



## MEASUREMENT REPORT

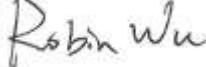
FCC PART 15.247 / IC RSS-210 WLAN 802.11a/b/g/n/ac

<b>FCC ID:</b>	VW3FAST5250
<b>IC:</b>	9140A-FAST5250
<b>APPLICANT:</b>	SAGEMCOM SAS

Application Type: Certification  
Product: Router  
Model No.: Fast 5250  
Brand Name: Sagemcom  
FCC Classification: Digital Transmission System (DTS)  
FCC Rule Part(s): Part 15.247  
IC Specification(s): RSS-210 Issue 8  
Test Procedure(s): ANSI C63.10-2009  
KDB 558074 D01v03r01, KDB 662911 D01v02r01,  
KDB 644545 D01v01r02  
Test Date: October 20, 2013 ~ January 04, 2014

Reviewed By : 

( Engineer: Sunny Sun)

Approved By : 

( Manager: Robin Wu )

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 558074 D01v03r01. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

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## Revision History

Report No.	Version	Description	Issue Date
1312RSU01001	Rev. 01	Initial report	01-28-2014

## §2.1033 General Information

<b>Applicant:</b>	SAGEMCOM SAS
<b>Applicant Address:</b>	250 Route de l'Empereur RUEIL MALMAISON CEDEX, 92848 France
<b>Manufacturer:</b>	Askey Technology (Jiangsu) Ltd.
<b>Manufacturer Address:</b>	No. 1388, Jiao Tong Road, WuJiang Economic-Technological Development Area, Jiangsu Province, P.R.C.
<b>Test Site:</b>	MRT Technology (Suzhou) Co., Ltd
<b>Test Site Address:</b>	D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
<b>MRT FCC Registration No.:</b>	809388
<b>MRT IC Registration No.:</b>	11384A
<b>FCC Rule Part(s):</b>	Part 15.247
<b>IC SPECIFICATION(S):</b>	RSS-210 Issue 8
<b>Model Name:</b>	Fast 5250
<b>FCC ID:</b>	VW3FAST5250
<b>IC:</b>	9140A-FAST5250
<b>Test Device Serial No.:</b>	N/A <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering
<b>FCC Classification:</b>	Digital Transmission System (DTS)
<b>Date(s) of Test:</b>	October 20, 2013 ~ January 04, 2014
<b>Test Report S/N:</b>	1312RSU01001

## 1. INTRODUCTION

### 1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

### 1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.



## 2. PRODUCT INFORMATION

### 2.1. Equipment Description

Product Name	Router
Model No.	Fast 5250
Frequency Range	802.11b/g/n: 2412 ~ 2462 MHz 802.11a/n/ac: 5745 ~ 5825MHz
Maximum Output Power	<b><u>802.11b/g/n:</u></b> 802.11b: 28.82dBm 802.11g: 25.69dBm 802.11n-HT20: 25.55dBm 802.11n-HT40: 22.70dBm <b><u>802.11a/n/ac:</u></b> 802.11a: 29.12dBm 802.11n-HT20: 28.87dBm 802.11n-HT40: 28.16dBm 802.11ac-VHT20: 28.83dBm 802.11ac-VHT40: 28.06dBm 802.11ac-VHT80: 27.29dBm
Type of Modulation	802.11b: DSSS 802.11a/g/n/ac: OFDM

### 2.2. Description of Available Antennas

Frequency Band (GHz)	Directional Gain (dBi)
2.4	5.9
5.8	6.8

Note:

1. The EUT supports CDD (Cyclic Delay Diversity) and transmit beamforming mode (transmit beamforming mode just for 2.4GHz), CDD and transmit beamforming signals are correlated.
2. The Directional Gain =  $10 \times \log \{ [10^{(Gain1/20)} + 10^{(Gain2/20)} + 10^{(Gain3/20)}] / 3 \}$

### 2.3. Frequency / Channel Operation

#### Channel for 802.11b/g/n-HT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10	2457 MHz	11	2462 MHz	N/A	N/A

#### Channel for 802.11n-HT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
03	2422 MHz	04	2427 MHz	05	2432 MHz
06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	N/A	N/A	N/A	N/A

#### Channel for 802.11a/n-HT20/ac-VHT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745 MHz	153	5765 MHz	157	5785 MHz
161	5805 MHz	165	5825 MHz	N/A	N/A

#### Channel for 802.11n-HT40/ac-VHT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
151	5755 MHz	159	5795 MHz	N/A	N/A

#### Channel for 802.11ac-VHT80

Channel	Frequency	Channel	Frequency	Channel	Frequency
155	5775 MHz	N/A	N/A	N/A	N/A

## 2.4. Device Capabilities

This device contains the following capabilities:

802.11a/b/g/n/ac WLAN (DTS/NII)

**Note:** 2.4GHz/5GHz WLAN (DTS/NII) operation is possible in 20MHz, 40MHz, and 80MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = peak per the guidance of Section 6.0 b) of KDB 558074 D01v03r01. The RBW and VBW were both greater than  $50/T$ , where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

802.11b – 99.8%

802.11a/g 20MHz Bandwidth – 98.1%

802.11n/ac 20MHz Bandwidth – 91.78%

802.11n/ac 40MHz Bandwidth – 86.3%

802.11ac 80MHz Bandwidth – 77%

## 2.5. Test Configuration

The Router FCC ID: VW3FAST5250 was tested per the guidance of KDB 558074 D01v03r01. ANSI C63.10-2009 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

## 2.6. Test Software

The test utility software used during testing was ART2 Version 0703.

Power Parameter Value of the test software setting:

Test Mode	Test Channel	Chain 1 + 2 + 3	Test Mode	Test Channel	Chain 1 + 2 + 3
802.11b	2412	21	802.11n-HT40	2422	13
	2417	23		2427	14
	2437	23		2432	15
	2457	22		2437	17
	2462	20		2442	16
802.11g	2412	15		2447	15
	2417	18		2452	12
	2422	19	802.11a	5745	22
	2437	20		5785	22
	2452	18		5825	22
	2457	17	802.11n-HT20	5745	23
	2462	15		5785	23
802.11 n-HT20	2412	16		5825	23
	2417	19	802.11n-HT40	5755	23
	2437	20		5795	23
	2452	19	802.11ac-VHT20	5745	23
	2457	18		5785	23
	2462	15		5825	23
--	--	--	802.11ac-VHT40	5755	23
--	--	--		5795	23
--	--	--	802.11ac-VHT80	5775	23

## 2.7. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

## 2.8. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

### 3. DESCRIPTION OF TEST

#### 3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2009), and the guidance provided in KDB 558074 D01v03r01 were used in the measurement of the **Router FCC ID: VW3FAST5250**.

**Deviation from measurement procedure.....None**

#### 3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or resolution, clock or data exchange speed, scrolling H pattern to the EUT and/or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. Line conducted emissions test results are shown in Section 7.7.

### 3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. An MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 0.8 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beamwidth of horn antenna, the horn antenna should be always directed to the EUT when rising height.

## 4. ANTENNA REQUIREMENTS

### **Excerpt from §15.203 of the FCC Rules/Regulations:**

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

The antenna of the Router is **permanently attached**.

There are no provisions for connection to an external antenna.

### **Conclusion:**

The Router FCC ID: **VW3FAST5250** unit complies with the requirement of §15.203.

## 5. TEST EQUIPMENT CALIBRATION DATA

### AC Conducted Emissions Test Equipment

Instrument	Manufacturer	Type No.	Serial No.	Cali. Due Date
EMI Test Receiver	R&S	ESR7	101209	2014/07/16
Two-Line V-Network	R&S	ENV216	101683	2014/07/21
Two-Line V-Network	R&S	ENV216	101684	2014/07/21
Temperature/ Meter Humidity	Anymetre	TH101B	SR2-01	2014/08/15

### Radiated Test Equipment

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	E4447A	MY45300136	2014/08/15
Preamplifier	MRT	AP01G18	1310002	2014/10/08
Preamplifier	MRT	AP18G40	1310003	2014/10/08
Loop Antenna	Schwarzbeck	FMZB1519	1519-041	2014/09/12
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	2014/09/12
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1167	2014/09/12
Broadband Horn Antenna	Schwarzbeck	BBHA9170	9170-549	2014/09/12
Temperature/Humidity Meter	Anymetre	TH101B	AC1-01	2014/08/15

### Conducted Test Equipment

Instrument	Manufacturer	Type No.	Serial No.	Cali. Due Date
Spectrum Analyzer	Agilent	N9010A	MY51440164	2014/08/15
Power Meter	Anritsu	ML2495A	0905006	2014/11/01
Power Sensor	Anritsu	MA2411B	0846014	2014/11/01
Temperature/Humidity Meter	Anymetre	TH101B	TR3-01	2014/08/15

## 6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

AC Conducted Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_{C(y)}$ ): 150kHz~30MHz: $\pm 3.5\text{dB}$
Radiated Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_{C(y)}$ ): 9kHz ~ 1GHz: $\pm 4.2\text{dB}$ 1GHz ~ 40GHz: $\pm 4.7\text{dB}$

## 7. TEST RESULT

### 7.1. Summary

**Company Name:** SAGEMCOM SAS  
**FCC ID:** VW3FAST5250  
**IC:** 9140A-FAST5250  
**FCC Classification:** Digital Transmission System (DTS)  
**Data Rate(s) Tested:**

1Mbps ~ 11Mbps (b);  
6Mbps ~ 54Mbps (a/g);  
19.5/21.7Mbps ~ 195/216.7Mbps (n-HT20MHz BW);  
40.5/45Mbps ~ 405/450Mbps (n-HT40MHz BW);  
19.5/21.7Mbps ~ 234/260.2Mbps (ac-VHT20MHz BW);  
40.5/45Mbps ~ 540/600Mbps (ac-VHT40MHz BW);  
87.9/97.5Mbps ~ 1170/1299.9Mbps (ac-VHT80MHz BW)

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	RSS-210 [A8.2]	6dB Bandwidth	$\geq 500\text{kHz}$	Conducted	Pass	Section 7.2
15.247(b)(3)	RSS-210 [A8.4]	Output Power	$\leq 1\text{Watt}$		Pass	Section 7.3
15.247(e)	RSS-210 [A8.2]	Power Spectral Density	$\leq 8\text{dBm} / 3\text{kHz Band}$		Pass	Section 7.4
15.247(d)	RSS-210 [A8.5]	Band Edge / Out-of-Band Emissions	$\geq 30\text{dBc(Average)}$		Pass	Section 7.5
15.205 15.209	RSS-210 [A8.5]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	Radiated	Pass	Section 7.6
15.207	RSS-Gen [7.2.2]	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.7

#### Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

## 7.2. 6dB Bandwidth Measurement S15.247(a)(2); RSS-210 /A8.2]

### 7.2.1. Test Limit

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

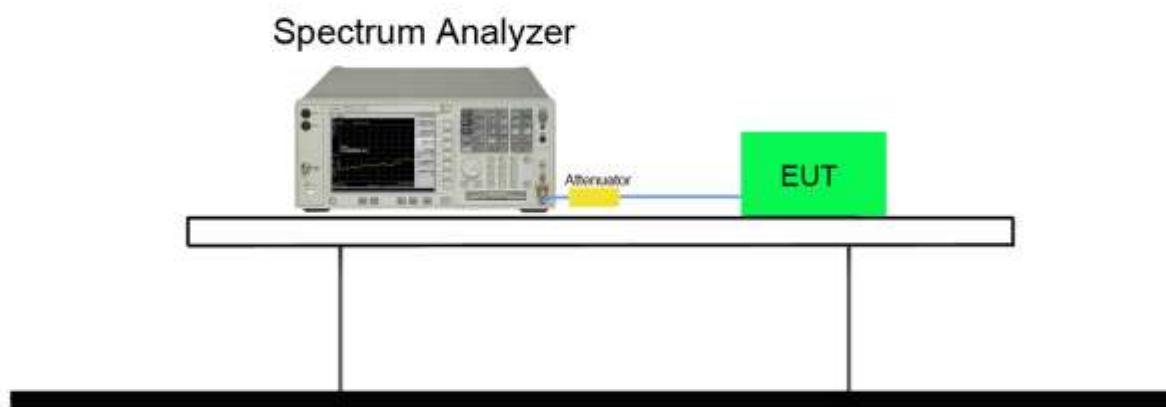
### 7.2.2. Test Procedure used

KDB 558074 D01v03r01 – Section 8.2 Option 2

### 7.2.3. Test Setting

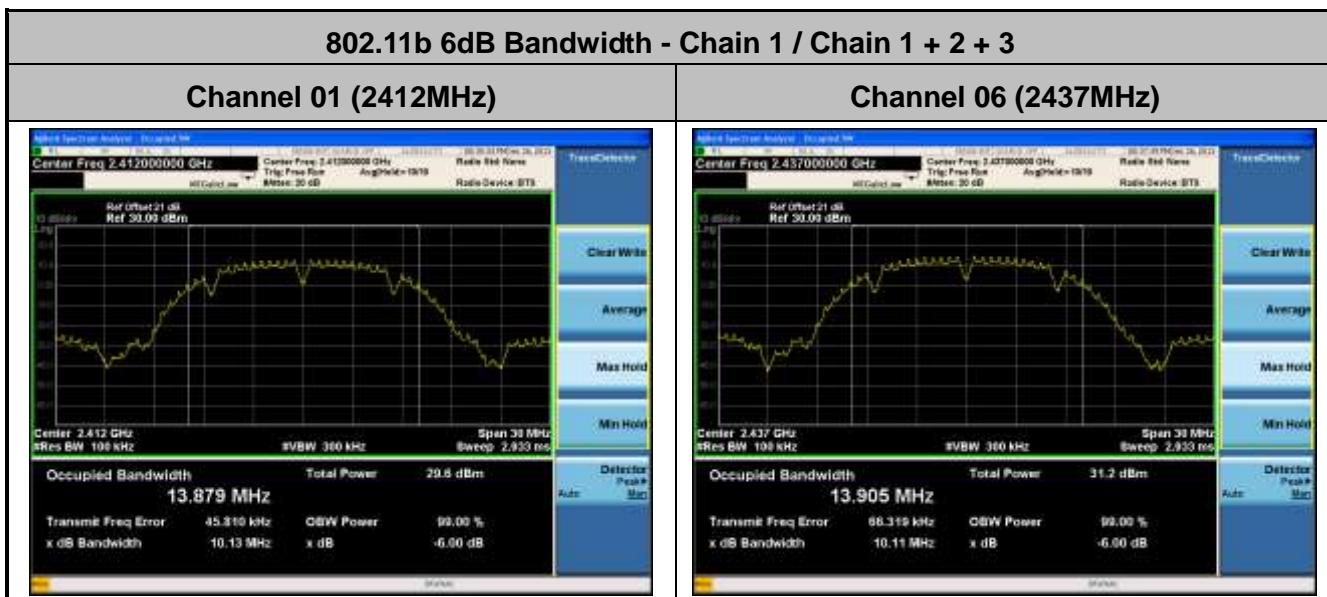
1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. Set RBW = 100 kHz
3. VBW  $\geq 3 \times$  RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace was allowed to stabilize

### 7.2.4. Test Setup



### 7.2.5. Test Result

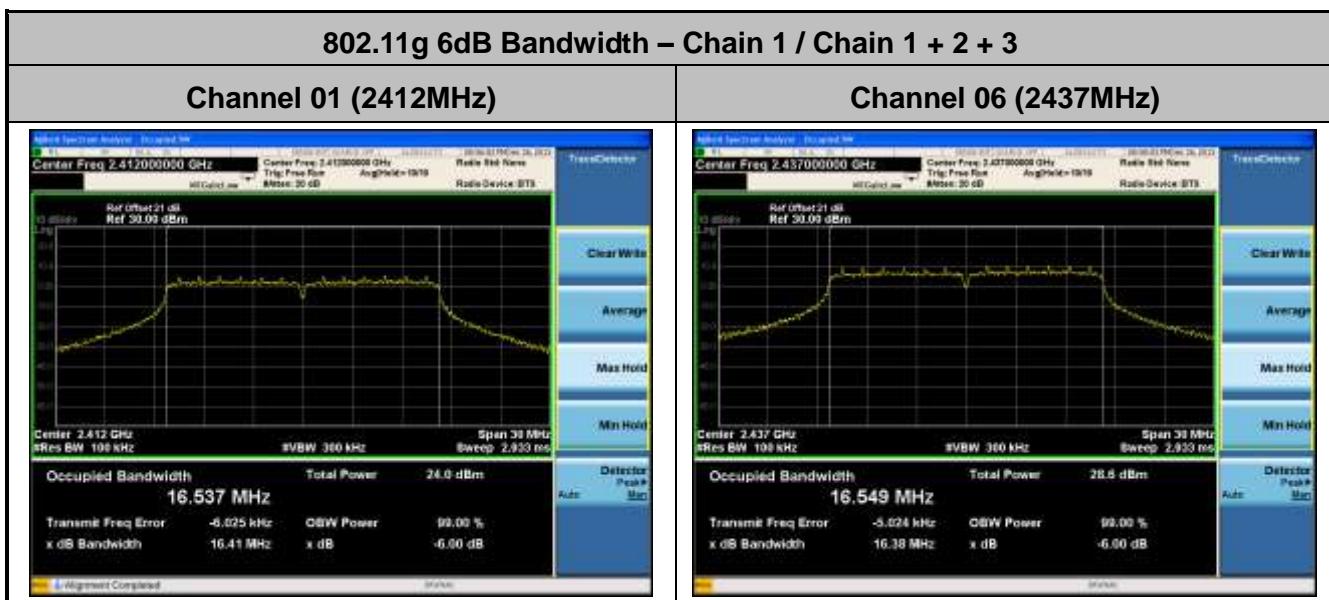
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Chain 1 / Chain 1 + 2 + 3						
802.11b	1	01	2412	10.13	≥0.5	Pass
802.11b	1	06	2437	10.11	≥0.5	Pass
802.11b	1	11	2462	10.12	≥0.5	Pass
Chain 2 / Chain 1 + 2 + 3						
802.11b	1	01	2412	10.13	≥0.5	Pass
802.11b	1	06	2437	10.10	≥0.5	Pass
802.11b	1	11	2462	10.13	≥0.5	Pass
Chain 3 / Chain 1 + 2 + 3						
802.11b	1	01	2412	10.12	≥0.5	Pass
802.11b	1	06	2437	10.11	≥0.5	Pass
802.11b	1	11	2462	10.12	≥0.5	Pass

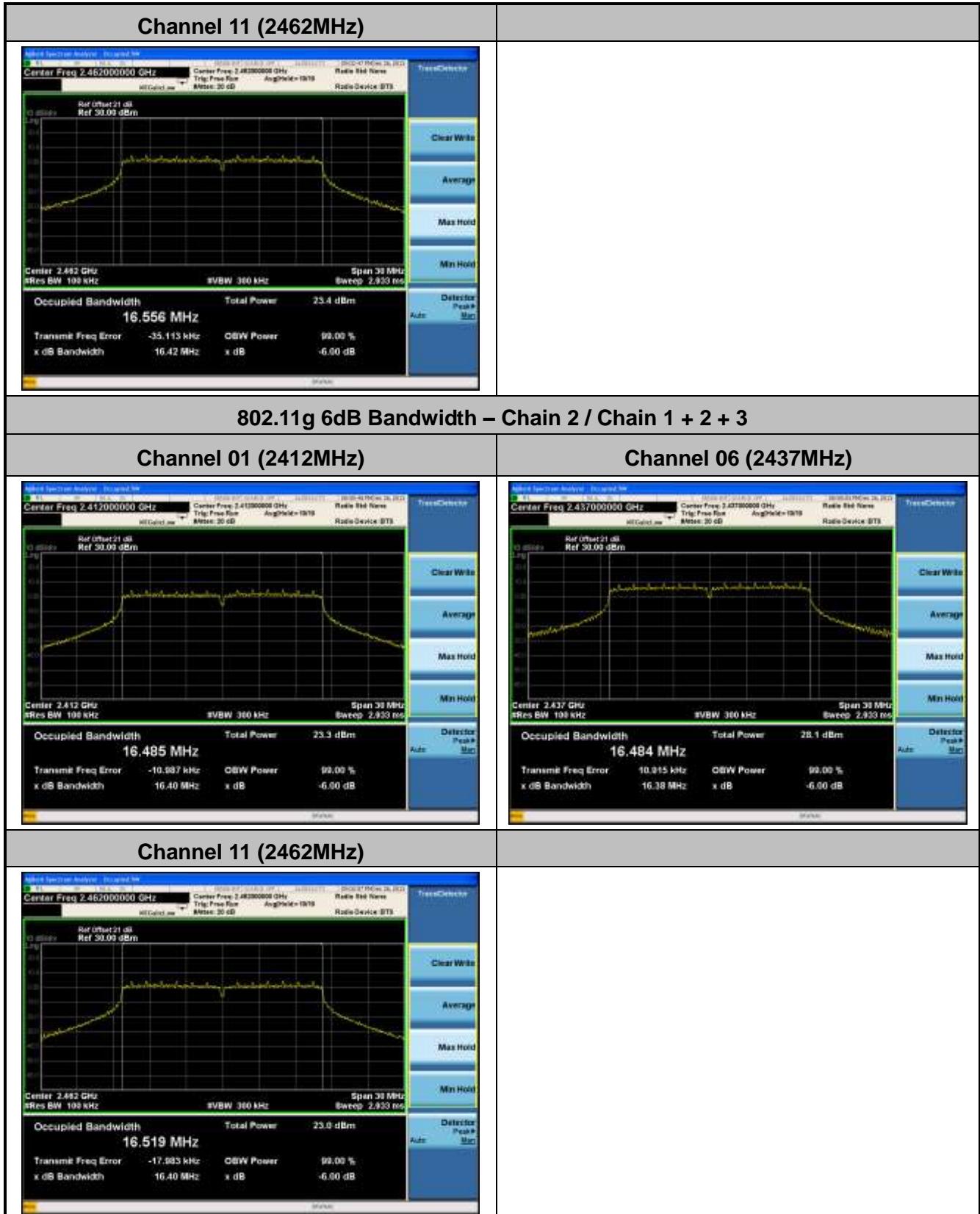


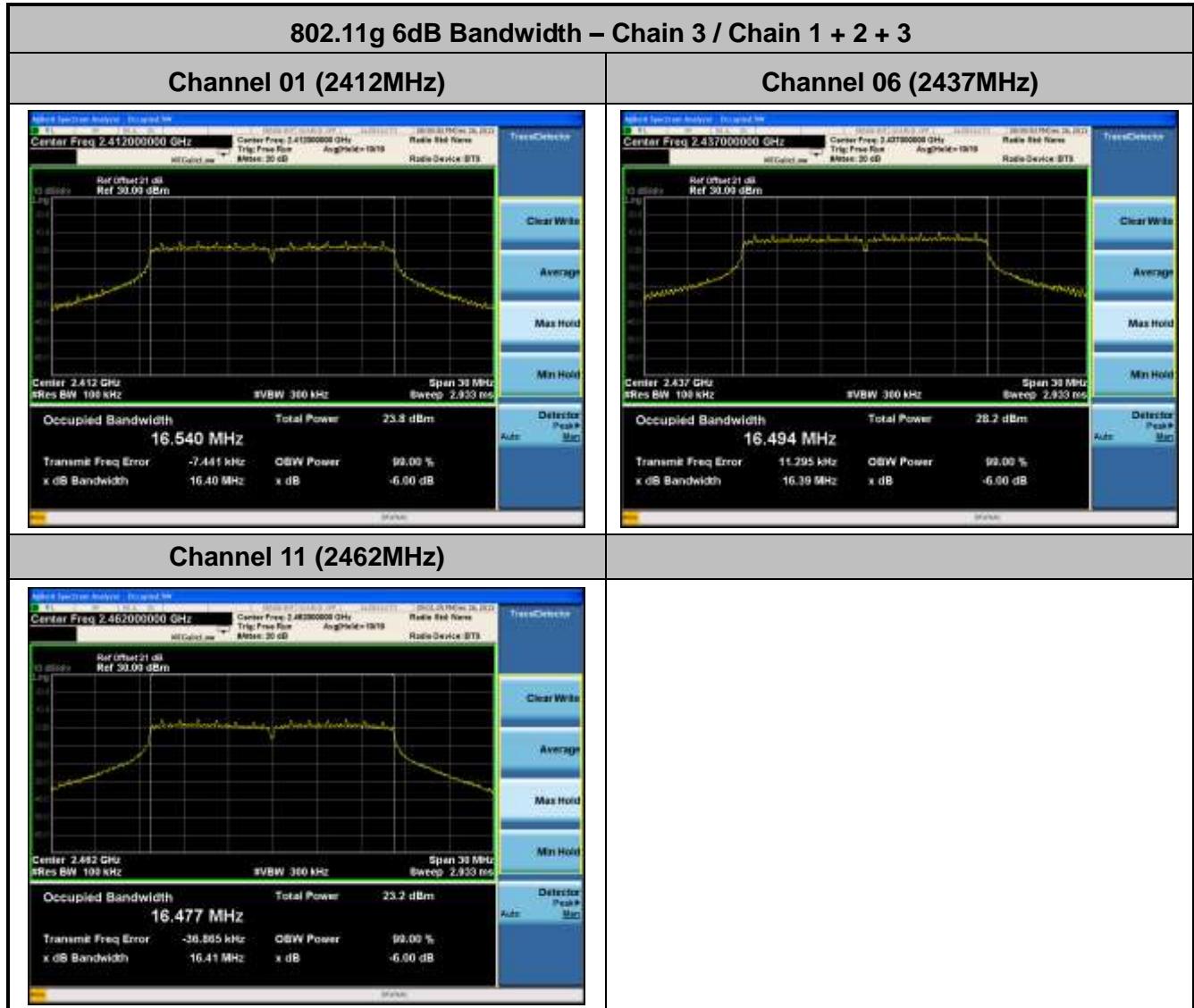




Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Chain 1 / Chain 1 + 2 + 3						
802.11g	6	01	2412	16.41	≥0.5	Pass
802.11g	6	06	2437	16.38	≥0.5	Pass
802.11g	6	11	2462	16.42	≥0.5	Pass
Chain 2 / Chain 1 + 2 + 3						
802.11g	6	01	2412	16.40	≥0.5	Pass
802.11g	6	06	2437	16.38	≥0.5	Pass
802.11g	6	11	2462	16.40	≥0.5	Pass
Chain 3 / Chain 1 + 2 + 3						
802.11g	6	01	2412	16.40	≥0.5	Pass
802.11g	6	06	2437	16.39	≥0.5	Pass
802.11g	6	11	2462	16.41	≥0.5	Pass

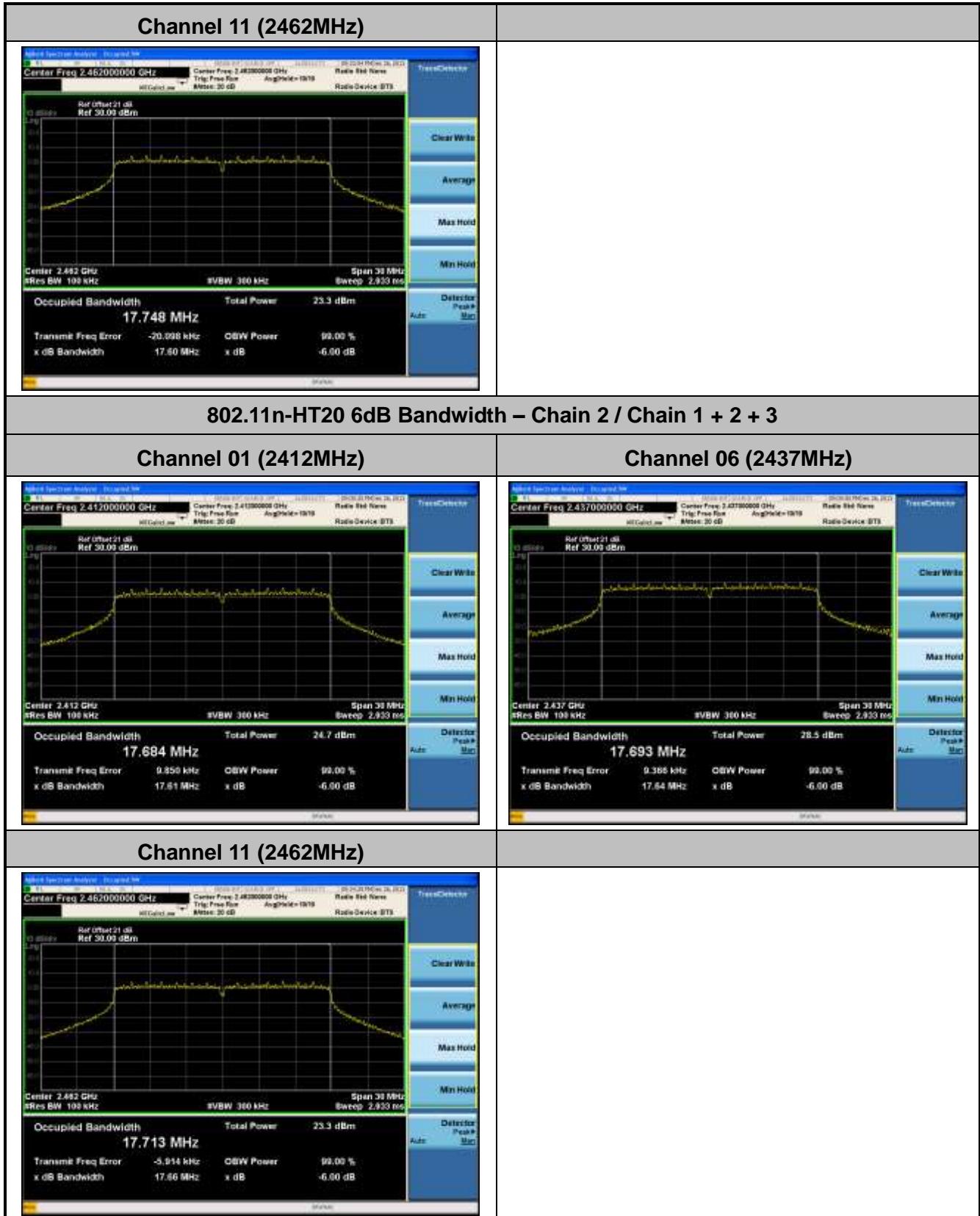






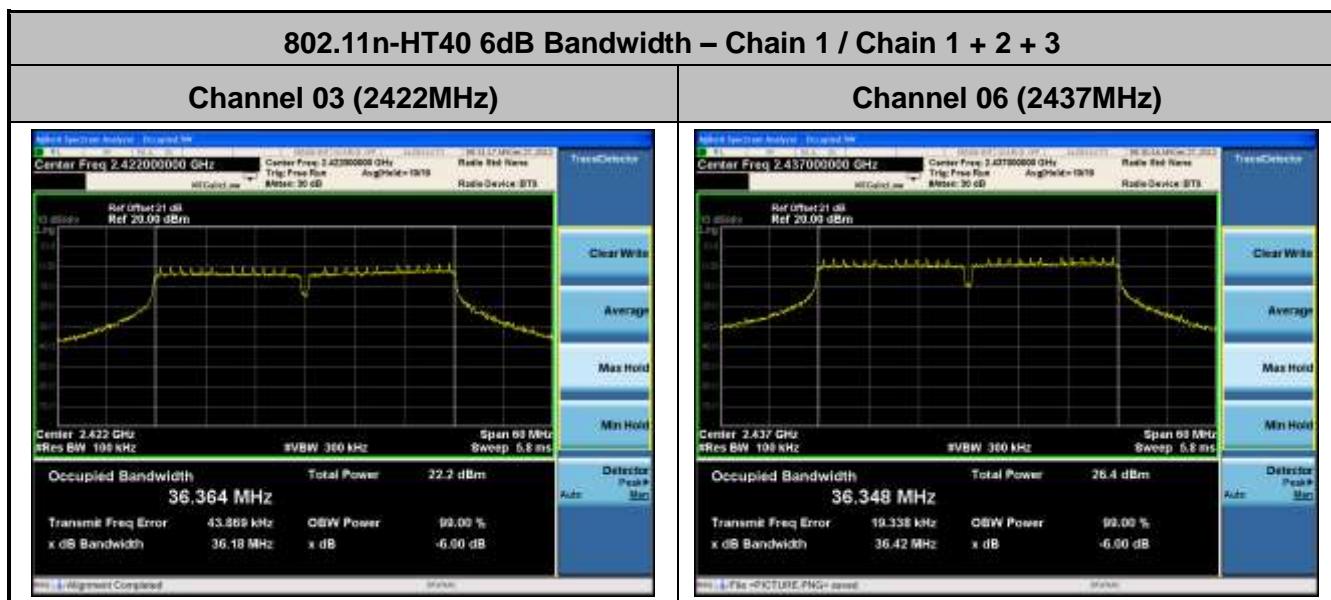
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Chain 1 / Chain 1 + 2 + 3						
802.11n-HT20	19.5/21.7	01	2412	17.59	≥0.5	Pass
802.11n-HT20	19.5/21.7	06	2437	17.57	≥0.5	Pass
802.11n-HT20	19.5/21.7	11	2462	17.60	≥0.5	Pass
Chain 2 / Chain 1 + 2 + 3						
802.11n-HT20	19.5/21.7	01	2412	17.61	≥0.5	Pass
802.11n-HT20	19.5/21.7	06	2437	17.64	≥0.5	Pass
802.11n-HT20	19.5/21.7	11	2462	17.66	≥0.5	Pass
Chain 3 / Chain 1 + 2 + 3						
802.11n-HT20	19.5/21.7	01	2412	17.62	≥0.5	Pass
802.11n-HT20	19.5/21.7	06	2437	17.60	≥0.5	Pass
802.11n-HT20	19.5/21.7	11	2462	17.63	≥0.5	Pass

