	-9.02	97	100	peak
4	501.1790	45.75	-5.78	39.97	46.00	-6.03	136	100	peak
5	625.0780	40.85	-1.51	39.34	46.00	-6.66	185	100	peak

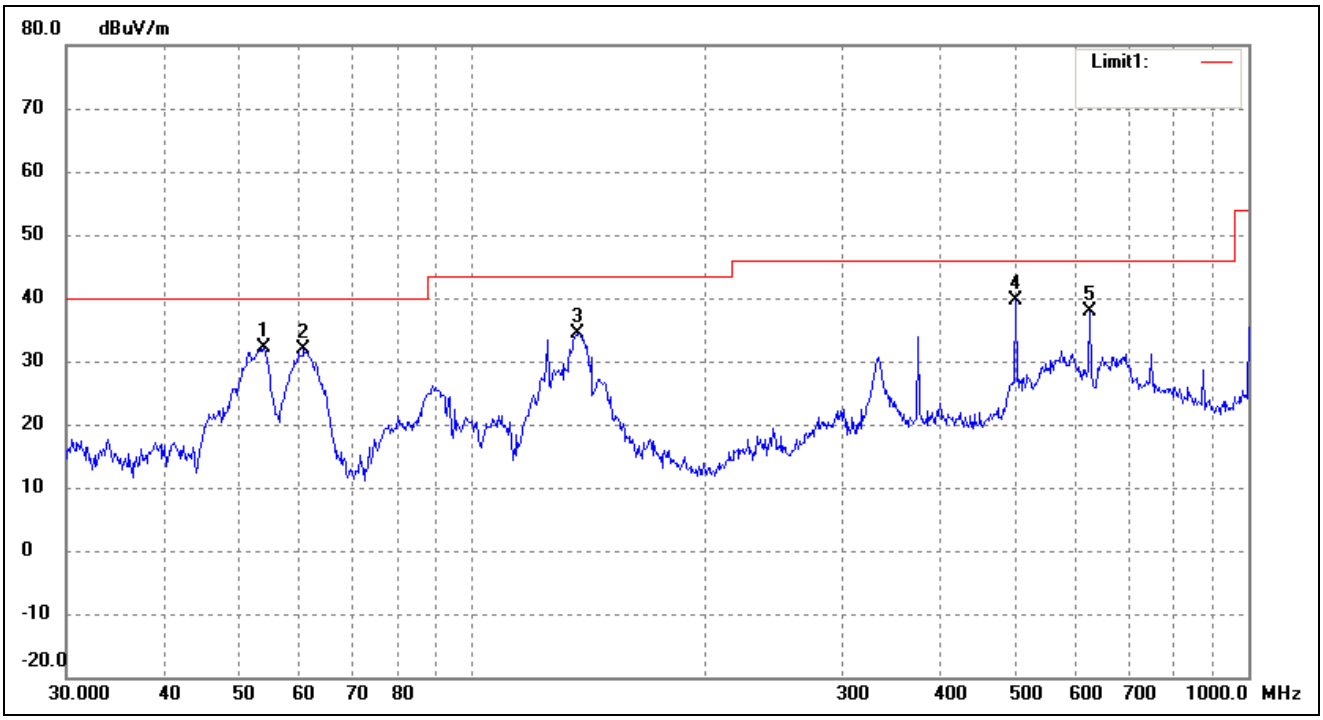
Test mode: Transmitting Channel 5755MHz

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	250.3012	44.10	-12.13	31.97	46.00	-14.03	267	100	peak
2	375.9385	47.04	-8.88	38.16	46.00	-7.84	116	100	peak
3	625.0780	45.74	-1.51	44.23	46.00	-1.77	360	100	peak

Test Specification: *Vertical*



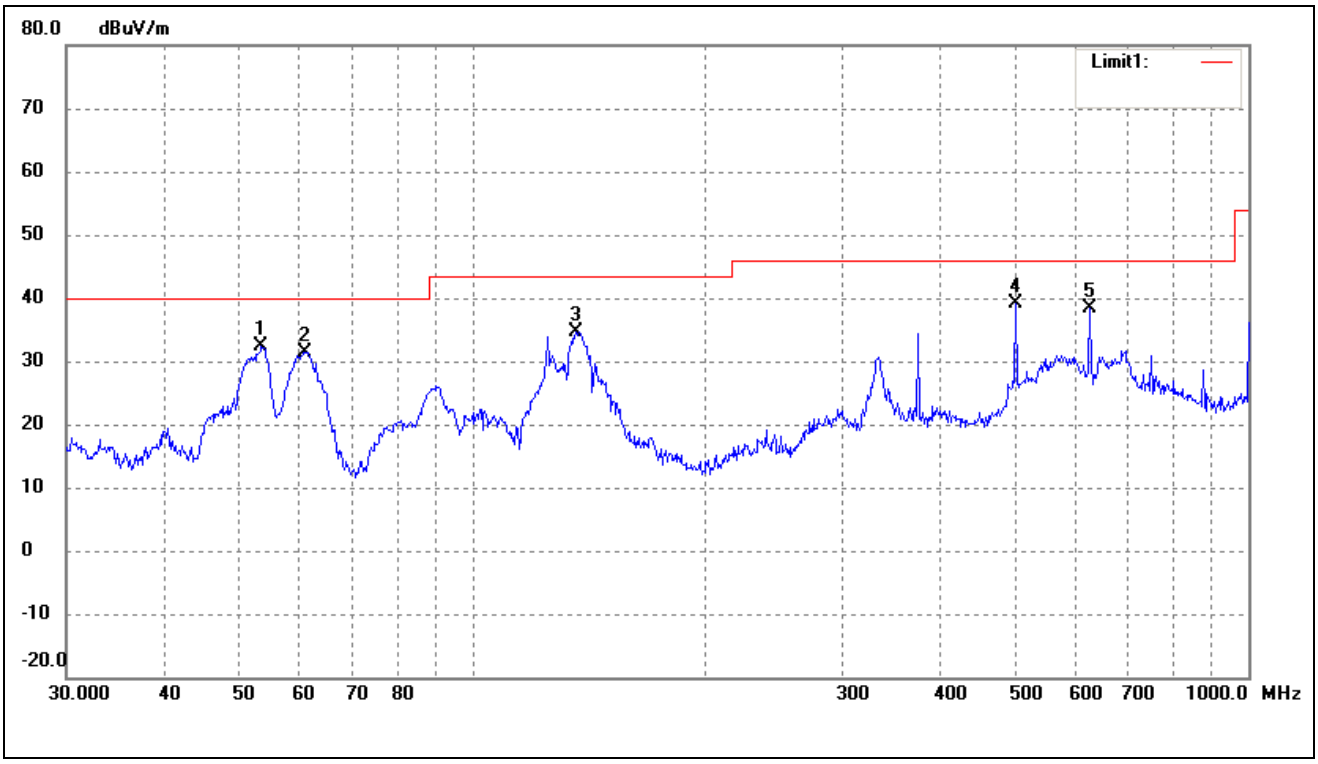
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	53.8818	48.50	-16.49	32.01	40.00	-7.99	267	100	peak
2	60.7044	48.40	-16.64	31.76	40.00	-8.24	218	100	peak
3	136.4598	52.46	-18.05	34.41	43.50	-9.09	91	100	peak
4	501.1790	45.38	-5.78	39.60	46.00	-6.40	131	100	peak
5	625.0780	39.45	-1.51	37.94	46.00	-8.06	91	100	peak

