

9.5.5.6 Chain A+B 802.11ac VHT80 Maximum Power Spectral Density

Chain A+B 802.11ac VHT80 Maximum Power Spectral Density/MHz						
Channel No.	Frequency (MHz)	Chain A (dBm)	Chain B (dBm)	Total PSD (dBm/MHz)	15.407 Limit (dBm/MHz)	RSS-247 Limit (dBm/MHz)
42	5210	-9.76	-9.54	-6.64	11	10
58	5290	-9.86	-9.89	-6.86	11	10
106	5530	-10.26	-10.54	-7.39	11	11
122	5610	-10.43	-10.74	-7.57	11	11
138	5690	-9.92	-9.83	-6.86	11	11

Chain A+B 802.11ac HT80 Maximum Power Spectral Density/500kHz						
Channel No.	Frequency (MHz)	Chain A (dBm)	Chain B (dBm)	Total PSD (dBm/500kHz)	15.407 Limit (dBm/500kHz)	RSS-247 Limit (dBm/500kHz)
155	5755	-12.55	-12.61	-9.57	30	30

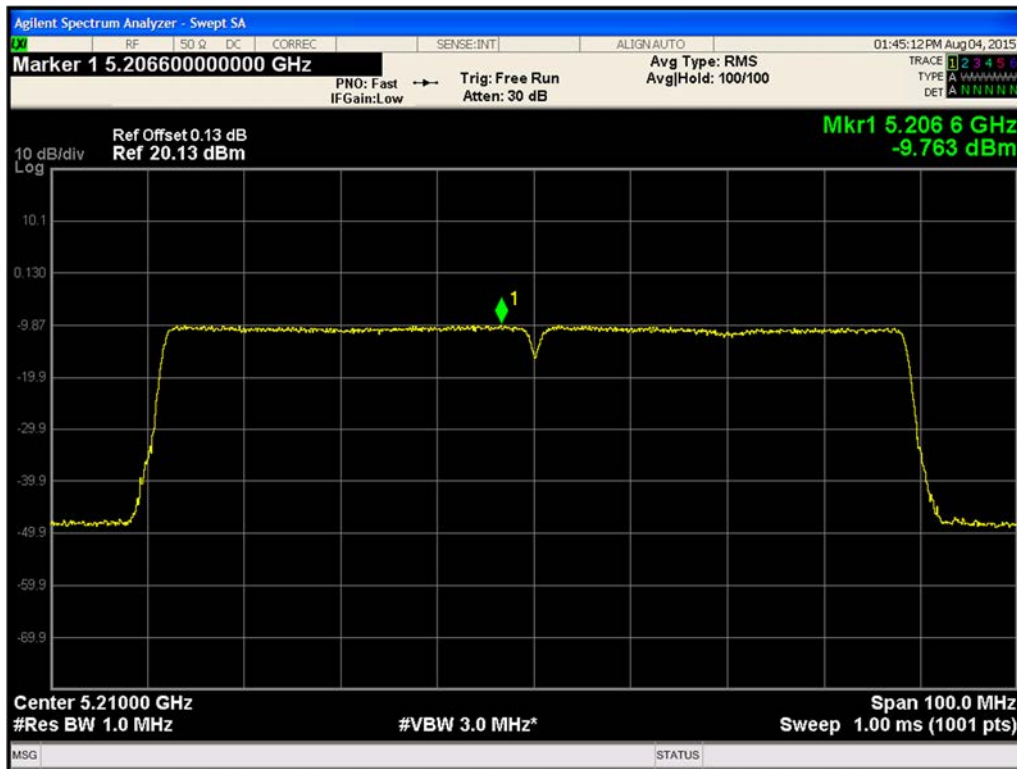


Figure 540. Maximum Power Spectral Density Chain A 802.11ac VHT80 (Ch. 42)

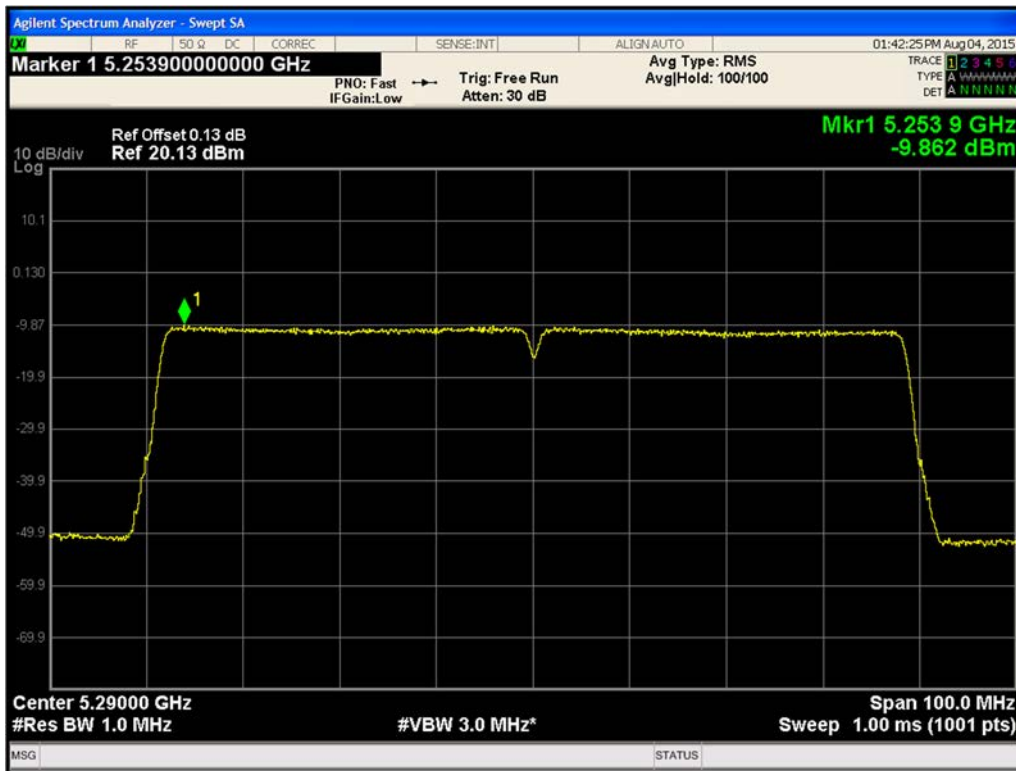


Figure 541. Maximum Power Spectral Density Chain A 802.11ac VHT80 (Ch. 58)

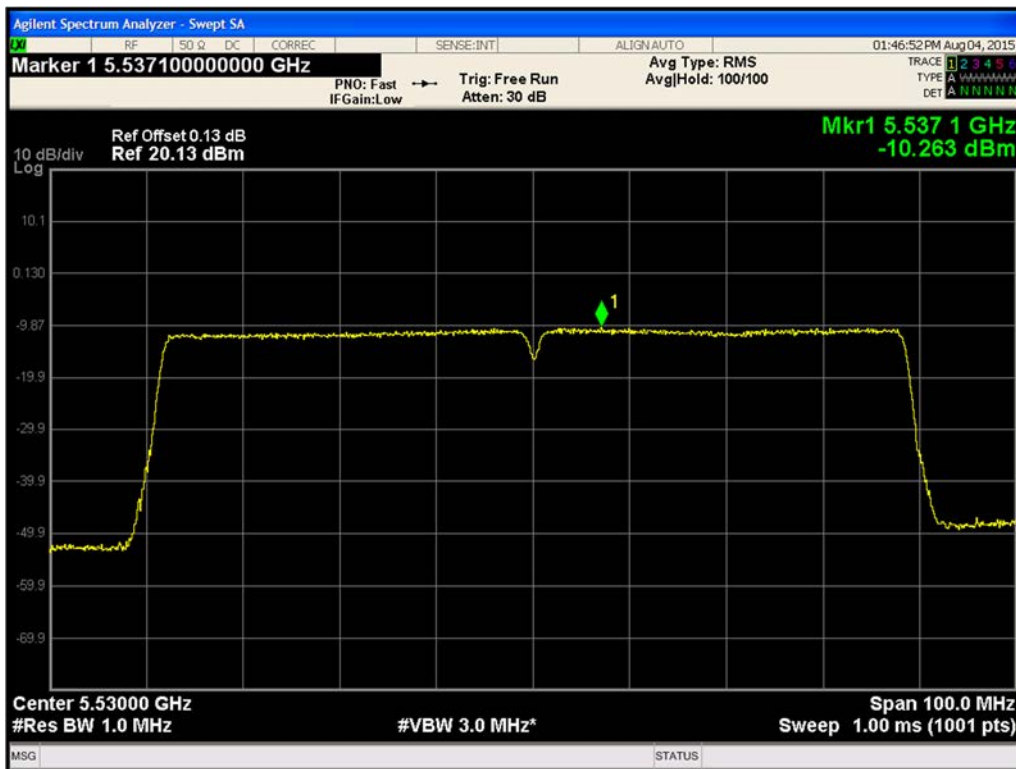


Figure 542. Maximum Power Spectral Density Chain A 802.11ac VHT80 (Ch. 106)

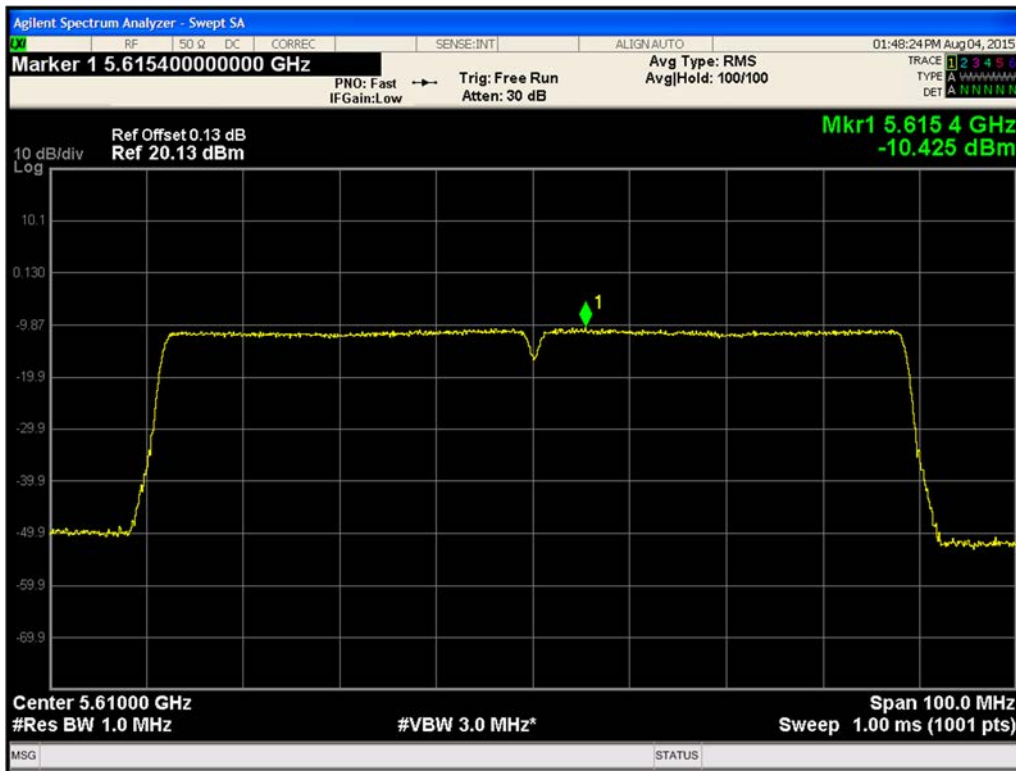


Figure 543. Maximum Power Spectral Density Chain A 802.11ac VHT80 (Ch. 122)

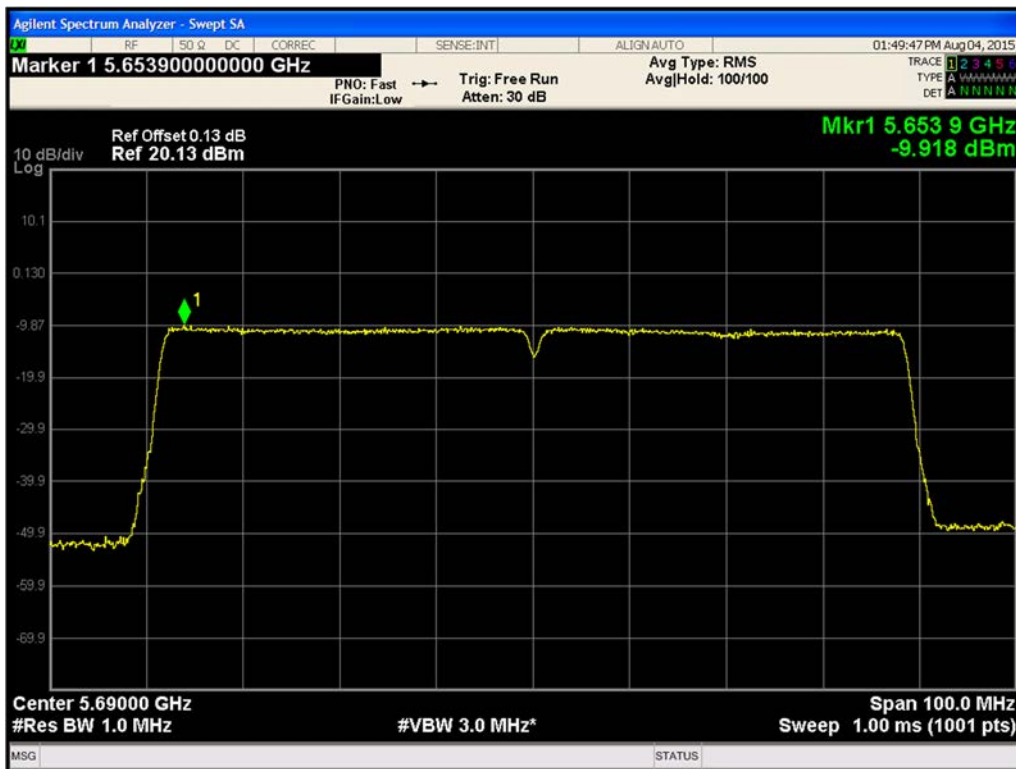


Figure 544. Maximum Power Spectral Density Chain A 802.11ac VHT80 (Ch. 138)

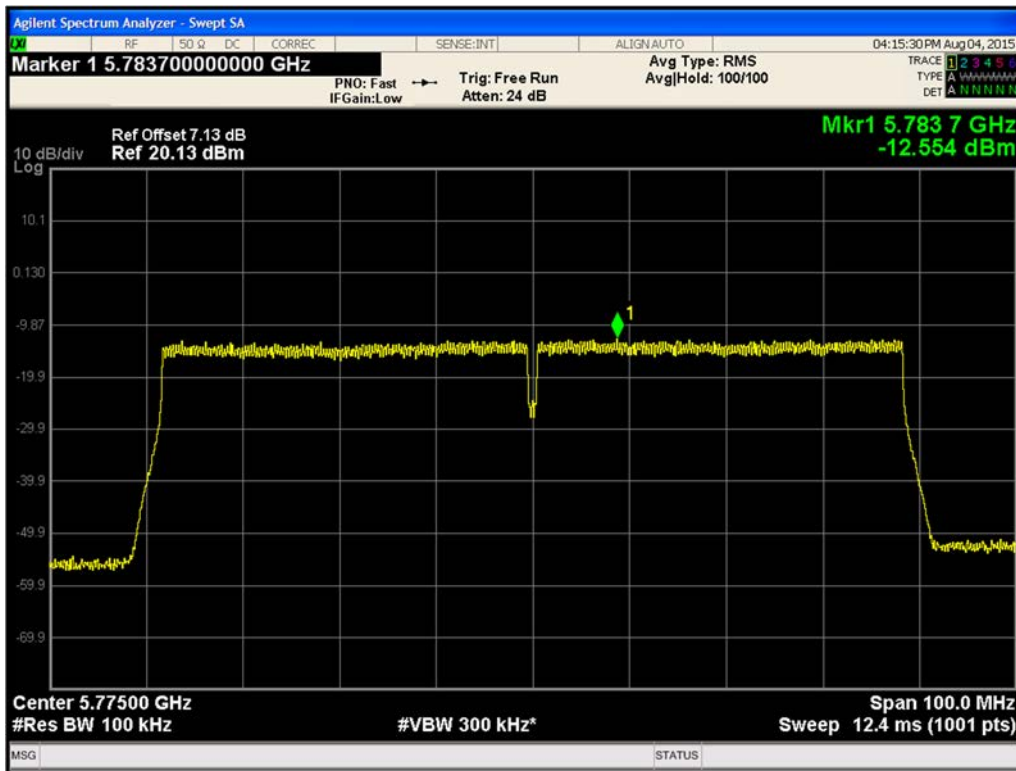


Figure 545. Maximum Power Spectral Density Chain A 802.11ac VHT80 (Ch. 5775)

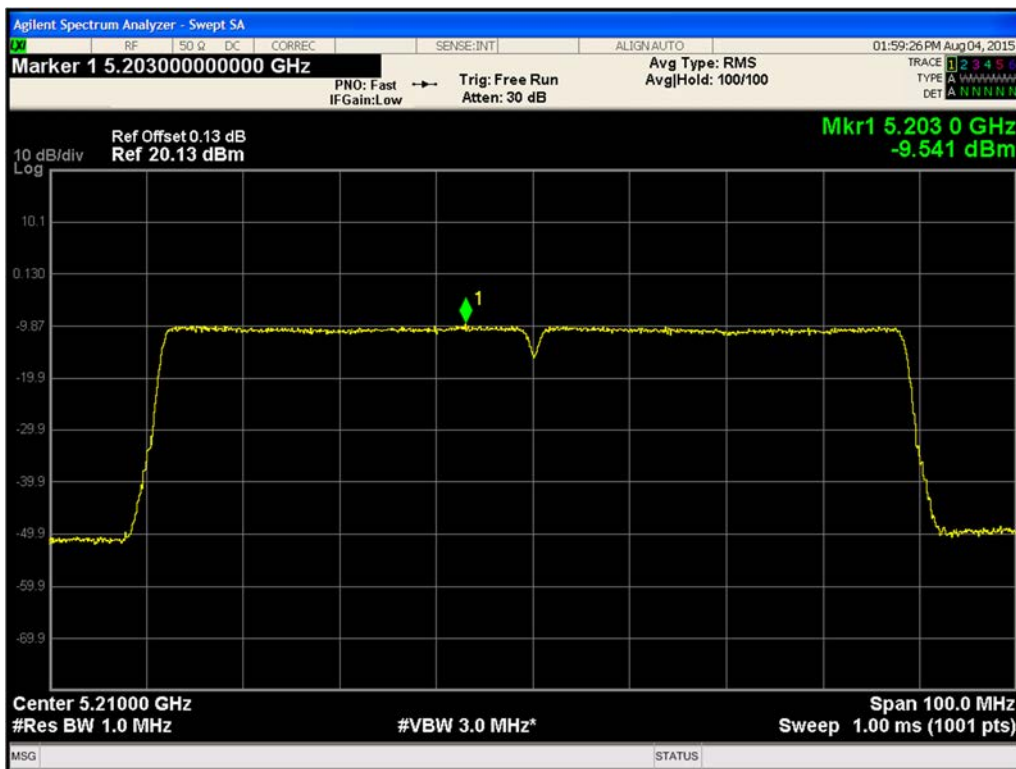


Figure 546. Maximum Power Spectral Density Chain B 802.11ac VHT80 (Ch. 42)

