

Test Report

Product	Module with WLAN and Bluetooth
Name and address of the applicant	Cisco Systems, Inc. 170 West Tasman Drive San Jose, CA 95134, USA
Name and address of the manufacturer	Cisco Systems, Inc. 170 West Tasman Drive San Jose, CA 95134, USA
Model	P3310
Rating	Mains (100-240V 50/60 Hz)
Trademark	Cisco
Serial number	/
Additional information	Bluetooth, WLAN 2x2 802.11a/b/g/n/ac
Tested according to	FCC Part 15.407 Unlicensed National Information Infrastructure Devices (U-NII) Industry Canada RSS-247, Issue 2 Licence-Exempt Local Area Network (LE-LAN) Devices
Order number	349542
Tested in period	2018.05.24 to 2018.06.01
Issue date	2018.07.19
Name and address of the testing laboratory	 Instituttveien 6 Kjeller, Norway SITE NUMBER: FCC: NO0001 IC: 2040D-1   An accredited technical test executed under the Norwegian accreditation scheme
 Prepared by [Frode Sveinsen]  Approved by [Jan G. Eriksen]	
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CONTENTS

1	INFORMATION	3
1.1	Test Item.....	3
1.2	Normal test conditions	4
1.3	Test Engineer(s)	4
1.4	Description of modification for Modification Filing	4
1.5	Family List Rational	4
1.6	Antenna Requirement	4
1.7	Worst-Case Configuration and Mode.....	4
1.8	On Time and Duty Cycle Factors.....	4
1.9	EUT Power Levels	5
1.10	EUT Operating Modes	6
1.11	Antenna Gain.....	6
1.12	Comments	6
2	TEST REPORT SUMMARY	7
2.1	General	7
2.2	Test Summary	8
2.3	Maximum Output Power, EIRP	9
2.4	Emission Bandwidth B	18
2.5	Peak Power Spectral Density, EIRP	25
2.6	Unwanted Emissions	33
2.7	Restricted Bands of operation.....	52
2.8	Radiated Emissions, below 1GHz.....	53
2.9	Radiated Emissions, above 1GHz	56
3	Measurement Uncertainty	106
4	LIST OF TEST EQUIPMENT.....	107
5	BLOCK DIAGRAM	108
5.1	Power Line Conducted Emission	108
5.2	Test Site Radiated Emission.....	108

1 INFORMATION

1.1 Test Item

Name	CISCO
Model	P3310
FCC ID	LDKNVTX221737
Industry Canada ID	2461N-NVTX21737
Serial number	/
Hardware identity and/or version	/
Software identity and/or version	/
Frequency Ranges	U-NII 1 : 5180 – 5240 MHz U-NII 2A : 5260 – 5320 MHz U-NII 2C : 5500 – 5700 MHz U-NII 3 : 5745 – 5825 MHz
Operating Modes	802.11a 802.11n (HT20 / HT40) 802.11ac (HT80)
Type of Modulation	Digital (OFDM - Orthogonal frequency-division multiplexing)
Conducted Output Power	5180 – 5240 MHz: 39.90 mW (802.11a) 5180 – 5240 MHz: 16.44 mW (802.11n HT20) 5190 – 5230 MHz: 26.92 mW (802.11n HT40) 5210 MHz: 27.10 mW (802.11n HT80) 5260 – 5320 MHz: 55.72 mW (802.11a) 5260 – 5320 MHz: 83.18 mW (802.11n HT20) 5270 – 5310 MHz: 62.66 mW (802.11n HT40) 5290 MHz: 41.78 mW (802.11n HT80) 5500 – 5700 MHz: 56.10 mW (802.11a) 5500 – 5700 MHz: 85.31 mW (802.11n HT20) 5510 – 5670 MHz: 51.76 mW (802.11n HT40) 5530 MHz: 22.49 mW (802.11n HT80) 5745 – 5825 MHz: 56.36 mW (802.11a) 5745 – 5825 MHz: 83.37 mW (802.11n HT20) 5755 – 5795 MHz: 67.30 mW (802.11n HT40) 5775 MHz: 33.34 mW (802.11n HT80)
Antenna Connector	Patch Antennas connected to radio module by U-FL connector
Number of Antennas	2
Antenna Diversity Supported	Yes
Smart Antennas System	MIMO
DFS/TPC	Slave Device
Power Supply	Mains (integral power supply)

Description of tested item

The EUT is a certified radio module with WiFi and Bluetooth transceivers, this test report contains data for new antennas.

1.2 Normal test conditions

Temperature: 20 – 24 °C
Relative humidity: 20 - 50 %
Normal test voltage: 120V 60Hz

The values are the limit registered during the test period.

1.3 Test Engineer(s)

Frode Sveinsen
Thomas Dangle (Power Line Conducted Test)

1.4 Description of modification for Modification Filing

Not applicable.

1.5 Family List Rational

Not Applicable.

1.6 Antenna Requirement

Is the antenna detachable?

☒ Yes ☐ No

If detachable, is the antenna connector non-standard?

☒ Yes ☐ No

Type of antenna connector: U-FL connector

Ref. FCC §15.203

1.7 Worst-Case Configuration and Mode

Radiated Emissions and Power Line Conducted Emissions were performed with the EUT set to transmit at the channel with the highest output power as worst-case scenario.

The worst case data rates were:

802.11a mode: 6 Mbps
802.11n HT20 mode: MCS0
802.11n HT40 mode: MCS0
802.11n HT80 mode: MCS0

1.8 On Time and Duty Cycle Factors

Mode	On Time Burst (ms)	Period (msec)	Duty Cycle (linear)	Duty Cycle Correction: Power (dB)	Duty Cycle Correction: Voltage (dB)
802.11a CDD	1.43	1.53	0.935	0.29	0.58
802.11n HT20 CDD	1.34	1.44	0.930	0.31	0.62
802.11n HT40 CDD	0.664	0.766	0.867	0.62	1.24
802.11n HT80 CDD	0.191	0.292	0.655	1.82	3.64

The results above are from UL report no. 11526345-E4V3

1.9 EUT Power Levels

Channel	Freq (MHz)	11a	11n HT20	11n HT40	11ac HT80	11ac HT160
36	5180	12.5	6.5			
40	5200	12.0	6.5			
44	5220	12.0	6.5			
48	5240	12.0	6.5			
52	5260	15.5	14.0			
56	5280	15.5	14.0			
60	5300	15.5	14.0			
64	5320	15.5	9.0			
100	5500	13.0	8.0			
104	5520	15.0	14.0			
108	5540	15.0	14.0			
112	5560	15.0	14.0			
116	5580	15.0	14.0			
120	5600	D	D			
124	5620	D	D			
128	5640	D	D			
132	5660	14.0	12.5			
136	5680	13.5	12.5			
140	5700	9.5	7.0			
144	5720	D	D			
149	5745	14.0	12.5			
153	5765	14.5	12.5			
157	5785	15.5	14.0			
161	5805	15.5	14.0			
165	5825	15.5	14.0			
38	5190			8.5		
46	5230			9.0		
54	5270			13.0		
62	5310			8.0		
102	5510			6.0		
110	5550			12.0		
118	5590			D		
126	5630			D		
134	5670			11.0		
142	5710			D		
151	5755			9.0		
159	5795			13.5		
42	5210				8.0	
58	5290				10.0	
106	5530				7.0	
122	5610				D	
138	5690				D	
155	5775				10.5	
50	5250					N/A
114	5550					N/A

D = Disabled / Not Used

Values in red are reduced levels from the original values for the certified module.

1.10 EUT Operating Modes

Description of operating modes	Additional information
Continuous TX, 5 GHz Mode	Continuous traffic, WLAN 5GHz 20, 40 or 80 MHz with special software version

1.11 Antenna Gain

The antennas are two patch antennas that are connected to the radio module by cable and U-FL connectors. The values below are the antenna gain values provided by the applicant:

Frequency (MHz)	Ant #1 Max Gain (dBi)	Ant #2 Max Gain (dBi)
5150	4.29	5.28
5200	3.59	5.53
5250	4.25	5.25
5300	3.06	5.52
5350	2.67	6.48
5400	2.88	7.38
5450	3.96	7.91
5500	3.51	6.17
5550	3.35	5.71
5600	3.04	4.92
5650	4.17	4.84
5700	4.11	5.38
5750	3.43	4.54
5800	3.14	5.22
5850	4.48	4.94

1.12 Comments

This report covers only limited radiated tests to show compliance with the new antenna in this EUT. All other radio tests for 5GHz WLAN are covered by UL reports no. 11526345-E4V3 and 11526345-E5V1.

All tests were performed with the antennas placed on the non-conducting support table with the radio module P3310 mounted in a TTC6-13 Digital Video Codec.

2 TEST REPORT SUMMARY

2.1 General

All measurements are traceable to national standards.

The tests were conducted for the purpose of demonstrating compliance with FCC CFR 47 Part 15, paragraph 15.407 and Industry Canada RSS-247 Issue 2.

Tests were performed in accordance with ANSI C63.4-2014 and ANSI C63.10-2013, and with the latest versions of KDB 789033.

EIRP values were calculated from field strength measurements using the method in KDB 412172 D01.

Antenna gain for MIMO mode was calculated using the procedures in KDB 662911, antenna gain with MIMO is the sum of the two antennas.

Radiated tests were performed in a semi-anechoic chamber at measuring distances of 3m and 10m.

A description of the test facility is on file with the FCC and Industry Canada.

☐ New Submission

☒ Production Unit

☒ Class II Permissive Change

☐ Pre-production Unit

NII Equipment Code

☒ Family Listing



THIS TEST REPORT APPLIES ONLY TO THE ITEM(S) AND CONFIGURATIONS TESTED.

Deviations from, additions to, or exclusions from the test specifications are described in "Summary of Test Data".

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2.2 Test Summary

Name of test	FCC Part 15 reference	RSS-247, Issue 2 reference	Result
Supply Voltage Variations	15.31(e)	N/A	N/A ¹
Antenna Requirement	15.203	6.8 (RSS-GEN)	N/A ¹
Power Line Conducted Emission	15.107(a) 15.207(a)	8.8 (RSS-GEN)	N/A ¹
Maximum Output Power	15.407(a)	6.2	Complies
Power Spectral Density	15.407(a)	6.2	Complies
Emission Bandwidth B	15.407	N/A	Complies
Occupied Bandwidth	N/A	6.7 (RSS-GEN)	N/A ¹
Unwanted Emissions	15.407(b)	6.2	Complies
Discontinuation of Transmission	15.407(c)	6.3	N/A ¹
Frequency Stability	15.407(g)	N/A	N/A ¹
Transmit Power Control	15.407(h)	6.2.3	N/A ¹
Radiated Emissions	15.205 15.209	8.9 (RSS-GEN)	Complies

¹Not Applicable for Class II Permissive Change application

Dynamic Frequency Selection

Name of test	FCC Part 15 reference	RSS-247, Issue 2 reference	Result
Non-Occupancy Period	15.407(h)	6.3	N/A ³
DFS Detection Threshold	15.407(h)	6.3	N/A ²
Channel Availability Check Time	15.407(h)	6.3	N/A ²
U-NII Detection Bandwidth	15.407(h)	6.3	N/A ²
Channel Closing Transmission Time	15.407(h)	6.3	N/A ³
Channel Move Time	15.407(h)	6.3	N/A ³

² The EUT is a Slave Device without radar detection.

³ Not Applicable for Class II Permissive Change application

TEST RESULTS

2.3 Maximum Output Power, EIRP

FCC 15.407 (a)

ISED RSS-247 Issue 2, Clause 6.2

Test Results: Complies

Measurement Data:

Ch. No.	Nominal Frequency (MHz)	Maximum E.I.R.P. (dBm)			
		802.11a	802.11n HT20	802.11n HT40	802.11n HT80
36	5180	16.0	15.7		
40	5200	14.5	12.1		
48	5240	13.9	12.0		
52	5260	17.2	19.2		
60	5300	17.2	18.8		
64	5320	13.4	15.7		
100	5500	18.1	15.3		
116	5580	17.7	19.7		
140	5700	12.2	12.7		
149	5745	18.8	18.8		
157	5785	20.5	20.5		
165	5825	20.2	20.2		
38	5190			13.3	
46	5230			14.2	
54	5270			17.8	
62	5310			14.5	
102	5510			12.6	
110	5550			18.0	
134	5670			16.5	
151	5755			16.4	
159	5795			21.4	
42	5210				14.3
58	5290				16.4
106	5530				13.7
155	5775				18.1

Measured values are corrected for Duty Cycle.

Values in boldface are measured values, all other values are calculated from UL report no. 11526345-E4V3.

The method described in KDB 412172 v01r01 was used for calculating e.i.r.p. from the measured field strength value.

Duty cycle correction factor from clause 1.8 was added to the calculated power value.

All measurements were performed radiated.

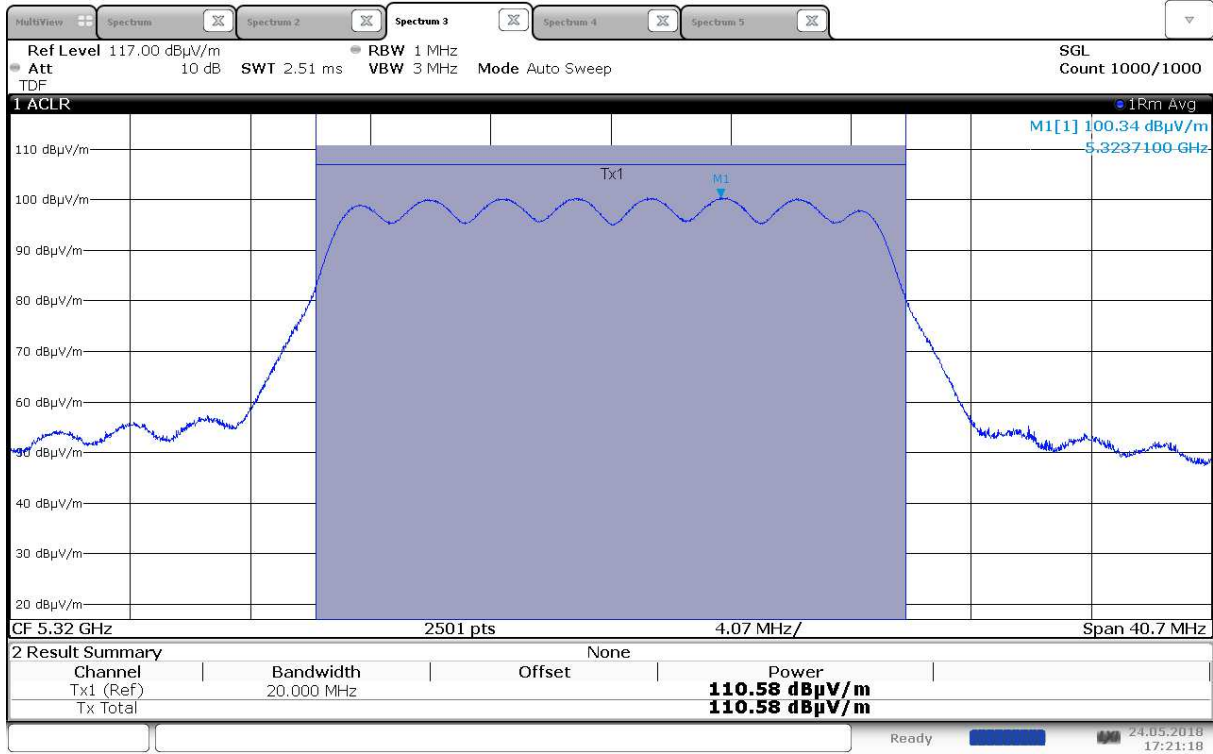
Power limits

Frequency Band	Power limit	
	FCC 15.407	ISED RSS-247, Issue 2
5150 – 5250 MHz	Master device: Less than 1 Watt Client device: Less than 250 mW	Less than the lesser of 200 mW or $10 + 10 \log_{10} B$ dBm ¹
5250 – 5350 MHz	Less than the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$ dBm	Less than the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$ dBm ¹
5470 – 5725 MHz		
5725 – 5825 MHz	Less than 1 Watt	Less than 1 Watt

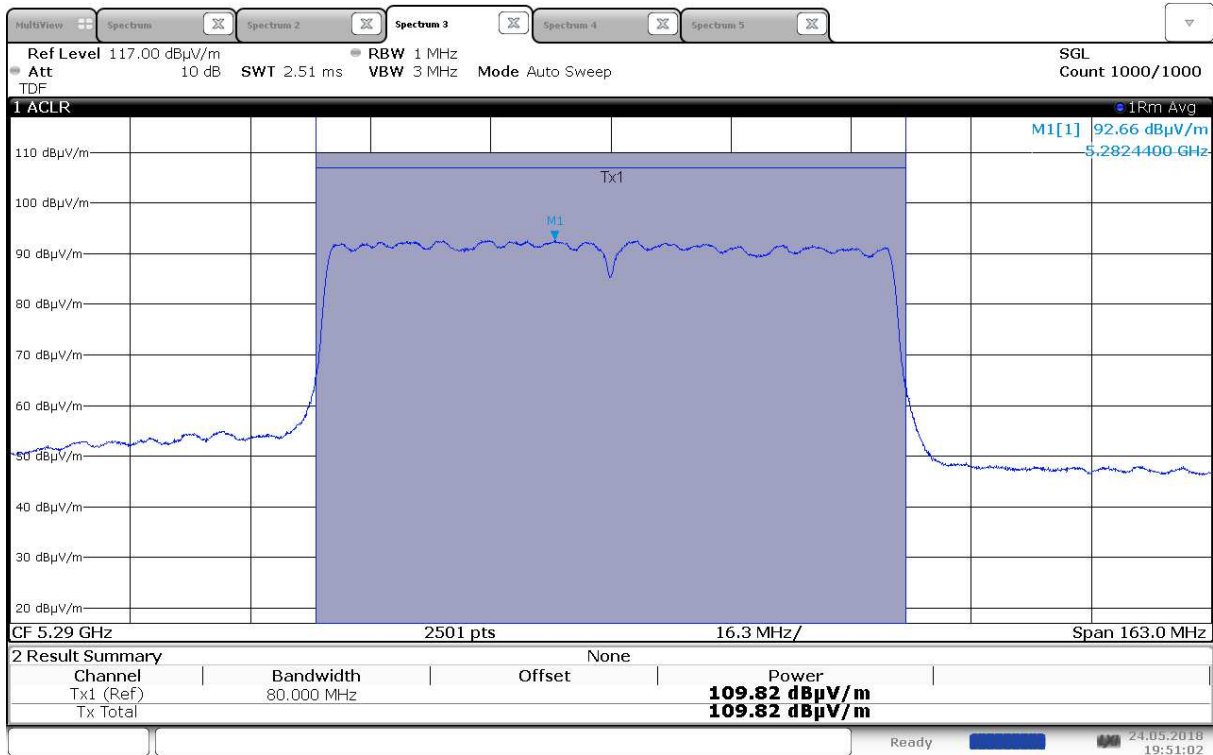
¹ Except OEM devices installed in vehicles

B is the 26 dB emission bandwidth in MHz

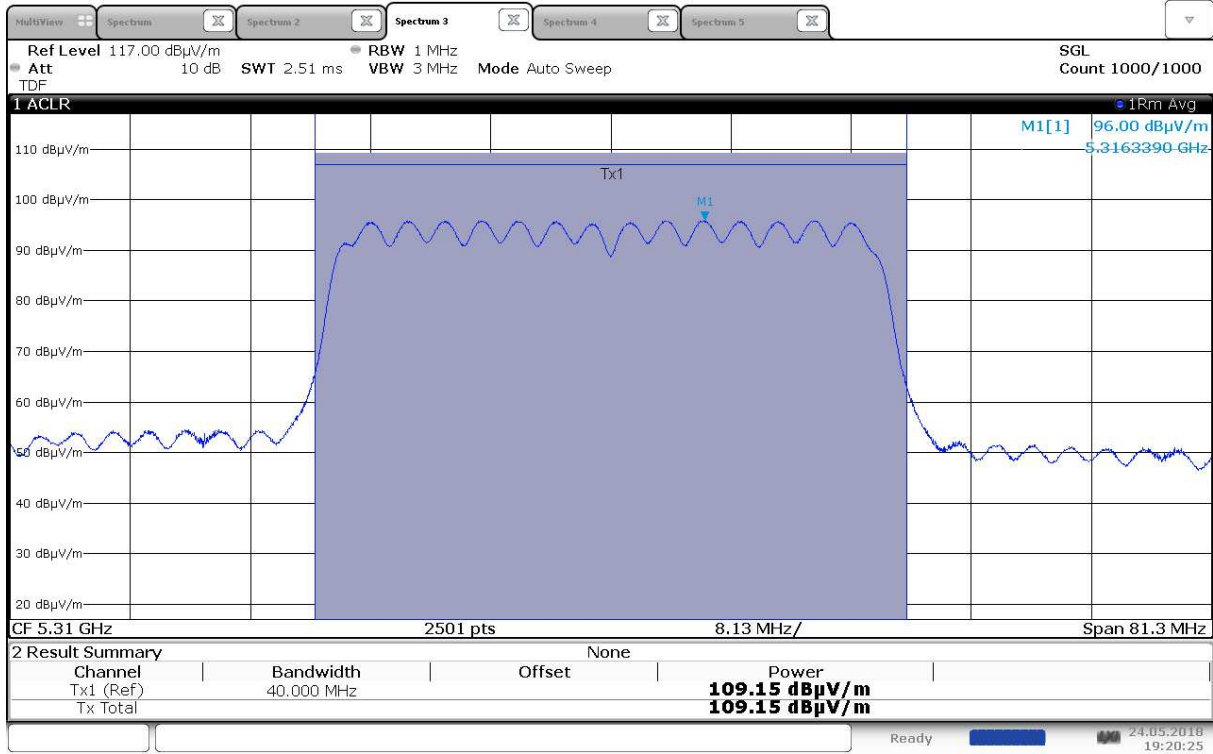
If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power from the intentional radiator shall be reduced below the stated value above by the amount in dB that the directional gain of the antenna exceeds 6 dBi.



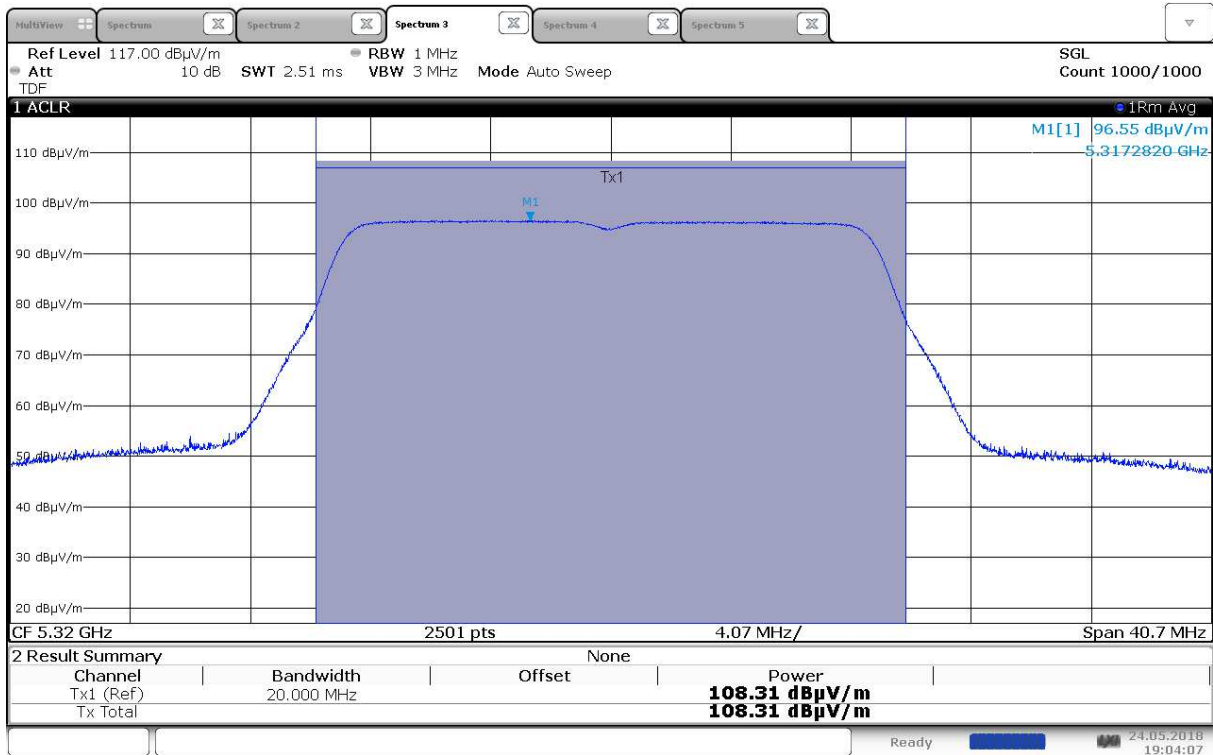
Maximum EIRP, 5180 MHz, 802.11n HT20, MIMO



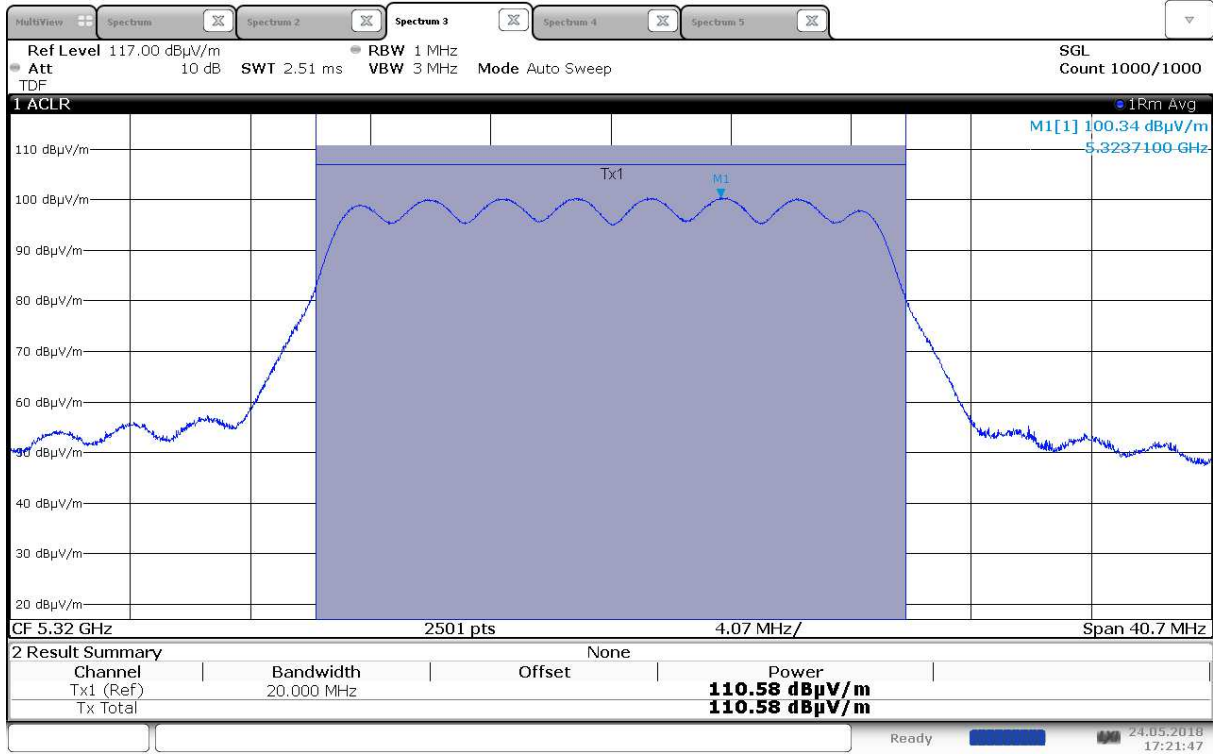
Maximum EIRP, 5290 MHz, 802.11n HT80, MIMO



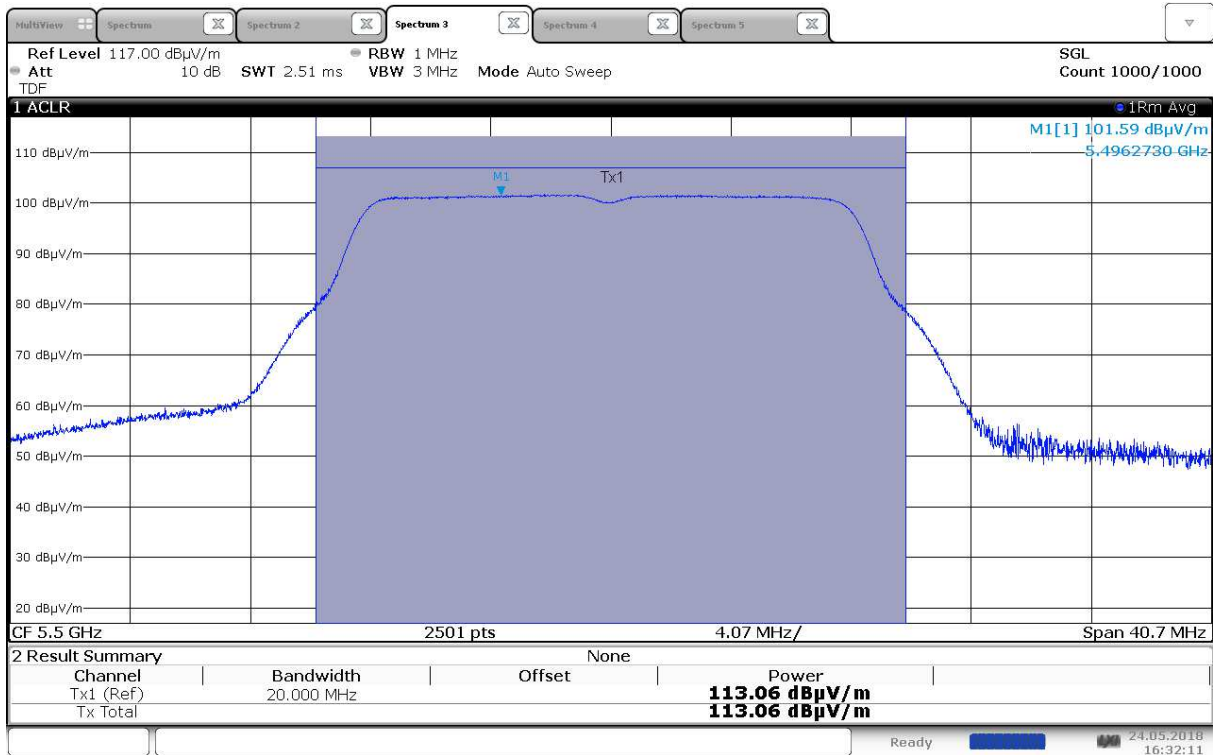
Maximum EIRP, 5310 MHz, 802.11n HT40, MIMO



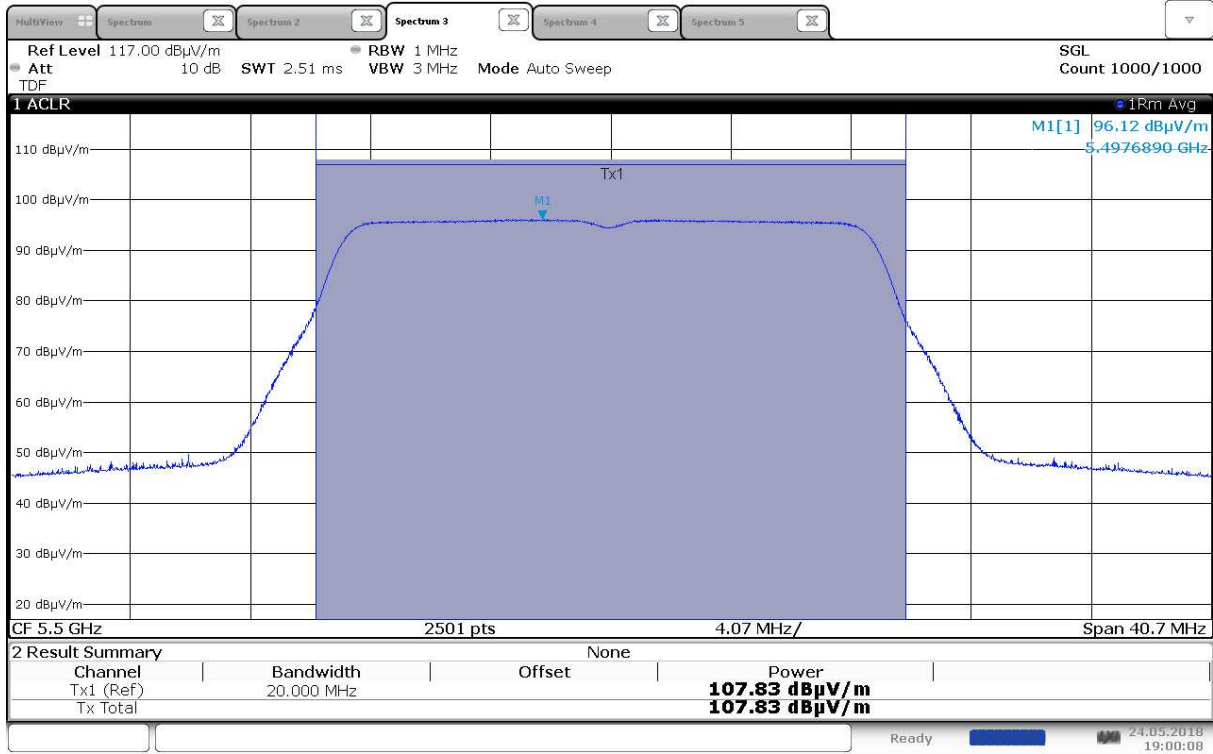
Maximum EIRP, 5320 MHz, 802.11n MCS0, Ant1



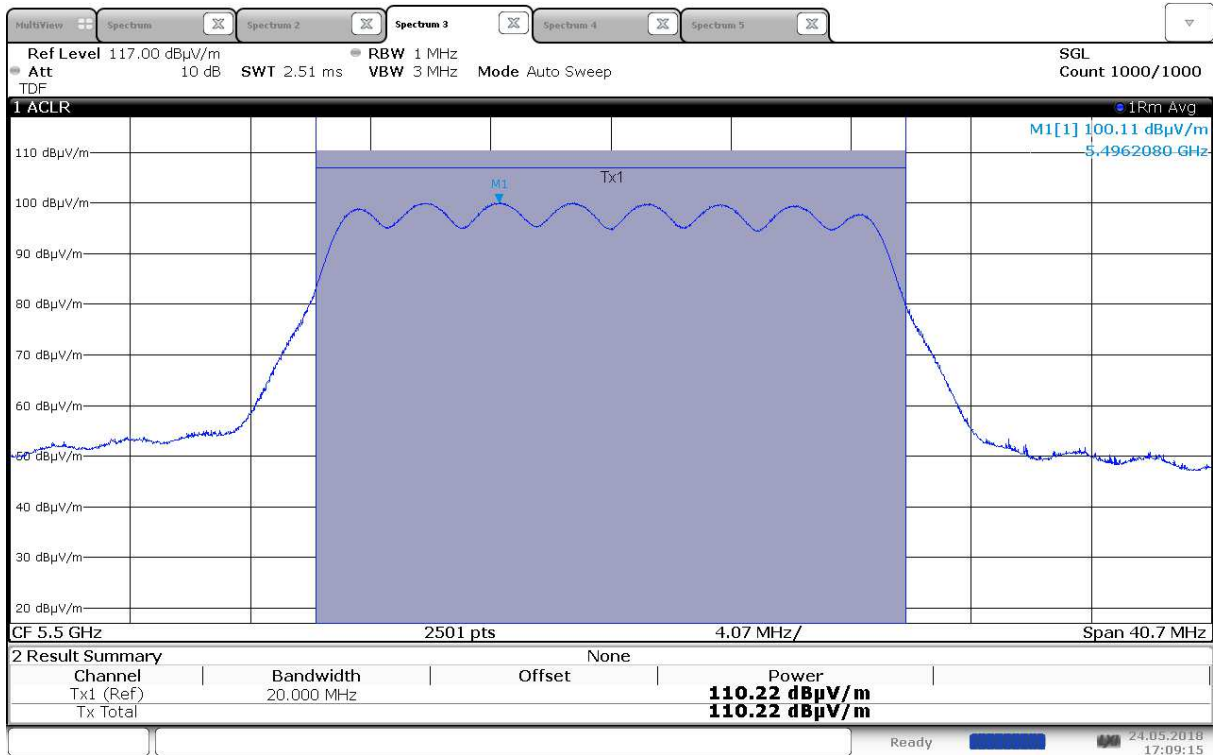
Maximum EIRP, 5320 MHz, 802.11n HT20, MIMO



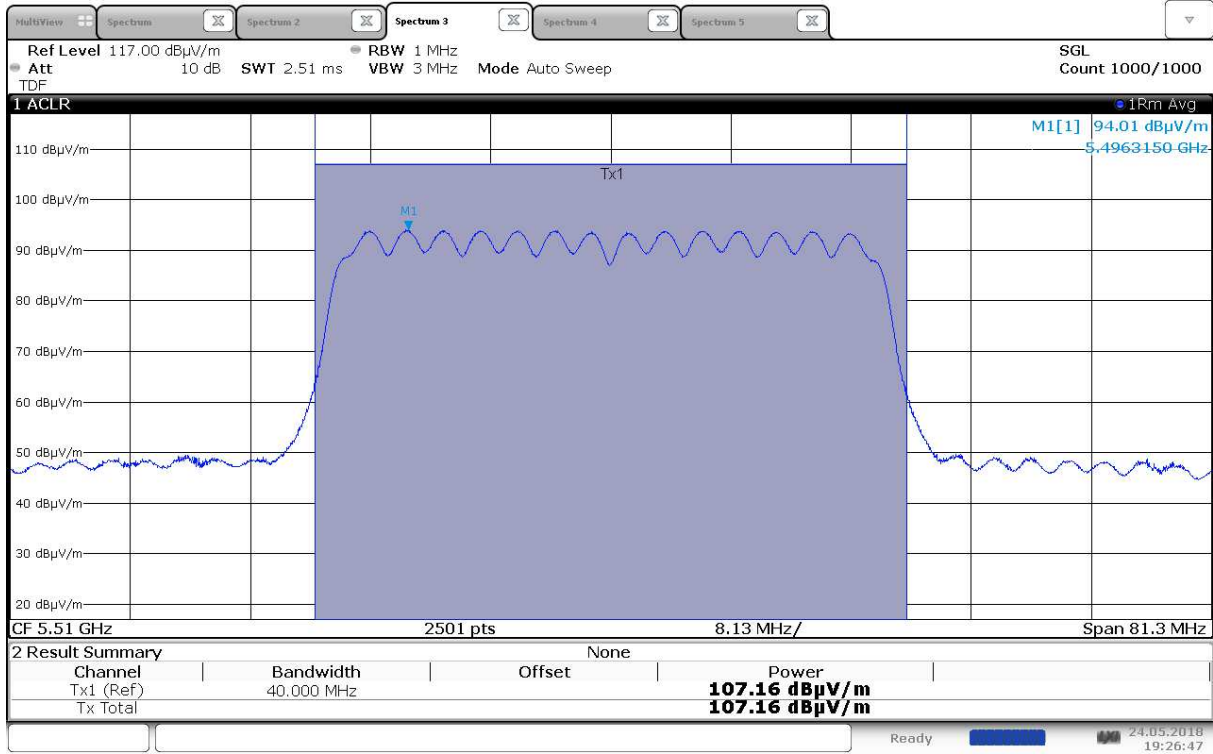
Maximum EIRP, 5500 MHz, 802.11a 6Mb, Ant1



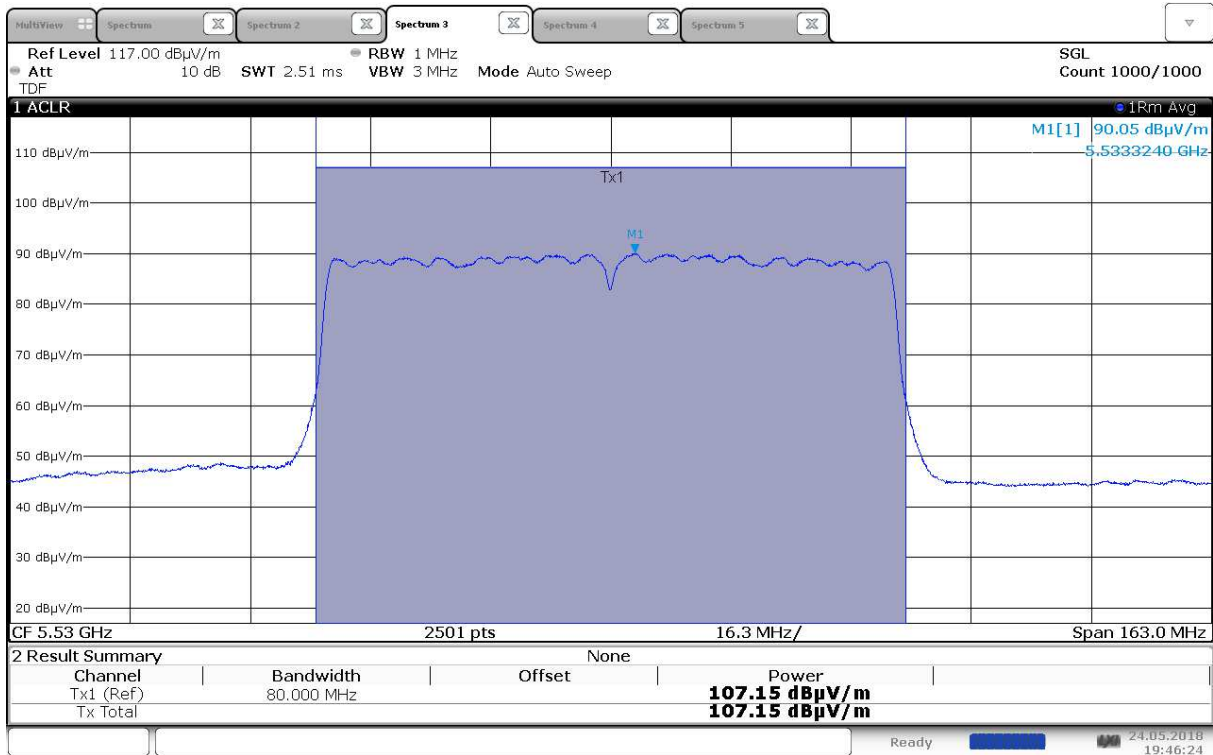
Maximum EIRP, 5500 MHz, 802.11n MCS0, Ant1



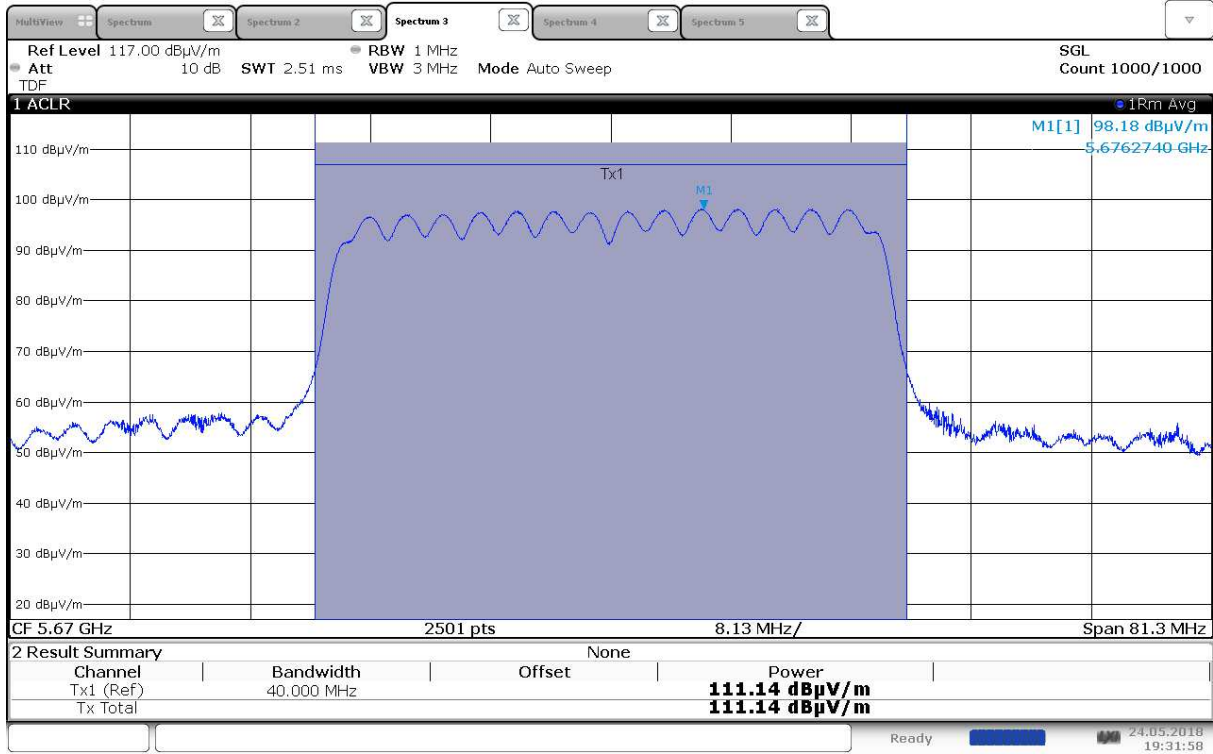
Maximum EIRP, 5500 MHz, 802.11n HT20, MIMO



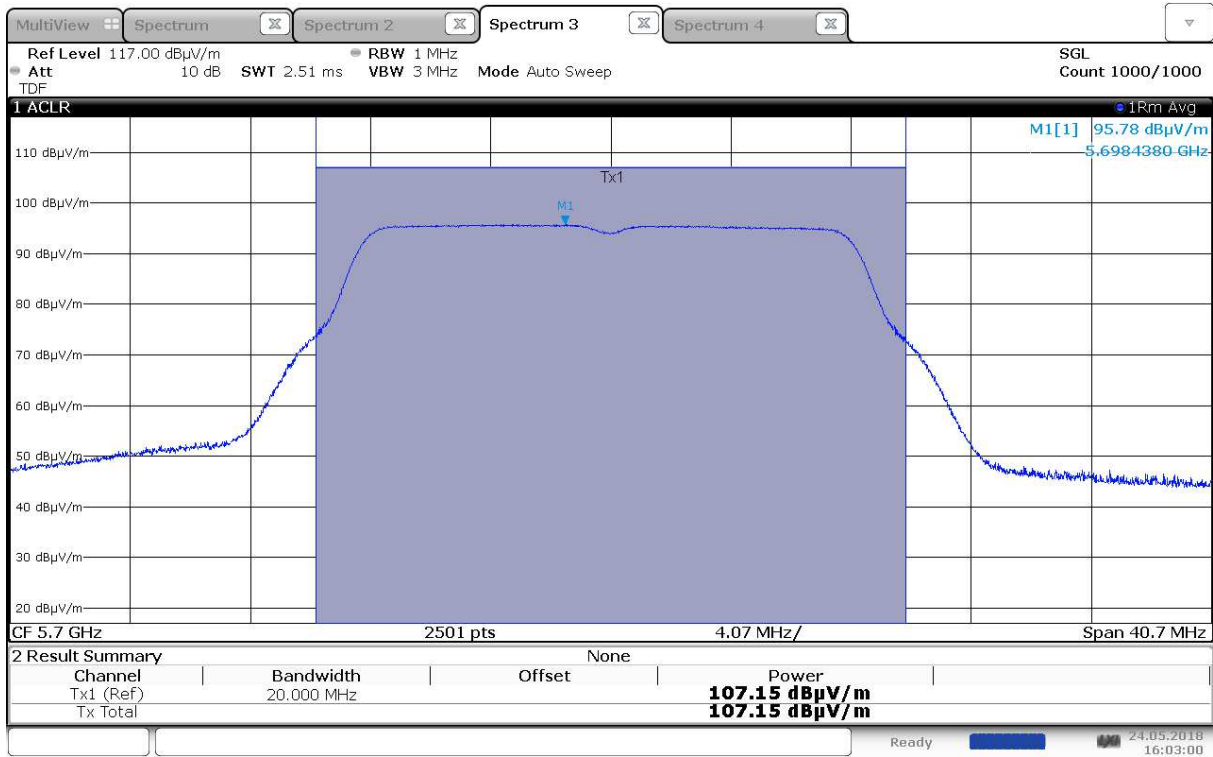
Maximum EIRP, 5510 MHz, 802.11n HT40, MIMO



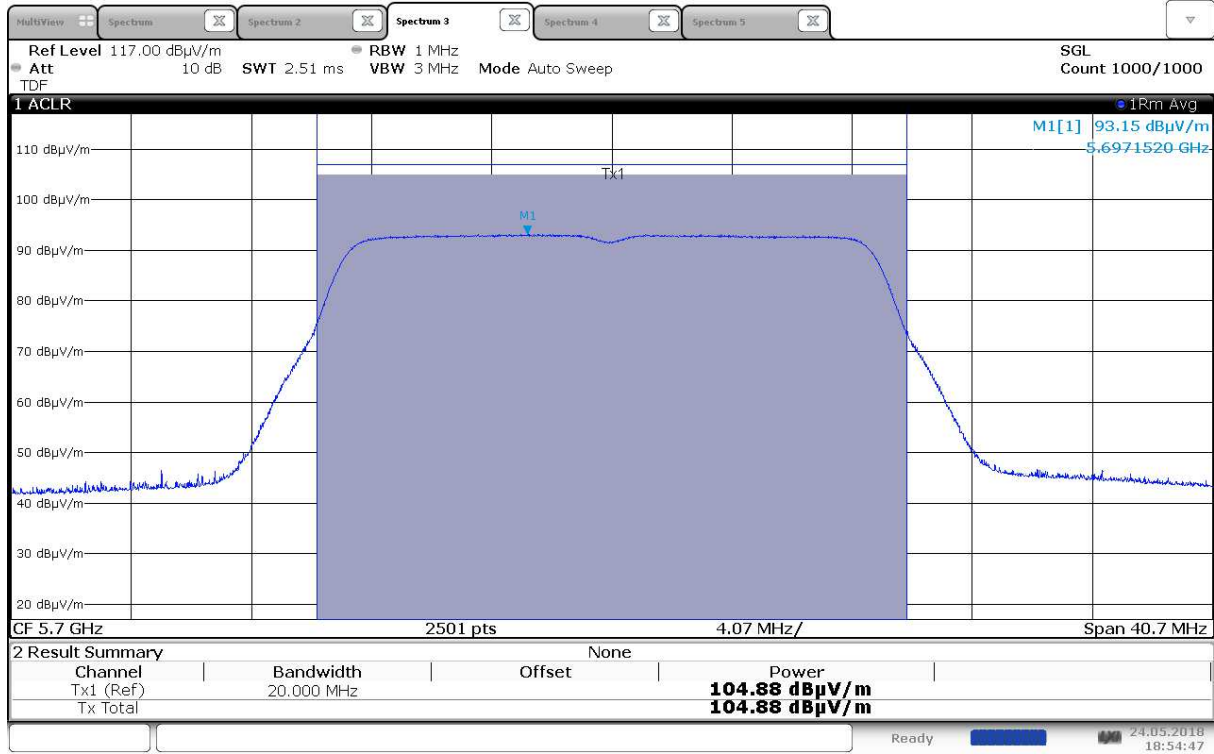
Maximum EIRP, 5530 MHz, 802.11n HT80, MIMO



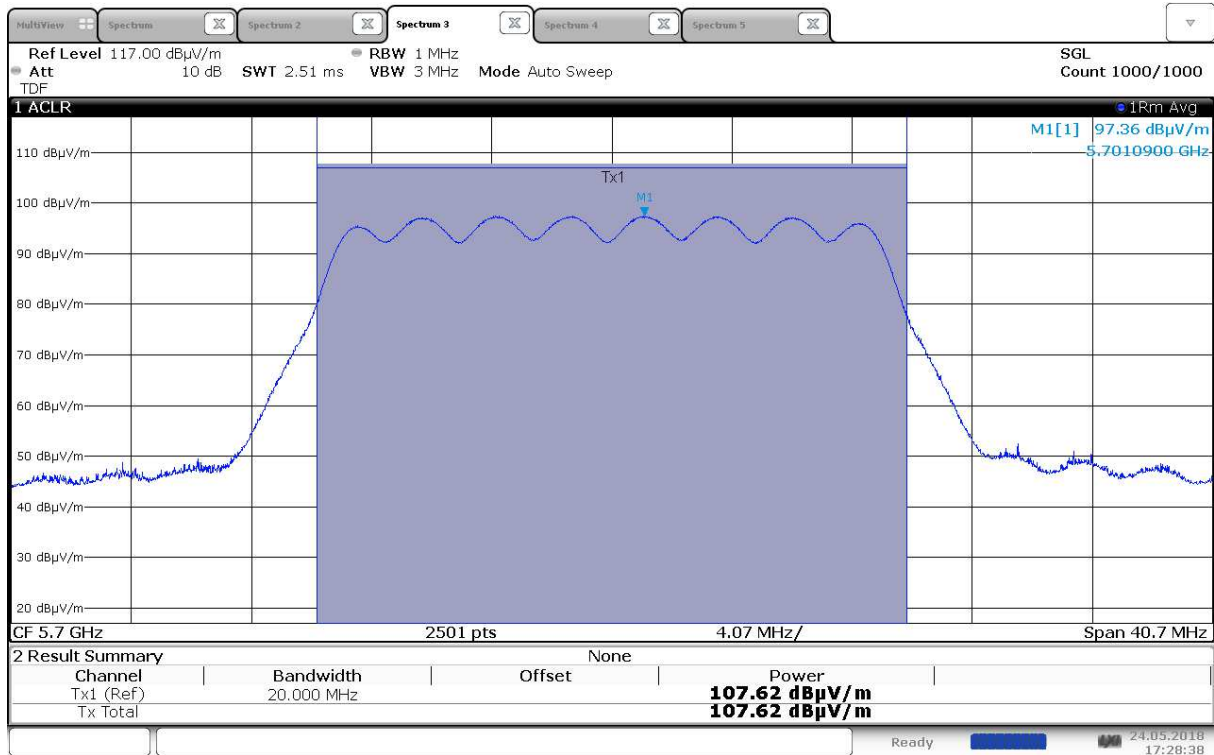
Maximum EIRP, 5670 MHz, 802.11n HT40, MIMO



Maximum EIRP, 5700 MHz, 802.11a 6Mb, Ant0



Maximum EIRP, 5700 MHz, 802.11n 6Mb, Ant1



Maximum EIRP, 5700 MHz, 802.11n HT20, MIMO

2.4 Emission Bandwidth *B*

Para. No.: 15.407(a)

Test Results: Complies

Measurement Data:

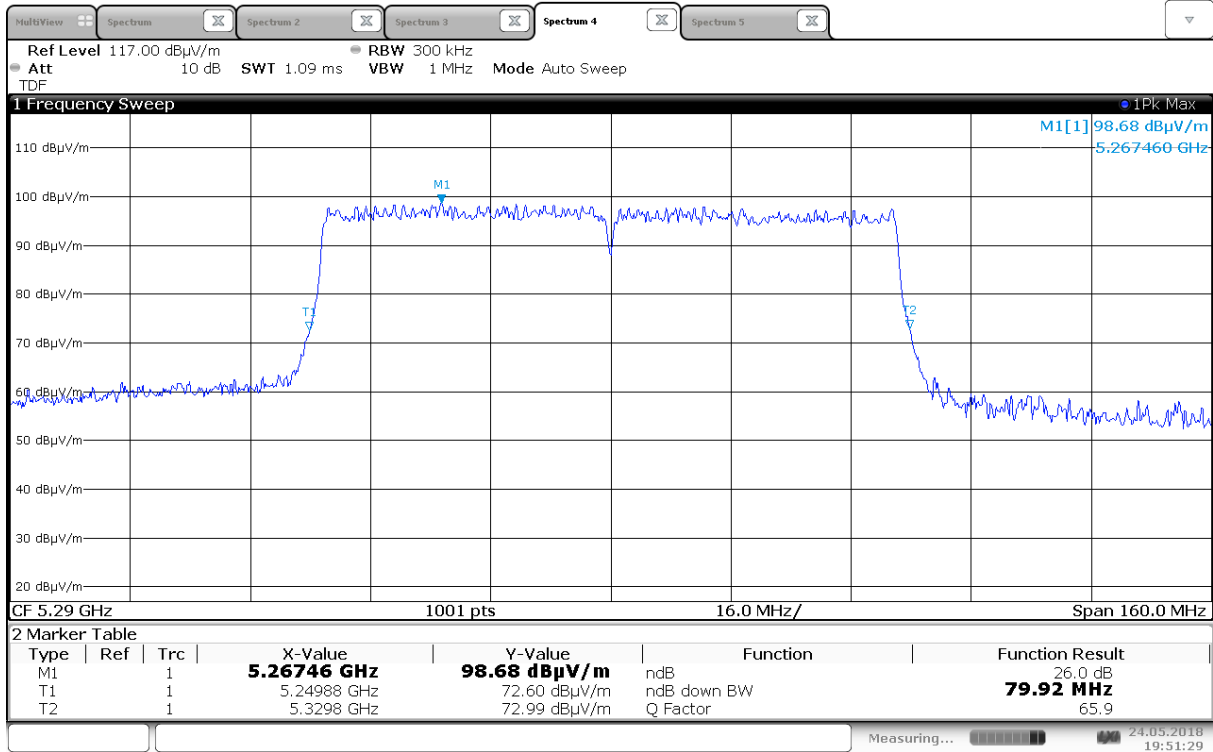
Ch. No.	Nominal Frequency (MHz)	26dB Bandwidth (MHz)			
		802.11a	802.11n HT20	802.11n HT40	802.11n HT80
36	5180	22.0	21.8		
40	5200	21.9	21.9		
48	5240	21.9	21.8		
52	5260	32.4	28.0		
60	5300	23.7	28.2		
64	5320	23.9	21.6		
100	5500	21.6	21.7		
116	5580	36.8	33.4		
140	5700	33.8	21.7		
38	5190			41.0	
46	5230			40.4	
54	5270			48.6	
62	5310			39.3	
102	5510			39.2	
110	5550			58.2	
134	5670			39.2	
42	5210				83.2
58	5290				79.9
106	5530				80.1

Values in boldface are measured values, all other values are from UL report no. 11526345-E4V3.