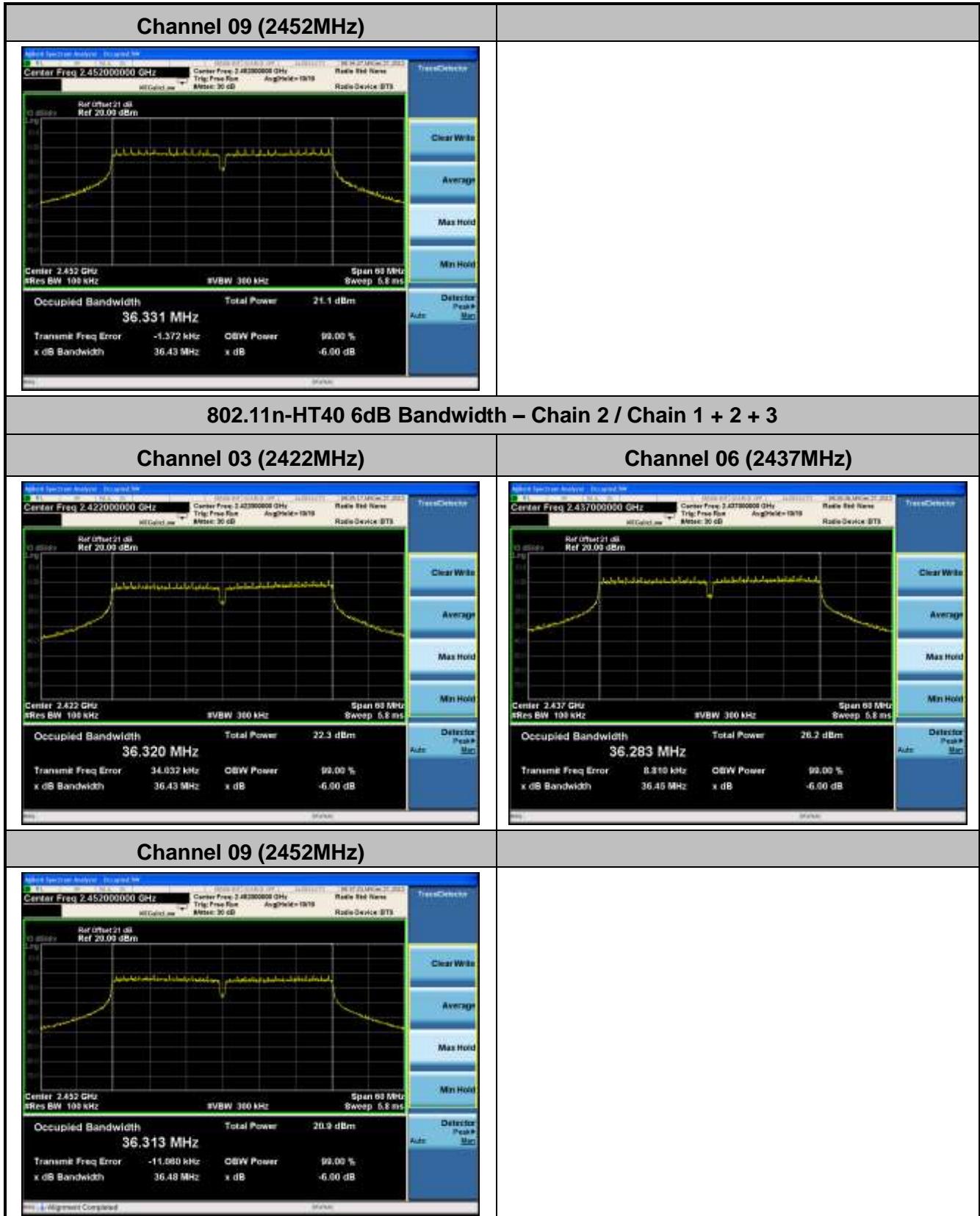


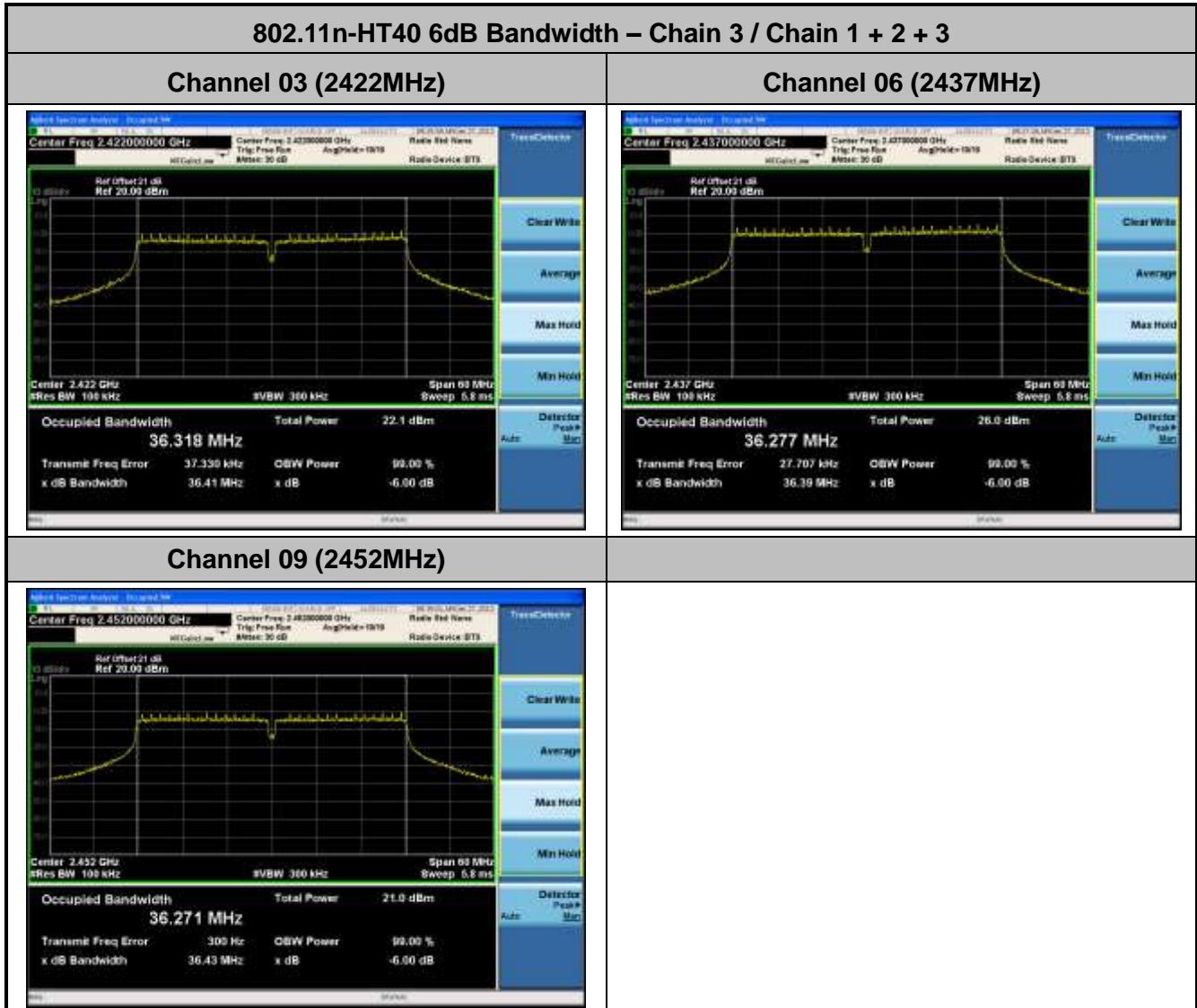




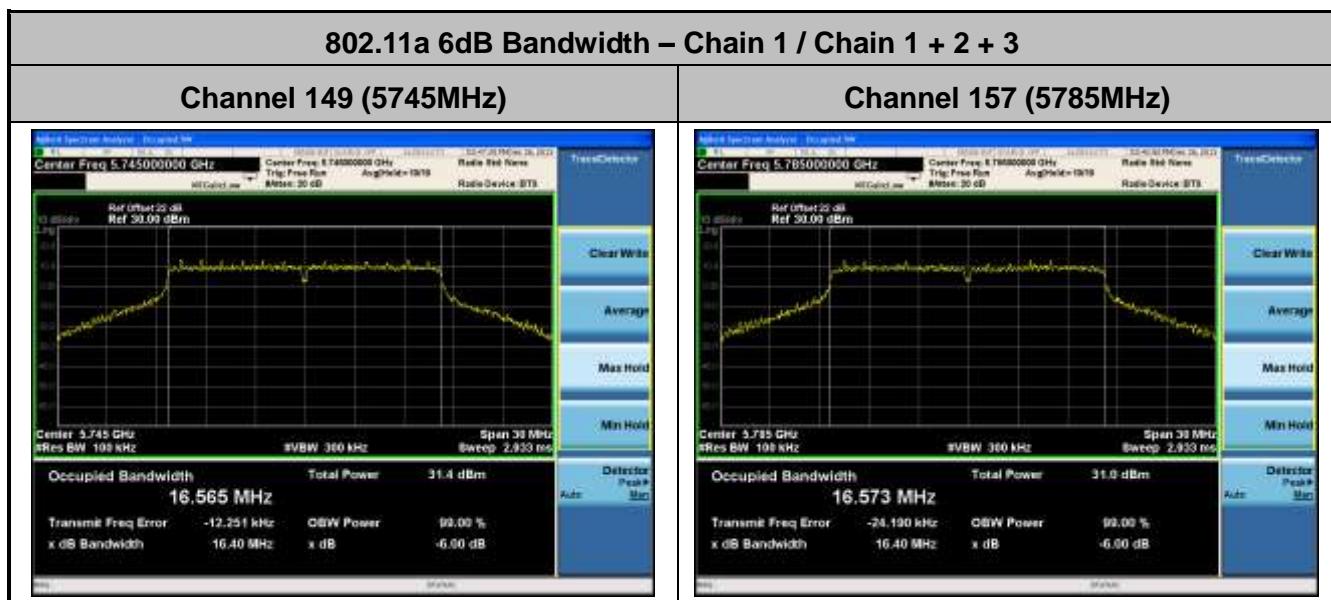
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Chain 1 / Chain 1 + 2 + 3						
802.11n-HT40	40.5/45	03	2422	36.18	≥0.5	Pass
802.11n-HT40	40.5/45	06	2437	36.42	≥0.5	Pass
802.11n-HT40	40.5/45	09	2452	36.43	≥0.5	Pass
Chain 2 / Chain 1 + 2 + 3						
802.11n-HT40	40.5/45	03	2422	36.43	≥0.5	Pass
802.11n-HT40	40.5/45	06	2437	36.45	≥0.5	Pass
802.11n-HT40	40.5/45	09	2452	36.48	≥0.5	Pass
Chain 3 / Chain 1 + 2 + 3						
802.11n-HT40	40.5/45	03	2422	36.41	≥0.5	Pass
802.11n-HT40	40.5/45	06	2437	36.39	≥0.5	Pass
802.11n-HT40	40.5/45	09	2452	36.43	≥0.5	Pass

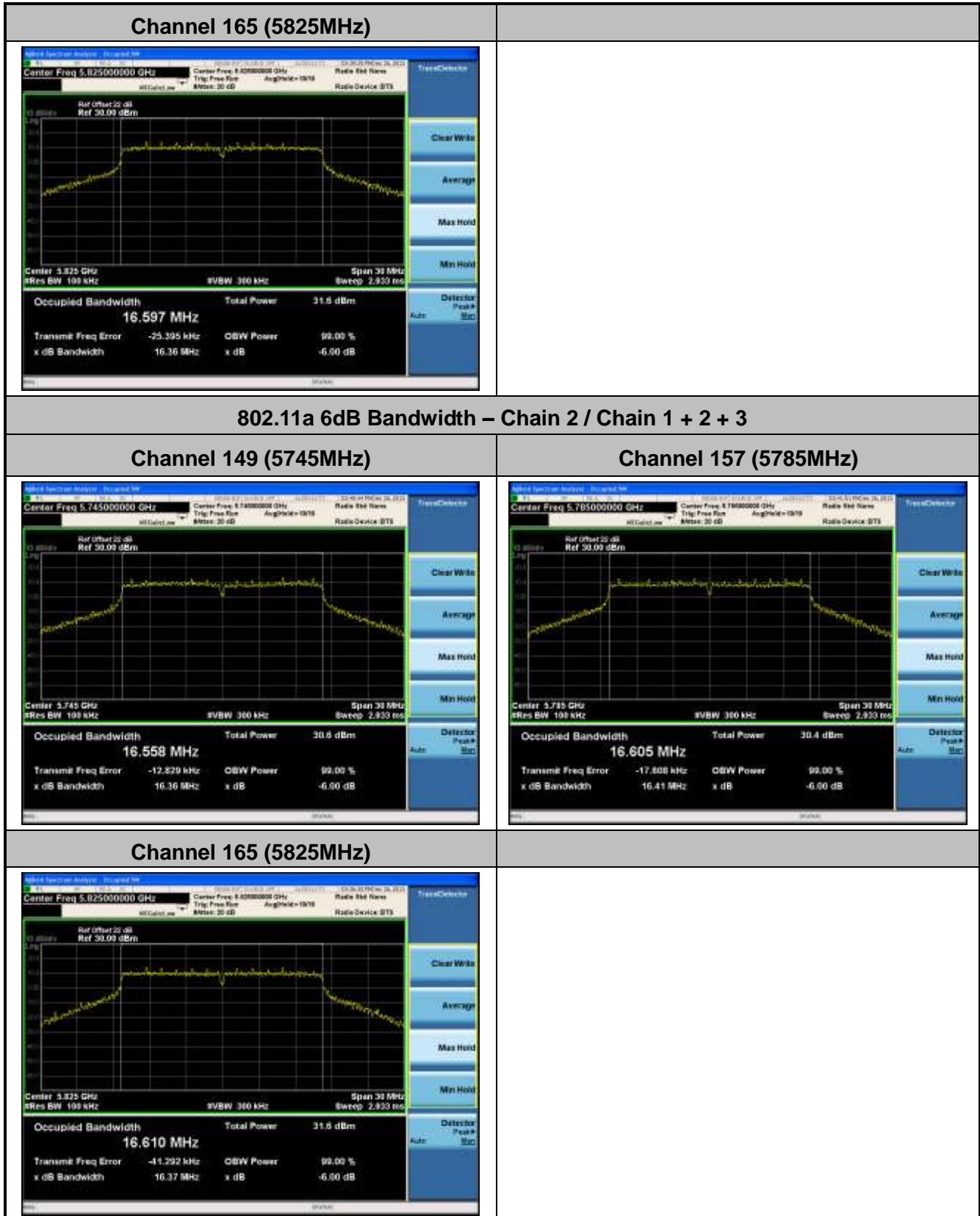


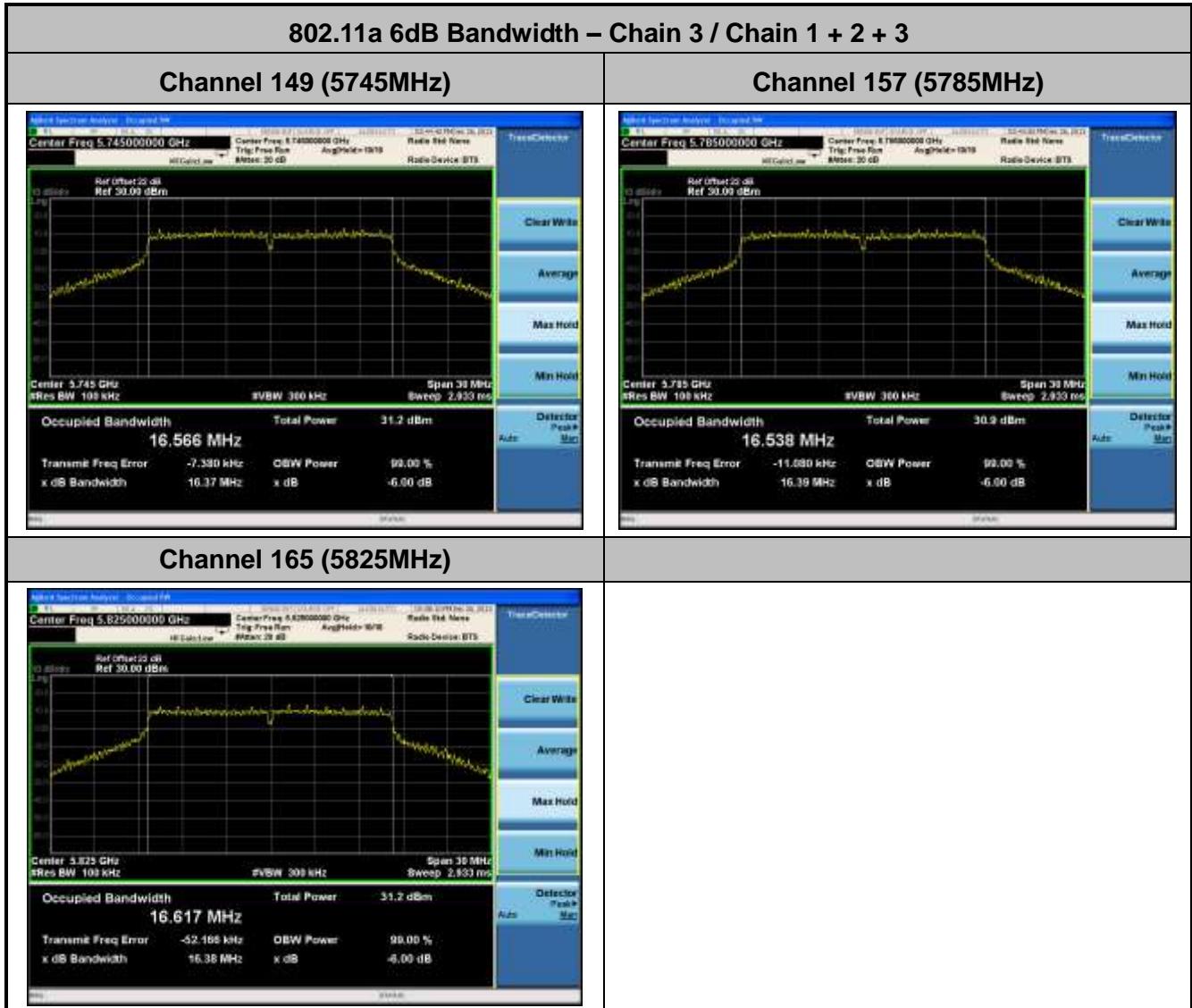




Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Chain 1 / Chain 1 + 2 + 3						
802.11a	6	149	5745	16.40	≥0.5	Pass
802.11a	6	157	5785	16.40	≥0.5	Pass
802.11a	6	165	5825	16.36	≥0.5	Pass
Chain 2 / Chain 1 + 2 + 3						
802.11a	6	149	5745	16.36	≥0.5	Pass
802.11a	6	157	5785	16.41	≥0.5	Pass
802.11a	6	165	5825	16.37	≥0.5	Pass
Chain 3 / Chain 1 + 2 + 3						
802.11a	6	149	5745	16.37	≥0.5	Pass
802.11a	6	157	5785	16.39	≥0.5	Pass
802.11a	6	165	5825	16.38	≥0.5	Pass

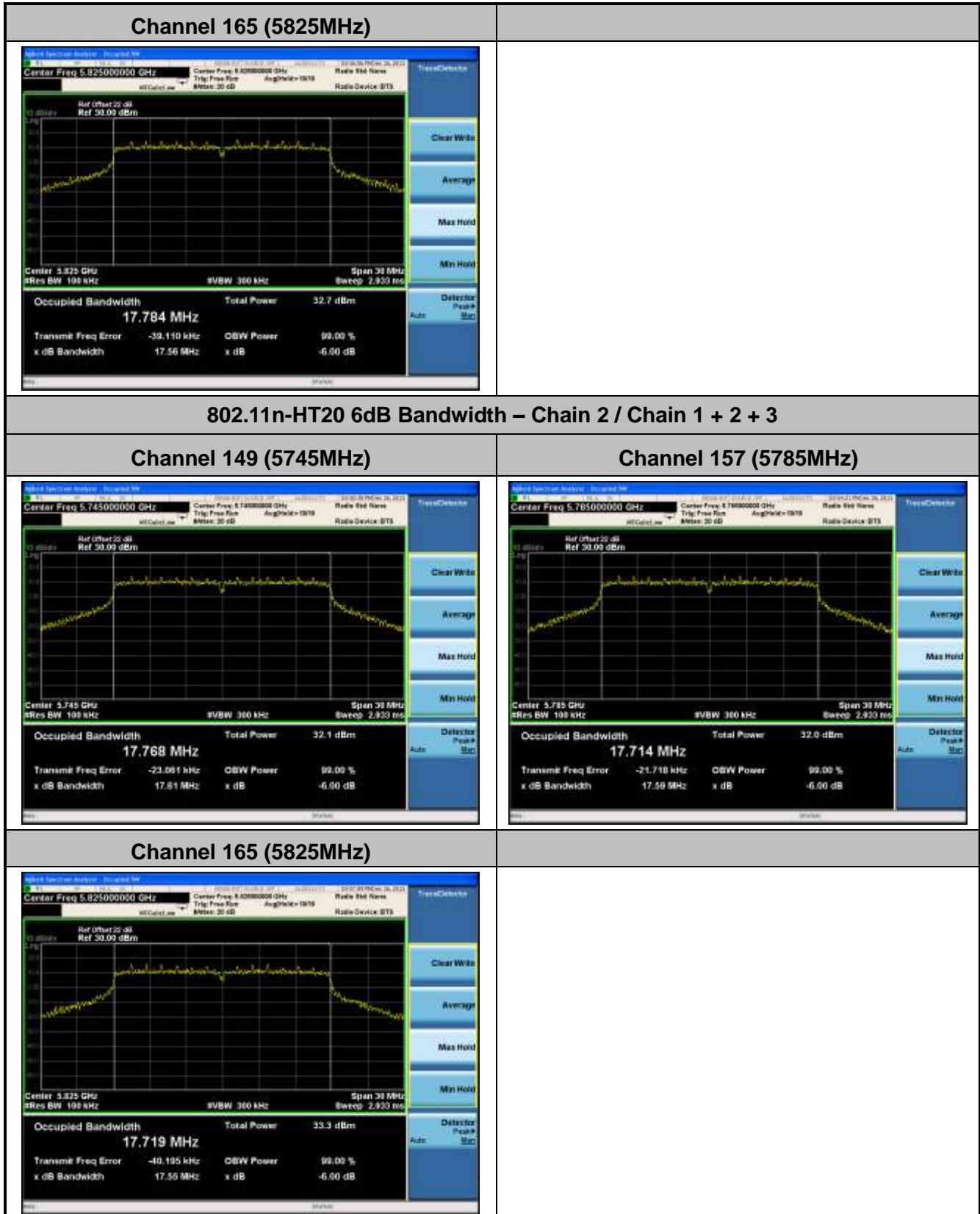






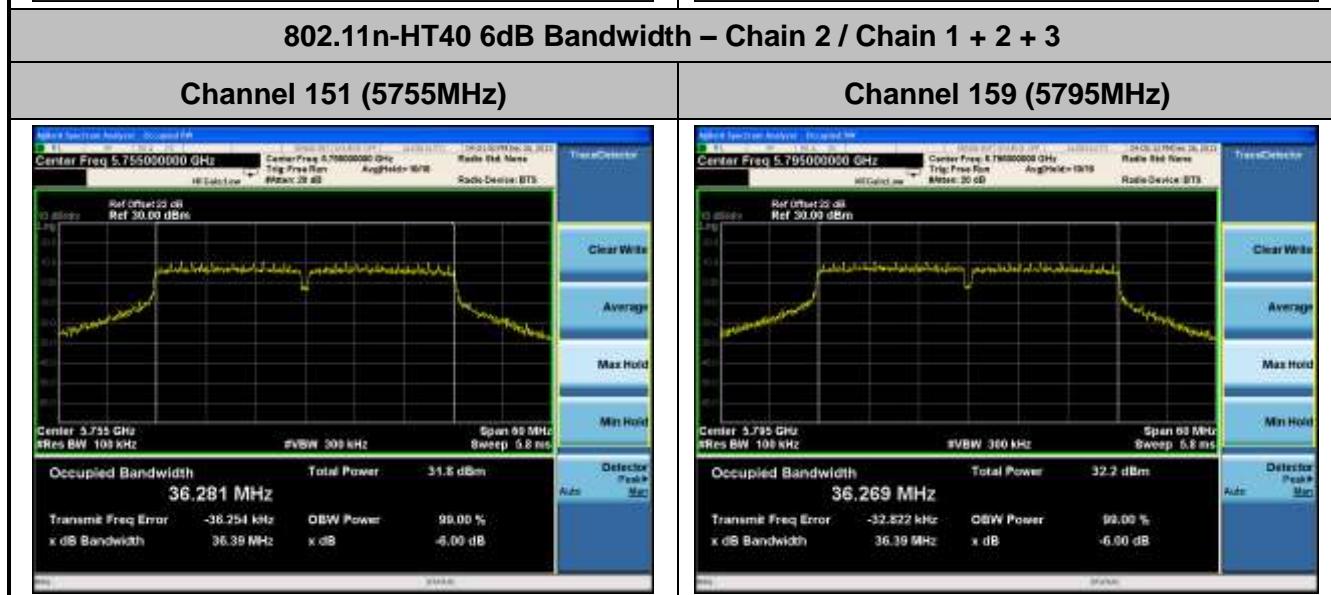
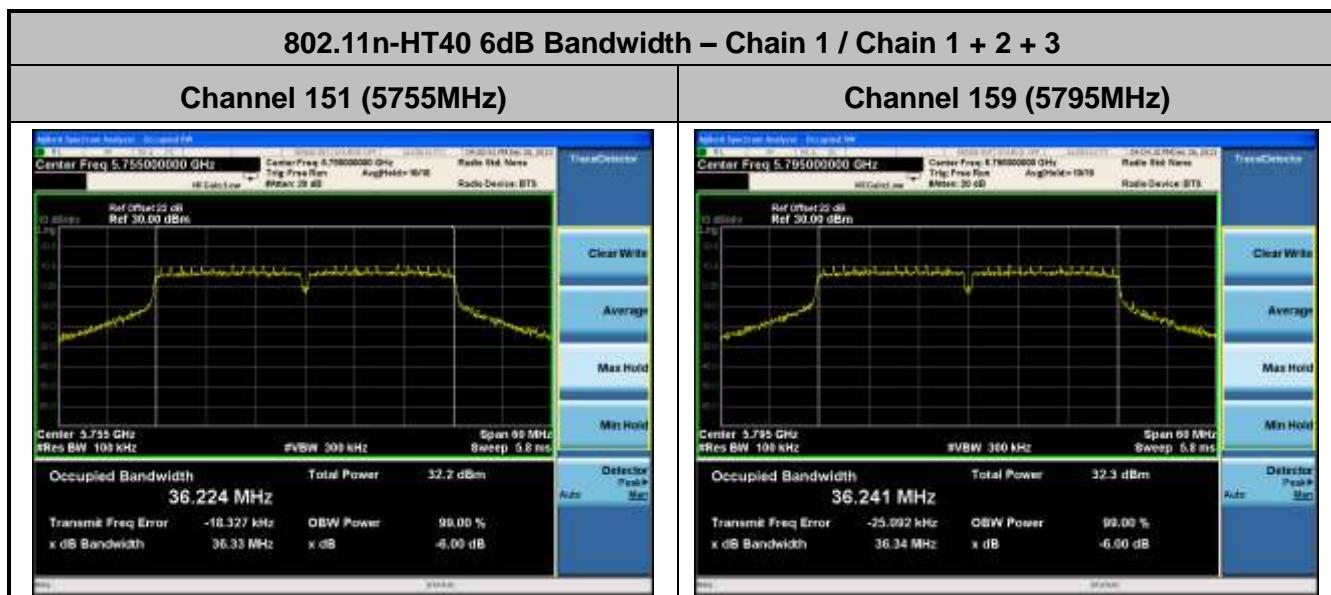
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Chain 1 / Chain 1 + 2 + 3						
802.11n-HT20	19.5/21.7	149	5745	17.58	≥0.5	Pass
802.11n-HT20	19.5/21.7	157	5785	17.57	≥0.5	Pass
802.11n-HT20	19.5/21.7	165	5825	17.56	≥0.5	Pass
Chain 2 / Chain 1 + 2 + 3						
802.11n-HT20	19.5/21.7	149	5745	17.61	≥0.5	Pass
802.11n-HT20	19.5/21.7	157	5785	17.59	≥0.5	Pass
802.11n-HT20	19.5/21.7	165	5825	17.55	≥0.5	Pass
Chain 3 / Chain 1 + 2 + 3						
802.11n-HT20	19.5/21.7	149	5745	17.57	≥0.5	Pass
802.11n-HT20	19.5/21.7	157	5785	17.58	≥0.5	Pass
802.11n-HT20	19.5/21.7	165	5825	17.60	≥0.5	Pass

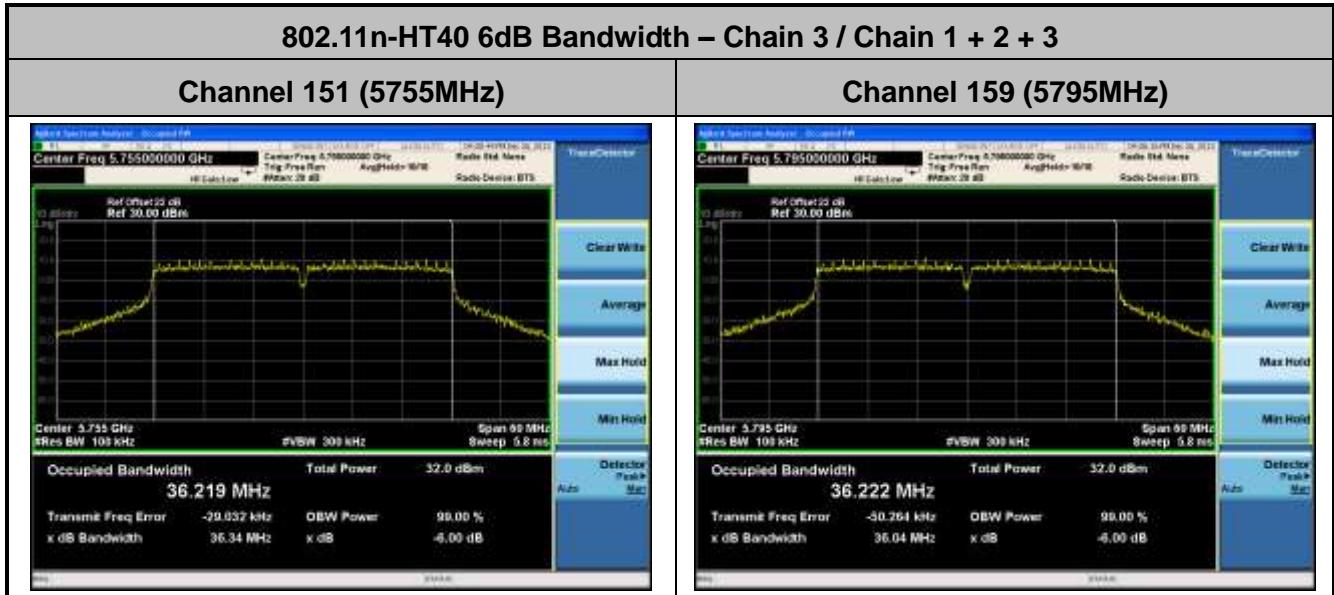






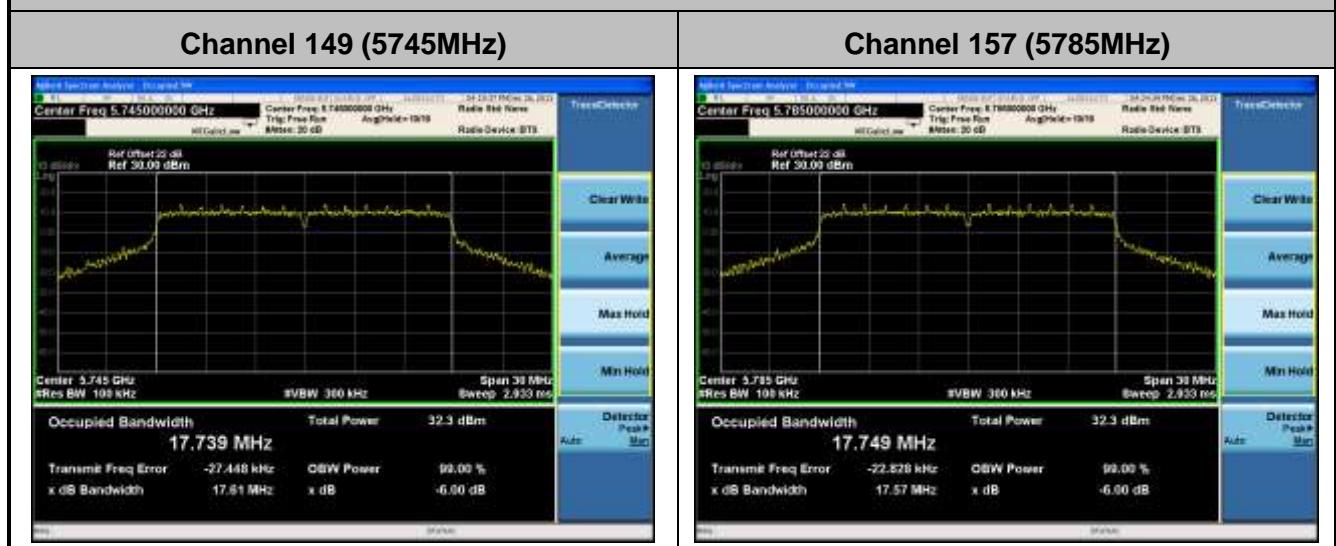
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Chain 1 / Chain 1 + 2 + 3						
802.11n-HT40	40.5/45	151	5755	36.33	≥0.5	Pass
802.11n-HT40	40.5/45	159	5795	36.34	≥0.5	Pass
Chain 2 / Chain 1 + 2 + 3						
802.11n-HT40	40.5/45	151	5755	36.39	≥0.5	Pass
802.11n-HT40	40.5/45	159	5795	36.39	≥0.5	Pass
Chain 3 / Chain 1 + 2 + 3						
802.11n-HT40	40.5/45	151	5755	36.34	≥0.5	Pass
802.11n-HT40	40.5/45	159	5795	36.04	≥0.5	Pass