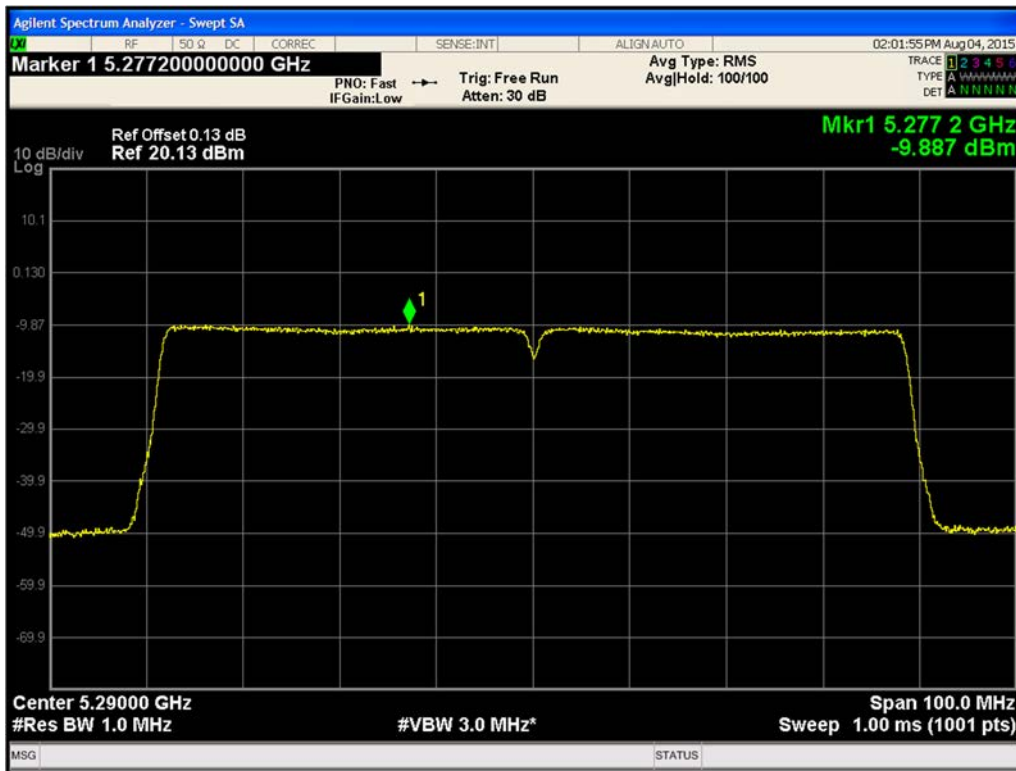


Figure 547. Maximum Power Spectral Density Chain B 802.11ac VHT80 (Ch. 58)

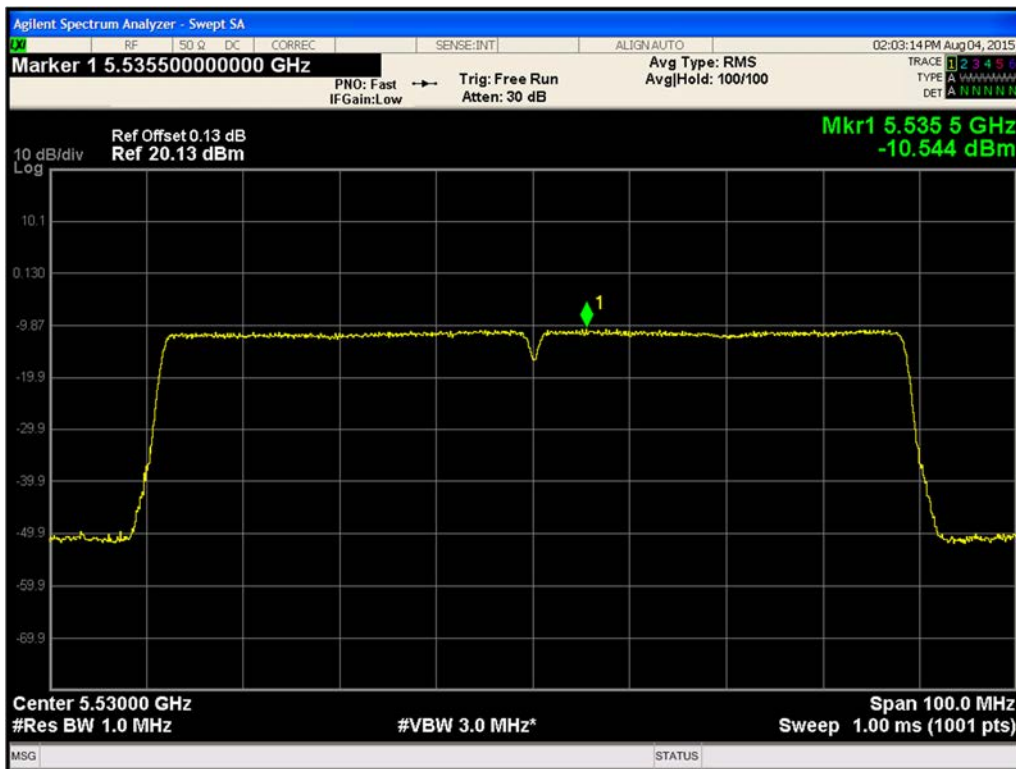


Figure 548. Maximum Power Spectral Density Chain B 802.11ac VHT80 (Ch. 106)

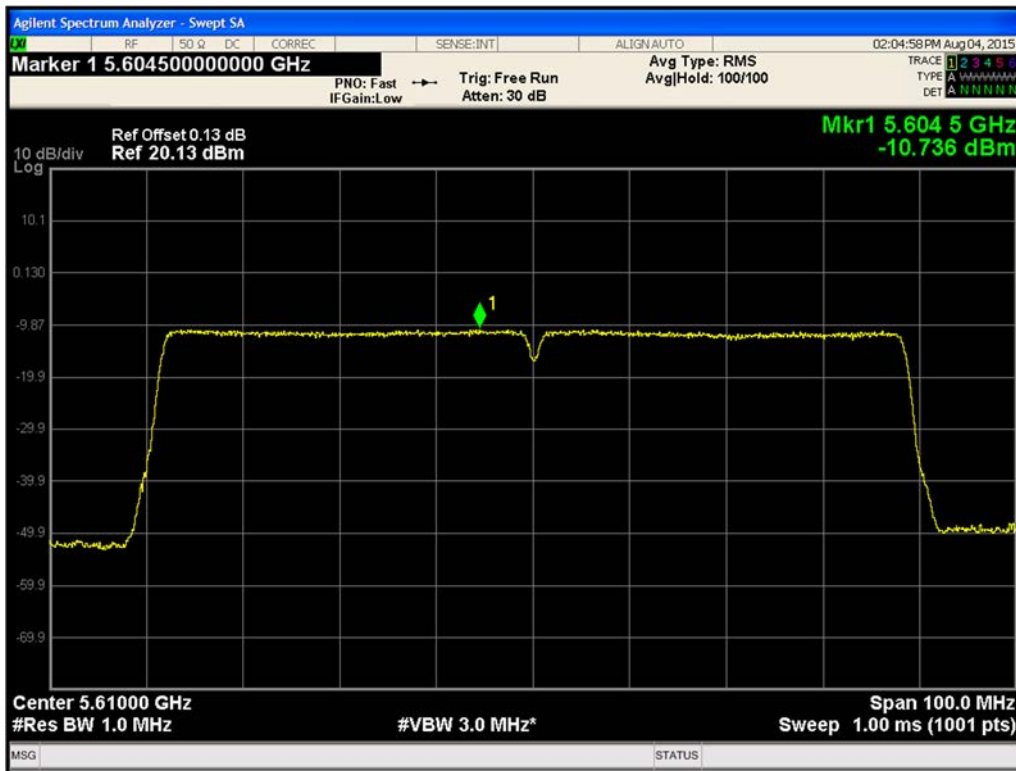


Figure 549. Maximum Power Spectral Density Chain B 802.11ac VHT80 (Ch. 122)

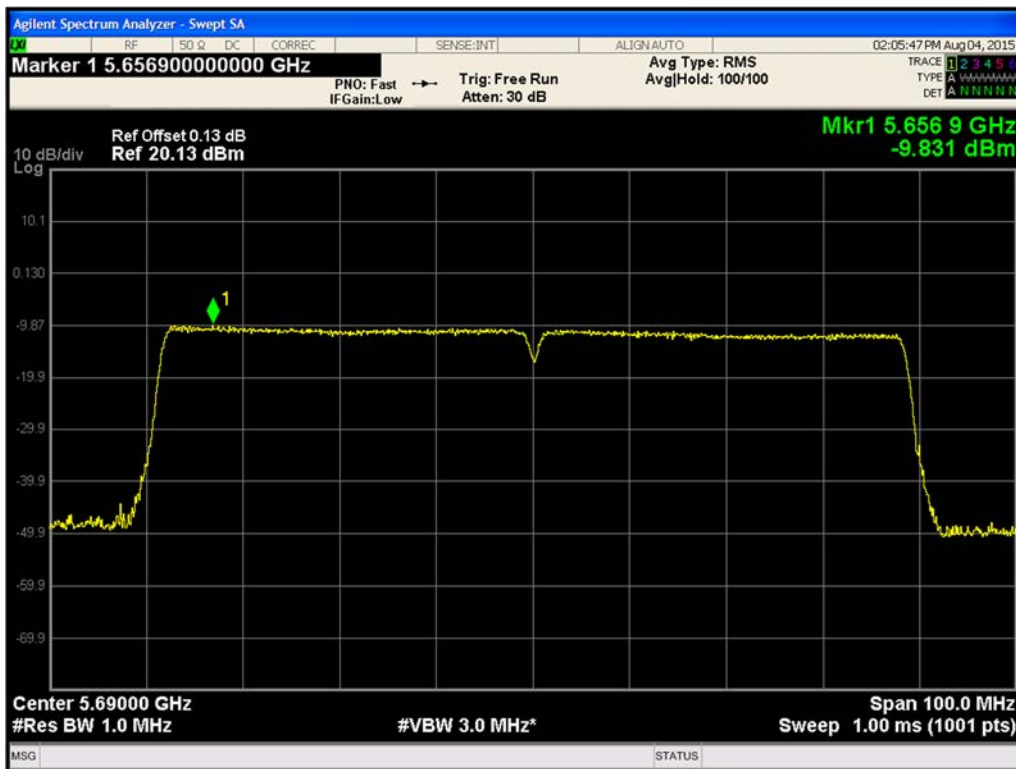


Figure 550. Maximum Power Spectral Density Chain B 802.11ac VHT80 (Ch. 138)

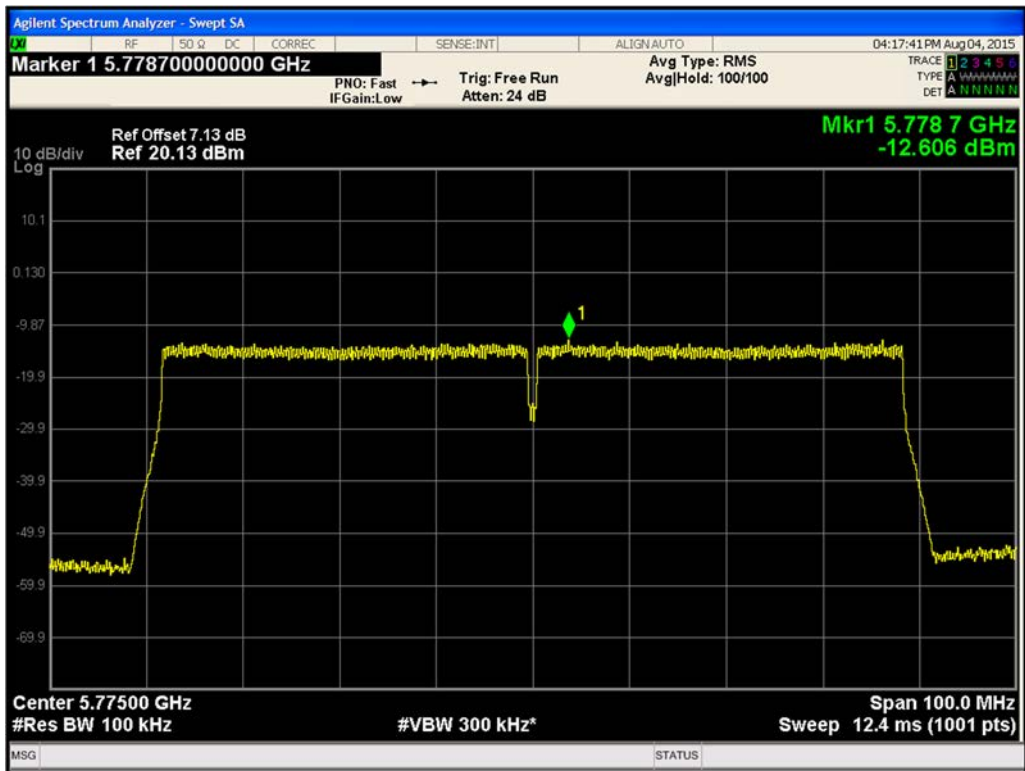


Figure 551. Maximum Power Spectral Density Chain B 802.11ac VHT80 (Ch. 155)

## 9.6 Conducted Band Edge Emissions

### 9.6.1 Test Requirement:

FCC CFR 47 Rule Part 15.407 (b)

Industry Canada RSS-247 [6.2]

### 9.6.2 Test Method:

Measurements were performed according to the procedures defined in KDBs 789033- General UNII Test Procedures New Rules v01, 662911 D01 Multiple Transmitter Output v02r01, and ANSI C63.10 2013.

#### **Spectrum Analyzer settings:**

##### ***Band Edge Emissions:***

RBW= 1 MHz

VBW  $\geq$  3 MHz

Detector= Peak

Sweep time= Auto

Span = 10MHz

Allow sweeps to continue until the trace stabilizes.

Measure and add  $10 \log(N_{ANT})$ ,

where  $N_{ANT}$  is the number of transmit chains.

### 9.6.3 Limits:

All undesired emissions that fall outside of restricted bands shall maintain level  $\leq -27\text{dBm/MHz}$

### 9.6.4 Test Result:

Pass.



### 9.6.5 Test Data:

#### 9.6.5.1 Chain A 802.11a Conducted Band Edge Emissions

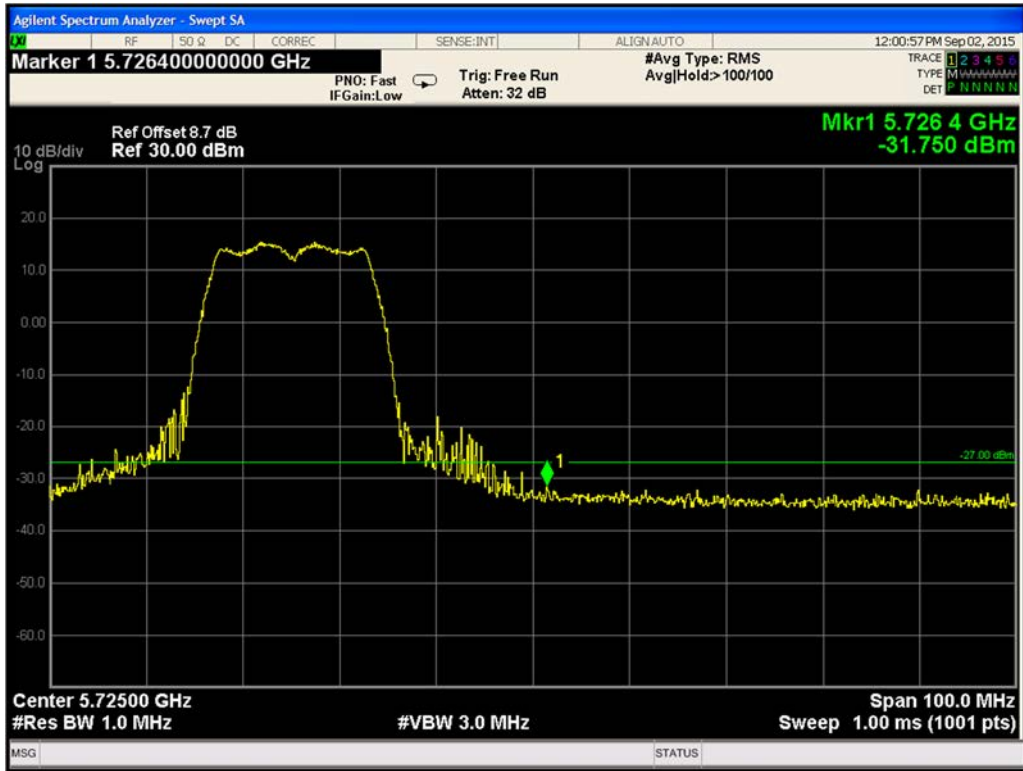


Figure 552. Conducted Band Edge Chain A 802.11a (Ch. 144)