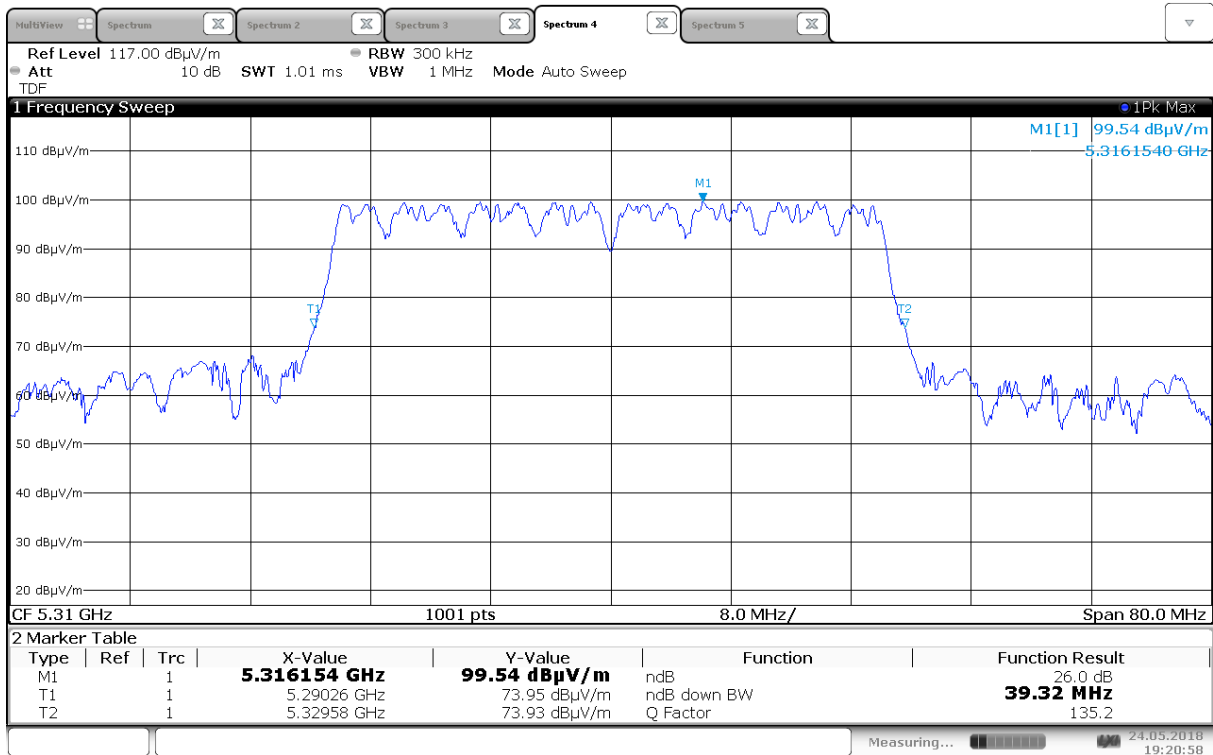
Measurements were performed radiated.

Limit:

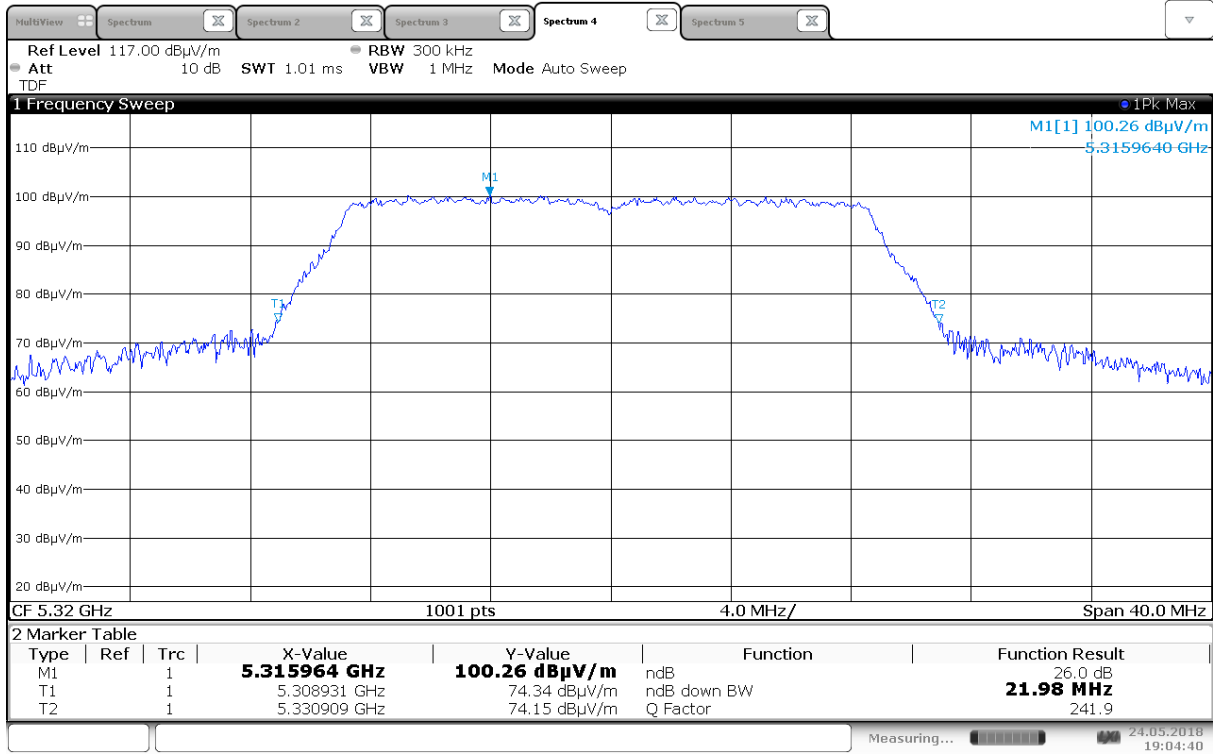
No requirements as long as the emissions are within the band-edges.



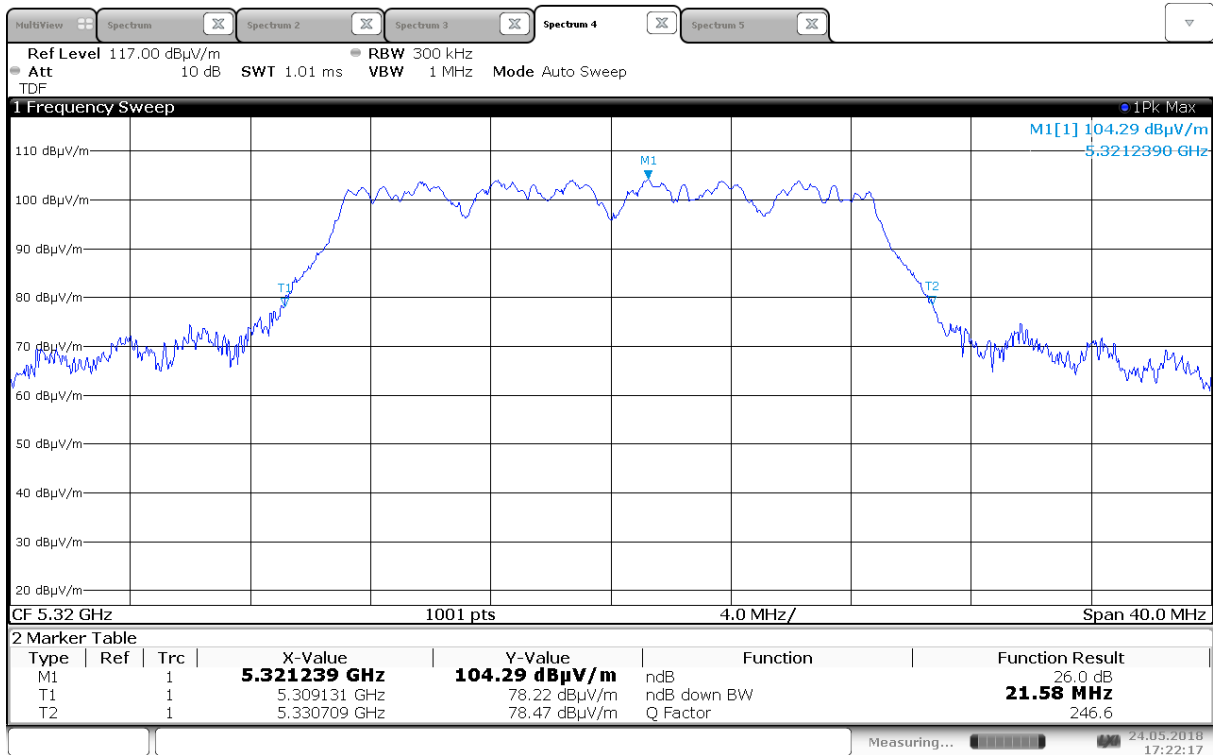
Emission Bandwidth B, 5290 MHz, 802.11n HT80, MIMO



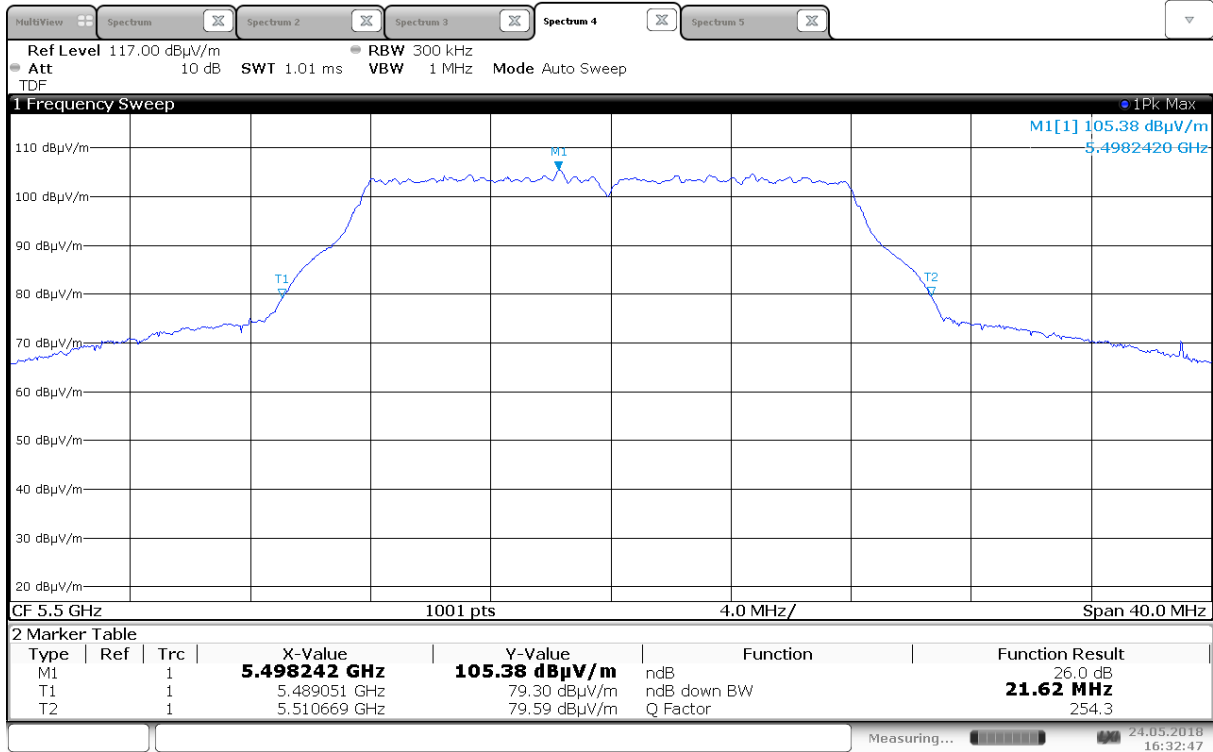
Emission Bandwidth B, 5310 MHz, 802.11n HT40, MIMO



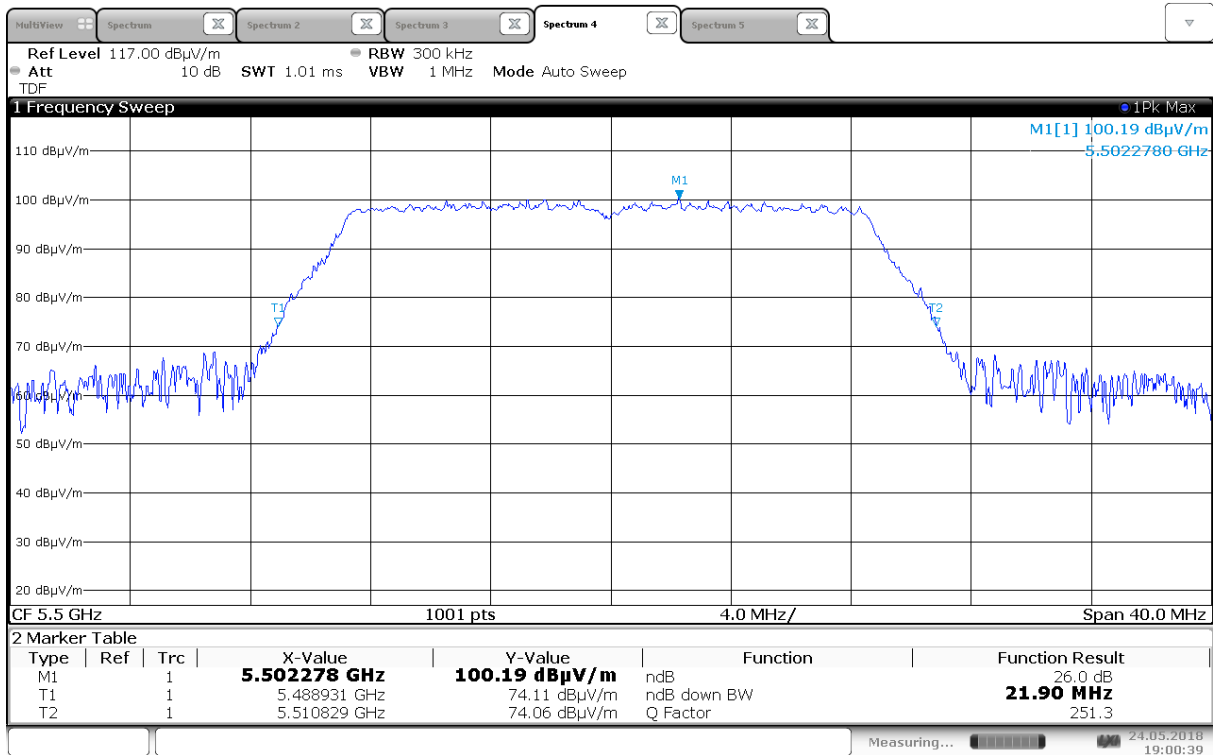
Emission Bandwidth B, 5320 MHz, 802.11n MCS0, Ant1



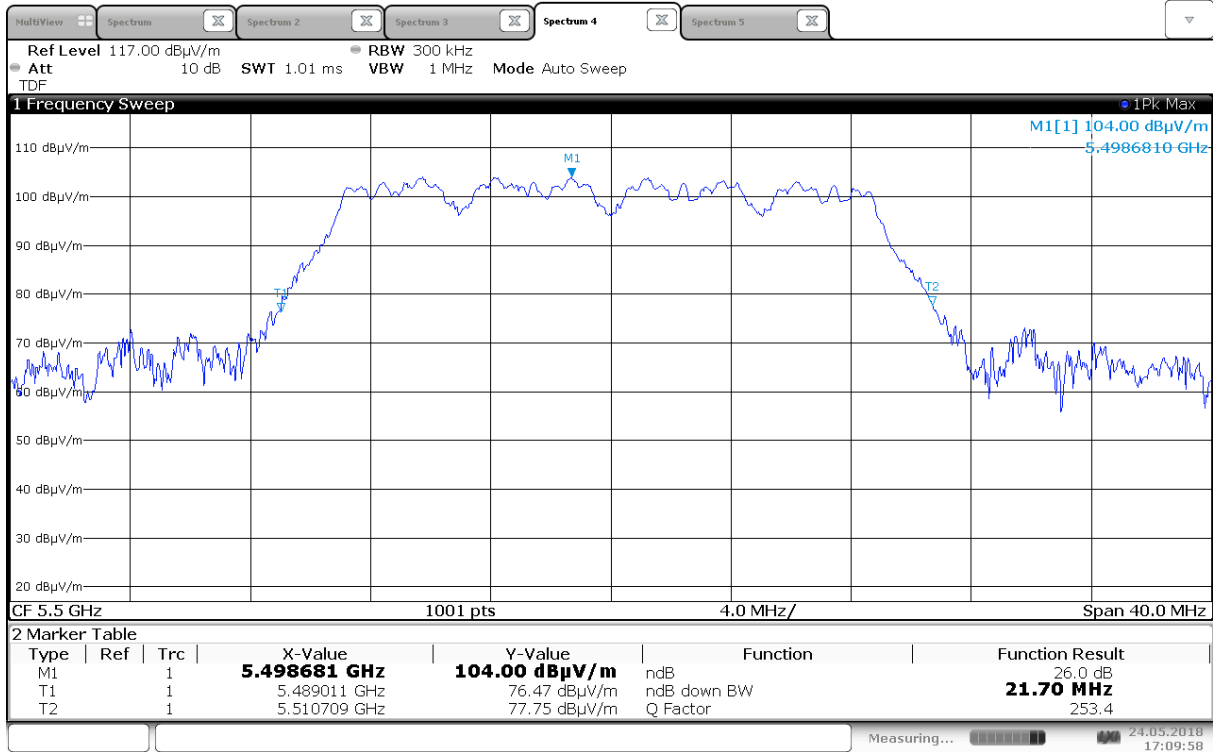
Emission Bandwidth B, 5320 MHz, 802.11n HT20, MIMO



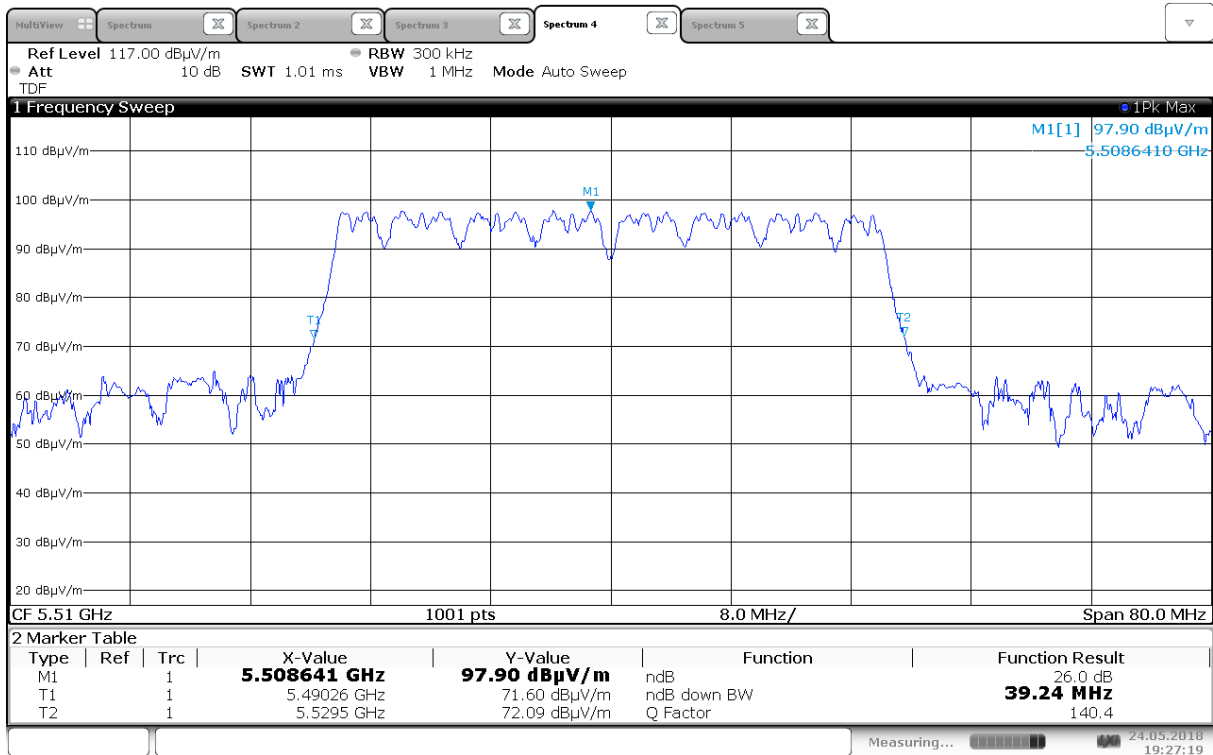
Emission Bandwidth B, 5500 MHz, 802.11a 6Mb, Ant1



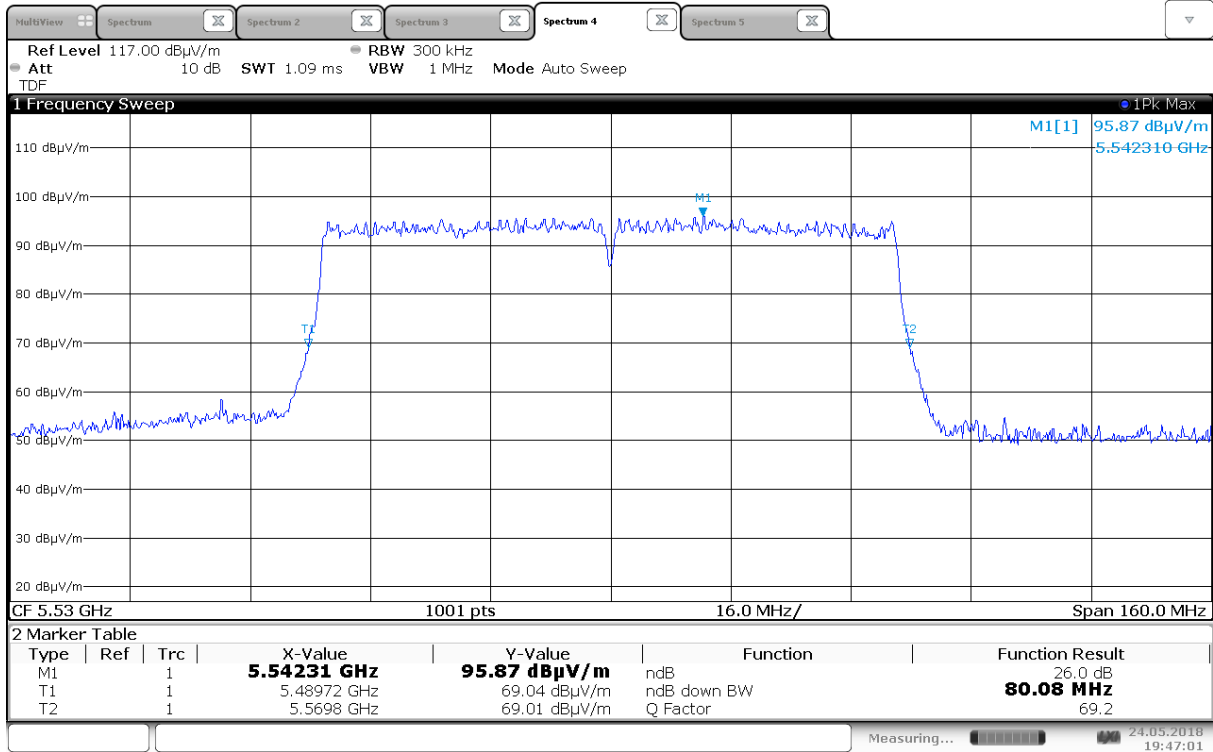
Emission Bandwidth B, 5500 MHz, 802.11n MCS0, Ant1



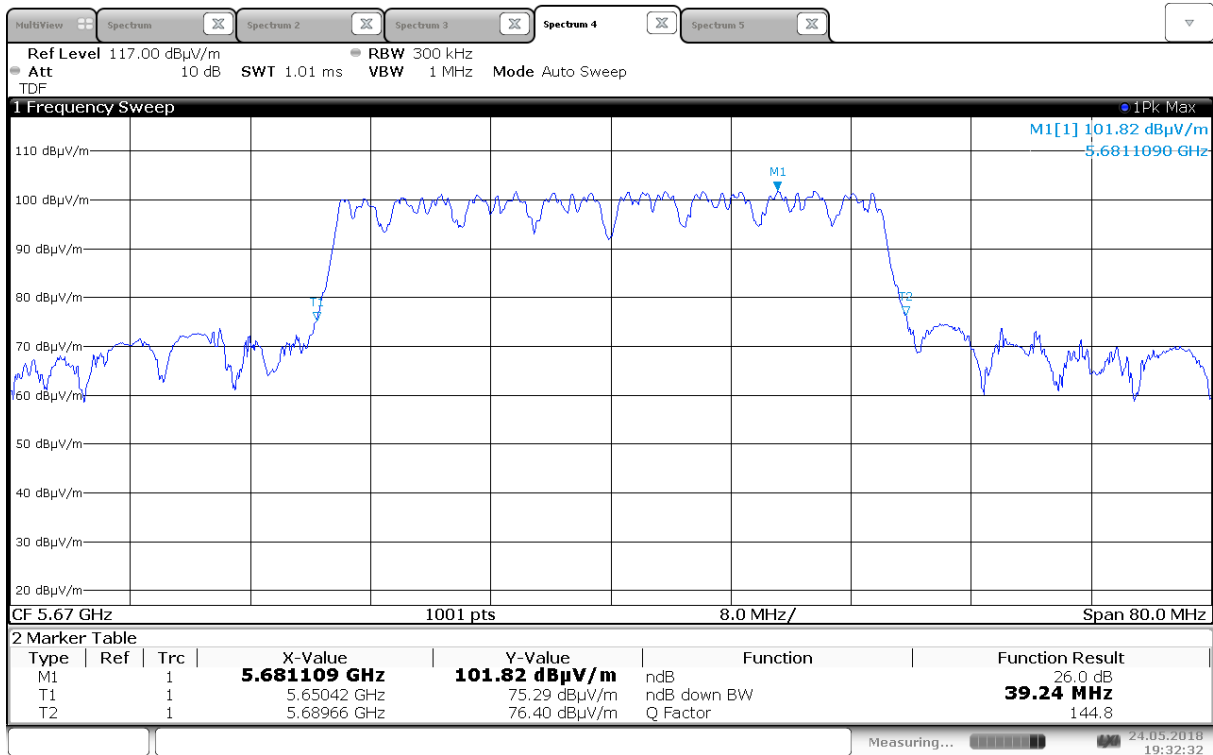
Emission Bandwidth B, 5500 MHz, 802.11n HT20, MIMO



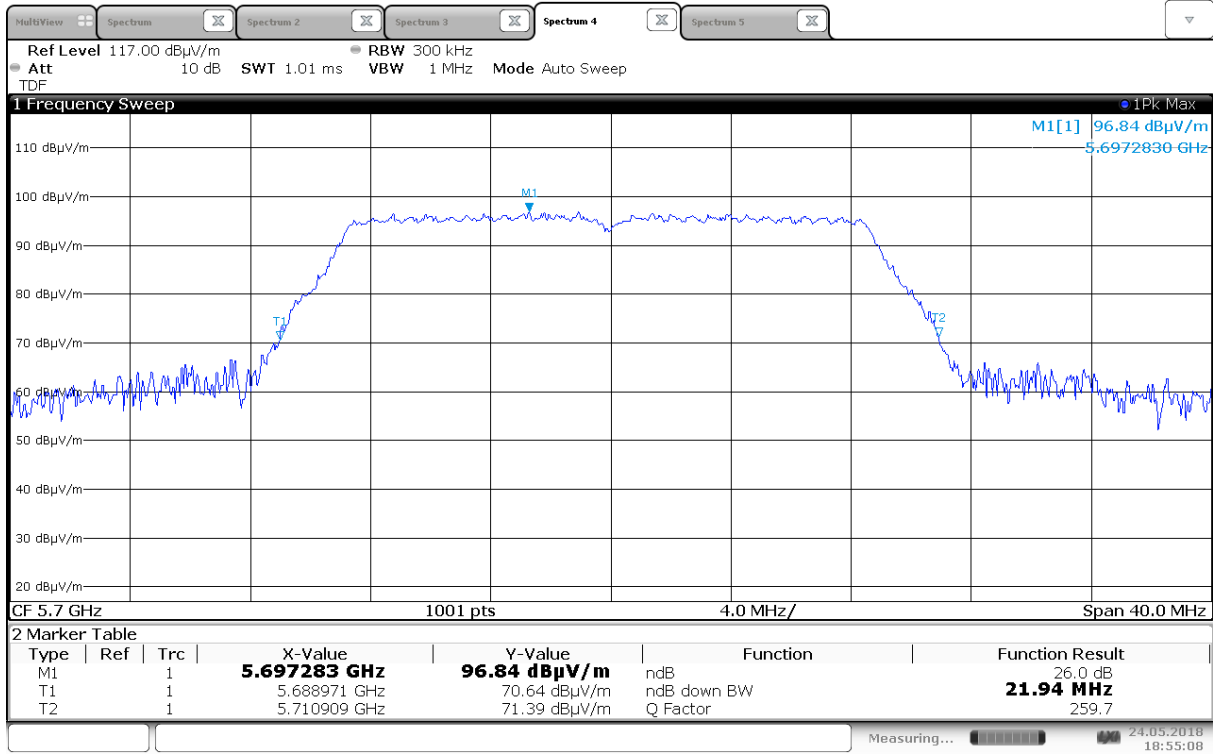
Emission Bandwidth B, 5510 MHz, 802.11n HT40, MIMO



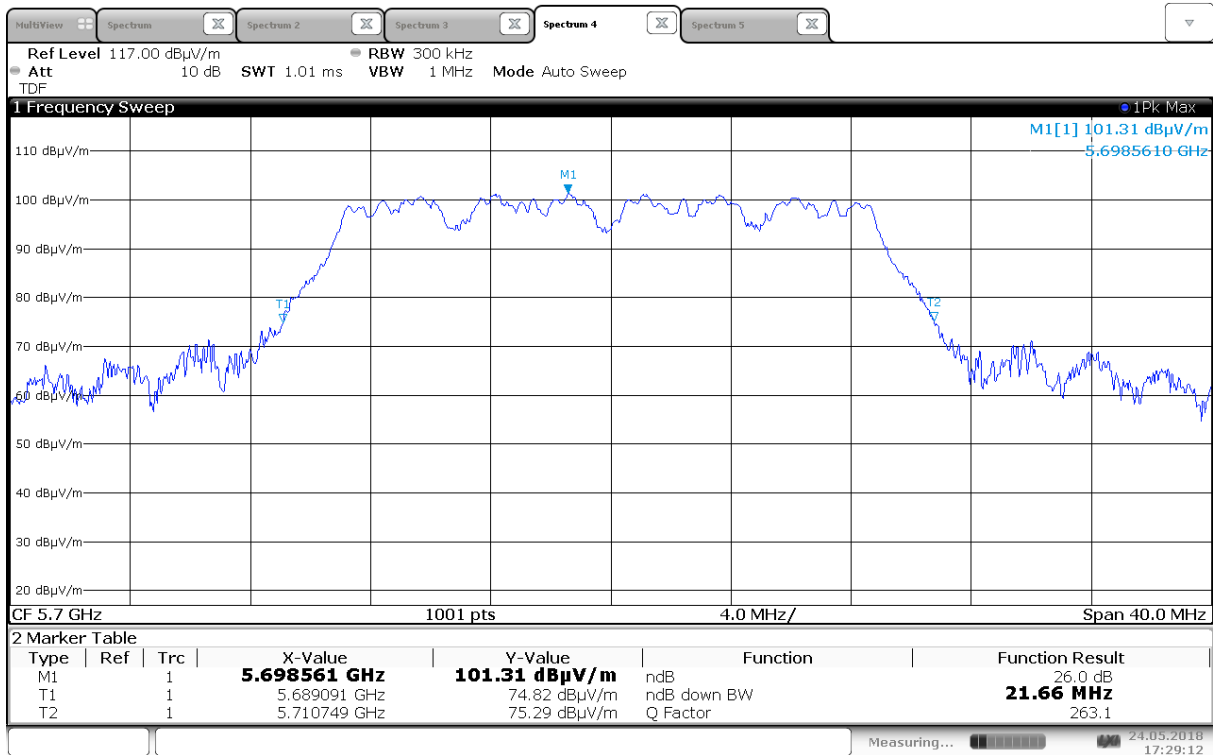
Emission Bandwidth B, 5530 MHz, 802.11n HT80, MIMO



Emission Bandwidth B, 5670 MHz, 802.11n HT40, MIMO



Emission Bandwidth B, 5700 MHz, 802.11n 6Mb, Ant1



Emission Bandwidth B, 5700 MHz, 802.11n HT20, MIMO

2.5 Peak Power Spectral Density, EIRP

FCC 15.407(a)

ISED RSS-247 Issue 2, Clause 6.2

Test Results: Complies

Measurement Data:

Ch. No.	Nominal Frequency (MHz)	PPSD EIRP (dBm/MHz)			
		802.11a	802.11n HT20	802.11n HT40	802.11n HT80
36	5180	4.3	1.6		
40	5200	3.6	1.6		
48	5240	3.4	2.0		
52	5260	6.8	9.3		
60	5300	6.8	7.9		
64	5320	7.2	5.5		
100	5500	6.7	5.2		
116	5580	6.8	8.7		
140	5700	2.6	2.5		
149	5745	6.6	7.1		
157	5785	7.3	7.6		
165	5825	7.1	7.9		
38	5190			0.0	
46	5230			1.5	
54	5270			4.8	
62	5310			1.4	
102	5510			-0.5	
110	5550			4.3	
134	5670			3.5	
151	5755			4.3	
159	5795			5.4	
42	5210				-3.0
58	5290				-0.9
106	5530				-3.4
155	5775				-0.3

* Values in U-NII Band 3 are dBm/500kHz

Values in boldface are measured values, all other values are calculated from values in UL report no. 11526345-E4V3, and corrected for antenna gain.

The method described in KDB 412172 v01r01 was used for calculating e.i.r.p. from the measured field strength value.

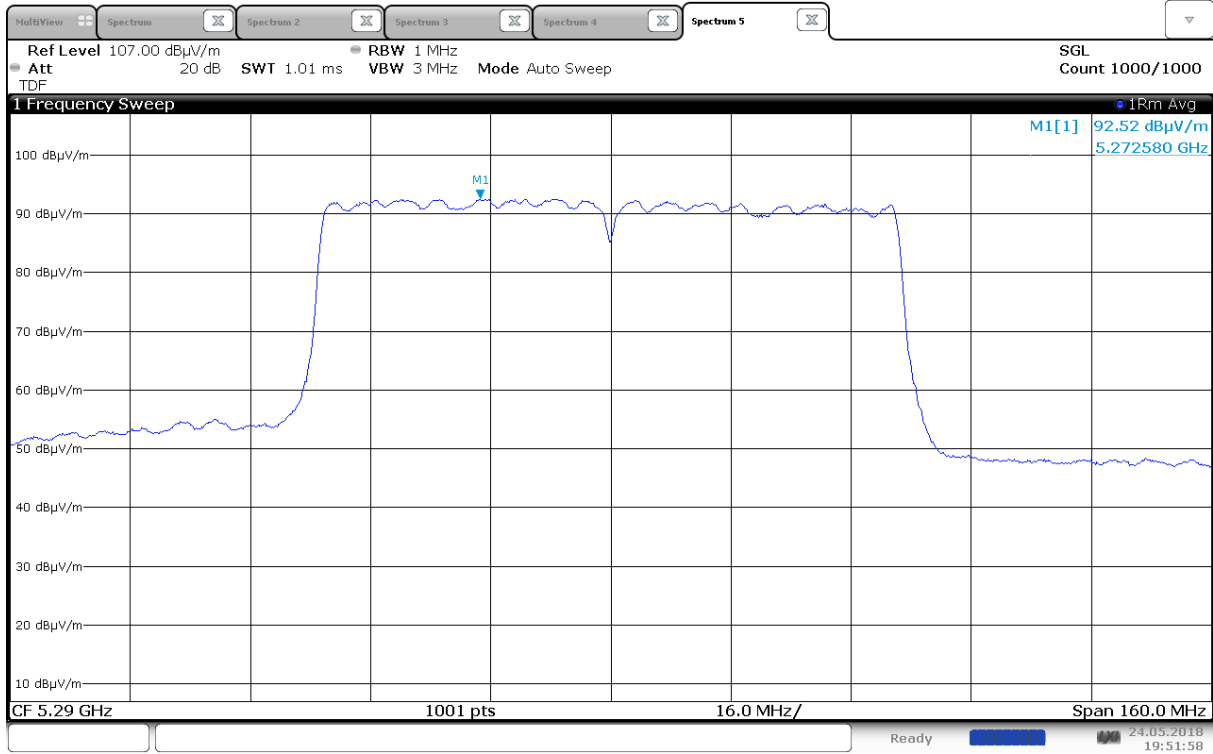
Duty cycle correction factor from clause 1.8 was added to the calculated power value.

Measurements were performed radiated.

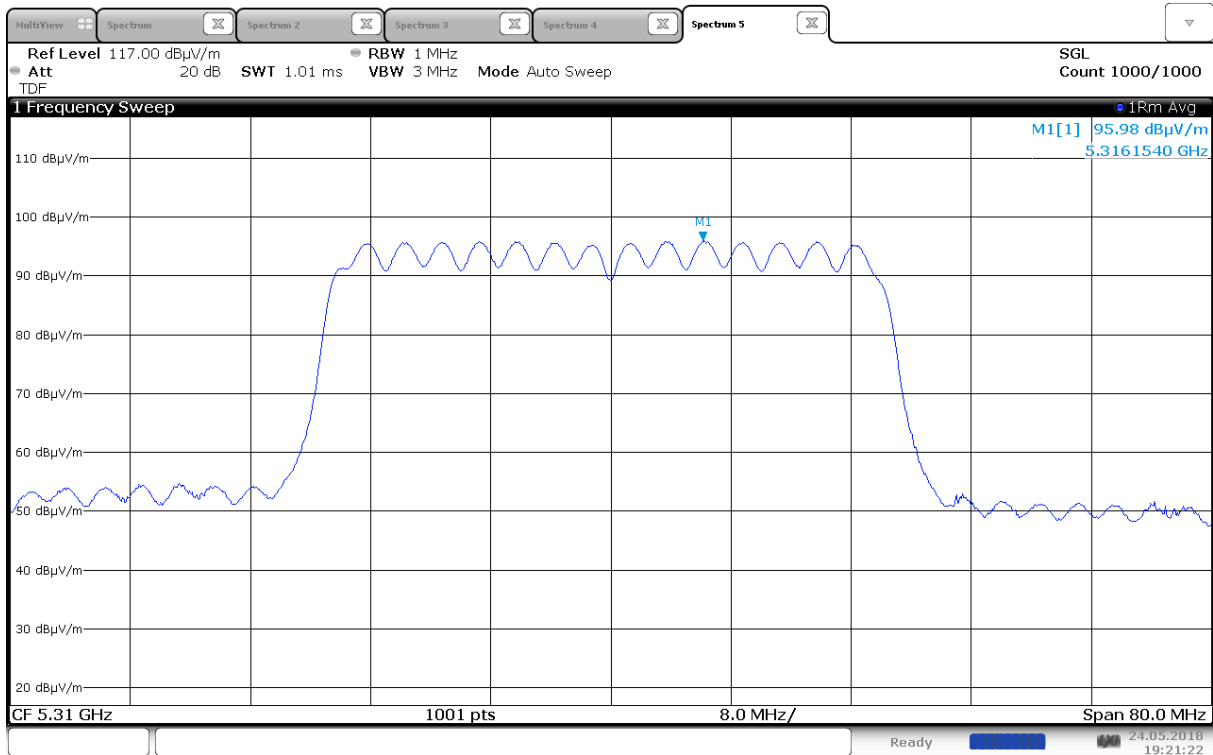
Power Spectral Density limits:

Frequency Band	Max Conducted Power Spectral Density	
	FCC 15.407(a)	RSS-247 Issue 2
5150 – 5250 MHz	17 dBm/MHz for master device 11 dBm/MHz for mobile/ portable client device	10 dBm/MHz (only indoor allowed)
5250 – 5350 MHz	11 dBm/MHz	The lesser of 30 dBm/MHz or $17 + 10\log_{10}B$ dBm/MHz (B is 99% BW in MHz)
5470 – 5725 MHz	11 dBm/MHz	The lesser of 30 dBm/MHz or $17 + 10\log_{10}B$ dBm/MHz (B is 99% BW in MHz)
5725 – 5825 MHz	30 dBm/500kHz	30 dBm/500kHz

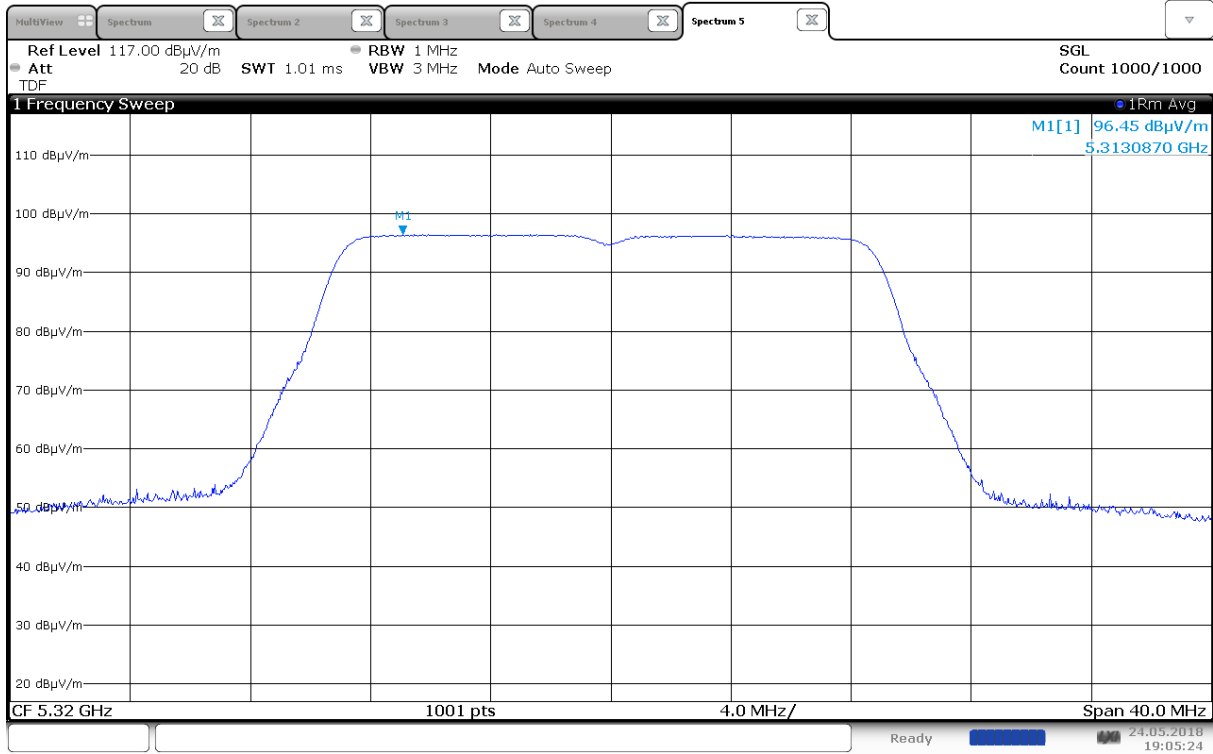
If transmitting antennas of directional gain greater than 6 dBi are used, the power spectral density from the intentional radiator shall be reduced below the stated value above by the amount in dB that the directional gain of the antenna exceeds 6 dBi.



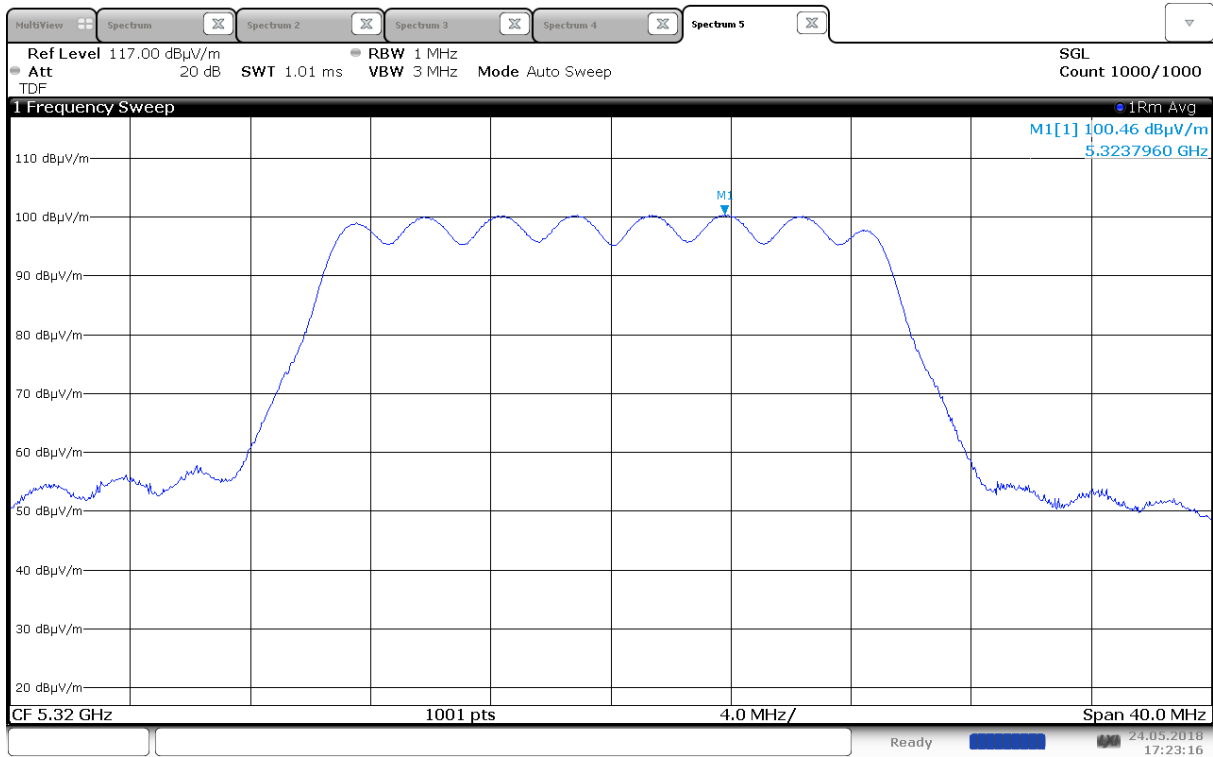
Power Spectral Density, 5290 MHz, 802.11n HT80, MIMO



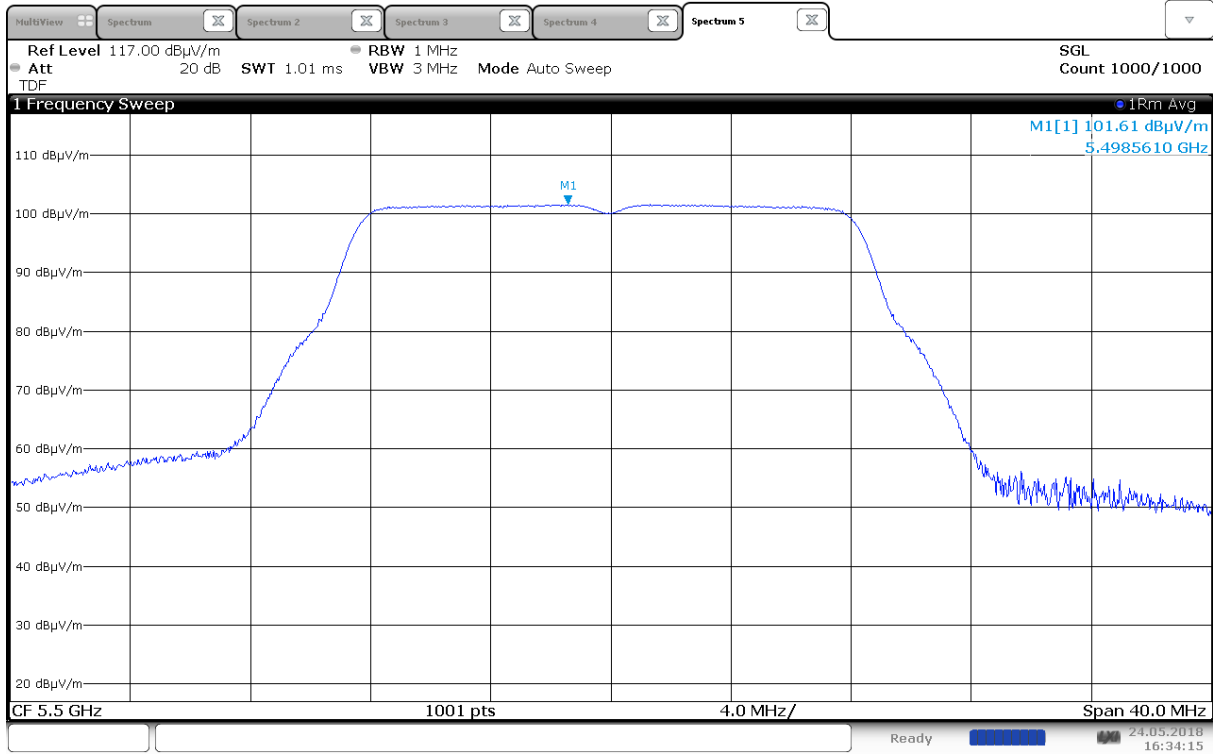
Power Spectral Density, 5310 MHz, 802.11n HT40, MIMO



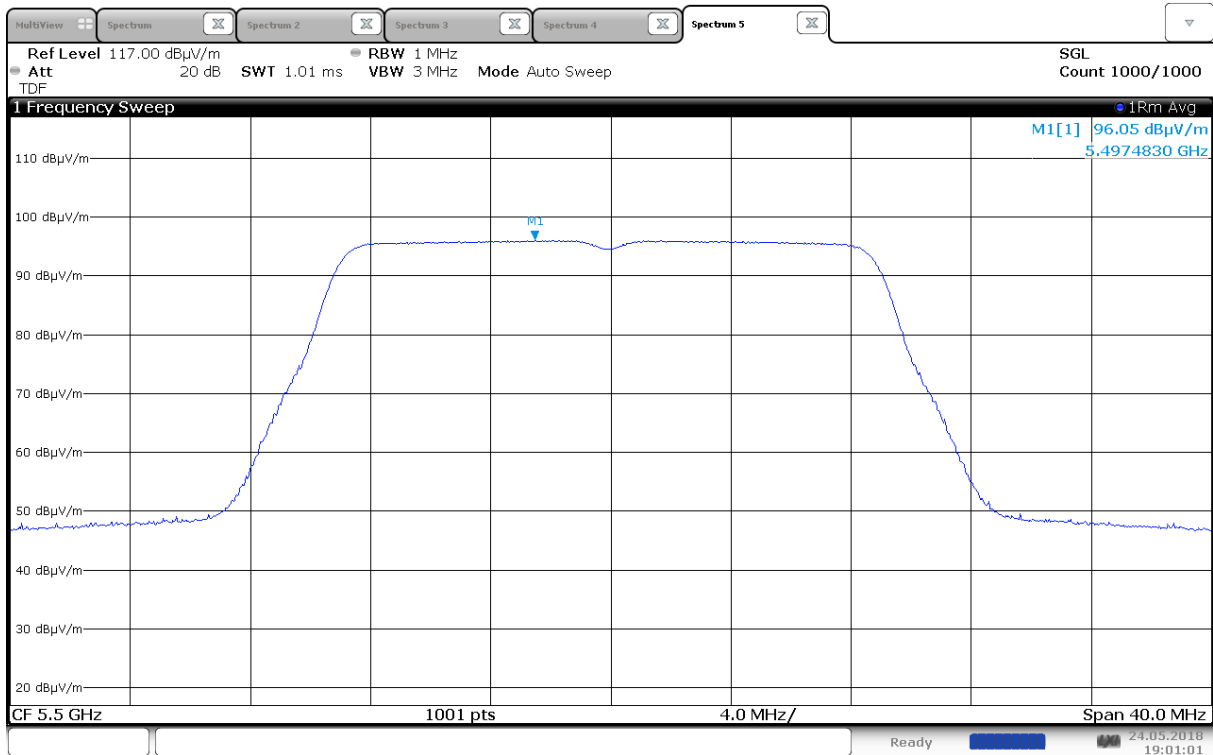
Power Spectral Density, 5320 MHz, 802.11n MCS0, Ant1



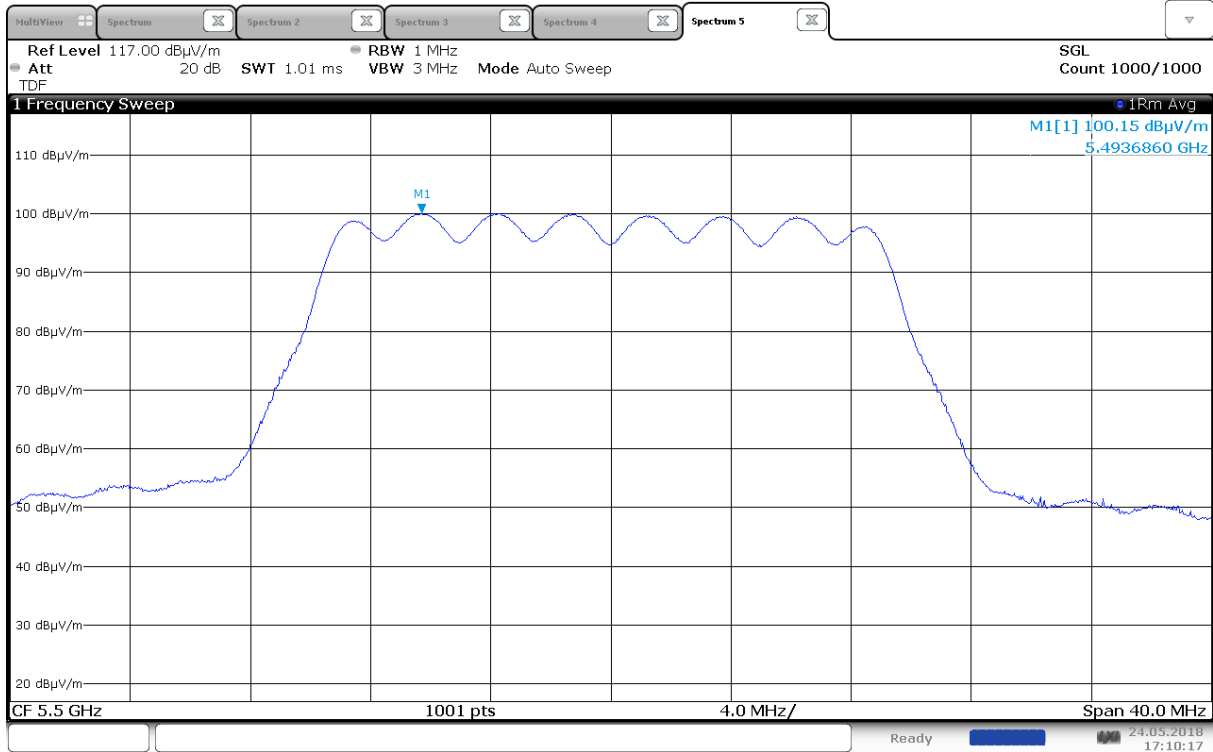
Power Spectral Density, 5320 MHz, 802.11n HT20, MIMO