Test mode: Transmitting Channel 5795MHz

Horizontal

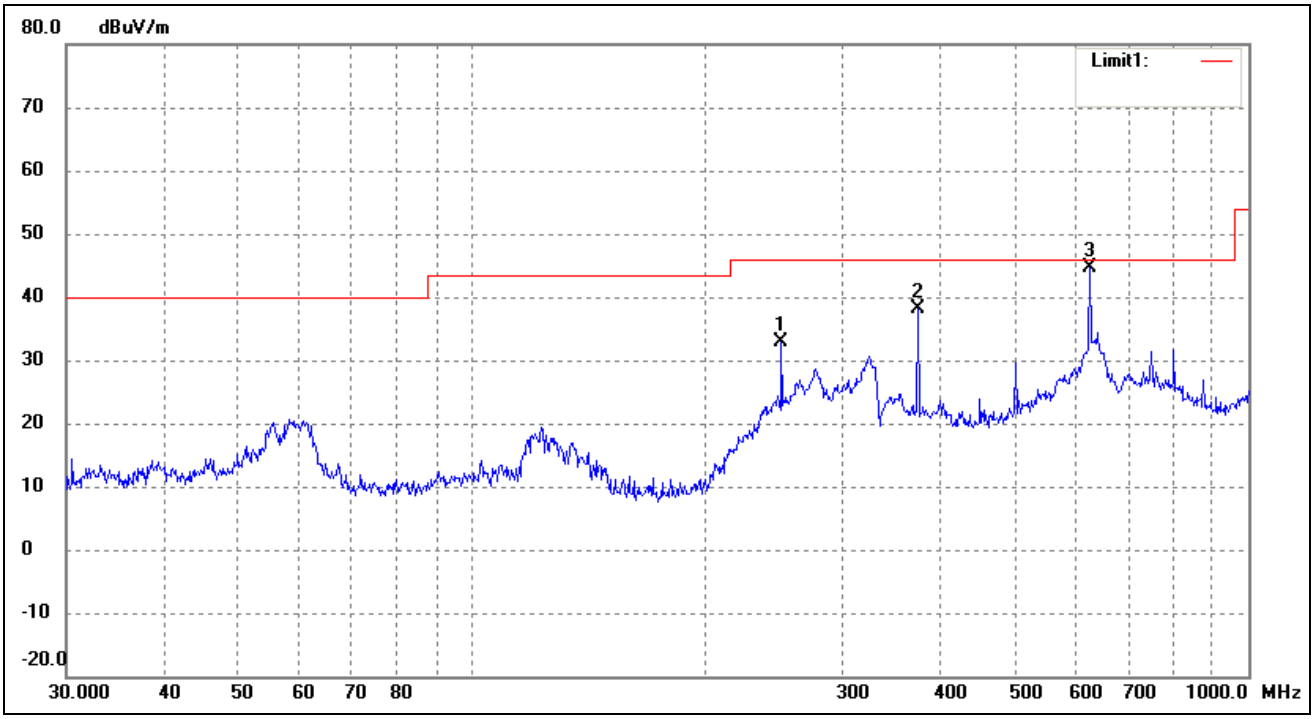
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	250.3012	43.61	-12.13	31.48	46.00	-14.52	322	100	peak
2	375.9385	46.79	-8.88	37.91	46.00	-8.09	121	100	peak
3	625.0780	45.58	-1.51	44.07	46.00	-1.93	79	100	peak

Test Specification: *Vertical*



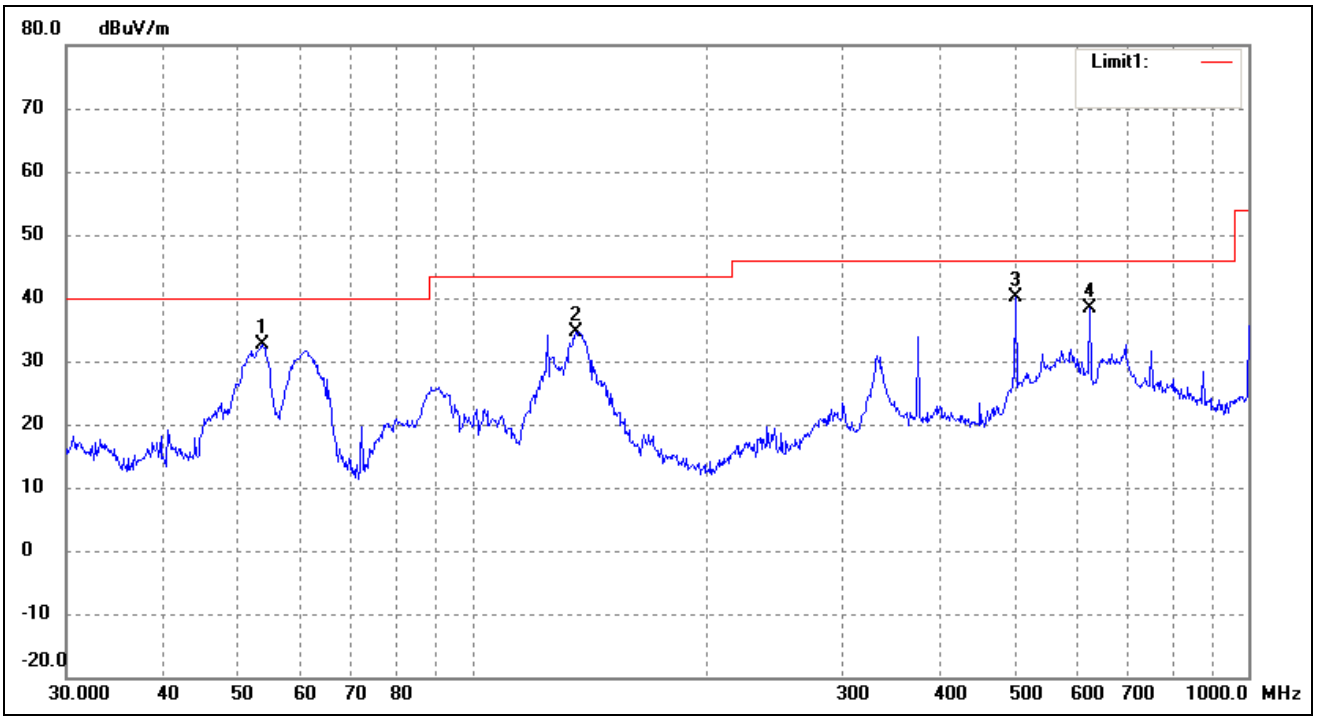
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	53.5052	48.82	-16.48	32.34	40.00	-7.66	255	100	peak
2	60.9176	48.14	-16.70	31.44	40.00	-8.56	91	100	peak
3	135.9822	52.60	-18.01	34.59	43.50	-8.91	71	100	peak
4	501.1790	45.01	-5.78	39.23	46.00	-6.77	169	100	peak
5	625.0780	39.87	-1.51	38.36	46.00	-7.64	265	100	peak

For 802.11ac-HT80
Test mode: Transmitting Channel 5210MHz
Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	250.3012	45.04	-12.13	32.91	46.00	-13.09	360	100	peak
2	375.9385	46.94	-8.88	38.06	46.00	-7.94	255	100	peak
3	625.0780	46.02	-1.51	44.51	46.00	-1.49	270	100	peak

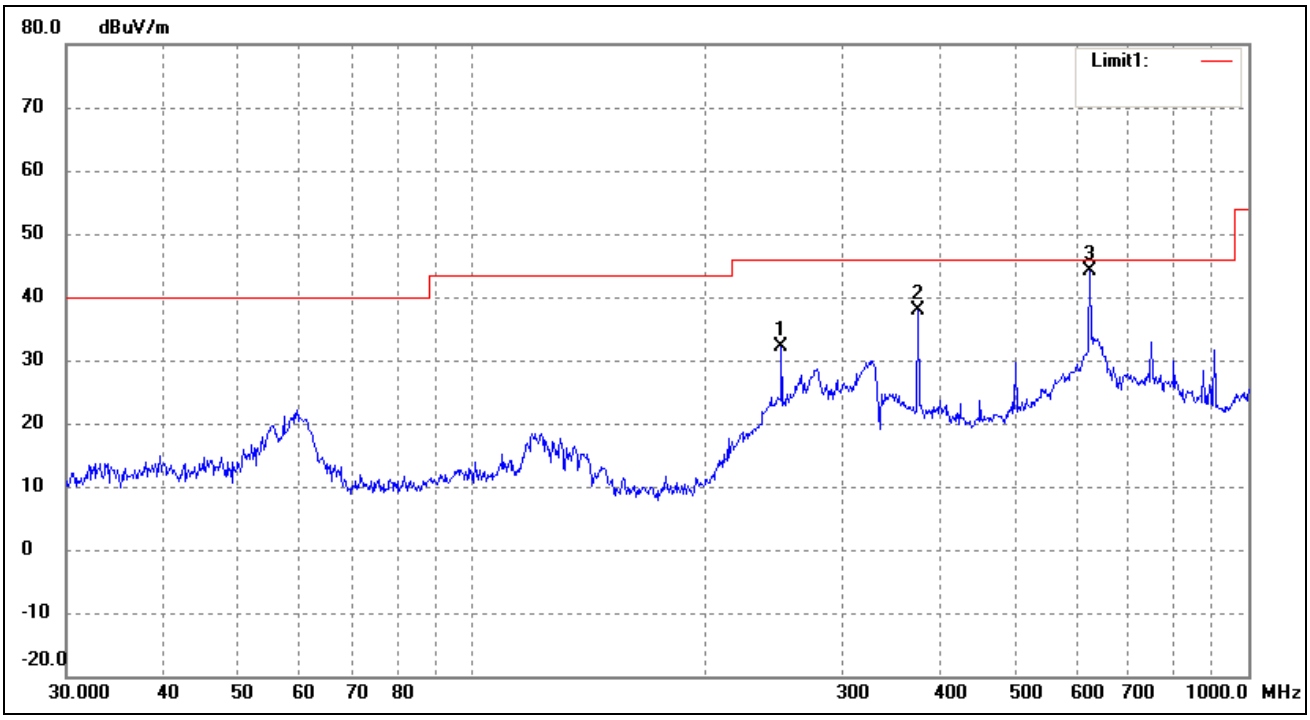
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	53.6932	49.04	-16.49	32.55	40.00	-7.45	112	100	peak
2	135.9822	52.63	-18.01	34.62	43.50	-8.88	70	100	peak
3	501.1790	45.81	-5.78	40.03	46.00	-5.97	130	100	peak
4	625.0780	40.01	-1.51	38.50	46.00	-7.50	153	100	peak