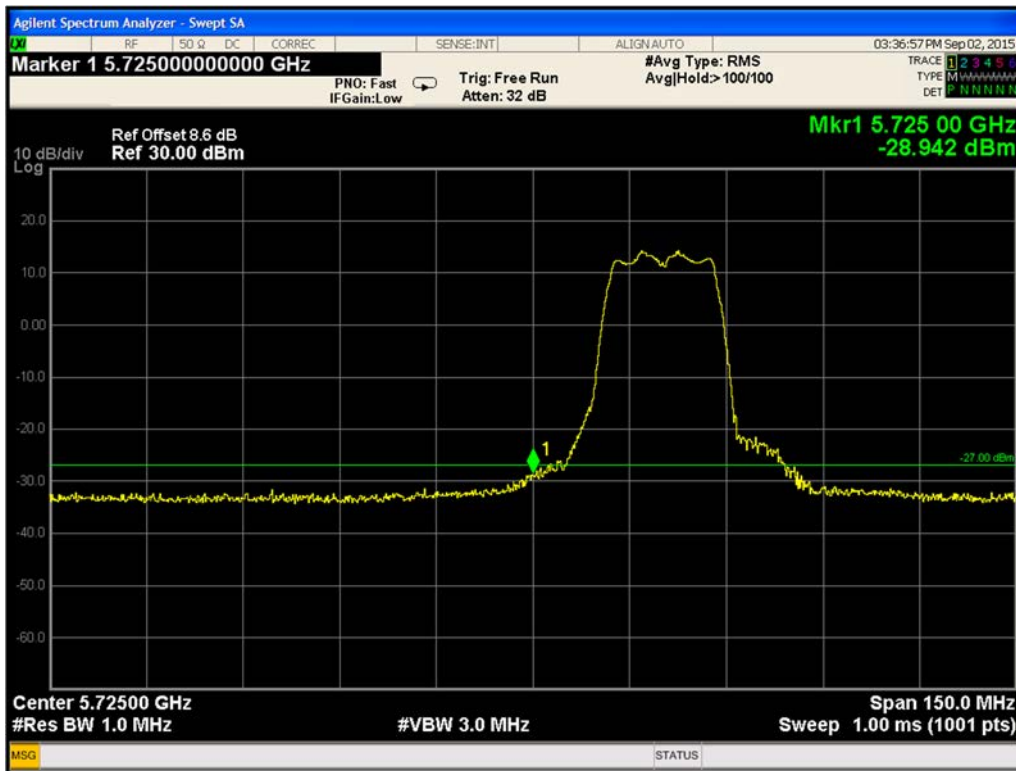


Figure 553. Conducted Band Edge Chain A 802.11a (Ch. 149)

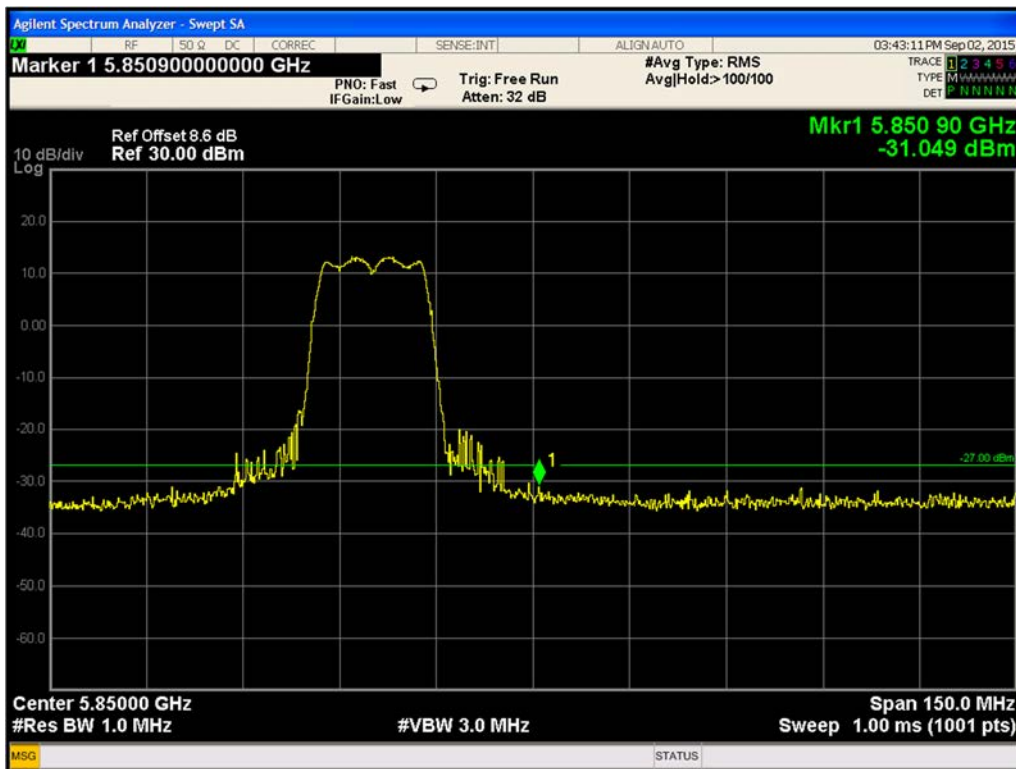


Figure 554. Conducted Band Edge Chain A 802.11a (Ch. 165)

9.6.5.2 Chain B 802.11a Conducted Band Edge Emissions

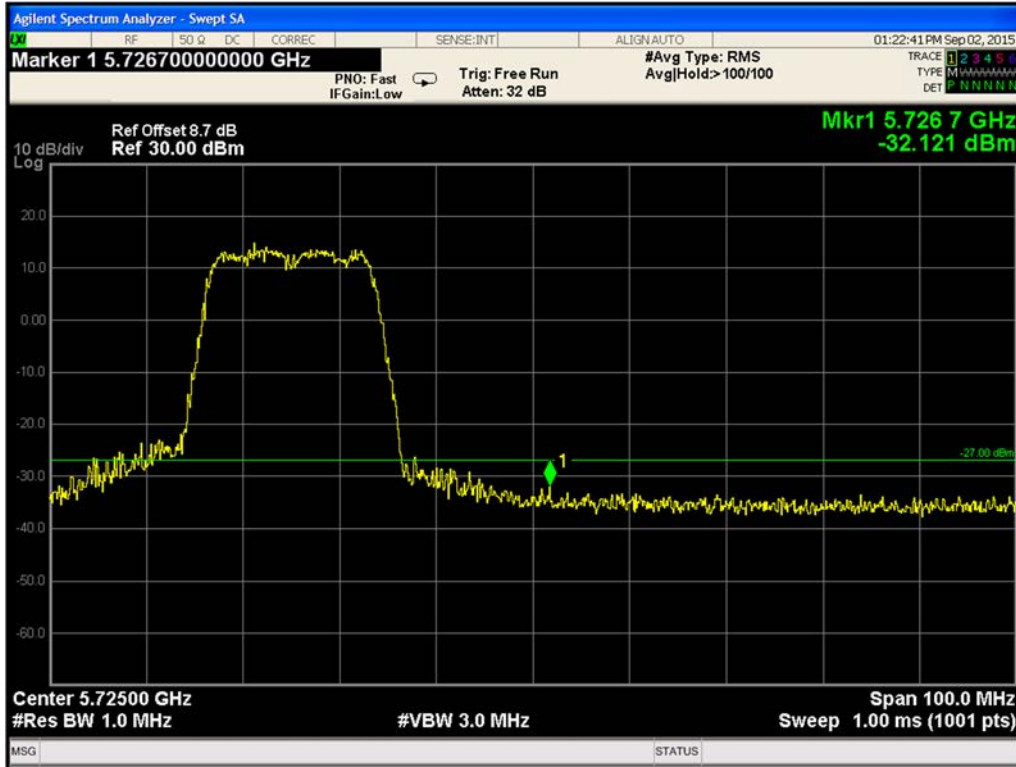


Figure 555. Conducted Band Edge Chain B 802.11a (Ch. 144)

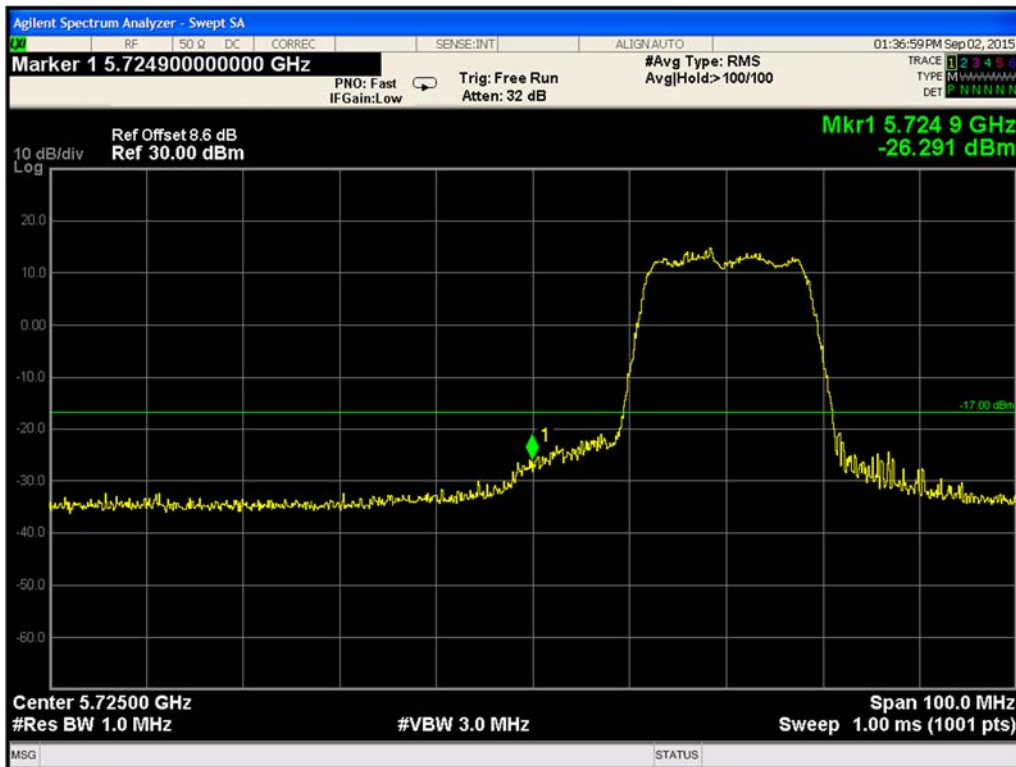


Figure 556. Conducted Band Edge Chain B 802.11a -17dBm Limit (Ch. 149)

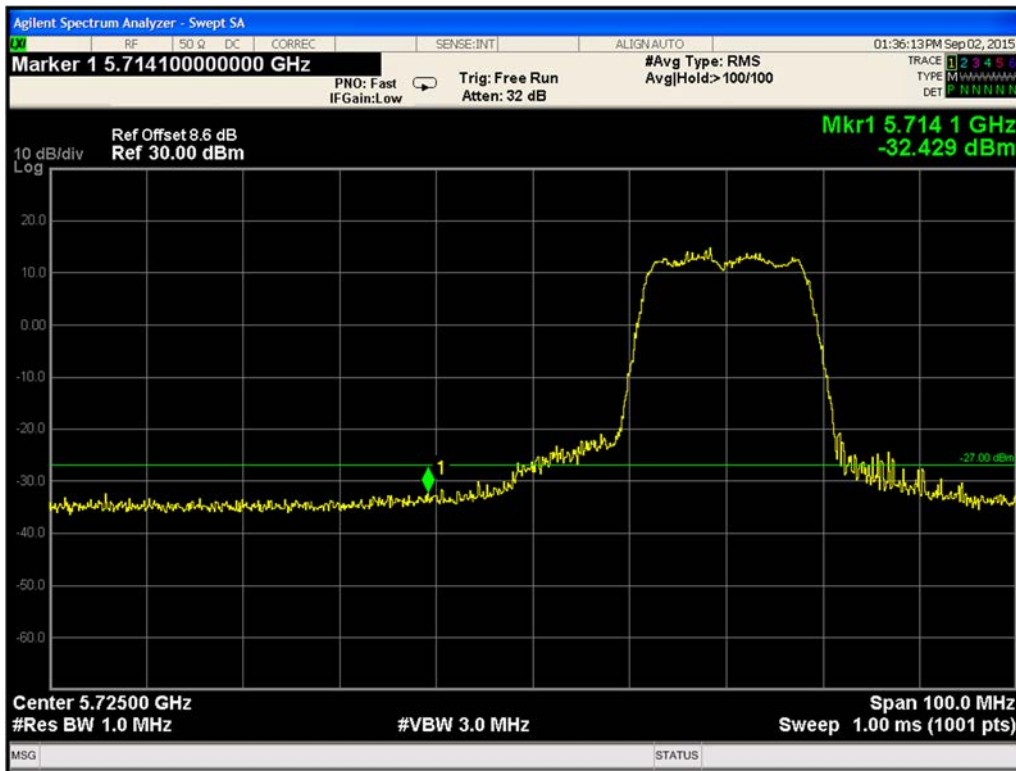


Figure 557. Conducted Band Edge Chain B 802.11a (Ch. 149)

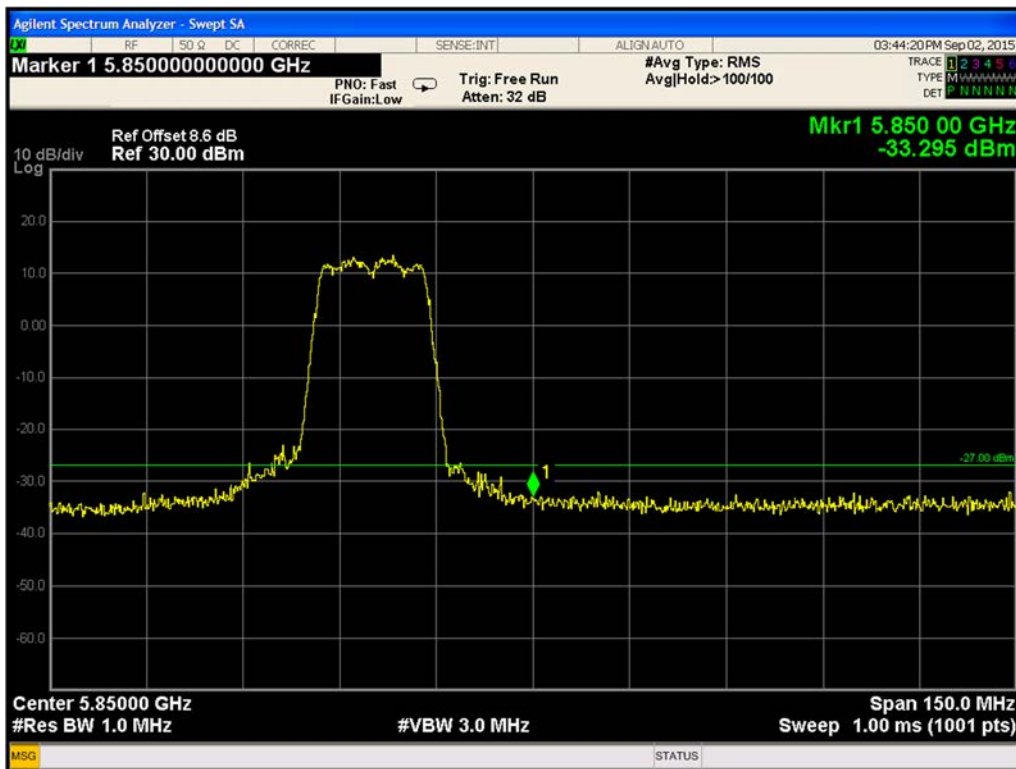


Figure 558. Conducted Band Edge Chain B 802.11a (Ch. 165)

9.6.5.3 Chain A 802.11n HT20 Conducted Band Edge Emissions

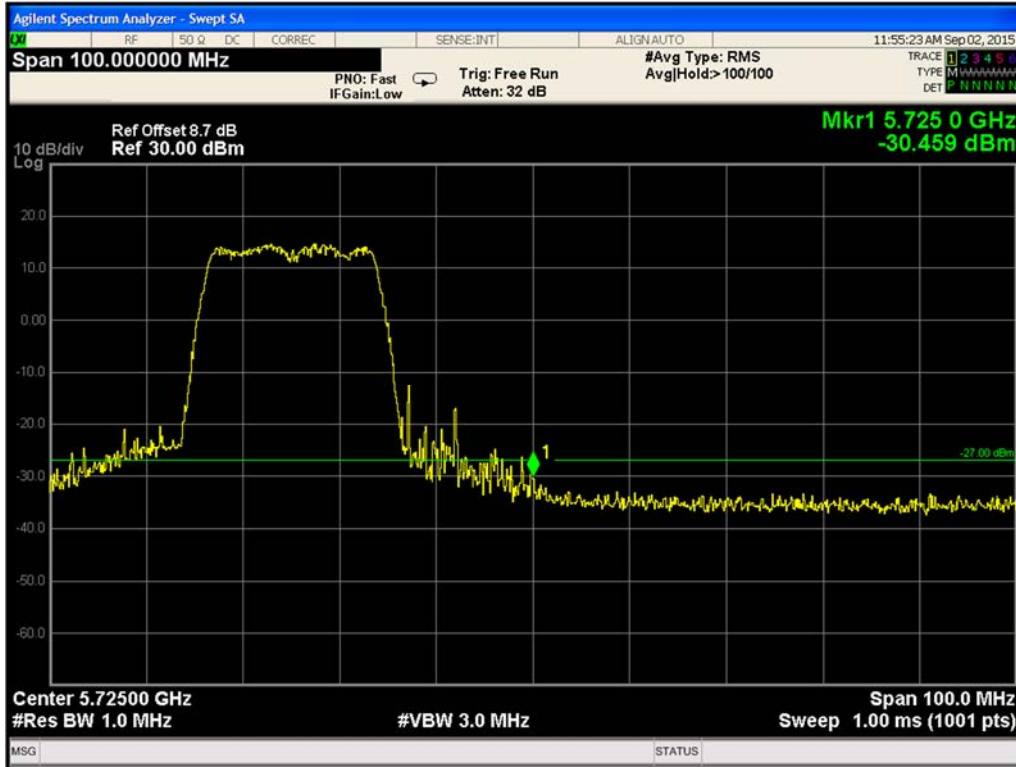


Figure 559. Conducted Band Edge Chain A 802.11n HT20 (Ch. 144)

