

## Appendix B – Test result for 5.25 GHz – 5.35 GHz band

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## TEST CONDITIONS

Power supply (V):

$$V_{\text{nominal}} = 3.3 \text{ Vdc}$$

Type of power supply = DC voltage from NGFC 30x30 test board.

Type of antenna = External attachable PIFA antenna.

Declared Gain for antenna = 3.7 dBi

### Operating frequencies in the sub-band 5.25-5.35 GHz.

-For IEEE 802.11a, the equipment uses channels 52, 56, 60, 64.

-For IEEE 802.11n, there are two bandwidths:

For 20 MHz bandwidth the equipment uses channels 52, 56, 60, 64.

For 40 MHz bandwidth the equipment uses channels 54, 62.

-For IEEE 802.11ac, there are three bandwidths:

For 20 MHz bandwidth the equipment uses channels 52, 56, 60, 64.

For 40 MHz bandwidth the equipment uses channels 54, 62.

For 80 MHz bandwidth the equipment uses channel 58.

### TEST FREQUENCIES:

For WiFi a/n20/ac20:

Lowest channel (52): 5260 MHz

Middle channel (60): 5300 MHz

Highest channel (64): 5320 MHz

For WiFi n40/ac40:

Lowest channel (54): 5270 MHz

Highest channel (62): 5310 MHz

For WiFi ac80:

Middle channel (58): 5290 MHz

The test set-up was made in accordance to the general provisions of ANSI C63.10: 2009 and FCC KDB 789033 D02 General UNII Test Procedures New Rules v01 dated 06/06/2014 and FCC KDB 662911 D01 Multiple Transmitter Output v02r01 dated 10/31/2013.

For radio testing purposes the card was installed in a test fixture. The test fixture is connected to a laptop computer and dc power supplied. The laptop computer was used to configure the EUT to continuously transmit at a specified output power with different modes and modulation schemes.

The data rates of 6Mb/s for 802.11a, HT0 (SISO) for 802.11n20/ac20 and n40/ac40, and VHT0 (SISO) for 802.11ac80 were selected based on preliminary testing that identified those rates corresponding to the worst cases for output power and spurious levels at the band edges.

The field strength at the band edges was evaluated for each mode and on each chain individually on the lowest and highest channels at the rated power for the channel under test. Where the power at the edge channels was lower than the power at the center channels additional measurements were made at the adjacent channels. Single transmission at each chain and simultaneous transmission at both chains modes were fully evaluated.

The PC was using the Intel test utility DRTU Version “DRTU 1.7.3-859”.

During transmitter test the EUT was being controlled by the Intel DRTU tool to operate in a continuous transmit mode on the test channels as required and in each of the different modulation modes.

The conducted RF output power at each chain was adjusted according to the client’s supplied Target values (see following table) using the Intel DRTU tool and measuring the power by using a calibrated average power meter. Measured values for adjustment were within -0.2 dB/+0.3 dB respect to the Target values.

**RF conducted output power target values**

	Mode	BW (MHz)	Channel / Freq (MHz).	SISO Chain A (dBm)	SISO Chain B (dBm)	MIMO at both ports A and B (dBm)
<b>5.25-5.35GHz Band</b>	802.11a	20	52 / 5260	16	16.5	n/a
			56 / 5280	16	16.5	n/a
			60 / 5300	16	16.5	n/a
			64 / 5320	13.5	13.5	n/a
	802.11n	20	52 / 5260	16	16.5	13.50
			56 / 5280	16	16.5	13.50
			60 / 5300	16	16.5	13.50
			64 / 5320	13.5	13.5	11.50
	802.11n*	40	54 / 5270	16.5	16.5	16.50
			62 / 5310	13.5	13.5	11.50
	802.11ac	80	58 / 5290	13.5	13.5	11.50

CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and it is connected to the spectrum analyzer using low loss RF cables with sma type connectors. The reading in the spectrum analyzer is corrected taking into account the cable loss.

RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 1m for the frequency range 1 GHz-40 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40 GHz horn antenna).

For radiated emissions in the range 1 GHz-40 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive (wooden) platform one meter above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360°.

Measurements were made in both horizontal and vertical planes of polarization.

### 99 % and 26 dB Bandwidth

#### RESULTS

##### 1. 802.11a mode (see next plots).

###### CHAIN A

	Lowest frequency 5260 MHz	Middle frequency 5300 MHz	Highest frequency 5320 MHz
99% bandwidth (MHz)	17.58	17.62	17.42
26 dB bandwidth (MHz)	26.73	26.97	25.89
Measurement uncertainty (kHz)	$\pm 7$		

###### CHAIN B

	Lowest frequency 5260 MHz	Middle frequency 5300 MHz	Highest frequency 5320 MHz
99% bandwidth (MHz)	17.78	17.94	17.46
26 dB bandwidth (MHz)	27.41	27.77	25.69
Measurement uncertainty (kHz)	$\pm 7$		

##### 2. 802.11 n20 MHz and 802.11 ac 20 MHz modes. (see next plots).

###### CHAIN A

	Lowest frequency 5260 MHz	Middle frequency 5300 MHz	Highest frequency 5320 MHz
99% bandwidth (MHz)	18.54	18.54	18.42
26 dB bandwidth (MHz)	26.65	27.01	26.29
Measurement uncertainty (kHz)	$\pm 7$		

###### CHAIN B

	Lowest frequency 5260 MHz	Middle frequency 5300 MHz	Highest frequency 5320 MHz
99% bandwidth (MHz)	18.66	18.74	18.42
26 dB bandwidth (MHz)	27.89	29.09	25.81
Measurement uncertainty (kHz)	$\pm 7$		

Note: the test was performed with 802.11 n20 MHz mode which is the same modulation scheme as 802.11 ac 20 MHz.

**3. 802.11 n40 MHz and 802.11 ac 40 MHz modes.** (see next plots).

CHAIN A

	Lowest frequency 5270 MHz	Highest frequency 5310 MHz
99% bandwidth (MHz)	36.76	36.56
26 dB bandwidth (MHz)	45.75	45.65
Measurement uncertainty (kHz)	$\pm 7$	

CHAIN B

	Lowest frequency 5270 MHz	Highest frequency 5310 MHz
99% bandwidth (MHz)	36.86	36.66
26 dB bandwidth (MHz)	48.85	45.95
Measurement uncertainty (kHz)	$\pm 7$	

Note: the test was performed with 802.11 n40 MHz mode which is the same modulation scheme as 802.11 ac 40 MHz.

**4. 802.11 ac 80 MHz mode.** (see next plots).

CHAIN A

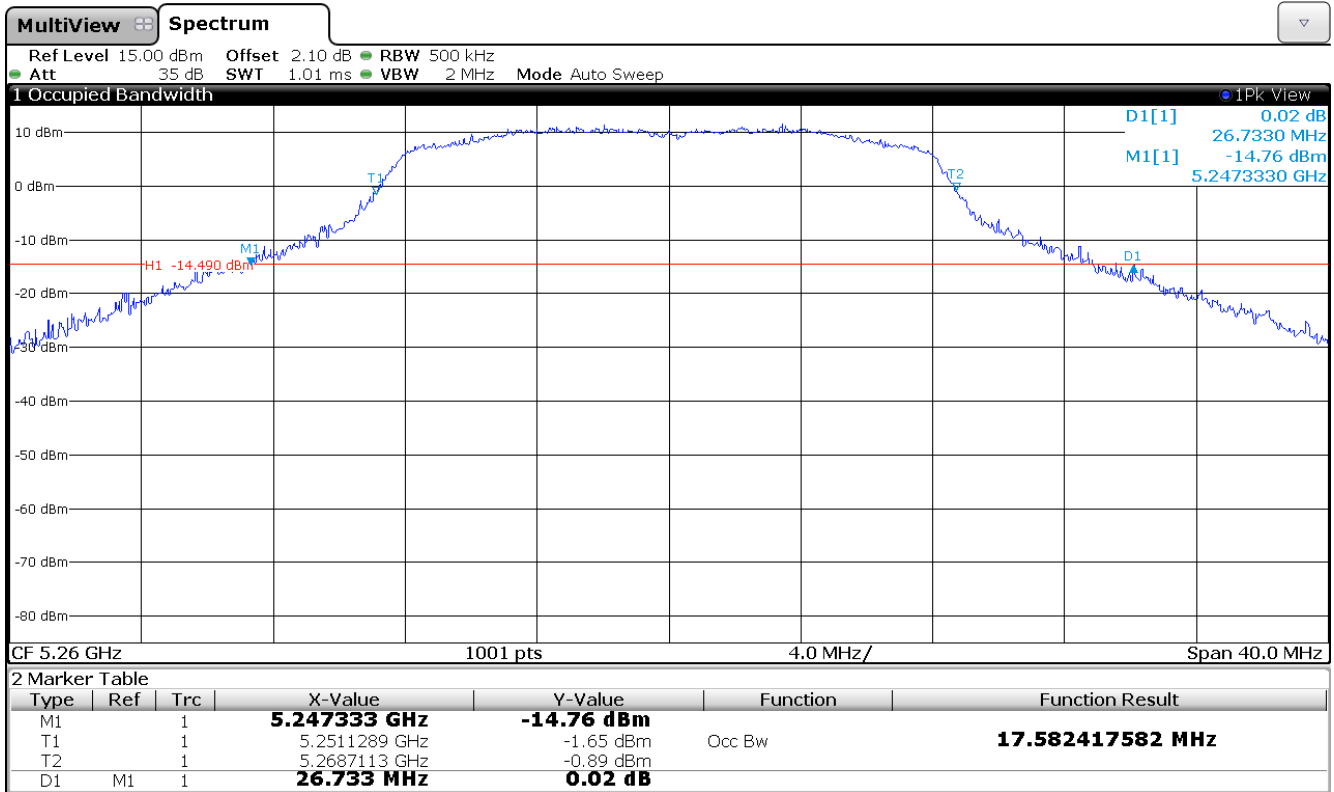
	Frequency 5290 MHz
99% bandwidth (MHz)	75.37
26 dB bandwidth (MHz)	82.42
Measurement uncertainty (kHz)	$\pm 7$

CHAIN B

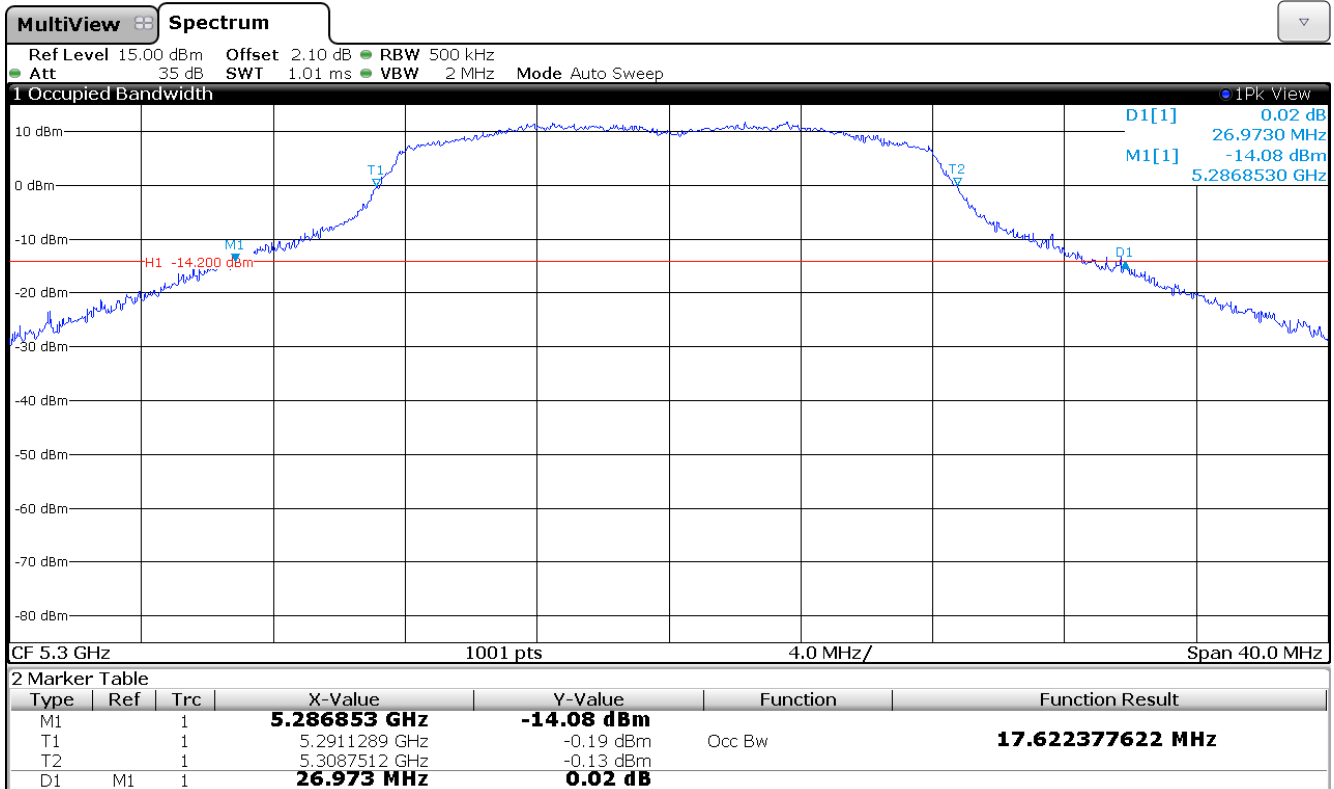
	Frequency 5290 MHz
99% bandwidth (MHz)	75.52
26 dB bandwidth (MHz)	82.57
Measurement uncertainty (kHz)	$\pm 7$