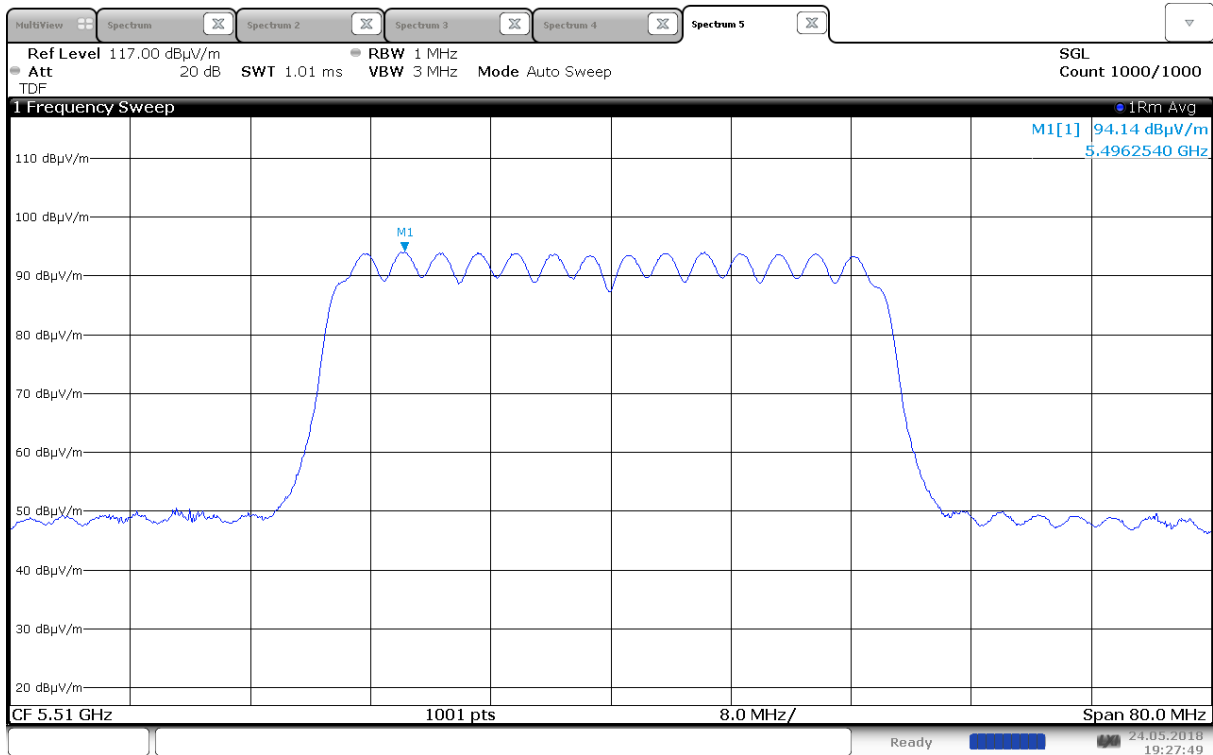
Power Spectral Density, 5500 MHz, 802.11a 6Mb, Ant1



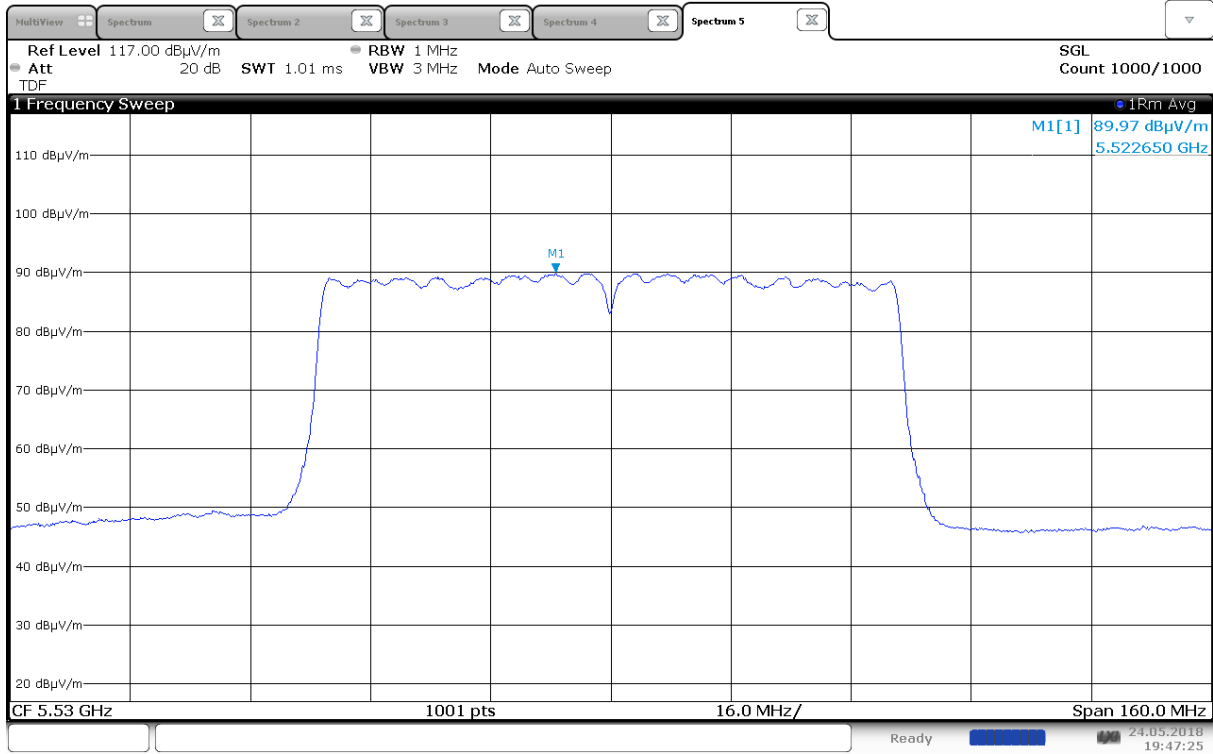
Power Spectral Density, 5500 MHz, 802.11n MCS0, Ant1



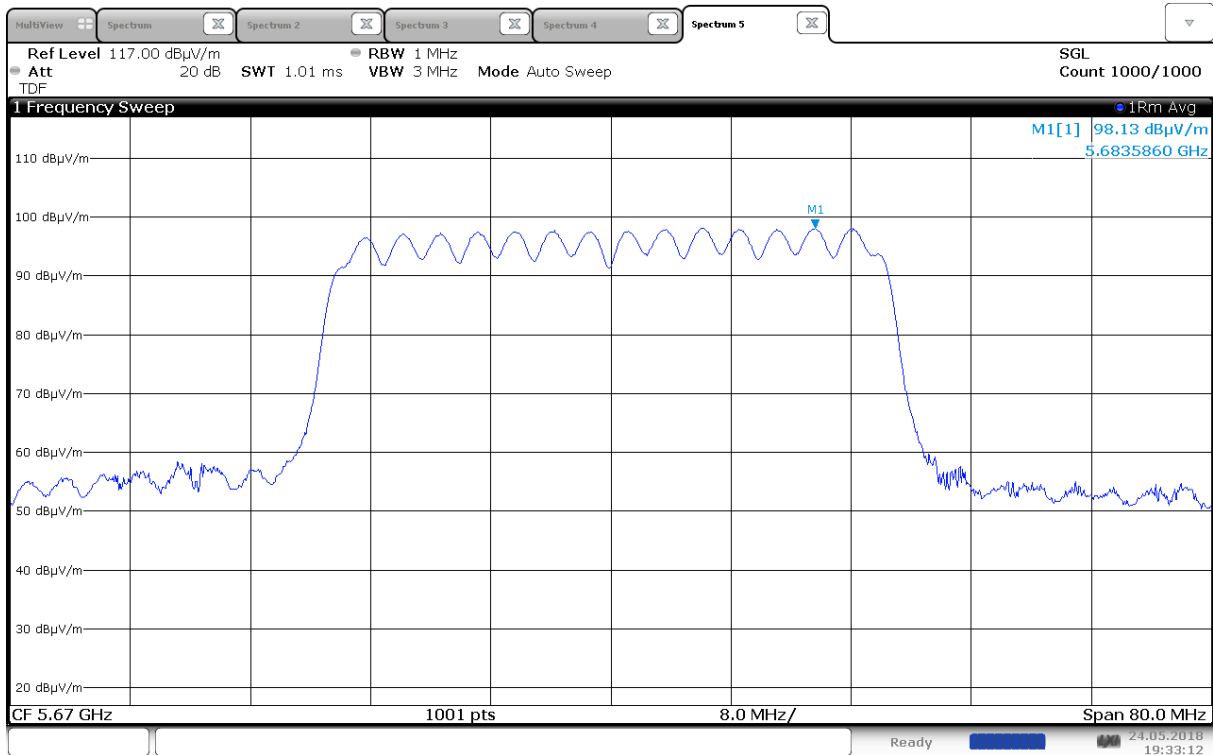
Power Spectral Density, 5500 MHz, 802.11n HT20, MIMO



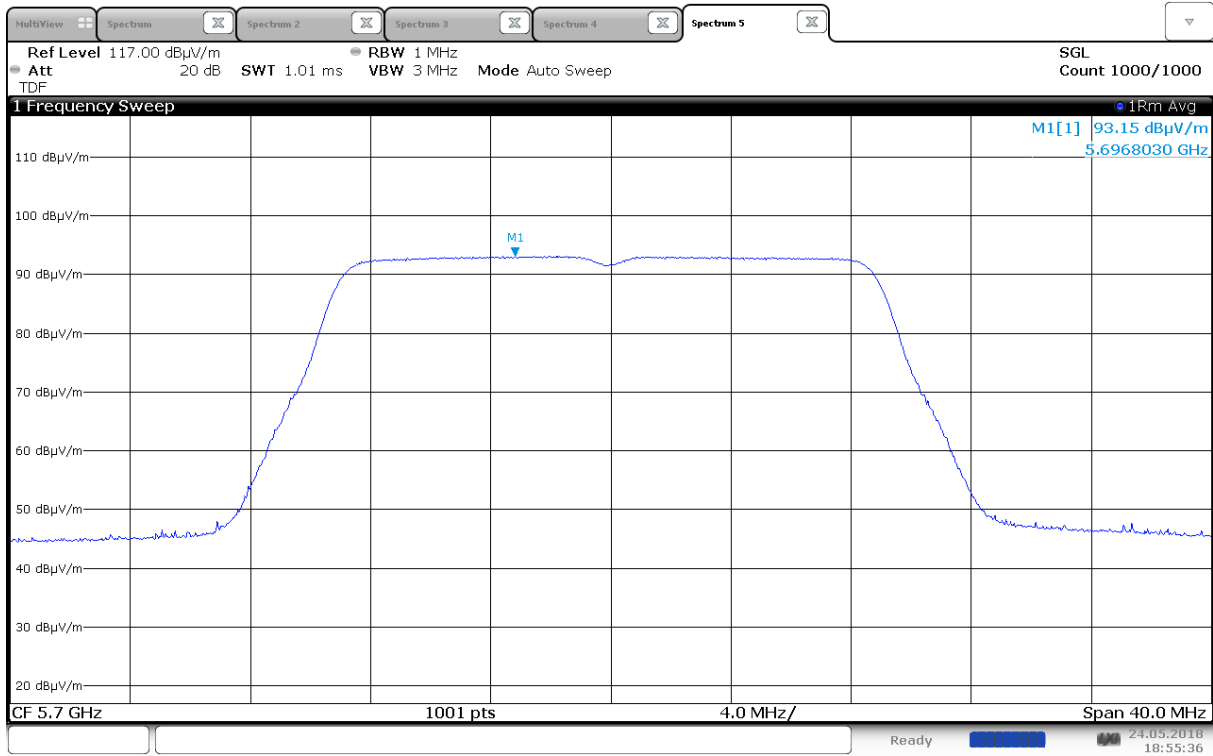
Power Spectral Density, 5510 MHz, 802.11n HT40, MIMO



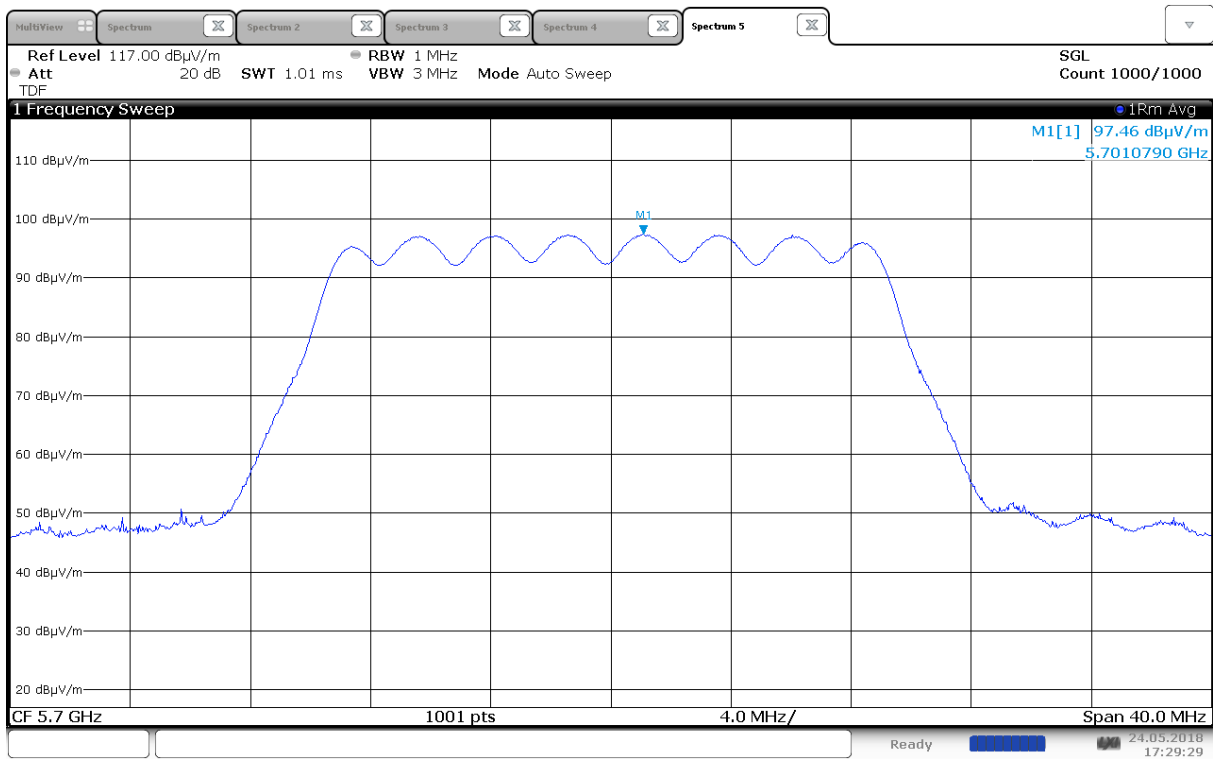
Power Spectral Density, 5530 MHz, 802.11n HT80, MIMO



Power Spectral Density, 5670 MHz, 802.11n HT40, MIMO



Power Spectral Density, 5700 MHz, 802.11n 6Mb, Ant1



Power Spectral Density, 5700 MHz, 802.11n HT20, MIMO

2.6 Unwanted Emissions

FCC 15.407(b)

ISED RSS-247 Issue 2, clause 6.2

Test Results: Complies

Measurement Data:

Band Edge Emissions, 5150MHz						
Carrier Modulation	Ch. No.	Carrier Freq MHz	Measured value Peak dBμV/m @3m	Calculated value Peak dBm/MHz	Limit dBm/MHz	Verdict
802.11a, Ant 0	36	5180	65.2	-30.0	-27	Complies
802.11a, Ant 1	36	5180	65.1	-30.2	-27	Complies
802.11n, HT20, MIMO	36	5180	59.5	-35.7	-27	Complies
802.11n, HT40, MIMO	38	5190	67.8	-27.4	-27	Complies
802.11n, HT80, MIMO	42	5210	63.5	-31.7	-27	Complies

Band Edge Emissions, 5350MHz						
Carrier Modulation	Ch. No.	Carrier Freq MHz	Measured value Peak dBμV/m @3m	Calculated value Peak dBm/MHz	Limit dBm/MHz	Verdict
802.11a, Ant 0	64	5320	66.1	-29.2	-27	Complies
802.11a, Ant 1	64	5320	64.8	-30.4	-27	Complies
802.11n, HT20, MIMO	64	5320	67.6	-27.6	-27	Complies
802.11n, HT40, MIMO	62	5310	65.8	-29.4	-27	Complies
802.11n, HT80, MIMO	58	5290	67.2	-28.1	-27	Complies

Band Edge Emissions, 5470MHz						
Carrier Modulation	Ch. No.	Carrier Freq MHz	Measured value Peak dBμV/m @3m	Calculated value Peak dBm/MHz	Limit dBm/MHz	Verdict
802.11a, Ant 0	100	5500	64.8	-30.4	-27	Complies
802.11a, Ant 1	100	5500	67.9	-27.3	-27	Complies
802.11n, HT20, MIMO	100	5500	65.2	-30.0	-27	Complies
802.11n, HT40, MIMO	102	5510	66.0	-29.2	-27	Complies
802.11n, HT80, MIMO	106	5530	65.1	-30.1	-27	Complies

Band Edge Emissions, 5725MHz						
Carrier Modulation	Ch. No.	Carrier Freq MHz	Measured value Peak dBμV/m @3m	Calculated value Peak dBm/MHz	Limit dBm/MHz	Verdict
802.11a, Ant 0	140	5700	66.4	-28.8	-27	Complies
802.11a, Ant 1	140	5700	67.1	-28.2	-27	Complies
802.11n, HT20, MIMO	140	5700	66.8	-28.4	-27	Complies
802.11n, HT40, MIMO	134	5670	67.1	-28.1	-27	Complies

Band Edge Emissions, 5700 – 5720 MHz						
Carrier Modulation	Ch. No.	Carrier Freq MHz	Measured value Peak dBμV/m @3m	Calculated value Peak dBm/MHz	Limit dBm/MHz	Verdict
802.11a, Ant 0	149	5745	See plot	See plot	< 10 to 15.6	Complies
802.11a, Ant 1	149	5745	See plot	See plot	< 10 to 15.6	Complies
802.11n, HT20, MIMO	149	5745	See plot	See plot	< 10 to 15.6	Complies
802.11n, HT40, MIMO	151	5755	See plot	See plot	< 10 to 15.6	Complies
802.11n, HT80, MIMO	155	5775	See plot	See plot	< 10 to 15.6	Complies
Band Edge Emissions, 5650 – 5700 MHz						
Carrier Modulation	Ch. No.	Carrier Freq MHz	Measured value Peak dBμV/m @3m	Calculated value Peak dBm/MHz	Limit dBm/MHz	Verdict
All modulations	/	/	See plot	See plot	< -27 to 10	Complies
Band Edge Emissions, < 5650 MHz						
Carrier Modulation	Ch. No.	Carrier Freq MHz	Measured value Peak dBμV/m @3m	Calculated value Peak dBm/MHz	Limit dBm/MHz	Verdict
All modulations	/	/	< 55	< -40	< -27	Complies

Band Edge Emissions, 5855 – 5875 MHz						
Carrier Modulation	Ch. No.	Carrier Freq MHz	Measured value Peak dBμV/m @3m	Calculated value Peak dBm/MHz	Limit dBm/MHz	Verdict
802.11a, Ant 0	165	5825	See plot	See plot	< 10 to 15.6	Complies
802.11a, Ant 1	165	5825	See plot	See plot	< 10 to 15.6	Complies
802.11n, HT20, MIMO	165	5825	See plot	See plot	< 10 to 15.6	Complies
802.11n, HT40, MIMO	159	5795	See plot	See plot	< 10 to 15.6	Complies
802.11n, HT80, MIMO	155	5775	See plot	See plot	< 10 to 15.6	Complies
Band Edge Emissions, 5875 – 5925 MHz						
Carrier Modulation	Ch. No.	Carrier Freq MHz	Measured value Peak dBμV/m @3m	Calculated value Peak dBm/MHz	Limit dBm/MHz	Verdict
All modulations	/	/	See plot	See plot	< -27 to 10	Complies
Band Edge Emissions, > 5925 MHz						
Carrier Modulation	Ch. No.	Carrier Freq MHz	Measured value Peak dBμV/m @3m	Calculated value Peak dBm/MHz	Limit dBm/MHz	Verdict
All modulations	/	/	< 55	< -40	< -27	Complies

See plots.

All measurements were performed radiated.

EIRP values are calculated from field strength measurements using the method in KDB 412172 D01.

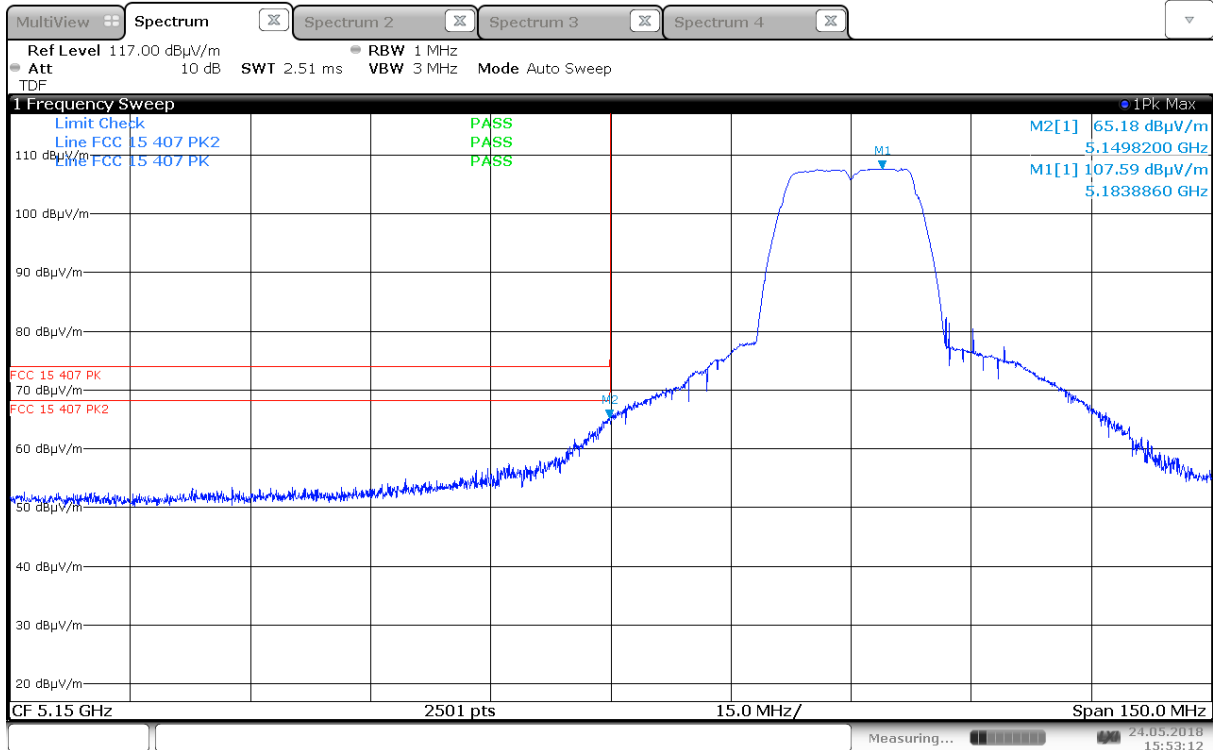
The tested equipment is for indoor use only, no band-edge requirements apply at 5250 MHz.

No spurious emissions except the above listed harmonics and band-edge emissions were found.

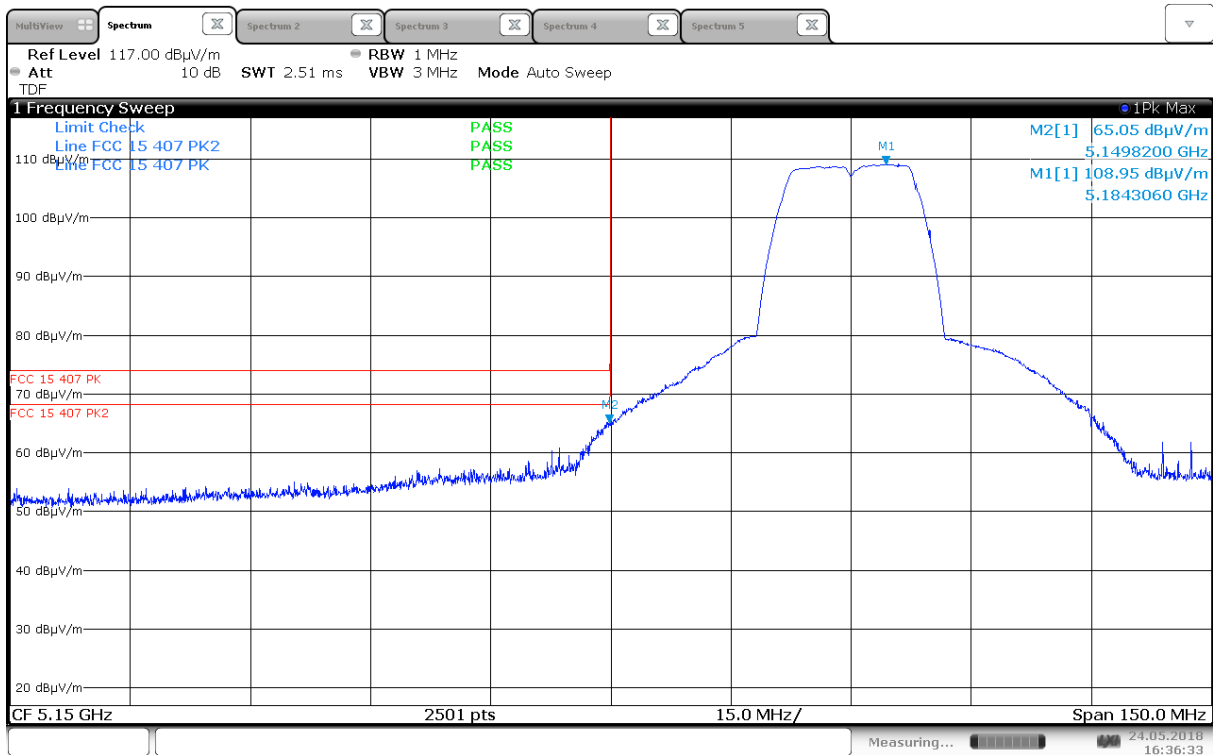
Unwanted Emissions limit:

Operating Frequency band	Limit for Emissions Outside Operating Frequency Band
5150 – 5250 MHz	-27 dBm/MHz
5250 – 5350 MHz	-27 dBm/MHz
5470 – 5725 MHz	-27 dBm/MHz
5725 – 5850 MHz	See FCC 15.407(b)(4)(i) or 15.407(b)(4)(ii) and ISED RSS-247 Issue 2, Clause 6.2.4 (2)

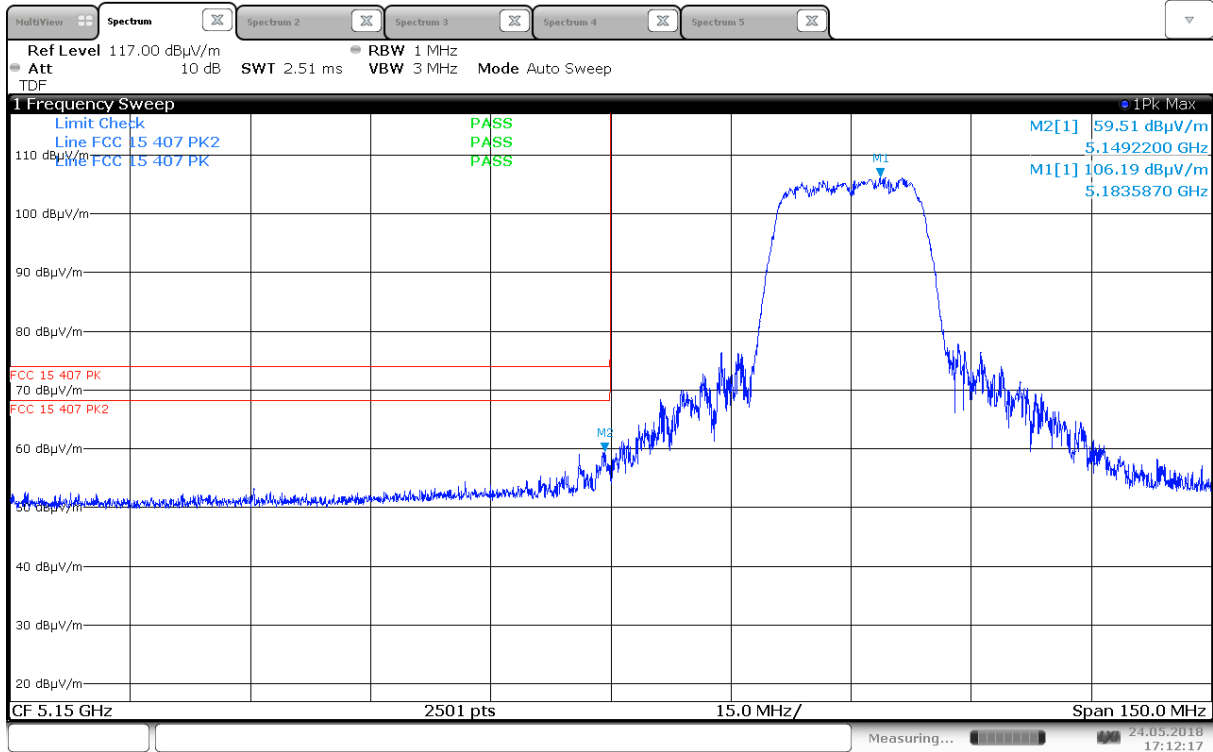
Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.



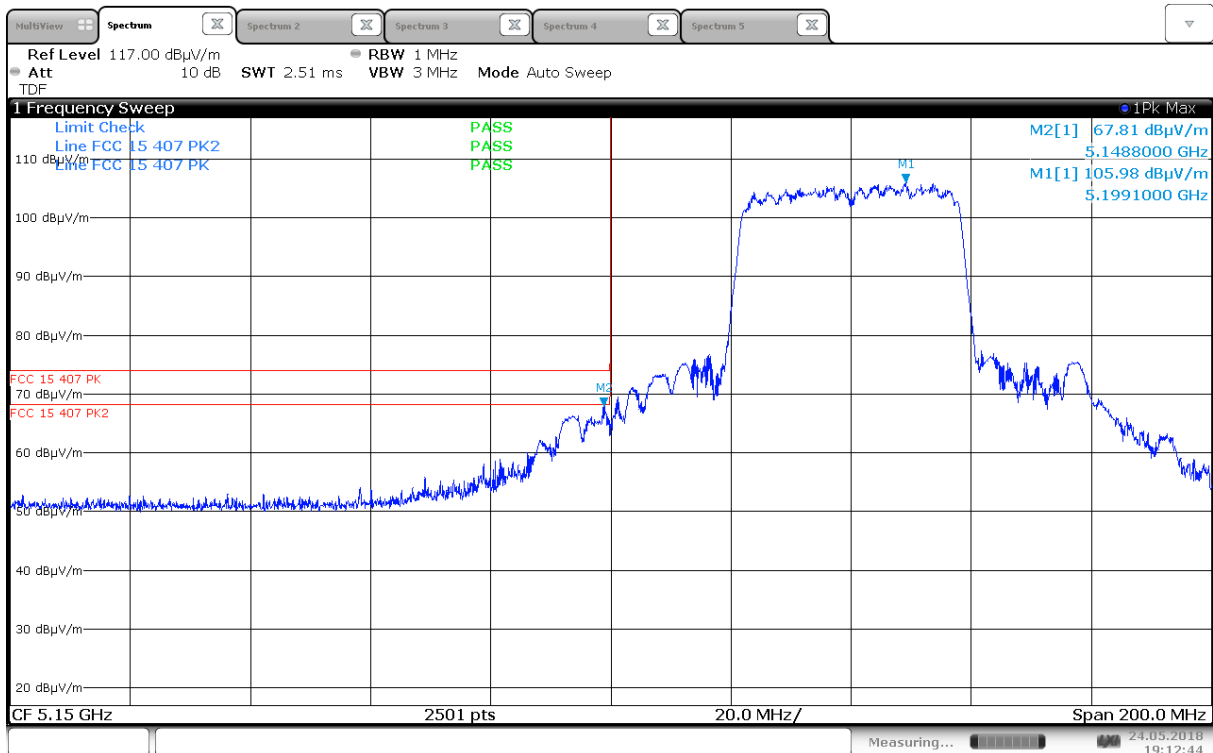
Unwanted Emissions, Band Edge, 5150MHz, ch36, 802.11a 6M, ant 0



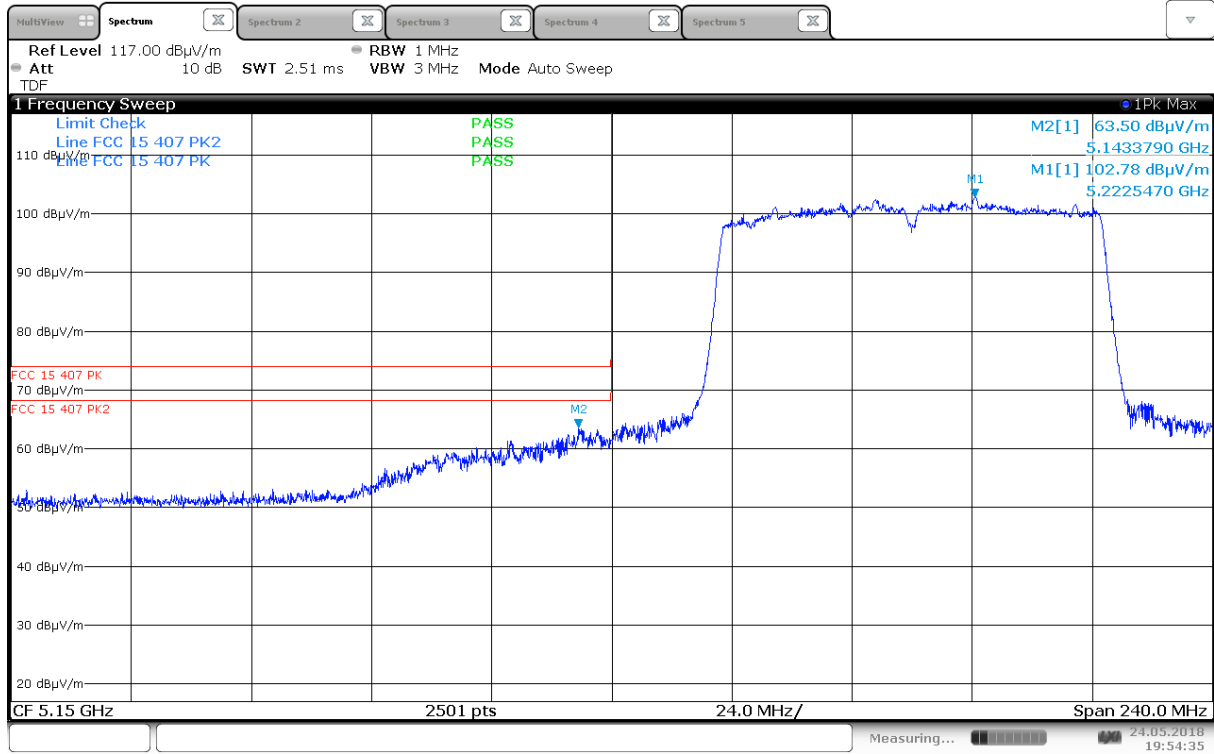
Unwanted Emissions, Band Edge, 5150MHz, ch36, 802.11a 6M, ant 1



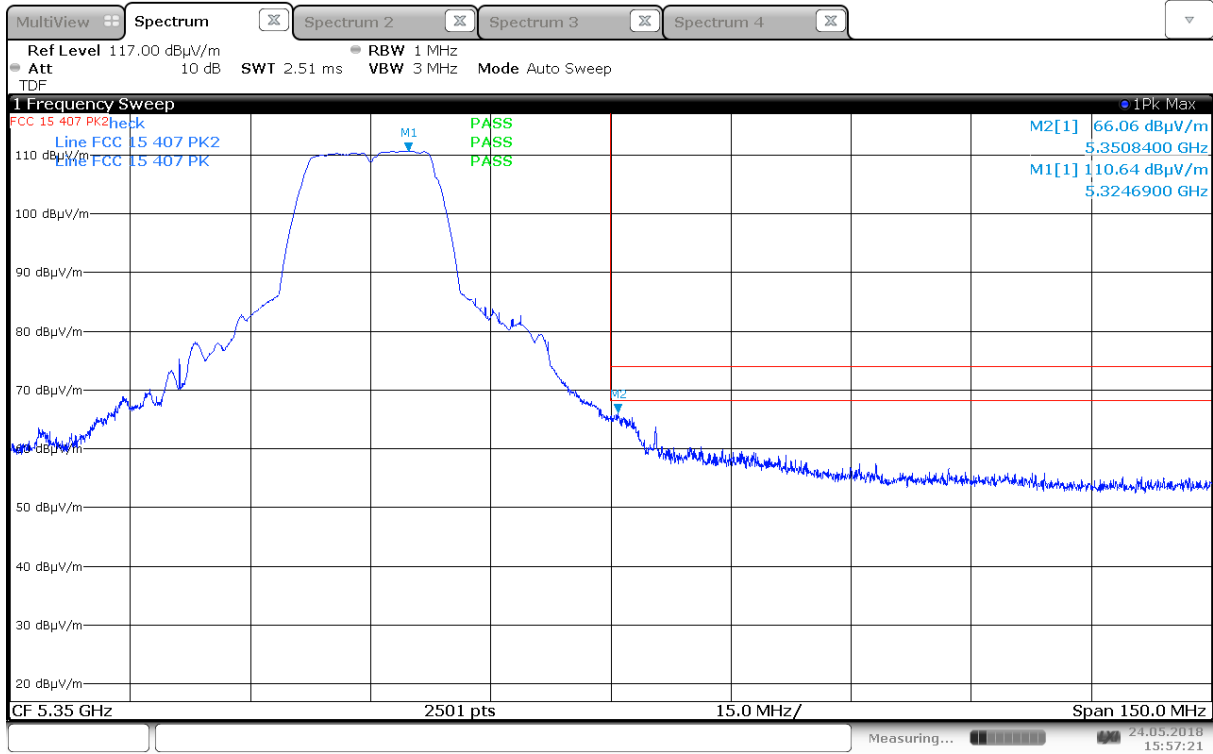
Unwanted Emissions, Band Edge, 5150MHz, ch36, 802.11n MCS0 HT20, MIMO



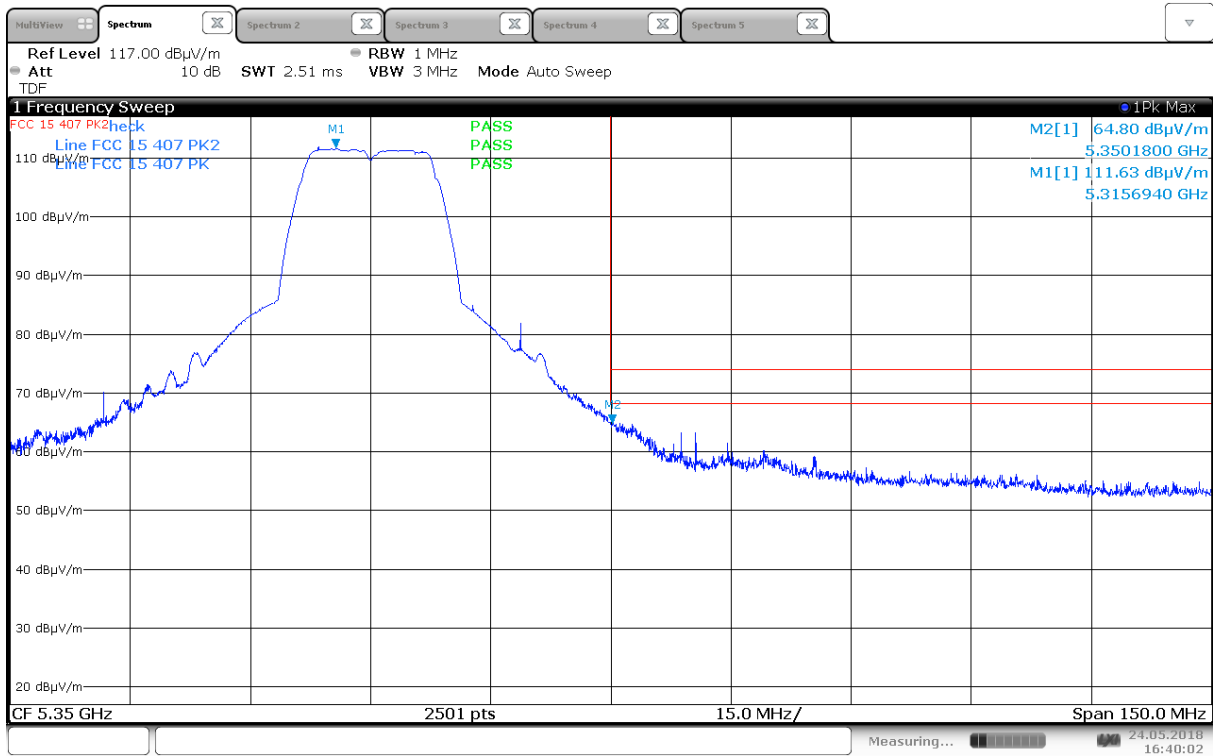
Unwanted Emissions, Band Edge, 5150MHz, ch38, 802.11n MCS0 HT40, MIMO



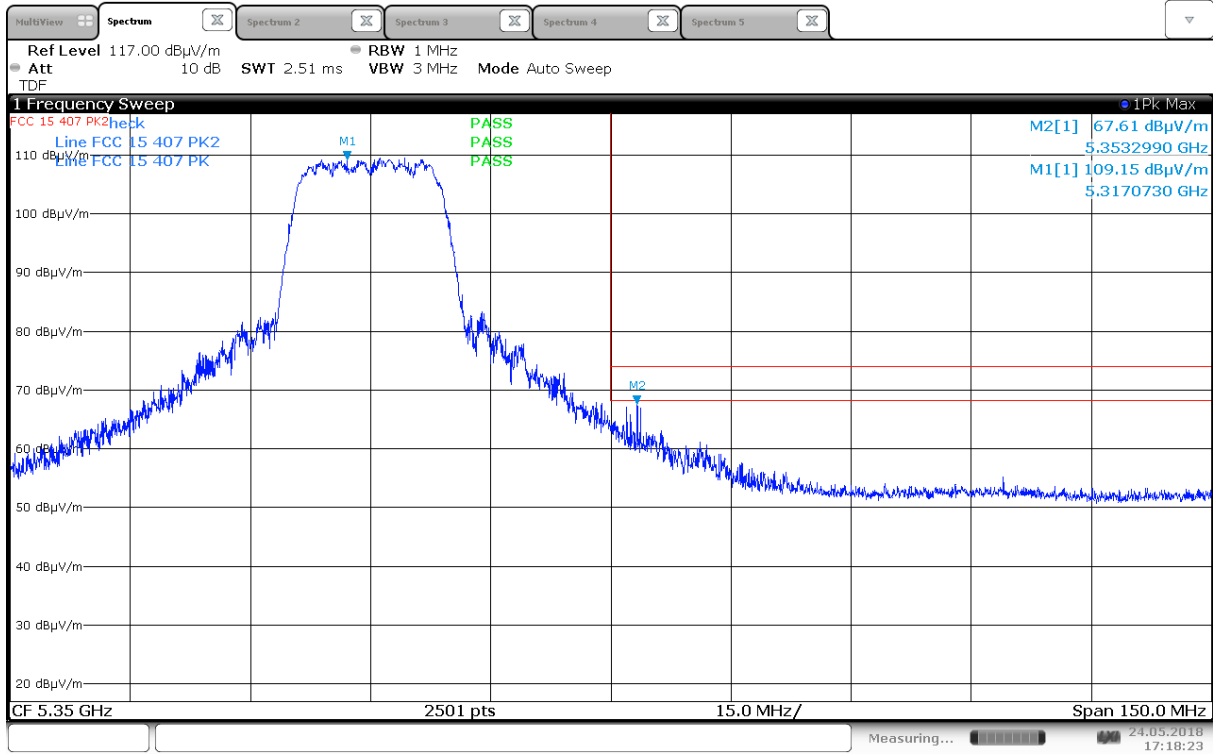
Unwanted Emissions, Band Edge, 5150MHz, ch42, 802.11n MCS0 HT80, MIMO



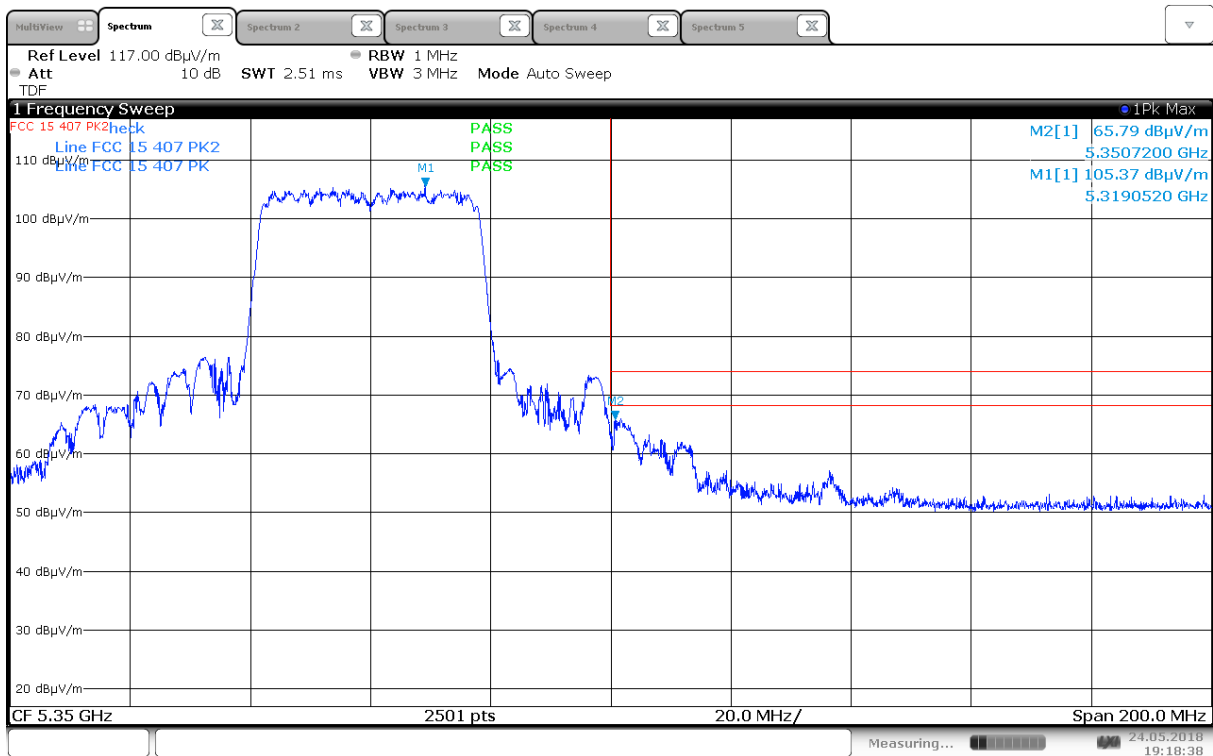
Unwanted Emissions, Band Edge, 5350MHz, ch64, 802.11a 6M, ant 0



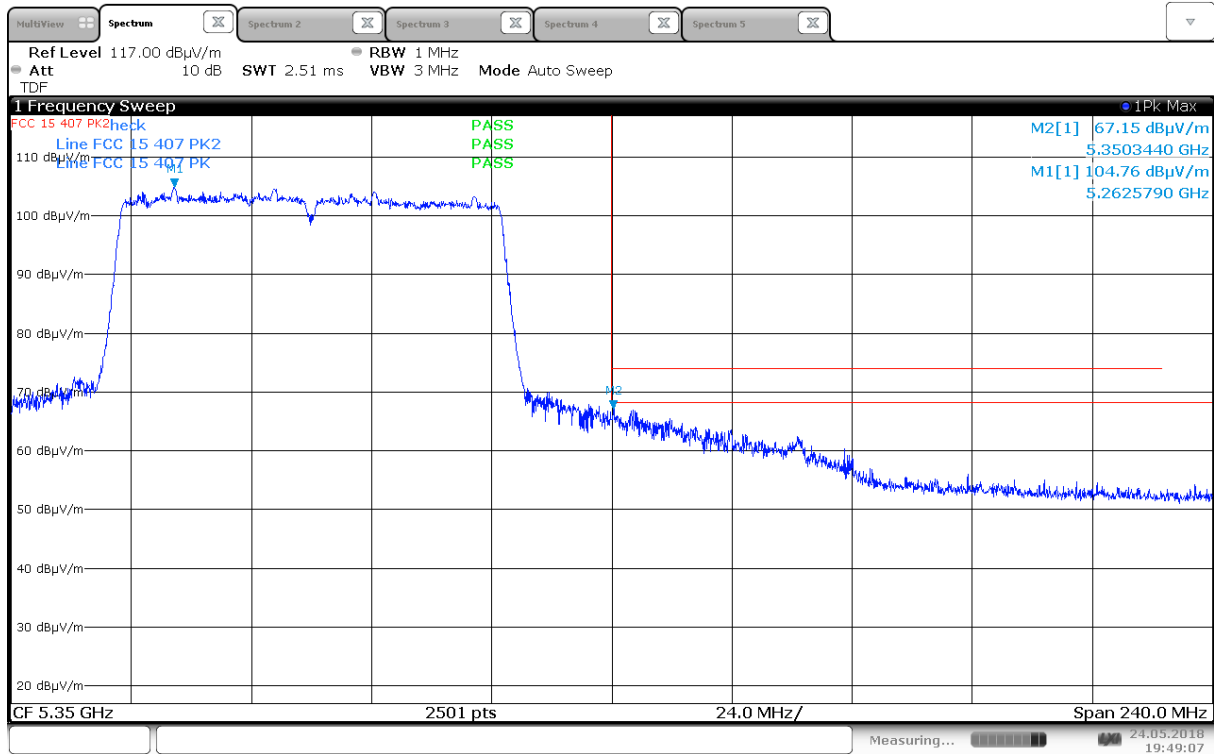
Unwanted Emissions, Band Edge, 5350MHz, ch64, 802.11a 6M, ant 1



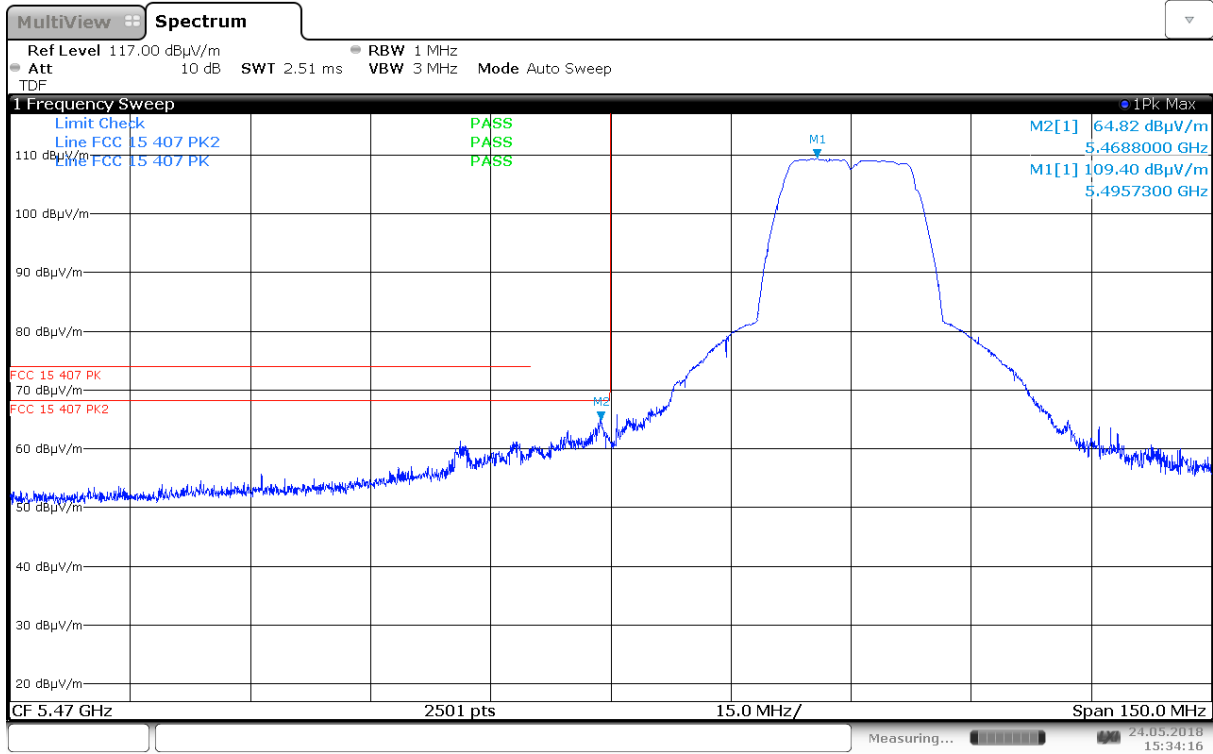
Unwanted Emissions, Band Edge, 5350MHz, ch64, 802.11n MCS0 HT20, MIMO



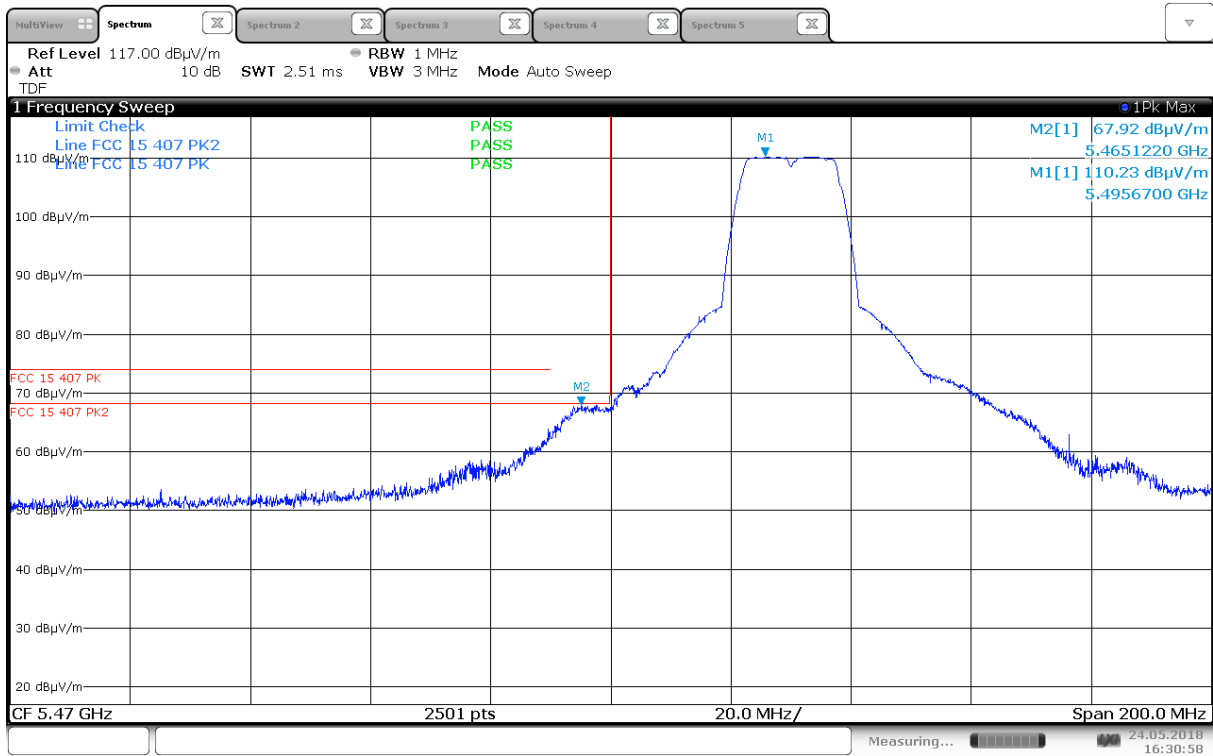
Unwanted Emissions, Band Edge, 5350MHz, ch62, 802.11n MCS0 HT40, MIMO