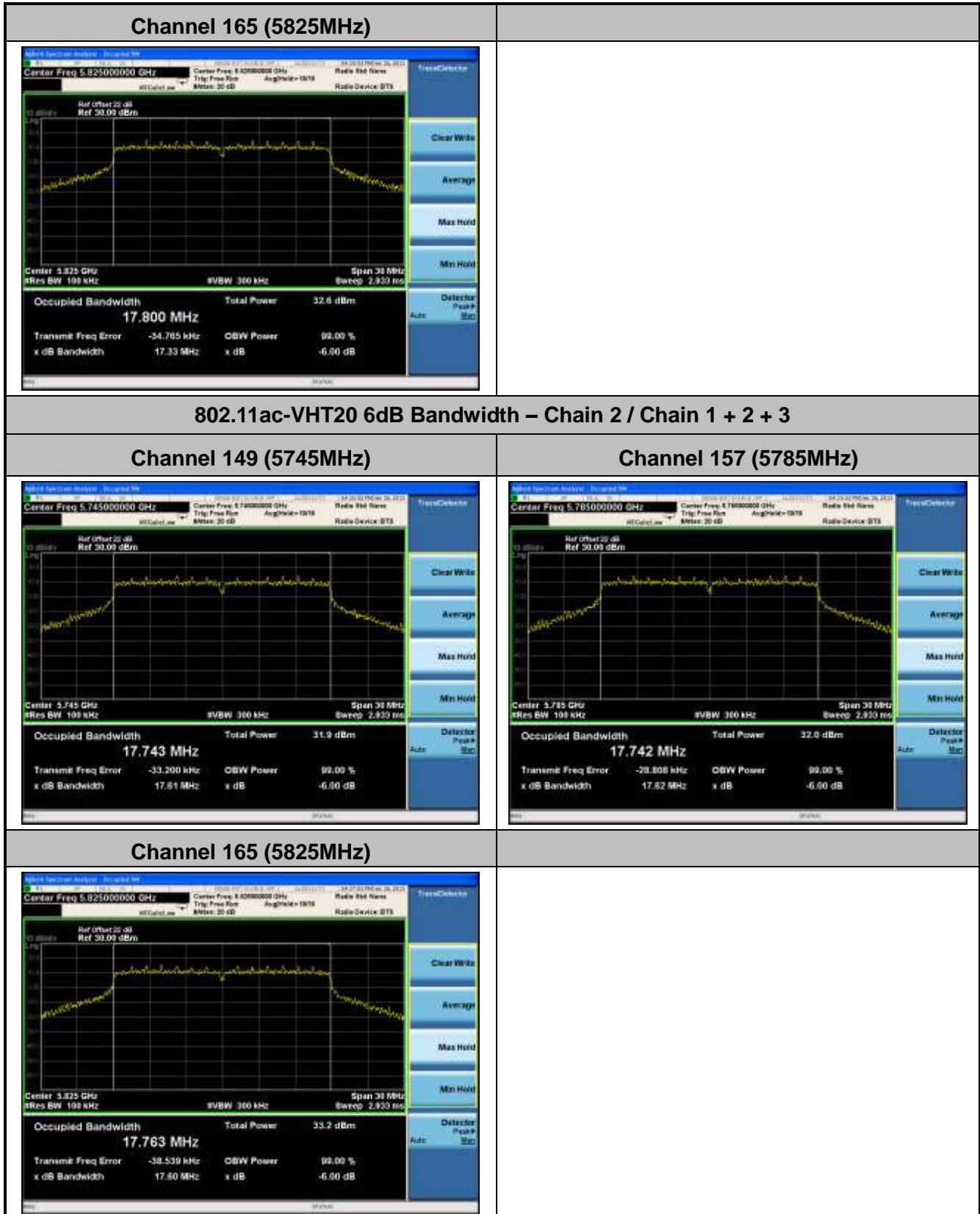


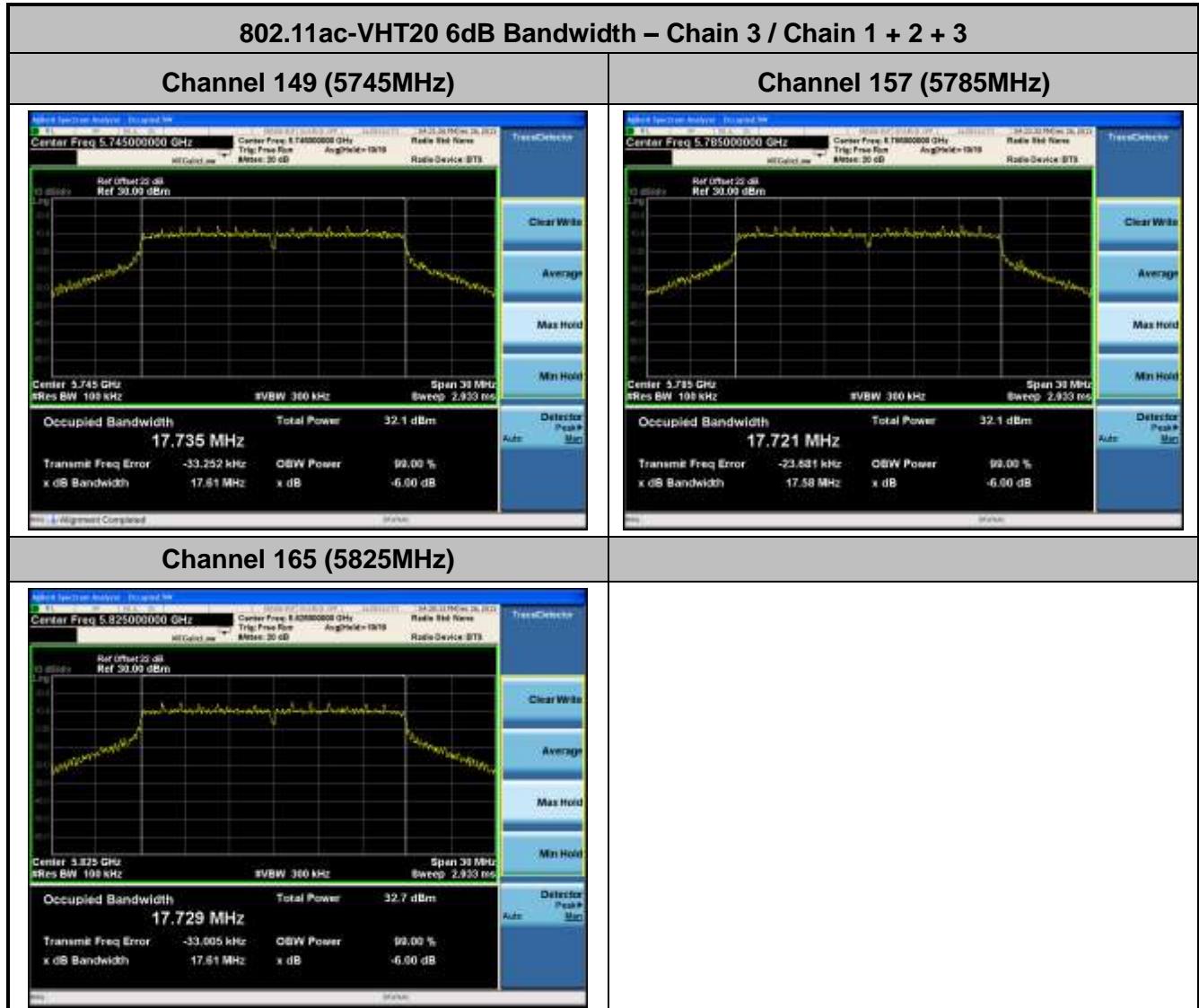


Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Chain 1 / Chain 1 + 2 + 3						
802.11ac-VHT20	19.5/21.7	149	5745	17.61	≥0.5	Pass
802.11ac-VHT20	19.5/21.7	157	5785	17.57	≥0.5	Pass
802.11ac-VHT20	19.5/21.7	165	5825	17.33	≥0.5	Pass
Chain 2 / Chain 1 + 2 + 3						
802.11ac-VHT20	19.5/21.7	149	5745	17.61	≥0.5	Pass
802.11ac-VHT20	19.5/21.7	157	5785	17.62	≥0.5	Pass
802.11ac-VHT20	19.5/21.7	165	5825	17.60	≥0.5	Pass
Chain 3 / Chain 1 + 2 + 3						
802.11ac-VHT20	19.5/21.7	149	5745	17.61	≥0.5	Pass
802.11ac-VHT20	19.5/21.7	157	5785	17.58	≥0.5	Pass
802.11ac-VHT20	19.5/21.7	165	5825	17.61	≥0.5	Pass

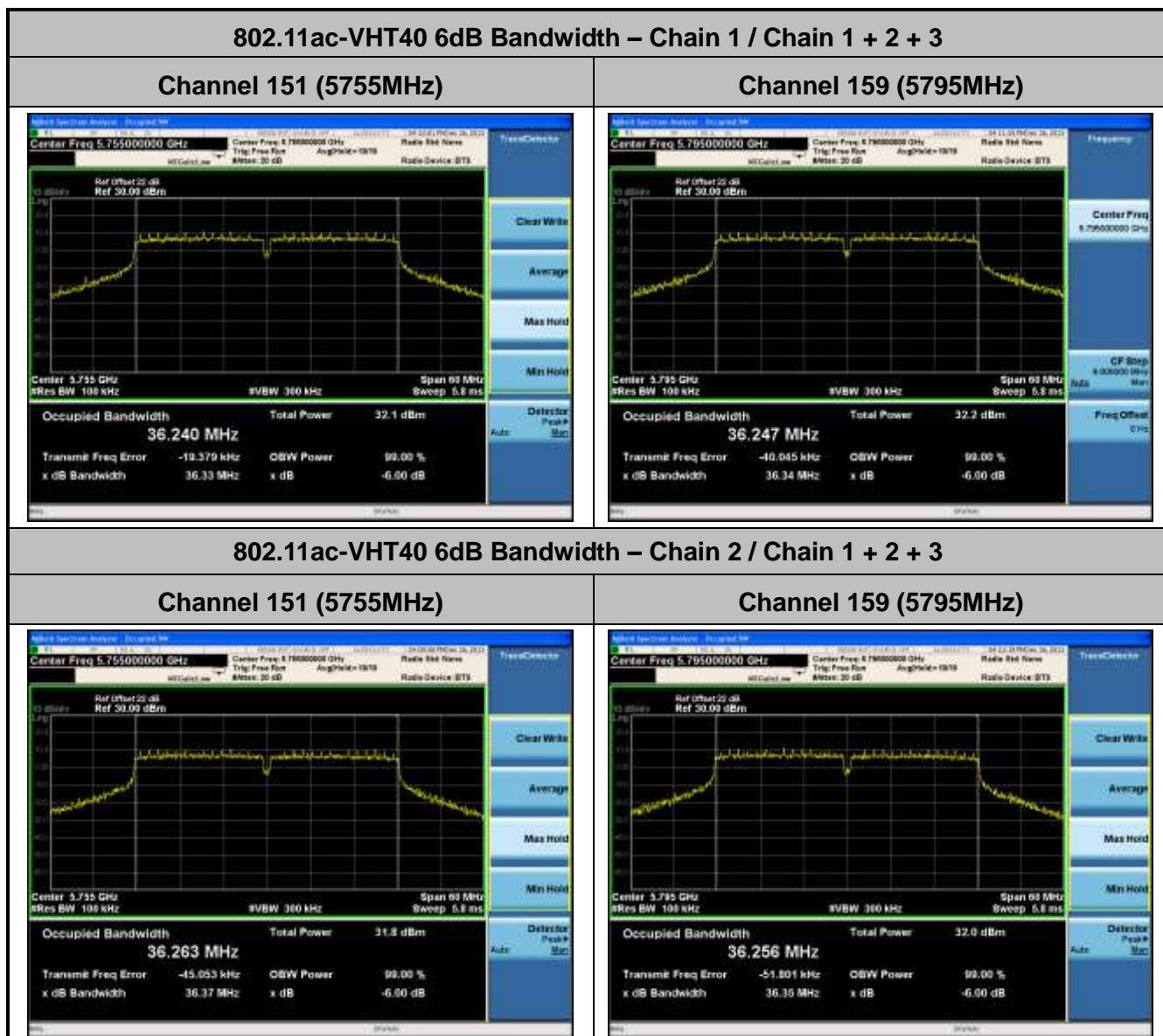
### 802.11ac-VHT20 6dB Bandwidth – Chain 1 / Chain 1 + 2 + 3

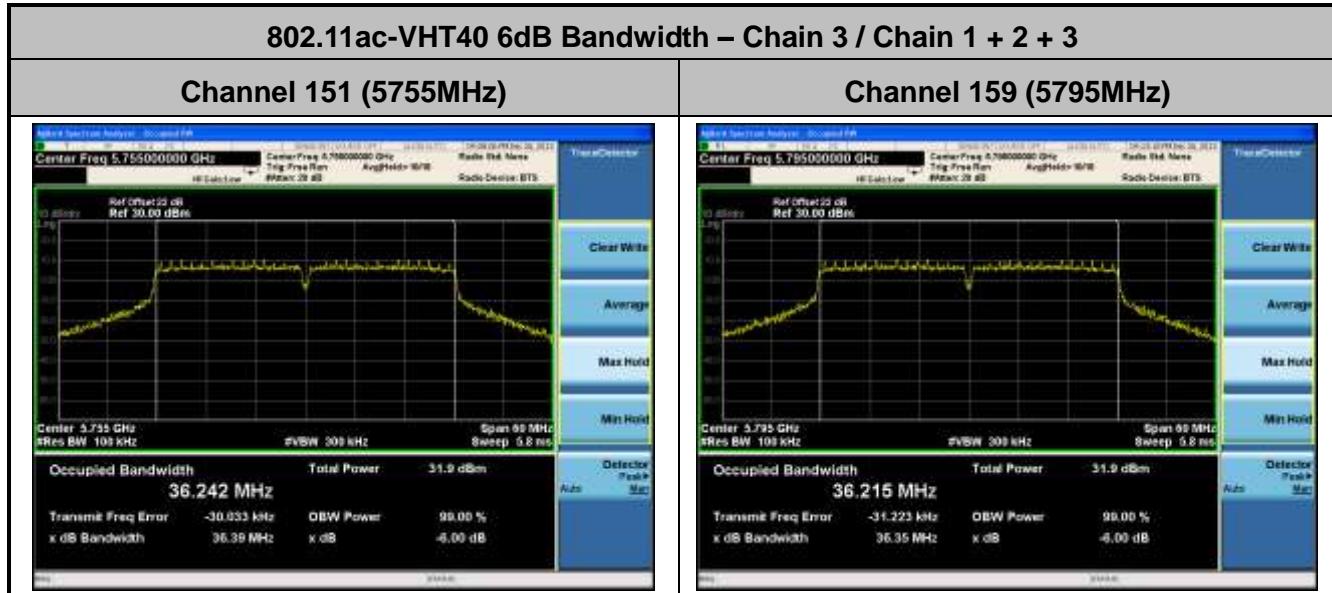




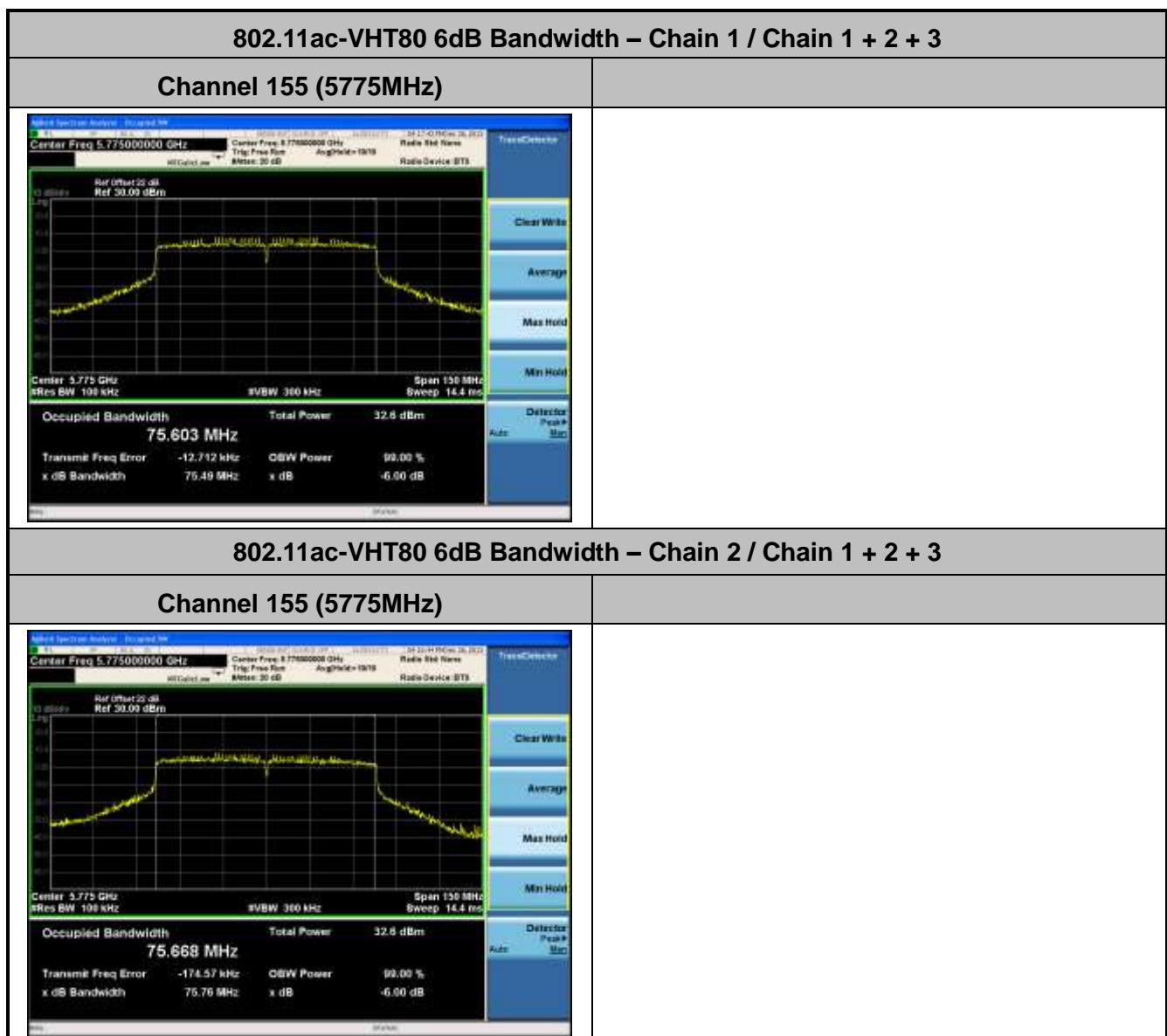


Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Chain 1 / Chain 1 + 2 + 3						
802.11ac-VHT40	40.5/45	151	5755	36.33	≥0.5	Pass
802.11ac-VHT40	40.5/45	159	5795	36.34	≥0.5	Pass
Chain 2 / Chain 1 + 2 + 3						
802.11ac-VHT40	40.5/45	151	5755	36.37	≥0.5	Pass
802.11ac-VHT40	40.5/45	159	5795	36.35	≥0.5	Pass
Chain 3 / Chain 1 + 2 + 3						
802.11ac-VHT40	40.5/45	151	5755	36.39	≥0.5	Pass
802.11ac-VHT40	40.5/45	159	5795	36.35	≥0.5	Pass





Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Chain 1 / Chain 1 + 2 + 3						
802.11ac-VHT80	87.8/97.5	155	5775	75.49	≥0.5	Pass
Chain 2 / Chain 1 + 2 + 3						
802.11ac-VHT80	87.8/97.5	155	5775	75.76	≥0.5	Pass
Chain 3 / Chain 1 + 2 + 3						
802.11ac-VHT80	87.8/97.5	155	5775	75.45	≥0.5	Pass





### 7.3. Output Power Measurement §15.247(b)(3); RSS-210 /A8.4

#### 7.3.1. Test Limit

##### For FCC

The maximum out power shall be less 1 Watt (30dBm).

As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

##### For IC

systems employing digital modulation techniques operating in the bands 2400-2483.5 MHz and 5725-5850 MHz, the maximum peak conducted output power shall not exceed 1 W, the e.i.r.p. shall not exceed 4 W.

$$\text{Limit (dBm)} = 30 - (6.8 - 6) = 29.2\text{dBm for 5.8G}$$

#### 7.3.2. Test Procedure Used

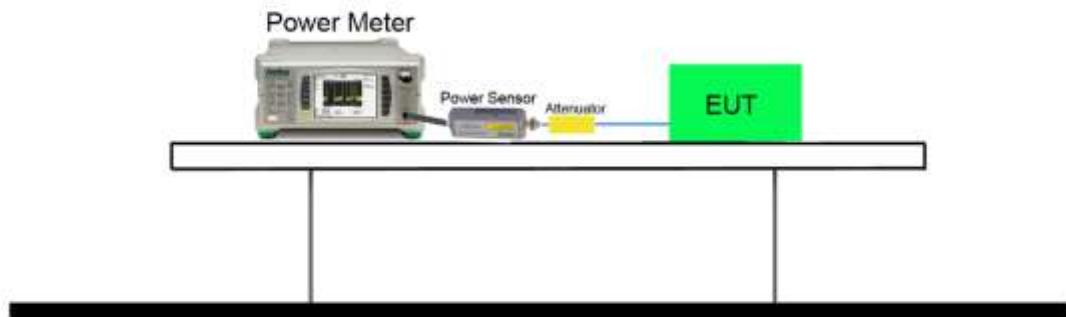
KDB 558074 D01v03r01 - Section 9.2.3.2 AVGPM-G (for signals of all BWs)

#### 7.3.3. Test Setting

##### Method AVGPM-G (Average Power Measurements for Signals With Any Channel BW)

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

#### 7.3.4. Test Setup



### 7.3.5. Test Result

**Power output test was verified over all data rates of each mode shown as below, and then choose the maximum power output (yellow marker) for final test of each channel.**

MCS Index for 802.11n	N <sub>Tx</sub>				Data Rate (Mbps)			
		b	g	a	20MHz Bandwidth		40MHz Bandwidth	
					800ns GI	400ns GI	800ns GI	400ns GI
0	1	1	6	6	6.5	7.2	13.5	15.0
1	1	2	9	9	13.0	14.4	27.0	30.0
2	1	5.5	12	12	19.5	21.7	40.5	45.0
3	1	11	18	18	26.0	28.9	54.0	60.0
4	1	--	24	24	39.0	43.3	81.0	90.0
5	1	--	36	36	52.0	57.8	108.0	120.0
6	1	--	48	48	58.5	65.0	121.5	135.0
7	1	--	54	54	65.0	72.2	135.0	150.0
8	2	1	6	6	13.0	14.4	27.0	30.0
9	2	2	9	9	26.0	28.9	54.0	60.0
10	2	5.5	12	12	39.0	43.3	81.0	90.0
11	2	11	18	18	52.0	57.8	108.0	120.0
12	2	--	24	24	78.0	86.7	162.0	180.0
13	2	--	36	36	104.0	115.6	216.0	240.0
14	2	--	48	48	117.0	130.0	243.0	270.0
15	2	--	54	54	130.0	144.0	270.0	300.0
16	3	1	6	6	19.5	21.7	40.5	45.0
17	3	2	9	9	39.0	43.3	81.0	90.0
18	3	5.5	12	12	58.5	65.0	121.5	135.0
19	3	11	18	18	78.0	86.7	162.0	180.0
20	3	--	24	24	117.0	130.0	243.0	270.0
21	3	--	36	36	156.0	173.3	324.0	360.0
22	3	--	48	48	175.5	195.0	364.5	405.0
23	3	--	54	54	195.0	216.7	405.0	450.0

MCS Index for 802.11ac	N <sub>Tx</sub>	Data Rate (Mbps)					
		20MHz Bandwidth		40MHz Bandwidth		80MHz Bandwidth	
		800ns GI	400ns GI	800ns GI	400ns GI	800ns GI	400ns GI
0	1	6.5	7.2	13.5	15.0	29.3	32.5
1	1	13.0	14.4	27.0	30.0	58.5	65.0
2	1	19.5	21.7	40.5	45.0	87.8	97.5
3	1	26.0	28.9	54.0	60.0	117.0	130.0
4	1	39.0	43.3	81.0	90.0	175.5	195
5	1	52.0	57.8	108.0	120.0	234.0	260.0
6	1	58.5	65.0	121.5	135.0	263.3	292.5
7	1	65.0	72.2	135.0	150.0	292.5	325
8	1	78.0	86.7	162.0	180.0	351.0	390.0
9	1	--	--	180.0	200.0	390.0	433.3
10	2	13.0	14.4	27.0	30.0	58.6	65.0
11	2	26.0	28.8	54.0	60.0	117.0	130.0
12	2	39.0	43.4	81.0	90.0	175.6	195.0
13	2	52.0	57.8	108.0	120.0	234.0	260.0
14	2	78.0	86.6	162.0	180.0	351.0	390.0
15	2	104.0	115.6	216.0	240.0	468.0	520.0
16	2	117.0	130.0	243.0	270.0	526.6	585.0
17	2	130.0	144.4	270.0	300.0	585.0	650.0
18	2	156.0	173.4	324.0	360.0	702.0	780.0
19	2	--	--	360.0	400.0	780.0	866.6
20	3	19.5	21.7	40.5	45.0	87.9	97.5
21	3	39.0	43.3	81.0	90.0	175.5	195.0
22	3	58.5	65.0	121.5	135.0	263.4	292.5
23	3	78.0	86.7	162.0	180.0	351.0	390.0
24	3	117.0	130.0	243.0	270.0	526.5	585.0
25	3	156.0	173.3	324.0	360.0	702.0	780.0
26	3	175.5	195.0	364.5	405.0	789.9	877.5
27	3	195.0	216.7	405.0	450.0	877.5	975.0
28	3	234.0	260.2	486.0	540.0	1053.0	1170.0
29	3	--	--	540.0	600.0	1170.0	1299.9

**Output power at various data rates for Chain 1 / Chain 1 + 2 + 3:**

Test Mode	Bandwidth	Frequency (MHz)	Channel	Data Rate (Mbps)	Average Power (dBm)
802.11b	20	2437	6	1	24.30
				5.5	24.11
				11	24.02
802.11g	20	2437	6	6	20.93
				24	20.52
				54	20.21
802.11n	20	2437	6	19.5/21.7(MCS16)	20.87
				117/130.0(MCS20)	19.42
				195/216.7(MCS23)	19.29
802.11n	40	2437	6	40.5/45(MCS16)	17.67
				243/270(MCS20)	17.03
				405/450(MCS23)	16.77
802.11a	20	5785	157	6	24.58
				24	23.77
				54	23.25
802.11n	20	5785	157	19.5/21.7(MCS16)	24.50
				117/130.0(MCS20)	23.81
				195/216.7(MCS23)	23.05
802.11n	40	5755	151	40.5/45(MCS16)	24.05
				243/270(MCS20)	23.08
				405/450(MCS23)	22.77
802.11ac	20	5785	157	19.5/21.7(MCS20)	24.24
				117/130.0(MCS24)	23.22
				234/260.2(MCS28)	22.71
802.11ac	40	5755	151	40.5/45(MCS20)	23.85
				243/270(MCS24)	23.19
				540/600(MCS29)	22.62
802.11ac	80	5775	155	87.8/97.5(MCS20)	23.07
				526.5/585(MCS24)	22.23
				1170/1299.9(MCS29)	21.20

Test Mode	N <sub>Tx</sub>	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Chain 1 Average Power (dBm)	Chain 2 Average Power (dBm)	Chain 3 Average Power (dBm)	Total Average Power (dBm)	Limit (dBm)	E.I.R.P (dBm)	E.I.R.P Limit (dBm)	Result
b	3	1	1	2412	21.90	22.06	21.56	26.62	≤30	32.52	≤36	Pass
b	3	1	2	2417	23.47	23.58	23.61	28.32	≤30	34.22	≤36	Pass
b	3	1	6	2437	24.30	24.03	23.81	28.82	≤30	34.72	≤36	Pass
b	3	1	10	2457	22.99	23.01	23.00	27.77	≤30	33.67	≤36	Pass
b	3	1	11	2462	21.64	21.68	21.65	26.43	≤30	32.33	≤36	Pass
g	3	6	1	2412	16.10	16.90	16.16	21.17	≤30	27.07	≤36	Pass
g	3	6	2	2417	18.21	18.32	18.19	23.01	≤30	28.91	≤36	Pass
g	3	6	3	2422	19.51	19.27	19.33	24.14	≤30	30.04	≤36	Pass
g	3	6	6	2437	20.93	21.10	20.73	25.69	≤30	31.59	≤36	Pass
g	3	6	9	2452	19.04	19.51	19.53	24.14	≤30	30.04	≤36	Pass
g	3	6	10	2457	17.43	18.09	18.07	22.65	≤30	28.55	≤36	Pass
g	3	6	11	2462	16.28	17.01	17.18	21.61	≤30	27.51	≤36	Pass
n-HT20	3	19.5/21.7	1	2412	15.77	16.56	15.78	20.82	≤30	26.72	≤36	Pass
n-HT20	3	19.5/21.7	2	2417	19.22	19.17	18.99	23.90	≤30	29.80	≤36	Pass
n-HT20	3	19.5/21.7	6	2437	20.87	21.03	20.40	25.55	≤30	31.45	≤36	Pass
n-HT20	3	19.5/21.7	9	2452	19.71	19.72	19.58	24.44	≤30	30.34	≤36	Pass
n-HT20	3	19.5/21.7	10	2457	18.51	18.81	18.70	23.45	≤30	29.35	≤36	Pass
n-HT20	3	19.5/21.7	11	2462	15.09	15.83	16.02	20.44	≤30	26.34	≤36	Pass
n-HT40	3	40.5/45	3	2422	13.75	14.95	13.56	18.90	≤30	24.80	≤36	Pass
n-HT40	3	40.5/45	4	2427	14.34	14.52	14.48	19.22	≤30	25.12	≤36	Pass
n-HT40	3	40.5/45	5	2432	15.61	15.24	15.55	20.24	≤30	26.14	≤36	Pass
n-HT40	3	40.5/45	6	2437	17.67	17.72	18.35	22.70	≤30	28.60	≤36	Pass
n-HT40	3	40.5/45	7	2442	16.78	16.54	17.27	21.65	≤30	27.55	≤36	Pass
n-HT40	3	40.5/45	8	2447	15.56	15.30	16.13	20.45	≤30	26.35	≤36	Pass
n-HT40	3	40.5/45	9	2452	12.53	12.91	12.88	17.55	≤30	23.45	≤36	Pass

Note: The E.I.R.P power = Average Power + Directional Gain.

Test Mode	N <sub>Tx</sub>	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Chain 1 Average Power (dBm)	Chain 2 Average Power (dBm)	Chain 3 Average Power (dBm)	Total Average Power (dBm)	Limit (dBm)	E.I.R.P (dBm)	E.I.R.P Limit (dBm)	Result
a	3	6	149	5745	24.84	23.85	23.72	28.94	≤29.2	35.74	≤36	Pass
a	3	6	157	5785	24.58	23.84	23.52	28.77	≤29.2	35.57	≤36	Pass
a	3	6	165	5825	24.68	23.82	24.50	29.12	≤29.2	35.92	≤36	Pass
n-HT20	3	19.5/21.7	149	5745	24.60	23.80	23.79	28.85	≤29.2	35.65	≤36	Pass
n-HT20	3	19.5/21.7	157	5785	24.50	23.61	23.62	28.70	≤29.2	35.5	≤36	Pass
n-HT20	3	19.5/21.7	165	5825	24.23	23.62	24.42	28.87	≤29.2	35.67	≤36	Pass
n-HT40	3	40.5/45	151	5755	24.05	23.06	22.97	28.16	≤29.2	34.96	≤36	Pass
n-HT40	3	40.5/45	159	5795	23.68	22.82	23.06	27.97	≤29.2	34.77	≤36	Pass
ac-VHT20	3	19.5/21.7	149	5745	24.55	23.68	23.89	28.83	≤29.2	35.63	≤36	Pass
ac-VHT20	3	19.5/21.7	157	5785	24.24	23.25	23.53	28.46	≤29.2	35.26	≤36	Pass
ac-VHT20	3	19.5/21.7	165	5825	24.02	23.46	24.29	28.71	≤29.2	35.51	≤36	Pass
ac-VHT40	3	40.5/45	151	5755	23.85	23.01	22.94	28.06	≤29.2	34.86	≤36	Pass
ac-VHT40	3	40.5/45	159	5795	23.50	22.70	22.90	27.82	≤29.2	34.62	≤36	Pass
ac-VHT80	3	87.8/97.5	155	5775	23.07	22.28	22.16	27.29	≤29.2	34.09	≤36	Pass

Note: The E.I.R.P power = Average Power + Directional Gain.

## 7.4. Power Spectral Density Measurement §15.247(e); RSS-210 /A8.2]

### 7.4.1. Test Limit

The maximum permissible power spectral density is 8 dBm in any 3 kHz band.

As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

**Limit (dBm/3kHz) = 8 – (6.8 – 6) = 7.2 dBm/3kHz for 5.8G**

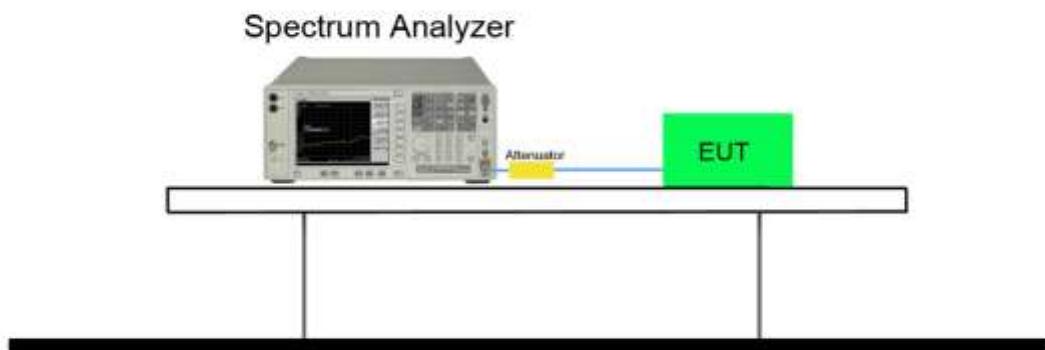
### 7.4.2. Test Procedure Used

KDB 558074 D01v03r01 - Section 10.5 Method AVGPSD-2

### 7.4.3. Test Setting

1. Measure the duty cycle of transmitter output signal
2. Set instrument center frequency to DTS channel center frequency
3. Span = 1.5 times the OBW channel bandwidth
4. RBW = 10kHz
5. VBW = 30kHz
6. Detector = power averaging (RMS)
7. Sweep points  $\geq 2 * \text{span} / \text{RBW}$
8. Sweep time = auto couple
9. Allow sweep to “ free run”
10. Employ trace averaging (RMS) mode over a minimum of 100 traces
11. Use the peak marker function to determine the maximum amplitude level
12. Add  $10\log(1/x)$ , where x is the duty cycle measured in step.

