FCC / ISED Test Report

FOR:
Juniper Systems, Inc.

Model Name:
MS3

Product Description:
Ultra-rugged handheld computer with Windows 10, providing long battery life, 7-inch touchscreen display, programmable keys, 802.11ac, Bluetooth, camera

FCC ID: VSFMS3
IC ID: 7980A-MS3

Applied Rules and Standards:
47 CFR Part 15.407 (UNII) & 5GHz (UNII)
RSS-247 Issue 2 (DTSs) & (LE-LAN), and RSS-Gen Issue 5

REPORT #: EMC_JUNIP-026-19001_15.407_UNII

DATE: 2019-03-27

A2LA Accredited

IC recognized #
3462B-2

***CETECOM* Inc.**
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CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

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1 Assessment

The following device was evaluated against the applicable criteria specified in FCC rules Parts 15.407 of Title 47 of the Code of Federal Regulations and the relevant ISED Canada standard RSS-247.

No deviations were ascertained.

Company	Description	Model #
Juniper Systems, Inc.	Ultra-rugged handheld computer with Windows 10, providing long battery life, 7-inch touchscreen display, programable keys, 802.11ac, Bluetooth, camera	MS3

Responsible for Testing Laboratory:

Date	Section	Name	Signature
2019-03-27	Compliance	Cindy Li (EMC Lab Manager)	Cindy Li Digitally signed by Cindy Li DN: cn=Cindy Li, o=Cetecom Inc., ou=EMC, email=cindy.li@cetecom.com, c=US Date: 2019.04.26 14:35:24 -07'00'

Responsible for the Report:

Date	Section	Name	Signature
2019-03-27	Compliance	Yuchan Lu (Test Engineer)	Yuchan Lu Digitally signed by: Yuchan Lu DN: CN = Yuchan Lu email = Yuchan.Lu@cetecom.com C = US O = CETECOM Inc. OU = EMC Date: 2019.04.26 14:24:16 -07'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
EMC Lab Manager:	Cindy Li
Responsible Project Leader:	Sangeetha Sivaraman

2.2 Identification of the Client

Applicant's Name:	Juniper Systems, Inc.
Street Address:	1132 W 1700 N
City/Zip Code:	Logan, UT 84321
Country:	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	The same as client
Manufacturers Address:	N/A
City/Zip Code	N/A
Country	N/A

3 Equipment under Test (EUT)

3.1 EUT Specifications

Model No:	MS3
HW Version :	MS3_00
SW Version :	MS3_SW_00
FCC-ID:	VSFMS3
IC-ID:	7980A-MS3
HVIN:	MS3
PMN:	Mesa 3
Product Description:	Ultra-rugged handheld computer with Windows 10, providing long battery life, 7-inch touchscreen display, programable keys, 802.11ac, Bluetooth, camera
Frequency Range / number of channels:	Center to center: 5180 MHz (ch 36) – 5240 MHz (ch 48), 4 channels 5260 MHz (ch 52) – 5320 MHz (ch 64), 4 channels 5500 MHz (ch 100) – 5720 MHz (ch 140), 9 channels; band 5600-5650MHz are excluded 5745 MHz (ch 149) – 5825 MHz (ch 165), 5 channels
Type(s) of Modulation:	OFDM
Modes of Operation:	802.11a/n/ac, 20MHz, 40MHz, 80MHz SISO & MIMO (2X2)
Antenna Information as declared:	PCB Trace, Primary chain: 3.1dBi@5180MHz, 4.1dBi@5500MHz, 4.3dBi@5825MHz Second chain: -2.5dBi@5180MHz, 0.7dBi@5500MHz, -5.6dBi@5825MHz
Max. Peak Output Power:	Conducted Power 16.36 dBm
Power Supply/ Rated Operating Voltage Range:	Battery: Vmin: 6 VDC/ Vnom: 7.3 VDC / Vmax: 7.3 VDC Charger: Vmin: 9.9 VDC/ Vnom: 12 VDC / Vmax: 15.6 VDC
Operating Temperature Range:	-20 ºC to +50 ºC
Other Radios included in the device:	Bluetooth BR / EDR, BLE WIFI 802.11b/g/n; WCDMA; LTE; GPS; RFID
Sample Revision:	☐Prototype Unit; ■Production Unit; ☐Pre-Production

3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	MS3W-C01	MS3_00	MS3_SW_00	Conducted RF
2	MS3W-C03	MS3_00	MS3_SW_00	Radiated Emissions

3.3 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number
1	Switching power supply	PSAA30R-120	Phihong Technology	P74900943A1

3.4 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#1 + AE#1	The radio of the EUT was configured to a fixed channel transmission with highest possible duty cycle using “wl command” with the input provided by client that is not available to the end user. The measurement equipment was connected to the 50 ohm RF port of the EUT.
2	EUT#2 + AE#1	The radio of the EUT was configured to a fixed channel with highest possible duty cycle using “wl command” with the input provided by client that is not available to the end user.

3.5 Justification for Worst Case Mode of Operation

During the testing process, the EUT was tested with transmitter sets on low, mid and high channels with the highest possible duty cycle. For radiated measurements, all data in this report shows the worst case between horizontal and vertical antenna polarizations and for all orientations of the EUT.

The EUT was configured by using "wl command" with the input provided by client (not available to the end user). The output power was fixed in the configuration file "US_ISED_HS2B56_NVRAM_V1.1_20190227_Rev00.txt" and can't be changed during testing

4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to assess the performance of the EUT according to the relevant requirements specified in FCC rules Part 15.407 of Title 47 of the Code of Federal Regulations and Radio Standard Specification RSS-247 of ISED Canada.

Testing procedures are based on 789033 D02 DTS UN-II Test Procedures New Rules v02r01 – "GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES (PART 15, SUBPART E)" - May 2, 2017, by the Federal Communications Commission, Office of Engineering and Technology, Laboratory Division.

5 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	NA	NP	Result
§15.407(e) RSS-247 6	Emission Bandwidth	Nominal	802.11 a/n/ac	■	☐	☐	Complies
§15.407(a) RSS-247 6	Power Spectral Density	Nominal	802.11 a/n/ac	■	☐	☐	Complies
§15.407(a) RSS-247 6	Maximum Conducted Output Power and EIRP	Nominal	802.11 a/n/ac	■	☐	☐	Complies
§15.407(b) RSS-247 6; RSS-Gen 8.9; 8.10	Band edge compliance Unrestricted Band Edges	Nominal	802.11 a/n/ac	■	☐	☐	Complies
§15.407(b); 15.209; 15.205 RSS-247 6; RSS-Gen 8.9; 8.10	Band edge compliance Restricted Band Edges	Nominal	802.11 a/n/ac	■	☐	☐	Complies
§15.407(b); §15.209; 15.205 RSS-247 6; RSS-Gen 8.9; 8.10	TX Spurious emissions-Radiated	Nominal	802.11 n_HT20 MIMO	■	☐	☐	Complies
§15.407(g)	Frequency stability	Extreme temperature -20°C-50°C	802.11 a_2* Tx	■	☐	☐	Complies
§15.207(a) RSS Gen 8.8	AC Conducted Emissions	Nominal	802.11 a_2* Tx	■	☐	☐	Complies

Note: NA= Not Applicable; NP= Not Performed.

6 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=1.

Radiated measurement

9 kHz to 30 MHz	±2.5 dB (Magnetic Loop Antenna)
30 MHz to 1000 MHz	±2.0 dB (Biconilog Antenna)
1 GHz to 40 GHz	±2.3 dB (Horn Antenna)

Conducted measurement

150 kHz to 30 MHz	±0.7 dB (LISN)

RF conducted measurement	±0.5 dB

According to TR 102 273 a multiplicative propagation of error is assumed for RF measurement systems. For this reason the RMS method is applied to dB values and not to linear values as appropriate for additive propagation of error. Also used: http://physics.nist.gov/cuu/Uncertainty/typeb.html. The above calculated uncertainties apply to direct application of the Substitution method. The Substitution method is always used when the EUT comes closer than 3 dB to the limit.

6.1 Environmental Conditions during Testing:

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25° C
- Relative humidity: 40-60%

6.2 Dates of Testing:

03/11/2019 - 3/27/2019

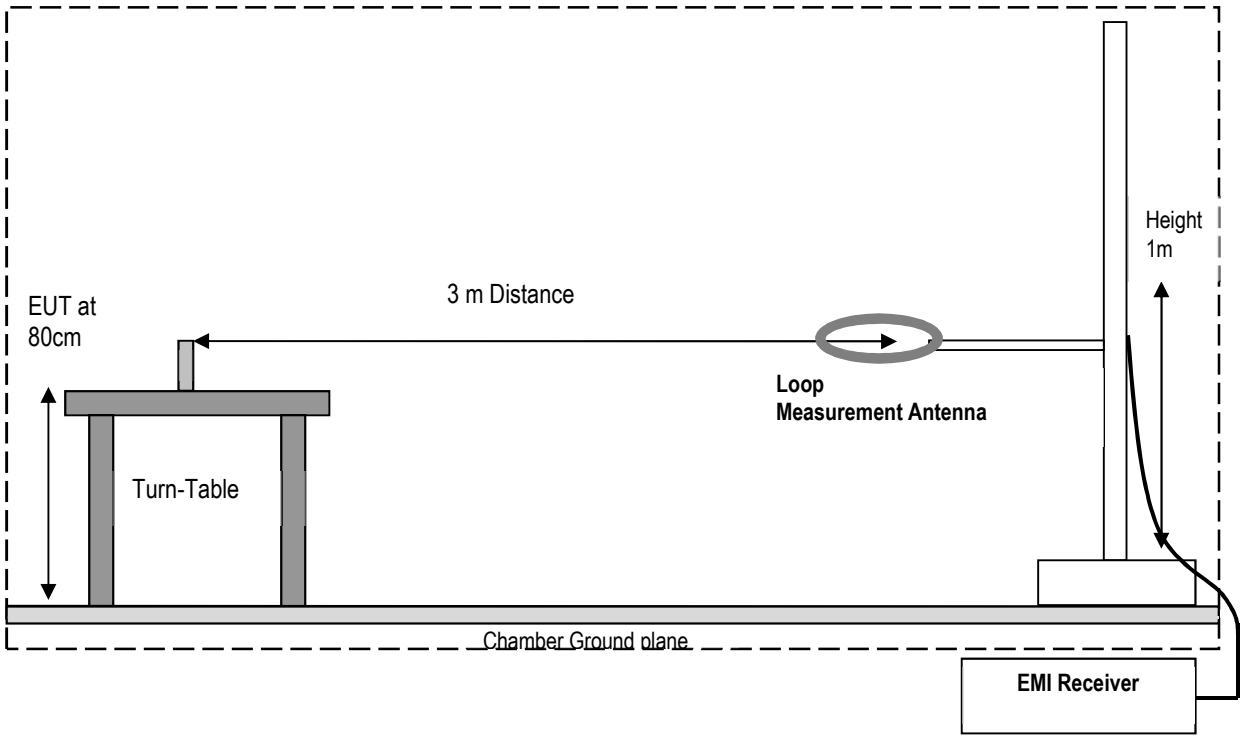
7 Measurement Procedures

7.1 Radiated Measurement

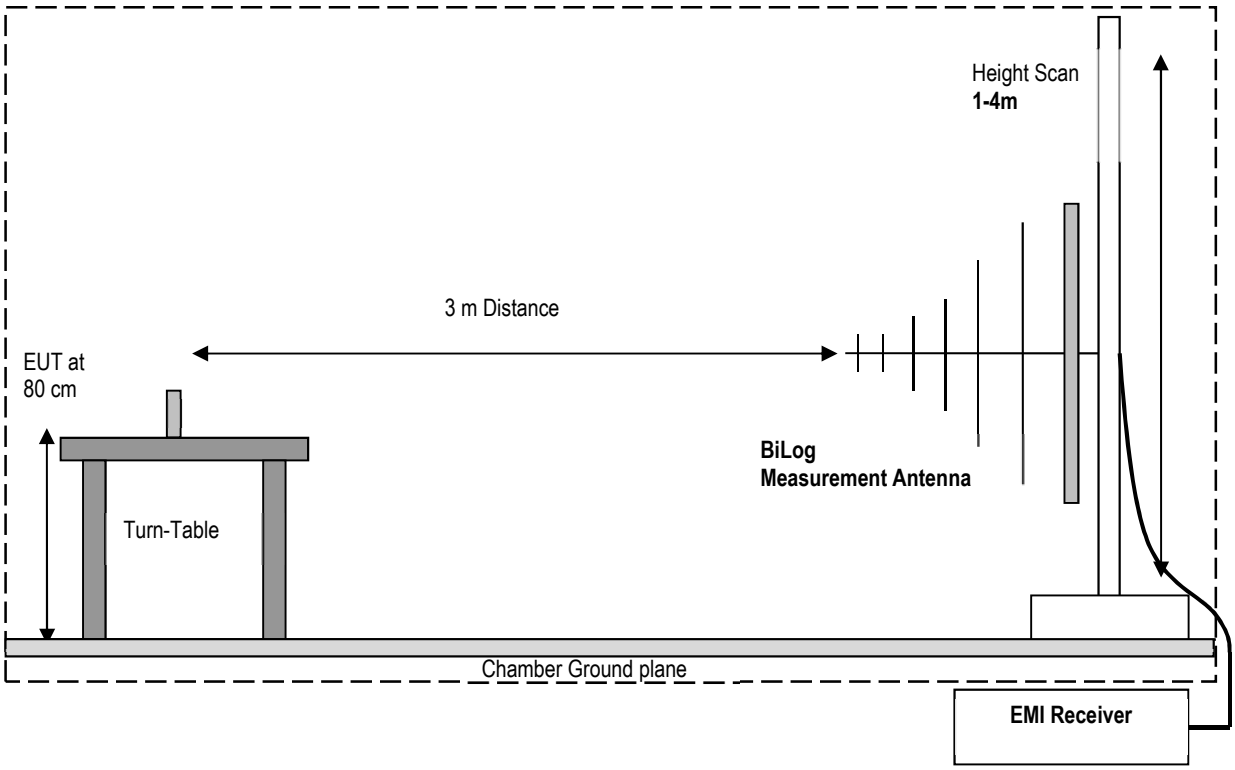
The radiated measurement is performed according to ANSI C63.10 (2013)

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.

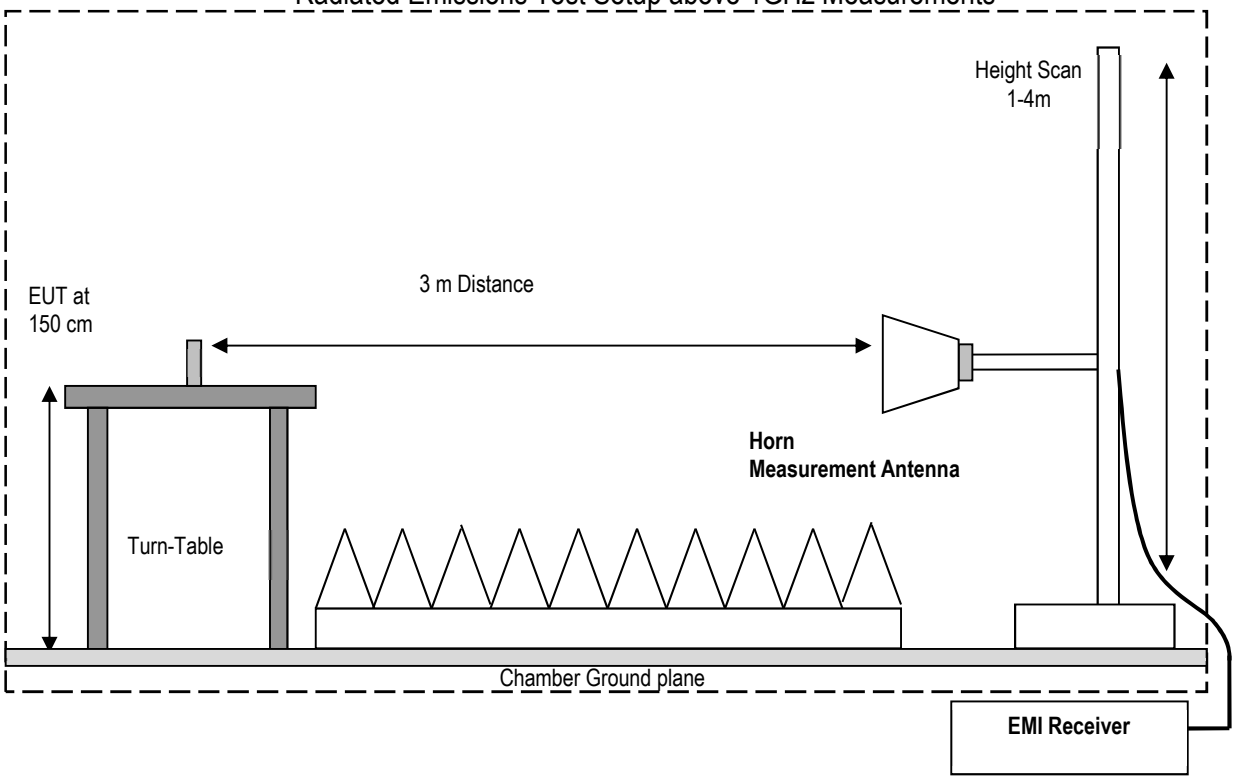
Radiated Emissions Test Setup below 30MHz Measurements



Radiated Emissions Test Setup 30MHz-1GHz Measurements



Radiated Emissions Test Setup above 1GHz Measurements



7.1.1 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

1. Measured reading in dBµV
2. Cable Loss between the receiving antenna and SA in dB and
3. Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

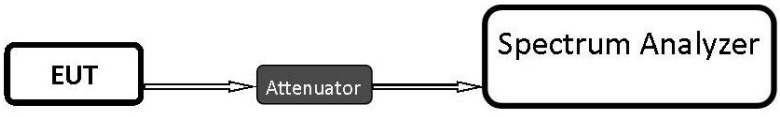
FS (dBµV/m) = Measured Value on SA (dBµV)- Cable Loss (dB)+ Antenna Factor (dB/m)

Example:

Frequency (MHz)	Measured SA (dBµV)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dBµV/m)
1000	80.5	3.5	14	98.0

7.2 RF Conducted Measurement Procedure

Testing procedures are based on 789033 D02 DTS UN-II Test Procedures New Rules v02r01 – "GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES (PART 15, SUBPART E)" - May 2, 2017, by the Federal Communications Commission, Office of Engineering and Technology, Laboratory Division.



- Connect the equipment as shown in the above diagram.
- Adjust the settings of the SA (Rohde-Schwarz Spectrum Analyzer) to connect the EUT at the required mode of test.
- Measurements are to be performed with the EUT set to the low, middle and high channels and for worst case modulation schemes.
- Calculate the conducted power by taking into account attenuation of the cable and the attenuator

8 Test Result Data

8.1 Duty cycle

8.1.1 Measurement according to FCC 789033 D02 General UNII Test Procedures New Rules v02r01

Spectrum Analyzer settings:

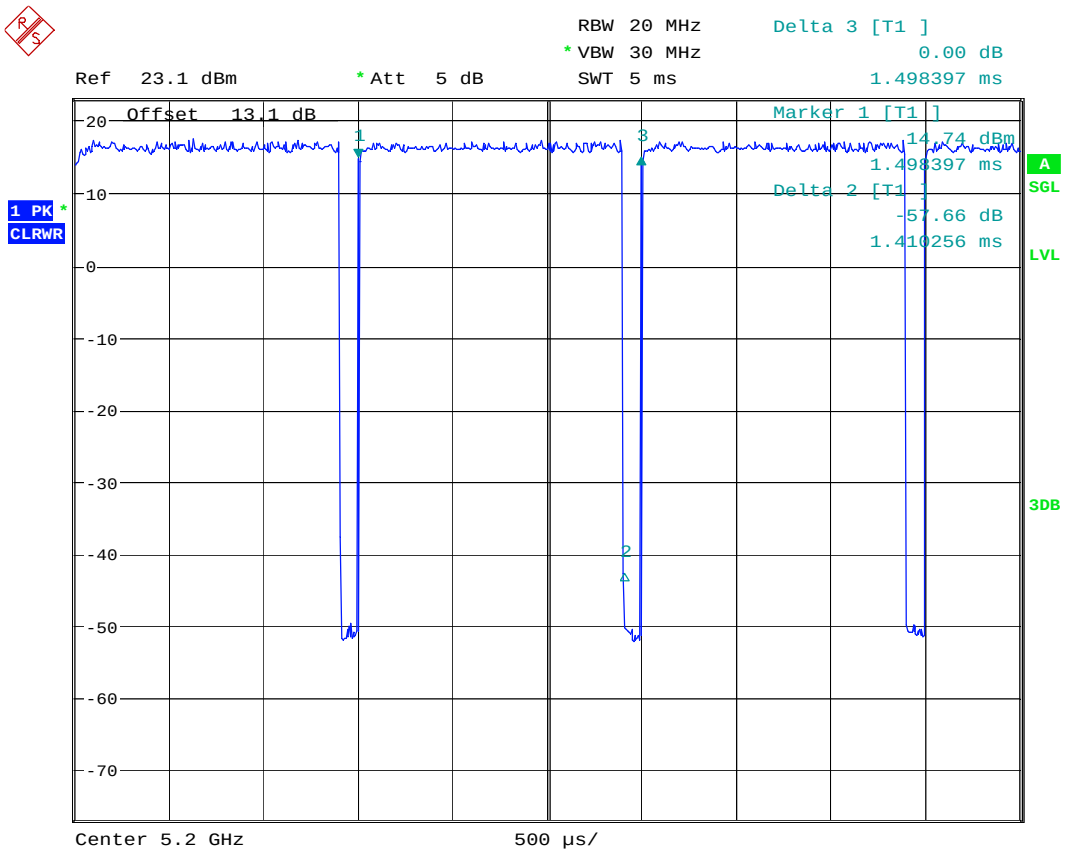
- Set the center frequency and of the instrument to the center frequency of the transmission
- Zero span
- Set RBW >=EBW if possible; otherwise, set RBW to the largest available value
- Detector = Peak or average

8.1.2 Measurement result

Plot #	Mode	Data Rate	Duty Cycle	Transmission Duration T(ms)	Duty Cycle Correction Factor (dB)
1	802.11a	6Mpbs	94.00%	1.41	0.27
2	802.11n_HT20	MCS0	93.62%	1.32	0.29
3	802.11n_HT40	MCS0	87.25%	0.657	0.59
4	802.11ac_VHT80	MCS0	77.28%	0.330	1.12

Plot #1

Channel40 / 5200 MHz	Modulation/Packet Type: 802.11a 6Mbps



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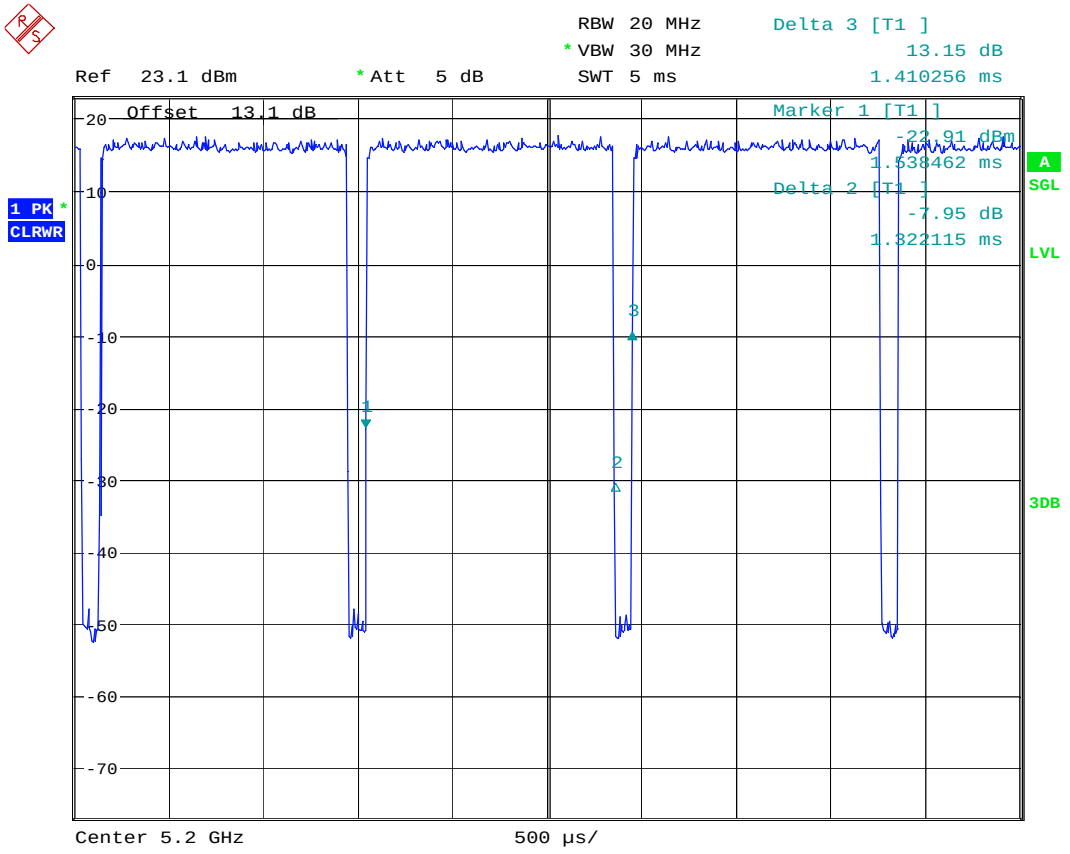
Plot #2

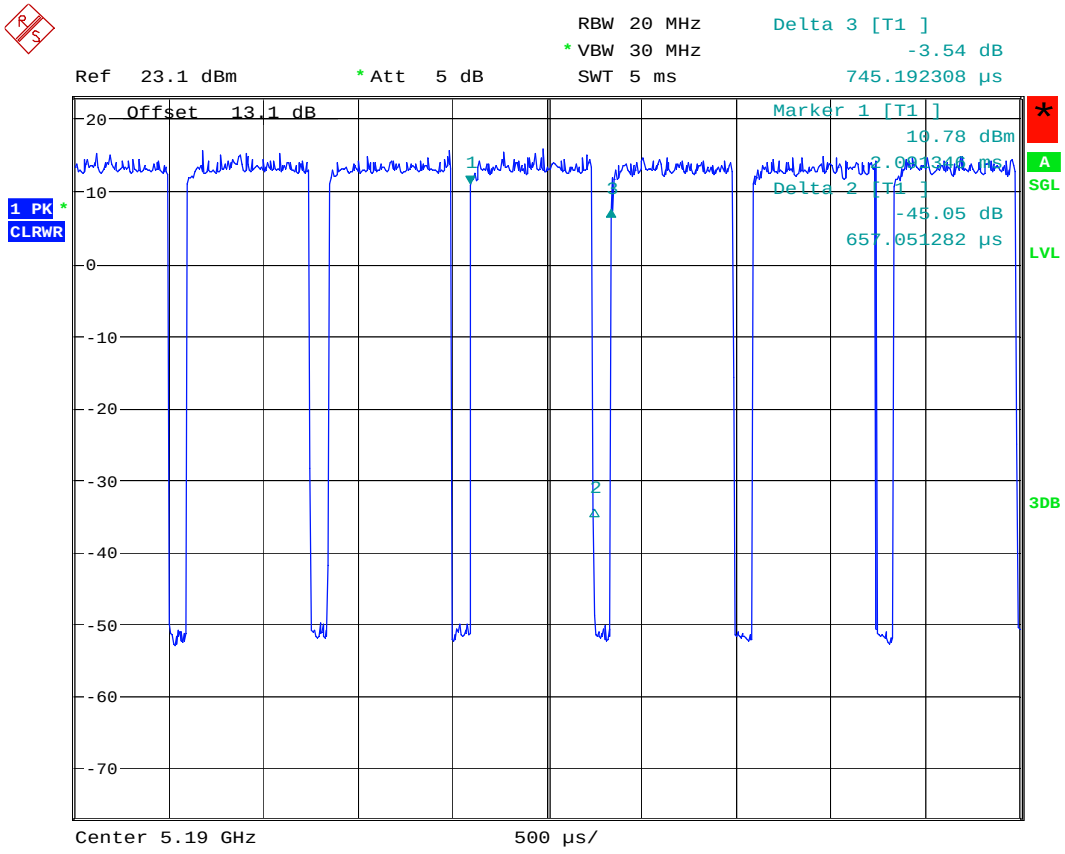
Channel40 / 5200 MHz	Modulation/Packet Type: 802.11n_HT20 MCS0



Date: 21.MAR.2019 15:03:40

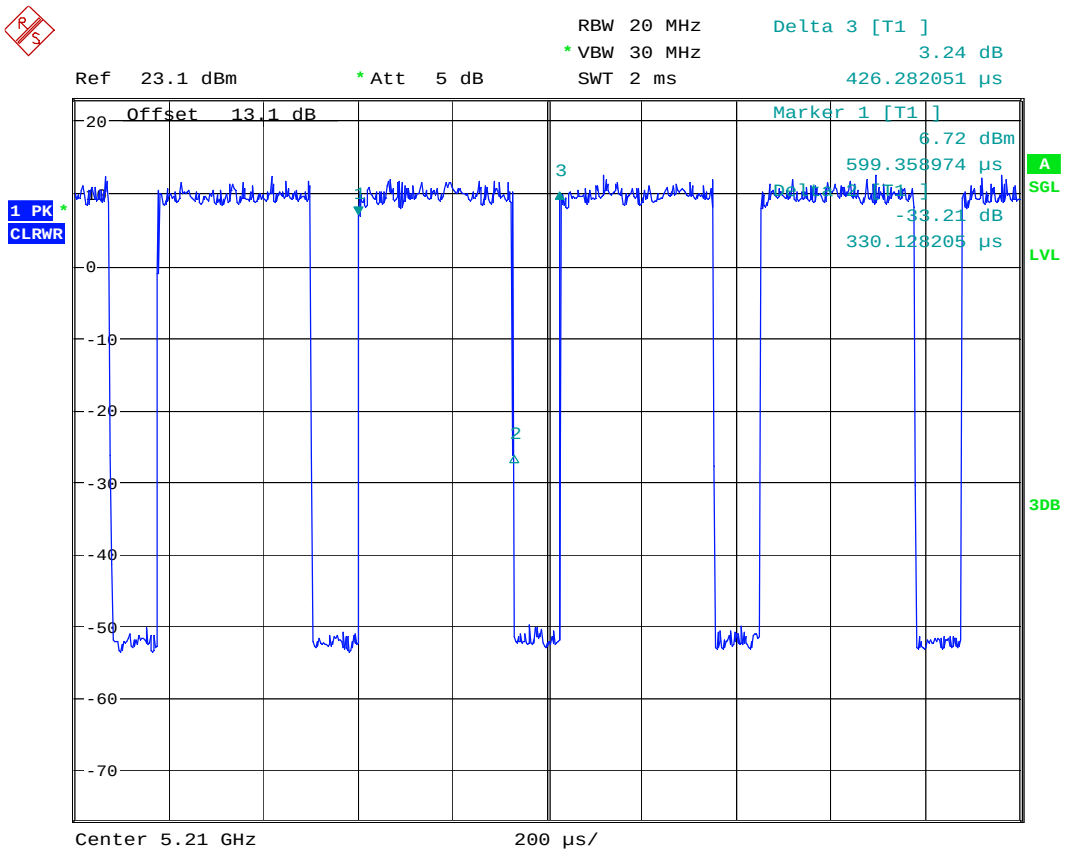
Plot #3

Channel38 / 5190 MHz	Modulation/Packet Type: 802.11n_HT40 MCS0



Plot #4

Channel42 / 5210 MHz	Modulation/Packet Type: 802.11ac_VHT80 MCS0



8.2 Maximum Conducted Output Power

8.2.1 Measurement according to FCC 789033 D02 General UNII Test Procedures New Rules v02r01

Spectrum Analyzer settings:

- Measure the duty cycle, x, of the transmitter output signal.
- Set span to at encompass the EBW.
- Set RBW = 1 MHz
- Set VBW ≥ 3 □ RBW.
- Number of points in sweep ≥ 2 □ span / RBW. (This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
- Sweep time = auto.
- Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- Allow the sweep to "free run".
- Trace average at least 100 traces in power averaging (i.e., RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the on and off periods of the transmitter.
- Compute power by integrating the spectrum across the EBW of the signal using the instrument's band power measurement function with band limits set equal to the EBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1MHz intervals extending across the EBW of the signal.
- Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on- and off-times of the transmission). For example, add 10 log (1/0.25) = 6 dB if the duty cycle is 25 %.

8.2.2 Limits:

Maximum Conducted Output Power:

FCC§15.407

Sub-band 5150-5250 MHz

- For Client Devices the maximum conducted output power over the frequency band of operation shall not exceed 250 mW

Sub-band 5250-5350 MHz and 5470-5725 MHz and

- 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

Sub-band 5725-5850 MHz

- The maximum conducted output power over the frequency band of operation shall not exceed 1 W

RSS-247

Sub-band 5150-5250 MHz

- For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or 1.76 + 10 log10B, dBm, whichever is less. Devices shall implement transmitter power control (TPC) in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.
- For other devices, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz.

Sub-band 5250-5350 MHz

- For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or 1.76 + 10 log10B, dBm, whichever is less. Devices shall implement TPC in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.
  - Devices, other than devices installed in vehicles, shall comply with the following:
    a) The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less.
    b) The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

- Additional requirements

  In addition to the above requirements, devices shall comply with the following, where applicable:

  a) Outdoor fixed devices with a maximum e.i.r.p. greater than 200 mW shall comply with the following e.i.r.p. at different elevations, where θ is the angle above the local horizontal plane (of the Earth) as shown below:

i. -13 dBW/MHz	for $0^\circ \leq \theta < 8^\circ$
ii. -13 − 0.716 (θ-8) dBW/MHz	for $8^\circ \leq \theta < 40^\circ$
iii. -35.9 − 1.22 (θ-40) dBW/MHz	for $40^\circ \leq \theta \leq 45^\circ$
iv. -42 dBW/MHz	for $\theta > 45^\circ$

  The measurement procedure defined in Annex A of this document shall be used to verify the compliance to the e.i.r.p. at different elevations.

  b) Devices, other than outdoor fixed devices, having an e.i.r.p. greater than 200 mW shall comply with either i. or ii. below:

  i. devices shall comply with the e.i.r.p. elevation mask in 6.2.2.3(a); or

  ii. devices shall implement a method to permanently reduce their e.i.r.p. via a firmware feature in the event that the Department requires it. The test report must demonstrate how the device's power table

can be updated to meet this firmware requirement. The manufacturer shall provide this firmware to update all systems automatically incompliance with the directions received from the Department.

Sub-band 5470-5600 MHz and 5650-5725 MHz

- The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less.
- The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

Sub-band 5725-5850 MHz

- The maximum conducted output power shall not exceed 1 W.

Note: All limits are conducted. 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.

8.2.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Single Antenna Gain
22° C	1	802.11 a/n/ac	120 VAC/Battery	Section 3.1

8.2.4 Measurement result:

Mode	DR	Channel/Frequency			Actual test result/dBm		corrected by path loss/dBm		Duty	Max conducted power/dBm			conducted	Corrected by antenna gain/dBm			Beamfor	EIRP/dB	EIRP Limit/ISED
					Primary	Secondary	Primary	Secondary	Cycle	Primary	Secondary	Sum	Limit/FCC	Primary	Secondary	Sum	ming	m	dBm
802.11a	6Mbps	Low	36	5180	9.84	9.75	11.47	11.23	0.94	11.74	11.50	**14.63**	23.89	14.84	9.00	15.84	0	**15.84**	23
		mid	40	5200	10.31	9.89	11.94	11.37	0.94	12.21	11.64	**14.94**	23.89	15.31	9.14	16.25	0	**16.25**	23
		High	48	5240	10.53	9.93	12.16	11.41	0.94	12.43	11.68	**15.08**	23.89	15.53	9.18	16.43	0	**16.43**	23
802.11 n20	MCS0	Low	36	5180	9.74	9.68	11.37	11.16	0.9362	11.66	11.45	**14.56**	23.89	14.76	8.95	15.77	3	**18.77**	23
		mid	40	5200	10.04	9.74	11.67	11.22	0.9362	11.96	11.51	**14.75**	23.89	15.06	9.01	16.02	3	**19.02**	23
		High	48	5240	10.18	9.75	11.81	11.23	0.9362	12.10	11.52	**14.83**	23.89	15.20	9.02	16.13	3	**19.13**	23
802.11 n40	MCS0	Low	38	5190	10.21	10.04	11.84	11.52	0.8725	12.43	12.11	**15.29**	23.89	15.53	9.61	16.52	3	**19.52**	23
		High	46	5230	10.7	10.06	12.33	11.54	0.8725	12.92	12.13	**15.56**	23.89	16.02	9.63	16.92	3	**19.92**	23
802.11ac80	MCS0	mid	42	5210	9.14	8.95	10.77	10.43	0.7728	11.89	11.55	**14.73**	23.89	14.99	9.05	15.97	3	**18.97**	23

Mode	DR	Channel/Frequency			Actual test result/dBm		corrected by path loss/dBm		Duty	Max conducted power/dBm			conducted	Corrected by antenna gain/dBm			Beamfor	EIRP/dB	EIRP Limit ISED
					Primary	Secondary	Primary	Secondary	Cycle	Primary	Secondary	Sum	Limit FCC	Primary	Secondary	Sum	ming	m	dBm
802.11a	6Mbps	Low	52	5260	10.36	9.79	11.99	11.27	0.94	12.26	11.54	**14.92**	23.89	15.36	9.04	16.27	0	**16.27**	23
		mid	60	5300	10.35	10.45	11.98	11.93	0.94	12.25	12.20	**15.23**	23.89	15.35	9.70	16.39	0	**16.39**	23
		High	64	5320	11.34	10.53	13.49	12.44	0.94	13.76	12.71	**16.28**	22.89	17.86	13.41	19.19	0	**19.19**	23
802.11 n20	MCS0	Low	52	5260	10.26	9.73	11.89	11.21	0.9362	12.18	11.50	**14.86**	23.89	15.28	9.00	16.19	3	**19.19**	23
		mid	60	5300	10.78	10.32	12.41	11.8	0.9362	12.70	12.09	**15.41**	23.89	15.80	9.59	16.73	3	**19.73**	23
		High	64	5320	11.29	10.5	13.44	12.41	0.9362	13.73	12.70	**16.25**	22.89	17.83	13.40	19.16	3	**22.16**	23
802.11 n40	MCS0	Low	54	5270	10.97	10.16	12.6	11.64	0.8725	13.19	12.23	**15.75**	23.89	16.29	9.73	17.16	3	**20.16**	23
		High	62	5310	11.36	10.42	12.99	11.9	0.8725	13.58	12.49	**16.08**	23.89	16.68	9.99	17.53	3	**20.53**	23
802.11ac80	MCS0	mid	58	5290	10.21	9.42	12.36	11.33	0.7728	13.48	12.45	**16.01**	22.89	17.58	13.15	18.92	3	**21.92**	23

Mode	DR	Channel/Frequency			Actual test result/dBm		corrected by path loss/dBm		Duty	Max conducted power/dBm			conducted	Corrected by antenna gain/dBm			Beamfor	EIRP/dB	EIRP Limit FCC/ISED
					Primary	Secondary	Primary	Secondary	Cycle	Primary	Secondary	Sum	Limit FCC	Primary	Secondary	Sum	ming	m	dBm
802.11a	6Mbps	Low	100	5500	10.59	10.53	12.74	12.44	0.94	13.01	12.71	**15.87**	22.89	17.11	13.41	18.65	0	**18.65**	27
		mid	116	5580	10.35	10.42	12.5	12.33	0.94	12.77	12.60	**15.69**	22.89	16.87	13.30	18.45	0	**18.45**	27
		High	140	5700	9.98	9.62	12.26	11.16	0.94	12.53	11.43	**15.02**	22.69	16.83	12.13	18.10	0	**18.10**	27
802.11 n20	MCS0	Low	102	5500	10.46	10.51	12.61	12.42	0.9362	12.90	12.71	**15.81**	22.89	17.00	13.41	18.57	3	**21.57**	27
		mid	110	5580	10.34	10.34	12.49	12.25	0.9362	12.78	12.54	**15.67**	22.89	16.88	13.24	18.44	3	**21.44**	27
		High	134	5700	9.84	9.54	12.12	11.08	0.9362	12.41	11.37	**14.93**	22.69	16.71	12.07	17.99	3	**20.99**	27
802.11 n40	MCS0	Low	102	5510	10.8	10.64	12.95	12.55	0.8725	13.54	13.14	**16.36**	22.89	17.64	13.84	19.16	3	**22.16**	27
		mid	110	5550	10.72	10.61	12.87	12.52	0.8725	13.46	13.11	**16.30**	22.89	17.56	13.81	19.09	3	**22.09**	27
		High	134	5670	10.26	9.85	12.54	11.39	0.8725	13.13	11.98	**15.61**	22.69	17.43	12.68	18.69	3	**21.69**	27
802.11ac80	MCS0	low	106	5530	9.39	9.43	11.54	11.34	0.7728	12.66	12.46	**15.57**	22.89	16.76	13.16	18.33	3	**21.33**	27

Mode	DR	Channel/Frequency			Actual test result/dBm		corrected by path loss/dBm		Duty	Max conducted power/dBm			conducted	Corrected by antenna gain/dBm			Beamforming	EIRP/dB	EIRP Limit FCC/IC
					Primary	Secondary	Primary	Secondary	Cycle	Primary	Secondary	Sum	Limit FCC/IC	Primary	Secondary	Sum	gain	m	dBm
802.11a	6Mbps	Low	149	5745	10.31	10	12.59	11.54	0.94	12.86	11.81	**15.38**	28.69	17.16	6.21	17.49	0	**17.49**	36
		mid	157	5785	10.55	10.14	12.83	11.68	0.94	13.10	11.95	**15.57**	28.69	17.40	6.35	17.73	0	**17.73**	36
		High	165	5825	10.77	10.27	13.05	11.81	0.94	13.32	12.08	**15.75**	28.69	17.62	6.48	17.94	0	**17.94**	36
802.11 n20	MCS0	Low	149	5745	10.09	9.76	12.37	11.3	0.936	12.66	11.59	**15.16**	28.69	16.96	5.99	17.29	3	**20.29**	36
		mid	157	5785	10.45	10.03	12.73	11.57	0.936	13.02	11.86	**15.49**	28.69	17.32	6.26	17.64	3	**20.64**	36
		High	165	5825	10.59	10.21	12.87	11.75	0.936	13.16	12.04	**15.64**	28.69	17.46	6.44	17.79	3	**20.79**	36
802.11 n40	MCS0	Low	151	5755	10.36	10.06	12.64	11.6	0.873	13.23	12.19	**15.75**	28.69	17.53	6.59	17.87	3	**20.87**	36
		High	159	5795	10.97	10.58	13.25	12.12	0.873	13.84	12.71	**16.32**	28.69	18.14	7.11	18.47	3	**21.47**	36
802.11ac80	MCS0	mid	155	5775	9.36	9.16	11.64	10.7	0.773	12.76	11.82	**15.33**	28.69	17.06	6.22	17.40	3	**20.40**	36

- Data rate or modulation scheme listed in above table for each mode was selected as worst case from pre-test
- EIRP= Conducted output power + Antenna gain
- Directional antenna gain of MIMO = Gain of antenna element + 10log(N_{ant})
- Adjusted limit of conducted power of MIMO for each sub-band due to directional antenna gain for MIMO is higher than 6dBi:
  UNII-1: 24dBm-(3.1+3.01-6) = 23.89dBm
  UNII-2A: 24dBm-(3.1+3.01-6) = 23.89dBm; 24dBm-(4.1+3.01-6) = 22.89dBm
  UNII-2C: 24dBm-(4.1+3.01-6) = 22.89dBm; 24dBm-(4.3+3.01-6) = 22.69dBm
  UNII-3: 30dBm-(4.3+3.01-6) = 28.69dBm
- TPC mechanism is not implemented

8.3 Power Spectral Density

8.3.1 Measurement according to FCC 789033 D02 General UNII Test Procedures New Rules v02r01

Spectrum Analyzer settings:

- Use the same setting in section 8.2.1 but not include the step labeled, "Compute power…."
- Set RBW =1MHz or 500 kHz
- Set the VBW ≥ 3 x RBW
- Use the peak search function on the instrument to find the peak of the spectrum and record its value
- Add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum

8.3.2 Limits:

FCC§15.407

Sub-band 5150-5250 MHz

- For AP the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band
- For Client Devices the maximum power spectral density shall not exceed 11 dBm in any 1 MHz band

Sub-band 5250-5350 MHz and 5470-5725 MHz and

- The maximum power spectral density shall not exceed 11 dBm in any 1 MHz band

Sub-band 5725-5850 MHz

- The maximum power spectral density shall not exceed 30 dBm in any 500 kHz band

RSS-247

Sub-band 5150-5250 MHz

- PSD shall be less than 10 dBm in any 1 MHz band- EIRP

Sub-band 5250-5350 MHz

- PSD shall be less than 11 dBm in any 1 MHz band

Sub-band 5470-5600 MHz and 5650-5725 MHz

- PSD shall be less than 11 dBm in any 1 MHz band

Sub-band 5725-5850 MHz

- PSD shall be less than 30 dBm in any 500 kHz band

Note: All limits are conducted. 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.

8.3.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Single Antenna Gain
22° C	1	802.11a/n/ac	120 VAC/Battery	Section 3.1

8.3.4 Measurement result:

Mode	DR	Channel/Frequency			test resulted by path los		Duty	conducted power/		conducted limit/FCC	ected by antenna gain		Beamforming	EIRP/dB	EIRP Limit/ISED	Plot #
					Primary	Primary	Cycle	Primary	Sum	dBm/MHz	Primary	Sum	gain	m	dBm/MHz	
802.11a	6Mbps	Low	36	5180	-1.56	0.07	0.94	0.34	3.34	10.89	3.44	6.44	0	6.44	10	1
		mid	40	5200	-0.96	0.67	0.94	0.94	3.94	10.89	4.04	7.04	0	7.04	10	2
		High	48	5240	-0.94	0.69	0.94	0.96	3.96	10.89	4.06	7.06	0	7.06	10	3
802.11 n20	MCS0	Low	36	5180	-1.99	-0.36	0.936	-0.07	2.93	10.89	3.03	6.03	3	9.03	10	4
		mid	40	5200	-1.71	-0.08	0.936	0.21	3.21	10.89	3.31	6.31	3	9.31	10	5
		High	48	5240	-1.31	0.32	0.936	0.61	3.61	10.89	3.71	6.71	3	9.71	10	6
802.11 n40	MCS0	Low	38	5190	-4.07	-2.44	0.873	-1.85	1.15	10.89	1.25	4.25	3	7.25	10	7
		High	46	5230	-4	-2.37	0.873	-1.78	1.22	10.89	1.32	4.32	3	7.32	10	8
802.11ac80	MCS0	mid	42	5210	-8.06	-6.43	0.773	-5.31	-2.31	10.89	-2.21	0.79	3	3.79	10	9

Mode	DR	Channel/Frequency			test resulted by path los		Duty	conducted power/		conducted limit/FCC
					Primary	Primary	Cycle	Primary	Sum	dBm/MHz
802.11a	6Mbps	Low	52	5260	-0.73	0.9	0.94	1.17	4.17	10.89
		mid	60	5300	-0.38	1.25	0.94	1.52	4.52	10.89
		High	64	5320	-0.18	1.97	0.94	2.24	5.24	9.89
802.11 n20	MCS0	Low	52	5260	-1.16	0.47	0.936	0.76	3.76	10.89
		mid	60	5300	-0.41	1.22	0.936	1.51	4.51	10.89
		High	64	5320	-0.4	1.75	0.936	2.04	5.04	9.89
802.11 n40	MCS0	Low	54	5270	-3.44	-1.81	0.873	-1.22	1.78	10.89
		High	62	5310	-3.26	-1.63	0.873	-1.04	1.96	10.89
802.11ac80	MCS0	mid	58	5290	-6.77	-4.62	0.773	-3.50	-0.50	9.89

Mode	DR	Channel/Frequency			test resulted by path los		Duty	conducted power/		conducted limit/FCC
					Primary	Primary	Cycle	Primary	Sum	dBm/MHz
802.11a	6Mbps	Low	100	5500	-0.46	1.69	0.94	1.96	4.96	9.89
		mid	116	5580	-0.8	1.35	0.94	1.62	4.62	9.89
		High	140	5700	-1.53	0.75	0.94	1.02	4.02	9.69
802.11 n20	MCS0	Low	102	5500	-1.1	1.05	0.936	1.34	4.34	9.89
		mid	110	5580	-1.32	0.83	0.936	1.12	4.12	9.89
		High	134	5700	-1.82	0.46	0.936	0.75	3.75	9.69
802.11 n40	MCS0	Low	102	5510	-3.52	-1.37	0.873	-0.78	2.22	9.89
		mid	110	5550	-3.9	-1.75	0.873	-1.16	1.84	9.89
		High	134	5670	-4.12	-1.84	0.873	-1.25	1.75	9.69
802.11ac80	MCS0	low	106	5530	-7.69	-5.54	0.773	-4.42	-1.42	9.89

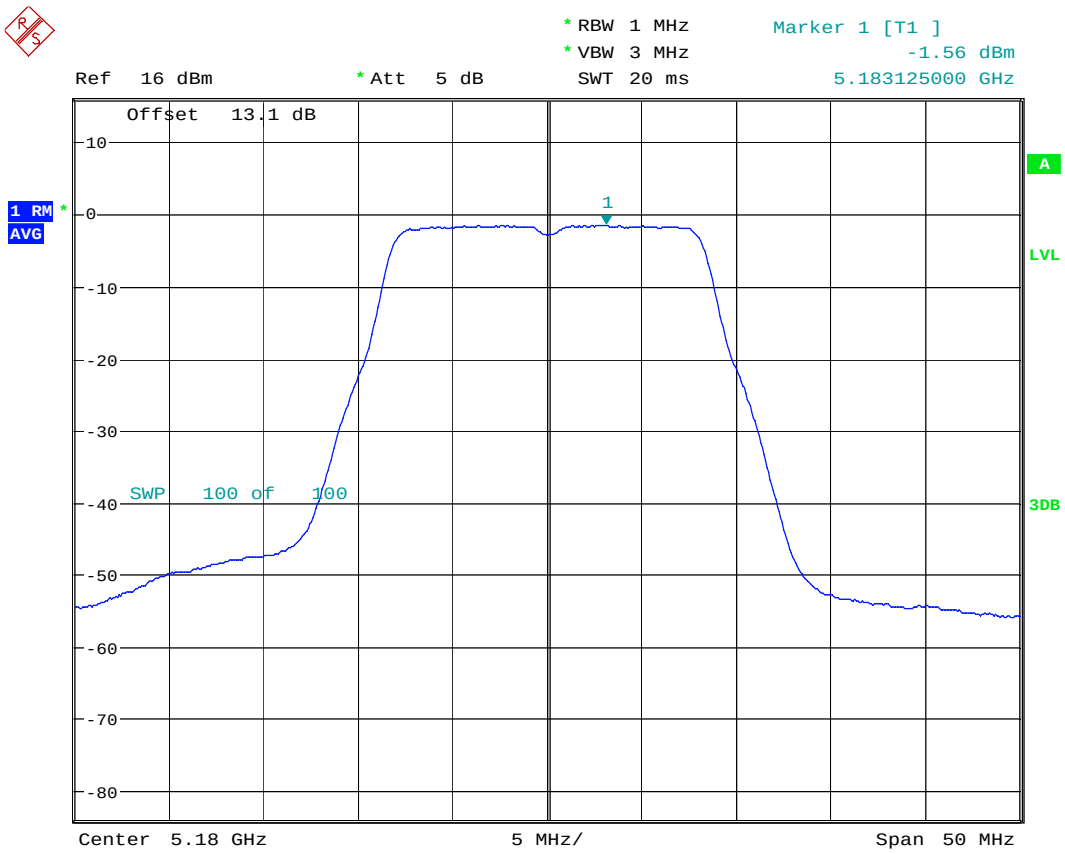
Mode	DR	Channel/Frequency			test resulted by path los		Duty	conducted power/		conducted Limit
					Primary	Primary	Cycle	Primary	Sum	dBm/500kHz
802.11a	6Mbps	Low	149	5745	-3.86	-1.58	0.94	-1.31	1.69	28.69
		mid	157	5785	-3.83	-1.55	0.94	-1.28	1.72	28.69
		High	165	5825	-3.56	-1.28	0.94	-1.01	1.99	28.69
802.11 n20	MCS0	Low	149	5745	-4.34	-2.06	0.936	-1.77	1.23	28.69
		mid	157	5785	-4.05	-1.77	0.936	-1.48	1.52	28.69
		High	165	5825	-4.28	-2	0.936	-1.71	1.29	28.69
802.11 n40	MCS0	Low	151	5755	-6.97	-4.69	0.873	-4.10	-1.10	28.69
		High	159	5795	-6.54	-4.26	0.873	-3.67	-0.67	28.69

- Adjusted limit of MIMO for each sub-band due to directional antenna gain of MIMO is higher than 6dBi:
  UNII-1: 11dBm/MHz -(3.1+3.01-6) = 10.89dBm/MHz
  UNII-2A: 11dBm-(3.1+3.01-6) = 10.89dBm; 11dBm-(4.1+3.01-6) = 9.89dBm
  UNII-2C: 11dBm-(4.1+3.01-6) = 10.89dBm; 11dBm-(4.3+3.01-6) = 9.69dBm
  UNII-3: 30dBm-(4.3+3.01-6) = 28.69dBm

8.3.5 Measurement Plots:

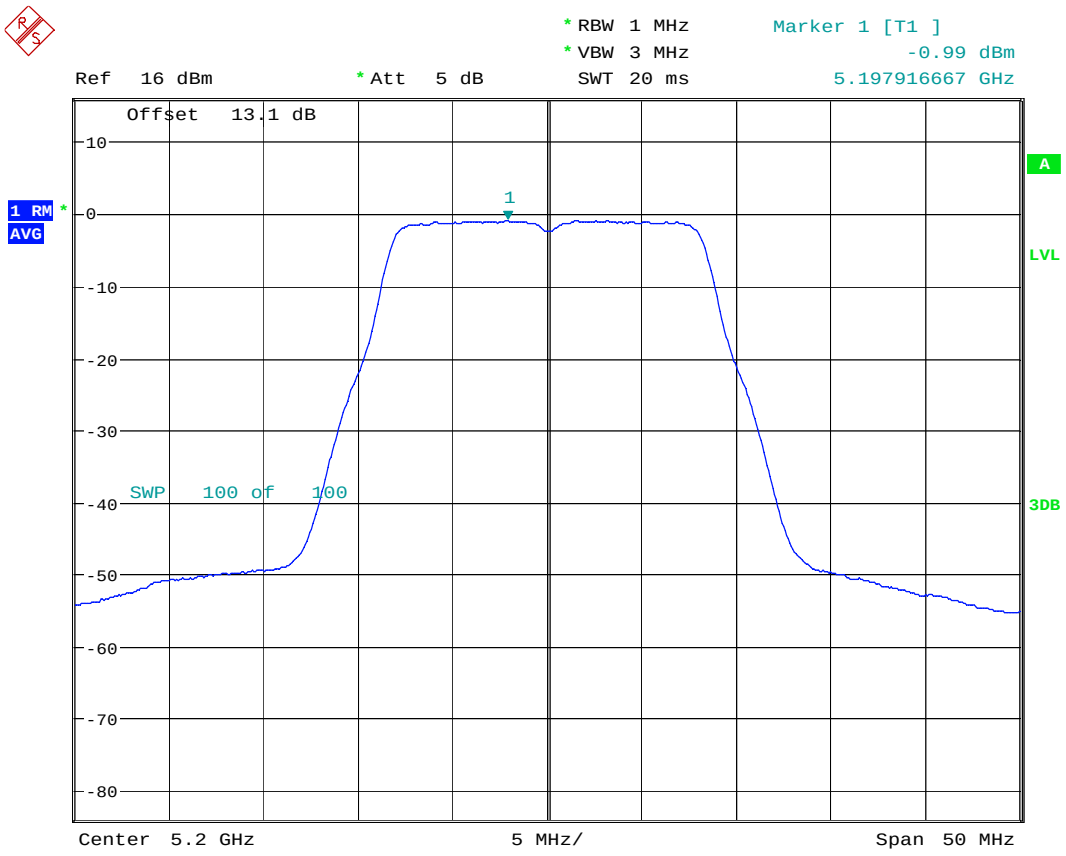
Plot #1

Channel36	Modulation/Packet Type: 802.11a 6Mbps



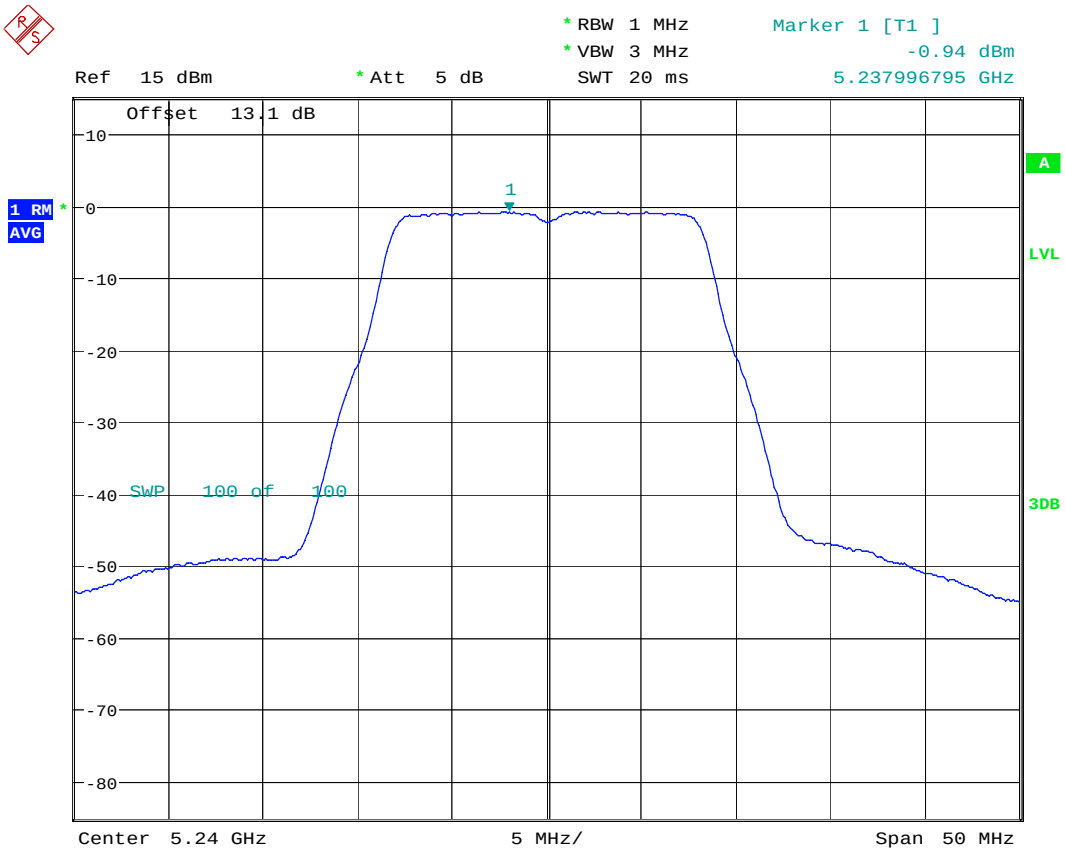
Plot #2

Channel40	Modulation/Packet Type: 802.11a 6Mbps



Plot #3

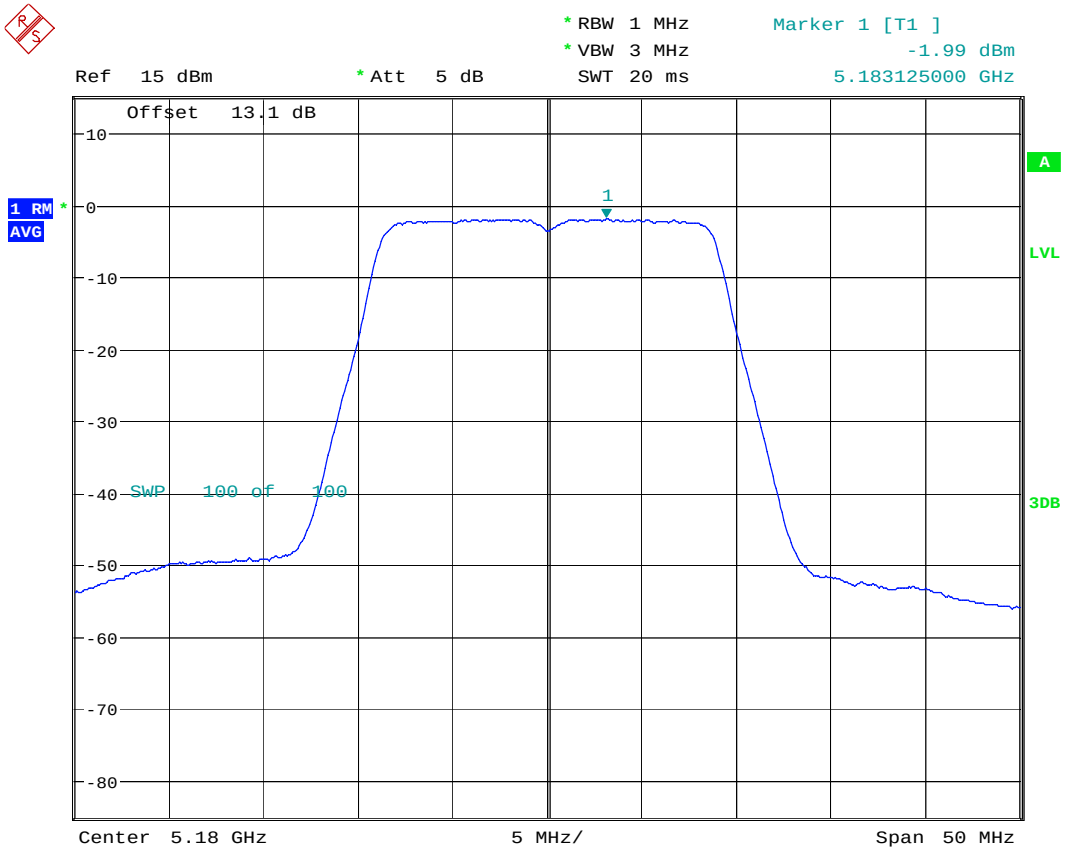
Channle 48	Modulation/Packet Type: 802.11a 6Mbps



