

4.4. CHANNEL 6: MIDDLE (2437 MHz). Out-of-band spurious emissions in the 1-25 GHz range and inside restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Chain A

| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.38988                  | PH           | Peak     | 64.77                         | $\pm 4.00$                   |
|                          |              | Average  | 50.50                         | $\pm 4.00$                   |
| 2.48353                  | PH           | Peak     | 66.27                         | $\pm 4.00$                   |
|                          |              | Average  | 53.01                         | $\pm 4.00$                   |
| 4.87425                  | PV           | Peak     | 42.15                         | $\pm 4.00$                   |
| 7.30408                  | PV           | Peak     | 42.72                         | $\pm 4.00$                   |

Chain B

| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.38972                  | PH           | Peak     | 71.93                         | $\pm 4.00$                   |
|                          |              | Average  | 53.78                         | $\pm 4.00$                   |
| 2.48353                  | PH           | Peak     | 67.85                         | $\pm 4.00$                   |
|                          |              | Average  | 53.91                         | $\pm 4.00$                   |
| 2.59500                  | PH           | Peak     | 50.53                         | $\pm 4.00$                   |
| 4.87664                  | PV           | Peak     | 55.61                         | $\pm 4.00$                   |
|                          |              | Average  | 46.32                         | $\pm 4.00$                   |

Chain A+B

| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.38988                  | PH           | Peak     | 62.51                         | $\pm 4.00$                   |
|                          |              | Average  | 48.65                         | $\pm 4.00$                   |
| 2.48369                  | PH           | Peak     | 65.72                         | $\pm 4.00$                   |
|                          |              | Average  | 50.42                         | $\pm 4.00$                   |
| 4.87181                  | PH           | Peak     | 52.60                         | $\pm 4.00$                   |

4.5. CHANNEL 7 (2442 MHz). Spurious emissions in restricted band 2.4835-2.5 GHz.

Chain A

| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.48377                  | PH           | Peak     | 58.65                         | $\pm 4.00$                   |
|                          |              | Average  | 47.69                         | $\pm 4.00$                   |

Chain B

| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.48369                  | PH           | Peak     | 58.73                         | $\pm 4.00$                   |
|                          |              | Average  | 46.79                         | $\pm 4.00$                   |

Chain A+B

| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.48357                  | PH           | Peak     | 65.71                         | $\pm 4.00$                   |
|                          |              | Average  | 51.75                         | $\pm 4.00$                   |

4.6. CHANNEL 8 (2447 MHz). Spurious emissions in restricted band 2.4835-2.5 GHz.

Chain A

| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.48354                  | PH           | Peak     | 56.76                         | $\pm 4.00$                   |
|                          |              | Average  | 45.33                         | $\pm 4.00$                   |

Chain B

| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.48353                  | PH           | Peak     | 59.56                         | $\pm 4.00$                   |
|                          |              | Average  | 47.15                         | $\pm 4.00$                   |

Chain A+B

| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.48422                  | PH           | Peak     | 65.88                         | $\pm 4.00$                   |
|                          |              | Average  | 51.75                         | $\pm 4.00$                   |

4.7. CHANNEL 9 (2452 MHz). Spurious emissions in restricted band 2.4835-2.5 GHz.

Chain A

| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.48351                  | PH           | Peak     | 56.40                         | $\pm 4.00$                   |
|                          |              | Average  | 45.03                         | $\pm 4.00$                   |

Chain B

| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.48354                  | PH           | Peak     | 59.63                         | $\pm 4.00$                   |
|                          |              | Average  | 47.41                         | $\pm 4.00$                   |

Chain A+B

| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.48351                  | PH           | Peak     | 59.97                         | $\pm 4.00$                   |
|                          |              | Average  | 46.87                         | $\pm 4.00$                   |

4.8. CHANNEL 10F: (2457 MHz). Out-of-band spurious emissions in the 1-25 GHz range and inside restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz. For information purposes only.

Chain A

| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.37884                  | PH           | Peak     | 45.16                         | $\pm 4.00$                   |
| 2.48351                  | PH           | Peak     | 54.36                         | $\pm 4.00$                   |
|                          |              | Average  | 41.75                         | $\pm 4.00$                   |

Chain B

| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.38932                  | PH           | Peak     | 48.14                         | $\pm 4.00$                   |
| 2.48353                  | PH           | Peak     | 58.37                         | $\pm 4.00$                   |
|                          |              | Average  | 47.18                         | $\pm 4.00$                   |

Chain A+B

| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.38972                  | PH           | Peak     | 46.08                         | $\pm 4.00$                   |
| 2.48353                  | PH           | Peak     | 58.37                         | $\pm 4.00$                   |
|                          |              | Average  | 47.18                         | $\pm 4.00$                   |
| 4.91342                  | PV           | Peak     | 36.70                         | $\pm 4.00$                   |

4.9. CHANNEL 11F: (2462 MHz). Spurious emissions inside restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz. For information purposes only.

Chain A

| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.37932                  | PH           | Peak     | 45.08                         | $\pm 4.00$                   |
| 2.48366                  | PH           | Peak     | 60.11                         | $\pm 4.00$                   |
|                          |              | Average  | 45.04                         | $\pm 4.00$                   |

Chain B

| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.38465                  | PH           | Peak     | 45.12                         | $\pm 4.00$                   |
| 2.48369                  | PH           | Peak     | 60.05                         | $\pm 4.00$                   |
|                          |              | Average  | 46.91                         | $\pm 4.00$                   |

Chain A+B

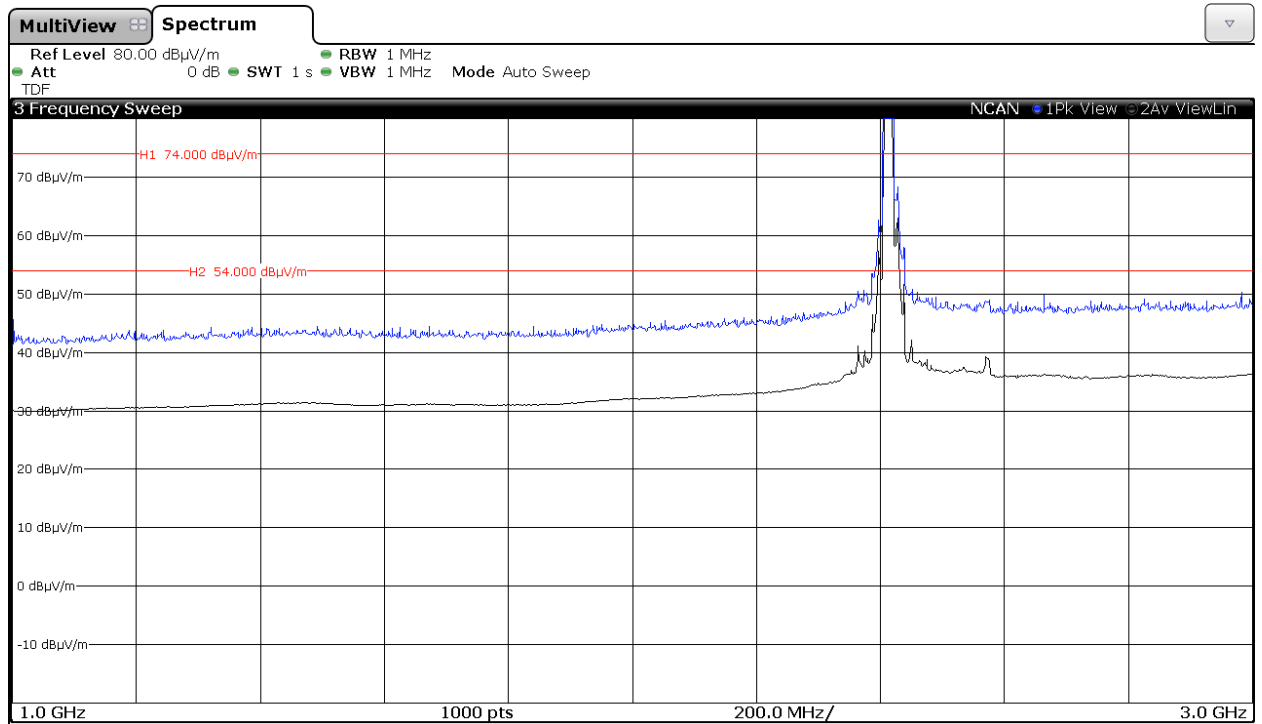
| Spurious frequency (GHz) | Polarization | Detector | Emission Level (dB $\mu$ V/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|----------|-------------------------------|------------------------------|
| 2.38924                  | PH           | Peak     | 45.61                         | $\pm 4.00$                   |
| 2.48353                  | PH           | Peak     | 60.63                         | $\pm 4.00$                   |
|                          |              | Average  | 47.40                         | $\pm 4.00$                   |



FREQUENCY RANGE 1 GHz to 3 GHz.

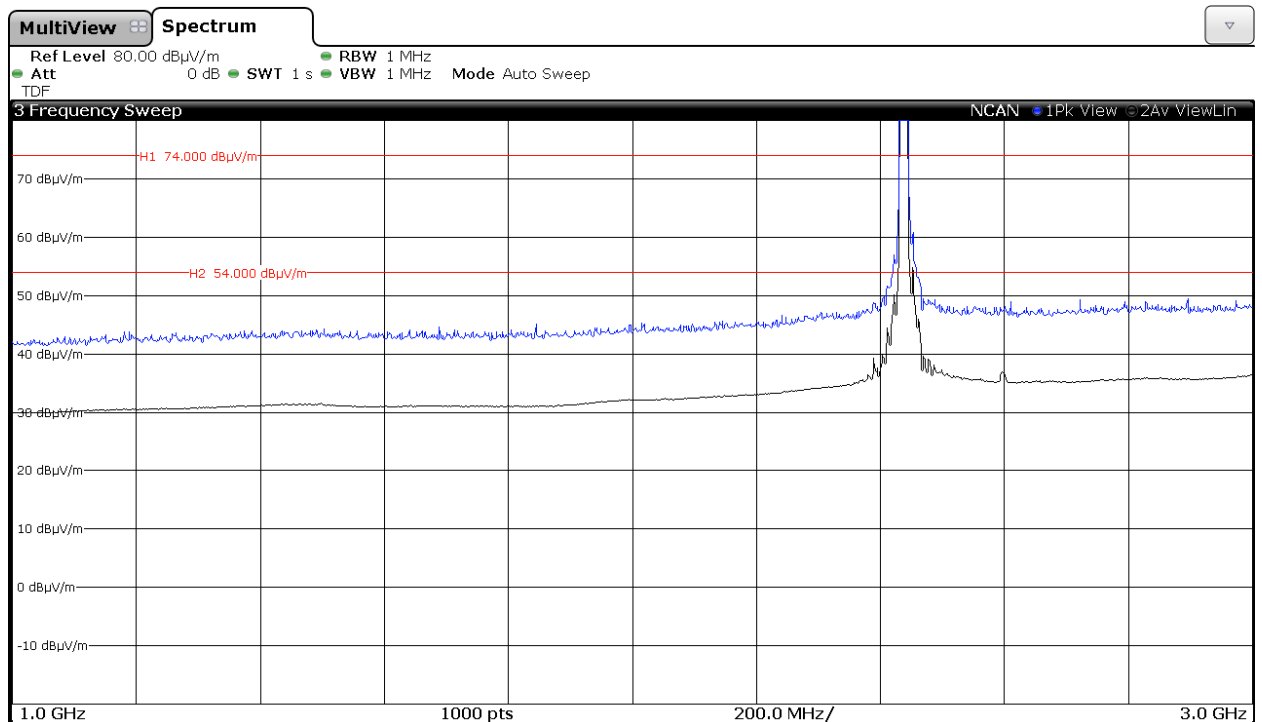
1. WiFi 2.4GHz 802.11 b mode

**CHANNEL 1 (2412 MHz).**



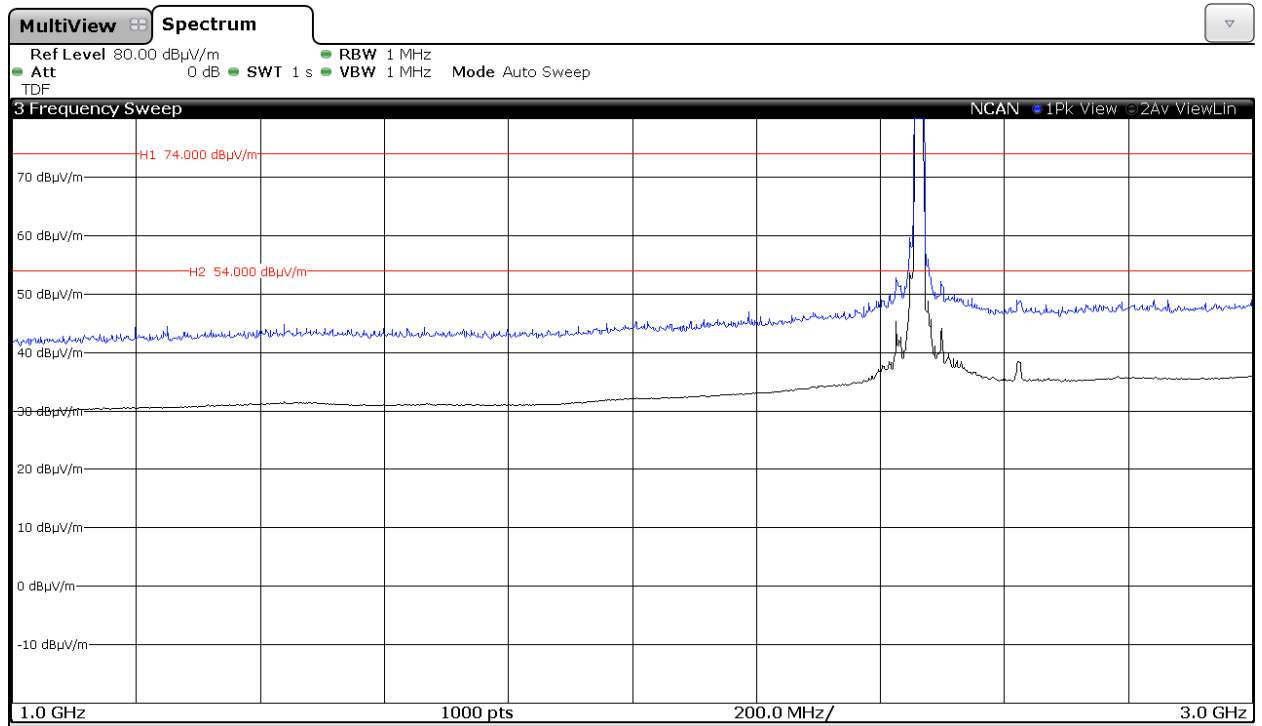
Note: The peak above the limit is the carrier frequency. This plot is valid for both Chain A and Chain B.

**CHANNEL 6 (2437 MHz).**



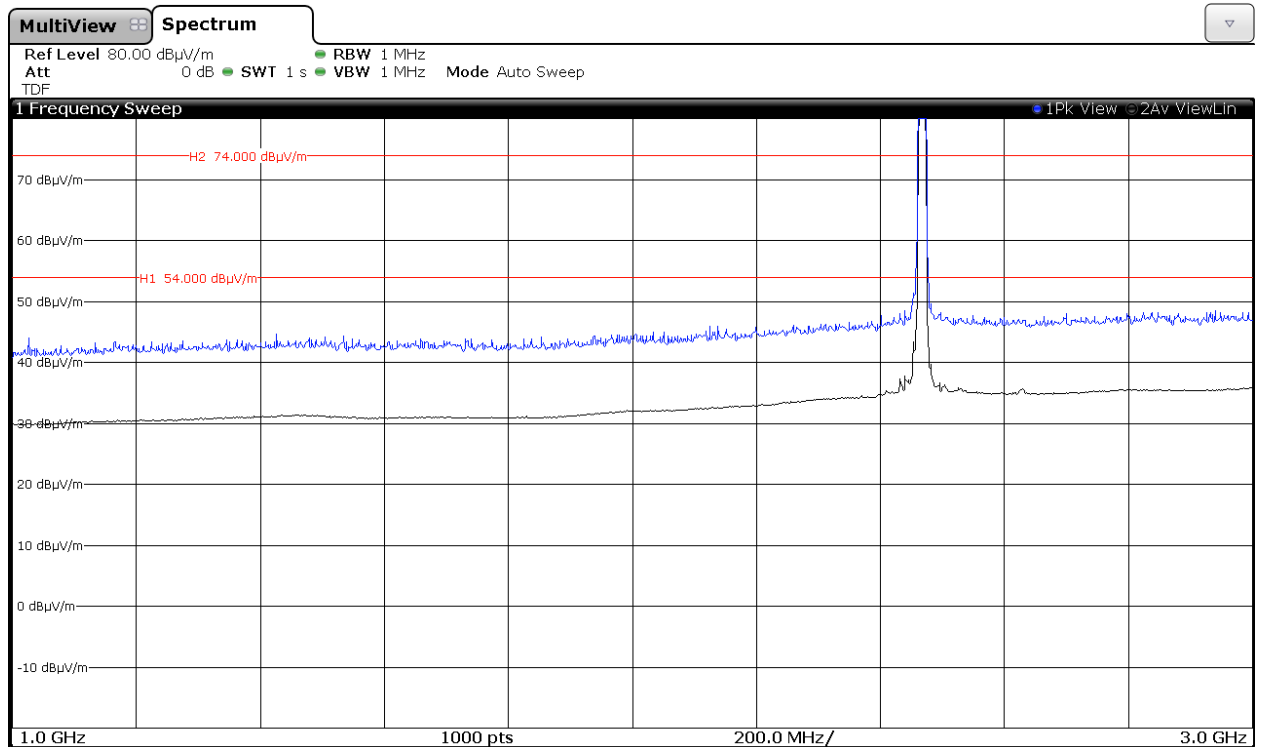
Note: The peak above the limit is the carrier frequency. This plot is valid for both Chain A and Chain B.

### CHANNEL 11 (2462 MHz).



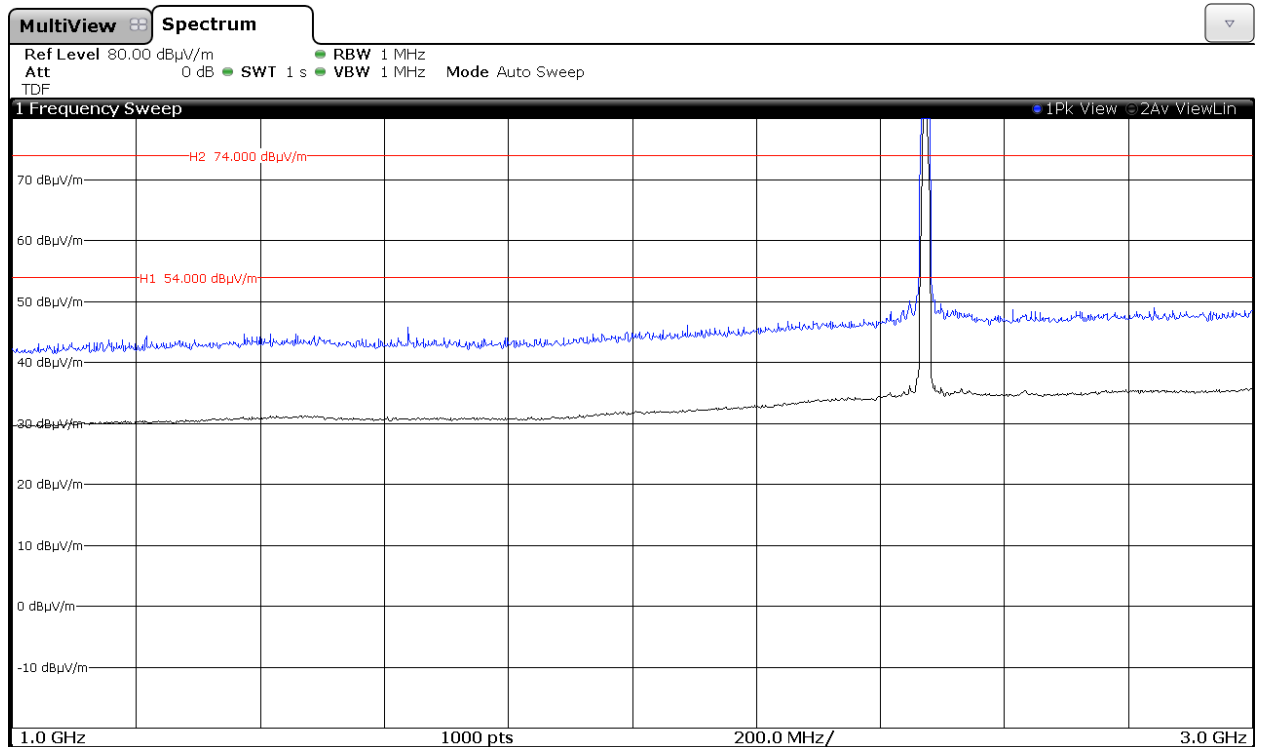
Note: The peak above the limit is the carrier frequency. This plot is valid for both Chain A and Chain B.

### CHANNEL 12 (2467 MHz).



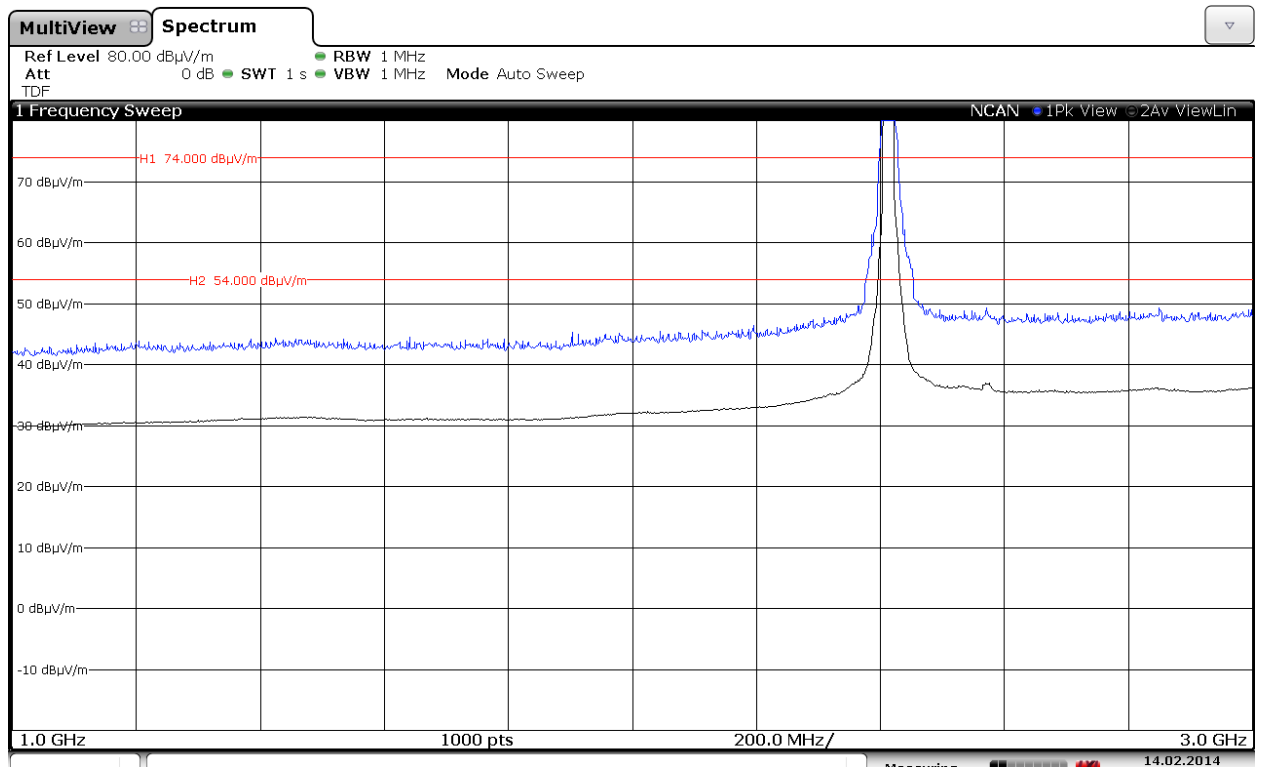
Note: The peak above the limit is the carrier frequency. This plot is valid for both Chain A and Chain B.

**CHANNEL 13 (2472 MHz).**



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

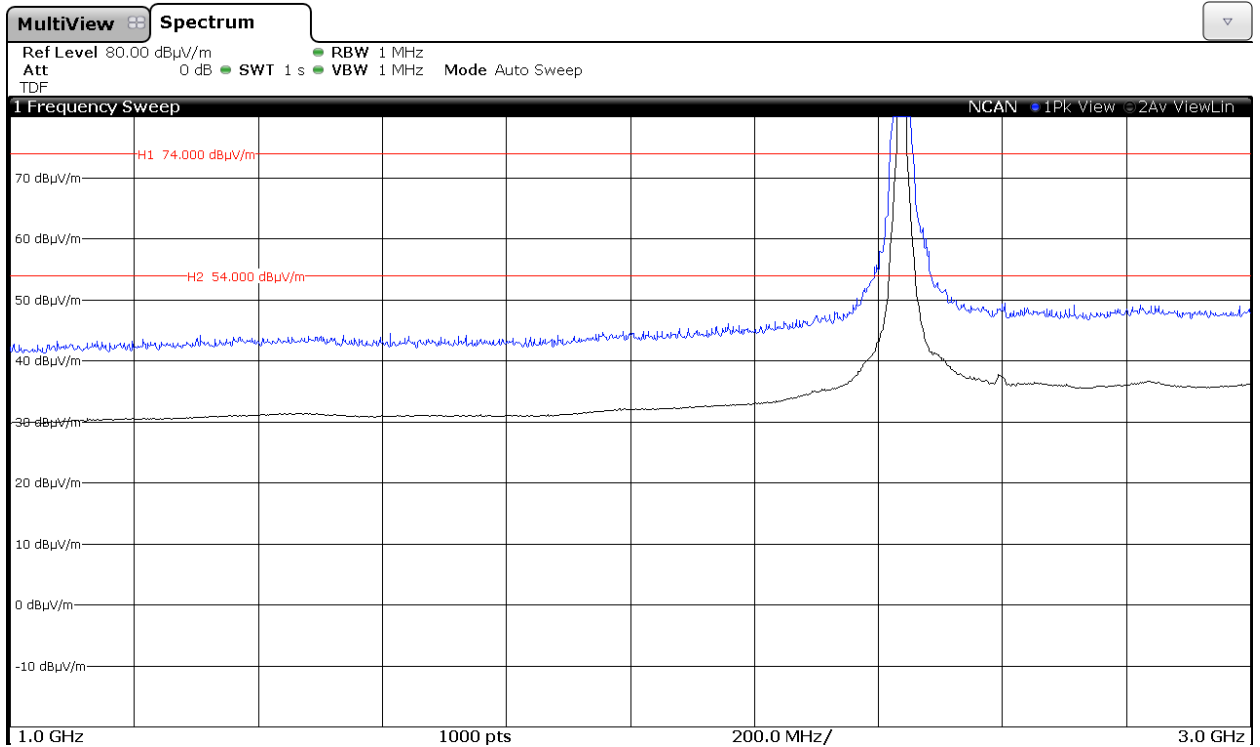
2. WiFi 2.4GHz 802.11 g mode (worst case)  
**CHANNEL 1 (2412 MHz).**



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

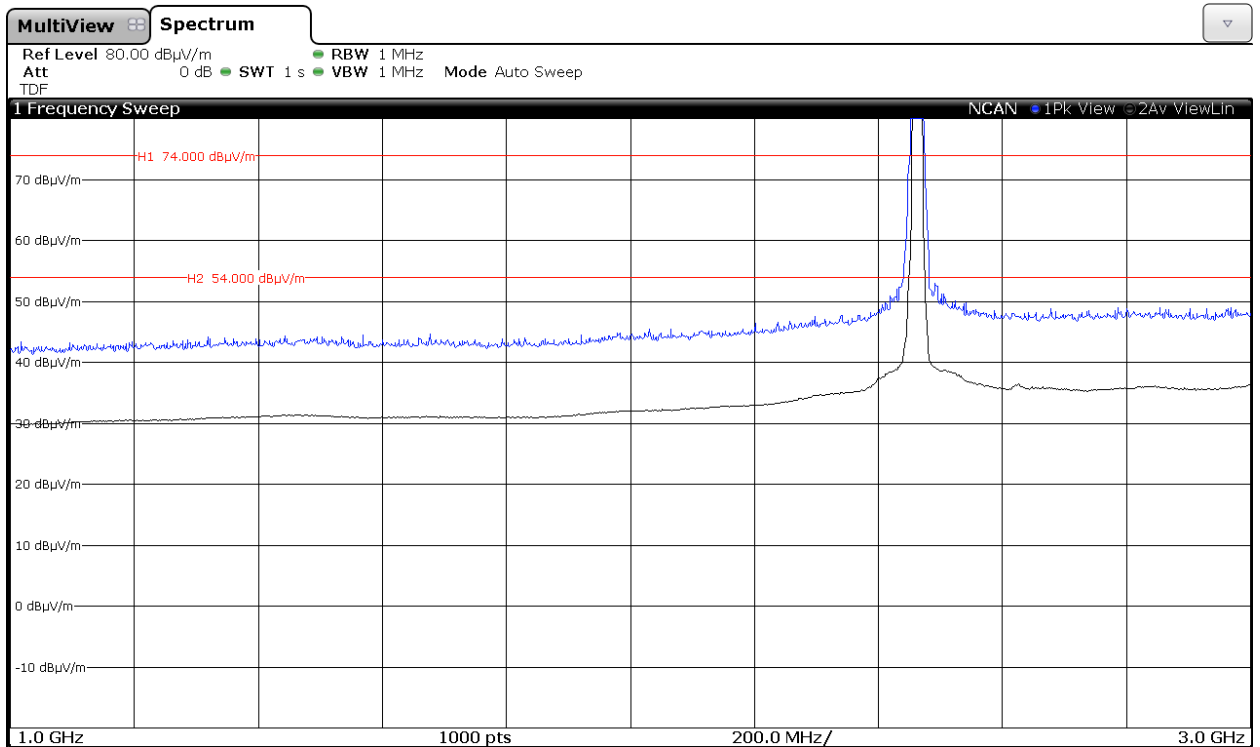


### CHANNEL 6 (2437 MHz).



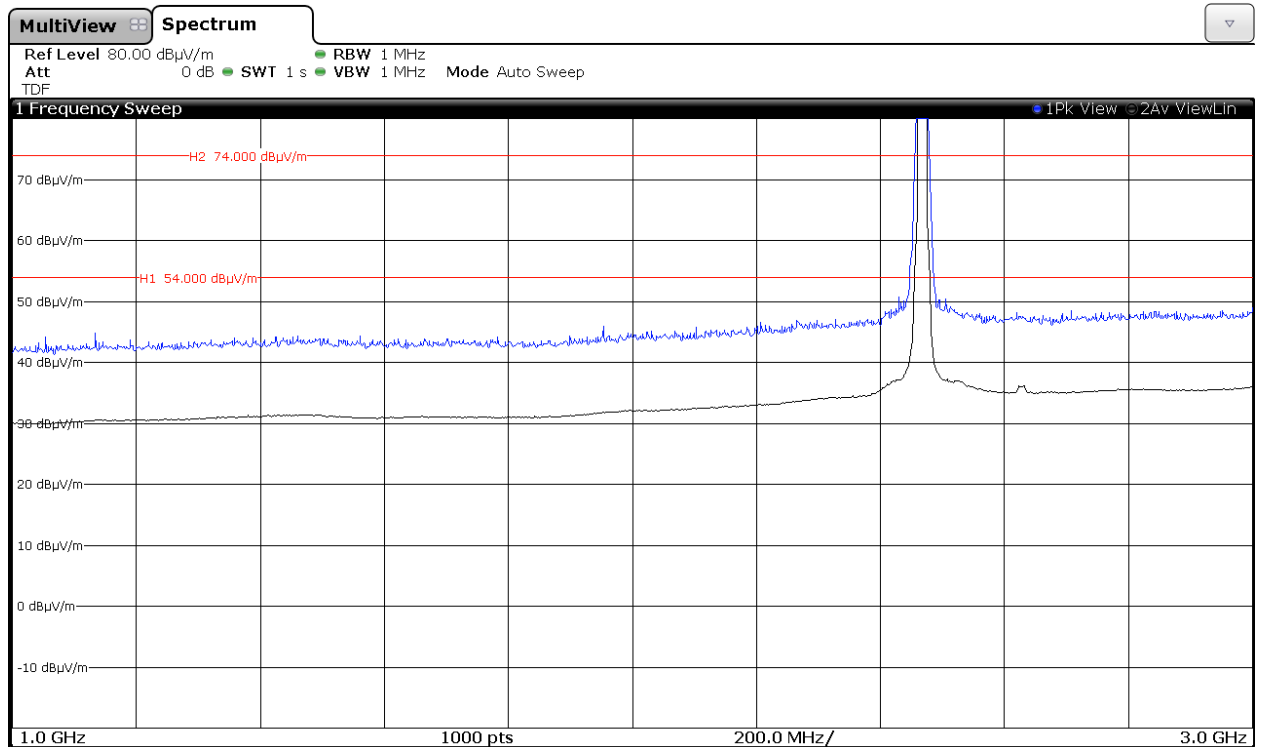
Note: The peak above the limit is the carrier frequency. This plot is valid for both Chain A and Chain B.

### CHANNEL 11 (2462 MHz).



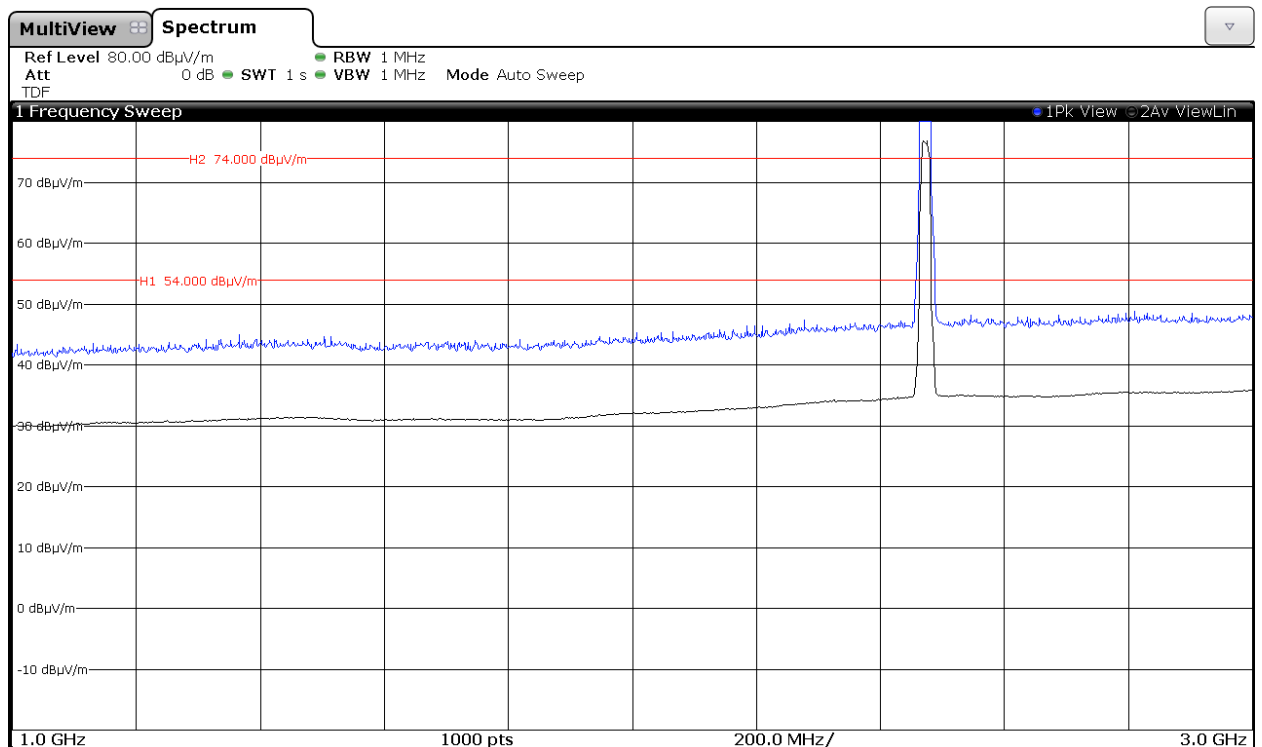
Note: The peak above the limit is the carrier frequency. This plot is valid for both Chain A and Chain B.

### CHANNEL 12 (2467 MHz).



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

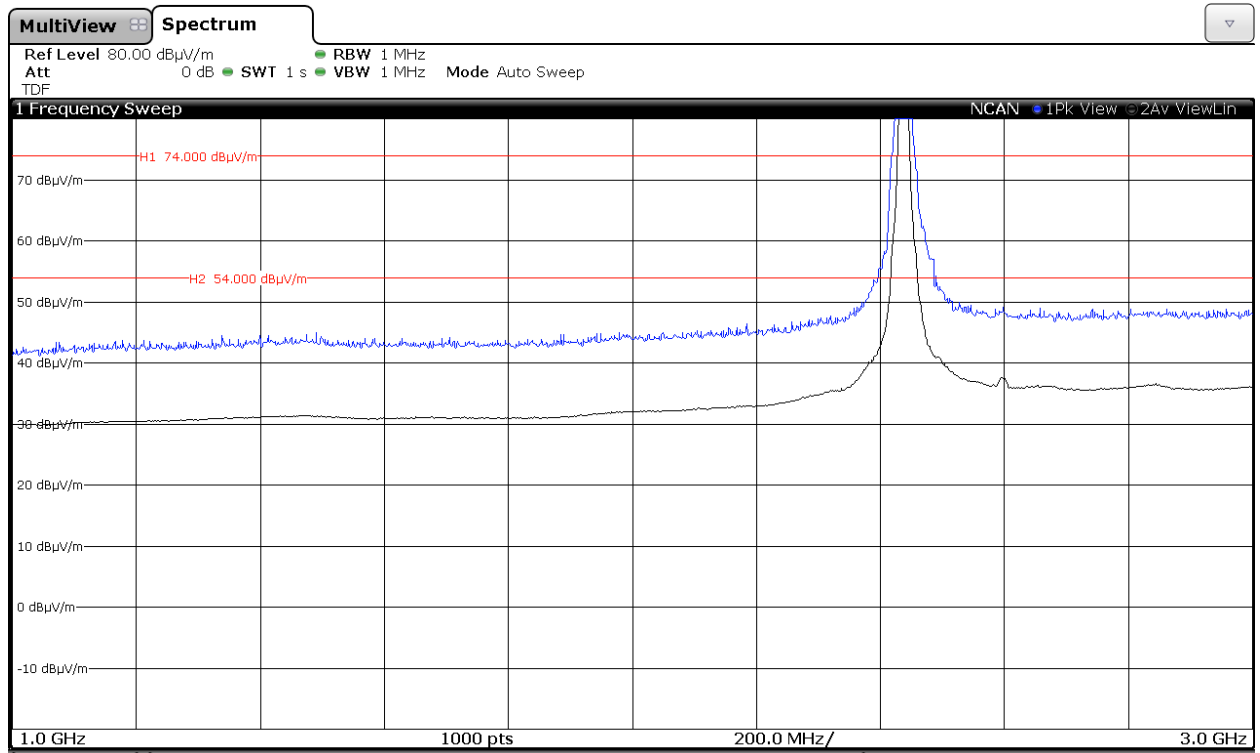
### CHANNEL 13 (2472 MHz).



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

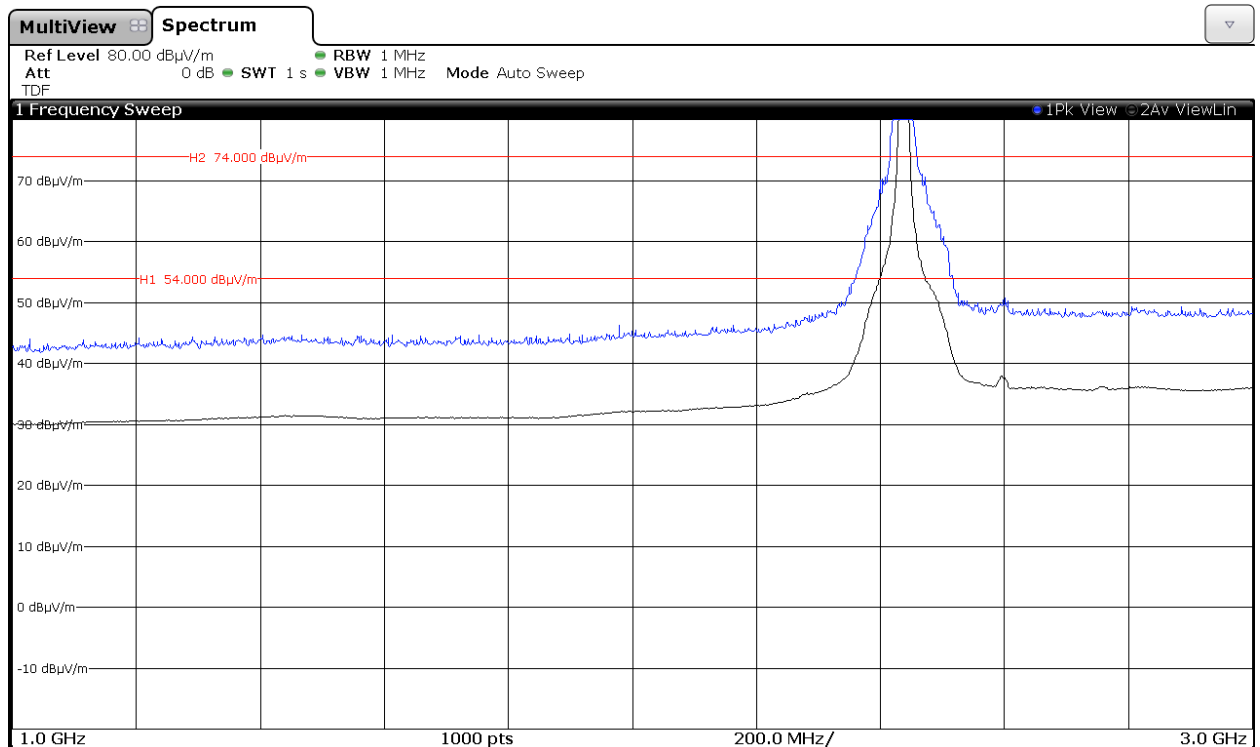
### 3. WiFi 2.4GHz 802.11 n20 mode

#### CHANNEL 6 (2437 MHz).



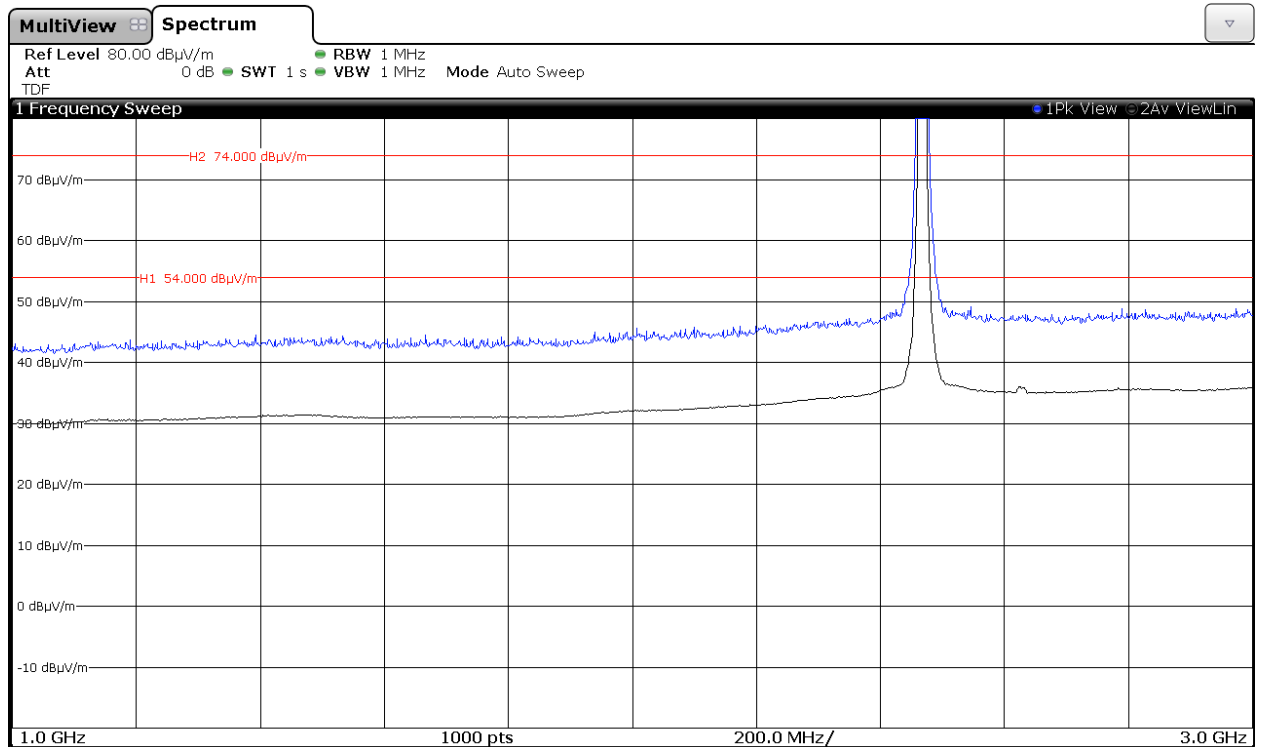
Note: The peak above the limit is the carrier frequency. This plot is valid for both Chain A and Chain B.

#### Chain A+B.



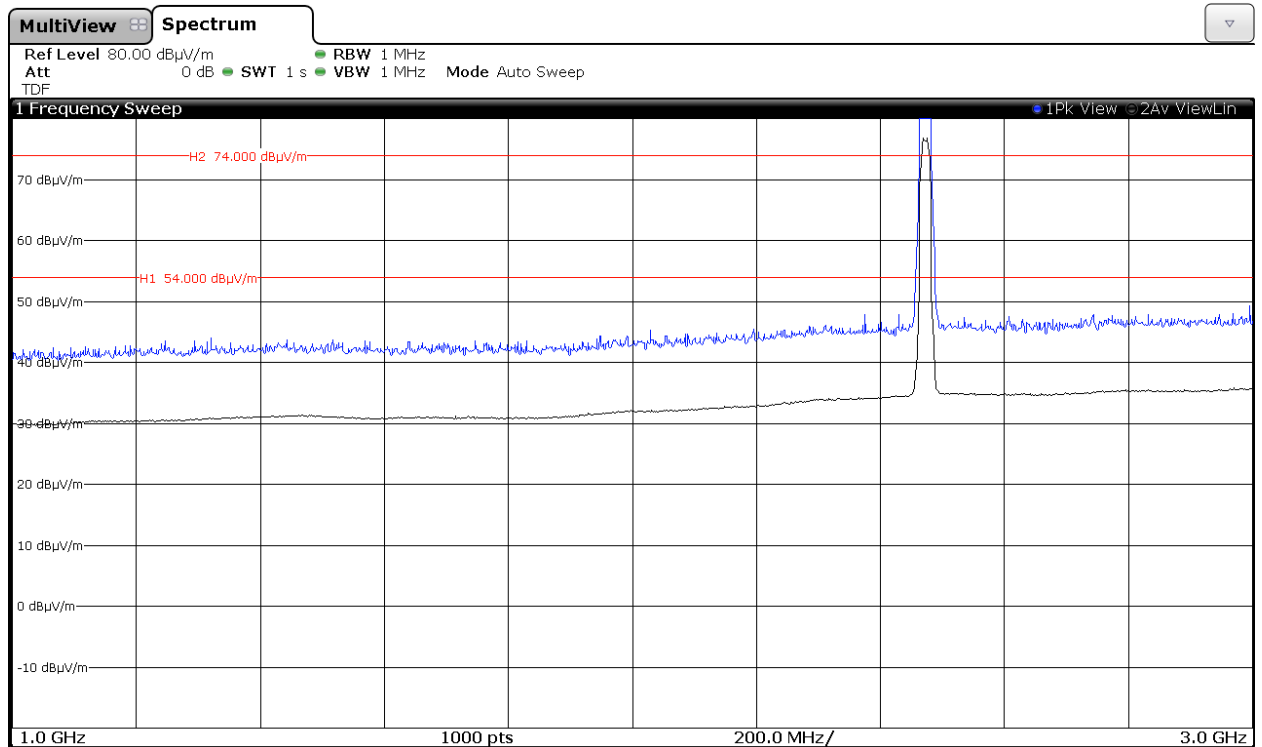
Note: The peak above the limit is the carrier frequency.

**CHANNEL 12 (2467 MHz).**



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

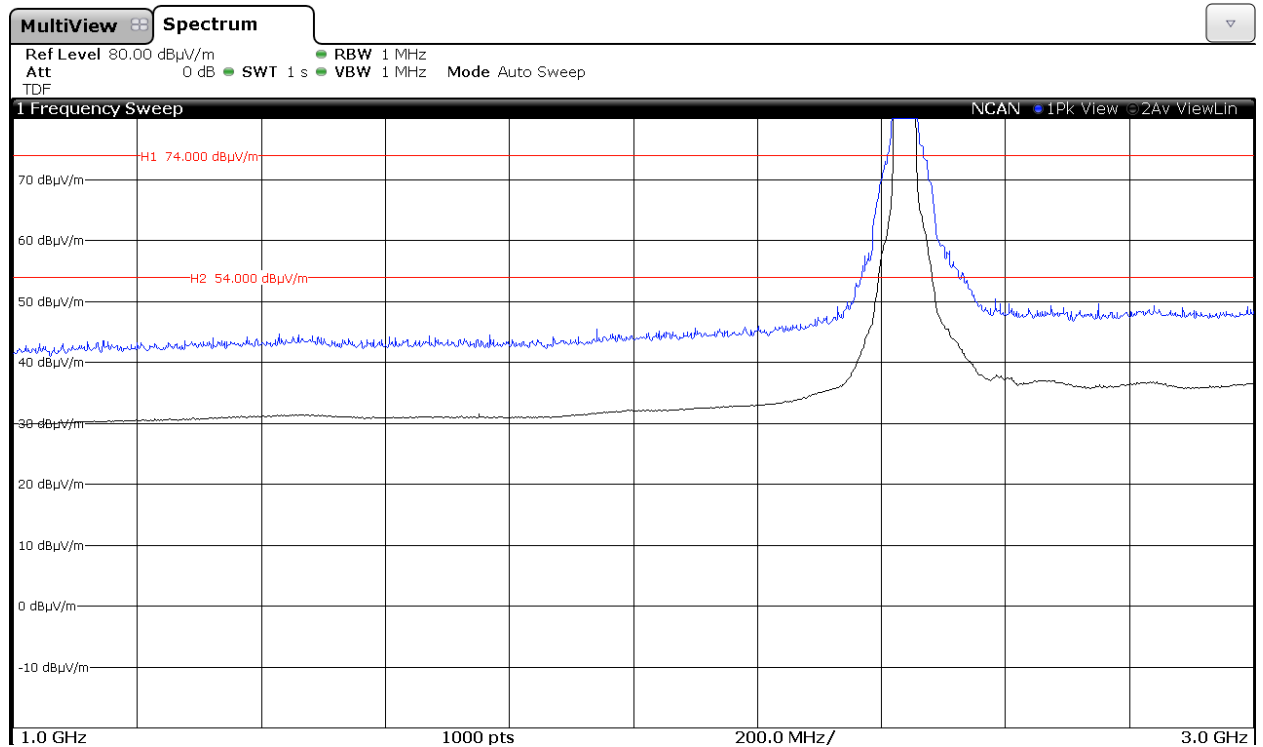
**CHANNEL 13 (2472 MHz).**



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

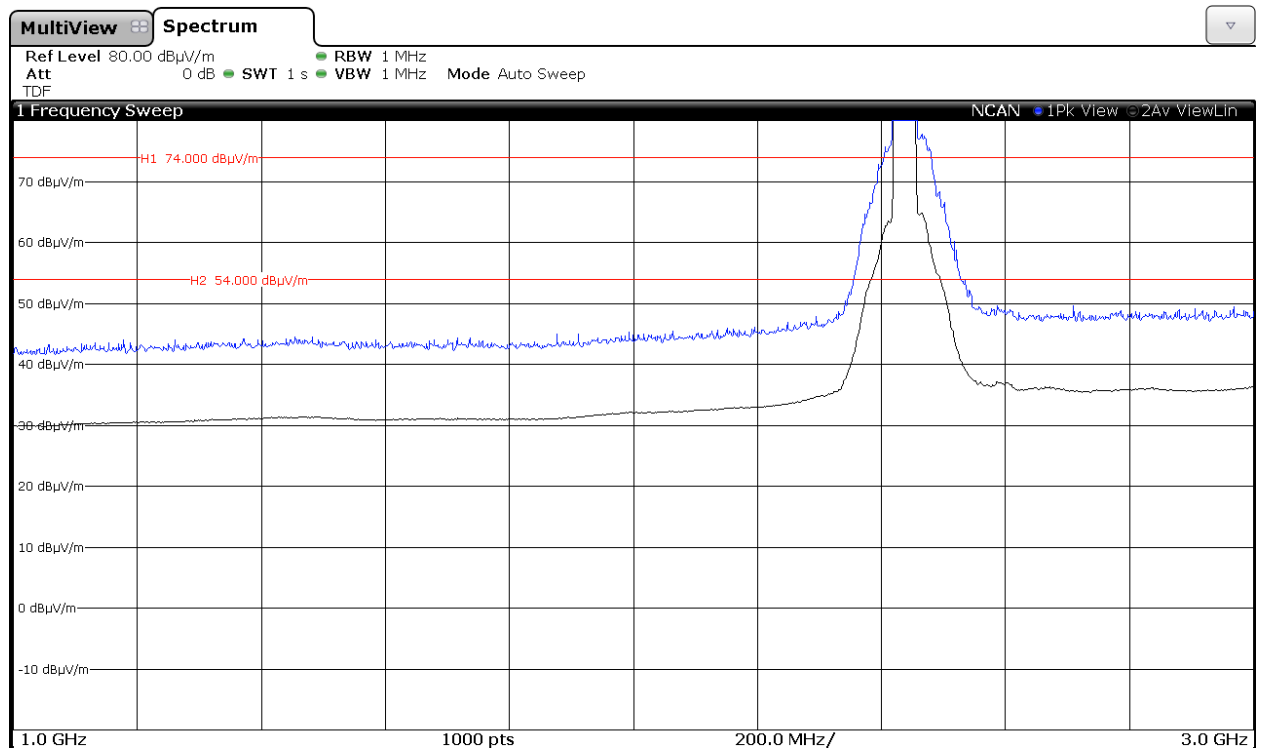
#### 4. WiFi 2.4GHz 802.11 n40 mode

#### CHANNEL 6 (2437 MHz).



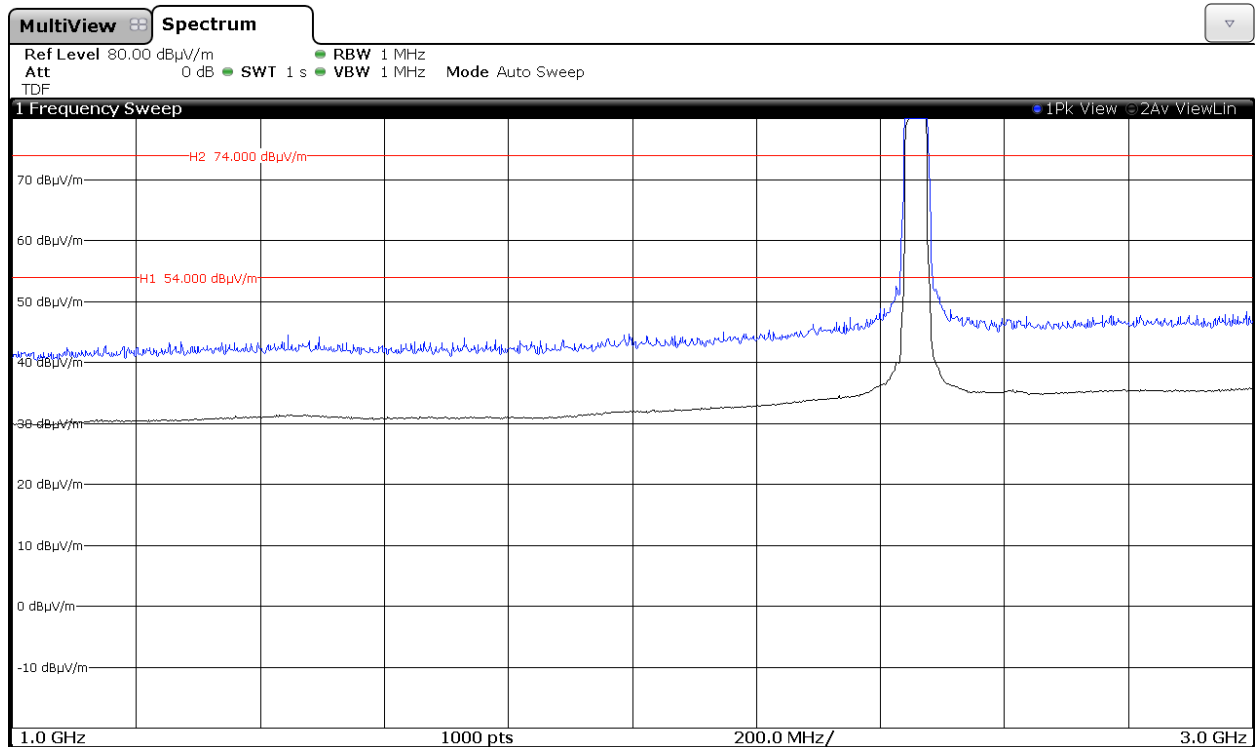
Note: The peak above the limit is the carrier frequency. This plot is valid for both Chain A and Chain B.

#### Chain A+B.



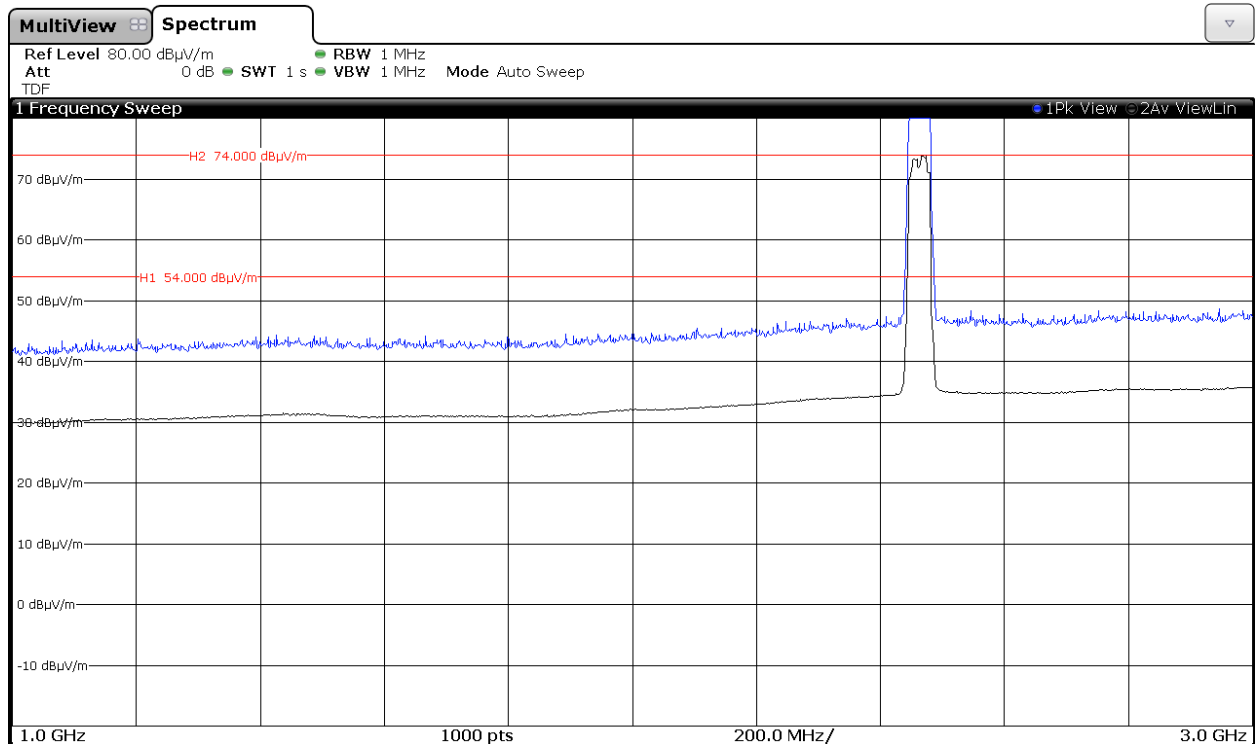
Note: The peak above the limit is the carrier frequency.

### CHANNEL 10F (2457 MHz).



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

### CHANNEL 11F (2462 MHz).



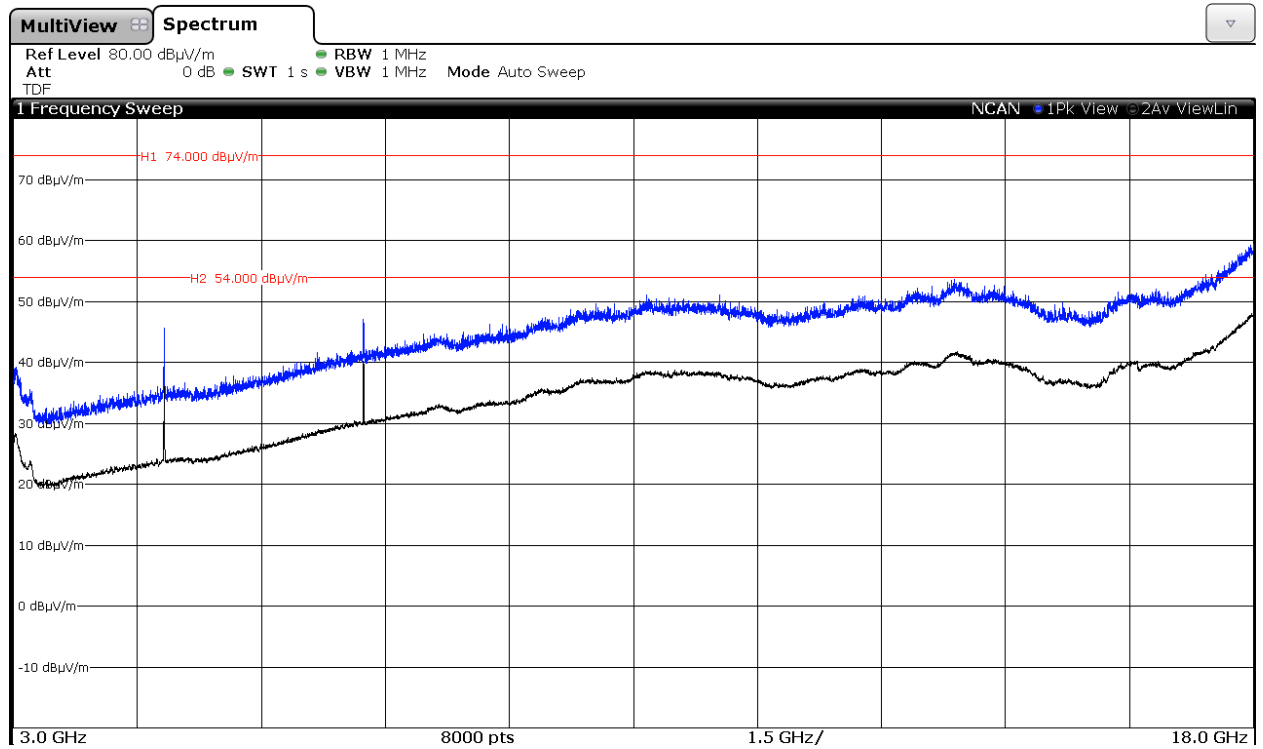
Note: The peak above the limit is the carrier frequency. This plot is valid for Chain A, Chain B and Chain A+B.

FREQUENCY RANGE 3 GHz to 18 GHz.