## 802.11a mode CHAIN A

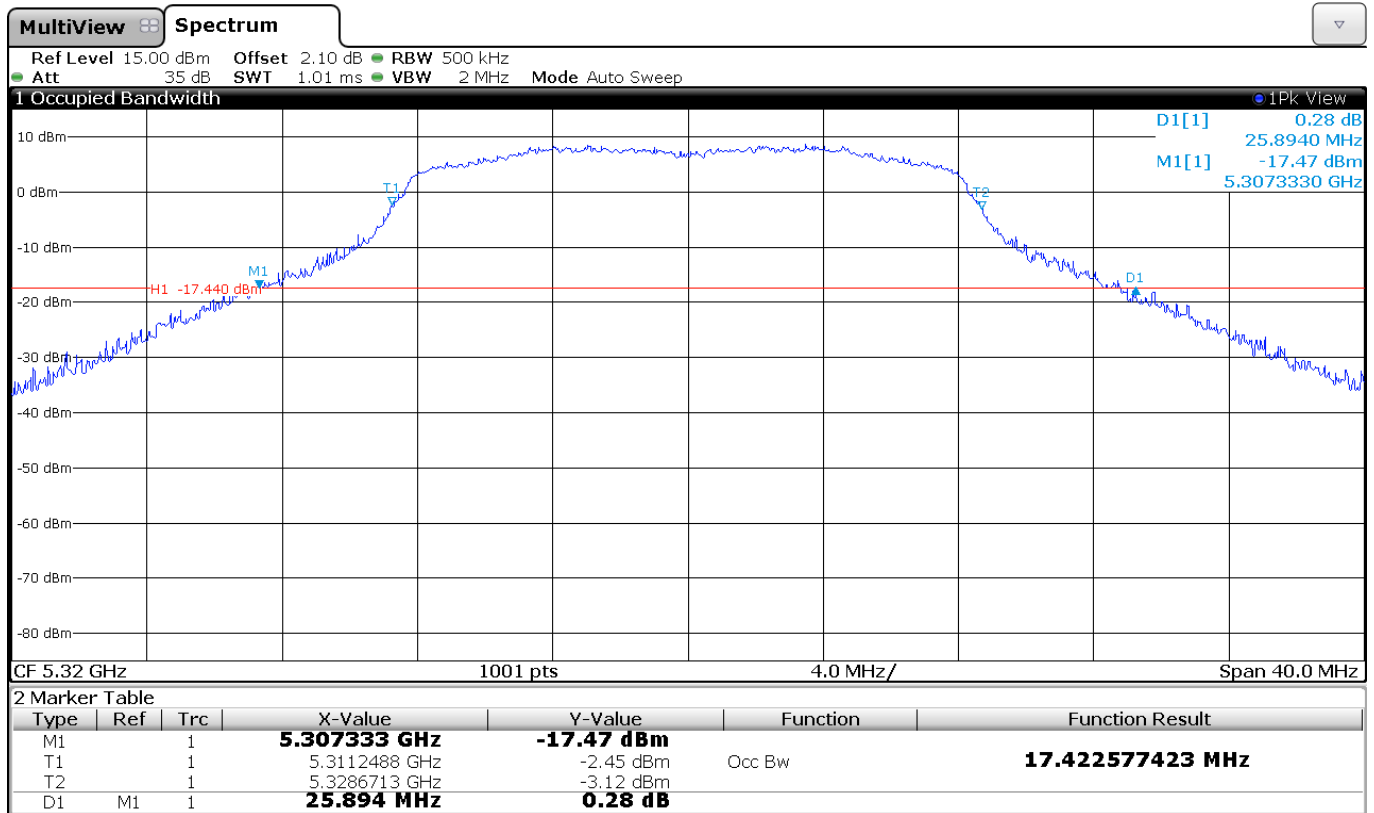
### Lowest Channel



### Middle Channel

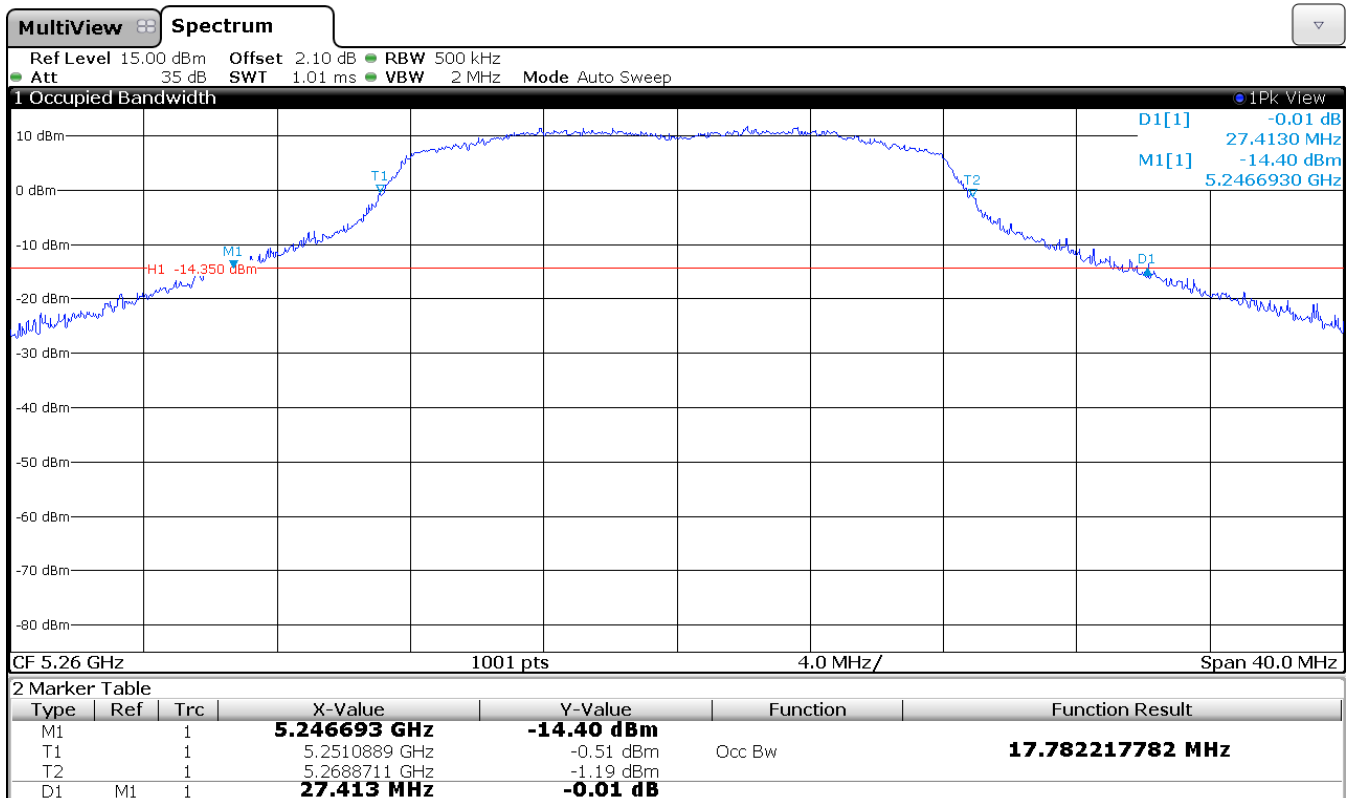


### Highest Channel



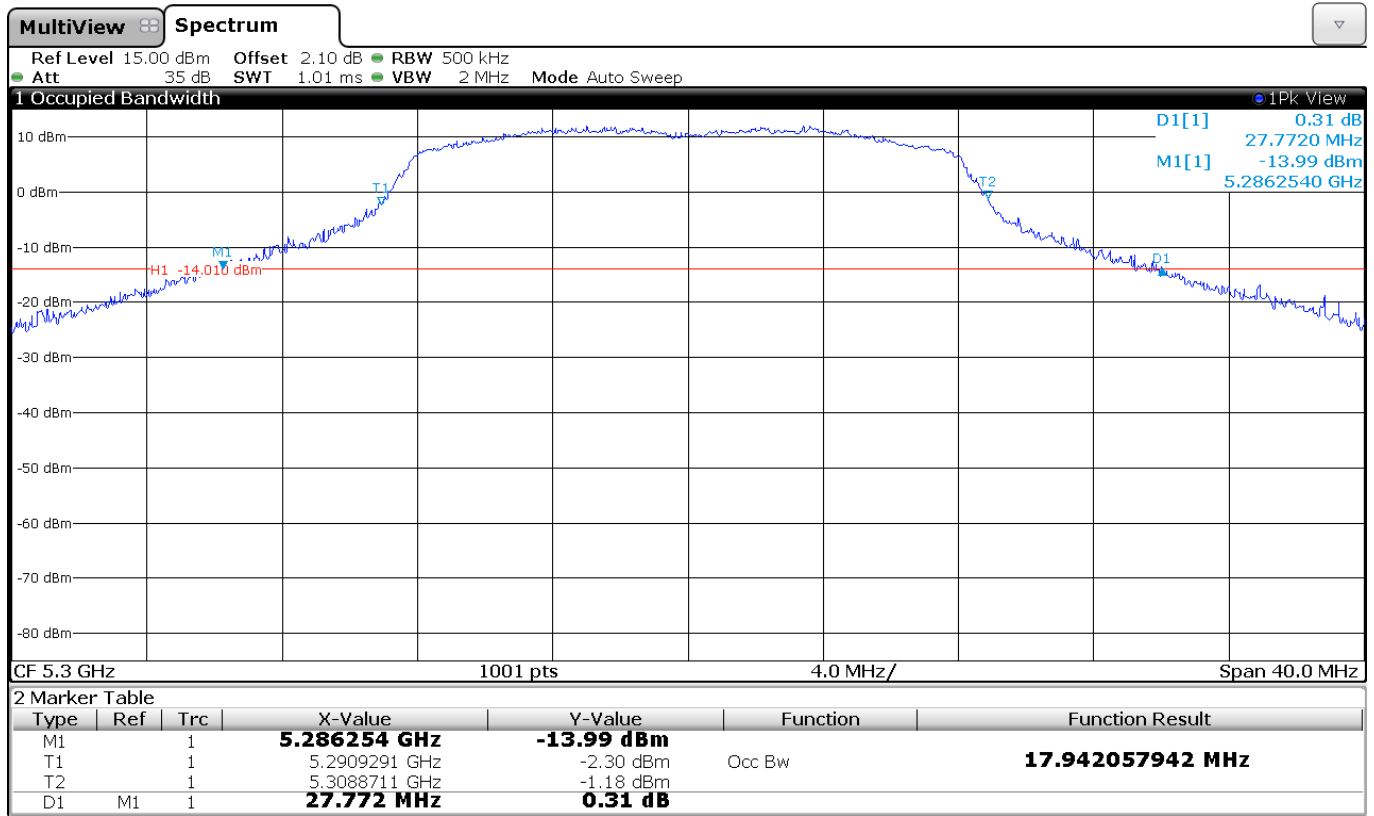
### 802.11a mode CHAIN B

#### Lowest Channel

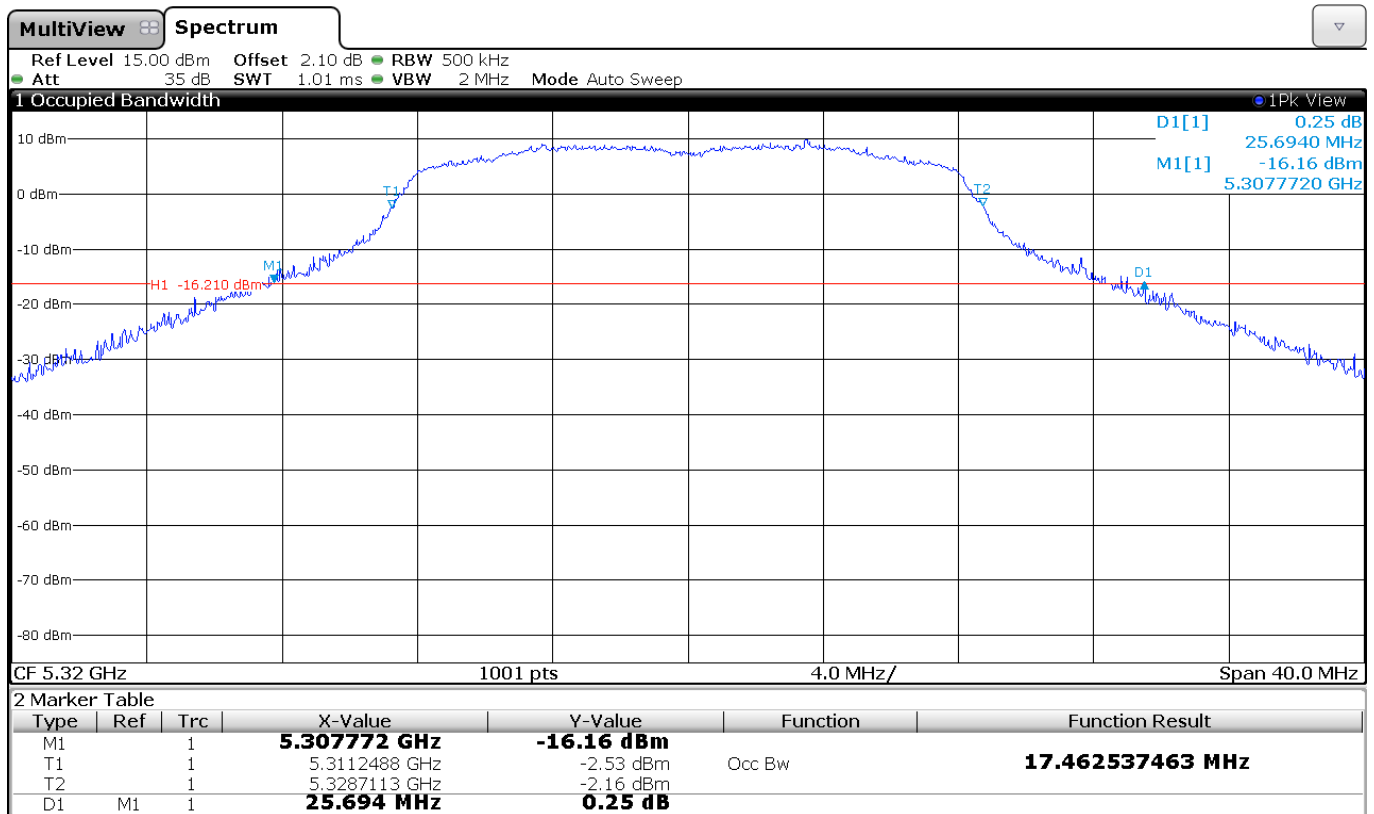




### Middle Channel

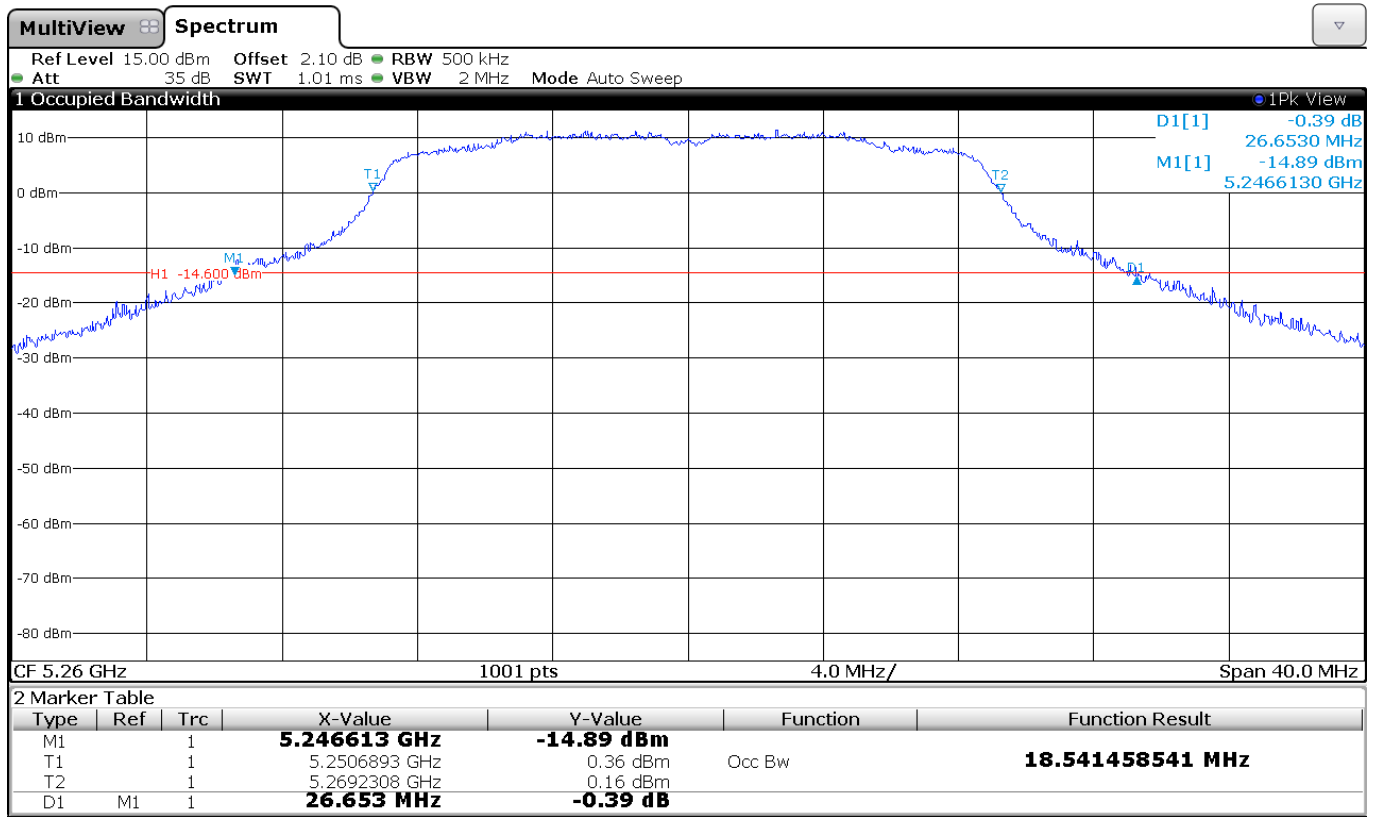


### Highest Channel

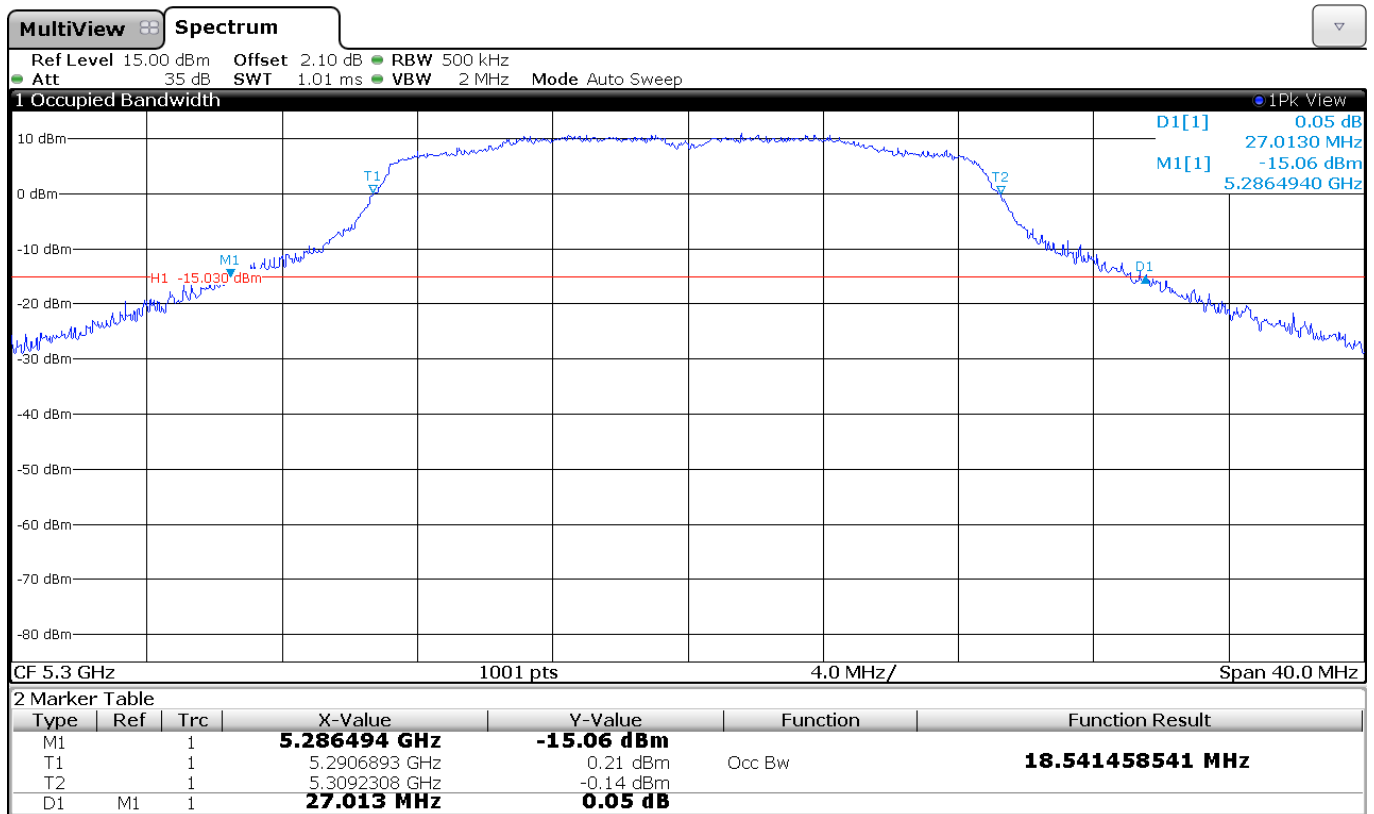


**802.11 n20 MHz and 802.11 ac 20 MHz modes CHAIN A**

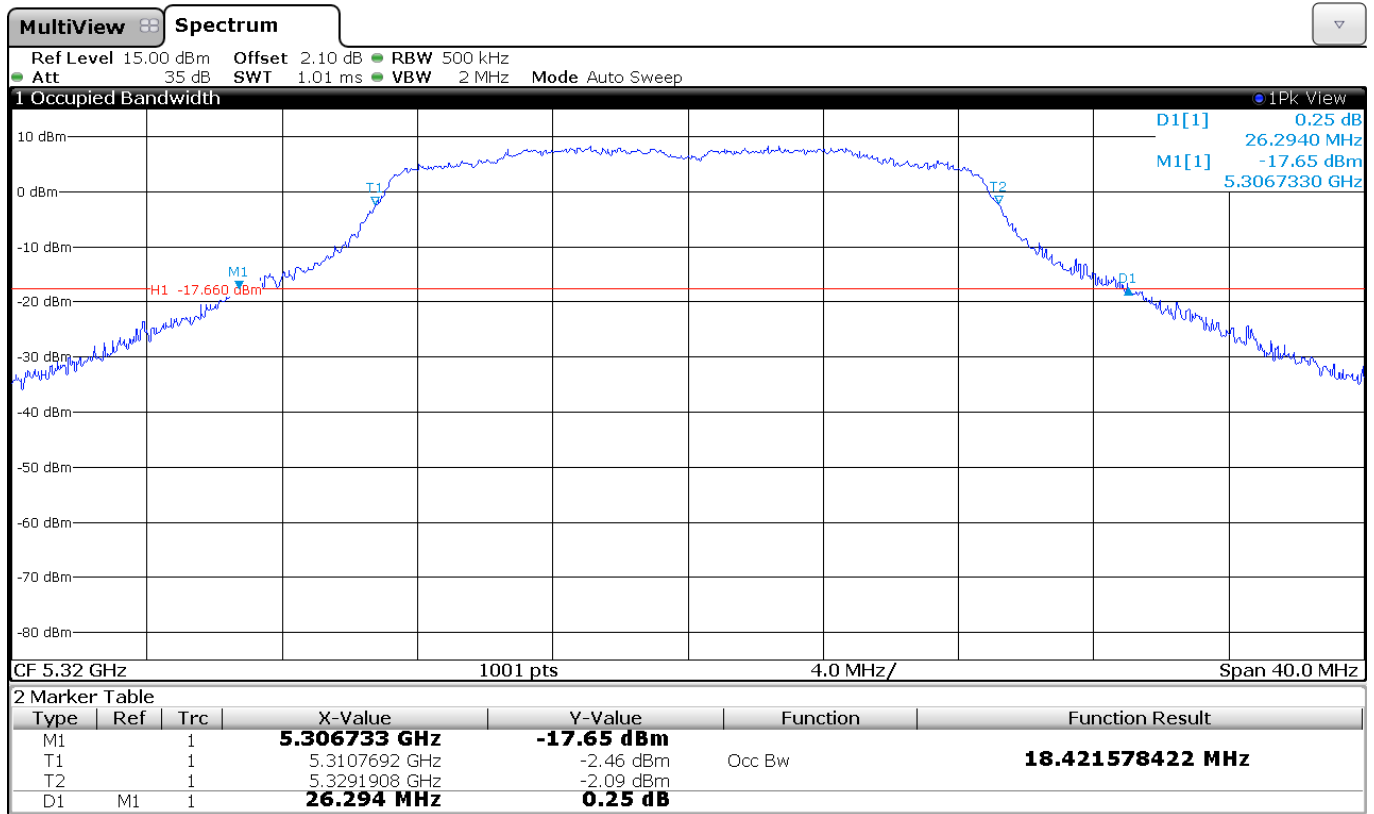
**Lowest Channel**



**Middle Channel**

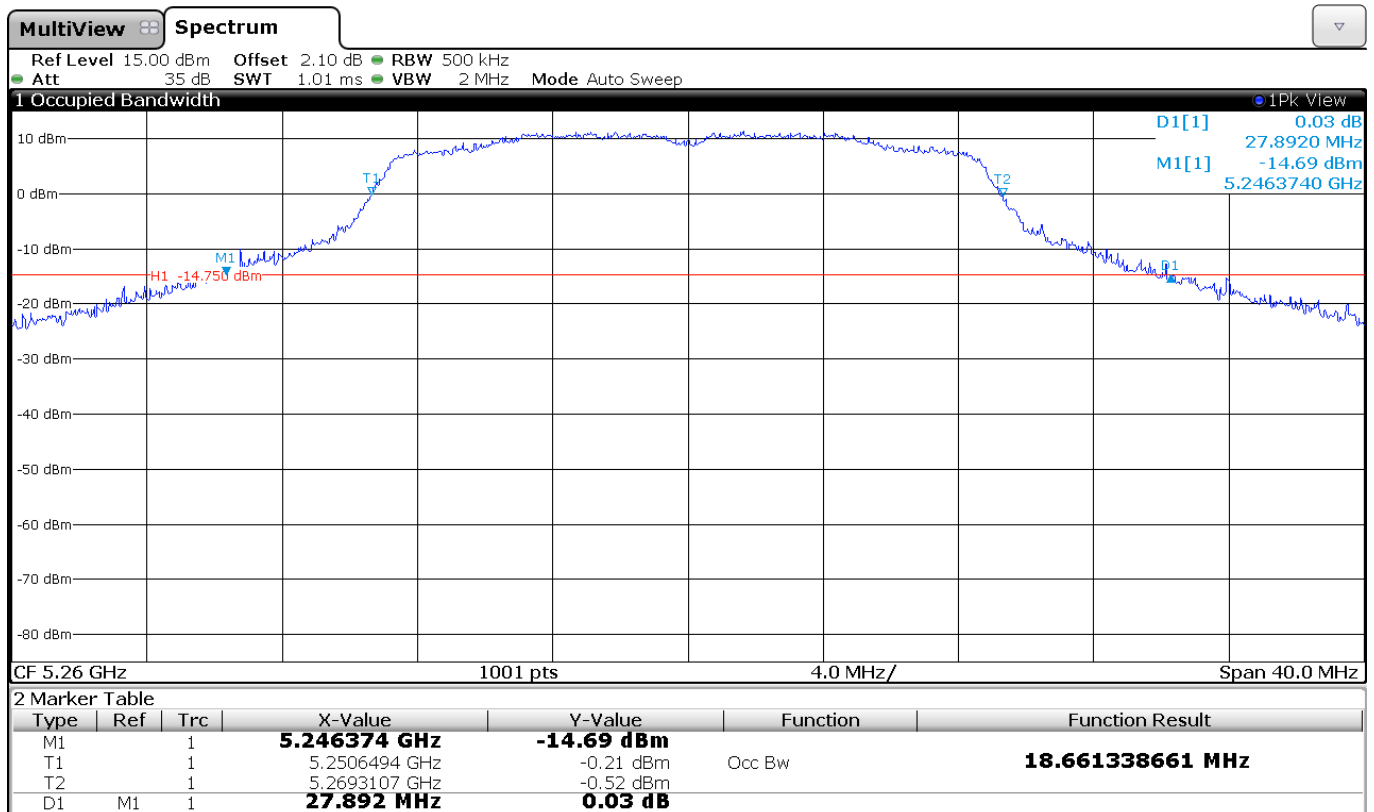


### Highest Channel

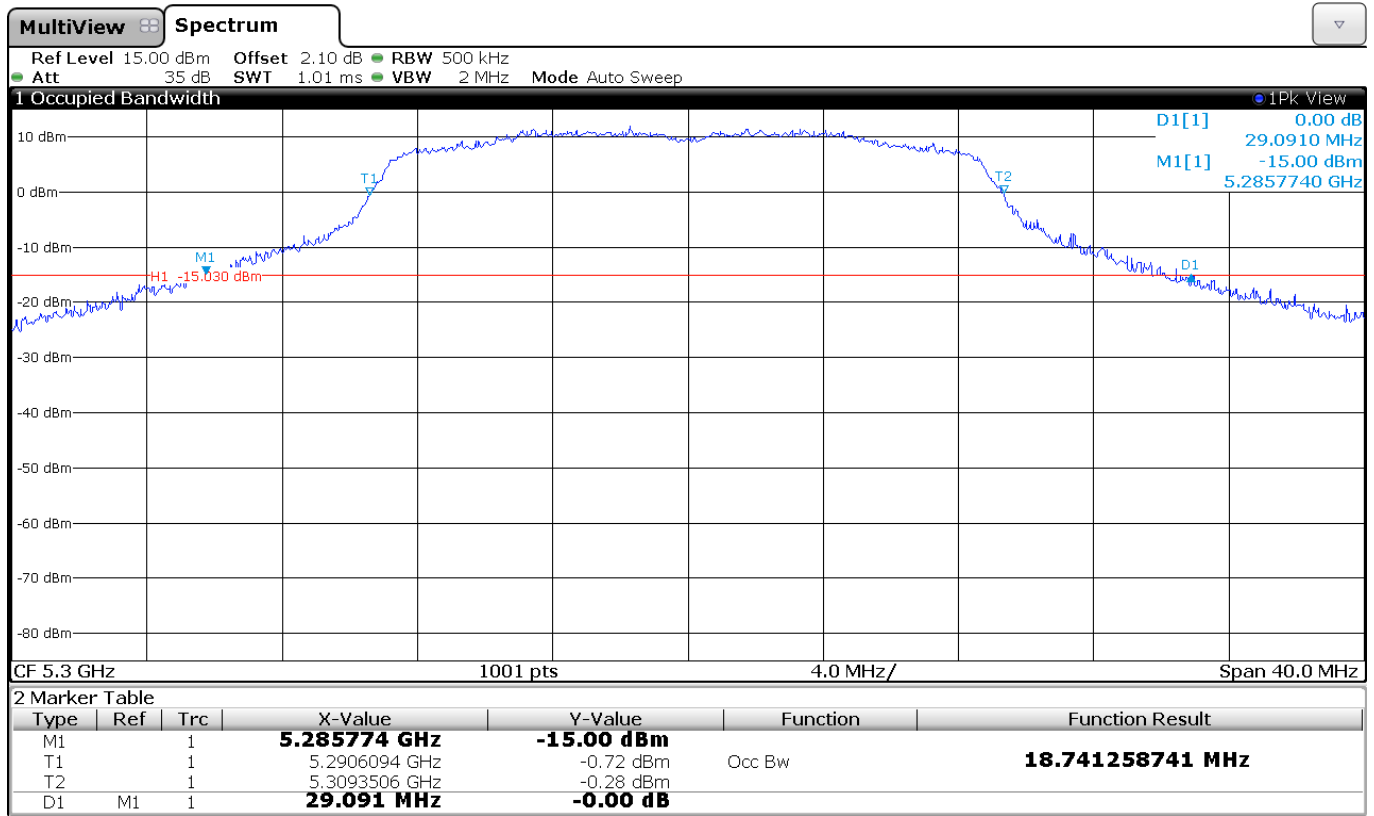


### 802.11 n20 MHz and 802.11 ac 20 MHz modes CHAIN B

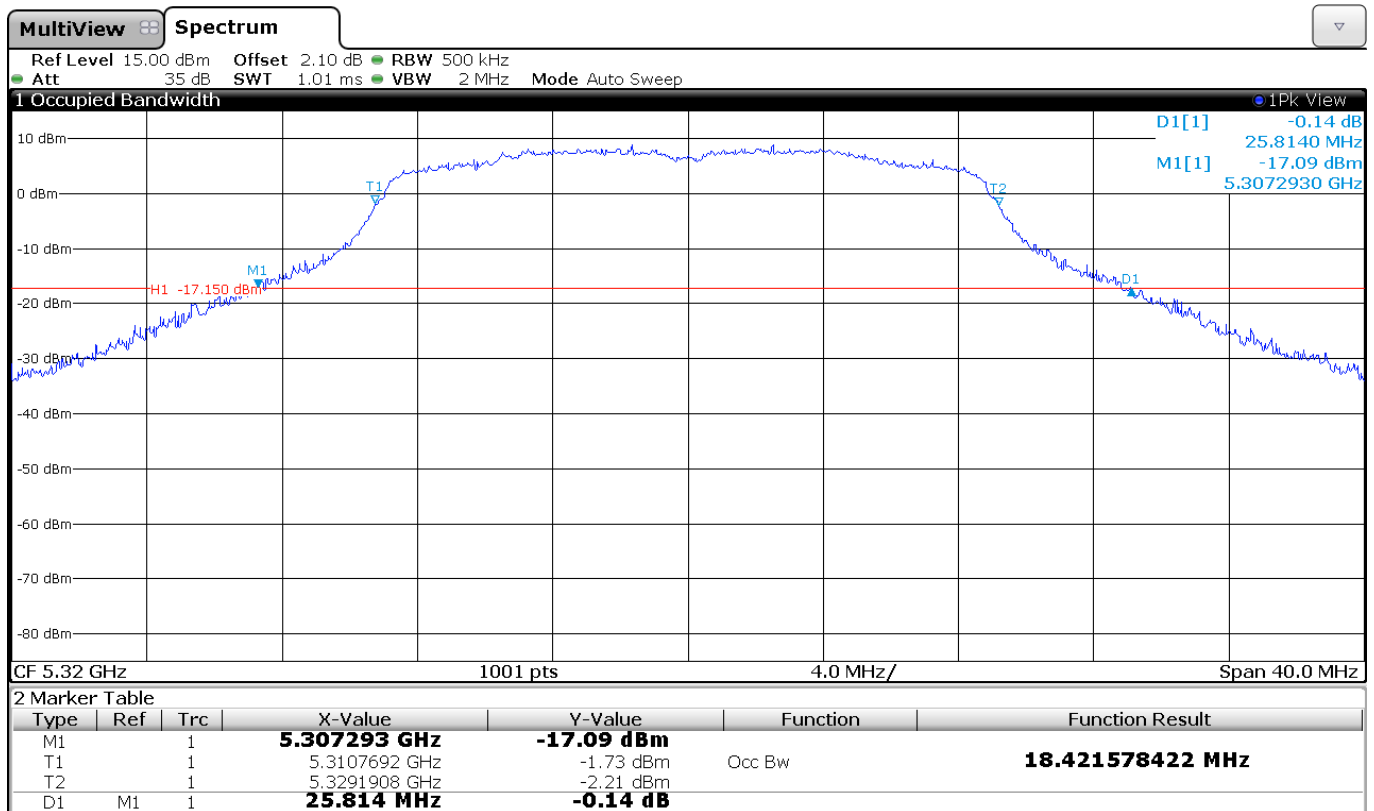
#### Lowest Channel



### Middle Channel

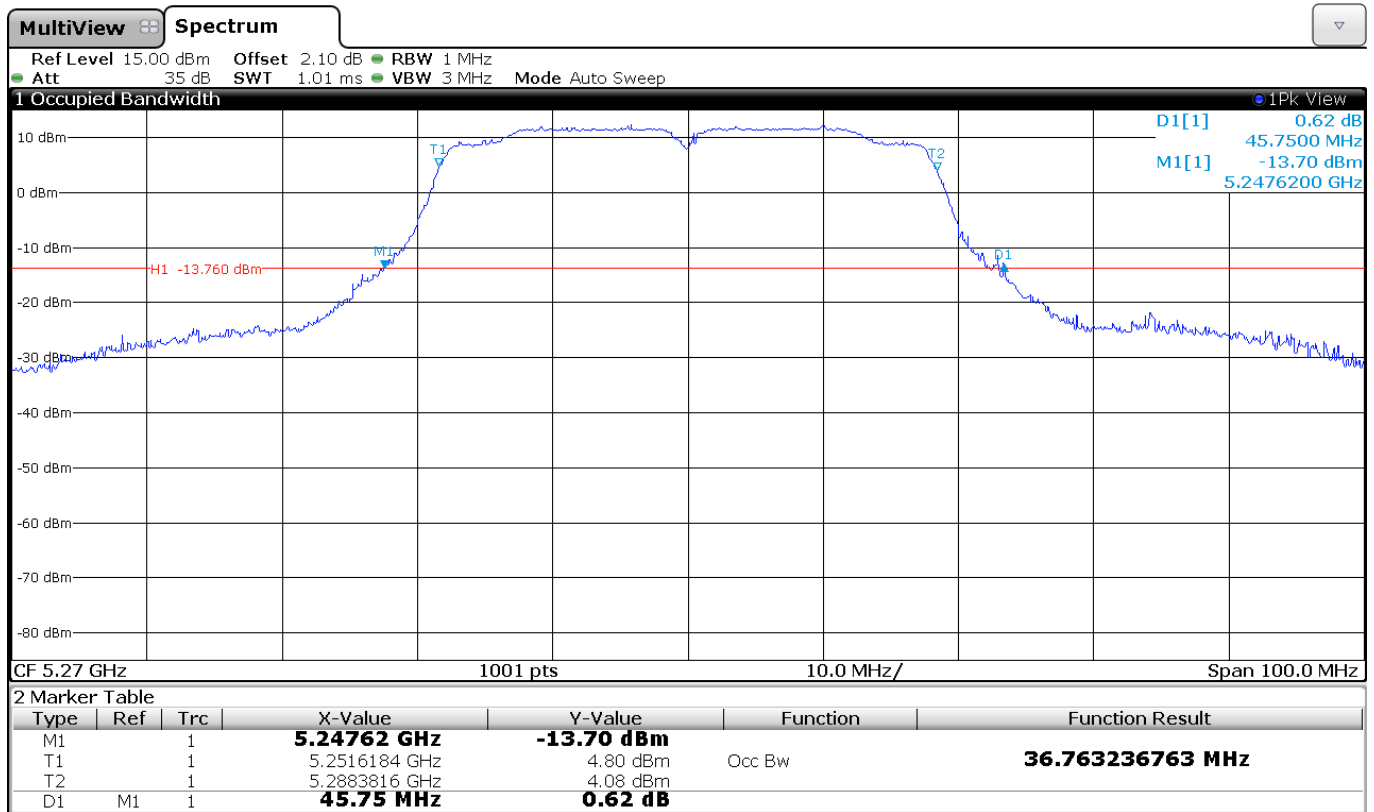


### Highest Channel

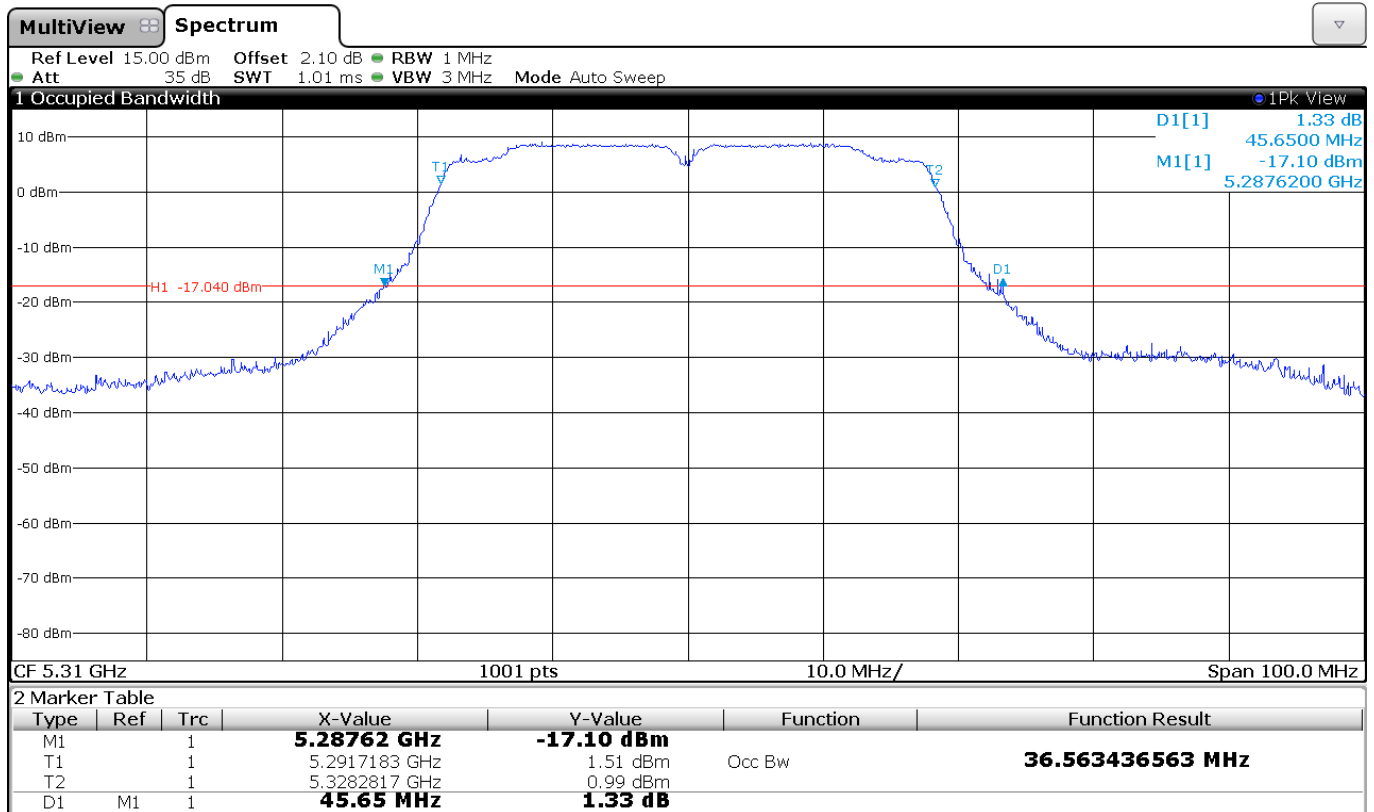


**802.11 n40 MHz and 802.11 ac 40 MHz modes CHAIN A**

**Lowest Channel**

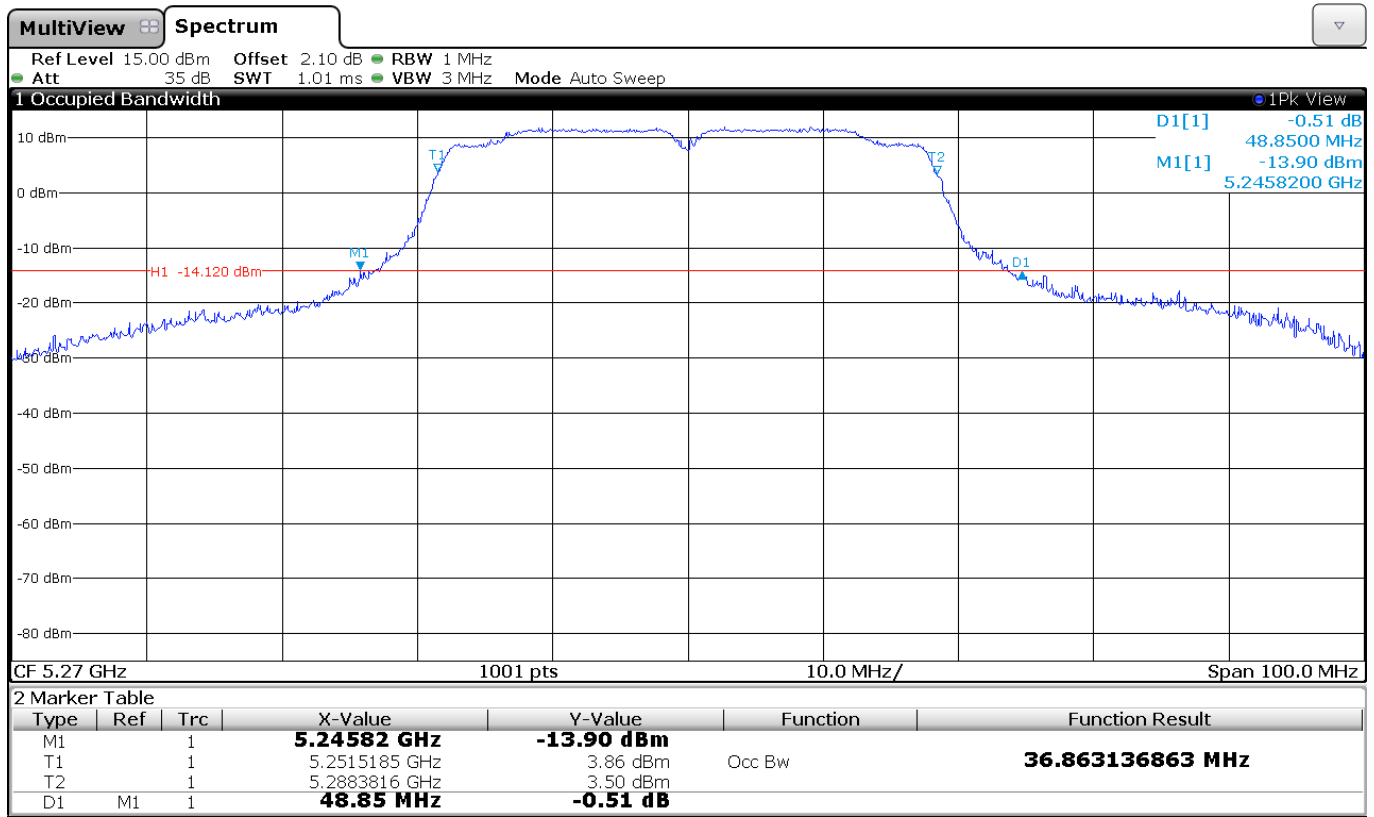


**Highest Channel**

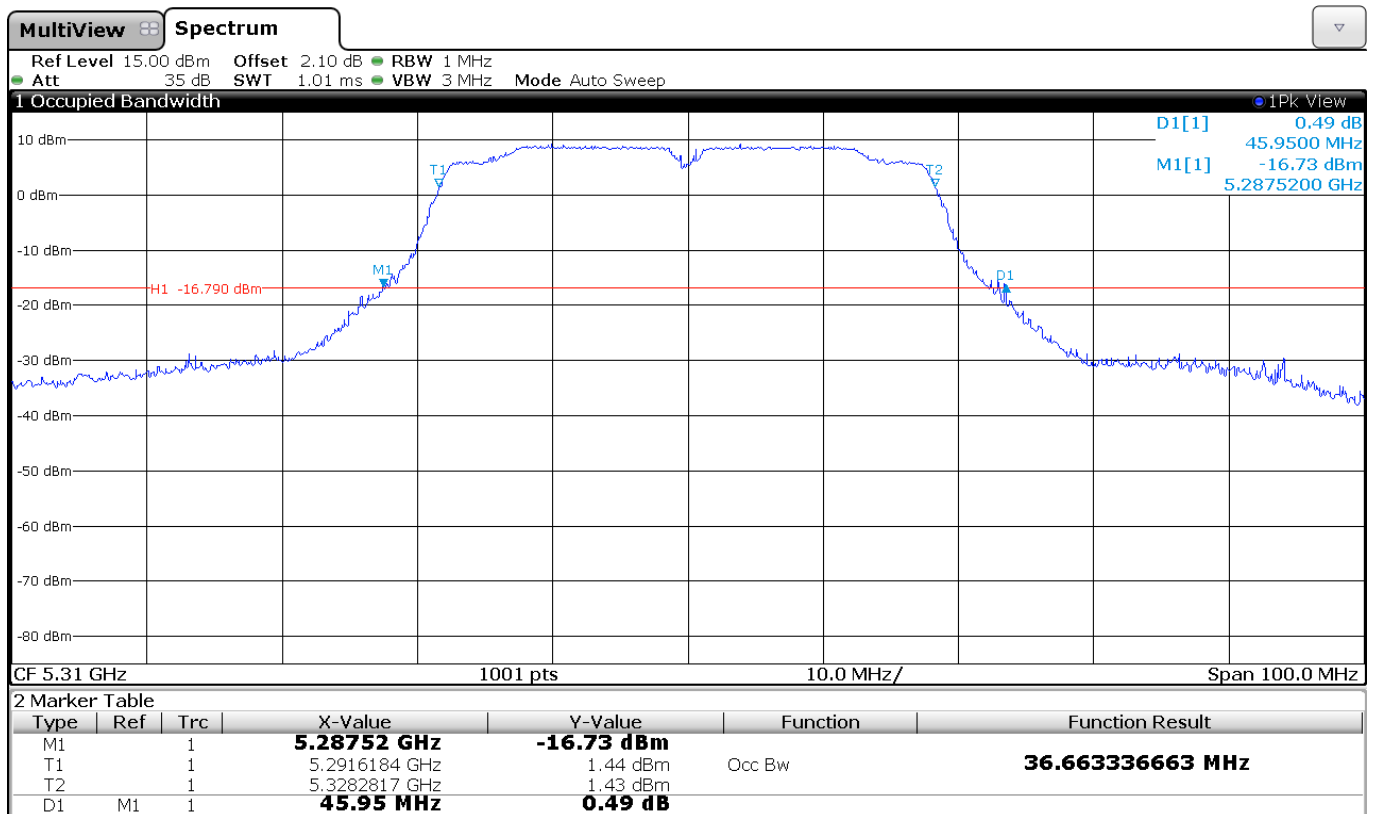


**802.11 n40 MHz and 802.11 ac 40 MHz modes CHAIN B**

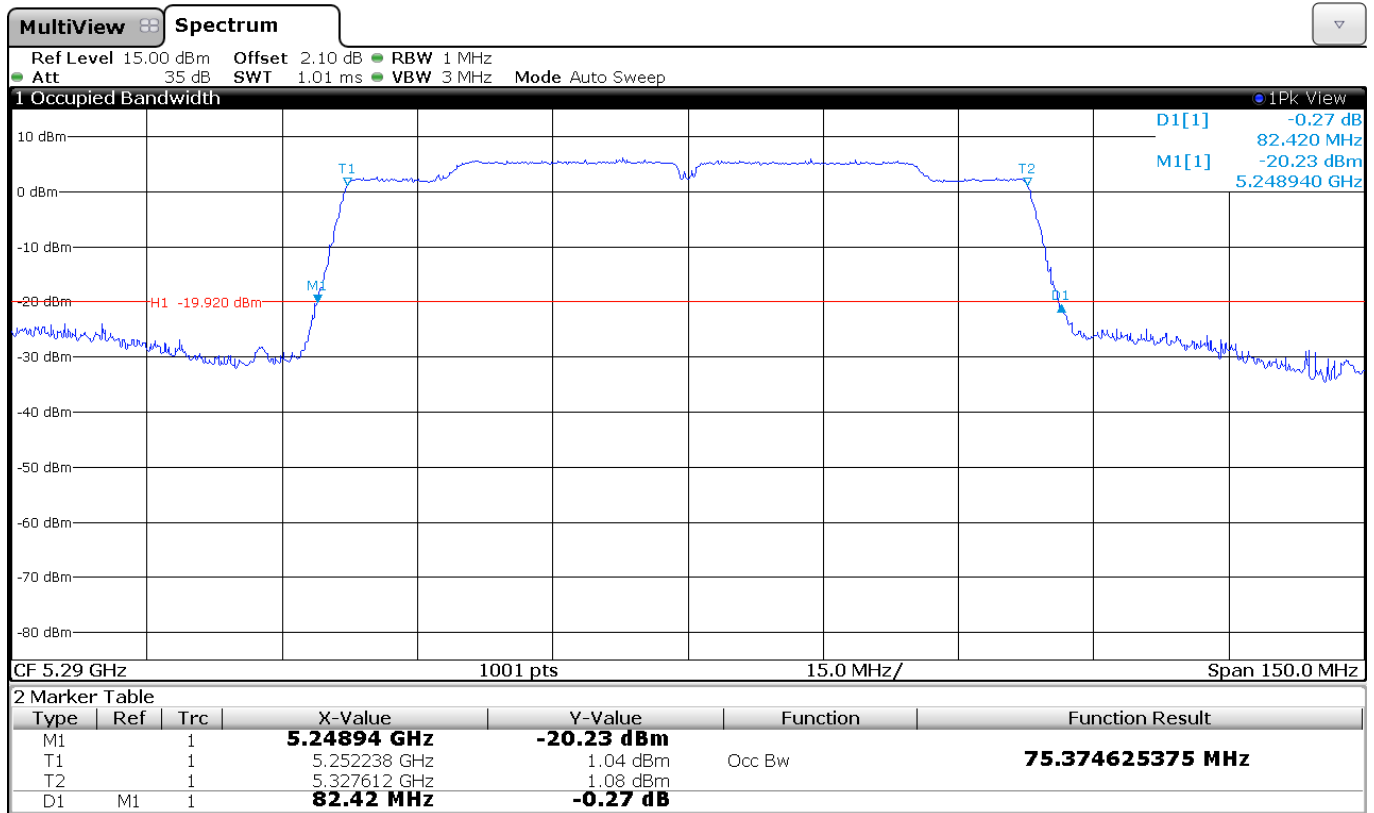
**Lowest Channel**



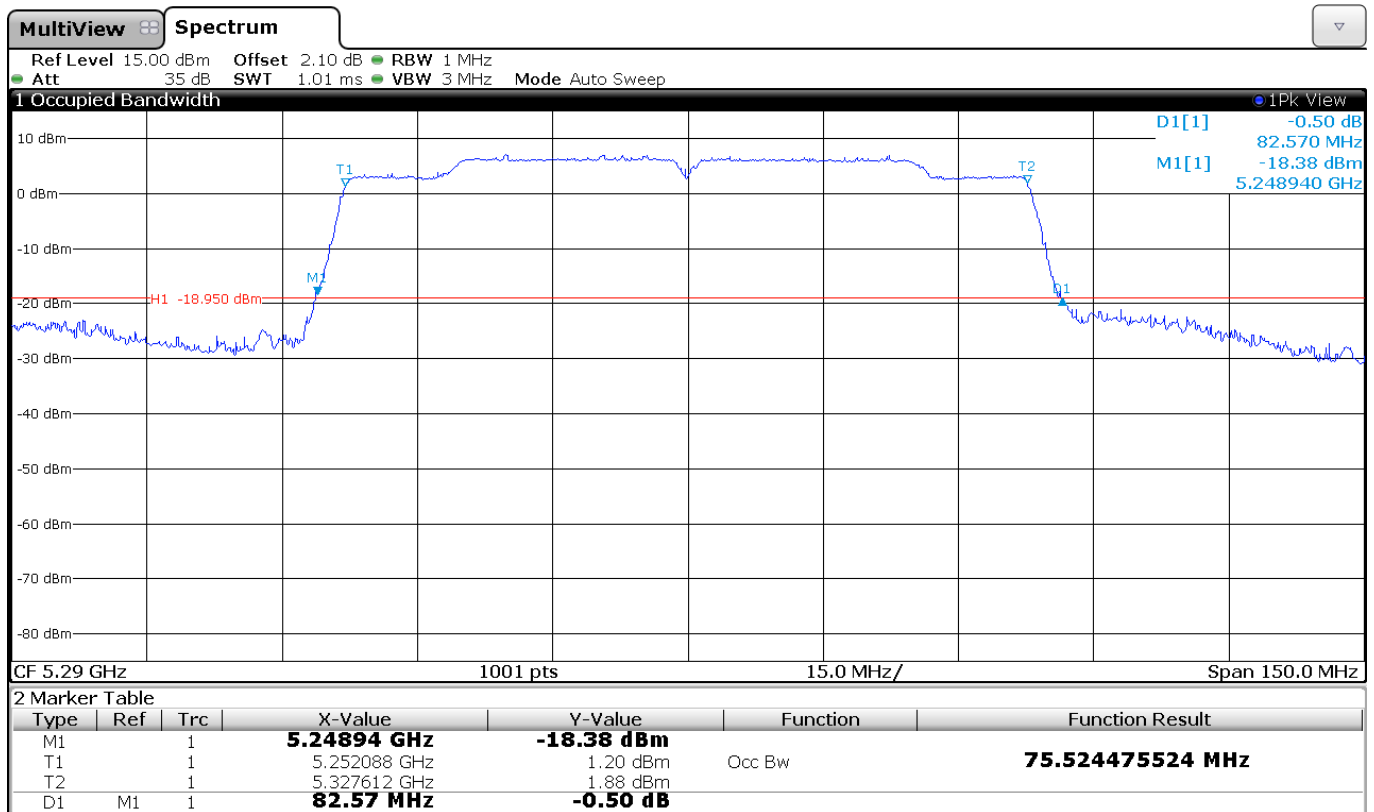
**Highest Channel**



### 802.11 ac 80 MHz mode CHAIN A



### 802.11 ac 80 MHz mode CHAIN B



## Section 15.407 Subclause (a) (2) / RSS-210 A9.2. (2). Maximum output power, Maximum power spectral density and antenna gain

### SPECIFICATION

**FCC 15.407:** For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW (23.98 dBm) or  $11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**RSS-210:** The maximum conducted output power shall not exceed 250 mW (23.98 dBm) or  $11 + 10 \log_{10} B$ , dBm, whichever power is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or  $17 + 10 \log B$ , dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

Within the emission bandwidth, when the peak spectral density per MHz over any continuous transmission exceeds the average ( $10 \log_{10} B$ ) value by more than 3 dB, the permissible power spectral density shall be reduced by the excess amount.

### RESULTS

The maximum conducted output power was measured using the channel power integration method according to point E) 2) b) (Method SA-1) of Guidance 789033 D02 General UNII Test Procedures New Rules v01.

In the measure-and-sum approach for MIMO mode, the conducted emission level (*e.g.*, transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in linear power units (mW—not dBm).

The e.i.r.p. levels are calculated by adding the declared maximum antenna gain (dBi).

The maximum power spectral density (PSD) was measured using the method according to point F) (Method SA-1) of Guidance 789033 D02 General UNII Test Procedures New Rules v01.

The e.i.r.p. levels are calculated by adding the declared maximum antenna gain (dBi).

For MIMO mode, the Measure and add  $10 \log(NANT)$  dB, (where NANT is the number of outputs) technique was used according to the Guidance for Emission Testing of Transmitters with Multiple Outputs in the Same Band 662911 D01 Multiple Transmitter Output v02r01 dated 10/31/2013.

With this technique, spectrum measurements are performed at each output of the device, and the quantity  $10 \log(NANT)$  dB is added to each spectrum value before comparing to the emission limit. Number of outputs = 2.

The number of transmit antennas (NANT) are 2 and the number of spatial streams (Nss) are 2 and therefore the Array Gain is 0 dB.

### 1. 802.11a mode (see next plots).



**CHAIN A** Maximum declared antenna gain = 3.7 dBi

Frequency	Maximum conducted output power (dBm)	Maximum output power e.i.r.p. (dBm)	PSD/MHz (dBm)	PSD/MHz e.i.r.p. (dBm)
5260 MHz	15.97	19.67	5.63	9.33
5300 MHz	16.13	19.83	5.88	9.58
5320 MHz	13.42	17.12	3.07	6.77

**CHAIN B** Maximum declared antenna gain = 3.7 dBi

Frequency	Maximum conducted output power (dBm)	Maximum output power e.i.r.p. (dBm)	PSD/MHz (dBm)	PSD/MHz e.i.r.p. (dBm)
5260 MHz	16.46	20.16	6.11	9.81
5300 MHz	16.55	20.25	6.21	9.91
5320 MHz	13.47	17.17	3.18	6.88

Measurement uncertainty = ±1.5 dB

Verdict: PASS

**2. 802.11 n20 MHz and 802.11 ac 20 MHz modes.** (see next plots).

Note: the test was performed with 802.11 n20 MHz mode which is the same modulation scheme as 802.11 ac 20 MHz.

**CHAIN A** Maximum declared antenna gain = 3.7 dBi

Frequency	Maximum conducted output power (dBm)	Maximum output power e.i.r.p. (dBm)	PSD/MHz (dBm)	PSD/MHz e.i.r.p. (dBm)
5260 MHz	15.97	19.67	5.49	9.19
5300 MHz	15.95	19.65	5.48	9.18
5320 MHz	13.51	17.21	3.05	6.75

**CHAIN B** Maximum declared antenna gain = 3.7 dBi

Frequency	Maximum conducted output power (dBm)	Maximum output power e.i.r.p. (dBm)	PSD/MHz (dBm)	PSD/MHz e.i.r.p. (dBm)
5260 MHz	16.45	20.15	5.99	9.69
5300 MHz	16.63	20.33	6.15	9.85
5320 MHz	13.41	17.11	2.91	6.61

**MIMO CHAIN A+B. MAXIMUM OUTPUT POWER**

Maximum declared antenna gain = 3.7 dBi

Frequency	Maximum conducted output power Chain A (dBm)	Maximum conducted output power Chain B (dBm)	Total conducted output power (dBm) A+B	Total output power e.i.r.p. (dBm) A+B
5260 MHz	13.63	13.57	16.61	20.31
5300 MHz	13.63	13.51	16.58	20.28
5320 MHz	11.63	11.51	14.58	18.28

**MIMO CHAIN A+B. PSD/MHz**

Maximum declared antenna gain = 3.7 dBi

Frequency	PSD/MHz Chain A (dBm)	PSD/MHz Chain B (dBm)	Total PSD/MHz Chain A (dBm) <sup>1</sup>	Total PSD/MHz Chain B (dBm) <sup>1</sup>	Total PSD/MHz Chain A e.i.r.p. (dBm)	Total PSD/MHz Chain B e.i.r.p. (dBm)
5260 MHz	3.35	3.33	6.36	6.34	10.06	10.04
5300 MHz	3.33	3.24	6.34	6.25	10.04	9.95
5320 MHz	1.35	1.20	4.36	4.21	8.06	7.91

Note 1: The quantity 10\*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

Measurement uncertainty = ±1.5 dB

Verdict: PASS

**3. 802.11 n40 MHz and 802.11 ac 40 MHz modes.** (see next plots).

Note: the test was performed with 802.11 n40 MHz mode which is the same modulation scheme as 802.11 ac 40 MHz.

**CHAIN A**

Maximum declared antenna gain = 3.7 dBi

Frequency	Maximum conducted output power (dBm)	Maximum output power e.i.r.p. (dBm)	PSD/MHz (dBm)	PSD/MHz e.i.r.p. (dBm)
5270 MHz	16.68	20.38	3.00	6.70
5310 MHz	13.62	17.32	0.16	3.87

**CHAIN B**

Maximum declared antenna gain = 3.7 dBi

Frequency	Maximum conducted output power (dBm)	Maximum output power e.i.r.p. (dBm)	PSD/MHz (dBm)	PSD/MHz e.i.r.p. (dBm)
5270 MHz	16.41	20.11	2.78	6.48
5310 MHz	13.55	17.25	0.13	3.83

**MIMO CHAIN A+B. MAXIMUM OUTPUT POWER**

Maximum declared antenna gain = 3.7 dBi

Frequency	Maximum conducted output power Chain A (dBm)	Maximum conducted output power Chain B (dBm)	Total conducted output power (dBm) A+B	Total output power e.i.r.p. (dBm) A+B
5270 MHz	16.40	16.48	19.45	23.15
5310 MHz	11.64	11.47	14.56	18.26

Measurement uncertainty = ±1.5 dB

Verdict: PASS

**MIMO CHAIN A+B. PSD/MHz**

Maximum declared antenna gain = 3.7 dBi

Frequency	PSD/MHz Chain A (dBm)	PSD/MHz Chain B (dBm)	Total PSD/MHz Chain A (dBm) <sup>1</sup>	Total PSD/MHz Chain B (dBm) <sup>1</sup>	Total PSD/MHz Chain A e.i.r.p. (dBm)	Total PSD/MHz Chain B e.i.r.p. (dBm)
5270 MHz	2.30	2.43	5.31	5.44	9.01	9.14
5310 MHz	-2.32	-2.43	0.69	0.58	4.39	4.28

Note 1: The quantity 10\*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

Measurement uncertainty = ±1.5 dB

Verdict: PASS

**4. 802.11 ac 80 MHz mode.** (see next plots).

**CHAIN A** Maximum declared antenna gain = 3.7 dBi

Frequency	Maximum conducted output power (dBm)	Maximum output power e.i.r.p. (dBm)	PSD/MHz (dBm)	PSD/MHz e.i.r.p. (dBm)
5290 MHz	13.69	17.39	-3.43	0.27

**CHAIN B** Maximum declared antenna gain = 3.7 dBi

Frequency	Maximum conducted output power (dBm)	Maximum output power e.i.r.p. (dBm)	PSD/MHz (dBm)	PSD/MHz e.i.r.p. (dBm)
5290 MHz	13.70	17.40	-3.46	0.24

**MIMO CHAIN A+B. MAXIMUM OUTPUT POWER**

Maximum declared antenna gain = 3.7 dBi

Frequency	Maximum conducted output power Chain A (dBm)	Maximum conducted output power Chain B (dBm)	Total conducted output power (dBm)	Total output power e.i.r.p. (dBm)
5290 MHz	11.38	11.40	14.40	18.10

Measurement uncertainty = ±1.5 dB

Verdict: PASS

MIMO CHAIN A+B. PSD/MHz

Maximum declared antenna gain = 3.7 dBi

Frequency	PSD/MHz Chain A (dBm)	PSD/MHz Chain B (dBm)	Total PSD/MHz Chain A (dBm) <sup>1</sup>	Total PSD/MHz Chain B (dBm) <sup>1</sup>	Total PSD/MHz Chain A e.i.r.p. (dBm)	Total PSD/MHz Chain B e.i.r.p. (dBm)
5290 MHz	-5.52	-5.14	-2.51	-2.13	1.19	1.57

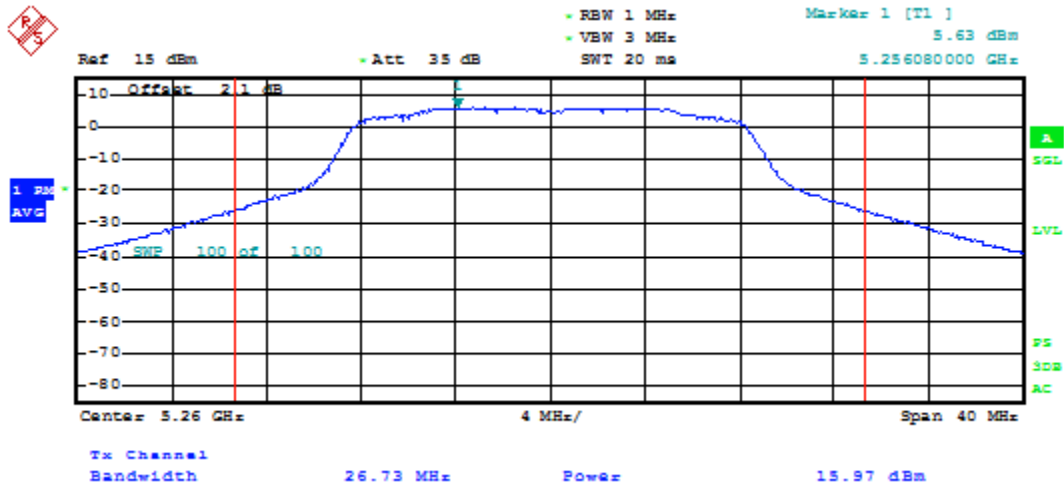
Note 1: The quantity  $10 \cdot \log 2$  (two antennas) is added to the spectrum peak value according to document 662911 D01.