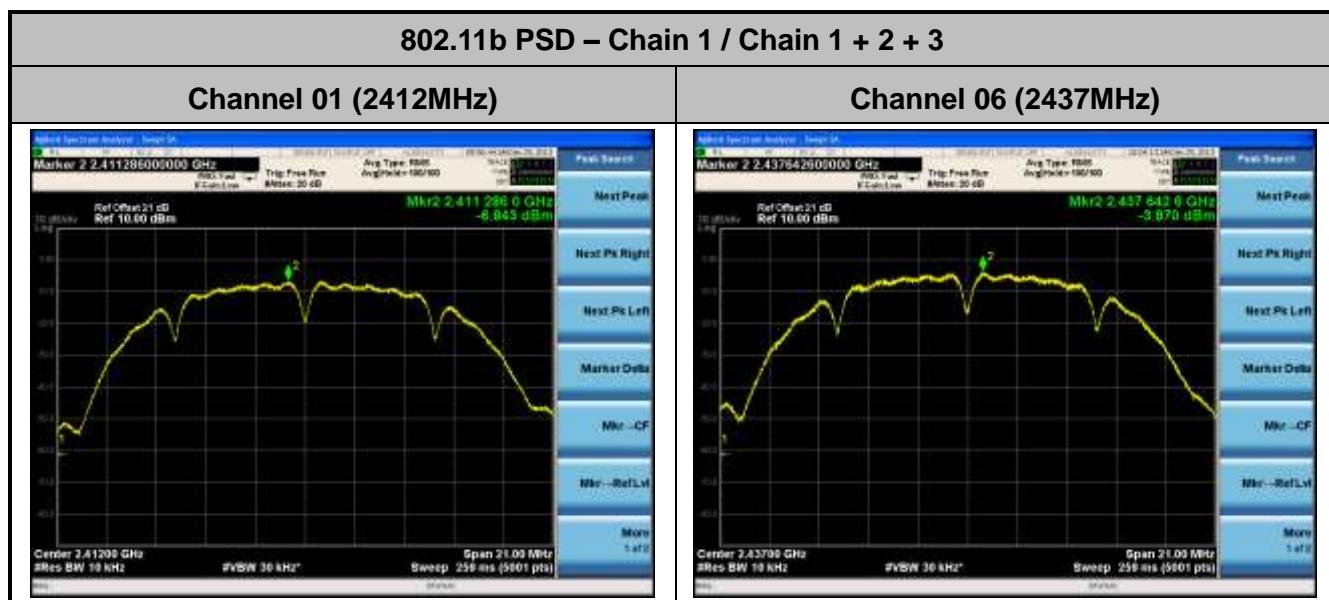
#### 7.4.4. Test Setup

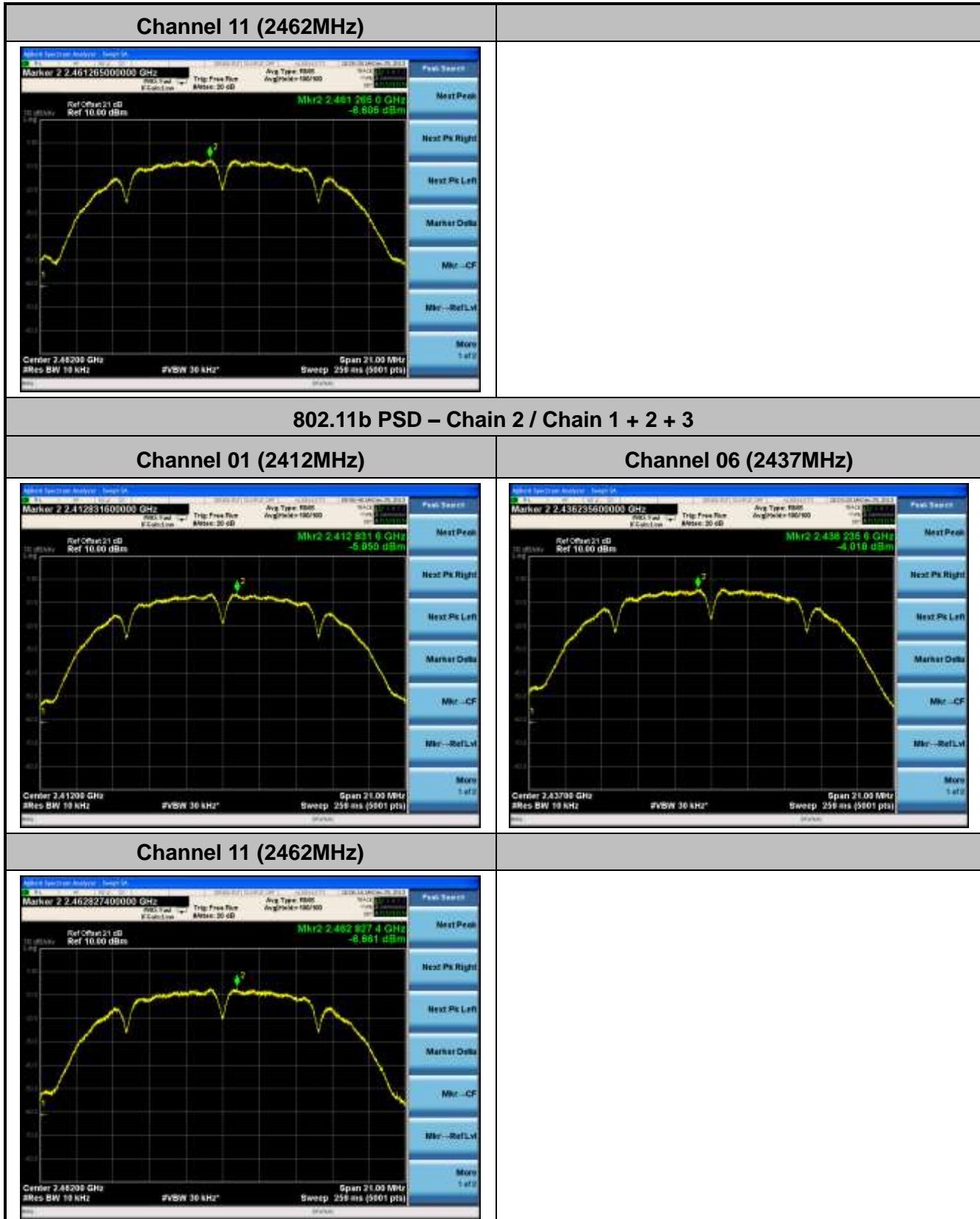


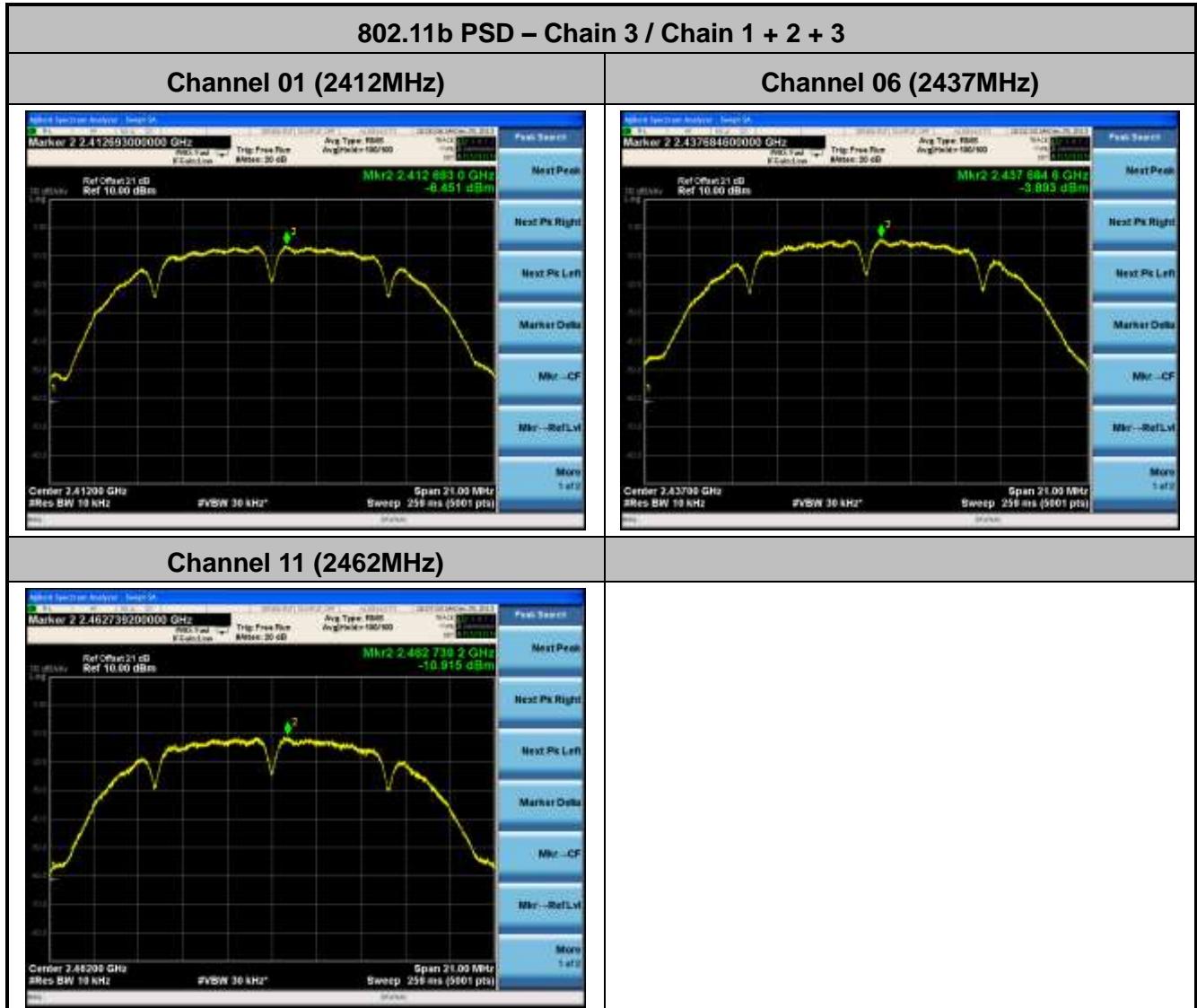
#### 7.4.5. Test Result

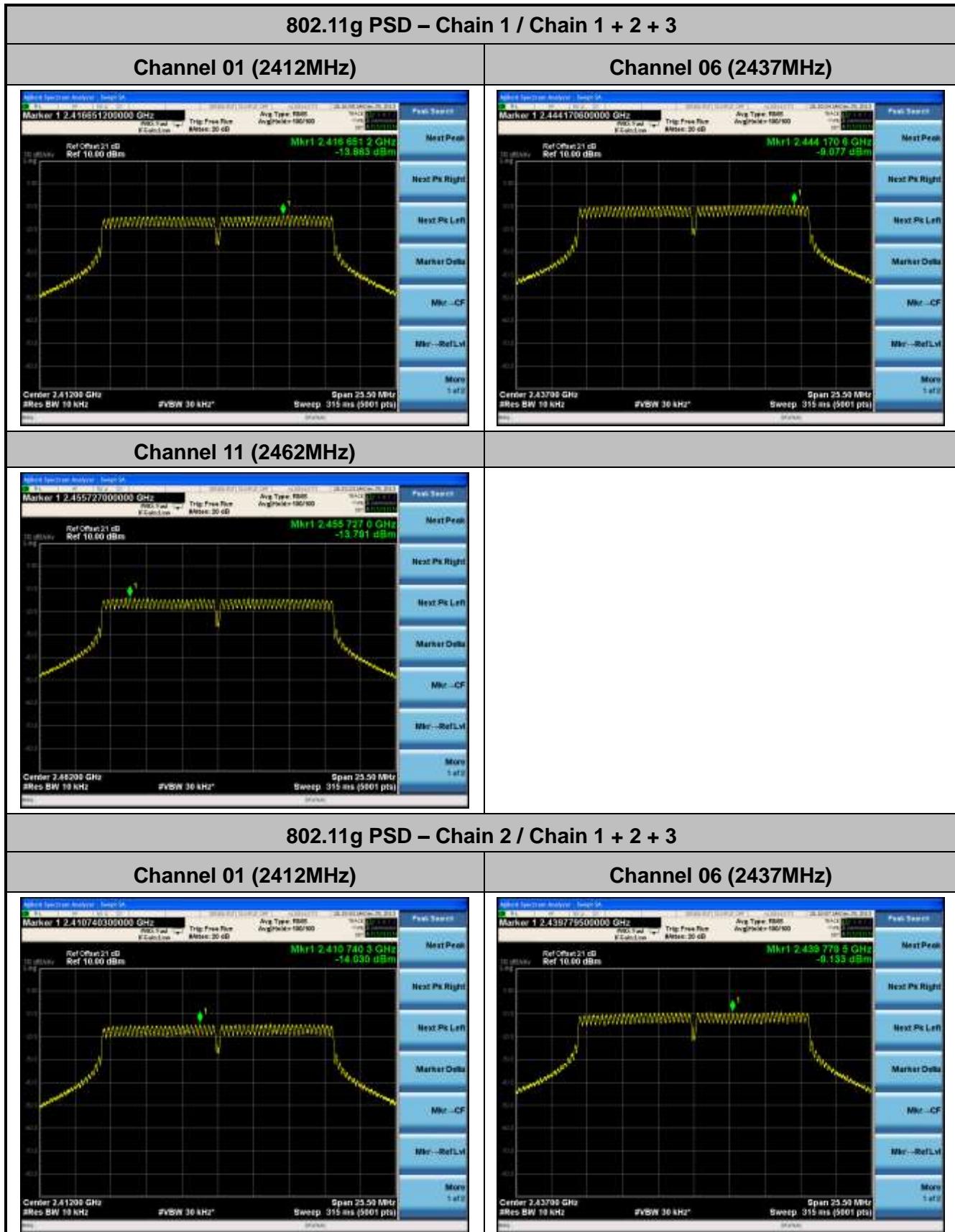
Test Mode	N <sub>Tx</sub>	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Chain 3 PSD (dBm)	Duty Cycle (%)	Total PSD (dBm)	Limit (dBm / 3kHz)	Result
11b	3	1	1	2412	-6.843	-5.850	-6.451	99.8	-1.59	≤8	Pass
11b	3	1	6	2437	-3.870	-4.018	-3.893	99.8	0.84	≤8	Pass
11b	3	1	11	2462	-6.606	-6.661	-10.915	99.8	-2.88	≤8	Pass
11g	3	6	1	2412	-13.863	-14.030	-17.356	98.1	-10.04	≤8	Pass
11g	3	6	6	2437	-9.077	-9.133	-11.892	98.1	-5.08	≤8	Pass
11g	3	6	11	2462	-13.781	-14.044	-17.151	98.1	-9.98	≤8	Pass
11n-HT20	3	19.5/21.7	1	2412	-12.541	-12.883	-15.671	91.78	-8.35	≤8	Pass
11n-HT20	3	19.5/21.7	6	2437	-8.159	-8.501	-10.037	91.78	-3.68	≤8	Pass
11n-HT20	3	19.5/21.7	11	2462	-13.494	-13.986	-17.437	91.78	-9.51	≤8	Pass
11n-HT40	3	40.5/45	3	2422	-16.440	-15.819	-19.187	86.3	-11.51	≤8	Pass
11n-HT40	3	40.5/45	6	2437	-13.055	-13.141	-15.970	86.3	-8.45	≤8	Pass
11n-HT40	3	40.5/45	9	2452	-18.131	-18.803	-21.954	86.3	-13.93	≤8	Pass

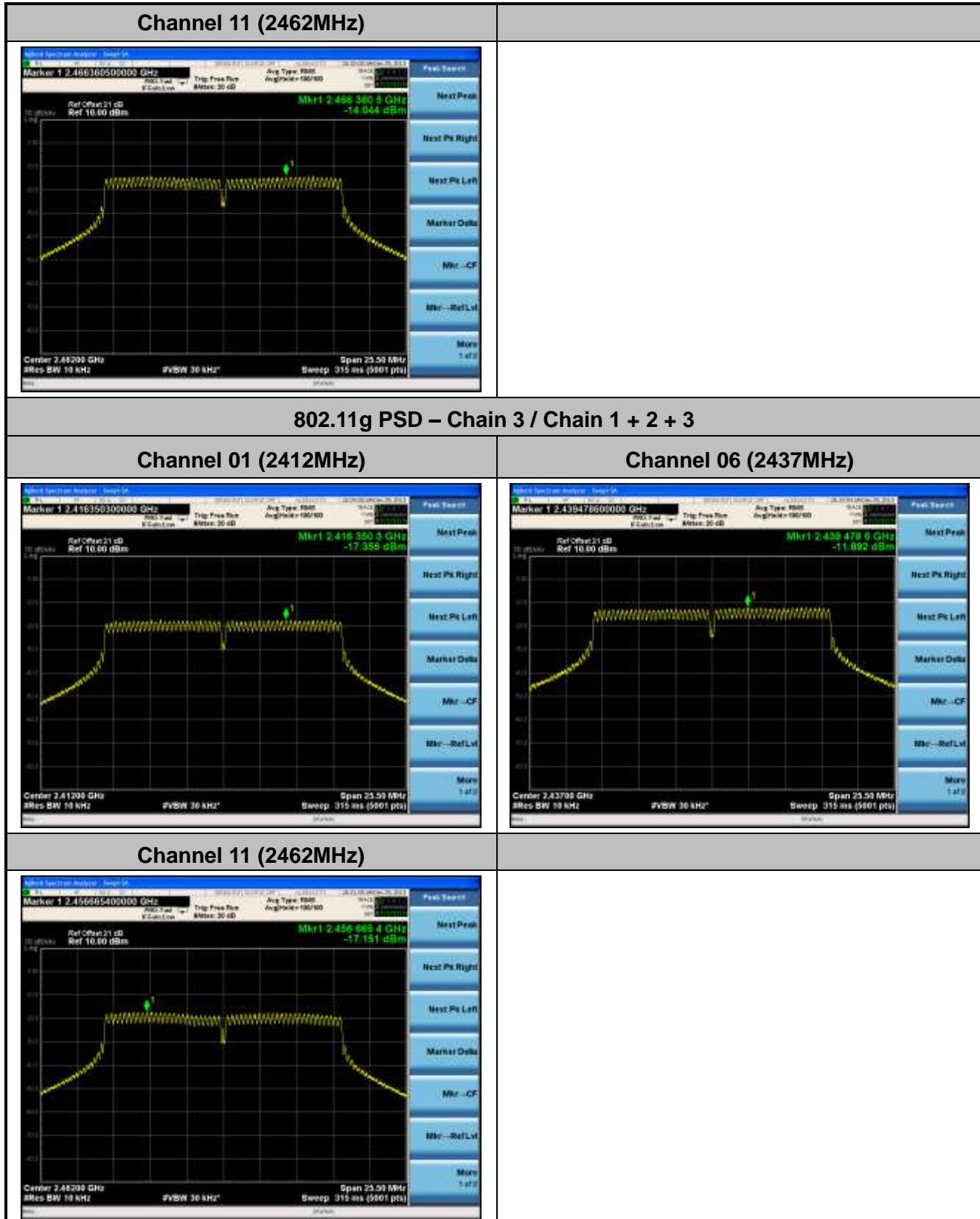
Note: When EUT duty cycle < 98%, the total PSD =  $10^{\log(10^{(\text{Chain 1 PSD}/10)} + 10^{(\text{Chain 2 PSD}/10)} + 10^{(\text{Chain 3 PSD}/10)})} + 10^{\log(1/x)}$ ; x = Duty Cycle