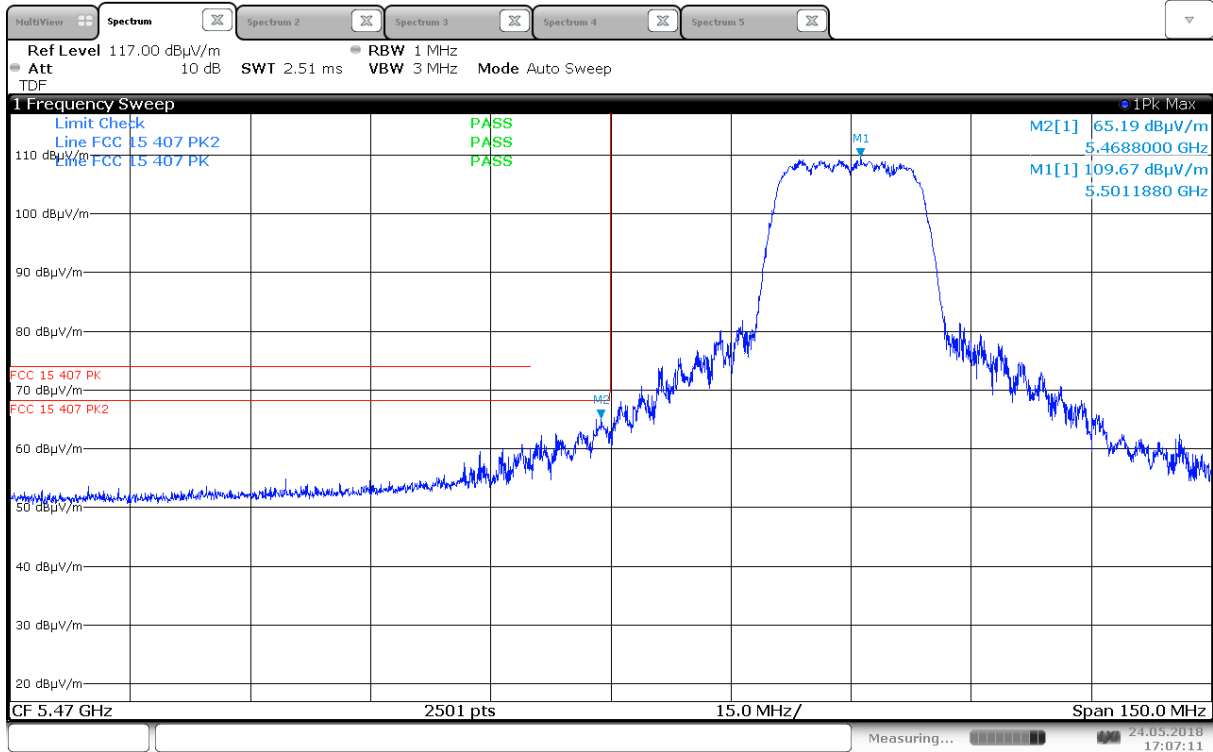
Unwanted Emissions, Band Edge, 5350MHz, ch58, 802.11n MCS0 HT80, MIMO



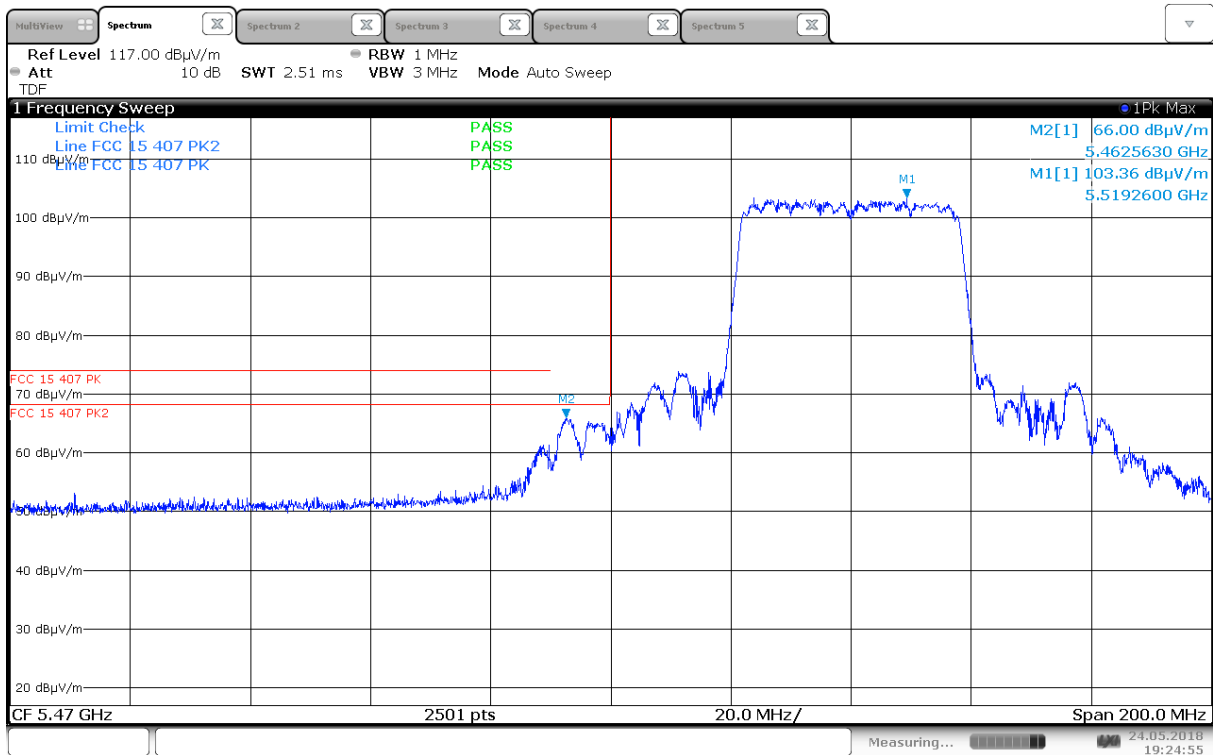
Unwanted Emissions, Band Edge, 5470MHz, ch100, 802.11a 6M, ant 0



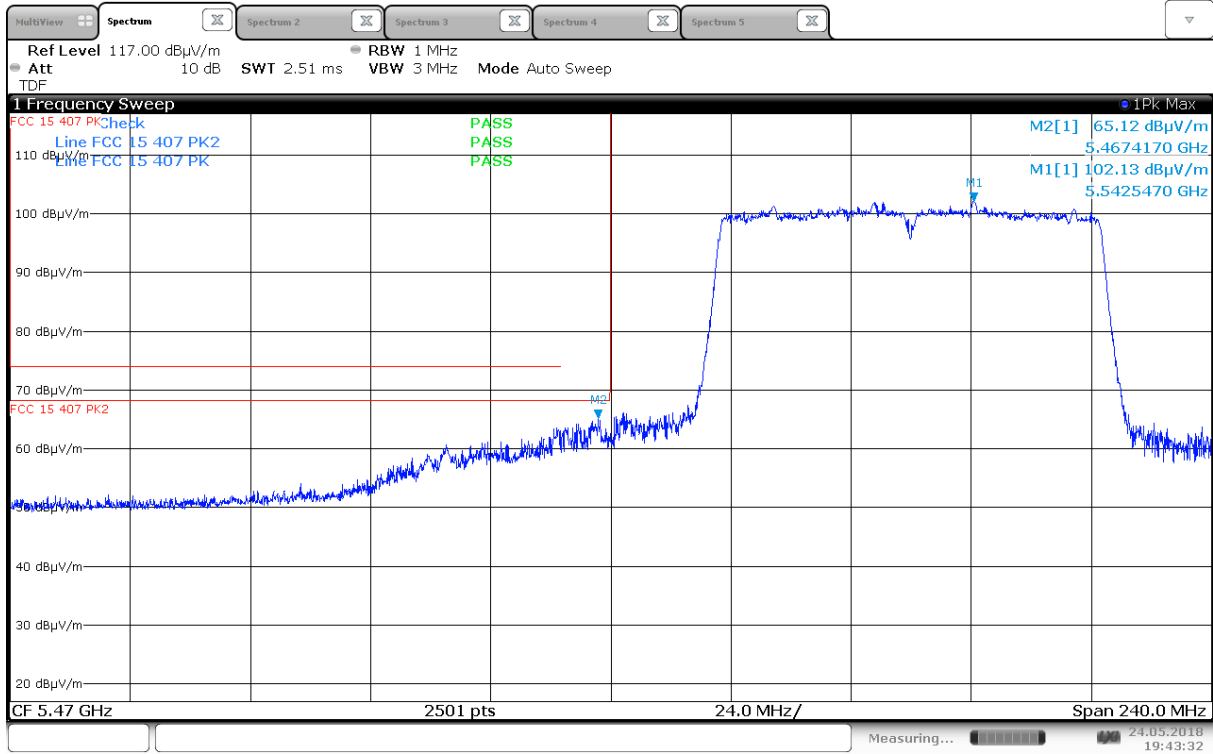
Unwanted Emissions, Band Edge, 5470MHz, ch100, 802.11a 6M, ant 1



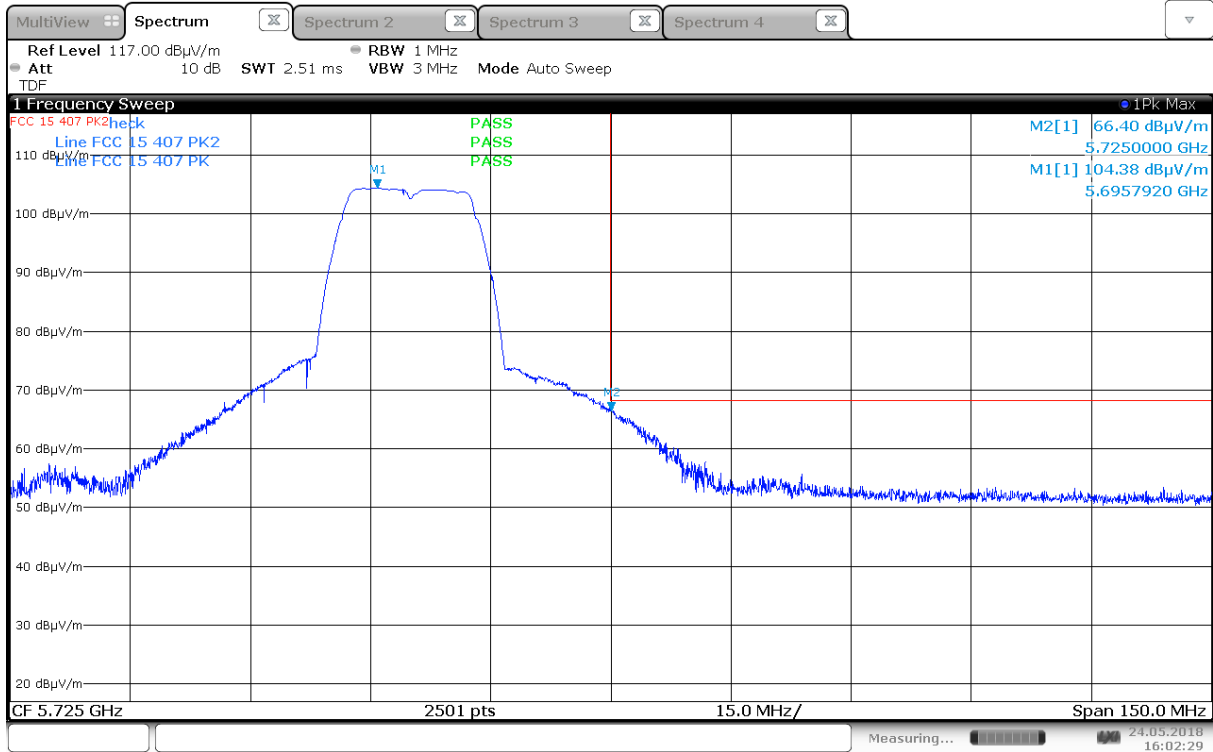
Unwanted Emissions, Band Edge, 5470MHz, ch100, 802.11n MCS0 HT20, MIMO



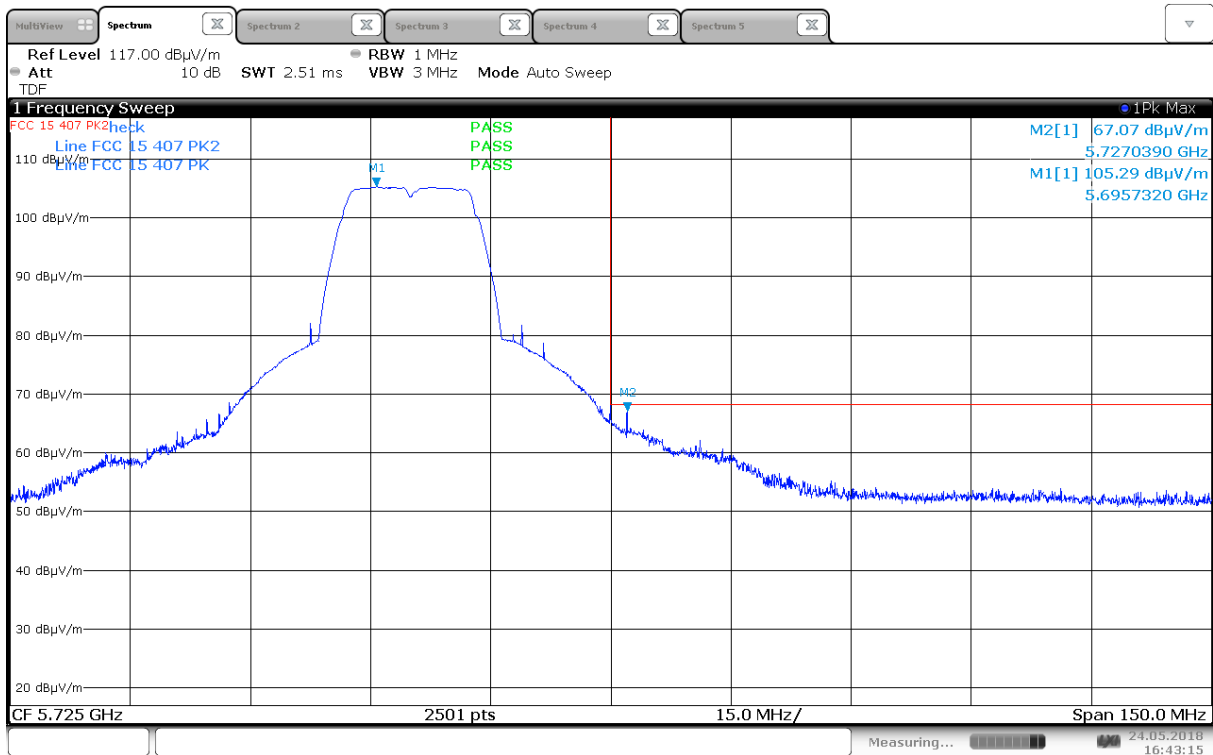
Unwanted Emissions, Band Edge, 5470MHz, ch102, 802.11n MCS0 HT40, MIMO



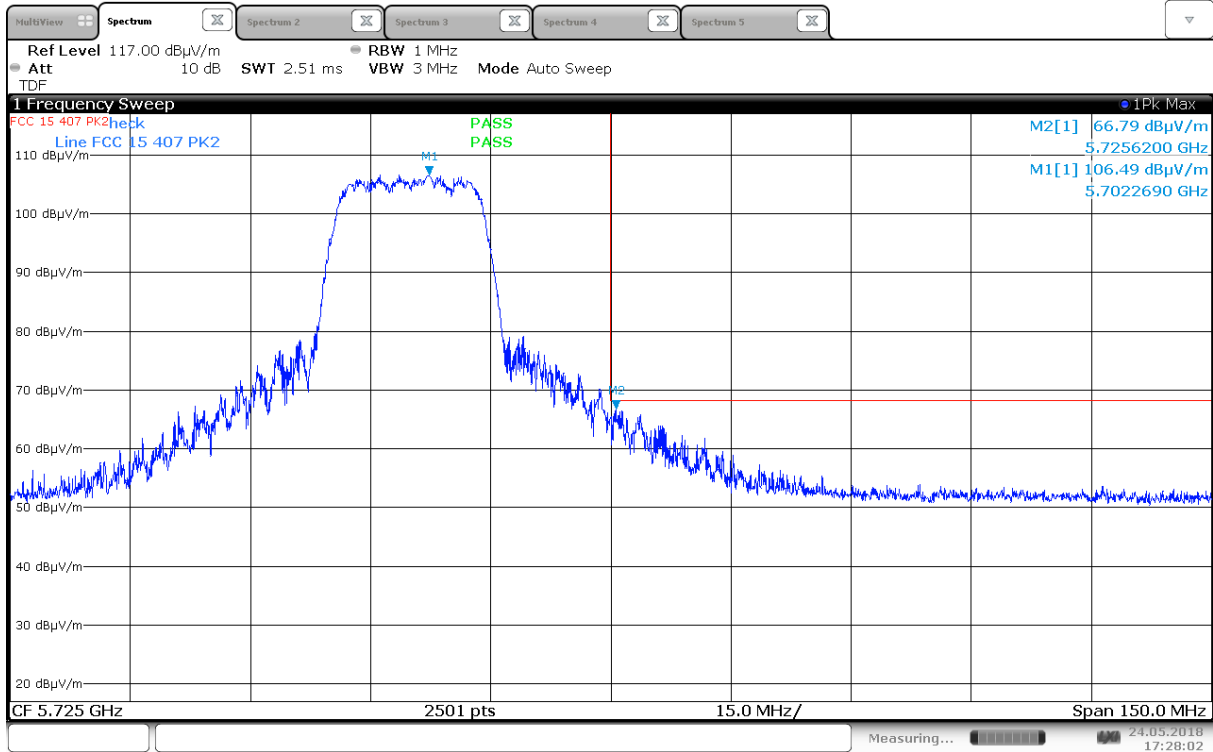
Unwanted Emissions, Band Edge, 5470MHz, ch106, 802.11n MCS0 HT80, MIMO



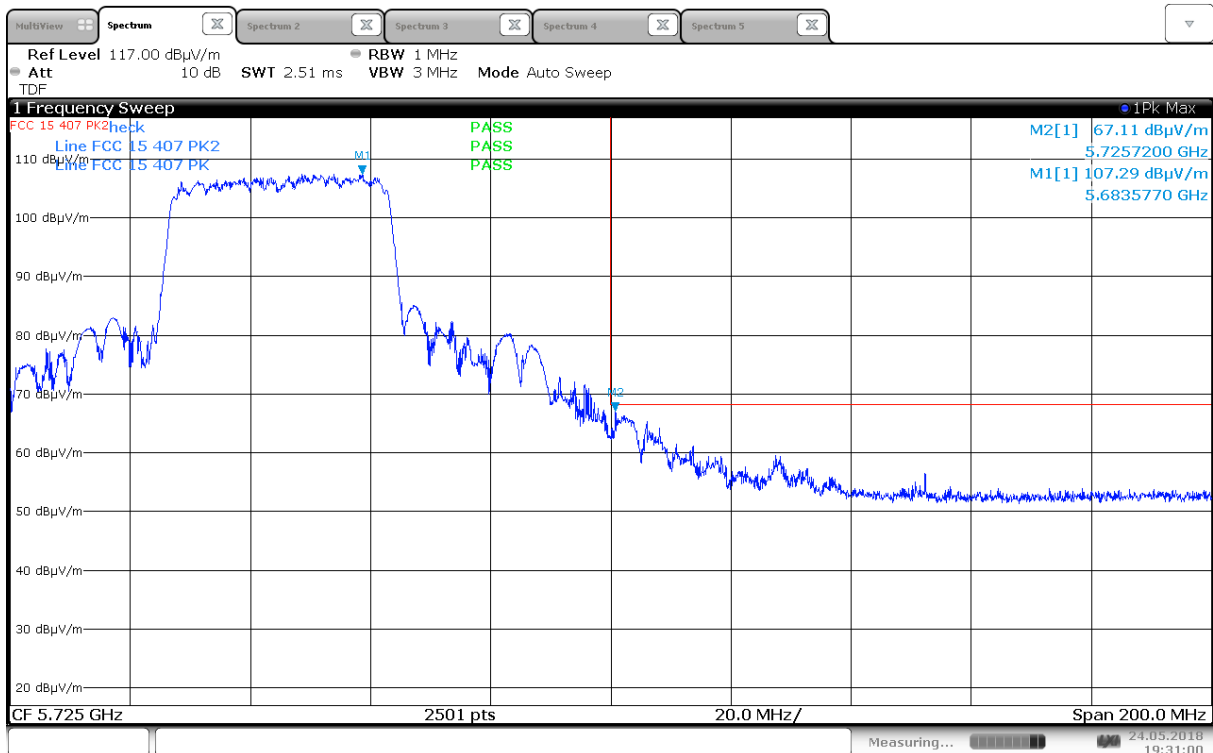
Unwanted Emissions, Band Edge, 5725MHz, ch140, 802.11a 6M, ant 0



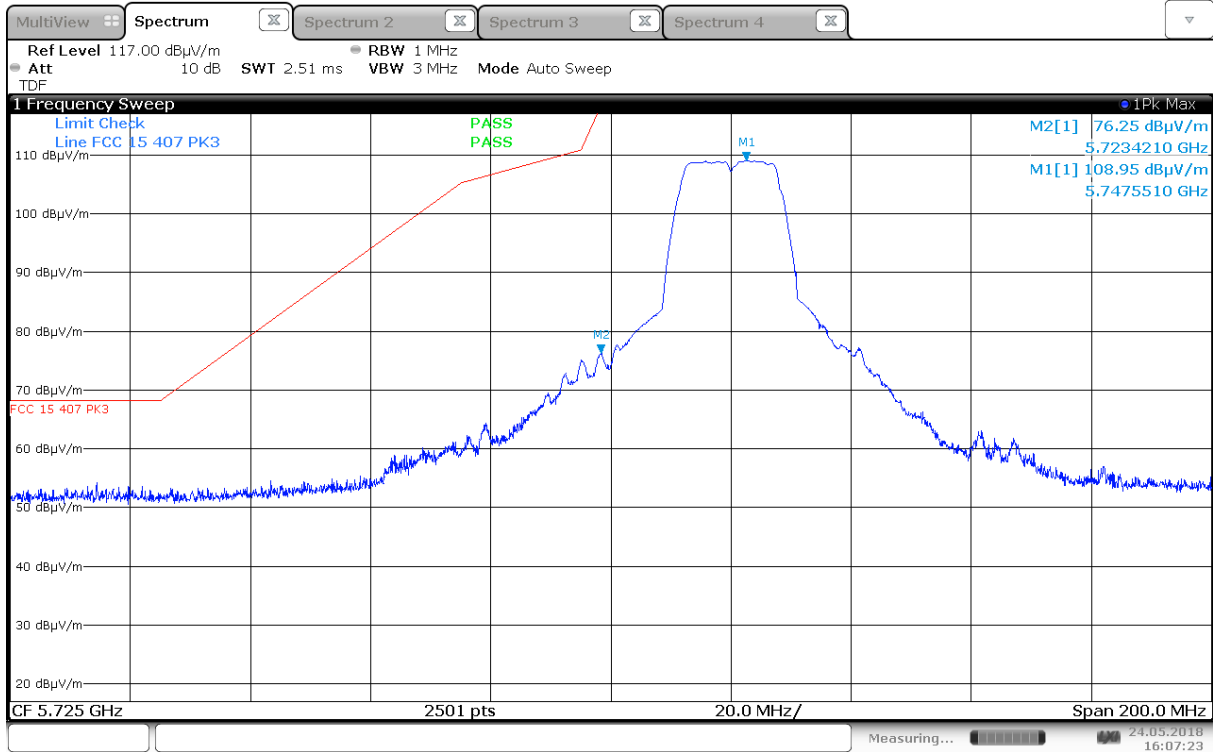
Unwanted Emissions, Band Edge, 5725MHz, ch140, 802.11a 6M, ant 1



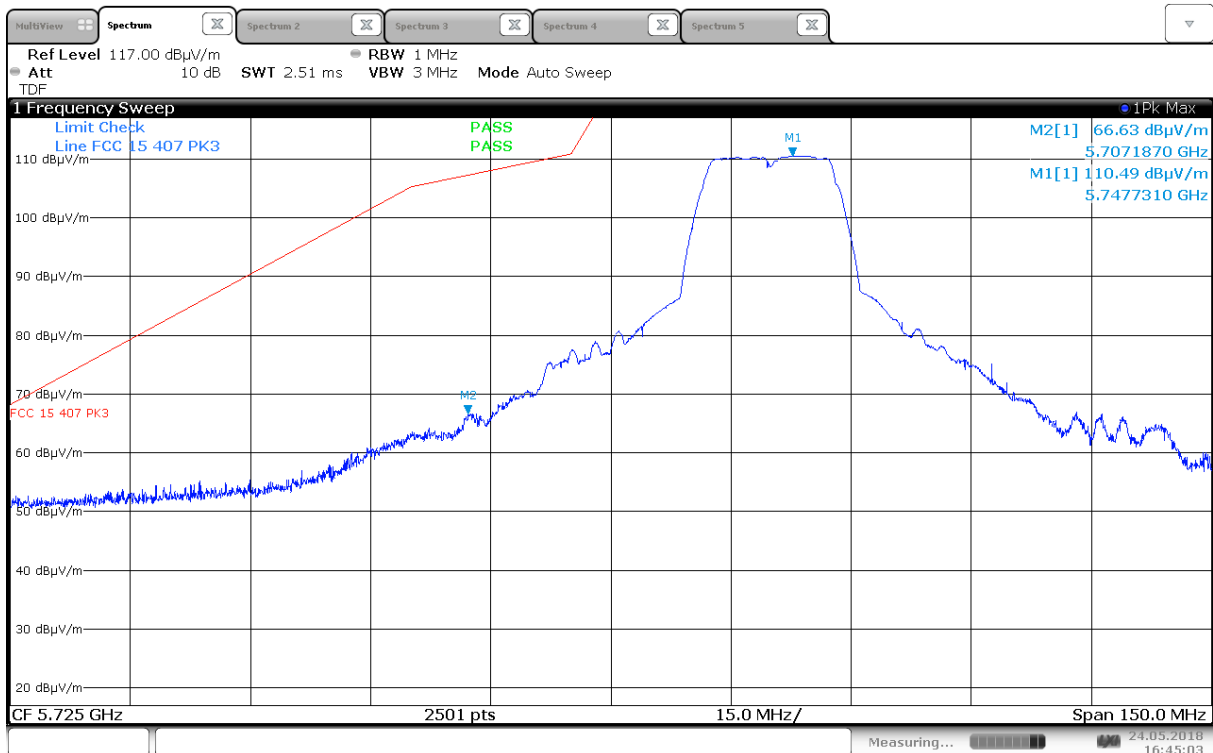
Unwanted Emissions, Band Edge, 5725MHz, ch140, 802.11n MCS0 HT20, MIMO



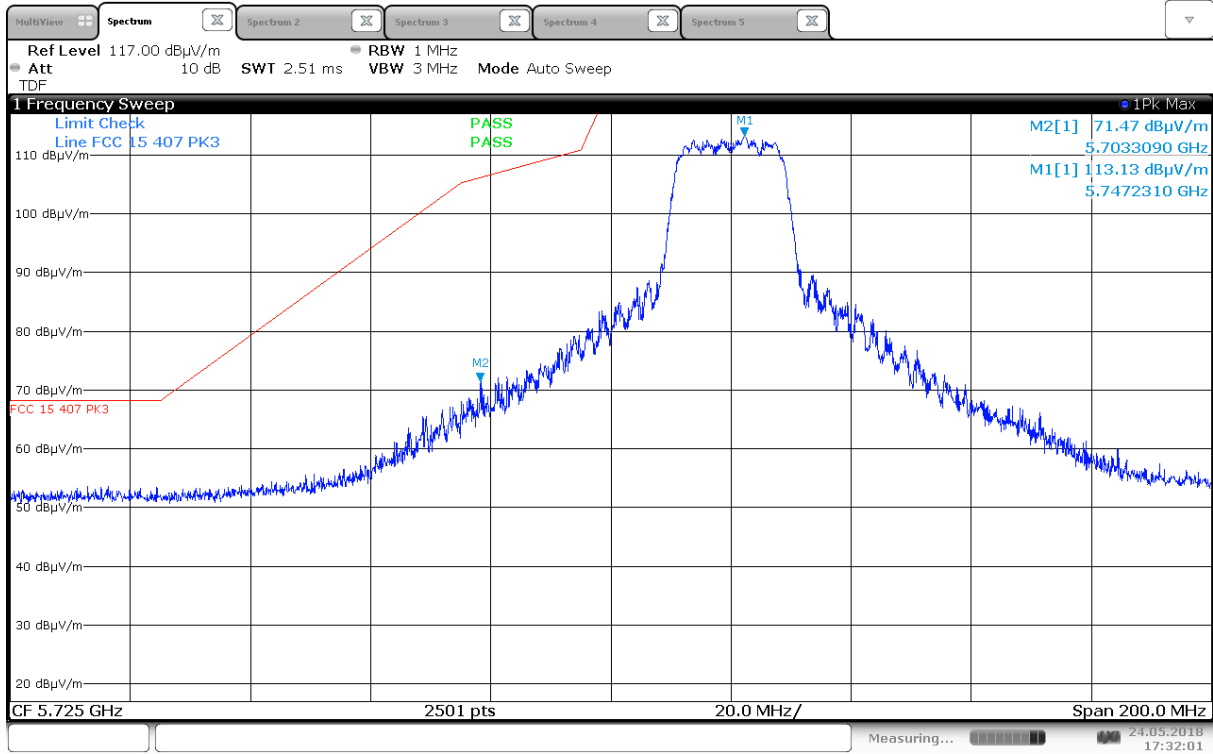
Unwanted Emissions, Band Edge, 5725MHz, ch134, 802.11n MCS0 HT40, MIMO



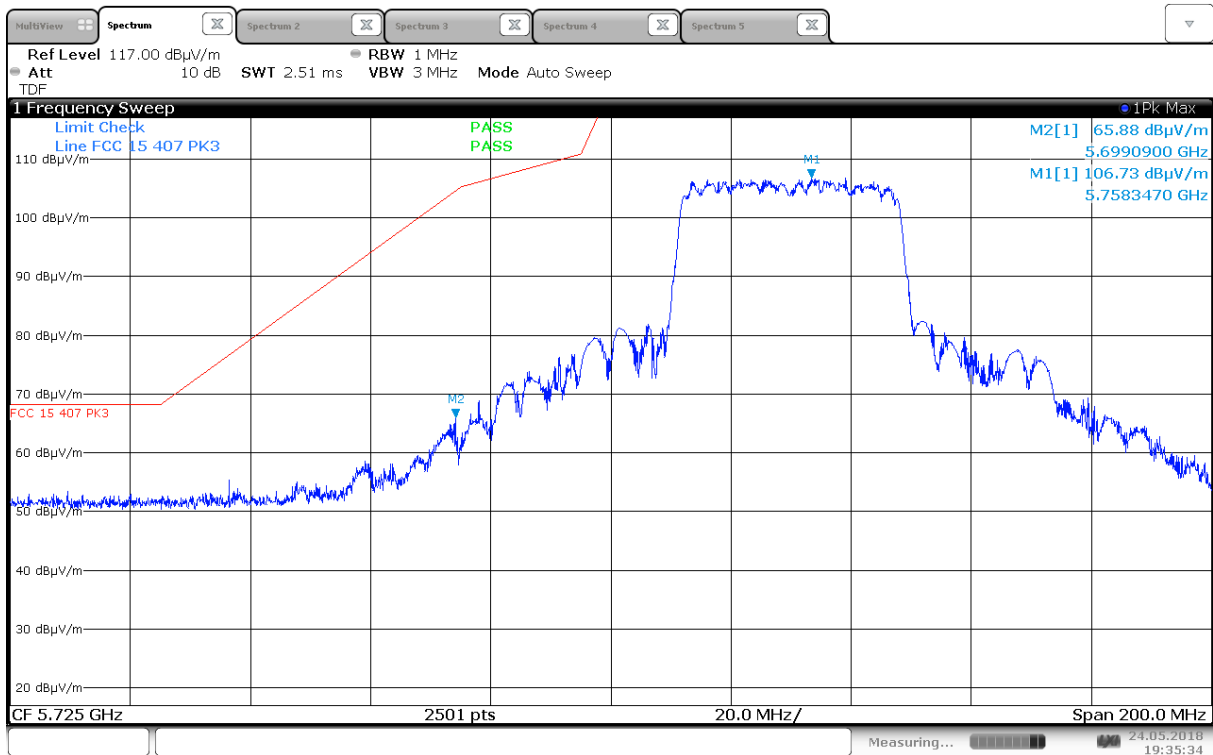
Unwanted Emissions, Band Edge, 5725MHz, ch149, 802.11a 6M, ant 0



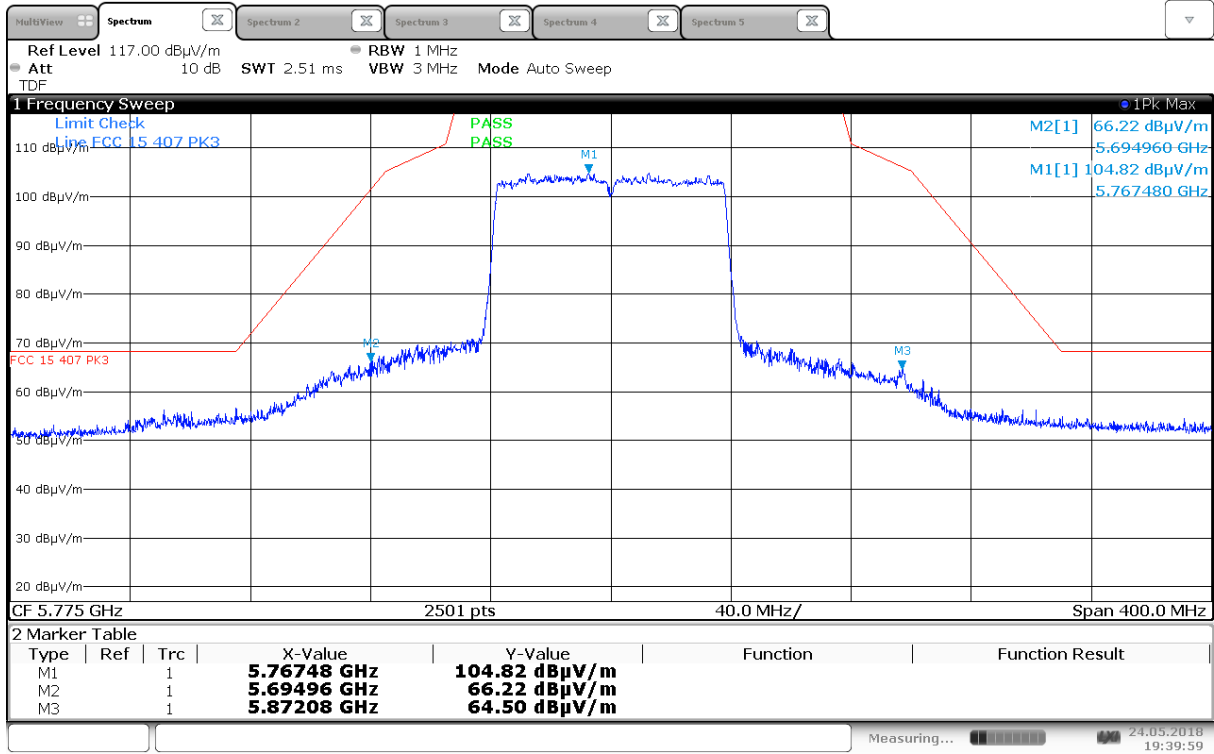
Unwanted Emissions, Band Edge, 5725MHz, ch149, 802.11a 6M, ant 1



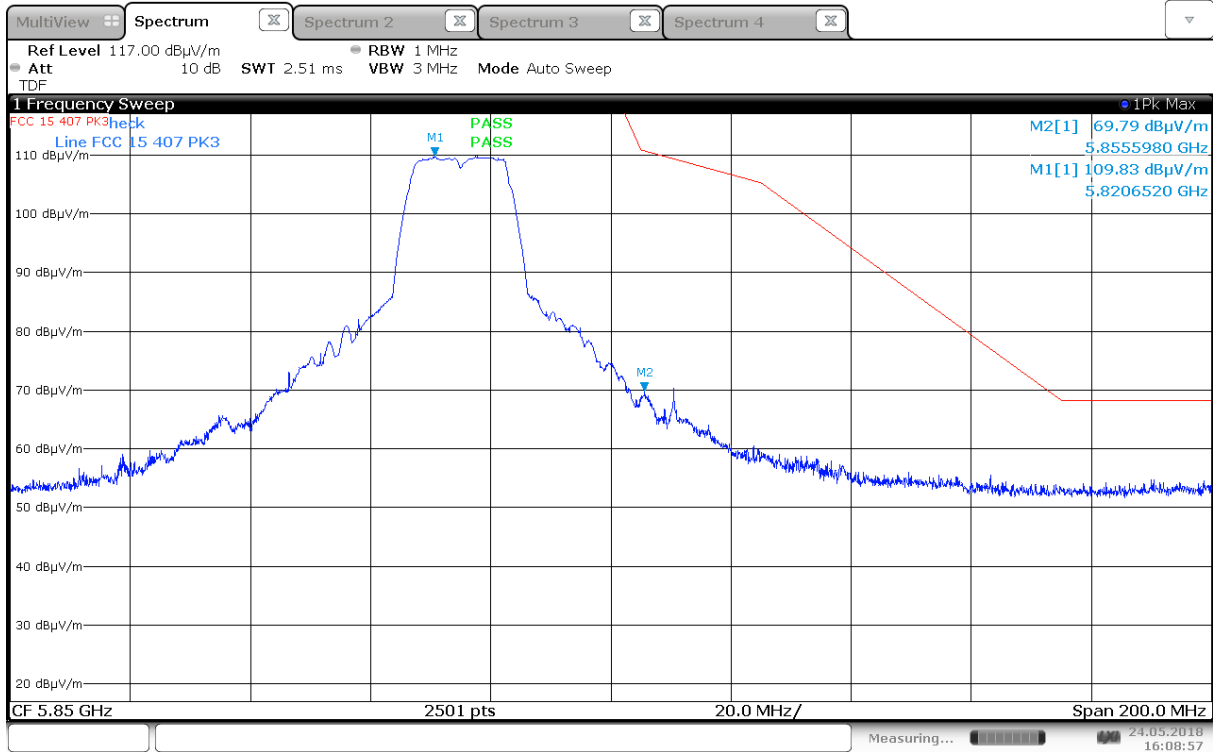
Unwanted Emissions, Band Edge, 5725MHz, ch149, 802.11n MCS0 HT20, MIMO



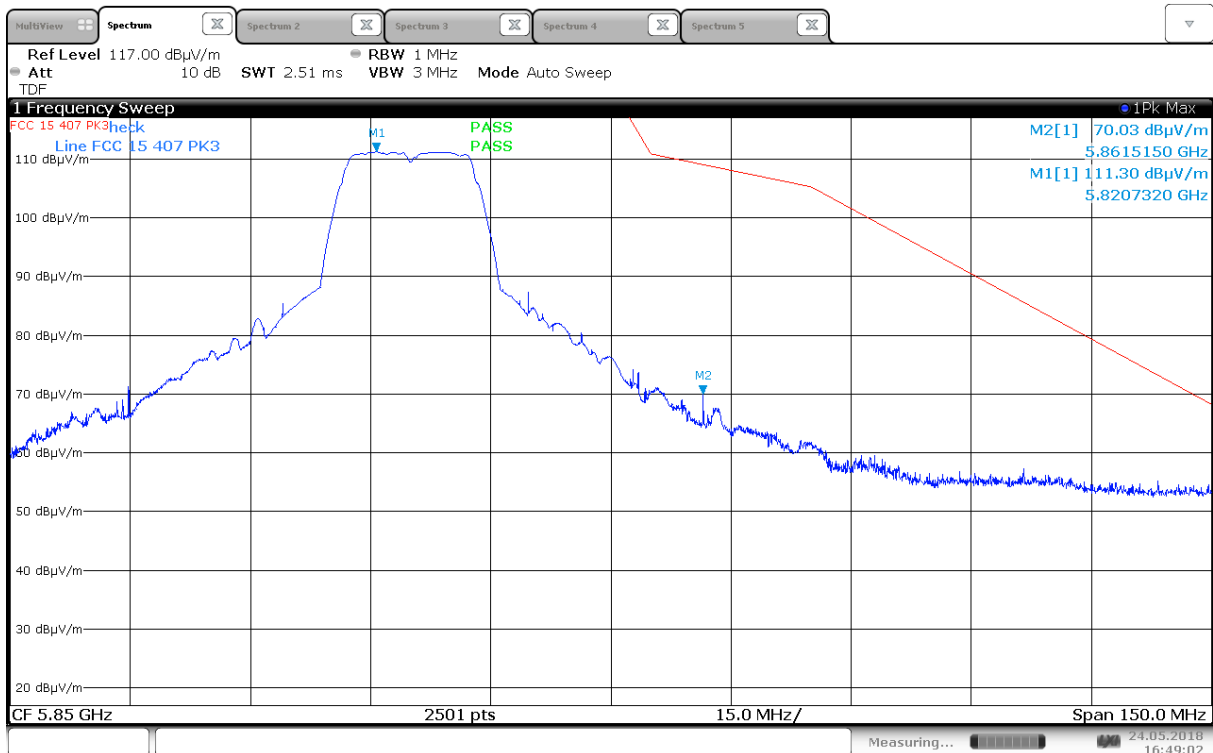
Unwanted Emissions, Band Edge, 5725MHz, ch151, 802.11n MCS0 HT40, MIMO



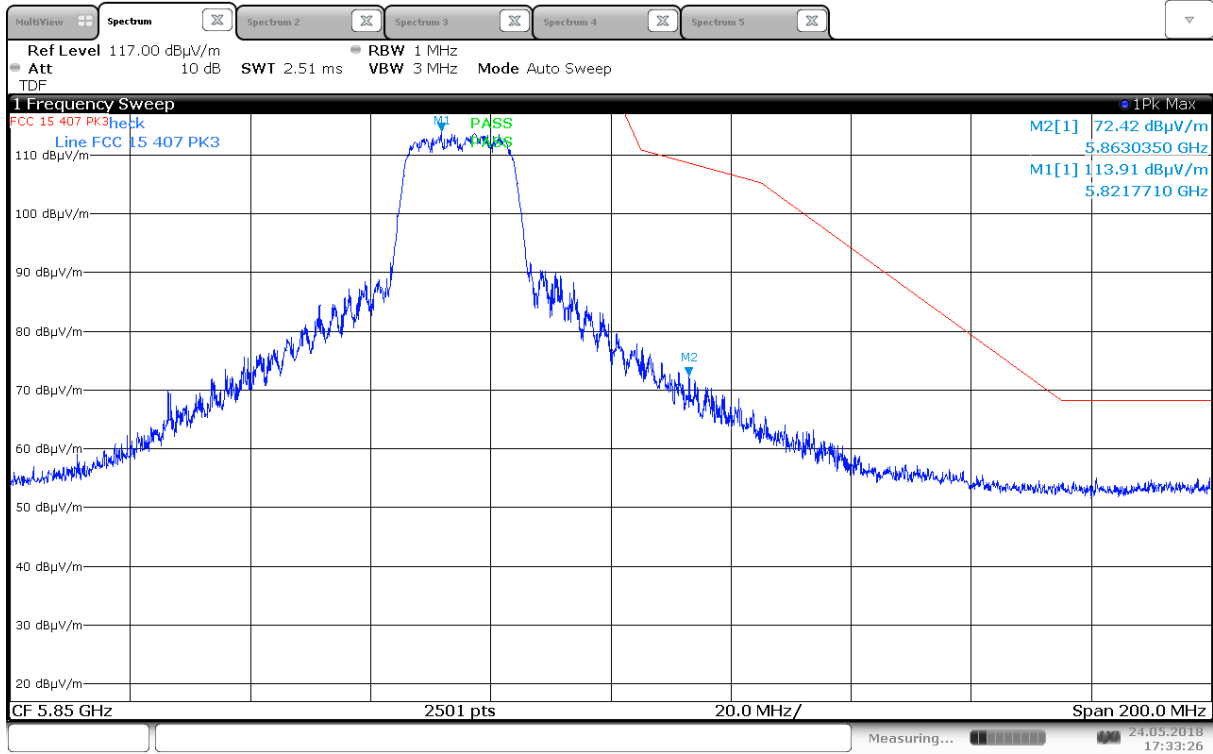
Unwanted Emissions, Band Edge, 5725/5850 MHz, ch155, 802.11n MCS0 HT80, MIMO



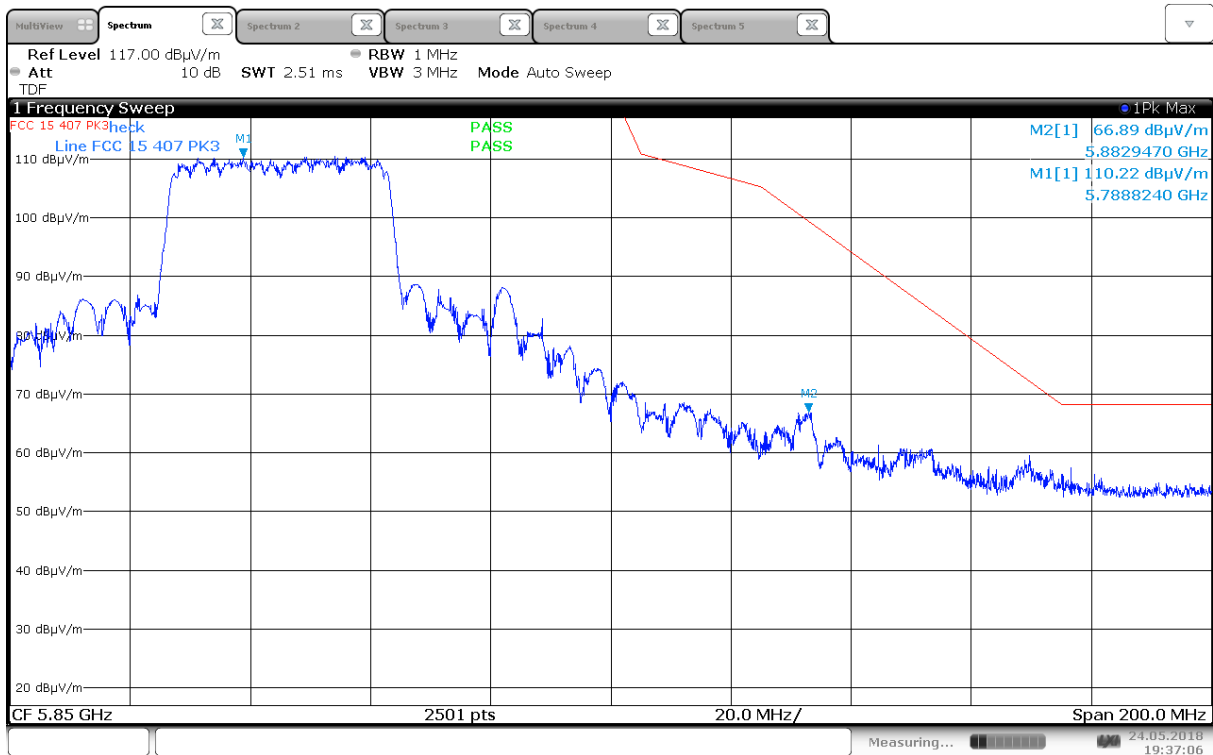
Unwanted Emissions, Band Edge, 5850MHz, ch165, 802.11a 6M, ant 0



Unwanted Emissions, Band Edge, 5850MHz, ch165, 802.11a 6M, ant 1



Unwanted Emissions, Band Edge, 5850MHz, ch165, 802.11n MCS0 HT20, MIMO



Unwanted Emissions, Band Edge, 5850MHz, ch159, 802.11n MCS0 HT40, MIMO

2.7 Restricted Bands of operation

Restricted Bands of operation for FCC and ISSED are defined in FCC Part 15.205 and ISSED RSS-GEN Issue 5 clause 8.10.

No fundamentals are allowed in the restricted bands and all emissions must comply with the limits in FCC 15.209 or RSS-GEN Issue 5, clause 8.9.

FCC (MHz)	ISED (MHz)	FCC (GHz)	ISED (GHz)
0.090-0.110	0.090-0.110	0.96-1.24 1.3-1.427	0.96-1.427
0.495-0.505	0.495-0.505	1.435-1.6265	1.435-1.6265
2.1735-2.1905	2.1735-2.1905	1.6455-1.6465	1.6455-1.6465
	3.020-3.026	1.660-1.710	1.660-1.710
4.125-4.128	4.125-4.128	1.7188-1.7222	1.7188-1.7222
4.17725-4.17775	4.17725-4.17775	2.2-2.3	2.2-2.3
4.20725-4.20775	4.20725-4.20775	2.31-2.39	2.31-2.39
	5.677-5.683	2.4835-2.5	2.4835-2.5
6.215-6.218	6.215-6.218	2.69-2.9	2.655-2.9
6.26775-6.26825	6.26775-6.26825	3.26-3.267	3.26-3.267
6.31175-6.31225	6.31175-6.31225	3.332-3.339	3.332-3.339
8.291-8.294	8.291-8.294	3.3458-3.358	3.3458-3.358
8.362-8.366	8.362-8.366	3.6-4.4	3.5-4.4
8.37625-8.38675	8.37625-8.38675	4.5-5.15	4.5-5.15
8.41425-8.41475	8.41425-8.41475	5.35-5.46	5.35-5.46
12.29-12.293	12.29-12.293	7.25-7.75	7.25-7.75
12.51975-12.52025	12.51975-12.52025	8.025-8.5	8.025-8.5
12.57675-12.57725	12.57675-12.57725	9.0-9.2	9.0-9.2
13.36-13.41	13.36-13.41	9.3-9.5	9.3-9.5
16.42-16.423	16.42-16.423	10.6-12.7	10.6-12.7
16.69475-16.69525	16.69475-16.69525	13.25-13.4	13.25-13.4
16.80425-16.80475	16.80425-16.80475	14.47-14.5	14.47-14.5
25.5-25.67	25.5-25.67	15.35-16.2	15.35-16.2
37.5-38.25	37.5-38.25	17.7-21.4	17.7-21.4
73-74.6	73-74.6	22.01-23.12	22.01-23.12
74.8-75.2	74.8-75.2	23.6-24.0	23.6-24.0
108-121.94 123-138	108-138	31.2-31.8	31.2-31.8
149.9-150.05	149.9-150.05	36.43-36.5	36.43-36.5
156.52475-156.52525	156.52475-156.52525	Above 38.6	Above 38.6
156.7-156.9	156.7-156.9		
162.0125-167.17	162.0125-167.17		
167.72-173.2	167.72-173.2		
240-285	240-285		
322-335.4	322-335.4		
399.9-410	399.9-410		
608-614	608-614		

Frequencies in **Bold** text are specific for FCC or ISSED, all other frequencies are common.

2.8 Radiated Emissions, below 1GHz

FCC 15.205, 15.209

ISED RSS-GEN Issue 5, Clause 8.9

Test Results: Complies

Measurement Data:

Detector: Quasi-Peak

Measuring distance 3m

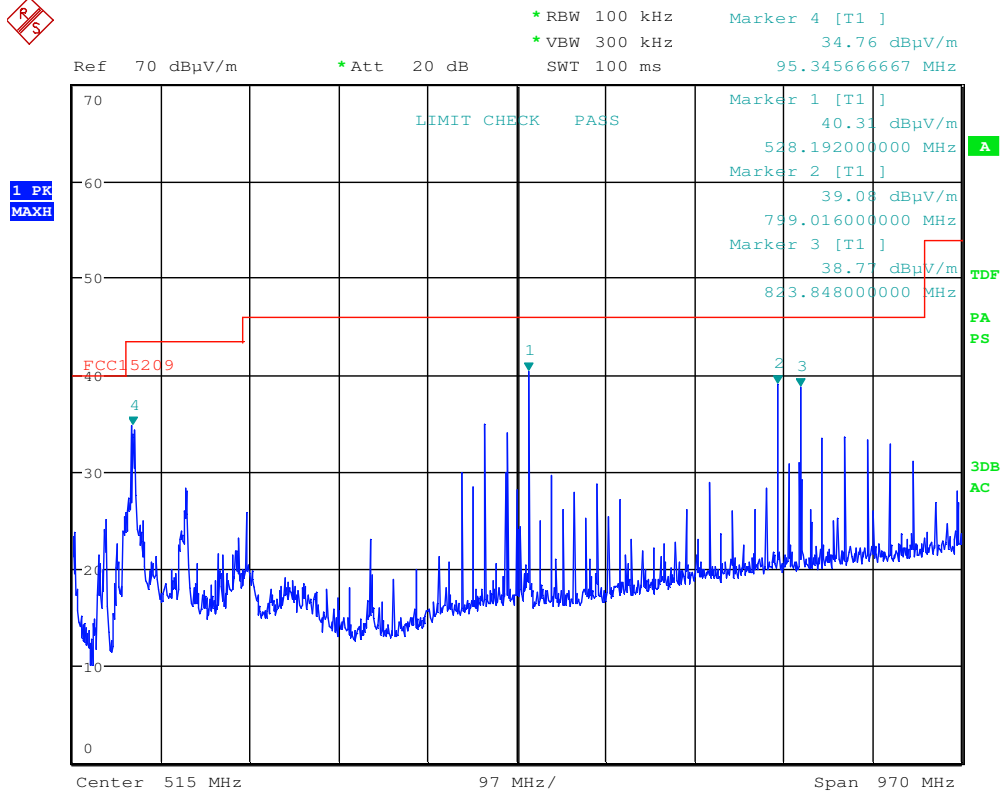
Tested with all all connections active

Radiated Emissions					
Carrier Modulation	Carrier Freq MHz	Measured Freq MHz	Measured value QP dBμV/m @3m	Limit (dBμV/m)	Verdict
Any	Any	32.500	28.0	40.0	Complies
Any	Any	454.660	40.4	46.0	Complies
Any	Any	479.233	40.8	46.0	Complies

See attached plot

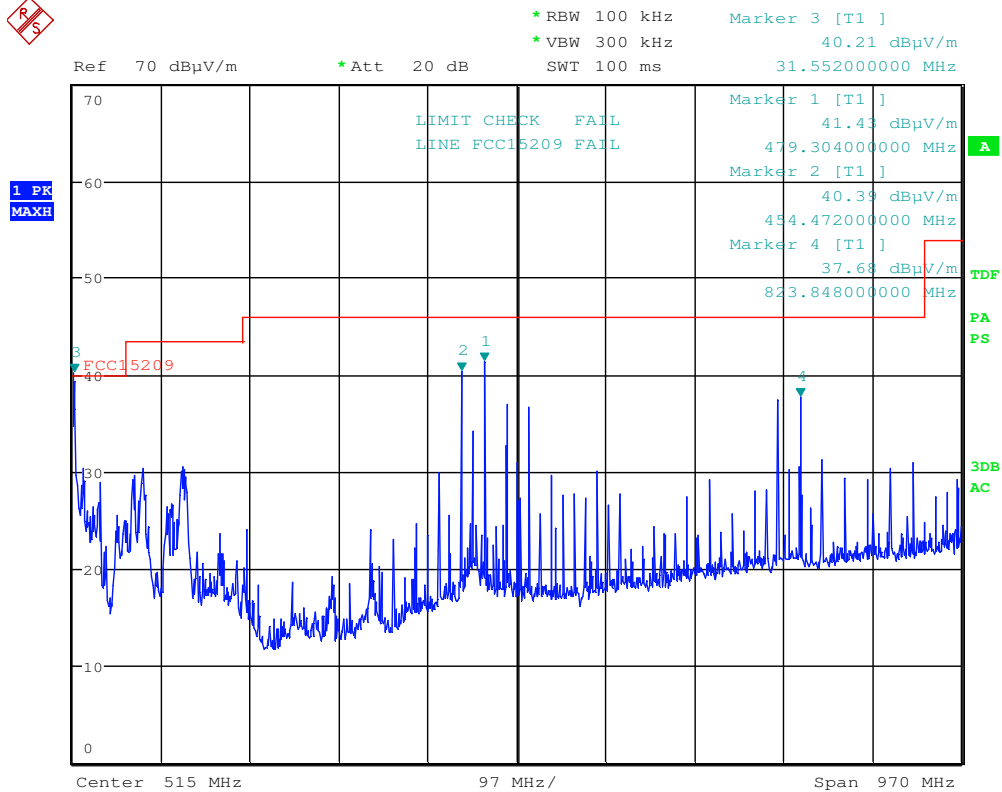
Requirements/Limit

FCC	Part 15.209 @ frequencies defined in §15.205	
ISED	RSS-GEN Issue 5, clause 8.9 @ frequencies defined in clause 8.10	
	Radiated emission limit @3 meters	
Frequency (MHz)	Quasi Peak (µV/m)	Quasi Peak (dBµV/m)
30 – 88	100	40.0
88 – 216	150	43.5
216 – 960	200	46.0
Above 960	500	54.0



Date: 4.JUN.2018 15:12:33

Radiated Emissions, 30 -1000MHz, HP, Peak Detector



Date: 4.JUN.2018 15:22:53

Radiated Emissions, 30 -1000MHz, VP, Peak Detector

2.9 Radiated Emissions, above 1GHz

FCC 15.205, 15.209

ISED RSS-GEN Issue 5, Clause 8.9

Test Results: Complies

Measurement Data:

Measuring distance: 3m (1 – 18 GHz)
1m (18 – 26 GHz)

A pre-scan was performed above 26 GHz and no spurious emissions were detected.