Measurement uncertainty =  $\pm 1.5$  dB

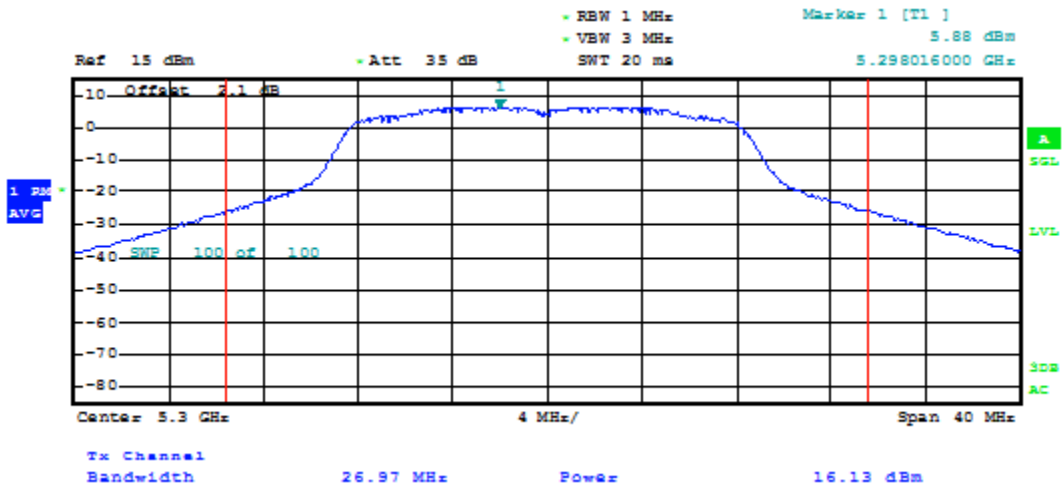
Verdict: PASS

**802.11a mode** CHAIN A

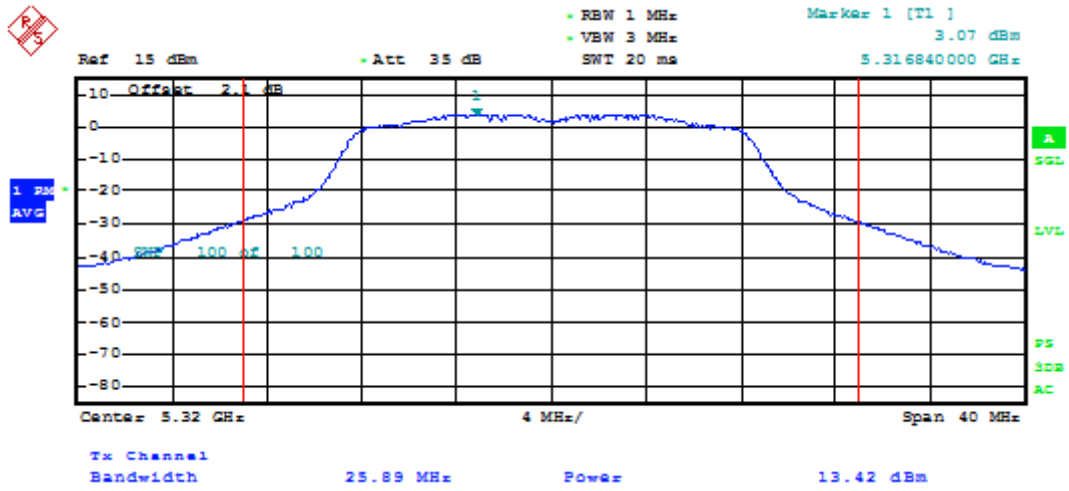
Lowest Channel



Middle Channel

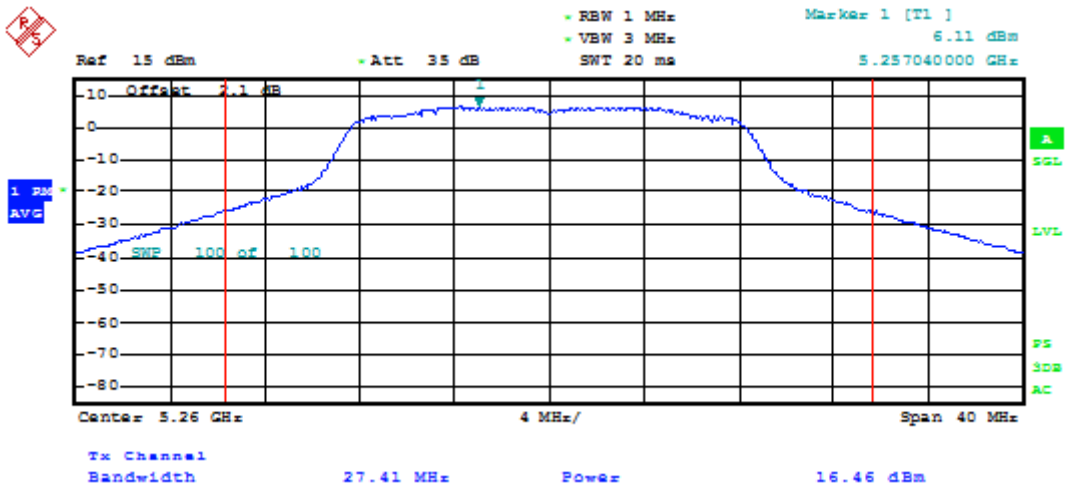


Highest Channel

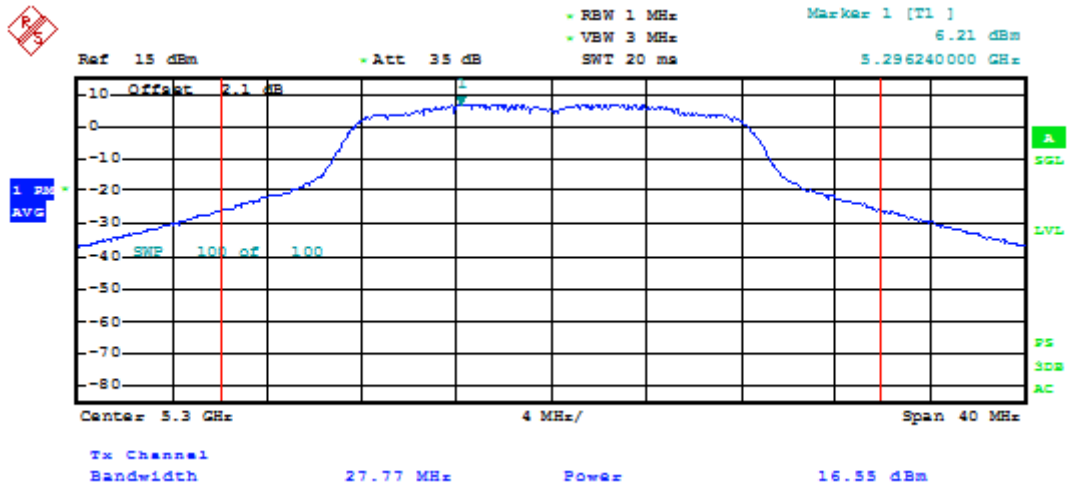


**802.11a mode** CHAIN B

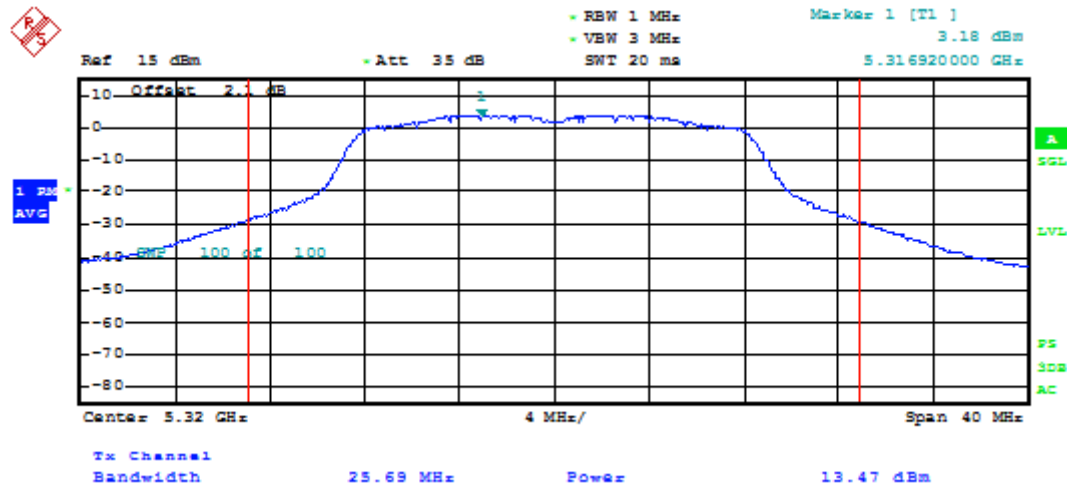
Lowest Channel



Middle Channel

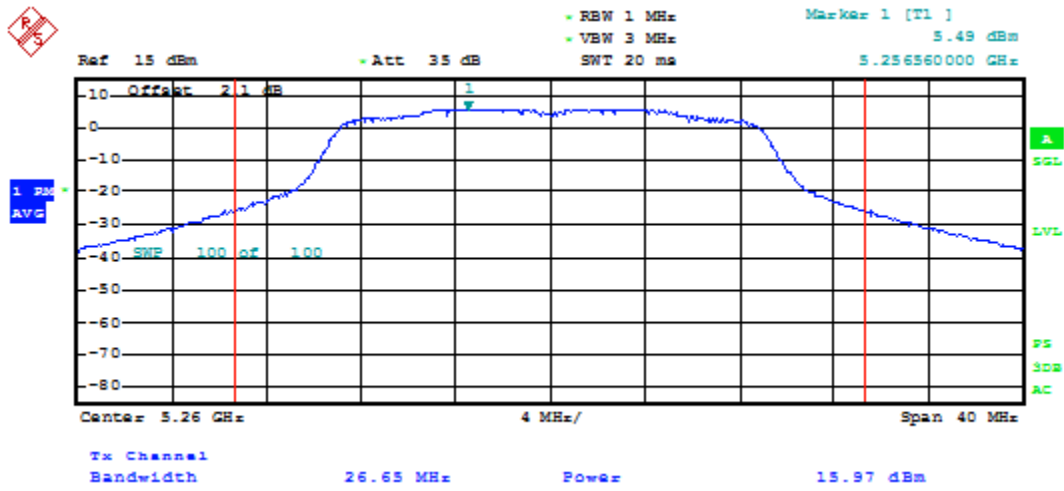


Highest Channel

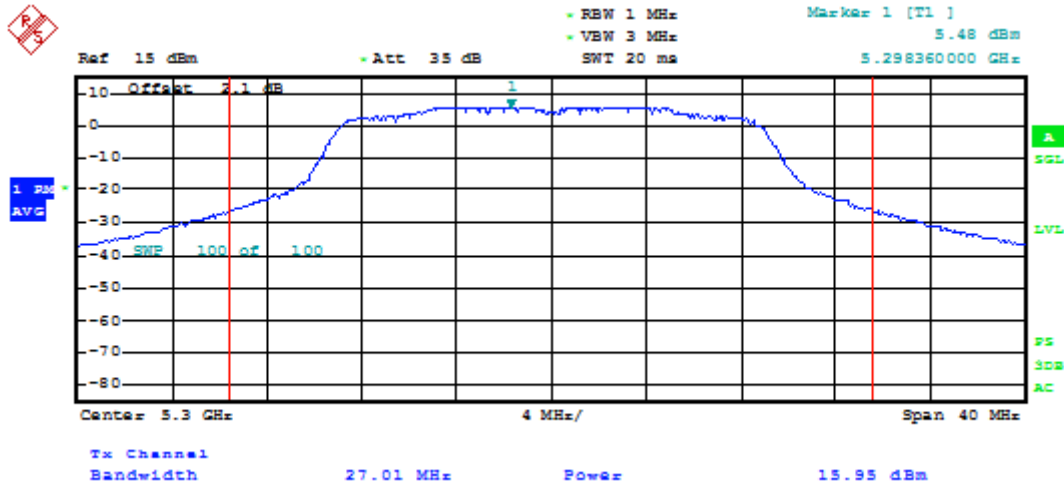


**802.11 n20 MHz and 802.11 ac 20 MHz modes CHAIN A**

Lowest Channel

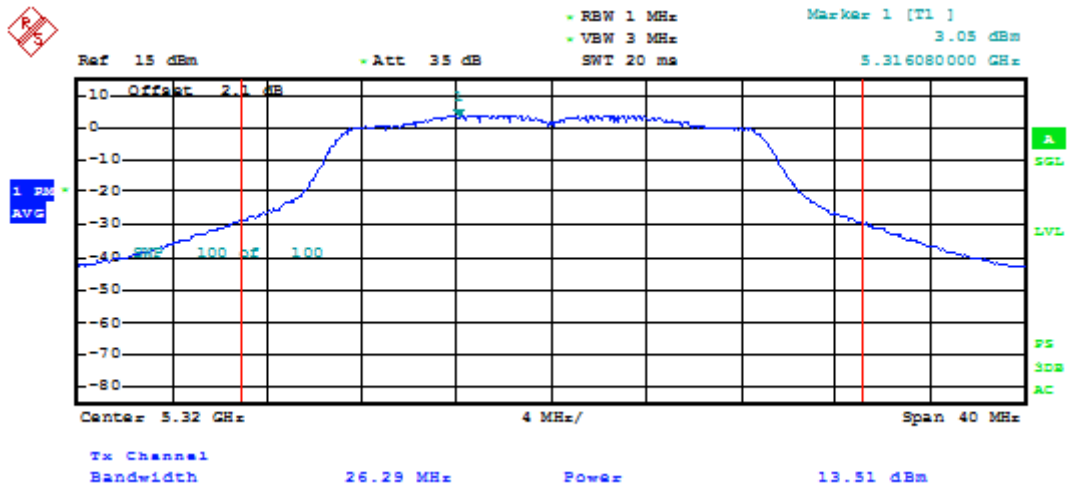


Middle Channel



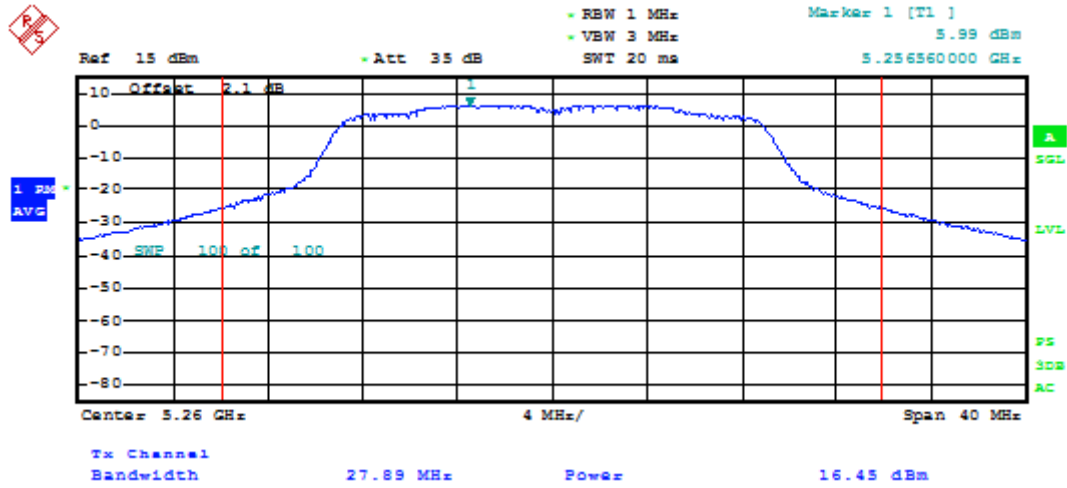


Highest Channel

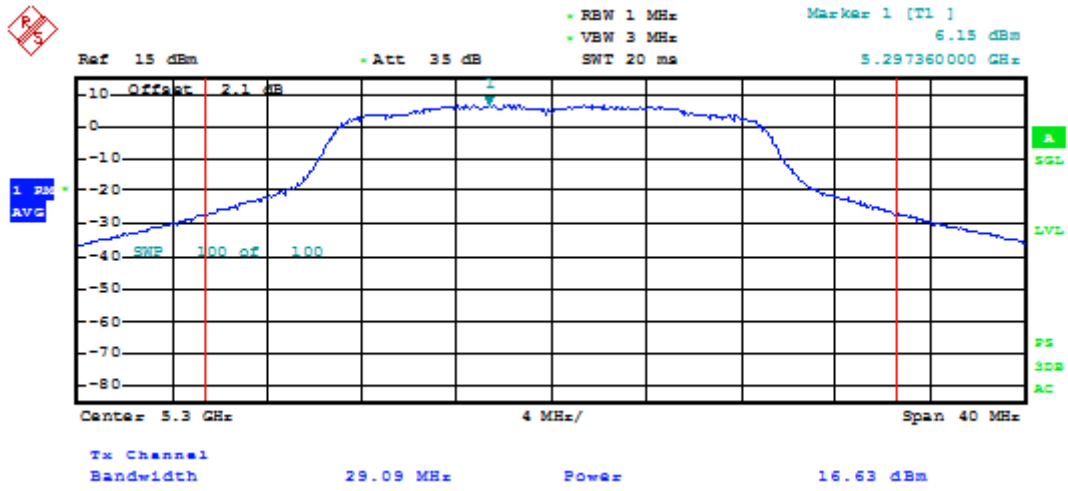


802.11 n20 MHz and 802.11 ac 20 MHz modes CHAIN B

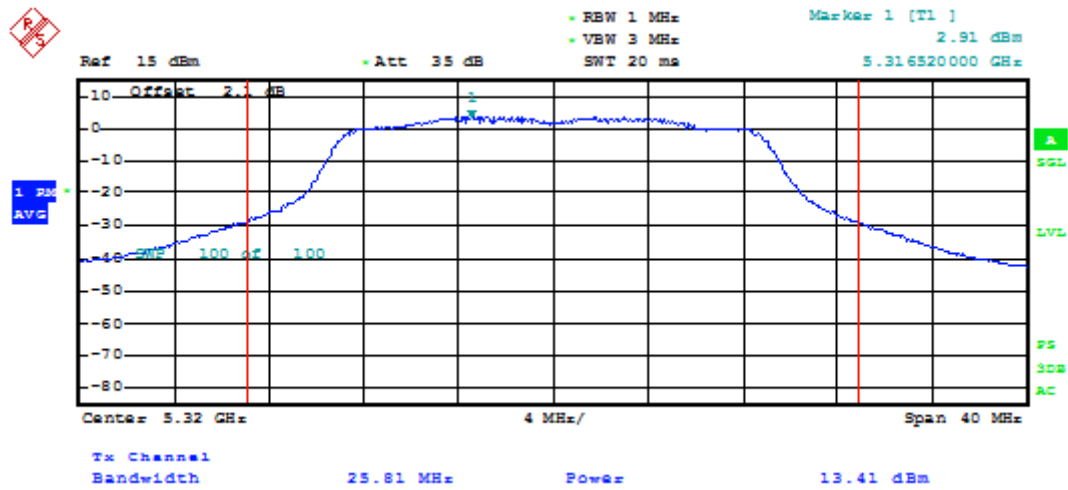
Lowest Channel



Middle Channel

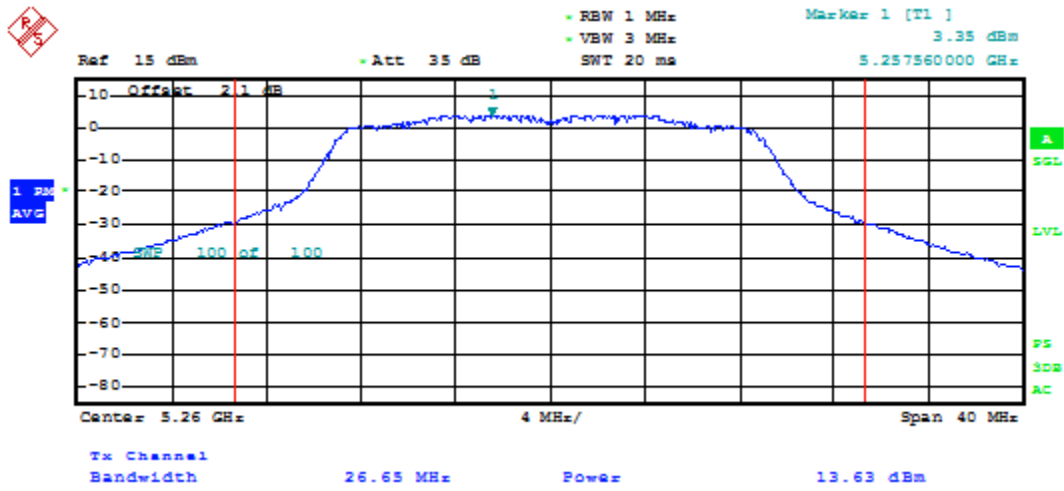


Highest Channel

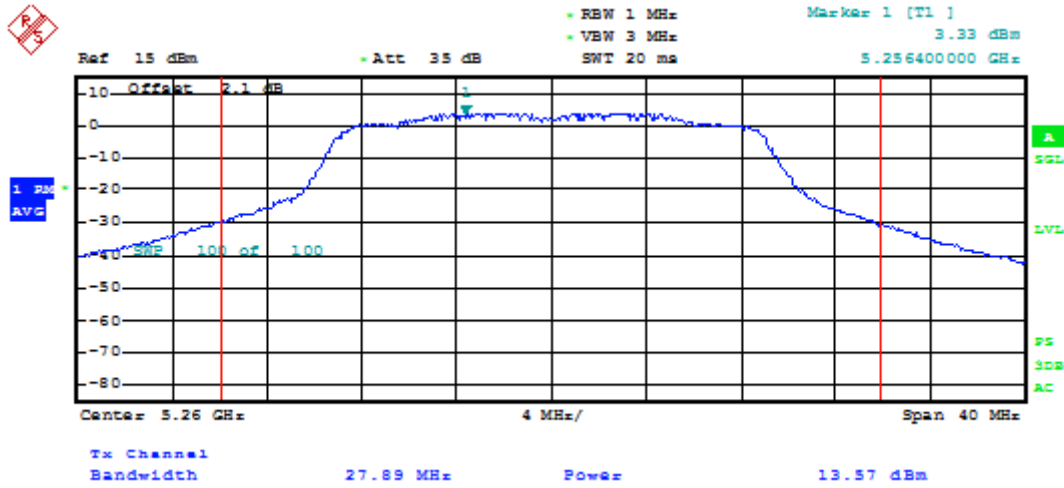


**802.11 n20 MHz and 802.11 ac 20 MHz modes** CHAIN A+B

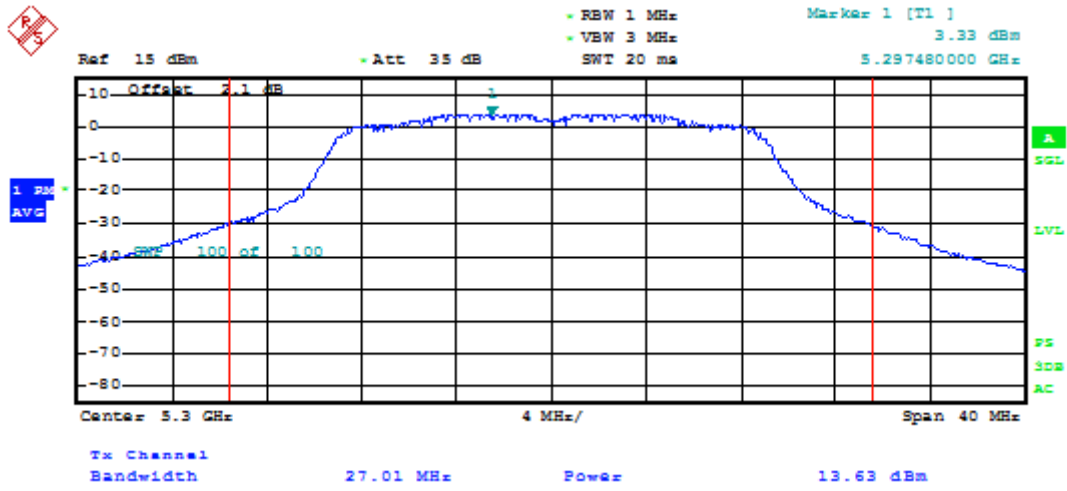
Lowest Channel. Chain A.



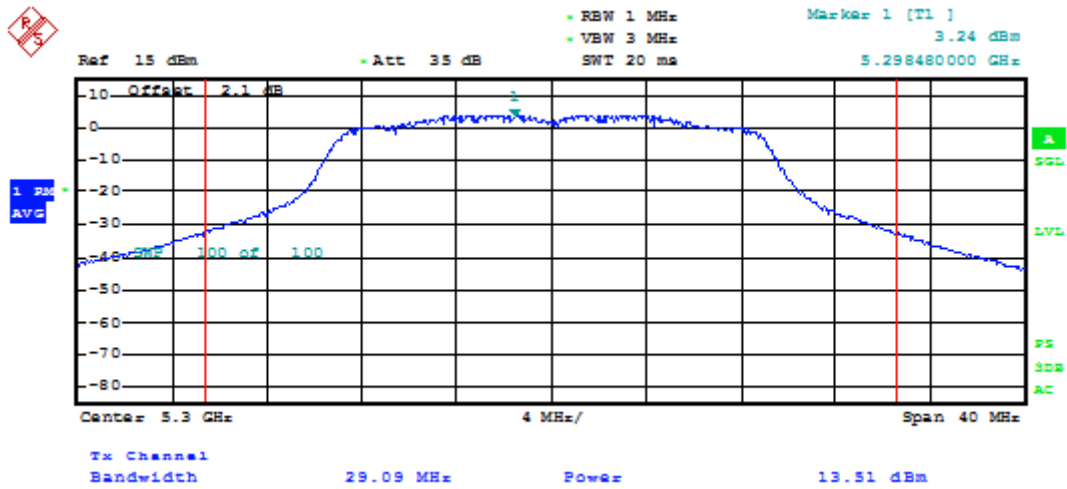
Lowest Channel. Chain B.



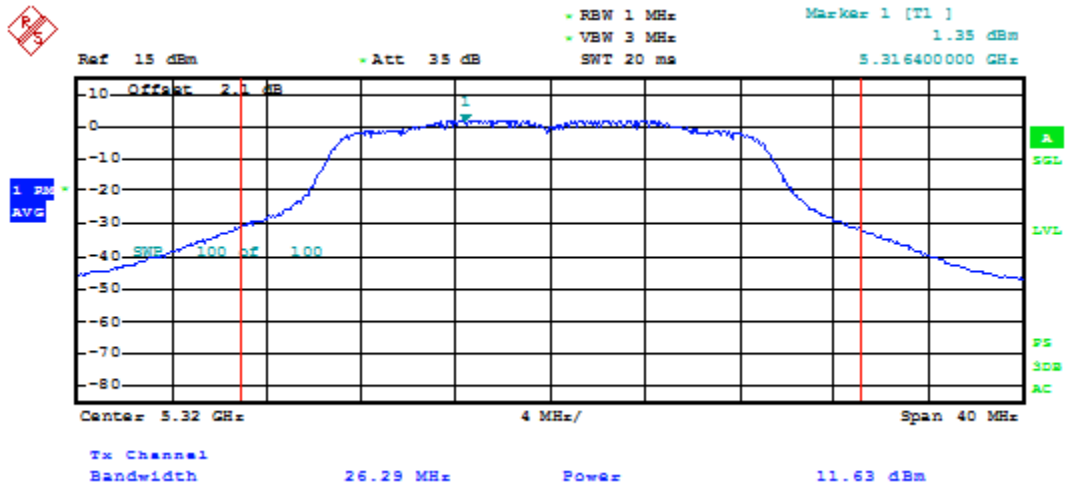
Middle Channel. Chain A.



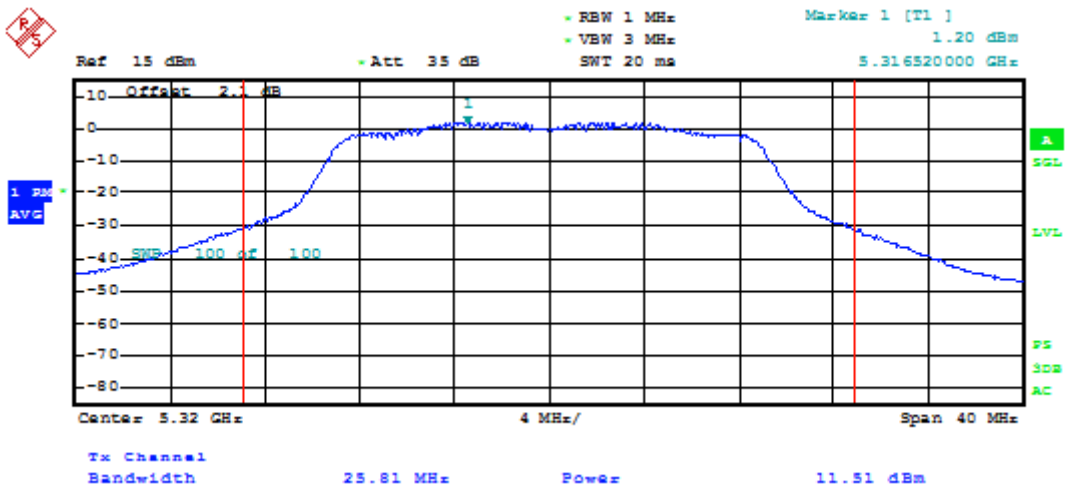
Middle Channel. Chain B.



Highest Channel. Chain A.

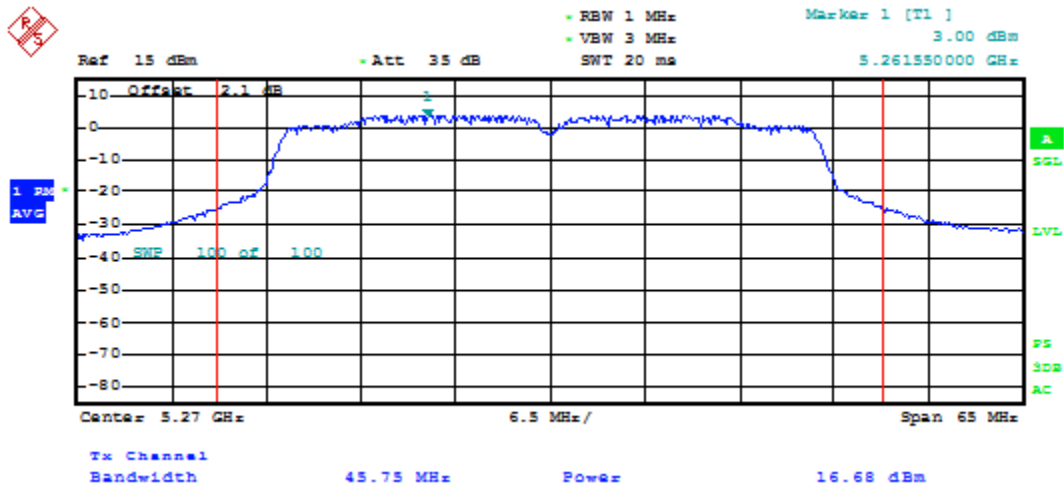


Highest Channel. Chain B.

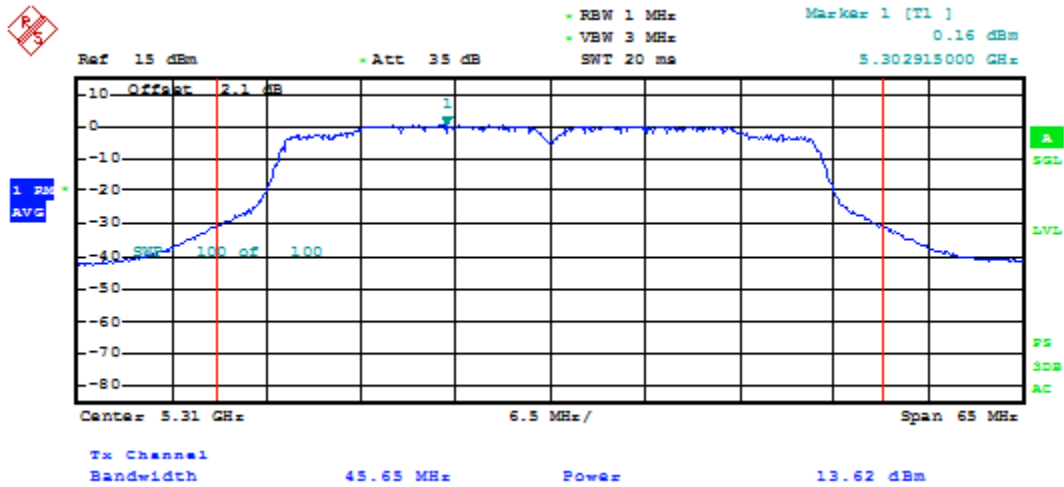


**802.11 n40 MHz and 802.11 ac 40 MHz modes CHAIN A**

Lowest Channel

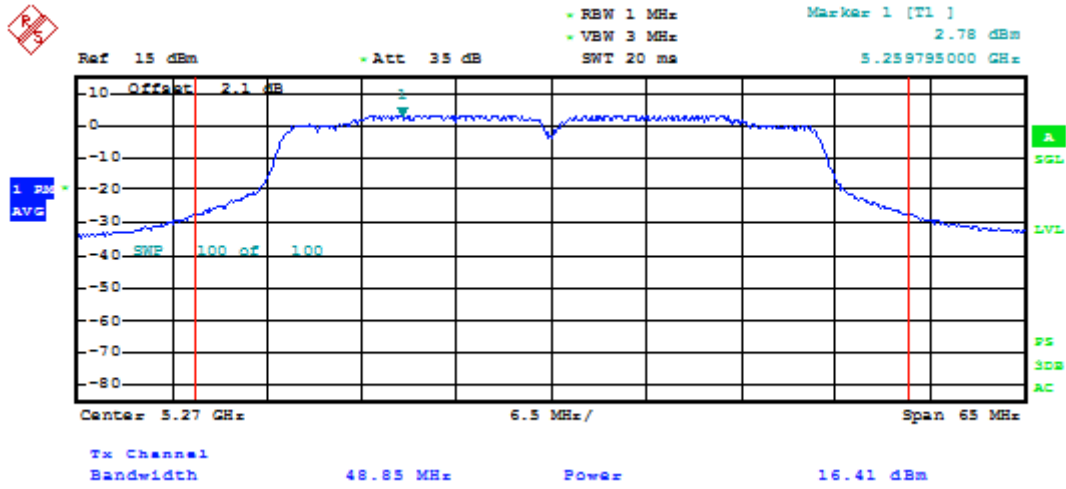


Highest Channel

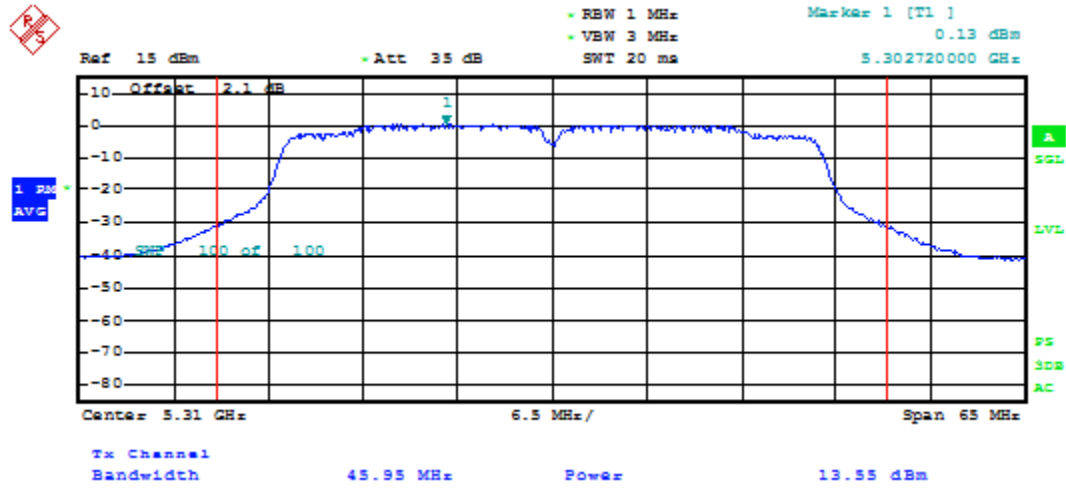


**802.11 n40 MHz and 802.11 ac 40 MHz modes CHAIN B**

Lowest Channel

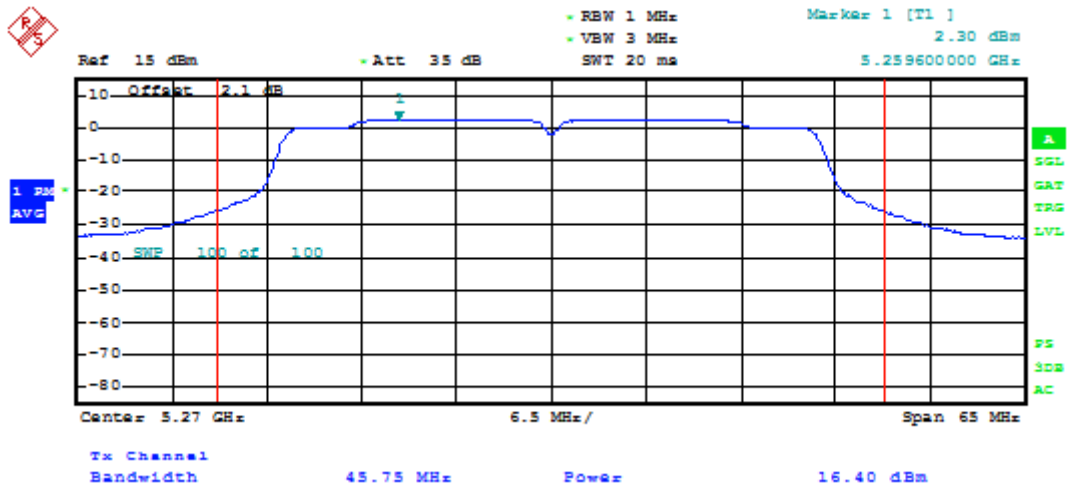


Highest Channel

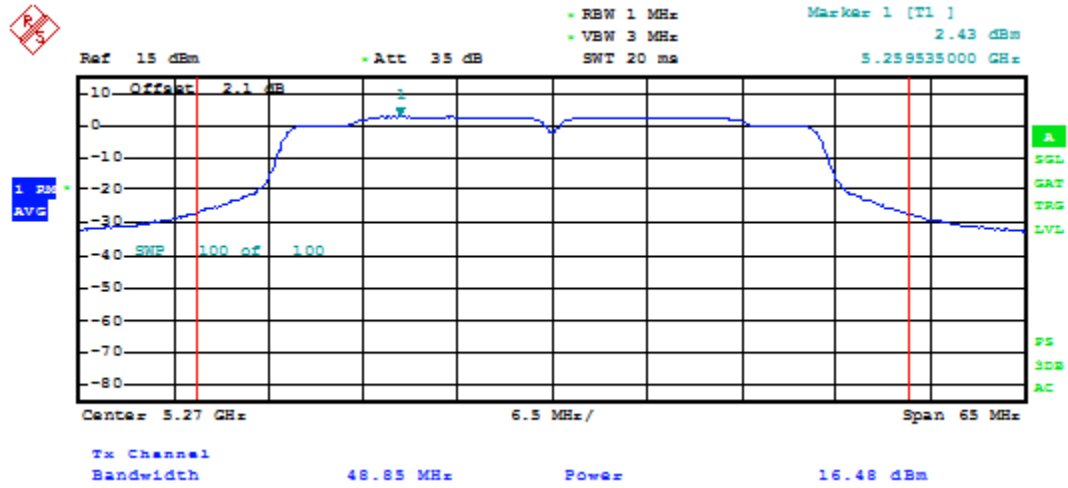


**802.11 n40 MHz and 802.11 ac 40 MHz modes CHAIN A+B**

Lowest Channel. Chain A.

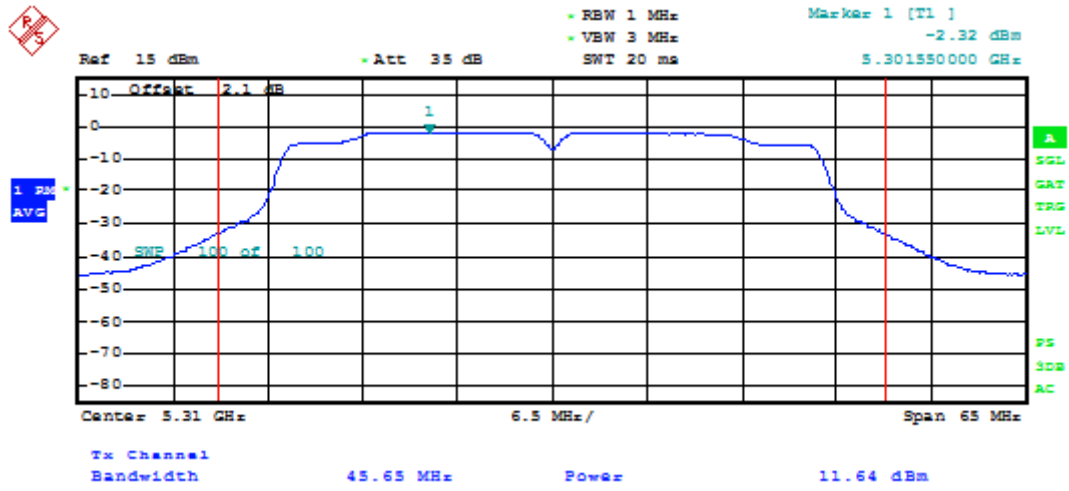


Lowest Channel. Chain B.