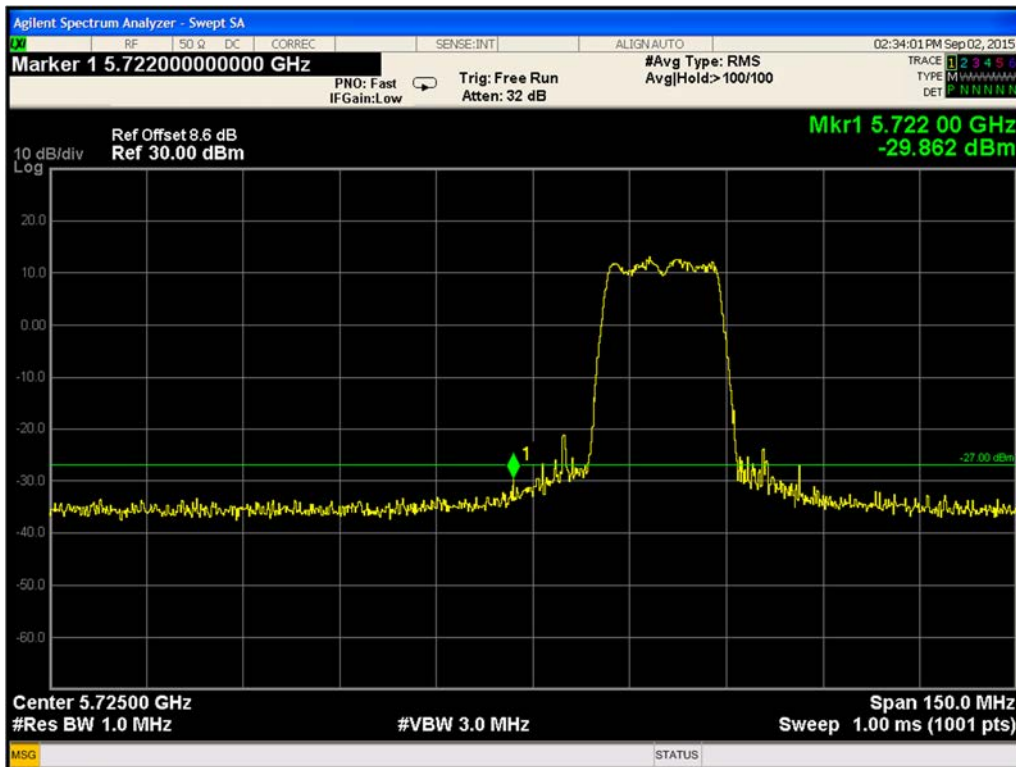


Figure 560. Conducted Band Edge Chain A 802.11n HT20 (Ch. 149)

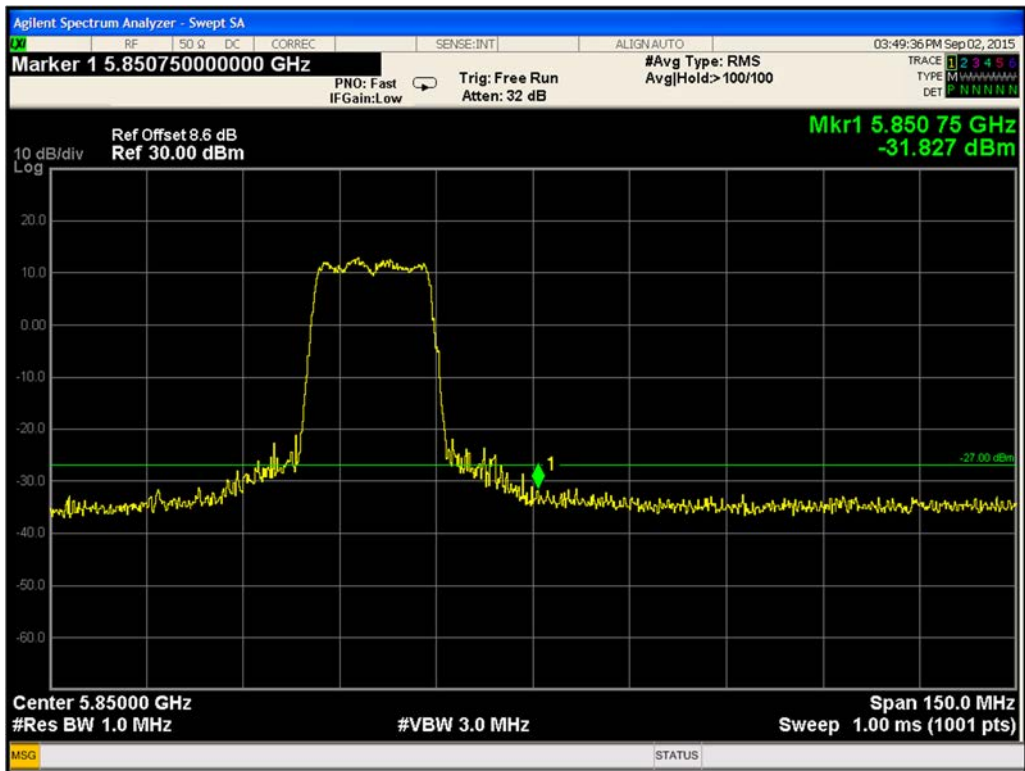


Figure 561. Conducted Band Edge Chain A 802.11n HT20 (Ch. 165)

9.6.5.4 Chain B 802.11n HT20 Conducted Band Edge Emissions

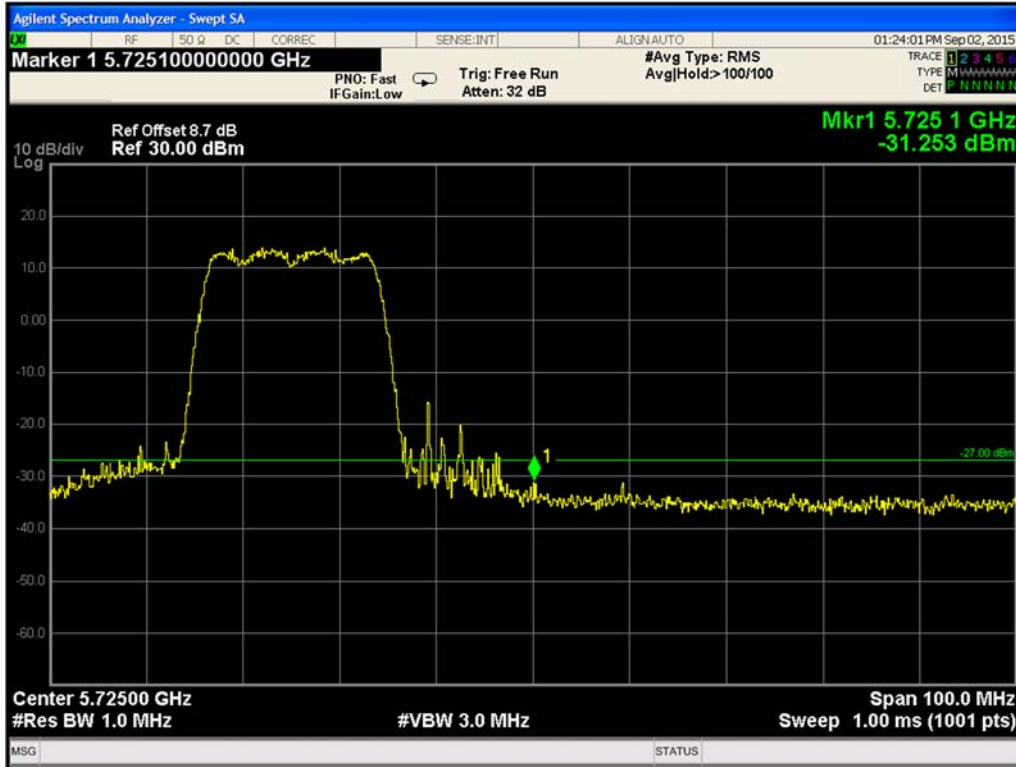


Figure 562. Conducted Band Edge Chain B 802.11n HT20 (Ch. 144)

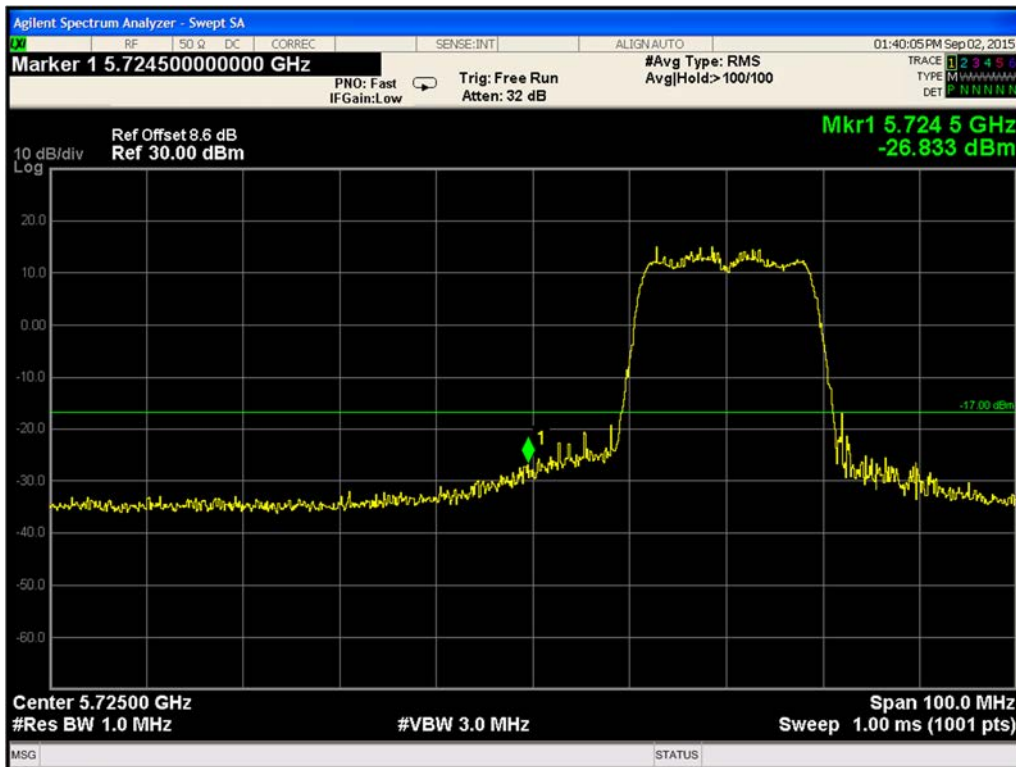


Figure 563. Conducted Band Edge Chain B 802.11n HT20 -17dBm Limit (Ch. 149)

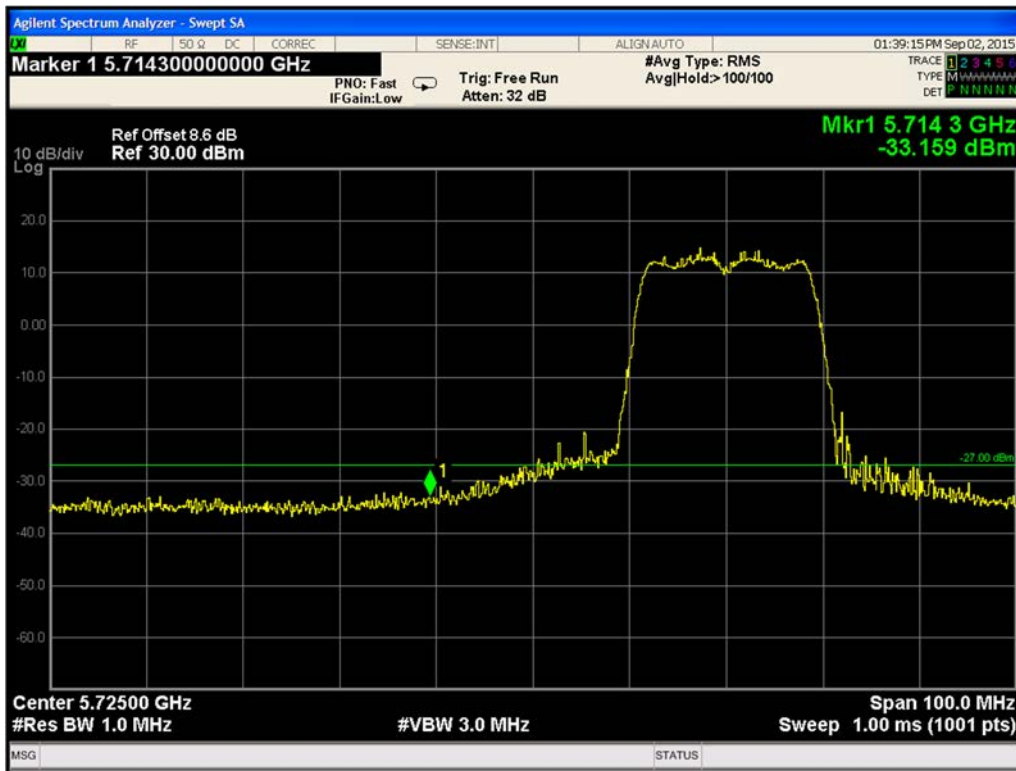


Figure 564. Conducted Band Edge Chain B 802.11n HT20 (Ch. 149)

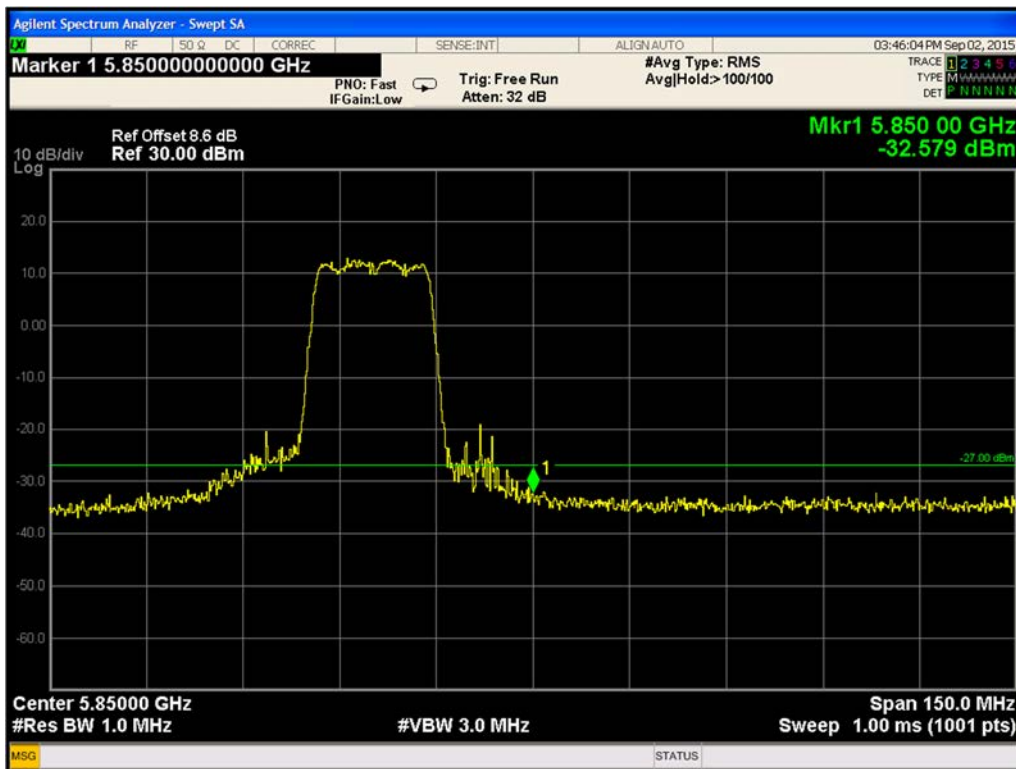


Figure 565. Conducted Band Edge Chain B 802.11n HT20 (Ch. 165)



9.6.5.5 Chain A 802.11ac VHT20 Conducted Band Edge Emissions



Figure 566. Conducted Band Edge Chain A 802.11ac VHT20 (Ch. 144)

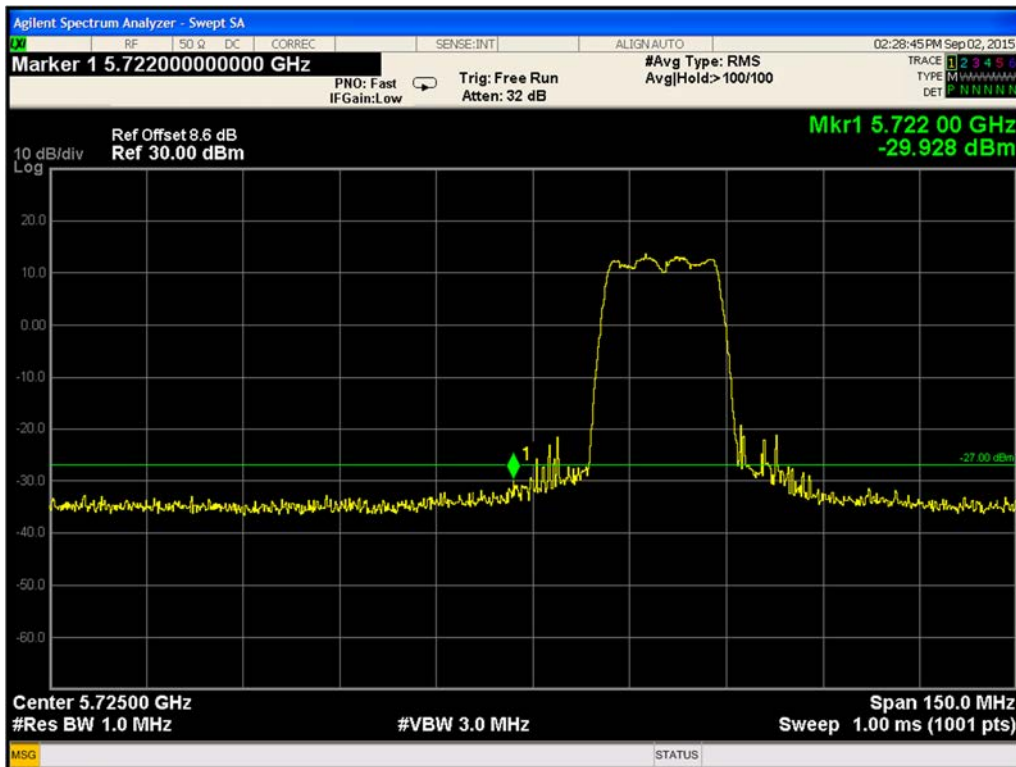


Figure 567. Conducted Band Edge Chain A 802.11ac VHT20 (Ch. 149)