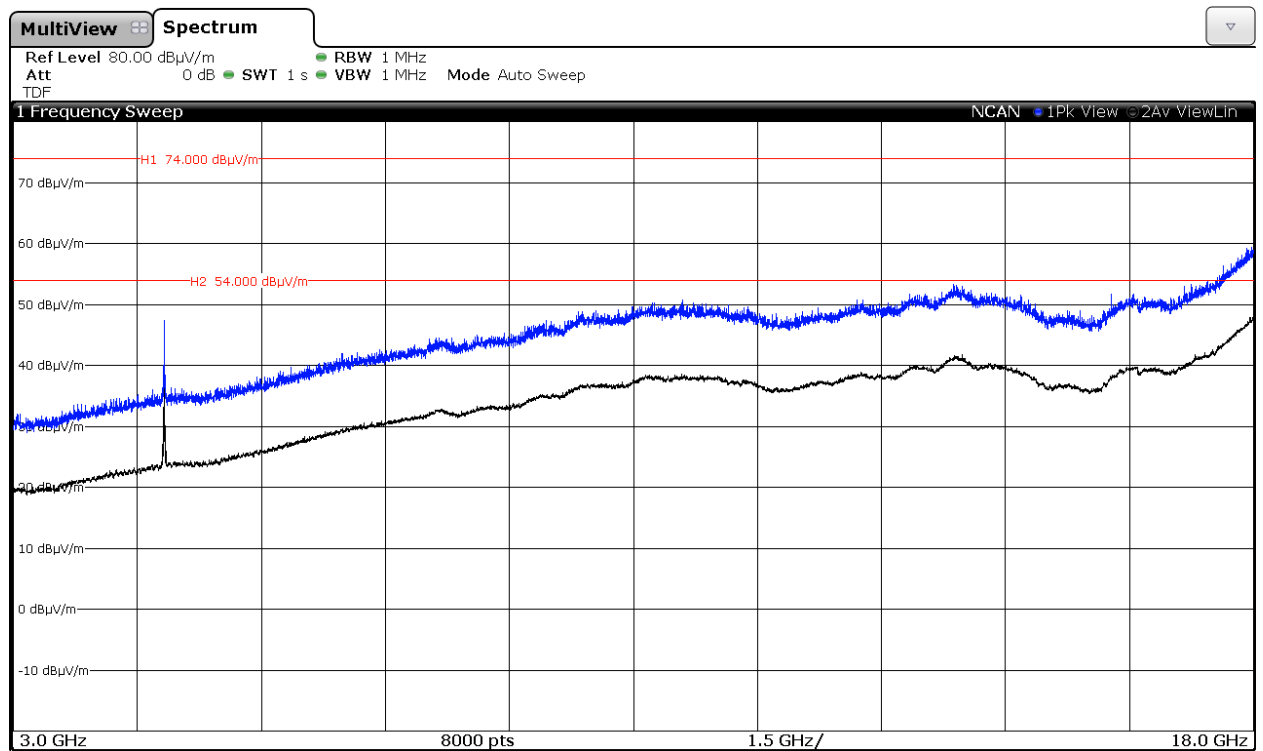
1. WiFi 2.4GHz 802.11 b mode

**CHANNEL 1 (2412 MHz).**

**Chain A**

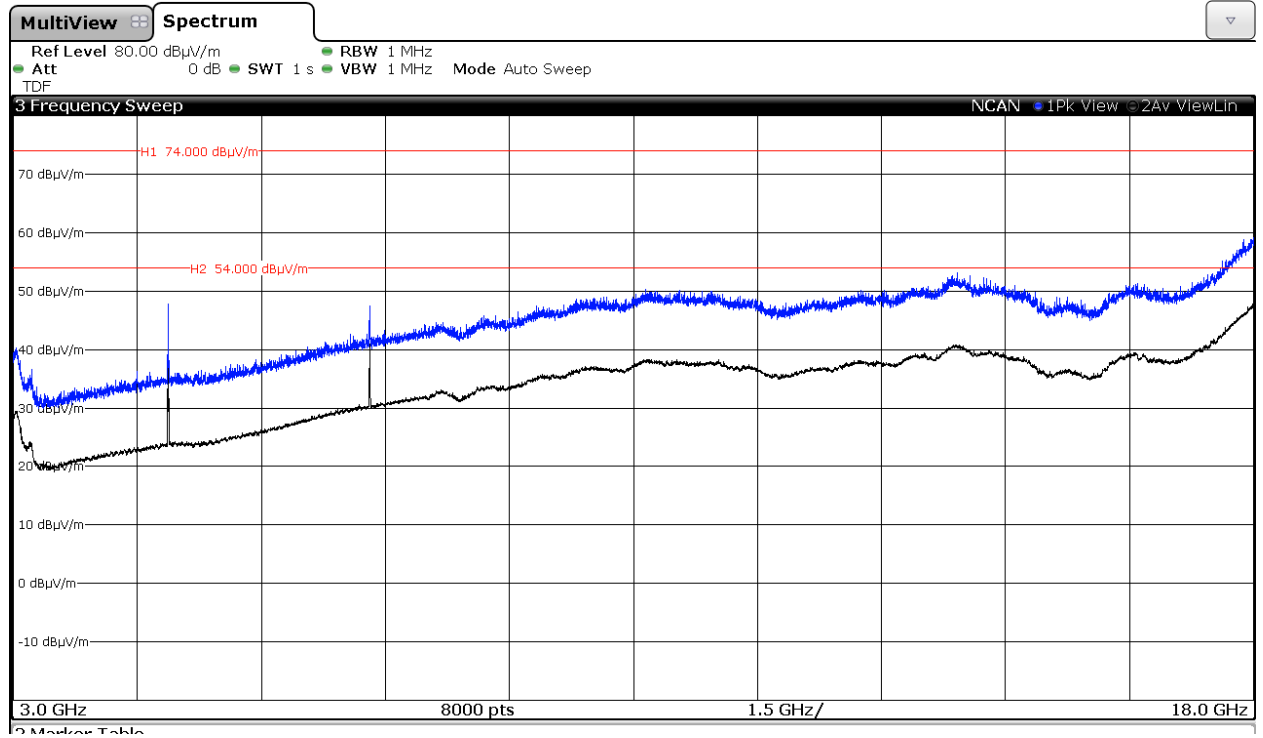


**Chain B**

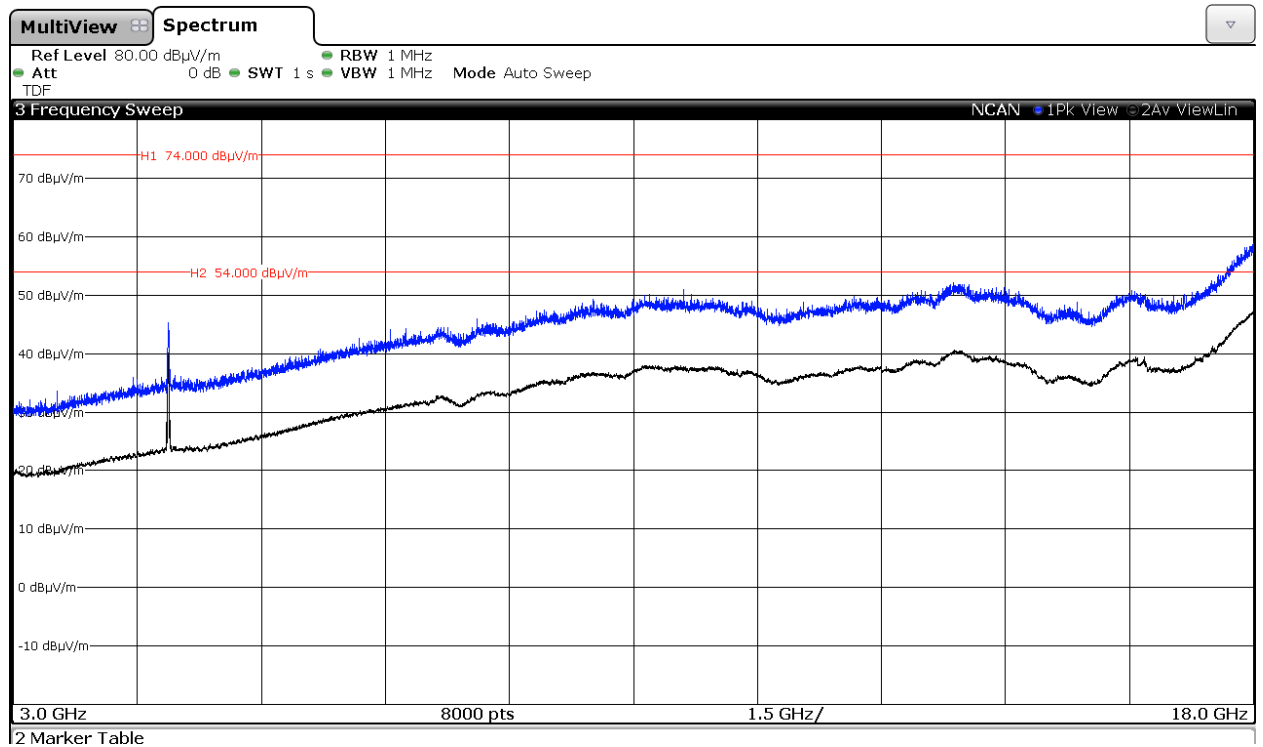


### CHANNEL 6 (2437 MHz).

#### Chain A



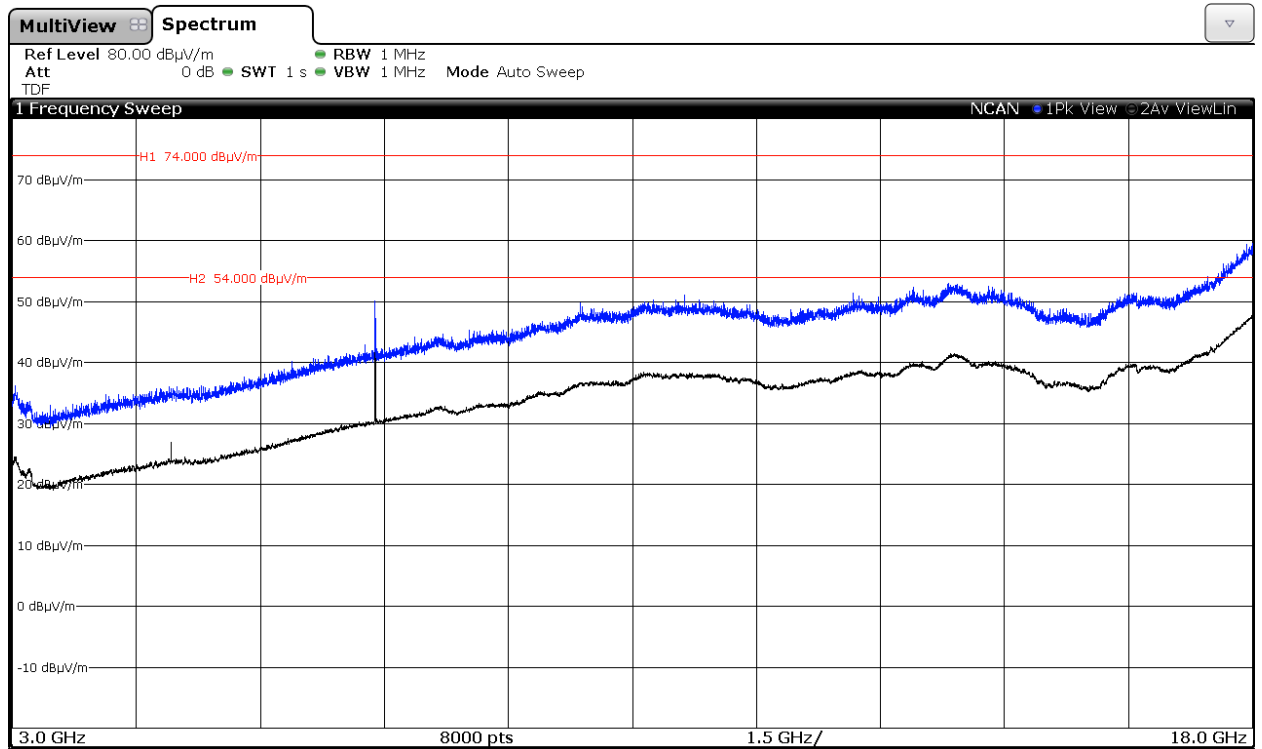
#### Chain B



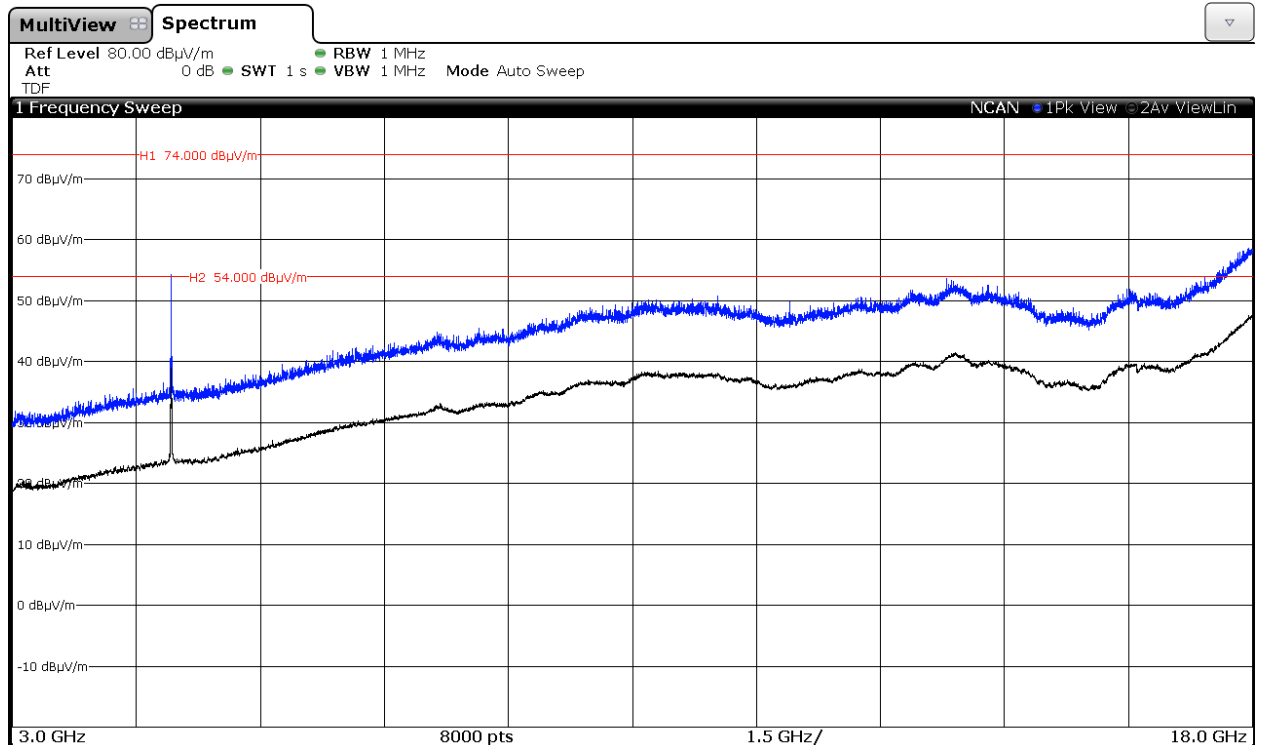


**CHANNEL 11 (2462 MHz).**

**Chain A**

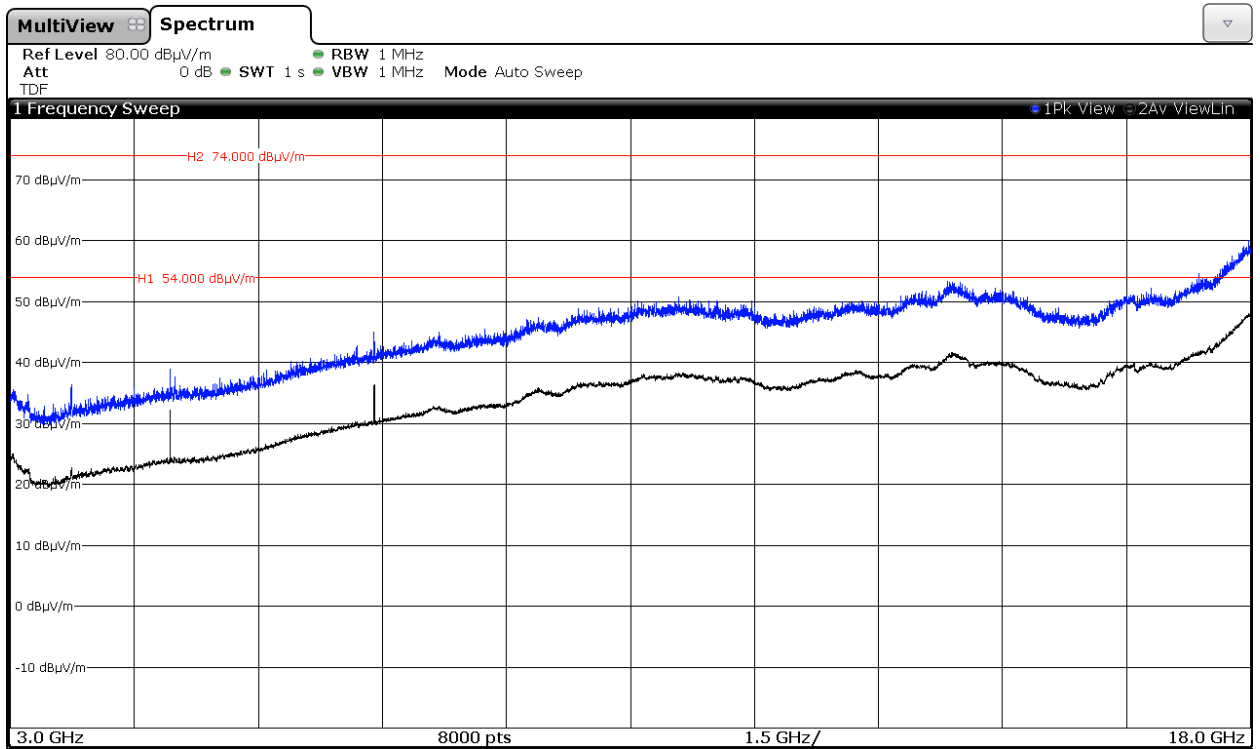


**Chain B**

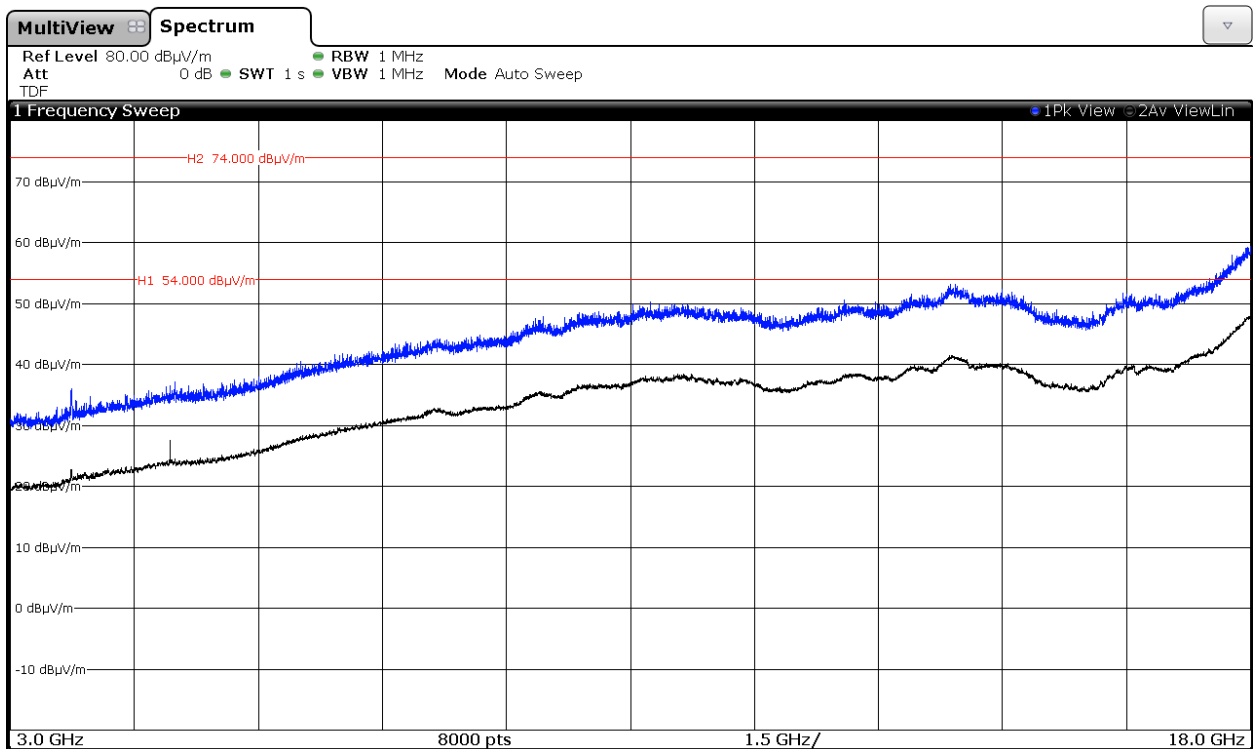


**CHANNEL 12 (2467 MHz).**

**Chain A**

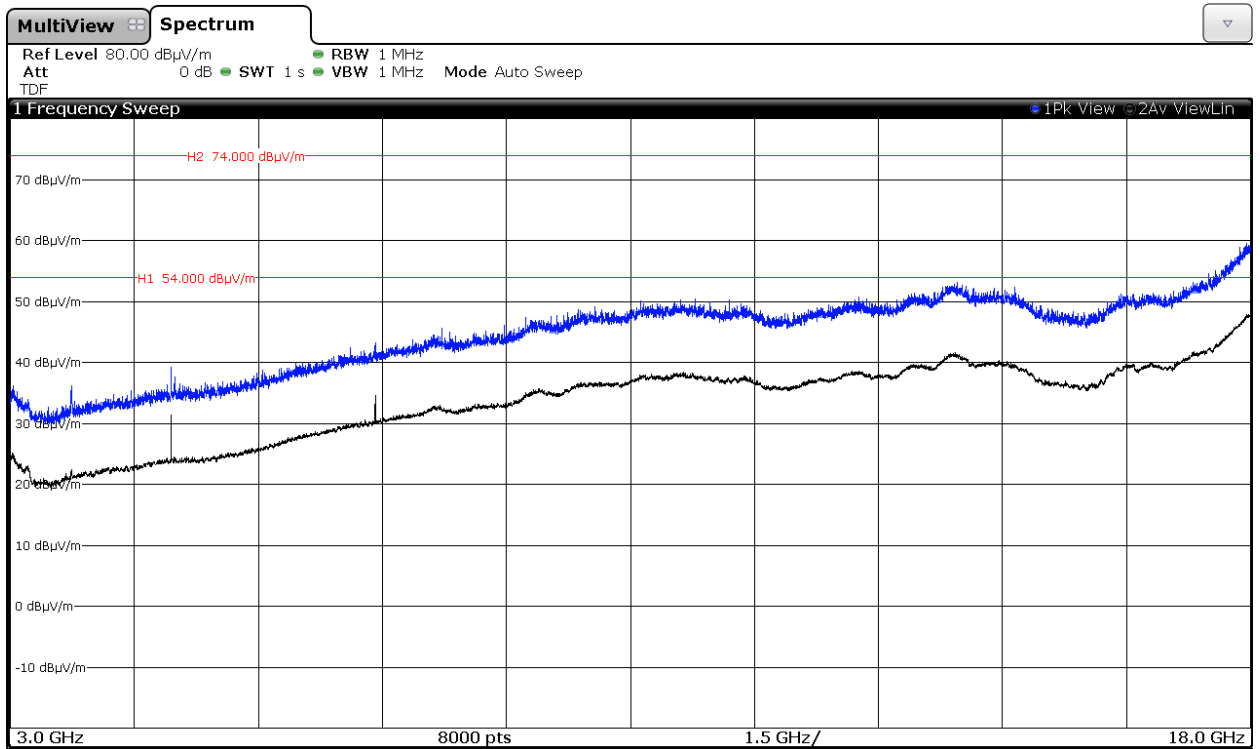


**Chain B**

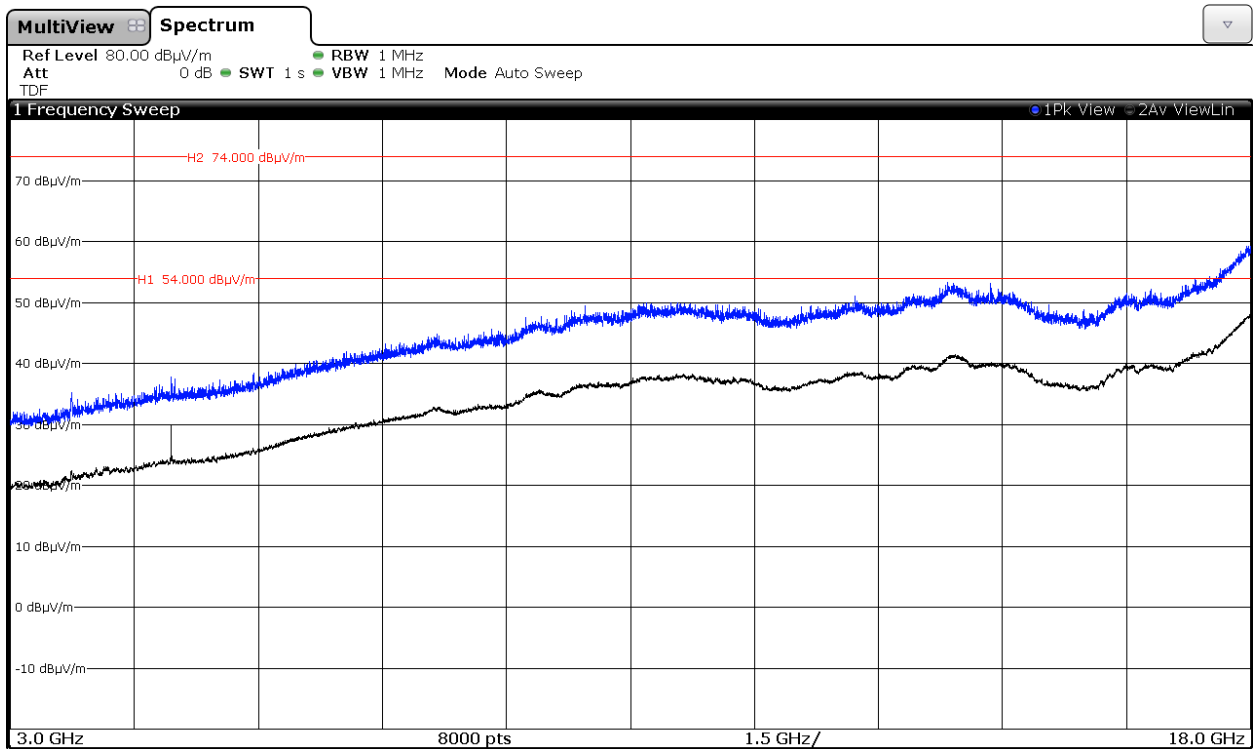


**CHANNEL 13 (2472 MHz).**

**Chain A**



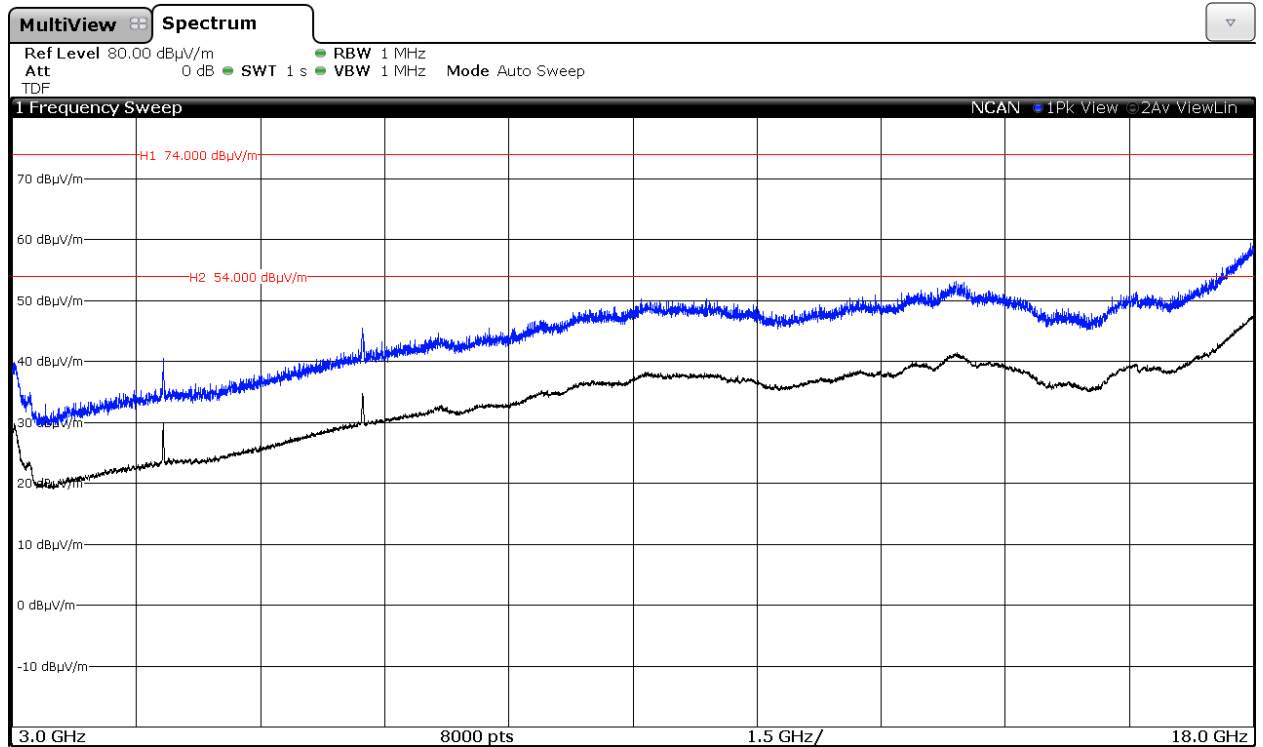
**Chain B**



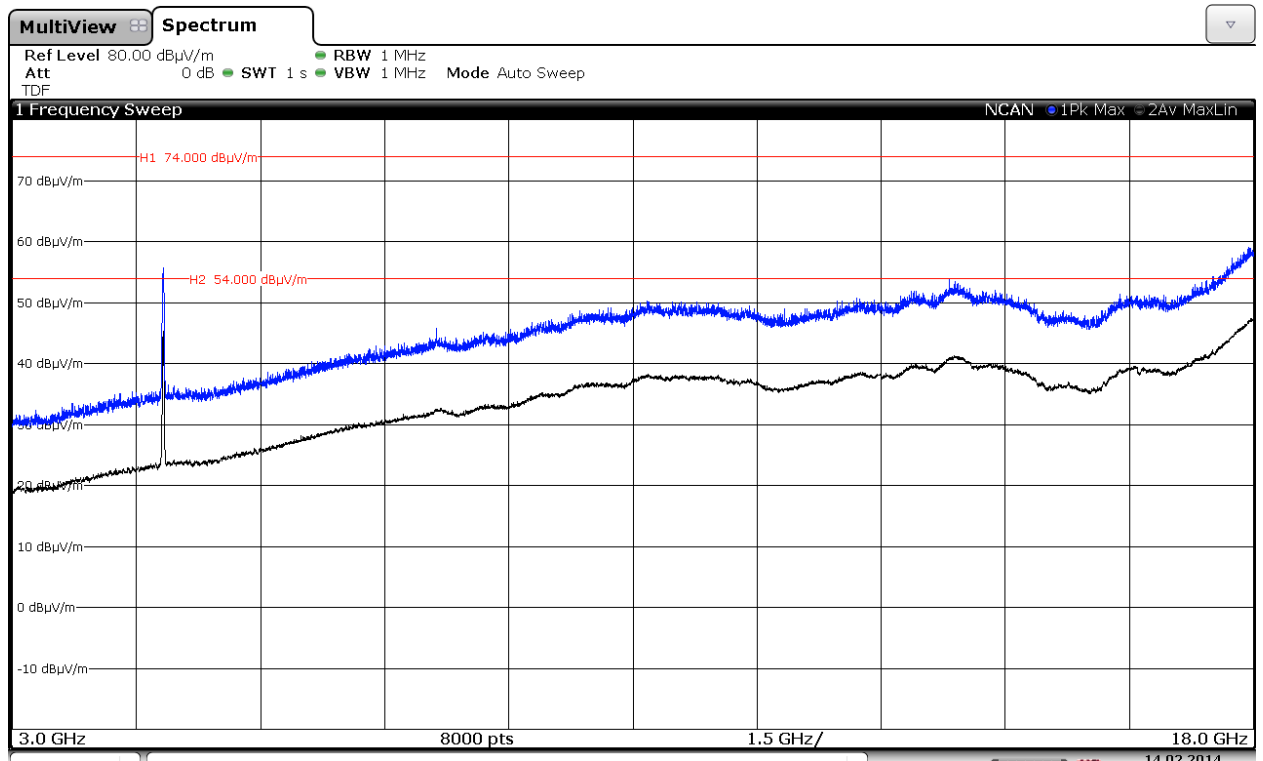
2. WiFi 2.4GHz 802.11 g mode (worst case)

CHANNEL 1 (2412 MHz).

Chain A

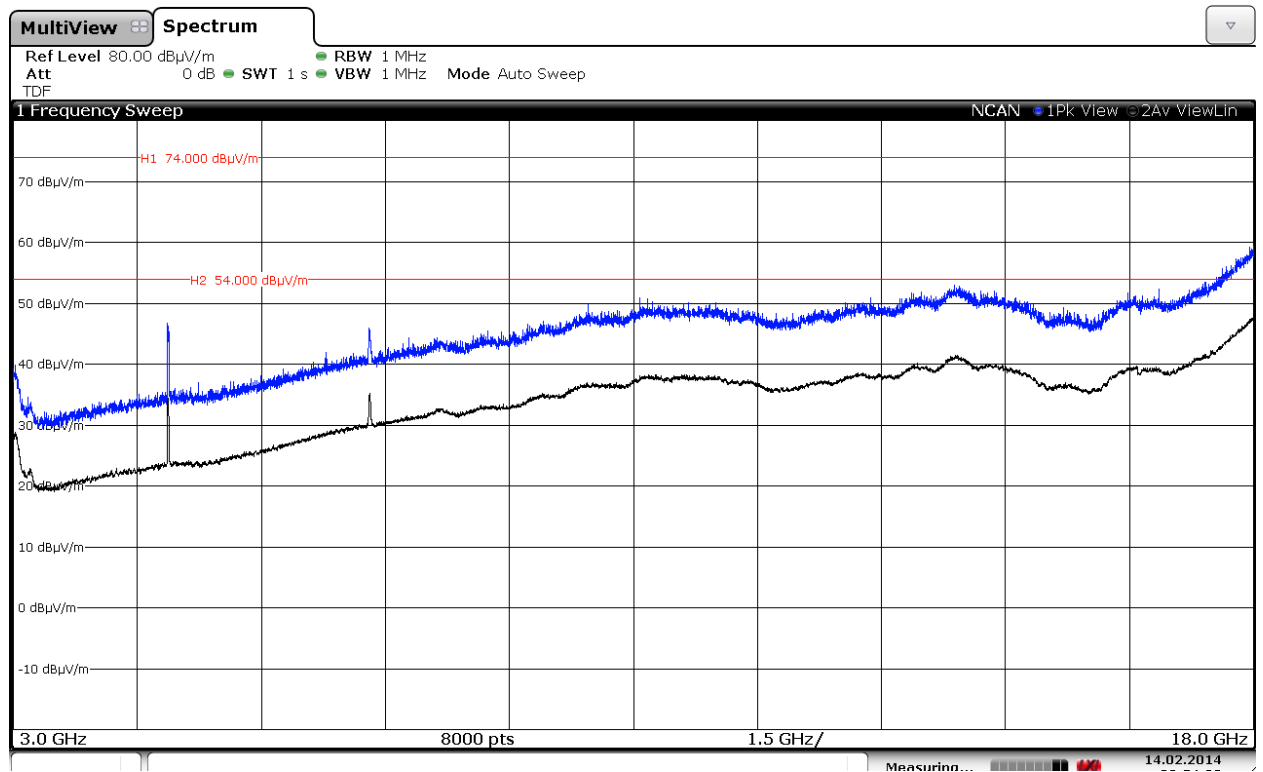


Chain B

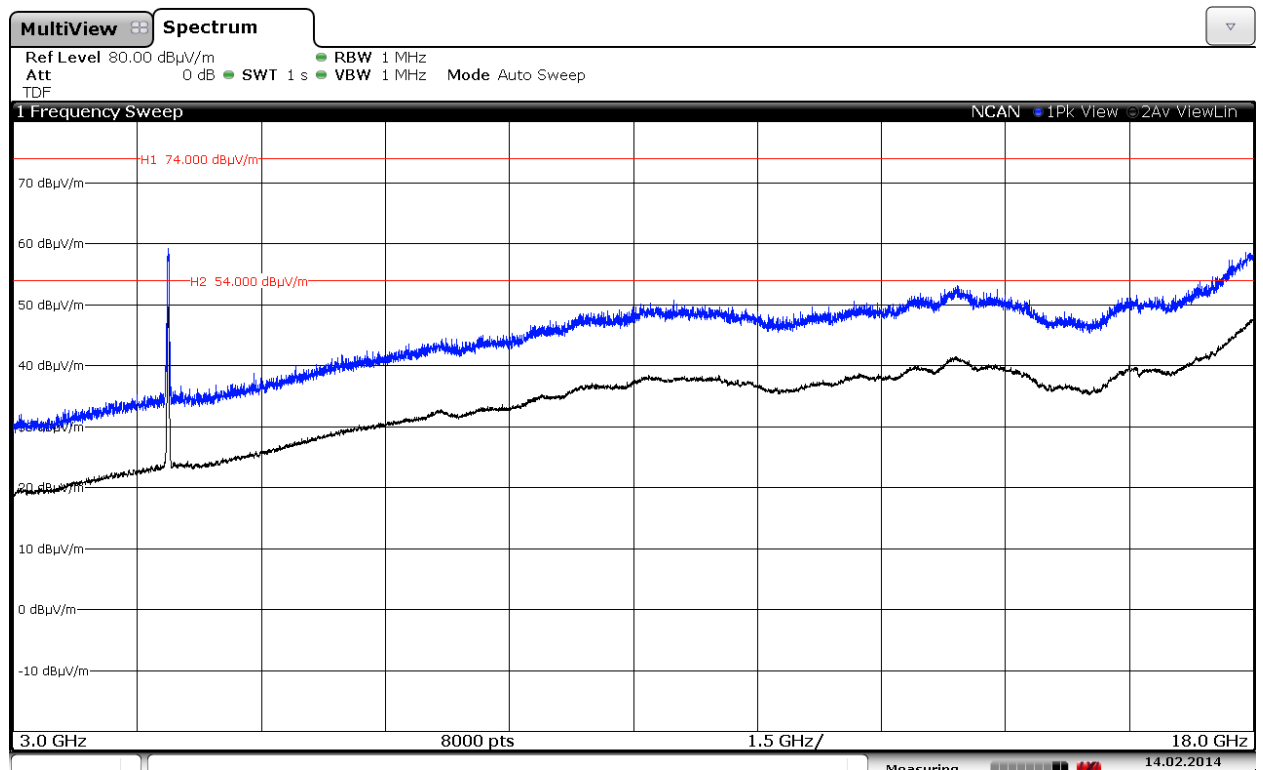


### CHANNEL 6 (2437 MHz).

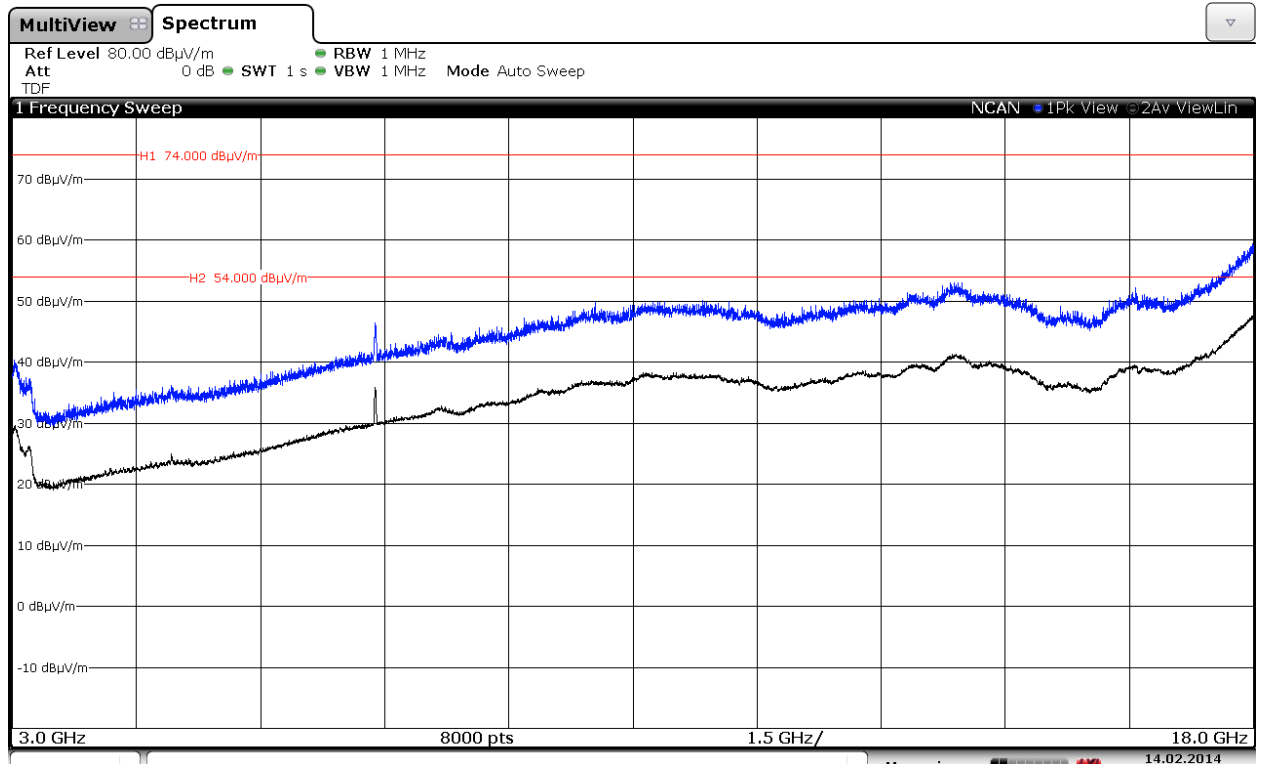
#### Chain A



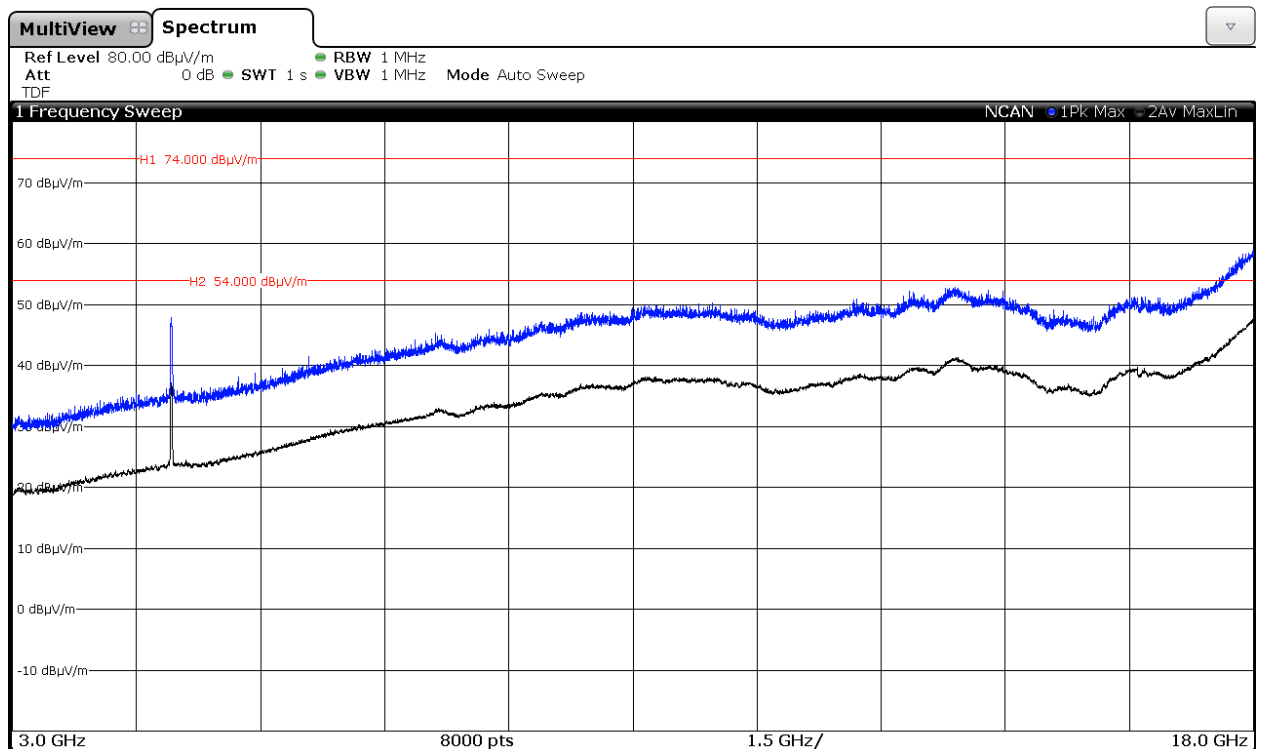
#### Chain B



**CHANNEL 11 (2462 MHz).**  
**Chain A**

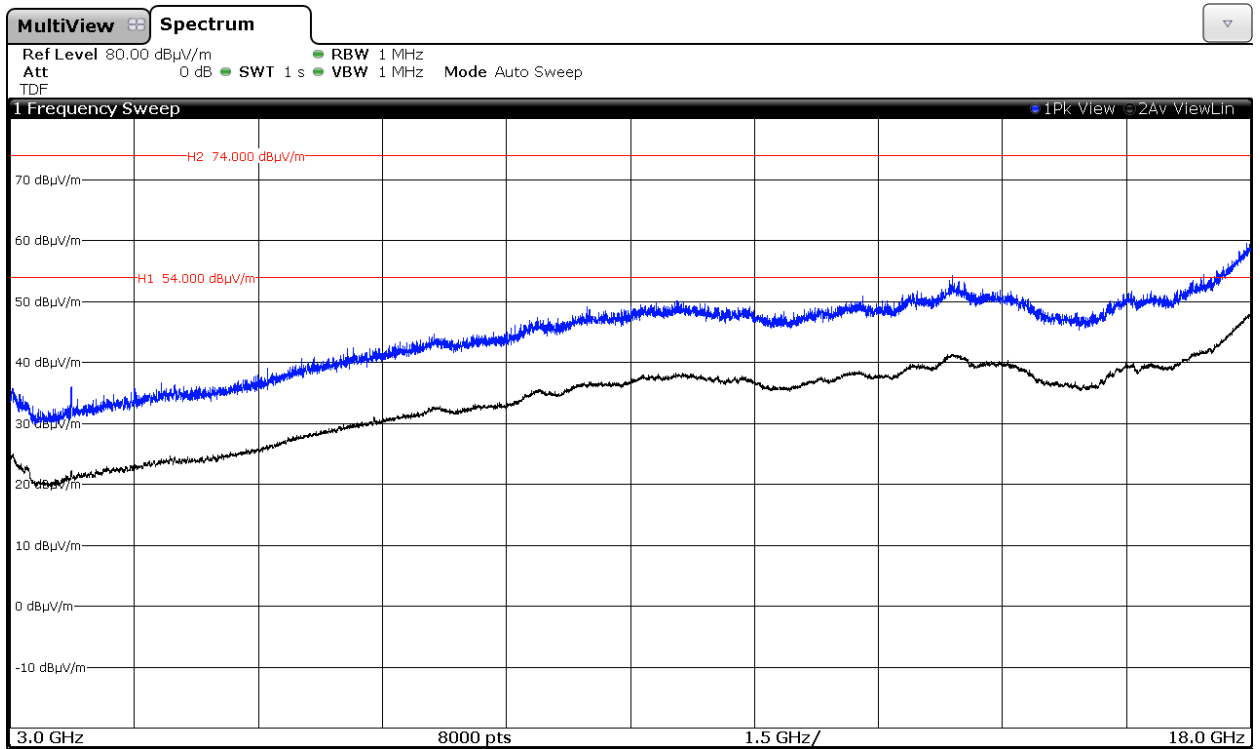


**Chain B**

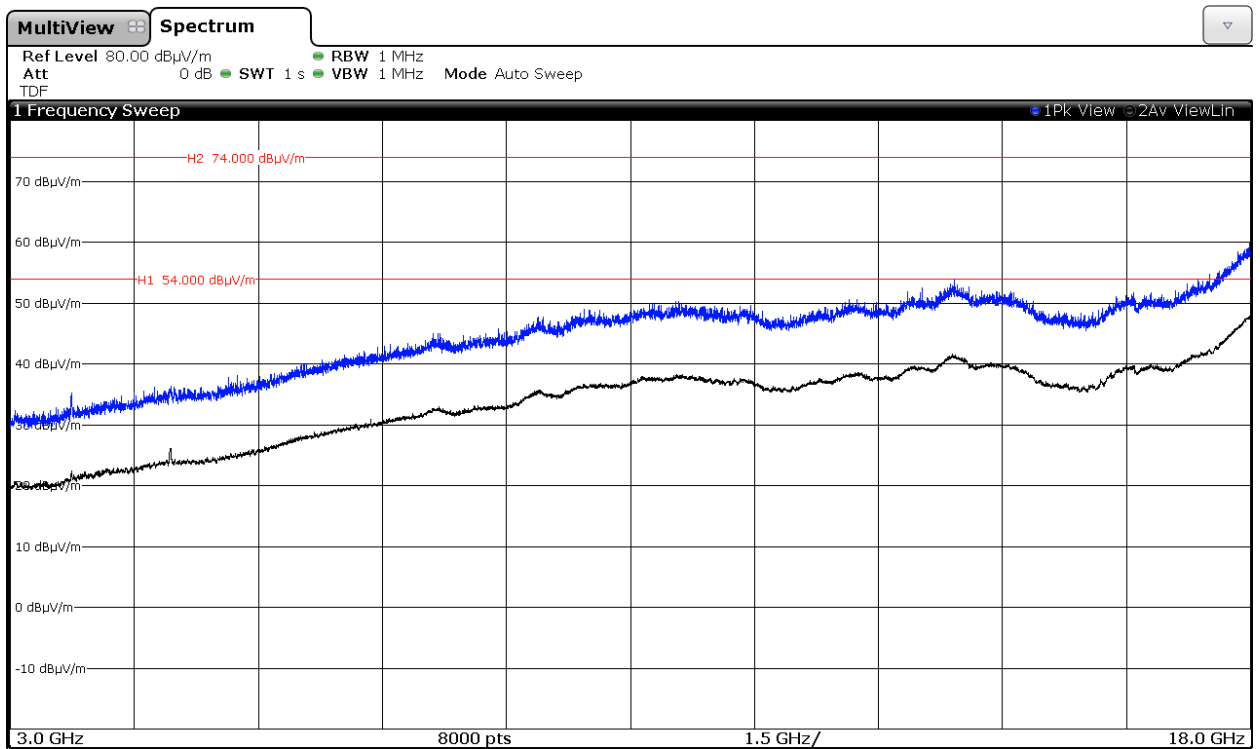


**CHANNEL 12 (2467 MHz).**

**Chain A**

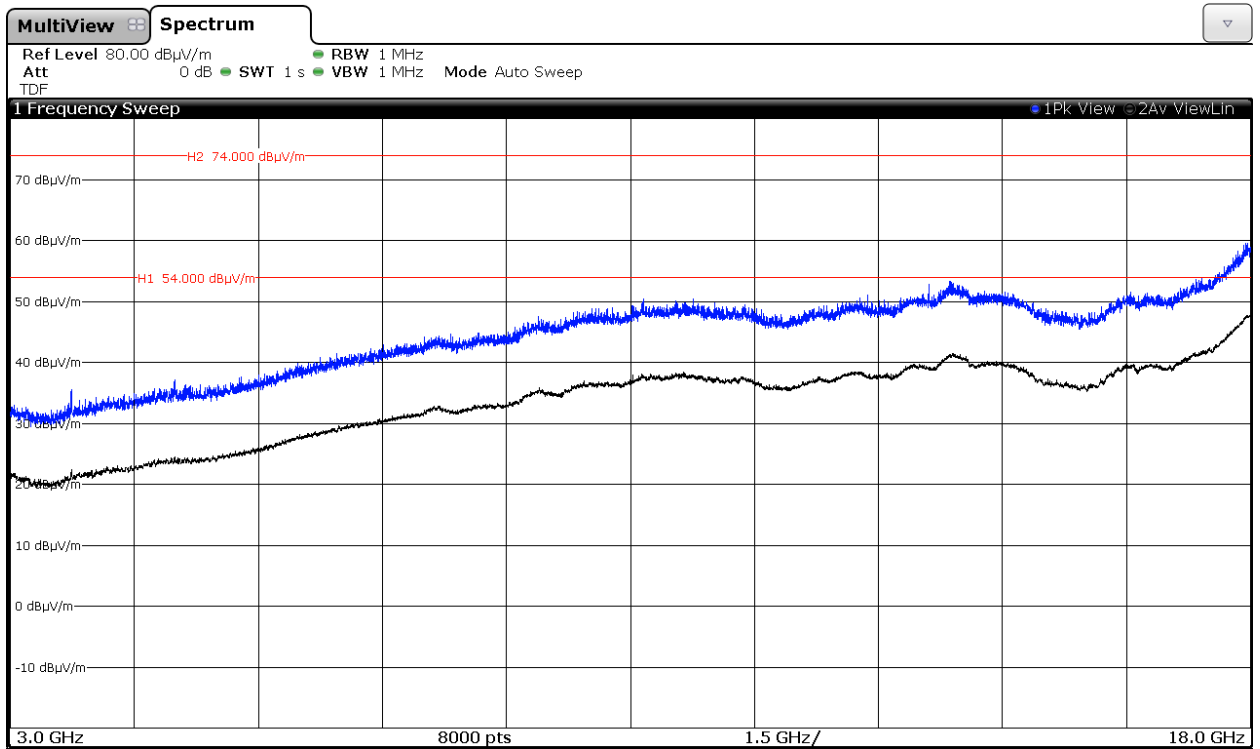


**Chain B**

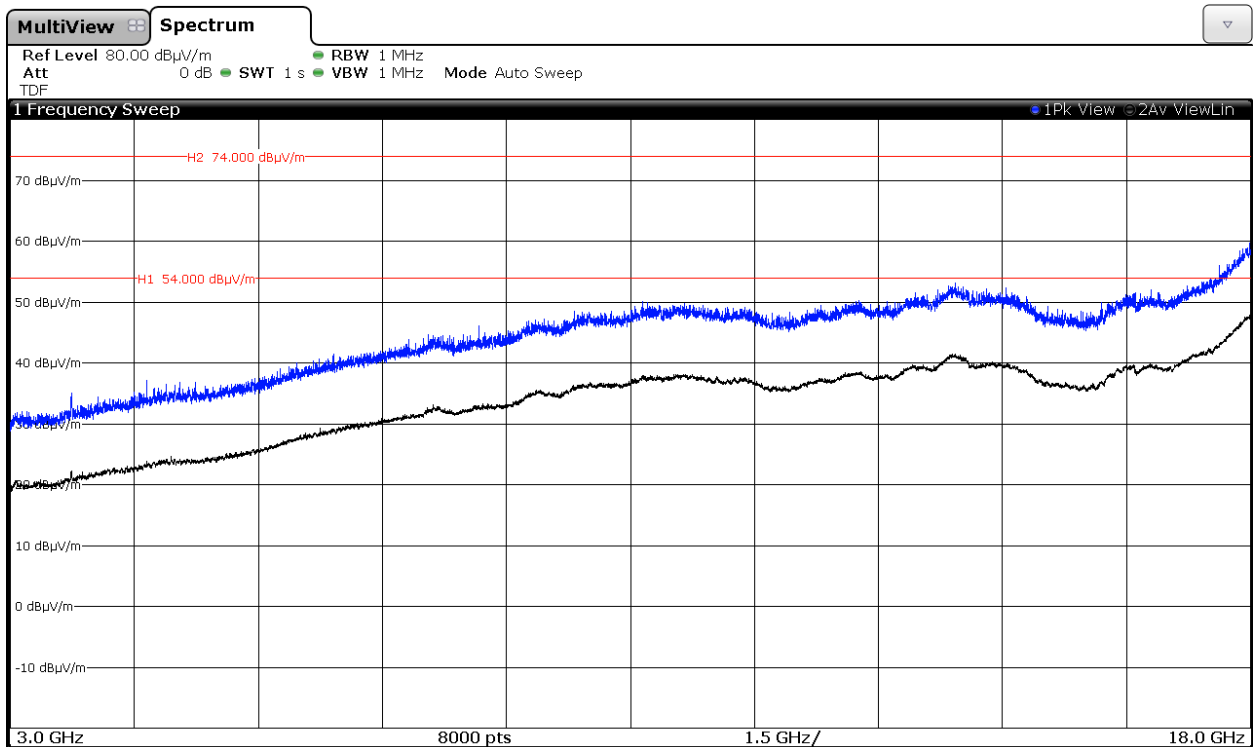


**CHANNEL 13 (2472 MHz).**

**Chain A**



**Chain B**

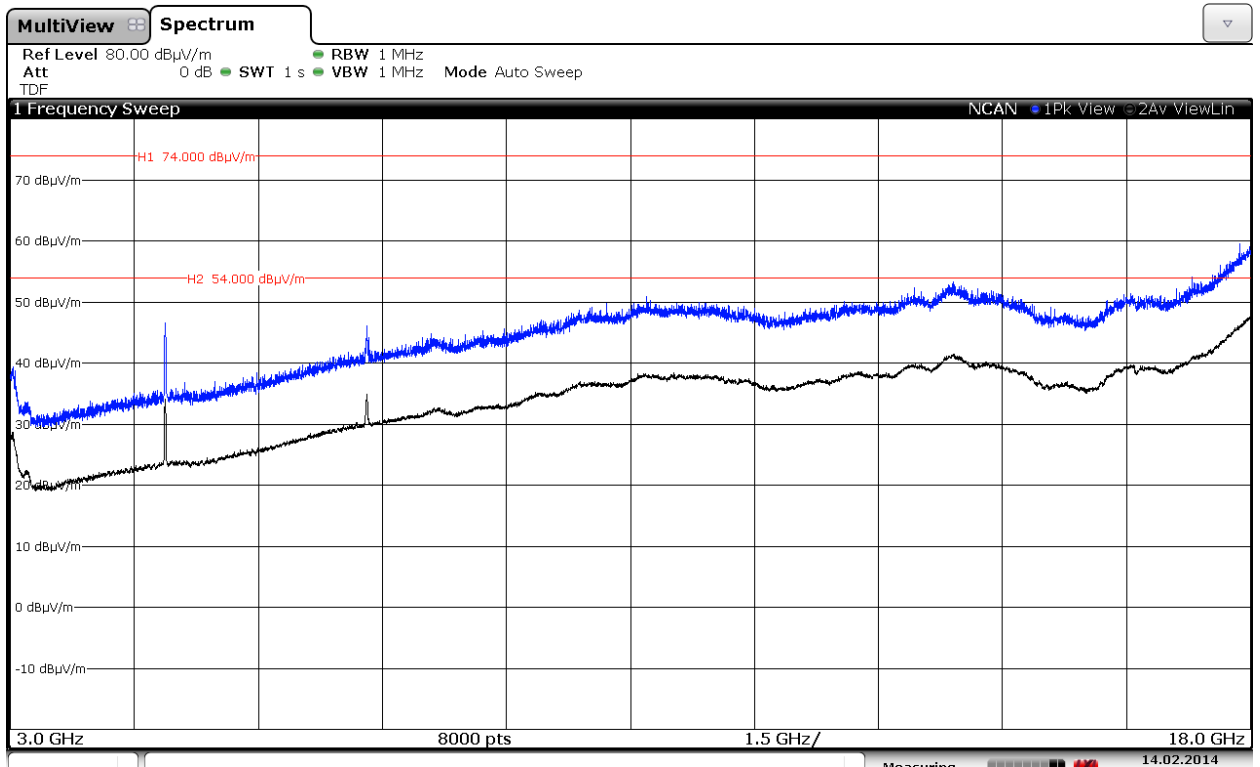




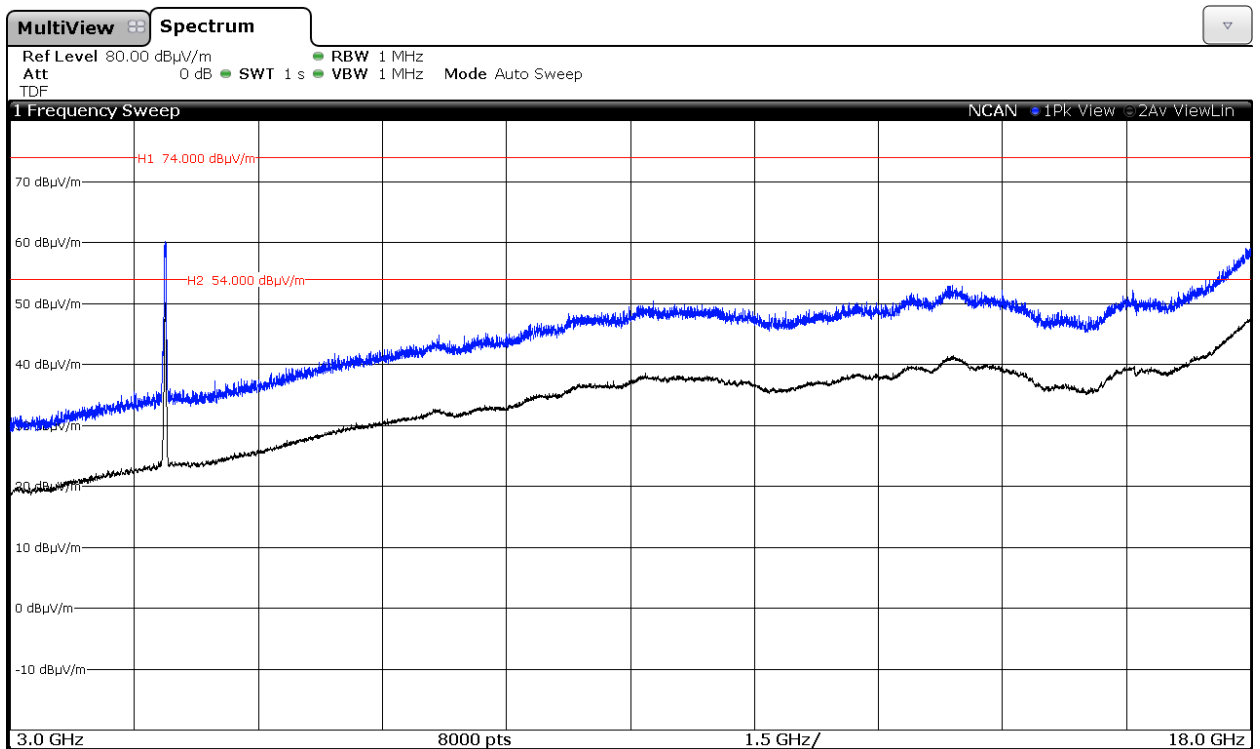
### 3. WiFi 2.4GHz 802.11 n20 mode

#### CHANNEL 6 (2437 MHz).

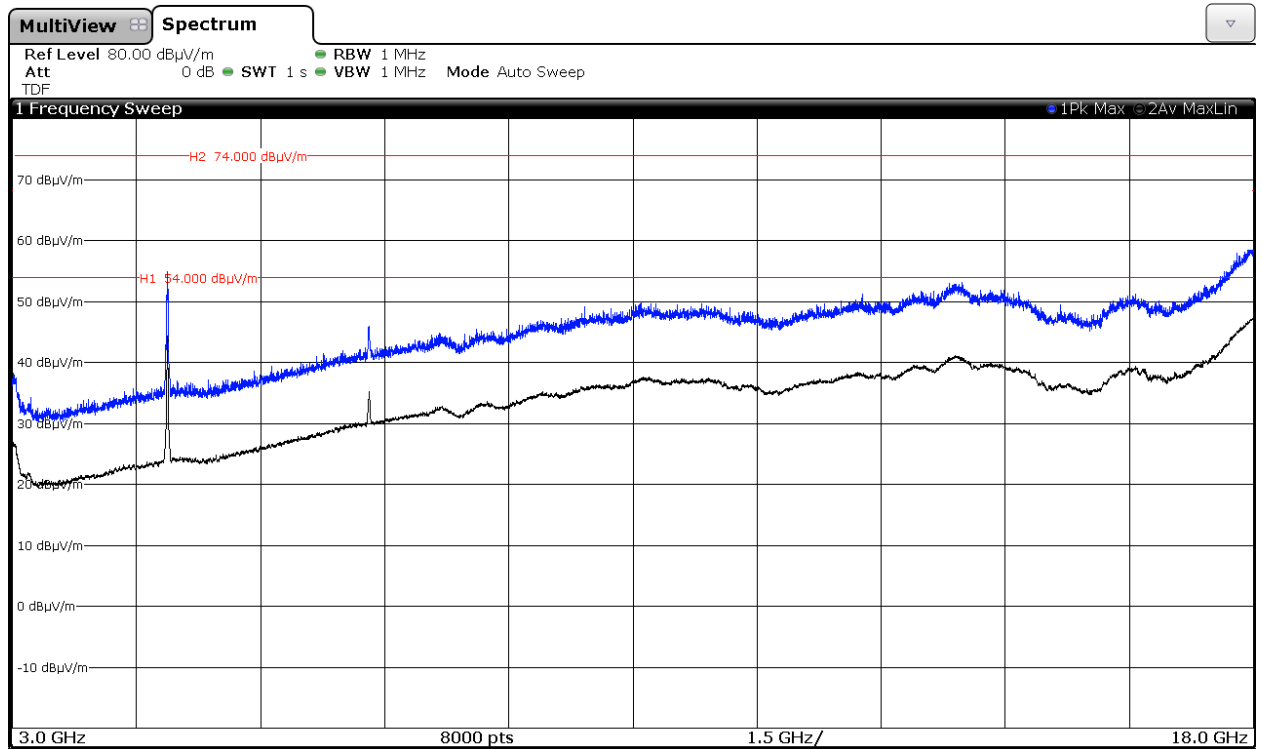
#### Chain A.