Date: 21.MAR.2019 17:22:00

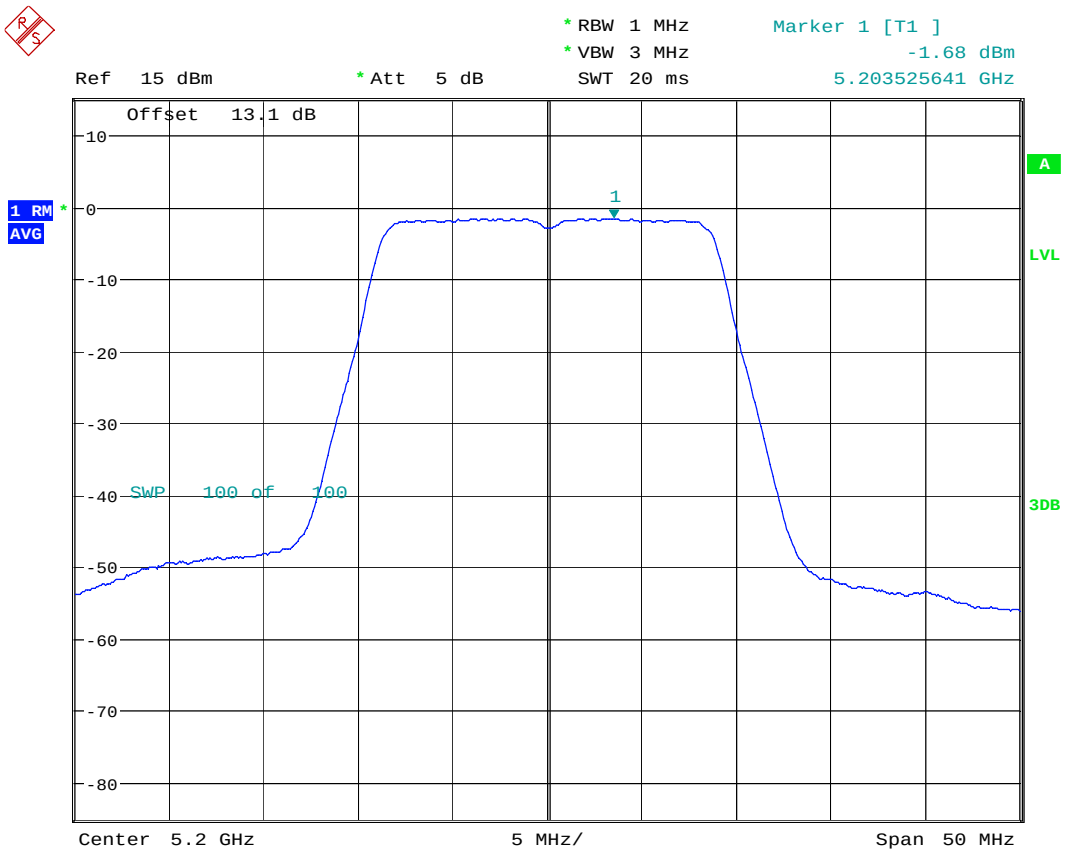
Plot #4

Channel36 | **Modulation/Packet Type: 802.11n_HT20 MCS0**



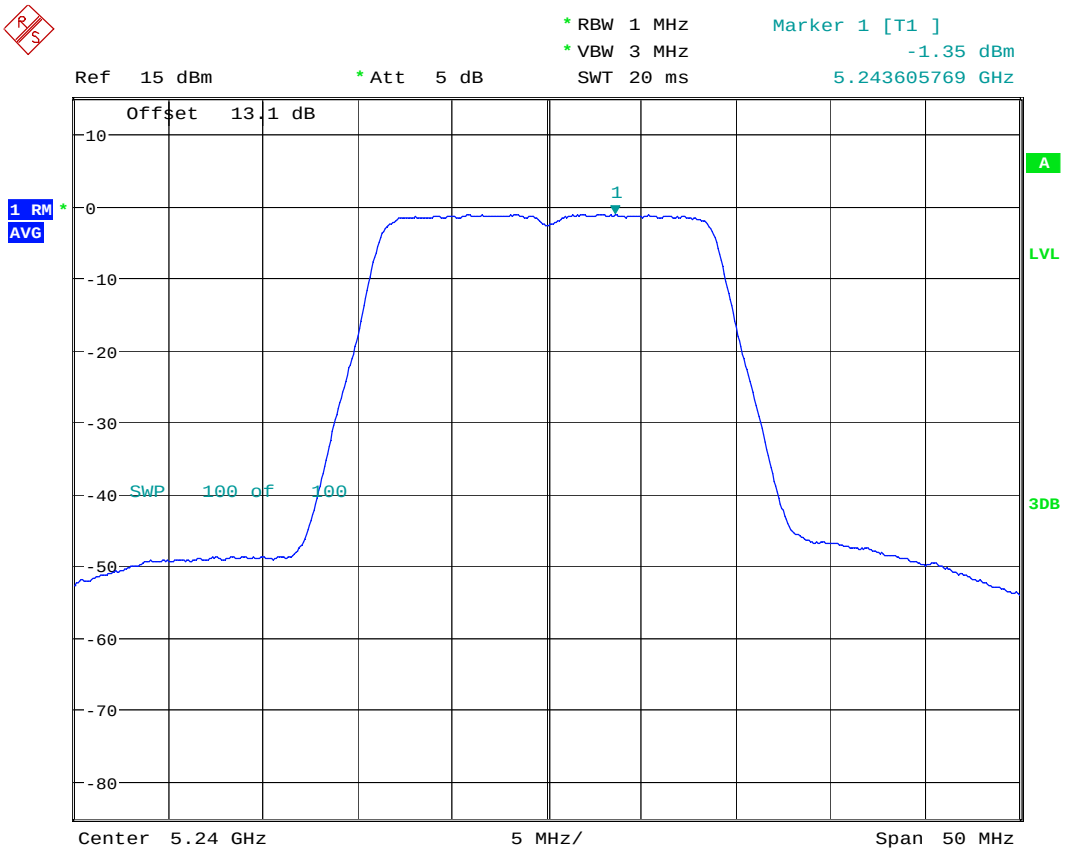
Plot #5

Channel40	Modulation/Packet Type: 802.11n_HT20 MCS0



Plot #6

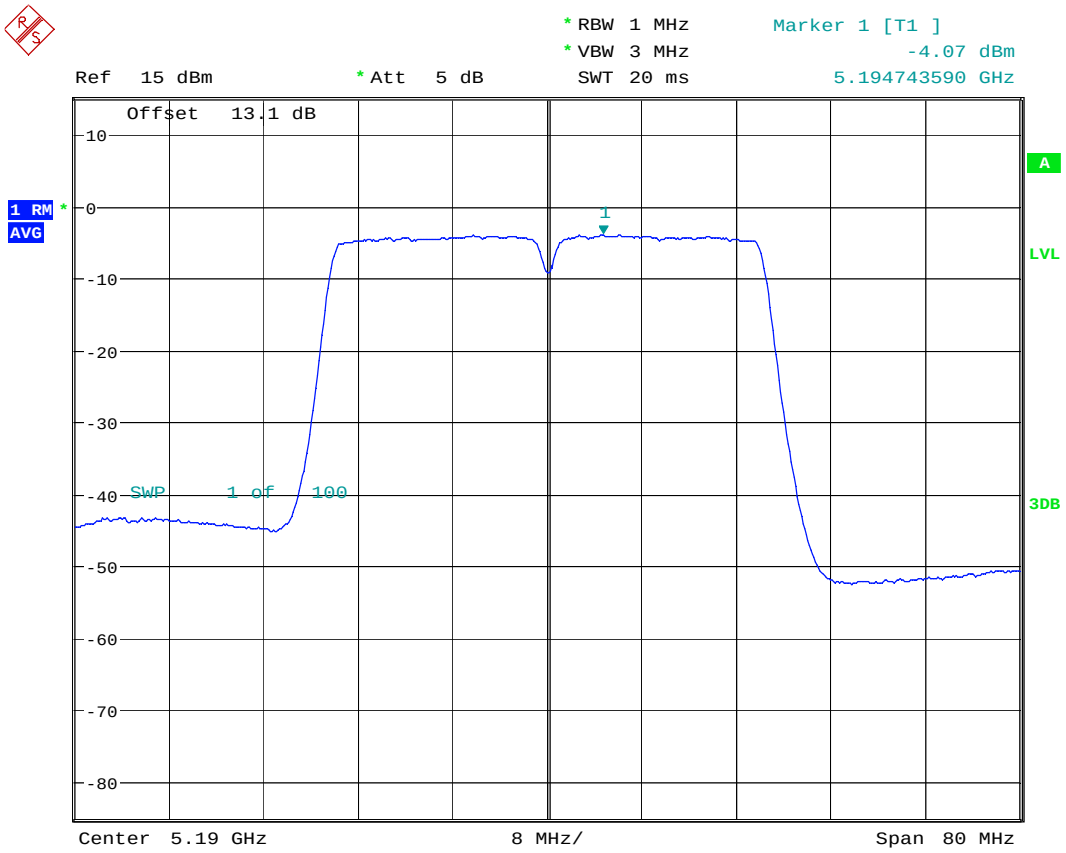
Channel48	Modulation/Packet Type: 802.11n_HT20 MCS0



Date: 21.MAR.2019 16:55:22

Plot #7

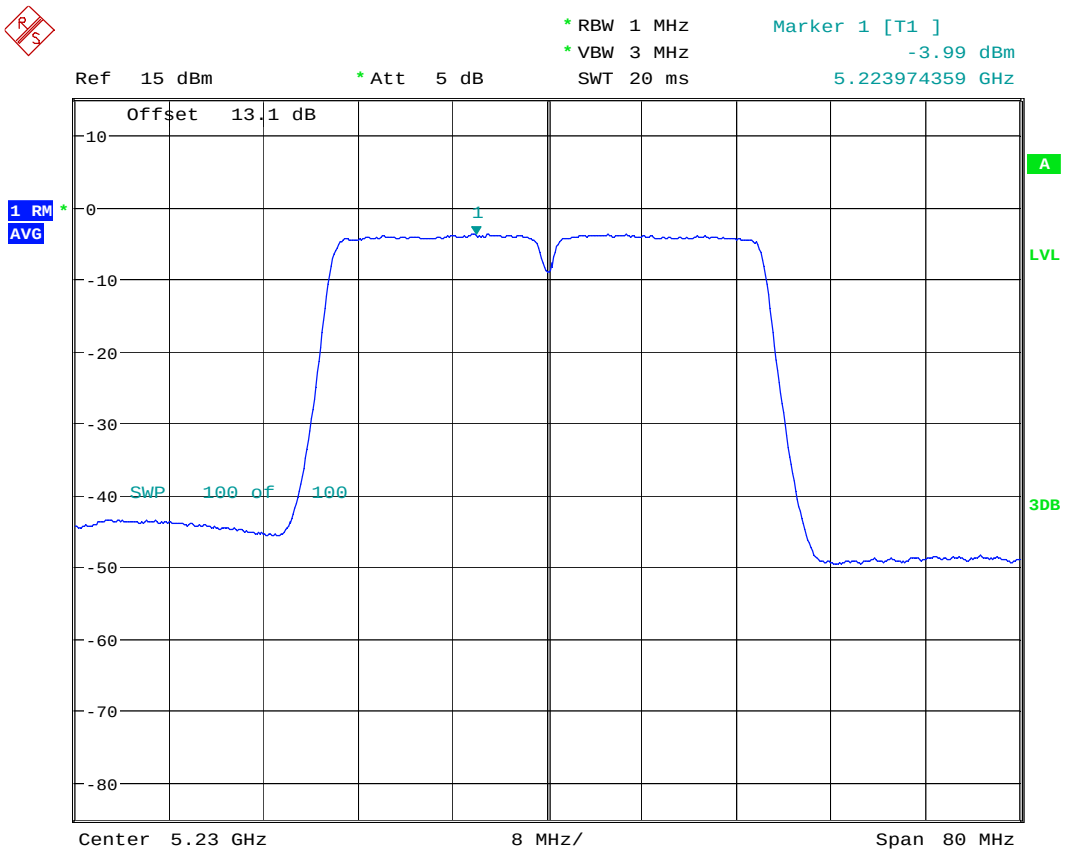
Channel38	Modulation/Packet Type: 802.11n_HT40 MCS0



Date: 21.MAR.2019 17:01:53

Plot #8

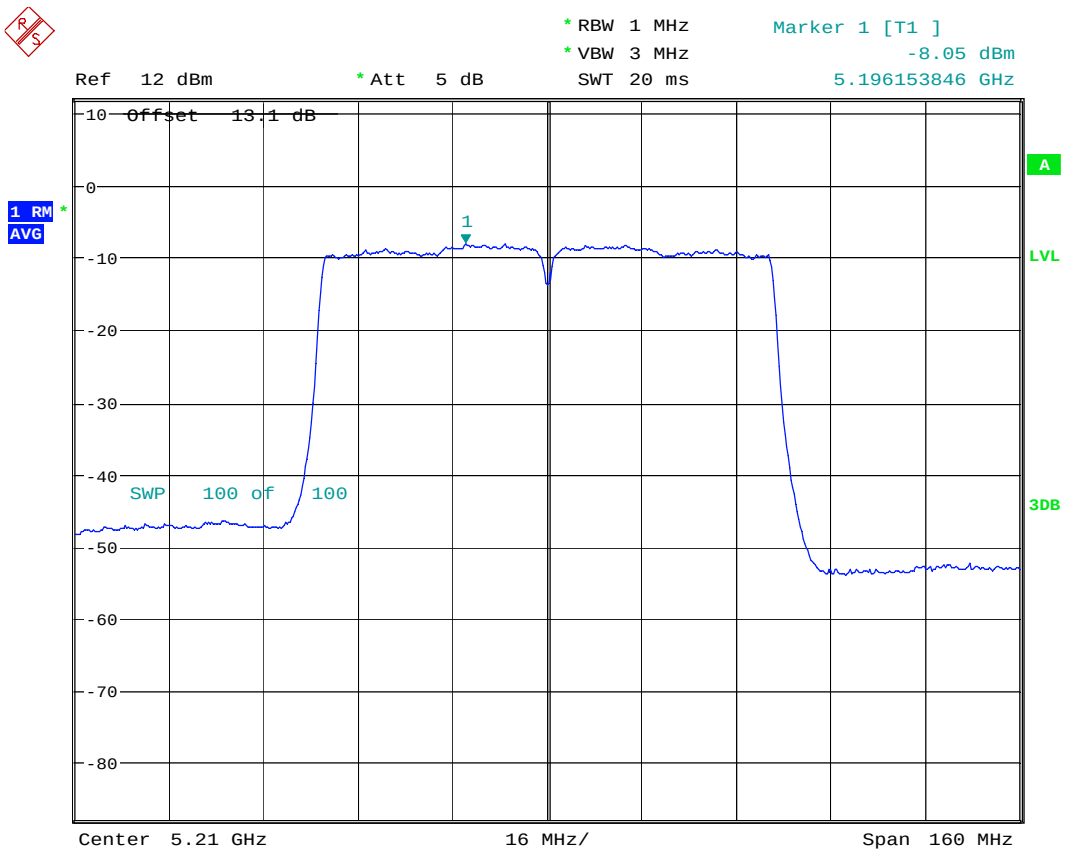
Channel46	Modulation/Packet Type: 802.11n_HT40 MCS0



Date: 21.MAR.2019 17:03:22

Plot #9

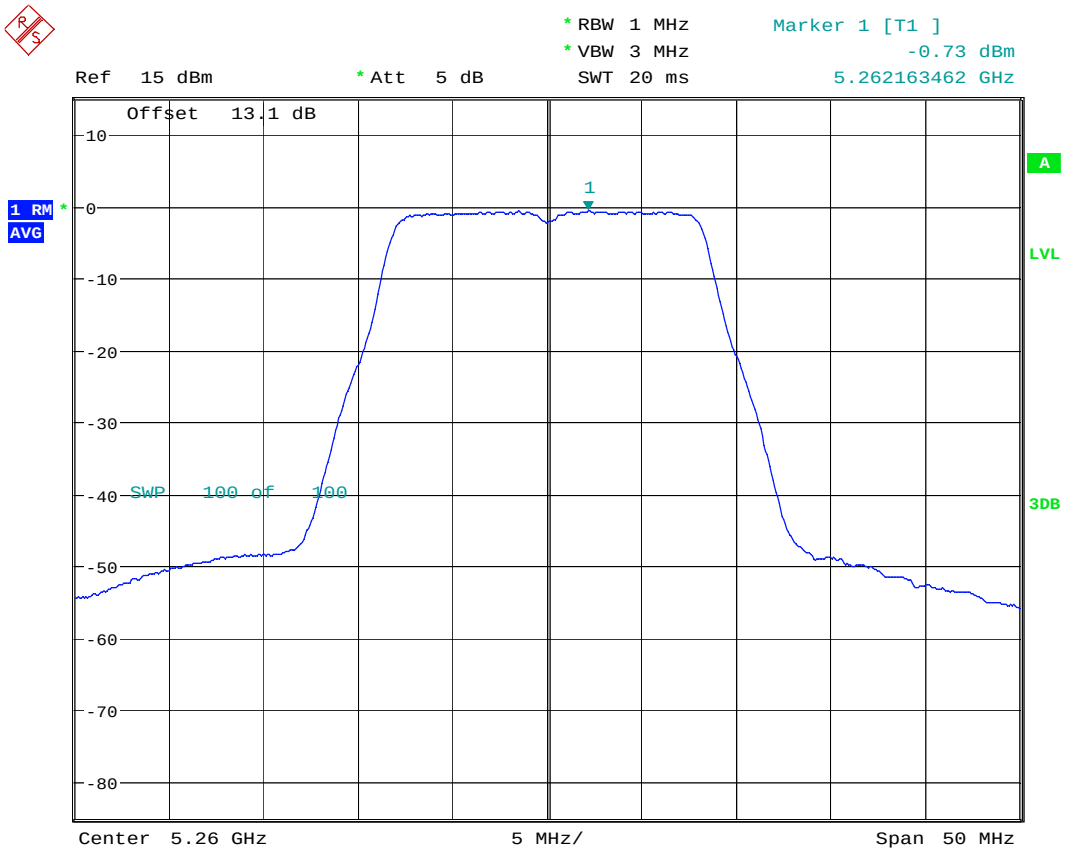
Channel42	Modulation/Packet Type: 802.11ac_VHT80 MCS0



Date: 21.MAR.2019 17:06:20

Plot #10

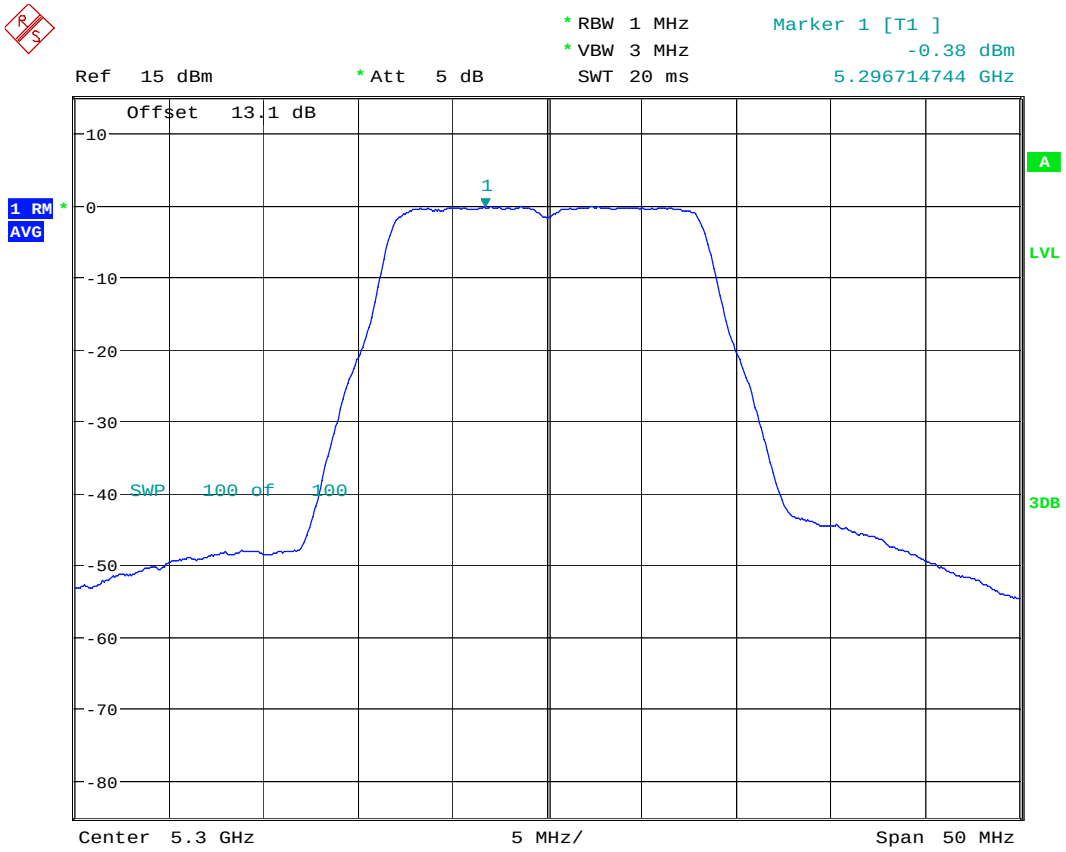
Channel52	Modulation/Packet Type: 802.11a 6Mbps



Date: 22.MAR.2019 10:24:31

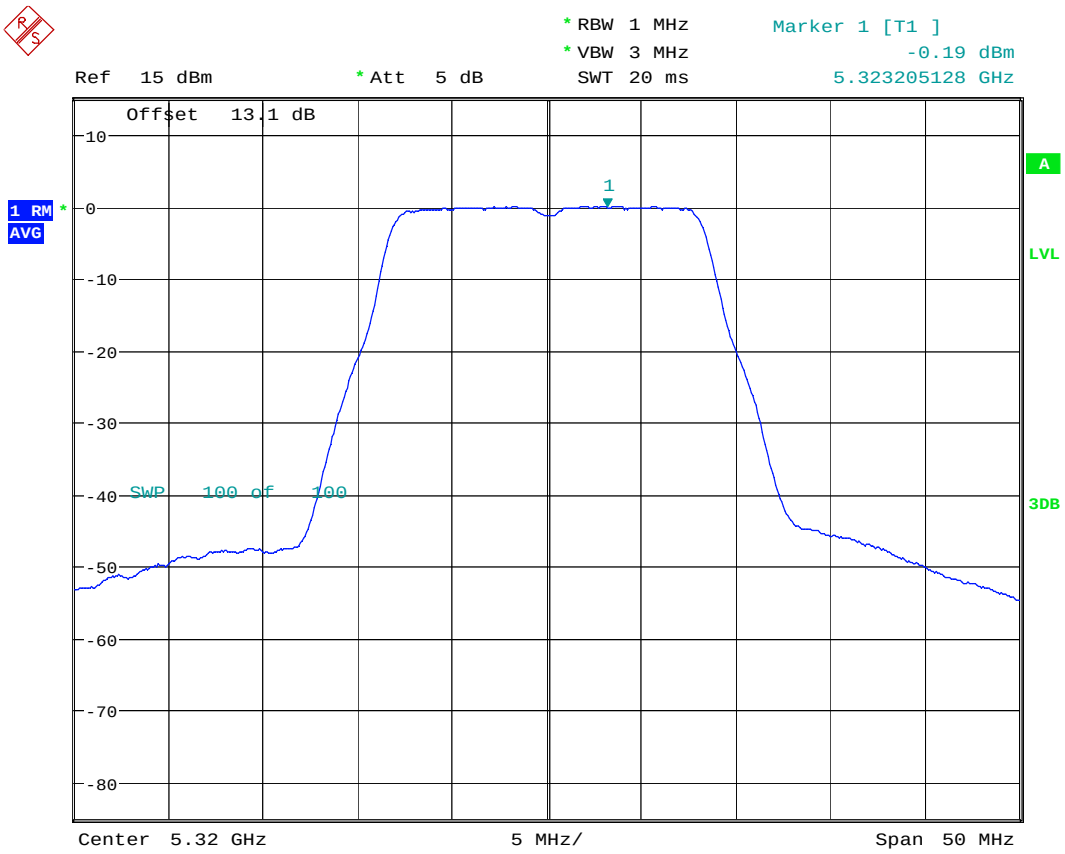
Plot #11

Channel60	Modulation/Packet Type: 802.11a 6Mbps



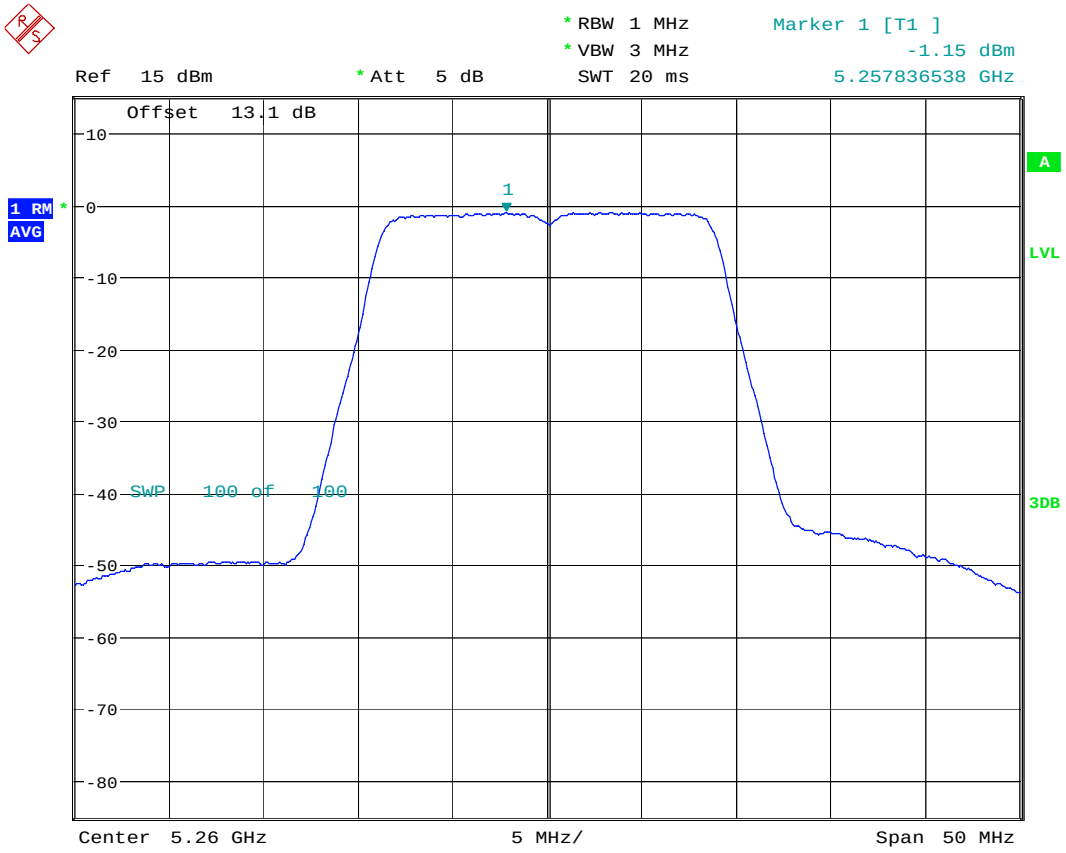
Plot #12

Channel 64	Modulation/Packet Type: 802.11a 6Mbps



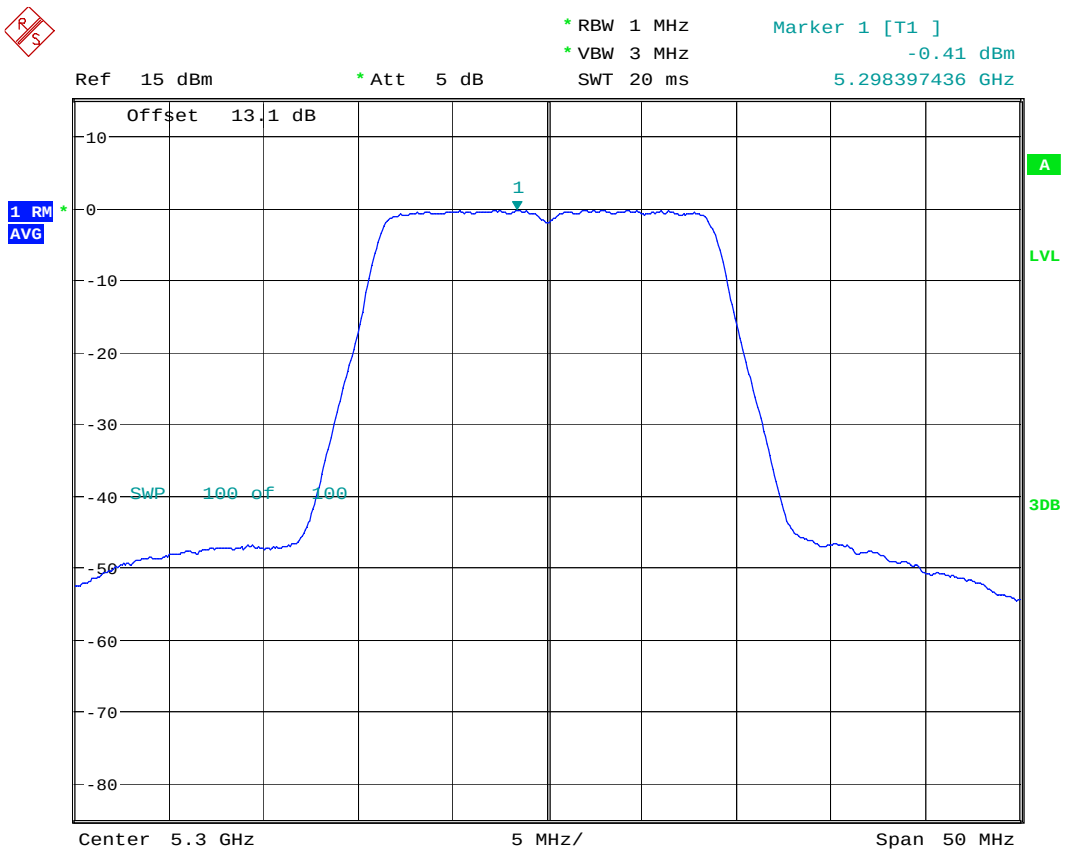
Plot #13

Channel52 | **Modulation/Packet Type: 802.11n_HT20 MCS0**



Plot #14

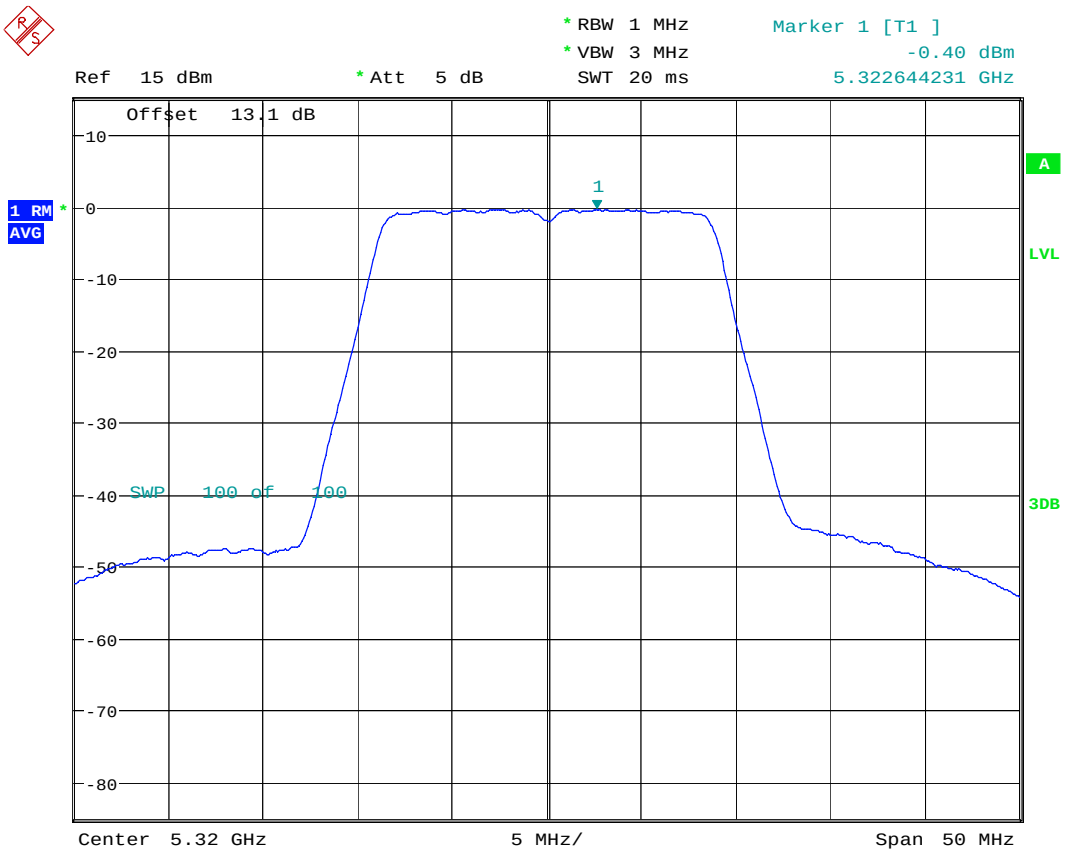
Channel60	Modulation/Packet Type: 802.11n_HT20 MCS0



Date: 22.MAR.2019 10:43:54

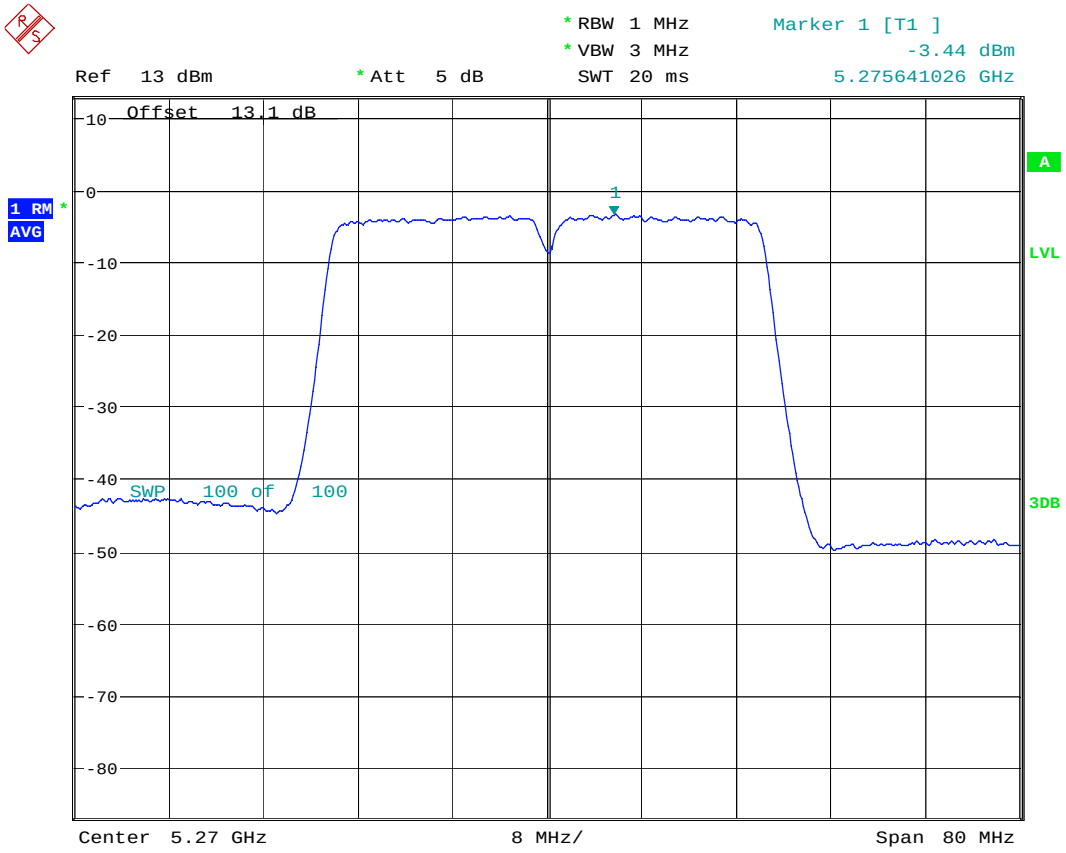
Plot #15

Channel64	Modulation/Packet Type: 802.11n_HT20 MCS0



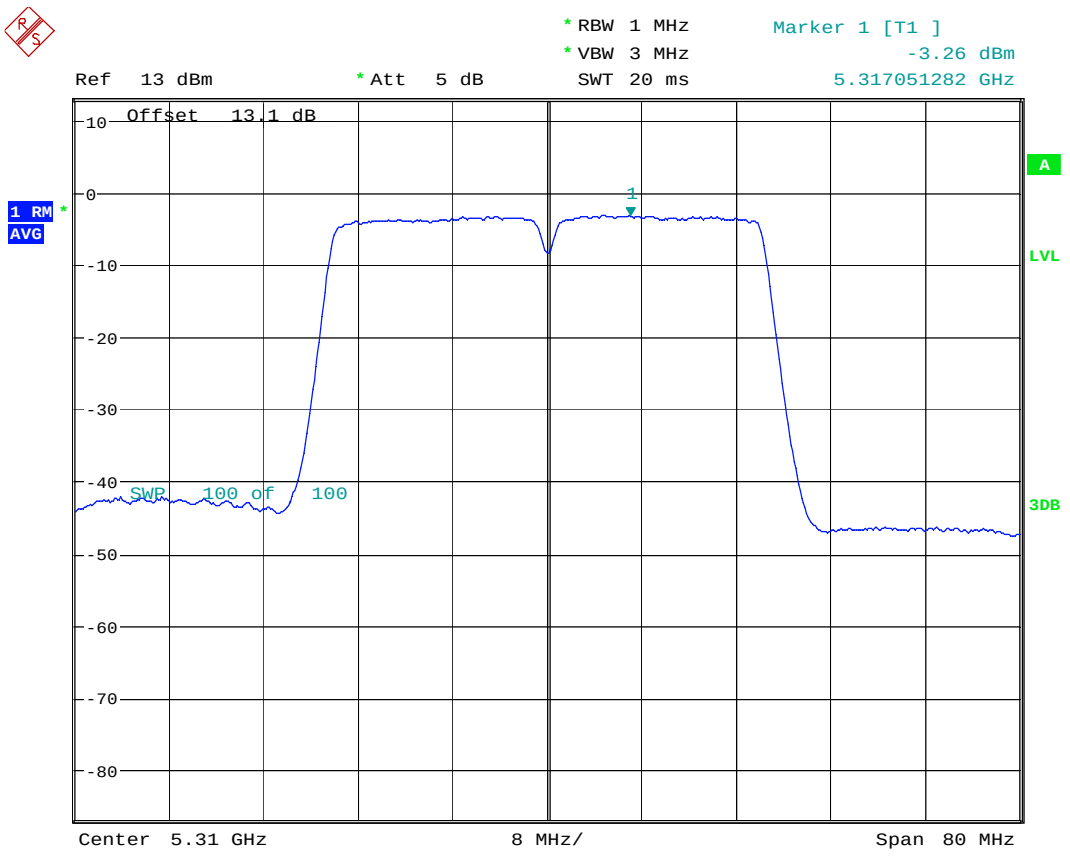
Plot #16

Channel54 | **Modulation/Packet Type: 802.11n_HT40 MCS0**



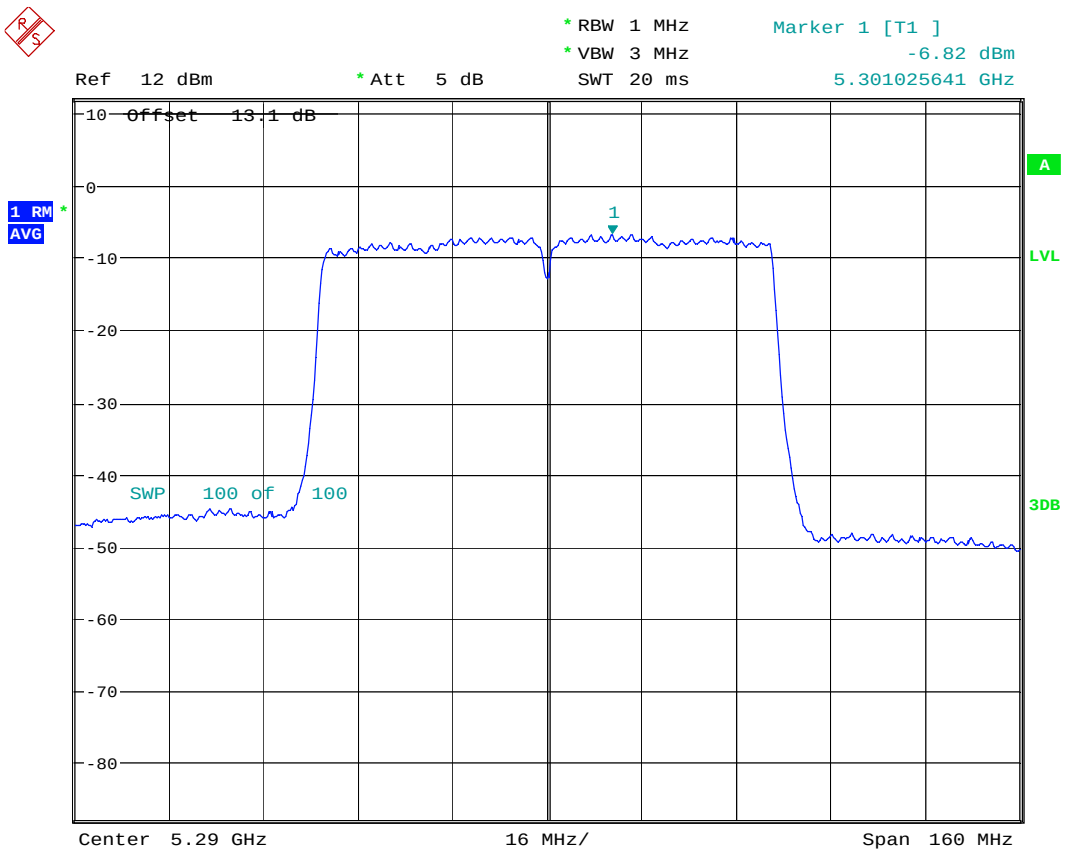
Plot #17

Channel62	Modulation/Packet Type: 802.11n_HT40 MCS0



Plot #18

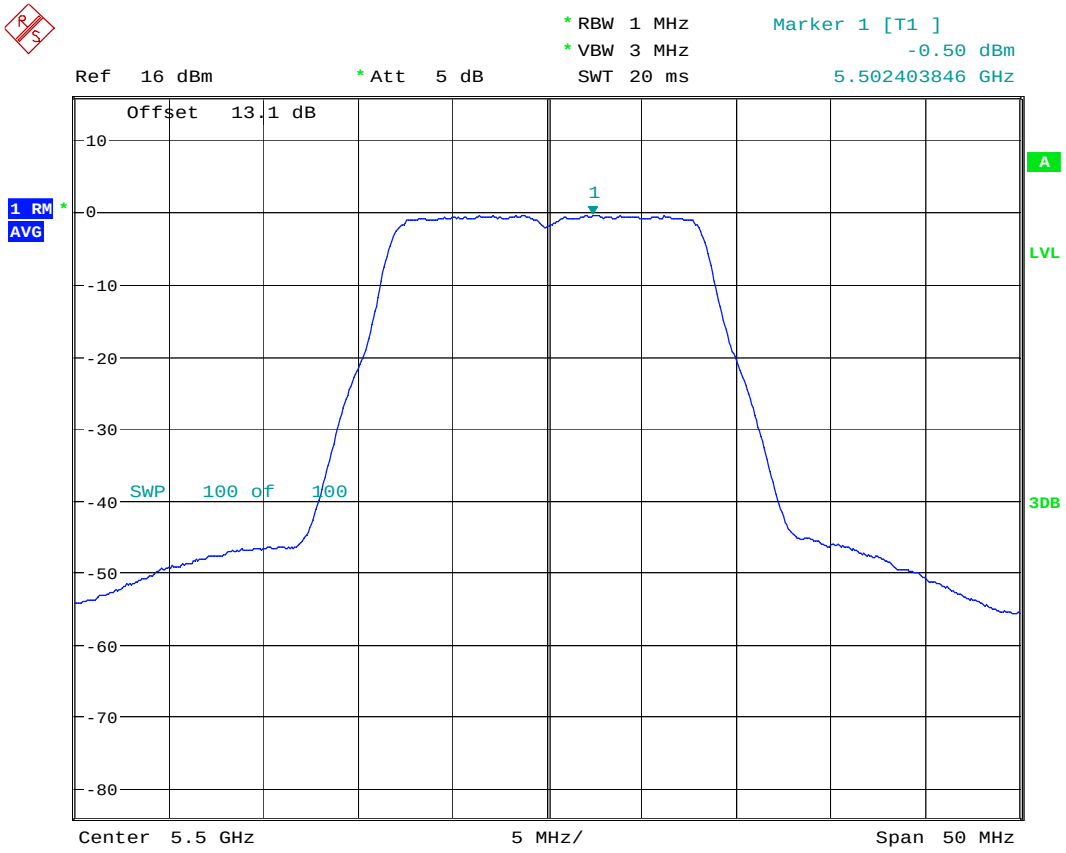
Channel58 | **Modulation/Packet Type: 802.11ac_VHT80 MCS0**



Date: 22.MAR.2019 10:49:55

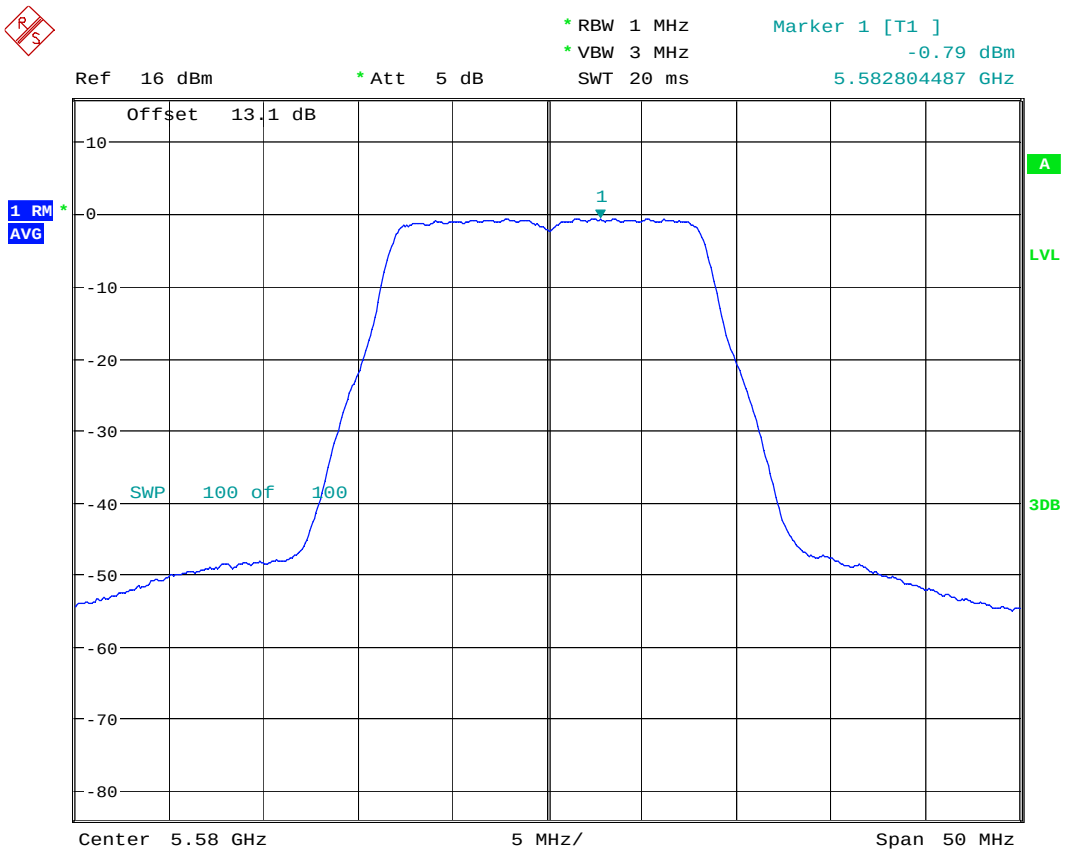
Plot #19

Channel100 | **Modulation/Packet Type: 802.11a 6Mbps**



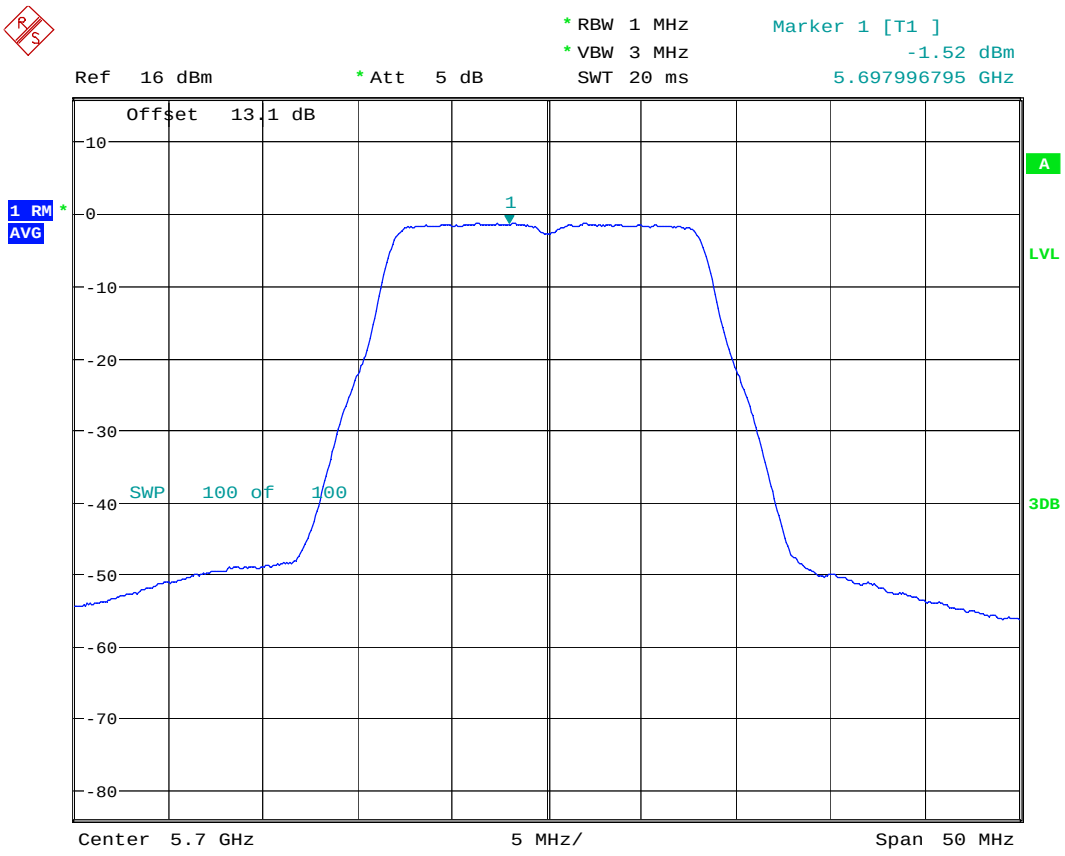
Plot #20

Channel116	Modulation/Packet Type: 802.11a 6Mbps



Plot # 21

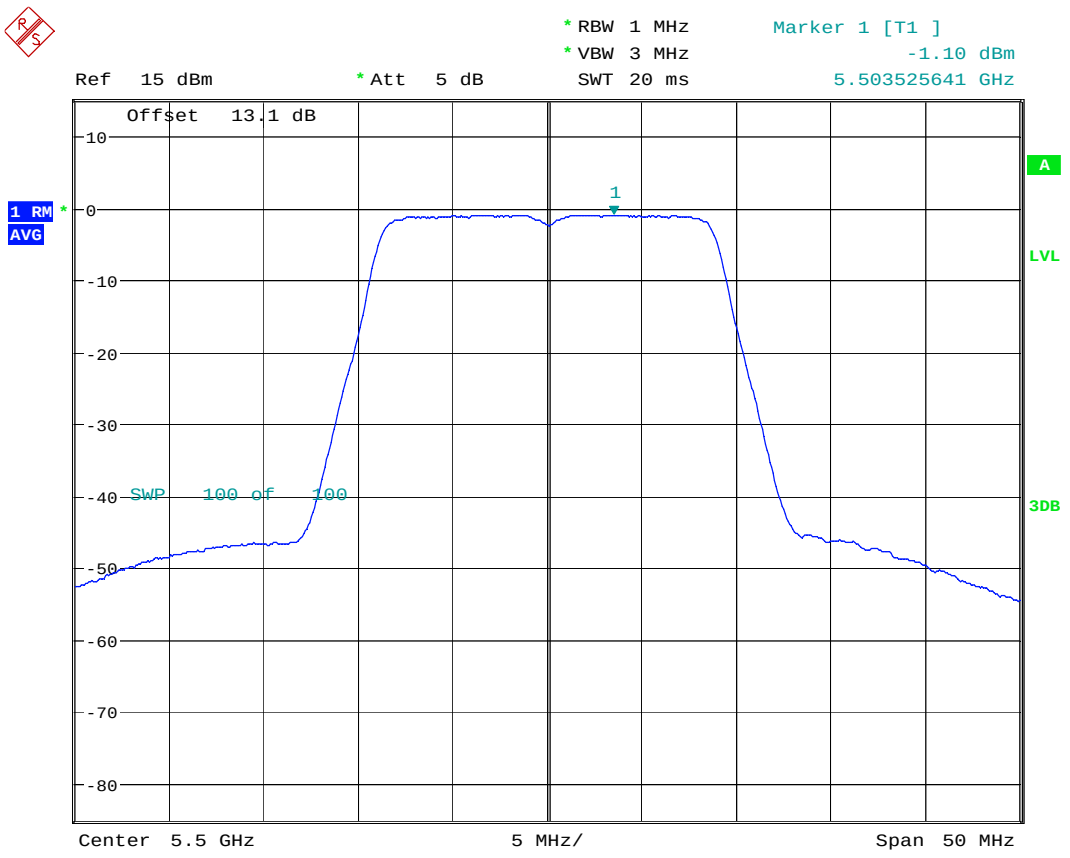
Channel 140	Modulation/Packet Type: 802.11a 6Mbps



Date: 22.MAR.2019 11:00:58

Plot #22

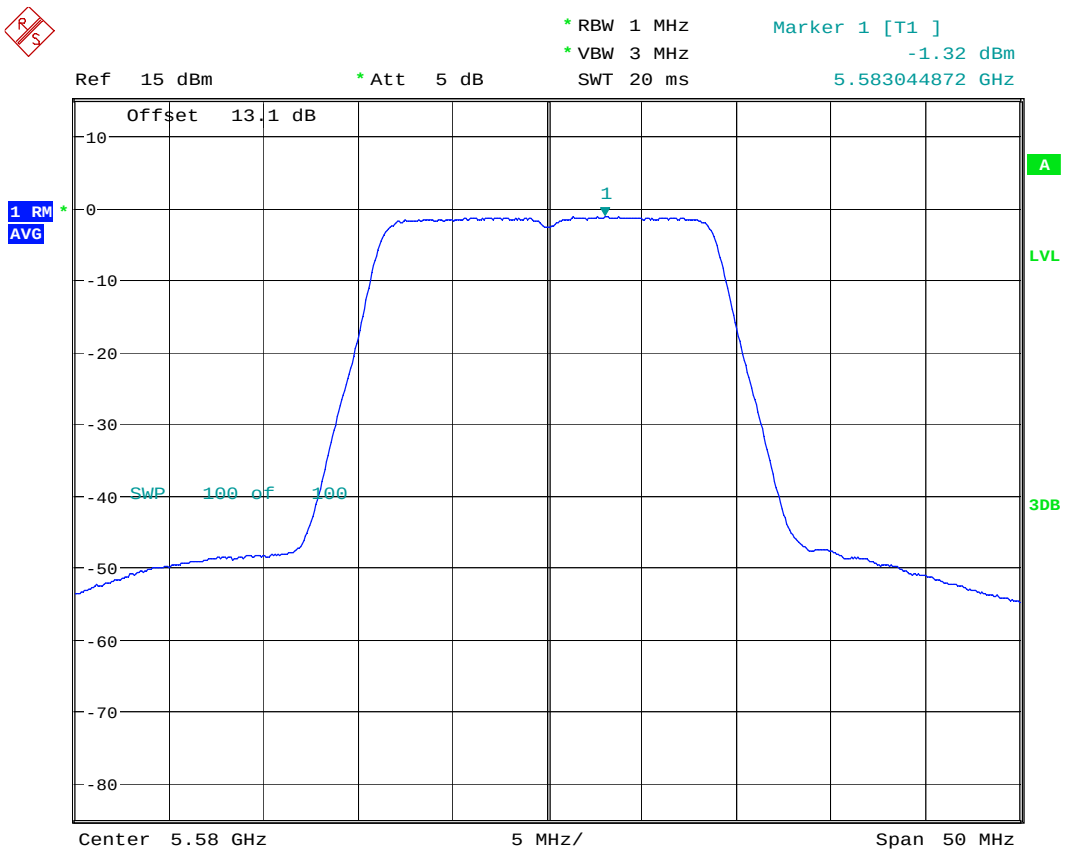
Channel100	Modulation/Packet Type: 802.11n_HT20 MCS0



Date: 22.MAR.2019 11:02:19

Plot #23

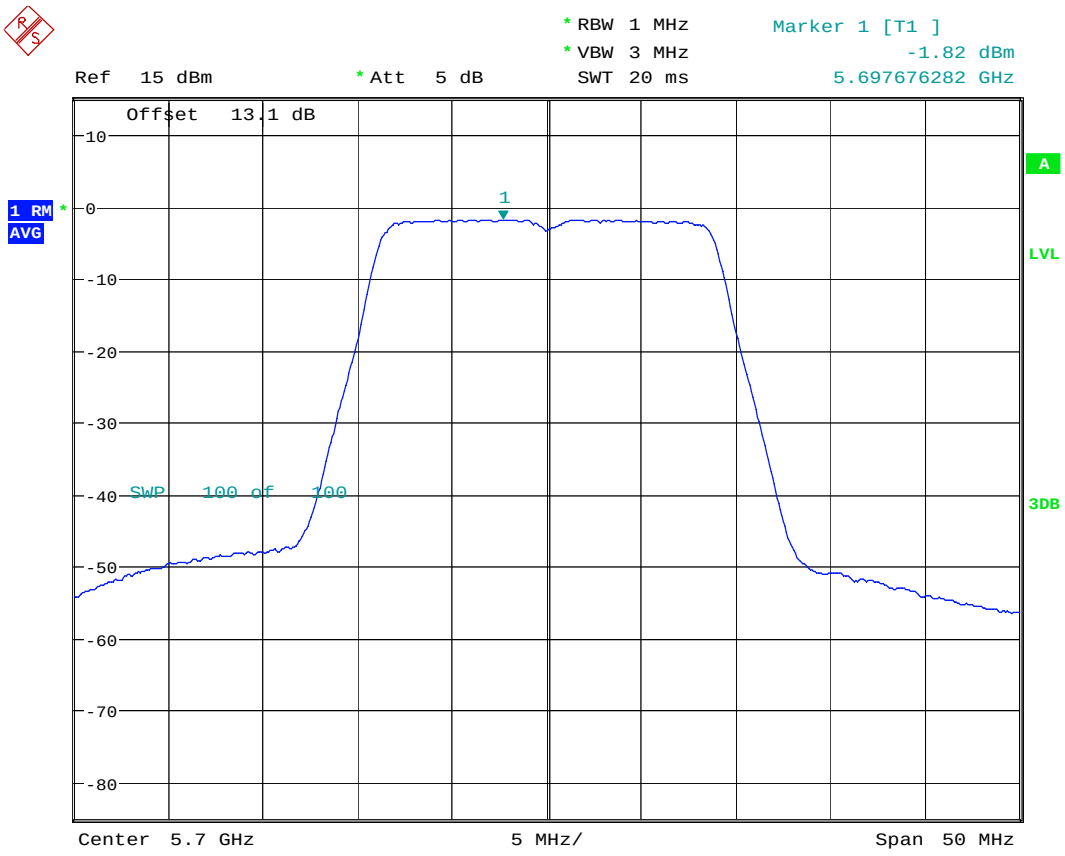
Channel116	Modulation/Packet Type: 802.11n_HT20 MCS0