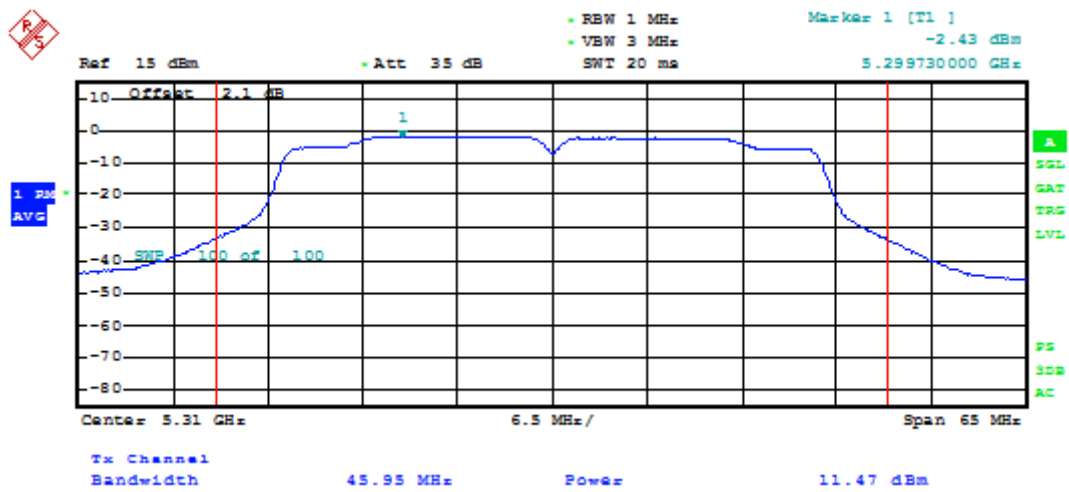




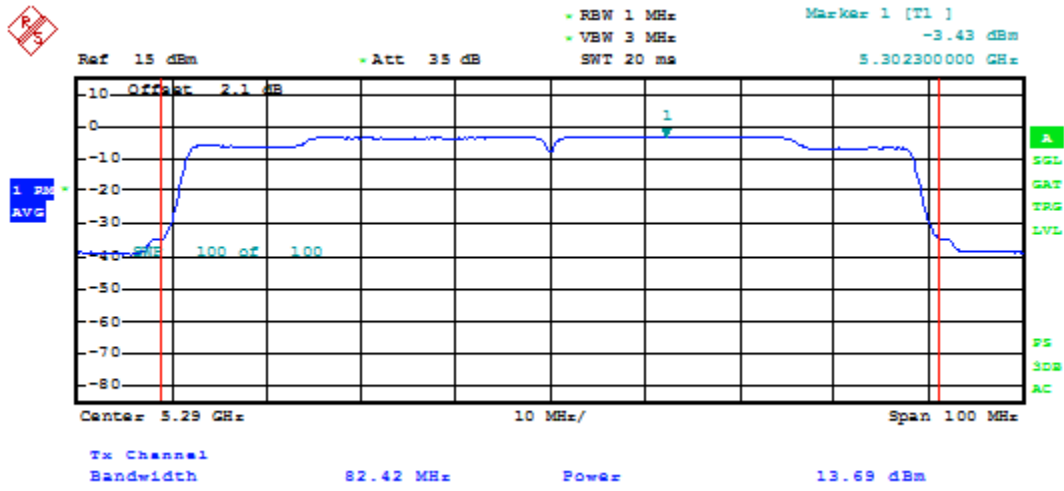
Highest Channel Chain A.



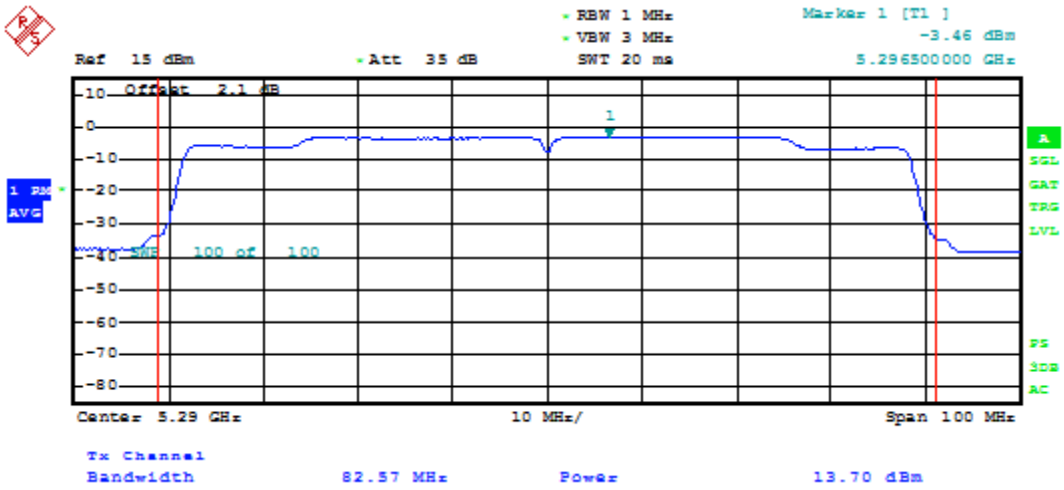
Highest Channel Chain B.



**802.11 ac 80 MHz mode CHAIN A**

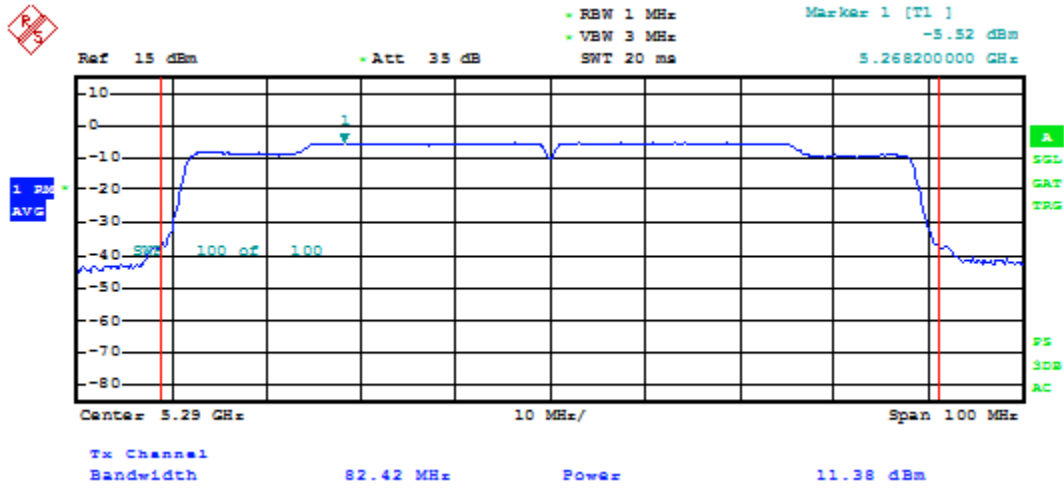


**802.11 ac 80 MHz mode CHAIN B**

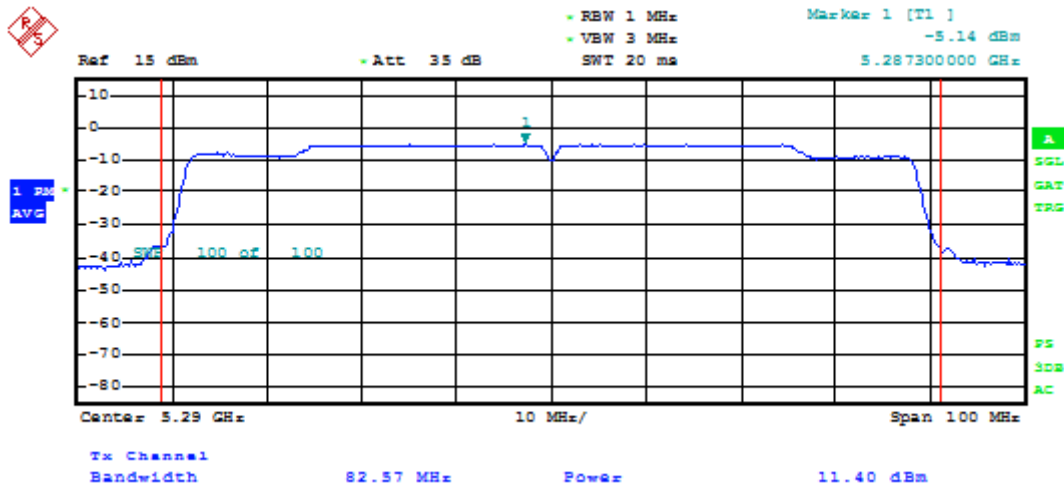


**802.11 ac 80 MHz mode** CHAIN A+B

Chain A.



Chain B.



**Section 15.407 Subclause (b) (2) / RSS-210 A9.2. (2). Undesirable radiated emissions (Transmitter) 1 to 40 GHz**

**SPECIFICATION**

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 EIRP of -27 dBm/MHz (68.23 dBμV/m at 3 m distance).

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)):

Frequency Range (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	300
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 40000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

**RESULTS:**

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 1m for the frequency range 1 GHz-40 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

The equipment transmits continuously in the selected channel so it is not necessary a duty cycle correction factor.

### Frequency range 30 MHz-1 GHz

The spurious signals detected do not depend on either the operating channel or the modulation mode.

See test results in Appendix A for details.

### Frequency range 1 GHz-40 GHz

The results in the next tables show the maximum measured levels in the 1-40 GHz range including the restricted band 5.35-5.46 GHz (see next plots).

For OFDM modulation modes (802.11a, 802.11n20, 802.11n40 and 802.11ac80), a preliminary measurement in the central channel in the range 1-18 GHz was performed to determine the worst case. The lowest and highest channels were measured for out-of-band emissions for the worst case (802.11a).

The field strength at the band edges was evaluated for each mode and on each chain individually on the lowest and highest channels at the rated power for the channel under test. Where the power at the edge channels was lower than the power at the center channels additional measurements were made at the adjacent channels. Single transmission at each chain and simultaneous transmission at both chains modes were fully evaluated.

Spurious signals with peak levels above the average limit (54 dB $\mu$ V/m at 3 m) are measured with an RMS average detector for checking compliance with the average limit.

#### 1. WiFi 5GHz 802.11 a mode

Lowest frequency 5260 MHz. Out-of-band spurious emissions in the 1-40 GHz range.

##### Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB $\mu$ V/m)	Measurement Uncertainty (dB)
15.77928	V	Peak	61.70	$\pm 4.00$
		Average	53.49	$\pm 4.00$
21.039943	V	Peak	48.81	$\pm 4.00$

##### Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB $\mu$ V/m)	Measurement Uncertainty (dB)
15.78478	V	Peak	64.25	$\pm 4.00$
		Average	53.69	$\pm 4.00$
21.039944	V	Peak	48.50	$\pm 4.00$

Middle frequency 5300 MHz. Out-of-band spurious emissions in the 1-40 GHz range and inside restricted band 5.35-5.46 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB $\mu$ V/m)	Measurement Uncertainty (dB)
5.35098	V	Peak	54.30	$\pm 4.00$
		Average	43.32	$\pm 4.00$
15.90285	V	Peak	60.06	$\pm 4.00$
		Average	51.86	$\pm 4.00$
21.199876	V	Peak	49.14	$\pm 4.00$

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB $\mu$ V/m)	Measurement Uncertainty (dB)
5.35013	V	Peak	55.92	$\pm 4.00$
		Average	44.34	$\pm 4.00$
15.90432	V	Peak	61.67	$\pm 4.00$
		Average	52.27	$\pm 4.00$
21.199876	V	Peak	49.00	$\pm 4.00$

Highest frequency 5320 MHz. Out-of-band spurious emissions in the 1-40 GHz range and inside restricted band 5.35-5.46 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB $\mu$ V/m)	Measurement Uncertainty (dB)
5.35173	V	Peak	54.97	$\pm 4.00$
		Average	43.03	$\pm 4.00$
15.95286	V	Peak	58.93	$\pm 4.00$
		Average	51.48	$\pm 4.00$
21.279948	V	Peak	48.75	$\pm 4.00$

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB $\mu$ V/m)	Measurement Uncertainty (dB)
5.350486	V	Peak	57.03	$\pm 4.00$
		Average	44.10	$\pm 4.00$
15.95748	V	Peak	58.68	$\pm 4.00$
		Average	49.51	$\pm 4.00$
21.280024	V	Peak	48.91	$\pm 4.00$

Verdict: PASS

2. WiFi 5GHz 802.11 n20 mode.

Middle frequency 5300MHz. Out-of-band spurious emissions in the 1-40 GHz range and inside restricted band 5.35-5.46 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBμV/m)	Measurement Uncertainty (dB)
5.35153	V	Peak	54.29	± 4.00
		Average	43.43	± 4.00
15.90285	V	Peak	60.68	± 4.00
		Average	51.41	± 4.00
21.199827	V	Peak	50.55	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBμV/m)	Measurement Uncertainty (dB)
5.35176	V	Peak	55.49	± 4.00
		Average	44.55	± 4.00
15.90102	V	Peak	60.99	± 4.00
		Average	51.37	± 4.00
21.200013	V	Peak	50.75	± 4.00

Chain A+B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBμV/m)	Measurement Uncertainty (dB)
5.35095	V	Peak	54.89	± 4.00
		Average	44.23	± 4.00
10.96935	V	Peak	52.15	± 4.00
15.90395	V	Peak	60.23	± 4.00
		Average	49.53	± 4.00
21.199721	V	Peak	50.24	± 4.00

Highest frequency 5320 MHz. Spurious emissions inside restricted band 5.35-5.46 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBμV/m)	Measurement Uncertainty (dB)
5.350678	V	Peak	56.86	± 4.00
		Average	43.13	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB $\mu$ V/m)	Measurement Uncertainty (dB)
5.35015	V	Peak	56.13	$\pm 4.00$
		Average	44.14	$\pm 4.00$

Chain A+B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB $\mu$ V/m)	Measurement Uncertainty (dB)
5.35021	V	Peak	56.42	$\pm 4.00$
		Average	43.93	$\pm 4.00$

Verdict: PASS

3. WiFi 5GHz 802.11 n40 mode

Lowest frequency 5270 MHz. Spurious emissions inside restricted band 5.35-5.46 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB $\mu$ V/m)	Measurement Uncertainty (dB)
5.35651	V	Peak	54.56	$\pm 4.00$
		Average	43.34	$\pm 4.00$

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB $\mu$ V/m)	Measurement Uncertainty (dB)
5.35445	V	Peak	54.60	$\pm 4.00$
		Average	43.41	$\pm 4.00$

Chain A+B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB $\mu$ V/m)	Measurement Uncertainty (dB)
5.35418	V	Peak	56.36	$\pm 4.00$
		Average	45.49	$\pm 4.00$

Verdict: PASS



Highest frequency 5310 MHz. Out-of-band spurious emissions in the 1-40 GHz range and inside restricted band 5.35-5.46 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB $\mu$ V/m)	Measurement Uncertainty (dB)
5.35061	V	Peak	56.60	$\pm 4.00$
		Average	45.49	$\pm 4.00$
15.92852	V	Peak	54.97	$\pm 4.00$
		Average	45.13	$\pm 4.00$
21.239902	V	Peak	50.67	$\pm 4.00$

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB $\mu$ V/m)	Measurement Uncertainty (dB)
5.35101	V	Peak	56.37	$\pm 4.00$
		Average	45.31	$\pm 4.00$
15.93328	V	Peak	53.94	$\pm 4.00$
21.239797	V	Peak	50.58	$\pm 4.00$

Chain A+B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB $\mu$ V/m)	Measurement Uncertainty (dB)
5.35086	V	Peak	54.29	$\pm 4.00$
		Average	43.58	$\pm 4.00$
15.93255	V	Peak	52.07	$\pm 4.00$
21.239919	V	Peak	50.49	$\pm 4.00$

Verdict: PASS

4. WiFi 5GHz 802.11 ac80 mode

Middle frequency 5290 MHz. Out-of-band spurious emissions in the 1-40 GHz range and inside restricted band 5.35-5.46 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB $\mu$ V/m)	Measurement Uncertainty (dB)
5.37045	V	Peak	58.38	$\pm 4.00$
		Average	46.46	$\pm 4.00$
15.90285	V	Peak	54.77	$\pm 4.00$
		Average	47.20	$\pm 4.00$
21.160019	V	Peak	50.65	$\pm 4.00$

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB $\mu$ V/m)	Measurement Uncertainty (dB)
5.35001	V	Peak	61.75	$\pm 4.00$
		Average	49.64	$\pm 4.00$
15.88562	V	Peak	56.29	$\pm 4.00$
		Average	46.04	$\pm 4.00$
21.159912	V	Peak	50.53	$\pm 4.00$

Chain A+B

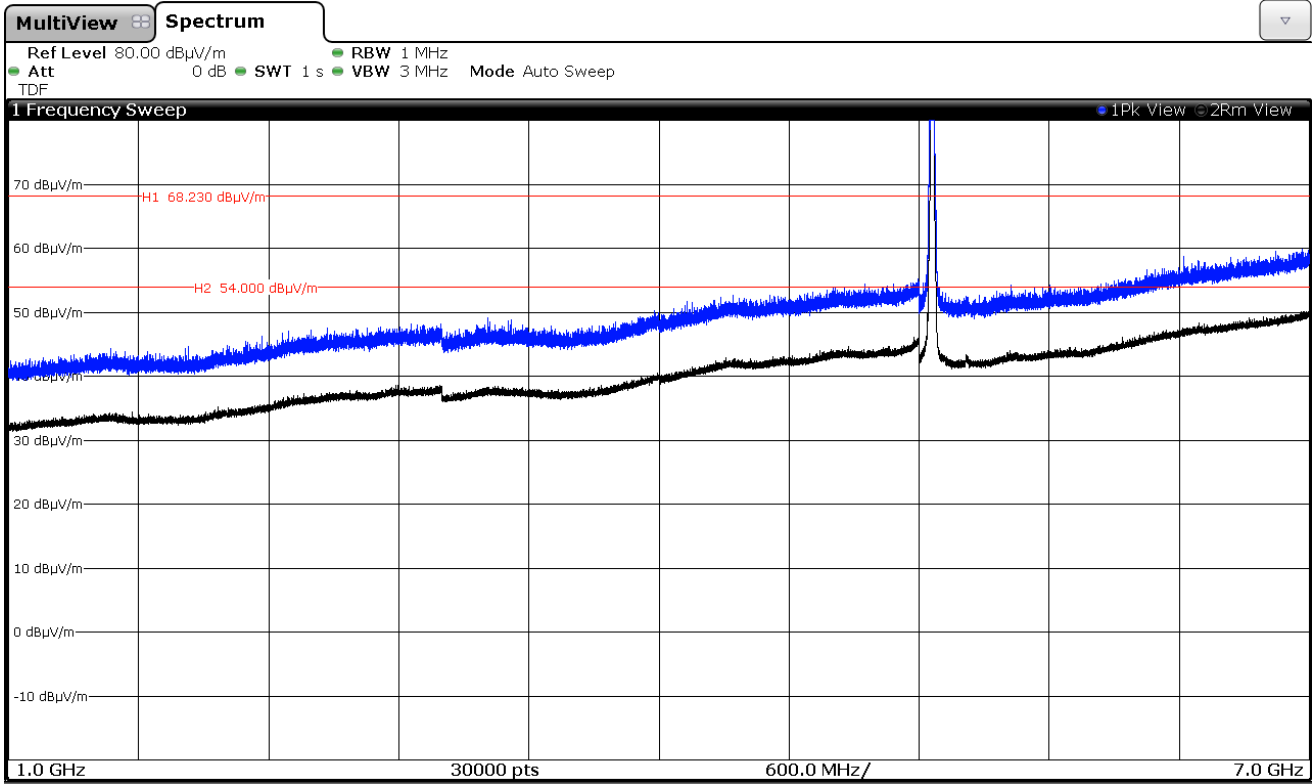
Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB $\mu$ V/m)	Measurement Uncertainty (dB)
5.35178	V	Peak	59.70	$\pm 4.00$
		Average	47.48	$\pm 4.00$
15.90285	V	Peak	53.02	$\pm 4.00$
21.129764	V	Peak	50.50	$\pm 4.00$

Verdict: PASS

**FREQUENCY RANGE 1 GHz to 7 GHz.**

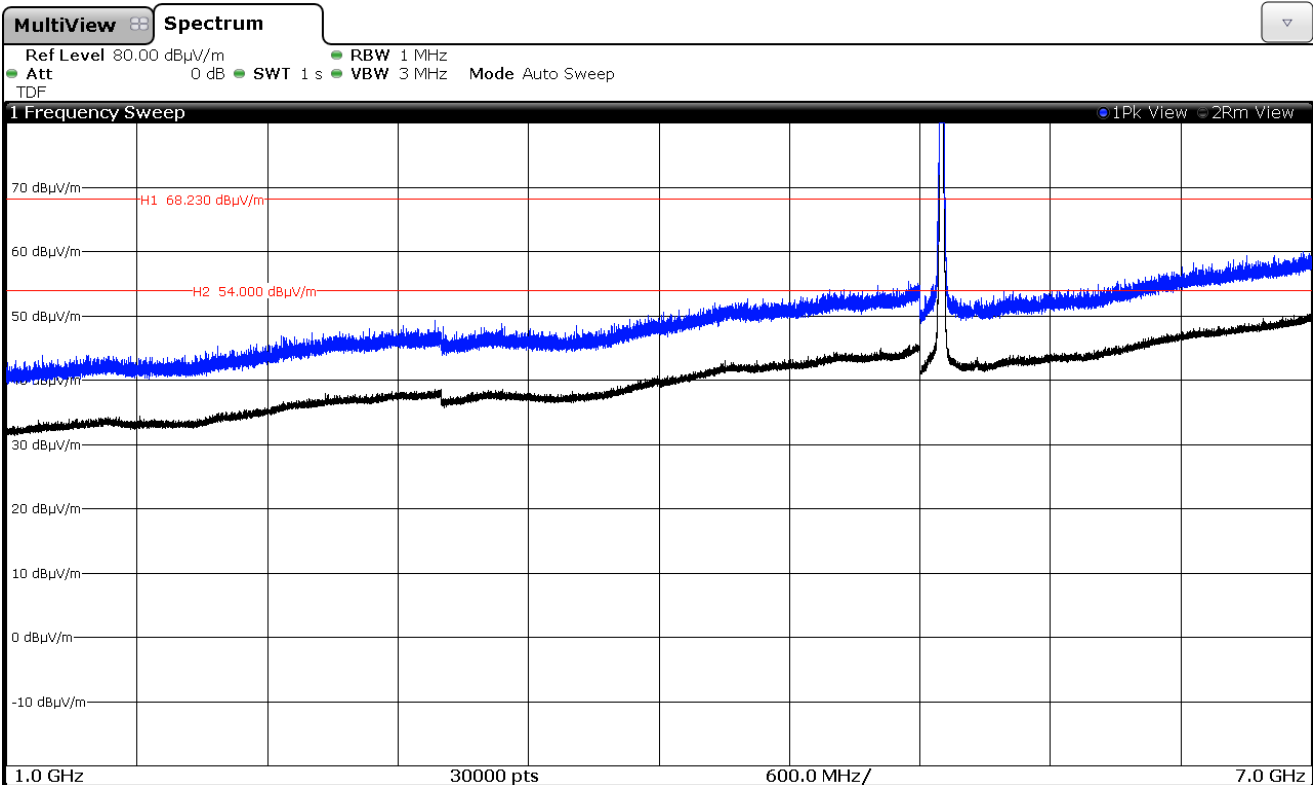
1. WiFi 5GHz 802.11 a mode

Lowest frequency 5260 MHz.



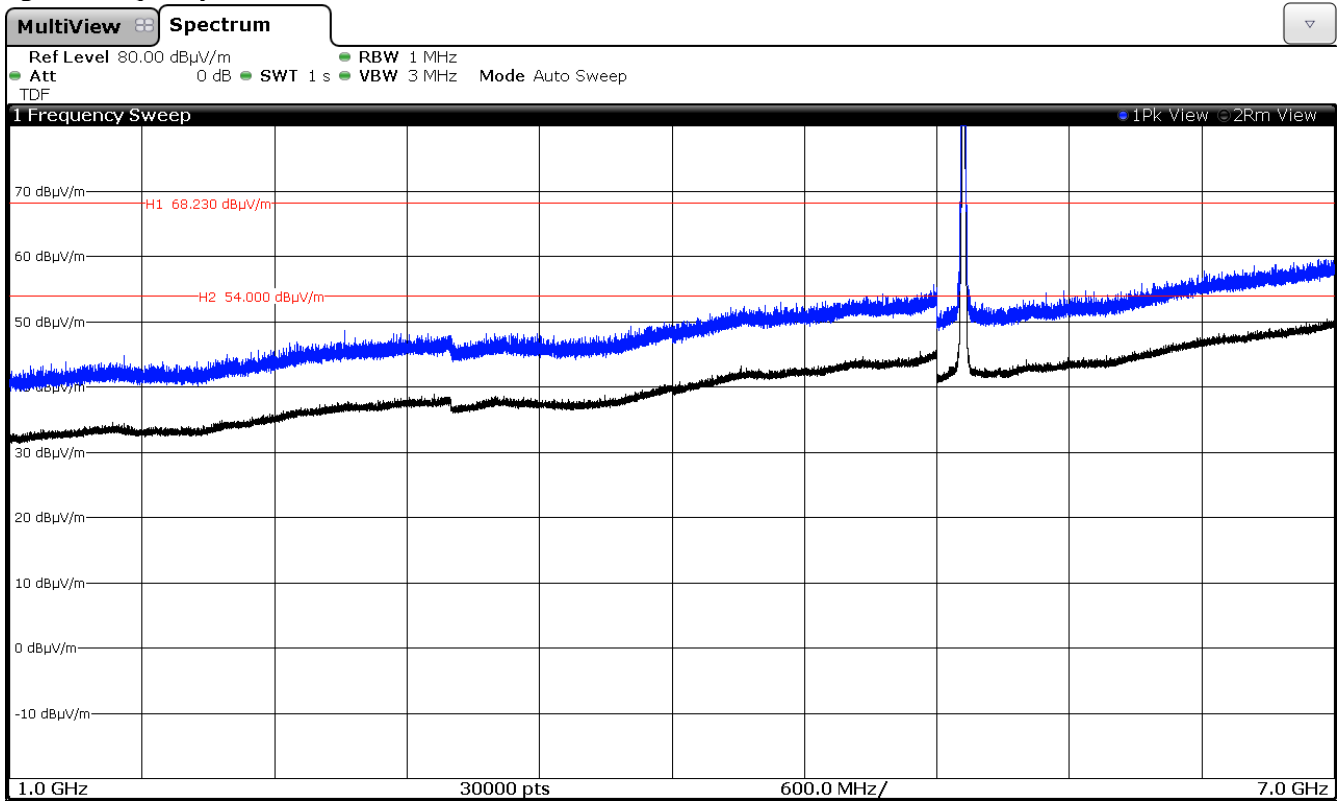
Note: The peak above the limit is the carrier frequency. This plot is valid for both Chain A and Chain B.

Middle frequency 5300 MHz.



Note: The peak above the limit is the carrier frequency. This plot is valid for both Chain A and Chain B.

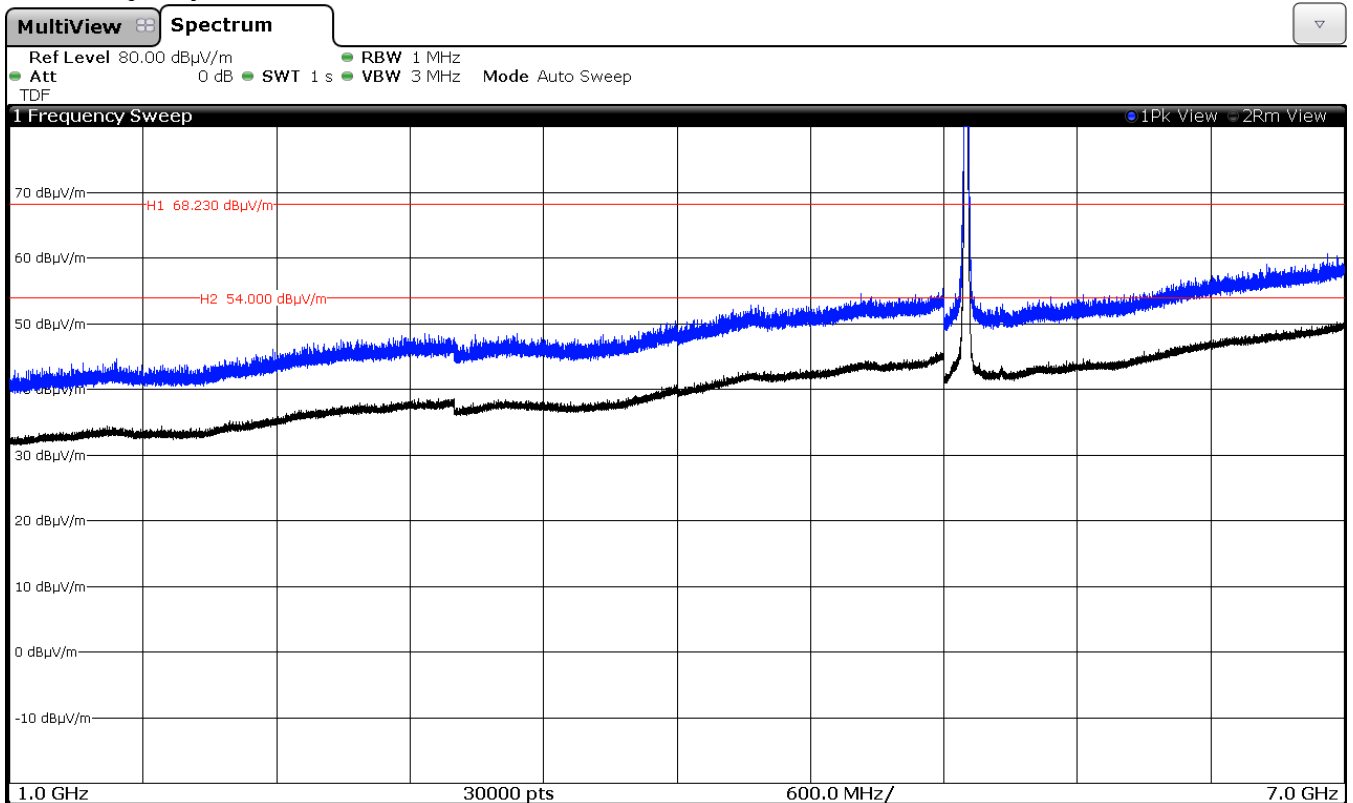
Highest frequency 5320 MHz.



Note: The peak above the limit is the carrier frequency. This plot is valid for both Chain A and Chain B.

2. WiFi 5GHz 802.11 n20 mode

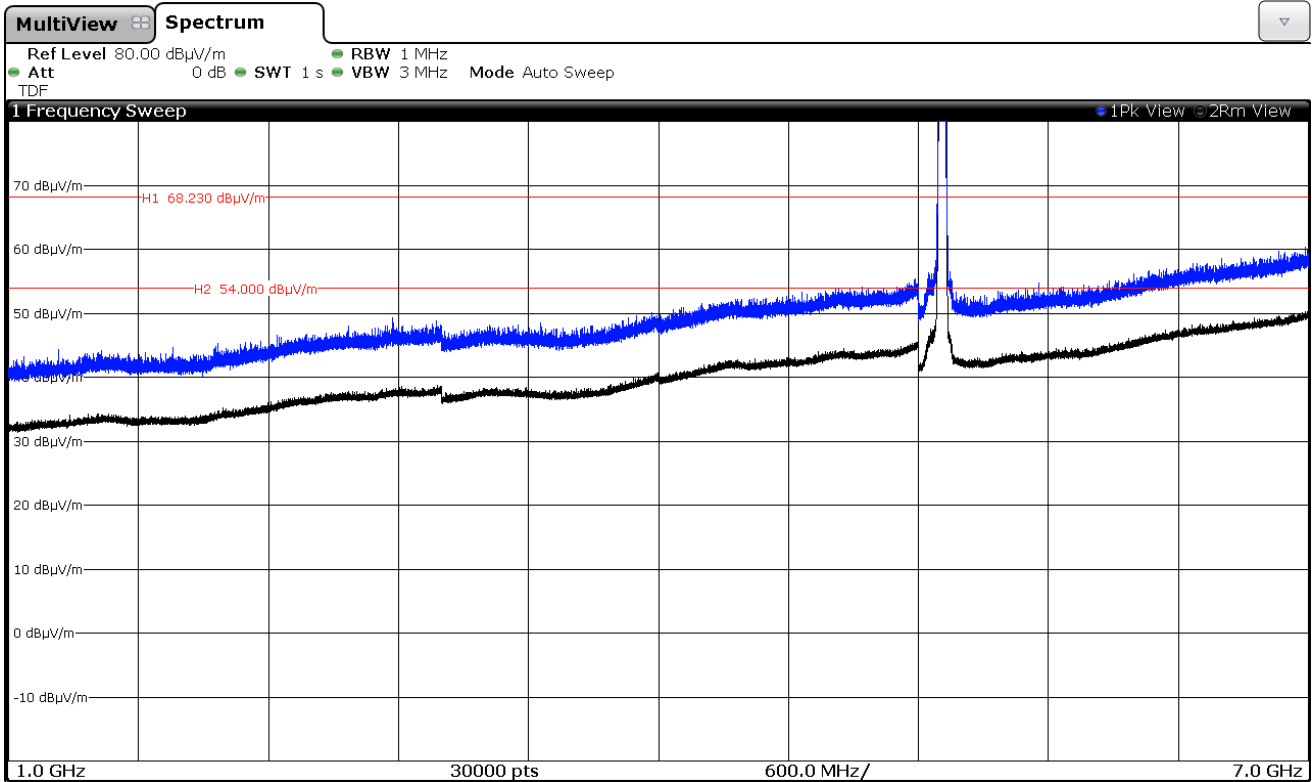
Middle frequency 5300 MHz.



Note: The peak above the limit is the carrier frequency. This plot is valid for Chain A, Chain B, Chain A+B.

### 3. WiFi 5GHz 802.11 n40 mode

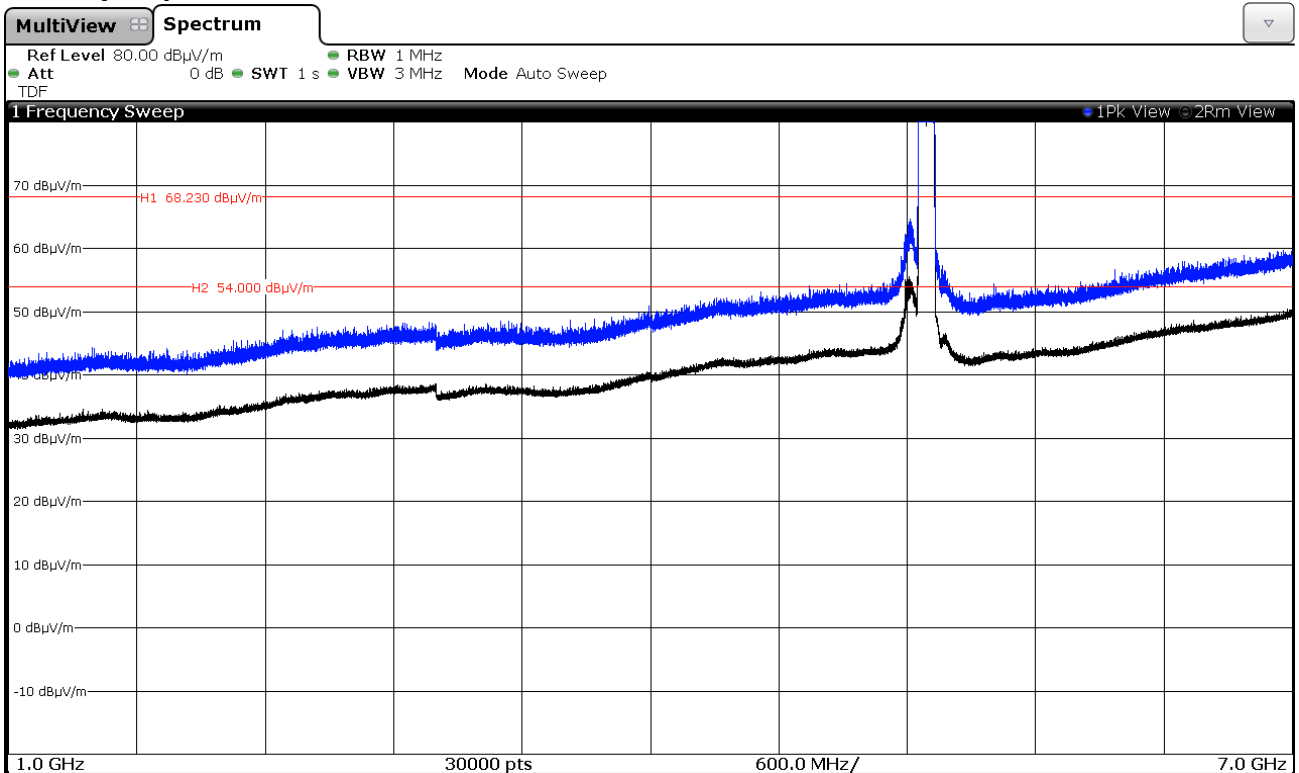
Highest frequency 5310 MHz.



Note: The peak above the limit is the carrier frequency. This plot is valid for Chain A, Chain B, Chain A+B.

### 4. WiFi 5GHz 802.11 ac80 mode

Middle frequency 5290 MHz.



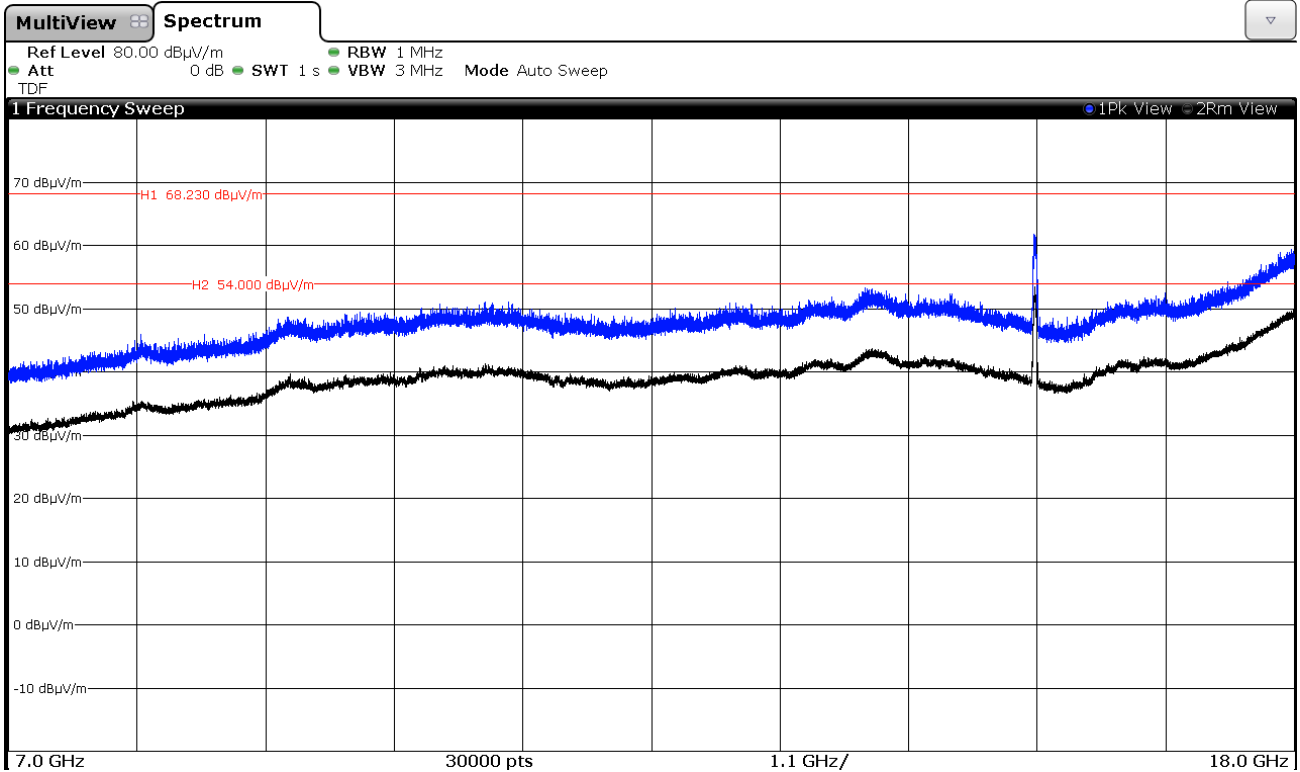
Note: The peak above the limit is the carrier frequency. This plot is valid for Chain A, Chain B, Chain A+B.

**FREQUENCY RANGE 7 GHz to 18 GHz.**

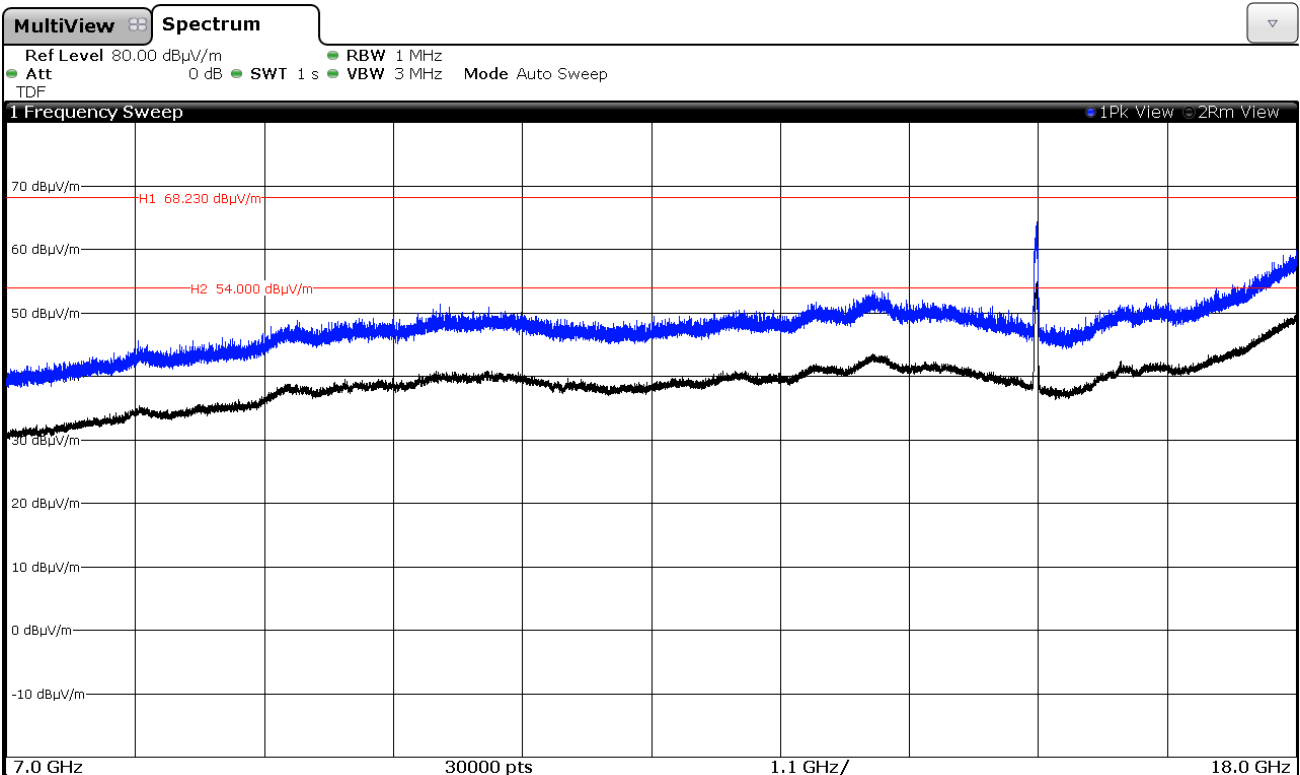
1. WiFi 5GHz 802.11 a mode

Lowest frequency 5260 MHz.