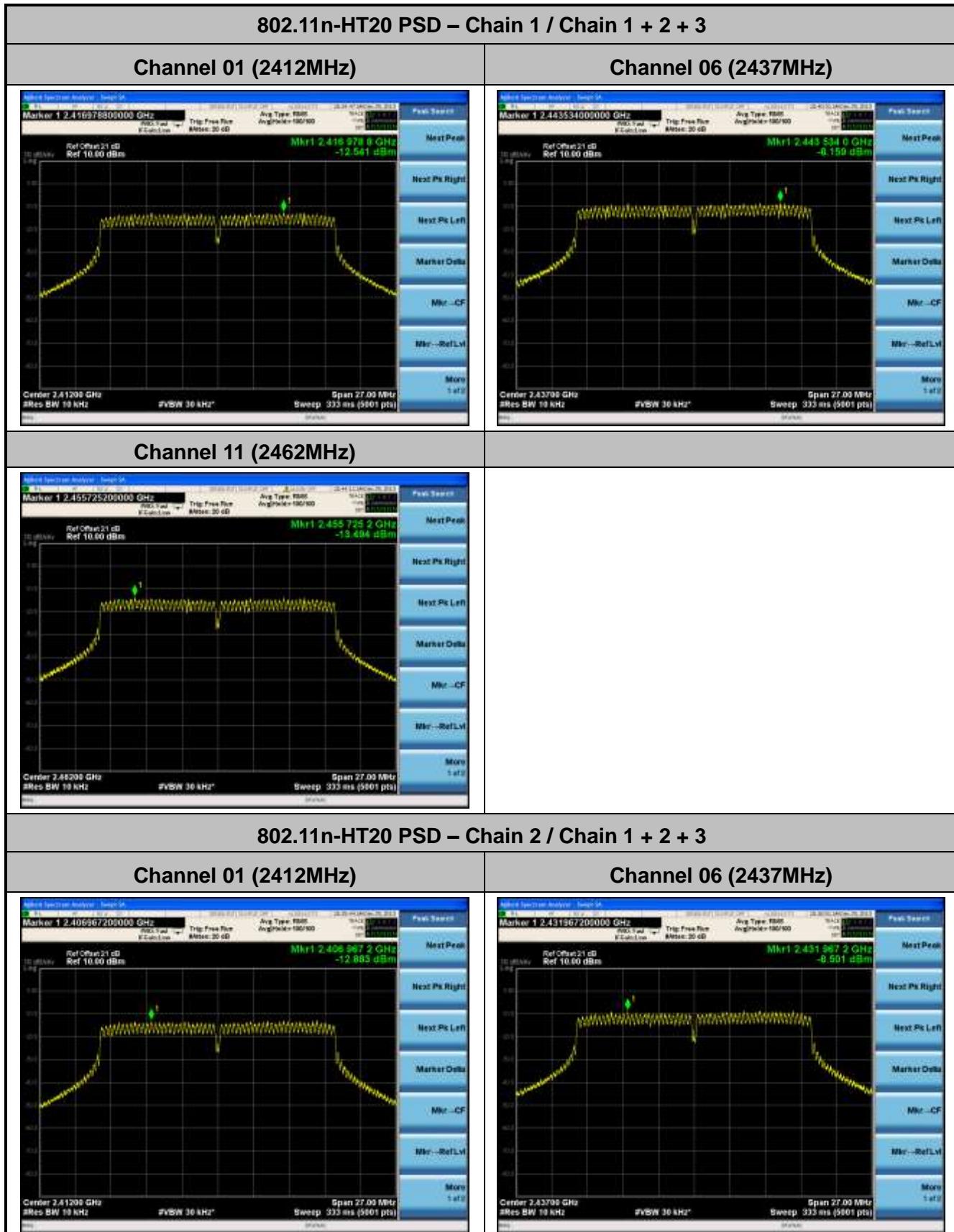


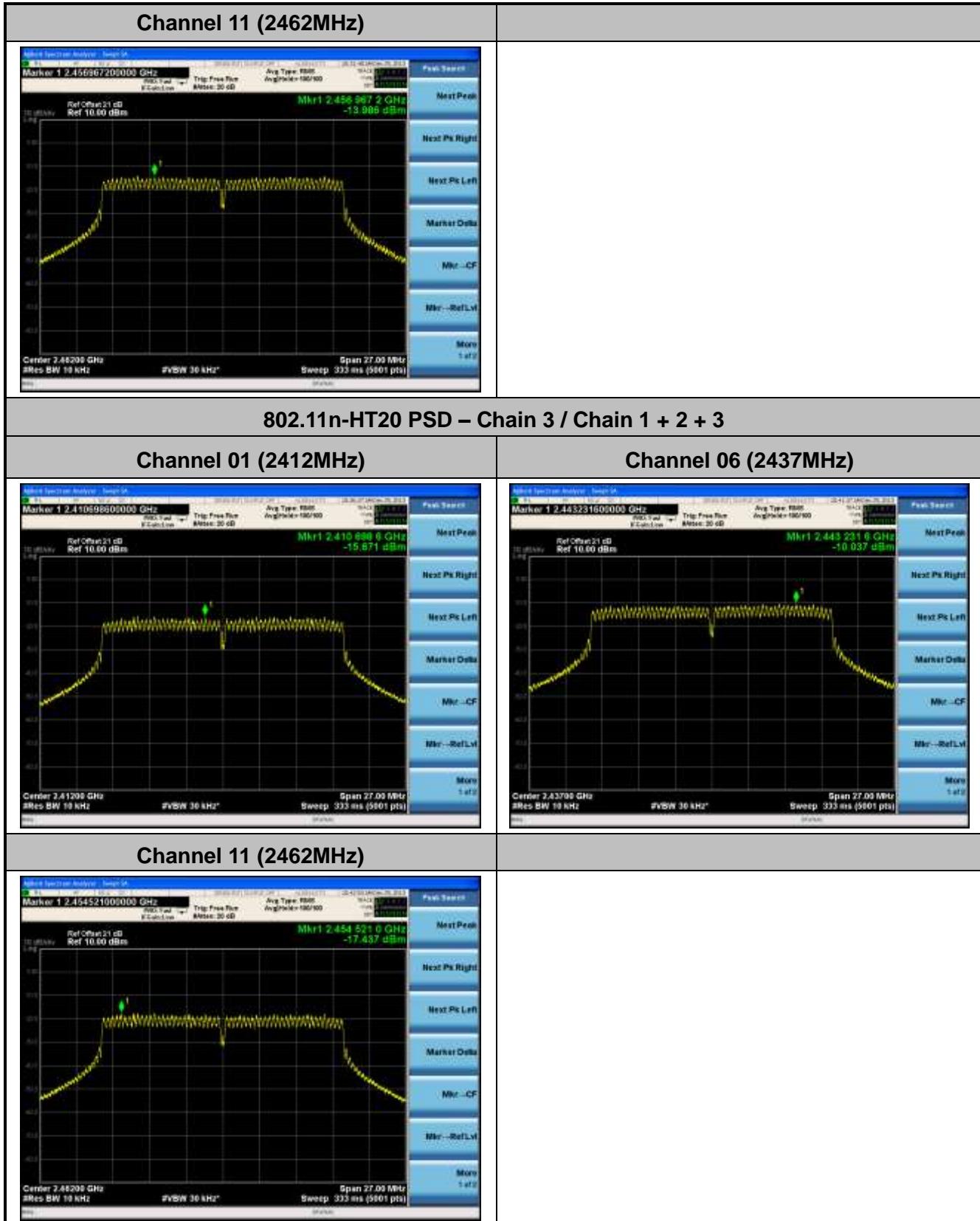


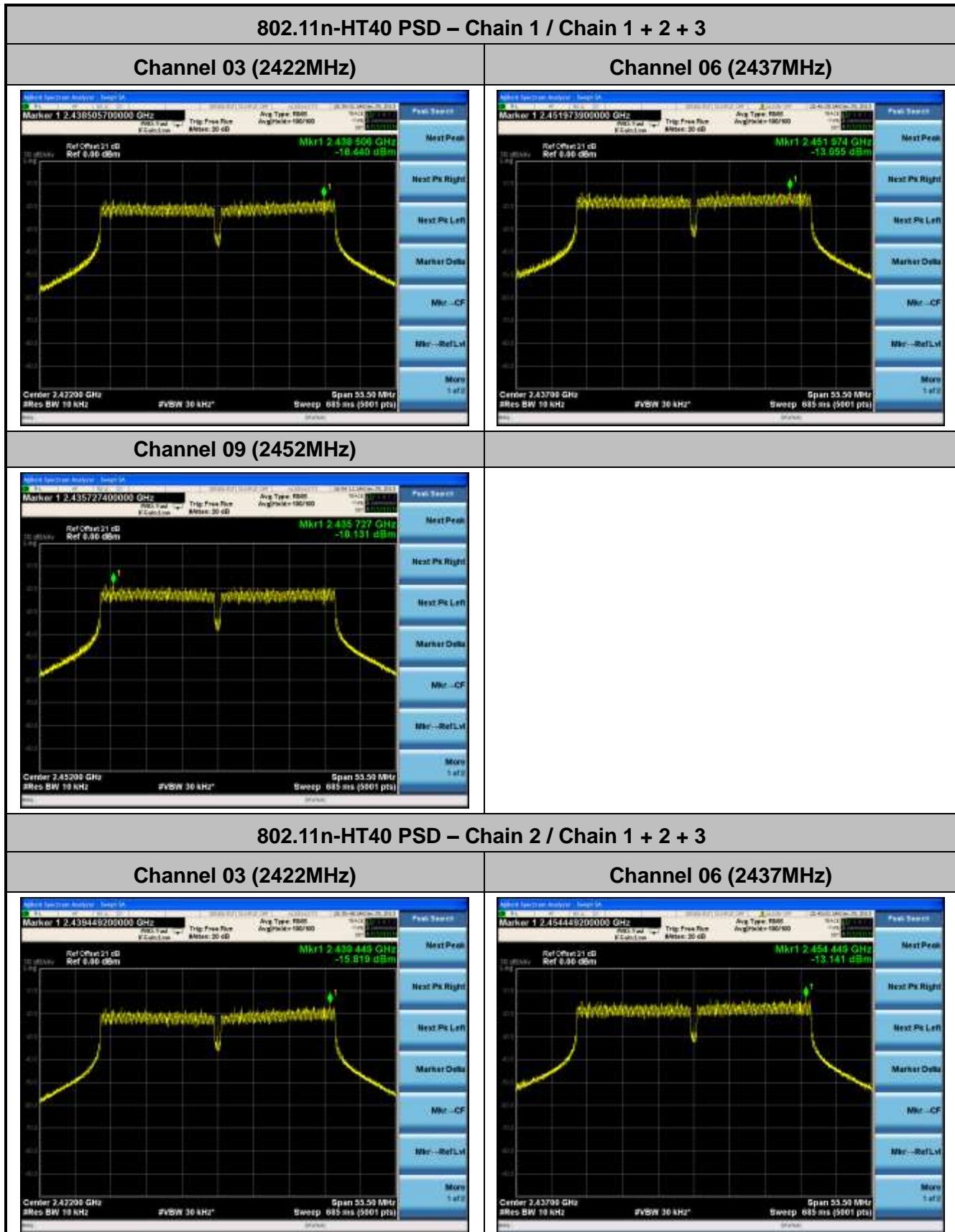


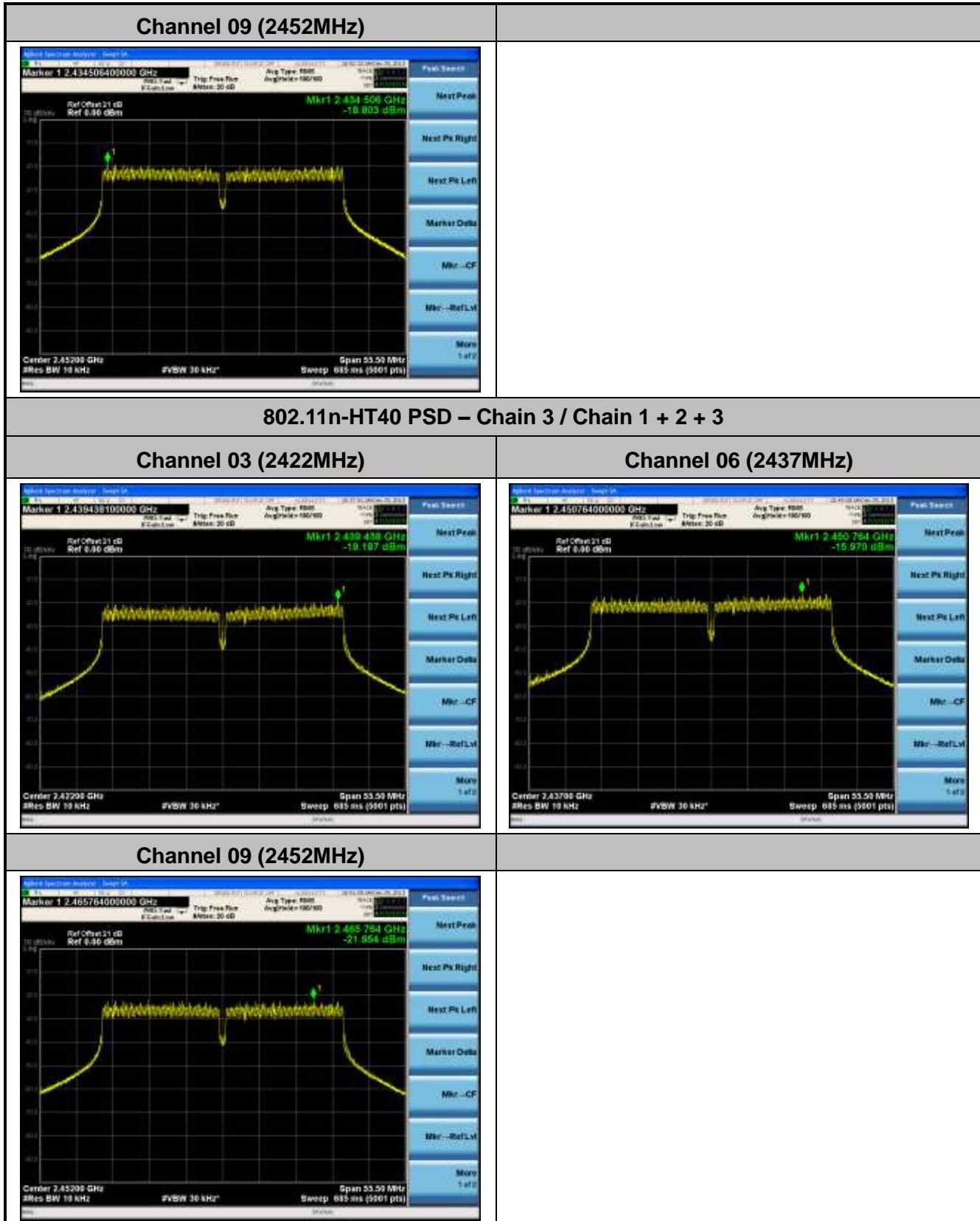








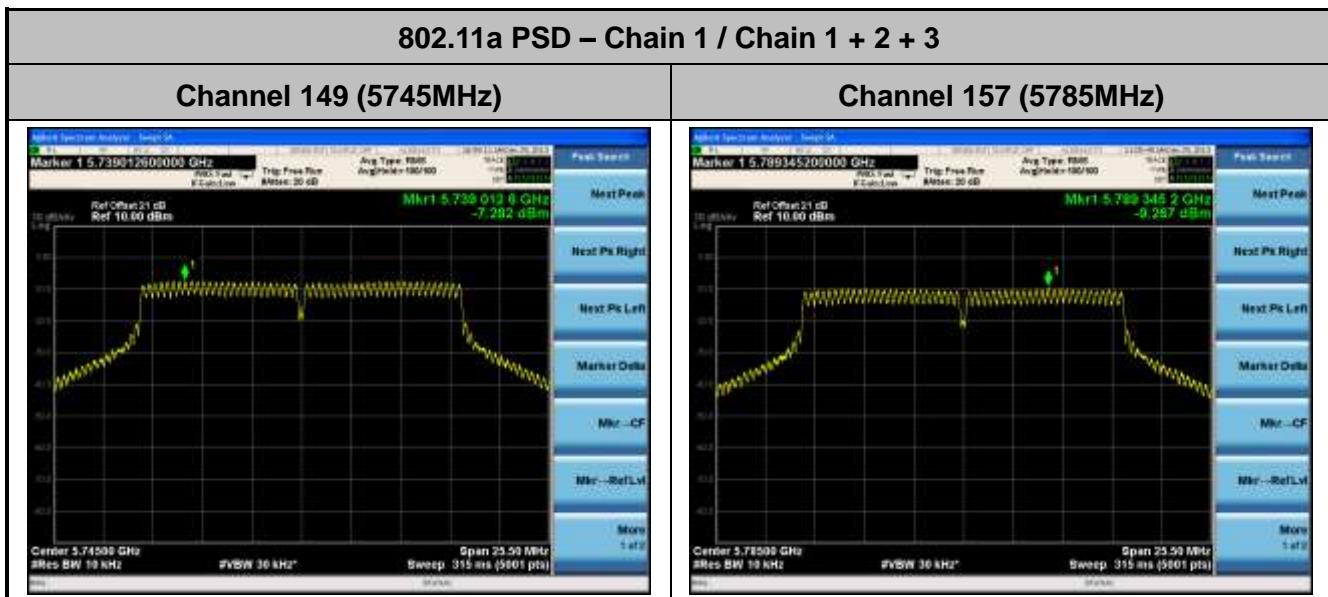


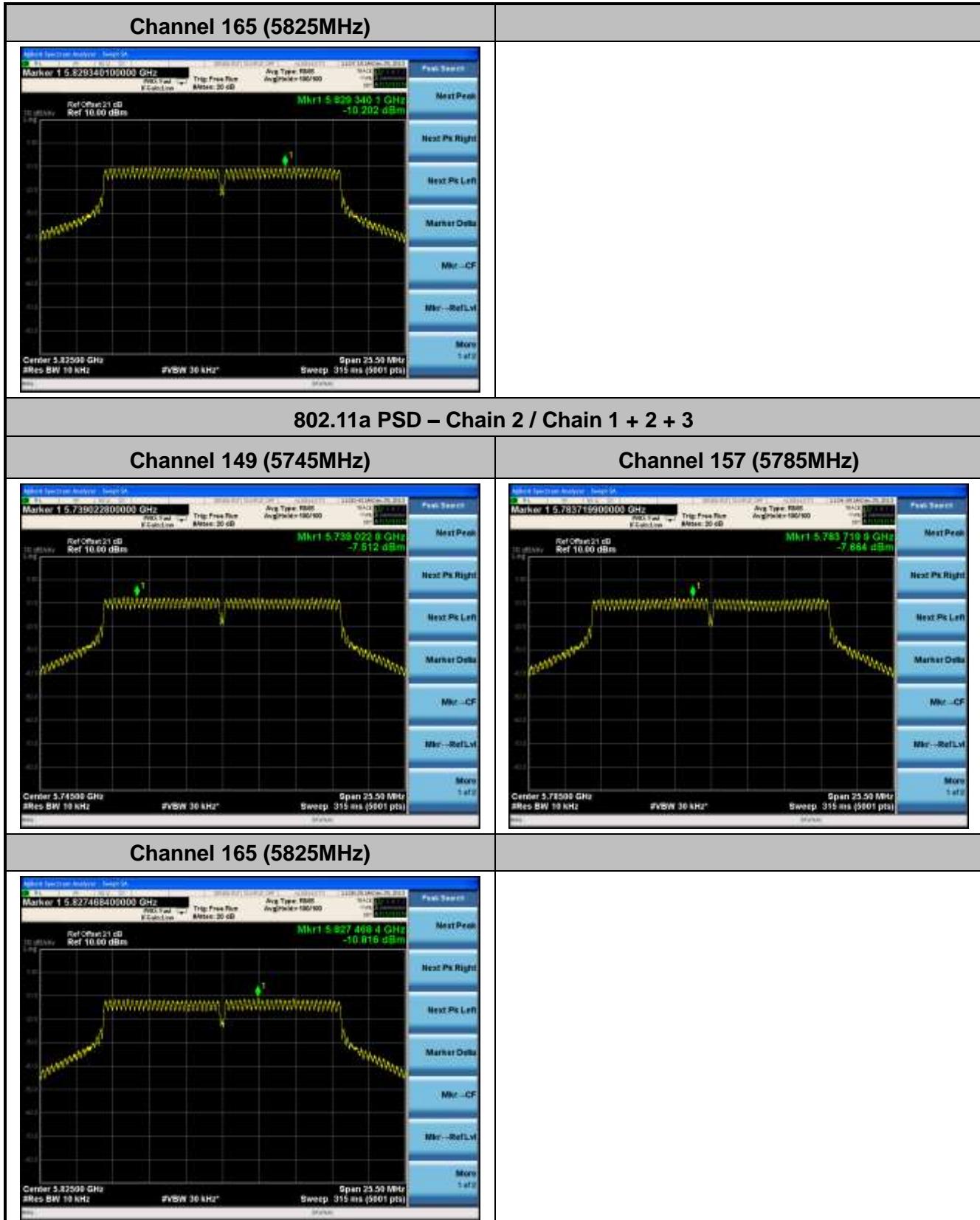


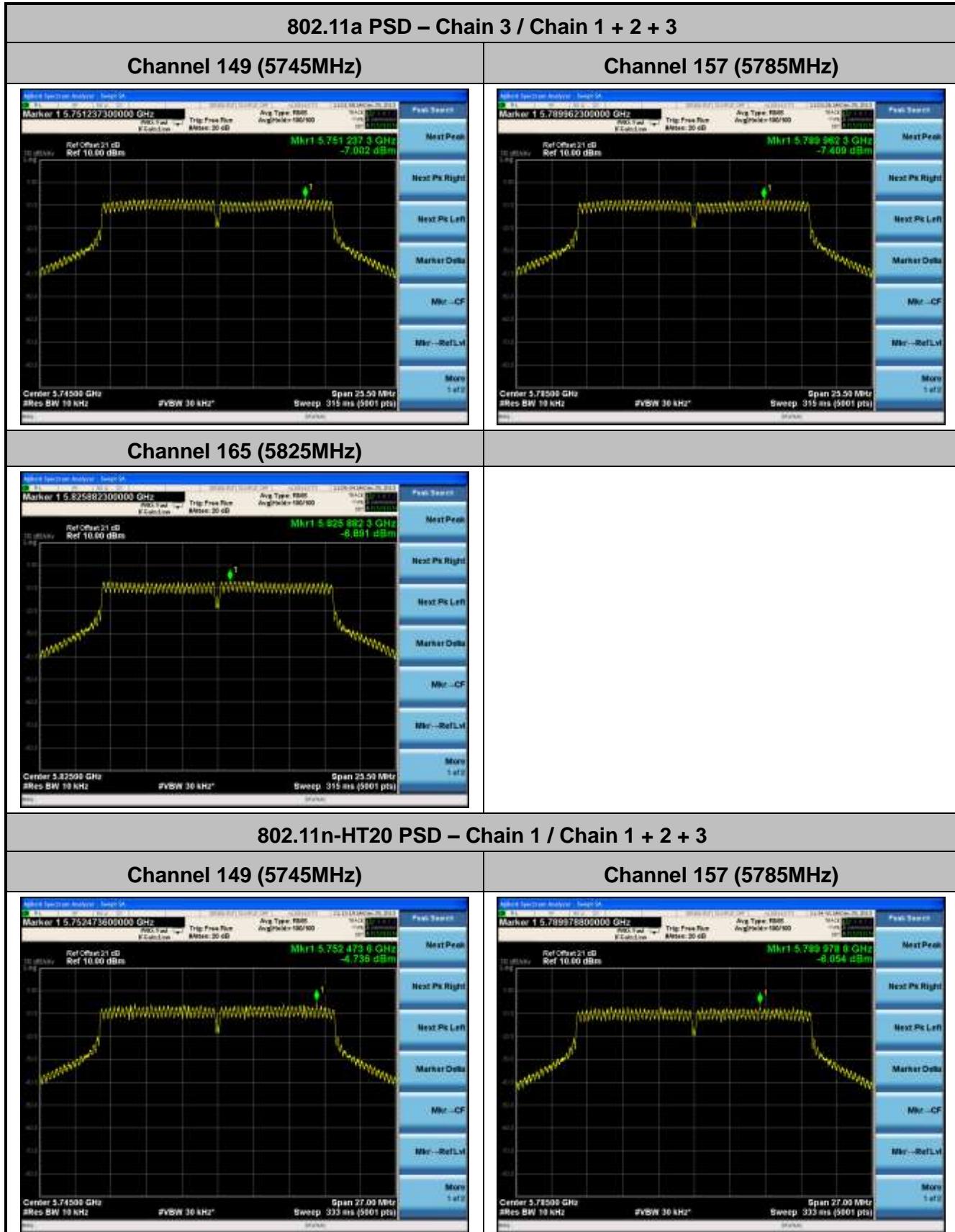
Test Mode	N <sub>Tx</sub>	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Chain 1 PSD (dBm)	Chain 2 PSD (dBm)	Chain 3 PSD (dBm)	Duty Cycle (%)	Total PSD (dBm)	Limit (dBm / 3kHz)	Result
11a	3	6	149	5745	-7.282	-7.512	-7.002	98.1	-2.49	≤7.2	Pass
11a	3	6	157	5785	-9.267	-7.664	-7.409	98.1	-3.27	≤7.2	Pass
11a	3	6	165	5825	-10.202	-10.816	-6.891	98.1	-4.17	≤7.2	Pass
11n-HT20	3	19.5/21.7	149	5745	-4.736	-7.995	-5.574	91.78	-0.75	≤7.2	Pass
11n-HT20	3	19.5/21.7	157	5785	-6.054	-9.234	-6.129	91.78	-1.77	≤7.2	Pass
11n-HT20	3	19.5/21.7	165	5825	-4.413	-4.932	-4.795	91.78	0.44	≤7.2	Pass
11n-HT40	3	40.5/45	151	5755	-7.473	-12.172	-8.201	86.3	-3.44	≤7.2	Pass
11n-HT40	3	40.5/45	159	5755	-8.141	-8.673	-8.758	86.3	-3.10	≤7.2	Pass
11ac-VHT20	3	19.5/21.7	149	5745	-5.029	-9.781	-8.297	91.78	-2.09	≤7.2	Pass
11ac-VHT20	3	19.5/21.7	157	5785	-7.233	-5.439	-8.809	91.78	-1.80	≤7.2	Pass
11ac-VHT20	3	19.5/21.7	165	5825	-6.018	-3.545	-9.454	91.78	-0.57	≤7.2	Pass
11ac-VHT40	3	40.5/45	151	5755	-7.401	-7.854	-11.922	86.3	-3.23	≤7.2	Pass
11ac-VHT40	3	40.5/45	159	5755	-7.082	-7.532	-14.067	86.3	-3.22	≤7.2	Pass
11ac-VHT80	3	87.8/97.5	155	5775	-10.151	-9.626	-8.629	77.0	-3.52	≤7.2	Pass

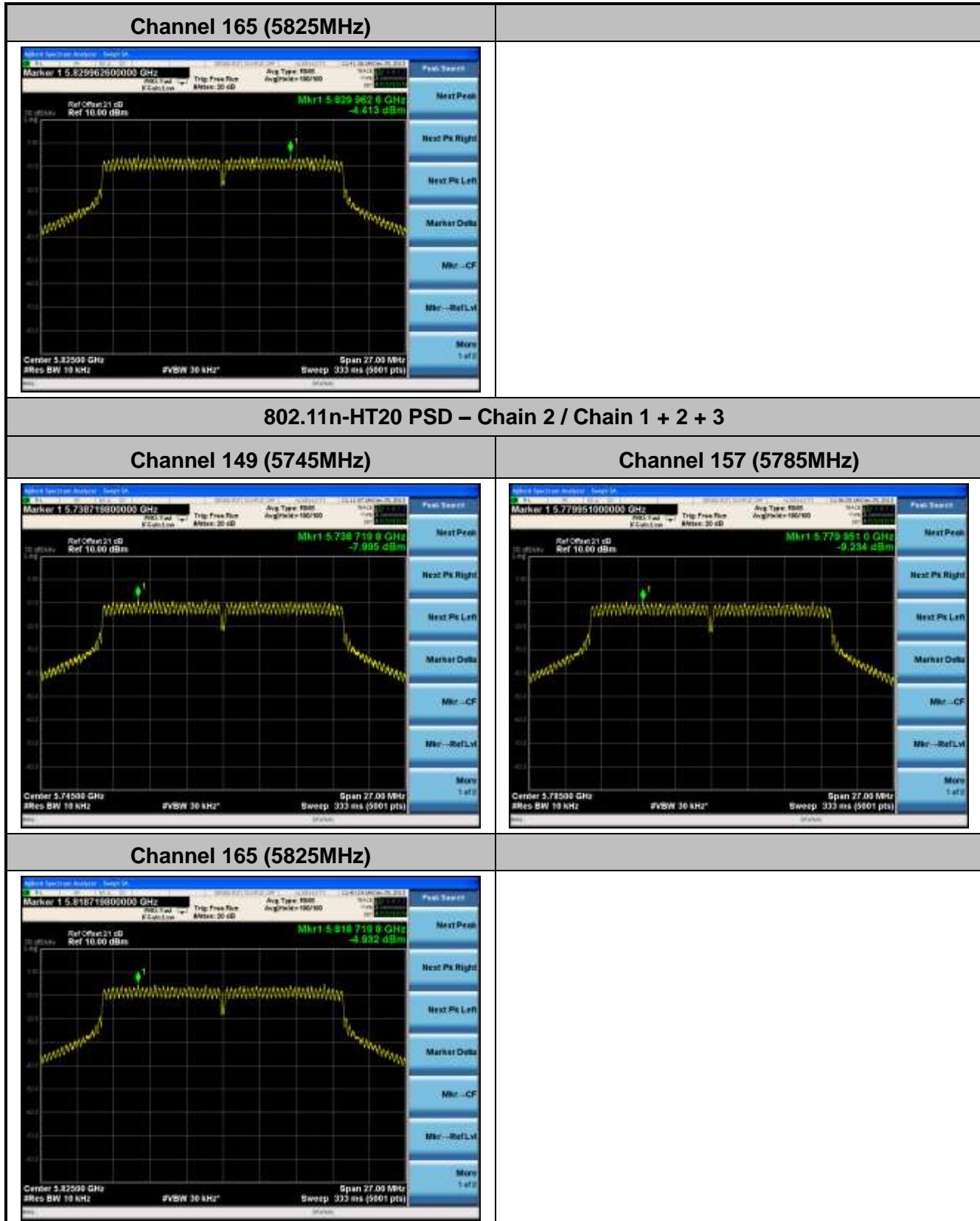
Note: When EUT duty cycle < 98%, the total PSD =  $10 \times \log(10^{(\text{Chain 1 PSD}/10)}) + 10^{(\text{Chain 2 PSD}/10)} + 10^{(\text{Chain 3 PSD}/10)}$

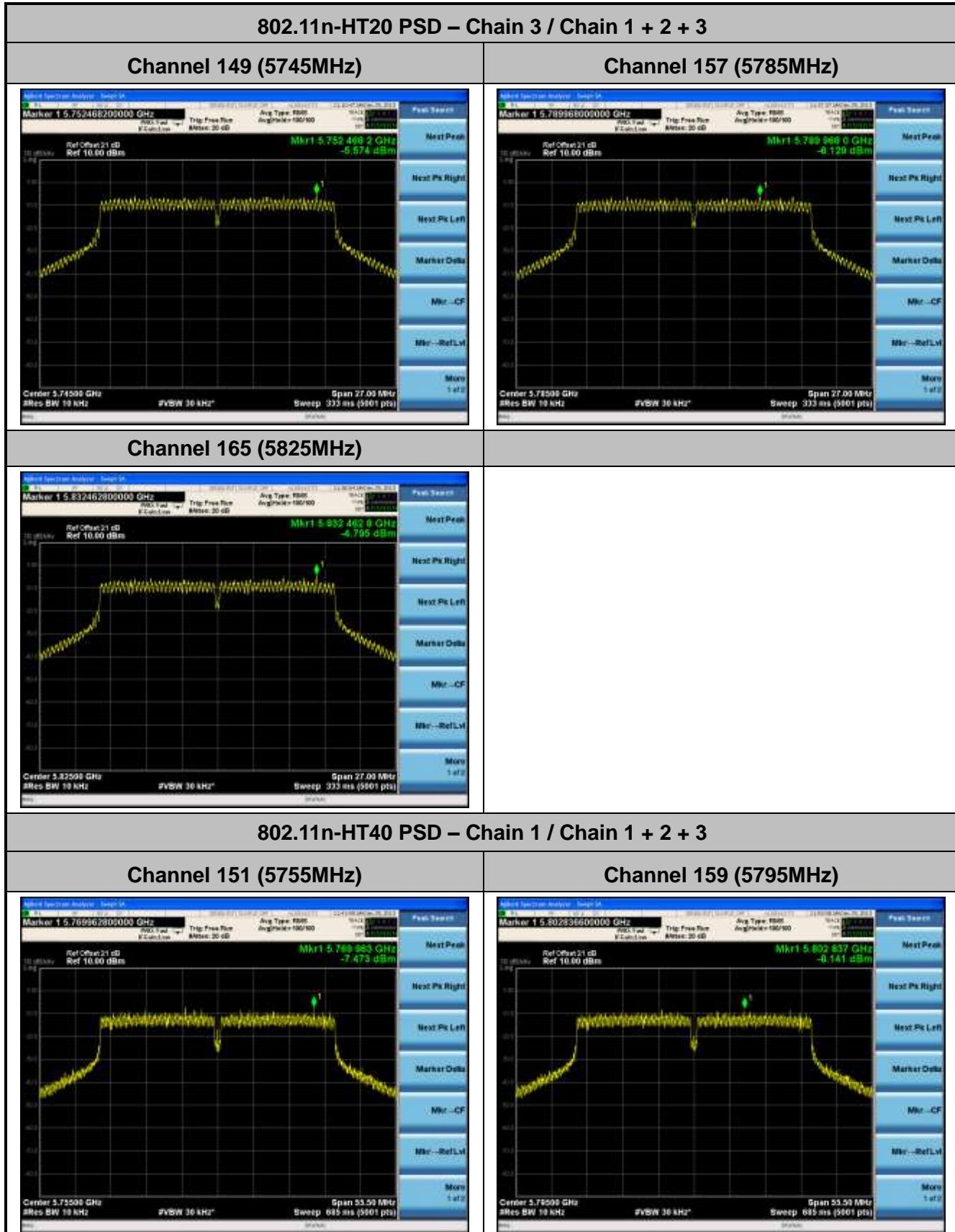
$\text{PSD}^{(10)}\} + 10 \times \log(1/x); x = \text{Duty Cycle}$

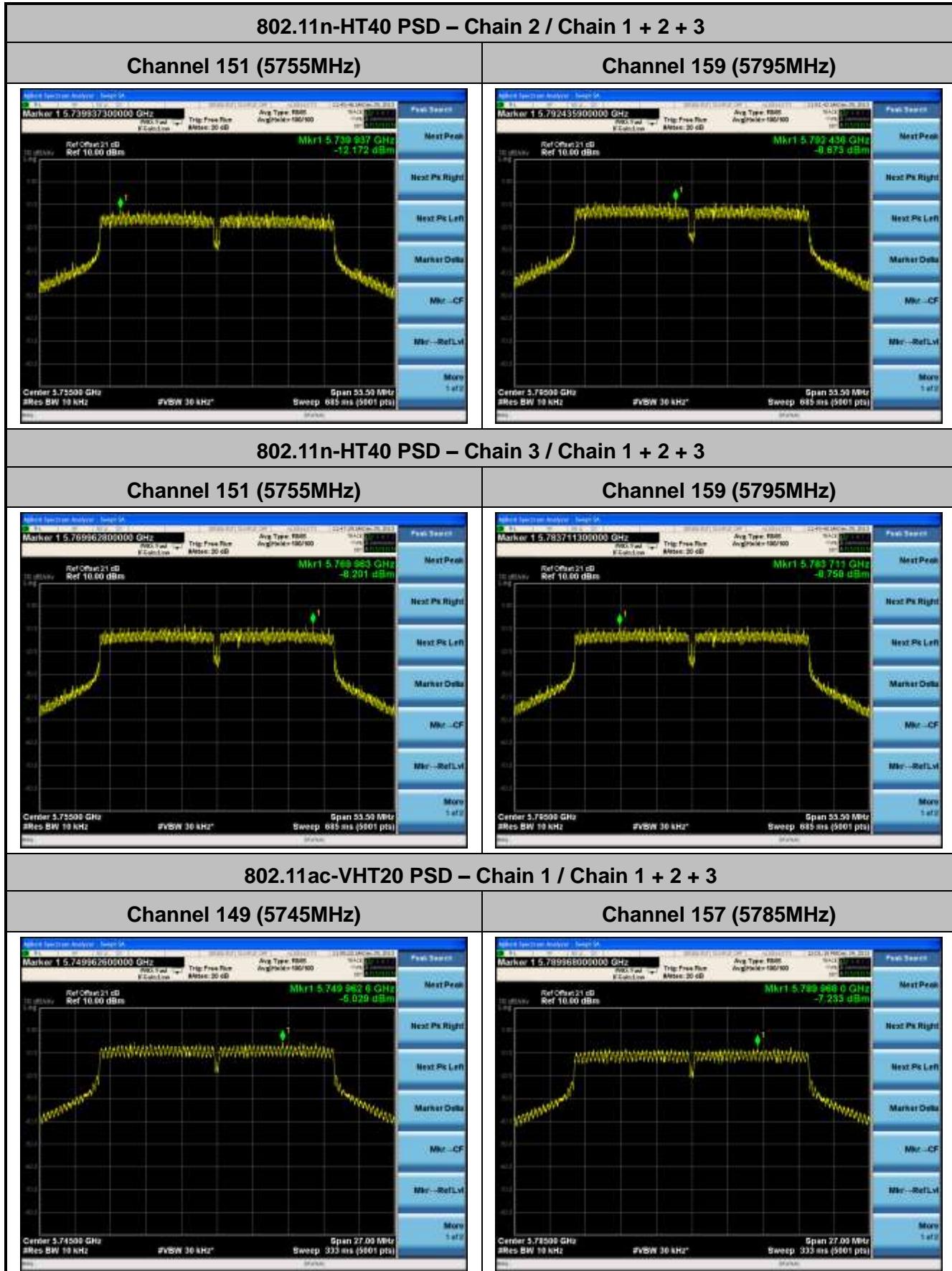


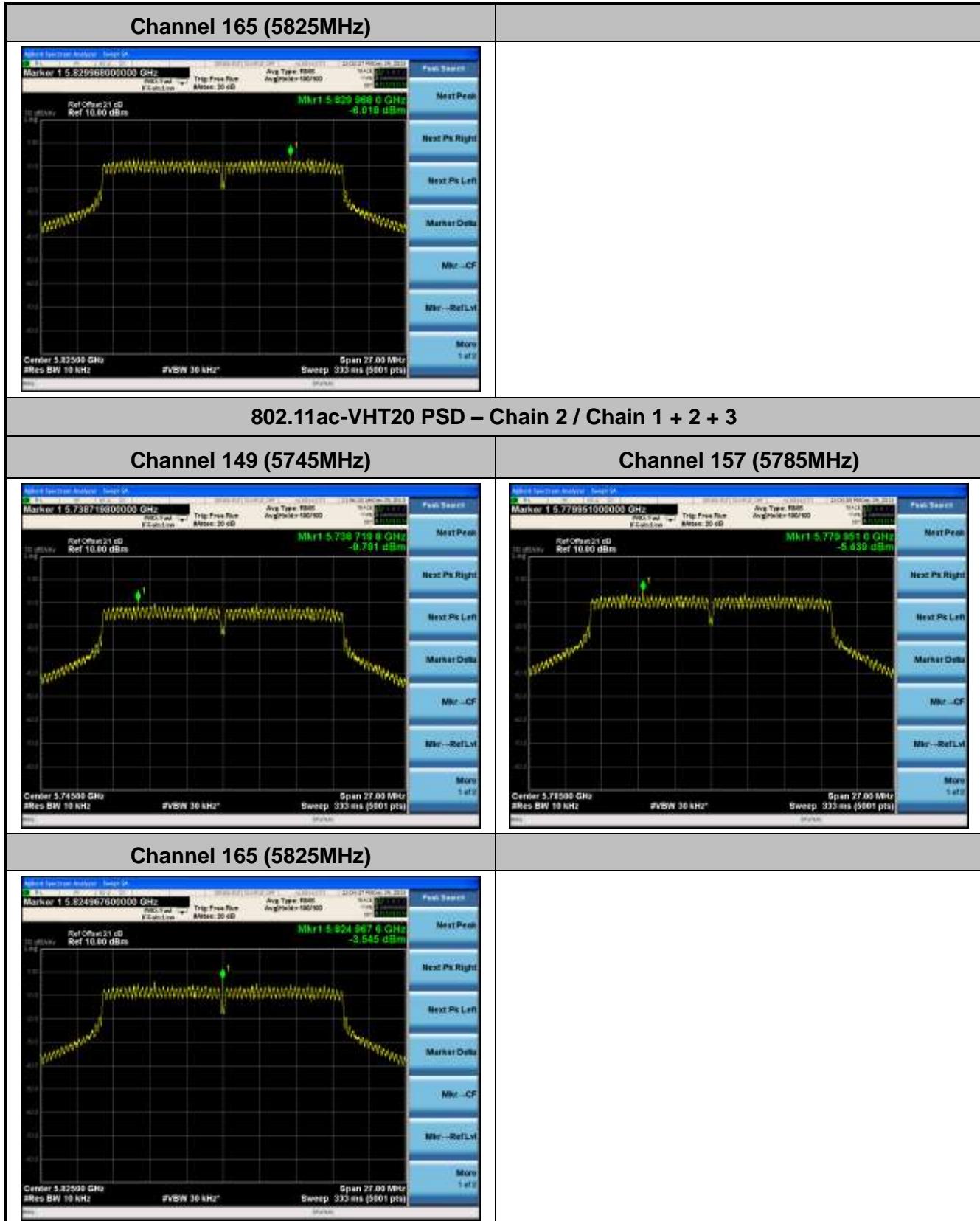


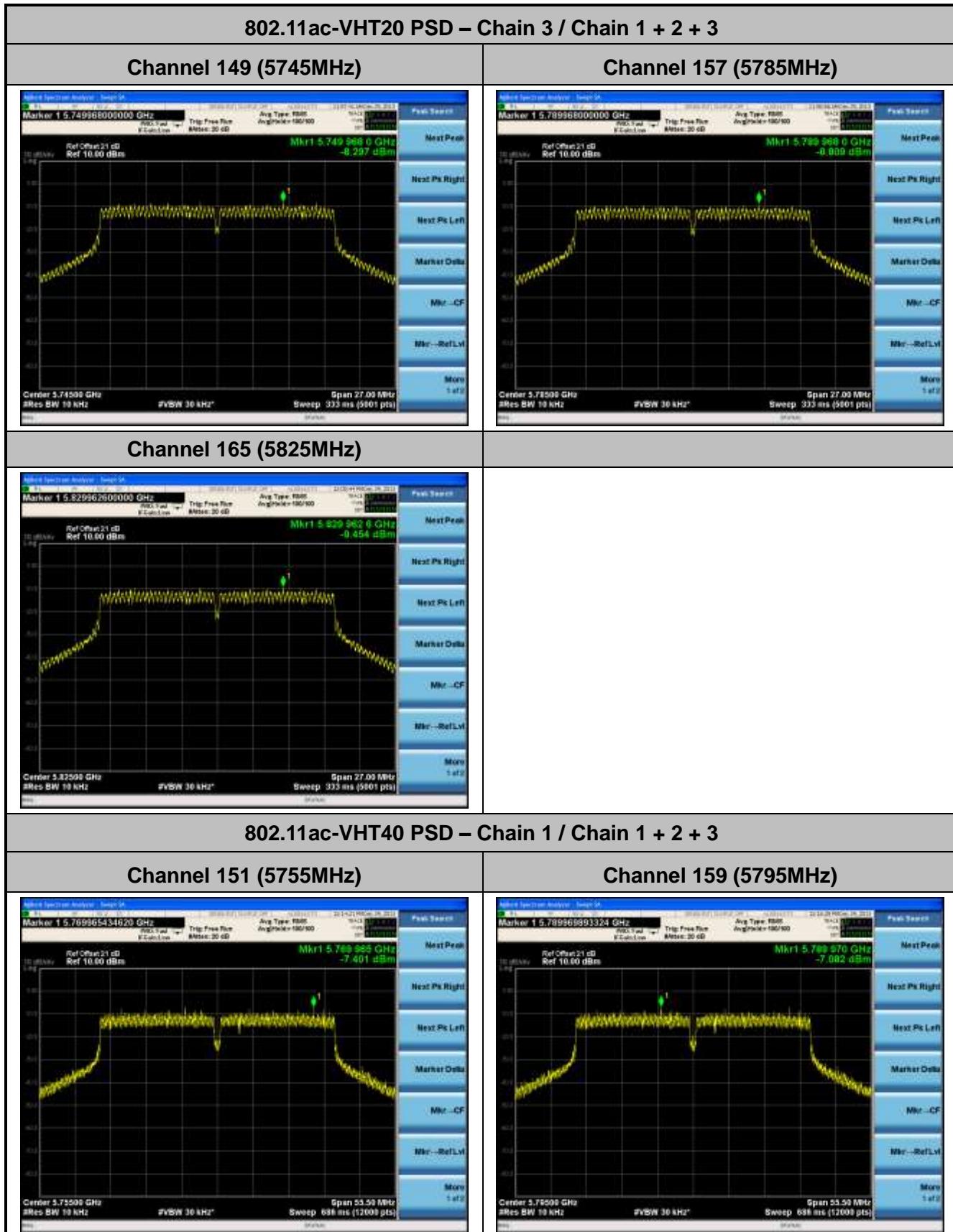


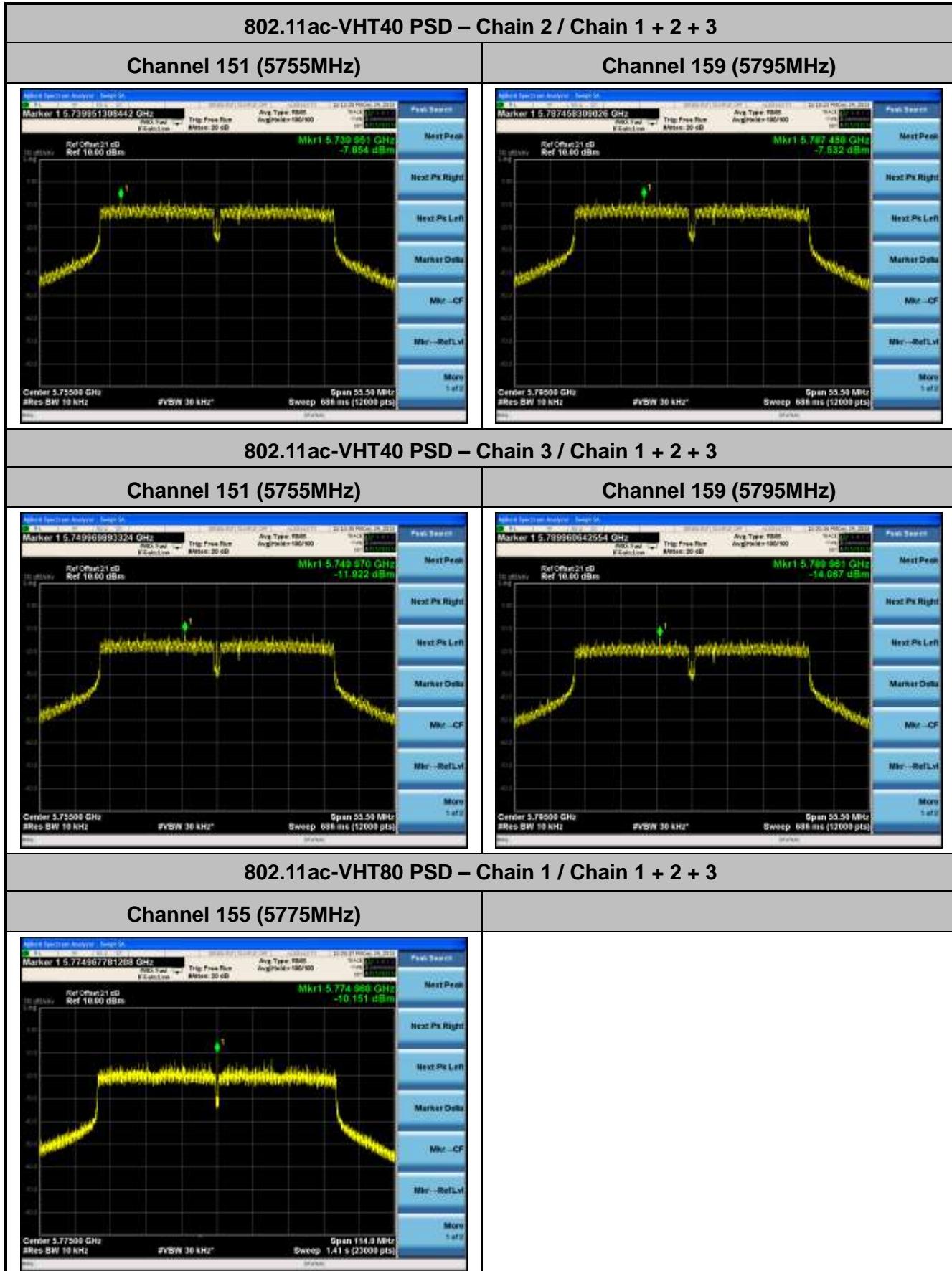


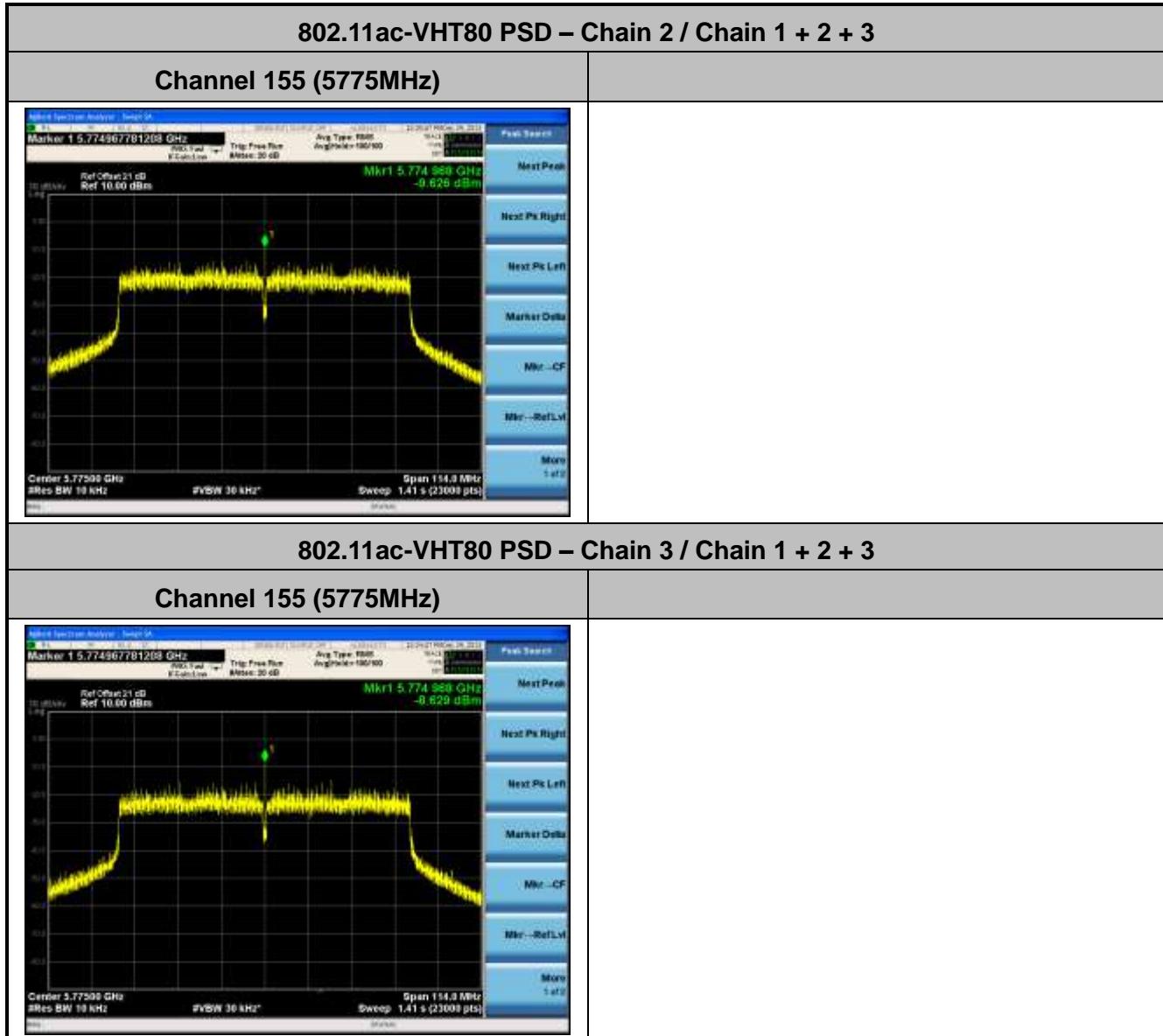












## 7.5. Conducted Band Edge and Out-of-Band Emissions §15.247(d); RSS-210 /A8.5

### 7.5.1. Test Limit

The limit for out-of-band spurious emissions at the band edge is 30dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth per the PSD procedure.