Date: 22.MAR.2019 11:03:00

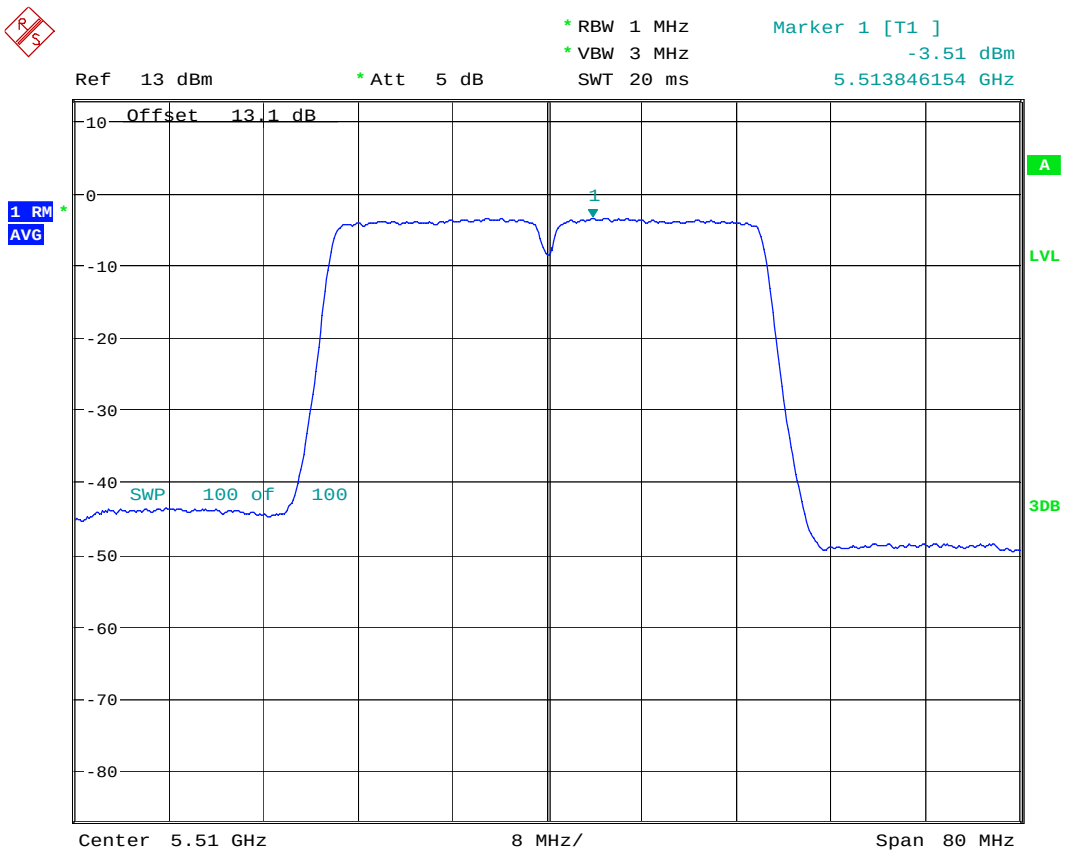
Plot #24

Channel140	Modulation/Packet Type: 802.11n_HT20 MCS0



Plot #25

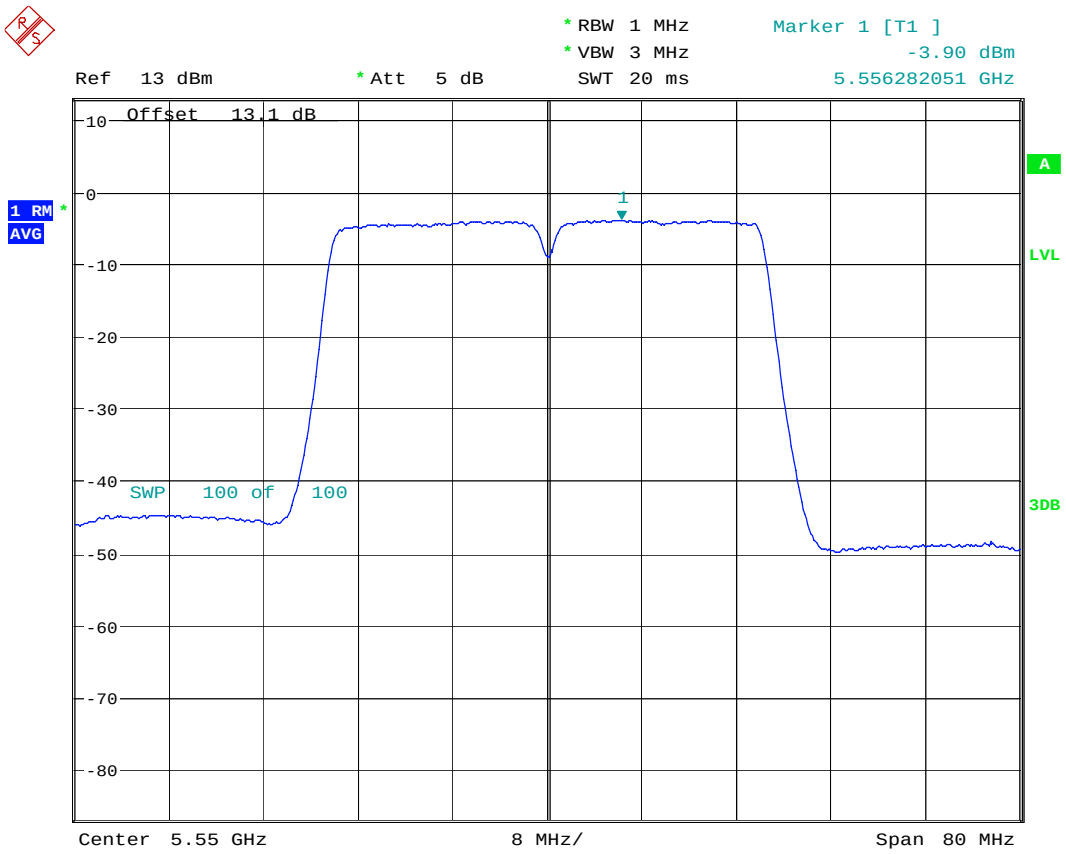
Channel102	Modulation/Packet Type: 802.11n_HT40 MCS0



Date: 22.MAR.2019 11:08:29

Plot #26

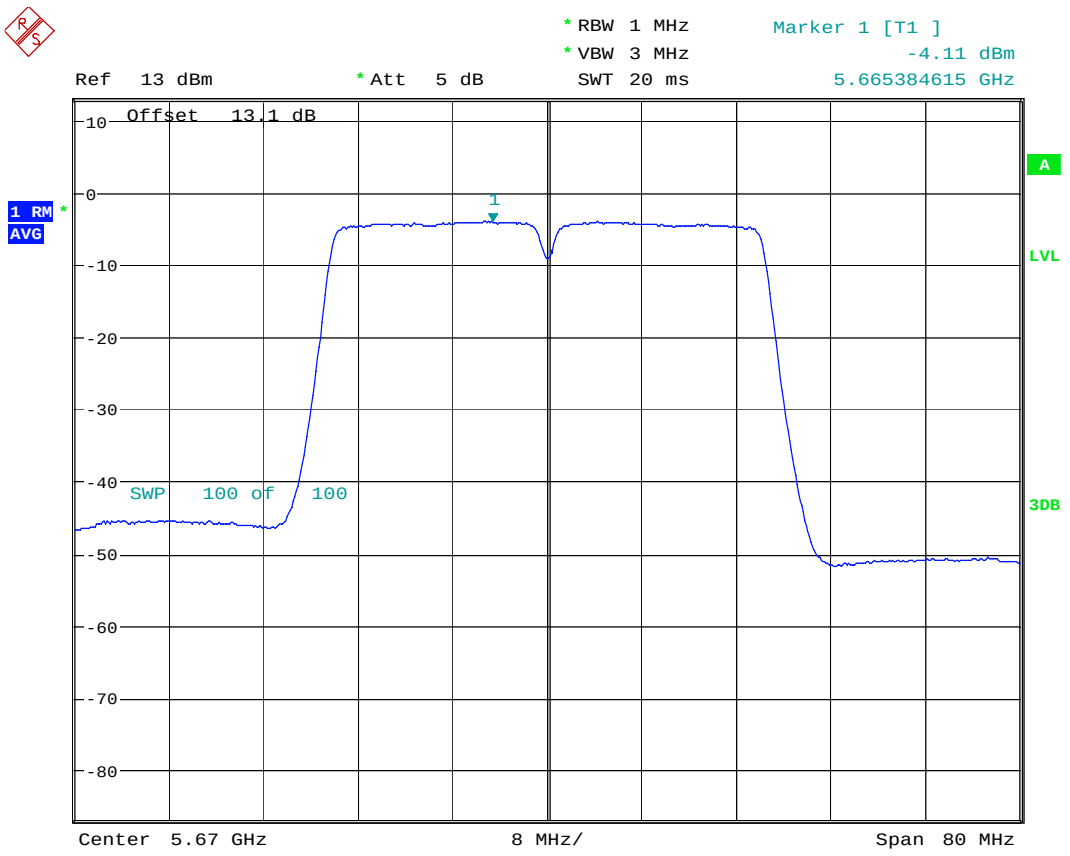
Channel110	Modulation/Packet Type: 802.11n_HT40 MCS0



Date: 22.MAR.2019 11:10:49

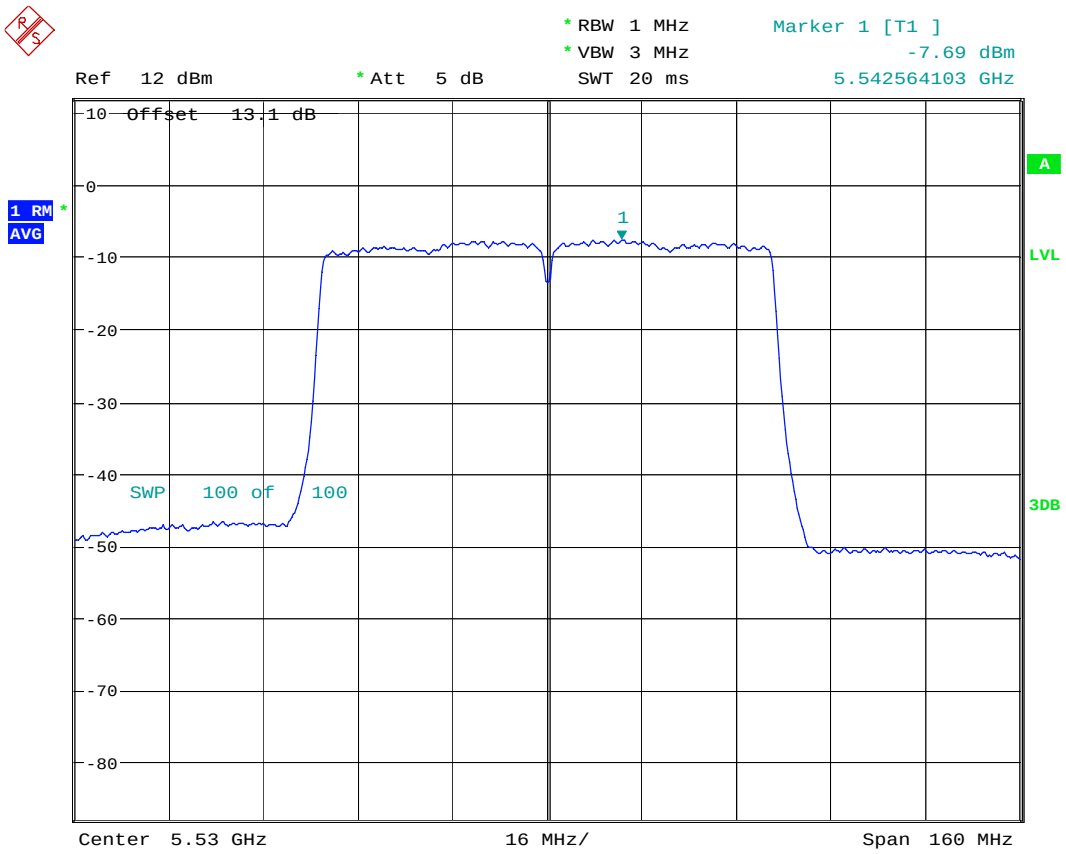
Plot #27

Channel134 | **Modulation/Packet Type: 802.11n_HT40 MCS0**



Plot #28

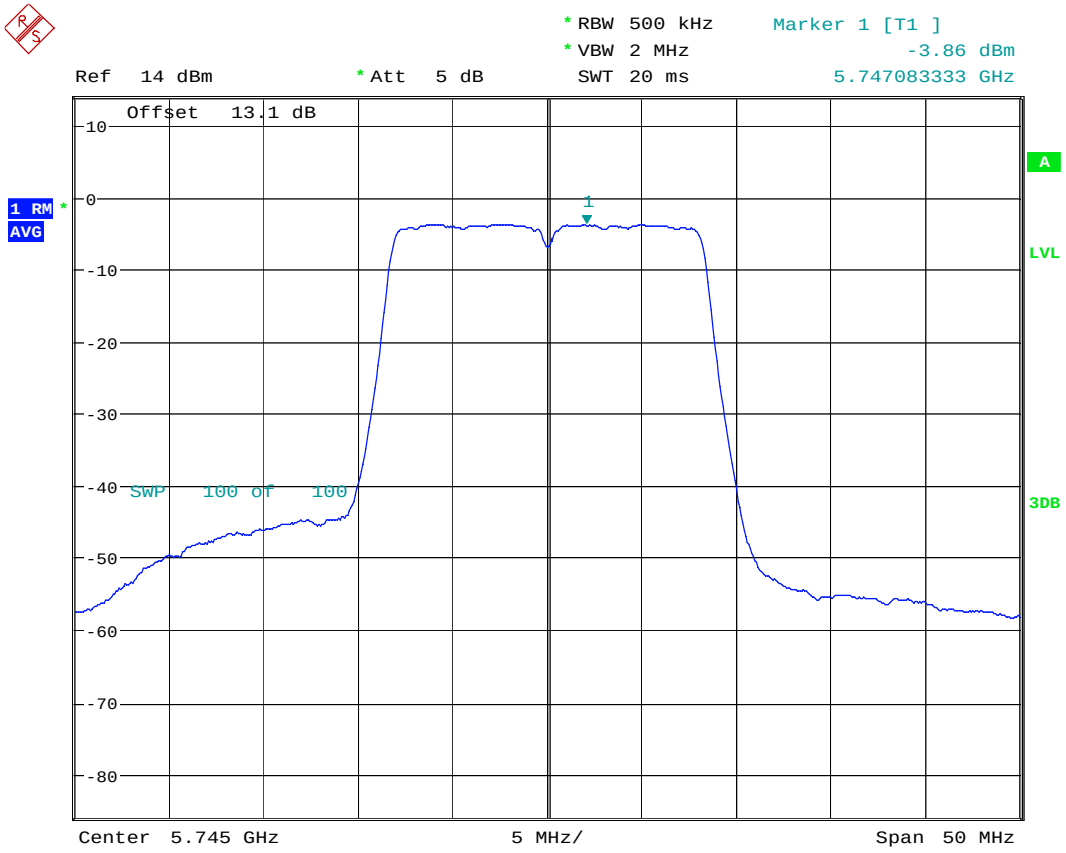
Channel106	Modulation/Packet Type: 802.11n_VHT80 MCS0



Date: 22.MAR.2019 12:09:45

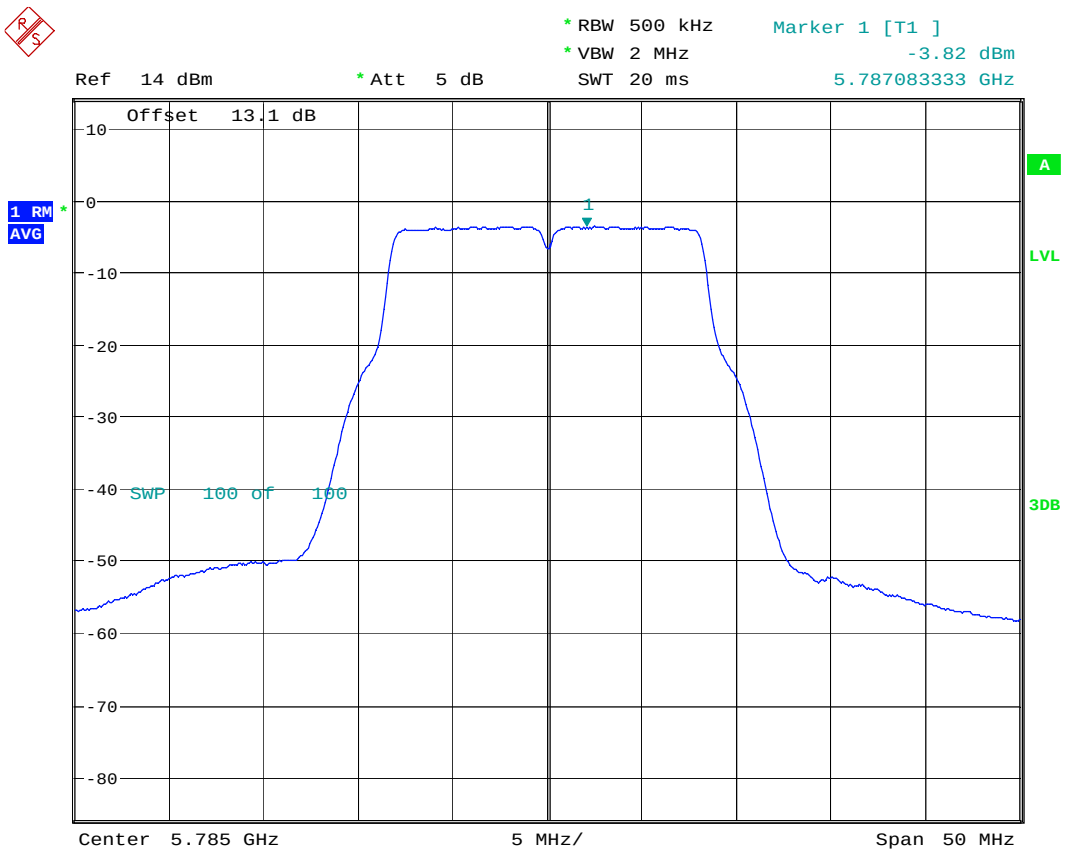
Plot #29

Channel149 | **Modulation/Packet Type: 802.11a 6Mbps**



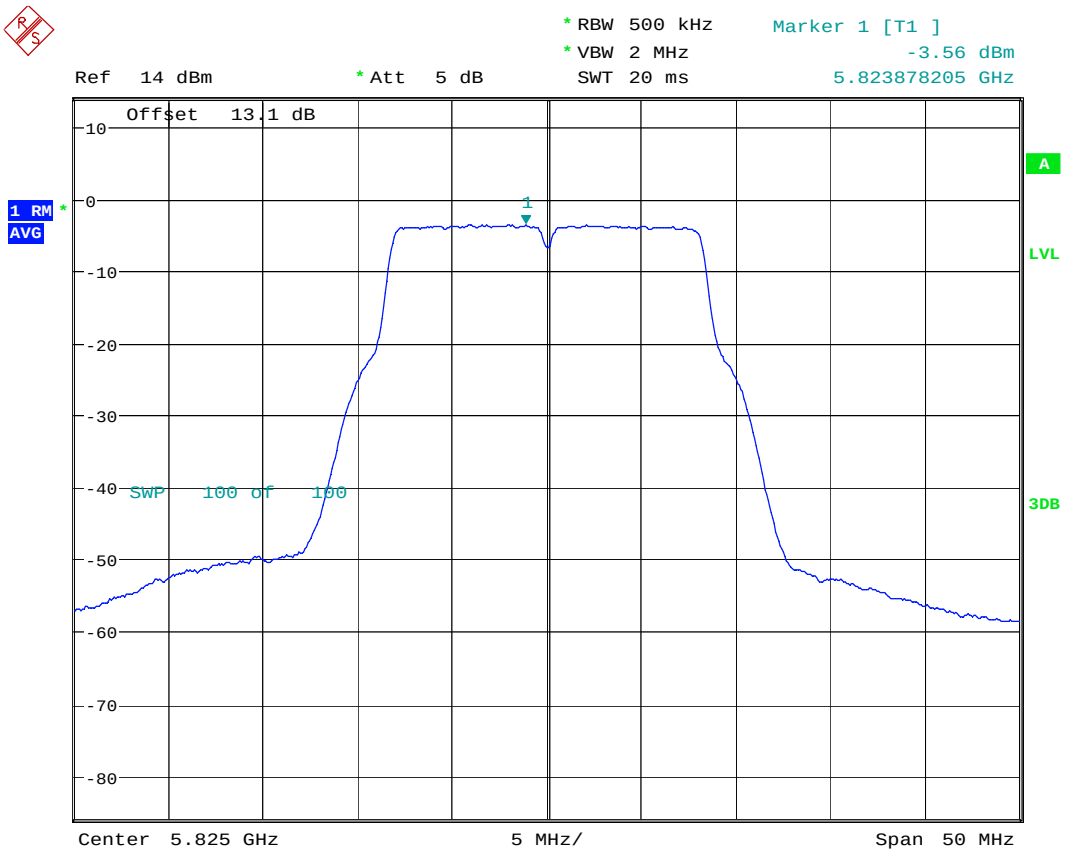
Plot #30

Channel157 | **Modulation/Packet Type: 802.11a 6Mbps**



Plot #31

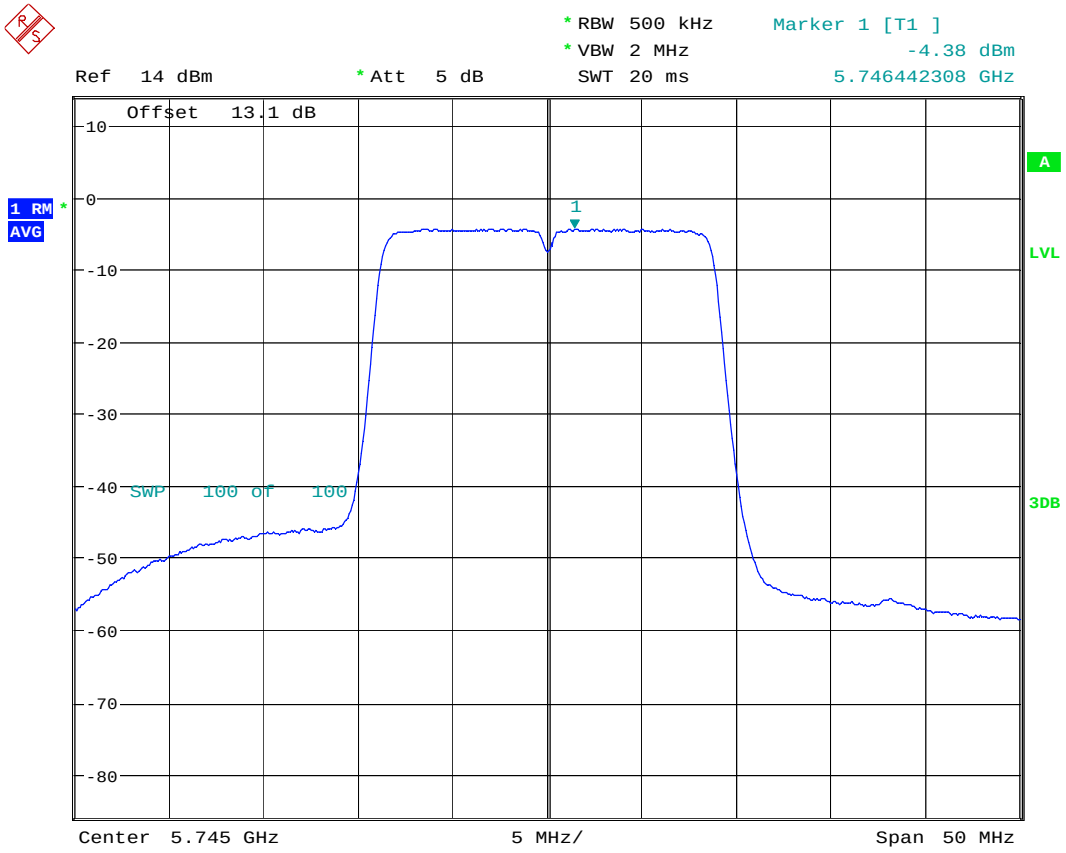
Channel 165	Modulation/Packet Type: 802.11a 6Mbps



Date: 22.MAR.2019 12:23:23

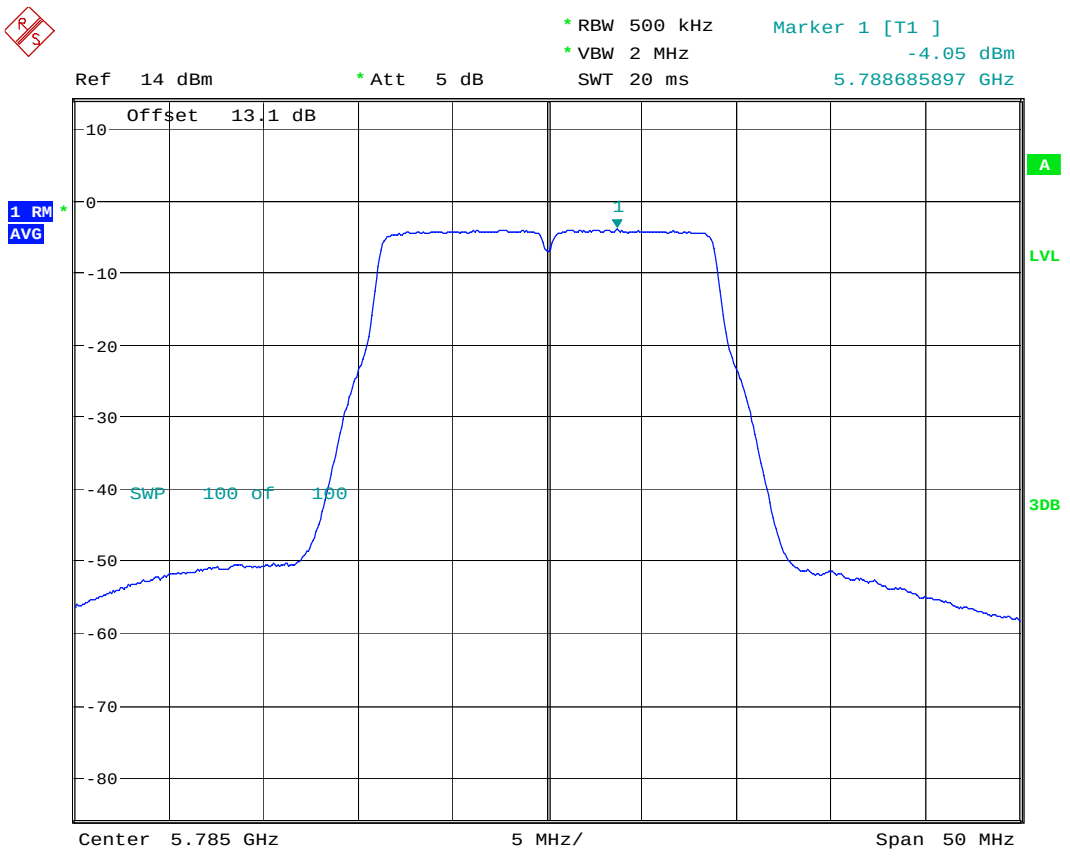
Plot #32

Channel149 | **Modulation/Packet Type: 802.11n_HT20 MCS0**



Plot #33

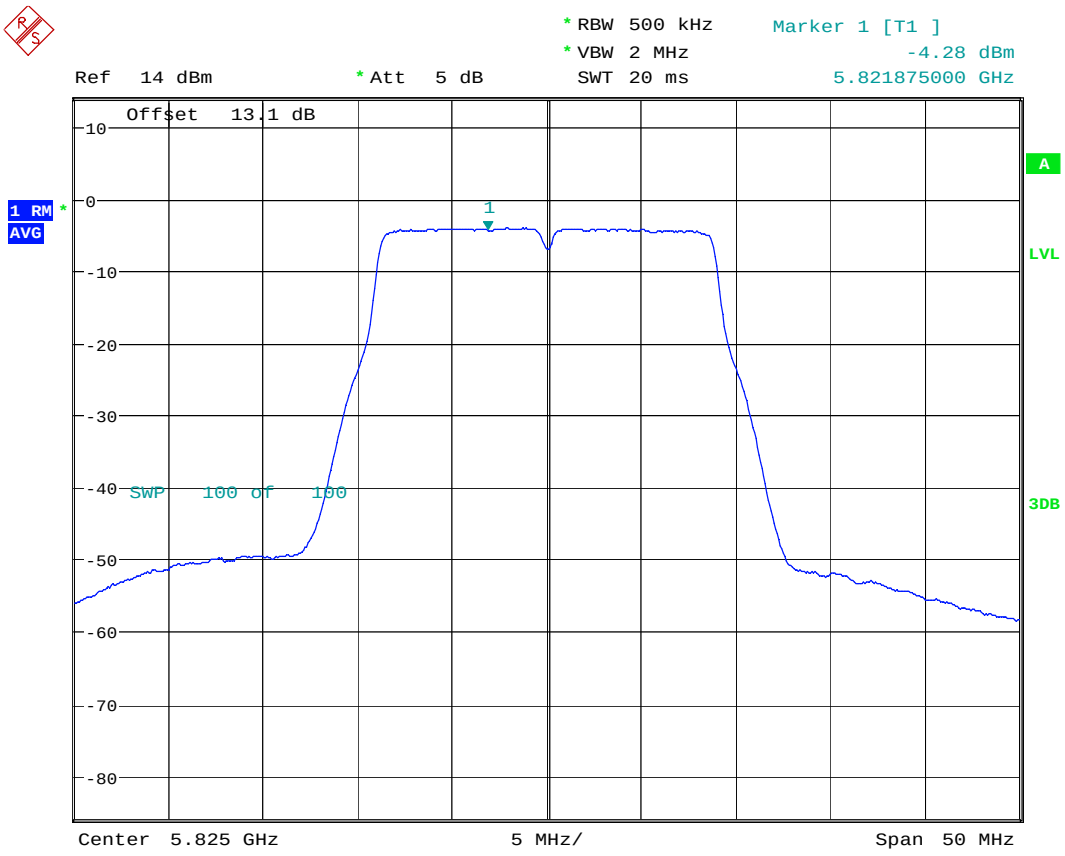
Channel157 | **Modulation/Packet Type: 802.11n_HT20 MCS0**



Date: 22.MAR.2019 12:26:18

Plot #34

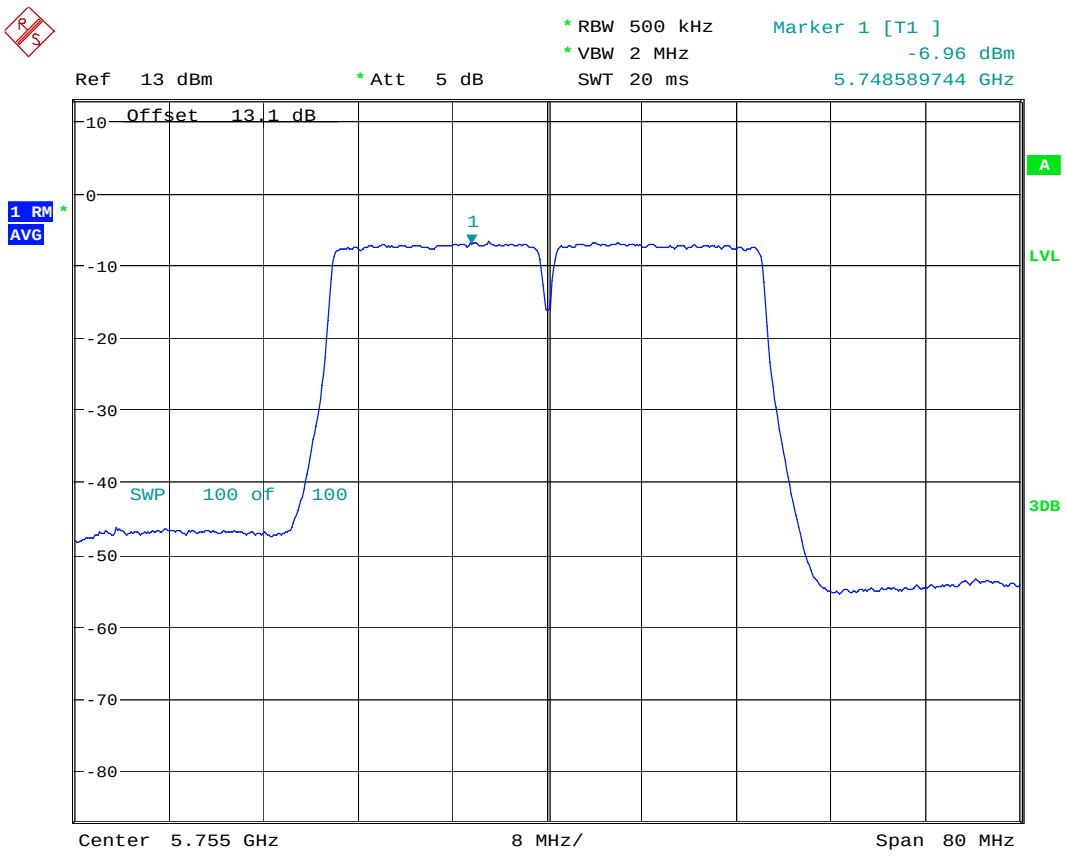
Channel165	Modulation/Packet Type: 802.11n_HT20 MCS0



Date: 22.MAR.2019 12:28:22

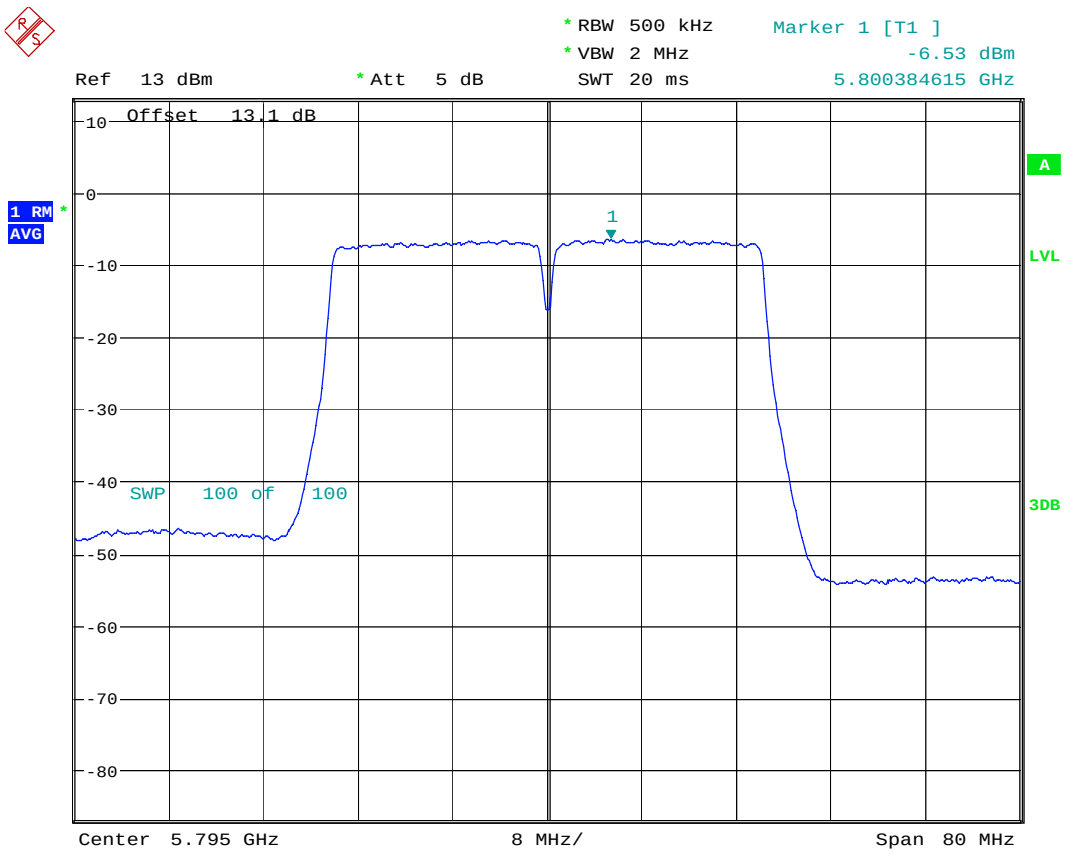
Plot #35

Channel151	Modulation/Packet Type: 802.11n_HT40 MCS0



Plot #36

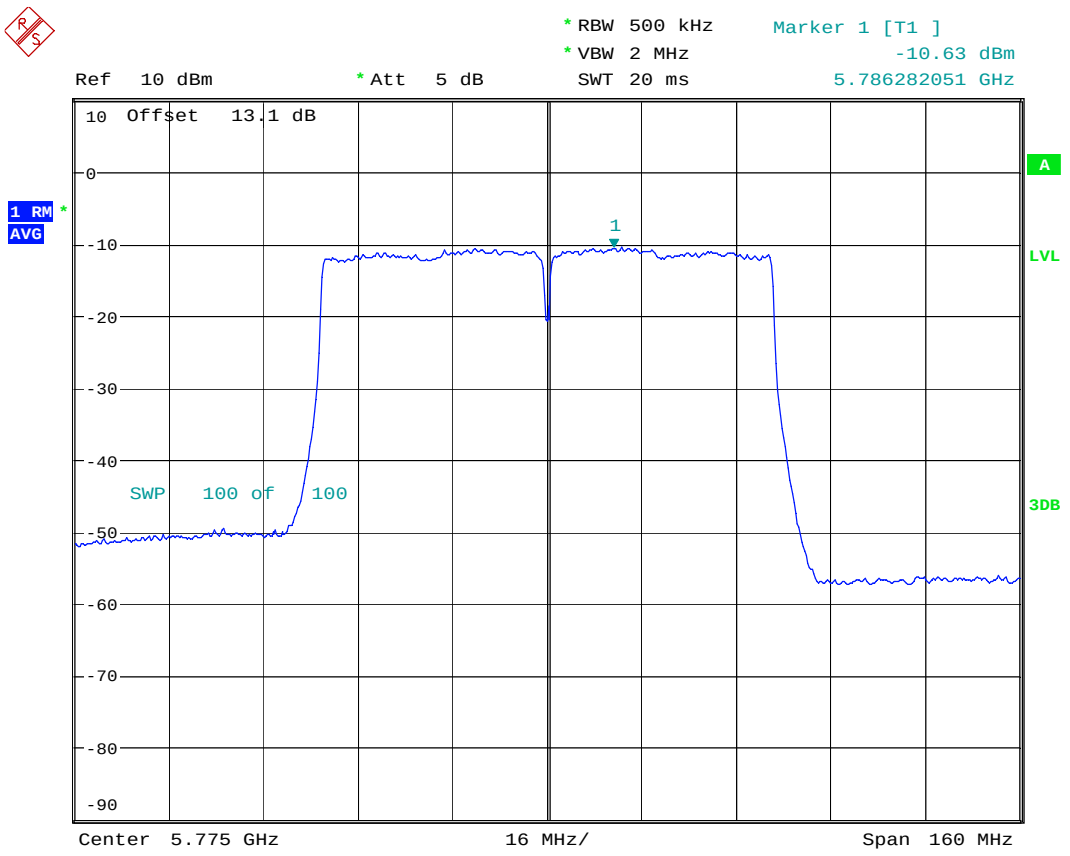
Channel159 | **Modulation/Packet Type: 802.11n_HT40 MCS0**



Date: 22.MAR.2019 13:32:40

Plot #37

Channel155 | **Modulation/Packet Type: 802.11ac_VHT80 MCS0**



8.4 Band Edge Compliance

8.4.1 Measurement according to FCC 789033 D02 General UNII Test Procedures New Rules v02r01

Non Restricted Band Edge and Restricted Band Edge Peak Measurement Spectrum Analyzer Settings:

- Follow the requirements in II.G.3, "General Requirements for Unwanted Emissions Measurements."
- Maximum emission levels are measured by setting the analyzer as follows:
- RBW = 1 MHz.
- VBW ≥ 3 MHz.
- Detector = Peak.
- Sweep time = auto.
- Trace mode = max hold.
- Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle. For example, at 50% duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission
- Upper control line is set to show the compliance of band emission mask according to 15.407(b)(4)(i)

Restricted Band Edge Average Measurement Spectrum Analyzer Settings:

- Follow the requirements in II.G.3. "General Requirements for Unwanted Emissions Measurements."
- RBW = 1 MHz.
- VBW ≥ 3 MHz.
- Detector = power averaging (rms), if span/(# of points in sweep) <= RBW/2. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak.
- Averaging type = power averaging (rms)
- Sweep time = auto.
- Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, the number of traces shall be increased by a factor of 1/x, where x is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—rather than turning on and off with the transmit cycle, at least 100 traces shall be averaged.)
- If tests are performed with the EUT transmitting at a duty cycle less than 98%, a correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
- If power averaging (rms) mode was used in II.G.6.c)(iv), the correction factor is 10 log (1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB must be added to the measured emission levels.

8.4.2 Limits non restricted band:

FCC§15.407 (b), RSS-247 6

- For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

- For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

- For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

- For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

8.4.3 Limits restricted band §15.407/15.209/15.205 and RSS-Gen 8.9/8.10

- *PEAK LIMIT= 74 dBµV/m @3m =-21.23 dBm
- *AVG LIMIT= 54 dBµV/m @3m =-41.23 dBm
- Start frequency & stop frequency according to frequency range specified in the restricted band table in FCC section 15.205 & RSS-Gen 8.10
- Measurements with a peak detector were used to show compliance to average limits, thus showing compliance to both peak and average limits.
- Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

8.4.4 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Single Antenna Gain
22° C	1	802.11a/n/ac	120 VAC/Battery	Section 3.1

8.4.5 Measurement result:

- The value of below table shows worst case of each mode.

5470MHz – 5725MHz upper non-restricted band

Plot #	EUT operating mode	Tx Chain	Operating Channel	Band Edge	Frequency (MHz)	Measured Emission Level(dBm)	Limit (dBm/MHz)	Result
1	802.11a	Primary	5700	Upper	5726.2	-47.1	-27	Pass
2	802.11n_HT20	Primary	5700	Upper	5721	-47.07	-27	Pass
3	802.11n_HT40	Primary	5670	Upper	5727.2	-46.57	-27	Pass

5725MHz – 5850 MHz Emission Mask

Plot #	EUT operating mode	Tx Chain	Operating Channel	Band Edge	Frequency (MHz)	Measured Emission Level(dBm)	Limit (dBm/MHz)	Result
4	802.11a	Primary	5745	Lower	5651.9	-52.9	-27	Pass
5	802.11a	Primary	5825	Upper	5929.1	-52.42	-27	Pass
6	802.11n_HT20	Primary	5745	Lower	5650	-54.39	-27	Pass
7	802.11n_HT20	Primary	5825	Upper	5939.1	-53.74	-27	Pass
8	802.11n_HT40	Primary	5755	Lower	5650	-52.58	-27	Pass
9	802.11n_HT40	Primary	5795	Upper	5925	-53.97	-27	Pass
10	802.11ac_VHT80	Primary	5775	Lower	5650	-45.69	-27	Pass
11	802.11ac_VHT80	Primary	5775	Upper	5925	-51.92	-27	Pass

Note: For the non-restricted band edge, the path loss and antenna gain has been offset into the spectrum analyzer for each mode

4500MHz – 5150 MHz restricted band edge

Plot #	EUT operating mode	Tx Chain	Operating Channel	Band Edge	Measured Emission level (dBm)	DC CF	Path loss (dB)	Antenna Gain (dBi)	MIMO gain	Calculated Emission Level (dBm)	Limit (dBm)	Result
12	802.11a	Primary	5180	Lower Restricted peak	-42.9	N/A	1.63	3.1	3	-35.17	-21.23 Peak	Pass
13	802.11a	Primary	5180	Lower Restricted Average	-55.21	0.27	1.63	3.1	3	-47.21	-41.23 AVG	Pass
14	802.11n_HT20	Primary	5180	Lower Restricted peak	-41.6	N/A	1.63	3.1	3	-33.87	-21.23 Peak	Pass
15	802.11n_HT20	Primary	5180	Lower Restricted Average	-54.97	0.29	1.63	3.1	3	-46.95	-41.23 AVG	Pass
16	802.11n_HT40	Primary	5190	Lower Restricted peak	-31.49	N/A	1.63	3.1	3	-23.76	-21.23 Peak	Pass
17	802.11n_HT40	Primary	5190	Lower Restricted Average	-50.87	0.59	1.63	3.1	3	-42.55	-41.23 AVG	Pass
18	802.11n_VHT80	Primary	5210	Lower Restricted peak	-34.49	N/A	1.63	3.1	3	-26.76	-21.23 Peak	Pass
19	802.11n_VHT80	Primary	5210	Lower Restricted Average	-50.57	1.12	1.63	3.1	3	-41.72	-41.23 AVG	Pass

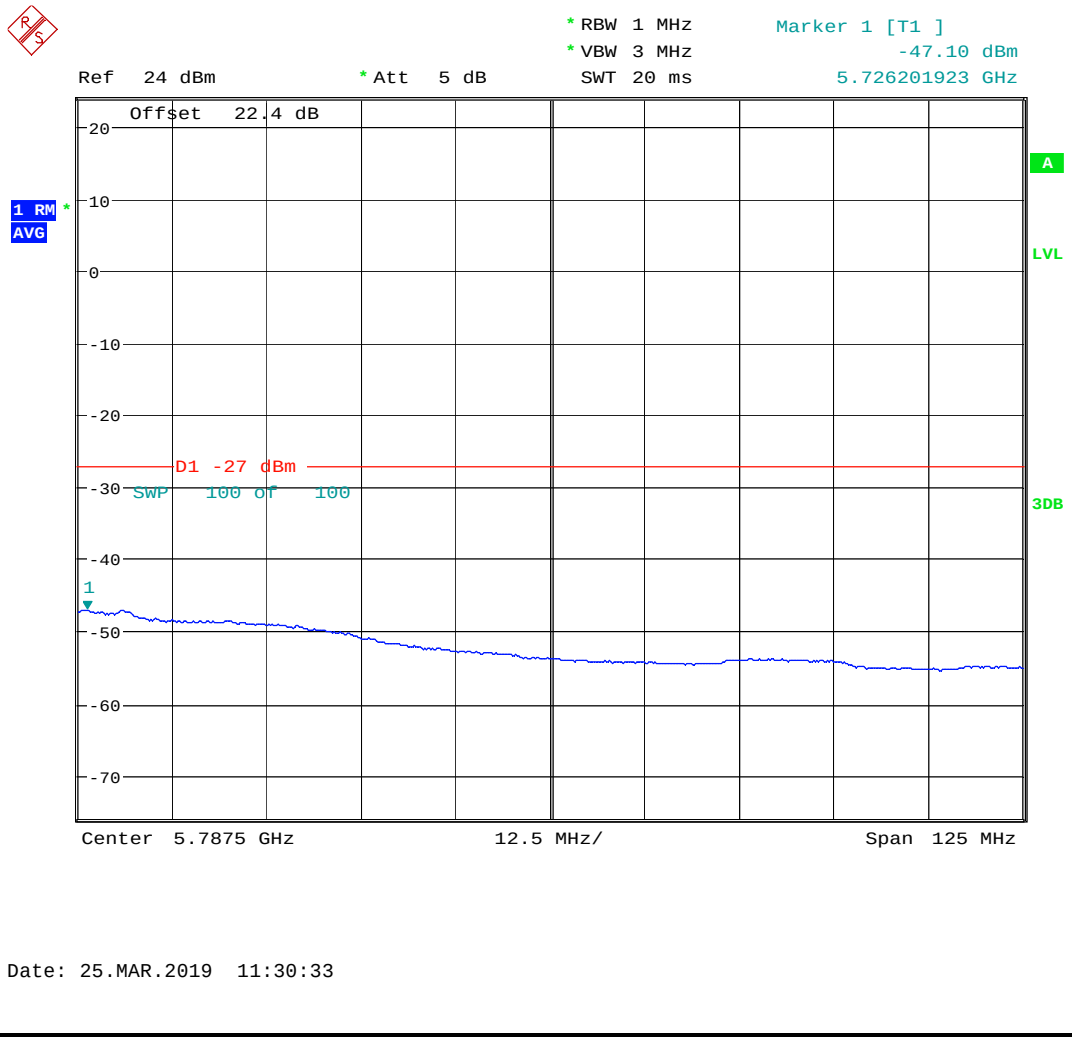
5350MHz – 5460 MHz restricted band edge

Plot #	EUT operating mode	Tx Chain	Operating Channel	Band Edge	Measured Emission level (dBm)	DC CF	Path loss (dB)	Antenna Gain (dBi)	MIMO gain	Calculated Emission Level (dBm)	Limit (dBm)	Result
20	802.11a	Primary	5320	Lower Restricted peak	-43.09	N/A	1.63	3.1	3	-35.36	-21.23 Peak	Pass
21	802.11a	Primary	5320	Lower Restricted Average	-54.86	0.27	1.63	3.1	3	-46.86	-41.23 AVG	Pass
22	802.11n_HT20	Primary	5320	Lower Restricted peak	-42.93	N/A	1.63	3.1	3	-35.2	-21.23 Peak	Pass
23	802.11n_HT20	Primary	5320	Lower Restricted Average	-57.13	0.29	1.63	3.1	3	-49.11	-41.23 AVG	Pass
24	802.11n_HT40	Primary	5310	Lower Restricted peak	-33.6	N/A	1.63	3.1	3	-25.87	-21.23 Peak	Pass
25	802.11n_HT40	Primary	5310	Lower Restricted Average	-50.35	0.59	1.63	3.1	3	-42.03	-41.23 AVG	Pass
26	802.11n_VHT80	Primary	5290	Lower Restricted peak	-36.43	N/A	1.63	3.1	3	-28.7	-21.23 Peak	Pass
27	802.11n_VHT80	Primary	5290	Lower Restricted Average	-51.47	1.12	1.63	3.1	3	-42.62	-41.23 AVG	Pass
28	802.11a	Primary	5500	Lower Restricted peak	-43.64	N/A	2.15	4.1	3	-34.39	-21.23 Peak	Pass
29	802.11a	Primary	5500	Lower Restricted Average	-56	0.27	2.15	4.1	3	-46.48	-41.23 AVG	Pass
30	802.11n_HT20	Primary	5500	Lower Restricted peak	-44.77	N/A	2.15	4.1	3	-35.52	-21.23 Peak	Pass
31	802.11n_HT20	Primary	5500	Lower Restricted Average	-56.02	0.29	2.15	4.1	3	-46.48	-41.23 AVG	Pass
32	802.11n_HT40	Primary	5510	Lower Restricted peak	-35.82	N/A	2.15	4.1	3	-26.57	-21.23 Peak	Pass
33	802.11n_HT40	Primary	5510	Lower Restricted Average	-52.33	0.59	2.15	4.1	3	-42.49	-41.23 AVG	Pass
34	802.11n_VHT80	Primary	5530	Lower Restricted peak	-34.88	N/A	2.15	4.1	3	-25.63	-21.23 Peak	Pass
35	802.11n_VHT80	Primary		Lower Restricted Average	-52.43	1.12	2.15	4.1	3	-42.06	-41.23 AVG	Pass

8.4.6 Measurement Plots:

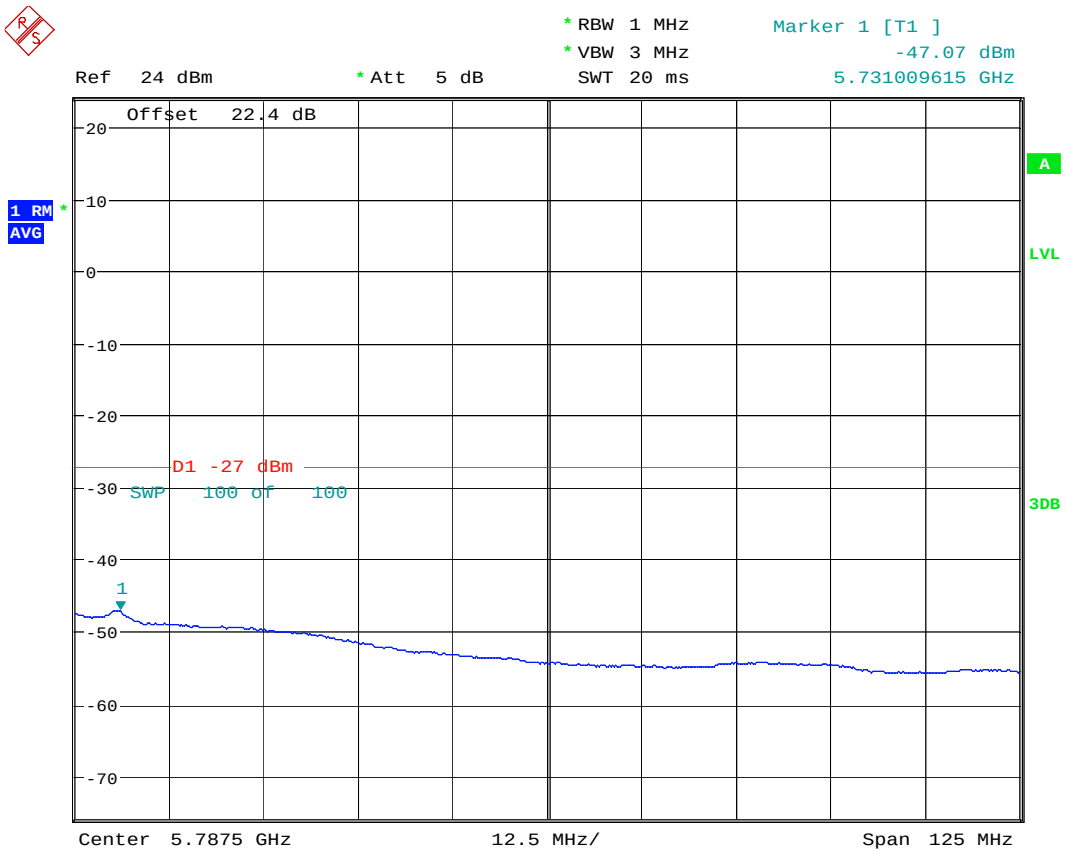
Plot #1

Channel 140	Modulation/Packet Type: 802.11a 6Mbps



Plot #2

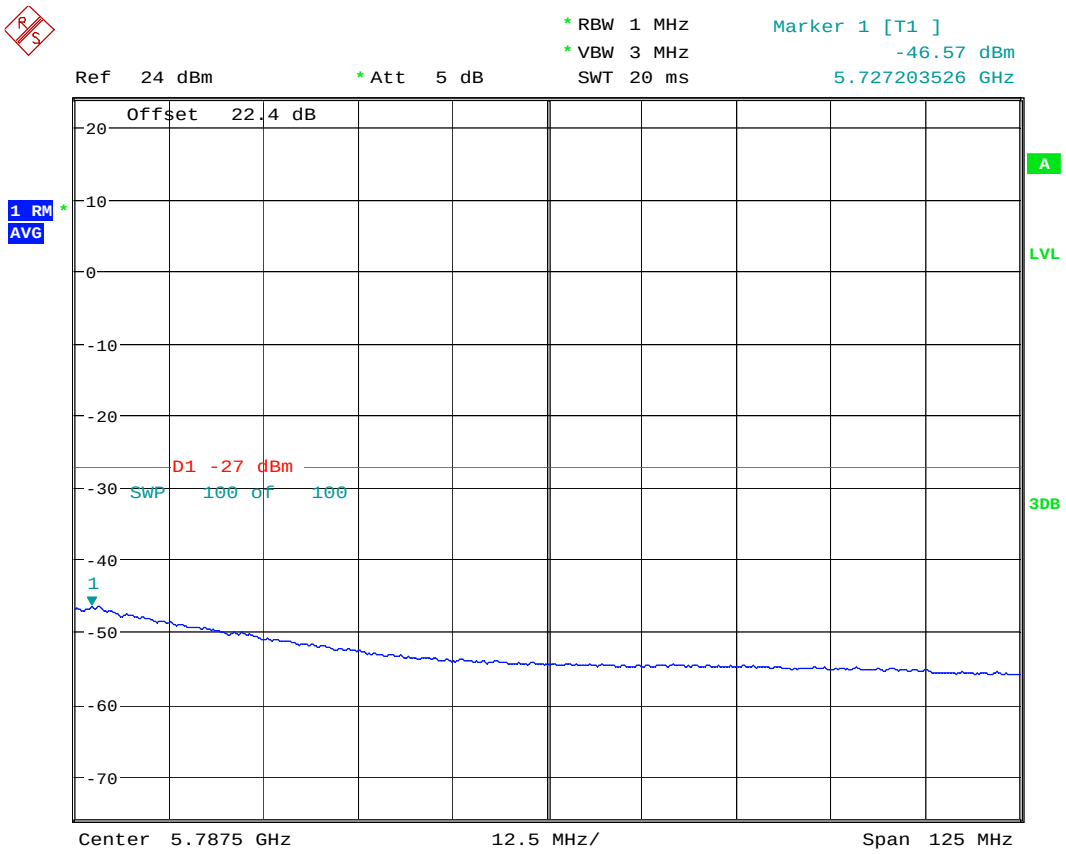
Channel 140	Modulation/Packet Type: 802.11n_HT20 MCS0



Date: 25.MAR.2019 11:31:43

Plot #3

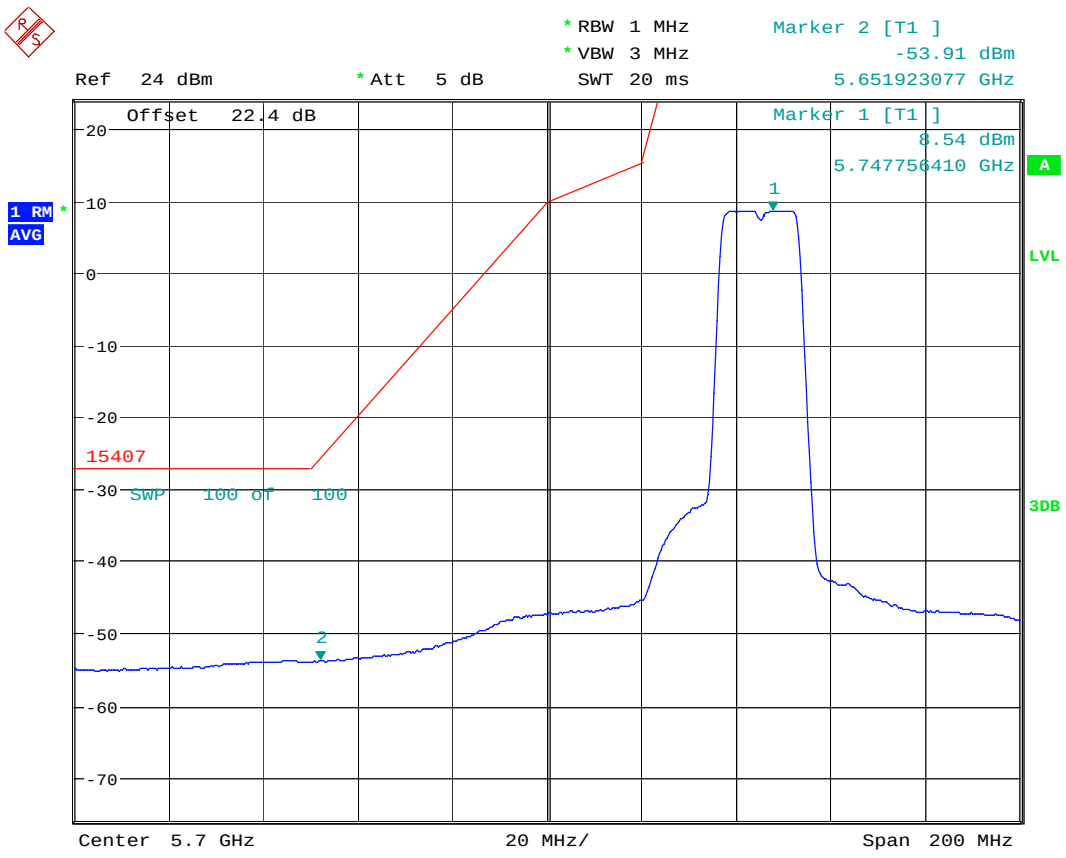
Channel 134	Modulation/Packet Type: 802.11n_HT40 MCS0