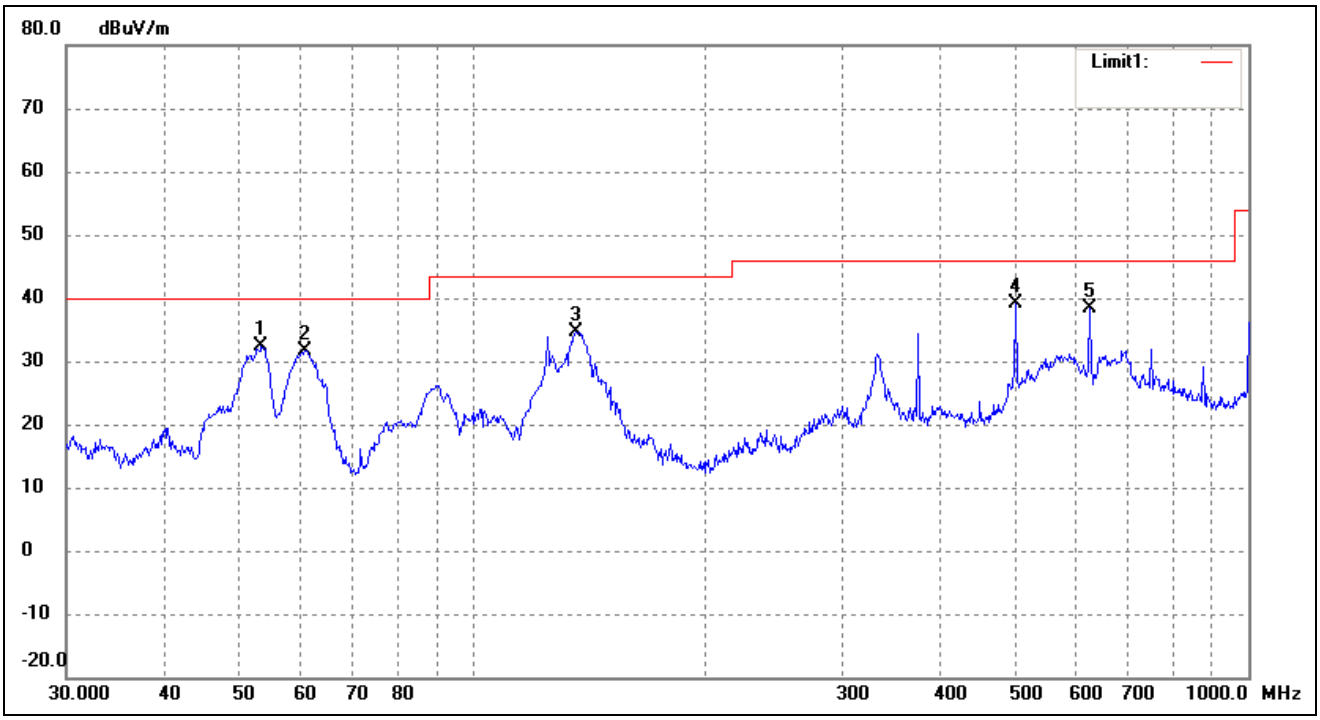
Test mode: Transmitting Channel 5775MHz

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	250.3012	44.15	-12.13	32.02	46.00	-13.98	123	100	peak
2	375.9385	46.79	-8.88	37.91	46.00	-8.09	132	100	peak
3	625.0780	45.60	-1.51	44.09	46.00	-1.91	293	100	peak

Test Specification: *Vertical*



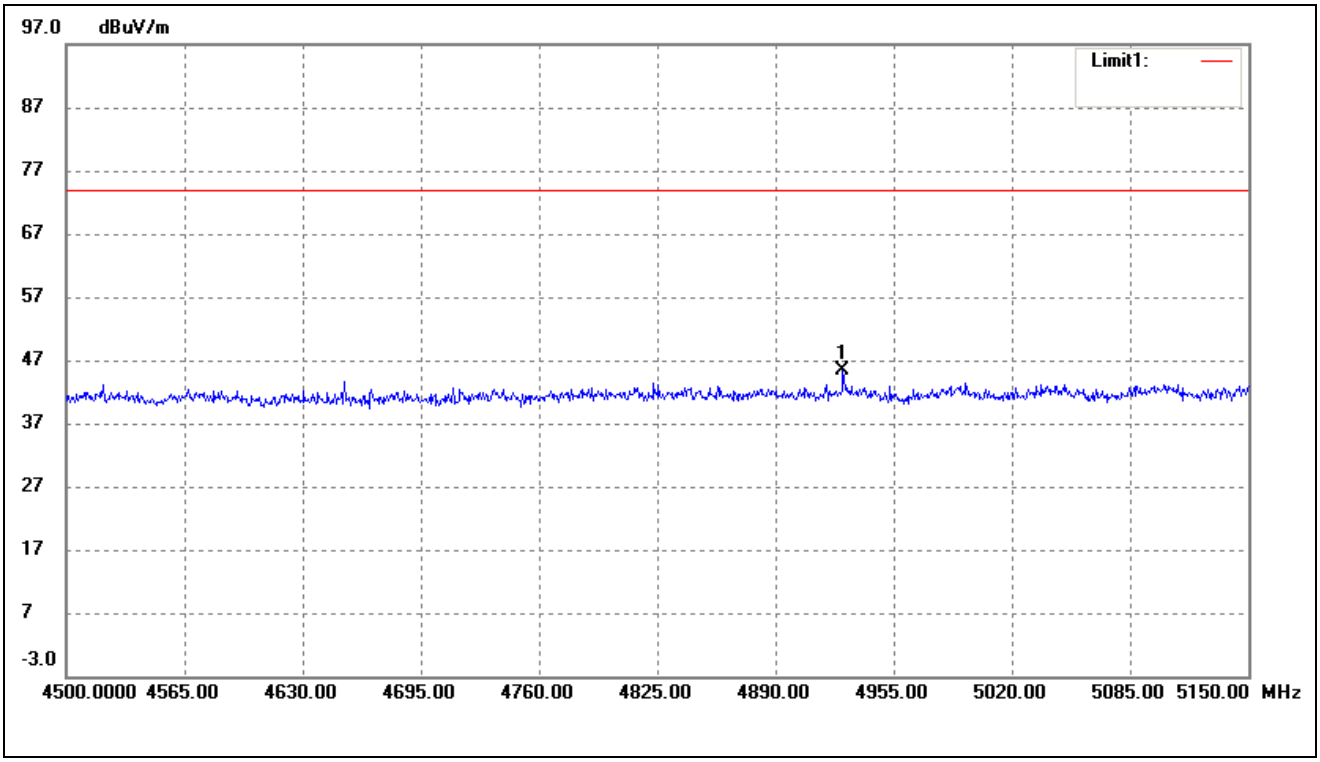
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	53.5052	48.82	-16.48	32.34	40.00	-7.66	90	100	peak
2	60.9176	48.23	-16.70	31.53	40.00	-8.47	67	100	peak
3	135.9822	52.60	-18.01	34.59	43.50	-8.91	90	100	peak
4	501.1790	45.01	-5.78	39.23	46.00	-6.77	69	100	peak
5	625.0780	39.89	-1.51	38.38	46.00	-7.62	274	100	peak