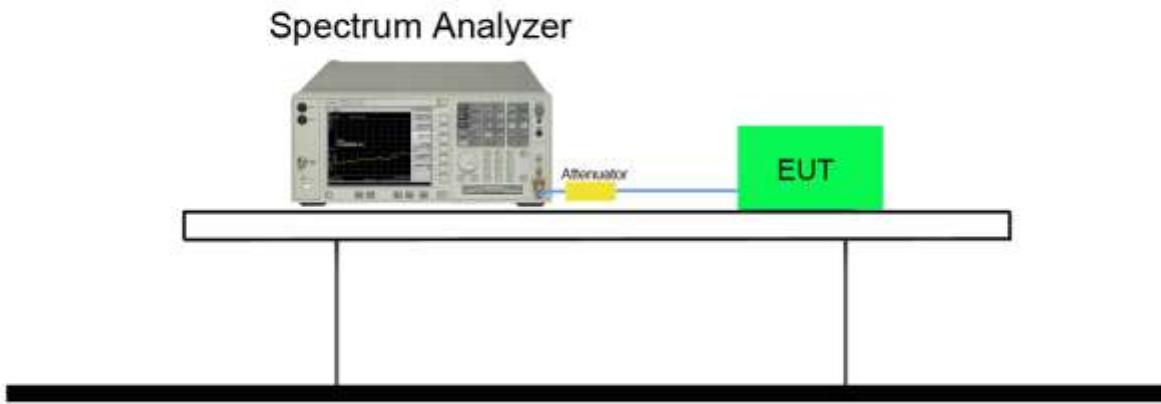
### 7.5.2. Test Procedure Used

KDB 558074 D01v03r01 – Section 11.3

### 7.5.3. Test Setting

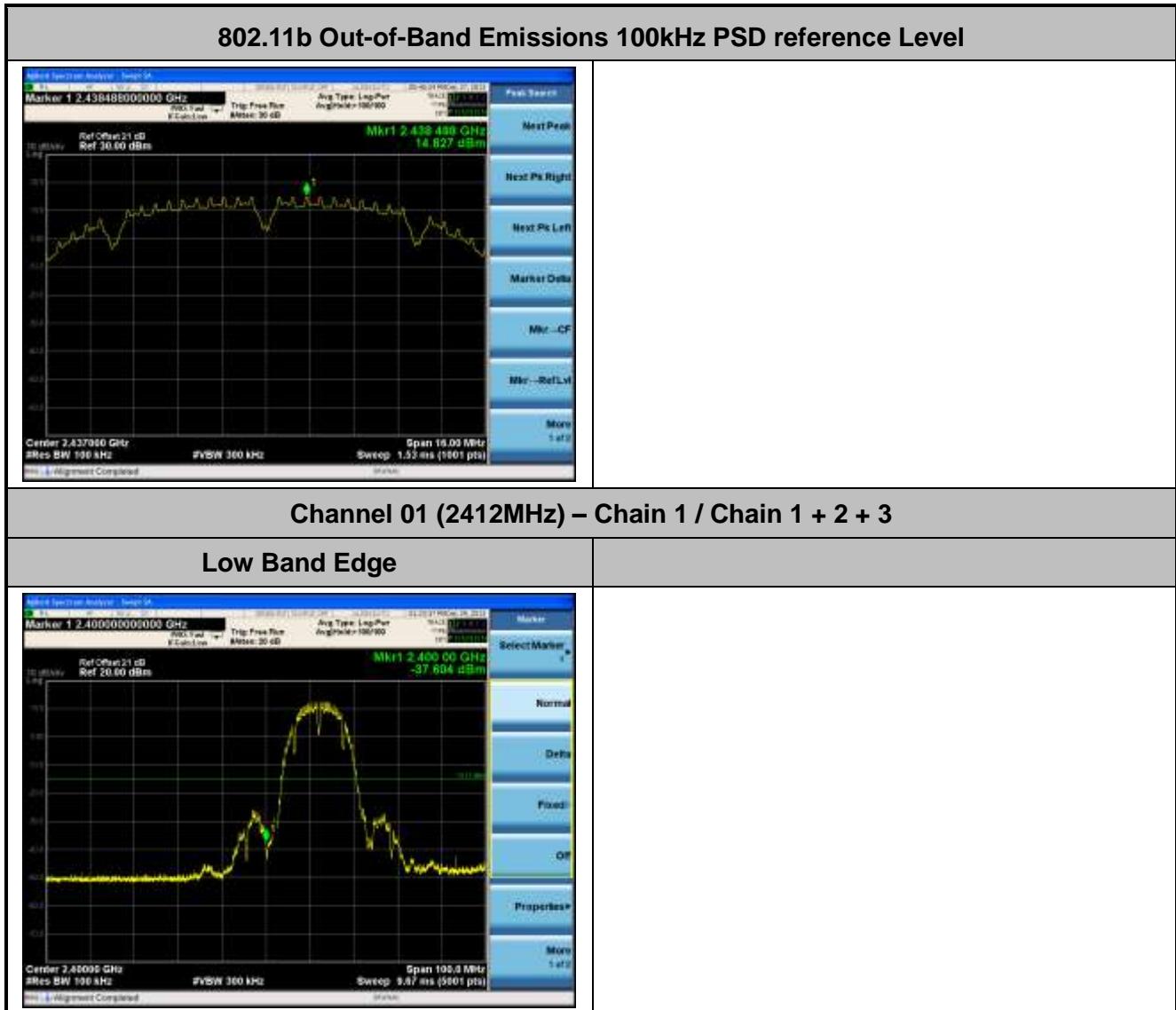
1. RBW = 100kHz
2. VBW = 300kHz
3. Detector = Peak
4. Trace mode = max hold
5. Sweep time = auto couple
6. The trace was allowed to stabilize

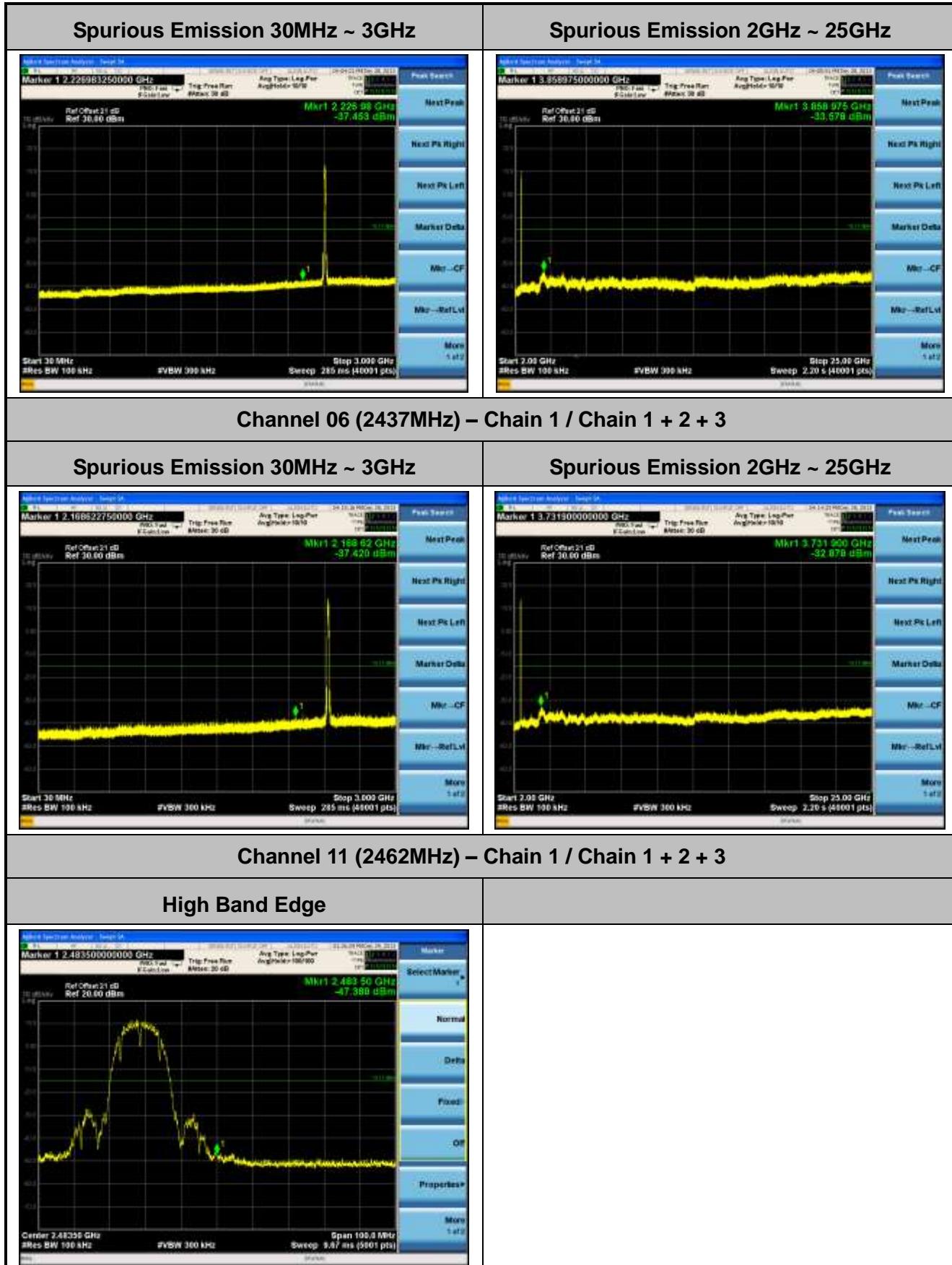
### 7.5.4. Test Setup

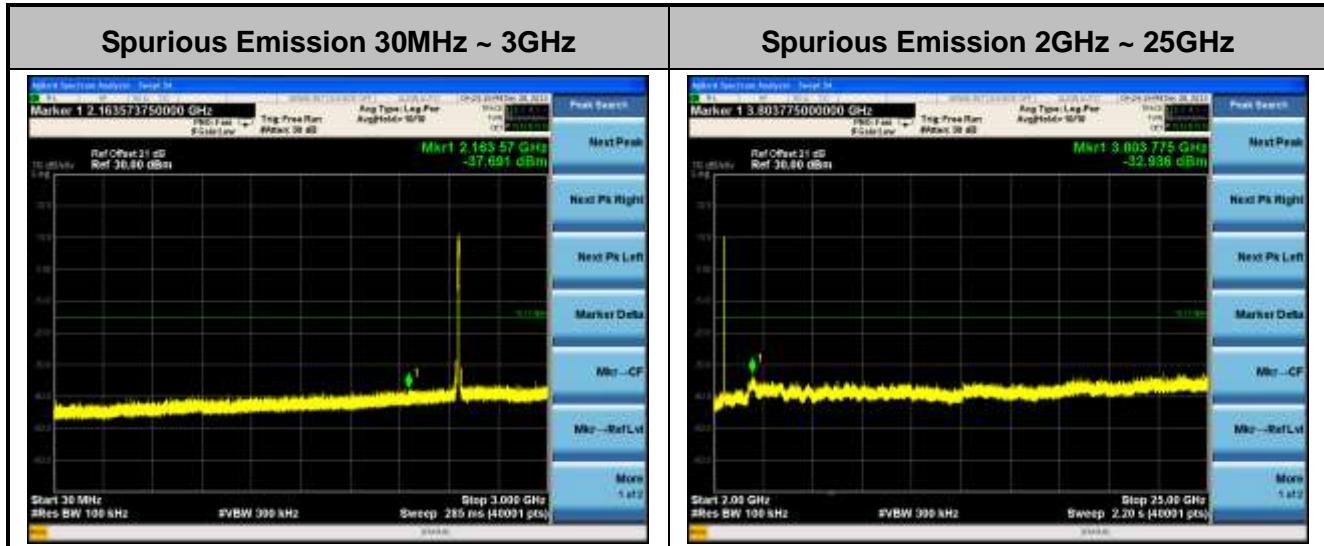


### 7.5.5. Test Result

Test Mode	N <sub>Tx</sub>	Data Rate	Channel No.	Frequency (MHz)	Limit	Result
802.11b	3	1Mbps	01	2412	30dBc	Pass
802.11b	3	1Mbps	06	2437	30dBc	Pass
802.11b	3	1Mbps	11	2462	30dBc	Pass





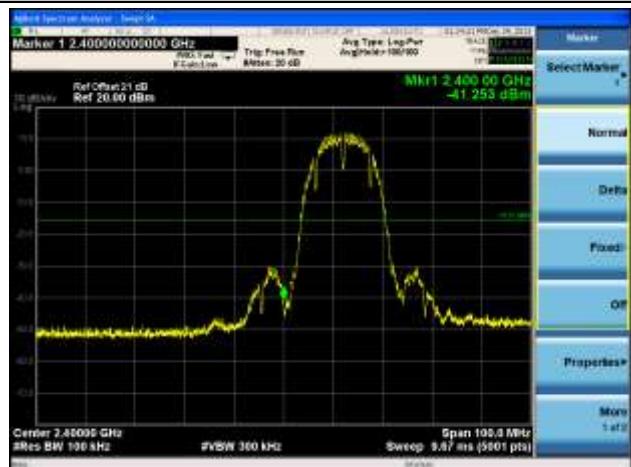


### 802.11b Out-of-Band Emissions 100kHz PSD reference Level



### Channel 01 (2412MHz) – Chain 2 / Chain 1 + 2 + 3

#### Low Band Edge

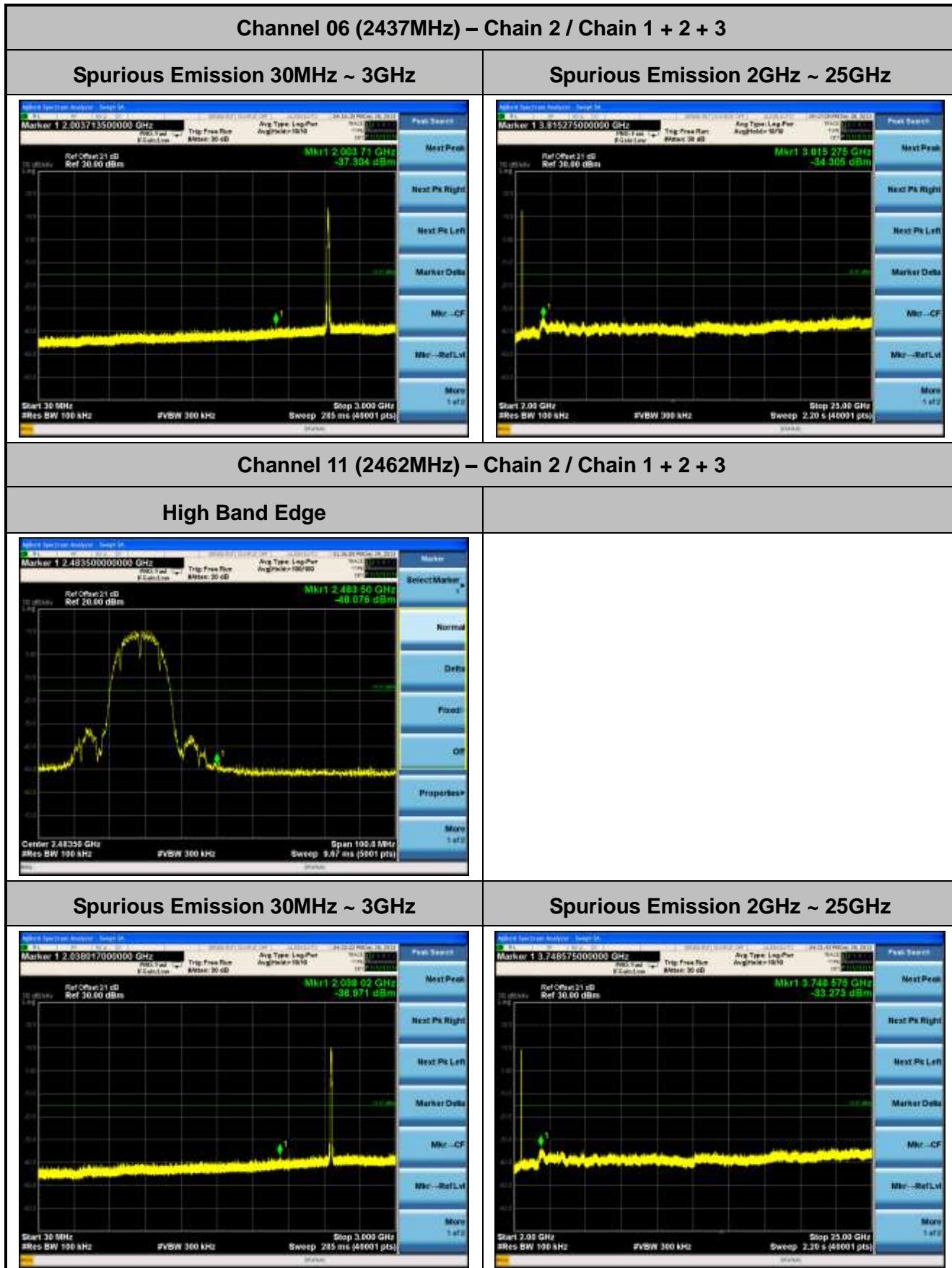


#### Spurious Emission 30MHz ~ 3GHz



#### Spurious Emission 2GHz ~ 25GHz



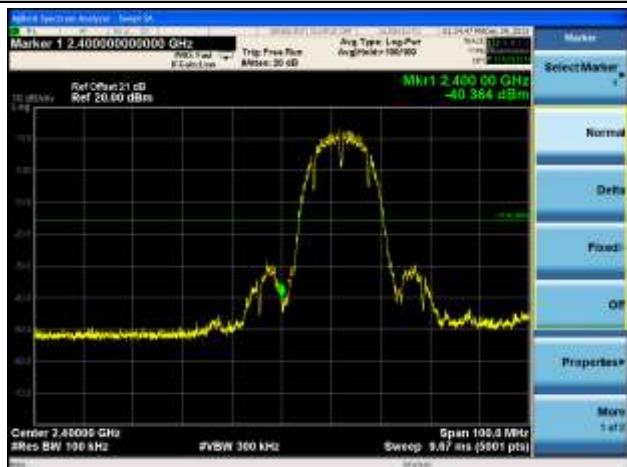


### 802.11b Out-of-Band Emissions 100kHz PSD reference Level



### Channel 01 (2412MHz) – Chain 3 / Chain 1 + 2 + 3

#### Low Band Edge

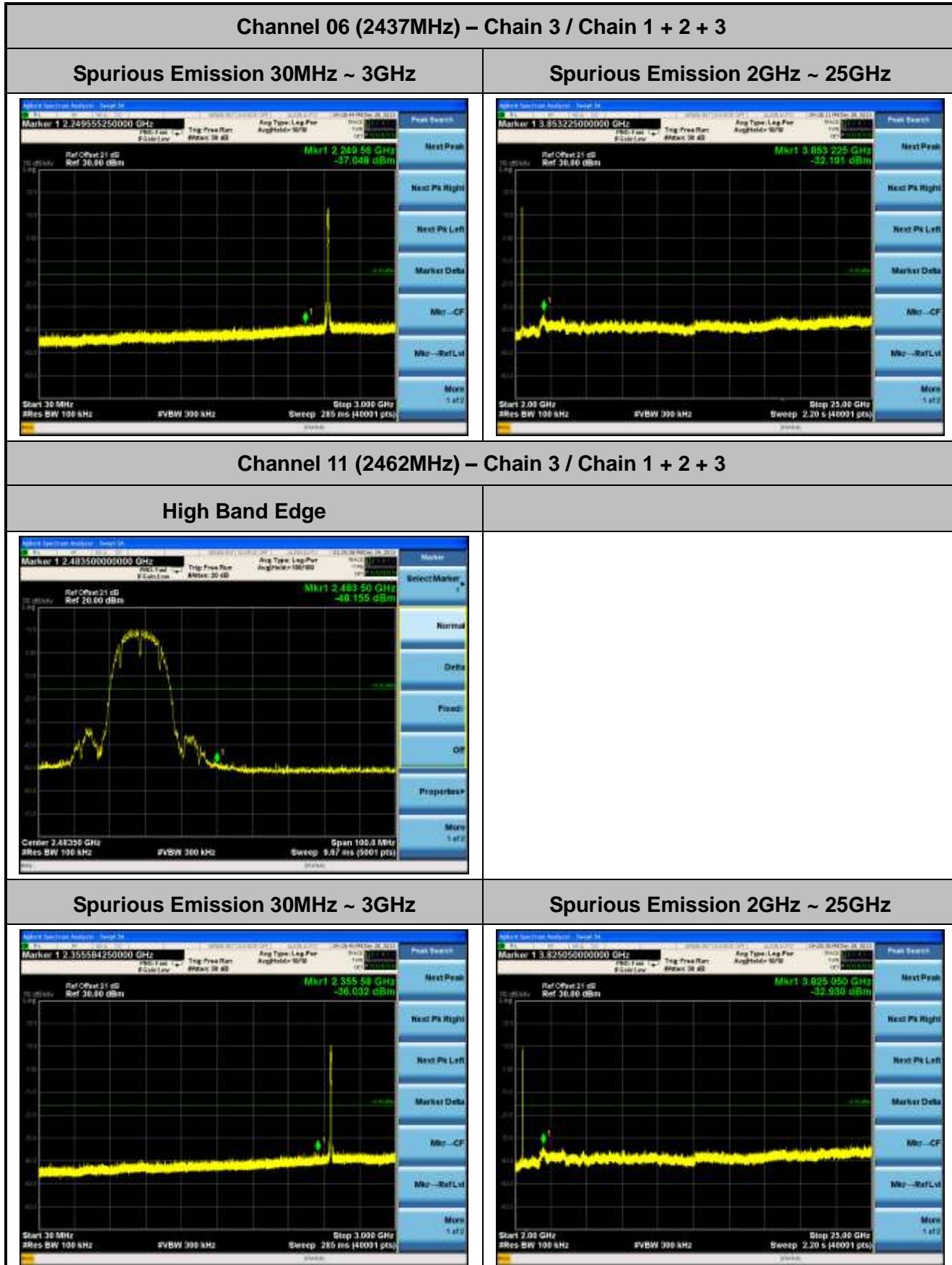


#### Spurious Emission 30MHz ~ 3GHz

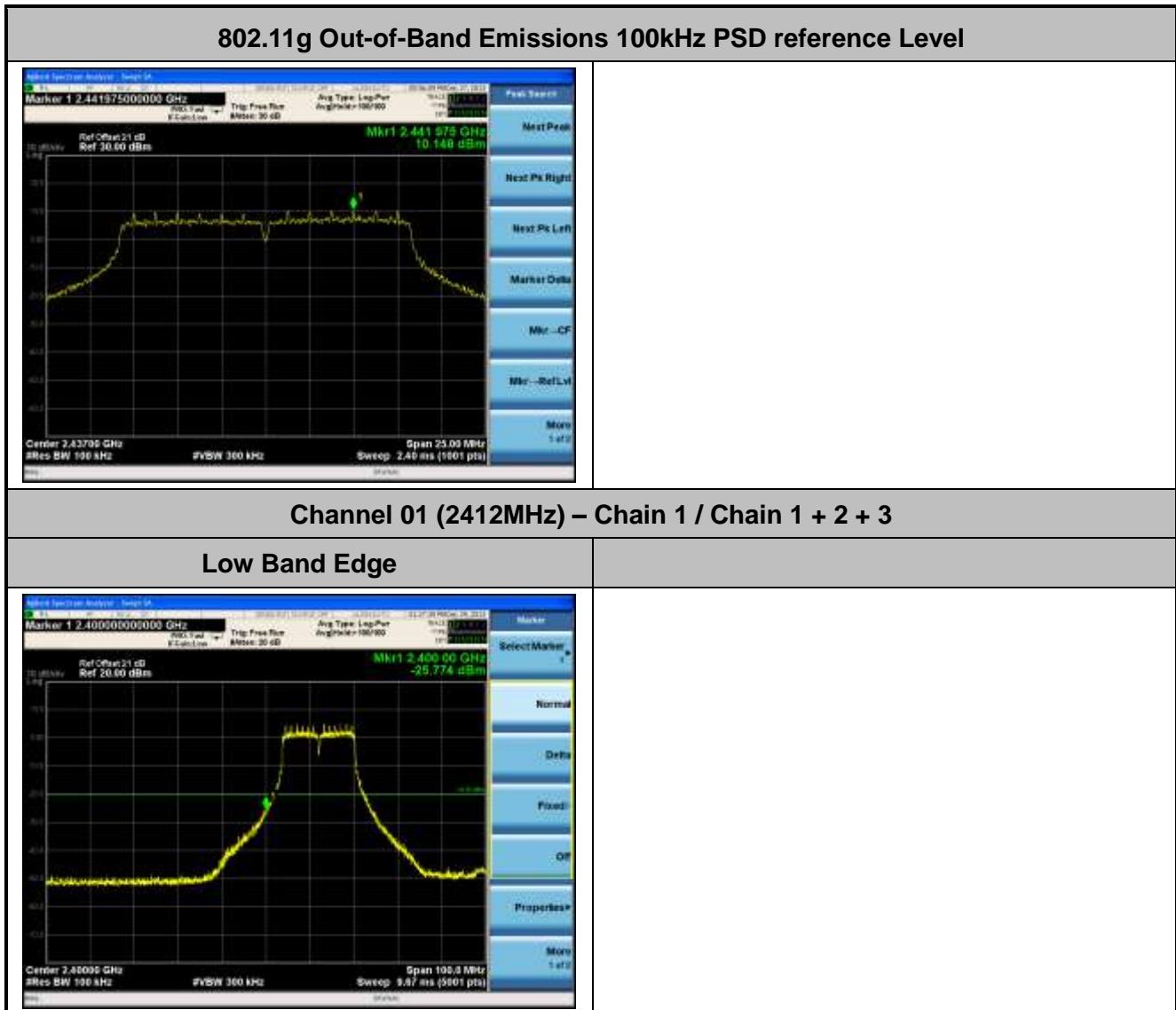


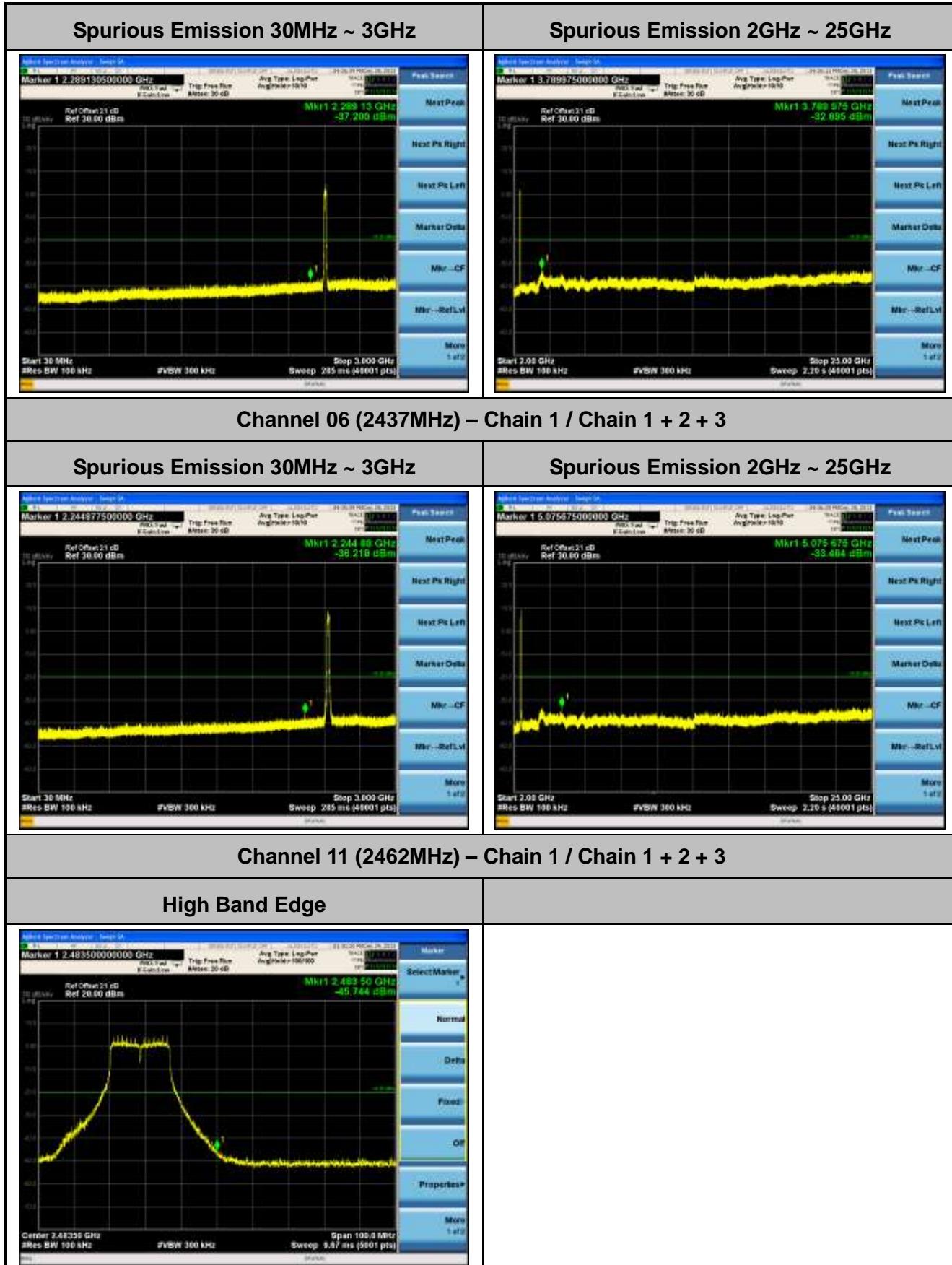
#### Spurious Emission 2GHz ~ 25GHz

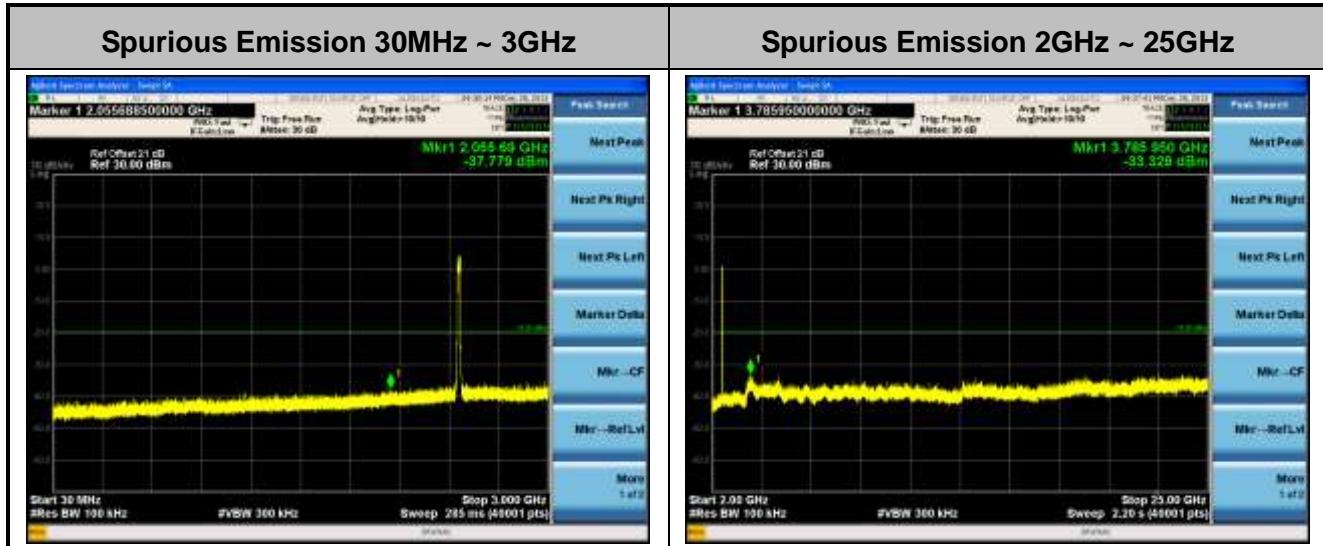




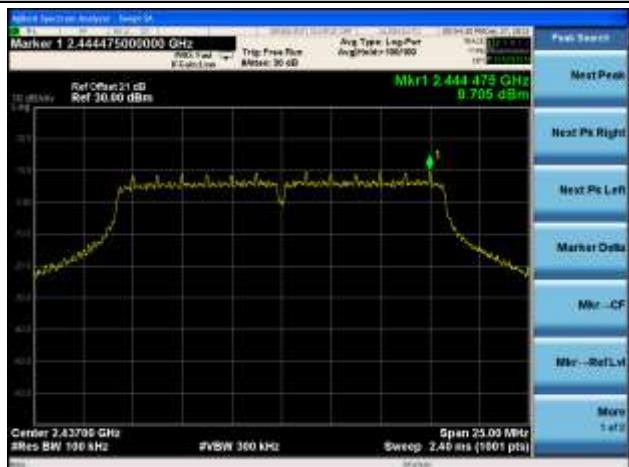
Test Mode	N <sub>Tx</sub>	Data Rate	Channel No.	Frequency (MHz)	Limit	Result
802.11g	3	6Mbps	01	2412	30dBc	Pass
802.11g	3	6Mbps	06	2437	30dBc	Pass
802.11g	3	6Mbps	11	2462	30dBc	Pass