Band Edge Emissions, Restricted Bands, 5150MHz						
Carrier Modulation	Ch. No.	Carrier Freq MHz	Measured value AV dBµV/m @3m	Measured value Peak dBµV/m @3m	Limit (dBµV/m)	Verdict
802.11a, Ant 0	36	5180	46.0	65.2	54/74	Complies
802.11a, Ant 1	36	5180	46.1	65.1	54/74	Complies
802.11n, HT20, MIMO	36	5180	42.8	59.5	54/74	Complies
802.11n, HT40, MIMO	38	5190	51.1	67.8	54/74	Complies
802.11n, HT80, MIMO	42	5210	49.6	63.5	54/74	Complies

Band Edge Emissions, Restricted Bands, 5350MHz						
Carrier Modulation	Ch. No.	Carrier Freq MHz	Measured value AV dBµV/m @3m	Measured value Peak dBµV/m @3m	Limit (dBµV/m)	Verdict
802.11a, Ant 0	64	5320	49.2	66.1	54/74	Complies
802.11a, Ant 1	64	5320	48.8	64.8	54/74	Complies
802.11n, HT20, MIMO	64	5320	45.1	67.6	54/74	Complies
802.11n, HT40, MIMO	62	5310	50.3	65.8	54/74	Complies
802.11n, HT80, MIMO	58	5290	51.4	67.2	54/74	Complies

Band Edge Emissions, Restricted Bands, 5460MHz						
Carrier Modulation	Ch. No.	Carrier Freq MHz	Measured value AV dBµV/m @3m	Measured value Peak dBµV/m @3m	Limit (dBµV/m)	Verdict
802.11a, Ant 0	100	5500	47.3	64.8	54/74	Complies
802.11a, Ant 1	100	5500	46.0	67.9	54/74	Complies
802.11n, HT20, MIMO	100	5500	44.2	65.2	54/74	Complies
802.11n, HT40, MIMO	102	5510	43.7	66.0	54/74	Complies
802.11n, HT80, MIMO	106	5530	50.0	65.1	54/74	Complies

Radiated Emissions in Restricted Bands						
Carrier Modulation	Carrier Freq MHz	Measured Freq MHz	Measured value Peak dBµV/m @3m	Measured value AV dBµV/m @3m	Limit (dBµV/m)	Verdict
802.11a, 6M, Ch1	5180	15540	56.7	44.3	74/54	Complies
802.11a, 6M, Ch1	5200	15600	58.1	43.6	74/54	Complies
802.11a, 6M, Ch1	5240	15720	56.6	42.2	74/54	Complies
802.11a, 6M, Ch1	5260	15780	67.0	52.5	74/54	Complies
802.11a, 6M, Ch1	5300	15900	66.8	53.2	74/54	Complies
802.11a, 6M, Ch1	5320	15960	67.6	53.5	74/54	Complies
802.11a, 6M, Ch0	5180	17585	< 56	44.1	74/54	Complies
All	Any	all others	< -54	< -44	74/54	Complies

Average Detector values for emissions from the radio are corrected for Duty Cycle as measured in UL report no. 11526345-E4V3. Calculated Duty Cycle Factor (-20xlog(DC)) is added to the measured values.

Emissions not from the radio are not corrected for duty cycle.

All non-Harmonics are below the average limit, even when measured with Peak Detector.

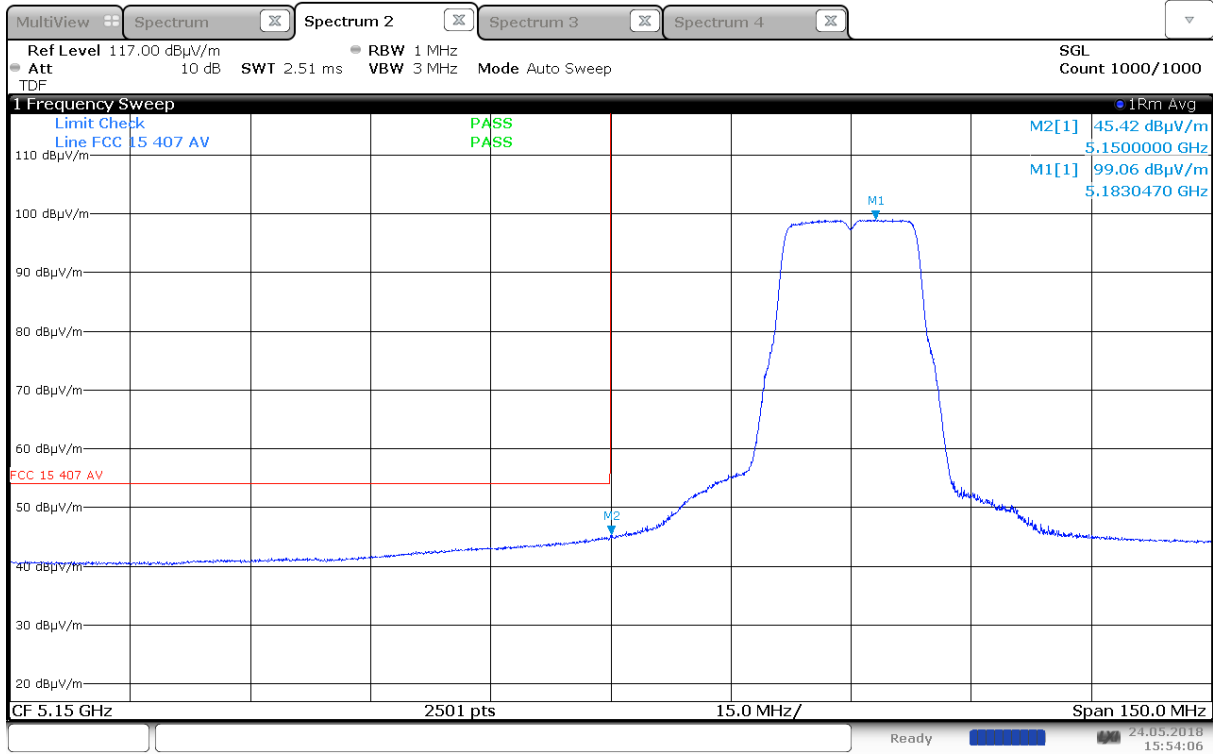
Only harmonics that fall in the restricted bands (ref. §15.205) have been checked.

Antenna factor, amplifier gain and cable loss are included in Spectrum Analyzer "Transducer factor".

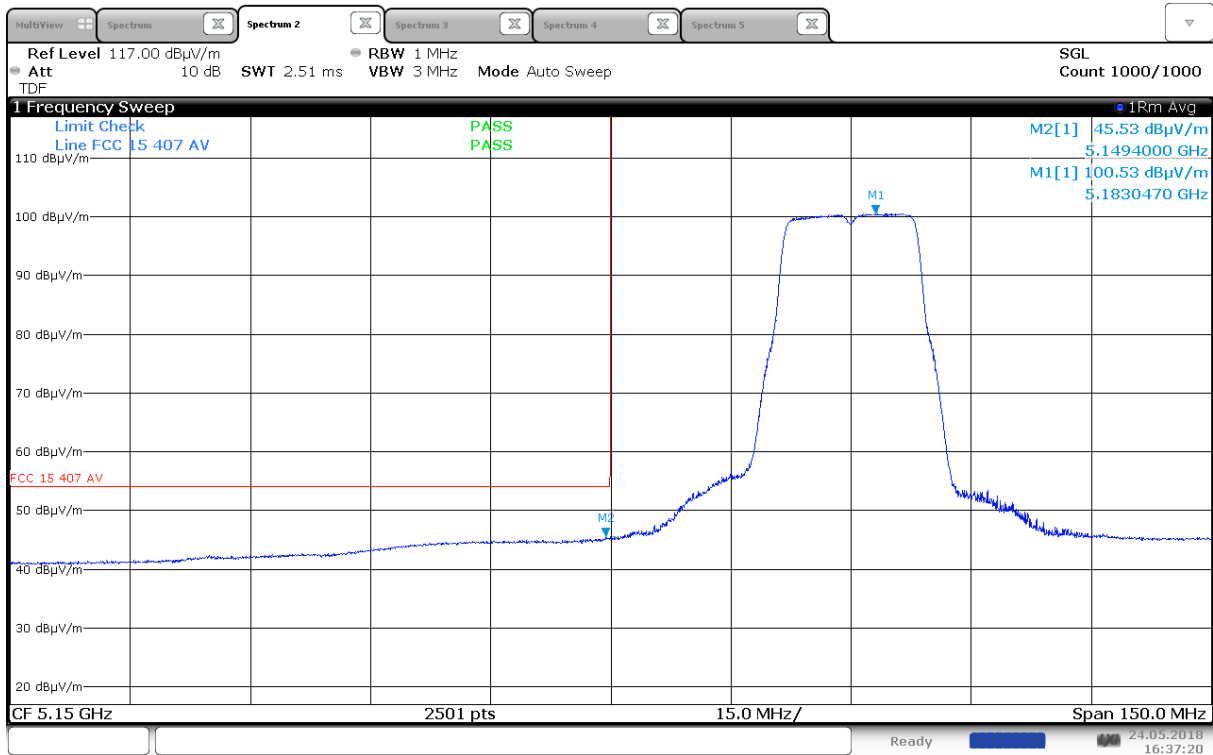
See attached plots.

Limits

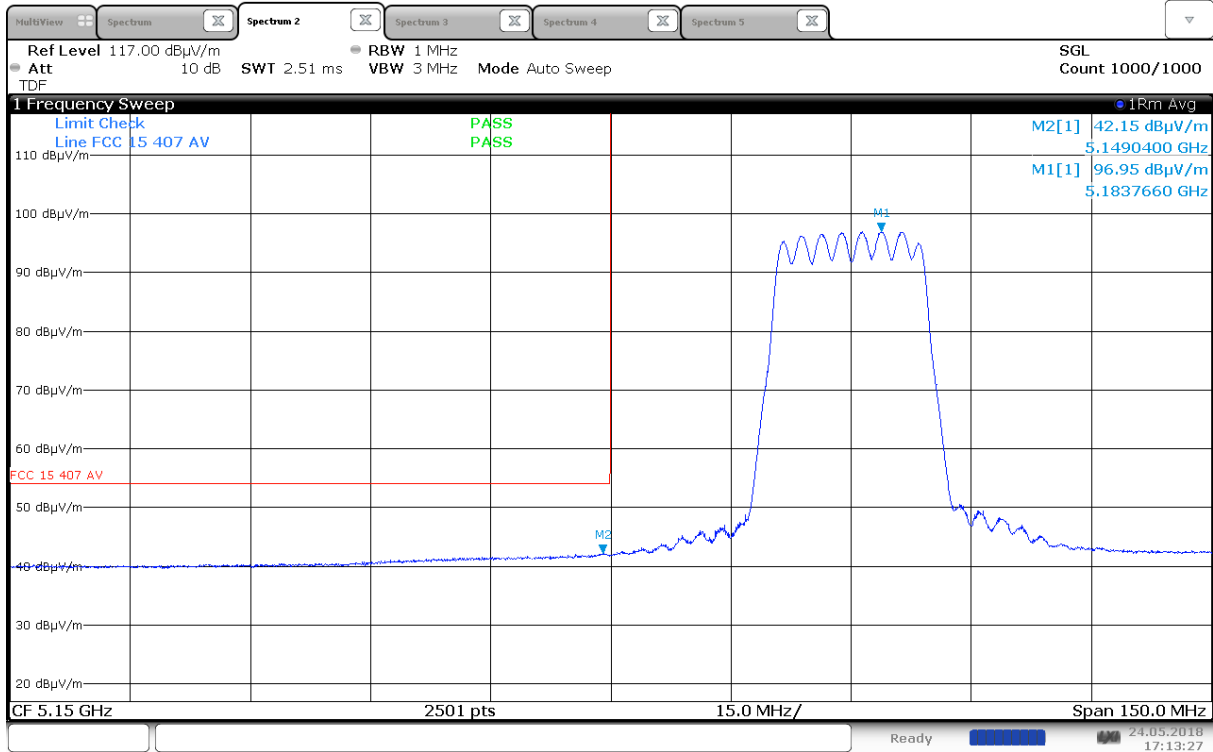
FCC	Part 15.209 @ frequencies defined in §15.205	
ISED	RSS-GEN Issue 5, Clause 8.9 @ frequencies defined in clause 8.10	
	Radiated emission limit @3 meters	
Frequency (MHz)	AV (dBµV/m)	Peak (dBµV/m)
Above 1 GHz	54.0	74.0



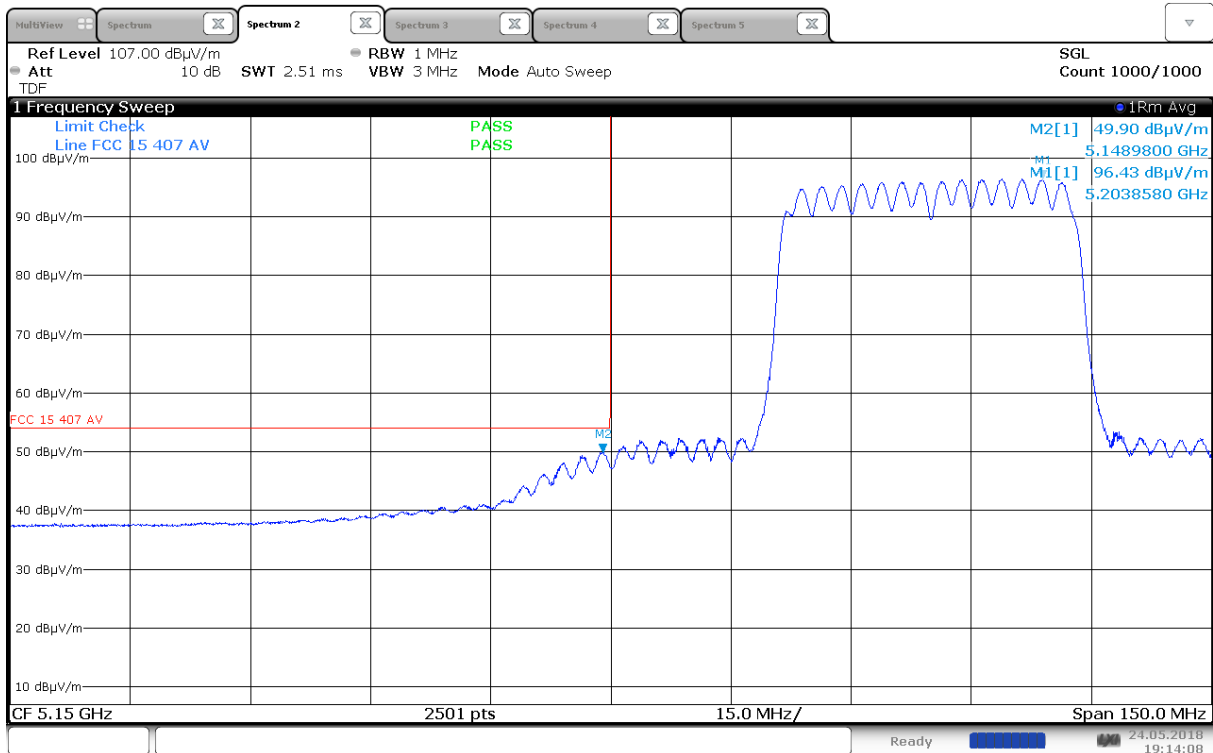
Band Edge RMS, < 5150MHz, 5180MHz, 802.11a 6Mb, Ant 0



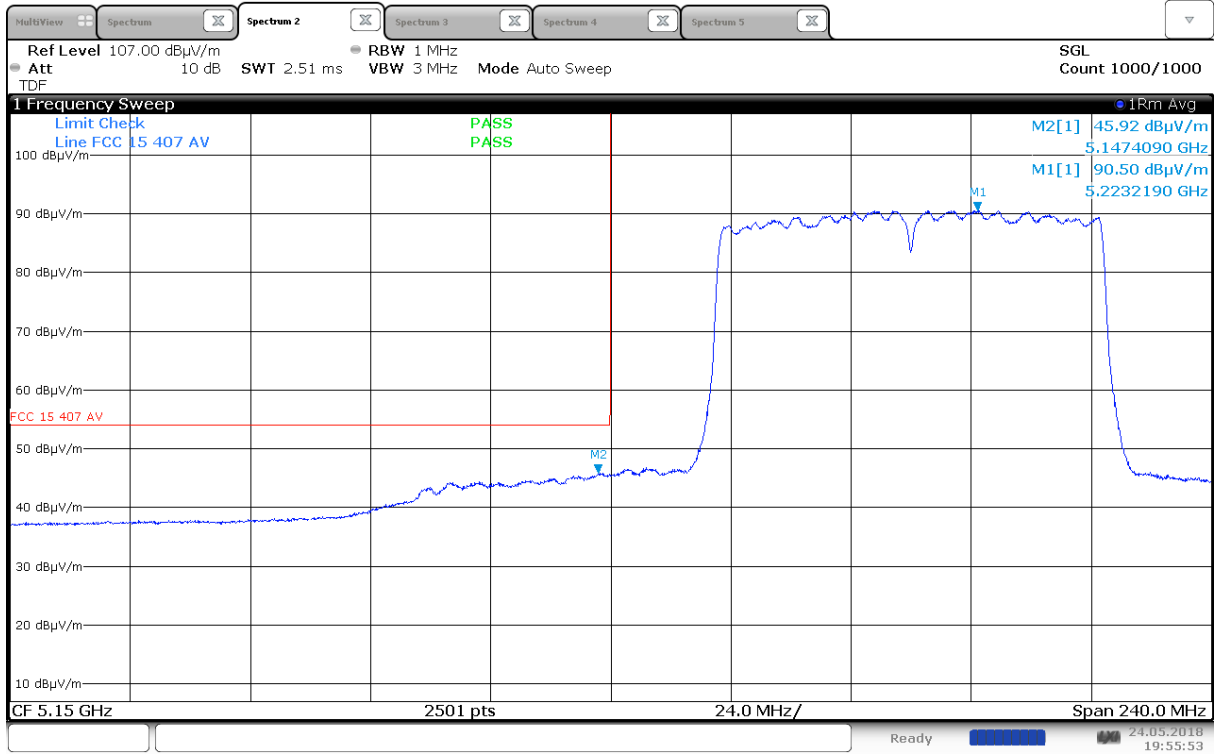
Band Edge RMS, < 5150MHz, 5180MHz, 802.11a 6Mb, Ant 1



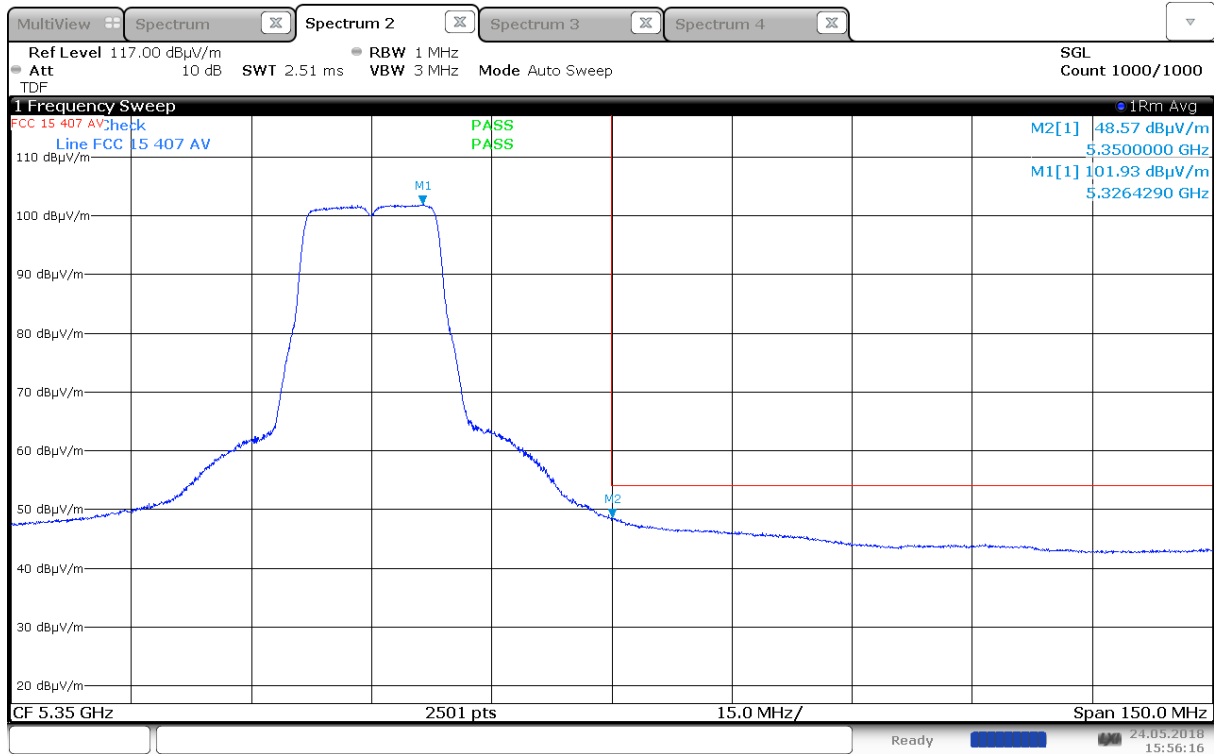
Band Edge RMS, < 5150MHz, 5180MHz, 802.11n HT20, MIMO



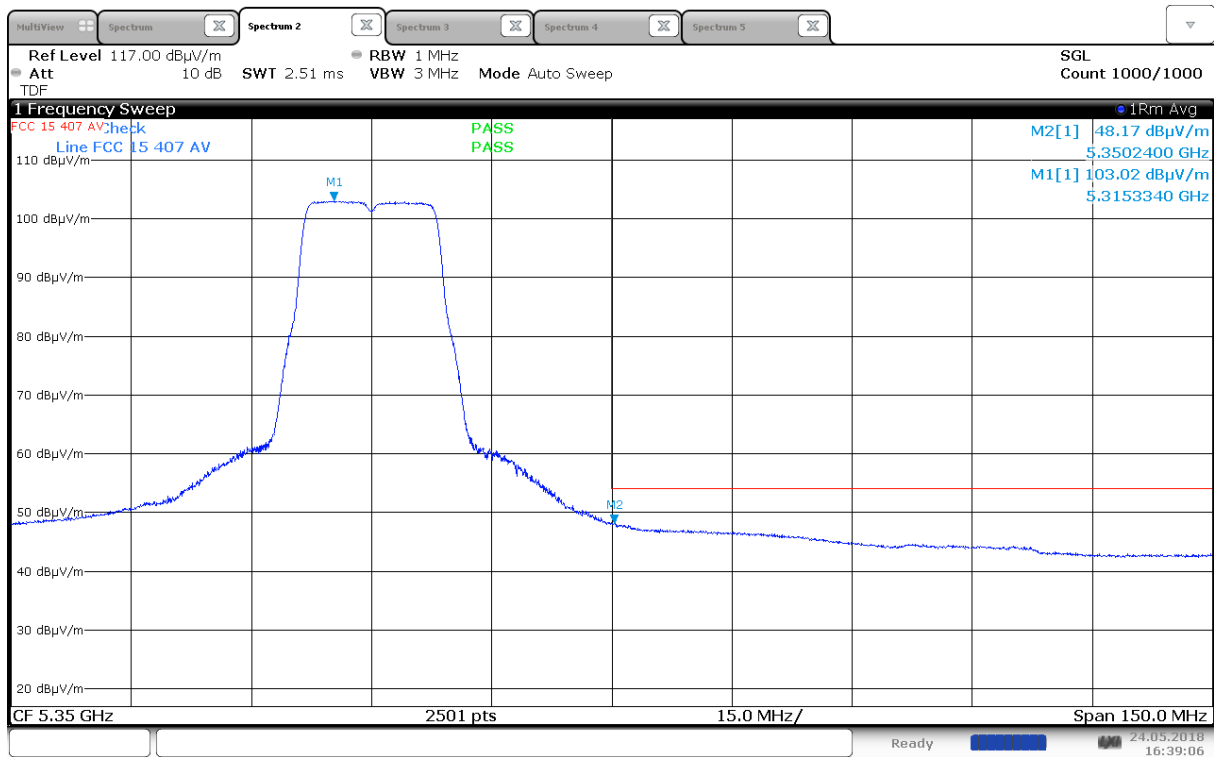
Band Edge RMS, < 5150MHz, 5190MHz, 802.11n HT40, MIMO



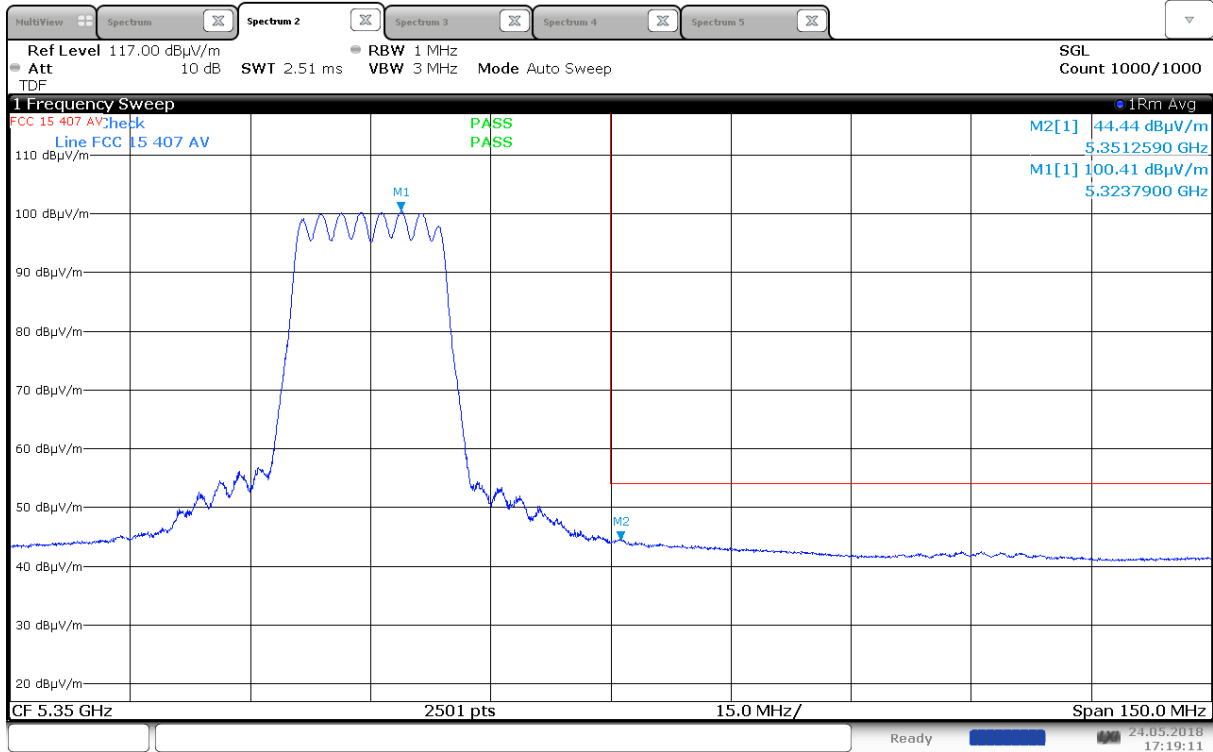
Band Edge RMS, < 5150MHz, 5210MHz, 802.11n HT80, MIMO



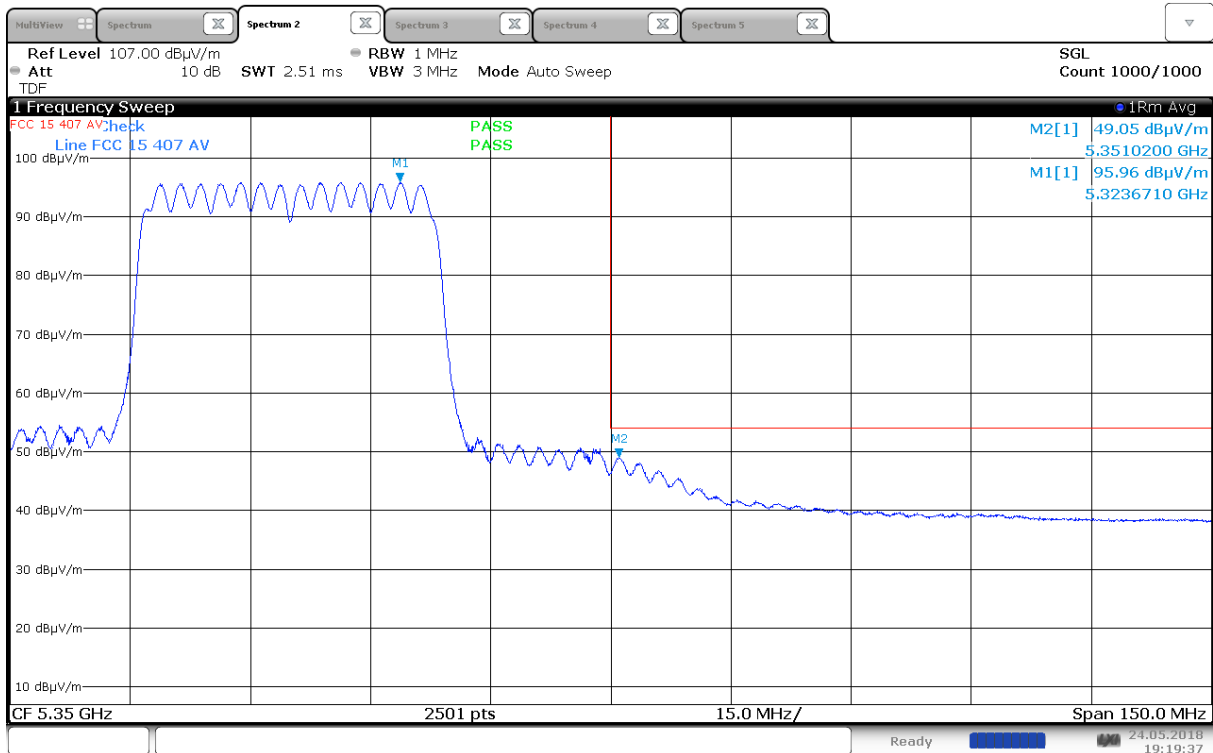
Band Edge RMS, > 5350MHz, 5320MHz, 802.11a 6Mb, Ant 0



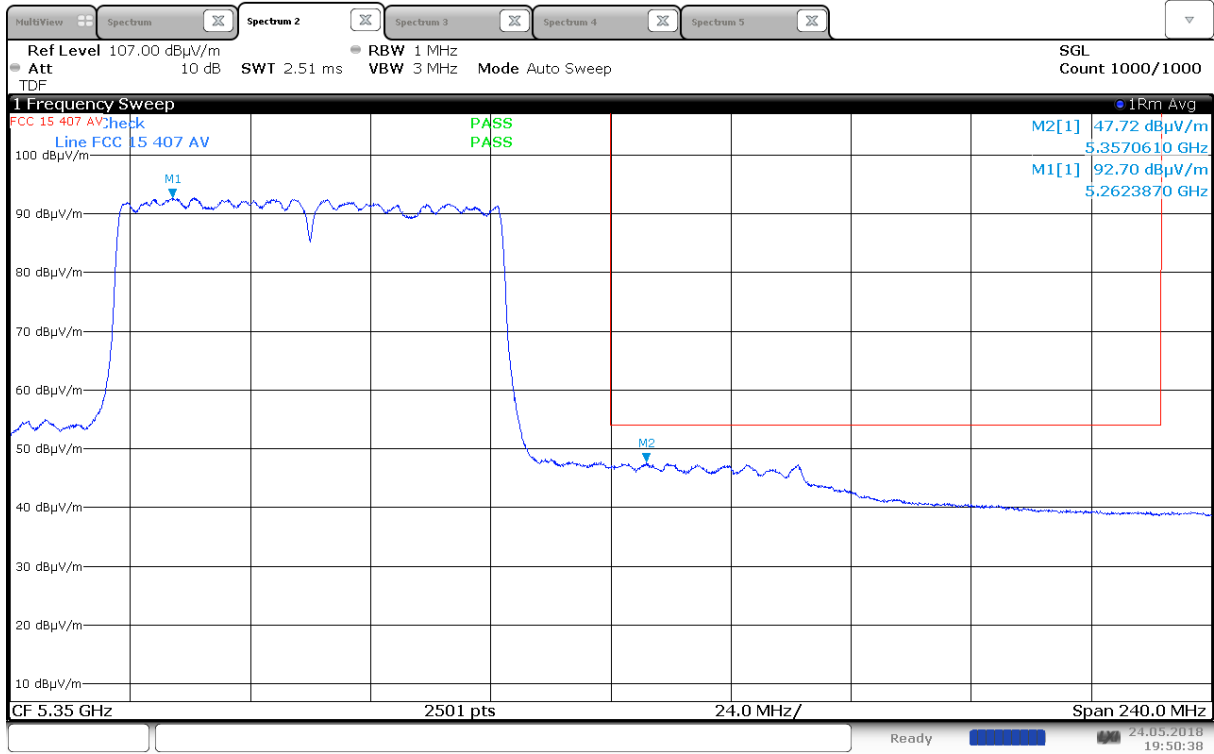
Band Edge RMS, > 5350MHz, 5320MHz, 802.11a 6Mb, Ant 1



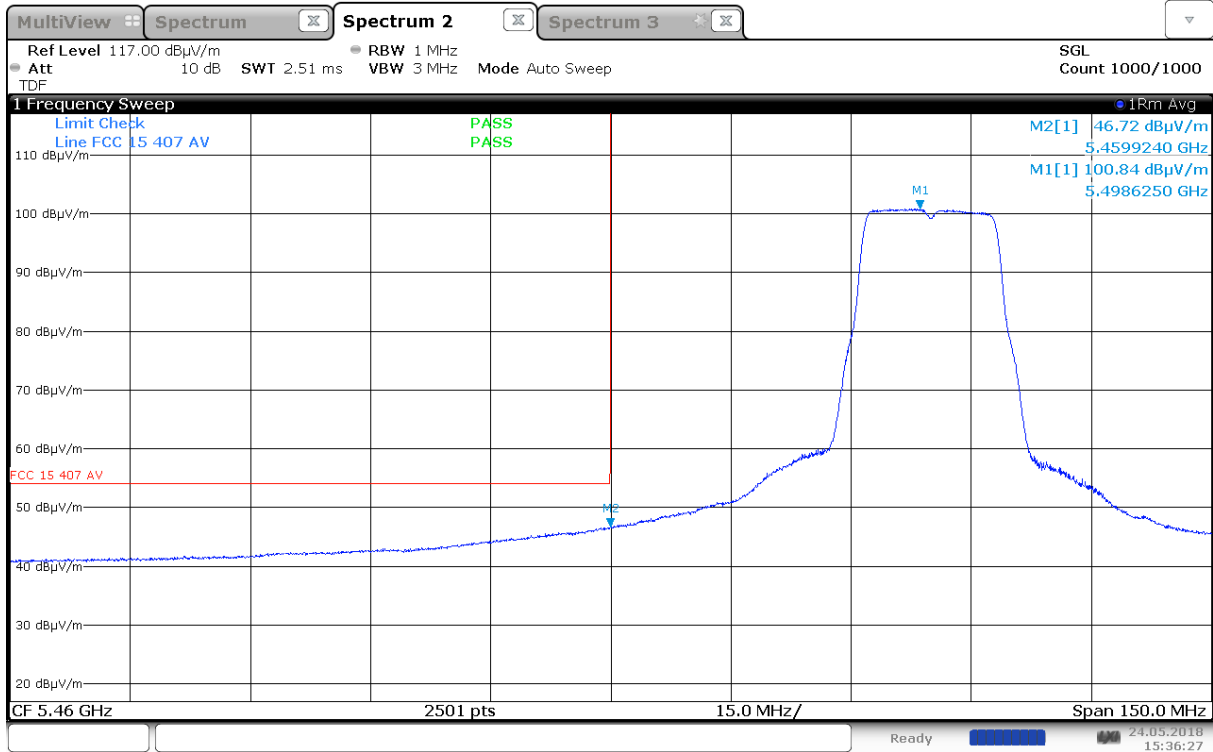
Band Edge RMS, > 5350MHz, 5320MHz, 802.11n HT20, MIMO



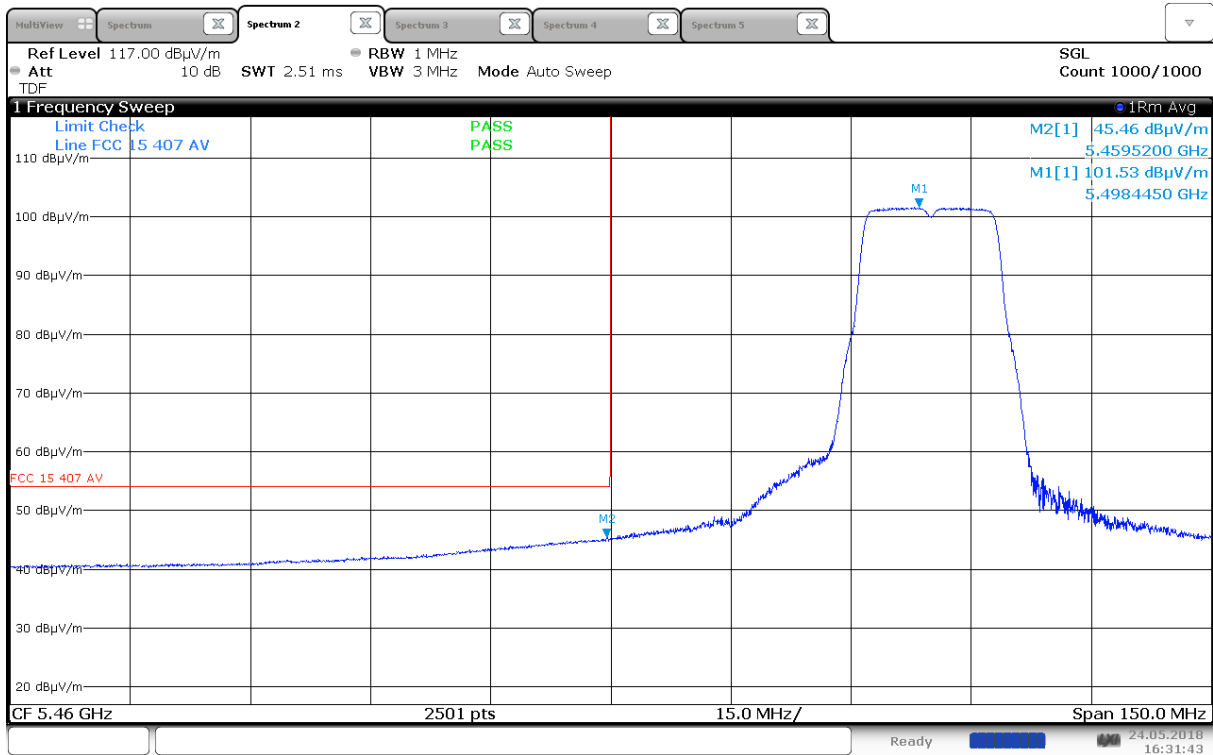
Band Edge RMS, > 5350MHz, 5310MHz, 802.11n HT40, MIMO



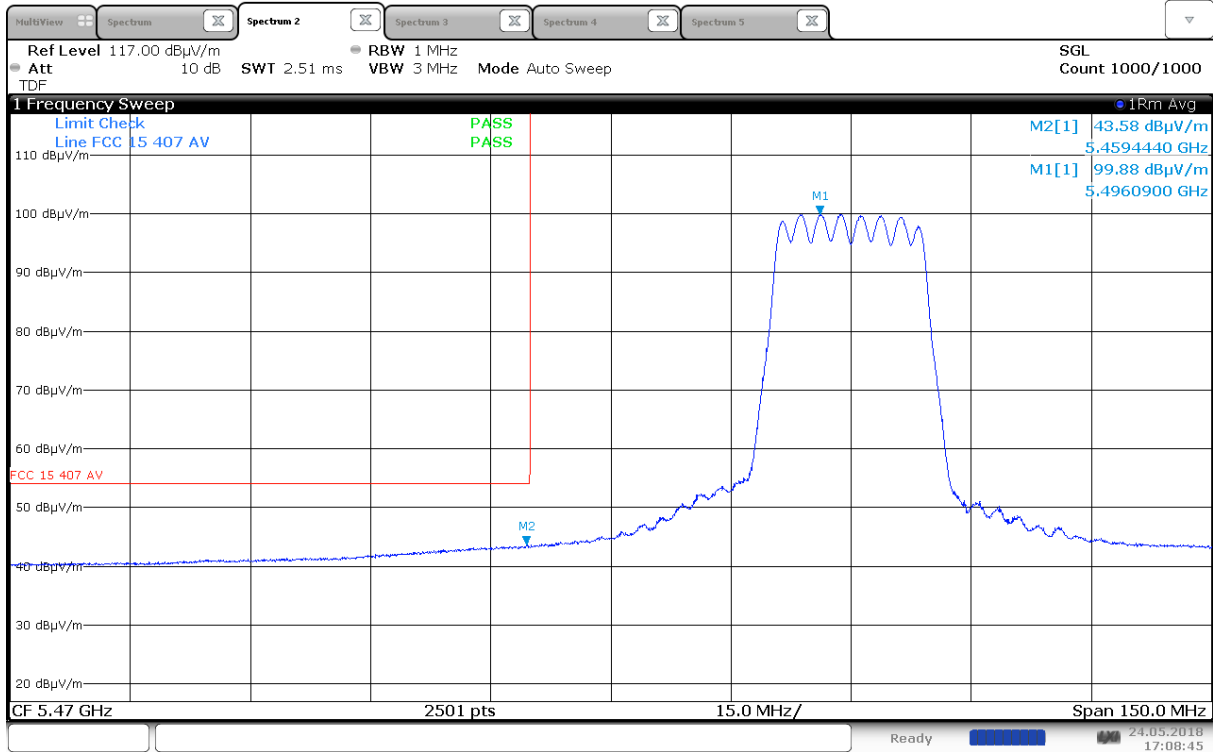
Band Edge RMS, > 5350MHz, 5290MHz, 802.11n HT80, MIMO



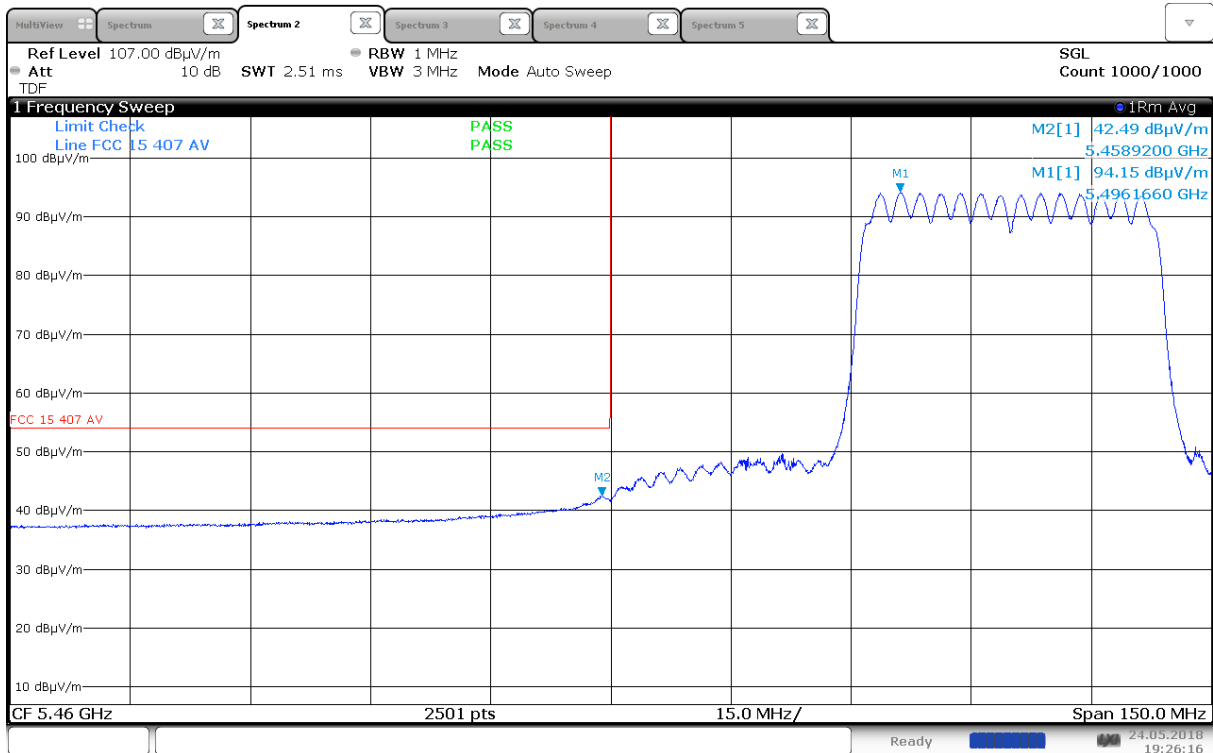
Band Edge RMS, < 5460MHz, 5500MHz, 802.11a 6Mb, Ant 0



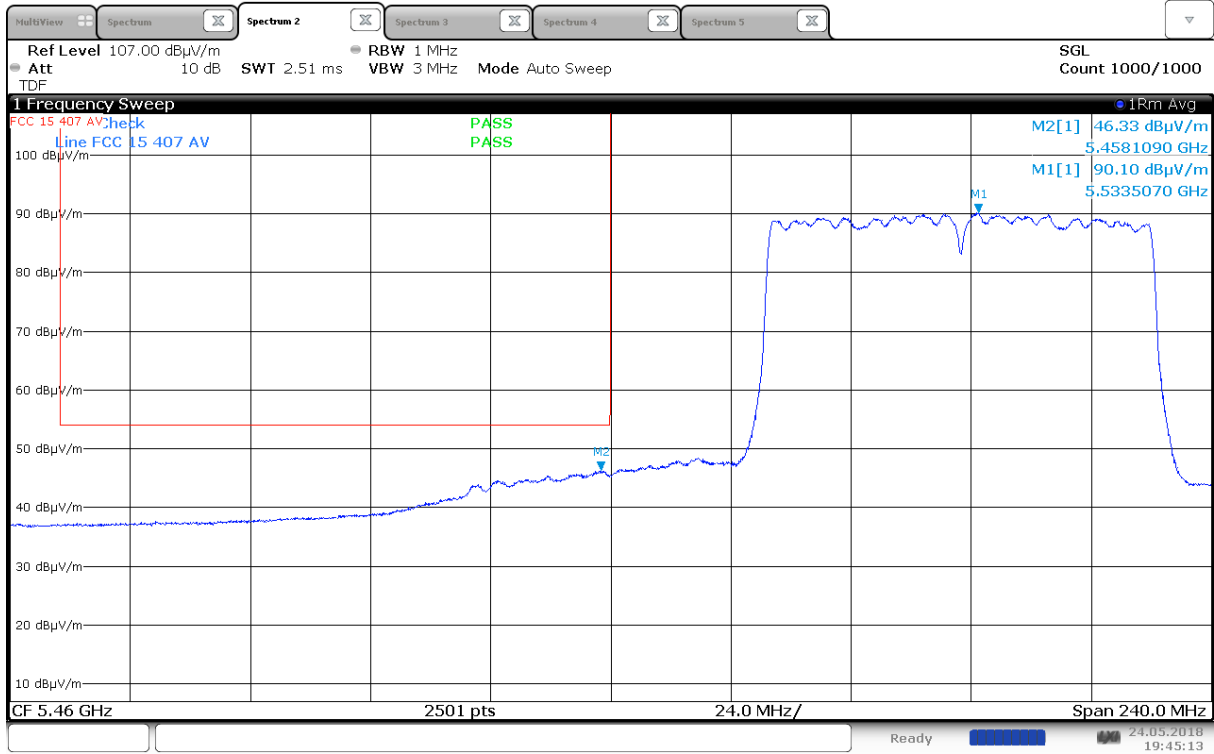
Band Edge RMS, < 5460MHz, 5500MHz, 802.11a 6Mb, Ant 1



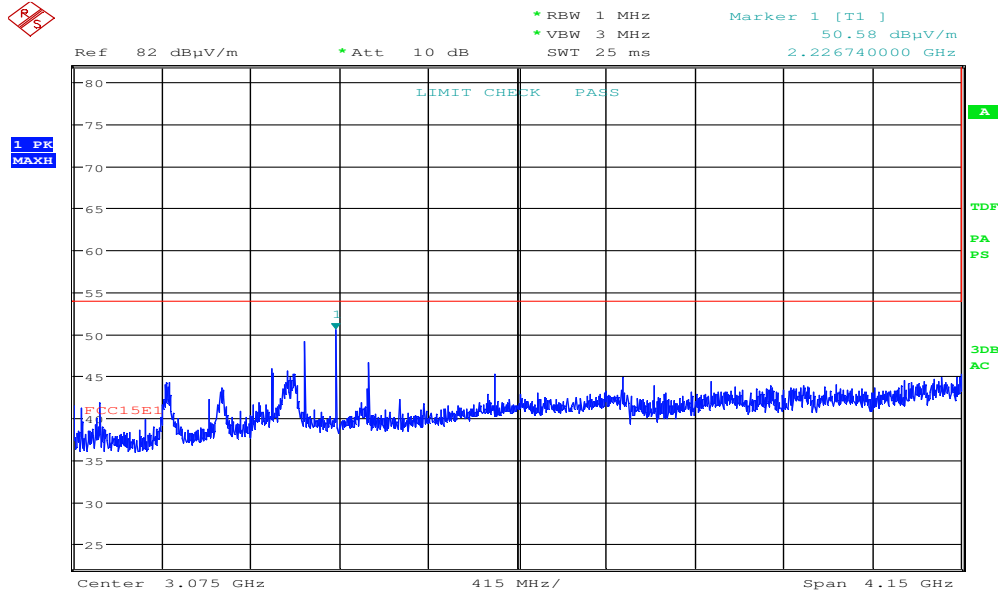
Band Edge RMS, < 5460MHz, 5500MHz, 802.11n HT20, MIMO