#### Chain B.

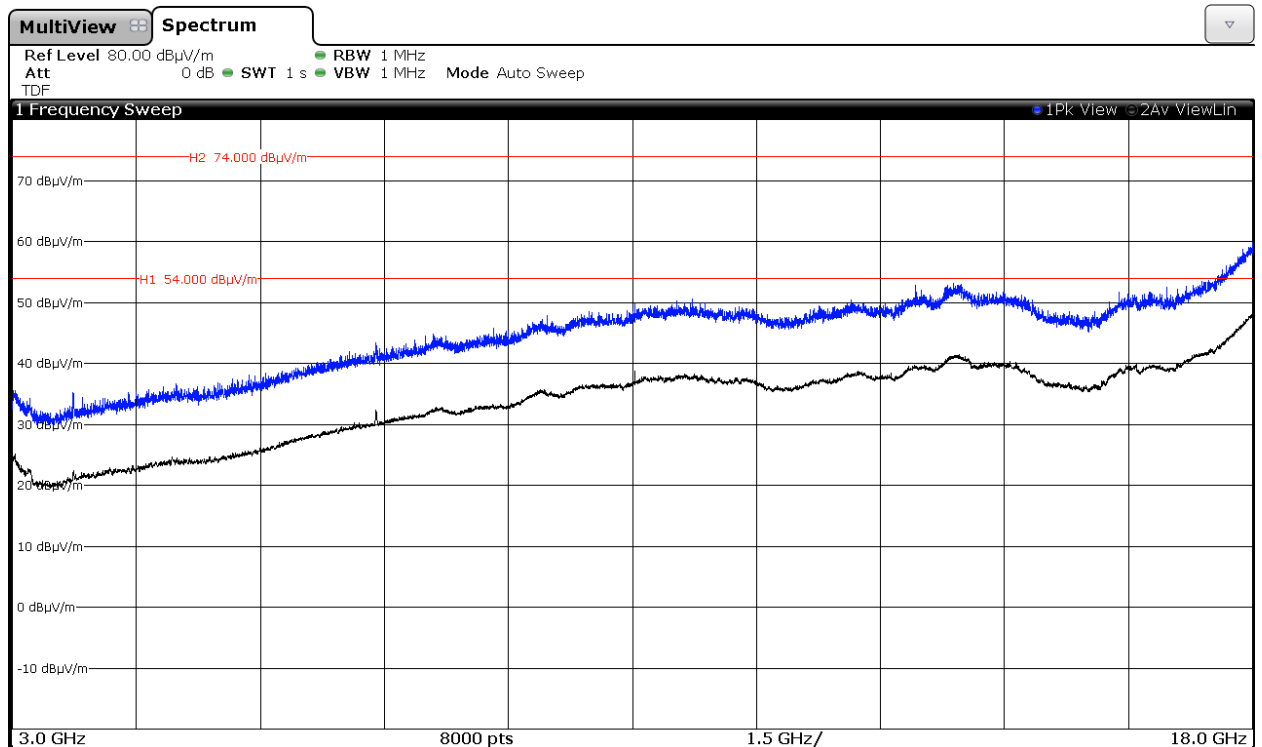


### Chain A+B.

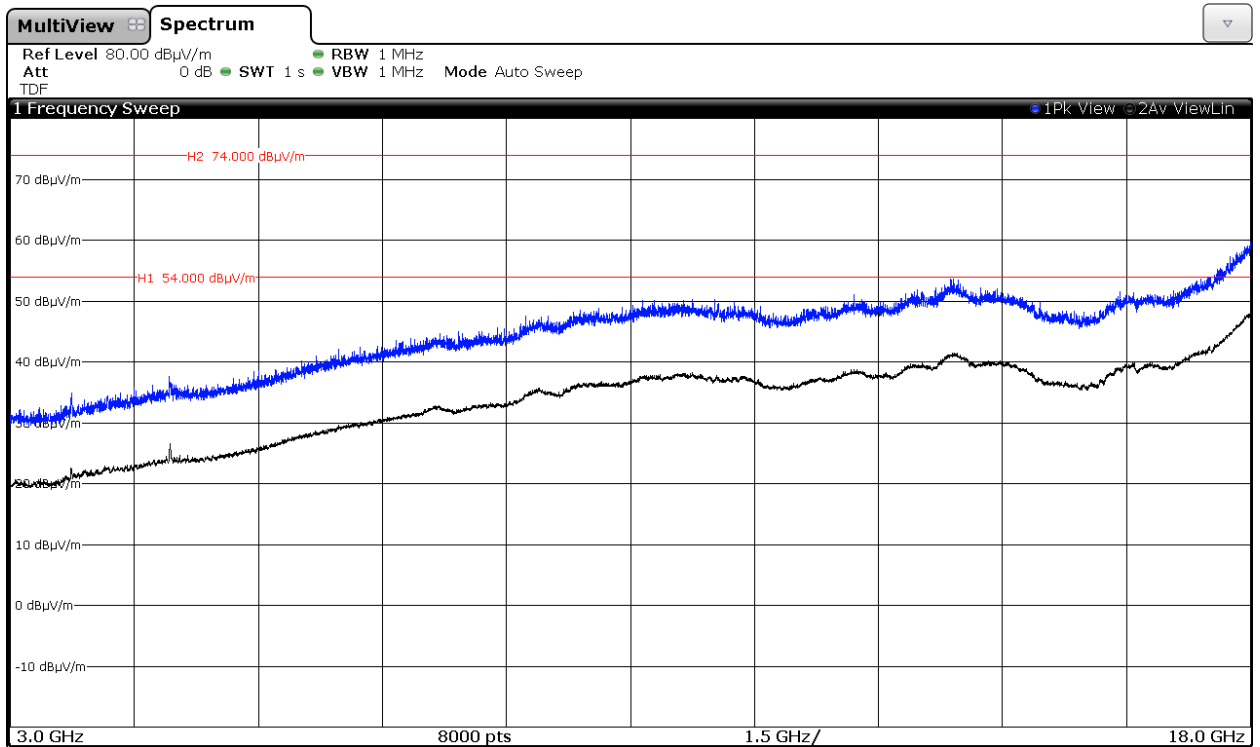


### CHANNEL 12 (2467 MHz).

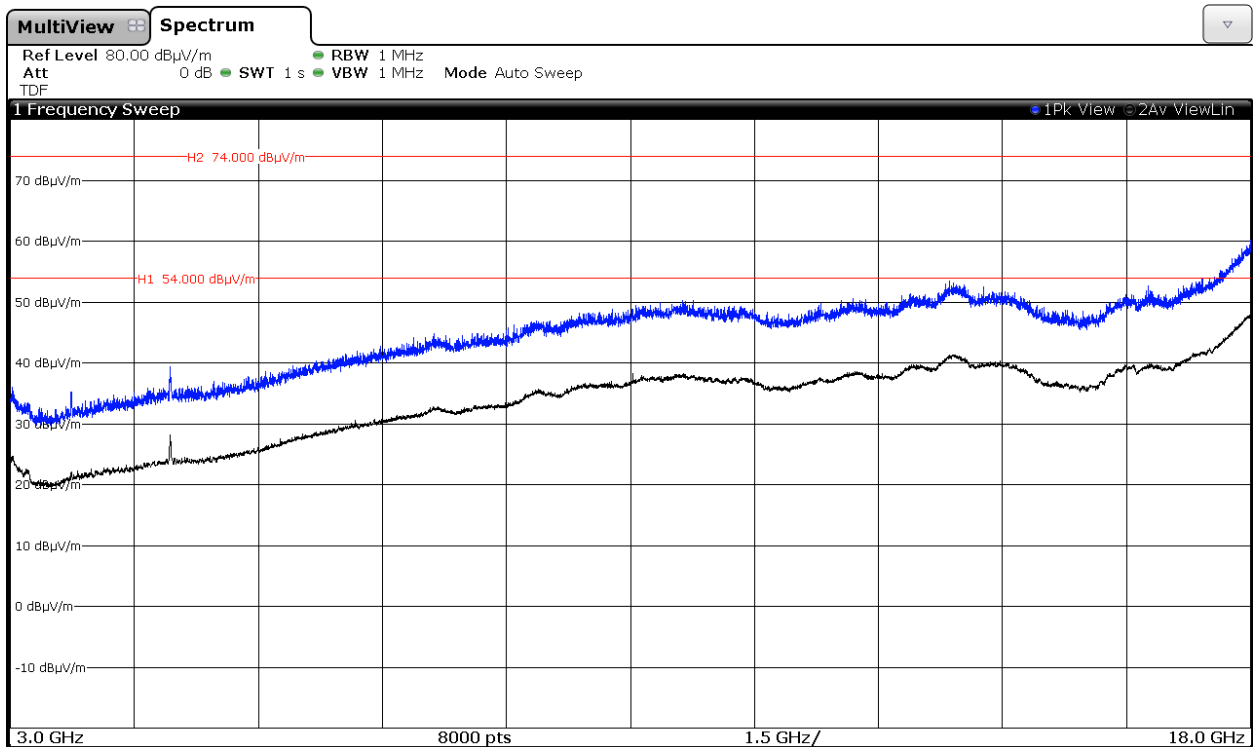
#### Chain A



### Chain B

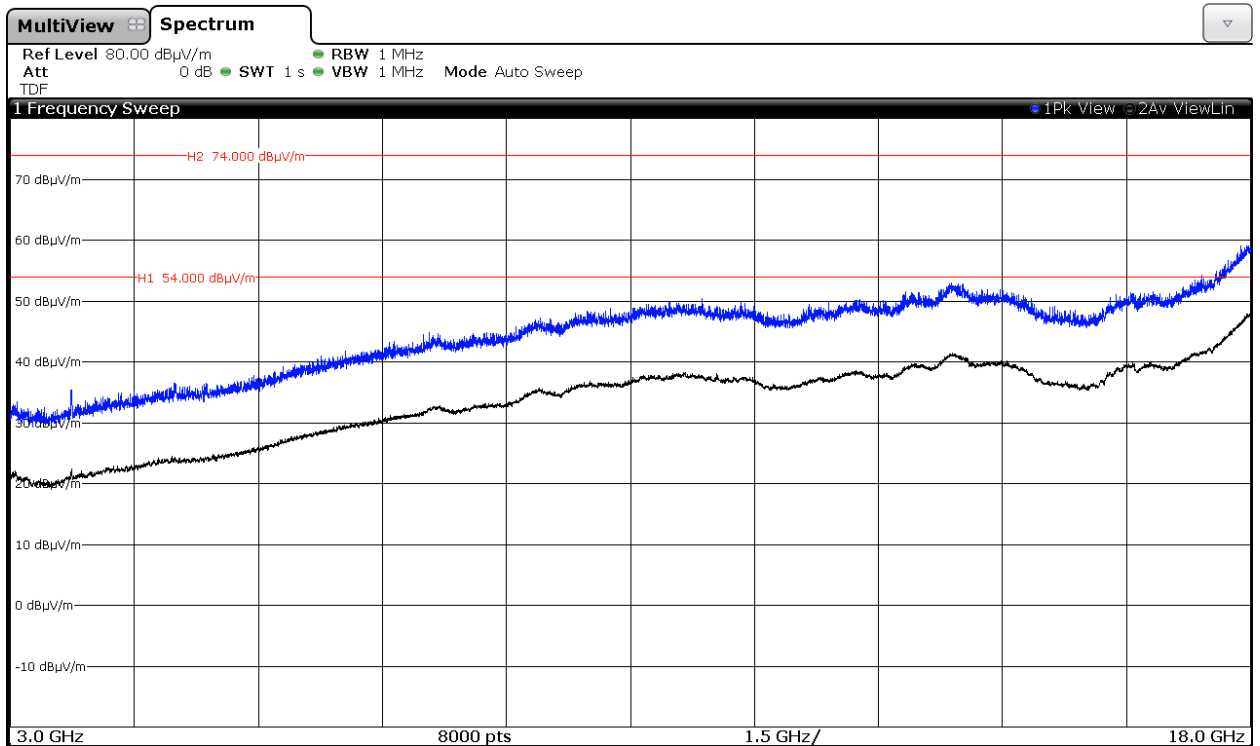


### Chain A+B

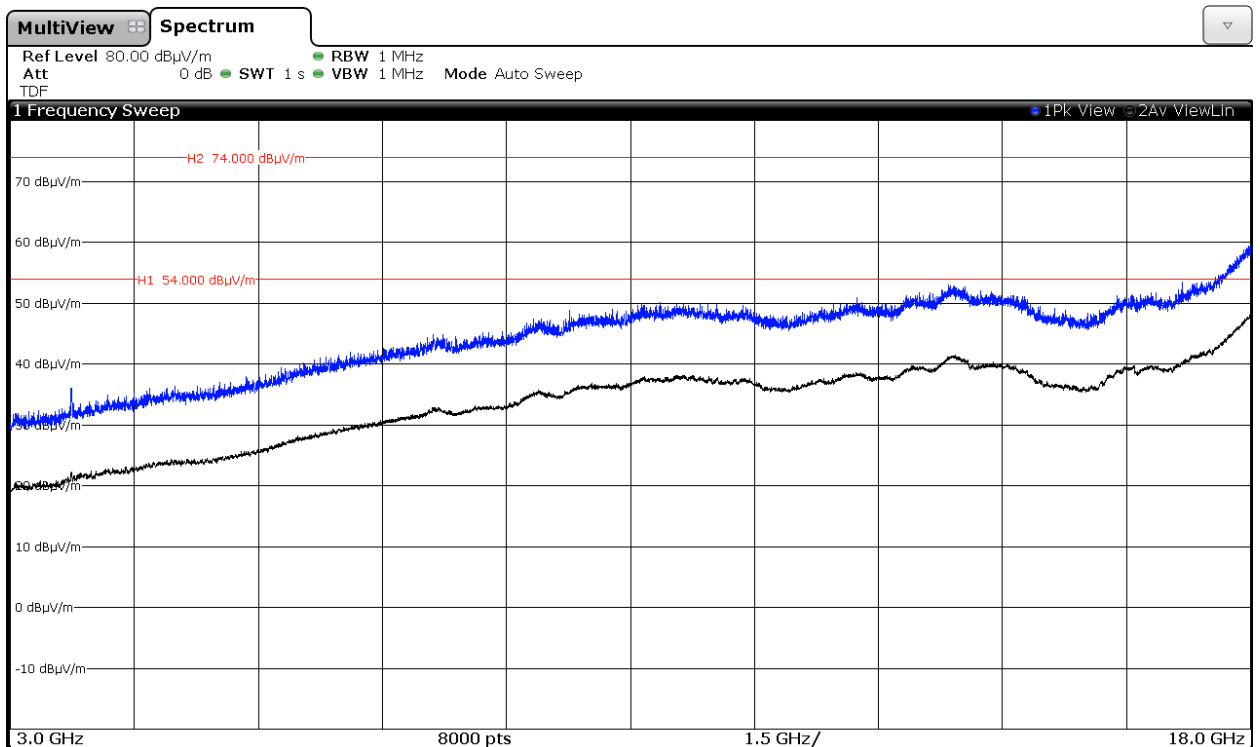


**CHANNEL 13 (2472 MHz).**

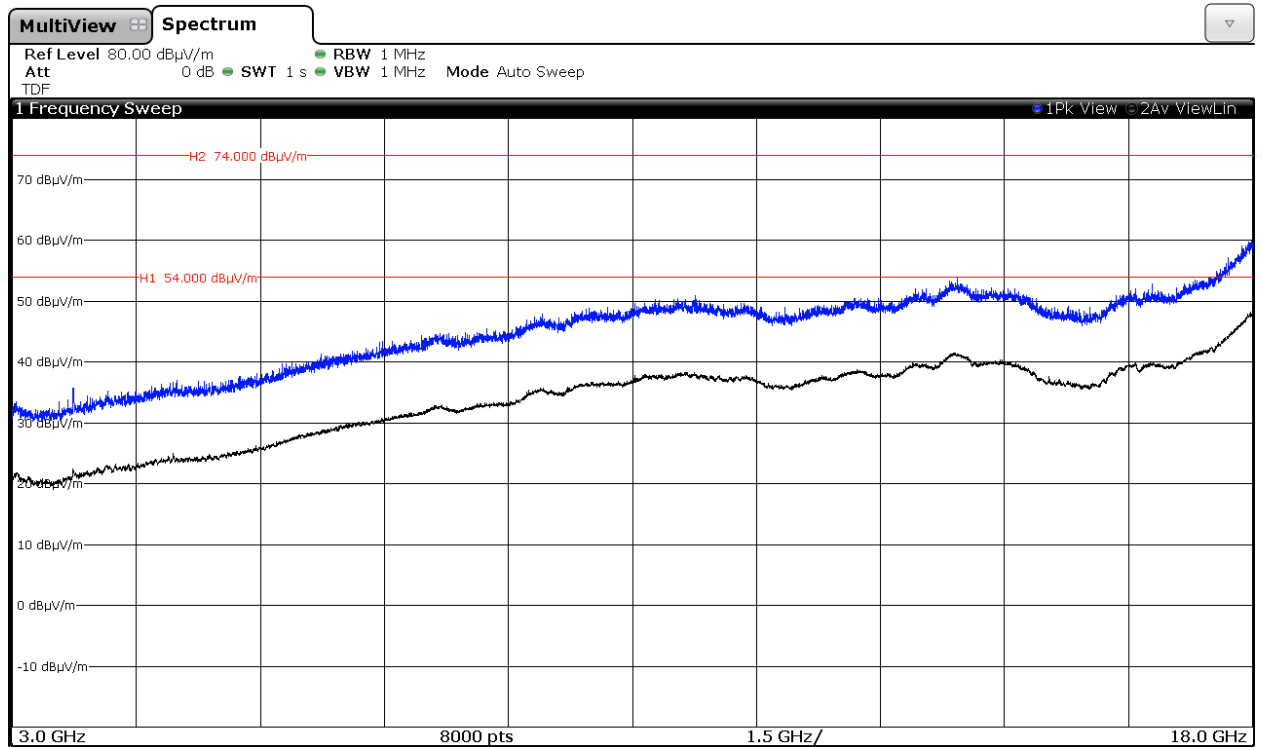
**Chain A**



**Chain B**



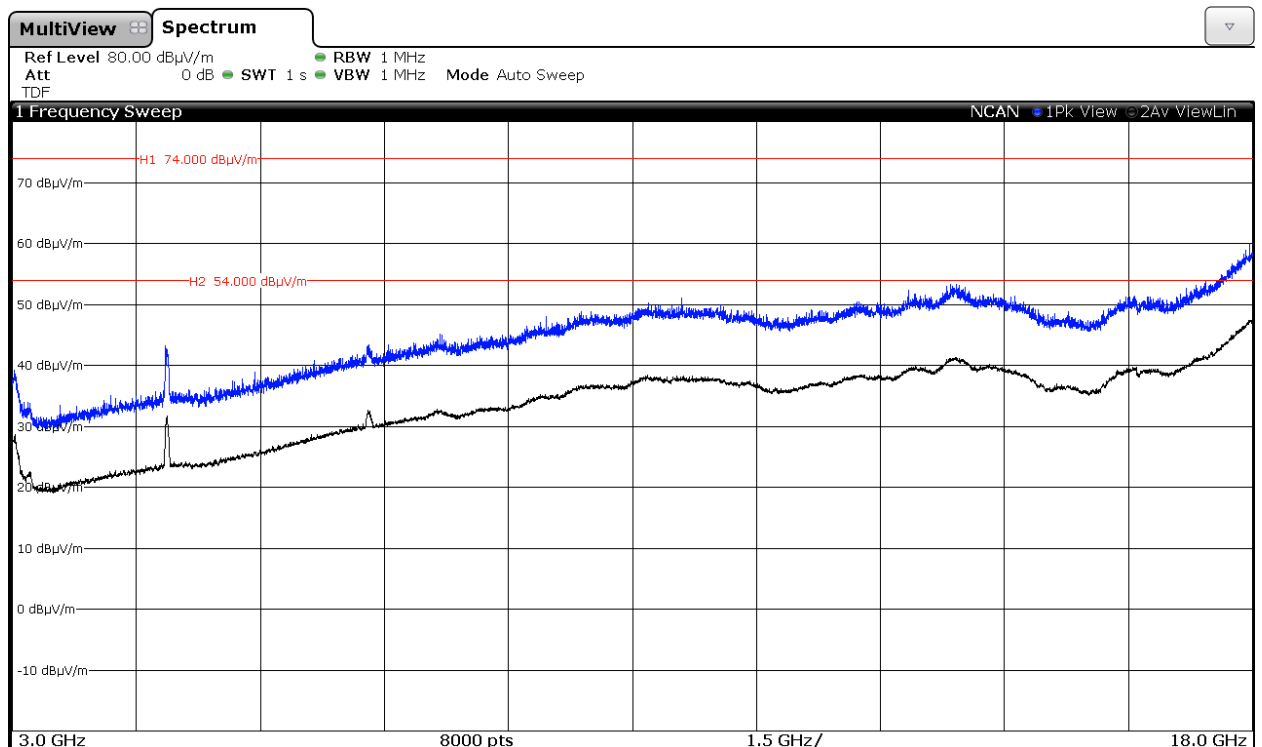
### Chain A+B



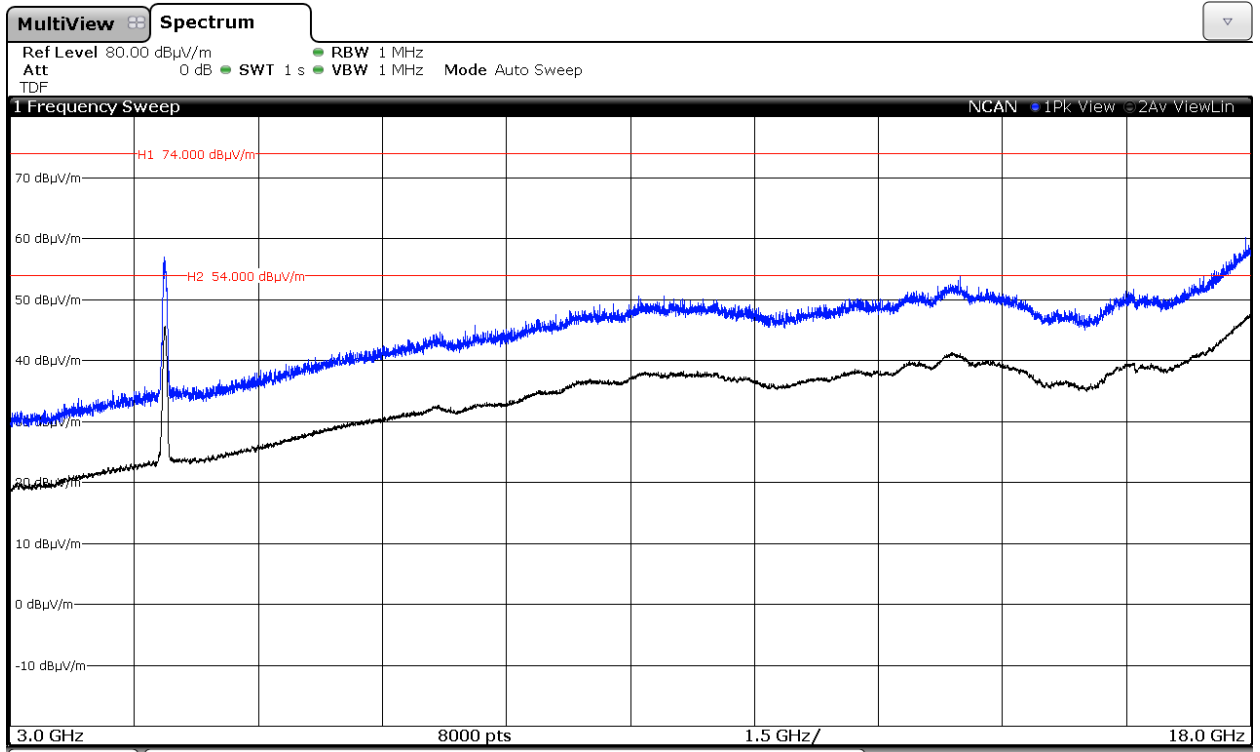
### 4. WiFi 2.4GHz 802.11 n40 mode

#### CHANNEL 6 (2437 MHz).

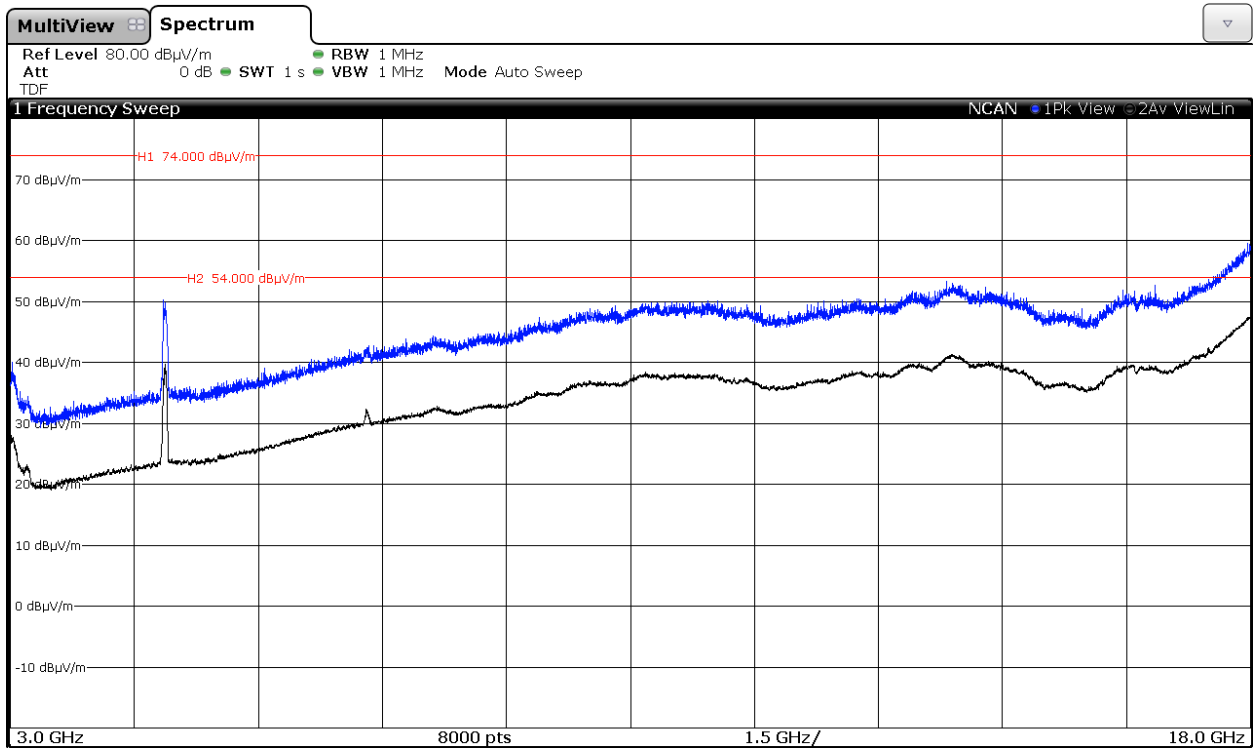
#### Chain A.



### Chain B

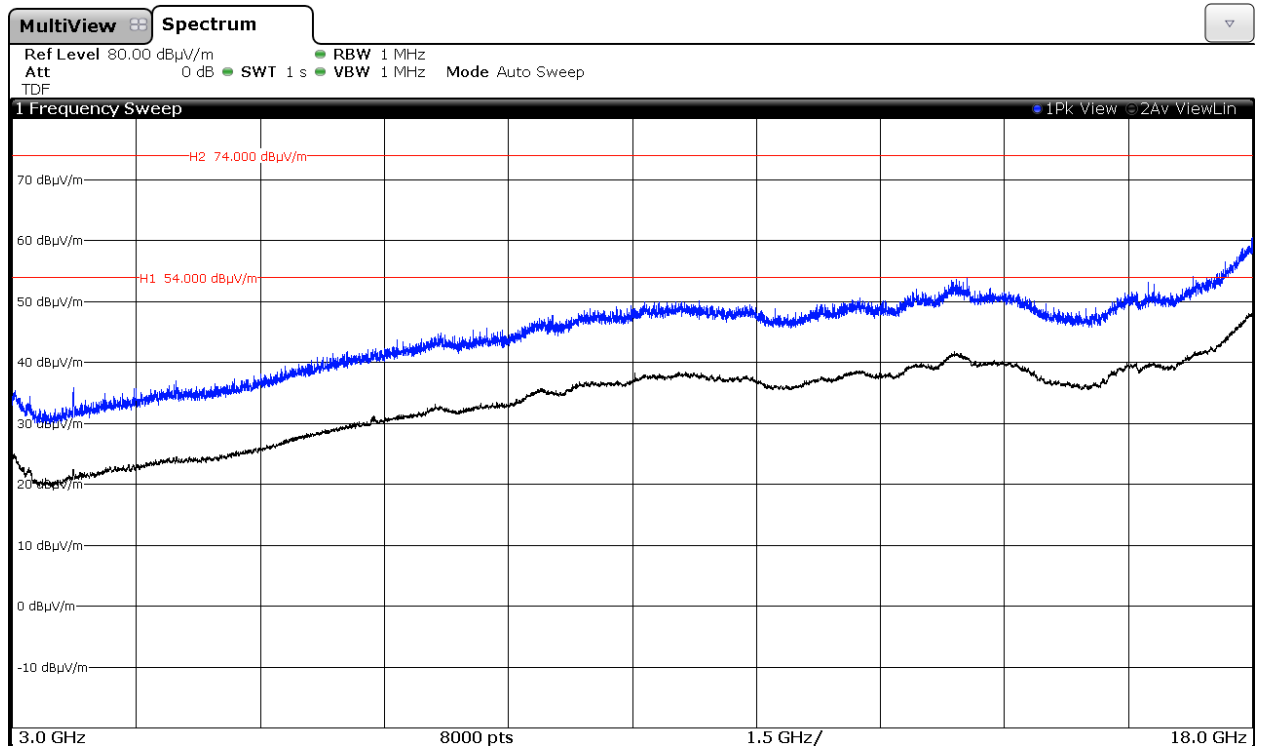


### Chain A+B

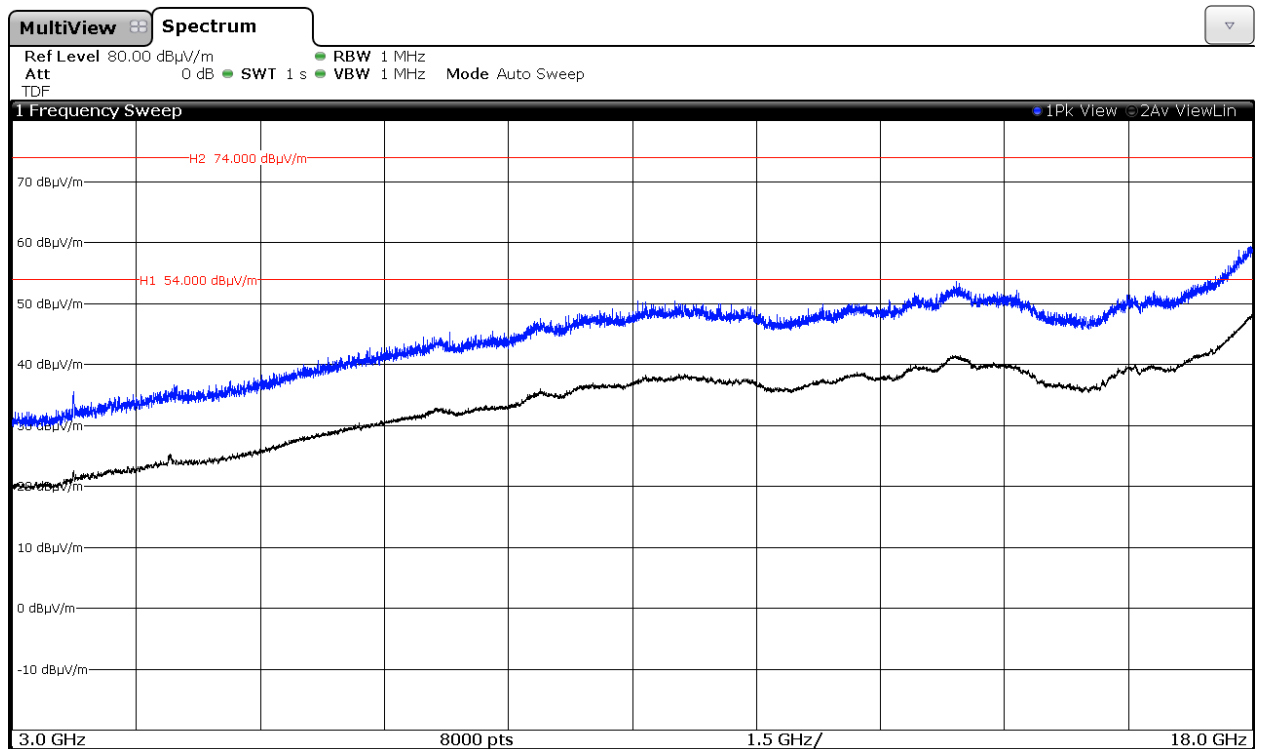


**CHANNEL 10F (2457 MHz).**

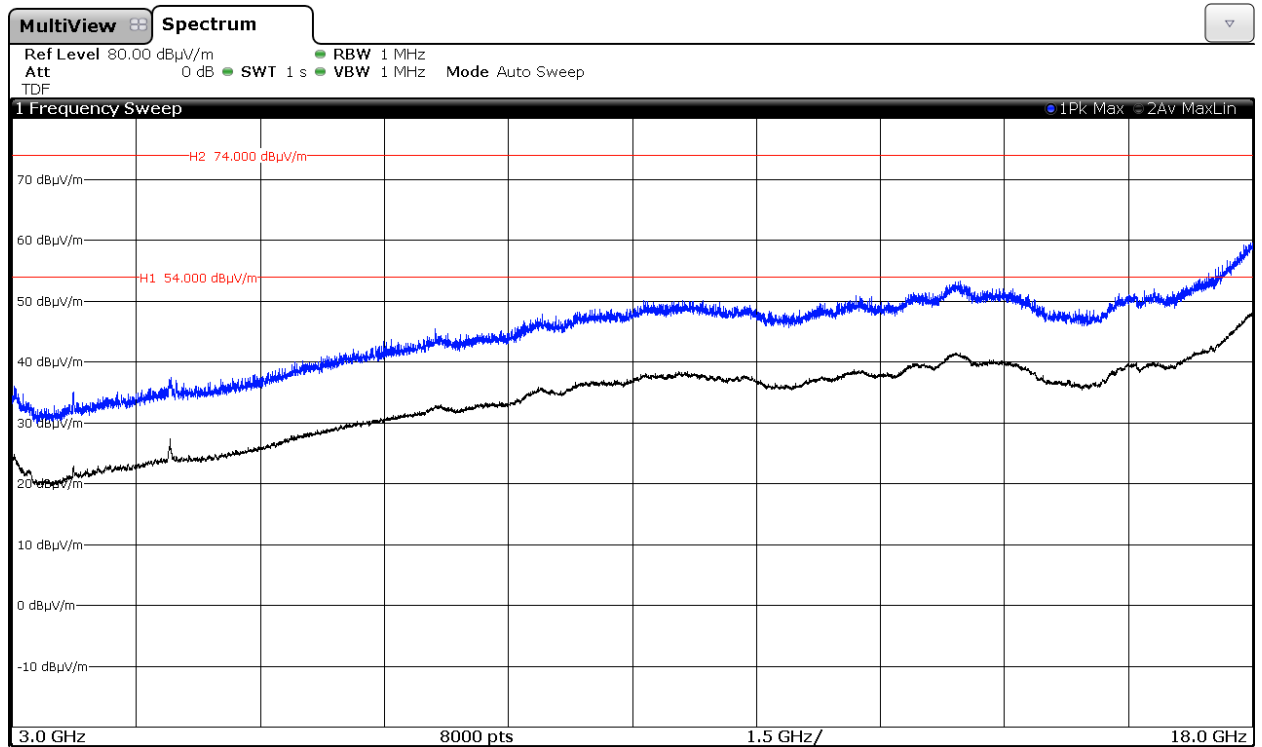
**Chain A**



**Chain B**

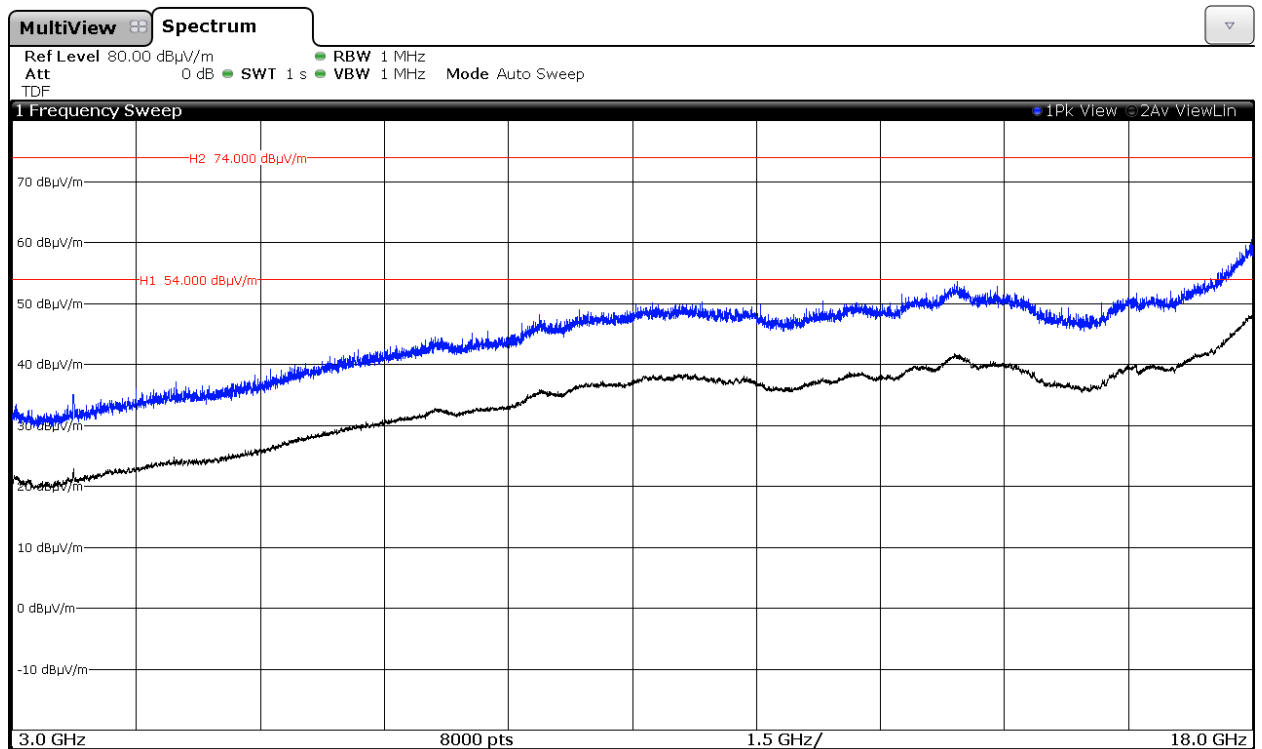


### Chain A+B



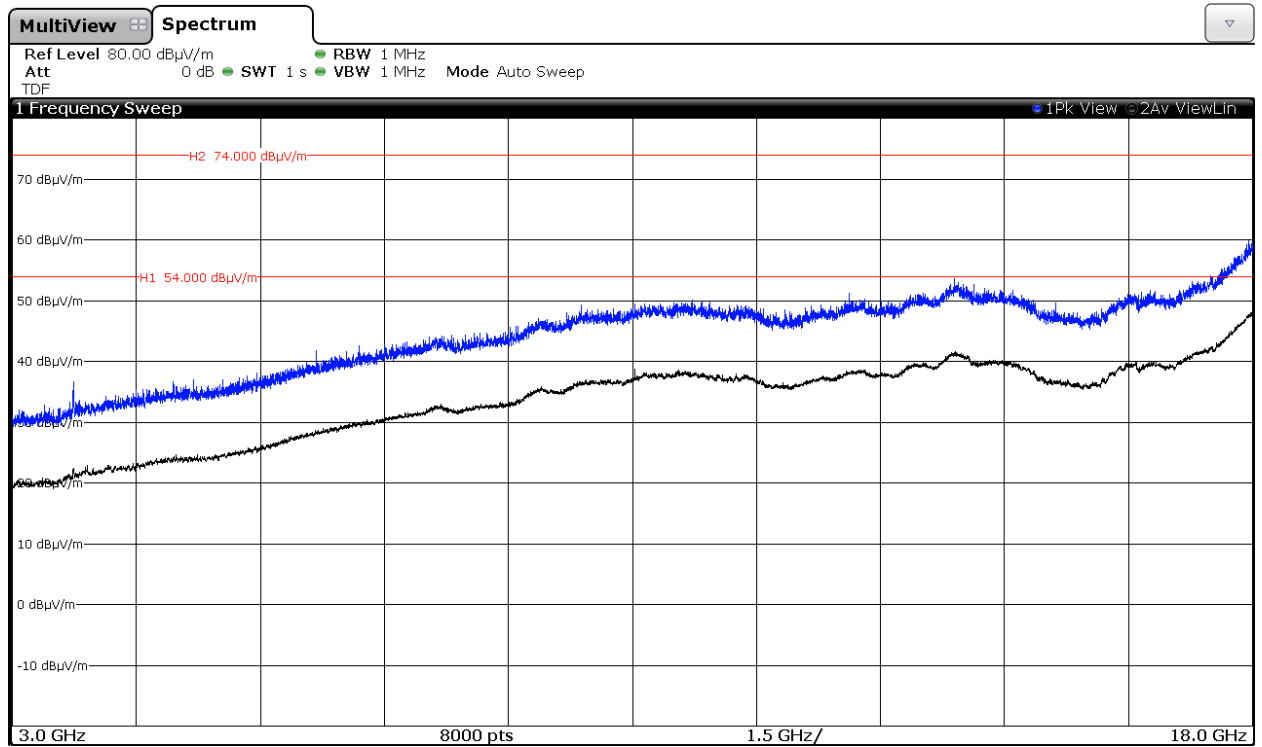
### CHANNEL 11F (2462 MHz).

### Chain A

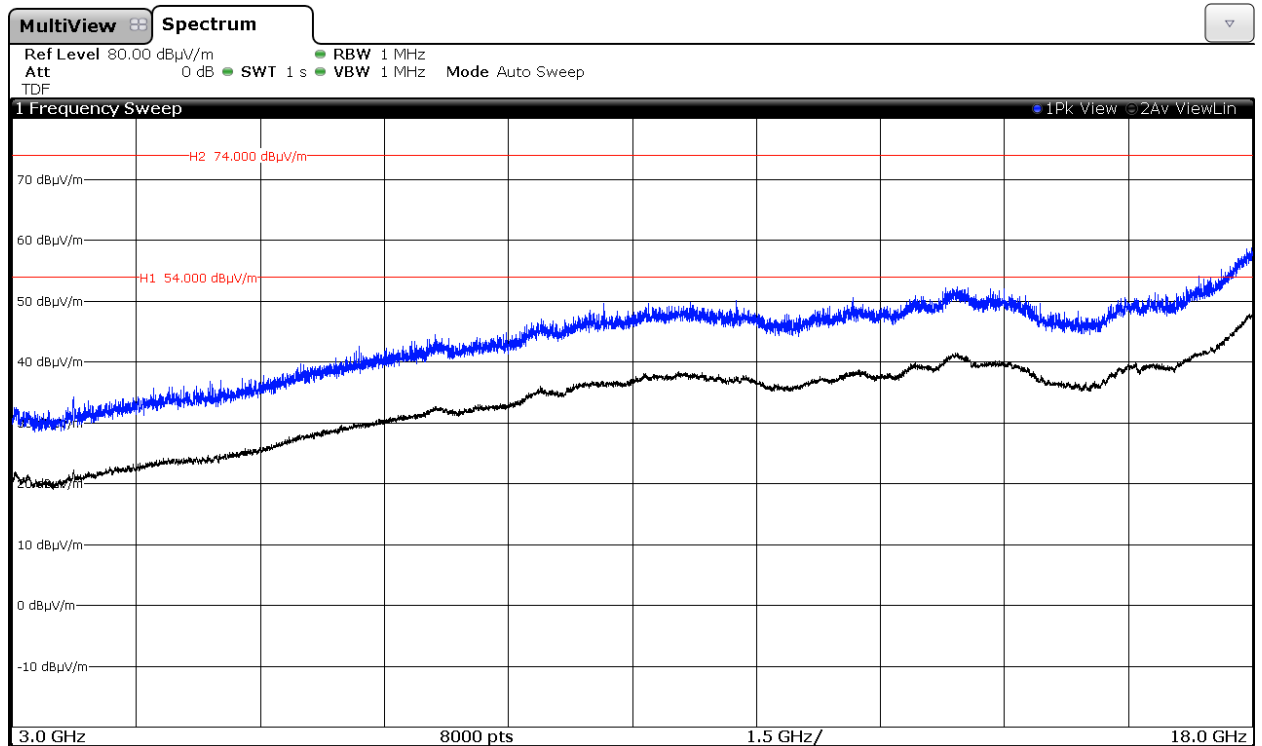




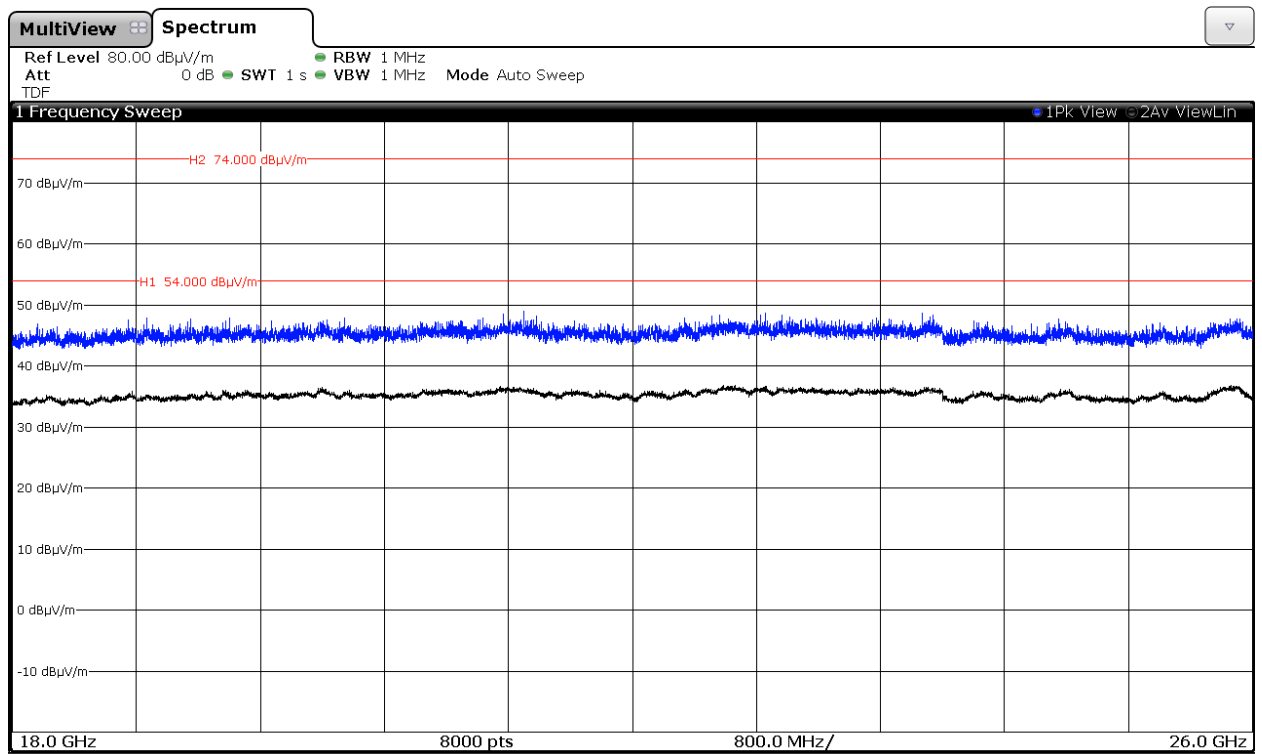
### Chain B



### Chain A+B



FREQUENCY RANGE 18 GHz to 25 GHz. No spurious signals were detected.



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

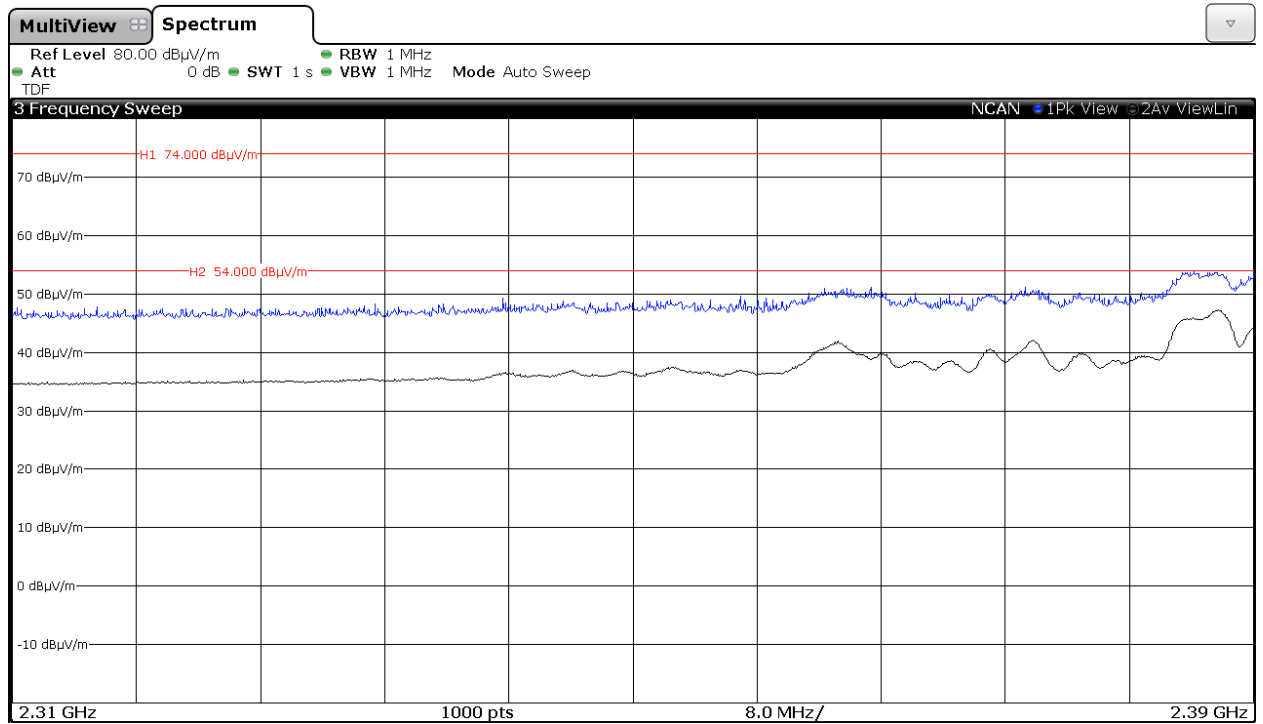
**Radiated spurious emissions at band-edges and inside restricted bands 2.31-2.39 GHz and 2.4835 – 2.5 GHz.**

FREQUENCY RANGE 2.31 GHz to 2.39 GHz. (RESTRICTED BAND)