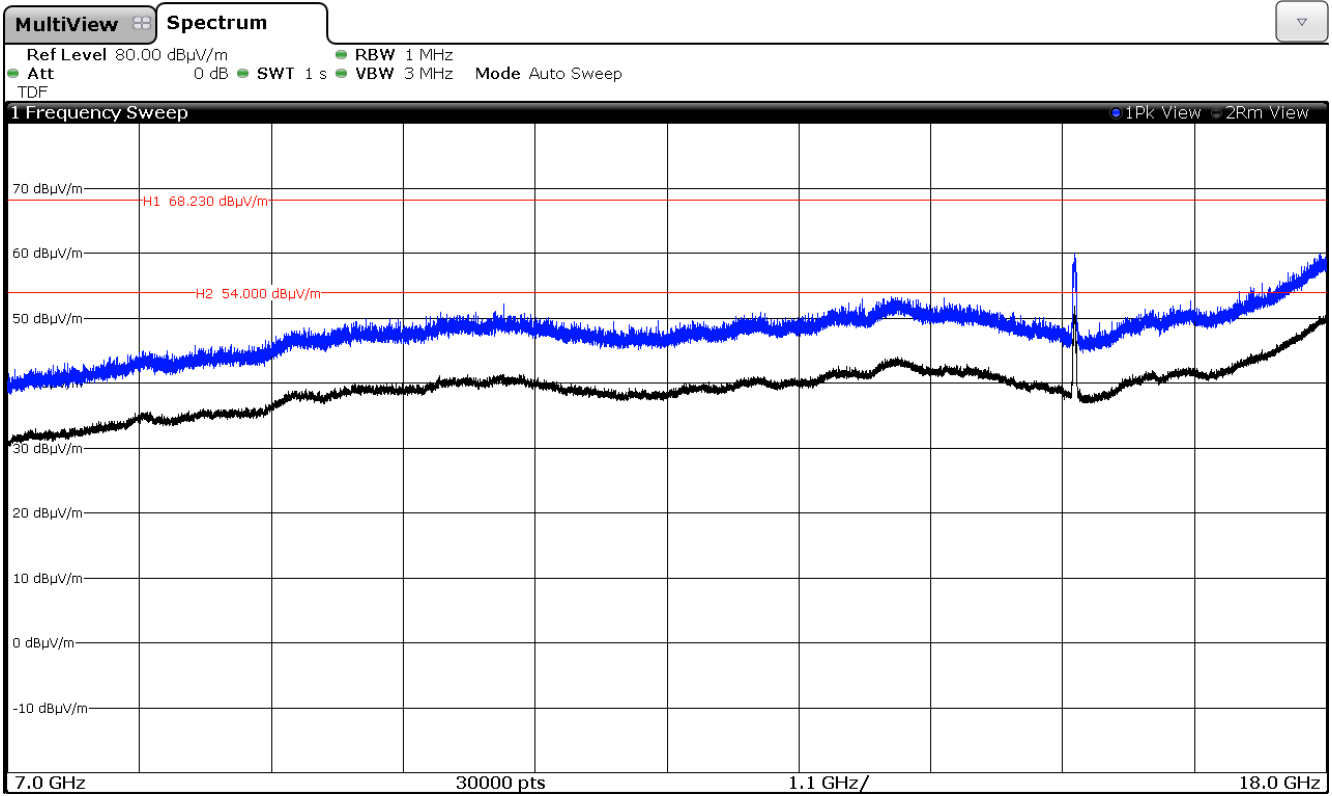
Chain A



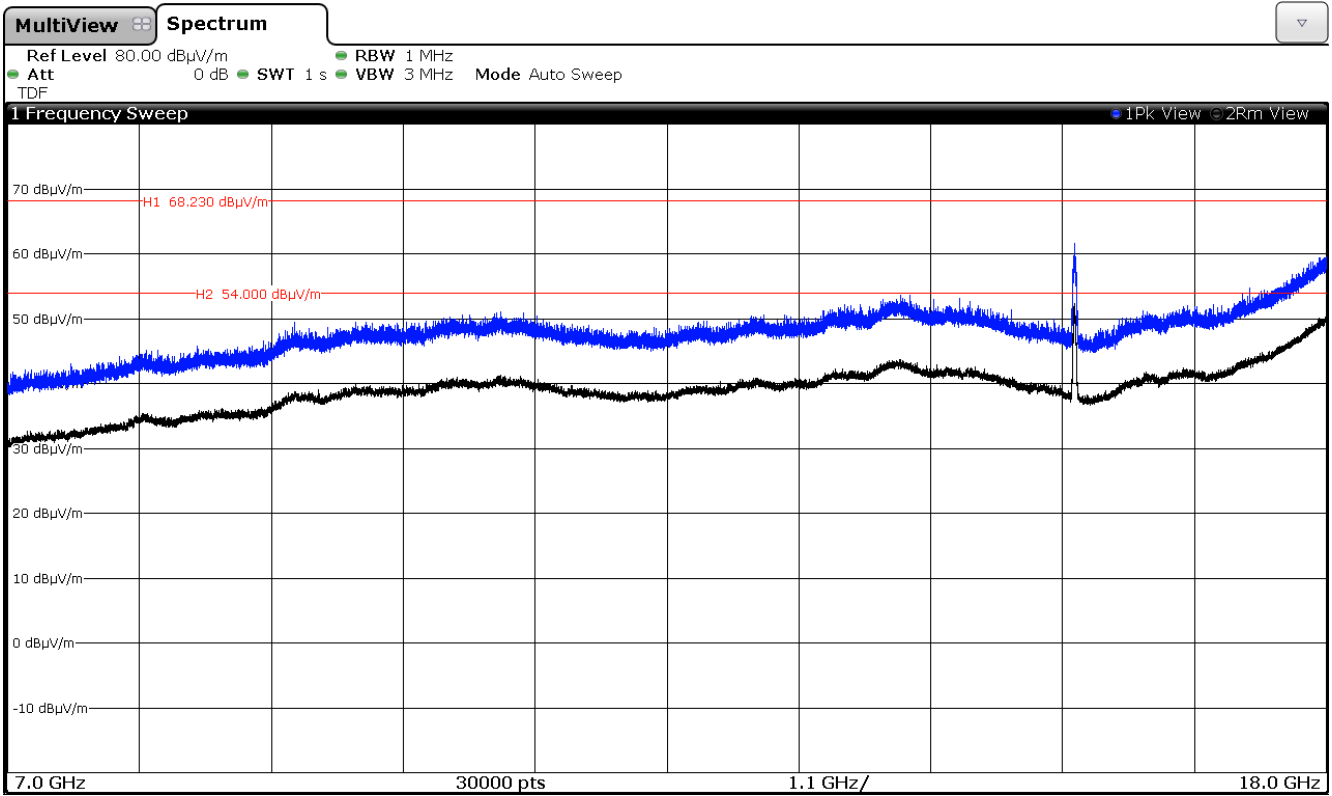
Chain B



Middle frequency 5300 MHz.  
 Chain A

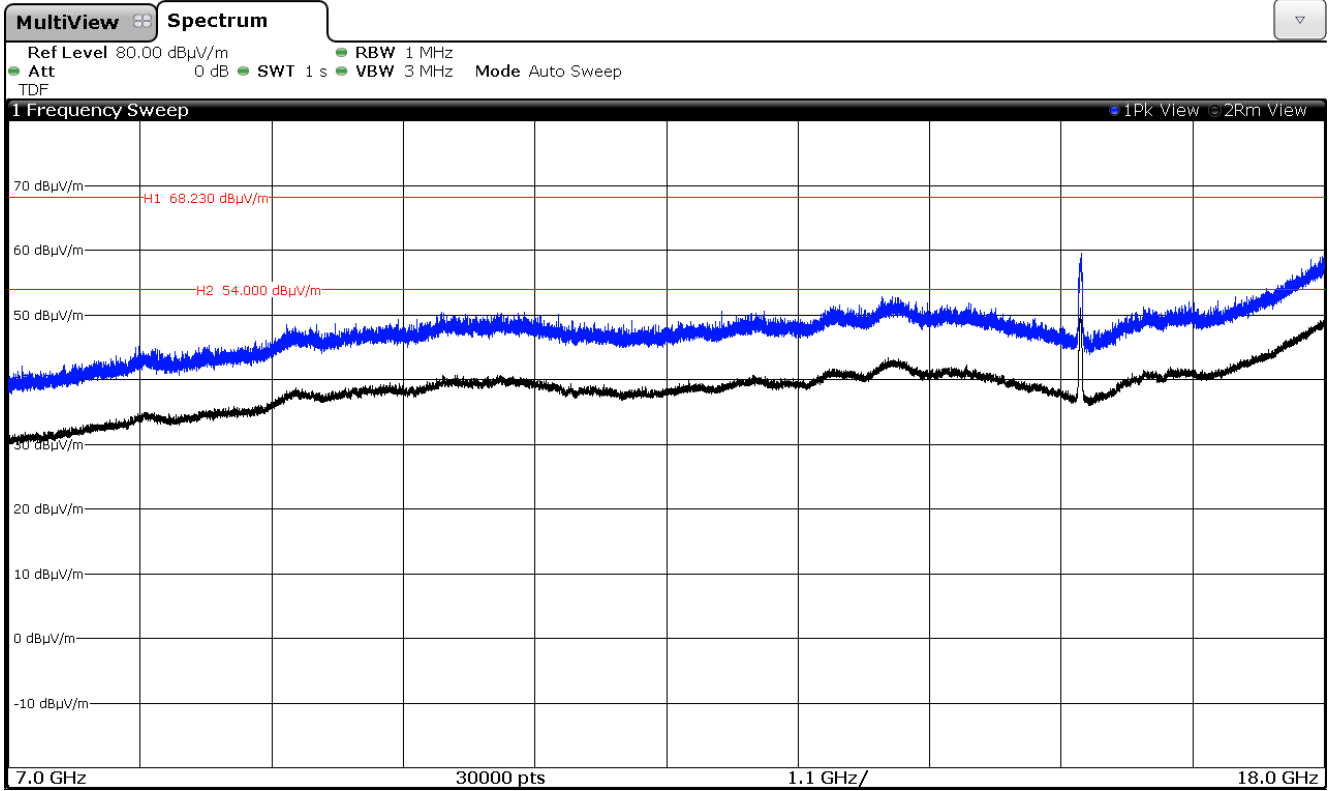


Chain B

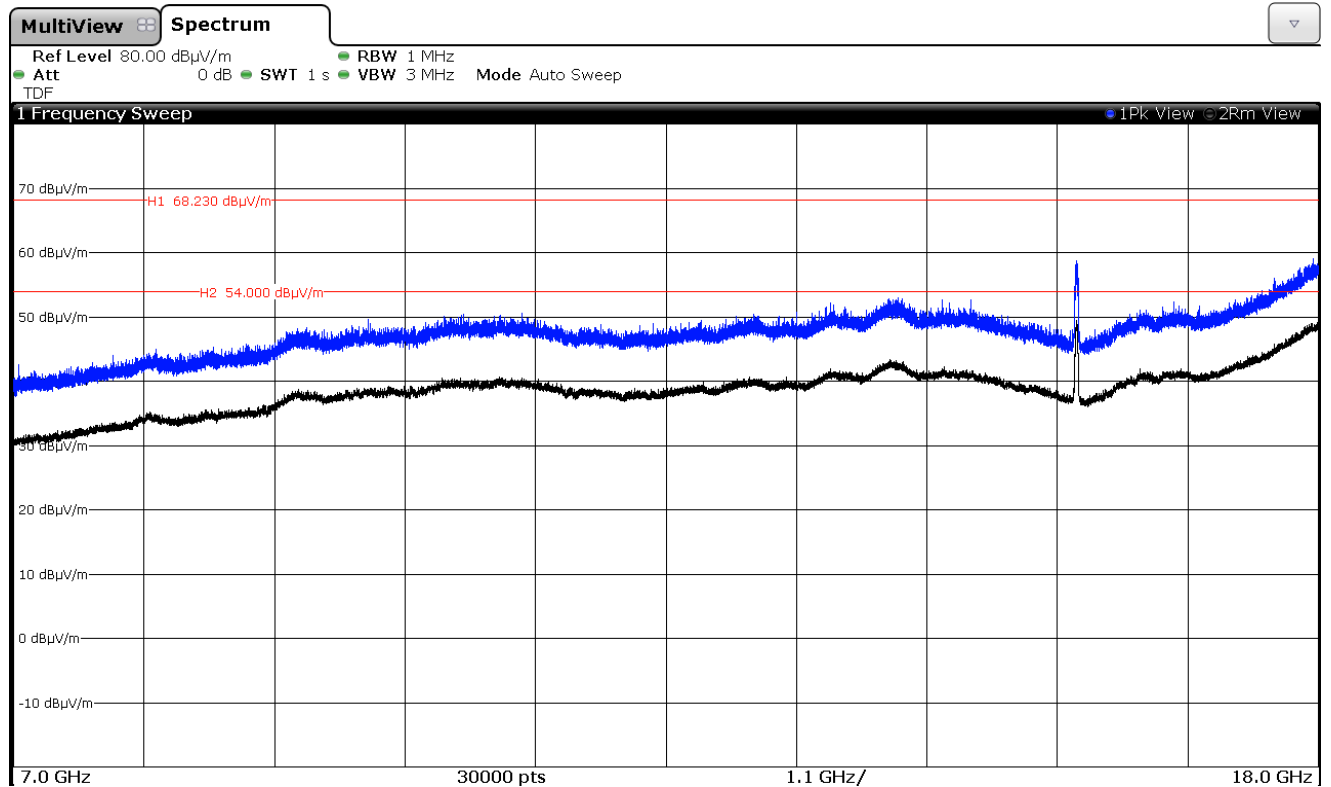


Highest frequency 5320 MHz.

Chain A



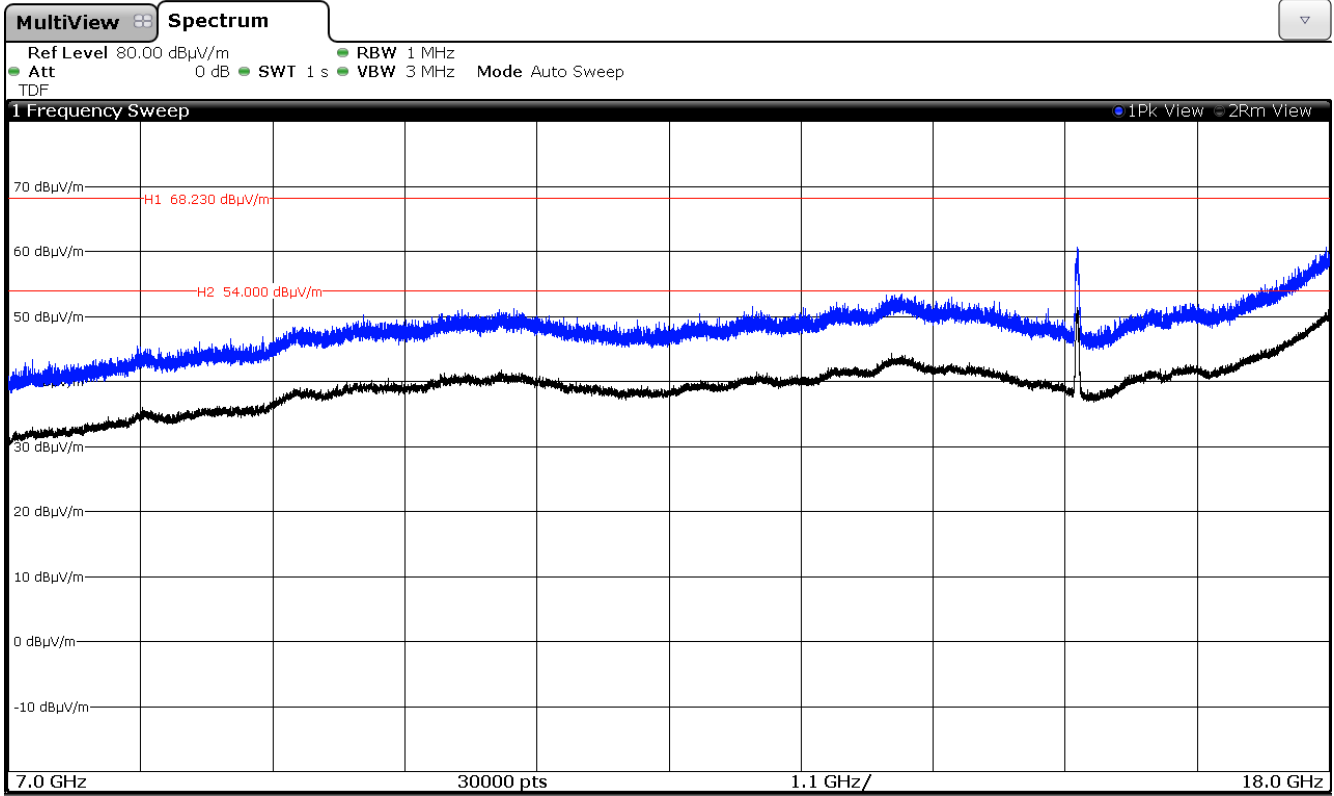
Chain B



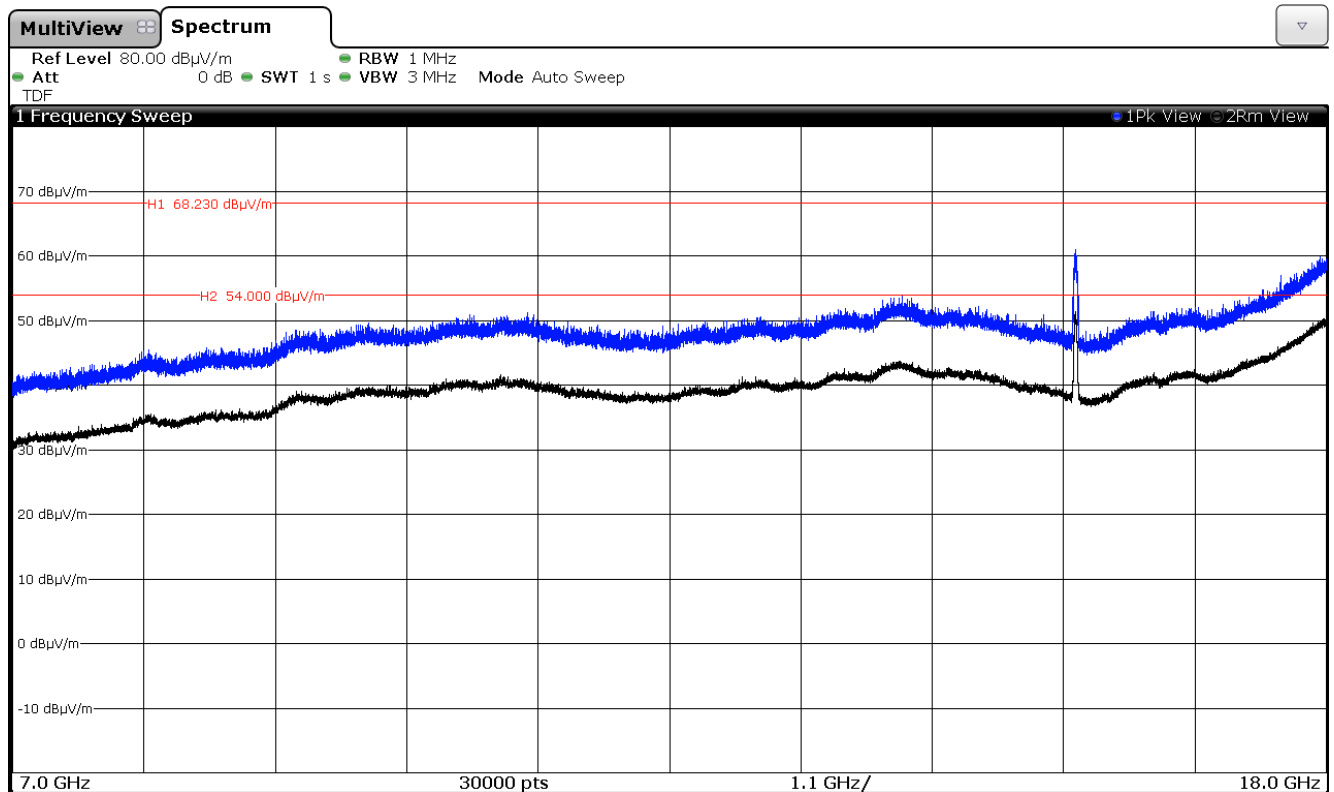


2. WiFi 5GHz 802.11 n20 mode

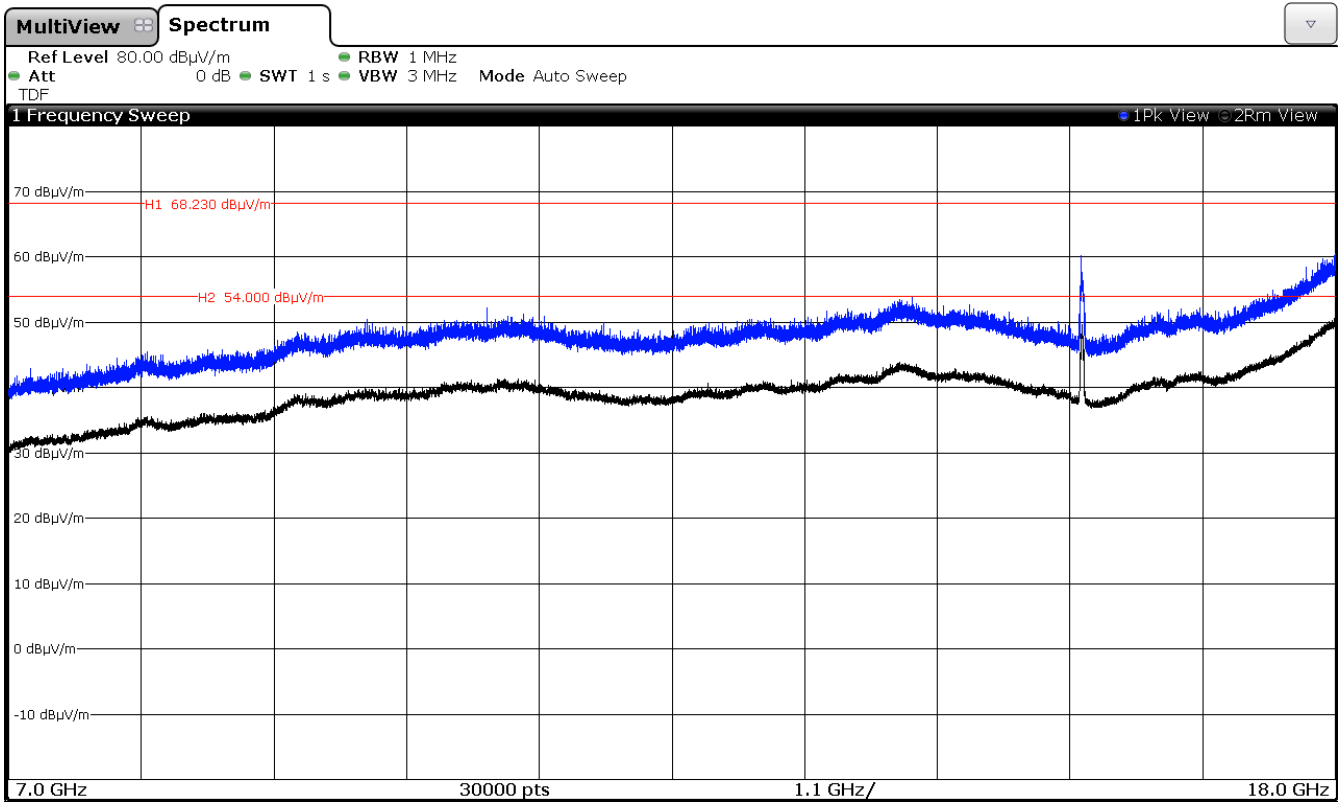
Middle frequency 5300 MHz.  
 Chain A



Chain B



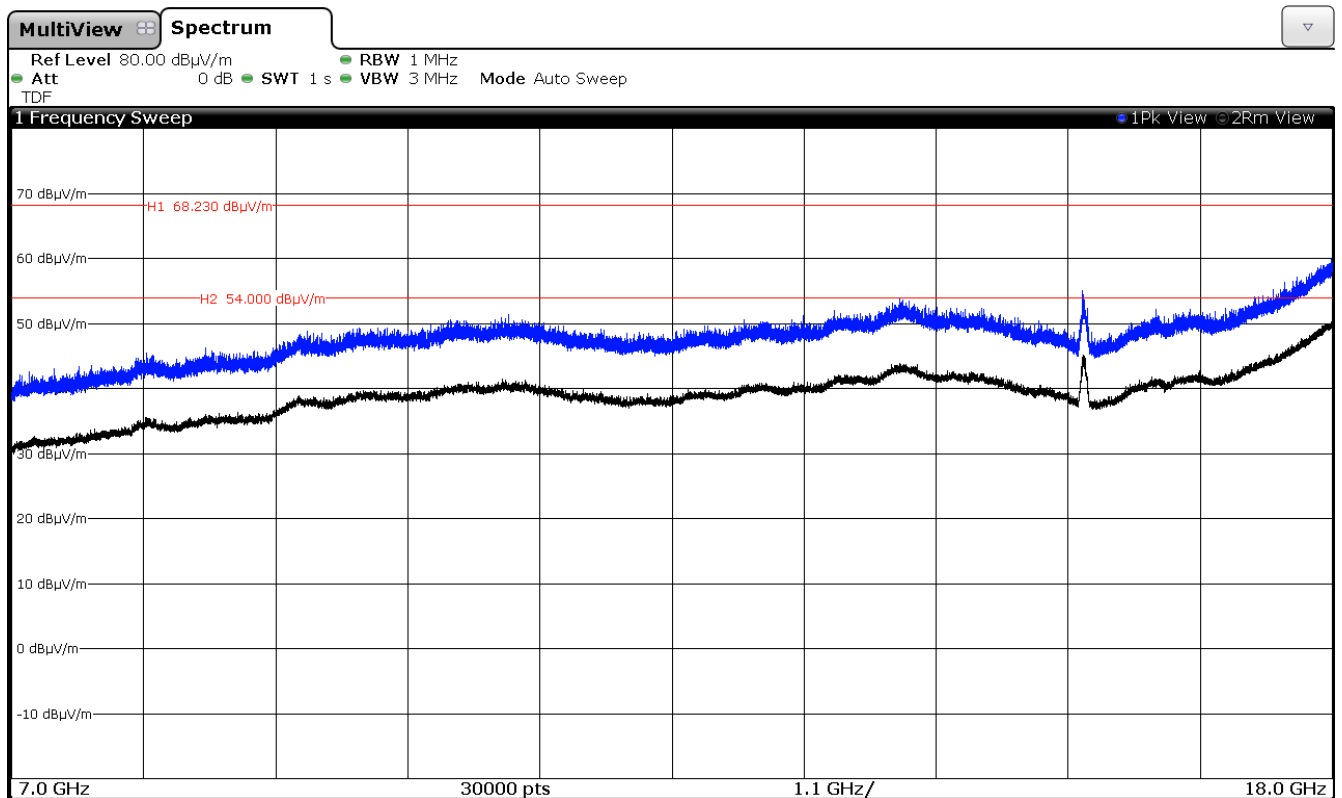
Chain A+B



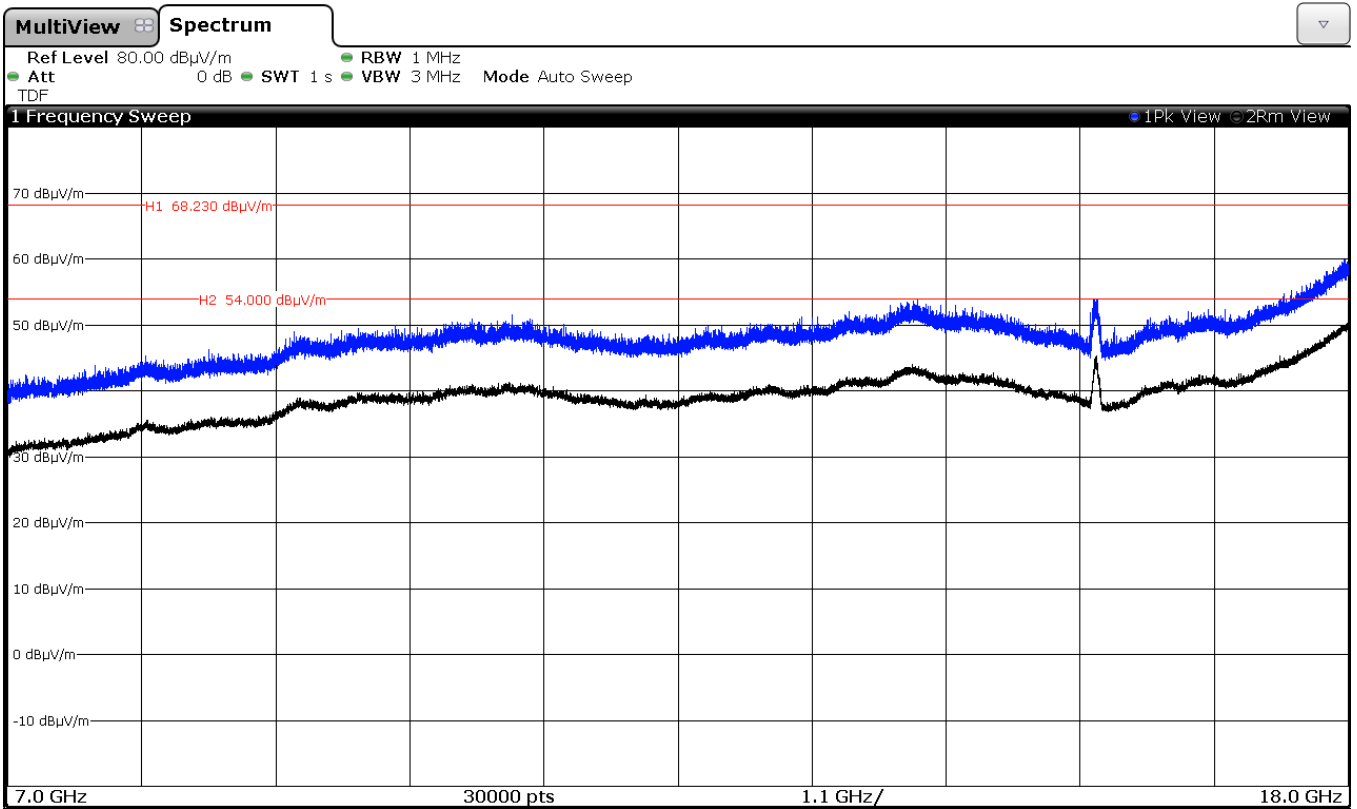
3. WiFi 5GHz 802.11 n40 mode

Highest frequency 5310 MHz.