Band Edge RMS, < 5460MHz, 5510MHz, 802.11n HT40, MIMO

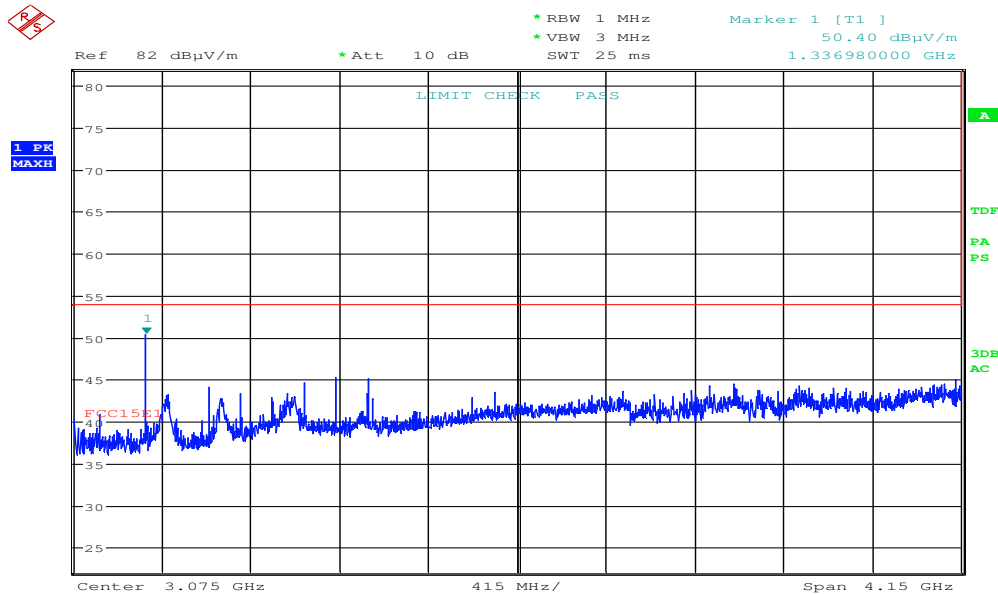


Band Edge RMS, < 5460MHz, 5530MHz, 802.11n HT80, MIMO



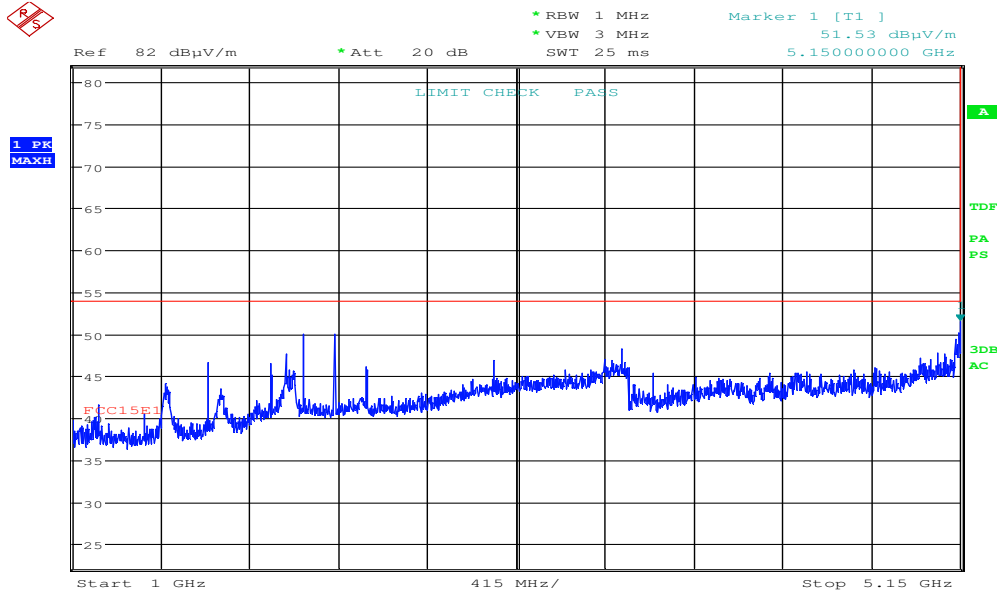
Date: 1.JUN.2018 09:28:27

Radiated Emissions, 1.0 – 5.15GHz, 5180MHz, 802.11a 6M, Ant 0, HP



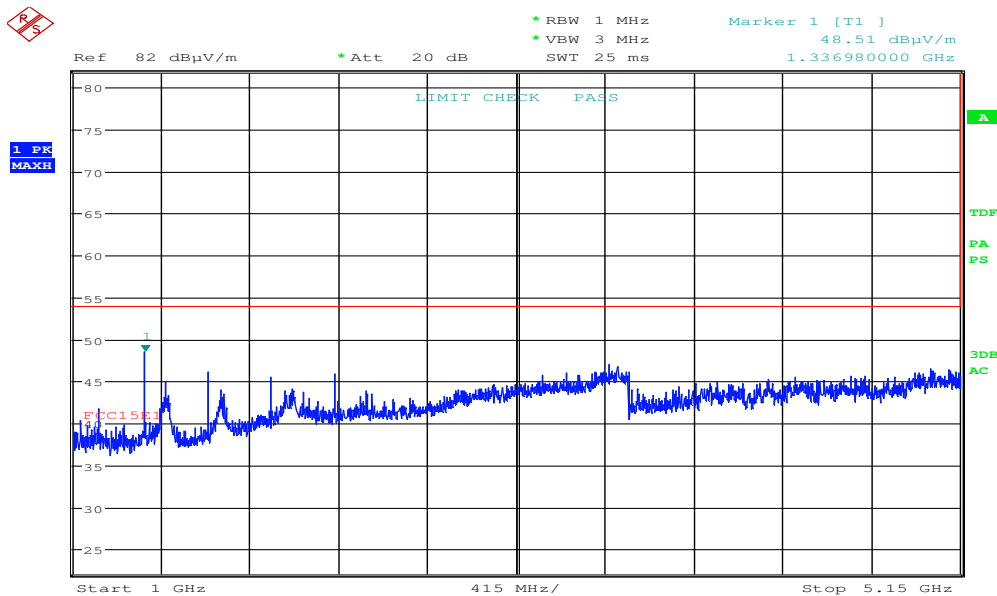
Date: 1.JUN.2018 09:25:15

Radiated Emissions, 1.0 – 5.15GHz, 5180MHz, 802.11a 6M, Ant 0, VP



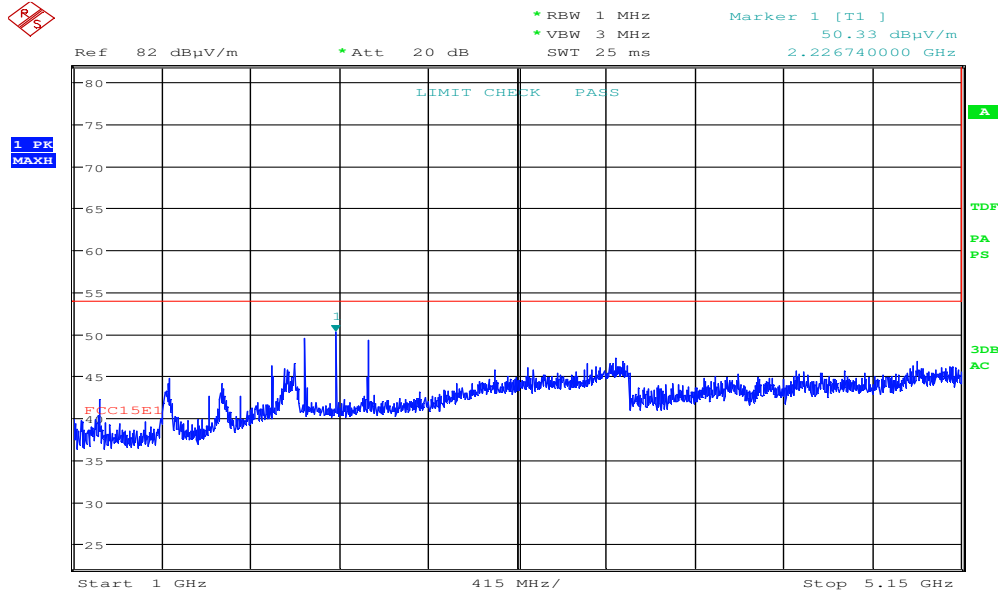
Date: 1.JUN.2018 09:33:56

Radiated Emissions, 1.0 – 5.15GHz, 5180MHz, 802.11a 6M, Ant 1, HP



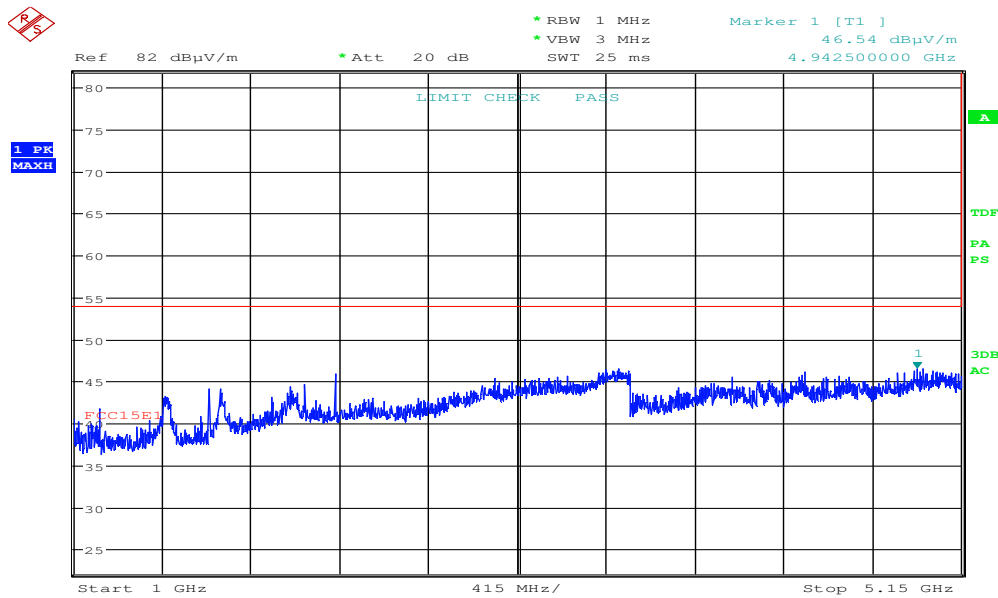
Date: 1.JUN.2018 09:31:51

Radiated Emissions, 1.0 – 5.15GHz, 5180MHz, 802.11a 6M, Ant 1, VP



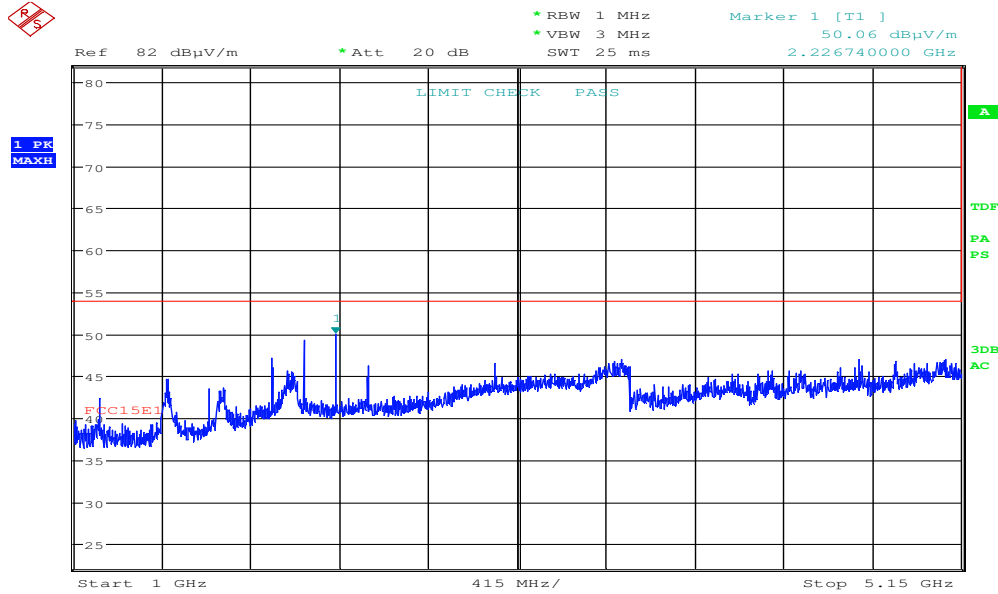
Date: 1.JUN.2018 09:45:53

Radiated Emissions, 1.0 – 5.15GHz, 5280MHz, 802.11a 6M, Ant 0, HP



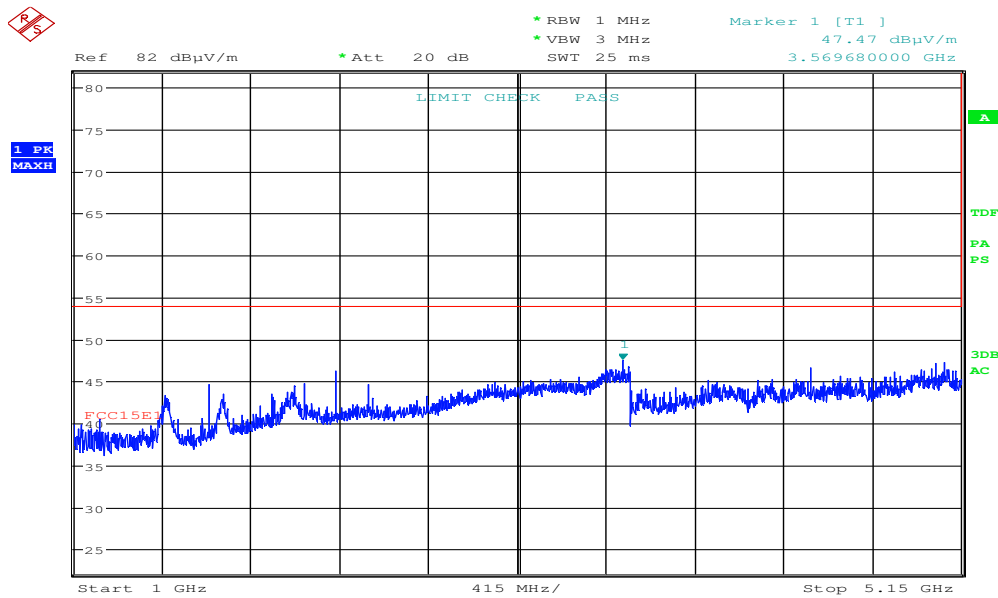
Date: 1.JUN.2018 09:43:48

Radiated Emissions, 1.0 – 5.15GHz, 5280MHz, 802.11a 6M, Ant 0, VP



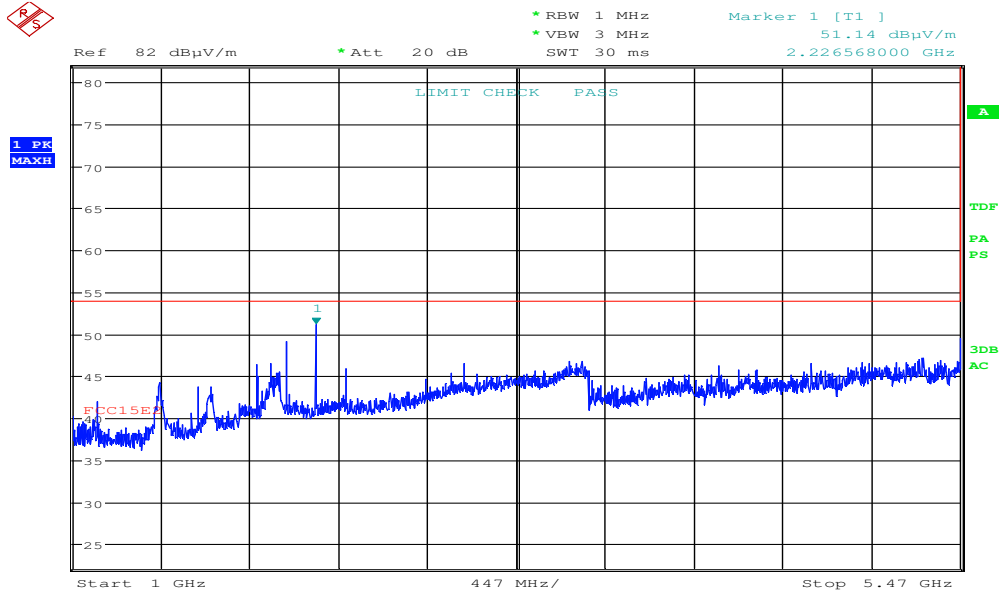
Date: 1.JUN.2018 09:51:15

Radiated Emissions, 1.0 – 5.15GHz, 5280MHz, 802.11a 6M, Ant 1, HP



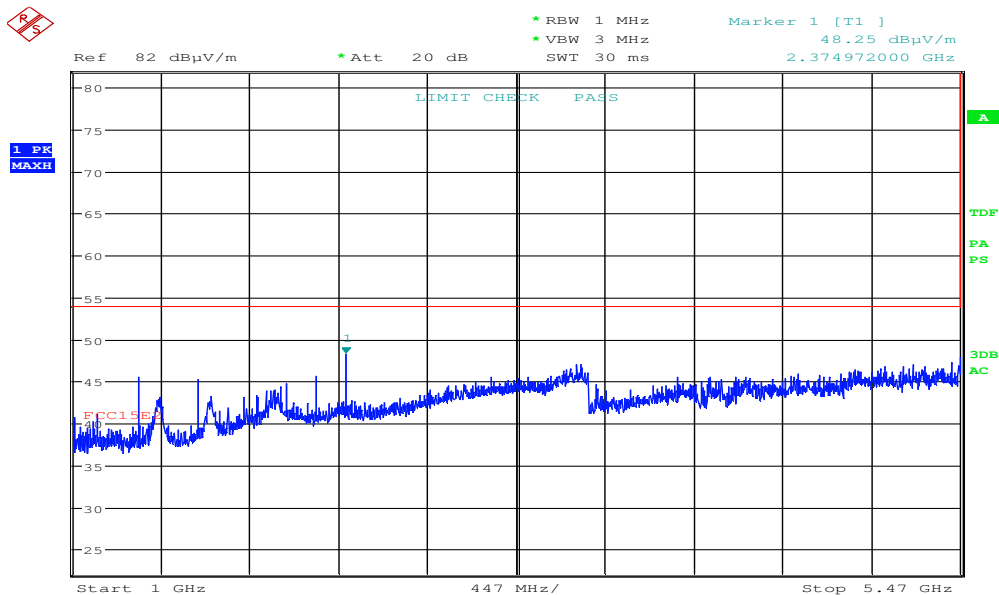
Date: 1.JUN.2018 09:49:10

Radiated Emissions, 1.0 – 5.15GHz, 5280MHz, 802.11a 6M, Ant 1, VP



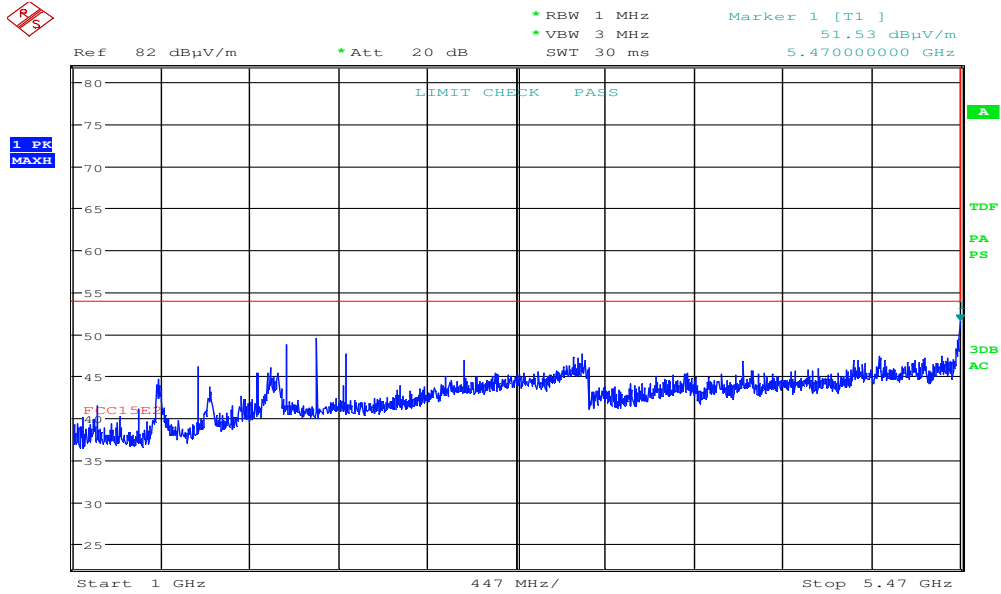
Date: 1.JUN.2018 10:07:55

Radiated Emissions, 1.0 – 5.47GHz, 5500MHz, 802.11a 6M, Ant 0, HP



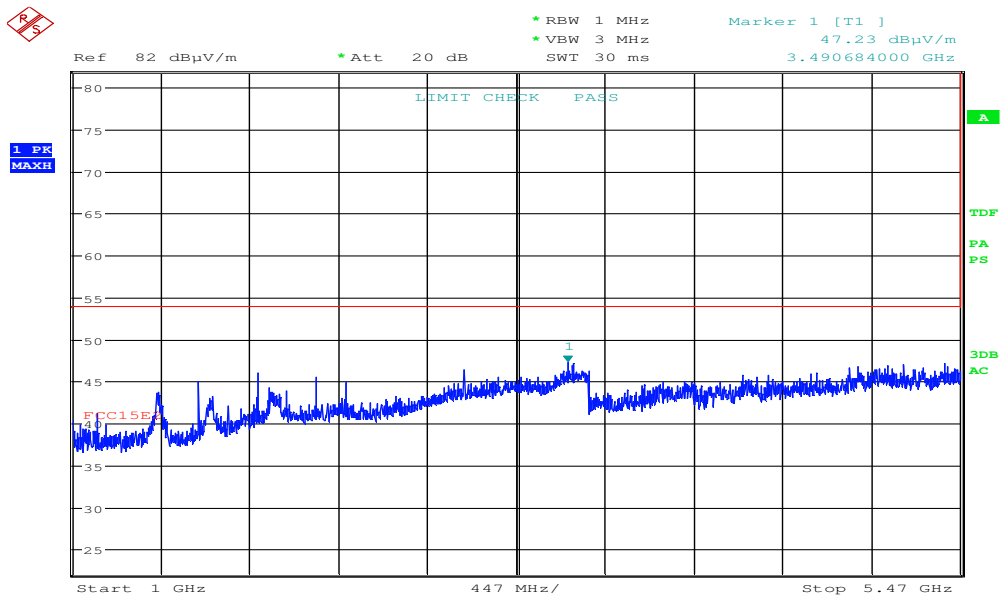
Date: 1.JUN.2018 10:05:55

Radiated Emissions, 1.0 – 5.47GHz, 5500MHz, 802.11a 6M, Ant 0, VP



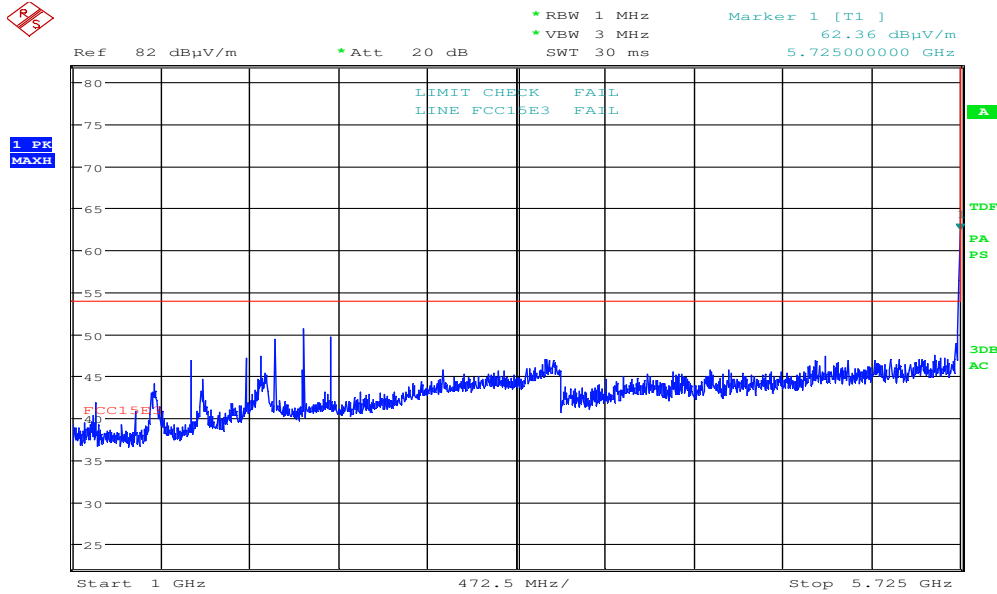
Date: 1.JUN.2018 10:12:19

Radiated Emissions, 1.0 – 5.47GHz, 5500MHz, 802.11a 6M, Ant 1, HP



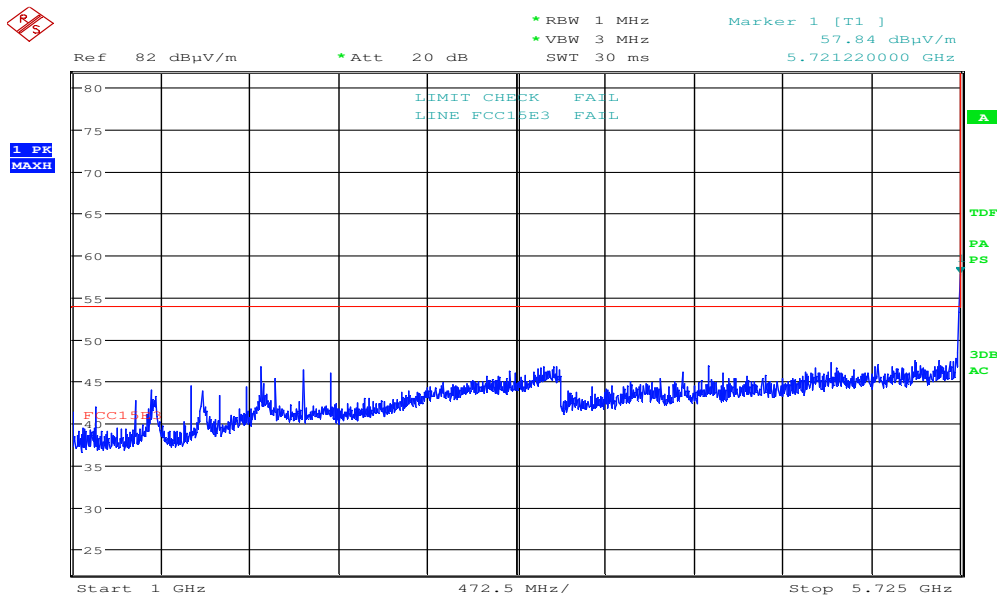
Date: 1.JUN.2018 10:10:18

Radiated Emissions, 1.0 – 5.47GHz, 5500MHz, 802.11a 6M, Ant 1, VP



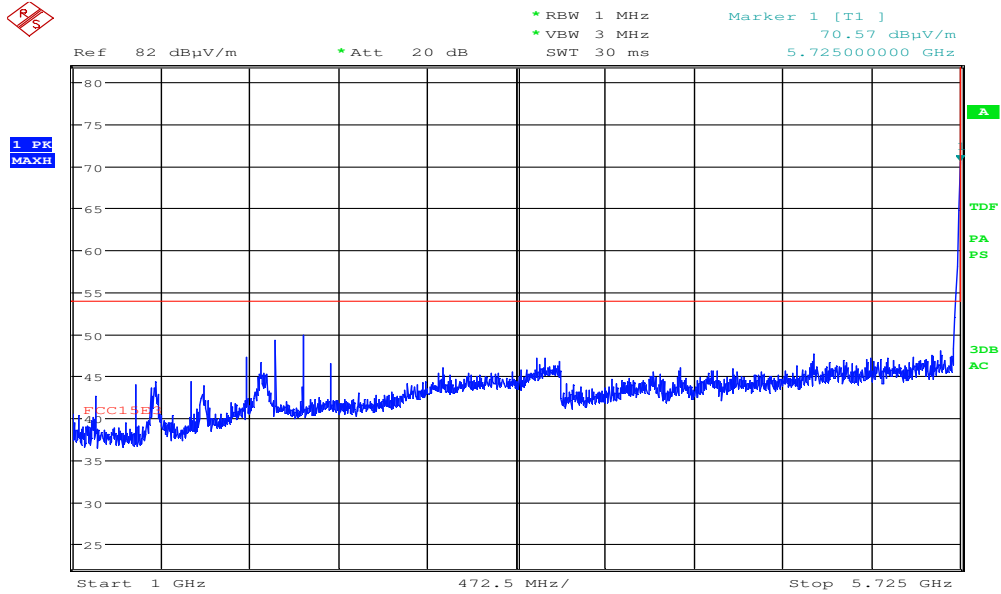
Date: 1.JUN.2018 10:23:22

Radiated Emissions, 1.0 – 5.725GHz, 5745MHz, 802.11a 6M, Ant 0, HP



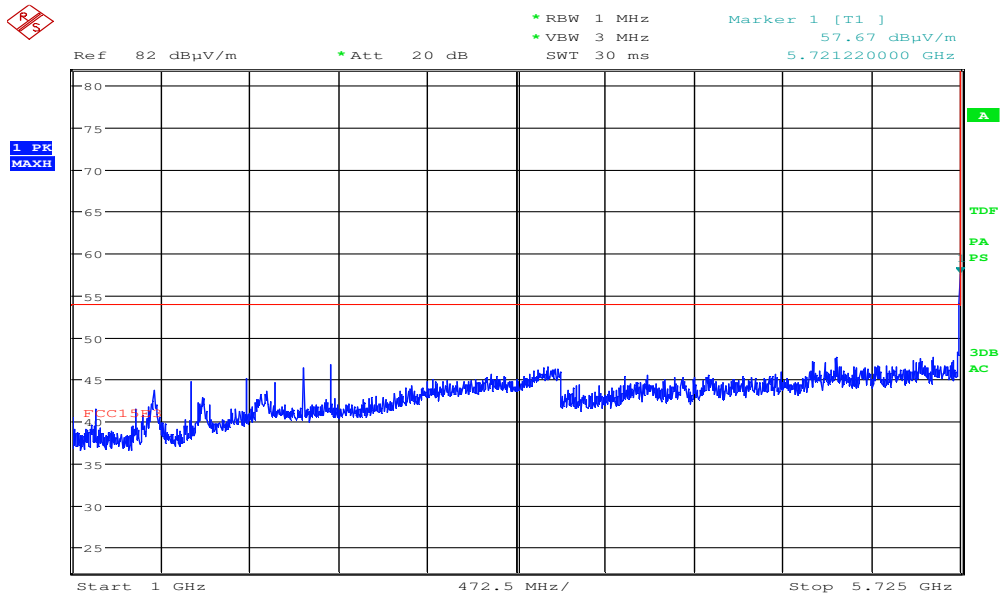
Date: 1.JUN.2018 10:21:21

Radiated Emissions, 1.0 – 5.725GHz, 5745MHz, 802.11a 6M, Ant 0, VP



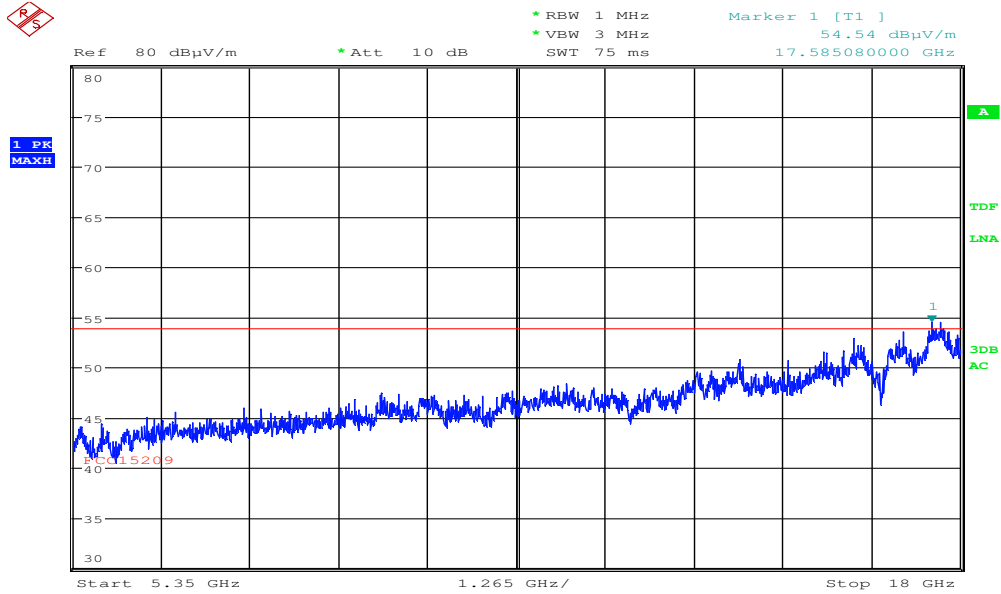
Date: 1.JUN.2018 10:28:15

Radiated Emissions, 1.0 – 5.725GHz, 5745MHz, 802.11a 6M, Ant 1, HP



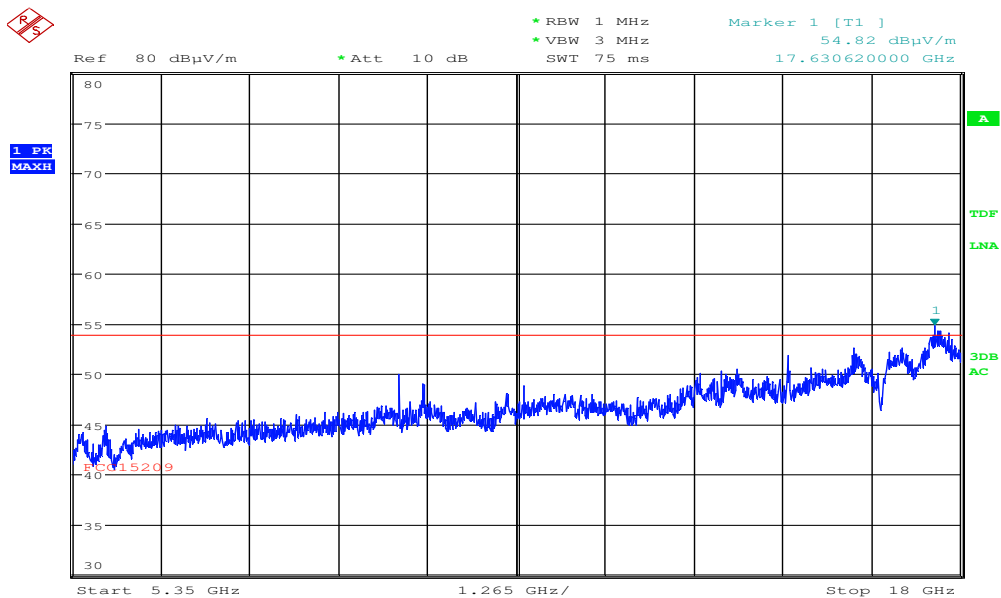
Date: 1.JUN.2018 10:26:14

Radiated Emissions, 1.0 – 5.725GHz, 5745MHz, 802.11a 6M, Ant 1, VP



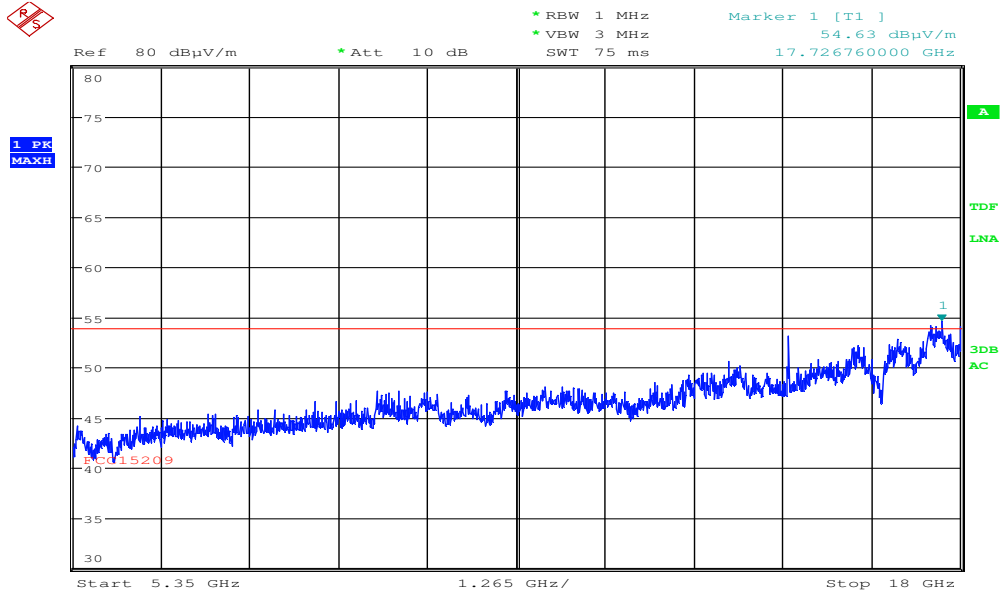
Date: 1.JUN.2018 14:45:51

Radiated Emissions, 5350 – 18000 MHz, 5180 MHz, 802.11a 6M, Ant0, HP



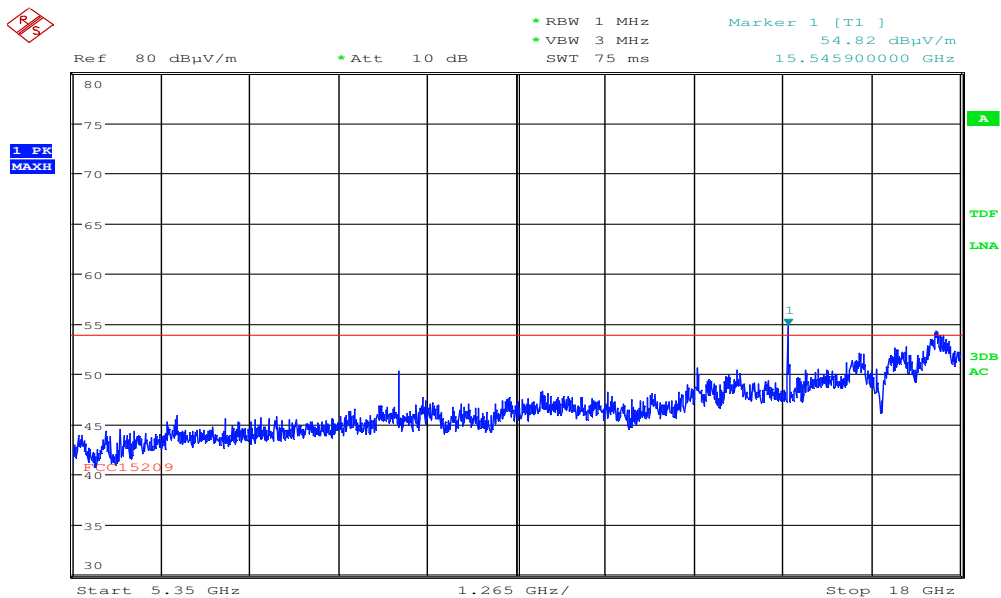
Date: 1.JUN.2018 14:43:50

Radiated Emissions, 5350 – 18000 MHz, 5180 MHz, 802.11a 6M, Ant0, VP



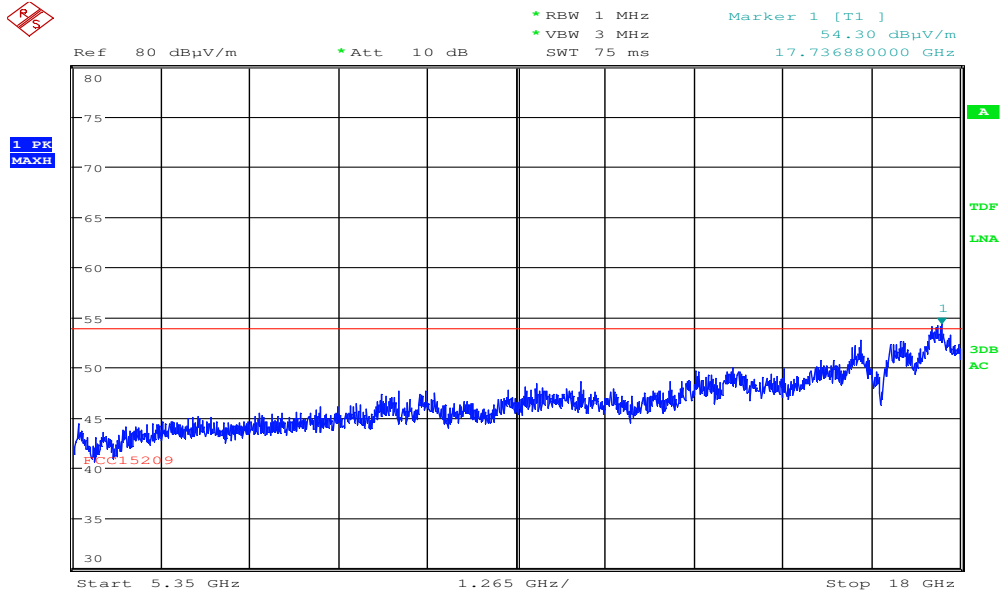
Date: 1.JUN.2018 14:20:25

Radiated Emissions, 5350 – 18000 MHz, 5180 MHz, 802.11a 6M, Ant1, HP



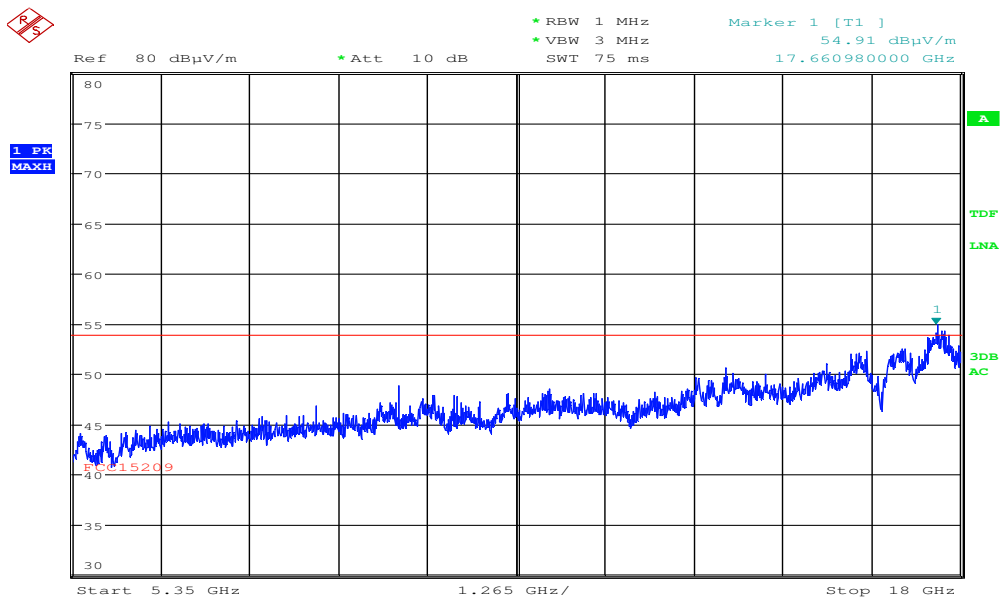
Date: 1.JUN.2018 14:18:24

Radiated Emissions, 5350 – 18000 MHz, 5180 MHz, 802.11a 6M, Ant1, VP



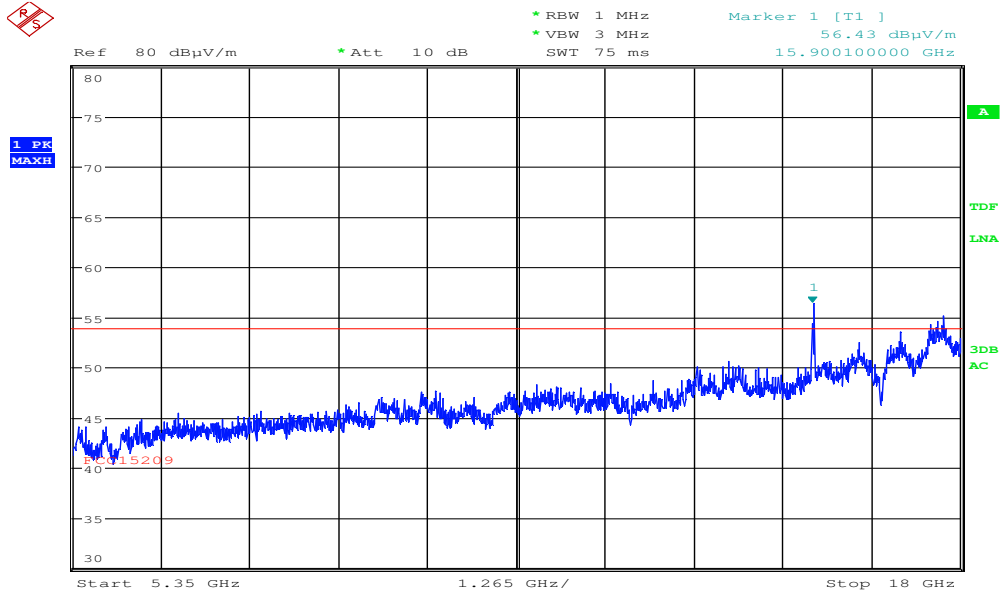
Date: 1.JUN.2018 15:02:37

Radiated Emissions, 5350 – 18000 MHz, 5180 MHz, 802.11n HT20, MIMO, HP



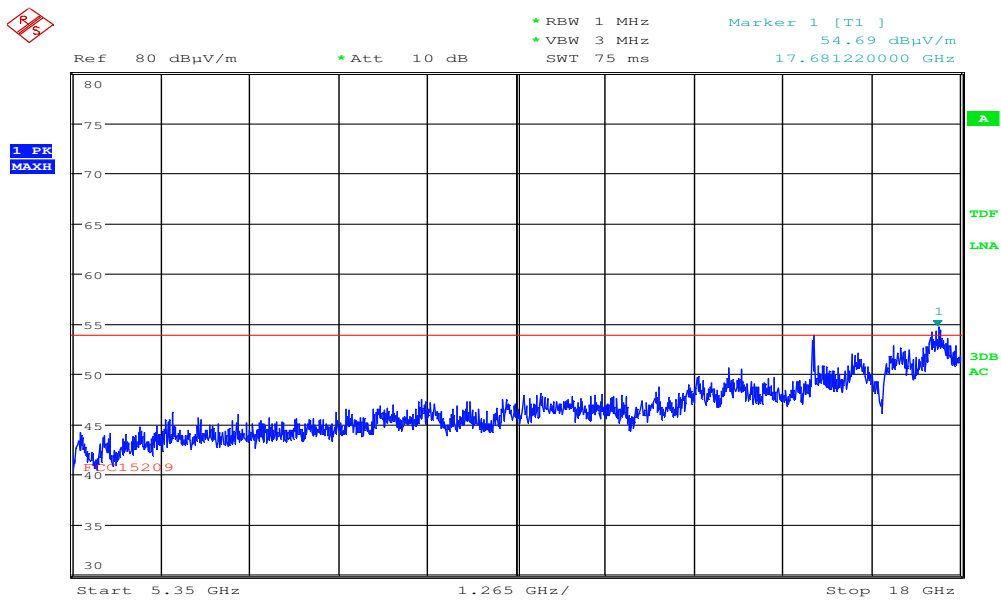
Date: 1.JUN.2018 15:00:36

Radiated Emissions, 5350 – 18000 MHz, 5180 MHz, 802.11n HT20, MIMO, VP



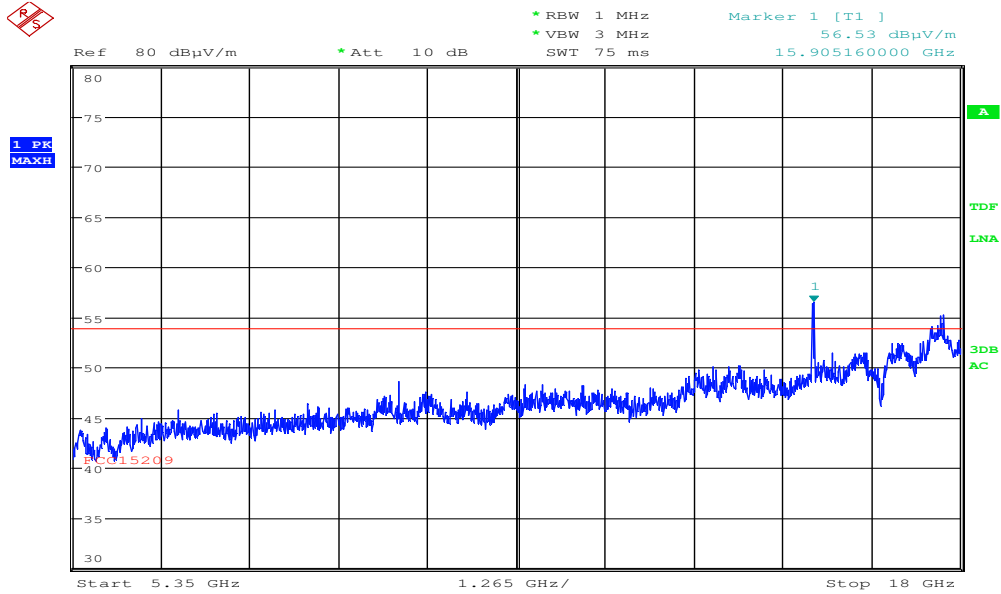
Date: 1.JUN.2018 12:46:22

Radiated Emissions, 5350 – 18000 MHz, 5300 MHz, 802.11a 6M, Ant0, HP



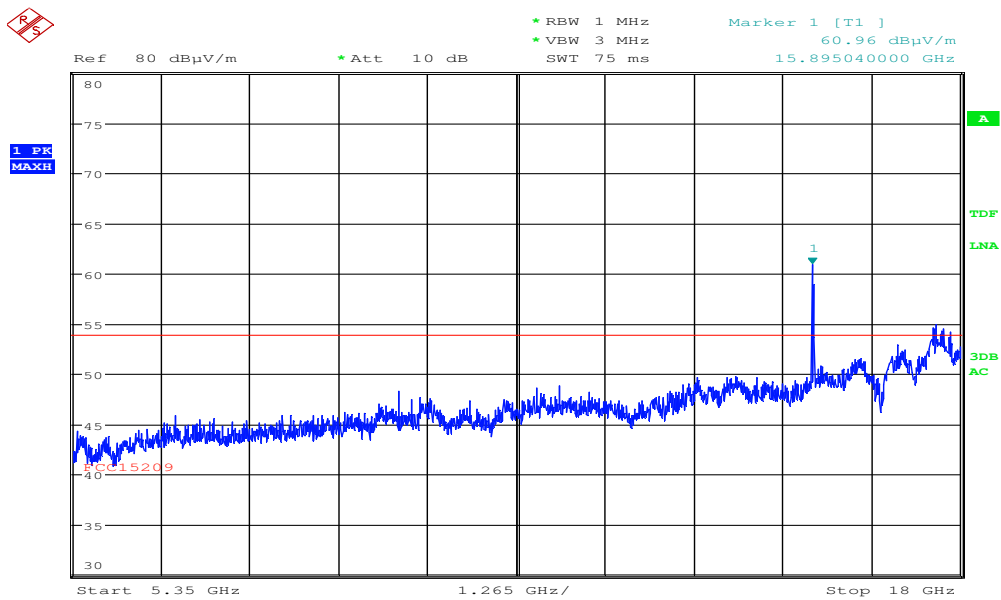
Date: 1.JUN.2018 12:44:21

Radiated Emissions, 5350 – 18000 MHz, 5300 MHz, 802.11a 6M, Ant0, VP



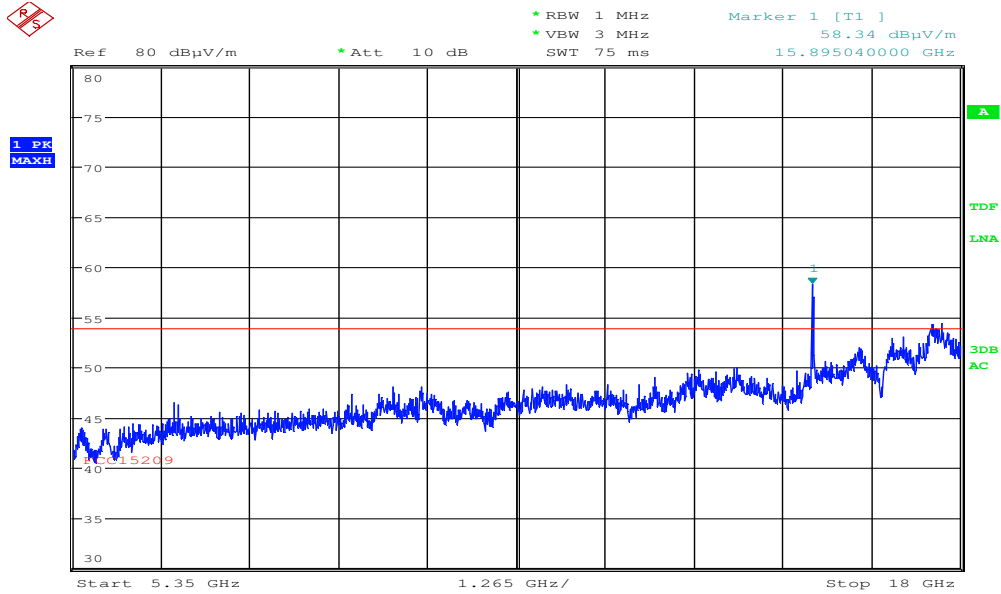
Date: 1.JUN.2018 13:41:02

Radiated Emissions, 5350 – 18000 MHz, 5300 MHz, 802.11a 6M, Ant1, HP



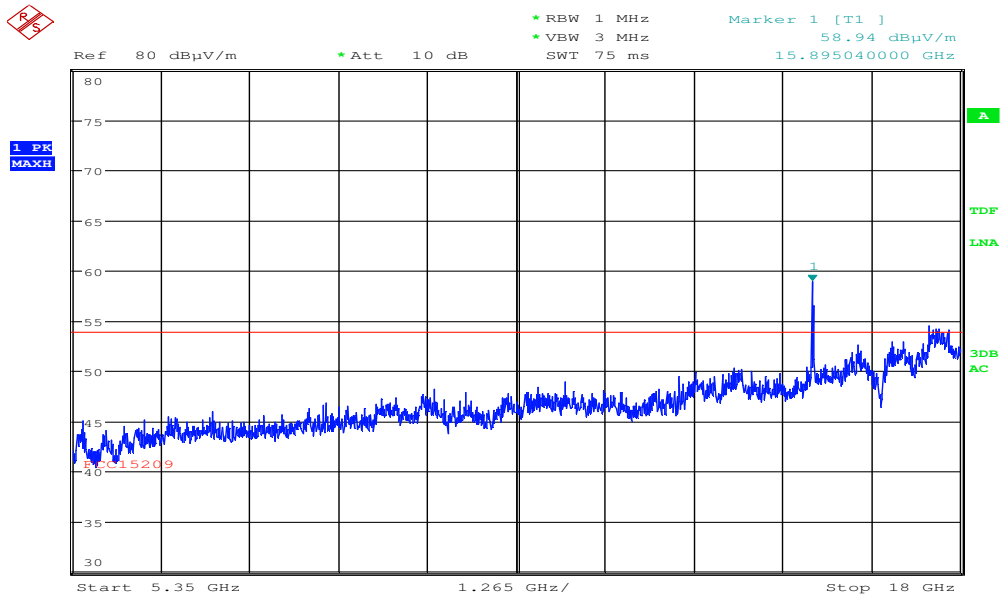
Date: 1.JUN.2018 13:39:01

Radiated Emissions, 5350 – 18000 MHz, 5300 MHz, 802.11a 6M, Ant1, VP



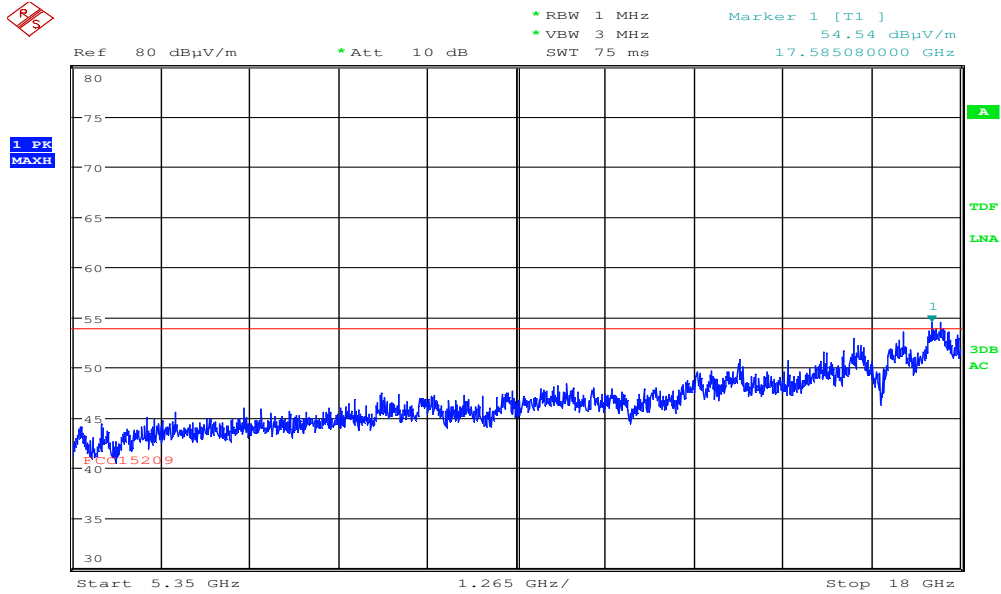
Date: 1.JUN.2018 12:15:14