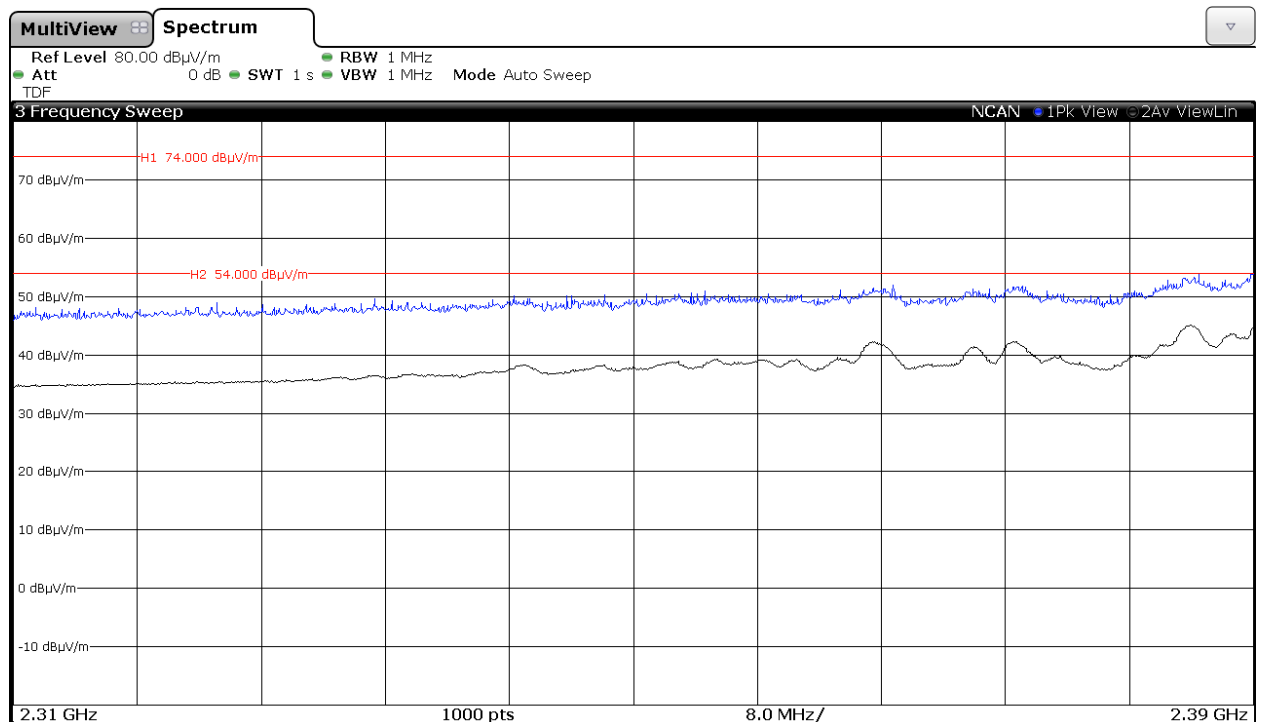
1. WiFi 2.4GHz 802.11 b mode

**CHANNEL 1 (2412 MHz).**

**Chain A**

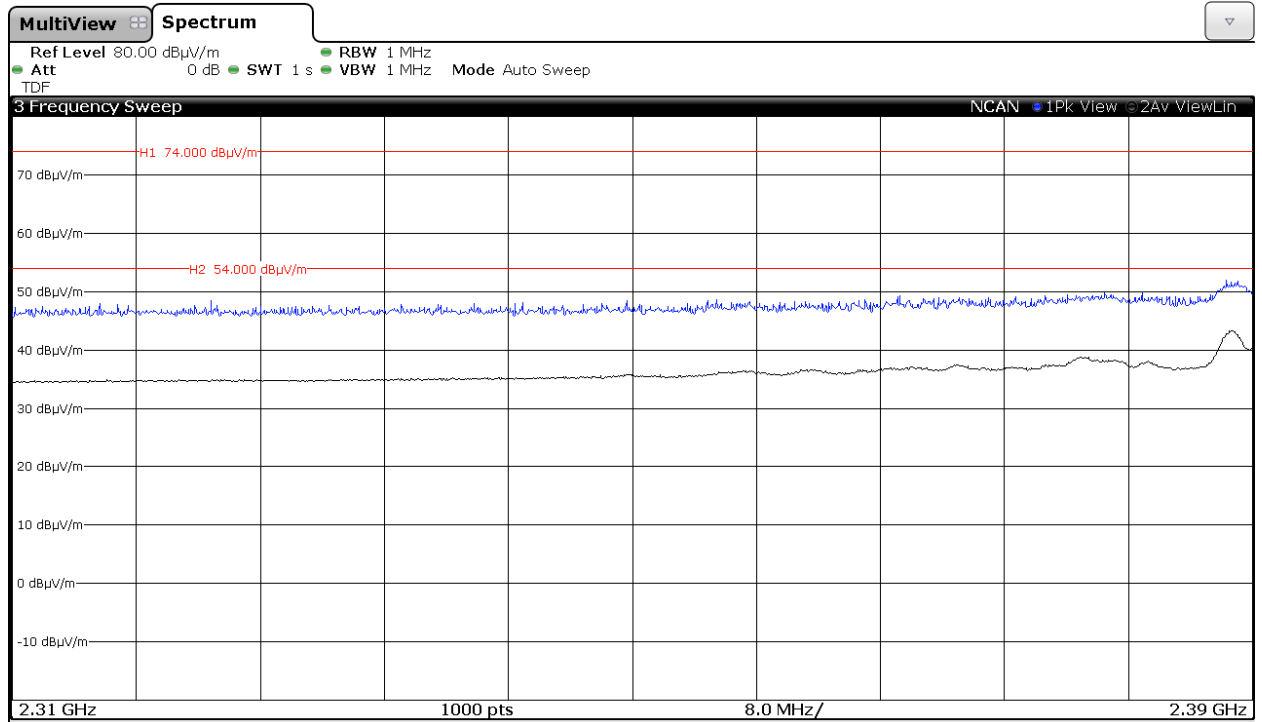


**Chain B**

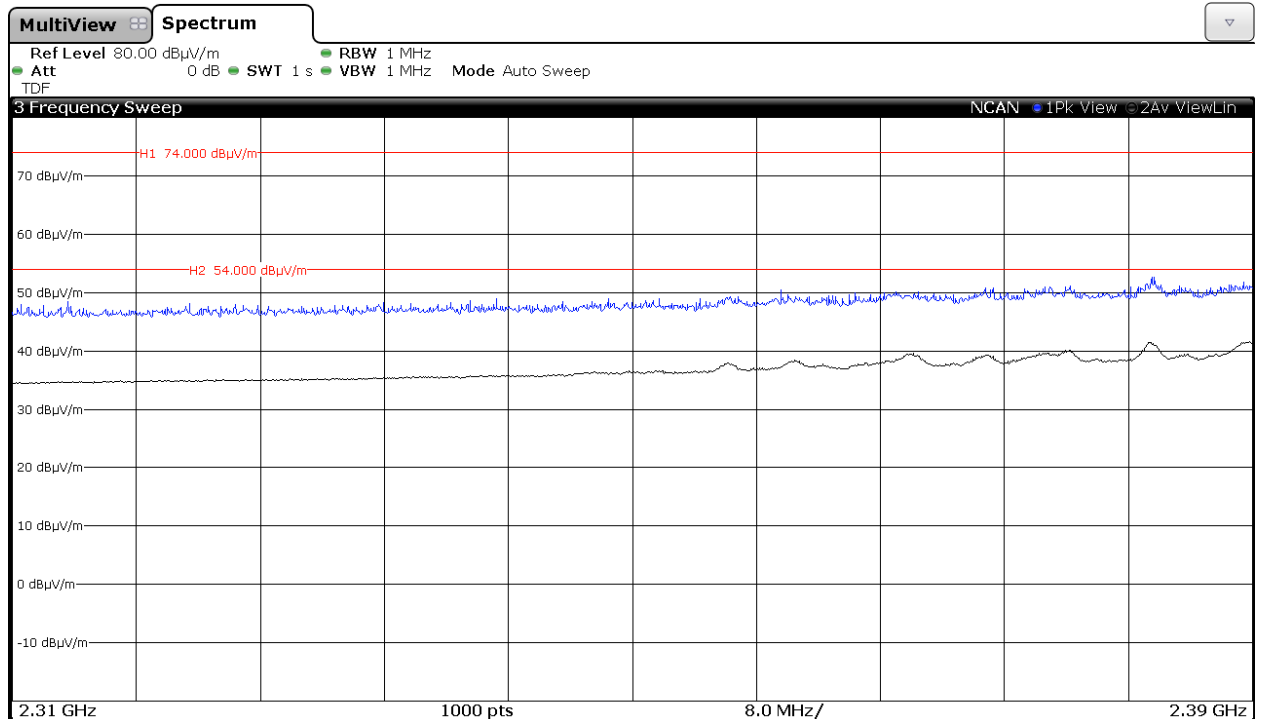


### CHANNEL 6 (2437 MHz).

#### Chain A

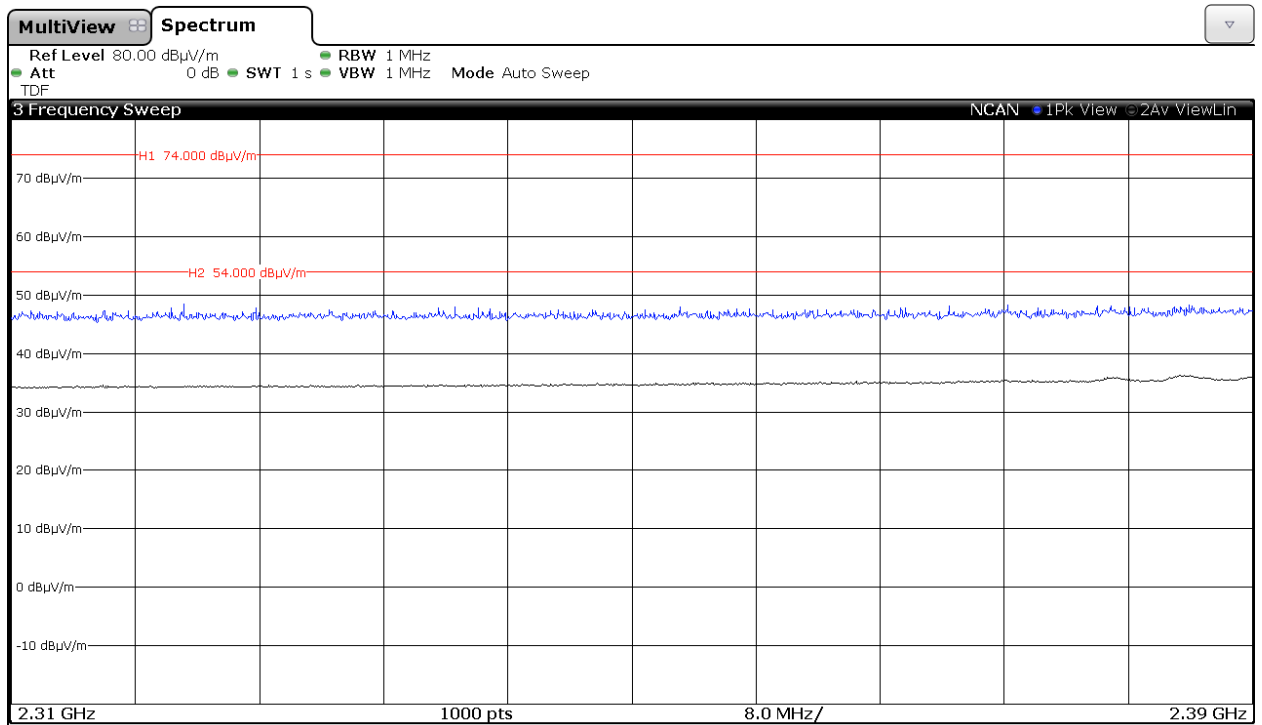


#### Chain B

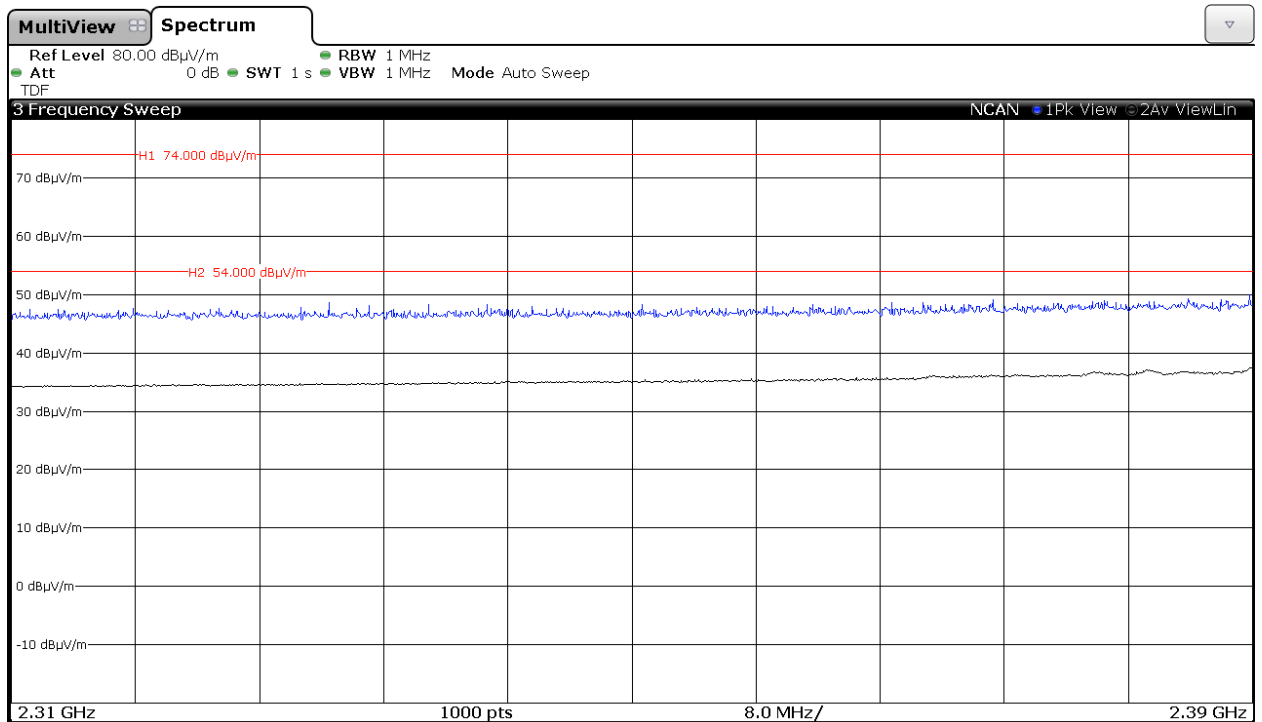


**CHANNEL 11 (2462 MHz).**

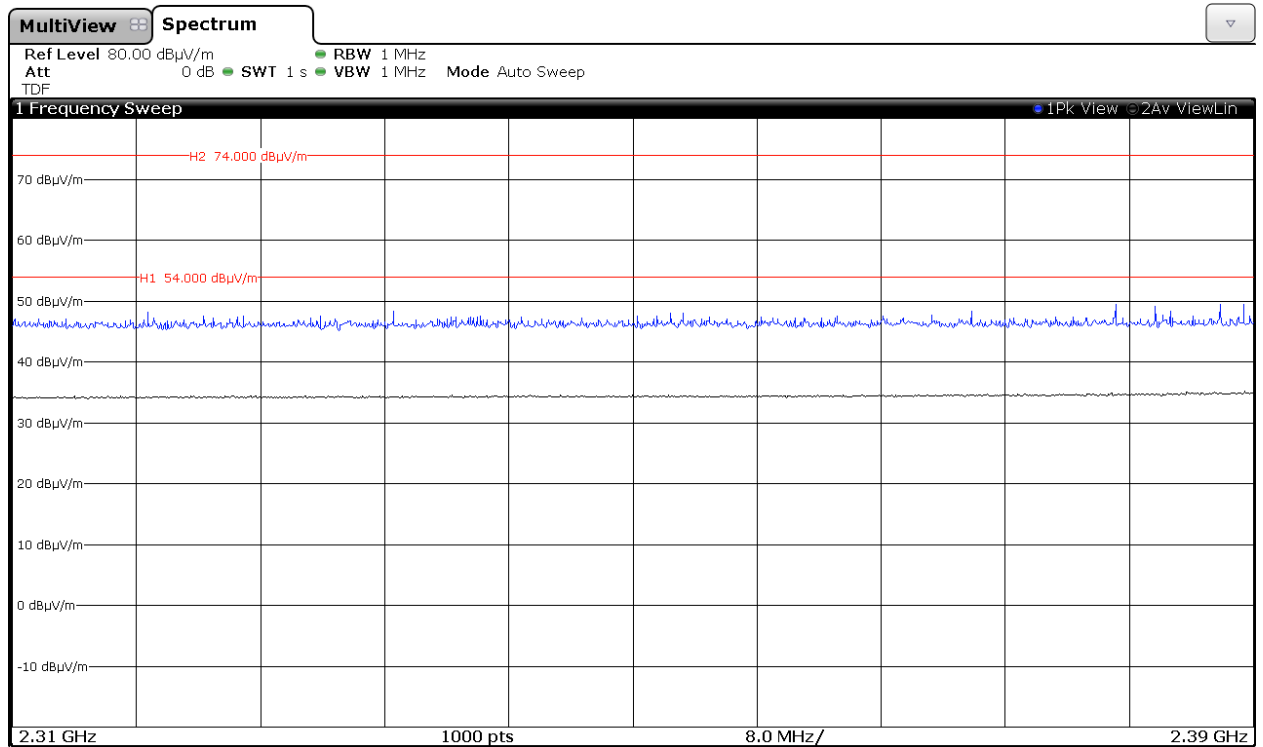
**Chain A**



**Chain B**

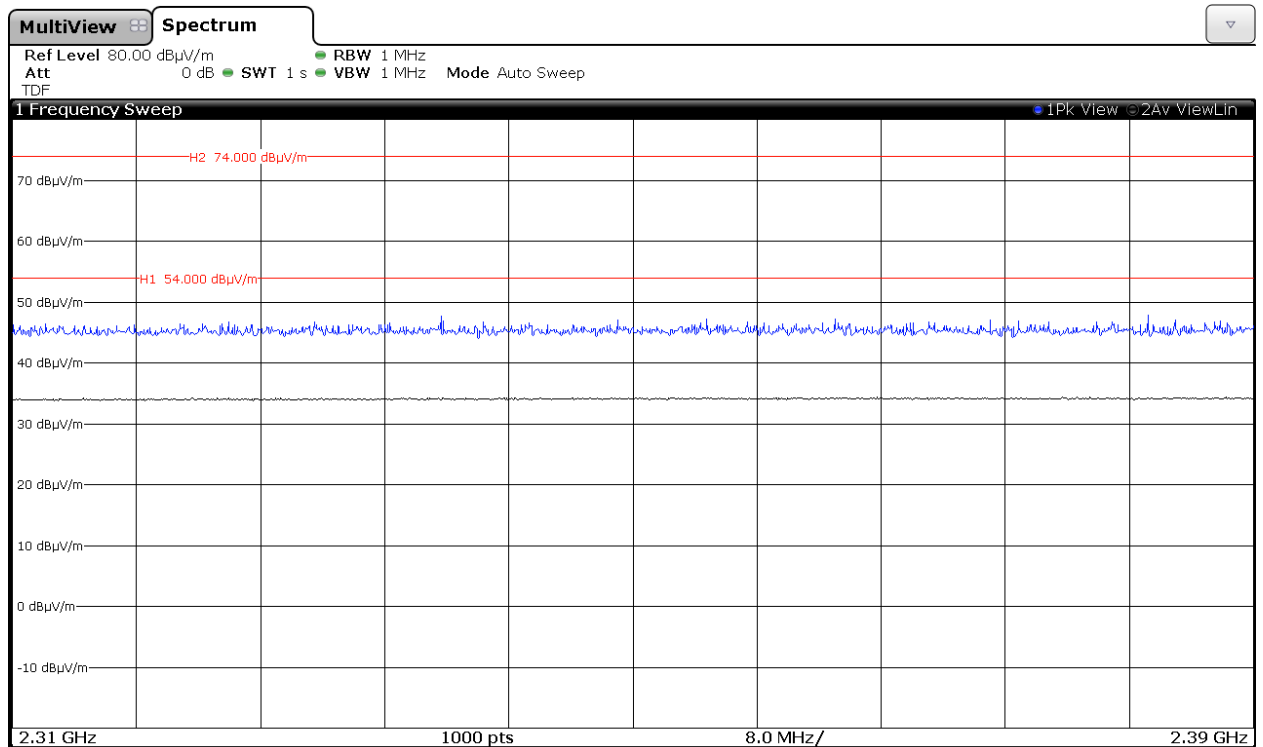


**CHANNEL 12 (2467 MHz).**



Note: This plot is valid for both Chain A and Chain B

**CHANNEL 13 (2472 MHz).**

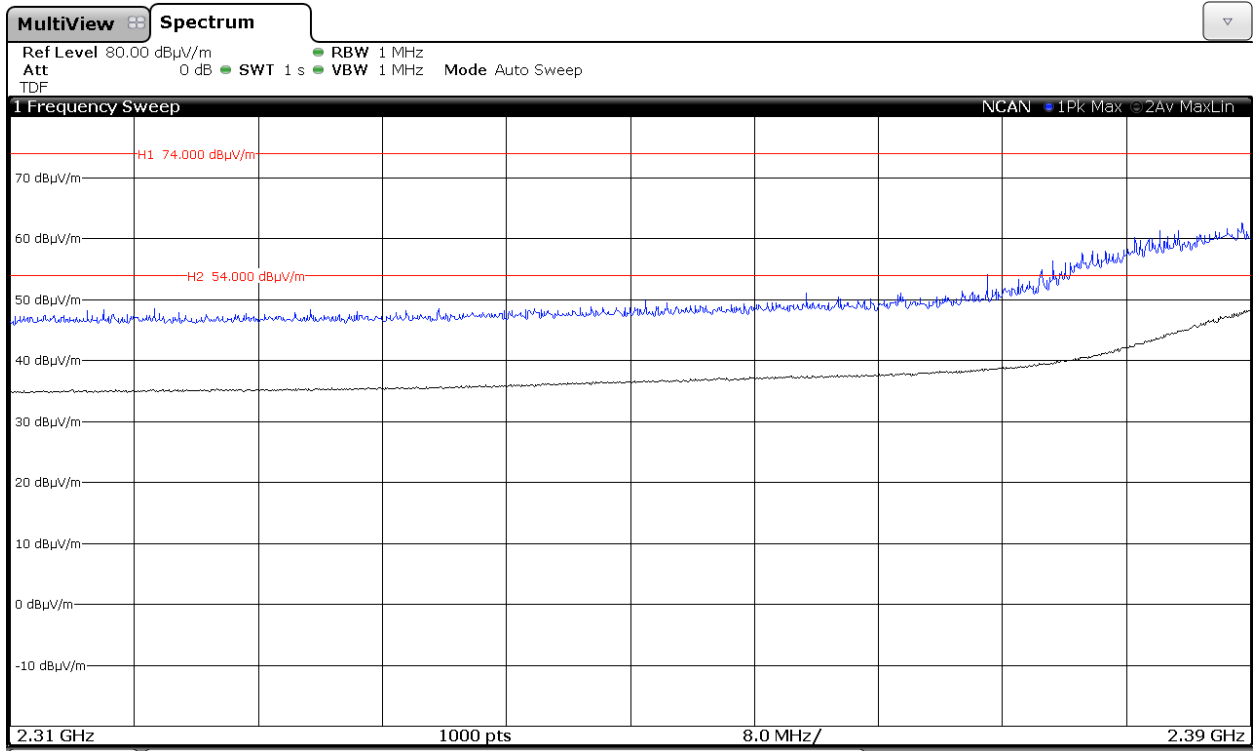


Note: This plot is valid for both Chain A and Chain B

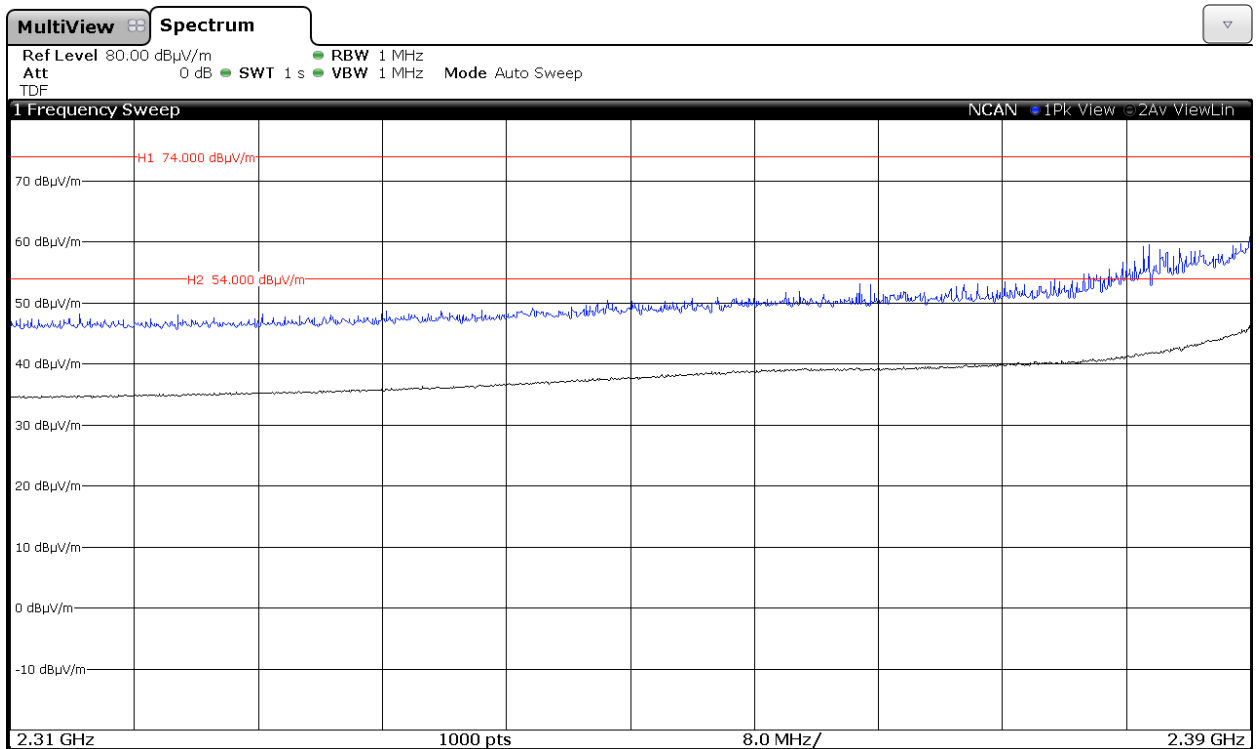
## 2. WiFi 2.4GHz 802.11 g mode

### CHANNEL 1 (2412 MHz).

#### Chain A

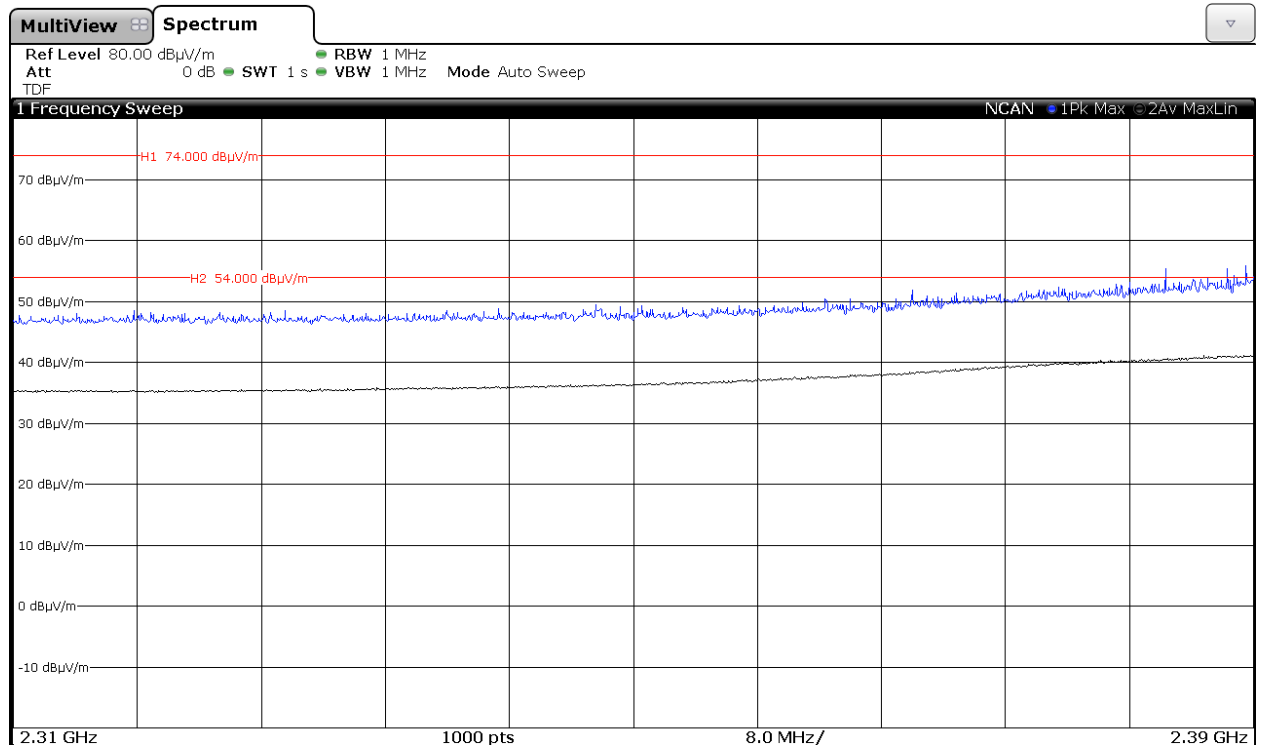


#### Chain B

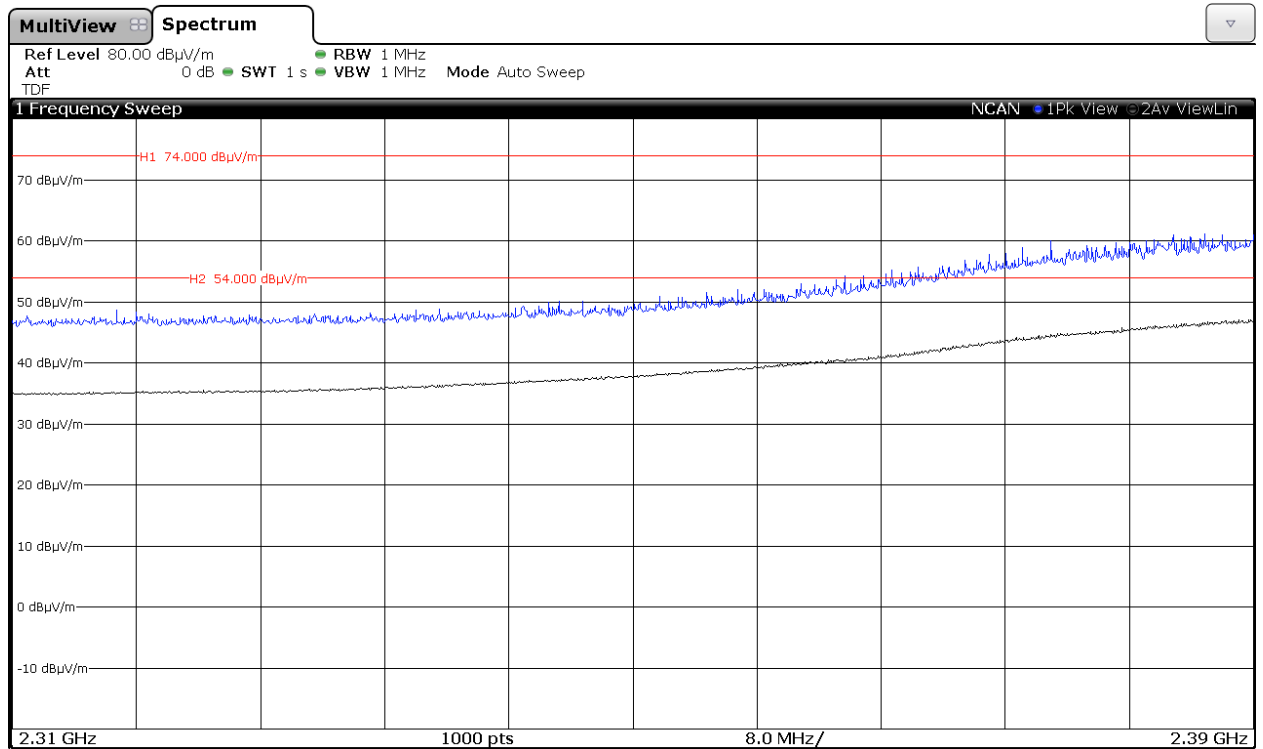


### CHANNEL 6 (2437 MHz).

#### Chain A



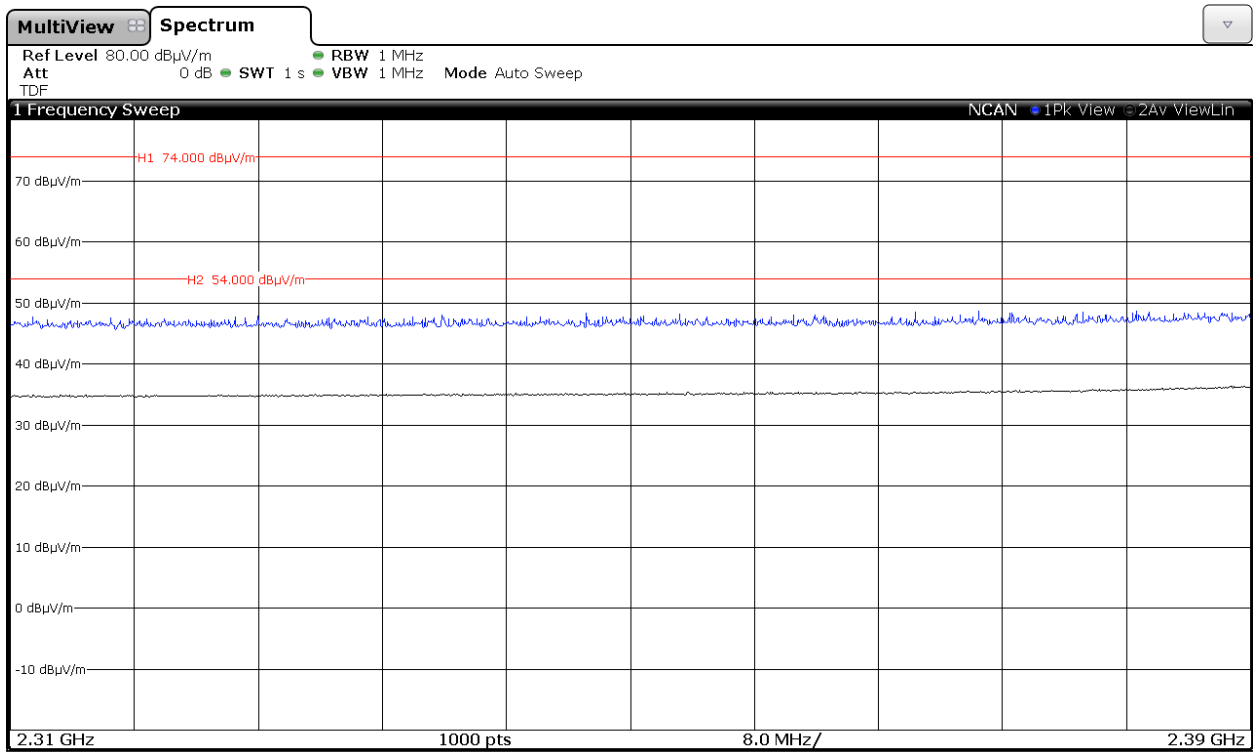
#### Chain B



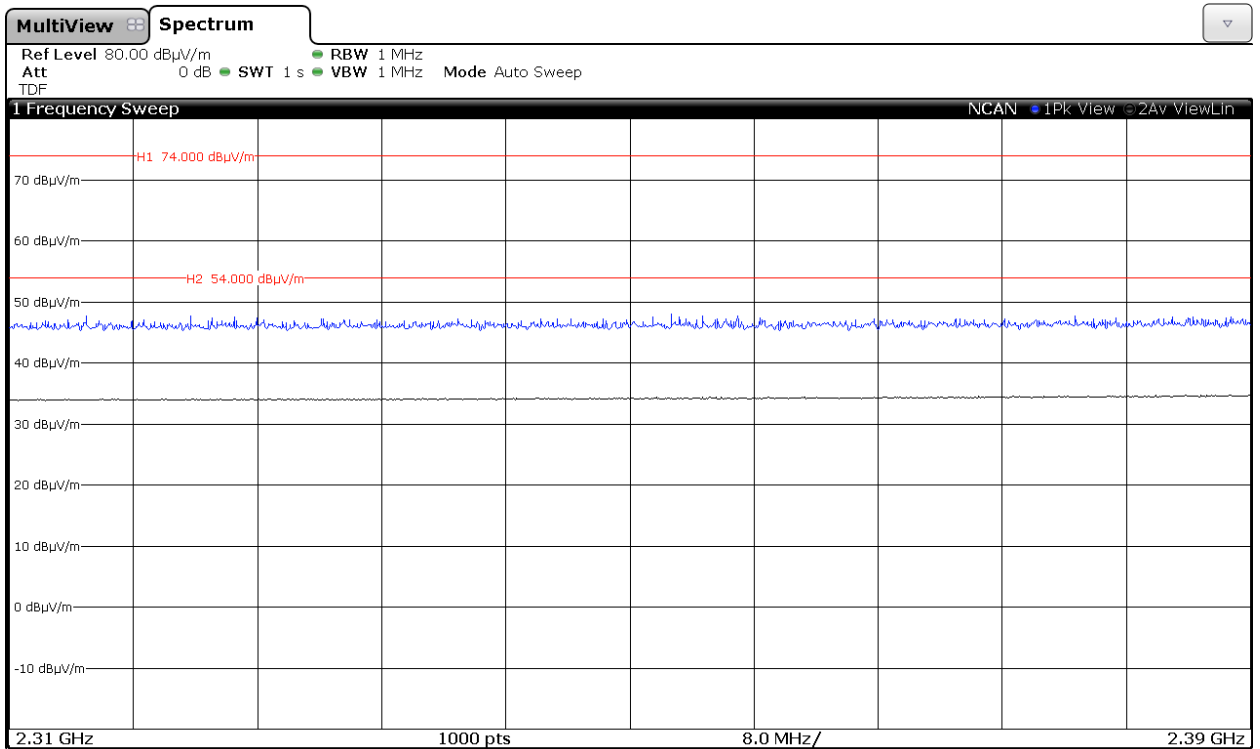


**CHANNEL 11 (2462 MHz).**

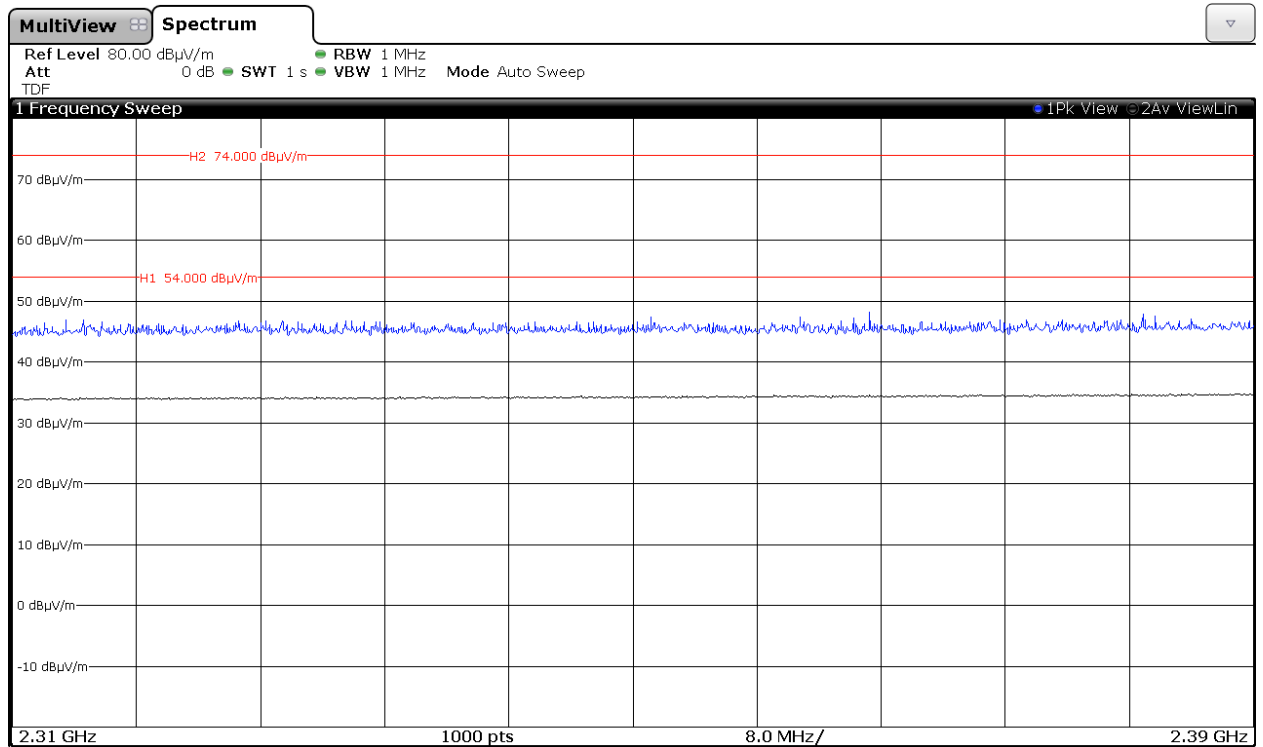
**Chain A**



**Chain B**

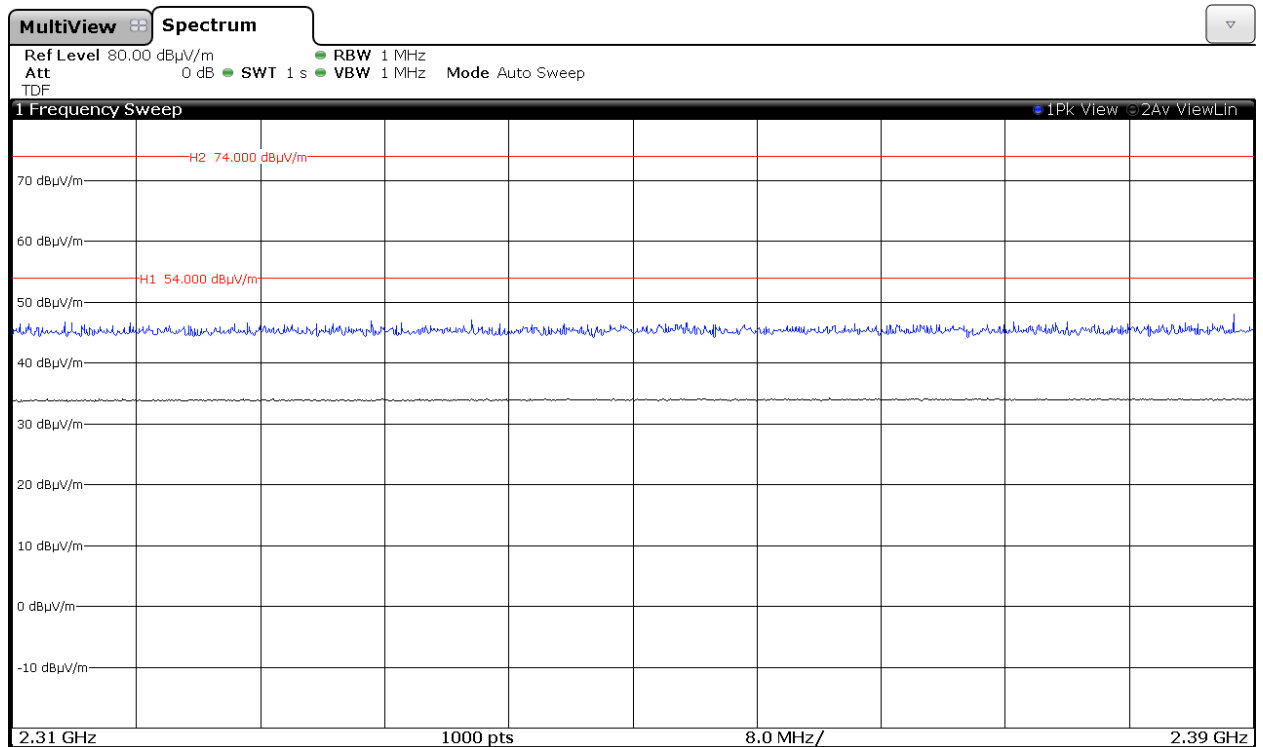


### CHANNEL 12 (2467 MHz).



Note: This plot is valid for both Chain A and Chain B

### CHANNEL 13 (2472 MHz).

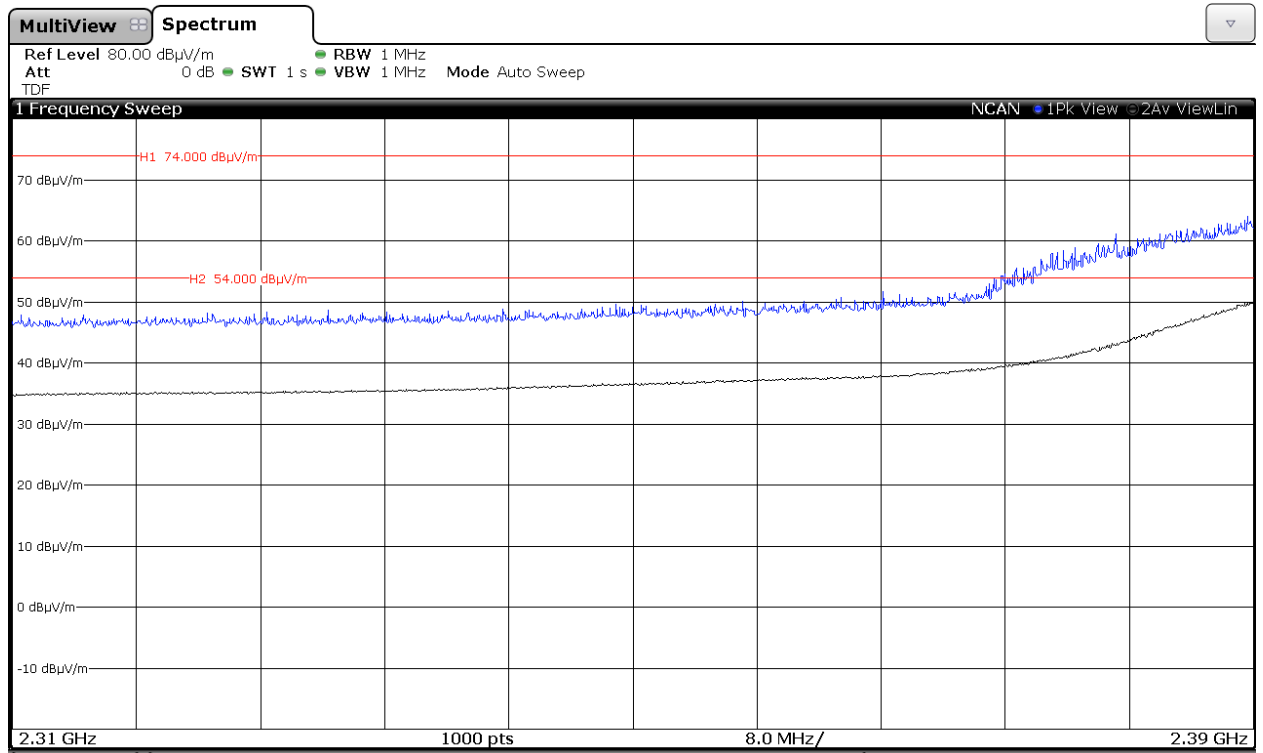


Note: This plot is valid for both Chain A and Chain B

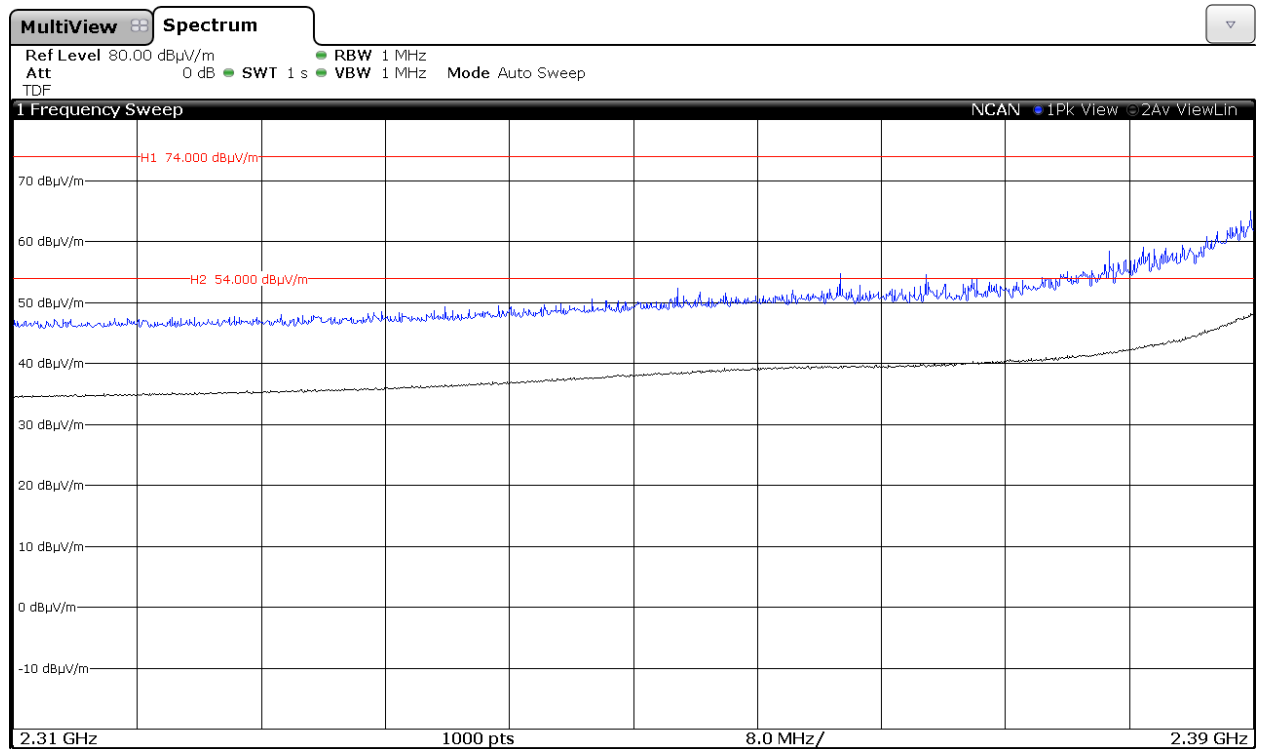
### 3. WiFi 2.4GHz 802.11 n20 mode

#### CHANNEL 1 (2412 MHz).

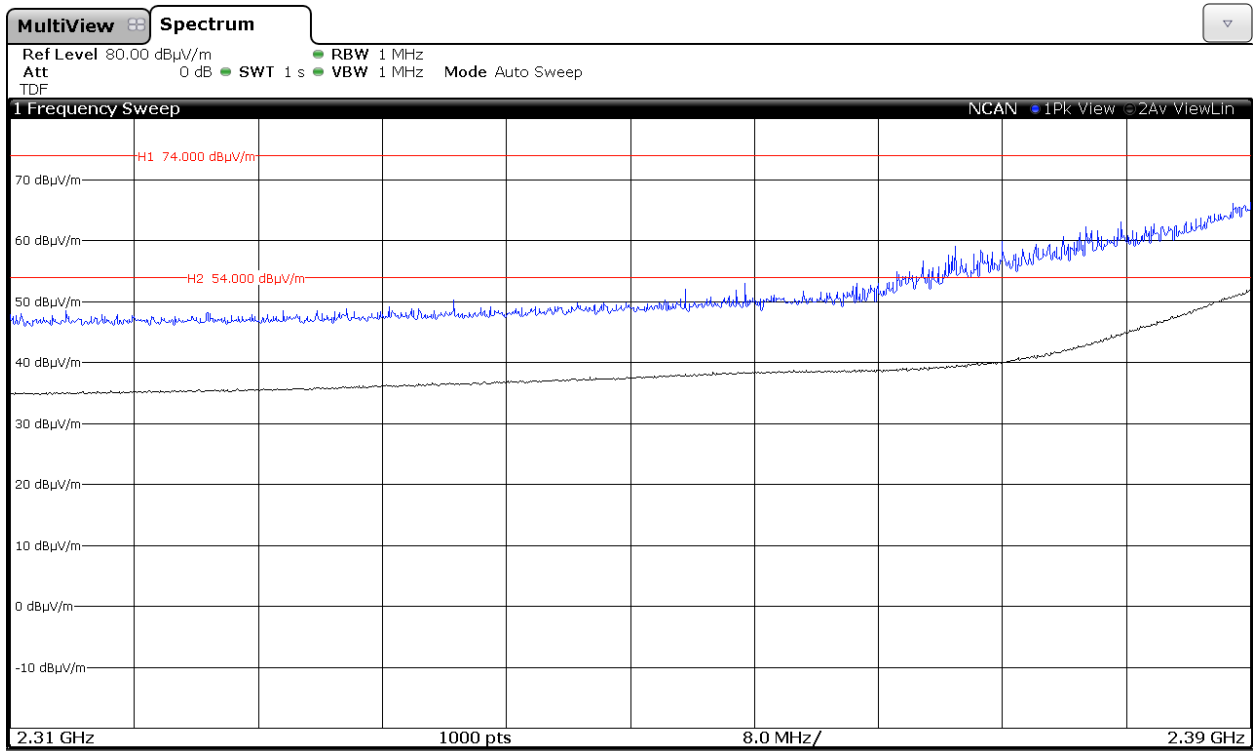
#### Chain A



#### Chain B

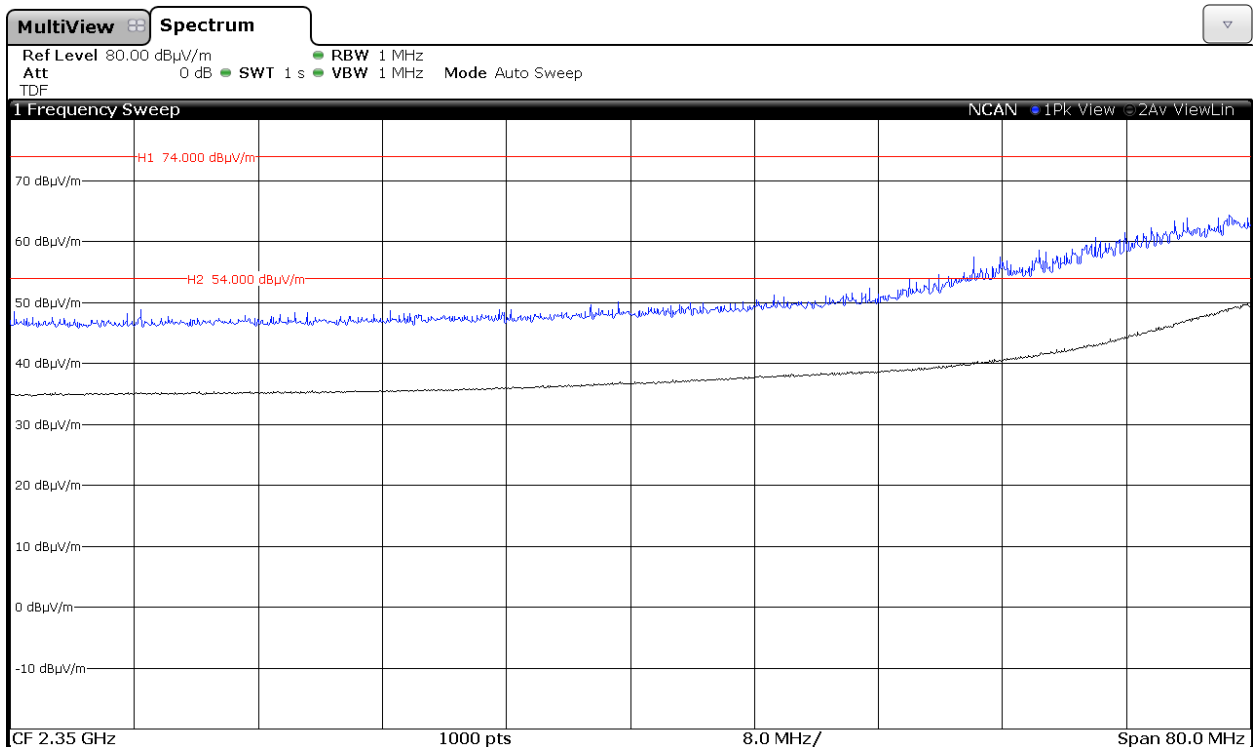


### Chain A+B

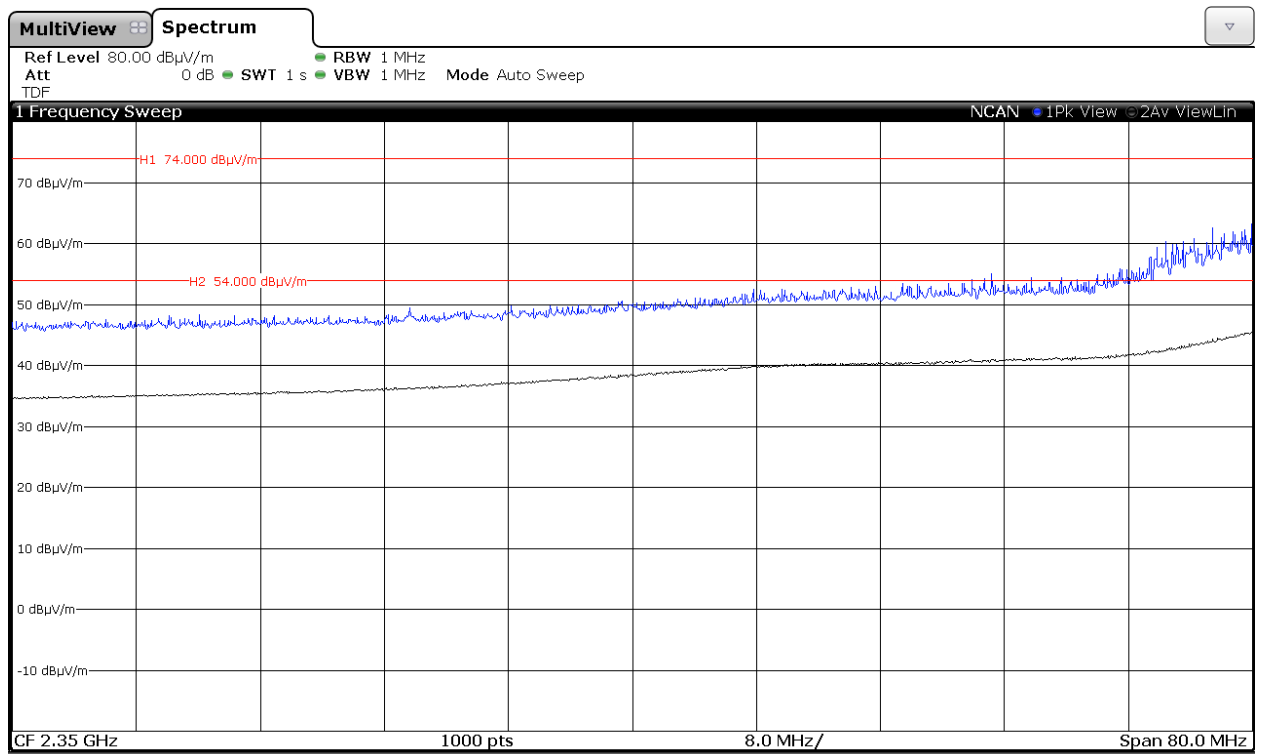


### CHANNEL 2 (2417 MHz).

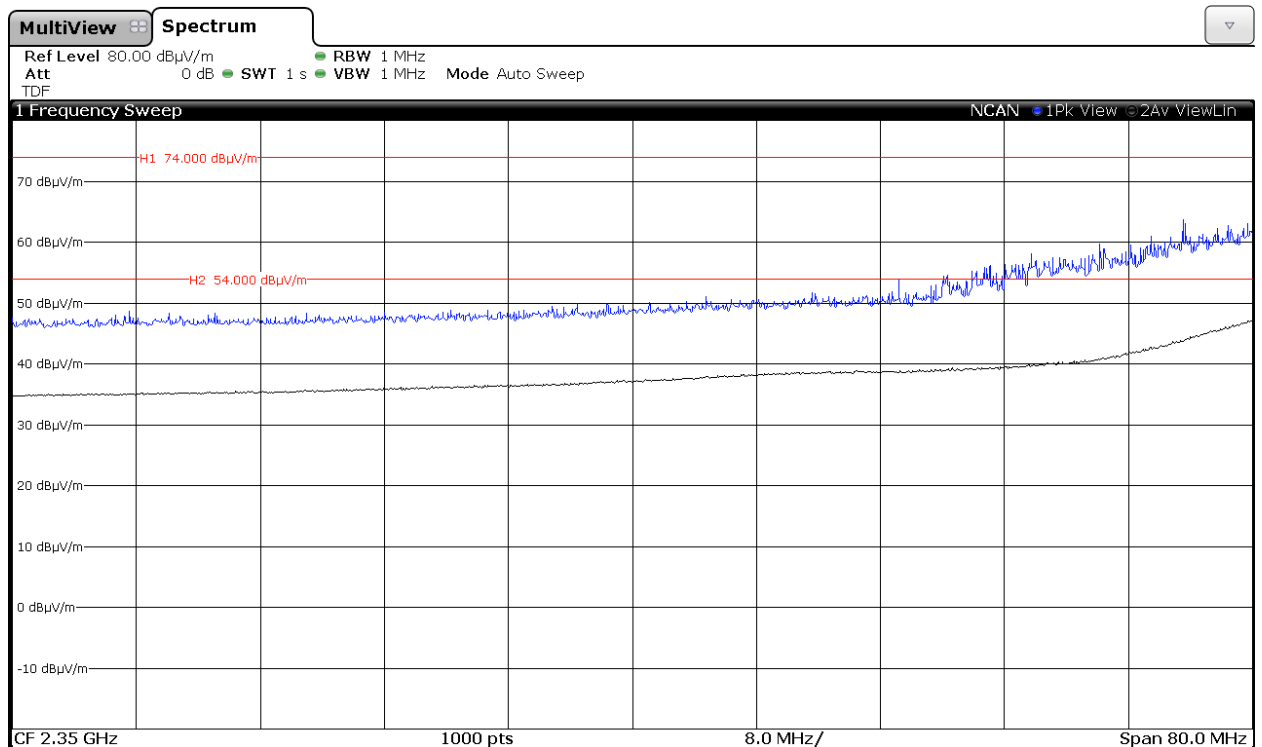
#### Chain A



### Chain B

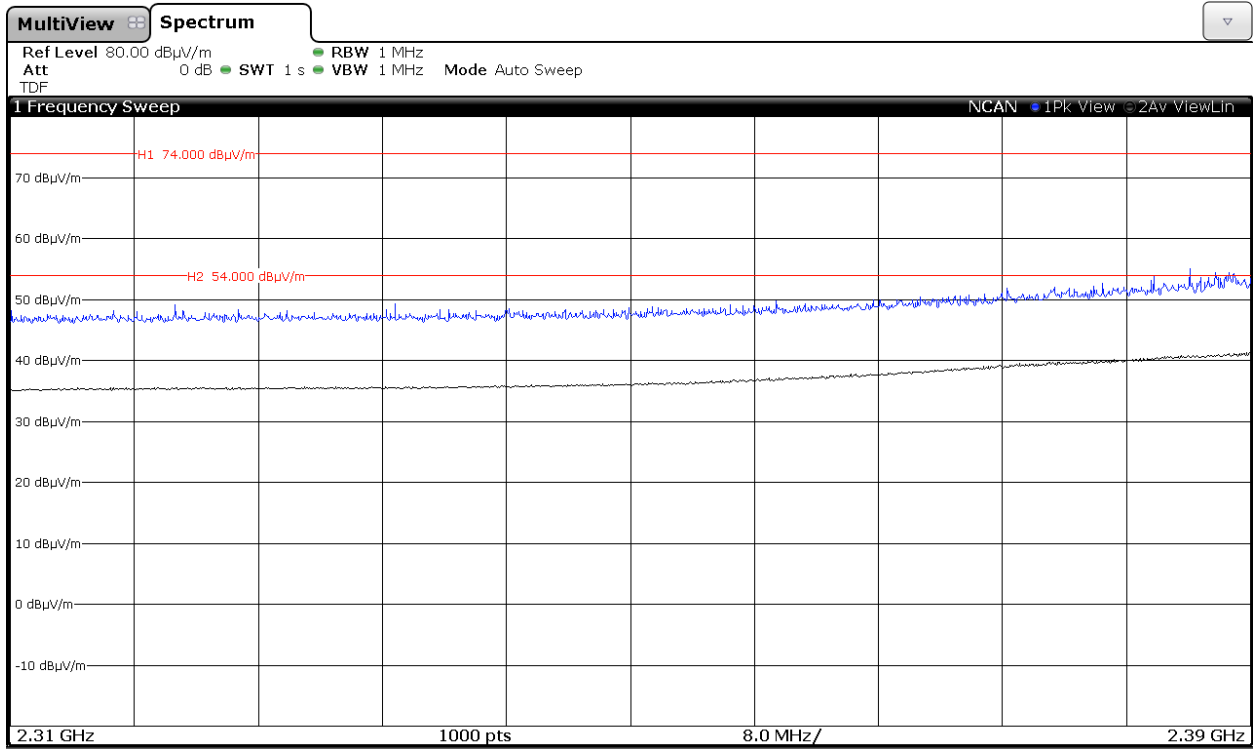


### Chain A+B

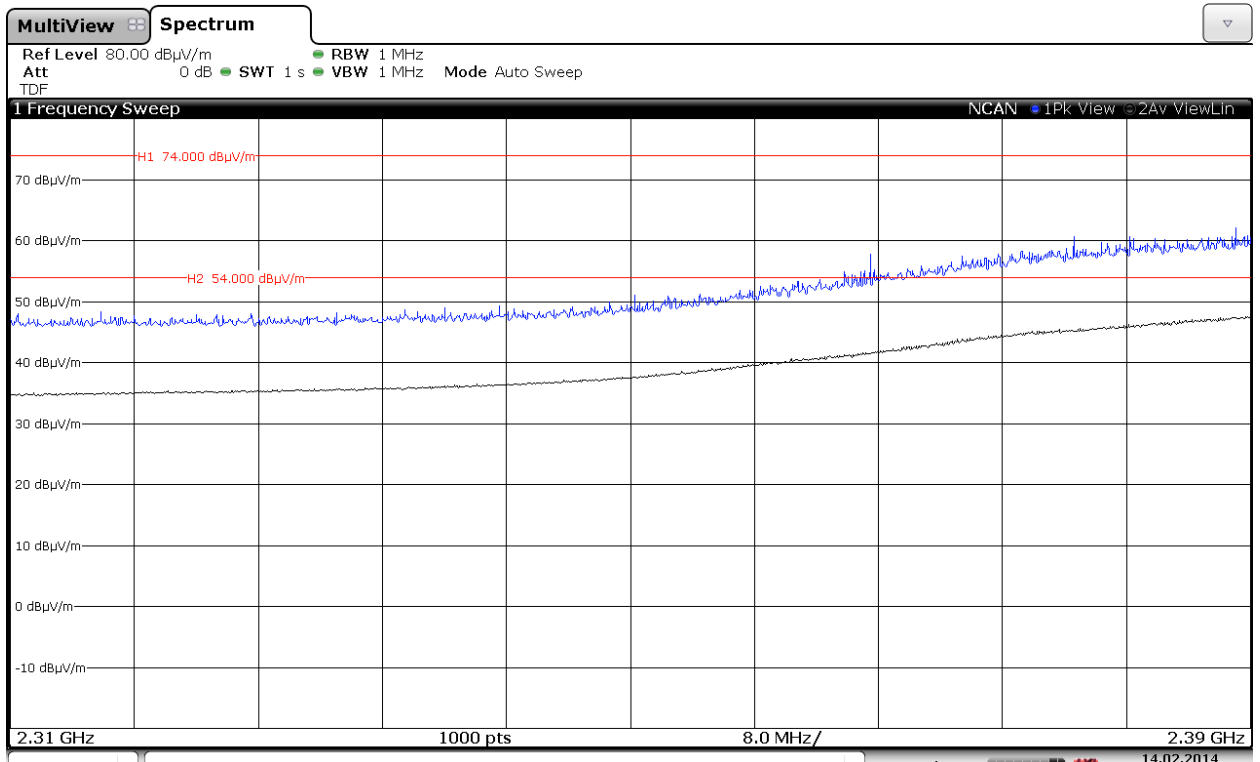


### CHANNEL 6 ( 2437MHz).

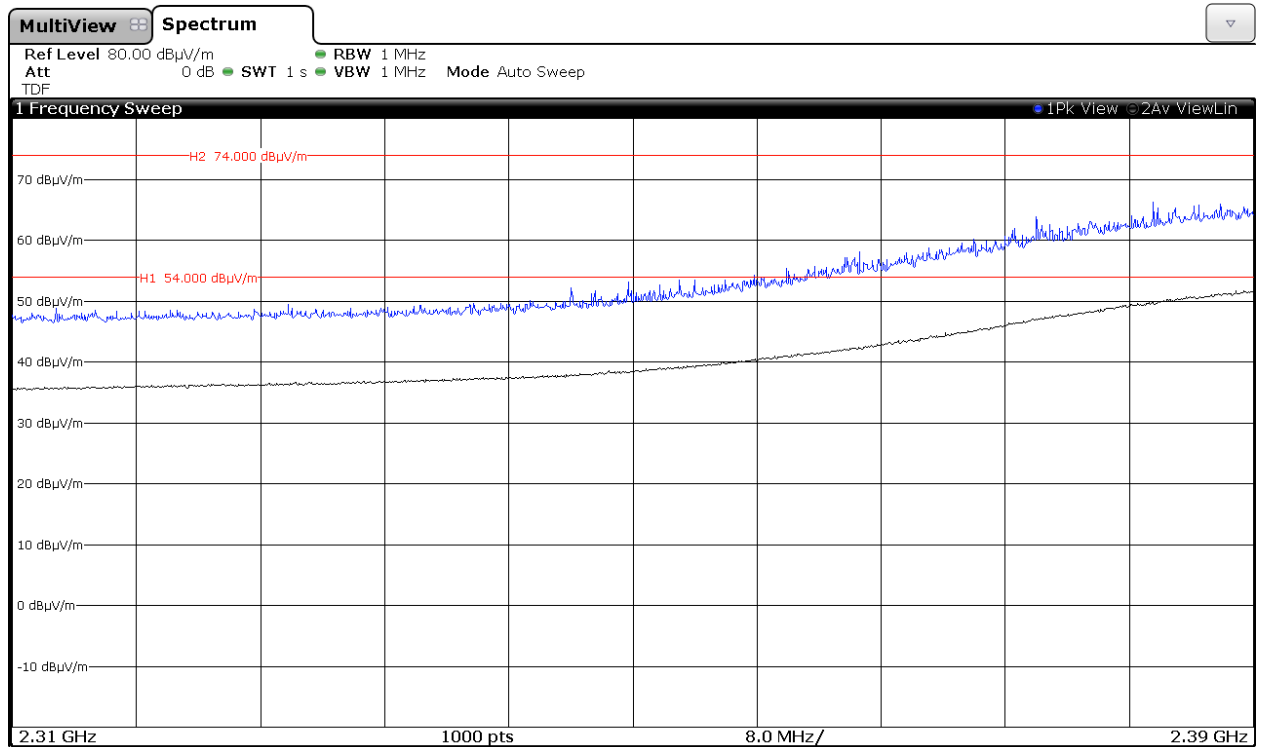
#### Chain A



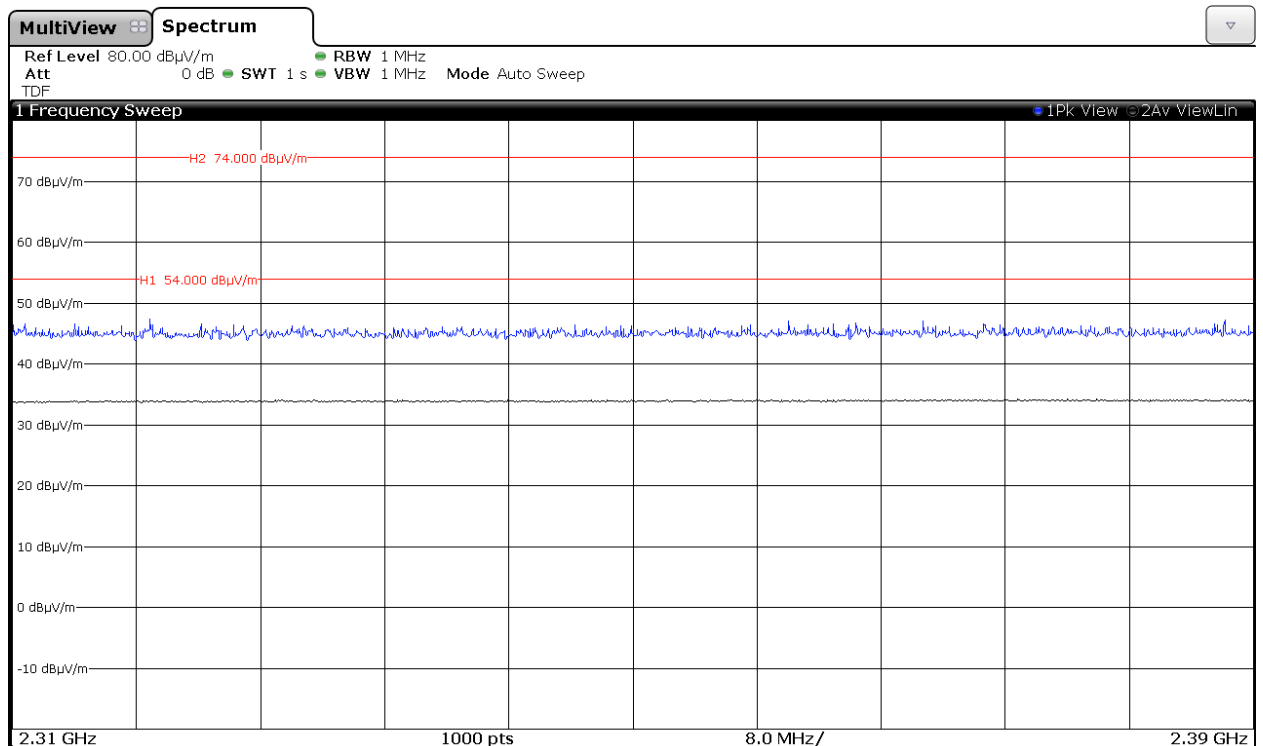
#### Chain B



### Chain A+B

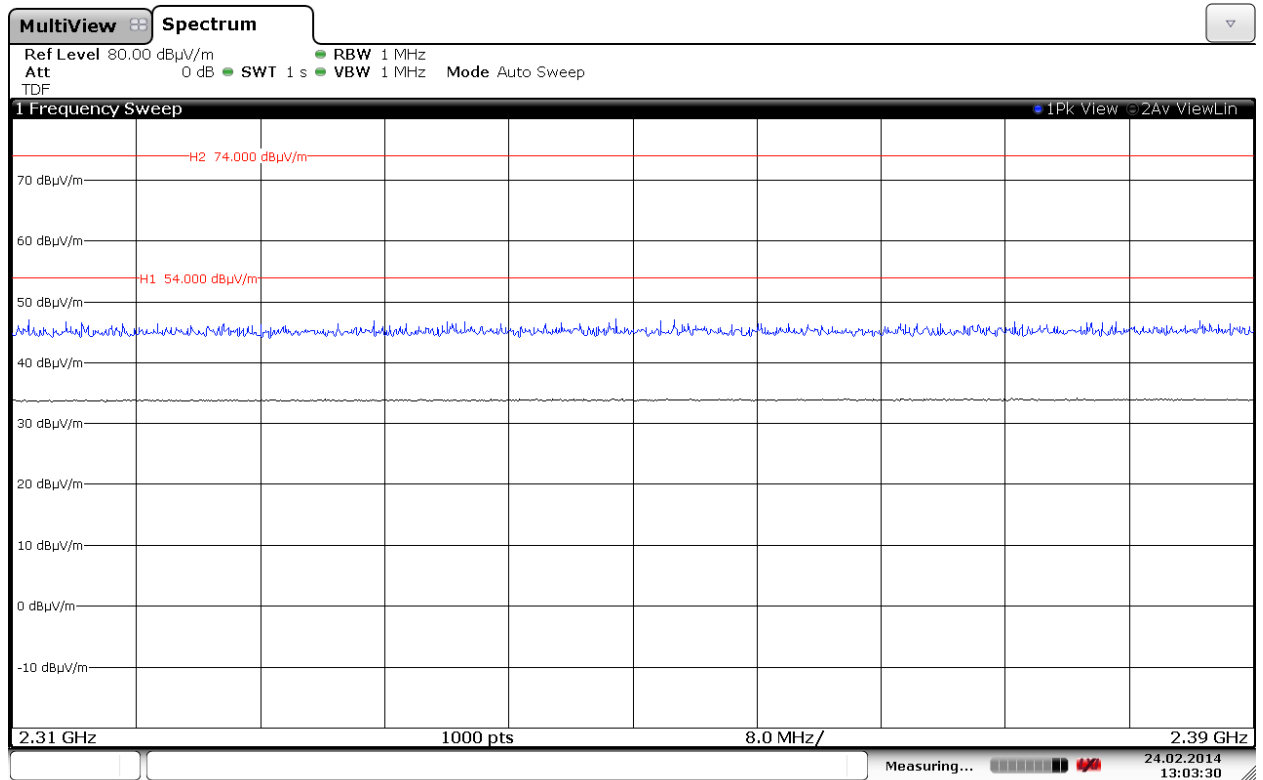


### CHANNEL 12 (2467 MHz).



Note: This plot is valid for Chain A, Chain B and Chain A+B.

### CHANNEL 13 (2472 MHz).



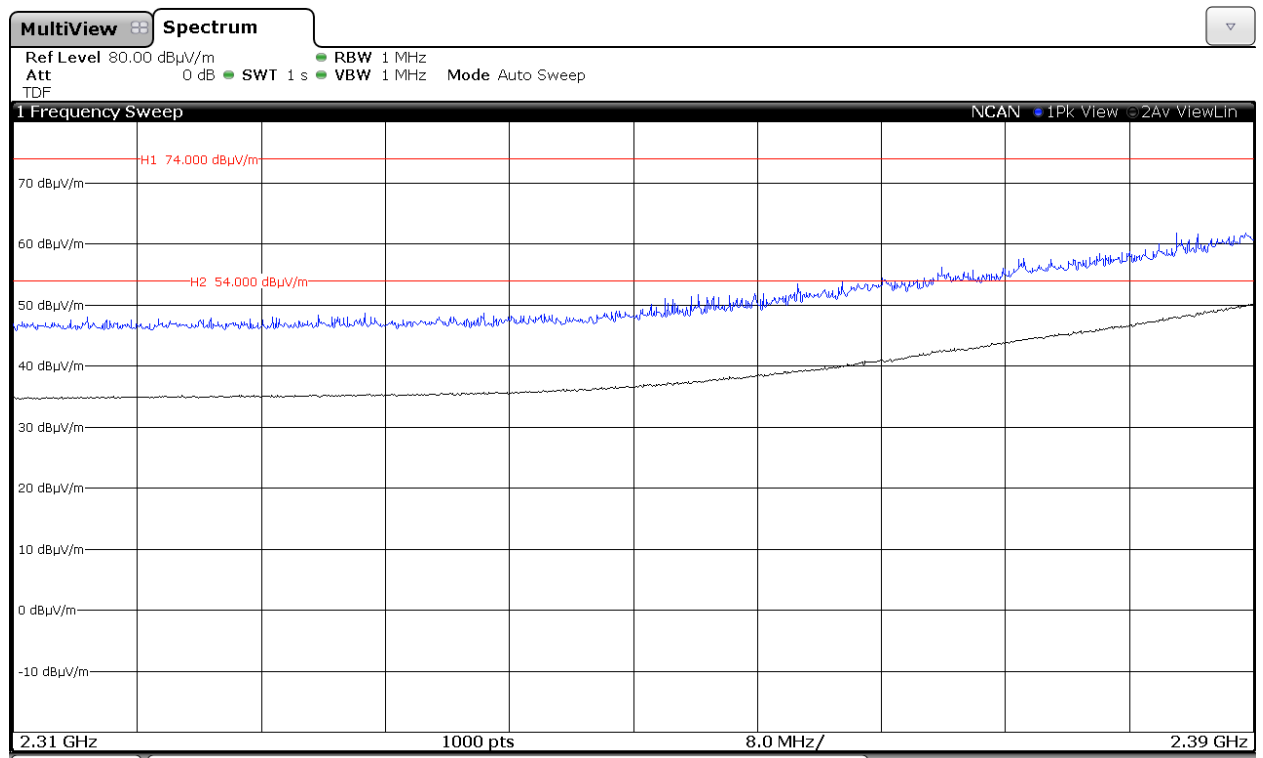
Date: 24.FEB.2014 13:03:30

Note: This plot is valid for Chain A, Chain B and Chain A+B.

### 4. WiFi 2.4GHz 802.11 n40 mode

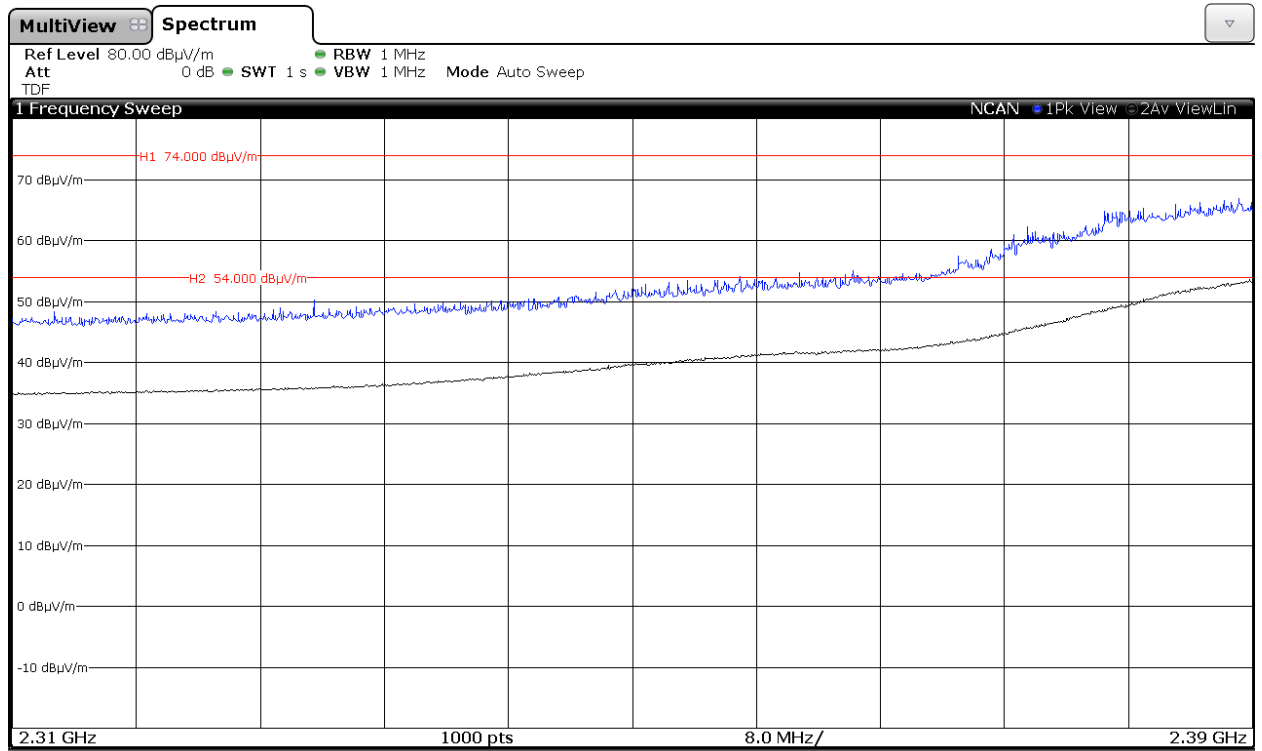
### CHANNEL 3 (2422 MHz).