For 802.11a

Spurious Emission above 1GHz

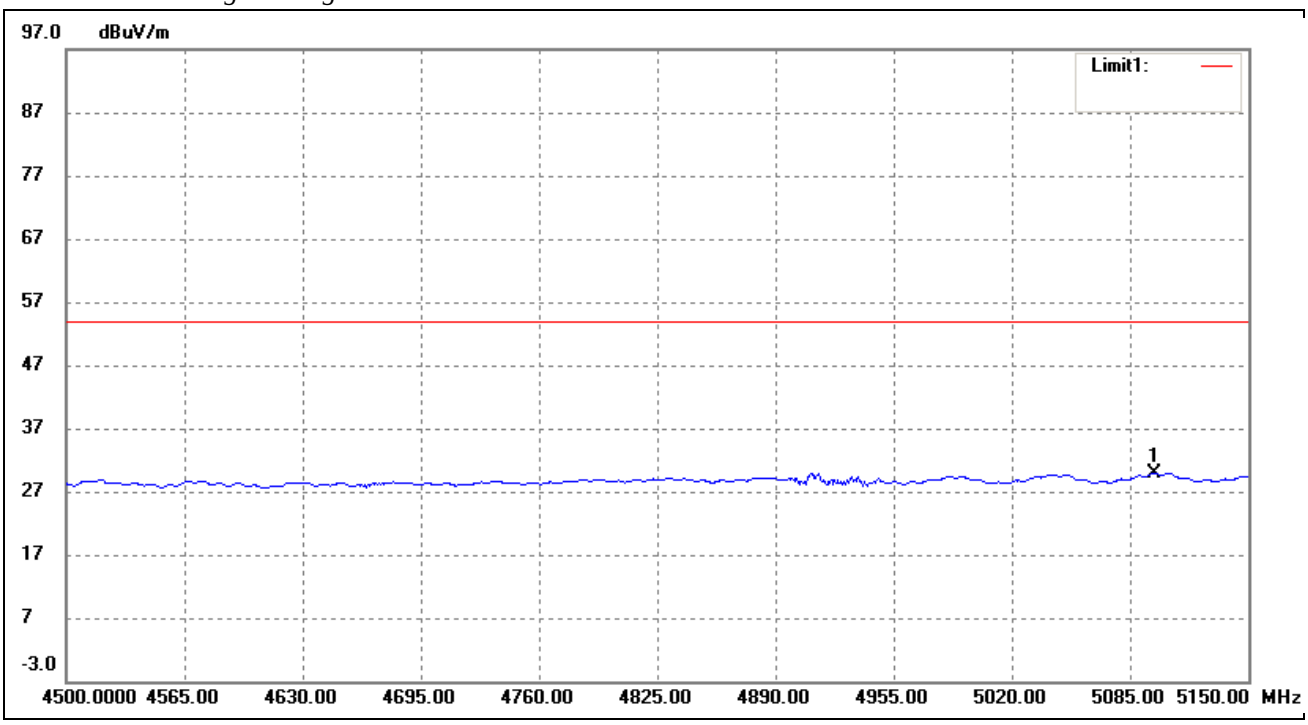
For the frequency band 5.15-5.25GHz(802.11a)

Restricted Bandedge Peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	4927.050	51.24	-5.80	45.44	74.00	-28.56	130	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	5098.000	35.20	-5.33	29.87	54.00	-24.13	112	100	Ave

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

Hormonics 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	50.35	165	V	40.7	10.9	39.6	62.35	74	-11.65
15540	PK	49.65	215	H	40.7	10.9	39.6	61.65	74	-12.35
15540	AV	35.69	28	V	40.7	10.9	39.6	47.69	54	-6.31
15540	AV	36.05	31	H	40.7	10.9	39.6	48.05	54	-5.95
High Channel (5240MHz)										
15720	PK	51.32	328	V	40.7	10.9	39.6	63.32	74	-10.68
15720	PK	48.78	79	H	40.7	10.9	39.6	60.78	74	-13.22
15720	AV	35.17	68	V	40.7	10.9	39.6	47.17	54	-6.83
15720	AV	36.31	265	H	40.7	10.9	39.6	48.31	54	-5.69

Out of Band edge

Test CH.	**Test Segment**	**Result**	**Limit**
	MHz	**dBm/MHz**	**dBm/MHz**
Lowest	Below 5150	-43.65	-27
Highest	Above 5350	-44.65	-27
Note: the data just list the worst cases			

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 (5745MHz)										
11490	PK	48.61	145	V	38.9	9.8	40.1	57.21	74	-16.79
11490	PK	47.79	254	H	38.9	9.8	40.1	56.39	74	-17.61
11490	AV	35.21	178	V	38.9	9.8	40.1	43.81	54	-10.19
11490	AV	36.01	54	H	38.9	9.8	40.1	44.61	54	-9.39
High Channel (5825MHz)										
11610	PK	50.14	129	V	38.9	9.8	40.1	58.74	74	-15.26
11610	PK	48.96	238	H	38.9	9.8	40.1	57.56	74	-16.44
11610	AV	36.02	247	V	38.9	9.8	40.1	44.62	54	-9.38
11610	AV	35.17	312	H	38.9	9.8	40.1	43.77	54	-10.23

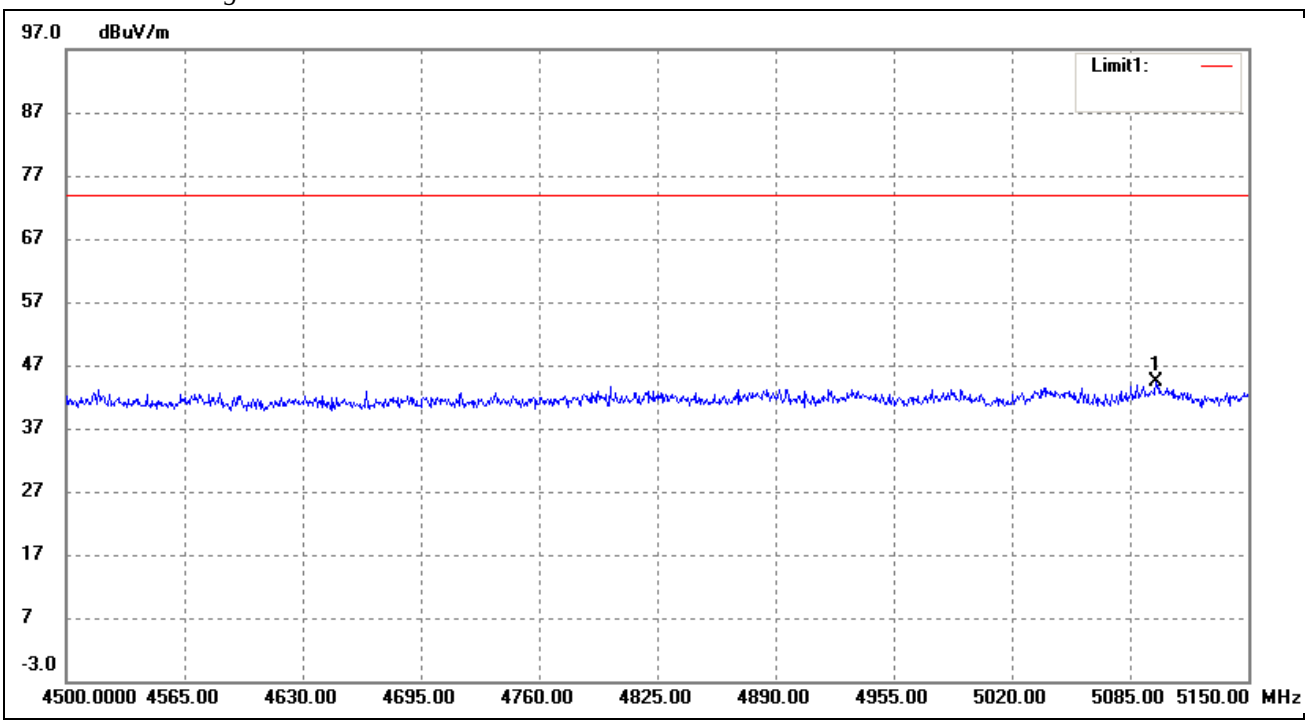
Out of Band edge

Test CH.	**Test Segment**	**Result**	**Limit**
	MHz	**dBm/MHz**	**dBm/MHz**
Lowest	Below 5715	-42.32	-27
	5715 to 5725	-41.32	-17
Highest	5850 to 5860	-44.35	-17
	Above 5860	-42.14	-27
Note: the data just list the worst cases			