Radiated Emissions, 5350 – 18000 MHz, 5300 MHz, 802.11n HT20, MIMO, HP



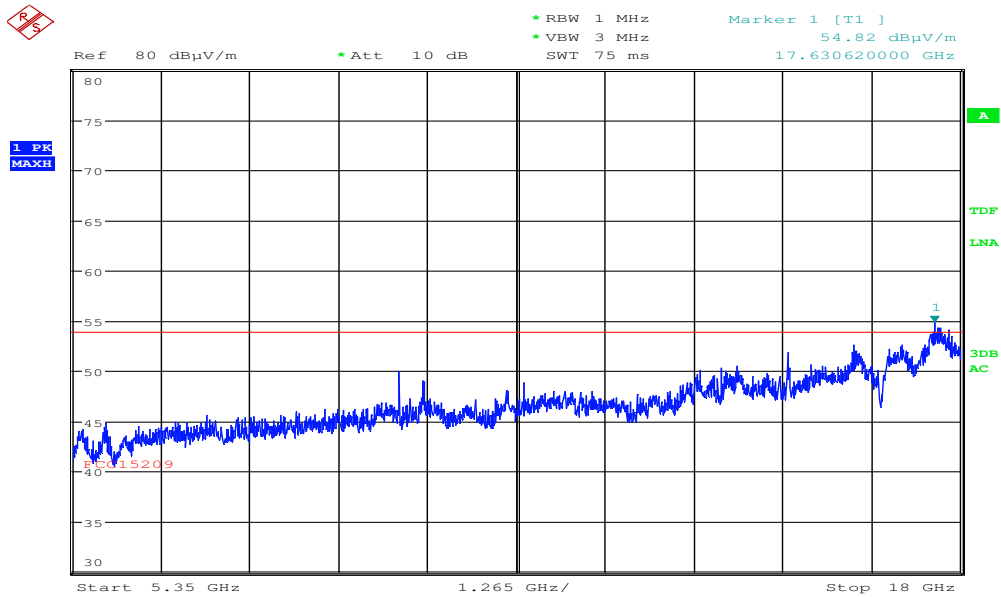
Date: 1.JUN.2018 12:13:12

Radiated Emissions, 5350 – 18000 MHz, 5300 MHz, 802.11n HT20, MIMO, VP



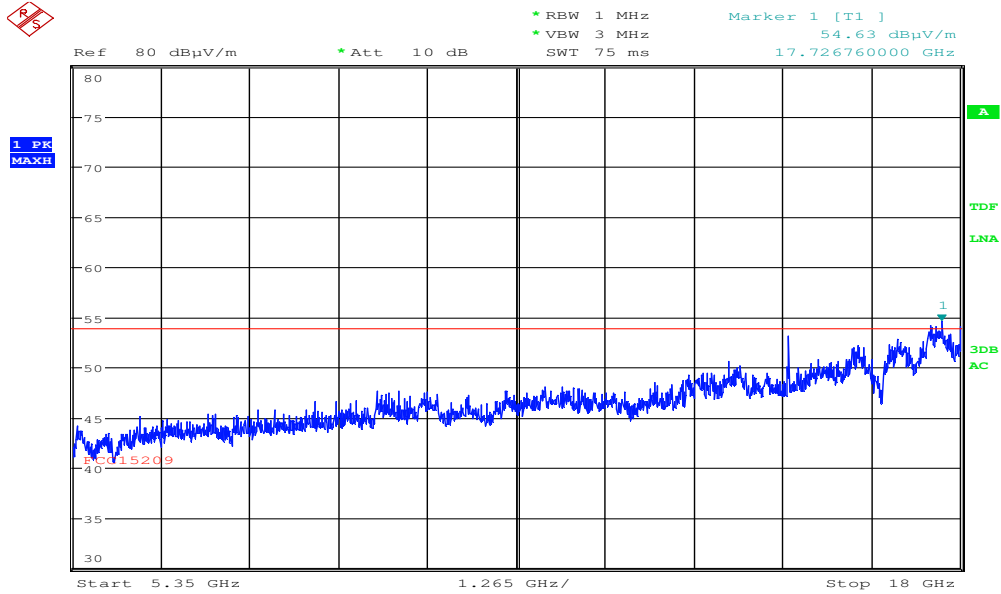
Date: 1.JUN.2018 14:45:51

Radiated Emissions, 5350 – 18000 MHz, 5180 MHz, 802.11a 6M, Ant0, HP



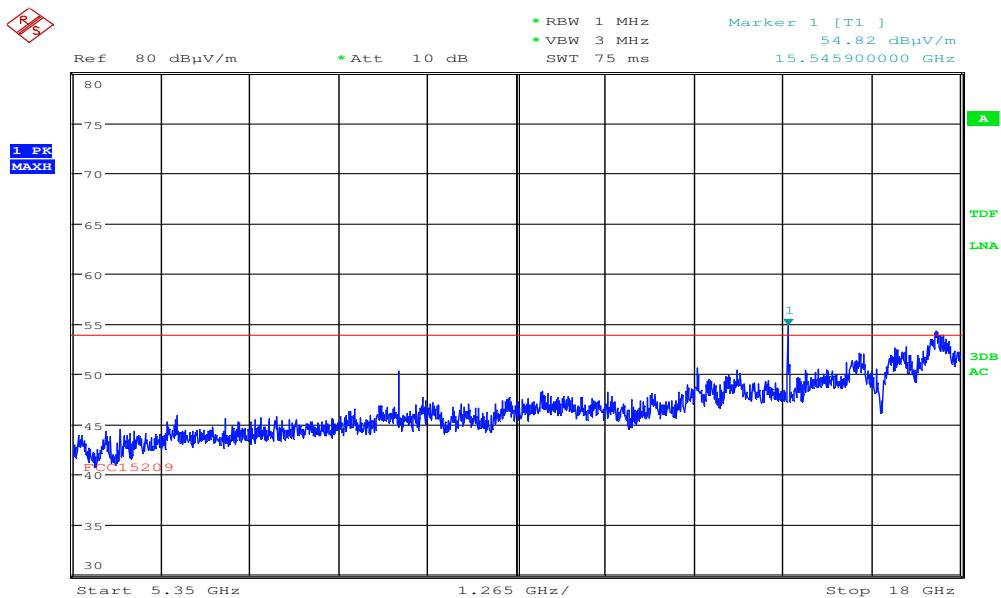
Date: 1.JUN.2018 14:43:50

Radiated Emissions, 5350 – 18000 MHz, 5180 MHz, 802.11a 6M, Ant0, VP



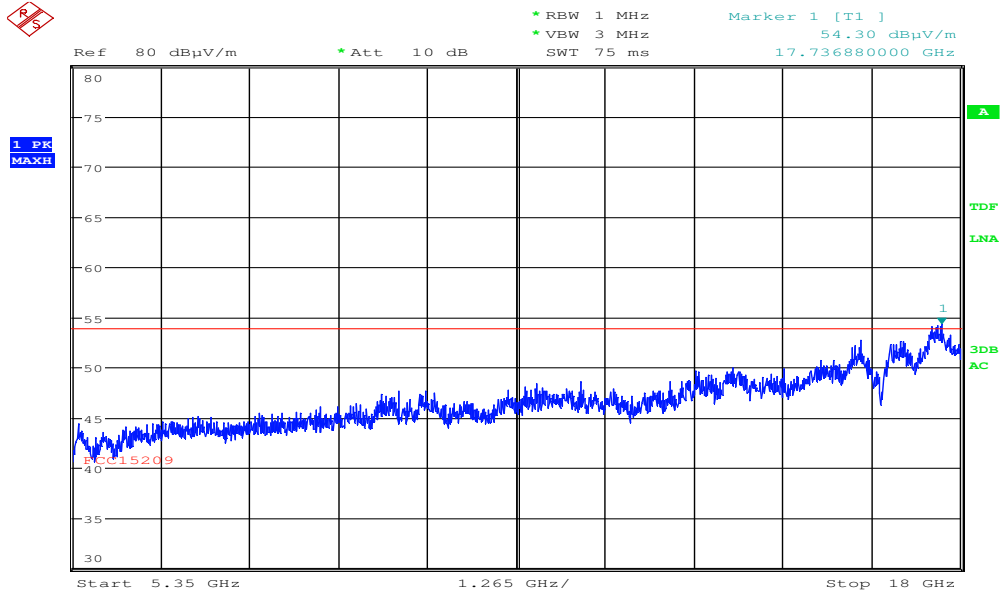
Date: 1.JUN.2018 14:20:25

Radiated Emissions, 5350 – 18000 MHz, 5180 MHz, 802.11a 6M, Ant1, HP



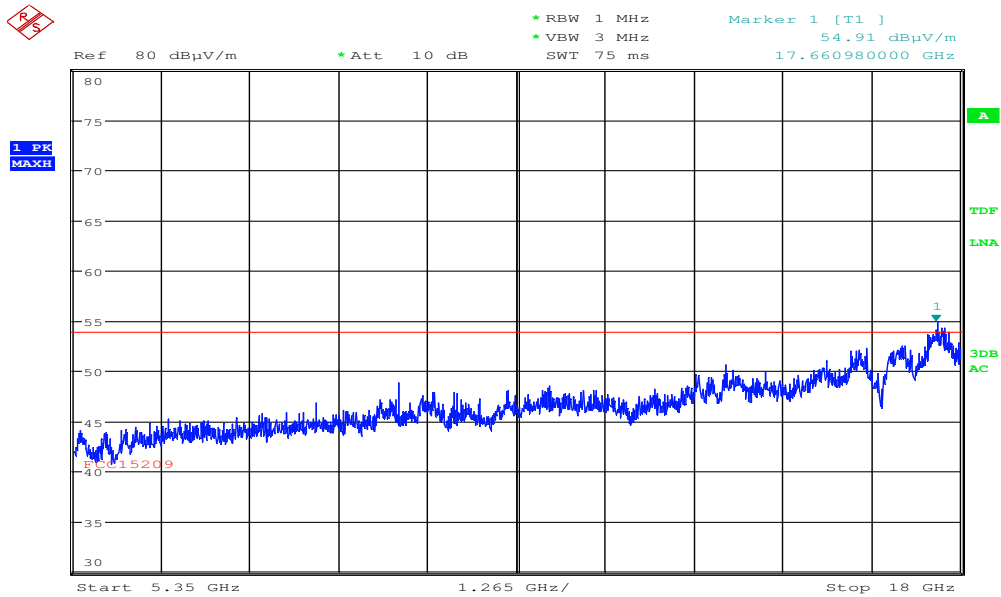
Date: 1.JUN.2018 14:18:24

Radiated Emissions, 5350 – 18000 MHz, 5180 MHz, 802.11a 6M, Ant1, VP



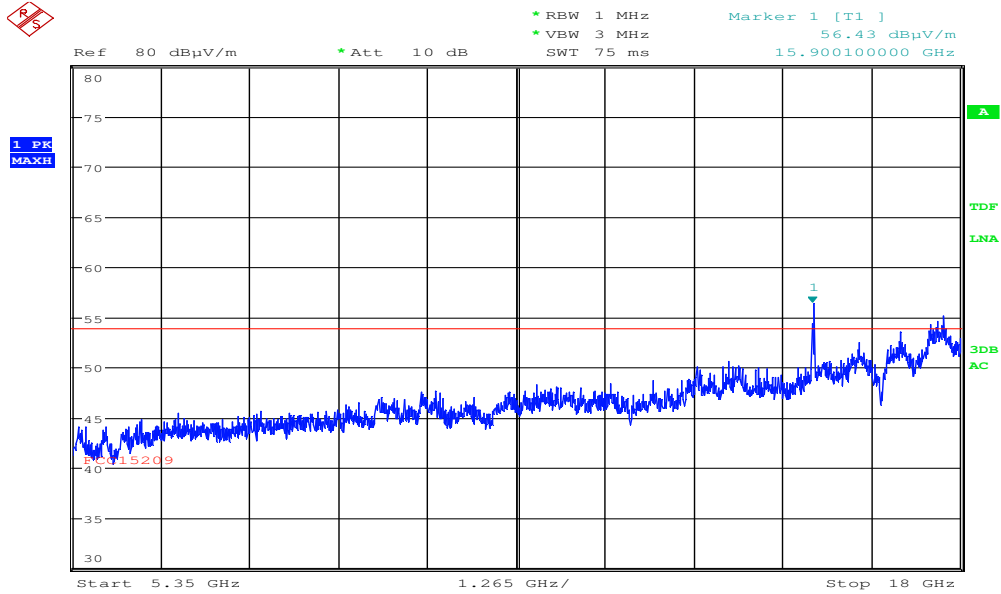
Date: 1.JUN.2018 15:02:37

Radiated Emissions, 5350 – 18000 MHz, 5180 MHz, 802.11n HT20, MIMO, HP



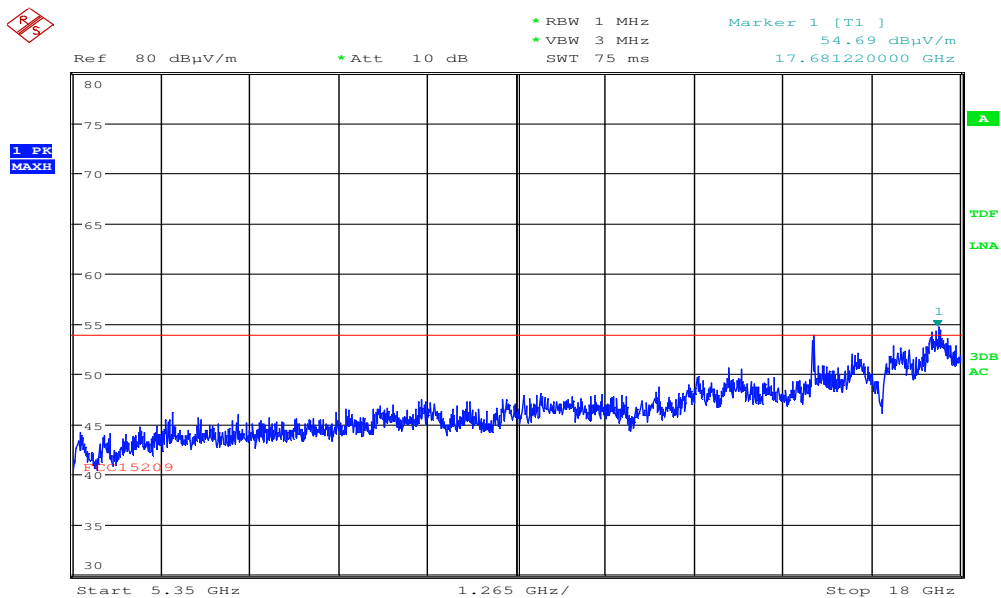
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Radiated Emissions, 5350 – 18000 MHz, 5180 MHz, 802.11n HT20, MIMO, VP



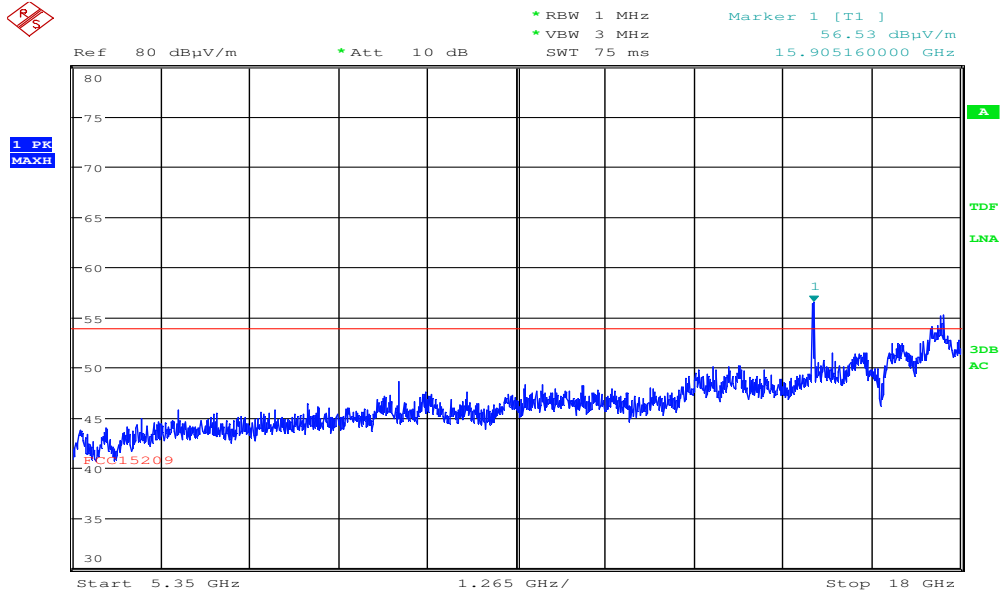
Date: 1.JUN.2018 12:46:22

Radiated Emissions, 5350 – 18000 MHz, 5300 MHz, 802.11a 6M, Ant0, HP



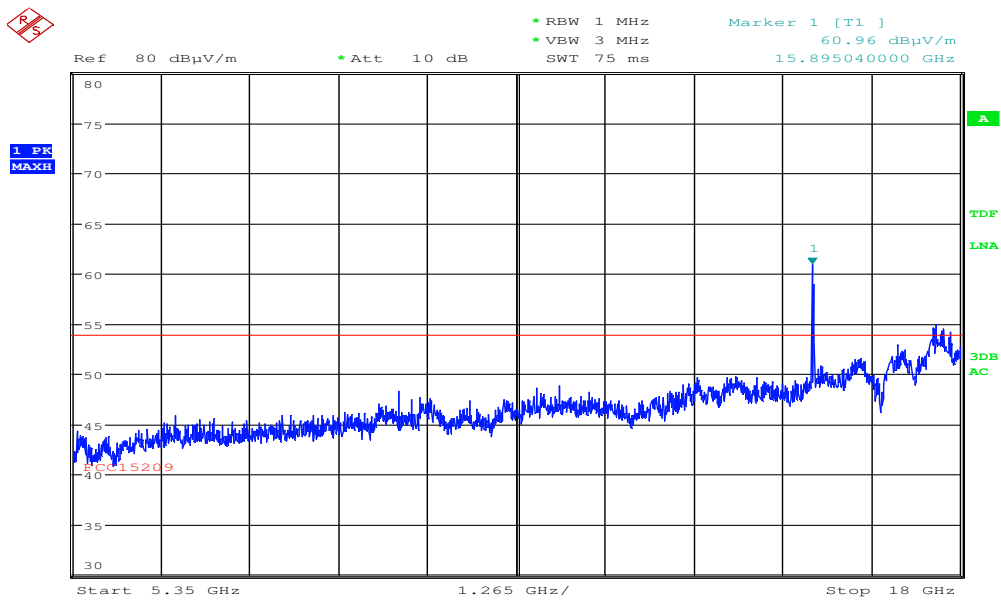
Date: 1.JUN.2018 12:44:21

Radiated Emissions, 5350 – 18000 MHz, 5300 MHz, 802.11a 6M, Ant0, VP



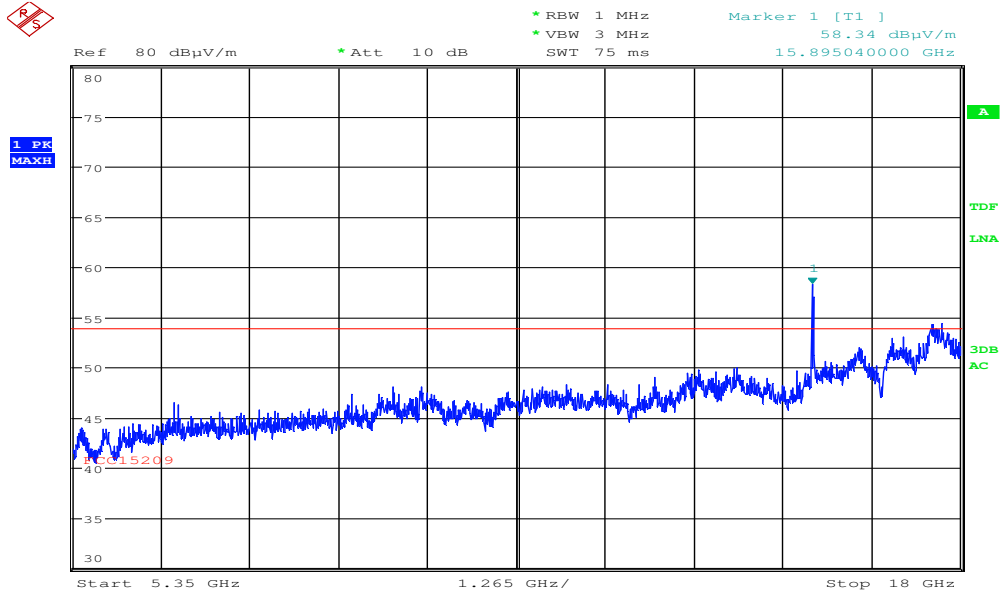
Date: 1.JUN.2018 13:41:02

Radiated Emissions, 5350 – 18000 MHz, 5300 MHz, 802.11a 6M, Ant1, HP



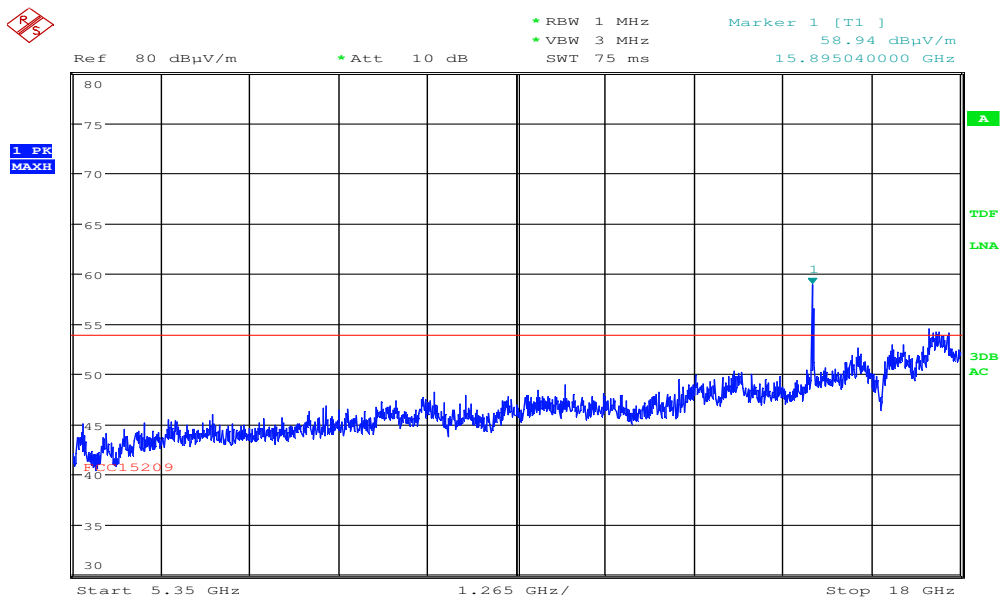
Date: 1.JUN.2018 13:39:01

Radiated Emissions, 5350 – 18000 MHz, 5300 MHz, 802.11a 6M, Ant1, VP



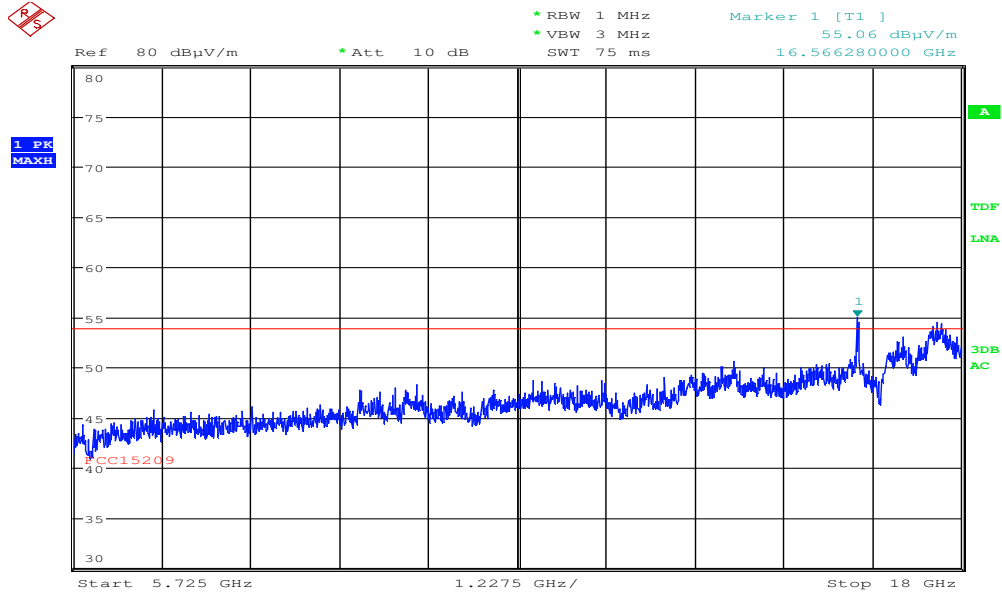
Date: 1.JUN.2018 12:15:14

Radiated Emissions, 5350 – 18000 MHz, 5300 MHz, 802.11n HT20, MIMO, HP



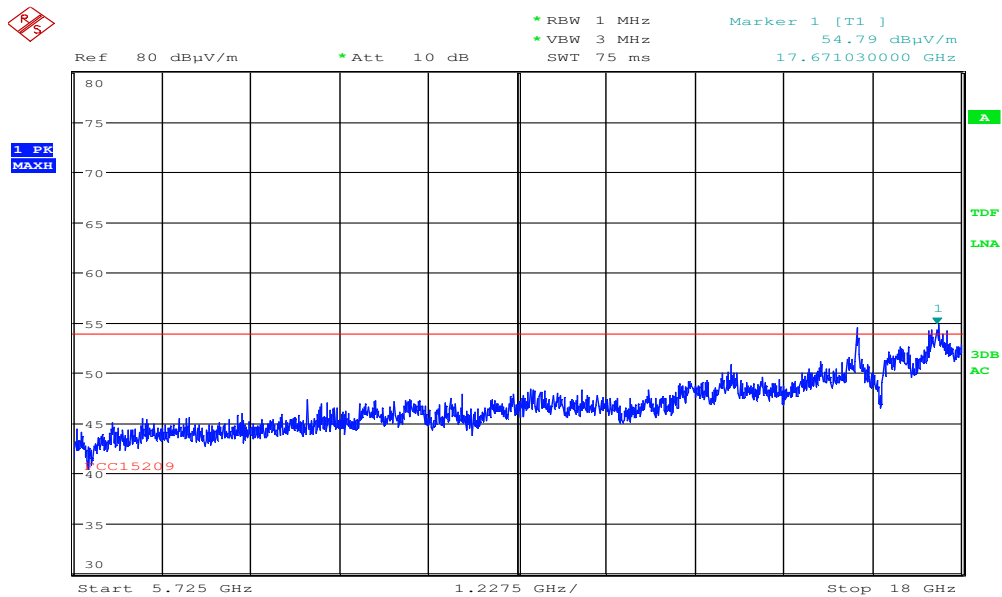
Date: 1.JUN.2018 12:13:12

Radiated Emissions, 5350 – 18000 MHz, 5300 MHz, 802.11n HT20, MIMO, VP



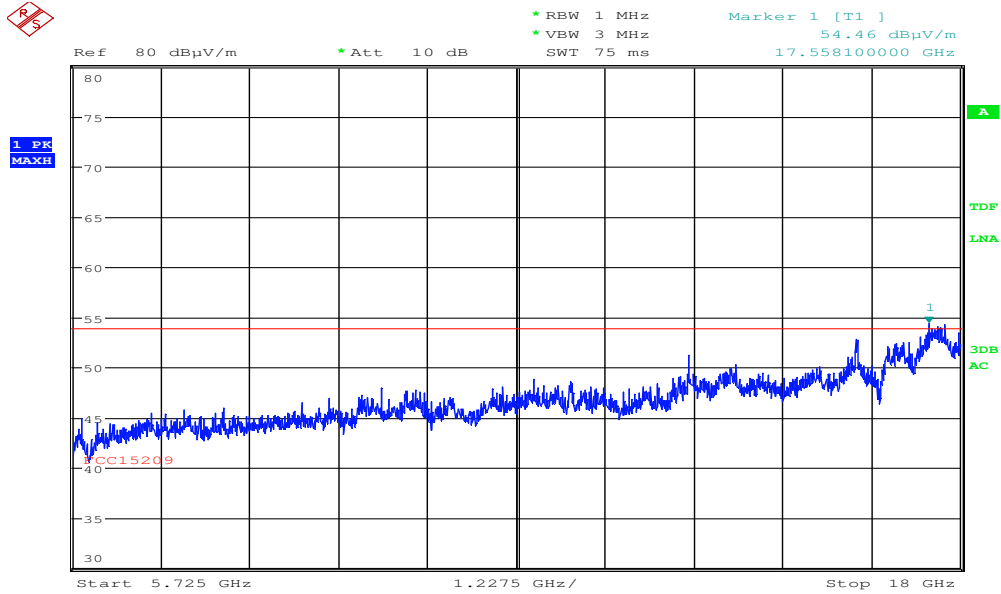
Date: 1.JUN.2018 11:30:28

Radiated Emissions, 5725 – 18000 MHz, 5520 MHz, 802.11a 6M, Ant0, HP



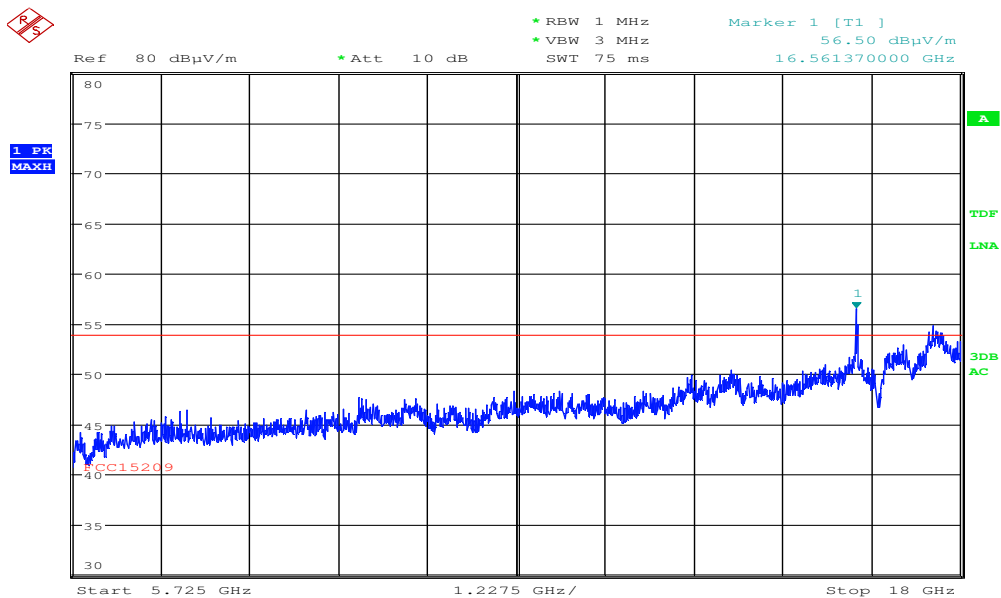
Date: 1.JUN.2018 11:28:27

Radiated Emissions, 5725 – 18000 MHz, 5520 MHz, 802.11a 6M, Ant0, VP



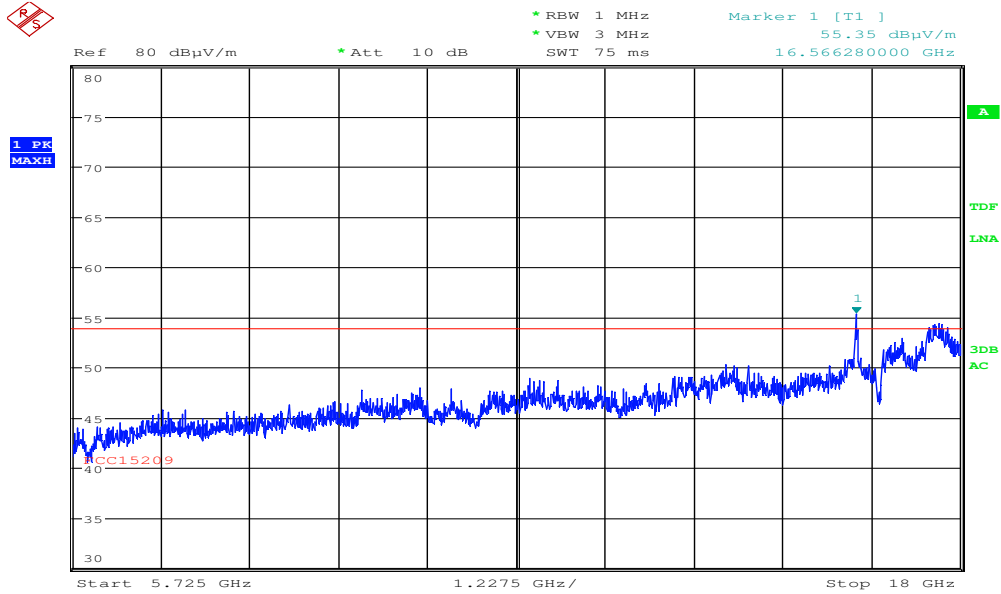
Date: 1.JUN.2018 12:03:10

Radiated Emissions, 5725 – 18000 MHz, 5520 MHz, 802.11a 6M, Ant1, HP



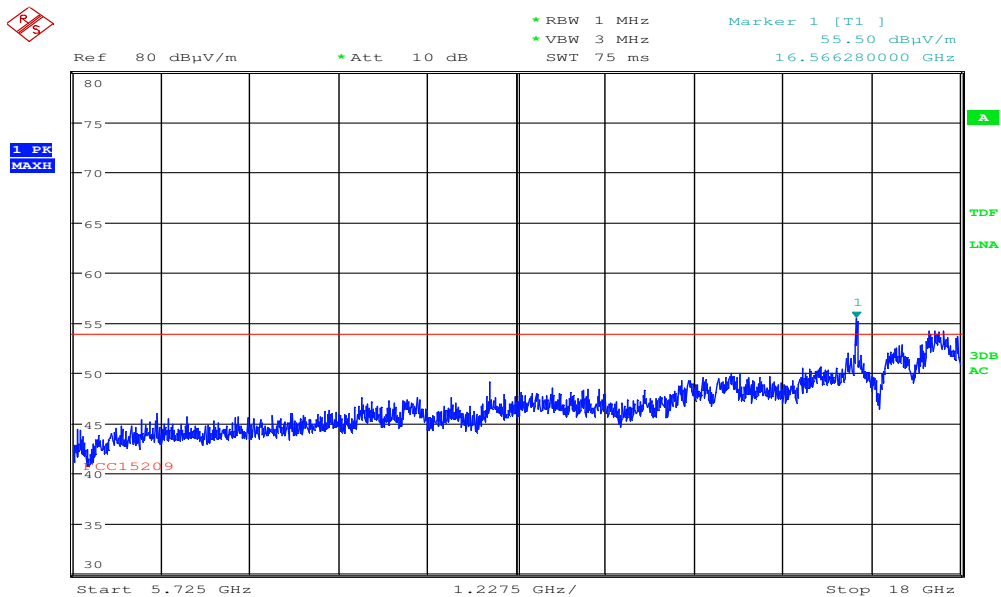
Date: 1.JUN.2018 12:01:09

Radiated Emissions, 5725 – 18000 MHz, 5520 MHz, 802.11a 6M, Ant1, VP



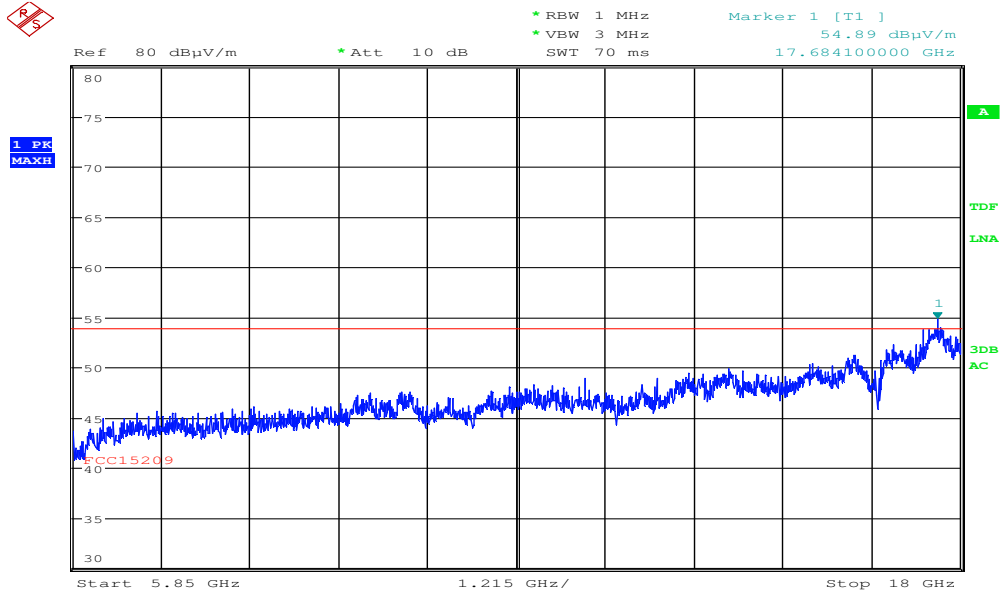
Date: 1.JUN.2018 12:09:26

Radiated Emissions, 5725 – 18000 MHz, 5520 MHz, 802.11n HT20, MIMO, HP



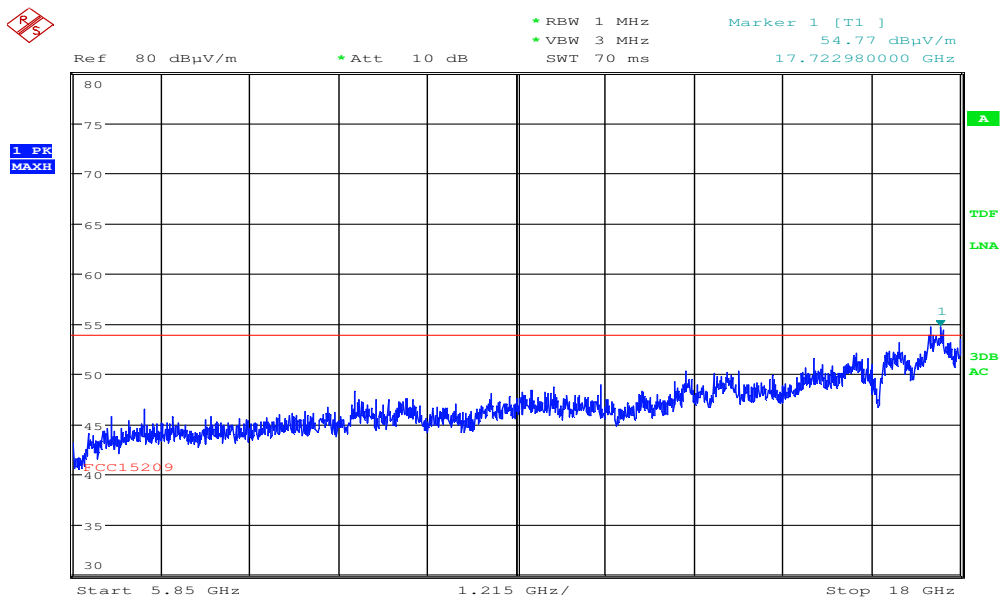
Date: 1.JUN.2018 12:07:25

Radiated Emissions, 5725 – 18000 MHz, 5520 MHz, 802.11n HT20, MIMO, VP



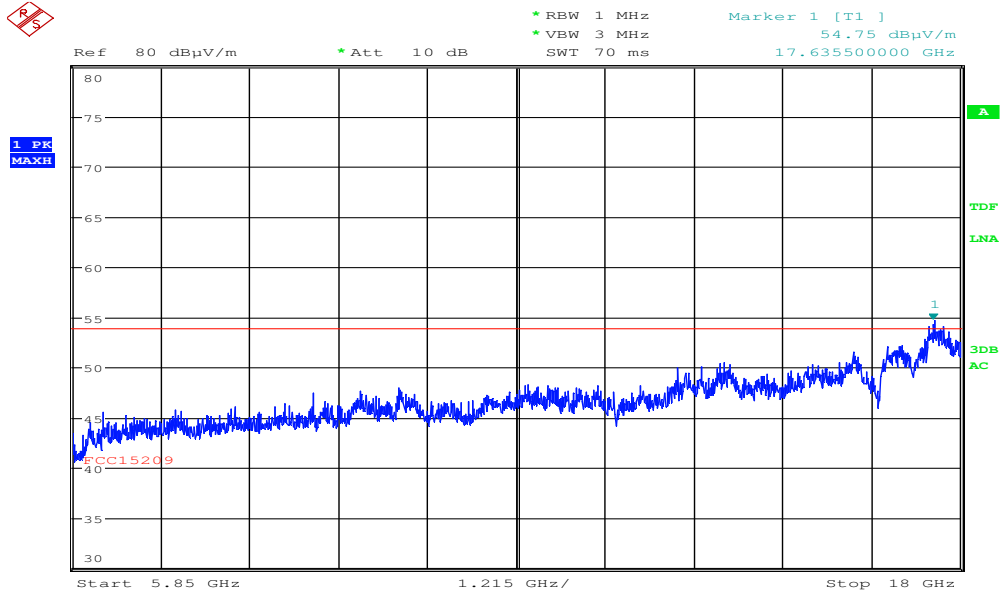
Date: 1.JUN.2018 11:19:25

Radiated Emissions, 5850 – 18000 MHz, 5785 MHz, 802.11a 6M, Ant0, HP



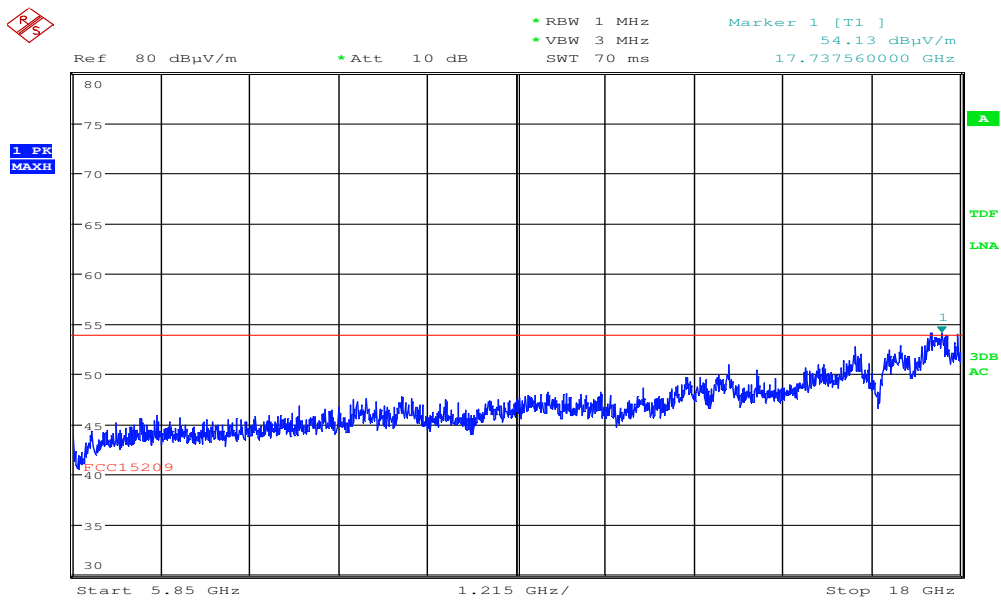
Date: 1.JUN.2018 11:17:23

Radiated Emissions, 5850 – 18000 MHz, 5785 MHz, 802.11a 6M, Ant0, VP



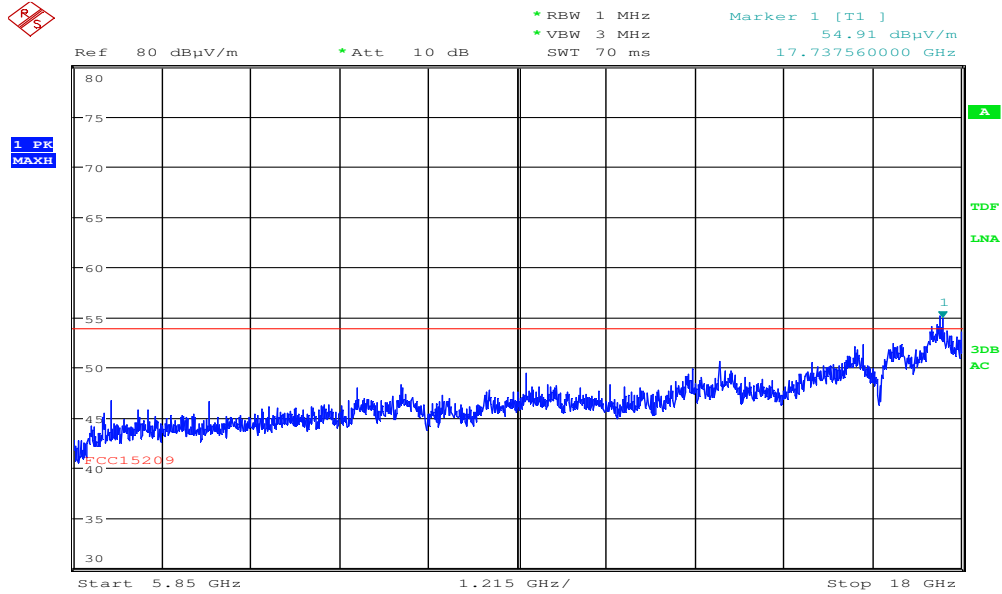
Date: 1.JUN.2018 11:25:04

Radiated Emissions, 5850 – 18000 MHz, 5785 MHz, 802.11a 6M, Ant1, HP



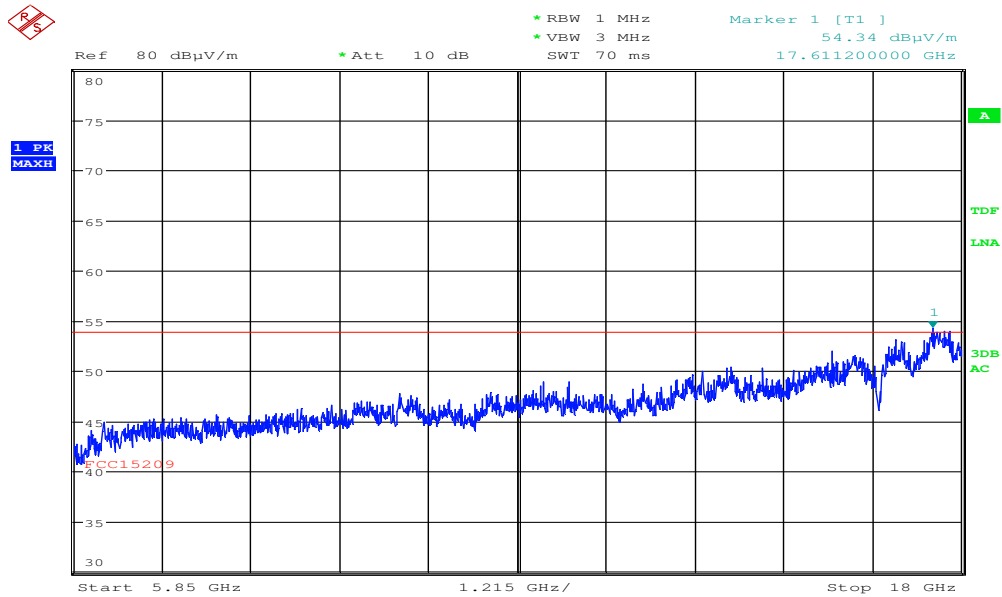
Date: 1.JUN.2018 11:23:03

Radiated Emissions, 5850 – 18000 MHz, 5785 MHz, 802.11a 6M, Ant1, VP



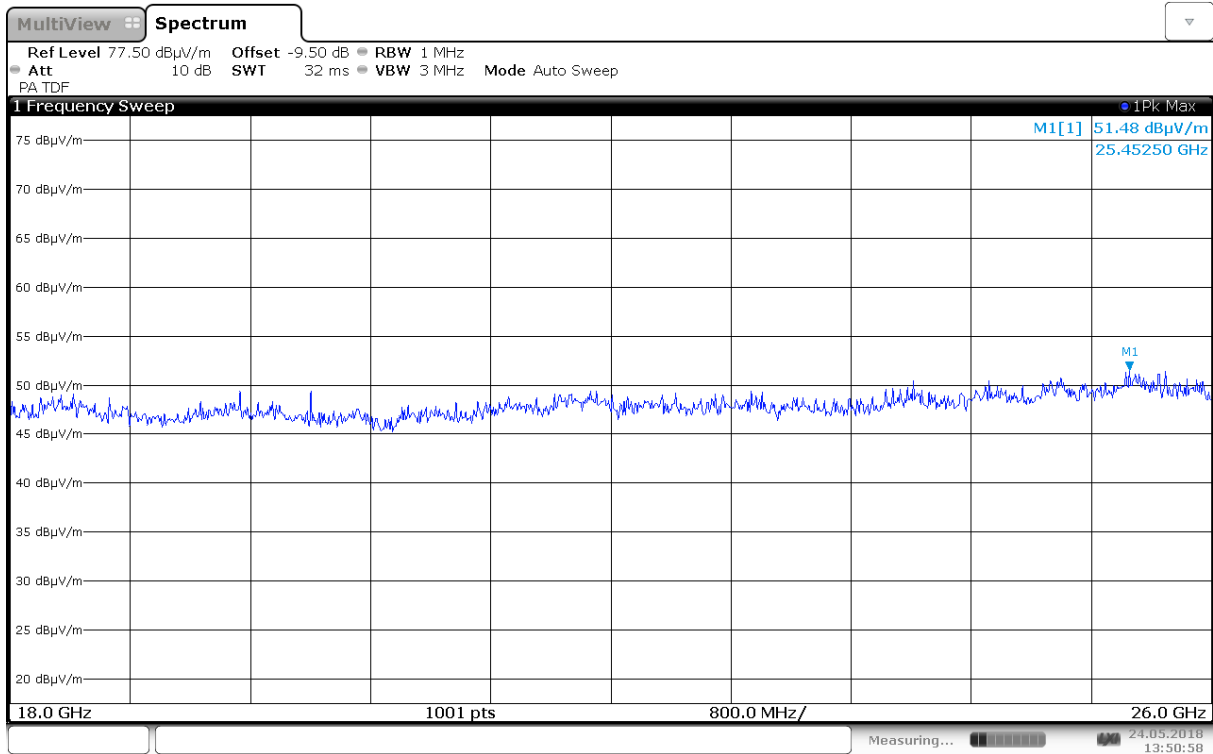
Date: 1.JUN.2018 11:14:40

Radiated Emissions, 5850 – 18000 MHz, 5785 MHz, 802.11n HT20, MIMO, HP

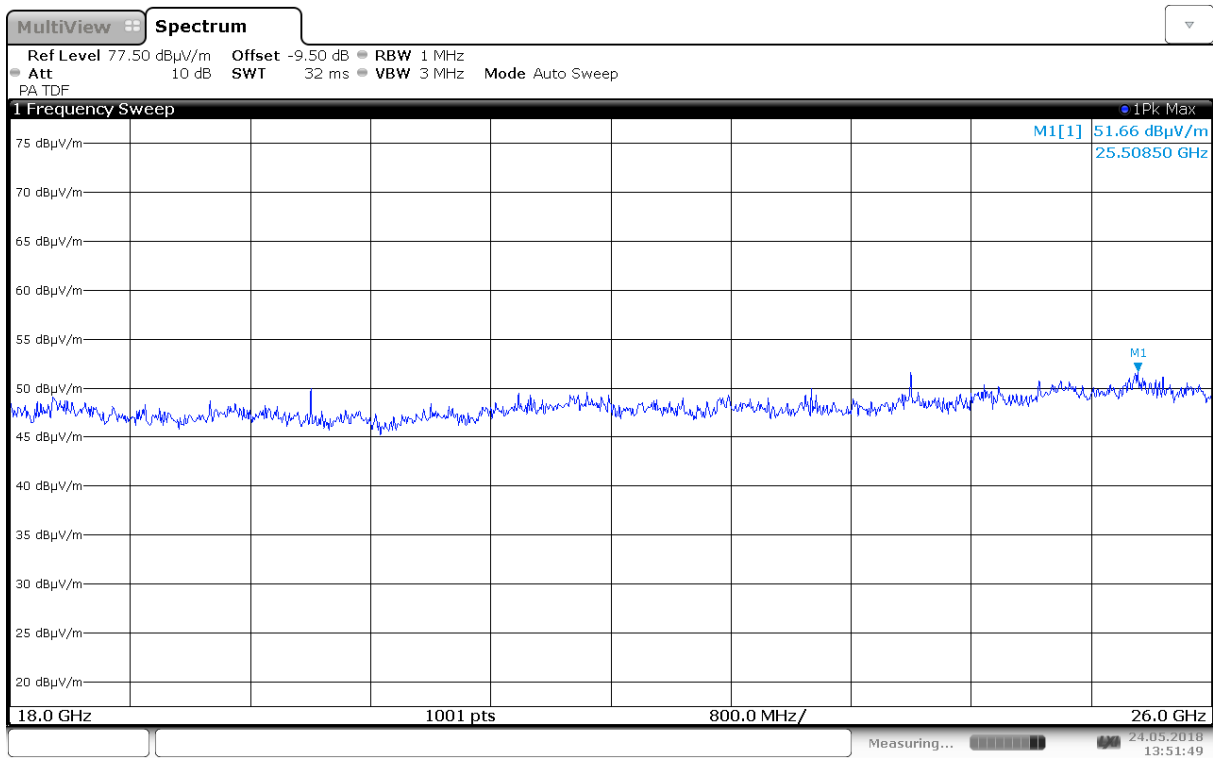


Date: 1.JUN.2018 11:12:39

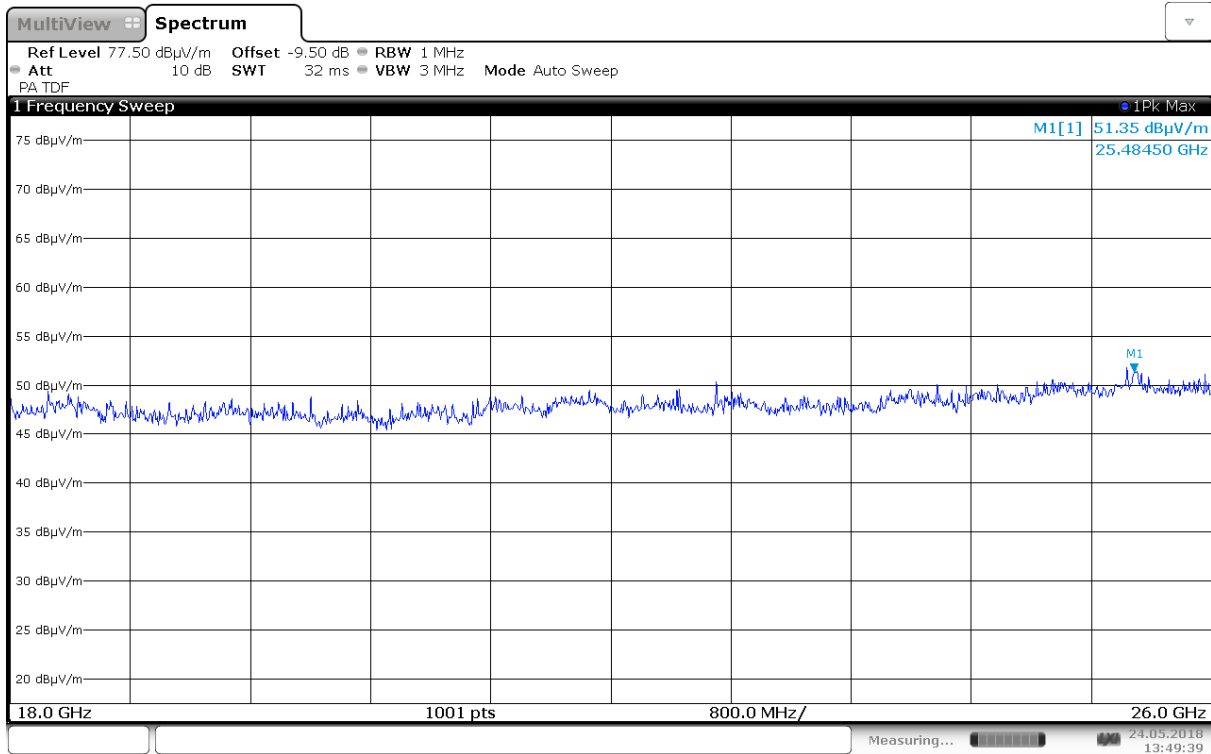
Radiated Emissions, 5850 – 18000 MHz, 5785 MHz, 802.11n HT20, MIMO, VP



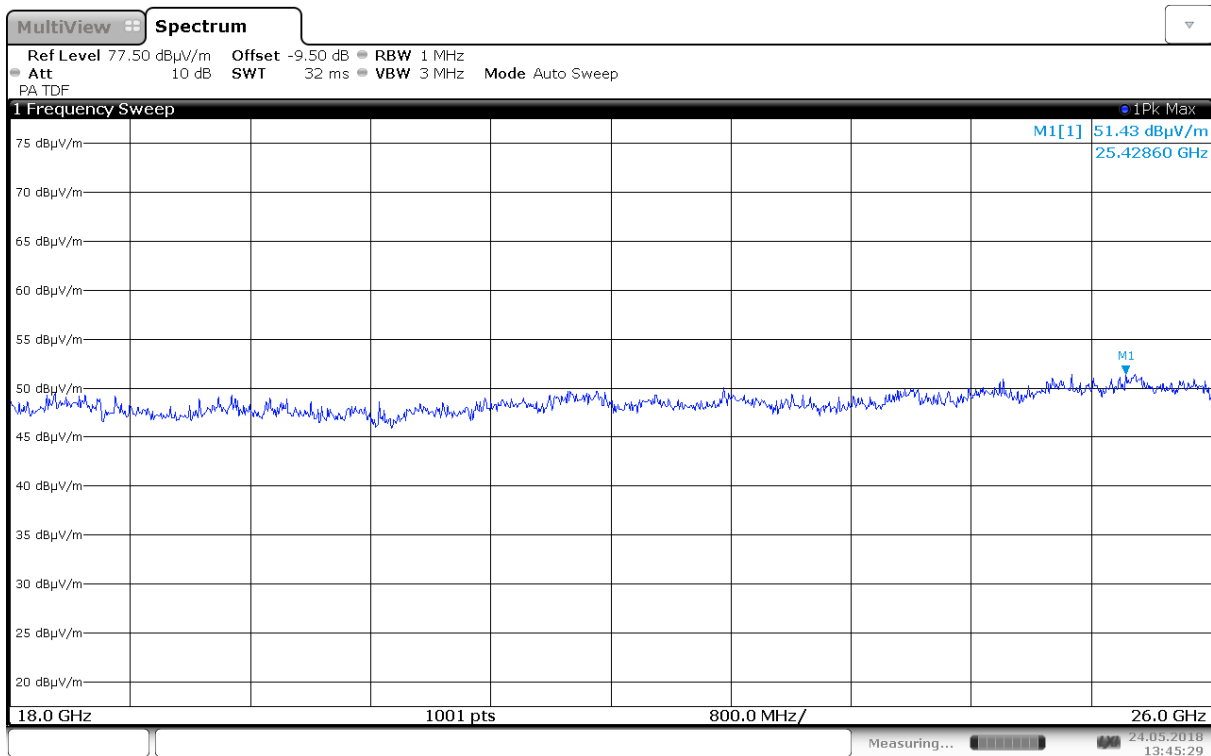
Pre-Scan, 18.0 – 26.0GHz, 5300 MHz, 802.11a 6M, Ant 0, VP/HP, @10cm



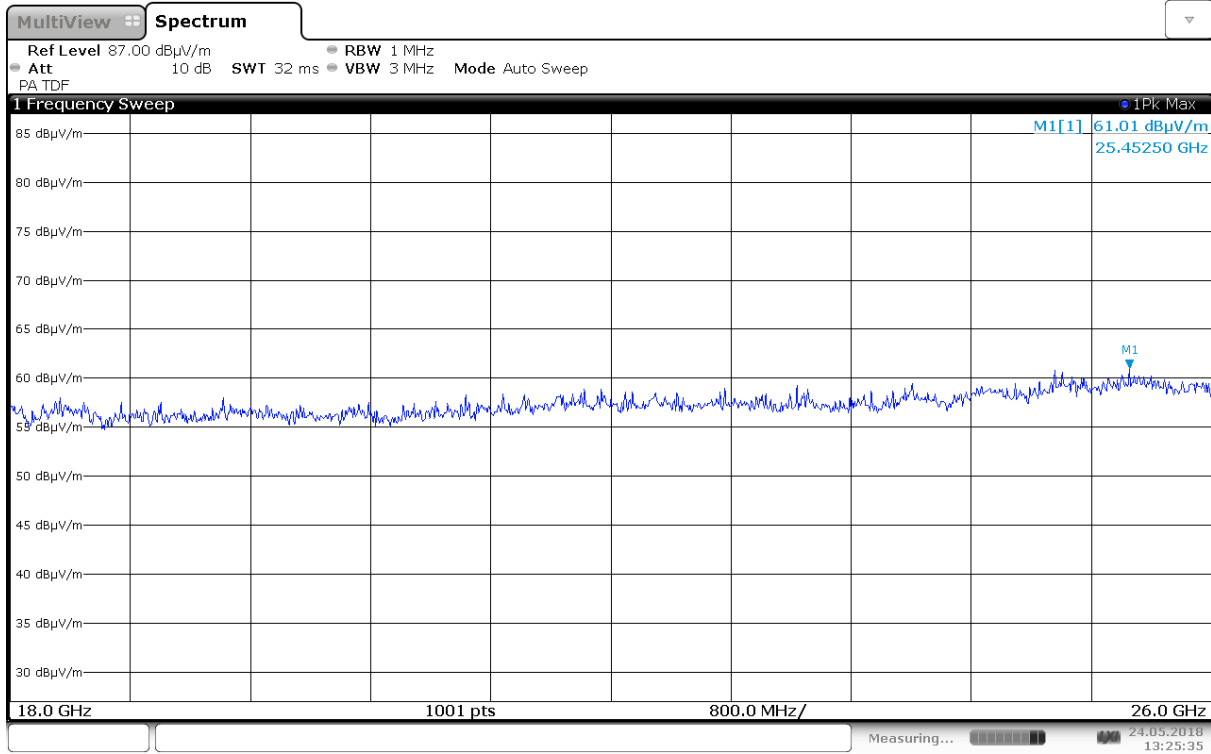
Pre-Scan, 18.0 – 26.0GHz, 5300 MHz, 802.11a 6M, Ant 1, VP/HP, @10cm