#### Chain A

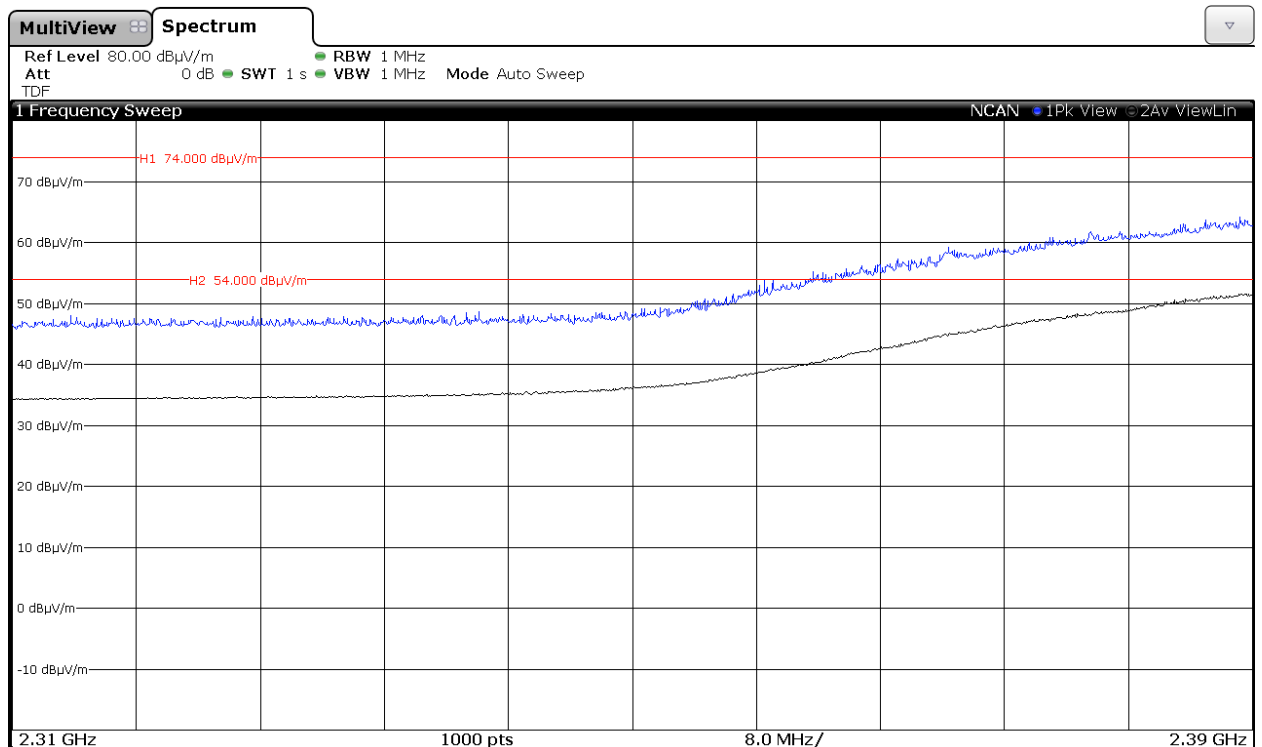




### Chain B

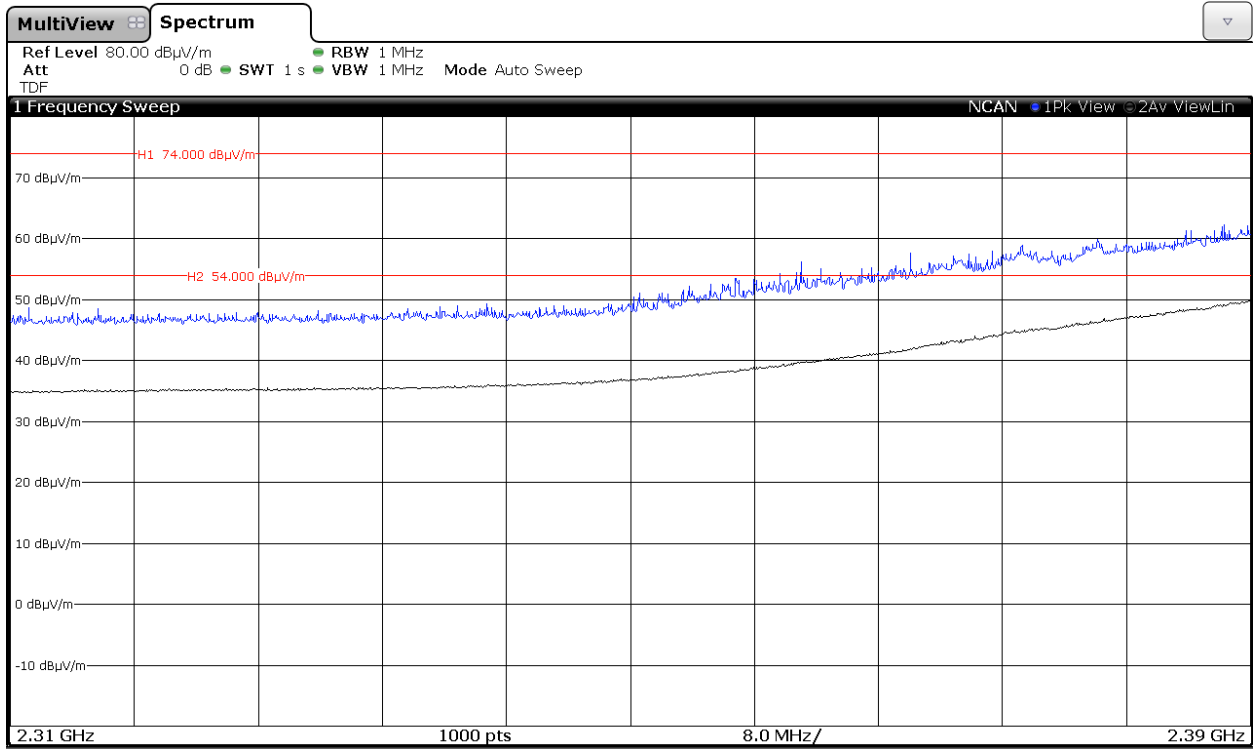


### Chain A+B

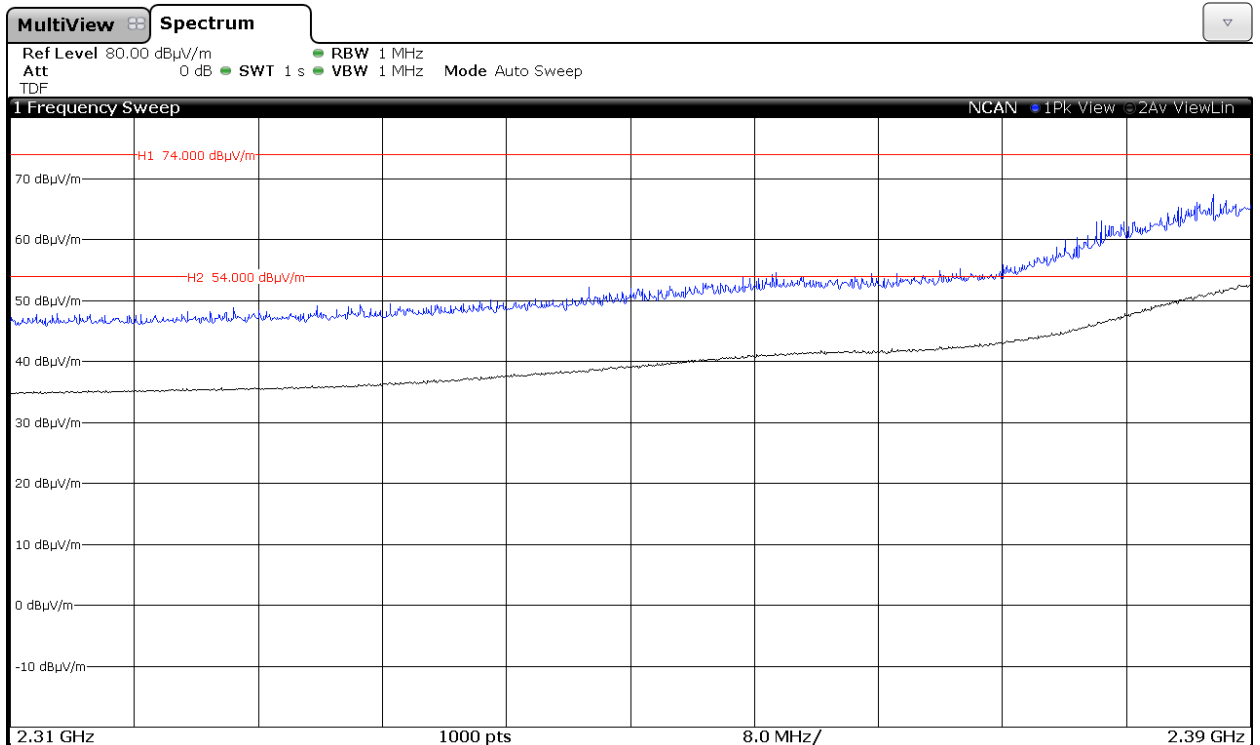


**CHANNEL 4 (2427 MHz).**

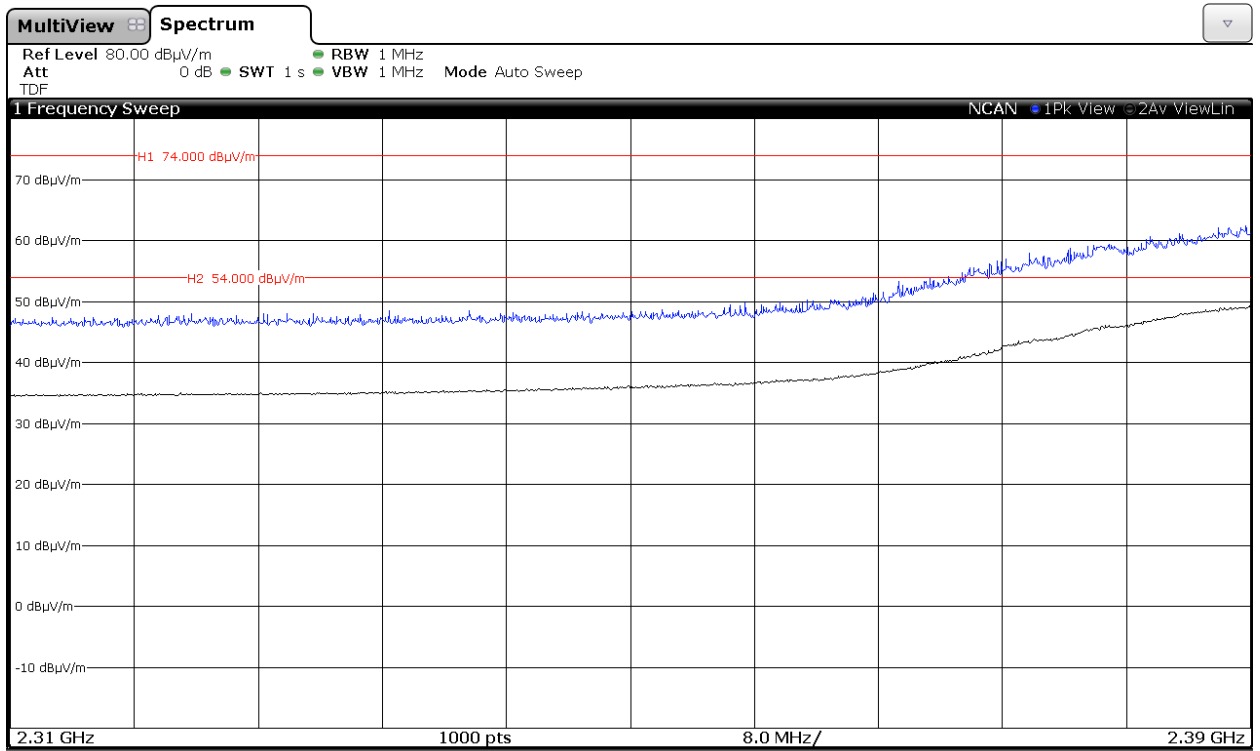
**Chain A**



**Chain B**

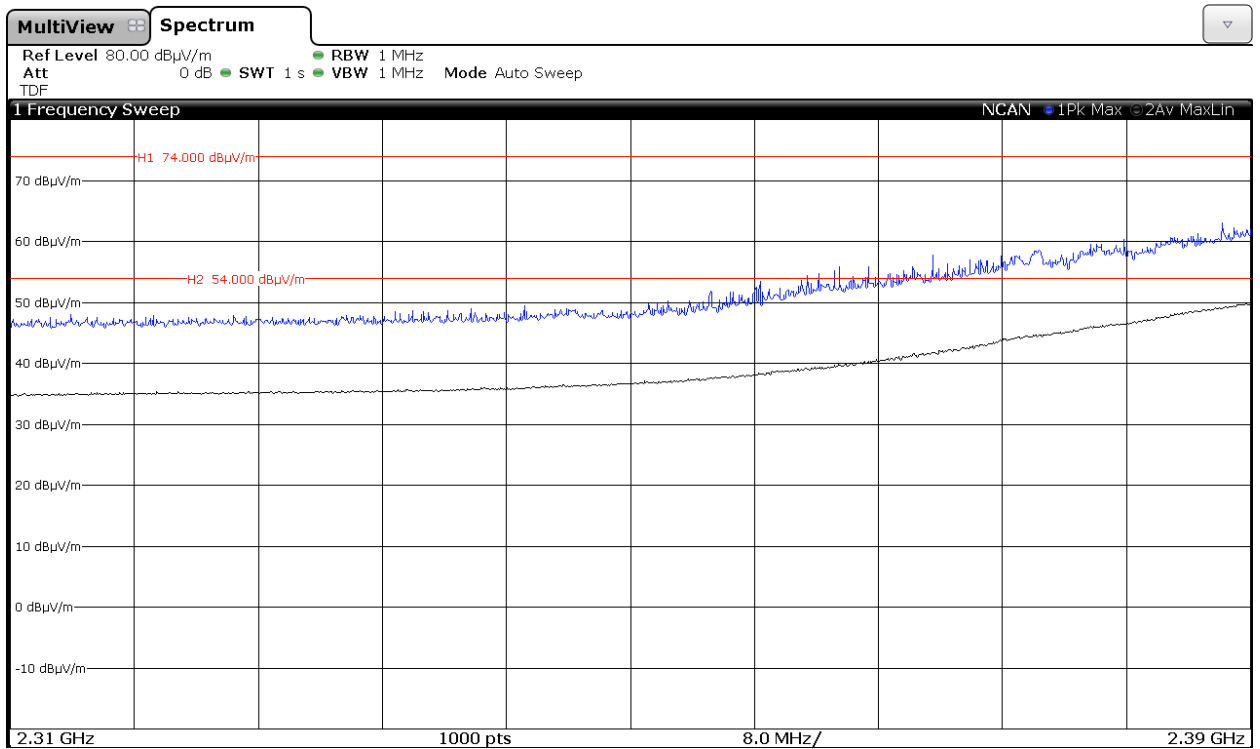


### Chain A+B

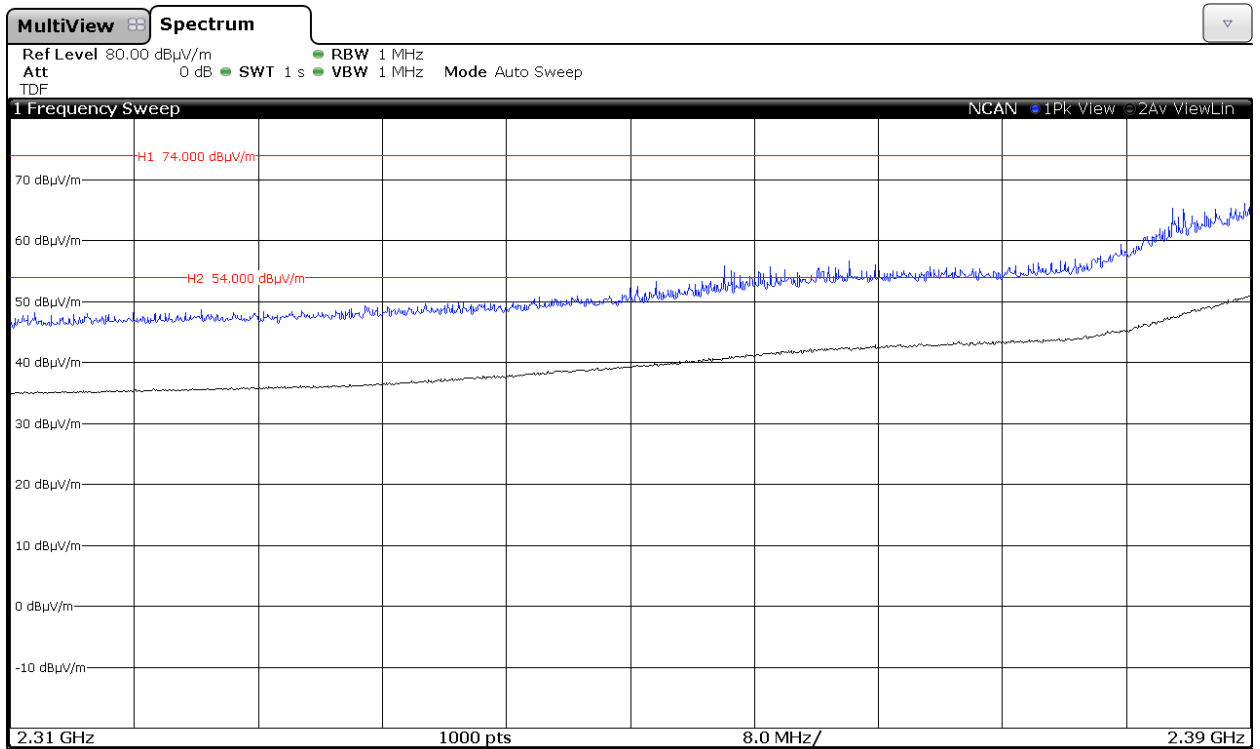


### CHANNEL 5 (2432 MHz).

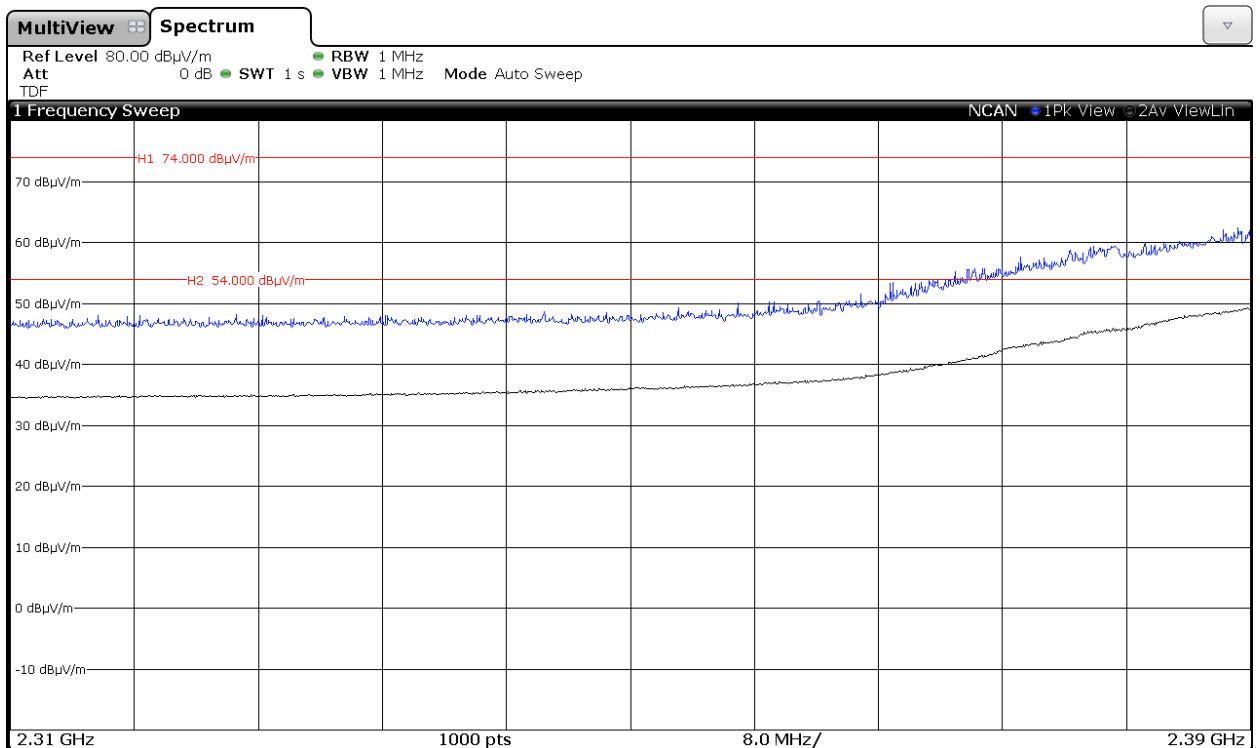
#### Chain A



### Chain B

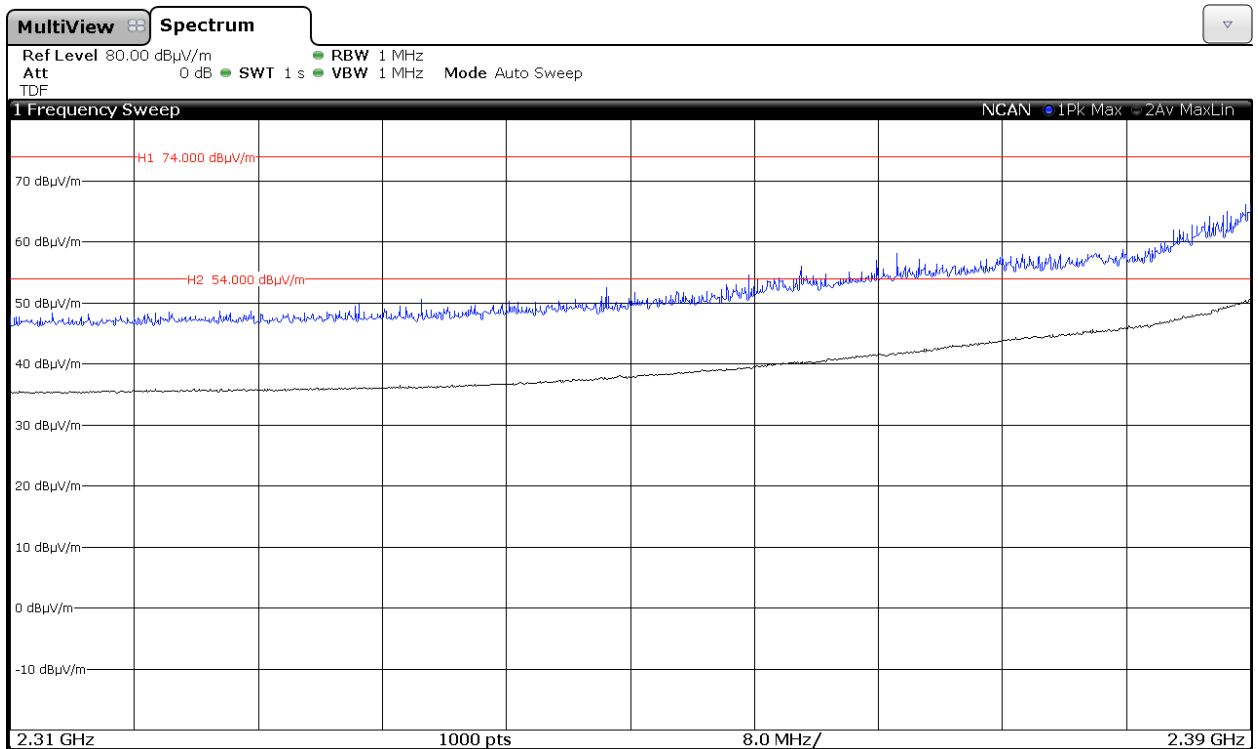


### Chain A+B

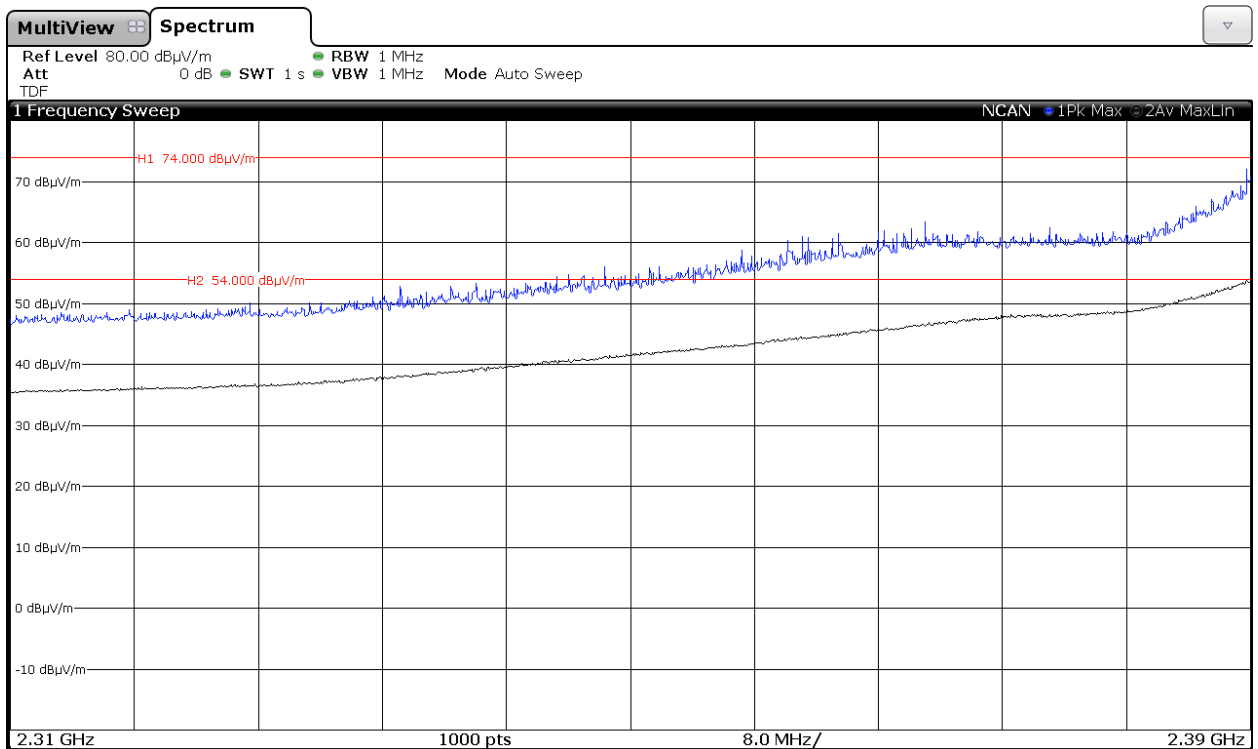


## CHANNEL 6 (2437 MHz).

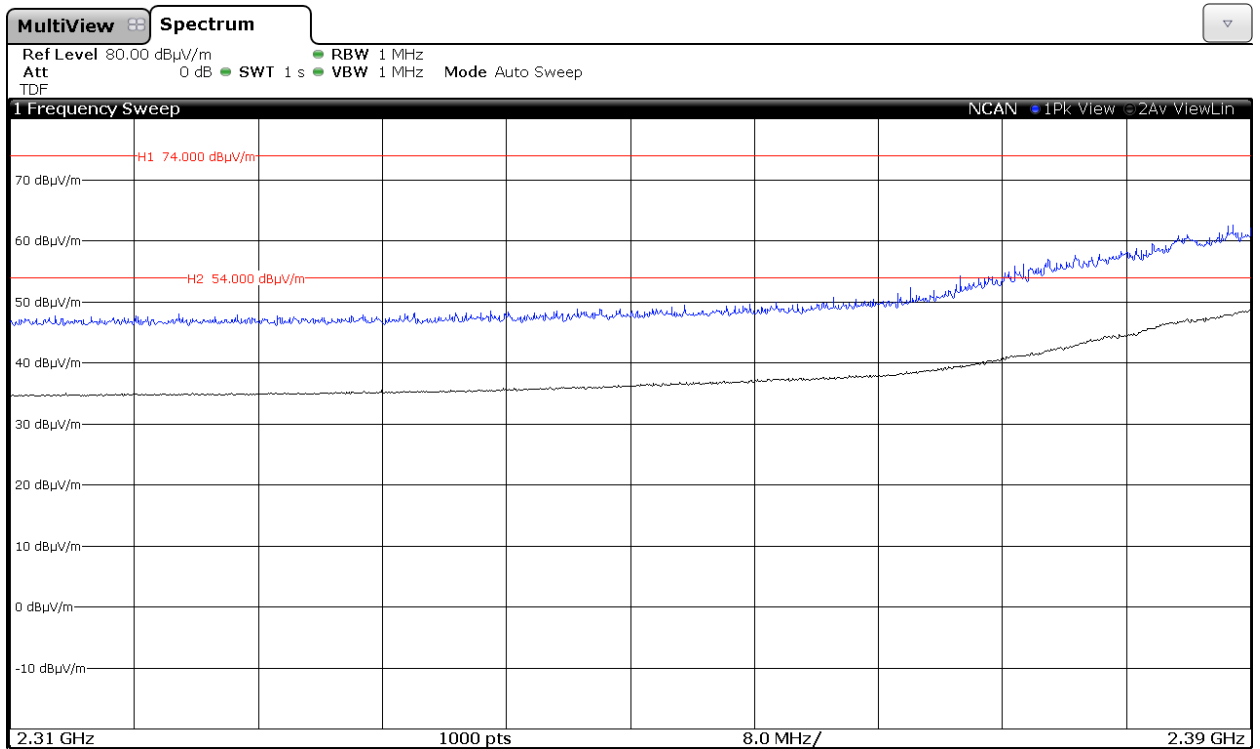
### Chain A



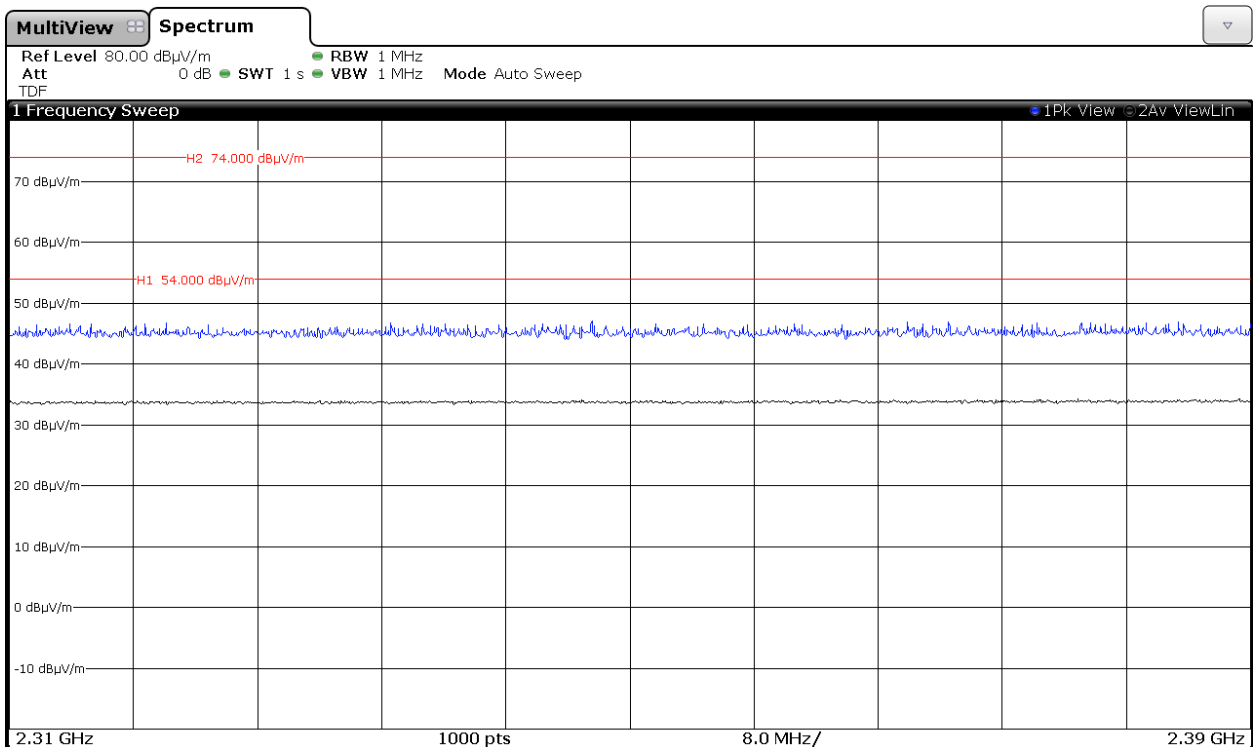
### Chain B



### Chain A+B

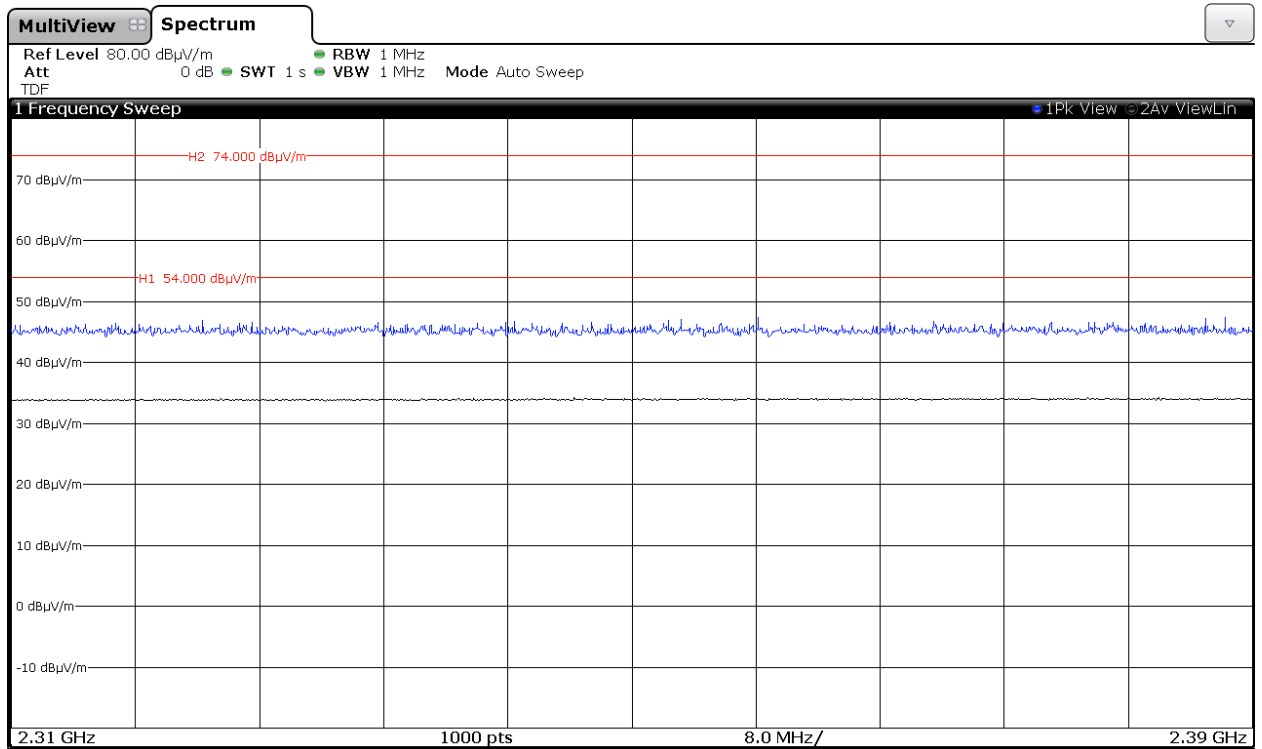


### CHANNEL 10F (2457 MHz).



Note: This plot is valid for Chain A, Chain B and Chain A+B.

**CHANNEL 11F (2462 MHz).**



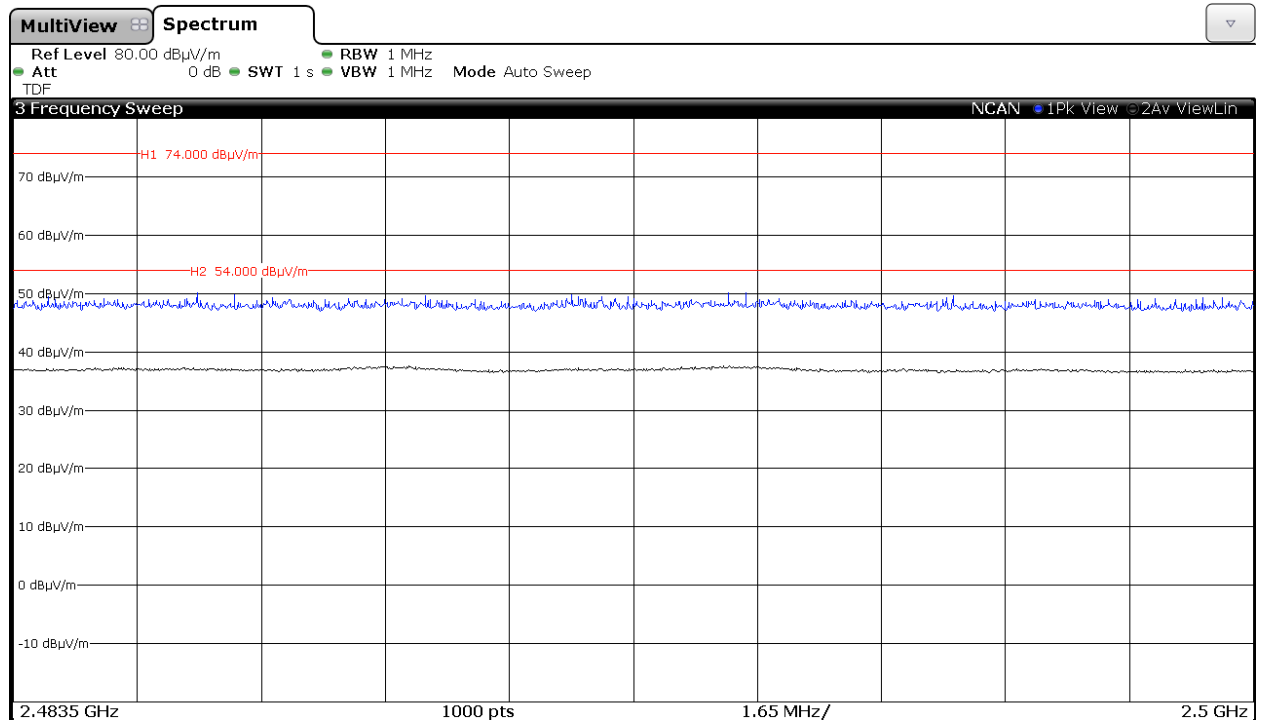
Note: This plot is valid for Chain A, Chain B and Chain A+B.

FREQUENCY RANGE 2.4835 GHz to 2.5 GHz. (RESTRICTED BAND)