802.11n HT20

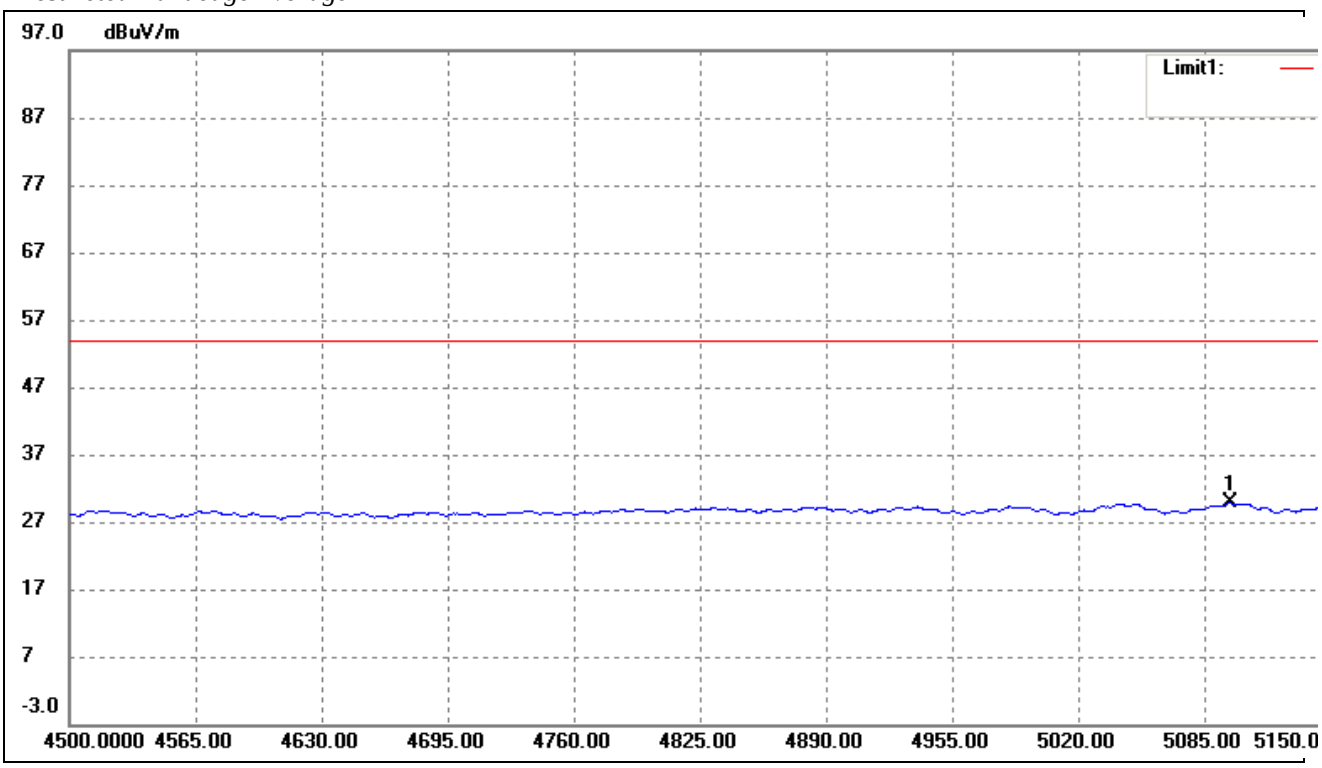
For the frequency band 5.15-5.25GHz(802.11n HT20)

Restricted Bandedge Peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	5099.300	49.76	-5.33	44.43	74.00	-29.57	253	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	5098.000	35.14	-5.33	29.81	54.00	-24.19	132	100	Ave

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

Hormonics 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	48.55	178	V	40.7	10.9	39.6	60.55	74	-13.45
15540	PK	48.21	214	H	40.7	10.9	39.6	60.21	74	-13.79
15540	AV	36.15	47	V	40.7	10.9	39.6	48.15	54	-5.85
15540	AV	35.64	114	H	40.7	10.9	39.6	47.64	54	-6.36
High Channel (5240MHz)										
15720	PK	49.01	175	V	40.7	10.9	39.6	61.01	74	-12.99
15720	PK	48.58	21	H	40.7	10.9	39.6	60.58	74	-13.42
15720	AV	36.1	147	V	40.7	10.9	39.6	48.1	54	-5.9
15720	AV	35.78	247	H	40.7	10.9	39.6	47.78	54	-6.22

Out of Band edge

Test CH.	**Test Segment**	**Result**	**Limit**
	MHz	**dBm/MHz**	**dBm/MHz**
Lowest	Below 5150	-42.32	-27
Highest	Above 5350	-40.14	-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	48.78	245	V	38.9	9.8	40.1	57.38	74	-16.62
11490	PK	47.32	239	H	38.9	9.8	40.1	55.92	74	-18.08
11490	AV	35.31	121	V	38.9	9.8	40.1	43.91	54	-10.09
11490	AV	35.01	157	H	38.9	9.8	40.1	43.61	54	-10.39
High Channel (5825MHz)										
11610	PK	47.87	217	V	38.9	9.8	40.1	56.47	74	-17.53
11610	PK	46.79	23	H	38.9	9.8	40.1	55.39	74	-18.61
11610	AV	35.21	125	V	38.9	9.8	40.1	43.81	54	-10.19
11610	AV	34.98	317	H	38.9	9.8	40.1	43.58	54	-10.42

Out of Band edge

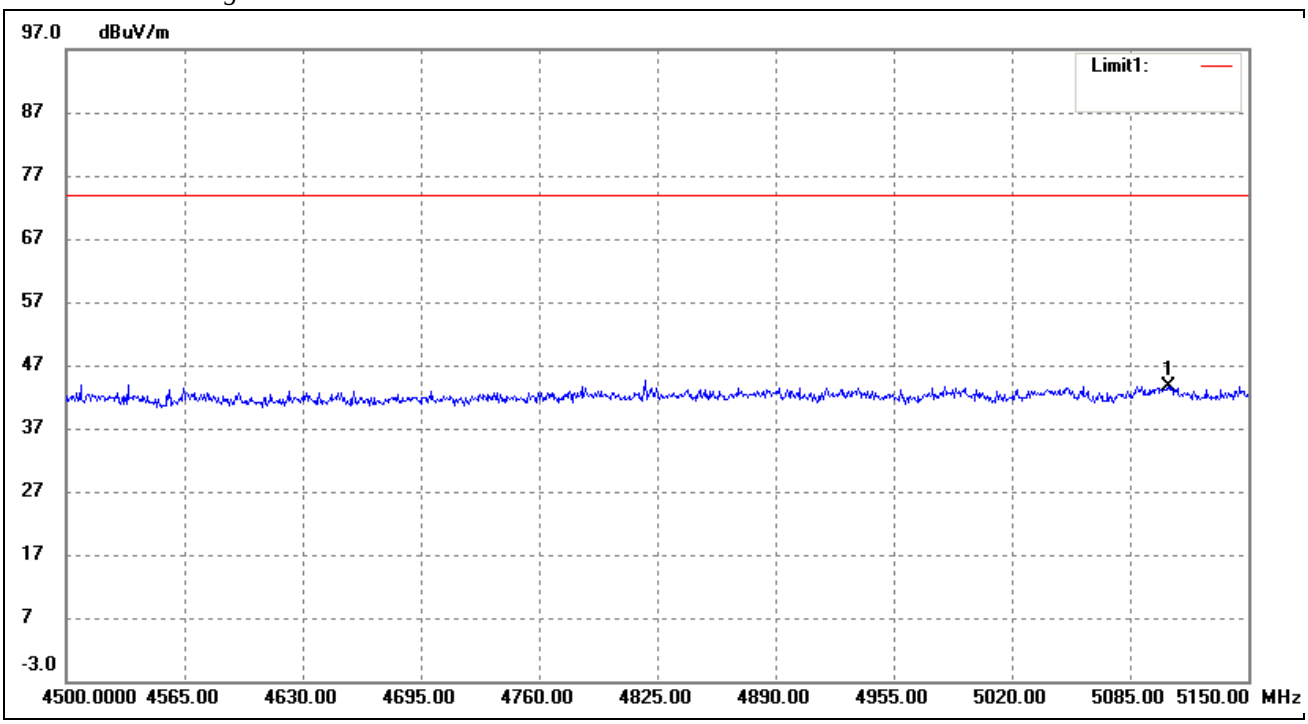
Test CH.	**Test Segment**	**Result**	**Limit**
	MHz	**dBm/MHz**	**dBm/MHz**
Lowest	Below 5715	-39.65	-27
	5715 to 5725	-38.21	-17
Highest	5850 to 5860	-39.21	-17
	Above 5860	-40.39	-27
Note: the data just list the worst cases			

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.

802.11n HT40

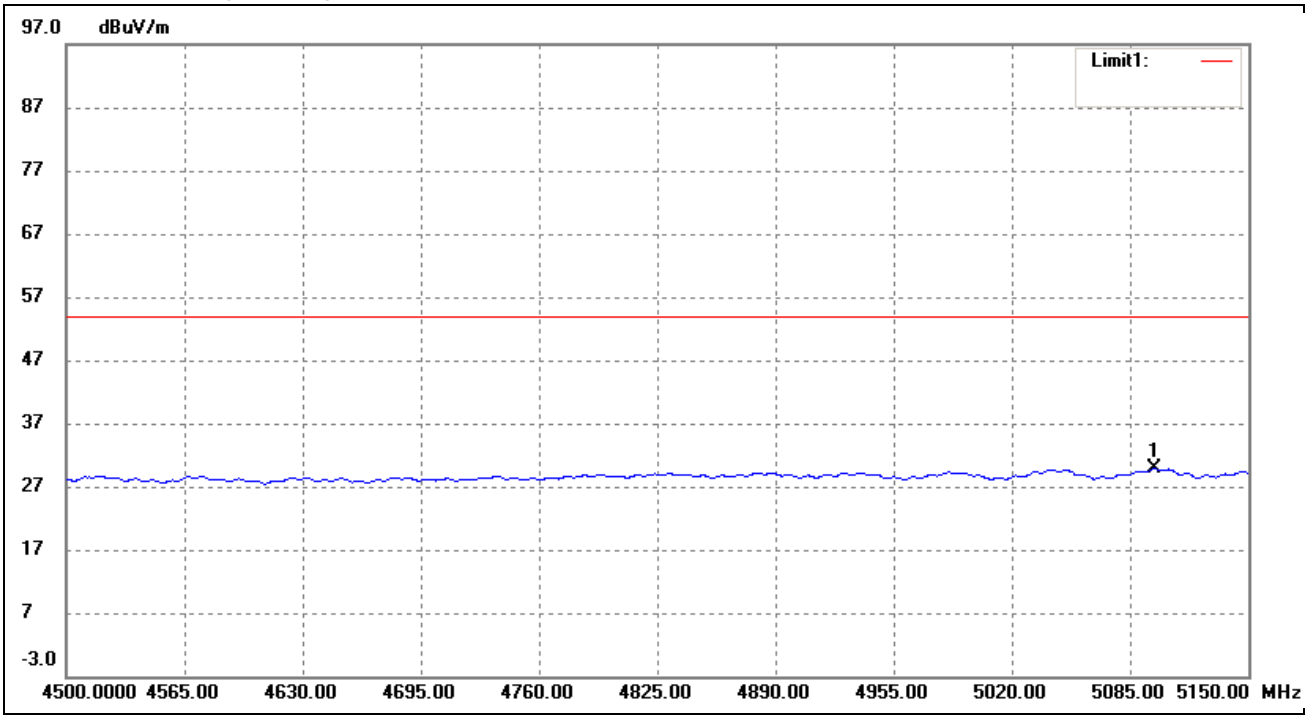
For the frequency band 5.15-5.25GHz(802.11n HT40)