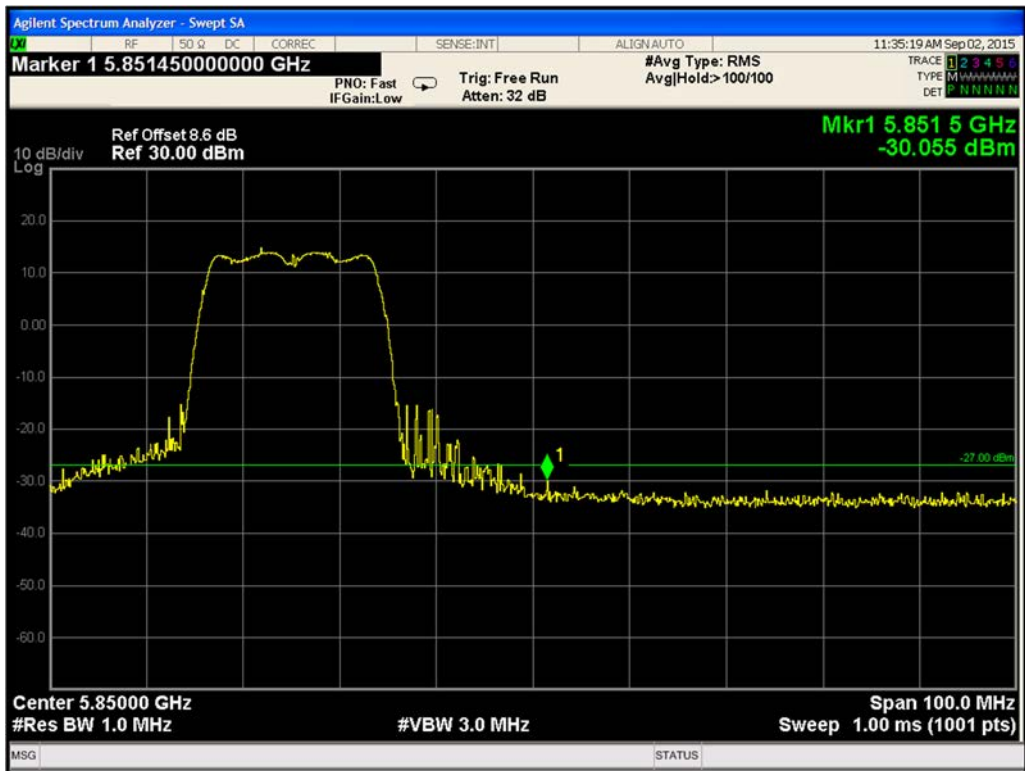


Figure 568. Conducted Band Edge Chain A 802.11ac VHT20 (Ch. 165)

9.6.5.6 Chain B 802.11ac VHT20 Conducted Band Edge Emissions

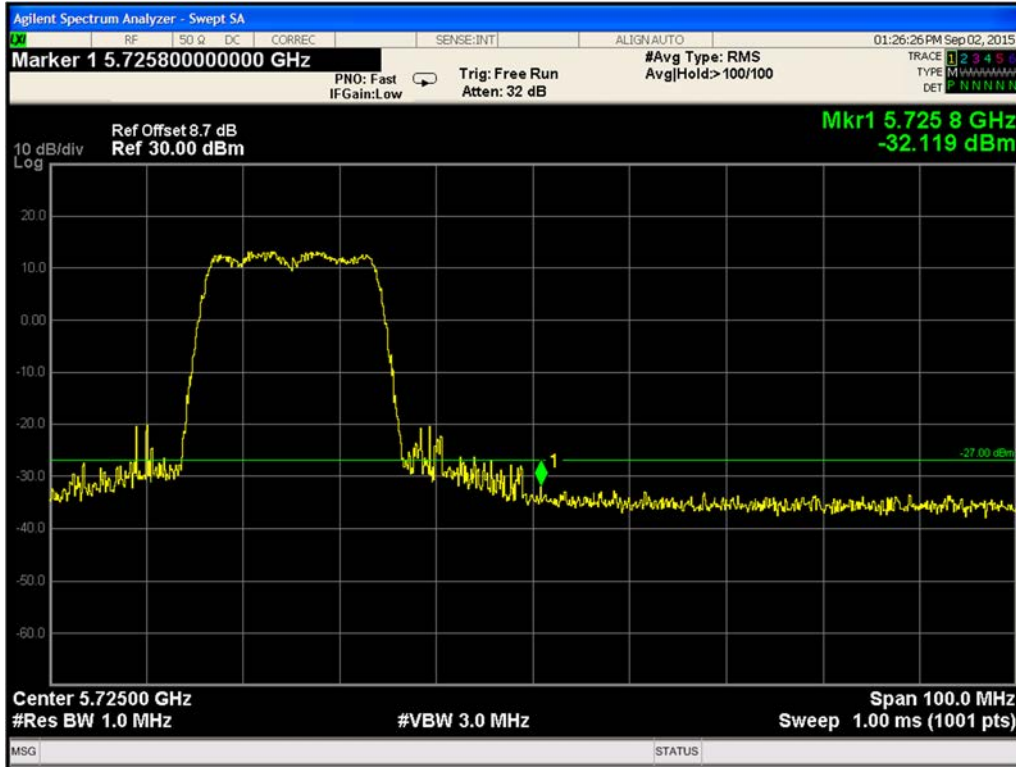


Figure 569. Conducted Band Edge Chain B 802.11ac VHT20 (Ch. 144)

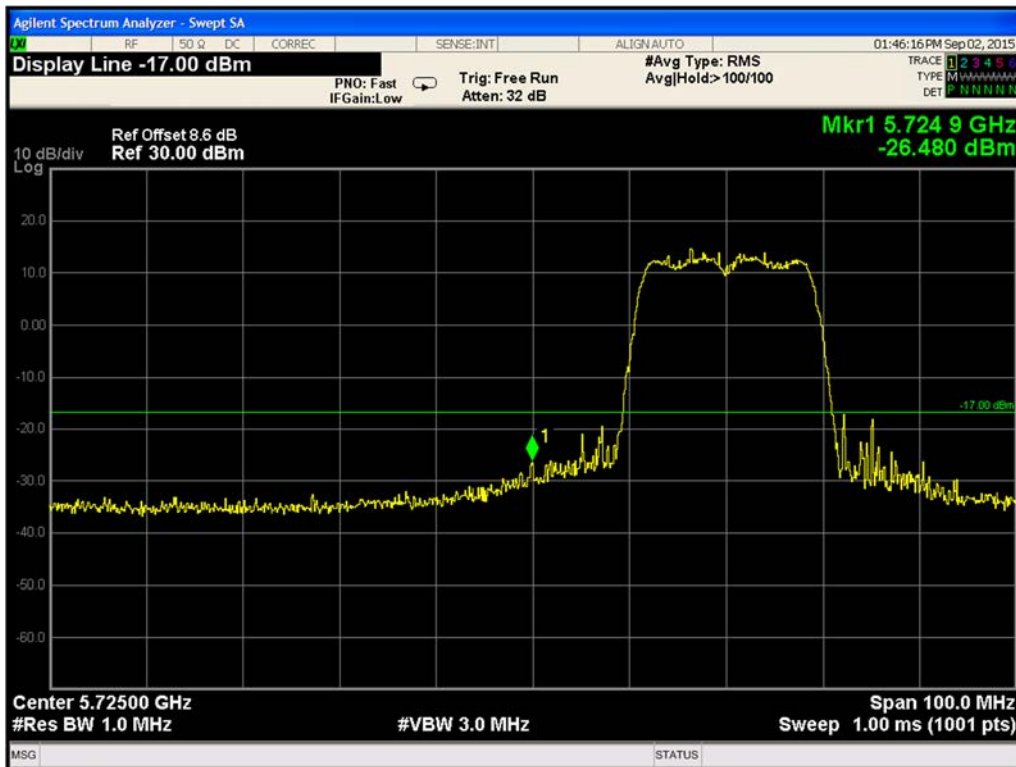


Figure 570. Conducted Band Edge Chain B 802.11ac VHT20 -17dBm (Ch. 149)

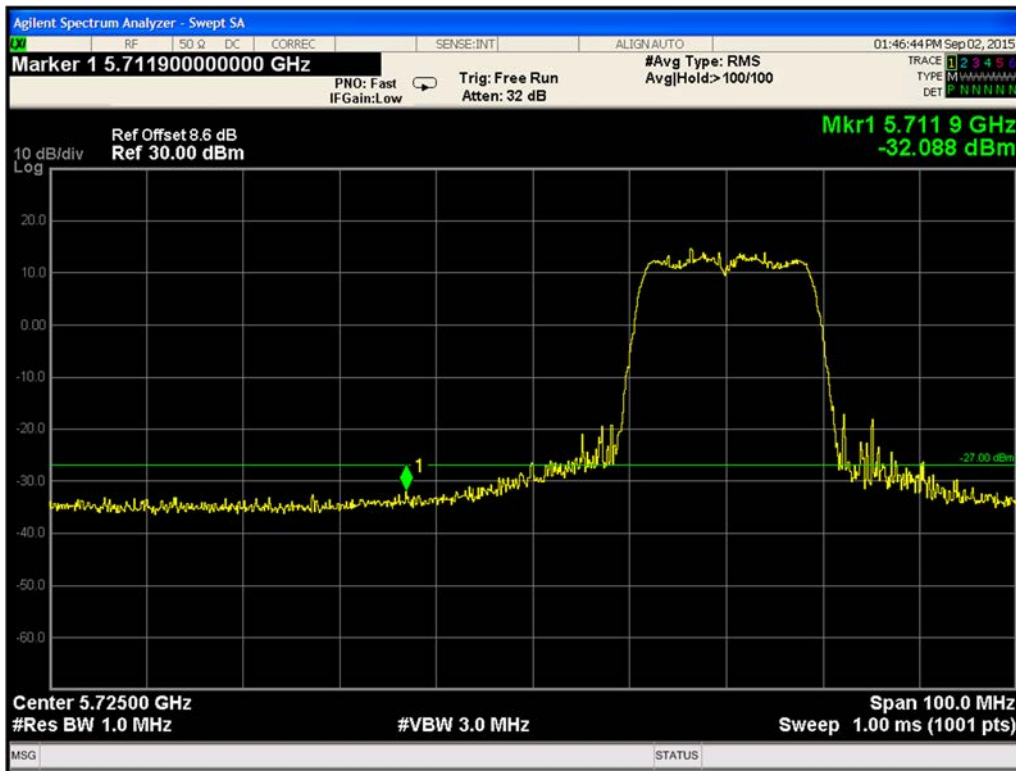


Figure 571. Conducted Band Edge Chain B 802.11ac VHT20 (Ch. 149)

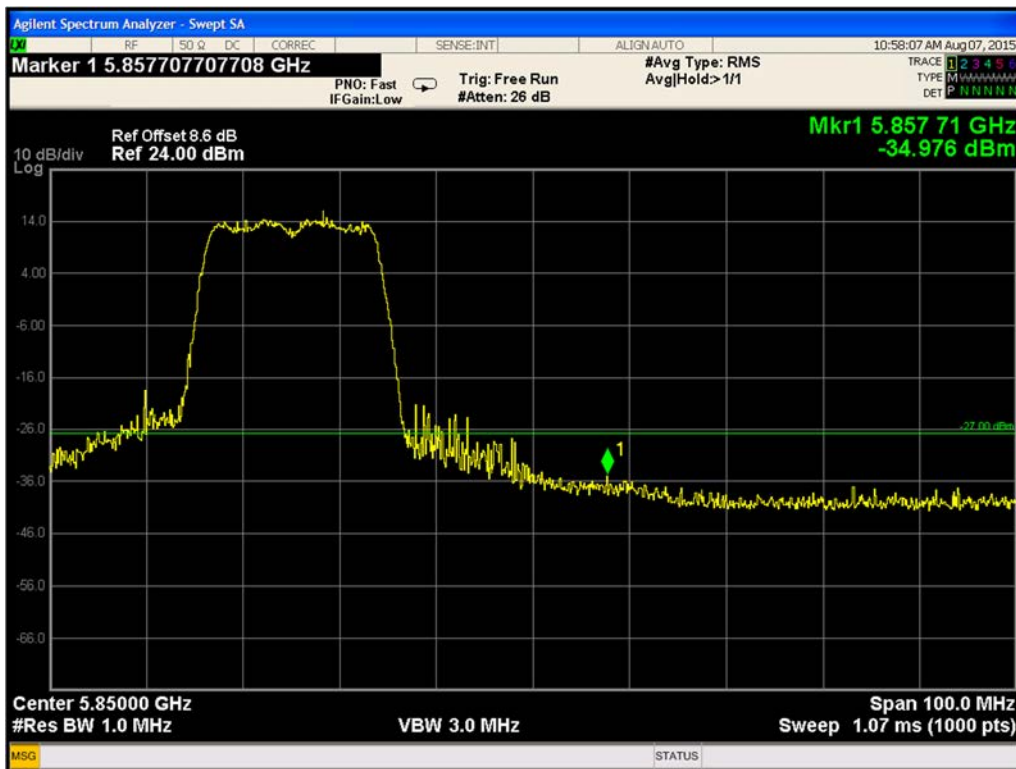


Figure 572. Conducted Band Edge Chain B 802.11ac VHT20 (Ch. 165)

9.6.5.7 Chain A 802.11n HT40 Conducted Band Edge Emissions

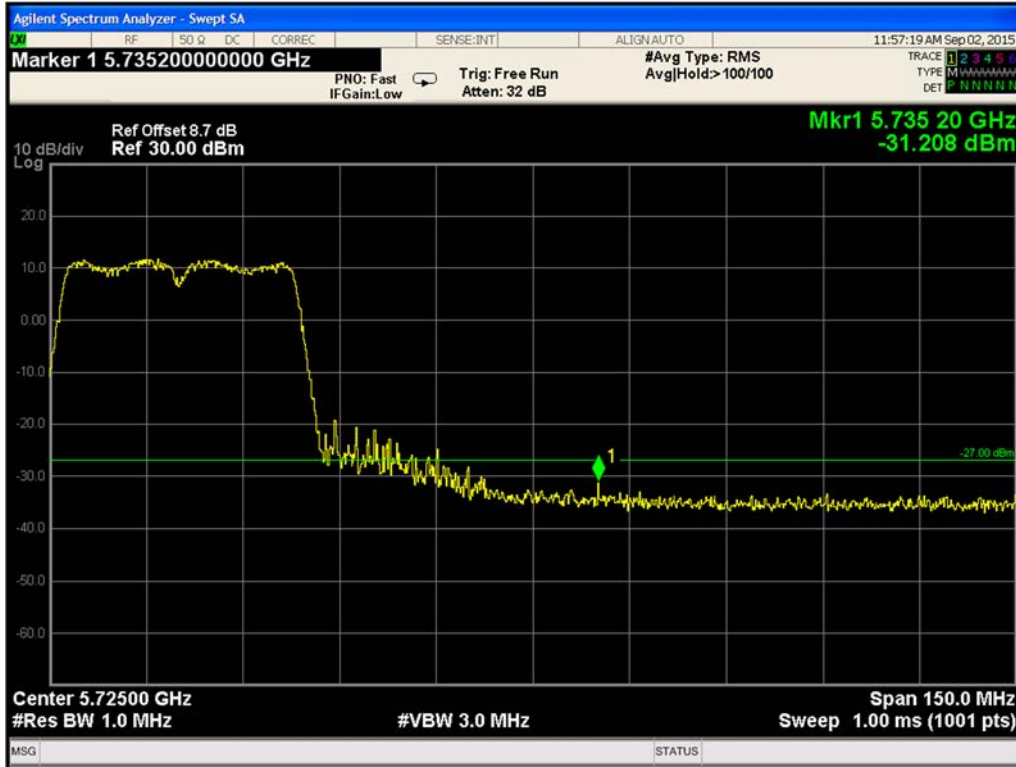


Figure 573. Conducted Band Edge Chain A 802.11n HT40 (Ch.142)

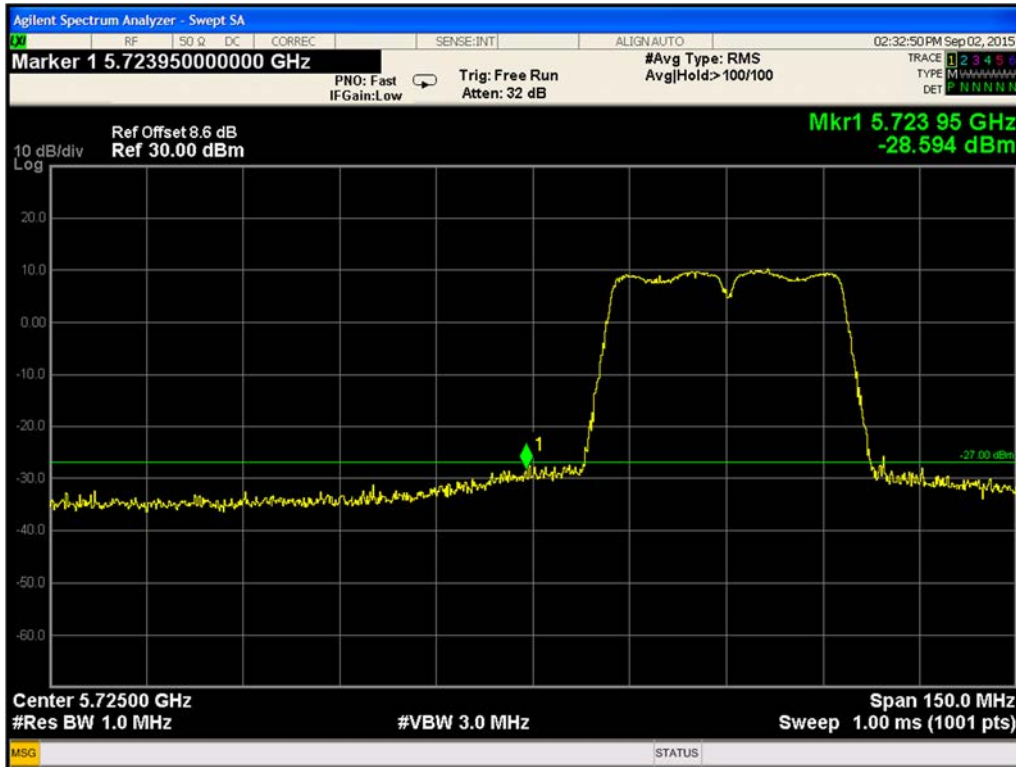


Figure 574. Conducted Band Edge Chain A 802.11n HT40 (Ch.151)