Date: 25.MAR.2019 11:32:47

Plot #4

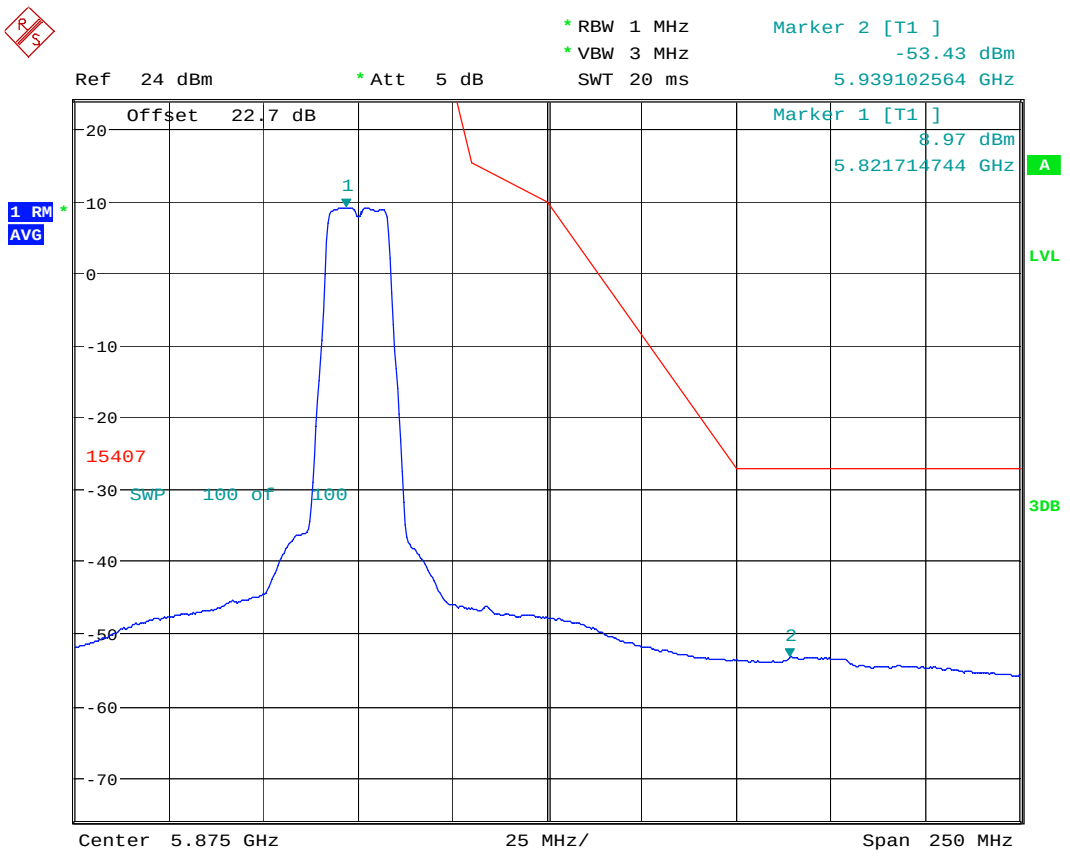
Channel 149	Modulation/Packet Type: 802.11a 6Mbps



Date: 25.MAR.2019 09:29:49

Plot #5

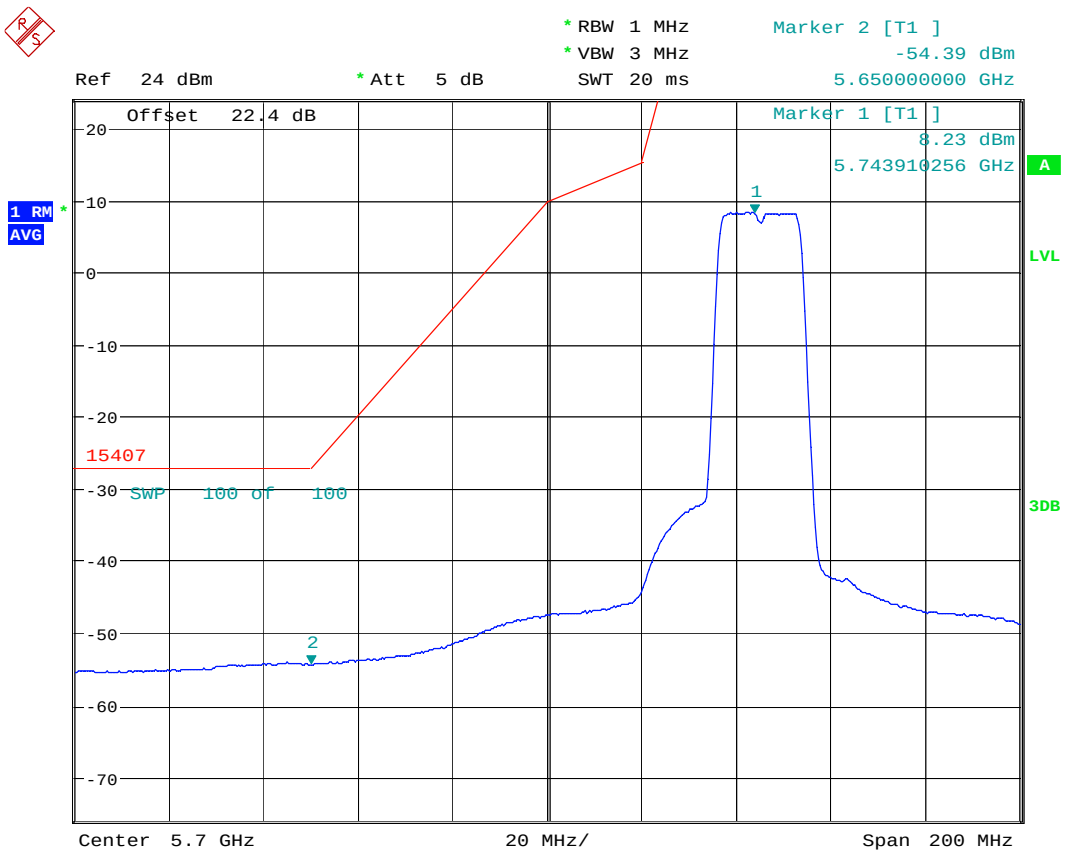
Channel 165	Modulation/Packet Type: 802.11a 6Mbps



Date: 25.MAR.2019 11:24:12

Plot #6

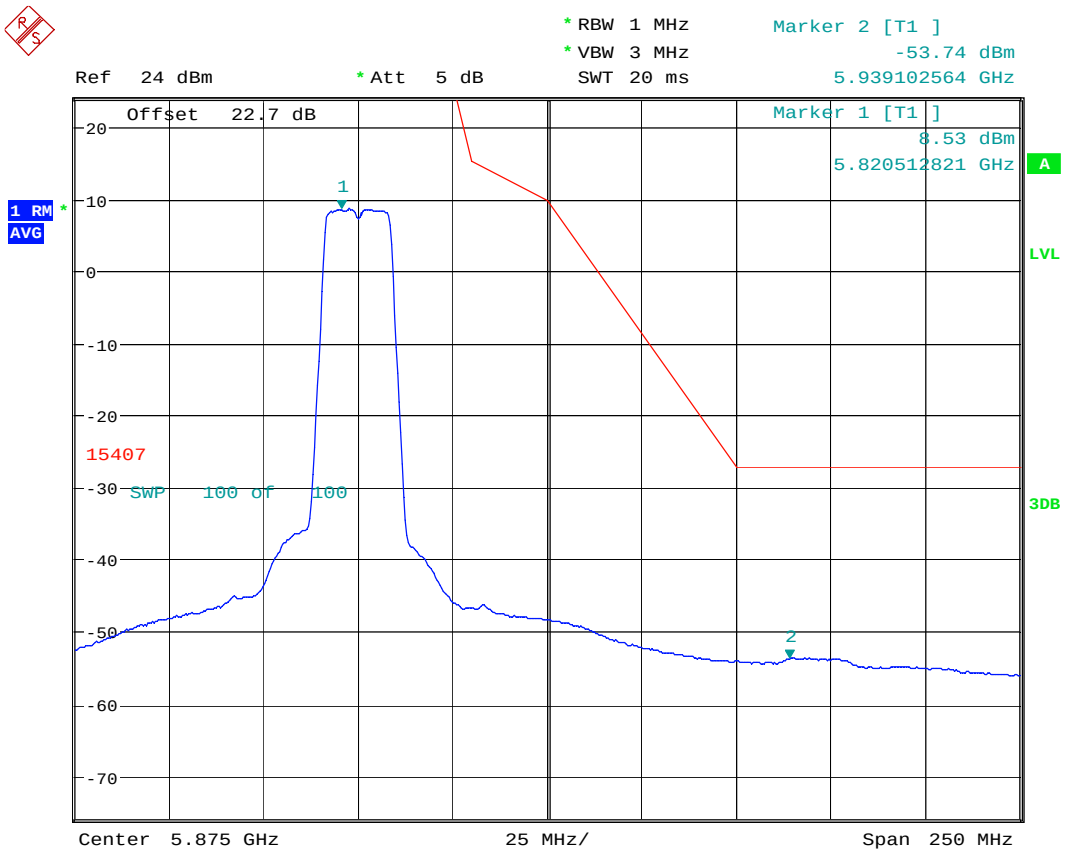
Channel 149	Modulation/Packet Type: 802.11n_HT20 MCS0



Date: 25.MAR.2019 09:31:33

Plot #7

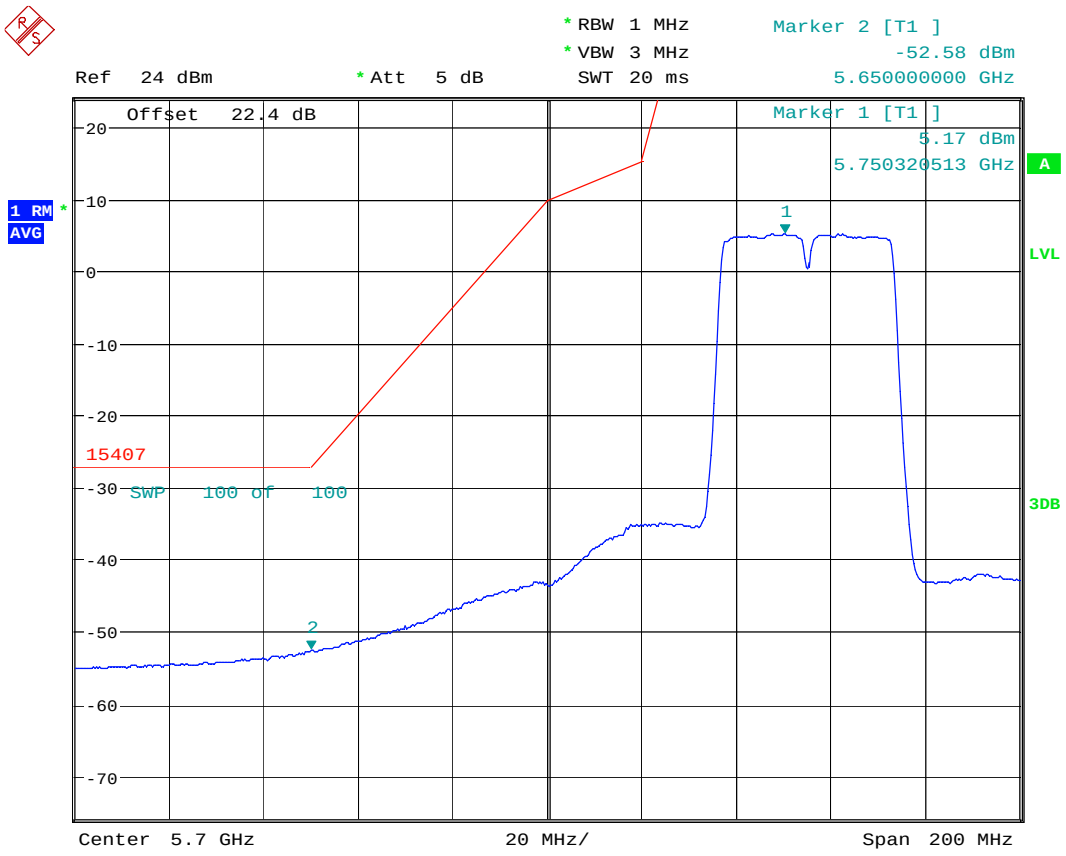
Channel 165	Modulation/Packet Type: 802.11n_HT20 MCS0



Date: 25.MAR.2019 11:25:16

Plot #8

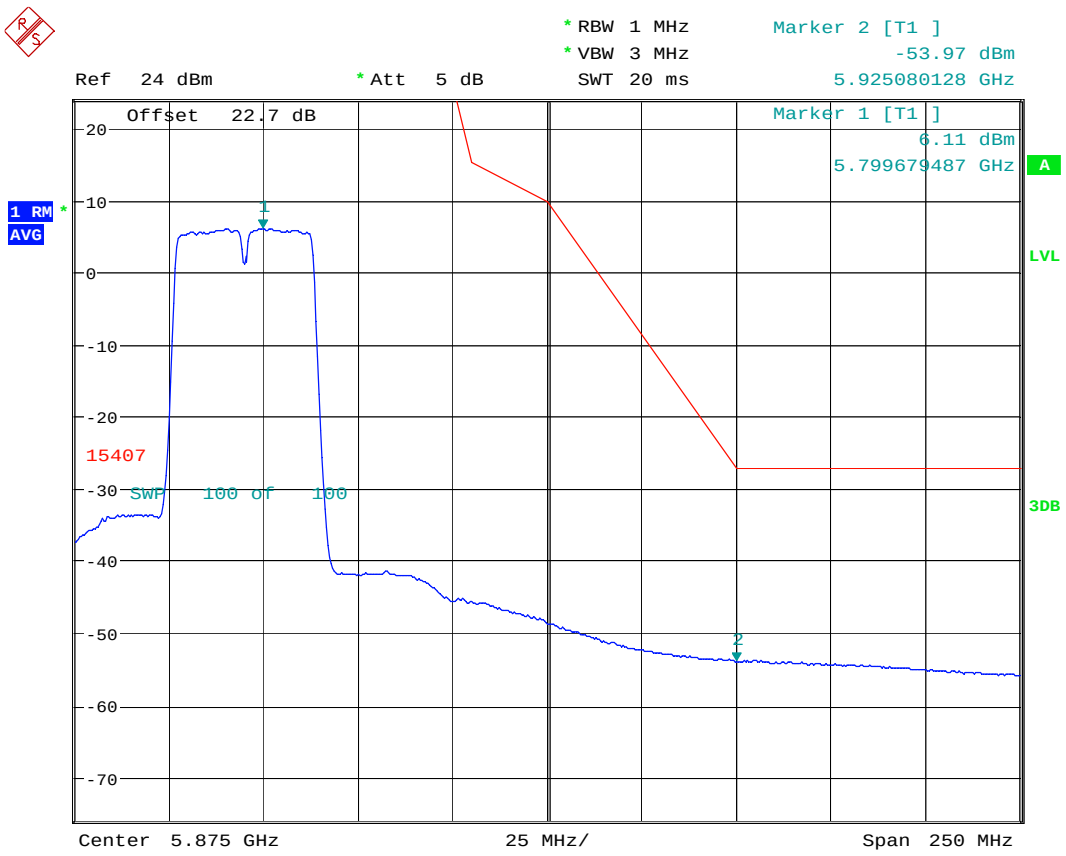
Channel 151	Modulation/Packet Type: 802.11n_HT40 MCS0



Date: 25.MAR.2019 09:32:23

Plot #9

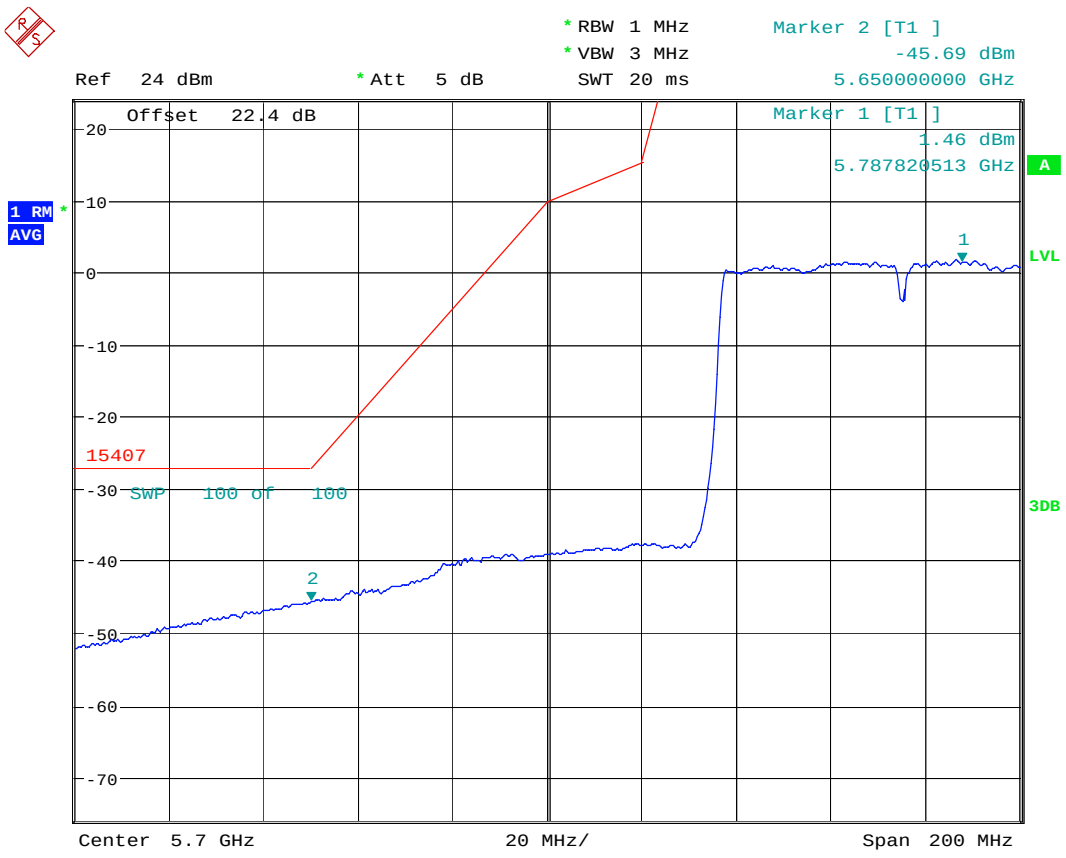
Channel 159	Modulation/Packet Type: 802.11n_HT40 MCS0



Date: 25.MAR.2019 11:26:45

Plot #10

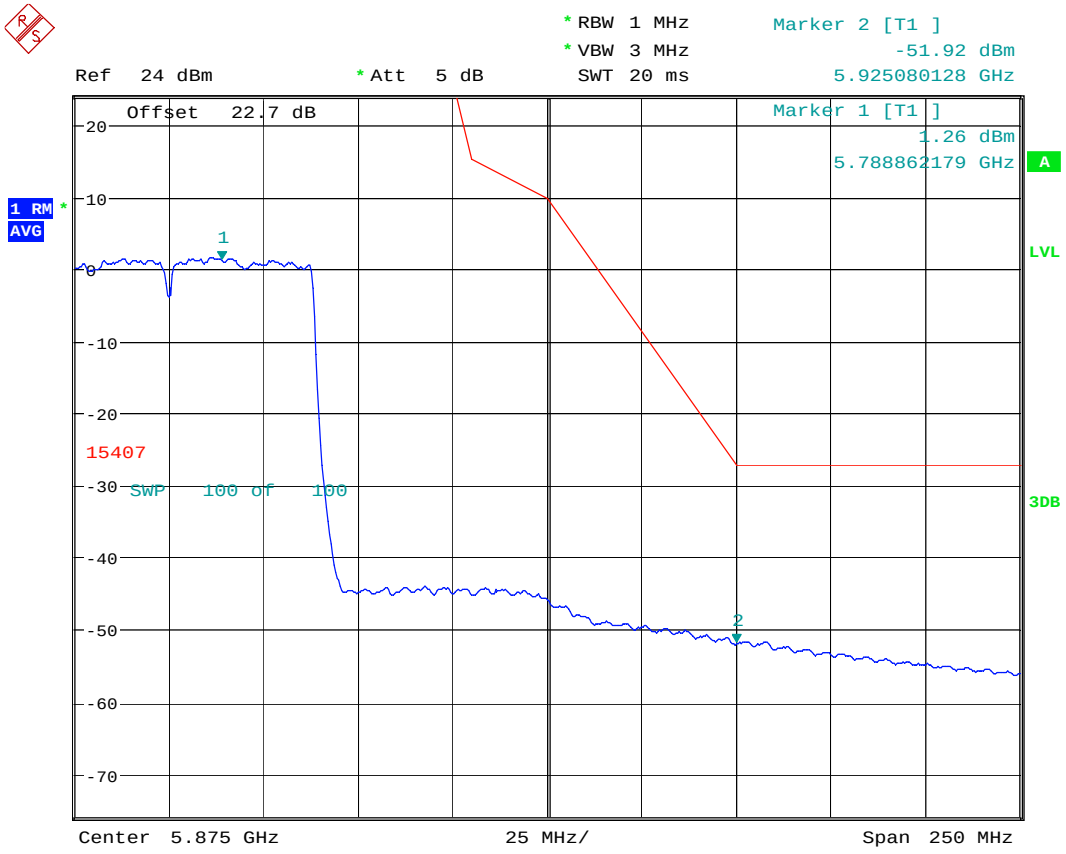
Channel 155	Modulation/Packet Type: 802.11ac_VHT80 MCS0



Date: 25.MAR.2019 09:33:19

Plot #11

Channel 155	Modulation/Packet Type: 802.11ac_VHT80 MCS0

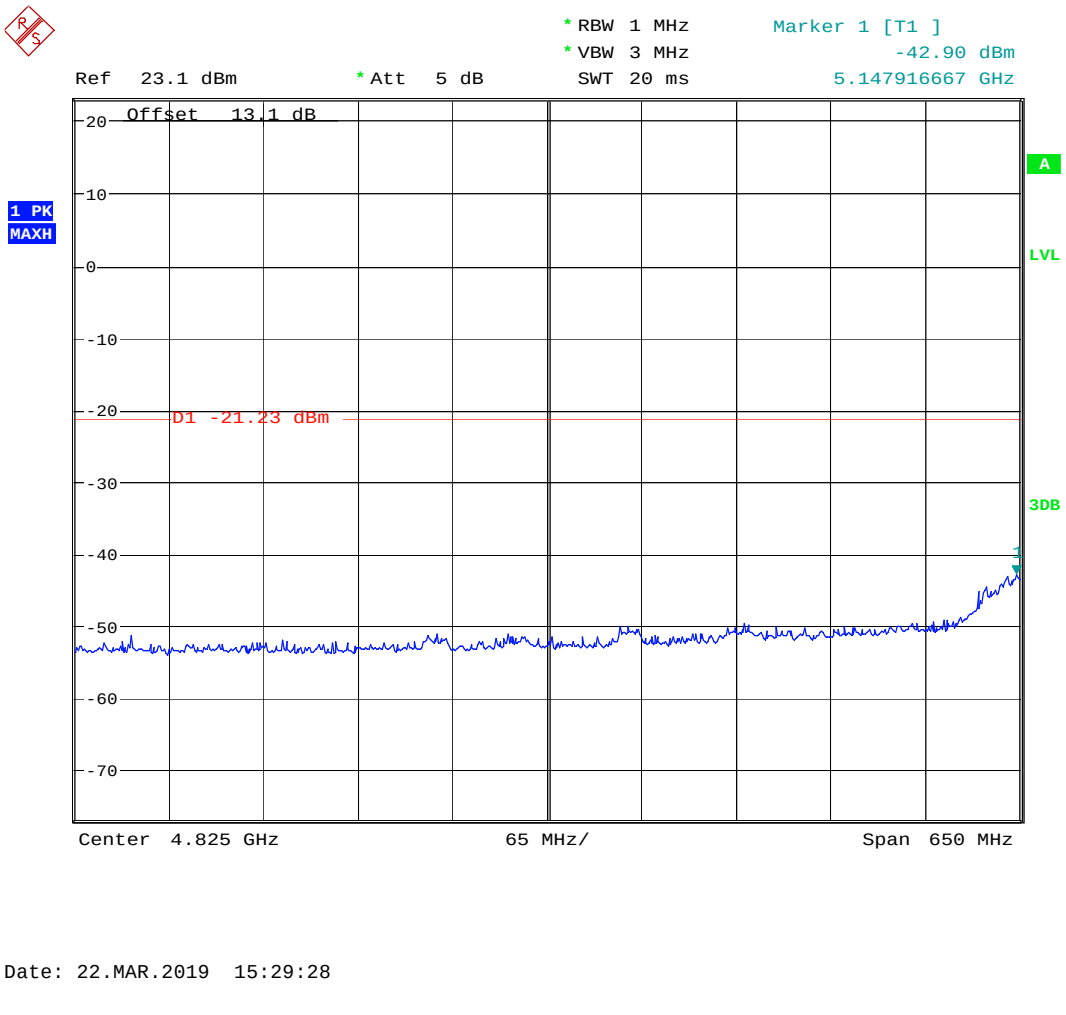


Date: 25.MAR.2019 11:27:46

Unwanted Band Edge Emission in Restricted band 4500-5150 MHz

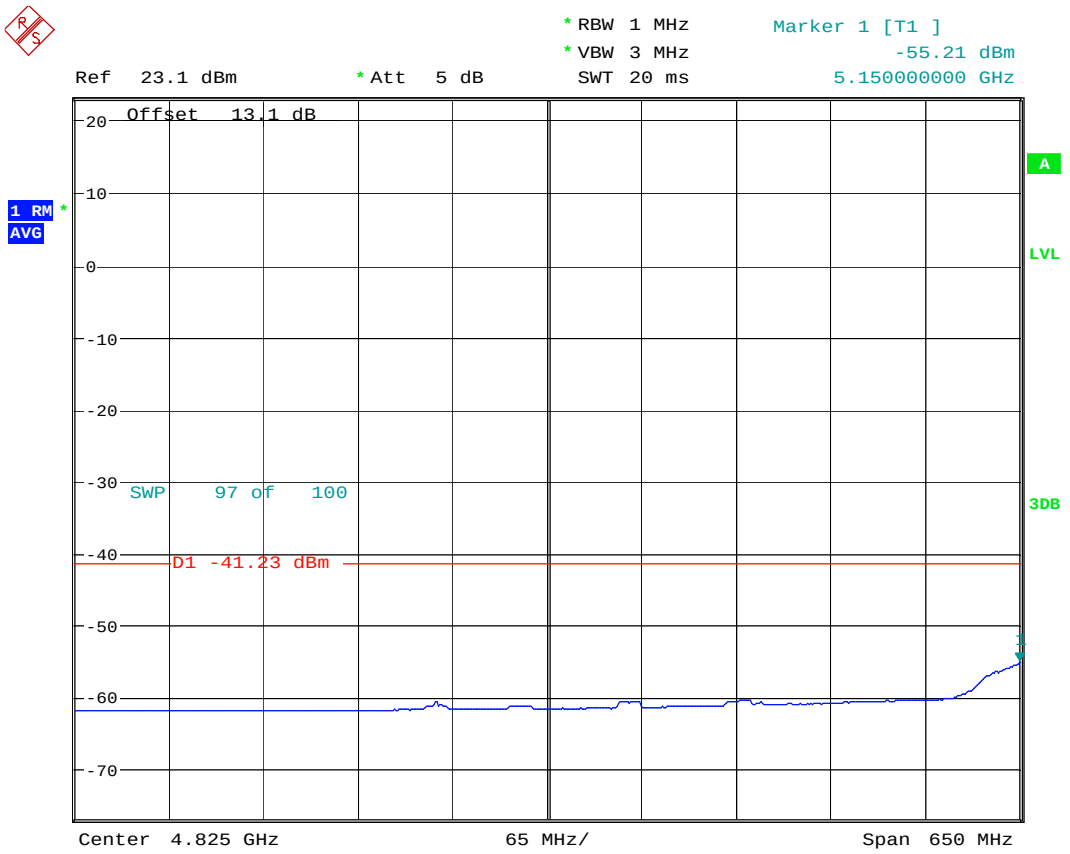
Plot #12

Channel 36	Modulation/Packet Type: 802.11a 6Mbps Peak



Plot #13

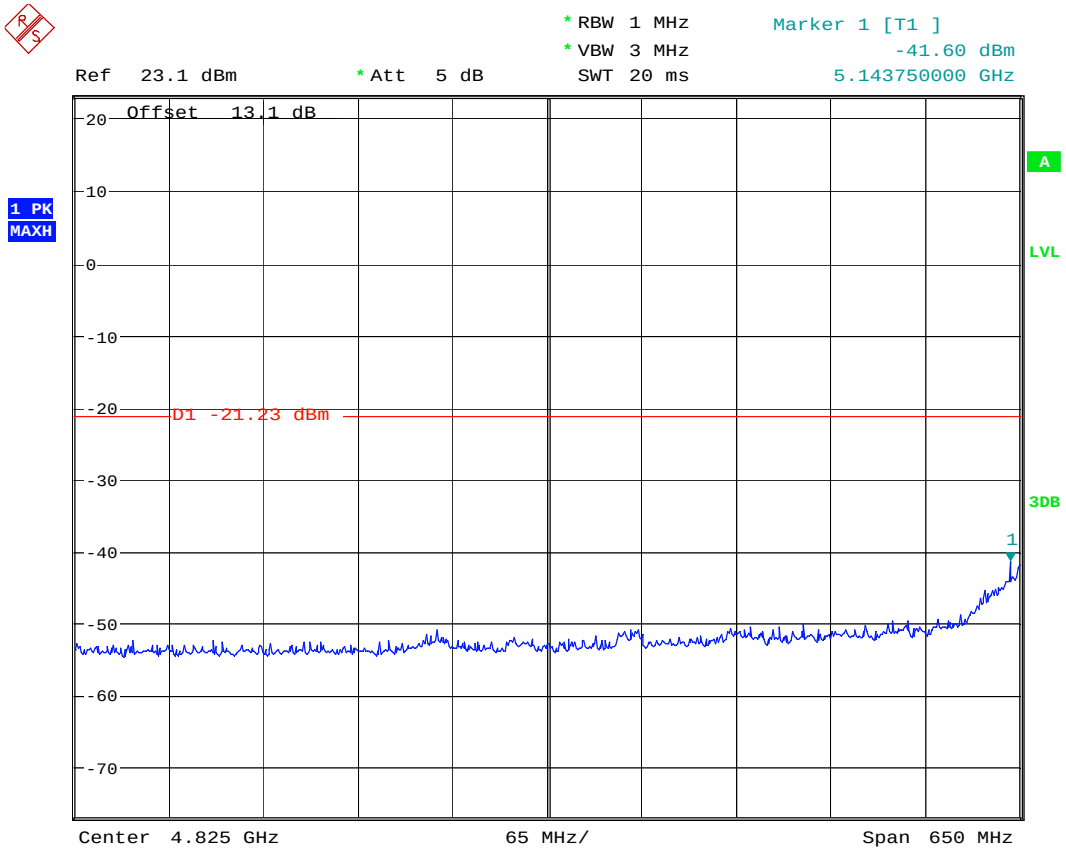
Channel 36	Modulation/Packet Type: 802.11a 6Mbps Avg



Date: 22.MAR.2019 15:39:55

Plot #14

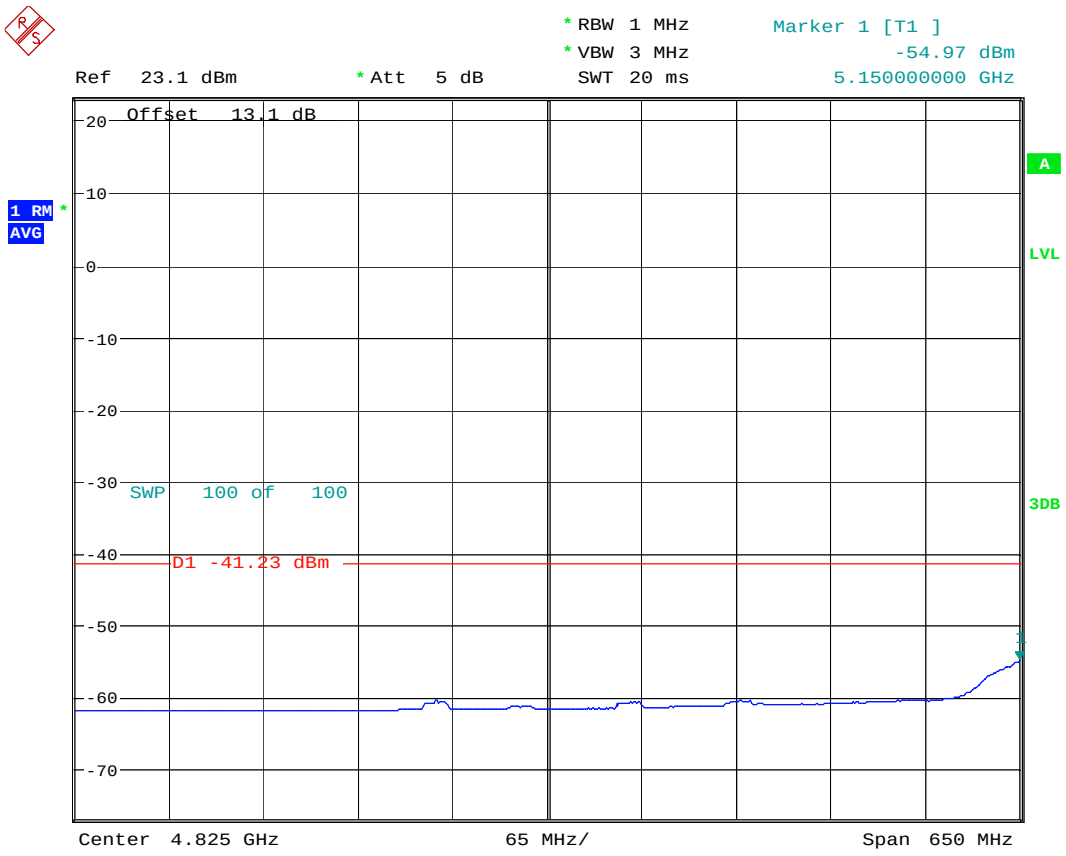
Channel 36	Modulation/Packet Type: 802.11n_HT20 MCS0 Peak



Date: 22.MAR.2019 15:31:22

Plot #15

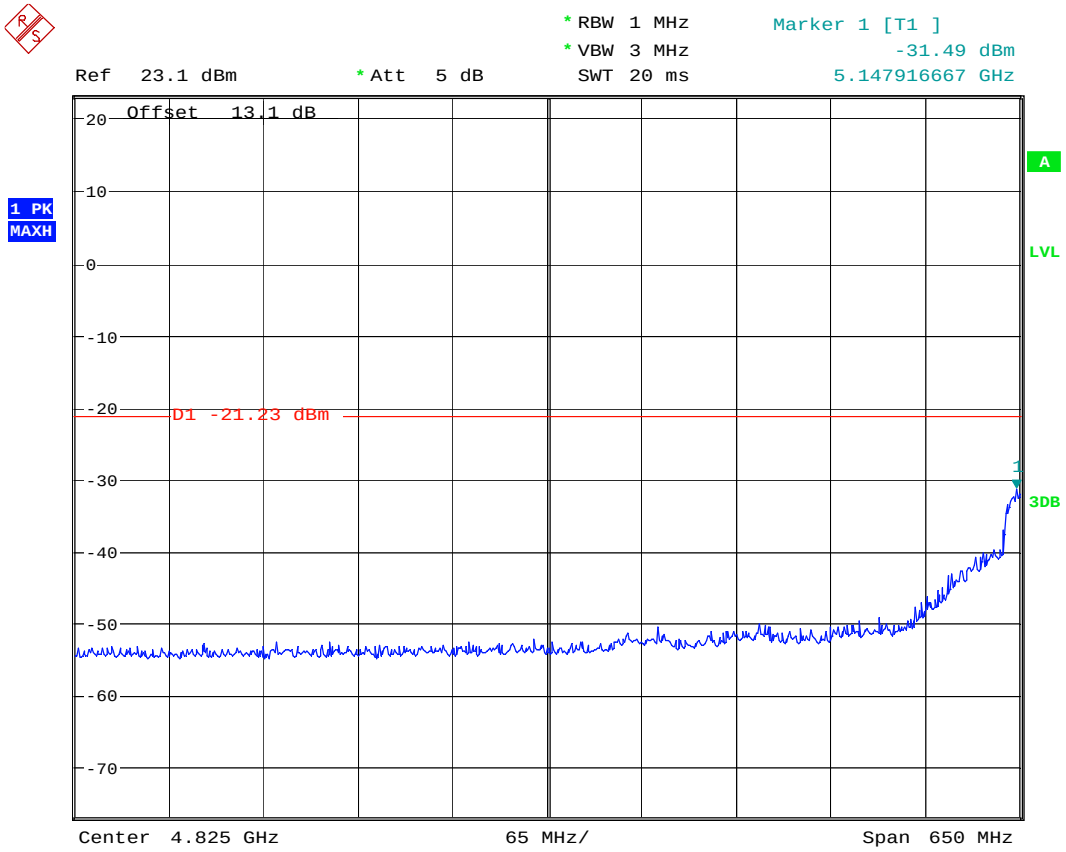
Channel 36	Modulation/Packet Type: 802.11n_HT20 MCS0 Avg



Date: 22.MAR.2019 15:41:15

Plot #16

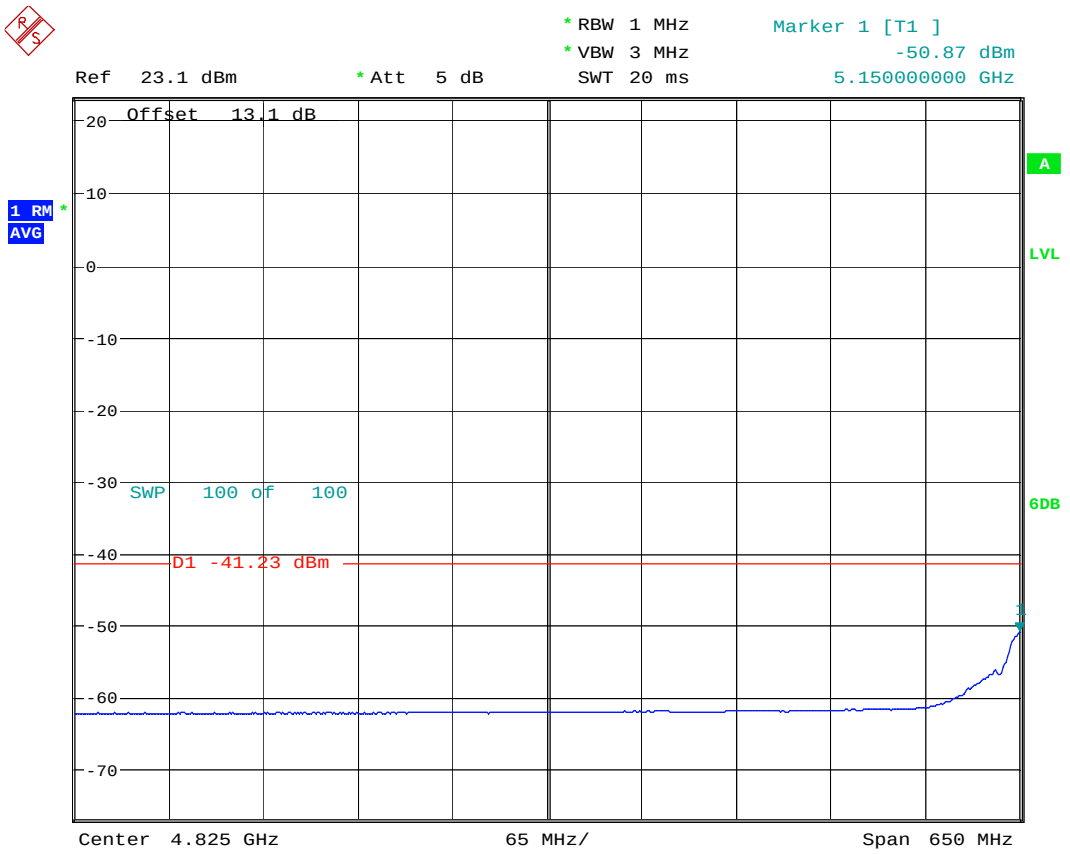
Channel 38	Modulation/Packet Type: 802.11n_HT40 MCS0 Peak



Date: 22.MAR.2019 15:34:35

Plot #17

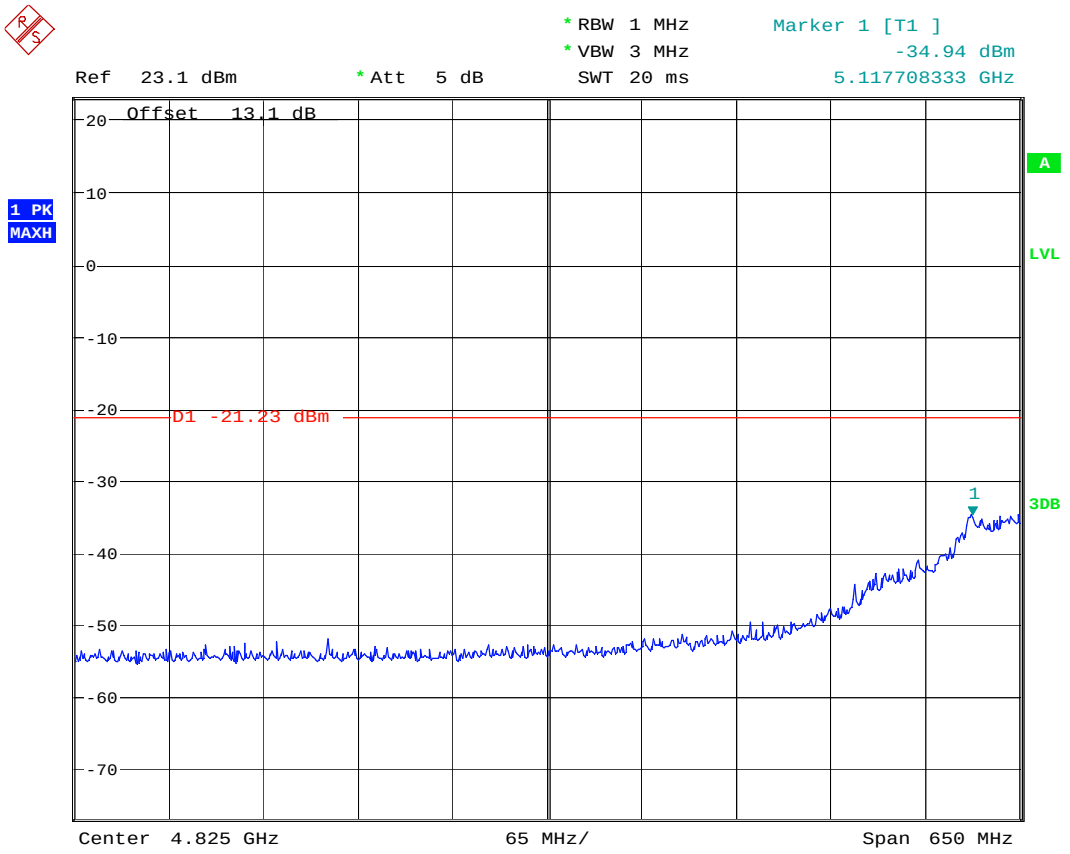
Channel 38	Modulation/Packet Type: 802.11n_HT40 MCS0 Avg



Date: 22.MAR.2019 15:54:16

Plot #18

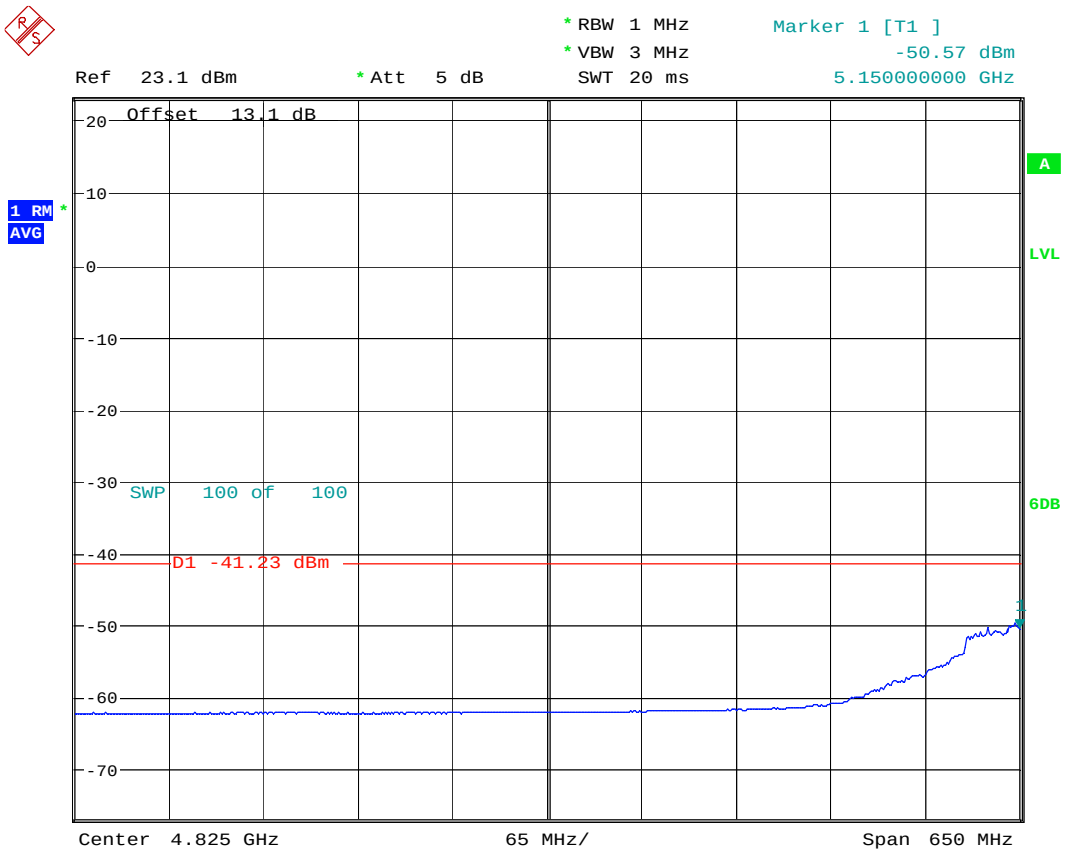
Channel 42	Modulation/Packet Type: 802.11ac_VHT80 MCS0 Peak



Date: 22.MAR.2019 15:35:38

Plot #19

Channel 42	Modulation/Packet Type: 802.11ac_VHT80 MCS0 Avg

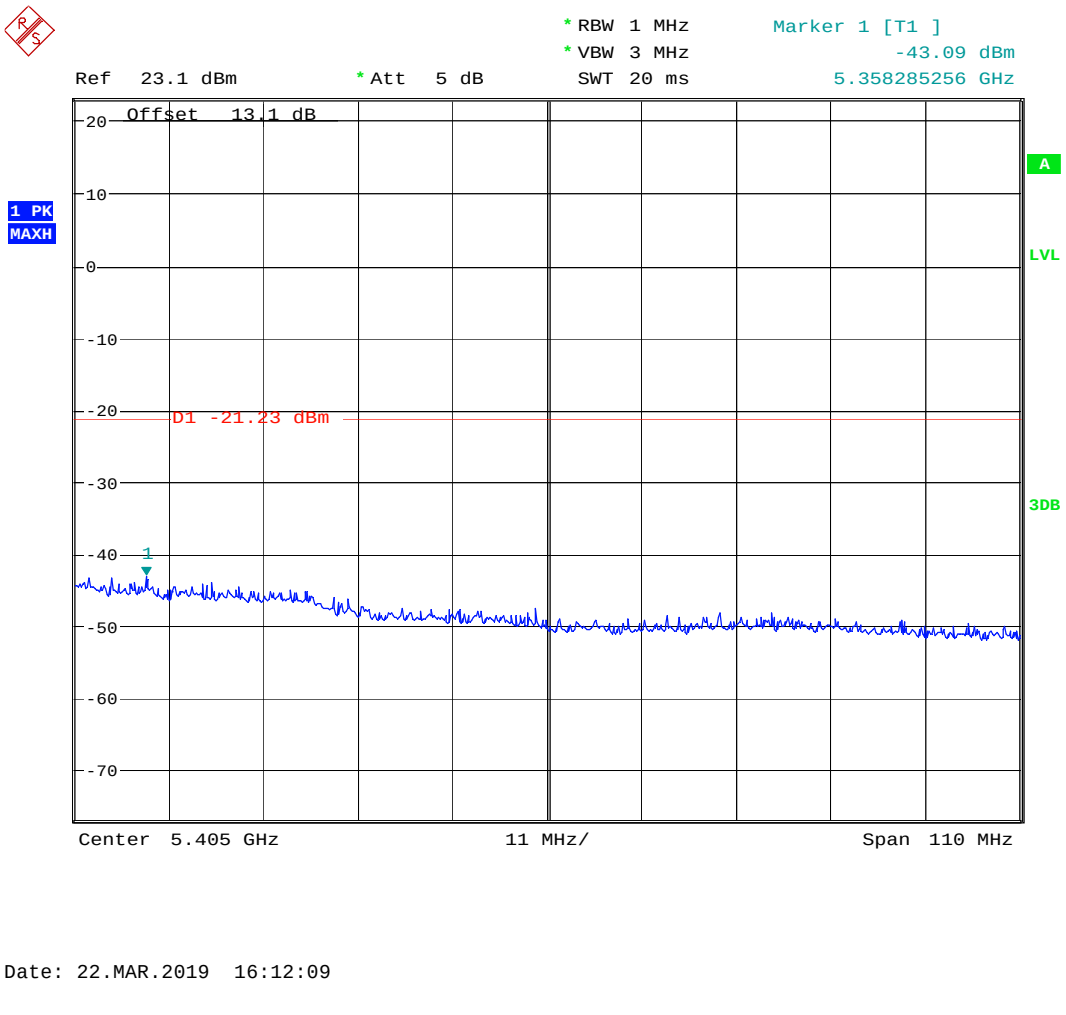


Date: 22.MAR.2019 15:55:18

Unwanted Band Edge Emission in Restricted band 5350 - 5470 MHz

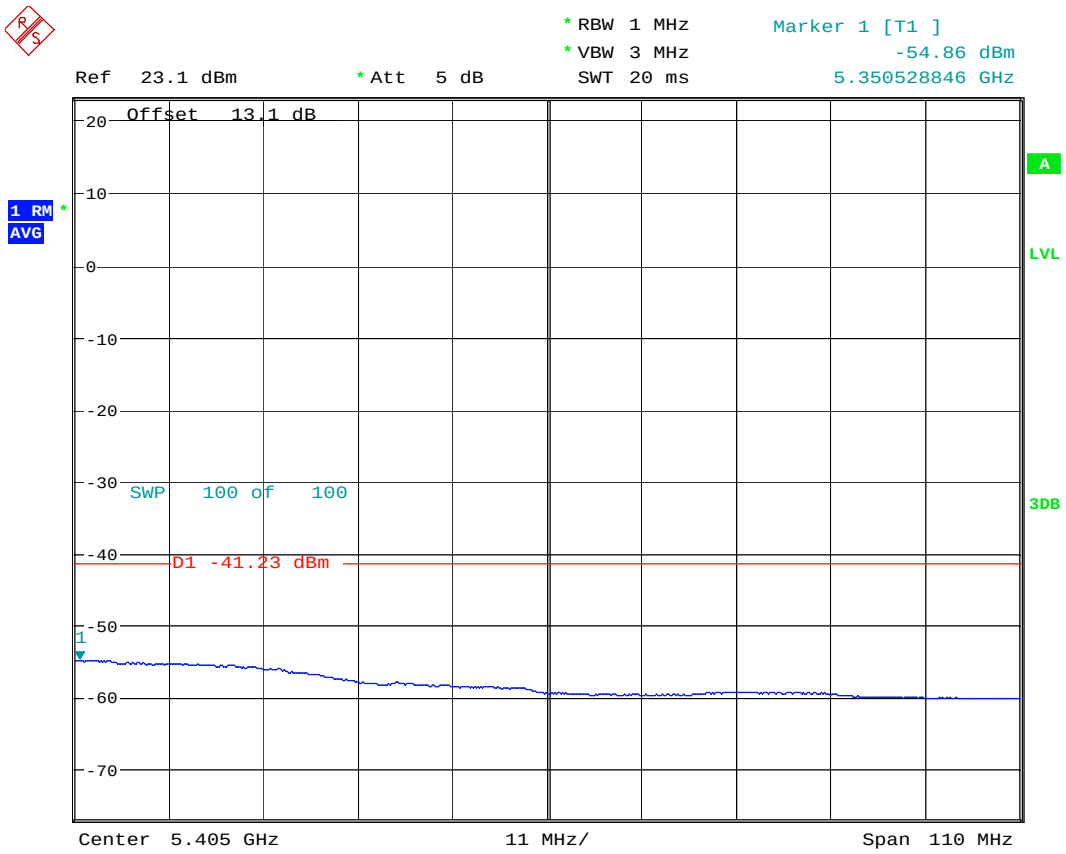
Plot #20

Channel 64	Modulation/Packet Type: 802.11a 6Mbps Peak



Plot #21

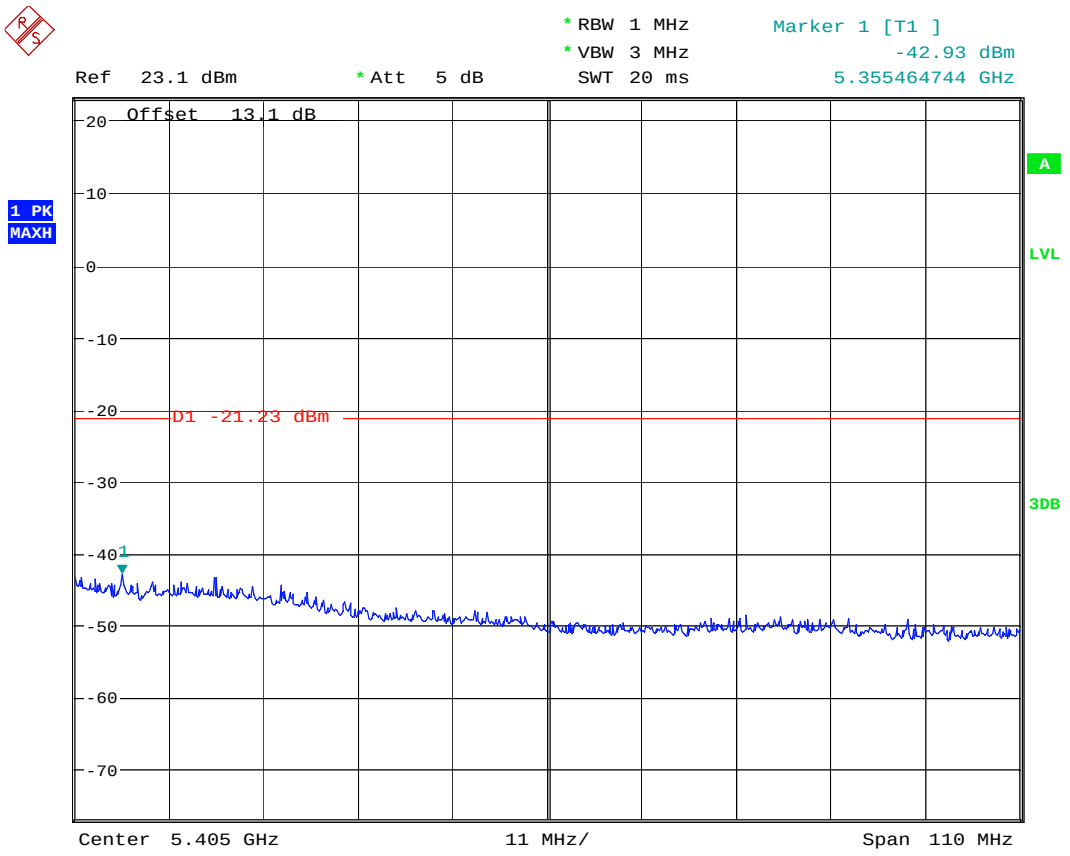
Channel 64	Modulation/Packet Type: 802.11a 6Mbps Avg



Date: 22.MAR.2019 16:17:02

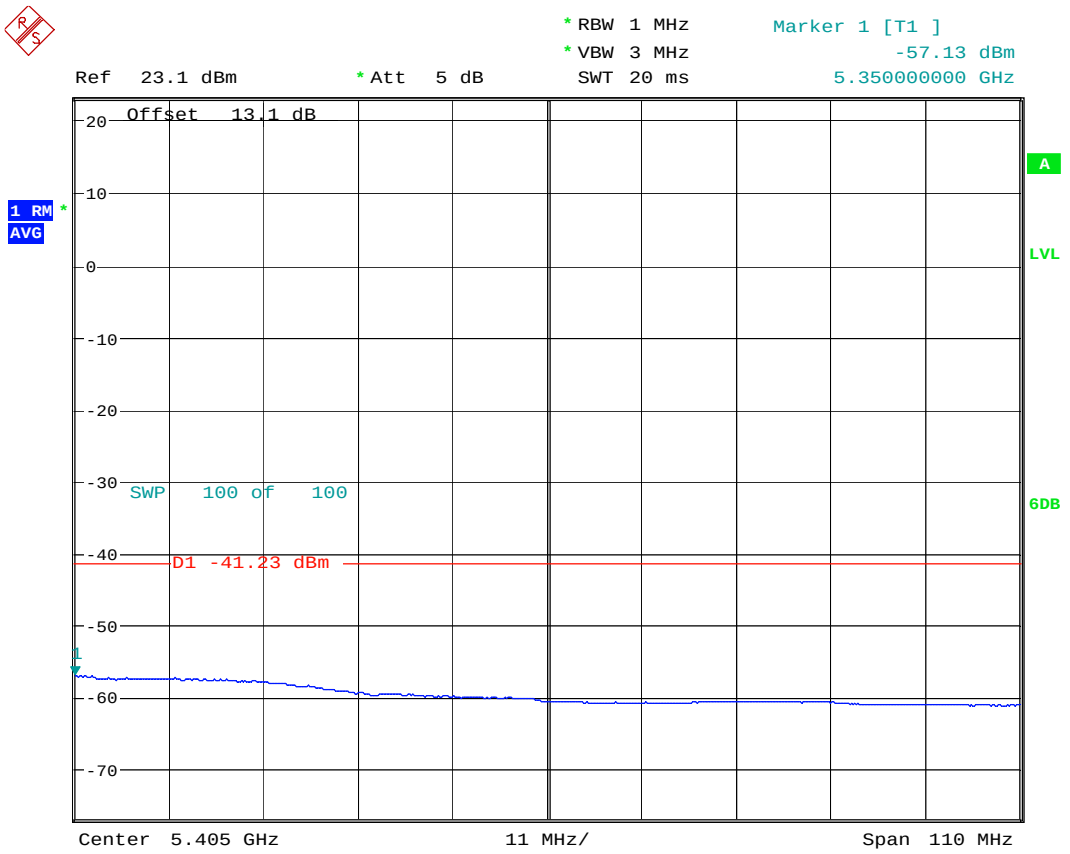
Plot #22

Channel 64	Modulation/Packet Type: 802.11n_HT20 MCS0 Peak



Plot #23

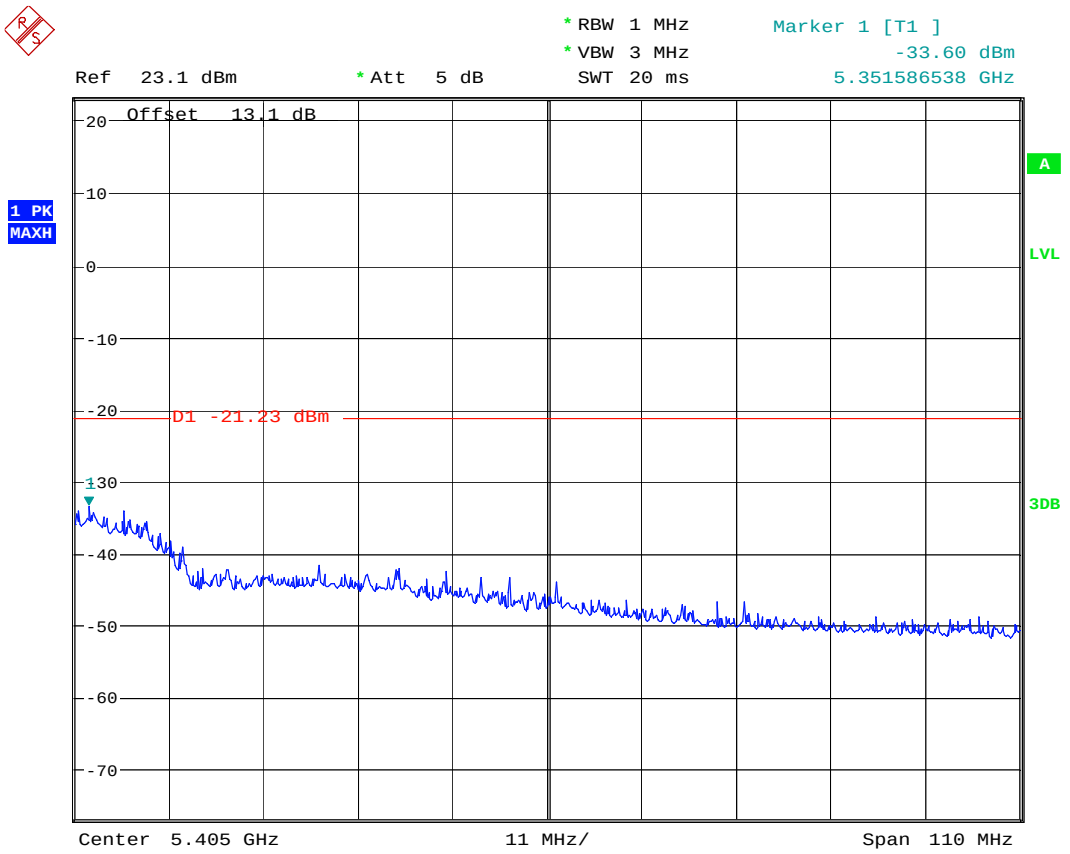
Channel 64	Modulation/Packet Type: 802.11n_HT20 MCS0 Avg