Restricted Bandedge Peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	5105.800	48.91	-5.32	43.59	74.00	-30.41	297	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	5098.650	35.13	-5.33	29.80	54.00	-24.20	91	100	Ave

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

Hormonics 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 (5190MHz)										
15570	PK	49.15	198	V	40.7	10.9	39.6	61.15	74	-12.85
15570	PK	48.85	214	H	40.7	10.9	39.6	60.85	74	-13.15
15570	AV	36.02	25	V	40.7	10.9	39.6	48.02	54	-5.98
15570	AV	35.18	153	H	40.7	10.9	39.6	47.18	54	-6.82
High Channel (5230MHz)										
15690	PK	50.32	165	V	40.7	10.9	39.6	62.32	74	-11.68
15690	PK	47.32	121	H	40.7	10.9	39.6	59.32	74	-14.68
15690	AV	35.42	278	V	40.7	10.9	39.6	47.42	54	-6.58
15690	AV	34.98	26	H	40.7	10.9	39.6	46.98	54	-7.02

Out of Band edge

Test CH.	**Test Segment**	**Result**	**Limit**
	MHz	**dBm/MHz**	**dBm/MHz**
Lowest	Below 5150	-45.35	-27
Highest	Above 5350	-41.41	-27
Note: the data just list the worst cases			

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)										
17265	PK	49.57	121	V	38.9	9.8	40.1	58.17	74	-15.83
17265	PK	47.61	29	H	38.9	9.8	40.1	56.21	74	-17.79
17265	AV	36.02	45	V	38.9	9.8	40.1	44.62	54	-9.38
17265	AV	35.78	156	H	38.9	9.8	40.1	44.38	54	-9.62
High Channel (5795MHz)										
17385	PK	50.36	221	V	38.9	9.8	40.1	58.96	74	-15.04
17385	PK	49.14	247	H	38.9	9.8	40.1	57.74	74	-16.26
17385	AV	37.22	197	V	38.9	9.8	40.1	45.82	54	-8.18
17385	AV	36.11	221	H	38.9	9.8	40.1	44.71	54	-9.29

Out of Band edge

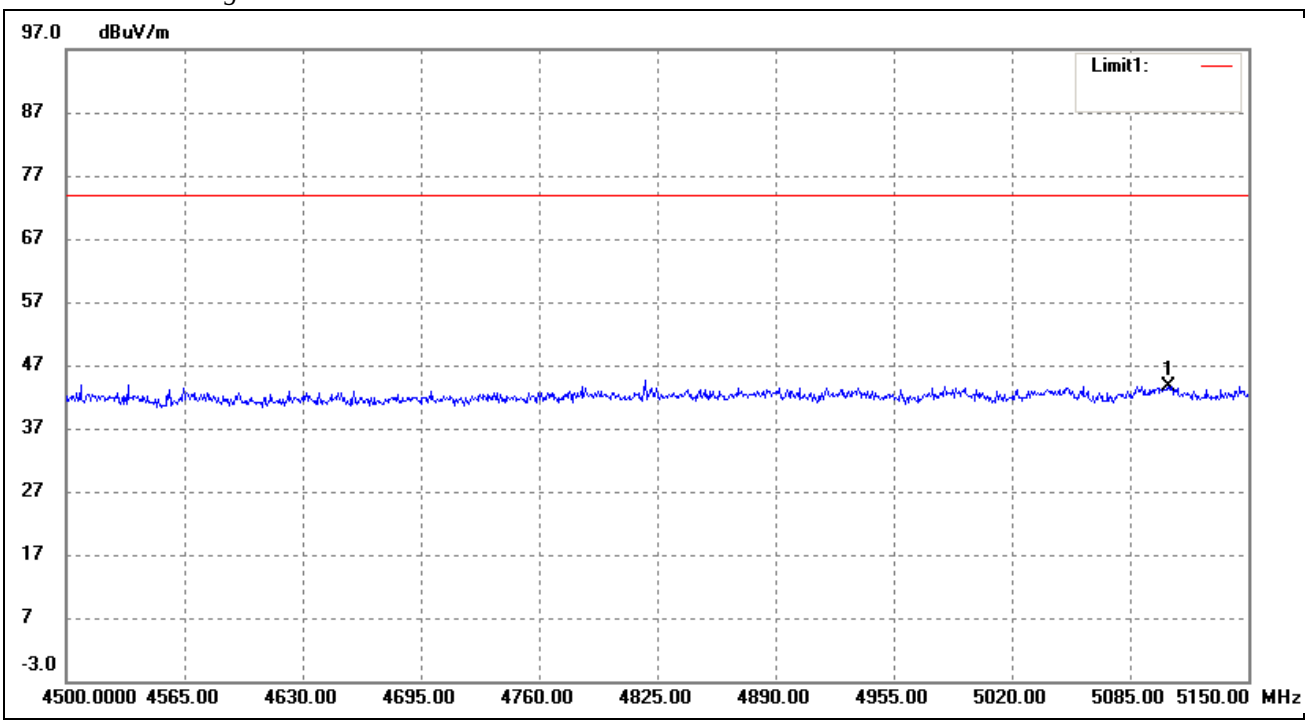
Test CH.	**Test Segment**	**Result**	**Limit**
	MHz	**dBm/MHz**	**dBm/MHz**
Lowest	Below 5715	-41.34	-27
	5715 to 5725	-37.36	-17
Highest	5850 to 5860	-38.38	-17
	Above 5860	-40.65	-27
Note: the data just list the worst cases			

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.

802.11ac-HT80

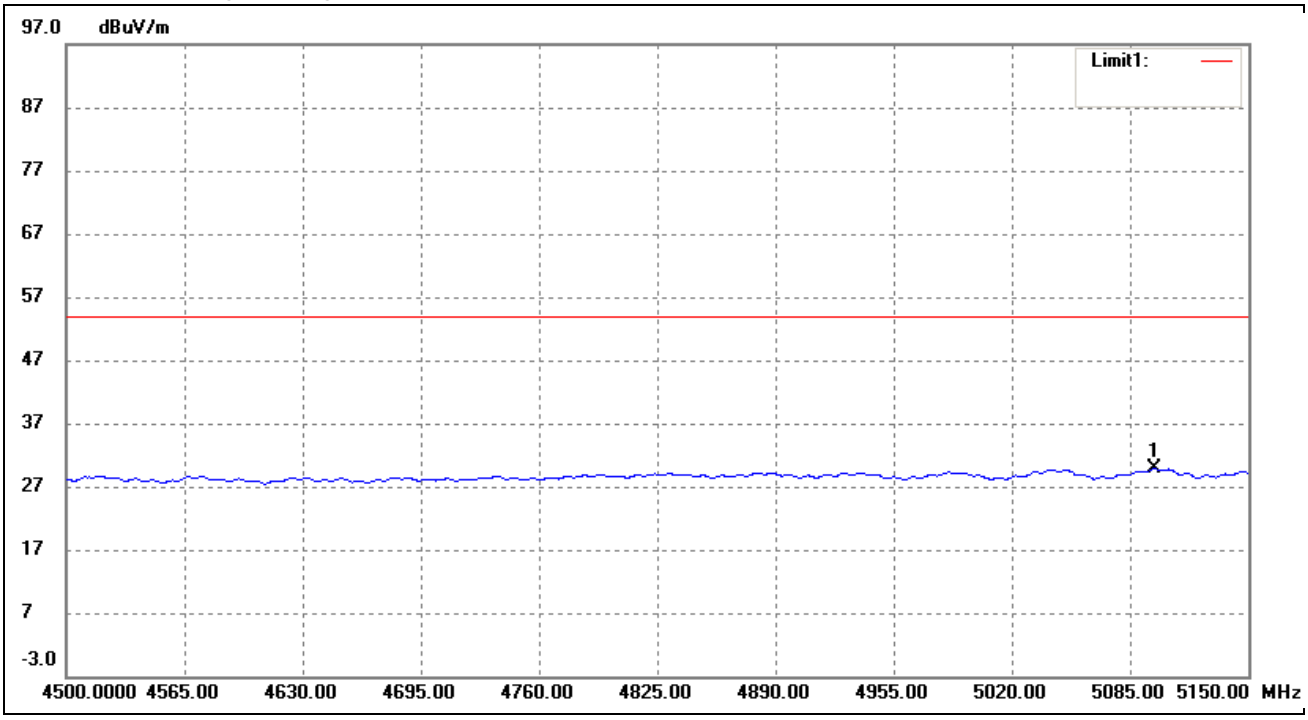
For the frequency band 5.15-5.25GHz(802.11ac-HT80)