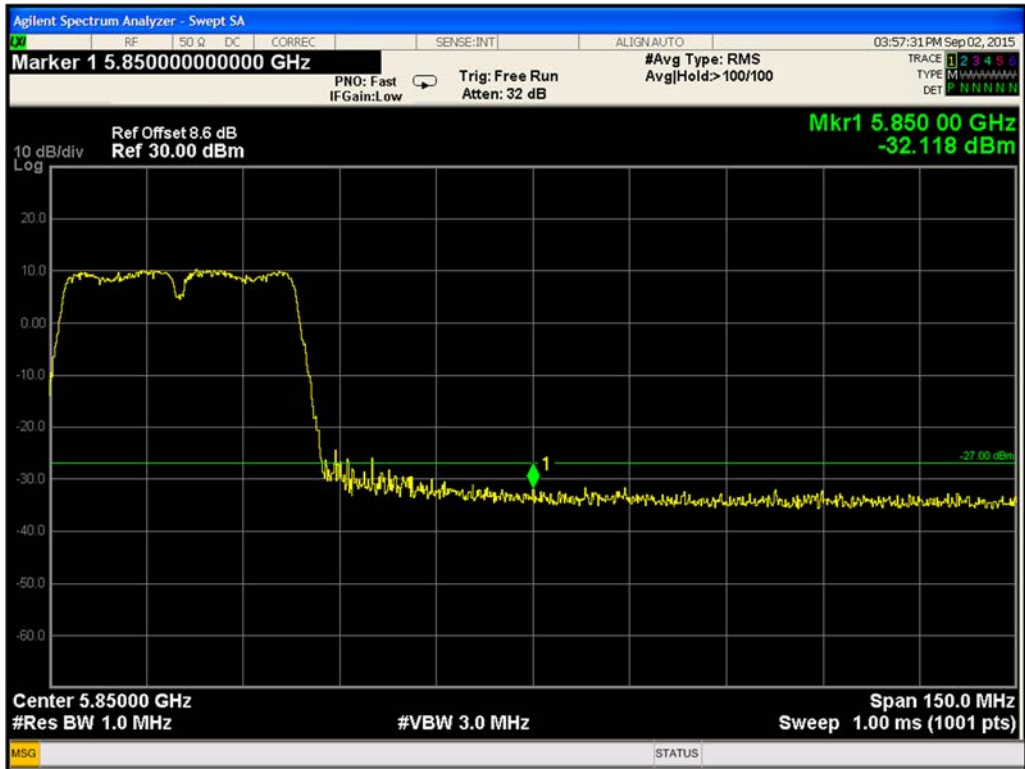


Figure 575. Conducted Band Edge Chain A 802.11n HT40 (Ch.159)

9.6.5.8 Chain B 802.11n HT40 Conducted Band Edge Emissions

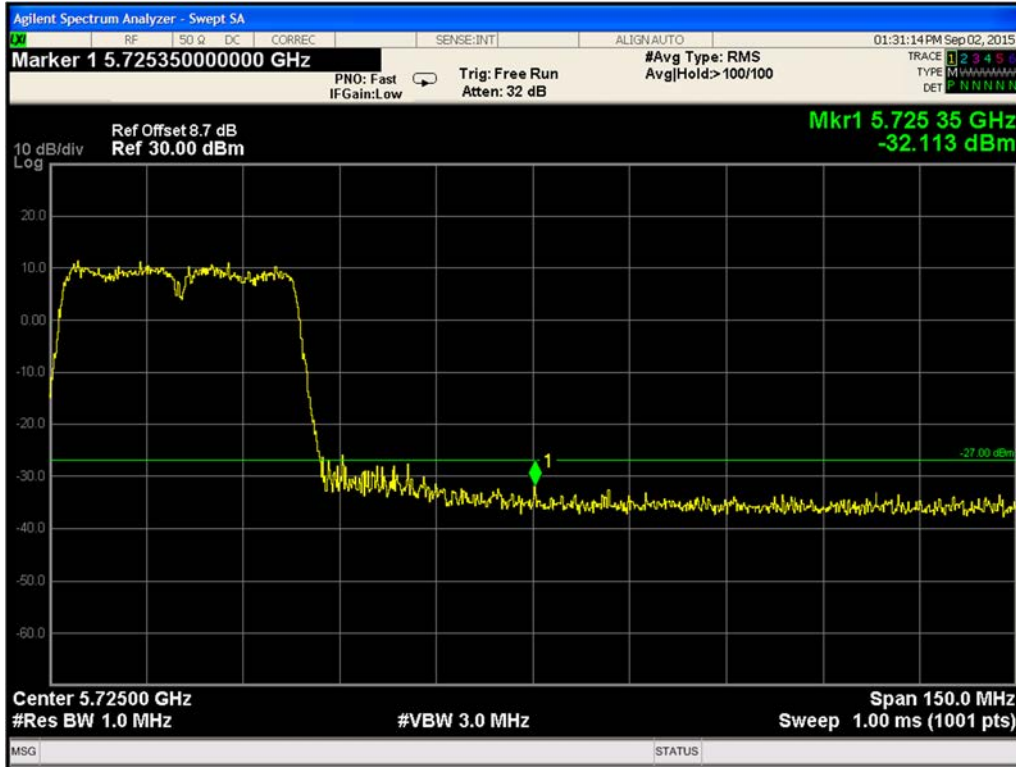


Figure 576. Conducted Band Edge Chain B 802.11n HT40 (Ch.142)

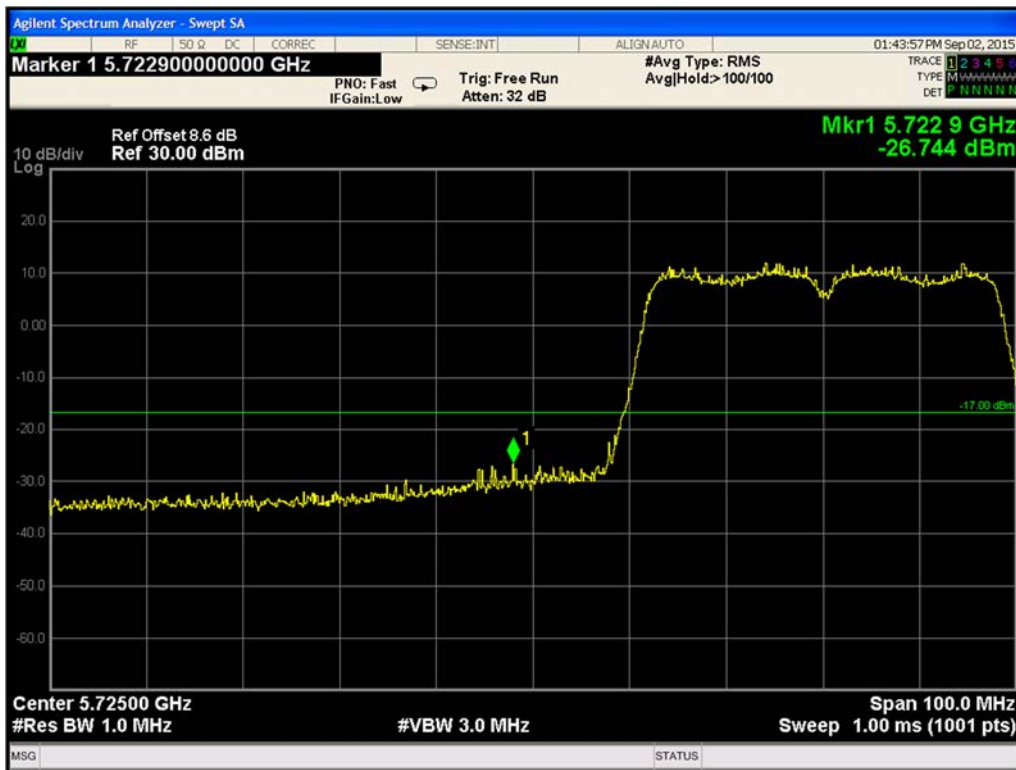


Figure 577. Conducted Band Edge Chain B 802.11n HT40 -17dBm Limit (Ch.151)

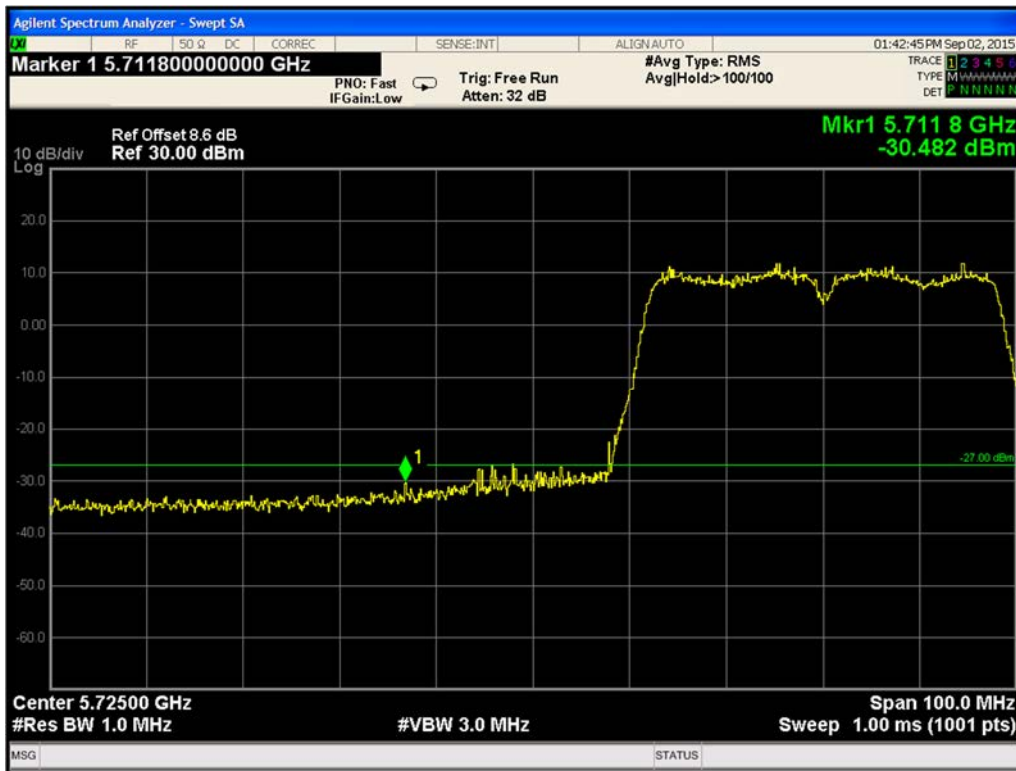


Figure 578. Conducted Band Edge Chain B 802.11n HT40 (Ch.151)

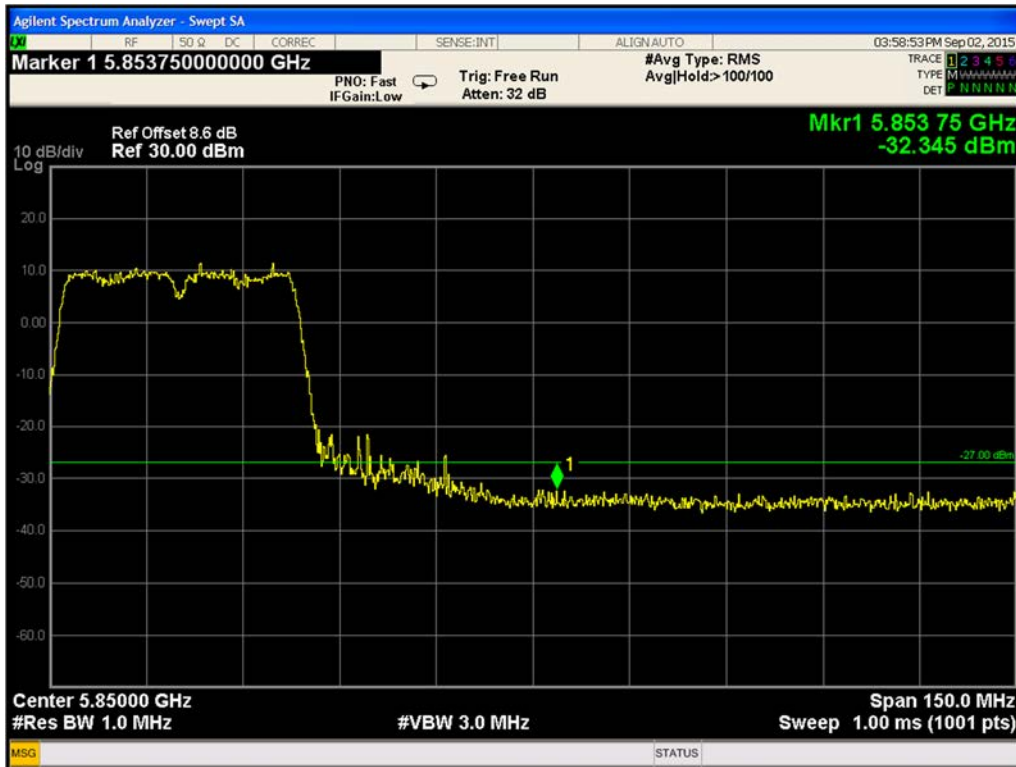


Figure 579. Conducted Band Edge Chain B 802.11n HT40 (Ch.159)



9.6.5.9 Chain A 802.11ac VHT40 Conducted Band Edge Emissions

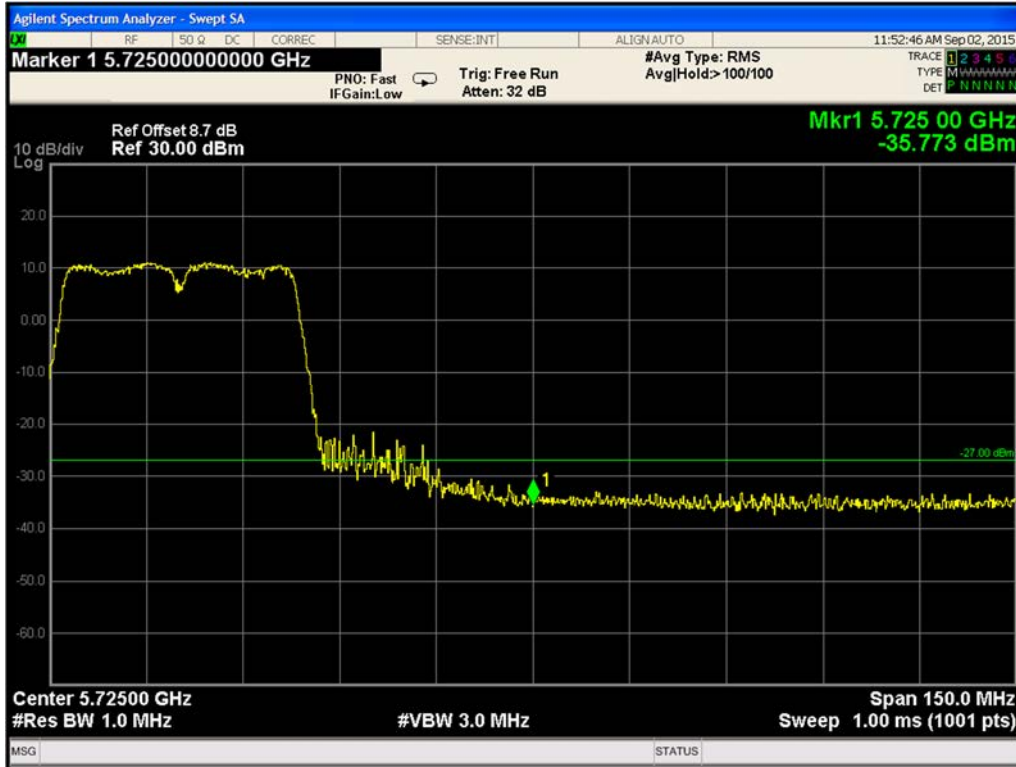


Figure 580. Conducted Band Edge Chain A 802.11ac VHT40 (Ch.142)

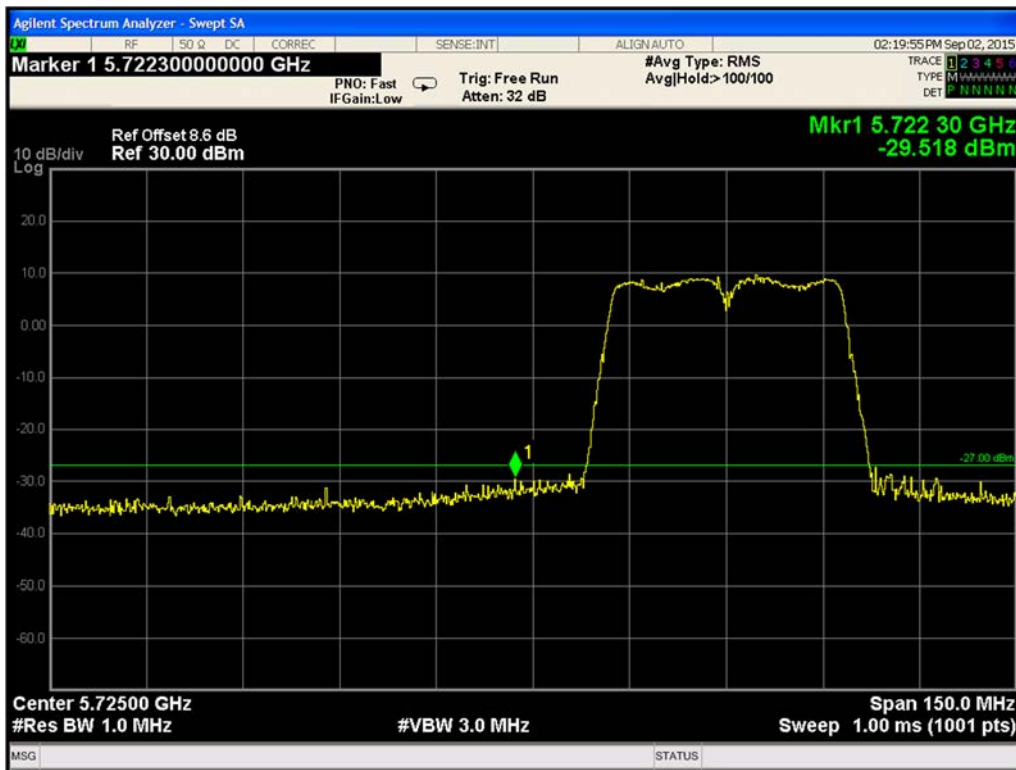


Figure 581. Conducted Band Edge Chain A 802.11ac VHT40 (Ch.151)