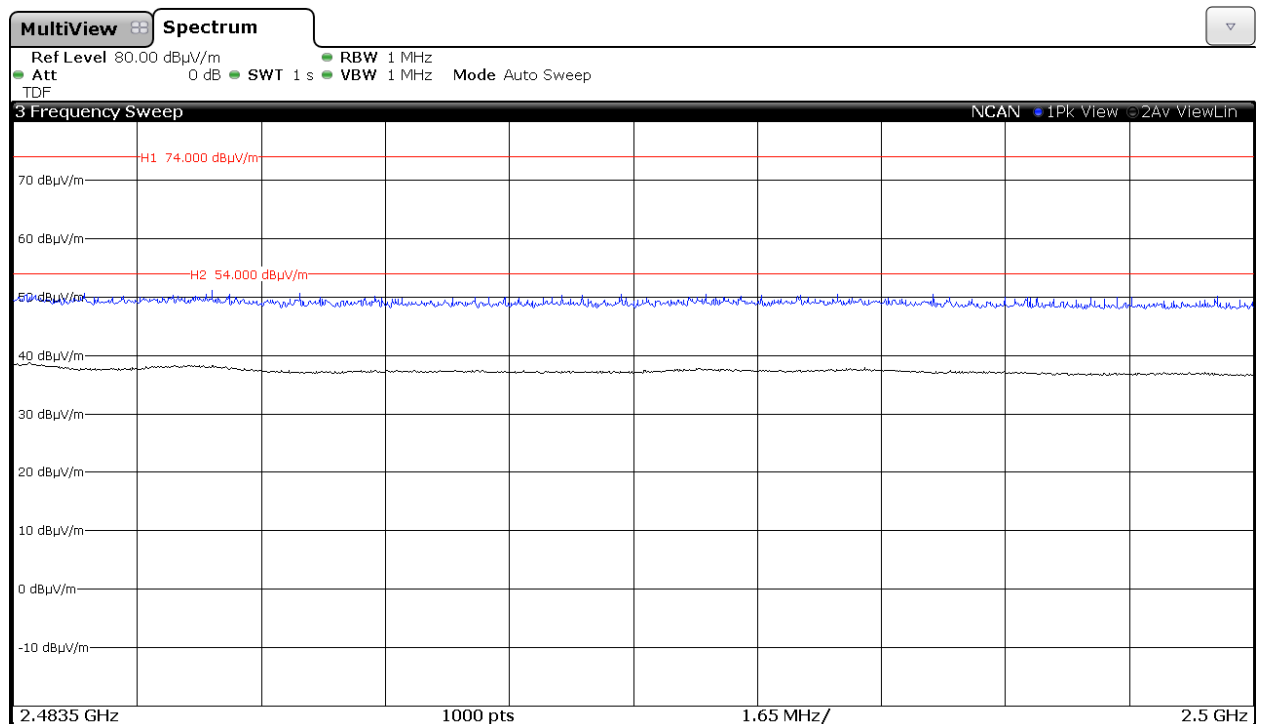
1. WiFi 2.4GHz 802.11 b mode

**CHANNEL 1 (2412 MHz).**

**Chain A**



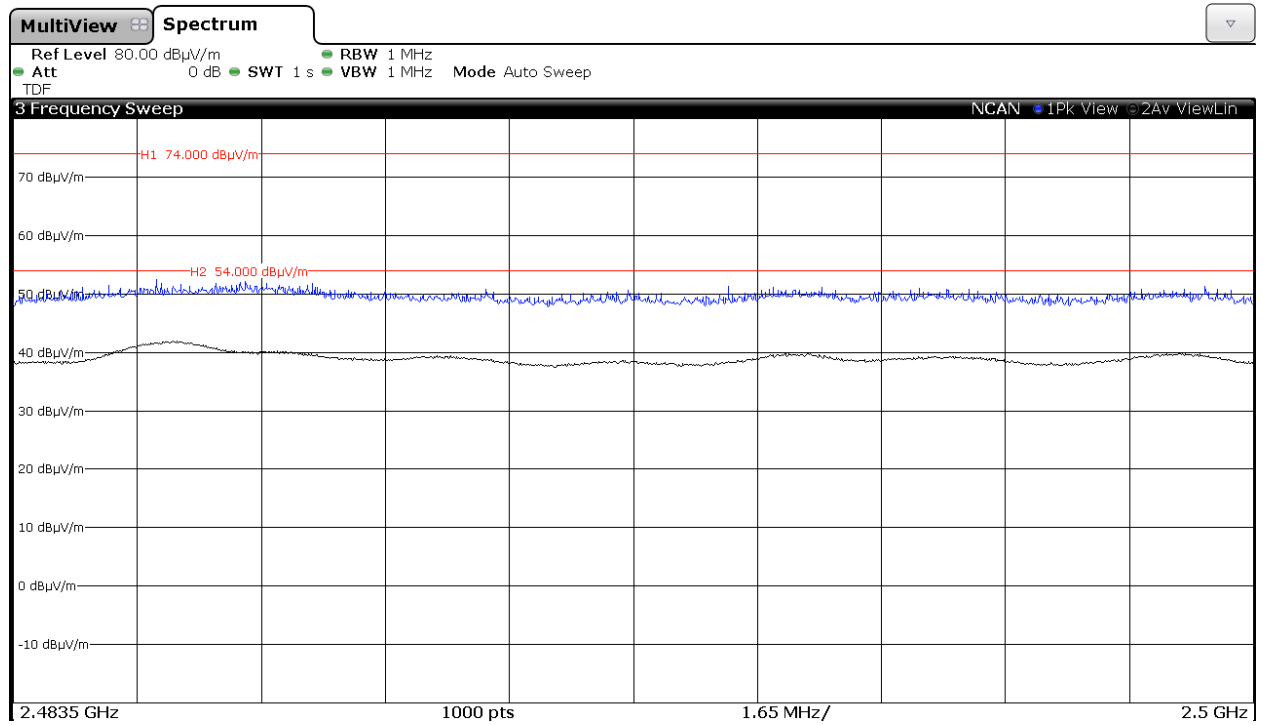
**Chain B**



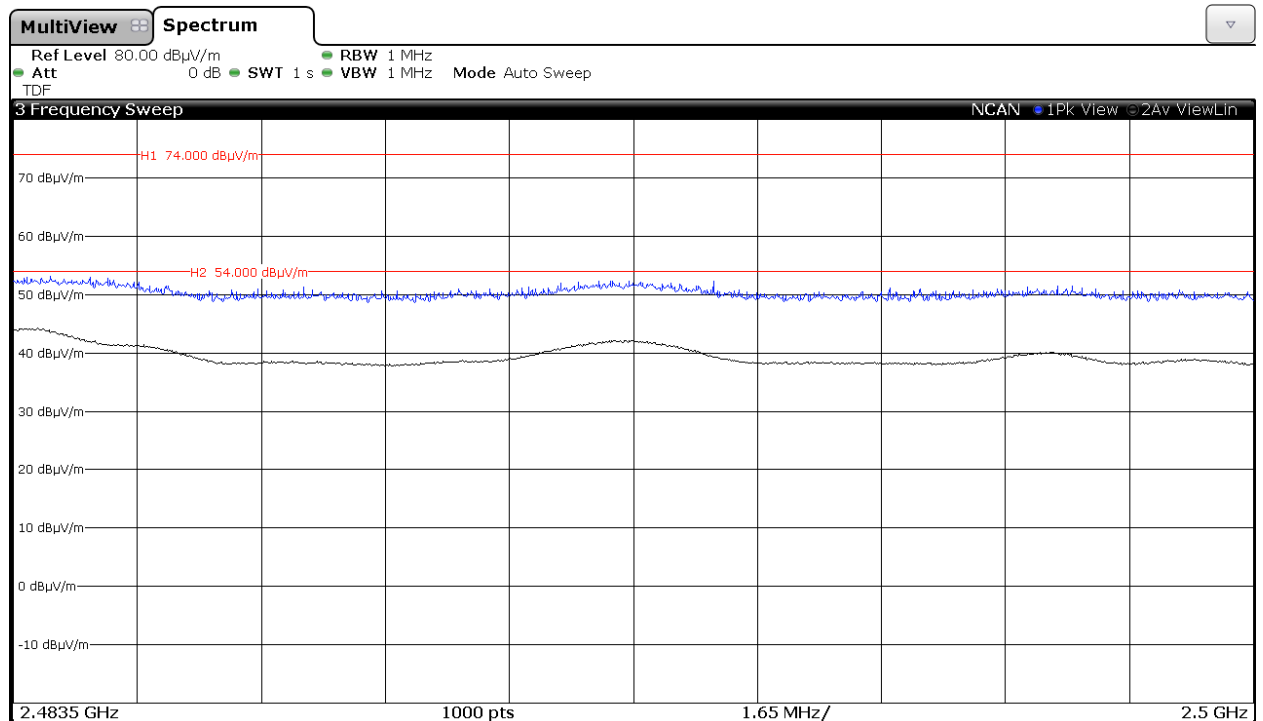


### CHANNEL 6 (2437 MHz).

#### Chain A

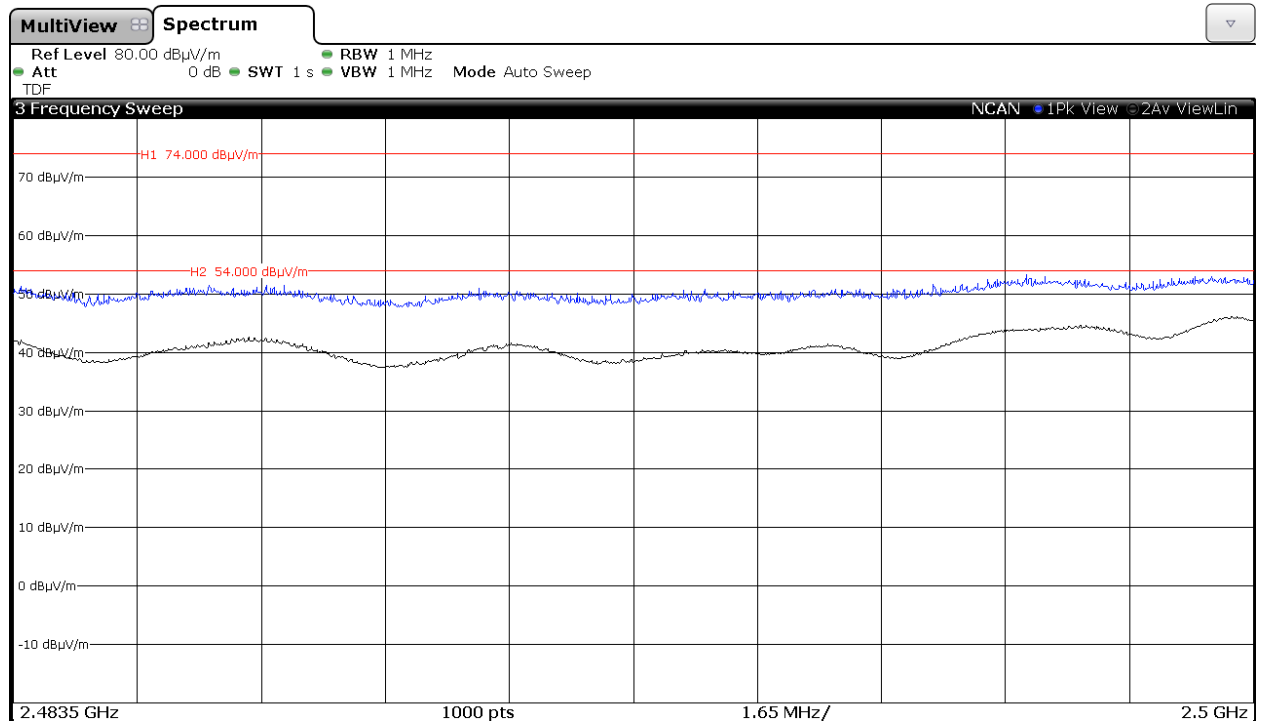


#### Chain B

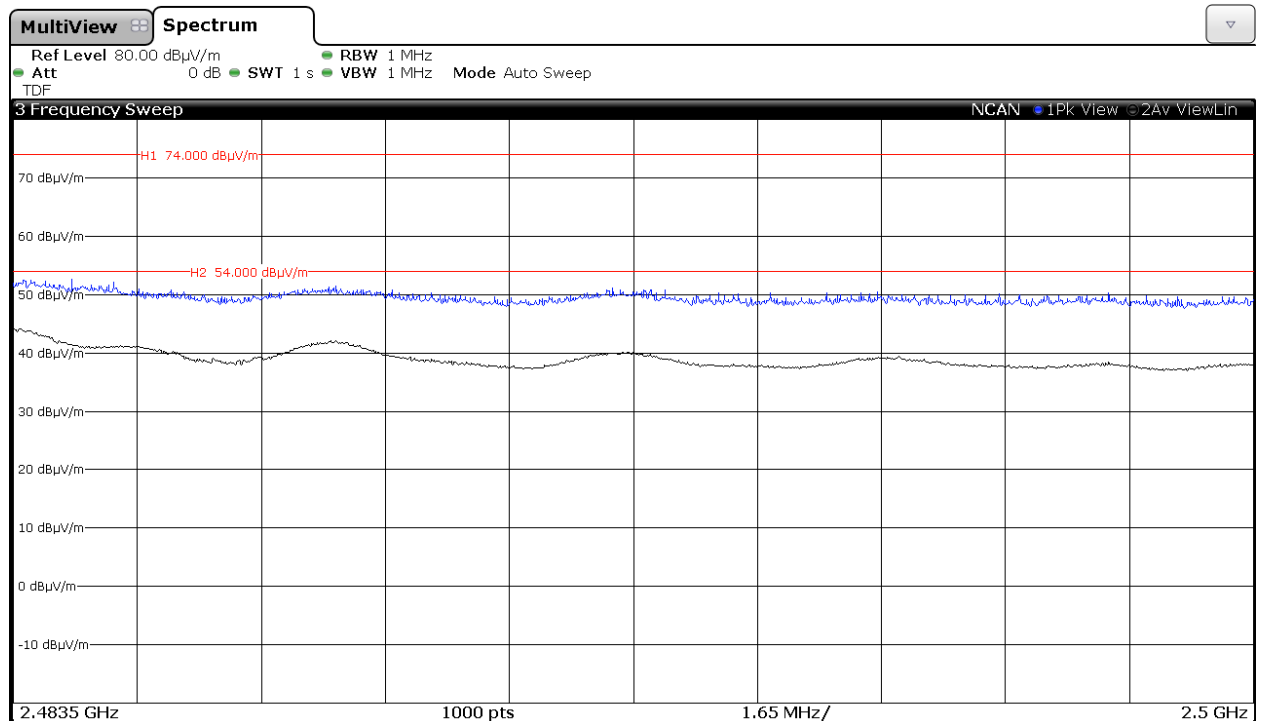


### CHANNEL 11 (2462 MHz).

#### Chain A

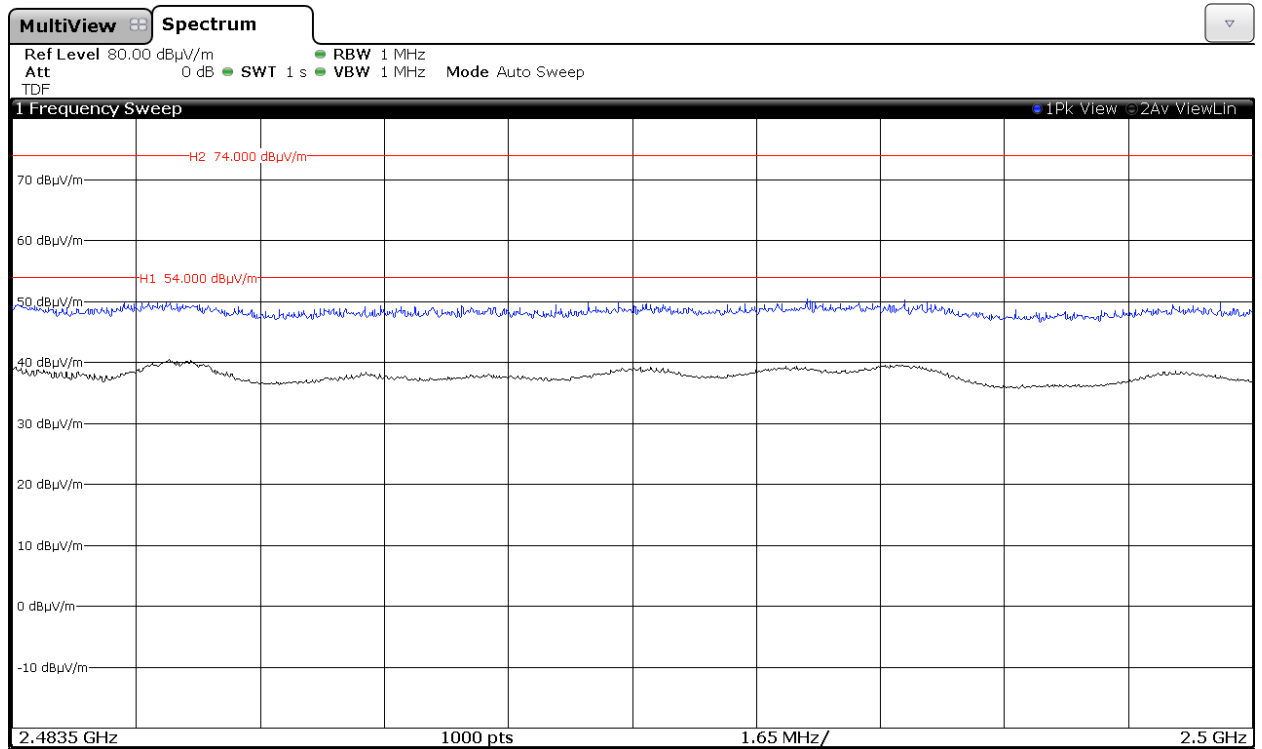


#### Chain B

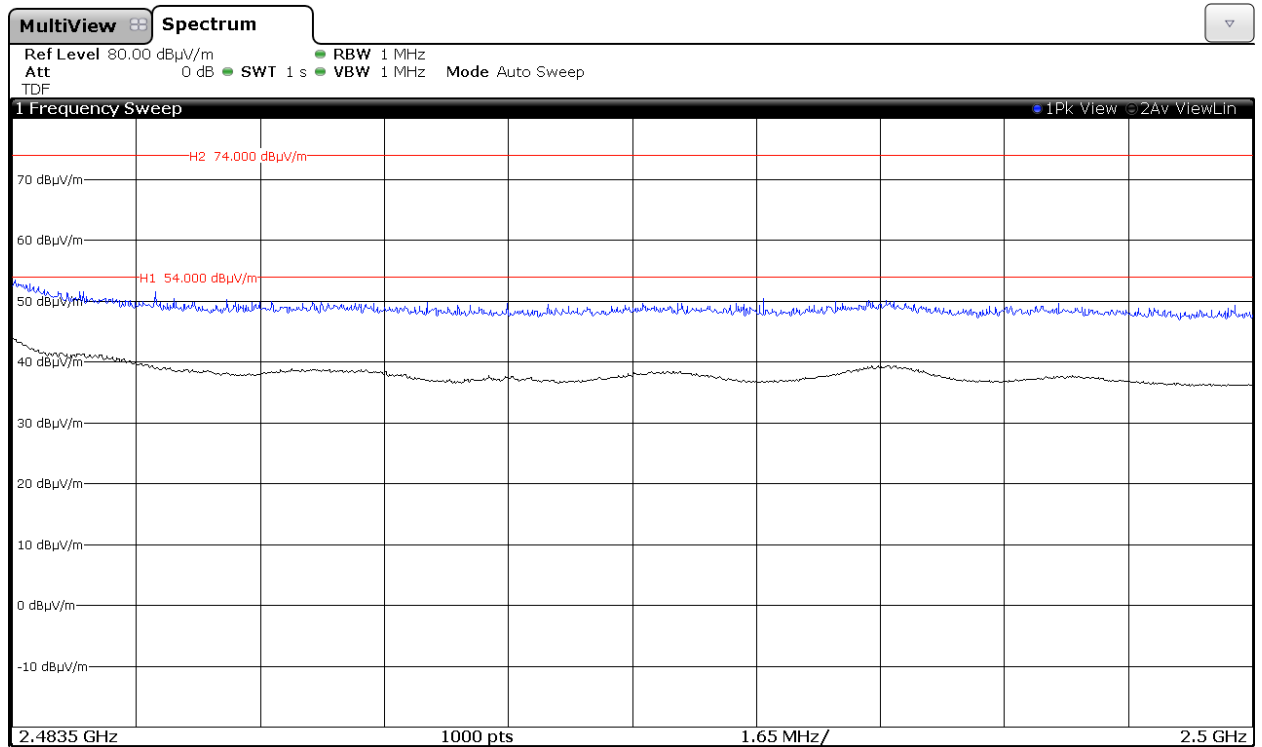


### CHANNEL 12 (2467 MHz).

#### Chain A

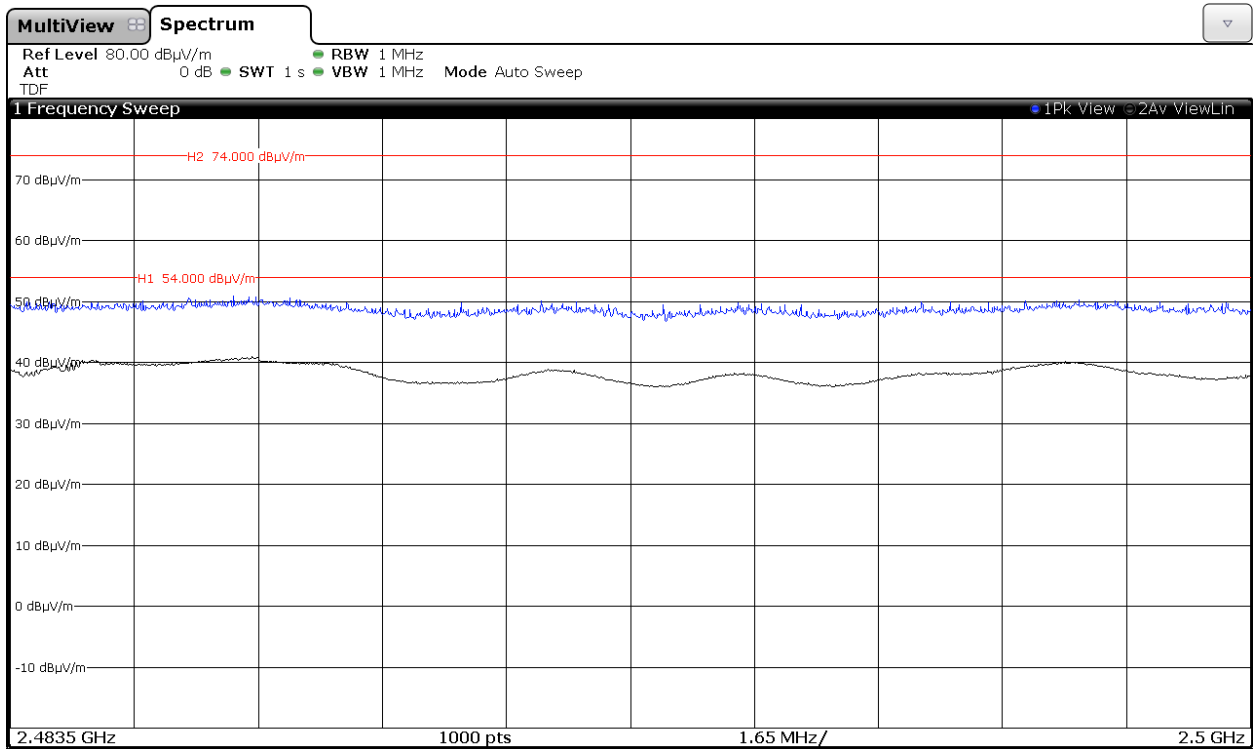


#### Chain B

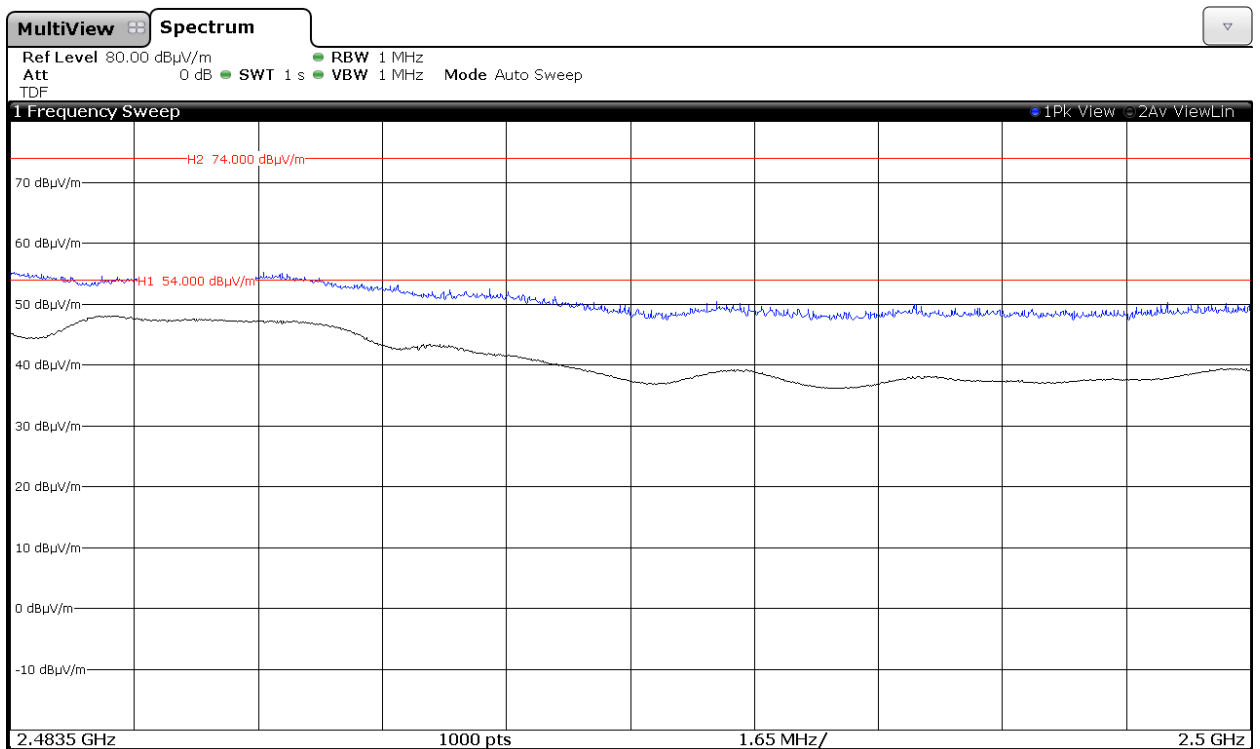


### CHANNEL 13 (2472 MHz).

#### Chain A



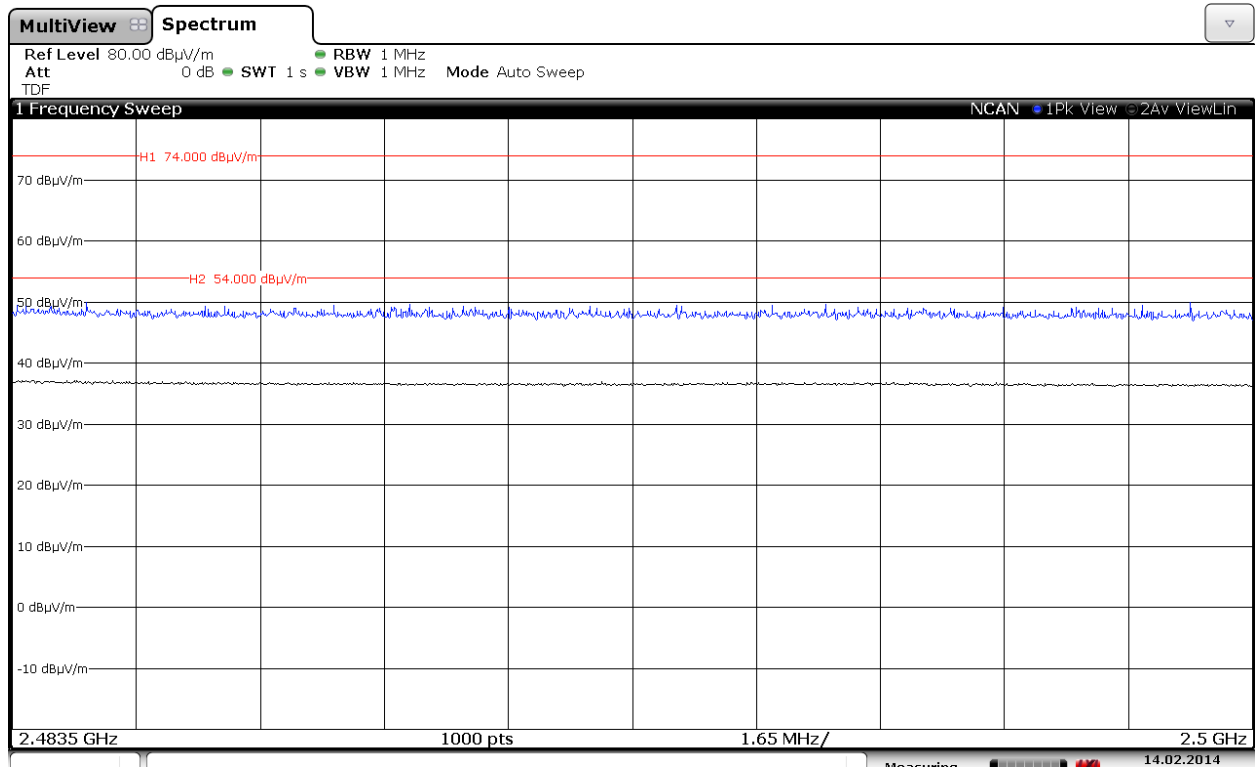
#### Chain B



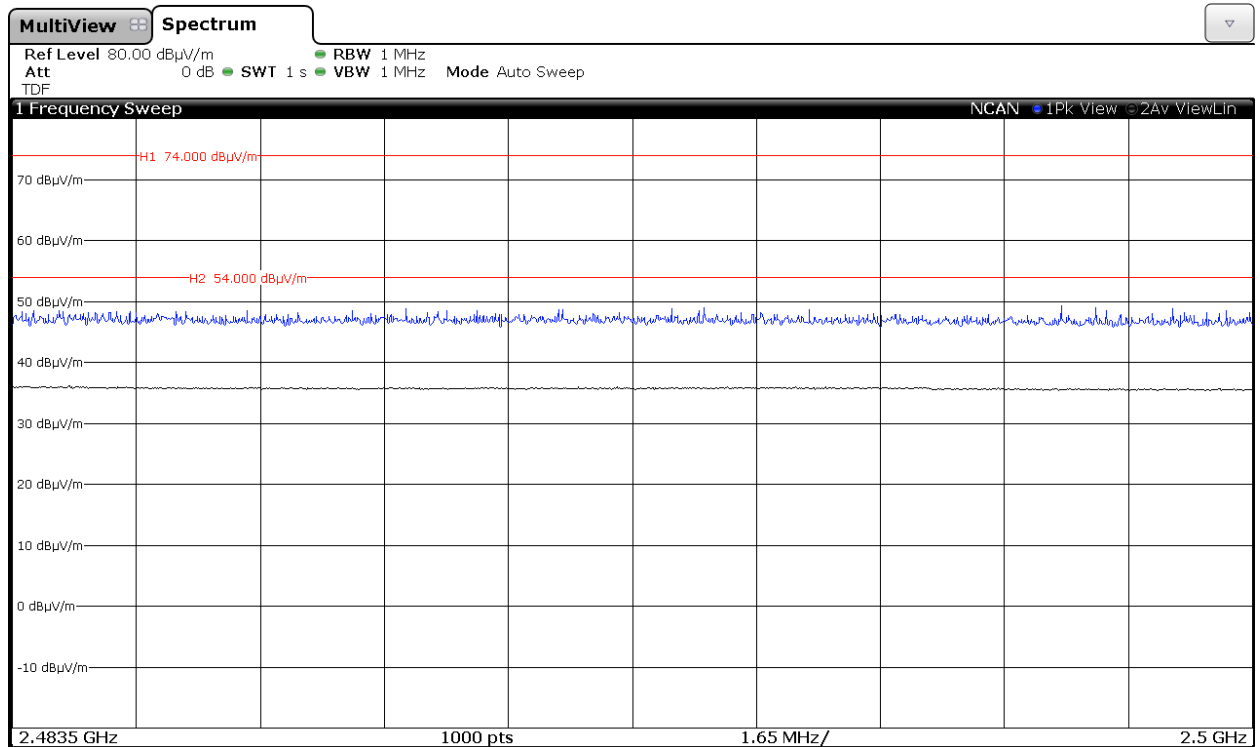
## 2. WiFi 2.4GHz 802.11 g mode

### CHANNEL 1 (2412 MHz).

#### Chain A

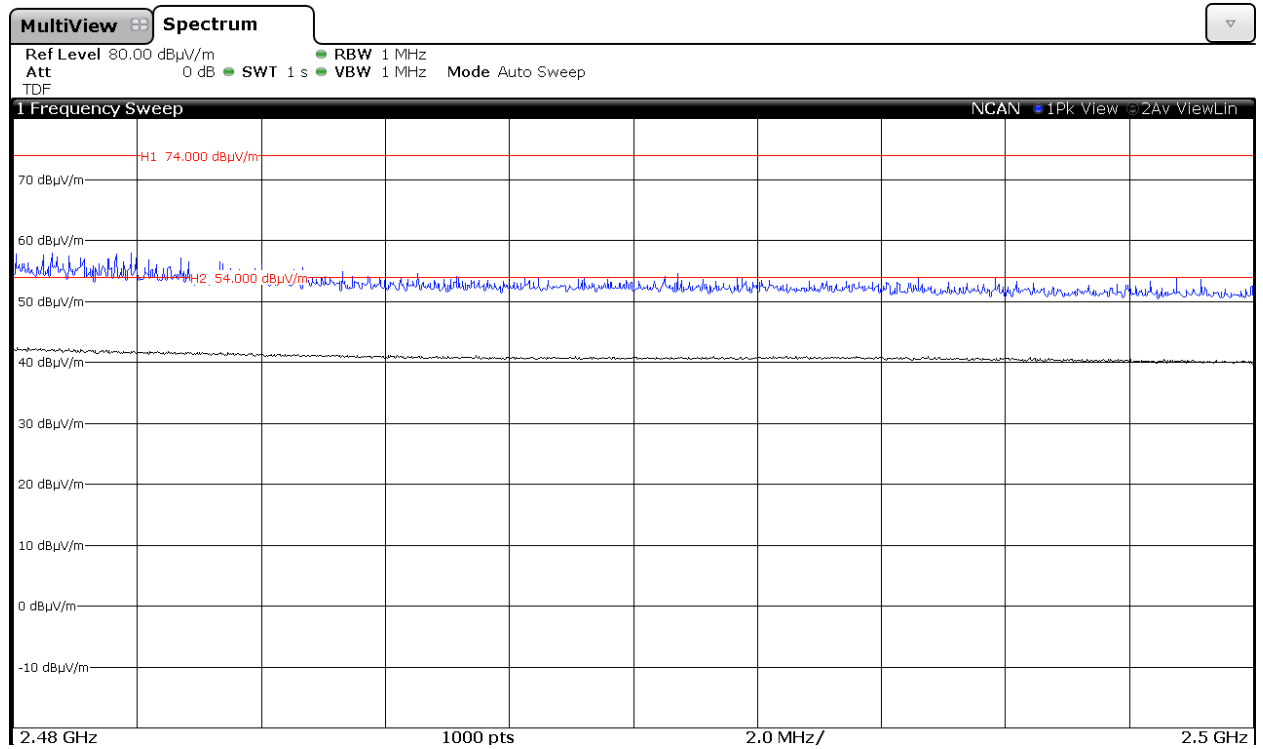


#### Chain B

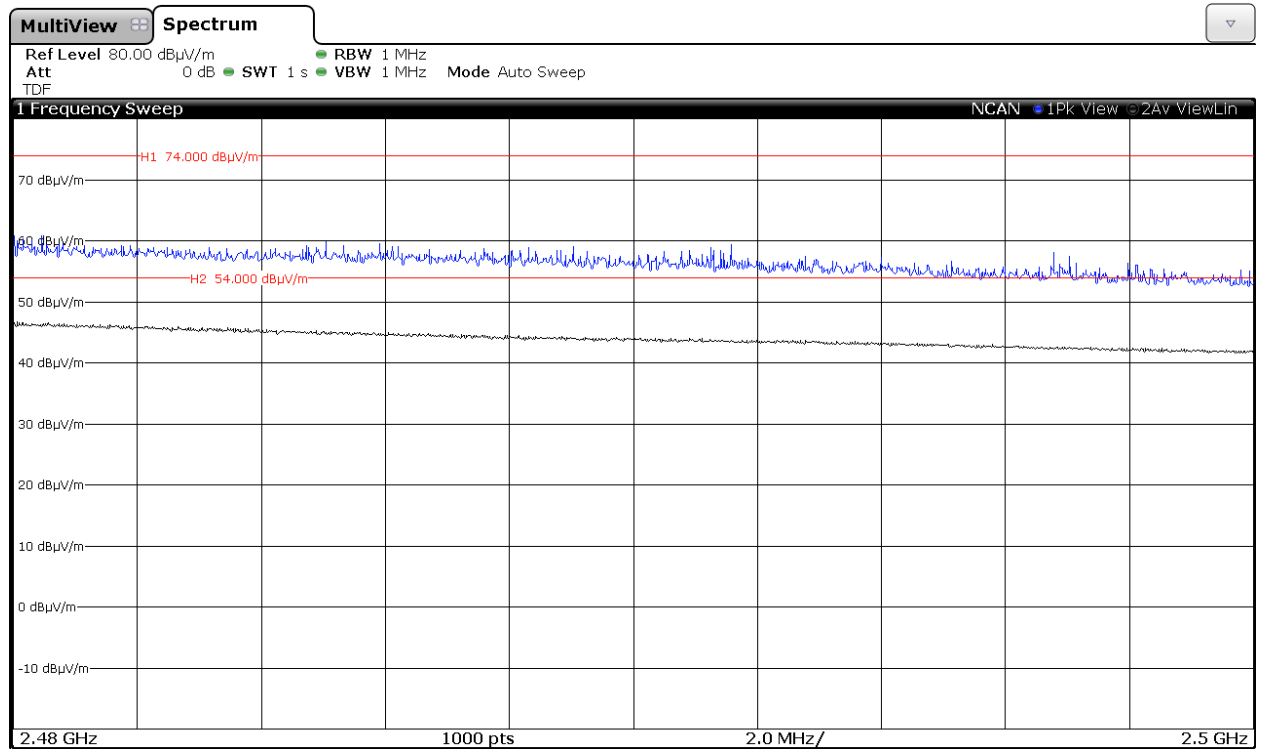


### CHANNEL 6 (2437 MHz).

#### Chain A

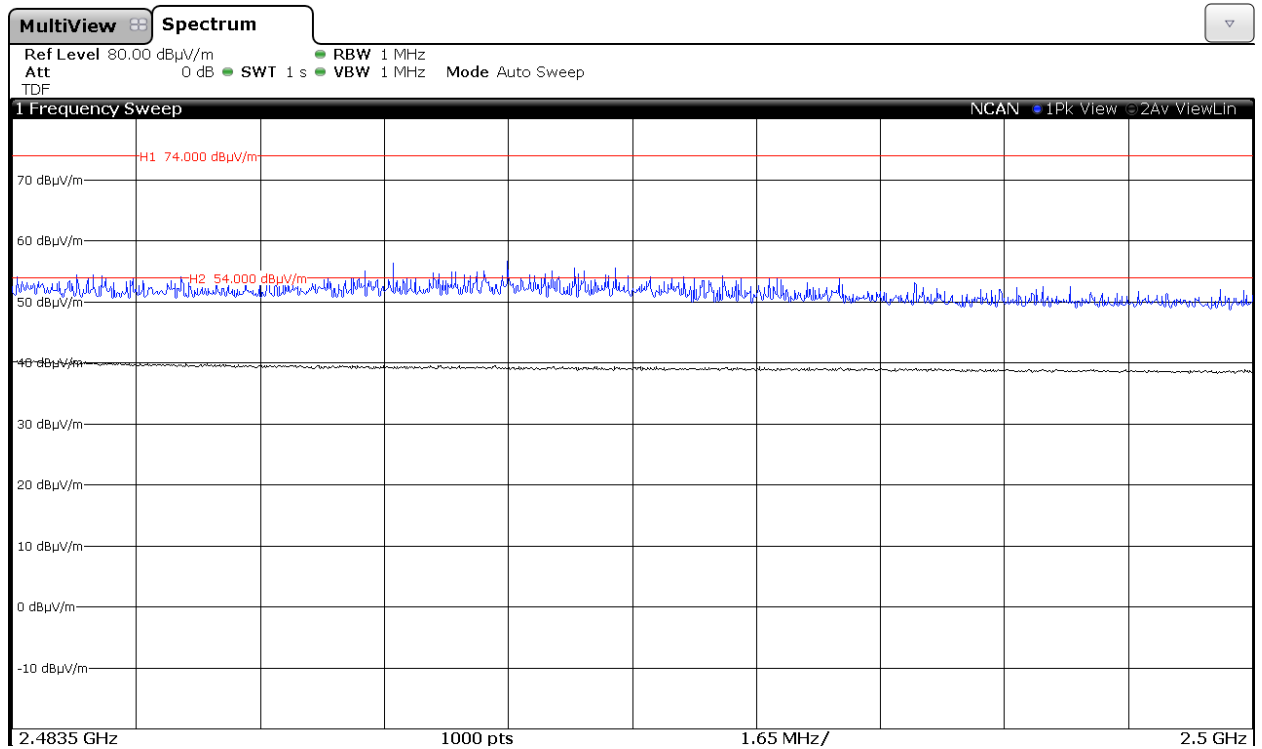


#### Chain B

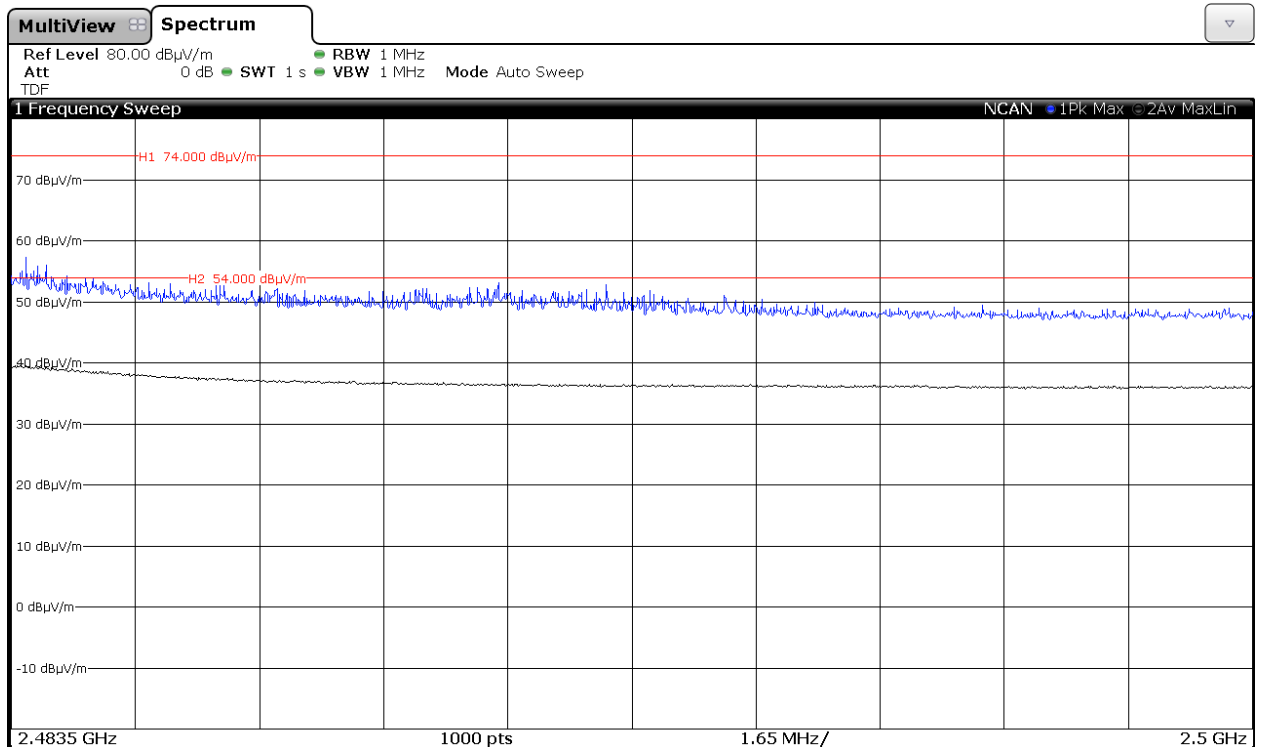


**CHANNEL 11 (2462 MHz).**

**Chain A**

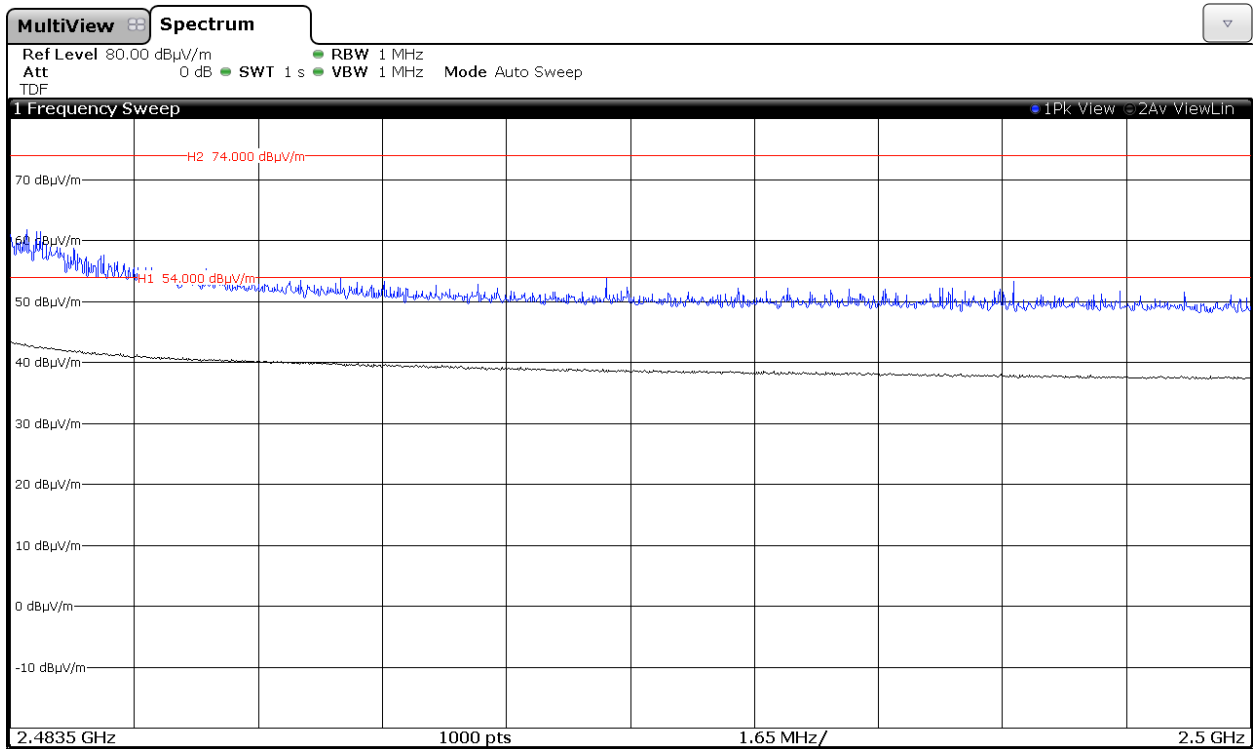


**Chain B**

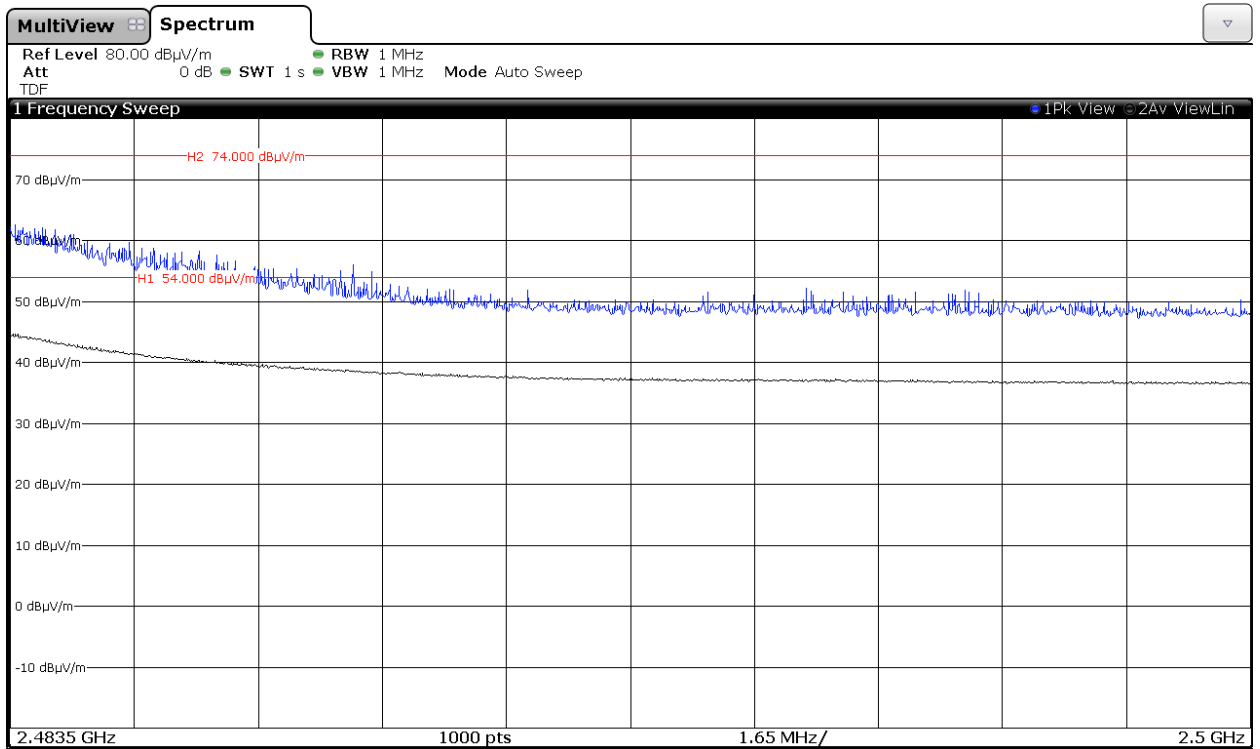


**CHANNEL 12 (2467 MHz).**

**Chain A**



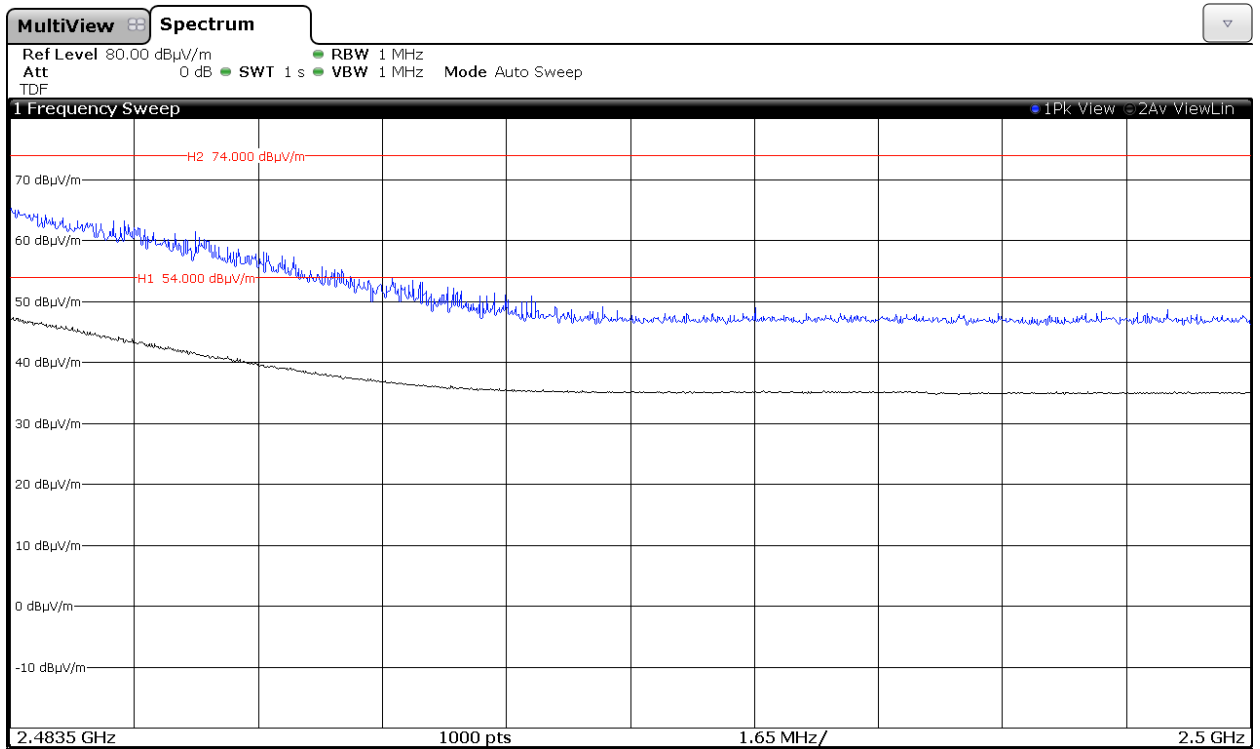
**Chain B**



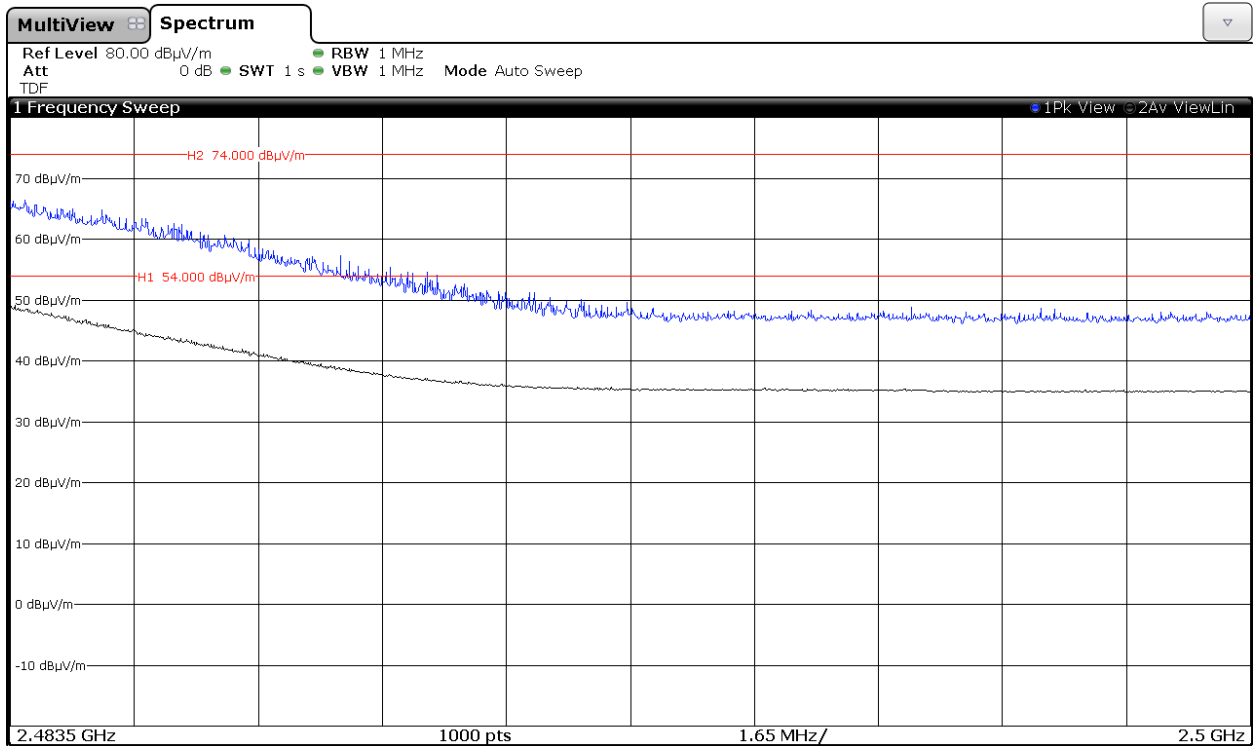


**CHANNEL 13 (2472 MHz).**

**Chain A**



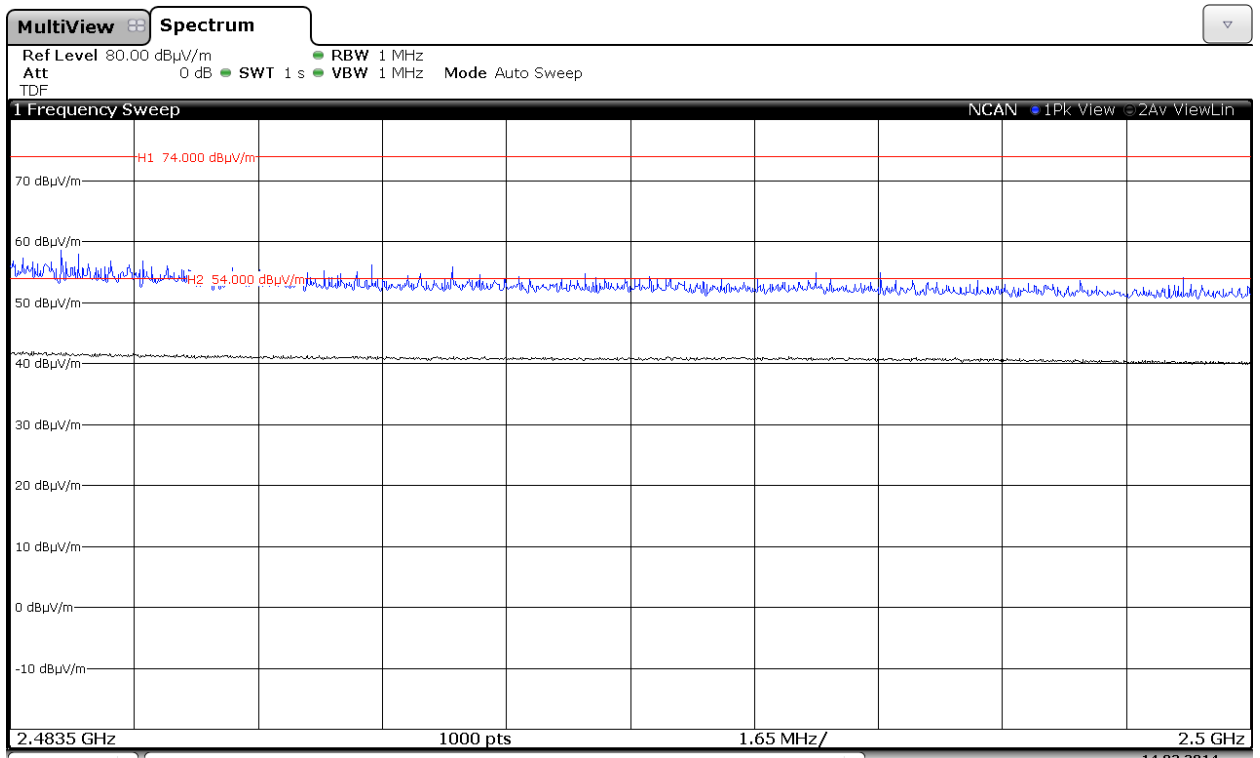
**Chain B**



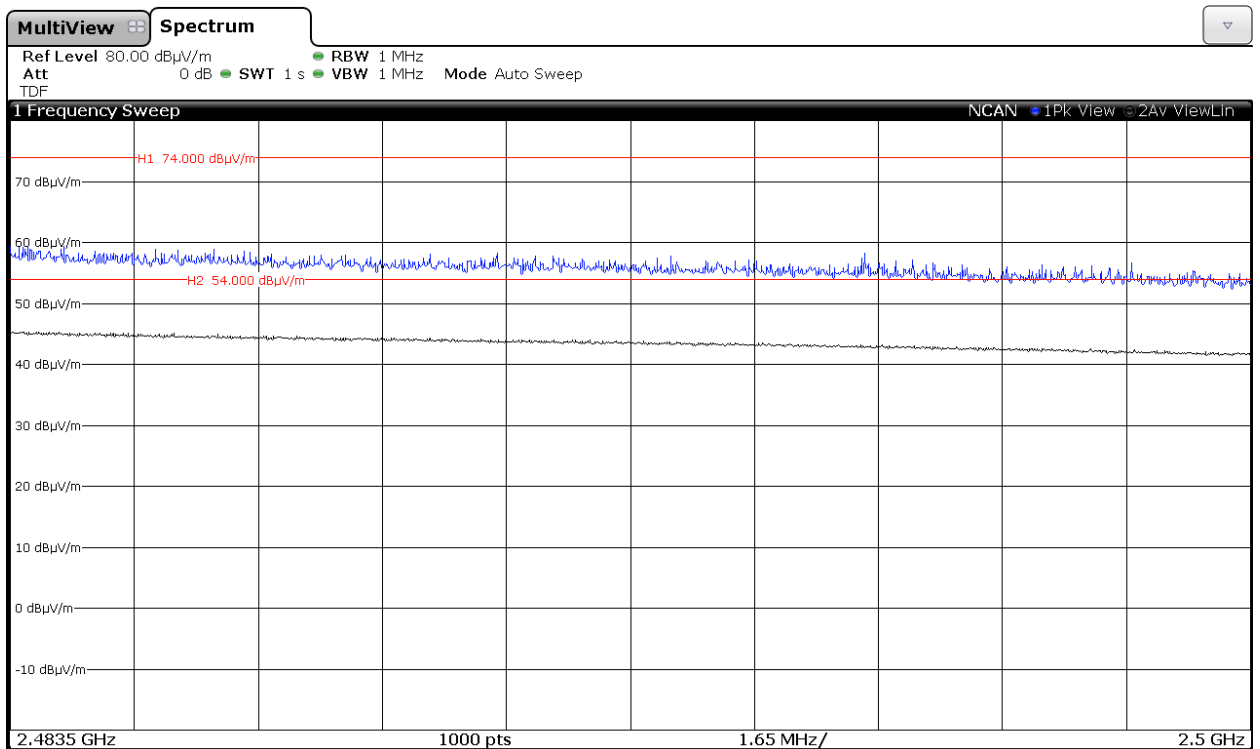
### 3. WiFi 2.4GHz 802.11 n20 mode

#### CHANNEL 6 (2437 MHz).

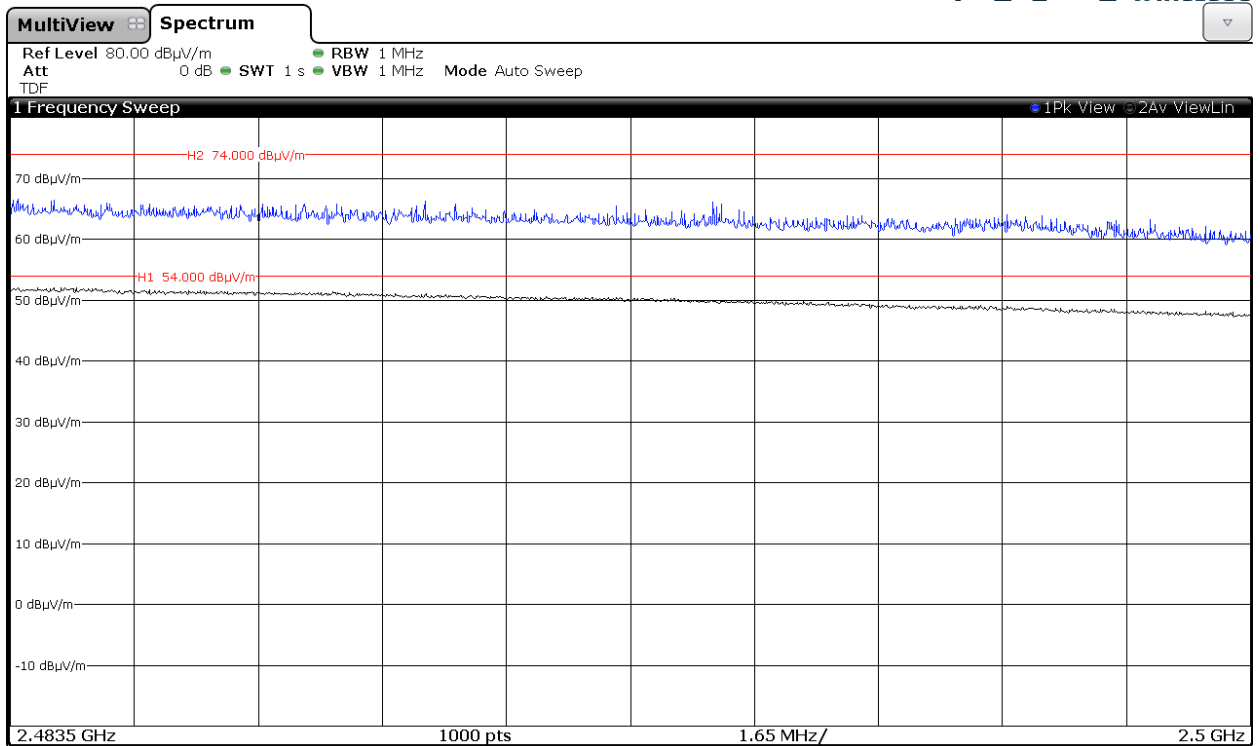
#### Chain A



#### Chain B

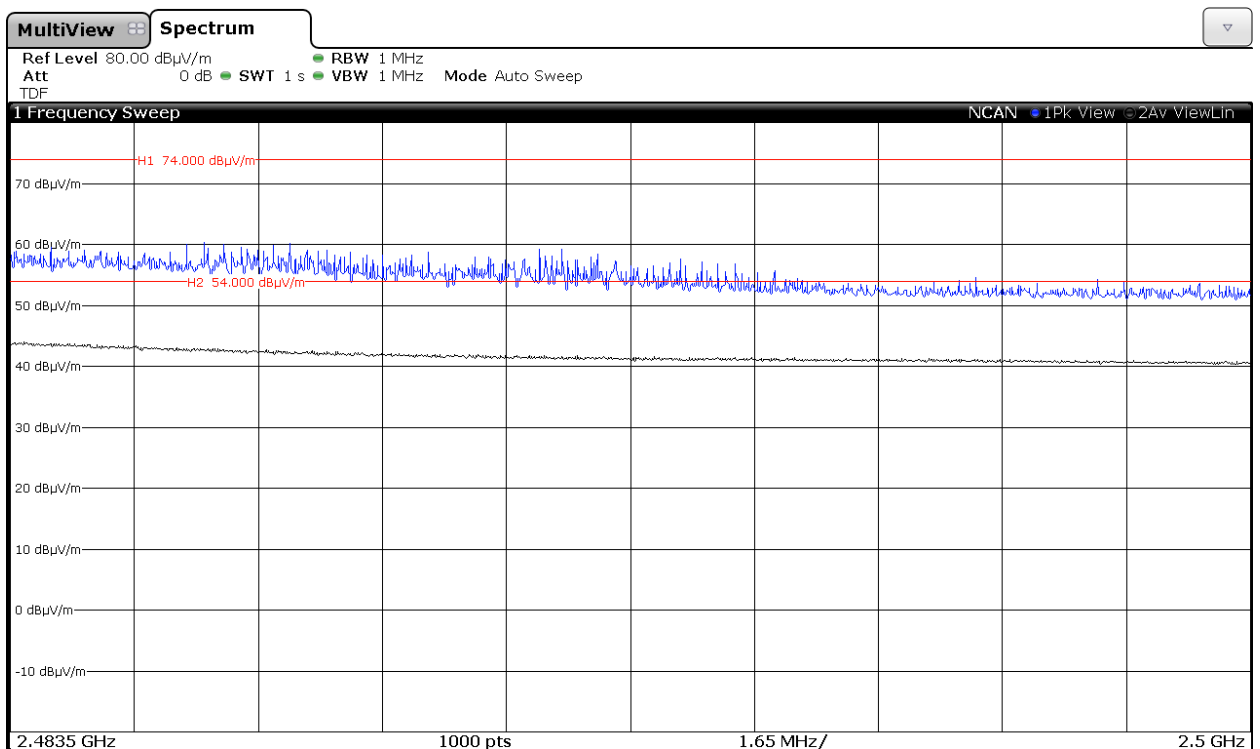


#### Chain A+B

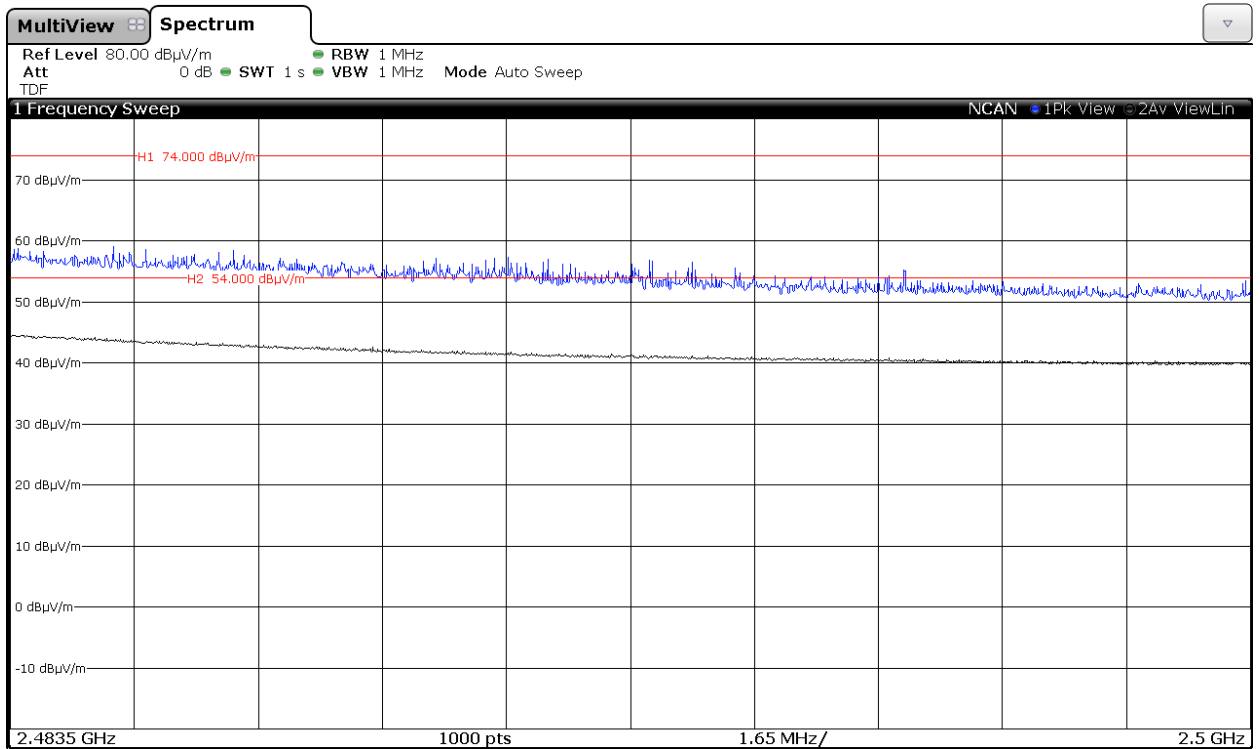


**CHANNEL 10 (2457 MHz).**

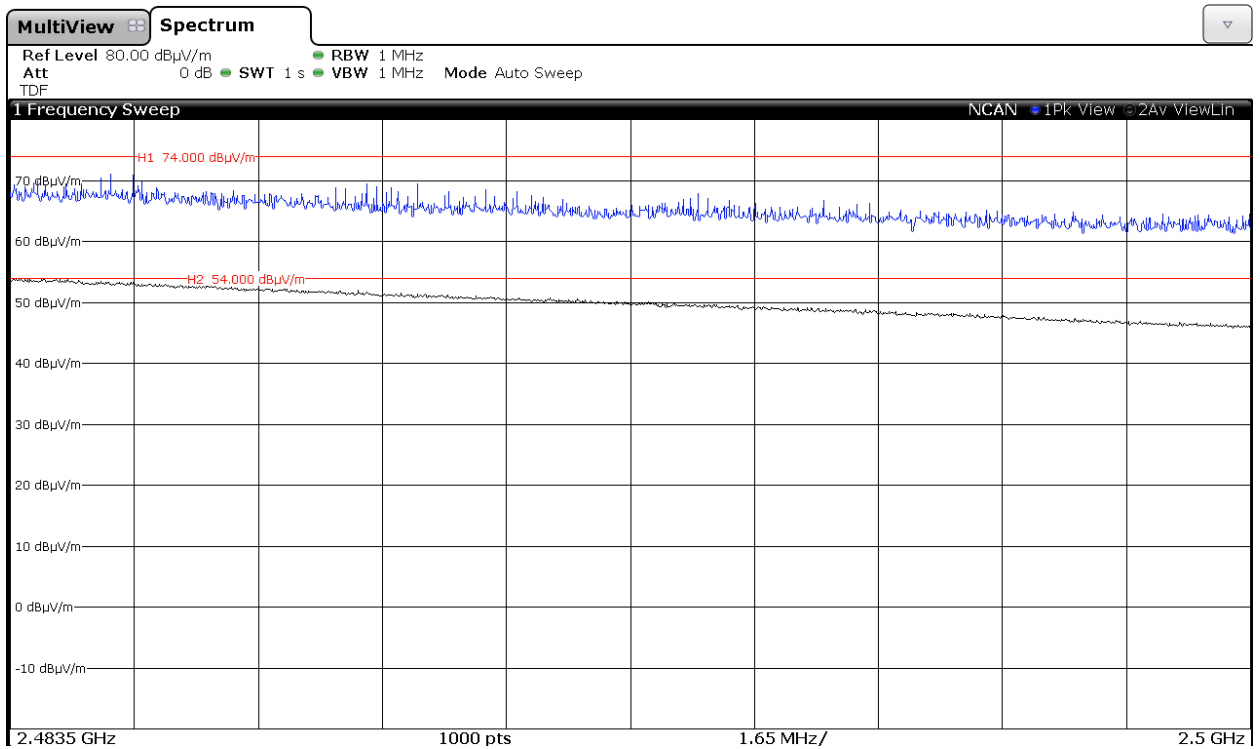
**Chain A**



### Chain B

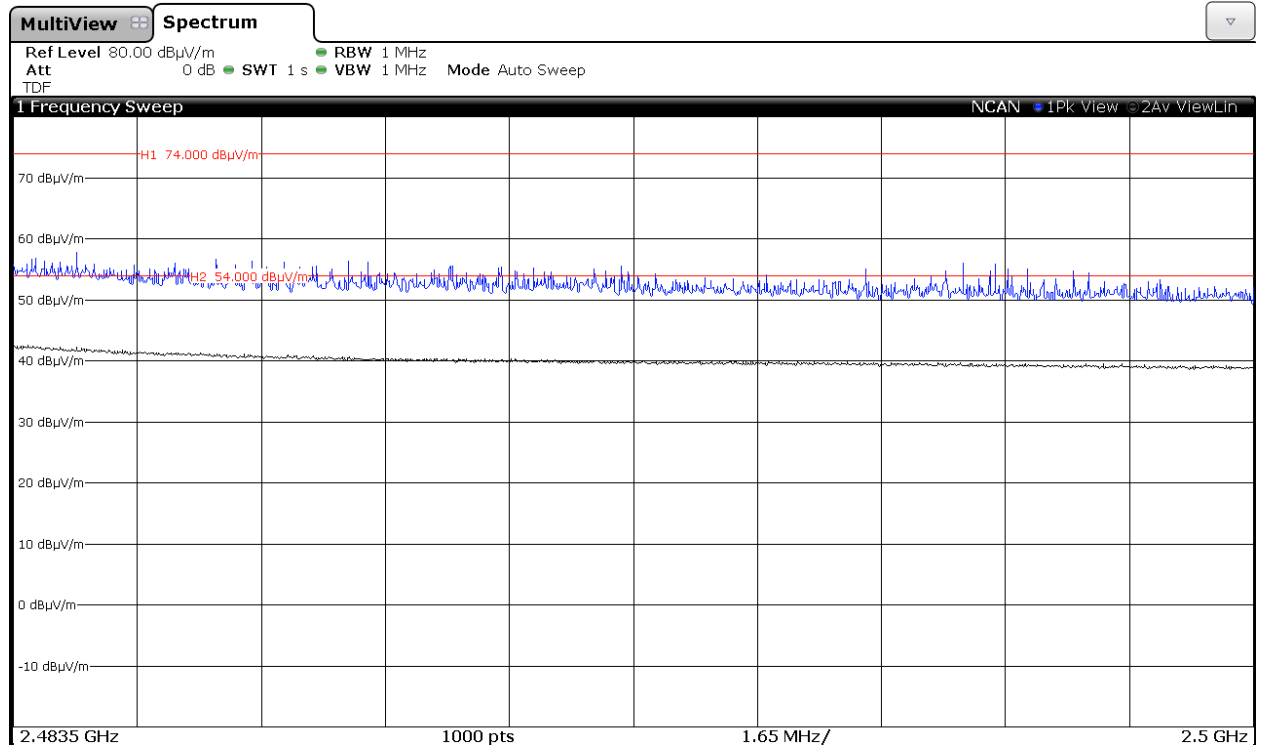


### CHAIN A+B

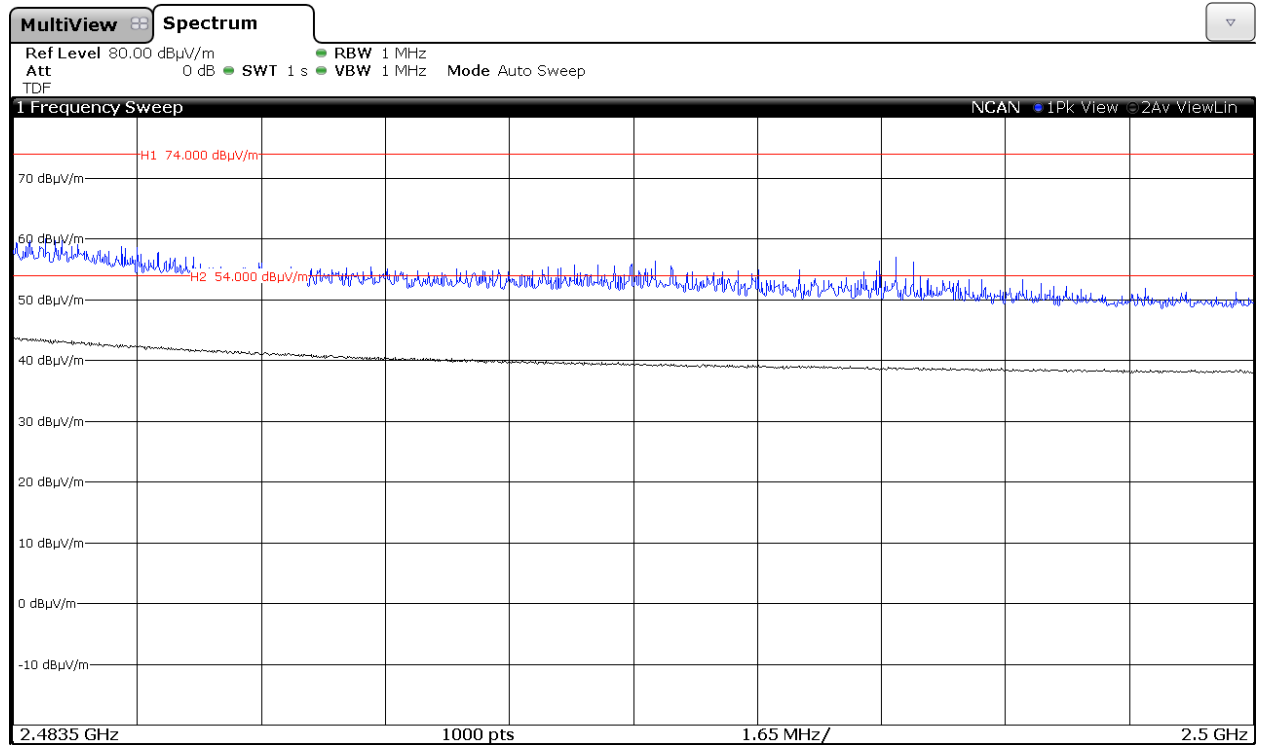


### CHANNEL 11 (2462 MHz).

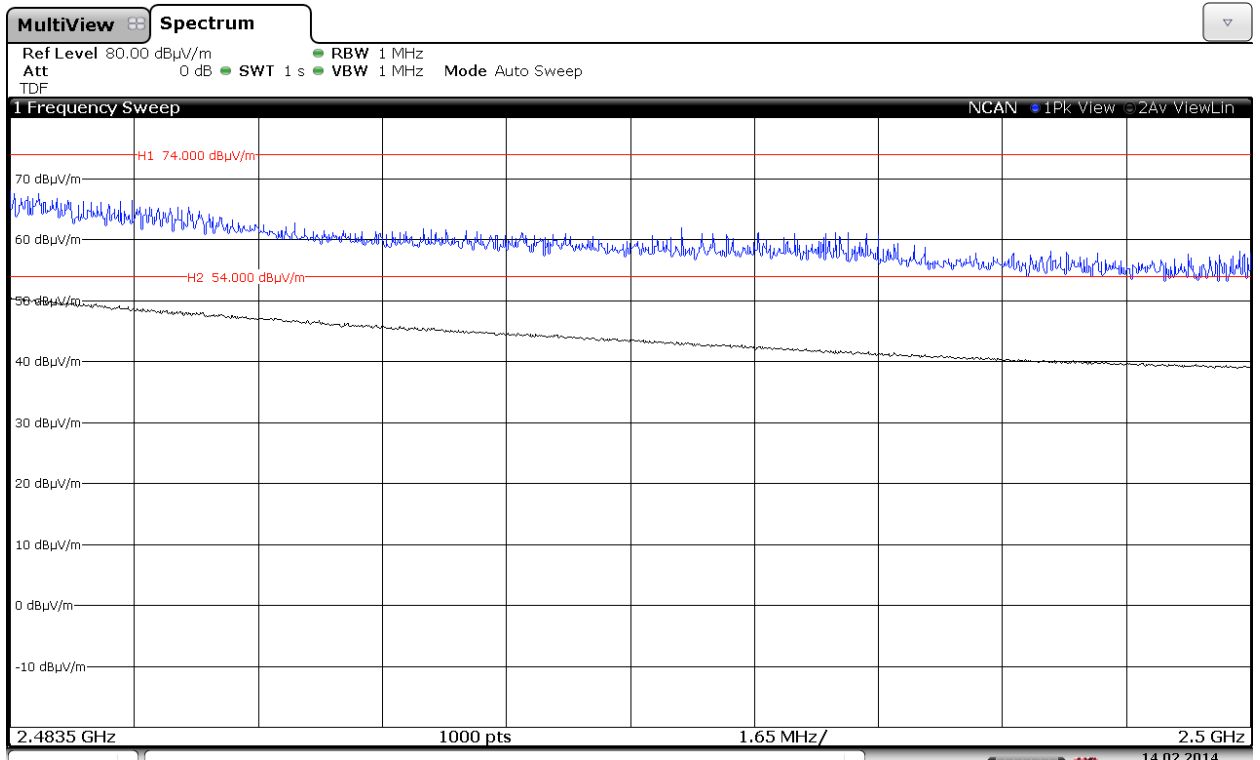
#### Chain A



#### Chain B

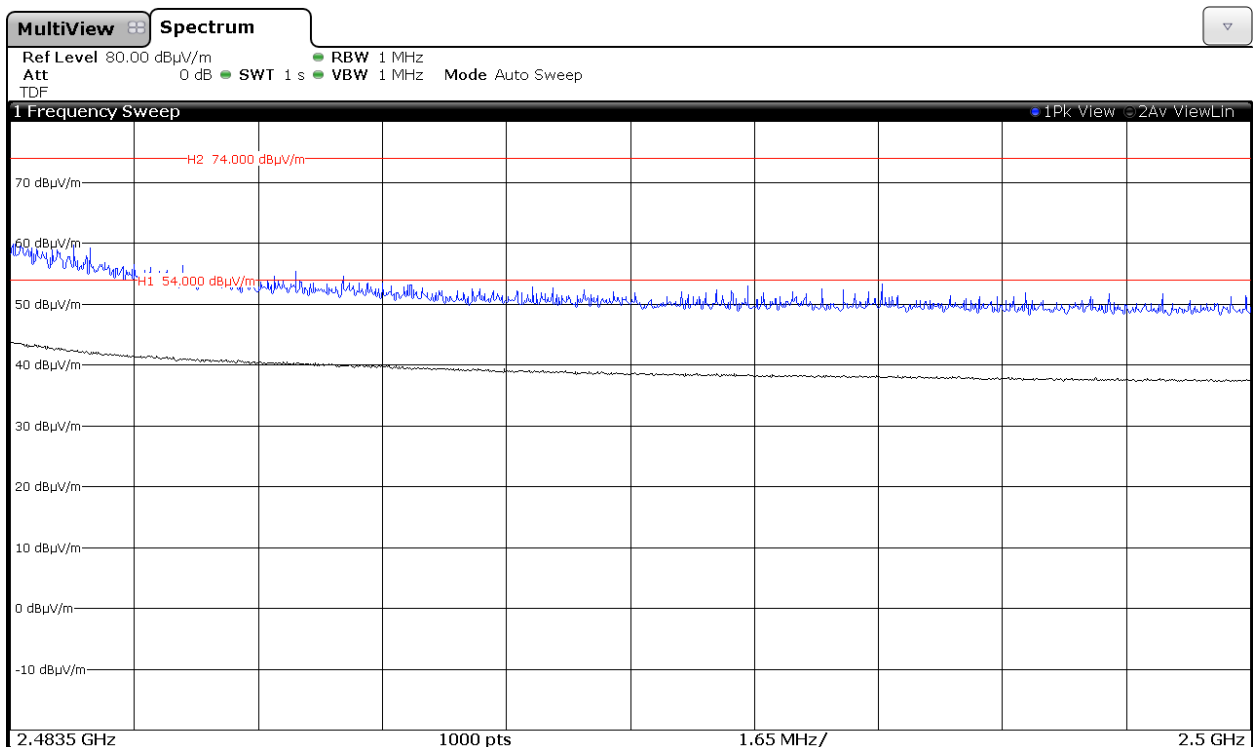


### Chain A+B

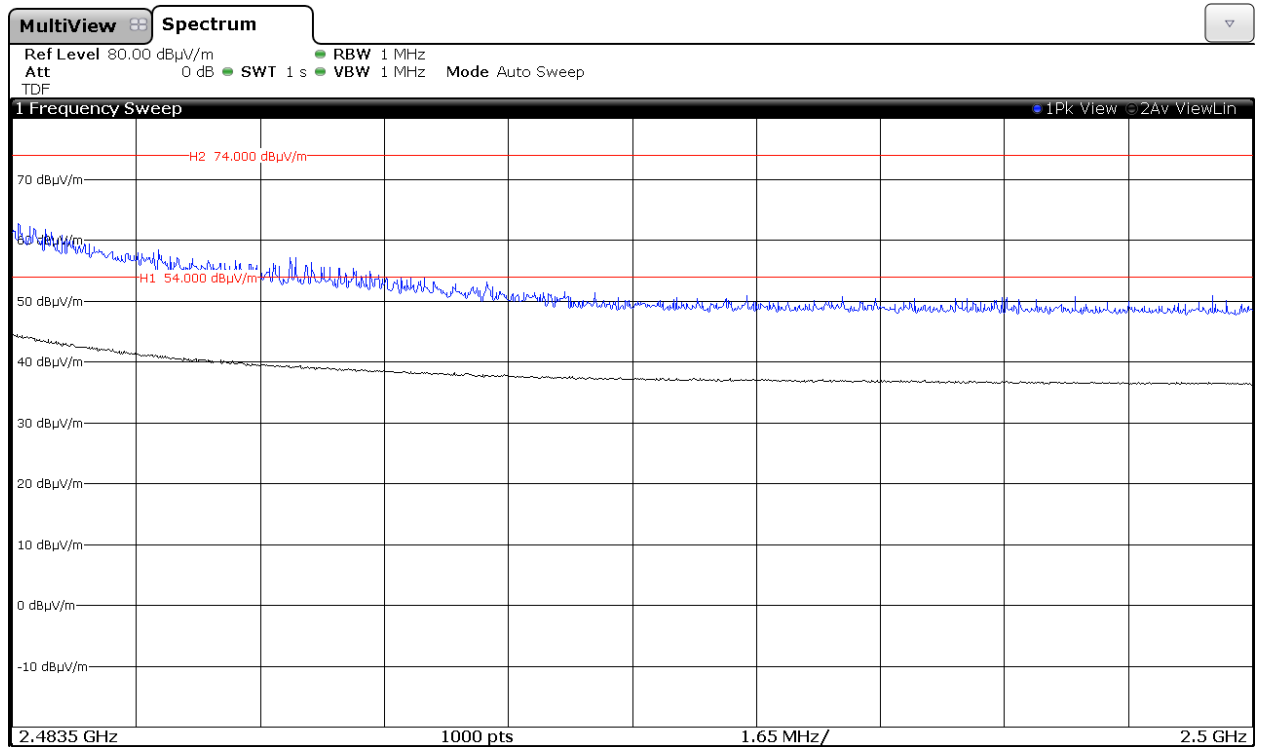


### CHANNEL 12 (2467 MHz).

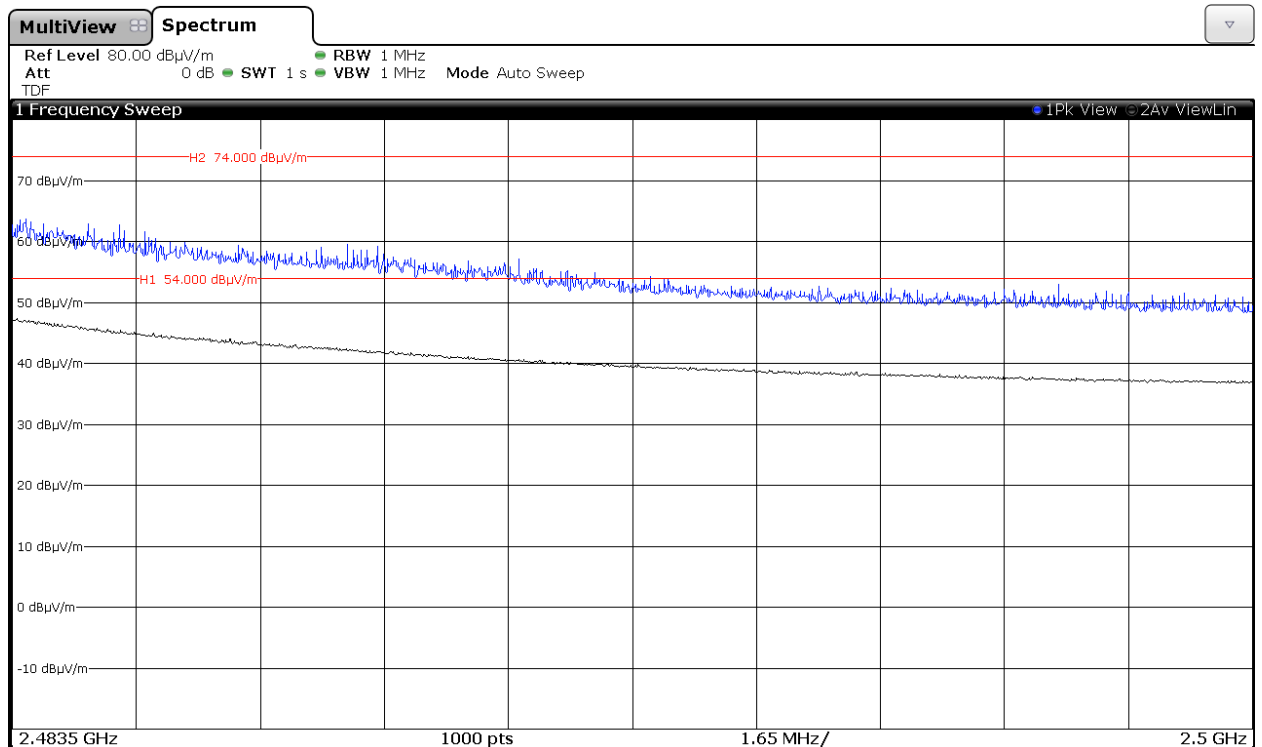
#### Chain A



### Chain B

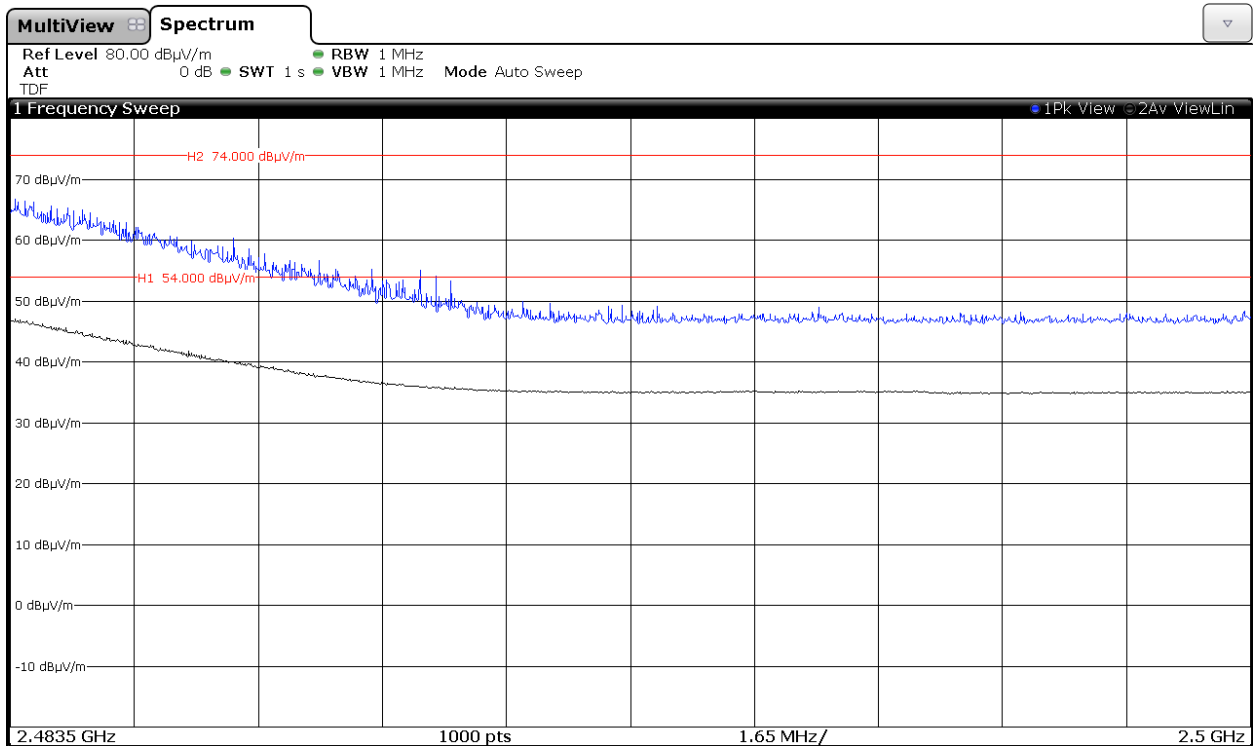


### Chain A+B

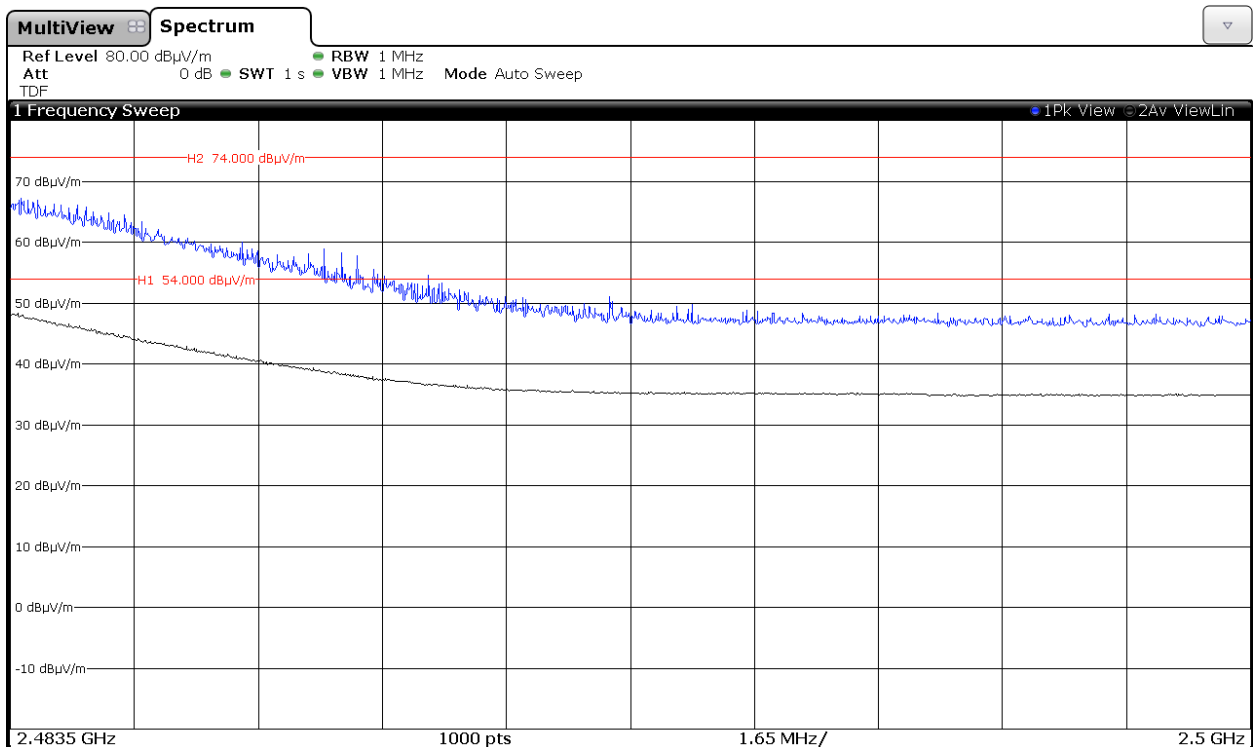


**CHANNEL 13 (2472 MHz).**

**Chain A**

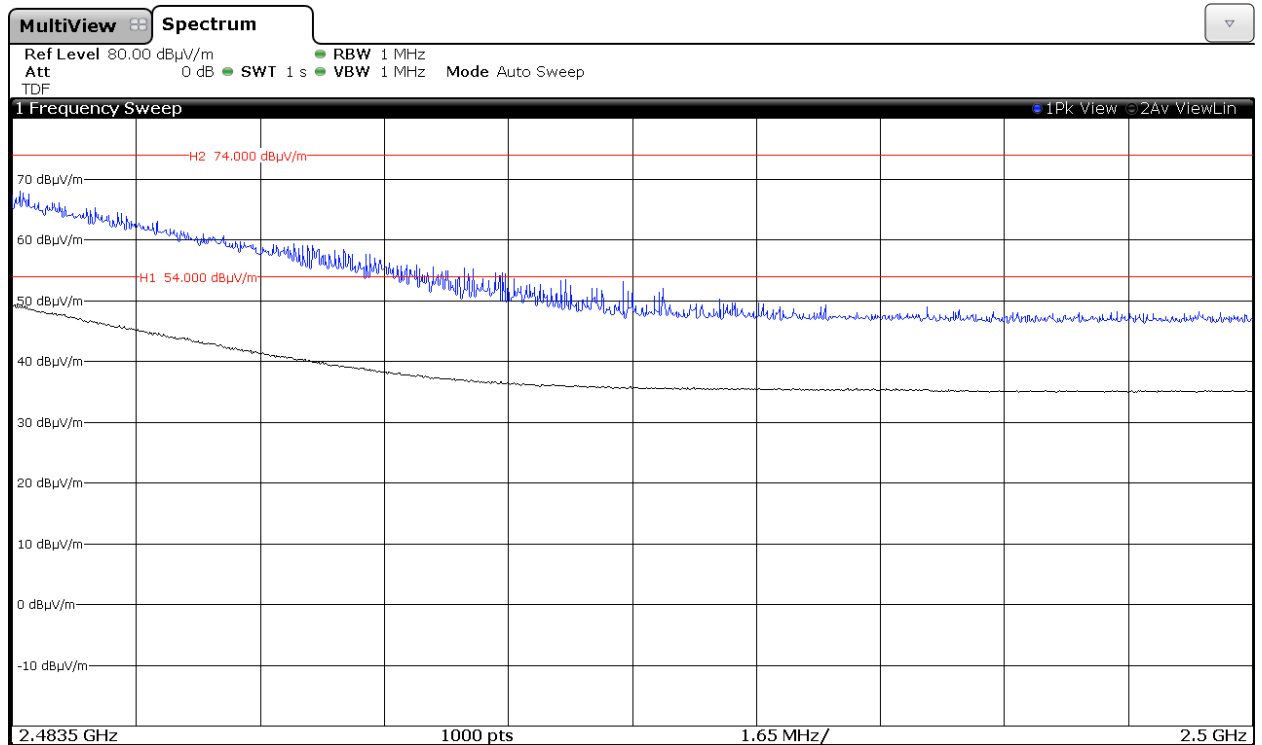


**Chain B**





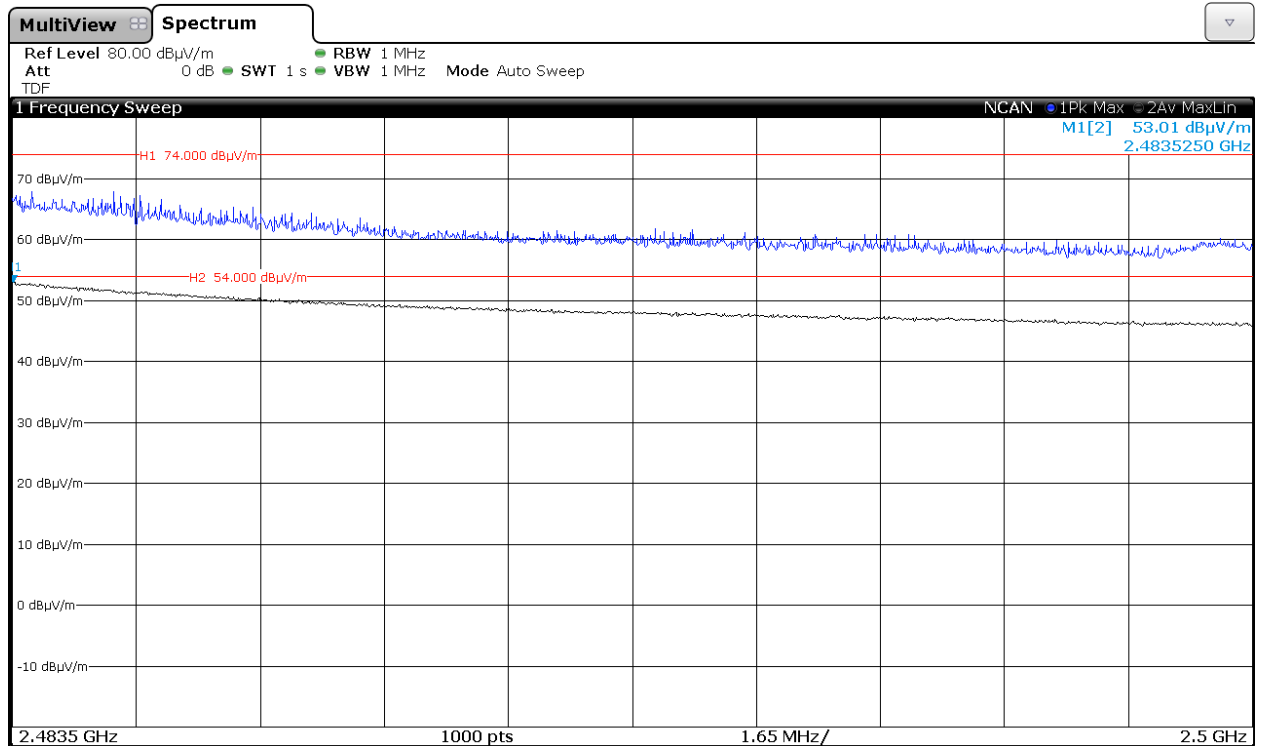
### Chain A+B



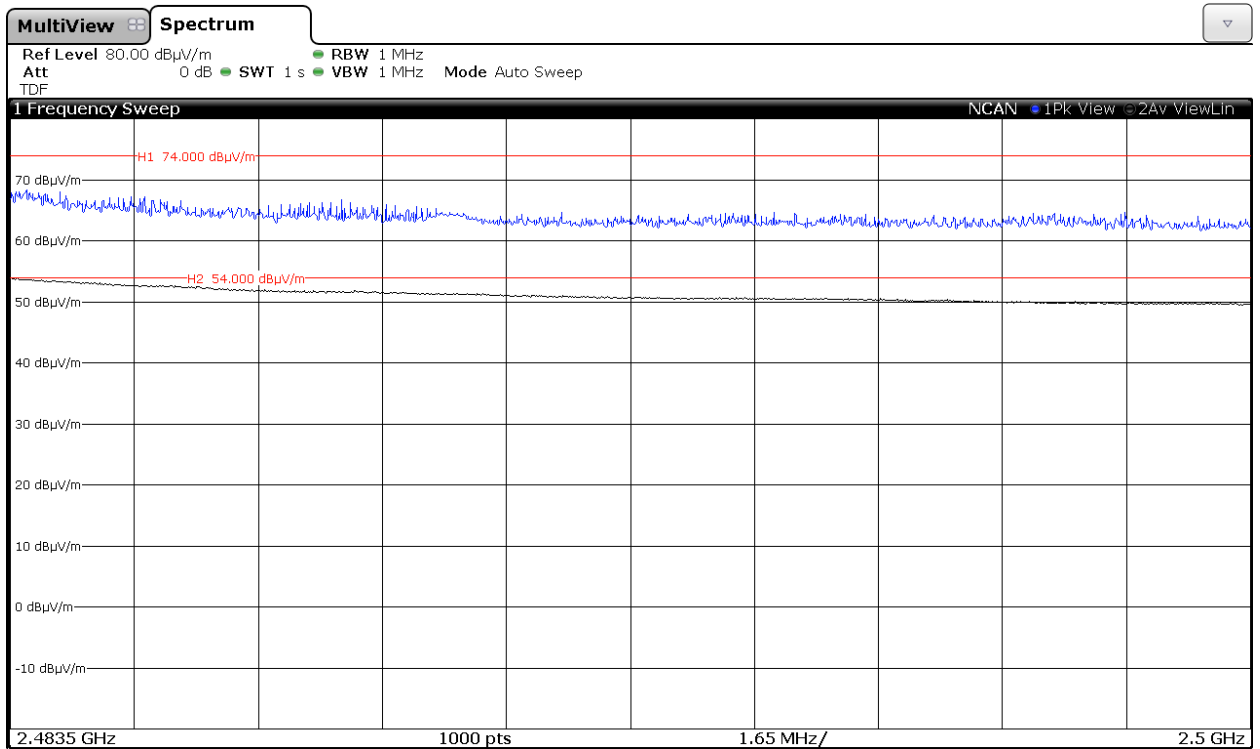
### 4. WiFi 2.4GHz 802.11 n40 mode

#### CHANNEL 6 (2437 MHz).

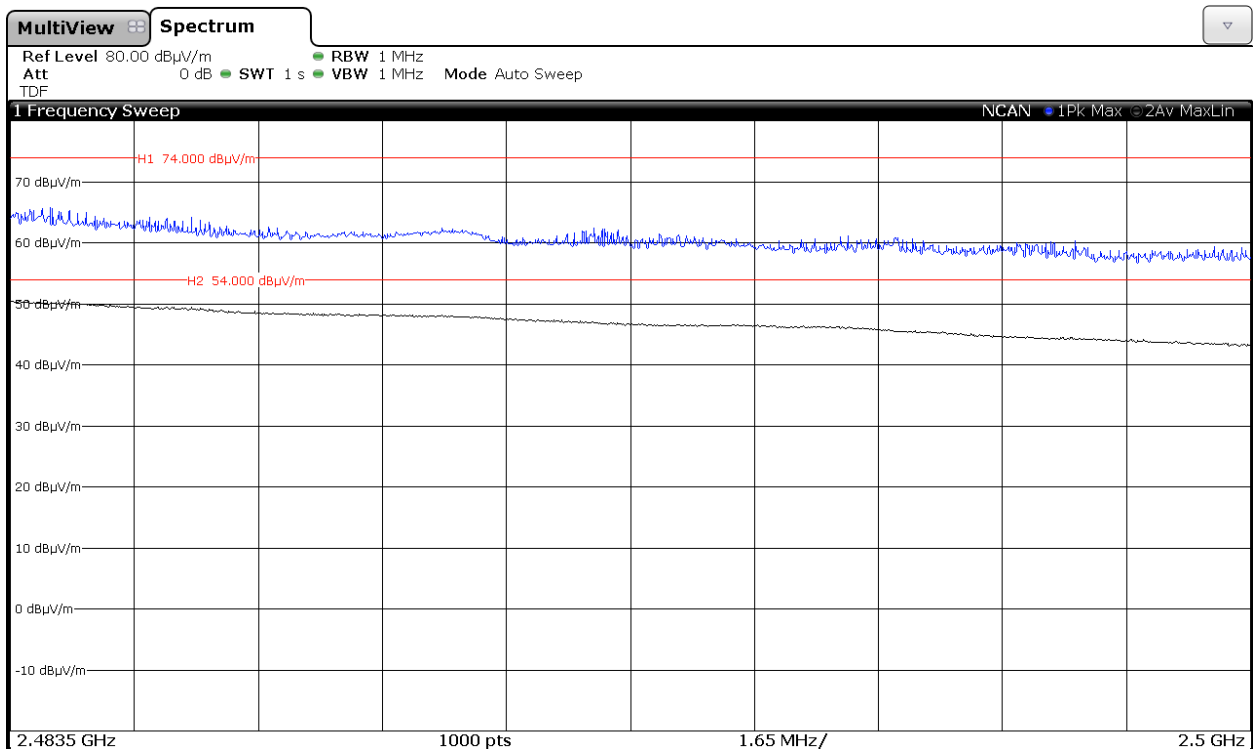
#### Chain A



### Chain B

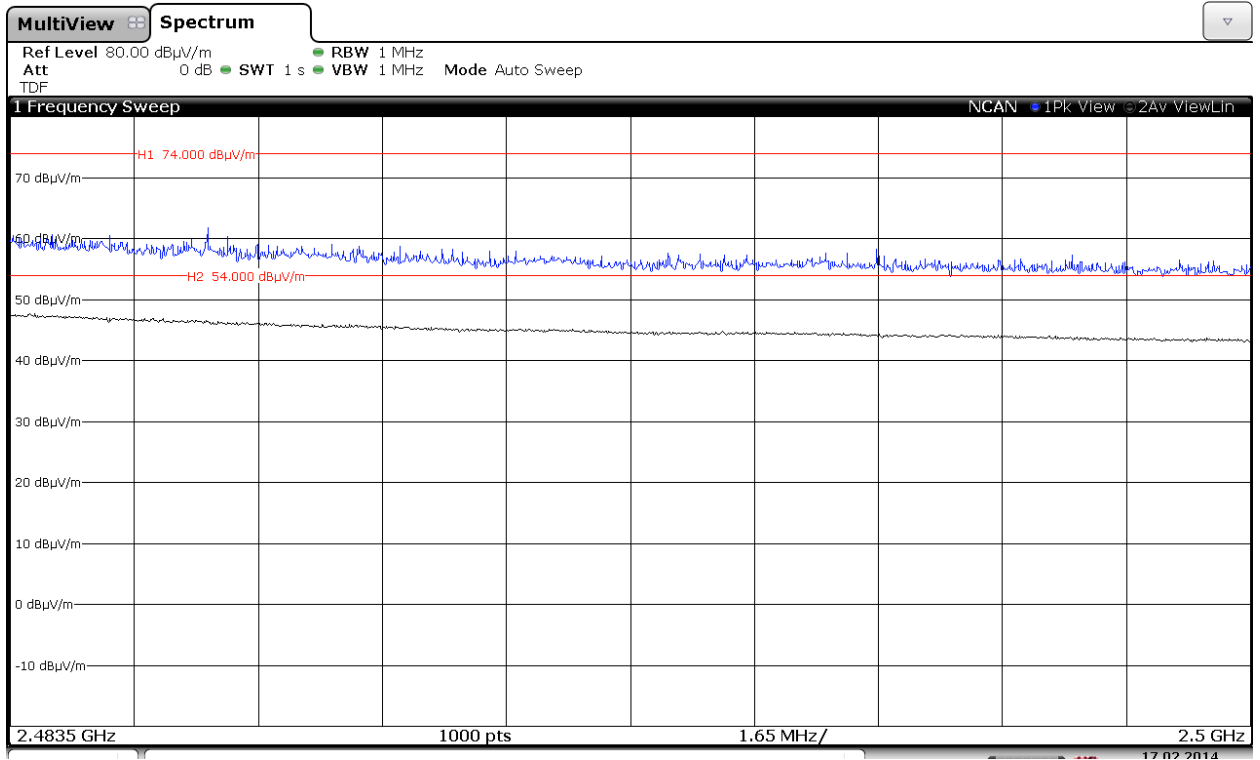


### Chain A+B

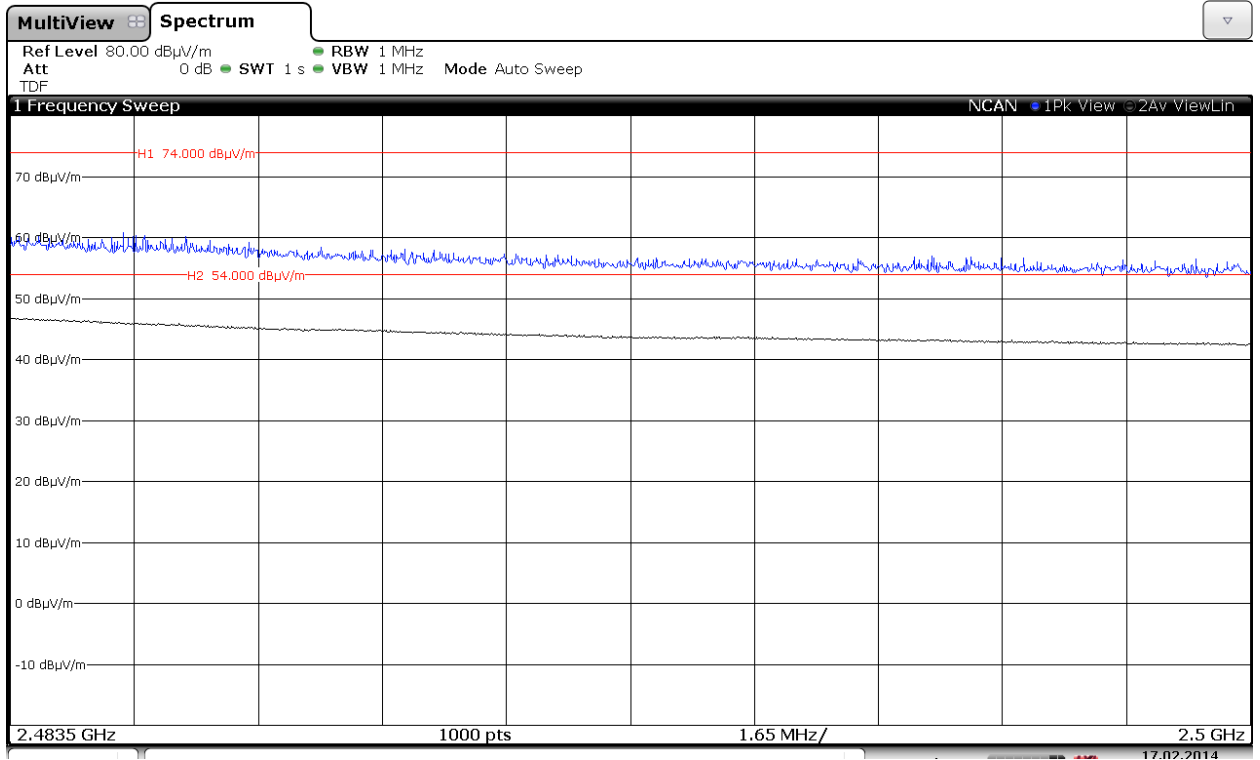


### CHANNEL 7 (2442 MHz).

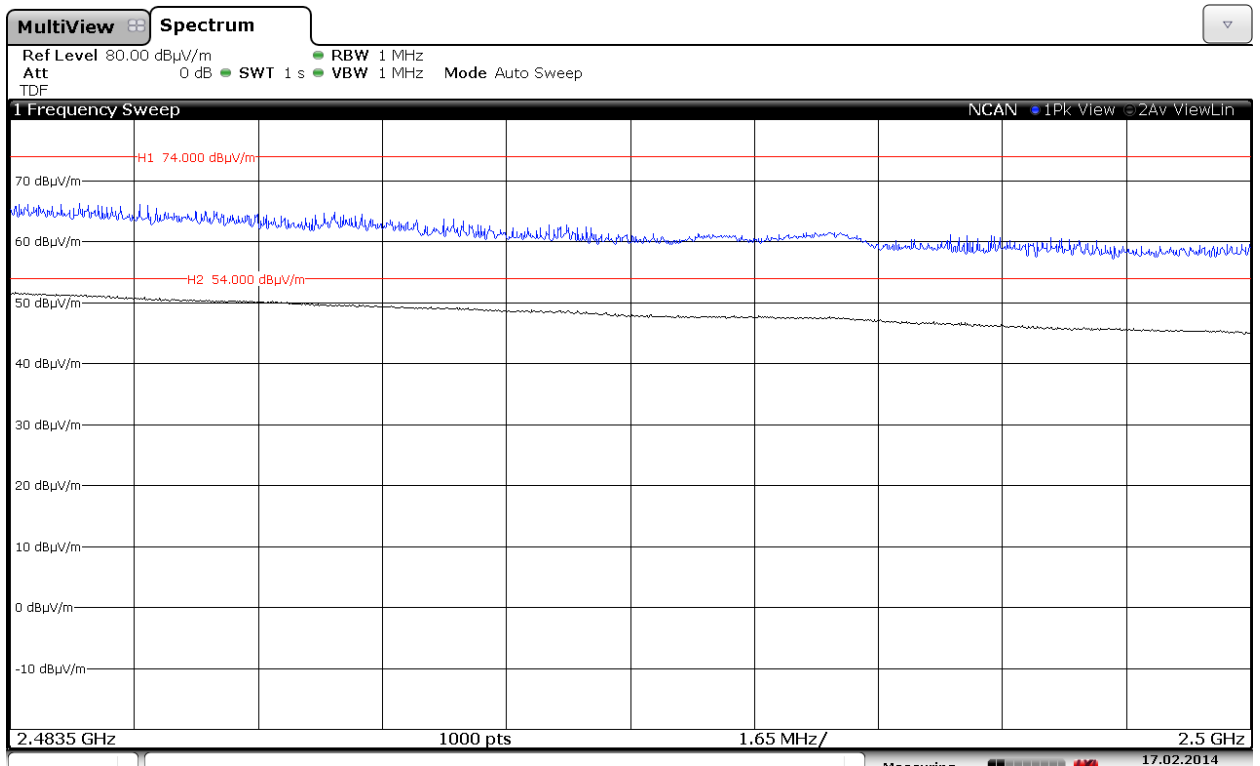
#### Chain A



#### Chain B

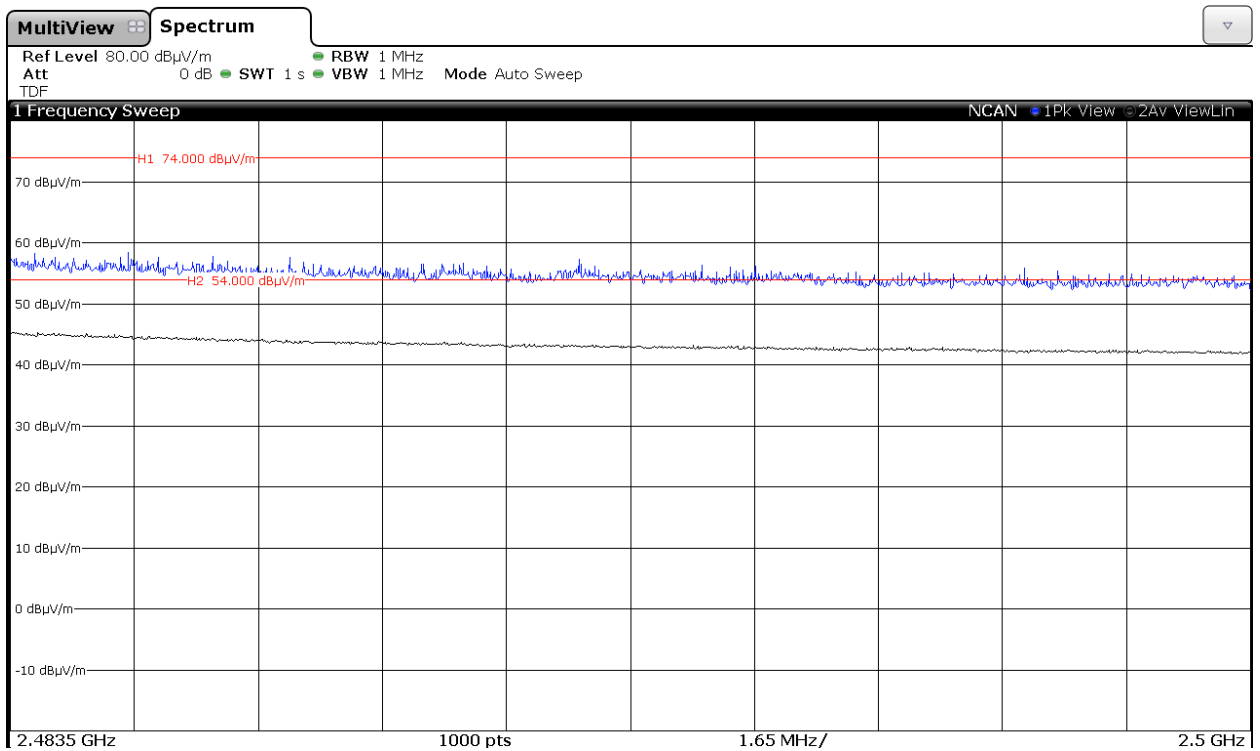


### Chain A+B

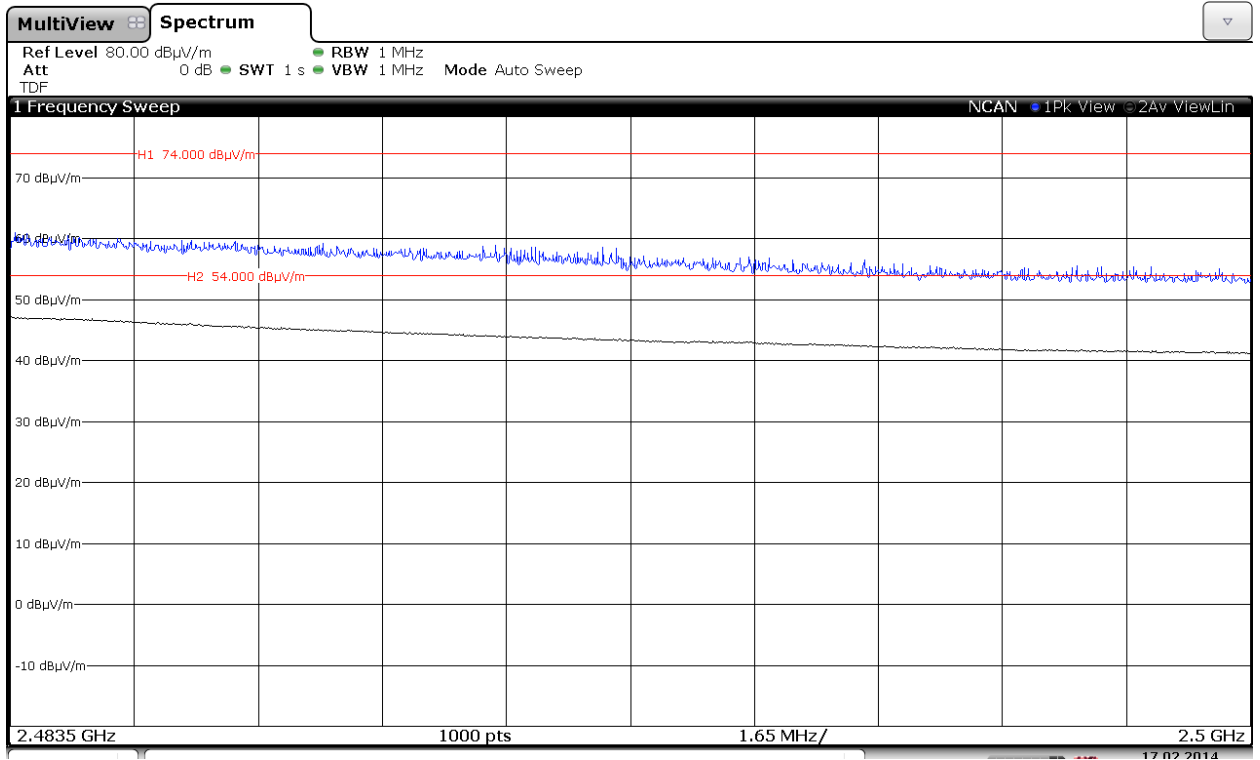


### CHANNEL 8 (2447 MHz).

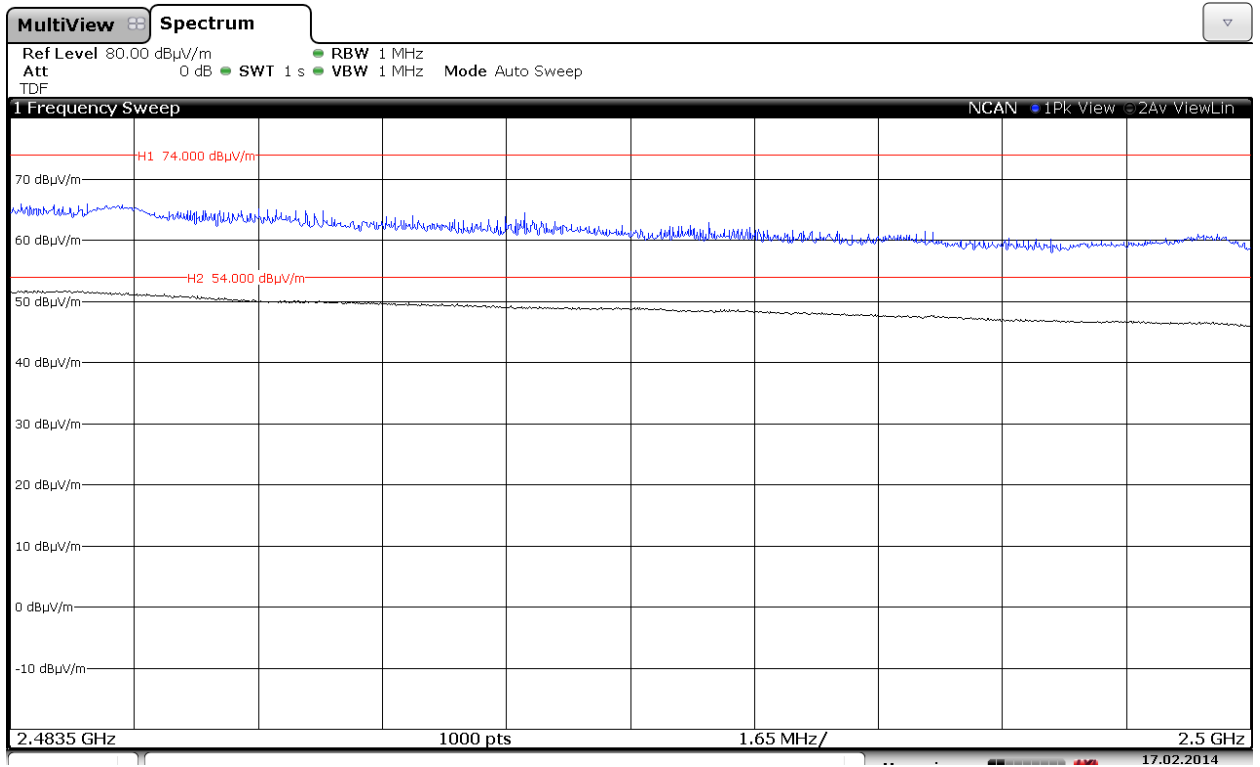
### Chain A



### Chain B

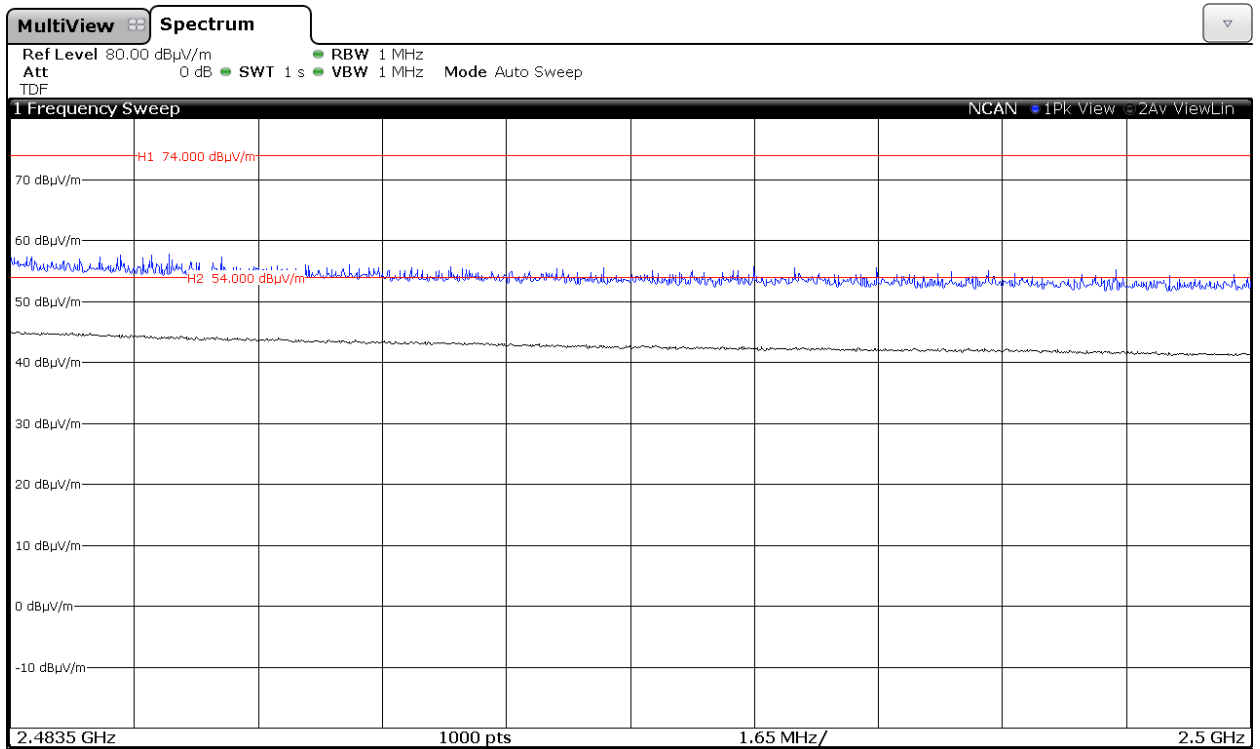


### Chain A+B

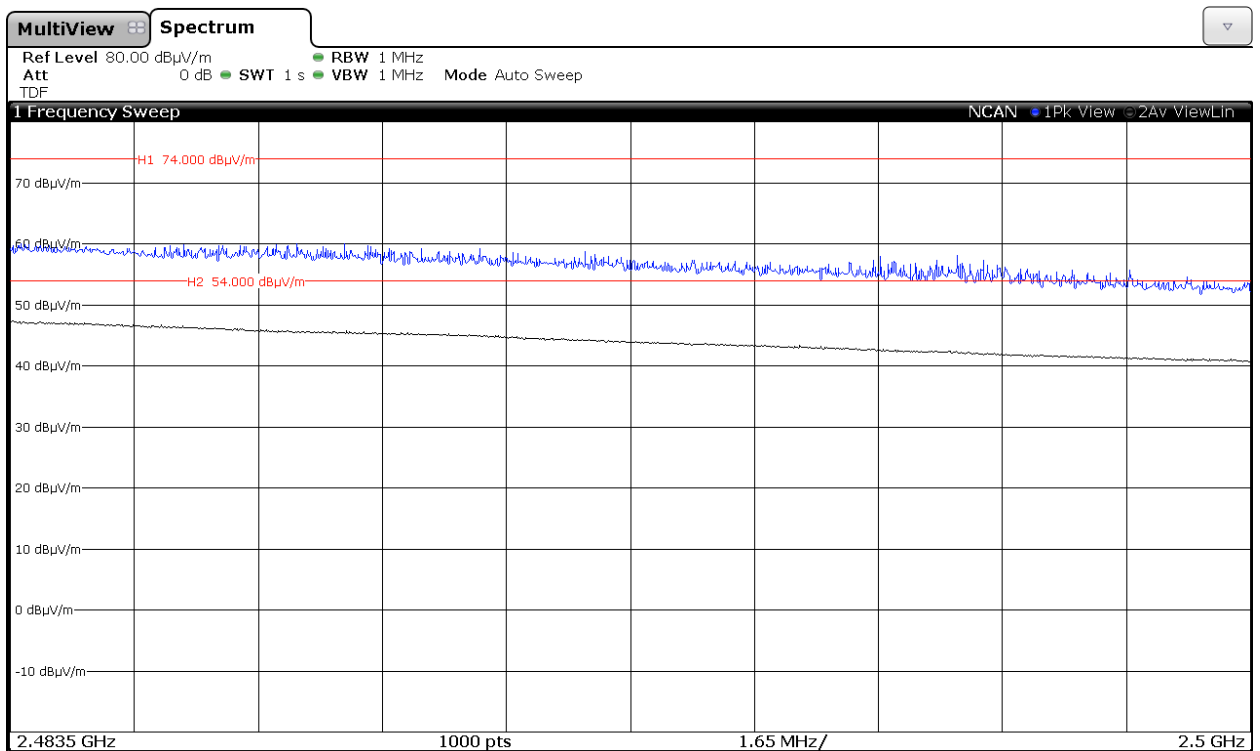


### CHANNEL 9 (2452 MHz).

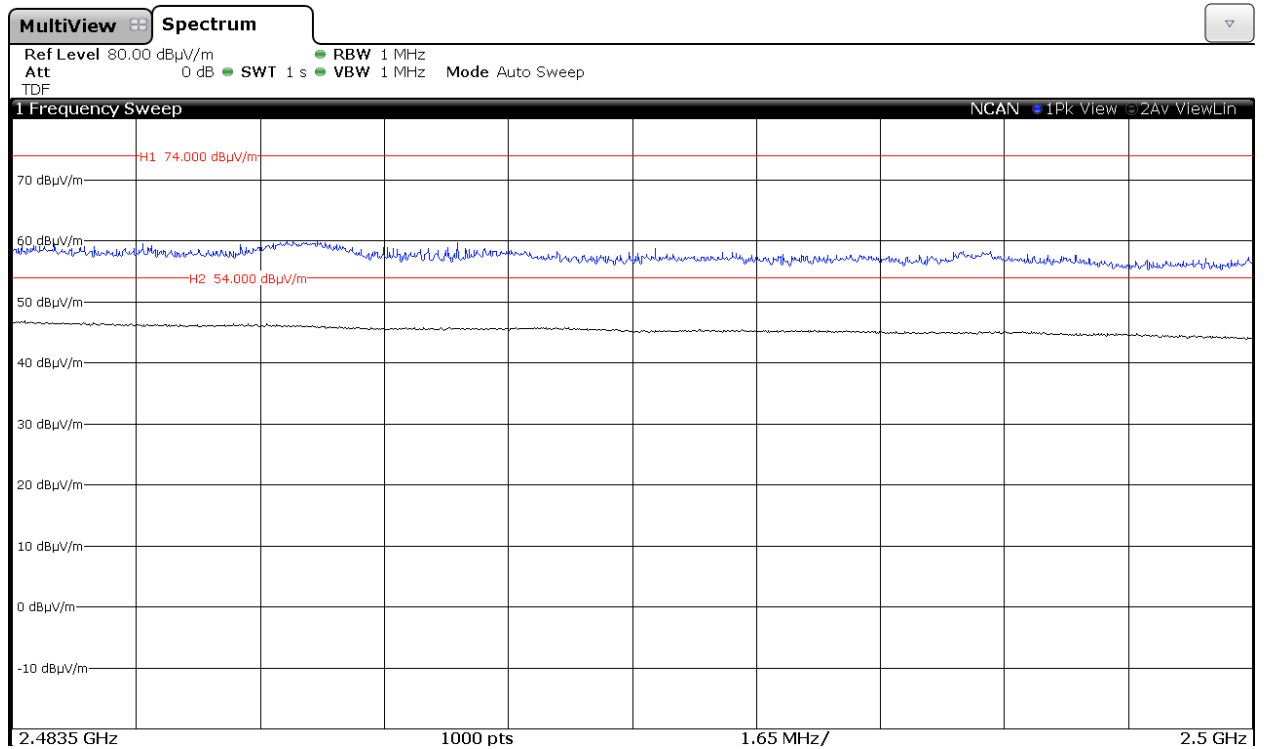
#### Chain A



#### Chain B

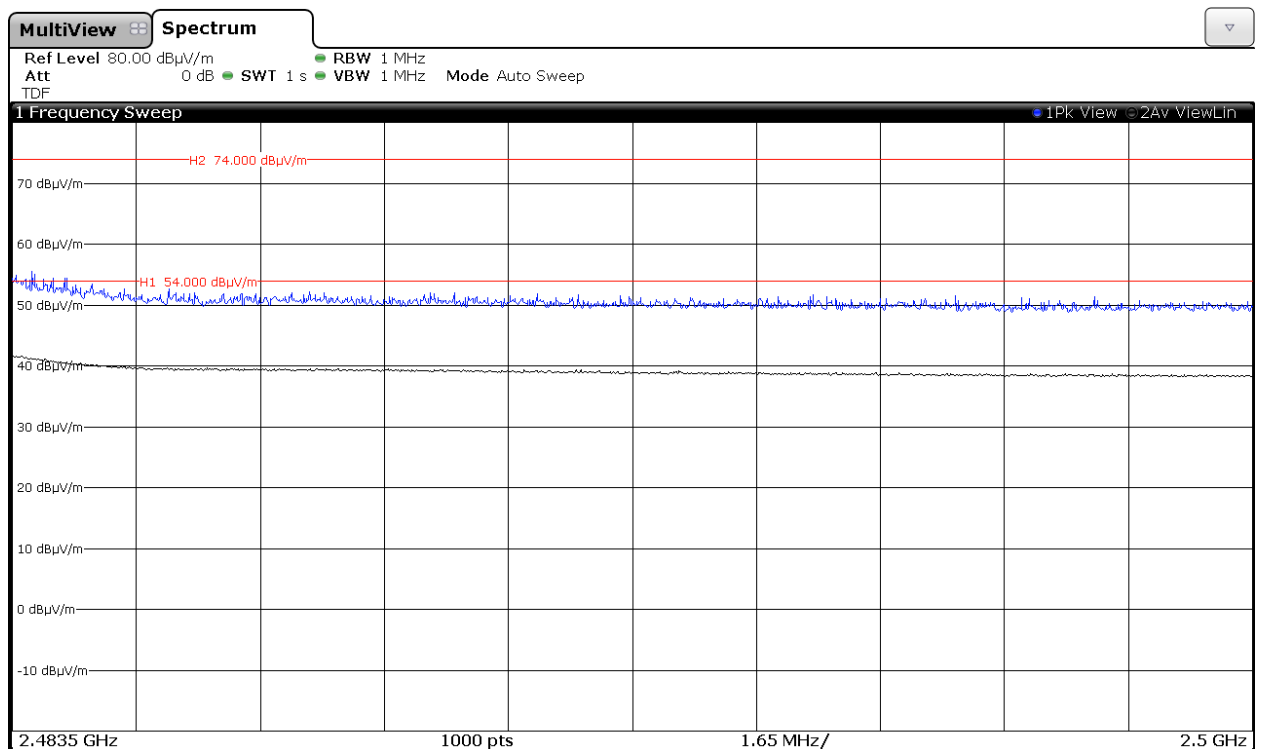


### Chain A+B

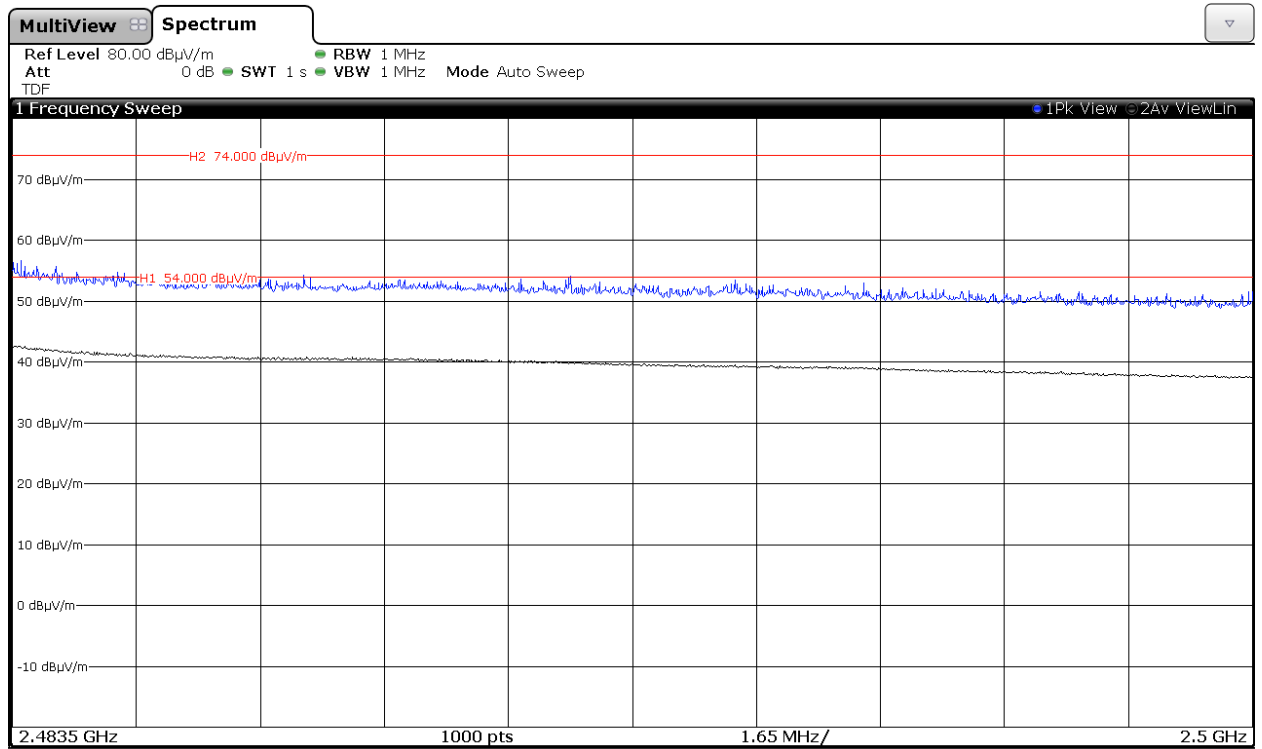


### CHANNEL 10F (2457 MHz).

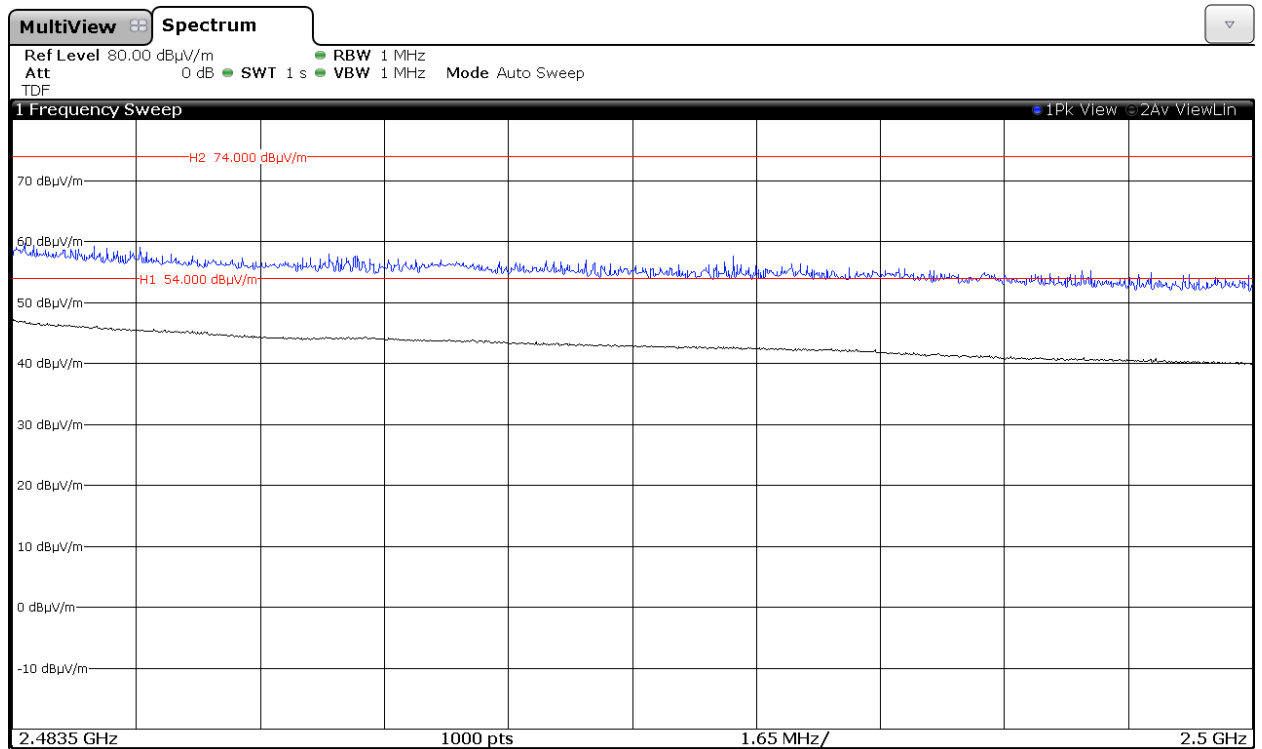
### Chain A



### Chain B



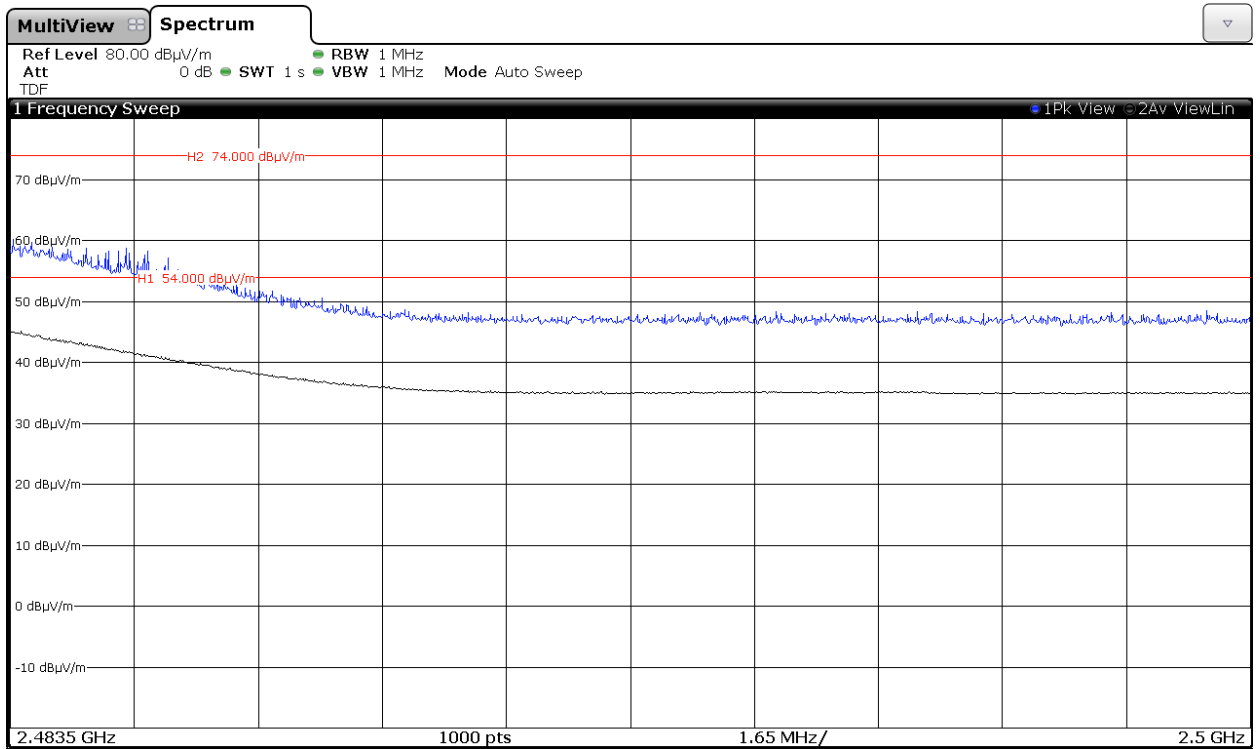
### Chain A+B



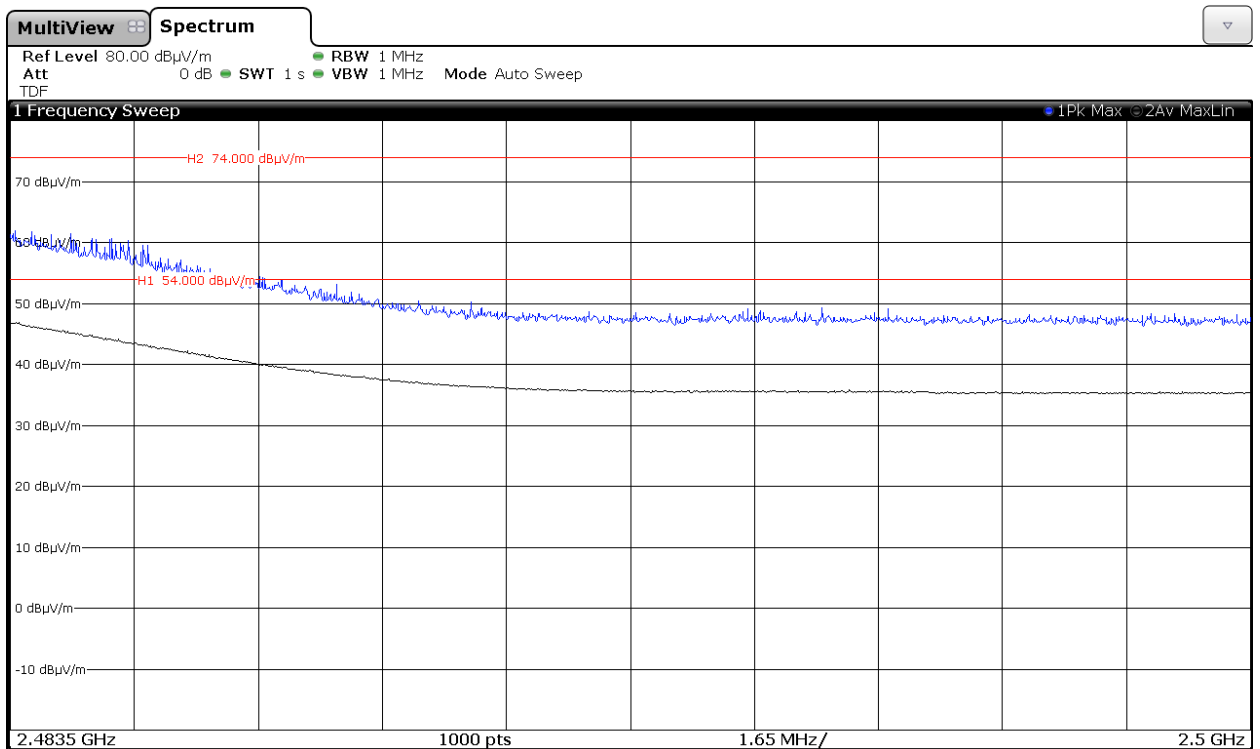


**CHANNEL 11F (2462 MHz).**

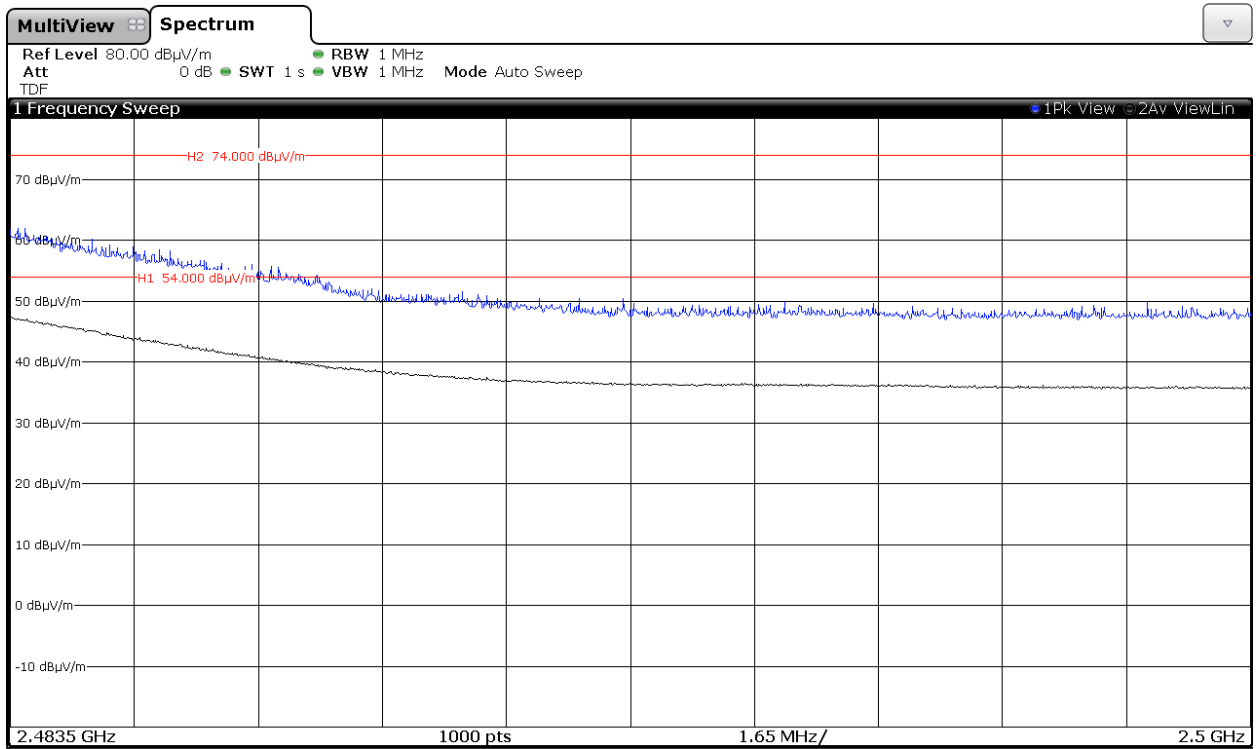
**Chain A**



**Chain B**



### Chain A+B



## **APPENDIX B: Test results “WiFi 5.725-5.825 GHz (802.11a/n20/n40/ac80)”**

## INDEX

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## **TEST CONDITIONS**

Power supply (V):

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

Type of power supply = DC voltage from HMC/NGFC test board.

Type of antenna = External attachable PIFA antenna.

Declared Gain for antenna = 5 dBi

### **Operating frequencies in the sub-band 5.725-5.825 GHz.**

-For IEEE 802.11a, the equipment uses channels 149,153,157,161,165.

-For IEEE 802.11n, there are two bandwidths:

For 20 MHz bandwidth the equipment uses channels 149,153,157,161,165.

For 40 MHz bandwidth the equipment uses channels 151 and 159.

-For IEEE 802.11ac80 (80 MHz bandwidth) the equipment uses channel 155.

### **TEST FREQUENCIES:**

For WiFi a/n20:

Lowest channel (149): 5745 MHz

Middle channel (157): 5785 MHz

Highest channel (165): 5825 MHz

For WiFi n40:

Lowest channel (151): 5755 MHz

Highest channel (159): 5795 MHz

For WiFi ac80:

Middle channel (155): 5775 MHz

The test set-up was made in accordance to the general provisions of FCC DTS Measurement KDB 558074 D01 DTS Meas Guidance v03r01.

For 802.11a mode the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually, but not simultaneously.

For 802.11n modes 802.11n20 (20 MHz channel bandwidth), 802.11n40 (40MHz channel bandwidth) and 802.11ac80 (80MHz channel bandwidth) mode the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually and simultaneously.