Restricted Bandedge Peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	5105.800	48.91	-5.32	43.59	74.00	-30.41	297	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	5098.650	35.13	-5.33	29.80	54.00	-24.20	91	100	Ave

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

Hormonics 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 (5210MHz)										
10420	PK	49.32	179	V	40.7	10.9	39.6	61.32	74	-12.68
10420	PK	47.35	57	H	40.7	10.9	39.6	59.35	74	-14.65
10420	AV	34.65	21	V	40.7	10.9	39.6	46.65	54	-7.35
10420	AV	35.02	12	H	40.7	10.9	39.6	47.02	54	-6.98

Out of Band edge

Test CH.	**Test Segment**	**Result**	**Limit**
	MHz	**dBm/MHz**	**dBm/MHz**
Lowest	Below 5150	-45.32	-27
Highest	Above 5350	-41.14	-27
Note: the data just list the worst cases			

For the frequency band 5.725-5.850GHz (802.11ac-HT80)

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
High Channel (5775MHz)										
11550	PK	47.68	165	V	38.9	10.9	39.6	57.88	74	-16.12
11550	PK	49.18	178	H	38.9	10.9	39.6	59.38	74	-14.62
11550	AV	35.02	210	V	38.9	10.9	39.6	45.22	54	-8.78
11550	AV	34.65	28	H	38.9	10.9	39.6	44.85	54	-9.15

Out of Band edge

Test CH.	**Test Segment**	**Result**	**Limit**
	MHz	**dBm/MHz**	**dBm/MHz**
Lowest	Below 5715	-41.12	-27
	5715 to 5725	-37.36	-17
Highest	5850 to 5860	-38.47	-17
	Above 5860	-40.65	-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.

9. Conducted Emissions

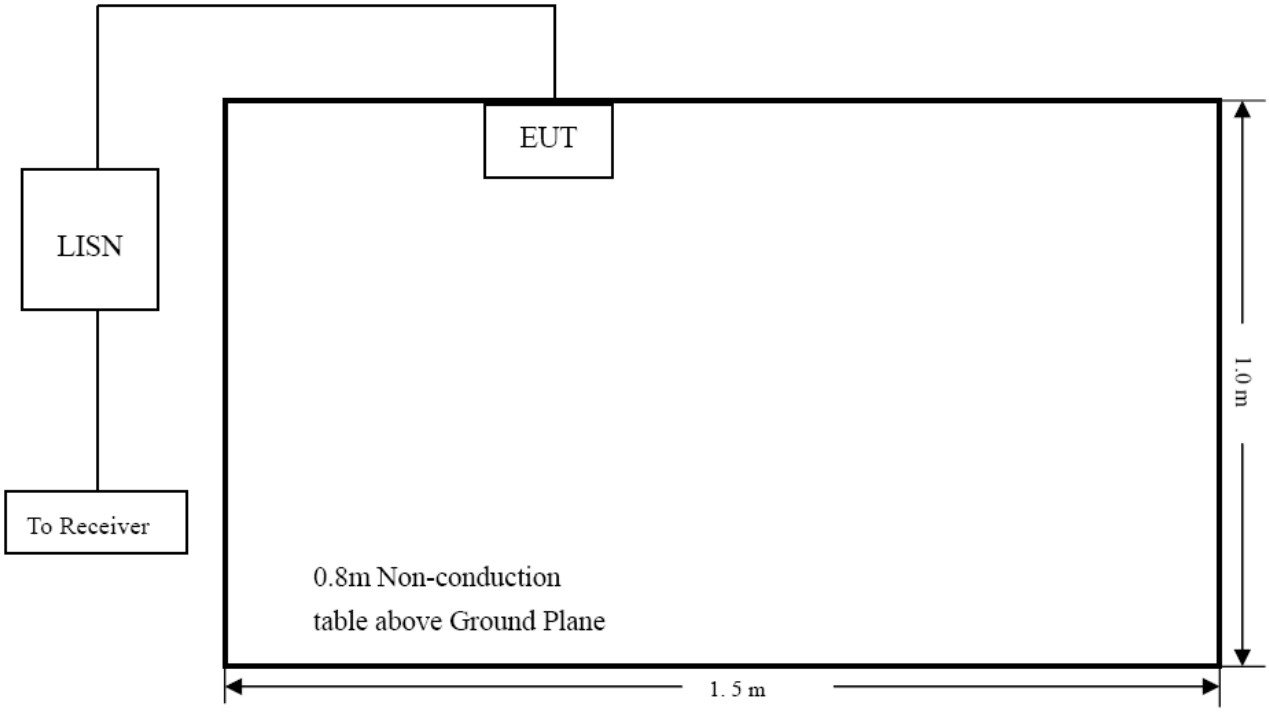
9.1 Measurement Uncertainty

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.

9.2 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.

9.3 Basic Test Setup Block Diagram



9.4 Environmental Conditions

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

9.5 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

9.6 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 this device, with the *worst* margin reading of:

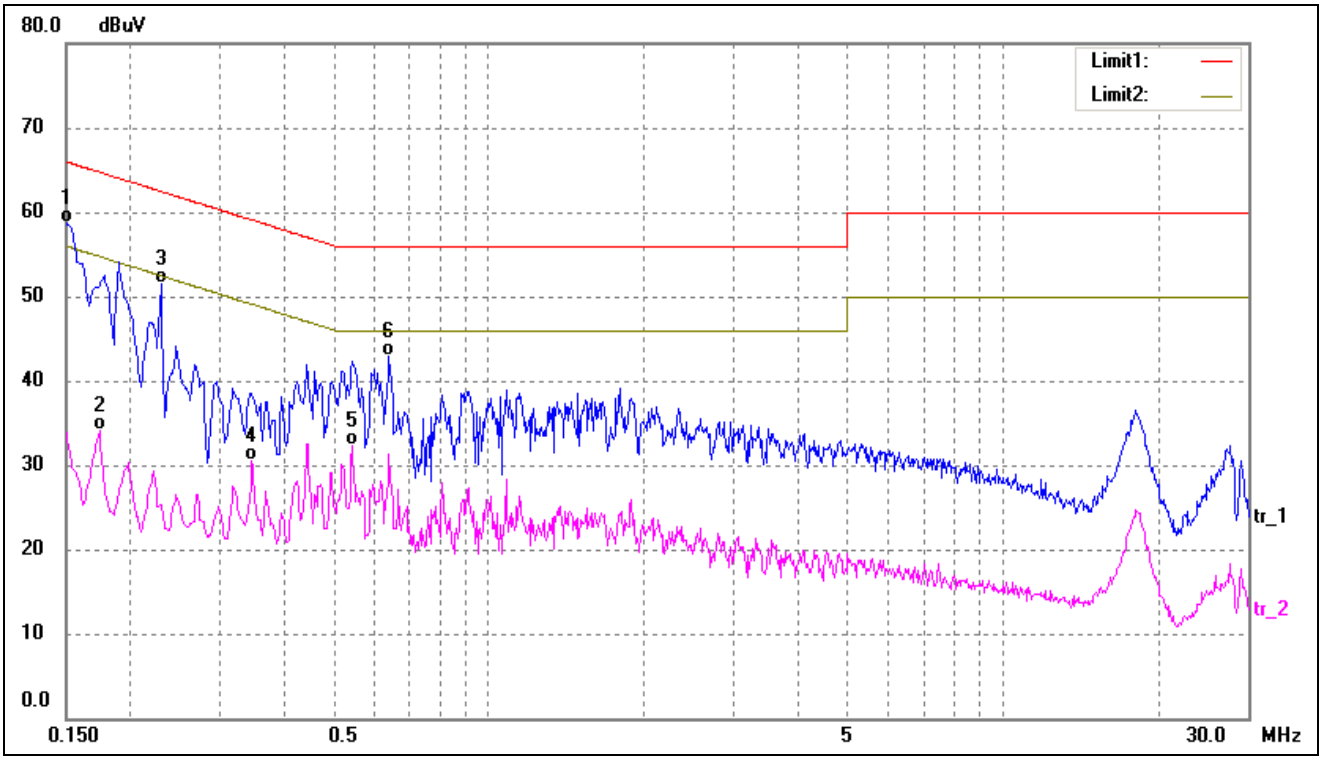
-7.30 dB at **0.1500 MHz** in the **Neutral**, **QP** detector, 0.15-30MHz