Date: 22.MAR.2019 16:24:53

Plot #24

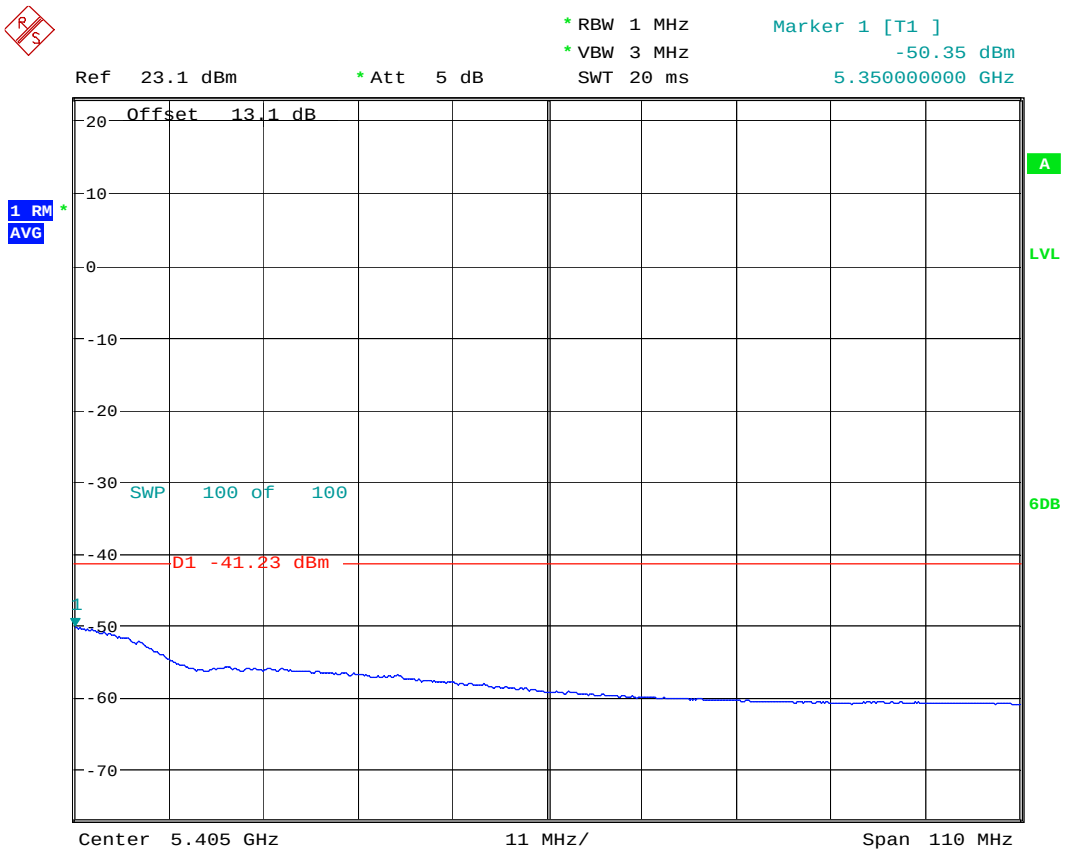
Channel 62	Modulation/Packet Type: 802.11n_HT40 MCS0 Peak



Date: 22.MAR.2019 16:14:18

Plot #25

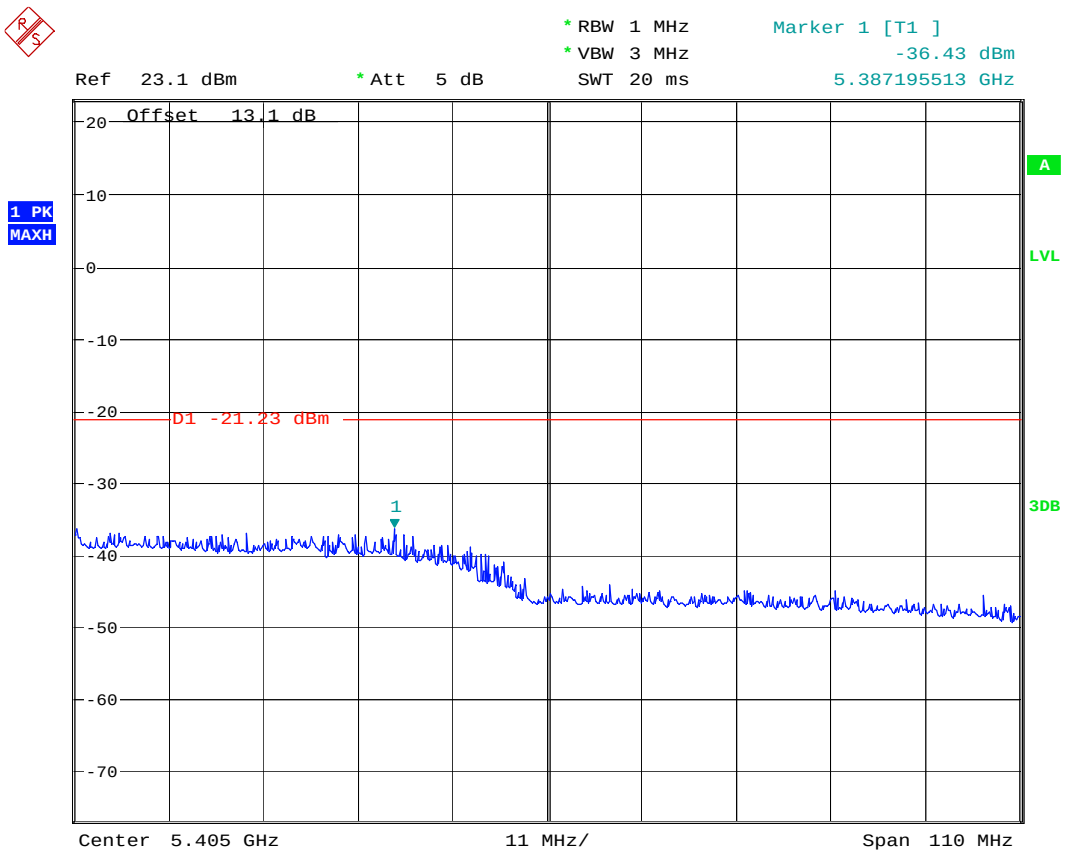
Channel 62	Modulation/Packet Type: 802.11n_HT40 MCS0 Avg



Date: 22.MAR.2019 16:22:19

Plot #26

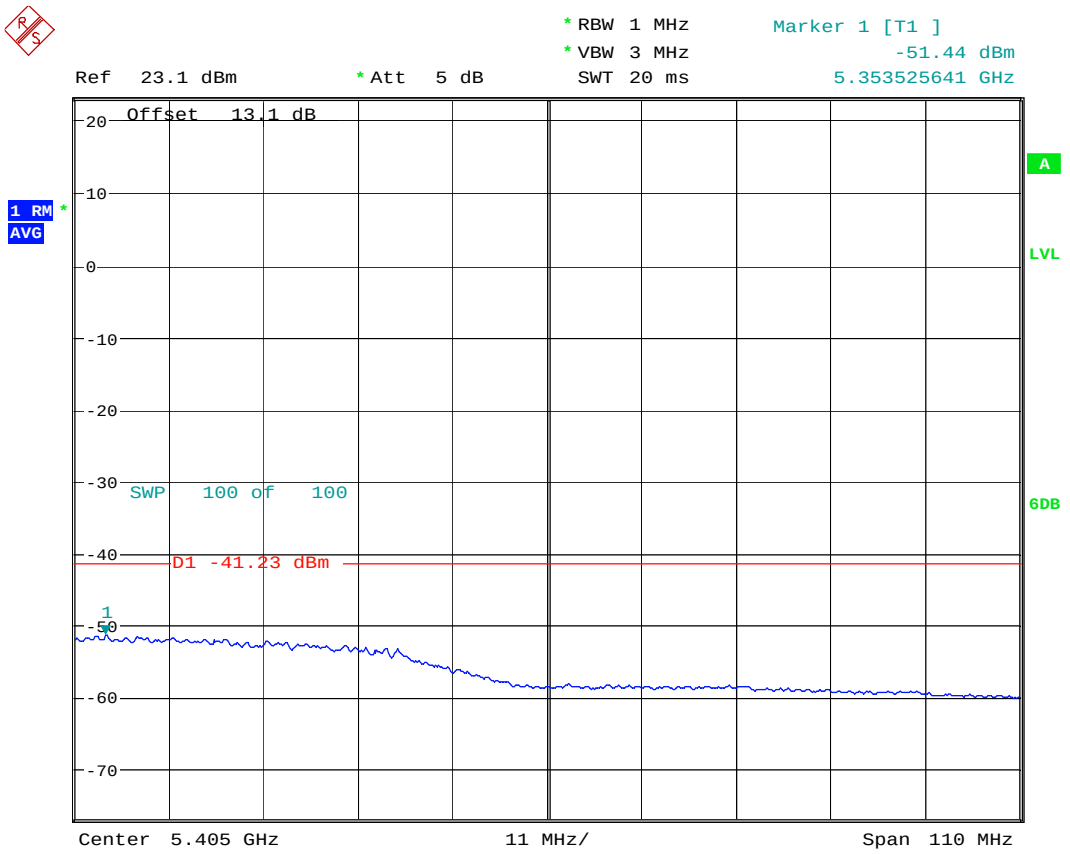
Channel 58	Modulation/Packet Type: 802.11ac_VHT80 MCS0 Peak



Date: 22.MAR.2019 16:15:17

Plot #27

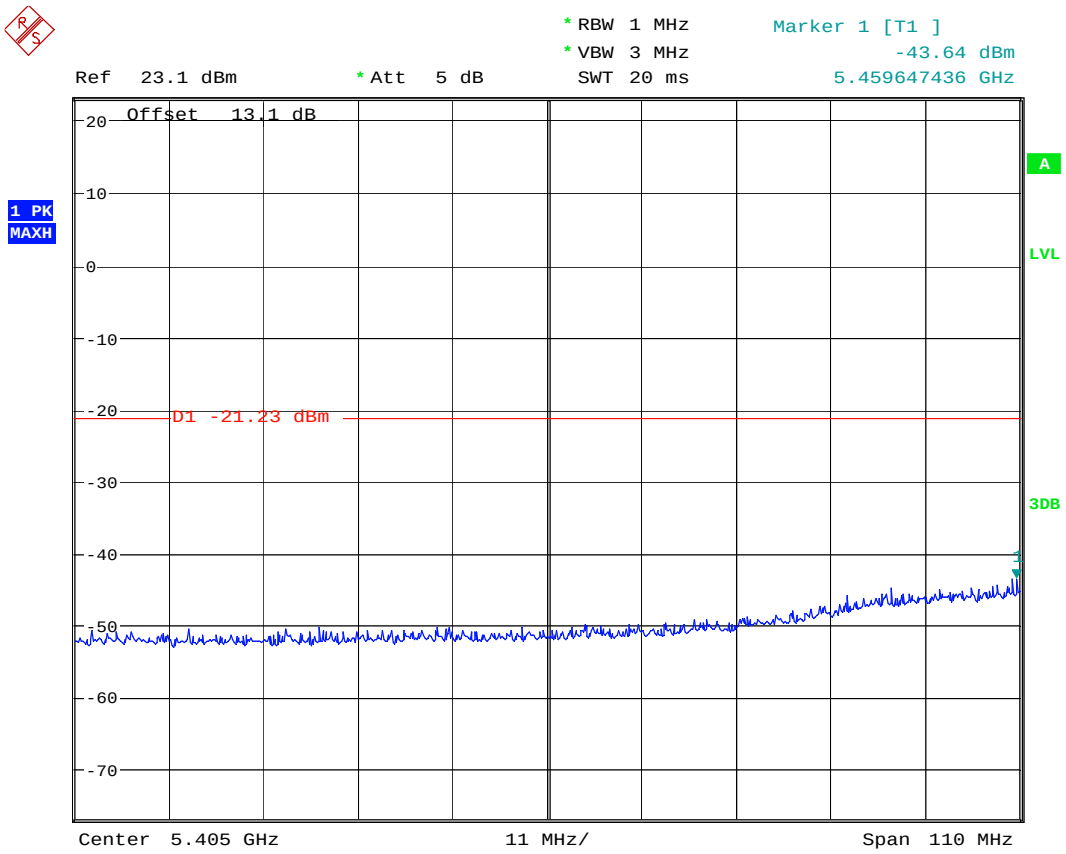
Channel 58	Modulation/Packet Type: 802.11ac_VHT80 MCS0 Avg



Date: 22.MAR.2019 16:21:19

Plot #28

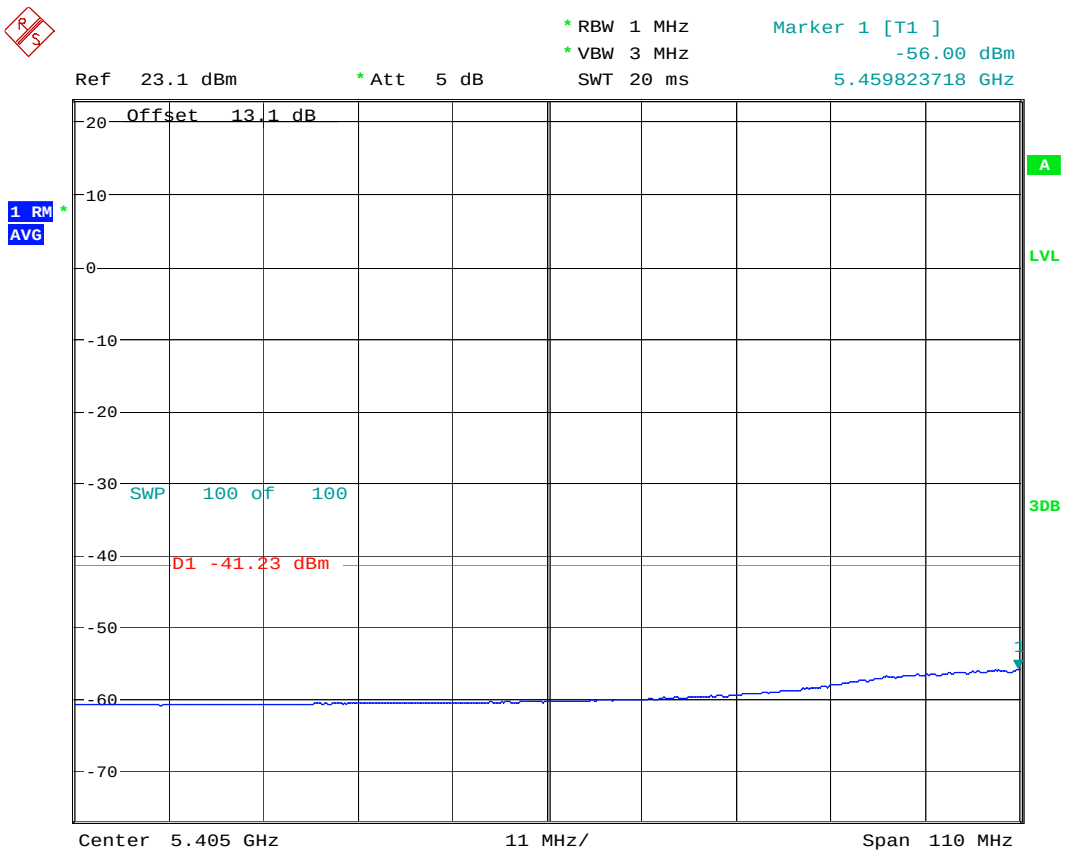
Channel 100 | **Modulation/Packet Type: 802.11a 6Mbps Peak**



Date: 22.MAR.2019 16:34:01

Plot #29

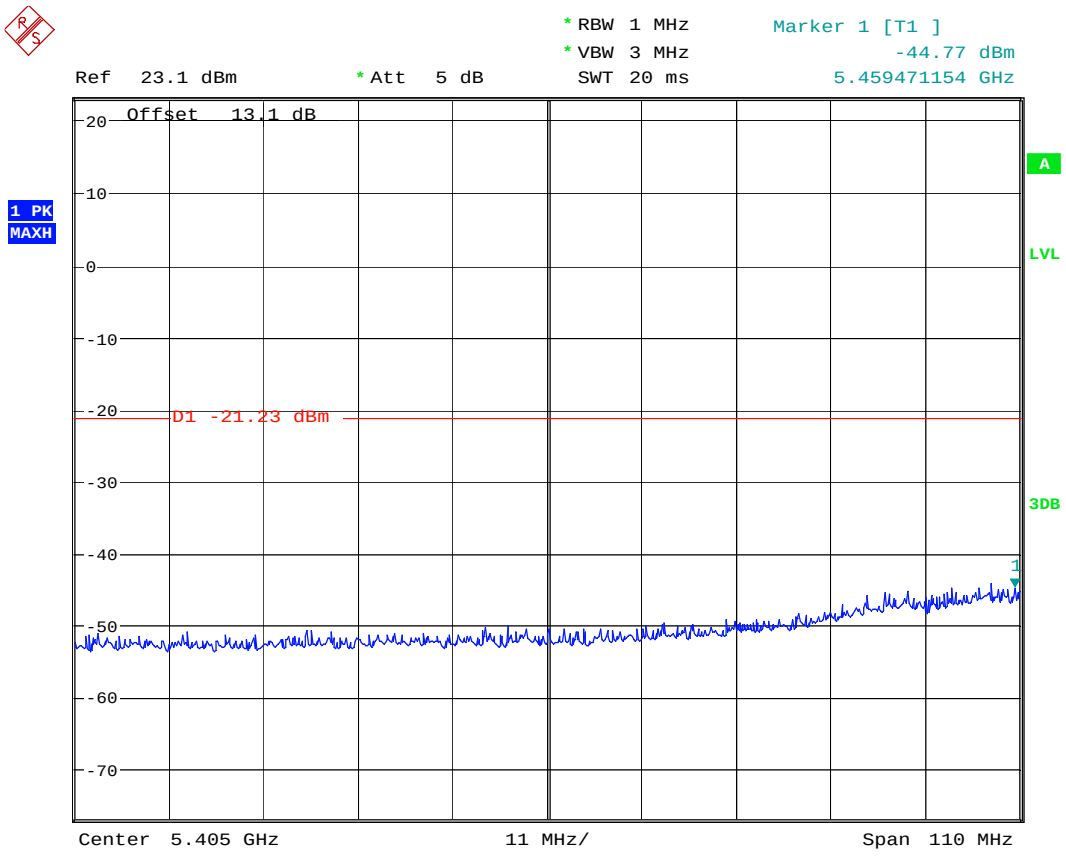
Channel 100	Modulation/Packet Type: 802.11a 6Mbps Avg



Date: 22.MAR.2019 16:50:42

Plot #30

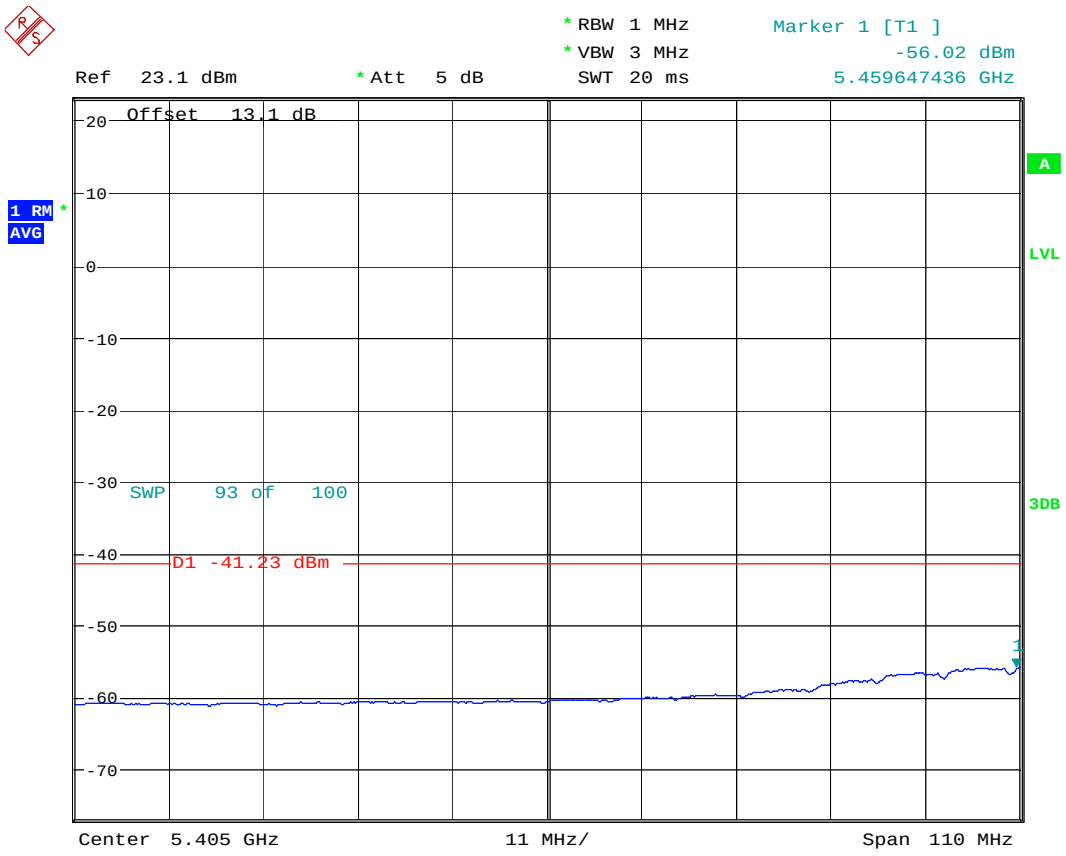
Channel 100 | **Modulation/Packet Type: 802.11n_HT20 MCS0 Peak**



Date: 22.MAR.2019 16:34:41

Plot #31

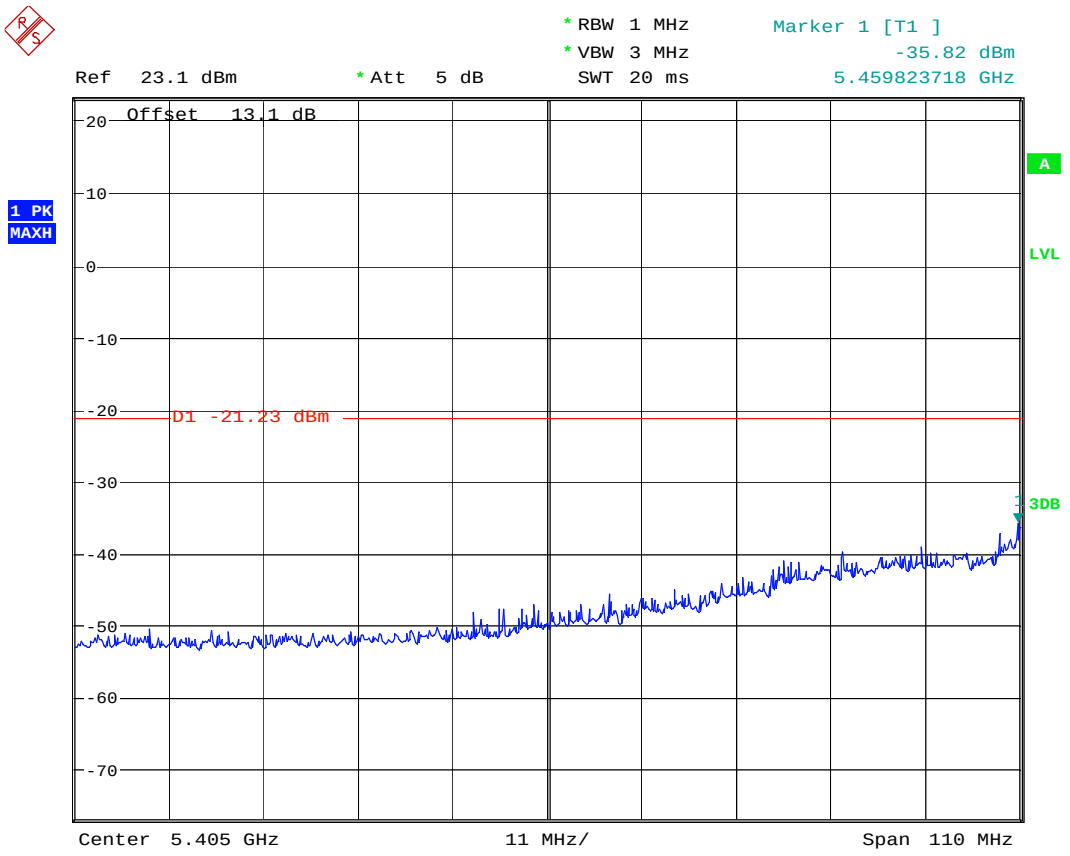
Channel 100	Modulation/Packet Type: 802.11n_HT20 MCS0 Avg



Date: 22.MAR.2019 16:51:39

Plot #32

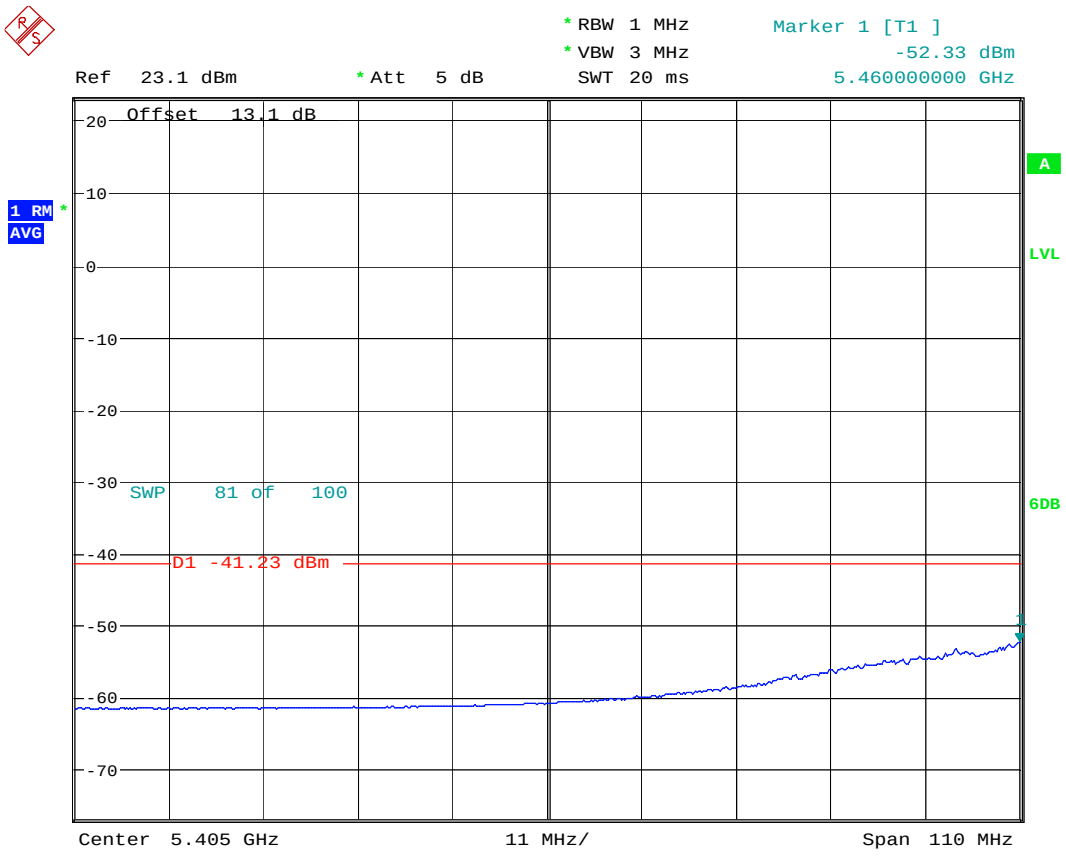
Channel 102	Modulation/Packet Type: 802.11n_HT40 MCS0 Peak



Date: 22.MAR.2019 16:35:26

Plot #33

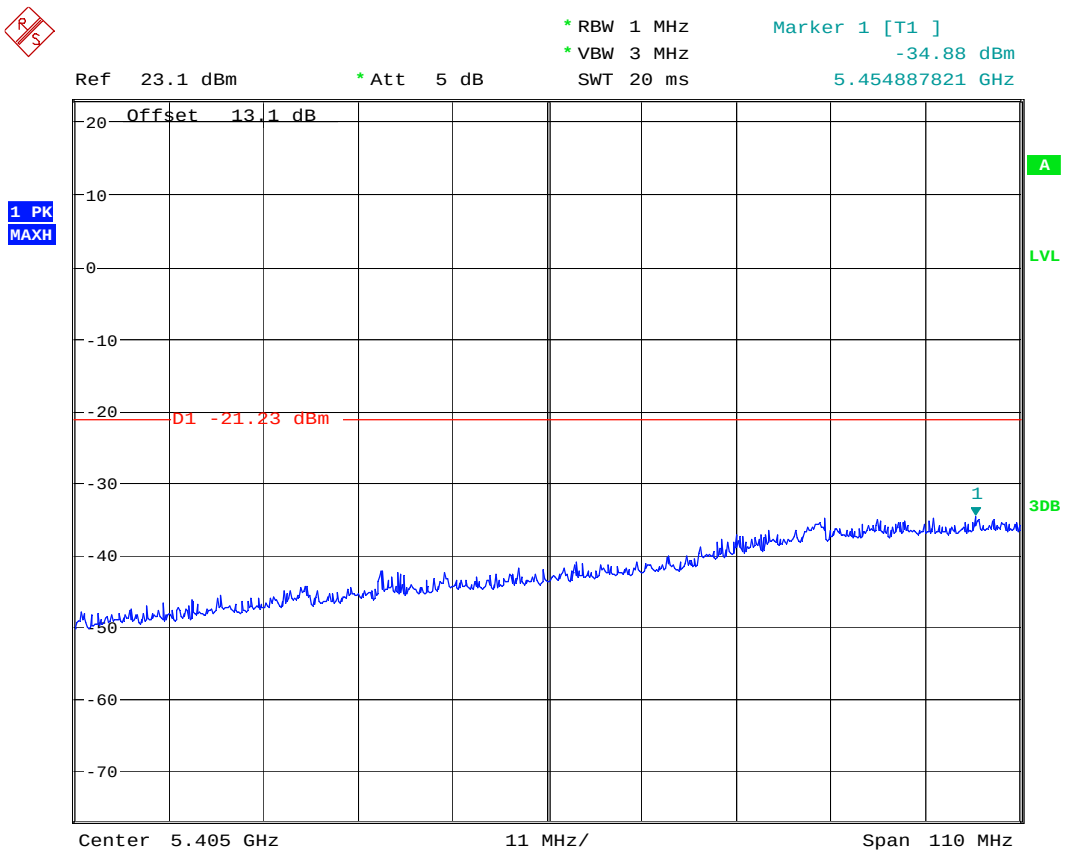
Channel 102	Modulation/Packet Type: 802.11n_HT40 MCS0 Avg



Date: 22.MAR.2019 16:52:36

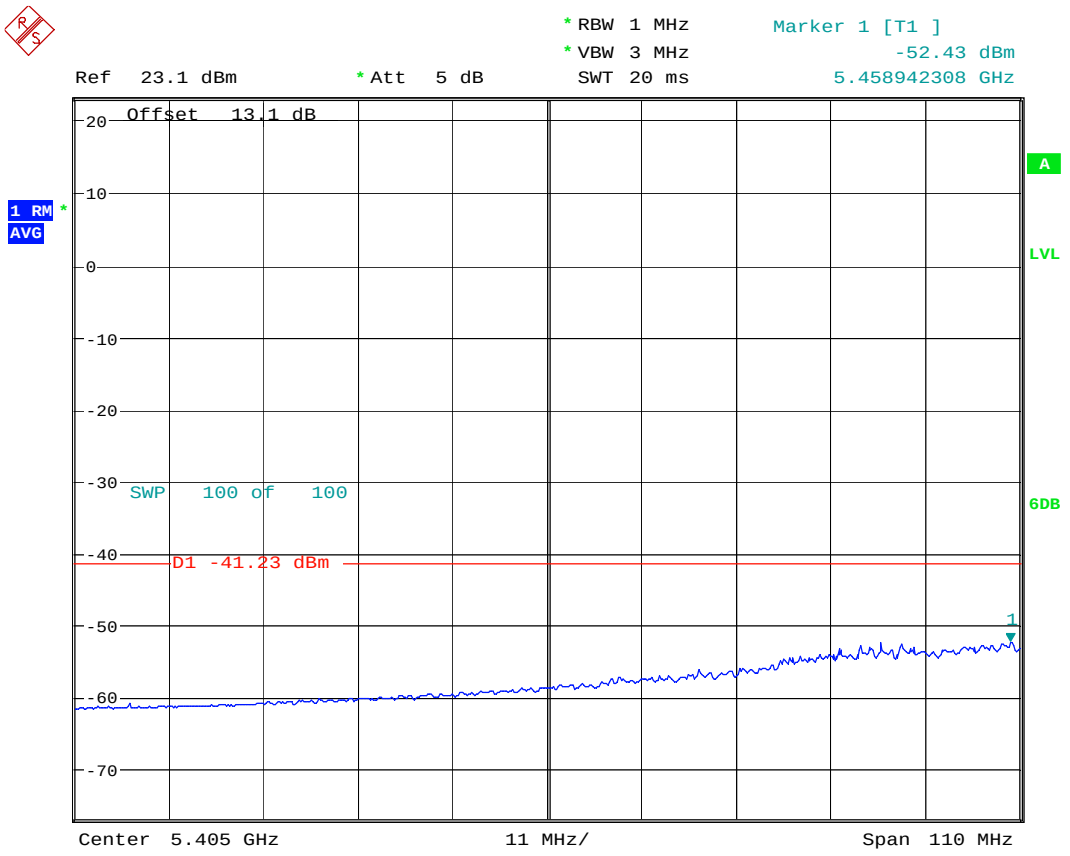
Plot #34

Channel 106	Modulation/Packet Type: 802.11ac_VHT80 MCS0 Peak



Plot #35

Channel 106	Modulation/Packet Type: 802.11ac_VHT80 MCS0 Avg



Date: 22.MAR.2019 16:55:06

8.5 Emission Bandwidth 6 dB, 26dB and 99% Occupied Bandwidth

8.5.1 Measurement according to FCC 789033 D02 General UNII Test Procedures New Rules v02r01

Spectrum Analyzer Settings for 26 dB EBW:

- Set RBW = approximately 1% of the emission bandwidth
- Set the VBW > RBW
- Detector = Peak
- Trace mode = Max Hold
- Sweep = Auto Couple
- Allow the trace to stabilize
- 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%

Spectrum Analyzer Settings for 6 dB EBW:

- Set RBW = 100 kHz
- Set the video bandwidth (VBW) ≥ 3 x RBW
- Detector = Peak
- Trace mode = max hold
- Sweep = auto couple
- Allow the trace to stabilize
- 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

Spectrum Analyzer Settings for 99% Occupied Bandwidth

- Set center frequency to the nominal EUT channel center frequency
- Set span = 1.5 times to 5.0 times the OBW
- Set RBW = 1% to 5% of the OBW
- Set VBW ≥ 3 x RBW
- 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
- Use the 99% power bandwidth function of the instrument (if available)
- 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

8.5.2 Limits:

FCC §15.407(e)and RSS-247 6

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

8.5.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
22° C	1	802.11 a/n/ac	120VAC/Battery

8.5.4 Measurement result:

Plot #	Mode	Channel	6 dB Emissions Bandwidth (MHz)	Limit (MHz)	Result
1	802.11a	157	16.41	> 0.5	Pass
2	802.11n_HT20	157	17.62	> 0.5	Pass
3	802.11n_HT40	159	36.35	> 0.5	Pass
4	802.11ac_VHT80	155	76.08	> 0.5	Pass

Plot #	Mode	Channel	26 dB Emissions Bandwidth (MHz)	Limit (MHz)	Result
5	802.11a	40	21.63	> 0.5	Pass
6	802.11a	60	21.96	> 0.5	Pass
7	802.11a	116	40.64	> 0.5	Pass
8	802.11a	157	84.87	> 0.5	Pass
9	802.11n_HT20	40	21.55	> 0.5	Pass
10	802.11n_HT20	60	21.96	> 0.5	Pass
11	802.11n_HT20	116	40.51	> 0.5	Pass
12	802.11n_HT20	157	84.62	> 0.5	Pass
13	802.11n_HT40	38	21.71	> 0.5	Pass
14	802.11n_HT40	62	22.2	> 0.5	Pass
15	802.11n_HT40	110	40.77	> 0.5	Pass
16	802.11n_HT40	159	83.33	> 0.5	Pass
17	802.11ac_VHT80	42	21.63	> 0.5	Pass
18	802.11ac_VHT80	58	21.96	> 0.5	Pass
19	802.11ac_VHT80	106	40.51	> 0.5	Pass
20	802.11ac_VHT80	155	83.59	> 0.5	Pass

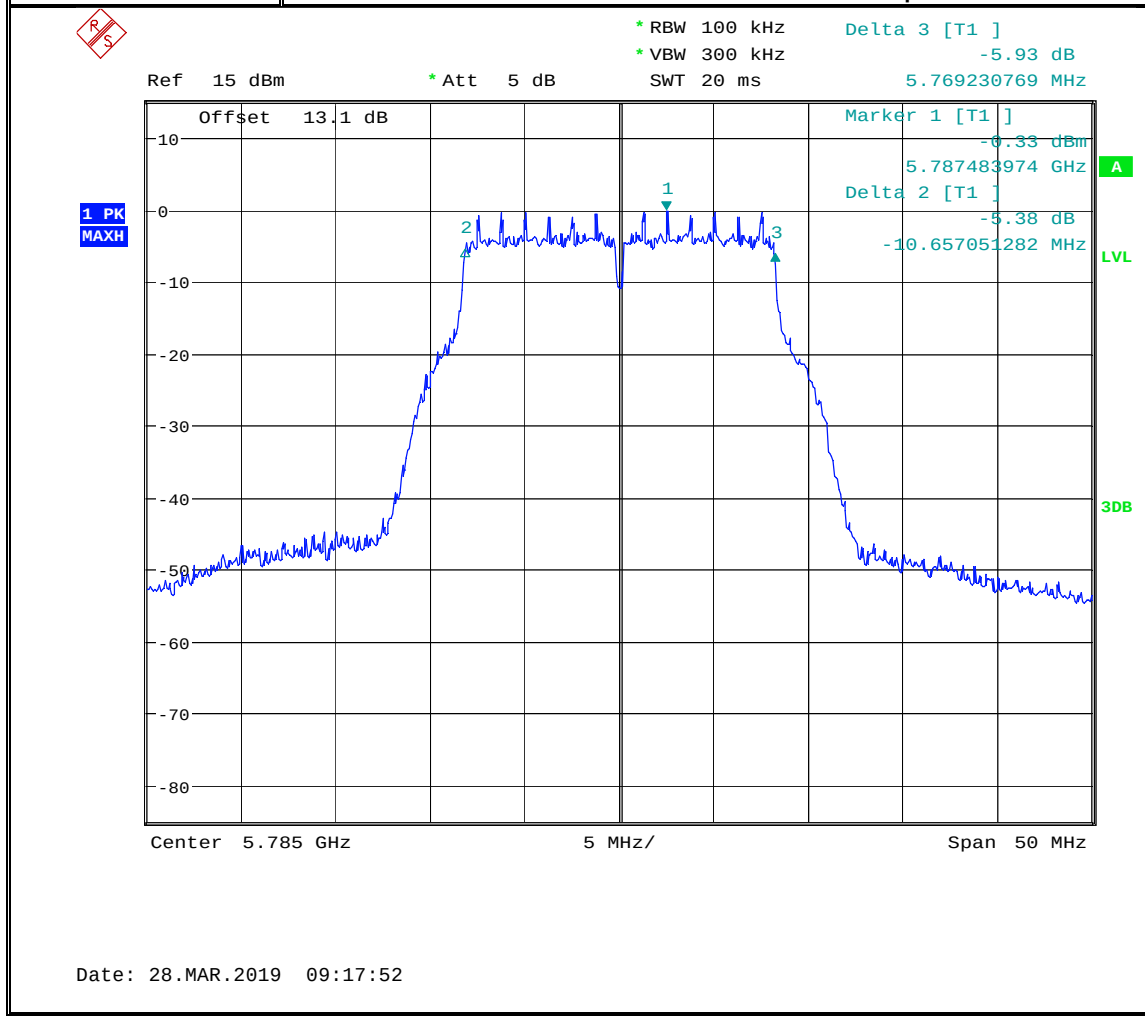
Plot #	Mode	Channel	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
21	802.11a	40	16.8	> 0.5	Pass
22	802.11a	60	18	> 0.5	Pass
23	802.11a	116	36.5	> 0.5	Pass
24	802.11a	157	76.4	> 0.5	Pass
25	802.11n_HT20	40	16.8	> 0.5	Pass
26	802.11n_HT20	60	18	> 0.5	Pass
27	802.11n_HT20	116	36.5	> 0.5	Pass
28	802.11n_HT20	157	76.15	> 0.5	Pass

29	802.11n_HT40	38	16.8	> 0.5	Pass
30	802.11n_HT40	62	18	> 0.5	Pass
31	802.11n_HT40	110	36.67	> 0.5	Pass
32	802.11n_HT40	159	76.15	> 0.5	Pass
33	802.11ac_VHT80	42	16.8	> 0.5	Pass
34	802.11ac_VHT80	58	18	> 0.5	Pass
35	802.11ac_VHT80	106	36.67	> 0.5	Pass
36	802.11ac_VHT80	155	76.15	> 0.5	Pass

8.5.5 Measurement Plots:

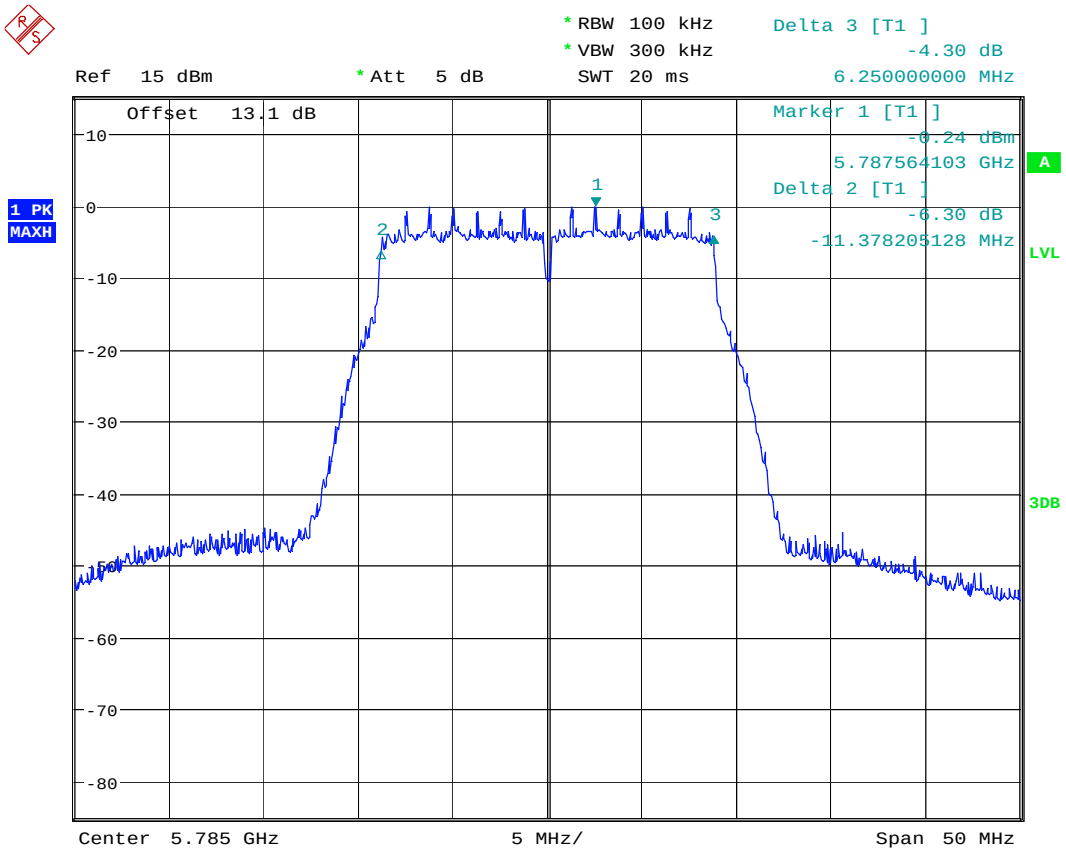
Plot #1

Channel 157	Mode: 802.11a 6Mbps



Plot #2

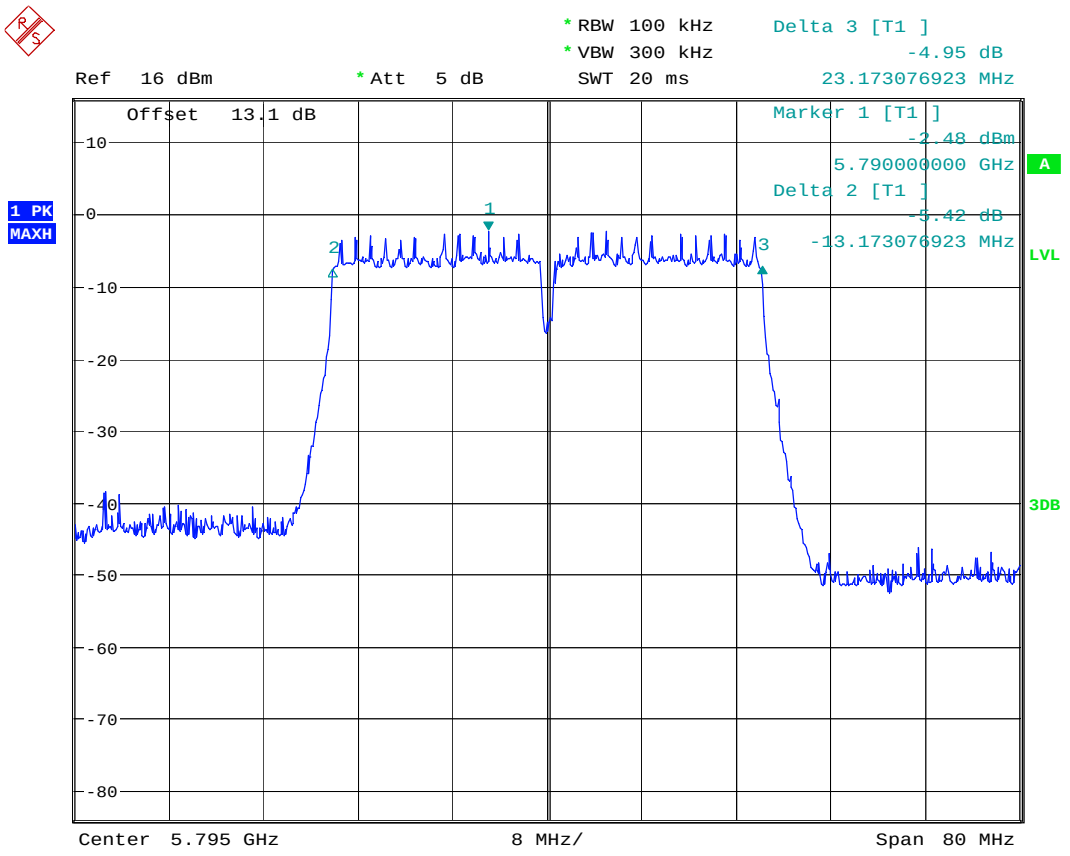
Channel 157 | **Mode: 802.11n HT20 MCS0**