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 PC was using the Intel test utility DRTU Version 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 data rates of 6Mb/s for 802.11a, HT0 (SISO)/HT8 (MIMO) for 802.11n20 and n40, and VHT0 (SISO)/(MIMO) for 802.11 ac80 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 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. | SISO Chain A (dBm) | SISO Chain B (dBm) | MIMO at both ports A and B (dBm) |
|----------|----------|-----------------|--------------------|--------------------|----------------------------------|
| 802.11a  | 20       | 149 / 5745      | 15.5               | 15                 | n/a                              |
|          |          | 157 / 5785      | 15.5               | 15                 | n/a                              |
|          |          | 165 / 5825      | 15.5               | 15                 | n/a                              |
| 802.11n  | 20       | 149 / 5745      | 15.5               | 15                 | 13.50                            |
|          |          | 157 / 5785      | 15.5               | 15                 | 13.50                            |
|          |          | 165 / 5825      | 15.5               | 15                 | 13.50                            |
| 802.11n* | 40       | 151 / 5755      | 16.5               | 16.5               | 16.50                            |
|          |          | 159 / 5795      | 16.5               | 16.5               | 16.50                            |
| 802.11ac | 80       | 155 / 5775      | 16.5               | 16.5               | 16.50                            |

### CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and it is connected to the spectrum analyser using a calibrated low loss RF cable. The reading in the spectrum analyser is compensated with the cable loss at each measurement frequency.

## RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and 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° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

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

## Occupied Bandwidth

### RESULTS

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

Occupied Bandwidth (see next plots).

|                               | Lowest frequency<br>5745 MHz |         | Middle frequency<br>5785 MHz |         | Highest frequency<br>5825 MHz |         |
|-------------------------------|------------------------------|---------|------------------------------|---------|-------------------------------|---------|
|                               | Chain A                      | Chain B | Chain A                      | Chain B | Chain A                       | Chain B |
|                               | 99% bandwidth (MHz)          | 16.712  | 16.668                       | 16.625  | 16.627                        | 16.683  |
| Measurement uncertainty (kHz) | ±21.7                        |         |                              |         |                               |         |

#### 2. WiFi 5GHz 802.11 n20 mode

Occupied Bandwidth (see next plots).

|                               | Lowest frequency<br>5745 MHz |         | Middle frequency<br>5785 MHz |         | Highest frequency<br>5825 MHz |         |
|-------------------------------|------------------------------|---------|------------------------------|---------|-------------------------------|---------|
|                               | Chain A                      | Chain B | Chain A                      | Chain B | Chain A                       | Chain B |
|                               | 99% bandwidth (MHz)          | 17.804  | 17.777                       | 17.779  | 17.753                        | 17.801  |
| Measurement uncertainty (kHz) | ±21.7                        |         |                              |         |                               |         |

#### 3. WiFi 5GHz 802.11 n40 mode

Occupied Bandwidth (see next plots).

|                               | Lowest frequency<br>5755 MHz |         | Highest frequency<br>5795 MHz |         |
|-------------------------------|------------------------------|---------|-------------------------------|---------|
|                               | Chain A                      | Chain B | Chain A                       | Chain B |
|                               | 99% bandwidth (MHz)          | 35.997  | 35.996                        | 35.971  |
| Measurement uncertainty (kHz) | ±21.7                        |         |                               |         |



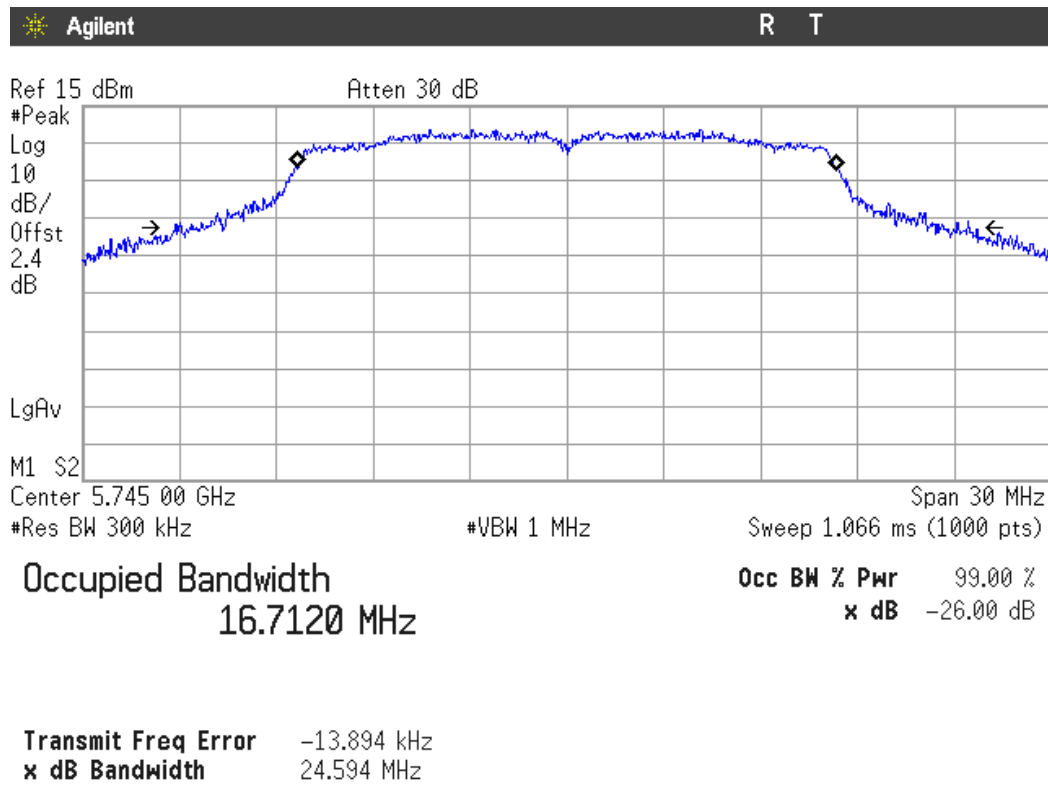
4. WiFi 5GHz 802.11 ac80 mode

Occupied Bandwidth (see next plots).

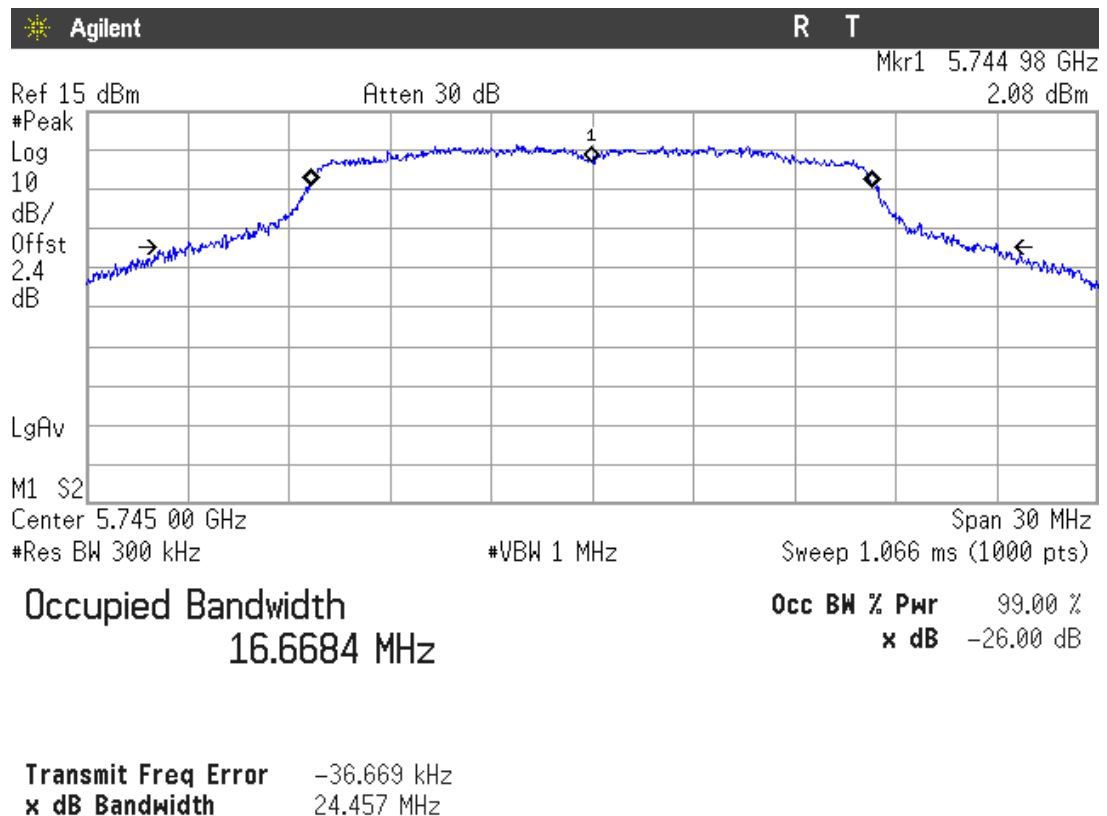
|                               | Middle frequency<br>5775 MHz |         |
|-------------------------------|------------------------------|---------|
|                               | Chain A                      | Chain B |
| 99% bandwidth (MHz)           | 75.124                       | 75.074  |
| Measurement uncertainty (kHz) | ±21.7                        |         |