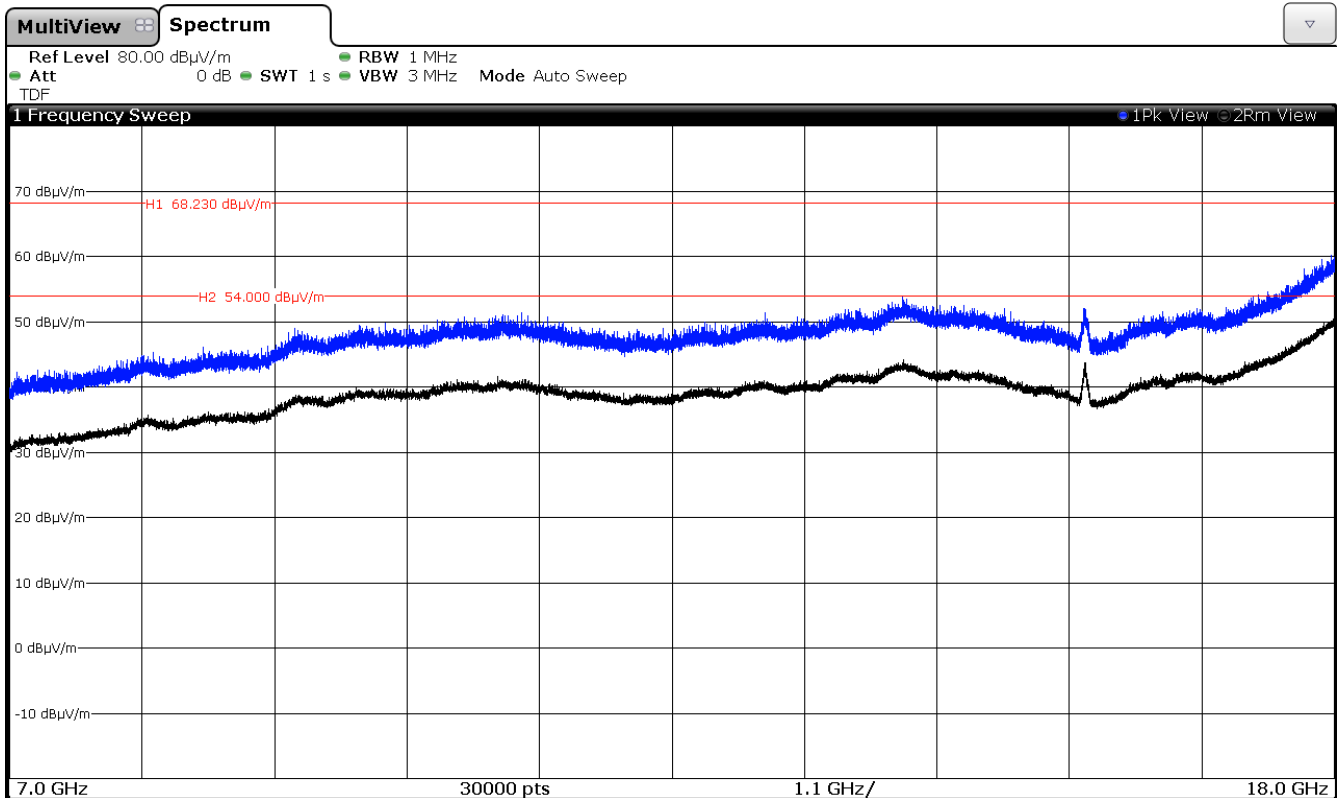
Chain A



Chain B

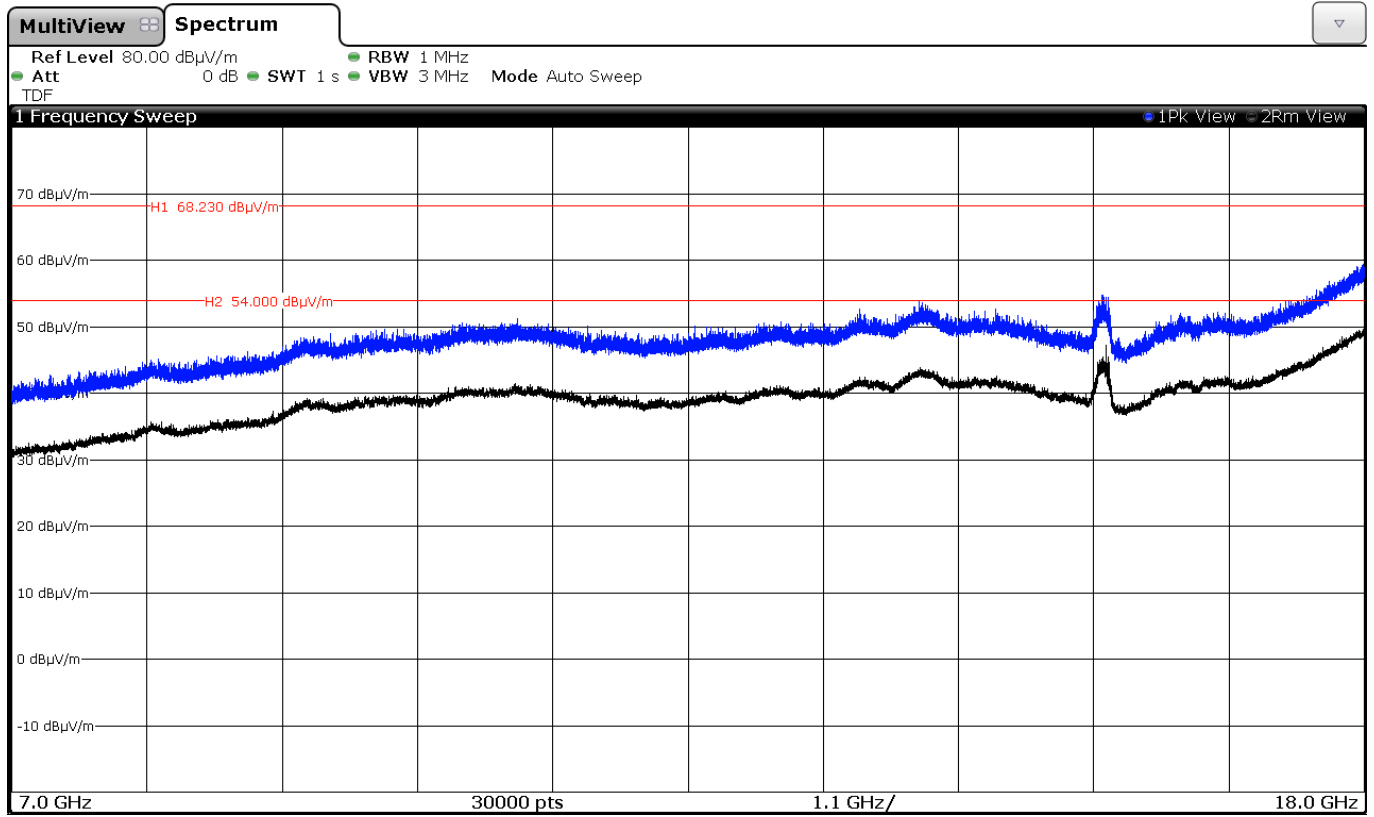


Chain A+B

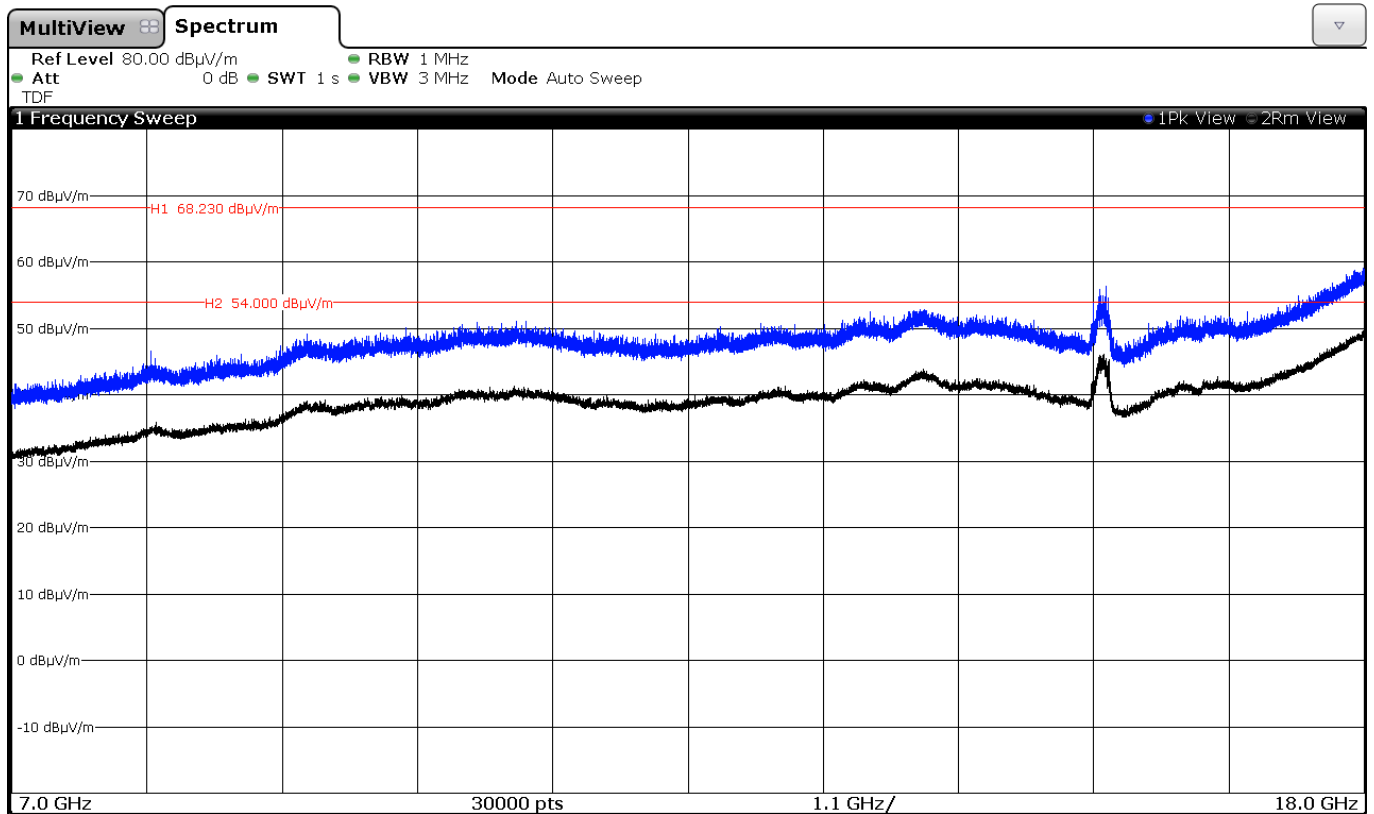


4. WiFi 5GHz 802.11 ac80 mode

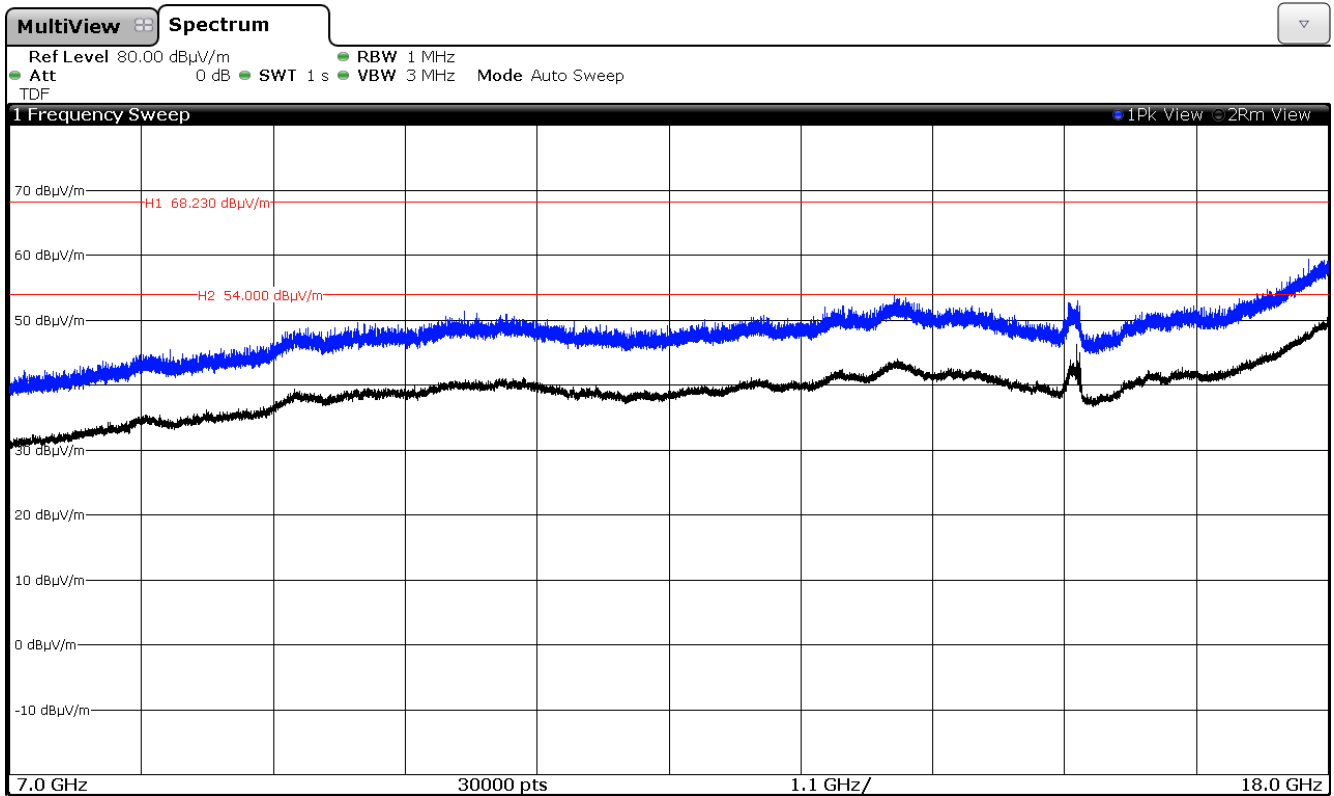
Chain A



Chain B



Chain A+B

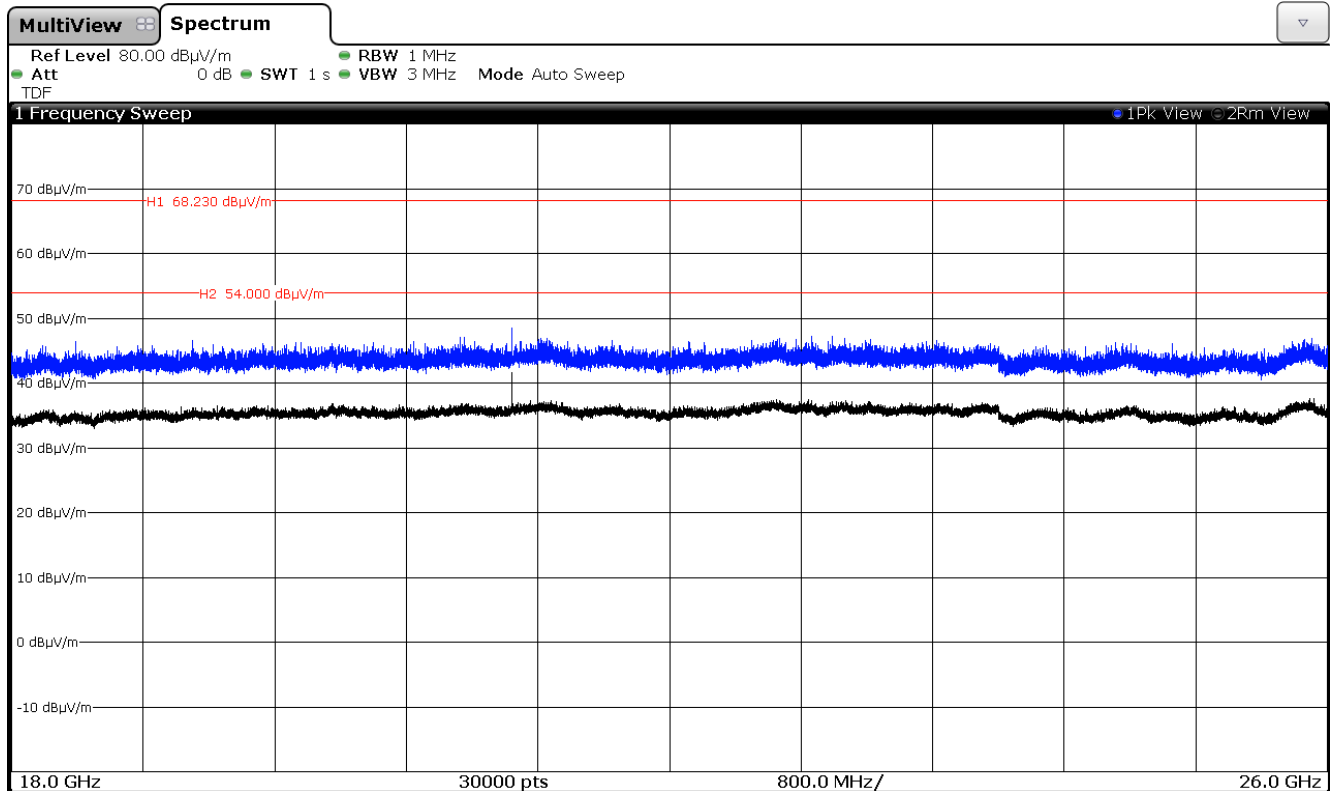


**FREQUENCY RANGE 18 GHz to 26GHz.**

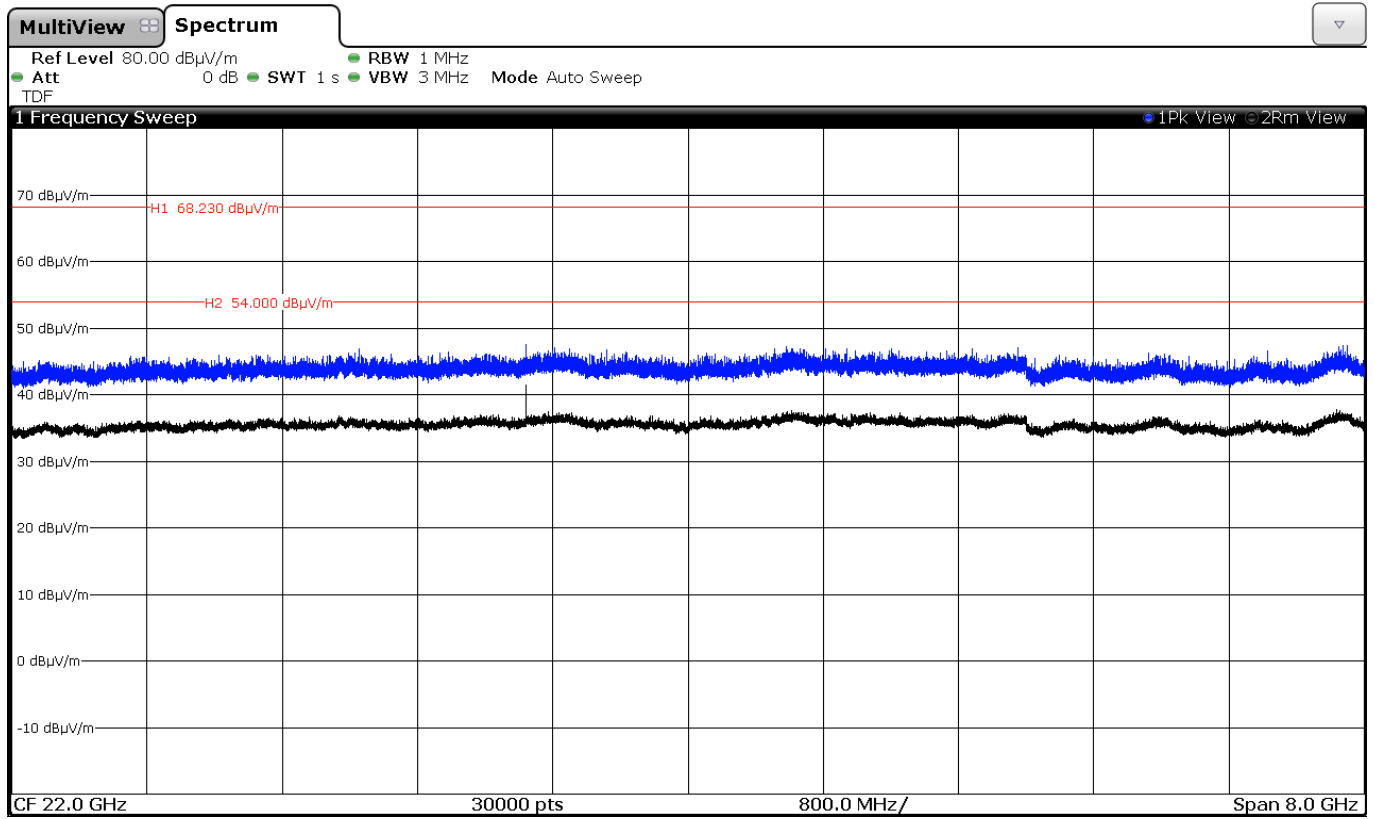
1. WiFi 5GHz 802.11 a mode

Lowest frequency 5260 MHz.

Chain A

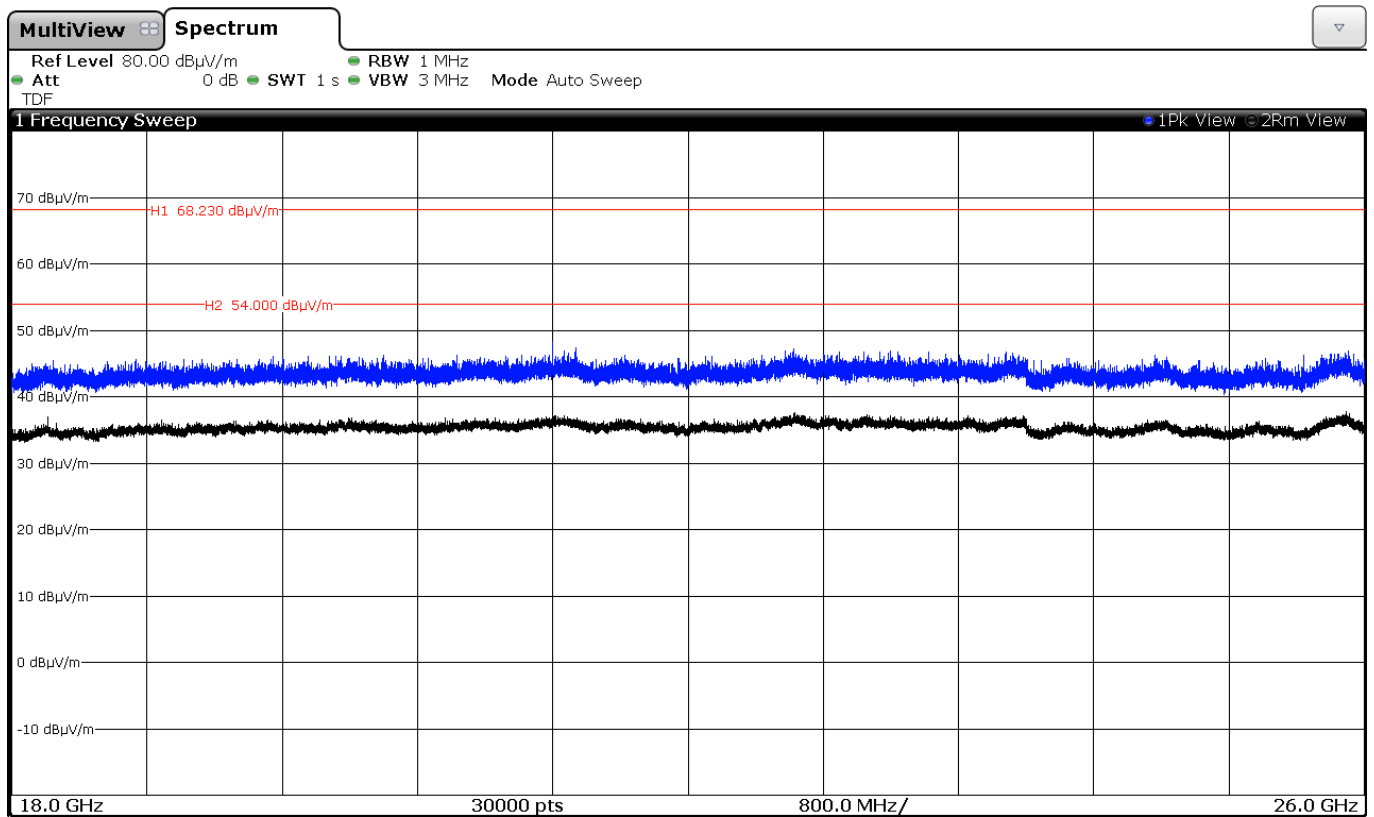


Chain B

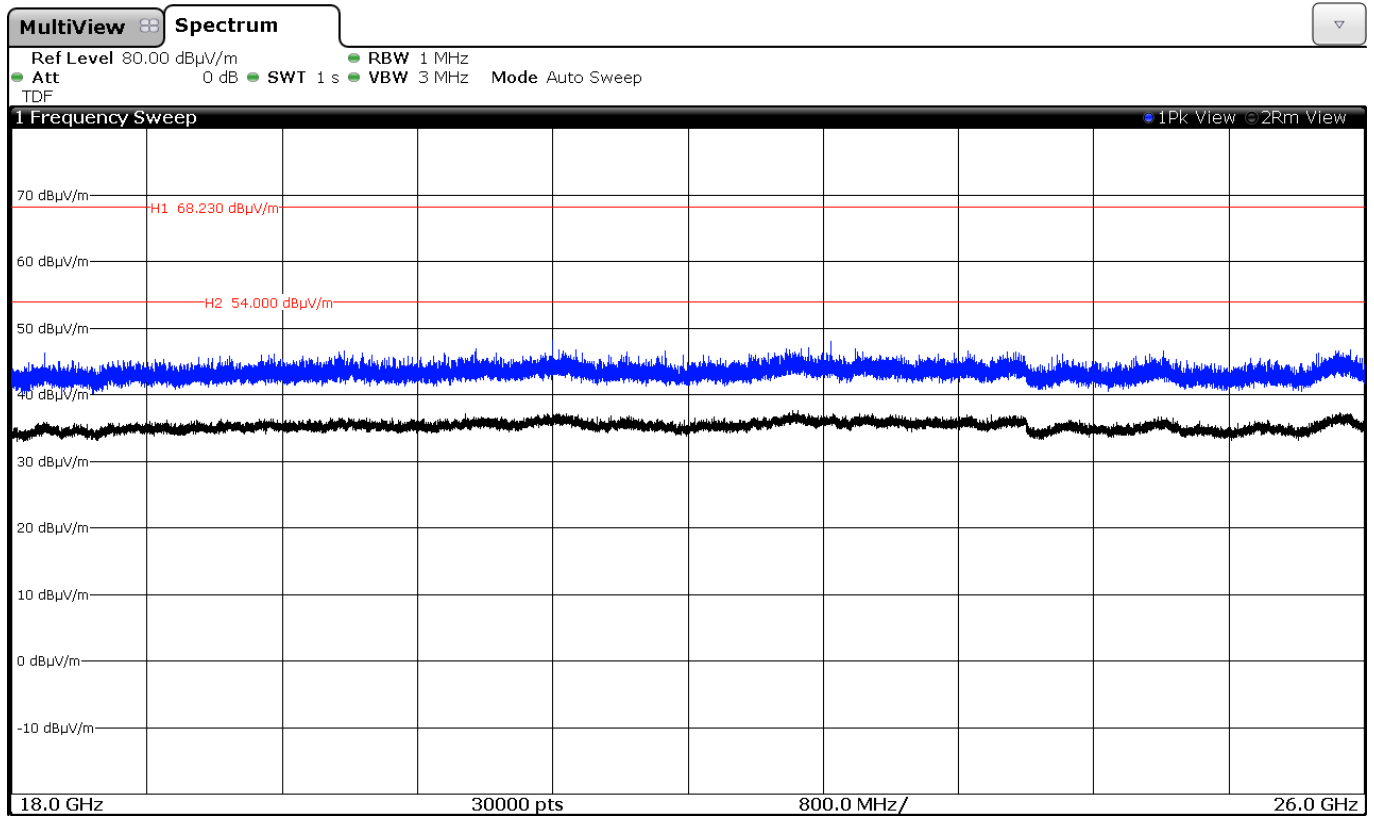


Middle frequency 5300 MHz.

Chain A

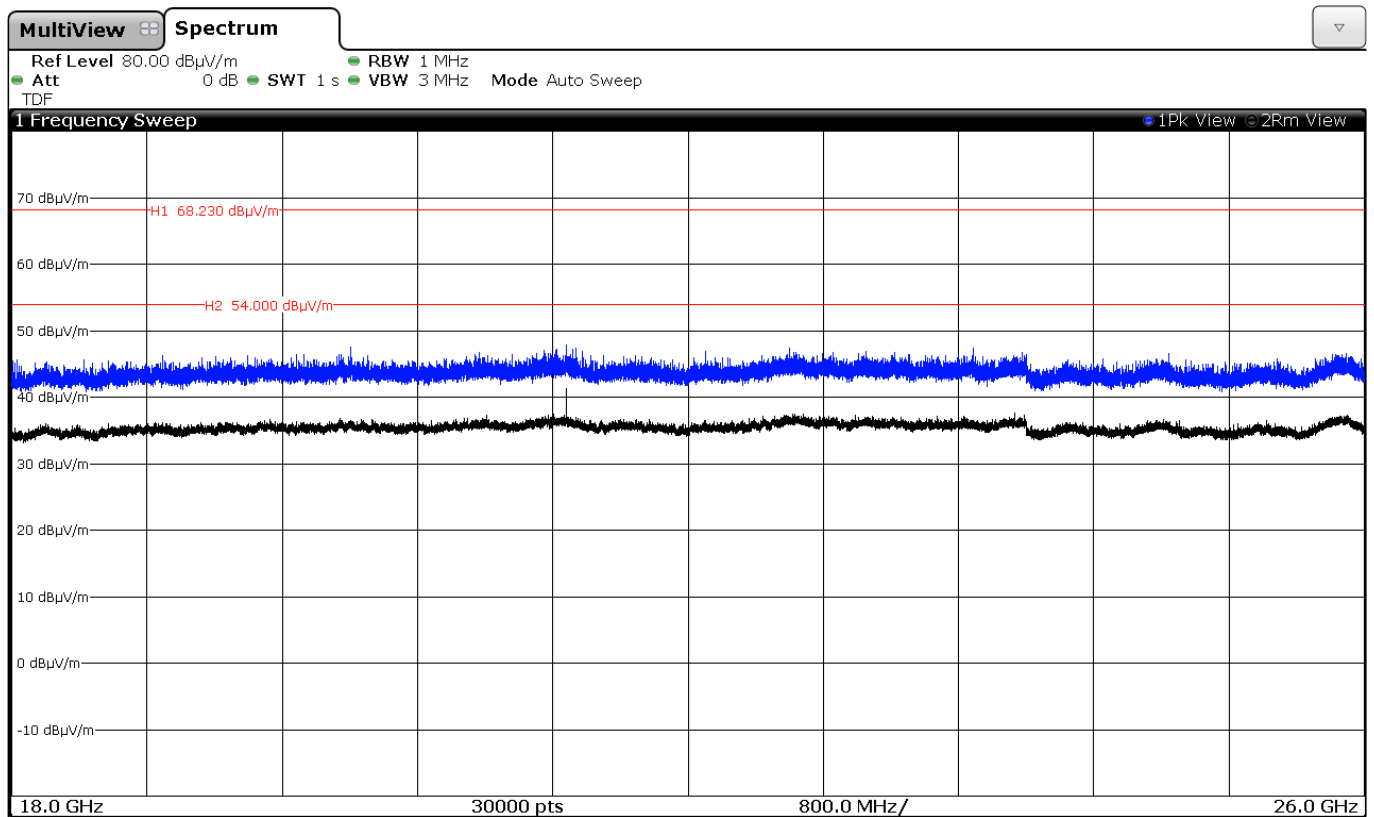


Chain B

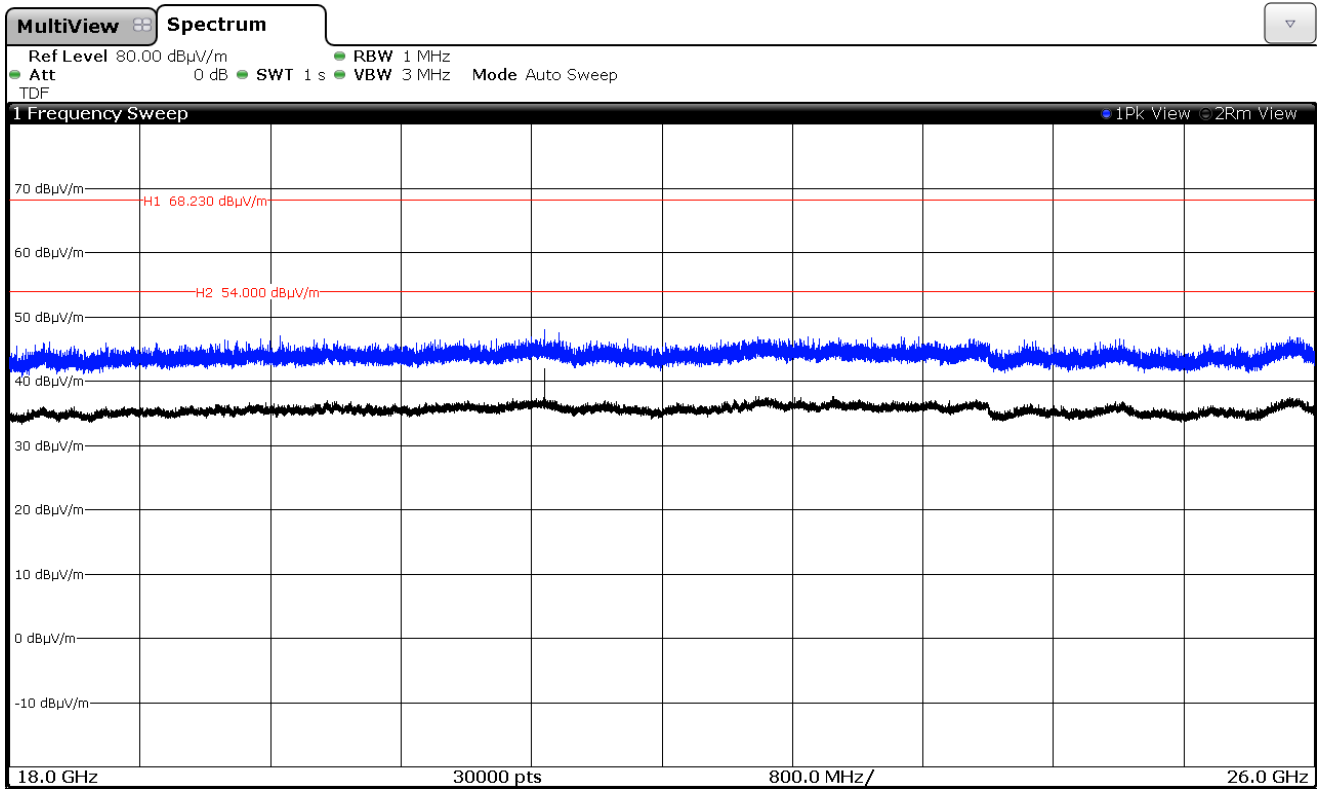


Highest frequency 5320 MHz.

Chain A



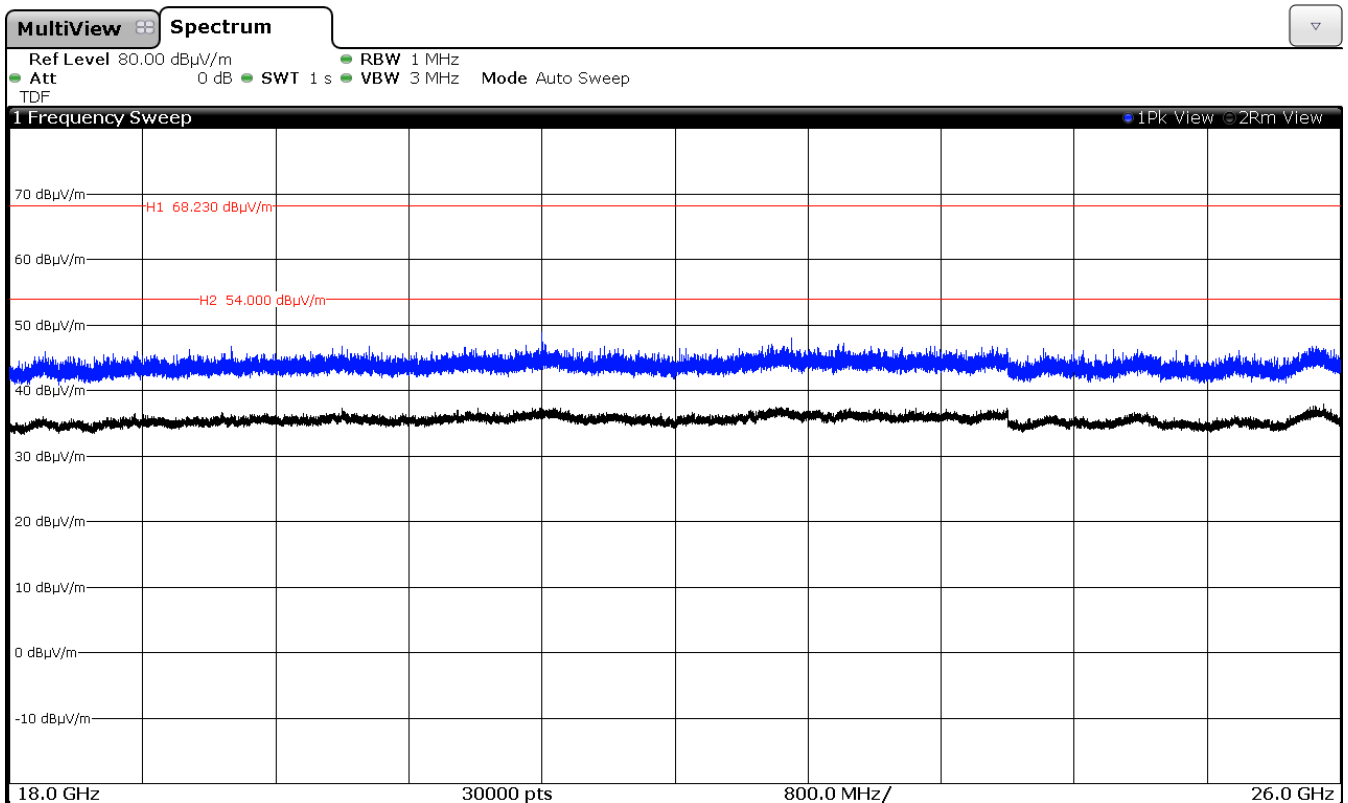
Chain B



2. WiFi 5GHz 802.11 n20 mode

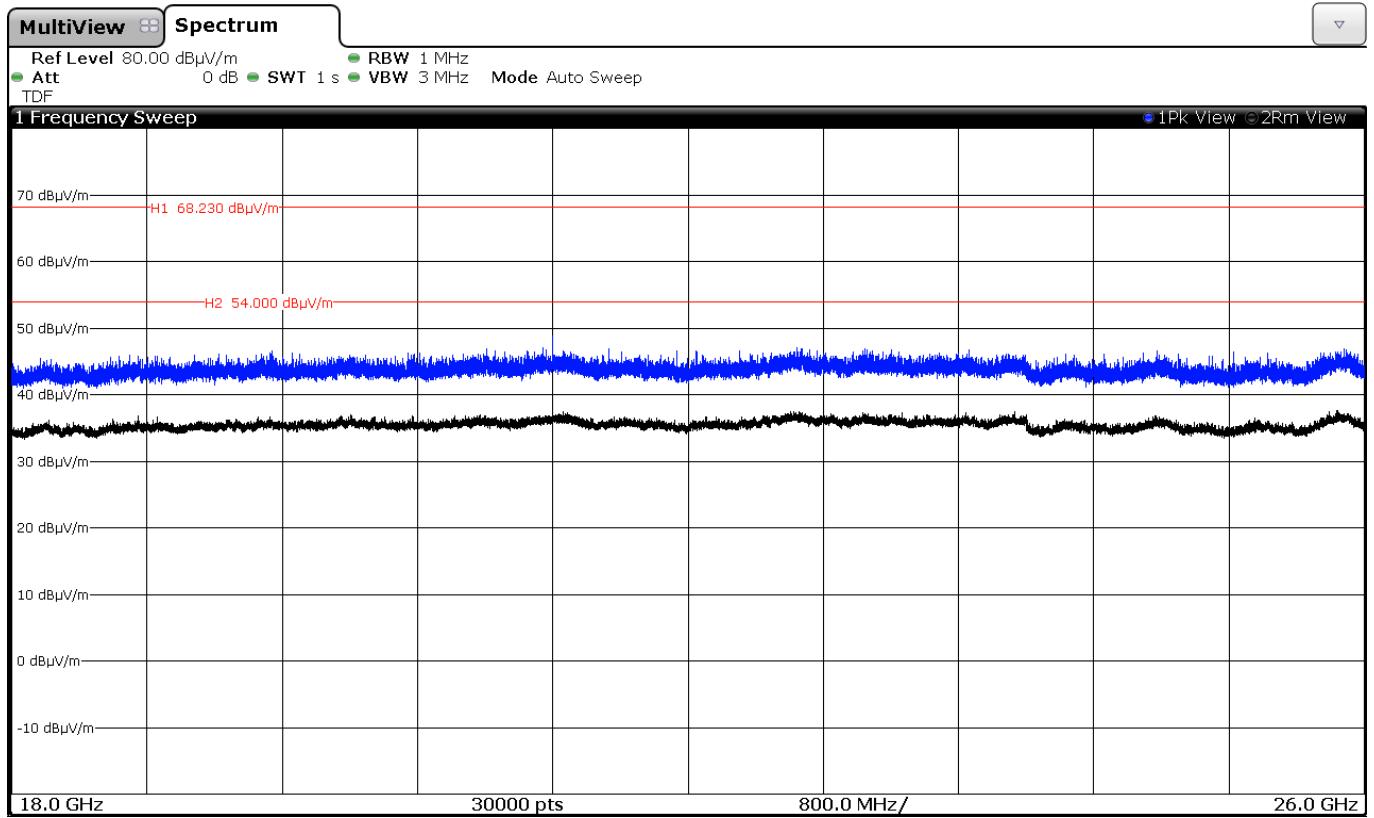
Middle frequency 5300 MHz.

Chain A

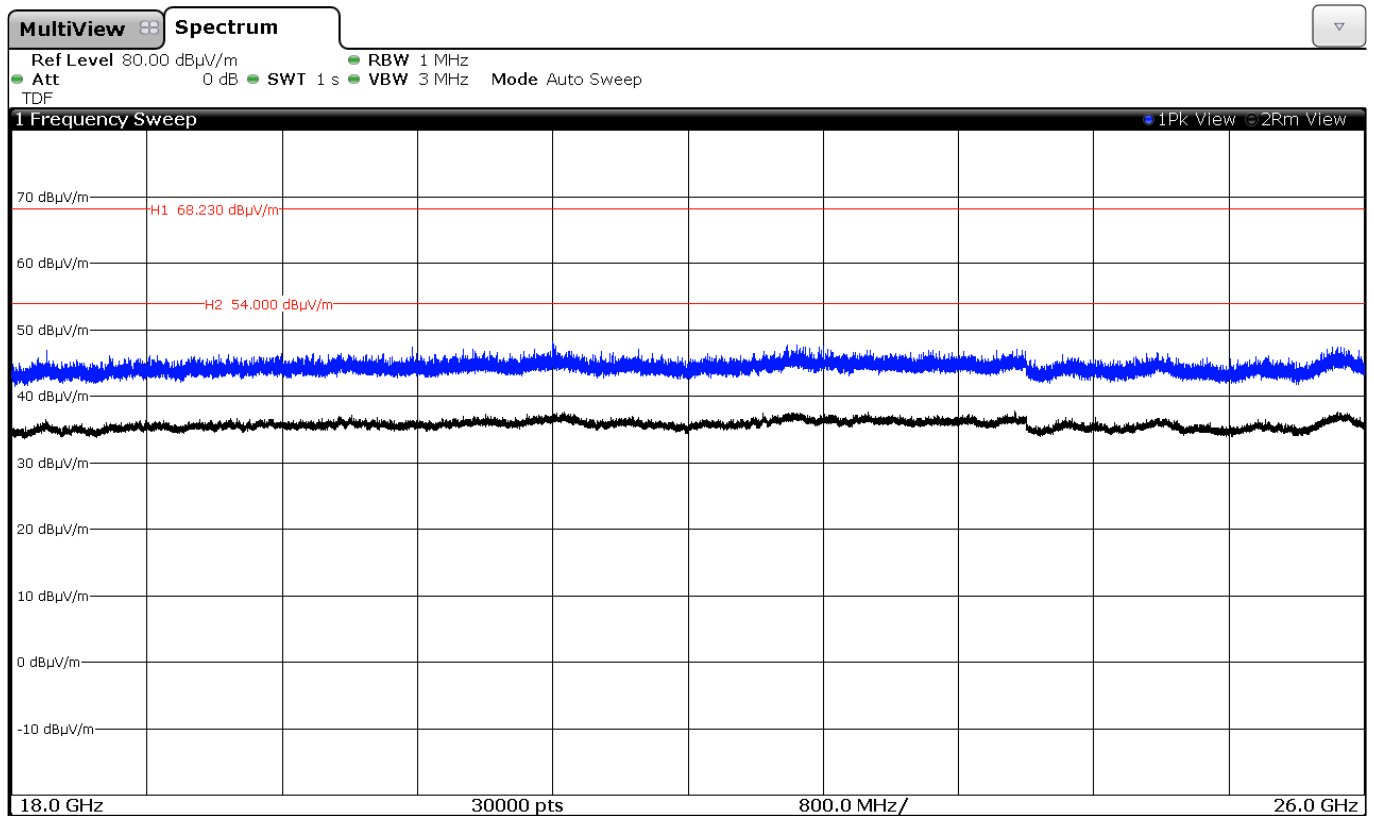




Chain B



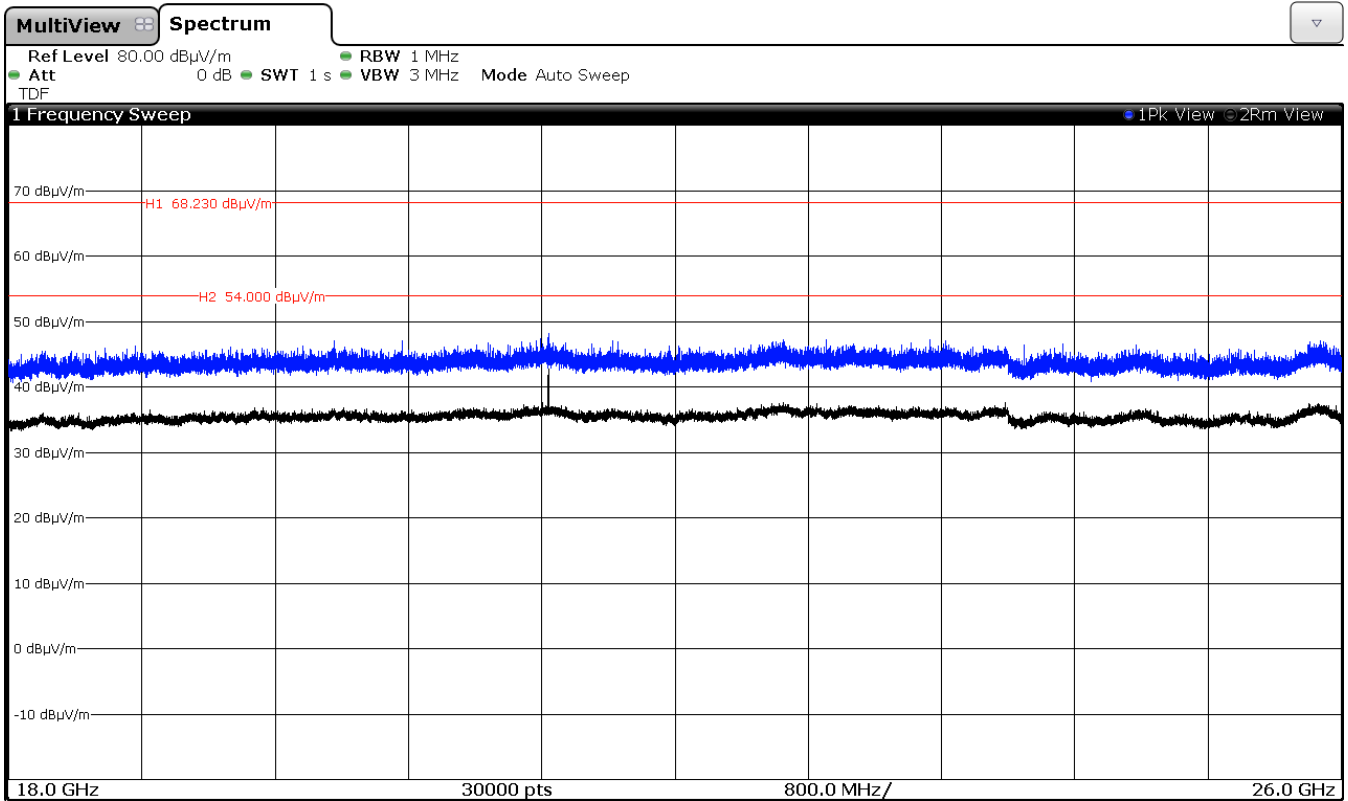
Chain A+B



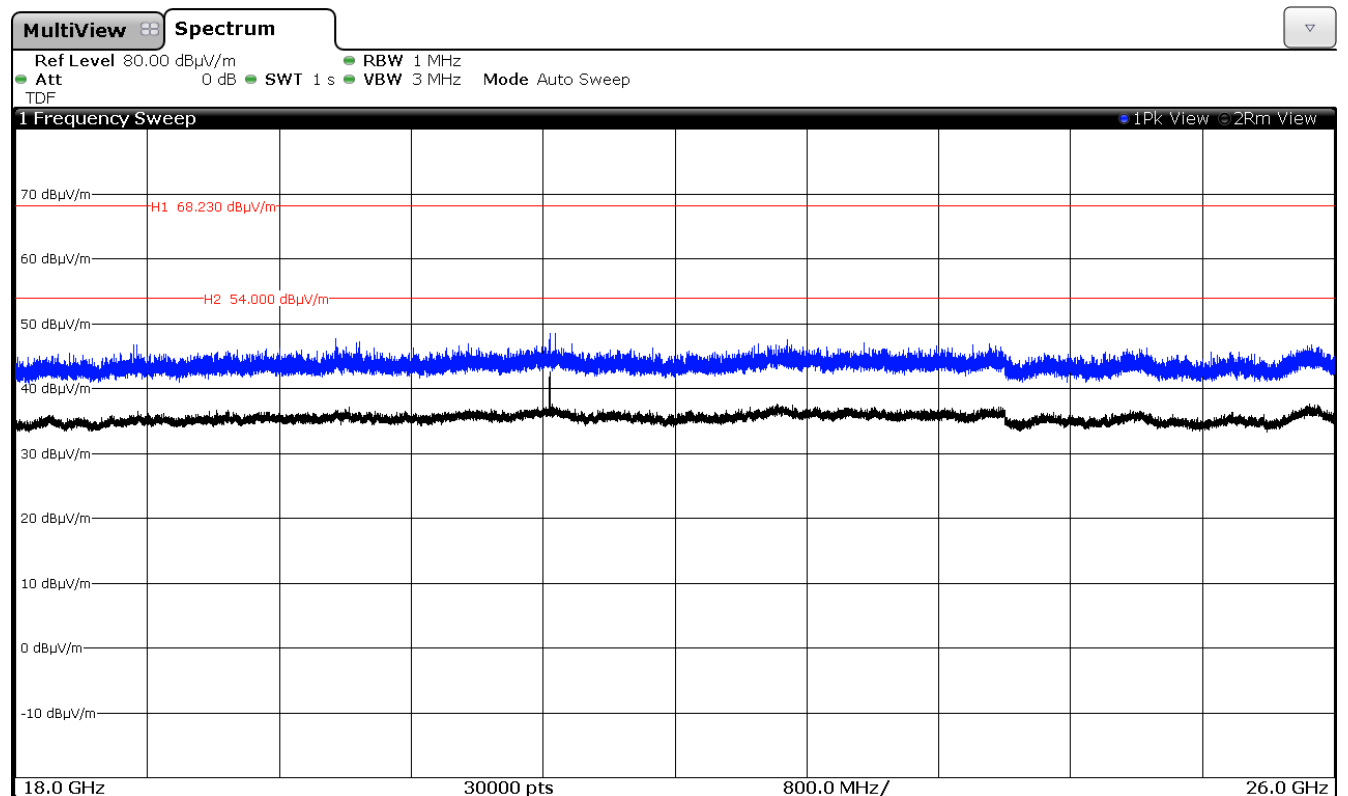
### 3. WiFi 5GHz 802.11 n40 mode

Highest frequency 5310 MHz.