Date: 28.MAR.2019 09:22:30

Plot #3

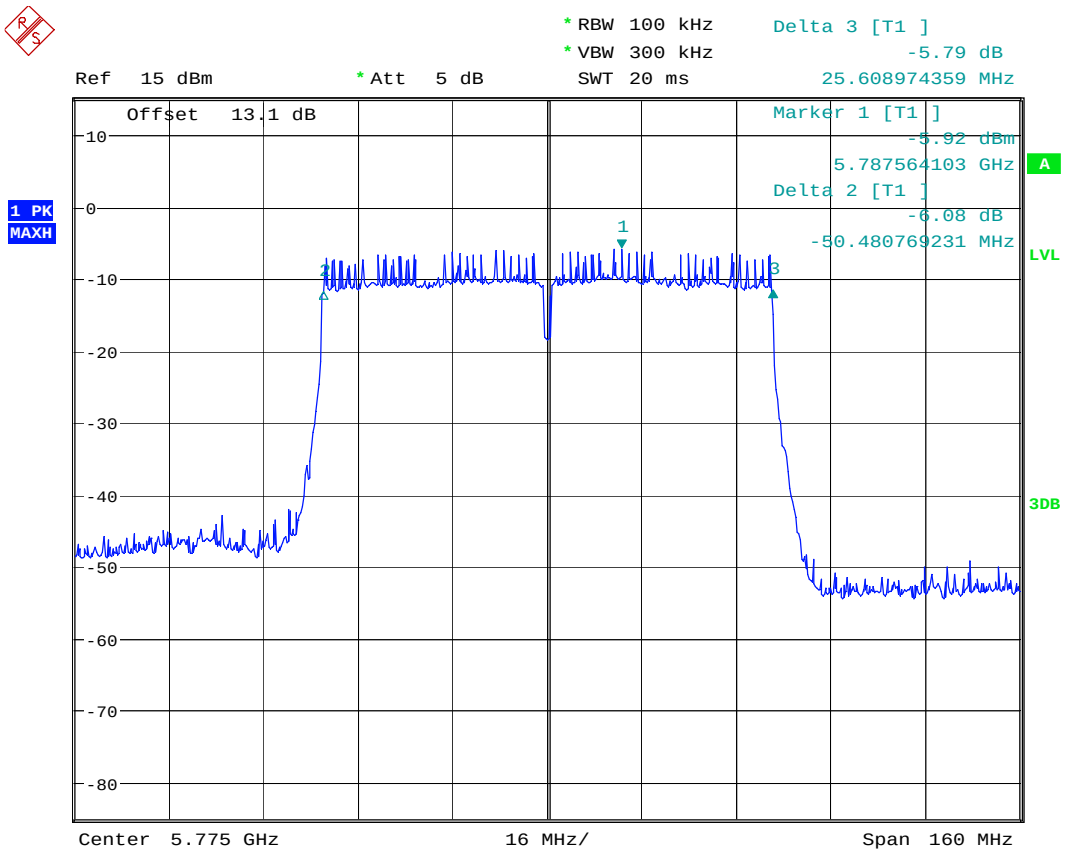
Channel 159	Mode: 802.11n_HT40 MCS0



Date: 28.MAR.2019 09:24:43

Plot #4

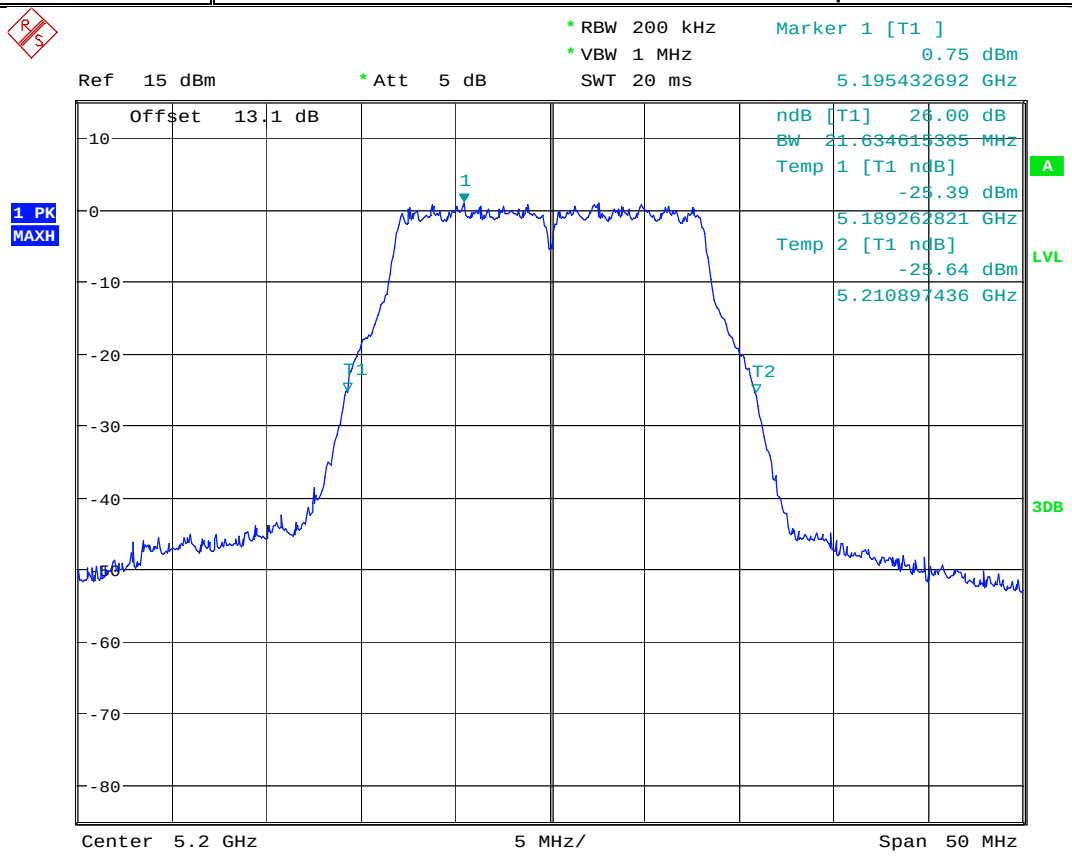
Channel 155	Mode: 802.11ac_VHT80 MCS0



Date: 28.MAR.2019 09:26:29

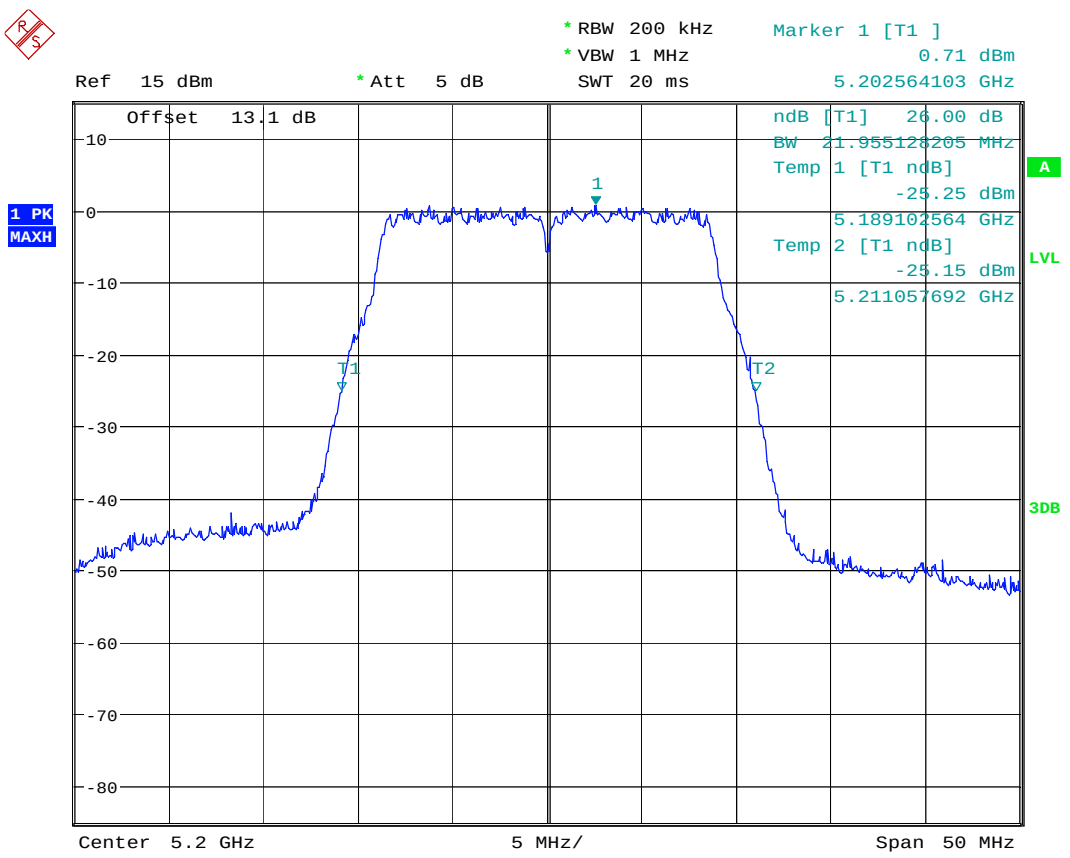
Plot #5

Channel 40 | **Mode: 802.11a 6Mbps**



Plot #6

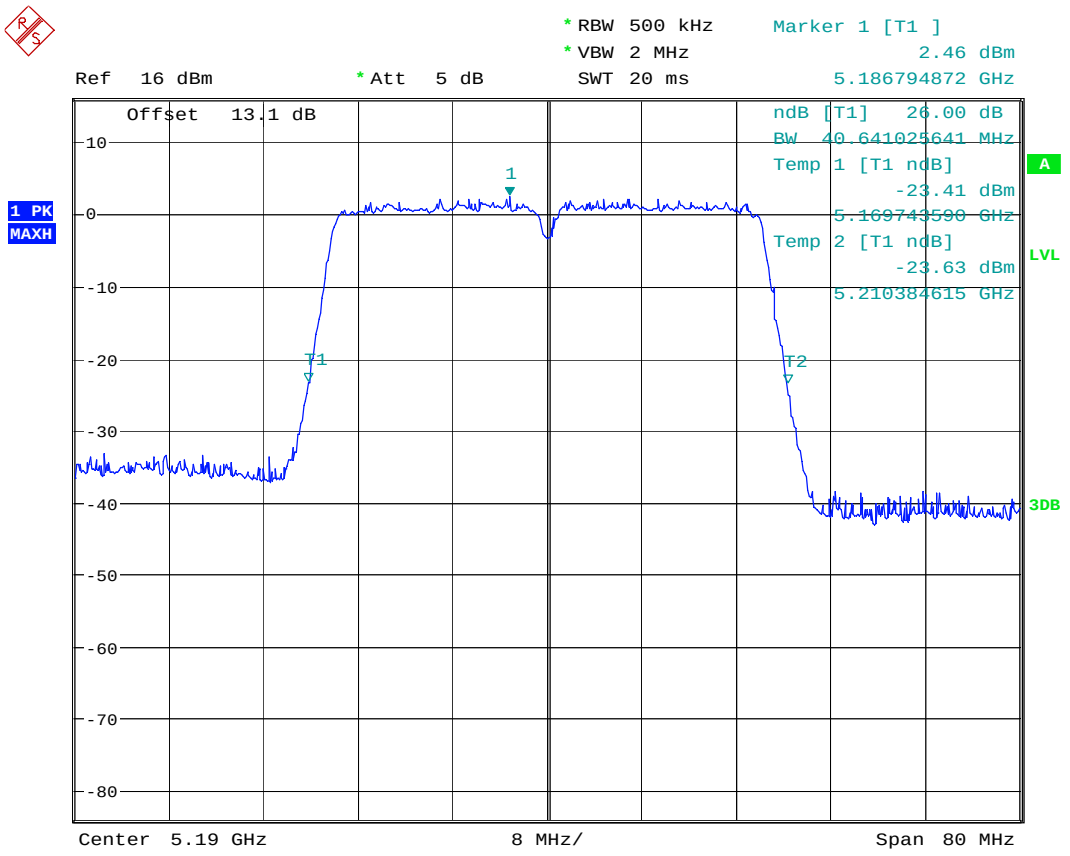
Channel 40	Mode: 802.11n HT20 MCS0



Date: 20.MAR.2019 13:38:10

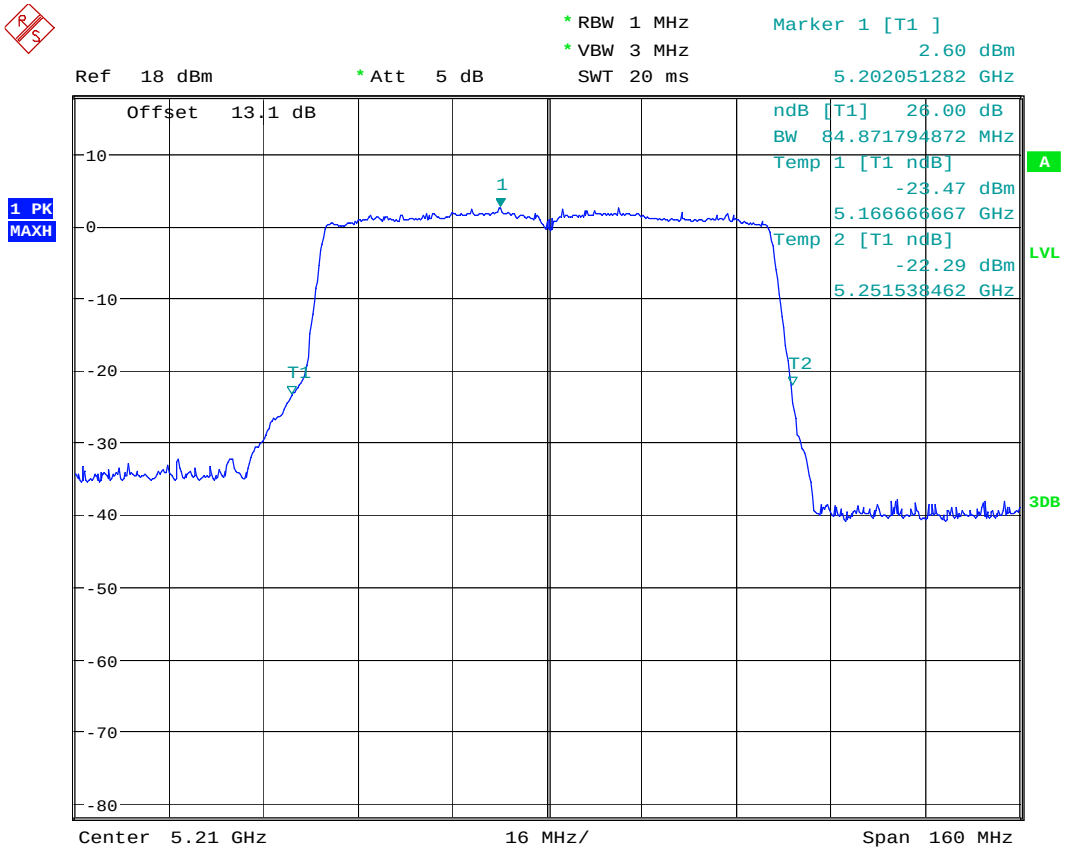
Plot #7

Channel 38 | **Mode: 802.11n_HT40 MCS0**



Plot #8

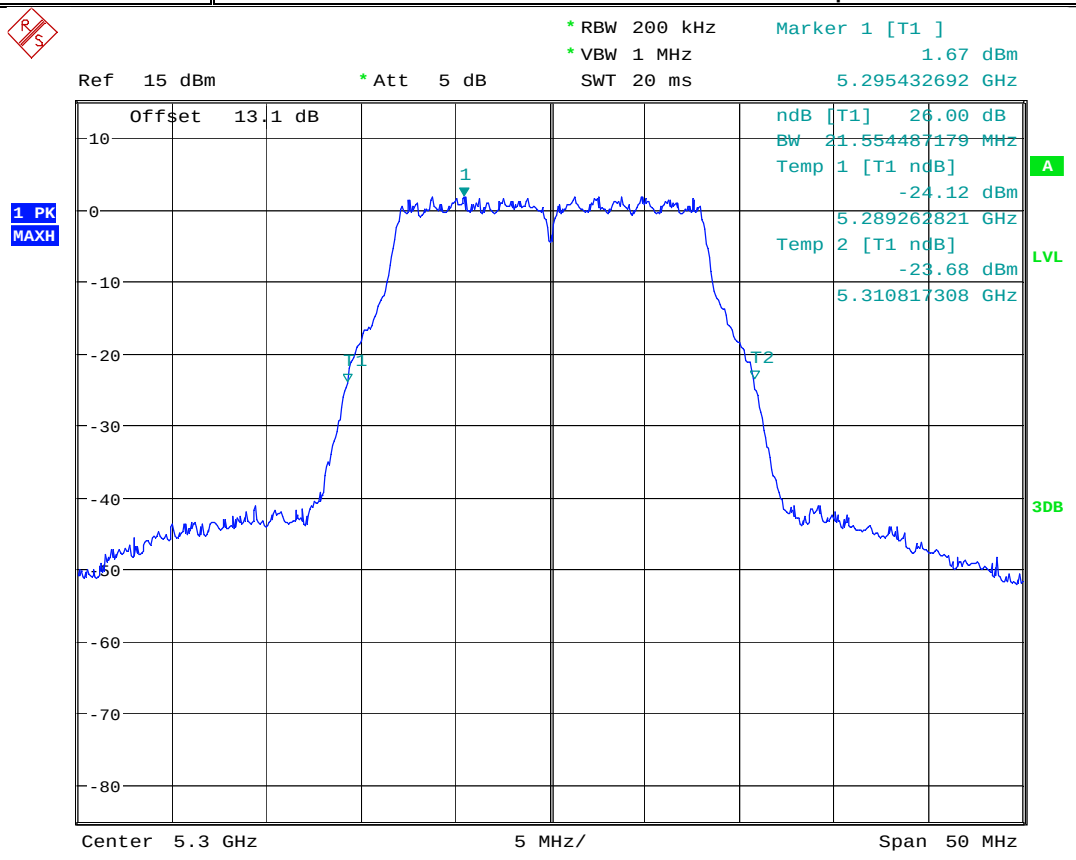
Channel 42	Mode: 802.11ac_VHT80 MCS0



Date: 20.MAR.2019 13:42:42

Plot #9

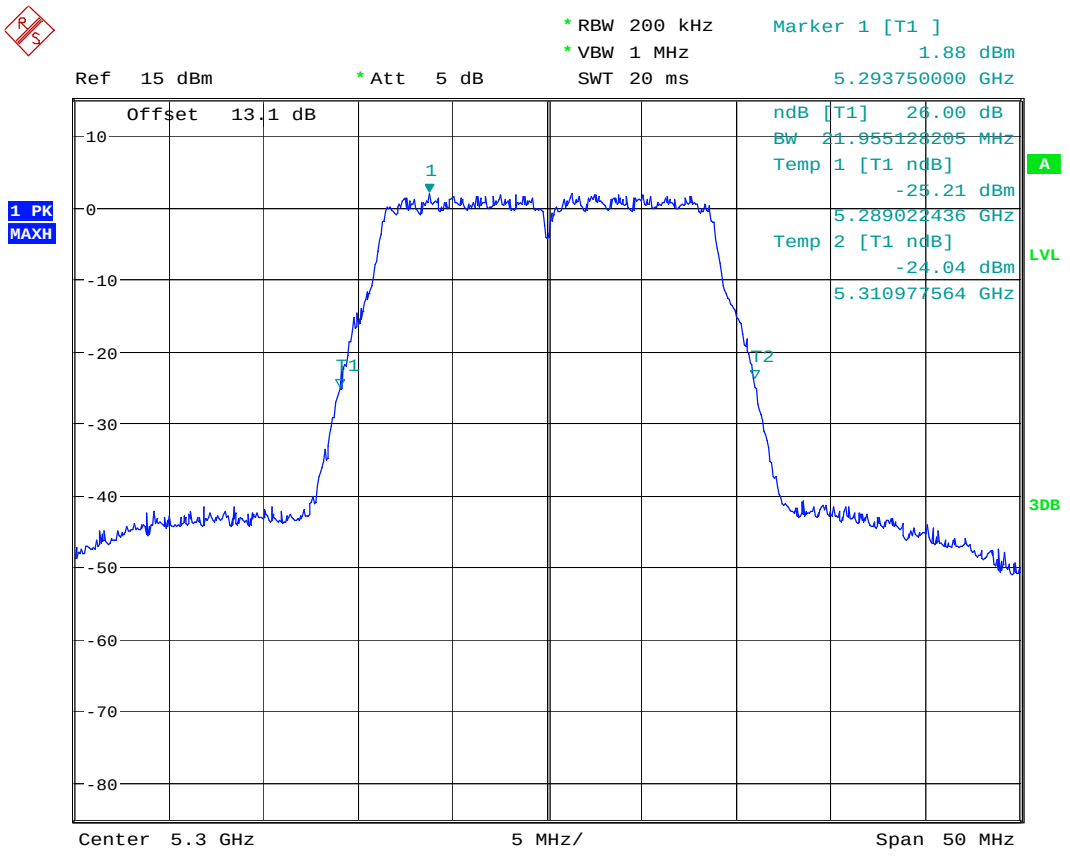
Channel 60 | **Mode: 802.11a 6Mbps**



Date: 20.MAR.2019 13:49:01

Plot #10

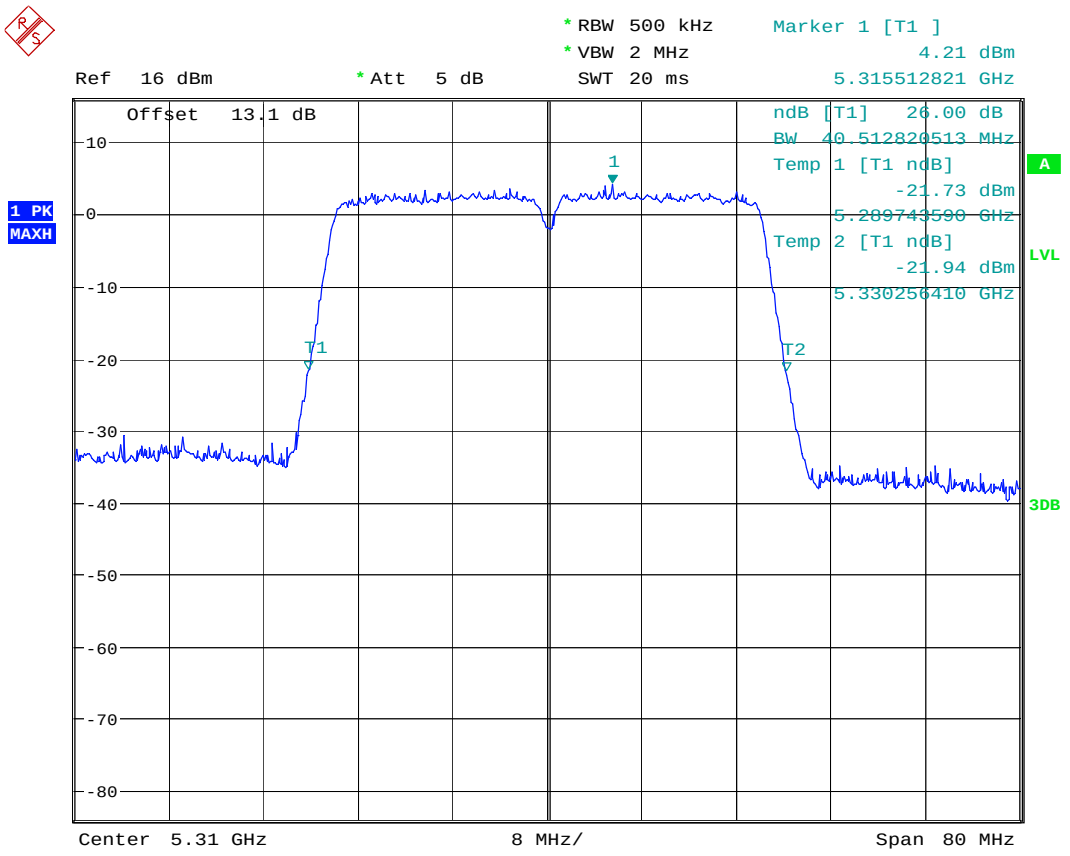
Channel 60	Mode: 802.11n HT20 MCS0



Date: 20.MAR.2019 13:51:13

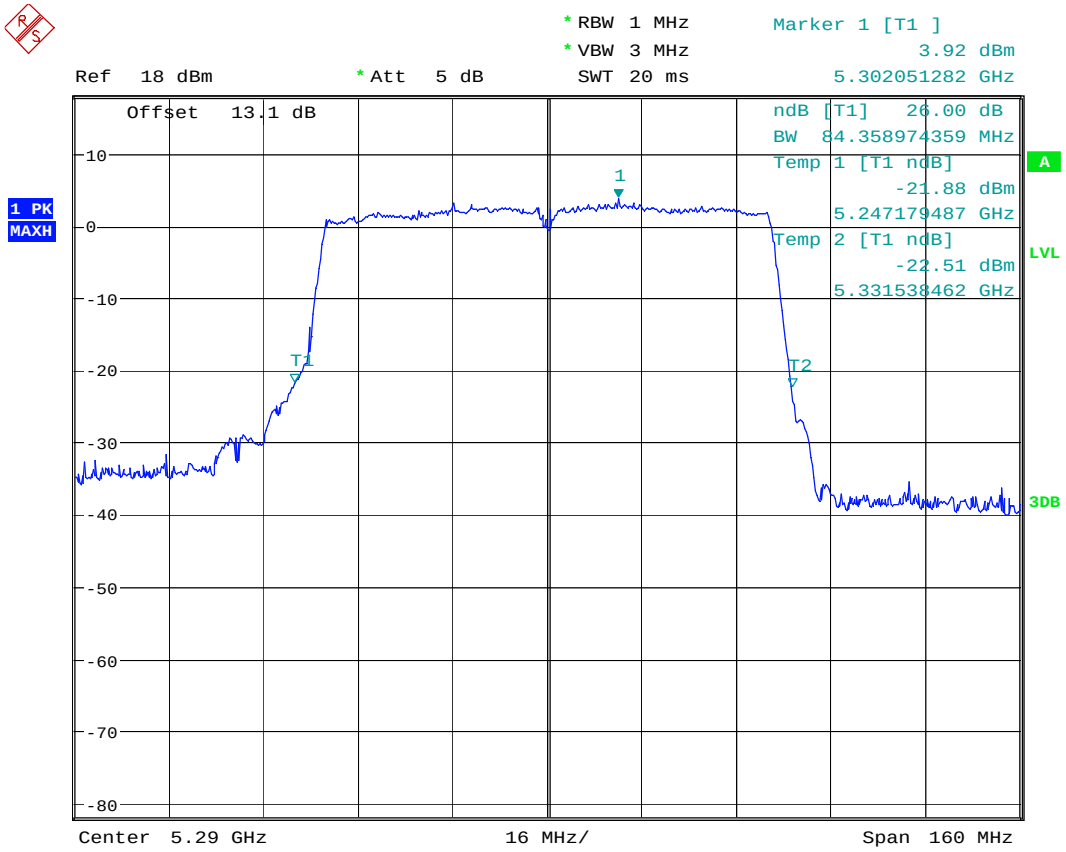
Plot #11

Channel 62 | **Mode: 802.11n_HT40 MCS0**



Plot #12

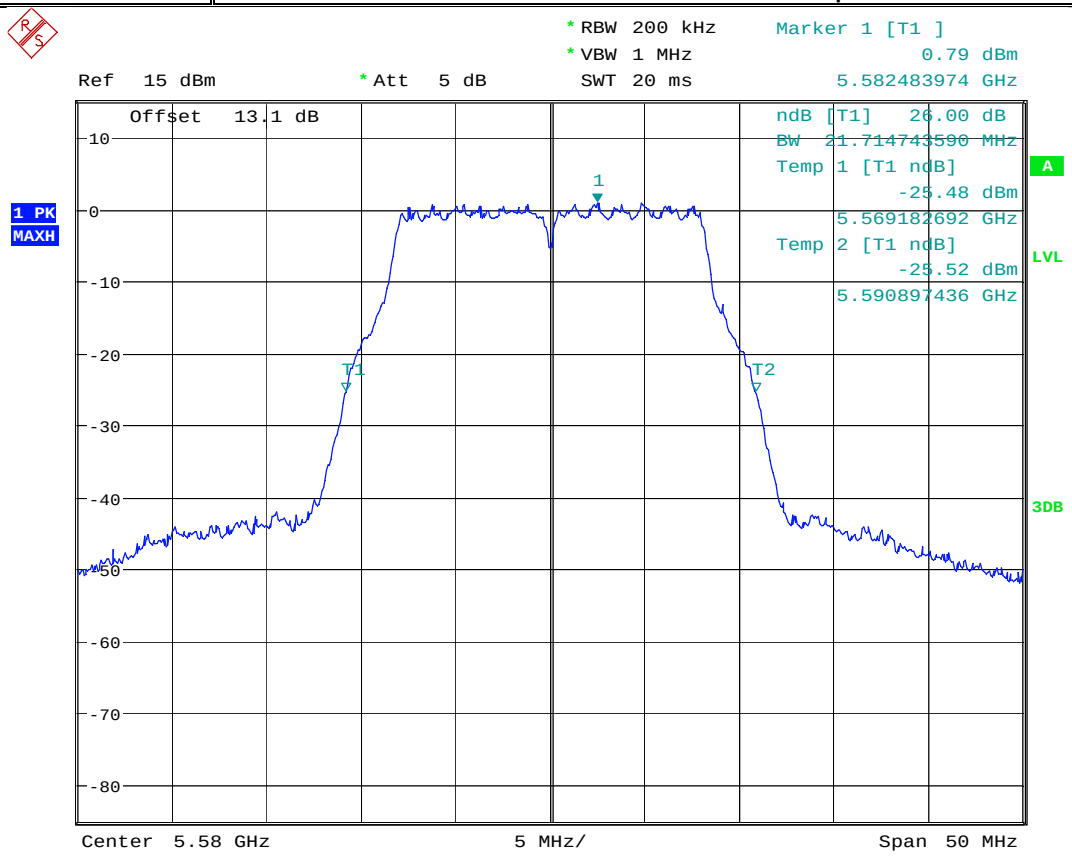
Channel 58	Mode: 802.11ac_VHT80 MCS0



Date: 20.MAR.2019 13:54:09

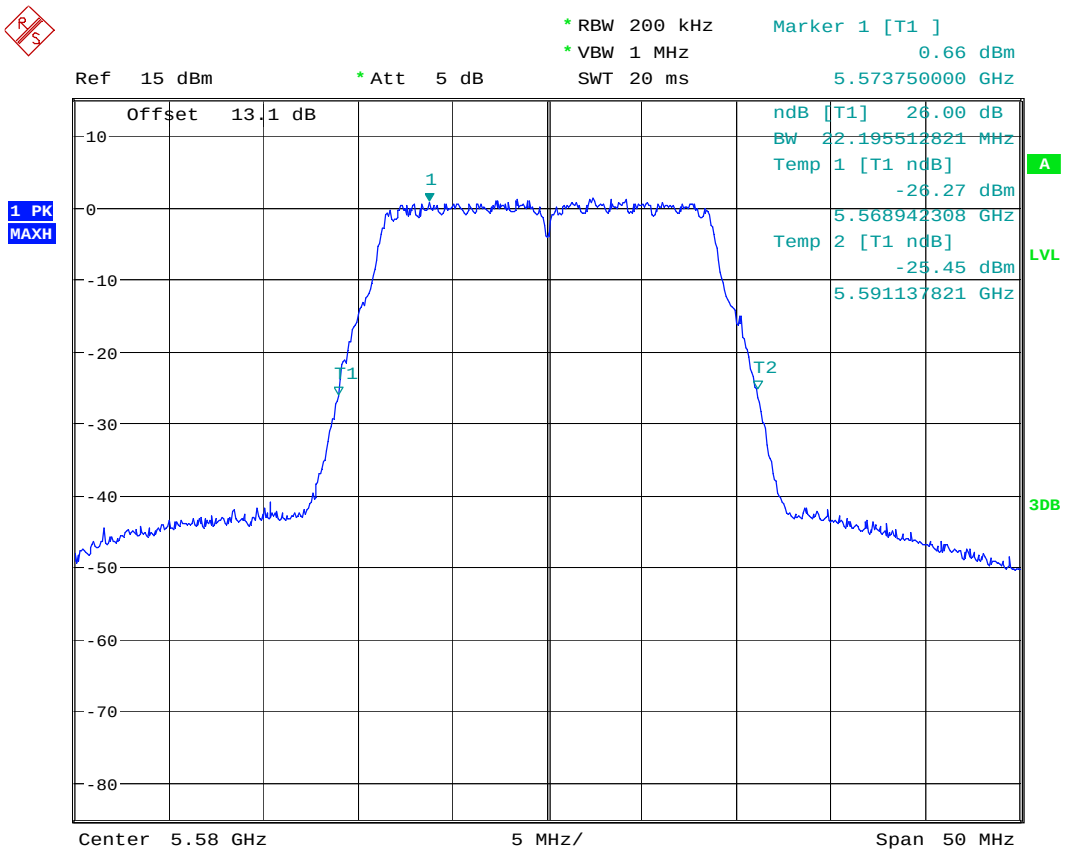
Plot #13

Channel 116 | **Mode: 802.11a 6Mbps**



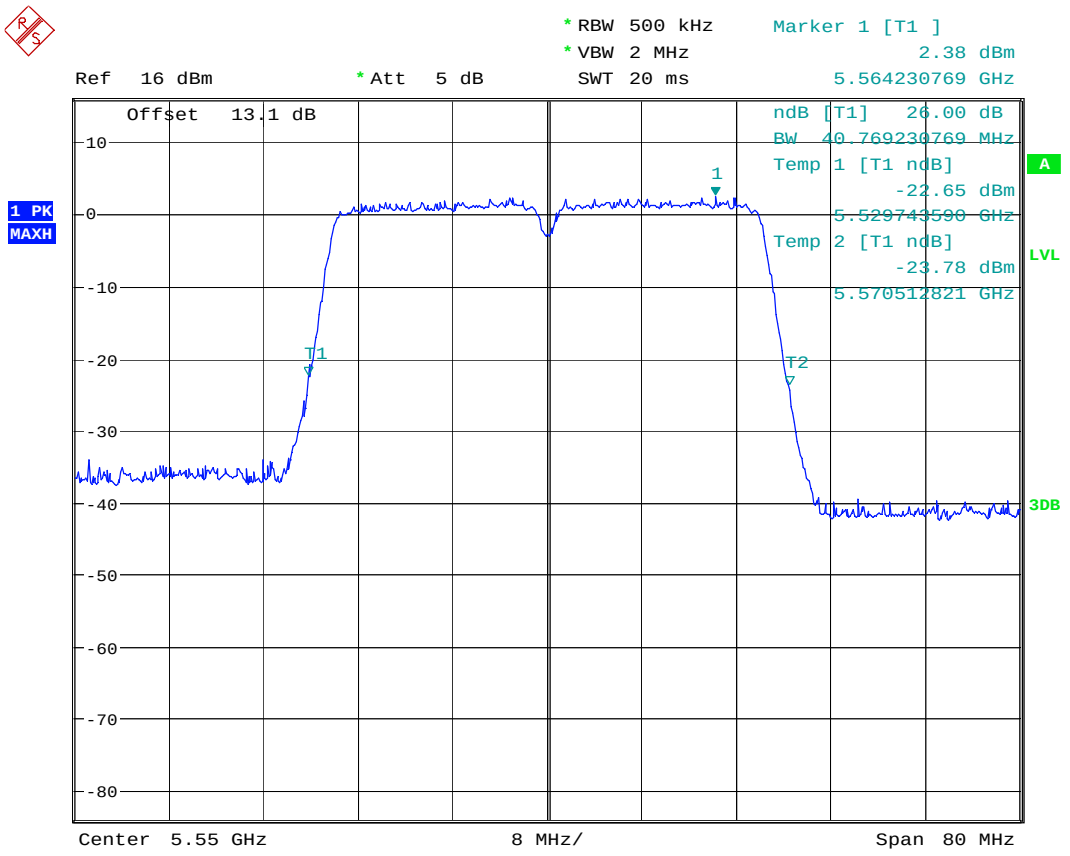
Plot #14

Channel 116	Mode: 802.11n HT20 MCS0



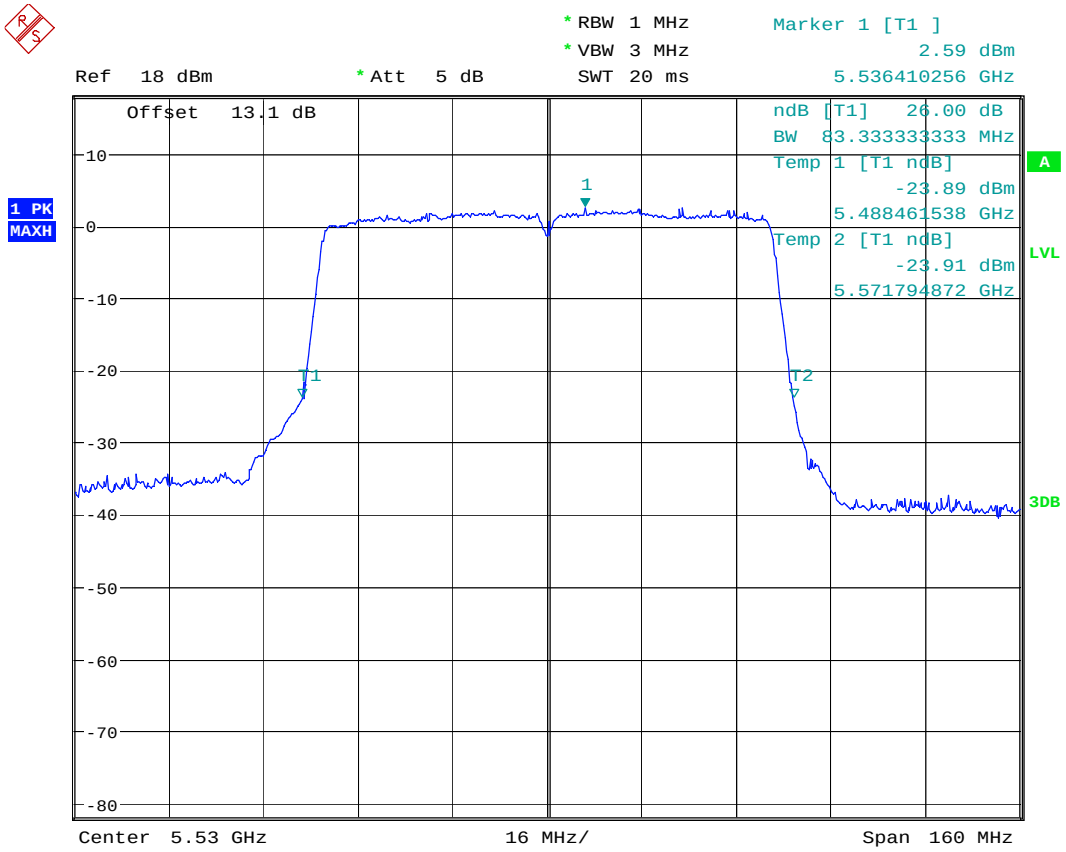
Plot #15

Channel 110	Mode: 802.11n_HT40 MCS0



Plot #16

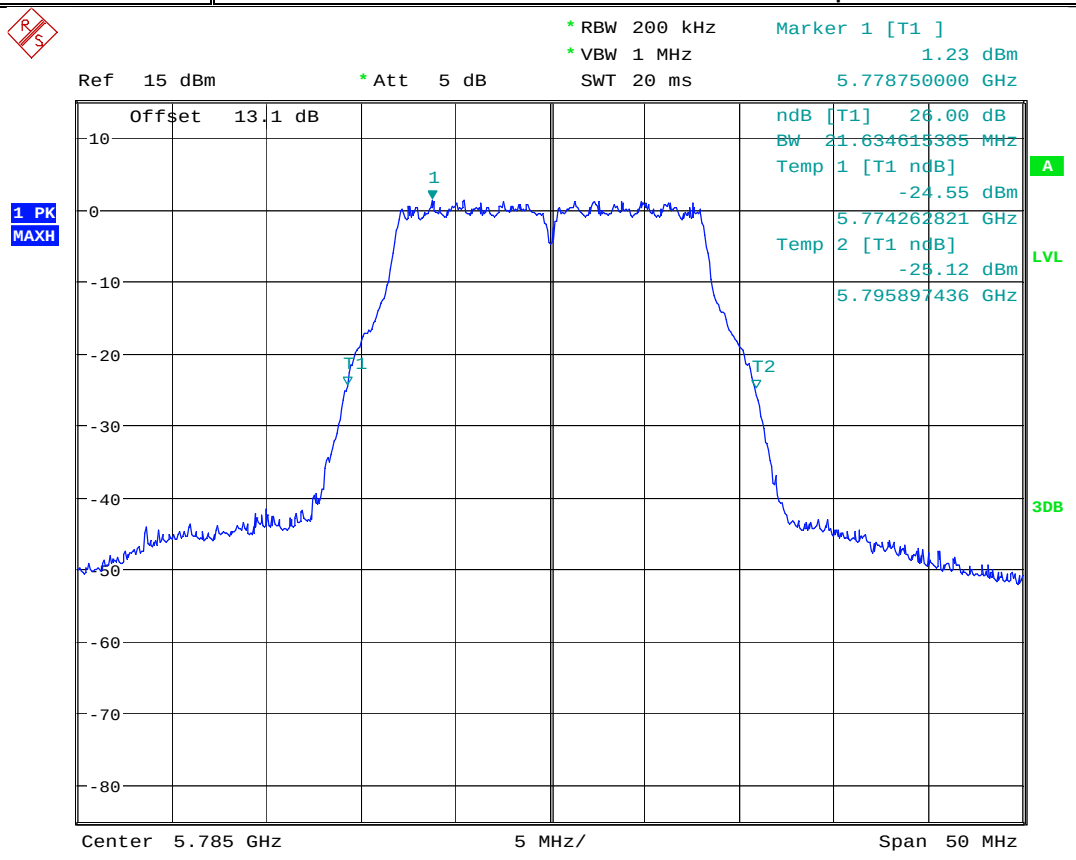
Channel 106	Mode: 802.11ac_VHT80 MCS0



Date: 20.MAR.2019 14:46:04

Plot #17

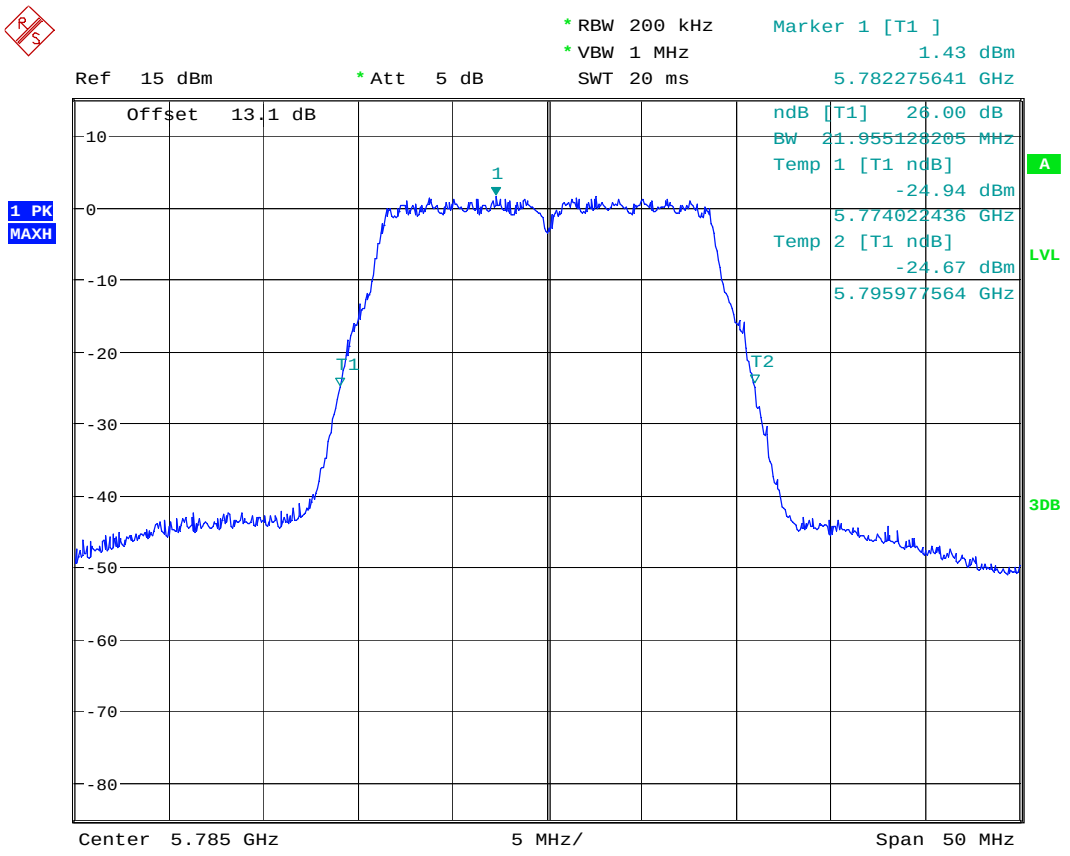
Channel 157 | **Mode: 802.11a 6Mbps**



Date: 20.MAR.2019 14:51:24

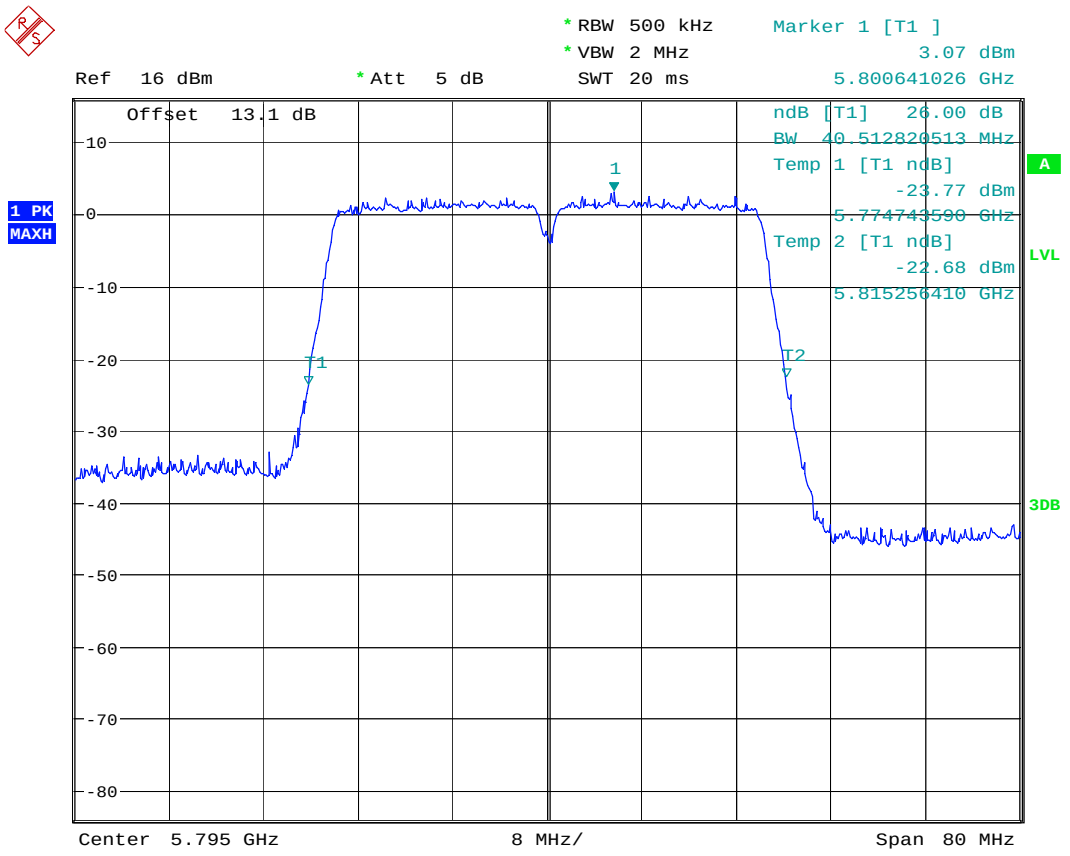
Plot #18

Channel 157 | **Mode: 802.11n HT20 MCS0**



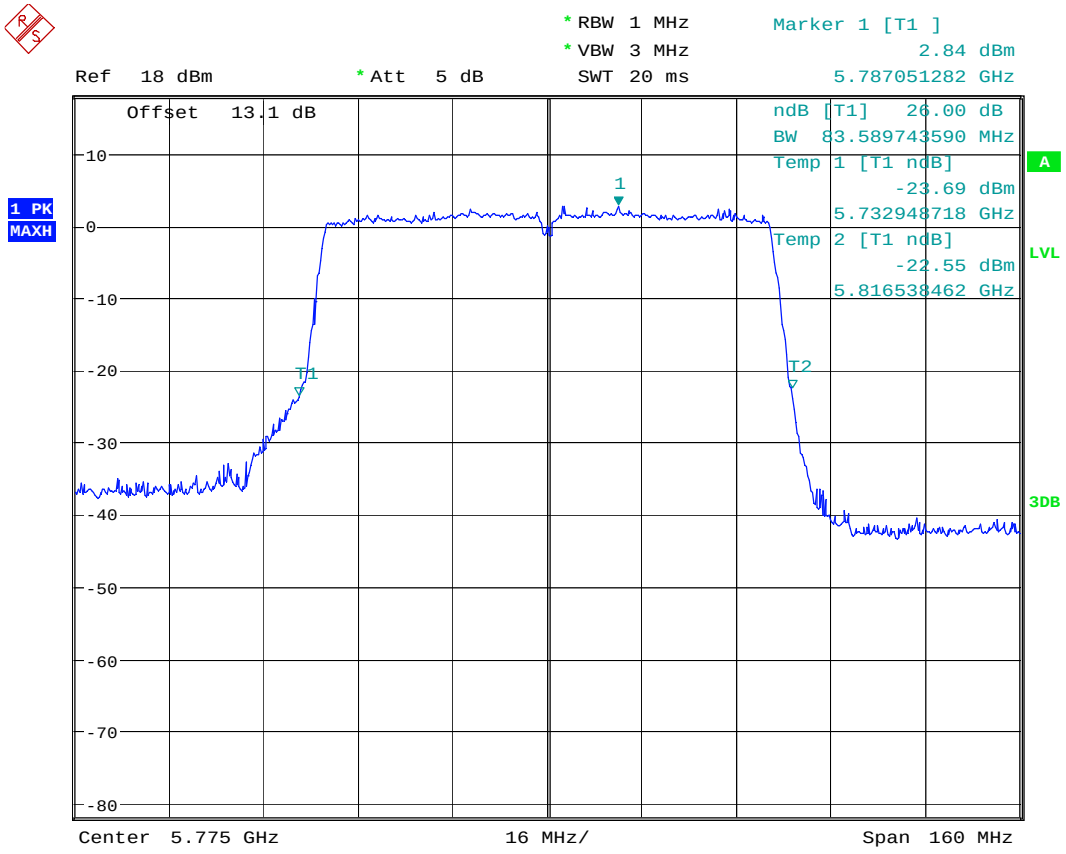
Plot #19

Channel 159	Mode: 802.11n_HT40 MCS0



Plot #20

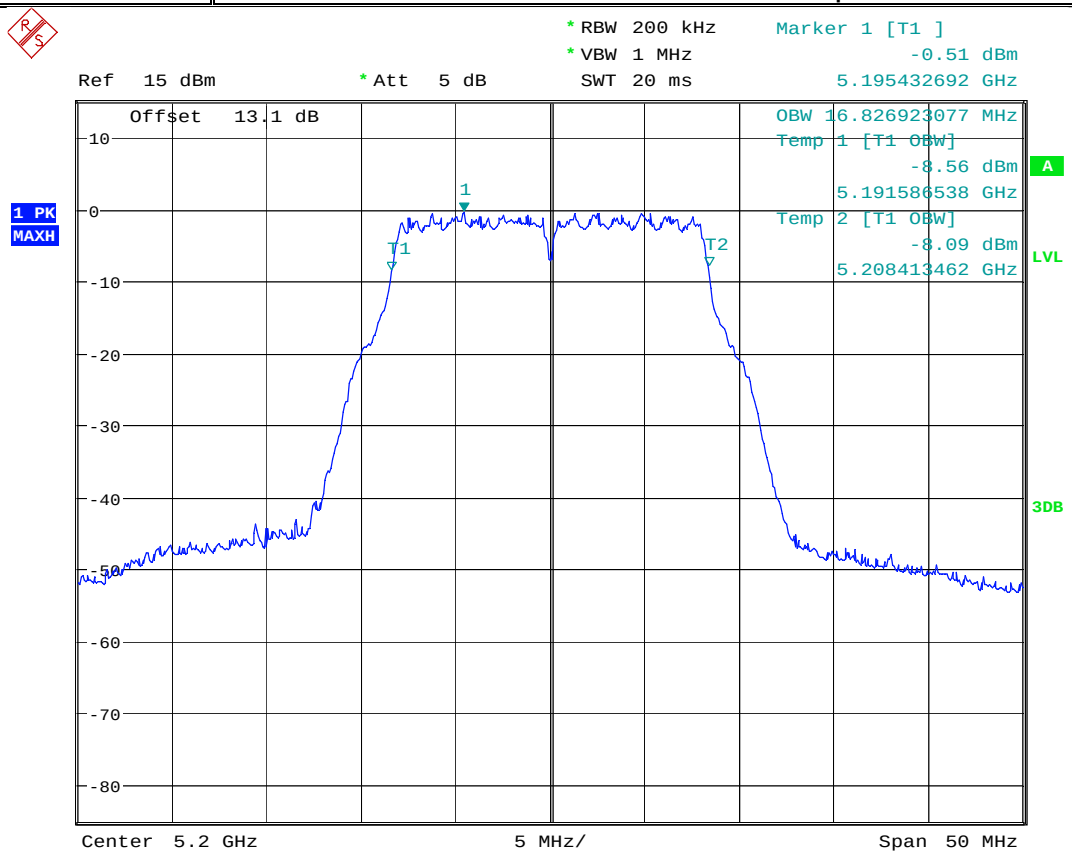
Channel 155	Mode: 802.11ac_VHT80 MCS0



Date: 20.MAR.2019 14:54:58

Plot #21

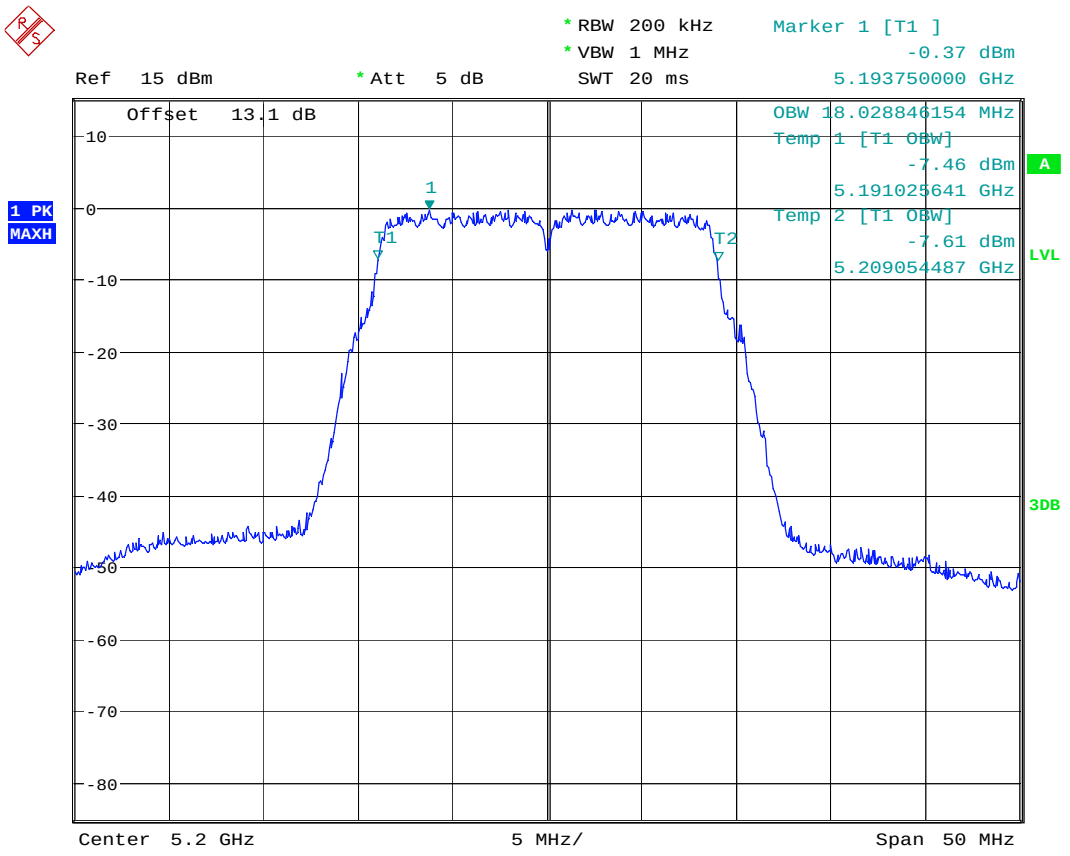
Channel 40 | **Mode: 802.11a 6Mbps**



Date: 27.MAR.2019 14:37:25

Plot #22

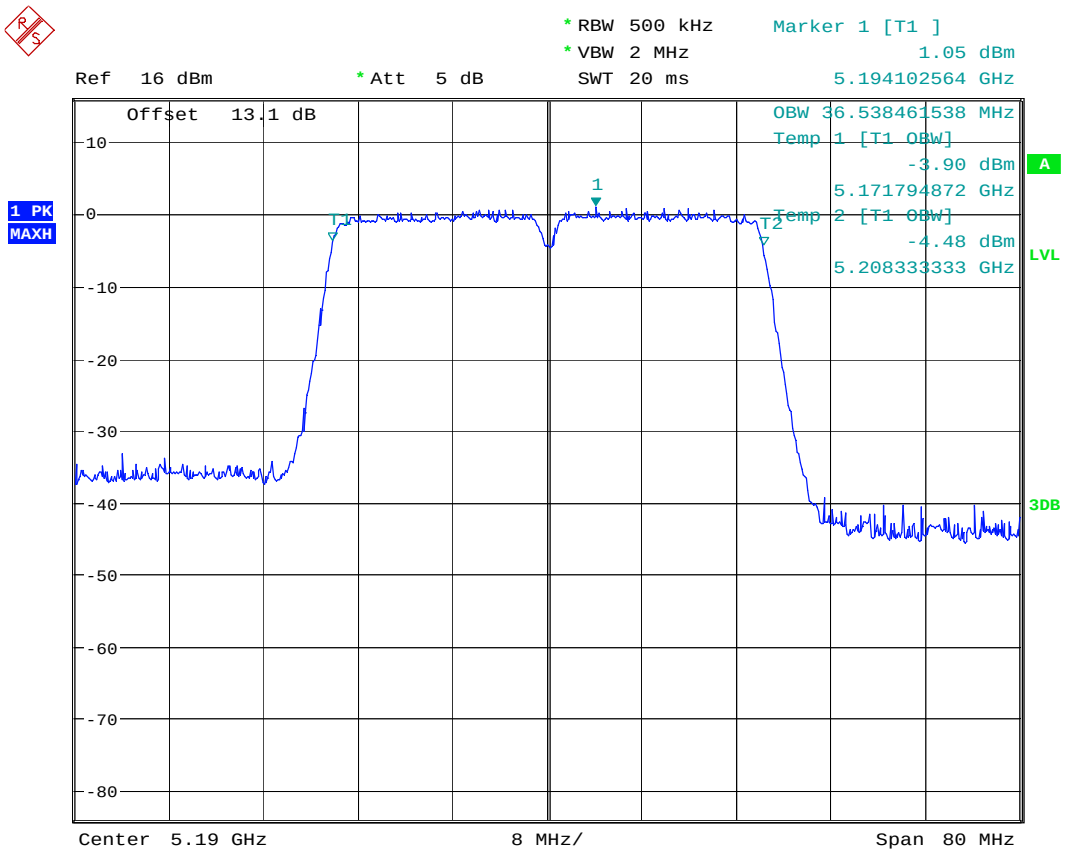
Channel 40 | **Mode: 802.11n HT20 MCS0**



Date: 27.MAR.2019 14:38:27

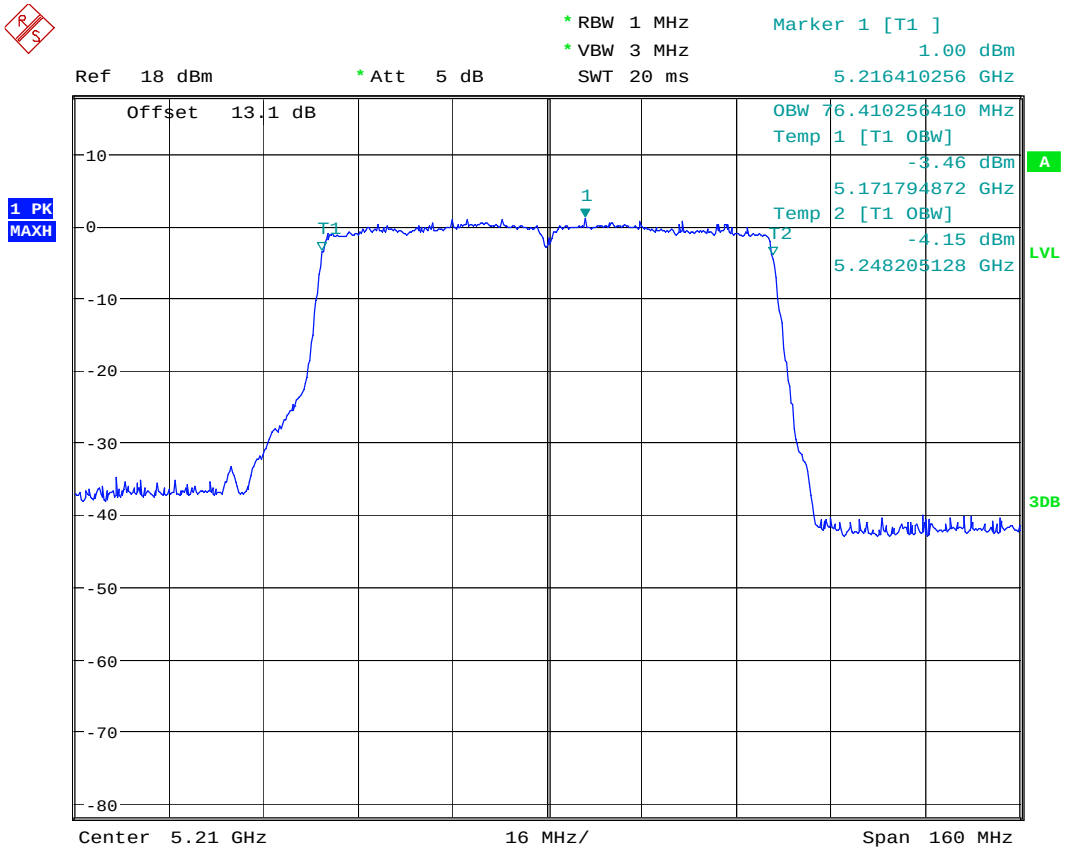
Plot #23

Channel 38	Mode: 802.11n_HT40 MCS0



Plot #24

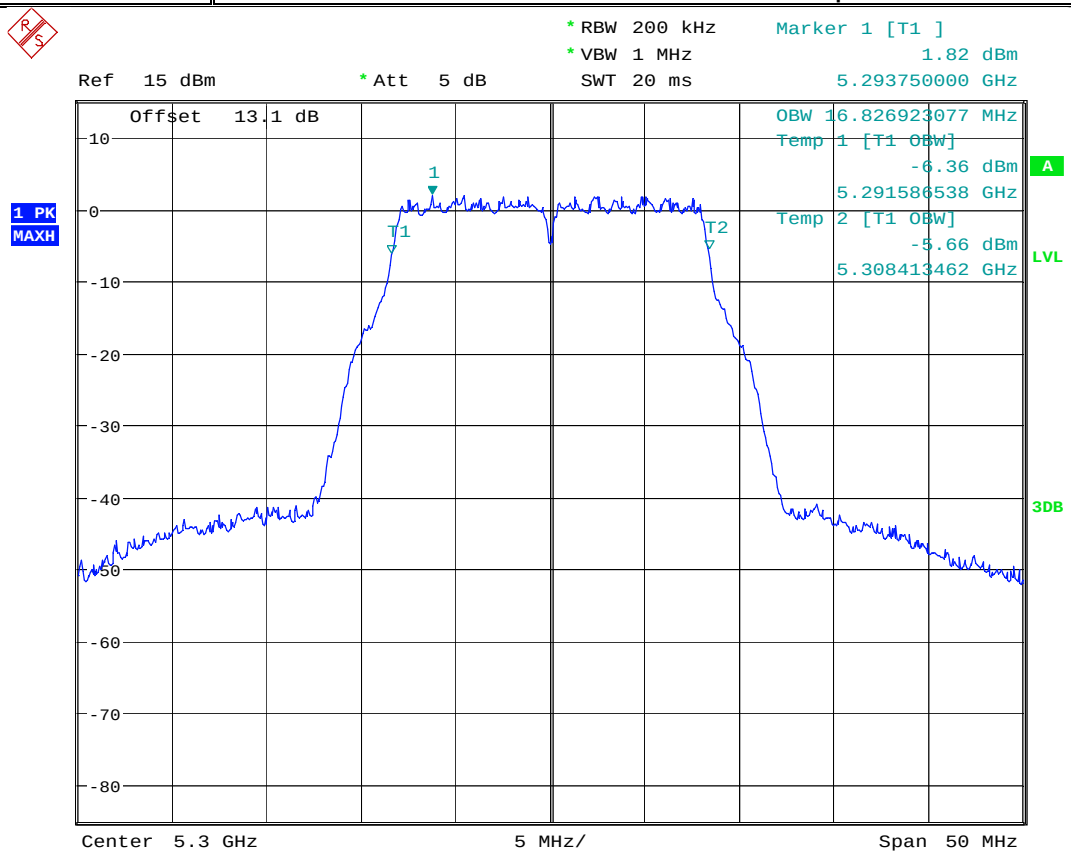
Channel 42	Mode: 802.11ac_VHT80 MCS0



Date: 27.MAR.2019 14:42:44

Plot #25

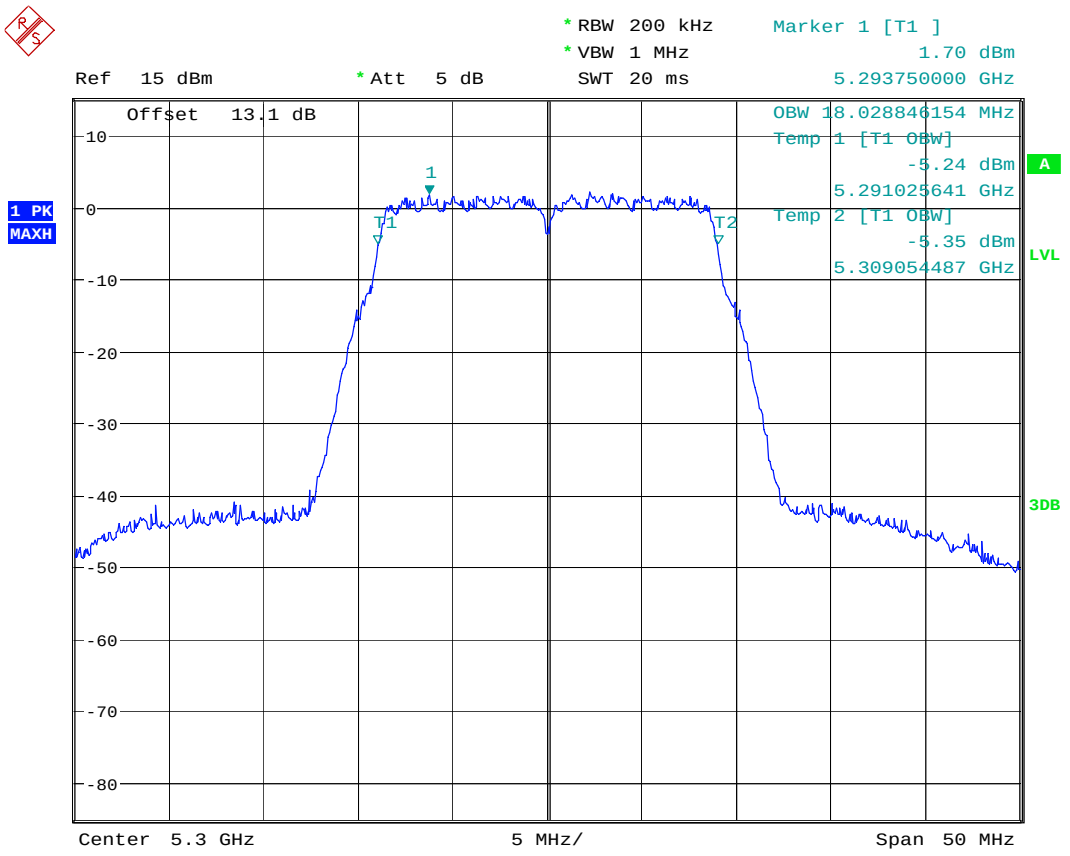
Channel 60 | **Mode: 802.11a 6Mbps**



Date: 27.MAR.2019 15:00:58

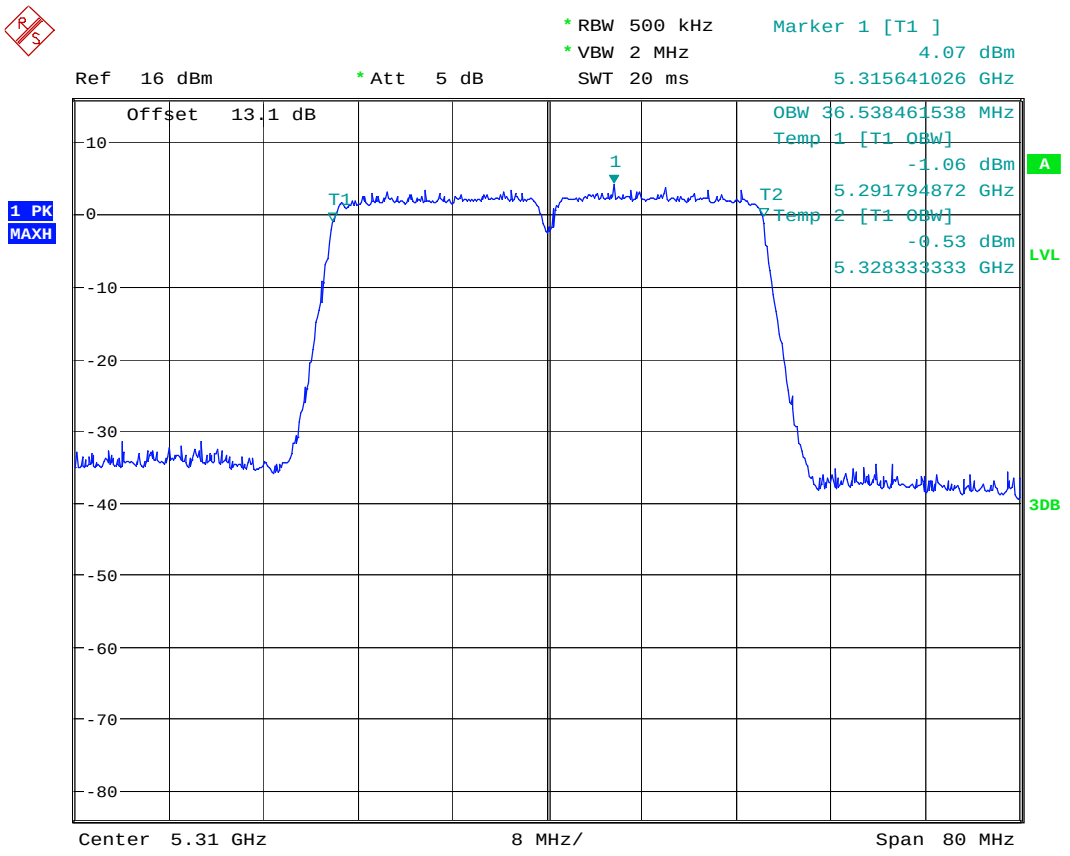
Plot #26

Channel 60	Mode: 802.11n HT20 MCS0



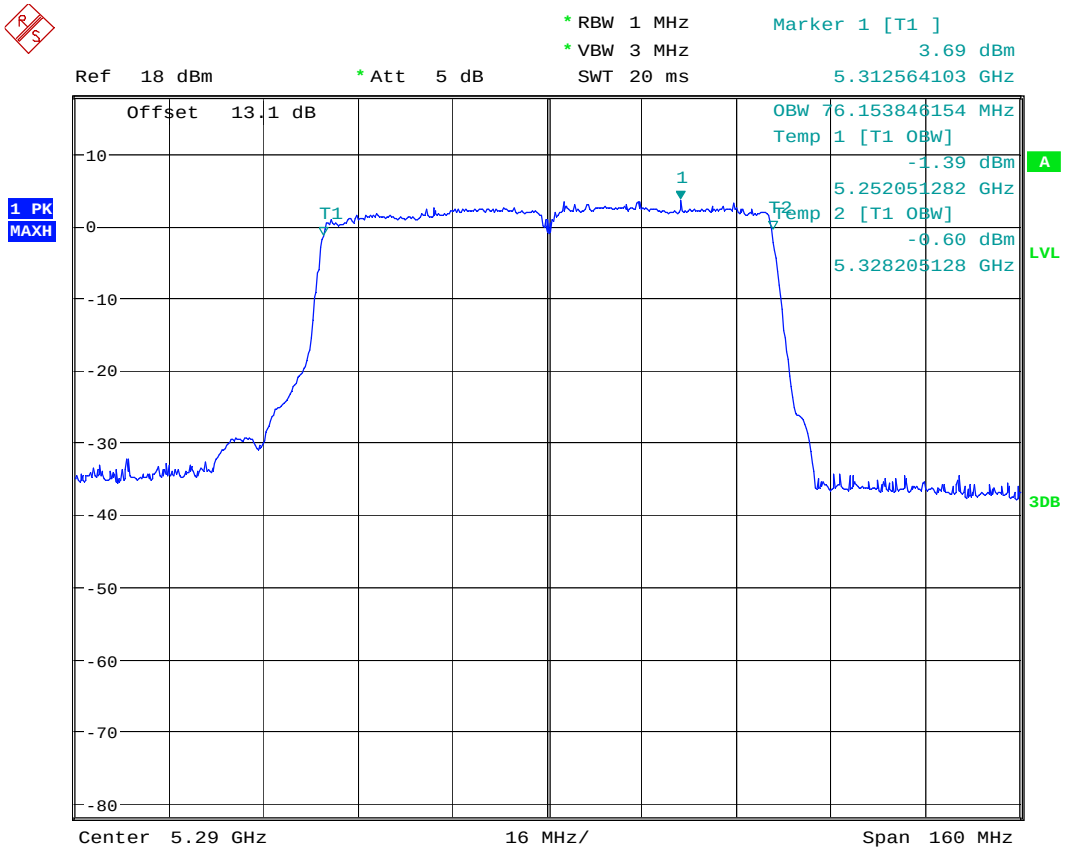
Plot #27

Channel 62 | **Mode: 802.11n_HT40 MCS0**



Plot #28

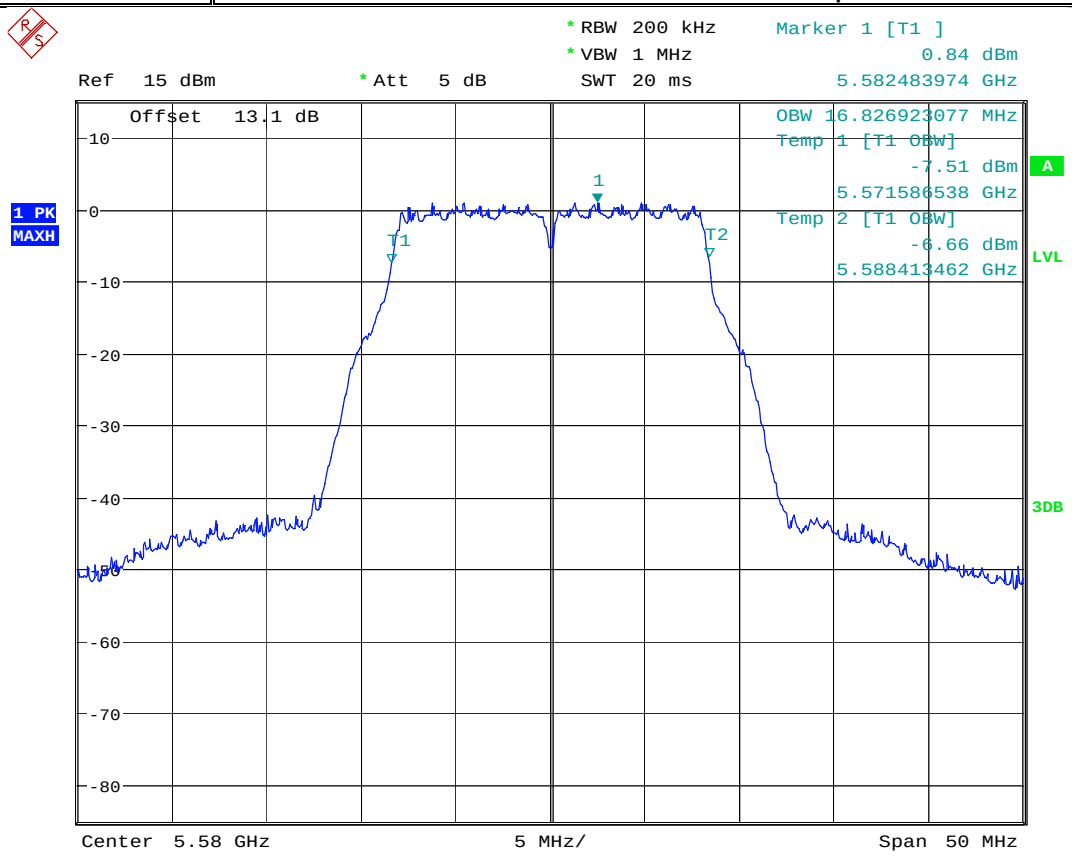
Channel 58	Mode: 802.11ac_VHT80 MCS0



Date: 27.MAR.2019 15:04:15

Plot #29

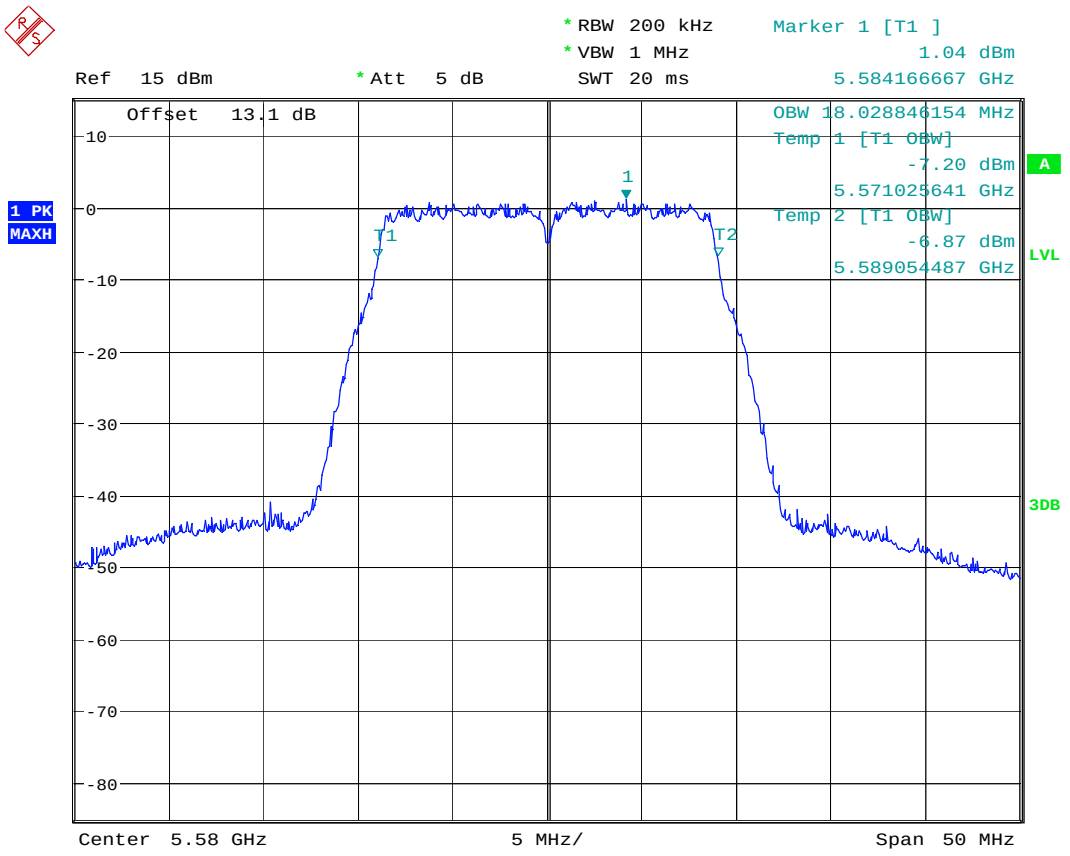
Channel 116 | **Mode: 802.11a 6Mbps**



Date: 27.MAR.2019 17:43:33

Plot #30

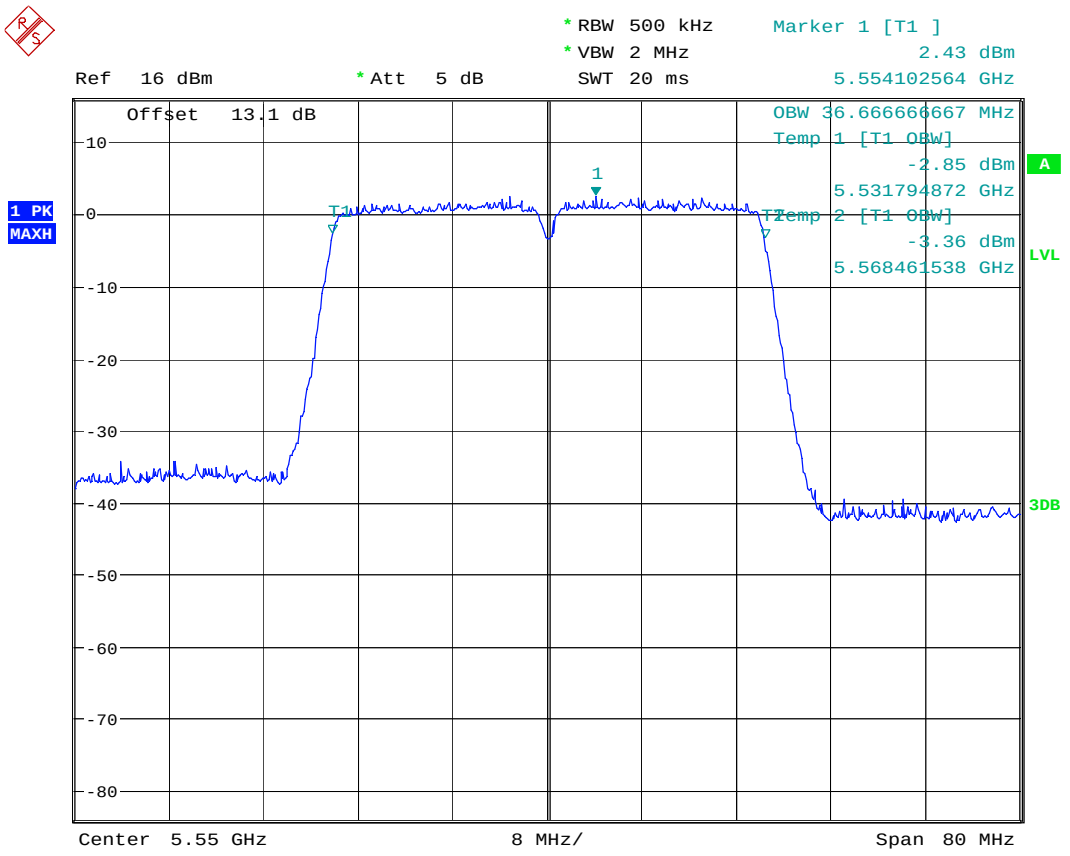
Channel 116 | **Mode: 802.11n HT20 MCS0**