### 1. WiFi 5GHz 802.11 a mode

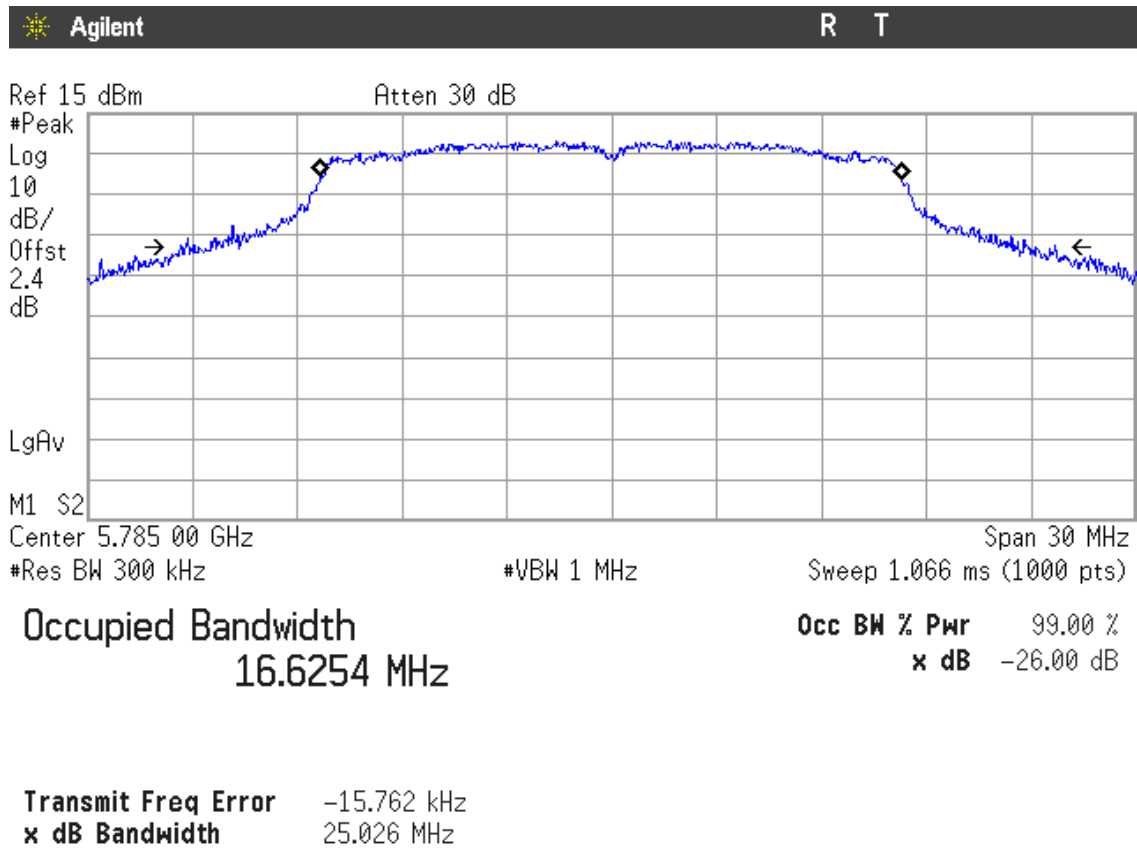
Lowest Channel: 5745 MHz. Chain A



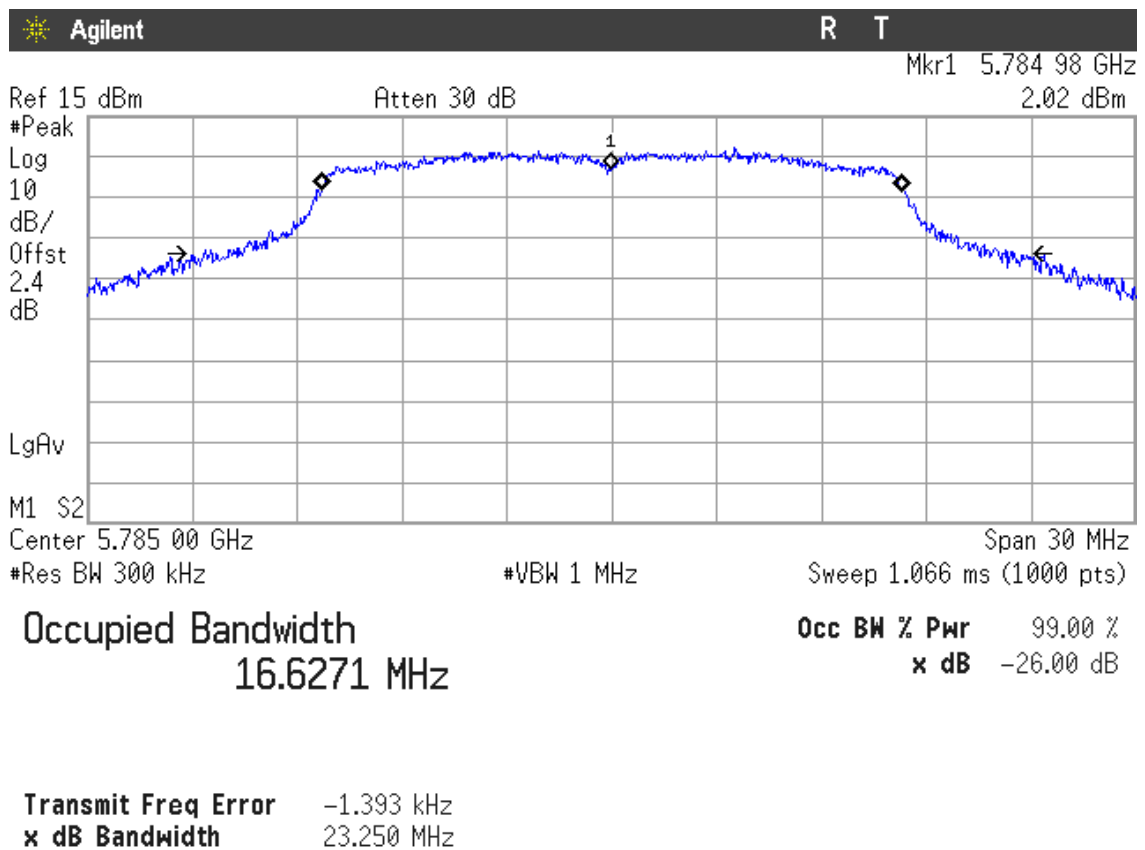
Lowest Channel: 5745 MHz. Chain B



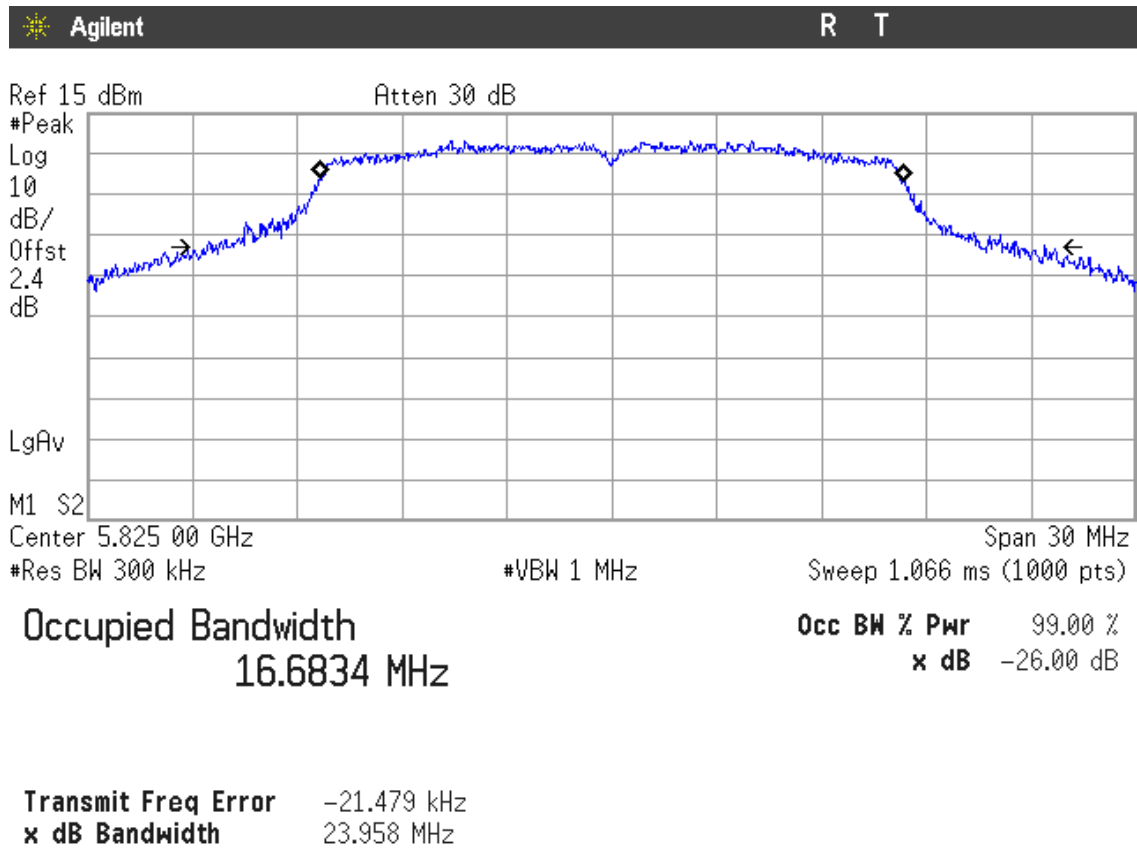
Middle Channel: 5785 MHz. Chain A



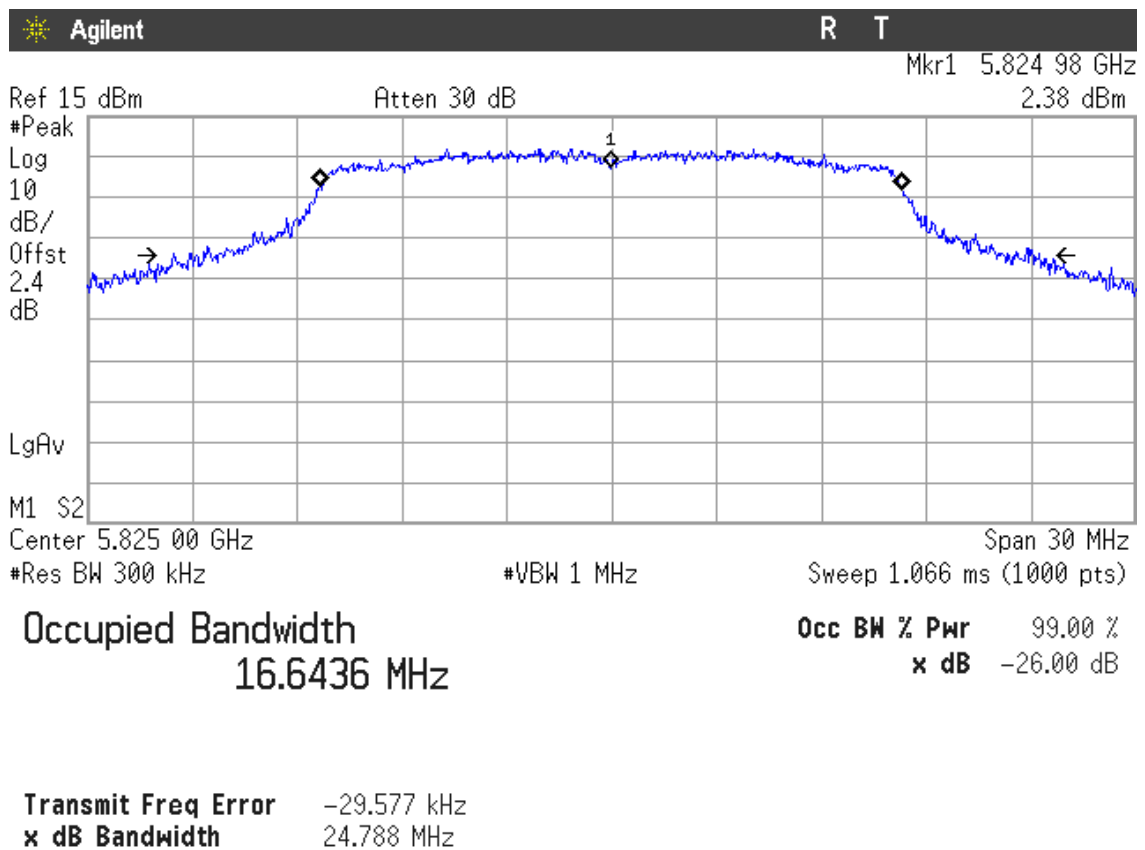
Middle Channel: 5785 MHz. Chain B



Highest Channel: 5825 MHz. Chain A

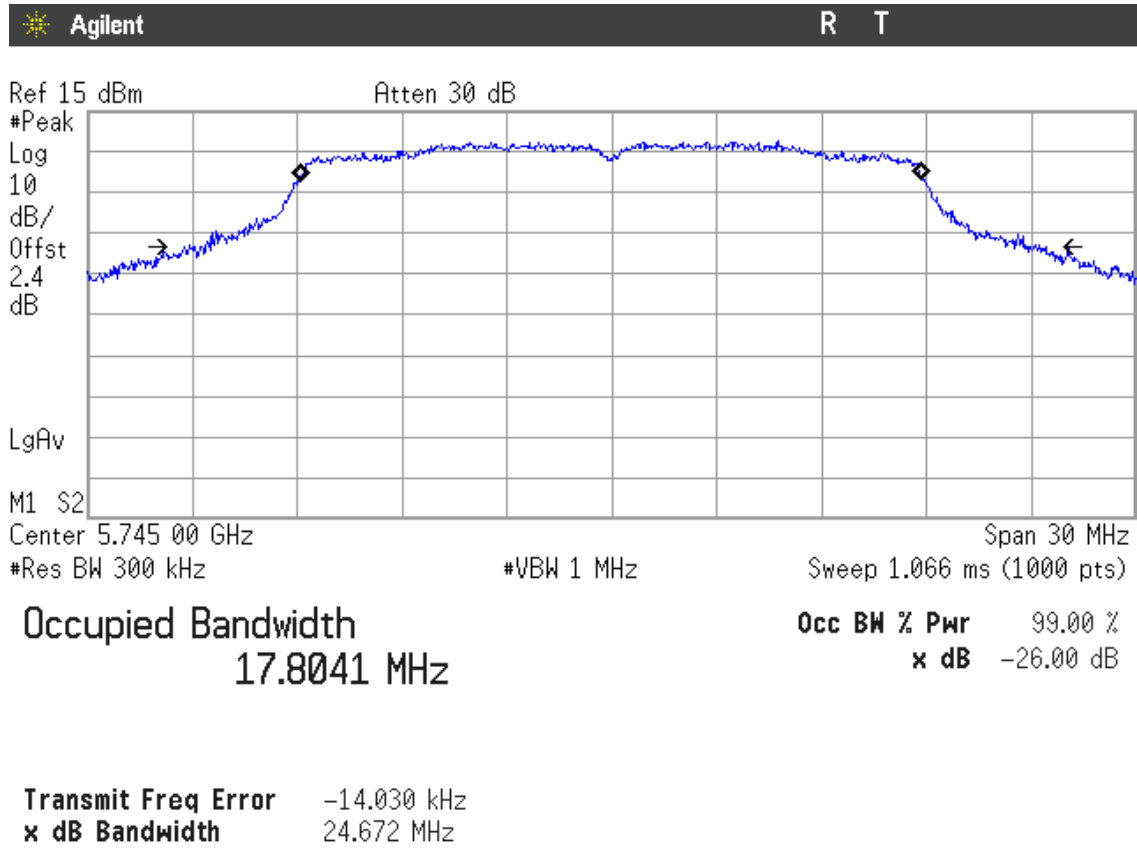


Highest Channel: 5825 MHz. Chain B

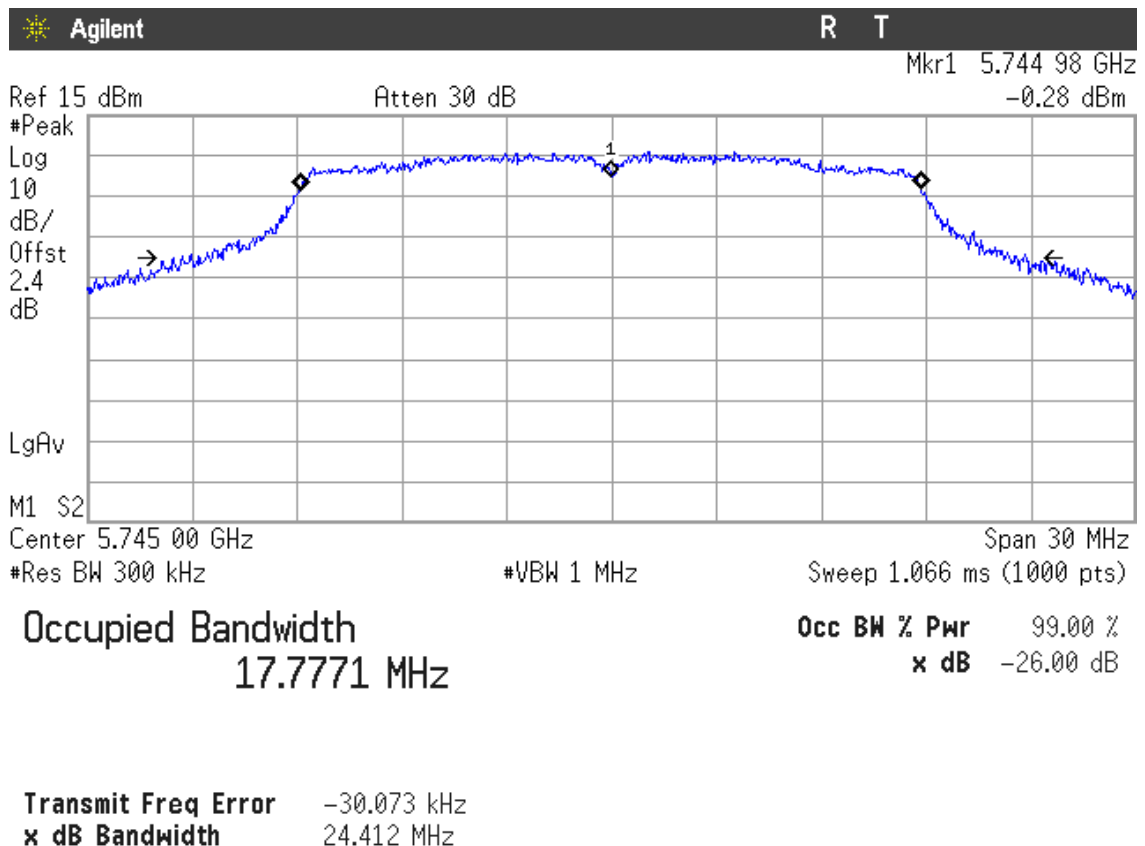


## 2. WiFi 5GHz 802.11 n20 mode

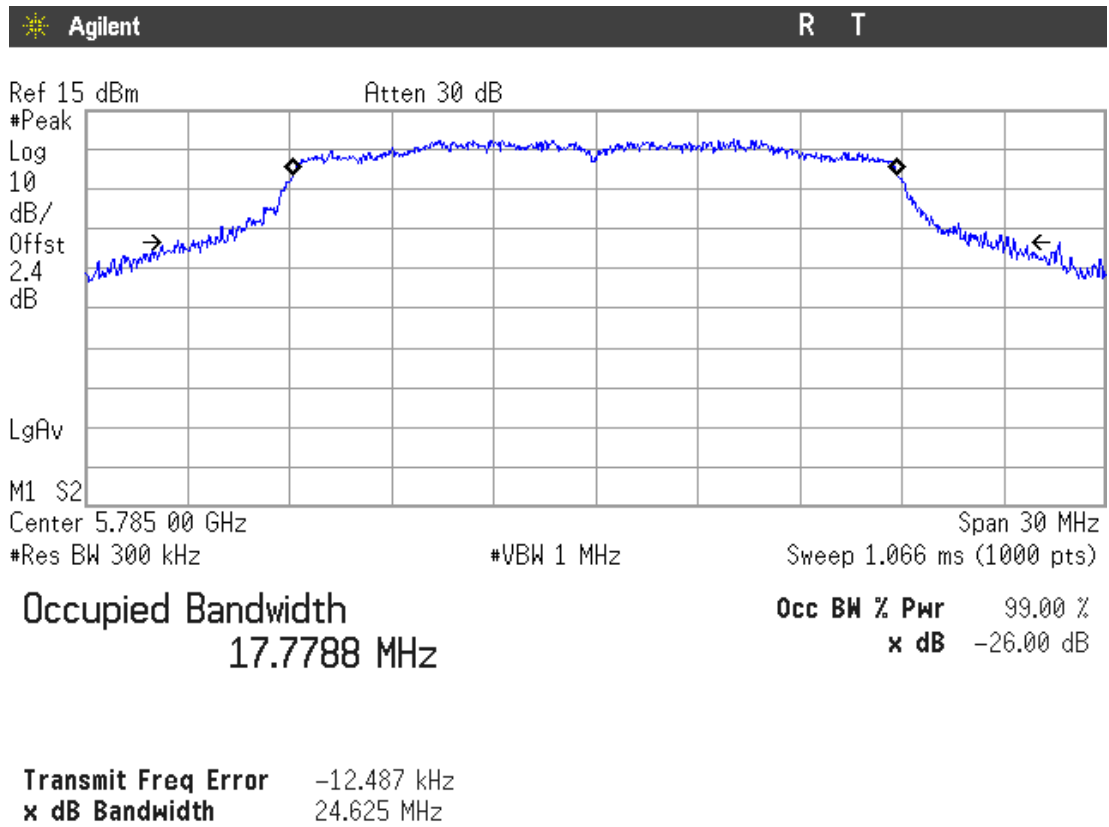
Lowest Channel: 5745 MHz. Chain A



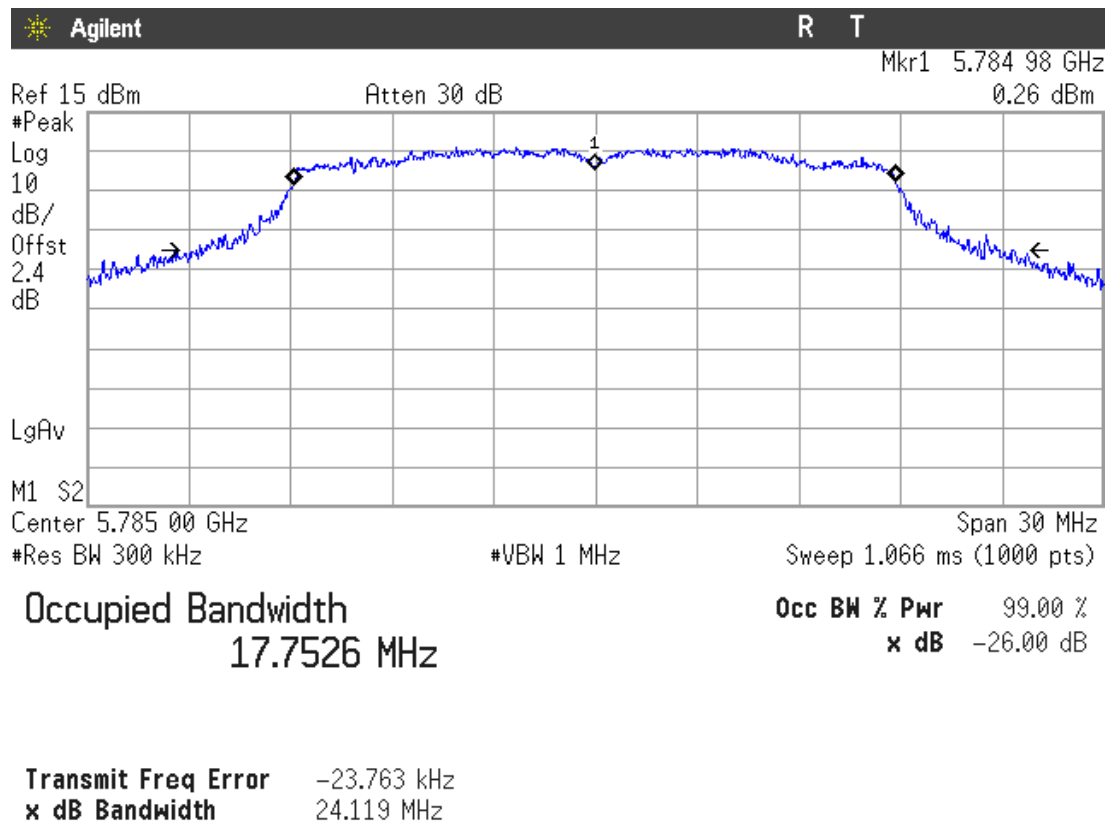
Lowest Channel: 5745 MHz. Chain B



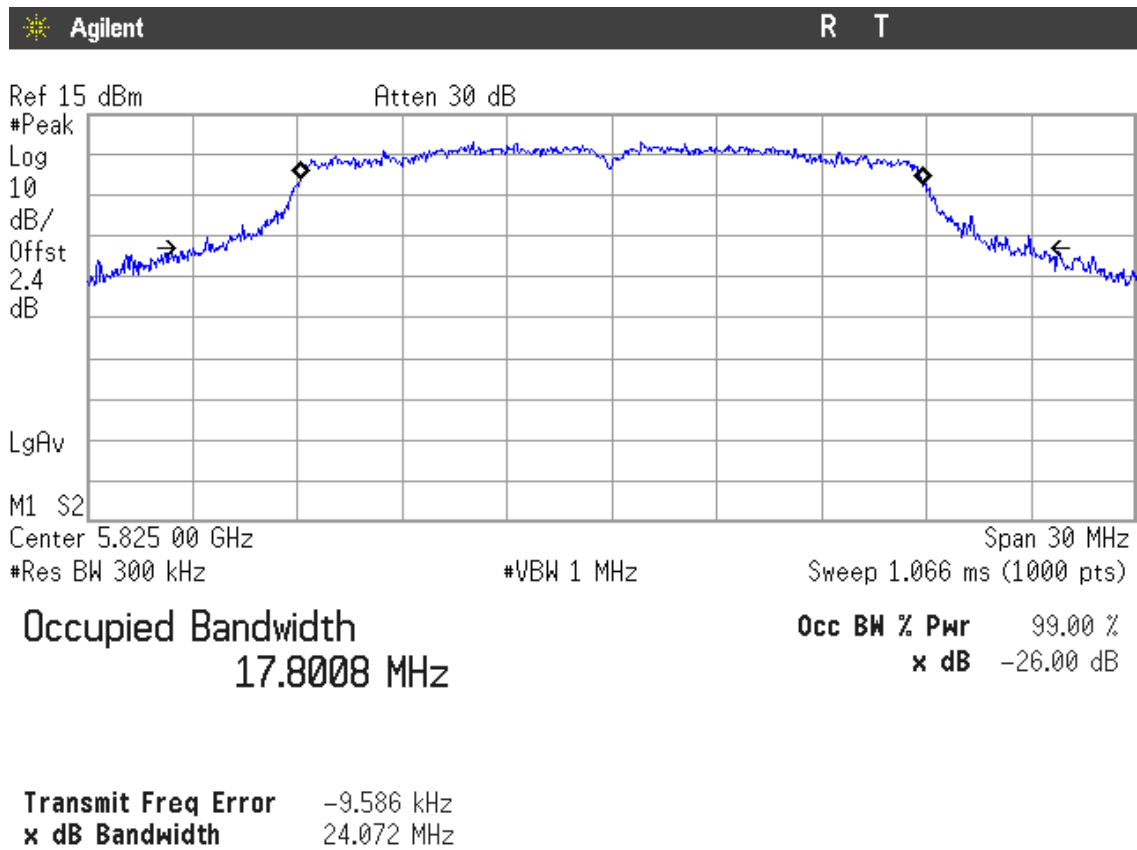
Middle Channel: 5785 MHz. Chain A



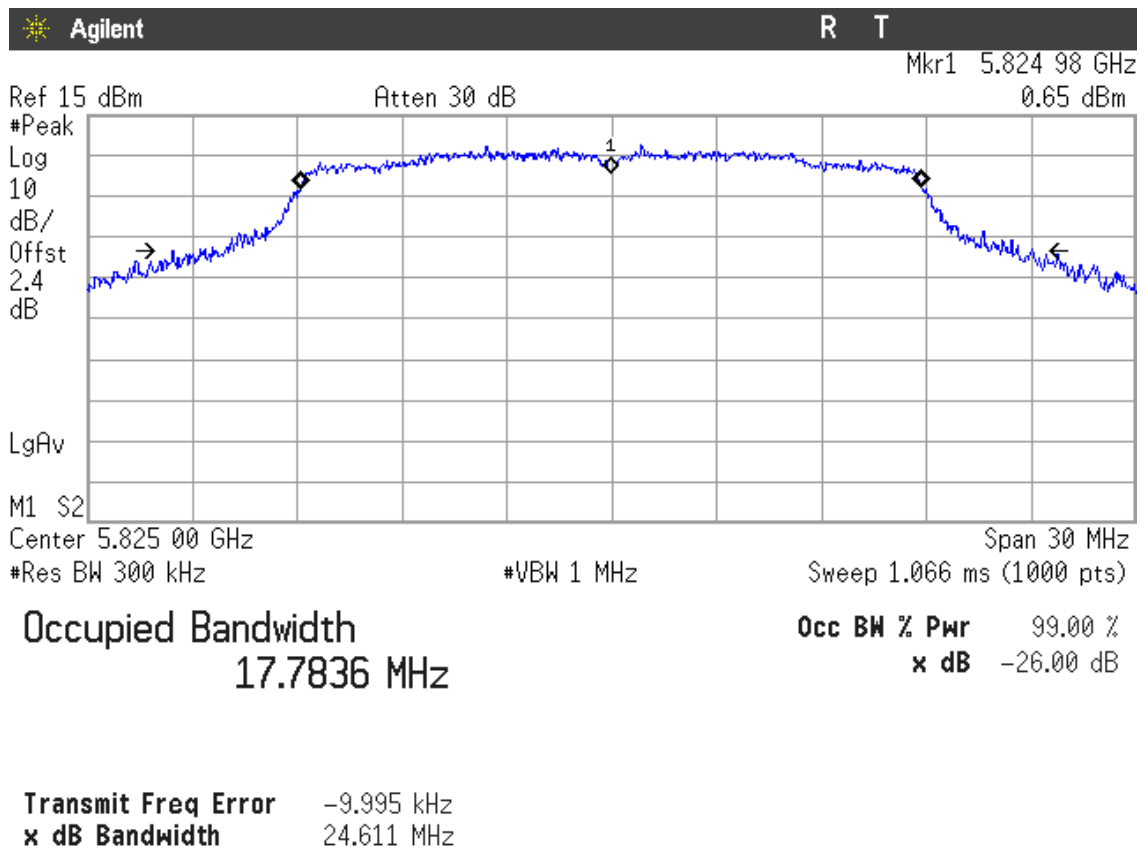
Middle Channel: 5785 MHz. Chain B



Highest Channel: 5825 MHz. Chain A

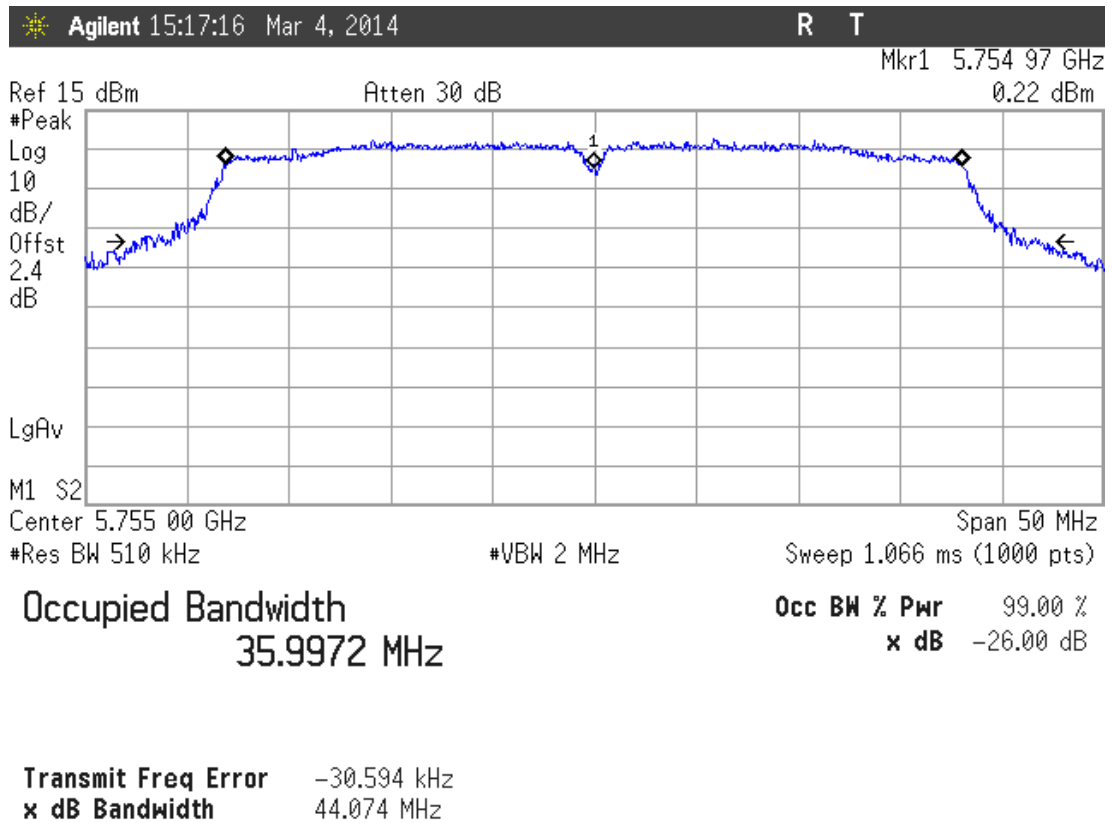


Highest Channel: 5825 MHz. Chain B

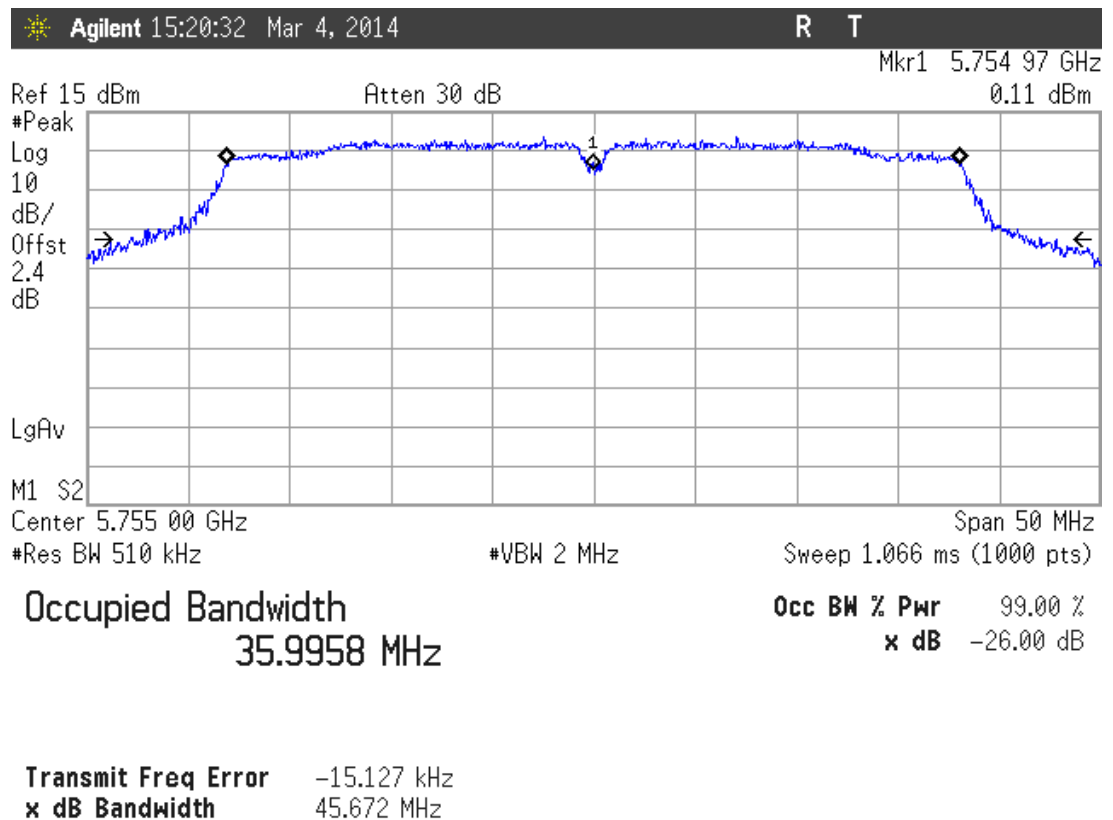


### 3. WiFi 5GHz 802.11 n40 mode

Lowest Channel: 5755 MHz. Chain A

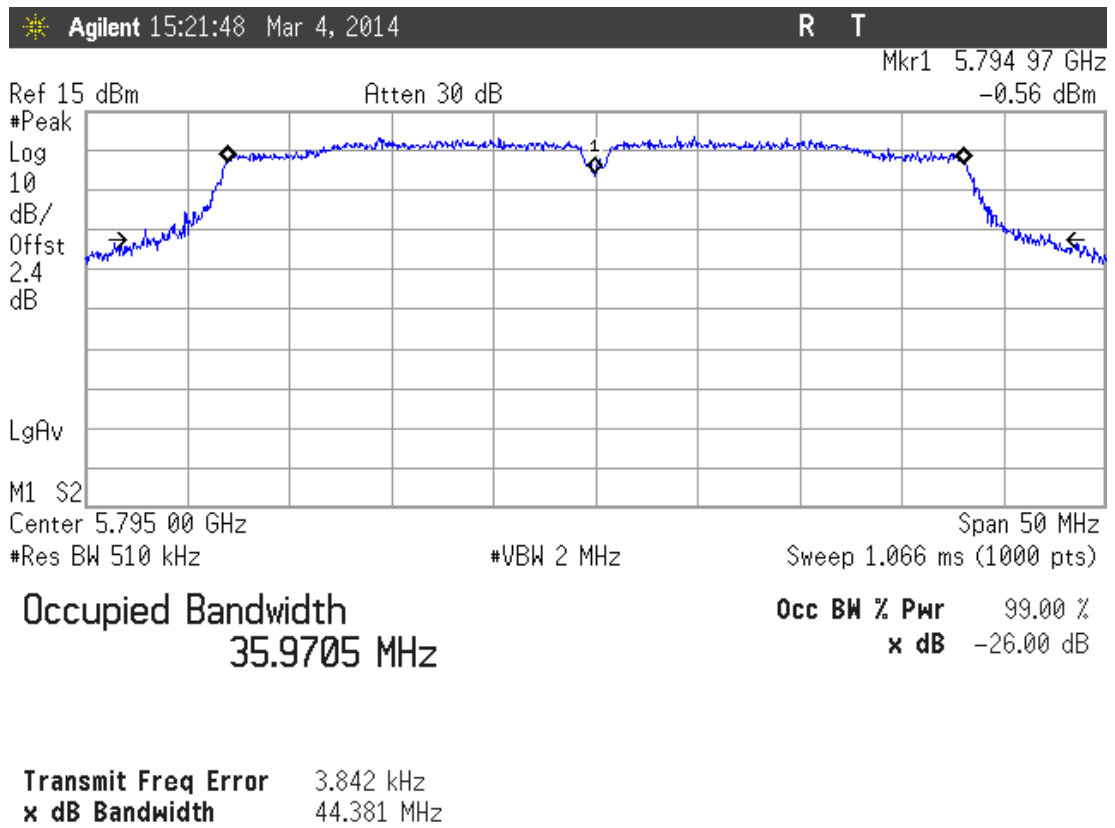


Lowest Channel: 5755 MHz. Chain B

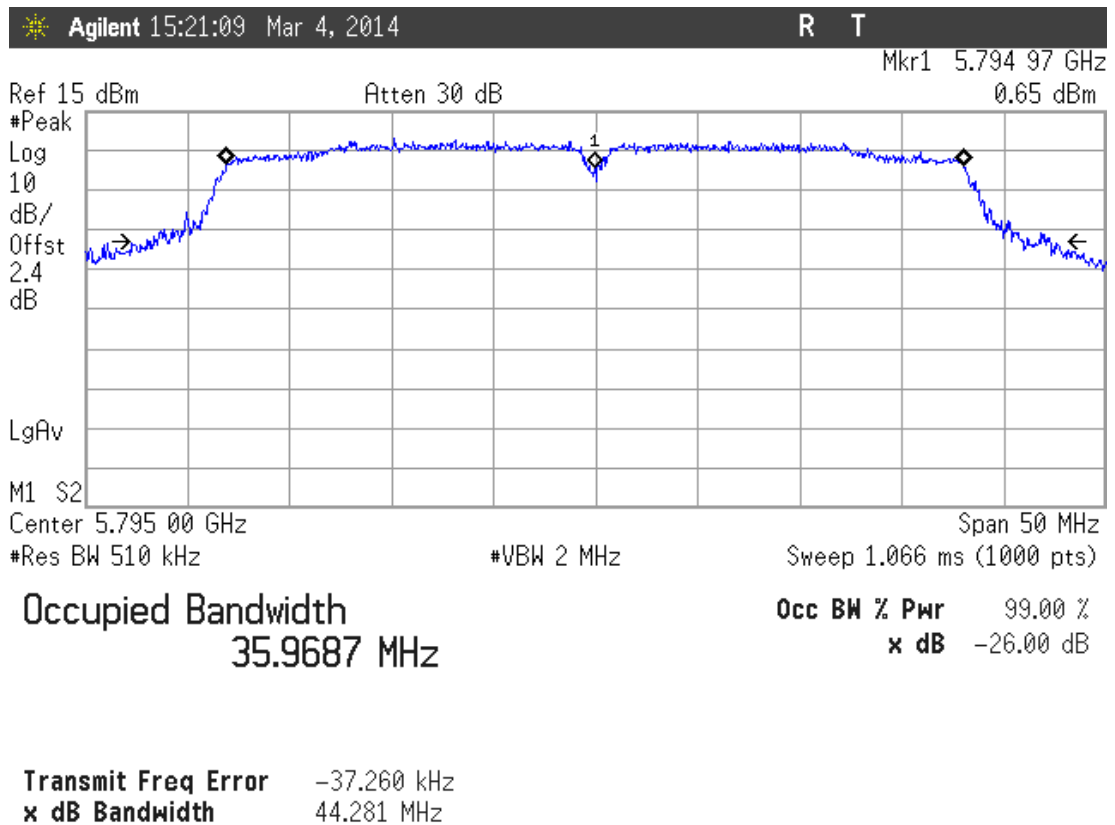




Highest Channel: 5795 MHz. Chain A

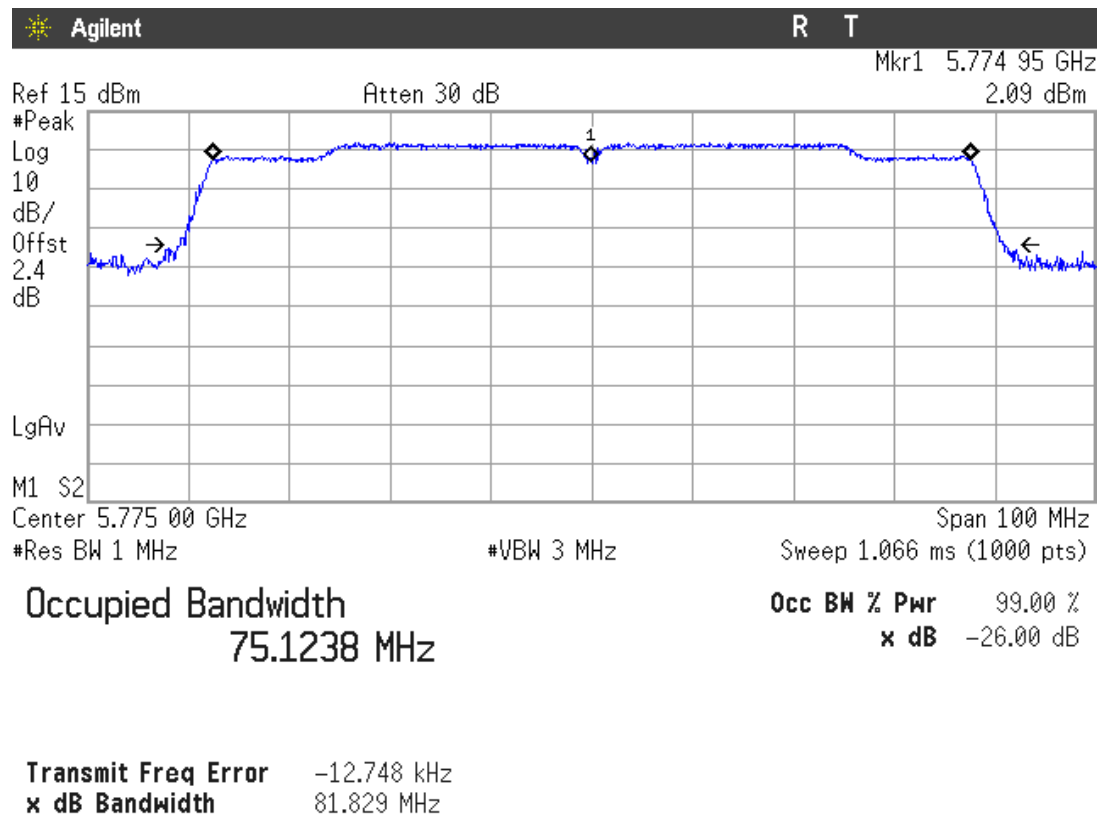


Highest Channel: 5795 MHz. Chain B

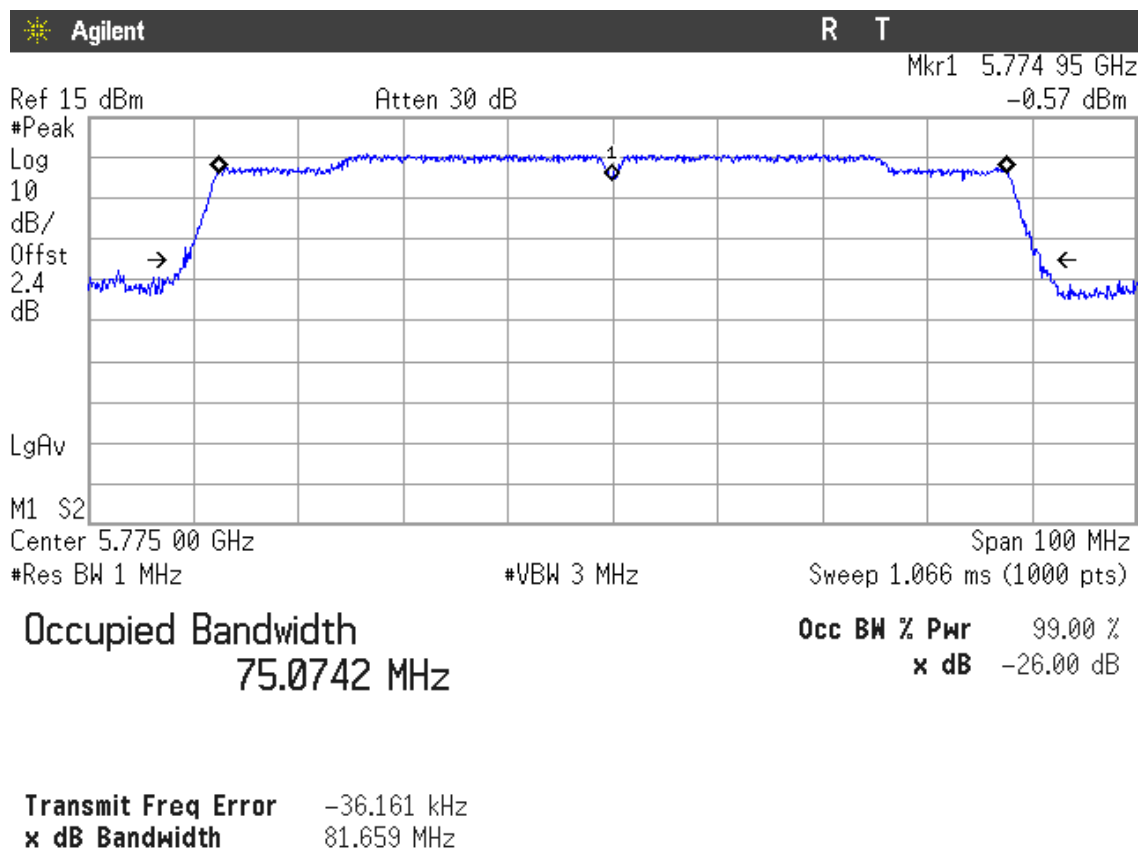


#### 4. WiFi 5GHz 802.11 ac80 mode

Middle Channel: 5775 MHz. Chain A



Middle Channel: 5775 MHz. Chain B



**Section 15.247 Subclause (a) (2) / RSS-210 A8.2. (a). 6 dB Bandwidth**

SPECIFICATION

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

6 dB Bandwidth (see next plots).

1. WiFi 5GHz 802.11 a mode

|                               | Lowest frequency<br>5745 MHz  |         | Middle frequency<br>5785 MHz |         | Highest frequency<br>5825 MHz |         |
|-------------------------------|-------------------------------|---------|------------------------------|---------|-------------------------------|---------|
|                               | Chain A                       | Chain B | Chain A                      | Chain B | Chain A                       | Chain B |
|                               | 6 dB Spectrum bandwidth (MHz) | 15.160  | 15.353                       | 15.321  | 15.160                        | 15.128  |
| Measurement uncertainty (kHz) | ±89                           |         |                              |         |                               |         |

2. WiFi 5GHz 802.11 n20 mode

|                               | Lowest frequency<br>5745 MHz  |         | Middle frequency<br>5785 MHz |         | Highest frequency<br>5825 MHz |         |
|-------------------------------|-------------------------------|---------|------------------------------|---------|-------------------------------|---------|
|                               | Chain A                       | Chain B | Chain A                      | Chain B | Chain A                       | Chain B |
|                               | 6 dB Spectrum bandwidth (MHz) | 15.128  | 15.321                       | 15.128  | 15.481                        | 15.096  |
| Measurement uncertainty (kHz) | ±89                           |         |                              |         |                               |         |

3. WiFi 5GHz 802.11 n40 mode

|                               | Lowest frequency<br>5755 MHz  |         | Highest frequency<br>5795 MHz |         |
|-------------------------------|-------------------------------|---------|-------------------------------|---------|
|                               | Chain A                       | Chain B | Chain A                       | Chain B |
|                               | 6 dB Spectrum bandwidth (MHz) | 35.128  | 35.128                        | 35.128  |
| Measurement uncertainty (kHz) | ±21.7                         |         |                               |         |

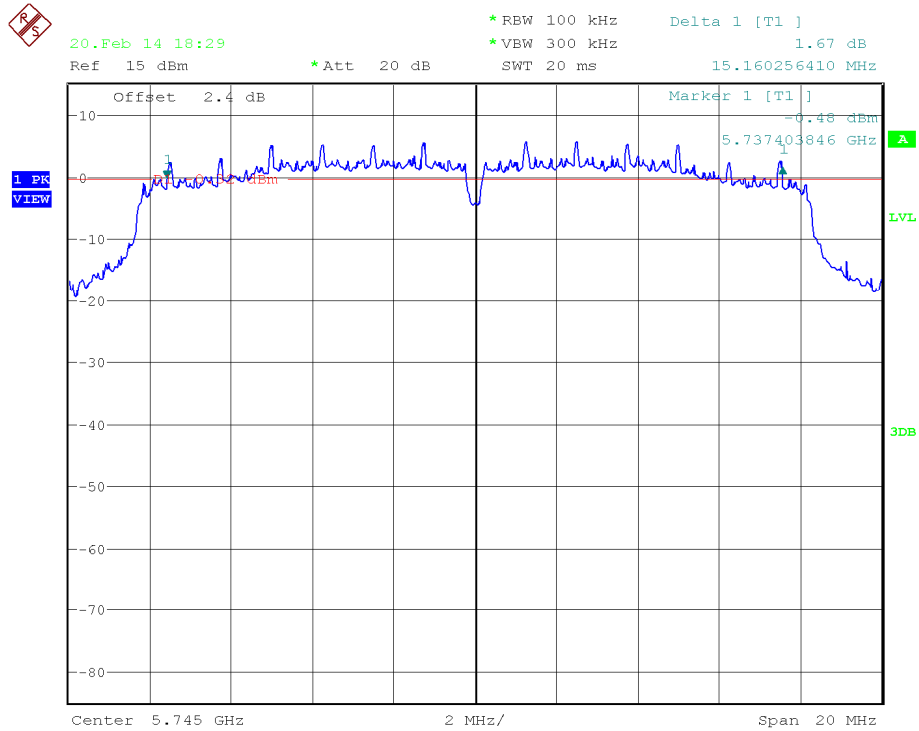
4. WiFi 5GHz 802.11 ac80 mode

|                               | Middle frequency |         |
|-------------------------------|------------------|---------|
|                               | 5775 MHz         |         |
|                               | Chain A          | Chain B |
| 6 dB Spectrum bandwidth (MHz) | 75.256           | 75.256  |
| Measurement uncertainty (kHz) | ±21.7            |         |

Verdict: PASS

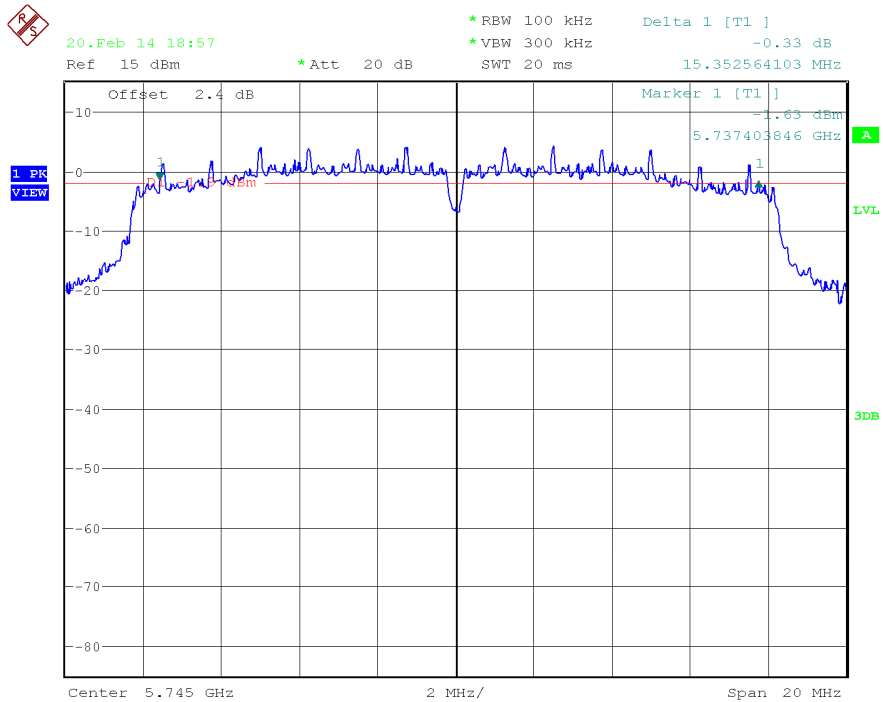
### 1. WiFi 5GHz 802.11 a mode

Lowest Channel: 5745 MHz. Chain A



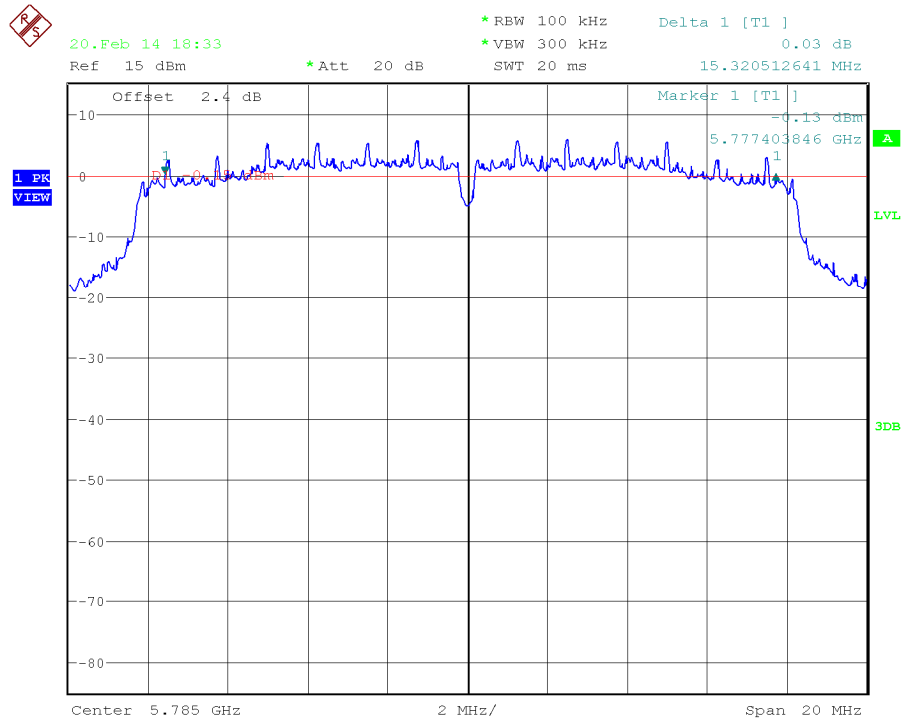
Date: 20.FEB.2014 18:29:34

Lowest Channel: 5745 MHz. Chain B



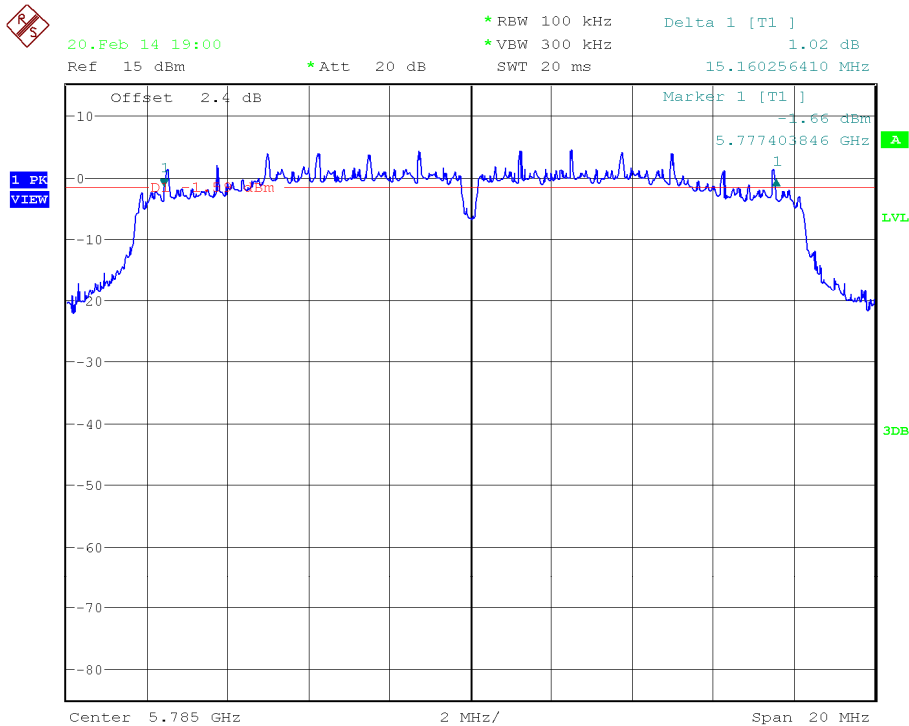
Date: 20.FEB.2014 18:57:40

Middle Channel: 5785 MHz. Chain A



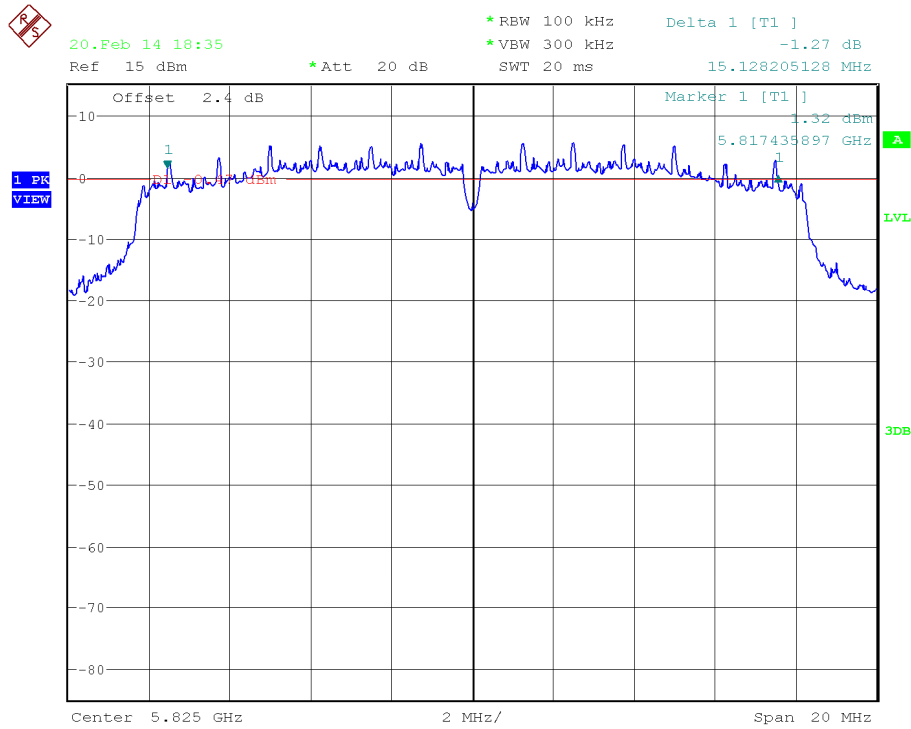
Date: 20.FEB.2014 18:33:04

Middle Channel: 5785 MHz. Chain B



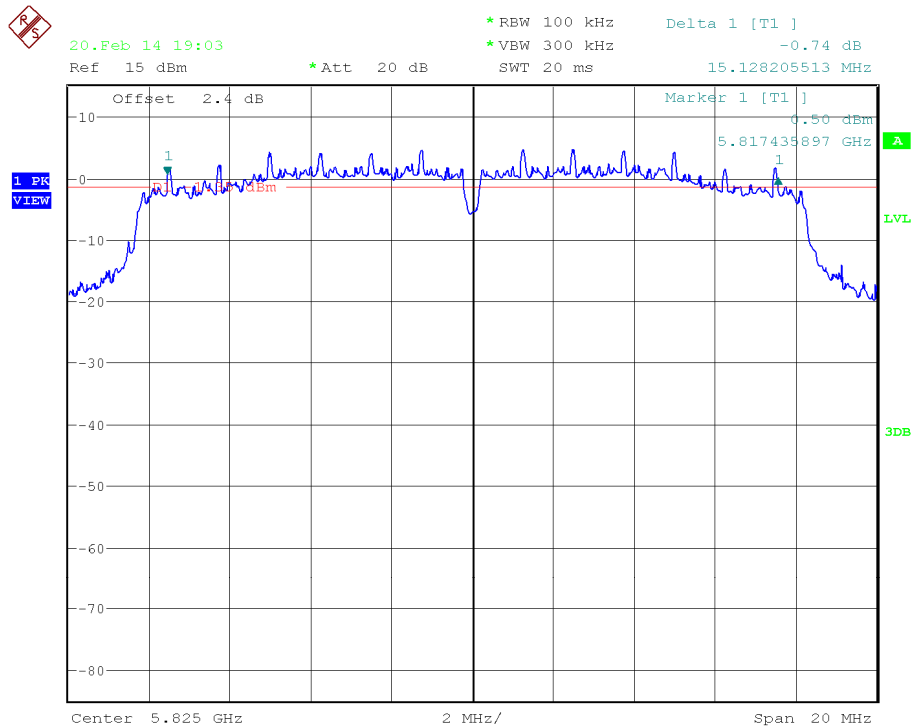
Date: 20.FEB.2014 19:00:45

### Highest Channel: 5825 MHz. Chain A



Date: 20.FEB.2014 18:35:35

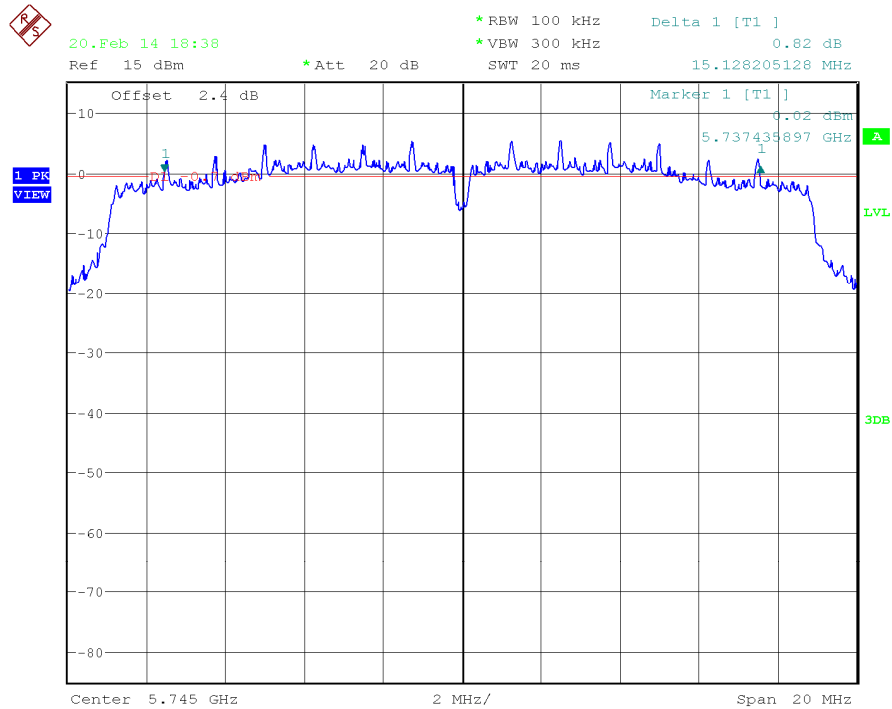
### Highest Channel: 5825 MHz. Chain B



Date: 20.FEB.2014 19:03:18

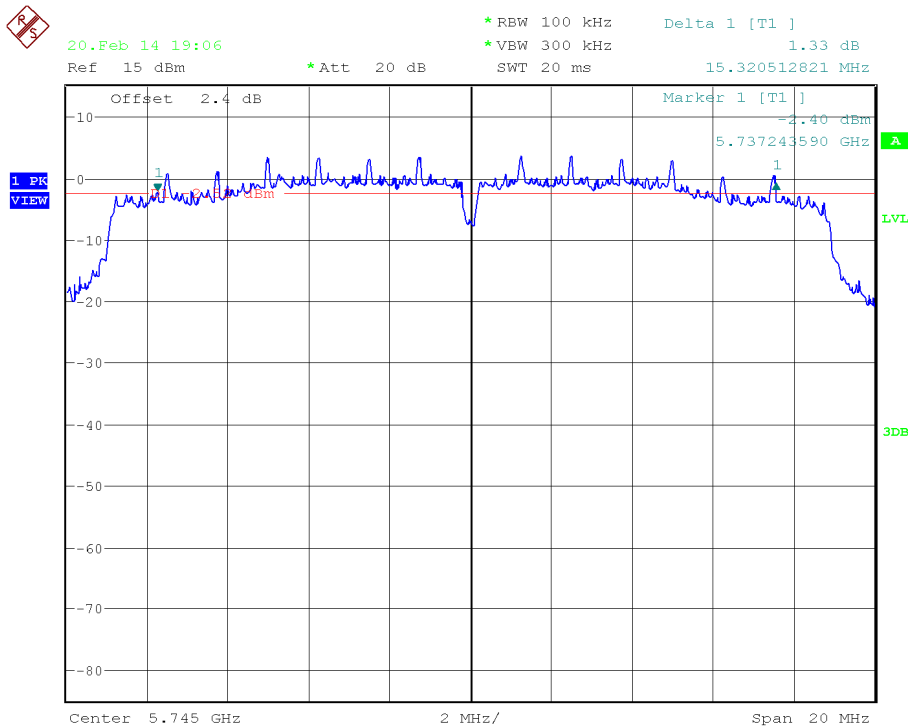
## 2. WiFi 5GHz 802.11 n20 mode

Lowest Channel: 5745 MHz. Chain A



Date: 20.FEB.2014 18:38:30

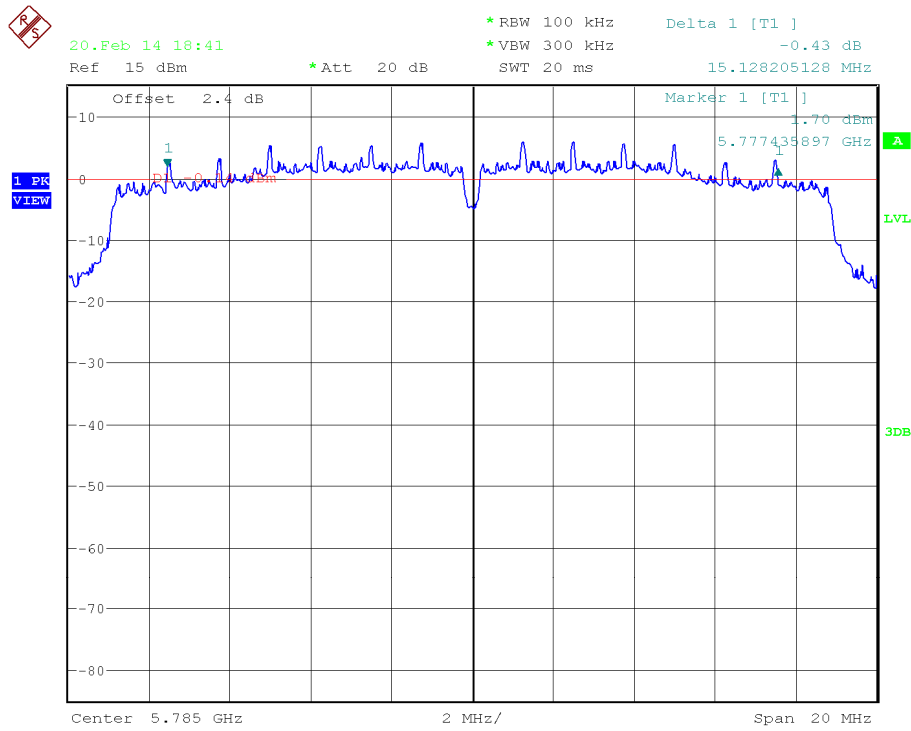
Lowest Channel: 5745 MHz. Chain B



Date: 20.FEB.2014 19:06:51

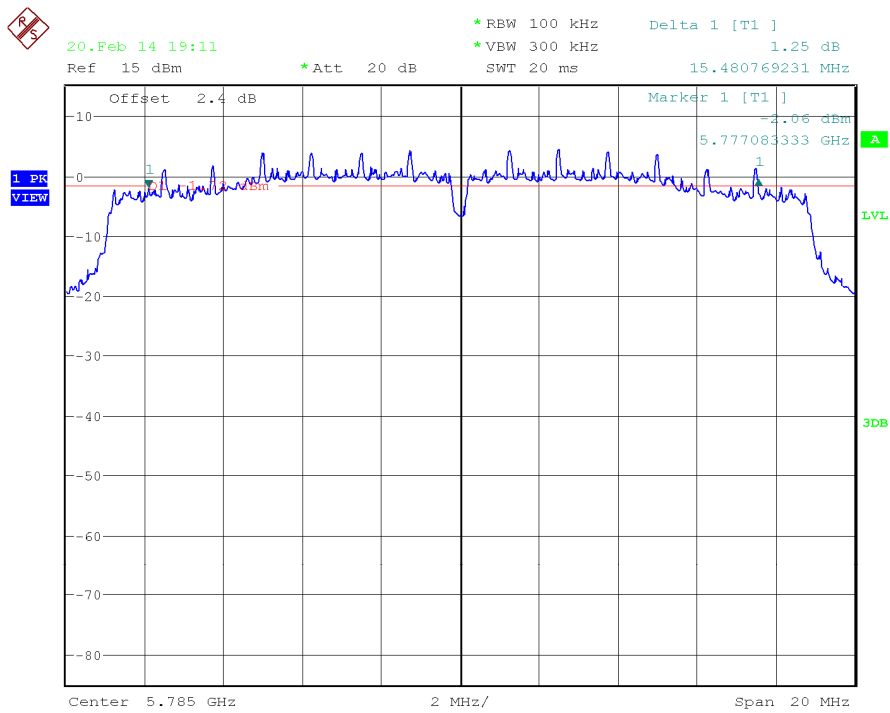


Middle Channel: 5785 MHz. Chain A



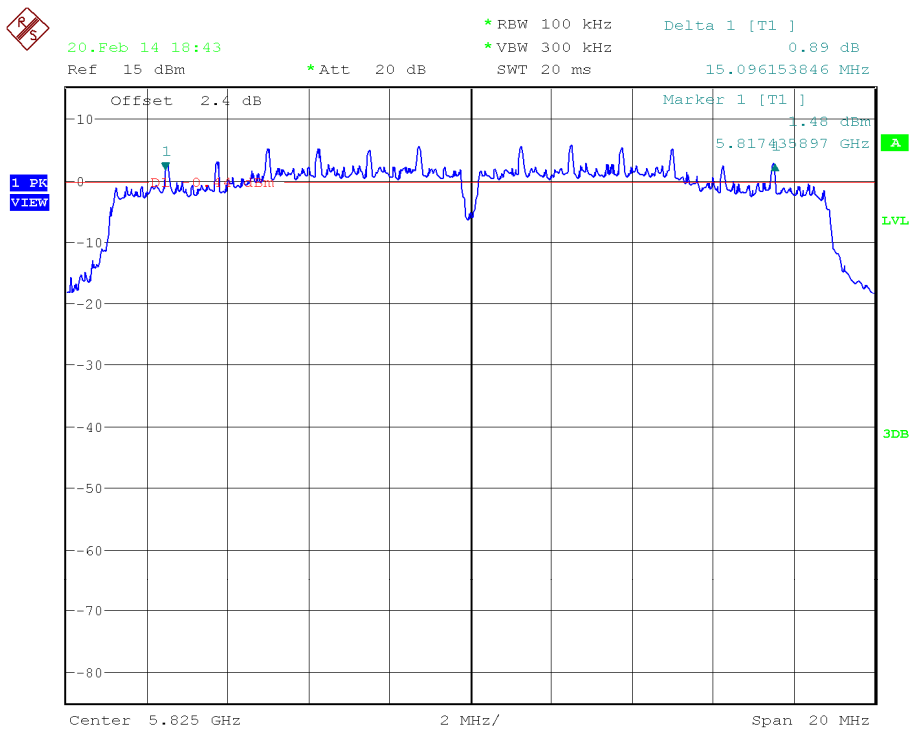
Date: 20.FEB.2014 18:41:41

Middle Channel: 5785 MHz. Chain B



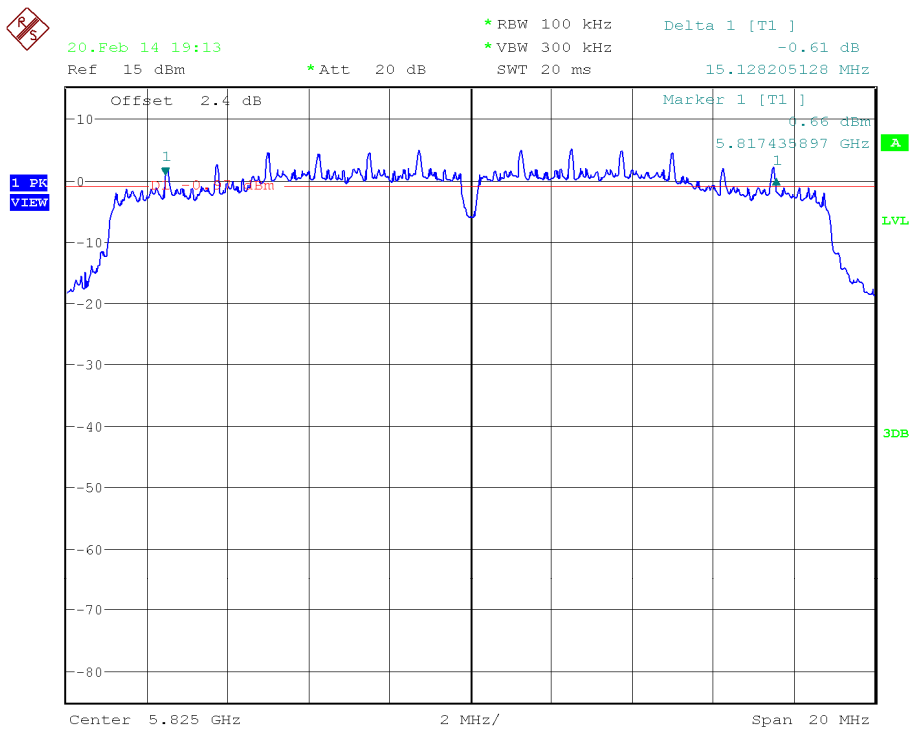
Date: 20.FEB.2014 19:11:10

Highest Channel: 5825 MHz. Chain A



Date: 20.FEB.2014 18:43:54

Highest Channel: 5825 MHz. Chain B



Date: 20.FEB.2014 19:13:39