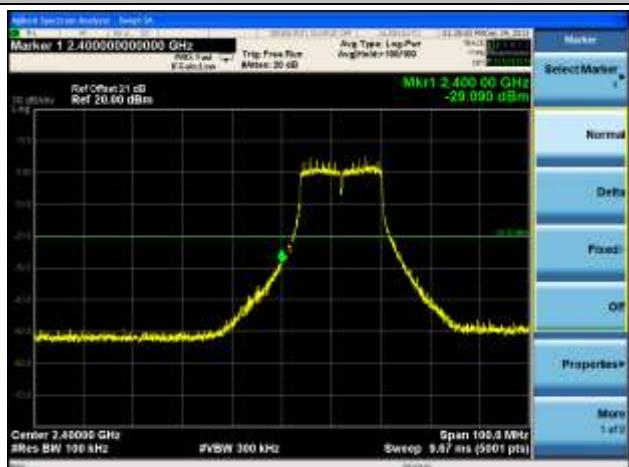


### 802.11g Out-of-Band Emissions 100kHz PSD reference Level

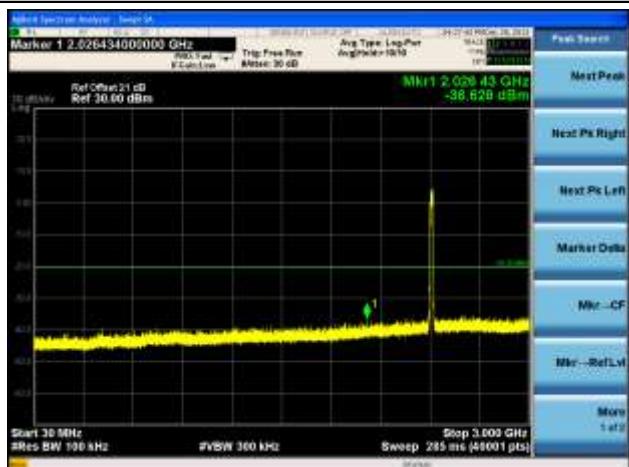


### Channel 01 (2412MHz) – Chain 2 / Chain 1 + 2 + 3

#### Low Band Edge

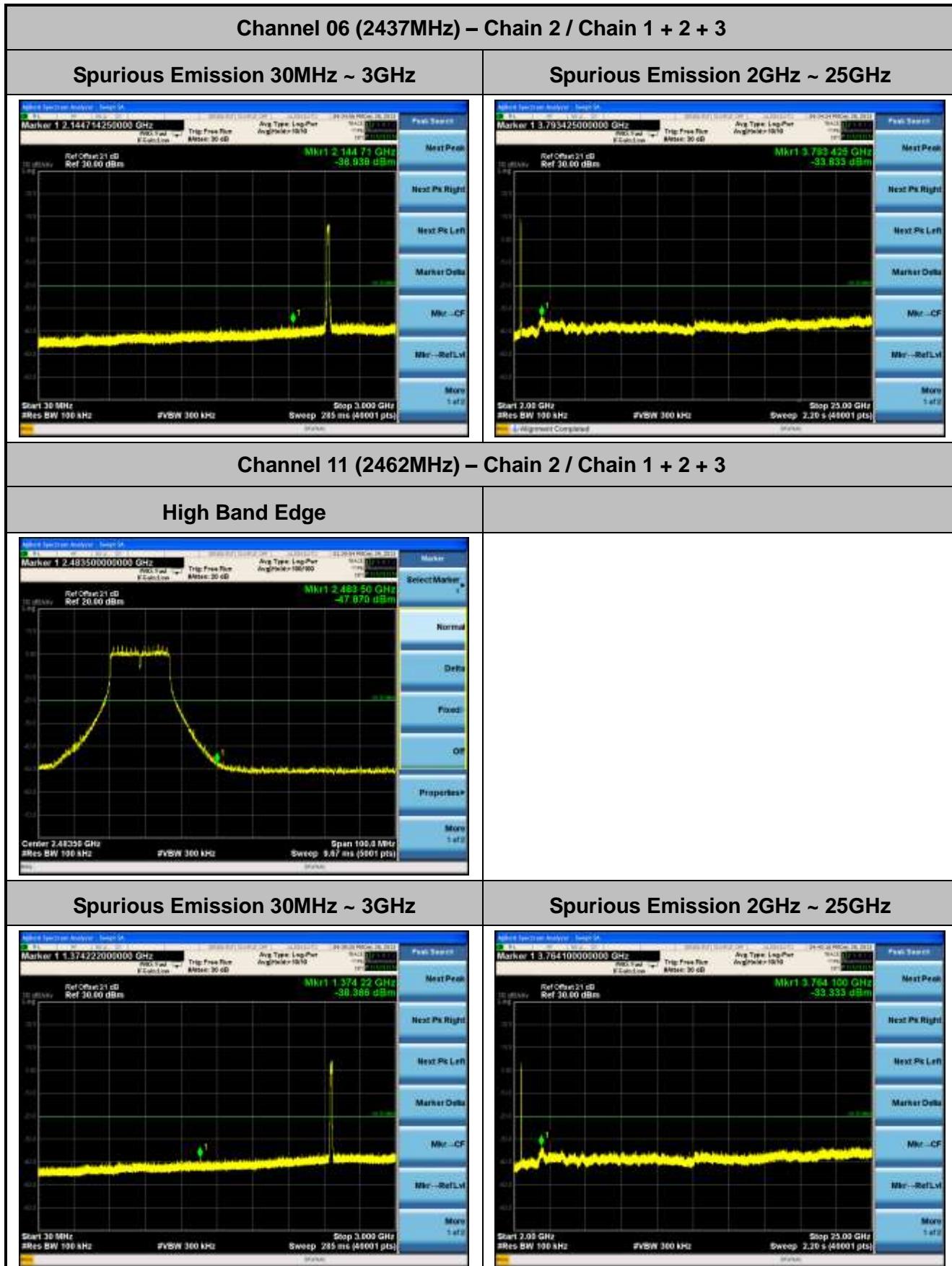


#### Spurious Emission 30MHz ~ 3GHz

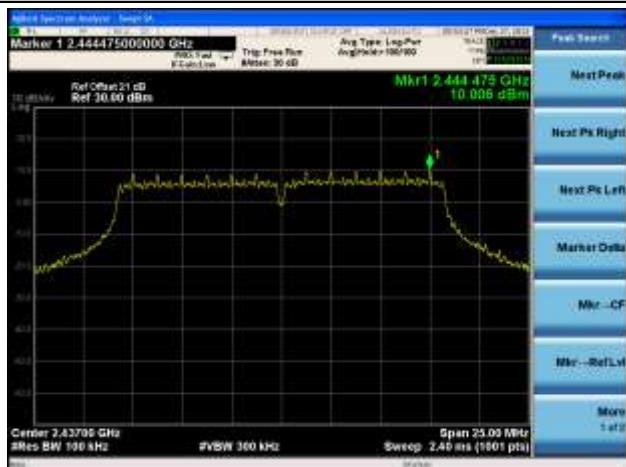


#### Spurious Emission 2GHz ~ 25GHz



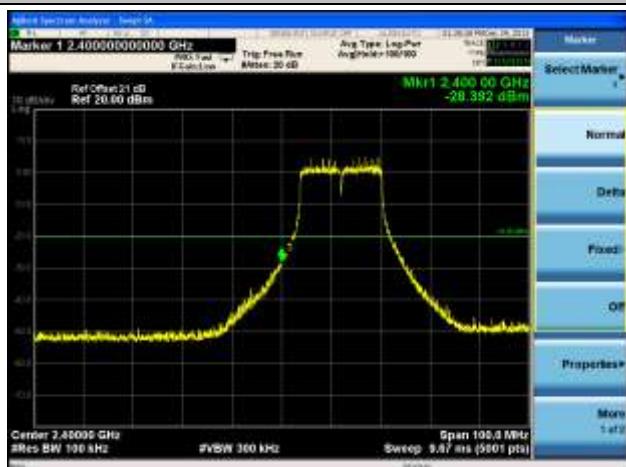


### 802.11g Out-of-Band Emissions 100kHz PSD reference Level

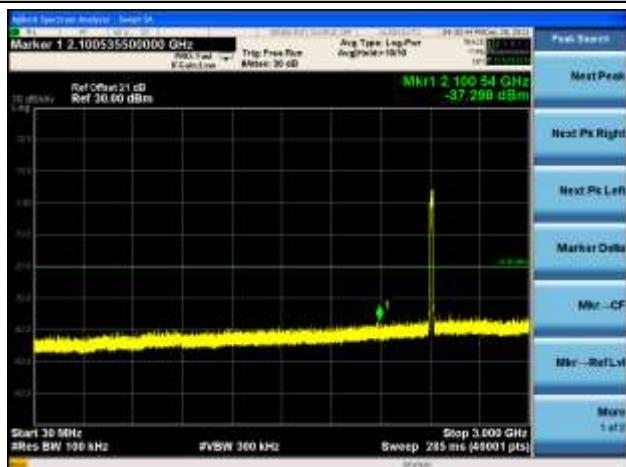


### Channel 01 (2412MHz) – Chain 3 / Chain 1 + 2 + 3

#### Low Band Edge

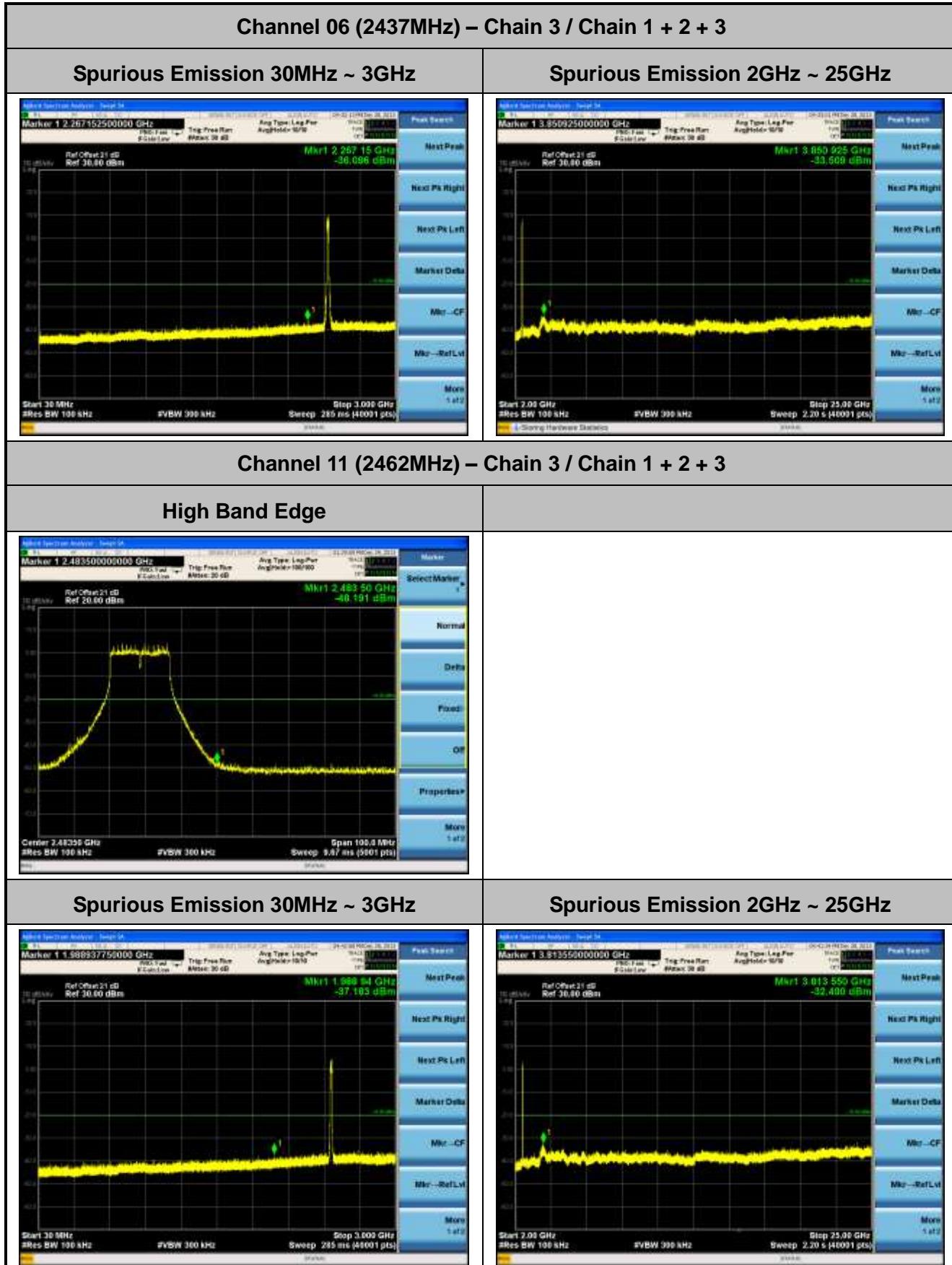


#### Spurious Emission 30MHz ~ 3GHz

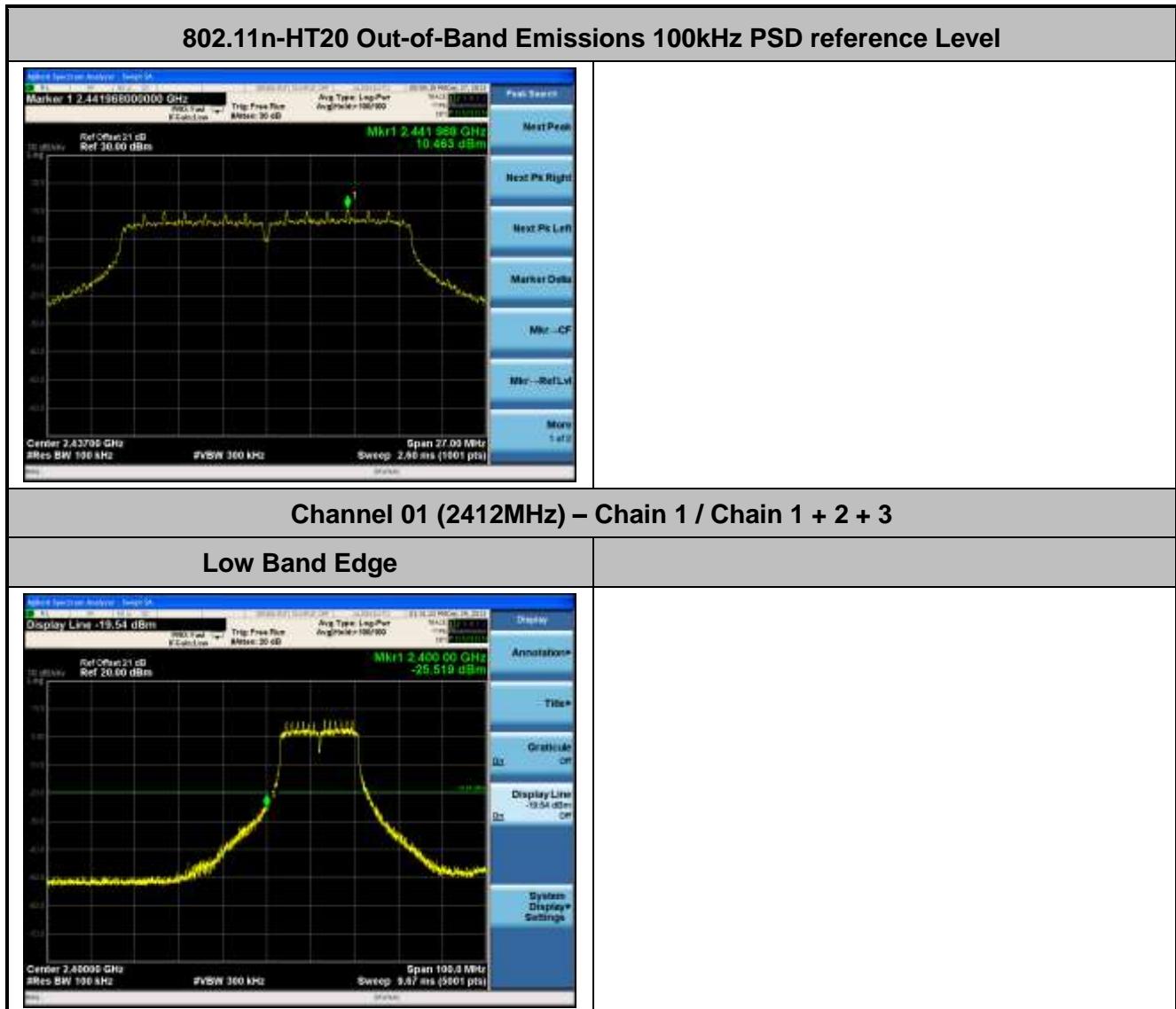


#### Spurious Emission 2GHz ~ 25GHz

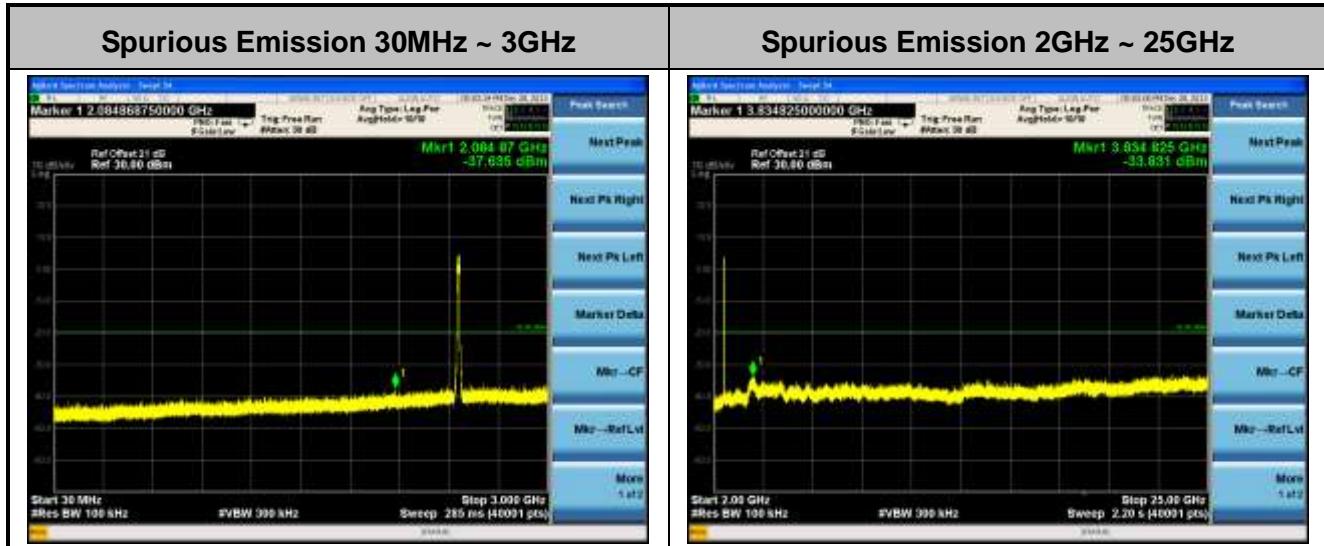




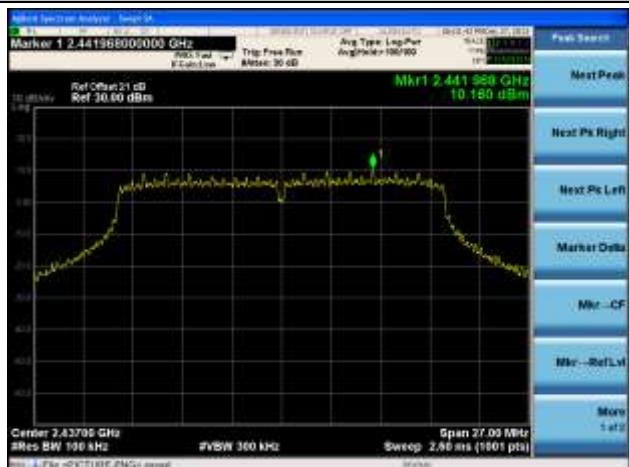
Test Mode	N <sub>Tx</sub>	Data Rate	Channel No.	Frequency (MHz)	Limit	Result
802.11n-HT20	3	19.5/21.7Mbps	01	2412	30dBc	Pass
802.11n-HT20	3	19.5/21.7Mbps	06	2437	30dBc	Pass
802.11n-HT20	3	19.5/21.7Mbps	11	2462	30dBc	Pass



Spurious Emission 30MHz ~ 3GHz	Spurious Emission 2GHz ~ 25GHz
<p>Marker 1 2.150134500000 GHz Ref Offset 21 dB Ref 30.00 dBm Mkr1 2.150 13 GHz -37.186 dBm</p> <p>Start 30 MHz #Res BW 100 kHz #vSW 360 kHz Sweep 285 ms (48001 pts)</p>	<p>Marker 1 3.786100000000 GHz Ref Offset 21 dB Ref 30.00 dBm Mkr1 3.786 400 GHz -33.563 dBm</p> <p>Start 2.00 GHz #Res BW 100 kHz #vSW 360 kHz Sweep 2.20 s (48001 pts)</p>
<b>Channel 06 (2437MHz) – Chain 1 / Chain 1 + 2 + 3</b>	
Spurious Emission 30MHz ~ 3GHz	Spurious Emission 2GHz ~ 25GHz
<p>Marker 1 2.037348750000 GHz Ref Offset 21 dB Ref 30.00 dBm Mkr1 2.037 35 GHz -30.094 dBm</p> <p>Start 30 MHz #Res BW 100 kHz #vSW 360 kHz Sweep 285 ms (48001 pts)</p>	<p>Marker 1 3.787875000000 GHz Ref Offset 21 dB Ref 30.00 dBm Mkr1 3.787 675 GHz -33.304 dBm</p> <p>Start 2.00 GHz #Res BW 100 kHz #vSW 360 kHz Sweep 2.20 s (48001 pts)</p>
<b>Channel 11 (2462MHz) – Chain 1 / Chain 1 + 2 + 3</b>	
High Band Edge	
<p>Marker 1 2.483500000000 GHz Ref Offset 21 dB Ref 20.00 dBm Mkr1 2.483 50 GHz -44.123 dBm</p> <p>Center 2.48350 GHz #Res BW 100 kHz #vSW 360 kHz Sweep 9.87 ms (5801 pts)</p>	

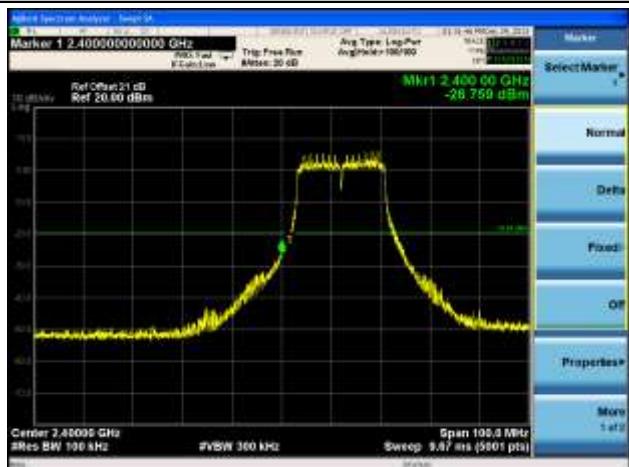


### 802.11n-HT20 Out-of-Band Emissions 100kHz PSD reference Level



### Channel 01 (2412MHz) – Chain 2 / Chain 1 + 2 + 3

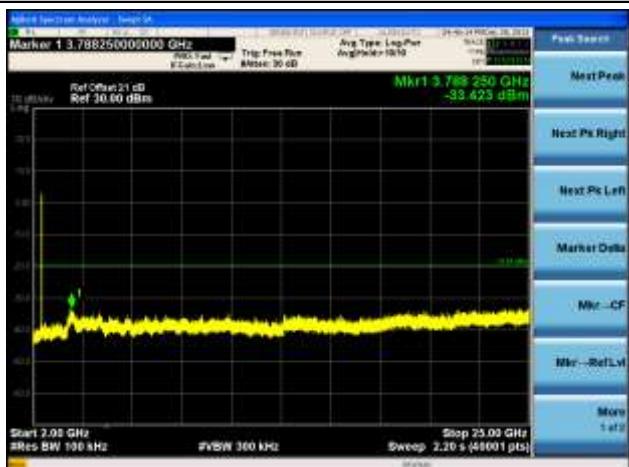
#### Low Band Edge

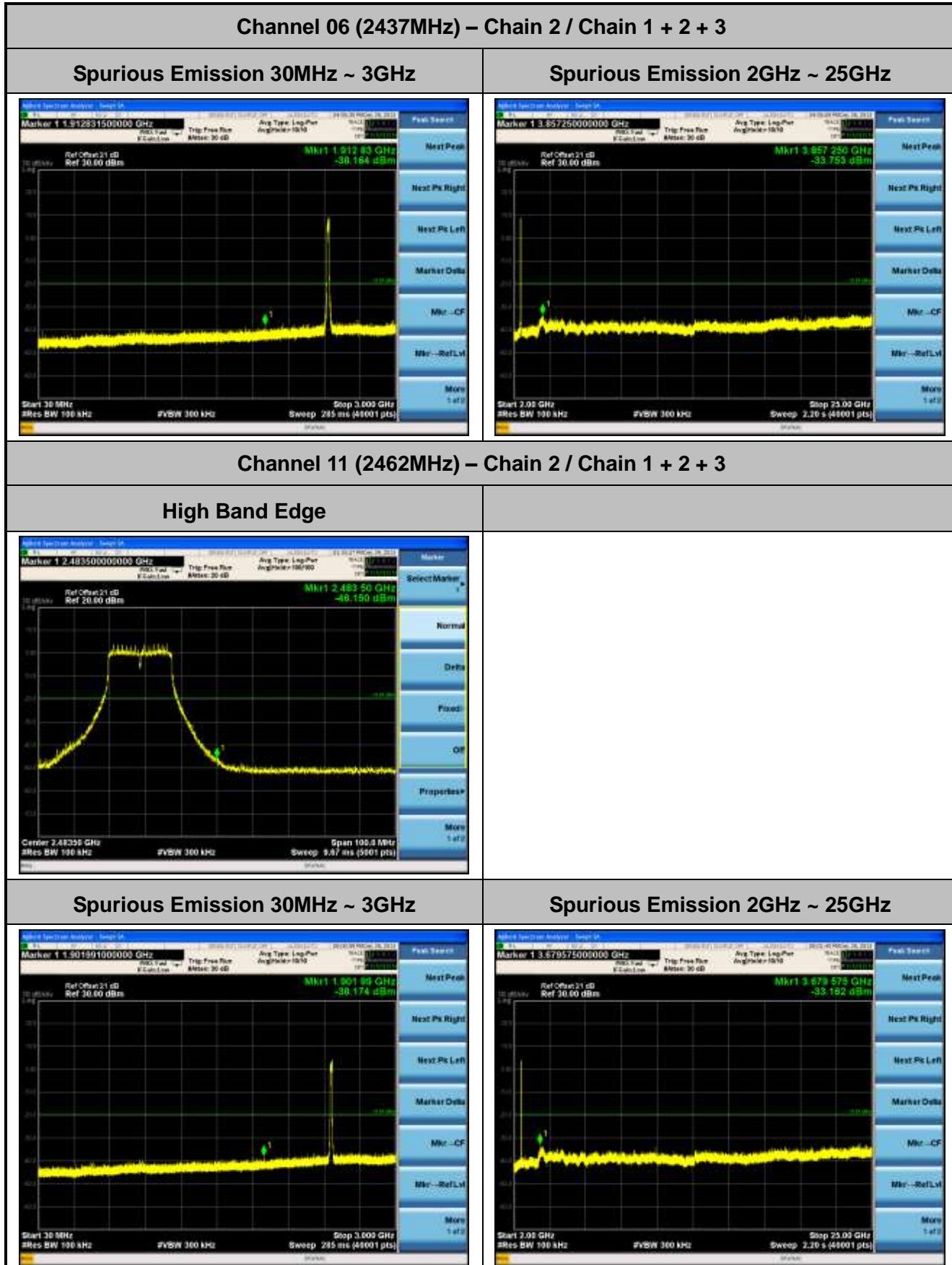


#### Spurious Emission 30MHz ~ 3GHz

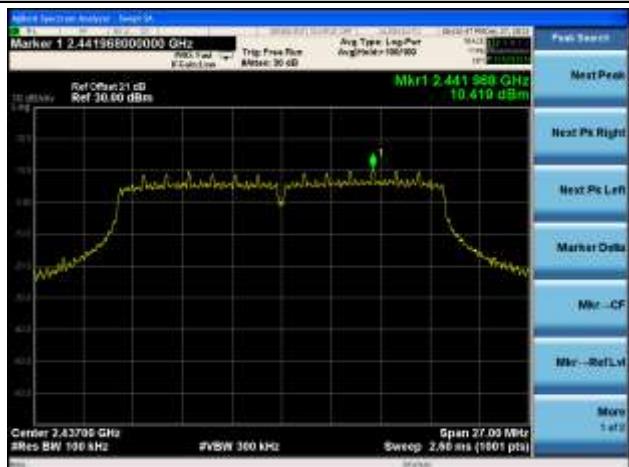


#### Spurious Emission 2GHz ~ 25GHz



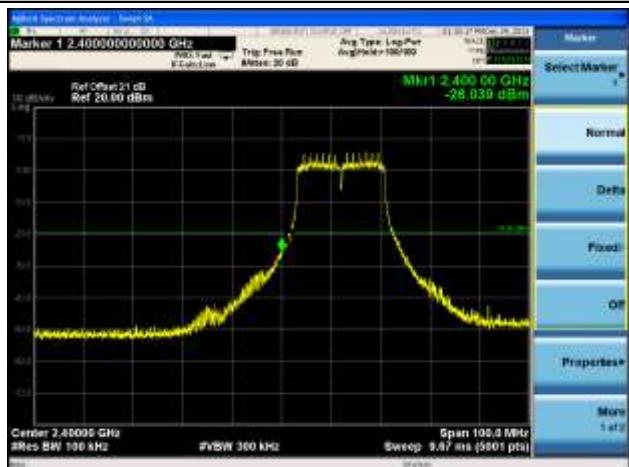


802.11n-HT20 Out-of-Band Emissions 100kHz PSD reference Level



Channel 01 (2412MHz) – Chain 3 / Chain 1 + 2 + 3

## Low Band Edge

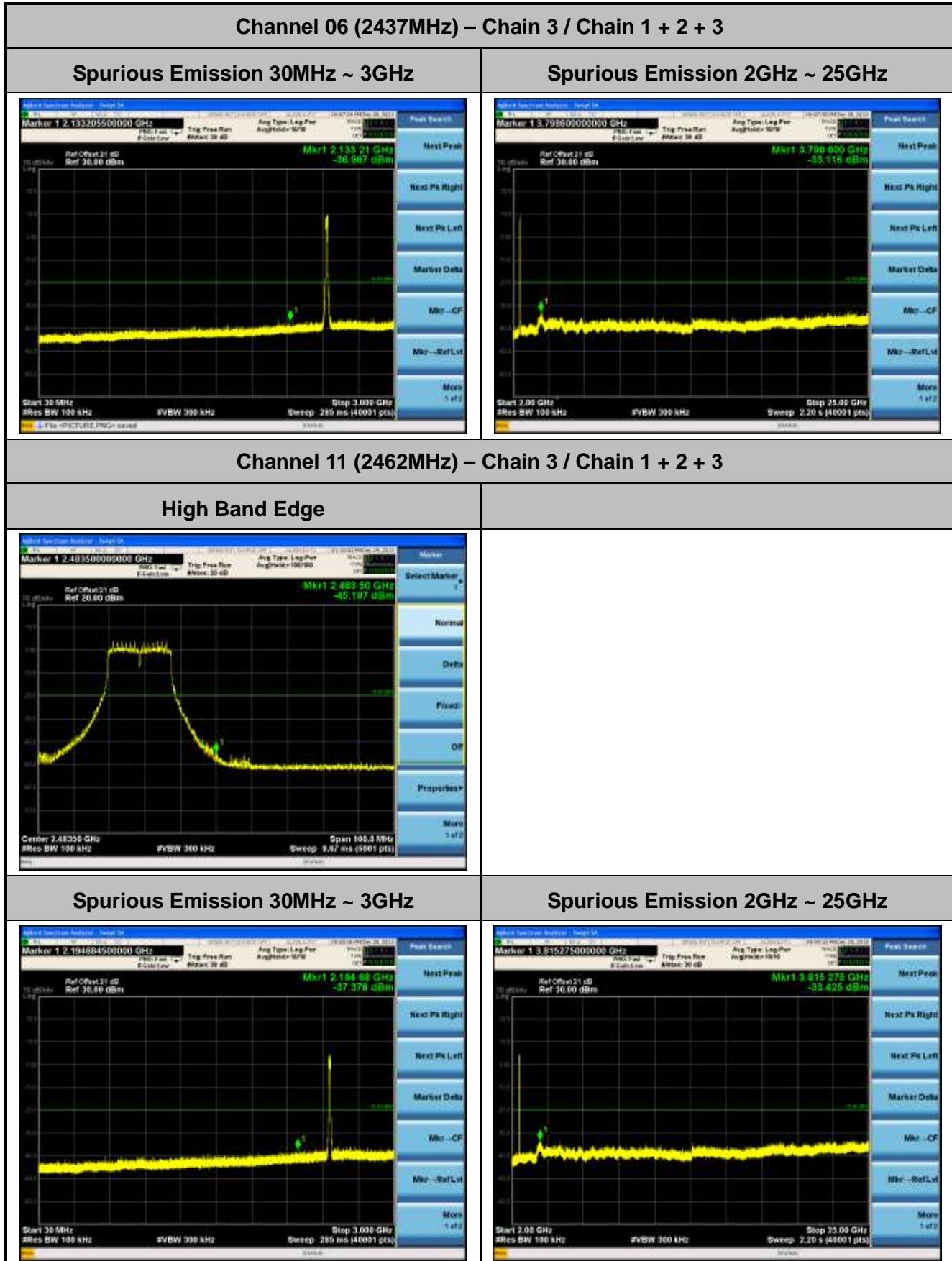


## **Spurious Emission 30MHz ~ 3GHz**



## **Spurious Emission 2GHz ~ 25GHz**

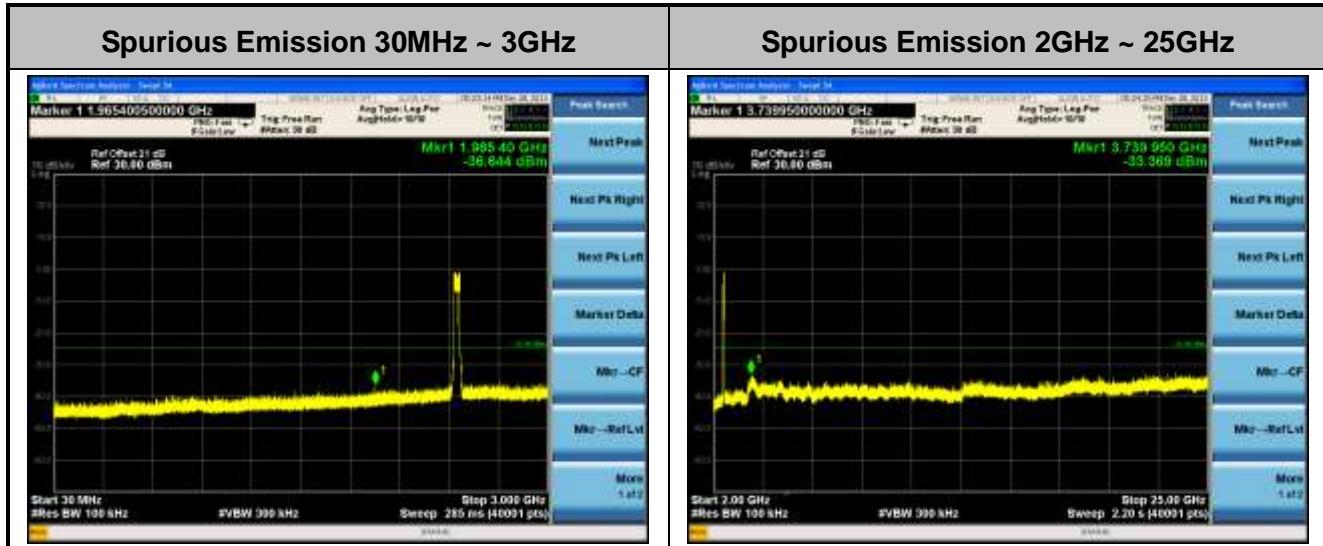




Test Mode	N <sub>Tx</sub>	Data Rate	Channel No.	Frequency (MHz)	Limit	Result
802.11n-HT40	3	40.5/45Mbps	03	2422	30dBc	Pass
802.11n-HT40	3	40.5/45Mbps	06	2437	30dBc	Pass
802.11n-HT40	3	40.5/45Mbps	09	2452	30dBc	Pass