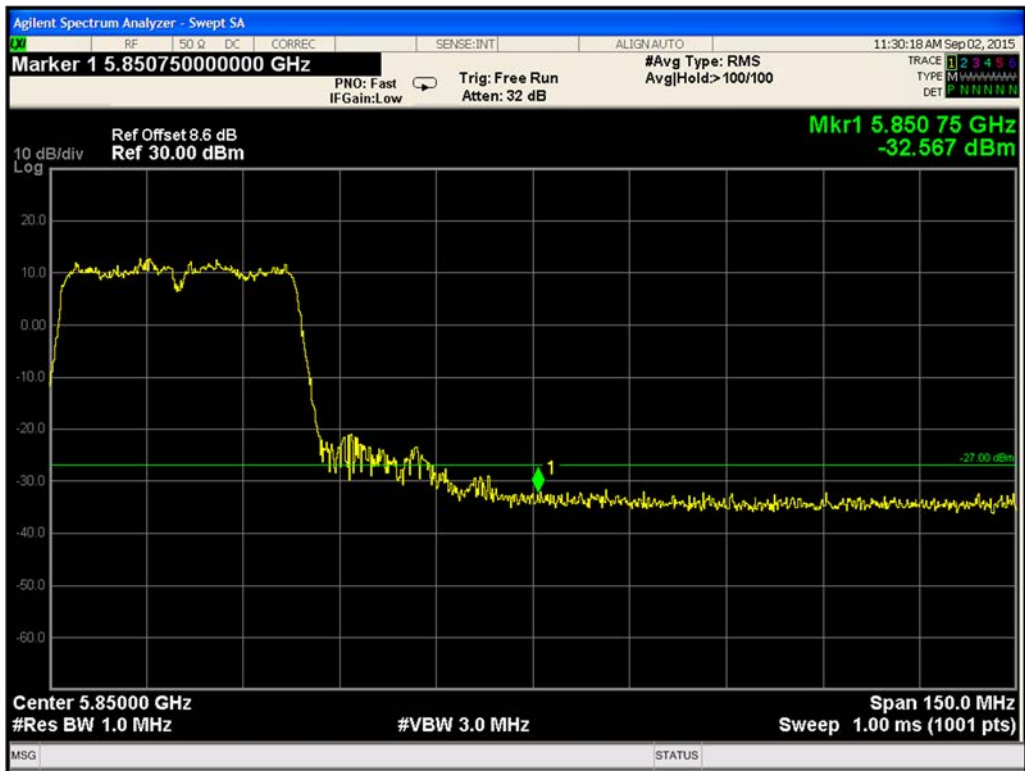


Figure 582. Conducted Band Edge Chain A 802.11ac VHT40 (Ch.159)

9.6.5.10 Chain B 802.11ac VHT40 Conducted Band Edge Emissions

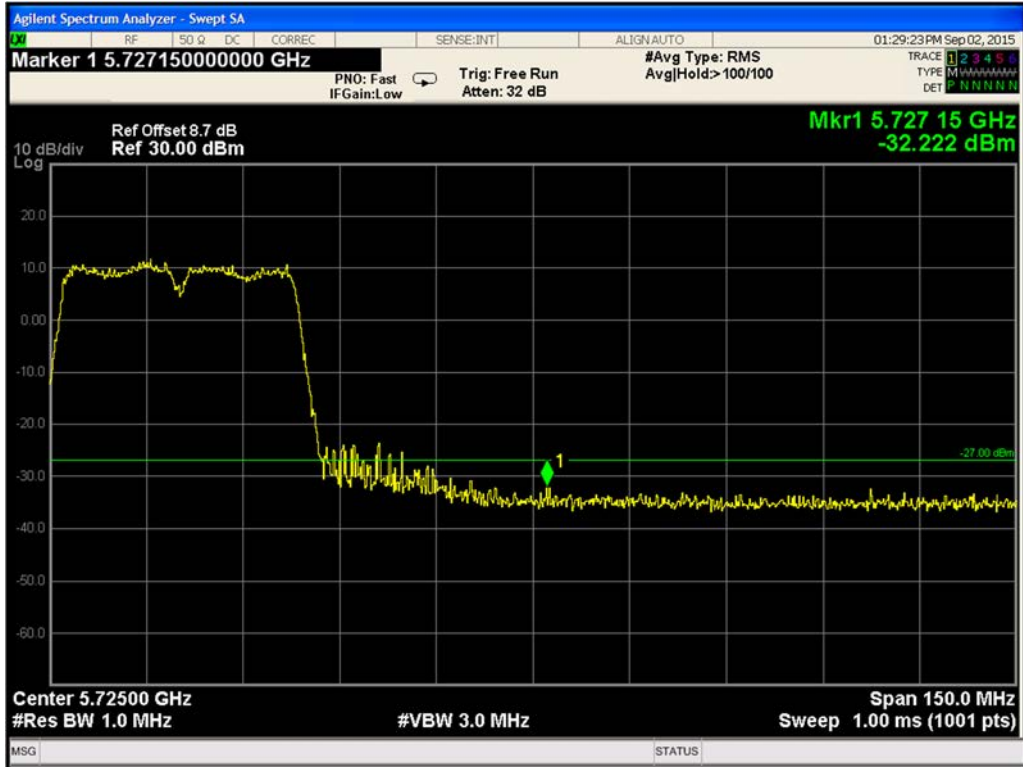


Figure 583. Conducted Band Edge Chain B 802.11ac VHT40 (Ch.142)

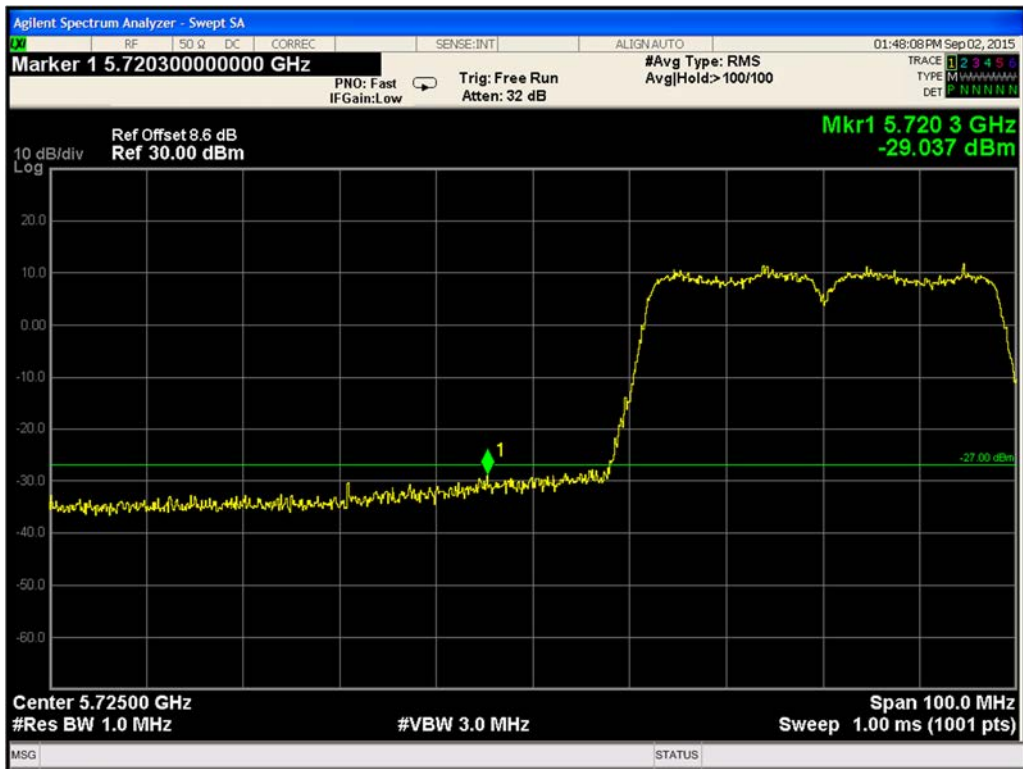


Figure 584. Conducted Band Edge Chain B 802.11ac VHT40 (Ch.151)

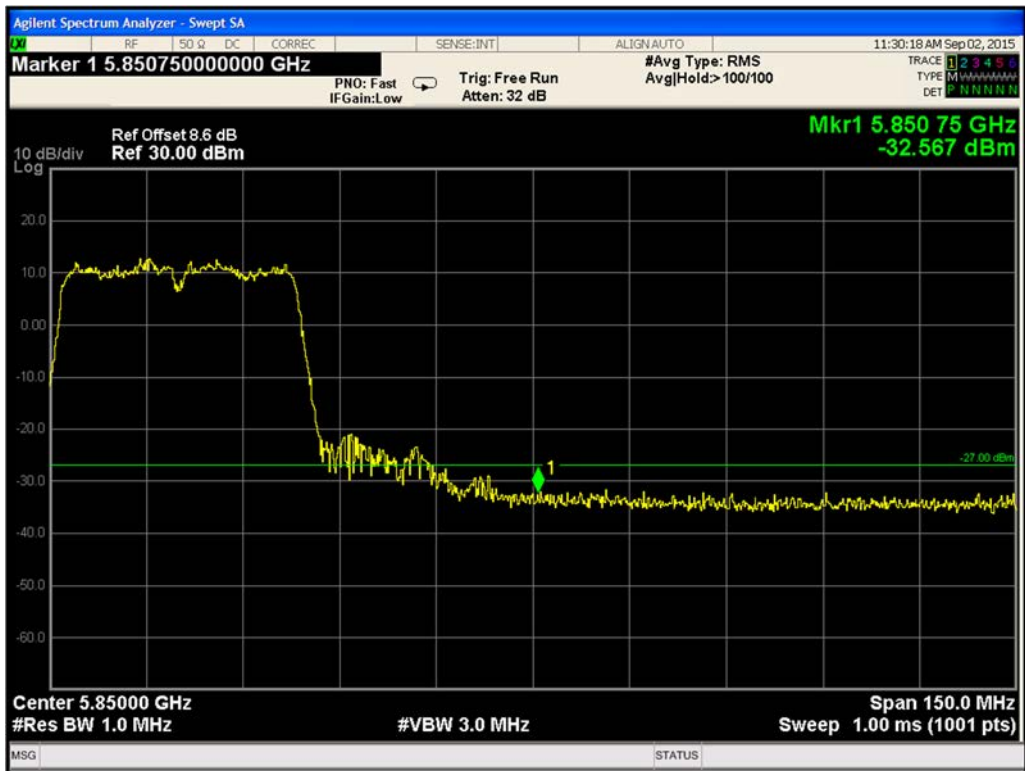


Figure 585. Conducted Band Edge Chain B 802.11ac VHT40 (Ch.159)

9.6.5.11 Chain A 802.11ac VHT80 Conducted Band Edge Emissions

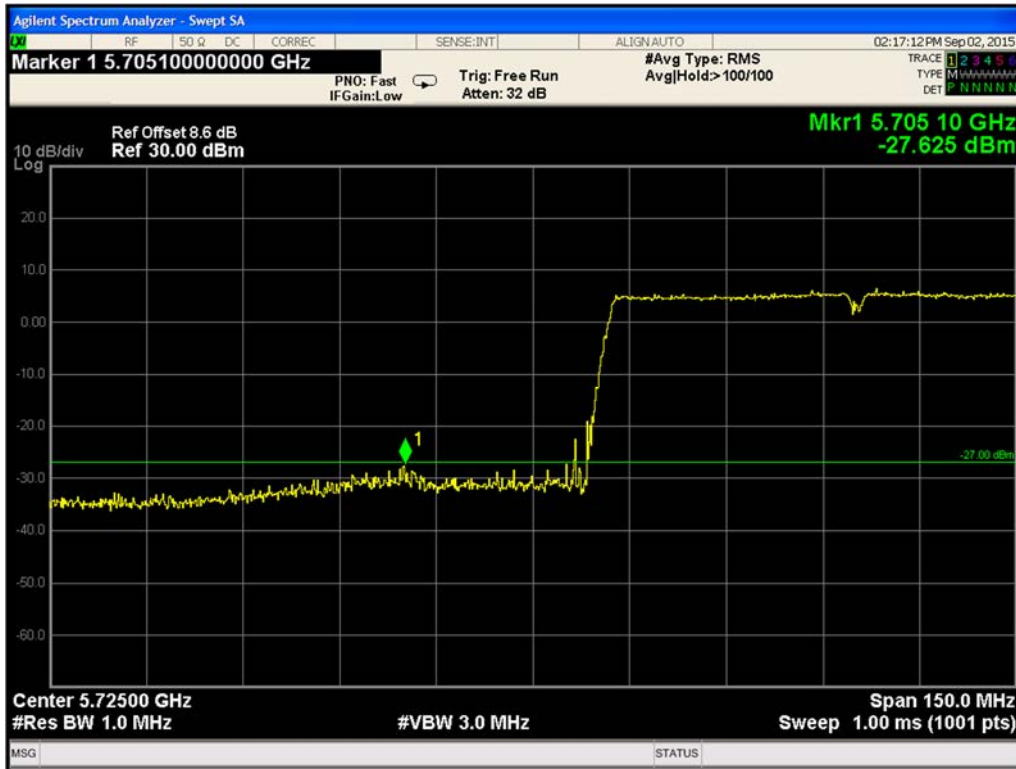


Figure 586. Conducted Band Edge-Low Chain A 802.11ac VHT80 (Ch.155)



Figure 587. Conducted Band Edge-High Chain A 802.11ac VHT80 -17dBm Limit (Ch.155)

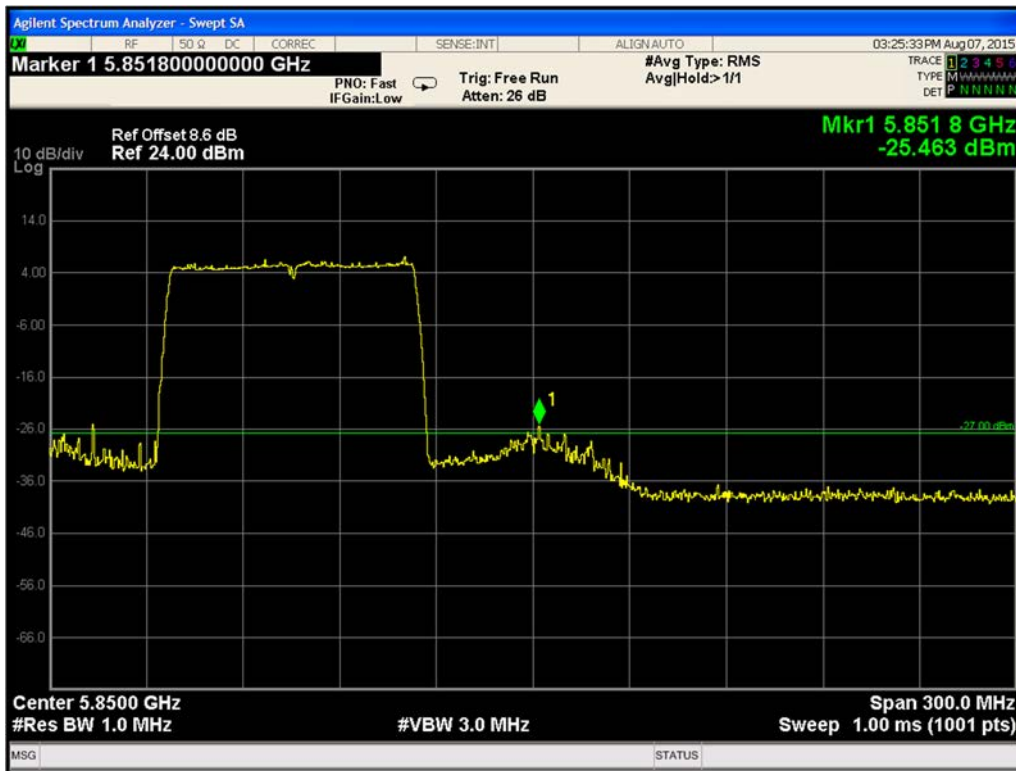


Figure 588. Conducted Band Edge-High Chain A 802.11ac VHT80 (Ch.155)



Figure 589. Conducted Band Edge-High Chain A 802.11ac VHT80 Integration (Ch.155)

9.6.5.12 Chain B 802.11ac VHT80 Conducted Band Edge Emissions

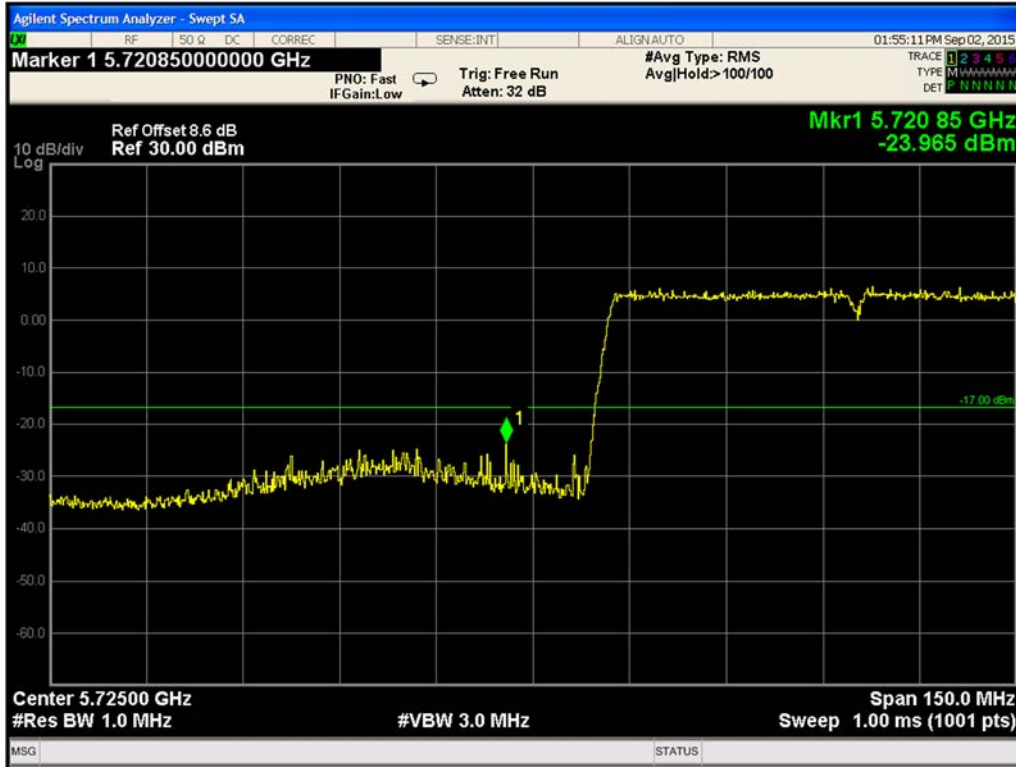


Figure 590. Conducted Band Edge-Low Chain B 802.11ac VHT80 -17dBm Limit (Ch.155)