Date: 27.MAR.2019 17:44:51

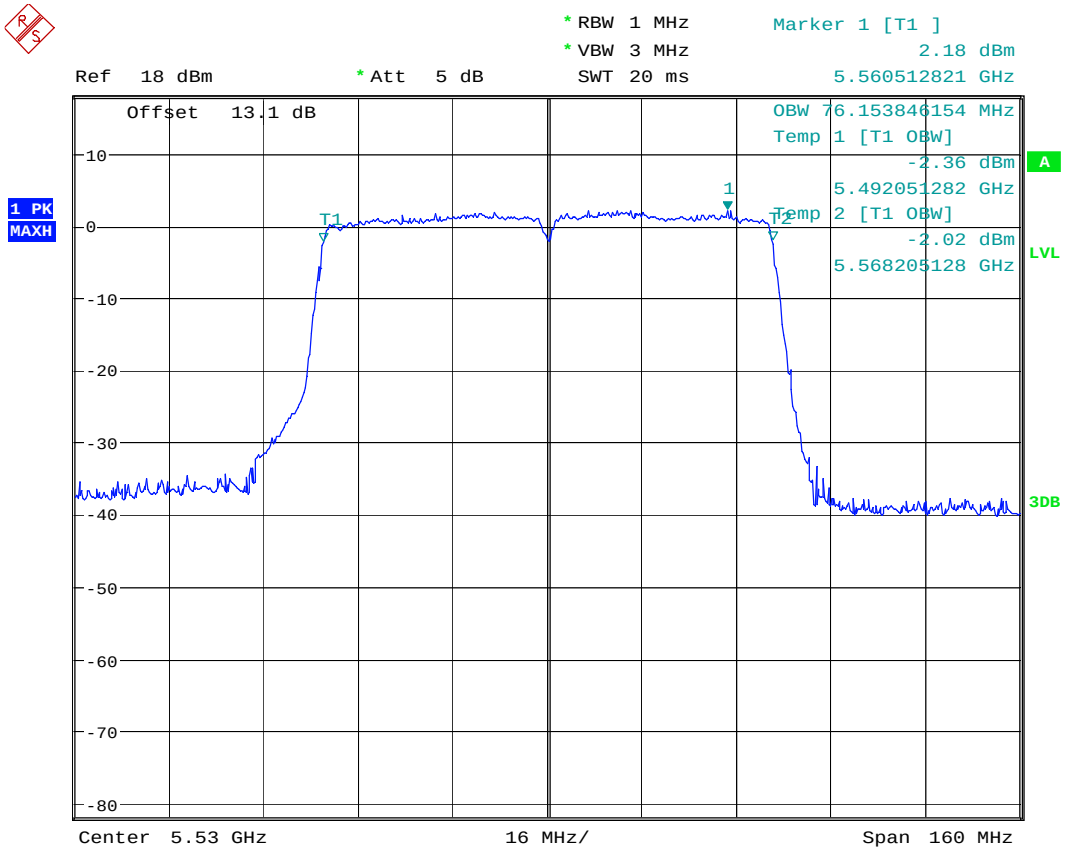
Plot #31

Channel 110 | **Mode: 802.11n_HT40 MCS0**



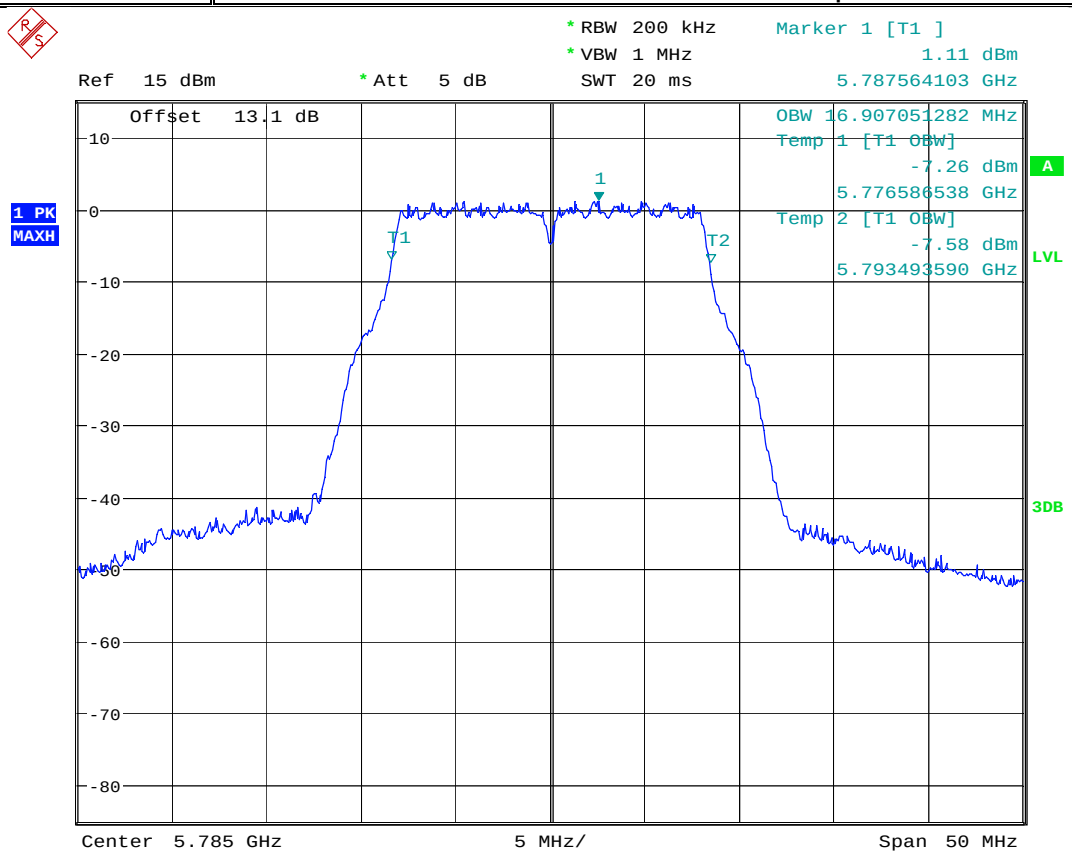
Plot #32

Channel 106	Mode: 802.11ac_VHT80 MCS0



Plot #33

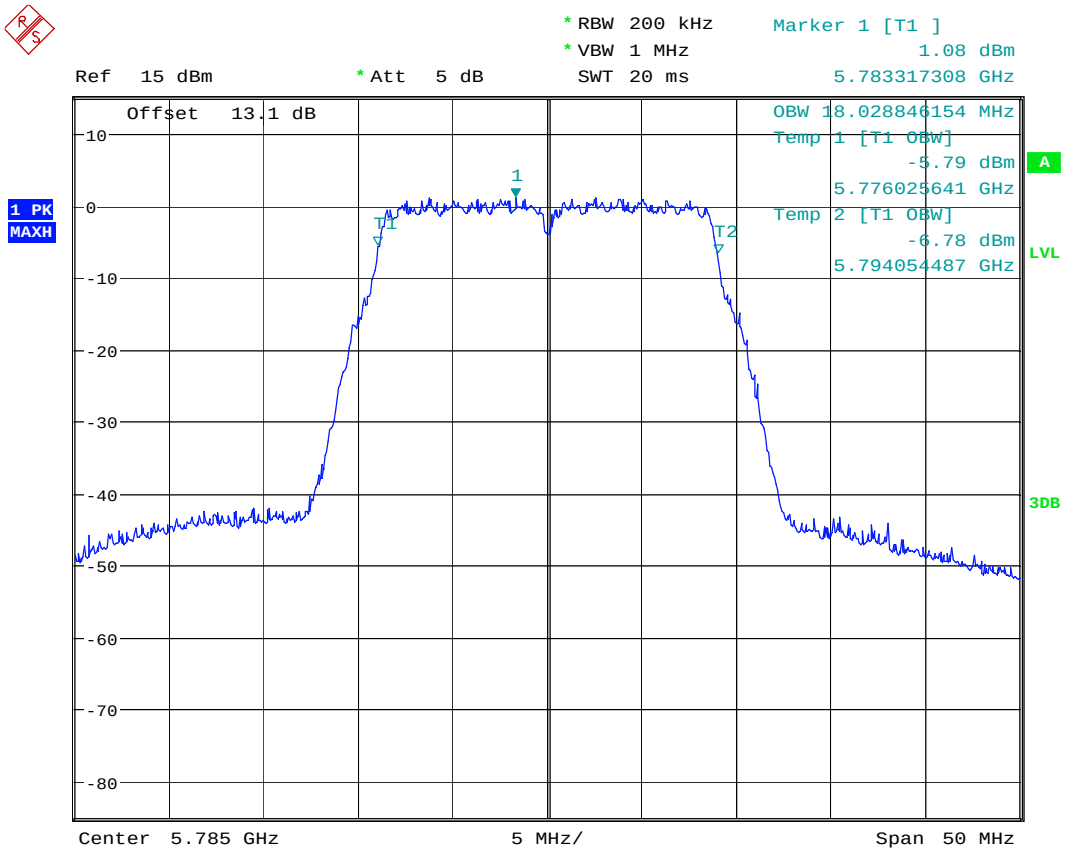
Channel 157 | **Mode: 802.11a 6Mbps**



Date: 28.MAR.2019 08:58:17

Plot #34

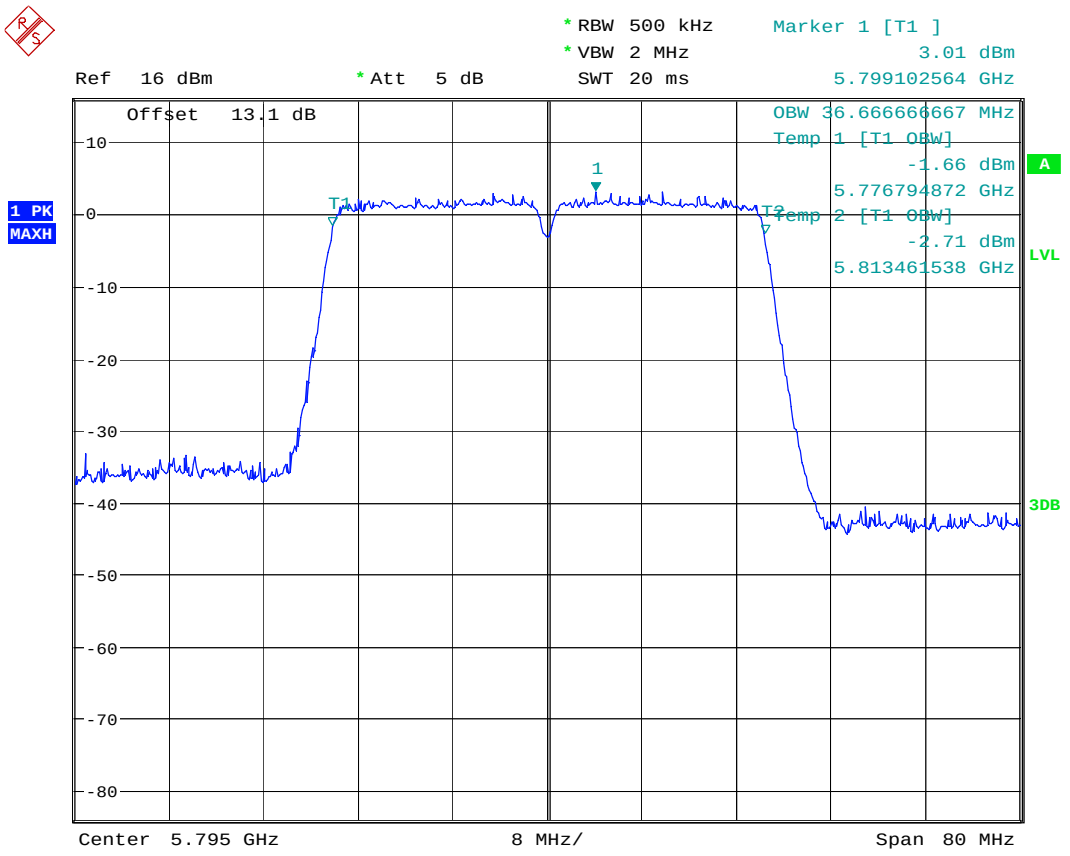
Channel 157 | **Mode: 802.11n HT20 MCS0**



Date: 28.MAR.2019 08:59:21

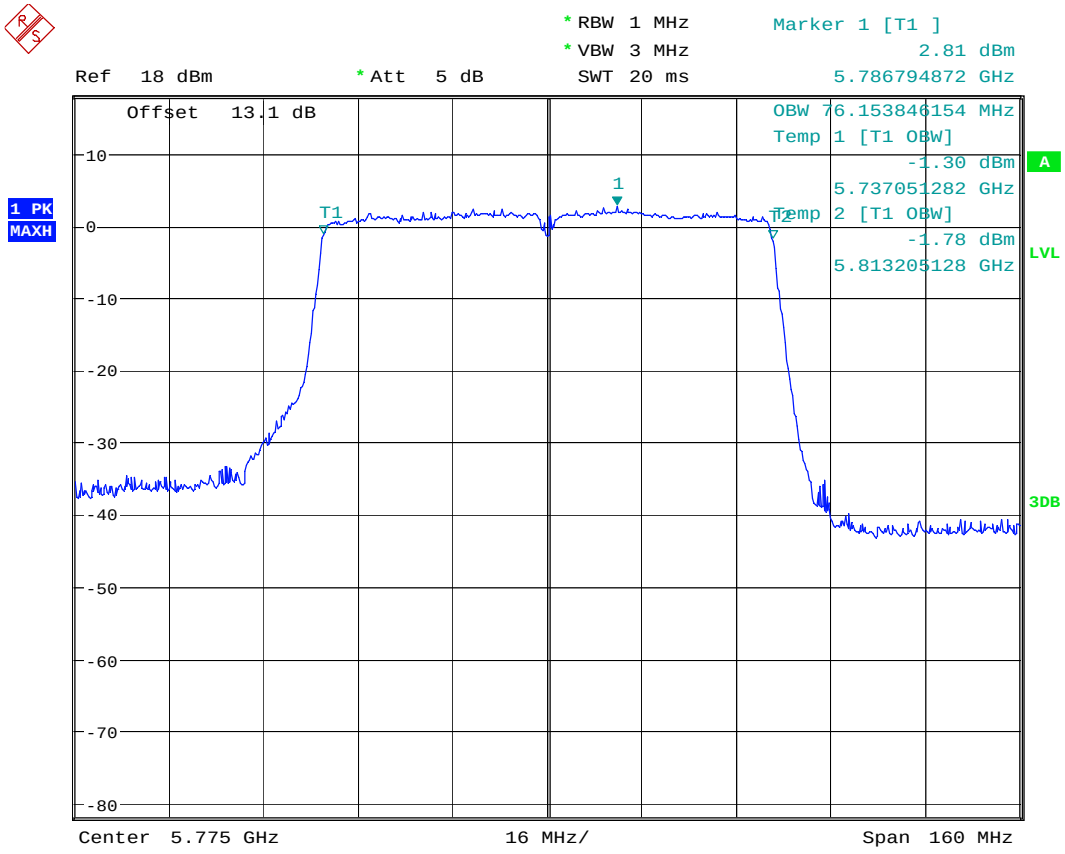
Plot #35

Channel 159 | **Mode: 802.11n_HT40 MCS0**



Plot #36

Channel 155	Mode: 802.11ac_VHT80 MCS0



Date: 28.MAR.2019 09:01:39

8.6 Frequency stability

8.6.1 Measurement Procedure

- The EUT was placed inside temperature chamber
- Set the EUT to the operation mode needed
- Set the chamber to the highest temperature specified
- Allow sufficient time for the temperature of the chamber to stabilize, measure the operating frequency
- Repeat step with the temperature chamber set to lowest temperature

8.6.2 Limits:

FCC §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 user manual

8.6.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
See section 8.6.4	1	802.11a	120VAC/Battery

8.6.4 Measurement result:

Temp	802.11n_HT20	Measured CF	ACF	Frequency Stability (ppm)
25°C	40	5200.028150	5200	5.41
	60	5300.030850	5300	5.82
	100	5500.040900	5500	7.44
	157	5785.032850	5785	5.68
-20°C	40	5200.017725	5200	3.41
	60	5300.028575	5300	5.39
	100	5500.018725	5500	3.40
	157	5785.023725	5785	4.10
70°C	40	5200.018425	5200	3.54
	60	5300.018525	5300	3.50
	100	5500.023375	5500	4.25
	157	5785.024325	5785	4.20

8.7 Radiated Transmitter Spurious Emissions and Restricted Bands

8.7.1 Measurement according to ANSI C63.10 (2013)

Spectrum Analyzer Settings:

- Frequency = 9 KHz – 30 MHz
- RBW = 9 KHz
- Detector: Peak

- Frequency = 30 MHz – 1 GHz
- Detector = Peak / Quasi-Peak
- RBW= 120 KHz (<1GHz)

- Frequency > 1 GHz
- Detector = Peak / Average
- RBW = 1 MHz

- Radiated spurious emissions shall be measured for the transmit frequencies, transmit power, and data rate for the lowest, middle and highest channel in each frequency band of operation and for the highest gain antenna for each antenna type, and using the appropriate parameters and test requirements.
- The highest (or worst-case) data rate shall be recorded for each measurement.
- For testing at distance other than the specified in the standard, the limit conversion is calculated by using 40 dB/decade extrapolation factor as follow: Conversion factor (CF) = 40 log (D/d) = 40 log (300m / 3m) = 80dB

8.7.2 Limits:

FCC §15.247

- In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

FCC §15.209 & RSS-Gen 8.9

- Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency of emission (MHz)	Field strength (µV/m)	Measurement Distance (m)	Field strength @ 3m (dBµV/m)
0.009–0.490	2400/F(kHz) / ---------	300	-
0.490–1.705	24000/F(kHz) / --------	30	-
1.705–30.0	30 / (29.5)	30	-
30–88	100	3	40 dBµV/m
88–216	150	3	43.5 dBµV/m
216–960	200	3	46 dBµV/m
Above 960	500	3	54 dBµV/m

FCC §15.205 & RSS-Gen 8.10

- Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

- Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
  *PEAK LIMIT= 74 dBµV/m
  *AVG. LIMIT= 54 dBµV/m

8.7.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
23° C	2	802.11a_2*Tx	120VAC/Battery

8.7.4 Measurement result:

Plot #	Channel #	Scan Frequency	Limit	Result
1-36	36/48/64/100/116/140/149/157/165	30 MHz – 18 GHz	See section 8.7.2	Pass
37-39	48/116/157	9 kHz – 30 MHz	See section 8.7.2	Pass
40-42	48/116/157	18 GHz – 40 GHz	See section 8.7.2	Pass

8.7.5 Measurement Plots:

Plot #1 Radiated Emissions: 30 MHz – 1GHz

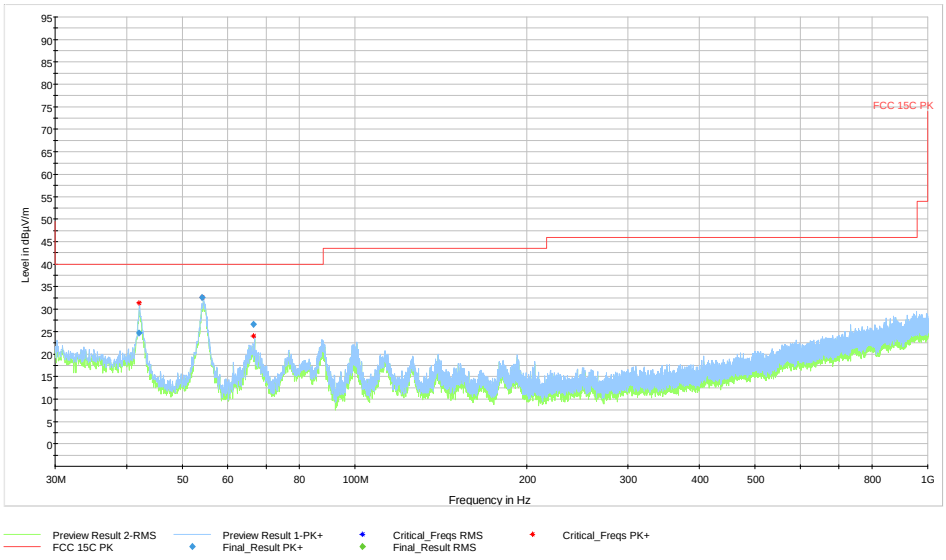
Modulation: 802.11a_2*Tx	Channel 36	94% Duty Cycle

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
42.05	24.69	---	40.00	15.31	100.0	100.0	159.0	V
54.16	32.61	---	40.00	7.39	100.0	100.0	100.0	V
66.50	26.54	---	40.00	13.46	100.0	100.0	163.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
42.05	263.0	-15	11:10:19 AM - 3/22/2019
54.16	-2.0	-20	11:13:15 AM - 3/22/2019
66.50	39.0	-25	11:15:30 AM - 3/22/2019



Plot #2 Radiated Emissions: 30 MHz – 1GHz

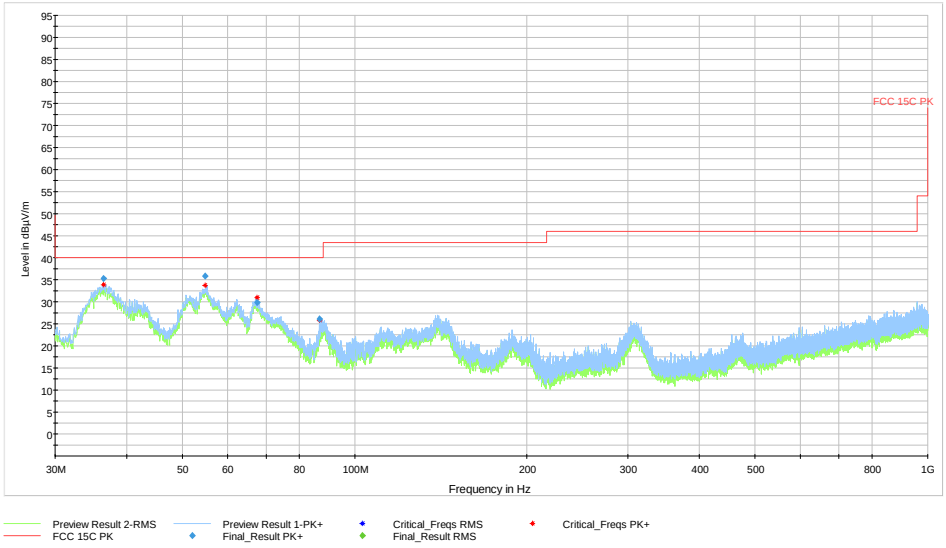
Modulation: 802.11a_2*Tx	Channel 48	94% Duty Cycle

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
36.43	35.27	---	40.00	4.73	100.0	100.0	100.0	V
54.77	35.82	---	40.00	4.18	100.0	100.0	208.0	V
67.58	29.87	---	40.00	10.13	100.0	100.0	108.0	V
86.79	26.07	---	40.00	13.93	100.0	100.0	201.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
36.43	265.0	-13	10:47:22 AM - 3/22/2019
54.77	-1.0	-21	10:50:04 AM - 3/22/2019
67.58	78.0	-25	10:52:24 AM - 3/22/2019
86.79	170.0	-23	10:55:01 AM - 3/22/2019



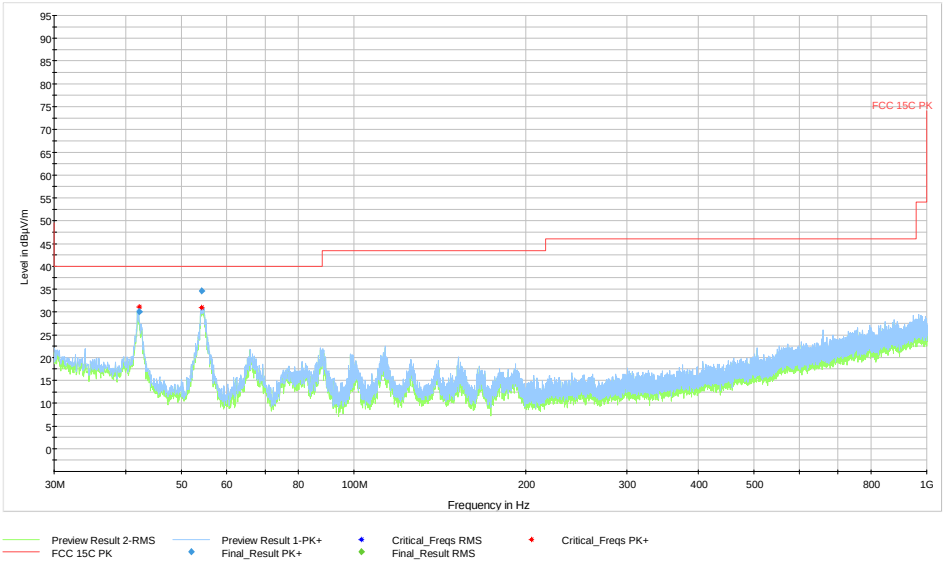
Plot #3 Radiated Emissions: 30 MHz – 1GHz		
Modulation: 802.11a_2*Tx	**Channel 64**	**94% Duty Cycle**

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
42.23	29.98	---	40.00	10.02	100.0	100.0	273.0	V
54.26	34.61	---	40.00	5.39	100.0	100.0	100.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
42.23	263.0	-15	11:25:12 AM - 3/22/2019
54.26	73.0	-20	11:28:08 AM - 3/22/2019



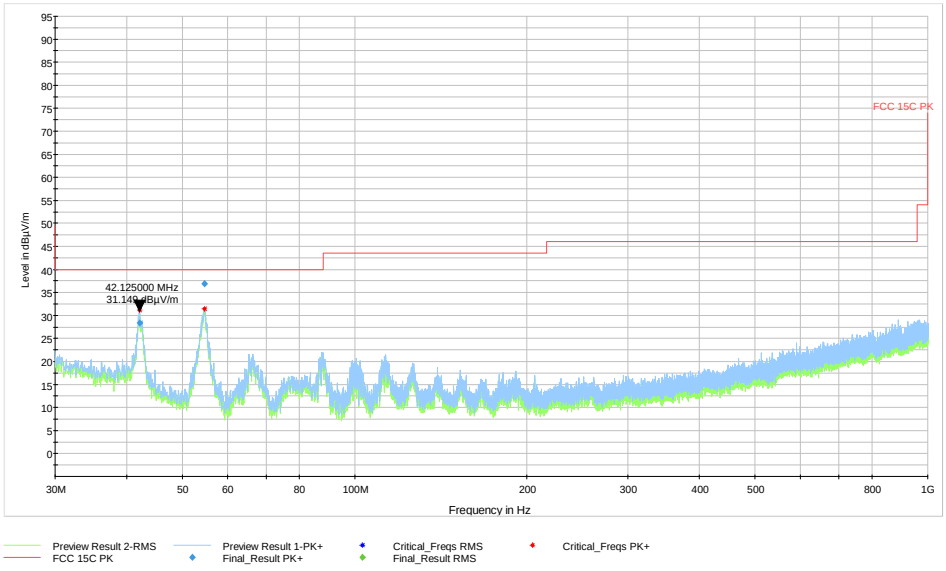
Plot #4 Radiated Emissions: 30 MHz – 1GHz		
Modulation: 802.11a_2*Tx	**Channel 100**	**94% Duty Cycle**

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
42.14	28.42	---	40.00	11.58	100.0	100.0	174.0	V
54.73	36.84	---	40.00	3.16	100.0	100.0	159.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
42.14	192.0	-15	11:39:20 AM - 3/22/2019
54.73	40.0	-21	11:42:06 AM - 3/22/2019



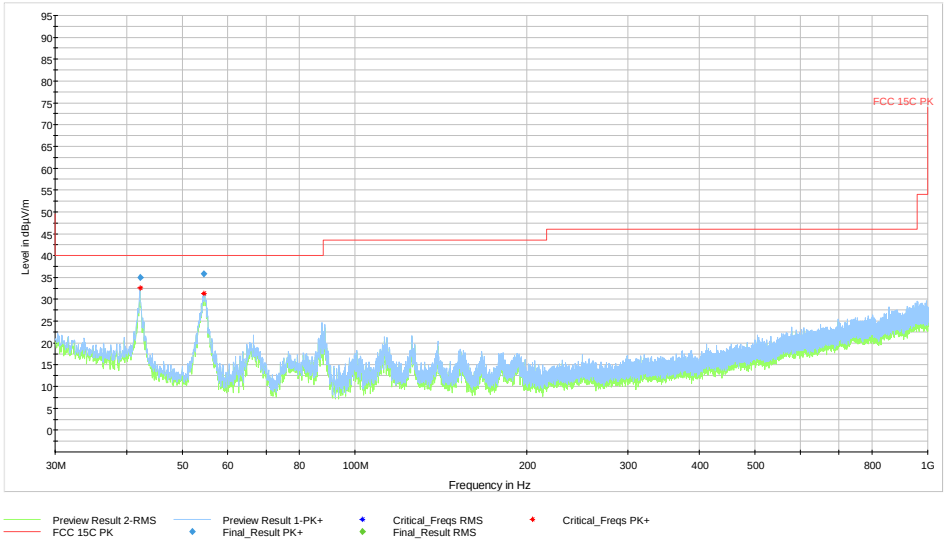
Plot #5 Radiated Emissions: 30 MHz – 1GHz		
Modulation: 802.11a_2*Tx	**Channel 116**	**94% Duty Cycle**

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
42.22	34.99	---	40.00	5.01	100.0	100.0	100.0	V
54.53	35.82	---	40.00	4.18	100.0	100.0	108.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
42.22	212.0	-15	11:57:18 AM - 3/22/2019
54.53	75.0	-20	11:54:42 AM - 3/22/2019



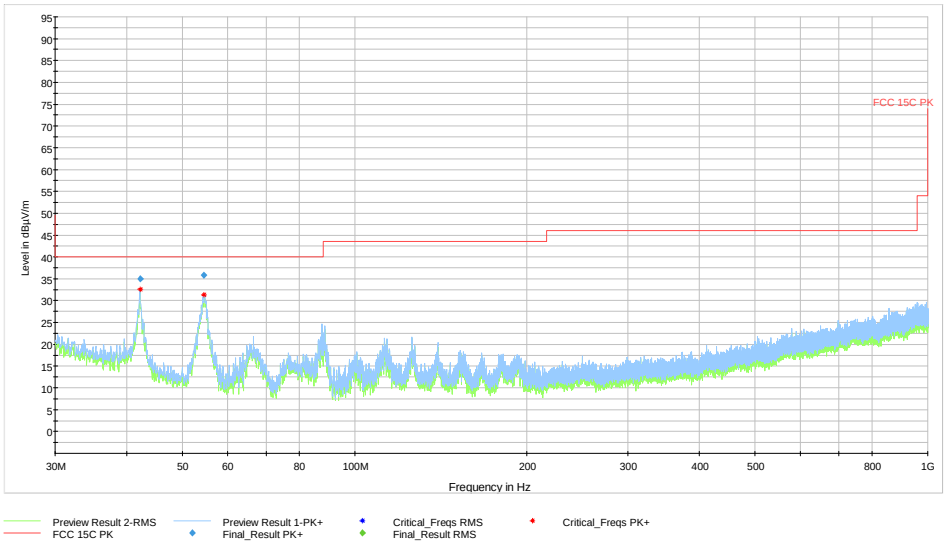
Plot #6 Radiated Emissions: 30 MHz – 1GHz		
Modulation: 802.11a_2*Tx	**Channel 140**	**94% Duty Cycle**

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
42.19	21.98	---	40.00	18.02	100.0	100.0	217.0	V
54.76	32.41	---	40.00	7.59	100.0	100.0	100.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
42.19	274.0	-15	12:07:25 PM - 3/22/2019
54.76	-17.0	-21	12:10:26 PM - 3/22/2019



Plot #7 Radiated Emissions: 30 MHz – 1GHz

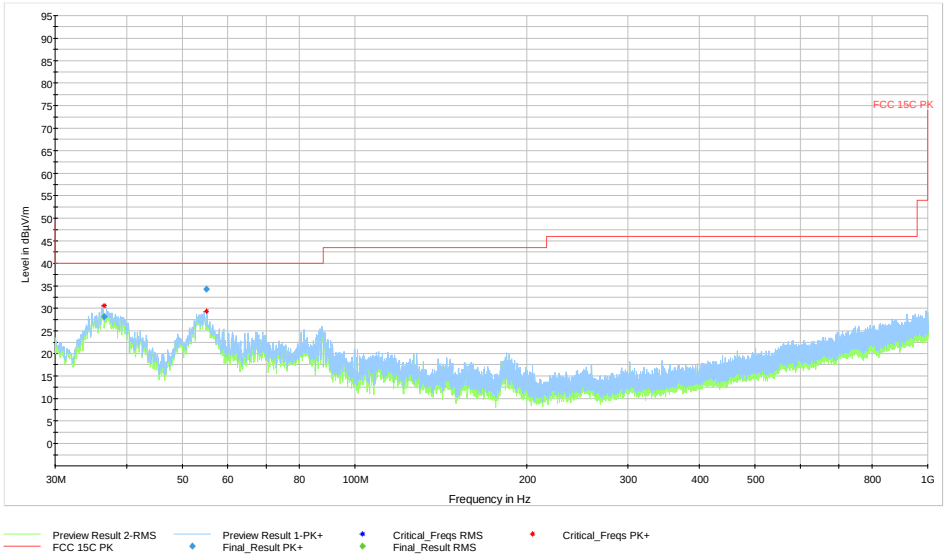
Modulation: 802.11a_2*Tx	Channel 149	94% Duty Cycle

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
36.56	28.09	---	40.00	11.91	100.0	100.0	117.0	V
55.00	34.22	---	40.00	5.78	100.0	100.0	108.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
36.56	15.0	-13	12:20:53 PM - 3/22/2019
55.00	0.0	-21	12:23:26 PM - 3/22/2019



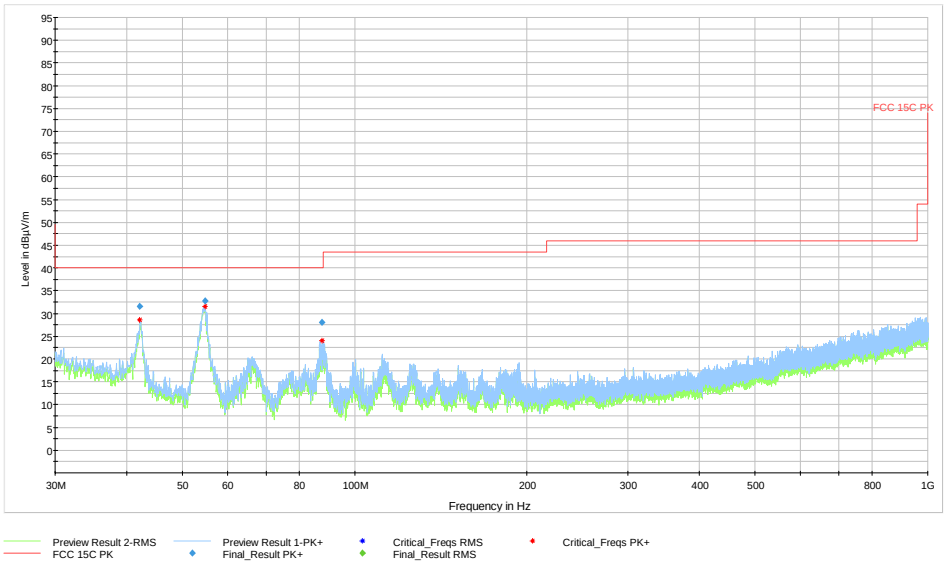
Plot #8 Radiated Emissions: 30 MHz – 1GHz		
Modulation: 802.11a_2*Tx	**Channel 157**	**94% Duty Cycle**

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
42.13	31.57	---	40.00	8.43	100.0	100.0	108.0	V
54.77	32.73	---	40.00	7.27	100.0	100.0	151.0	V
87.70	28.10	---	40.00	11.90	100.0	100.0	237.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
42.13	8.0	-15	12:34:40 PM - 3/22/2019
54.77	13.0	-21	12:37:25 PM - 3/22/2019
87.70	191.0	-22	12:40:16 PM - 3/22/2019



Plot #9 Radiated Emissions: 30 MHz – 1GHz

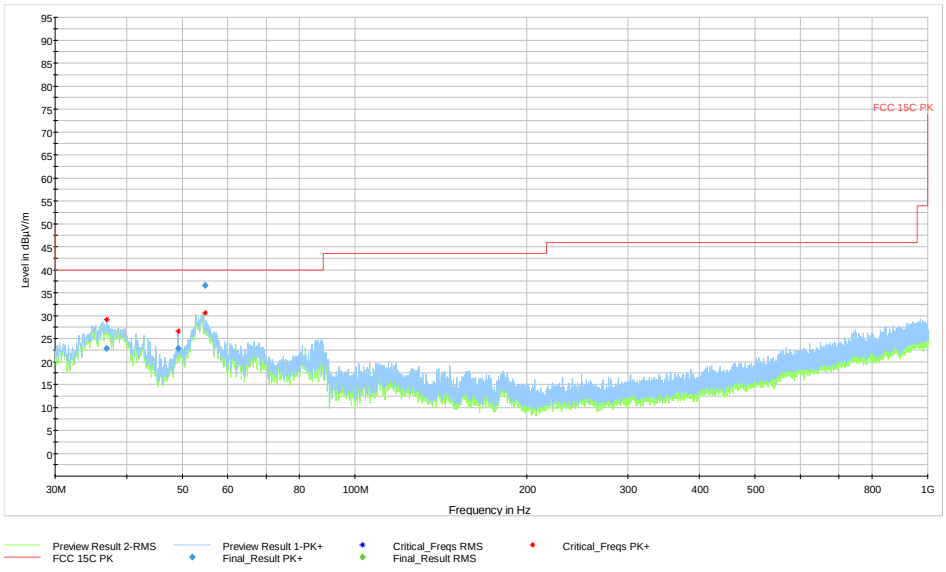
Modulation: 802.11a_2*Tx	Channel 165	94% Duty Cycle

Final_Result

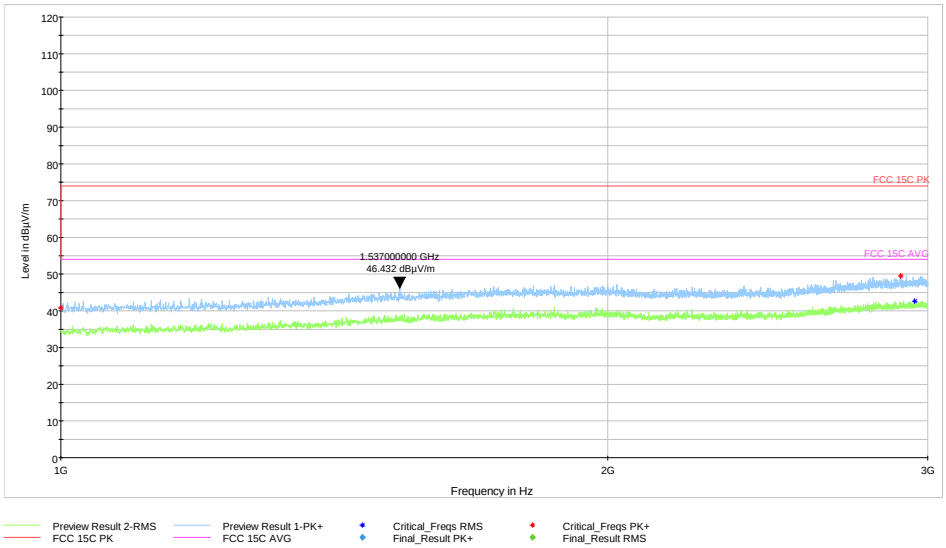
Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
36.86	22.92	---	40.00	17.08	100.0	100.0	100.0	V
49.15	22.81	---	40.00	17.19	100.0	100.0	178.0	V
54.80	36.60	---	40.00	3.40	100.0	100.0	152.0	V

(continuation of the "Final_Result" table from column 14 ...)

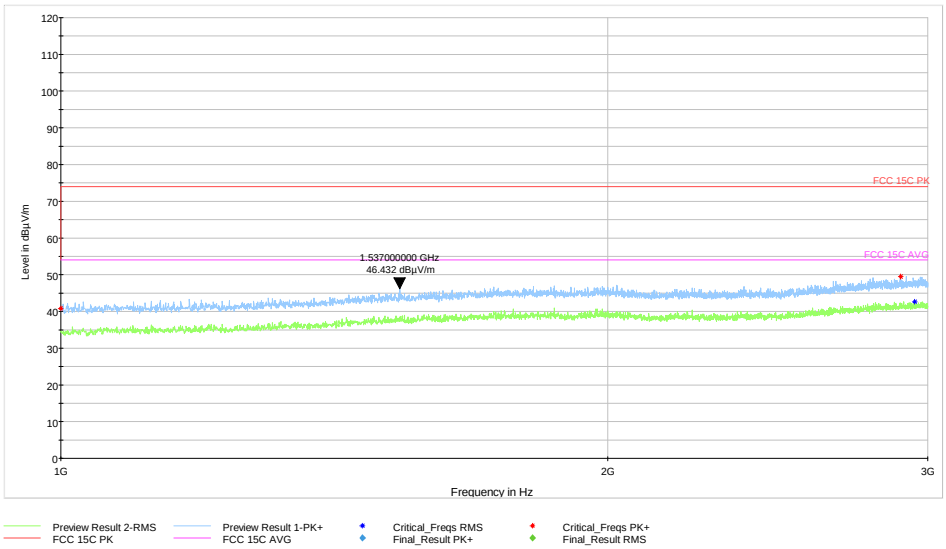
Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
36.86	37.0	-13	12:51:47 PM - 3/22/2019
49.15	90.0	-19	12:53:58 PM - 3/22/2019
54.80	20.0	-21	12:56:40 PM - 3/22/2019



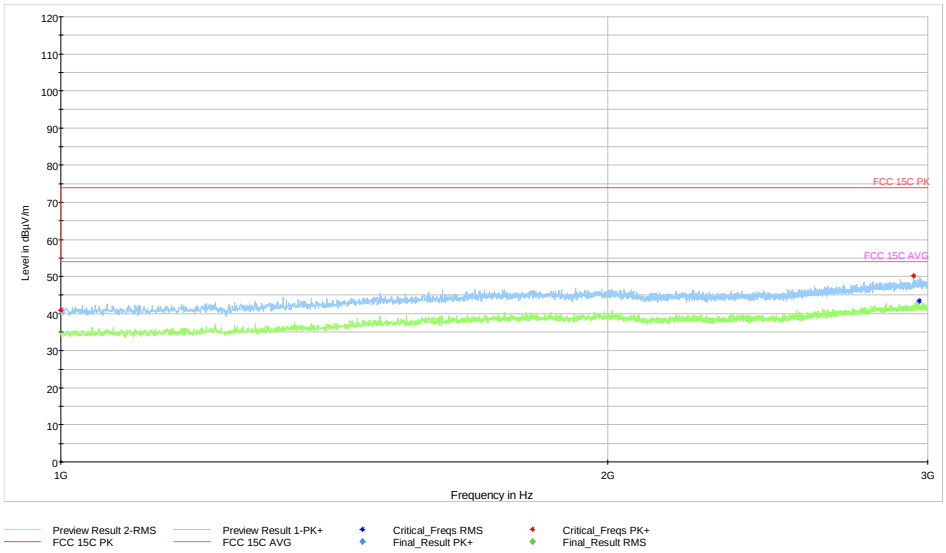
Plot #10 Radiated Emissions: 1-3 GHz		
Modulation: 802.11a_2*Tx	**Channel: 36**	**94% Duty Cycle**



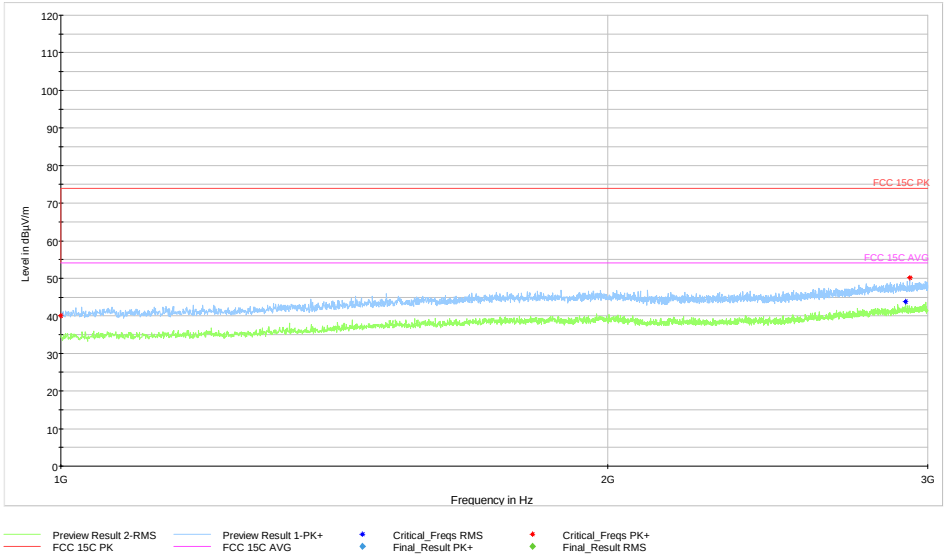
Plot #11 Radiated Emissions: 1-3 GHz		
Modulation: 802.11a_2*Tx	**Channel: 48**	**94% Duty Cycle**



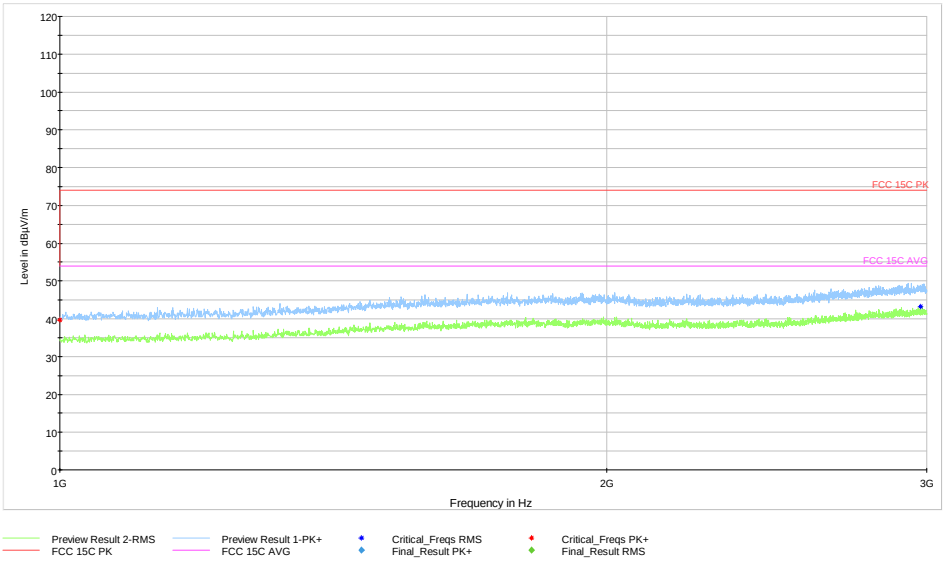
Plot #12 Radiated Emissions: 1-3 GHz		
Modulation: 802.11a_2*Tx	**Channel: 64**	**94% Duty Cycle**



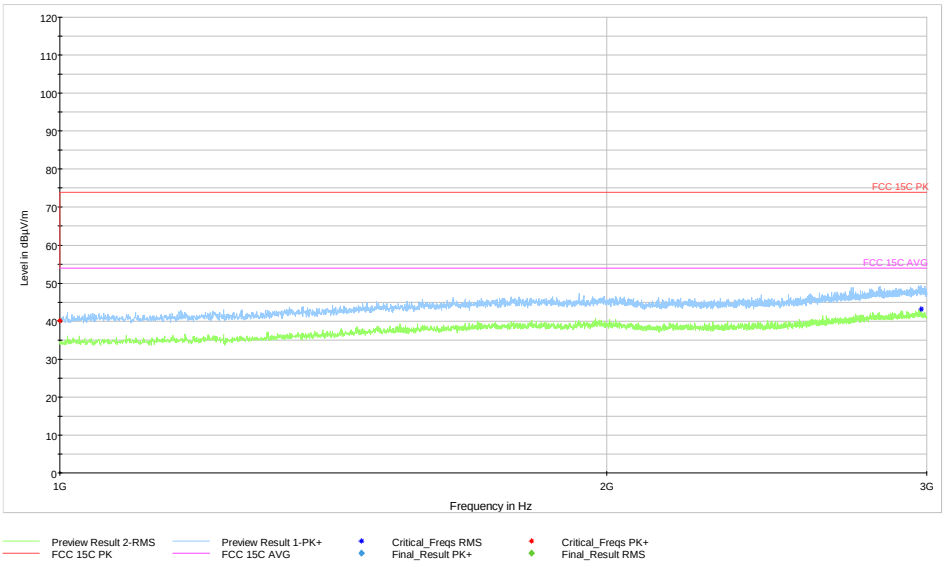
Plot #13 Radiated Emissions: 1-3 GHz		
Modulation: 802.11a_2*Tx	**Channel: 100**	**94% Duty Cycle**



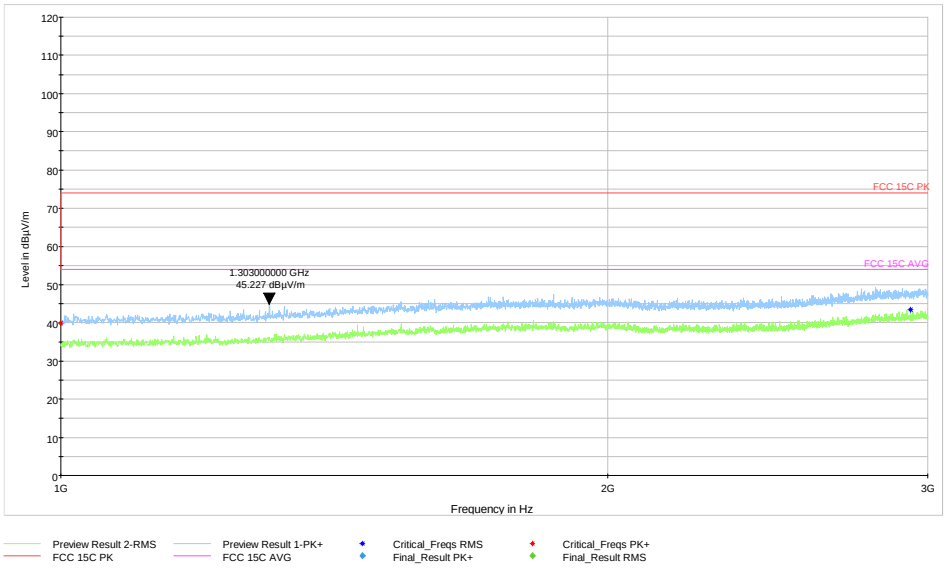
Plot #14 Radiated Emissions: 1-3 GHz		
Modulation: 802.11a_2*Tx	**Channel: 116**	**94% Duty Cycle**



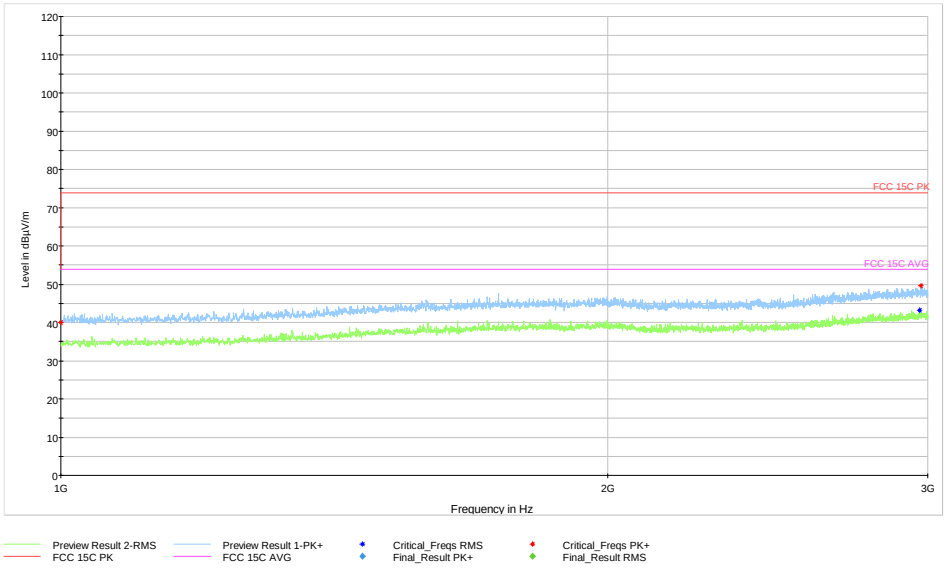
Plot #15 Radiated Emissions: 1-3 GHz		
Modulation: 802.11a_2*Tx	**Channel: 140**	**94% Duty Cycle**