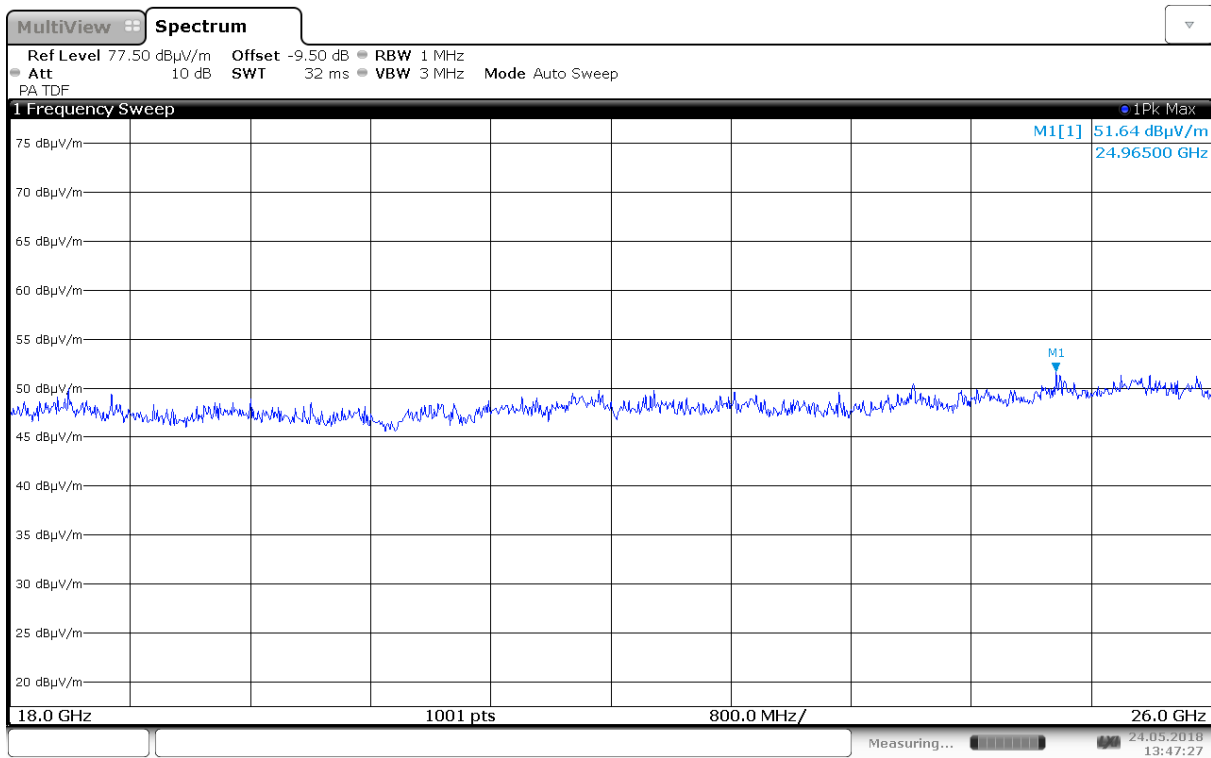
Pre-Scan, 18.0 – 26.0GHz, 5300 MHz, 802.11n HT20, MIMO, VP/HP, @10cm



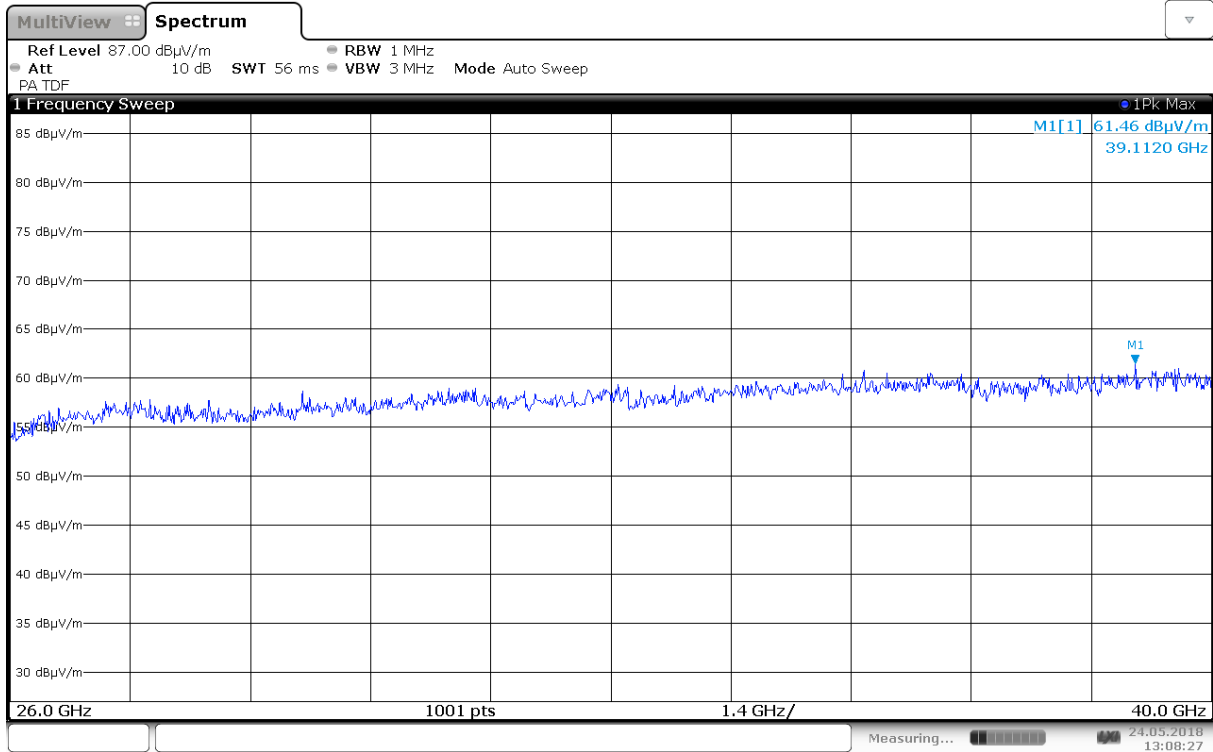
Pre-Scan, 18.0 – 26.0GHz, 5580 MHz, 802.11a 6M, Ant 1, VP/HP, @10cm



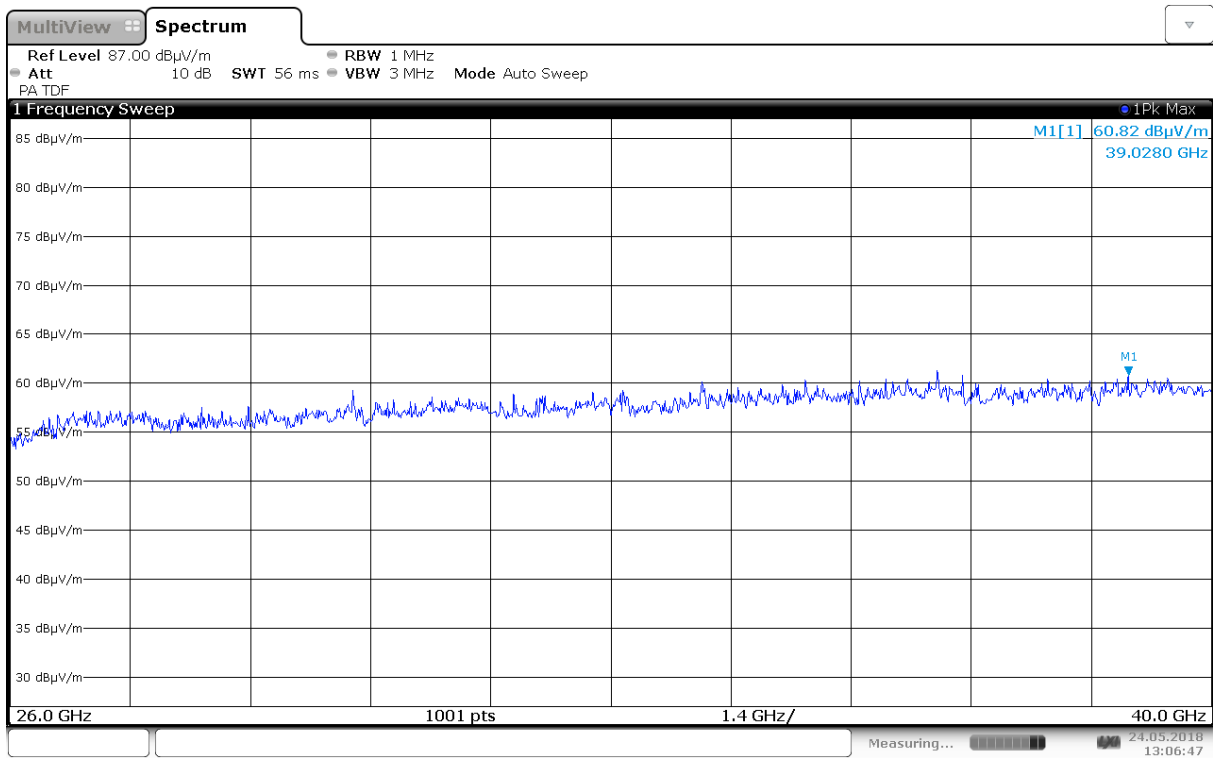
Pre-Scan, 18.0 – 26.0GHz, 5580 MHz, 802.11a 6M, Ant 1, VP/HP, @10cm



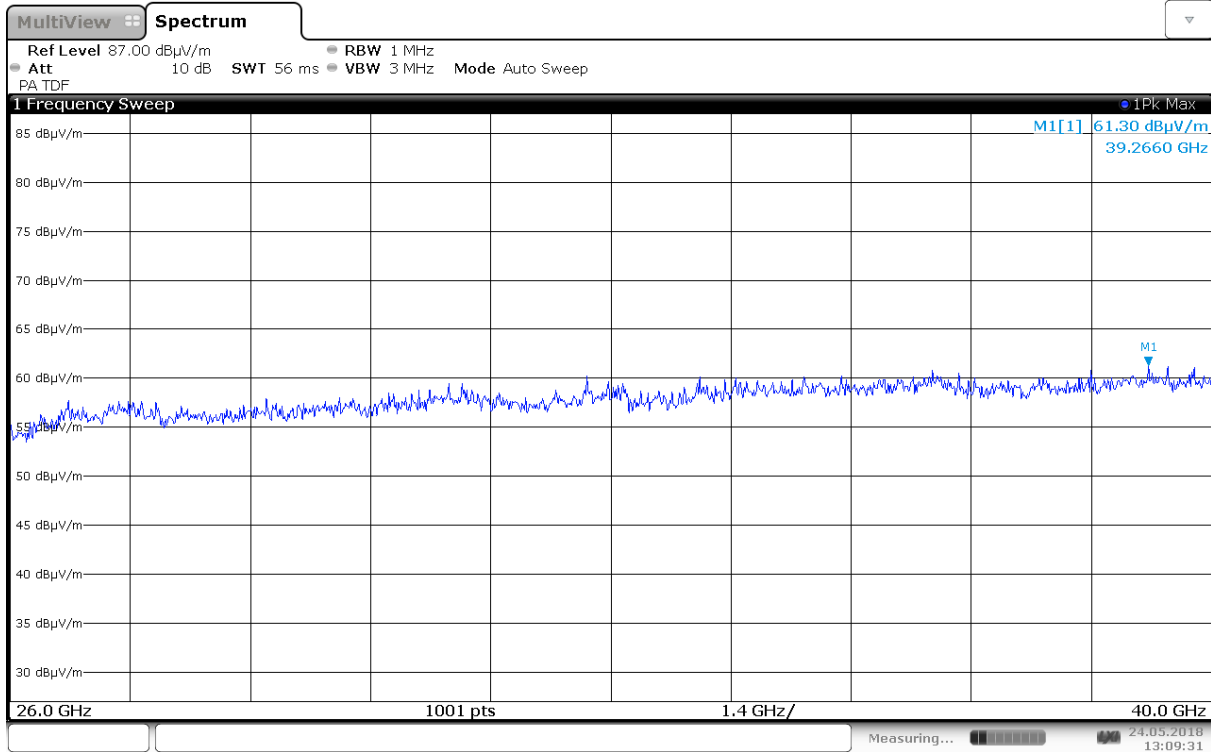
Pre-Scan, 18.0 – 26.0GHz, 5580 MHz, 802.11n HT20, MIMO, VP/HP, @10cm



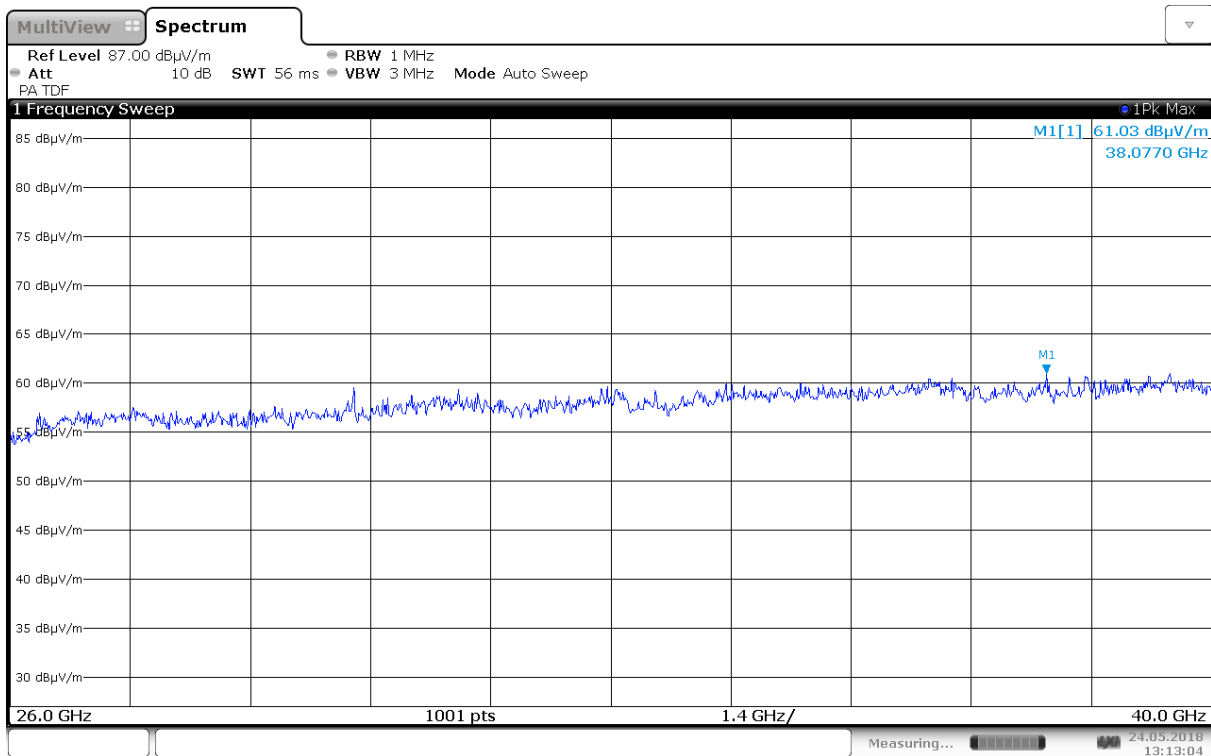
Pre-Scan, 18.0 – 26.0GHz, 5300 MHz, 802.11a 6M, Ant 0, VP/HP, @10cm



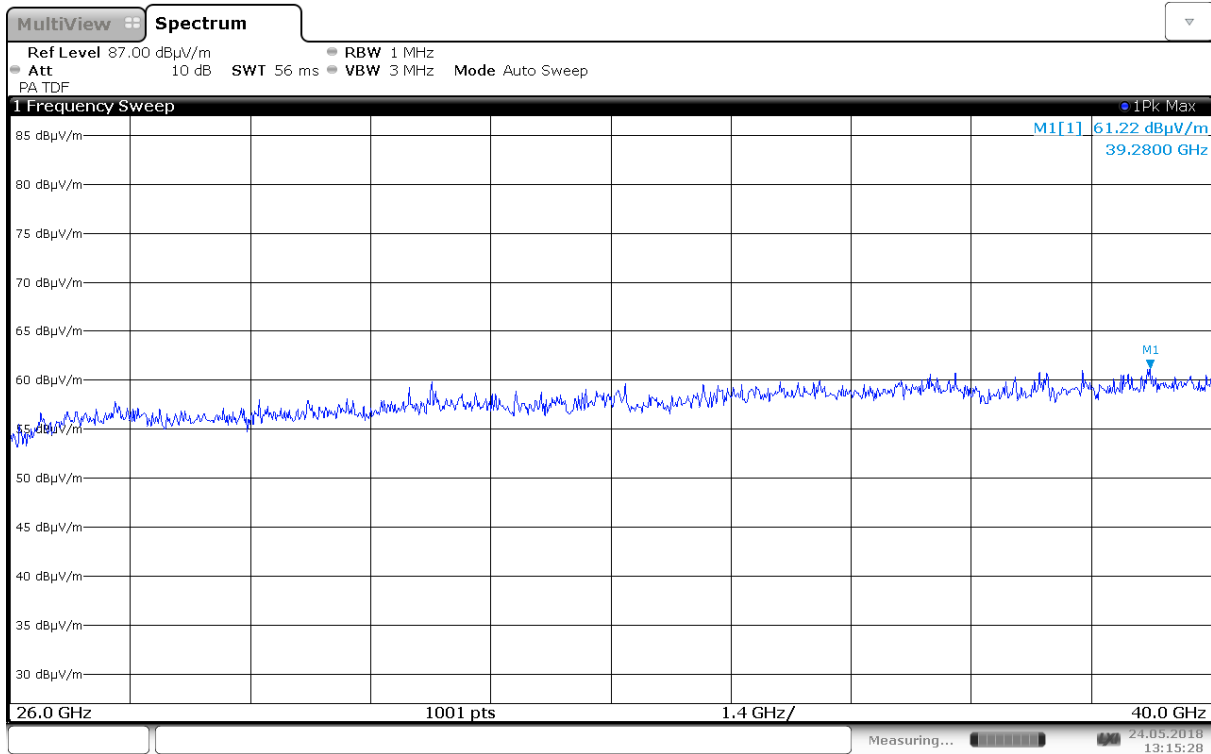
Pre-Scan, 18.0 – 26.0GHz, 5300 MHz, 802.11a 6M, Ant 1, VP/HP, @10cm



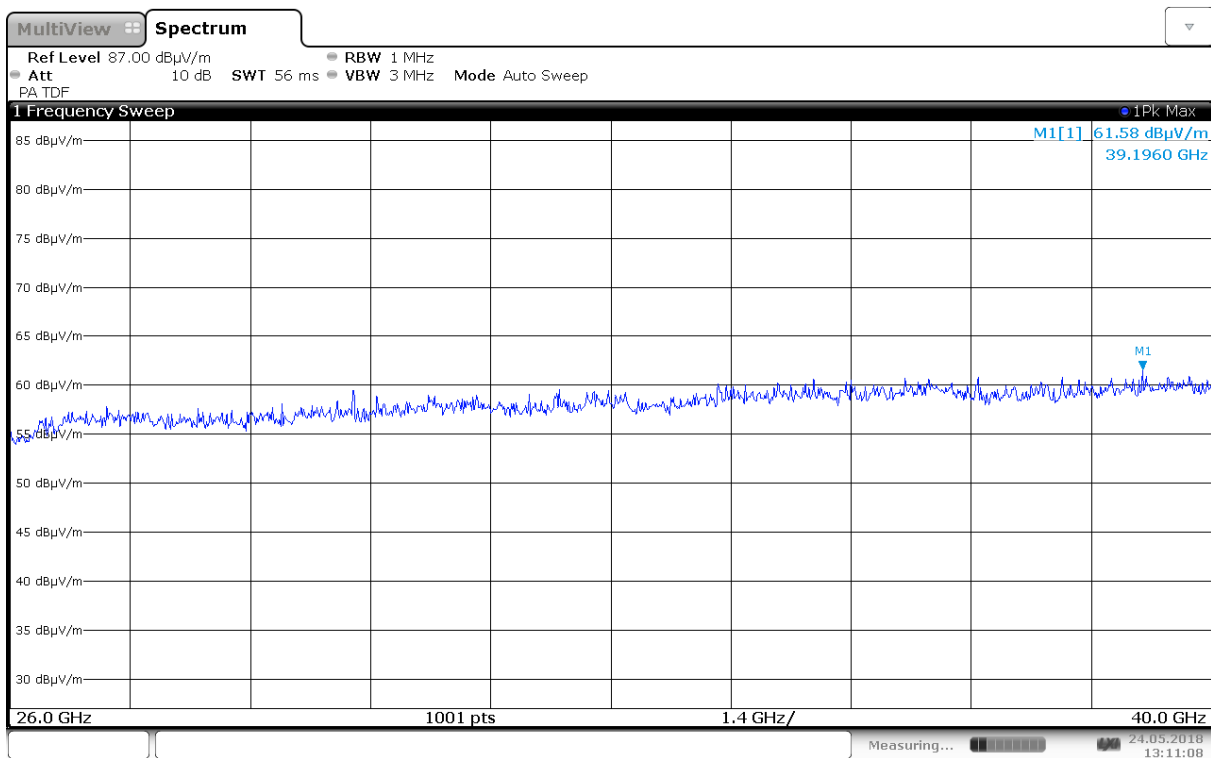
Pre-Scan, 18.0 – 26.0GHz, 5300 MHz, 802. 11n HT20, MIMO, VP/HP, @10cm



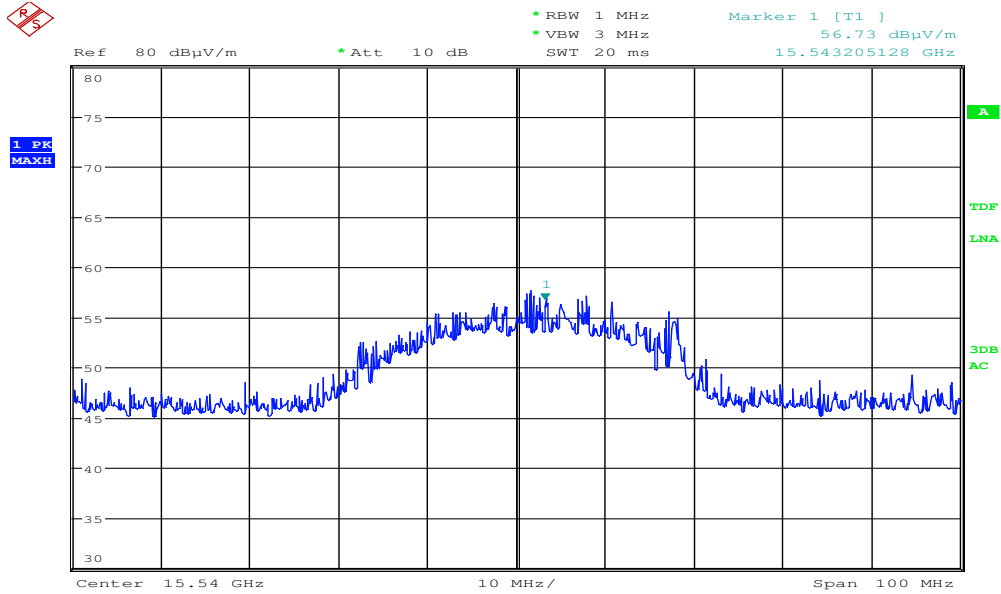
Pre-Scan, 18.0 – 26.0GHz, 5580 MHz, 802.11a 6M, Ant 0, VP/HP, @10cm



Pre-Scan, 18.0 – 26.0GHz, 5580 MHz, 802. 11a 6M, Ant 1, VP/HP, @10cm

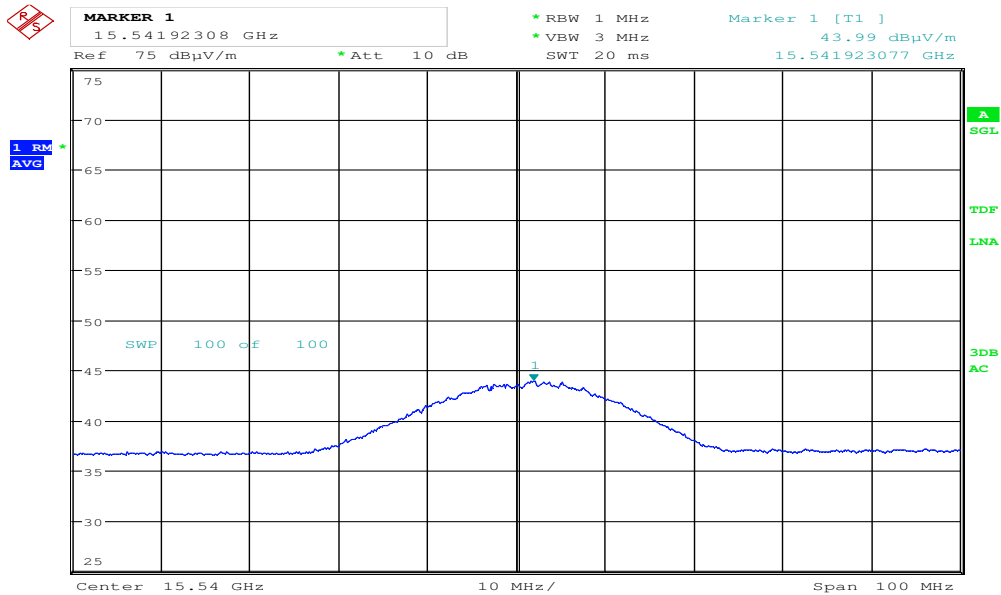


Pre-Scan, 18.0 – 26.0GHz, 5580 MHz, 802.11n HT20, MIMO, VP/HP, @10cm



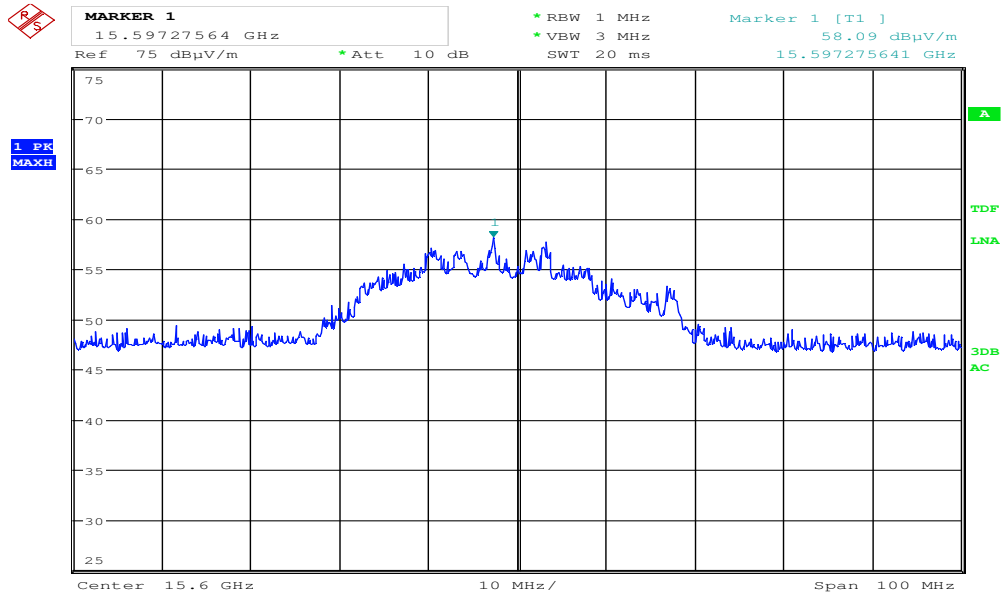
Date: 1.JUN.2018 14:27:41

Radiated Emissions Pk, 15540 MHz, 5180 MHz (Max: 802.11a 6M, Ch 1, HP)



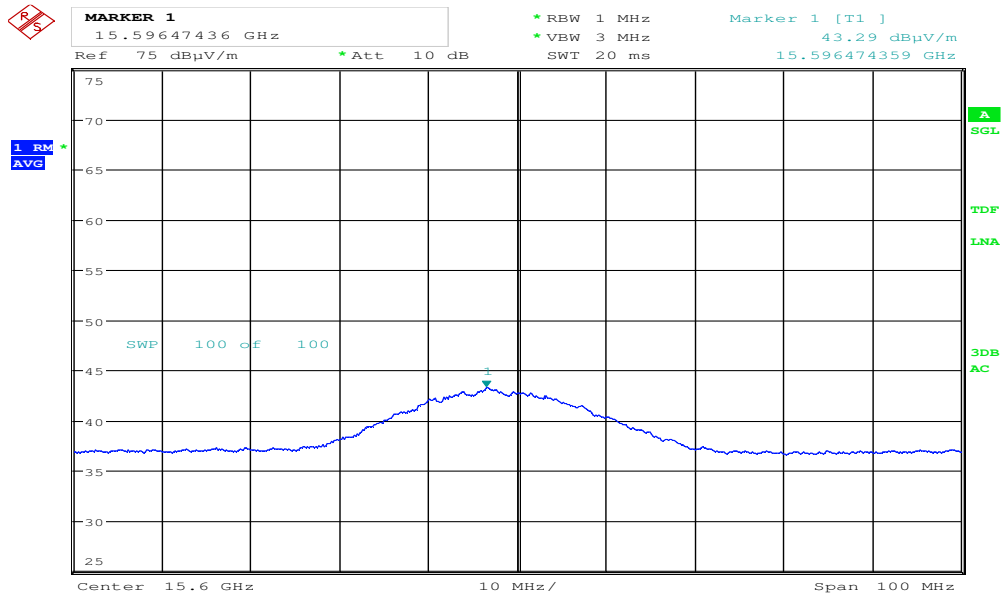
Date: 1.JUN.2018 14:28:54

Radiated Emissions Av, 15540 MHz, 5180 MHz (Max: 802.11a 6M, Ch 1, HP)



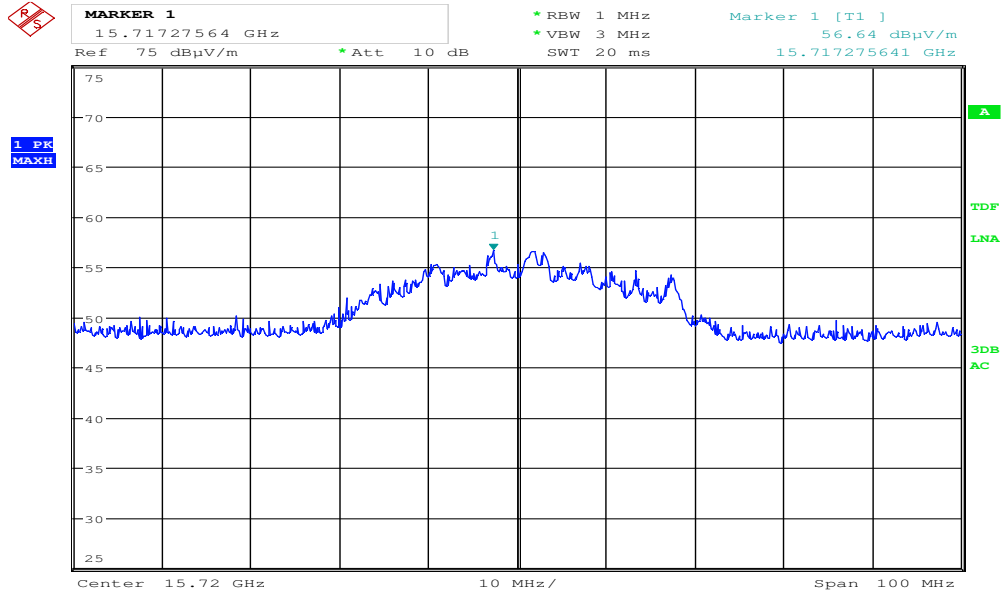
Date: 1.JUN.2018 14:37:53

Radiated Emissions Pk, 15600 MHz, 5200 MHz (Max: 802.11a 6M, Ch 1, HP)



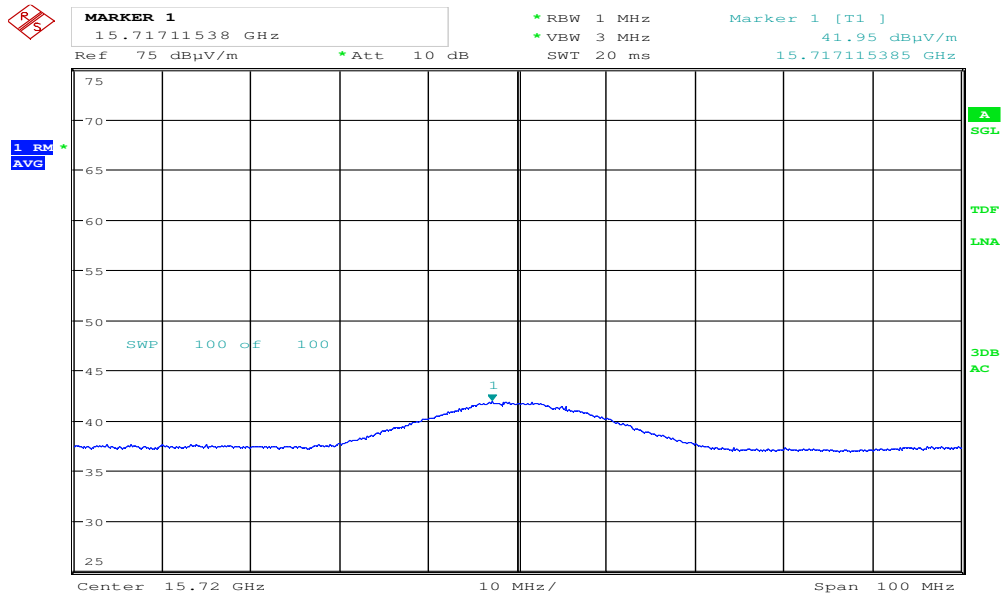
Date: 1.JUN.2018 14:38:54

Radiated Emissions Av, 15600 MHz, 5200 MHz (Max: 802.11a 6M, Ch 1, HP)



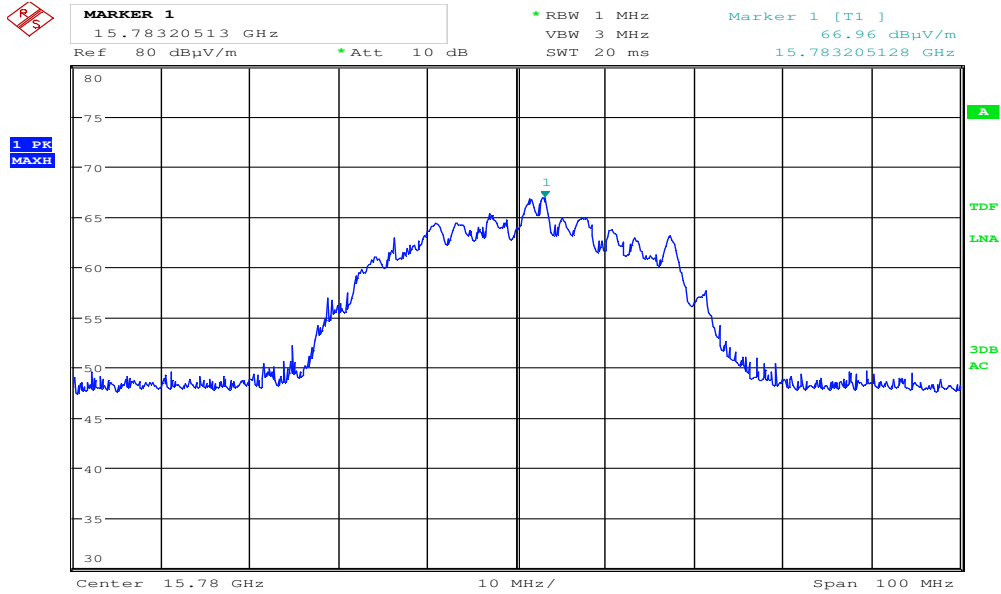
Date: 1.JUN.2018 14:36:28

Radiated Emissions Pk, 15720 MHz, 5240 MHz (Max: 802.11a 6M, Ch 1, HP)



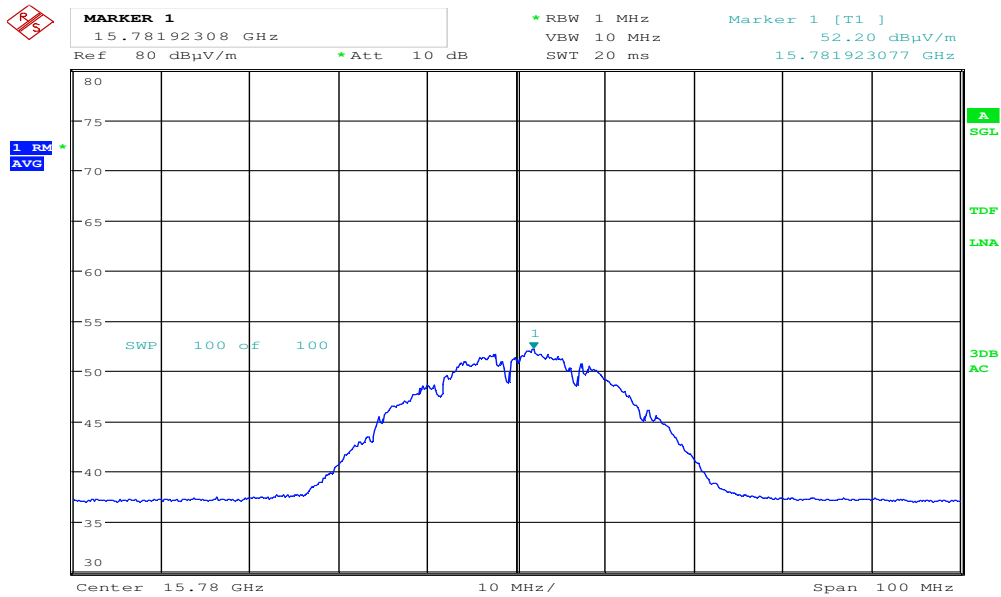
Date: 1.JUN.2018 14:32:15

Radiated Emissions Av, 15720 MHz, 5240 MHz (Max: 802.11a 6M, Ch 1, HP)



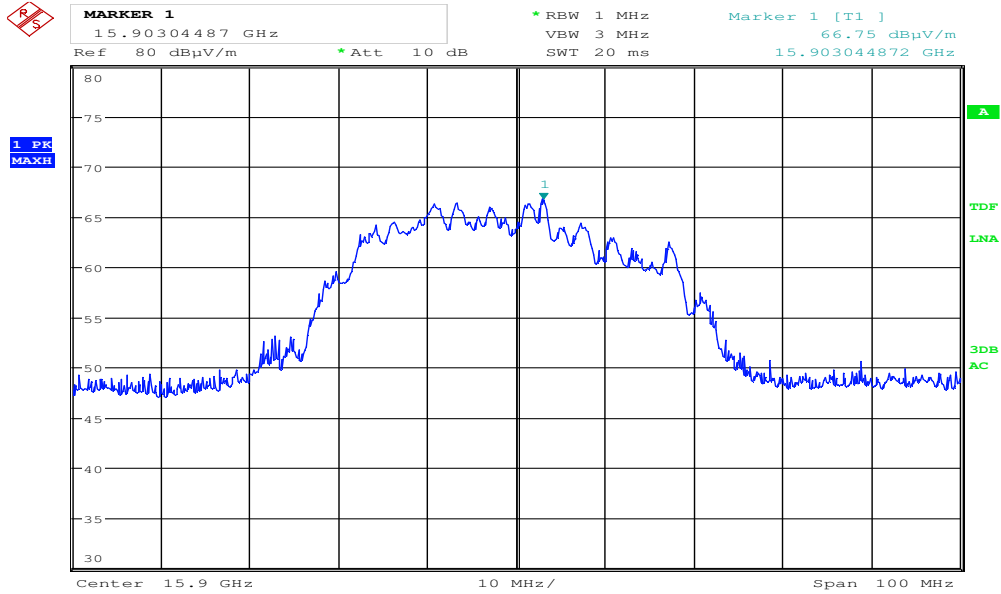
Date: 1.JUN.2018 14:06:45

Radiated Emissions Pk, 15780 MHz, 5260 MHz (Max: 802.11a 6M, Ch 1, HP)



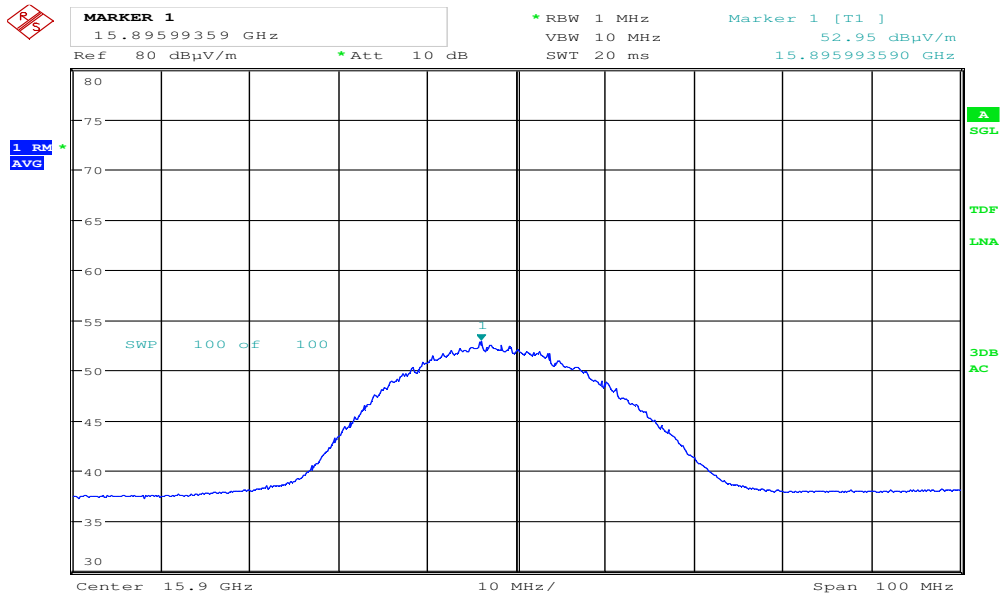
Date: 1.JUN.2018 14:05:12

Radiated Emissions Av, 15780 MHz, 5260 MHz (Max: 802.11a 6M, Ch 1, HP)



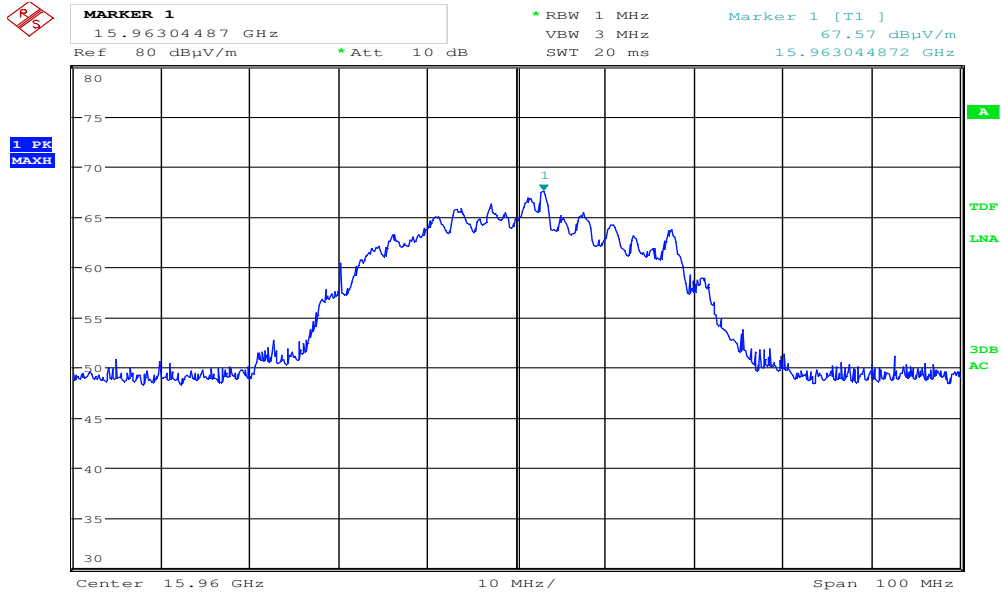
Date: 1.JUN.2018 13:58:28

Radiated Emissions Pk, 15900 MHz, 5300 MHz (Max: 802.11a 6M, Ch 1, HP)



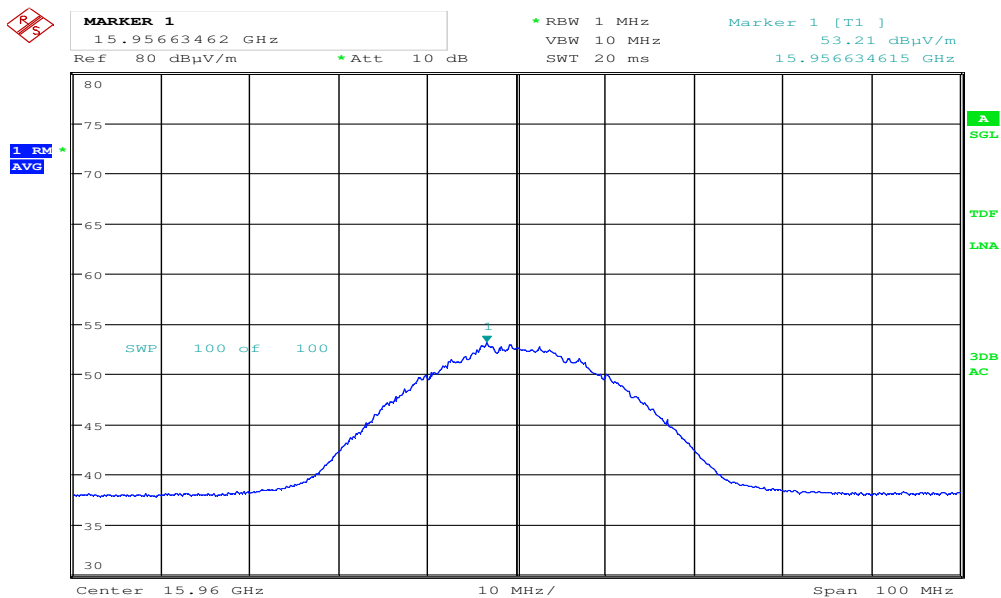
Date: 1.JUN.2018 13:59:33

Radiated Emissions Av, 15900 MHz, 5300 MHz (Max: 802.11a 6M, Ch 1, HP)



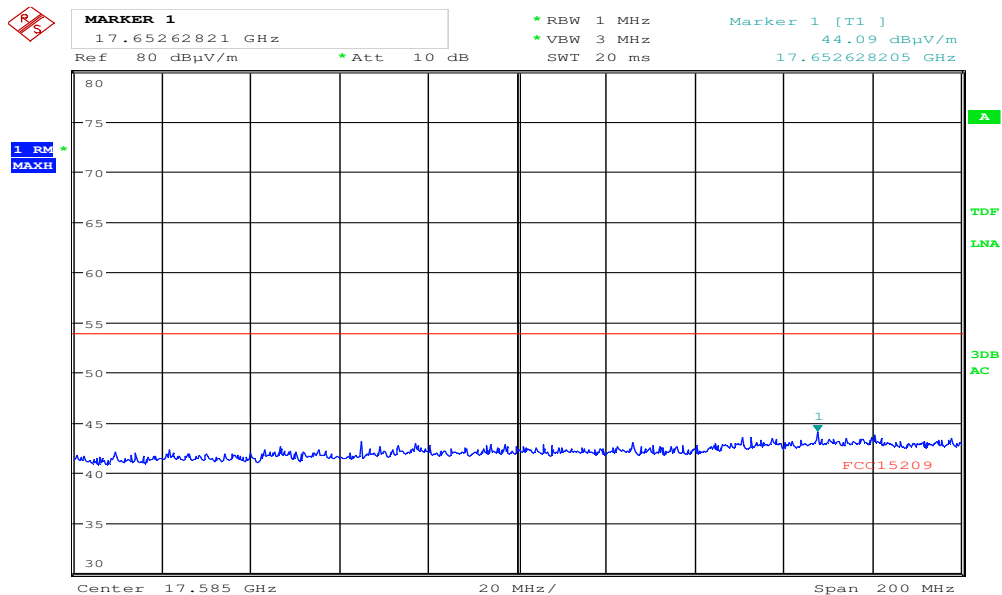
Date: 1.JUN.2018 14:09:56

Radiated Emissions Pk, 15960 MHz, 5320 MHz (Max: 802.11a 6M, Ch 1, HP)



Date: 1.JUN.2018 14:13:04

Radiated Emissions Av, 15960 MHz, 5320 MHz (Max: 802.11a 6M, Ch 1, HP)



Date: 1.JUN.2018 14:56:29

Radiated Emissions Av, 17585 MHz, 5180 MHz (Max: 802.11a 6M, Ant 0, VP/HP)

3 Measurement Uncertainty

Measurement Uncertainty Values		
Test Item		Uncertainty
Output Power		±0.5 dB
Power Spectral Density		±0.5 dB
Out of Band Emissions, Conducted	< 3.6 GHz	±0.6 dB
	> 3.6 GHz	±0.9 dB
Spurious Emissions, Radiated	< 1 GHz	±2.5 dB
	> 1 GHz	±2.2 dB
Emission Bandwidth		±4 %
Power Line Conducted Emissions		+2.9 / -4.1 dB
Spectrum Mask Measurements	Frequency	±5 %
	Amplitude	±1.0 dB
Frequency Error		±0.6 ppm
Temperature Uncertainty		±1 °C

All uncertainty values are expanded standard uncertainty to give a confidence level of 95%, based on coverage factor k=2

4 LIST OF TEST EQUIPMENT

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the Test Laboratory.

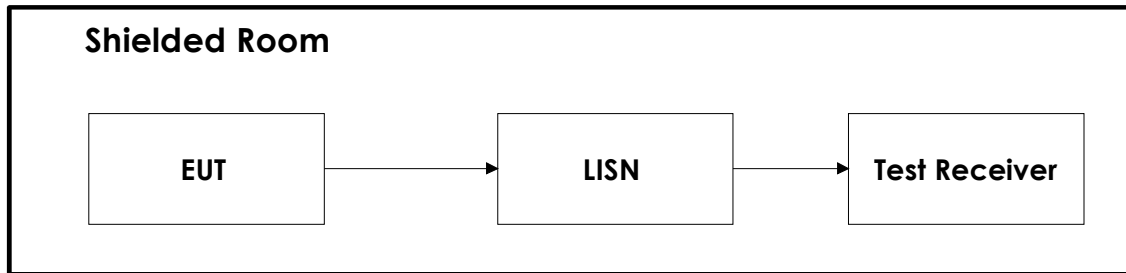
No.	Model	Description	Manufacturer	Asset no.	Cal. date	Cal. Due
1	FSW40	Spectrum Analyzer	Rohde & Schwarz	LR 1690	2018.01	2019.01
2	ESU40	Measuring Receiver	Rohde & Schwarz	LR 1639	2018.03	2019.03
3	WHKX6.5/18G	Highpass Filter	Wainwright Inst.	LR 1619	COU	
4	310	Preamplifier	Sonoma Instrument	LR 1686	2017.08	2018.08
5	317	Preamplifier	Sonoma Instrument	LR 1687	2017.08	2018.08
6	8449A	Pre-amplifier	Hewlett Packard	LR 1322	2017.08	2018.08
7	6812B	AC Power Source	Agilent	LR 1515	COU	
8	3115	Horn Antenna	EMCO	LR 1330	2016.10	2021.10
9	3117-PA	Horn Antenna with Preamp	EMCO	LR 1717	2017.12	2018.12
10	JB3	BiLog Antenna	Sunol	N-4525	2017.11	2020.11
11	638	Antenna Horn	Narda	LR 1480	2010.06	2020.06
12	Model 87 V	Multimeter	Fluke	N-4669	2016.10	2018.10
13	V637	Antenna Horn	Narda	LR 099	2010.06	2020.06
14	JS4-26004000	Preamplifier	Miteq	LR 1591	2017.08	2018.08

COU = Calibrate on use

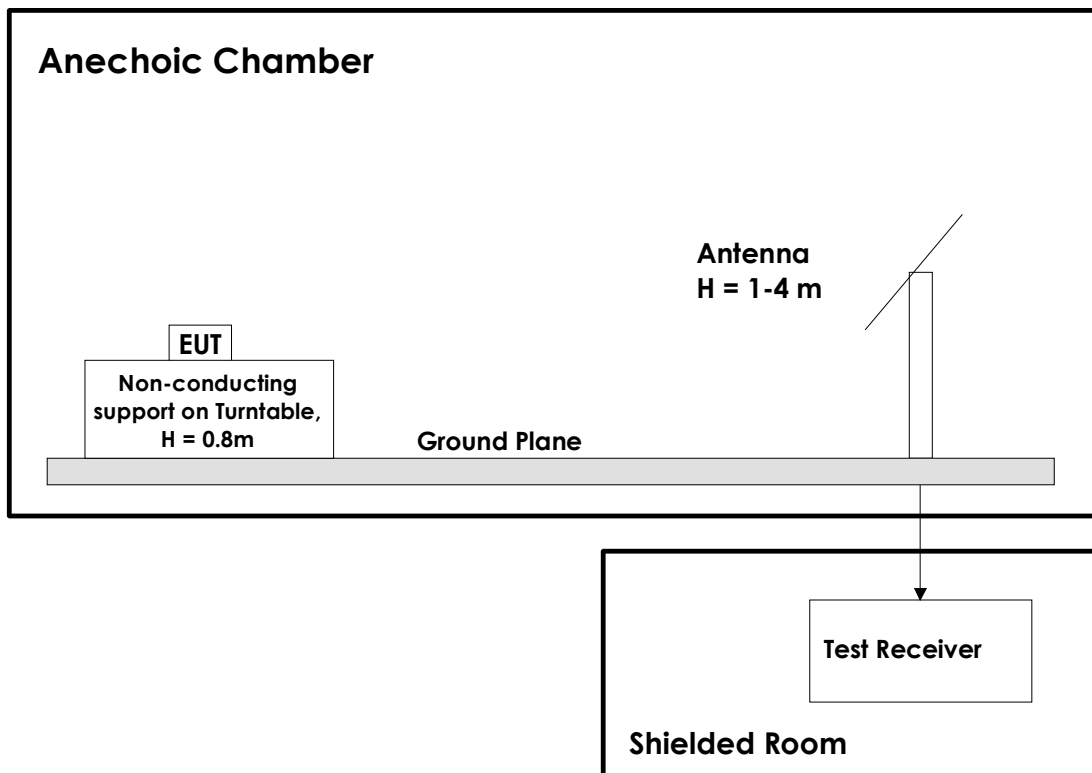
Test Software List			
Description	Manufacturer	Model	Version
EMC Software for Conducted tests	Rohde & Schwarz	EMC32	10.20.01
EMC Software for Radiated tests	Rohde & Schwarz	EMC32	10.20.01

5 BLOCK DIAGRAM

5.1 Power Line Conducted Emission



5.2 Test Site Radiated Emission



All tests below 1 GHz were performed at 3m with ground plane. The EUT was placed on the stand at 0.8m height.

Tests above 1 GHz were performed with the space between the EUT and the antenna covered by absorbers. The EUT was placed on a 1.5m high stand. Tests from 1 GHz to 18 GHz were performed @3m distance. Tests above 18 GHz were performed @1m distance.

The antenna was raised from 1 to 4m and the turntable rotated from 0 to 360 degrees to maximize any emissions found.

Revision history

Version	Date	Comment	Sign
1.0	2018.07.10	First edition	FS
1.1	2018.07.19	Minor corrections	FS