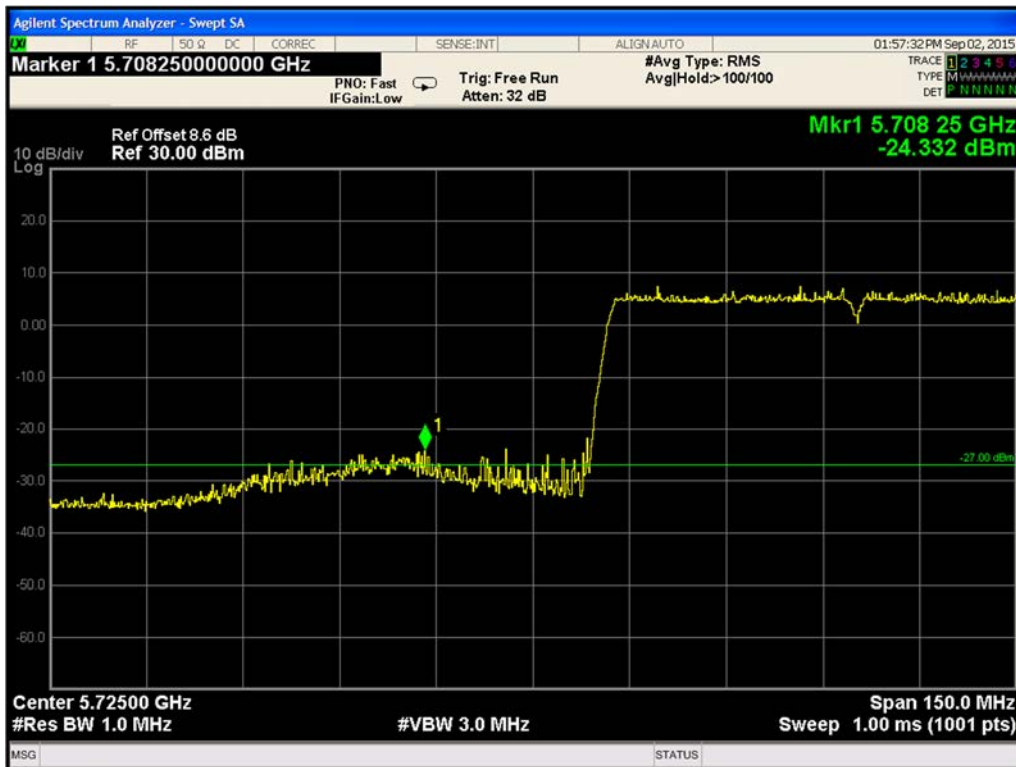


Figure 591. Conducted Band Edge-Low Chain B 802.11ac VHT80 (Ch.155)

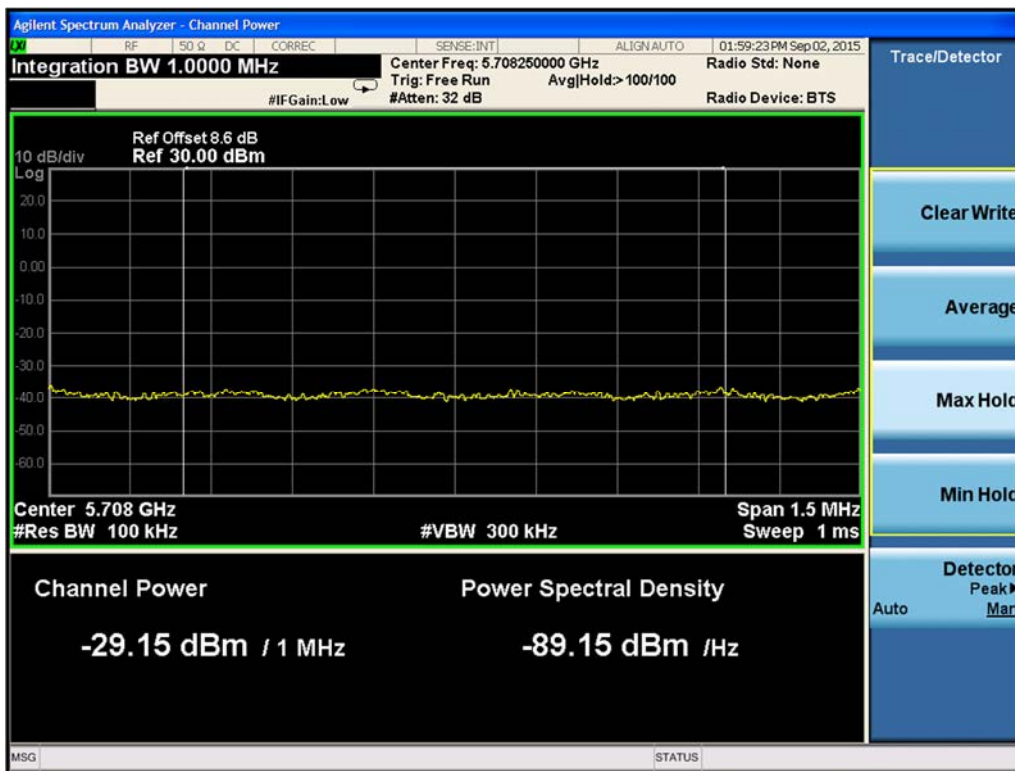


Figure 592. Conducted Band Edge-Low Chain B 802.11ac VHT80 Integration1 (Ch.155)



Figure 593. Conducted Band Edge-Low Chain B 802.11ac VHT80 Integration2 (Ch.155)



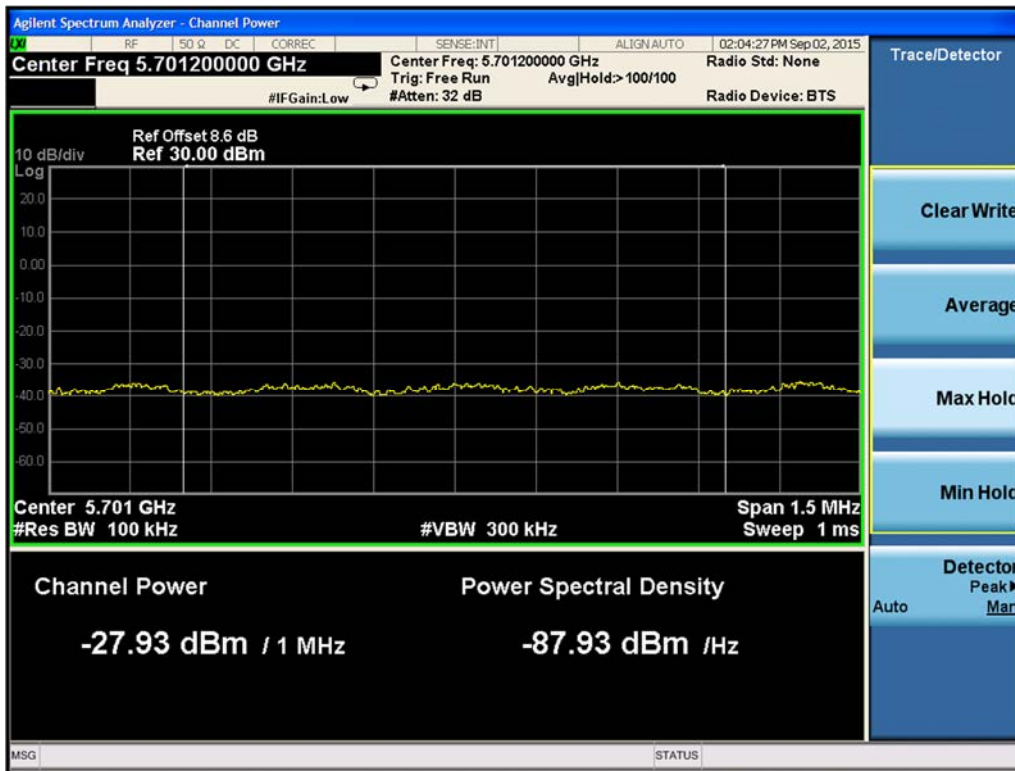


Figure 594. Conducted Band Edge-Low Chain B 802.11ac VHT80 Integration3 (Ch.155)

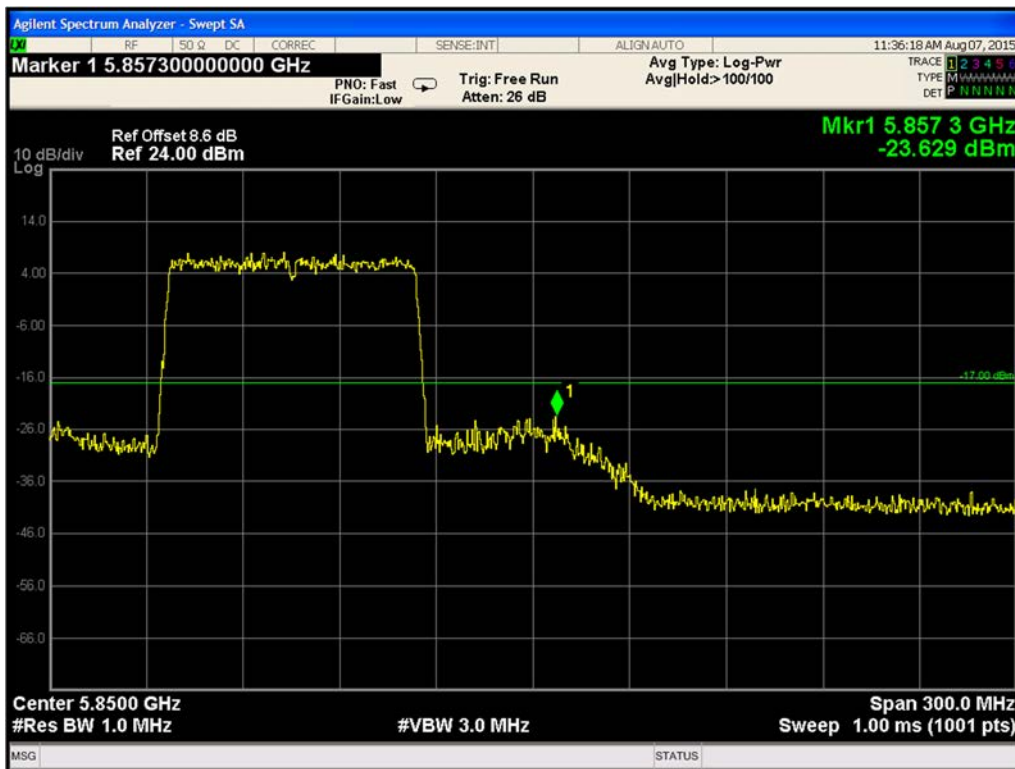


Figure 595. Conducted Band Edge-High Chain B 802.11ac VHT80 -17dBm Limit (Ch.155)



Figure 596. Conducted Band Edge-High Chain B 802.11ac VHT80 (Ch.155)



Figure 597. Conducted Band Edge-High Chain B 802.11ac VHT80 Integration (Ch.155)

## 9.7 Radiated Spurious and Band Edge Emissions

### 9.7.1 Test Requirement:

FCC CFR 47 Rule Part 15.407 (b)

Industry Canada RSS-247 [6.2] and RSS GEN [8.9]

### 9.7.2 Test Method:

Measurements were performed according to the procedures defined in KDB 789033 D02 General UNII Test Procedures New Rules v01 and ANSI C63.10 2013.

Radiated spurious measurements were made from 30MHz to the 10th harmonic of the fundamental frequency of the transmitter. The limit for radiated spurious emissions is per 15.209 and RSS-Gen. Additionally, emissions found in the restricted bands as listed in 15.205 were tested for compliance per limits 15.209 and RSS-Gen.

The EUT was tested near the low, middle and high channels of operation in each sub band. Guidelines in ANSI C63.10 2013 were followed with respect to maximizing the emissions. Emissions below 1 GHz were maximized by continuously scanning the unit in three orthogonal orientations. Measurements above 1 GHz were maximized by rotating the EUT about its vertical and horizontal axis. The horizontal axis was varied in 30 degree increments up to 150 degrees in accordance with ANSI C 63.10 2013. Both Horizontal and vertical polarizations were investigated. Worst case maximized data is shown in this test report. The EUT's maximum emissions for measurements below 1GHz were observed to be with the unit placed flat on the table.

A pre-amp and a high pass filter were required for this test, in order to provide the measuring system with sufficient sensitivity. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength.

### **Radiated Spurious Emissions**

#### **Spectrum Analyzer Settings:**

##### **30 MHz- 1 GHz:**

RBW= 120 kHz

VBW  $\geq$  3 X RBW

Trace Mode: Peak Detector (Max Hold). Final measurements performed using QP Detector.

Span= 30 MHz- 1 GHz

Sweep time= Auto

##### **Above 1 GHz:**

RBW= 1 MHz

VBW= 3 MHz

Trace Mode: Peak Detector (Max Hold) and RMS Average Detector (Max Hold)

Span= 1- 18 GHz and 18- 26.5 GHz.

Sweep time= Auto

## Restricted Band-Edge Emissions

### Spectrum Analyzer Settings:

RBW= 1 MHz

VBW= 3 MHz

Trace Mode: Peak Detector (Max Hold) and RMS Average Detector (Max Hold)

Span= 2310 – 2500 MHz

Sweep Points = 801

Sweep Time = Peak: Auto; Average: 100 s

### Sample Calculation:

Field Strength Level: Amplitude (Analyzer level) + AFCL (Antenna Factor and Cable losses) –  
 Amplifier Gain = 50 dB $\mu$ V + 33 dB – 25 dB = 78dB $\mu$ V/m

### 9.7.3 Limits:

Frequency (MHz)	Field Strength ( $\mu$ V/m)	Measurement Distance (meters)	Corrected Field Strength for 3m measurement distance (dB $\mu$ V/m)
0.009-0.490	2400/F (kHz)	300	48.5- 13.8
0.490-1.705	24000/F (kHz)	30	33.8- 23.0
1.705-30	30	30	29.5
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
960-1000	500	3	54
Above 1000	500	3	54 (Average) 74 (Peak)

### 9.7.4 Test Result:

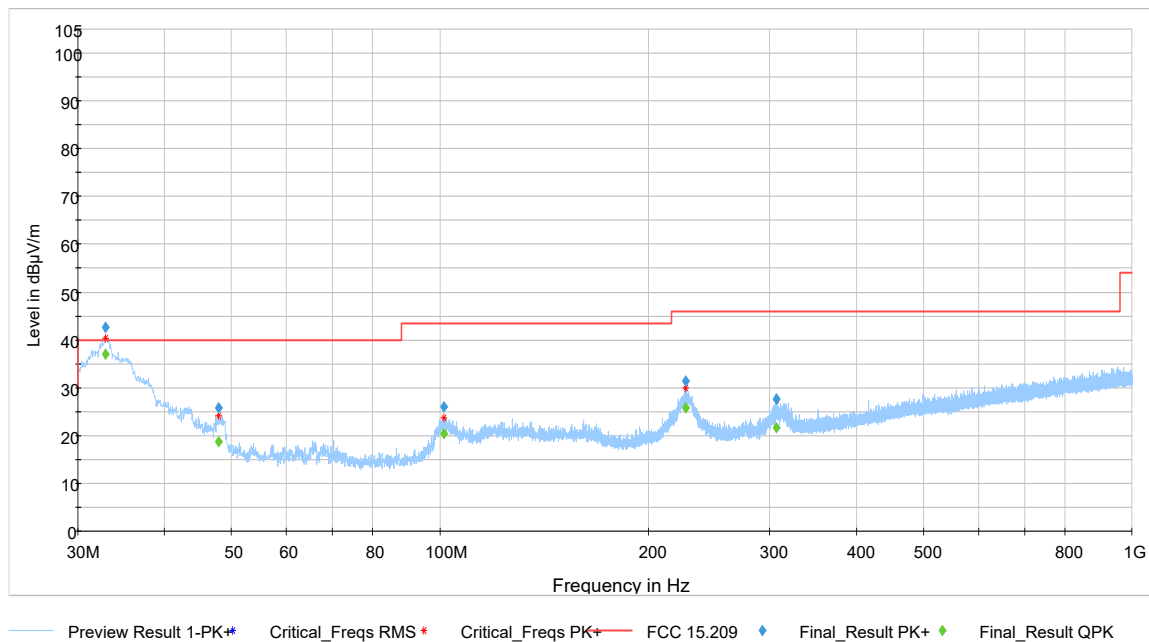
Pass.

## 9.7.5 Test Data:

### 9.7.5.1 Radiated Emissions in 30 MHz- 1 GHz range

Worst case emissions shown below.

RSE 30-1000 MHz					
Frequency (MHz)	Raw Quasi-Peak Amplitude (dB $\mu$ V/m)	Correction Factor (dB)	Corrected Quasi-Peak Field Strength (dB $\mu$ V/m)	Quasi-Peak Limit (dB $\mu$ V/m)	Quasi-Peak Margin (dB)
32.8725	17.7	19.4	37.10	40.0	-2.90
47.910	8.45	10.3	18.75	40.0	-21.25
101.486	8.89	11.5	20.39	43.52	-23.13
226.342	13.41	12.3	25.71	46.02	-20.31
306.230	6.52	15.1	21.62	46.02	-24.40



**Figure 598. Radiated Spurious Emissions 30-1000 MHz Tx Chains A & B 802.11a (Ch. 48)**