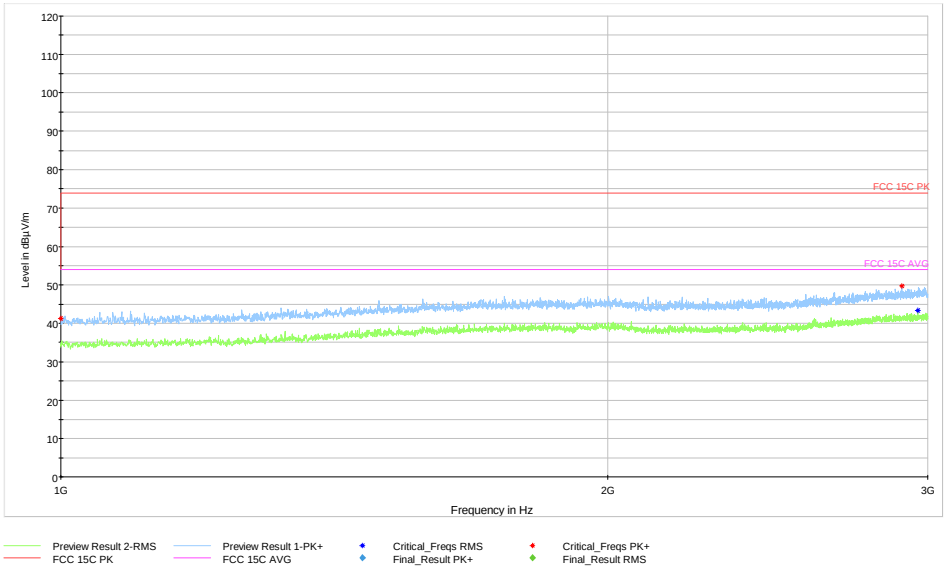
Plot #16 Radiated Emissions: 1-3 GHz		
Modulation: 802.11a_2*Tx	**Channel: 149**	**94% Duty Cycle**



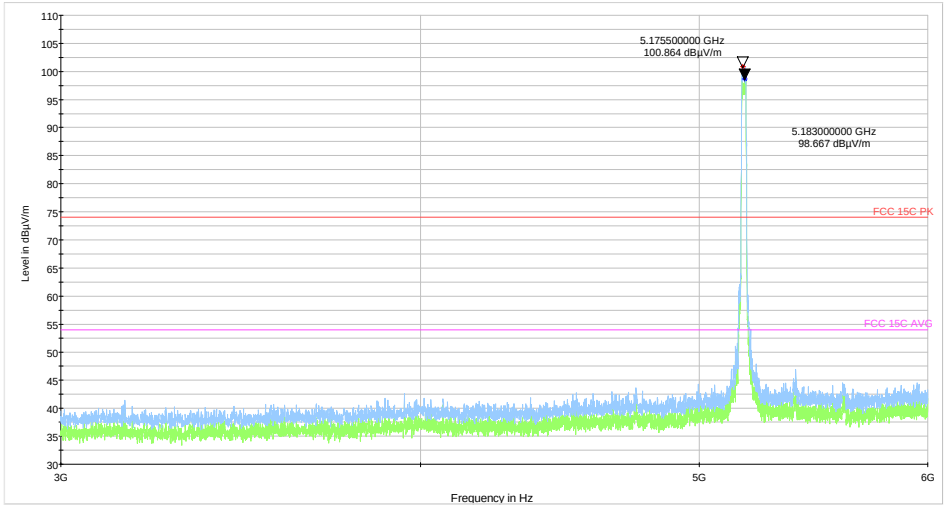
Plot #17 Radiated Emissions: 1-3 GHz		
Modulation: 802.11a_2*Tx	**Channel: 157**	**94% Duty Cycle**



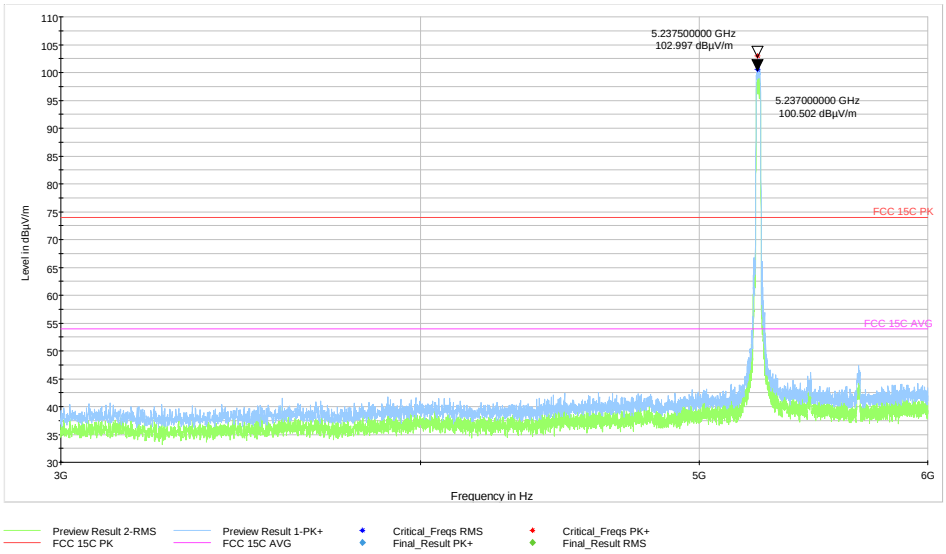
Plot #18 Radiated Emissions: 1-3 GHz		
Modulation: 802.11a_2*Tx	**Channel: 165**	**94% Duty Cycle**



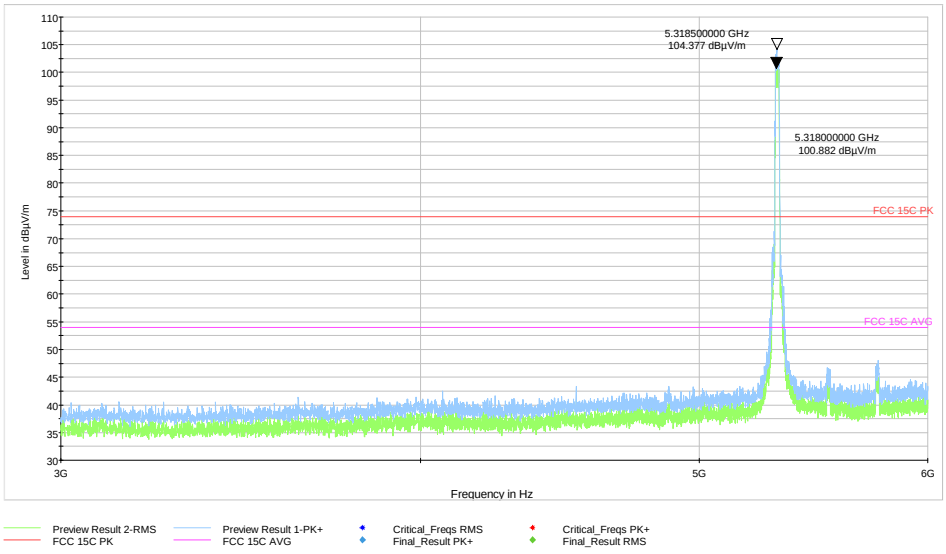
Plot #19 Radiated Emissions: 3-6 GHz		
Modulation: 802.11a_2*Tx	**Channel: 36**	**94% Duty Cycle**



Plot #20 Radiated Emissions: 3-6 GHz		
Modulation: 802.11a_2*Tx	**Channel: 48**	**94% Duty Cycle**



Plot #21 Radiated Emissions: 3-6 GHz		
Modulation: 802.11a_2*Tx	**Channel: 64**	**94% Duty Cycle**



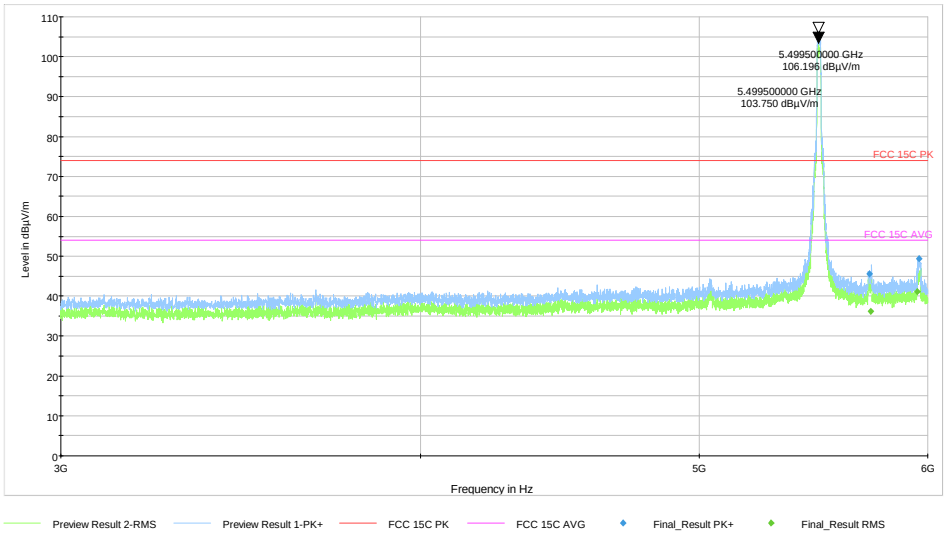
Plot #22 Radiated Emissions: 3-6 GHz		
Modulation: 802.11a_2*Tx	Channel: 100	94% Duty Cycle

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
5728.02	45.61	---	73.99	28.37	100.0	1000.0	188.0	V
5731.92	---	36.21	53.98	17.77	100.0	1000.0	117.0	V
5951.71	---	41.06	53.98	12.92	100.0	1000.0	255.0	V
5958.96	49.44	---	73.99	24.55	100.0	1000.0	108.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBµV)	Comment
5728.02	48.0	-4	8	0	-12	50	1:28:58 PM - 3/21/2019
5731.92	47.0	-4	8	0	-12	41	1:35:38 PM - 3/21/2019
5951.71	134.0	-4	8	0	-12	45	1:38:35 PM - 3/21/2019
5958.96	226.0	-4	8	0	-12	53	1:32:17 PM - 3/21/2019



Plot #23 Radiated Emissions: 3-6 GHz

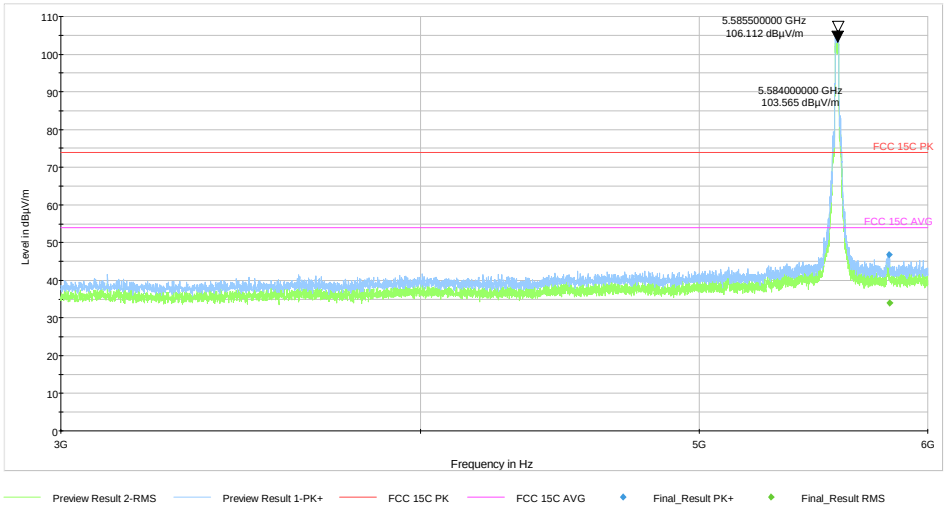
Modulation: 802.11a_2*Tx	Channel: 116	94% Duty Cycle

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
5818.80	46.85	---	73.99	27.14	100.0	1000.0	145.0	V
5819.53	---	33.88	53.98	20.10	100.0	1000.0	243.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBµV)	Comment
5818.80	200.0	-4	8	0	-12	51	1:16:14 PM - 3/21/2019
5819.53	240.0	-4	8	0	-12	38	1:18:54 PM - 3/21/2019



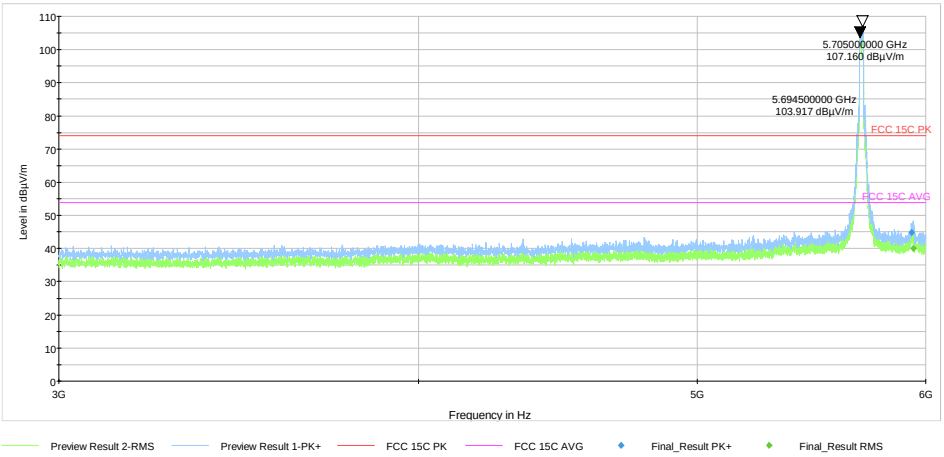
Plot #24 Radiated Emissions: 3-6 GHz		
Modulation: 802.11a_2*Tx	**Channel: 140**	**94% Duty Cycle**

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
5932.07	44.82	---	73.99	29.16	100.0	1000.0	236.0	V
5940.75	---	40.00	53.98	13.97	100.0	1000.0	236.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBµV)	Comment
5932.07	20.0	-4	8	0	-12	48	1:03:38 PM - 3/21/2019
5940.75	21.0	-4	8	0	-12	44	1:06:26 PM - 3/21/2019



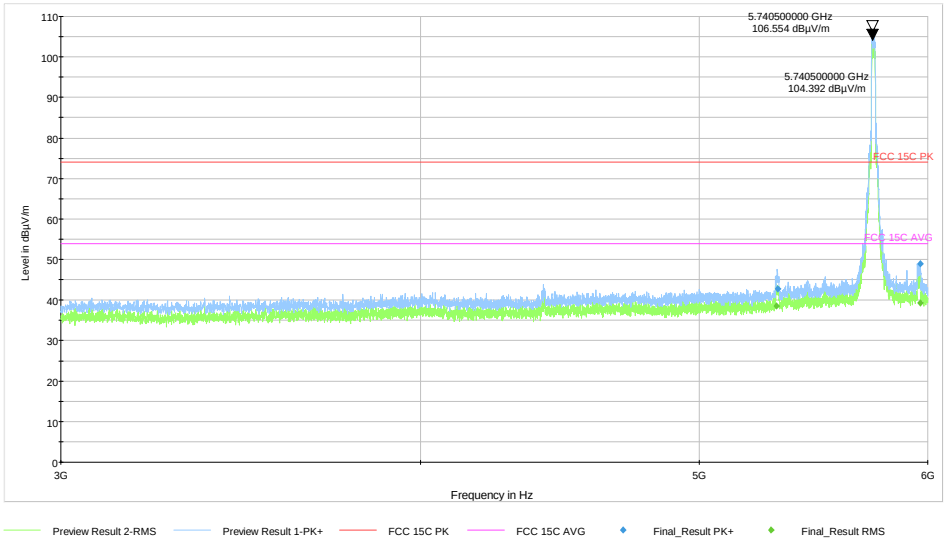
Plot #25 Radiated Emissions: 3-6 GHz		
Modulation: 802.11a_2*Tx	**Channel: 149**	**94% Duty Cycle**

Final_Result

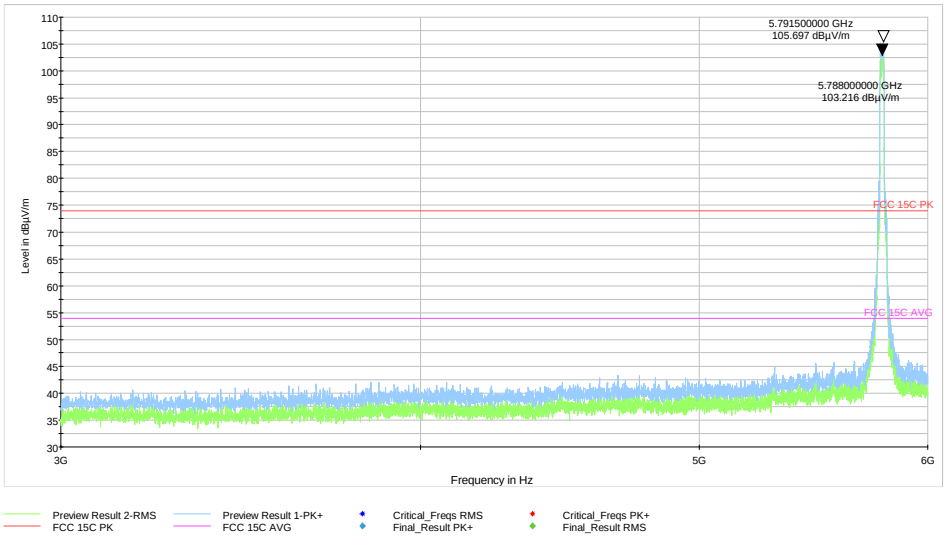
Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
5316.263	---	38.54	53.98	15.44	100.0	1000.0	237.0	H
5321.220	42.79	---	73.99	31.20	100.0	1000.0	108.0	V
5964.540	48.98	---	73.99	25.00	100.0	1000.0	270.0	V
5964.920	---	39.25	53.98	14.73	100.0	1000.0	237.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBµV)	Comment
5316.263	-1.0	-5	8	0	-12	43	12:49:51 PM - 3/21/2019
5321.220	226.0	-5	8	0	-12	48	12:44:06 PM - 3/21/2019
5964.540	10.0	-4	8	0	-12	53	12:47:02 PM - 3/21/2019
5964.920	10.0	-4	8	0	-12	43	12:52:46 PM - 3/21/2019



Plot #26 Radiated Emissions: 3-6 GHz		
Modulation: 802.11a_2*Tx	**Channel: 157**	**94% Duty Cycle**



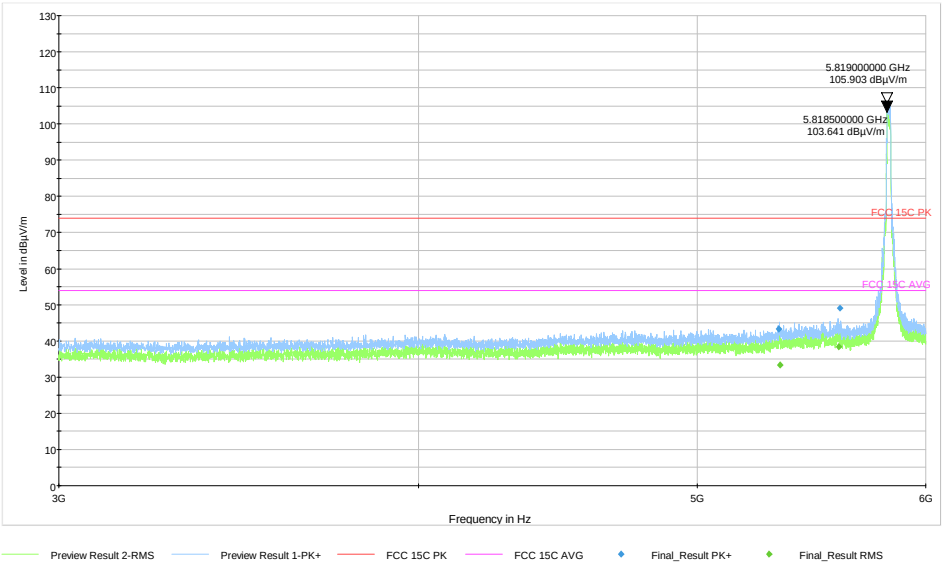
Plot #27 Radiated Emissions: 3-6 GHz		
Modulation: 802.11a_2*Tx	**Channel: 165**	**94% Duty Cycle**

Final_Result

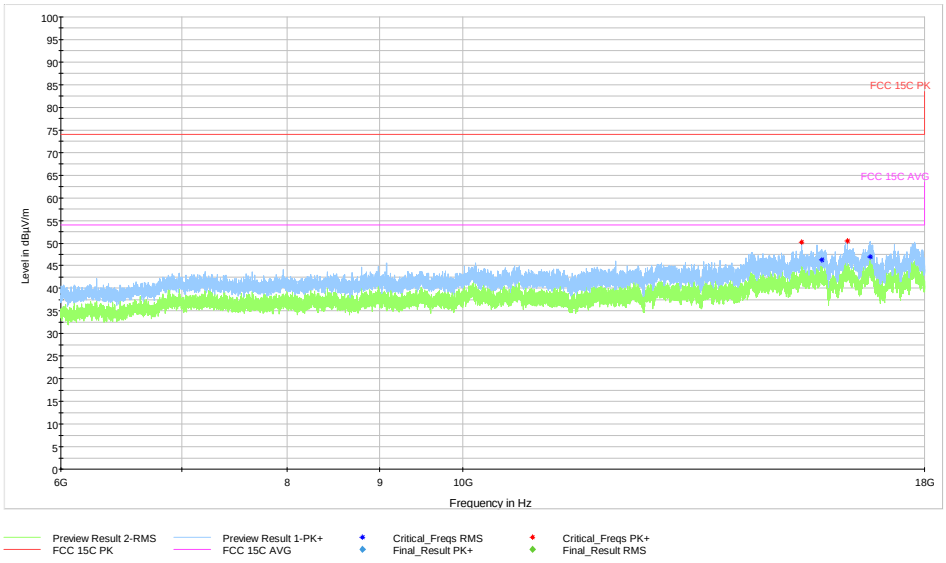
Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
5336.453	43.30	---	73.99	30.69	100.0	1000.0	100.0	H
5340.063	---	33.35	53.98	20.63	100.0	1000.0	145.0	V
5596.397	---	38.48	53.98	15.50	100.0	1000.0	279.0	V
5603.797	49.09	---	73.99	24.90	100.0	1000.0	280.0	V

(continuation of the "Final_Result" table from column 14 ...)

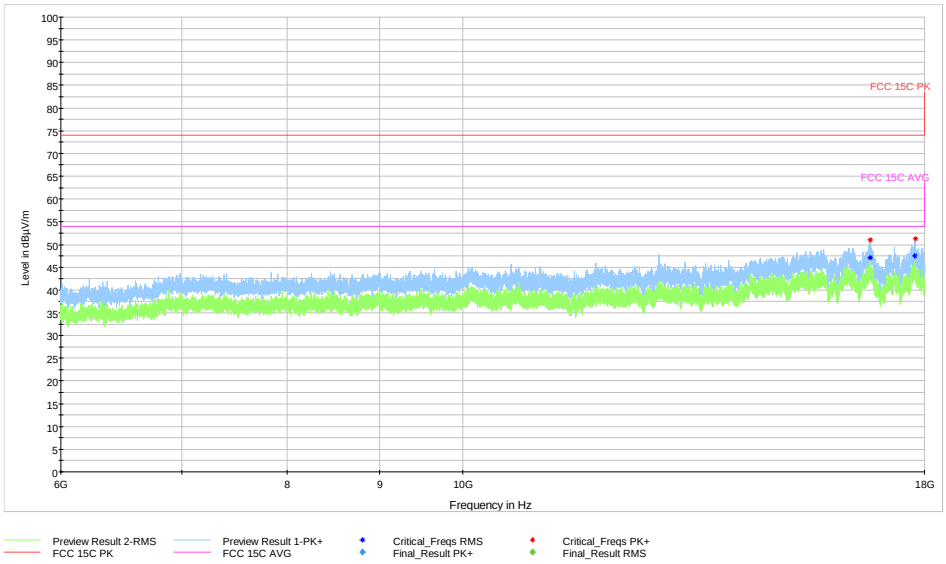
Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBµV)	Comment
5336.453	19.0	-5	8	0	-12	48	12:18:19 PM - 3/21/2019
5340.063	13.0	-5	8	0	-12	38	12:24:14 PM - 3/21/2019
5596.397	15.0	-4	8	0	-12	43	12:26:54 PM - 3/21/2019
5603.797	18.0	-4	8	0	-12	53	12:21:09 PM - 3/21/2019



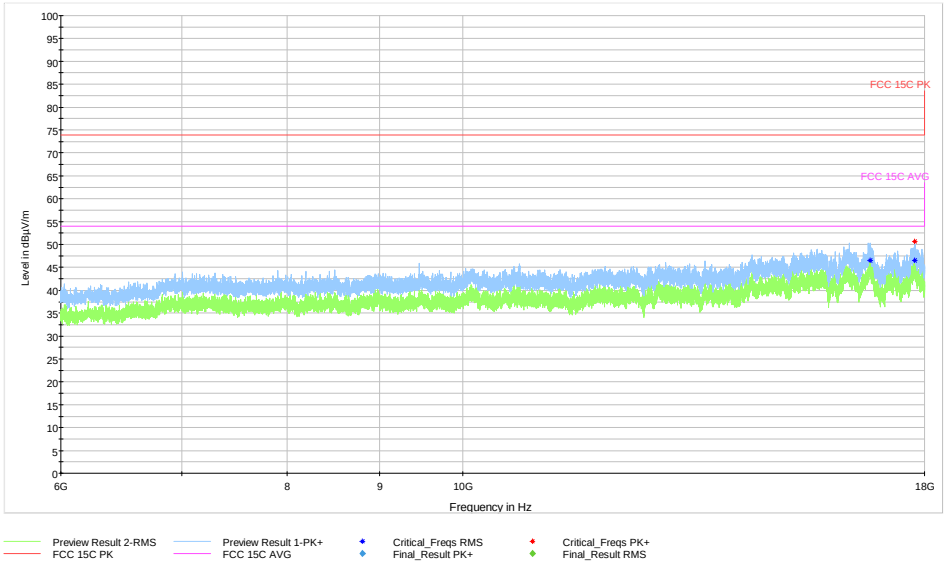
Plot #28 Radiated Emissions: 6-18 GHz		
Modulation: 802.11a_2*Tx	**Channel: 36**	**94% Duty Cycle**



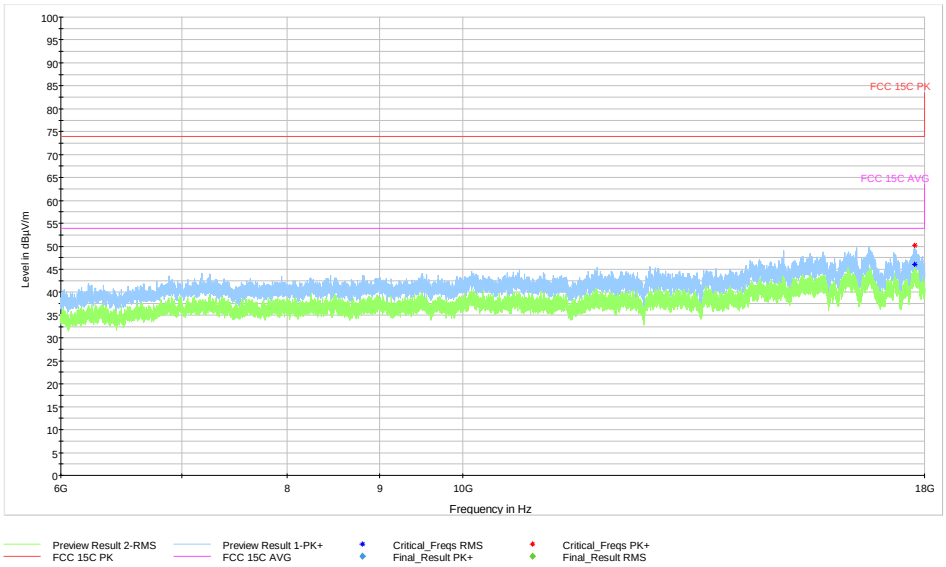
Plot #29 Radiated Emissions: 6-18 GHz		
Modulation: 802.11a_2*Tx	**Channel: 48**	**94% Duty Cycle**



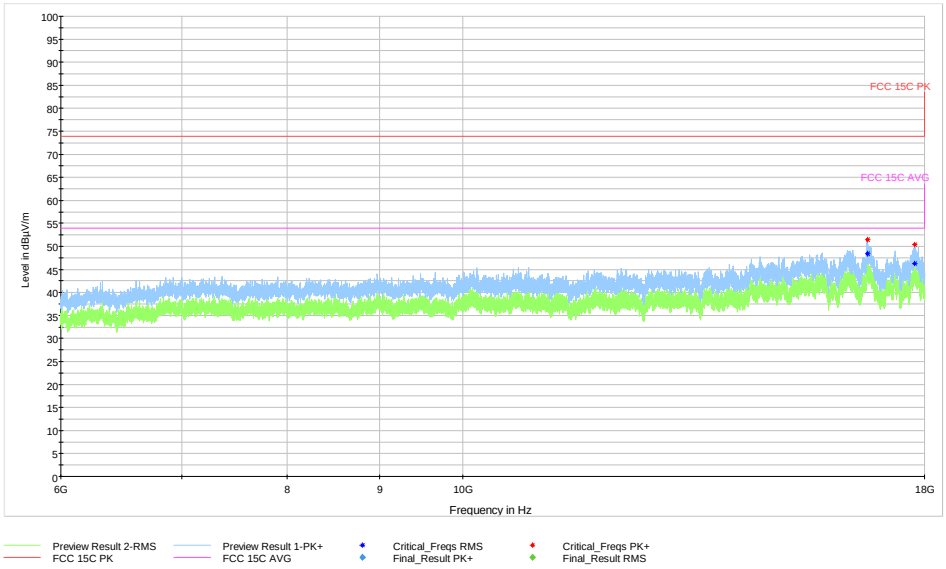
Plot #30 Radiated Emissions: 6-18 GHz		
Modulation: 802.11a_2*Tx	**Channel: 64**	**94% Duty Cycle**



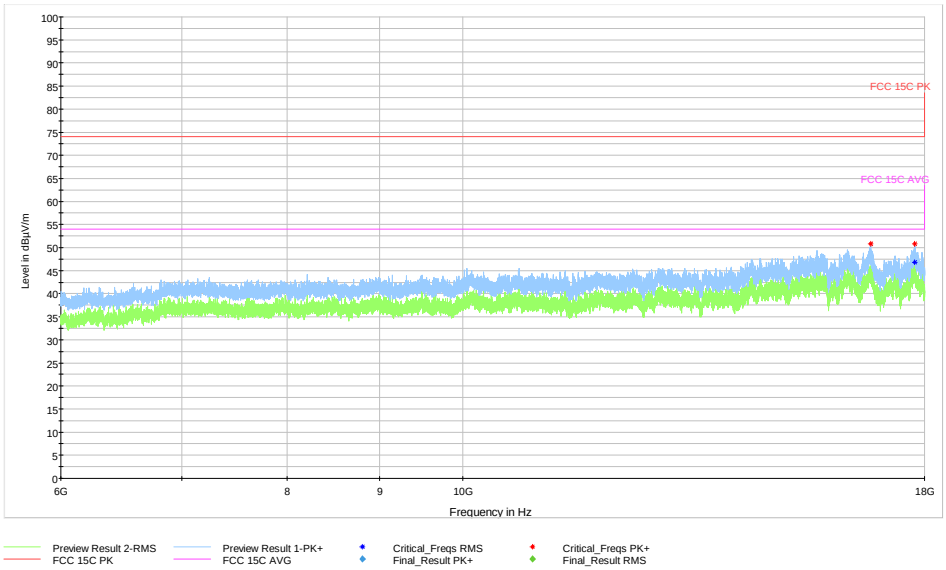
Plot #31 Radiated Emissions: 6-18 GHz		
Modulation: 802.11a_2*Tx	**Channel: 100**	**94% Duty Cycle**



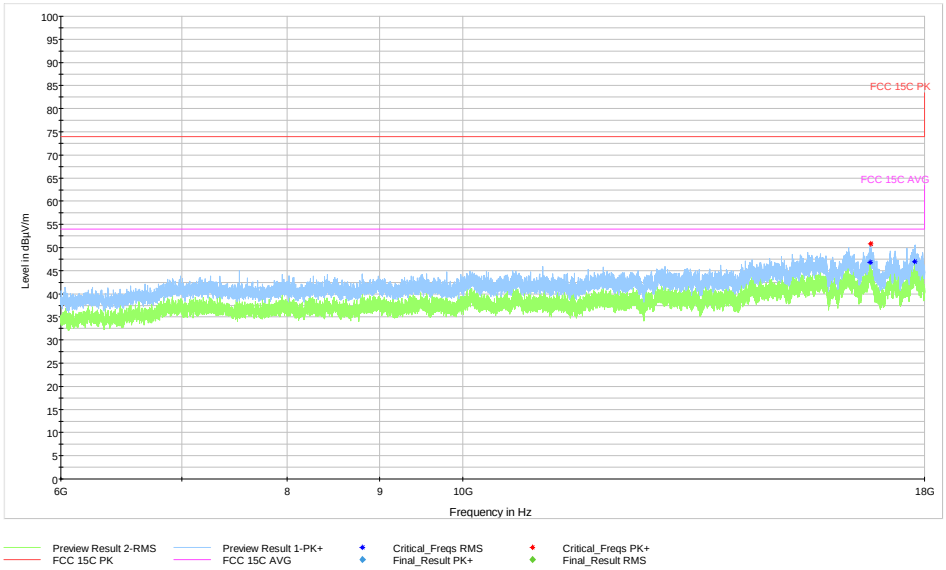
Plot #32 Radiated Emissions: 6-18 GHz		
Modulation: 802.11a_2*Tx	**Channel: 116**	**94% Duty Cycle**



Plot #33 Radiated Emissions: 6-18 GHz		
Modulation: 802.11a_2*Tx	**Channel: 140**	**94% Duty Cycle**



Plot #34 Radiated Emissions: 6-18 GHz		
Modulation: 802.11a_2*Tx	**Channel: 149**	**94% Duty Cycle**



Plot #35 Radiated Emissions: 6-18 GHz

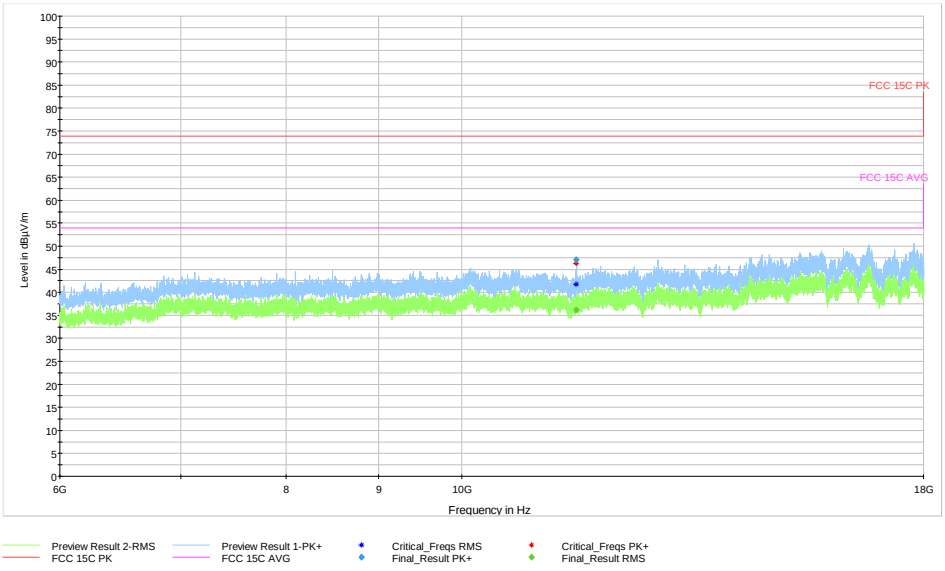
Modulation: 802.11a_2*Tx	Channel: 157	94% Duty Cycle

Final_Result

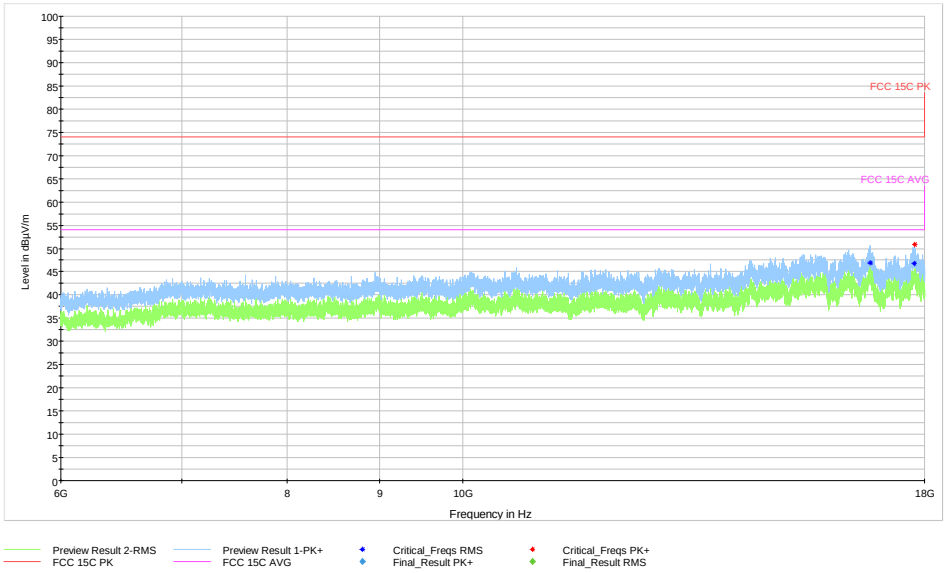
Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
11569.08	---	36.17	53.98	17.81	100.0	1000.0	138.0	V
11573.49	47.09	---	73.98	26.89	100.0	1000.0	138.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
11569.08	1.0	-24	2:47:52 PM - 3/21/2019
11573.49	-1.0	-23	2:44:21 PM - 3/21/2019



Plot #36 Radiated Emissions: 6-18 GHz		
Modulation: 802.11a_2*Tx	**Channel: 165**	**94% Duty Cycle**



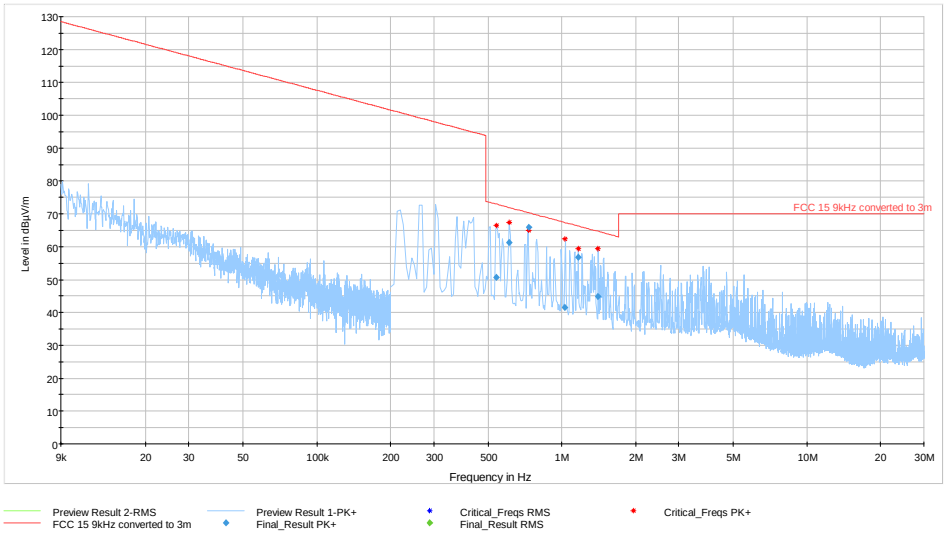
Plot #37 Radiated Emissions: 9 KHz – 30 MHz		
Modulation: 802.11a_2*Tx	**Channel: 48**	**94% Duty Cycle**

Final_Result

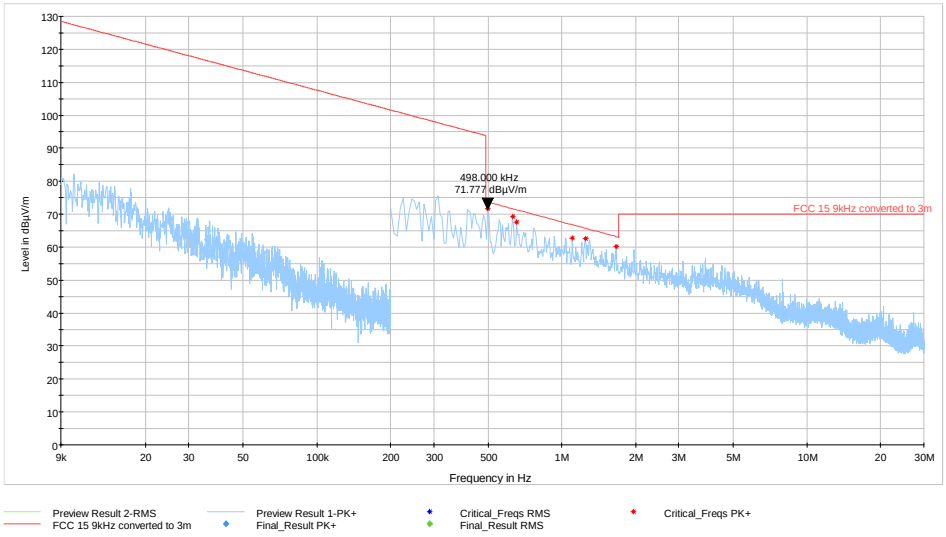
Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
0.54	50.71	---	72.97	22.26	500.0	9.0	116.0	H
0.61	61.18	---	71.92	10.74	500.0	9.0	107.0	V
0.73	65.87	---	70.33	4.46	500.0	9.0	134.0	H
1.03	41.53	---	67.37	25.83	500.0	9.0	159.0	V
1.16	56.83	---	66.32	9.49	500.0	9.0	141.0	H
1.40	44.83	---	64.69	19.85	500.0	9.0	153.0	V

(continuation of the "Final_Result" table from column 14 ...)

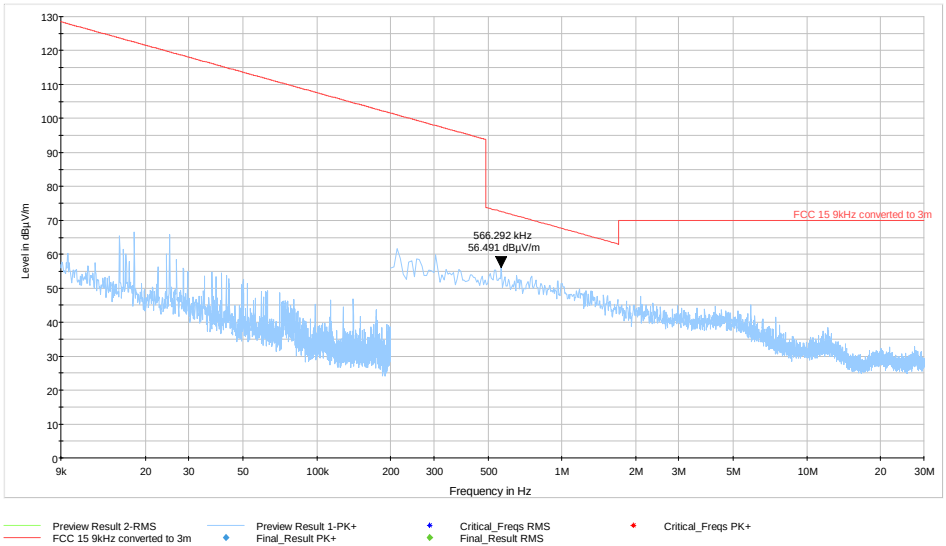
Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
0.54	122.0	19	6:36:36 PM - 3/21/2019
0.61	237.0	19	6:39:25 PM - 3/21/2019
0.73	113.0	19	6:31:49 PM - 3/21/2019
1.03	310.0	19	6:41:35 PM - 3/21/2019
1.16	140.0	19	6:34:06 PM - 3/21/2019
1.40	340.0	19	6:43:46 PM - 3/21/2019



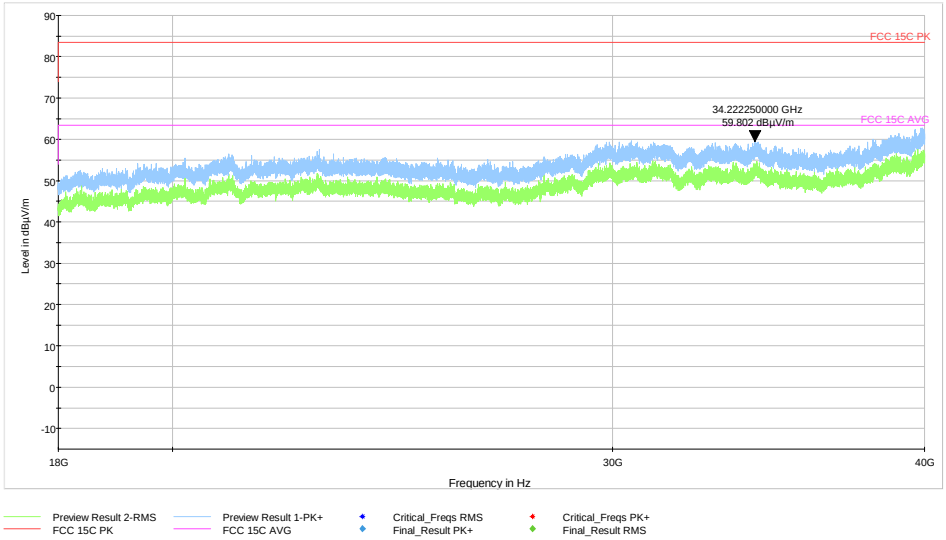
Plot #38 Radiated Emissions: 9 KHz – 30 MHz		
Modulation: 802.11a_2*Tx	**Channel: 116**	**94% Duty Cycle**



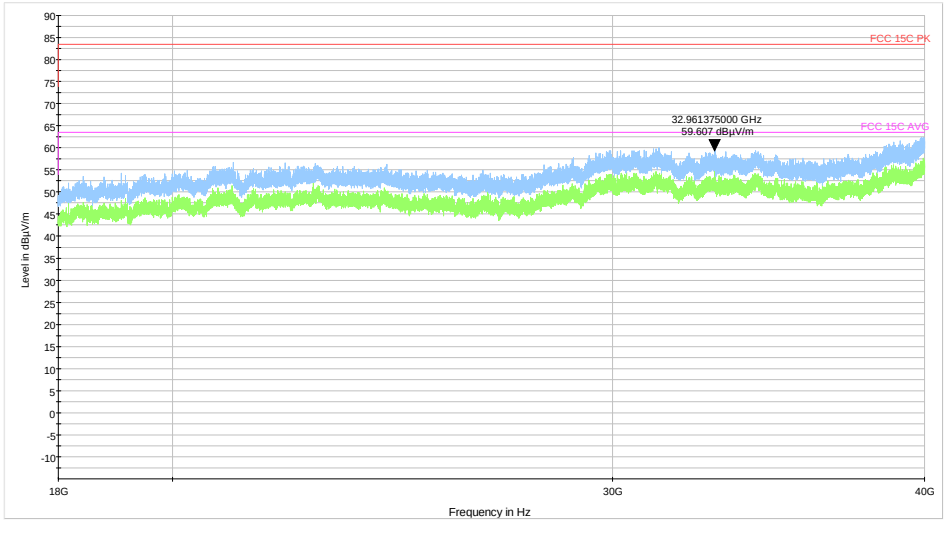
Plot #39 Radiated Emissions: 9 KHz – 30 MHz		
Modulation: 802.11a_2*Tx	**Channel: 157**	**94% Duty Cycle**



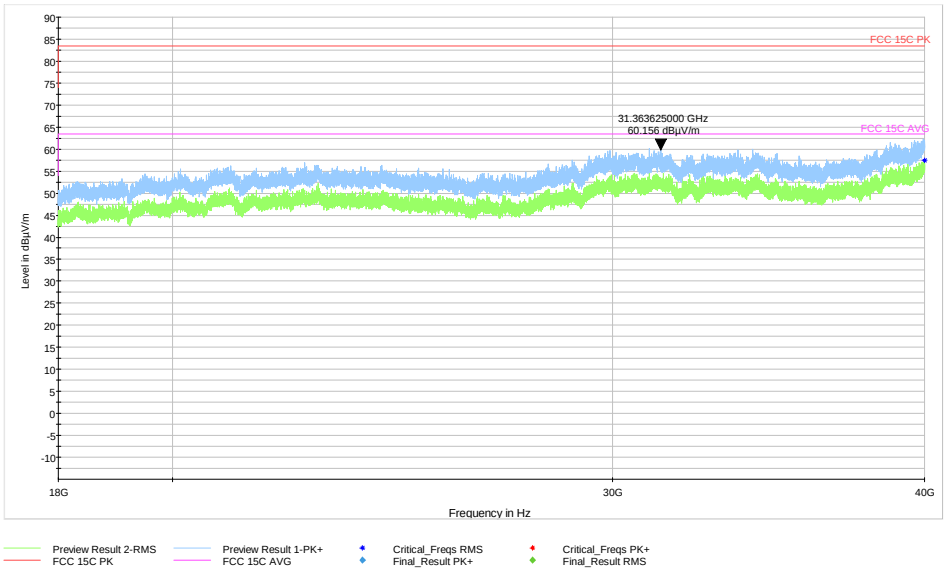
Plot #40 Radiated Emissions: 18-40 GHz		
Modulation: 802.11a_2*Tx	**Channel: 48**	**94% Duty Cycle**



Plot #41 Radiated Emissions: 18-40 GHz		
Modulation: 802.11a_2*Tx	**Channel: 116**	**94% Duty Cycle**



Plot #42 Radiated Emissions: 18-40 GHz		
Modulation: 802.11a_2*Tx	**Channel: 157**	**94% Duty Cycle**



8.8 AC Power Line Conducted Emissions

8.8.1 Measurement according to ANSI C63.10 (2013)

Analyzer Settings:

- RBW = 9 KHz (CISPR Bandwidth)
- Detector: Peak / Average for Pre-scan
- Quasi-Peak/Average for Final Measurements

8.8.2 Limits: §15.207 & RSS-Gen 8.8

FCC §15.207(a) & RSS-Gen 8.8

- Except as shown in paragraphs (b) and (c) of this section of the CFR, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table (1), as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

8.8.3 Test conditions and setup:

Ambient Temperature ©	EUT Set-Up #	EUT operating mode	Power line (L1, L2, L3, N)	Power Input
22	2	802.11a_2x Tx	Line & Neutral	110V / 60Hz

8.8.4 Measurement Result:

Plot #	Port	EUT Set-Up #:	EUT operating mode	Scan Frequency	Limit	Result
1	AC Mains	2	802.11a_2x Tx, channel 48	150 kHz – 30 MHz	See section 8.8.2	Pass
2	AC Mains	2	802.11a_2x Tx, channel 116	150 kHz – 30 MHz	See section 8.8.2	Pass
3	AC Mains	2	802.11a_2x Tx, channel 157	150 kHz – 30 MHz	See section 8.8.2	Pass

8.8.5 Measurement Plots:

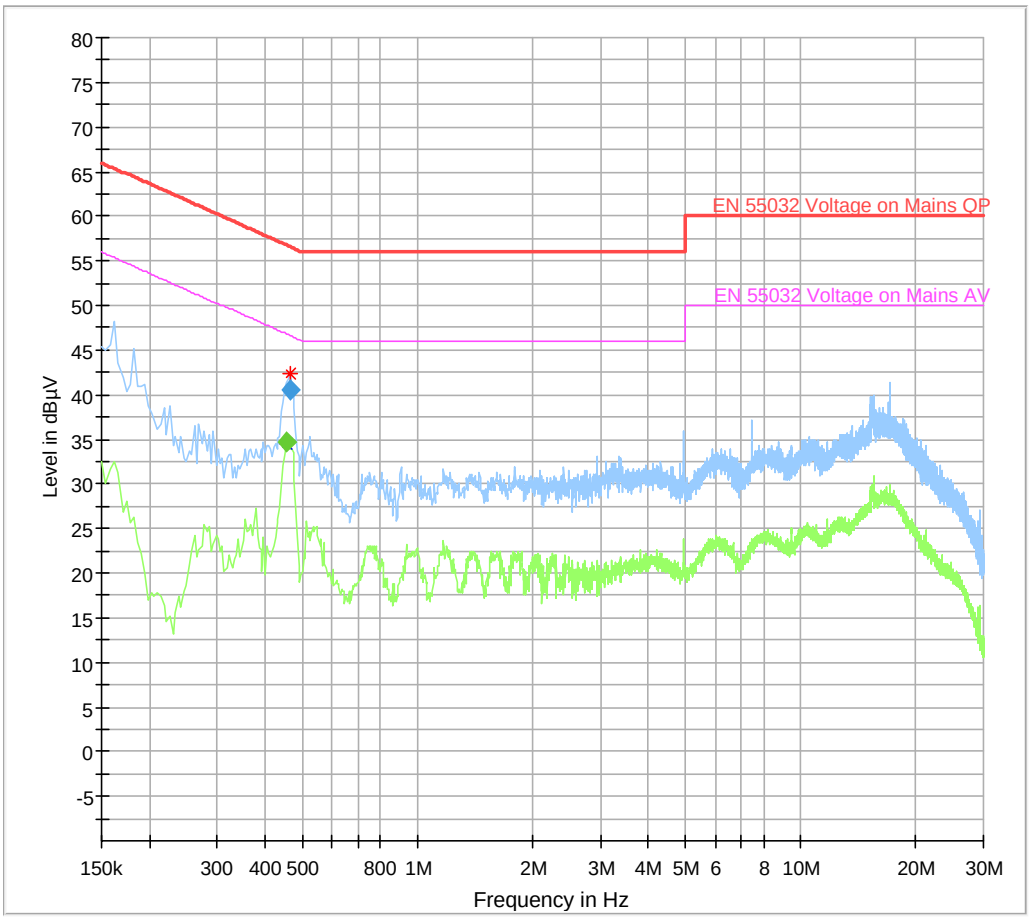
Plot #1

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.454000	---	34.76	46.80	12.04	500.0	9.000	N	GND	10.3
0.466000	40.48	---	56.59	16.10	500.0	9.000	N	GND	10.2

(continuation of the "Final_Result" table from column 15 ...)

Frequency (MHz)	Comment
0.454000	7:04:16 PM - 3/27/2019
0.466000	7:04:11 PM - 3/27/2019



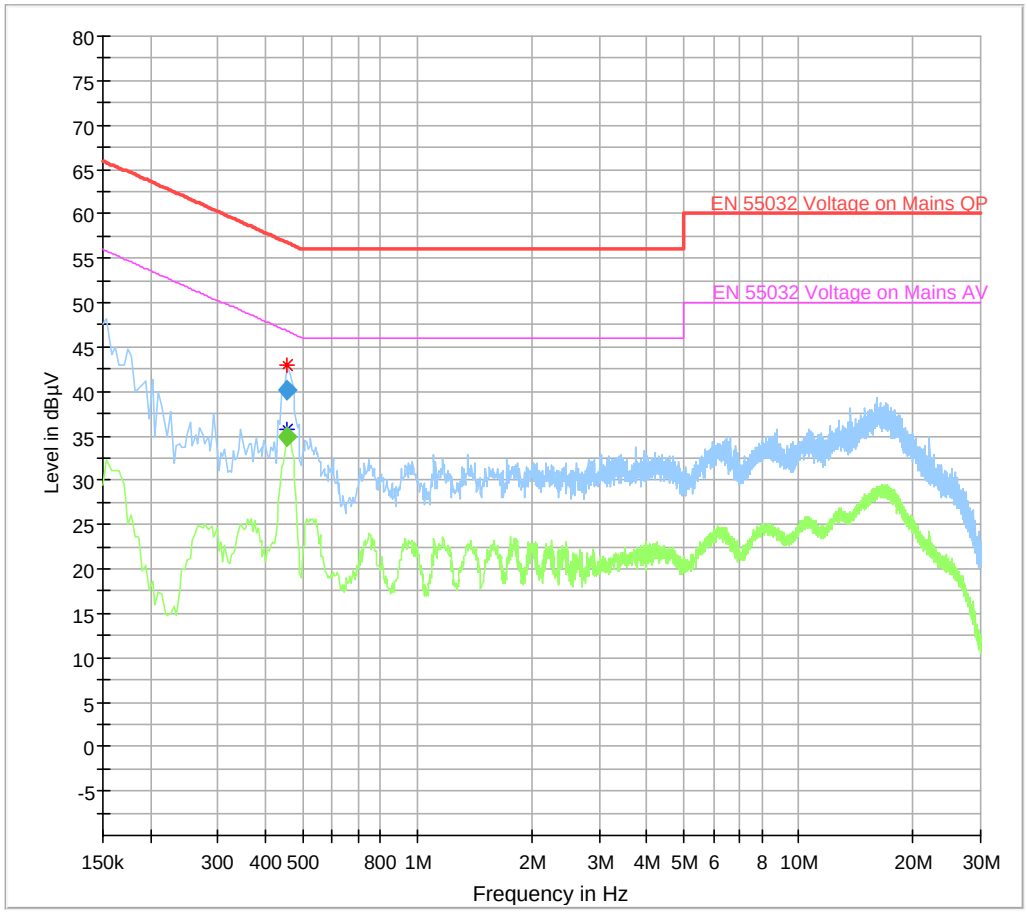
Plot #2

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.458000	---	34.96	46.73	11.77	500.0	9.000	N	GND	10.3
0.458000	40.09	---	56.73	16.64	500.0	9.000	N	GND	10.3

(continuation of the "Final_Result" table from column 15 ...)

Frequency (MHz)	Comment
0.458000	7:12:57 PM - 3/27/2019
0.458000	7:12:53 PM - 3/27/2019



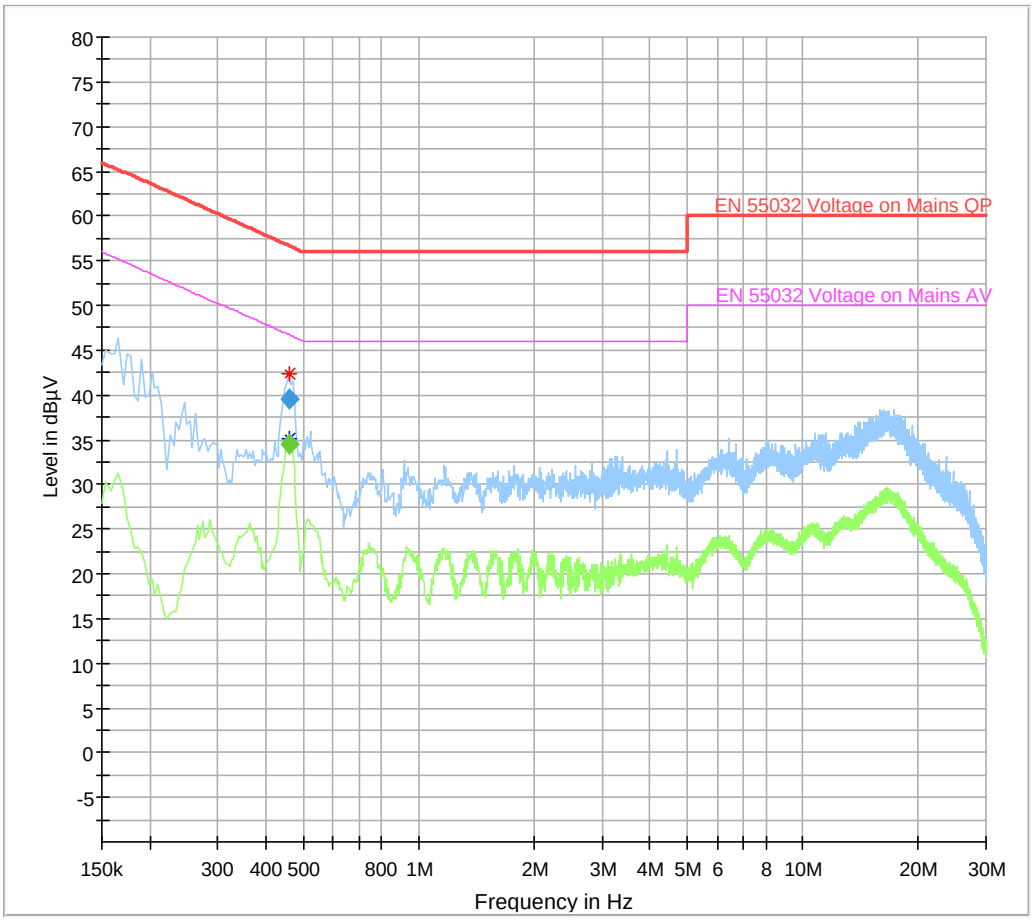
Plot #3

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.462000	---	34.53	46.66	12.13	500.0	9.000	N	GND	10.2
0.462000	39.60	---	56.66	17.05	500.0	9.000	N	GND	10.2

(continuation of the "Final_Result" table from column 15 ...)

Frequency (MHz)	Comment
0.462000	7:21:11 PM - 3/27/2019
0.462000	7:21:07 PM - 3/27/2019



Preview Result 2-AVG
Critical_Freqs AVG
EN 55032 Voltage on Mains QP
Final_Result QPK
Preview Result 1-PK+
Critical_Freqs PK+
EN 55032 Voltage on Mains AV
Final_Result CAV

9 Test setup photos

Setup photos are included in supporting file name: "EMC_JUNIP-026-19001 _15.247_Setup_Photos.pdf"

10 Test Equipment and Ancillaries Used For Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
Biconlog Antenna	EMCO	3142E	166067	3 years	6/28/2017
Loop Antenna	ETS Lindgren	6507	161344	3 years	10/26/2017
Horn Antenna	EMCO	3115	35114	3 years	7/31/2017
Horn Antenna	ETS Lindgren	3117 PA	169547	3 years	8/8/2017
Compact Digital Barometer	Control Company	35519-055	91119547	2 Years	6/20/2017
Spectrum Analyzer	R&S	FSU26	200065	3 years	7/3/2017
Spectrum Analyzer	R&S	FSV40	101022	3 years	7/5/2017
Thermometer Humidity	Dickson	TM320	5280063	2 Year	11/2/2017

Note: Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels. Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

11 Revision History

Date	Report Name	Changes to report	Report prepared by
2019/3/27	EMC_JUNIP-026-19001 _15.407_UNII	Initial version	Yuchan Lu