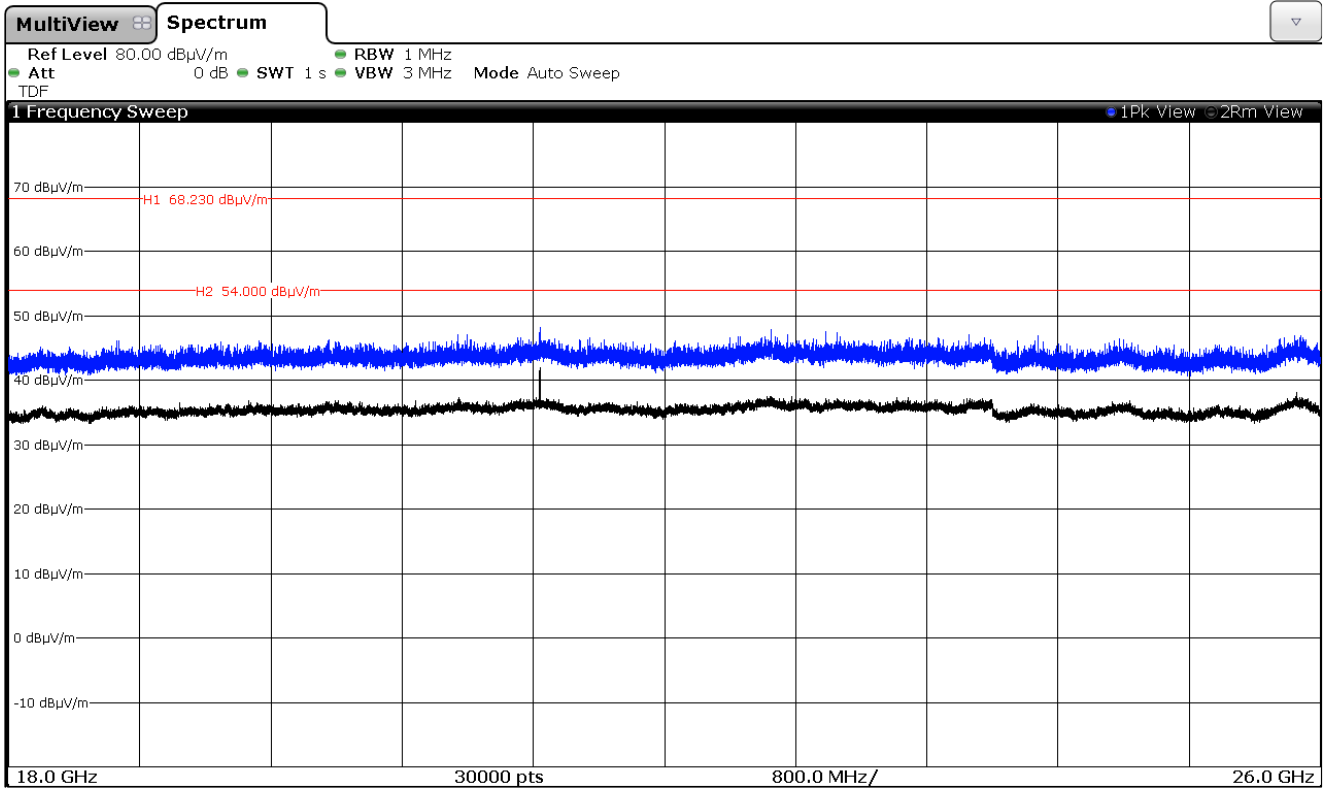
Chain A



Chain B

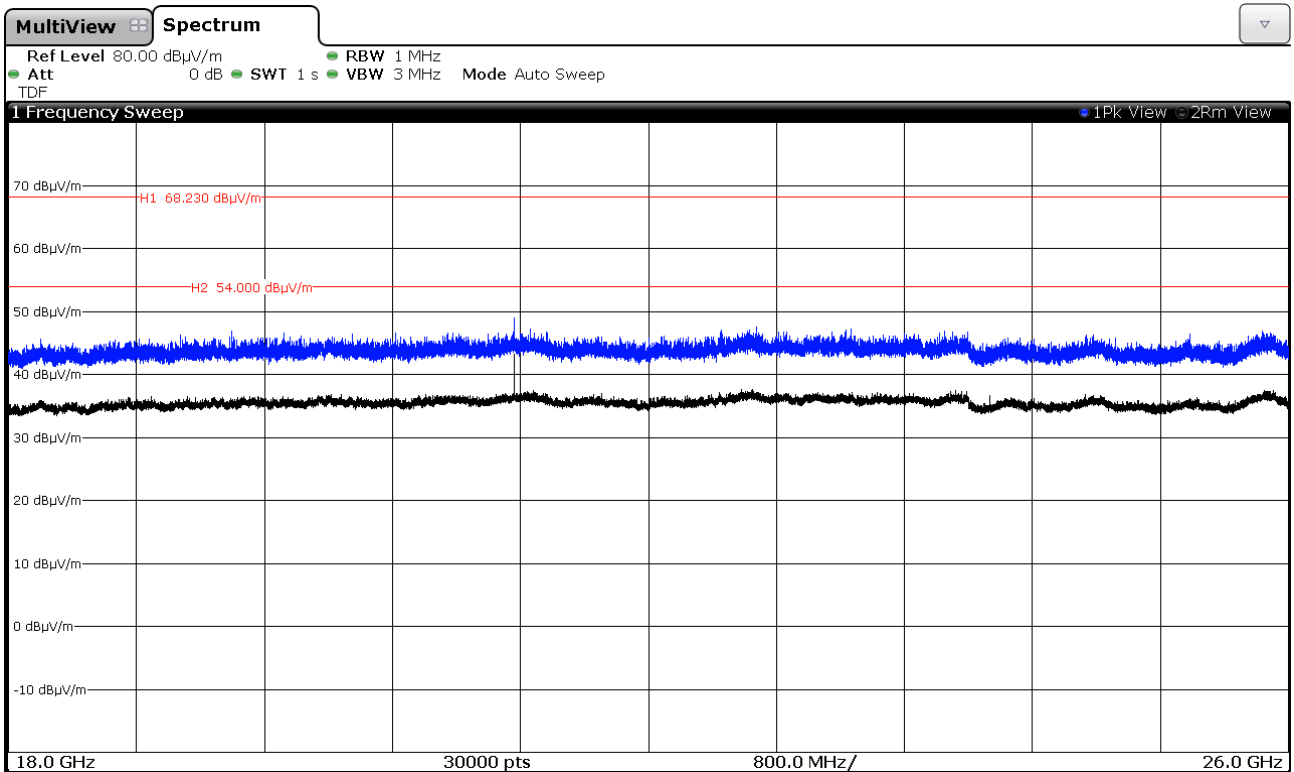


Chain A+B

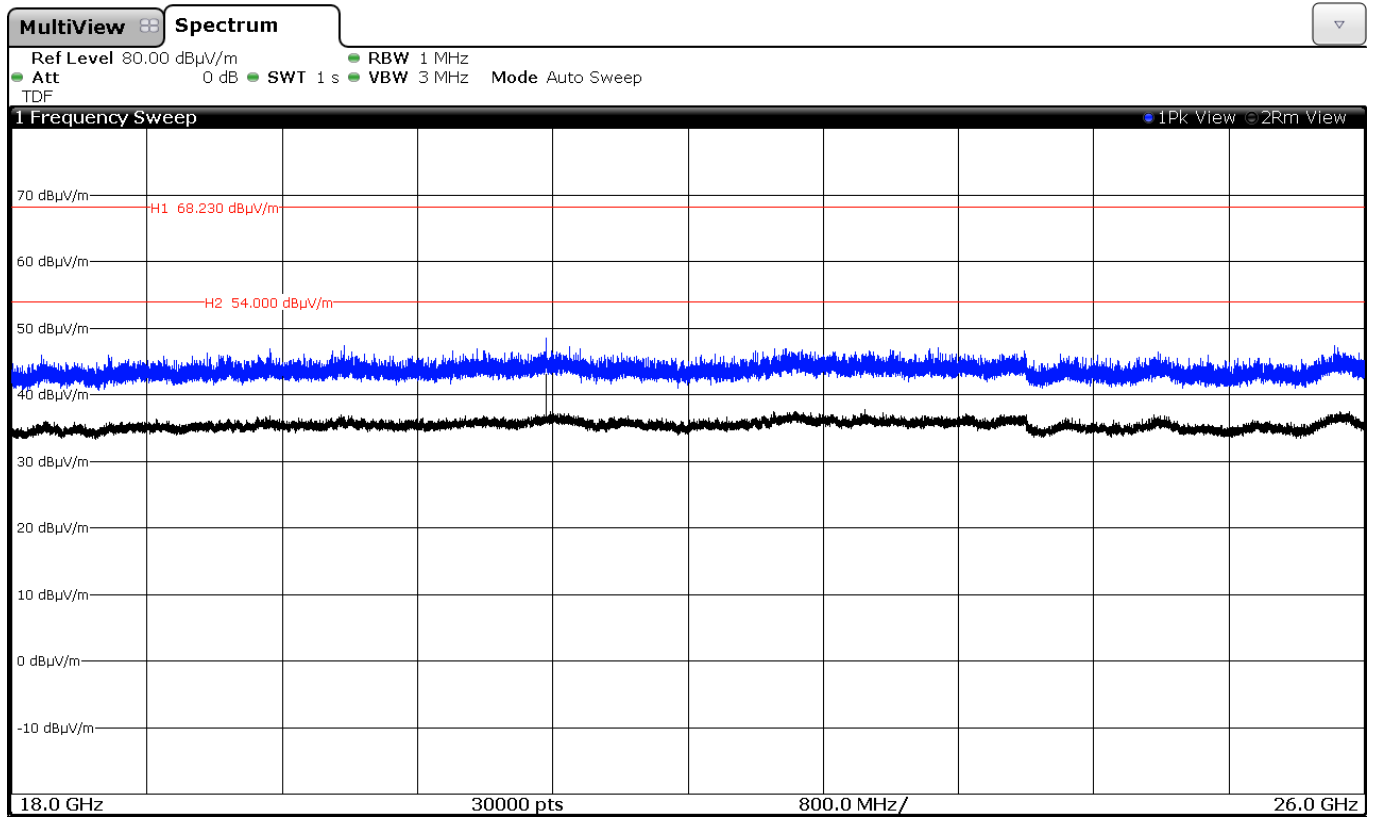


4. WiFi 5GHz 802.11 ac80 mode

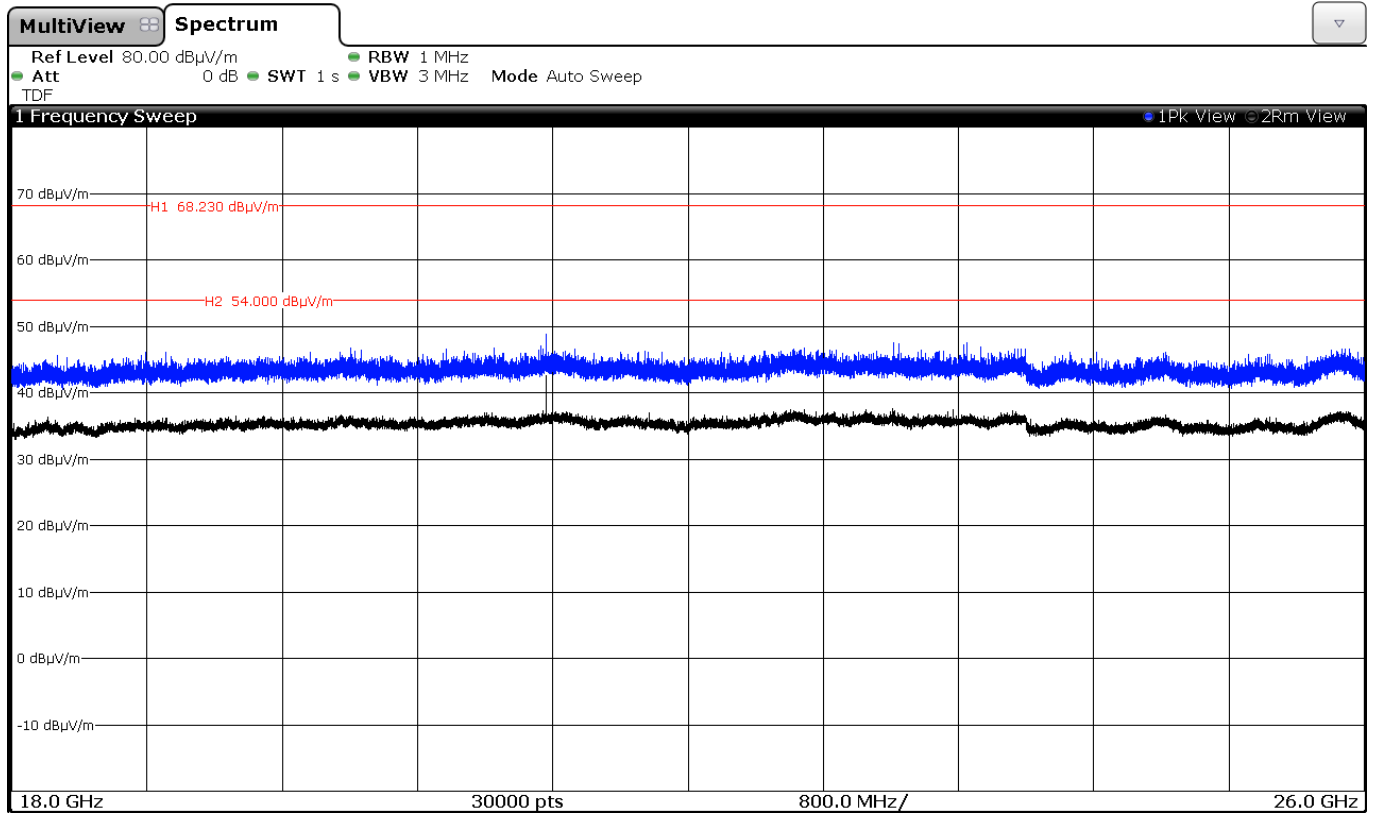
Middle frequency 5290 MHz  
 Chain A



Chain B

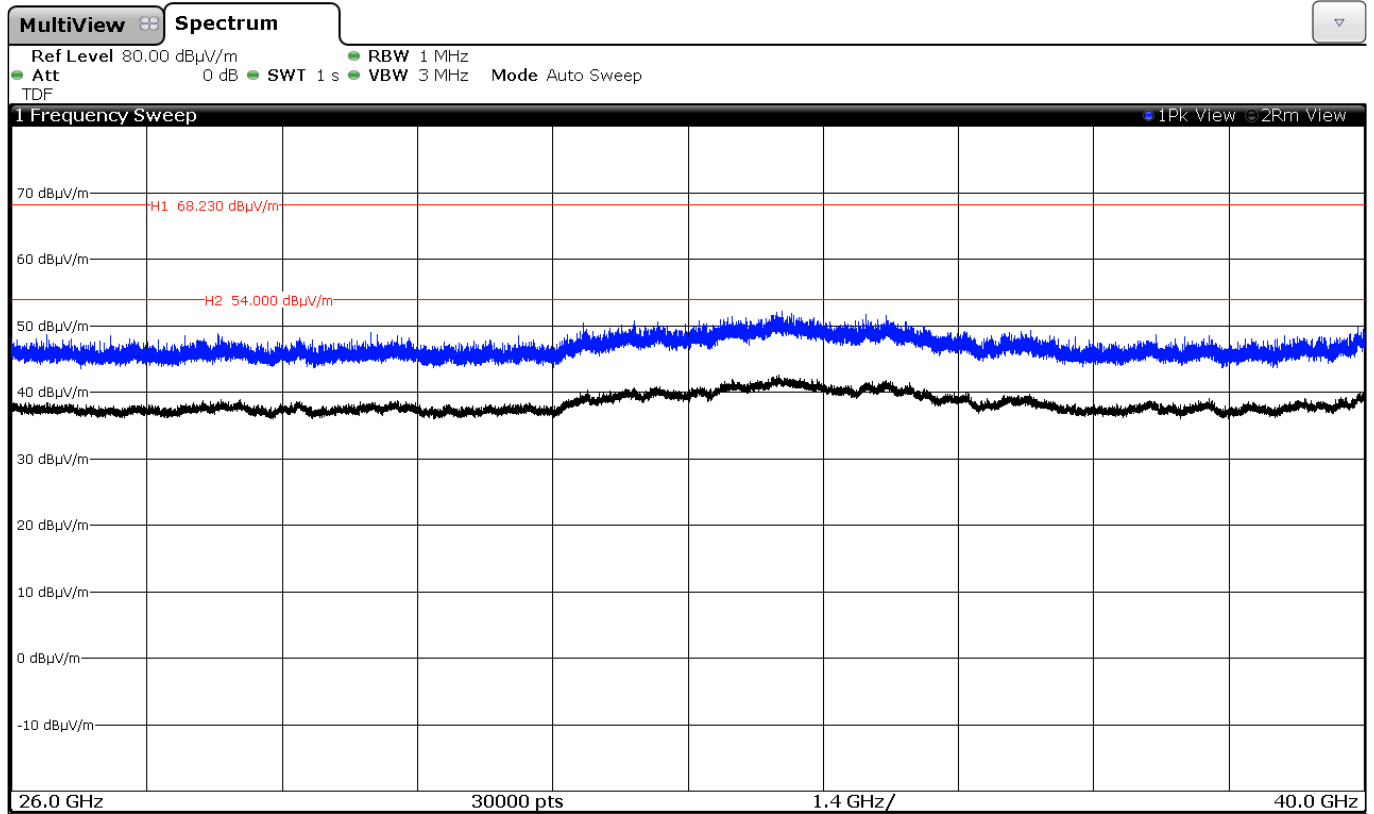


Chain A+B



### FREQUENCY RANGE 26 GHz 40GHz.

No spurious signals were found in all modulations and channels tested.



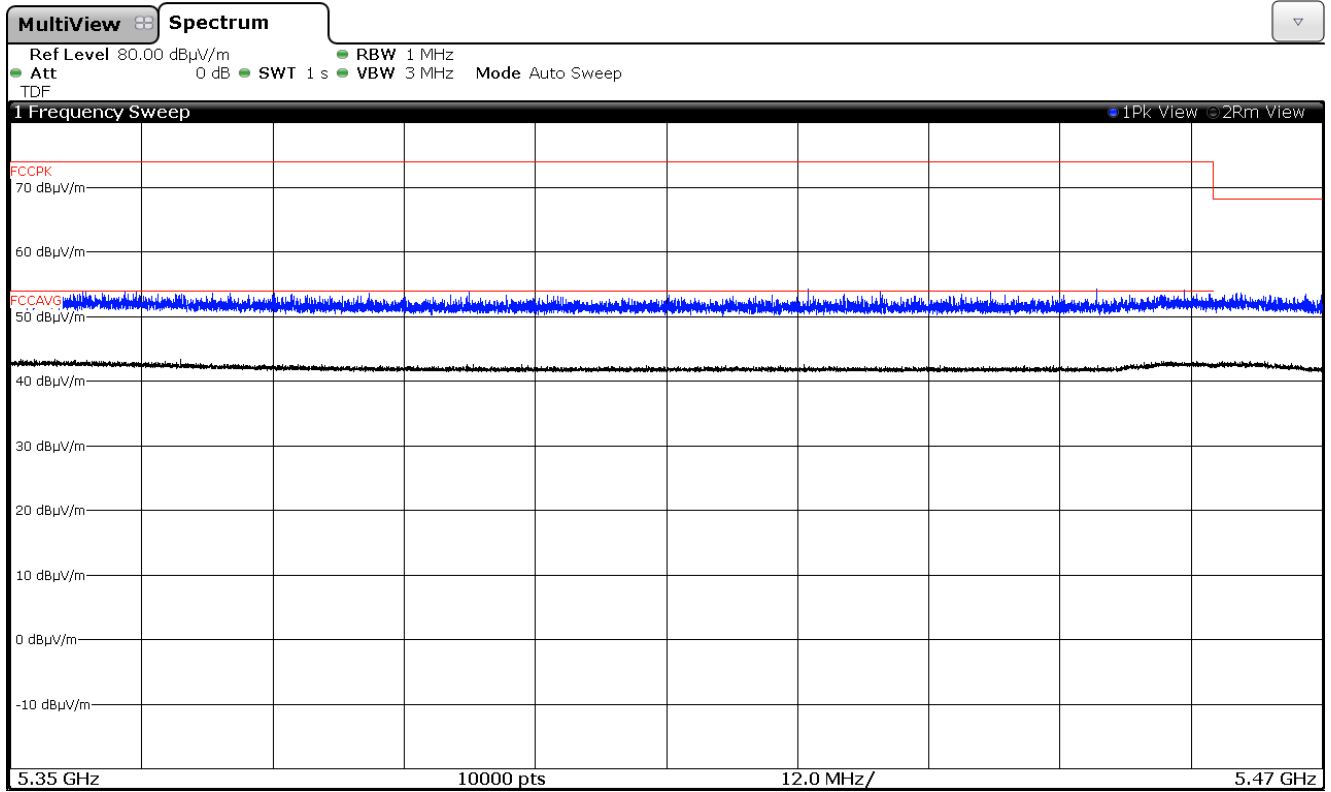
(This plot is valid for both SISO and MIMO).

### Radiated spurious emissions at band-edges and inside restricted band 5.35 – 5.46 GHz and adjacent band 5.46 – 5.47 GHz.

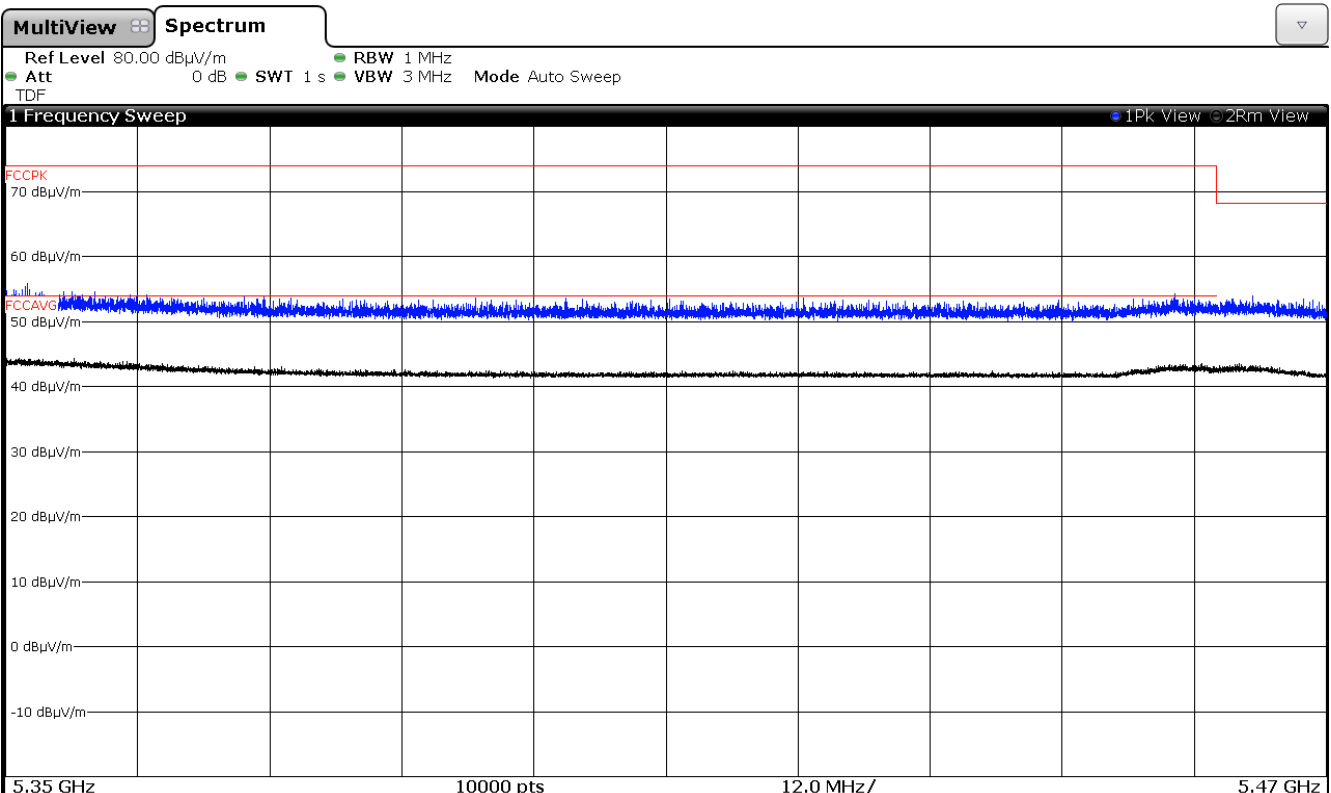
#### 1. WiFi 5GHz 802.11 a mode

Middle frequency 5300 MHz.

Chain A

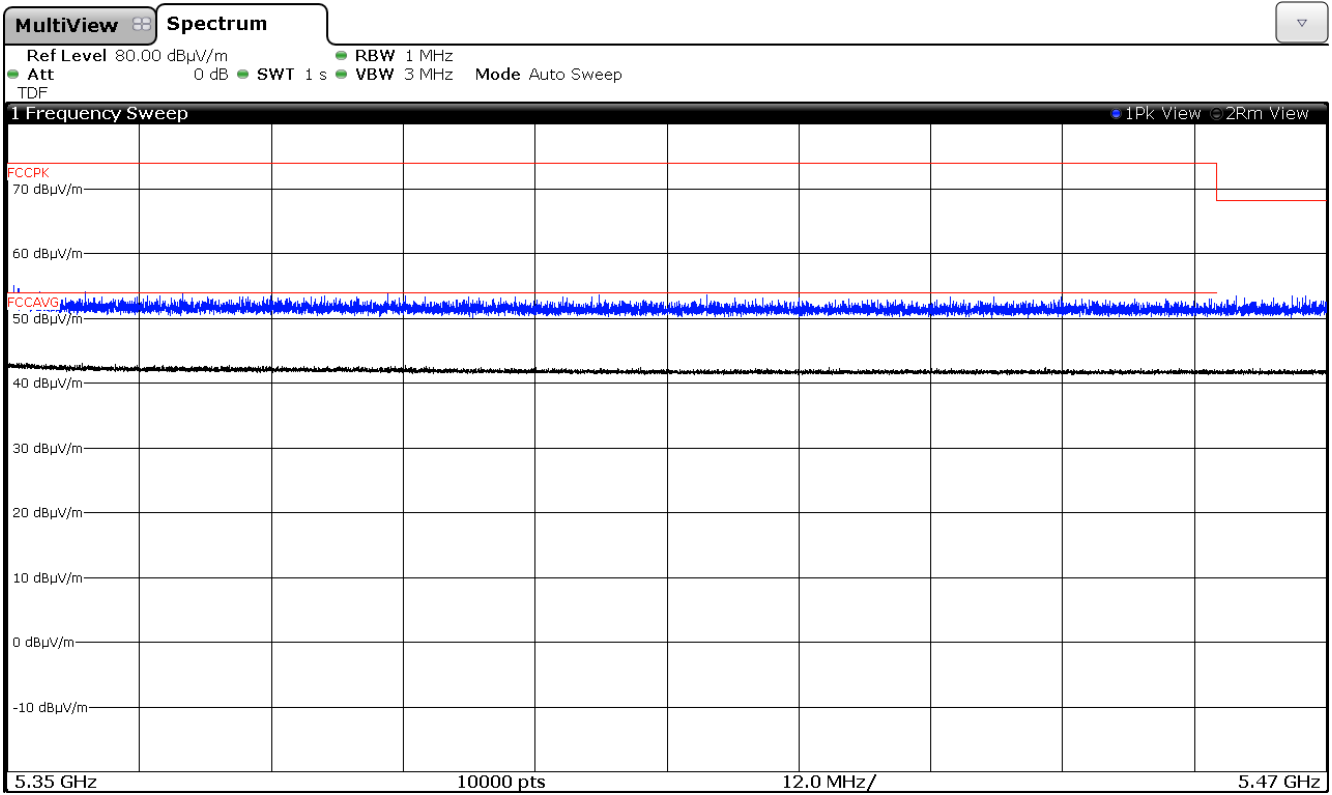


Chain B

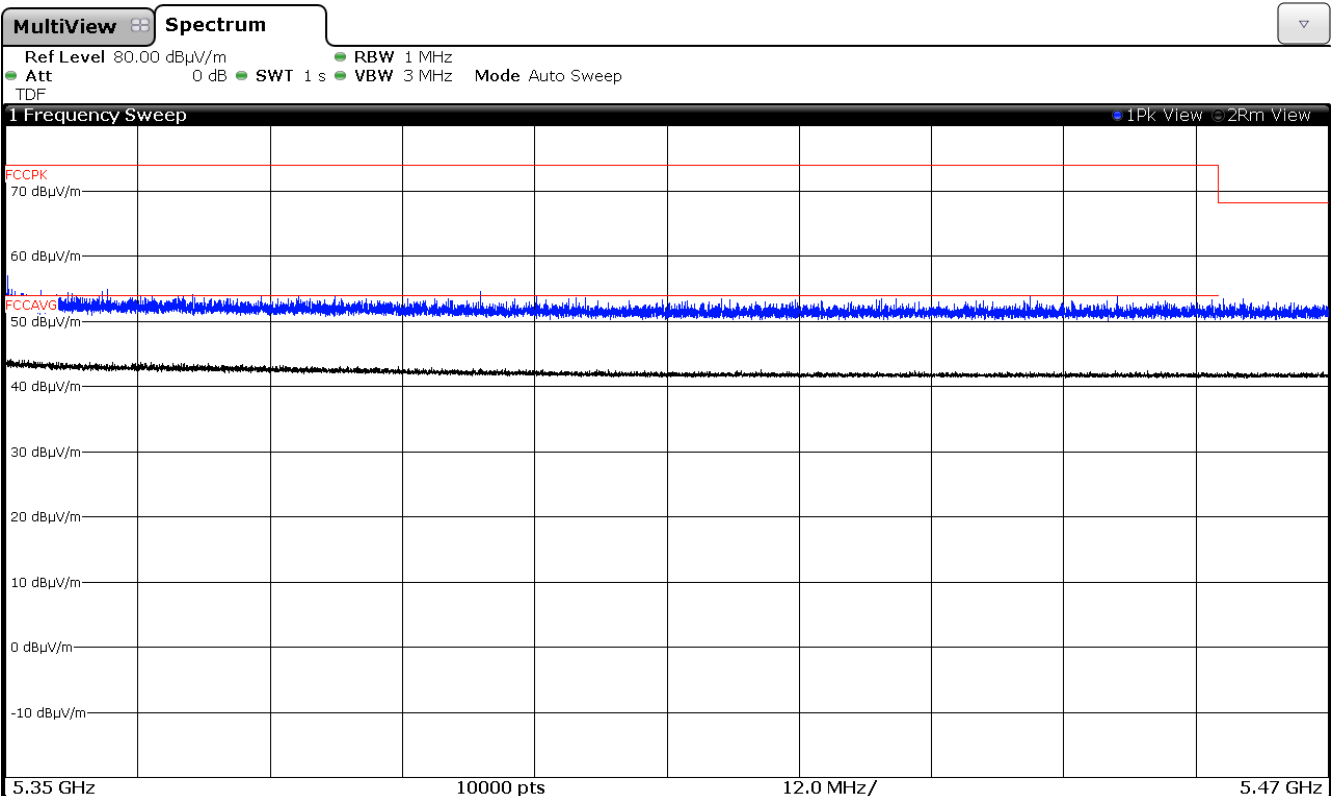


Highest frequency 5320 MHz.

Chain A



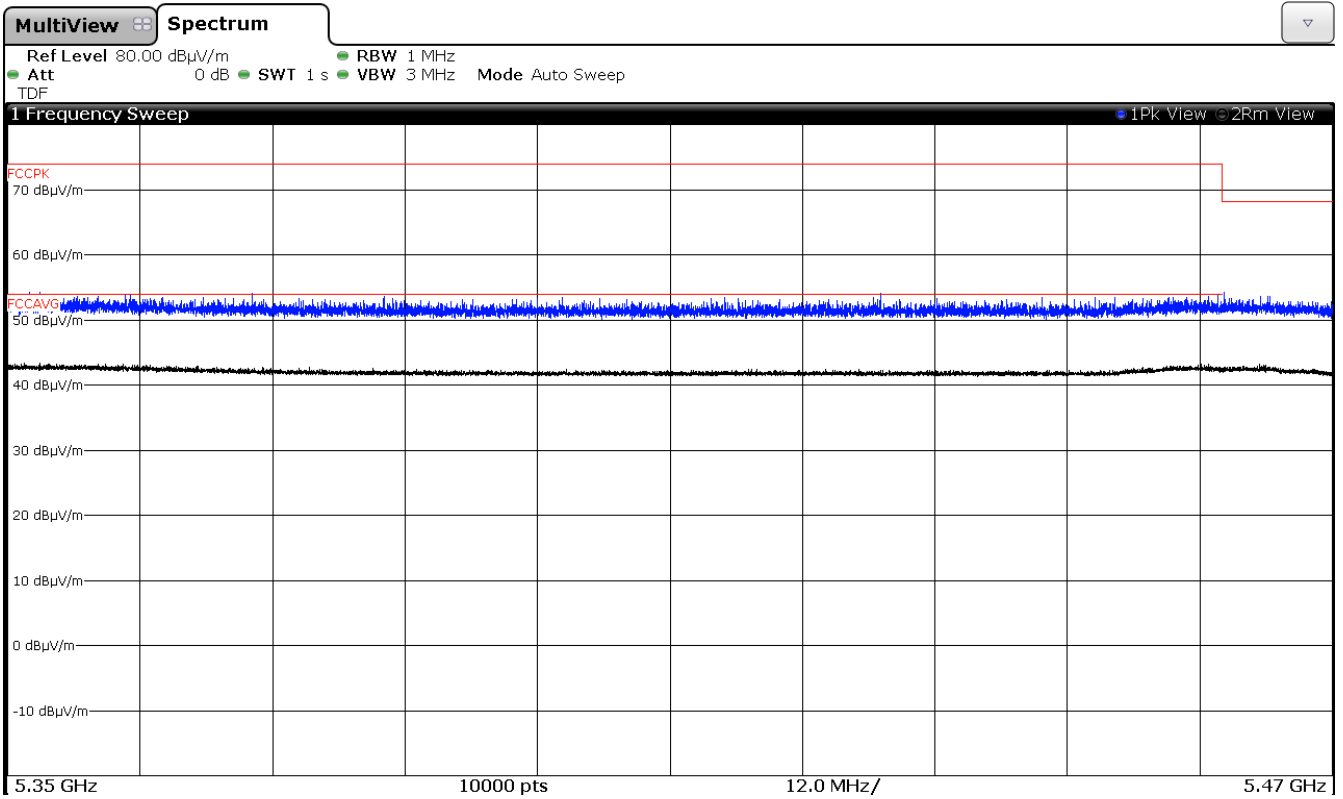
Chain B



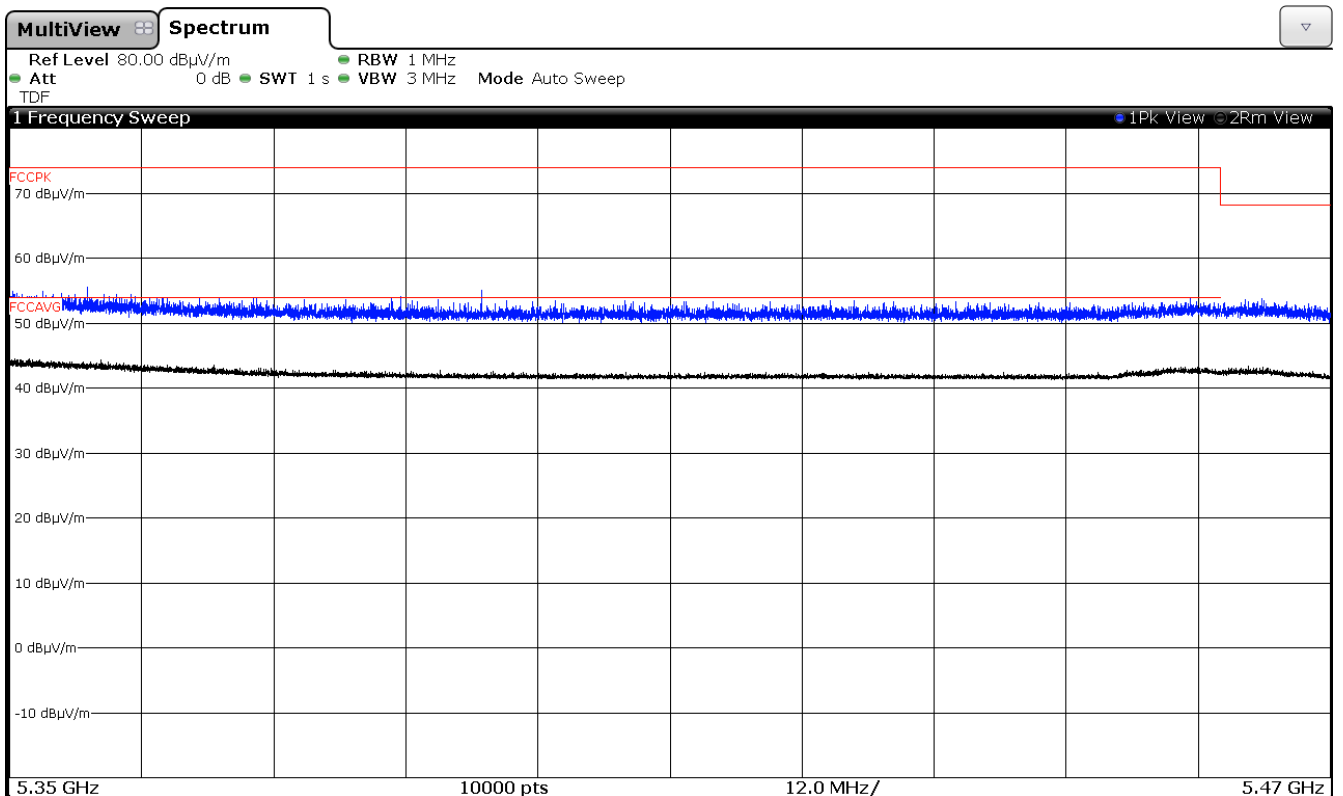
## 2. WiFi 5GHz 802.11 n20 mode

Middle frequency 5300 MHz.