Spurious Emission 30MHz ~ 3GHz	Spurious Emission 2GHz ~ 25GHz
<p>Marker 1 2.308212750000 GHz Trip: Free Run Avg Type: Log/Per Avg/Holder: 10/10 Ref Offset: 21 dB Ref 30.00 dBm Mkr1 2.308 21 GHz -36.074 dBm</p> <p>Start 30 MHz #Res BW 100 kHz #vSW 360 kHz Sweep 285 ms (48001 pts)</p>	<p>Marker 1 3.821025000000 GHz Trip: Free Run Avg Type: Log/Per Avg/Holder: 10/10 Ref Offset: 21 dB Ref 30.00 dBm Mkr1 3.821 025 GHz -33.565 dBm</p> <p>Start 2.00 GHz #Res BW 100 kHz #vSW 360 kHz Sweep 2.20 s (48001 pts)</p>
<b>Channel 06 (2437MHz) – Chain 1 / Chain 1 + 2 + 3</b>	
Spurious Emission 30MHz ~ 3GHz	Spurious Emission 2GHz ~ 25GHz
<p>Marker 1 2.090511750000 GHz Trip: Free Run Avg Type: Log/Per Avg/Holder: 10/10 Ref Offset: 21 dB Ref 30.00 dBm Mkr1 2.090 51 GHz -37.460 dBm</p> <p>Start 30 MHz #Res BW 100 kHz #vSW 360 kHz Sweep 285 ms (48001 pts)</p>	<p>Marker 1 3.822175000000 GHz Trip: Free Run Avg Type: Log/Per Avg/Holder: 10/10 Ref Offset: 21 dB Ref 30.00 dBm Mkr1 3.822 175 GHz -33.191 dBm</p> <p>Start 2.00 GHz #Res BW 100 kHz #vSW 360 kHz Sweep 2.20 s (48001 pts)</p>
<b>Channel 09 (2452MHz) – Chain 1 / Chain 1 + 2 + 3</b>	
High Band Edge	
<p>Marker 1 2.483500000000 GHz Trip: Free Run Avg Type: Log/Per Avg/Holder: 100/100 Ref Offset: 21 dB Ref 20.00 dBm Mkr1 2.483 5 GHz -39.809 dBm</p> <p>Center 2.48350 GHz #Res BW 100 kHz #vSW 360 kHz Sweep 9.80 ms (1801 pts)</p>	

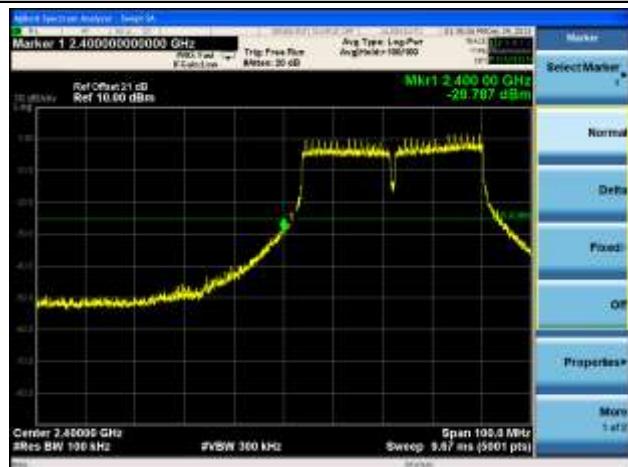


### 802.11n-HT40 Out-of-Band Emissions 100kHz PSD reference Level

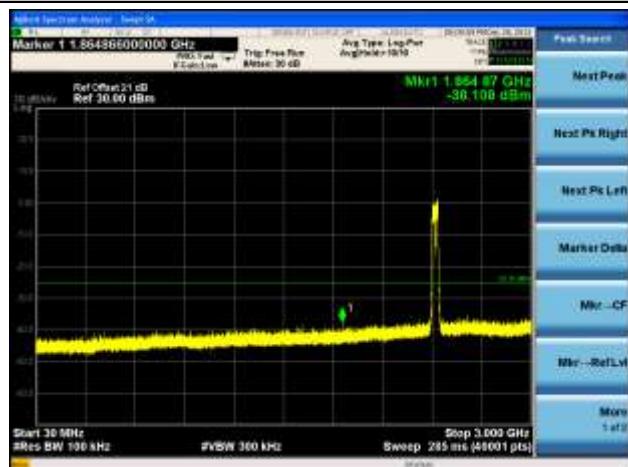


### Channel 03 (2422MHz) – Chain 2 / Chain 1 + 2 + 3

#### Low Band Edge

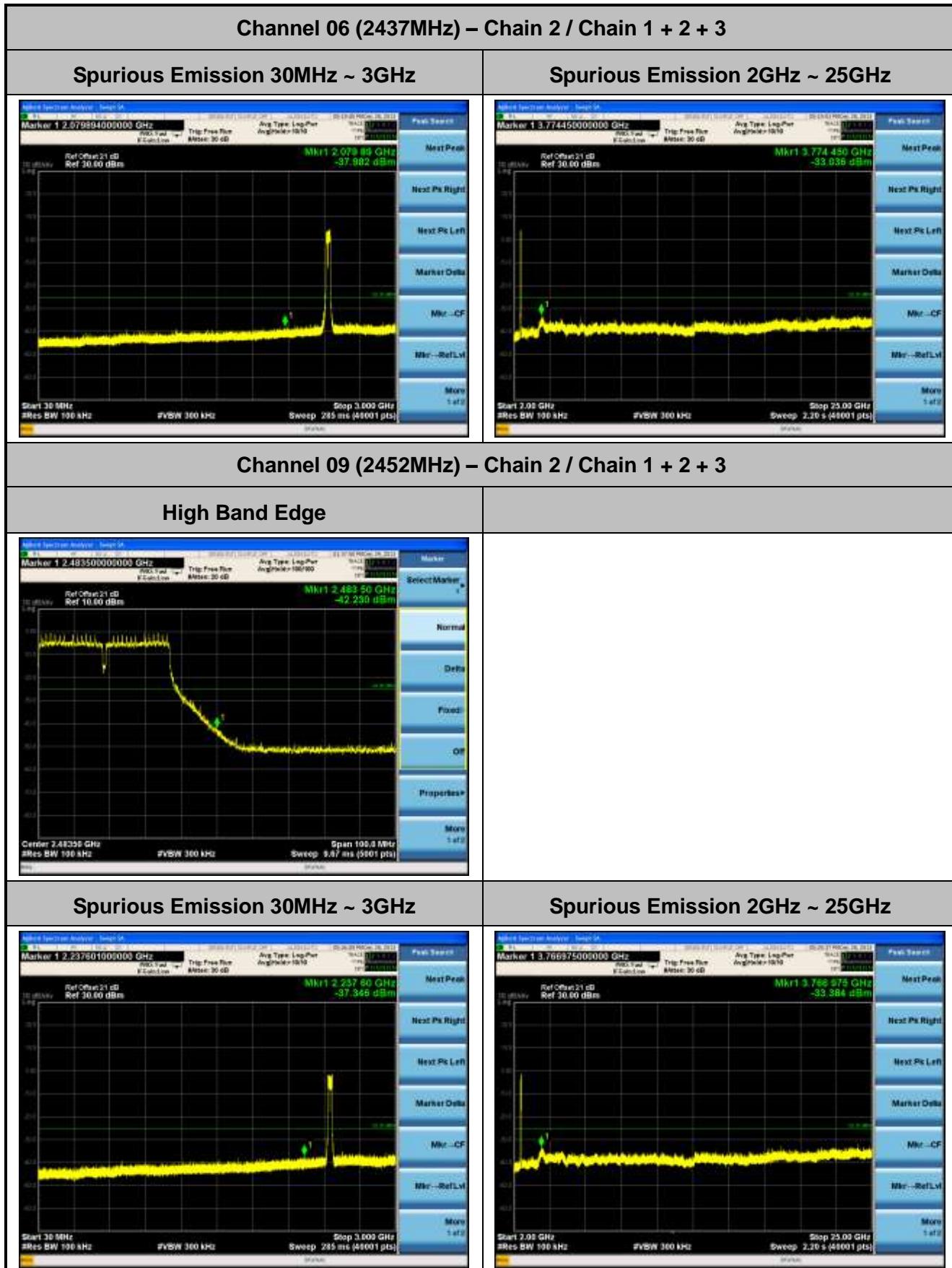


#### Spurious Emission 30MHz ~ 3GHz



#### Spurious Emission 2GHz ~ 25GHz





### 802.11n-HT40 Out-of-Band Emissions 100kHz PSD reference Level

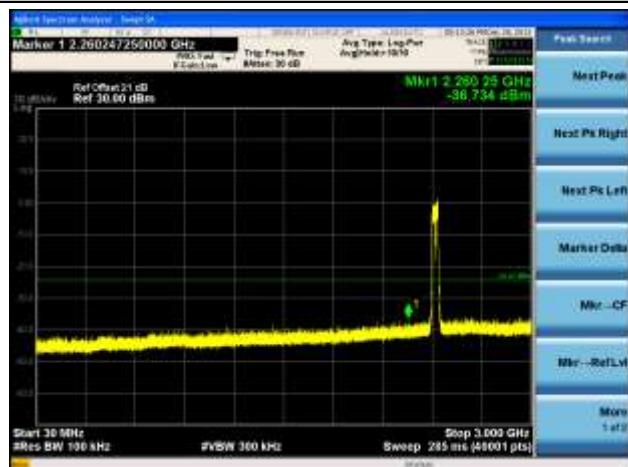


### Channel 03 (2422MHz) – Chain 3 / Chain 1 + 2 + 3

#### Low Band Edge

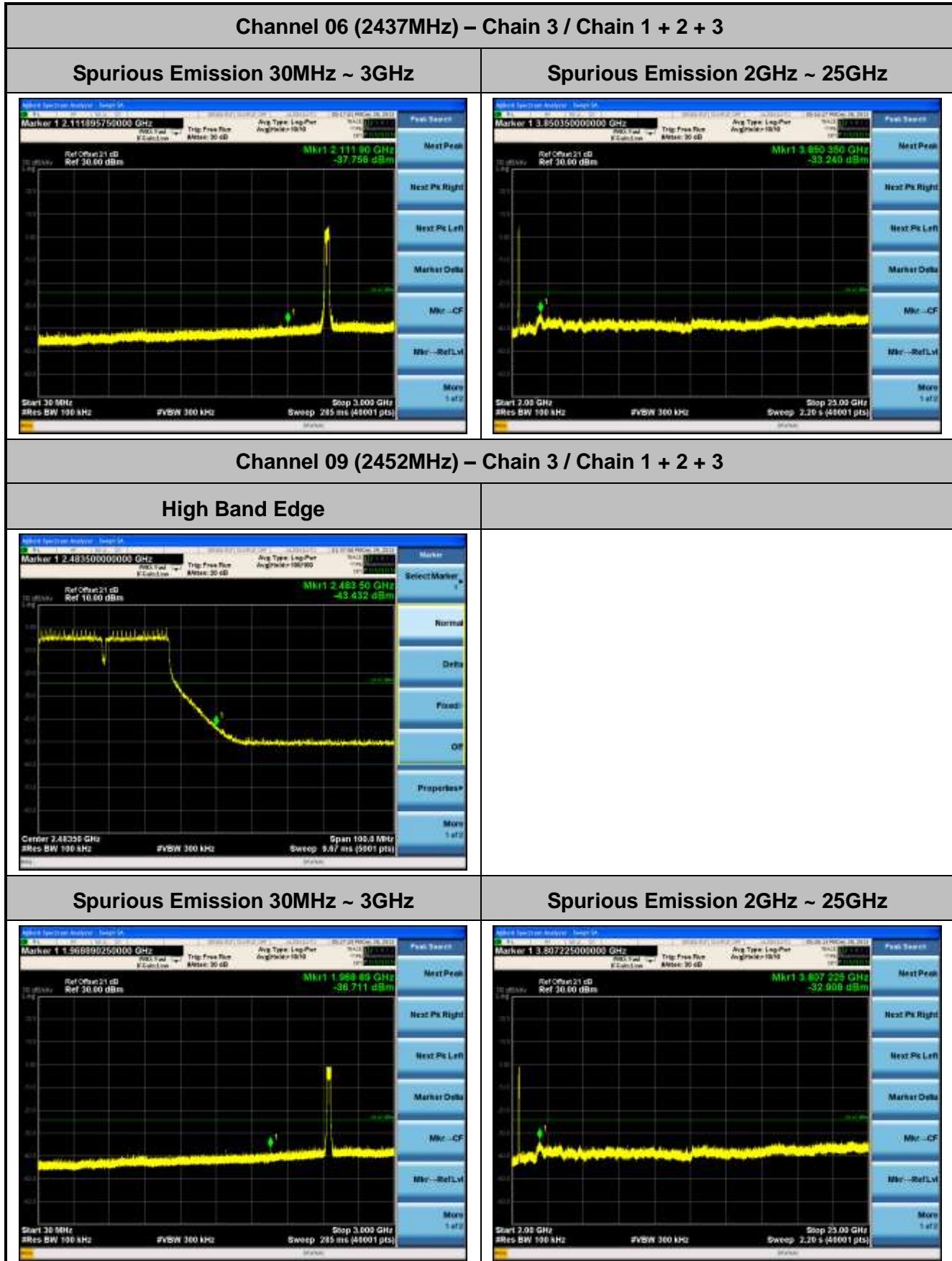


#### Spurious Emission 30MHz ~ 3GHz

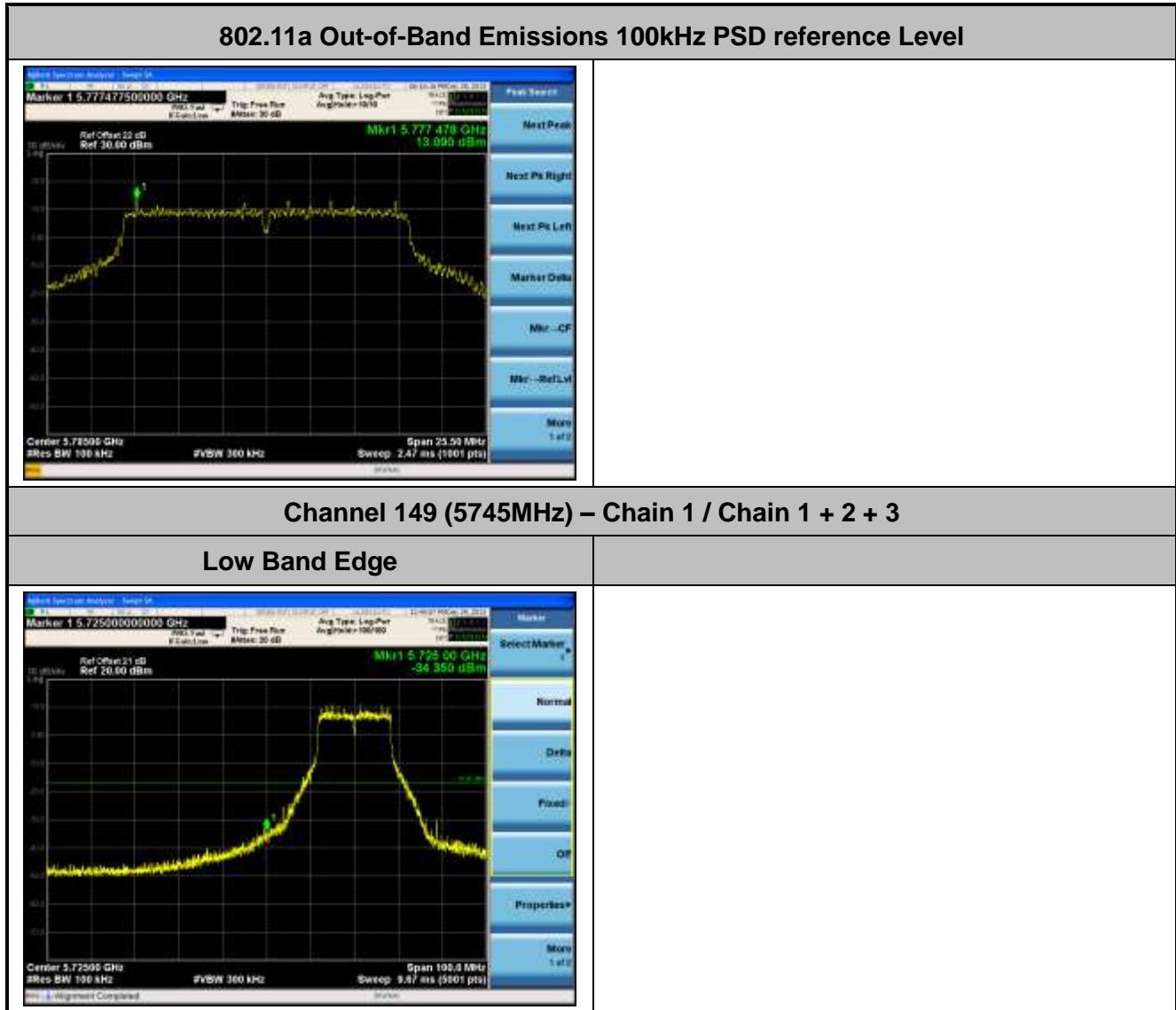


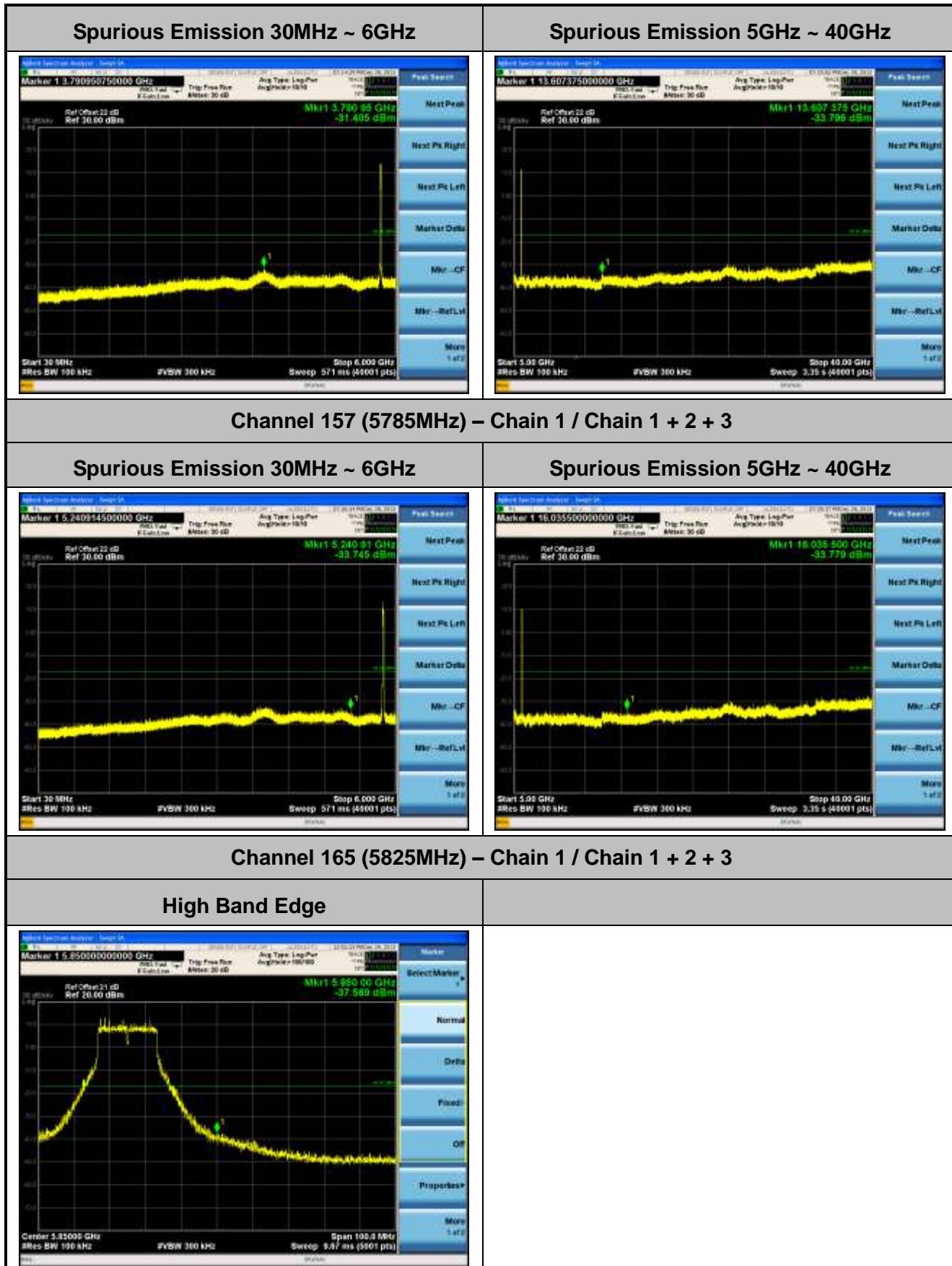
#### Spurious Emission 2GHz ~ 25GHz

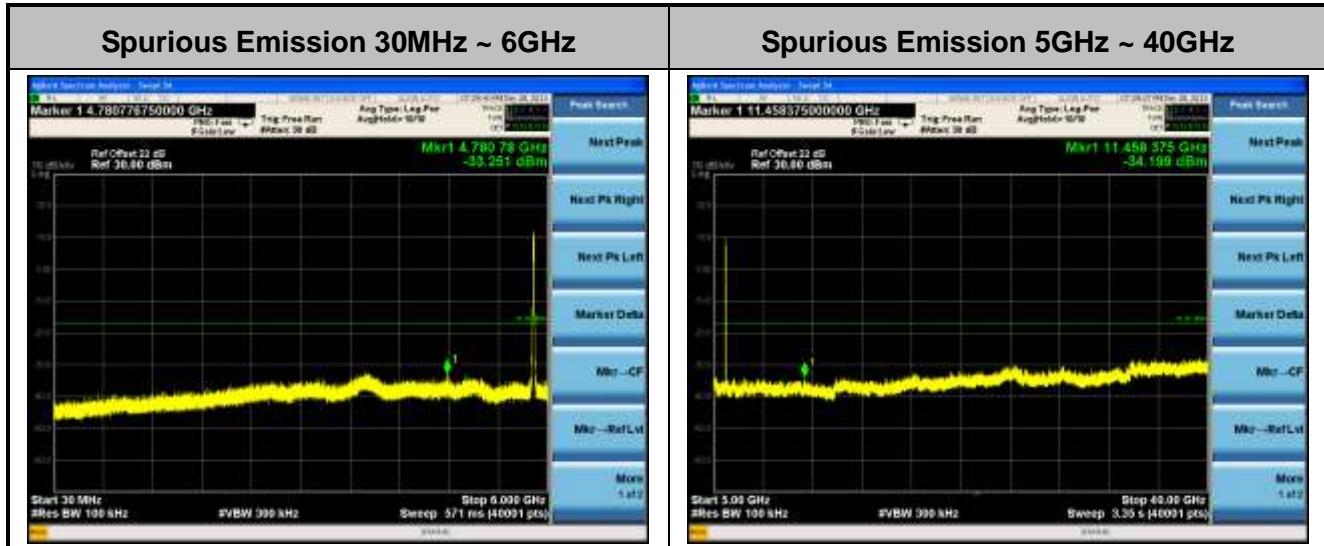




Test Mode	N <sub>Tx</sub>	Data Rate	Channel No.	Frequency (MHz)	Limit	Result
802.11a	3	6Mbps	149	5745	30dBc	Pass
802.11a	3	6Mbps	157	5785	30dBc	Pass
802.11a	3	6Mbps	165	5825	30dBc	Pass





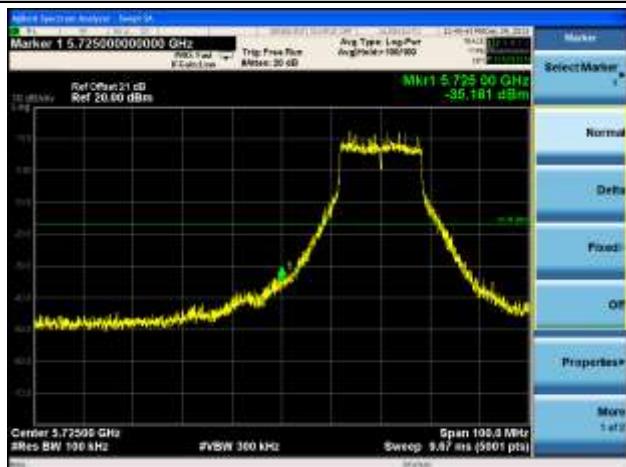


### 802.11a Out-of-Band Emissions 100kHz PSD reference Level



### Channel 149 (5745MHz) – Chain 2 / Chain 1 + 2 + 3

#### Low Band Edge

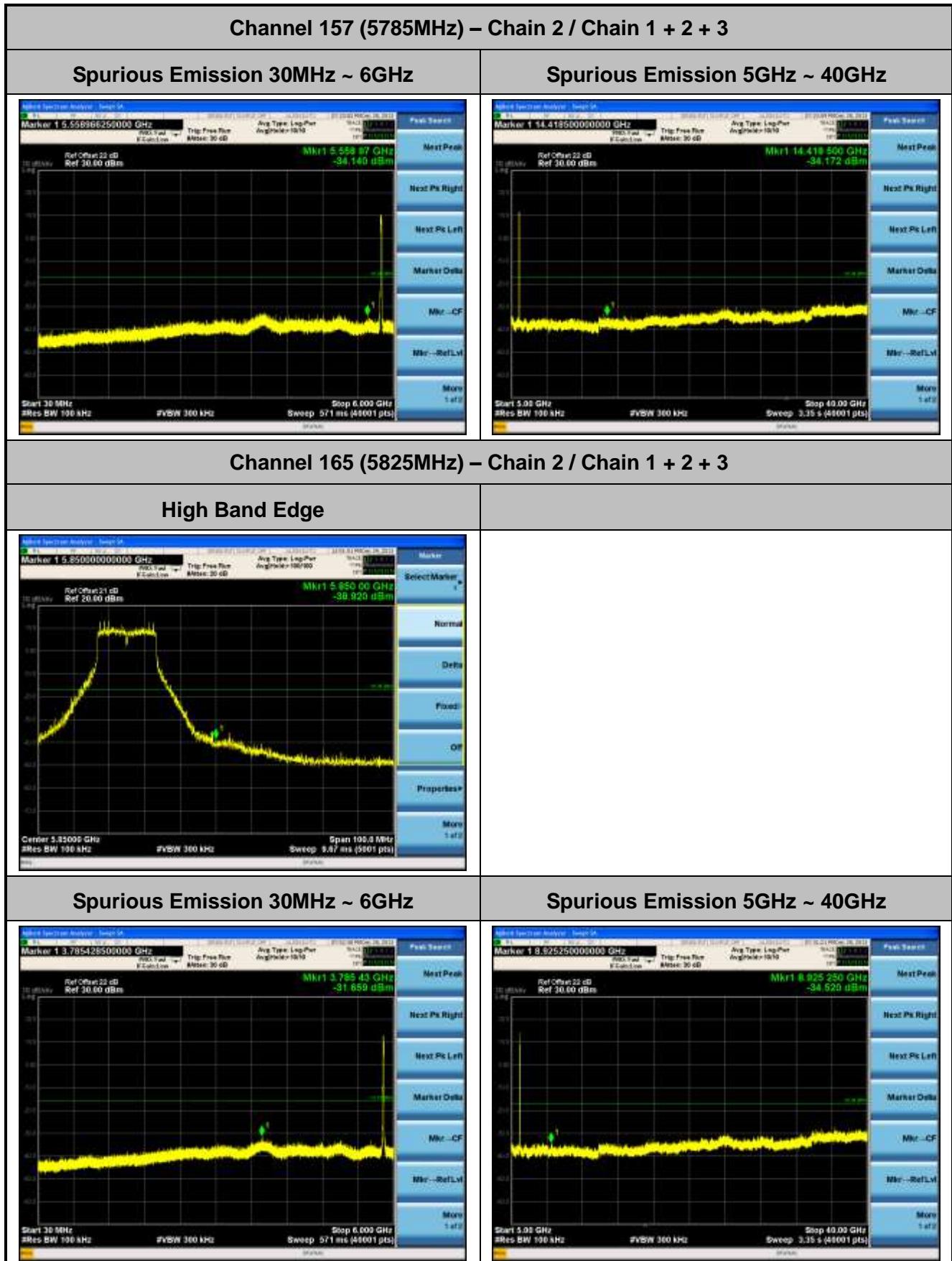


#### Spurious Emission 30MHz ~ 6GHz



#### Spurious Emission 5GHz ~ 40GHz



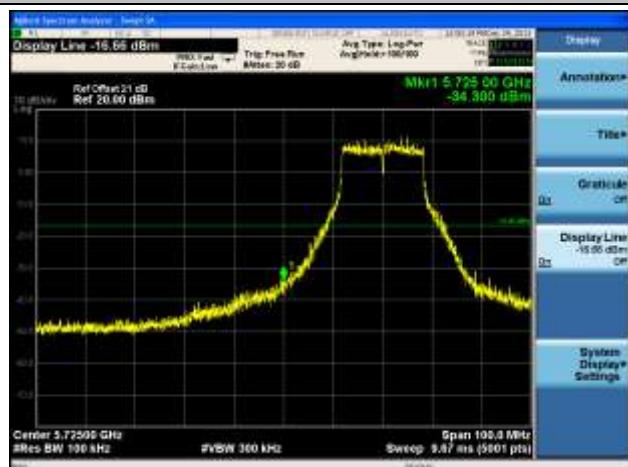


### 802.11a Out-of-Band Emissions 100kHz PSD reference Level

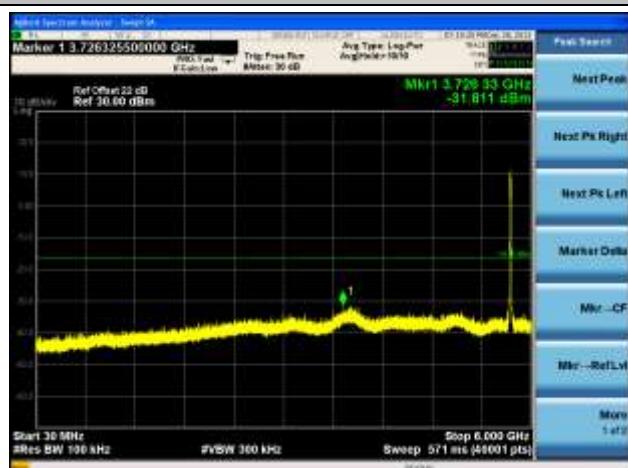


### Channel 149 (5745MHz) – Chain 3 / Chain 1 + 2 + 3

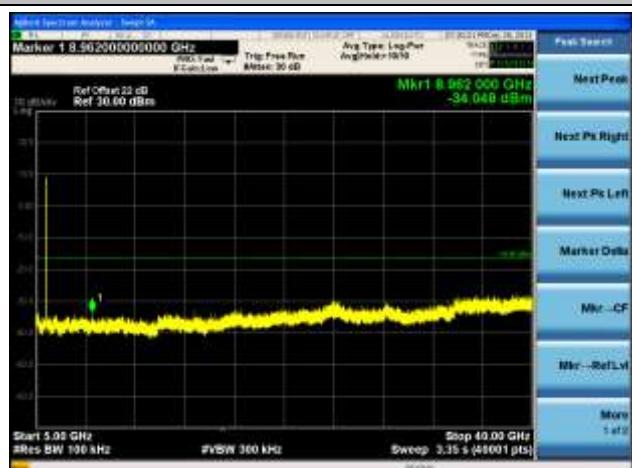
#### Low Band Edge

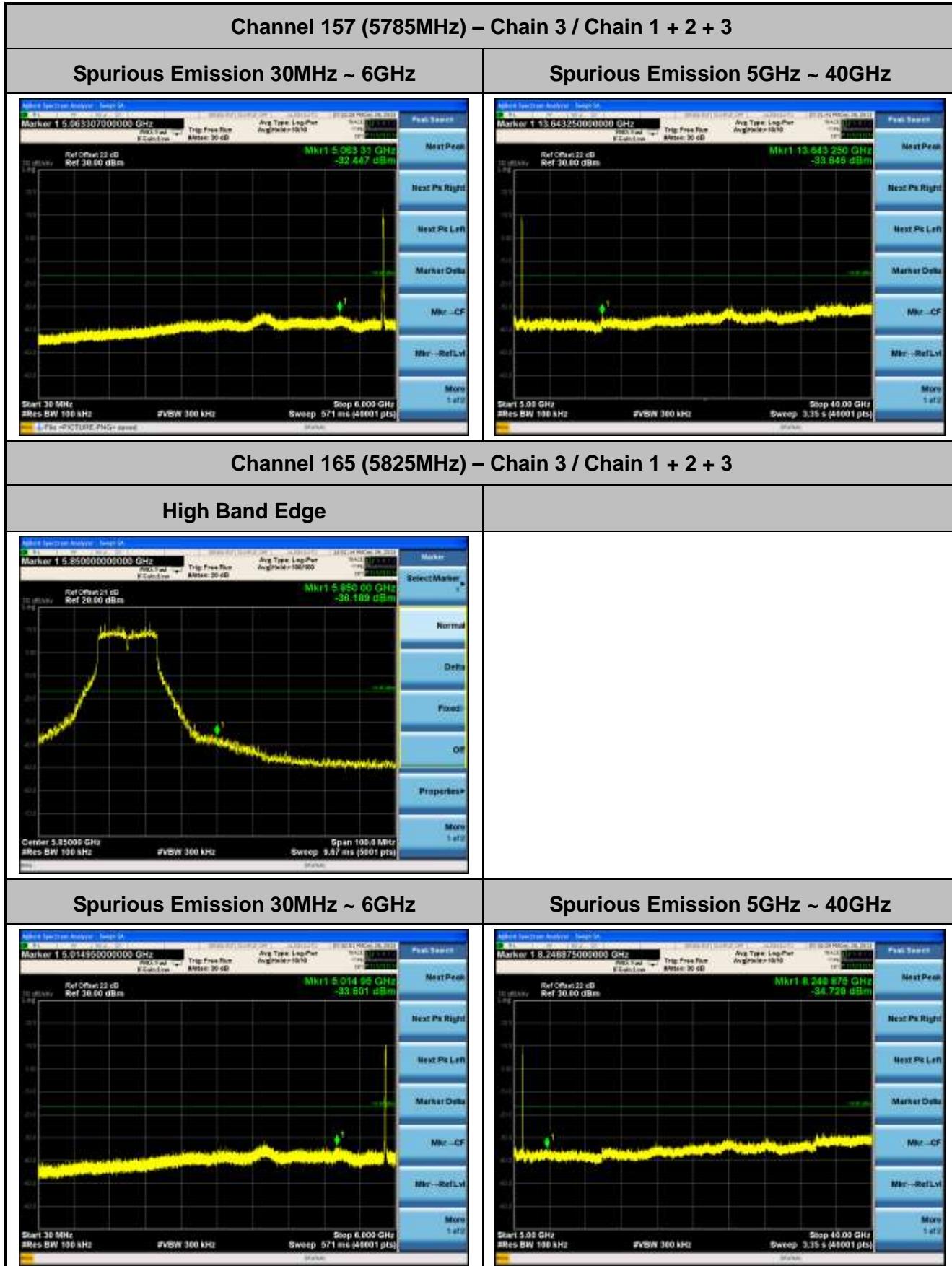


#### Spurious Emission 30MHz ~ 6GHz



#### Spurious Emission 5GHz ~ 40GHz





Test Mode	N <sub>Tx</sub>	Data Rate	Channel No.	Frequency (MHz)	Limit	Result
802.11n-HT20	3	19.5/21.7Mbps	149	5745	30dBc	Pass
802.11n-HT20	3	19.5/21.7Mbps	157	5785	30dBc	Pass
802.11n-HT20	3	19.5/21.7Mbps	165	5825	30dBc	Pass