9.7 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

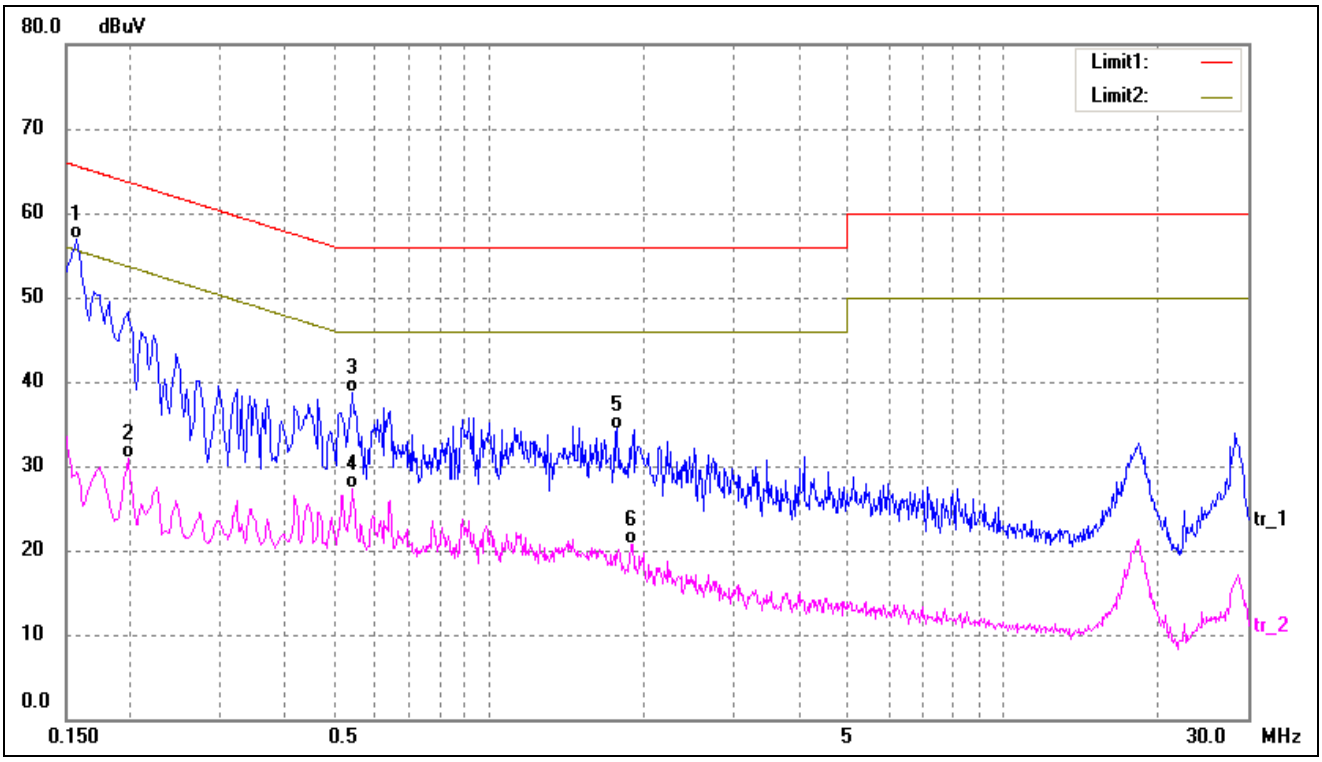
EUT: *Starry Launch*
Tested Model: *S00911*
Operating Condition: *Transmitting*
Comment: *AC 120V/60Hz*

Test Specification: *Neutral*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1*	0.1500	48.84	9.85	58.69	65.99	-7.30	QP
2	0.1740	24.31	9.83	34.14	54.76	-20.62	AVG
3	0.2300	41.61	9.80	51.41	62.45	-11.04	QP
4	0.3460	20.76	9.80	30.56	49.06	-18.50	AVG
5	0.5420	22.45	9.80	32.25	46.00	-13.75	AVG
6	0.6380	33.11	9.79	42.90	56.00	-13.10	QP

Test Specification: *Line*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1*	0.1580	47.05	9.84	56.89	65.57	-8.68	QP
2	0.1980	21.14	9.80	30.94	53.69	-22.75	AVG
3	0.5420	28.89	9.80	38.69	56.00	-17.31	QP
4	0.5420	17.55	9.80	27.35	46.00	-18.65	AVG
5	1.7780	24.66	9.74	34.40	56.00	-21.60	QP
6	1.8900	11.04	9.74	20.78	46.00	-25.22	AVG

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	85-115% 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

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	12.0	165	0.0317
40	12.0	201	0.0387
30	12.0	147	0.0283
20	12.0	161	0.0310
10	12.0	120	0.0231
0	12.0	163	0.0313
-10	12.0	145	0.0279
-20	12.0	130	0.0250
-30	12.0	125	0.0240

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	12.0	138	0.0265
40	12.0	125	0.0240
30	12.0	145	0.0279
20	12.0	210	0.0404
10	12.0	167	0.0321
0	12.0	112	0.0215
-10	12.0	136	0.0262
-20	12.0	152	0.0292
-30	12.0	139	0.0267

802.11n_HT40

Reference Frequency(Middle Channel): 5230 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	12.0	174	0.0333
40	12.0	162	0.0310
30	12.0	123	0.0235
20	12.0	115	0.0220
10	12.0	175	0.0335
0	12.0	122	0.0233
-10	12.0	143	0.0273
-20	12.0	121	0.0231
-30	12.0	165	0.0315

802.11ac_HT80

Reference Frequency(Middle Channel): 5210 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	12.0	174	0.0334
40	12.0	121	0.0232
30	12.0	156	0.0299
20	12.0	132	0.0253
10	12.0	171	0.0328
0	12.0	126	0.0242
-10	12.0	192	0.0369
-20	12.0	123	0.0236
-30	12.0	165	0.0317

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	12.0	176	0.0304
40	12.0	135	0.0233
30	12.0	126	0.0218
20	12.0	154	0.0266
10	12.0	147	0.0254
0	12.0	149	0.0258
-10	12.0	156	0.0270
-20	12.0	135	0.0233
-30	12.0	117	0.0202

802.11n_HT20

Reference Frequency(Middle Channel): 5785MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	12.0	174	0.0301
40	12.0	135	0.0233
30	12.0	122	0.0211
20	12.0	112	0.0194
10	12.0	136	0.0235
0	12.0	167	0.0289
-10	12.0	132	0.0228
-20	12.0	175	0.0303
-30	12.0	164	0.0283

802.11n_HT40

Reference Frequency(Middle Channel): 5755MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	12.0	174	0.0302
40	12.0	126	0.0219
30	12.0	214	0.0372
20	12.0	154	0.0268
10	12.0	174	0.0302
0	12.0	121	0.0210
-10	12.0	163	0.0283
-20	12.0	175	0.0304
-30	12.0	136	0.0236

802.11ac-HT80

Reference Frequency(Middle Channel): 5775MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	12.0	165	0.0286
40	12.0	98	0.0170
30	12.0	112	0.0194
20	12.0	91	0.0158
10	12.0	125	0.0216
0	12.0	167	0.0289
-10	12.0	146	0.0253
-20	12.0	135	0.0234
-30	12.0	187	0.0324

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	10.8	165	0.0317
	12.0	217	0.0417
	13.2	154	0.0296

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	10.8	132	0.0254
	12.0	179	0.0344
	13.2	121	0.0233

802.11n_HT40

Reference Frequency(Middle Channel): 5230MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	10.8	135	0.0258
	12.0	201	0.0384
	13.2	166	0.0317

802.11ac_HT80

Reference Frequency(Middle Channel): 5210 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	10.8	165	0.0317
	12.0	132	0.0253
	13.2	179	0.0344

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	10.8	174	0.0301
	12.0	155	0.0268
	13.2	139	0.0240

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	10.8	165	0.0285
	12.0	91	0.0157
	13.2	17	0.0029

802.11a_HT40

Reference Frequency(Middle Channel): 5785 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	10.8	187	0.0325
	12.0	136	0.0236
	13.2	121	0.0210

802.11ac_HT80

Reference Frequency(Middle Channel): 5785 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	10.8	174	0.0301
	12.0	122	0.0211
	13.2	168	0.0291

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