Chain A

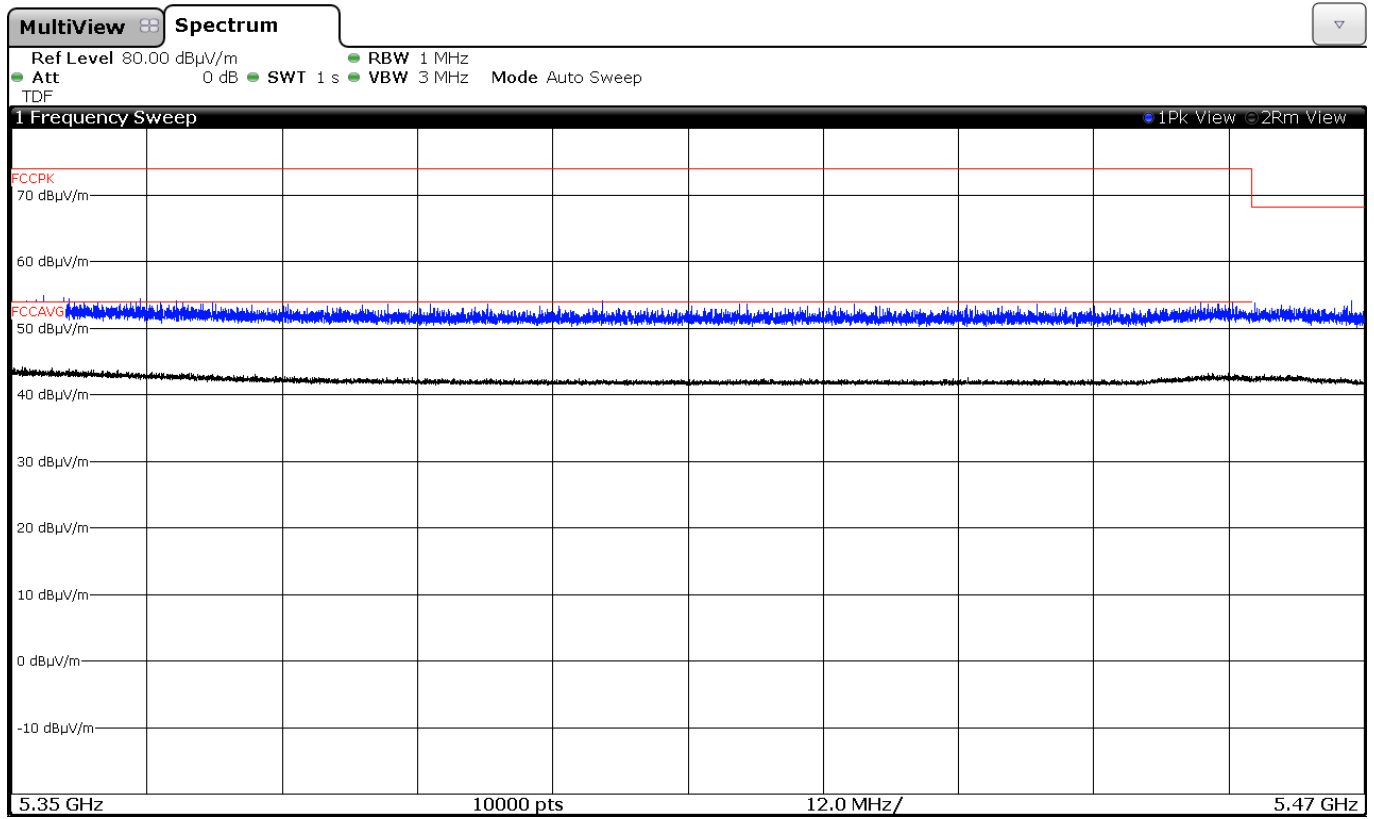


Chain B



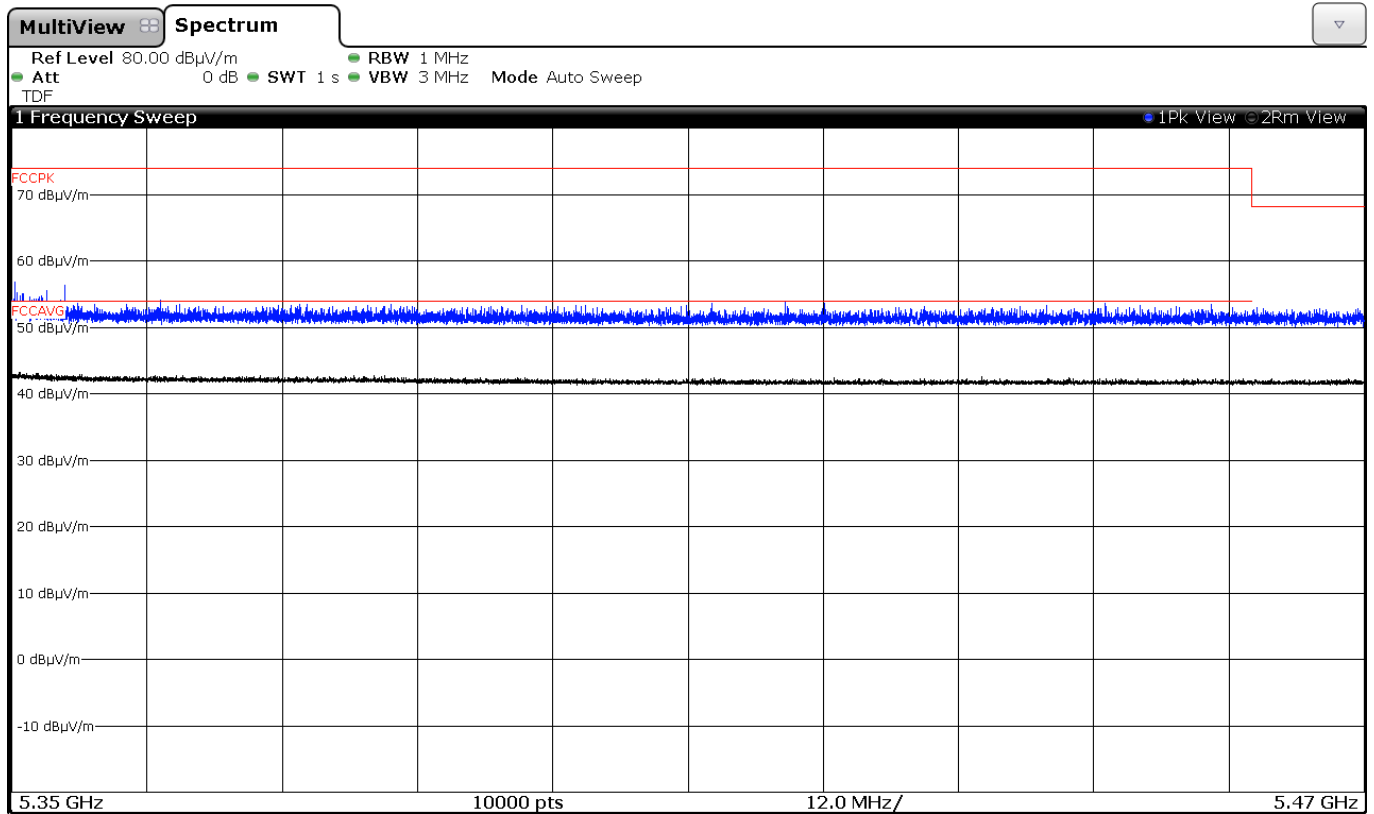


### Chain A+B

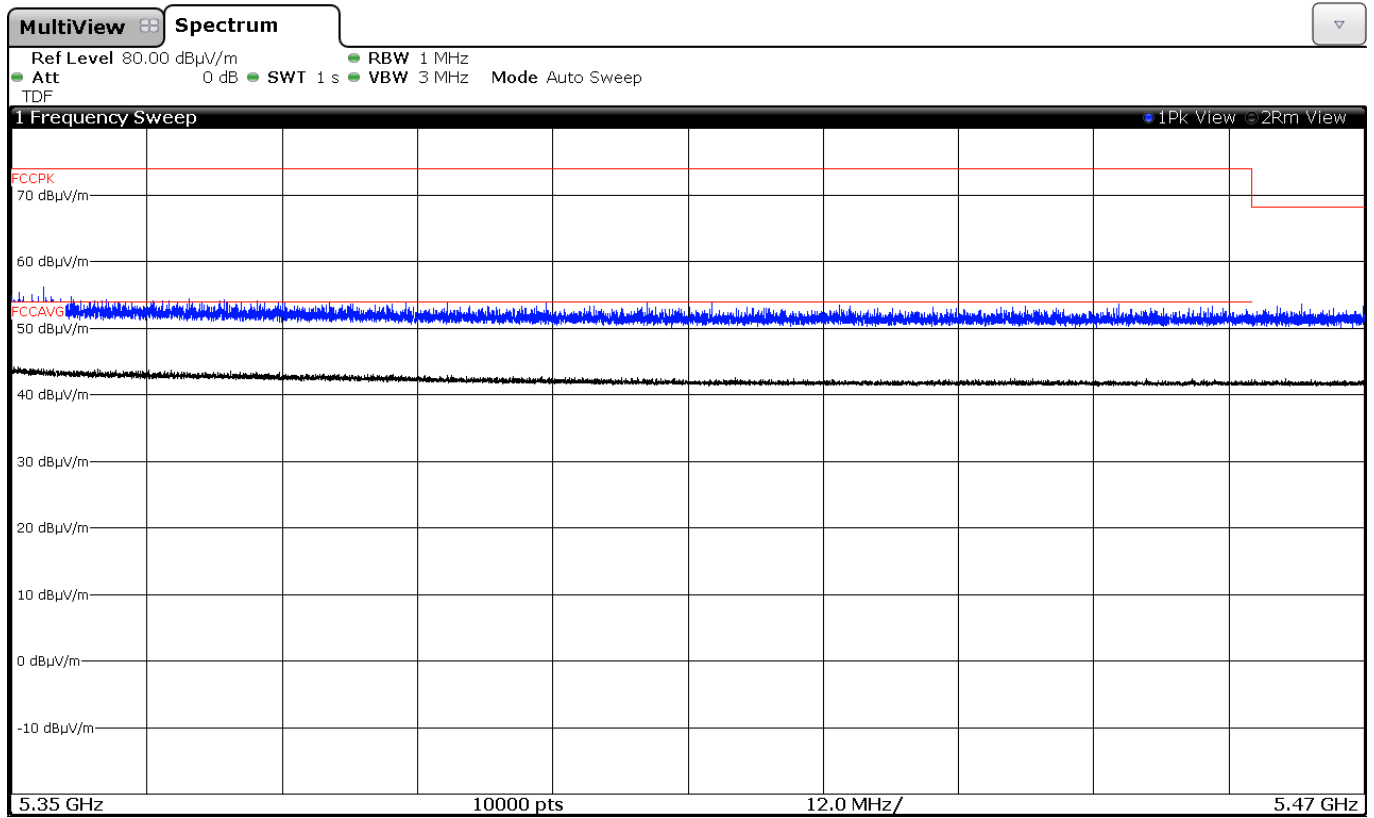


Highest frequency 5320 MHz.

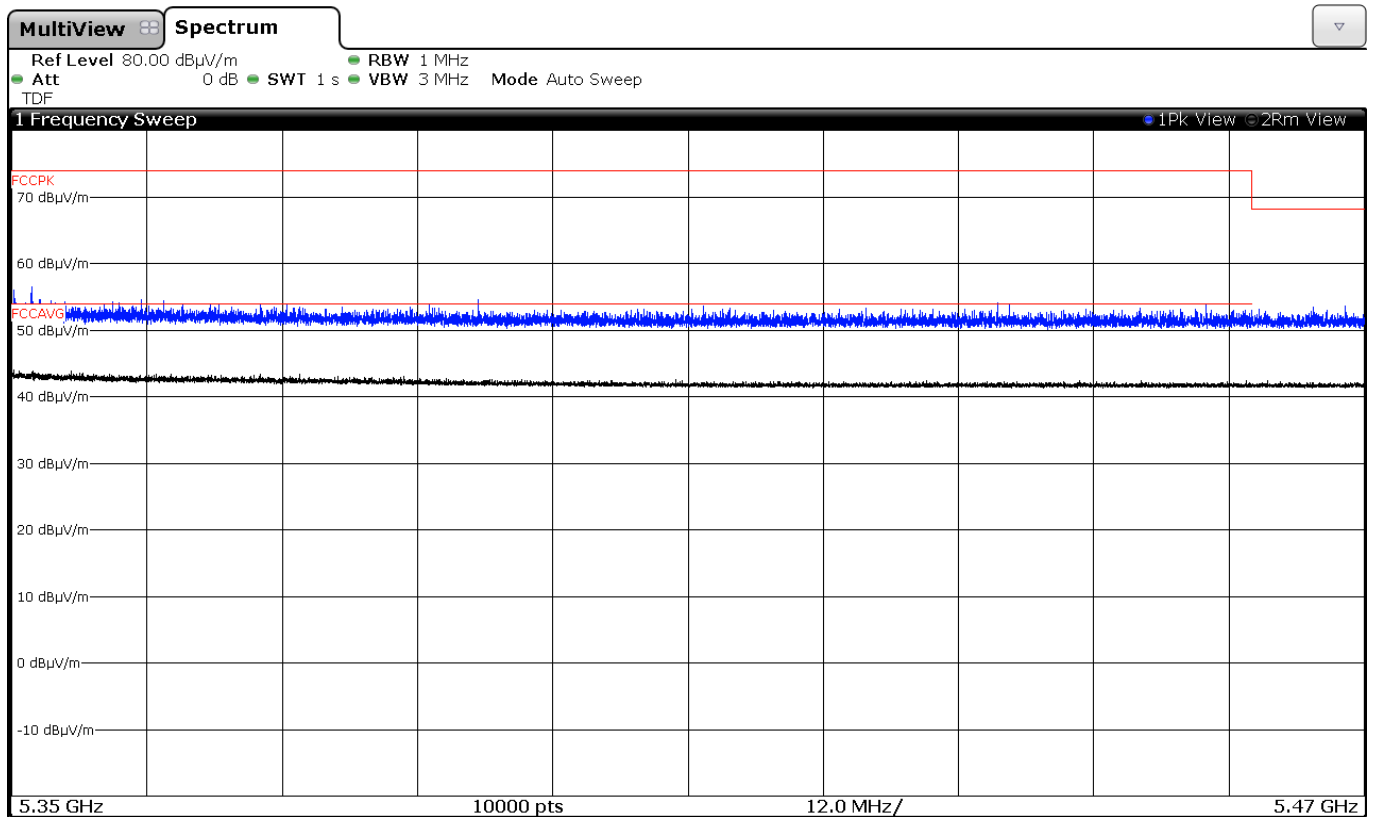
### Chain A



### Chain B



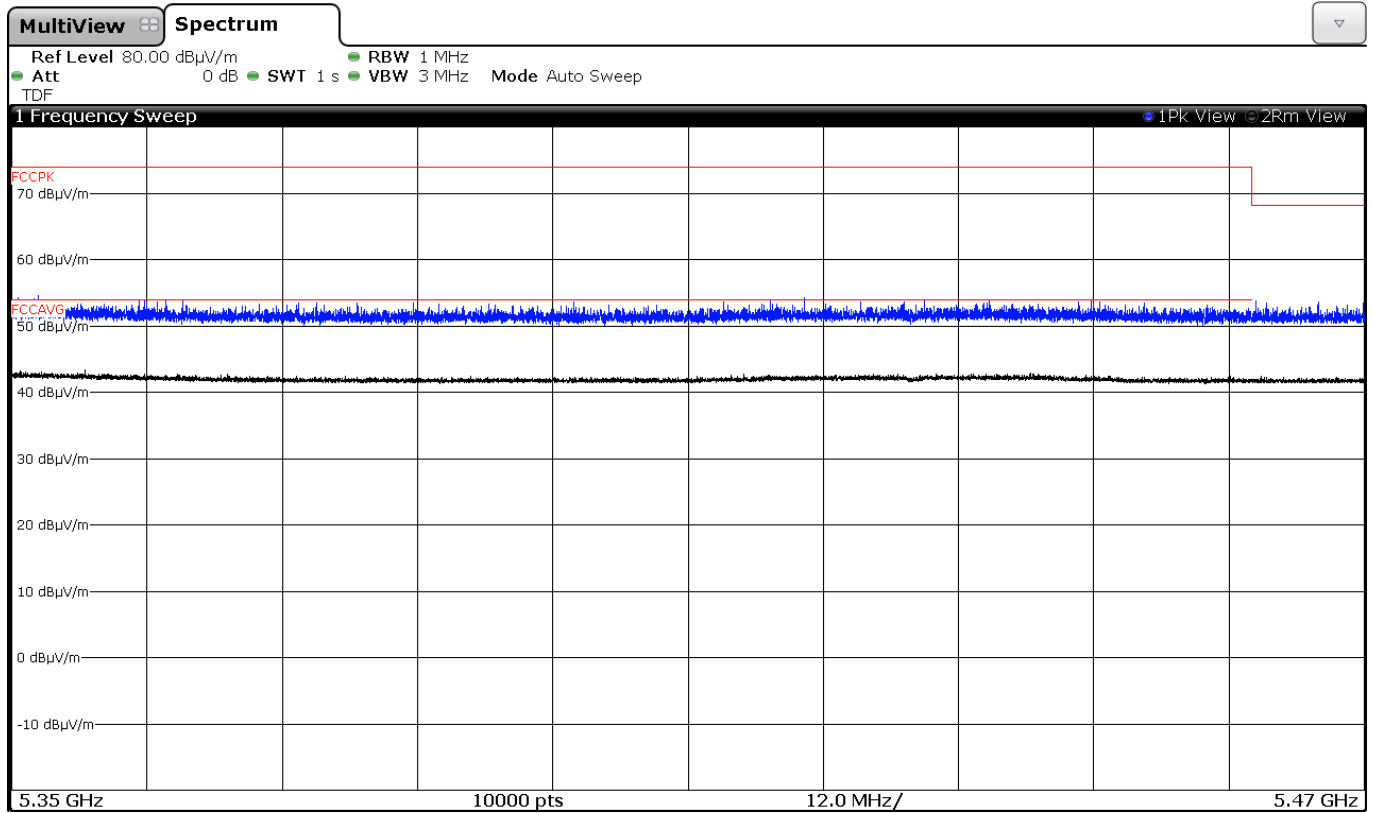
### Chain A+B



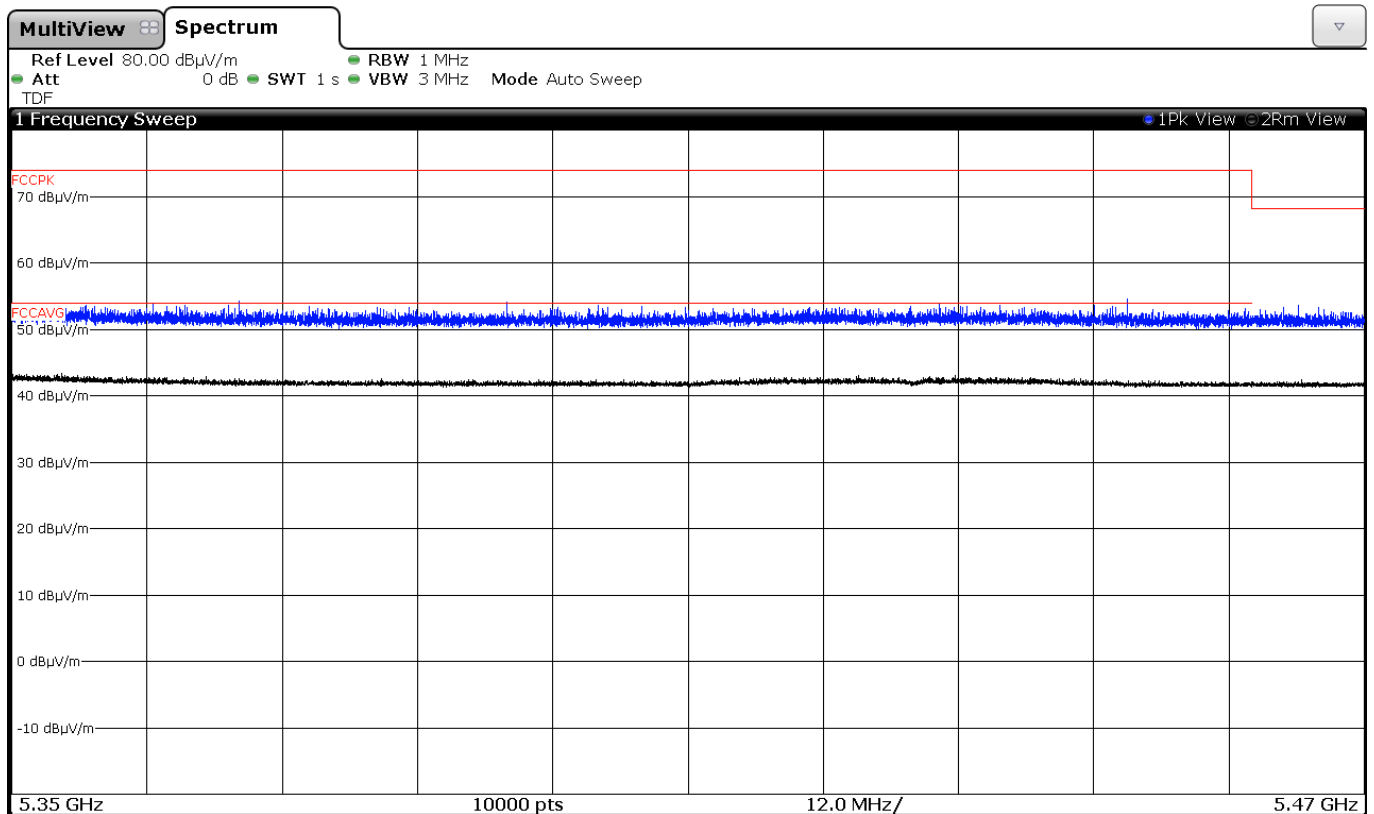
### 3. WiFi 5GHz 802.11 n40 mode

Lowest frequency 5270 MHz.

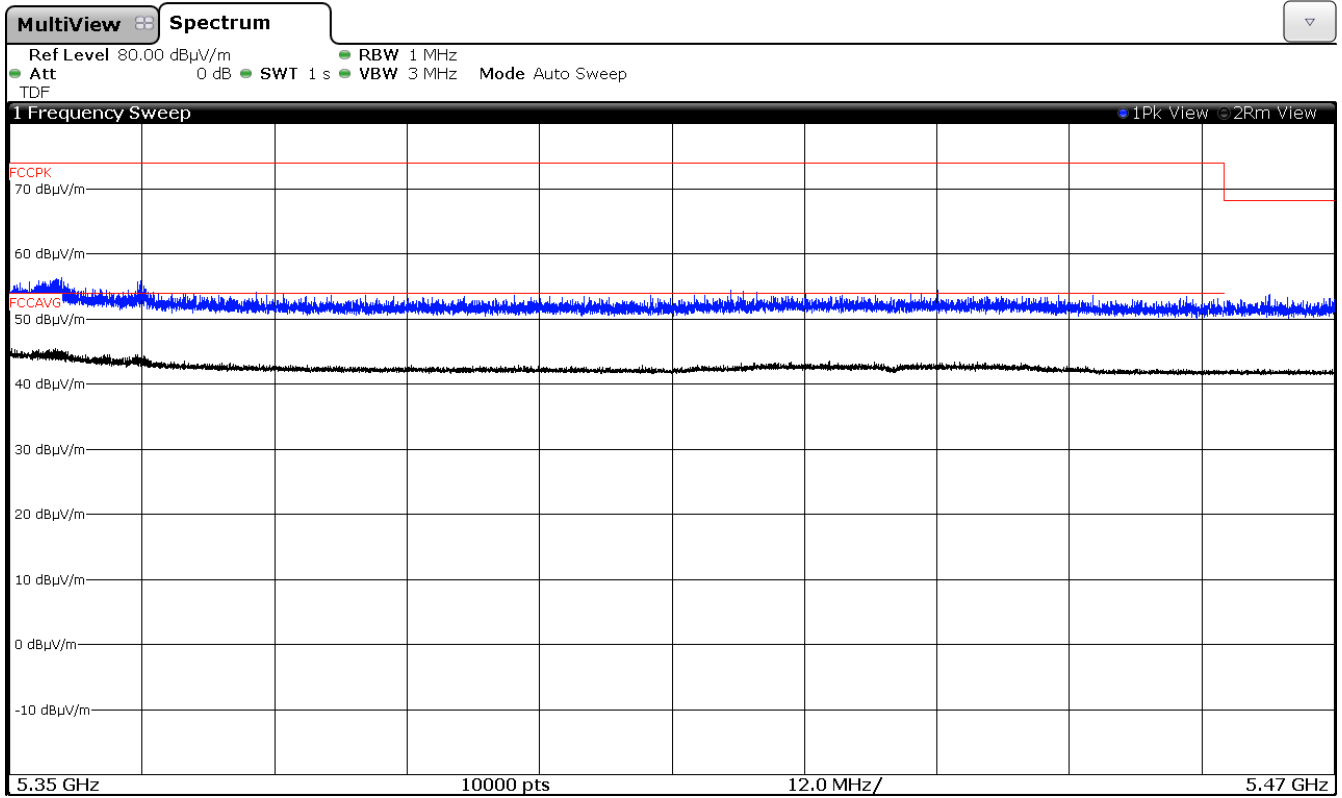
Chain A



Chain B

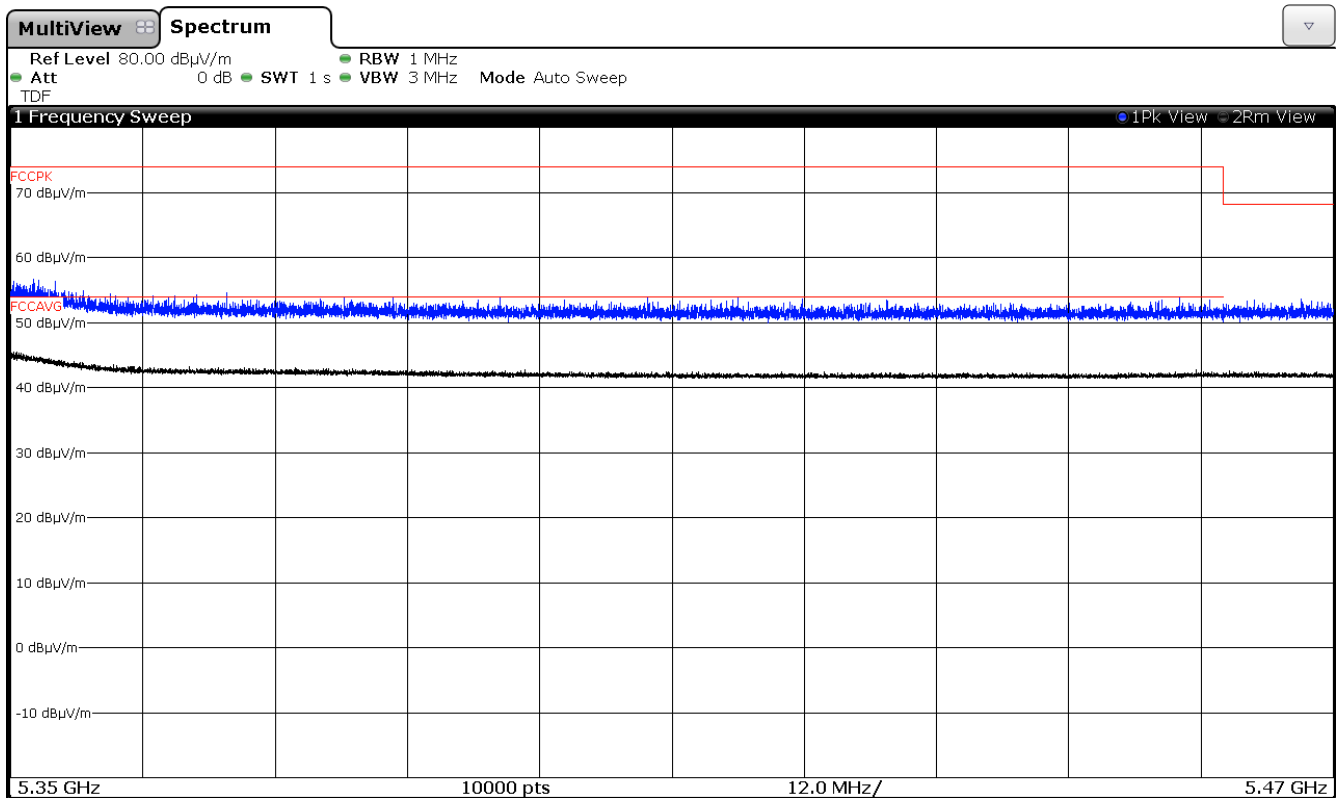


Chain A+B

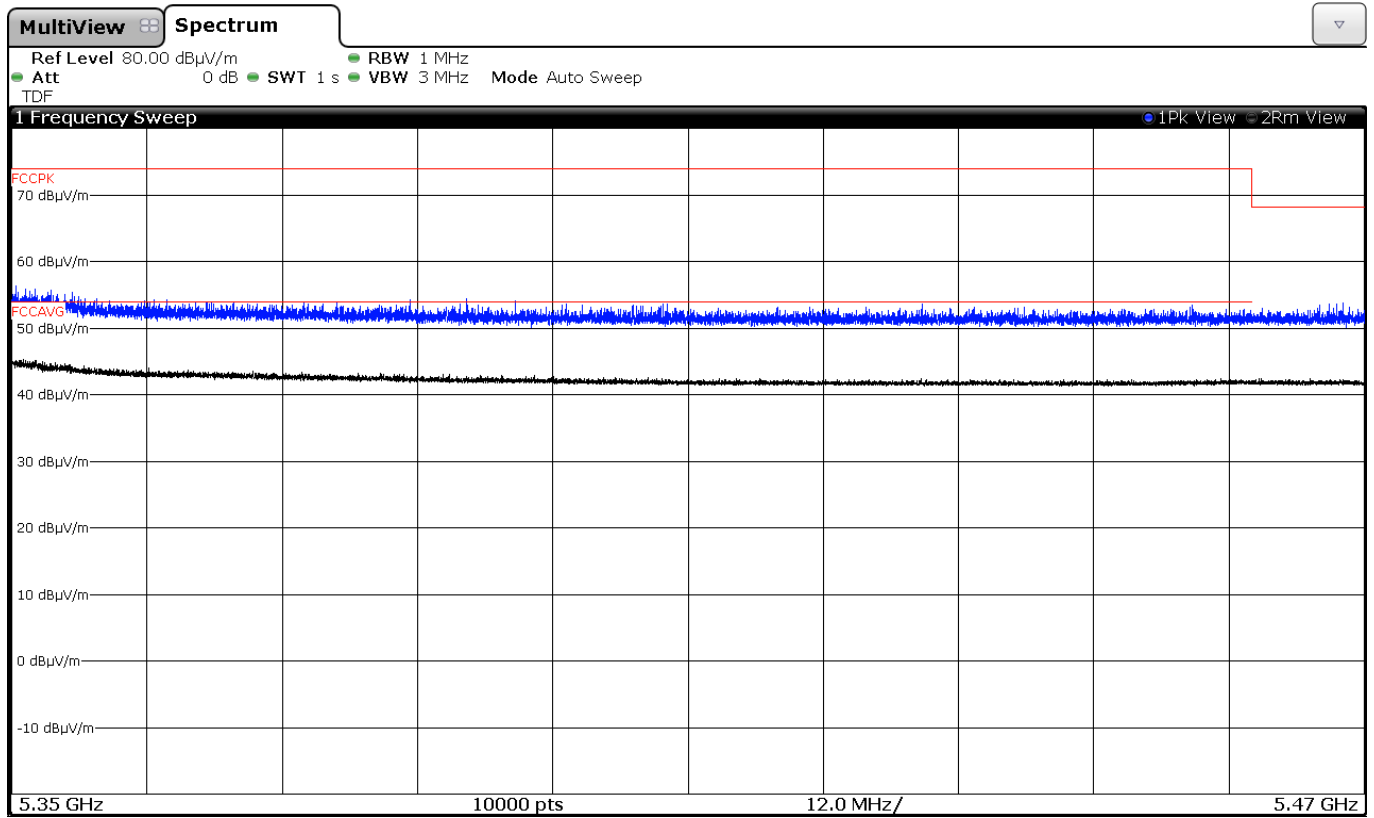


Highest frequency 5310 MHz.

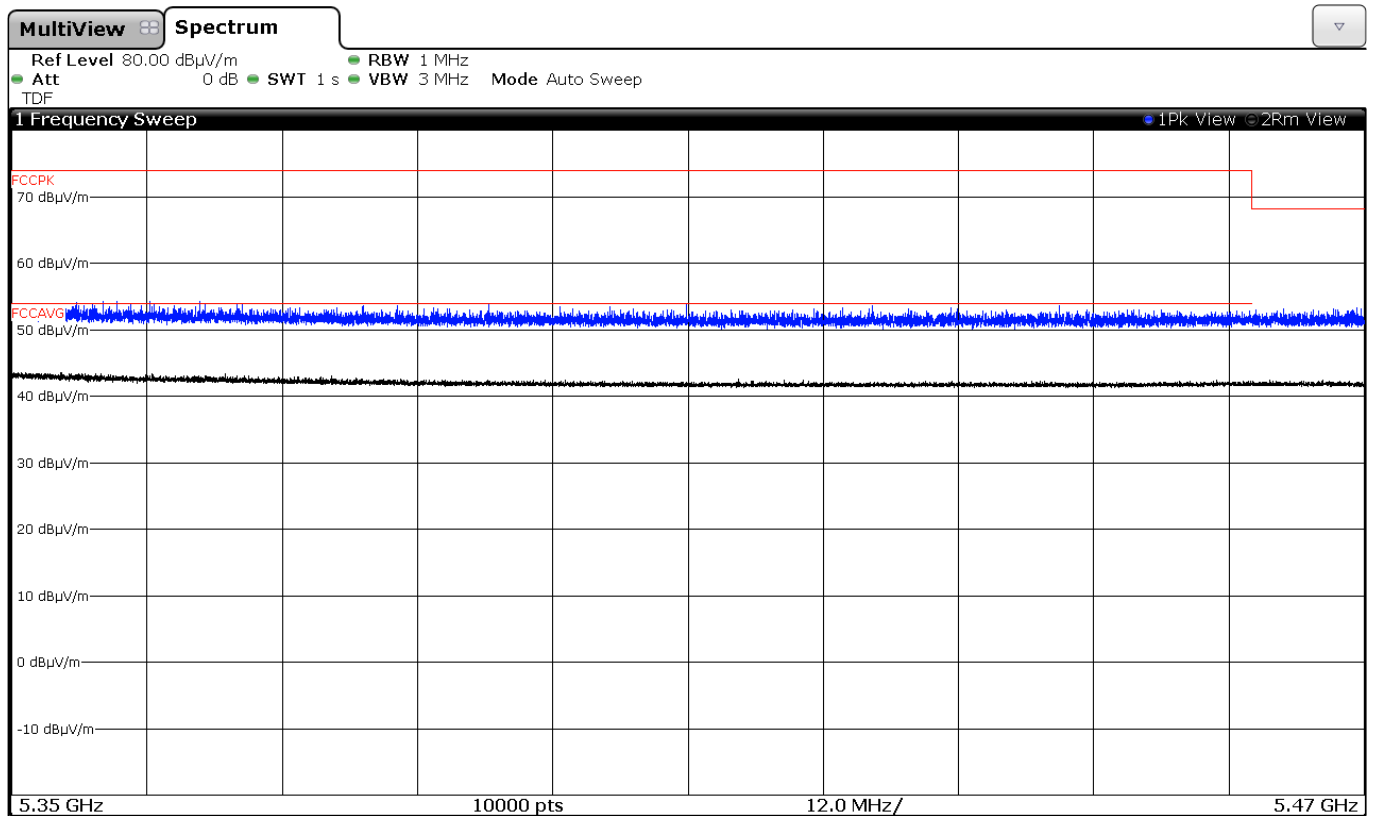
Chain A



Chain B



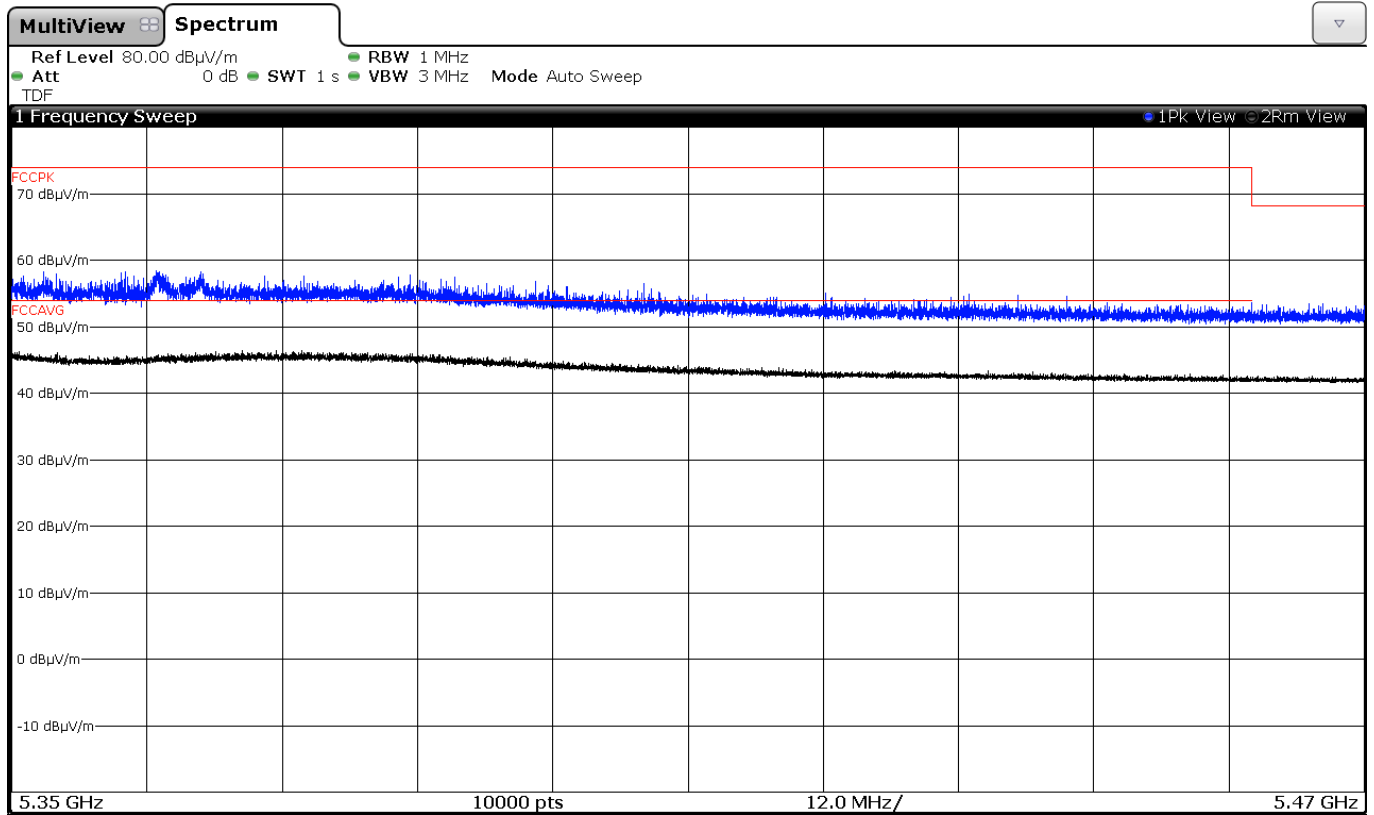
Chain A+B



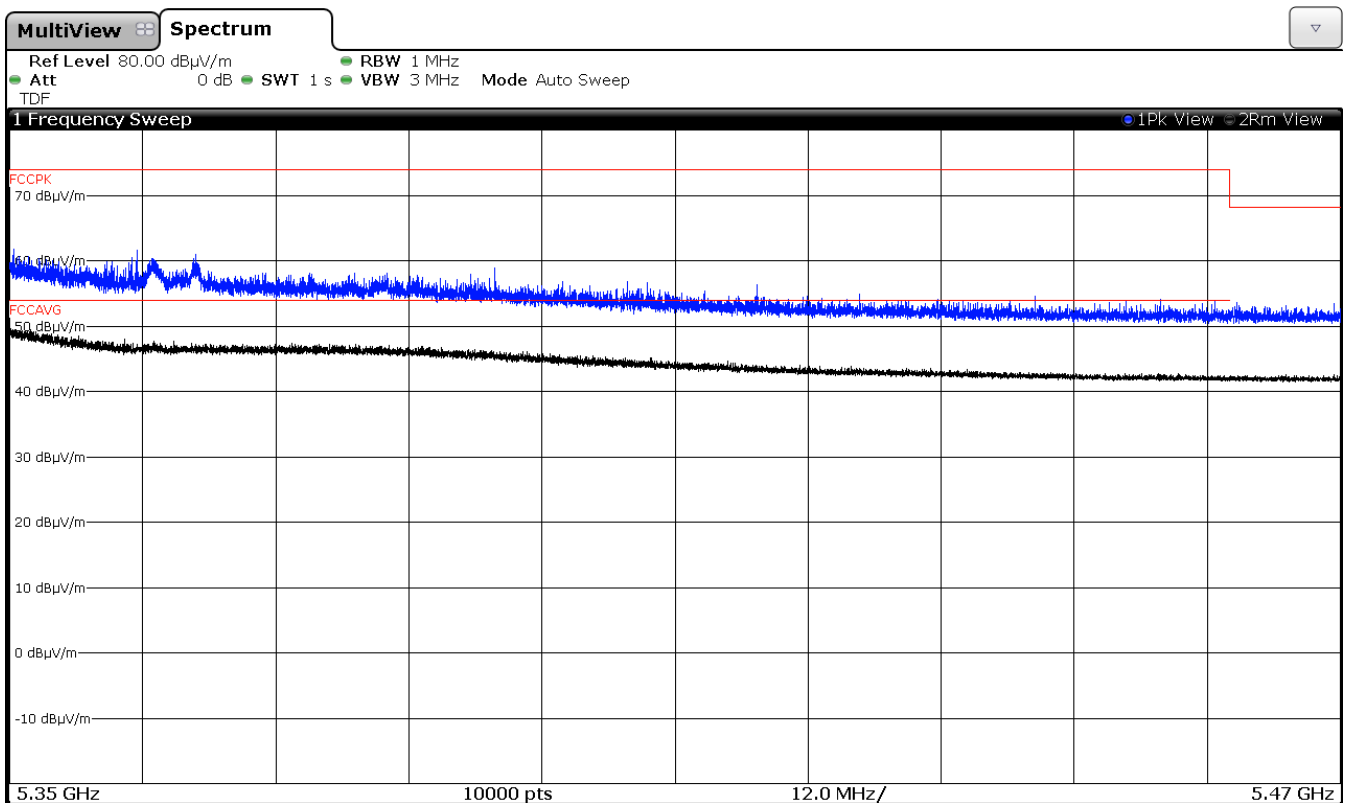
4. WiFi 5GHz 802.11 ac80 mode

Middle frequency 5290 MHz.

Chain A



Chain B



Chain A+B

